1. **Belarus. General description.**

The Republic of Belarus is a young independent state. It appeared on the maps in 1991. The state is situated practically in the center of Europe. The capital of the Republic of Belarus is Minsk. It is the industrial, political and cultural center of the Republic. Belarus borders on Poland, Lithuania, Latvia, Russia and Ukraine. The total length of the state border makes up 2,969 km. The territory of Belarus is 207.6 thousand kilometers. It is the land of blue lakes and green forests, of sunny meadows and cultivated fields, of picturesque villages and modern cities.

During its history Belarus knew **a lot wars and invasions** but **it was never a conqueror**. Belarusians had to accept **alien religion**, culture and language but the country remained distinctive and original.

The country’s relief is flat with hills. The highest point, mount [Dzerzhinskaya](https://www.britannica.com/place/Dzyarzhynskaya-Hill), is only 346 meters above the [sea level](https://www.britannica.com/science/sea-level), and more than the half of Belarus’ territory lies below 200 meters. Lowlands are often marshy and contain many small lakes. There are more than 20 thousand rivers and streams in Belarus and about 11 thousand lakes. The largest lake is Naroch.

The Belovezhskaya Pushcha is one of the largest **surviving areas** of primeval [mixed forest](https://www.britannica.com/science/mixed-forest) in Europe, [encompassing](https://www.merriam-webster.com/dictionary/encompassing) more than 1,200 square kilometers. Now it is a national park, reservation, home of the [European bison](https://www.britannica.com/animal/European-bison) (aurochs), elk, deer, boar and many other animals, birds and plants. Some of them are widespread, others have become extinct outside the borders of the national park.

The population of Belarus is about 9.5 million people. The official languages of the country are [Belarusian](https://www.britannica.com/topic/Belarusian-language) and [Russian](https://www.britannica.com/topic/Russian-language). Belarus is a **poly-ethnic and poly-confessional state**. Ethnic Belarusians **make up about four-fifths** of the country’s population. [Russians](https://www.britannica.com/topic/Russian-people) form the second largest [ethnic group](https://www.britannica.com/topic/ethnic-group). Then come Poles, Ukrainians, Jews, Latvians and Lithuanians. Representatives of more than 100 nationalities live in Belarus.

The climate of Belarus is moderately **continental** due to a strong influence of the maritime **air of the Atlantic** with mild and humid winter, warm summer and wet autumn. It can be cold from October to April. The average temperature in January is from – 4°C to – 8°C. July is the warmest month. The average temperature of July is +18°C.

Belarus is the country with beautiful nature and hospitable people, with unique history and rich cultural heritage.

1. **Belarus. Economy.**

Due to **attractive geographical location** and highly developed scientific and technical potential, Belarus is oriented to the production of ready-made items and is based on imports of raw material, fuel and energy resources. Since the late 1990s, Belarus has attained progress in economic reform and stabilization.

The **leading sectors of Belarusian industry** are machine building and metalworking, machine-tool building, chemical and petrochemical industry, wood and wood processing industry, light and food industry. **Heavy industry** is well developed in Belarus. Heavy-duty vehicles, particularly **trucks and tractors**, are manufactured in Minsk, Zhodino, and [Mogilyov](https://www.britannica.com/place/Mahilyow-province-Belarus).

About **100 major plants form the core** of Belarusian industry. Among them are the Minsk Tractor Plant, the Minsk Automobile Plant, the “Atlant” freezer and refrigerator plant, the “Horizont” TV-set plant, oil-refineries in Novopolotsk and Mozyr, “Belaruskaliy” – the biggest producer of potassium fertilizers in the world.

**Agro-industrial complex** of Belarus specializes in animal farming (milk and meat products), in growing flax, potato, grain and vegetable crops, sugar beet, rapes and fodder crops. Agricultural production is highly industrialized and is based on the use of modern technology. Cattle, poultry, and pigs are the main **livestock**.

The vast Belarusian forests support a large lumber industry, contributing about one-third of the **gross domestic product** (GDP).

Belarus trades with more than 190 countries, its major trade partners being Russia, Ukraine, China, Great Britain, Germany, Poland, Lithuania, Italy, and Latvia. The Government takes measures to improve the competitiveness of Belarusian goods and to achieve their expansion to the Western market.

The republic has a well-developed transportation system. A vast railway network crisscrosses the country. There are also good road connections between the capital and all regional centers. Buses operate throughout the country. Minsk National Airport, opened in 1982, provides international service.

The Republic of Belarus does not have a **massive mineral resource base**, the country imports different kinds of fuels and raw materials required for its needs.

The IT sector is increasingly becoming an essential element in Belarus’ economy. Over the past ten years, the [exports of IT services have increased more than 50 times](http://www.uniter.by/upload/iblock/5b3/5b3ff828404fadecf355ade129db0965.pdf). [In 2015, it reached USD 818 million](http://www.emia.org/news/story/3794). The sphere is characterized by the client maturity, the complexity of the implemented projects, the global network of service delivery, the variety of products and services. The most successful HTP projects include the multiplayer online game and the development of the Viber software.

1. **Belarus. Political System.**

The Constitution of the Republic of Belarus is the main law of the country. Adopted in 1994, this formal document establishes the framework of the Belarusian state and [government](http://www.thefullwiki.org/Government_of_Belarus) and enumerates the rights and freedoms of its citizens. The contents of the Constitution include the [**preamble**](http://www.thefullwiki.org/Preamble)**, 9 sections, and 146 articles**. The Constitution **was amended** twice: in 1996 and 2004.

The Constitution is based on the separation of legislative, executive, and judicial powers. Under the terms of the Constitution, the President, who is the head of the state, is popularly elected for a **five-year term**. The President appoints the [prime minister](https://www.britannica.com/topic/prime-minister) who is the head of the government.

