# 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. Forestry faculties were established in 1919 at the GoryGoretsky 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.

In August 1946 the Institute was transferred to Minsk. 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. In 1993 the Government of the Republic of Belarus granted the Institute with the university status (Belarusian State Technological University). The scope of the University competence has enlarged dramatically.

The Belarusian State Technological University was granted the status of a leading higher educational institution of the CIS in the fields of forestry and forest industry. In 2012 the University was reorganized into an educational, research and production centre in line with lifelong learning principles. Thus, in March 2013, five colleges were affiliated to the University as separate subdivisions.

# 2.OUR UNIVERSITY:SCIENTIFIC AND RESEARCH WORK

The BSTU is a major scientific and research centre actively developing fundamental and applied research trends. Our research sets out to provide solutions to the vital concerns faced by humankind. The University scholars are active participants of scientific and technical programs of various scope. For instance, over the last years they have contributed to different national and regional research and technical projects. The Belarusian State Technological University has been the leading partner of national research and technical program “Forests of Belarus – Productivity, Sustainability, Efficiency”.

The scope of research trends developed by the University is highly diverse.

The research and education schools of national, CIS and international recognition have been established and are operating at the University. Belarusian State Technological University houses 5 PhD Certification Councils. Annually the University researchers publish over 2,500 papers and abstracts. Only for the past 5 years the University has been received more than 240 patents for inventions and useful models, 117 PhD and doctoral theses have been defended, 67 monographs, 663 textbooks and tutorials have been published at the University. Over 88 international and republican conferences have been hosted by the BSTU.

The high-quality research carried out by the BSTU research staff is supported and ensured by the availability of unique and state-of-the-art laboratory and technical facilities.

# 3.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 student campus houses five dormitories where students can rest and study. The dormitories are conveniently located within a walking distance from the University’s . All rooms are equipped with modern furniture and facilities. The student organizations in campus enrich the social, cultural,

and educational experiences of students. Representatives in student government collaborate with university leaders to enhance the student experience. Students interested in the arts participate in a variety of visual and performing art groups, dance groups, choirs, student theatre. Various festivals such as “Student Spring”, “Student Autumn”, “Mother’s Day”, contests, meetings, discotheques, sport events in six kinds of sports are arranged at the dormitories. Students go in for football, volleyball, basketball and other sports.

It’s hard to imagine student life without sport. 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. Interfaculty competitions in various kinds of sport are held at the University annually. University sport club comprises such sport groups as: swimming, athletics, tourism, football, unarmed combat, Greco-Roman wrestling, sambo, karate, judo, volleyball, table tennis, basketball, arm-wrestling, and weight lifting. 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.

# SCIENCE AND TECHNOLOGY: the importance of inventions..

Science

Что такое наука

Modern civilization is everything that has been achieved thanks to science. Science is systemized knowledge received through experimentation, observation and study. In their work scientists use different methods and techniques. They build up hypotheses, theories, perform experiments, explore, discover and invent. Among the achievements of science are the discovery of penicillin by Alexander Fleming; the invention of the electric light bulb by Thomas Edison; the invention of the telephone by Alexander Bell; the invention of radio by Alexander Popov; the invention of television and the Internet.

Цели и задачи науки

"Scientific work must have no object except to find out the truth" (Miguel de Unamuno). The goal of science is to learn how nature works and to understand this world through research and experiments. The tasks of science are collecting, describing, analyzing and explaining facts and phenomena.

Классификация наук

The branches of science (scientific disciplines) are divided into three groups (formal, natural, social)

Normal sciences study mathematics and logic, natural ciences study natural phenomena. Social sciences study human behavior and societies.

# 5.SCIENCE AND TECHNOLOGY: inventions, famous scientists..

Modern civilization is everything that has been achieved thanks to science. Science is systemized knowledge derived through experimentation, observation, and study. In its widest sense it is formulated knowledge, knowledge of structure, laws, and operations. 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. 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.

