Digital Photogrammetric System

PHOTOMOD

USER MANUAL

AutoUAS program

RACURS

Table of Contents

1. About

1.1. Purpose of the document

This document contains detailed information about features of the *PHOTOMOD AutoUAS* system (hereinafter referred to as *program*).

1.2. Brief description of program features

The *PHOTOMOD AutoUAS* program is purposed to process data from unmanned aircraft system (UAS). There is a limit on using of the source data when working with program. Only central projection images with size not more than 100 Mpix could be used a source data.

The *PHOTOMOD AutoUAS* program is a stand-alone software, which does not require the *PHOTOMOD* system installation. The program allows for **automatic** (without manual editing) performance of the following stages of UAS data processing:

- Selection of the project coordinate system zone and output data;
- Creating interim projects on the base of input UAS survey data;
- Image adding;
- Aerial triangulation;
- Triangulation network adjustment;
- Output products creation: (dense DSM, TrueOrtho, LAS point clouds and 3D models).

The system allows for task setting and running in the distributed processing mode. Operator's control of processing results is available in the *PHOTOMOD AutoUAS* 2D-window.

Additional installation of *PHOTOMOD* or *PHOTOMOD UAS* software on a workstation allows to expand the capabilities of operator control and analysis of the obtained results (and also provides for their further manual processing).

1.3. Technical Support

The Racurs company technical support provides the actual information about system functionality, characteristics, price and services.

For technical support use one of the following ways:

- e-mail: support@racurs.ru;
- phone: +7 (495) 720-5127;

- fax: +7 (495) 720-5128;
- mail: RACURS Co., Ul. Yaroslavskaya, 13-A, office 15, Moscow, Russia.

1.4. Distribution kit

License software distribute in a branded box. The company name is place on the front. On the reverse side are placed address, technical support service phone and e-mail, web-site of company.

The system distribution kit includes:

- CD-ROM containing the system setup files and the documentation files in PDF format;
- 'System installation and configuration Manual;
- Unique hardware lock key (see Section 3.4).

2. About program

The purpose of the software package is prompt full-automatic processing of materials acquired by unmanned cameras that carried out using a workstation or a portable device (laptop) and obtaining spatial products: digital terrain models (DTM), TrueOrtho and 3D models of two types (DSM + TrueOrtho or LAS + Textures), as well as *PHOTOMOD AutoUAS* final product visualizations.

This software is intended for organizations that need to promptly receive monitoring metric 3D information about objects of their interest (security agencies, EMERCOM, organizations operating linear objects, pipelines, and etc.).

Available data processing methods (**Precise**, **Optimal** and **Fast**) allows to obtain products having the resolution depending on acceptable software running tine. The **precise** method is for producing output products with the resolution that matches the pixel size of the source data (approximate data processing speed – from 5 sq. km per hour); the **optimal** method - with 2 pixel resolution (from 10 sq. km per hour); and the **fast** method - with 4 pixel resolution (from 34 sq. km per hour).

Here we imply the theoretical speed of typical data processing that cover territories with the abovementioned areas and having averaged parameters that are typical for the materials collected in normal conditions by UAS equipped with standard instruments (GSD – 0.1 m).

The accuracy of output products corresponds the accuracy of source data. The software allows for processing source raster imagery (`*.jpeg` or `*.tiff`) obtained by cameras with central projection and exterior and interior orientation (EXIF). Interior and exterior orientation import is carried out automatically from EXIF metadata of source imagery (or separate file) and does not require operator customization.

Selection of a coordinate system is automatic with the selection of the zone of the cartographic coordinate system with minimal distortion for the processed area. The following coordinate system family is supported (National State Standard GOST 32453-2017): **PZ-90.11**, **GSK-2011**, **SK-42**, **SK-95**; **WGS-84/UTM** (full compatibility with *Panorama* products).

Photogrammetric processing in order to obtain output products is full automatic and does not require operator customization.

When creating dense regular DSMs, the state-of-the-art methods of semi-global image identification (SGM) are used that do not require customization. Output DSM are represented as rasters (`*.tiff`).

True ortho images represent metric raster data without distortions caused by technogenic objects (buildings, fences, utility poles, and trees) and imaging angles (building side walls) what facilitates determination of object location and decreases the area of invisible zones.

Processing results are saved into the output folder and supplemented with report files about image block adjustment and processing.

Minimum specifications: 4 core RAM 16 Gb and greater (there are no mandatory requirements for using specific video cards).

3. Program installation

Prior to the system installation it is desirable to insert *Sentinel HL* security key into the USB-socket of the workstation.

The system required 2 GB of free hard disk space.

To start the system installation, launch the `setup.exe` file or input the installation software and launch the `autorun.exe` file.

The **PHOTOMOD** window opens.

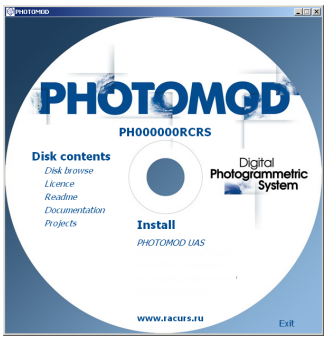


Fig. 1. PHOTOMOD installation window

Click **Install › PHOTOMOD AutoUAS**. The **Installation PHOTOMOD 7 AutoUAS** window opens.

The system initial installation process consists of a sequence of steps with instructions.

In case of cancel at any step, installed program files and data are not removed. To complete the system installation, restart the `autorun.exe` or `setup.exe` file and go through all steps again.

To start installation manually, run the `PH_N_CCCC_AutoUAS_x64.exe` file, where N is the version number, CCCC is the build number.

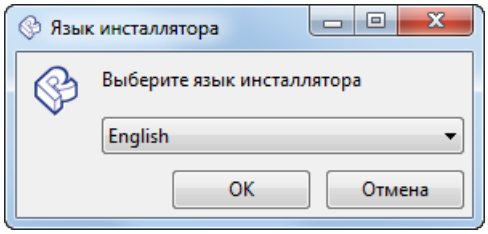
The *PHOTOMOD AutoUAS* program requires 64 bit operating system.

It is strongly not recommended to install the system in folder with name, which contains letters, different from Latin.

If the program is to be installed on a workstation with a network profile and with preinstalled *PHOTOMOD* or *PHOTOMOD UAS* system (hereinafter referred to as the *system*), close all system's modules on each workstation before installation.

3.1. Preparation step

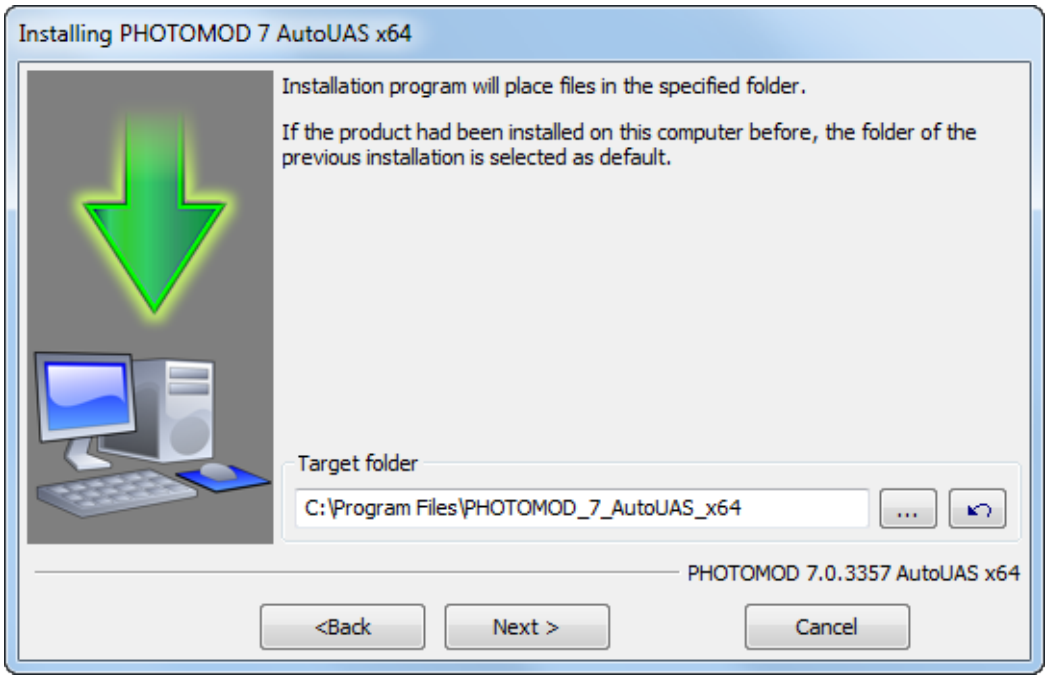
1. Choose the installation language:



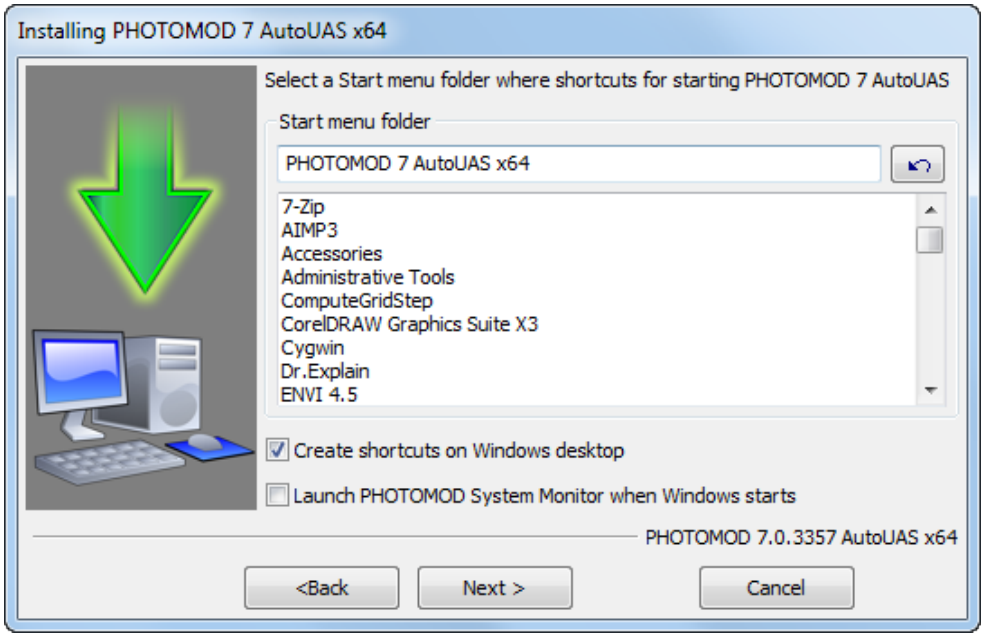
2. Read the welcome and warning messages. Select the program language. Click the **Next** button;

3. Read the license agreement. If you agree with it, set the **I accept the terms in the License Agreement** checkbox on and click the **Next** button;

4. Define the folder to install the program files of the system. By default for the program files the *C:\Program Files\PHOTOMOD_7_AutoUAS_x64* folder is used. Click the **Next** button;

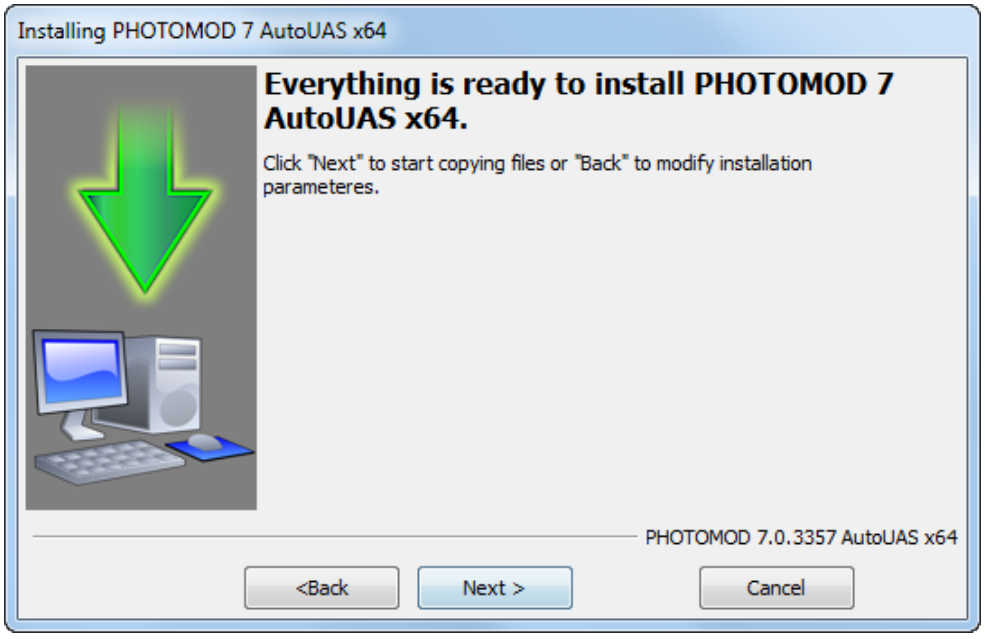


5. Enter a folder name for the PHOTOMOD programs and modules in the Windows **Start** menu. The **Create shortcuts on Windows desktop** and **launch automatically the System Monitor module at Windows start** checkboxes are set on by default. Clear them if needed. Click the **Next** button.

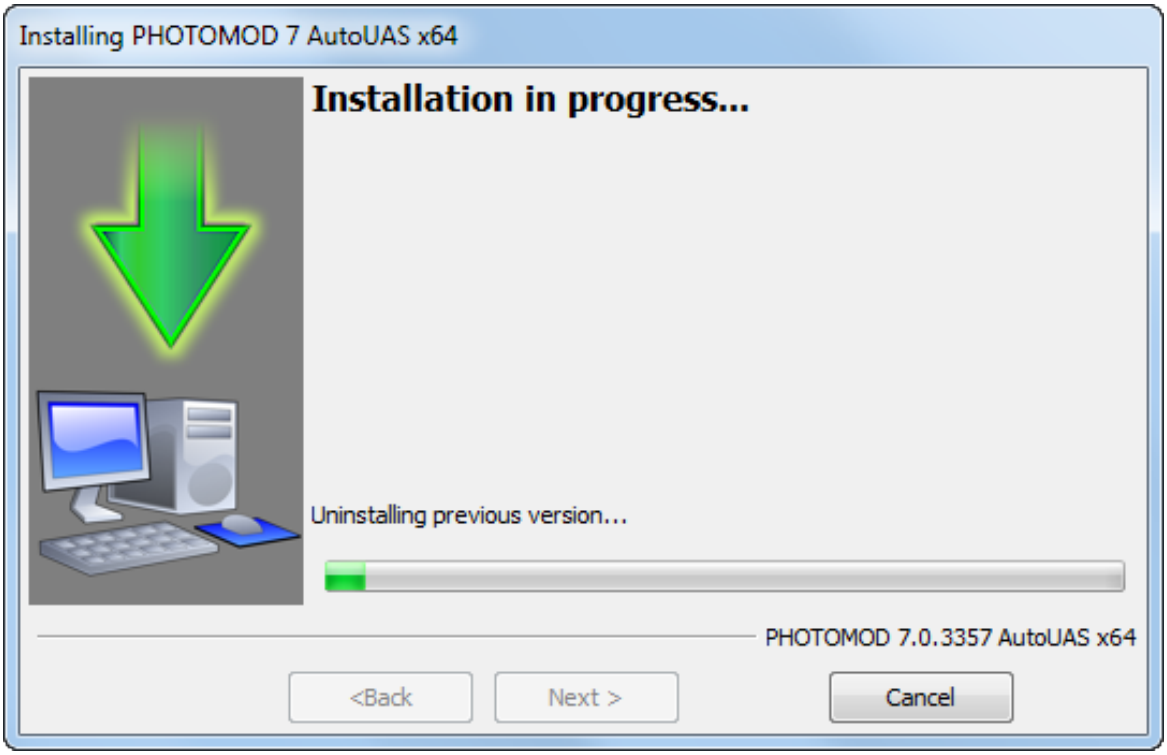


3.2. File copy stage

1. [optional] click the **Back** button to change installation parameters. Click the **Next** button to start installation;



2. Wait until the installation is complete.



3. When installation complete perform one of the following actions:

   - [optional] clear the **Start PHOTOMOD AutoUAS x64** checkbox and click the **Finish** button to complete the installation process without program launch;
   - [optional] leave the **Start PHOTOMOD AutoUAS x64** checkbox set and click the **Finish** button to proceed to the system configuration stage.

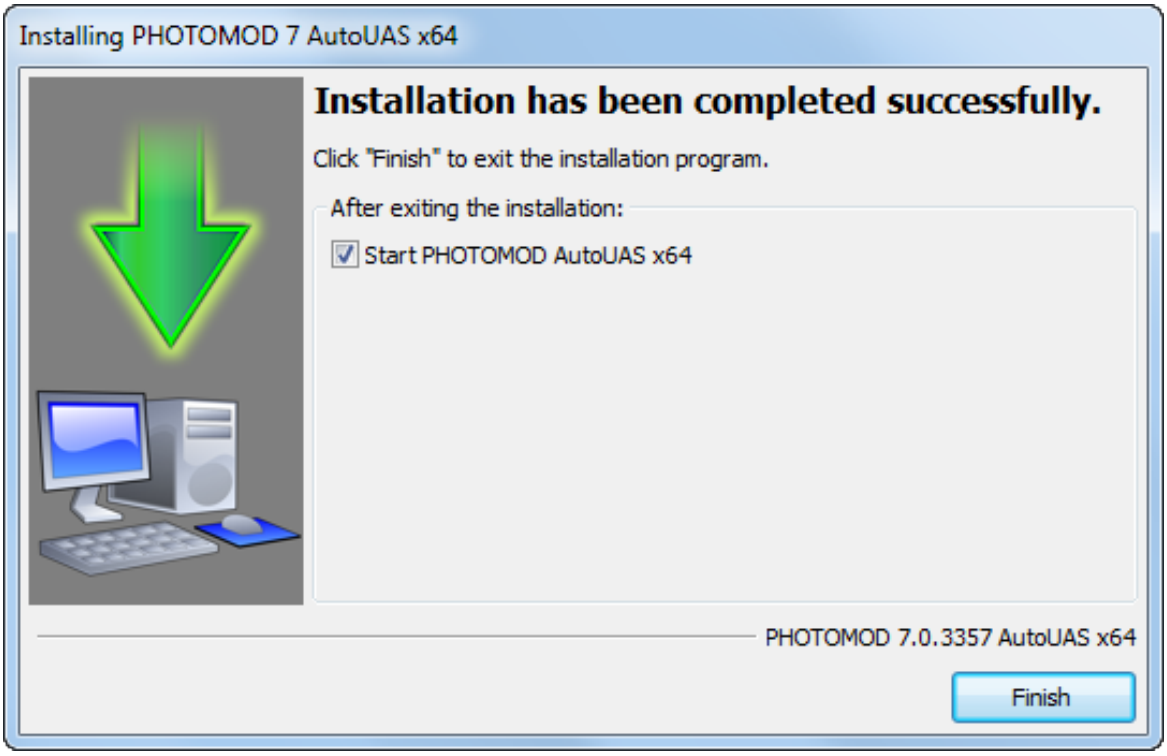
If the **Start PHOTOMOD AutoUAS x64** checkbox is set, the *PHOTOMOD UAS* program will launch automatically.

Make sure that the *Sentinel HL* security key is inserted into the USB-socket of the workstation.

If the security key or security key drivers (they must be installed automatically during the program installation) were not found, the error message displays.

Make sure that the *Sentinel HL* security key is inserted into the USB-socket of the workstation. Install the security key drivers manually and restart the system.

In case of problems contact the Racurs company technical support service (see *Section 1.3*).



3.3. System configuration stage

During the first launch of the system the *PHOTOMOD AutoUAS* initial (fast) setup windows are opened.

1. Click the ... button to select a physical folder on a local PC to store resources (an intermediate data) of the *PHOTOMOD AutoUAS* projects. Click OK.

   ⚠ Resources can take up a significant amount of free space on hard drive.

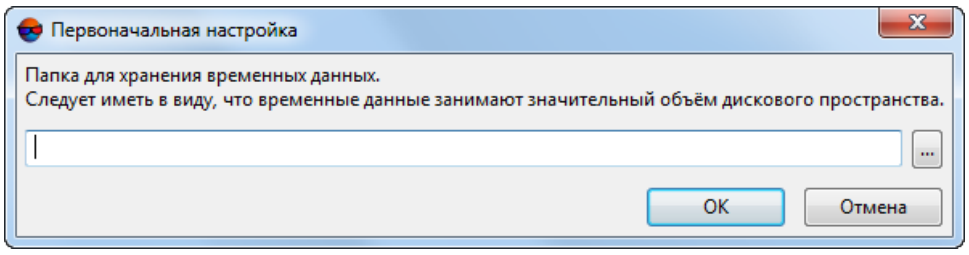


Fig. 2. Choosing a folder to store the projects (an intermediate data)

2. In the **Settings folder** field is displayed path to the *PHOTOMODAutoUAS7.VAR* folder, that is used to store configuration files. Click the ... button to change path to configuration folder or click OK to finish fast system configuration and create the *local profile* automatically.

If *PHOTOMOD* and/or *PHOTOMOD UAS* are installed on the workstation, the advanced user have an option to connect the *PHOTOMOD AutoUAS* software to one of the current profiles and the existing resource system. To do this click the ... button to choose path to *PHOTOMOD* or *PHOTOMOD UAS* configuration folder.

Additional installation of *PHOTOMOD* or *PHOTOMOD UAS* software on a workstation allows to expand the capabilities of operator control and analysis of the obtained results (and also provides for their further manual processing).

If *PHOTOMOD* or *PHOTOMOD UAS* software are installed on the workstation *after* the *PHOTOMOD AutoUAS* program – their connection to the *PHOTOMOD AutoUAS* resources is performed according to a separate algorithm.

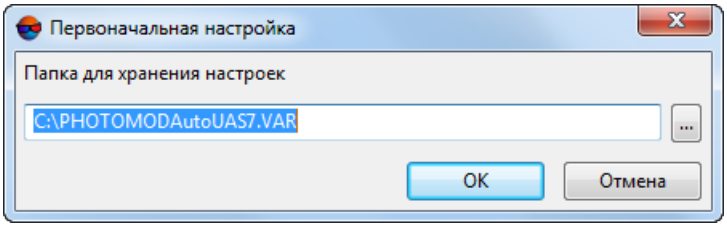


Fig. 3. Choosing a folder to store the configuration files

The *Control Panel* module is used to configure detailed system settings during the further work. More details about program resources, recommendations on organizing of local or network work, and about creating profiles and virtual folders connecting see in Appendix C.

3. Click OK to finish system configuration and create the *local profile* automatically.

The *Control Panel* module is used to configure detailed system settings during the further work. More details about program resources, recommendations on organizing of local or network work, and about creating profiles and virtual folders connecting see in Appendix C.

If the existing folder for data storage (or configuration files folder) are not specified during the fast system setup, the message about the required detailed configuration appears. To do this, perform the following:

1. Click OK.

Fig. 4. Information message

2. The **PHOTOMOD initial setup** window opens:

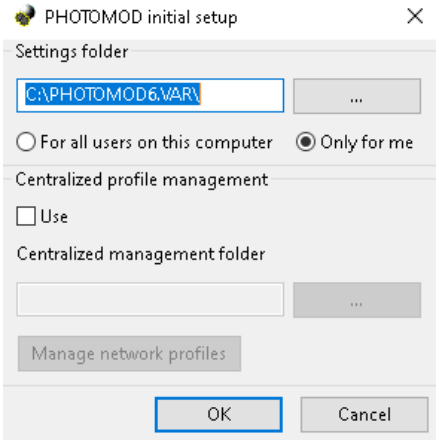


Fig. 5. The “PHOTOMOD initial setup” window

In the **Settings folder** section is displayed path to the *PHOTOMOD7.VAR* folder, that is used to store configuration and temp files. Click the ... button to change path to configuration folder.

Choose **For all users on this computer** to use one configuration folder for all users of current workstation, otherwise choose **Only for me**.

In the **Centralized management folder** section set the **Use** checkbox on and define a folder.

Creation of a *local profile* is described in this Chapter. Network profiles management is described below in Appendices.

3. An info that at least one *local profile* is to be created appears:

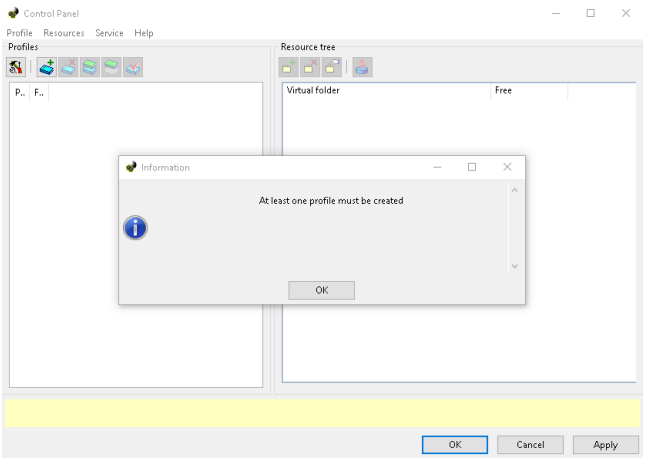


Fig. 6. Information message

Нажмите OK.

4. Specify a *local profile* name:

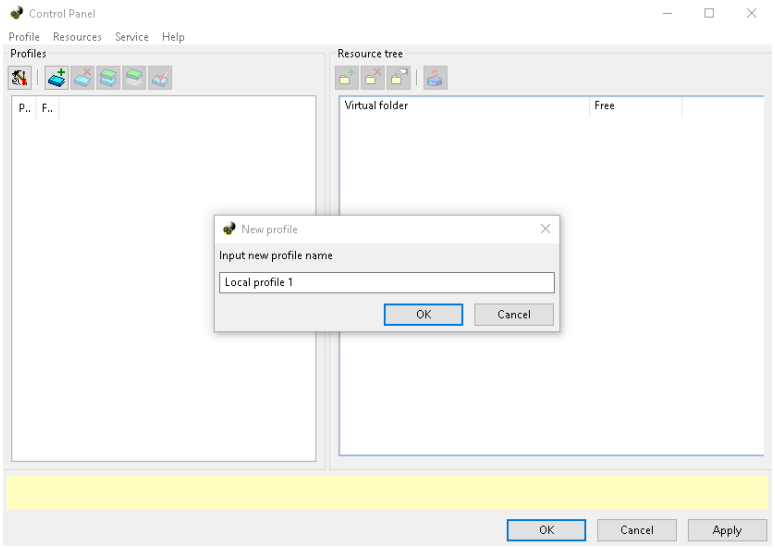


Fig. 7. Local profile name setup

Click OK.

5. Input a **virtual folder name** – arbitrary text used to identify data in folder.

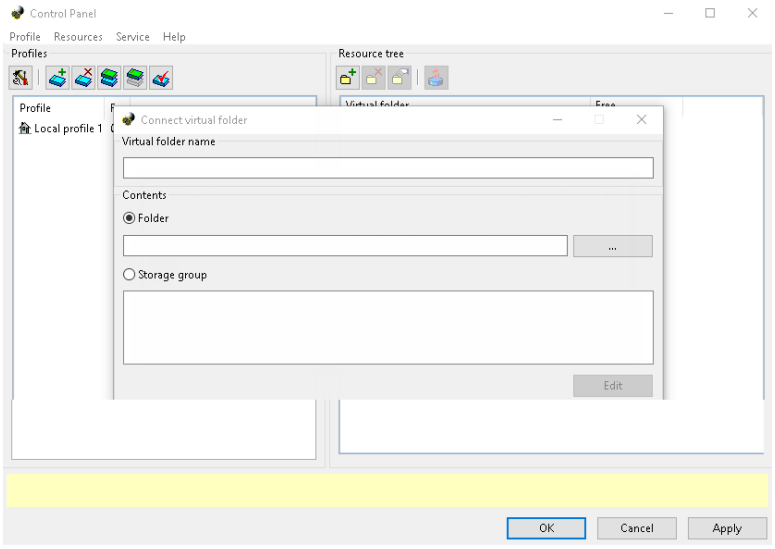


Fig. 8. Connect virtual folder

In the **Contents** section choose a physical space for connecting as a virtual folder:

- choose **Folder** to use only one *network or local* physical folder click the ... button and choose a folder;

To connect folder only read access for this folder is required.

Local profile folder could be placed both on a workstation, where the system runs, and on any workstation of the network.

- choose **Storage group** to use several local or network folders as virtual.

The use of a group of storages is described in detail in the Appendix.

Click OK.

3.4. Sentinel hard lock key

The distribution kit includes the unique hard lock key from *Sentinel HL* (previous called *HASP*), to protect the system and data from software piracy and unauthorized dissemination.

Prior to work in the program, it is needed to insert *Sentinel HL* unique security key into the USB-socket of the workstation. The security key drivers should be installed on the workstation too.

If the *Sentinel HL* hard lock key or security key drivers (they must be installed automatically during the program installation) are not found, the error message of protection system displays. Contact the Racurs company technical support service (see *Section 1.3*) to for the consultation.

In case of problems with installation of security key drivers, install it manually. To do this open the *Hasp\Sentinel_HASP_Run-time_setup* folder from the installation CD and launch the `HASPUserSetup.exe` file. Install security key drivers with default parameters. You can also download the last version of security key drivers on this link.

To check congruity of hard lock key perform the following:

1. Choose **License info** in the right-click menu of the *System Monitor module* (the  icon in the *Windows* system tray). Process of licences checking starts. After checking, the **PHOTOMOD Distribution info** windows opens.

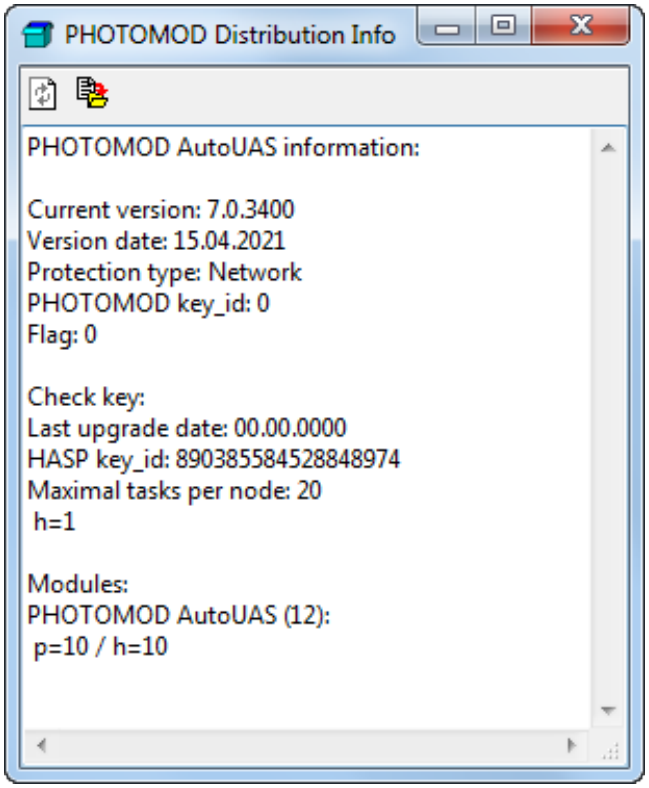


Fig. 9. Distribution Info

2. Compare the unique number of security key in the `Serial number` line with the number on hard lock key.

3. Compare quantity of license for modules in each line below the name of module. Quantity of licence in the hard lock key and in certificate should be equal.

   ’*h*’ is quantity of licence in the hard lock key, ’*p’* is quantity of licence in certificate.

4. If number are not equal contact the RACURS company technical support service.

If there is not enough RAM or resource-intensive tasks are performed on workstation with the secure key, The protection system failure or loss of data are possible.

3.5. System deinstallation

To remove the system from computer, close all modules of the system and choose **Start › Programs › PHOTOMOD 7 AutoUAS x64 › Uninstall PHOTOMOD AutoUAS x64** or use standard tools in **Control panel** of *Windows file system*.

4. PHOTOMOD AutoUAS interface and its elements

4.1. PHOTOMOD AutoUAS main window

The main *PHOTOMOD AutoUAS* window allows to set the new project processing parameters and start the distributed processing, as well as to view the previously created projects output data (if available). For the processing parameters configuration, the **General** and **Settings** tabs are provided.

The **Start processing** button clears an intermediate data (in case of reprocessing an existing project) and runs the distributed processing. The **Help** button allows to open Help documents.

4.1.1. The “General” tab

The **General** tab allows to create a new project or to select a previously created project from the list to view it’s output data (if available).

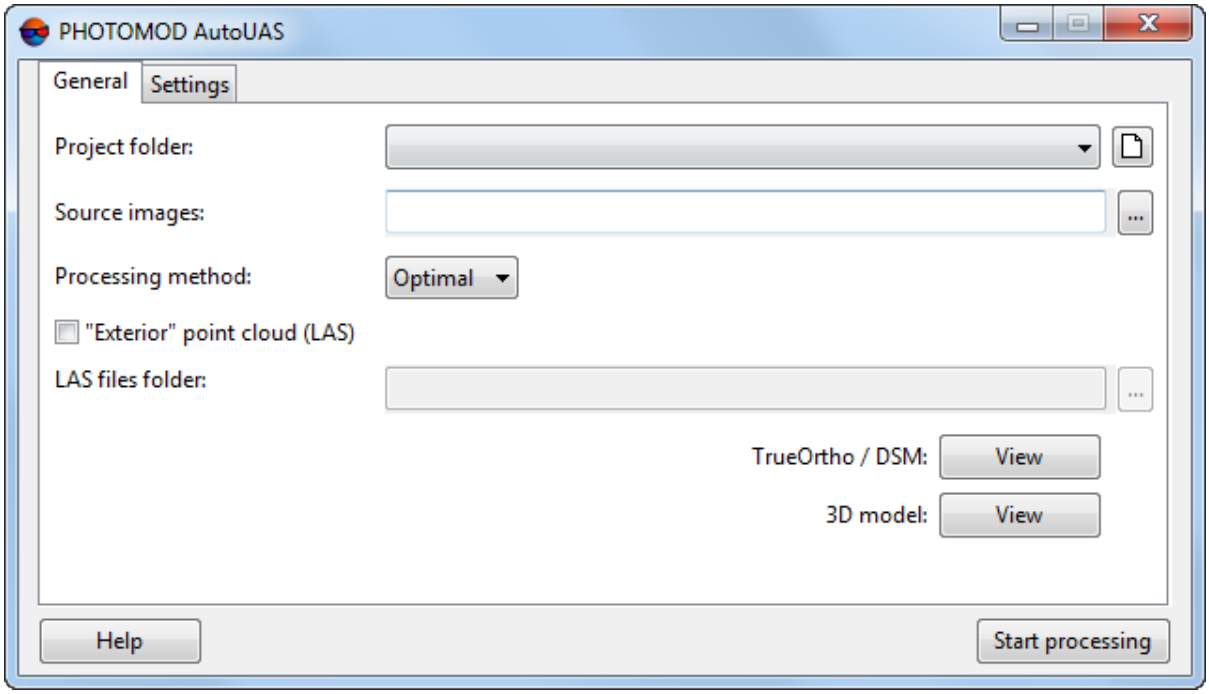


Fig. 10. The “General” tab

The **General** tab contains the following elements:

- The drop-down list, allowing to select to the **project folder**. See output data format and placement in Appendix A.

The button allows to specify the path to the **project folder** in *Windows* file system.

- The field, allowing to input (...) the path to the **Source images** folder in *Windows* filesystem.

The *PHOTOMOD AutoUAS* program is purposed to process data from unmanned aircraft system (UAS). There is a limit on using of the source data when working with program. Only central projection images with size not more than 100 Mpix could be used a source data.

The software allows for processing source raster imagery (`*.jpeg` or `*.tiff`) obtained by cameras with central projection and exterior and interior orientation (EXIF), 8 bit, RGB formats.