The National Assembly (the Parliament) consists of the Council of the Republic and the House of Representatives. The Council of the Republic is the House of territorial representation. Eight members of the Council of the Republic are elected in each region and in the city of Minsk at sittings of deputies. Eight members are appointed by the President. The House of Representatives consists of 110 **deputies** elected directly by the people. Members of the Council and the House serve four-year terms.

Judicial power is exercised by **General Courts and by Economic Courts**.

The State Flag of the Republic of Belarus is a rectangular canvas made of two horizontal colored stripes. The upper one is red and makes up two thirds of the width while the lower one is green and as large as one third of the flag width. A vertical red-on-white Belarusian national pattern as large as one ninth of the flag length is located near the **flagpole.**

The State Emblem of the Republic of Belarus is made up of a green outline of the Republic of Belarus lit by the golden rays of the sun rising over the globe. A five-pointed red star is located at the top of the outline. The emblem is encircled by a wreath of golden **wheat** heads intertwined with **clover flowers** on the right and **flax flowers** on the left. The wheat heads are embraced by a red-and-green ribbon with a golden inscription “Republic of Belarus”.

The State Anthem of the Republic of Belarus changed very little. It retains the musical basis of the anthem of the Belarusian Soviet Socialist Republic. The music by Nestor Sokolovsky has been popular and respected by generations of Belarusians; this is why it was decided to keep it when the anthem of the independent Belarus was created. The lyrics were written by Mikhail Klimkovich and Vladimir Korizna.

The words of the State Anthem reflect development of the Republic of Belarus as a sovereign and peace-loving country. They emphasize patriotism and brotherly relations between all nationalities that live in the country.

Other than the National Flag, Anthem and Emblem, Belarus has several unofficial symbols. The [Cross of Saint Euphrosyn](https://www.revolvy.com/topic/Cross%20of%20Saint%20Euphrosyne&item_type=topic)ia, a 12th-century relic disappeared during the [Second World War](https://www.revolvy.com/topic/Second%20World%20War&item_type=topic), is considered to be a spiritual symbol of Belarus. The European bison is regarded as a symbol of Belarus and of the [Belovezhskaya Pushcha](https://www.revolvy.com/topic/Belavezha%20Forest&item_type=topic). Other widely known symbols of Belarus are a white stork and a [cornflower](https://www.revolvy.com/topic/Cornflower&item_type=topic).

1. **Great Britain. General description.**

Great Britain is a large island in the north Atlantic Ocean off the northwest coast of continental Europe. The country is situated on the British Isles. The British Isles are divided into two countries – the United Kingdom of Great Britain and Northern Ireland and the Irish Republic.

Great Britain is the largest of the British Isles, the largest European island, and the ninth largest island in the world. In everyday speech “Great Britain” is used to mean the United Kingdom. The population of the United Kingdom is over **57 million people**. Its area is about **244,000 square kilometres**. The United Kingdom is made up of four countries: England, Wales, Scotland and Northern Ireland.

The flag of the United Kingdom, known as the Union Jack, is made up of three crosses.

Britain’s climate is dominated by the influence of the sea. It is frequently said that Great Britain doesn’t have climate but only weather. The weather changes constantly. The most remarkable feature of English weather, the fog, has an exaggerated reputation. There is occasionally haze in summer and fog in winter. It is no wonder that the Englishmen talk a lot about the weather.

There are a lot of rivers in Great Britain but they are not very long. **The Severn is the longest** river while the **Thames is the deepest** and the most important one.

In 2011 the island had a population of about 61 million people making it one of the most populated land in the world.

The true value of Britain’s geographical position is obvious. With the discovery of America the British Isles became an intermediary between Europe and the New World. From the 16th century the wealth and influence of Great Britain increased rapidly. Sea ports play a great role in the life of the country. London, Liverpool and Glasgow are the biggest English ports, from which big liners go to all parts of the world.

1. **Great Britain. Economy.**

The true value of Britain’s geographical position is obvious. With the discovery of America the British Isles became an intermediary **between Europe and the New World.** From the 16th century the influence of Great Britain increased rapidly. Sea ports play a great role in the life of the country. London, Liverpool and Glasgow are the biggest English ports, from which big liners go to all parts of the world. The UK retains a significant [fishing](https://en.wikipedia.org/wiki/Fishing) industry.

After becoming one of the most prosperous economic regions in Europe between 1600 and 1700 Britain led the [industrial revolution](https://en.wikipedia.org/wiki/Industrial_revolution) and **dominated the European and world economy during the 19th century**. In the 19th century Britain was more powerful than ever. It produced **steam engines, textile equipment, and tools.**

The rise of Britain as an industrial nation was partly due to the presence of considerable mineral resources. They provide **raw materials** as well as sources of power. There were a lot of **coal and iron ore**. Britain had enough non-ferrous metals.

It was a leader in international and domestic banking, entrepreneurship, and trade. It built a global [British Empire](https://en.wikipedia.org/wiki/British_Empire). The economy of the United Kingdom is the [**fifth-largest national economy**](https://en.wikipedia.org/wiki/List_of_countries_by_GDP_(nominal)) **in the world**. Nowadays, the English economy relies heavily on services. The main industries are travel (discount airlines and travel agencies), education ([Oxford](http://www.eupedia.com/england/oxford.shtml) and [Cambridge](http://www.eupedia.com/england/cambridge.shtml) universities, hundreds of language schools for learners of English), music, prestige cars (Rolls Royce, Bentley), fashion and food (especially tea, biscuits, chocolates and jam). It is known as one of world’s largest producers and exporters of machinery, electronics, textile, aircraft and navigation equipment.

The currency of the UK is the [pound sterling](https://en.wikipedia.org/wiki/Pound_sterling), which is one of the **ten most-valued currencies** in the world.

1. **Great Britain. Political System.**

Great Britain is a parliamentary monarchy. Officially, the head of the state is the king or the queen. The power of the monarch is not absolute but constitutional (it is limited by the Parliament).

