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METHODOLOGICAL RECOMMENDATIONS
TO LECTURES ON THE ACADEMIC DISCIPLINE

Educational discipline
Information technology in pharmacy

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TOPIC

"Information Technologists . Basic Concepts and Definitions"

Topic relevance : Currently observed transition from industrial to informational society , which accompanied growth value informational technologies — informatization all industries public life , including medicine and pharmacy . So higher education applicants - pharmacists need to have the idea of medical informatics as a new type of resource , and its properties , as well as about the pharmaceutical system and medical informatics in Ukraine . Also The type of separation is important the most important directions application computer (information) technologies in pharmacy , which allows must form in higher education applicants integral an idea of the course that will deepen more detailed studying individual sections in the future .

Purpose : To give definition concepts : computer , information , information technology , medical informatics . Introduce from main properties and classification methods medical informatics , the main philosophical interpretations this concept . To form an idea of the medical informatics system in Ukraine and its features . Form an idea of the possibilities and main areas of application informational technologies in medicine .

Basic concept :

Information resources are the ideas of humanity and instructions for their implementation. These are books, articles, various documentation, website instructions , etc.

Information carriers are a medium or physical body for transmitting, storing, and reproducing information: electrical, light, thermal, sound, radio signals, magnetic and laser discs, printed publications, photographs, etc.

Information processes are processes related to the receipt, storage, processing and transmission of information, during which the content of the information or the form of its presentation changes.

Content lecture hall material (lecture text)

The concept of information

Information (lat. Informatio) - knowledge, information, awareness. This is information about the surrounding world, its processes and phenomena, which are perceived by a person or a special device in various ways using conventional signals, technical means, etc.

Information is a concept associated with the objective property of material objects and phenomena (processes) to generate a variety of states, which, through interaction (fundamental interaction), are transmitted to other objects and reflected in their structure. (V.M. Glushkov, M.M. Amosov "Encyclopedia of Cybernetics", Kyiv. 1975.)

The concept of information is ambiguous, so various interpretations are considered:

* In the "cybernetic [1] " sense, the concept of information is widely used in the control signal system, [which] is transmitted over communication lines.

* In the "philosophical" sense, information is closely related to such concepts as interaction and reflection.

* In the "probable" sense, information is understood as information about objects and phenomena of the environment, their parameters, properties and state, which reduce the existing degree of uncertainty and incompleteness of knowledge.

* In the "ordinary" sense, the word information is used as a synonym for intuitively understandable words: data, meaning, message, awareness.

* For a person, this is information, knowledge, messages that a person perceives from the surrounding world using the senses (sight, hearing, taste, smell, touch).

* In terms of computer processing, information is understood as a certain sequence of characters (numbers, letters, sounds) that have CONTENT 1 provided to/from a computer in an understandable form.

In nature, information exists in various forms:

- Human language.
- Texts, numbers.
- Light or sound signals.
- Electrical or nerve impulses.
- Gestures, facial expressions.
- Smells or tastes.
- Genetic inheritance
- Other forms.

Classification by form of presentation

•Continuous information. A quantity that characterizes a process that is continuous in time.

•Discrete information. A sequence of symbols that characterizes a continuous variable.

Information properties

• Objectivity. Not dependent on circumstances or anyone's opinion.

•Reliability. Reflects the true state of affairs.

•Completeness. Has enough information to understand and make a decision.

• Relevance. This is important when working in constantly changing conditions.

• Value (usefulness, significance). Provides a solution to the task, is necessary for making the right decisions.

• Clarity: Expressed in language that is accessible to perception.

To ensure the information process, an information source, a communication channel and a consumer of information are necessary. The source transmits (sends) information, and the receiver receives (perceives) it. Information is transmitted from the source to the receiver using a signal (code). Changing the signal allows you to obtain information.

Therefore, an information process is a set of information that is received from the environment (input information), processed and/or stored within a certain system (internal information), and released to the environment (output information).

An information system is an interconnected set of tools, methods, and personnel used to store, process, and retrieve information to solve a specific problem.

The main link of the information system is a computer or ECM (Electronic Computing Machine).

A component of information is data, which during the information process is transformed from one type to another using methods.

Basic data operations

- Data collection. The accumulation of information to ensure sufficient completeness for decision-making.

- Data formalization. Bringing data from different sources into a uniform form to make them comparable (that is, able to be measured the same way with any measure; unidimensional) and increase accessibility.
- Data filtering. Weeding out "superfluous" data that is not important for decision-making. After filtering, the reliability and adequacy of the data should increase.
- Data sorting. Arranging data according to a given characteristic for ease of use and increased accessibility of information.
- Data archiving. Organization of data storage in a convenient and easily accessible form. This is necessary to reduce the economic costs of data storage and increases the overall reliability of the information process as a whole.
- Data protection. A set of measures aimed at preventing the loss, reproduction, and modification of data.
- Data transportation. The reception and transmission of data between remote participants in an information process.
- Data transformation. Converting data from one form to another or from one structure to another.

Working with information is quite extensive, so they are trying to automate it.

Information technology The word "technology" is of Greek origin from two components: " logos " - concept, teaching, " techne " - art, skill, ability, process. By process we mean a certain set of actions aimed at achieving a set goal. The process should be determined by the chosen strategy and implemented using a set of different means and methods.

The technology of material production is understood as a process that is determined by a set of means and methods of processing, manufacturing, changing the state, properties, and form of raw materials or materials. Technology changes the quality or primary state of matter in order to obtain a material product.

The goal of material production technology is to produce products that satisfy the needs of a person or system.

Information is one of the most valuable resources of society, along with traditional material resources such as oil, metal, minerals, etc., therefore, the process of processing information, like the processes of processing material resources, can be perceived as technology.

Information technology involves the ability to work competently with information and computing equipment.

Information technology is a process that uses a set of means and methods for collecting, obtaining, accumulating, storing, processing, analyzing and transmitting data (primary information) in an organizational structure using computer technology to obtain new quality information about the state of an object, process or phenomenon (information product).

The purpose of information technology is to produce information for analysis and decision-making to perform a specific action.

If you apply different technologies to the same material resource, you can get different products. This will also be true for information processing technology.

The concept of computer information technology Information technology is the most important component of the process of using information resources of society. To date, it has gone through several evolutionary stages, the change of which was determined by the development of scientific and technological progress and the emergence of new technical means of information processing.

In modern society, the main technical means of information processing technology is the personal computer, which has significantly influenced both the concept of building and using technological processes and the quality of the resulting information. The introduction of the personal computer into the information sphere and the use of telecommunications have determined a new stage in the development of information technology and now the following terms are often used: "new", "computer" or "modern".

The adjective "new" emphasizes the innovative, rather than evolutionary, nature of this technology. Its introduction is an innovative act, because it significantly changes the content of various types of activities in organizations. The concept of new information technology also includes communication technologies that provide information transmission in various ways, namely telephone, fax, modem, telecommunications, etc.

The adjective "computer" emphasizes that the main technical means of its implementation is a computer.

Three basic principles of computer information technology:

- Interactive (dialogue) mode of working with a computer.
- Integration (interconnection) with other software products
- Flexibility of the process of data analysis and problem formulation.

Stages of information technology development

Stage 1 (until the second half of the 19th century). "Manual" information technology, the tools of which were: pen, inkwell, book. Communications were carried out manually or through the mail* of letters, packages, dispatches. The main goal was to present information in the desired form.

2 (from the end of the 19th century). "Mechanical" technology, the tools of which included: typewriter, telephone, dictaphone and mail, equipped with more advanced means of delivery. The main goal was to present information in the desired form by more convenient means.

3 (1940s-1960s). "Electric" technology, the tools of which included: mainframe computers and appropriate software, electric typewriters, copiers, portable dictaphones. The emphasis in information technology begins to shift from the form of information presentation to the formation of its content.

4 (from the beginning of the 70s). "Electronic" technology, the main tools of which are large computers and information and computing systems, equipped with a wide range of basic and specialized software complexes. The center of technology shifts to the formation of the substantive side of information for the management environment of various spheres of public life.

5 (from the mid-1980s). "Computer" ("new") technology, the main tool of which is a personal computer with a wide range of standard software products for various purposes. At this stage, the process of personalization of computing systems and the widespread use of telecommunications are taking place. In connection with the transition to a microprocessor base, technical means of household, cultural and other purposes are also undergoing significant changes. Global and local computer networks are beginning to be widely used in various areas.

Basic components of information technology

- Technical support.
- Software.
- Information support.
- Methodological and organizational support.

Technical support (NagsPUage). These are personal computers, office equipment, communication lines, network equipment. Technical equipment affects the collection, processing

and transmission of information. The development of computer technology does not stand still. Personal computers are becoming more powerful and cheaper and, therefore, are available to a wide range of users. Computers are equipped with built-in communication capabilities, high-speed modems, large amounts of memory, scanners, voice and handwriting recognition devices.

Software (8o/) y'age). Is directly dependent on technical and information support, implements the functions of accumulation, processing, analysis, storage, and provides a user interface with the computer.

Information support. A collection of data that is presented in a certain form for computer processing.

Organizational and methodological support is a set of measures aimed at the functioning of the computer and software to obtain the required result.

The main properties of information technology are:

- Expediency.
- Availability of components and their structure.
- Interaction with the external environment.
- Integrity.
- Development over time.

Relevance . The main goal of implementing information technology is to increase production efficiency based on the use of modern computers for distributed information processing, distributed databases, and various information computing networks by ensuring the circulation and transformation of information.

Components. These are functional units of information circulation and processing processes.

Structure. The internal organization that reflects the relationships between components.

Interaction with the external environment. Interaction of information technology with control objects, systems, software and hardware automation tools.

Coherence . Information technology is a holistic system that is capable of solving problems using the capabilities of its components.

Implementation (development) over time Ensuring the dynamism of information technology development, its modification, change of structure, addition of new components.

questions on the topic: :

1. What definitions of the concept of "Information" do you know?
2. List the main properties of information
3. Name the temporal and other additional properties of information.
4. List the main criteria by which information is classified.
5. Name the types of information by areas of knowledge, method of perception, form of presentation, and purpose.
6. Features of pharmaceutical informatics. Describe the pharmaceutical informatics system in Ukraine.
7. List the main areas of application of computer technologies in pharmacy.

Test task

1. As an integral part property matter information are considering supporters :

A. Formal approach

B. Attributional approach

B. Functional approach

2. One of main properties information that reflects impossibility algebraic addition messages , because of this distorted their content , this property :

A. Relevance

B. Reliability

B. Cumulativeness

D. Non-additivity

D. Noncommutativity

3. One of main properties information that reflects impossibility rearrange message in places , because of this distorted their content , this property :

A. Relevance

B. Reliability

B. Cumulativeness

D. Non-additivity

D. Noncommutativity

4. The linguistic nature of information is that :

A. Information is only textual message

B. Information always is expressed using languages

B. Any others means , except speech , incapable transfer information

5. What type of information does not exist according to the method of perception ?

A. Auditory

B. Mental

B. Visual

G. Tactile

D. Taste

List of sources on the topic:

Main

1 Medical Informatics : textbook / I.Ye. Bulakh , Yu.Ye. Liakh , VP Martseniuk , I.Yo. Khaimzon . — 4th edition . — Kyiv : AUS Medicine Publishing, 2018. — 368 p.

2. G.G. Shvachych , V.V. Tolstoy , L.M. Petrechuk , Y.S. Ivashchenko , O.A. Gulyaeva , O.V. Sobolenko Modern information and communication Technology : Educational manual . - Dnipro : NMetAU , 2017. -230 p.

3. Medical computer science in modules. Practicum: practicum for medical (pharmac .) universities of the IV level accreditation / I. Ye. Bulakh [and others] . ; edited by I. Ye. Bulakh ; O. O. Bogomolets National Medical University . – K. : Medicine , 2012. – 208 p.

4. Computer modeling in pharmacy : teaching . manual . for pharmacy . f- tiv universities of the Ministry of Health of Ukraine / I. E. Bulakh , L. P. Voitenko, I. P. Kryvenko. – K.: Medicine, 2017. – 208 p.