Interior and exterior orientation import is carried out automatically from EXIF metadata of source imagery and does not require operator customization.

- The drop-down list, allowing to select the processing method:
  - **Precise** – for producing output products with the resolution that matches the pixel size of the source data (approximate data processing speed – from 5 sq. km per hour);
  - **Optimal** – for producing output products with 2 pixel resolution (approximate data processing speed – from 10 sq. km per hour);
  - **Fast** – for producing output products with 4 pixel resolution (approximate data processing speed – from 34 sq. km per hour).

Here we imply the theoretical speed of typical data processing that cover territories with the abovementioned areas and having averaged parameters that are typical for the materials collected in normal conditions by UAS equipped with standard instruments (GSD – 0.1 m).

- The **view** button (TrueOrtho / DSM) allowing to open 2D-window, to view the project output data.
- The **view** button (3D model) allowing to run the *PHOTOMOD 3D-Mod* software to view the output data (see the "Three-dimensional modeling" User Manual).

To use an **"Exterior" point cloud (LAS)** as input data to build dense DSM and TrueOrtho, set the appropriate checkbox. In this case, the source of data used when creating the abovementioned photogrammetcric products is the user-defined **LAS files folder** in the *Windows* file system. Otherwise, a dense DSM to be used for further creation of a TrueOrtho is created using the SGM method directly during data processing by the *PHOTOMOD AutoUAS* program.

An **"exterior" point cloud (LAS)** can only be used if it spatially intersects with the territory displayed in the images of the project being processed. When processing a project, the system runs an appropriate check (see Appendix A for detailed information).

4.1.2. The “Settings” tab

The **Settings** tab is used to set output data formats.

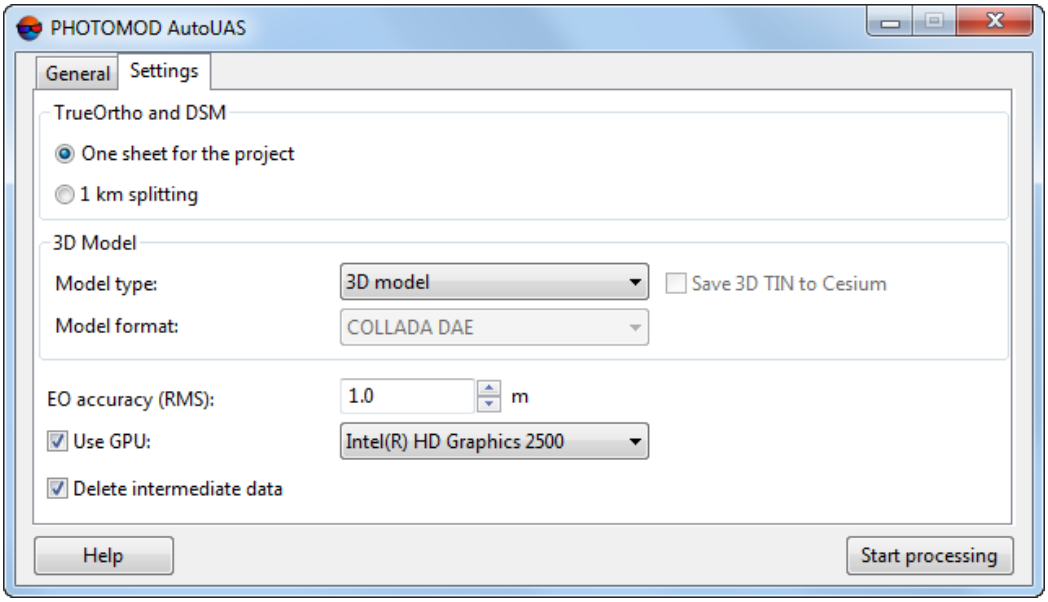


Fig. 11. The “Settings” tab

The **Settings** tab contains the following elements:

- The **TrueOrtho and DSM** section allowing to set one of the following ways of splitting into sheets an output orthomosaic:
  - **One sheet for the project**;
  - **1 km splitting** – in this case, the output mosaic is splitted into similar 1000 m x 1000 m sheets. Each sheet has X-Y name, where X and Y are the coordinates of the left lower sheet corner in kilometers. It is used when creating orthophotomaps larger than 1:2000 scale.
- The drop-down list, allowing to select the **model type** for the output data:
  - **3D-model** – the digital surface model (DSM) and true ortho are created. The *PHOTOMOD AutoUAS* 2D-window is used to view the processing results;
  - **3D-TIN** – the textured 3D-TIN surface in **B3DM** format (and also LAS point cloud) is created. The *PHOTOMOD 3D-Mod* software is used to view the output data (see the “Three-dimensional modeling” User Manual).
    - To view and edit the textured 3D-TIN surface in *Panorama* software, select the **COLLADA DAE model format** from the appropriate drop-down list.

- Set the **Save 3D-TIN to Cesium** checkbox to select the appropriate coordinate system.

  For CESIUM 1.38 version, the coordinate system does not matches the geocentric reference one. It is rotated by -90 degrees around the X axis. CESIUM 1.70 coordinate system matches the classic geocentric reference system with WGS84 ellipsoid and orientation.

- Set the **EO accuracy (RMS)** in meters. It is recommended to enter following values of **EO accuracy (RMS)**:
  - Navigation projection centers (frequency L1) – 10 meters;
  - Precise projection centers (frequencies L1, L2) without postprocessing – 1 meters;
  - Fixed projection centers (RTK, PPK postprocessing) – 0.1 meter.

  Postprocessing accuracy data could be taken from the corresponding report.

- [optional] To increase the system performance through graphic processing unit resources, set the **Use GPU** checkbox and select the desired device from the drop-down list.
- [optional] To **delete intermediate data** data if success, set the appropriate checkbox.

  Unlike output project data that are placed in the chosen folder in the *Windows* file system and are available for view and analysis in *PHOTOMOD AutoUAS*, intermediate project data are placed in the active profile resources (see the description of the *Control Panel* service module).

  Viewing and analysis of the intermediate project saved in the active profile resources can be useful for advanced users and is available if *PHOTOMOD* and/or *PHOTOMOD UAS* are also installed on the workstation. It is recommended to save intermediate data when you need contacting the technical support.

  The work with resources is described in detail in Section C.4.

5. Data processing sequence

Prior to work in the program, perform the following:

- insert *Sentinel HL* unique security key into the USB-socket of the workstation. The security key drivers should be installed on the workstation;

- run the *System Monitor module*. To do this choose the **Start › Programs › PHOTOMOD 7 AutoUAS x64 › PHOTOMOD System Monitor**. If the *System Monitor module* is active the icon appears in the system tray.
- run the *PHOTOMOD AutoUAS* main window. To do this choose the **PHOTOMOD AutoUAS** in the context menu of *System Monitor module* (the icon in the system tray);
- [optional] create a profile for placing project resources such as project configuration files, images files, files processing projects/project group;

Profile creation is performed during the first launch of *PHOTOMOD AutoUAS* program or in the *Control Panel* module.

To open the *System Monitor module* and the *PHOTOMOD AutoUAS* main window simultaneously use the appropriate desktop shortcut.

To create a new project do the following:

1. run and setup distributed processing control center. Otherwise the warning message appears:

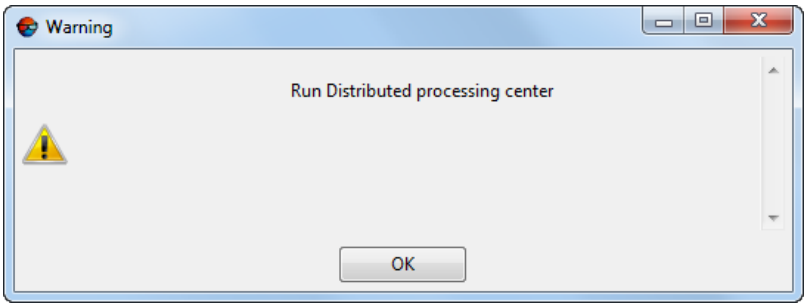


Fig. 12. The warning message

2. set the project processing parameters in the main program window;
3. click the **Start processing** button. The information window with the progress bars appears:

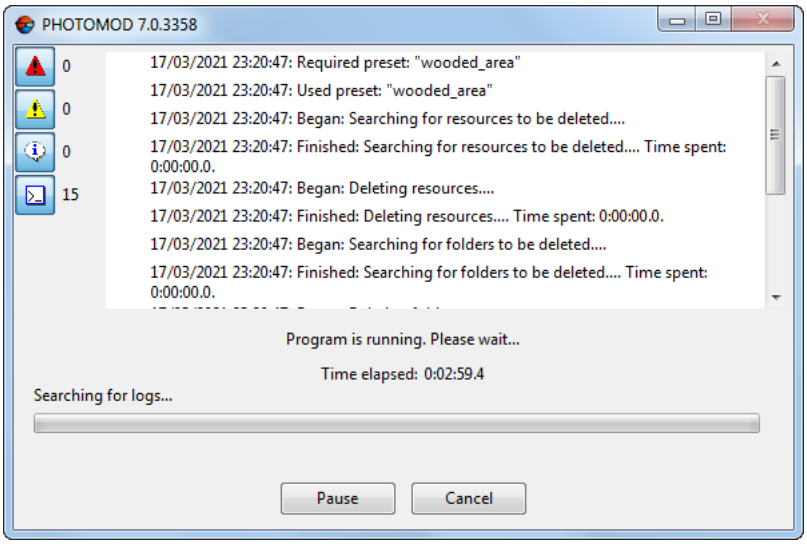


Fig. 13. The information window with the progress bars

6. Output data viewing and analysis

If the project processing is successfully complete, the appropriate info message appears and one of output data viewing instruments opens:

- [optional] 2D window, if the output data **model type** selected is a **3D model**;
- [optional] *PHOTOMOD 3D-Mod* software, if the output data model type selected is a **3D-TIN** (see the "Three-dimensional modeling" User Manual).

If the **3D-TIN model format** is **COLLADA DAE**, *Panorama* software is used for viewing and further work. In *PHOTOMOD 3D-Mod*, a **3D-TIN** model will be opened in this case, that is additionally built in **B3DM** format and saved in a folder intended for storing intermediate data.

To view output data of previously processed projects, perform the following:

1. Open the program main window;
2. The **project folder** drop-down list, select the folder containing the output data of previously processed project.

   The button allows to specify the path select to the **project folder** in *Windows* file system.

3. Perform one of the following, as appropriate and depending on output data of the selected project:

   - [optional] click the **view** (TrueOrtho / DSM) button, to open the 2D window, to view DSM and orthophoto;

- [optional] click the **view** (3D model) button, to open *PHOTOMOD 3D-Mod*, to view textured 3D surfaces (see the "Three-dimensional modeling" User Manual).

It is possible to view output project data in the 2D window in any case. User can view output data in *PHOTOMOD 3D-Mod* only if textured 3D surface (**3D-TIN**) was created.

If output data that correspond to the chosen viewer are not found, the appropriate error message appears. Check the selection accuracy in the **project folder** drop-down list, as well as the content of this folder in the *Windows* file system.

Make sure that the files containing output data from the projects performed before have not been moved or damaged. Otherwise their successful identification is not possible.

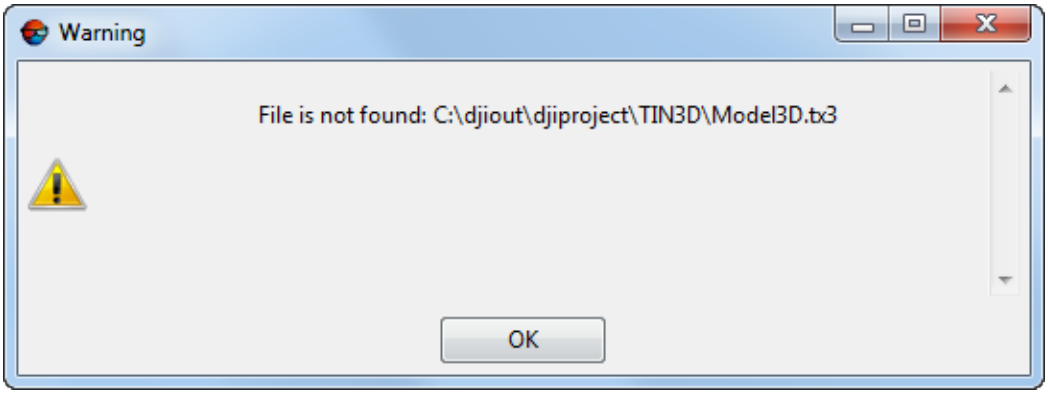


Fig. 14. Warning of absent required output data

6.1. 2D-window

PHOTOMOD AutoUAS 2D window is intended for operator control of processing results (DSM and orthophotos).

General principles of *PHOTOMOD AutoUAS* 2D window are similar to those of *PHOTOMOD* 2D windows (see the "General information" User Manual).

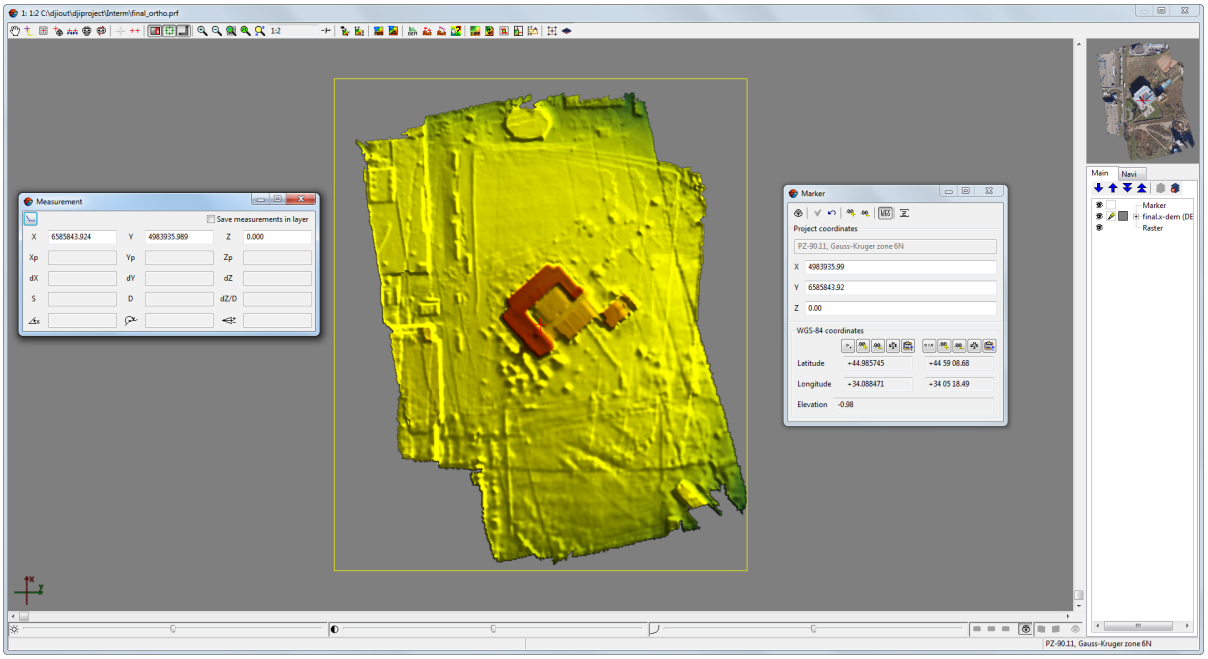


Fig. 15. 2D-window

The **Measurements** and **Marker** windows open simultaneously with the 2D window.

The 2D-window GUI contains the following elements:

- the toolbar is used for the 2D-window modes managing;
- the work area is used for viewing and processing with loaded data;
- the navigation bar is used for fast moving on the specified block images area;

> Open the **Navi** tab of the *Layer manager* (see below) and choose layers to be displayed in navigation window, if needed.

- the *Layer manager* allows to manage loaded data layers;
- the axes direction of loaded data coordinate system;
- the status bar is used for viewing current real (ground) and pixel marker coordinates and brightness, contrast and gamma data adjustment in the work area.

> When place marker is on the area out of image or on background, brightness is indicated as *NULL*.

6.1.1. 2D-window modes managing toolbar

The toolbar of 2D-window contains the following buttons:

- – allows to turn on/off panning mode: press and hold down the mouse button to move image in 2D-window after mouse moving;
- **F4** – turn on/off 'marker=mouse' mode;
- – allows to center image on marker (move point with marker to the center of the 2D-window);
- **F6** – turn on/off fixed marker mode;
- – show/hide the **Navigation bar** and *Layer manager*;
- – show/hide the **Navigation bar**;
- (**Ctrl+F8**) – show/hide scroll bars;
- , , , , and – buttons allowing to setup image scale in 2D-window;

> Description of buttons to setup image scale in 2D-window see in the Section 6.1.2.

6.1.2. Image scaling in 2D-window

Image scaling of 2D-window is performed with the following buttons of 2D-window toolbar:

- – allows to zoom in an image by one step (*);
- – allows to zoom out an image by one step (/);
- – allows to fit to page data of opened layers (**Alt+Enter**);

> To apply this function to a certain layer, select the layer in the *Layer manager* and select **Edit › Fit to window current layer** (or choose **Zoom to fit** in the shortcut menu for this layer in the *Layer manager*).

- – allows to display data in 1:1 scale, when one pixel of the image corresponds to one pixel on the screen (**Alt+1**);
- – allows to sequentially display preset zoom (**Alt+5**);

> To edit preset zoom choose **Service › Settings** and move to **Windows | Zoom** tab (see the 'General parameters' User Manual).

Alt+0 hotkeys is used to return to previous scale.

To set scale manually, click the button and move slider.

Press and hold **Ctrl+Alt** hotkeys and click on image to zoom in or **Ctrl+Alt+Shift** to zoom out image in the window.

Press **Ctrl+Alt** hotkeys and drag a rectangle by mouse to zoom in area of image. Press **Ctrl+Alt+Shift** hotkeys and drag a rectangle by mouse to zoom out area of image.

Press and hold **Alt** key and mouse button for panning. Slide bars are also used to move image.

To move fast in area of image is used the *Navigation bar*.

6.1.3. Layer manager

The 2D-window supports the following types of layers and their parameters:

- **Marker** – layer with marker and direction of the axis;
- **Raster** – layer contains loaded output orthoimages;
- **DEM** – layer contains digital surface model with the following objects:
  - **Selection** – frame of DEM selected area;
  - **Frame** – rectangle frame of DEM;
  - **Raster** – DEM.

The program provides possibility to manage layers, loaded in the 2D-window. *Layer manager* is used for that.

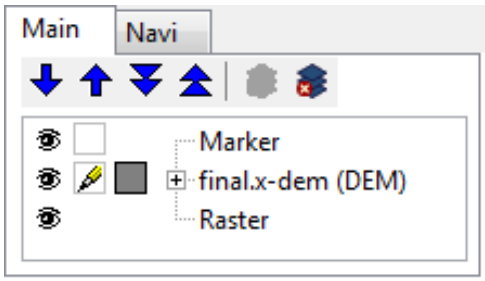


Fig. 16. Layer manager

The  button of the 2D-window toolbar allows to show/hide *Layer manager* and *Navigation bar*.

Ctrl+F11 hotkeys are also used for that.

The **Main** tab is used to adjust layer displaying in 2D-window, the **Navi** tab – to adjust objects displaying in *navigation bar*.

In the *Layer manager* is displayed the list of all opened layers and the following elements of layer management:

- , , and – is used to change layers order;
- – allows to close all the layers of the selected type;
- – allows to close the layer group (selected in the **Close selected layers** window):

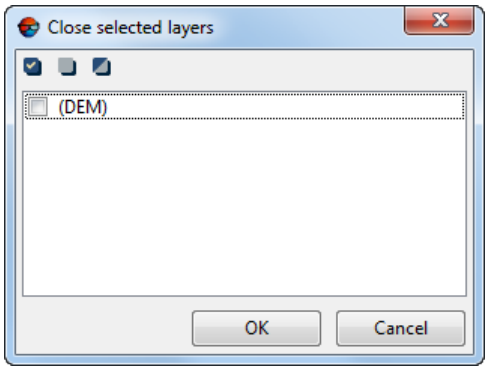


Fig. 17. The “Close selected layers” window

the **Close selected layers** window toolbar contains the following elements:

  - – allows to select all items;
  - – allows to deselect all items;
  - – allows to invert items selection.

  to close the layer group set the appropriate checkboxes and click OK.

- – layer is visible in 2D-window;
- – layer is invisible;

If layer visibility changes, layer status (active/editable) does not change.

Visibility of any layer element could be set separately.

- – layer is active and editable;
- – layer is active, but not editable;
- – displays general color of layer objects;

- For the digital surface model layer could be changed *transparency* of layer visibility in 2D-window;

To change the transparency of objects in digital surface model layer perform the following:

1. Double-click on layer objects color button ( ) in a *Layer manager*. The **Layer display settings** window opens:

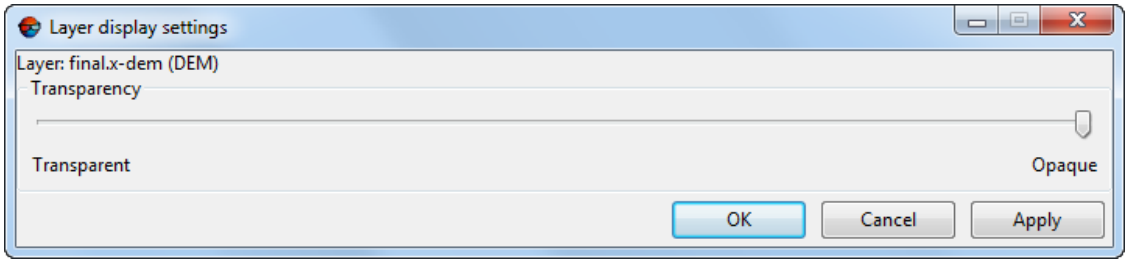


Fig. 18. Layer display settings

2. Set the digital surface model transparency.
3. Click OK to save parameters.

Right-click menu is used to save, close or to obtain info about layer. Right-click on the name of layer in the *Layer manager* to open it.

Right-click menu of selected layer can contain the following menu items, depending of the layer type:

- **Information** – allows to open layer info image;
- **Properties** – allows to configure the settings of DSM display (see the “Settings of DEM display” chapter of the “General system’s parameters” User Manual);
- **Zoom to fit** – allows to move the marker to the geometric center of the selected layer and show the entire layer in the 2D-window;

See also **Edit › Fit to window current layer**.

6.1.4. Settings of DSM display

The **DEM parameters** window is used to setup parameters of digital elevation model (DSM) display. To get access to DSM view settings right-click the name of layer containing DSM in the **Layer Manager** (see above). The context menu is opened. Select the **Properties** item in the context menu.

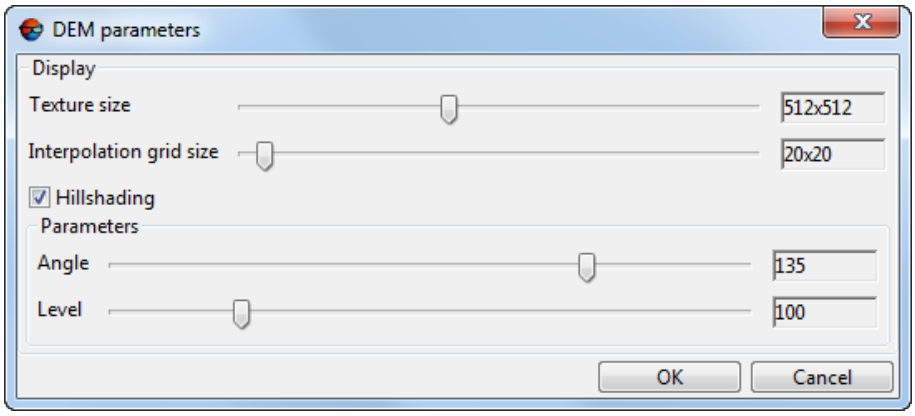


Fig. 19. Settings of DSM display

In the **Display** section use sliders to setup the following parameters:

- **Texture size** – allows to specify texture size, which is used to make surface image more realistic (to let it look like terrain relief). When the slider is shifted to the right the image is more detailed, however DEM loading slows down significantly;
- **Interpolation grid size** – allows to specify a size of regular grid, which is used to "draw on" texture (to comply a relief in non-orthogonal projection), it influences on DEM display in stereo window.
- In the system the **Hillshading** checkbox is set by default to let your DEM be more realistic. It is necessary to set off the checkbox to increase performance.

  In the **Hillshading** section use sliders to setup the following parameters:

  - **Angle** – allows to setup lighting parameters ("sun angle", for example, 90 degrees - at the nadir; 135 degrees - Northwest lighting);
  - **Level** – allows to specify the level of micro-relief detail (the more the slider is moved to the right, the more detailed the micro-relief).
- The **Marker Z coordinate follows DEM in active layer** checkbox is set in the system by default, the result is that marker is placed on DEM surface, i.e. marker's Z-coordinate is equated with DEM's Z-coordinate in specified point of DEM's active layer.

6.1.5. Orthoimages brightness and contrast settings

To display the status bar used to adjust the image brightness, contrast and gamma-correction for a single image or both images of a stereopair use the **Shift+F8** hotkeys.

The , , sliders are used to adjust a brightness, contrast and gamma-correction of a stereoimage. Tools located in the right part allow to select color channels, which correction settings will be applied to.

If the button is set on, adjustment settings is performed by all channels at the same time. Otherwise, adjustment settings is performed only for selected channel.

Fig. 20. Status bar used to adjust image brightness and contrast

To restore brightness and contrast settings to default values, right click the settings panel and select the **Reset** item.

Brightness, contrast and gamma settings are not restored after the 2D-window restart.

6.2. The “Marker” window

The program provides possibility to display current marker coordinates both in output data coordinate system and WGS-84 geodetic coordinate system, as well as marker move to a point with specified coordinates. The **Marker** window is used for this purpose. Click the button of the main toolbar to open the **Marker** window.

The top toolbar contains the following buttons:

- - enables the mode, allowing to change marker’s position just after input of coordinates values without clicking the button or press **Enter**.
- - allows to move marker in accordance with specified coordinates;
- – allows to cancel changes and return to initial coordinates;
- - allows to increase number of displayed decimal places by one;
- - allows to decrease number of displayed decimal places by one;
- – allows to show/hide bottom part of the window to display geodetic marker coordinates in WGS-84;
- – allows to fix the marker value by Z coordinate (**Alt+Z**)

The bottom part of the window displays geodetic marker coordinates (latitude/longitude/height). The toolbox contains the following buttons:

- - allows to change display format of geodetic coordinates;
- - allows to increase number of displayed decimal places by one;
- - allows to decrease number of displayed decimal places by one;
- - allows to turn on display format of units and hemispheres;

- allows to copy coordinates to clipboard (**Ctrl+C**).

Only plane coordinates copies by default. To copy all coordinates, click the button while holding **Alt** key.

In order to change marker position in project coordinate system perform the following actions:

1. [optional] Click the button of the main toolbar. The **Marker** window opens.

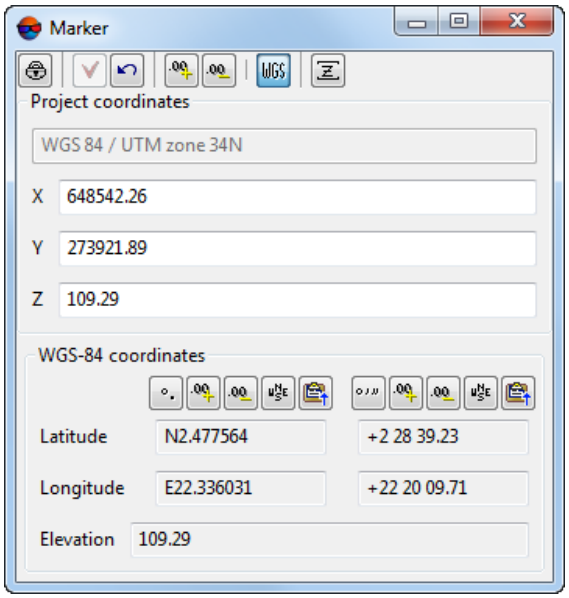


Fig. 21. The “Marker” window

2. Input coordinates of a point to move marker to in the **Project coordinates** section.

   [optional] To change marker’s position automatically just after input of coordinates values click the button.

3. Click the button or press the **Enter** key. After that marker is moved to the point with specified coordinates.

6.2.1. Marker modes

Depending on the object of vectorization for different stereo vectorization methods the system provides the following modes of marker work:

- *moving marker mode* – the marker moves arbitrarily by image “fixed” in XY plane.

  Use arrow keys to move marker in XY plane. Use the **Page Up** and **Page Down** hotkeys or rotate mouse wheel to set marker by Z.

Moving marker mode is used in the system by default.

- *fixed marker mode* (**F6**) – marker is always in the center of the screen.

  In fixed marker mode a step of model move by Z is defined arbitrarily.

  To place the marker on the surface of relief model in stereomode use the **Page Up** and **Page Down** hotkeys (in XY plane) or mouse wheel rotation to move marker by Z. To move image in XY plane use mouse or arrow keys.

- *marker=mouse mode* (**F4**) – mouse cursor is invisible, all mouse moves lead to marker moving without additional clicks of mouse buttons.

The program places marker on a model surface (DSM) automatically using correlator.

6.3. The “Measurement” window

The program provides possibility to perform measurements on images. To do so use the **Measurements** window.

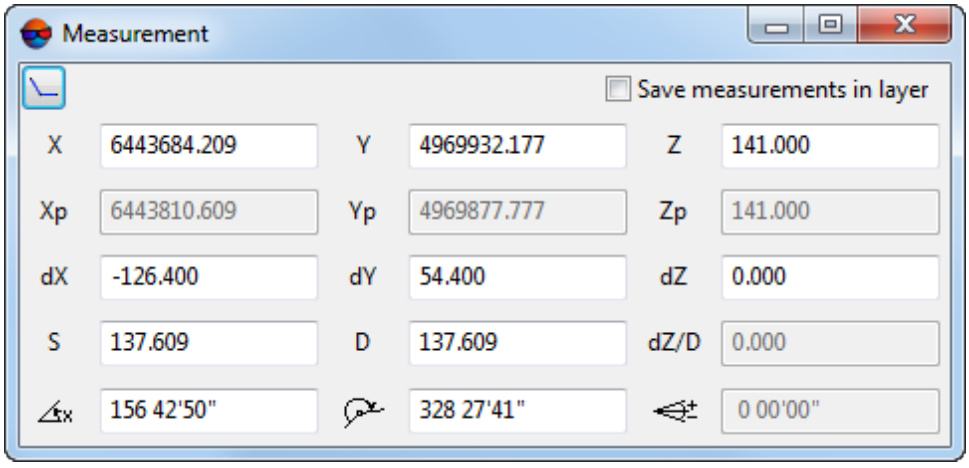


Fig. 22. The “Measurements” window

The window contains fields with marker coordinates values:

- *X* – marker X geodetic coordinate;
- *Y* – marker Y geodetic coordinate;
- *Z* – marker Z geodetic coordinate;
- *Xp* – marker Xp geodetic coordinate;

- *Yp* – marker Yp geodetic coordinate;
- *Zp* – marker Zp geodetic coordinate;
- *dX* – current segment incrementation by X;
- *dY* – current segment incrementation by Y;
- *dZ* – current segment incrementation by Z;

Besides, the **Measurements** window contains fields with values of the following parameters of segment:

- *S* – a length of segment;
- *D* – a length of horizontal distance (projection on a plane) of segment by Z;
- *dZ/D* – a value of segment slope (Z increment ratio to the horizontal distance);
- – direction of current segment relative to X axis;
- – direction of current segment relative to previous one;
- – vertical angle of current segment.

Do the following actions to perform measurements:

1. [optional] Click the button of the main toolbar to turn on the measurements mode. The *Marker* layer becomes active and the **Measurements** window opens.
2. Place marker to start point of measurement and press **Insert**.

   During measuring the system creates temporary line (“rubber line”), that disappears after exit from measurements mode. To start temporary line creation click the button.

3. Place marker to next point of measurement and press **Insert**. Parameters of created segment are displayed in the **Measurements** window.

   Measurements are performed between current marker position and the last point where the **Insert** key was pressed.

   The system provides possibility to input using keyboard marker geodetic coordinates and segment parameters to fields of the **Measurements** window. Marker moves to a point with specified coordinates and segment parameters after pressing the **Enter** key.

   The program places marker by Z axis on a model surface (DSM) automatically.

4. To complete measurements, close the **Measurements** window.

To leave the *Marker* layer active, close the **Measurements** window holding pressed **Ctrl** key.

Appendix A. Input and output data

A.1. Input data

The software allows for processing source raster imagery (`*.jpeg` or `*.tiff`) obtained by cameras with central projection and exterior and interior orientation (EXIF), 8 bit, RGB formats.

Interior and exterior orientation import is carried out automatically from EXIF metadata of source imagery (or separate file) and does not require operator customization.

The camera description is carried out automatically from EXIF metadata of source imagery (or from the separate file).

A.1.1. Interior and exterior orientation import from separate file

Interior and exterior orientation import is carried out automatically from EXIF metadata of source imagery (or separate file) and does not require operator customization.

If both sources of interior and exterior orientation parameters are available, priority is given to a separate file delivered with imagery.

This file must meet the following requirements:

- The file must be located strictly in the root of the **Source images** folder in the *Windows* file system;

It is allowed to place source images both in the root of the **Source images** folder, together with the `eo.csv` file, and in child subfolders.

- The file must have strictly defined name and extension, `eo.csv`;
- The file must have the following `*.csv` format parameter settings:
  - The field delimiter is a comma;
  - The decimal delimiter is a dot.
- The coordinate system for data imported from the file is geodetic, WGS-84, lat./lon.;
- The file coding is UTF-8;

- In its first line, the file must contain the following column names: `Name`, `Lat`, `Lon`, `Alt`, in the above order. Additional columns with other data (if they are located after the four abovementioned) is acceptable;

  Data import, therefore, is performed starting from the second line of the `eo.csv` file

- Names of image files in the `Name` column must not contain an extension. Otherwise, proper data import from `eo.csv` is not possible.

  In case of impossible data import from the detected `eo.csv` file, the appropriate error message appears.

The following is an example of correct `eo.csv` file content (note that image names have no extensions):

```
Name,Lat,Lon,Alt,column5,column6

20TUZ_DJI_f1_19,56.8444136,80.60971671,336.226,data5,data6

20TUZ_DJI_f1_20,56.84418296,80.60976516,335.766,data5,data6

20TUZ_DJI_f1_21,56.84395433,80.60980611,335.551,data5,data6

20TUZ_DJI_f1_22,56.84390058,80.60982994,335.882,data5,data6

20TUZ_DJI_f1_23,56.84393753,80.61012121,336.117,data5,data6

20TUZ_DJI_f1_24,56.84396039,80.61046207,336.55,data5,data6

20TUZ_DJI_f1_25,56.84399618,80.61048636,336.622,data5,data6

20TUZ_DJI_f1_26,56.8441402,80.61041766,336.654,data5,data6

20TUZ_DJI_f1_27,56.84434981,80.61036323,336.126,data5,data6

20TUZ_DJI_f1_28,56.84457253,80.61031856,335.649,data5,data6

20TUZ_DJI_f1_29,56.84479721,80.61026833,335.417,data5,data6
```

A.1.2. Camera description import from separate file

The camera description is carried out automatically from EXIF metadata of source imagery (or from the separate file).

If both sources of camera description are available, priority is given to a separate file delivered with imagery.

This file must meet the following requirements:

- The file must be located strictly in the root of the **Source images** folder in the *Windows* file system;

  It is allowed to place source images both in the root of the **Source images** folder, together with the `camera.x-cam` file, and in child subfolders.

- The file must have strictly defined name and extension, `camera.x-cam`.

A.1.3. “Exterior” point cloud (LAS)

An **“exterior” point cloud (LAS)** can only be used if it spatially intersects with the territory displayed in the images of the project being processed. When processing a project, the system runs an appropriate check.

Some point clouds (depending on data formats and providers) can contain metadata carrying information on the point cloud coordinate system (PCS). If these metadata are not found, the program attempts to automatically determine the coordinate system of the external point cloud.

In case of the lack of reliable information on the availability of abovementioned metadata, use external point clouds saved in the coordinate system identical to the output project coordinate system (WGS84 UTM point cloud is also acceptable).

The *PHOTOMOD* software provides for converting LAS-files into another coordinate system (see the “Transformation of point cloud coordinate system” in the “LIDAR Data processing” User Manual of the main *PHOTOMOD* documentation).

In case of complete absence of spatial intersection of the point cloud with the territory displayed in the images of the project under processing (or in case of inability to determine the coordinate system of the external point cloud reliably), the system generates appropriate information messages.

A.2. Output data

Output data formats:

- Digital orthophotos are presented in TIFF formats with `*.tfw` or GeoTIFF, 8 bit, RGB binding files;
- Digital terrain models are presented in one band GeoTIFF format, floating-point numbers, 64 bits;
- 3D textured terrain models are presented in `*.b3dm` format.

An output data of the each processed project is stored in **Output folder** in *Windows* file system, in a separate folder with definite structure for output files.

It is not recommended to change output files or folders using standard OS *Windows tools*.

The name of this folder is taken from the **Project name** field, and it contains the following files and folders:

- *DSM* folder – is used to store output DSM files with `*.tif` extension;
- *Interm* folder – is used to store intermediate DSM files and orthoimages;
- *Reports* folder contains processing report (`report.html`) and block adjustment report (`adjust_report.txt`);
- *TIN3D* folder contains output textured 3D models;
- *LAS* folder contains output LAS point clouds;
- *TrueOrtho* folder – is used to store output orthoimages;
- `*.x-ini` file, containing project processing parameters;
- `*.x-ref-system` file containing data about project coordinate system.

Appendix B. Distributed processing

B.1. General Information

Program includes capability of distributed processing of some tasks. This helps achieve maximum utilization of hardware resources for carrying out large projects.

Distributed tasks processing is a capability of parallel task execution with multiple processor cores or multiple computers in local network.

Computers participating in the distributed processing are assigned the two following modes:

- *Server* is the control center of the distributed processing, responsible for distribution of tasks and synchronization of *Client* computers;

Server is also could has *Client* status.

- *Client* is a computer, which receives tasks to process from the *Server*;

Each *Client* must be connected to the *Server.*

It is possible to temporary exclude *Client* from distributed processing.

There could be several computer groups in one local network to process project in distributed mode independently of each other.

To launch the **Distributed processing control center** perform one of the following:

- in right-click menu of *System Monitor module*choose the **Distributed processing control center**;

  The **Start automatically** menu item allows to launch the distributed processing control center automatically concurrently with launching any module of program when *System Monitor module* is launched.

- choose the **Service › Distributed processing › Control center**.

If both *PHOTOMOD AutoUAS* and full version of *PHOTOMOD* system (and/or *PHOTOMOD UAS* program) are installed on a computer, it is required to install the same *PHOTOMOD AutoUAS* and *PHOTOMOD* (*PHOTOMOD UAS*) system's version (pg. 7) on all computers of group, to guarantee correct distributed processing.

The distributed processing control center is launched with properties of previous working session of program in the *Windows* system tray the  icon displays. During the first launch the **Distributed processing setup** window is also opens.

Tooltip to the distributed processing center displays name of version from what **distributed processing center** was launched and information about server/client status.

The distributed processing icon in the *Windows* system tray is different depending on using computer in the distributed processing mode:

-  – *Server* and *Client* are not launched (computer is not used in distributed processing);
-  – *Server* connection fault;
-  – only *Server* is launched;
-  – *Server* and *Client* are launched;
-  – only *Client* is launched, connection to *Server*.

To use distributed processing in a local network requires the following:

- the same Centralized management folder should be connected to each workstation, involved in distributed processing;

  Active profile is not important for *Client* computers.

- read and write public access and defined full path is required for all folders with data;

  Full path is not required for local folders.

- at least one computer should be in *Server* mode and all *Clients* should be connected to one *Server*.

B.2. Workflow of distributed processing

The following workflow is used to distributed tasks processing:

1. Launch the **Distributed processing control center** on all involved computers.
2. Configure the required distributed processing settings:
   - Define one of computers as a *Server* and input free **Port for incoming connections**.

     Ports in the range 0-1023 are reserved by the operating system, so the minimum value of the port is set to 1024.

   - Define all the rest involved computers as a *Clients*, choose server name and **Port for connecting to server**, specified on step 2.

     Server is also could be use as a *Client* at the same time.

     The system also provides an opportunity only to use local computer for distributed processing tasks with using several cores of one computer, i.e. using computer as a *Server* and *Client* at the same time.
3. Open the main *PHOTOMOD AutoUAS* window;
4. Setup the processing parameters in this window and click the **Start processing** button. The list of distributed processing tasks is created and displayed in the **Tasks** table.

   As the output folders and folders for intermediate data, specify only folders which are available for all involved computers.

Distributed processing is impossible if the **Distributed processing control center** has not been previously started and configured (see items **1** and **2**). The appropriate message appears in this case.

Fig. B.1. A message that appears if items **1** and **2** have not been completed before clicking the **Distributed processing button**

5. Open the **Monitor for distributed processing** to view the progress of tasks performance;

Click the button to perform all distributed processing tasks automatically.

The **Monitor for distributed processing** window also allows to manage distributed processing tasks performance.

B.3. Distributed processing parameters setup

The **Distributed processing setup** window is used to setup distributed processing parameters. Parameters are setup depending on computer's mode.

To open the **Distributed processing setup** window the menu item **Configuration...** of right-click menu of the distributed processing icon is used. The **Distributed processing setup** also opens after the first launch of the **Distributed processing control center**.

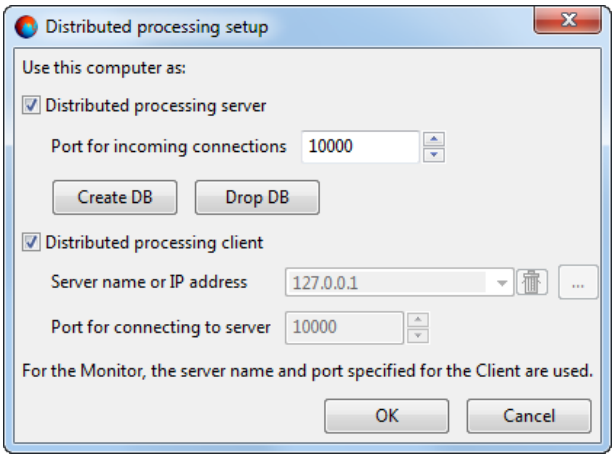


Fig. B.2. Distributed processing parameters setup

To use computer as a *Client* of distributed processing, perform the following actions:

When first setting up the *Server* of distributed processing control center, it is necessary to create a *database*. The system upgrade may also require to delete the existing database and create a new one (when the **Distributed processing setup** window opens, the appropriate informational message appears).

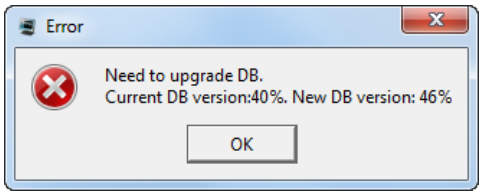


Fig. B.3. The informational message

The *database* contains the distributed processing parameter settings, the lists of tasks and logs of their execution. The database files are saved in the *PHOTOMOD.VAR* folder at the *Server* by default.

1. [optional] click the **Drop DB** button;

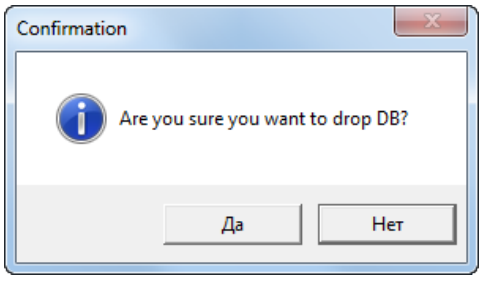


Fig. B.4. A prompt to confirm database deletion

Click **Yes**;

Fig. B.5. Database deletion confirmed

2. [optional] Click the **Create DB** button;

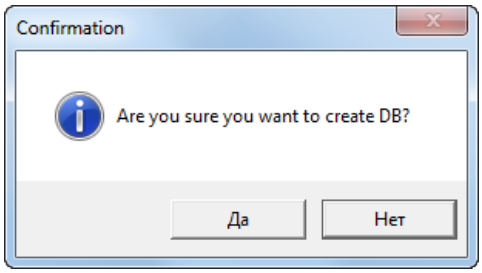


Fig. B.6. A prompt to confirm database creation

Click **Yes**;

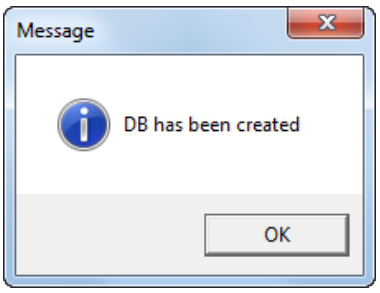


Fig. B.7. Database creation confirmed

3. Set on the **Distributed processing server** checkbox.
4. Set the **Distributed processing client** checkbox off.
5. Set free port in the **Port for incoming connections** field.

Ports in the range 0-1023 are reserved by the operating system, so the minimum value of the port is set to 1024.

If not possible to connect with chosen port, choose another one.

6. Click OK.

It is necessary to restart the distributed processing control center if parameters were changed.

To use computer as a *Client* of distributed processing, perform the following actions:

1. Set the **Distributed processing server** checkbox off.
2. Set on the **Distributed processing client** checkbox.
3. Input in the **Server name or IP address** or click the ... button and choose computer name or IP-address from the list used as a *Server*.

The list of last computers, used as a Server, are kept in the system. The button allows to clear the file list;

4. Input port number which was specified during the **Server** adjustment in the **Port for incoming connections** field.
5. Click OK.

It is necessary to restart the distributed processing control center if parameters were changed.

The system also provides an opportunity only to use local computer for distributed processing tasks with using several cores of one computer, i.e. using computer as a *Server* and *Client* at the same time. Perform the following actions to do this:

1. Set on the **Distributed processing server** checkbox.
2. Set free port in the **Port for incoming connections** field.

If not possible to connect with chosen port, choose another one.

3. Set on the **Distributed processing client** checkbox. Server name and port number are set automatically.

Ports in the range 0-1023 are reserved by the operating system, so the minimum value of the port is set to 1024.

If not possible to connect with chosen port, choose another one.

4. Click OK.

It is necessary to restart the distributed processing control center if parameters were changed.

B.4. Distributed processing management

The **Monitor for distributed processing** window is used for condition monitoring of distributed processing. The menu item **Start monitor** of right-click menu of the distributed processing icon allows to open this window.

Tasks could be created both by *Server* and *Client*.

If the *Server* (and *database*) are disconnected for any reason, the further distributed processing management is not available (when trying to run the **Monitor for distributed processing** window at the *Client* workstation, the appropriate informational message appears).

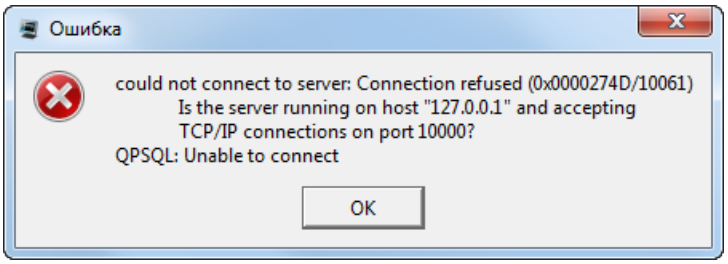


Fig. B.8. The informational message

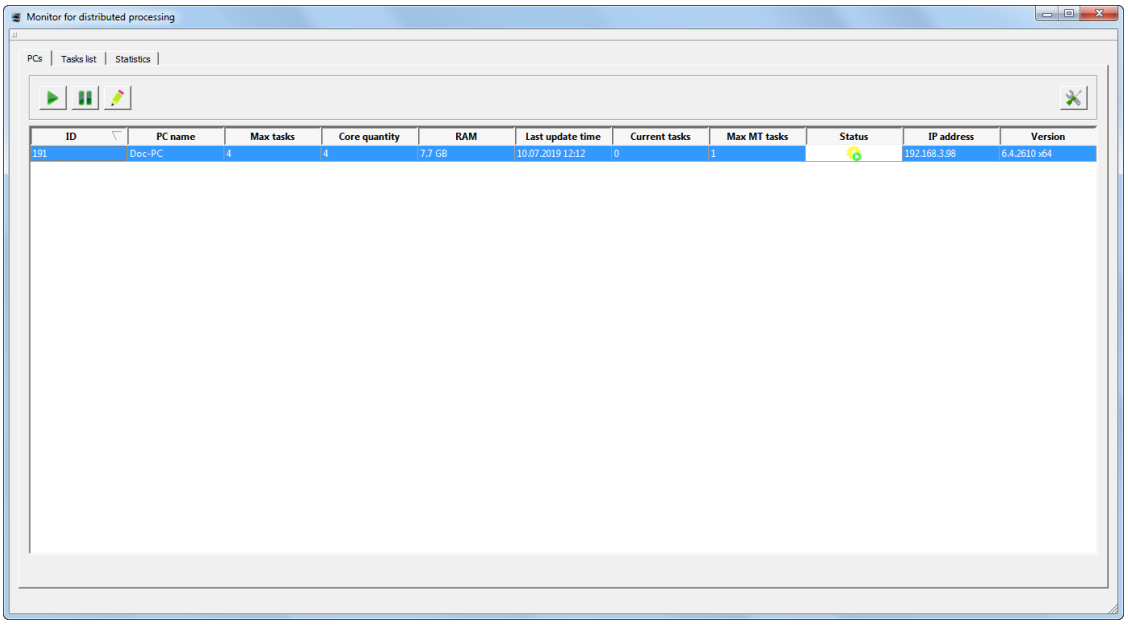


Fig. B.9. Monitor for distributed processing

The **Monitor for distributed processing** window contains the following tabs: **PCs**, **Tasks list** and **Statistics**.

In the **Monitor for distributed processing** window displays information about tasks queue and *Clients* computers using. The window also allows to manage tasks processing.

The window refresh automatically each several seconds.

B.4.1. Computers

The **PCs** tab contains toolbar and table of computers, which are currently in the network and configured with the same *Server*.

The *Server* is displayed in this list only in if it also takes part in the processing being also a *Client*.

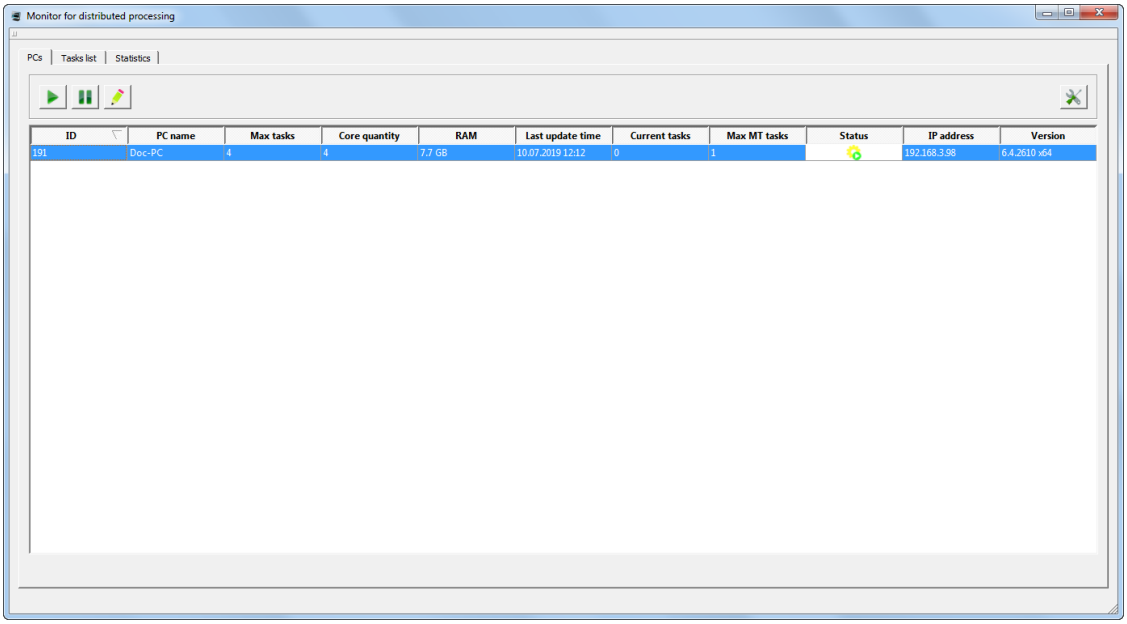


Fig. B.10. The “PCs” tab

The table contains following parameters for each computer:

Points sorting in columns of the list is performed by mouse click on the column header.

The button allows to set columns visibility.

- The Computer **ID**;
- **PC Name** – shows network computer name;
- **Max tasks** – the maximum quantity of simultaneously running tasks on *Client*;

The **Max tasks** number by default is equal to the number of CPU’s cores of a workstation (but doesn’t exceed the number available according to the license).

If the capacity of the network connecting workstations equipped with hard disk drives (HDD) does not exceed 1 Gb/s, the recommended total **Max tasks** for all workstations is no more than 16.

- **Core quantity** – the total quantity of Client CPU's cores;
- The Client's **RAM**;
- **Last update time** – the time of the last connection between *Server* and *Client*;
- **Current tasks** – tasks number of distributed processing, which currently performed by Client;
- **Max MT tasks** – the maximum quantity of simultaneously running tasks on *Client* in *MultiThreading* mode;

MultiThreading – in computer architecture, multithreading is the ability of a central processing unit (CPU) (or a single core in a multi-core processor) to provide multiple threads of execution concurrently, supported by the operating system.

This approach differs from multiprocessing. In a multithreaded application, the threads share the resources of a single or multiple cores, which include the computing units, the CPU caches, and the translation lookaside buffer (TLB).

Where multiprocessing systems include multiple complete processing units in one or more cores, multithreading aims to increase utilization of a single core by using thread-level parallelism, as well as instruction-level parallelism. As the two techniques are complementary, they are sometimes combined in systems with multiple multithreading CPUs and with CPUs with multiple multithreading cores.

When setting this option, it is needed to take into account the *Client's* specifications i.e. **RAM** and the number of processor cores. In most cases, the recommended **Max MT tasks** value for a workstation having a multicore processor and 8 GB **RAM** is 1. The recommended **Max MT tasks** value for a workstation with 16 GB **RAM** is 2, etc.

- The permission **Status** for the selected computers to execute new tasks;
  -  – allowed;
  -  – forbidden.

When current task complete, *Client* go to sleep mode and doesn't start new tasks temporary.

- **IP-address** – IP-address of the computer;
- **Version** – the PHOTOMOD build number for control of compatibility.

It is recommended to use the same RHOTOMOD build on all computers working with the same Synchronization folder.

To perform actions with multiple computers, select them in the table using **Shift** and **Ctrl** keys.

Table B.1. The “PC” tab toolbar

Buttons	Function
	allow selected computers to execute new tasks (if forbidden)
	forbid selected computer to execute new tasks When current task complete, *Client* go to sleep mode and doesn’t start new tasks temporary
	allows to open the **Num tasks entry** window to set **Max tasks** and **Max MT tasks** quantity (see below)
	allows to open the **Display options** window to set the visibility of the columns in the table of computers (see below)

To set **Max tasks** and **Max MT tasks** quantity for the selected workstation, select this computer in the table of computers and click the  button of the **PCs** tab toolbar. The **Num tasks entry** window opens:

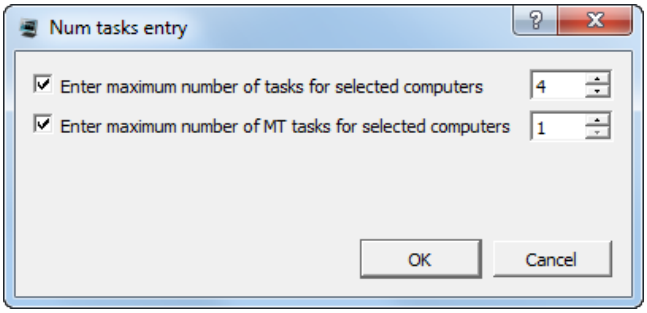


Fig. B.11. The “Num tasks entry” window

- [optional] **Enter maximum number of tasks for selected computers** or clear an appropriate checkbox, if this parameter does not need to be changed;
- [optional] **Enter maximum number of MT tasks for selected computers** or clear an appropriate checkbox, if this parameter does not need to be changed;

Click OK. If no workstations were selected above, changes will be applied to all of them.

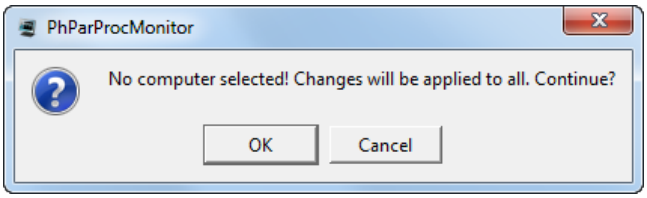


Fig. B.12. The question window

The system allows to set visibility of the columns in the table of computers. To do this click the button of the **PCs** tab toolbar. The **Display options** window opens. Clear an appropriate checkboxes if needed, and click OK.

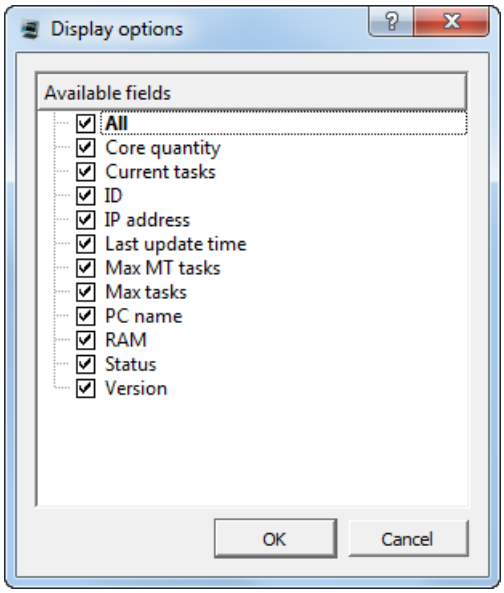


Fig. B.13. The “Display options” window

B.4.2. Tasks list

The **Tasks list** tab contains toolbar and table with information about tasks.

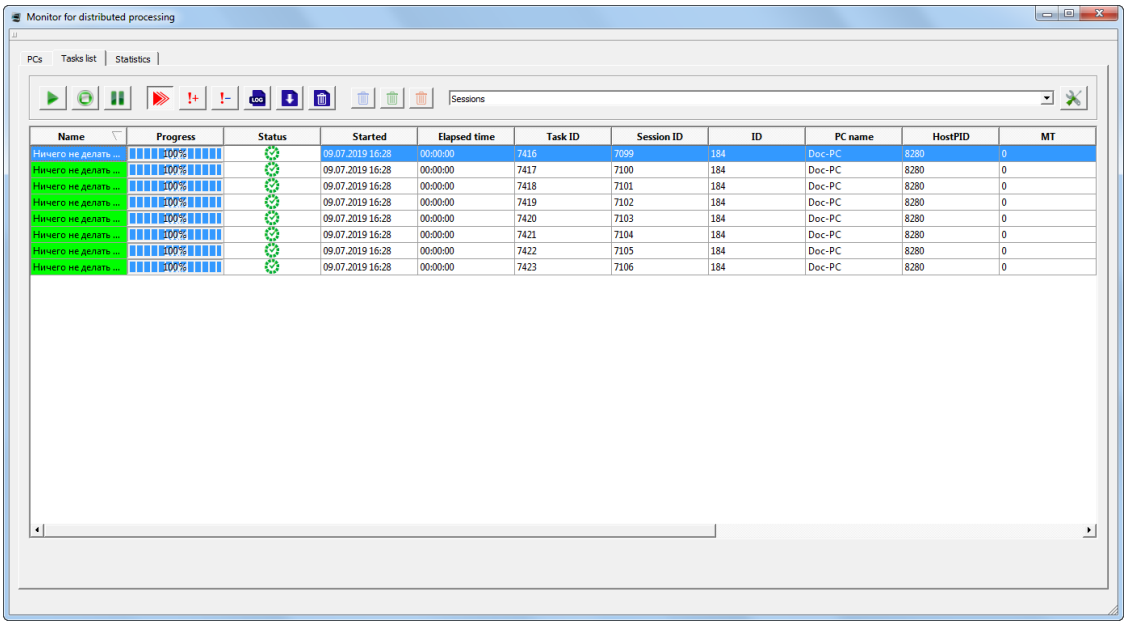


Fig. B.14. The “Tasks list” tab

The table consists of columns with following information:

Points sorting in columns of the list is performed by mouse click on the column header.

The button allows to set columns visibility.

- The task **name**;
- The task **progress**;
- The **Status** of the task:
  - – `waiting`;
  - – `unknown error`;
  - – `stopped`;
  - – `paused`;
  - – `performed`;
  - – `restarted`;
  - – `complete`;
  - – `failed` – displayed in case of complete part or resource connection error;

  -  – `not complete` – displayed in case of tasks didn't complete because of *Client* was disconnected during the task processing, *Server* was disconnected or task was canceled.

- **Started** – the data and time are displayed for started task;
- **Elapsed time**;
- **Task ID** – unique identifier for each task;
- **Session ID** – unique identifier for each communication session between the *Server* and the *Client*;
- Computer **ID**;
- **Maker** – shows network computer name;
- **Maker ID** – is a unique *PHOTOMOD* session ID;
- **MT** – this parameter estimates if this task is processed in the MultiThreading mode;

  1– this task is processed in the MultiThreading mode, 0 – this task is not processed in the MultiThreading mode.

- **Update time** is the time of the latest log entry creation;
- **Priority** – priority of the tasks (integer, the larger the number, the higher the priority, the tasks of higher priority are performed in the first place);

  To change the **Priority** of the performed task, double click the appropriate cell of this column.

  To sort out performed tasks by priority, click the  icon to the right of the **Priority** column name.

- **Executor** – for started task – the name of *Client* computer, which executes it;
- **Created at** – the date and time of posting task;
- **Profile** – active Client profile at the time of posting of tasks. This profile must be network and connected to other Clients in order that they have been able to execute the tasks;
- The task **description**.

If during the task execution an error occurs on any of network computers, it's highlighted in red in the list. In this case attempts will be made to perform the same tasks on other

computers. The task will remain in the queue with a `failed` state until it is deleted manually, if no computer in network is able to execute this task.

Table B.2. The “Tasks list” tab toolbar

Buttons	Function
	allows to start selected tasks sequentially
	allows to pause selected tasks
	allows to stop selected tasks
	allows to set on the auto run tasks – automatic distribution of tasks in the queue (according to priority) between the Clients and launch of the tasks
	allows to increase priority of selected tasks by 1
	allows to decrease priority of selected tasks by 1
	allows to show logs for selected tasks (see below)
	allows to perform logs export (see below)
	allows to enable/disable logs saving mode while deleting tasks
	allows to remove selected tasks from the queue
	allows to remove complete tasks from the queue
	allows to clear the queue of tasks
	allows to open the **Display options** window to set the visibility of the columns in the table with information about tasks (see below)

The system allows to set visibility of the columns in the table with information about tasks. To do this click the  button of the **Tasks list** tab toolbar. The **Display options** window opens. Clear an appropriate checkboxes if needed, and click OK.

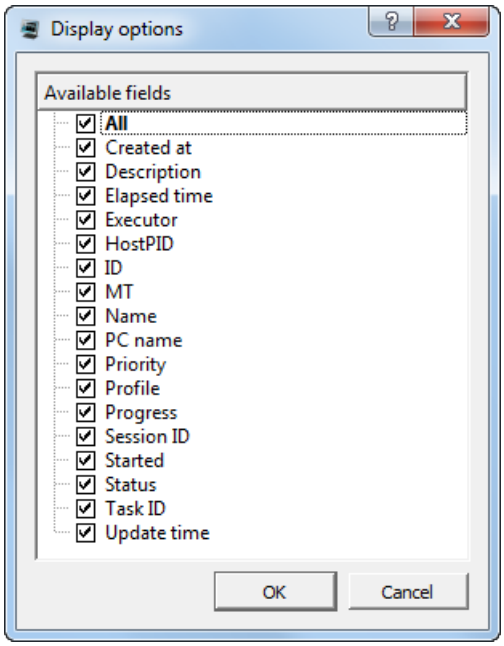


Fig. B.15. The “Display options” window

To show logs for selected tasks, select this tasks in the table above and click the LOG button of the **Tasks list** tab toolbar. The **Session logs** window opens:

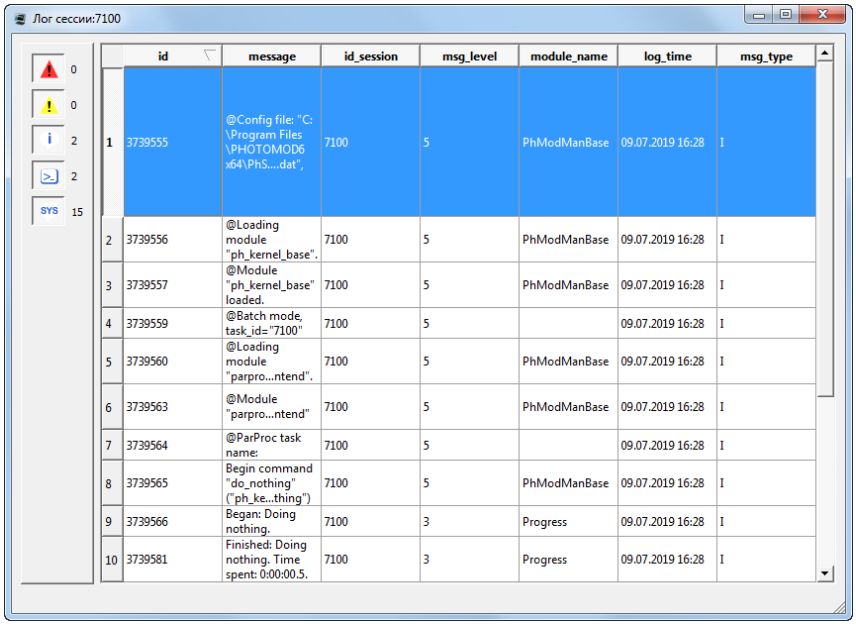


Fig. B.16. The “Session logs” window

The **Session logs** window contains the table with messages about tasks performance and the toolbar, allowing to enable/disable the visibility of the messages categories.

The table consists of columns with following information:

Points sorting in columns of the list is performed by mouse click on the column header.

- **ID** – unique identifier for each message;
- the **message** text;
- **Session ID** – unique identifier for each session;
- **Msg level** – message significance level;
- **Module name** – the used module of the *PHOTOMOD* system;
- **Log time** – the time of message creation;
- **Msg type** – message category.

The buttons of the **Session logs** window toolbar allows to enable/disable the visibility of an appropriate messages categories. The number of messages in the each category is displayed to the right of the corresponding button.

Table B.3. The “Session logs” window toolbar

Buttons	Function
	allows to enable/disable the visibility of the error messages
	allows to enable/disable the visibility of the warnings
	allows to enable/disable the visibility of the information messages
	allows to enable/disable the visibility of all the messages
	allows to show all records (detailed log)

To export the logs of the selected tasks perform the following:

1. [optional] select necessary tasks in the table together with task info (otherwise, logs of all the tasks from this table will be exported);
2. click the  button of the **Tasks list** tab toolbar. The **Log export** window opens;

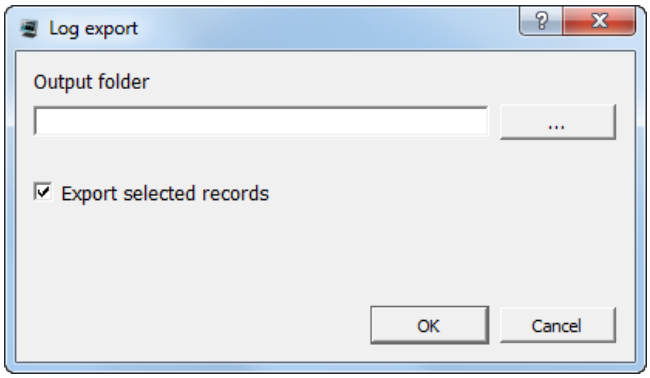


Fig. B.17. The “Log export” window

3. press the ... button to specify the **Output folder**;

4. [optional] clear the **Export selected records** checkbox to export logs of all the tasks from the table in the **Tasks list** tab;

5. To save logs in the chosen folder, click OK. Task logs are text files with `*.log` extensions. If it is needed to export logs for more than one task, an archive of logs with `*.tar.gz` extensions will be saved in the chosen folder.

B.4.3. Statistics

The **Statistics** tab contains the table with statistics of the current task session.

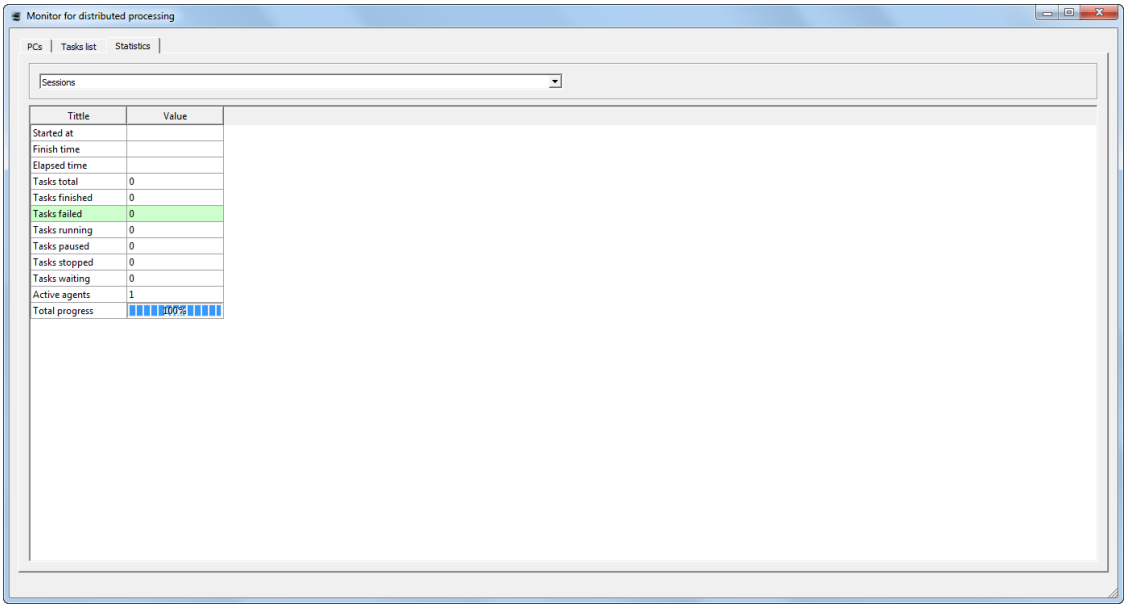


Fig. B.18. The “Statistics” tab

The table consists of strings with following information:

- **Start time**;
- **Finish time**;
- **Elapsed time**;
- **Tasks total**;
- **Tasks finished** ();
- **Tasks failed** ();
- **Tasks runned** ();
- **Tasks paused** ();
- **Tasks stopped** ();
- **Tasks waiting** ();
- **Active agents** – the number of *Clients* in the **PCs** tab;
- **Total progress**.

Appendix C. Prepare to processing

C.1. Data storing

C.1.1. Main definitions of resources system

Resources system of *PHOTOMOD* software is a way to store data with possibility of network distributed project processing. Operator has access for an unified system with all available profiles, nod depends on PC using for storing data and processing. Data could be stored in optimal way for processing a current task.

The following main definitions are used in the resources system:

- *Profile* – independent group of projects relative to one or several projects;
- *Virtual folders* is a virtual names of real local/network folders (hard disks) or group of folders, chosen by user to store profile resources;

  One profile could use data placed on several computers.

- *Virtual folder types* – folders and storages.

C.1.2. Profiles and virtual folders

Configuration of resources depends on profile settings. Profile has a virtual name and do not equal to real file system. This name is a common root of the resources tree that connects all branches (resources) profile.

Profile resources could be placed on any workstations and hard disks in a local network.

It is recommended to create one profile for one project or group of projects.

The profile resources system contains all subfolders and files (except `meta`-files) of real folder, defined as virtual.

Configuration files that describe a set of local profiles and its structure are stored in the *PHOTOMOD7.VAR folder.*

The Control Panel module is used to create and manage profiles. The *Control Panel module* is used to create and edit profiles, connect virtual folders, create/connect network profiles folder, change active profile and so on.

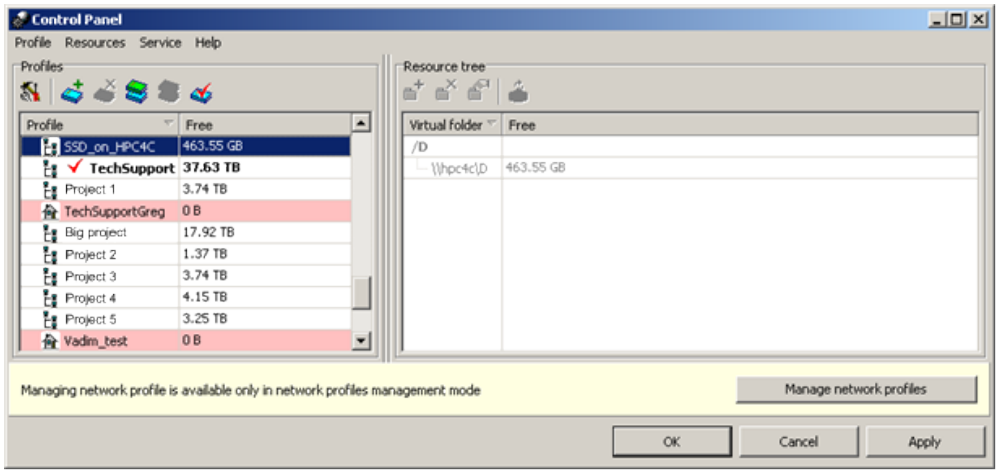


Fig. C.1. Control Panel window

The system provides possibility to create and manage local and network profiles.

Profile, available to use only on one PC, is called *local* profile. Local profile is marked with leftward to profile name.

Network profile is available on all workstations in the system to process project at the same time. Network profile is marked with leftward to profile name. When selecting a network profile, its configuration is copied automatically to a local PC to provide independent work if storage is unavailable.

In one session could be used only one active profile. Any local or network profile available profile could be chosen as active.

The *PHOTOMOD Explorer module*is a service module for resources management. All active profile resources are displayed in the module – contents of virtual folders (including subfolders and files). The module also allows to edit resource structure.

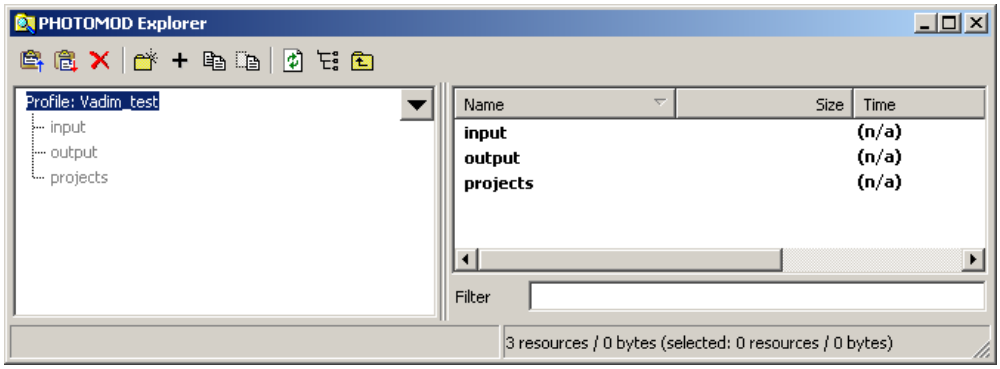


Fig. C.2. ' PHOTOMOD Explorer' window

C.1.3. Storages

Storage folders are a special type of virtual folder.

Resources are automatically placed in storage folders by the system on the basis of free space analysis. Thus, storage folders allow optimization of multiple disk usage for storage resources, which is advantageous when network processing large projects (see the section called "Distribution of resources on servers").

It is not recommended to place more than one storage on the same hard disk.

Both one and several storages could be connected to a profile as a virtual folder.

It is available to create not more than 16 storages for one virtual folder.

If you create a folder in virtual folder with several storages, it creates in all storages in the */content* folder. Thus, all storages have equal structure. Besides content of these folders is different, because one resource could be used only in one storage of group.

In the root folder of storage are placed *$PhStorage.list* file with information about all resources in storage, *$PhStorage.x-ini* file with information about storage and temporary files to block *$PhStorage.list* file during its reading/saving. The *$PhStorage.x-ini* file contains storage ID and ID list of all other storage in a group. These information is checked during initialization of virtual folder.

These way of data storing allows to reallocate data between storages. To reallocate data, move files and delete table of storages. At the next using of the virtual folder, new *$PhStorage.list* files create automatically.

Metadata of each resource is stored in `*.meta`-files. Metadata files always place in the same storage as resource.

C.2. Profiles

C.2.1. Control Panel Profiles management

The *Control Panel module* is used to manage profile structures to work in the system.

To launch the system at least *one* profile is required. Creation of profile is performed in the *Control Panel module*.

During the first launch of the system, the **PHOTOMOD initial setup** windows opens that allows to define settings folder and create profile.

Profile separate place for project files. It is a resources tree with the following structure:

- *Root* – profile virtual name.
- *Top level branches* – profile virtual folders – virtual names of physical local or network folders/disks.

  One physical folder/disk or folders/disks group could be specified as a virtual folder (storages group).

- *Resources* – the whole content of selected folder of a profile – all subfolders and files. Only images source files from active profile resources could be matched with images of current project.

In the Lite-version of the system it is possible to create *only local* profiles and to process project only by *one operator* in one time. In the full version could be created any local or network profiles and organized network processing of project with a lot of operators. In both versions project data could be stored on any computers of the net (including servers).

To launch the *Control Panel module* perform one of the following actions:

- choose **Start › Programs › PHOTOMOD 7 AutoUAS x64 › Control Panel**;
- Choose **Control Panel** in the right-click menu of the *System Monitor module* (the  icon in the *Windows* system tray);
- click the  button in the **Project management** window in the system (see the Project creation User Manual).

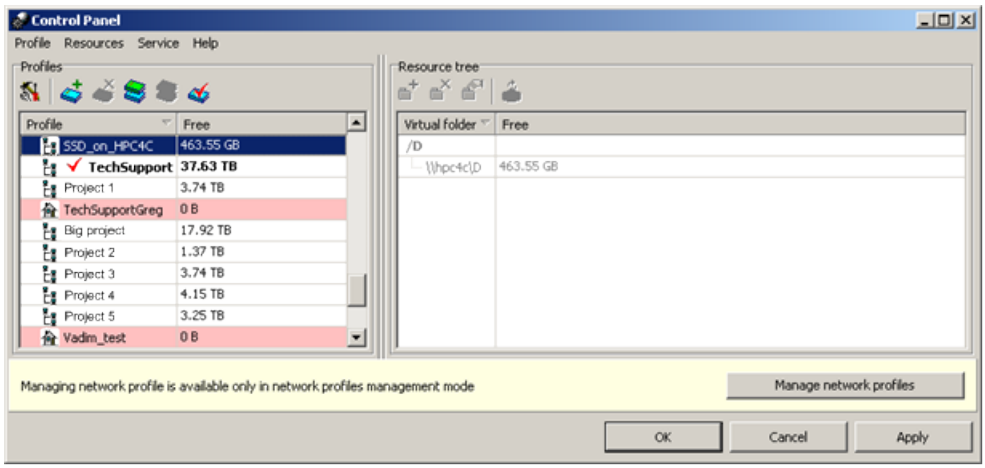


Fig. C.3. Control Panel window

Loading progress with a log-file are displayed while module is launching.

If module launches too slowly, remove all incorrect profiles, because delay is due to attempts to access a non-existent folders.

Loading progress window is displayed while processing any time-consuming operation. Progress of loading, spent and estimates time and log are displayed in the window.

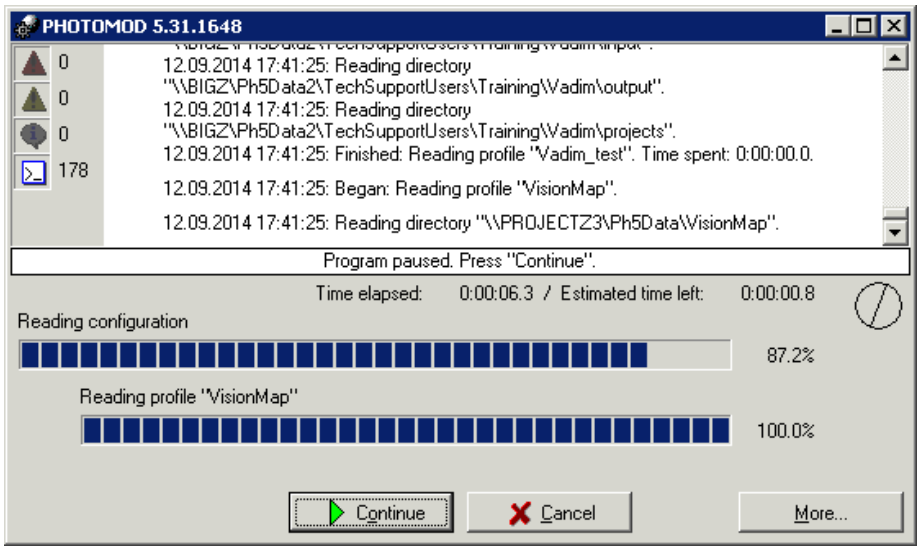


Fig. C.4. Control panel module loading

In the *Control Panel module* window the resources system, allowed to work in the system, is displayed. Each profile has resource structure – list of virtual folder compared to real folders on hard disks of different computers in the network used to store system's data.

Only one chosen *'active'* profile could be used at the same time.

Unavailable profiles and profiles with unavailable resources or virtual folders are marked by red color in the table. To remove these profiles from the table choose **Profile › Delete uncorrect profiles**.

Table of profiles with size of common free space of each profile is displayed in the **Profiles** section. Common free space of profile is a sum of free places on all hard disks with connected folders. Profiles could be local or network and marked by different icons in the table. For detailed information see the Creating and connecting profiles chapter.

Table of virtual folders is displayed in the **Resource**. It contains list of real folders or groups of folders (storages), corresponding to virtual folders and information about free space on all involved hard disks.

Points sorting in columns of the list is performed by mouse click on the column header.

The system provides possibility of additional placement of project folder in subfolder (e.g. *Projects/InfoMap/InfoMap_copy*). For example, to place project folder in the *InfoMap_copy* folder, create a new folder in the *InfoMap_copy* with ***project.tag*** name. It is possible to place projects in the *projects.tag* folder.

Table C.1. Brief description of Control Panel window toolbar and menu items

Buttons and menu items	Function
Service › Initial setup	allows to specify initial settings of access and management of network profiles, which configurations are stored in the centralized management folder
Profile › Create	is used to create the new local profile
Profile › Delete	allows to remove from the table local profile and its resources structure; at fact files and folders *do not delete* and could be used again in new or existed profiles
Profile › Delete uncorrect profiles	allows to remove from the table all profiles (local or network) that are linked to unavailable of nonexistent profiles
Profile › Copy	allows to copy selected profile with its its resources structure and save it with a new name
Profile › Rename	allows to to rename selected profile
Profile › Activate	allows to make selected profile active and use it in the next system's launch
Resources › Connect folder	allows to create virtual folder and connect it to a selected profile
Resources › Disconnect folder	allows to disconnect folder selected in the list from profile; real folder does not changes
Resources › Modify folder	allows to rename virtual folder or change path to its real folder on a hard drive
	allows to refresh storage ID in case of incorrect profile working

C.2.2. Creating active profile

Profile, available to use only on one PC, is called *local* profile. This profile is not displayed in the list of profiles on other PCs in the network. Local profile is marked with leftward to profile name.

Perform the following actions to create a local profile:

1. Choose the **Profile › Create** or click the button. The **New profile** window opens.

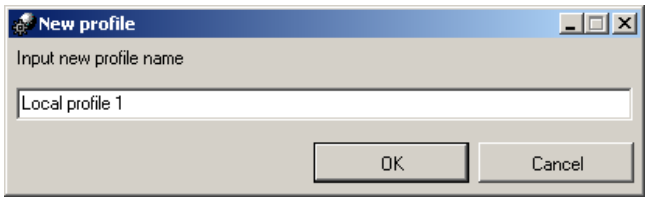


Fig. C.5. Creating profile

2. Input a name of new local profile.
3. Click OK. The **Connect virtual folder** window opens.

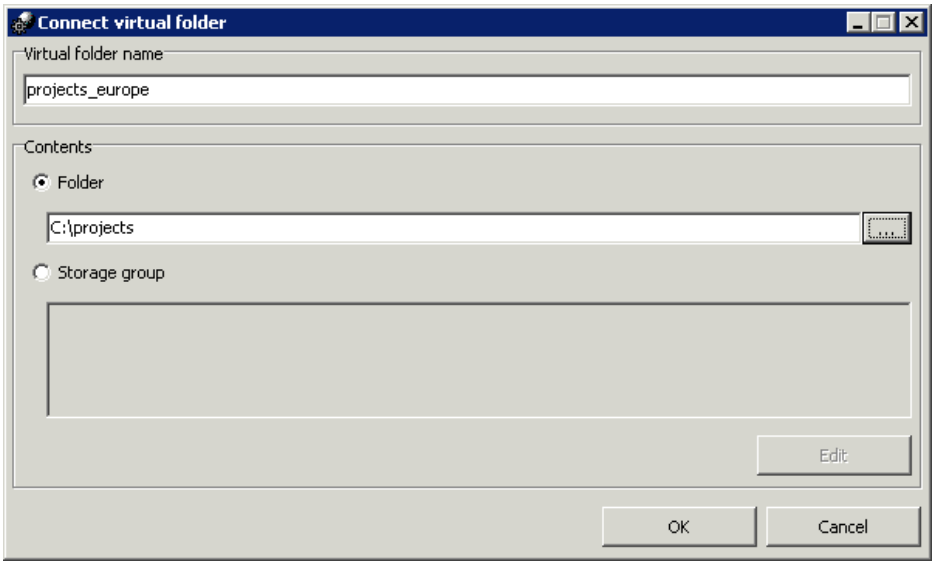


Fig. C.6. Connecting new folder

4. Define name and path to virtual folder.
5. Click OK. Local profile creates and also defined virtual folder connects to this profile.

Local profile is marked with leftward to profile name.

6. Make profile active by double-clicking on its name. Leftward to profile name is shown the red mark. It marks an active profile.

Restart all opened modules of the system to apply changes.

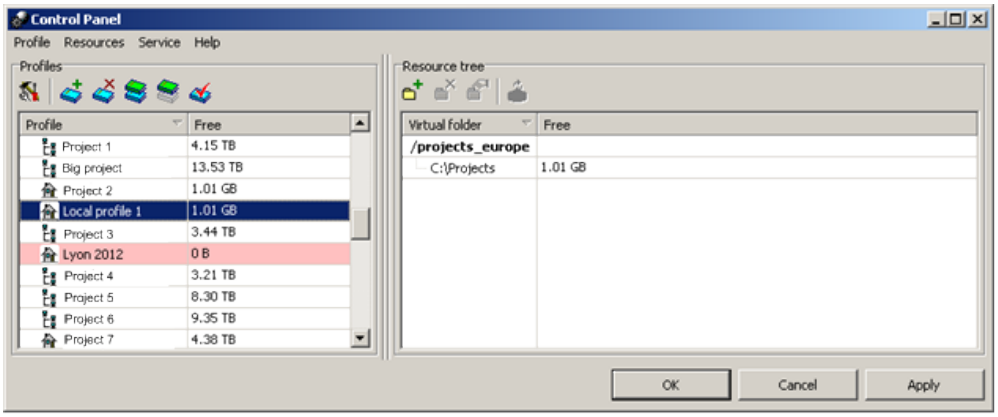


Fig. C.7. Control Panel window

7. Click OK.

8. Run the system. All space in active network profile resources is available in the system on a current workstation. The **Project management** window opens allows to choose active or create, copy, remove, import and backup profiles (see the Project creation User Manual)

C.2.3. Connect virtual folder

To connect virtual folder to selected profile perform the following:

1. In the Control panel window choose the **Resources › Connect folder** or click the button. The **Connect virtual folder** window opens.

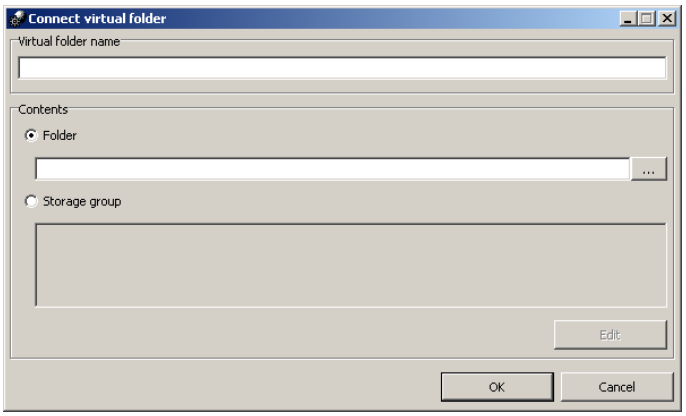


Fig. C.8. Connect virtual folder

2. Input a **virtual folder name** – arbitrary text used to identify data in folder.

3. In the **Contents** section choose a physical space for connecting as a virtual folder:

   - choose **Folder** to use only one *network or local* physical folder click the ... button and choose a folder;

     To connect folder only read access for this folder is required.

     Local profile folder could be placed both on a workstation, where the system runs, and on any workstation of the network.

   - choose **Storage group** to use several local or network folders as virtual.

     To use storage group perform the following:

     1. Click the **Edit** button. The **Edit list of storage** window opens.

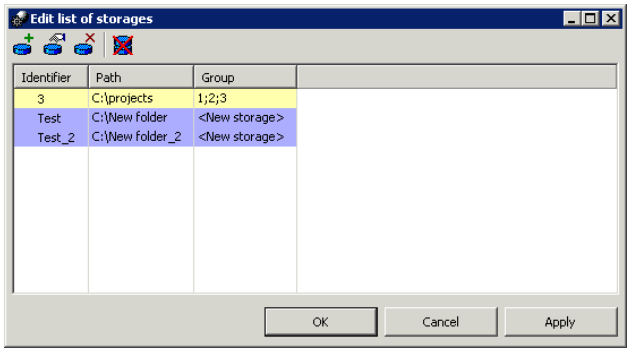


Fig. C.9. Connect new storage in the 'Edit list of storage' window

The window contains the toolbar with buttons used to perform the following operations:

- – allows to create new storage of connect existed one.

  Specify the *Identifier* of storage when creating a new one. Only Latin symbols and numbers are available in the ID. The *$PhStorage.x-ini*, file creates in chosen folder. It contains information about storage, its ID and list of all ID in the storage group. ID is obtained automatically in case of connecting already existed storage.

- – allows to change ID for storage selected in the table;

- – allows to disconnect selected storage;

  In case of second connection of storage, ID is obtained automatically.

○ – allows to disconnect all storages in a group.

In case of second connection of storage, ID are obtained automatically.

Do not edit storage ID or list of storages in a group to avoid errors in system work.

2. Create new storage or connect existed one and click the **Apply** button. In the **Group** field for each storage is displayed a list of ID of all storages in a group.

3. Click OK. List of storage displays in the **Connect virtual folder** window in the **Storage group** section.

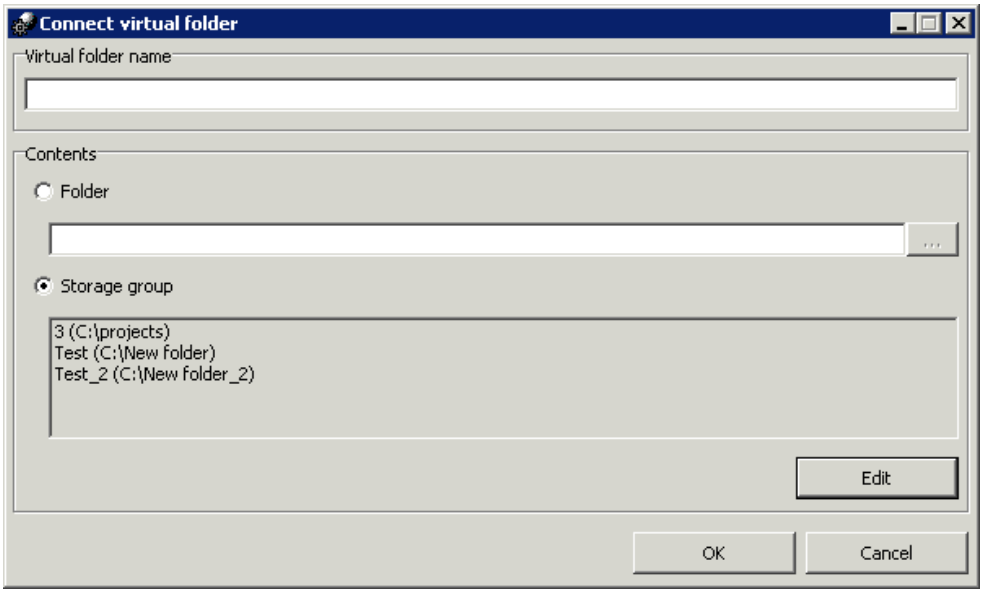


Fig. C.10. List of storage group

4. Click OK. A virtual folder for a storage group displays in the table of **Resource tree** section of the *Control Panel module* window.

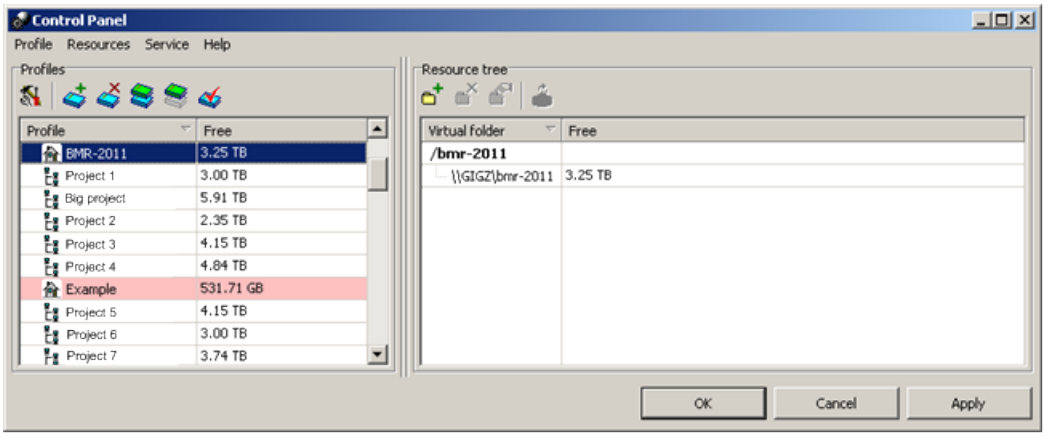


Fig. C.11. Resource structure with using a storage group

4. Click OK. Folder or storage group connects to the active profile.

To disconnect virtual folder form a local profile, choose **Resources › Disconnect folder** or click the button. At that, physical folder *is not deleted*, only the *virtual folder name* is remove (cleared the path to this folder).

To disconnect virtual folder form a network profile, choose **Resources › Disconnect folder** or click the button in the Network profiles **management**.

When disconnecting the *network* profile it is converted to *local*. *This local* profile is available on all workstation of the network.

C.2.4. Creating network profile

Network profile is available on all workstations in the system to process project at the same time. Network profile is marked with leftward to profile name. When selecting a network profile, its configuration is copied automatically to a local PC to provide independent work if storage is unavailable.

The **PHOTOMOD initial setup** window is used to create/edit network profiles and network profiles accessing. Network profiles are used to process one project with several operators, at the same time as well.

Centralized management folder and network profiles create and adjust only on one of the workstations with installed system.

Perform the following actions to create a local profile:

1. Choose **Control Panel** in the right-click menu of the *System Monitor module* (the icon in the *Windows* system tray). The **Control Panel** window opens.

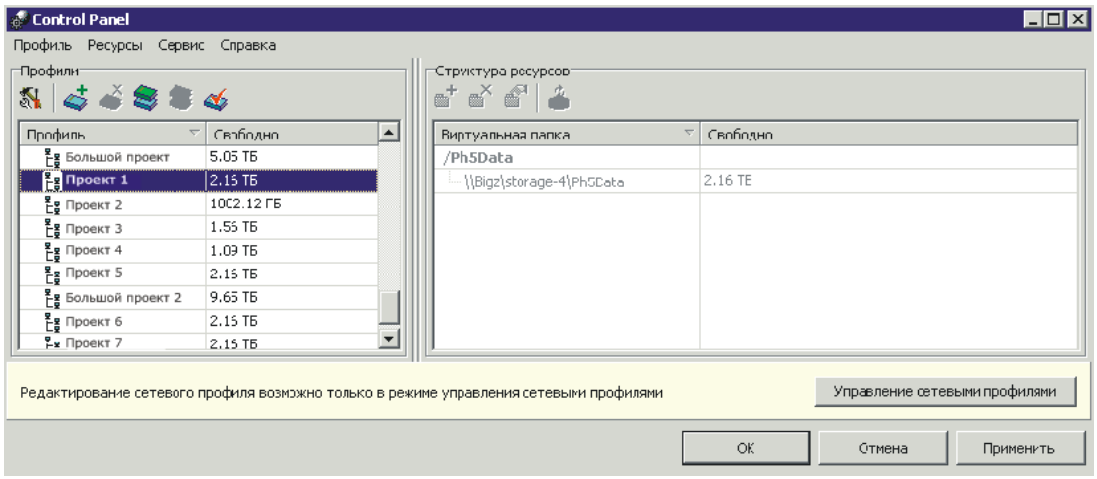


Fig. C.12. Control Panel window

2. Click the button. The **PHOTOMOD initial setup** window opens.

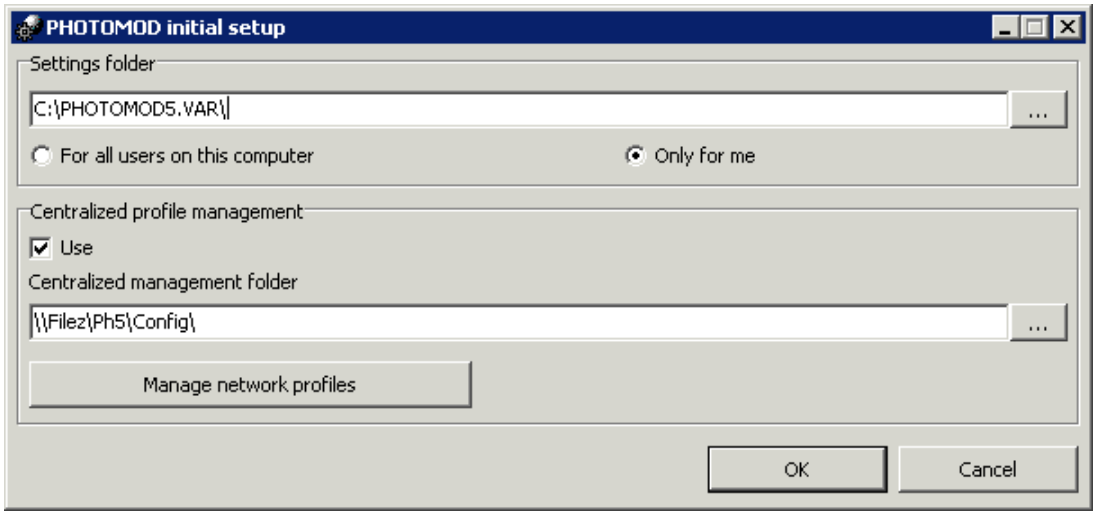


Fig. C.13. PHOTOMOD initial setup window

In the **Settings folder** section is displayed path to the *PHOTOMOD7.VAR* folder, that is used to store configuration and temp files. Click the ... button to change path to configuration folder.

Choose **For all users on this computer** to use one configuration folder for all users of current workstation, otherwise choose **Only for me**.

3. In the **Centralized management folder** section set the **Use** checkbox on and define a folder.

4. Click the **Manage network profiles** button. The **Control Panel – network profiles management** window opens.

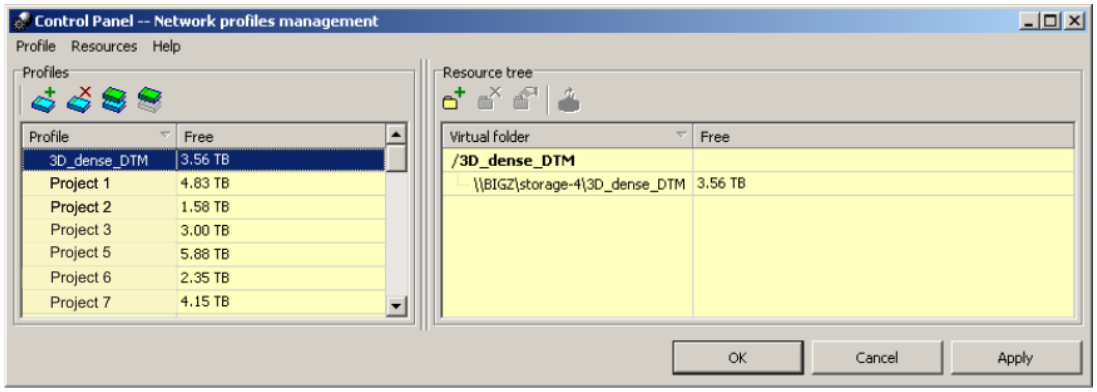


Fig. C.14. Network profiles management

5. Click the button. The **New profile** window opens. Input a network profile name for project or independent group of projects. Click OK.

6. In the **Resource tree** section create a resource structure for a new network profile.

   Network profiles could be edited/created in the **Control Panel – network profiles management** window the same way as local profiles in the **Control Panel** window. Structure type of local and network profiles are the same.

   Network profile could be edited *only in the network profiles management mode*.

7. Click OK. Network profile saves in the centralized management folder. Created profile could be used on a current workplace straight away.

Network profile should be connected to other workplaces to use this profile. Perform the following actions to do this:

1. On a workstation choose **Control Panel** in the right-click menu of the *System Monitor module* (the icon in the *Windows* system tray). The **Control Panel** window opens.

2. Click the button. The **PHOTOMOD initial setup** window opens.

3. In the **Centralized management folder** section set the **Use** checkbox on and choose a path to centralized management folder that was defined on a network resource structure creation step.

   During connecting of centralized management folder all network profiles configuration are copied to a local workstation into the *PHOTOMOD7.VAR* folder.

4. Click OK. Network profiles are displayed in the **Profiles** table of the **Control panel** window.

5. Make profile active by double-clicking on its name. Leftward to profile name is shown the  red mark. It marks an active profile. Click OK.

6. Run the system. All space in active network profile resources is available in the system on a current workstation.

7. Repeat the 1–6 steps on other workstations to add access to network profile resources.

At creation of network profile in a centralized management folder following files creates:

- *profiles.x-ini* file with list of all network profile;

- subfolders with names equal to profile names; they contains files of configuration *profiles.x-ini* profile resources. Each *profiles.x-ini* file (relative to concrete profile) contains description of profile resources structure tree: list of virtual folders and its absolute path to physical folders or storages.

C.3. Processing setup

C.3.1. Local processing

The system implements not only local, but network processing of one o several projects at the same time.

When working on a single workstation, and if at the same time with each project is only one operator, it is recommended to create a separate local profile with all the resources for each workstation. It allows to take advantage of the access speed to hard disk compared with access through the network (if the virtual profile folders are located on the server or on another workstation).

C.3.2. Network processing

One of the main features of the system is way to store data and possibility of distributed network processing. Network processing is a joint project processing by several operators at several workstations. For network processing resources could be placed both on workplaces and servers.

Distribution of resources on workstation

Profile resources could be placed on several workstation in a local network. Read and write public access is required for all folders with data.

 Any number of profiles could be created in the network.

The following recommendations for the allocation of resources on the network workstations:

- use to store data computers that are not used as a workplace to decrease risks of failed access;
- place resource on different hard disks to most effective use of free space;
- to install hard lock key on a separate computer, which does not has resource-intensive tasks, which can lead to failures in protection and failures of system processing on workstations.

For simultaneous editing of the same files there is always a rule, except for explicit messages and warnings, the rule of *'the last saved data is stored'*.

There is no limitation for browsing, it's allowed to simultaneously open the same project files in any number on multiple computers. In the local OS Windows (XP, Vista, 7) there is a limit in 8 connections.

The best way to organize network-based workflow using network computers to store resources is as described below:

1. Create a centralized management folder on any workstation. Configure read-write network access to that computer.
2. Create network profile in this folder (or multiple network profiles) and setup resources configuration of each profile. Connect the virtual folders.
3. Configure the usage of centralized management folder on the all workstations. All network profiles, for which configurations are stored in central control folder, will be available on workstations (which are displayed in **Control Panel's** profiles list).
4. Choose a network profile and make in active.
5. Restart all opened modules of the system to apply changes.

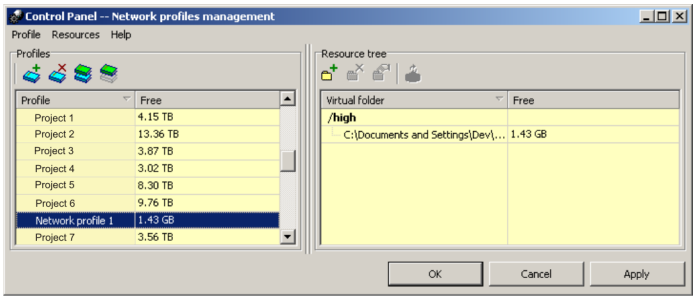


Fig. C.15. Example of network profile

Distribution of resources on servers

This option is most appropriate for working with network projects. It is recommended to have dedicated file-servers, which are not used as workstations.

As a file server it is recommended to use *FreeBSD* operating system or *Microsoft Windows Server* and*Linux* OS.

It is recommended to store profile resources in several virtual folders on different servers.

It is recommended to store not more than one virtual folder on one hard disk drive. It provides more uniform load distribution on aggregate bandwidth of disk system of servers and network.

Perform the following actions to create a network profile:

1. In the **Initial setup** window define a centralized management folder.
2. Choose a network profile and make in active.
3. Restart all opened modules of the system to apply changes.

Network access to data is used operation system's tools (network access to folders and files).

There are the following recommendations of network processing management using file servers:

For project or group of projects not more than 1 Tb perform the following:

1. Create a network profile with centralized folder on a server.
2. Allocate hard disk or folder on a server (depending on size of a project) to store data and define virtual folders.
3. Connect created network profile to all workstations involved in the project processing.
4. Restart all opened modules of the system to apply changes.

This data organization is convenient in terms of easy backups (all resources is placed in the same place), and there is no loss in speed while simultaneous processing of small volumes.

If the project (or group of projects) assumes large volumes, it is best to use to place resources multiple file servers; use several different server drives.

It is recommended to allocate resources so that it would be convenient to backup it.

Two strategies of resources allocation on the servers are recommended:

1. Connect different server drives (folders) as virtual folder to store images, and separate server drives to store projects. Administrator involvement is desirable for organization of such structure and to monitor availability of free space on server drives.

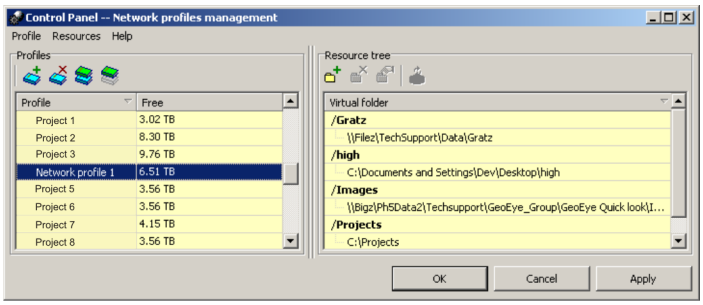


Fig. C.16. Example of creating network profile using different server drives to store images and separate network profile for project files

2. Select different server drives (folders) as storages to place images and connect that group of storages to profile, using virtual folder Select separate server drive (s) as virtual folder to store projects. All storages connected using virtual folder will be filled with data automatically

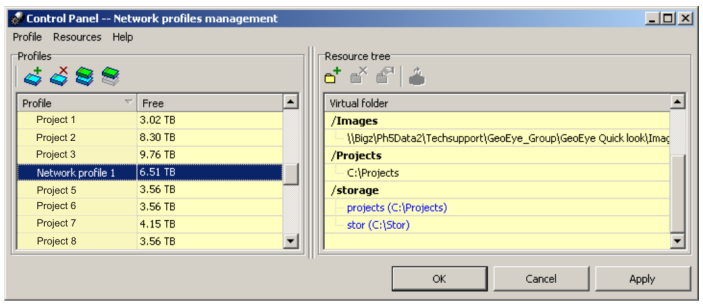


Fig. C.17. Example of creating network profile using group of storages for images and separate server for project files

Network data access is only implemented using operating system (network access to files and folders). It is strongly recommended to meet following requirements when network processing is performed:

- network access must be permitted to profile resources with full permissions for all users, who work with them;
- all profile resources connected to workstation should be available while working with the system on this workstation;
- all changes in structure of profile resources, which performed using *Control Panel module*are available for running modules only after restart of these modules;
- if local network contains a server, where profiles are created, it is necessary to control number of users accessing it simultaneously. There are limitations to simultaneous access in non server operating systems *(Windows 2000/XP)*.In this case recommended number of operators working with server storage is not more than 8.

- install hard lock key on a separate computer, which does not has resource-intensive tasks, which can lead to failures in protection and failures of system processing on workstations.

C.4. Resources management

PHOTOMOD Explorer module is a service module to work with system resources.

The **PHOTOMOD Explorer** window displays active profile resources.

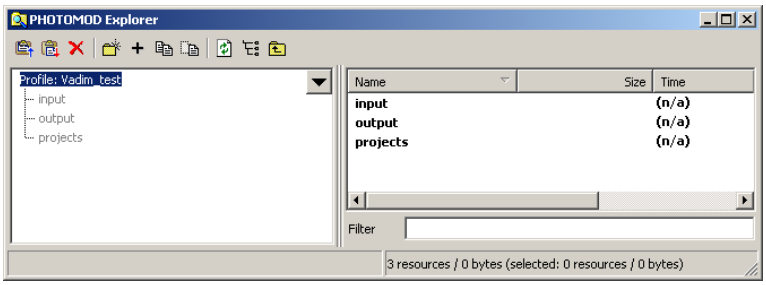


Fig. C.18. The “PHOTOMOD Explorer” window

List of projects is presented in hierarchical form and displays in the left part of window. Upper level is a virtual folders.

The ▼ button allows to show a list with 10 recently selected resources.

In the right part of the window resources of selected project are displayed. Resources are displayed as a table with the following rows:

- **Name** – name of file or project’s subfolder;
- **Size** – [for files only] file size;
- **Time** – time of the last change;
- **Path** – real path to folder or file in a workstation.

Points sorting in columns of the list is performed by mouse click on the column header.

Full path to selected folder is displayed in the left status bar, in the right one – resource statistics: `number of resources/their size (selected resources/size)`.

The **Filter** field is used to quick search files in the system profile resources.

Table C.2. Brief description of the PHOTOMOD Explorer window toolbar

Buttons	Function
	allows to copy selected resources to clipboard
	allows to paste resources from clipboard
	allows to remove selected resources
	allows to create new physical folder in the active profile resources New physical folder couldn't be created on a virtual folder level.
	allows to connect new virtual folders
	allows to copy resource
	allows to rename resource selected in the right part of window
	allows to refresh window
	allows to display all resources in all subfolders of selected folder, or entire profile. The list on the right side of the window shows all subfolders, and all files of selected folder and path to them
	allows to move one level up in resources tree

The tools should be used carefully to edit resource structure in **PHOTOMOD Explorer** window in order to avoid loss of needed resources, belonging to project (delete, rename or move configuration files of projects, etc.).

In PHOTOMOD Explorer window, it's possible to connect new virtual folder only to local profile. Use Control Panel for network profile.

All changes of connecting new virtual folders in the *PHOTOMOD Explorer module*are displayed automatically in the *Control Panel module*window. The *PHOTOMOD Explorer module* does not provide possibilities to edit or disconnect virtual folders, The Control Panel module is used for this.

The *PHOTOMOD Explorer module* is not used to connect storage as virtual folder, it is possible only in the *Control Panel module*.

C.5. System Monitor service module

After the system installation *System Monitor* module is launched and in the system tray of *Windows* the  icon displays.

The **Start › Programs › PHOTOMOD 7 AutoUAS x64 › PHOTOMOD System Monitor** menu item is used to start the module.

It is also possible to start module from a command line. Use *--profile='*profile_name' key when launch the run the module from command line to run profile with active profile, defined in a key. Last active profile is used if module runs without key.

It is not possible to change active profile when module is launched from a command line.

Module right-click menu contains the following menu items:

- **PHOTOMOD AutoUAS** – is used to launch the program (also double-click on the icon);
- **Control Panel** – allows to run module for resources system management;
- **3D-Mod** – allows to run *PHOTOMOD 3D-Mod* software (see the "Three-dimensional modeling" User Manual);
- **Distributed processing control center** – allows to setup options and to control distributed processing;
- **Start automatically** – with start of *System Monitor module* **Distributed processing control center** starts automatically;
- **Profile** – allows to select an active profile in the list of local (h) and network (R) profiles;
- **Language** – allows to change the interface language;

  Language changes at restart modules. To change the *System Monitor* language also restart the module.

- **Mouse configuration** – allows to setup a configuration of mice or other special devices (like hand wheels/foot pedals);
- **Log cleanup settings**;
- **About** – opens a window indicating the number of system build, system version (32-bit or 64-bit) and serial number of hard lock key, the technical support end date, and also opens the **System Information Panel** window with detailed information about software, hardware configuration, and components of the computer (such as details about the device drivers);
- **Licence info** – opens a window with information on system's modules configuration and hard lock key ID;
- **Exit** – allows to close the *System Monitor module* and close the system.

Appendix D. The PHOTOMOD7.VAR configuration folder

At the stage of system first configuration is automatically created the *PHOTOMODAutoUAS7.VAR* folder. This folder is used to store configuration, temporary and other system files.

Only one *PHOTOMODAutoUAS7.VAR* folder creates, even for several installed copies of the system.

It is not recommended to place the configuration folder in the net, because it leads to slowing of system's work.

PHOTOMODAutoUAS7.VAR folder contains the following files and folders:

- *AutoSave* folder – is used to store autosaved data:
- *Config* folder – is used to store files of general parameters of all profiles;

It is possible to return to default parameters in case of changing configuration file. To do this, remove a configuration file in the *PHOTOMODAutoUAS7.VAR* folder and restart the system. Default configuration file are copied from the *PHOTOMODAutoUAS7.VAR\Config* system files folder.

Both global settings and settings for the local profile is loaded at startup of the system and saved when you exit. Local project settings is loaded when loading a project and saved when project closing. In case of working without projects, settings are stored in the *PHOTOMODAutoUAS7.Var\Profiles\[profile_name]\VoidProjOptions.x-ini* file.

- *Logs* folder – is used to store log-files for all profiles;
- *Profiles* folder – is used to store all parameters for each profile separately. The list of local and network profiles is also stored in the folder. It is the same list as in the **Control Panel** module. Configuration file with resource structure and path to local/network folder is also stored in folder of each profile;

New subfolder creates for each profile.

- *Tmp* folder – is used to store temporary files;
- *UserData* folder – is used to store data out of resources system;
- *policy.x-ini* file – contains general information about configuration parameters (active profile name, name and path to centralized management folder and so on).

Appendix E. Network pre-configuration for connecting nodes to the server

This operation is required when using distributed task processing using several computers connected via a local network. It is not required when *PHOTOMOD AutoUAS* is used on a single workstation.

Network pre-configuration for connecting nodes to the server is described for the *Windows 7* operation system. For more information, contact the Racurs Company Technical Support service.

E.1. Requirements to connection with permission for remote start of applications

In order to connect *nodes* to the *server* in case of required remote start of applications on the *nodes*, make the following pre-configurations:

- Allow remote access to WMI on each client participating in distributed processing;
- Set permissions to access COM applications on each client participating in distributed processing;
- Set permissions for folder archiving and recovery on each client participating in distributed processing;
- It is recommended to disable *Firewall* on all clients.

Firewall is a software to protect computers from network attacks.

- Assign a unique network name to each client (including a local one) (the computer's network name is displayed in **Control panel › System › Computer name**);
- Configure shared access to the *PHOTOMOD7.Var* configuration folder;

It is strongly recommended to place the *PHOTOMOD7.Var* into the network share.

E.2. Allow remote access to WMI

To allow remote access to WMI, perform the following:

WMI (*Windows Management Instrumentation*) is the technology for centralized control of Windows-based infrastructure. WMI is installed on all computers with Microsoft operation systems (Windows 2000, Windows XP, Windows 2003, Windows Vista, and Windows 8.1).

1. In the **Start** menu, right click the **Computer** icon and select **Manage**. The **Computer management** window opens.

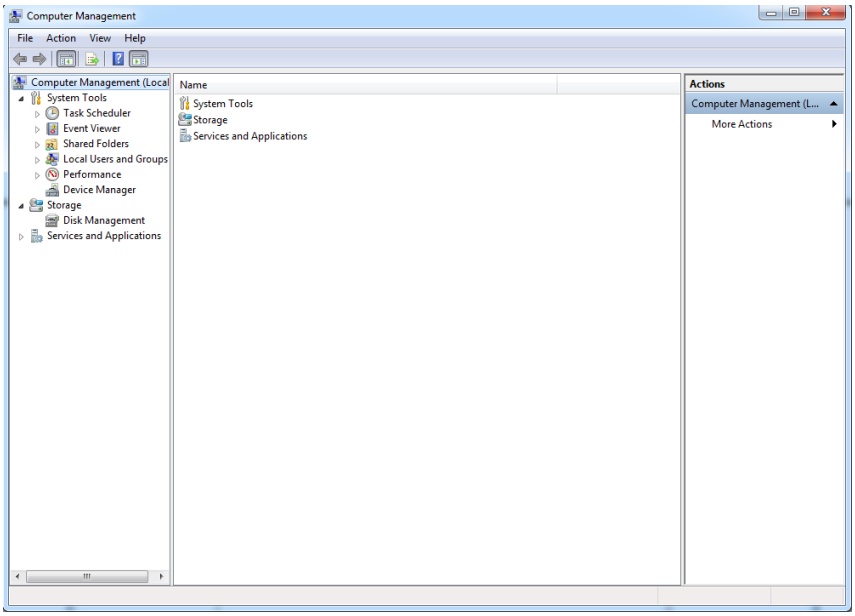


Fig. E.1. The “Computer management” window

2. In the folder tree in the left part of the window, select **Services and Applications › WMI Control**.

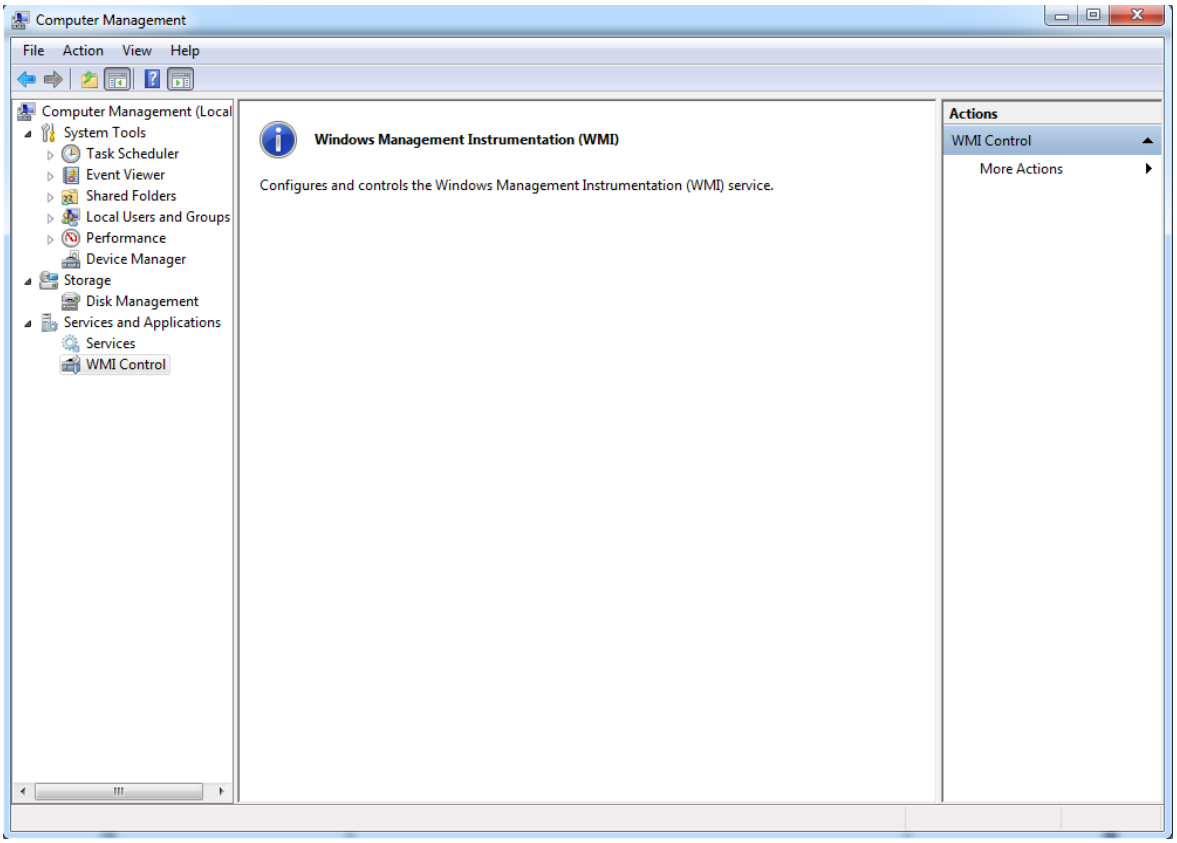


Fig. E.2. The “WMI Control” menu item

3. Right clicking the **WMI Control** open the context menu and choose **Properties**. The **WMI Control Properties** window opens.

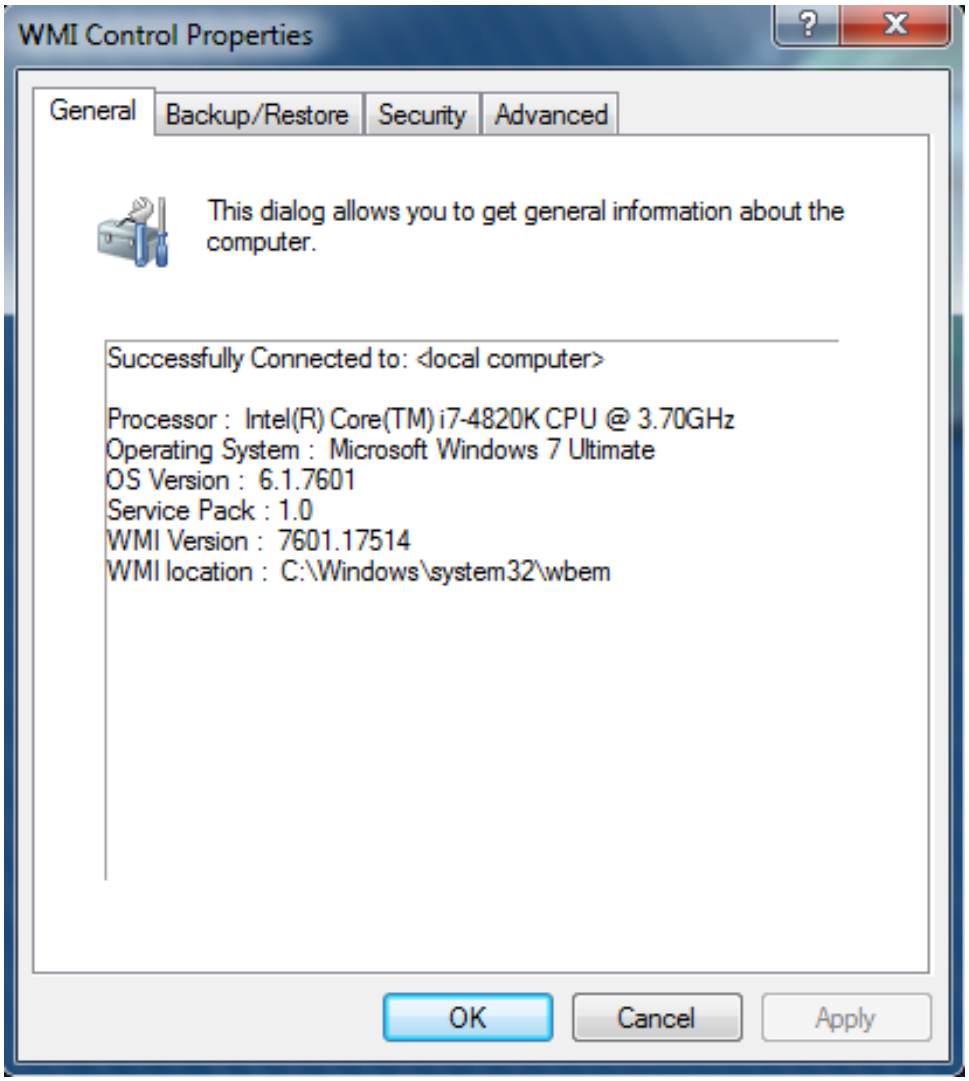


Fig. E.3. General computer information

4. Proceed to the **Security** tab.

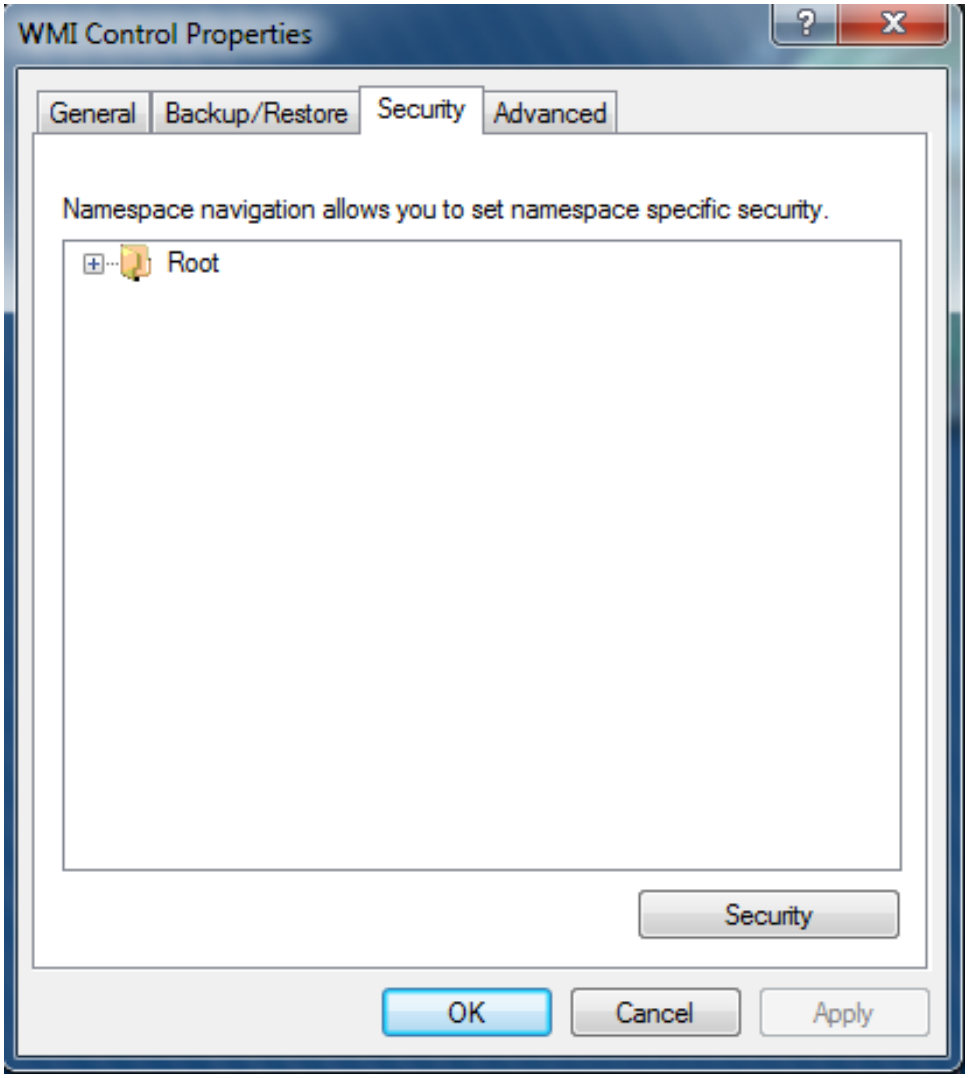


Fig. E.4. The “Security” tab of the “WMI Control Properties” window

5. Click the **+** button against the *Root* folder, then click the *CIMV2* folder.

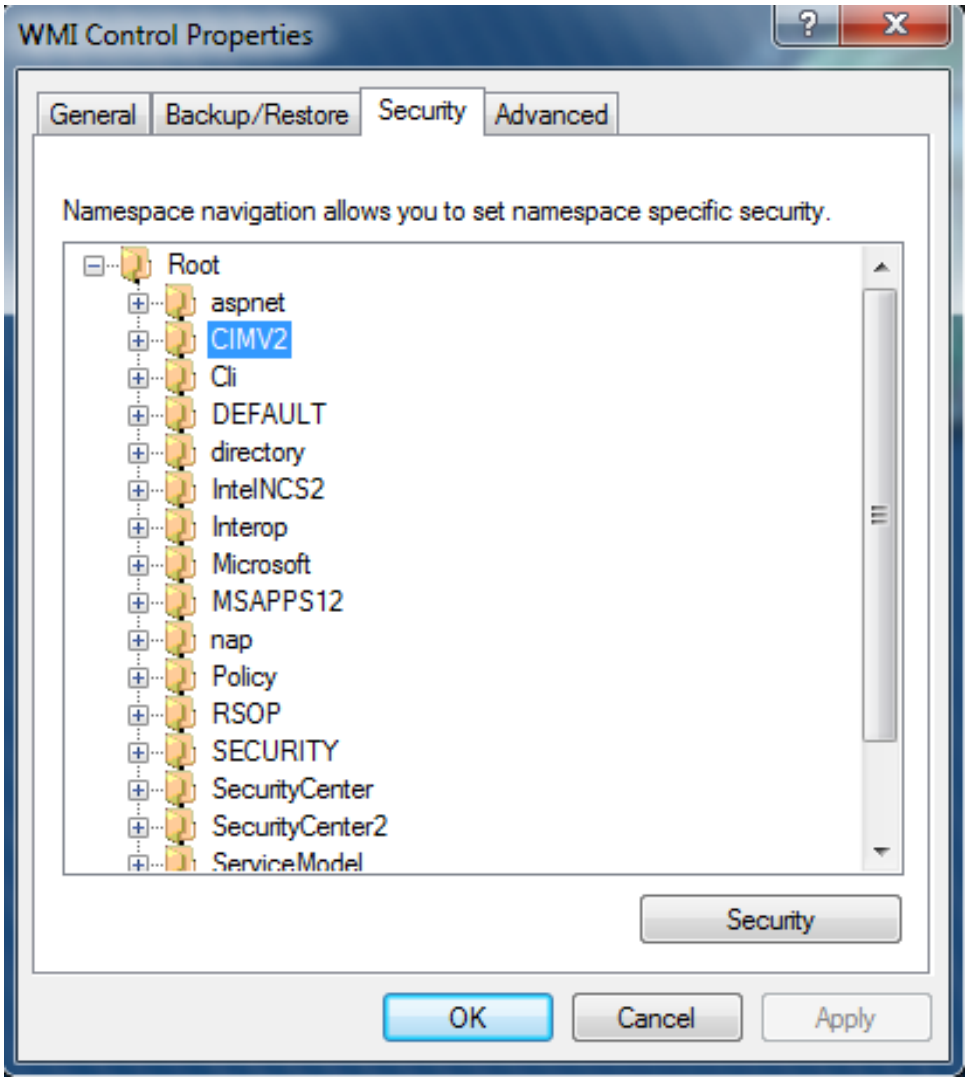


Fig. E.5. Chosen CIMV2 folder

6. Click the **Security** button. The **Security for ROOT\CIMV2** window opens.

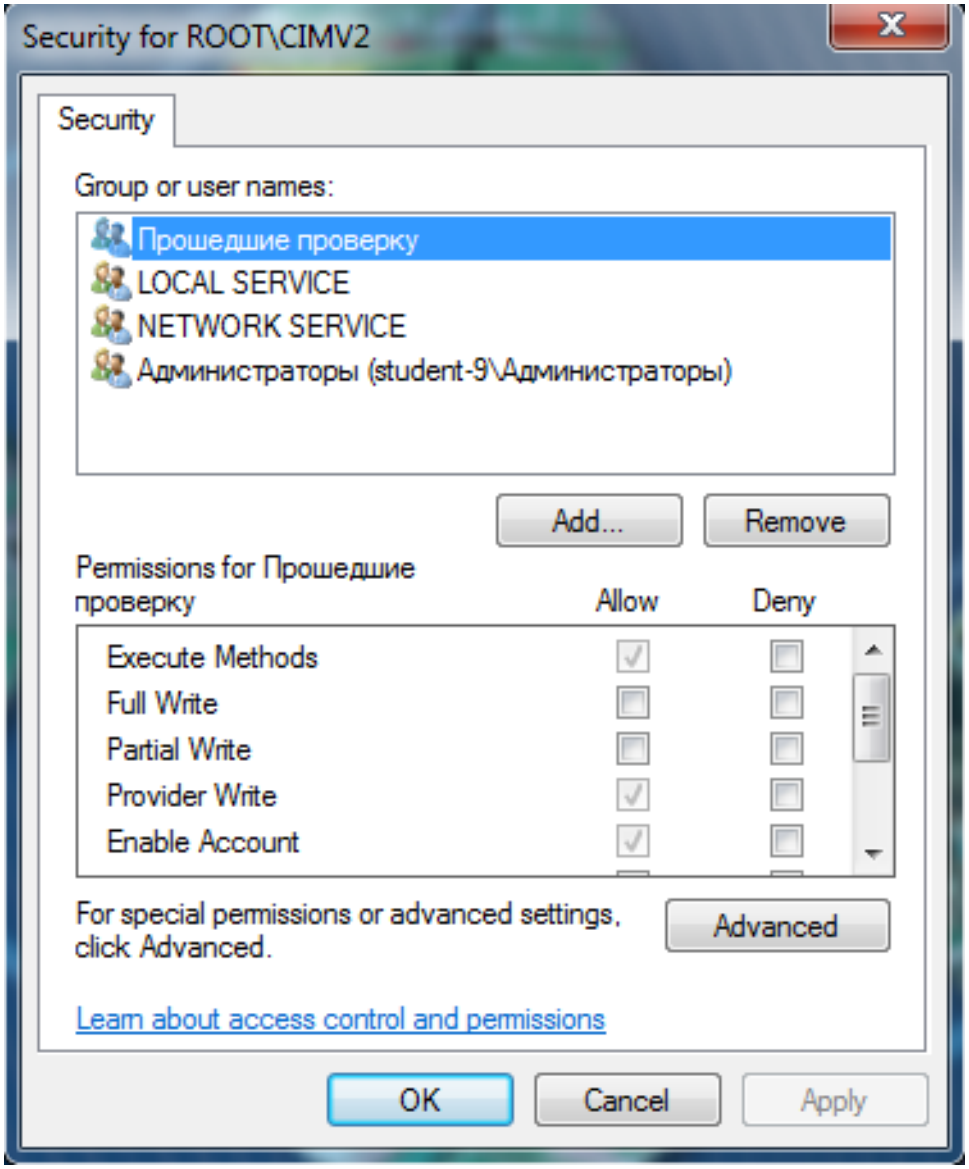


Fig. E.6. The “Security for ROOT\CIMV2” window

7. In the **Group or user names** section, click the **Add** button. The **Select Users, Computers, Service accounts, or Groups** window opens.

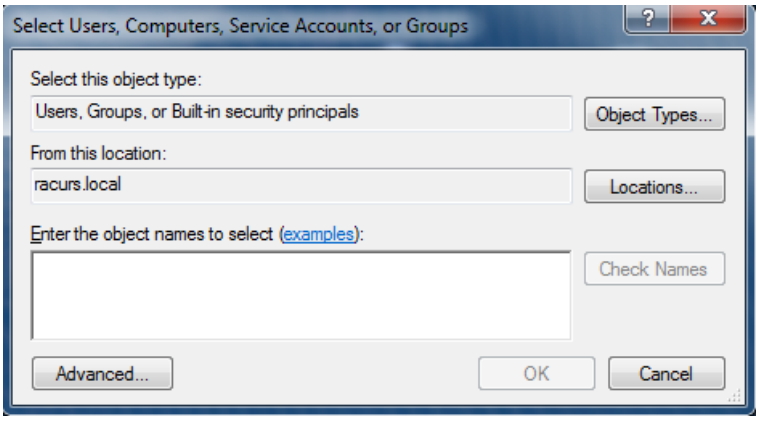


Fig. E.7. The user selection window

8. In the **Enter the object names to select** input field, enter the username on whose behalf the clients will start (this user is to be entered in **PHOTOMOD Remote Starter Tool**, in the **Edit keyring** window, the **Keyring** column).

   Entering usernames, use one of the following templates:

   - `EnteredName (example: First name Surname);`
   - `ObjectName (example: Computer1);`
   - `UserName (example: User1);`
   - `ObjectName@DomainName (example: User1@Domain1);`
   - `ObjectName\DomainName (example: Domain1\User1).`

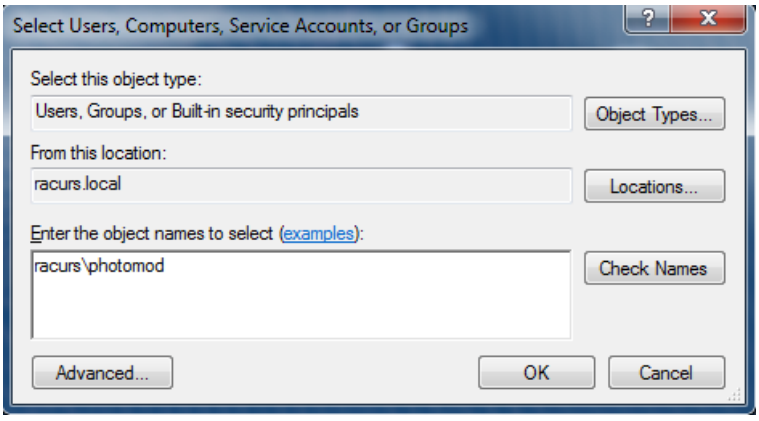


Fig. E.8. Entering a new user name

9. Click OK. The new user is to be displayed in the **Group or user names** section.

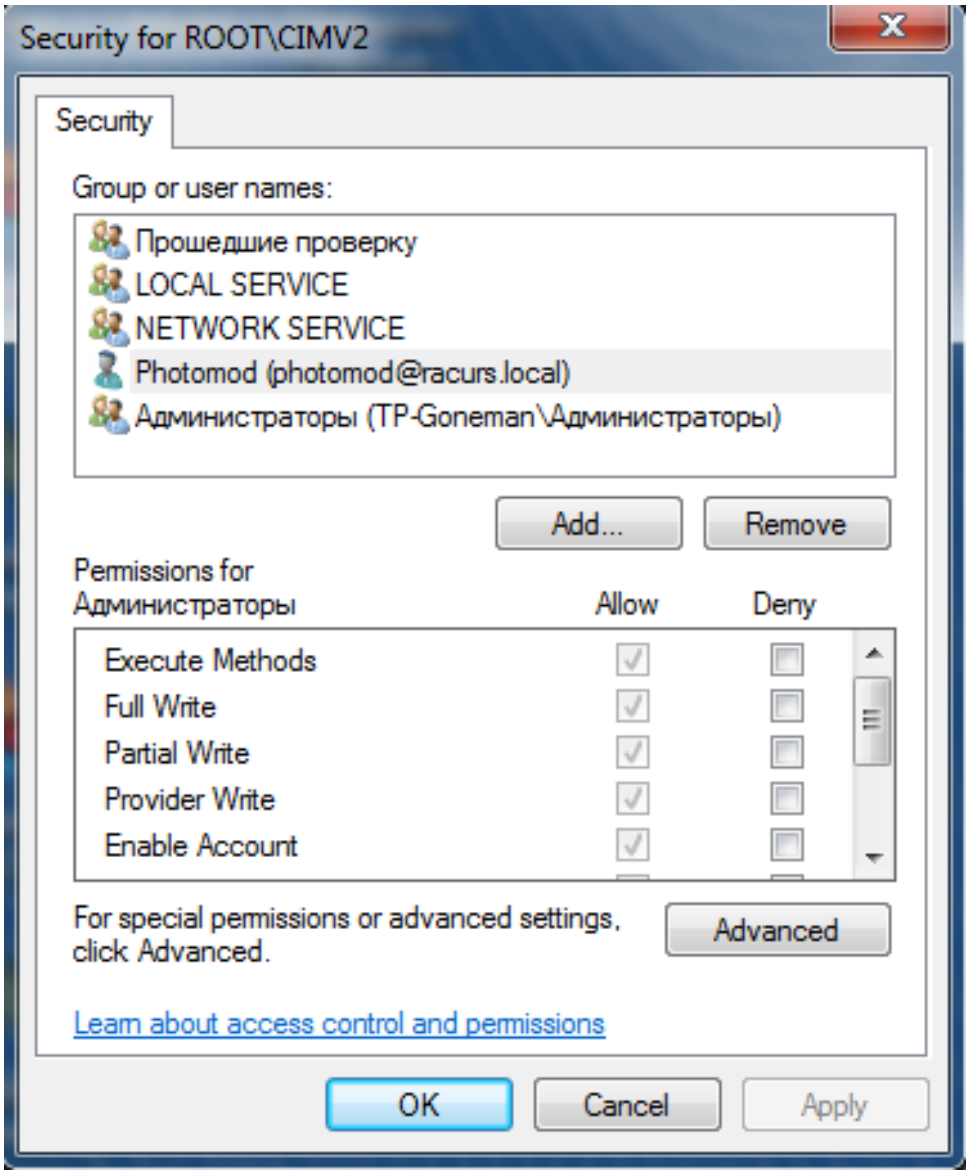


Fig. E.9. A new users is displayed in the “Groups and users” section

10. Select the new user in the **Group or user names** section. In the **Permission for <new user>** section against all the options from the list, set **Allow** checkboxes.

It is strongly encouraged to set the **Allow** checkbox for the **Remote Enable** option. Otherwise remote access to WMI is impossible.

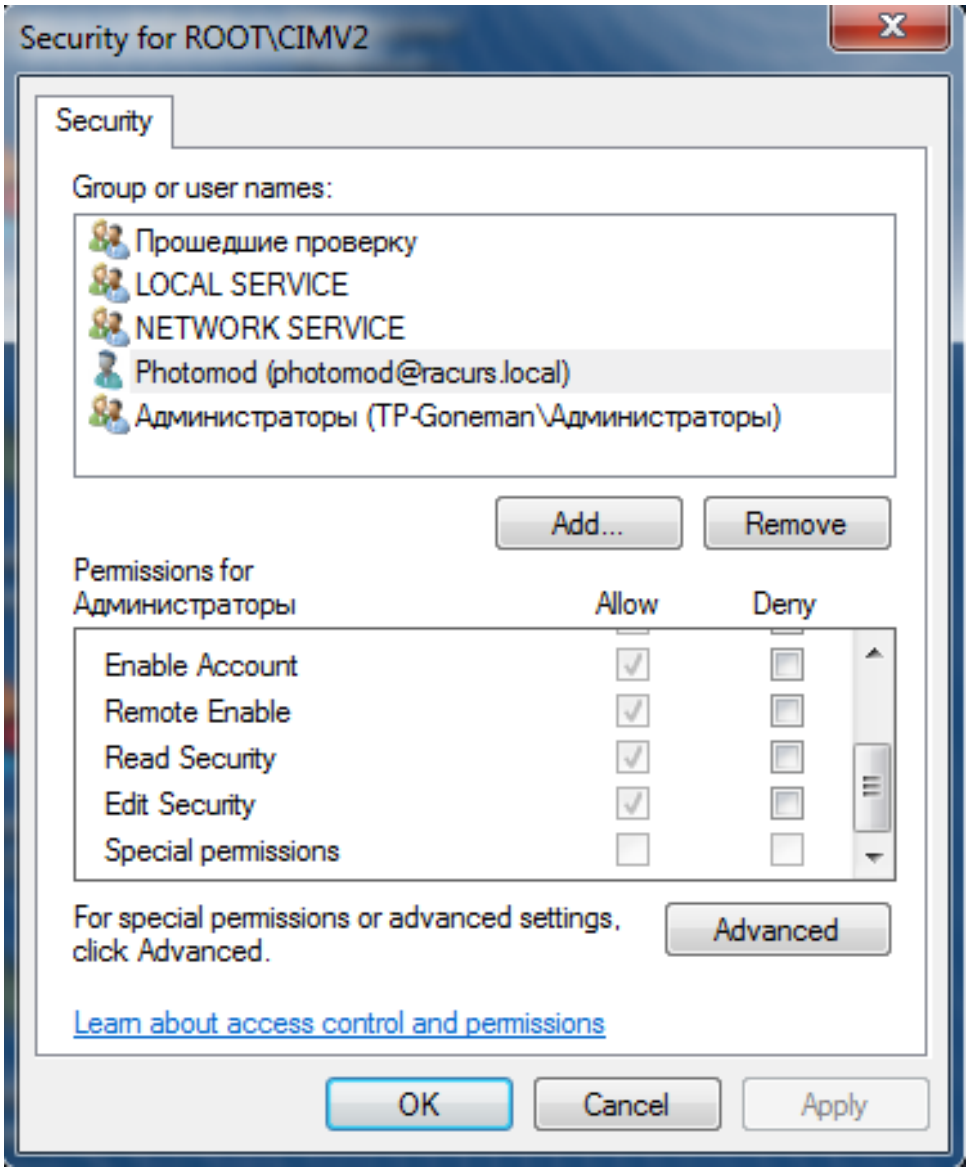


Fig. E.10. Allowances for a new user

11. Click the **Advanced** button. The **Additional security parameters for CIMV2** window opens.

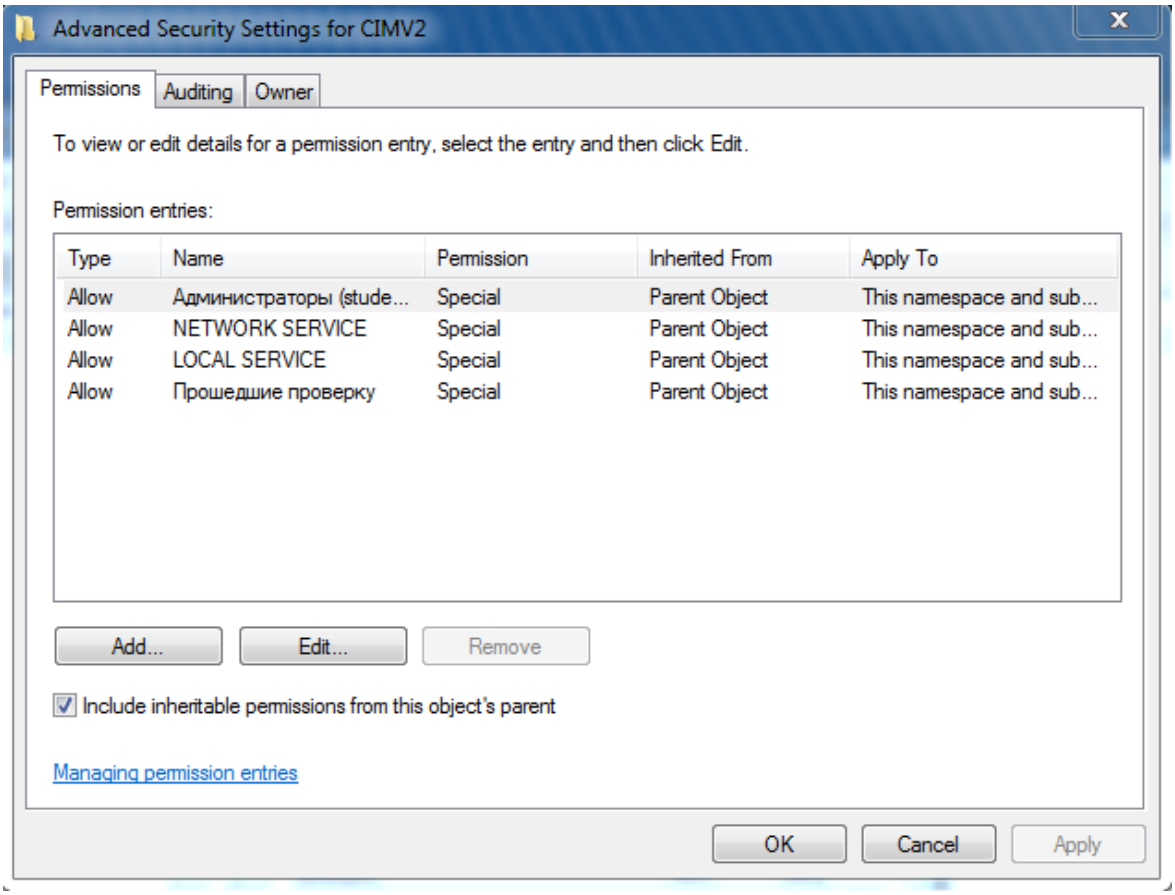


Fig. E.11. Setup of additional security parameters for CIMV2

12. Double click the line with the new user. The **Permission Entry for CIMV2** window opens.

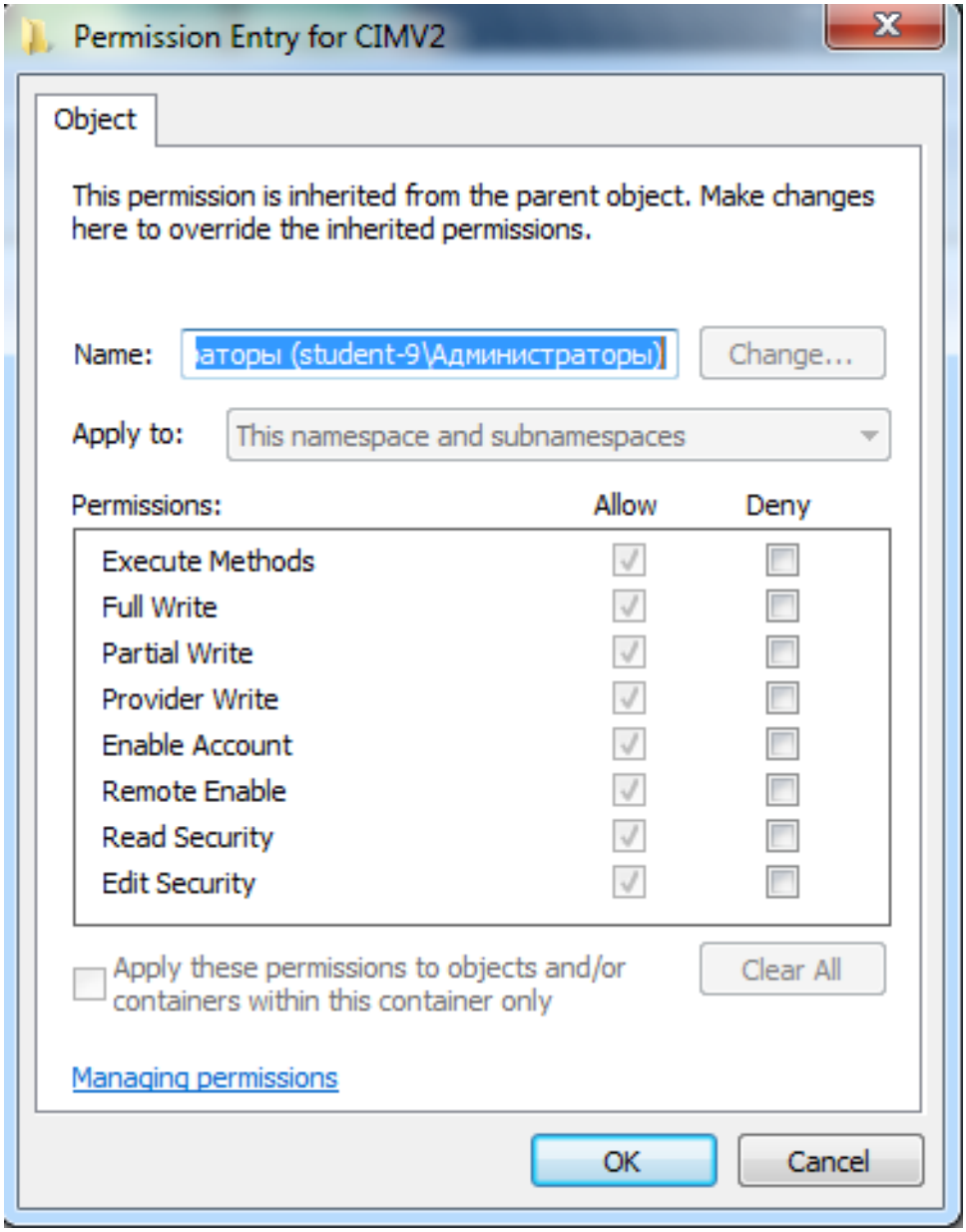


Fig. E.12. Allowance for CIMV2

13. In the **Apply to** drop-down list, select **This namespace and subnamespaces**.

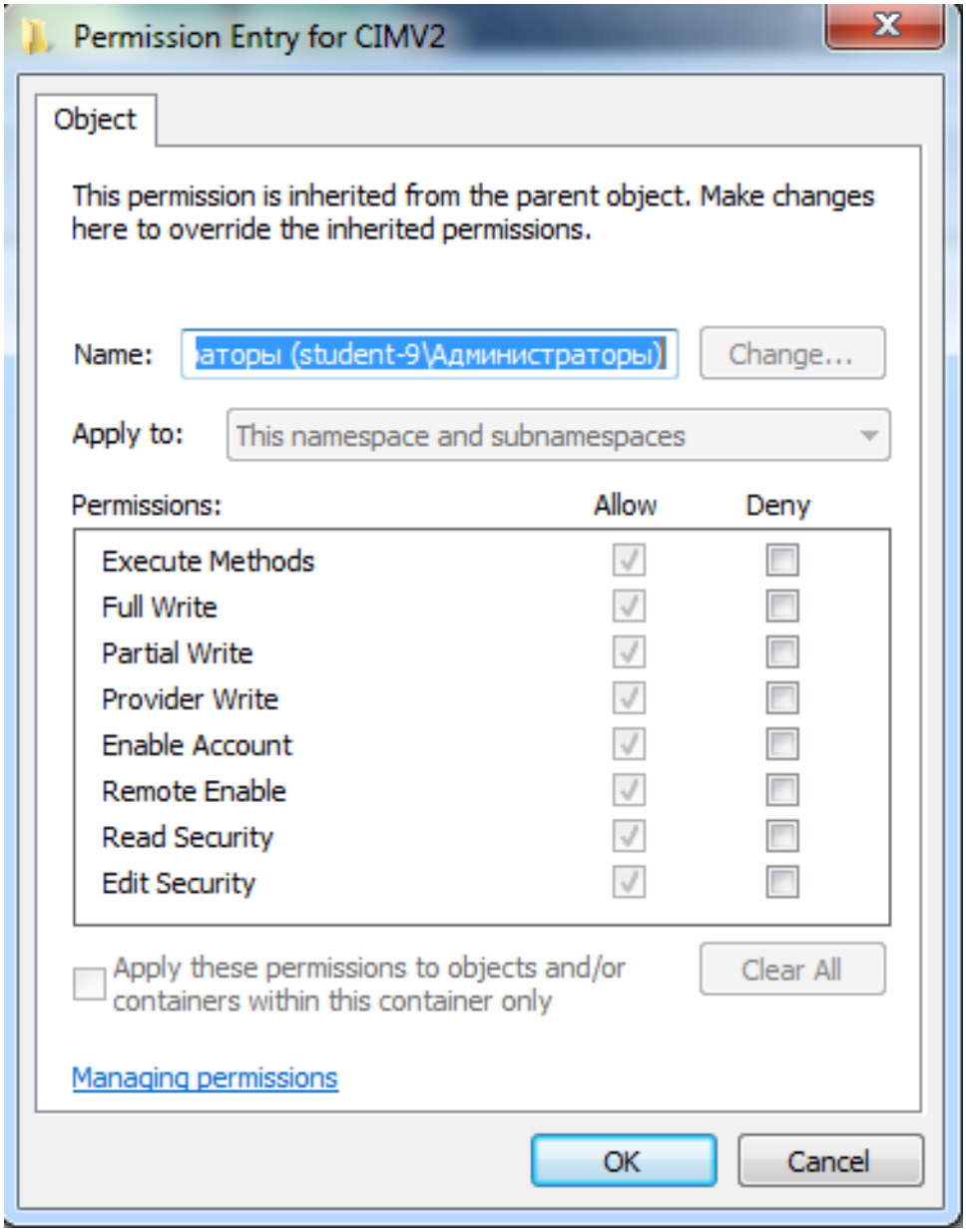


Fig. E.13. Allowance element configuration/setup/customization

14. Click OK. **This space and name subspace** is displayed in the **Apply to** column.

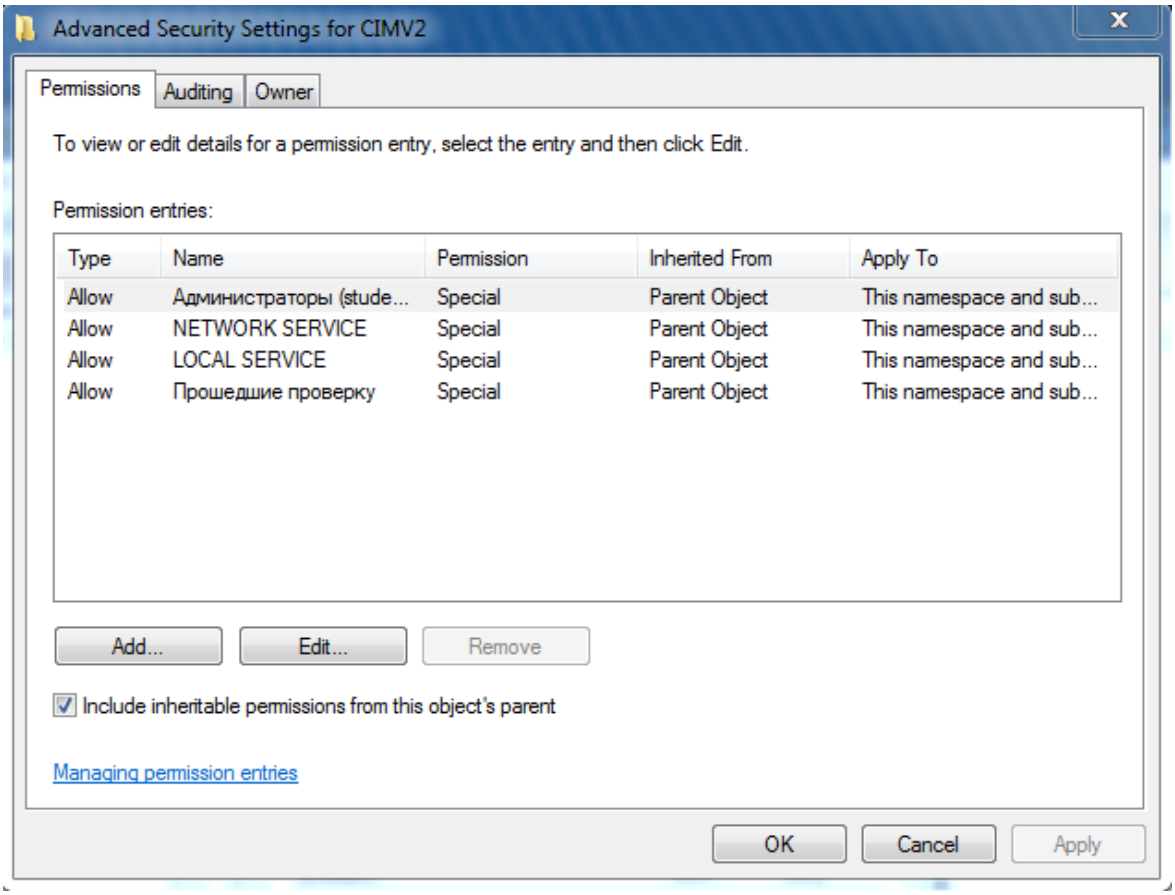


Fig. E.14. Applying allowance settings

15. In the **Additional security parameters for CIMV2** window, click the **Apply** button and then OK.

16. In the **ROOT\CIMV2 security** window, click the **Apply** button and then OK.

17. In the **Properties: WMI Control** window, click OK. Remote access to WMI is configured.

E.3. Permission for remote access to COM applications

Permission for remote access to COM applications allows you to connect, start processes, and run tasks non-stop.

To configure remote access to COM applications, you need to have admimistrator's rights.

To allow remote access to COM applications, perform the following:

COM (*Component Object Model*) is a binary-interface standard for software components by Microsoft. It is used to enable inter-process communication object creation in a large range of programming languages.

1. Enter `dcomcnfg` in the search field of the **Start** menu and press **Enter**. The **Component services** window opens.

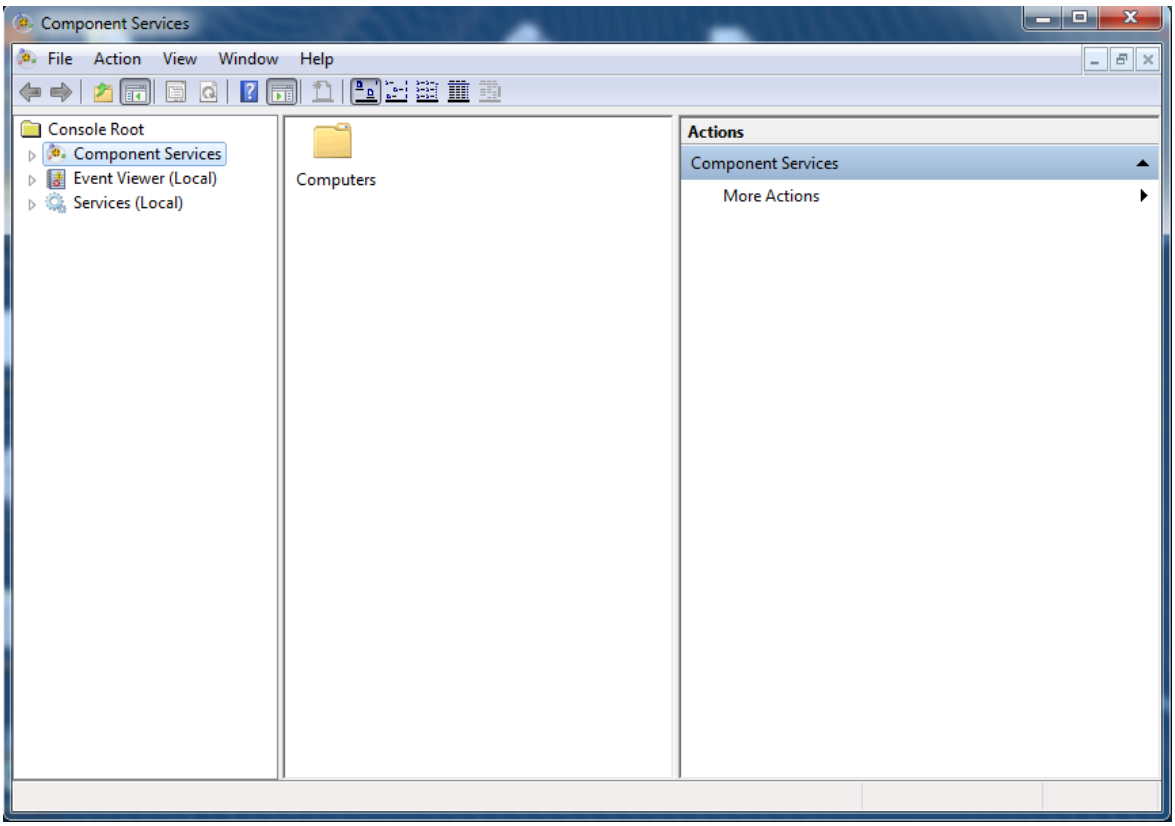


Fig. E.15. The “Component services” window

2. In the folder tree, select **Component services › Computers**. In the central window area the **My computer** icon appears.

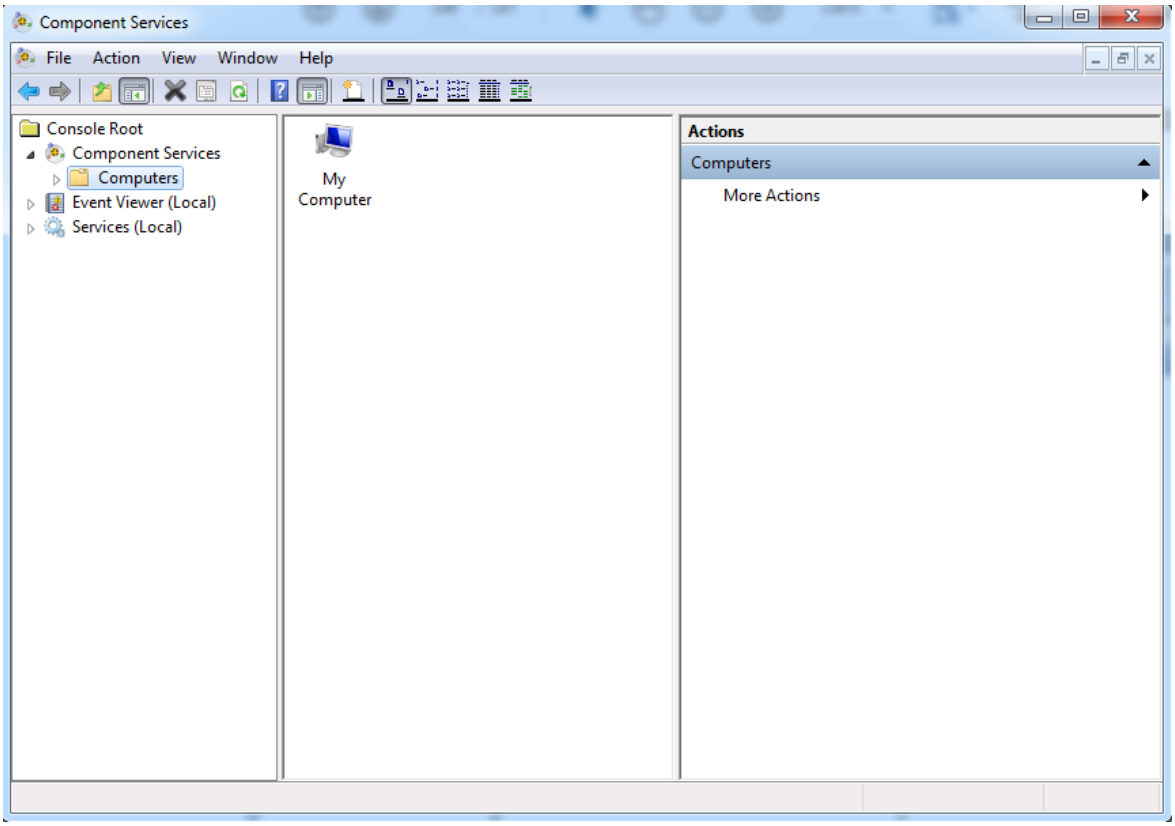


Fig. E.16. The “My computer” icon displayed in the “Component services” window

3. Right clicking the **My computer** icon open the context menu and select **Properties**. The **My Computer Properties** window opens.

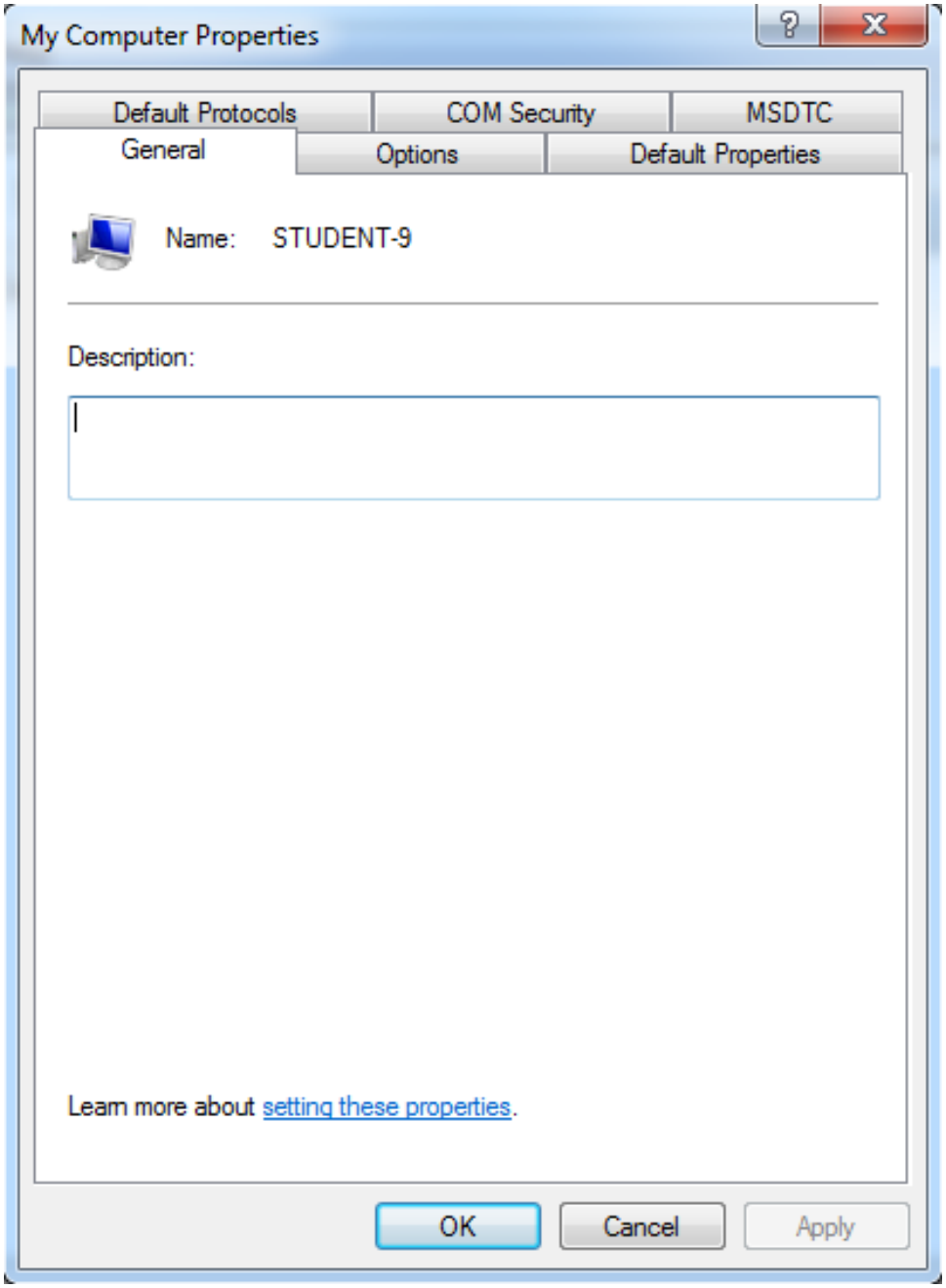


Fig. E.17. The “My Computer Properties” window

4. Open the **COM Security** tab.

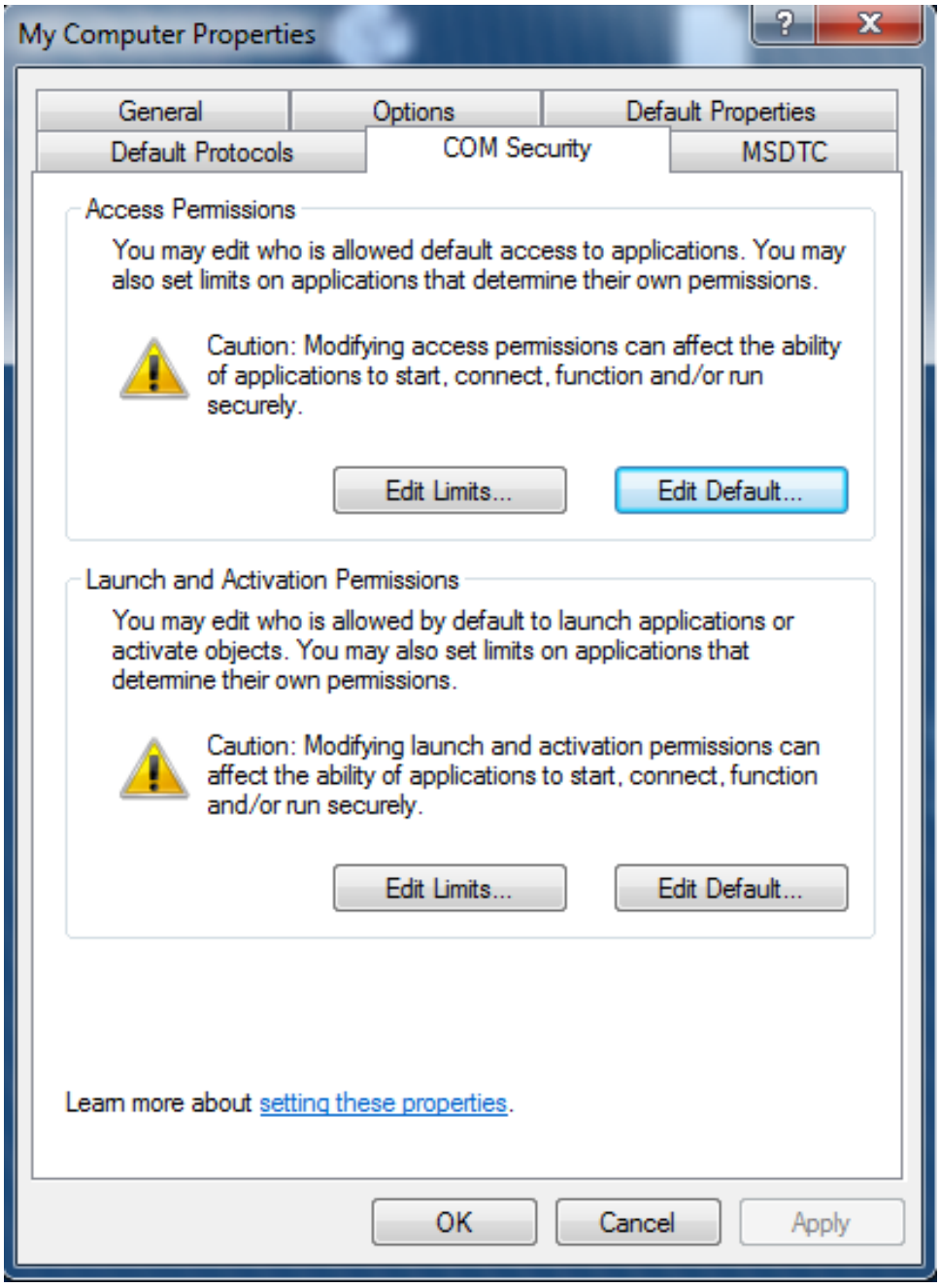


Fig. E.18. COM Security setup

5. In the **Access permissions** section, click the **Edit limits** button. The **Access permissions** window opens.

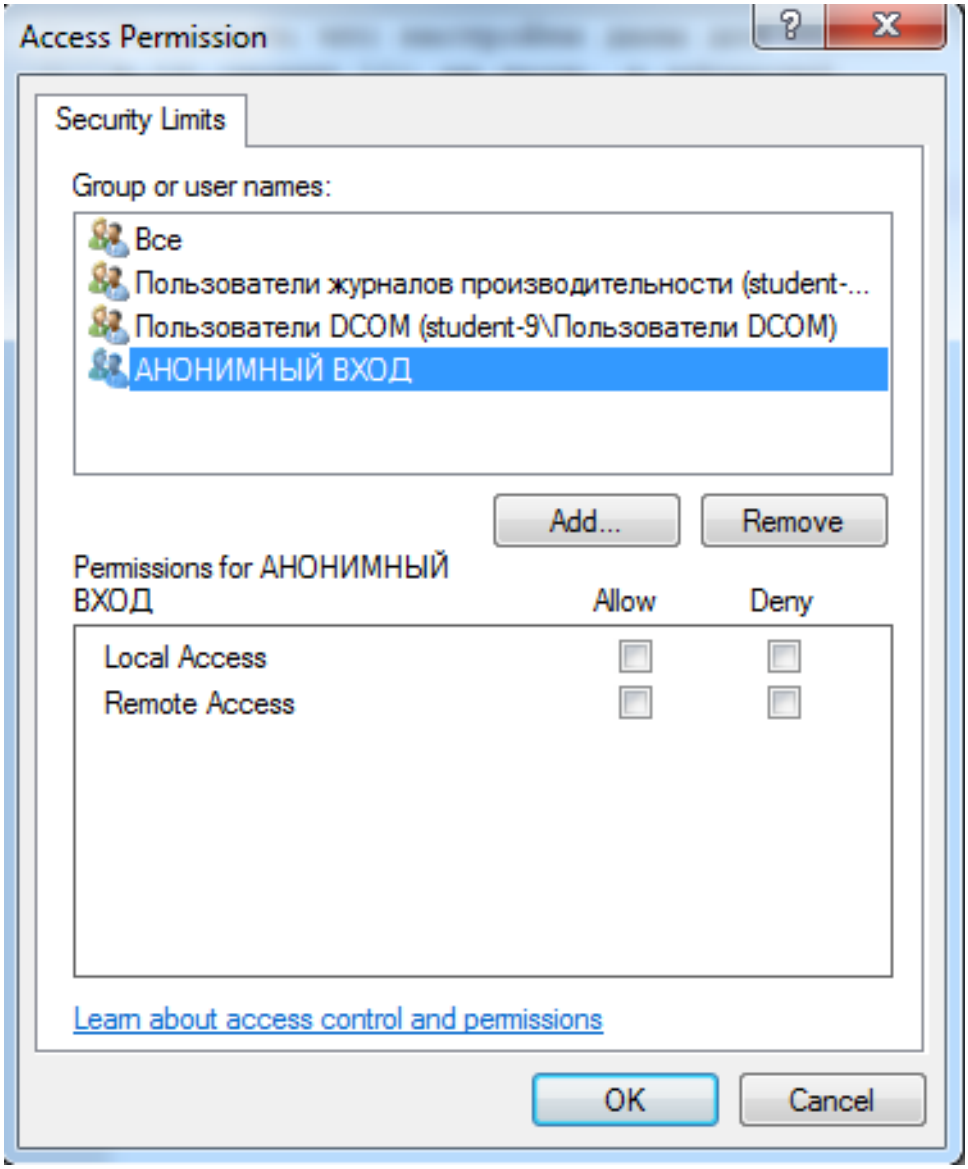


Fig. E.19. The “Access permissions” window

6. In the **Groups and user names** section, click **ANONYMOUS ACCESS**.

7. In the **Permissions for ANONYMOUS ACCESS** group section, set **Allow** check-boxes against **Local access** and **Remote access** options.

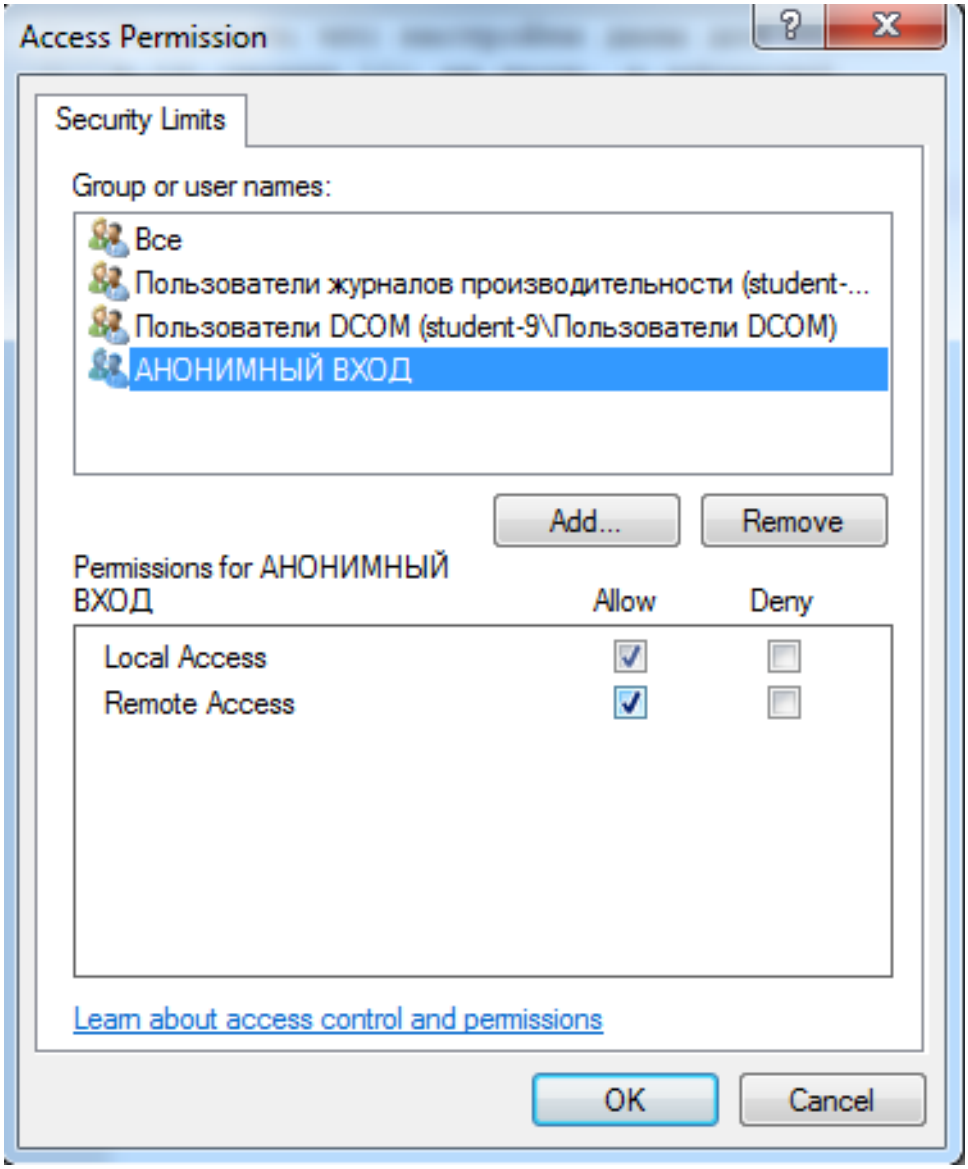


Fig. E.20. Local and remote access allowances

8. Click OK.

9. In the **COM security** tab in the **Launch and activation permissions**, click the **Edit limits** button. The **Launch and activation permission** window opens.

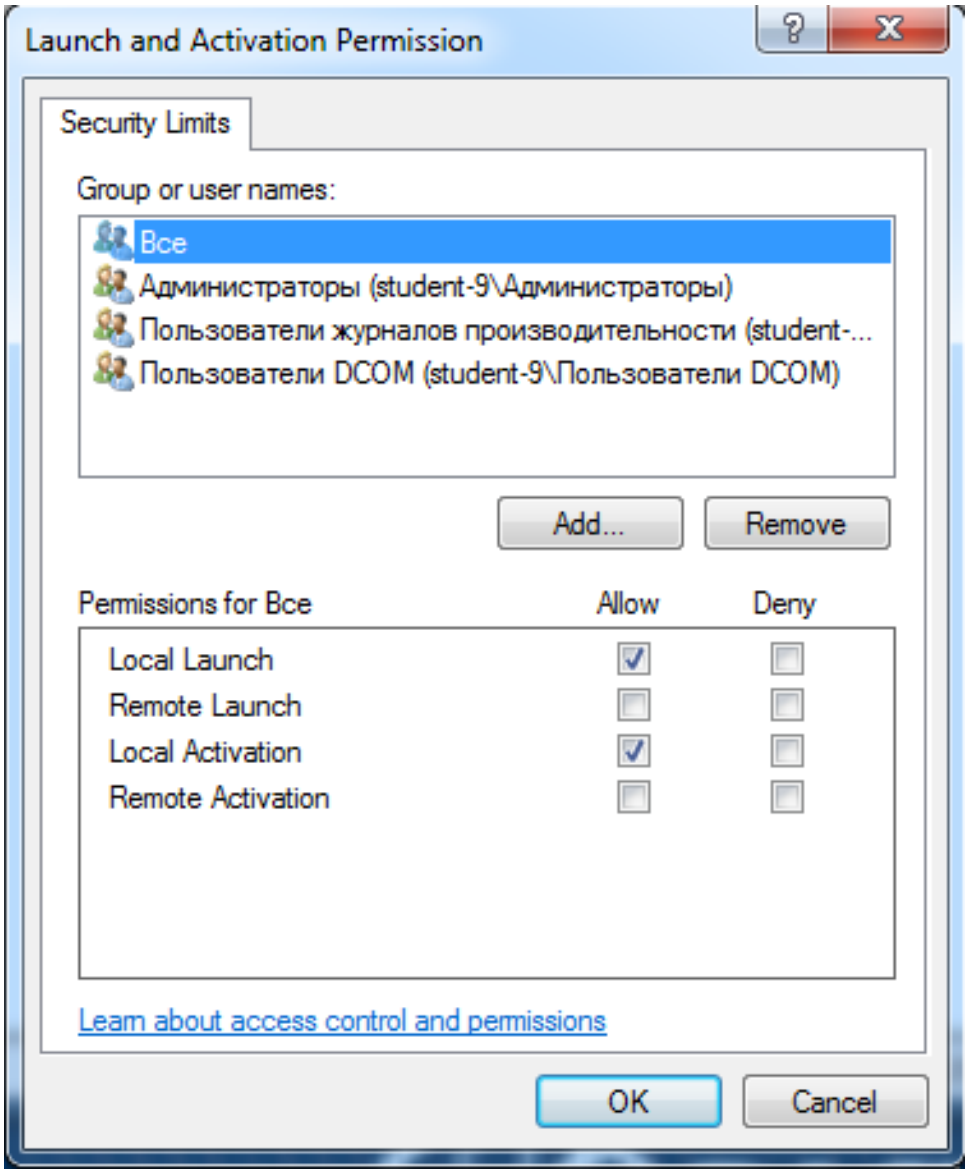


Fig. E.21. Start and activation allowance

10. Click the **Add** button. The **Select: Users, Computers, Service accounts, or Groups** window opens.

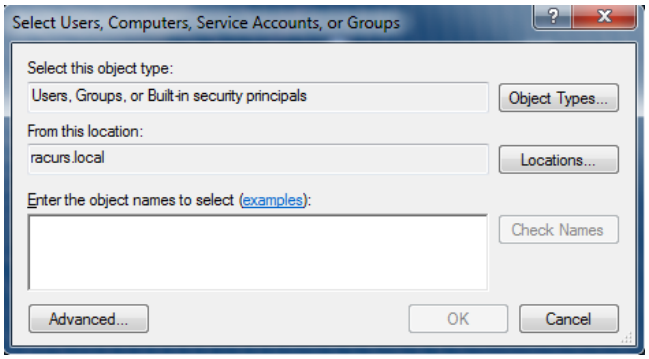


Fig. E.22. User selection window

11. In the **Enter the object names** input field, enter the username for whom remote access to WMI was previously allowed (this user is to be entered in **PHOTOMOD Remote Starter Tool**, in the **Edit keyring** window, the **Keyring** column).

    Entering usernames, use one of the following templates:

    - `EnteredName (example: First name Surname);`
    - `ObjectName (example: Computer1);`
    - `UserName (example: User1);`
    - `ObjectName@DomainName (example: User1@Domain1);`
    - `ObjectName\DomainName (example: Domain1\User1).`

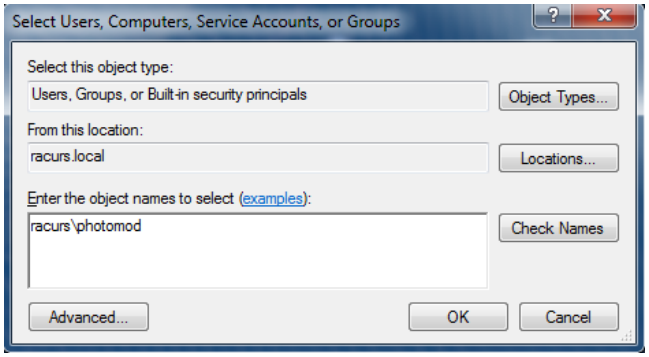


Fig. E.23. Username example

12. Click OK.
13. In the **Allowances for the Photomod group**, set **Allow** checkboxes against all the options from the list.
14. Click OK.

15. In the **Properties: My computer** window, **COM Security** tab, click the **Apply** button. The access to COM applications is configured.

E.4. Permission for data archiving

To set permission for data archiving, perform the following:

1. Enter `local security policy` in the **Start** menu search field and press **Enter**. The **Local security policy** window opens.

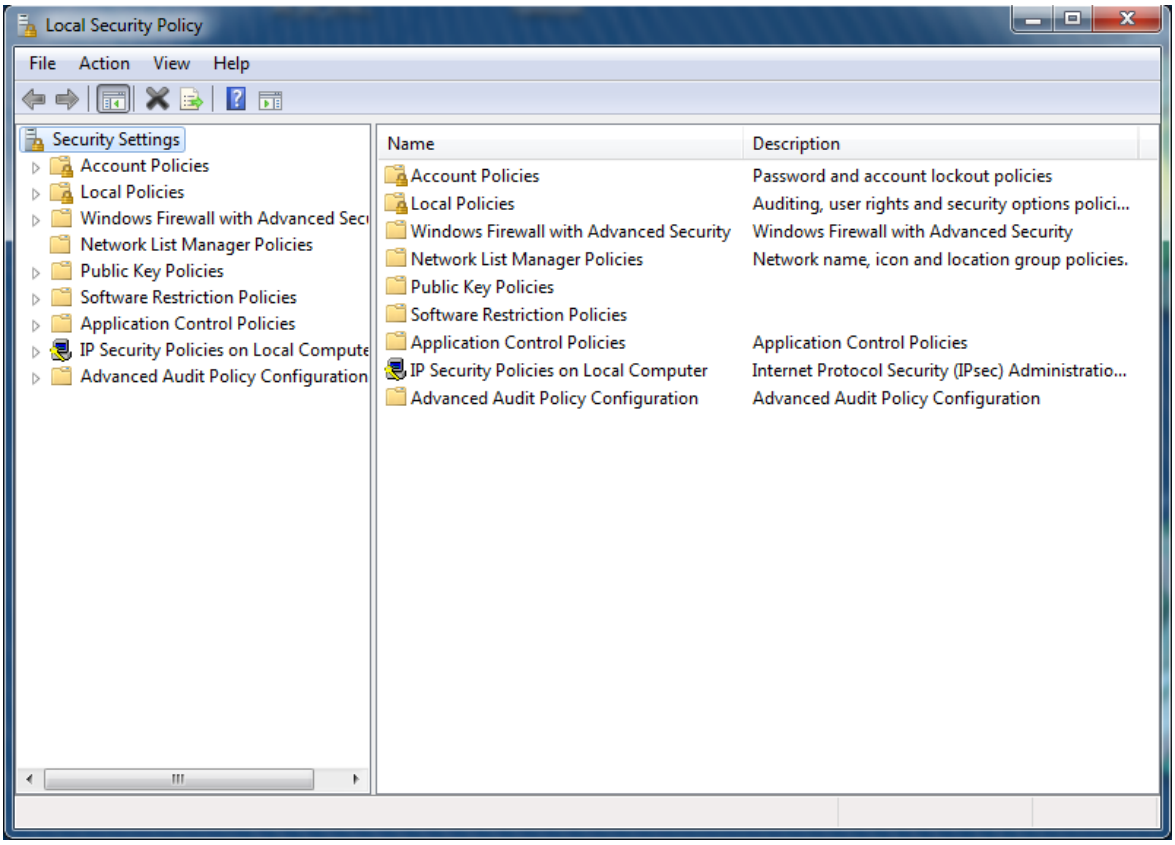


Fig. E.24. Local security policy

2. In the left part of the window in the folder tree, select **Security settings › Local policies › User rights assignment**.

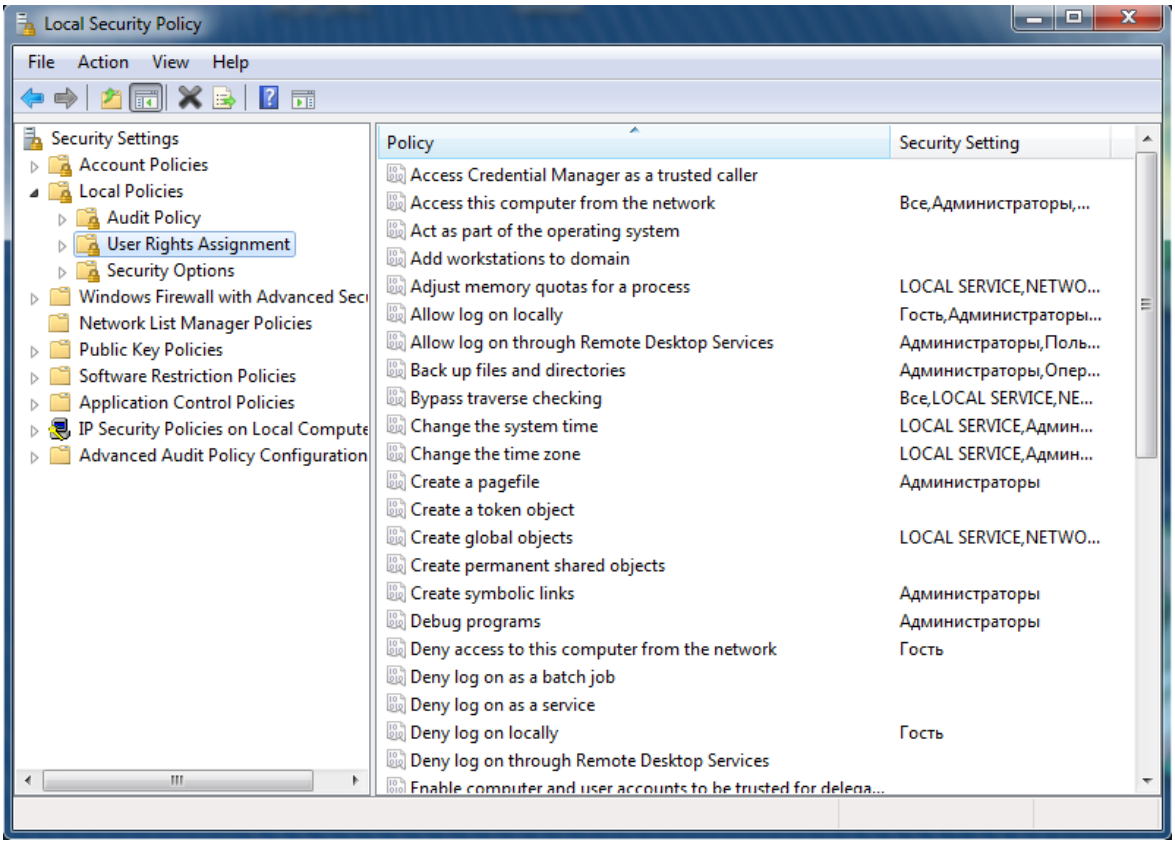


Fig. E.25. Assignment of user rights

3. Right click **Back up files and directories** and select **Properties**. The **Back up files and directories Properties** window opens.

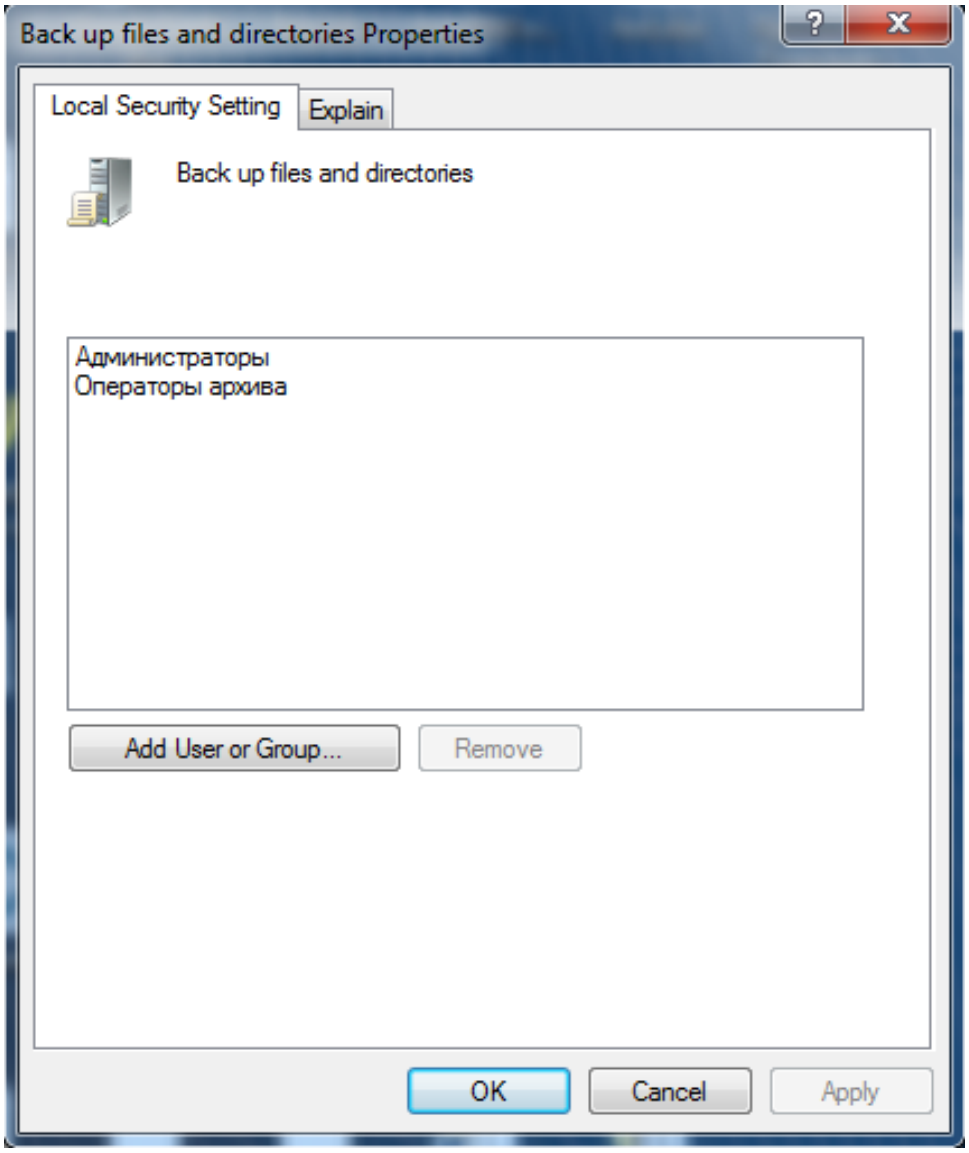


Fig. E.26. File and folder archiving access right setup

4. Click the **Add user or group** button. The **Select: Users, Computers, Service accounts, or Groups** window opens.

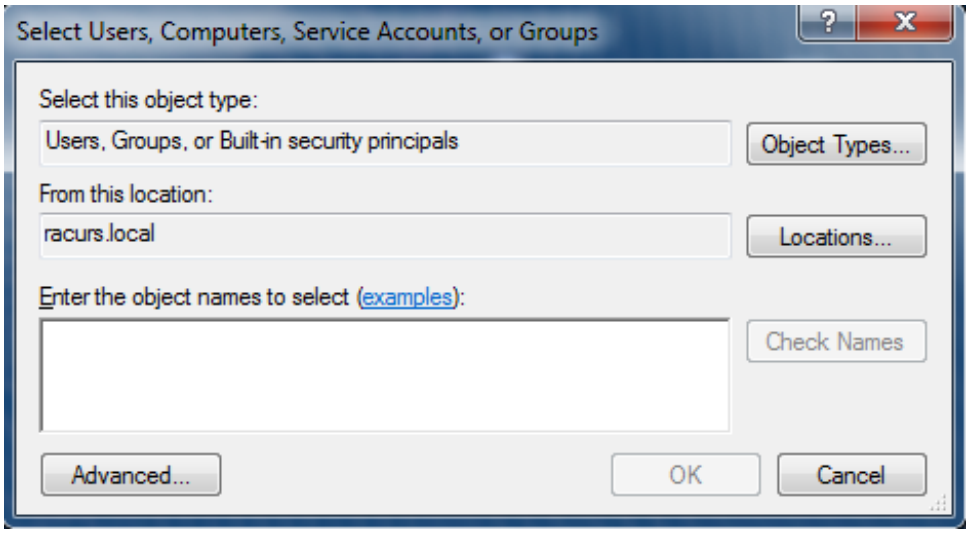


Fig. E.27. The user selection window

5. In the **Enter the object names** input field, enter the username for whom you want to set permission to archive data.

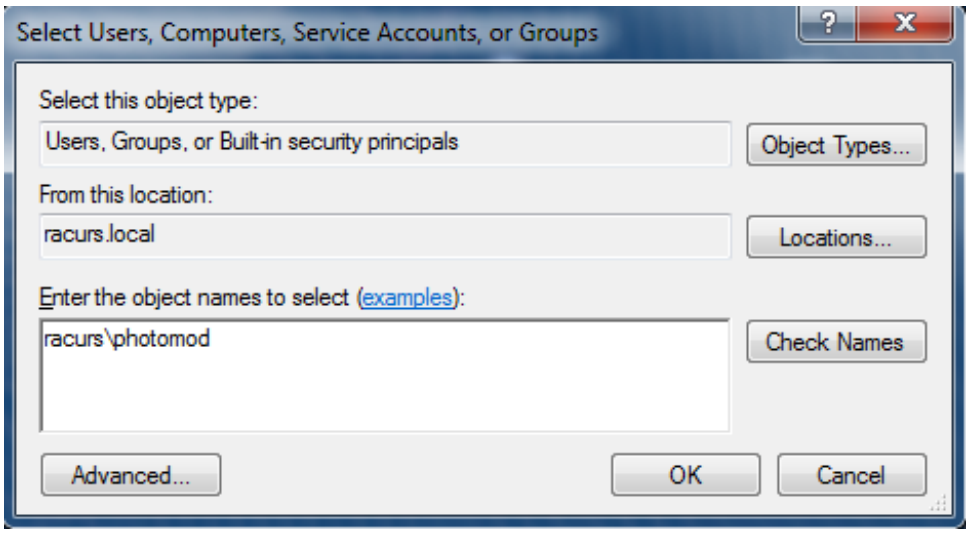


Fig. E.28. Username example

6. Click OK.

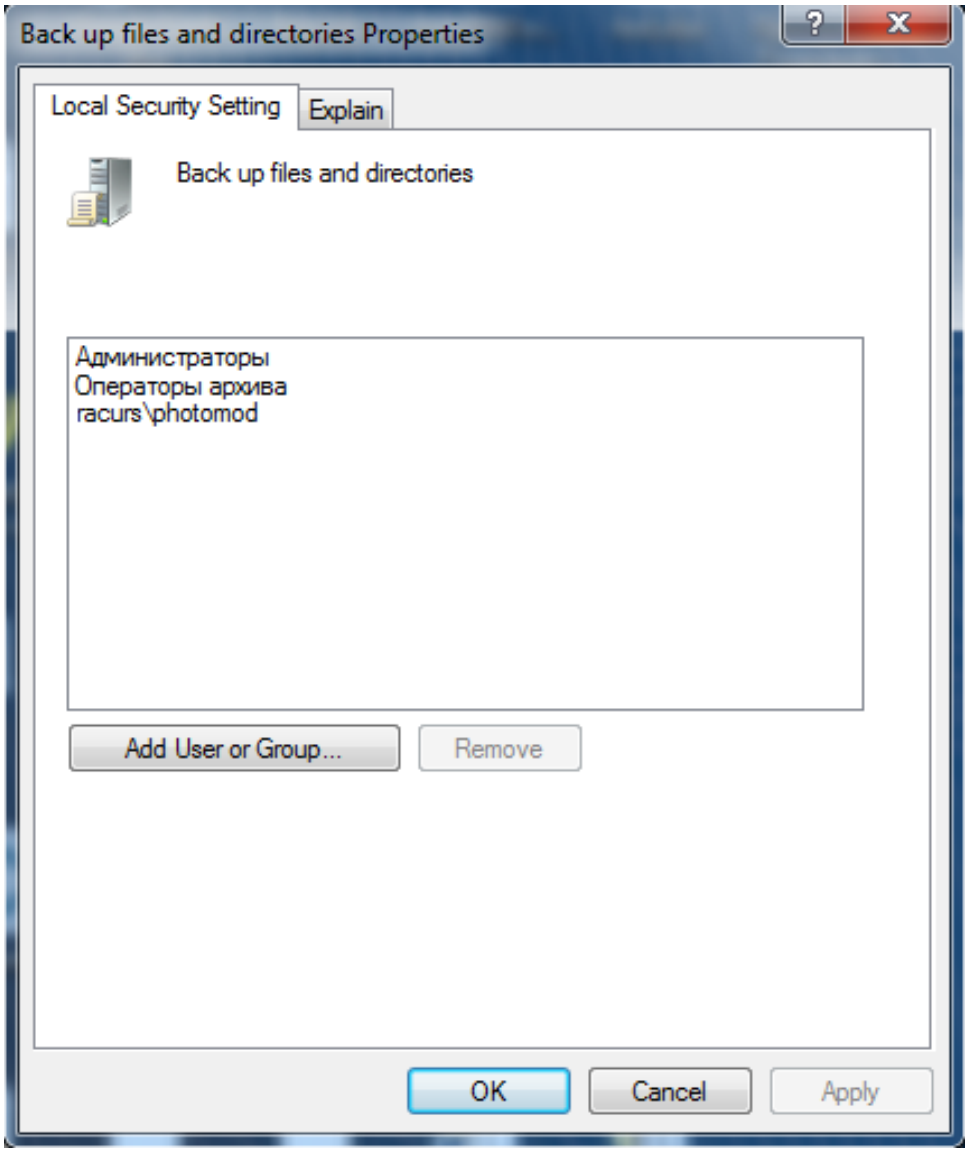


Fig. E.29. Photomod user access to file and folder archiving

7. Click OK. Access to file and folder archiving is allowed to the selected user.

8. In the **Local security policy** window, right click **Restore files and directories** and select **Properties**. The **Restore files and directories Properties** window opens.

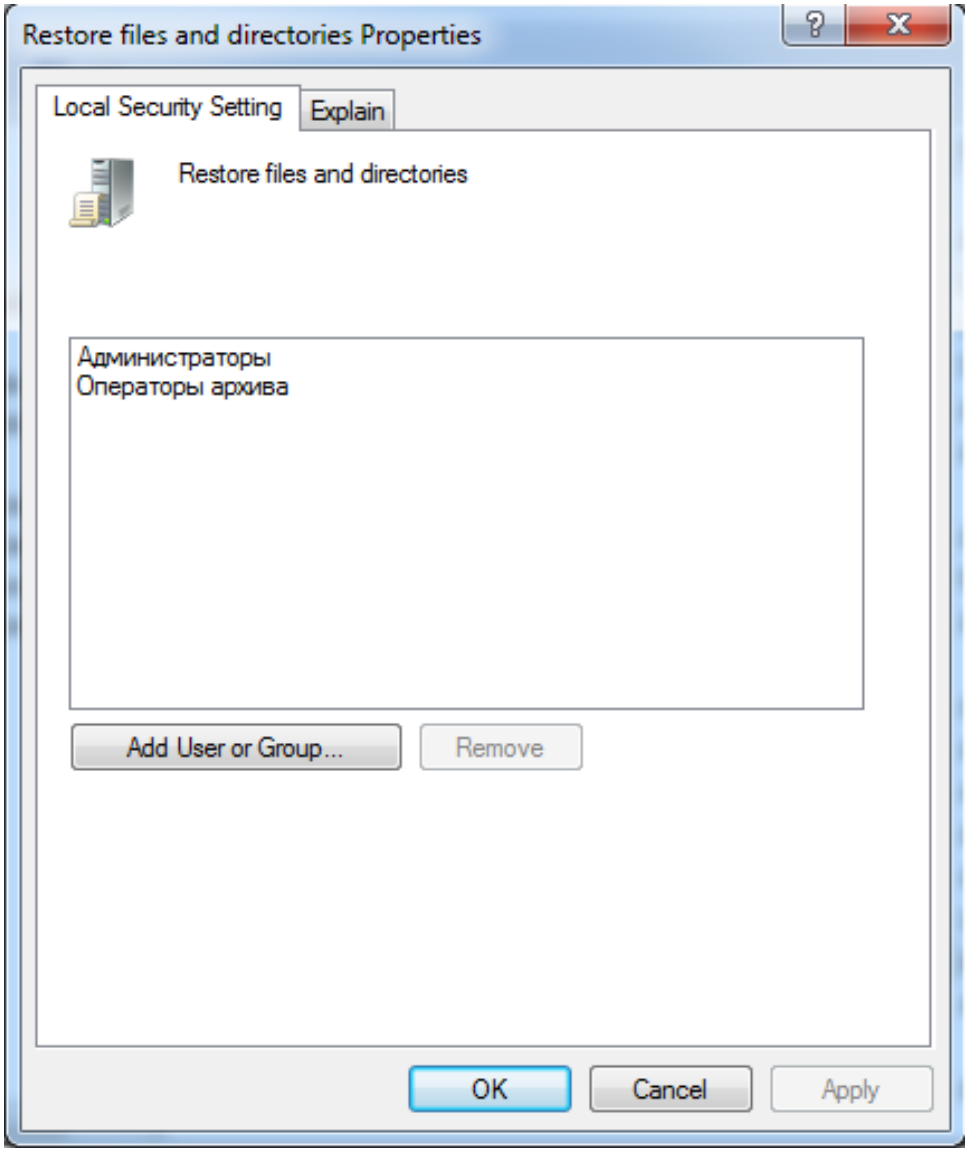


Fig. E.30. Access rights to file and folder recovery

9. Click the **Add user or group** button. The **Select: Users, Computers, Service accounts, or Groups** window opens.

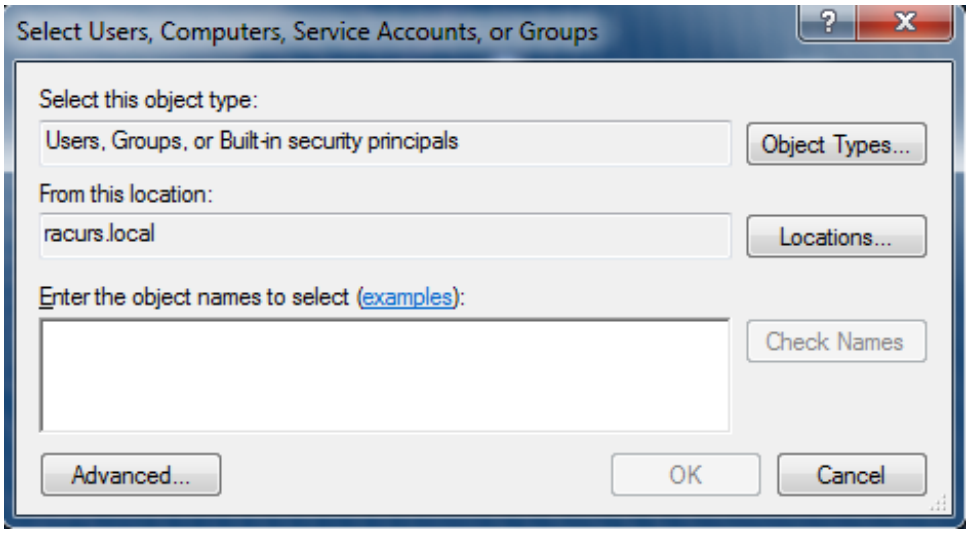


Fig. E.31. The user selection window

10. In the **Enter the object names** input field, enter the username for whom you want to set permission to recover files and folders.

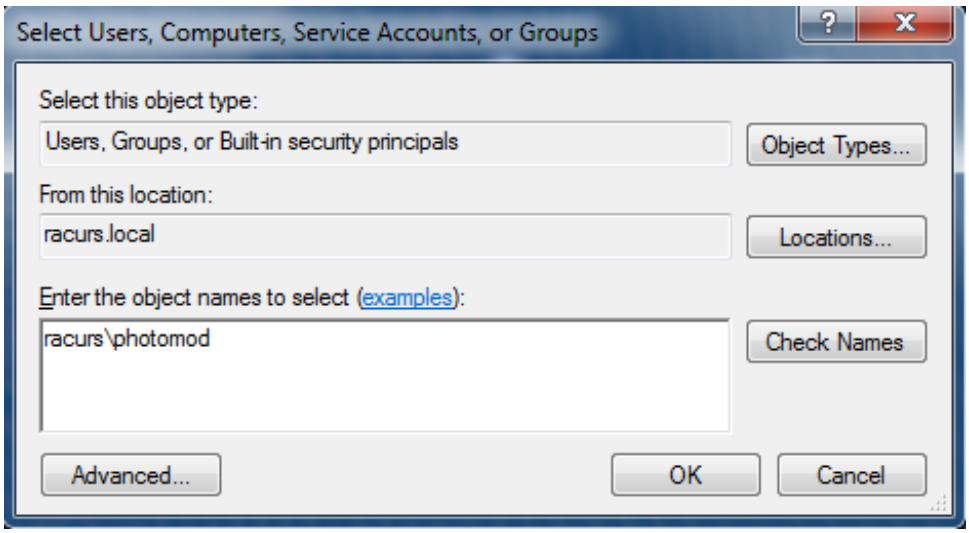


Fig. E.32. Username example

11. Click OK.

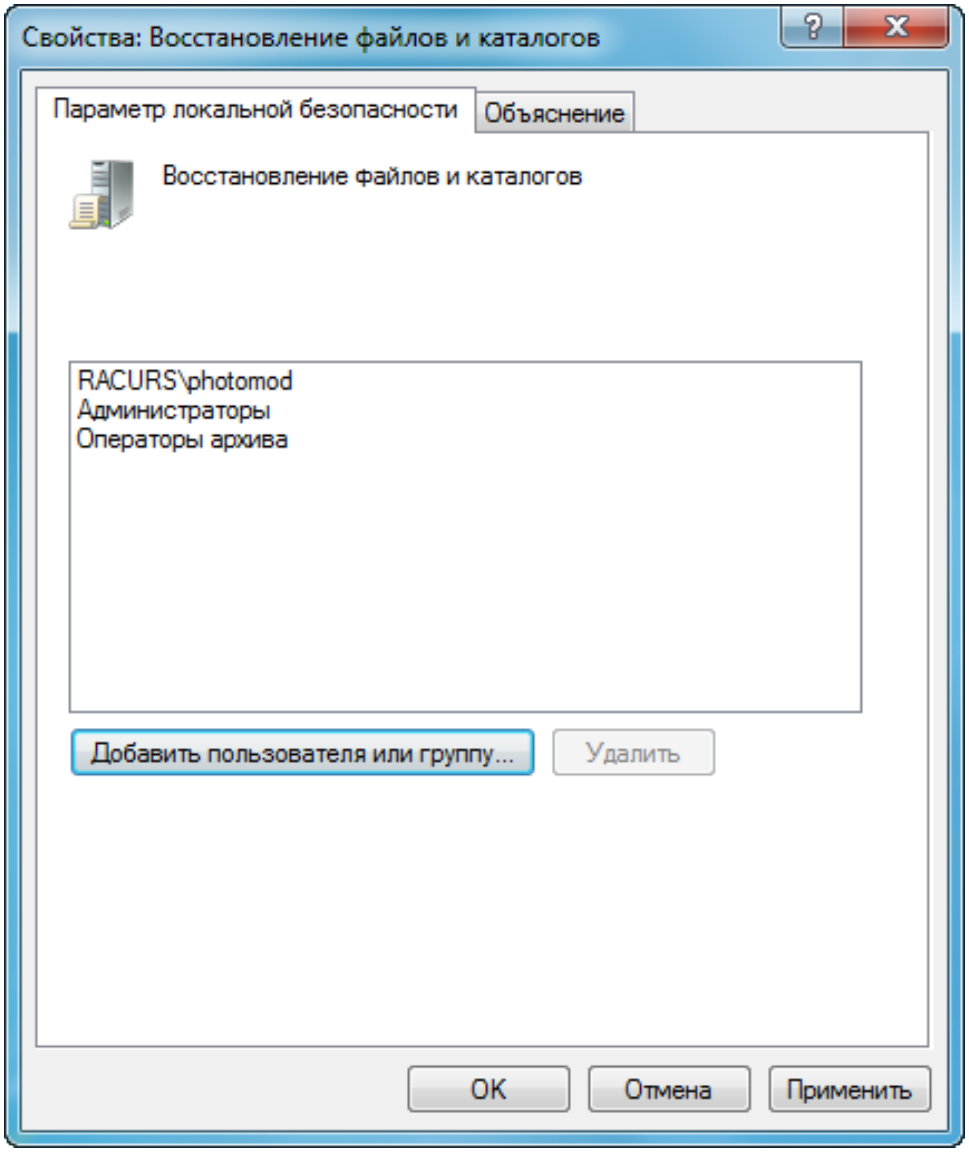


Fig. E.33. Photomod user access to file and folder recovery

12. Click OK. Access to file and folder recovery is allowed to the selected user.

13. In the **Local security policy** window, right click **Replace a process level token** and select **Properties**. The **Replace a process level token Properties** window opens.

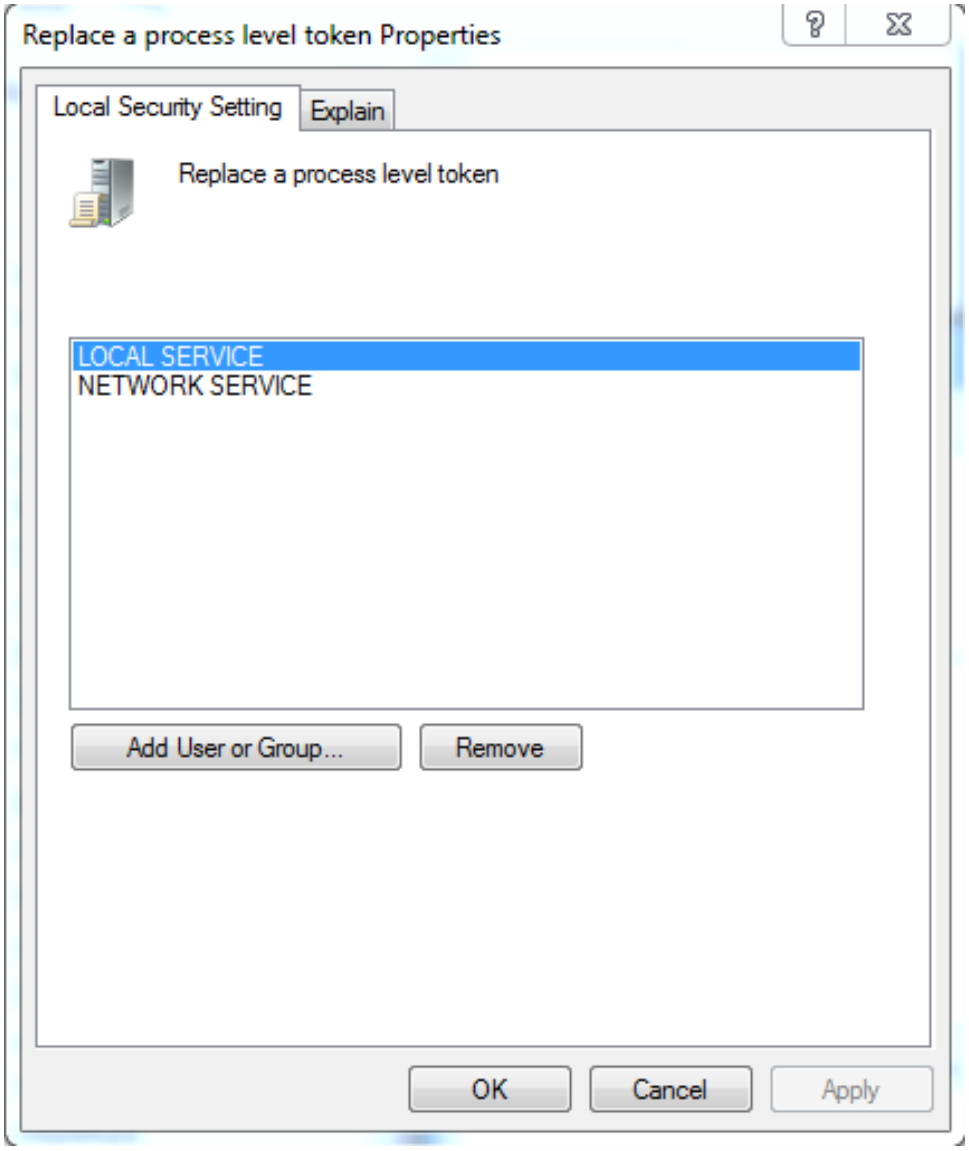


Fig. E.34. Replace a process level token

14. Click the **Add user or group** button. The **Select: Users, Computers, Service accounts, or Groups** window opens.

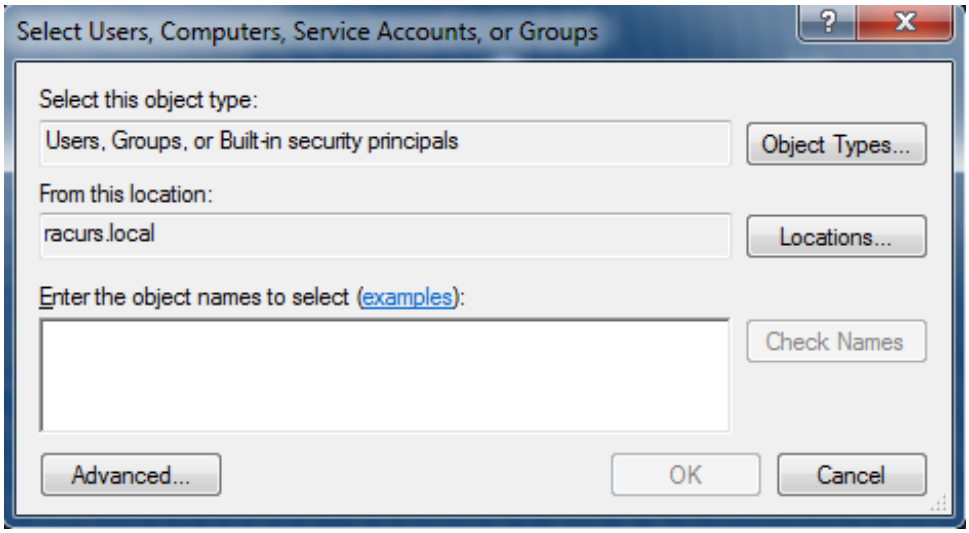


Fig. E.35. The user selection window

15. In the **Enter the object names** input field, enter the username for whom you want to set permission to recover files and folders.

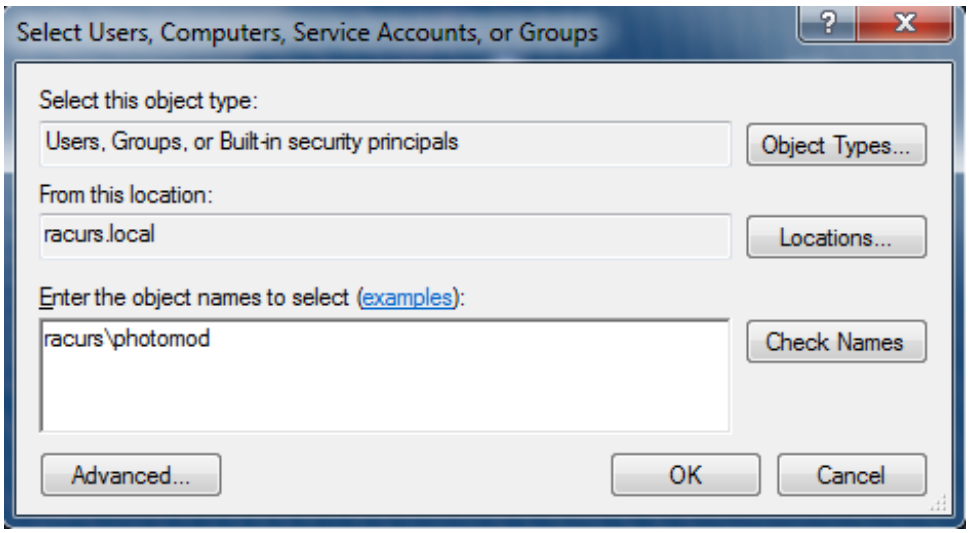


Fig. E.36. Username example

16. Click OK.

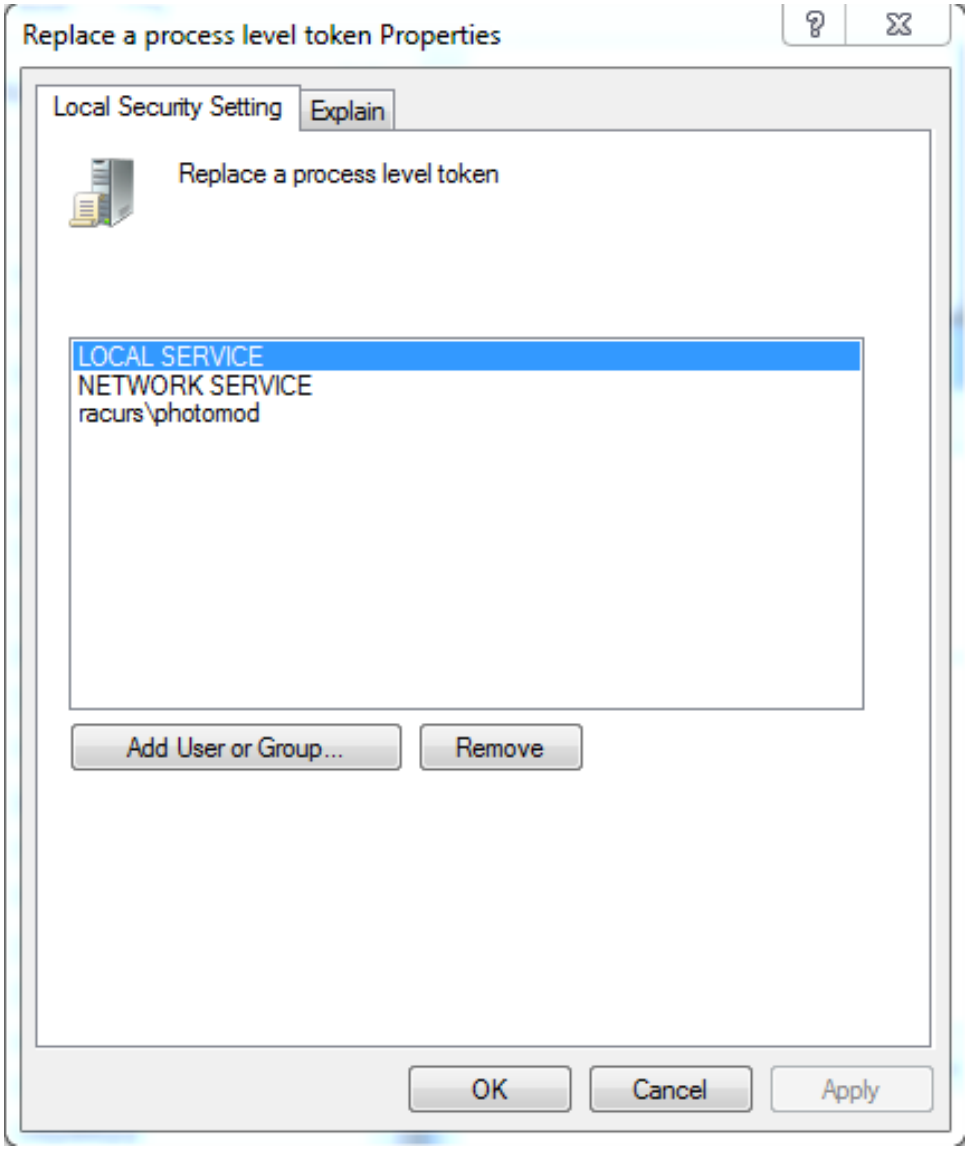


Fig. E.37. Replace a process level token

17. Click OK.

E.5. Shared access setup

To setup shared access to a folder, perform the following:

1. Right click the folder for which you want to setup shared access, open the context menu, and select **Properties**. The **Properties: PHOTOMOD7.Var** window opens.

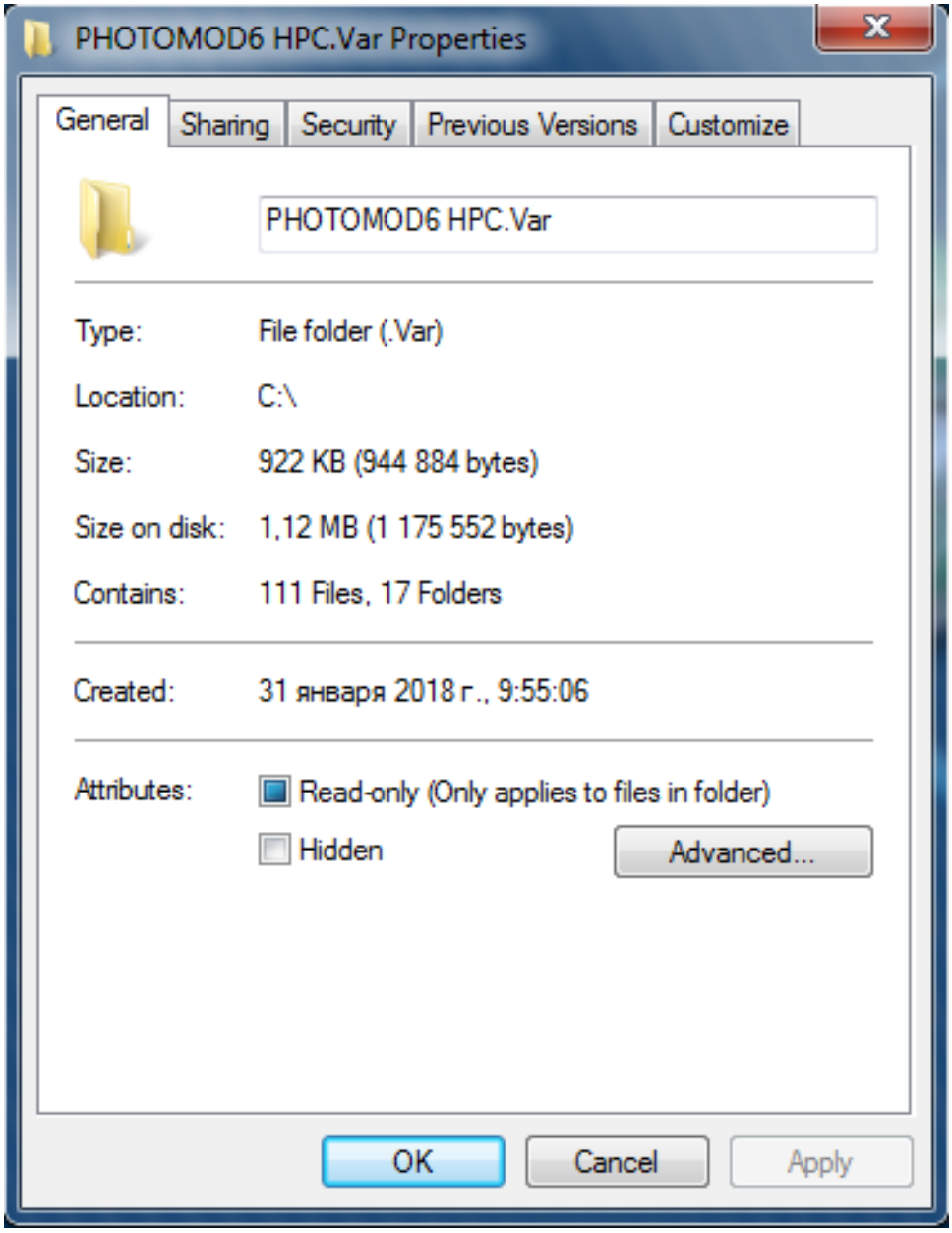


Fig. E.38. General tab

2. Go to the **Access** tab.

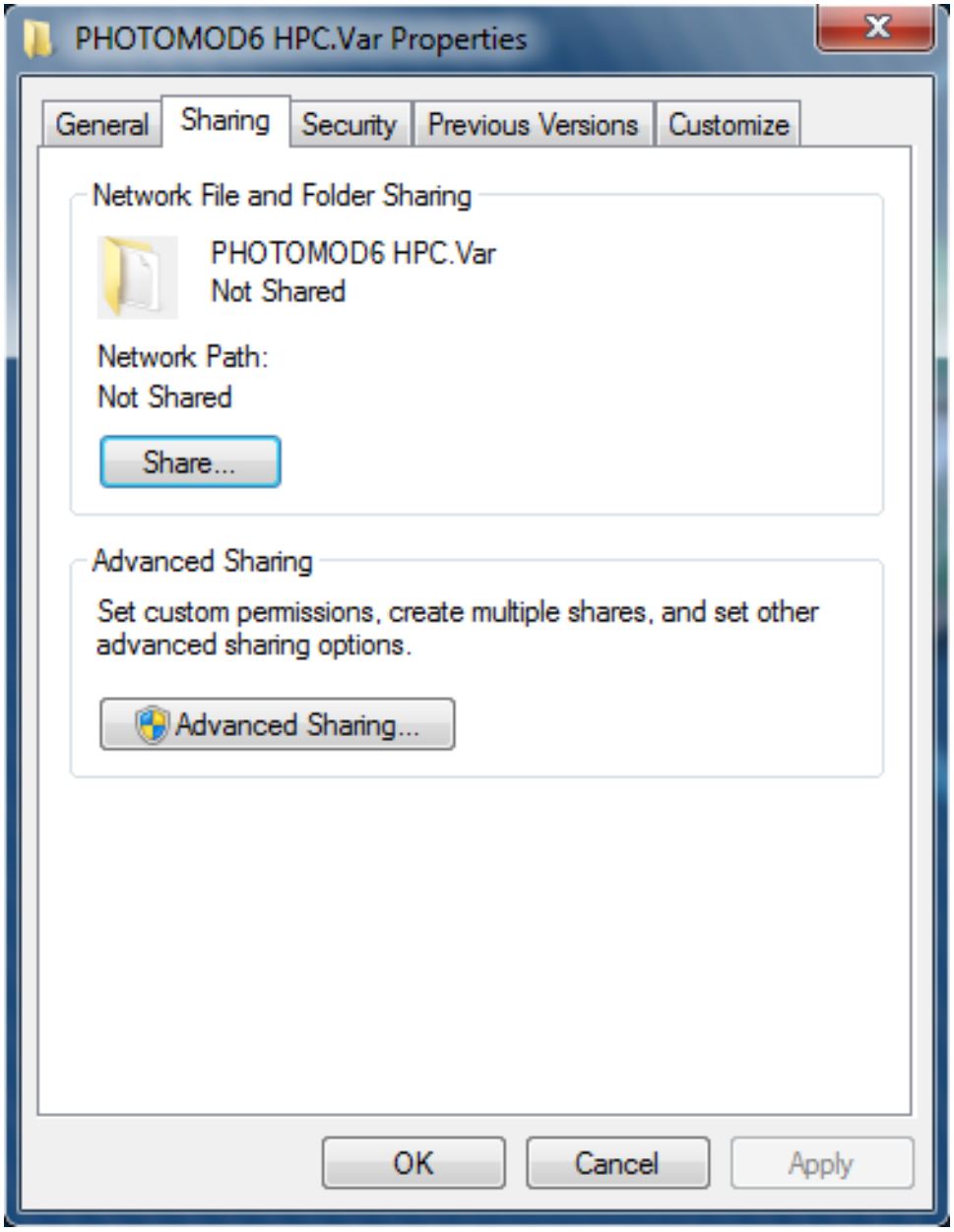


Fig. E.39. Access to shared files and folders

3. In the **Advanced shared access setup** section, click the **Advanced setup** button. The **Advanced shared access setup** window opens.

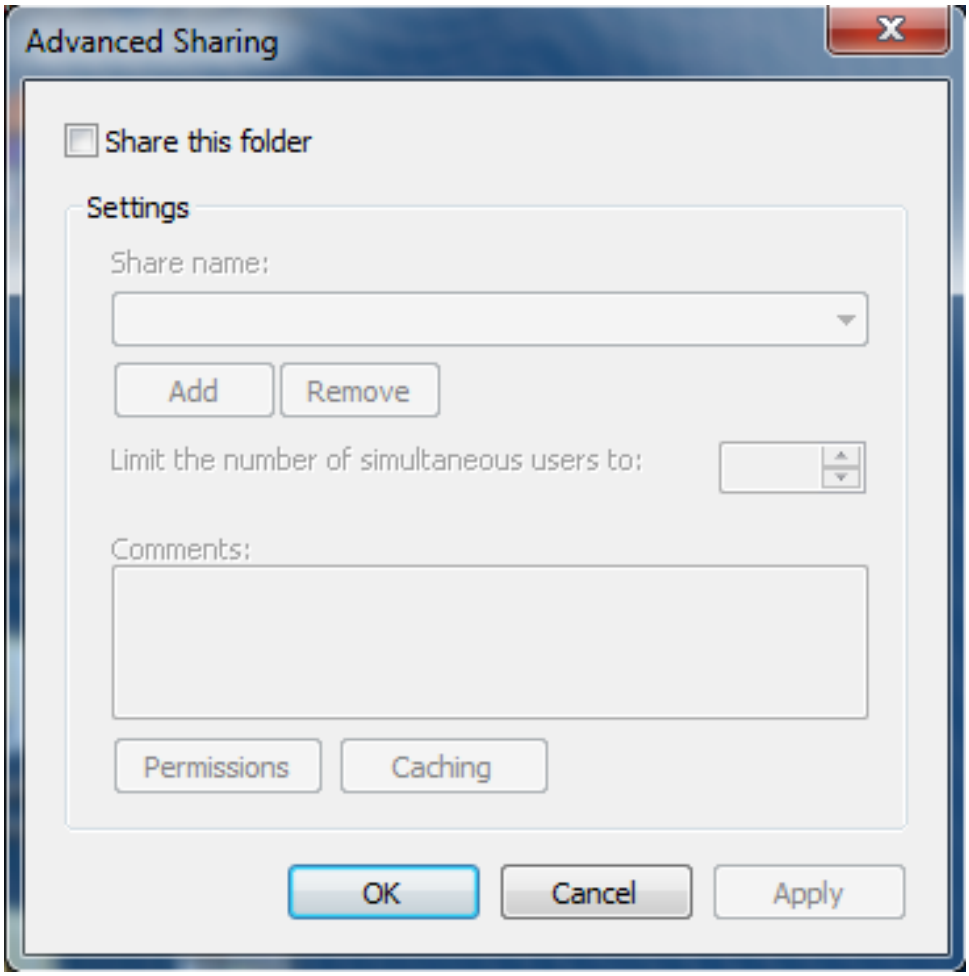


Fig. E.40. Shared access setup

4. Set the **Open shared access to this folder** checkbox.

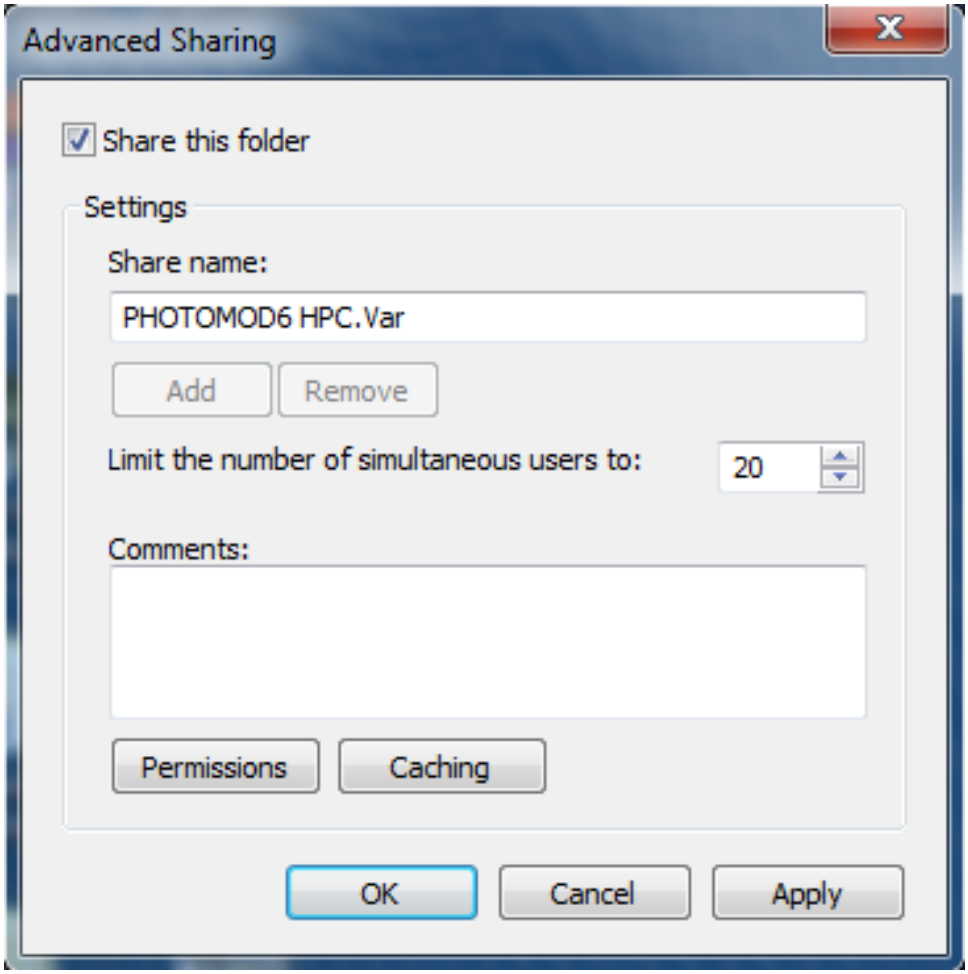


Fig. E.41. Open shared access to this folder

5. Click the **Apply** button.

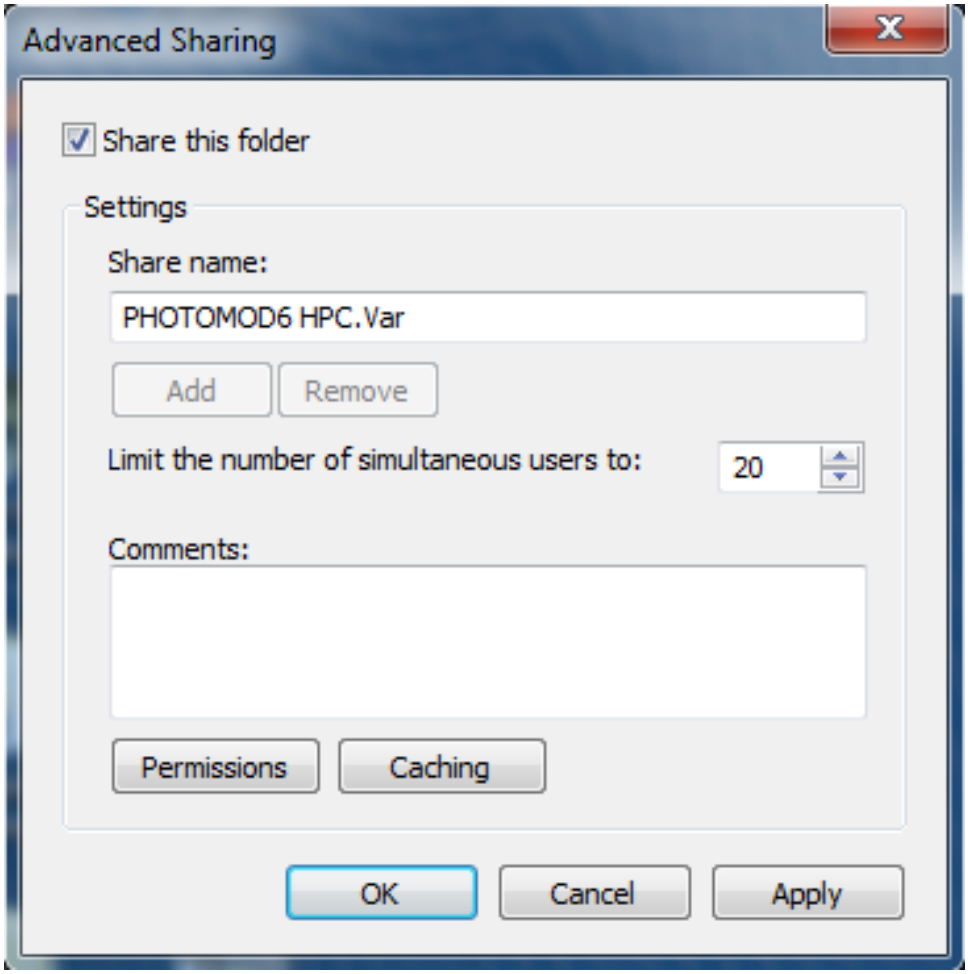


Fig. E.42. Applying shared access to a folder

6. Delete spaces in the folder name in the **Shared resource name** input field.
7. Click OK. Shared access is configured.

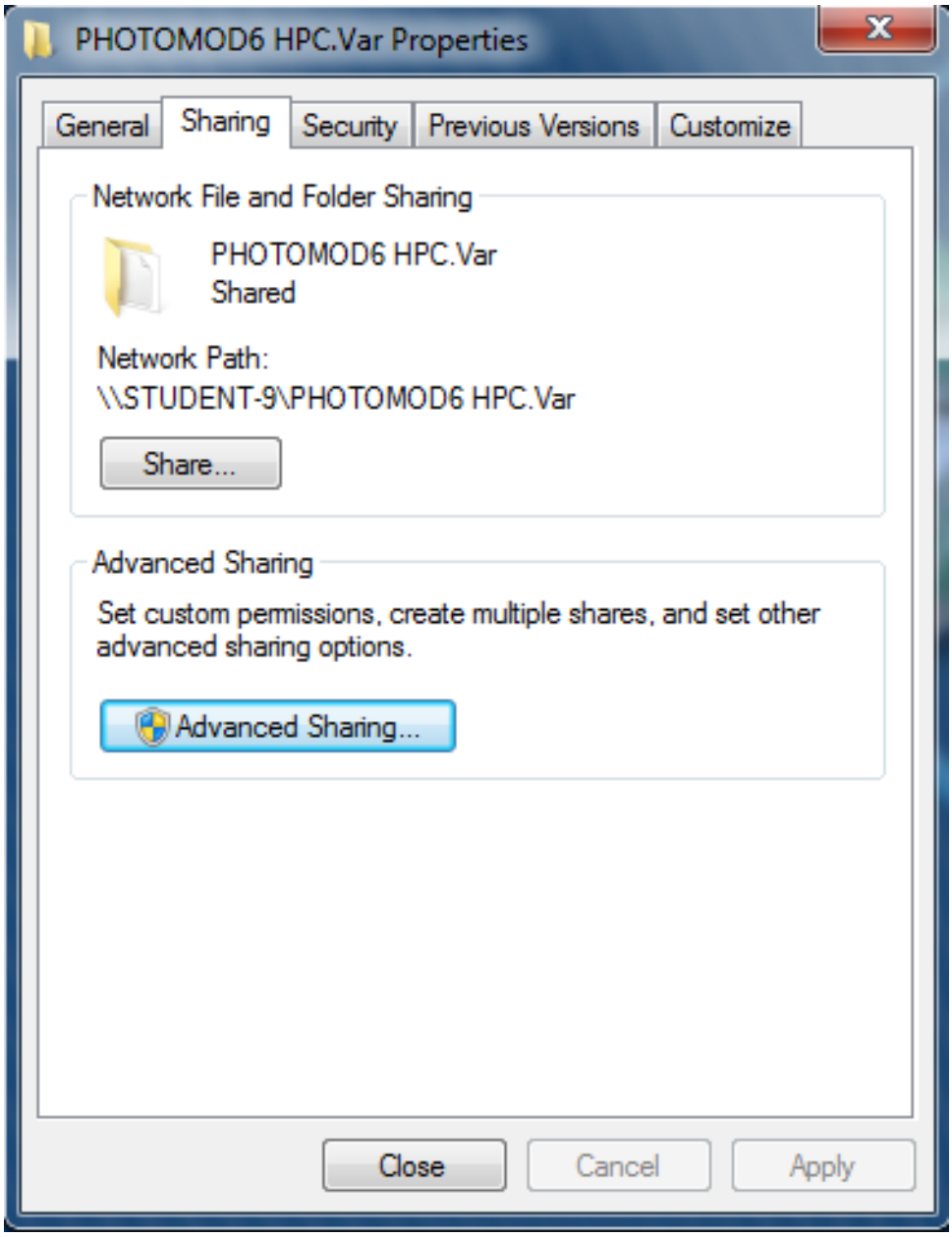


Fig. E.43. Saving shared access configuration