There is **no written constitution** in Great Britain. The term “English Constitution” means the leading principles, conventions and laws, many of which have been existing for centuries, though they have undergone modifications and extensions in agreement with the advance of civilization. These principles are expressed in such documents of major importance **as Magna Charta**, a famous document in English history, which set certain limits on royal power.

Power in Great Britain is divided among three branches: the legislative branch, the executive branch and the judicial branch. The legislative branch is represented by Parliament, which consists of two chambers, or houses: the House of Lords and the House of Commons.

The House of Lords consists of more than 1,000 peers and 24 bishops of the Church of England. The peers have the right to sit in Parliament during their lifetime and transmit their right to their eldest sons.

The members of the House of Commons are elected by a general election. The whole country is divided into constituencies, every one of which chooses one delegate. Big cities are divided into several constituencies each. Members of the House of Commons are elected for five years.

Parliament’s main function is to make laws. The procedure of making new laws is as follows: a member of the House of Commons **proposes** a bill, which is discussed by the House. If the bill is approved, it is sent to the House of Lords, which, in case it doesn’t like it, has the right to veto it for one year. If the House of Commons passes the bill again the following year, the House of Lords cannot reject it. Finally, the bill is sent to the Queen for the “royal assent”, after which it becomes a law.

The executive power is headed by the Prime Minister, who is appointed by the king (queen). The Prime Minister is the leader of the party that has won the elections and has the majority in the House of Commons.

The judicial branch **interprets** the laws. The highest judicial body is the **Supreme Court of Judicature**, which consists of two divisions: **the High Court of Justice and the Court of Appeal**. It is often said that the English law is superior to the law of most other countries. Indeed, the English judicial system contains many rules which protect individual against arbitrary action by the police and government.

The two main political parties are the Conservative Party and the Labour Party.

1. **Our University. Brief historical survey.**

The early history of the University began **on the 8th of December, 1859**, when the Gory-Goretsky Agricultural Institute welcomed the first students of the Forestry program, who were trained for careers in agronomy. Forestry faculties were established in 1919 at the Gory-Goretsky Agricultural Institute and in 1920 in Minsk Polytechnic Institute. They further became a basis for the foundation of the Forestry Institute in Gomel on June 1, 1930.

In 1934 the Forestry Institute was renamed into the Belarusian Forestry Engineering Institute and was given the name of S. M. Kirov in 1935.

Its reformation in **1961 into the Belarusian Technological Institute** was inspired by an intensive development of the Republic’s chemical industry. It started training engineers for chemical industries. Later it was given the name of the Belarusian Technological Institute named after S. M. Kirov

Real flourishing of the Technological Institute started at the end of the 80s and was brought about by intensive development of science; new graduate programs, improved material and technical facilities, and well-equipped laboratories. **In 1993** the Government of the Republic of Belarus granted the Institute with the university status.

The scope of the University competence has enlarged dramatically. The University began training specialists for the careers in landscape architecture, glass production, polymer and mould products design, bio-ecology, automation of technological processes, medicines, perfumery and cosmetics, information systems and technologies, printing industry, data processing and publishing, management, marketing, tourism and nature management, etc.

In 2011 the BSTU was accredited as research organization and became a member of Belarusian-Kazakhstan educational-scientific consortium.

1. **Our University. Scientific and research work.**

Being the leading educational institution in the fields of forestry, chemical and printing industries, the University uses innovative to teaching in accordance with up-to-date conceptual model.

**The University houses** 10 faculties, the Institute for retraining and professional development, 53 departments, 20 affiliated departments, 5 affiliated colleges, affiliated forestry experimental station in Negoreloe.

The head of the University is the Rector and 5 Deputy Rectors. Nearly 680 university academic staff and researchers support 9,000 enrolled students. About 73% of the university academic staff holds scientific ranks and degrees.

The teaching process at the University is organized in the following way. The academic year is divided into two terms. During the terms students attend lectures and carry out laboratory and practical work. At the end of each term student pass credit tests and sit exams. The course of studies lasts 4–5 years. At the end of the course of studies, students sit the State Examination and defend Diploma paper (project).

Over 980 academic disciplines of higher education and 410 vocational disciplines are taught at the University. The teaching process at the University and its affiliated colleges is supported by comprehensive textbooks, manuals, tutorials. Electronic teaching resources make best use of the current achievements in science and technology as well as modern trends of teaching.

Classes are conducted in seven academic buildings, at the six affiliations of the University. Annually our lecturers, researchers and students are actively involved in international events. They carry out research and develop innovative technologies in close collaboration with their international partners. Students and professors participate in such international programs as Erasmus +, Horizon 2020, Baltic Sea Region, etc.

International cooperation is among the top priorities of the University activities, having old and well-established traditions of international networking.

The University holds over 150 bilateral cooperation agreements with educational and research institutions from 32 countries worldwide. The strongest partnerships are maintained with the following universities: Vilnius Gediminas Technical University (Lithuania), D. Mendeleyev University of Chemical Technology of Russia (Russia), Saint-Petersburg State Chemical and Pharmaceutical Academy (Russia), Saint-Petersburg State Forest Technical University named after S. M. Kirov (Russia), Warsaw University of Life Sciences (Poland), etc.

The international student community of the BSTU annually totals over 350 students coming from such countries as Turkmenistan, Iran, Iraq, Turkey, Nigeria, China, Sri Lanka, Vietnam, Finland, Czech republic, Mexico, Azerbaijan, Tajikistan, etc.

Internationalization is an important component of Belarusian State Technological University’s strategy, enabling academic staff and students of the university to be globally active and well prepared for future challenges.

1. **BSTU today. Student life.**

Student life is the most exciting and challenging time for students **to explore new horizons and set a course for the future.** The Belarusian State Technological University gives the chance to make new friends and enjoy new hobbies or sports, to explore opportunities and gain experiences that can change your life.