Information Workshop technologies in pharmacy [Electronic resource]: teaching . manual . for students of universities / S. V. Velma , N. M. Yatsenko, Yu. M. Penkin ; National University of Physics and Technology . – Kh. : NFaU , 2016. FA 1.1-26-295

Auxiliary

1. Forkun Y. V. Informatics : teaching aids / Yu. V. Forkun , N. A. Dlugunovich . - – Lviv : Publishing house " New" World – 2000”, 2018. – 464 p.

2. Computers and computer technologies : teaching aids / Yu. B. Brodsky , K. V. Molodetska , O. B. Borysyuk, I. Yu . Grinchuk . – Zhytomyr: Publishing house « Zhytomyrsky national agroecological University ”, 2016. – 186 p.
3. Pharmaceutical encyclopedia . – Kh.: National University of Physics : LLC "MOR I ON", 2016.

TOPIC

« Basic concept coding Information Systems calculus »

Relevance of the topic: Coding information is important concept in modern world , because it allows us to transmit and store data using different systems and formats . This process conversion of text, images , sounds or others species information into a special code that can be understood and easily processed computer or others devices .

Purpose: To give definition concepts : coding, binary number system , etc. Acquaint from main properties and methods of encoding medical information , the main philosophical interpretations this concept . To form understanding of coding data . Generate an idea of the possibilities and main areas of application codes in medicine .

Basic concept :

Natural human language is a coding system ideas and concepts for expressing thoughts using broadcasting .

The alphabet is a coding system components languages for with help graphic characters .

Encoding (English: encoding ; German : Kodieren):

Coding (computer science) —operation text code replacement data ; replacement ordinary text-based data abbreviated conditional notation ; translation of any information ; expressed by means natural languages , in sequence conditional symbols , signals according to certain rules; that called code.

Coding symbol table - a table that matches each character from a certain set sequence bytes .

Coding (programming) is a process writing selected program code in the language programming .

Encoding (telecommunications) — the conversion of any information on the sequence impulses that have property self-synchronization for transmission over telecommunication channels.

Content lecture hall material (lecture text)

For automation working with data ., that belong to different types , it is important to bring them to a single forms . For this , as a rule: use encoding , that is representation data of the same type through data of a different type.

Binary code

In computer science, there is a coding system called binary code (digital code). It uses only 2 symbols "0" and "1" (binary digits).

Information presented in this form is easy to technically simulate . For example, in the form of electrical pulses (pulse present - "1", pulse absent - "0") or on an optical disk (transparent area - beam reflected - "1", darkened area - beam absorbed - "0").

All information stored and processed by computer technology, regardless of its type (numbers, text, graphics, sound, video), is represented in binary code.

The amount of information needed to store such a symbol ("0" or "1") is called a bit (bit is an abbreviation of the English words binary > digif).

- One bit can encode two values: 0 or 1 (no or yes, false or true, no pulse or pulse).
- Two bits can encode four values: 00, 01, 10, 11.

- Three bits encode eight values: 000, 001, 010, 011, 100, 101, 110, 111.

Increasing the number of bits (sometimes called digits) for encoding doubles the number of values that can be encoded. Therefore, the number of values is calculated by the formula.

Units of information

The basic unit of information is a bit, which takes on the value "0" or "1".

To encode symbols familiar to humans, computer science uses 8 bits, which can encode 2$=256 values.

A standard set of 256 characters was developed, called ASCII (American Standard Code for Information Interchange - .American Standard Code for Information Interchange. The ASCII code was developed in America, but it is used all over the world, taking into account national alphabets.

- 128 characters are reserved for Latin letters, numbers, mathematical and other symbols.
- 128 characters are reserved for letters of national alphabets, specific symbols.

The amount of information allocated to store one ASCII character is called a byte.

A byte is the smallest unit of data measurement, consisting of 8 bits. The following units of information measurement are:

Kilobyte	Kb	1 Kbyte =	2^{10} bytes	1024 bytes
Megabyte	Mb	1 Mbyte =	2^{10} KB	2^{20} bytes
Gigabyte	Gb	1 GB = 2^{10} MB		2^{30} bytes
Terabyte	Tb	1 Tbyte =	2^{10} GB	2^{40} bytes
Petabyte	Pb	1 Pbyte =	2^{10} Tbyte	2^{50} bytes

Systems calculus

The number system is way writing numbers using a given set of special symbols - numbers

Systems calculus can divide into

- Non-positional systems calculus
- Positional systems calculus .

Non-cognitive number system

In the opposition system calculus value each numbers in random place sequence of numbers that denotes The number is not changed . In the opposition system each character in the record regardless from places means the same number .

A well-known example of an oppositional numeral system is the Roman system, in which the letters of the Latin alphabet play the role of numbers:

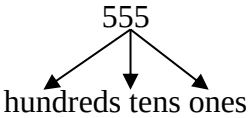
I - one C - one hundred L - fifty M - a thousand

V-five X-ten D- five hundred For example, 224 = SSSHHHTU

The Roman system does not have the concept of "0". The non-positional number system is inconvenient and difficult to perform arithmetic operations and write numbers.

Positional number system

In the positional number system, the value of each digit depends on its place in the sequence of digits in the number.



The decimal positional number system, which came to Europe from India via Arab countries, is generally accepted in the modern world. The basis of this system is the number ten.

The base of a number system is the number that indicates how many times the next digit is greater than the previous one.

Writing a number is a shortened form of writing the expansion in powers of the base of the number system, for example:

$123456=1*10^{5}+2*10^{4}+3*10^{5}+4*10^{2}+5*10^{1}+6*10^{0}$

Here , 10 is basis systems number , and the exponent degrees are number positions digits of the record numbers (numbering) is underway left to the right , starting from zero).

1 2 3 4 5 6

5 4 3 2 1 0

Arithmetic operations in this system are performed according to rules that were proposed back in the Middle Ages. For example, when adding two multi-digit numbers, we apply the rule of column addition. In this case, everything comes down to adding single-digit numbers, for which knowledge of the addition table is required.

Theoretically, any number can be used as the basis of a number system, but in practice, only a few are used.

Binary number system

To represent numbers in computer memory, the binary number system is used.

To denote numbers in this system, there are only two digits: "0" and "1", that is, two stable states of physical elements (no signal - "0", there is a signal - "1"; off - "0", on - "1", etc.).

Such a system is easy to model and elementary to perform arithmetic operations.

All information stored and processed by computer technology, regardless of its type (numbers, text, graphics, sound, video), is represented in binary code, that is, a long sequence of "0" and "1".

For a computer, binary representation is very convenient and efficient, but for programmers and hardware or software developers, such a notation is extremely inconvenient.

To shorten the length of the binary code, it was decided to replace the sequence of three binary digits with one decimal digit. Since the enumeration of all combinations of three binary digits gives 8 values (2;=8), this code is called octal and it uses only 8 digits (from "0" to "7").

Hexadecimal number system

Later, a similar approach was used to group four binary symbols and designate such a group with a single digit. Since the enumeration of all combinations of four binary digits gives 16 values (24=16), such a code is called hexadecimal and uses 10 decimal digits (from "0" to "9") and additional digits, denoted by the first letters of the Latin alphabet ("A", "B", "C", "I)"5 "I-", "E").

When debugging programs and in some other situations in programming, it is necessary to convert numbers from one number system to another. Therefore, rules for converting between different number systems have been developed.

Transfer rules

Conversion from 2nd to 8th and 16th systems

If the base of the new number system is equal to some power of the binary number system (8=23, 16=24), then the conversion algorithm is very simple.

You need to group binary digits from right to left (from the end of the number) in a quantity equal to the exponent of the power and replace this group of digits with the corresponding digit of the new number system (if there are not enough digits for the group, you can add zeros to the left of the number).

Conversion from 8th and 16th systems to 2nd

Converting numbers from the hexadecimal or hexadecimal number systems to binary is done according to the reverse rule:

One symbol of the old number system is replaced by a group of digits of the binary number system, in a quantity equal to the exponent of the old number system (8=2, 16=24).

Question for self-control on the topic:

1. What is a number system?
2. What types of number systems do you know?
3. What is the base of the positional number system [0?]
4. What number system is used to represent numbers in computer memory? Why?
5. For what reasons are the octal and hexadecimal number systems used [? 0]
6. How can you convert a number from the 8th number system to the 16th?
7. What are the rules for converting numbers from the decimal number system?
8. What are the rules for converting numbers to the decimal number system?

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Main

1 Medical Informatics : textbook / I.Ye. Bulakh , Yu.Ye. Liakh , VP Martseniuk , I.Yo. Khaimzon . — 4th edition . — Kyiv : AUS Medicine Publishing, 2018. — 368 p .

2. G.G. Shvachych , V.V. Tolstoy , L.M. Petrechuk , Y.S. Ivashchenko , O.A. Gulyaeva , O.V. Sobolenko Modern information and communication Technology : Educational manual . - Dnipro : NMetAU , 2017. -230 p.

3. Medical computer science in modules. Practicum: practicum for medical (pharmac .) universities of the IV level accreditation / I. Ye. Bulakh [and others] . ; edited by I. Ye. Bulakh ; O. O. Bogomolets National Medical University . – K. : Medicine , 2012. – 208 p.

4. Computer modeling in pharmacy : teaching . manual . for pharmacy . f- tiv universities of the Ministry of Health of Ukraine / I. E. Bulakh , L. P. Voitenko, I. P. Kryvenko. – K.: Medicine, 2017. – 208 p.

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Auxiliary

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2. Computers and computer technologies : teaching aids / Yu. B. Brodsky , K. V. Molodetska , O. B. Borysyuk, I. Yu . Grinchuk . – Zhytomyr: Publishing house « Zhytomyrsky national agroecological University ", 2016. – 186 p.

3. Pharmaceutical encyclopedia . – Kh.: National University of Physics and Technology : LLC "MORION", 2016.

TOPIC

« Basics computer networks »

Relevance of the topic: With a stormy development telecommunications in modern world society steadily is getting complicated interconnection between different links of production , increase informational flows in technical , scientific , political , cultural , everyday and other spheres of social life activities . Today , it is obvious that none process in life modern society cannot to occur without exchange information , for timely transmission whose are used different tools and systems communication . At this time, the development telecommunication networks is moving towards the growth of the multi-service market services , implementation new telecommunications and information technologies , their convergence . Broadband Internet connectivity has become one of the most successful telecommunications services not very long ago, but just a few years number users grew to 200 million, most of of them so far are limited to accessing the Internet from a computer or laptop. Modern development computer networks is characterized by theirs convergence . The task of constructing becomes relevant universal networks that capable equally effectively give services different types .

Purpose : Dates definition concepts : internet, domain, IP address . Get to know from main properties , methods and use of communication technologies in pharmacy . To form an idea of the communications system . To form an idea of the possibilities and main areas of application Internet in medicine and pharmacy .

Basic concept :

Local area networks are a combination of a varying number of computers with a single cable system, located at a relatively short distance from each other (from 10 m to 100 km). They are created within the same premises, organization or district.

The Internet is a global computer system that contains a logically interconnected space of globally unique addresses.

Information services are information access services. Access to network information resources. You can get information contained on network servers, for example, sites, documents, files, information from various databases, etc.

Content lecture hall material (lecture text)

Nowadays it is difficult to imagine life without computers. Computers are needed in production, IN offices, banks, educational institutions and at home. They have opened a new stage in the life and development of human civilization. However, for effective processing and transmission of information, it is important to connect computers with each other.

The first experiments on creating computer networks were conducted in 1965 by researcher Larry Robertson (Massachusetts University of Technology). Since then, humanity has been developing and improving the capabilities of combining computers into computer networks.

In general, computer networks can be divided into 2 large classes:

- Local Area Networks (LAN).
- Global, remote WAN (Wide Area Network).

Local area networks

Today, wireless local area networks are popular, where air channels (radio, infrared, and ultrashort waves) are used as a connecting medium.

Local area network capabilities

- Data exchange and collective data processing.
- Sharing programs.
- Sharing printers and hard drives.

To create local networks you need:

- Equip computers with network cards.
- Connect computers with cables through which data is transmitted.
- Install and configure appropriate software on computers.

