# Installation, configuration and use of software to perform an individual assignments in the discipline "Parallel and Multithreaded Programming" (2024-2025 academic year, 4th year, 7th semester)

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# 1. Installation of development environments and additional libraries

- **Dev-C++ 6.30**: <u>http://ptaskbook.com/download/Embarcadero\_Dev-Cpp\_6.3\_TDM-GCC\_9.2\_Setup.exe</u>
- Visual Studio Code (version *Windows*, *System Installer*, *64 bit*): http://ptaskbook.com/download/VSCodeSetup-x64-1.63.2.exe
- Microsoft MPI 10.1.2: <u>http://ptaskbook.com/download/msmpisetup10\_1\_2.exe</u>

#### During the installation process, select the default options.

Microsoft Visual Studio versions 2017, 2019 or 2022 also may be used. To work correctly with C++ programs in the Microsoft Visual Studio, you need to install the C++ Classical Application Development extension, using the Visual Studio Installer (to install new extensions for one of the available Visual Studio version, you need to press the Change button next to the description of this version).



# 2. Installing the Programming Taskbook 4.25

Download and run the following installation program (the distribution of the taskbook is also available on the course page in the Moodle system):

http://ptaskbook.com/download/PT4Complete\_v4\_25ruen.exe

If the interface language selection window appears at startup, select the **English** option:

Language	×
Выберите язык:	
	_
ок	

When installing the taskbook, you should not change the default directory.

F	PT4Complete Install	×
	Programming Taskbook 4	
	Complete Edition	
	Version 4.25 (Build 27.08.2024) Copyright (c) M. E. Abramyan, 1998-2	025
	Select the directory where you would like PT4 to be installed: C:\Program Files (x86)\PT4 Browse	<b>.</b>
	About PT4 License agreement Install Exit	

After installing the Programming Taskbook, you will see a window of the **PT4 Setup** program, designed to configure various parameters of the taskbook. The **Programming Taskbook registration** section does not require any action, just leave the registration number as zero. Close the **PT4 Setup** program by pressing the **Exit** button or the Esc key.

<sub>3</sub> PT4 Setup			_		×	
Programming Taskbook registration						
Russian						
	Your computer key:	PT323930336274127140	Save the	e key [F5]		
	Registration number:	000000000000000000000000000000000000000	Save the r	umber (F6)		
		Registration [F7]				
	L	oad the saved registration number [F8]				
All registration data are found. Registration level: "Programming Taskbook Mini"; only the tasks marked by ° character (in particular, all tasks of the groups "Begin", "Integer", and "Boolean") are available for solving.						
PT 4.25 Copyright (c) M. I	Website: <u>ptaskbook.com</u> E. Abramyan, 1998-2025	< Back [F3]	Next [F4] >	Exi	t	

# **3. Installing additional extensions for the Programming Taskbook** Install **Programming Taskbook for OpenMP 1.9:**

http://ptaskbook.com/download/PTforOMP\_v1\_9ruen.exe).



Immediately close the **PT4 Setup** window that appears after the **Programming Taskbook for OpenMP** installation is complete.

#### Then install **Programming Taskbook for MPI-2 1.6**:

http://ptaskbook.com/download/PTforMPI2 v1 6ruen.exe

Programming Taskboo	k for MPI-2
Electronic book of training tasks on MPI-2 p	programming
Version 1.6 (Build 01.01.2024)	Copyright (c) M. E. Abramyan, 2017-20
Select the directory where you would like PT for MPI-2 to be	e installed: C:\Program Files (x86)\PT4 Browse

After installing the Programming Taskbook for MPI -2, the **PT4 Setup** program will be automatically launched, in which you must perform the actions described in the following sections. In the future, the **PT4 Setup** program can be launched from the Windows menu (**Start | Programs | Programming Taskbook 4 | PT4 Setup**) or using the **PT4 Panel** program of the **Programming Taskbook**.