# Information technology industry in Belarus

In the past several years Belarus has earned the reputation of the leading "IT country" in the Eastern European region. According to the Global Services 100 rating, the Republic of Belarus placed 13th among the 20 leading countries in the sphere of IT outsourcing and high-tech services. Moreover,

three companies with Belarusian roots entered the top-100 of the largest world companies in this sphere: EPAM Systems, IBA Group and Intetics Co. Belarus ranks 48th in the IT-ranking of UN. Software development has existed in the country since 1998. However, the key "point of reference" from which the development of the IT sphere in Belarus began is considered to be September 2005, when by the Decree of the President of the Republic of Belarus №12 "On HTP", the legal basis for

the successful work of the "Belarusian Silicon Valley" - the High-Tech Park - and the attraction of investments to the software development industry was laid. Today Belarusian companies working within the HTP, differ by the progressive management and the effectiveness of marketing decisions. The sphere is characterized by client maturity, the complexity

of the implemented projects, the global network of service delivery, the variety of the "portfolio" cf products and services, the ability to work on the niche markets.

# 7. Information systems and technologies; types of computer, positive and negative impact of IT

An Information System (IS) is a large umbrella referring to systems designed to create, store, manipulate or disseminate information.

Humans have been storing, retrieving, manipulating, and communicating information since the Sumerians in Mesopotamia developed writing in about 3000 BC but the term IT in its modern sense first appeared in a 1958.

The conception of IT is closely associated with Information Systems.

IT falls under the information systems umbrella but has nothing to do with systems per say. IT deals with the technology involved in the systems themselves, e.g. an information system contains many information technologies such as servers, server operating systems, web server software etc.

there are different types of computers this is a   
PC  
DESKTOP  
LAPTOP  
TABLET COMPUTERS  
SMARTPHONES  
WORKSTATION  
SERVER  
MAINFRAME  
SUPERCOMPUTER

The computer is an invention of the 20th century that changed people's lives. Now we can no longer imagine life without it, but before no one could have thought how far technological progress would go. There are both pros and cons of using computers.

The indisputable advantage of a computer as a technical invention is the simplification and improvement of work in many areas of life. These are mainly work processes in science, architecture, and industry.

The search for information with the advent of the computer and the Internet has become much more convenient and faster. Communication, communication, search for the right people have become more accessible thanks to the development of the Internet. Such a number of advantages and a variety of computer capabilities has led to the fact that more and more people spend all their working time and all their leisure time with it. This adversely affects the physical condition of a person.

# 8. Computer Essentials

A computer is a complex machine that is capable of performing huge computations at an extraordinary speed. Computer consists of a processing unit, an arithmetic/ logic unit, computer storage, and input/ output devices along with its peripherals. All the parts make the whole system.

Central Processing Unit (CPU): Also known as the computer processor, The CPU is an electronic circuit that executes computer programs.

CPU operation can be divided into four basic steps, namely, fetch, decode, execute, and writeback.

During the fetch step, the processor retrieves program instructions from memory. In the decode step, the instruction is broken down into parts. The CPU defines the way in which an instruction is decoded. In the execute step, CPU performs the operation. During the writeback step the CPU writes back the results of execution to the computer’s memory.

The motherboard is the main board of the computer. It has slots and connectors for connecting PC components, such as: video cards, RAM (random access memory), processor, data drives, as well as peripherals.

A hard disk stores data and provides computer users with quick access to large amounts of data~~.~~

Random Access Memory, popularly known as RAM, is a small-sized light and volatile form of computer memory. It is capable of temporary storage of data.

Computers require a non-volatile primary storage to read large programs. This non-volatile memory is known as ROM or Read-only memory. It also contains the startup programs used for bootstrapping a computer.

Secondary storage media such as flash memory, magnetic tape, punch cards – are also a part of computer memory.

Computers have input devices such as a keyboard, computer mouse, microphone, and output devices such as a monitor and speakers.

Monitor is an electrical equipment that displays images generated by the video output device of a computer.

A computer mouse is a coordinate device for controlling the cursor and giving various commands to the computer. There are three basic types of mice, namely, mechanical, opto-mechanical, and optical.

A keyboard is a set of buttons located in a block or panel on which numbers, symbols or letters of the alphabet are printed.

# **9. The development of computer(generations)**

The history of computer development is often referred as to the different generations of computing devices. Each of the six generations of computers is characterized by a major technological development.

*First generation (1940-1956): vacuum tubes.* The first computers used vacuum tubes and were often enormous. They were very expensive to operate and in addition to using a great deal of electricity. First generation computers relied on machine language.