Ways to connect computers

- Simple. The simplest way to connect. It is used for a small number of computers (2-3) located in the same room or at a short distance (2-5 m). The cables are connected either to the output of network cards or to the DTV ports (then network cards are not required).
- Common bus. Computers are connected to a single cable with plugs at the ends. This connection is simple, economical, but not very reliable and fast.
- Star. All computers are connected to a central device, which can be either a computer or a special device (swlth). The connection is reliable, fast, aie more expensive due to the large number of cables and the central device.
- Ring. Connecting computers in a circle. The cost of the network is low, the information after sending reaches the sender, which allows you to control its integrity. But the speed and reliability of such a connection are somewhat low.

Ways to organize networks

If there is no master computer in the network and all computers are equal, then the network is called peer-to-peer. Computers are workstations, and their union is a workgroup. Computers have access to the unused resources of all other computers. Such networks are not very efficient because they do not have centralized process control.

If there is a dedicated computer in the network that manages the network, has programs and databases that are used by the rest of the computers, then the network is called multi-rank . The main computer is the server, the rest of the computers are clients.

Special software is installed on the server, which ensures reliable and efficient processing of client requests. Servers are usually not used as a workplace and can be located in a separate room or at a considerable distance from other computers. Global (remote) networks are used to connect local networks.

Global networks

They are divided into regional and international. Regional ones are created in certain areas, cities, and countries, and international ones provide communication with any computer in the world. Communication in global networks is provided via telephone or satellite communication lines, for this the computer must be equipped with a modem. Such a connection is called remote access, and the users' computers are subscribers.

The functioning of global networks is supported by special computers of the provider company . They are called servers and are used only for administrative purposes. Administrators keep records of subscribers, give each of them their own address, check the status of the network, expand or narrow the network.

For simultaneous connection of a large number of users, the server has special facilities - multi-channel telephone or multi-port network cards. On the other hand, it is connected to other servers via high-quality specially allocated lines - trunks.

Providers provide services on a contractual basis, focusing on the user's working time or the volume of data transferred. When concluding a contract, the provider provides the user with all the attributes necessary for work - phone numbers, identifiers, passwords). Protective functions against the flow of unnecessary information are performed by a program installed on the server and called a firewall.

World Wide Web Internet

The most widespread and well-known global network, which unites hundreds of millions of computers around the world, is the Internet. There is no unified management of the Internet; there are public committees that develop uniform standards for all Internet applications, distribute subscriber addresses and domain names for web resources, and much more.

History of the Internet

In 1969, the Department of Defense determined that in the event of war with the Soviet Union, America would need a reliable information transmission system. The Advanced Research Projects Agency (ARP) proposed developing a computer network for this purpose. The University of California, Los Angeles , the Stanford Research Center, the University of Utah, and the University of California, Santa Barbara were involved in the development of such a network.

This network was called ARPANET (Advanced Research Projects Agency Network) and it existed until 1990. The development was so successful that that many organizations (universities and government organizations) began to create their own networks on the same principles. They began to unite among themselves and later, this union formed the Internet.

The Internet is a global computer system that:

- Contains a logically interconnected space of globally unique addresses.

Here, every computer connected to the Internet has its own unique address.

- Capable of supporting information exchange, i.e., enabling communication between remote computers.
- Ensures the functioning of various information and communication services.

Internet services

1. Information services are information access services:

- Access to network information resources. You can obtain information contained on network servers, for example, sites, documents, files, information from various databases, etc.
- Posting your own information online. If information is posted for public use, any Internet user can access this information.

2. Communication services are information exchange and communication services:

Information exchange in a deferred mode. This is how e-mail works, for example. The sender sends a letter to the recipient, who can read it at a convenient time.

Exchange of information in real time. For example, conversations on the network in text, audio or video format. Communication can be between two participants or within a certain group of participants.

Services provided to Internet users are called services. In order for a user to use a certain service, he must install a client program corresponding to the service on his computer . On the Internet side, a server program must be installed on the corresponding server, which is able to process requests from the user's client program and send him the results of processing.

Working on the Internet assumes the presence of an information transmitter, a receiver and a communication channel between them. In general, computers in a network can be divided into client computers and server computers . A client computer needs certain information and to obtain it sends a message (request, task) to a server computer containing this information. After performing certain actions according to the request, the server computer sends the result of the execution back to the client computer . One computer in different situations can be both a client computer and a server computer .

When a user connects to the Internet, their computer acts as a client, as it typically sends a request to the selected server to retrieve the necessary information.

Powerful computers - servers - are installed in the nodes of the global connection, which perform specific functions. Also, servers contain information resources. Resources include various objects, for example, web pages, files, programs, legislative, scientific and technical, commercial, advertising information, etc.

Popular Internet services

1. Web service. Information service Internet. The basic concept of the service is links , which are contained in the text of the page and allow the user to travel both within a specific website and to go to other sites. The client program for the Web service is a browser.

Website.

- Web forums,
- Blogs.
- Project Ages (Vikshediya).
- Online stores,
- Online auctions,
- Internet advertising,
- Social networks,
- Multi-use Parenting games.

2. Communications services

- Email. Email service. Allows users around the world to exchange text messages; to which various files can be attached. The client program can be either a browser or specialized EMAIL CLIENTS. client.
- Instant messaging services, messengers
- Internet chat rooms. Designed for communication between many participants in real time. Chat rooms are mainly intended for entertainment, acquaintances, serious issues are usually not discussed here. The client program is a browser.

3. News and bulletin services

Mailing lists. The user chooses a topic and subscribes to a cycle of articles (listings) that will be sent to him at a certain frequency.

KBB technologies. News service from selected sites. Instant display of any new arrivals, news feed.

4.File services

o BTR servers File transfer service. Allows you to emulate the file structure of a remote computer on your own computer and work with it as with a local directory, for example, download files from a PR server to your computer and vice versa. The client program can be a browser, file manager or specialized GGR client .

- o File castings
- o File sharing networks

5.Broadcasting services

- o Internet radio. A service that allows you to listen to hundreds of

radio stations broadcasting on the Internet. There is a possibility to choose radio stations taking into account the language and the subject of broadcasting (for example, news). Music radio stations can be filtered by musical styles (popular, classical , retro music). The number of radio stations on the Internet is constantly growing.

o Internet television. A service that allows you to receive many television channels.

6. Remote access services. Provide client access to another remote computer and provide the ability to work on it as if it were your own.

7.Electronic payment systems

There are many services on the Internet and their list is constantly expanding. The main task of developers is to ensure the reliability and ease of use of the corresponding service.

WWW World Wide Web

Most users begin their acquaintance with the Internet with this service, because it is a huge database of Internet pages that are created in HTML (HyperText Markup Language) format and contain hyperlinks to other pages.

the WWW service is supported by the following programs:

The client program on the user side that sends the request. The client program is one of several browsers installed on the computer.

A server program. which processes a request and sends the user the necessary information. This program is called a web server and it is located on a powerful computer - a server, which is constantly turned on and connected to the Internet. Sites and other Internet resources are stored there.

Browser - a program for viewing web pages. The first browser, Line Mode Browser, was created by Tim Burns Lee in 1990. It operated in command mode and was serviced by the TelNet service . The first graphical browser, Mosaic, was created in 1993. Over time, it grew into Netscape and captured the browser market.

Today in our country the leaders among browsers are Internet Explorer, Opera, Mozilla FireFox , Google Chrome. They display pages almost the same way, but differ in certain functional features. opportunities.

Web document types

Web Page (e.g. page.html). This is a text document created in HTML format and, in addition to text, contains hyperlinks to various resources.

On the Internet, a resource is a file, image, text, sound, video, or multimedia object. Each resource has its own address, called a URL (Uniform Resource Locator) - a unique resource identifier.

For example: http: 71p.edu.ua IKN Linguistics html studv.htm

Website (Web Site). These are several pages that are united by a single theme and design. They can contain dynamic information that is generated by accessing certain server databases (news, weather forecast, exchange rates, promotions, prices and offers in online stores).

Web Portal . A very large site containing a variety of information: news, site catalogs, online stores, recruitment agencies, informers , search for necessary information, provision of a free email address, as well as places for paid or free hosting of sites.

E-mail

Historically, email is the very first Internet service and is an analogue of regular mail. Email is a service that enables the interaction of an email client (can be a browser or other program) with a mail server.

An email account is a user account in the mail server database. To send or receive messages, you need to have access to the mailbox, that is, enter a name (login) and password. They are created when the user registers on the mail server.

Email address boxes are record that simultaneously determines the path to electronic recipient's mailbox . It consists of 2 parts (lopn@mail server), which separated by the % symbol (ai , "dog"). On the left from the @ symbol indicate name owner boxes (login), on the right is the domain address of the mail server where the message For example , student@polynet.lyiy.ua .

Search engines

Search engines (Search Sy stems) are designed to search for information in the web space and display the found resources in a user-friendly form.

Typically, a search engine has 3 components:

- Web interface - the actual web page of the search engine with a field for entering a search query.
- Database - it contains brief information about existing and Internet-wide websites.
- Search robots - programs that populate search engine databases with information.

Search engines provide answers to user queries in a matter of seconds because the search is performed in the search engine's databases. Access to the databases may be provided to other search engines and organizations for a fee.

The leaders among search engines are Google, Yandex.ru, Meta.ua IP addressing

This is a unique numeric address that uniquely identifies a node, a group of nodes, or an entire network. An IP address is 4 bytes long (4x8*32 bits). For convenience, an IP address is written as 4 numbers (octets) separated by periods.

For example,

•Decimal representation: 128.10.2.30

- Binary representation: 10000000.0001010.0000010.00011110
- Hexadecimal representation: CO.94.1.3

The decimal form of the IP address is used in operating systems because it is convenient for the user who configures network access. The binary form is convenient for administration and for internal device operations. The hexadecimal form is rarely used .

An IP address consists of two logical parts: a network number and a network node number. Depending on the network class, the network number can be specified by one, two, or three left octets, and the node number, respectively, by three, two, or one right octet.

The centralized distribution of IP addresses is handled by the state organization Stanford International Research University, located in the Silicon Valley.

IP address assignment services are free and last about a week. If the local network administrator independently assigns an IP address, this can later lead to theft and errors in operation. This addressing system is intended for addressing computers and is convenient and effective for network administration (management).

The universal resource index displays:

The protocol of the corresponding service. In this example, the protocol used is http: // - the hypertext transfer protocol.

- Service name. In this example, it is the Web service - www

- A domain or IP address that uniquely identifies the web server on the Internet where the desired site or other resource is hosted.

- A path consisting of directory names separated by the "/" (slash) symbol, opening which sequentially, you can "get" to the desired information. In this example, the information is located in the directory " documents ".

- The name of the file that contains the required information. In this example, the information is in the file page.html.

Internet Protocols

But, in order to use the corresponding service, all the computers involved in this process must understand each other. For this, special rules - protocols - have been developed. Each protocol performs its own function and must be compatible with other protocols.

A set of protocols that are interconnected and distributed across layers is called a protocol stack .

In every computer connected to a local or global network, protocols are installed and must be executed.

In its most generalized form, the stack has the following protocols:

- Application layer protocols.
- Transport layer protocols.
- Network layer protocols.
- Application layer protocols

This is the highest level. Application layer protocols are the intermediary between the client program and the network. They transform the information transmitted over the network into a form that the client program understands .

HTTP (Hyper Text Transfer Protocol) protocol . Provides the transfer of documents in HTML format from a remote web server to a local computer and vice versa.

HTTP protocol is used to send requests to the web server, process its response, and generate information in the browser window.

Protocols for working with e-mail. Designed to organize the delivery and transmission of messages through a mail server.

SMTP (Simple Mail Transfer Protocol). Responsible for sending emails from the client to the mail server. Allows you to send messages to multiple addresses, intermediate storage, and forwarding copies to other addresses.

POP3 (Post Office Protocol). Delivery of letters from the mail server to the client. This protocol has built-in mechanisms for recognizing email addresses, as well as modules for increasing the reliability of message receipt.

FTP protocols : TelNet and others. Designed to supply information to client programs of the corresponding services.