The student campus houses five dormitories where students can rest and study. The dormitories are conveniently located within a walking distance from the University’s academic buildings and provide excellent opportunities to feel part of the community the students are joining. All rooms are equipped with modern furniture and facilities.

The BSTU students are engaged in multiple interests. Representatives in student government collaborate with university leaders to enhance the student experience. Student journalists write, edit and produce multimedia content for campus publications. Students interested in the arts participate in a variety of visual and performing art groups, dance groups, choirs, student theatre.

Students go in for football, volleyball, basketball and other sports. The University possesses a modern sports complex with a gym for team sports, wrestling, eurhythmics and aerobics, medical gymnastics, as well as a stadium with running tracks, football grounds, 2 tennis-courts, basketball and 4 volleyball-courts with synthetic covering. Among the BSTU students there are winners of the international competitions and world championships.

Students show their organizational and creative skills in the activities of the primary organization of the Belarusian National Youth Union. The Student Union organizes numerous events for students every year; they invite students to experience new places and countries, to join students’ volunteering network and to engage in various activities.

1. **Science and technology: the importance of inventions to the progress of humanity.**

Modern civilization is everything that has been achieved thanks to science. Science is systemized knowledge derived through experimentation, observation, and study.

We are living in a world of technologies now and can't remember our life being different. The humanity has made many discoveries and invented lots оf mechanisms and devices which have simplified our life significantly. Nowadays we can’t do without such gadgets as mobile phones. PCs, digital tape recorders, air conditioners, fax machine and so on. Many people feel ill at ease without their laptop computers or GPS navigation systems. In my opinion, technology facilitates our lives and saves our time. Computers help us do the most difficult sums and investigate complicated data. The list of the advantages is rather long: computers give us access to the Internet- an International computer network. You can spread a lot of your free time surfing the Internet and got all sorts of information from it. But in my opinion, they have more advantages that disadvantages. It’s an open secret that the computer is a source of education, entertainment and communication. And in my life the computer plays a very important role. It helps me to find information and relax. People do business, communicate and do the shopping via the Internet. It is much easier to do housework nowadays, thanks to electric equipment such as microwave ovens, washing machines and so on. The list of the inventions is rather long. We am onlookers of greet scientific achievements such as television and a computer. We can't imagine our life without a notebook or a radio.

Science is broadly subdivided into the categories of natural and social sciences. There are also related disciplines that are grouped into interdisciplinary and applied sciences, such as engineering and health science. Within these categories are specialized scientific fields that can include elements of other scientific disciplines but often possess their own terminology and body of expertise. Examples of diverse scientific specialties include linguistics, archaeology, forensic psychology, materials science, microbiology, nuclear physics, and paleontology.

1. **Science and technology: inventions, famous scientists and inventions.**

Every human being possesses two strong impulses: to create and to explore. That is why people have always explored, created and invented something. But there are major inventions and discoveries which have changed our life completely. Among the earliest inventions we can’t but mention the invention of the early steam engine by Hero of Alexandria in AD 100; the invention of paper by the Chinese in AD 105.

**The seventeenth century** saw the development of scientific thinking on entirely new scale. Scientific ideas were tested **by experiments**. Isaac Newton developed the theory of Gravity in 1687. The discovery of blood circulation and its mechanism by William Harvey, Robert Boyle and Robert Hooke in 1628 led to great advances in medicine and in the study of the human body.

The nineteenth and twentieth centuries are notable for the discoveries and inventions which were a real breakthrough in the world science. Among them are the discovery of the law of chemical elements by Dmitry Mendeleev in 1869; of the invention of the telephone by Alexander Bell in 1876; the invention of the electric light bulb by Thomas Edison in 1879; the invention of a petrol driven car by Karl Benz in 1885; the discovery of radium made by Marie Curie in 1911; the invention of radio by Alexander Popov; the first practical helicopter built up by Igor Sikorski; the invention of television in 1926; the discovery of penicillin by Alexander Fleming in 1928; the discovery of nuclear fission by Lise Meitner in 1939 and many others.

The telephone could be considered the most important invention in the history of communication. The telephone was thought of by Alexander Bell. The first conversation happened in 1876, when Bell was working upstairs in his laboratory. Suddenly, the assistant heard Bell’s voice on a receiver downstairs: “Mr. Watson, come here, I want you”. The first exchange, with operators connecting callers, was opened in Connecticut in 1887.

Scientific explorations, discoveries and inventions were made by outstanding people like Leonardo de Vinci, Galileo, Newton, Lomonosov, Edison, Einstein. In most cases the genius of the scientist played the decisive role in creating the invention or discovery of scientific laws.

1. **Information technology. People in computing.**

IT deals with the use of electronic computers and computer software to convert, store, protect, process, transmit and retrieve information, securely. Several [industries](http://en.wikipedia.org/wiki/Computer_industry) are associated with information technology, including [computer hardware](http://en.wikipedia.org/wiki/Computer_hardware), [software](http://en.wikipedia.org/wiki/Software), [electronics](http://en.wikipedia.org/wiki/Electronics), [semiconductors](http://en.wikipedia.org/wiki/Semiconductors), [Internet](http://en.wikipedia.org/wiki/Internet), [telecom equipment](http://en.wikipedia.org/wiki/Telecommunications_equipment), [e-commerce](http://en.wikipedia.org/wiki/E-commerce) and computer services.

One of the first and largest applications of computers is keeping and managing business and financial records. Large companies keep the employment records of all their workers in large databases that are managed by computer programs. Computers have also become very important in modern factories. Computer-controlled robots now do tasks that are hot, heavy, or hazardous. Robots are also used to do routine, repetitive tasks in which boredom or fatigue can lead to poor quality work.