#### 4. Setting up programming environments for the Programming Taskbook

After launching the **PT4 Setup** program, go to the section with a list of programming environments by pressing the **Next button** (**F4**) or the F4 key.

T4 Setup			-		×	
Programming Taskbook registration						
Russian						
	Your computer key:	PT323930336274127140	Save the k	ey [F5]		
	Registration number:	000000000000000000000000000000000000000	Save the nu	mber [F6]		
		Registration [F7]				
1	L	.oad the saved registration number [F8]				
All registration data are found. Registration level: "Programming Taskbook Mini"; only the tasks marked by * character (in particular, all tasks of the groups "Begin", "Integer", and "Boolean") are available for solving.						
PT 4.25 Copyright (c) M. I	Website: <u>ptaskbook.com</u> E. Abramyan, 1998-2025	< Back [F3]	Next [F4] >	Exit		

- In the section with a list of programming environments, you need to check that the taskbook has detected the systems **Dev-C++** (**C++**), **Visual Studio Code** (**C++**) or **Visual Studio C++ 2017**, **2019** or **2022**, and the **MS MPI 10** package (in this case, the checkbox next to the specified environment list items will be selected). Use the scroll bar to view the whole environment list.
- If the checkboxes for some required environments are not selected, you can try to find the required exe files yourself by selecting the required environment in the list and pressing the **Browse (F8)** button or the F8 key.

Programmin	g Taskbook setup for available	IDEs		
Code::Blocks (C)     Code::Blocks (C++)     Dev-C++ (C)     Dev-C++ (C++)     Eclipse (Java)     Free Pascal Lazarus     DLE (Python)     MPICH 1.2.5     MPICH2 1.3     Microsoft Visual Basic .NET 2017     Microsoft Visual Basic .NET 2019     Microsoft Visual Basic .NET 2022	Executable file: C:\Program Files\Microsoft MP\\bin\mpiexec.exe Up [F5] Down [F6] Do not use Programming Taskbook	e Brov k for this IDE (F	wse [F8] 7]	
Prog PT 4.25 Website: ptaskbook.com	amming Taskbook can be used with MS-MPI 10.	ct [F4] >	Exit	

- For **Dev-C++** (**C++**), you need to specify the devcpp.exe file (for version 6.30, this file is located in the C:\Program files (x86)\Embarcadero\Dev-Cpp directory).
- For Visual Studio Code (C++), you need to specify the code.exe file (for the System Installer version of Visual Studio Code, the file is located in the C:\Program files\Microsoft VS Code directory).
- For **MS-MPI 10**, you need to specify the mpiexec.exe file (located in the C:\Program files\Microsoft MPI\bin directory).

For **Visual Studio Code** (C++) environment, additionally click the **Additional settings** (**F9**) button.

T4 Setup		_		×
Programmi	ng Taskbook setup for availab	ole IDEs		
Microsoft Visual F# 2022     PyCharm (Python)     Rstudio     RubyMine     SharpDevelop (C#)     SharpDevelop (F#)     Visual Studio Code (C+)     Visual Studio Code (C++)     Visual Studio Code (C++)     Visual Studio Code (Julia)     Visual Studio Code (Julia)     Visual Studio Code (Ruby)     Visual Studio Code (Ruby)     Wing IDE 101 (Python)     Wing IDE Dereonal (Duthon)      Programm	Executable file: c:\Program files\Microsoft VS Code\code.e Up [F5] Down [F6] Do not use Programming Taskb ng Taskbook can be used with Visual Studio Code (C	book for this IDE	owse [F8] \dditional !ttings [F9] [F7]	
PT 4.25 Website: ptaskbook. Copyright (c) M. E. Abramyan, 1998-2025	om < Back [F3] I	Next [F4] >	Exit	

The **Additional settings** window appears, which will indicate the path to the g++.exe file from the **Dev-C**++ environment. If the path is not specified, you must specify it by clicking the **Browse (F8)** button and selecting the file g++.exe in the dialog box.