With the advent of the ability to connect mobile devices (telephones, smartphones, PDAs) to the Internet, the WAP protocol is used, which provides access to various Internet services.

Transport layer protocols

They control the transmission of information. The main task is to control the correctness of data transmission, as well as ensure reliable delivery of data to the intended computer.

The protocol receives information from application-layer protocols and divides it into separate pieces - packets. An important part of the packet is its header, which contains: the packet number, information about the sending and receiving computers, as well as a checksum that is needed to verify the integrity of the packet.

For further transmission, the packet is forwarded to the next layer (in this lecture, the network layer) and then through the network to the receiving computer , from where it must receive an acknowledgement of receipt of the packet. If the packet does not arrive, is lost, or is damaged, it will be sent again. After the packets arrive at their destination, the transport layer protocol of the receiving computer analyzes their headers, combines the packets into a single whole, and sends the information to the application layer protocols.

Network layer protocols

It provides interaction between specific computers on the network, that is, it determines the route of information movement within the network. This process is called routing. On the way between the client computer and the server computer, there may be several intermediate computers, called routers. The router determines which connections currently exist and are less loaded for transmitting the packet. Therefore, packets are not always transmitted in the same way and in the same time.

At the network level of the receiving computer, packets are accumulated (buffered). Then they are transferred to the protocol - transport layer. The most popular and well-known network protocol is the Internet Protocol (IP). Another purpose of the IP protocol is to provide addressing during the transmission of information.

Question for self-control to the topic :

1. What is a Website?
2. What are powerful servers for storing web resources called?

3. Who is considered the "father" of basic Web technologies - HTTP? URU\URL ?
4. Classification of websites by service availability.
5. Classification of websites by the nature of the content.
6. Classification of websites by physical location.
7. Search engines, their composition, functions and principle of operation.
8. Main characteristics of the search engine.
9. What is an indexing module? Name its three auxiliary programs.

List of sources on the topic :

Main

1. Organization computer networks [Electronic resource]: textbook : for student of specialty 121 « Engineering software provision » and 122 " Computer Science" / Igor KPI Sikorsky ; Yu. A. Tarnavsky , I. M. Kuzmenko. – Electronic textual data (1 file: 45.7 MB). – Kyiv : Igor Sikorsky Kyiv Polytechnic Institute Sikorsky , 2018. – 259 p.
2 Medical Informatics : textbook / I.Ye. Bulakh , Yu.Ye. Liakh , VP Martseniuk , I.Yo. Khaimzon . — 4 th edition . — Kyiv : AUS Medicine Publishing, 2018. — 368 p.
3. G.G. Shvachych , V.V. Tolstoy , L.M. Petrechuk , Y.S. Ivashchenko , O.A. Gulyaeva , O.V. Sobolenko Modern information and communication Technology : Educational manual . - Dnipro : NMetAU , 2017. -230 p.
4. Medical computer science in modules. Practicum: practicum for medical (pharmac .) universities of the IV level accreditation / I. Ye. Bulakh [and others] . ; edited by I. Ye. Bulakh ; O. O. Bogomolets National Medical University . – K. : Medicine , 2012. – 208 p.
5. Computer modeling in pharmacy : teaching . manual . for pharmacy . f- tiv universities of the Ministry of Health of Ukraine / I. E. Bulakh , L. P. Voitenko, I. P. Kryvenko. – K.: Medicine, 2017. – 208 p.
6. Information Workshop technologies in pharmacy [Electronic resource]: teaching . manual . for students of universities / S. V. Velma , N. M. Yatsenko, Yu. M. Penkin ; National University of Physics and Technology . – Kh. : NFaU , 2016. FA 1.1-26-295

Auxiliary

1. Forkun Y. V. Informatics : teaching aids / Yu. V. Forkun , N. A. Dlugunovich . - – Lviv : Publishing house " New" World – 2000”, 2018. – 464 p.
2. Computers and computer technologies : teaching aids / Yu. B. Brodsky , K. V. Molodetska , O. B. Borysyuk, I. Yu . Grinchuk . – Zhytomyr: Publishing house « Zhytomyrsky national agroecological University ”, 2016. – 186 p.
3. Pharmaceutical encyclopedia . – Kh.: National University of Physics and Technology : LLC "MORION", 2016.

TOPIC

« Internet business , electronic commerce »

Relevance of the topic: Over time , development informational technologies and systems are becoming more and more at a rapid pace, which led to significant changes in interaction subjects business . For domestic enterprises electronic business performs effective a tool for managing settlements with customers , expansion volumes markets sales products , goods , services , search new partners , creating a positive image . Some types business is more conducive to implementation electronic commerce , and therefore their level development much higher compared to others . To such industries attributed trade intangible goods, valuable papers , banking services , development and implementation software provision , provision informational services , remote teaching etc. For enterprises that do not have opportunities completely transfer business processes to electronic environment , in connection from specificity goods , products and services that implemented , e- business may become important tool competitive This is why implementation is so important . enterprises modern technologies electronic business that guarantee interaction manufacturers with the widest and most solvent range audience potential consumers . Thanks to existence networks Internet electronic business has spread internationally and is the basis for development and growth the volume of the online economy . But on the other hand, there is the problem of ignorance and uncertainty. producers , intermediaries and consumers in the feasibility of transitioning to the electronic segment of the economy , although he is quite promising . This problem arises because of incomprehension key advantages and disadvantages electronic method of keeping business that does not allow business entities to keep up with the times

Purpose : To give definition concept Internet business . Get to know from main properties and methods of user interaction in online business . Form general statement of B2C interaction . Form an idea of the possibilities and main areas of application e-commerce in medicine .

Basic concept :

Trade platform (B2B model - electronic platform) is a portal on which users have possibility carry out the entire complex of trade and procurement events : search goods from catalogs, to carry out on-line negotiations, conclude agreements, make payments, etc. Trading platforms , as a rule, are intended for wholesale agreements .

Exchange - this is trading platform for holding trade commodity (valuable securities , currency, goods), the price of the goods is determined by supply and demand . Stock exchanges are divided into stock , currency , commodity , futures (trading futures contracts) , universal , etc. Stock exchange conducts valuable trades securities : shares enterprises , bonds , shares or others valuable papers .

Auction - a marketplace where the seller exhibits for sale your product, buyer becomes the one who will offer a higher price for the product . To the most popular online auctions include : eBay.com (E-Bay); Molotok.ru. eBay auction is trading platform for profitable acquisition the goods you need and for keeping own business .

The catalog is trading platform (B2B electronic platform), which is a list of goods and services for sale or purchases. Use catalogs much saves time searching goods and services . To the catalog goods and services belong many websites .

An online store is a (B2C model - retail trade) a site where installed specialized program (script), the so-called " Virtual store". On the site outlined goods , placed advertising for the purpose of promoting the goods, a form for ordering goods, specified methods of payment for goods .

Content lecture hall material (lecture text)

Basic ways management network business

By main market sectors or interaction models Market entities in computer networks are:

- B 2 B - business to business (Business- to -Business);
- B2C - Business - to - Consumer ;
- C 2 C - consumer to consumer or business focused on the end user ;
- B 2 A - business administration , defines interaction companies with administrative bodies;
- C 2 A - consumer - administration , determines interaction consumers with the administration .

Business- to -Business is business - interaction model companies among themselves with the help of computer networks. The basis of the B 2 C business model is retail trade , that is interactions companies from consumers in the network Internet .

Basic types of network or electronic (virtual) business presented in the section " Conduct electronic or network business ":

- Trading platforms ;
- Internet shops ;
- Financial services ;
- Investment funds ;
- Internet marketing;
- Advertising business ;
- Software and digital development goods ;
- MLM or network marketing;
- Affiliate programs .

Let's consider some types electronic business .

Trade ground

Trade playground (model B 2 B - electronic platform) is a portal on which users have possibility carry out the entire complex of trade and procurement events : search goods from catalogs, to carry out on-line negotiations, conclude agreements, make payments, etc. Trading platforms , as a rule, are intended for wholesale agreements .

Stock exchange

The stock exchange is trading platform for holding trade commodity (valuable securities , currency, goods), the price of the goods is determined by supply and demand . Stock exchanges are divided into stock , currency , commodity , futures (trading futures contracts) , universal , etc. Stock exchange conducts valuable trades securities : shares enterprises , bonds , shares or others valuable papers .

Online auctions (OnLine auctions)

Auction - a marketplace where the seller exhibits for sale your product, buyer becomes the one who will offer a higher price for the product . To the most popular online auctions include : eBay.com (E-Bay); Molotok.ru. eBay auction is trading platform for profitable acquisition the goods you need and for keeping own business .

In online auctions, bids are placed through the auction site . After end online auction the buyer must transfer the money to the seller , and the seller obliged send the goods to the buyer .

Catalogs of goods and services

The catalog is trading platform (B2B electronic platform), which is a list of goods and services for sale or purchases. Use catalogs much saves time searching goods and services . To the catalog goods and services belong many websites .

Internet shops

An online store is a (B2C model - retail trade) a site where installed specialized program (script), the so-called " Virtual store". On the site outlined goods , placed advertising for the purpose of promoting the goods, a form for ordering goods, specified methods of payment for goods .

In the online store users can choose a product, place an order order , make payment for goods via electronic payment systems or in another way specified on the website seller . In online stores, as a rule, they are used straight sales , that is organization sales goods manufacturer directly final to the consumer .

Financial services

To financial services on the Internet belong electronic payment systems (WebMoney Transfer, UkrMoney , E-Gold, etc.), Internet banking , Online trading.

Payment systems

Electronic payment systems intended to provide payment network operations Internet . With the help of these systems can be pay for a domain or hosting for a website , utilities services , mobile communication , cable and satellite television , commercials services , online shopping store , various paid services that are provided commercial websites, etc.

Internet banking

Internet banking - provision of services by the bank to customers via the global Internet network . Internet banking allows users Internet manage his/her own banking account via the Internet . Internet banking is more perfect modification " Client -Bank" system .

About opportunities internet banking can to check out the website of any bank that provides these services , for example , on the website Internet bank Privat24 .

Online trading or Internet trading

Trade online or Online trading allows to customers independently work via the Internet on some stock exchanges and world investment and financial markets, for example , "FOREX" (Foreign Exchange Market). International monetary market is a system of interacting between regional foreign exchange markets using informational technologies . Working in the international currency market is a set of different transactions for the purchase and sale of foreign currencies. The essence of trading operations is to buy cheaper , but sell more expensive .

Online trading provides possibility independently carry out transactions on stock exchanges and financial markets in real time via the Internet , using special software security (trade) terminal), installed on the client's PC . How to make money on Forex see the website kf-forex . How to get started to work on the stock exchange see the website www.finam.ru/

Earnings on investments . Investments are deposits under interest . On the Internet exists many investment funds that under certain interest offer to borrow money from you for a certain period of time period of time.

Internet marketing

Internet marketing is an independent type of activity , which refers to electronic business . Due to the fact that electronic business and electronic commerce are carried out in a global

networks The Internet , in which are located huge number sites and millions potential customers , the main thing task owners websites and portals make their recognizable and visited .

Auctions , exchanges , electronic shops, etc. must visit target audience . Target audience clients learn about sites and portals from search engines and specialized directories. Therefore, the main direction Internet marketing is the promotion of a site in search engines so that the resource becomes known. target audience and was we visit customers .

Advertising business

Advertising as a type of business is based on providing places on pages your site for hosting paid links to the customer's website . To Internet advertising These include : banner advertising; contextual advertising and image advertising.

Software and digital development goods

One of the popular and common species electronic business is development digital products : software providing , e- books, magazines , etc. To create electronic books e- book are used different formats representation information , such as: TXT, RTF, DOC, HTML, CHM, EXE, PDF, DjVu , FB2 and others formats .

Most distributed on the Internet e- books , which used in mode offline , these are books in EXE formats. To create an e- book in this format are used different compilers : SbookBuilder , Natata eBook Compiler , ExeBookWM-Publisher , eBook Edit Pro, Fast EBook Compiler , eBook Maestro, eBooks Compiler , EbookCreator and many more others compilers . For production virtual covers e- books can use the cover editor eCover Studio.