Information technology plays an important role in medicine. For example, a scanner takes a series of pictures of the body by means of computerized axial tomography (CAT) or magnetic resonance imaging (MRI). A computer then combines the pictures to produce detailed three-dimensional images of the organs.

Using supercomputers, meteorologists predict future weather by using a combination of observation of weather conditions from many sources, a mathematical representation of the behavior of the atmosphere and geographic data.

There is a wide range of jobs in computing and different titles are sometimes given to the same type of job. Jobs mentioned in this unit include:

**• A Webmaster** – a person who administers a Web server.

**• A help-desk troubleshooter** – a person who works as part of a telephone service that helps users solve problems that occur on computer systems.

**• An applications programmer** – a person who writes applications programs (computer programs designed to be used for a particular purpose e.g. word-processors, spreadsheets or database programs).

• **A security specialist** – a person who tests the security of networks systems and advises customers how to introduce and maintain security policies

**A software engineer/designer** produces the programs which control the internal operations of computers. They use program libraries (sets of programmed functions that are made available for use by any program) to produce programs. They also design, test and improve programs for a variety of purposes including computer-aided design and manufacture (the production of technical designs and the production of goods using machines controlled by computers).

**A computer services engineering technician** is responsible for installation, maintenance and repair of computers and peripherals (associated equipment). They install, test, troubleshoot, upgrade (add components to improve the features or performance of a system) and carry out routine maintenance on hardware, ranging from personal computers (a computer designed to be used by one person at a time) to mainframes (the largest and most powerful type of computer, usually operated by a team of professionals).

**A network support** person or computer engineer maintains the link between PCs (personal computers) and workstations (powerful desktop computers used by power users for work that requires a lot of processing e.g. graphic design) connected in a network (a number of computers and peripheral devices connected together).

**A systems support person** is an analyst programmer (a person whose job is a combination of systems analysis and computer programming) who is responsible for maintaining, updating (bring up to date i.e. change into the latest version) and modifying the software used by a company.

1. **Operating Systems (definition, classifications).**

An operating system (commonly abbreviated as OS and O/S) is the software component of a computer system that is responsible for the management and coordination of activities and the sharing of the resources of the computer. It is the most important program that runs on a computer. Every general-purpose computer must have an operating system to run other programs. Operating systems perform basic tasks, such as recognizing input from the keyboard, sending output to the display screen, keeping track of files and directories on the disk, and controlling peripheral devices such as disk drives and printers.

Operating systems can be classified as follows:

* Multi-user (многопользовательские): allow two or more users to run programs at the same time. Some operating systems permit hundreds or even thousands of concurrent users.
* Multi-processing: support running a program on more than one CPU.
* Multi-tasking: allow more than one program to run concurrently (одновременно).
* Real time: respond to input instantly (реагируют на вход мгновенно).

Operating systems provide a software platform on top of which other programs, called application programs (прикладные), can run. The application programs must be written to run a particular operating system. For PCs, the most popular operating systems are Windows, OS/2, Linux.

As a user, you normally interact with the OS through a set of commands. [Graphical user interfaces](http://www.webopedia.com/TERM/G/Graphical_User_Interface_GUI.htm) allow you to enter commands by pointing and [clicking](http://www.webopedia.com/TERM/C/click.htm) at [objects](http://www.webopedia.com/TERM/O/object.htm) that appear on the screen.

The three most common operating systems for personal computers are Microsoft Windows, Apple Mac OS X, and Linux.

Microsoft Windows. Microsoft created the Windows OS in the mid-1980s. Over the years, there have been many different versions of Windows, but the most recent one is Windows 10. Windows comes preloaded on most new PCs, which helps to make it the most popular operating system in the world. Windows dominates the PC world, running, by some estimates, on 90 % of all PCs. The remaining 10% are mostly Macintosh computers.

Mac OS is a line of operating systems created by Apple. It comes preloaded on all new Macintosh computers, or Macs. Mac OS X users account for 9.5% of the operating systems market as of September 2014 – much lower than the percentage of Windows users (almost 90%). One reason for this is that Apple computers tend to be more expensive. However, many people prefer the look and feel of Mac OS X.

Linux is a family of open-source operating systems, which means they can be modified and distributed by anyone around the world. This is different from proprietary software like Windows, which can only be modified by the company that owns it (Microsoft). The advantages of Linux are that it is free, and there are many different distributions – or versions – you can choose from. Each distribution has a different look and feel, and the most popular ones include Ubuntu, Mint, and Fedora. Linux is named after Linus Torvalds, who created the Linux kernel in 1991. The kernel is the computer code that is the central part of an operating system. Linux users account for less than 2% of the operating systems market as of September 2014. However, most servers run Linux because it’s relatively easy to customize.

1. **Software: classes (programming, system, application) and types (freeware, shareware, etc.)**

Computer software is a general term used to describe a collection of computer programs that perform some tasks on a computer system. Software includes websites, programs, video games, etc. that are coded by programming languages like C, C++, etc. The term “software” is sometimes used in a broader context to mean anything which is not hardware but which is used with hardware, such as film, tapes, records, etc.

In computers, software is loaded into RAM and executed in the CPU. Once the software is loaded, the computer is able to execute the software. Software is usually written in high-level programming languages that are easier and more efficient for humans to use (closer to natural language) than machine language.

Classes of Software

Practical computer systems divide software into three major classes: system software, programming software and application software, although the distinction is arbitrary, and often blurred.

* System software helps run the computer hardware and computer system. It includes operating systems, device drivers, servers, windowing systems, utilities and more. The purpose of system software is to insulate the applications programmer as much as possible from the details of the particular computer complex being used, especially memory and other hardware features, and such accessory devices as printers, readers, displays, keyboards, etc.
* Programming software usually provides tools to assist a programmer in writing computer programs and software using different programming languages in a more convenient way. The tools include text editors, compilers, interpreters, linkers, debuggers, etc.
* Application software allows end users to accomplish one or more specific tasks. It is often purchased separately from computer hardware. Businesses are probably the biggest users of application software, but almost every field of human activity now uses some form of application software.

Types of Software

1. *Freeware* is a computer software that is available for use with no cost or for an optional fee. The user is not obliged to pay (e.g. after some trial period or for additional functionality).

2. The term *shareware* refers to copyrighted commercial software that is distributed without payment on a trial basis and is limited by any combination of functionality, availability, or convenience. It is often offered as a download from an Internet website or as a CD inserted into a periodical such as a magazine. The aim of this type of software is to give buyers the opportunity to use the program and judge its usefulness before purchasing a license for the full version of the software. It is usually offered as a trial version with certain features only available after the license is purchased, or as a full version, but for a trial period. This software is often offered without support, updates, or help menus, which only become available with the purchase of a license.

3. *Abandonware* refers to computer software that is no longer sold or supported, or whose copyright ownership may be unclear for various reasons. In other words, it is the software no longer available for legal purchase. The reasons can be different: software companies may change their names, go bankrupt, enter into mergers, or cease to exist for a variety of reasons.

4. Adware (advertising-supported software) is any software package which automatically plays, displays, or downloads advertisements to a computer after the software is installed on it or while the application is being used. Some types of this software are also spyware and can be classified as privacy-invasive software.

5. Careware (also called charityware) is software distributed in a way that benefits a charity. Some … is distributed free, and the author suggests that some payment be made to a nominated charity.

6. Proprietary ware is a computer software which is the legal property of one party. The terms of use for other parties are defined by contracts or licensing agreements. These terms may include various privileges to share, alter and use the software and its code. Therefore this software is not free. Well known examples of this type of software include Microsoft Windows, adobe Photoshop, Mac OS X, WinZip.

7. Spyware is a computer software that is installed intentionally on a PC to intercept or take partial control over the user’s interaction with the computer, without the user’s informed consent. … programs can collect various types of personal information, such as the Internet surfing habits, sites that have been visited, but can also interfere with the user’s control of the computer in other ways, such as installing additional software and redirecting Web browser activity.

8. Commercial software refers to any software that is designed for sale to serve a commercial need. It is usually proprietary software, but in some instances it may be public-domain (общедоступный) software.

1. **Networks and network topology; LAN, WAN, MAN, PAN, CAN.**

Networking allows two or more computer systems to exchange information and share resources and peripherals. Networks are classified according to geographical area. They can be divided into PANs (Personal Area Networks) which typically include a laptop, a mobile phone and a PDA; LANs usually placed in the same building; MANs (Metropolitan Area Networks) which cover a campus or a city; WANs (Wide Area Networks) which have no geographical limit and may connect computers or LANs on opposite sides of the world. They are usually linked through telephone lines, fibre-optic cables or satellites. The main transmission paths within a WAN are high-speed lines called backbones. Wireless WANs use mobile telephone networks. The largest WAN in existence is the Internet.

LANs can be built with two main types of architecture: peer-to-peer, where the two computers have the same capabilities, or client-server, where one computer acts as the server containing the main hard disk and controlling the other workstations or nodes, all the devices linked in the network (e.g. printers, computers, etc.). Computers in a LAN need to use the same network protocol (the language, or set of rules) to communicate with each other. Networks use different protocols. For instance, the Internet uses TCP/IP. Ethernet is one of the most common protocols for LANs.

A router, a device that forwards data packets, is needed to link a LAN to another network, e.g. to the Net. Most networks are linked with cables or wires but new Wi-Fi, wireless fidelity, technologies allow the creation of WLANs, where cables or wires are replaced by radio waves.

Topology refers to the shape of a network. There are three basic physical topologies.

• Star: there is a central device to which all the workstations are directly connected. This central position can be occupied by a server, or a hub, a connection point of the elements of a network that redistributes the data.

• Bus: every workstation is connected to a main cable called a bus.

• Ring: the workstations are connected to one another in a closed loop configuration. There are also mixed topologies like the tree, a group of stars connected to a central bus.

1. **Programming (steps in writing a program; object-oriented programming, C, C++, Java)**

To write a program, software developers usually follow these steps. First they try to understand the problem and define the purpose of the program. They design a flowchart, a diagram which shows the successive logical steps of the program. Next they write the instructions in a high-level language (Pascal, C, etc.). This is called coding. The program is then compiled. 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.

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.

A programming language in computer science is an artificial language used for writing a sequence of instructions. Similar to natural languages, such as English, French, programming languages have a vocabulary, grammar and syntax.

Programming languages can be classified as low-level and high-level languages. Examples of high-level languages are COBOL (Common business oriented language, used for commercial purposes, was first introduced in 1959), PASCAL and FORTRAN (used for solving scientific and mathematical problems, 1954, the USA), BASIC (Beginner’s all purpose symbolic instruction code, developed in 1965 at Dartmouth College in the USA for students who require a simple language to begin programming).

C is a programming language developed by Dennis Ritchie at Bell Laboratories in 1972 to support the UNIX OS. C is a compiled language that contains a small set of built-in functions that are machine dependent.

C++ is a general purpose programming language; it was developed by Biorn Straustrup in 1979 at Bell Laboratories as an enhancement to the C programming language and was initially named “C with Classes”. It was renamed to C++ in 1983. It is widely used in the software industry.

Java is a programming language developed by James Gosling at Sun Microsystems and released in 1995 as a core component of Sun Microsystems’ Java platform. Its original name was OAK. It was used for writing client’s applications and server software.

PACAL is a high-level general purpose programming language. It’s one of the most famous languages and is widely used in industrial programming as well as in teaching programming at high school. This language is a base for a great number of other languages. It was designed in 1970 by Niklaus Wirth. The most famous version of PASCAL is TURBO PASCAL.

C# was developed by Microsoft as part of the . NET initiative and later approved as a standard by ECMA. It has an object-oriented syntax based on C++ and is heavy influenced by Java.

1. **Internet, WWW, e-mail, Spam.**

The Internet is an International computer Network made up of thousands of networks linked together. All these computers communicate with one another; they share data, resources, transfer information, etc. To do it they need to use the same language or protocol: TCP/IP (Transmission Control Protocol I Internet Protocol) and every computer is given an address or IP number. This number is a way to identify the computer on the Internet.

To use the Internet you basically need a computer, the right connection software and a modem to connect your computer to a telephone line and then access your ISP (Internet Service Provider).

The modem (modulator-demodulator) converts the digital signals stored in the computer into analogue signals that can be transmitted over telephone lines.

Telephone lines are not essential. Satellites orbiting the earth enable your computer to send and receive Internet files. Finally, the power-line Internet, still under development, provides access via a power plug.

The Internet consists of many systems that offer different facilities to users.

Chat and instant messaging, for real-time conversations; you type your messages on the keyboard.

Internet telephone, a system that lets people make voice calls via the Internet. Video conference, a system that allows the transmission of video and audio signals in real time so the participants can exchange data, talk and see one another on the screen.

WWW, the World Wide Web, a collection of files or pages containing links to other documents on the Net. It’s by far the most popular system. Most Internet services are now integrated on the Web.

To surf or navigate the Web, access and retrieve web pages or websites, you need a computer with an Internet connection and a web browser. After you have launched it, you must type the website address or URL (Uniform Resource Locator), which may look like this: http://www. cup.org/education/sample.htm.

http: // indicates the type of protocol that the server and browser will use to communicate; www. shows that it is a resource on the World Wide Web; cup.org is the domain name of the web server that hosts the website; education is the path, the place where a web page is located; htm is the filename or name of a single web page.

The different parts are separated by full stops (.) and forward slashes (/). When we say a URL, we say dot (.) and slash (/).

E-mail, or electronic mail, for the exchange of messages and attached files. Mailing lists based on programs that send messages on a certain topic to all the computers whose users have subscribed to the list. A typical e-mail address has three parts: [jsmith@hotmail.com](mailto:jsmith@hotmail.com), where jsmith – username (a person’s name or nickname), the @ sign means ‘at’, hotmail.com – the domain name or network address: the mail server where the account is located. The final part of it, the top-level domain, adds information about it, e.g. .com = company, .org = non profit institution, .co.uk = a company in the UK, .es = España, etc.

You can make your message look more expressive or attractive by using smileys (also called emoticons): little pictures either made with characters from the keyboard such as :-) for happy, :-o surprised, :-( sad, etc. or downloaded images and animations.

Spam, or junk e-mail, is the name given to unwanted messages, mainly commercial advertising. Some companies, spammers, use it extensively because it’s cheaper than other types of advertising: you or your Internet Service Provider pay for it.

1. **Computer Hardware and Functionality.**

A computer system consists of two parts: hardware and software. Hardware is any electronic or mechanical part you can see or touch. Software is a set of instructions, called a program, which tells the computer what to do. There are three basic hardware sections: the central processing unit (CPU), main memory and peripherals. Perhaps the most influential component is the central processing unit. Its function is to execute program instructions and coordinate the activities of all the other units. In a way, it is the “brain” of the computer. Peripherals are the physical units attached to the computer. They include storage devices and input/output devices.

# Computer case. The computer case contains the most important components of the computer: the motherboard, the processor, random access memory modules, the hard drive etc.

# Motherboard. The motherboard is the part of the computer where such things as the processor, memory modules, expansion cards and external devices are attached. This means that the motherboard controls the functions of different components.

# Processor. The processor can be considered to be the ‘engine’ of the computer because it executes the lion’s share of the information processing; the processor fetches commands and necessary information from the RAM, carries out the tasks specified by the commands, and returns the processed information to the RAM. The speed of a computer depends largely on the speed of the processor.

# Random Access Memory. The RAM is a memory storage that functions during computer use and is especially utilized by the processor. In modern computers, the amount of RAM is around 4–16 GB depending on the type and purpose of the computer. The RAM consists of one or more memory modules. When the computer is started, the operating system is loaded into the RAM (an operating system is a program that controls the devices and programs in a computer). The computer also loads the files being processed – music, assignments, videos etc – to the RAM. If there is enough RAM, the computer executes requested tasks quickly. This is why it is a good idea to add to the memory by buying more memory modules as the need arises.

# Hard drive. The hard drive is the permanent memory of the computer where saved files remain even when the computer is turned off. This is why the hard drive is used for saving files. The capacity of hard drives varies; currently the typical capacity is 500 – 1000 GB, but hard drives of over 1500 GB, i.e. 1,5 terabit, are also available. However, the capacity of the internal hard drives in laptop computers is often less than that.

# Display and display adapter. Most computer displays are so-called LCD displays (Liquid Crystal Display), where the image display is produced by liquid crystals between two transparent sheets. Display sizes range between only a few inches in handheld apparatuses to large 24 inch desktop displays. One of the most important features of the display is its resolution, i.e. how many pixels (picture elements) the image consists of.

# Keyboard. A standard keyboard has 102 keys. The keys are divided into alphabetical (a-z), numerical (1-0) and special (Function, Ctrl, Alt etc keys). Special keys are located among the alphabetical ones.

Pointing devices. Traditionally, most programs have been designed to be used with a mouse. The mouse cursor seen on the screen of the computer moves along with the mouse.  The cursor can be used to select menu commands and areas, as well as activating different objects by clicking the mouse keys.

* Mouse. You can attach a traditional mouse with or without a cord to any computer. Cordless mice use radio waves to relay movement from the mouse to the computer (for this mouse, a small radio receiver is attached to the computer).

## Touchpad. Almost all laptop computers have a touchpad which is used to move the cursor. Some models also have a so-called pointing stick. In addition, portable computers have keys with the clicking function of a mouse. The touchpad is a pad where you can control the cursor by moving your finger along the pad. Tapping the pad serves the same function as clicking a mouse.

Storage devices (hard drives, DVD drives or flash drives) provide a permanent storage of both data and programs. Disk drives are used to read and write data on disks. Input devices enable data to go into the computer’s memory. The most common input devices are the mouse and the keyboard. Output devices enable us to extract the finished product from the system. For example, the computer shows the output on the monitor or prints the results onto paper by means of a printer.

On the rear panel of the computer there are several ports into which we can plug a wide range of peripherals – a modem, a digital camera, a scanner, etc. They allow communication between the computer and the devices. Modern desktop PCs have USS ports and memory card readers on the front panel.

1. **Computer Viruses and Computer Security.**

Computer Security is a number of techniques developed to protect single computers and network-linked computer systems from accidental or intentional harm. The harm can include destruction of computer hardware and software, physical loss of data, deception of computer users and so on.

One technique to protect confidentiality is encryption. Information can be **scrambled and unscrambled** using mathematical equations and a secret code called a key. Two keys are usually employed, one to encode and the other to decode the information. The key that encodes the data, called the private key, is possessed by only the sender. The key that decodes the data, called the public key, may be possessed by several receivers. The keys are modified periodically, further hampering unauthorized access and making the encrypted information difficult to decode or forge.

Another technique to prevent computer crime is to limit access of computer data files to approved users. Access-control software verifies computer users and limits their privileges to view and alter files. Records can be made of the files accessed, thereby making users accountable for their actions. Military organizations give access rights to classified, confidential, secret, or top secret information according to the corresponding security clearance level of the user.

Passwords are confidential sequences of characters that give approved users access to computers. To be effective, passwords must be difficult to guess. Effective passwords contain a mixture of characters and symbols that are not real words. To thwart imposters, computer systems usually limit the number of attempts to enter a correct password.

Information on networks can be protected by a firewall, a computer placed between the networked computers and the network. The firewall prevents unauthorized users from gaining access to the computers on a network, and it ensures that information received from an outside source does not contain computer viruses, self-replicating computer programs that interfere with a computer’s functions.

Security and Privacy on the Internet

There are many benefits from an open system like the Internet, but one of the risks is that we are often exposed to hackers, who break into computer systems just for fun, to steal information, or to spread viruses (see note below). So how do we go about making our on-line transactions secure?

Security is crucial when you send confidential information on line. Consider, for example, the process of buying a book on the Web. You have to type your credit card number into an order form which passes from computer to computer on its way to the on-line bookstore. If one of the intermediary computers is infiltrated by hackers, your data can be copied. To avoid risks, you should set all security alerts to high on your web browser. Mozilla Firefox displays a lock when the website is secure and allows you to disable or delete cookies – small files placed on your hard drive by web servers so that they can recognize your PC when you return to their site. If you use on-line banking services, make sure they use digital certificates– files that are like digital identification cards and that identify users and web servers. Also be sure to use a browser that is compliant with SSL (Secure Sockets Layer), a protocol which provides secure transactions.

Private networks can be attacked by intruders who attempt to obtain information such as Social Security numbers, bank accounts or research and business reports. To protect crucial data, companies hire security consultants who analyze the risks and provide solutions. The most common methods of protection are passwords for access control, firewalls, and encryption and decryption systems. Encryption changes data into a secret code so that only someone with a key can read it. Decryption converts encrypted data back into its original form.

If you want to protect your PC, don’t open e-mail attachments from strangers and take care when downloading files from the Web. Remember to update your anti-virus software as often as possible, since new viruses are being created all the time.

1. **The development of computers (generations).**

The history of computer development is often referred as to the different generations of computing devices. Each of the five generations of computers is characterized by a major technological development that fundamentally changed the way computers operate, resulting in smaller, cheaper, more powerful and more efficient and reliable computing devices.

First generation (1940-1956): vacuum tubes. The first computers used vacuum tubes and were often enormous, taking up entire rooms. They were very expensive to operate and in addition to using a great deal of electricity, generated a lot of heat, which was often the cause of malfunctions. First generation computers relied on machine language, the lowest-level programming language understood by computers, to perform operations, and they could only solve one problem at a time.

Second generation (1956-1963): transistors. The transistor was invented in 1947 but did not see a widespread use in computers until the late 1950s. The transistor was far superior to the vacuum tube, allowing computers to become smaller, faster, cheaper, more energy-efficient and more reliable than their first-generation predecessors. Second-generation computers moved to symbolic, or assembly languages, which allowed programmers to specify instructions in words. High-level programming languages were also being developed at this time, such as the early versions of COBOL and FORTRAN. The first computers of this generation were developed for the atomic energy industry.

Third generation (1964-1971): integrated circuits. Transistors were miniaturized and placed on silicon chips, called semiconductors, which drastically increased the speed and efficiency of computers. Users interacted with the third generation computers through keyboards and monitors and interfaced with an operating system, which allowed the device to run many different applications at one time with a central program that monitored the memory. Computers for the first time became accessible to a mass audience because they were smaller and cheaper than their predecessors.

Fourth generation (1971-present): microprocessors. The microprocessor brought the fourth generation of computers, as thousands of integrated circuits were built onto a single silicon chip. What in the first generation filled an entire room could now fit in the palm of the hand. In 1981 IBM introduced its first computer for the home user, and in 1984 Apple introduced the Macintosh. As these small computers became more powerful, they could be linked together to form networks, which eventually led to the development of the Internet.

Fifth generation (present and beyond): artificial intelligence. Fifth generation computing devices, based on artificial intelligence, are still in development, though there are some applications, such as voice recognition, that are being used today. The use of parallel processing and superconductors is helping to make artificial intelligence a reality.