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ENGLISH FOR IT STUDENTS

Учебное пособие для студентов

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Учебное пособие предназначено для студентов 2-го курса всех форм обучения факультета экономики и прикладной информатики направления подготовки «Прикладная информатика».

Составлено в соответствии с рабочей программой по дисциплине «Иностранный язык» по направлению «Прикладная информатика» для студентов неязыковых направлений подготовки.

Цель пособия – сформировать навыки перевода технической литературы по информационным технологиям, развить навыки устной речи и ведения беседы по компьютерной тематике.

СОДЕРЖАНИЕ

Введение

Данное пособие предназначено для студентов 2-го курса направления подготовки «Прикладная информатика». Главной целью обучения иностранным языкам – формирование иноязычной коммуникативной компетенции будущего специалиста, позволяющей использовать английский язык как средство профессионального и межличностного общения. Актуальность пособия определяется его направленностью на реализацию задач будущей профессиональной деятельности.

Целью пособия является обогащение словарного запаса студентов по предлагаемой тематике, развитие лексических навыков в области специальной терминологии, совершенствование навыков письменной и устной монологической/диалогической речи, развитие умений понимать содержание прочитанного, формирование навыков перевода и реферирования текстов, имеющих профессиональную значимость для ИТ специалистов.

Пособие состоит из восьми основных частей (units) и приложений (appendixes), охватывающих основные направления данной специальности. Характер текстового материала и его расположение не обязывает строгому следованию предложенному порядку. В пособие представлены актуальные профильно-ориентированные тексты, обладающие информационной и познавательной ценностью. Текстовый материал сопровождаются комплексом лексических упражнений на отработку и закрепление активной лексики, а также коммуникативные упражнения. Новая лексика закрепляется в разнообразных упражнениях: дать английские и русские эквиваленты, согласиться или не согласиться с утверждением, ответить на вопросы по тексту, подобрать синонимы и антонимы к данным словам, сопоставить слово с определением, закончить предложение, перевести предложение с русского языка на английский. Задачей коммуникативных упражнений является развитие навыков говорения и умения вести беседу на английском языке на профессиональные темы. В задачу преподавателя входит стимулирование высказываний студентов путем создания соответствующих ситуаций, организаций дискуссий и обсуждений на основе содержания текстов и ключевых понятий.

Unit 1. History of computers

Reading

Before you read

- **What do you know about computers?**
- **What are the reasons for using computers?**

Text A. History of computers

Let us take a look at the history of computers that we know today. The very first calculating device used was the ten fingers of a man's hands. This, in fact, is why today we still count in tens and multiples of tens. Then the abacus was invented, a bead frame in which beads are moved from left to right. People went on using abacus till the 16th century and they sometimes use it now because it can be understood without knowing how to read.

During the 17th and 18th centuries many people tried to find easy ways of calculating. J. Napier, a Scotsman, devised a mechanical way of multiplying and dividing, which is how the modern slide rule works. Henry Briggs used Napier's ideas to produce logarithm tables which all mathematicians use today. Calculus, another branch of mathematics, was independently invented by both Sir Isaac Newton, an Englishman, and Leibniz, a German mathematician.

The first real calculating machine appeared in 1820 as the result of several people's experiments. This type of machine, which saves a great deal of time and reduces the possibility of making mistakes, depends on a series of ten-toothed gear wheels. In 1830 Charles Babbage, an Englishman, designed a machine that was called "The Analytical Engine". This machine, which Babbage showed at the Paris Exhibition in 1855, was an attempt to cut out the human being altogether, except for providing the machine with the necessary facts about the problem to be solved. He never finished his work, but many of his ideas were the basis for building today's computers.

In 1930, the first analog computer was built by an American named Vannevar Bush. This device was used in World War II to help aim guns. Mark I, the name given to the first digital computer, was completed in 1944. The men responsible for this invention were Professor Howard Aiken and some people from IBM. This was the first machine that could figure out long lists

of mathematical problems, all at a very fast rate. In 1946 two engineers at the University of Pennsylvania, J. Eckert and J. Mauchly, built the first digital computer using parts called vacuum tubes. They named their invention ENIAC. Another important advancement in computers came in 1947, when John von Newman developed the idea of keeping instructions for the computer inside the computer's memory.

The first-generation computers, which used *vacuum tubes,* came out in 1950. Univac I is an example of these computers which could perform thousands of calculations per second. In 1960 **the second generation of computers** was developed and these could perform work ten times faster than their predecessors. The reason of this extra speed was the use of *transistors* instead of vacuum tubes. The second generation computers were smaller, faster and more dependable than first generation computers. **The third-generation computers** appeared on the market in 1965. These computers could do a million calculations a second, which is 1000 times as many as the first-generation computers. Unlike the second generation computers, these are controlled by *tiny integrated circuits* and are consequently smaller and more dependable.

In **the fourth-generation computers** integrated circuits have been greatly reduced in size. This is due to microminiaturization, which means that the circuits are much smaller than before; as many as 1000 tiny circuits now fit onto a single *chip.* A chip is a square or rectangular piece of silicon, usually from 1/10 to A inch, upon which several layers of an integrated circuit are etched or imprinted, after which the circuit is encapsulated in plastic, ceramic or metal. The fourth-generation computers are 50 times faster than third generation computers and can complete approximately 1,000,000 instructions per second.

At the rate computer technology is growing, today's computers might be obsolete tomorrow. It has been said that if transport technology had developed as rapidly as computer technology, a trip across the Atlantic Ocean today would take a few seconds.

Vocabulary

English	Russian

multiple	кратное число
abacus	счеты
bead	шарик, кости (на счетах)
to devise	придумывать, изобретать
to invent -	изобретать
slide-rule (sliding-rule)	счетная логарифмическая линейка
calculus	исчисление
to save a great deal of time	экономить много времени
to depend on	зависеть от
to figure out	вычислять, понимать
advancement	успех, прогресс, достижение
dependable	надежный
rectangular	прямоугольный
silicon	кремний, силикон, силоксан
to etch	травить, гравировать
to encapsulate	инкапсулировать
obsolete	устарелый
calculating device	счетное устройство
to multiply	умножать
to divide	делить
digital computer	цифровой компьютер
extra speed	дополнительная скорость
to perform	выполнять
to complete	завершать, выполнять
integrated circuits	интегральные схемы
to be controlled	контролироваться
to reduce in size	уменьшать в размере
consequently	следовательно
approximately	приблизительно
predecessor	предшественник

Task 1. Read and translate the text.

Task 2. Give the Russian equivalents for the following words and word combinations:

1) to count in tens and multiples of tens; 2) without knowing how to

read; 3) calculus; 4) to save a great deal of time; 5) to cut out the human being altogether; 6) advancement; 7) to perform thousands of calculations per second; 8) extra speed; 9) tiny integrated circuits; 10) approximately.

Task 3. Give the English equivalents for the following words and word combinations:

1) изобретать счеты; 2) продолжать использовать; 3) механический способ умножения и деления; 4) уменьшать вероятность ошибок; 5) вычислять длинные списки математических задач; 6) хранить инструкции для компьютера внутри компьютерной памяти; 7) предшественник; 8) более надежный; 9) прямоугольный кусочек кремния; 10) устарелый.

Task 4. Agree or disagree with the statements using phrases of agreement and disagreement. If you disagree, give the correct variant.

1. People still use abacus and fingers for calculating today.
2. The slide rule was invented in 15th century.
3. During the early 1880s many people worked on inventing a mechanical calculating machine.
4. Charles Babbage, an Englishman could well be called the father of computers.
5. The first computer was built in the USA.
6. Instructions used by computer have always been kept inside the computer's memory.
7. Using transistors instead of vacuum tubes did nothing to increase the speed at which calculations were done.
8. As computers evolved, their size decreased and their dependability increased.
9. Today's computers have more circuits than previous computers.
10. Computer technology has developed to a point from which new development in the field will take a long time to come.

Task 5. Answer the questions to the text.

1. Why do we still count in tens and multiples of tens?
2. Is the abacus still being used? Why?
3. What is a mechanical way of multiplying and dividing?
4. How did the first real calculating machine work?
5. What machine was an attempt to cut out human being?
6. For what purpose was the first analog computer built?
7. When was the first digital computer built?

8. What was an important advancement in computers in 1947?

9. What are the distinguishing features of four generations of computers?

10. What is a chip?

11. Can today's computers be obsolete tomorrow?

Task 6. Refer back to the text and find

Synonyms for the following words:

1. Machine
2. Designed
3. a lot
4. Errors
5. Solve

Antonyms for the following words:

1. Old
2. A few
3. To include
4. Contemporaries
5. Still in use

Task 7. Match the following words in column A with the statements in column B.

A	B
1. abacus	a. instrument used for doing multiplication and division
2. chip	b. used in mathematics
3. vacuum tubes	c. used to help aim guns
4. calculus	d. used in the first digital computers
5. analog computer	e. an instrument used for counting
6. digital computer	f. circuitry of fourth generation computers
7. transistors	g. invented by an American in 1944
8. microminiaturization	h. a branch of mathematics

9. slide rule	i. made computers smaller and faster
10. logarithm tables	j. the reduction of circuitry onto a chip

Task 8. Translate the sentences into English.

1. Сегодня мы всё ещё считаем десятками и числами кратными десяти.

2. Счетами очень легко пользоваться, для этого даже не нужно уметь читать.

3. Логарифмические таблицы используются всеми математиками.

4. Первая настоящая вычислительная машина экономила много времени и уменьшала вероятность ошибки.

5. Чарльз Бэббидж изобрел «Аналитический двигатель» в 1820г.

6. Первый аналоговый компьютер использовался во Второй Мировой Войне для наведения оружия.

7. Первый цифровой компьютер мог вычислять длинные списки математических задач на очень большой скорости.

8. Использование транзисторов вместо вакуумных ламп было причиной дополнительной скорости компьютеров второго поколения.

9. Компьютеры третьего поколения контролировались крошечными интегральными схемами

10. Они были меньше и более надежны, чем их предшественники.

11. В компьютерах четвертого поколения интегральные схемы были сильно уменьшены в размере.

12. Компьютерные технологии развиваются очень быстро, и сегодняшние компьютеры могут стать устаревшими уже завтра.

Task 9. Complete the sentences.

1.Today we still count in tens and multiples of tens because…

2.The slide rule was invented in ...

3.The first real calculating machine could.

4.... was an attempt to cut out the human being altogether.

5.... was used in World War II to help aim guns.

6.The first digital computer was called.

7.The first generation computers appeared in .

8.In the second generation of computers . were used.

9.Integrated circuits have been greatly reduced in size in .

10.A chip is a square or rectangular…

Task 10. Give the summary of the text.

Text B. What is a computer?

A computer is a machine with an intricate network of electronic circuits that operate switches or magnetize tiny metal cores. The switches, like the cores, are capable of being in one of two possible states, that is, on or off; magnetized.

The machine is capable of storing and manipulating numbers, letters and characters.

The basic idea of a computer is that we can make the machine do what we want by inputting signals that turn certain switches on and turn others off, or that magnetize or do not magnetize the cores.

The basic job of computers is the processing of information. For this reason, computers can be defined as devices which accept information in the form of instructions called a program and characters called data performing mathematical and logical operations on the information, and then supply results of these operations.

The program or a part of it, which tells the computers what to do and the data, which provide the information needed to solve the problem, are kept inside the computer in a place called memory.

Computers are thought to have many remarkable powers. Most computers, whether large or small have three basic capabilities.

First, computers have circuits for performing arithmetical operations, such as: addition, subtraction, division, multiplication and exponentiation. Second, computers have means of communicating with the user. If we couldn't feed information in and get results back these machines wouldn't be of much use.

However, certain computers (commonly minicomputers and microcomputers) are used to control directly things such as robots, aircraft navigation systems, medical instruments, etc. Some of the most common methods of inputting information are to use terminals, diskettes, disks and magnetic tapes.

The computer's input device (which might be a disk drive depending on the medium used in inputting information) reads the information into the computer. For outputting information, two common devices are used a printer which prints the new information on paper, or a cathode-raytube (CRT) display screen which shows the results on a TV-like

a screen. Third, computers have circuits which can make decisions. The kinds of decisions which computer circuits can make are not of the type: 'Who would win a war between two countries?' or 'Who is the richest person in the world?' Unfortunately, the computer can only decide three things, namely:' Is one number use more often than another? 'Are two numbers equal?' and, 'Is one number greater than another?'

A computer can solve a series of problems and make hundreds even thousands of logical operations without becoming tired or bored. It can find the solution to a problem in a fraction that it takes a human being to do the job. A computer can replace people in dull routine, but it has no originality, it works according to the instructions given to it and cannot exercise value judgements.

There are times when a computer seems to operate like a mechanical «brain», but its achievement is limited by the minds of human beings. A computer cannot do anything unless a person tells it what to do and gives the appropriate information, but because of electric pulses can move at the speed of light, a computer can carry out vast numbers of arithmetical logical operations almost instantaneously.

A person can do the same, but in many cases that person would be deal long before the job was finished.

Vocabulary

English	Russian
tiny	крошечный
intricate	сложный
capability	способность мощность,
addition	сложение, добавление
subtraction	вычитание
division	деление
multiplication	умножение
core	ядро, сердечник, стержень
to manipulate	манипулировать, управлять
to magnetize	намагничивать
to perform	выполнять
to supply	снабжать, предоставить
to feed	питать, подать
to be capable of	быть способным к
memory	память

to solve the problem	решать проблему
circuit	схема, цепь
input device	устройство ввода
output device	устройство вывода
arithmetical logical operations	арифметические логические операции

Task 1. Read and translate the text.

Task 2. Translate these into English: переключатель, подобный металлическому сердечнику; буквы и знаки (символы); намагничивать металлический сердечник; обработка информации; выполнять металлические и логические операции; данные; средства связи с пользователем; схема; механический мозг; непосредственно управлять; скорость света; подходящий.

Task 3. Translate these into your own language: for outputting information; to carry out; an intricate network; the processing of information; tiny metal cores; to replace; by inputting signals; to define; to provide; appropriate.

Task 4. Fill in the necessary words:

1. A computer is a ..... with an intricate network of electronic circuits.
2. The machine is ..... of storing and manipulating numbers, letters and characters.
3. The basic job of a computer is the ..... of information.
4. Most computers have three basic ..... .
5. Computers have ..... for performing arithmetical operations.
6. Certain computers are used ..... directly things such as robots, medical instruments, etc.
7. For outputting information two common ..... are used.
8. A computer can ..... people in dull routine.
9. The computer's input device … the information into the computer.
10. It can … the solution to a problem in a fraction that it takes a human being to do the job.

Task 5. Fill in the gaps the prepositions:

1. A computer is a device ..... an intricate network.
2. The switches are capable of being ..... one or two states.
3. We can make the machine do what we want ..... inputting signals.

4. Computers accept information ..... the form of instructions called a program.

5. Computers have circuits ..... performing operations.

6. Computers have means of communicating ..... the user.

7. Input device may be a disk drive depending ..... the medium used ..... inputting information.

8. Computers can solve a series of problems ..... becoming tired or bored.

9. The machine is capable …storing and manipulating numbers, letters and characters.

10. It works … to the instructions given to it

Task 6. Match the names on the left with the definitions on the right:

1. video recorder	a) a kind of sophisticated typewriter using a computer
2. photocopier	b) a machine which records and plays back sound
3. fax machine	c) a machine which records and plays back pictures
4. tape recorder	d) a camera which records moving pictures and sound
5. modem	e) a machine for chopping up, slicing, mashing, blending, etc.
6. camcorder	f) a machine which makes copies of documents
7. robot	g) a machine which makes copies of documents and sends them down telephone lines to another place
8. word-processor	h) a machine which acts like a person
9. food-processor	i) a piece of equipment allowing you to send information from one computer down telephone lines to another computer
10. memory	j) a system or process that stores what we learn for future use.

Task 7. Give the appropriate definitions of the following terms: computer, memory, output device, input device, data.

Task 8. Arrange the items of the plan in a logical order according to the text:

1. A computer can solve a series of problems and make hundreds even thousands of logical operations.
2. The basic job of computers is the processing of information.
3. A computer is a machine with an intricate network of electronic circuits.
4. Computers have circuits for performing arithmetic operations.
5. The machine is capable of storing and manipulating numbers, letters and characters.
6. Some of the most common methods of inputting information are to use terminals.
7. For outputting information only two common devices are used.

Task 9. Answer the following questions:

1. What is a computer?
2. What is it capable to do?
3. The basic job of a computer is the processing of information, isn't it?
4. How do we call a program, which tells the computer what to do?
5. Computers have many remarkable powers, don't they?
6. What can computer solve?
7. Can computers do anything without a person?
8. What are the computer's achievements limited by?
9. What are the ways of inputting information into the computer?
10. What devices are used for outputting information?

Task 10. Fill in the necessary words:

Output devices Software CPU main memory ports Peripherals RAM Input devices computer Hardware ROM Storage devices modem

Parts of a Computer

A … is an electronic machine that accepts, processes, stores and outputs

information. A typical computer consists of two parts: hardware and software.

…: is any electronic or mechanical part of the computer system that you can see or touch.

… is a set of instructions called a program, which tells a computer what to do.

There are three basic hardware sections.

1. The … is the heart of the computer, a microprocessor chip which processes data and coordinates the activities of all the other units. In a way, it is the "brain" of the computer.

2. The … holds the instructions and data which are being processed by the CPU. It has two main sections… (random access memory) and …(read only memory).

3. … are the physical units attached to the computer. These can include input devices, output devices, storage devices and communications devices.

… , which let us enter data and commands (e.g. keyboards, mouses, scanners, barcode readers, microphones, webcams (small digital video cameras used on the Web).

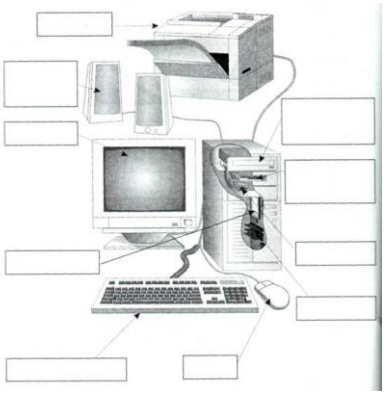
…, which let us extract the results (e.g. monitors, printers, plotters, loudspeakers, headphones).

…, which are used to store information permanently (e.g. hard disks and DVD-RW drives, earlier there were floppy disks). Disk drives are used to read and write data on disks.

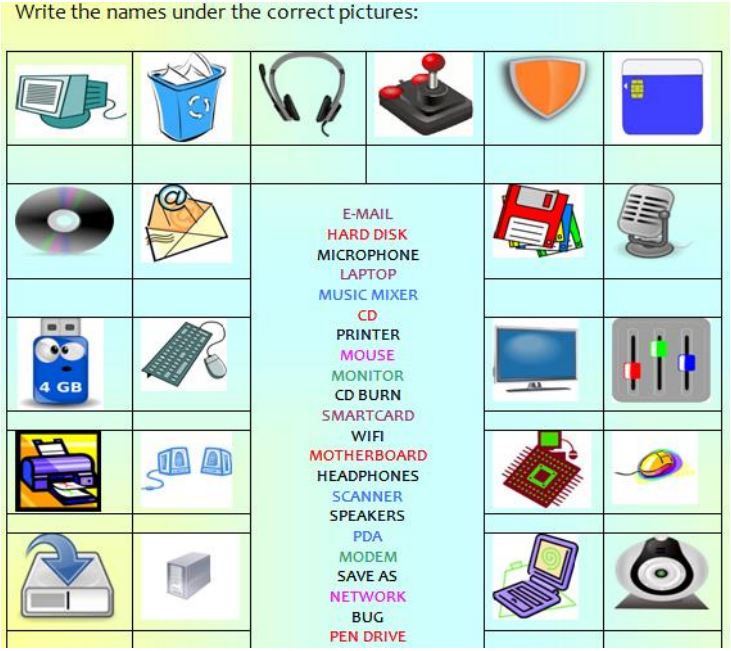
A common **communications device** is a … (a modula- tor/demodulator used for converting digital signals to analogue signals and vice versa to allow a computer to be connected to the ordinary telephone system).

At the back of a computer there are… into which we can plug external devices (e.g. a scanner, a modem, etc.) They allow communication between the computer and the devices. Modern desktop PCs have USB ports and memory card readers on the front panel.

Task 11.1. Label this diagram with the correct terms.



Task 11.2. Write the names under the correct pictures:



Task 12. Give a short summary of the text.

Text C. The Information Age

Information technology is playing an increasingly important role in the work and personal lives of citizens.

We are now living in what some people call the **information age** or **digital age**, meaning that computers have become an essential part of our

lives. Young people who have grown up with PCs and mobile phones are often called the **digital generation**. Computers, communications, digital information, software - the constituents of the information age - are everywhere.

Computers help students to **perform mathematical operations** and improve their maths skills. They are used to **access the Internet**, to **do basic research** and to communicate with other students around the world. Teachers use projectors and **interactive whiteboards** to **give presentations** and teach sciences, history or language courses. PCs are also used for administrative purposes - schools use word processors to write letters, and databases **to keep records** of students and teachers. A school website allows teachers to publish exercises for students to complete online. Students can also **enrol for courses** via the website and parents can **download** official **reports**.

Mobiles let you **make voice calls**, send texts, email people and download logos, ringtones or games. With a built-in camera you can send pictures and make video calls in **face to face mode**. New smartphones combine a telephone with web access, video, a games console, an MP3 player, a **personal digital assistant (PDA)** and a **GPS navigation system**, all in one.

In banks, computers **store information** about the money held by each customer and enable staff to **access** large **databases** and to **carry out** financial **transactions** at high speed. They also control the **cashpoints**, or **ATMs (automatic teller machines)**, which **dispense money** to customers by the use of a PIN-protected card. People use a Chip and PIN card to pay for goods and ser vices. Instead of using a signature to **verify payments**, customers are asked to **enter** a four-digit **personal identification number** (PIN), the same number used at cashpoints; this system makes transactions more secure. With online banking, clients can easily **pay bills** and **transfer money** from the comfort of their homes.

Airline pilots use computers to help them control the plane. For example, monitors **display data** about fuel consumption and weather conditions. In airport control towers, computers are used to **manage radar systems** and **regulate air traffic**. On the ground, airlines are connected to travel agencies by computer. Travel agents use computers to find out about the availability of flights, prices, times, stopovers and many other details.

Task 1. Look up in the dictionary how to pronounce and to translate the following words in bold. Write them down in the dictionary.

Task 2. Find English equivalents of Russian word combinations in the text: неотъемлемаячасть нашейжизни, составляющие информационноговека,загрузить официальные отчеты, проводить фундаментальные исследования, загружать логотипы, вместо того чтобы использовать подпись, общаться со студентами по всему миру, совершать голосовые звонки, интерактивные доски, использовать в административных целях, выполнять упражнения онлайн, управлять радиолокационными системами, режим личной беседы, игровая приставка, выдавать деньги, данные о расходе топлива и погодных условиях.

Task 3. Answer the questions.

1. How can you describe Information Age?
2. What are the key features of modern smartphones?
3. How are computers used by the students and teachers?
4. What is the role of computers in banks?
5. What does make payment system more secure?
6. How do computers help travel agents and airline pilots?
7. What is the role of computers in our society?
8. Give examples of using computers in everyday life.

Task 4. Complete text with the following words:

financial Internet electronic print design microchips

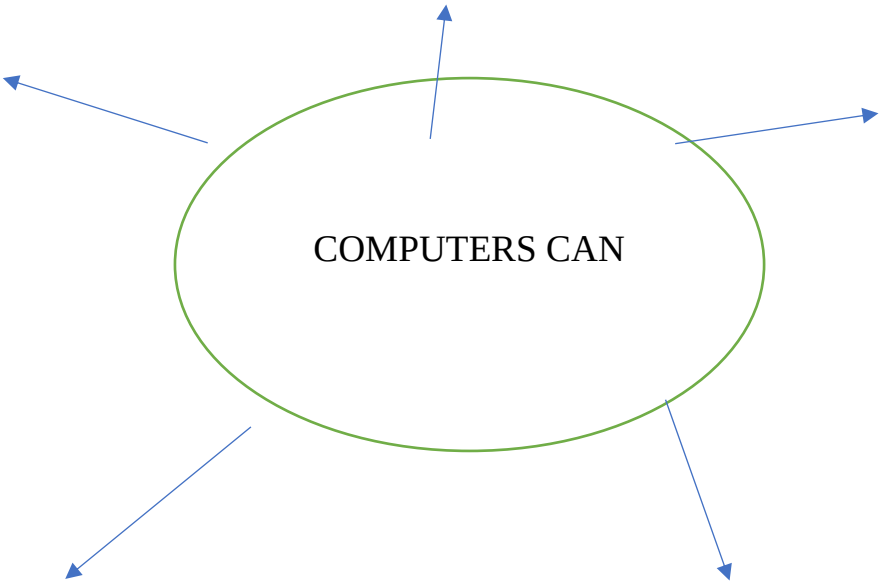
Computers in Everyday Life

Computers have changed the way we do everyday things, such as working, shopping and looking for information. We (1) ... houses with the help of PCs; we buy books or make flight reservations on the (2) ... ; we use gadgets that spring to life the instant they are switched on, for example the mobile phone, the music player, or the car ignition, all of which use (3) ... . Many people now work at home, and they communicate with their office by computer and telephone. This is called ”teleworking”.

With the appropriate hardware and software, a PC can do almost anything you ask. It’s a magical typewriter that allows you to type and (4) ... any sort of document. It’s a calculating machine that makes (5) ... calculations. It’s a filing cabinet that manages a large collections of data. It’s a personal communicator that lets you interact with friends. It’s a small lab that helps you edit photos and movies. And if you like (6) ... entertainment,

you can also use it to relax with games.

Task 5. Look at the mind: *Computers can*. Think and give your ideas.



Task 6. Choose the correct answer:

1. Computer is a ... for processing information.
a) device b) car c) board
2. Without … instructions hardware doesn't know what to do.
a) hardware b) software c) printer
3. The basic job of the computer is the ... of information.
a) drawing b) processing c) translating
4. With ... you can type instructions and commands for the computer.
a) mouse b) screen c) keyboard
5. You can move the ... оп the screen with the help of the mouse.
a) button b) cursor c) key
6. ...is a hand-held device connected to the computer by a small cable.
a) drive b) mouse c) character
7. You can type letters and other … using this keyboard.
a) buttons b) angles c) characters
8. The ... can read and write on diskettes.
a) system board b) drives c) contents
9. … is the term used to describe the instructions that tell the hardware how to perform a task.
a) software b) application c) procedures
10. How many letter ... are there on this computer keyboard?
a) keys b) manuals c) dot
11. Computer hardware can be divided into four categories: input hardware, processing hardware,… output hardware.
a) storage hardware b) memory hardware c) software
12. There are two types of computer memory: …
a) RAM and RIM b) RAM and ROM c) RUM and ROM
13. Scanner is used to …. texts and graphics.
a) output b) read c) input

14. Printer is a ….

a) processing hardware b) input hardware c) output hardware

15. …. collects data and converts them into a form suitable for computer processing.

a) processing hardware b) input hardware c) output hardware

16. Information in the form of instruction is called a ….

a) program b) command c) memory

17.Computer has no intelligence until ... is loaded.

a) software b) hardware c) scanner

18. Software are the programs that tell … how to perform a task

a) modem b) software c) hardware

19. There are four elements of computer system: hardware, software, …

and data.

a) diskettes b) procedures c) purposes

20. The ... displays text characters and graphics.

a) mouse b) keyboard c) monitor

21. The large metal box that is the main part of the computer is called the...

a) case b) screen c) arrow

22. The kind of input hardware designed for typing letters and numbers is …

a) keyboard b) monitor c) mouse

23. Thanks to computer we can ... information millions of times more quickly.

a) process b) plug in c) slide

24. Of course the device is not working, you have not ... it.

a) reduced b) plugged in c) processed

25. The purpose of …. is to store computer instructions.

a) input hardware b) storage hardware c)processing

Unit 2. Types of computers

Reading

Before you read

- **What do you know about types of computers?**
- **What are the reasons for using different types of computers?**

Text A. Types of Computers

There are different types of computers of varying size and power, including the following:

Supercomputer is the most powerful type of mainframe.

Mainframe is large, very powerful, multi-user i.e. can be used by many people at the same time, multi-tasking i.e. can run many programs and process different sets of data at the same time. Mainframes are used for large-scale computing purposes in banks, big companies and universities.

Minicomputer is smaller than a mainframe, powerful, multiuser, multi-tasking.

Personal computer (PC) is designed for a single user.

Desktop computer has a suitable size for sitting on an office desk.

Workstation is the most powerful type of desktop computers, used for graphic design, etc.

Portable computer can be carried around, can operate with batteries.

Laptop is large portable, can be rested on user's lap. A laptop (also called a **notebook** PC which has a size of a sheet of notebook paper) is a lightweight computer that you can transport easily/

It can work as fast as a desktop PC, with similar processor, memory, capacity and disk drives, but it is portable and has a smaller screen. Modern notebooks have a **TFT** (Thin Film Transistor) screen that produces very sharp images.

Instead of a mouse, they have a **touchpad** built into the keyboard - a sensitive pad that you can touch to move the pointer on the screen. They offer a lot of connectivity options: USB (Universal Serial Bus) ports for connecting peripherals, slots for memory cards, etc.

They come with battery packs, which let you use the computer when there are no electrical outlets available.

A **tablet PC** looks like a book with an LCD-screen on which you can write using a special digital pen. You can fold and rotate the screen 180 degrees. Your handwriting can be recognized and converted into editable text. You can also type at the detached keyboard or use voice recognition. It's

mobile and versatile.

Pen-based which main input device is an electronic pen.

A personal digital assistant or **PDA** is a tiny computer which can be held in one hand. The term PDA refers to a wide variety of **hand-held** devices, palmtops and pocket PCs.

For input, you type at a small keyboard or use a stylus - a special pen used with a **touch screen** to select items, draw pictures, etc. Some models incorporate handwriting recognition, which enables a PDA to recognize characters written by hand. Some PDAs recognize spoken words by using voice recognition software.

They can be used as mobile phones or as personal organizers for storing notes, reminders and addresses. They also let you access the Internet via wireless technology. Without cables.

Note that the term **PC** usually refers to an **IBM** compatible personal computer i.e. an Apple Mac personal computer is not referred to as a PC. A computer that provides a service on a network e.g. storing files, sharing a printer, is known as a **server** computer. Server computers usually have a **UPS** (uninterruptible power supply) attached to them. This is a battery that automatically provides an electricity supply to allow the server to shut itself down properly if the main supply fails.

Task 1. Look up in the dictionary how to pronounce and to translate the following words in bold. Write them down in the dictionary.

Task 2. Which type of computer do these descriptions refer to?

1. a hand-held computer which can be used as a telephone, a web explorer and a personal organizer;

2. a typical computer found in many businesses and popular for home use;

3. a large computer used for intensive data processing and often linked to many terminals;

4. a small computer that fits into items of clothing;

5. a portable computer that can be closed up like a briefcase, but it can be as powerful as a desktop PC;

6. a full function PC, though it only weighs 1.1 kg you can go to a meeting and write your notes on it, like a paper notepad; its screen mode can be changed from portrait to landscape.

Task 3. Find English equivalents of Russian word combinations in the text:очень мощный; легкий компьютер, который можно легко

транспортировать; подходящий размер для размещения на рабочем столе; может использоваться многими людьми одновременно; можно носить с собой; размером с лист бумаги; может запускать много программ и обрабатывать разные наборы данных одновременно; экран, который дает очень четкие изображения; с аналогичным процессором, памятью, мощностью; программное обеспечение для распознавания голоса; он может работать от батарей; распознавание рукописного ввода; для хранение заметок, напоминаний; предлагать множество вариантов подключения; распознать и преобразовать почерк в редактируемый текст;

Task 4. Answer the questions:

1. What is the difference between supercomputer and mainframe?
2. What is a typical computer found in many businesses and popular for home use?
3. What is a workstation?
4. What is a laptop? What benefits of a laptop do you know?
5. What is a tablet PC? What functions of it do you know?
6. What is a PDA? What for can we use it?
7. What is a UPS?
8. What computer is designed for a single user?
9. What computer is the most powerful type of mainframe?
10. What computers let you access the Internet via wireless technology.

Task 5. Look at the computer advertisement. Translate the questions into English and find the answers:

Toshiba Satellite

- Intel Centrino processor; 1,024 MB RAM, 100 GB hard disk drive; DVD SuperMulti (+/R double layer) drive.
- 15.4” widescreen TFT active-matrix LCD display.
- 85 key keyboard and touchpad; 2 memory slots,1 PC Card or PCMCIA slot.
- Wireless communications: Wi Fi compliancy and Bluetooth.
- 4 USB ports for connecting peripherals; digital camera, MP3 player, modem, etc.
- 6-cell rechargeable Lithiumion battery pack.

1. Какой тип компьютера рекламируют?
2. Какой у него экран?

3. Какое (указывающее) устройство заменяет мышку?

4. Какие у него есть порты, чтобы подключить камеру и музыкальный проигрыватель?

5. Какой источник питания он использует?

Task 6. Look at the ways of classifying and then use suitable classifying expressions to complete these sentences:

Classifying

Classifying means putting things into groups or classes. We can classify types of computers, parts a PC, etc. Some typical expressions for classifying are:

...are classified by... ...can be divided into X types / categories ...include(s).	*are classified into X types / categories X is a type of. .consist(s) of.*

1. A computer ... hardware and software.
2. Peripherals ... three types: input, output and storage devices.
3. A word processing program … . which lets the user create and edit text.
4. ... of network architecture: peer to peer, where all computers have the same capabilities, and client server (e.g. the Internet), where servers store and distribute data, and clients access this data.
5. Digital computers can ... into five main types: mainframes, desktop PCs, laptops, tablet PCs and handheld PDAs.

Text B. Mainframes. Minicomputers. Microcomputers

Task 1. Read and memorize the words and read the text "Mainframes":

Vocabulary

English	Russian
immense amounts of data	огромное количество данных
to take use of	использовать
to be dealt with	быть занятым чем-либо
to transfer for rapid access	передать для быстрого доступа
a repertoir	набор (команд)
to be executed	быть выполненным
to accomplish	выполнять
to make up	составлять
tremendous speed	огромная скорость
to work out	вырабатывать
to simulate	моделировать
to involve	включать
to require	требовать
to accommodate	разместить

Task 2. Read and translate the text.

Mainframes

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

These computers can be of two types: digital or analog. The digital computer or general-purpose computer as it is often made up about 90% of the large computers now in use. It gets name from the name of the data that are presented to it and which consist of digits.

The digital computer can do calculations in steps at tremendous speed and with great accuracy. Digital computer programming is by far the most

commonly used in electronic data processing for business or statistical purposes. The analog computer works something like a car speedometer, in that it continuously works out calculations. It is used essentially for problems invo1ving measurements. I t can simu1ate or imitate different measurements by electronic means. Both of these types are made of electronic computers that may require a larger room to accommodate them.

Task 3. Read and memorize the words and read the text "Minicomputers":

Vocabulary

English	Russian
expensive	expensive – дорогой
a large array of	большое количество
to satisfy the need	удовлетворить потребность
performance	работа
to lead to	привести к
for short	в сокращенном виде
exact	точный
to refer to	относиться к
it goes without saying	само собой разумеется
to differ from	отличаться от
to run	выполнять
to provide access to	обеспечить доступ к
a user	пользователь
at a time	за один раз
to process	обладать

Task 4. Read and translate the text.

Minicomputers

Until the mid – 1960s, digita1 computers were powerful, physically large and expensive. What was really needed were computers of less power, a smaller memory capacity and whiteout such a large array of peripheral equipment. This need was partially satisfied by the rapid improvement in performance of the semiconductor devices (transistors), and their incredib1e reduction in size, cost and power – al1 of which led to the development of the minicomputer or mini for short.

Although there is no exact definition of a minicomputer, it is generally understood to refer to a computer whose mainframe is physically small, and has a fixed word length between 8 and 32 bits.

A large number of peripherals have been developed especially for use in systems built round minicomputers. They include magnetic tape, cartridges and cassette, small disk units and a large variety of printers and consoles.

Since the operating environment for most minis is far less varied and complex than large mainframes, it goes without saying that the software and peripheral requirements differ greatly from those of a computer which runs several hundred ever changing jobs a day. The operating systems of minis also usually provide system access to either a single user or to a limited number of users at a time.

Since many minis are employed in real time processing, they are usually provided with operating systems that are specialized for this purpose. Because minicomputer systems have been used so often in real time applications, other aspects of their design have changed; that is, they usually possess the hardware capability to be connected directly to a large variety of measurement instruments, to analog and digital converters, to microprocessors, and to an even larger mainframe in order to analyze the collected data.

Task 5. Read and memorize the words and read the text "Microcomputers":

Vocabulary

English	Russian
to be composed of	состоять из
to de hooked up together	быть сцепленным, собранным
flexible	гибкий
instruction sets	наборы инструкций
to be available	имеется, быть доступным
to converge	сходиться
to be destined for	предназначаться для
TV game attachments	телевизионные игровые приставки

Task 6. Read and translate the text.

Microcomputers

The early 1970-s saw the birth of the microcomputer, or micro for short. The central processor of the micro, called the microprocessor, is built as a single semiconductor device; that is, the thousands of individual circuit elements necessary to perform all the logical and arithmetic functions of a computer are manufactured as a single chip. A complete microcomputer system is composed of a microprocessor, a memory and peripheral equipment.

The processor, memory and electronic controls for periphera1 equipment are usually put together on a single or a few printed circuit boards. System using microprocessors can be hooked up together to do the work that until recently only minicomputers systems were capable of doing. Micros generally have same what simpler and less flexible instruction sets than minis, and are typically much slower.

Different micros are available with 4, 8, 16 bit word lengths. Similarly minis can be equipped with much larger primary memory sizes, micros are becoming more powerful and converging with minicomputer technology.

In addition to their extensive use in control systems of all types, they are destined for many new uses from more complex calculators to automobile engine operation and medical diagnostics. They are already used in automobile emission control systems the basis of many TV game attachments.

Task 7. Summarize the texts on "Mainframes", "Minicomputers" and "Microcomputers" by completing the following table:

Types of computers			
	Mainframes	*Minicomputers*	*Microcomputers*
When developed Usage		the mid – 1960s	in the early 1970s
Memory speed and capacity	Most primary memory ranges		

	from32 – 512 k bits		
Size			Small portable size
Complexity of instructions			
Number of users			Single userpersonal computer
Type of processing			

Task 8. Read attentively the text, make the summary in English using the following clichés:

The text / article under review ...(gives us a sort of information about...) The subject of the text is...

The article begins with the description of.., a review of..., the analysis of... The article opens with ...

In conclusion ...

Microcomputers

Microcomputers, also called microcomputers or microcomputers, are computers that have a microprocessor as the central processing unit, and that are configured to fulfill specific functions. Aspects such as the complexity of the system, power, operating system, standardization, versatility and price of the equipment, among others, depend on the microprocessor.

Basically, microcomputers constitute a complete system for personal use, which contains, in addition to the microprocessor, a memory and a series of information input and output components.

Finally, it is important to clarify that although microcomputers are often confused with personal computers, they are not the same. It could rather be said that the latter are part of the general classification of the former.

If you want to know more details about it, I invite you to read the article on the computer types that exist today.

From

Microcomputers owe their origin to the need to bring small computers to homes and businesses. Which could be consolidated after the creation of microprocessors in 1971.

The first known prototype of a microcomputer, although it did not contain a microprocessor, but a set of microcircuits, became available in 1973. It was designed and built by the Xerox Research Center and was called Alto. The project was unsuccessful due to the level of technology that was required, but was not available at the time.

After this model, other initiatives emerged from the hand of other companies, including Apple. However, it was in 1975 that the first commercial personal microcomputer was sold. It was the Altair 8800, belonging to the MITS company. Although it lacked a keyboard, monitor, permanent memory, and programs, it quickly became a hit. It had switches and lights.

Later, in 1981, IBM released the first personal computer, called the IBM PC, which was based on Intel's 8080 microprocessor. This fact marked the beginning of a new era of computing, since from there more powerful models of microcomputers began to emerge, promoted by companies such as Compaq, Olivetti, Hewlett - Packard, among others.

Evolution

Since the appearance of Alto, which contained an 875 line scanning screen, a 2,5 MB disk and an interface with a 3 Mbits / s Ethernet network, the technology has evolved, always taking into account the best aspects of each of the preceding models.

From this point of view, it can be said that the rise of microcomputers is mainly due to the fact that their technology is more advanced, compared to that of minicomputers and supercomputers. Its design and construction, including more powerful microprocessors, faster and more capable memory and storage chips, is achieved in shorter cycle times. In this way, they buy time for generations of other types of computers.

Finally, it should be clarified that as a consequence of technological advances, the term microcomputer is in disuse, since today most manufacturing companies include microprocessors in almost any type of computer.

Features

Microcomputers are a type of computer that has the following characteristics:

Its central component is the microprocessor, which is nothing more than an integrated circuit.

Its architecture is classical, built on a flow of control of operations and a language of procedures.

It presents built in technology, which allows the intercommunication of its components.

Due to its compact design, it is easy to pack and move.

How do microcomputers work?

Microcomputers are capable of executing input, output, calculation and logic operations, through the following basic procedure:

- Receipt of the data to be processed.
- Execution of programmed commands for information processing.
- Information storage, before and after its transformation.
- Presentation of the results of data processing.

In other words, microcomputers use a format of instructions that allow them, by decoding them, to perform the necessary micro -operations to respond to user requests.

Thus, the instruction format includes an operation code, through which it indicates the addressing of each operand, that is, it defines a bit of an instruction, of the different elements that make it up.

For their part, micro-operations are the functional operations of the microprocessor, responsible for the reordering of instructions and the sequential execution of a program.

While through timing, the microcomputer manages to coordinate the events of the network of communication lines that connect the elements of the system.

Lastly, it is important to clarify what decoding means. Decoding is the process by which instructions are interpreted, in order to identify the operation to be carried out and the way to obtain the operands on which these orders must be executed.

Text C. It is interesting to know that ...

Task 1. Read and translate the text. Write down unknown words.

PCs and PC compatibles are used in organization of all sizes. PCs are an office time saver, allowing the staff to write press releases and legislative

testimony, performs accounting tasks, and prepares mailing lists more quickly. It is also paves the way for organization to complete more effectively with other public interest groups. Today, over 80 percent of Public Citizen's employees use PC compatibles. Word processing has replaced typewriters, hard disk drive storage has reduced the amount of paper kept in filing cabinets, and laser printing has cut their outside printing costs dramatically.

Banks have traditionally used the latest computer technology to automate their own operations, but First Banks for Business found a way to use personal computers to improve customer service. In the past, when a customer wanted to cash a check, the signature card had to be compared to verify identity. That meant looking through a card file or containing central book-keeping, which could take as long as 30 minutes.

Now Banks for Business installed PC 2s with special graphics capabilities and software called Signet to perform the task. When the letters retrieve customer account information from the computer, they see the authorized signatures appear right on the screen. The system also tells them what other signatories are permitted on the account or if two signatures are required to cash a check. The banks say the main reason customers change banks is due to bad service. Using the powerful PS 2s signet, they can cash a customer's cheek in a minute or less.

People use laptops for many of the same tasks that they use desktops and more.

Astrophysicists use Sun Microsystems workstations for their engineering work. They routinely sketch graphs and diagrams on the screen using computer-aided drafting software, as well as sophisticated calculation software to test mathematical equations. They also exchange ideas and information with each other in electronic messages. One project they have worked on in cooperation with NASA is the Advanced X-Ray Astrophysic Facility. It is an observatory in space that will measure cosmic X-rays, which are invisible an earth. The astrophysicists hope that the information provided will help them understand better how the universe was formed and what is eventual fate will be.

The Sun workstation performed an additionally important task: helping gather visual and textual information into a comprehensive report for NASA to explain how an X -ray telescope would function abroad the observatory. Using electronic publishing software, they combined graphics screens, mathematical equations, and textual explanations into a

document that took just six hours to prepare. Previously, it would have taken two days.

Task 2. Fill in the necessary words:

1. ..... are generally classified as general – or special purpose machine.
2. A special purpose computer is designed and used ..... for one application.
3. Personal computer ..... on a desktop.
4. Each type of a personal computer ..... many characteristics in common with their counterparts.
5. There are many portables ..... today.
6. CPUs, terminals, printers and storage devices can be ..... separately.

Task 3. Agree or disagree with the following statements:

1. All computer systems have the same five hardware components.
2. Input/output devices receive data, enter it into the computer for processing, then send it back to people so it can be used.
3. Storage components don't keep data for later use.
4. Computers are general purpose machines.
5. The machine may need to be redesigned and certainly reprogrammed.
6. We can't say, that there are different types of computers.

Task 4. Ask questions to which the following statements might be the answer:

1. Desktop personal computers are used for education, running a small business or in large corporation to help office workers be more productive.
2. Laptops fall into the same general categories as desktop personal computers.
3. The workstation is a computer that fits on a desktop.
4. Workstations are designed for three major tasks.
5. A minicomputer system combined with specialized equipment and peripherals is designed to perform a specific task.
6. A mainframe uses the same basic building blocks of a computer system: the CPU, I/O devices and external memory.

Task 5. Match the words of the first column with those of the second one:

1. regardless	a) убеждать
2. to enter	b) проверять
3. a routing	c) покупать

4. to direct
5. to modify
6. to purchase
7. to convince
8. solely
9. to monitor
10. occurrence
11. to afford
12. to confine

d) ограничиваться
e) входить
f) видоизменять
g) программа
h) не обращая внимание
i) представлять/ быть в состоянии
j) исключительно
k) управлять
l) 12. случай

Task 6. Give the definitions to the following terms:

1. computer
2. supercomputer
3. special purpose computer
4. general purpose computer
5. personal computer
6. minicomputer
7. mainframe
8. workstation

Task 7. Give a short summary of the text.

Task 8. Work in pairs.

№1

A: Hi there! I've been thinking about getting a computer, and I could really use your advice. What do you think about the possibilities of having one?

- Hi! Sure, I can help. Computers are great for various things like surfing the internet, doing school or work tasks, and even playing games. They're quite versatile.

A: That sounds good. How about the advantages of a computer compared to other media?

- Well, computers are more interactive than TV or newspapers. You can watch videos, read news online, and even chat with friends. Plus, you can store a lot of information on them.

A: Makes sense. But I'm worried about the price. How much should I expect to spend on a computer?

- The price can vary a lot, depending on what you need. Basic ones start at around 20000 rubles, but if you want a powerful one for gaming or heavy work, it could cost a lot more.

A: Got it. Where should I buy a computer, and what kind should I go for?

- You can buy one at electronics stores or online. Consider your needs and budget. Brands like HP, Dell, or Lenovo are reliable for general use. If you're into gaming, look for gaming−specific brands.

A: Thanks for the info! I'm leaning towards buying one now. It seems like a good investment.

- You're welcome! It's a useful tool to have. If you decide to get one, I can help you find the right one. Just let me know! See you!

№2

A: It’s really nice of you to come with me to buy my computer. This is the Desktop I’m thinking about.

- This is okay, but if I were you, I’d buy a Laptop. It’s more Versatile. You can travel with it.

A: I’m not sure about getting a laptop. The Screen is so small.

- No problem. You can get a separate Monitor. This is a good one. You just need a Connector and a Cable To hook it up to your laptop. Here’s a Monitor stand, too, so you can Elevate it if you want to.

A: The Speakers on the laptop aren’t very loud.

- You can get these great speakers. You Plug them into your laptop and the sound is amazing.

A: I’m not sure about the Battery.

- It comes with a battery that lasts three to five hours, but you can always buy a Spare. Of course, it comes with a Power cord, too, so you can just plug it in if your battery runs low.

A: The Keyboard is a little Cramped, too.

- That’s what a full size keyboard is for. You can buy a separate keyboard and Mouse and attach them to your laptop. It’ll be just like having a desktop.

A: Then why don’t I just buy a desktop?

- If you do, you won’t be able to buy all of these great Accessories. That’s half the fun of buying a new computer!

№3

A: Hi, Max! I know you're a computer genius so I need your help.

- What's the problem?

A: It's my computer. While I was doing my project yesterday my Internet connection was lost.

- Did you try to reset the computer and modem?

A: Yes, several times. It didn't help.

- Did you call to your Internet Service Provider?

A: Not yet. Do you think it could be their problem?

- Yes. If they have failure it needs some time to fix it. So call them.

A: Ok. Thanks for advice!

- You're welcome.

№ 4

A: I'm thinking of buying a computer, and I need some advice.

- OK. What do you want to use it for?

A: For writing, maybe for games. I want it for the Internet.

- For the Internet and games… I recommend you a multimedia computer.

A: What do you mean a multimedia computer?

- Well, it's more powerful than a basic computer. It's got sound and CD-ROM or DVD drive. You can use it for high-quality graphics, animation and video.

№5

A: What if I wanted… I travel a lot, if I wanted something smaller, what's available?

- There are portable computers. A multimedia notebook is probably best.

A: Is a notebook the smallest kind you can get?

- No, you can get subnotebooks and even smaller handheld devices. They're mostly used as organizers, as a diary, a «to do» list, and that kind of thing. But for writing and general use a notebook is better.

A: OK. I think I'll go for a notebook. What other things do I need?

- A printer… and for the Internet, make sure you have a modem.

A: A modem?

- Yes, it's a device for connecting your computer to a telephone line. You need it to connect to the Internet.

Unit 3. Hardware and Software

Reading

Text A. Software

A computer system implies a mixture of integrated parts working together. It consists of two parts. The first part is **hardware** - the physical, electronic devices that are thought of as "computers". The hardware consists of equipment: keyboard, mouse, monitor, system unit and other devices. The second part is **software** - the programs that control and coordinate the activities of the computer hardware and that direct the processing of data.

There are two major kinds of software: **system software** and **application software**. The user interacts with application software. System software enables the application software to interact with the computer hardware. System software is "background" software that helps the computer manage its own internal resources. The most important system software program is the operating system, which interacts between the application software and the computer. The operating system handles such details as running ("executing") programs, storing data and programs, and processing data.

Application software might be described as "end-user" software. Application software performs useful work on general-purpose tasks such as word processing and cost estimating. Application software may be packaged or custom-made.

Packaged software is programs prewritten by professional programmers that are typically offered for sale.

Custom-made software, or custom programs, is programs written for a specific purpose and for a specific organization. Using computer languages, programmers create this software to instruct the company computer to perform whatever tasks the organization wants. A program might compute payroll checks, keep track of goods in the warehouse, calculate sales commissions, or perform similar business functions.

General-purpose programs, or "basic applications", are widely used in nearly all career areas. One of these basic applications is a browser to navigate, explore, and find information in the Internet. The two most widely used browsers are Microsoft's Internet Explorer and Netscape's Communicator.

There are more advanced applications that are more specialized than the basic applications. They are widely used within certain career areas. One

of the most exciting advanced applications is multimedia, which integrates video, music, voice, and graphics to create interactive presentations.

Text B. Hardware.

Microcomputer hardware - the physical equipment - falls into five categories. They are input devices, the system unit, secondary storage, output devices and communications devices.

Input devices translate data and programs that humans can understand into a form that the computer can process. The most common input devices for microcomputers are the keyboard and the mouse. The keyboard on a computer looks like a typewriter keyboard, but it has additional specialized keys. A mouse is a pointing device that typically rolls on the desktop. It directs the insertion point, or cursor, on the display screen. As you glide the mouse, the arrow on the screen moves in the direction of your movement. A mouse has one or more buttons. You click (press and release the button one time) or double-click the mouse button to open the document or to start the program, for example.

The large metal box, or the case, with its contents (electronic circuitry) is called **the system unit**. The two most important components of the system unit are:

The central processing unit (CPU) controls and manipulates data to produce information. A microcomputer's CPU is contained on a single integrated circuit or microprocessor chip. These chips are called microprocessors.

Memory, also known as **primary storage** or **random-access memory** (RAM), holds data and program instructions for processing the data. It also holds the processed information before it is output. Memory is sometimes referred to as temporary storage, because it will be lost if the electrical power to the computer is disrupted or cut off. Data and instructions are held in memory only as long as the electrical power to the computer is on. Memory is located in the system unit on the tiny memory chips.

Secondary storage also holds data and programs. It stores permanently, that is, the data and programs remain even after the turning off the electrical power. The most important kinds of secondary storage devices are: floppy disks, hard disks, optical disks, flash cards.

Floppy disks, or diskettes, are widely used to store and transport data from one computer to another. They are called *"floppy"* because data is stored on a very thin flexible plastic disk. The disk rotates within a protective

sturdy plastic cover. Today's standard floppy disk is a "3,5-inch 2HD" (two-sided high density) with a capacity to hold the equivalent of 400 type-written pages.

Hard disks are typically used to store programs and very large data files. Hard disks have much greater capacity and are able to access information much faster than floppy disks. Almost every microcomputer system has an internal hard disk that is permanently installed within the system cabinet. This disk is used to store system programs, application programs and data.

Optical disks are laser technology and have great capacity. There are two basic types of optical disks: **CD** and **DVD**. **CDs** (compact disks) are widely used today, they are used to store great amount of data. **DVD** stands for both digital versatile disk and digital video disk. Its capacity is far greater than CD's. DVDs can be used for all the things that CDs are used for, but also they can distribute full-length motion pictures.

Flash cards have become very popular today, because they are very compact and therefore more convenient. Flash cards can hold great number of gigabytes of data.

Output devices are pieces of equipment that translate the processed information from the CPU into a form that humans can understand. One of the most important output devices is **the monitor** or **video display screen**, which resembles a television screen. The monitor displays text characters and video images. It allows you to see the result of your work going on inside the system unit. The image that you see is made up of tiny dots called pixels. The sharpness of the picture depends on the number and size of these pixels. The more pixels, the sharper the image. This is called resolution. Another important output device is **a printer**, a device that produces printed paper output.

Communications hardware sends and receives data and programs from one computer or secondary storage device to another. Many microcomputers use a modem. This device converts the electronic signals that can travel over a telephone line. A modem at the other end of the line then translates the signals for the receiving computer. A modem may be internal or located inside a microcomputer's system cabinet. It may also be a separate unit, or external.

Vocabulary

English	Russian

to imply	подразумевать
a mixture of integrated parts	смесь связанных деталей
equipment	оборудование
to direct the processing of data	направлять обработку данных
to interact	взаимодействовать
application software	прикладное программное обеспечение
internal resources	внутренние ресурсы
to run (execute programs)	запускать (выполнять) программы
to store data and programs	сохранить данные и программы
word processing	текстовая обработка
payroll checks	проверка платежных ведомостей
explore	исследовать, изучать
a pointing device	указательное устройство
to roll on the desktop	кататься (скользить) на поверхности стола
to direct the insertion point (cursor)	направлять указатель (курсор)
to glide the mouse	скользить мышкой
to move in the direction of your movement	to move in the direction of your двигаться в направлении вашего движения
to press and release the button one time	нажать и отпустить кнопку один раз
the system unit	системный блок
to double-click the mouse	делать двойной щелчок мышью
to hold the processed information	содержать обработанную информацию
temporary storage	временное хранилище
if the electrical power is disrupted or cut off	если электричество прерывается или отключается электричество включено

the electrical power is on to store permanently the turning off the electrical power flexible plastic disk to have much greater capacity to access information to resemble to display text characters image to be made up of tiny dots resolution to send and receive data to convert the electronic signals external unit	хранить постоянно выключение электричества гибкий пластиковый диск иметь гораздо большую ёмкость получить доступ к информации напоминать показывать текстовые символы изображение состоять из крошечных точек разрешающая способность отправлять и получать данные преобразовывать электронные сигналы внешний элемент

Task 1. Read and translate the texts.

Task 2. Give the Russian equivalents for the following word combinations:

to imply a mixture of integrated parts working together; to enable the application software to interact with the computer hardware; programs prewritten by professional programmers; custom programs might compute payroll checks; a browser to navigate, explore, and find information in the Internet; more advanced applications; to fall into five categories; to look like a typewriter keyboard; to direct the insertion point; to be contained on a single integrated circuit; to be located on the tiny memory chips; a protective sturdy plastic cover; to distribute full-length motion pictures; internal or external unit; to depend on the number and size of the pixels.

Task 3. Give the English equivalents for the following words and word combinations:направлять обработку данных; управлять своими внутренними ресурсами; предлагаться для продажи; выполнять подобные функции; широко использоваться почти во всех

профессиональных областях; создавать интерактивные презентации; устройства вывода; переводить данные и программы в форму, которую может обработать компьютер; делать двойной щелчок мышью; хранить постоянно; выключение электричества; гибкий пластиковый диск; ёмкость (вместимость);показывать текстовые символы и видео изображения; преобразовывать электронный сигнал.

Task 4. Refer back to the text and find

Synonyms for the following words:

1. to store
2. special
3. the same
4. to calculate
5. insertion point
6. small
7. hard

Antonyms for the following words:

1. soft
2. permanent
3. internal
4. input
5. to turn on
6. thick
7. to send

Task 5. Make up 5 sentences in English using active vocabulary.

Task 6. Agree or disagree with the statements using phrases of agreement and disagreement. If you disagree, give the correct variant.

1. System software is one of the kinds of application software.
2. The operating system interacts between the application software and the computer.
3. System software may be packaged or custom-made.
4. Packaged software is programs written for a specific purpose and for a specific organization.
5. One of the general-purpose programs is a browser to navigate, explore, and find information in the Internet.
6. Microcomputer hardware consists of input devices, the system unit, secondary storage, output devices and communications devices.
7. The processor is often referred to as CPU.

8. The keyboard and the mouse are output devices.

9. Memory is a permanent storage.

10. Hard disk is a secondary storage device.

11. The capacity of floppy disks is far greater than CD's.

12. The monitor is an input device with the help of which you enter information into the computer.

Task 7. Translate the sentences into English.

1. Программное обеспечение контролирует и координирует работу аппаратного обеспечения.

2. Пользователь взаимодействует с прикладным программным обеспечением.

3. Операционная система - это самая важная программа системного программного обеспечения.

4. Операционная система управляет запуском программ, хранением и обработкой данных.

5. Клиентское программное обеспечение пишется для особых целей.

6. Одна из программ общего назначения — это браузер для навигации и поиска информации в Интернете.

7. Мультимедиа используется для создания интерактивных презентаций.

8. Мышь — это устройство указания, которое управляет курсором на экране.

9. Чтобы запустить программу, нужно сделать двойной щелчок мышью.

10. Память содержит обработанную информацию.

11. Данные будут потеряны, если электричество выключится.

12. Данные во вторичной памяти остаются постоянно, даже после выключения электричества.

13. Жесткие диски имеют гораздо большую ёмкость, чем гибкие диски.

14. Гибкий диск удобен для хранения текстовых файлов.

15. Если вы повредите гибкий диск, то все файлы, хранящиеся на нем, будут утеряны.

16. Жесткий диск установлен внутри системного блока и используется для хранения программ, приложений и данных.

17. Лазерные диски хранят огромное количество данных.

18. Модем - это устройство, преобразующее электронные сигналы, которые могут передаваться по телефонной линии.

19. Чтобы получить доступ к информации во всемирной паутине, используйте модем и подключитесь к Интернету.

20. Большинство людей используют Интернет только для получения и отправки электронных сообщений.

Task 8. Match the following words in column A with the statements in column B.

A	B
1. hardware	a) “background software”
2. software	b) a pointing device that rolls on the desktop
3. memory	c)the physical, electronic devices
4. system software	d) “end-user software”
5. secondary storage	e) temporary storage
6. custom-made software	f) the programs
7. a mouse	g) permanent storage
8. application software	h) programs written for a specific purpose

Task 9. Work in pairs. Compose a dialogue.

Student A: You are a sales representative trying to sell your company’s notebook computer. You are presenting your product to the Sales Director of a manufacturing company which is thinking of buying 20 notebook computers for the staff. Try to persuade the Sales Director to buy your product.

Useful expressions:

It costs...

It runs/operates on.

It weighs.

Student - You are a Sales Director of a manufacturing company. You are considering buying 20 notebook computers for your staff. Find out about all the specifications of the model in offer (type (size), processor type, operating speed, memory, display, power supply, cost, and other features). Decide whether it is suitable for your needs.

Useful expressions:

How much does it cost?

What power source does it use?

How big/heavy is it?

Task 10. Read the following guidelines to reduce eyestrain if you sit in front of the monitor for a long period of time. Do you follow them? Can you give any other pieces of advice, concerning work at the computer?

- Use the computer in a room with even lighting. Adjust the controls on the monitor to vary the contrast and brightness of the display to suit the lighting in the room.
- Keep the screen clean.
- Adjust your chair so that you are looking down at the screen at a slight angle.
- Turn the monitor away from the windows and bright lights to avoid glair.
- Some of the controls on the monitor change the size and position of the image. You should set them for the largest image without losing any part of it.
- You can set a screen saver to appear on your monitor screen if the computer sits idle for a period of time. Screen savers can reduce wear on your screen.

Text C A Central Processing Unit (CPU)

There are three basic hardware sections: the central processing unit (CPU), main memory and peripherals.

The processor, also called the CPU or central processing unit is the heart and brain of your computer. To control instructions and data flow to and from other parts of the computer, the CPU relies heavily on a chipset, which is a group of microchips located on the motherboard. The chips itself are small pieces of silicon with a complex electrical circuit called an integrated circuit.

The processor consists of three main parts:

The control unit extracts instructions from memory and decodes and executes them.

The arithmetic logic unit (ALU) performs mathematical calculations (+, ~, etc.) and logical operations (AND, OR, NOT).

The registers are high-speed units of memory used to store and control data. One of the registers (the program counter, or PC) keeps track of the next instruction to be performed in the main memory. The other (the instruction register, or IR) holds the instruction that is being executed.

The power and performance of a computer is partly determined by the speed of its processor. A system clock sends out signals at fixed intervals to measure and synchronize the flow of data. Clock speed is measured in gigahertz (GHz). For example, a CPU running at 4GHz (four thousand million hertz, or cycles, per second) will enable your PC to handle the most demanding applications.

The main circuit board inside your system is called the motherboard and contains the processor, the memory chips, expansions slots, and controllers for peripherals, connected by buses - electrical channels which allow devices inside the computer to communicate with each other. The CPU has an internal bus for communication with the internal cache memory, called the backside bus. The main bus for data transfer to and from the CPU, memory, chipset, and AGP socket is called the front-side bus.

The size of a bus, called bus width, determines how much data can be transmitted. It can be compared to the number of lanes on a motorway - the larger the width, the more data can travel along the bus. For example, a 64-bit bus can transmit 64 bits of data. Expansion slots allow users to install expansion cards, adding features like sound, memory and network capabilities.

Some computers utilize two or more processors. These consist of separate physical CPUs located side by side on the same board or on separate boards. Each CPU has an independent interface, separate cache, and individual paths to the system front-side bus. Multiple processors are ideal for intensive parallel tasks requiring multitasking. Multicore CPUs are also common, in which a single chip contains multiple CPUs.

Task 1. Read and translate the text.

Task 2. Match the terms with their definitions:

1 Expansion cards	A handles all processor control signals. It directs all input and output flow, fetches code for instructions from microprograms and directs other units and models by providing control and timing signals.
2 motherboard	B determines how much data can be transmitted.
3 control unit (CU)	C extra circuit boards that are used to increase the functions of a computer.
4arithmetic logic unit	D is a firm slotted board onto which computer circuitry is attached.
5 bus width	E is a major component of the central processing unit of a computer system. It does all processes related to arithmetic and logic operations that need to be done on instruction words.

Task 3. Answer the questions:

1. What is the main function of a computers processor?
2. What unit of frequency is used to measure processor speed?
3. What are the main parts of the CPU?
4. What does ALU stand for? What does it do?
5. What is the function of the system clock?
6. What is a bus, backside bus, front-side bus?
7. What do you know about multiple processors?

Task 4. Read attentively the text, make the summary in English using the following clichés:

The text / article under review ...(gives us a sort of information about...) The subject of the text is...

The article begins with the description of.., a review of..., the analysis of... The article opens with ...

In conclusion ...

Main Memory

Random access memory (RAM) is a type of data storage used in computers that is generally located on the motherboard. This type of memory is volatile and all information that was stored in RAM is lost when the computer is turned off. Volatile memory is temporary memory while ROM

(read-only memory) is nonvolatile and holds data permanently when the power is turned off.

The RAM chip may be individually mounted on the motherboard or in sets of several chips on a small board connected to the motherboard. Older memory types were in the form of chips called dual in-line package (DIP). Although DIP chips are still used today, the majority of memory is in the form of a module, a narrow printed circuit board attached to a connector on the motherboard. The three main memory circuit boards types containing chips are: RIMMs (Rambus in-line memory modules), DIMMs (dual in-line memory modules) and SIMMs (single in-line memory modules). Most motherboards today use DIMMs.

There are two main types of RAM: dynamic random access memory (DRAM), or Dynamic RAM, and static random access memory (SRAM). The RAM in most personal computers (PC's) is Dynamic RAM. All dynamic RAM chips on DIMMs, SIMMs or RIMMs have to refresh every few milliseconds by rewriting the data to the module.

Static RAM (SRAM) is volatile memory and is often used in cache memory and registers because it is a lot faster and does not require refreshing like Dynamic RAM. SRAM retains information and is able to operate at higher speeds than DRAM. Because DRAM is a lot cheaper than SRAM, it's common to see PC manufacturers use DRAM.

The BIOS (basic input/output system) uses ROM to control communication with peripherals. The amount of RAM determines the number of programs you can run simultaneously and how fast they operate. RAM capacity can be expanded by adding extra chips, usually contained in small circuit boards called dual in-line memory modules (DlMMs).

Read-only memory (ROM) is a type of storage medium that permanently stores data on personal computers (PCs) and other electronic devices. It contains the programming needed to start a PC, which is essential for boot-up; it performs major input/output tasks and holds programs or software instructions.

There are numerous ROM chips located on the motherboard and a few on expansion boards. The chips are essential for the basic input/output system (BIOS), boot up, reading and writing to peripheral devices, basic data management and the software for basic processes for certain utilities.

Because ROM cannot be changed and is read-only, it is mainly used for firmware. Firmware is software programs or sets of instructions that are

embedded into a hardware device. It supplies the needed instructions on how a device communicates with various hardware components. Firmware is referred to as semipermanent because it does not change unless it is updated. Firmware includes BIOS, erasable programmable ROM (EPROM) and the ROM configurations for software.

ROM may also be referred to as maskROM (MROM). MaskROM is a read-only memory that is static ROM and is programmed into an integrated circuit by the manufacturer. An example of MROM is the bootloader or solid-state ROM, the oldest type of ROM.

Task 5. Answer the questions:

1. What are three main memory circuit boards types? Which type is used more than others?
2. What type of memory is permanent and includes instructions needed by the CPU?
3. What is the difference between two main types of RAM?
4. How can RAM be increased?
5. What do you know about the BIOS?
6. What is a firmware?
7. What is a MaskROM?

Text D. Input and Output Devices

A peripheral is a device performs input, output or storage functions and is connected to CPU. In order for the computer to be of use to us, there must be some types of mechanism for entering data into the computer for processing. Devices which allow the task of data entry to be performed are called input devices.

Input we use to perform the two basic computational tasks: data entry and issuing commands. The most widely used input device is the keyboard, which was adapted from the typewriter. The keyboard is the standard mean for the user to input data into the computer. Unfortunately, it is not a very satisfactory means of input because most people have little or no knowledge of the layout of a typewriter keyboard.

The keyboard itself doesn't contain any mechanism for creating printed pages. Each time a key on the keyboard is pressed, an electronic signal is sent to the system unit indicating which key was pressed. The system unit and the software interpret this signal and take the appropriate action.

Some keys are added to terminal keyboards to fulfill special functions. The most important of these is the RETURN or ENTRY key. This is pressed by the user to indicate to the computer, by the sending of a special code, that the typed line is complete and that the computer can now analyze it. Other keys that may be present include a delete key which when pressed deletes the character just typed, special function keys that can be used for special purpose by different programs and one marked CONTROL or CTRL which also has a particular function when used with other keys. Some keyboards may also have a numeric keypad to the right of the typewriter keyboard. This may be of help when entering numeric data.

There are three keyboard layouts. The first is the standard IBM-PC keyboard. The central portion of the keyboard consists of the alphanumeric keys, that there are ten function keys (labeled F1 – F10) on the top side of the keyboard, and there is a numeric keypad, much like that found on a calculator, on the right side of the keyboard.

The function keys are keys which send special signals to the system unit. The effect of pressing a given function key will depend on the software which is currently in use.

The numeric keypad is useful when numeric data must be entered into the computer. The numeric keypad serves two roles. The 1st role is the digits, decimal points and addition and subtraction signs are active. The 2nd role is the key of the keypad are used to control the small blinking box or line on the screen which shows the user where the next typed character will be displayed. This line is known as the cursor. The cursor control keys are the arrows (left, right, up and down), PgUp , PgDn, Insert and Delete. But there are several types of pointing device that are used to move the cursor and usually work in conjunction with the keyboard. The most common pointing device is the mouse, so called because it slides over the desktop and has a wire or ‘tail’ attached to the computer.

So a mouse is a hand-held device with a small rotating ball embedded in the bottom. The mouse is an opto-mechanical input device. It has three or two buttons which control the cursor movement across the screen. Each software program uses those buttons differently. The Mouse’s primary functions are to help users to draw, point and select images on the computer display by moving the mouse across the screen. In general software programs require to press one or more buttons, sometimes

keeping them depressed or double-click them to issue changed in commands and to draw or to erase images.

The Mouse slopes gently towards the front, so fingers rest comfortably on the three (or two) buttons which respond easily, and click when pressed. Especially this feature is helpful when user must «double-click» the buttons to activate commands. Hardware installation is required to utilize the mouse.

Another pointing device is a trackball, which performs like a stationary upside-down mouse. A joystick is another pointing device, one that is usually associated with playing computer games. A light-pen is used to draw, write or issue commands when it touches the specially designed monitor or screen. It is a pen-shaped device connected by a cable to the terminal and a thin beam of light shines from the end. When the pen is pressed on the screen, the co-ordinates of the point are fed to the computer.

A scanner permits entering text into a computer. There are flat-bed scanners and hand-held scanners.

Perhaps the easiest way to enter data into a computer is by speaking, called Voice Recognition. Source data input refers to data fed directly into the computer without human intervention.

If the result of the processing is to be any use to us, the system unit must somehow convey these results to us. Devices which are used for this purpose are called output devices. Today, most outputs are visual in nature, produced by two devices: a video display screen monitor or a printer. Most computer outputs come in two forms: text and graphics. A monitor may be referred to as a cathode Ray Tube (CRT) – a vacuum tube such as the picture tube on a television set – that is used to generate the display on most monitors. Portable computers usually rely on other, less bulky, technologies, such as liquid crystal diode (LCD) or gas plasma displays. Each monitor has either a color or a monochrome display and has varying degrees of picture sharpness. The sharpness or resolution of a video display is often stated in term of the number individual dots which can be displayed on the screen. These individual dots are called pixels (picture elements). The typical display will allow 25 rows and 80 columns of textual material.

Printers are output devices which produce hardcopy. Printers come in all kinds of shapes and sizes, with varying capabilities and mechanisms for printing. The important thing is the user must be sure that the printer is appropriate to the type of output that he wishes to produce. There are

three main types of printers: a dot-matrix printer, a letter quality printer and a laser printer.

A dot-matrix printer produced output by having small pins strike a ribbon, producing a pattern of dots on the paper. A letter quality printer uses the same technology as a typewriter, with type holding the reserved images of fully formed characters striking the ribbon. Dot matrix printers can also produce both characters and graphics by building a pattern of dots.

A laser printer provides high-quality non-impact printing and offers the highest quality texts and graphics printing for the desktop. A laser printer is like a dot-matrix printer is produced by generating patterns of dots; this is done electronically, so that the pattern can be extremely fine, making the individual dots indistinguishable to the naked eye.

A letter quality printer is unable to produce both characters and graphics by building a pattern of dots, because a dot pattern is not used to produce characters. A letter quality printer allows the production of documents with a high quality of printing at a relatively low cost.

There are another types of printers. Inkjet printers transfer characters and images to paper by spraying a fine jet of ink. Like lasers, they are able to print many different types of fonts and graphics.

Other printers include plotters, that use colored pens for scientific and engineering drawing and thermal printers that use heat to form a nonimpact image on paper.

Computer output can also be sent to another machine, device or computer. Computer output task involved micrographics. Micrographics is a way to store output on a film. Output is sent to a special machine that reduces its size and records it 10 to 20 times faster than printing.

There are two methods of storing and accessing instructions or data in auxiliary storage. One is direct access and the other is sequential access.

Direct access, called random access, means the data is stored in a particular memory location. Direct access storage devices or DASD are magnetic disk drives use for auxiliary storage. There are two types of DASD: floppy disks and hard disks. Floppy disks are divided into two sizes of portable magnetic disks, which are commonly in use. The first of these is the 5.25 floppy disk. The second of these is the 3.5 floppy disk. Both these disks are called diskettes, because the disk material itself is a strong, flexible (floppy) plastic. The 5.25 disk has a heavy, but

flexible, plastic envelope that protects the actual disk. The 3.5 disk has a rigid plastic casing to protect the disk.

The capacity of disks is determined by the density with which the metallic particles are placed on the disk; so the capacity of a disk is expressed in terms of this density. A 5.25 double density disk can hold ap proximately 360K bytes, a 5.25 high density disk can hold 1.2 megabytes. A 3.5 double density disk can hold 720K bytes, a 3.5 high density disk can hold 1.44 megabytes.

Hard disks operate in a similar fashion to floppy disks, but the disk itself is made from a rigid material – often aluminum. In most personal computers the hard disk and the hard disk drive are single unit that is permanently installed. The hard disk is a sealed unit manufactured to fine tolerance, it can operate at higher speed and store more data and information than floppy disk systems. A common size for a hard disk is 40 megabytes, which can hold as much data as over double density 5.25 floppies.

On disk type storage, data is magnetically laid out in tracks and sectors. Track are concentric circles on which data is recorded. Sectors are pie-shaped wedges that compartmentalize the data into the addresses for the head to locate. Multiple head disks drives organize tracks into cylinders, a vertical stack of tracks that make it easier for the head to locate the data.

Task 1. Look up the words in the dictionary. Write them down.

English	Russian
a desktop	
to install	
a strip	
a wedge	
to slide	
to attach	
to insert	
non-impact	
a seal	
a track	
a slot	
to delete	
a keypad	

a double click to utilize a beam a pin a dot an auxiliary storage density	

Task 2. Read the text and translate it.

Task 3. Translate these word combinations into Russian:

1. input, output or storage functions
2. to be of use to us
3. basic computational tasks
4. the standard mean
5. interpret the signal
6. numeric keypad
7. central portion
8. small blinking box
9. small rotating ball embedded in the bottom
10. to transfer characters and images to paper

Task 4. Translate these into English:

1. вводное устройство
2. выводное устройство
3. клавиатура
4. результативные команды
5. выполнять специальные функции
6. напечатанный символ
7. курсор
8. двойной щелчок
9. четкость изображения
10. жидкий кристаллический диод

Task 5. Fill in the gaps necessary words:

1. A peripheral is a ..... that performs input/ output or ..... functions.
2. There must be some type of mechanism for ..... data into the computer for ..... .
3. Input is used to perform two basic computational tasks ..... and ..... .
4. There are three keyboard ..... .

5. The numeric ..... is useful when numeric data must be ..... into the computer.

6. The mouse is a ..... unit with a small rotating ball.

7. A user must ..... the buttons to activate the command.

8. The system unit must ..... the results to us.

9. Printers are ..... devices which produce ..... .

10. ..... or ..... are magnetic disk drives use for auxiliary storage.

11. The ..... of disks is ..... by the density.

12. The ..... is a sealed unit, which is installed by the manufacturer.

Task 6. Fill in the prepositions:

1. A keyboard was adapted ..... the typewriter.

2. Special function keys can be used ..... special purpose ..... different programs.

3. There are 10 function keys ..... the top side of the keyboard.

4. Numeric data must be entered ..... the computer.

5. Joystick is usually associated ..... playing computer games.

6. A scanner permits entering text ..... a computer.

7. Vacuum tube is used to generate the display ..... most monitors.

8. Micrographics is a way to store output ..... film.

9. Floppy disks are divided ..... two sizes of portable magnetic disks.

10. The capacity of disks is determined by the density ..... which the metal particles are placed ..... the disk.

Task 7. Give the definitions to the following terms:

1. input device
2. output device
3. a keyboard
4. a mouse
5. a scanner
6. a joystick
7. voice recognition
8. printer
9. hard-disk
10. floppy disk

Task 8. Which sentences don't correspond to the sense of the text:

1. Input we use to perform the two basic computational tasks: data entry and issuing commands.

2. There are a lot of kinds of keyboards. IBM manufactures a keyboard which has a split-keypad, gently sloping keyboard that fits more closely to natural position of your hands and wrists.

3. The most common pointing device is the mouse. The mouse's primary functions are to help users to draw, point and select images on the computer display.

4. There are a lot of output devices. The most convenient is when scanner, printer and fax are united together in one.

5. There are several types of auxiliary storage. Floppy disks are divided into two sizes: 5.25 floppy disk and 3.5 floppy disk.

Task 9. Answer the following questions:

1. What is the peripheral?

2. What can input units perform? Name the input units. Give them short characteristics.

3. What can the output units perform? Name them and give them short characteristics.

4. How many methods of storing and accessing instructions or data are in the auxiliary storage?

5. How many types of disks do you know? Give the features to the floppy disks, to the hard-disks?

Task 10. Fill in the gaps in the text with the appropriate words.

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

Task 11. Read the beginning of the dialogue. Think of your own ending.

- Hallo, Nick! Where are you going?

- Hallo, Tommy! I'm going to the reading room to read up for the seminar.

- Oh, I'm going to the reading room, too. I want to finish my report on computer's hardware.

- Really? Great! I'd like to ask you some questions about computers if you don't mind.

- Sure. Go ahead.

- **……..**

The following expressions might be helpful:

* I wonder … if ……... ?
* I'm not sure I'll have to check …….. .
* That's a very interesting question ..
* What else I'd like to …
* Well, let me see ……

Task 12. Write the plan for retelling and retell the text.

Text E. What is Software?

Computer Software is a set of computer programs & instructions that tell computer systems what to do. n simple language, the software is help the user to interact with the computer system in which the user gives instructions to the computer system.

The software can be used for any task, such as - playing games, ordering food, designing, coding, typing & balancing your finances. Software is usually made up of various different components. The different parts are called modules and they cover different tasks, such as - communicating with the user or managing data. Software is a general term that refers to computer applications or computer programs. Today's computer software is available in both types of work, such as - commercial and non-commercial software. AutoCAD, Microsoft Office, Adobe Photoshop, PageMaker & Video editor software are examples of commercial software. There are various types of computer software but basically two types of computer software:

System Software

Applications Software

1. System Software

System software refers to a collection of programs & instructions that enable a computer system to operate and control its hardware components. There are various types of hardware in computers system. Basically, system software provides a platform for running various types of application software. System software works as an intermediary between the computer hardware & applications software. Operating system & device drivers are examples of system software.

2. Application Software

Application software is also known as an Application or simply an App. These types of computer software are designed & developed to perform specific tasks for users.

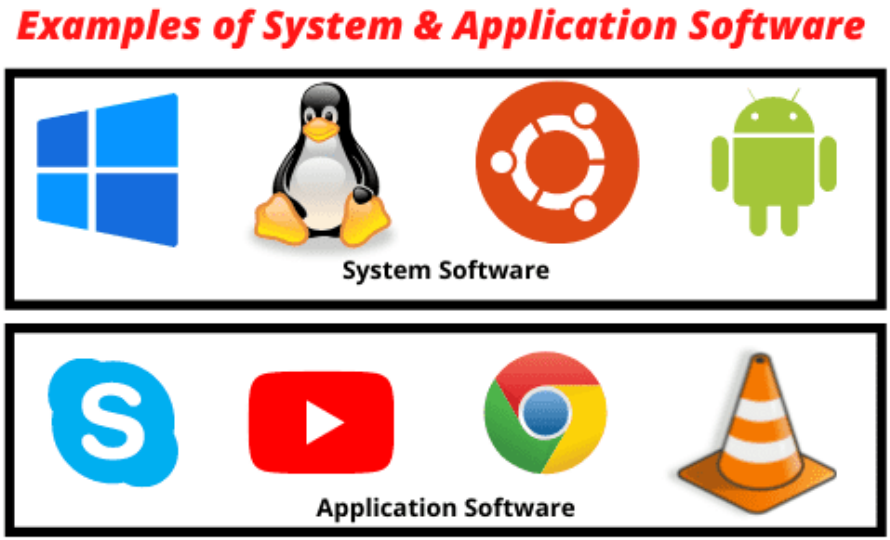
The main purpose of developing application software is to fulfill the various needs of the users. Such as - Productivity, Entertainment, Communication, Education & Data sharing.

Application software is developed for various platform users. Such as - Desktop computers, Smartphones, tablets PC, Smartwatches & Laptops.

Word processors, Web browsers, Video games, Antivirus, Photo editors, Video editors & spreadsheet software programs are examples of application software.

What are the Examples of Software?

There are various examples of computer software, which are given below.



Internet Browser
Media Player
Operating System
Photo Editor
Video Editor
Antivirus Software

Game Software
Word Processors Software
VirtualBox
TeamViewer
WinRAR
1. Web Browser

An Internet connection has become an important part of our life. This time everyone uses the internet because the internet helps to access information easily and communicate with anyone.

If you want to use the internet you need a web or internet browser because the web browser helps to access the information & other things.

A browser is an application software that lets you surf the internet, using either your Mobile phone & Computer.

Web browser helps you to download files, Access Web Applications & other things. There are different types of web browsers available now time but Google Chrome, Safari & Firefox are the most popular internet browsers. Opera & UC Browser are the most popular web browsers for smartphones. I am sure you are reading this article in Chrome, UC Browser & Opera Browser.

Internet Explorer, Google Chrome, Mozilla Firefox, Safari, Opera, Konqueror, Lynx Browser these all are examples of web browsers application software.

2. Media Player

The media player is a type of application software it is used to play all types of audio & video files. Media players are available on various devices. Such as - Personal Computer (PC), Chromebook, Mobile phones & Tablet PC.

VLC media player, Windows Media Player, MediaMonkey, Media Player Classic, iTunes & KMPlayer are examples of media players software. There are two types of media player software which are given below.

1. Audio Player

An audio player is a type of media player application software it is used to play audio files. Such as - Mp3 files, WAV, AIFF, AAC, OGG & WMA

audio files.The audio player helps to play audio songs. Without the audio player, you can not play any audio songs.

Audio player software enables the user to organize digital music, podcasts & other audio files according to their own choice. Audio player software Programs are available for various operating systems. Such as - macOS, Windows OS, iOS, Android OS & Linux OS.

2. Video Player

A video player is a type of media player software it is used to play all types of video formats. Such as - MP4, MOV, WMV, FLV, AVI & MKV. Video player software comes with different features & interfaces and these media Video player software is also able to play videos from your computer derive & Pen drive.

Nowadays most computers come with a built-in media player for playing videos but you may need additional video software if you want to do more with your video player, such as - Recording Videos & other things.

3. Operating System

An operating system (OS) is a computer's software that manages the hardware and resources of the machine.

The operating system is an important element of a computer because the operating system (OS) operates the whole computer system & controls the input & output operations of a computer.

Without the operating system computer system can not work. Every smart device has its own operating system.

It provides basic commands, such as - Opening programs or reading data from ROM Memory.

It also provides more complex commands like managing file systems and network connections. There are various components of a computer network.

Windows 11, Linux, Unix, DOS, Mac OS, Android, Chrome & Ubuntu are examples of operating system.

4. Photo Editor

Photo editing software is a type of application software it is used to modify photographs.

Photo editing software helps to be users edit their photos, such as - Enhancing or Slattering colors or Contrast, Adding artistic effects, Adjusting image resolution, Brightness, Aize, Aropping, red-eye correction & Sharpness.Today I am sure everyone uses a photo editor to edit their own photos. There are various types of photo & graphics editors available but Adobe Photoshop is the most popular photo editing software.

5. Video Editor

Video editing software is a type of application software it is used to edit videos. Video editing software can also be used for professional works, such as - Video Production & Film editing.
Video editor software helps users to produce video clips with text, graphics, animation & sound. Video editors software helps to edit videos, such as - You can easily crop the video, cut video, add filters to the video, add images to the video & add sound to the video.
There are various video editing software available but Filmora video editor software is the most popular video editor among YouTubers.

6. Antivirus Software

Antivirus software is utility software it is used to remove viruses and protect our computer system from unwanted viruses.

I strongly recommend to all of you install antivirus software on your computer system because antivirus software protects us from dangerous viruses that steal our personal information, such as passwords, Credit card detail & Internet banking detail.

Antivirus software helps you to protect yourself from a virus attack by checking your computer system for malware & removing any threats found.

There are various Antivirus software is available this time but Microsoft Defender, Norton AntiVirus, Avast, Norton 360 & Quick heal is the most popular antivirus software.

7. Game Software

Game software is a type of application software it is used to play video games. Today approx. kids & youngsters love to play video games because video games are high graphics which attract more.

There are different types of video games, such as - Games on consoles, Games on handhelds & Computer games.

Games software is necessary to play most video games. Different systems have different types of game software that can be used on them.

Grand Theft Auto, Red Dead Redemption 2, Street Fighter 6, Rocket League & Minecraft are the most popular games on computer systems.

8. Word Processing Software

Word processors are a type of application software it is used to Create, Edit & Export documents in different formats. Word processors software is also known as word processing programs or just plain word processors. There are various features of a word processor.

Word processor helps to create a document and provides a lot of features to add to your document, such as - Font style, Font size, Bullet list, Insert picture, Insert shapes, cut, copy, paste & AutoCorrect. MS Word, Google Docs, iWork Pages, OpenOffice Writer, WordPerfect & FocusWriter are examples of the word processing software.

9. VirtualBox

VirtualBox is a type of application software and this software is an open-source virtualization software it is developed by Oracle Company.

VirtualBox is an Open-source software which means this software is free at no charge to pay for use.

VirtualBox software helps to create and run virtual machines on their own computer system & user can run multiple operating systems simultaneously without the need for other computer systems.

There are various features of VirtualBox which are given below.

Guest additions.

Virtual networking.

USB device support.

Snapshot and restore.

Hardware virtualization.

10. TeamViewer

TeamViewer is a the most popular remote application software it is used to access and control Computers & Mobile phones remotely. Once the TeamViewer connection is established between the two computers user can easily do various tasks, such as - Files transfer, Chat & Fixing issue. TeamViewer software supports multiple operating systems, such as - Windows, macOS, Linux, iOS & Android.

11. WinRAR

WinRAR is the most popular file compression software it is used to compress files and folders into a single compressed archive Basically WinRAR helps to reduce the file size. WinRAR software helps to do various task, such as - File Compression, Archive Encryption, Splitting Archives, Archive Repair & Multi-volume Archives.

Task 1. Read attentively the text, make the summary in English using the following clichés:

The text / article under review ...(gives us a sort of information about...) The subject of the text is...

The article begins with the description of.., a review of..., the analysis of... The article opens with ...

In conclusion ...

Unit 4. Programming and Languages

Reading

Before you read

- **What do you know about programming and languages?**
- **What are the most popular nowadays?**

Text A. 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 I960.

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 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.

Vocabulary

English	Russian
to deal with different kinds of problems	иметь дело с разного рода проблемами
high-level languages	языки высокого уровня
a source program	программа - источник
to compile	составлять, собирать
to be interpreted into machine code	переводиться в машинный код
to result in	иметь результатом
to solve scientific and mathematical problems	решать научные и математические задачи
purpose	цель
scientific applications	научное применение
to require a simple language	требовать простого языка
to support	поддерживать
artificial intelligence	искусственный интеллект
to purchase	покупать
to meet the specifications of the users	отвечать условиям пользователей
to convert into machine code	превращать в машинный код
to be referred to as	называться
to accept	принимать
the linkage editor	редактор соединения
to link	соединять
to correspond to smb's needs	соответствовать чьим-то потребностям

Task 1. Read and translate the text.

Task 2. Give the Russian equivalents for the following word combinations: to give the right instructions; to be interpreted into machine code; to result in several instructions; to combine features of COBOL and

ALGOL; to require a simple language; to support the UNIX operating system; to meet the specifications of the users; to be converted into machine code; to fetch required systems routines; the program, directly executable by the computer.

Task 3. Give the English equivalents for the following words and word combinations: зависеть от типа решаемой проблемы; программа-источник; решать научные задачи; использоваться для коммерческих целей; искусственный интеллект; научное применение; покупать; продавец; обеспечиваться производителем; соответствовать чьим-то потребностям.

Task 4. Agree or disagree with the statements using phrases of agreement and disagreement. If you disagree, give the correct variant.

1. A source program cannot be directly processed by the computer until it has been compiled.
2. FORTRAN is not as efficient as COBOL in solving scientific problems.
3. COBOL is written using English statements.
4. BASIC was developed to help students.
5. ALGOL is used for work in artificial intelligence.
6. PL/I is used for mathematical purposes.
7. A computer needs its own compiler for the various high-level languages.
8. The compiler is a systems program which may be written only in PL/I.
9. Software packages are not written in high-level languages.
10. Different high-level languages suit different problems.

Task 5. Complete the 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. The … 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 6. Refer back to the text and find

Synonyms for the following words:

1. converted
2. buy
3. brings
4. agree with, comply with
5. rented

Antonyms for the following words:

1. lengthy
2. unchanged
3. separate
4. rejected
5. depending on

Task 7. Ask your group mates the questions about the text.

Task 8. Translate the sentences into English.

1. Инструкции сначала пишутся на одном из языков высокого уровня, в зависимости от решаемой проблемы.

2. Компьютеры могут иметь дело с разного рода задачами, если им давать правильные инструкции.

3. Когда программа, написанная на одном из языков высокого уровня, создается для выполнения особого типа работы, она называется прикладная программа.

4. Программа-источник должна быть переведена в машинный код, чтобы компьютер мог с ней работать.

5. FORTRAN используется для решения научных и математических задач.

6. COBOL был разработан для использования в коммерческих целях.

7. Программисты пишут прикладные программы так, чтобы они отвечали условиям пользователей.

8. Программные пакеты можно купить у различных продавцов, не обязательно у производителей компьютеров.

Task 9. Match the following words in column A with the statements in column B.

A	B

1. source program	a. to solve a particular problem
2. high-level languages	b. can be executed by the computer directly
3. applications program	c. program translated into machine code
4. software packages	d. connects routines with programs in memory
5. object program	e. examples are COBOL and PASCAL
6. compiler	f. directs the processes of the computer CPU and peripherals
7. systems program	g. groups of programs designed to solve a specific problem
8. operating systems	h. written in a high-level language
9. linkage editor	i. computer needs one for each high-level language
10. load module	j. deals with the running of the actual computer not with programming problems.

Task 10. Summarize the information on different high-level computer languages by completing the table below.

Language	Date of development	Purpose	Characteristics
	1959		
		Mathematical and scientific	
			Combines features of COBOL and ALGOL
BASIC			

		to support Unix operating system	
	1962		

Task 11. Complete the sentences, choosing the appropriate form of the words.

instruction, instruct, instructed, instructor

a) Our math‟s _____ 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.

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 ____.

result, results, resulting

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

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

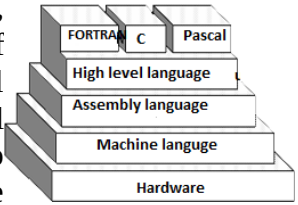
Task 12. Retell the text using conversational phrases.

Text B. Programs and programming languages

In this article, we will discuss programming languages and paradigms so that you have a complete under-standing. Let us first inspect if there any difference is.

The difference between programming paradigms and programming languages is that **programming language** is an artificial language that has vocabulary and sets of grammatical rules to instruct a computer to perform specific tasks. **Programing paradigm** is a particular way (i.e., a 'school of thought') of looking at a programming problem.

The term programming language usually refers to high-level languages, such as BASIC, C, C++, COBOL, FORTRAN, Ada, and Pascal. Each language has a unique set of keywords (words that it understands) and a special syntax for organizing program instructions. High-level programming languages, while simple compared to human languages, are more complex than the languages the computer actually understands, called machine languages. Each different type of CPU has its own unique machine language. **Assembly languages** are lying between machine languages and high-level languages. Assembly languages are similar to machine languages, but they are much easier to program in because they allow a programmer to substitute names for numbers. Machine languages consist of numbers only. Lying above high-level languages are languages called fourth-generation languages (usually abbreviated *4GL*). 4GLs are far re- moved from machine languages and represent the class of computer languages closest to human languages. Regardless of what language you use, you eventually need to convert your program into machine language so that the computer can understand it. There are two ways to do this: *compile* the program and interpret the program. A program that executes instructions **is** written in a high-level language. There are two ways to run programs written in a high-level language. The most common is to compile the program. To transform a program written in a high-level programming language from source code into object code. Programmers write programs in a form called source code. Source code must go through several steps before it becomes an executable program. The first step is to pass the source code through a compiler, which translates the high-level language instructions into object code. The final step in producing an executable program -- after the compiler has produced object code -- is to pass the object code through a *linker*. The linker combines modules and gives real values to all symbolic addresses, thereby producing machine code.



The other method is to pass the program through an interpreter. An interpreter translates high-level instructions into an intermediate form, which it then executes. In contrast, a compiler translates high-level instructions directly into machine language. Compiled programs generally run faster than interpreted programs. The advantage of an interpreter, however, is that it does not need to go through the compilation stage during which machine instructions are generated. This process can be time-consuming if the

program is long. The interpreter, on the other hand, can immediately execute high-level programs. For this reason, interpreters are sometimes used during the development of a program, when a programmer wants to add small sections at a time and test them quickly. In addition, interpreters are often used in education because they allow students to program interactively. Both interpreters and compilers are available for most high-level languages. However, BASIC and LISP are especially designed to be executed by an interpreter. In addition, page description languages, such as PostScript, use an interpreter. Every PostScript printer, for example, has a built-in interpreter that executes PostScript instructions. The question of which language is best is one that consumes a lot of time and energy among computer professionals. Every language has its strengths and weaknesses. For example, FORTRAN is a particularly good language for processing numerical data, but it does not lend itself very well to organizing large programs. Pascal is very good for writing well- structured and readable programs, but it is not as flexible as the C programming language. C++ *embodies* powerful object-oriented features, but it is complex and difficult to learn. The choice of which language to use depends on the type of computer the program is to run on, what sort of program it is, and the expertise of the programmer. Computer programmers have evolved from the early days of the bit processing first generation languages into sophisticated logical designers of complex software applications. Programming is a rich discipline and practical programming languages are usually quite complicated. Fortunately, the important ideas of programming languages are simple (See Appendix IV).

Usually, the word "paradigm" is used to describe a thought pattern or methodology that exists during a certain period of time. When scientists refer to a scientific paradigm, they are talking about the prevailing system of ideas that was dominant in a scientific field at a point in time. When a person or field has a **paradigm shift**, it means that they are no longer using the old methods of thought and approach, but have decided on a new approach, often reached through an *epiphany*.

Programming paradigm is a framework that defines how the user conceptualized and interprets complex problems. It is also is a fundamental style or the logical approach to programming a computer based on a mathematical theory or a coherent set of principles used in software engineering to implement a programming language. There are currently 27 paradigms (see the chart above) exist in the world. Most of them are of similar

concepts extending from the 4 main programming paradigms.

Programming languages should support many paradigms. Let us name 4 main programming paradigms: the imperative paradigm, the functional paradigm, the logical paradigm, the object-oriented paradigm. Other possible programming paradigms are: the visual paradigm, one of the parallel/ concurrent paradigms and the constraint-based paradigm. The paradigms are not exclusive, but reflect the different emphasis of language designers. Most practical languages embody features of more than one paradigm.

Each paradigm supports a set of concepts that makes it the best for a certain kind of problem. For example, object-oriented programming is best for problems with a large number of related data abstractions organized in a hierarchy. Logic programming is best for transforming or navigating complex symbolic structures according to logical rules. Discrete synchronous programming is best for reactive problems, i.e., problems that consist of reactions to sequences of external events. Programming paradigms are unique to each language within the computer programming domain, and many programming languages utilize multiple paradigms. The term paradigm is best described as a "pattern or model." Therefore, a programming paradigm can be defined as a pattern or model used within a soft- ware programming language to create software applications. Languages that support these three paradigms are given in a classification table below.

Imperative/ Algorithmic	Declarative		Object-Oriented
	Functional Programming	Logic Programming	
Algol Cobol PL/1 Ada C Modula-3 Esterel	Lisp Haskell ML Miranda APL	Prolog	Smalltalk Simula C++ Java

Popular mainstream languages such as Java or C++ support just one or two separate paradigms. This is unfortunate, since different programming problems need different programming concepts to solve them cleanly, and those one or two paradigms often do not contain the right concepts. A language should ideally support many concepts in a well-factored way, so that the programmer can choose the right concepts whenever they are needed

without being *encumbered* by the others. This style of programming is sometimes called multiparadigm programming, implying that it is something exotic and out of the ordinary.

Programming languages are extremely logical and follow standard rules of mathematics. Each language has a unique method for applying these rules, especially around the areas of functions, variables, methods, and objects. For example, programs written in C++ or Object Pascal can be purely procedural, or purely object-oriented, or contain elements of both paradigms. Software designers and programmers decide how to use those paradigm elements. In object-oriented programming, programmers can think of a program as a collection of interacting objects, while in functional programming a program can be thought of as a sequence of stateless function evaluations. When programming computers or systems with many processors, process-oriented programming allows programmers to think about applications as sets of *concurrent* processes acting upon logically shared data structures. Just as different groups in software engineering advocate different methodologies, different programming languages advocate different programming paradigms. Some languages are designed to support one particular paradigm (Smalltalk supports object-oriented programming, Haskell supports functional programming), while other programming languages support multiple paradigms (such as Object Pascal, C++, C#, Visual Basic, Common Lisp, Scheme, Perl, Python, Ruby, Oz and F Sharp).

It is helpful to understand the history of the programming language and software in general to better grasp the concept of the programming paradigm. In the early days of software development, software engineering was completed by creating binary code or machine code, represented by 1s and 0s. These binary manipulations caused programs to react in a specified manner. This early computer programming is commonly referred to as the "low-level" programming paradigm. This was a tedious and error prone method for creating programs. Programming languages quickly evolved into the "procedural" paradigm or third generation languages including COBOL, Fortran, and BASIC. These procedural programming languages define programs in a step-by-step approach.

The next evolution of programming languages was to create a more logical approach to software development, the "object oriented" programming paradigm. This approach is used by the programming

languages of Java™, Smalltalk, and Eiffel. This paradigm attempts to abstract modules of a program into reusable objects.

In addition to these programming paradigms, there is also the "declarative" paradigm and the "functional" paradigm. While some programming languages strictly enforce the use of a single paradigm, many support multiple paradigms. Some examples of these types include C++, C#, and Visual Basic®.

Each paradigm has unique requirements on the usage and abstractions of processes within the programming language. Nevertheless, Peter Van Roy says that understanding the right concepts can help improve programming style even in languages that do not directly support them, just as object-oriented programming is possible in C with the right programmer attitude.

By allowing developers flexibility within programming languages, a programming paradigm can be utilized that best meets the business problem to be solved. As the art of computer programming has evolved, so too has the creation of the programming paradigm. By creating a framework of a pattern or model for system development, programmers can create computer programs to be the most efficiency within the selected paradigm.

Task 1. Look up in the dictionary how to pronounce and to translate the unknown words/ keywords. Write them down in the dictionary.

Task 2. Find and learn Russian equivalents for the following words and ex- pressions:

1)constraint programming	a)
2) discrete synchronous programming	b)
3) software applications	c)
4) concurrent processes	d)
5) step-by-step approach	e)
6) external event	f)
7) assembly language	g)
8) source code	h)

Task 3. Find and learn English equivalents for the following words and expressions:

1)программа,работающаяс абстрактными типами данных	a)

2)реагирующие проблемы (изменяющие своё поведение в ответ на конкретные ситуации)	b)
3)оценочная функция без запоминания состояния о сетевых протоколах	c)
4)низкоуровневое программирование	d)
5)уязвимый для ошибок	e)
6)преобразовыватьисходные тексты программы в объектные модули	f)
7)объектный код, объектная программа	g)
8)стадия компиляции	h)

Task 4. Translate the following sentences into Russian.

1. However, it does not mean that constraint programming is restricted to CLP.

2. Data abstraction is a programming (and design) technique that relies on the separation of interface and implementation.

3. In computer science, a low-level programming language is a programming language that provides little or no abstraction from a computer's instruction set architecture.

4. Early systems were frequently error-prone and difficult to modify be- cause they made widespread use of global data.

5. Functional programming a program can be thought of as a combination of stateless function evaluations.

Task 5. Give a short summary of the text.

Unit 5. Data and Databases

Reading

- **What do you know about databases?**
- **What are the reasons for using databases?**

Text A. Databases

File and database concepts

In the broadest definition, a database is a collection of data. Today, databases are typically stored as computer files. The tasks **associated** with creating, maintaining, and **accessing** the information in these files are referred to as data management, file management, or database management. The basic element of a structured file is a field. It contains the smallest unit of meaningful information. Each field has a unique field name that describes its contents. For example, in the Vintage Music Shop database, the field name Album Title describes a field containing the name of an album, such as Hard Day's Night. A field can be variable length or fixed length. A variable-length field is like an accordion – it expands to fit the data you enter, up to some maximum number of characters. A fixed-length field contains a predetermined number of characters (bytes). The data you enter in a fixed-length field cannot exceed the allocated field length. Moreover, if the data you enter is shorter than the allocated length, blank spaces are automatically added to fill the field.

In the world of computing, a record refers to a collection of data fields. Computer databases typically display records as rows in a table or as forms. Each kind of record is referred to as a record type. It is usually shown without any data in the fields. A record that contains data is referred to as a record occurrence, or simply a record.

A structure file that contains only one record type is often referred to as a flat file. Flat files can be used to store simple data, such as names and addresses. In contrast, a database can contain a variety of different record types. A key characteristic of a database is its ability to maintain relationships so that data from several record types can be consolidated or aggregated into essentially one unit for data retrieval and reporting purposes. In database jargon, a relationship is an association between data that's stored in different record types. For example, Vintage Music Shop's Customers record type is related to the Orders record type because customers place orders.

An important aspect of the relationship between record types is cardinality. Cardinality refers to the number of associations that can exist between two record types. When one record is related to many records, the relationship is referred to as a one-to-many relationship. A many-to-many relationship means that one record in a particular record type can be related to many records in another record type, and vice versa. The relationship between record types can be **depicted** graphically with an entity-relationship diagram (sometimes called an "ER diagram" or "ERD").

Several database models exist. Some models work with all the relationships described earlier in this section, whereas other models work with only a subset of the relationships. The four main types of database models in use today are **hierarchical**, network, relational, and object oriented. The simplest database model arranges record types as a hierarchy. In a hierarchical database, a record type is referred to as a **node** or "segment". The top node of the hierarchy is referred to as the root node. Nodes are arranged in a hierarchical structure as a sort of upside-down tree. A parent node can have more than one child node. But a child node can have only one parent node.

The network database model allows many-to-many relationships in addition to one-to-many relationships. Related record types are referred to as a network set, or simply a "set". A set contains an owner and members. An owner is similar to a parent record in a hierarchical database. A member is roughly equivalent to a child record. The most popular database model today is a relational database model. It stores data in a collection of **related** tables. Each **table** (also called a "relation") is a sequence, or list, of records. All the records in a table are of the same record type. Each row of a table is equivalent to a record and is sometimes called a tuple. Each column of the table is equivalent to a field, sometimes called an attribute. Relationships can be

added, changed, or deleted on demand. An object-oriented database stores data as objects, which can be grouped into classes and defined by attributes and methods. A class defines a group of objects by specifying the attributes and methods these objects share. The attributes for an object are equivalent to fields in a relational database. A method is any behavior that an object is **capable** of performing. There is no equivalent to a method in a non-object-oriented database.

Task 1. Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.

Task 2. Mark the following statements as True or False.

1. The field is a basic element of a structured file.
2. The field contains the biggest unit of meaningful information.
3. The length of a field is always fixed.
4. Simple data, such as names and addresses, can be stored in flat files.
5. Every relation is a sequence, or list, of records.
6. Relationships can be changed or deleted on demand.

Task 3 Find and learn Russian equivalents for the following words and ex- pressions:

1)a collection of data	a)
2) database management	b)
3) meaningful information	c)
4) a fixed-length field	d)
5) a record type	e)
6) a flat file	f)
7) a key characteristic of a database	g)
8) cardinality	h)
9) a one-to-many relationship	i)
10) a root node	j)

Task 4. Translate the following sentences into Russian.

1.The basic element of a structured file is a field.

2.Each field has a unique field name that describes its contents.

3.A field can be variable length or fixed length.

4.A record refers to a collection of data fields.

5.Flat files can be used to store simple data, such as names and addresses.

6.An important aspect of the relationship between record types is cardinality.

7.A database can contain a variety of different record types.
8.The simplest database model arranges record types as a hierarchy.
9.The top node of the hierarchy is referred to as the root node.
10.Relationships can be added, changed, or deleted on demand.
Task 5. Give a short summary of the text.

Text B How databases work

People have kept track of information and data in many ways. Sometimes it was by using an elaborate file system, *a ledger*, or even a box. As computers be- come more popular and less expensive, many people find it easier to store information on the computer. The most common way to store large amounts of information with a computer is by using a database (DB) -- a structured collection of records or data that is stored in a computer system. The structure is achieved by organizing the data according to a database model. You can think of a database as an electronic filing system. A collection of information organized in such a way that a computer program can quickly select desired pieces of data.

In the early days of computing, a database generally consisted of a single file that was divided into data blocks that in turn consisted of records and fields within records. The COBOL language was (and is) particularly suited to reading, processing, and writing data in such files. This flat file database model is still used for many simple applications including "home data managers." However, for more complex applications where there are many files containing interrelated data, the flat file model proves inadequate.

In 1970, computer scientist E. F. Codd proposed a relational model for data organization. In the relational model, data is not viewed as files containing records, but as a set of tables, where the columns represent fields and the rows individual *entities* (such as customers or transactions). Relational databases usually also enforce referential integrity. This means preventing changes to the database from causing inconsistencies. For example, if table A and table B are linked and a record is deleted from table A, any links to that record from records in table B must be removed. Similarly, if a change is made in a linked field in a table, records in a linked table must be updated to reflect the change. During the 1980s, the dBase relational database program became the most popular DBMS on per- sonal computers. Microsoft Access is now popular on Windows systems, and Oracle is prominent in the UNIX world. Beginning in the 1980s, SQL

(Structured Query Language) became a widely used standard for querying and manipu- lating data tables, and most DBMS implement SQL.

All computer databases are made up of tables. These tables contain records and each record is made up of some number of fields, columns and rows which are designed to provide an organized or arranged mechanism for managing, storing and retrieving information. A field is a single piece of information; a record is one complete set of fields; and a file is a collection of records. For example, a telephone book is analogous to a file. It contains a list of records, each of which consists of three fields: name, address, and telephone number. An alternative concept in database design is known as *Hypertext*. In a Hypertext database, any object, whether it is a piece of text, a picture, or a film, can be linked to any other object. Hypertext databases are particularly useful for organizing large amounts of *disparate* information, but they are not designed for numerical analysis.

To access information from a database, you need a database management system (DBMS). This is a collection of programs that enables you to enter, organize, and select data in a database.

Increasingly, the term database is used as shorthand for database management system.

Databases are useful as one can manipulate data, update records in bulk, perform complex calculations and *retrieve* records that match particular criteria.

The collected information could be in any number of formats (electronic, printed, graphic, audio, statistical, combinations). There are physical (paper/print) and electronic databases. A database could be as simple as an alphabetical arrangement of names in an address book or as complex as a database that provides information in a combination of formats.

For instance, bibliographic databases provide a descriptive record of an item, but the item itself is not provided in the database. Information about the item is provided, including such things as author, title, subject, publisher, etc. The information provided is called a *citation.* Sometimes a short summary or abstract of the item is provided as well. Examples of bibliographic databases include the GALILEO database Social Sciences Abstracts, or the Internet Movie Database on the World Wide Web. A full-text database provides the full-text of a publication. For example, Research Library in GALILEO provides not only the citation to a journal article, but often the entire text of the article as well. "College Source Online" offers full-text of 20,000 college

catalogs, so rather than having to request a catalog from several colleges to make comparisons, you can gather information from all colleges you're interested in at one time.

Some databases provide numeric information, such as statistics or demographic information. Examples of these are (link will open in a pop-up window) Census Bureau databases and databases containing stock market information. You can also find databases that collect only image information (**EBSCOhost image collection**), audio information (MP3 or wav files), or a combination of any of the above types. CNN's site has a search option that provides access to news articles and the original video and audio files that accompanied them. Me- ta-databases are databases that allow one to search for content that is indexed by other databases. GOLD is an example of this kind of database. If you find a citation for an article in one of the bibliographic databases and want to determine if the article is available in full-text in another database, you could do a search for the journal in GALILEO in Journals A-Z to get a list of all the databases that index that specific publication.

There are thousands of different types and manufacturers of computer databases. A few common examples are Microsoft's Access, **Oracle** and **MySQL**. Some computer databases are completely free, while others cost tens of thou- sands of dollars. Databases are used around the world by nearly every business in the twenty-first century, including vast government databases that contain huge amounts of information about citizens.

If you're familiar with spreadsheets like Microsoft Excel, you're probably already accustomed to storing data in tabular form. It's not much of a stretch to make the leap from spreadsheets to databases. Just like Excel tables, database tables consist of columns and rows. Each column contains a different type of at- tribute and each row corresponds to a single record. For example, imagine that we were building a database table that contained names and telephone numbers. We'd probably set up columns named "FirstName", "LastName" and "Telephone Number." Then we'd simply start adding rows underneath those columns that contained the data we're planning to store. If we were building a table of contact information for our business that has 50 employees, we'd wind up with a table that contains 50 rows.

Databases are actually much more powerful than spreadsheets in the way you're able to manipulate data. Here are just a few of the actions that you can perform on a database that would be difficult if not impossible to

perform on a spreadsheet:

- Retrieve all records that match certain criteria
- Update records in bulk
- Cross-reference records in different tables
- Perform complex aggregate calculations

You can correlate information from multiple tables in a database by creating foreign key relationships between the tables.

Task 1. Find and learn Russian equivalents for the following words and ex- pressions:

1) flat file database	a)
2) interrelated data	b)
3) relational model	c)
4) manipulating data table	d)
5) access information	e)
6) data bulk	f)
7) physical database	g)
8) numeric information=numerical information	h)
9) pop-up window	i)
10) candidate key	j)

Task 2. Find and learn English equivalents for the following words and ex- pressions:

1) целостность ссылочных данных, ссылочная целостность	a)
2) отразить изменения	b)
3) обращаться с запросом к базе данных	c)
4) системауправления базами данных, СУБД	d)
5) библиографическая база данных	e)
6) полнотекстовая база данных	f)
7) графическая информация	g)
8) суммарные вычисления	h)

9) внешний ключ	i)
10) таблица	j)

Task 3. Translate the following sentences into Russian.

1. Some can manipulate only one collection of data-a table at a time; these database programs are called flat-file database managers.

2. When a firewall detects suspicious activity, it sends an alert in the form of a pop-up window or email to notify the computer's user or the network man- ager that someone might have tried to break in.

3. When a calculation uses an aggregate function, it's called an aggregate calculation which you create by defining a new calculated field.

4. In the context of relational databases, a foreign key is a referential constraint between two tables.

5. Referential integrity is a relational database concept in which multiple tables share a relationship based on the data stored in the tables, and that relationship must remain consistent.

Task 4. Answer the following questions.

1. What is a database?
2. What is a research database?
3. What is the difference between a database and the Internet?
4. If a database is so much like a spreadsheet, why can't we just use a spreadsheet?
5. What is DBMS?
6. What is a Database system?
7. The DBMS acts as an interface between what two components of an enterprise-class database system?
8. What are the advantages of DBMS?
9. What are the disadvantages in File Processing System?
10. Describe the three levels of data abstraction?
11. Who is MySQL named after? What does it stand for?
12. Why are there so many database models?
13. Are there undiscovered new models?
14. Is there an ultimate data model?

Text C Advantages of computer data processing

Computer-oriented data processing systems or just computer data processing systems are not designed to imitate manual systems. They should

combine the capabilities of both humans and computers. Computer data processing systems can be designed to take advantage of four capabilities of computers.

Accuracy. Once data have been entered correctly into the computer component of a data processing system, the need for further manipulation by humans is eliminated, and the possibility of error is reduced. Computers, when properly programmed, are also unlikely to make computational errors. Of course, computer systems remain vulnerable to the entry by humans of invalid data.

Ease of communications. Data, once entered, can be transmitted wherever needed by communications networks. These may be either earth or satellite-based systems. A travel reservations system is an example of a data communications network. Reservation clerks throughout the world may make an enquiry about transportation or lodgings and receive an almost instant response. Another example is an office communications system that provides executives with access to a reservoir of date, called a corporate data base, from their personal microcomputer work stations.

Capacity of storage. Computers are able to store vast amounts of information, to organize it, and to retrieve it in ways that are far beyond the capabilities of humans. The amount of data that can be stored on devices such as magnetic discs is constantly increasing. Thus the cost per character of data stored is decreasing.

Speed. The speed, at which computer data processing systems can respond, adds to their value. For example, the travel reservations system mentioned above would not be useful if clients had to wait more than a few seconds for a response. The response required might be a fraction of a second.

Thus, an important objective in the design of computer data processing systems is to allow computers to do what they do best and to free humans from routine, error-prone tasks. The most cost-effective computer data processing system is the one that does the job effectively and at the least cost. By using computers in a cost-effective manner, we will be better able to respond to the challenges and opportunities of our post-industrial, information-dependent society.

Vocabulary

English	Russian
to take advantage of smth	воспользоваться ч.-л.
capability	способность, возможность

accuracy	точность, правильность
to eliminate	устранять, удалять, отменять
error-prone	подверженный ошибкам
to remain vulnerable	оставаться уязвимым
invalid data	неверные данные
communications networks	сети передачи данных/ связи
travel	перемещение, путь, ход
instant response	мгновенный ответ (реакция)
to respond	отвечать, реагировать
access	доступ, обращение
capacity of storage	объем (емкость) памяти
to retrieve	извлекать, выбирать (данные); восстанавливать (файл)
value	значение, величина
objective	цель, требование
cost-effective	экономичный; экономически оправданный
challenge	трудность, препятствие, представлять трудность

Task 1. Read and translate the text.

Task 2. Find English equivalents for these words: система обработки информации компьютером; оставаться уязвимым; недопустимые данные; легкость осуществления связи; сеть передачи информации; системы, основанные на использовании спутников; получить мгновенный ответ; наводить справки; хранилище данных; корпоративная база данных; объем памяти; запоминать огромное количество информации; извлекать информацию; добавить значимости.

Task 3. Match the terms to their definitions:

data elements	the process of entering collected into a data processing system
database	the part of the computer that receives and stores data for processing
record	a written language symbol
keyboard	a set of related facts
outputting	the most common input device

inputting	a collection of related data elements
character	directing the sequence of the operations performed
controlling	saving information for further processing
storing	the process of producing useful information
memory	meaningful collections of related characters

Task 4. Answer the questions:

1. What capabilities should data-processing systems combine when designed?
2. What are the main advantages of computers?
3. What do you know of computers accuracy?
4. What is the function of communication networks?
5. Give examples of a data communication network.
6. What do you understand by capacity storage?
7. What other values of computer data processing systems do you know?
8. What is an important objective in the design of computer data processing systems?
9. What is the most effective computer data processing system?
10. What is the best way of responding to the challenges and opportunities of our post-industrial society?

Task 5. Choose the correct answer:

1. Computer data … system gets free humans from routine error-prone tasks.

a) counting; b) computing: c) processing

2. Computers can store vast amount of information to organize it and … it.

a) to travel; b) to retrieve; c) to respond

3. The entered data can be transmitted by … networks.

a) communications; b) conversions; c) procession

4. The possibility of … is reduced if data were correctly put into the data processing system.

a) character; b) access; c) error

5. Computer data processing systems can … at a fraction of a second.
a) receive; b) respond; c) retrieve
6. Computer systems are vulnerable to the entry of … data.
a) invalid; b) invariable; c) invisible
7. As soon as data were entered into the system correctly, the human … is limited.
a) computation; b) information; c) manipulation
8. The amount of data stored on magnetic discs is constantly … .
a) decreasing; b) increasing; c) eliminating

Unit 6. The Internet Access

Reading

Before you read

- **What do you know about The Internet Access?**
- **What are the reasons for using Internet?**

Text A. The Internet or www?

The Internet has become so *ubiquitous* it's hard to imagine life without it. It's equally hard to imagine a world where "www" isn't the prefix of many of our online activities. But just because the **Internet** and the World Wide

Web are firmly **intertwined with** each other, it doesn't mean they're synonymous. Let's go back to when it all began.

Mention the history of the Internet to a group of people, and chances are someone will make a *snarky* comment about Al Gore claiming to have invented it. Gore actually said that he "took the initiative in creating the Internet". He promoted the Internet's **development** both as a senator and as vice president of the United States. So how did the Internet really get started? Believe it or not, it all began with a satellite. It was 1957 when the then Soviet Union **launched** Sputnik, the first **man-made satellite**. Americans were shocked by the news. The Cold War was at its peak, and the United States and the Soviet Union considered each other enemies. If the Soviet Union could launch a satellite into space, it was possible it could launch a *missile* at North America. President Dwight D. Eisenhower created the **ARPA** in 1958 as a direct response to Sputnik's launch. ARPA's purpose was to give the United States a technological edge over other countries. One important part of ARPA's mission was **computer science**. In the 1950s, computers were enormous devices that filled entire rooms. They had a fraction of the power and processing ability you can find in a modern PC. Many computers could only read magnetic tape or punch cards, and there was no way **to network computers** together. ARPA aimed to change that. It enlisted the help of the company Bolt, Beranek and Newman (BBN) to create a computer network. The network had **to connect** four computers running on four different operating systems. They called the network ARPANET. By October 29, 1969, the first ARPANET network connection between two computers was launched and promptly crashed. But happily, the second time around was much more successful and the Internet was born. More and more computers were added to this ever-increasing network and the megalith we know today as the Internet began to form. Although other groups were working on ways to network computers, ARPANET **established** the protocols used on the Internet today. Moreover, without ARPANET, it may have taken many more years before anyone tried to find ways to join regional networks together into a larger system. In 1973, engineers began to look at ways to connect ARPANET to the PRNET. A packet radio network connects computers through radio transmitters and receivers. Instead of sending data across phone lines, the computers use **radio waves**. It took three years, but in 1976 engineers successfully connected the two networks. Technicians joined the SATNET to the other two networks in 1977. They called the connection

between multiple networks internetworking, or the Internet for short. Other early computer networks soon joined. They included **USENET**, **BITNET**, **CSNET** and **NSFNET**. In 1990, Tim Berners-Lee developed a system designed to simplify navigation on the Internet. In time, this system became known as the World Wide Web. It didn't take long for some people to mistakenly **identify the Internet and the Web** as the same thing. The Internet is a global interconnection of computer networks; the World Wide Web is a way to navigate this massive network. In sailing terms, it's like comparing an ocean to a ship.

Most early Internet users were government and military employees, graduate students and computer scientists. Using the World Wide Web, the Internet became much more accessible. Colleges and universities began to connect to the Internet, and businesses soon followed. The creation of the World Wide Web came with the help of a man named Tim Berners-Lee. In 1990, he developed the backbone of the World Wide Web the **HTTP**. People quickly developed browsers which supported the use of HTTP and with that the popularity of computers *skyrocketed.* In the 20 years during which ARPANET ruled the Internet, the worldwide network grew from four computers to more than 300,000. By 1992, more than a million computers were connected only two years after HTTP was developed.

You might be wondering at this point what exactly HTTP is -- it's simply the widely used set of rules for how files and other information are transferred between computers. So what Berners-Lee did, in essence, was determine how computers would communicate with one another. For instance, HTTP would've come into play if you clicked the source link in the last paragraph or if you typed the http://www.iseu.by **URL** into your browser to get to our university page. But don't get this confused with Web page programming languages like **HTML** and **XHTML**. We use those to describe what's on a page, not to communicate be- tween sites or identify a Web page's location.

So, if there is any difference between www and the Internet? To answer this question, let's look at each element. Simply, the Internet is a network of networks and there are all kinds of networks in all kinds of sizes. You may have a computer network at your work, at your university or even one at your house. These networks are often connected to each other in different configurations, which is how you get groupings such as LANs and regional networks. Your cell phone is also on a network that is considered part of the

Internet, as are many of your other electronic devices. And all these separate networks added together are what constitute the Internet. Even satellites are connected to the Internet.

The World Wide Web, on the other hand, is the system we use to access the Internet. The Web isn't the only system out there, but it's the most popular and **widely used**. (Examples of ways to access the Internet without using HTTP include e-mail and instant messaging.) As mentioned on the previous page, the World Wide Web makes use of hypertext to access the various forms of information available on the world's different networks. This allows people all over the world to share knowledge and opinions. We typically access the Web through browsers, like Internet Explorer and Mozilla Firefox. By using browsers like these, you can visit various Web sites and view other online content.

So another way to think about it is to say the Internet is composed of the machines, hardware and data; and the World Wide Web is what brings this technology to life.

Task 1. Read the text and try to guess the meaning of the words in bold. Check your variants in the dictionary.

Task 2. Find and learn English and Russian the definitions for the following abbreviations

1) ARP	a)
2) ARPANET	b)
3) PRNET	c)
4) SATNET	d)
5) USENET	e)
6) BITNET	f)
7) CSNET	g)
8) NSFNET	h)
9) WWW	i)
10) HTTP	j)
11) URL	k)

Task 3. Answer the following questions and think over five more questions, which you could ask your partner about.

1. Is there any fundamental difference between the Internet and the World Wide Web?

2. Why it's so easy for us to link them together in our minds?

3. What are the advantages and disadvantages of our ever-increasing use of computer technology?

Text B. The Internet

The Internet, a global computer network which embraces millions of users all over the world, began in the United States in 1969 as a military experiment. It was designed to survive a nuclear war. Information sent over the Internet takes the shortest path available from one computer to another. Because of this, any two computers on the Internet will be able to stay in touch with each other as long as there is a single route between them. This technology, known as packet switching, in which data meant for another location is broken up into little pieces, each with its own "forwarding address" had the promise of letting several users share just one communications line. Owing to this technology, if some computers on the network are knocked out (by a nuclear explosion, for example), information will just route around them. One such packet switching network already survived a war. It was the Iraq computer network which was not knocked out during the Gulf War.

Most of the Internet host computers (more than 50%) are in the United States, while the rest are located in more than 100 other countries. Although the number of host computers can be counted fairly accurately, nobody knows exactly how many people use the Internet, there are millions, and their number is growing by thousands each month worldwide.

The most popular Internet service is e-mail. The people, who have access to the Internet, use the network for sending and receiving e-mail messages. Every person connected can communicate with anyone on the Internet, or to use any public resources available in it, to publish any documents and ideas, to sell or to buy products and online goods and services. The Internet is based on the number of protocols and services. It is first of all TCP/IP protocol. HTTP protocol is used to retrieve a hypertext, graphics, audio and video and other media content. SMTP/POP3 allows to send and to receive e-mail. XML/web services give a great opportunity for developers to the powerful client-server applications.

In many developing countries the Internet may provide businessmen with a reliable alternative to the expensive and unreliable telecommunications systems of these countries. Commercial users can communicate over the Internet with the rest of the world and can do it very

cheaply. When they send e-mail messages, they only have to pay for phone calls to their local service providers, not for calls across their countries or around the world. But who actually pays for sending e-mail messages over the Internet long distances, around the world? The answer is very simple: a user pays his service provider a monthly or hourly fee. A part of this fee goes towards its costs to connect to a larger service provider. And a part of the fee got by the larger provider goes to cover its cost of running a worldwide network of wires and wireless stations.

However, there are some problems in the Internet. The most acute one is security. When you send an e-mail message to somebody, it can travel through many different networks and computers. The data is constantly directed towards its destination by special computers called routers. Because of this, it is possible to get into any computer along the route, intercept and even change the data. In spite of the fact that there are many strong encoding programs available nearly all the information being sent over the Internet is transmitted without any form of encoding, i.e. “in the clear”

People use the Internet for different purposes. It can be used in business for providing access to complex databases; businessmen can conduct transactions and negotiations over the Internet. With the Internet it is possible to get information on nearly all the subjects, so it is very helpful for students in their study. You can also do research, download music, play interactive games, shop, talk in chat rooms and communicate with your friends using e-mail. The possibilities of the internet seem to be unlimited.

Vocabulary

English	Russian
to embrace millions of users	охватывать миллионы пользователей
to survive a nuclear war	выживать в ядерной войне
the shortest path available	самый короткий доступный путь
to stay in touch	оставаться на связи
route	маршрут
packet switching technology	технология пакетного переключения
owing to this technology	благодаря этой технологии
to be knocked out	выходить из строя
host computer	сервер

can be counted fairly accurately	может быть подсчитано довольно точно
to be based on the number of protocols and services	основываться на нескольких протоколах и услугах
to retrieve	находить, восстанавливать
to provide	обеспечивать
reliable alternative	надежная альтернатива
a monthly or hourly fee	помесячная или почасовая оплата
to cover the cost	покрывать стоимость
wires and wireless stations	проводные и беспроводные станции
an acute problem	острая проблема
to be directed towards the destination	направляться к месту назначения
router	маршрутизатор
to intercept	перехватывать
to be transmitted without any form of encoding	передаваться без какой- либо формы кодирования
encoding programs	кодирующие программы
to provide access to complex databases	обеспечивать доступ к комплексным базам данных
to conduct transactions and negotiations	- проводить сделки и переговоры
unlimited possibilities	безграничные возможности

Task 1. Read and translate the text.

Task 2. Give the Russian equivalents for the following word combinations:

information takes the shortest path available; data is broken up into little pieces; to be knocked out by a nuclear explosion; host computer; to use any public resources available; to provide businessmen with a reliable alternative; to cover the cost; the data is constantly directed towards its destination; in spite of the fact that; the information is transmitted without any form of encoding; to provide access.

Task 3. Give the English equivalents for the following word

combinations:

технология пакетного переключения; информация обойдет их; может быть подсчитано довольно точно; иметь доступ в Интернет; платить помесячную или почасовую плату; проводные и беспроводные станции; перехватывать и менять данные; сильные кодирующие программы; использовать для различных целей.

Task 4. Answer the questions to the text. Extend your answers to short situations.

1. What is the Internet?
2. What was the Internet originally designed for?
3. What does the packet switching technology mean?
4. What is a host computer? Where are most of the host computers located?
5. How many users of the Internet are there in the world?
6. The most popular Internet service is buying products and online goods and services, isn't it?
7. What is the Internet based on?
8. What possibilities does the Internet give businessmen?
9. Whom do you pay for using the Internet?
10. What kinds of fees are there?
11. Are there any problems in the Internet?
12. How can the data be protected?
13. For what purposes do people use the Internet?
14. How often and for what purposes do you use the Internet?
15. Does the Internet make our life easier? Would it be more difficult to do without it?

Task 5. Translate the sentences into English.

1. Всемирная компьютерная сеть была разработана в США в 1969г. И начиналась как военный эксперимент.
2. Интернет охватывает миллионы пользователей по всему миру, и нельзя точно подсчитать, сколько людей пользуется им.
3. Интернет основывается на нескольких протоколах и услугах.
4. Популярность Интернета растет с каждым днем по всему миру.
5. Благодаря технологии пакетного переключения, любые два компьютера в Интернете смогут оставаться на связи, пока между ними существует один маршрут.
6. Интернет может использоваться для различных целей, он даёт

безграничные возможности каждому человеку, подключенному к нему.

7. Такая сеть может выжить в ядерной войне, даже если некоторые компьютеры выйдут из строя.

8. Интернет позволяет вам оставаться на связи с вашими друзьями, которые находятся далеко от вас.

9. Многие люди пользуются самой популярной услугой в Интернете - электронной почтой, чтобы получать и отправлять электронные сообщения.

10. За пользование Интернетом мы платим помесячную или почасовую плату своему сервисному провайдеру.

11. Часть платы за Интернет составляет покрытие стоимости передачи проводных и беспроводных станций.

12. Безопасность — это одна из проблем, существующих в Интернете.

13. Маршрутизаторы направляют данные к месту назначения.

14. Если информация передается без какой-либо формы кодирования, она может быть перехвачена хакерами.

15. Чтобы защитить информацию, используйте кодирующие программы.

16. Интернет - это отличная возможность для бизнесменов получить доступ к базам данных.

Task 6. Give the summary of the text.

Task 7. Retell the text using conversational phrases.

Task 8. Work in pairs. Compose a dialogue. Discuss your using the Internet.

Task 9. Which of the activities you your friends, your parents use the Internet for?

Complete and send your chart to make a survey. Use the words:

- every day
- once a week
- never

Activity	I	My parents	My friends
Browse/surf the web			
Send/receive e-mails			
Get information about hobbies and interests			

Get product or service information			
Read the news			
Get information for schoolwork			
Get travel information			
Download images or photos			

Task 10. Translate the sentences into Russian.

1. The Internet is the greatest invention ever and it has made a significant impact on our lives.
2. Nowadays the Internet connects people all around the world.
3. Our modern life will stop without the net because it helps to make on-line business transactions, manage our bank accounts, pay our gas or electricity bills and send important e-mails.
4. The Internet is the largest source of information.
5. The Internet saves our time and money.
6. On-line chatting through social networking websites is more comfortable for Internet users with the lack of social skills.
7. We can also download our favourite movies or songs, listen to radio channels or play games.
8. We can do on-line shopping choosing the desirable thing at the best price. And then we just click "Order the delivery".
9. some people become rather addicted to it and spend all days long surfing the net, on-line dating or playing games.
10. Over-using the net can be dangerous because new technology victims start neglecting their families, friends, work and real hobbies.

Task 11. Fill in all the gaps using the words from the box.

browsers click content copyright design format Internet layout World Wide Web

Tim: Hey! What are you looking at, Barbara?

Barbara: I am taking a class called 21st Century Advertising. The teacher wants us to study different web sites to learn about web page _____.

Tim: That sounds like a great class for people who are studying business.

Barbara: It is. The _____ is the future of business. And the _____ is going to be the storefront of the next century. To be competitive, businesses have to adapt their current advertising techniques. However, creating a good web site is much more difficult than most people think.

Tim: Have you discovered anything interesting which you consider to be well designed?

Barbara: Yeah, this site is fantastic. Take a look. It's very artistic and the technical _____ is convenient and very logical. It also looks good in different _____. I have already viewed it in Microsoft Explorer and Firefox. The _____ is also fantastic; the size and shape of the text are perfect. I am going to borrow some of their techniques when I make my own web page for class.

Tim: Borrowing ideas is OK, but you have to remember that the _____ of all web pages is legally protected.

Barbara: I know. Our professor taught us about intellectual rights. He told us that _____ infringement is a real concern for people who publish on the Web.

Tim: That's right. Hey, that picture says "continue on". Why don't you _____ there so we can see the next page.

Barbara: OK.

Task 12. Read attentively the text, make the summary in English using the following clichés:

The text / article under review ...(gives us a sort of information about...) The subject of the text is...

The article begins with the description of.., a review of..., the analysis of... The article opens with ...

In conclusion ...

How do I connect to the Internet?

Once you've set up your computer, you may want to purchase home Internet access so you can send and receive email, browse the Web, stream videos, and more. You may even want to set up a home wireless network,

commonly known as Wi-Fi, so you can connect multiple devices to the Internet at the same time.

Types of Internet service

The type of Internet service you choose will largely depend on which Internet service providers (ISPs) serve your area, along with the types of service they offer. Here are some common types of Internet service.

Dial-up: This is generally the slowest type of Internet connection, and you should probably avoid it unless it is the only service available in your area. Dial-up Internet uses your phone line, so unless you have multiple phone lines you will not be able to use your landline and the Internet at the same time.

DSL: DSL service uses a broadband connection, which makes it much faster than dial-up. DSL connects to the Internet via a phone line but does not require you to have a landline at home. And unlike dial-up, you'll be able to use the Internet and your phone line at the same time.

Cable: Cable service connects to the Internet via cable TV, although you do not necessarily need to have cable TV in order to get it. It uses a broadband connection and can be faster than both dial-up and DSL service; however, it is only available where cable TV is available.

Satellite: A satellite connection uses broadband but does not require cable or phone lines; it connects to the Internet through satellites orbiting the Earth. As a result, it can be used almost anywhere in the world, but the connection may be affected by weather patterns. Satellite connections are also usually slower than DSL or cable.

3G and 4G: 3G and 4G service is most commonly used with mobile phones, and it connects wirelessly through your ISP's network. However, these types of connections aren't always as fast as DSL or cable. They will also limit the amount of data you can use each month, which isn't the case with most broadband plans.

Choosing an Internet service provider

Now that you know about the different types of Internet service, you can do some research to find out what ISPs are available in your area. If you're having trouble getting started, we recommend talking to friends, family members, and neighbors about the ISPs they use. This will usually give you a good idea of the types of Internet service available in your area.

Most ISPs offer several tiers of service with different Internet speeds, usually measured in Mbps (short for megabits per second). If you mainly

want to use the Internet for email and social networking, a slower connection (around 2 to 5 Mbps) might be all you need. However, if you want to download music or stream videos, you'll want a faster connection (at least 5 Mbps or higher).

You'll also want to consider the cost of the service, including installation charges and monthly fees. Generally speaking, the faster the connection, the more expensive it will be per month.

Although dial-up has traditionally been the least expensive option, many ISPs have raised dial-up prices to be the same as broadband. This is intended to encourage people to switch to broadband. We do not recommend dial-up Internet unless it's your only option.

Hardware needed

Modem

Once you have your computer, you really don't need much additional hardware to connect to the Internet. The primary piece of hardware you need is a modem.

The type of Internet access you choose will determine the type of modem you need. Dial-up access uses a telephone modem, DSL service uses a DSL modem, cable access uses a cable modem, and satellite service uses a satellite adapter. Your ISP may give you a modem—often for a fee—when you sign a contract, which helps ensure that you have the right type of modem. However, if you would prefer to shop for a better or less expensive modem, you can choose to buy one separately.

Router

A router is a hardware device that allows you to connect several computers and other devices to a single Internet connection, which is known as a home network. Many routers are wireless, which allows you to create a home wireless network, commonly known as a Wi-Fi network.

You don't necessarily need to buy a router to connect to the Internet. It's possible to connect your computer directly to your modem using an Ethernet cable. Also, many modems include a built-in router, so you have the option of creating a Wi-Fi network without buying extra hardware.

Setting up your Internet connection

Once you've chosen an ISP, most providers will send a technician to your house to turn on the connection. If not, you should be able to use the instructions provided by your ISP—or included with the modem—to set up your Internet connection.

After you have everything set up, you can open your web browser and begin using the Internet. If you have any problems with your Internet connection, you can call your ISP's technical support number.

Home networking

If you have multiple computers at home and want to use all of them to access the Internet, you may want to create a home network, also known as a Wi-Fi network. In a home network, all of your devices connect to your router, which is connected to the modem. This means everyone in your family can use the Internet at the same time.

Your ISP technician may be able to set up a home Wi-Fi network when installing your Internet service. If not, you can review our lesson on How to Set Up a Wi-Fi Network to learn more.

If you want to connect a computer that does not have built-in Wi-Fi connectivity, you can purchase a Wi-Fi adapter that plugs into your computer's USB port.

Introduction to Internet safety

There's almost no limit to what you can do online. The Internet makes it possible to access information quickly, communicate around the world, and much more. Unfortunately, the Internet is also home to certain risks, such as malware, spam, and phishing. If you want to stay safe online, you'll need to understand these risks and learn how to avoid them.

Adopting a safer mindset

Computers can often give us a false sense of security. After all, no one can physically harm you through a computer screen. But to stay safe online, you'll want to take a more cautious approach. Here's one way to think about it: Treat the Internet as you would a shopping mall.

Most people don't consider a mall to be an especially dangerous place. You can go there to shop and meet up with friends. But there are also small things you may do to stay safe, even if you don't think about them very often. For example, you probably wouldn't leave your car unlocked or give your credit card number to a stranger.

Apply this same mindset whenever you're online. You shouldn't be afraid to use the Internet, but remember that it comes with many of the same risks you'd face in the real world. Throughout this tutorial, we'll show you how to prepare for these risks so you can be online without putting yourself in danger.

Hacker is a term used by some to mean "a clever programmer" and by others, especially those in popular media, to mean "someone who tries to break into computer systems."

1) Eric Raymond, compiler of The New Hacker's Dictionary, defines a hacker as a clever programmer. A "good hack" is a clever solution to a programming problem and "hacking" is the act of doing it. Raymond lists five possible characteristics that qualify one as a hacker, which we paraphrase here:

• A person who enjoys learning details of a programming language or system

• A person who enjoys actually doing the programming rather than just theorizing about it

• A person capable of appreciating someone else's hacking

• A person who picks up programming quickly

• A person who is an expert at a particular programming language or system, as in "UNIX hacker"

Raymond deprecates the use of this term for someone who attempts to crack someone else's system or otherwise uses programming or expert knowledge to act maliciously. He prefers the term cracker for this meaning.

2) The term hacker is used in popular media to describe someone who attempts to break into computer systems. Typically, this kind of hacker would be a proficient programmer or engineer with sufficient technical knowledge to understand the weak points in a security system.

A cracker is someone who breaks into someone else's computer system, often on a network; bypasses passwords or licenses in computer programs; or in other ways intentionally breaches computer security. A cracker can be doing this for profit, maliciously, for some altruistic purpose or cause, or because the challenge is there. Some breaking-and-entering has been done ostensibly to point out weaknesses in a site's security system.

The term "cracker" is not to be confused with "hacker". Hackers generally deplore cracking. However, as Eric Raymond, compiler of The New Hacker's Dictionary notes, some journalists ascribe break-ins to "hackers."

A classic story of the tracking down of a cracker on the Internet who was breaking into U.S. military and other computers is told in Clifford Stoll's The Cuckoo's Egg.

Unit 7. Protection Information

Reading

Text A. Protection of information

1. Rapid development of automation processes and the penetration of the computers in all fields of life have led to appearance of a range of peculiar problems. One of these problems is the necessity of providing effective protection to information and means of its processing.

2. A lot of ways to access information, considerable quantity of qualified specialists, vast use of special technical equipment in social production makes it possible for violators practically at any moment and in any place carry out the actions, which represent a threat to information safety.

3. Particular role in this process has been played by appearance of personal computer (PC), which has made computers, software and other informational technologies available to general public. Wide distribution of PC and impossibility of conducting effective control of their use have resulted in the decreasing security level of information systems.

In the current situation, data processing has moved the problems of information security forward to the rank of most important problems of national economy. Solving the problem of poor information security presupposes a complex of measures. First of all, such actions of government as development of classification system, documentation of information and protection methods, data access regulations and punishing measures against information security violators.

State informational sources

4. Formation of state informational sources is carried out by citizens, state authorities, organizations and social unions. Documents, which belong to a person, can be included in the state structure of informational sources, of course, if the person wishes. State informational sources are open and generally available. Documented information with limited access is divided into state secret and confidential information.

Citizen information (personal information)

5. Personal data refers to confidential information. The collection, storage, use and distribution of private information are not allowed. The information, which breaks personal and family secret, secret of correspondence, telephone, postal, telegraph talks and other messages of a person without his/her permission, is also confidential. Personal data may not

be used with purpose of causing damage to person's property and reputation, difficulties of realization its right. Collected data must be limited to necessary information. The information, which carries strong probability of causing damage to a citizen's interests shouldn't be collected.

There are some categories of personal information:

secret documents;

official department rules and instructions;

information, which is not to be made public in accordance with legislative acts;

confidential business information;

information, which touches private life of a person;

information of financial institutions;

Development and production of informational systems

6. All types of informational systems and networks, technologies and means of their providing compose a special branch of economic activity, whose development is defined by the state scientific, technological and industrial policy of informatization.

State and non-state organizations and, of course, the citizens have equal rights in terms of access to the development and producing of informational systems, technologies.

Owner of informational systems

7. The informational systems, technologies and means of their providing can be the property objects of juridical person, non-juridical person and state. The owner of informational system is a person, who purchased these objects or got as a gift, heredity or by any other legal way. The informational systems, technologies and means of their providing can be considered as a good (product), if the producer rights are not broken. The owner of informational system determines the using conditions of this product.

Copyrights and property rights

8. Copyrights and property rights on informational systems, technologies and means of their providing can be belong to different persons. The owner of informational systems has to protect copyrights in accordance with legislation. Informational systems and databases, intended for citizens' and organizations' informational service, are subjected to certification according to the established custom. The organizations, which work in the field of making design, producing the means of information protection and

personal data treatment, must obtain licenses to conduct such activity. The steps for obtaining license are defined by the legislation.

Task1. Find English equivalents of the following words and word co mbinations*:* представлять угрозу информационной безопасности, предлагает комплекс мер, способы защиты, средства обработки, широкое распространение ПК, решить проблему, штрафные меры, осуществлять эффективный контроль, нарушители информационной безопасности, общественное производство, проникновение компьютеров во все сферы жизни, необходимость обеспечить эффективную защиту.

Task 2. Say whether the following statements are true or false.

1. State organizations have more legal rights than non-state ones in terms of access to the development and producing of informational systems, technologies

2. Documents which belong to a person can be included in the state structure of informational sources if it is necessary for the state.

3. The owner of informational systems is a person who got it by any legal way.

4. Informational systems and databases, intended for citizens' and organizations' informational service, are not obligatory subjected to certification.

5. The informational systems, technologies and means of their providing can be considered as a good.

6. The organizations, which work in the field of making design, producing the means of information security and personal data must obtain licenses.

Task 3. Complete the following sentences choosing the most suitable variant.

1.The development of computer technology has moved the problems of information security to the rank of …

a) most serious problems of industrial policy

b) most important problems of national economy

c) most significant problems of economic activity

2. The collection, storage, use and distribution of private information …

a) are permitted for employers

b) are carried out by state institutions

c) are not allowed by the law

3. The development of data processing technology has led to the appearance of …

a) official department rules and instructions

b) information of financial institutions

c) the necessity of providing effective protection to information

4. The fact of great number of computer users means …

a) the definite risk to security

b) poor quality of processing of information

c) slower access to data resources

5. The organizations, which work in the field of making design, producing the means of information protection and personal data treatment must …

a) determine the using conditions of their product

b) use new informational services at homes

c) obtain licenses to conduct such activity

Task 4. Answer the questions.

What information is considered confidential?

How may personal data be used?

What are the categories of personal information?

Task 5. Translate the sentences into English.

1. Информационная безопасность является процесс защиты информации.

2. Многие предприятия исключительно на основе информации, хранящейся в компьютерах.

3. Персональные данные сотрудников, списки клиентов, заработная плата, банковские реквизиты, маркетинг и продажи информации может быть сохранены в базе данных.

4. Системы информационной безопасности должны быть реализованы для защиты этой информации.

5. Набор процедур и систем необходимо применять эффективного сдерживания доступа к информации.

Task 6. Speak about the significance of protection of information.

Text B. Tips for personal information protection

Protecting your personal information can help reduce your risk of identity theft. There are four main ways to do it: know who you share information with; store and dispose of your personal information securely, especially your Social Security Number; and maintain appropriate security on your computers and other electronic devices.

Before you share information at your workplace, a business, your child's school, or a doctor's office, ask why they need it, how they will safeguard it, and the consequences of not sharing.

Be Alert to Impersonators

Make sure you know who is getting your personal or financial information. Don't give out personal information on the phone, through the mail or over the Internet unless you've initiated the contact or know who you're dealing with. If a company that claims to have an account with you sends email asking for personal information, don't click on links in the email. Instead, type the company name into your web browser, go to their site, and contact them through customer service. Ask whether the company really sent a request.

Safely Dispose of Personal Information

Before you dispose of a computer, get rid of all the personal information it stores. Use a wipe utility program to overwrite the entire hard drive.

Before you dispose of a mobile device, check your owner's manual for information on how to delete all the information permanently, and how to save or transfer information to a new device. Remove the memory or subscriber identity module (SIM) card from a mobile device.

Encrypt Your Data

Keep your browser secure. To guard your online transactions, use encryption software that scrambles information you send over the internet. A "lock" icon on the status bar of your internet browser means your information will be safe when it's transmitted. Look for the lock before you send personal or financial information online.

Keep Passwords Private

Use strong passwords with your laptop, credit, bank, and other accounts. Be creative: think of a special phrase and use the first letter of each word as your password. Substitute numbers for some words or letters. For example, "I want to see the Pacific Ocean" could become 1W2CtPo.

Protect your passwords. The longer the password, the tougher it is to crack. Use at least 10 characters; 12 is ideal for most home users. Mix letters, numbers and special characters. Try to be unpredictable - don't use your name, birthdate or common words. Don't use the same password for many accounts. If it's stolen from you it can be used to take over all your accounts. Don't share passwords on the phone, in texts or by email. Legitimate companies will not send you messages asking for your password. If you get such a message, it's probably a scam.

Don't Overshare on Social Networking Sites

If you post too much information about yourself, an identity thief can find information about your life, use it to answer 'challenge' questions on your accounts, and get access to your money and personal information. Consider limiting access to your networking page to a small group of people. Never post your full name, Social Security number, address, phone number, or account numbers in publicly accessible sites.

Secure Your Social Security Number

Keep a close hold on your Social Security number and ask questions before deciding to share it. Ask if you can use a different kind of identification. If someone asks you to share your SSN or your child's, ask: why they need it, how it will be used, how they will protect it, what happens if you don't share the number.

The decision to share is yours. Sometimes you will have to share your number. Your employer and financial institutions need your SSN for wage and tax reporting purposes. A business may ask for your SSN so they can check your credit when you apply for a loan, rent an apartment, or sign up for utility service.

Keep Your Devices Secure

Use Security Software

Install anti-virus and anti-spyware software, and a firewall. Set your preference to update these protections often. Protect against intrusions and infections that can compromise your computer files or passwords by installing security patches for your operating system and other software programs.

Avoid Phishing E-mails

Don't open files, click on links, or download programs sent by strangers. Opening a file from someone you don't know could expose your

system to a computer virus or spyware that captures your passwords or other information you type.

Be Wise about Wi-Fi

Before you send personal information over your laptop or smartphone on a public wireless network in a coffee shop, library, or other public place, see if your information will be protected. If you use an encrypted website, it protects only the information you send to and from that site. If you use a secure wireless network, all the information you send on that network is protected.

Lock Up Your Laptop

Keep financial information on your laptop only when necessary. Don't use an automatic login feature that saves your user name and password, and always log off when you're finished. That way, if your laptop is stolen, it will be harder for a thief to get at your personal information.

Read Privacy Policies

Yes, they can be long and complex, but they tell you how the site maintains accuracy, access, security, and control of the personal information it collects; how it uses the information, and whether it provides information to third parties.

Task 1. Find English equivalents in the text.

Поддерживать необходимую безопасность; оставаться настороже; использовать шифровальное программное обеспечение; общедоступные сайты; зашифрованные сайты; рассекретить компьютерные файлы; безопасная беспроводная сеть; подавать (заявку) на кредит; общественная беспроводная сеть; программа очистки жесткого диска; «проверочный» вопрос.

Task 2. Learn the following expressions by heart.

To maintain appropriate security; expired charge cards; install security patch; contact a company through customer service; to be tough to crack; legitimate company; rent an apartment; to limit access to the resource; to share the information; to log off from the sites; publicly accessible sites; download unknown programs; compromise your computer files.

Task 3. Make up a sentence with each of the expressions from Task 2.

e.g. *to restrict access to -*

This company has restricted access to this kind of sites for all its employees.

Task4. Work in pairs. Practice giving advice to a non IT expert on

protecting their computer.

Task 5. Give a short summary of the text.

Unit 8. IT Jobs

Reading.

Text A Jobs in information technology

If you love technology and you're looking for a job with high pay and a robust occupational outlook, you're in luck. The tech sector is booming, and IT occupations are expected to continue to grow over the next decade. These jobs also pay far more than the median wage for all occupations.

People with jobs in information technology (IT) use computers, software, networks, servers, and other technology to manage and store data. IT job titles can vary significantly from one company to another. For instance, one company may recruit a "developer" while another company recruits a "programmer" — but the work may be precisely the same at the two companies, despite the job title variation. Also, many of the skills in this field are transferable, which means candidates may be qualified for many different roles.

Information Technology Job and Education Requirements

Some IT jobs with higher pay require that candidates have a bachelor's degree, ideally in computer science, software engineering, etc. Some employers care more about the quality of your work than they do about your formal education. As such, many different kinds of IT jobs (such as coding-related or software programming) evaluate candidates based on their portfolio

Information Technology Job Titles

Below is a list of some of the most common job titles from the IT industry, as well as a description of each. For more information about each job title, check out the Bureau of Labor Statistics' Occupational Outlook Handbook.

Cloud Computing Engineers

Cloud computing engineers define, design, build, and maintain systems and solutions leveraging systems and infrastructure managed by cloud providers such as Amazon Web Services (AWS) and Microsoft Azure.

- Cloud Architect
- Cloud Consultant

- Cloud Product and Project Manager
- Cloud Services Developer
- Cloud Software and Network Engineer
- Cloud System Administrator
- Cloud System Engineer

Computer Network Specialists

Computer network specialists and analysts define, design, build, and maintain a variety of data communication networks and systems. They typically have a bachelor's degree in computer science or a related field..

- Computer and Information Research Scientist
- Computer and Information Systems Manager
- Computer Network Architect
- Computer Systems Analyst
- Computer Systems Manager
- Senior Network System Administrator
- Telecommunications Specialist

Computer Support Specialist

Computer support specialists and network administrators help computer users and organizations. Some of these workers support computer networks by testing and evaluating network systems and ensuring that the day-to-day operations work. Others provide customer service by helping people with their computer problems..

- Desktop Support Manager
- Desktop Support Specialist
- Help Desk Specialist
- Help Desk Technician
- IT Support Manager
- IT Support Specialist
- IT Systems Administrator
- Senior Support Specialist
- Senior System Administrator
- Support Specialist
- Systems Administrator
- Technical Specialist
- Technical Support Engineer
- Technical Support Specialist

Database Administrator

Database administrators help store and organize data or companies and/or customers. They protect the data from unauthorized users. Some work for companies that provide computer design services. Others work for organizations with large database systems, such as educational institutions, financial firms, and more. Data Center Support Specialist

- Data Quality Manager
- Database Administrator
- Senior Database Administrator

Information Technology Analysts

IT analysts are responsible for designing and implementing organizational technology for businesses. They create solutions for collecting and analyzing market data, customer input, and client information.

- Application Support Analyst
- Senior System Analyst
- Systems Analyst
- Systems Designer

Information Technology Leadership

Leadership in IT draws from candidates with strong technology backgrounds and superior management skills. They have experience in creating and implementing policies and systems to meet IT objectives, and the ability to budget the time and funds necessary.

- Chief Information Officer (CIO)
- Chief Technology Officer (CTO)
- Director of Technology
- IT Director
- IT Manager
- Management Information Systems Director
- Technical Operations Officer

Information Security Specialist

The increased incidence of security breaches and the associated danger of identity theft has enhanced the importance of protecting data on commercial and governmental sites. Information security analysts help defend an organization's computer network and computer systems.

They plan and carry out a variety of security measures, such as installing and using software, and simulating cyber-attacks to test systems..

- Information Security
- Security Specialist

- Senior Security Specialist

Software/Application Developer

Software developers design, run, and test various computer programs and applications. Application Developers create new applications and code solutions. They usually have a bachelor's degree in computer science or a related field. Application Developer

- Applications Engineer
- Associate Developer
- Computer Programmer
- Developer
- Programmer Analyst
- Senior Applications Engineer
- Software Architect
- Software Developer
- Software Engineer
- Software Quality Assurance Analyst
- System Architect
- Systems Software Engineer

Web Developer

Web developers design, create, and modify websites. They are responsible for maintaining a user-friendly, stable website that offers the necessary functionality for their client's needs. Some jobs require a bachelor's degree, while others need an associate degree, including classes in HTML, JavaScript, or SQL.

- Front End Developer
- Senior Web Administrator
- Senior Web Developer
- Web Administrator
- Web Developer
- Webmaster

Task 1. Read, translate, write out key words in the text, learn.

Task 2. Give the Russian equivalents for the following word combinations:

information technology; design; create; modify; various computer programs and applications; organization's computer network and computer systems; protect the data from unauthorized users;cloud providers; computer network specialists;carry out a variety of security measures.

Task 3. Make up the sentences.

1) is sector booming tech The
2) Web design developers create modify and websites.
3) computer have a bachelor's They degree usually in science
4) code Application create Developers new and applications solutions.
5) from IT job can titles company vary significantly one to another.

Task 4. Find and learn English and Russian the definitions for the following word combinations:

1.Web developers	a)help defend an organization's computer network and computer systems.
2.Software developers	b)design, create, and modify websites.
3.Information security analysts	c)are responsible for designing and implementing organizational technology for businesses.
4.IT analysts	d)help store and organize data or companies and/or customers.
5.Database administrators	e)design, run, and test various computer programs and applications.
6. Computer security specialist	f)designs and develops the components of a computing system, microprocessors, sound boards, etc.
7. Help desk technician	g)takes care of communication networks, such as local area networks (LANs), wide area networks (WANs), and intranets.
8. Web designer	h)designs and maintains websites, updates their content.
9. Software engineer	i)communicates with end users dealing with their computer errors, internet connectivity, and other

	problems to be troubleshot.
10. Network engineer	j)carries out measures to make computers more secure and prevent systems crashes.
11. Computer engineers/hardware engineer	k)manages computer hardware and software that comprises a network.
12. Network Architect	l)writes computer programs, the computer codes.

Task 5. Find a mistake in each sentence.

1. An Information Technology (IT) specialist is a person who work with computers and other technologies such as telephones and fax machines.
2. Many companys have someone on staff who helps with the maintenance of computers and computer networks within the organization.
3. He or she may also work for a independent consulting company
4. A person can to come to him to pay him for help with a computer.
5. In a company, an IT specialist may serve much roles and functions.

Task 6. Give a short summary of the text «Top 10 Jobs in Information Technology»

Text B Business ethics.

Business or professional ethics are standards or codes of conduct set by people in a specific profession. A code of ethics is a part of the expectations of those involved in many different types of professions. People in a profession don't want to condone bad, dishonest or irresponsible behavior if it does occur by someone in their field. By setting out expected behaviors in the form of professional ethics, professionals work together to try to uphold a good reputation. Professional ethics are commonly known as ethical business practices.

Respect and honesty are the two main components of professional ethics. All employees are expected to represent a business ethically as they are a part of it. This is why businesspeople traditionally speak of "we" or "us"

rather than the more personal "I" for the most part. For instance, if an employee must mention company policy to a customer, he or she may say "I'm sorry, but this is our company policy in these situations." Policies are another type of preferred standards in how business is done, and everyone in a company is expected to represent them.

It should be noted that people within each profession are expected to be respectful and honest in their personal dealings as well. For instance, it would be unethical for law enforcement professionals to also be criminals in their time off the job. Professionals are also expected to uphold ethics by not getting involved in any type of conflict of interest. A conflict of interest situation may occur when an individual tries to accomplish personal goals as a result of being in a certain profession. For example, a politician who uses government resources to get work done on his personal home could be seen as being involved in a conflict of interest.

Professional ethics training is often included in career education programs. For instance, medical assistants are trained on the many ethics issues regarding patient confidentiality. It is both unethical and unlawful to discuss a patient's health records with others who are not involved in the medical care of the individual.

Engineering, journalism, religious organizations and many other professions have professional ethics. These ethical codes or rules must never go against laws, but rather often coordinate with them as in the case of medical record confidentiality. In general, these ethics always include upholding honesty and respect in the profession over personal needs, conflicts or biases. A bias is a personal belief such as prejudice toward a certain group of people.

Task 1. Read, translate, write out key words in the text, learn.

Task 2. Fill in the gaps.

Business Etiquette Rules

1. arrive time Always on 2. Dress 3. names Pay to attention 4. others Introduce 5. appropriately Maintain contact eye 6. paying Give that you attention clues are 7. interrupt Don't 8. emails Double- your check 9. gossip Avoid 10. workplace tidy Keep your

1.

contact politely impression handshake skills

Eye … can be an important indication of your communication and body language ….. It tells what cannot be said, like how interested you are in the conversation. Along with a firm …, eye contact can build a great first …. .

Making and maintaining eye contact …. is about duration. Keep it long enough to show you're paying attention to your coworkers but short enough to avoid being rude.

2.

visual dressing personality looks code

Humans are naturally ….beings, so even if people you meet don't consciously judge you based on …, …. appropriately still creates an impression as much as your words and actions. Dressing like a professional you aspire to be is proper etiquette that impacts how credible you look.

Dress appropriately is by being aware of your activities. There's always a proper dress …for any occasion. At the office, match your dress code to meet the company policy while expressing your….

3.

clean working organized workers clutter

It's easy to get lost in your work and not mind your ….area. However, it's also important to remember that you're sharing the office with other ….. This is about keeping your desk …, which affects productivity. To maintain an organized workplace, start by making a place for everything you do need, and get rid of anything you don't. Use book organizers, minimize …., or go paperless. Always … your desk after you are done for the day.

4.

introduce introduction coworkers growth details

The strong skill of …. can lead to more opportunities for your professional …. It helps build relationships among … and widens your business network.

This skill applies whenever you're meeting with a new group of people, for example, during a networking session. Getting to know everyone can get overwhelming, and you can be the one to …them around.

When introducing others, what matters is the current social situation you're in. Make sure to understand their seniority or status and adjust accordingly. Introduce them with more than their names by including

professional and even some …, as long as it's brief and within the context of the conversation.

5.

Remembering names organization appreciated name loyalty conversation

During social interaction, a person's … is usually the first thing you learn about someone. Paying attention and memorizing their …. shows your sincerity and how involved you are in the conversation.

… names right away generally leads to people respecting and liking you more. Colleagues, employees, and coworkers will feel more …. For customers, mentioning and remembering their names makes them feel important and valued which helps build… .

Memorizing names can be challenging, especially in a big ….. Overcome this by repeating the person's name during your first interaction. Mention their names a few times in a….. Alternatively, keep their business cards to help memorize their names and details.

6.

position understand interrupting talk listen

Doing this is merely polite and shows respect to your colleagues. Without specific purposes, …. others when talking or working isn't proper etiquette in any scenario.

If you're ever in the opposite …., avoid interrupting the other part. Instead, make them …. your position by staying in the conversation and constructively communicating your point of view. Practice this on any interaction to understand the difference between speaking up and interrupting others. Know when to …. and when to … to everyone else. In an argument, don't interrupt by controlling your emotions.

7.

tasks office punctuality respect time meeting money punctual

In business, …really is …! ….applies to situations like coming to the …., attending a …., or finishing your ….

Timely arrivals tell a lot about your behavior and manners. Arriving on time for meetings shows that you …. the attendants. As a result, you gain mutual respect. Additionally, being … adds professionalism and shows that you take responsibility.

9.

gaps personal unprofessional distractions

Naturally, office gossip between coworkers reflects …. behavior. Gossiping in the workplace creates …between employees that eventually affect the efficiency of their collaborations.

Gossiping tends to start with one person, so it helps to keep … thoughts to yourself and not overshare. Don't create unnecessary … from work. Consider how you behave as a part of the group.

9.

listen opinions smiling gestures body

Through simple gestures or replies, paying attention tells people that you care and value their … . Most of the time, showing attention is about your … language. Actively … to the person you talk to by nodding your head, …, or giving …. that show responses. It's also about taking turns, where you wait until they finished talking before replying.

10.

interactions check send misunderstandings

Business etiquette applies to digital communication just as much as to real-life …. Being able to write great business emails is an art form by itself, but even simply proofreading your emails can go a long way. Proofreading can be a tedious task. So, save time by having email templates. Consider using online tools to …. the grammar and make sure no typos sneak in.

Double (or triple!) check your emails before hitting that " …" button to avoid …., especially considering how delicate words can be.

Task 3. Translate the words. Write your advice to each word.

1. Reliability
2. Dedication
3. Discipline
4. Productivity
5. Cooperation
6. Integrity
7. Responsibility
8. Professionalism
9. Self-Motivation
10. Flexibility

Task 4 . Make up the word combinations. Write your examples.

perform	sure
make	responsibilities
be	the fact
take	chain
accept	time
financial	the tasks
organizational	forward in the job
to waste	growth
irresponsible	productive
move	people

Task 5. Fill in the gaps.

1.Your employer and colleagues should be able to rely … you to do a specific job at your particular role.

2. Your bosses and colleagues can depend upon you to do work … time and to everyone's satisfaction.

3. Dedication to your job is another work ethic that employers look ….

4. Dedication consists … a lot of factors.

5. Discipline means arriving … the office or workplace … schedule.

6. Cooperation is the manner by which you interact … other team members.

7. You'll comply with all the rules and regulations … the company.

8. Employees that take responsibilities are usually good leaders and excel … their work.

9. And they take responsibilities … their team members too.

10. An employee … a high level of professionalism will always strive … maximum perfection at their jobs.

Task 6. Find a mistake in each sentence.

Reliability

The first and foremost work ethic that you should had is reliability. This mean, your employer and colleagues should be able to rely on you to do a specific job with your particular role.

Any organization is like a chain made out of links. And you're one of the links in this organizational chain. Therefore, you're equally if not most important than

When you will be reliable, you won't be the weaker or unreliable link in this large chain. Therefore, your bosses and colleagues can to depend upon you to do work on time and to everyone's satisfaction.

Reliability is most important in teamwork. Colleagues on your team can rely upon you to perform to your fullest, which means that any project or assignment would be complete on time and in a professional manner.

Task 7. Complete this e-mail with am, is, are, their, our or my.

My name_____Jessica Martin and I____the IT support team leader. The IT support team members_____: Mahmoud Al Banaway, Eli and Guido_____system maintenance officers___job is to keep our system going____job is to support you. _____contact number_____675 567 567. Bets regards.

Task 8. Read the team introduction. Complete the description with the IT jobs in the box.

Hi! I'm Silvia. I create usernames and passwords and I set firewalls. This is Isabelle. Her job is to plan and design the network. And this is Andrew. His job is to make sure all of the computers work properly. Finally, Mark and Latika. Their area is data processing. We all work for the university. Our offices are in building 8.

database analyst network architect IT support officer network administrator

1.Sylvia is a _____

2 Isabelle is a _____

3 Andrew is an _____

4 Mark and Latika are____

Task 9. Work with a groupmate to discuss the following:

1. Are there many different jobs in IT? How much status do these jobs have in our country?

2. Can you name the specialists in the sphere of IT? How important/useful do you think they are?

3. Do you know their responsibilities and tasks?

4. Approximately how much are people paid for these jobs in Russia and abroad? Do you think they should be paid more or less money? Why?

5. Which adjectives would you use to describe the jobs in IT?

Task 10. Role play ‘‘Job Interview’’. Act any of three situations: Role A - an applicant, Role B – an interviewer.

Role A

You apply for a position of a web designer of a big international company.

You’ve designed lots of websites.

All of your projects were pretty creative and successful.

You’ve worked for Kaspersky company and a few small organizations. You’re already familiar with HTML and are learning XML.

Now you prefer teleworking as you have to study at the University.

Role B

You’re the head of the HR department of a big international company.

You’re looking for a part time web designer (teleworking is possible). Candidate responsibility:

1) to maintain and update the website of the company, including English version;

2) to create unique websites for your company VIP clients;

3) must be well-versed in languages like PHP and Java and have the ability to create scripts or web pages.

Interview a candidate. Ask him/her about work experience and skills you’re interested in announce your decision about him/her employment.

Role A

You apply for a position of a network designer of a multinational

Role B

You’re the head of the R&D of a multinational

organization.

You've got the university degree (Engineering) with honors not long ago.

You've had some experience in switching and transmission while being a graduate trainee.

You're looking for a challenging position with a fast-expanding company in telecommunication, which will appreciate your leadership qualities and strong communication skills.

You speak fluent English, German and have basic knowledge in Chinese.

organization 'Anglo Telecom'. Due to company expansion you now need a Network Designer to work on your 21st century development project and be involved in all areas of the project.

Requirements for a network designer:

1) to know and work on a wide range of networking technologies;

2) to work effectively in a team;

3) to have a university qualification in Telecommunication Engineering or a related subject;

4) to have an experience of working with different cultures.

Interview a candidate. Ask him/her about work experience and skills you're interested in announce your decision about him/her employment.

Task 11. Describe job responsibilities of different IT specialists. Use the following patterns:

1. I'm going to become a…. I'll have to….
2. If you are a/an…, you have to….
3. My father's/ friend's/ brother's/ sister's profession is…. He/she is responsible for…. His/ her tasks/ duties are... .

Task 12. Work in groups. Rank the things you want from a jo- 1 = most important, 10 = least important.

■ a high salary ■ flexible working hours ■ responsibility ■ interest or enjoyment ■ a nice office ■ telecommuting ■ long holidays ■ working with people

■ security ■ excitement/risk ■ good benefits, e.g. a company car, gym membership

Task 13. Read the list of IT jobs. Which one is in demand nowadays? Which one is the most popular? Could you enlarge the list?

IT support technician, software developer, database administrator, network administrator, helpdesk officer, technical analyst, security officer, website developer, network architect, data storage consultant, network engineer, IT trainer, systems analyst, test engineer, infrastructure engineer, computer hardware engineer, computer system maintenance engineer, SPSS analyst, Java Software engineer.

Task 14. What is your dream job? Write a job description for the job of your choice.

Job_____

Company to work for_____

Responsibilities_____

Task 15. Read IT Specialist Resume and write your future resume.

Alexey I. Maximov

123456, Moscow,
Lenin St. 1, apt.2
Tel. home: (495) 555-55-55
Tel. mobile: 8-XXX-555-55-55
E-mail: aleksey@nail.ru
Date of Birth: July 15, 1973
Objective:

To obtain a position of IT Specialist, Supply Support Engineer, Technical Support Engineer, Technical Representative and any position related to software and hardware of end-user system support.

Education:

1989 – 1995

Moscow Institute of Radioengineering, Electronics and Automatics (MIREA). Graduate as an Engineer Of Electronic Engineering

Work Experience:

1995 to present

Working as a chief specialist in Scientific Technical Centre "SYSTEMA" of Federal Agency of Government Media under the President of the Russia Federation.

Responsibilities: programming, supporting, of end-user system, preparing documentation for software, design of software interface, participation in international exhibition. Producing Power Point presentations of software Computer articles, software documentation translation (Eng-Rus, Rus-Eng). Two patents for created products.

Computing Skills:

MS Windows (3.11, 95, 98, XP) MS Word (6.0, 7.0, 97), MS PowerPoint, MS Excel, Internet (all popular browsers), skills of handing multimedia files.

Language:

English – fluent

Personal information:

Russian native speaker, Moscow permanent resident. Responsible, communicative, work well individually and in team, willing to travel a lot.

Additional information:

Driving license, foreign passport.

Hobbies:

Alpine skiing, climbing, music, foreign languages, traveling.

References:

available on request

USEFUL VOCABULARY Useful verbs	
to back up (backup)	выполнять резервное копирование
to boot	загружать, загружаться (например, об устройстве или операционной системе)
to burn	записывать на оптический диск
to compile	компилировать
to compress	сжимать (например, архиватором)
to connect	соединять, подключаться
to copy	копировать
to create	создавать
to cut	вырезать в буфер обмена
to debug	отлаживать
to decrypt	расшифровывать
to delete	удалять
to deploy	развертывать (например, приложение на сервере)
to develop	разрабатывать
to disable	отключать, деактивировать
to disconnect	разъединять, отключаться
to display	отображать

to download	загружать, скачивать
to eject	извлекать (устройство)
to enable	включать, активировать
to encrypt	шифровать, зашифровывать
to execute	исполнять
to format	форматировать
to implement	внедрять, реализовывать
to initialize	приводить в исходное состояние, инициализировать
to install	инсталлировать, устанавливать
to integrate	интегрировать, объединять в одну систему
to link to	ссылаться на что-либо
to load	загружать
to paste	вставлять из буфера обмена
to plug in	подключать
to press (a button)	нажимать (кнопку)
to read	считывать
to reboot	перезагружать, перезагружаться
to restore	восстанавливать

to save	сохранять
to scroll up/down	прокручивать вверх/вниз (например, вебстраницу)
to sort	сортировать
to switch on/off	включать/выключать
to uninstall	деинсталлировать, удалять
to update	обновлять
to upgrade	улучшать, модернизировать
to upload	загружать, скачивать
to verify	проверять
Hardware	
a bus	шина
a cable	кабель
a central processing unit (CPU)	центральный процессор
a computer case	корпус системного блока
a device	устройство
a fan	вентилятор охлаждения, кулер
a graphics card, a display card, a display adapter, a graphics adapter	видеокарта (графический адаптер)

a graphics processing unit (GPU)	графический процессор
a hard disk drive (HDD)	жесткий диск
a laptop	ноутбук, портативный компьютер
a light-emitting diode (LED)	светодиод
a motherboard (mainboard)	материнская плата
a network card	сетевой адаптер (сетевая карта, сетевая плата)
a port	разъем, порт
a power supply unit (PSU)	блок питания
a solid-state drive (SSD)	твердотельный накопитель
a sound card, an audio card	звуковая карта
a storage device	запоминающее устройство, накопитель
a touch screen	сенсорный экран
air cooling	воздушное охлаждение
an expansion card	карта (плата) расширения
an optical disk drive	оптический привод
an uninterruptible power source (UPS)	источник бесперебойного питания
input devices:	устройства ввода:

• akeyboard • amouse • ascanner • adigital camera • ajoystick	• клавиатура • мышь • сканер • цифровая камера • джойстик
output devices: • a monitor • a printer • a speaker • headphones	устройства вывода: • монитор • принтер • колонка (акустическая) • наушники
random-access memory (RAM)	оперативная память (ОЗУ)
read-only memory (ROM)	постоянное запоминающее устройство (ПЗУ)
removable media	съемные носители информации
water cooling	водяное охлаждение
Software	
a compiler	компилятор
a database	база данных
a debugger	отладчик
a desktop application/app	приложение для настольного компьютера
a device driver	драйвер устройства
a graphical user interface (GUI)	графический пользовательский интерфейс

a kernel	ядро (например, операционной системы)
a mobile application/app	мобильное приложение
a plug-in (plugin)	плагин, расширение, дополнительный программный модуль
a programming language	язык программирования
a query	запрос
a scroll bar	полоса прокрутки
a snapshot	снимок состояния системы
a spreadsheet	электронная таблица
a status bar	строка состояния
a template	шаблон
a text editor	текстовый редактор
a utility	утилита (служебная программа)
a version control system (VCS)	система контроля версий
a web application, a web app	веб-приложение
a word processor	текстовый процессор
acceptance testing	приемочное тестирование
agile methodology	гибкая методология разработки

an algorithm	алгоритм
an array	массив
an encoding	кодировка
an enterprise application	корпоративное приложение
an executable (file)	исполняемый файл
an interpreter	интерпретатор
an operating system (OS)	операционная система
application software	прикладное программное обеспечение
aspect-oriented programming (AOP)	аспектно-ориентированное программирование
binary data	двоичные данные
commercial software	платное программное обеспечение
data	данные, информация
data processing	обработка данных
extreme programming	экстремальное программирование
firmware	прошивка, микропрограмма
freeware	бесплатное программное обеспечение
incremental development	инкрементная модель разработки
integrated development	интегрированная среда разработки

iterative development	итеративная модель разработки
malicious software (malware)	вредоносное программное обеспечение
object-oriented programming (OOP)	объектно-ориентированное программирование
open source software	программное обеспечение с открытым исходным кодом
prototyping	создание прототипа, прототипирование
rapid application development (RAD)	быстрая разработка приложений (методология)
regression testing	регрессионное тестирование
runtime (runtime environment)	среда выполнения кода
server software	серверное программное обеспечение
spiral development	спиральная модель разработки
spyware	программа-шпион, шпионское программное обеспечение
system software	системное программное обеспечение
unit testing	модульное (блочное, компонентное) тестирование
waterfall model	каскадная модель разработки

Internet	
a bookmark	закладка (в браузере)
a bridge	мост
a browser	браузер, обозреватель
a domain	домен
a firewall	брандмауэр, межсетевой экран
a gateway	шлюз
a hyperlink	гиперссылка
a node	узел сети
a packet	пакет
a patch cord	коммутационный кабель, патч-корд
a router	маршрутизатор, роутер
a search engine	поисковая система
a subdomain	поддомен, субдомен
a switch	коммутатор, свитч
a website	веб-сайт, веб-узел
a wireless network	беспроводная сеть
bandwidth	пропускная способность (канала передачи данных)

broadband	широкополосный доступ в интернет
client-server architecture	клиент-серверная архитектура
cloud computing	облачные вычисления
cloud storage	облачное хранилище данных
domain name system (DNS)	система доменных имен
dynamic host configuration protocol (DHCP)	протокол динамической настройки узла
instant messaging (IM)	обмен мгновенными сообщениями
Internet service provider (ISP)	интернет-провайдер
latency	задержка, период ожидания
local area network (LAN)	локальная сеть
media access control (MAC) address	аппаратный адрес, MAC-адрес
peer-to-peer (P2P)	одноранговая сеть, пиринговая сеть
twisted pair	витая пара
voice over IP (VoIP)	голосовая связь через интернет, IP-телефония
wide area network (WAN)	глобальная сеть, широкомасштабная сеть

Английские слова и обозначения на клавиатуре ноутбука

1 ***Tab*** (сокращение от ***tabulation***) – табуляция. Именно от слова «таблица» происходит термин «табуляция».
2 ***Caps Lock*** (сокращение от capitals lock) – фиксация прописных, то есть заглавных букв (capitals – заглавные буквы, lock – замОк).
3 ***Space*** – пробел. На клавиатуре это слово означает «пробел».
4 ***Back space*** – возврат курсора на одну позицию назад. Back – назад, space – здесь означает «место», то есть получается «назад на место».
5 ***Esc*** (сокращение от escape) – убегать, спасаться. Клавиша Esc означает отказ от выполнения того или иного действия на компьютере.
6 ***Enter*** – начинать с новой строки. На клавиатуре данная клавиша имеет множество функций, одной из которых будет перевод строки в текстовом редакторе к началу новой строки текста.
7 ***Print Screen*** – распечатать (print) экран (screen). Клавиша позволяет копировать содержимое экрана монитора в буфер обмена, чтобы затем полученную «картинку» записать либо в редактор изображений, либо в файл.
8 ***Shift*** – изменение. Клавиша означает смену регистра с прописных (маленьких) букв на строчные (большие) буквы или наоборот.
9 ***Insert*** – вставлять. Означает вставку символа в середину текста. На клавиатурах часто сокращают надпись до Ins.
10 ***Delete*** – вычеркивать, стирать. Клавиша удаления одного символа текста, расположенного справа от курсора. На клавиатурах наименование клавиши может быть сокращено до Del.
11 ***Page Up*** – страница (page) вверх (up). Клавиша позволяет перемещать курсор на предыдущую страницу текста. Бывают сокращения наименования клавиш, например, до PgUp.
12 ***Page Down*** – страница (page) вниз (down). Обратное действие Page Up – перемещение на следующую страницу текста. Также допускаются сокращения надписи на клавише до PgDn.
13 ***Left*** – влево, налево. Часто вместо слова left на клавиатуре просто рисуют стрелку влево.
14 ***Right*** – вправо, направо. Может быть нарисована стрелка вправо вместо слова right.
15 ***Up*** – вверх, наверх. Или просто рисунок стрелки вверх.

16 **Down** – вниз. Иногда заменяют рисунком стрелки вниз.
17 ***End*** – конец. Клавиша означает перевод курсора к концу текста в текстовом редакторе.
18 ***Home*** – дом, домой. Клавиша означает перевод курсора к началу текста в текстовом редакторе.
19 ***Fn*** (сокращение от ***function***) – функция или функциональный. Клавиша позволяет включить режим работы клавиатуры так, чтобы клавиши работали не как обычные кнопки, а как функциональные клавиши для выполнения специальных действий.
20 ***Ctrl*** (сокращение от ***control***) – управлять. Клавиша применяется для ввода так называемых управляющих символов.
21 ***Alt*** (сокращение от *alternate*) – сменять, чередовать. Чаще Alt применяется в сочетании с другими клавишами для управления курсором или редактором – это своего рода дополнение к клавише Ctrl, расширяющее возможности клавиатуры.
22 ***Scroll Look*** – заблокировать (lock) прокрутку (scroll) экрана компьютера. Часто надпись на клавише сокращают, например, до ScrLk..
23 ***Num Lock*** – сокращение от *Numeric Lock* – цифровая блокировка. Включенный режим Num Lock позволяет пользоваться малой цифровой клавиатурой. В выключенном состоянии можно пользоваться стрелками управления курсором (left, right, up, down и др.)
24 ***Power*** – энергия. Это клавиша включения питания компьютера.
25 ***Pause*** – приостанавливать.
26 ***Break*** – прерывать. Аналог pause, причем break пишется на той же клавише клавиатуры, что и pause.
27 **Windows** – окно. Кнопка с логотипом Windows (удобна тем, чтобы, например, вызывать меню «Пуск»).

TEXTS FOR ADDITIONAL READING

FIVE GENERATIONS OF MODERN COMPUTERS

THE FIRST GENERATION (1945-1956)

With the onset of the Second World War, governments sought to develop computers to exploit their potential strategic importance. This increased funding for computer development projects hastened technical progress. By 1941 German engineer Konrad Zuse had developed a computer, the Z3, to design airplanes and missiles. The Allied forces, however, made greater strides in developing powerful computers. In 1943, the British completed a secret code-breaking computer called Colossus to decode German messages. The Colossus's impact on the development of the computer industry was rather limited for two important reasons. First, Colossus was not a general-purpose computer; it was only designed to decode secret messages. Second, the existence of the machine was kept secret until decades after the war.

American efforts produced a broader achievement. Howard H. Aiken (1900-1973), a Harvard engineer working with IBM, succeeded in producing an all-electronic calculator by 1944. The purpose of the computer was to create ballistic charts for the U.S. Navy. It was about half as long as a football field and contained about 500 miles of wiring. The Harvard-IBM Automatic Sequence Controlled Calculator, or Mark I for short, was a electronic relay computer. It used electromagnetic signals to move mechanical parts. The machine was slow (taking 3-5 seconds per calculation) and inflexible (in that sequences of calculations could not change); but it could perform basic arithmetic as well as more complex equations.

Another computer development spurred by the war was the Electronic Numerical Integrator and Computer (ENIAC), produced by a partnership between the U.S. government and the University of Pennsylvania. Consisting of 18,000 vacuum tubes, 70,000 resistors and 5 million soldered joints, the computer was such a massive piece of machinery that it consumed 160 kilowatts of electrical power, enough energy to dim the lights in an entire section of Philadelphia. Developed by John Presper Eckert (1919-1995) and John W. Mauchly (1907-1980), ENIAC, unlike the Colossus and Mark I, was a general-purpose computer that computed at speeds 1,000 times faster than Mark I.

In the mid-1940's John von Neumann (1903-1957) joined the University of Pennsylvania team, initiating concepts in computer design that remained central to computer engineering for the next 40 years. Von Neumann designed the Electronic Discrete Variable Automatic Computer (EDVAC) in 1945 with a memory to hold both a stored program as well as data. This "stored memory" technique as well as the "conditional control transfer," that allowed the computer to be stopped at any point and then resumed, allowed for greater versatility in computer programming. The key element to the von Neumann architecture was the central processing unit, which allowed all computer functions to be coordinated through a single source. In 1951, the UNIVAC I (Universal Automatic Computer), built by Remington Rand, became one of the first commercially available computers to take advantage of these advances. Both the U.S. Census Bureau and General Electric owned UNIVACs. One of UNIVAC's impressive early achievements was predicting the winner of the 1952 presidential election, Dwight D. Eisenhower.

First generation computers were characterized by the fact that operating instructions were made-to-order for the specific task for which the computer was to be used. Each computer had a different binary-coded program called a machine language that told it how to operate. This made the computer difficult to program and limited its versatility and speed. Other distinctive features of first generation computers were the use of vacuum tubes (responsible for their breathtaking size) and magnetic drums for data storage.

THE SECOND-GENERATION COMPUTERS (1956-1963)

By 1948, the invention of the transistor greatly changed the computer's development. The transistor replaced the large, cumbersome vacuum tube in televisions, radios and computers. As a result, the size of electronic machinery has been shrinking ever since. The transistor was at work in the computer by 1956. Coupled with early advances in magnetic-core memory, transistors led to second generation computers that were smaller, faster, more reliable and more energy-efficient than their predecessors. The first large-scale machines to take advantage of this transistor technology were early supercomputers, Stretch by IBM and LARC by Sperry-Rand. These computers, both developed for atomic

energy laboratories, could handle an enormous amount of data, a capability much in demand by atomic scientists. The machines were costly, however, and tended to be too powerful for the business sector's computing needs, thereby limiting their attractiveness. Only two LARCs were ever installed: one in the Lawrence Radiation Labs in Livermore, California, for which the computer was named (Livermore Atomic Research Computer) and the other at the U.S. Navy Research and Development Center in Washington, D.C. Second generation computers replaced machine language with assembly language, allowing abbreviated programming codes to replace long, difficult binary codes.

Throughout the early 1960's, there were a number of commercially successful second generation computers used in business, universities, and government from companies such as Burroughs, Control Data, Honeywell, IBM, Sperry-Rand, and others. These second generation computers were also of solid state design, and contained transistors in place of vacuum tubes. They also contained all the components we associate with the modern day computer: printers, tape storage, disk storage, memory, operating systems, and stored programs. One important example was the IBM 1401, which was universally accepted throughout industry, and is considered by many to be the Model T of the computer industry. By 1965, most large business routinely processed financial information using second generation computers.

It was the stored program and programming language that gave computers the flexibility to finally be cost effective and productive for business use. The stored program concept meant that instructions to run a computer for a specific function (known as a program) were held inside the computer's memory, and could quickly be replaced by a different set of instructions for a different function. A computer could print customer invoices and minutes later design products or calculate paychecks. More sophisticated high-level languages such as COBOL (Common Business-Oriented Language) and FORTRAN (Formula Translator) came into common use during this time, and have expanded to the current day. These languages replaced cryptic binary machine code with words, sentences, and mathematical formulas, making it much easier to program a computer. New types of careers (programmer, analyst, and computer

systems expert) and the entire software industry began with second generation computers.

THE THIRD GENERATION COMPUTERS (1964-1971)

Though transistors were clearly an improvement over the vacuum tube, they still generated a great deal of heat, which damaged the computer's sensitive internal parts. The quartz rock eliminated this problem. Jack Kilby, an engineer with Texas Instruments, developed the integrated circuit (IC) in 1958. The IC combined three electronic components onto a small silicon disc, which was made from quartz. Scientists later managed to fit even more components on a single chip, called a semiconductor. As a result, computers became ever smaller as more components were squeezed onto the chip. Another third-generation development included the use of an operating system that allowed machines to run many different programs at once with a central program that monitored and coordinated the computer's memory.

THE FOURTH GENERATION (1971-PRESENT)

After the integrated circuits, the only place to go was down - in size, that is. Large scale integration (LSI) could fit hundreds of components onto one chip. By the 1980's, very large scale integration (VLSI) squeezed hundreds of thousands of components onto a chip. Ultra-large scale integration (ULSI) increased that number into the millions. The ability to fit so much onto an area about half the size of a U.S. dime helped diminish the size and price of computers. It also increased their power, efficiency and reliability. The Intel 4004 chip, developed in 1971, took the integrated circuit one step further by locating all the components of a computer (central processing unit, memory, and input and output controls) on a minuscule chip. Whereas previously the integrated circuit had had to be manufactured to fit a special purpose, now one microprocessor could be manufactured and then programmed to meet any number of demands. Soon everyday household items such as microwave ovens, television sets and automobiles with electronic fuel injection incorporated microprocessors.

Such condensed power allowed everyday people to harness a computer's power. They were no longer developed exclusively for large business or

government contracts. By the mid-1970's, computer manufacturers sought to bring computers to general consumers. These minicomputers came complete with user-friendly software packages that offered even non-technical users an array of applications, most popularly word processing and spreadsheet programs. Pioneers in this field were Commodore, Radio Shack and Apple Computers. In the early 1980's, arcade video games such as Pac Man and home video game systems such as the Atari 2600 ignited consumer interest for more sophisticated, programmable home computers.

In 1981, IBM introduced its personal computer (PC) for use in the home, office and schools. The 1980's saw an expansion in computer use in all three arenas as clones of the IBM PC made the personal computer even more affordable. The number of personal computers in use more than doubled from 2 million in 1981 to 5.5 million in 1982. Ten years later, 65 million PCs were being used. Computers continued their trend toward a smaller size, working their way down from desktop to laptop computers (which could fit inside a briefcase) to palmtop (able to fit inside a breast pocket). In direct competition with IBM's PC was Apple's Macintosh line, introduced in 1984. Notable for its user-friendly design, the Macintosh offered an operating system that allowed users to move screen icons instead of typing instructions. Users controlled the screen cursor using a mouse, a device that mimicked the movement of one's hand on the computer screen.

As computers became more widespread in the workplace, new ways to harness their potential developed. As smaller computers became more powerful, they could be linked together, or networked, to share memory space, software, information and communicate with each other. As opposed to a mainframe computer, which was one powerful computer that shared time with many terminals for many applications, networked computers allowed individual computers to form electronic co-ops. Using either direct wiring, called a Local Area Network (LAN), or telephone lines, these networks could reach enormous proportions. A global web of computer circuitry, the Internet, for example, links computers worldwide into a single network of information. During the 1992 U.S. presidential election, vice-presidential candidate Al Gore promised to make the development of this so-called "information

superhighway" an administrative priority. Though the possibilities envisioned by Gore and others for such a large network are often years (if not decades) away from realization, the most popular use today for computer networks such as the Internet is electronic mail, or E-mail, which allows users to type in a computer address and send messages through networked terminals across the office or across the world.

THE FIFTH GENERATION (PRESENT AND BEYOND)

Defining the fifth generation of computers is somewhat difficult because the field is in its infancy. The most famous example of a fifth-generation computer is the fictional HAL9000 from Arthur C. Clarke's novel, 2001: A Space Odyssey. HAL performed all of the functions currently envisioned for real-life fifth generation computers. With artificial intelligence, HAL could reason well enough to hold conversations with its human operators, use visual input, and learn from its own experiences. (Unfortunately, HAL was a little too human and had a psychotic breakdown, commandeering a spaceship and killing most humans on board.)

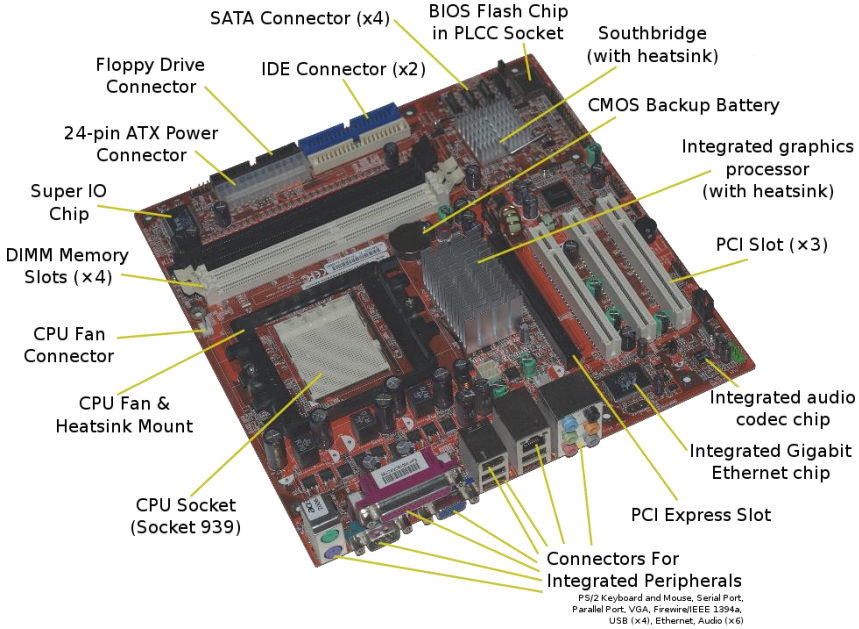
Though the wayward HAL9000 may be far from the reach of real-life computer designers, many of its functions are not. Using recent engineering advances, computers are able to accept spoken word instructions (voice recognition) and imitate human reasoning. The ability to translate a foreign language is also moderately possible with fifth generation computers. This feat seemed a simple objective at first, but appeared much more difficult when programmers realized that human understanding relies as much on context and meaning as it does on the simple translation of words.

Many advances in the science of computer design and technology are coming together to enable the creation of fifth-generation computers. Two such engineering advances are parallel processing, which replaces von Neumann's single central processing unit design with a system harnessing the power of many CPUs to work as one. Another advance is superconductor technology, which allows the flow of electricity with little or no resistance, greatly improving the speed of information flow. Computers today have some attributes of fifth generation computers. For example, expert systems assist doctors in making diagnoses by applying

the problem-solving steps a doctor might use in assessing a patient's needs. It will take several more years of development before expert systems are in widespread use.

HARDWARE (PART I)

A typical hardware setup of a desktop computer consists of: computer case with power supply, central processing unit (processor), motherboard, memory card, hard disk, video card, visual display unit (monitor), optical disc drive, keyboard and pointing device. The motherboard is a main part of a computer that connects all devices together. The memory card(s), graphics card and processor are mounted directly onto the motherboard (the processor in a socket and the memory and graphics cards in expansion slots). The mass storage is connected to it with cables and can be installed in the computer case or in a separate case. This is the same for the keyboard and mouse, except that they are external and connect to the I/O panel on the back of the computer. The monitor is also connected to the I/O panel, either through an onboard port on the motherboard, or a port on the graphics card.



Several functions (implemented by chipsets) can be integrated into the motherboard, typically USB and network, but also graphics and sound. Even if these are present, a separate card can be added if what is available isn't sufficient. The hardware capabilities of personal computers can sometimes be extended by the addition of expansion cards connected via an expansion bus.

A computer case is the enclosure that contains the main components of a computer. Cases are usually constructed from steel, aluminium, or plastic. Cases can come in many different sizes, or form factors. The size and shape of a computer case is usually determined by the form factor of the motherboard that it is designed to accommodate, since this is the largest and most central component of most computers. PC form factors typically specify only the internal dimensions and layout of the case. Currently, the most popular form factor for desktop computers is ATX, although microATX and small form factors have become very popular for a variety of uses.

The central processing unit, or CPU, is that part of a computer which executes software program instructions. Nearly all PCs contain a type of CPU known as a microprocessor. The microprocessor often plugs into the motherboard using one of many different types of sockets. IBM PC compatible computers use an x86-compatible processor, usually made by Intel or AMD. Modern CPUs are equipped with a fan attached via heat sink.

The motherboard (systemboard or mainboard) is the primary circuit board within a personal computer. Many other components connect directly or indirectly to the motherboard. Motherboards usually contain one or more CPUs, supporting circuitry - usually integrated circuits (ICs) - providing the interface between the CPU memory and input/output peripheral circuits, main memory, and facilities for initial setup of the computer immediately after power-on (boot firmware or, in IBM PC compatible computers, a BIOS).

A PC's main memory is fast storage that is directly accessible by the CPU, and is used to store the currently executing program and immediately needed data. PCs use semiconductor random access memory (RAM) of various kinds. Main memory is much faster than mass storage devices like hard disks or optical discs, but is usually volatile,

meaning it does not retain its contents (instructions or data) in the absence of power, and is much more expensive for a given capacity than is most mass storage.

HARDWARE (PART II)

Mass storage devices store programs and data even when the power is off; but they require power to perform read and write functions during usage. Although flash memory has dropped in cost, the prevailing form of mass storage in personal computers is still the hard disk.

The video card (graphics card, graphics adapter or video adapter) processes and renders the graphics output from the computer to the computer display, and is an essential part of the modern computer. On budget models, graphics circuitry is integrated with the motherboard.

A visual display unit (or monitor) is a piece of electrical equipment, usually separate from the computer case, which displays viewable images generated by a computer without producing a permanent record. A computer display device is usually either a cathode ray tube or some form of flat panel such as a TFT LCD. The monitor comprises the display device, circuitry to generate a picture from electronic signals sent by the computer, and an enclosure or case. Within the computer, either as an integral part or a plugged-in expansion card, there is circuitry to convert internal data to a format compatible with a monitor. The images from monitors originally contained only text, but as graphical user interfaces emerged and became common, they began to display more images and multimedia content.

In computing, a keyboard is an arrangement of buttons that each correspond to a function, letter, or number. They are the primary devices

of inputing text. In most cases, they contain a set of keys specifically organized with the corresponding letters, numbers, and functions printed or engraved on the button. They are generally designed around an operators language, and many different versions for different languages exist. In English, the most common layout is the QWERTY layout, which was originally used in typewriters. They have evolved over time, and have been modified for use in computers with the addition of function keys, number keys, arrow keys, and OS specific keys. Often, specific functions can be achieved by pressing multiple keys at once or in succession, such as opening a task manager. Programs use keyboard shortcuts very differently and all use different keyboard shortcuts for different program specific operations, such as refreshing a web page in a web browser or selecting all text in a word processor.

A Mouse on a computer is a small, slidable device that users hold and slide around to point at, click, and sometimes drag objects on screen in a graphical user interface using a pointer on screen. Almost all personal computers have mice. It may be plugged into a computer's rear mouse socket, or as a USB device, or may be connected wirelessly via a USB or Bluetooth antenna. In the past they had a single button but now many Mice have two or three buttons and a scroll wheel. The scroll wheel can also be pressed down, and therefore be used as a third button. Modern mice use optical technology to directly trace movement of the surface under the mouse and are much more accurate and durable. They work on a wider variety of surfaces and can even operate on walls, ceilings or other non-horizontal surfaces.

OPERATING SYSTEM

The operating system is a sort of catch-all of useful pieces of code. Whenever some kind of computer code becomes sharable by many different types of computer program, over many years, programmers eventually move it into the operating system.

The operating system, decides which programs are run, when, and what resources (such as memory or I/O) they get to use. The operating system also provides services to other programs, such as code ("drivers") which allow programmers to write programs for a machine without needing to know the intimate details of all attached electronic devices.

USES OF COMPUTERS

The first digital computers, with their large size and cost, mainly performed scientific calculation. ENIAC, an early US computer originally designed to calculate ballistics firing tables for artilery, calculated neutron cross-sectional densities to see if the hydrogen bomb would work properly (this calculation, performed in December 1945 through January 1946 and involving over a million punch cards of data, showed the design then under consideration would fail). The CSIR Mk I, the first Australian computer, evaluated rainfall patterns for the catchment of the Snowy Mountains scheme, a large hydroelectric generation project. Others were used in cryptanalysis, for example the world's first programmable digital electronic computer, Colossus, built during World War II. However, early visionaries also anticipated that programming would allow chess playing, moving pictures and other uses.

People in governments and large corporations also used computers to automate many of the data collection and processing tasks previously performed by humans - for example, maintaining and updating accounts and inventories. In academia, scientists of all sorts began to use computers for their own analyses. Continual reductions in the costs of computers saw them adopted by ever-smaller organizations. Businesses, organizations, and governments often employ a large number of small computers to accomplish tasks that were previously done by an expensive, large mainframe computer. Collections of the smaller computers in one location is referred to as a server farm.

With the invention of the microprocessor in the 1970s, it became possible to produce very inexpensive computers. Personal computers became popular for many tasks, including keeping books, writing and printing documents. Calculating forecasts and other repetitive math with spreadsheets, communicating with e-mail and, the Internet. However, computers' wide availability and easy customization has seen them used for many other purposes.

At the same time, small computers, usually with fixed programming, began to find their way into other devices such as home appliances, automobiles, aeroplanes, and industrial equipment. These embedded processors controlled the behaviour of such devices more

easily, allowing more complex control behaviours (for instance, the development of anti-lock brakes in cars). By the start of the twenty-first century, most electrical devices, most forms of powered transport, and most factory production lines are controlled by computers. Most engineers predict that this trend will continue.

FEATURES OF A PROGRAMMING LANGUAGE

Each programming language can be thought of as a set of formal specifications concerning syntax, vocabulary, and meaning.

These specifications usually include:

Data and Data Structures

Instruction and Control Flow

Reference Mechanisms and Re-use

Design Philosophy

Most languages that are widely used, or have been used for a considerable period of time, have standardization bodies that meet regularly to create and publish formal definitions of the language, and discuss extending or supplementing the already extant definitions.

Data and Data Structures

Internally, all data in a modern digital computer are stored simply as on-off (binary) states. The data typically represent information in the real world such as names, bank accounts and measurements and so the low-level binary data are organised by programming languages into these high-level concepts.

The particular system by which data are organized in a program is the *type system* of the programming language; the design and study of type systems is known as type theory. Languages can be classified as *statically typed* systems, and *dynamically typed* languages. Statically-typed languages can be further subdivided into languages with manifest types, where each variable and function declaration has its type explicitly declared, and *type-inferred* languages. It is possible to perform type inference on programs written in a dynamically-typed language, but it is entirely possible to write programs in these languages that make type inference infeasible. Sometimes type-inferred and dynamically-typed languages are called *latently typed*.

With statically-typed languages, there usually are pre-defined types for individual pieces of data (such as numbers within a certain range, strings of letters, etc.), and programmatically named values (variables) can have only one fixed type, and allow only certain operations: numbers cannot change into names and vice versa. Examples of these languages are: C, C++ and Java.

Dynamically-typed languages treat all data locations interchangeably, so inappropriate operations (like adding names, or sorting numbers alphabetically) will not cause errors until run-time. Examples of these languages are: Lisp, JavaScript, Tcl and Prolog.

Type-inferred languages superficially treat all data as not having a type, but actually do sophisticated analysis of the way the program uses the data to determine which elementary operations are performed on the data, and therefore deduce what type the variables have at compile-time. Type-inferred languages can be more flexible to use, while creating more efficient programs; however, this capability is difficult to include in a programming language implementation, so it is relatively rare. Examples of these languages are: MUMPS and ML.

Sometimes statically-typed languages are called *type-safe* or *strongly typed*, and dynamically-typed languages are called *untyped* or *weakly typed*; confusingly, these same terms are also used to refer to the distinction between languages in which it is impossible to use a value as a value of another type and possibly corrupt data from an unrelated part of the program or cause the program to crash, and languages in which it is possible to do this. Examples of strongly typed languages are: Eiffel, Oberon, Lisp, Scheme and OCaml. Examples of weakly typed languages are: Forth, C, assembly language, C++, D and most implementations of Pascal.

Most languages also provide ways to assemble complex data structures from built-in types and to associate names with these new combined types (using arrays, lists, stacks, files).

Object oriented languages allow the programmer to define data-types called "Objects" which have their own intrinsic functions and variables (called methods and attributes respectively). A program containing objects allows the objects to operate as independent but interacting sub-programs: this interaction can be designed at coding time

to model or simulate real-life interacting objects. This is a very useful, and intuitive, functionality. Programs such as Python and Ruby have developed as OO (Object oriented) languages. They are comparatively easy to learn and to use, and are gaining popularity in professional programming circles, as well as being accessible to non-professionals. These more intuitive languages have increased the public availablity and power of customised computer applications.

Aside from when and how the correspondence between expressions and types is determined, there's also the crucial question of what types the language defines at all, and what types it allows as the values of expressions (*expressed values*) and as named values (*denoted values*). Low-level languages like C typically allow programs to name memory locations, regions of memory, and compile-time constants, while allowing expressions to return values that fit into machine registers; ANSI C extended this by allowing expressions to return struct values as well. Functional languages often allow variables to name run-time computed values directly instead of naming memory locations where values may be stored. Languages that use garbage collection are free to allow arbitrarily complex data structures as both expressed and denoted values.

Finally, in some languages, procedures are allowed only as denoted values (they cannot be returned by expressions or bound to new names); in others, they can be passed as parameters to routines, but cannot otherwise be bound to new names; in others, they are as freely usable as any expressed value, but new ones cannot be created at run-time; and in still others, they are first-class values that can be created at run-time.

Instruction and Control Flow

Once data has been specified, the machine must be instructed how to perform operations on the data. Elementary statements may be specified using keywords or may be indicated using some well-defined grammatical structure. Each language takes units of these well-behaved statements and combines them using some ordering system. Depending on the language, differing methods of grouping these elementary statements exist. This allows one to write programs that are able to cover a variety of input, instead of being limited to a small number of cases. Furthermore, beyond the data manipulation instructions, other typical

instructions in a language are those used for control flow (branches, definitions by cases, loops, backtracking, functional composition).

Reference Mechanisms and Re-use

The core of the idea of *reference* is that there must be a method of indirectly designating storage space. The most common method is through named variables. Depending on the language, further indirection may include references that are pointers to other storage space stored in such variables or groups of variables. Similar to this method of naming storage is the method of naming groups of instructions. Most programming language use macro calls, procedure calls or function calls as the statements that use these names. Using symbolic names in this way allows a program to achieve significant flexibility, as well as a high measure of reusability. Indirect references to available programs or predefined data divisions allow many application-oriented languages to integrate typical operations as if the programming language included them as higher level instructions.

Design Philosophies

For the above-mentioned purposes, each language has been developed using a special design or philosophy. Some aspect or another is particularly stressed by the way the language uses data structures, or by which its special notation encourages certain ways of solving problems or expressing their structure.

Since programming languages are artificial languages, they require a high degree of discipline to accurately specify which operations are desired. Programming languages are not error tolerant; however, the burden of recognising and using the special vocabulary is reduced by help messages generated by the programming language implementation. There are a few languages which offer a high degree of freedom in allowing self-modification in which a program re-writes parts of itself to handle new cases. Typically, only machine language and members of the Lisp family (Common Lisp, Scheme) provide this capability. Some languages such as MUMPS and Perl allow modification of data structures that contain program fragments, and provide methods to transfer program control to those data structures; languages that support dynamic linking and loading such as C, C++, and the Java programming language can emulate self-modification by either embedding a small

compiler or calling a full compiler and linking in the resulting object code. Interpreting code by recompiling it in real time is called dynamic recompilation; emulators and other virtual machines exploit this technique for greater performance.

There are a variety of ways to classify programming languages. The distinctions are not clear-cut; a particular language standard may be implemented in multiple classifications. For example, a language may have both compiled and interpreted implementations.

HISTORY OF PROGRAMMING LANGUAGES

The development of programming languages , unsurprisingly, follows closely the development of the physical and electronic processes used in today's computers.

Charles Babbage is often credited with designing the first computer-like machines, which had several programs written for them (in the equivalent of assembly language) by Ada Lovelace.

Alan Turing used the theoretical construct of a Turing machine which behaves in principle in all relevant ways like modern computers, according to the low level program which is input.

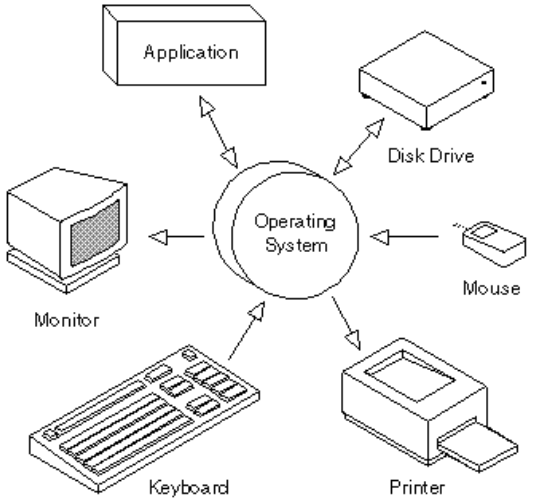
In the 1940s the first recognisably modern, electrically powered computers were created, requiring programmers to operate machines by hand. Some military calculation needs were a driving force in early computer development, such as encryption, decryption, trajectory calculation and massive number crunching needed in the development of atomic bombs. At that time, computers were extremely large, slow and expensive: advances in electronic technology in the post-war years led to the construction of more practical electronic computers. At that time only Konrad Zuse imagined the use of a programming language (developed eventually as Plankalkül) like those of today for solving problems.

Subsequent breakthroughs in electronic technology (transistors, integrated circuits, and chips) drove the development of increasingly reliable and more usable computers. This was paralleled by the development of a variety of standardised computer languages to run on them. The improved availability and ease of use of computers led to a much wider circle of people who can deal with computers. The subsequent explosive development has resulted in the Internet, the

ubiquity of personal computers, and increased use of computer programming, through more accessible languages such as Python, Visual Basic, etc..

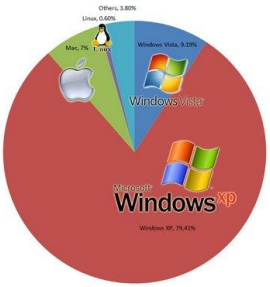
OPERATING SYSTEM

An **O**perating **S**ystem (**OS**) is an interface between hardware and user which is responsible for the management and coordination of activities and the sharing of the resources of the computer. One of the purposes of an operating system is to handle the details of the operation of the hardware. This relieves application programs from managing these details and makes it easier to write applications. Almost all computers (including handheld computers, desktop computers, supercomputers, video game consoles) as well as some robots, domestic appliances (dishwashers, washing machines), and portable media players use an operating system of some type.



Operating systems offer a number of services to application programs and users. Applications access these services through application programming interfaces (APIs) or system calls. By invoking these interfaces, the application can request a service from the operating system, pass parameters, and receive the results of the operation. Users may also interact with the operating system by typing commands in command line or using a graphical user interface (GUI [gui]). For hand-held and desktop computers, the user interface is generally considered part of the operating system. On large multi-user systems like Linux, the user interface is generally implemented as an application program that runs outside the operating system.

Common contemporary operating systems include BSD, Darwin (Mac OS X), Linux, SunOS (Solaris/Open Solaris), and Windows NT (XP/Vista/7). While servers generally run Unix or some Unix-like operating system, embedded system markets are split amongst several operating systems. The Microsoft Windows line of operating systems has almost 90% of the client PC market. Microsoft responded to this progress by hiring Dave Cutler, who had developed the VMS operating system for Digital Equipment Corporation. He would lead the development of the Windows NT operating system, which continues to serve as the basis for Microsoft's operating systems line.



Access to data stored on disks is a central feature of all operating systems. Computers store data on disks using files, which are structured in specific ways in order to allow for faster access, higher reliability, and to make better use out of the drive's available space. The specific way in which files are stored on a disk is called a file system, and enables files to have names and attributes. It also allows them to be stored in directories or folders arranged in a directory tree.

COMPUTER PROGRAMMING

Computer programming (often shortened to programming, scripting, or coding) is the process of designing, writing, testing, debugging, and maintaining the source code of computer programs. This source code is written in one or more programming languages (such as Java, C++, C#, Python, etc.). The purpose of programming is to create a set of instructions that computers use to perform specific operations or to exhibit desired behaviours. The process of writing source code often requires expertise in many different subjects, including knowledge of the application domain, specialized algorithms and formal logic. From the moment you turn on your computer, it is running programs, carrying out instructions, testing your RAM (Random-access memory), resetting all attached devices and loading the operating system from hard disk or CD-ROM. Each and every operation that your computer performs has instructions that someone had to write in a programming language. These had to be created, compiled and tested- a long and complex task. An

operating system like Microsoft's Windows Vista took millions of man hours to write and test the software. There have been many attempts to automate this process, and have computers write computer programs but the complexity is such that for now, humans still write the best computer programs. To write a program, software developers usually follow these steps:

1. First they try to understand the problem and define the purpose of the program.

2. They design a flowchart, a diagram which shows the successive logical steps of the program.

3. Next they write the instructions in a high-level language (Pascal, C, etc). This is called coding. The program is then compiled.

4. When the program is written, they test it: they run the program to see if it works and use special tools to detect bugs, or errors. Any errors are corrected until it runs smoothly. This is called debugging, or bug fixing.

5. Finally, software companies write a detailed description of how the program works, called program documentation. They also have a maintenance program. They get reports from users about any errors found in the program. After it has been improved, it is published as an updated version. Within software engineering, programming (the implementation) is regarded as one phase in a software development process. As time has progressed, computers have made giant leaps in the area of processing power. This has brought about newer programming languages. Popular programming languages of the modern era include C++, C#, Visual Basic, SQL, HTML with PHP, Perl, Java, JavaScript, Python and dozens more. Although these high-level languages usually incur greater overhead, the increase in speed of modern computers has made the use of these languages much more practical than in the past. These increasingly abstracted languages typically are easier to learn and allow the programmer to develop applications much more efficiently and with less source code. However, high-level languages are still impractical for a few programs, such as those where low-level hardware control is necessary or where maximum processing speed is vital. Computer programming has become a popular career in the developed world, particularly in the United States, Europe, Scandinavia, and Japan.

Due to the high labour cost of programmers in these countries, some forms of programming have been increasingly subject to offshore outsourcing (importing software and services from other countries, usually at a lower wage), making programming career decisions in developed countries more complicated, while increasing economic opportunities for programmers in less developed areas, particularly China and India. Quality requirements. Whatever the approach to software development may be, the final program must satisfy some fundamental properties. The following properties are among the most relevant:

- Reliability: how often the results of a program are correct.
- Robustness: how well a program anticipates problems not due to programmer error.
- Usability: the ergonomics of a program: the ease with which a person can use the program for its intended purpose or in some cases even unanticipated purposes.
- Portability: the range of computer hardware and operating system platforms on which the source code of a program can be compiled / interpreted and run. Maintainability: the ease with which a program can be modified by its present or future developers in order to make improvements or customizations, fix bugs and security holes, or adapt it to new environments.
- Efficiency/performance: the amount of system resources a program consumes (processor time, memory space, slow devices such as disks, network bandwidth and to some extent even user interaction): the less, the better.

Readability of source code. In computer programming, readability refers to the ease with which a human reader can comprehend the purpose, control flow, and operation of source code. It affects the aspects of quality above, including portability, usability and most importantly maintainability. Readability is important because programmers spend the majority of their time reading, trying to understand and modifying existing source code, rather than writing new source code. Unreadable code often leads to bugs, inefficiencies, and duplicated code.

Methodologies. The first step in most formal software development processes is requirements analysis, followed by testing to

determine value modelling, implementation, and failure elimination (debugging). There exist a lot of differing approaches for each of those tasks. One approach popular for requirements analysis is Use Case analysis. Nowadays many programmers use forms of Agile software development where the various stages of formal software development are more integrated together into short cycles that take a few weeks rather than years. There are many approaches to the software development process. Popular modelling techniques include Object-Oriented Analysis and Design (OOAD) and Model-Driven Architecture (MDA). The Unified Modelling Language (UML) is a notation used for both the OOAD and MDA. A similar technique used for database design is Entity-Relationship Modelling (ER Modelling). Implementation techniques include imperative languages (object-oriented or procedural), functional languages, and logic languages.

Debugging. Debugging is a very important task in the software development process, because an incorrect program can have significant consequences for its users. Some languages are more prone to some kinds of faults because their specification does not require compilers to perform as much checking as other languages. Use of a static code analysis tool can help detect some possible problems.

PROGRAM PLANNING

The programming process begins with a problem statement that helps you clearly define the purpose of a computer program. In the context of programming, a problem statement defines certain elements that must be manipulated to achieve a result or goal. A good problem statement for a computer program has three characteristics:

1. It specifies any assumptions that define the scope of the problem.
2. It clearly specifies the known information.
3. It specifies when the problem has been solved. In a problem statement an assumption is something you accept as true in order to proceed with program planning. The “known information” is the information that you supply to the computer to help it solve a problem. There are also variables (values that can change) and constants (factors that remain the same) in computer programs. Formulating a problem

statement provides a minimal amount of planning, which is sufficient for only the simplest programs. A typical commercial application requires far more extensive planning, which includes detailed program outlines, job assignments, and schedules. To some extent, program planning depends on the language and paradigm used to code a computer program. The phrase programming paradigm refers to a way of conceptualizing and structuring the tasks a computer performs. For example, whereas one programmer might focus on the steps required to complete a specific computation, another one might focus on the data that forms the basis for the computation. Quite a number of programming paradigms exist, and a programmer might use techniques from multiple paradigms while planning and coding a program. There are different program planning tools, such as flowcharts, structured English, pseudo code, UML diagrams, and decision tables, which are used to provide sufficient planning. Regardless of the tools used, when planning is complete, programmers can begin coding, testing, and documenting. The process of coding a computer program depends on programming language you use, the programming tools you select, and the programming paradigm that best fits the problem you are trying to solve. Programmers typically use a text editor, a program editor, or a VDE to code computer programs. A text editor is any word processor that can be used for basic editing tasks, such as writing e-mail, creating documents, or coding computer programs. When using a text editor to code a computer program, you simply type in each instruction. A program editor is a type of text editor specially designed for entering code for computer programs. A VDE (visual development environment) provides programmers with tools to build substantial sections of a program by pointing and clicking rather than typing lines of code. A typical VDE is based on a form design grid that a programmer manipulates to design the user interface for a program. By using various tools provided by the VDE, a programmer can add objects, such as controls and graphics, to the form design grid. In the context of a VDE, a control is a screen-based object whose behaviour can be defined by a programmer. In visual development environment, each control comes with predefined set of events. Within the context of programming, an event is defined as an action, such as dick, drag, or key press, associated with the form or control. A programmer can select the

events that apply to each control. An event usually requires the computer to make some response. Programmers write eventhandling code for the procedures that specify how the computer responds to each event. A programmer's choice of development tools depends on what is available for a particular programming language and the nature of the programming project. Text editors and program editors provide a fine tool set for programs with minimal user interfaces. A visual development environment is a powerful tool for programming software applications for GUI environments, such as Windows. Most GUI applications are "event-driven", which means that when launched, the program's interface appears on the screen and waits for the user to initiate an event. A computer program must be tested to ensure that it works correctly. Testing often consists of running the program and entering test data to see whether the program produces correct results. When a program doesn't work correctly, it is usually the result of an error made by the programmer. A syntax error occurs when an instruction doesn't follow the syntax rules, or grammar of the programming language. Syntax errors are easy to make, but they are usually also easy to detect and correct. Another type of program bug is a runtime error, which, as its name indicates, shows up when you run a program. Some runtime errors result from instructions that the computer can't execute. Some runtime errors are classified as logic errors. A logic error is an error in the logic or design of a program. It can be caused by an inadequate definition of the problem or an incorrect formula for a calculation, and they are usually more difficult to identify than syntax errors. Programmers can locate errors In a program by reading through lines of code, much like a proof-reader. They can also use a tool called debugger to step through a program and monitor the status of variables, input, and output. A debugger is sometimes packaged with a programming language or can be obtained as an add-on. Anyone who uses computers is familiar with program documentation in the form of user manuals and help files. Programmers also insert documentation called remarks or "comments" into the programming code. Remarks are identified by language-specific symbols. A well-documented program contains initial remarks that explain its purpose and additional remarks in any sections of a program where the purpose of the code is not immediately clear.

OBJECT-ORIENTED PROGRAMMING

One of the principal motivations for using OOP is to handle multimedia applications in which such diverse data types as sound and video can be packaged together into executable modules. Another is writing program code that's more intuitive and reusable; in other words, code that shortens program-development time. Perhaps the key feature of OOP is encapsulation - bundling data and program instructions into modules called 'objects'. Here's an example of how objects work. An icon on a display screen might be called Triangles'. When the user selects the Triangles Icon - which is an object composed of the properties of triangles and other data and Instructions - a menu might appear on the screen offering several choices. The choices may be (1) create a new triangle and (2) fetch a triangle already in storage. The menu, too, is an object, as are the choices on it. Each time a user selects an object, instructions inside the object are executed with whatever properties or data the object holds, to get to the next step. For instance, when the user wants to create a triangle, the application might execute a set of instructions that displays several types of triangles - right, equilateral, isosceles, and so on. Many industry observers feel that the encapsulation feature of OOP is the natural tool for complex applications in which speech and moving images are integrated with text and graphics. With moving images and voice built into the objects themselves, program developers avoid the sticky problem of deciding how each separate type of data is to be integrated and synchronized into a working whole. A second key feature of OOP is inheritance. This allows OOP developers to define one class of objects, say "Rectangles", and a specific instance of this class, say "Squares" (a rectangle with equal sides). Thus, all properties of rectangles - "Has 4 sides" and "Contains 4 right angles" are the two shown here - are automatically inherited by Squares. Inheritance is a useful property in rapidly processing business data. For instance, consider a business that has a class called "Employees at the Dearborn Plant" and a specific instance of this class, "Welders". If employees at the Dearborn plant are eligible for a specific benefits package, welders automatically qualify for the package. If a welder named John Smith is later relocated from Dearborn to Birmingham, Alabama, where a different benefits package is available, revision is simple. An icon

representing John Smith - such as John Smith's face - can be selected on the screen and dragged with a mouse to an icon representing the Birmingham plant. He then automatically "inherits" the Birmingham benefit package. A third principle behind OOP is polymorphism. This means that different objects can receive the same instructions but deal with them in different ways. For instance, consider again the triangles example. If the user right clicks the mouse on "Right triangle", a voice clip might explain the properties of right triangles. However, if the mouse is right clicked on "Equilateral triangle" the voice instead explains properties of equilateral triangles. The combination of encapsulation, inheritance and polymorphism leads to code reusability. "Reusable code" means that new programs can easily be copied and pasted together from old programs. All one has to do is access a library of objects and stitch them into a working whole. This eliminates the need to write code from scratch and then debug it. Code reusability makes both program development and program maintenance faster.

OBJECT-ORIENTED LANGUAGES AND APPLICATIONS

Computer historians believe that SIMULA (SIMUIation LAnguage) was the first computer language to work with objects, classes, inheritance, and methods. SIMULA was developed in 1962 by two Norwegian computer scientists for the purpose of programming simulations and models. SIMULA laid the foundation for the object-oriented paradigm, which was later incorporated into other programming languages, such as Eiffel, Smalltalk, C++, and Java. The second major development in object-oriented languages came in 1972 when Alan Kaye began work on the Dynabook project at the Xerox Palo Alto Research Center (PARC). Dynabook was a prototype for a notebook-sized personal computer, intended to handle all the information needs of adults and children. Kaye developed a programming language called Smalltalk for the Dynabook that could be easily used to create programs based on real-world objects. Dynabook never became a commercial product, but Smalltalk survived and is still in use today. Smalltalk is regarded as a classic object-oriented language, which encourages programmers to take a "pure" 0 0 approach to the programming process. As the object-oriented paradigm gained popularity, several existing programming

languages were modified to allow programmers to work with objects, classes, inheritance, and polymorphism. The concept for the Ada programming language originated in 1978 at the U. S. Department of Defense. The first versions of Ada were procedural, but in 1995, the language was modified to incorporate object-oriented features. A similar transformation took place with the C language in 1983, except that the object-oriented version earned a new name — C++. Hybrid languages, such as Ada95, C++, Visual Basic, arid C#, give programmers the option of using procedural and object-oriented techniques. Java is one of the newest additions to the collection of object-oriented languages. Originally planned as a programming language for consumer electronics, such as interactive cable television boxes, Java evolved into an object-oriented programming platform for developing Web applications. Java was officially launched by Sun Microsystems in 1995 and has many of the characteristics of C++, from which it derives much of its syntax. Like C++, Java can also be used for procedural programming, so it is sometimes classified as a hybrid language. The object-oriented paradigm can be applied to a wide range of programming problems. Basically, if you can envision a problem as a set of objects that pass messages back and forth, the problem is suitable for the 0 0 approach. The object-oriented paradigm is cognitively similar to the way human beings perceive the real world. Using the object-oriented approach, programmers might be able to visualize the solutions to problems more easily. Facets of the object-oriented paradigm can also increase a programmer's efficiency because encapsulation allows objects to be adapted and reused in a variety of different programs. Encapsulation refers to the process of hiding the internal details of objects and their methods. After an object is coded, it becomes a "black box," which essentially hides its details from other objects and allows the data to be accessed using methods. A potential disadvantage of object-oriented programs is runtime efficiency. Object-oriented programs tend to require more memory and processing resources than procedural programs. Programmers, software engineers, and system analysts can work together to weigh the tradeoffs between the 0 0 approach and runtime efficiency.

JAVA

Java is a high-level language with which to write programs that can execute on a variety of platforms. So are C, C++, Fortran and Cobol, among many others. So the concept of a portable execution vehicle is not new. Why, then, has the emergence of Java been trumpeted so widely in the technical and popular press? Why is Java different from other languages? Part of Java's novelty arises from its new approach to portability. In previous High- level languages, the portable element was the source program. Once the source program is compiled into executable form for a specific instruction set architecture (ISA) and bound to a library of hardware-dependent I/O, timing and related operating system (OS) services, portability is lost. The resultant executable form of the program runs only on platforms having that specific ISA and OS. Thus, if a program is to run on several different platforms, it has to be recompiled and re-linked for each platform. And if a program is sent to a remote target for execution, the sender must know in advance the exact details of the target to be able to send the correct version. With Java, source statements can be compiled into machine-independent, "virtual instructions" that are interpreted at execution time. Ideally, the same virtual code runs in the same way on any platform for which there is an interpreter and OS that can provide that interpreter with certain multithreading, file, graphical and similar support services. With portability moved to the executable form of the program, the same code can be sent over the net to be run without prior knowledge of the hardware characteristics of the target. Executable programs in the Java world are universal. In principle, portability could have been achieved in the C or C++ world by sending the source program over the net and then having the compilation and linkage done as a pre-step to execution. However, this approach would require that the target system have sufficient CPU speed and disk capacity to run the sophisticated compilers and linkers required. In the future, network platforms may not have the facilities to run even a simple compiler. Is that all? Java is not just a new concept in portability. The Java language evolved from C and C++ by locating and eliminating many of the major sources of program error and instability. For example, C has an element known-as a pointer that is supposed to contain the address at which a

specific type of information is stored. However, the pointer can be set to literally any address value, and by «casting» a programmer can trick the compiler into storing any type of information at the arbitrary pointer address. This is convenient if you write error-free code and a snake pit if you don't. Java does not have pointers. Equally important, Java has built-in support for multiprogramming. C and its immediate descendant C++ were designed to express a single thread of computing activity. There was no inherent support for multiple program threads executing simultaneously (on multiple CPUs), or in parallel (timesharing a single CPU). Any such facilities had to be supplied by an external multitasking operating system. There are several good programs of this type readily available, such as MTOS-UX from Industrial Programming. However, the services provided are all vendor-specific. Neither ANSI nor any of the various committees set up to hammer out a universal set of OS services ever produced a single, universally-accepted standard. There are in fact, several proposed standards, so there is no standard. Java bypasses the problem by building multithreading and the data synchronization it requires directly into the source program. You still need an OS to make this happen, but, the semantic meaning of the OS actions is standardized at the source level. A standard at last Java has all of the technical requisites to become the standard programming language for programs to be distributed over the net. And with a well-supported campaign spearheaded by Sun Microsystems, Java is becoming the de facto working standard. Will Java supersede C as the language of choice for new programs in general? With network programming likely to play an increasingly larger part in the overall programming field, I think so. Java for embedded systems. Embedded or real-time systems include all those in which timing constrains imposed by the world outside of the computer play a critical role in the design and implementation of the system. Common areas for embedded systems are machine and process control, medical instruments, telephony, and data acquisition. A primary source of input for embedded systems - are random, short-lived, external signals. When such signals arrive, the processor must interrupt whatever else it is doing to capture the data or it will be lost. Thus, an embedded program is most often organized as a set of individual, but cooperating threads of execution. Some threads capture new data, some analyze the

new data and integrate it with past inputs some generate the outgoing signals and displays that are the products of the system. Currently, most embedded programs are coded in C, with critical parts possibly in assembler. Putting the issue of execution efficiency aside, some of the major problems of C for embedded systems are: • The permissiveness of C operations, which can lead to undisciplined coding practices and ultimately to unstable execution. • The absence of universal standards for multithreading, shared data protection, and intra-thread communication and coordination, which can make the program hard to transfer to alternate platforms. But, these are just the problems that Java solves. Since many programmers will have to lean Java because of its importance to the net, it will be natural for Java to supplant C in the embedded world. The use of Java may be different, however. We anticipate that Java programs for embedded applications will differ from net applets in at least five major ways. Embedded applications will be: • compiled into the native ISA for the target hardware; • capable of running in the absence of a hard or floppy disk, and a network connection; • supported by highly tailored, thus relatively small run-time packages; • able to execute on multiple processors, if needed for capacity expansion; • contain significant amounts of legacy C code, at least during the transition from C to Java. Mixed systems: multiple languages, multiple CPUs. While we expect Java to supersede C as the primary programming language for embedded systems in the near future, there is still an enormous number of lines of C code in operation. Companies will have to work with that code for many years as the transition to Java runs its course. Many systems will have to be a mixture of legacy C code and Java enhancements. It is not trivial to integrate an overall application with some components written in Java and others in C or assembler. Part of the problem arises from security issues: How can Java guarantee the security of the system if execution disappears into “unknown” regions of code? Furthermore, the danger is compounded if the non-Java code were to make OS support service calls, especially calls that alter the application's threading and data-protection aspects. Java expects to be the sole master of such matters. Thus we see that mixed language systems may have to exist, but this is not going to be easy. Similarly, there may be problems with multiple CPUs. Current CPUs are fast, and get faster

with each new generation. Yet, there are some embedded applications for which a single CPU still does not have enough power to keep up with a worst-case burst of external input. Such systems require multiple CPUs working together to complete the required processing. Even if the system can handle current work loads, the next version may not. Do we have a problem? When you combine the des ire to write in Java, with the need to execute on unique, system-specific hardware, possibly with mixed source languages and multiple CPUs, you introduce a major obstacle. You are not likely to get an off-the-shelf Java OS from Sun Microsystems. Many companies that have previously offered their own proprietary real-time OS are now developing a Java OS, or are seriously considering such an offering. My own company, Industrial Programming, is currently using its experience with embedded multithreading / multiprocessor operating systems to create a new system that will handle applications written in both Java and C. And as the case with its traditional product, MTOS-UX, the OS is transparent to the number of tightly-coupled CPUs that are executing the application code. If one CPU is not enough, you can add more without altering the application.

DATA SECURITY

There are a variety of security measures that can be used to protect hardware (the physical components of a computer system) including:

1. Controlling physical access to hardware and software.

2. Backing up data and programs (storing a copy of files on a storage device to keep them safe).

3. Implementing network controls such as:

- using passwords (a secret code used to control access to a network system);
- installing a firewall (a combination of hardware and software used to control the data going into and out of a network. It is used to prevent unauthorised access to the network by hackers);
- encrypting data (protecting data by putting it in a form only authorised users can understand;
- installing a call-back system (a system that automatically disconnects a telephone line after receiving a call and then dials the telephone number of the system that made the call, to reconnect the line.

It is used in remote access system to make sure that connections can only be made from permitted telephone numbers);

•using signature verification or biometric security devices (security devices that measure some aspect of a living being e. g. a fingerprint reader or an eye scanner).

4. Separating and rotating the computing functions carried out by employees and carrying out periodic audits of the system i.e. o b s e r v p & ^ ^ /s o ^ ^ .on ,;Ш §..пе^гк_ systematically.

5. Protecting against natural disasters by installing uninterruptible power supplies (battery backup system that automatically provide power to a computer when the normal electricity source fails) and surge protectors (electronic devices that protect equipment from damage due to a sudden surge in a power supply).

6. Protecting against viruses by using antivirus programs (computer programs or sets of programs used to detect, identify and remove viruses from a computer system) and ensuring that all software is free of viruses before it is installed. Particular care must be taken when using public domain software (free software) and shareware (software that is free to try out but must be paid for if it is used after the trial period). A smart card is a plastic card containing a processor and memory chip. It can be used to store large amounts of confidential data including coded data that can be used as digital cash (electronic currency that is used for making electronic purchases over the Internet). It can also be used as a security device to prevent or allow access to a system and allow a user to withdraw cash from a bank ATM (automatic teller machine - a type of machine used by banks for enabling customers to withdraw money from their bank accounts). A smart card reader is a device used for reading smart cards by detecting radio signals emitted from a radio antenna (aerial) in the form of a small coil inside the smart card. An anti-virus program is a program that checks files for virus coding instructions inside another program and can be used for removing any virus coding instructions detected. A backup program is a program that stores a copy of data on a storage device to keep it safe. There are different kinds of backup, including:

1. Incremental backup which copies all the selected files that have created or changed since the last full, differential or incremental backup.

These files are identified by the fact that their archive bit would be on. The archive bit is a digital bit stored with a file indicating if the has been backed up since it was last edited. The archive bit is switched off when the file is backed up using a full or incremental backup.

2. Differential backup which copies all the files created or modified since the last full backup. The archive bit is not set to “o ff1 by a differential backup.

3. Full backup which copies all the selected files on a system, whether or not they have been edited or backed up before. A series of incremental backups and a full backup, or the most recent differential backup and a full backup is known as a backup set.

DATA THEFT: HOW BIG IS A PROBLEM?

Data theft is, quite simply, the unauthorized copying or removal of confidential information from a business or other large enterprise. It can take the form of ID-related theft or the theft of a company’s proprietary information or intellectual property. ID-related data theft occurs when customer records are stolen or illegally copied. The information stolen typically includes customers’ names, addresses, phone numbers, usernames, passwords and PINs, account and credit card numbers, and, in some instances, Social Security numbers. When transmitted or sold to lower-level criminals, this information can be used to commit all manner of identity fraud. A single data theft can affect large numbers of individual victims. Non-ID data theft occurs when an employee makes one or more copies of a company’s confidential information, and then uses that information either for his own personal use or transmits that information to a competitor for the competitor’s use. However it’s done, this is a theft of the business’ intellectual property, every bit as harmful as a theft of money or equipment. A company’s confidential information includes its employee records, contracts with other firms, financial reports, marketing plans, new product specifications, and so on. Imagine you're a competitor who gets hold of a company’s plans for an upcoming product launch; with knowledge beforehand you can create your own counter-launch to blunt the impact of the other company’s new product. A little inside information can be extremely valuable and damaging for the company from which it was stolen. Data theft can be a virtual theft

(hacking into a company's systems and transmitting stolen data over the Internet) or, more often, a physical theft (stealing the data tapes or discs). In many ways, it's easier for a thief to physically steal a company's data than it is to hack into the company's network for the same purpose. Most companies give a lot of attention to Internet based security, but less attention is typically paid to the individuals who have physical access to the same information. One would expect data theft to be somewhat widespread. And it probably is if we truly knew all the numbers. The problem with trying to size the data theft issue is twofold. First, many companies do not report data theft to the police or do not publicize such thefts; they're trying to avoid bad publicity. And even when data theft is reported, the dollar impact of such theft is difficult to ascertain. Whichever number is correct, that's a lot of stolen data. Add to that the immeasurable cost of intellectual property data theft, and you get a sense of the size of the problem — it's big and it's getting bigger. Unfortunately, there's little you as an individual can do to prevent data theft; the onus is all on the company holding the data. You could reduce your risk by limiting the number of companies with which you do business, but that may not be practical. Being alert is your only defence against this type of large-scale theft.

INFORMATION WARFARE

In the past decade we have witnessed phenomenal growth in the capabilities of information management systems. National security implications of these capabilities are only now beginning to be understood by national leadership. There is no doubt IW is a concept the modern military officer should be familiar with, for advancements in computer technology have significant potential to dramatically change the face of military command and control. Information warfare is an orchestrated effort to achieve victory by subverting or neutralizing an enemy command and control (C2) system, while protecting use of C2 systems to coordinate the actions of friendly forces. A successful IW campaign seizes initiative from an enemy commander; the IW campaign allows allied forces to operate at a much higher tempo than an enemy can react to. The concept of an "OODA Loop" is often used to illustrate information warfare. OODA stands for the steps in a commander's

decision making cycle — Observe, Orient, Decide and Act. Based on the premise that information is a strategic asset, a portion of IW doctrine seeks to disrupt or deny access to information in order to seize initiative from an adversary. The other half of IW doctrine seeks to maintain the integrity of our information gathering and distribution infrastructure.

Applying Information Warfare. Most modern political and military C2 systems are based on high-speed communications and computers. It follows that this information infrastructure, also known as an Info-sphere", will be the arena in which information warfare is waged. Any system or person who participates in the C2 process will be a potential target in an IW campaign. An IW campaign will focus against the enemy info-sphere. It will be necessary to isolate, identify and analyze each element of an enemy info-sphere in order to determine portions which can affect the OODA loop's size. Once these areas of the enemy info-sphere are identified, an attack against critical nodes would deny access to information, destroy the information, or render it useless to the adversary forces. Even more damaging, information warriors could alter data in a network, causing the adversary to use false information in his decision-making process and follow a game plan of the friendly commander's design.

Fighting the information War. One development with implications for the military is the appearance of "hackers" and "phreakers" — persons who gain unauthorized access to computer and telephone systems, respectively. A computer network or telephone system is designed to transmit information. Much of that information will form an excellent intelligence picture of an adversary. Computer networks can be monitored through telephone modems, peripheral equipment, power lines, human agents and other means, if a system can be monitored remotely, it might also be accessed remotely. A program could be installed to record and relay computer access codes to a remote location. Employing computers as a weapon system will introduce a new glossary of terminology. Computer war fighting weapons can be divided into four categories: software, hardware, electromagnetic systems and other assets. Software consists of programs designed to collect information on, inhibit, alter, deny use of, or destroy the enemy info-sphere. The examples of software war fighting; assets have exotic, computer hacker

names: “knowbot”, “demons”, “sniffers”, “viruses", “Trojan horses”, “worms” or “logic bombs”.

A knowbot (knowledge robot) is a program which moves from machine to machine, possibly cloning itself. KNOWBOTs can communicate with one another, with various servers in a network, and with users. The KNOWBOT could even be programmed to relocate or erase itself to prevent discovery of espionage activity. KNOWBOTs could seek out, alter or destroy critical nodes of an enemy C2 system. Demon. A program which, when introduced into a system, records all commands entered into the system. Similar to the demon is the “sniffer”. A sniffer records the first 128 bits of data on a given program. Logon information and passwords are usually contained in this portion of any data stream. Because they merely read and record data, such programs are very difficult to detect.

Virus. A program which, upon introduction, attaches itself to resident files or tables on a machine or network. The virus spreads itself to other files as it comes into contact with them. It may reproduce without doing any actual damage, or it may erase files via the file allocation table.

Trap Door. A back door into a system, written in by a programmer to bypass future security codes.

Trojan Horse. A code which remains hidden within a computer system or network until it emerges to perform a desired function. A Trojan Horse can authorize access to the system, alter, deny or destroy data, or slow down system function.

Worm. A nuisance file which grows within an information storage system. It can alter files, take up memory space, or displace and overwrite valuable information.

Logic Bomb. This instruction remains dormant until a pre-determined condition occurs. Logic bombs are usually undetectable before they are activated. The logic bomb can alter, deny or destroy data and inhibit system function.

Hardware. The primary purpose of a hardware asset is to bring software assets into contact with an enemy computer system. Any piece of equipment connected to a computer, be it a fibre-optic or telephone cable, facsimile machine or printer, is capable of transmitting information to that computer. Therefore it is a potential avenue for

gaining access to the info-sphere. Electromagnetic Systems. Any mechanisms using the electromagnetic spectrum to subvert, disrupt or destroy enemy command and control are electromagnetic systems. Electromagnetic pulse simply shorts-out electronic equipment.

Other assets. This catch-all category makes an important point. Information warfare is not limited to electronic systems. Simply put, non-computer assets can compliment use of computer hardware and software assets, or can act unilaterally. Their goal is to achieve the desired effect upon the enemy G2 network in pursuit of strategic, operational or tactical objectives. Successful employment of IW assets could theoretically end a war before the first shot is fired. IW doctrine has significant implications for modern military theory. IW will focus on preventing the enemy soldier from talking to his commander. Without coordinated action, an enemy force becomes an unwieldy mob, and a battle devolves to a crowd-control issue. In the not too distant future, computer weapon systems will conduct "software strikes" against the enemy infosphere to disrupt command and control. Targets will be chosen for military, political or economic significance. IW opens new doors throughout the spectrum of conflict to achieve tactical, operational and strategic objectives.

Information warfare is a concept which is only now beginning to make its way through governmental and military circles. The technology currently exists with which to conduct an IW campaign. National leaders must reflect on the implications of this new technology in order to develop coherent policy and rules of engagement.

ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS

There is a class of computer programs, known as expert systems that aim to mimic human reasoning. The methods and techniques used to build these programs are the outcome of efforts in a field of computer science known as Artificial Intelligence (At). Expert systems have been built to diagnose disease, translate natural languages, and solve complex mathematical problems. In conventional computer programs, problem-solving knowledge is encoded in program- logic and program-resident data structures. Expert systems differ from conventional program-, both in the way problem knowledge is stored and used. An expert system is a

computer program, with a set of rules encapsulating knowledge about a particular problem domain (i.e. medicine, chemistry, finance, flight and so on). These rules prescribe actions to take when certain conditions hold, and define the effect of the action on deductions or data. The expert system, seemingly, uses reasoning capabilities to reach conclusions or to perform analytical tasks. Expert systems that record the knowledge needed to solve a problem as a collection of rules stored in a knowledge-base are called rule-based systems. Expert systems are especially important to organizations that rely on people who possess specialized knowledge of some problem domain, especially if this knowledge and experience cannot be easily transferred. Artificial intelligence methods and techniques have been applied to a broad range of problems and disciplines, some of which are esoteric and others which are extremely practical. Expert systems are used by the investments, banking, and telecommunications industries. They are essential in robotics, natural language processing, theorem proving, and the intelligent retrieval of information from databases. They are used in many other human endeavours which might be considered more practical. Rule-based systems have been used to monitor and control traffic, to aid in the development of flight systems. A rule-based, expert system maintains a separation between its knowledge base and that part of the system that executes rules, often referred to as the expert system shell. The system shell is indifferent to the rules it executes. This is an important distinction, because it means that the expert system shell can be applied to many different problem domains with little or no change. It also means that adding or modifying rules to an expert system can effect changes in program behaviour without affecting the controlling component, the system shell. r The language used to express a rule is closely related to the language subject matter experts use to describe problem solutions. When the subject matter expert composes a rule using this language, he is, at the same time, creating a written record of problem knowledge, which can then be shared with others. Thus, the creation of a rule kills two birds with one stone; the rule adds functionality or changes program behaviour, and records essential information about the problem domain in a human-readable form. Knowledge captured and maintained by these

systems ensures continuity of operations even as subject matter experts (i.e. mathematicians, accountants, physicians) retire or transfer.

Furthermore, changes to the knowledge-base can be made easily by subject matter experts without programmer intervention, thereby reducing the cost of software maintenance and helping to ensure that changes are made in the way they were intended. Rules are added to the knowledge-base by subject matter experts using text or graphical editors that are integral to the system shell. Finally, the expert system never forgets, can store and retrieve more knowledge than any single human being can remember, and makes no errors, provided the rules created by the subject matter experts accurately model the problem at hand.

ARTIFICIAL INTELLIGENCE IN EDUCATION

For decades, science fiction authors, futurists, and movie makers have been predicting the amazing changes that will arise with the advent of widespread artificial intelligence. So far, Al hasn't made any such extreme waves, and in many ways has quietly become ubiquitous in numerous aspects of our daily lives. From the intelligent sensors that help us take perfect pictures, to the automatic parking features in cars, to the sometimes-frustrating personal assistants in smart phones, artificial intelligence of one kind or another is all around us all the time. One place where artificial intelligence is poised to make big changes (and in some cases already is) is in education. White we may not see humanoid robots acting as teachers within the next decade, there are many projects already in the works that use computer intelligence to help students and teachers get more out of the educational experience. Here are just a few of the ways those tools, will shape and define the educational experience of the future.

Artificial intelligence can automate basic activities in education, like grading. In college, grading homework and tests for large lecture courses can be tedious work. Even in lower grades, teachers often find that grading takes up a significant amount of time, time that could be used to interact with students, prepare for class, or work on professional development.

While Al may not ever be able to truly replace human grading, it’s getting pretty close. It’s now possible for teachers to automate grading

for nearly all kinds of multiple choice and fill-in-the-blank testing and automated grading of student writing may not be far behind. Today, essay-grading software is still in its infancy, yet it can (and will) improve over the coming years, allowing teachers to focus more on in-class activities and student interaction than grading.

Educational software can be adapted to student needs. From kindergarten to graduate school, one of the key ways artificial intelligence will impact education is through the application of greater levels of individualized teaming. Some of this is already happening through growing numbers of adaptive learning programs, games, and software. These systems respond to the needs of the student, putting greater emphasis on certain topics, repeating things that students haven't mastered, and generally helping students to work at their own pace, whatever that may be. This kind of custom-tailored education could be a machine-assisted solution to helping students at different levels work together in one classroom, with teachers facilitating the teaming and offering help and support when needed. Adaptive learning has already had a huge impact on education, and as Al advances in the coming decades adaptive programs will likely only improve and expand.

Students could get additional support from Al tutors. While there are obviously things that human tutors can offer that machines can't, at least not yet, the future could see more students being tutored by tutors that only exist "in zeros and ones". Some tutoring programs based on artificial intelligence already exist and can help students through basic mathematics, writing, and other subjects. These programs can teach students fundamentals, but so far aren't ideal for helping students learn high-order thinking and creativity, something that real-world teachers are still required to facilitate. Yet that shouldn't rule out the possibility of Al tutors being able to do these things in the future. With the rapid pace of technological advancement that has marked the past few decades, advanced tutoring systems may not be a dream.

Al-driven programs can give students and educators helpful feedback. Al can not only help teachers and students to craft courses that are customized to their needs, but it can also provide feedback to both about the success of the course as a whole. Some schools, especially those with online offerings, are using Al systems to monitor student

progress and to alert professors when there might be an issue with student performance. These kinds of Al systems allow students to get the support they need and for professors to find areas where they can improve instruction for students who may struggle with the subject matter. Al programs at these schools aren't just offering advice on individual courses, however. Some are working to develop systems that can help students to choose majors based on areas where they succeed and struggle. While students don't have to take the advice, it could mark a brave new world of college major selection for future students.

It could change the role of teachers. There will always be a role for teachers in education, but what that role is and what it entails may change due to new technology in the form of intelligent computing systems. As we've already discussed, Al can take over tasks like grading, can help students improve learning, and may even be a substitute for real-world tutoring. Yet Al could be adapted to many other aspects of teaching as well. Al systems could be programmed to provide expertise, serving as a place for students to ask questions and find information or could even potentially take the place of teachers for very basic course materials. In most cases, however, Al will shift the role of the teacher to that of facilitator. Teachers will supplement Al lessons, assist students who are struggling, and provide human interaction and hands-on experiences for students. In many ways, technology is already driving some of these changes in the classroom, especially in schools that are online or embrace the classroom model.

All can make trial-and-error learning less intimidating. Trial and error is a critical part of learning, but for many students, the idea of failing, or even not knowing the answer, is paralyzing. Some simply don't like being put on the spot in front of their peers or authority figures like a teacher. An intelligent computer system, designed to help students to lean, is a much less daunting way to deal with trial and error. Artificial intelligence could offer students a way to experiment and lean in a relatively judgment-free environment, especially when Al tutors can offer solutions for improvement. In fact, Al is the perfect format for supporting this kind of learning, as Al systems themselves often lean by a trial-and-error method.

Data powered by all can change how schools find, teach, and support students. Smart data gathering, powered by intelligent computer systems, is already making changes to how colleges interact with prospective and current students. From recruiting to helping students choose the best courses, intelligent computer systems are helping make every part of the college experience more closely tailored to student needs and goals. Data mining systems are already playing an integral role in today's higher-education landscape, but artificial intelligence could further alter higher education, initiatives are already underway at some schools to offer students Al-guided training that can ease the transition between college and high school. Al may change where students learn, who teaches them, and how they acquire basic skills< While major changes may still be a few decades in the future, the reality is that artificial intelligence has the potential to radically change just about everything we take for granted about education. Using Al systems, software, and support, students can learn from anywhere in the world at any time, and with these kinds of programs taking the place of certain types of classroom instruction, Al may just replace teachers in some instances (for better or worse). Educational programs powered by Al are already helping students to learn basic skills, but as these programs grow and as developers team more, they will likely offer students a much wider range of services. What is the result? Education could look a whole lot different a few decades from now.

USEFUL GRAMMAR

Раздел включает следующие разделы: • Имя существительное / The Noun; • Артикль / The Article; • Местоимение / The Pronoun; • Имя числительное / The Numeral; • Имя прилагательное / The Adjective; •• Предлоги / Prepositions; • Глагол / The Verb; • Порядок слов в предложении.

Имя существительное (The Noun)

Имя существительное – часть речи, обозначающая предмет и отвечающая на вопросы: кто это ? (Who is this ?) или что это ? (What is this?)

По своему значению имена существительные делятся: на собственные (Charles Babbage, Konrad Zuse, Washington) и нарицательные (a computer, a machine, a device)

Нарицательные делятся на:

Существительные также подразделяются на исчисляемые (a device – устройство, devices – устройства) и неисчисляемые (information, advice, knowledge).

Большинство имён существительных в английском языке употребляется с артиклями.

Артикль /(The Article)

Основная функция артикля - указывать на определенность или неопределенность существительного. Поэтому существуют **неопределенный артикль a/an** (indefinite article) и **определенный артикль the** (definite article), нулевой артикль (zero article) — это отсутствие артикля.

Главный принцип выбора артикля в английском языке: неопределенный артикль a/an мы ставим, когда говорим не о каком-то конкретном предмете, человеке или явлении, а об одном из многих. Если же речь идет о чем-то или ком-то конкретном, употребляем определенный артикль the.

Артикли на русский язык не переводятся, но если попытаться перевести по смыслу, то неопределенный артикль a/an значит «один, какой-то», определенный the - «этот», «тот».

I need a computer. - Мне нужен компьютер. (какой-то один компьютер)

I need the computer I chose yesterday. - Мне нужен компьютер,

который я вчера выбрал. (тот самый, конкретный компьютер)

Мы **не используем артикли** a, an или the, если перед существительным уже стоит:

притяжательное местоимение (my - мой, his - его);

указательное местоимение (this - этот, that - тот);

числительное (one - один, two - два).

This is my printer. *I have one printer.*

Неопределенный артикль a

не используется с существительными во множественном числе.

Неопределенный артикль an

- если слово начинается с гласного звука: an algorithm, an operating system.

- **Неопределенный артикль a/an употребляется:**
- при упоминании чего-то в первый раз
- с одним из группы, типа, рода
- с названием профессии, национальности
- когда мы используем прилагательное для описания существительного
- с дробями, единицами меры, веса, большими числами
- вместе с half/quite

Неопределенный артикль a/an не употребляется с неисчисляемыми существительными.

Определенный артикль the употребляется:

- с существительными, которые были упомянуты ранее. Первый раз мы используем артикль a/an, а второй раз - the.
- впервые, но понятно о ком/о чем идет речь
- с существительными, которые конкретизируются с помощью дополнительной информации
- с существительными, единственными в своем роде
- перед прилагательными в превосходной степени
- перед порядковыми числительными
- перед такими словами, как same, whole, right, left, wrong, only, main, last, next, previous
- перед национальными группами
- перед фамилиями в значении семья, семейство
- перед прилагательными в значении

существительного во мн.ч., обозначающими группы людей.

Местоимения (Pronouns)

Они указывают на объект или человека, обозначают их признаки или количество, но не называют их напрямую.

Местоимения помогают избегать ненужных повторов и очень точно выражать свои мысли.

По своему строению местоимения в английском делятся на следующие группы: Группа местоимений	Состав	Местоимения
Простые местоимения (Simple pronouns)	Один корень	I he us they same whose
Составные местоимения (Compound pronouns)	Два корня и более	somebody (some + body) myself (my + self) nothing (no + thing)
Сложные местоимения (Composite pronouns)	Несколько слов	each other one another

Также все местоимения делятся на несколько групп-разрядов. Всего таких классов местоимений в английском языке десять: личные (Personal pronouns), притяжательные (Possessive pronouns), возвратные (Reflexive pronouns), взаимные (Reciprocal pronouns), указательные (Demonstrative pronouns), вопросительные вопросительные (Interrogative pronouns), относительные (Relative pronouns), определяющие (Defining pronouns), отрицательные (Negative pronouns), неопределённые (Indefinite and Negative pronouns).

Приведём местоимения по отношению к каждой группе отдельно и подробнее рассмотрим их особенности.

Разряды	Английские местоимения	Значение
Личные	I You He She It We You They	Я Ты Он Она Оно Мы Вы Они
Притяжательные	My Your His Her Its Our Their	мой твой, ваш его её его, её, свой наш их
Указательные	This That These Those Such	этот, эта, это тот, та, то эти те такие
Возвратные	Myself Yourself	себя, себе себя

	Himself Herself Itself Ourselves Yourselves Themselves	себя, сам себя, сама себя, себе, сам, сама, само себя, себе, сами себя, себе самих себя; сами, себя, себе
Взаимные	Each other One another	друг друга один другого; друг друга
Разделительные	Other Another	другой, иной, остальные другой, иной, подобный, ещё один
Вопросительные	Who What Which Whose Whoever Whatever Whichever	который, кто что, какой который, кто, какой чей, чьё кто бы ни…, который бы ни... какой бы ни…, что бы ни…, хоть что-нибудь какой бы ни…, какой угодно
Относительные	Who Whose Which That	который, кто чей, чьё который, какой, кто тот, та, то

Неопределенные	Some Something Somebody Someone Any Anything Anybody Anyone	некоторые, одни, другие нечто, что-нибудь, кое-что кто-то кто-то, кто-нибудь, некто любой, всякий, кто-либо, какой-нибудь ничто, что угодно, все кто-нибудь, никто, любой, всякий кто-нибудь, никто, всякий, любой
Отрицательные	No Nothing Nobody No one None Neither	никакой ничего, ничто никто никто, никого, ни один никто, ни один, ничто, ни один из... ни один, никто, ни тот ни другой
Определяющие	All Each Both Every Everything Everybody Everyone	все, каждый каждый, всякий и то и другое, оба каждый, все, всякий всё каждый, всякий каждый, всякий

Имя числительное (The Numeral)

Именем числительным (**The Numeral**) называется часть речи, которая обозначает количество или порядок предметов. Числительные в английском языке, так же как и в русском делятся на количественные (**Cardinal Numerals**) и порядковые числительные (**Ordinal Numerals**).

Имена числительные бывают **простые**, **производные** и **составные**.

К **простым** именам числительным относятся: **one** - один, **two** - два, **three** - три, **hundred** - сто, **thousand** - тысяча, **first** - первый, **second** - второй и т.д.

К **производным** именам числительным относятся числительные, имеющие в своем составе суффиксы **-teen**, **-ty**, **-th**:**fourteen** - четырнадцать, **seventy** - семьдесят, **tenth** - десятый и т.д.

К **составным** именам числительным относятся числительные, состоящие из двух или более слов: **four hundred** - четыреста, **six hundred and twenty five** - шестьсот двадцать пять, **three thousand five hundred and seventy two** - три тысячи пятьсот семьдесят два и т.д.

Количественные числительные (Cardinal Numerals)		
1 — one 2 — two 3 — three 4 — four 5 — five 6 — six 7 — seven 8 — eight 9 — nine 10 — ten 101 — a (one) hundred and one 200 — two hundred	11 — eleven 12 — twelve 13 — thirteen 14 — fourteen 15 — fifteen 16 — sixteen 17 — seventeen 18 — eighteen 19 — nineteen 20 — twenty 1,000 — a (one) thousand 2,000 — two thousand	21 — twenty-one 22 — twenty-two, …, 30 — thirty 40 — forty 50 — fifty 60 — sixty 70 — seventy 80 — eighty 90 — ninety 100 — a (one) hundred 100,000 — a (one) hundred thousand 1,000,000 — a (one) million
Порядковые числительные (Ordinal Numerals)		
1st — first 2nd — second 3rd — third 4th — fourth 5th — fifth 6th — sixth 7th — seventh 8th — eighth 9th — ninth 10th — tenth	11th — eleventh 12th — twelfth 13th — thirteenth 14th — fourteenth 15th — fifteenth 16th — sixteenth 17th — seventeenth 18th — eighteenth 19th — nineteenth 20th — twentieth	21st — twenty first, …, 30th — thirtieth 40th — fortieth 50th — fiftieth 60th — sixtieth 70th — seventieth 80th — eightieth

		90th — ninetieth 100th — a (one) hundredth
Дроби (Fractional Numerals)		
Простые (Common Fractions)	$^1/_2$ — a (one) half $^1/_3$ — one third	$^2/_5$ — two fifths $2\,^3/_7$ — two and three sevenths
Десятичные (Decimal Fractions)	0.3 — nought (zero) point three (point three) 2.35 — two point three five (thirty five) 32.305 — three two (thirty two) point three zero (nought) five	

Хронологические даты

Годы, в отличие от русского языка, обозначаются количественными числительными. При чтении обозначений года хронологическая дата делится пополам, причем каждая половина читается как отдельное число:

1900 - nineteen hundred
1904 - nineteen four
1964 - nineteen sixty-four
In 1964 - in nineteen sixty-four

Слово **year** (***год***) после обозначения года не употребляется. Но возможен вариант: **In the year (of) 1964**.

Даты обозначаются порядковыми числительными:

16-th June, 1964 - The sixteenth of June, nineteen sixty four
June 16-th, 1964 - June the sixteenth, nineteen sixty four
June 16, 1964

Имя прилагательное (The Adjective)

Именем прилагательным называется часть речи, которая обозначает признак предмета и отвечает на вопрос:

What? (Какой?)

good - хороший, **interesting** - интересный, **Russian** - русский.

В отличие от русского языка, прилагательные в английском языке не подвергаются никаким изменениям, ни по родам, ни по числам.

1. **Простые** (simple)	**good** - хороший, **bad** - плохой, **long** - длинный, **large** - большой, **easy** - легкий	
2. **Производные** (derivative)	с суффиксами: **-ful powerful** -мощный **-less useless** - бесполезный **-able capable** - способный **-ous numerous** - многочисленный **-y lucky** - удачливый, счастливый **-ly lovely** - прелестный, славный **-ish reddish** - красноватый **-en golden** - золотистый	с префиксами: **un- untrue** - ложный, неправильный **in- insecure** -небезопасный **im- impossible** - невозможный **ir- irrelevant** - неуместный
3. **Составные** (compound)	**snow-white** - белоснежный, **dark-blue** - темно-синий	

Степени сравнения

	положительная	**сравнительная**	**превосходная**
Односложные	**long** - длинный **large** - большой	**longer** - длиннее **larger** - больше	**the longest** самый длинный **the largest** самый большой

	easy - легкий **big** - большой	**easier** - легче **bigger** - больше	**the easiest** самый легкий **the biggest** самый большой
Многосложные	**beautiful** красивый **impossible** невозможный	**more beautiful** красивее **more impossible** невозможнее	**the most beautiful** самый красивый **the most impossible** самый невозможный
Исключения	**good** - хороший **bad** - плохой **little** - маленький **many**, **much** - многие **far** - далекий	**better** - лучше **worse** - хуже **less** - меньше **more** - больше **farther**, **further** - дальше	the **best** самый лучший the **worst** самый худший the **least** наименее, наименьшее the **most** наиболее, самый the **farthest**, **furthest** самый далекий
Сравнительные конструкции			
than - чем	The result of the experiment is much better **than** that of the previous one. Результат эксперимента гораздо лучше, чем у предыдущего.		
as … as - так … как	This result is **as** good **as** that one. Этот результат так же хорош, как тот.		
not so … as - не так … как	This result is **not so** good **as** that one. Этот результат не так хорош, как тот.		
the (***more***) … **the** (***less***) чем (больше) … тем (меньше)	**The *more*** we study **the *less*** we know. Чем больше мы учим, тем меньше мы знаем.		

Наречие /(The Adverb)

Наречие - часть речи, которая обозначает признак или образ происходящего действия. Наречия в английском языке отвечают на вопросы:

- **How**? (Как?)
- **Where**? (Где?)
- **Why**? (Почему?)
- **When**? (Когда?)
- **In what manner**? (Каким образом?)
- **To what degree**? (В какой степени?)

1. **Простые** (simple)	**well** - хорошо, **much** - много, **very** - очень, **often** - часто
2. **Производные** (derivative)	**partly** - частично, **quickly** - быстро, **hardly** - едва
3. **Составные** (compound)	**sometimes** - иногда, **somewhere** - где-нибудь, **anywhere** - где-нибудь (вопр. и отриц. предл.), **nowhere** - нигде, **since then** - с тех пор, **so far** - до сих пор, пока
4. **Совпадающие по форме:** **с прилагательными**	**fast** - быстро (быстрый), **hard** - жестко (жесткий), **late** - поздно (поздний)
с предлогами	**after** - после, **before** - прежде чем (перед), **since** - с тех пор (с)
с союзами	**since** - с тех пор (с тех пор как), **when** - когда, **where** - где, **but** - кроме (но)

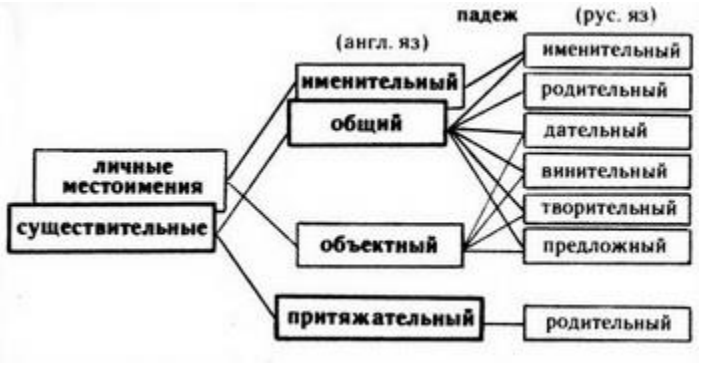
Предлоги (Prepositions)

Предлоги - это служебные слова, выражающие отношение существительного, местоимения, числительного, герун дия к другим частям речи в предложении.

Предлоги очень важны для построения и понимания английского предложения, так как являются одним из основных средств, которые указывают на связь слов в предложении.

1.Простые (simple)	of, for, in, at, on
2. Производные (derivative)	across, between, below
3. Сложные (complex)	into, upon, within, outside
4. Составные (compound)	out of, in front of, by means of, in spite of

Предлоги, обозначающие отношения, выражаемые в русском языке падежными окончаниями

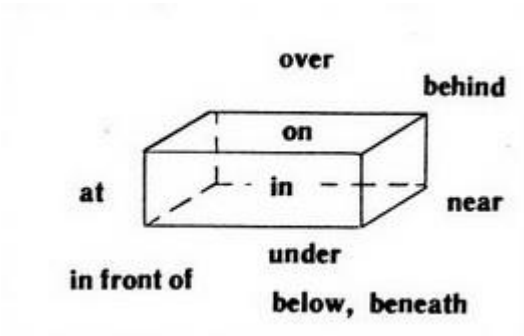


of

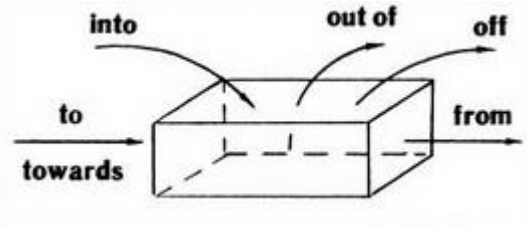
to, for

by, with

Предлоги места (Prepositions of Place)

	on - на in - в at - у under (below, beneath) - под, ниже over - над near - около in front of - перед behind - за, позади across - через through - через, сквозь between - между among - среди	on the box - на ящике in the box - в ящике at the box - у ящика under the box - под ящиком over the box - над ящиком near the box - около ящика in front of the box - перед ящиком behind the box - позади ящика across the street - через улицу through the window - сквозь окно between two windows - между двумя окнами among the students - среди студентов

Предлоги направления (Prepositions of Direction)

	to - к, на, в towards - к, в направлении from - от, из into - в (внутрь) out of - из (изнутри) off - с, от	to the house - к дому towards the house - в сторону дома from the house - от дома into the house - в дом out of the house - из дома off the house - с дома

Предлоги времени (Prepositions of Time)			
on - в	on Saturday - в субботу on the first of May - первого мая	for - в течение during - во время	for an hour during the lecture
in - в, через, за, в течение	in March - в марте in a month - через месяц	before - перед, до	before the lecture –
at - в	at 7 o'clock - в семь часов	after - после	after the lecture –
by - к (ко времени)	by 3 o'clock - к трем часам	till (until) - до	till June - до июня
from … till - с … до	from 3 till 5 o'clock - с трех до пяти часов	between - между	between on one and two o'clock -
since - с	since 5 o'clock - с пяти часов		

Глагол (The Verb)

Глагол (the Verb) - часть речи, которая обозначает действие или состояние лица или предмета.

Глаголы бывают ***простые*** и ***производные***. К простым относятся глаголы, не имеющие в своем составе ни префиксов, ни суффиксов: to run - бегать, to do - делать. К производным относятся глаголы, имеющие в своем составе суффиксы или префиксы: to widen - расширять, to simplify - упрощать.

По своему значению и выполняемой в предложении роли глаголы делятся на ***смысловые***, ***вспомогательные***, ***глаголы-связки*** и ***модальные глаголы***.

В английском языке у глаголов может быть две категории форм: личные (Finite Forms) и неличные (Verbals). Личные формы английских глаголов выражают лицо, число, время, наклонение, залог. Неличные формы глагола выражают действие без указания лица, числа и наклонения. К неличным формам глагола относятся инфинитив (Infinitive), причастие (Participle), герундий (Gerund).

По структуре глаголы делятся на простые, производные, сложные и составные.

В состав простых глаголов английского языка не входят ни суффиксы, ни префиксы, например, to go - идти, to say – говорить, to read – читать.

Производные глаголы имеют в своем составе аффиксы (префиксы, суффиксы, или и то, и другое): to unbutton – расстегивать, to activate – приводить в действие.

Сложные глаголы образуются посредством соединения двух слов в одно: to typewrite — печатать на машинке browbeat – запугивать, to overcome - преодолеть, to broadcast - передавать по радио.

К составным глаголам относятся сочетания глаголов с наречиями или предлогами (такие глаголы называются фразовыми): to go on - продолжать, to cross out — вычеркнуть, to call back — перезванивать.

По значению и выполняемой в предложении функции глаголы делятся на:

Знаменательные/смысловые (Notional Verbs)

У знаменательных глаголов есть собственное лексическое значение, они функционируют в качестве членов предложения и могут быть просто сказуемым. Большая часть английских глаголов относится к данной группе. ·

Вспомогательные (Auxiliary Verbs)

Глаголы этой группы своего значения не имеют, они служат для образования аналитических глагольных форм. К таким глаголам относятся be, have, do, shall, should, will, would.

Модальные глаголы в английском языке относятся к особой группе глаголов. Они обозначают возможность, способность, необходимость и вероятность совершения действия.

Модальные глаголы в английском языке не употребляются самостоятельно, а в сочетании с инфинитивом основного смыслового глагола, после них не ставится частица to (исключение составляет ought).

I can do it. - Я могу сделать это.

You ought to be there. - Вам следует быть там.

Глаголы *can* и *may* имеют форму настоящего времени и прошедшего *could, might.* Глаголы *must, ought* и *need* имеют форму только настоящего времени.

Модальные глаголы в английском языке имеют одну форму для всех лиц и чисел. Вопросительная форма образуется без вспомогательных глаголов. Отрицательная форма образуется при помощи частицы not.

I can't do it. - Я не могу этого сделать.

May I use your phone? - Могу я воспользоваться вашим телефоном?

Основные значения модальных глаголов и их эквивалентов

Глаголы	Значение	Примеры
can (could)	Способность, навыки, умения	Kate *can* speak English well. I *could* skate well when I was little.
	Просьба, разрешение	*Could* you help me? — I'm afraid I can't. I'm busy. You *can* use my mobile if you need it.
	Объективная возможность	You *can* always go to the school library if you need a book.
	Неуверенность, сомнение	*Can* she be so young? She *could* have written this letter.
	Невероятность	He *can't* have done it.

	Упрек	He *could* be more generous to his mother. You *could* have called us.
may (might)	Формальная просьба, разрешение	*May* I come in? - Yes, you may. You *may* take my pen.
	Предположение	It *may* start raining soon.
	Упрек, совет (только might)	You *might* help us, you're quite free now. You *might* have told us about it.
must	Обязанность, долг, необходимость	You *must* do it immediately. *Must* we learn it by heart?
	Строгий запрет	You *mustn't* go there.
	Уверенность	It *must* be cold outside. You *must* have made a mistake.

Образование временных форм в английском языке

Три группы времен английского языка включают по четыре видовых категории:

Simple — простое время;

Continuous — длительное время;

Perfect — совершенное время;

Perfect Continuous — длительное совершенное время.

Каждый вид предполагает употребление глаголов в соответствующей форме.

В приведенной ниже таблице представлены все времена английского языка и их видовые категории.

Категория	*Настоящее*	*Прошлое*	*Будущее*
Simple	I write scientific articles every month.	I read scientific articles last month.	He will write scientific articles next month.

Категория	*Настоящее*	*Прошлое*	*Будущее*
Continuous	I'm writing a scientific article now.	I was reading programming book at 7 o'clock yesterday.	They will be reading programming book at 8 tomorrow.
Perfect	I have written a scientific article yet.	I had read the programming book by Friday	He will have finished by 7 a.m.
Perfect Continuous	I have been writing for 5 hours	He had been reading for 5 hours when she came home	Next September they will have been living in Moscow for 4 years.

Grammar

Passive Voice

Если подлежащее само производит действие, то мы используем глагол в действительном залоге (active voice):

Пассивный залог (passive voice) - это когда в роли подлежащего объект, над которым было произведено действие:

The letter was written (by him) last week.

Пассивный залог в английском языке употребляется в тех случаях, когда неизвестно, неважно или ясно из ситуации, кто произвел действие:

Students are asked not to smoke. My bike has been stolen!

Mr Jones will be arrested. The box was opened with a knife.

Если мы хотим подчеркнуть кто исполнитель действия, то используем предлог by:

He was asked about the accident by the police yesterday.

Если действие осуществляется при помощи какого-либо предмета, инструмента, материала, то используется предлог with:

The streets are covered with snow.

Внимание! Только переходные глаголы (у которых может быть дополнение (объект) употребляются в пассивном залоге.

They sent the letter. The letter was sent.

They arrived late. (нельзя употребить в пассивном залоге)

Глаголы с двумя дополнениями могут образовывать пассивный залог двумя способами:

They sent me the letter. (active voice)

I was sent the letter. The letter was sent to me. (passive voice)

Глаголы, которые обозначают состояние лица или предмета, а не действие или процесс, **не употребляются** в пассивном залоге: ***have, resemble, become, fit, suit, lack*** и другие.

Формы пассивного залога образуются по схеме: **to be +V3**, где **to be** - вспомогательный глагол, который ставится в нужную форму (изменяемая часть), а **V3** (смысловой глагол) всегда стоит в третьей форме (неизменяемая часть).

Времена пассивного залога

Время	**Сказуемое**		**Пример**
Present Simple	**am/is/are**	**+ written**	*It is written by Sam.* - Это написано Сэмом.
Past Simple	**was/were**		*It was written by Sam yesterday.* - Это было написано Сэмом вчера.
Future Simple	**will be**		*It will be written by Sam tomorrow.* - Это будет написано Сэмом завтра.
Present Continuous	**am/is/are**	**+ being written**	*It is being written by Sam now.* - Это пишется Сэмом сейчас.

Past Continuous	**was/were**		*It was being written by Sam at 10 a.m. yesterday.* - Это писалось Сэмом вчера в 10 утра.
Future Continuous, Future Perfect	**НЕ СУЩЕСТВУЕТ**		

Continuous			
Present Perfect	**have/has**	+ **been written**	*It has just been written by Sam.* - Это было только что написано Сэмом.
Past Perfect	**had**		*It had been written by Sam before I came back.* - Это было написано Сэмом до того, как я вернулся.
Future Perfect	**will have**		*It will have been written by Sam by the end of July.* - Это будет написано Сэмом к концу июля.

Отрицательная форма глагола в пассивном залоге образуется с помощью частицы **not**, она стоит **за вспомогательным глаголом:**

Для образования **вопросительного предложения** в пассивном залоге первый вспомогательный глагол ставится перед подлежащим.

Особенность порядка слов в английском языке

В английском языке более строгий порядок слов, чем в русском.

В утвердительном предложении используется прямой порядок слов. Схема следующая: подлежащее, сказуемое, дополнение (если есть).

Подлежащее	**Сказуемое**	**Дополнение**
I	see	you
Я	*вижу*	*тебя*
We	bought	a computer
Мы	*купили*	*компьютер*
Mark	will help	them
Марк	*поможет*	*им*

В отрицательном предложении порядок слов такой же. Разница в том, что в отрицательном предложении используется отрицательная частица **not** и вспомогательный глагол (will, do, be, have).

Подлежащее	**Сказуемое**	**Дополнение**
I	**will not** tell	the truth
Я	*не расскажу*	*правду*
We	**do not** help	rich people
Мы	*не помогаем*	*богатым людям*

Место определения

У определения нет четко зафиксированного места в предложении, оно может стоять при любом определяемом им существительном, например:

I see a **new** computer — Я вижу новый компьютер (**new** — определение),

My friend will help me. — Мой друг мне поможет (my — определение).

Косвенное дополнение может находиться до или после прямого дополнения.

Как правило, косвенное дополнение находится ДО прямого — в этом случае предлог перед косвенным дополнением не нужен.

Подлежащее	**Сказуемое**	**Косвенное дополнение**	**Прямое дополнение**
I	sent	**my sister**	a message
Я	*отправил*	*моей сестре*	*сообщение*

Косвенное дополнение может находиться после прямого — в этом случае используется предлог **to**.

Подлежащее	**Сказуемое**	**Прямое дополнение**	**Косвенное дополнение**
I	sent	a message	**to my sister**
Я	*отправил*	*сообщение*	*моей сестре*

Место обстоятельства, выраженного наречием
Обстоятельство образа действия располагается после глагола, если он непереходный, то есть не требующий после себя дополнения.

Подлежащее	**Сказуемое**	**Обстоятельство**
He	typed	**slowly**
Он	*печатал*	*медленно*

Обстоятельство места
Находятся после прямого дополнения или сказуемого.

Подлежащее	**Сказуемое**	**Прямое дополнение**	**Обстоятельство**
I	need	that machine	**here**
Мне	*нужен*	*этот станок*	*здесь*

Обстоятельство времени
Обстоятельство времени обычно располагается в конце предложения.

Подлежащее	**Сказуемое**	**Косв. дополнение**	**Прямое дополнение**	**Обст. времени**

I	will tell	you	the story	**tomorrow**
Я	*расскажу*	*тебе*	*историю*	*завтра*
Maria	didn't see		you	**yesterday**
Мария	*не видела*		*тебя*	*вчера*

Оно может находиться и в начале.

Обст. времени	**Подлежащее**	**Сказуемое**	**Косв. дополнение**	**Прямое дополнение**
Tomorrow	I	will tell	you	the story
Завтра	*я*	*расскажу*	*тебе*	*историю*
Yesterday	Maria	didn't see		you
Вчера	*Мария*	*не видела*		*тебя*

Обстоятельства времени, обозначающие частоту действия
Особый случай — обстоятельства, обозначающие частоту действия, например: **always** (всегда), **seldom** (редко), **usually** (обычно), **never** (никогда).
1. В предложениях без глагола to be в составе сказуемого «частотные» обстоятельства располагаются перед сказуемым.

Подлежащее	**Обстоятельство**	**Сказуемое**	**Дополнение**
Helen	**rarely**	needs	help
Хелен	*редко*	*нужна*	*помощь*
I	**often**	read	newspapers
Я	*часто*	*читаю*	*газеты*

2. Если сказуемое включает глагол to be в одной из простых форм, то есть без вспомогательного глагола, обстоятельство ставится ПОСЛЕ to be.

Подлежащее	**Сказуемое to be**	**Обстоятельство**	**Обст. места**
We	are	**usually**	here
Мы		*обычно*	*здесь*

3. Если сказуемое используется в сложной форме (вспомогательный глагол + глагол, в том числе to be), обстоятельство стоит между вспомогательным и основным глаголом.

Подлежащее	**Вспомогательный глагол**	**Обстоятельство**	**Основной глагол**	**Дополнение**
I	will	**always**	remember	you
Я	*буду*	*всегда*	*помнить*	*тебя*

Это касается и предложений с глаголом to be в сложной форме (то есть «вспомогательный глагол + to be»).

Подлежащее	**Вспомогательный глагол**	**Обстоятельство**	**Основной глагол**	**Обстоятельство места**
We	have	**never**	been	abroad
Мы		*никогда*	*не были*	*за границей*
This house	will	**always**	be	here
Этот дом		*всегда*	*будет*	*здесь*

Порядок слов в вопросительном предложении

В вопросительном предложении вспомогательный глагол выносится в начало предложения.

Вспомогательный глагол	**Подлежащее**	**Основной глагол**	**Дополнение**
Do	you	need	my assistance?
	Вам	*нужна*	*моя помощь?*
Did	your brother	pass	the exam?

	Твой брат	*сдал*	*экзамен?*

Порядок слов в придаточном предложении (в сложноподчиненном предложении)
В придаточных предложениях порядок слов простой — такой же как в утвердительном,
I know where you live. — Я знаю, где ты живешь.
I don't know where you live. — Я не знаю, где ты живешь.
Do you know where I live? — Ты знаешь, где я живу?

Для наглядности представлю предложения в виде таблицы:

Основная часть	**Союз**	**Придаточное предложение**
I know	where	you live
I don't know	where	you live
Do you know	where	I live?

Частая ошибка заключается в том, что в части предложения, начинающейся на союзы (в данном случае это союзы) **who, why, when, where** слова переставляют, как в вопросительном предложении.
Неправильно: I don't know **why did she call me.**
Правильно: I don't know **why she called me.**
Особенно часто так ошибаются в сложноподчиненных вопросительных предложениях. В таком случае обратный порядок слов должен быть только в основной части (Do you know), но не в придаточной (where I live).
Неправильно: Do you know **where do I live?**
Правильно: Do you know **where I live?**
Неправильно: Do you know **who was it?**
Правильно: Do you know **who it was?**