Additional settings for Visual Studio Code (C++)	×
Select the file g++.exe, which will be used when compiling programs in Visual Studio Code (C++).	
It is recommended to choose a compiler included in the environments that are supported by the Programming Taskbook:	
* Dev-C++ 5.11: g++.exe is contained in the MinGW64\bin subdirectory,	
* Dev-C++ 6.30: g++.exe is contained in the TDM-GCC-64\bin subdirectory,	
* Code::Blocks 20.03: g++.exe is contained in the MinGW/bin subdirectory.	
n Files (x86)\Embarcadero\Dev-Cpp\TDM-GCC-64\bin\g++.exe Browse [F8]	
OK Cancel	

- For **Dev-C++ 6.30**, the g++.exe file is located in the C:\Program Files (x86)\Embarcadero\Dev-Cpp\TDM-GCC-64\bin directory.
- After setting the path to the g++.exe file, close the Additional settings window by clicking OK.

#### 5. Setting up working directories for the Programming Taskbook

Proceed to the next section of the PT4 Setup program by pressing the Next (F4) button again.

T4 Setup		-	- X			
Programming Taskbook setup for available IDEs						
<ul> <li>✓ Microsoft Visual F# 2022</li> <li>PyCharm (Python)</li> <li>✓ RStudio</li> <li>RubyMine</li> <li>SharpDevelop (C#)</li> <li>SharpDevelop (F#)</li> <li>✓ Visual Studio Code (C#)</li> </ul>	Executable file: c:\Program files\Microsoft VS Code	\code.exe	Browse [F8]			
<ul> <li>✓ Visual Studio Code (C)</li> <li>✓ Visual Studio Code (C++)</li> <li>✓ Visual Studio Code (Java)</li> <li>✓ Visual Studio Code (Julia)</li> <li>✓ Visual Studio Code (Python)</li> <li>✓ Visual Studio Code (Ruby)</li> <li>✓ Wing IDE 101 (Python)</li> <li>✓ Wing IDE Descent (Python)</li> </ul>	Up [F5] Down [F6] Do not use Programmin	g Taskbook for this ID	Additional settings [F9]			
Programming Taskbook can be used with Visual Studio Code (C++).						
PT 4.25 Website: ptaskbook. Copyright (c) M. E. Abramyan, 1998-2025	com < Back [F3]	Next [F4] >	Exit			

In the **Working directories** section that appears, you need to configure the working directory for executing tasks. The list of working directories will already include the C:\PT4Work directory. For **Environment**, select **Visual Studio Code** (C++) or other variant for the C++ language.

T4 Setup			-	- 🗆 X		
Working directories setup						
C:\PT4Work	Up [F5]	Down [F6]	Add [F7]	Remove [F8]		
	File results.dat:	Abramyan Mikhail		Change [F9]		
	Environment:	Visual Studio Code (C++)	•			
	File access.dat	:		Add [F10]		
				Disconnect [F11]		
		Additional sett	ings [F12]			
The working directory is defined. It contains all necessary components.						
PT 4.25 Webs Copyright (c) M. E. Abramya	ite: <u>ptaskbook.com</u> in, <u>1998-2025</u>	< Back [F3]	Next [F4] >	Finish		

To complete the setup of the working directory, you need to add *an access certificate* access.dat to it (see the next section).

#### 6. Adding an access certificate to the working directory

Download the archive of certificates for this course: <u>http://ptaskbook.com/download/access-paral24e.zip</u>, find the directory with your name in the archive and extract the access.dat file from this directory. To add this file to the working directory, return to the **PT4 Setup** program window (see the previous screenshot), click the **Add (F10)** button and select the access.dat file extracted from the certificate archive in the dialog box that appears. As a result, in the **File access.dat** field, information related to the access certificate should appear (this should include your name). After adding the access.dat file, the text of the **Add (F10)** button will change to **Delete (F10)**.

