

# *TRMS*

## *User's Manual*

Version 2004-11-18

**Authors:**

Paweł Fraś  
Tomek Kostienko  
Jarek Magiera  
Marek Szlęzak

*This page has been intentionally left blank.*

## Table of Contents

|           |   |           |
|-----------|---|-----------|
| <b>1</b>  | <b>INTRODUCTION .....</b>                   | <b>5</b>  |
| 1.1       | WHAT IS TRMS? .....                         | 5         |
| 1.2       | TRMS KEY FEATURES .....                     | 5         |
| 1.3       | TRMS ARCHITECTURE .....                     | 6         |
| <b>2</b>  | <b>INSTALLATION AND CONFIGURATION .....</b> | <b>6</b>  |
| 2.1       | SYSTEM REQUIREMENTS .....                   | 6         |
| 2.2       | TRMS INSTALLATION .....                     | 7         |
| 2.3       | CONFIGURATION FILES .....                   | 7         |
| <b>3</b>  | <b>QUICK TOUR .....</b>                     | <b>9</b>  |
| 3.1       | LOGIN .....                                 | 9         |
| 3.2       | WORKFLOW .....                              | 10        |
| 3.3       | TOOL/TASK .....                             | 10        |
| 3.4       | TOOL SERVERS .....                          | 11        |
| 3.5       | USERS .....                                 | 12        |
| 3.6       | OPTIONS .....                               | 12        |
| 3.7       | ADMINISTRATION .....                        | 13        |
| 3.8       | HELP .....                                  | 13        |
| <b>4</b>  | <b>LOGIN TO TRMS.....</b>                   | <b>14</b> |
| 4.1       | HOW TO LOGIN TO TRMS? .....                 | 14        |
| <b>5</b>  | <b>WORKFLOW – HOW TO ...? .....</b>         | <b>16</b> |
| 5.1       | CREATE A NEW WORKFLOW .....                 | 16        |
| 5.2       | LAUNCH A WORKFLOW .....                     | 20        |
| 5.3       | TOOL INVOCATION .....                       | 21        |
| <b>6</b>  | <b>TOOL/TASK – HOW TO ?.....</b>            | <b>25</b> |
| 6.1       | ADD A NEW TOOL .....                        | 25        |
| 6.2       | MODIFY A TOOL .....                         | 27        |
| 6.3       | REMOVE A TOOL .....                         | 28        |
| 6.4       | BROWSE REGISTERED TOOLS .....               | 29        |
| <b>7</b>  | <b>TOOL SERVER – HOW TO...?.....</b>        | <b>30</b> |
| 7.1       | ADD A NEW TOOL SERVER .....                 | 30        |
| 7.2       | MODIFY A TOOL SERVER .....                  | 33        |
| 7.3       | REMOVE A TOOL SERVER .....                  | 34        |
| 7.4       | BROWSE REGISTERED TOOL SERVERS .....        | 36        |
| <b>8</b>  | <b>USERS – HOW TO ...? .....</b>            | <b>36</b> |
| 8.1       | BROWSING REGISTERED USERS .....             | 36        |
| 8.2       | ADD A NEW USER .....                        | 38        |
| 8.3       | MODIFY USER .....                           | 41        |
| 8.4       | REMOVE A USER .....                         | 42        |
| <b>9</b>  | <b>OPTIONS .....</b>                        | <b>43</b> |
| <b>10</b> | <b>ADMINISTRATION .....</b>                 | <b>45</b> |
| <b>11</b> | <b>PERMISSIONS.....</b>                     | <b>47</b> |
| 11.1      | USER PERMISSIONS .....                      | 47        |

---

|           |  |           |
|-----------|--|-----------|
| 11.2      | TOOL SERVER PERMISSIONS .....                        | 48        |
| <b>12</b> | <b>FURTER DEVELOPMENT OF TRMS.....</b>               | <b>48</b> |
|           | <b>REFERENCES.....</b>                               | <b>49</b> |
|           | <b>APPENDIX A HOW TO GENERATE USER'S KEYS? .....</b> | <b>50</b> |
|           | <b>APPENDIX B TRMS SUPPORT .....</b>                 | <b>56</b> |

## 1 INTRODUCTION

### 1.1 What is TRMS?

Since a number of years enhanced collaboration is one of major trends in industry. Collaborative engineering (CE) is a new paradigm for product development which integrates widely distributed engineers for virtual collaboration. The major obstacle in stronger proliferation of CE practices is the lack of appropriate infrastructures suitable for distributed engineering work.

Tool Registration and Management System (TRMS) is an innovative solution that constitutes a kernel of the collaborative infrastructure, as it enables distance-spanning tool integration. Once registered, tools provide their services to distributed engineers. Advanced service discovery methods are used to connect to the most appropriate service with respect to optimal availability within the current configuration of the virtual engineering network. TRMS guarantees secure data transfer with authentication and authorisation of users, as well as it includes security management mechanisms that allow administrator to monitor users' activity and to execute a proper security policy. TRMS allows design teams to make their resources available to the others. It is thus intended for distributed engineer groups collaborating on the same project and using shared tools.

TRMS was developed by the EU **E-Colleg Project** (IST-1999-11746, [www.ecolleg.org](http://www.ecolleg.org)).

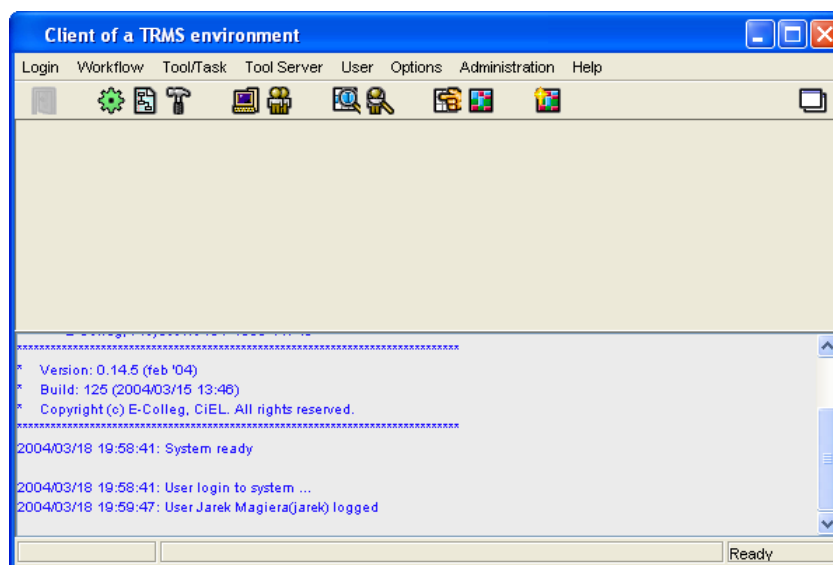


Figure 1.1: Main window of the TRMS Client application

### 1.2 TRMS Key Features

TRMS enables to use tools that have been installed in geographically dispersed locations. Built-in mechanisms make tool integration very easy. This means straightforward tool registration and invocation. TRMS provides a user with a comfortable interface - the TRMS Client for looking for a required tool. It makes user's work more efficient and saves his/her time. Only tools pre-registered in the system may be searched for. Registered tools are configured for integration due to automatically generated XML-based interfaces. Of course, one needs rights to use a particular tool. Management of users and their multilevel privileges is a strong asset of the system. Cryptography techniques and digital signature technology protect project data on their way through the network, as well as protect access to the system.