*Second generation (1956-1963): transistors.* Transistors replaced vacuum tubes and ushered in the second generation of computers. The transistor was invented in 1947. The transistor allowing computers to become smaller, faster. Second-generation computers moved to assembly languages.

*Third generation (1964-1971): integrated circuits.* users interacted with the third generation computers through keyboards and monitors, device to run many different applications at one time

*Fourth generation (1971-1982): microprocessors.* The microprocessor brought the fourth generation of computers, as thousands of integrated circuits were built onto a single silicon chip. As these small computers became more powerful, they could be linked together to form networks, which eventually led to the development of the Internet. Fourth generation computers also saw the development of the GUI and the mouse.

*Fifth generation (1982-present):* *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.

Now we use the*Fifth Generation of Computers*which were started around 1982. These generation computers use the high level of languages.

It introduces the laptops, notebooks, PC’s, desktops, and many more during this period.

The fifth-generation computers introduce an improvement in semiconductor technology and Artificial Intelligence.

*Sixth Generation* of computers is different from, other generation computers in terms of size, speed and tasks that they perform. These computers are called intelligent computers based on artificial intelligence or artificial brains.

*Future Generation Computers*may be neurons and attains the human level intelligence.

# **9. Artificial Intelligence**

Artificial Intelligence is the simulation of natural intelligence in machines that are programmed to learn and mimic the actions of humans. These machines are able to learn with experience and perform human-like tasks.

*Artificial Intelligence Definition.*AI isan intelligent entity created by humans. AI is capable of performing tasks intelligently without being explicitly instructed. AI is capable of thinking and acting rationally and humanely.

Artificial Intelligence can be built over a diverse set of components and will function as an amalgamation of Philosophy, Mathematics, Economics, Neuroscience, Psychology, Computer Engineering, Control Theory and Cybernetics, Linguistics.

There are 3 Types of Artificial Intelligence: Artificial Narrow Intelligence (ANI), Artificial General Intelligence (AGI), Artificial Super Intelligence (ASI)

Artificial Narrow Intelligence (ANI) is the most common form of AI that you’d find in the market now. These Artificial Intelligence systems are designed to solve one single problem and would be able to execute a single task really well. (4) By definition, they have narrow capabilities, like recommending a product for an e-commerce user or predicting the weather. This is the only kind of Artificial Intelligence that exists today. They’re able to come close to human functioning in very specific contexts, and even surpass them in many instances, but only excelling in very controlled environments with a limited set of parameters.

AGI is still a theoretical concept. It’s defined as AI which has a human-level of cognitive function, across a wide variety of domains such as language processing, image processing, computational functioning and reasoning and so on. An AGI system would need to comprise of thousands of Artificial Narrow Intelligence systems working in tandem, communicating with each other to mimic human reasoning.

Artificial Super Intelligence (ASI) is seen as the logical progression from AGI. It would be able to surpass all human capabilities. This would include decision making, taking rational decisions, and even includes things like making better art and building emotional relationships.

# **10. Computer network and network topology; LAN, WAN, MAN, etc**

A Computer Network is a system of connected computers, peripherals and communication devices that can exchange data and share resources. The network connections can be cable, fiber-optic, or wireless (infra-red, microwave or radio).

*Client-server network.* . One or more server computers which have the role of: controlling access to shared files; installing software on the client computers; allowing the client computers to access networked printers and managing print queues;

*Peer-to-peer networks.* In a peer-to-peer network computers are simply linked together, either using cables and a hub or with a wireless connection. All the computers in the network have equal status so there is no server controlling the network.

**Ring topology.** This is typically a peer-to-peer network. The devices are connected in a ring and data travels in one direction using a control signal called a ‘token’.

**Bus (line) topology.** This is typically a peer-to-peer network. Devices are connected to a main (bus) cable using special T-connectors.

**Star topology.** This is typically a client-server network. A central computer (server) is connected to the other devices either through a switch or hub.

A WAN covers a much larger geographical area than a LAN. The largest WAN is the Internet itself as it is a global network of linked computers and LANS.

***Network security methods used:***

*IP Addressing*. An Internet Protocol (IP) address is a unique address number that is allocated to devices on a computer network that uses the Internet Protocol.