To create a large e- book are applied PDF (Portable Document Format) formats , which can be used both in mode online , yes offline . Programs for creating PDF files : PdfFactory Pro v3.00, PDF Factory Pro v3.10, Primo PDF 3.0, PDF995 utility and others means .

Multi- level marketing (MLM) or Network marketing

Multi- level marketing - multi-stage or multi-level marketing means delivering goods , or informational products , or services from producer to consumer using multi-level structures that consists of distributors . MLM or Network marketing is a non-store form of business . retail trade .

The essence of MLM or network marketing boils down to the fact that , by promoting goods or services , trade representatives companies offer to buyers also become commercial representatives this one companies . In some MLM projects they introduce limitation widths first lines (binary marketing plans , etc.) networks . Trading representatives for promotion goods use your sites and apply direct marketing or email marketing.

On the Internet exists many legal MLM projects , authorized partners (distributors) or agents) of which will offer you join these programs . The most popular MLM project is: 4life

So , MLM is a method of selling goods through a network in which each of the distributors maintains its own business , as their main The task is not to directly sell goods , but to create network (commands or organizations) and training members commands .

Internet marketing

It is known that marketing is a type of human activities aimed at meeting needs through exchange . The components of marketing are: product; price ; sales ; advertising.

Marketing is not possible identify from sales or stimulation sales . Marketing can be to consider as a mechanism , to adapt production goods or granting services to market needs.

One of the leading management theorist , Peter Drucker , spoke of marketing objectives as follows: "The goal of marketing is to make sales efforts unnecessary . His goal is to know and

understand so well customer that the product or service will fit perfectly " to the latter and sell themselves ."

Development infrastructure global networks Internet and commercialization The Internet has brought about changes ways management business and appearance electronic market . The Internet began to be used as an interactive channel of interaction companies with business partners and clients that provided management interactive marketing (Internet marketing) and implementation direct online sales .

Traditional business processes (sales, marketing, supply , etc.) in the network economy acquire new forms.

Thus, the turbulent growth electronic business and e-commerce commerce became the basis for the emergence Internet marketing (online marketing). Tools Internet marketing is significantly differ from traditional marketing tools .

To the main advantages Internet marketing compared to offline Marketing tools include :

- widest coverage target audiences (market globalization);
- personalization customer interactions ;
- decrease transactional expenses .

Internet marketing is a set of measures for promotion and sales in the market. goods and services through network technologies Internet . For promotion goods and services on the Internet necessary have your own website, which should present various product information or services and facilities , using whose consumer maybe place and pay order .

Currently, Internet marketing is an independent type of activity , which refers to electronic business . In the global networks Internet exists many sites that provide marketing services (site promotion services in search engines) .

Basic marketing functions : study demand , pricing , advertising , promotion sales , marketing , planning assortment , etc. The main direction Internet marketing is the promotion of a website in search engines.

Exactly website promotion in search engines is necessary a condition for achieving effective interactions with the target audience or customers , as search engines systems and thematic catalogs are the main channels through which targeted visitors get to the site.

Website promotion in search engines is a complex of all marketing measures to promote the site on the Internet so that the resource becomes known target audience and was we visit clients :

- website promotion (building) referring bases);
- website optimization for search systems ;
- Advertising on the Internet ;
- carrying out surveys , support communication with customers (organization effective reverse customer relations , operational study their needs);
- permanent website support , search optimization and monitoring efficiency its functioning ;
- change marketing plans according to changes situations .

Website promotion

Website promotion is : registration in site in search engines and specialized directories, exchange links , placement paid links on popular Web servers in order to increase resource authority , address indication electronic email and website addresses in all advertising ads .

Website optimization

Site optimization for search systems are : optimization site structure , selection key words , input key words in the text and title of the site.

Online advertising

Required distinguish between advertising your own website and advertising on the Internet as a type of business . Advertising as a type of business is based on providing places on pages your site for hosting paid links to the customer's website .

Internet advertising of the site is a set of services aimed at both active involvement audience to the site, as well as to form a positive image companies .

To online advertising include :

▪ banner advertising (targeted and image);

▪ contextual advertising (for example , advertising from Google, advertising on Bigun , Yandex.Direct).

In addition, Internet marketing includes : Direct marketing or direct marketing and network marketing or network marketing.

Direct marketing

For promotion goods on the Internet Direct marketing is used . Direct marketing gives maximum efficiency and selectivity actions . Direct marketing involves creating client's bases data and organization work with this database for personalization customer interaction (mail) mailing , personalized personal selling, etc.) .

Network marketing

For promotion their own products on the Internet using MLM or Network marketing - this is a non-store form of management retail The essence of MLM or network marketing boils down to the fact that , by promoting goods or services , trade representatives companies offer to buyers also become commercial representatives this one companies .

MLM also called Network Marketing or network marketing, as distributors form a network or hierarchical organization for promotion goods from buyers who become also distributors . MLM is one of ways retail trade through a network in which each of the distributors maintains its own business .

Payment systems on the Internet

Electronic payment systems intended to provide payment network operations Internet . With the help of these systems can be pay for a domain or hosting for a website , utilities services , mobile communication , cable and satellite television , commercials services , online shopping store , various paid services that are provided commercial websites, etc.

Depending from the method of calculations electronic payment systems internet divided into credit , when using banking credit cards , and debit cards , which work with electronic checks and electronic (digital) money . Electronic checks are an analogue of paper checks that payer who has money in a bank account , maybe to forward to the recipient in electronic in the form of .

Depending from payment amounts apply those or others ways calculations . For small and urgent payments , so -called micropayments , on the Internet (for example , to pay for purchases of small costs) apply electronic or digital money

Digital money is electronic analogue of cash . Electronic money in different payment systems are called differently . They are purchased (bought) by users and entered into special devices in which stored . To such devices include :

▪ smart cards (bank cards) payment cards with microprocessor);

▪ software - hardware complexes (servers payment systems and computers user).

To implement payments on the Internet using a smart card necessary its connect via special readable device to computer payer . Currently this technology in the CIS countries has not yet

found wide application . Abroad, smart cards are used , for example , systems Mondex (issued by MasterCard).

In the CIS, it is widely used for micropayments the second type of devices for working with electronic money . These systems provide mutual settlements directly between by the payer and the recipient , provided that they are connected to the same payment system systems . To become a member one of the payment systems on the Internet , it is necessary in it register and they will open it for you account in the form of electronic wallets .

Electronic wallet is electronic device that keeps in its remember the amount of money funds (digital money). To conduct You need calculations first buy digital money and transfer (inject) it into these wallets , that is to fill them , and only them after You can pay for various purchases with this .

Introduction monetary funds in electronic wallets is carried out by those methods which are expected specific payment system. Electronic money from virtual You can always exchange your account for real money. money , that is to withdraw from electronic payment systems.

Existing electronic payment systems typically provide users with a Web interface for management accounts (wallets), but some payment systems require download and install special applied computer program user (for example , WebMoney Transfer).

payment system - a tool for everyone species online payments

WebMoney Transfer - payment system online on the Internet, created in 1998 (wmtransfer.com/).

In order to become a participant payment WebMoney Transfer system is necessary install on computer client software - WM Keeper (Keeper Classic) and register in the system via the interface program , accepting the system agreements . After this will be assigned to you identifier user - WM- identifier (for example , WMID: 088492845977).

For you too will be created several WM wallets (one for each type of WebMoney):

- WMZ - accounting WM units equivalent to USD;
- WME - accounting WM units equivalent to EUR;
- WMU - accounting WM units equivalent to UAH;
- WMR - accounting WM units equivalent to RUR.

By means of payment WebMoney system you can :

1. Carry out safe and instant transfers to others users systems .
2. Accept online payments for various goods or services .
3. The commission for transfers in the system is 0.8%.

All transactions in the payment system in the WebMoney system between wallets of the same type. You can transfer funds from your Z- wallet only to another Z- wallet .

Get details for replenishment you can with the help of WebMoney Keeper Classic program (menu item " Replenish" wallet ...").

Find payment , which for some reason did not arrive in your wallet , you can in the " Search " section payments .

In the payment room system implemented WM- certification program . Each user has a WM certificate - digital certificate drawn up on the basis of provided them personal data . Each member systems has certain business level (BUSINESS LEVEL).

BL is public integral level characteristic business activities of the WM- identifier owner , which is calculated based on data on the duration of active use payment WebMoney Transfer system ; amounts correspondents with whom the user has were transactions ; volume conducted transactions , availability claims or positive reviews on address user . The BL value can be see in

the dialogue WebMoney Keeper program when working with a specific counterparty, as well as on the pages services systems .

Description procedures registration

In order to become a user payment WebMoney Transfer system, please complete next steps:

1. Download to your computer installation archive client's WM Keeper Classic programs .
2. Install received file double by clicking on the file name , in the process installations do it instructions that will appear on the screen .
3. After installations start program to execute by clicking on the WM Keeper icon . In the dialog box window will prompt you or register , or log in . Select registration .
4. Next you will be offered to indicate place in memory computer for storage files with secret key and wallets and assign a password to launch applications . Fill in the fields and select " Create ".
5. Process registration will be completed automatically. You will be assigned unique WM identifier required to log in . Write down his , the password to it and definitely do backup a copy of the key file .
6. After installation , the program will create four wallets : R, Z, E and U, which you you will be able to to use for conducting calculations in the system .
7. WebMoney Keeper Classic is running from the start menu or icons on the desktop When appears on the screen stylized WM safe image , select " Log in to the program " and enter your WMID - identifier and password assigned by you during registration . Wait connection programs to the certification server (Online status) and you get access to your WM wallets and operations in the system .

Recommendations users payment WebMoney Keeper Classic systems

Using recommendations and services described on the site , users systems will be able to to secure your electronic wallets from various kinds of unauthorized , criminal and other interventions , as well as in case of force majeure circumstances .

When registering specify that your key file will be saved on the variable media . (File with wallets maybe be stored on the hard drive because without a file with keys no one can access it) .

Do it. backup a copy of the key file on a secure variable media and provide its save . Carry out this repeat the operation every time after procedures changes access keys and (or) passwords .

Systems electronic payments Internet bank Privat24

In 2006 PrivatBank opened a system of electronic payments UkrMoney.com.ua to ensure payment network operations Internet . Accounts : UAH (hryvnia), USD (dollar), EUR (euro). Accounts in UkrMoney.com are a reflection of real accounts users in CB " PrivatBank ".

Then , in connection from closure of the " UkrMoney " project in 2008 , the remains monetary funds in accounts customers were transferred to Privat24 accounts to virtual ones accounts . In the future , Privat24 clients can to translate from virtual account on any card in your accounts without commission .

If you are a customer PrivatBank , then register in the system electronic Privat24 payments can be made on the website https://privatbank.ua/ru via the link " Registration ".

Will open window in which enter your TIN, mobile phone number (used as login) and click "Login".

I, the client PrivatBank and UkrMoney , registered with Privat24 at the link Registration on the website PrivatBank .

Electronic system payments Privat24 or Internet Bank Privat24 is Internet banking from " PrivatBank ", which is the first in Ukraine proposed his/her own to customers services Internet banking .

Currently, the electronic system payments "Privat24" is considered most convenient system for payments in the mode online . It allows manage virtual and card accounts PrivatBank via the Internet in real time . Electronic system payments Privat24 has high speed transfers and low transfer transaction fees funds .

Client has possibility to track operations and manage their own accounts from any a computer connected to the Internet .

After completion registration , you can log in to your account and make settings. To log in to the electronic payments Privat24 you need to enter your login (cell phone number), and then click on the "Login" button .

After You will receive a password entry call to the phone number specified as login . You need perform instructions (enter the check digit on the phone), which you will receive by phone. This is technology provides password protection and the ability to log in to the electronic system payments from any (other) computer connected to the Internet . After this Your account will open with many tabs.

Replenishment account in the system payments can carry out in various ways: with a Privat24 voucher, with Visa, MasterCard or create a transfer between your accounts (Payments / Create / Transfer between your accounts). List ways replenishment the account is in the account systems Privat24 payments .

From card / account payment Privat24 system can pay communal services , mobile communication , Internet provider services , Skype, to carry out espresso translations , etc.

E-Gold payment system

January 20, 2015. The e- gold website is now closed !!!

International The E- gold payment system was created in 1996 by Gold & Silver Reserve (G & SR). Cash funds Payment systems correspond in precious metals: silver , gold, platinum and palladium. For this reason, the E-Gold Payment System is very effective for conducting international payments , as bills users are not tied to any national currency .

USD E-Gold is accounting e- gold units e-gold.com systems , which equivalent to USD. By replenishing Payment account e- gold system , you convert money to the chosen one precious metal at market price cost , thus, money on your account stored in equivalent certain masses selected metal . By default this is gold, but you can sell it and buy it another precious metal: platinum, silver or palladium .

Unlike from WebMoney all Payment transactions e- gold system are carried out only using a browser , without installing additional software software provision for local computer .

Discovery Payment account E-Gold system

Discovery e- gold account is carried out free of charge on the website https://www.e-gold.com/, in the browser must be included before displaying the image, and it must support JavaScript and 128 bit SSL. It will open page Account Creation accounting recording), on which The User Agreement is displayed , and if you agree with it , select the corresponding Agree button to continue registration .

Next you need to indicate your E-mail and enter the specified sequence random numbers into a text string. e- gold payment system uses " Turing Number" as a measure protection from automated password selection .

Fig. 1 .

Next, you fill out the questionnaire. It is necessary note that all information is typed in Latin.

Fill in the Account Name fields . account and Description ("Description accounts"). Name The account will be displayed during transfer operations and receiving money from others users system . Description account optional

Further followed by the User Name fields ("User Name" user") and Description (" Description user "). Description user optional , but here's the name the user will be displayed in the history operations .

Further enter your details : name , address, etc. Name , surname , address can be write transliteration , that is in Russian English letters . After this twice enter a password (enter at least 8 characters), it must contain letters and numbers written in different registers . Use safe auxiliary e- gold keyboard (click on the SRK button) to enter the password if you are you afraid keyboard spies , trojans or viruses .

Attention !!! SRK is displayed in the account as a button with the inscription SRK 

filled out correctly questionnaires you will receive unique account number . Keep the account number and password safe , as they will be identify your account in Payment e- gold system . Be sure to read and follow recommendations protection , as set out on the e- gold website .

Log in to your account

When you log in to your account (your Account record or in the open account) at https://www.e-gold.com/acct/login.html

Fig. 2 .

You need to enter your account number , password and the specified sequence random numbers. To enter the password, use safe auxiliary e- gold SRK keyboard if you are you afraid keyboard spies , trojans or viruses .

If The payment system detected changes in your IP address and/ or browser settings, then further will open page with text a window for entering a PIN code, which the system will send to your e-mail. Term PIN code entry within 15 minutes from the moment of its sent to your email.

Fig. 3 .

After successful entering the PIN code you log in to your account and gain access to the following elements controls , located on six tabs:

1. Logout - log out of your account . This operation trace perform every time you you are finishing work with the system.
2. Balance - the balance of your Payment account e- gold system . On this tab can to see the number precious metal , which is on your account and its current cost in the selected currency .
3. Spend (send) - transfer e- gold from your account for another account . When transferring is being removed commission of 1 % of amounts transfer , but not more than 50 cents .
4. Redeem (retrieval) - physical withdrawal precious metals from your account , that is receiving ingot of your chosen metal (realized (for residents of the USA and Canada only).
5. History - history of your payments .
6. Account Info accounting record) - your personal information

Deposits and withdrawals Payment accounts system

The most common ways to top up accounts include :

▪ get a translation from friends or acquaintances through the E- gold system ;

▪ direct banking by transfer directly to the E- gold account ;

▪ to replenish account through special virtual and real exchangeable points or through payment WebMoney system .

Breeding funds with Payment E-Gold systems

Withdrawing money from E- gold can carry out in similar ways, i.e. through the WebMoney system, through exchange points or banking by transfer . It is necessary note that when deriving funds with E-Gold exchange points establish very high " Commission ".

Bitcoin cryptocurrency is an encrypted digital (electronic) currency of a decentralized electronic payment systems

Cryptocurrency (cryptocurrency - cryptographic currency)

Cryptocurrency is decentralized digital money that operate in a distributed computer networks . Cryptocurrency is characterized by the absence of a control center (cryptocurrency is not tied to neither to banking systems nor to states), which could control emission , influence the cryptocurrency exchange rate, influence transactions participants payment systems . Cryptocurrencies include : Bitcoin , Litecoin , Peercoin , Ethereum , Ripple , etc.

Bitcoin , BTC (bit , coin)

One of the most **The** most popular **cryptocurrency** is **Bitcoin .** Bitcoin is peer-to-peer (P2P) payment system (Peer-to-Peer Electronic Cash System), which is in the Bitcoin network uses the virtual currency Bitcoin , i.e. certain a set of bytes formed issuer .

In January 2009, there was first block generated , 50 bitcoins . From 2009 to 2010 operations Bitcoins were not bought and sold . In April 2010, the first official sale of 1,000 bitcoins for 0.3 cents took place . Bitcoin exchange rate as of August 28 , 2017 from coinmarketcap : 1.0000 BTC = 4307.34 USD, and the exchange rate in Privat24 Internet banking : 1 BTC = 109946.5501 Privat24 UAH.

To ensure protection payment systems Bitcoin are used cryptographic methods (hash functions) and *Blockchain (blockchain)* - technology . *Blockchain* used for the purpose of preservation Bitcoin transactions . Hash functions are the basis of security and immutability. structures data blockchains (chains blocks). Chain blocks consists of from the list of blocks , where each the next block contains hash of the previous block, and after the blocks (transaction lists) were recorded Bitcoin transactions (payments) no one can their change .

" Blockchain is public register (log) of all cryptocurrency transactions that have ever were carried out . He becomes increasingly more , because to him are added " completion " blocks with a new set of records . Blocks are added to the blockchain in linear , chronological order. Each node (a computer connected to a network) Bitcoin using client software that performs task checks and relays transactions) receives a copy of the blockchain that is automatically downloaded when connected to the network Bitcoin . blockchain has full info information about addresses and their balances right from the genesis block to the last completed block." - Investopedia .

In the future technology blockchain can be used in any field human activities for long-term , transparent , reliable and credible storage of any data .

BTC can use to pay for some goods or services , or exchange for another currency. Bitcoin allows you to quickly translate money without intermediaries . Exchange Bitcoin on traditional currencies can to carry out in private persons or through exchanges points and special stock exchanges .

Trace to note that digital coin Bitcoin in contrast from traditional currency is not backed by real value and is an anonymous currency formed a random set of characters (numbers and letters). The issuer Bitcoin is a miner (clients) payment systems), which use computational power his/her equipment or rented capacity to provide works distributed bitcoin network and get paid for it reward in the form of emitted bitcoins (minimum value 10^{-8} Bitcoins). Minimum transferred amount Bitcoin received the name " Satoshi " (10^{-8} bitcoins) in honor of Satoshi Nakamoto .

Emission Bitcoin decentralized and limited in scope . The final amount bitcoins limited to 21 million . Every ten minutes is carried out processing transactions in the world 25 new ones

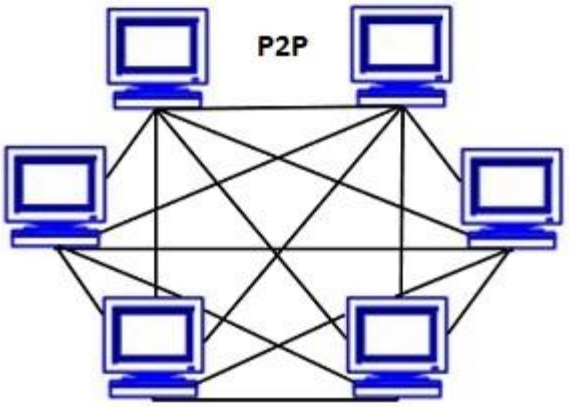
appear bitcoins (one new block) regardless from how much man their produces (emitted bitcoins are distributed between everyone applicants). Since the final amount is limited , then, given developer software provision (Satoshi Nakamoto (algorithm) mining , probably , emission will stop in 2140 .

As a result , what more miners Bitcoin (Miner) works in a certain period , that more difficult their to extract even less received profit . To obtain more new bitcoins necessary have more powerful computational means for which software is installed to ensure works distributed Bitcoin network and developments or Mining Bitcoin (mining) Bitcoin).

Two types of software Bitcoin security :

▪ standard bitcoin client , e.g. basic client Bitcoin Core for interacting with Bitcoin clients , while client programs are connected among themselves in peer-to-peer connection (P2P);

▪ **miner program** for development Bitcoins , that is, for Bitcoin mining .



Where to buy or sell Bitcoin ?

▪ directly from the Bitcoin client ;

▪ exchange through services exchange digital currencies: exchangers or stock exchanges ;

▪ through specialized ATMs ;

▪ independently to mine Bitcoin .

Earn money on Bitcoin can in various ways described on the Internet.

How to mine (extract) bitcoins ?

Currently there are two ways implementation Mining : the first is buy relevant hardware mining equipment bitcoins and execute Mining at home, the second is to invest in development cloudy Bitcoins . At the first variant necessary to consider next factors that affect profit : current quotation Bitcoin , value hardware Mining facilities , electricity and cooling costs hardware means .

Trace to note that for the execution Is mining at home advisable? buy ASIC type devices (for example , from blockhunter), capable replace a computer farm . In addition , extract Bitcoins must be in a pool (in large communities Miner), as currently alone obtain bitcoins economically unprofitable .

Second way developments Bitcoins are invest in development cloudy Bitcoins . Cloud production bitcoins allows to the user pay only for use hardware and software the provision necessary for the development Bitcoins . For example , one of the companies cloudy Mining is Genesis Mining.

Discovery account in Payment system Bitcoin

That it is necessary to use BTC buy wallet . A wallet is like a storage Bitcoins , as well as a tool for payments . Wallet number used as addresses for receiving transfers . Creation bitcoin wallet (bitcoin wallet) can implement how to install program on a PC, for example , MultiBit or

Bitcoin Core for Windows, and by creating an online wallet , for example , on the web resource Coinbase .

Organization of a Web site for conducting own electronic business

For maintenance electronic online business Internet necessary have own website.

Sites are created to form image companies , management effective advertising and marketing research to find new buyers and increase volume sales , as well as for information and service support clients . Sites also can be used as informational channels exchange information with partners.

In addition, websites are a tool management electronic or network business . In this case websites perform functions trading platforms to which include : Internet exchanges , auctions , etc.

Sites designed to provide financial services (online payment exchange systems points , etc.) and so on . In addition , sites necessary for remote learning via the Internet . Thus, conducting electronic business (electronic) commerce) is not possible without a website possible .

A website (site - a section on a server) is a set of Web pages and files related between themselves by hyperlinks . Web pages or hypertext documents are a text in which contained special commands called tags . These tags provide formatting elements pages and allow to place on it in addition to text, graphics objects , pictures , sound, video or animation , hyperlinks , etc.

Web pages are created using special HTML language . HTML or Hyper Text Markup Language is a language markup hypertext , markup is carried out using tags . Today in addition to HTML , other formats are also used languages markup : WML, XML. Web page can open and view using a browser (application) programs for viewing hypertext documents).

The main components of a Web page are: text, design, and tools. navigation . The text carries main informational load pages and the site, so the main thing on the site is its content or content. The design of the site is determined content materials pages . Design brings to life pages and at the expense of unique design pages , allows distinguish this site from others websites on the Internet .

Web pages and a website should have convenient means Navigation . Moving around the site is done using hyperlinks . Hyperlinks to the main site sections are combined into panels navigation , which are placed on each page (top , left , right , or bottom of the page). If the site has a large number of pages , then it is necessary create a sitemap and point to it link to all pages of the site. In addition, such a site may include a search engine for searching materials on the website .

To create a company website necessary :

- determine the purpose of creating the site;
- develop the technical specifications;
- register a website domain in a specific zone (com , ru , ua , net , etc.);
- develop a website;
- place website created on hosting (for running electronic business website must be hosted on paid hosting);
- register in search engines and thematic directories;
- perform search engine website optimization ;
- carry out permanent website support , search engine optimization and monitoring efficiency its functioning .

Web site organization , the basics of Web design, and the creation of Web pages and a site using the FrontPage editor are described in detail in the section Applied programs for creating

Web sites . FrontPage refers to visual editors who allow create Web pages "as is", in WYSIWYG (What You See) mode Is What You Get), i.e. What you see is what you get . You type, edit, and format texts , insert pictures , tables , as in a regular text editor (for example , in Word), and FrontPage generates the corresponding HTML code of the document.

As a result study technology creation static Web pages and Web sites you will master in the language hypertext HTML text markup , learn create web page and websites , insert text and images into pages . In addition , you will learn receptions creation hyperlinks and learn establish connections between web pages .

Affiliate programs (Affiliate programs , etc.)

Affiliate programs are business cooperation businessmen , when businessmen for distribution products on certain conditions attract business partners .

Question for self-control on the topic :

1. By main market sectors or interaction models market entities in computer networks are ...
2. Name the origin types of network or electronic (virtual) business .
3. What is a trade fair? playground ?
4. Explain the concept of " internet" shops »
5. Which refers to Finance ? services ?

List of sources on the topic :

Main

1 Medical Informatics : textbook / I.Ye. Bulakh , Yu.Ye. Liakh , VP Martseniuk , I.Yo. Khaimzon . — 4 th edition . — Kyiv : AUS Medicine Publishing, 2018. — 368 p.

2. G.G. Shvachych , V.V. Tolstoy , L.M. Petrechuk , Y.S. Ivashchenko , O.A. Gulyaeva , O.V. Sobolenko Modern information and communication Technology : Educational manual . - Dnipro : NMetAU , 2017. -230 p.

3. Medical computer science in modules. Practicum: practicum for medical (pharmac .) universities of the IV level accreditation / I. Ye. Bulakh [and others].; edited by I. Ye. Bulakh ; O. O. Bogomolets National Medical University . – Kyiv : Medicine, 2012. – 208 p.

4. Computer Modeling in Pharmacy : A Manual for Pharmacists of Universities of the Ministry of Health of Ukraine / I. E. Bulakh , L. P. Voitenko, I. P. Kryvenko. – Kyiv: Medicine, 2017. – 208 p.

Information Workshop technologies in pharmacy [Electronic resource]: teaching . manual . for students of universities / S. V. Velma , N. M. Yatsenko, Yu. M. Penkin ; National University of Physics and Technology . – Kh.: National University of Physics and Technology , 2016. F A 1.1-26-295

Auxiliary

1. Forkun Y. V. Informatics : teaching aids / Yu. V. Forkun , N. A. Dlugunovich . - – Lviv : Publishing house « Novyi World – 2000", 2018. – 464 p.

2. Computers and computer technologies : teaching aids / Yu. B. Brodsky , K. V. Molodetska , O. B. Borysyuk I. Yu. Grinchuk . – Zhytomyr: Publishing house « Zhytomyrskyi national agroecological University ", 2016. – 186 p.

3. Pharmaceutical encyclopedia . – Kh.: National University of Physics : LLC "MOR I ON", 2016.

TOPIC

« Expert systems and modeling in biology and medicine

Relevance of the topic: Traditional DSS are universal and are used to solve unique problems in different subject areas, and ES give answers to questions in a narrow subject areas and do conclusions that could do professional person high Qualifications . Integration traditional DSS with ES will form more complex view - the so- called expert support system adoption decisions (ESDPR). Such a system, based on general requirements proposed to the EU should explain your advice to the end to the user , and, in addition , to provide him universal means free modeling . Thus, it is such version organizations systems will be considered in the lecture , because he provides most rational approach to obtaining effective analysis .

Purpose : Dates definition concepts : computer , information , information technology , medical informatics . Introduce from main properties and classification methods medical informatics , the main philosophical interpretations this concept . To form an idea of the medical informatics system in Ukraine and its features . Form an idea of the possibilities and main areas of application informational technologies in medicine .

Basic concept :

Procedural knowledge is knowledge that relate to processing procedures information , methods logical output . These knowledge are asked consistency actions that must be performed , and the sequence goals that must be achieved

Content lecture hall material (lecture text)

Systems knowledge . Expert systems Definition and architecture of knowledge systems

Fundamentally new advances in technology processing information , applied mathematics and cybernetics related from creation special human-machine systems that are intended for storage and processing in a computer knowledge necessary to solve complex practical problems. Similar systems were called knowledge systems (knowledge based system), and the discipline that is engaged in research , development and application of such systems is called engineering knowledge .

Systems knowledge give possibility solve important tasks in different in the fields of science and technology . This became possible thanks to success in development research from artificial intelligence . To the most important practical results these research that seriously influenced the development applied knowledge systems , it is possible to attribute development methods representation knowledge and logical conclusion (acceptance decisions), as well as research in the field of DB. In general systems knowledge represent a new qualitative stage in the evolution of processing systems information .

Knowledge reflect our understanding of the subject area (PrO) and express a system of concepts, relationships and dependencies between concepts . Examples of concepts can be serve electric conductor , number; examples of relationships between concepts conductor and number are resistance , current and voltage ; an example of a relationship is Ohm's law.

If it is necessary to transfer a certain amount of knowledge to a computer, then objects are presented first, then the relationships that establish the necessary connections between objects, and the processes that determine the creation, destruction, transformation, and other types of behavior of objects. Knowledge consist of data about objects , relationships and processes . Objects can

represent symbolic structures data ; relationships - lists of properties ; processes are comforted computer-based programs .

Knowledge can divided into procedural and declarative .

Declarative knowledge are coming into the system from experts PrO and include facts or axioms and rules that belong to these facts . Declarative forms of knowledge are characterized by an organization bases knowledge , in which it are stored only descriptions of objects and their semantic relationship and absent information on how they can be used given descriptions. The procedural form is based on the description knowledge about PrO using procedures of any kind language (for example , LISP).

Advantages and disadvantages have both procedural and declarative ways presentation knowledge . The best approach consists in considering problems from two perspectives at once positions , because he uses advantages both these ways .

Man and computer

Before proceeding with the development of a computerized knowledge system, it is necessary to answer the question: can computers make the same decisions as an experienced doctor, using the same data and knowledge and logical procedures for processing them. In other words, if people can use scientific knowledge and clinical experience to gain certain conclusion , then how can we to teach computers use the same knowledge to obtain similar conclusion ? To answer this we ask first must to find out what The structure of knowledge in human beings is different . brain from structures knowledge in the computer . How should they be structured knowledge or data in the computer to their can was use for acceptance solutions similar to those that are accepted by a doctor when establishing diagnosis or appointment treatment ? Unfortunately, the key problem here is that we don't know what "model" it uses human brain to solve problems .

A special role in database theory occupy such concepts such as a data model and its schema. Model schema data is semantic model presentation knowledge about data .

Development banks Data mining (DBM) occurs by improving search procedures information and display its in complex structures. Unlike from BnD information that stored in the model knowledge , connects internally (structured) not at the expense of tabular forms and documents , and with the help of relations between the facts that observed at the facility management . In models knowledge relationship possess defined , fixed semantics outside the system and are themselves as expected as the outputs .

Having traced evolution data , you can to note a number of features that distinguish data from knowledge . Firstly , the lack of orientations data on some specific program and availability special metaprocedures , the need for which generated by knowledge itself . Secondly , the possibility internal interpretations . For this given necessary give attributes , due to what will they get defined semantics. The next step on the path to knowledge is the introduction of relations over such units information , such as genealogical , temporal etc. Thirdly , the assumption recursive connections of some information units with others . In general divergence between do not have the data and knowledge clear borders .

Thus, you can to note at least three features knowledge that distinguish their from data :

- knowledge differ devoted , first of all , to the ability to interpret ;

- the presence of relationships that distinguish knowledge: element-class, class-subclass, type-subtype, situation- subsituation ;

- availability situational relations that determines situational compatibility knowledge .

Analyzing given concept , you can to claim that question nature knowledge , their classifications and methods systematization in many ways have debatable nature. Development computational techniques opens new opportunities processing knowledge . However, for this necessary to highlight and present knowledge in the forms in which they are used on a computer .

Knowledge system characterized by presence knowledge and means deriving new knowledge , which in a nutshell in the form of can be represented by the formula: " knowledge + mechanism" conclusion - a system of knowledge . " Similar systems able to explain how line reasoning , and to accumulate knowledge. Accordingly, the following main elements of a knowledge system can be distinguished: a knowledge acquisition module, a knowledge base, an inference mechanism, and an explanatory interface.

The core of knowledge systems is the knowledge base (KB) and the inference mechanism, which are associated with the concepts of "methods of presenting problematic knowledge", "the process of obtaining new knowledge through plausible reasoning". It is the choice of methods of presenting and obtaining knowledge that determines the architecture of the knowledge system and, in practice, takes the form of the corresponding organization of the KB and the control scheme of the inference mechanism.

Expert systems in medicine

Among knowledge systems, medical expert systems (ES) have developed most rapidly in recent times.

Computer programs, as a rule, are adapted to solve a precisely defined range of tasks. This range can be expanded or changed in some way only by introducing the appropriate instructions of the programmer into the program. But such improvement takes a lot of time, there is always a possibility of additional errors. The development of artificial intelligence technologies (software that can, within certain limits, imitate some features of human thinking on a computer) has led to the emergence of a new class of software capable of self-learning and accumulating new, useful information. It is to this class that systems based on the use of knowledge - knowledge-based system (intelligent systems, knowledge systems). In older literature, the term “expert system” is used because such systems used knowledge obtained from experts and could solve problems in a way that was somewhat similar to the reasoning of an expert. A feature of such a system is the division into a database containing medical histories , a knowledge base about the subject area, and a mechanism for logical inference. In the general case, an intelligent system assumes that there is a knowledge acquisition program that will be used to build and maintain the knowledge base. Such a system may also contain an explanation module that helps explain its recommendations to users. Expert systems are widely used in medicine to support decision-making in solving various problems of diagnosis, prognosis, treatment, management, training, etc.

Artificial intelligence

At first glance, artificial intelligence (AI) is something from the realm of science fiction. In fact, it has penetrated all areas of computer technology. It makes human professional possibilities practically limitless even today.

Artificial intelligence is a program that simulates the human thinking process on a computer. To create such a system, it is necessary, first of all, to study the human thinking process that solves problems or makes decisions in any field of human activity, break this process into stages, and develop programs that reproduce these stages on a computer.

The most important thing is to build into these programs the ability to self-learn and accumulate new, useful information in the future. Changing any part of the information should not

change the structure of the entire program. After all, a person accumulates knowledge without changing the way of thinking and without forgetting already known facts (most of them).

Of course, scientists do not fully understand how the human brain works. Only some mechanisms have been elucidated, which are being tried to be modeled in artificial intelligence systems. Artificial intelligence (artificial intelligence) can be considered as the property of automatic systems to take on certain functions of human intelligence, for example, to choose and make optimal decisions based on previously acquired experience and rational analysis of external actions.

Thinking is at the heart of human activity. For example, the bell rings for class, and you head to the classroom. This seemingly automatic reaction is the result of solving a problem that the brain is presented with by an external signal - the bell. The teacher's question sounds and you raise your hand if you want to be asked or, for example, lower your head if you don't want it. The result you are striving for is the goal that your brain's thought processes are aimed at achieving.

Our daily activities are a sequence of such goals. Each step on the way to the main goal is a component of the sequence. The brain is always focused on the goal(s), and it does not matter whether the person is performing physical or intellectual work.

The human brain is a place where a huge amount of knowledge is stored. A person constantly acquires new knowledge and applies it in emerging situations. Knowledge can be represented as a set of facts and rules for their use. The rules are expressed by the formula:

IF..., THEN....

That is, IF the condition is met, THEN a specific action is performed. Our memory stores a huge number of such facts and rules. To achieve goals, people connect complex sets of facts and rules.

How does the human brain select those that are relevant to a specific situation from a large number of diverse facts and rules? There is a complex selection scheme in the brain, which is called the simplification mechanism. Achieving a goal, a person not only solves the task set before him, he receives new facts, forms new rules. The mechanism of forming new facts and rules - the mechanism of inference, allows a person to learn from experience, also helps to identify errors in reasoning and improve the rules used to achieve goals.

Creating artificial intelligence means creating a program that includes all the stages of the human decision-making process: goals, facts, rules, a simplification mechanism, and an inference mechanism that completes the thinking process.

Since the basic human thought processes remain the same when solving a variety of problems, one basic artificial intelligence system can be used to solve a large number of problems.

Specific areas of human activity in which artificial intelligence systems can be used are called subject areas. Examples of subject areas can be: economic management, development of strategies and tactics in military science, etc. It is only necessary to take into account that a large number of facts and rules are required to solve all possible problems. The narrower the subject area, the easier it is to fill it with knowledge.

The source of knowledge for filling expert systems are experts in the relevant subject area. When creating an expert system, a group consisting of an expert and a knowledge engineer collects facts, rules and heuristic rules (i.e. rules that are formed on the basis of practical knowledge of experts), and then includes them in the artificial intelligence system. A knowledge engineer is a new profession that was born from the rapid development of knowledge bases. A knowledge engineer is a high-class specialist who knows system programming and artificial intelligence

methods. In the era of information technology, this profession becomes very important and necessary.

Modern intelligent information technologies are technologies for processing information and solving problems using computers, based on achievements in the field of artificial intelligence.

Artificial intelligence systems consist of three main blocks: a knowledge base, a solution, and an intelligent interface. A typical representative of artificial intelligence systems is expert systems.

Artificial intelligence systems are focused on solving an important class of problems called informal, for example, in the analysis of dynamically changing data and knowledge. In artificial intelligence research, two main directions can be distinguished:

- programmatic-pragmatic. This includes work on creating programs for solving logical problems, pattern recognition, classifying data obtained as a result of research, etc.;
- bionic. It deals with the development of systems that solve problems by analogy with the solution of problems by the human brain. Within the framework of the bionic approach to the problems of artificial intelligence, a new science has been formed - neuroinformatics .

Currently, any large system that uses a database is called an expert system, often for commercial reasons, although many such systems are more accurately called knowledge systems. Nowadays, there is no clear boundary between the terms “expert systems” and “knowledge systems”. Perhaps, in the future, a clearer classification of knowledge systems and restrictions on the use of the name “expert systems” will be established. For example, it is noted that for knowledge systems, the source of knowledge is not necessarily an expert, but for ES it is essential.

The term “expert system” is naturally associated with the term “expert.” This is the name given to a highly qualified, authoritative specialist in any field of activity who solves problems using his experience and knowledge.

The following tasks can be identified that are solved by experts:

- diagnostics - determining the causes of a disease or malfunction of a technical system and developing recommendations for their elimination;
- classification - building a hierarchy of concepts or objects; determining the place of a given object or concept in this hierarchy;
- forecasting - predicting the behavior of an organism, technical or any other system based on data about its current state;
- planning - building a plan (program) of actions to solve a problem;
- management - monitoring the state of a complex system and making operational decisions regarding its change.

There are almost as many definitions of expert systems as there are authors of books and developments on this topic. Here are the most famous:

An expert system is an intelligent computer program that uses knowledge and inference procedures to solve problems that are quite complex and require the involvement of experts. The knowledge and inference procedure required for this can be considered as a model for conducting an examination by the best experts in their field.

Expert systems are systems that, by reproducing the work of an expert by modeling the process of drawing conclusions from available information using the rules of logical inference, model the behavior of an expert within a special field of knowledge.

Expert systems are knowledge systems that, using an inference mechanism, apply knowledge to solve a specific problem.

Let us note two main points inherent in all the author's definitions of the concept of ES. First of all, this is an indication that ES is a ready-made software product that is used to solve problems. Second, there is a description of the scope of ES application or a characteristic of the class of problems being solved.

Thus, we can say that expert systems are a type of computer systems that in some way model human thought processes; use appropriately presented knowledge, in particular medical knowledge; they are designed to obtain logical conclusions and conclusions on a given initial set of knowledge with explanations in an understandable form.

Unlike the previously considered diagnostic systems, medical expert systems to some extent model the thought processes of a doctor. Naturally, medicine, as a field of activity, is an ideal environment for the creation and application of expert systems.

In the future, expert systems will be considered systems that:

- process a large amount of knowledge;
- present knowledge in a simple, unified form;
- have an independent mechanism of logical conclusions;
- can explain the results obtained in the process of knowledge processing.

Expert systems in medicine should:

- model the behavior of a competent doctor when solving a diagnostic problem, model methods of finding solutions ;
- present the obtained solutions in such a way that they are understandable to both the doctor and the patient;
- quickly and relatively easily adapt to changes in the body of medical knowledge, modify when new knowledge appears or when old knowledge is clarified.

There are many types of expert systems, among which the following can be distinguished:

- expert data interpretation systems that determine the content of data, in particular data from medical observations and experiments;
- expert diagnostic systems, during which the nature of the deviation of the object's state from the norm is determined, and on this basis it is assigned to the appropriate category;
- expert monitoring systems focused on continuous interpretation of data in real time and signaling when certain parameters exceed permissible limits, in particular, expert medical monitoring systems in intensive care units;
- expert forecasting systems logically draw probabilistic conclusions about the future course of events based on existing situations, taking into account all circumstances. In medicine, they are used to predict the course of a disease under different treatment regimens, determining the best one for a particular patient;
- expert learning systems identify errors in the study of a discipline, collecting and analyzing data on "weak points", and then provide the necessary explanations and recommendations that determine which exercises are needed to improve the training of the future doctor;
- expert planning systems determine optimal action plans for objects capable of performing certain functions;
- expert design systems prepare documentation for the creation of objects with predefined properties, even containing ready-made drawings and a corresponding description.

According to the degree of integration, expert systems are distinguished as follows:

- autonomous expert systems that work directly in consultation with the user without using any traditional data processing methods (calculations, modeling, etc.);

- hybrid expert systems, which contain standard packages of processing applications, DBMS, spreadsheets and their management tools. It is clear that hybrid expert systems are much more complex, but their capabilities justify the costs of their development and maintenance.

According to the form of the problem-solving process and the ultimate goal, ES are divided into:

- systems of the “question-answer” type, which include subsystems of dialogic communication with the user in the professional language of the user of this ProO ;
- consultant systems that ensure the preservation, analysis and generalization of knowledge of highly qualified specialists in highly specialized PRs and are able to make design (advisory) decisions and explain the logic of their conclusion;
- solver systems that develop knowledge base models and implement them in the form of problem-oriented problem-solving packages based on the existing knowledge bank and characteristics of the class of problems being solved.

History of the EU

ES emerged as a result of the use of artificial intelligence methods, which has a history of development of more than 40 years. In the 50s, the main direction of development of AI systems was modeling the human brain in the form of neural networks. However, due to the insufficiently high level of development of computing technology at that time, the development of neural networks gave way to other AI methods and was reactivated only in the 80s, when the first neurocomputers were developed.

In the 1960s, the main focus was on the development of general heuristic search methods. The universal heuristic on which the problem-solving strategy is based is known as depth-first search:

IF - the method for solving the problem is not known;

SO - it's worth trying to break the problem into parts and solve each of them independently.

This simple example demonstrates all the features of heuristics: vagueness and limited scope. Experience has shown that there is no universal set of heuristic methods that allows solving a problem in any area and of any complexity. And intelligent problem solvers built on sets of general heuristic methods turned out to be able to solve only "toy" problems. However, the study of heuristic search methods turned out to be a necessary step to the next stage of development.

Since the late 1960s, leading AI experts have significantly changed their perspective on problem-solving methods. It has become clear that the effectiveness of a method depends primarily on specific knowledge about the area under study, and only in the last place on general strategies and schemes of logical inference.

This principle is one of the most important principles of developing ES. In other words, the more universal an AI system is planned to be, the less powerful it will be (it will be able to solve only very simple problems). Conversely, the more we specify (narrow) the area, the task and the knowledge about its solution, the higher the “intellectual level” of the system that solves this problem using the knowledge embedded in it. The first system based on this approach was the CETSHIAE system - a highly qualified expert in the field of chemistry, which was developed in 1965 at Stanford University. It solves the problems of constructing possible chemical structures based on experimental data on the substance under study. This system uses a knowledge base in its work that contains not general heuristic rules, similar to those given above, but several dozen heuristic methods that reflect the specific rules of reasoning inherent in chemists. This system turned out to be a new stage in the development of ES.

One of the most famous medical diagnostic expert systems in the world is the EC "MUSII". It solves the problems of diagnosing infectious blood diseases and developing recommendations for their treatment. The system uses a medical knowledge base about diseases, symptoms and microorganisms (cultures) that caused them. The system receives the necessary information about the patient in the process of dialogue with the user (doctor). According to medical specialists, the MUSII system is not inferior in the quality of diagnostics to leading expert specialists.

Question for self-control on the topic :

1. What definitions of the concept of "Information" do you know?
2. List the main properties of information
3. Name the temporal and other additional properties of information.
4. List the main criteria by which information is classified.
5. Name the types of information by areas of knowledge, method of perception, form of presentation, and purpose.
6. Features of pharmaceutical informatics. Describe the pharmaceutical informatics system in Ukraine.
7. List the main areas of application of computer technologies in pharmacy.

Test task

1. As an integral part property matter information are considering supporters :
   A. Formal approach
   B. Attributional approach
   B. Functional approach
2. One of main properties information that reflects impossibility algebraic addition messages , because of this distorted their content , this property :
   A. Relevance
   B. Reliability
   B. Cumulativeness
   D. Non-additivity
   D. Noncommutativity
3. One of main properties information that reflects impossibility rearrange message in places , because of this distorted their content , this property :
   A. Relevance
   B. Reliability
   B. Cumulativeness
   D. Non-additivity
   D. Noncommutativity
4. The linguistic nature of information is that :
   A. Information is only textual message
   B. Information always is expressed using languages
   B. Any others means , except speech , incapable transfer information
5. What type of information does not exist according to the method of perception ?
   A. Auditory
   B. Mental
   B. Visual
   G. Tactile
   D. Taste

List of sources on the topic :

Main

1 Medical Informatics : textbook / I.Ye. Bulakh , Yu.Ye. Liakh , VP Martseniuk , I.Yo. Khaimzon . — 4th edition . — Kyiv : AUS Medicine Publishing, 2018. — 368 p.

2. G.G. Shvachych , V.V. Tolstoy , L.M. Petrechuk , Y.S. Ivashchenko , O.A. Gulyaeva , O.V. Sobolenko Modern information and communication Technology : Educational manual . - Dnipro : NMetAU , 2017. -230 p.

3. Medical computer science in modules. Practicum: practicum for medical (pharmac .) universities of the IV level accreditation / I. Ye. Bulakh [and others] . ; edited by I. Ye. Bulakh ; O. O. Bogomolets National Medical University . – K. : Medicine , 2012. – 208 p.

4. Computer modeling in pharmacy : teaching . manual . for pharmacy . f- tiv universities of the Ministry of Health of Ukraine / I. E. Bulakh , L. P. Voitenko, I. P. Kryvenko. – K.: Medicine, 2017. – 208 p.

Information Workshop technologies in pharmacy [Electronic resource]: teaching . manual . for students of universities / S. V. Velma , N. M. Yatsenko, Yu. M. Penkin ; National University of Physics and Technology . – Kh. : NFaU , 2016. FA 1.1-26-295

Auxiliary

1. Forkun Y. V. Informatics : teaching aids / Yu. V. Forkun , N. A. Dlugunovich . - – Lviv : Publishing house " New" World – 2000", 2018. – 464 p.

2. Computers and computer technologies : teaching aids / Yu. B. Brodsky , K. V. Molodetska , O. B. Borysyuk, I. Yu . Grinchuk . – Zhytomyr: Publishing house « Zhytomyrsky national agroecological University ", 2016. – 186 p.

3. Pharmaceutical encyclopedia . – Kh.: National University of Physics and Technology : LLC "MORION", 2016.