		-				
🐻 PT4 Setup			– 🗆 X			
Working directories setup						
C:\PT4Work	Up (F5)	Down [F6] Add [F7]	Remove [F8]			
	File results.dat:	9-Abramyan Mikhail :9	Change [F9]			
	Environment:	Visual Studio Code (C++)				
	File access.dat:	9-Abramyan Mikhail :9 paral24e [CPPCODE1] 28/08 13:20	Delete [F10] Disconnect [F11]			
		Additional settings [F12]				
The working directory is defined. It contains all necessary components.						
PT 4.25 Website: ptaskt Copyright (c) M. E. Abramyan, 1998-2	000k.com 025	< Back [F3] Next [F4] >	Finish			

- Once you have completed setting up the working directories, close the **PT4 Setup** program window by clicking the **Finish** button or the Esc key.
- Go to the C:\PT4Work directory and make sure it contains the files, access.dat and a set of shortcuts Demo, Load, Panel and Results.

When performing subsequent actions, as well as when solving tasks, the computer must be connected to the Internet!

# 7. Activation of the access certificate, acquaintance with the variant of individual tasks and creation of a template for the selected task

While in your working directory, launch the Panel shortcut. The Programming Taskbook toolbar will appear at the bottom of the screen, which is already set to the working directory C:\PT4Work. Press the button corresponding to the PT4 Load program (you can also press L, F3 or spacebar key).

🐨 😨 😨 😨 C:\PT4Work 🖵 😨	1	×
------------------------	---	---

When you launch the **PT4 Load** program for the first time, *an access certificate activation window* will appear, in which you must specify the activation code.

C:\PT4Work Enter the activation code for the repository access certificate:	Directory:	
Enter the activation code for the repository access certificate:	C:\PT4Work	
for the repository access certificate:	Enter the activati	on code
Show code	for the repository	access certificate:
Don't use the access sertificate		Show code

The certificate activation code will be given to you by the teacher at the first class.

After this, an attempt will be made to connect to the remote repository. The following describes the actions that must be performed if the connection to the repository is successful. First, the required files will be downloaded from the remote repository. This may take several minutes.



After successful download, the following message will be displayed:



After clicking the **OK** button, the **PT4 Load** program window will appear on the screen. Make sure that the list of task groups contains groups with the prefixes **MPI** (including the **MPI**-**Gravit** group) and **OMP** and that the window contains a label with the text **AV** (the list of groups can be scrolled using the  $\uparrow$  and  $\checkmark$  keys). At the bottom of the window, a list of the tasks included in your variant will be displayed.

Task:		_	_	_	_	_	•	+				Γ	L	oad		
	<i>.</i>								_							
Directory:	C:\PT4	Work	¢										C	ancel		
	9-Abra	amya	n Mik	thail :	9				A	V						
/inmax, ZMini	max, A	rray,	ZArr	ay, N	latrix	, ZM	atrix,	Strin	g, Fik	e, Te	xt, P	aram,	ZPa	ram,		
Recur. Dynam	ic. Tree	e Tak	Bas	e Ta	blExt	Cor	nsole	App	31							ļ
API1Proc, MPI	2Send,	MPI3	Coll,	MPI4	Туре	, MP	ISCor	nm, M	IPI6Fi	ile, M	IPI7W	/in, M	PI8Int	er,		
API9Matr, MPI	Debua.	MPIG	ravit	: OM	PBeo	in O	OPOR	Beain	, 00	P1Cr	eat.	00P2	Struc	5.		
	21						01 01					0012	ouru	1		
Enter the grou	ip name	ə.										0012	.ou u			
Enter the grou Variant 9	ip name	э.										0012	ourus			
Enter the grou Variant 9 MPI1Proc:	ip name 6	e. 9													_	
Enter the grou Variant 9 MPI1Proc: MPI2Send:	ip name 6 6	ə. 9 9	10	14	16	18	21									
Enter the grou Variant 9 MPI1Proc: MPI2Send: MPI3Coll:	ip name 6 6 6	9 9 9 9	10 13	14 14	16 20	18 25	21								<u> </u>	
Inter the grou Variant 9 MPI1Proc: MPI2Send: MPI3Coll: MPI4Type:	ip name 6 6 3	9 9 9 9 7	10 13 9	14 14 12	16 20 16	18 25	21								<u> </u>	
Enter the grou Variant 9 MPI1Proc: MPI2Send: MPI3Coll: MPI3Coll: MPI4Type: MPI5Comm:	ip name 6 6 3 1	9 9 9 7 5	10 13 9 7	14 14 12 11	16 20 16 14	18 25 18	21 26	28								
Enter the grou Variant 9 MPI1Proc: MPI2Send: MPI3Coll: MPI3Coll: MPI4Type: MPI5Comm: OMPBegin:	ip name 6 6 3 1 4	9 9 9 7 5 7	10 13 9 7 11	14 14 12 11	16 20 16 14	18 25 18	21 26	28							- -	
Enter the grou Variant 9 MPI1Proc: MPI2Send: MPI3Coll: MPI3Coll: MPI5Comm: OMPBegin: MPI9Matr:	6 6 6 3 1 4 34	9 9 9 7 5 7 23	10 13 9 7 11 4	14 14 12 11 19 40	16 20 16 14	18 25 18	21 26	28						<u> </u>	- 	
Enter the grou Variant 9 MPI1Proc: MPI2Send: MPI3Coll: MPI3Coll: MPI5Comm: OMPBegin: MPI9Matr: MPI9Matr:	6 6 3 1 4 34 1	9 9 9 7 5 7 23	10 13 9 7 11 4	14 14 12 11 19 40	16 20 16 14	18 25 18	21	28								
Enter the grou Variant 9 MPI1Proc: MPI2Send: MPI3Coll: MPI3Coll: MPI5Comm: OMPBegin: MPI9Matr: MPI9Gravit:	6 6 3 1 4 34 1	9 9 9 7 5 7 23	10 13 9 7 11 4	14 14 12 11 19 40	16 20 16 14	18 25 18	21	28								
Enter the grou Variant 9 MPI1Proc: MPI2Send: MPI3Coll: MPI4Type: MPI5Comm: OMPBegin: MPI9Matr: MPI9Gravit:	6 6 3 1 4 34 1	9 9 9 7 5 7 23	10 13 9 7 11 4	14 14 12 11 19 40	16 20 16 14	18 25 18	21	28								

Clicking on the **AV** label will display the same task list with additional information about the points associated with each tasks (in square brackets). To close the window, click the **x** button in the right corner of the window or press the Esc key.

```
😨 Variant info
The variant file: paral24e.var.
 Parallel and Multithreaded
Programming (2024)
Variant 9
MPI1Proc MPI: processes and their ranks:
     6[1], 9[1]
MPI2Send MPI: point-to-point communication:
     6[1], 9[1], 10[1], 14[2], 16[2], 18[2], 21[2]
MPI3Coll MPI: collective communication:
     6[1], 9[2], 13[2], 14[2], 20[1], 25[1]
MPI4Type MPI: derived datatypes, packing and unpacking:
     3[1], 7[1], 9[1], 12[1], 16[3]
MPI5Comm MPI: communicators and virtual topologies:
     1[1], 5[1], 7[2], 11[2], 14[1], 18[2], 26[2], 28[3]
OMPBegin OpenMP: nested loops processing:
     4[2], 7[2], 11[2], 19[1]
MPI9Matr MPI: parallel matrix algorithms:
     34[1], 23[2], 4[2], 40[2]
MPIGravit MPI: n-body gravitational problem:
     1[7]
```

To select the required task in the **PT4Load** window, you can either specify the task name in the **Task** input field (and press the **Load** button or the Enter key), or simply click on the task number at the bottom of the window. A template for this task will be created and the preset will be automatically loaded into the selected programming environment (the programming environment is specified in the window header).