*MAC Addressing.* In computer networking, a Media Access Control address (MAC address) is a unique 48-bit number assigned by the manufacturer to any hardware device.

*Data Packets.* Modern computer networks carry data by breaking it down into a series of distinct units called data packets.

*Protocols.* A communications protocol is a description of the format that digital data has to be in and the rules for hardware/software to communicate that data.

*Suitable passwords:* a password is used in combination with the username to prevent unauthorized access to a network.

*Filtering:* certain websites can be blocked by filtering.

*Wi-Fi access restrictions* should be in place to allow only legitimate computers to connect to the network.

*Firewall*: this can be a device or be software-based.

# 11. Internet, WWW

1. **The Internet** is a global network connecting millions of computers. In the early days, most people just used the Internet to search for information. Today the Internet helps many people communicate, work, learn, and have fun.

2. The Internet enables computers to send one another small packets of digital data. For that to work, they use a common ’language’ called TCP/IP (Transmission Control Protocol / Internet Protocol). If you are on the net, you have an IP address. This address is a way to identify a computer on the Internet. Packets of Internet data are transmitted through a variety of cables, routers and host computers on the way to their destination.

3. The Internet began in 1969 as ARPAnet, The nature of the Internet changed in 1992, when the U.S. government offered Internet access to the general public.

4. The Internet consists of multiple data systems. The most popular and important systems are:

**WWW, the World Wide Web**, a collection of files or pages containing links to other documents on the Internet. Most Internet services are now integrated on the Web.

E-mail, or electronic mail, for the exchange of messages and attached files.

Instant messaging (IM), a system for sending public and private messages to other users in real time over the Internet. The most popular instant messaging services include Skype, WhatsApp, Viber, Telegram, etc.

File Transfer Protocol (FTP), a system for transferring data files between computers via the Internet. Some services also let you do video conferencing, such as Skype and Facebook Video Calling. VoIP (Voice over Internet Protocol), or Internet Telephone, a system that lets people make voice calls over the Internet.

# 12. Software

*Computer software* is a general term used to describe a collection of computer programs, procedures and documentation that perform some tasks on a computer system. In computers, software is loaded into RAM and executed in the CPU.

There are different classes of computer software which are useful for several purposes.

*System Software* coordinates the complete system hardware and provides an environment or platform for all the other types of software to work in.

Mac OS, Linux, Ubuntu, devices drivers, etc. Apple’s iOS, Google’s Android, Windows Phone OS.

*Application Software*. They are non-essential software which are installed and run depending upon the requirements, in the environment provided by the system software.

There are some examples of application software that allow you to do specific work: **MS Excel, Photoshop, Skype**

*Programming software* is used to write, test, debug, and develop other software programs and applications.

Programming software is used by software programmers as translator programs. They are facilitator software used to translate programming languages (i.e., Java, C++, Python, PHP, BASIC) into machine language code.

There are **five additional subcategories of software**. These are: Freeware; Shareware; Open Source Software; Closed Source Software; Utility Software.

*Freeware software* is any software that is available to use for free. They can be downloaded and installed over the internet without any cost.

Google Chrome; Skype; Instagram; Snapchat; Adobe reader.

*Shareware*. You can use the software without any charges for the trial period but you will be asked to purchase it for use after the trial ends. Shareware allows you to test drive the software before you actually invest in purchasing it.

Adobe PhotoShop; Adobe Illustrator; Netflix App; Matlab; McAfee Antivirus.

*Open Source Software* is a type of software that has an open-source code that is available to use for all users. It can be modified and shared with anyone for any purpose.

LibreOffice; PHP; GNU Image Manipulation Program (GIMP).

*Closed Source Software.* These are the types of software that are non-free for the programmers. For this software, the source code is the intellectual property of software publishers.

NET; Java; Android; Microsoft Office; Adobe PhotoShop.

*Utility software* is considered a subgroup of system software. They manage the performance of your hardware and application software installed on your computer, to ensure they work optimally. Some features of utility software include: Antivirus and security software; File compressor; Disk cleaner; Disk defragmentation software; Data backup software.

There can be multiple ways to classify different types of computer software. The software can be categorized based on the function they perform nature of source code, accessibility, and cost of usage.

# 13. Operation systems

An OS acts an interface between a user and a device. Thus, in general sense, an OS is that software which helps a user to run other applications on his computing device.

All the computers and computer-like devices comprise Operating System, including laptop, desktop, or any other smart computing system like a smart phone or a smart watch. Some of the popular OS are Linux, OS X, WINDOWS, VMS, OS/400, AIX, z/OS, etc.

The OS performs multiple functions and management. It manages computer’s hardware resources by performing required services:

Front end management of hardware resources.

The functions

*Memory Management*. Memory management keeps an eye on each and every memory location, in any case either it is allocated or it is not allocated (free).

*Device Management*. An OS with help of their respective drivers manages device communication.

*Processor Management*. In a multiprogramming environment, it is OS which decides which process will get the processor when and for how long. This task is called Process Scheduling.

*File Management.* In a file system, generally directories are organized for usage and easy navigation.

*Controls System Performance*. An OS records delays between a request and response of the system.

*Security*. An OS by using password and other similar techniques prevents and checks unauthorized users to access the data and program.

*Error Detection*. By using various error detecting aids an operating system helps in prevention of errors.

*Coordination among Software and Users*. It Coordinates and assigns compilers, assemblers, interpreters and other software to users.

*Job accounting*. It keeps a track of resources and jobs used by different users all the time.

**Types of Operating Systems**

The broad family of operating systems can be categorized in to four types based on their controlling and supporting systems.

A *Real Time Operating System* (RTOS) intends to provide real time applications that process data without buffer delays. A Real Time Operating System is a time bound operating system which has fixed time constraints. Processing has to be done within the defined time constraints or the system will definitely fail. Examples of Real Time systems are Air Traffic Control Systems, Command Control Systems etc.

Command Control systems and Air traffic control systems are best examples of Hard Real Time systems. Online transaction systems, like booking a movie ticket or airline reservation systems are best examples of Soft Real Time systems. Multimedia applications is one example of Firm RTOS.

*Single User Single Task* Operating System. As the name indicates, Single User Single Task OS is a system in which only one program is executed at one time.

*Single User MultiTasking Operating System*. Most people use this Operating-System on their computers, laptop and desktops today. This Operating System will allow a single user to operate several programs at the same time.

*Multi User Operating System* allows various different users on different desktop or computer to access a single System.

# 14. Computer viruses and computer security

A computer virus is a malware program that is written to gain access to a computer without its owner’s permission. There are different types of computer viruses.

*Direct Action Virus* gets into the main memory, affects all programs/files/folder. Itdoesn’t delete system files but changes the system’s performance. It can affect all .exe and .com file extension. Protection: Use antivirus software

*Overwrite Virus* deletes the data and replaces the old code with their own. They replace the file content without changing its size. Protection: The only way to get rid of this virus is to delete all the infected files and Use antivirus software.

*Web Scripting Virus* can affect web browser. It is used to attack large sites like social networking, user review or email. Protection: Use real-time antivirus software, disable script, use cookie security

*Directory Virus* (also known as Cluster virus) infects the file by changing the DOS directory information. When you run a program, DOS first loads and executes the virus code before running the actual program code. Protection: Use antivirus software.

*Memory Resident Virus* lives in primary memory (RAM) and get activated when you switch on the computer. They affect all files currently running on the desktop. Protection: use antivirus software.

*Macro Virus* is written in the macro language, so it can run automatically when the document is opened and it can easily spread to other files too. They are generally hidden in documents that are shared via email. Protection: Disable macros and don’t open emails from unknown sources and use antivirus software.

*Companion Virus* does not modify the existing file. It creates a copy of a file with a different extension (usually .com) which runs in parallel with the actual program. It can delete the original files. Can affect: All .exe files. Protection don’t open emails from unknown sources and use antivirus software

*Trojan Horse* can destroy or modify all the files, crash the computer and give hackers remote access to your PC. Protection: Use antivirus software.

*FAT Virus*. FAT stands for file allocation table which is a section of storage disk. A FAT virus alters the index and makes it impossible for the computer to allocate the file. It is powerful enough to format the whole disk. It can affect any file. Protection: Avoid downloading files from non-trusted sources. Use robust antivirus software.

Polymorphic Virus. The polymorphic virus encodes themselves using different encryption keys and algorithms each time they infect a program or create a copy of itself.