Advanced Network Transport Service (ANTS) enable exchange of project data through existing firewall systems without a need for their reconfiguration. TRMS has its own workflow management system that simplifies management of tasks realised by a distributed engineering environment. TRMS uses **ecollegML** markup language for description of: tools, tasks, and workflows.

### 1.3 TRMS Architecture

A general architecture of the TRMS in the simplified perspective includes three basic components: **Global Tool Lookup Server (GTLS)**, **Tool Server (TS)** and **Client**. Additionally, **Advanced Network Transport Services (ANTS)** supporting communication and **Data Bases Server (DB)** responsible for data storage complete the architecture. The main component GTLS is responsible for registration and modification of data on users and their privileges, elements of the system, as well as, information on accessible tools and machines that make them available. GTLS is also responsible for the security policy of the whole system. The ANTS is a SOAP web service that enables routed data transport through gateways and firewalls. TRMS uses ANTS for the transport of all data between clients and remote tools. ANTS can also be used to distribute SOAP messages across network boundaries. It enables TRMS to be deployed fully independent of the network infrastructure when ANTS connectivity is supported. DB server contains two databases: a native XML DB Exists with tool descriptions and the relational DB PostgreSQL with information on users and their privileges. TS is responsible for confirmation of users identity and privileges, as well as directly launches the tool.

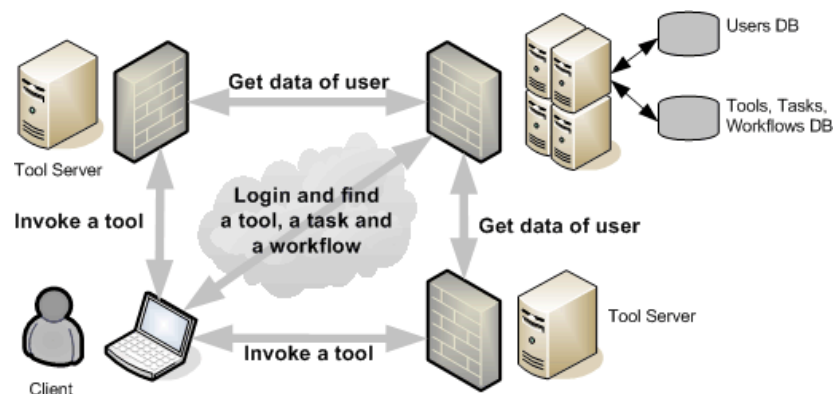


Figure 1.2 TRMS architecture

## 2 INSTALLATION AND CONFIGURATION

### 2.1 System requirements

- ◆ Operating System:
  - ✓ TRMS is independent on the operating system platform. It has been tested on the following OS: *Windows 2000, Windows XP, Linux (Mandrake 10), Solaris 8*
- ◆ Minimum Hardware Requirements:
  - ✓ Processor platform i586, i686
  - ✓ Memory RAM minimum 64MB (greater recommended)
  - ✓ Installed Disk Space 10 MB or more of free hard drive space
- ◆ Minimum Software Requirements:
  - ✓ Installed Java 2 Platform, Standard Edition (J2SE)<sup>1</sup>

<sup>1</sup>NOTE: TRMS has been tested with J2SE 1.4.0\_x, 1.4.1\_x, 1.4.2\_x and 1.5\_x. Unfortunately, we have noticed some problems with J2SE 1.4.2\_x. It is caused by a lack of compatibility in attendance of JCEKS keystore file in this edition (<http://developer.java.sun.com/developer/bugParade/bugs/4887561.html>). JCE keystore files store generated private and public keys for all system components, as well as for each user. The JCE keystore file created in other version J2SE then 1.4.2\_x is incorrectly read by this edition. We suggest creation of the new JCE keystore file and registration of new public and private keys in the GTLS database after each change of J2SE edition.

## 2.2 TRMS installation

A general architecture of the TRMS in the simplified perspective includes three basic components: Global Tool Lookup Server (GTLS), Tool Server (TS) and Client. They are delivered in the form of one archive (zip file). Installation requires unpacking of this archive to an optional folder and a proper modification of the configuration files.

Table 2.1: Contents of the installation folder

| Folders and files       | Contents   |
|-------------------------|--|
| /config                 | Configuration files  |
| /doc                    | Documentation  |
| /keys                   | Default localization of the files storing user's private and public keys and the GTLS public key |
| /lib/ciel/cielicons.zip | File with graphics used by TRMS  |
| /lib/ciel/trms-ciel.jar | Library file with TRMS   |
| /lib/ciel               | Libraries used by TRMS   |
| /lib                    | Additional libraries essential for correct TRMS operation (e.g. ANTS)                            |
| /resource               | Graphics files used by TRMS  |
| /sampleconfig           | Exemplary configuration files for ANTS   |
| /sampletooldesc         | Exemplary files describing tools   |
| /scripts                | Scripts starting up an environment   |
| /tmp                    | Working directory. Default directory for temporary and outcome files                             |
| /antsnames.txt          | File with hosts' names and node numbers (used by ANTS)   |
| /trms.jar               | ANTS Library   |

## 2.3 Configuration files

The TRMS environment employs a number of configuration files that allows a user to match the environment to requirements. All files are defined in the XML format. Configuration files are localized in the *config* subdirectory (an exception is the ANTS configuration file which is located in the *script* subdirectory). The *config* directory includes the following files: *GlobalConfig.xml*, *GTLSConfig.xml*, *ClientConfig.xml*, *TSConfig.xml*.

The *GlobalConfig.xml* file should exist in every TRMS distribution. It contains setups common for all TRMS' components. Remaining files (*GTLSConfig.xml*, *ClientConfig.xml*, *TSConfig.xml*) are used by individual parts of the TRMS environment.

The *GlobalConfig.xml* file includes the following XML tags:

Table 2.2: GlobalConfig.xml file

| TAG                          | VALUE/<br>DEFAULT VALUE             | DESCRIPTION  |
|------------------------------|-------------------------------------|--|
| type_communication_with_gtls | <u>tomcat/ants</u>                  | Type of communication with the GTLS server.  |
| level_debug                  | <u>user/administrator/developer</u> | It specifies the range of messages displayed on the screen.  |
| encryption                   | <u>yes/no</u>                       | It switches on encryption during communication. All components of the TRMS environment must have the same setups.    |
| compression_message          | <u>yes/no</u>                       | It switches on compression of files during communication (it is useful with slow networks )                          |
| enable_local_cache           | <u>yes/no</u>                       | It switches on caching data on a local disk It decreases frequency of communication with GTLS server and databases.  |
| time_delay_ping_to_gtls      | (Integer) <u>1200</u>               | Frequency with that TS or client application is communicated with GTLS server for confirmations of its availability. |
| with_proxy                   | <u>yes/no</u>                       | YES in a proxy server presence.  |
| proxy_host                   | (IP lub url)                        | The proxy server IP or URL   |
| proxy_port                   | (Integer)                           | The proxy server port number.  |
| proxy_user_name              | (String)                            | User name for the proxy server, if it is required.   |
| proxy_user_password          | (String)                            | A password for the proxy server, if it is required.  |

Setups concerning client application are placed in the *ClientConfig.xml* file. This file includes the following XML tags:

Table 2.3: ClientConfig.xml file

| TAG                                | VALUE/<br>DEFAULT VALUE            | DESCRIPTION  |
|------------------------------------|------------------------------------|--|
| gui_type                           | simple/ts_manage/ <u>full</u>      | It allows the administrator to hide some functions of the client application and match GUI with user's requirements. The mode <i>simple</i> (simplified GUI) is useful, if user has access to searching out and launching tools only. Remaining functions are reserved for an administrator. |
| ip                                 | (URI)<br><u>157.158.96.14:8080</u> | The GTLS Server's IP address and port number   |
| nodeid                             | (ANTS Node)                        | The ANTS node number (It is used in case when ANTS type of communication has been chosen).   |
| gtls_public_key_file               | C:\TRMS\keys\gtls.cer              | The certificate with GTLS server's public key localization.  |
| dir_default_client_pair_secret_key | C:\TRMS\keys                       | Localization of the file storing user's private and public keys.   |
| dir_install                        | C:\TRMS                            | Target directory for client application.   |
| dir_working                        | C:\TRMS\work                       | Working directory. Default directory for temporary and outcome files   |
| ants_config                        |                                    | The nodeconfig.xml file localization. The <i>script</i> directory is default localization  |
| localANTS                          | <u>http://localhost:8080</u>       | The IP address on which the ANTS server has to listen to incoming messages.  |

Setups concerning the GTLS Server are placed in the *GTLSConfig.xml* file. The configuration file includes proper parameters for use of databases

Table 2.4: GTLSConfig.xml file

| TAG                       | VALUE/<br>DEFAULT VALUE                                   | DESCRIPTION   |
|---------------------------|---|---|
| login                     |   | User name for a database.   |
| password                  |   | A password for a database   |
| url                       |   | The database localization.  |
| driver                    |   | The database driver   |
| gtls_pair_secret_key_file |   | Localization of the file storing GTLS server's private and public keys.                   |
| dir_install               | C:\TRMS   | Target directory for GTLS Server installation.  |
| dir_working               | C:\TRMS\work  | Working directory. Default directory for temporary and outcome files                      |
| ants_config               |   | The nodeconfig.xml file localization. The <i>script</i> directory is default localization |
| localANTS                 | <a href="http://localhost:8080">http://localhost:8080</a> | IP address on which the ANTS server has to listen to incoming messages.                   |

Setups concerning a Tool Server are placed in the *TSConfig.xml* file. This file includes the following XML tags:

Table 2.5: TSConfig.xml file

| TAG                     | VALUE/<br>DEFAULT VALUE   | DESCRIPTION  |
|-------------------------|---|--|
| ts_id                   | (String)  | Name of a Tool Server. This name should be registered in GTLS database.                    |
| ts_communication_type   | <i>tomcat/ants</i>  | Type of communication with the GTLS server.  |
| ip                      | (URI)<br><a href="http://157.158.96.14:8080">157.158.96.14:8080</a> | The GTLS Server's IP address and a port number.  |
| nodeid                  | (ANTS Node)   | The ANTS node number (It is used in case when ANTS type of communication has been chosen). |
| gtls_public_key_file    | C:\TRMS\keys\gtls.cer   | The certificate with GTLS server's public key localization.                                |
| ts_pair_secret_key_file | C:\TRMS\keys  | Localization of the file storing Tool Server's private and public keys.                    |
| dir_install             | C:\TRMS   | Target directory for Tool Server installation.   |
| dir_working             | C:\TRMS\work  | Working directory. Default directory for temporary and outcome files                       |
| ants_config             |   | The nodeconfig.xml file localization. The <i>script</i> directory is default localization  |
| localANTS               | <a href="http://localhost:8080">http://localhost:8080</a>           | The IP address on which the ANTS server has to listen to incoming messages.                |

### 3 QUICK TOUR

#### 3.1 Login

The **Login Menu** enables a user to perform three basic operations: login to and logout from the TRMS system, as well as safe closing of the client application.

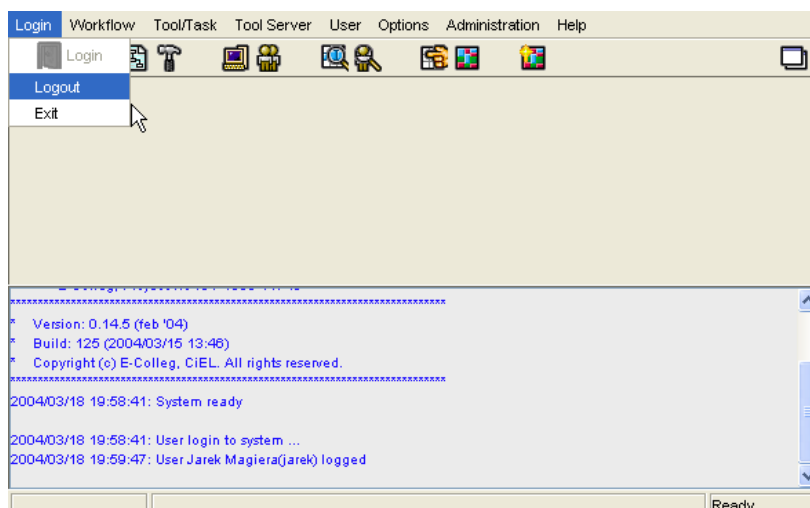


Figure 3.1: Login menu

### 3.2 Workflow

The **Workflow Menu** includes two items. The first one (*Workflow*) enables the user to create a simple workflow through sequence launch of distributed tools in such a way, that exit data of the first tool is input data for the second one. For this purpose a simple graphic workflow editor is used. The second item (*Tool invoke*) is used for invocation of remote tools.

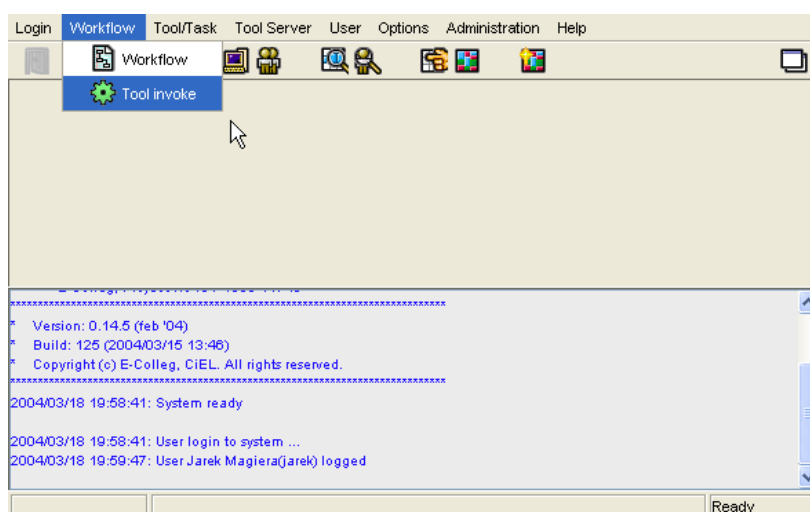


Figure 3.2: Workflow menu

### 3.3 Tool/Task

Invocation and management of tools, tasks, as well as workflows is possible through the **Tool/Task Menu**. It comprises four items, which enable the user to add new tools and effectively manage the registered tools. Depending on user's own privileges, the user can access a whole or a part of the Tool/Task Menu. Basically, a regular user can only browse information about registered tools and remotely launch them (if he owns sufficient privileges for launching these tools). Instruments for registration of new tools and suitable configuration of tools registered are reserved for an administrator. More information on

how to add a new tool, modify and delete registered tools one may find in section **Tool/Task – How to..?**

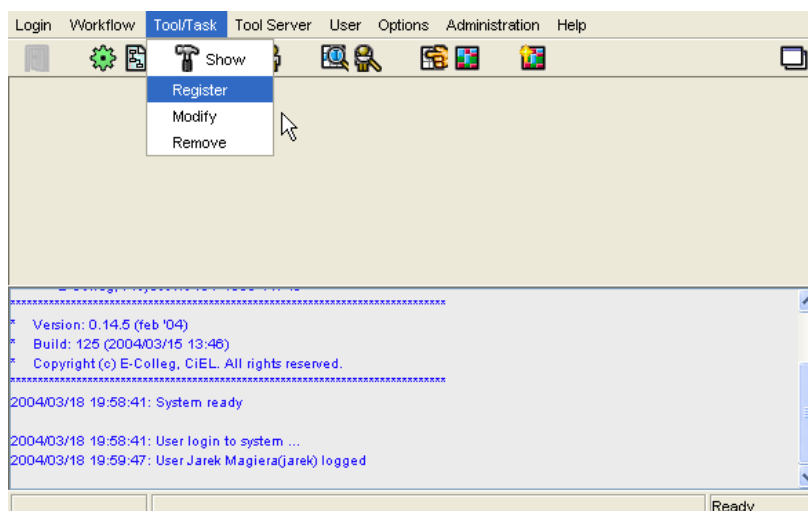


Figure 3.3: Tool/Task menu

### 3.4 Tool Servers

The **Tool Servers Menu** enables efficient management of Tool Servers. Four operations are available: adding a new Tool Server, as well as deleting, browsing and modifying parameters of registered Tool Servers. Depending on the user's own privileges a user can access a whole, or a part of the Tool Servers Menu. Due to the security reasons, most often the user owns privileges for browsing registered Tool Servers only. Instruments for registration of new Tool Servers and configuration the registered ones are reserved for the administrator. More information on how to add a new Tool Server, modify and/or delete the registered one, can be found in section **Tool Servers – How to..?**

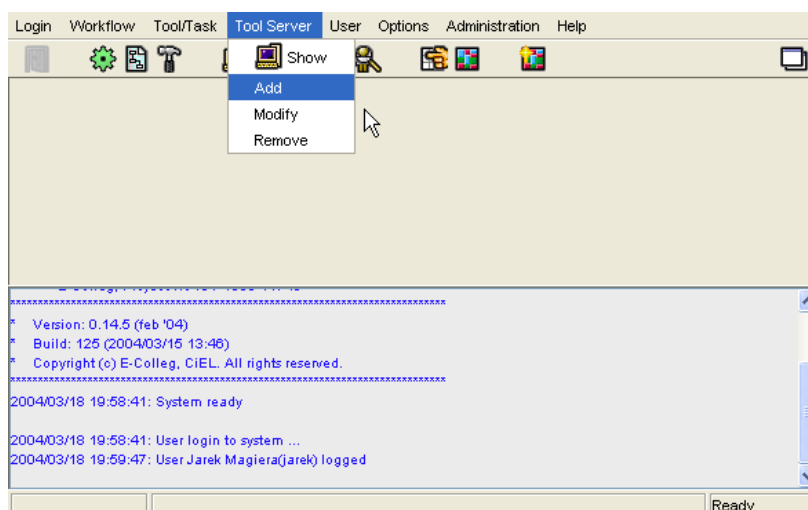


Figure 3.4: Tool Server menu

### 3.5 Users

Management of users is realised through the **Users Menu**. It comprises seven items, which enable proficient management of new and registered users and their privileges. Depending on the user own privileges the user can access a whole or a part of the Users Menu. Basically, a regular user can only browse information about other registered users and their privileges. Instruments for suitable configuration of users' accounts and their membership in a proper group and an institution are reserved for the administrator. More information on how to add a new user, modify and delete the registered ones one can find in section **Users – How to..?**

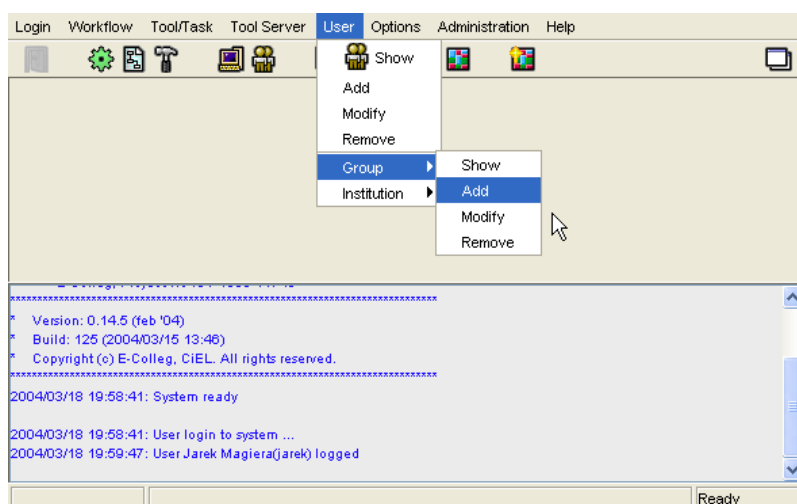


Figure 3.5: User menu

### 3.6 Options

The **Options Menu** includes four items. The **User configuration** item enables suitable configuration of the client application through setup of proper parameters determining cooperation with the GTLS server and Tool Servers. The **User profile** item displays complete information about the logged user. The **Look & Feel** item allows the user to change an appearance of the client application. The **Close all Windows** item closes all opened windows.

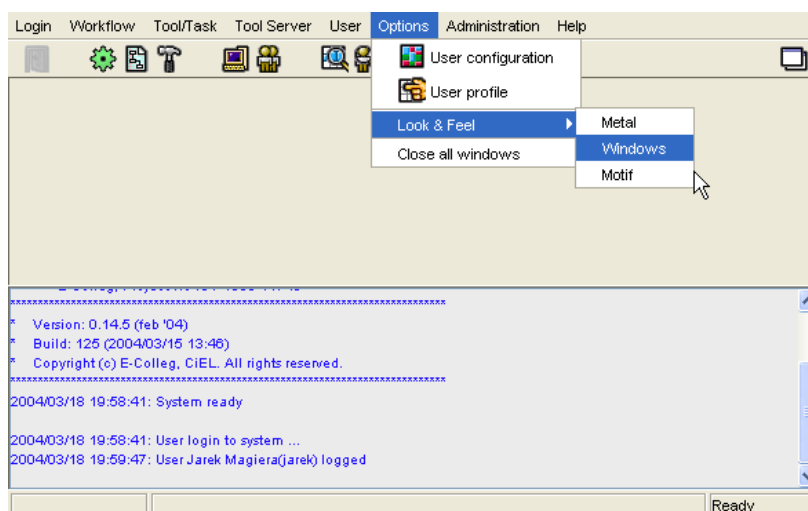


Figure 3.6: Options menu

### 3.7 Administration

The **Administration Menu** allows the user a suitable configuration of the GTLS server that is the main component of the TRMS. It enables looking after the users' activity and the availability of Tool Servers. The **Administration Menu** includes the following four items:

- **GTLS configuration** - for GTLS management (proper privileges are required)
- **TS sessions** - shows information on currently active and used Tool Servers
- **User sessions** - identifies users currently logged to the system.
- **Log** - enables access to logs with information on users and Tool Servers' activity.

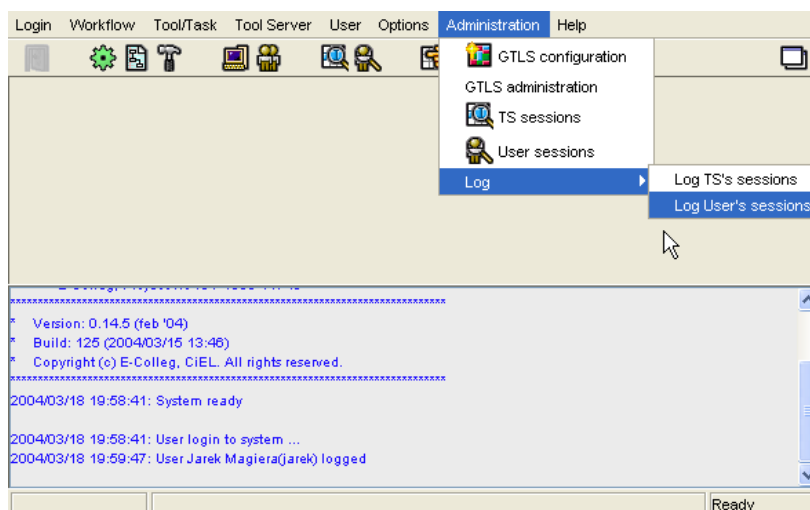


Figure 3.7: Administration menu

### 3.8 Help

The **Help Menu** allows access to two items. The first one (**Help**) is the simplified version of the current manual; the second one (**About**) includes information about version and copyright.

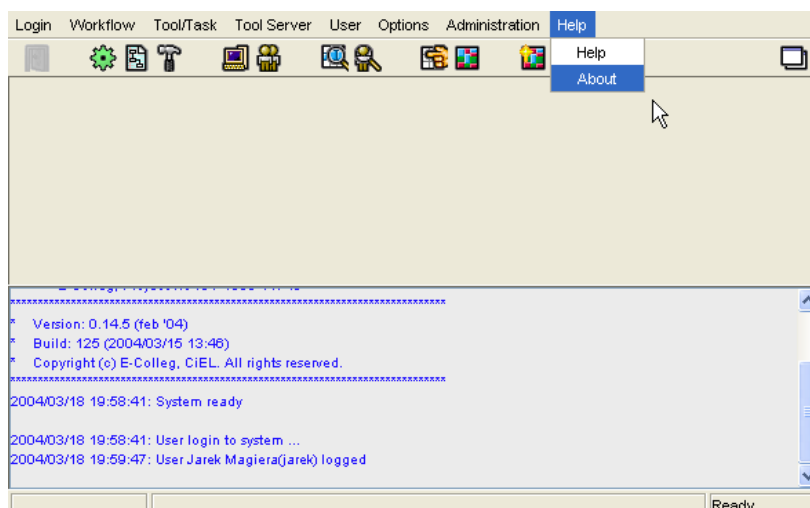


Figure 3.8: Help menu

## 4 LOGIN TO TRMS

### 4.1 How to login to TRMS?

The **Login** operation to the TRMS system is indispensable. To log in, one has to make the following steps:

Open the **Login Menu** and choose **Login** item

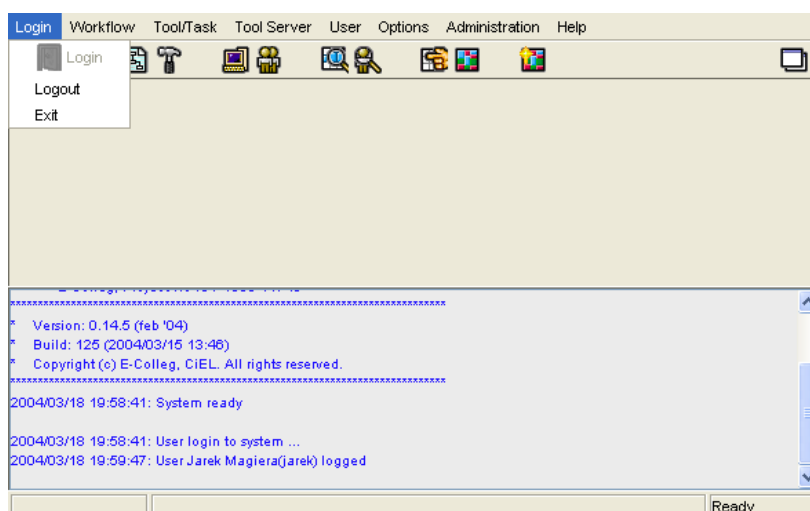


Figure 4.1: Login menu

Point at location of the file with one's own pair of keys.



Figure 4.2: Choose file window

Enter access password to the file.



Figure 4.3: Enter password window

If password and file location are correct corresponding message will appear.

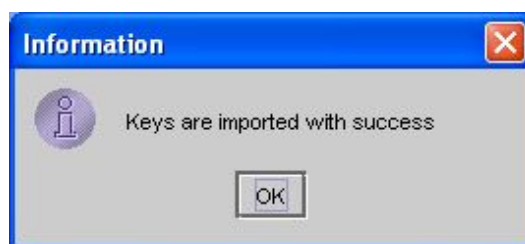


Figure 4.4: Message box

Enter the correct authentication credentials.



Figure 4.5: Enter credentials window

Now, you are logged to the system. All bookmarks are available. The right message is displayed.

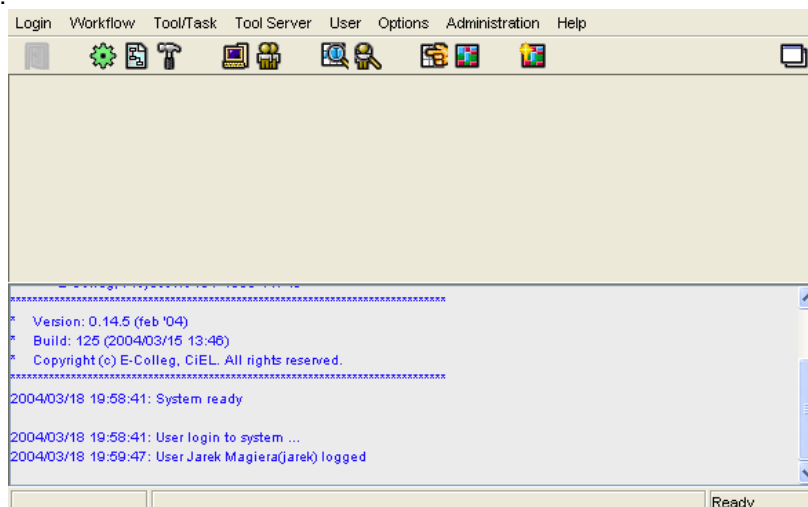


Figure 4.6: Main window

## 5 WORKFLOW – HOW TO ...?

### 5.1 Create a new workflow

The **Workflow** Menu allows the user to create a new workflow. Open the **Workflow** menu and select the **Workflow** item. A new window with a graphic workflow editor will be displayed.

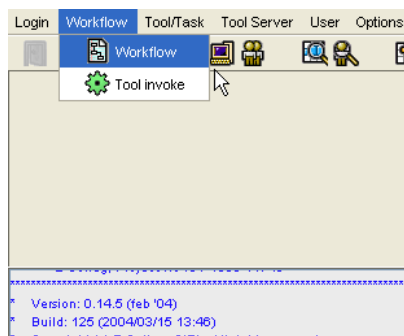


Figure 5.1: Workflow menu

The workflow designer window includes two bookmarks: **Designer** and **Main info**. The **Main info** bookmark allows a designer to enter general information of the created workflow.

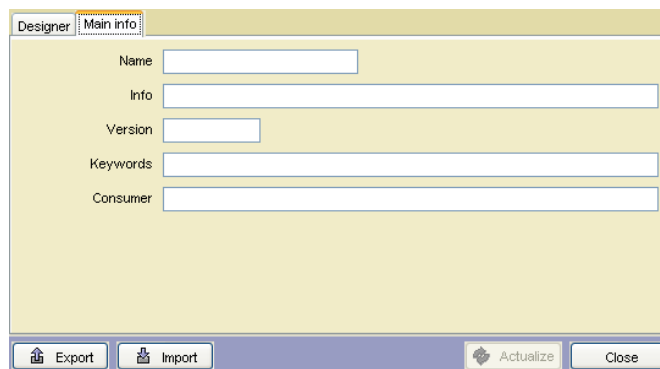

A screenshot of the 'Main info' bookmark in the workflow designer window. The window has a title bar with 'Designer' and 'Main info'. The main area contains five text input fields: 'Name', 'Info', 'Version', 'Keywords', and 'Consumer'. At the bottom, there are four buttons: 'Export', 'Import', 'Actualize', and 'Close'.

Figure 5.2: Main info bookmark

The **Designer** bookmark displayed below includes two blocks start and stop, which represent beginning and the end of the designed workflow. Each new block will be inserted between them and represents a task. Click on the **Add new block**  button.

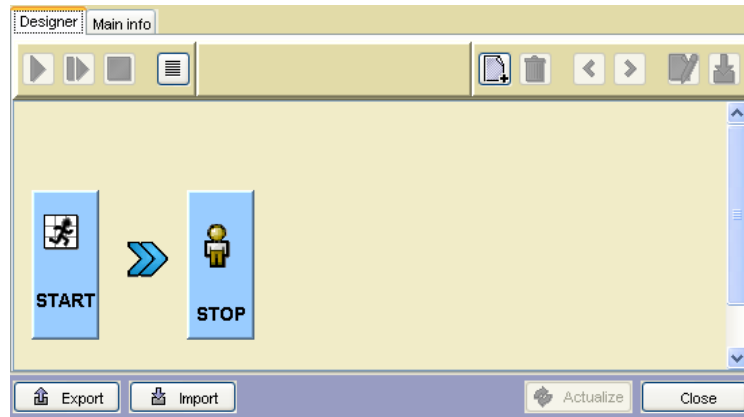


Figure 5.3: Designer window

A new block appears in the designer window.



Figure 5.4: Adding a new block

The user can declare a new task represented by the block in two ways. The task can be imported from the earlier prepared XML file or just created ad hoc.

### Import the task

Click on the **Import** button. A new window appears. The **Select file** window allows the user to select location of a task file. Next, click on the **Choose** button.

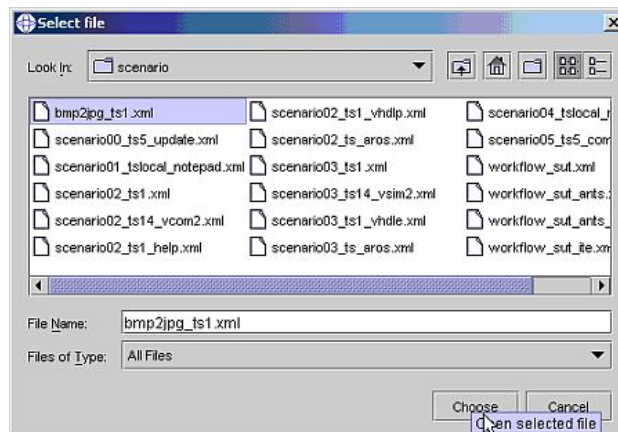



Figure 5.5: Choose file window

The task has been imported.

### Create the task

If one wants to create/declare a new task, click on the **Edit block**  button or double click on the block. A new window appears. The same window is used for tool invocation. The detailed description on filling in all fields is available in section **5.3 Launch a tool**.

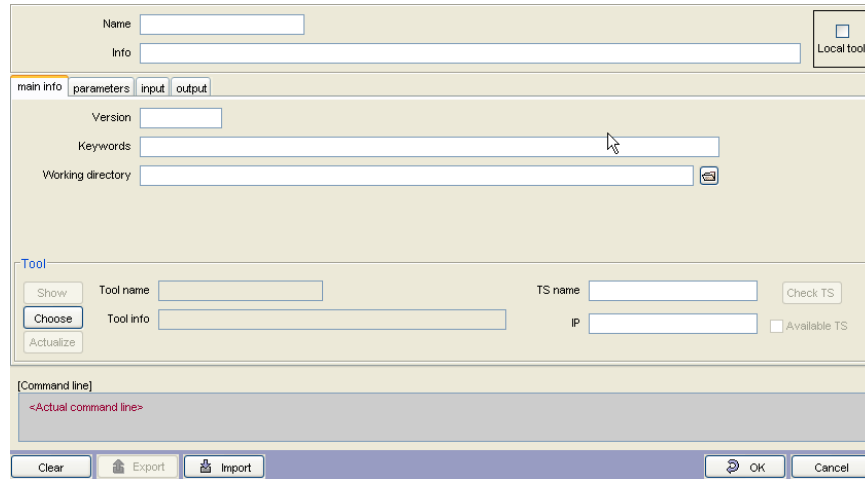


Figure 5.6: Edit task window

When the task is imported or created, the user has to update parameters of the imported/created task. This process checks correctness of the task configuration. TRMS verifies all parameters essential for a successful tool invocation. Click on the **Actualize** button.



Figure 5.7: Designer window

The user can also modify any time task settings by clicking on the **Edit block**  button.

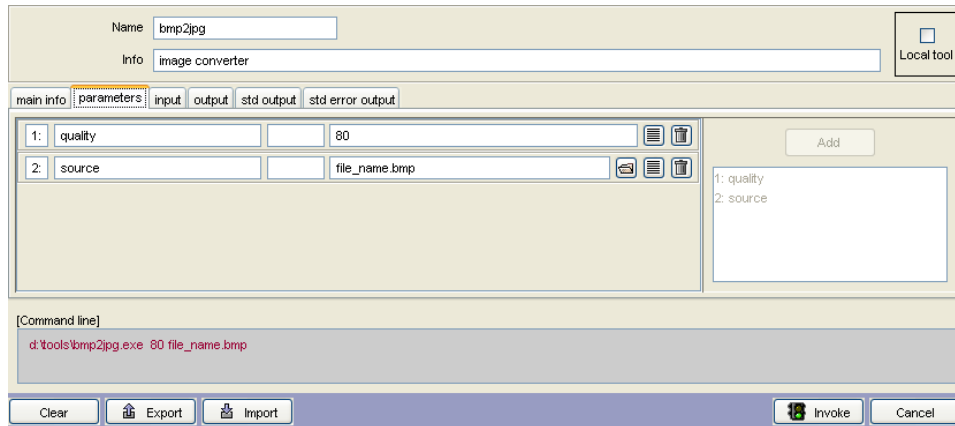


Figure 5.8: Edit task window

If all parameters are correct the task can be run. Click on the **Run selected tool** button.

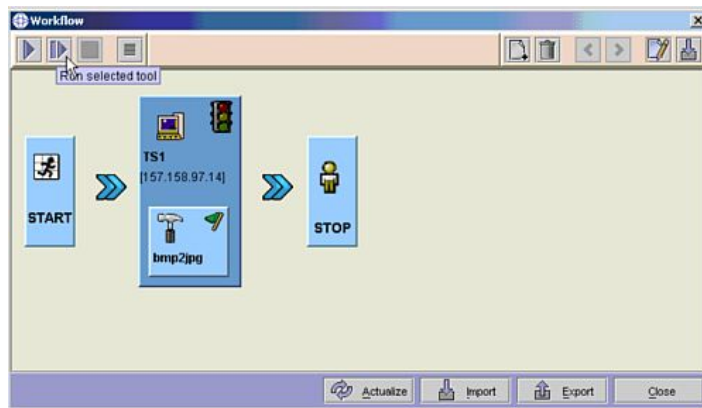


Figure 5.9: Workflow window – run task

The end of the task operation is indicated by a green light at the light controller. If the user wants to add more tasks to the workflow he repeats the action of adding a task.



Figure 5.10: Workflow window – the end of task operation

The created workflow can be saved as an XML file. Click on the **Export** button and select a proper location.

### 5.2 Launch a workflow

The **Workflow** Menu enables the user to import and launch prepared workflows. Open the **Workflow** menu and chose the **Workflow** item. A new window with the graphic workflow editor appears.

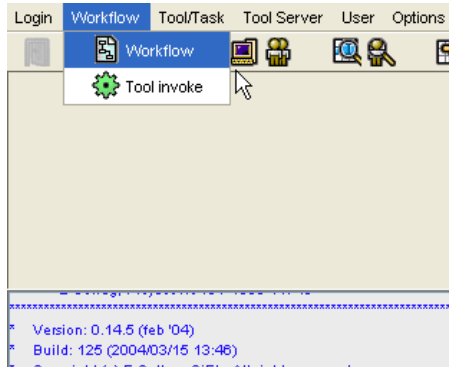
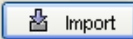


Figure 5.11: Workflow item

Click on the **Import**  button in the workflow editor window.

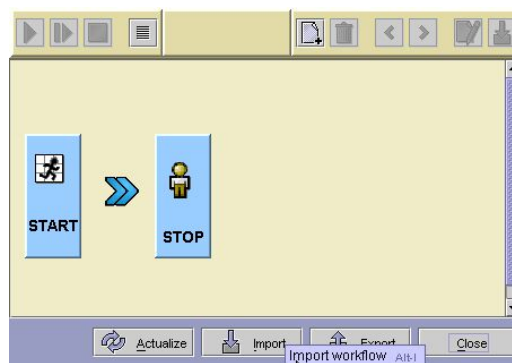


Figure 5.12: Workflow designer window

Choose a file with the earlier prepared workflow.

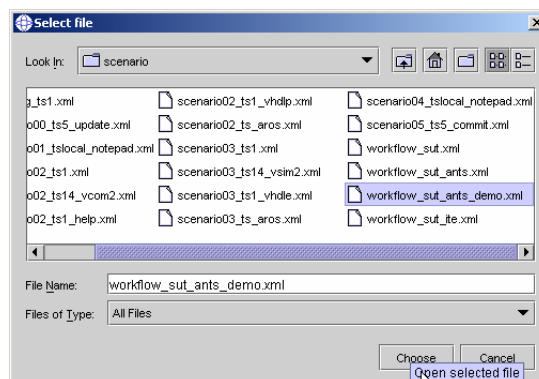



Figure 5.13: Choose file window

The workflow is imported. Now, click on the  button to execute the workflow.

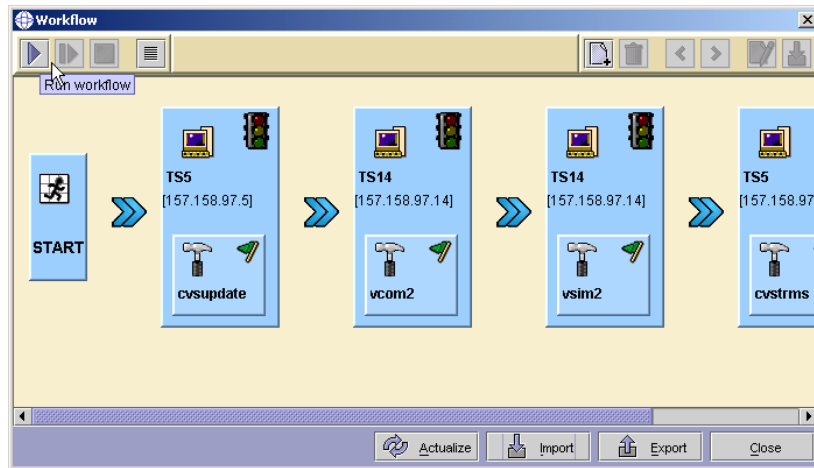


Figure 5.14: Imported workflow

### 5.3 Tool invocation

Tool invocation is realised through the **Workflow** Menu and selection of the **Tool invoke** item.

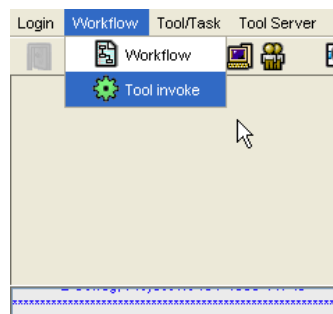


Figure 5.15: Tool invoke item

A new window with details will be displayed on the screen. Now, click on the **Choose** button.

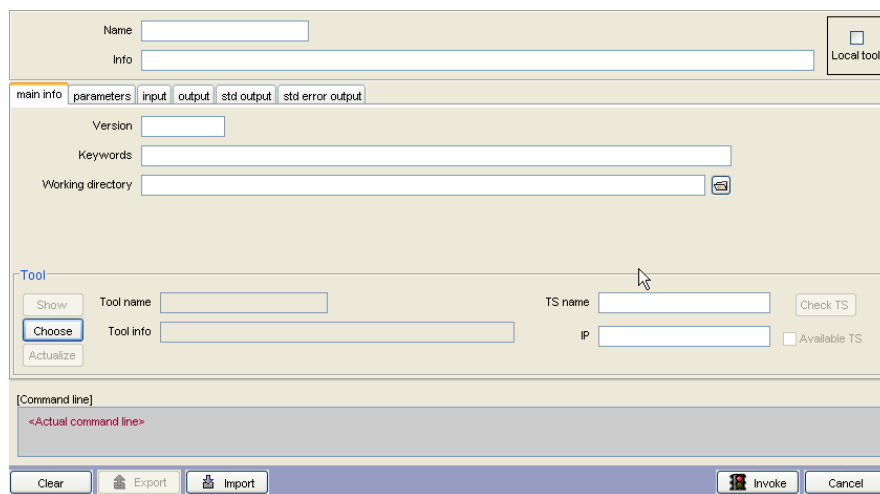
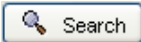
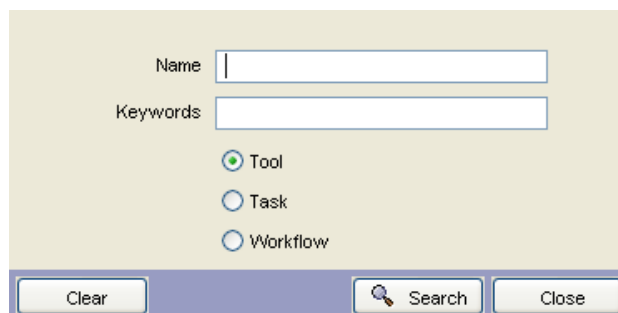


Figure 5.16: Tool invoke window

After activation of this item a proper searching window will be displayed. Tool name and keywords can be entered as the attributes of a searched tool. Next, press the  button. The result of searching will be displayed as a table. If no attributes are given then all tools currently registered in the TRMS database will be displayed.



The search window contains the following elements:

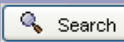
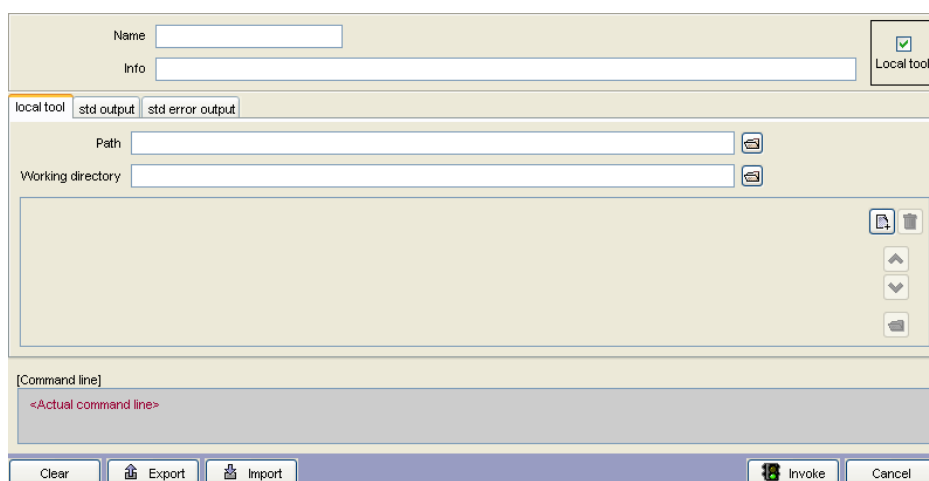
- Name:
- