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TELECOMMUNICATIONS

Department of Radio
engineering and information
security

INFORMATION AND COMMUNICATION TECHNOLOGIES

Methodological guidelines of laboratory works for students
of specialty
5B100200 – Information Security Systems

Almaty 2019

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The methodological guidelines for performing laboratory works are intended for the first year students and contain the material for performing 15 laboratory works on the course «Information and communication technologies».

Pictures – 81, tables – 6, ref. – 13 items.

Reviewer: B.I. Tuzelbayev, Ph.D. in Economics, associate professor

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Introduction

The course «Information and Communication Technologies» includes all aspects of creating, monitoring and studying telecommunication networks and systems.

To master the course and study basic concepts in the field of information and communication technologies, it is necessary to perform 15 laboratory works that include the architecture of computer networks, monitoring the performance of a personal computer, creating documents in the cloud and MS Office tools, environment Moodle, using hardware and software for information security, etc.

1 Laboratory work № 1. Calculating the performance metrics of computer systems

Work purpose is to study the architecture of a personal computer, analyze the performance characteristics and calculate them by using built-in Windows tools.

1.1 Preliminary preparation

1.1.1 Study and master the working principle of the built-in PC programs.

1.1.2 Study the operation principle of computer resource monitoring programs.

1.2 Work assignment

1.2.1 Monitor the PC by using built-in Windows tools.

1.3 Methodological guidelines for performing the work

1.3.1 Definition of PC configuration.

The information about the hardware configuration of the computer can be collected without installing third-party programs. The structure of Windows includes the utility «System Information», which has the ability to export collected data to a text file. You can run the program:

– Start menu - Programs - Standard - Service;

– Start – Win + X, Run, enter «msinfo32» and click «OK».

– press Win + R on the keyboard and enter «msinfo32».

After a few seconds, the program will collect information about the system and its hardware configuration. To export the report, select Export from the File menu, and then specify the file name and folder to save.

1.3.2 Monitoring PC performance with built-in tools in Windows 7.

System monitoring tools differ depending on the version of Windows (may have different names), but they are all extremely simple to use for performing primary performance monitoring. The graphs in a single time dimension show the instantaneous activity level of each subsystem, providing the user with a visual representation of the change in the load, even if the tasks are running on the computer.

1) Access to «*Task Manager*» can be done:

– using the classic keyboard shortcut Ctrl + Alt + Del;

– by click Windows + X;

– open the context menu of «Start» button, then select «Task Manager»;

– using the keyboard combination Ctrl + Shift + Esc and by right-clicking on the taskbar and selecting «Task Manager» (if the task manager is opened as a small relatively simple window, click «More details» link at the bottom of the window).

When the Task Manager is running, click the Performance tabulate figure 1.1 shows the Task Manager window.

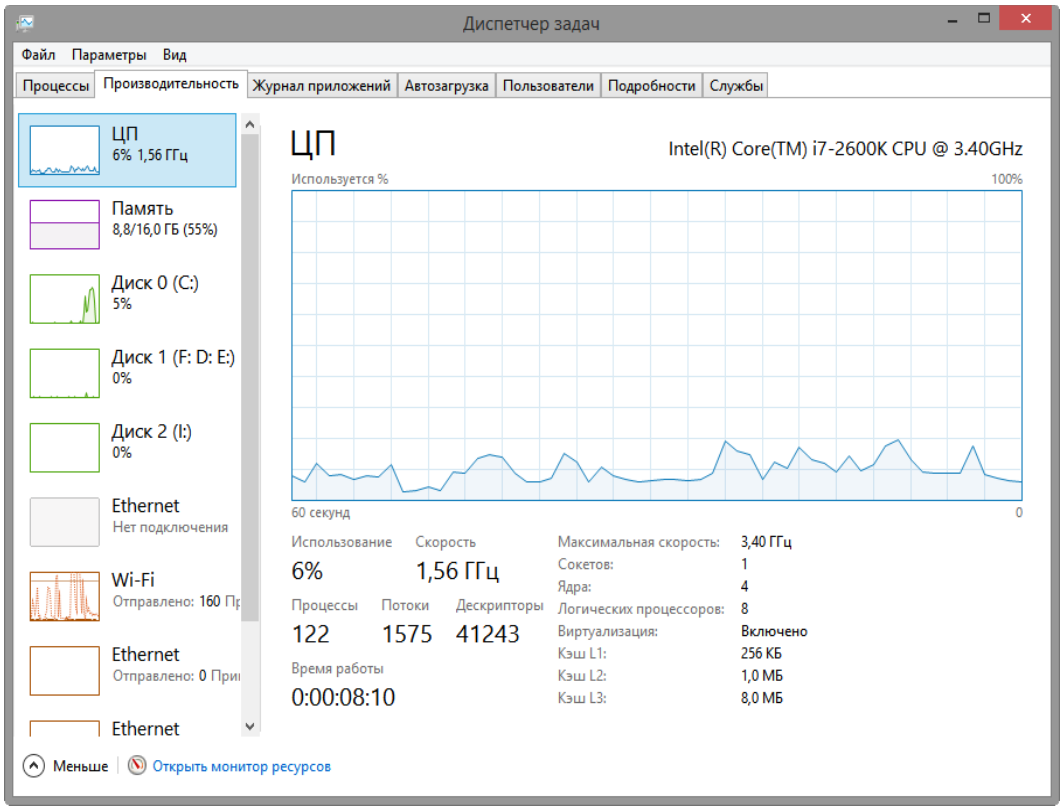

Figure 1.1 – Window of Task Manager

Monitoring results in the «Performance» tab show the degree of subsystem activity. If the system has a hardware «plug», then one of the graphs will be quite different from the others. As a rule, it will show a high level of activity, while other subsystems will show relatively low levels of activity.

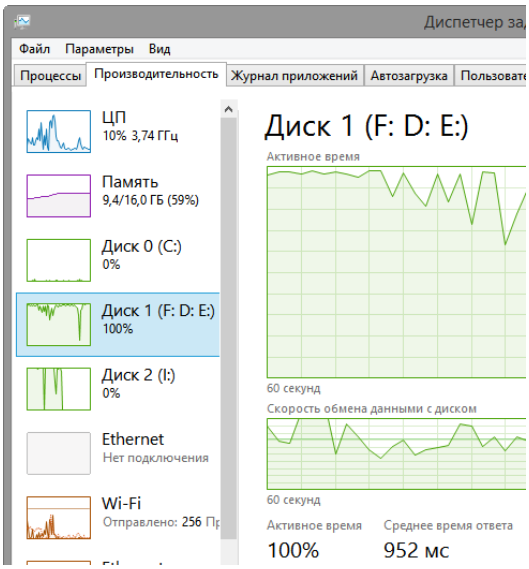

Figure 1.2 – Demonstration of a 100% disk access level

For example, Figure 1.2 shows a system with 100 % disk subsystem activity. Serious disparity in the activity of subsystems. 100 % -level of disk accesses may indicate performance problems, an additional analysis is needed.

2) *Windows Resource Monitor* is a system application with which you can view information about the use of the processor, memory, disk, network and program resources in real time (figure 1.3).

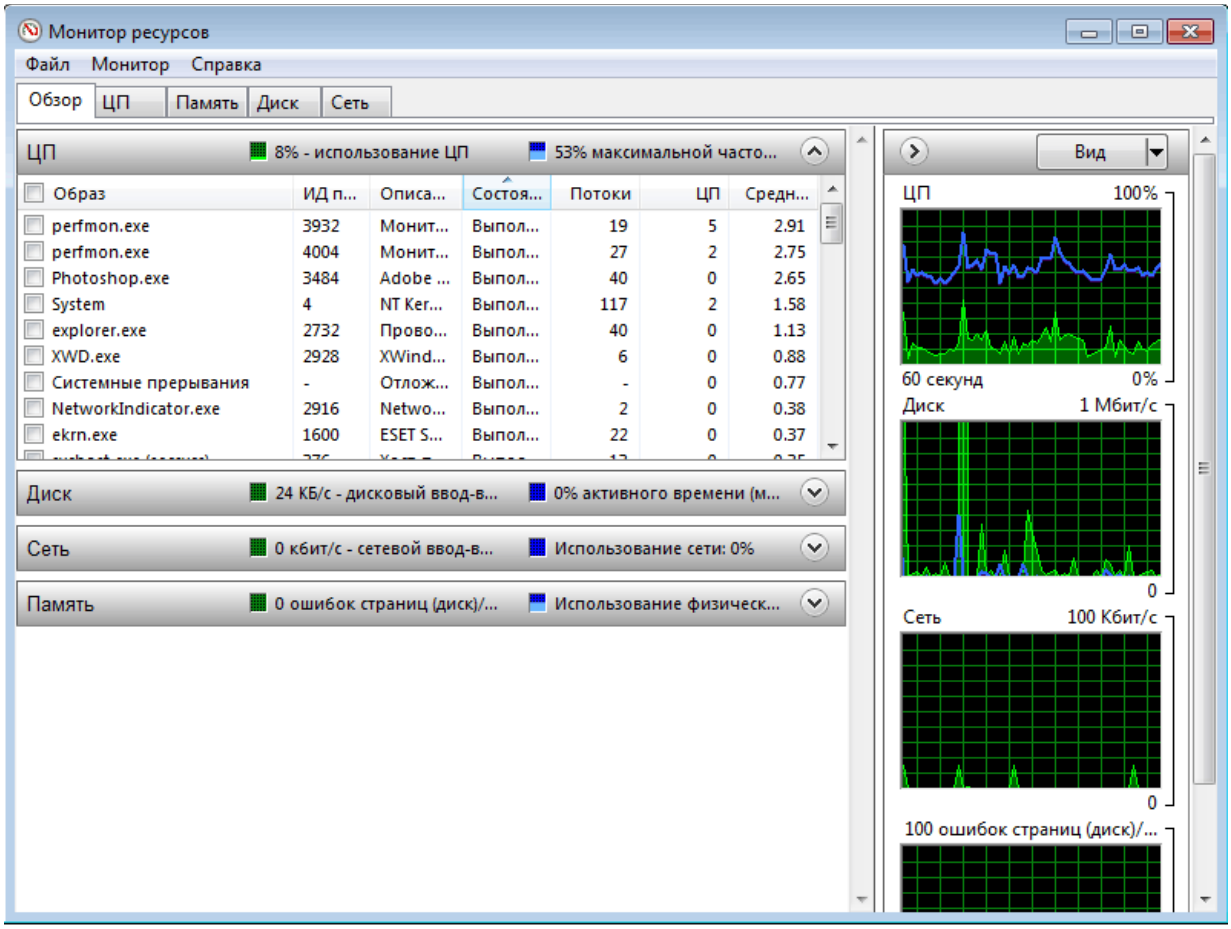

Figure 1.3 - Windows Resource Monitor

You can launch the «Windows Resource Monitor» in several ways:

– by «Start» button, then enter the command «Find programs and files»: *resmon.exe* or start by typing the name of the program, and then click on the appeared line, press ENTER;

– click «START» - «All Programs» - «Standard» - «Service» - «Resource Monitor»;

– press «Win + R» keys on the keyboard and enter «*resmon*» command.

The «Overview» tab allows you to complete the processes, complete the process tree and resume them.

To do this, in «Image» column, right-click the name of the executable file that you want to complete / resume for displaying the context menu. In the shortcut

menu, select «End Process» or «End Process Tree» or «Shut down Process_Name.exe» to confirm that the process is complete.

To pause the process, select «Pause process» in the context menu. In the dialog that appears, «pause process_name.exe», we confirm the suspension of the process. All suspended processes in the table will be displayed in blue.

To resume a paused process, select «Resume Process». In the «Resume work_name process_name.exe» dialog, click «Resume Process» button.

«CPU» tab allows you to start, stop or pause the service. For this:

– click the left mouse button on the header of the «Services» table, in order to deploy it;

– In «Name» column, right-click on the service name to open the context menu;

– choose one of the options: «Stop the service», «Start the service» or «Restart the service».

To sort the services according to their status, click the left mouse button on the header of «Status» column.

You can also use the resource monitor to solve the problems with applications that do not respond. A process record that does not respond is highlighted in red in «CPU» table on «Overview» tab and in «Processes» table on «CPU» tab.

To perform a process analysis using the resource monitor, you must do the following:

– open the resource monitor;

– right-click on the main table of any tab of the resource monitor in the «Image» column on the name of process executable file that you want to analyze for the context menu. Then select the option «Analysis of expectation chain».

If the process is running in normal mode and does not expect other processes, then no information about the expectation chain is displayed, as shown in figure 1.4:

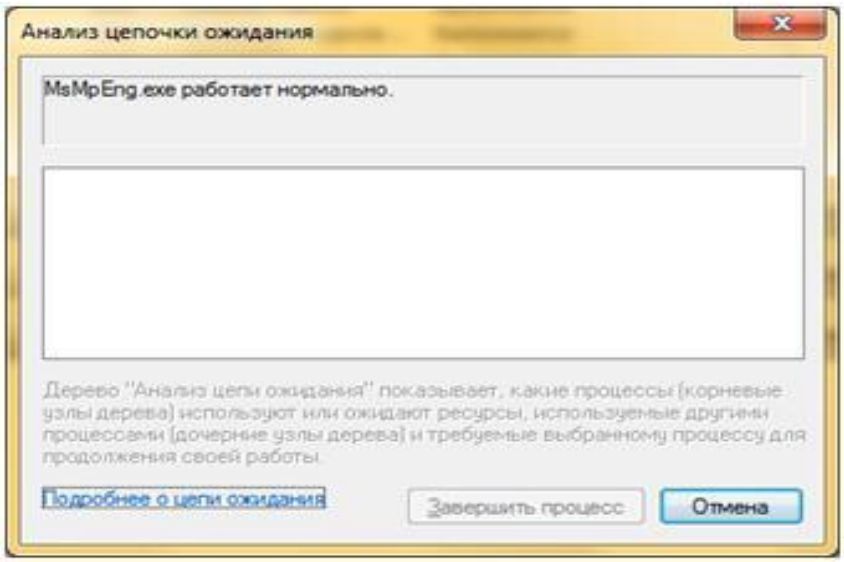

Figure 1.4 - Window of expectation chain analysis

In the event that the process is waiting for another process, the tree of dependencies from other processes will be shown (figure 1.5):

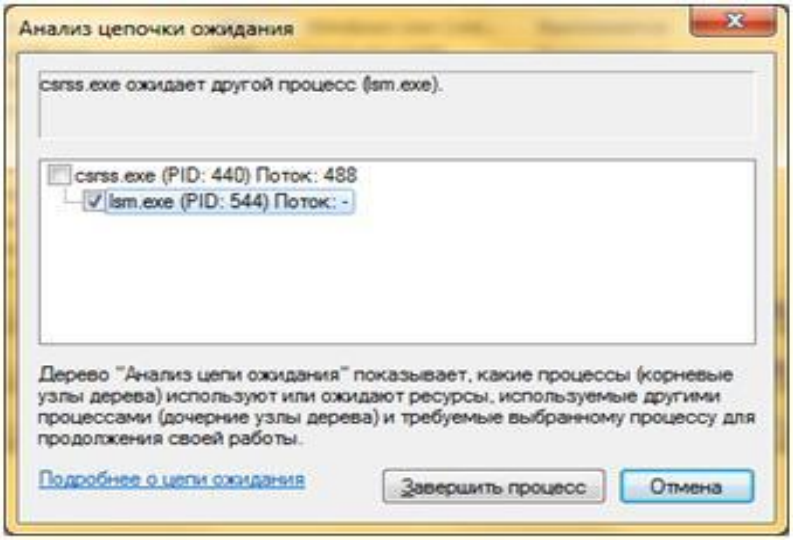

Figure 1.5 - Window of expectation chain analysis

The normal operation of many system processes depends on other processes and services. The Resource Monitor displays the information about expectation chain for each process. If the process record in the table is not highlighted in red, if the process status is «On» and if the program works as usual, then the user intervention is not recommended.

If the expectation chain tree is displayed, you can terminate one or more processes in the tree by checking the check boxes next to the names of processes you need and selecting the «End Process» command.

«Memory» tab at the bottom shows the RAM graph on the computer under test. If «Free 0 megabytes» it is not worth worrying about this, it is a normal situation and in fact, the memory displayed on the graph in «Waiting» column is also a kind of free memory.

«Disk» tab allows you to view the speed of read operations of each process record (and total stream), as well as to see the list of all storage devices and free space on them.

«Network» tab of the Resource Monitor allows you to view open ports of various processes and programs, addresses they are accessing, and to see if the connection is allowed by the firewall. If you think that a program causes suspicious network activity, some useful information can be found on this tab.

3) Diagnosis of the hard disk.

To open the hard disk diagnostics window, open the Start menu, then select «Computer». Click on the section with the right mouse button to open the context menu, in which select «Properties» (figure 1.6).

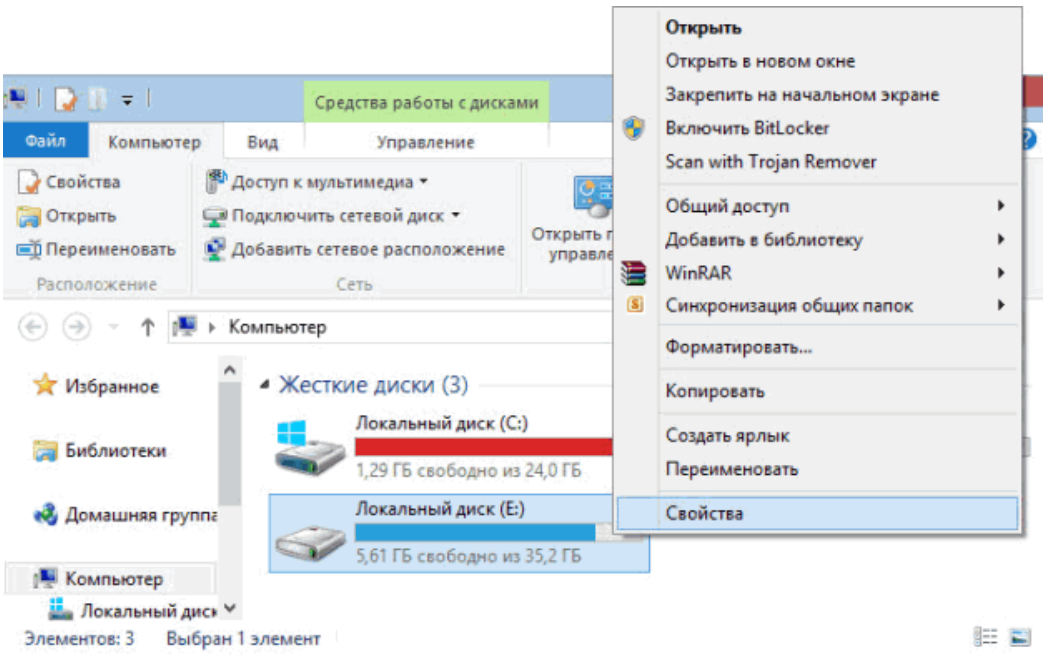

Figure 1.6 – Window of Hard Drive Properties

In the Properties dialog box that opens, click «Tools» tab and in the «Check for errors» section, click «Check» button.

Windows 7 opens a window where, for a more thorough check, you must set both check boxes (figure 1.7) and click «Start» button. If the operating system uses the volume that you want to check, the following message will be displayed:

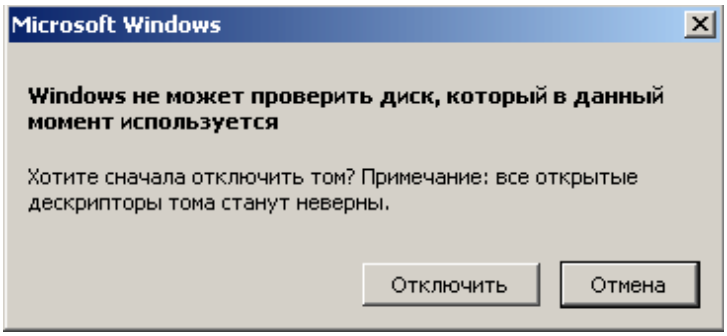

Figure 1.7 - System message

If you click «Disconnect», then the disk check will start (figure 1.8).

If you click «Cancel», then one more window will appear with a suggestion to check the disk the next time you boot the computer. This is the most preferable option. In this case, the disk under test will be free of any tasks and processes, which will allow performing the test without problems. Click the schedule for checking the disk.

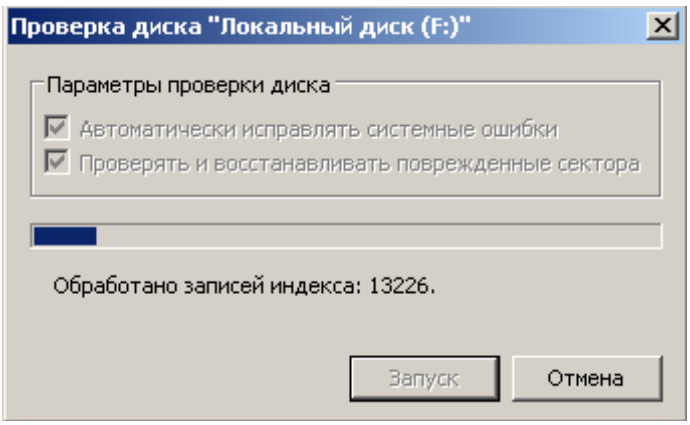

Figure 1.8 - Checking the disk

Repeat all the above steps with all sections (volumes) of your hard disk and reboot the computer. When the computer boots up, the operating system will perform hard disk diagnostics. If there is something interesting, then when you start the computer, you will see an information window with the results:

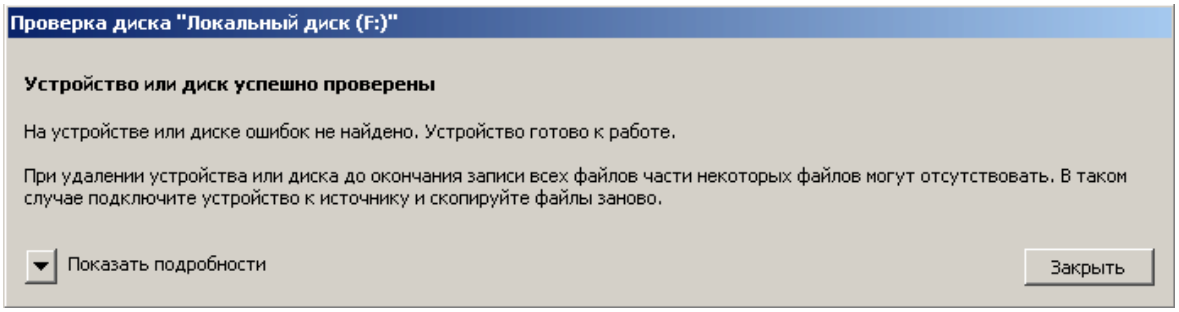

Figure 1.9 - Disk Check Results

Normally, Windows cannot immediately check the system disk. It asks you to assign it the next time you boot. All other sections can be tested without rebooting.

If you want to scan the system disk and assigned it to the next boot, you must wait for the diagnostic to complete and the operating system to boot. If errors are detected, carry out diagnostics with the help of HDD Regenerator programs.

1.1 Control questions

1. What command does the task manager call?
2. What is the processor?
3. What is a system unit?
4. What is the motherboard?
5. What is memory? How is memory classified into a computer?
6. What information does the Memory Tab reflect?
7. What information does the Disc tab reflect?
8. What information does the Network tab reflect?

2 Laboratory work №2. Determination of operating system properties

Work purpose: studying properties and purposes of operations with the elements of interface of Windows operating system with demonstration of them on PC.

2.1 Preliminary preparation

2.1.1 Study the types of PC operating systems.
2.1.2 Study and master the principle of dealing with files and catalogues.

2.2 Work assignment

2.2.1 Define the version and bitness of Windows operating system.
2.2.2 Deal with files and catalogues.
2.2.3 Make the title page of laboratory work report according to AUPET standards.

2.3 Methodological guidelines for performing the work

2.3.1 Determination of operating system properties.

The determination of properties of PC operating system is carried out by two methods:

- by running the command winver;
- by clicking the right mouse button on the icon «Computer»

Start of command «*winver*» for Windows 7 is done by means of the button Start-Find programs and files – enter «winver» and press button Enter.

For Windows XP and 10 click the right mouse button on Start – Carry out – enter the command «*winver*».

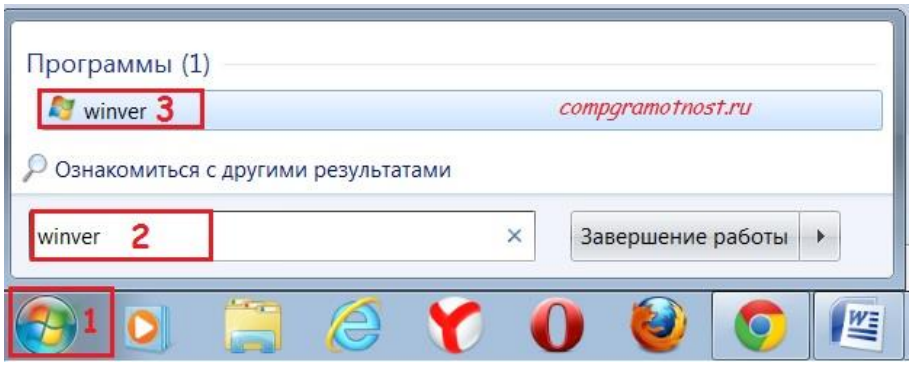

Figure 2.1 – Command «Winver» for Windows 7

Command's result will be presented in the window «About Windows program» (figure 2.2) specifying the version of the operating system.

There are six different versions of Windows 7 that differ in the set of possibilities (from minimum to maximal).

If there is no «Start» button, probably, you have Windows 8.

To make sure, on the start screen «Start» click «All applications».

In the applications find «Service» - «Carry out» enter without quotes and without the dot command «winver».

The result of this command will appear, as seen on figure 2.2.

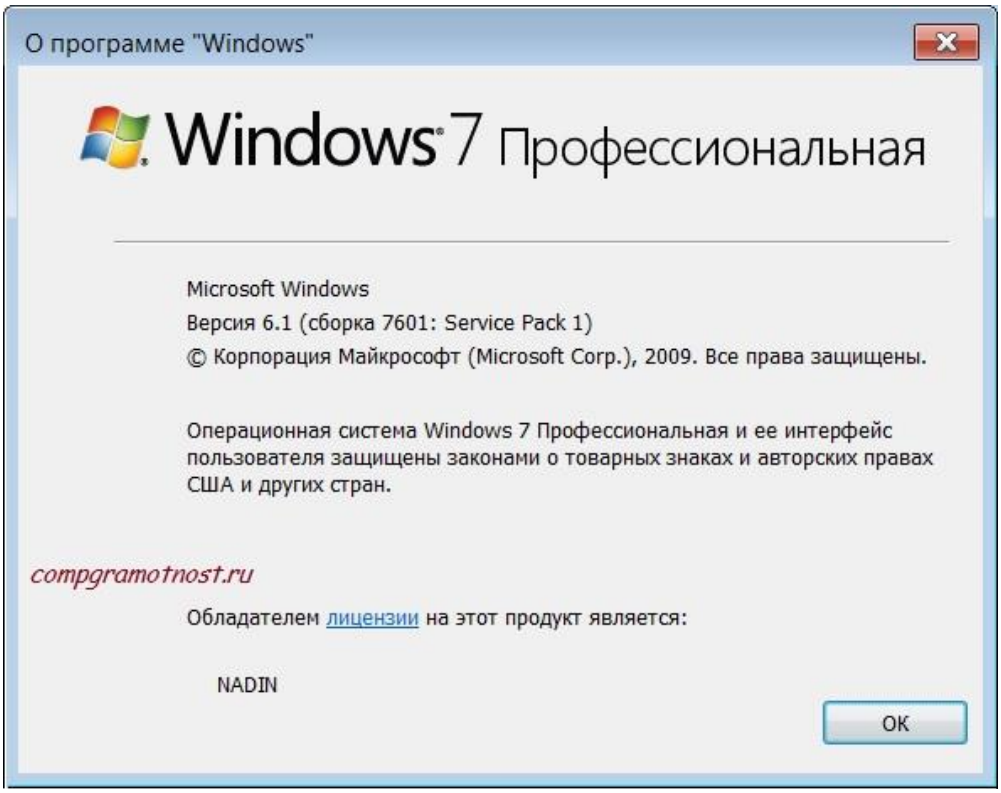

Figure 2.2 – Command result for Windows 7

Determination of properties of PC operating system with RMB click (Right Mouse Button) on icon «Computer» or «My computer». In an appearing after that window it is necessary to click left mouse button on «Properties». Then a window with the complete information about the operating system of your computer will open. Click on the Star button for Windows 7. Then click RMB (Right Mouse Button) on the icon «Computer» - «Properties».

A window «Viewing basic information about Your computer» will appear (figure 2.4), where it will be possible to get to know the operating system installed on your computer, and also the information about a processor, Random Access Memory and OS bitness.

If on a desktop you have the icon «My computer», it means that your operating system is Windows XP. We click on this icon, and in the output menu we click on «Properties». The window «Properties of the system» appears (figure 2.5).

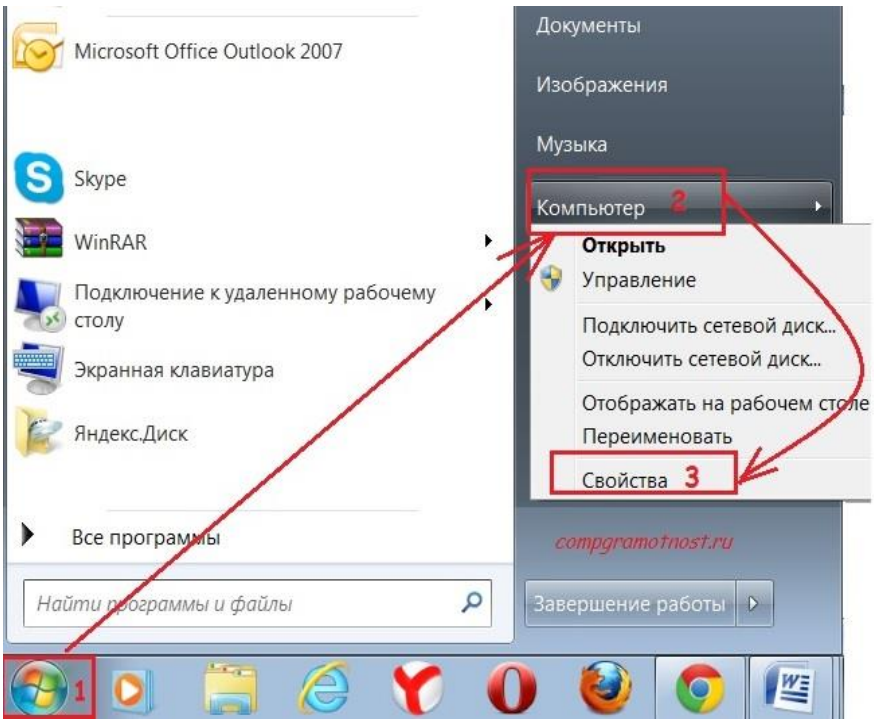

Figure 2.3 – RMB (Right Mouse Button) for icon «Computer» in Windows 7

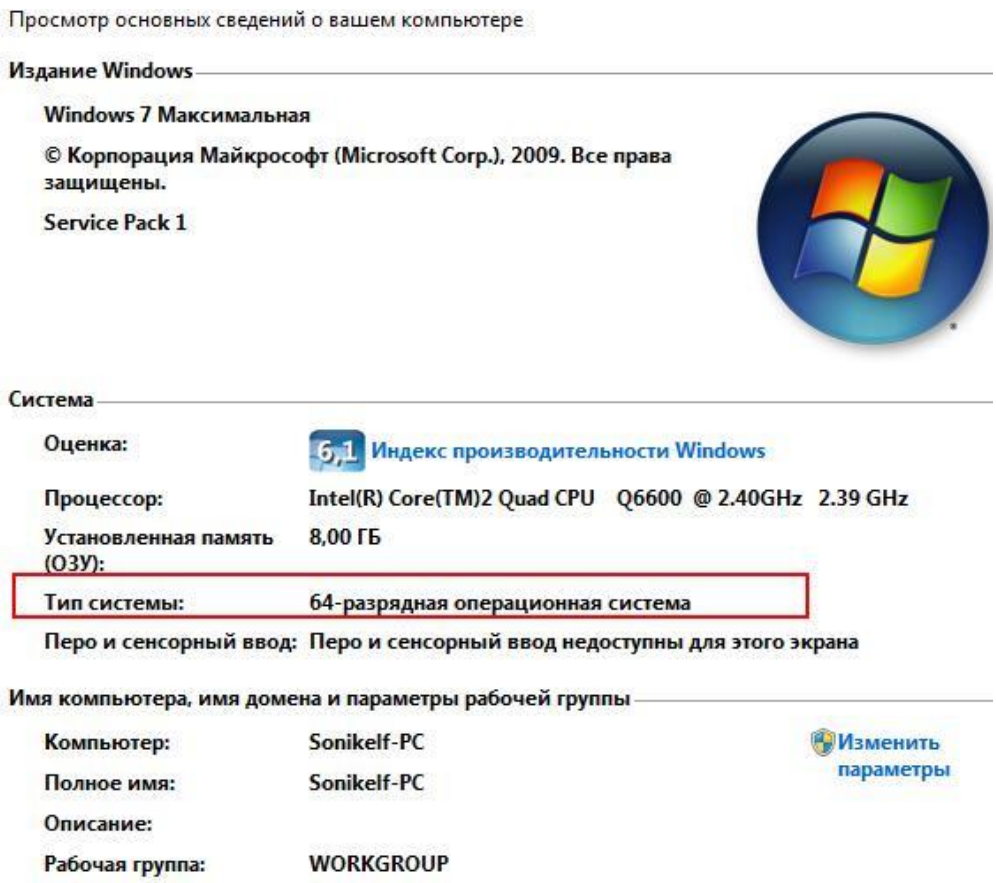

Figure 2.4 – Basic information about the computer for Windows 7

In this window it is possible to get to know the name of the operating system on tab «General», and also information about the processor and RAM (Random Access Memory)

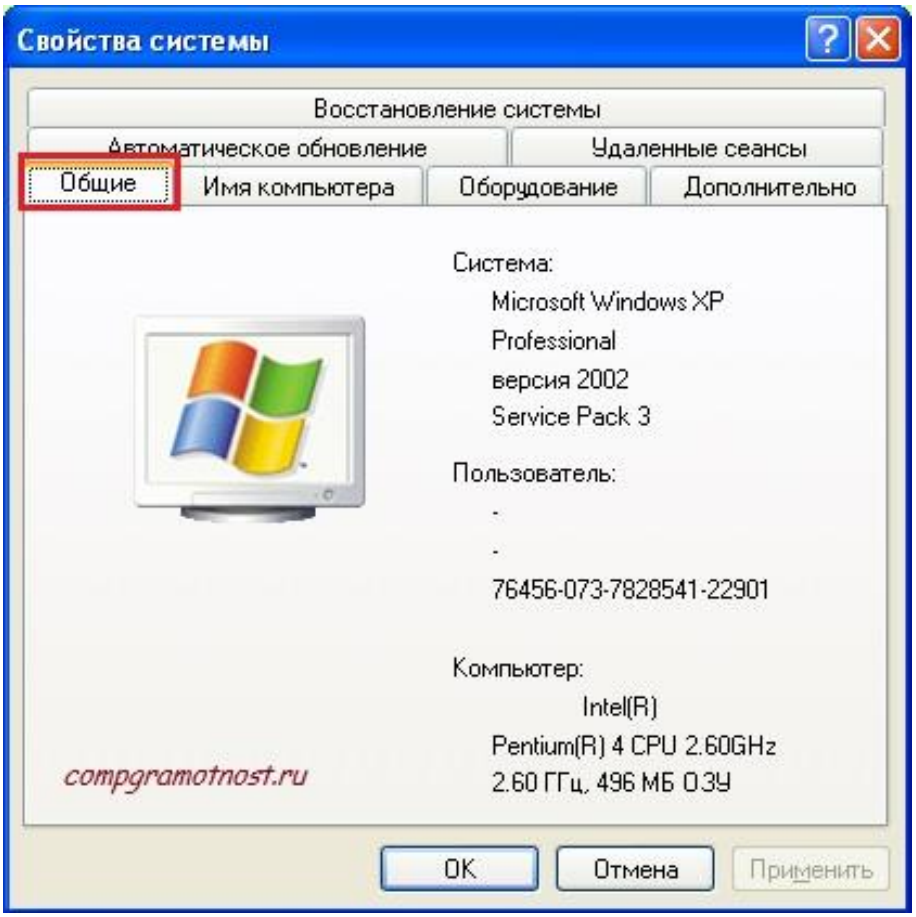

Figure 2.5 – Properties of the system with Windows XP

2.4 Control questions

1. How to determine the bitness of OS?
2. What is an Operating System?
3. What is the RAM?
4. What is the operating system used for?
5. What properties does the operating system have?
6. How can we display OS properties on the screen?
7. What is the command winver used for?
8. How to run the command winver?
9. How to view details about PC?
10. How many versions of Windows are there?

3 Laboratory work №3. Installation and use of application programs in the professional field

Work purpose: mastering principles of installation of AIDA64 application program and its use in the professional sphere.

3.1 Preliminary preparation

3.1.1 It is necessary to get acquainted with the concept of «file manager».
3.1.2 Study main functions of AIDA64program.

3.2 Work assignment

3.2.1 Install AIDA64 program.
3.2.2 Master main functions of AIDA64 program.

3.3 Methodological instructions for performing the work

3.3.1 Monitoring the computer productivity by means of AIDA64 utility.

Having loaded AIDA64 program in the main window we choose the Russian language by the command File/Settings.

To deal with AIDA64 program you need to select the section of interest in the menu and the program gives comprehensive information about the values of parameters of the chosen device or program. If necessary, you can select on the bar of tools Report\ Rapid report\Simple text.

1) Monitoring temperature, voltage and fans.

AIDA64 supports 250 different sensors located on internal devices of the computer, and displays temperature, voltage, fan speed and power consumption. Among other things, this data can be displayed in the mono with the system tray, OSD panel, desktop gadget and on the Logitech G15/G19 keyboard display. The values can be written in the journal or exported to external application (for example in RivaTuner and Samurai). In addition, AIDA64 can signal about exceeding the allowed values and about emergency.

To know the temperature of computer/laptop components you can see the tab Menu-Computer-Sensors (figure 3.1).

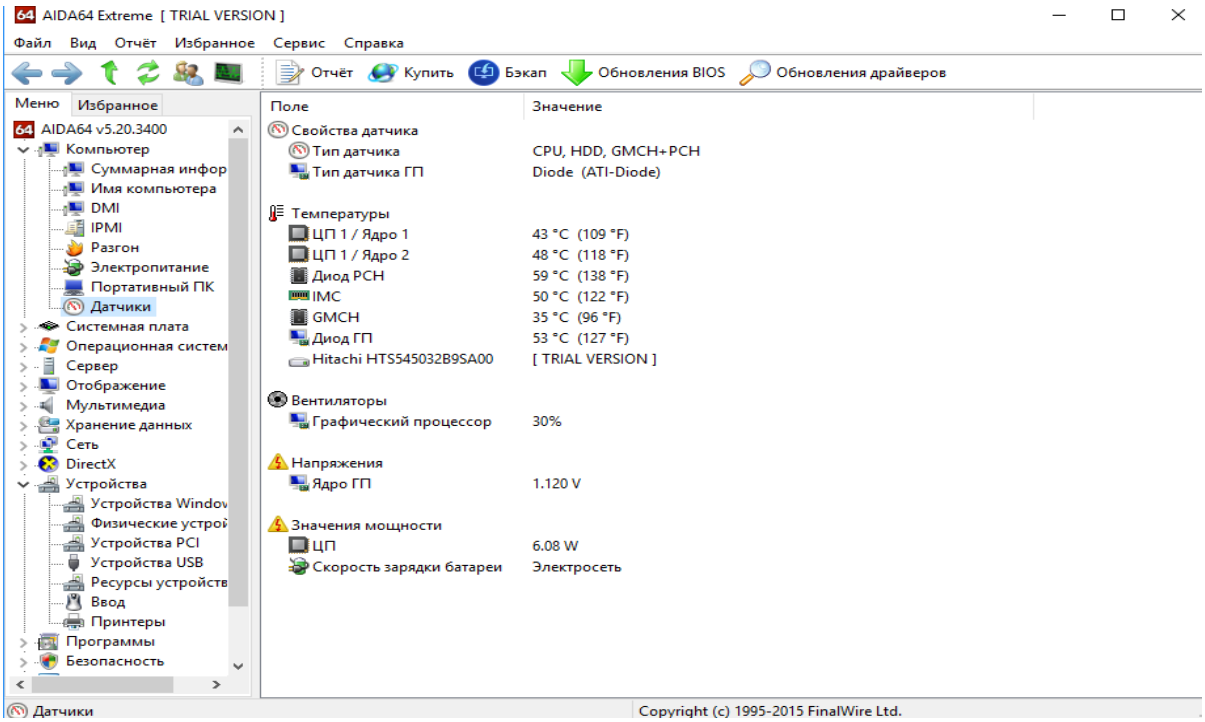

Figure 3.1

2) *Test of drivers.* Select the tab «Service» - Test Drive → in «AIDA64 Disk Benchmark» select an available storage device in output lists and one of the data reading modes → «Start».

Figure 3.2

Possible data reading modes:

a) «Linear Read» – mode of linear reading (megabyte per second), the graph of this speed should be linear, it can be stepped for outdated HDDs, but both with a linear decrease of speed;

b) «Random Read» – this mode reflects speed of working with small sized files;

c) «Buffered Read» – mode of reading accumulated data;

d) «Average Read Access» – average speed of access to data when reading;

e) «Max Read Access» – maximal access time when reading.

To check the hard disk in modes of recording data, click on «Options» on the top panel and activate the «Write tests» option. If desired, the test results can be saved as screenshots using «Save» button.

3) *Test of processor cache and RAM* is done in «Test cache and memory» section of «Service» menu → «Start Benchmark».

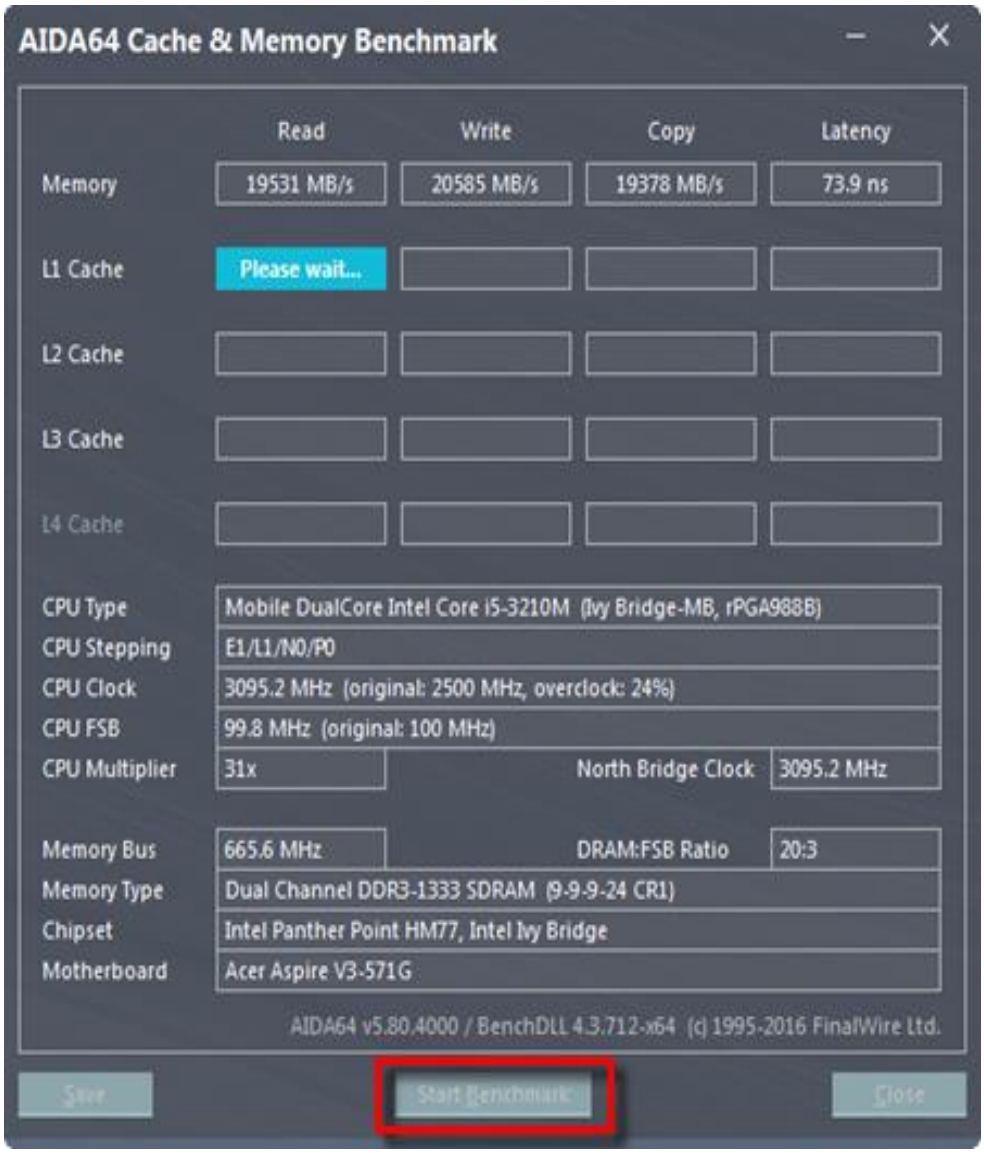

Figure 3.3

This test displays Read speed; Write speed, Copy speed and Latency of the processor cache. Cash of Central Processing Unit – it is the fast-acting memory of SRAM type, used for storage often-used data from slower main memory.

4) *Test of video card in the GPGPU mode* is done by the start of command «GPGPU Test» in «Service» menu – «Start Benchmark».

The test can be done maximum on 16 graphic processors from AMD, Intel and NVIDIA.

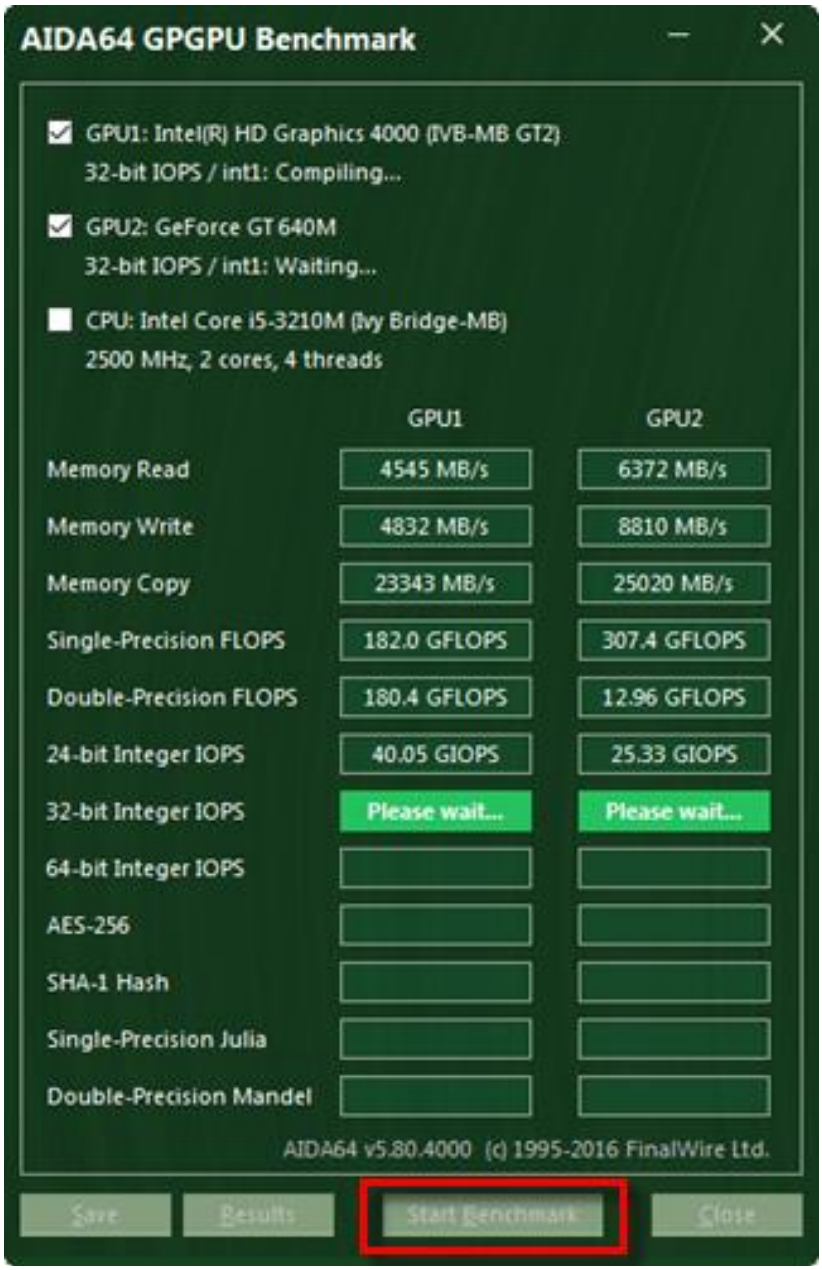

Figure 3.4

GPGPU – General-purpose computing for graphics processing units, unspecialized calculations on graphic processors – is a technique of the use of graphic processor video card. The processor usually deals with calculations only for computer graphics, to perform calculations in general computing applications, that

are usually carried out by central processor, i.e. the use of a graphics processor (GPU) with CPU to accelerate the applications.

5) *Test of system stability* allows creating a full load for the processor (or even for several processors at the same time), memory subsystem, disks and graphic processor. During the test, you can monitor temperature and voltage indications, as well as the fan speed and consumption of energy in real time of the graph. We run the test by selecting the «System Stability Test» in the «Service» window.

The duration of the test must be chosen independently!!!

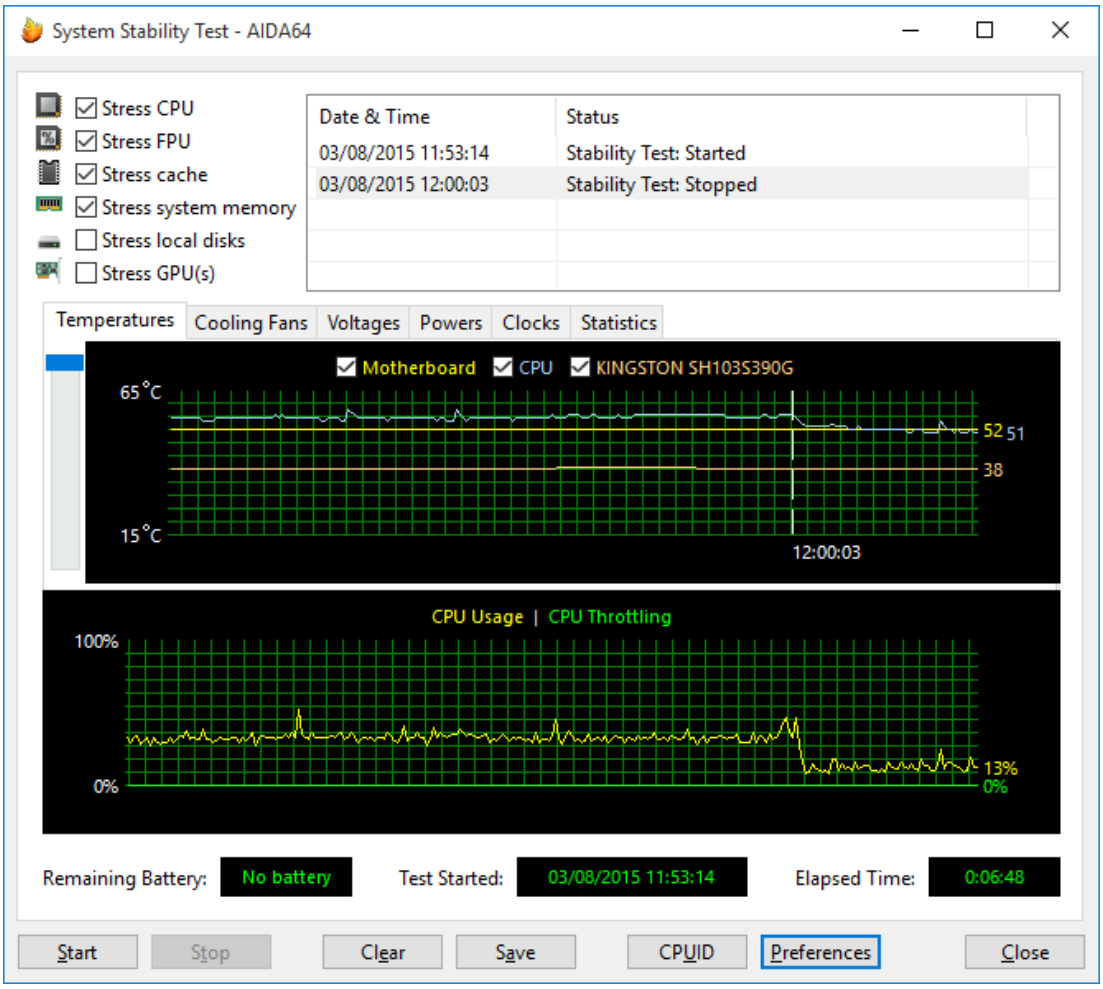

Figure 3.5

«Temperature» tab and the top graph show the temperatures of computer components. By setting or removing a checkmark, you are able to display or remove the temperature of any component on the graph. Taps of cooler speed, voltage and others are shown by their components.

The tap «Statistics» shows in the form of a table the minimum and maximum of any parameter: temperature, voltages, etc., i.e. all statistics collected during the test.

The lower graph shows CPU Usage and CPU Throttling mode.

CPU Throttling – it is a technology that, in the case of processor overheating, activates throttling and strongly reduces the productivity, and so, the temperature, which frequently rescues from the emergency of shutdown of the computer and loss of information.

But if this mode is started, this means that the temperature attained its critical mass and it is extremely important to turn off the computer and see, what happened with cooling system.

The types of tests are indicated on top: Stress CPU, Stress FPU, Stress cashe, Stress system memory, Stress local disks (processor, coolers, cache, operating memory, hard disk).

The word "Stress" means, that a load of one type or another will be applied on one or another component of the system, marked with a check mark, beginning from a simple simulation of the work (for example, calculating some difficult operation by the processor) and ending with abnormal situations (such as reducing the speed of coolers, which simulates, say, the summer heat).

6) *Monitor diagnostics* allows you to find necessary settings of LCD- or CRT-screens, to calibrate the devices and detect possible problems with the equipment. The display is checked with 45 different test screens, which allows detecting any problems with configuration or potential malfunction.

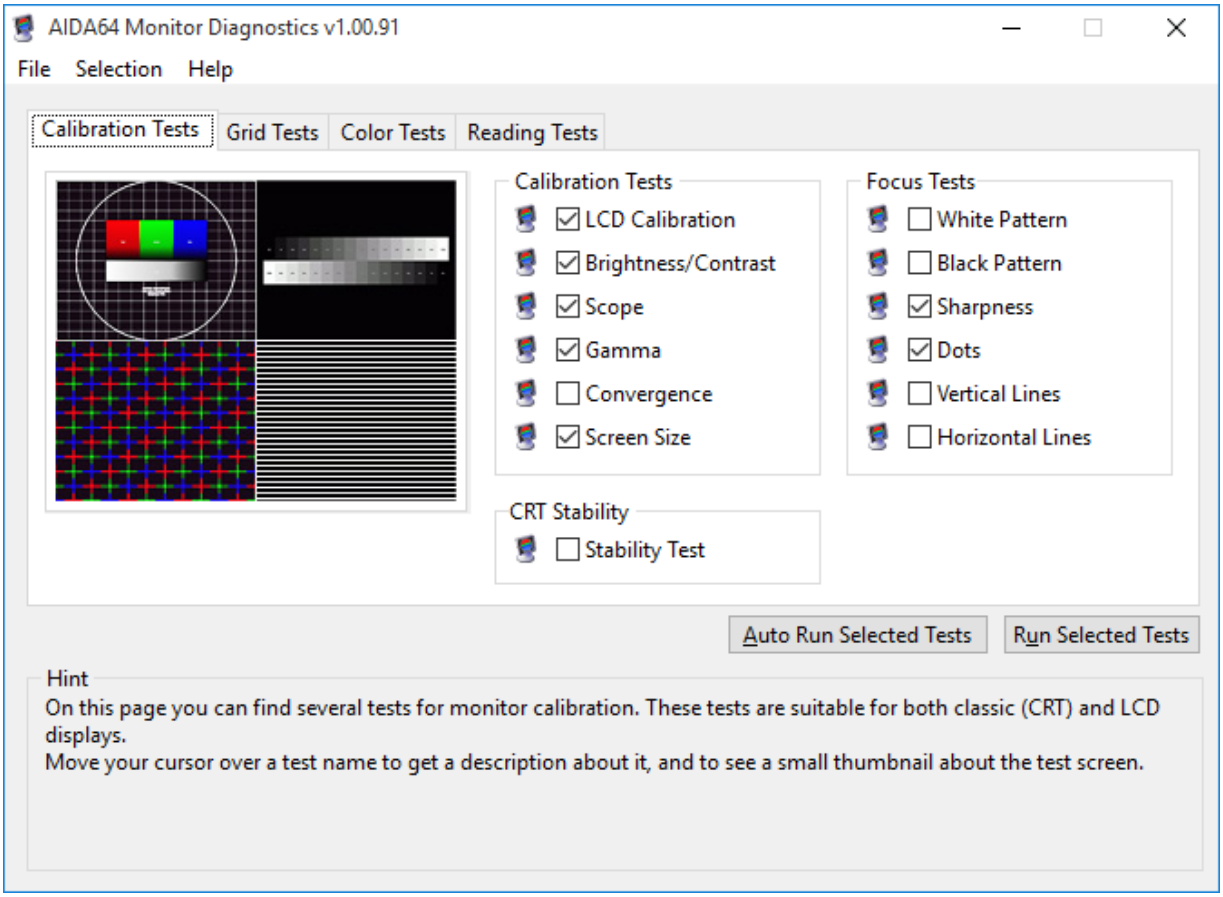

Figure 3.6 – Monitor diagnostics

3.4 Control questions

1. Which command does the task manager call?
2. What is the processor?
3. What is the system block?
4. What is the motherboard?
5. What is memory? How is the memory classified in an Electronic Computer?
6. What is Stress test of system stability?
7. How to test a video card?
8. How to carry out a CPU test?
9. List the modes of reading data when testing the disks.

4 Laboratory work №4. Processing of numerical information, edits, formulas and creating diagrams in Excel spreadsheet editor

Work purpose: study principles of Excel table editor, processing of numeral information by means of MS Office.

4.1 Preliminary preparation

4.1.1 It is necessary to get acquainted with main features of the Excel table editor.

4.1.2 Study and learn the principle of operation of Excel table editor.

4.2 Work assignment

4.2.1 Create the table of student's progress on ICT discipline in Excel table editor.

4.2.2 Carry out the processing of numeral information in the Excel spreadsheet (average score on the subject, common score, part of assessments «excellent» и «good», amount of lateness.

4.2.3 Organize diagrams on base numeral information of Excel tabular editor by student's progress.

4.3 Methodological guidelines for performing the work

Open the table editor by Start - MS Office - MS Office Excel 2007. The Microsoft Excel 2007 window uses a new ribbon interface (figure 4.1).

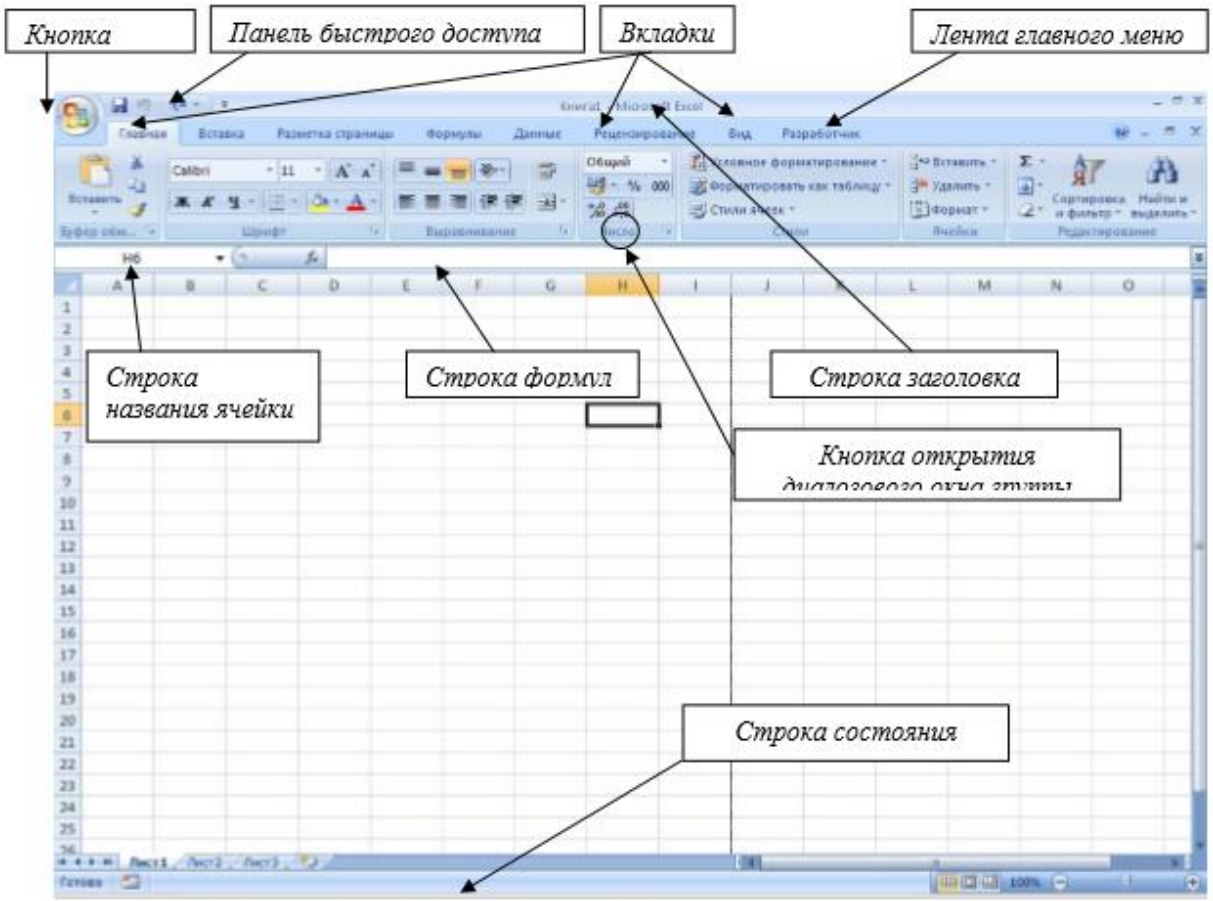

Figure 4.1 –Interface of table editor Excel 2007

All files created in Excel are called books; they consist of many worksheets and have an extension.

– .XLSX, if the book does not contain macros;
– .XLSM, in the book contains macros;
– .XLTX, if the book is a template;
– .XLTM, if the book is a template with macros.

When you start the program, a new empty book is automatically created. To create a new book one can also use «Create» of the «Office» button.

To save the book and its compatibility with earlier versions, you should save it in Excel 97-2003 file format («Office» button - Save as ...). Also with this command, you can save the book in other available formats. Excel 2007, by default, saves the files in xlsx format.

4.3.1 Dealing with the sheets and sells in Excel 2007.

Every workbook in Excel consists of working sheets. A sheet consists of cells that form rows and columns. To activate a sheet, it is necessary to click on its name in the sheet label group, or on the arrow buttons to go to the necessary sheet (figure 4.2).

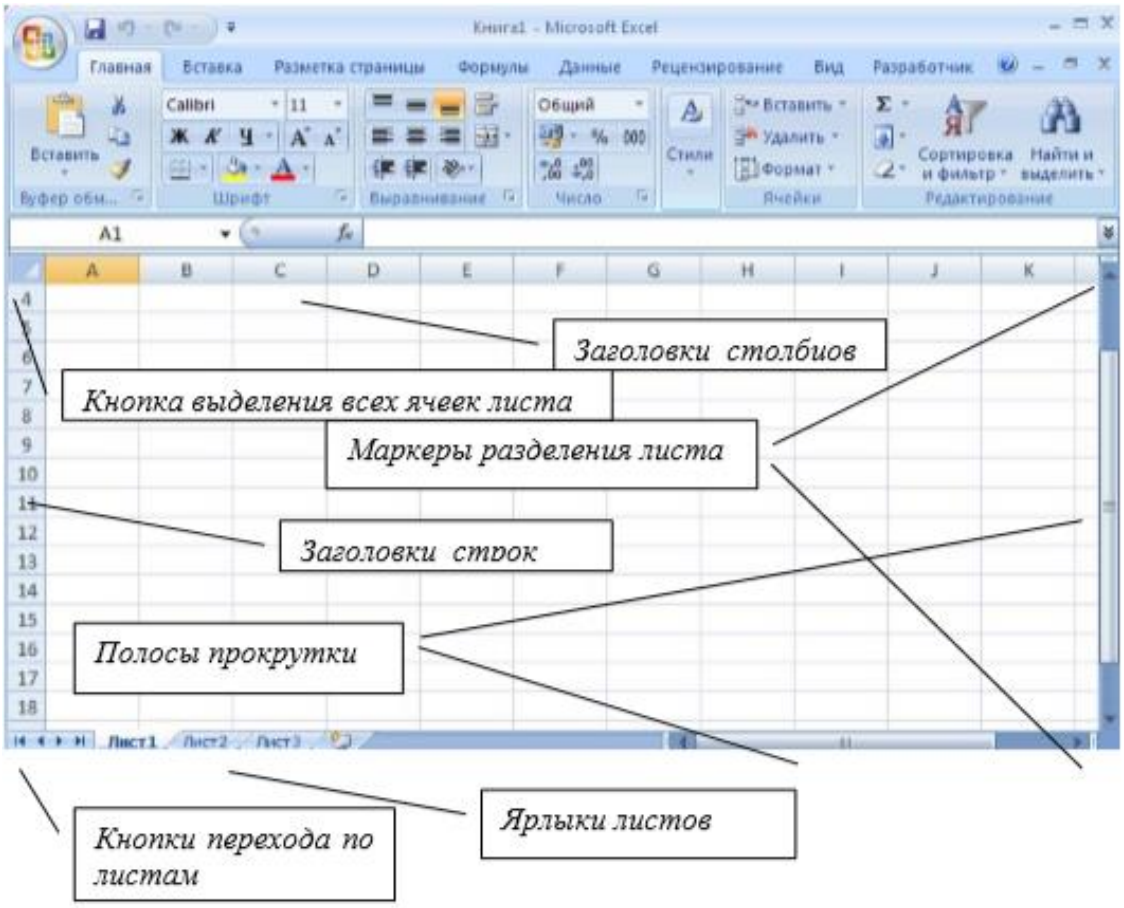

Figure 4.2 – Working sheet of the book

You can add the sheets, delete them, move, copy, rename, highlight and select a color for label. To do this, you can use an appropriate command from the context menu by clicking right mouse button on the sheet label.

To move data from cell/row/column, you must highlight a necessary element and in context menu by clicking right mouse button select *Cut* then *Insert*, moving the cursor and selecting the desirable place to insert. In addition, you can use keyboard shortcuts Shift+Delete or Ctrl+X (to cut) and Shift+Insert or Ctrl+V (to insert), or just drag the element to the new place by left mouse button, or use corresponding buttons on the *Clipboard* panel of the *Home* tab.

To add a new cell on a sheet, highlight the place of a new cell, then in context menu select the command *Cut* … and in the appeared window *Add cells* select the desired option.

To add a new row/column, highlight a row or column, where a new row/column will be inserted, and in context menu by command *Insert* introduce the element, or apply the command *Home – Cells – Insert*.

To delete a row/column highlight this element and in context menu by command Delete carry out the removal or apply the command Home – Cells – Delete.

When removing a row there will be a displacement to up; when removing a column there will be a displacement to the left. To delete cells with a shift, select *Delete* from the shortcut menu and specify how to delete them..

To delete the data from cells use the command in context menu *Delete – Clear contents*. Also on *Editing* panel on the Home tab there is a *Clear* button, which allows you to select exactly what you want to clear in the cell (everything, format, contents, notes).

To prevent other users from seeing a part of the information on the sheet, you can hide its specific rows/columns. To do this highlight desired rows/columns and select command *Hide context menu* or command *Home – Cells – Format – Hide*, or *Display – Hide rows(columns).* Headings of hidden columns are not displayed on the screen. To display hidden elements select the area that includes them, and execute the command in context menu *Display*, or command *Home – Cells – Format – Hide* or *Display – Display rows(columns).*

4.3.2 Formatting table cells in EXCEL 2007.

The main facilities for formatting the cells are located on panels *Font*, *Alignment*, *Styles*, *Number*, *Cells* of tab *Home*, in a dialog window *Format of cells* (opened from toolbar, or from context menu) and on a mini-panel, that is called when you click on a cell by right mouse button. (Figure 4.3).

Having selected a cell and called the dialog window of formatting, you can apply different ways of drawing up cells. You can use the tools from the mini-bar, from the *Font* tab of the *Home* tab, or from the *Font* tab of the *Format Cells* window to set font parameters (view, outline, color, size, modification. The alignment of text in cells horizontally and vertically, the slope of the text, word wrap, auto-selection of the width of the cell and amalgamation/disamalgamation can be set using the *Alignment* panel buttons of the *Home* tab, the mini-panel, the *Alignment* tab of the *Format Cells* window.

The border and cell fill options are specified in the Font pane, mini-panels, *Border* tabs, *Pour* in the *Format cells* window. The format of data representation in cells can be specified on the Number tab of the Format Cells window either in the Number of Home tab, or in the mini-panel.

When formatting, you can use the Format by sample that is called by the button from Clipboard panel of the Home tab. It transfers the formatting parameters of the selected cell to a new fragment of the table.

Formatting the cells can be produced using styles – blanks that includes certain set of parameters for formatting cells. The convenience of styles is that all cells, formatted with the same style, will change their appearance when editing style settings. To use a ready-made style, you need to select cells and apply the desired style by command *Home – Styles – Style of cells*. After applying the style to the cells you can additionally use any other formatting methods.

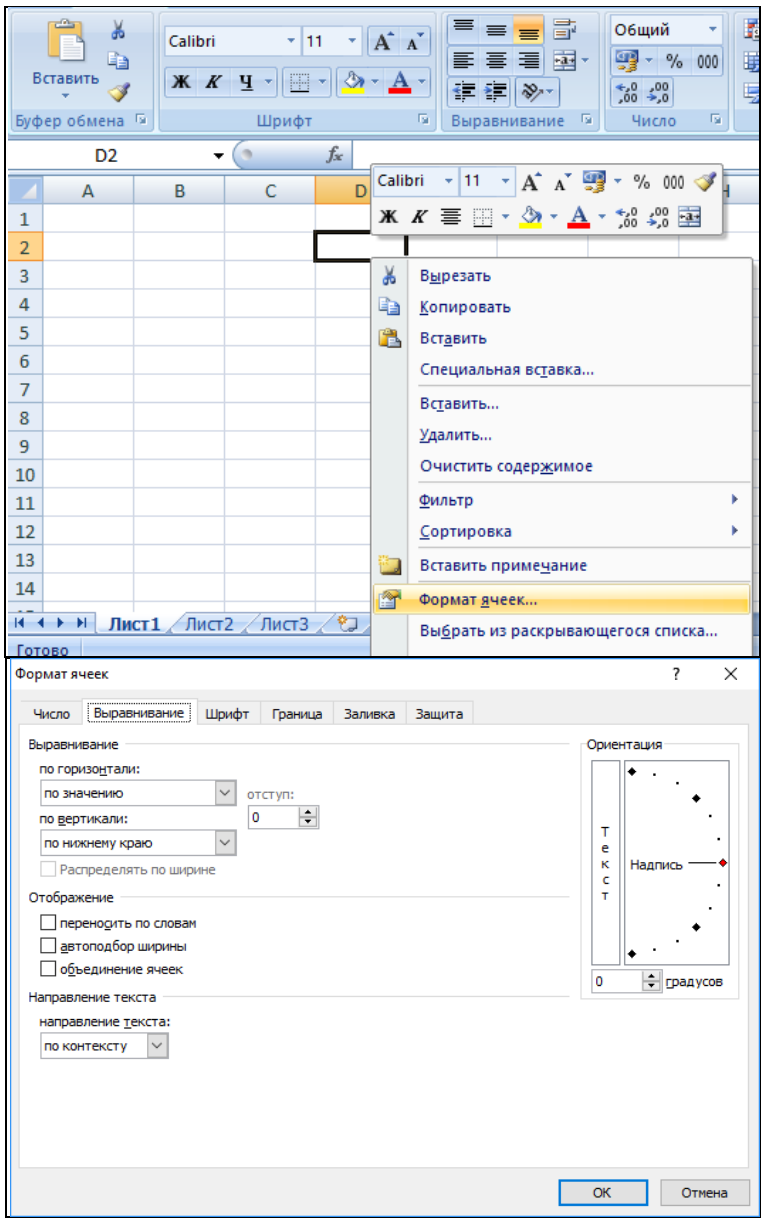

Figure 4.3 – Context menu for formatting cells in table

To make necessary changes to the existing style, select *Home – Styles – Style* of cells and on the name of appropriate style click right mouse button. In the dialog window *Style* select Format button and make the necessary changes to the styles settings. To make your own style, format the cell as needed, select Home – Styles – Style of cells – Make cells style and add a name. To copy the style of one book to another, use the command Home – Styles – Style of cells – Combine styles in a book, that you want to copy desired style. In the dialog window of combining styles, select the style you want to transfer.

To change height and width parameters of the columns, it is necessary to select corresponding rows/columns and drag it: the upper for the rows and the right for the column. To set the exact height and width values, use the Main – Cells – Format – Row Height/Column Width commands. Commands Home – Cells – Format – Auto-fit row height/Auto-fit of column width allow you to select

automatically the values of corresponding parameters, so that the text input in the cell was fully displayed.

4.3.3 Data input in Excel 2007.

Data of three types can be in the cells of electronic tables:

– numerical value (including time and date);
– text;
– formula.

On the desktop, but in the «graphic layer» on the top of the sheet, there also may be drawings, diagrams, buttons and other objects.

Numbers are input using the upper row of the keyboard or numeric keypad. A comma or dot is used as a decimal separator; you can enter signs of money values. If you enter minus or parentheses before the number, it is considered negative. Zeroes typed before a number are ignored by the program. If you want to get a value with zeroes in front, it must be interpreted as a text value.

Entering dates and time values for representation of date Excel uses the internal system for serial numbering of dates. Dates are entered in the usual format and are automatically recognized. Time values are also entered in one of the recognizable time formats. The representation of the date and time directly on the sheet is controlled by specifying the display format of the cell.

All entered data are perceived as text values, and not recognized as numbers and formulas. Text values are aligned on the left border of the table. If the text does not fit in one cell, then it is located on top of adjacent cells, if they are free. Parameters of location of the text in a cell are specified by format of the cells.

The Formula – it is any mathematical value. The formula always starts with sign «=», besides operators and links to the cells, it includes built-in Excel functions.

After data input to the cell, Excel automatically tries to define their type and assign an appropriate format to the cell - the data representation form, selecting *Home - Number - Number format*, or by the context menu for the selected cell on the *Number* tab of the *Format Cells* window. Initially, all cells in the table have the format *General*.

When you enter data on the sheets, you can use some techniques to speed up their input.

1) Autocomplete when entering.
2) Use of progression.
3) Auto-complete when entering.
4) Using AutoCorrect when entering
5) Use Ctrl + Enter key combination to enter duplicate values.

4.3.4 Using formulas in Excel 2010.

A formula in Excel is a mathematical expression, on the basic of which the value of a certain cell is calculated.

One can use in formulas:

– numeral values;
– cell addresses (relative, absolute and mixed links);

– operators: mathematical (+, -, *, /, %, ^), comparisons (=, <, >, >=, <=, < >), the text operator & (for combining several text rows into one), operators range of relations (a colon (:) – range, comma (,) – to combine ranges, space – intersection of ranges);

– functions.

The formula always starts with a «=» sign. The result of the formula is displayed in the cell, and the formula itself is displayed in a formulas row.

The cells address consists of the name of the column and number of row of the worksheet (for example A1, BM55). In the formulas, addresses are indicated by links - relative, absolute or mixed.

A relative link indicates the location of desired cell relative to active one (i.e., the current one). When you copy formulas, these links automatically change according to new position of the formula (example of link entry: A2, C10).

An absolute reference indicates the exact location of the cell in the formula. When you copy formula, these links are not saved. To create an absolute link to a cell, put dollar sign ($) before the column and line designation (example of link entries: $ A $ 2, $ C $ 10). To fix a part of the addresses (from a column or row) when copying formulas, use a mixed link with the fixation of the desired parameter (example of link entry: $ A2, C $ 10).

To avoid using manually dollar signs when writing links, one can use the F4 key, which allows you to «sort out» all kinds of links for the cell. To use a cell link from another worksheet in the formula, you need to use the following syntax: SheetName! CellName (example: Sheet2! C20).

To use in the formula a link to the cell from another worksheet, you need to use the following syntax: [Work_book_name] Sheet_name! Cell_address (example of record: [Tables.xlsx] Sheet2! C20).

To edit the content of formula: click twice on a cell with formula, click F12, or edit the content in the formula input row.

To identify errors during creation the formulas, you can display the dependence of cells. Dependencies are displayed only within one open book. When creating a dependency, the influencing cells and dependent cells are used. An influencing cell is a cell that refers to a formula in another cell. A dependent cell is a cell that contains a formula.

To display a link, cells, you must select the *Influencing cells* or *Dependent cells* command on the *Dependence of formulas* panel on the *Formulas* tab. To avoid displaying the dependencies, use the Remove arrows command of the same panel.

4.3.5 Dealing with diagrams.

A diagram is the way of visual representation of information, given in the form of a table of numbers. The main elements of the diagram is shown on figure 4.4. To create a diagram, you must first select a range of data; click the button of desired type of diagram in the Diagrams panel of the *Insert* tab.

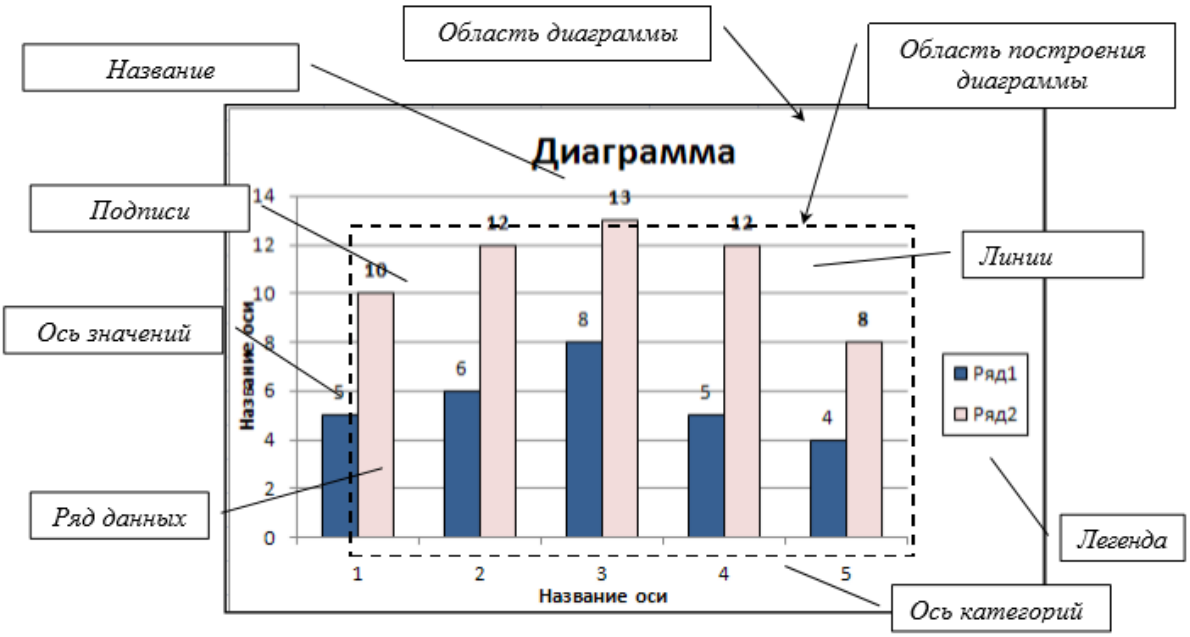

Figure 4.4 – Main elements of the diagram

To move the diagram to another place, you need to highlight and drag it with a left mouse button. To move the diagram to another sheet, use the standard clipping commands (Home – Clipboard – Cut or Ctrl + X) and insert (Home – Clipboard - Insert or Ctrl + V).

To move the diagram on a separate sheet use the command Work with diagrams – Constructor – Arrange – Move the diagram.

To copy the diagram to another place of the sheet, you need to press the key Ctrl and replace it. On a new place, there will be a copy of it. To copy the diagram, located on a separate sheet, you need to move it with the pressed Ctrl key, as a result, a sheet with the copy of the diagram will be added to the book. Also, for copying, you can use the standard copy commands (Home - Clipboard - Copy or Ctrl + C) and paste (Home - Clipboard - Insert or Ctrl + V).

To delete the diagram, select it and click Delete button. To delete the diagram on a separate sheet, you need to click on the label sheet and by the right mouse button from context menu select command *Delete*.

4.4 Control questions

1 What is the purpose of Microsoft Excel program?
2 What is the main functions of Microsoft Excel program?
3 What is the difference between relative and absolute address?
4 How to change parameters of a diagram?
5 What actions ca be performed using the Form?
6 How is data sorted?
7 How is data filtered?
8 What is the Consolidation and how to carry out it?
9 How to establish the dependence of cells?

5 Laboratory work №5 Design and creation of presentations of lecture material.

Work purpose: creating presentations with MS Office, studying the principles of Microsoft PowerPoint 2007 presentation editor.

5.1 Preliminary preparation

5.1.1 It is necessary to get acquainted with main features of Microsoft PowerPoint 2007 presentation editor.

5.1.2 Study and master the working principle of Microsoft PowerPoint 2007 presentation editor.

5.2 Work assignment

5.2.1 Make a presentation in Microsoft PowerPoint 2003/2007/2010 editor.

5.2.2 Assign a template, set an animation.

5.3 Methodological guidelines for performing the work

5.3.1 Basics of the work in MS PowerPoint 2007.

1) Open MS Office PowerPoint 2007 program application:

Home – Programs - Microsoft Office – Microsoft Office PowerPoint 2007.

2) Select the type of current presentation slide: «Main» tab – «Slides» group – «Layout» command. In «Office theme» window, select slide type - Empty slide (figure 5.1).

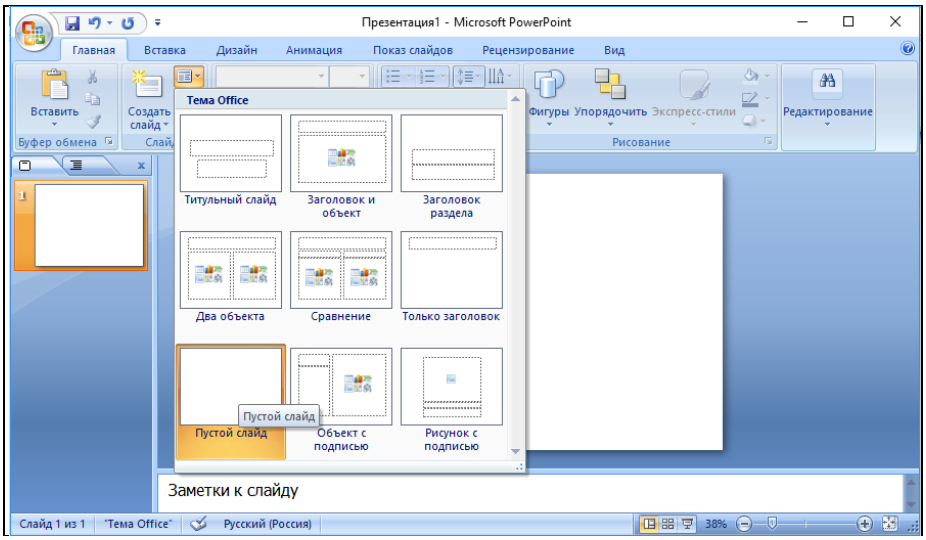

Figure 5.1 – Selection of the type of current presentation slide

You can create a new slide or delete it using «Slides» group (figure 5.2).

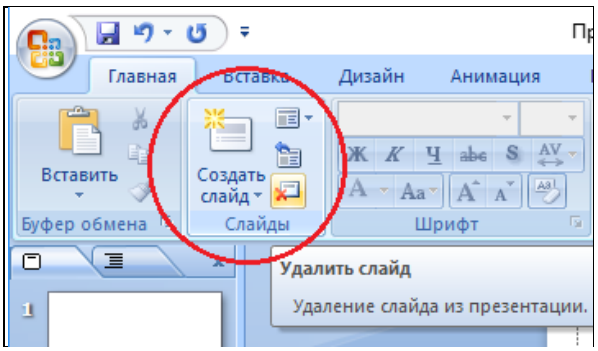

Figure 5.2 – Creating and deleting slides

3) You can create a slide background in Design tab by two ways:

– 1 way: choose the theme of the slide – in «Themes» group. Having chosen the themes, you can change the color, font and Effects. (figure 5.3);

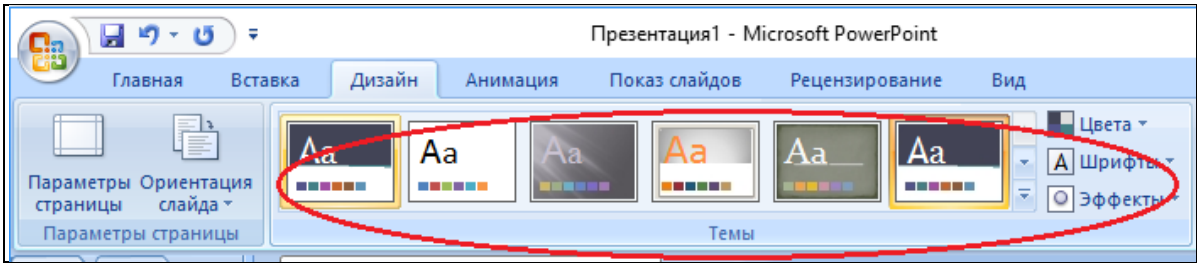

Figure 5.3 – Background theme selection

– 2 way: create your background - «Design» tab - «Background» group - «Background Styles» command (figure 5.4).

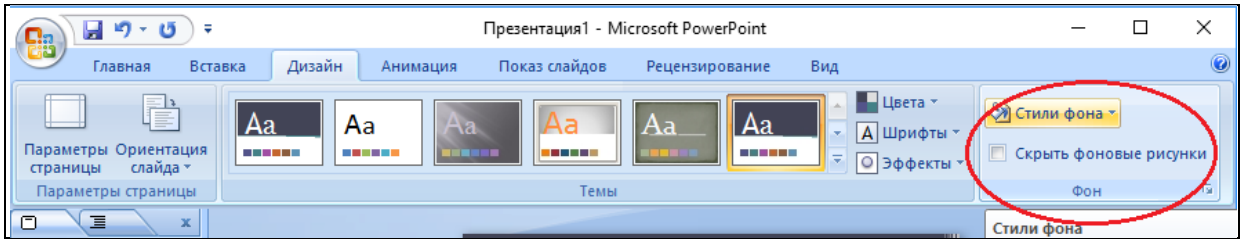

Figure 5.4 –Background styles

The background format is set in «Background Format» window (figure 5.5), which is called by «Background Format» command in «Background Styles» list. Using it, you can select the type of the fill, its color, and so on.

Figure 5.5 – Background format

4) Insert the text into the slide (two ways):

– 1 way «Insert» tab – «Text» – «Caption». Mark the area on the slide with cursor, where the text will be typed, type the text;

– 2 way: in another document, select the text, copy it to the clipboard, go to the presentation, paste it onto the «Caption» slide (select the area for the text) and paste the text from the clipboard, make sure the cursor is in the «Caption».

5) Formatting the selected text: «Home» tab – «Font» or «Paragraph» group:

– color change – «Text color» command  ;

– change of the size of letters – command «Increase font size» or «Decrease font size»  ;

– change the distance between lines - the command «Line spacing» (figure 5.6);

– insert columns;

– change the direction of the text, etc.

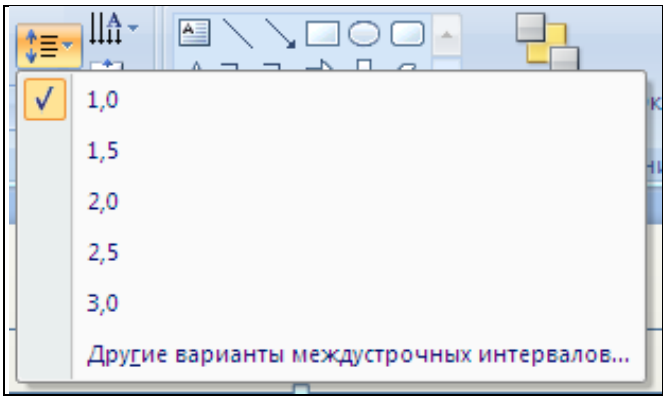

Figure 5.6 – Change of line spacing

To move the area with the text to another place, if you select the area with a mouse and find that cross ✥, then move the area with a mouse and keep left mouse button pressed.

To change the size of the text area, by selecting it with mouse, pointing the cursor at one of the 8 markers on the boundaries of the area, get a double arrow ⟷, move the cursor with the left mouse button pressed.

Inserting graphic images: «Insert» tab - «Illustration» group. Then select the desired command / button.

6) Setting graphic images.

After selecting the graphic object, there will be Format tab. Using commands of «Format» tab, you can:

- change the brightness and contrast of the picture;
- repaint the picture;
- change the display design of the picture, shape, borders, various effects;
- cut a part of the picture, rotate a picture;
- move the picture to the front or back plane (if there are several objects on the slide), etc.

7) Changing the sequence of slides: in «Slides» area, select the slide and drag it to another place with the mouse (figure 5.7).

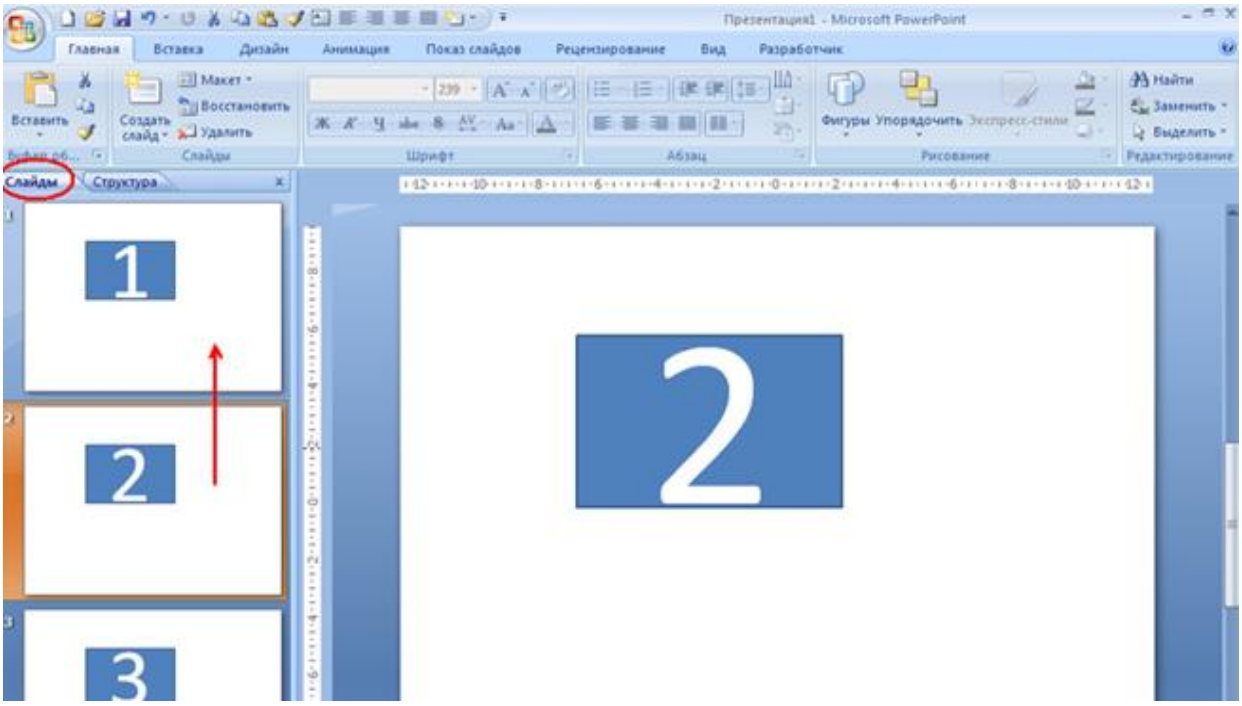

Figure 5.7 – Changing the sequence of slides

8) Setting the animation of selecting object on the current slide: «Animation» tab –«Animation» group – «Setting of the animation» command.

In Animation settings area, from the Add Effect list, select the effect. One mono object has several different animation effects set up. The sequence of the

animation can be changed in «Animation changes» area to change the Start, Direction, Speed.

9) Viewing the presentation: «Slide show» tab –«Start» group – «At first» command. Also, through «Slide Show» tab, you can configure a slide show demonstration.

10) You can save a presentation through the program menu by clicking on the button . Through the item «Save as ...» open «Save document» window - select the folder to save and the name of the presentation, click «Save» button.

5.4 Useful hotkeys

BACKSPACE	Delete one character to the left
CTRL + BACKSPACE	Delete one word to the left
DELETE	Delete one character to the right
CTRL + DELETE	Delete one word to the right
CTRL + X	Cut the selected object
CTRL + C	Copy the selected object
CTRL + V	Paste the copied or cut object
CTRL + Z	Undo the last action
LEFT ARROW	Move one character to the left
RIGHT ARROW	Move one character to the right
CTRL +LEFT ARROW	Move one word to the left
CTRL + RIGHT ARROW	Move one word to the right
END	End of the line
HOME	Beginning of the line
CTRL + END	Go to the end of the text
CTRL + HOME	go to the beginning of the line
SHIFT + (ARROWS, HOME, END)	Select the text
CTRL + RIGHT ARROW	Beginning of the word
CTRL + LEFT ARROW	End of the word
CTRL + HOME	Beginning of the document
CTRL + END	End of the document
PAGE UP	Go back to the previous slide
[NUMBER] + ENTER	Go to slide
F1	Help
CTRL + SHIFT + M	New slide
F5	Slide show
SHIFT + F5	Slide show from the current slide
During the presentation	
B	Black screen
W	White screen
S	Stop or start the automatic slide show

ESC]	End of slide show
CTRL + P	Change pointer by a pen
CTRL + A	Change pen by a pointer
SHIFT + F10/ DCM	Displaying the context menu
Both mouse buttons for 2 seconds	Return to the first slide

5.5 Control questions

1 What is a slide?
2 What is the animation? How to set up animation?
3 How to create a slide?
4 How to change the sequence of slides?
5 How to create a text on the slide?
6 How to create a diagram on the slide?
7 How to create a picture in the slide?
8 What are graphical elementa of the presentation?

6 Laboratory work №6. Development of a database structure, creation of tables and requests

Work purpose: study the principles of operation of Access, development of DB structure by means of MS Office.

6.1 Preliminary preparation

6.1.1 It is necessary to get acquainted with Access main opportunities.
6.1.2 To study and master the principle of operation of Access.

6.2 Work assignment

6.2.1 To create DB tables in Access 2007.
6.2.2 To create cross-table relationships.
6.2.3 To realize data selection by means of requests.

6.3 Methodological guidelines for performing the work

6.3.1 Creation of Microsoft Access database 2007.
1. Start Microsoft Access 2007.
2. Press New Database button.
3. Set a name of the new database – «Firm.accdb».
4. On the tape *Creation* tab in a toolbar of *Table*, press *Designer of Tables* button.

5. Enter names of fields and specify data types, which they treat.

Table 6.1 – Types of data

Field name	Data type
Employee's code	Counter
Surname	Text
Name	Text
Address	Text
Index	Numerical
Phone	Text
Hobby	Text
E-mail	Hyperlink

6. Having saved the table under the name of «Employees» quit a design view and do not set key fields.

7. Thus, it is necessary to create two more tables: *Clients* and *Orders* with the following data.

Table 6.2 – Types of data *Clients*

Field name	Type of data.
Client's code	Counter
Name of the company	Text
Address	Text
Phone number	Text
E-mail	Hyperlink
Notes	Field MEMO

Table 6.3 – Types of data *Orders*

Field name	Type of data.
Order code	Counter
Client's code	Text
Employee's code	Text
Date of placement	Date/time
Date of performance	Date/time
Sum	monetary
Mark about performance	Logical

6.3.2 Creation of cross-table relationships.

It is necessary to connect separate tables containing information on a certain subject in a uniform database structure. For connecting the tables, it is necessary to set key fields. The key consists of one or more fields whose values uniquely identify each record in the table. The most suitable one is «Counter», because the values in this field are unique (i.e. exclude repetitions).

1. Open table «Employees» in regime «Designer».

2. Right-click in the field «The employee's code» and in the appeared shortcut menu choose the Key Field command. If it is necessary to set several key fields in the table, then it is possible to select them, retaining the Ctrl key.

3. Assign the key field «Client's Code» for table «Clients» and for table «Orders» – «An order code».

4. Table «Orders» contains the *Employee's Code* and *Client's Code* fields. In case of their filling there can be some difficulties as it is not always possible to remember all enterprises with which the firm, and all employees works with number of a code. For convenience, it is possible to create the revealing lists by means of «Master of substitutions».

5. Open table *«Orders»* in regime of *«Designer»*.

6. For Employee's Code field select data type «Master of substitutions».

7. Choose the Object in the appeared window. «Substitution Column» will use the values from the Table or a Request command and click on the button *Further*.

8. Select the table «Employees» from the list of tables and click on *Further*.

9. Select the Employee's Code field from Available fields list and click on the button with an arrow to enter a field into *Selected Fields* list. Add *Surname and Name* field in the same way and click on *Further*.

10. Select an order of sorting list "*Surname*" across the field.

11. Set a necessary column width of the revealing list in the following dialog box.

12. Set *Hide a Key Column* checkbox and press the button *Further*.

13. Replace, if necessary, a note for a field of substitutions on the last step of "*Master of substitutions"* and click on the button *Ready*.

14. Create the revealing list for *Client's Code* field in the same way.

15. After creating key fields, it is possible to start creating relations. There are several types of relations between tables:

– in case of the relation «one-to-one», each entry of a key field in the first table corresponds only one record in the connected field of the other table and vice versa. The relations of this kind are used not very often. Sometimes they can be used for division of the tables containing many fields for separation of a part of the table for safety reasons;

– in case of «one-to-many» relation, each entry in the first table corresponds to several records in the second one, but entry in the second table cannot have more than one connected entry in the first table;

– in case of the relation to «many-to-many» one entry in the first table can correspond to several entries in the second table, and one entry in the second table can correspond to several records in the first.

16. Close all open tables, as it is impossible to create or change relations between open tables.

17. Execute a command: tab of the tape «*Operation with Databases*» → *Data diagram* button.

18. If there were no relations between tables of the base, then when opening *Data diagram* window, *Adding Table* window appears, from which one can select the tables *«Employees», «Clients» and «Orders»*.

19. If table relationships were already set, then right-click on the data scheme for adding in the data scheme of the new table and select *Add the Table* in the shortcut menu.

20. Establish cross-table relationship «*Employees»* and *«Orders»*, for this purpose select the *Employee's Code* field from table «*Employees»* and transfer it to the appropriate field in table *Orders*.

21. After transferring and the dialog box *«Change of relations»* will appear (Figure 6.1) in which click "Support of Integrity Condition". It will allow preventing from cases of deleting records from one table in case of which the related data in other tables will be left without relation.

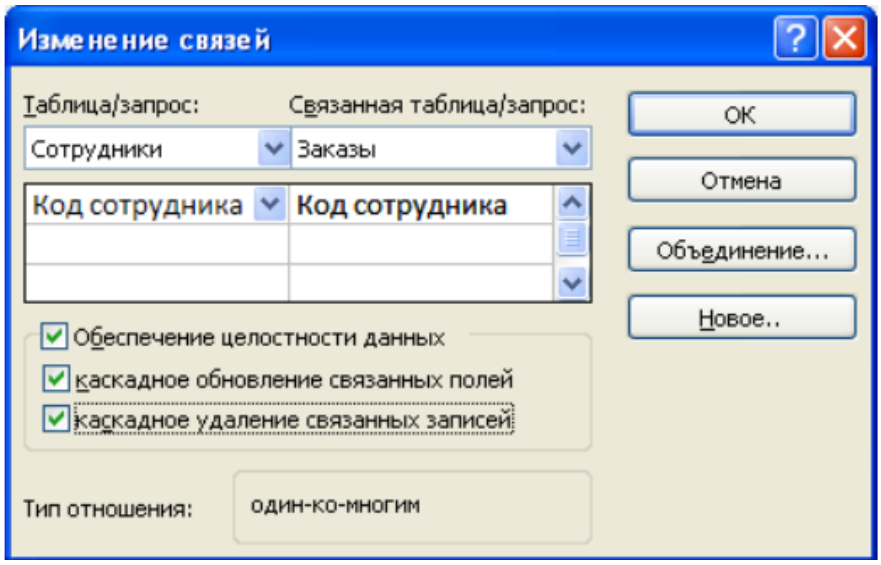

Figure 6.1 – Creation of relations between tables

22. «The Cascade Update of the Connected Fields» and «The Cascade Delete of the Connected Records» checkboxes provide simultaneous up dating or deleting data in all subordinate tables in case of their change in the principal table.

23. Parameters of relation can be changed, by pressing *Combining* button.

24. Having installed all necessary parameters press *OK* button.

25. Establish the relation between the tables «*Clients» and «Orders»*independently.

26. As a result, the data scheme provided in a figure 6.2 will turn out.

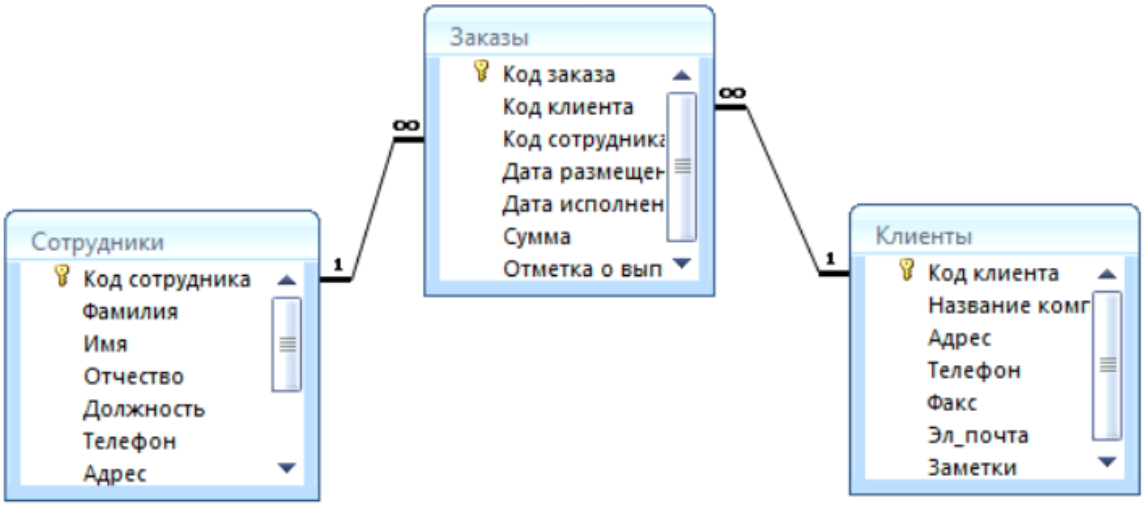

Figure 6.2 – Data diagram

27. Enter the information on ten enterprises with which this firm works in the table *«Clients»*.

28. In the table *«Orders»*issue several applications received by the firm.

29. Open the table *«Employees»* double click of the mouse and fill in it 10 lines.

30. Add «*Middle Name*» and «*Date of birth»* field, for this purpose:

– set the cursor in the field, before which it is necessary to insert a new column;

– execute a command: the tab of the tape «*Datasheet view»* → → *«Insert»* the Fields and Columns toolbar;

– having clicked twice on «Field 1», rename it into *«Middle name»*, and «Field 2» – «Date of birth».

31. Pass to regime of *«Designer»* with a command: tab of the tape *«Principal»* → *«Modes»* → *«Designer»*.

32. For the field «*Date of birth*», set the data type «*Date/time*»; select «*Date short format»* from field properties.

33. Format the table as follows:

a) color of grid – dark red;

b) background color – blue;

c) text color is dark red, the size is 12 pt, outline is italic.

34. For this purpose, select «*Formatting of the Text»* panel from the *Principal* tab, open additional functions of this tab – «*Table format»*.

35. Rename «*Hobby»* field into «*Notices»*.

36. Delete the record number 8.

37. Change the size of cells so that all data were visible. For this purpose, it should be enough to left-click twice on boundary of fields.

38. Locate the fields in the following order: *«№»*, *«Surname»*, *«Name»*, *«Middle name»*, *«Phone»*, *«Date of birth»*, *«Notices»*, *«Address»*, *«Index»*, *«Photo»* *«E-mail»*.

39. Fill blank cells of the table.

40. In regime of «*Designer»* add the «*Marital status»* field, which will contain the fixed set of values –*married, not married*. For creation of the revealing list we will use «Master of substitutions»:

– set data type «*Master of substitutions*»;

– select the line «*Fixed Set of Values Will Be Entered*» from the appeared dialog box and press the button «*Further»*;

– number of columns – 1;

– enter data of the list –married, not married;

– press the button «*Ready»*.

41. By means of the revealing list, fill a new column. As the table turned out wide, when filling this column there are some inconveniences: the surname of the person for whom «*Marital status»* field is filled is not visible. To see well the surname when filling the table, it is necessary to use the «*Fix Column»* command from the shortcut menu of the *«Surname»* field.

6.3.3 Selection of data by means of requests.

The requests are the main player of information preview, selection, change and analysis, which is in one or several tables of the database. There are different types of requests, but requests for selection are the most widespread.

1. Open the database «*Firm»* created earlier.

2. Execute the command: *Creation* tape tab → *Master of requests* → *Simple request.*

3. In the appeared dialog box (figure 6.3) specify the table *«Employees»* and select the fields «*Surname», «Name», «Phone»*. Press the button «*Further»*.

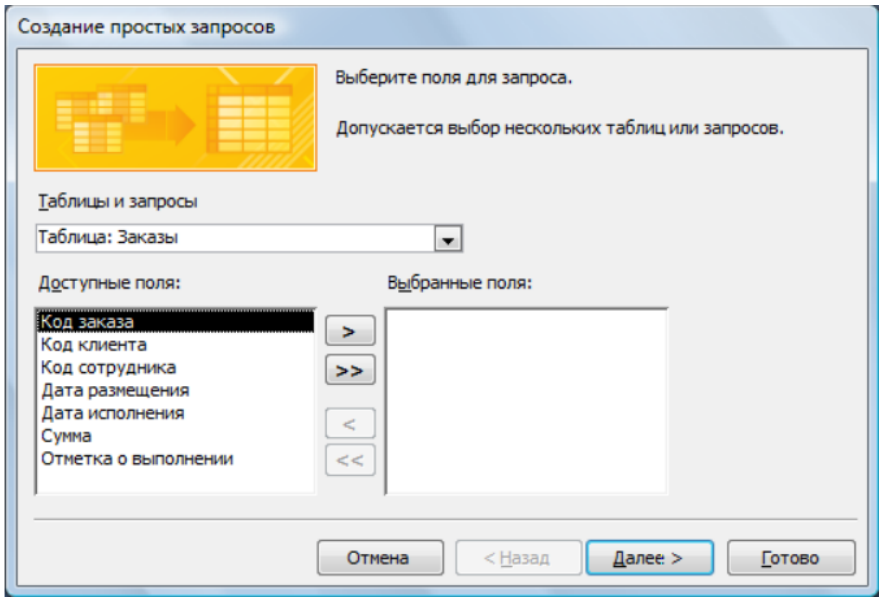

Figure 6.3 – Simple inquiry

4. Enter query name – «*Phones»* – and press the button *«Ready»*. There will be a request, in which it is possible to view phones of employees.

5. Try to create the following request by means of «*Designer*», for this purpose execute a command: tab of the tape *Creation* → *Designer of requests*.

6. In *Adding tables* select the table *Clients* from the dialog box and click on the button «*Add*», and then – on the button «*Close*».

7. To transfer necessary fields to the request form, it is necessary to click twice on them the left mouse button (figure 6.4).

8. To sort records in the field «*Company name*» in alphabetical order, it is necessary to select in the revealing list of the line «*Sorting*» item «in ascending order».

9. Save the request «*Addresses of Clients*».

10. Create independently a request «*Birthdays*», in which it will be possible to view birthdays of employees.

11. Let us assume that we want to know who has a birthday in current month, for example, in April. For this purpose, open a request in regime of «*Designer*».

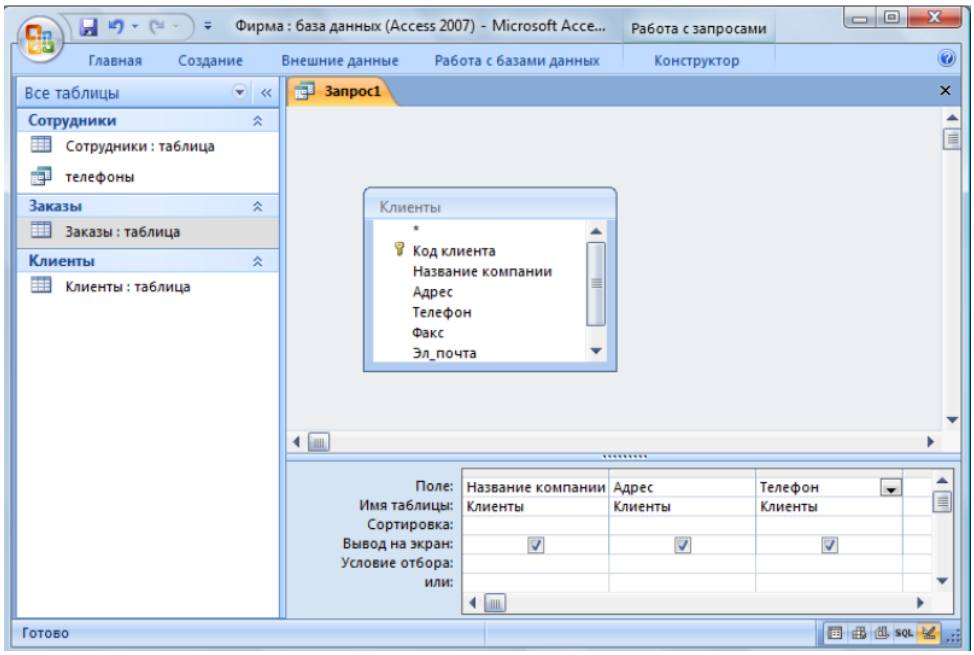

Figure 6.4 – Inquiry in Designer regime

12. In the line «*Selection Condition*» for the «*Date of birth*» field enter *.04.*. This record * means that the date and year of birth can be any, and the month must be the 4th (i.e. April). After that, the window of a request will look as it is given on Figure 6.5.

13. Close «*Designer*» and view the received result. If in the request *Birthdays* there is no entry, so in the table «*Employees*» there is no person who was born in April. Add several people who were born in April to the table «*Employees*», and look how the request will change. Requests are automatically updated in case of each opening.

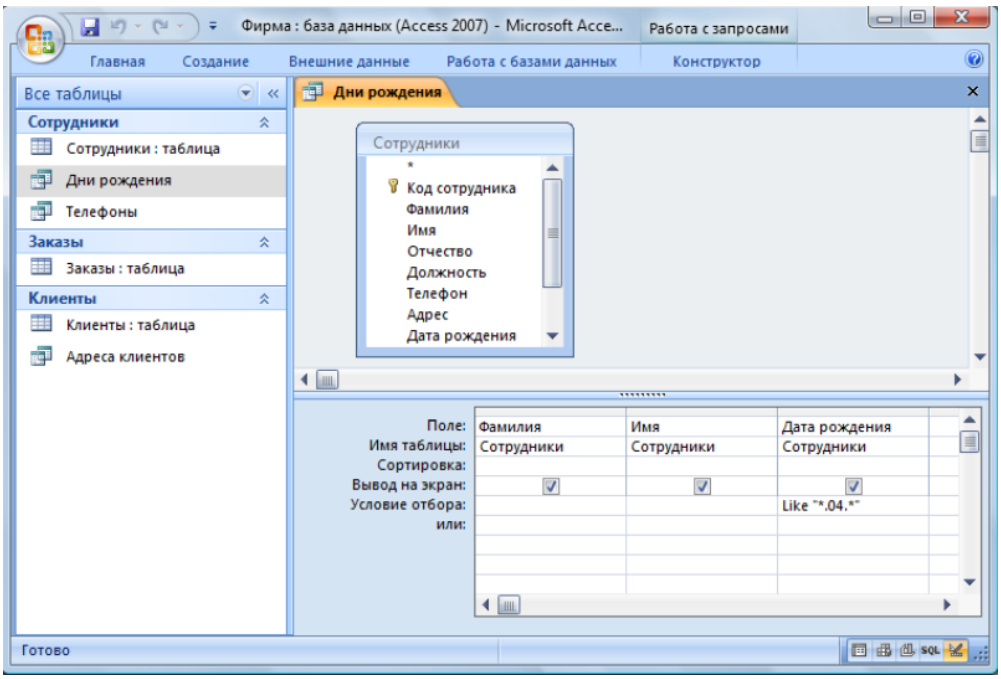

Figure 6.5 – Inquiry creation

14. If it is necessary to know who was born in May, then it is necessary to create a new request or to change a condition in the existing request *Birthdays*. If it is necessary to execute often a request, but every time with new values of conditions, use a request with a parameter. To create a request with parameter, the user needs to enter the text of the message in the line *Selection Condition* of the Form of a Request (figure 6.6).

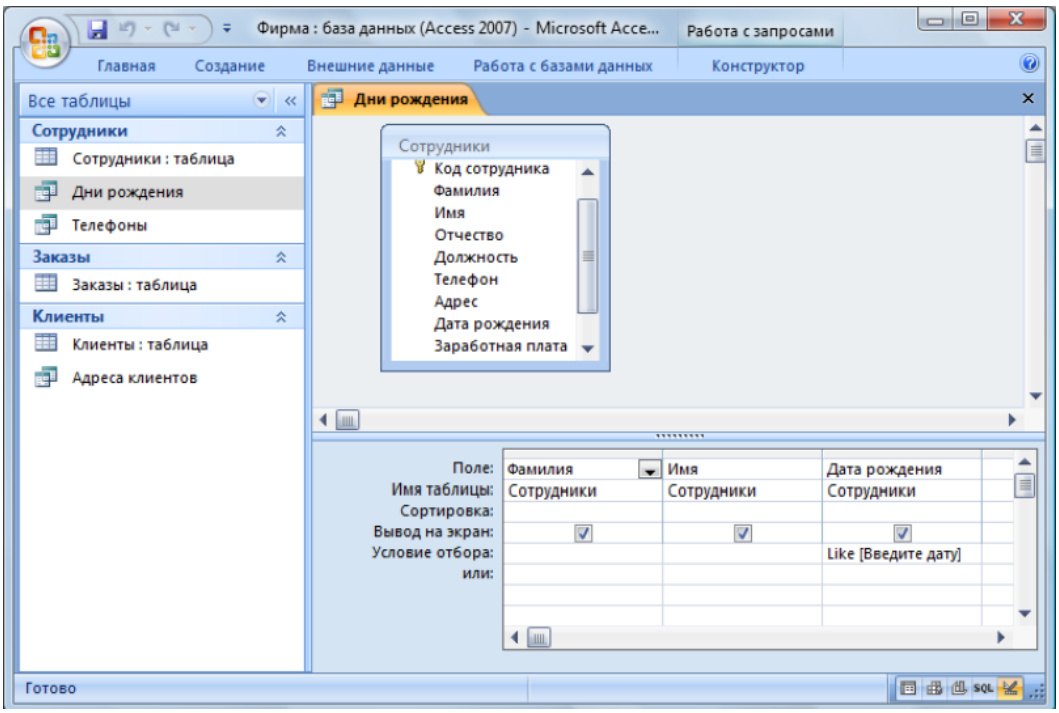

Figure 6.6 – Creation of inquiry with a parameter

15. The record Like [Enter date] means that in case of opening a request a dialog box with the text «*Enter the date*» and the field for input of a condition of selection will appear. If you enter the condition *.04. *, in a request there will be a list of employees who were born in April. Launch a request once again and enter *.05. *, look how the request changed.

16. Change the request *«Phones»* so that in case of its start the dialog box with the message *«Enter a surname»* appeared. As in a request it is necessary to remove a specific surname, the word «Like» should not be written in *Selection condition.*

17. Change the request *«Phones»* so that in case of its start not only the surname, but also the name of the employee were requested.

18. Create independently the request «*The executed orders*» containing the following data: the surname and name of an employee, company name for which he works, mark about execution and order value. Take data of the request from several tables.

19. In «*Selection condition»* for the logical field «*Mark about Execution*», enter «Yes» so that in the request only the executed orders were displayed.

20. Make so that «*Mark about Execution*» column was not displayed.

21. Create request «*Order sum*» in which orders for the amount more than 50 000 tenges will be displayed.

22. Change the request that *Order sum* was from 20 000 to 50 000 tenges. For these requests in *Selection condition* it is possible to use comparison operators >, =, <=, < > and logical operators of And, Or, Not, etc.

23. Sometimes in requests, it is required to make some computation, for example, to count income tax of 13% for each transaction. For this purpose, open the request *«Order sum*» in regime of *«Designer*».

24. In an empty column of the form of the request right-click on the cell *«Field*» and in the appeared shortcut menu choose the *Construct* command. The window «*Expression builder»* will appear (figure 6.7), which consists of three areas: fields of expression, buttons of operators and elements of expression. The field of expression will be on the top, in which it is created. The elements entered into this field are selected from two other areas of the window *«Builder».*

25. In the left list open the *Requests* folder and select the request «*Order sum*». Highlight the *«Sum»* field in the average list and press the button «Insert». The identifier of this field will appear in the field of expression *«Builder».*

26. Click on the button * and enter 0,13 (figure 6.7). Thus, we will count income tax of 13%.

27. Press OK then in the property cell Field the value «Expression 1» will appear: [Amount] *0,13».

28. Replace «Expression 1» with «Tax» and close «Designer».

29. Open the request and look what you got.

30. Using «Expression builder», add to the request «Order sum» the «Profit» field, in which the income from the order will be calculated (i.e. the amount minus a tax).

31. Create the request «Managers» by means of which find all managers of the firm in the table «Employees».

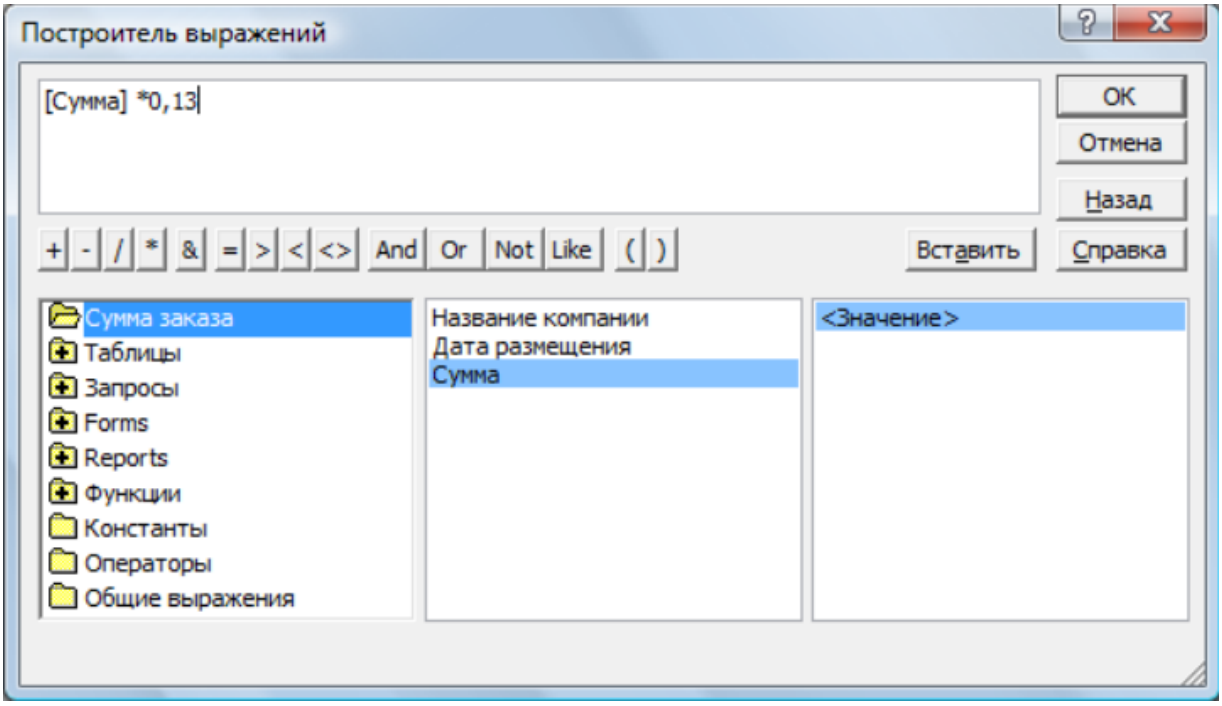

Figure 6.7 – Expression Builder

6.4 Control questions

1. What is the database (DB)?
2. What is the database management system (DBMS)?
3. What is the difference between Microsoft Excel and Microsoft Access?
4. What database objects of Microsoft Access do you know?
5. What are fields and records in a DB?
6. What data types are there in Access?
7. How is it possible to rename a field?
8. By means of what is it possible to create tables?
9. What is the key field?
10. How to establish the relations between tables?

6.5 Hot keys

CTRL + N	New document
CTRL + O	Open
ALT + F4	Close
CTRL + P	Print
S	Open the Page setup dialog box
ALT + SHIFT + F2	“Save as” dialog box

F9	Update contents of field of viewing of the list or the field with the list
ARROW DOWN	Down one line
PAGE DOWN	Down one page
ARROW UP	Up one line
TAB	Leave the field with the list
CTRL + F	Open the dialog box "*Find and Replace"*
F2	Switching between the modes of editing and the mode of navigation
F4	Pass to properties
F6	Switching between the top and lower parts of a window
ALT + V + P	Properties of the chosen object

7 Laboratory work №7. Creation of a simple network configuration. IP addressing. Network monitoring. Traffic analysis. Use of sniffers for analysis of network packets

Work purpose: studying the operation of Packet Tracer program using the example of building an IP version 4 network and analyzing the network by means of Wireshark sniffer.

7.1 Preliminary preparation

7.1.1 It is necessary to get acquainted with the main opportunities of Packet Tracer program.

7.1.2 To study and master the principle of operation of Wireshark sniffer.

7.2 Work assignment

7.2.1 Using Packet Tracer program, perform the following tasks:

– study the interface and a toolbar of Packet Tracer program;
– build a network on the basis of IP version 4 protocol.

7.2.2 Using Wireshark program, perform the following tasks:

– study the interface and a toolbar of Wireshark program;
– realize the capture of a traffic, to make filtering;
– analyze the parameters of the captured traffic.

7.3 Methodological guidelines for performing the work

7.3.1 Creation of IP version 4 network.

The interface of Cisco Packet Tracer program is given in figure 7.1.

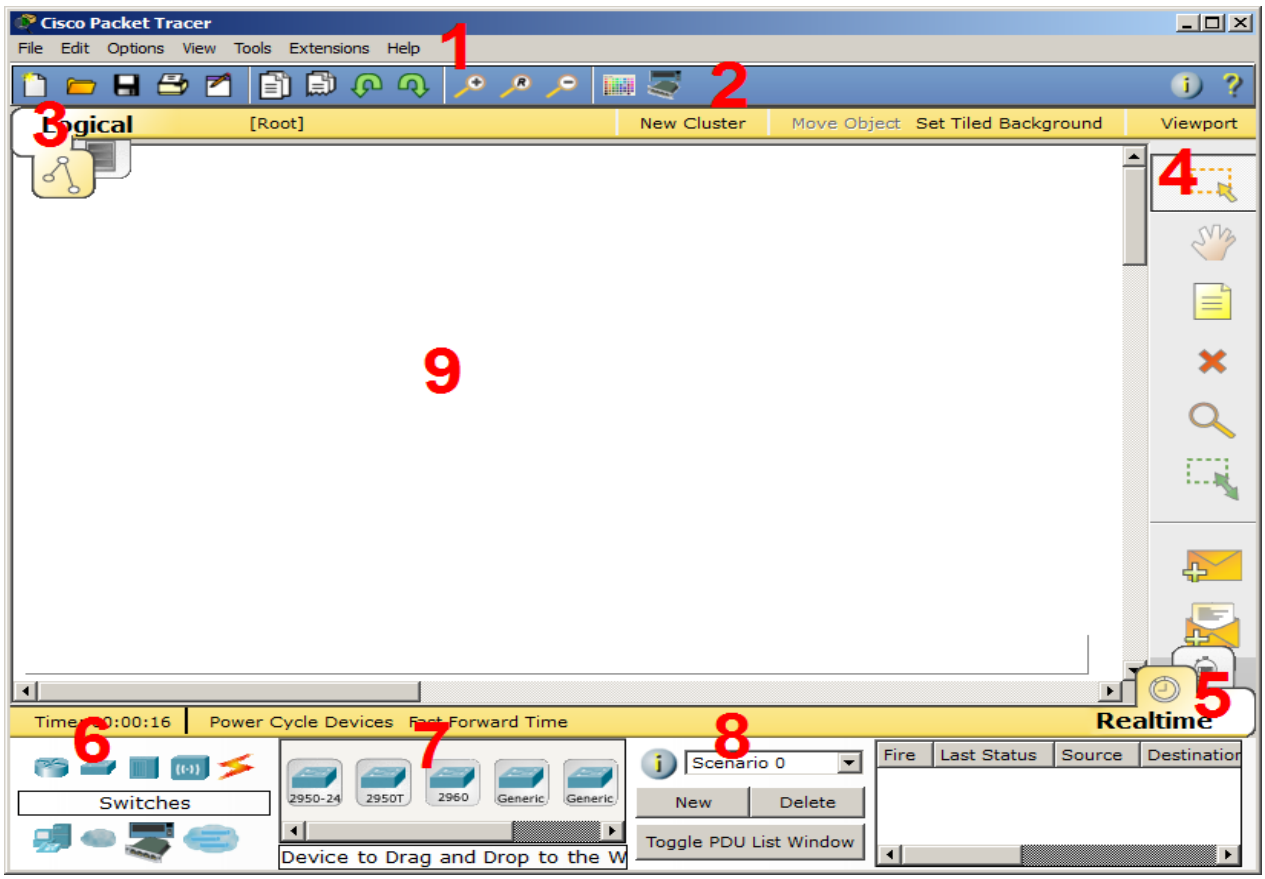

Figure 7.1 – Cisco Packet Tracer program interface

1. Main menu of the program.
2. Toolbar duplicates several menu items.
3. Switch between logical and physical organization.
4. One more toolbar contains instruments of highlighting, deleting, replacing, scaling of objects and formation of arbitrary packets.
5. Switch between the real mode (Real-Time) and mode of simulation.
6. Panel with groups of end devices and communication lines.
7. End devices are various switches, nodes, access points, conductors.
8. Panel of creating user scenarios.
9. Work space.

It is necessary to build IP version 4 network of the protocol (figure 7.2), using the following devices:

– Cisco router 2811 - 2 pieces;
– Cisco switch 2950-24 – 2 pieces;
– server – 1 piece;
– personal computer – 6 pieces.

To place the device, it is necessary to select it from the menu and drag onto the principal panel (figure 7.3).

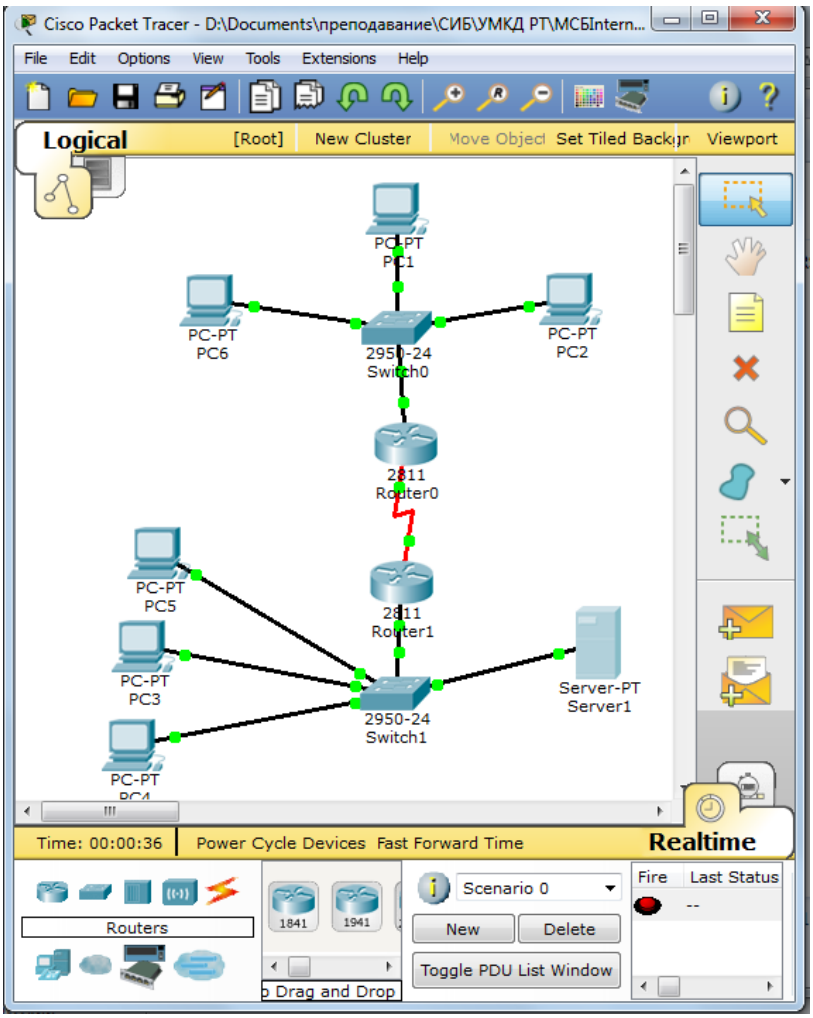

Figure 7.2 – IPv4 network topology

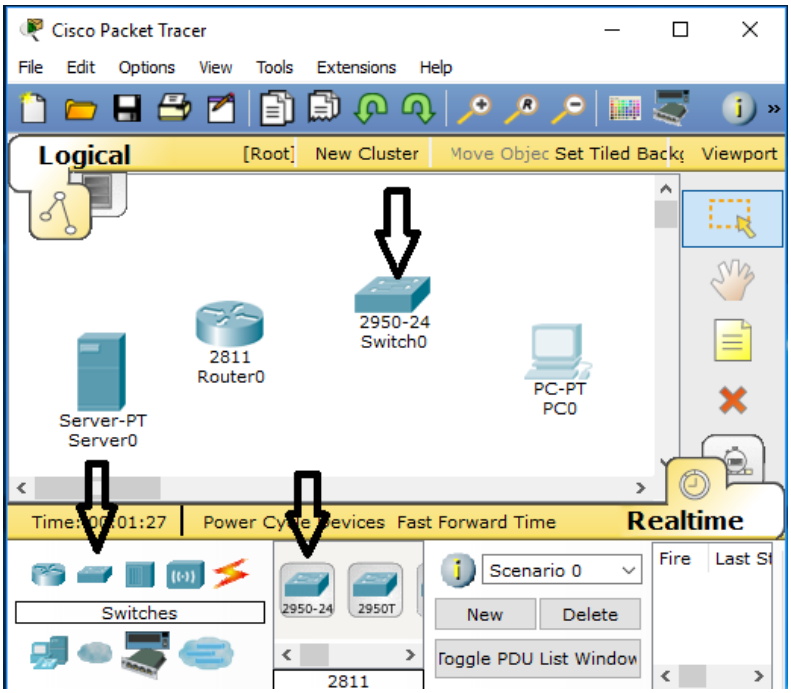

Figure 7.3 – Choice of the device

The majority of devices in Packet Tracer have expansion units necessary for connection of additional ports. Adding modules is carried out in a setup panel. In case of connection of a new module, the device should be switched-off from the power supply network (figure 7.4).

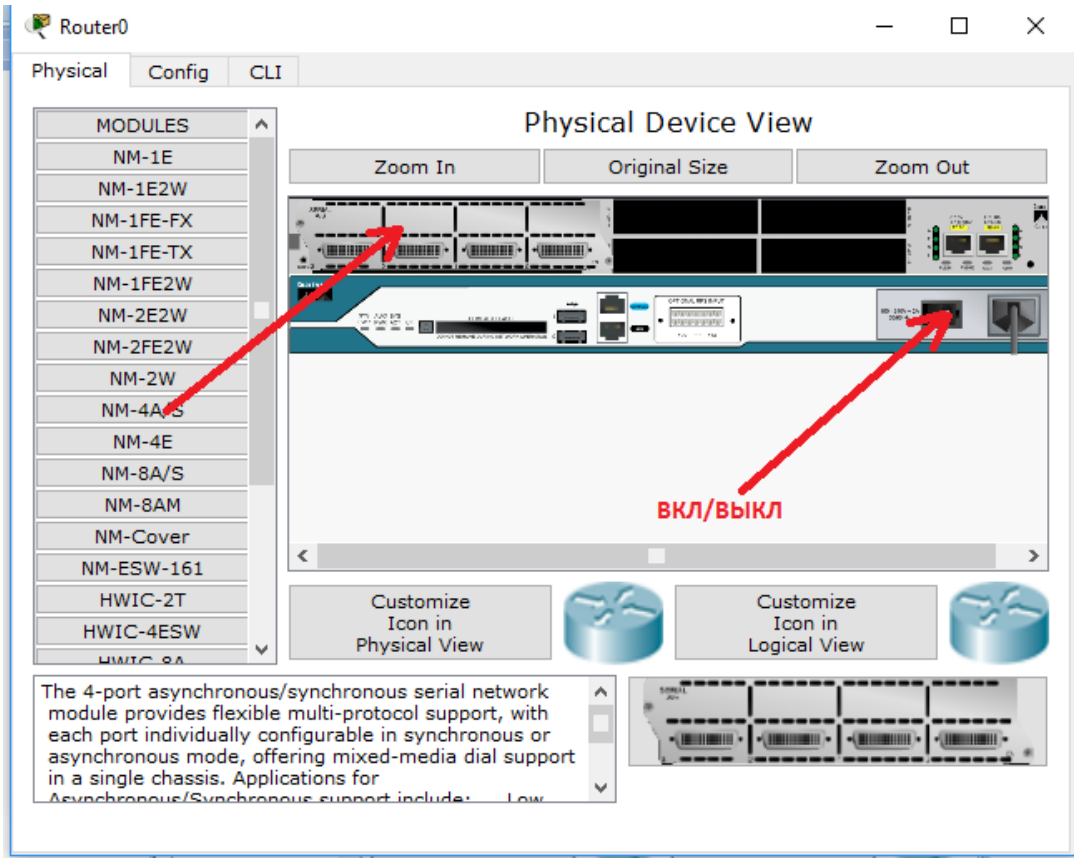

Figure 7.4 – Addition of extension modules

To connect the devices located on *Connections* panel (figure 7.5) it is necessary to select suitable cables among themselves. Then it is necessary to right-click on one of the devices and select a port of connection. Perform similar operations for all devices.

To connect devices of one category it is necessary to use crossover cable, in our case it is Serial DTE. In case of connection of devices from different categories – Copper Straight-Through (cable of direct connection).

Serial interfaces are necessary to connect the router to WAN (wide area networks).

The FastEthernet0/0 interface is set up to connect the device to a local area network, i.e. FastEthernet0/0 is the Inside interface, and FastEthernet0/1 is the Outside interface for connection to an external network.

The command «no shutdown» turns on interfaces.

For configuring routers, it is necessary to select the tab CLI (figure 7.6).

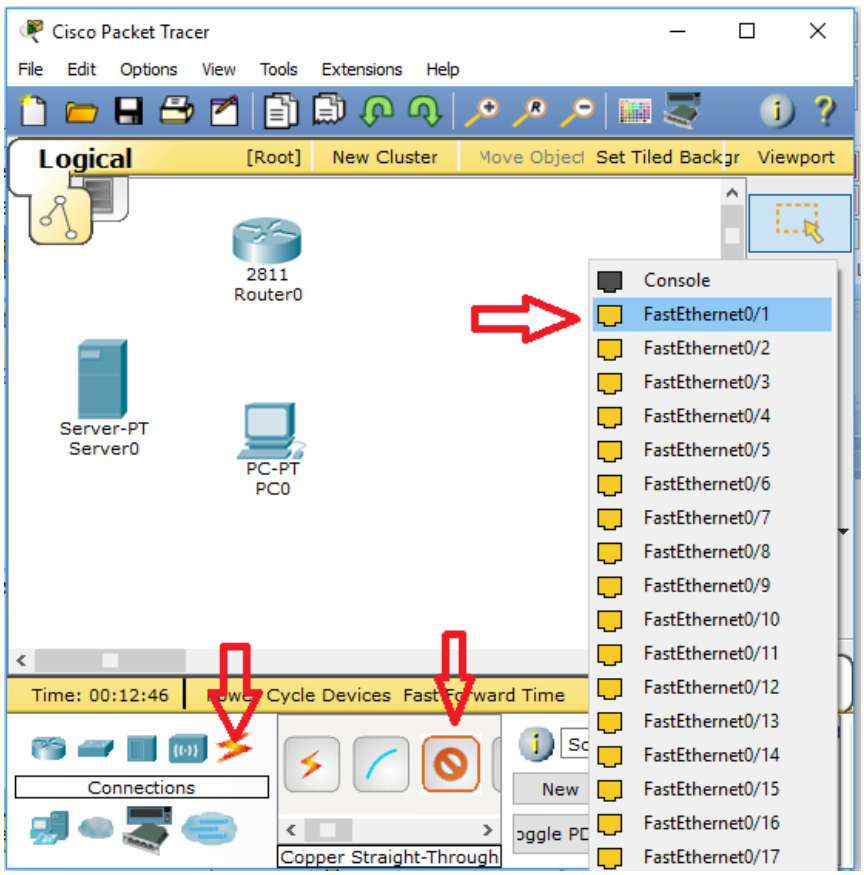

Figure 7.5 – Establishing communications between devices

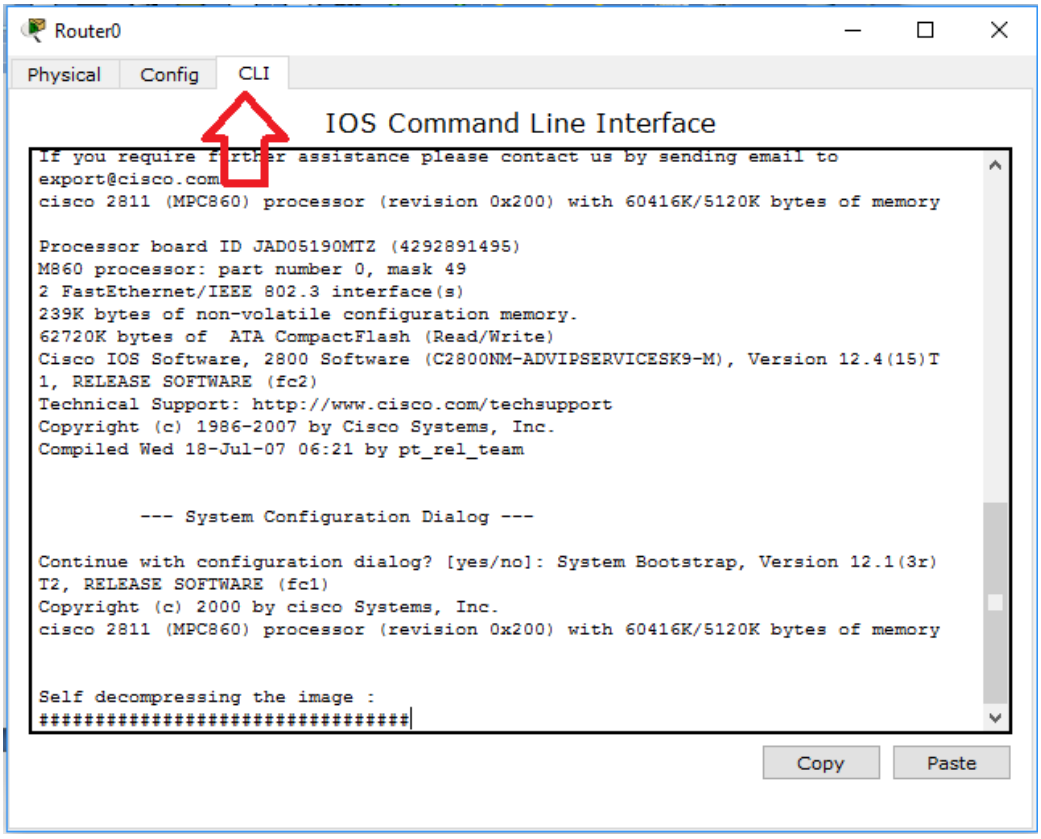

Figure 7.6 – Router Configuration Window

When configuring one can select an option of the range of networks, according to table 7.1.

Table 7.1 – Basic data

Variant	IP-address			
	1 octet	2 octet	3 octet (ID penultimate figure)	4 octet (ID last figure)
0	192	85		
1	168	75		
2	159	62		
3	207	15		
4	198	95		
5	168	125		
6	112	198		
7	158	168		
8	165	125		
9	203	21		

Control of router 1:

```
Router# en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router (config) #interface fastEthernet 0/0
Router (config-if) #ip address 192.168.1.1 255.255.255.0
Router (config-if) #no shutdown
Router (config-if) #exit

Router (config) #interface serial 1/0
Router (config-if) #ip address 192.168.20.1 255.255.255.0
Router (config-if) #no shutdown
Router#wr me
Router#wr memory
```

Control of router 2:

```
Router#
Router>en
Router#conf t
Router (config) #interface fa0/0
Router (config-if) #ip address 192.168.2.1 255.255.255.0
Router (config-if) #no shutdown
Router (config-if) #exit
```

Router (config) #interface serial 1/0
Router (config-if) #ip address 192.168.20.2 255.255.255.0
Router (config-if) #clock rate 64000
Router (config-if) #no shutdown
Router#wr

In case of simulation of the first network, we will appropriate addressing between PC manually. For this purpose, it is necessary to output the menu of configuration, having clicked with a mouse on PC. To select «Static» manually to enter the IP address, a mask of network and the IP address of the router (Default Gateway) (figure 7.7).

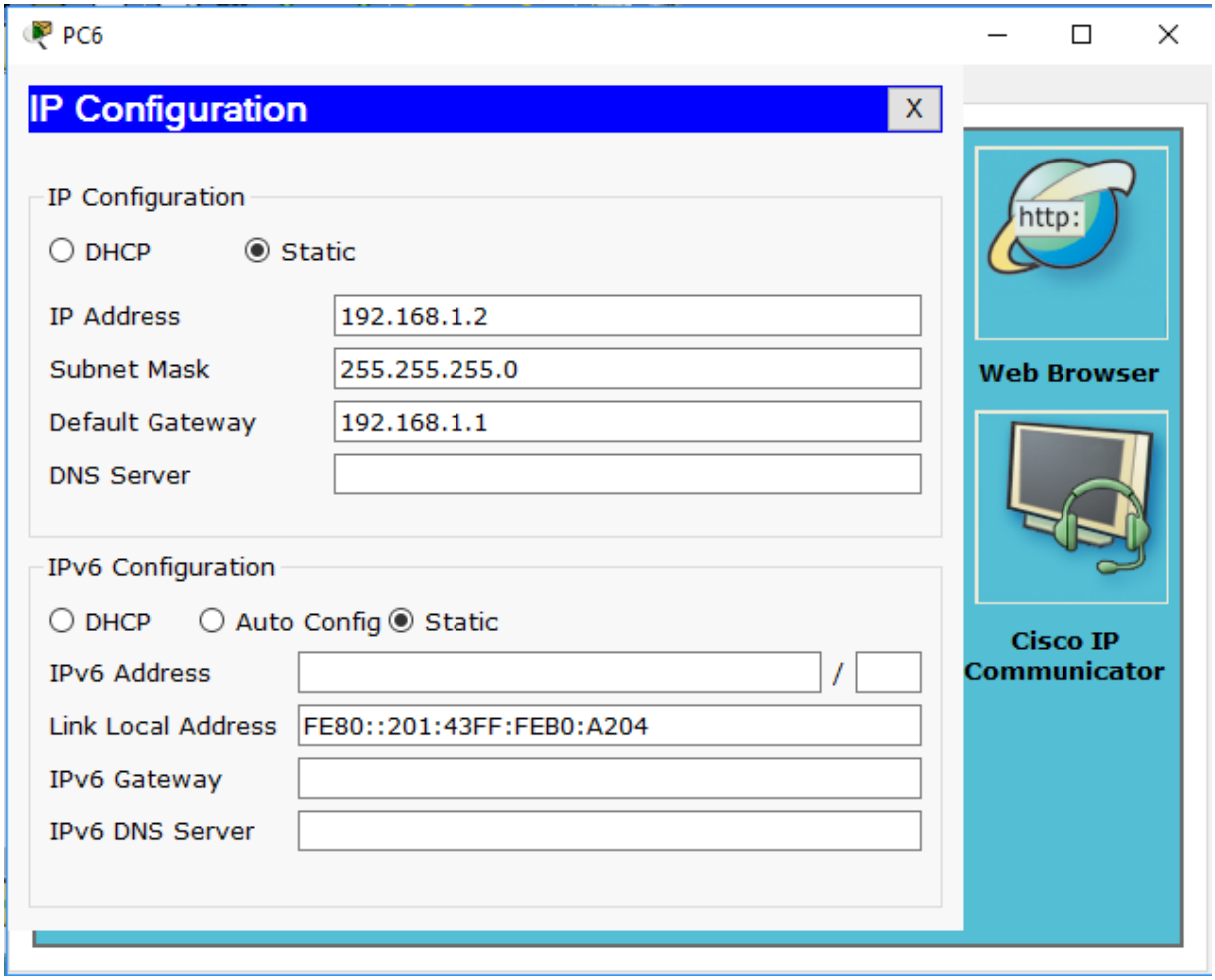

Figure 7.7 – PC Settings

Also in the «Config» tab, it is necessary to fill the network router IP address (figure 7.8).

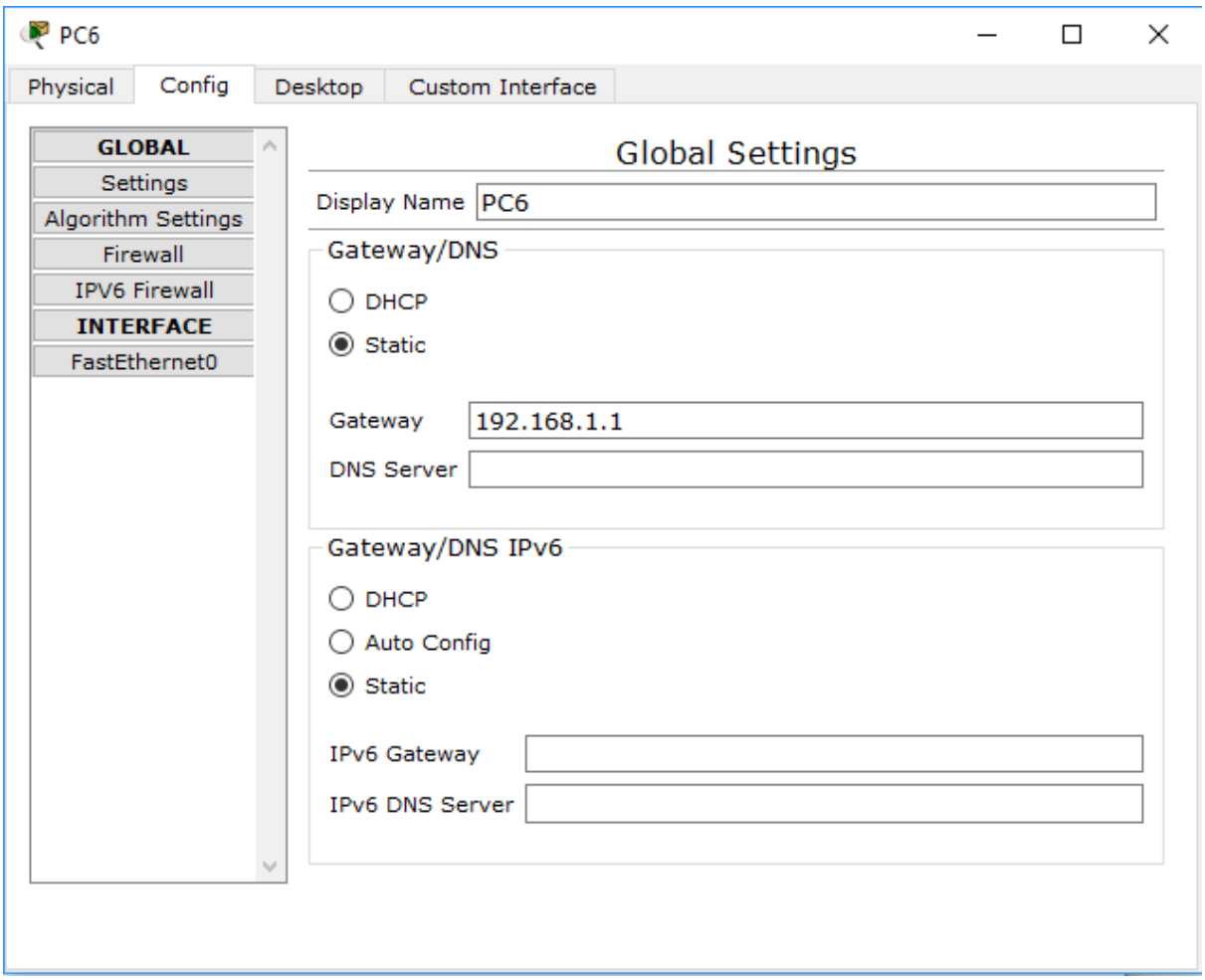

Figure 7.8 – PC configuration

In case of simulation of the second network, it is necessary to use DHCP server.

DHCP is a network protocol allowing computers to receive automatically the IP address and other parameters necessary for TCP/IP net surfing. This protocol works according to the client-server model. For an automatic configuration, the computer client at a stage of a configuration of the network device addresses to so-called DHCP server and receives from it necessary parameters. It is for the convenience of distribution of IP addresses on a network. Server configuration is shown in figure 7.9.

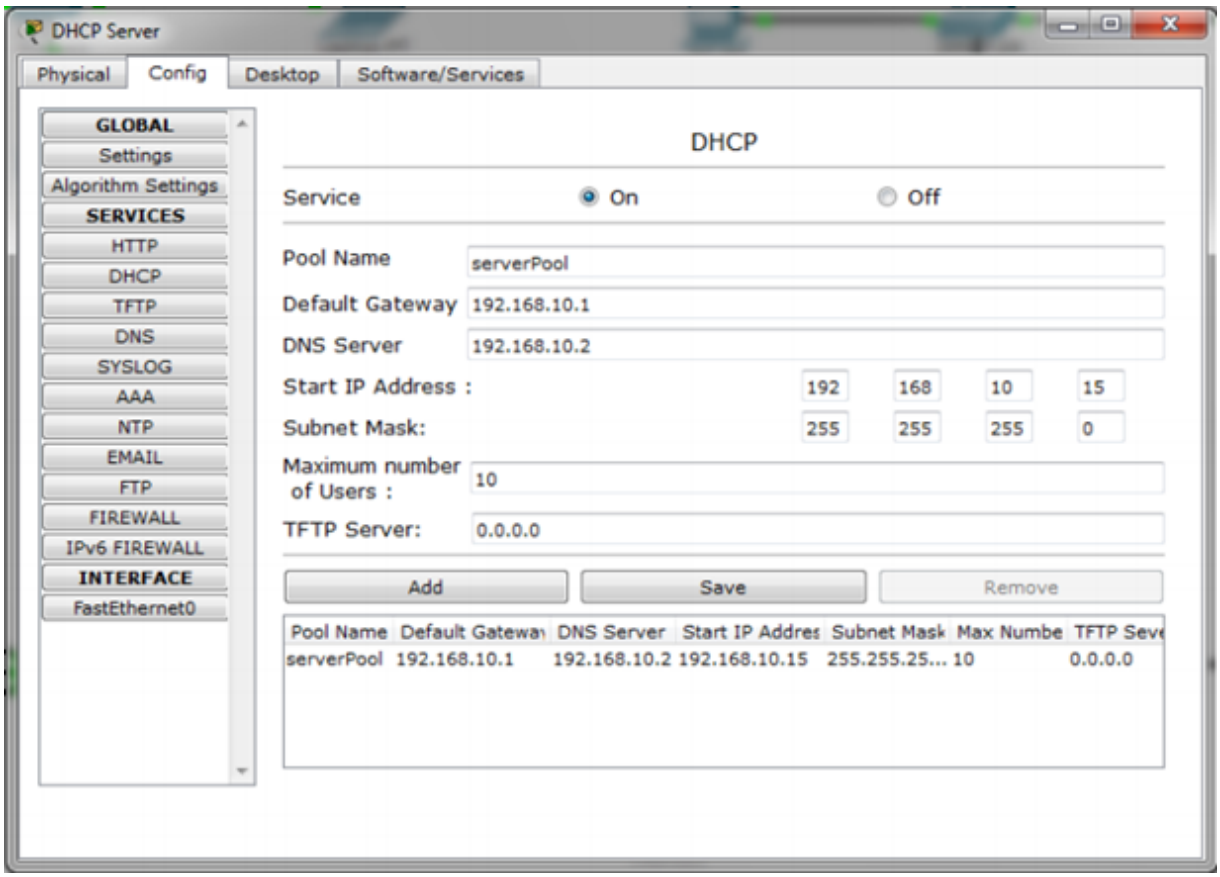

Figure 7.9 – DHCP server configuration

1. Set up static routing between routers without using any protocols directly connected to each other and by means of «ip route» command to subnets; remove this command.

2. Check the network level by means of «show ip route» command (verification of the presence of record about scheduled destination network in a routing table).

3. By means of «show run» command show the current status of ports of the router and also the type of connection and connection protocol.

On IP configuration 4 of a computer it is seen that the IP address was received automatically, due to DHCP protocol (figure 7.10).

It is enough to set up on the router the way to a subnet and computers will automatically configure IP addresses, as shown in figure 7.11.

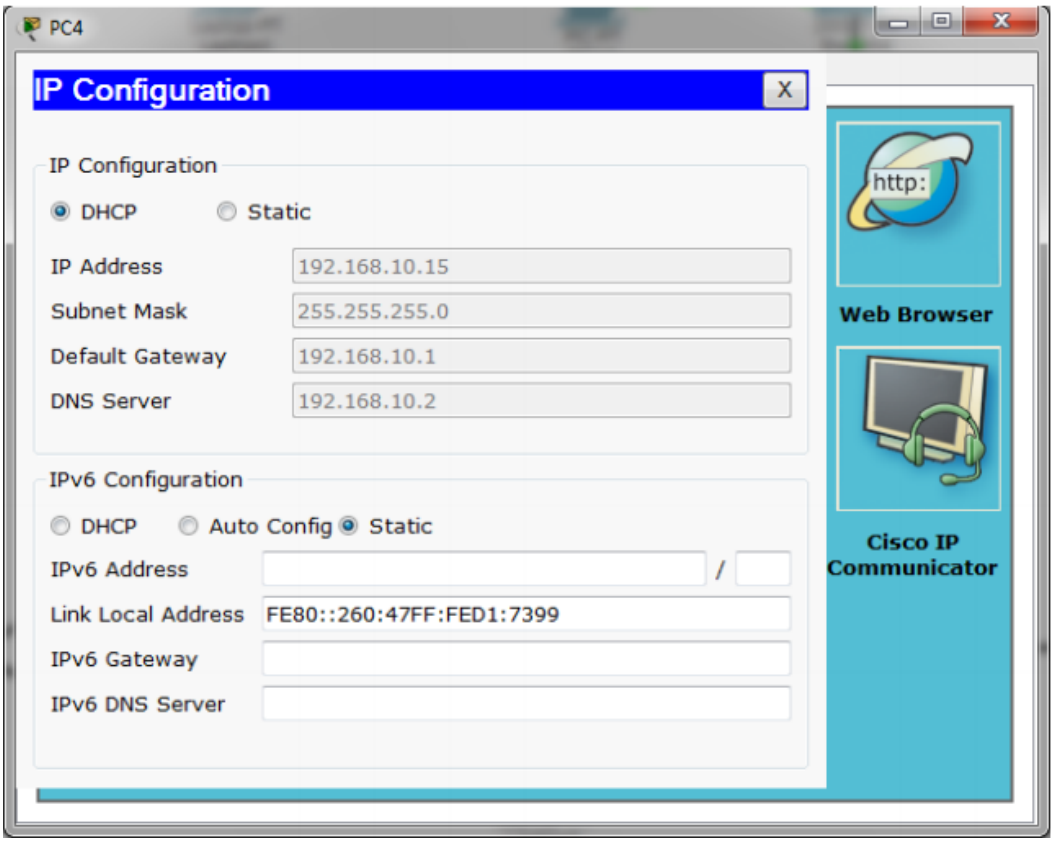

Figure 7.10 – PC4 Configuration

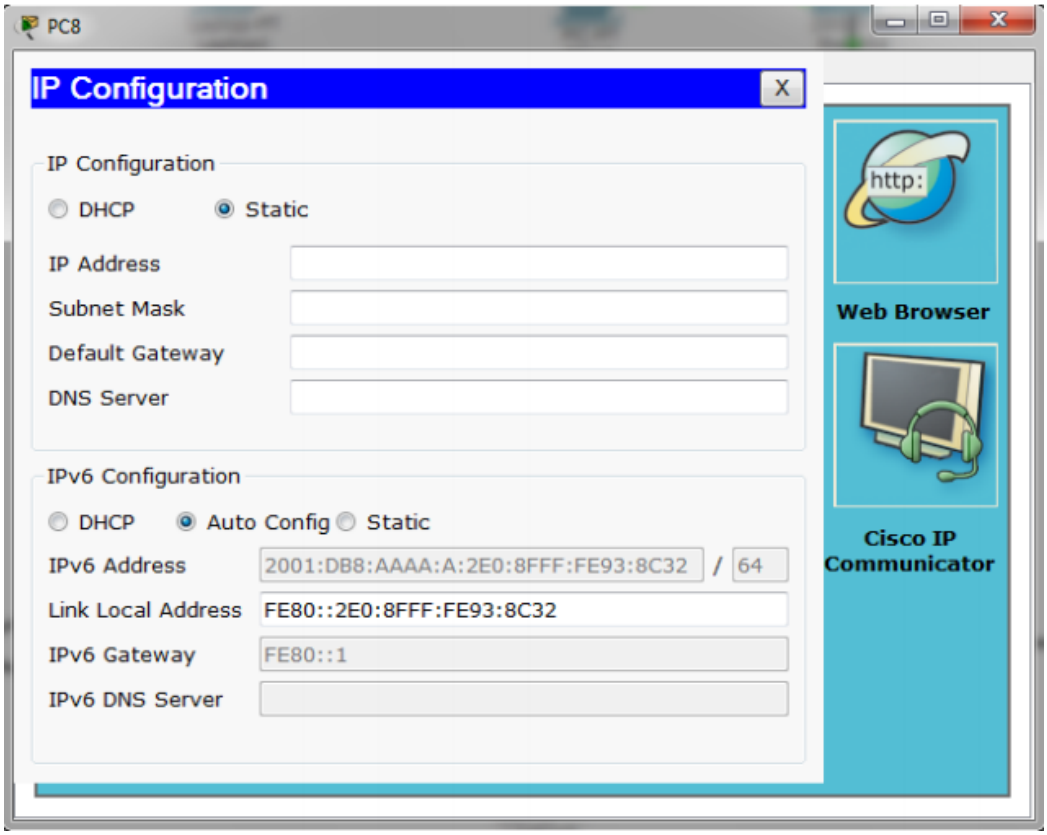

Figure 7.11 – PC8 IP configuration

In real time, the network always works irrespective of actions of the user. Configuring a network is carried out on-line.

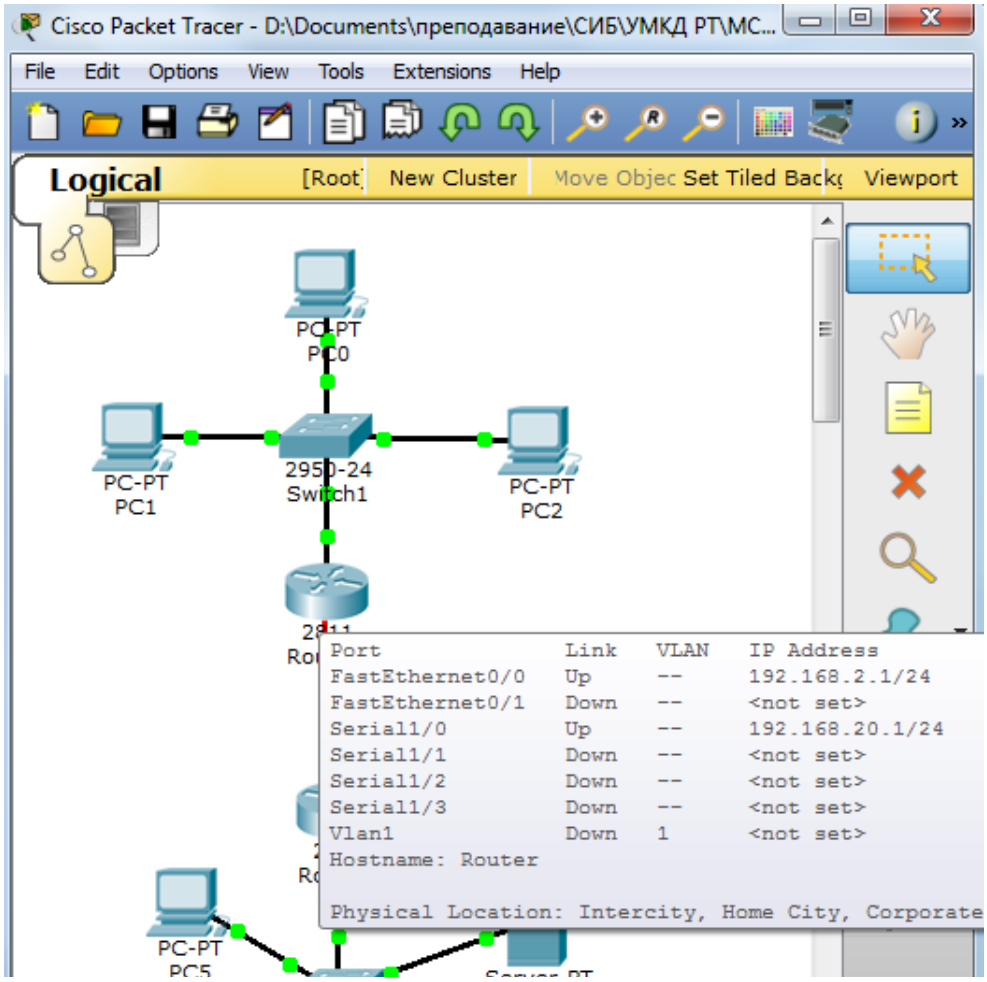

Figure 7.12 – Functioning of the network in real time

In the mode of simulation, it is possible to watch the networks, work slower, studying the ways on which packets are sent. When switching in the mode of simulation the special panel will appear. You can graphically view the distribution of packets on a network, having pressed the Add Simple PDU button. There is a possibility of monitoring of speed of simulation with use of the Speed Slider button. It is also possible to view the previous events, having pressed the button *Back*.

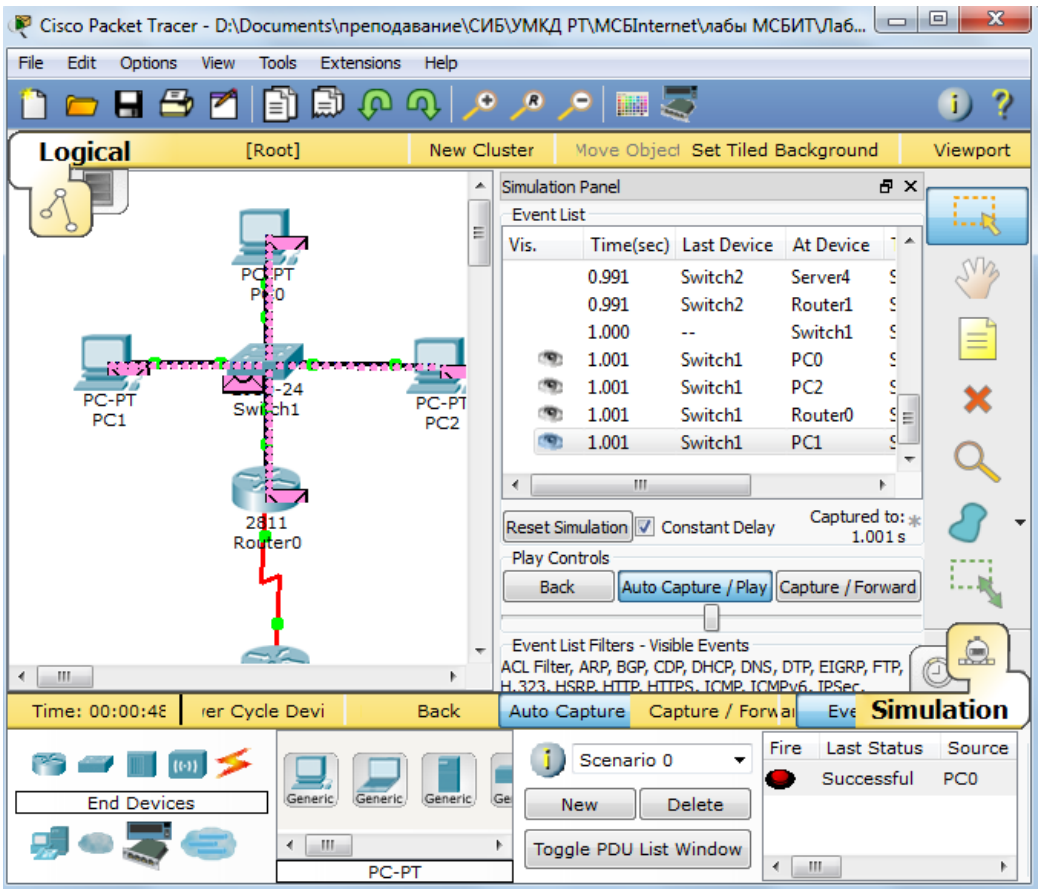

Figure 7.13 – Modeling mode (simulations)

During simulation it is possible to click on the sent packet and obtain the detailed information about it.

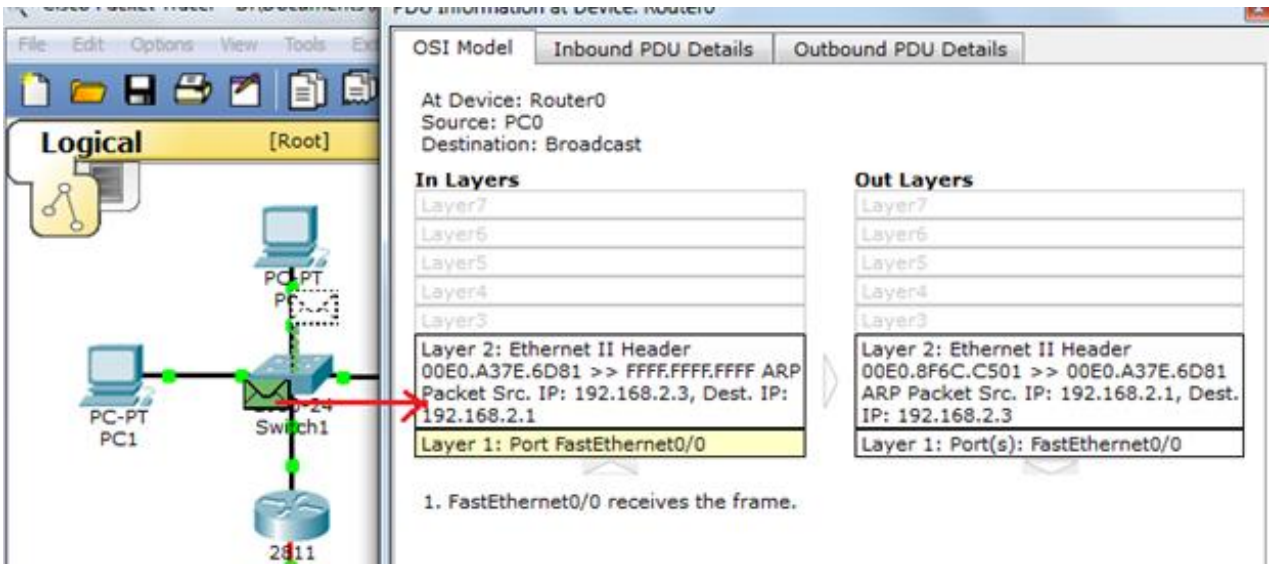

Figure 7.14 – Information on a package

7.3.2 Operation in Wireshark program.

To start the program it is necessary to click: *Start-up - Programs - Wireshark* or two times to left-click on a program label on a desktop.

The initial interface of the program is shown in Figure 7.15 and its description is given in Table 7.2.

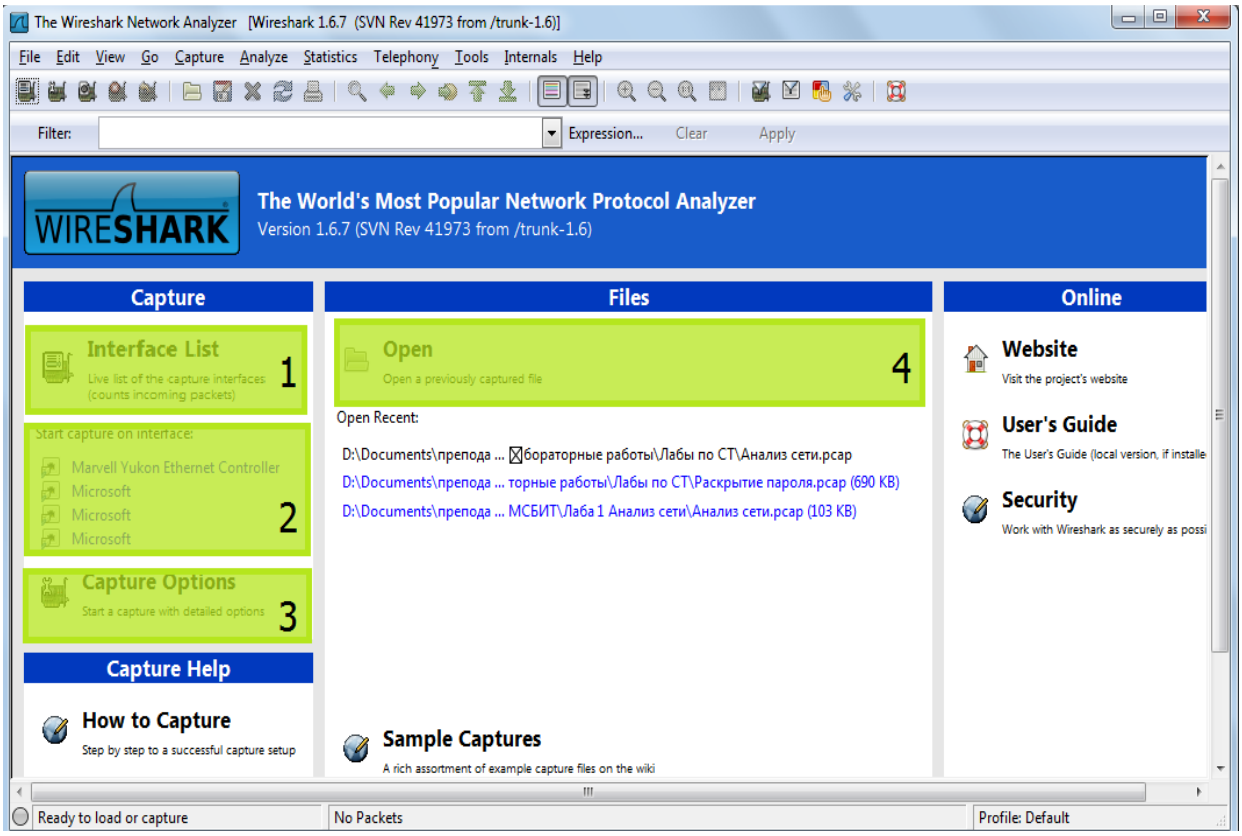

Figure 7.15 – Initial interface of the program

Table 7.2 – Description of functions of program area

Highlighted area	Description and functions
1	Button of active network adapters from which the capture of traffic is possible. The list has the form of an interactive table
2	List of active network interfaces. Pressing any interface from the list will immediately start the process of traffic capture
3	Button of settings of process of traffic capture
4	Button allowing to load into the program the file taken earlier and saved with the report on the taken network traffic

7.3.3 Capture of network traffic.

Capture traffic through the command *Capture – Options*. The following options for capturing packets are set in the opened dialog box:

a) register the place of saving future captured file in Capture file (s) -> File;

b) set the size of the captured file, ticked the function Use multiple files ->, select the size;

c) if necessary, set restriction for the size of the captured file in the field of Stop Capture, having restricted by quantity of packets, byte, minutes.

Capture traffic through the command *Capture - Interfaces*. Select an active interface from the opened dialog box or necessary for you if there are several active ones (figure 7.16).

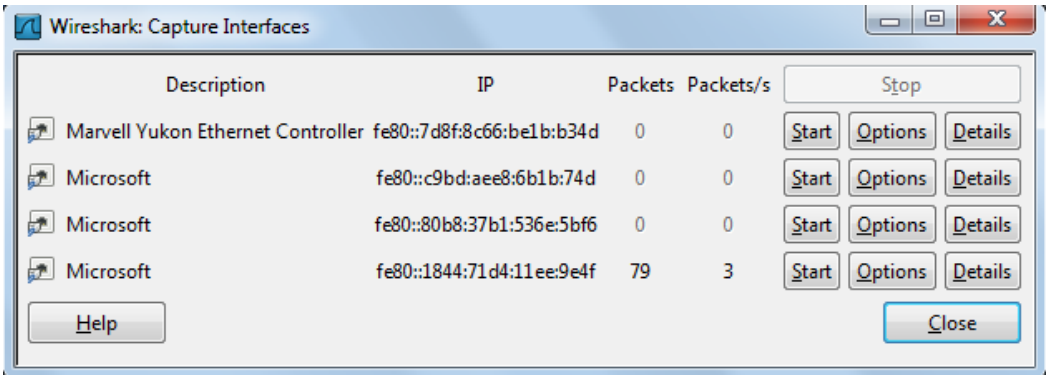

Figure 7.16 – Capture - Interfaces window

7.3.4 Filtering packets.

After selecting the interface and capturing traffic, the packet capture window is displayed (figure 7.17), the description of fields is given in table.

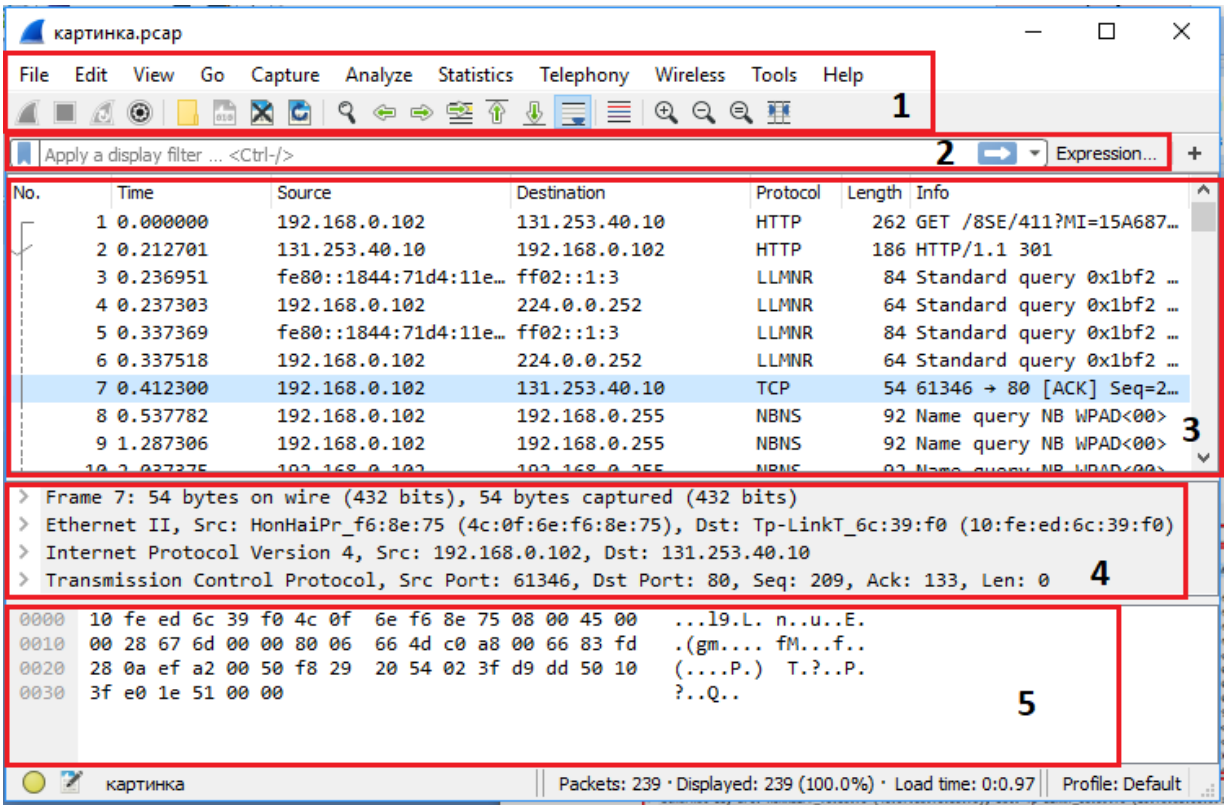

Figure 7.17 – Window of captured packets

Columns of field 3 show:

- No. – number of a packet in the file of capture;
- Time – temporal mark of a packet;
- Source –address (from where the packet came);
- Destination – destination address (where the packet will go to);
- Protocol –name of the protocol in reduced version;
- Info – additional information about the contents of the packet.

Table 7.3 – Description of capture window fields

Selected area	Description
1	Program menu and toolbar of the most often used program functions
2	Filter the captured packets
3	Summary list box for all captured PDUs (Packet list)
4	Information field for displaying detailed information about a specific selected PDU (Packet Details)
5	Field for displaying the data highlighted in the information field in hex and text form (Packet Bytes)

7.3.4.1 Packet filtering by certain protocols.

The filter can be used both for capturing traffic in real time, and when analyzing it, stored in the capture file. To apply the filter it is necessary to:

1) enter the filter in the input field.

2) press the button «Apply».

The field for entering the filter may change color depending on what was typed:

– green means everything is in order;

– red an error has been made;

– yellow an unexpected result is obtained, because there are other options for writing a filter (for example, it is possible to write *ip.dst! = 8.8.8.*8 or *!ip.dst == 8.8.8.8*, the second option is more preferable).

Let us filter on TCP protocols (figure 7.18), Similarly, we will filter on HTTP, DNS.

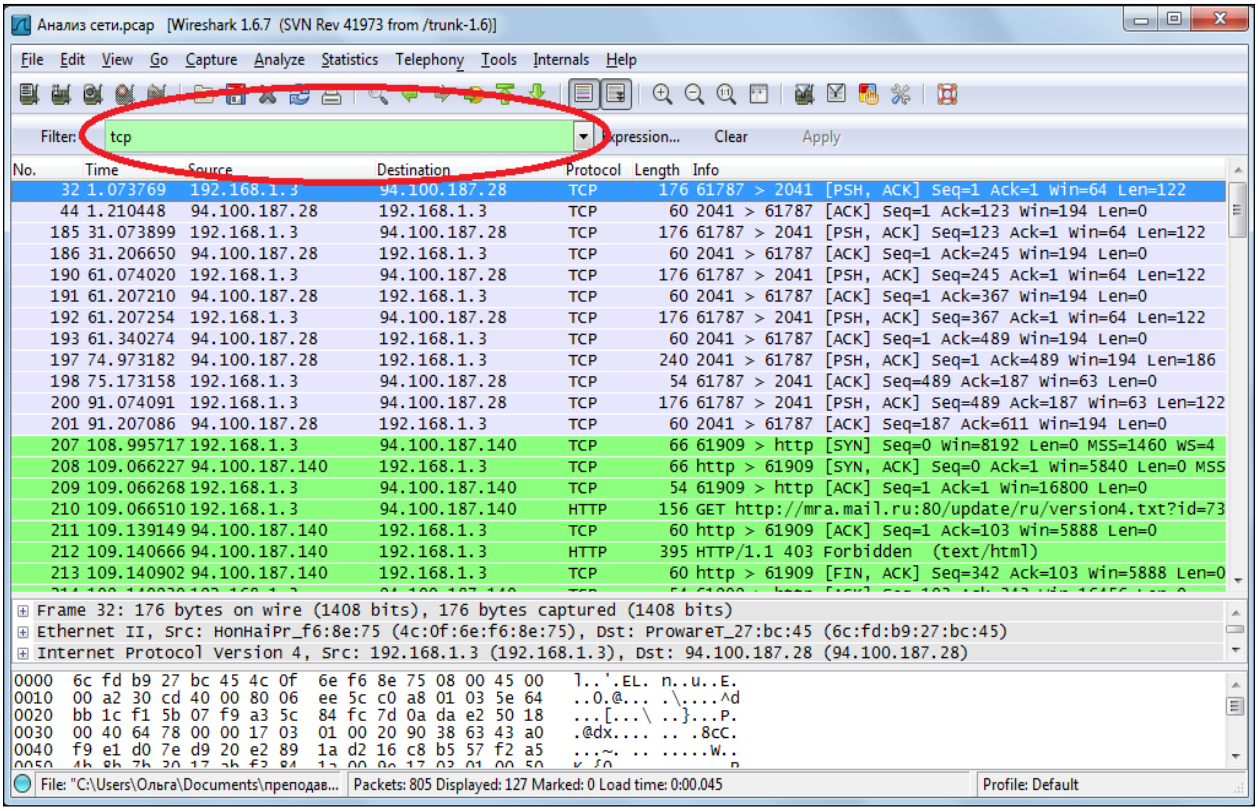

Figure 7.18 – Packet filtration of TCP protocol

7.3.4.2 Saving the filter at the toolbar.

To further use the filter, you must press the «Save» button in the filter field, then enter an arbitrary name and, after clicking on the «OK» button, the filter appears as a button on the toolbar (figure 7.19).

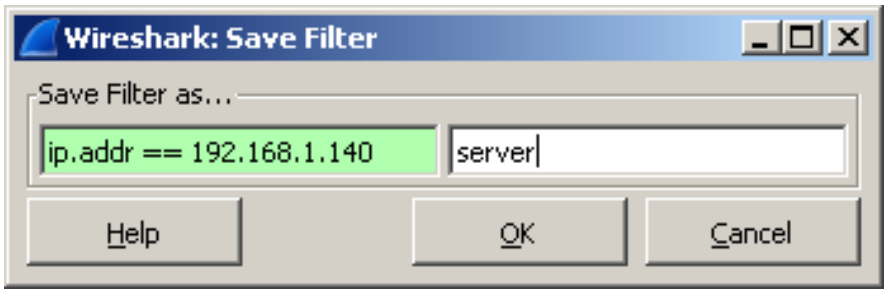

Figure 7.19 – Window of filter saving

To create a filter for certain parameters of the packet, you must right-click on the selected option and apply it.

7.3.5 Retrieving information from captured packets.

From locked files it is necessary to make filtering on HTTP protocol packets for extraction of files or pictures.

To retrieve files or images from the captured files, you need to filter for packets of HTTP Protocol.

Then go to *File – Export Objects – HTTP* menu to retrieve information. A window will appear that will show all captured http objects-text files, pictures, etc. (figure 7.20).

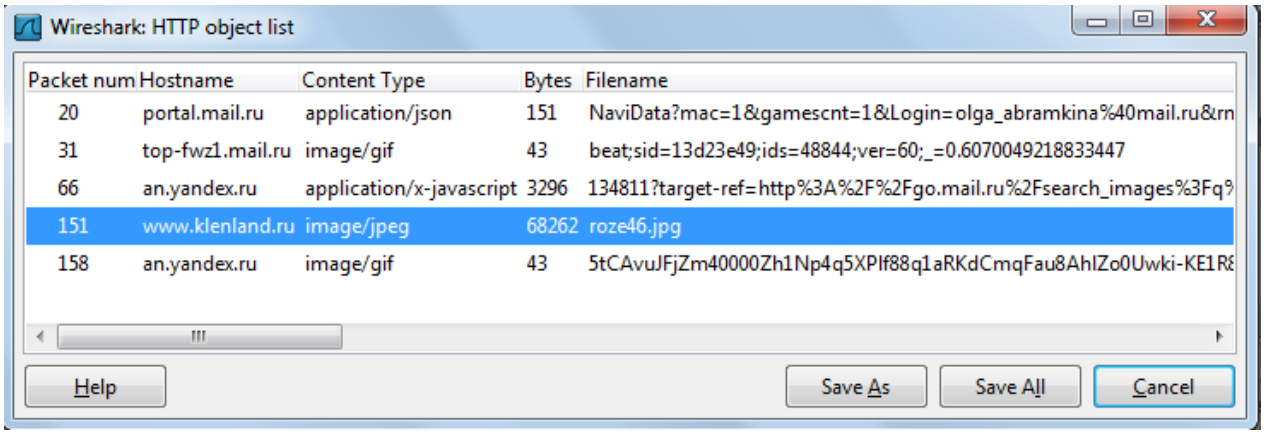

Figure 7.20 – List of captured files

In order to retrieve any file from this list, simply highlight it and click «Save As».

The drawing was extracted without any problems. In the same way, you can extract and stream video / audio.

In order to view quickly the transmitted data within a certain session, use the menu command Analyze - Follow TCP Stream. After executing the command, a dialog box appears in which different colors will display both the client's requests and the server's responses.

The «Entire conversation» button with a drop-down list allows you to display both parties involved in the exchange, or only one of them. The dialog box allows you to display data in various formats (ASCII, EBCDIC, Hex Dump, C Arrays, Raw) and save them to a file. When frames with a file are detected in a session, you can display only the stream of the corresponding direction, select the desired format, and save it on the disk.

7.3.6 Statistics on captured packets in graphic form.

Wireshark can output the information in graphical mode, which facilitates its perception. By going to the Statistics-Graphs tool menu, you can select five filters to compare the files by title with the help of highlighting with different colors in figure 7.21.

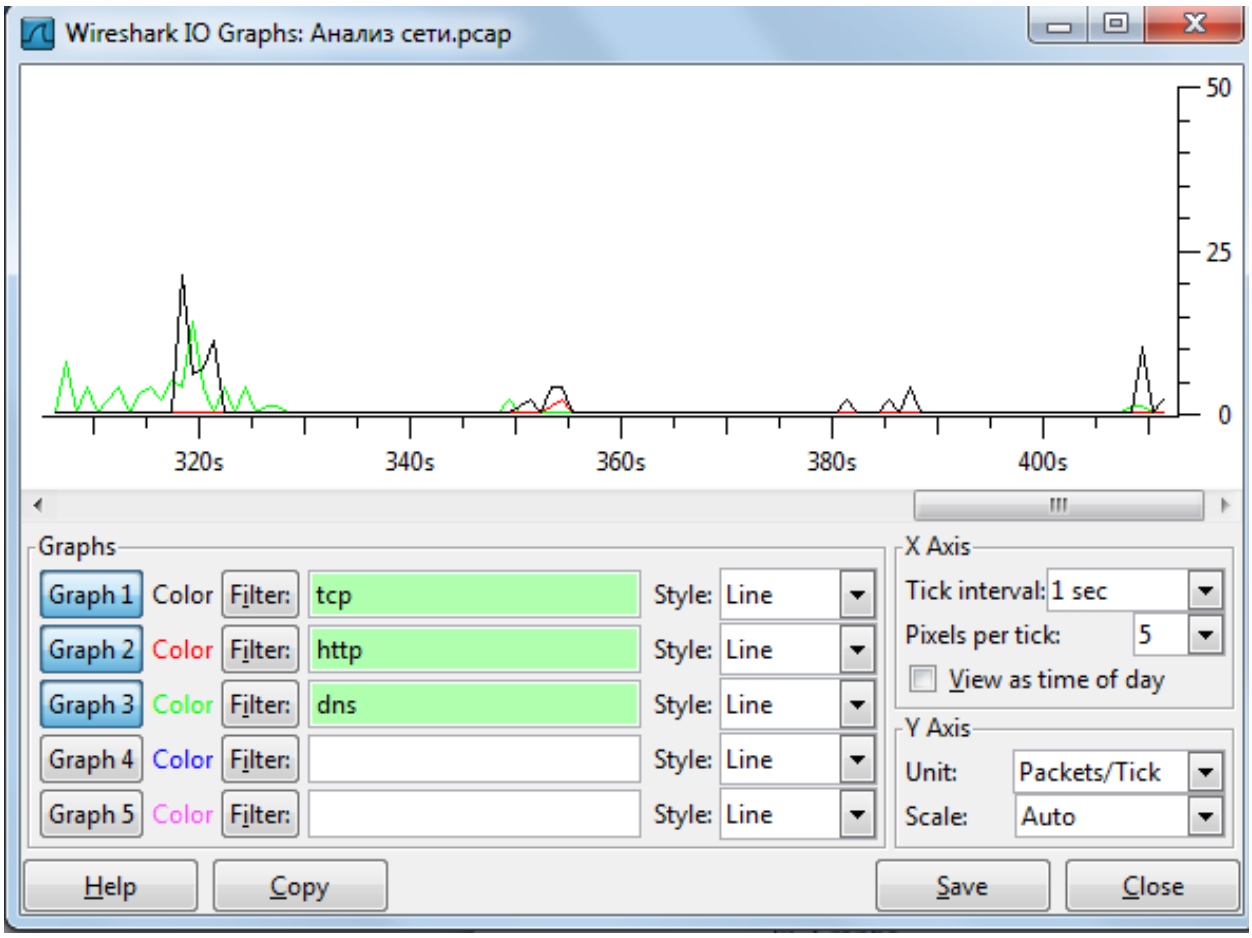

Figure 7.21 – Graph of dependence of traffic different types

7.4 Control questions

1. What command is used to configure devices in the program?
2. How to change the transmission rate of packets?
3. What is a packet?
4. What is a router?
5. How to configure routing?
6. What is IP protocol? Advantages and shortcomings of IP protocol?
7. How to retrieve a picture from captured packets?
8. How to output the diagram of traffic dependence?
9. How to save the filter on a panel?
10. How to realize packet filtering?

8 Laboratory work №8. Use of hardware and software for generating keys. Application of EDS and encryption for the exchange of messages by E-mail

Work purpose: software tool for creating digital signatures - an electronic digital signature using the example of PrettyGoodPrivacy (PGP) program and creating keys in PGP system.

8.1 Preliminary preparation

8.1.1 To study the existing methods and algorithms of encryption with an open key.

8.1.2 To study points of the main PGPDesktop menu.

8.2 Work assignment

8.2.1 To create a couple of keys of encryption in PGP system.

8.2.2 To carry out the transfer of PGP open key to correspondents.

8.2.3 To carry out transfer of the protected and signed messages by means of the PGP system.

8.3 Methodological guidelines for performing the work

PGP operates on the basis of a public key encryption method, which consists in creating a user key pair in a small text file. One key is *closed* and stored in a safe place. The other - *open*, on the contrary, is laid out for everyone to see. When someone wants to encrypt a written letter, he does it with a public key. Since the moment the message is encrypted with a public key, only the owner of the private key can read it. Note: even the author, after encrypting the message with a public key, will not be able to read it. This encryption principle is very reliable. Its most subtle place is the problem of authenticity of the public key.

The PGP program installed on the computer starts automatically when the operating system starts up (figure 8.1).

There are following windows:

1) PGP Keys.
2) PGP Messaging.
3) PGP Zip.
4) PGP Netshare.

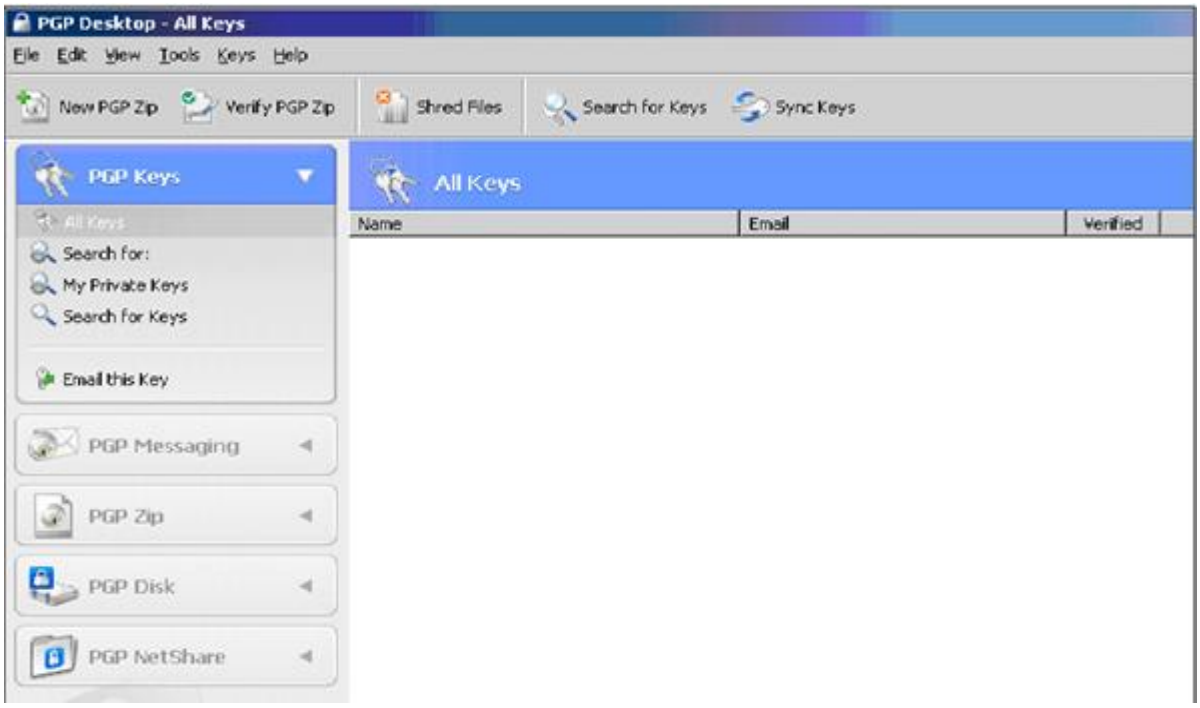

Figure 8.1 – Program interface

8.3.1 Creation of keys.

Click the PGP tray icon in the display panel with the right mouse button and select PGP keys from the shortcut menu. The PGP keys utility window opens. To do this, move the cursor to File - New PGP Keys.

Click the Generate new keypair button. The «KeyGenerationAssistant» will start. Click the «Next» button.

Enter your full name in the *Fullname* field and your e-mail address in the *E-mail address* field. «Public keys» that do not contain complete and accurate information are not taken seriously. To fully configure the keys, click *Advanced*.

The *Advancedkeysettings* window will appear.

Set the *Diffie-Hellman/DSS* switch. This is a more modern algorithm for generating a pair of keys.

Set the switch 2048 bits (2048 bits), which determines the length of the key (for reliability, a key of this length corresponds to approximately 128-bit key for symmetric encryption).

In this case, set the *Keypairneverexpires* switch («The key pair acts permanently»). In practice, it is recommended that you specify a limited period for the keys. Click «OK», «Next» buttons.

Double-enter the random *Passphrase* in the appropriate fields.

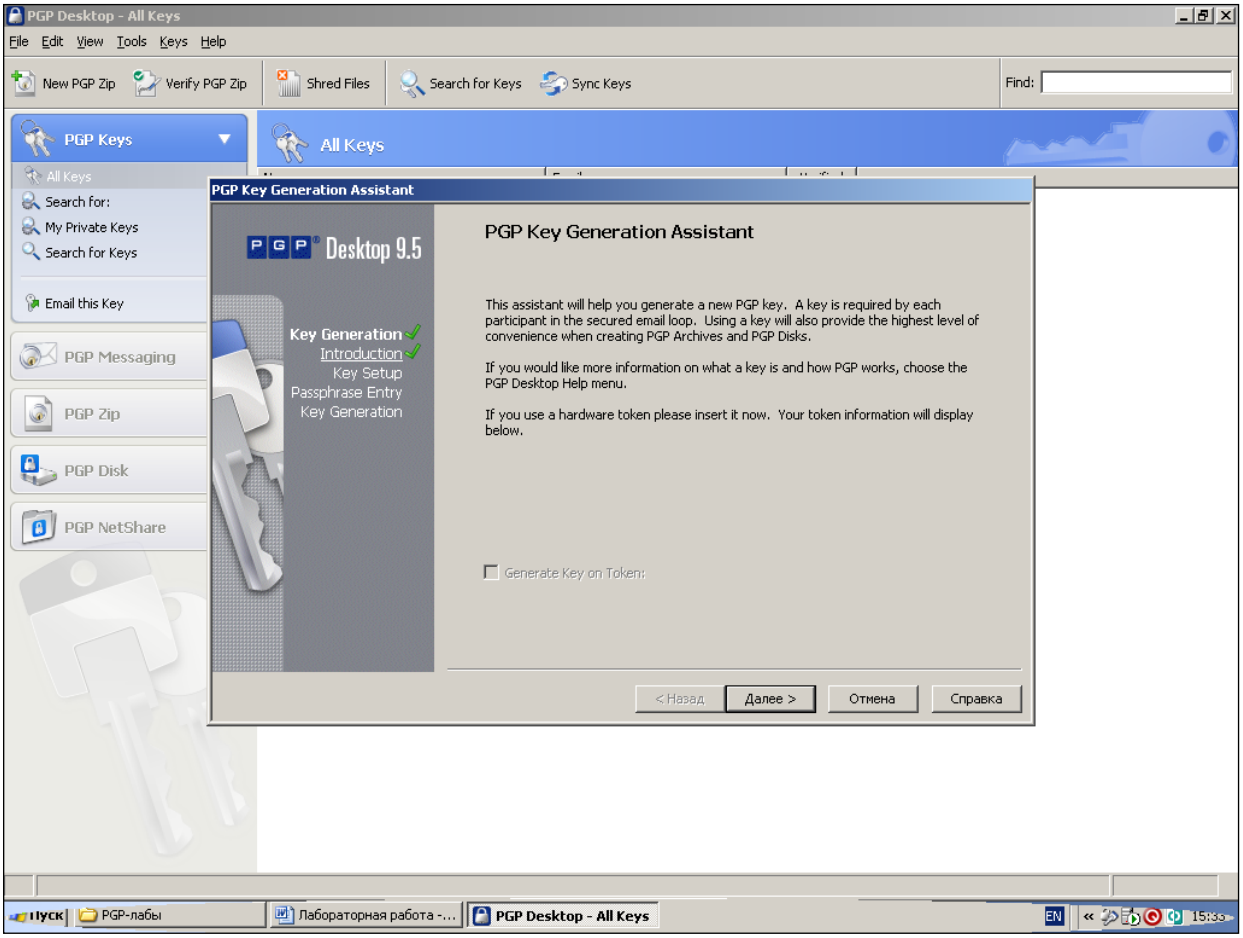

Figure 8.2 – Creation of keys pair

Since in this case, the real secrecy is not significant, you can reset the HideTyping check box to make the text you type appear on the screen. It is recommended that the password phrase is easily remembered, but it contains spaces, letters of different case, numbers, special symbols. Quality (difficulty finding) of the key phrase is displayed using the indicator PassphraseQuality. After the passphrase is entered twice, click the «Next» button.

Watch over the process of generating a key pair, which can take up to several minutes. After the message «Continue» appears, click the «Next» button. Then, you may need a few more clicks on the «Next» buttons and, at the end, Done, to complete the creation of the keys (you do not need to publish the key on the server).

See how the newly created key is displayed in the AllKeys list. Make sure that its creator, who is supposed to absolutely trust himself, automatically signs this key.

To view the key properties, right-click the key and select Key Properties from the shortcut menu. Read the key properties, including the «fingerprint», designed to confirm the correctness of the key, for example, by phone. Make sure that the ImplicitTrust checkbox is selected, indicating that you trust the owner of this key, i.e. to yourself.

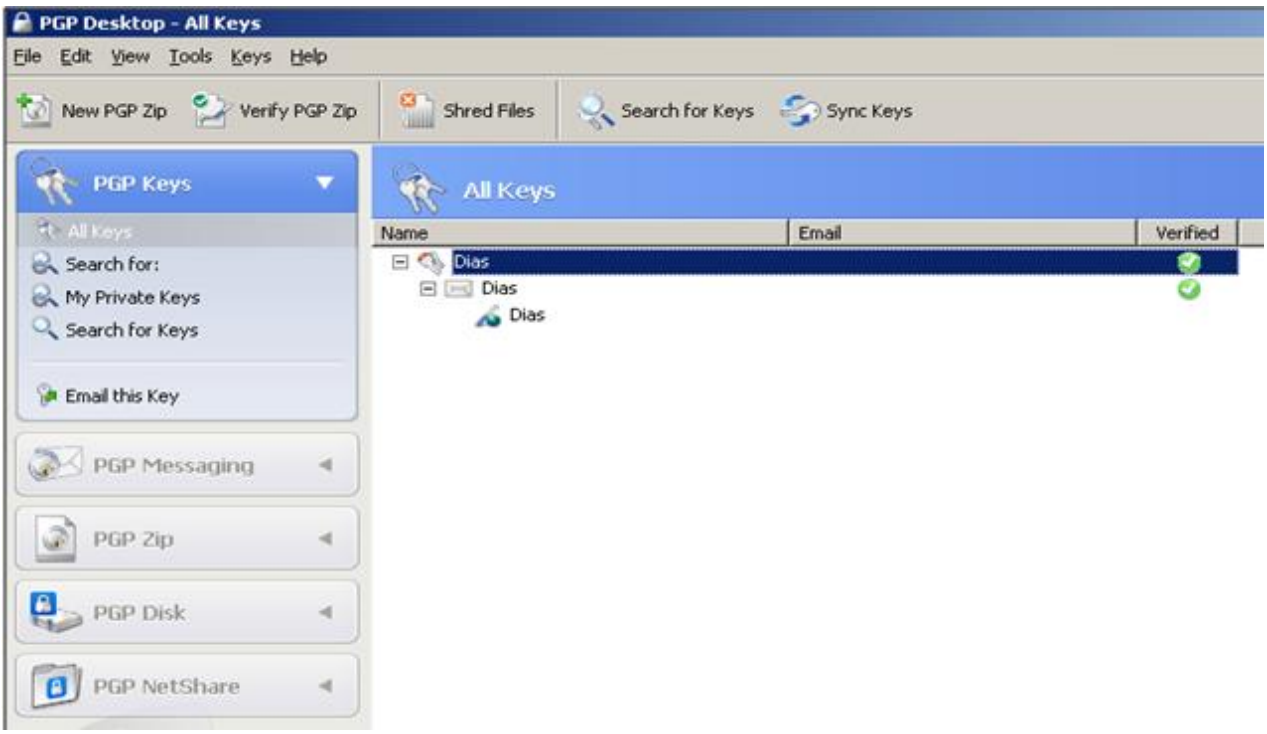

Figure 8.3 – List of created keys

8.3.2 Public key transfer.

Switch to the PGPkeys program. Click the PGPtray icon in the display panel with the right mouse button and select PGPkeys from the shortcut menu. The PGPkeys service tool window opens.

Select the key to be sent to the correspondent in the list and give the command Edit / Copy (Edit / Copy).

Place the cursor at the end of the message and click the «Paste» button on the toolbar.

Make sure that a symbol block describing the public key has been inserted into the message text. Save the message (do not send it). Check if the key can be moved to an e-mail message by dragging.

8.3.3 Keys import and export.

Highlight the key's text, including special lines describing its start and end. Copy the key to the clipboard using the CTRL + C key combination. Switch to the PGPkeys program.

Press CTRL + V. In the dialog that appears, click on the «SelectAll» button, and then on the «Import» button.

In the PGPkeys window, you will not see any changes after that, because the corresponding key is already stored on this computer. To export a key to a file, select it and give the command Keys / Export.

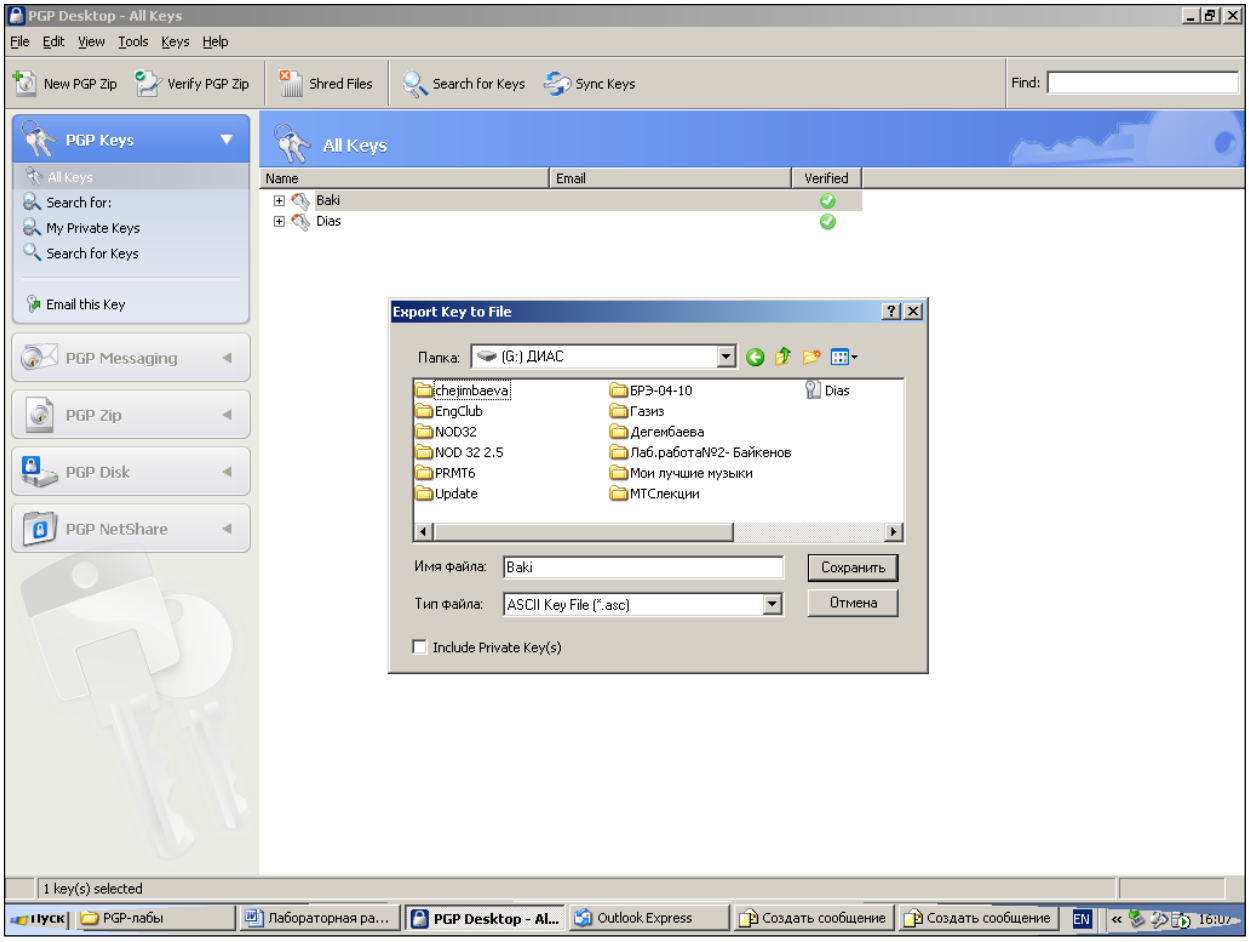

Figure 8.4 – Key import/export

Select the catalog and specify the file name. Click the Save button to save the key to a text file. On your own, import the key stored in the file in at least two different ways.

8.3 Control questions

1. What key is used when encrypting messages?
2. What key is used while creating the digital signature?
3. What systems of EDS creation and encrypting are used in Russia?
4. What is EDS used for? What are the features of EDS (electronic digital signature)?
5. What is EDS legal support?
6. What programs are used for creation EDS in Russia and abroad?
7. How is it more preferable to transfer the PGP open keys to our correspondents?
8. What is an EDS compromise?
9. What influences EDS cryptographic strength?

9 Laboratory work №9. Creation of Google accounts using Google Docs. Use of mobile technologies to gain access to information

Work purpose: development of principles of operation of Internet Google service of Docs and the use of mobile technologies for gaining access to information.

9.1 Preliminary preparation

9.1.1 It is necessary to get acquainted with Google services.
9.1.2 To study the main technologies of gaining access to information.

9.2 Work assignment

9.2.1 To create an account in Google Docs.
9.2.2 To study the main functions of Google service Docs.
9.2.3 To provide access to the account Google Docs using a mobile phone.

9.3 Methodological guidelines for performing the work

9.3.1 Creation of an account in Google Docs.

Google Docs is a file storage system linked to a Google account that provides secure storage of documents: Word, video, photos, presentations, Excel spreadsheets, etc.

To create an account in the Google Docs online service, you must register with a Gmail email account. To register a new account or log in to an existing one, you need to go to www.gmail.com and fill in the required fields.

To get started with Google Docs, you need to log in to your Gmail account and click on the «Disc» link located in the center next to the «Mail» highlighted link (figure 9.1).

Before you open the Google Docs storage - Google Drive. You do not need to install Google Drive on a computer or mobile device to use the Google Docs service.

When you first access the Google Docs service, all interface elements (buttons, menus, labels) are often displayed in English. To switch the language, you must do the following:

– on the Google Docs page, select the «Settings» button from the top right, and in the drop-down menu - the «Documents settings» line;

– on the «Settings» page, select the «Russian» language and click «Save» button.

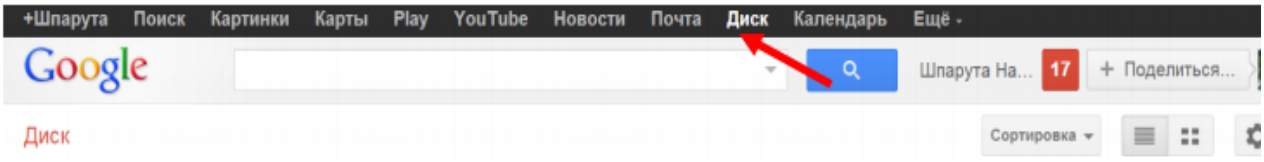

Figure 9.1 – Log in to account

9.3.2 Main functions of *Google Document*.

1. To create a Google document, click «Create» and select the type of document to be created or load an existing one (figure 9.2).

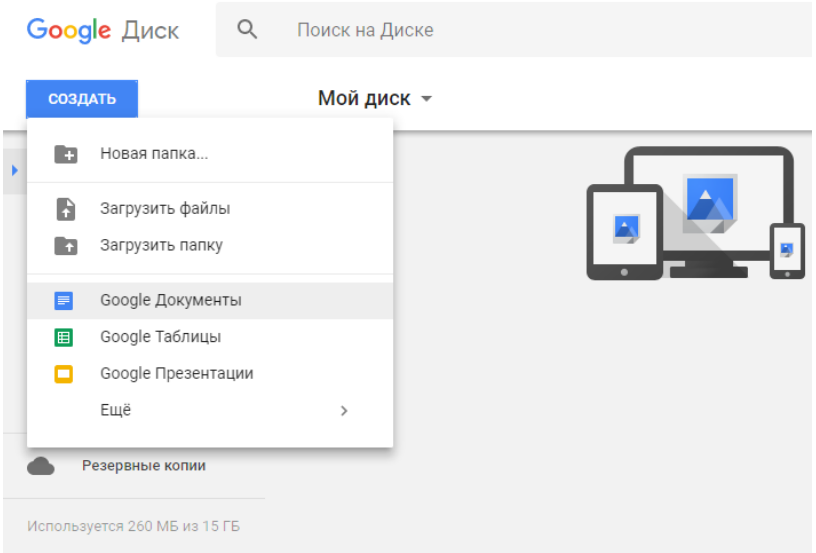

Figure 9.2 – Document creation

Select Google Docs, the document window will open (figure 9.3).

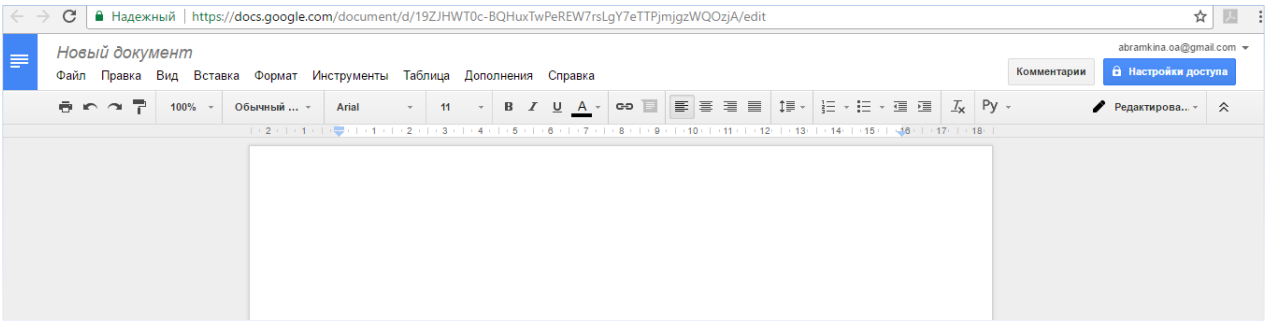

Figure 9.3 – Document interface

2. In Google Docs, you can work with documents that are created in the Word editor (if necessary, install the «Edit Office files» plug-in). To do this, go to the «File» menu and click «Open». Then select «Download» and specify the path to the document on your computer.

3. It is recommended to save downloaded files in Google Docs format. To do this, open the «File» and select «Save as Google Docs Format».

4. Once you create a document, it is automatically saved to Google Drive. To rename a file - click on the name in the upper left corner and edit it (figure 9.4).

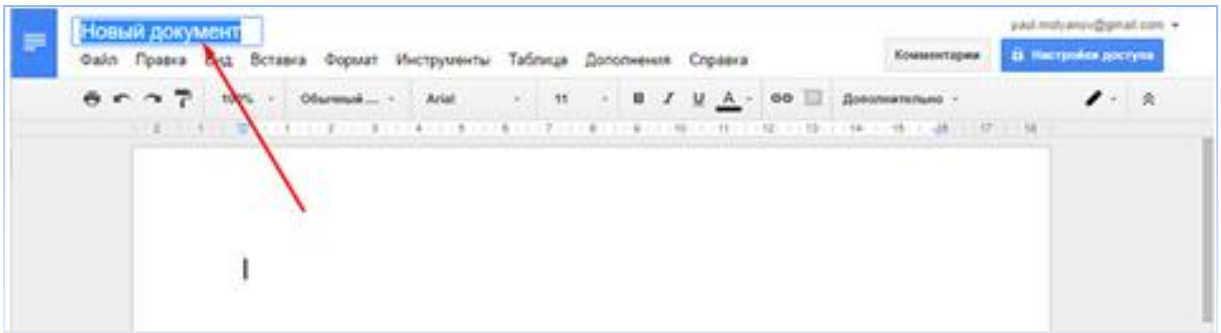

Figure 9.4 – Rename a file

5. If you need to save the file not in the cloud, but on the computer - just download it. Open the «File» menu, «Download as» and select the desired format.

6. Working with text in Google Docs is identical to working in MSOffice Word. The difference is the ability to change the way information is entered, by calling various on-screen keyboards. If the screen does not have enough space for all the tools - some of them are hidden in the «Advanced» folder.

7. Working with images allows you to insert images into the text, by copying an image into a document or «dragging» it from the site. Another method is the «Image» tool in the «Insert» menu. Here you can take a snapshot from a webcam, specify a link to a picture, upload a file from your computer, or even use Google search.

7. After that, you can set the image dimensions, rotate and adjust the text flow. The image can be copied, rearranged, hyperlinked, aligned to the desired edge of the sheet or centered.

8. In the context menu in the «Image Settings» section, you can change the transparency, brightness, contrast and change the color rendering.

9. To crop an image in the context menu, select the «crop image» item and use the frames to specify the area to be left.

10. Double clicking on the picture also causes the frame to crop.

11. The change history allows you to observe all the changes in the document. To do this, open the «File» menu – «View Change History». In the lower right corner there is a button «More Details». Click on it. A huge history of versions of the document will open. You can choose any stage and see how it differs from the current text. From here, you can copy deleted fragments or simply roll back to the desired version.

12. Voice input of information is started by the button «Voice input» in the «Tools» section or by the combination Ctrl + Shift + S. When the icon with the microphone is red - recording is in progress. To pause - just click on it.

9.3.3 Access settings to Google Docs.

Setting up access allows you to work on the file at the same time. Confidentiality is provided by setting the access level. By default, the document is visible and is accessible only to the creator.

1. Access by the link is configured by clicking on the «Access Settings» button in the upper right corner of the screen.

Go to the access settings, click «Enable access with a link».

Now you can choose one of the four levels of access for users who have clicked on the link:

- off. The document is inaccessible to everyone;
- browse. Users will be able to read the document and copy its contents;
- comment. Users can write comments on the margins or advice edits. But they will not be able to change something in the document;
- edit. Everyone who passed by the link can do anything with the document.

Now you can copy the link and send it to anyone or post it on the site. Only the author can delete the document.

2. Access to certain users. You can open by sending an invitation to users by mail and give them one of three levels of access. The invitation works only with people who have a Gmail account.

Click on the «Access Settings» button on the upper right. Enter email addresses or names (if they exist in your address book) and choose what rights you want to give to these people.

3. Access through email.

To change the permissions of users, you need to go to the advanced settings «Access Settings» - «Advanced» in the lower right corner. Here is a list of all who have access. You can remove unnecessary people, change the permissions of existing members, or add new ones.

4. Sharing is configured through advanced access settings. Open them and click «Change» in the column «Access Levels». Select «Enable for everyone on the Internet».

The second way is through the menu. Click the «File» tab and click «Publish to the Internet».

The third way to grant access is to choose what you want to do (get a link or embed document on the site) and click «Publish».

5. Access to the folder with the files.

If you need to configure access for a group of files, and not for one document, it is better (faster) to do this through Google Drive. You need to collect all the files in the folder, and then configure access for it.

Select the folder, open the shortcut menu and select «Shared».

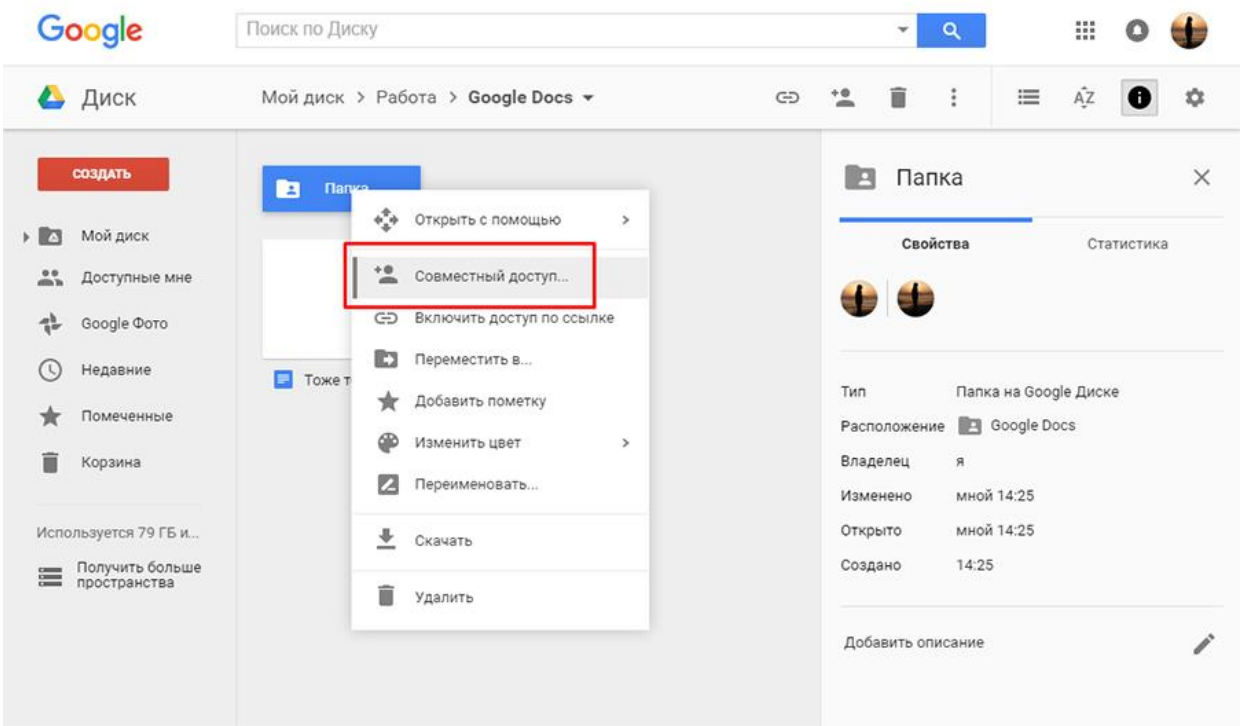

Figure 9.5 – Providing general access to the folder

9.3.4 Joint work on the document.

1. Comments.

You (and other users) can write notes in the margin. To do this, select a piece of text, call the context menu and click «Leave a comment». Alternatively, just click on the icon that appears on the right, as soon as you highlight something.

To remove the comment, click the «Question Solved» button. The note will be sent to the archive. If you want to delete a comment without leaving a trace, click on the button in the form of three points and select «Delete».

To view the archive, click on the «Comments» button in the upper right corner.

2. The «Advise edits» feature allows you to add text and delete existing fragments. In this case, the action is not immediate, and with the permission of the owner.

To switch to the edit mode, expand the list under the «Access Settings» button and select «Advise».

Users with a «Comment» access level are always in this mode.

9.4 Control questions

1. What requirements is it necessary to fulfill to enter the account Documents?
2. What is an Internet service?
3. What are main functions of Internet service?
4. What services does Google provide besides documents?

5. How to create a Google account?
6. What is the account?
7. How to adjust access levels?
8. What properties does Google documents have?
9. What merits and shortcomings do cloud services have?

10 Laboratory work № 10. Determining the requirements for developing an «easy-to-use» Web site

Work purpose: mastering the principles of developing Web-sites in MS Sharepoint Designer 2007/2010 environment.

10.1 Preliminary preparation

10.1.1 You need to familiarize yourself with the interface of MS Office Sharepoint Designer 2007 application.

10.1.2 Study basic methods for developing Web sites.

10.2 Work assignment

10.2.1 Create a new Web site.

10.2.2 Examine main functions of MS Office Sharepoint Designer 2007 application.

10.3 Methodological guidelines for performing the work

10.3.1 Creating Web pages.

To create the «University Structure» web page (University / Dean's office / Departments), open the SharePoint Designer 2007 program with Start / Programs / ... / Microsoft Office SharePoint Designer 2007 command.

Create an empty web site (File / New / Web site) and go to the "Transitions" mode (figure 10.1).

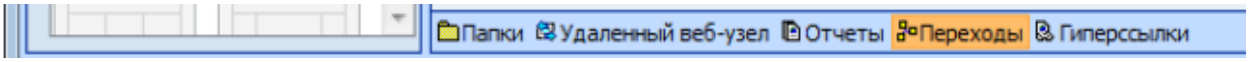

Figure 10.1 - Page Modes

Right-click in the workspace, select New / Top Page (figure 10.2).

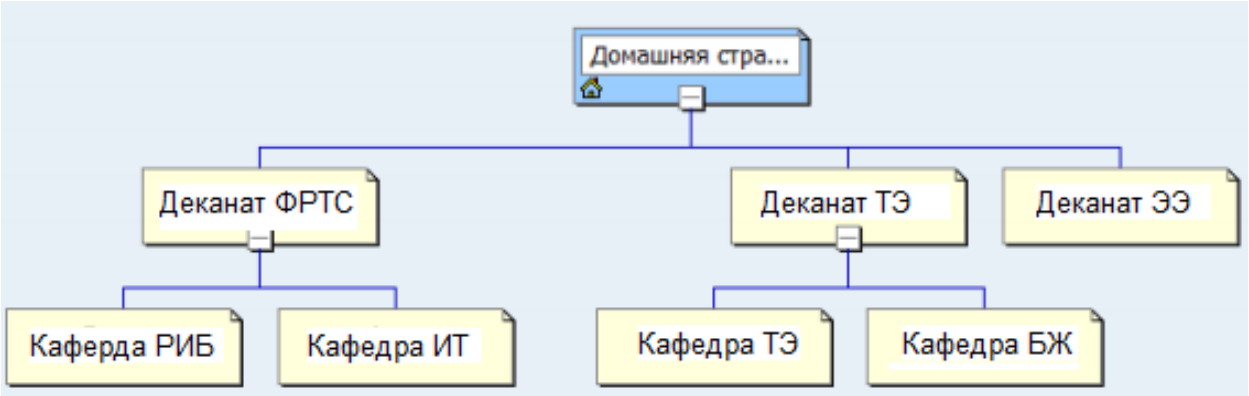

Figure 10.2 - Site structure (transitions)

Highlight the «Home Page», right-click on it, select «New / Page» (figure 10.3).

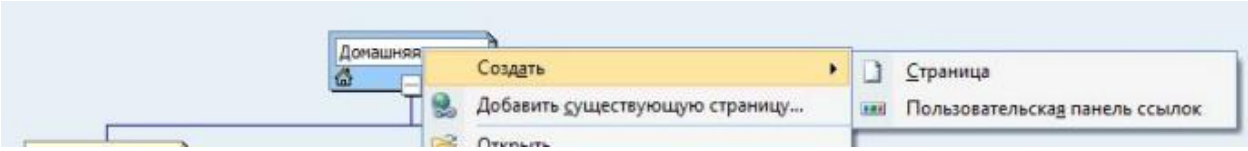

Figure 10.3 - Creating a home page

Rename the home page in accordance with the diagram in figure 10.2. Similarly add other pages of the structure.

10.3.2 Design web pages:

1) Activate the «Constructor» mode by clicking the button at the bottom left of the document area.

2) In the working area of the document, enter any text of the title of your page, for example, «CREATING AND DESIGNING A SIMPLE PAGE».

3) Perform the font design of the title using the «Format / Font» command or the corresponding buttons on the toolbar: set arbitrary font parameters (size, style, color, effects, etc.).

4) Save the file with the command «File / Save» or the «Save» button on the panel.

5) Find on your computer a file with a picture (with the extension jpg, gif, jpeg, etc.) and copy to your folder.

6) In SharePoint Designer 2007, choose Format / Background. In the «Page Properties» window that opens, to place the picture as the page background, check the «Wallpaper» box.

7) Use the «Browse» button to specify a file with a picture for the page background. Save the web page.

In the «Save Embedded Files» window that opens, click the «Change folder» button and select the desired folder.

8) Choose View / List of Folders. In the «Folder List» area, make sure that the drawing is saved in your folder. Review the resulting page in the browser with the command «File / View in the browser».

9) Open the «Your Site» home page in MS SharePoint Designer 2007. Place the cursor in the cell under the logo and execute the «Insert / Web Component» command (figure 10.4).

10) In the window that opens, select «Link Pane / Panel» based on the navigation structure and click «Next».

Select the button style. Click «Next».

Select the vertical orientation, click «Ok».

In the window, in the «Advanced» section, check the box next to the home page. Click OK.

Review the result in the browser, change the panel style if necessary.

11) Similarly, place the navigation bar (the same level) on the pages – «Dean», «Departments», and on the others create hyperlinks of the transition to the main and the previous level.

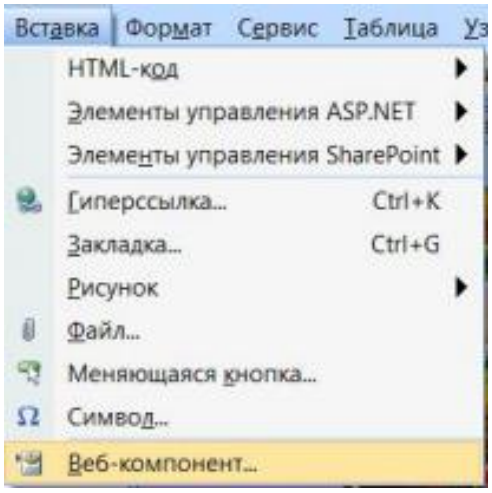

Figure 10.4 - Web Components Insertion

12) Select the first item of the «Dean» menu and execute the «Insert / Hyperlink» command. In the Insert Hyperlink dialog box that opens in the «Link to Click» area (by default the current folder with the list of «html» files opens), click the «Current folder» button, in the list of files, select the «Dean» web page. Specify the frame in which the hyperlink will be displayed using the «Frame selection» button, click in the «End frame» window on the frame on the selected page and confirm with the «OK» button. Make sure that the address field of the desired file (file name) is specified in the «Address» field. Click «OK».

13) Create a bookmark to go from the beginning of the page to its end: pose the cursor on the first line of the page; select the command «Insert / Bookmark»; In the «Bookmark name» field, enter «Top of page», click «OK».

Similarly, create the «End of Page» tab on the last line of the page. To check the operation of these bookmarks, ensure that the first and last lines of the page do not fit on one screen.

10.4 Control questions

1. What are the requirements for the development of websites?
2. What is a website?
3. What are the main functions of FrontPage?
4. How to create a home page?
5. What is the home page?
6. How to access remotely a Web site?
7. How to customize the publication of a page?
8. How to insert pictures?
9. How to set up a hyperlink?
10. How to create a navigation tab?

11 Laboratory work № 11. Receiving data from the server. Designing a graphical interface for a Web application. Creating Styles

Work purpose: mastering the principles of designing the graphical interface of Web applications and editing its styles.

11.1 Preliminary preparation

11.1.1 You should familiarize yourself with the HTML language.
11.1.2 Study the concept of cascading style sheets.

11.2 Work assignment

11.2.1 Create a Web application using HTML.
11.2.2 Change the page style by means of CSS.

11.3 Methodological guidelines for performing the work

11.3.1 Creating Web pages.

HTML hypertext markup language is used to create hypertext documents. These documents are ASCII files containing information about the appearance of the document and its hyperlinks. HTML-documents are created in any text editor supporting ASCII-format.

To describe the structural and format information, labels called tags, instructions and necessary parameters enclosed in angle brackets are used. There are rules for creating HTML documents in which the language has a structure:

<tag parameter1 = value1, parameter2 = value2>
  text
other constructions
<tag>;

– document is placed in the parentheses <html>;
– document starts with the header <head>;
– title of the document is <title>;
– main body of the document («body») is labeled with <body> tags.

11.3.2 Initial HTML.

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html>
<head>
<title>Template</title>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1" />
<style type="text/css" media="all">
@import "style.css";
</style>
</head>
<body>
<div class="content">
  <div class="toph"></div>
  <div class="right">
    <div class="title">GREY</div>
    <div class="nav">
      <ul>
        <li><a href=#>HOME</a></li>
        <li><a href=#>ARTICLES</a></li>
        <li><a href=#>GALLERY</a></li>
        <li><a href=#>AFFILIATES</a></li>
        <li><a href=#>SUPPORT</a></li>
        <li><a href=#>CONTACT</a></li>
      </ul>
    </div>
    <h2>Top Articles:</h2>
    <ul>
      <li><a href=#>NoHeader Template</a></li>
      <li><a href=#>Consectetuer adipiscing elit</a></li>
      <li><a href=#>Lorem ipsum dolor sit amet</a></li>
      <li><a href=#>dolor sit amet consectet</a></li>
    </ul>
```

```
    <hr />
    <h2>Links</h2>
    <ul>
      <li><a href=#>any.com</a></li>
      <li><a href="htmlbook.ru/samcss">htmlbook.ru/samcss</a></li>
    </ul>
    <hr />
  </div>
  <div class="center">
    <h2><a href=#>Try sNews 1.4!</a></h2>
Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Integer euismod ante non diam. Sed eleifend odio sed quam. Sed vulputate, <a href=#>turpis at tincidunt</a> porttitor, est elit consequat metus, non dignissim augue mauris quis arcu. Phasellus faucibus blandit eros. Curabitur porttitor ante non est. Maecenas dolor. Aenean egestas sem. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos hymenaeos. Sed suscipit, nisi sit amet pharetra malesuada, sem velit laoreet sem, vitae iaculis diam neque consequat est. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Pellentesque tincidunt eros non quam. Mauris a magna sit amet libero accumsan auctor. Aenean nec urna non dui lobortis viverra...
    <p class="date">Posted by Avenir <img src="more.gif" alt="" />
 <a href=#>Read more</a> <img src="comment.gif" alt="" />
<a href=#>Comments (2)</a> <img src="timeicon.gif" alt="" /> 21.02.</p>
    <br />
    <h2><a href=#>Heading Item</a></h2>
Lorem ipsum dolor sit amet, consectetuer adipiscing elit. Integer euismod ante non diam. Sed eleifend odio sed quam. Sed vulputate, <a href=#>turpis at tincidunt</a> porttitor, est elit consequat metus, non dignissim augue mauris quis arcu. Phasellus faucibus blandit eros.
    <p class="date">Posted by James <img src="more.gif" alt="" />
<a href=#>Read more</a> <img src="comment.gif" alt="" />
 <a href=#>Comments (7)</a> <img src="timeicon.gif" alt="" /> 18.01.</p>
    <br />
    <div class="boxad"> Your Ads here...sNews is a completly free PHP and MySQL driven tool for publishing and maintaining news articles on a website.</div>
  </div>
  <div class="footer"></div>
</div>
</body>
</html>
```

11.3.3 Required style.

Figure 11.1 – Required style

11.3.4 Realization:

1) For the selector «body»:

– set the page body background color # 7D8085, using the «background» property of the selector «body»;

– set the page body font 74% Arial, Sans-Serif, using «font» property.

2) For the selector (class) «.toph»:

– set a non-recurring background image «top.jpg», without margins, 39px high, with center alignment using «background», «height», «margin», «padding» properties.

3) For the selector (class) «.content»:

– set a repeating background image «bg.jpg», without margins, 800px width, aligned in the center, using the properties «background», «width», «margin», «padding».

4) For the selector (class) «.title»:

– set a non-recurring background image «logo.jpg» with the alignment on the left side, using the «background» property;

– with fields from the top edge of 10px, from the left 40px, 28px height, using the properties «height», «padding»;

– set the font size to 140%, bold, color # F29900, using the «font» property.

5) For the selector (class) «.right»:

– set the flow to the left using the «float» property;

– with an indent from the right edge of 15px, and a field from the right edge of 1em, using the properties of «margin», «padding»;

– set the font size to 95%, bold, using the «font» property;

– set the width of the layer to 170px, using the «width» property.

6) For the selector (class) «.footer»:

– set the flow restriction simultaneously from the right and left edges, using the «clear» property;

– set a non-repeating wallpaper pattern «bot.jpg» with a center-aligned side, using the «background» property;

– set the text alignment using the «text-align» property;

– set the layer height to 37px, using the «height» property;

– set the automatic layer width to «auto» using the «width» property.

7) For the selector (class) «.center»:

– set the flow to the right using the «float» property;

– set the width of the layer to 530px, using the «width» property;

– set the font size to 95%, bold, using the «font» property;

– set the text color #FFF;

– set margins and indentation accordingly «margin: 0px 0 5px 35px; padding: 0».

8) Set the color of the links for the central unit:

– the color of the main reference # F29900, using the selectors «.center a»;

– the color of the link under the cursor #FFF, using the selectors «.center a: hover».

9) Set for the «date» block:

– base text color #ccc;

– right justify the text using the «text» property;

– margins and paddings respectively «margin: 4px 0 5px 0; padding: 0.4em 0 0 0; »;

– the upper border of the block is 1px thick by the color # 555, using the «border» property.

10) Set the color of the link to #ccc, using the «color» property of the selector «.date a».

11) Set the color of the link to # 7D8085, using the «color» property of the selector «.right a».

12) Set the color of the paragraph and reference tags to # 888 using the «color» property of the «p» and «a» selectors.

13) For the selector «a»:

– set the background inheritance, using the «background» property with the «inherit» parameter;

– turn off text styles using the «text-decoration» property.

14) For the selector «p» set indents and margins accordingly «margin: 0 0 5px 0; padding: 0;».

15) For the «hr» selector:

– set the height to 1px;

– set the main and background colors in #eee;

– remove «border».

16) For the selector of header «h1»:

– remove indents and margins;

– set the color to #FFF;

– install a bold font of 1.8em size, Arial, Sans-Serif;

– set the background inheritance, using the «background» property with the «inherit» parameter;

– set the letter-spacing property to «-1px».

17) Set the color for the «a» links in the header «h1» to #FFF, and set the background inheritance for them.

18) For the «h2» header selector:

– set the background color inheritance, using the «background» property with the «inherit» parameter;

– set indents and margins according to «margin: 10px 0 10px 0; padding: 0;»;

– set the base color to # F29900;

– set the font size to 140%, bold.

19) Set the color for links «a» in the header «h2» in # F29955. For links under the cursor, set the same color and remove the underscore.

20) Apply the styles of the list items according to the instructions and insert the comments on the action of the properties:

```
ul {margin: 5px 0 20px 15px;
      padding: 0;
      list-style: none;
}
li {list-style-type: square;
     color: # F29900;
     margin: 0 0 0px 0;
     padding: 0 0 0 0px;
}
li a {color: # 7D8085; }
li a: hover {color: # F29900; }
```

21) Implement the application of these styles in three ways: connected, global and internal.

11.4 Control questions

1. What are the requirements for developing web applications?
2. What is a web application?
3. Basic parameters of the HTML language?
4. Concept and structure of HTML?
5. How to change the styles?
6. How to set the background color?
7. How to insert pictures?
8. How to set the color for links in the header?
9. How to set the color of the body text?
10. How to set the font of the main page?

12 Laboratory work №12. Creation of video files using Windows Movie Maker

Work purpose: development of creation principles of video files by means of Windows Movie Maker.

12.1 Preliminary preparation

12.1.1 It is necessary to get acquainted with the interface of Windows Movie Maker.

12.1.2 To study the main methods of creation of video files.

12.2 Work assignment

12.1.1 To create a new video file.

12.1.2 To study main functions of Windows Movie Maker.

12.3 Methodological guidelines for performing the work

1. Start Windows Movie Maker through «Start-up/program / Windows Movie Maker».

2. Create and keep the new project: «File / Create the project/file / Save as». By default, the program suggests to save the project in My Documents folder.

3. In *Operations* tab by means of the teams «Import of Video», «Import of Images», «Import of a Sound or Music» of the section «Record of Video» load the files chosen by you for the clip into the project. These files are located in a working window of the program in the section «Collections» (figure 12.1).

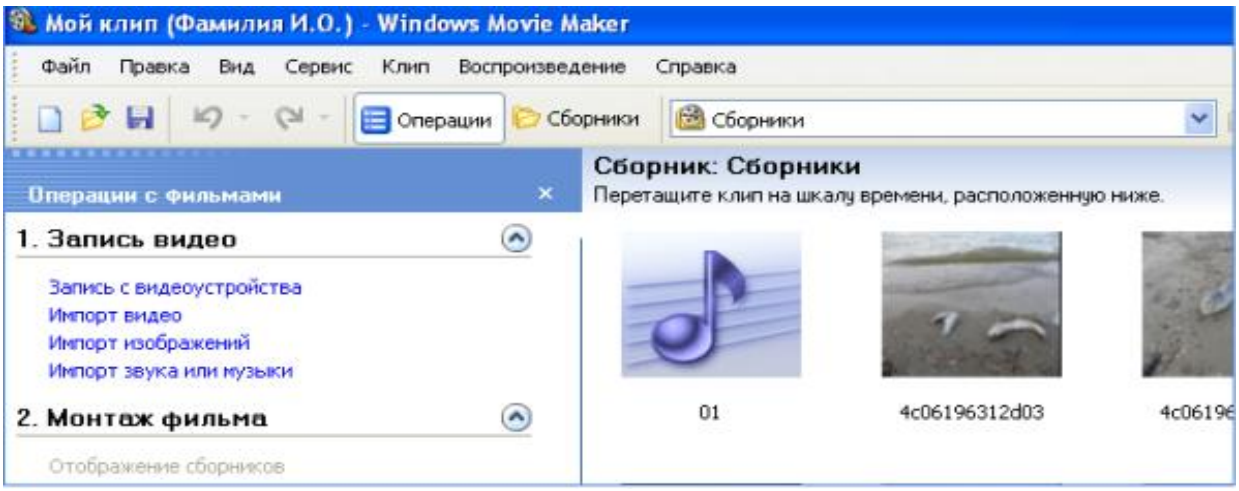

Figure 12.1 – Information import

4. For creation of the name of the movie, there shall be a depressed key «Operations». In the section «Film editing» we select «Creation of Names and Titles». Further «Add the name at the beginning of the movie».

5. For input of the name in the opened text box we click «Ready, add the name to the movie» - the clip with the name will appear on a storyboard panel, in the lower part of a window of the program. Animation of the name, color and a font of the text can be changed, having clicked the appropriate links in the same window.

6. To place figures on a panel of a storyboard it is necessary to drag the picture from «Collection» on a panel of a storyboard and to set on a time scale (figure 12.2).

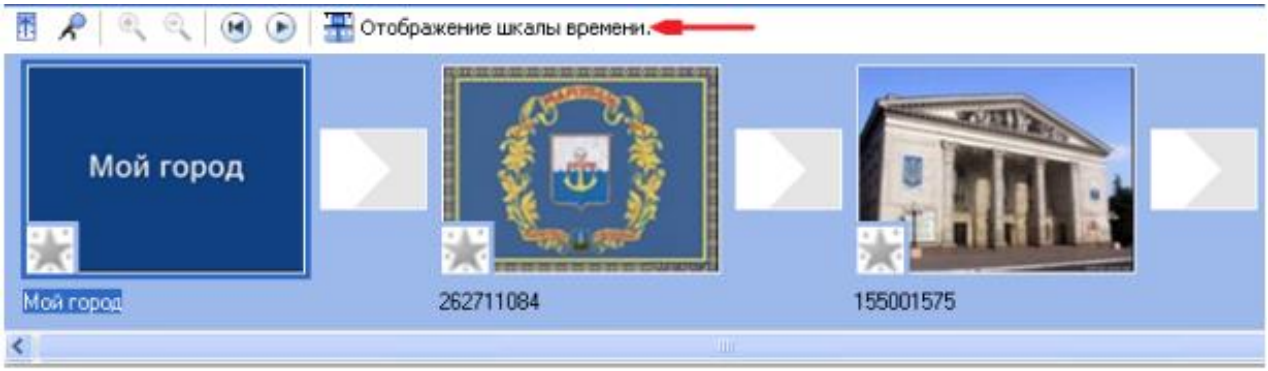

Figure 12.2 – Display of the time scale

7. For establishment of effects we click on the picture the right mouse button, we select item of the Video effect shortcut menu and we set some effect with which the selected picture will be displayed (for example, «To weaken inside»).

8. For adding titles, select the first clip with name of the movie for panels of a storyboard and in a window of operations to click «To add the Name after the selected clip on a time scale». To enter the text «To change animation of the name».

If it is necessary to change effects or the text, one should click on the clip with titles (on a storyboard panel) the right mouse button and having selected «To change the name...»

9. To change photo animation, open the *Operations* tab, the section *«Film editing»* and select «Viewing of transition video». Select the desired transition and drag it to the storyboard panel, between the first and second images. Click «Play» and see what happened (figure 12.3).

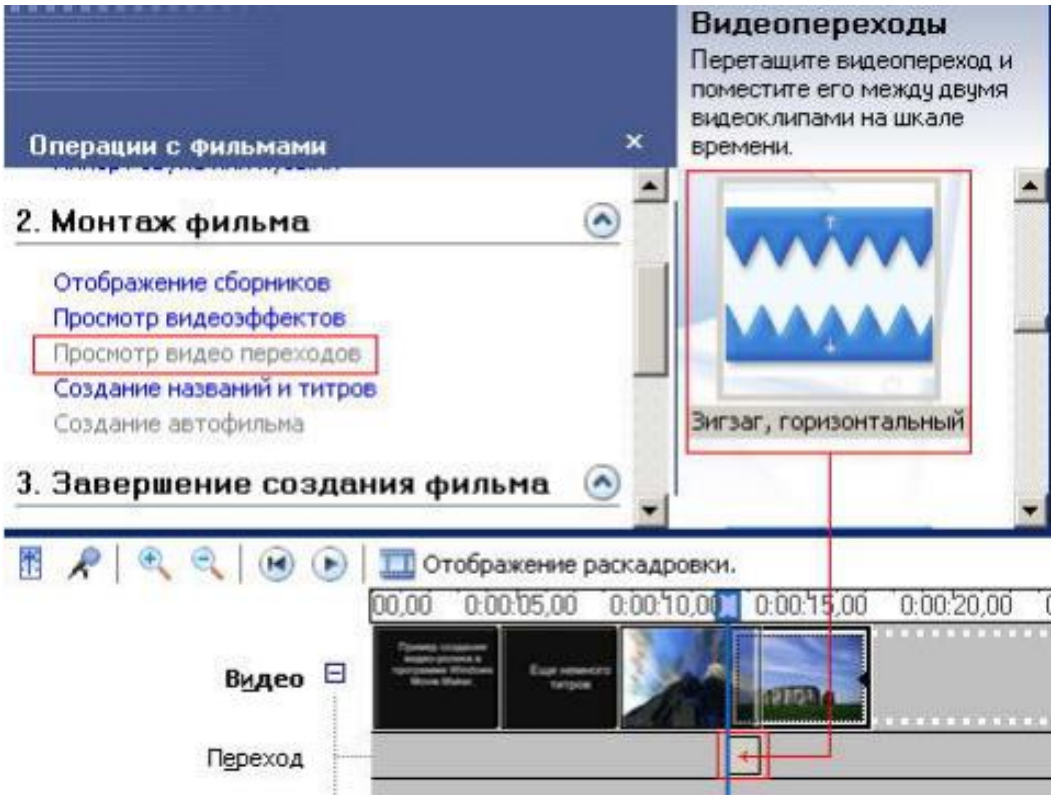

Figure 12.3 – Animation change

10. Save the created movie File - Save the movie file.

12.3 Control questions

1. What are transitions?
2. What is the concept of video?
3. What is audio?
4. What is a storyboard?
5. How to realize the animation change?
6. How to add a text or a photo?
7. How to set effects on the clip?
8. Why is it necessary to display on a time scale?
9. How to create a new video file?

13 Laboratory work №13. Working with Smart Applications: Smart TV, Smart Hub

Work purpose: mastering principles of operation of Smart-applications.

13.1 Preliminary preparation

13.1.1 To study SMART technologies.
13.1.2 To study basic principles of operation of smart-applications.

13.2 Work assignment

13.2.1 It is necessary to organize connection of the TV set on SMART technology.
13.2.2 To realize the analysis of operation of Smarts-applications.

13.3 Methodological guidelines for performing the work

Smart TV. The main idea of the technology: the integration of the Internet and television.

To connect a smart TV to the Internet, you need to connect TV Ethernet port to a router (for example, a Wi-Fi router), as shown in figure 13.1.

Figure 13.1 –Diagram of Smart-TV connection

To use Smart TV functions it is not mandatory to buy a modern TV set, it is enough to buy the «Blu-Ray» players with Smart TV function. There are also LG Smart TV Upgrader. Some modern media players also allow installing the applications.

Smart TV functions can be controlled from the remote control, the LG Remote App application to control the TV from the screen of a smartphone or tablet; you can connect a standard wireless keyboard + mouse.

The applications are divided into panels belonging to the following categories:

- on TV (TV shows);
- social (social networks);
- movies & TV;
- all Share (connect mobile devices to the TV).

Smart Hub - proprietary technology (service), from Samsung, used in smart TVs to access various multimedia applications.

You can get into the Smart Hub interface by clicking on the button on the remote control after it is turned on.

Next, register Samsung Smart TV account. In the «SMART HUB» menu, we press the A button on the remote control and in the appeared «Login» window we press the «Create an account» button.

Accept the «Terms of Service Agreement», and then enter the data:

1) In the line «Samsung Account» press the button (Enter). Data entry is carried out using the on-screen keyboard. Enter «Admin» and confirm with the «OK» button.

2) In the lines «Password» and «Password verification», enter any password from 6 to 15 characters using the on-screen keyboard and confirm with the «OK» button.

3) We tick the box 2Receive E-mail on Samsung Smart TV» and click the «Create an account» button. The message appears «An Admin account will be created. Continue», press «OK». The account «Admin» in Smart TV is created.

Select the Samsung Smart TV account. After the account is created, the «Login» window will appear, select the created «Admin» account, enter the password, put a tick and click the login button.

To adjust the synchronization with TENET-TV. In the «SMART HUB» menu of the TV, press the D button on the remote control and in the «Settings» window select «Development» and press the «Enter» button (in some versions of the TV firmware, the «TOOLS» button is used to access the «Settings» window).

Next, select «Configure the IP address of the server». And press the «Enter» button.

Enter the IP address for synchronization with Smart Hub: 195.138.78.68, pressing the «Enter» button confirms the synchronization of the user's applications. Exit the menu «SMART HUB» and select the TENET-TV widget. If the TV is not registered, the registration form will appear on the screen (figure 13.2).

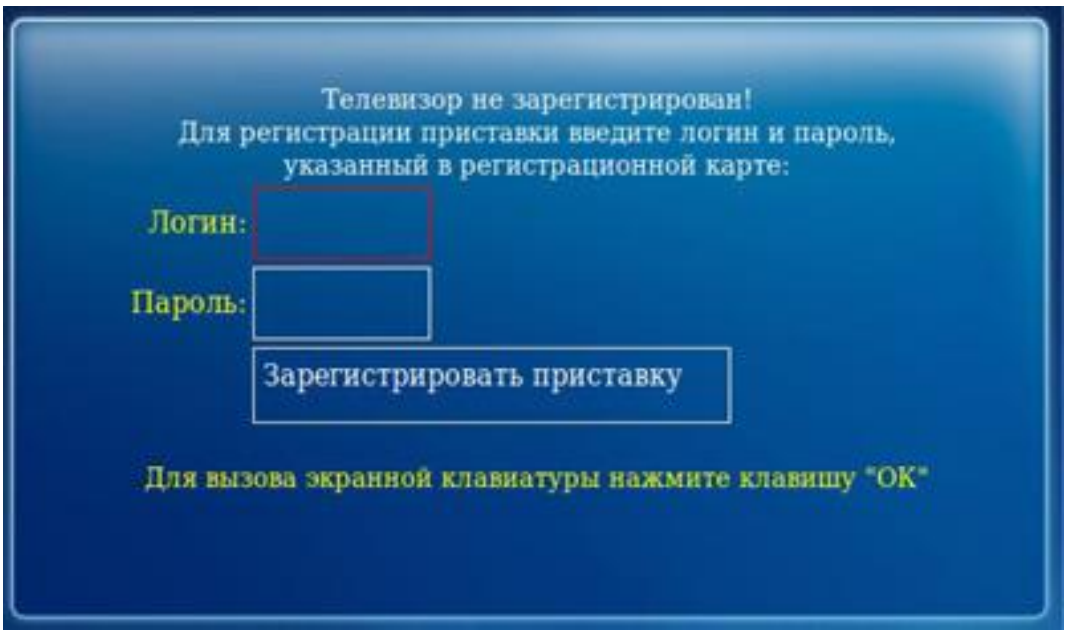

Figure 13.2 – Registration form of the TV set

To register, enter the login and password for the Internet connection in the appropriate lines, press the «close» key. To enter the password on the highlighted field, press the key and enter the password using the on-screen keyboard, press the «close» key.

After entering the login and password, click the «Register TV» button. If the login and password are entered correctly, the TV will be registered in 1-2 seconds. If you make a mistake while filling in the fields, when you try to register, the message appears «Incorrect login or password!».

13.4 Control questions

1. What is the Smart technology?
2. What is the concept of Smart TV?
3. What are Smart functions?
4. What is Smart Hub?
5. How to realize the registration of a TV set?
6. How to realize the setup of Smart functions on TV set?
7. How do you set up a new account?
8. What panels are Smart applications?
9. How can you manage Smart applications?
10. How to connect the TV to the network using Smart technology?

14 Laboratory work № 14. Working with services on the e-government website: registration of applications, receipt of duplicates of documents

Work purpose: development of the principles of work with the website of RK e-government.

14.1 Preliminary preparation

14.1.1 To study services of the e-government.
14.1.2 To study basic principles of operation of the website of the e-government.

14.2 Work assignment

14.2.1 To create the request on the e-government website.
14.2.2 To realize obtaining of duplicates of documents.

14.3 Methodological guidelines for performing the work

To enter the electronic government site of the Republic of Kazakhstan by link egov.kz. The interface of the site is shown in figure 14.1.

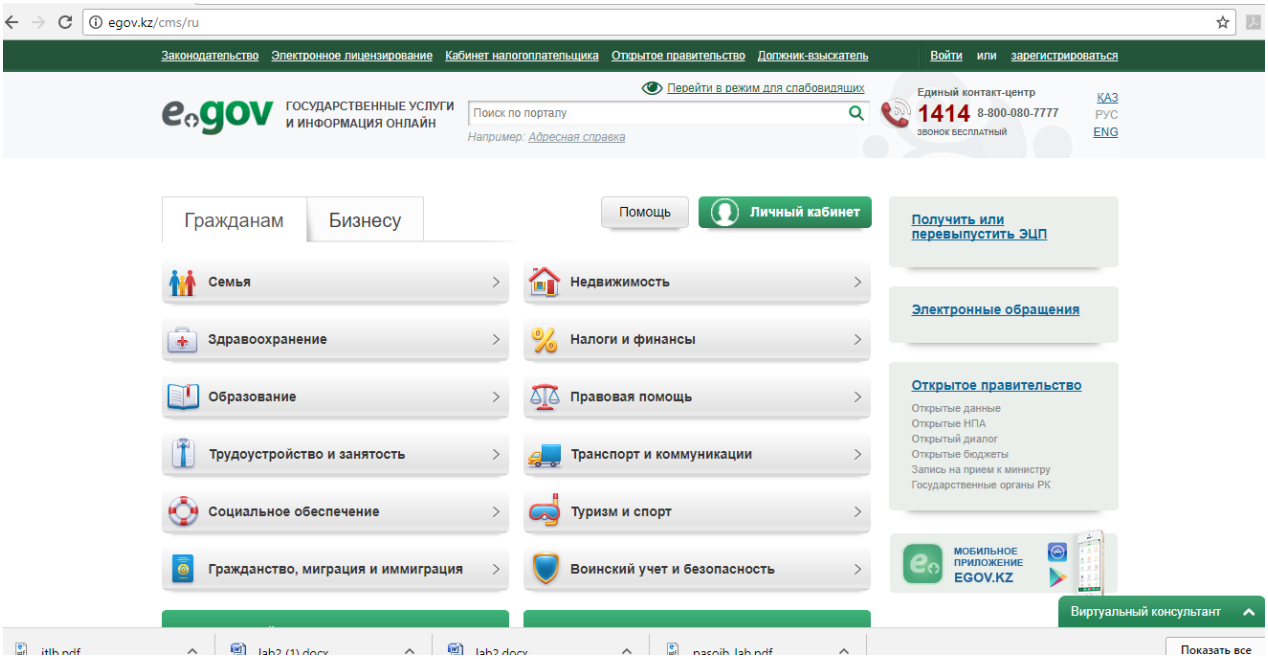

Figure 14.1 – Homepage interface

On the main page, there are sections of the government's interaction with the public.

To apply, you must select the section «Education» - «Higher and vocational education» - «Obtaining duplicates of documents on higher and postgraduate education» - «Order an online service» (figure 14.1).

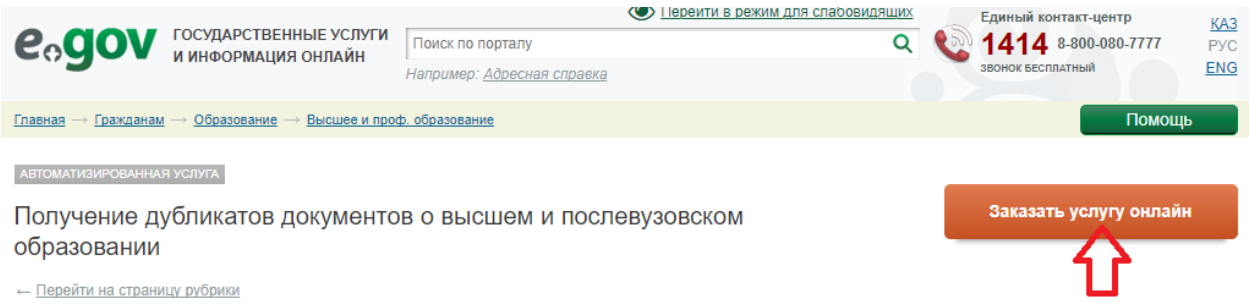

Figure 14.1 – Online application

Terms for the provision of public services:

– from the moment of the receipt by the recipient of the state service of the necessary documents, - not more than 20 minutes;

– from the moment of application for receiving a state service - no more than 10 calendar days.

A public service is provided free of charge.

To receive a public service, the recipients submit the following documents:

1) Application of the citizen who lost the document to the head of the education organization, which sets out the circumstances of his loss.

2) An extract from the newspaper on the loss of the document, indicating the number and date of registration of the issue of the document.

3) A copy of the birth certificate or identity card.

4) Certificate of Lost and Found.

All documents must be attached when submitting an electronic application.

14.4 Control questions

1. What is the E-government?
2. What are the functions of e-government?
3. How to apply on the e-government website?
4. What services does the e-government website provide?
5. What are the terms of receiving the «Obtaining a duplicate of a higher education document» service?
6. How to communicate with a virtual consultant?
7. Which numbers can be consulted on the issues of interest?
8. What list of documents is needed to obtain duplicates about higher education?
9. What is the address of the e-government homepage?

15 Laboratory work № 15. Developing the structure and content of the lesson in the Moodle distance learning environment

Work purpose: development of the principles of operation of Moodle distance learning environment.

15.1 Preliminary preparation

15.1.1 Examine existing distance learning environments.
15.1.2 To study the basic principles of the Moodle distance learning environment.

15.2 Work assignment

15.2.1 Create a lesson structure in the Moodle distance-learning environment.
15.2.2 Develop the content of the lesson in the Moodle environment.

15.3 Methodological guidelines for performing the work

To enter the portal of the distance learning system «MOODLE» go to www.sdo.apa.kz. The main page is divided into three columns. Blocks are placed in the columns at the edges of the page, and the middle wide column of the page is occupied by sections of the course (figure 15.1).

Figure 15.1 –Distance learning interface

To enter the program, click the (Login) button in the upper right corner. In the fields that appear, you must enter your login and password (the administrator logs in to the system, which sends the login and password to your email address).

After you go to the System, the line with your name «You have come under the name: Your name and surname» appears in the upper right corner and the Exit link that you need to use to end the session in the System.

All courses that need to be conducted are on the Navigation tab - My Courses (figure 15.2).

Figure 15.2 – My Courses Tab

The course can be created on the basis of the available program or is developed specially under the system of distance learning.

Development of a course assumes the following stages:

1) Definition of the purpose and problem of a course taking into account features of target audience.

2) Preparation and structuring the training material. The division of the course on themes (a lecture + a practical task + the test). It is recommended to include in a text part of each themes (lecture):

– purposes of studying the theme;
– study questions;
– training material;
– set of key problems on the theme;
– glossary – the main terms and concepts on the theme;
– questions for self-examination and a reflection (it is desirable with responses, comments and recommendations).

3) Preparation of media and interactive fragments. Development of figures, tables, diagrams, drawings, video series.

4) Selection of the list of references and hyperlinks to resources of the Internet (the annotated list of the best websites on this theme, websites of electronic libraries, etc.).

5) Consideration of the control system and assessment. Selection of tests, tasks, control questions, cases, subjects of papers and term papers, independent work. Development of methods of reinforcing knowledge and skills and implementation of feedback.

6) Development of the calendar of course.

7) Loading of materials in the Moodle system.

8) Testing of course, including on different display resolutions and in different web browsers.

9) Start of the course.

The virtual educational environment Moodle provides the teacher with a set of flexible and easily customizable tools for placing educational materials, managing students' access to them, and monitoring the learning process.

To add a course, you must leave a request for the course. To do this, go to the category of your department on the main page of the site and click the button «Send a request for creating a course». In the appeared window, it is necessary to specify the full and short name of the course, the reason for the request. Administrators will review the application as soon as possible, and the course will be added to the system. After this, the created course will be displayed in the «My Courses» tab in the upper left corner of the page.

When creating a course, only the news forum, 3 topics and blocks on the right side of the main page are automatically included in it. To make any changes to the course, you must enable «Edit Mode» using the button in the upper right corner of the main page or in the «Settings» block – «Course Management». In Edit mode, you can create, rename, move, hide, delete modules, themes and blocks, and edit their settings.

15.3.1 The main element of the distance course is the «Lecture». To add this element to the created course, perform the following sequence of actions:

In the menu «Add item or resource», select «Lecture».

Enter the title of the lecture.

If you want, fill out the proposed parameters of the lecture: time limit, evaluation parameters, etc. The meaning of each parameter can be found by clicking the question mark next to this parameter.

Click the «Save and return to course» button.

The lecture consists of logically completed semantic fragments. There are two main types of pages:

– «The rubric card (section)» is a page that contains material and a button / and unconditional conversions to other pages of the lecture;

– «Question» is a page containing a question, options for answers, comments for the answers, transitions for each answer.

The Question page can also contain a separate portion of the training information. The question, on the one hand, checks whether the student has

acquired the information provided, on the other hand, serves as a control element, since depending on the correctness of the answer the student will be shown various pages of the «Lectures».

An important concept of the «Lecture» element is the transition. This concept is present on all pages of the lecture, both basic and special. The transition determines which page will be displayed to the next student.

15.3.2 To add a text page:

- select «Add information page / table of contents»;
- insert the text of the page in the «Contents of the page»;
- set one or more transitions to the next semantic page of the lecture, in accordance with its logic. For example, in «Content 1» in the «Description» field, enter the word «Next» and in the «Transition» section select «Next page»;
- click «Save Page».

To add the next page in the «Actions» menu, click «Add Information Page / Table of Contents».

In the «Preview» tab, you can see the lecture in the form in which it will be presented to the course participants. In the «Edit» tab you can add, view, update, move and delete the page.

To add a question, you must:

- go to the «Edit» tab;
- choose «Question» in the «Actions» menu;
- select the type of question;
- enter the name of the question in after the «Page title» and the text of the question in the «Page content» field;
- indicate the answers in the «Reply» field;
- set the number of points for each answer;
- set transitions to other pages of the lecture in each answer;
- add a teacher's comment to each option in the «Feedback» field;
- click the «Save Page» button.

In the question «Short answer», there is an opportunity to provide a comment on the wrong answer. To do this, you must specify * (an asterisk) as one of the options, write a comment and put 0 points for the answer.

In this type of question, by default, the character case is significant. To work around this limitation, you can use regular expressions in response variants. To do this, check «Use regular expressions». For example, the answer «(Б | б)улгаков» allows you to enter the surname of the writer with a large or small letter, which does not affect the correctness of the answer in any way.

15.3.3 Record users to the course.

There are four main roles in the Moodle courses:

1) The teacher can keep up to date on any action, including changing the elements of the course and assessing students.

2) The assistant (without the right to edit) can teach in courses and make grades, but he cannot change the course content.

3) The student has a basic set of rights, allowing you to work with the materials of the course.

4) The guest has the right only to read some course materials.

When adding a course, the user who requested the creation of this course is automatically enrolled to the created course with the role of «Teacher». The teacher can write users to his course manually, set up a self-recording or open guest access to the course.

When enrolling manually, the teacher writes users to the course from the number registered on the site and assigns roles to them. To do this you need:

1) Go to the «Settings» - «Course management» - «Users» - «Recorded for the course users».

2) Click the button «Write users to the course».

3) Enter the name and surname of the user in the search box and click «Search».

4) In the top menu, «Assign roles» select the role that you want to assign to the user (the default is «Student»).

5) Select from the list of the user that you want to write to the course, and click the «Record» button.

If necessary, record a few more users by repeating steps 3-5.

6) Click «End User Recording».

To change the course role, delete the current role by clicking on - «Unassign Role» icon, then click on - «Assign Roles» icon and select the role that you want to assign to the participant.

If the course is allowed guest access, then any user of the site will be able to view any course materials except items that are evaluated (tests, assignments, lectures, etc.). To open the guest access to the course, you need to go to «Settings» - «Course Management» - «Users» - «Ways to write to the course» and in the line «Guest access» click on the icon («Enable»).

In addition, guest access can be free or using a password. To set a password, click on the icon - («Settings»), enter the password in the appropriate field and click «Save».

Self-enrollment allows the users of the site to enroll themselves on the course with the role of «Student». To enable the self-enrollment, you must also go to «Settings» - «Course management» - «Users» - «Ways to write to the course» and in the line «Self-recording (Student)», click on - the «Enable» icon.

Self- enrollment can be limited to a code word. To do this, click on - the icon («Settings»), enter the password in the «Keyword» field and click «Save».

By default, the course is hidden, that is, it is not displayed in the list of courses and is not available through the search, and only teachers and administrators can enter this course. To open a course, go to «Settings» - «Course Management» - «Edit Settings», in «General» - «Availability» set «Show» and at the bottom of the page click «Save and show».

After that, students who have been enrolled in the course manually will see your course in the «My Courses» list and will be able to start working with

resources and course elements. If you set up a self-enrollment for the course, after the course opens, users will be able to find your course through the search and enroll in it. If guest access to the course is open, after opening access to the course, any user of the site will be able to view any course materials.

The teacher can see how the course looks for students and guests. To do this, go to the user profile menu in the upper-right corner of the page, click «Switch to the role ...» and select the role of «Student» or «Guest». To return to the normal course display, click «Back to my normal role».

15.4 Control questions

1. What is distance learning?
2. What functions does distance learning do?
3. How to create a course in the Moodle system?
4. What address is it possible to get access to Moodle homepage?
5. What types of access to the course are there?
6. How to add a page to the lecture?
7. How to establish student's manual enrollment in the distance learning system?
8. How to add an element or resource to the course?
9. What roles are there in the distance learning system?
10. What is the structure of a lesson in the distance learning system?

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