Task:							•					Load	
Directory:	C:\PT4	Work	¢							1		Cancel	
	9-Abra	amya	n Mik	thail :	9				AV		_		_
										NEW CONTRACTOR			
inter the grou Variant 9	up name	ə.											
inter the grou Variant 9 MPI1Proc:	up name	9. 9							-				
inter the grou Variant 9 MPI1Proc: MPI2Send:	up name	9 9	10	14	16	18	21						
inter the grou Variant 9 MPI1Proc: MPI2Send: MPI3Coll:	up name	9 9 9	10 13	14 14	16 20	18 25	21						
Inter the grou Variant 9 MPI1Proc: MPI2Send: MPI3Coll: MPI4Type:	up name	9 9 9 7	10 13 9	14 14 12	16 20 16	18 25	21						
Inter the grou Variant 9 MPI1Proc: MPI2Send: MPI3Coll: MPI4Type: MPI5Comm: OMPBegin:	up name 6 6 3 1	9 9 9 7 5 7	10 13 9 7	14 14 12 11	16 20 16 14	18 25 18	21 26	28					
Inter the grou Variant 9 MPI1Proc: MPI2Send: MPI3Coll: MPI3Coll: MPI4Type: MPI5Comm: OMPBegin: MPI9Matr:	up name 6 6 3 1 4 34	9 9 9 7 5 7 23	10 13 9 7 11	14 14 12 11 19 40	16 20 16 14	18 25 18	21 26	28					
Arter the grou Variant 9 MPI1Proc: MPI2Send: MPI2Send: MPI2Scom: OMPBegin: MPI9Matr: MPI9Matr:	up name 6 6 3 1 4 34 1	9 9 9 7 5 7 23	10 13 9 7 11 4	14 14 12 11 19 40	16 20 16 14	18 25 18	21 26	28					
Enter the grou Variant 9 MPI1Proc: MPI2Send: MPI2Send: MPI2Send: MPI4Type: MPI4Type: MPI9Matr: MPI9Matr:	6 6 6 3 1 4 34 1	9 9 9 7 5 7 23	10 13 9 7 11 4	14 14 12 11 19 40	16 20 16 14	18 25 18	21 26	28					

#### 8. Running the program

- In the **VS Code** editor settings, it is recommended to change the values of two parameters. To display the **Settings** tab, run the command **File** | **Preferences** | **Settings**.
- You need to select the **Text section Editor** | **Files** and set the **Hot Exit** parameter equals **off**. This setting will ensure that you are prompted to save the file when you close the **VS Code** if the file has been changed since the last save.
- Next, you need to select the **Application** | **Update** and set the **Mode** parameter to **none**. This setting will block the periodic window asking you to update your **VS Code** version.
- In the **VS Code** window, you can also change the dark color scheme to light. To do this, press the F1 key and enter the text **Color Theme** in the input field that appears, select text **Preferences: Color Theme** from the list of options, then select a new color theme from the list that appears, for example, **Light (Visual Studio)**.



- When loading a C++ program file for the first time, the **VS Code** editor will display a message asking if you want to install recommended extensions for C++: **Do you want to install recommended extensions for C++?** In response to this message you should select the option **Install**.
- If the message with such a request does not appear, you should install the C++ extension yourself. To do this, go to **Extensions** mode in **VS Code** window (press Ctrl+Shift+X) and choose **C/C++ Extension Pack** (Microsoft) from the list of available extensions for C++ language and click **Install**. To get the list of extensions for C++, just enter the text **C++** in the search field at the top of the **Extensions** panel. Note that the required extension is listed third in the list of C/C++ extensions. The figure below shows the view of the window after successful installation of the extension.



As a result, the **VS Code** editor window will take the following form.

After the editor loads the extension for the C++ language, it will be possible to run programs in this language from it. To start, just press the F5 key. You can also go to **Run and Debug** mode (Ctrl+Shift+D) and click on the button with a triangle in the upper left corner of the window.



Features of performing tasks on parallel programming based on MPI technology will be described in lectures and seminars.

# 9. Running tasks in other development environments

If you're having trouble setting up **VS Code e**ditor to run programs in C++, then you can use other environments to perform tasks, in particular, the **Dev-C++** environment.

The easiest way to select a new environment is to use *the context menu* of the **PT4 Load** program. If the directory contains an access certificate, you can only select an environment that matches the programming language specified in the certificate.

## 10. Viewing tasks in demo mode

Using the **PT4 Demo** program, you can quickly view all the tasks included in the option.



To do this, after launching the **PT4 Demo** program, select the item starting with the word **Variant** in the drop-down list and click on the **Browse** button.

😱 PT4 Demo [C++]		_	-		×
Task group:	Variant 9	[		Browse	
Task number:	1			Exit	
Number of tasks: 37.	Chosen task: MPI1Proc6.				

You can also generate an HTML document with the wording of all the tasks included in the variant if you click on the button to the right of the **Task number** field or F2 key:

😱 PT4 Demo [C++]		_	· 🗆	×
Task group:	Variant 9		Browse	
Task number:	1		Exit	
Number of tasks: 37.	Chosen task: MPI1Proc6.			

To close the **PT4 Demo** program, press the **Exit** button or the Esc key.

#### 11. Checking and reviewing solutions by the teacher

- The teacher checks the programs with solutions uploaded to the repository, and if they meet all the requirements, he accepts them. If some problems have not yet been solved, then it marks them as *reviewed* (i. e., not containing the correct solution).
- Information about the test results is automatically sent to the student and displayed on the screen when he launches the **PT4 Load** program. This information is saved in the teacher.txt file in the working directory.
- If you have solved some task, but in the teacher. txt file sou see the information that the repository does not have a version with the correct solution (No version in the repository with the correct solution), this means that for some reason the correct solution was not sent to the repository. In this case, load the program with the correct solution and run it again, making sure that the taskbook window displays a message stating that the program has been successfully saved in the repository. If such a message does not appear, then <u>slightly</u> change the program text by adding an empty comment // to it, and run the program again. If this does not help, then contact your teacher.

The repository is checked automatically by **PT4 Load** once a day, when it is first launched. You can also perform this check explicitly using the **Update command data** from the context menu of the **PT4 Load** window.

In this case, a window will appear on the screen in which you need to click the **Update** button.

PT4 Load - Update o	directory settings		×
C Don't use the	update directory		
C Local:			
C FTP:			
	Example: ftp://	/mysite.ru/mydir	
Username	:		Test
Password:			connection
Use the updat	e directory from	the repository	
Automati	ic updating is pe	rformed 1 time pe	er day
	ОК	Update	Cancel

## 12. Viewing results using the PT4 Results program

You can view the results using the **PT4 Results** program by launching it from the **PT4 Panel** taskbar:

	🖫 🕄 ╣L ╣D   L:\PL4Work			
The same wi dow by pres you can view the F2 key).	ndow will appear on the screen, which can be called up from the tas sing the F2 key. If there is a teacher.txt file in the working dire w it by clicking on the first button at the top of the results window (	kboc ctor or p	ok w y, tl ress	/in- hen ing
😨 PT4 Results		-	٥	×
Directory: C:\PT4Work  1. Summary information	An         AA         I         I         Exit         The results.dat file: 22.08.2022 - 13:36:12.			
= 9-Abramvan Mikhail	(C:\PT4Work)			~

## 13. Toolbar features

The **PT4 Panel** toolbar of Programming Taskbook is always located on top of other windows on the screen and allows you to quickly launch all the taskbook's programs, as well as select one of the previously configured working directories. In addition, it allows you to launch the taskbook *help system* (button ) and select an option for this help system using the context

menu (button	):				
	<b>4</b>	TL TD	C:\PT4Work	75 🗟	×

- To launch all programs, *keyboard shortcuts are provided*, which are displayed on tooltips for the corresponding buttons.
- Using the Home, Up, PgUp, End, Down, PgDn keys, you can move the toolbar to one of the corners of the screen working area or position it at the bottom or top center of the working area.
- To close the toolbar, just press the X or Alt+F4 key or the **x** button located in the upper right corner of the toolbar.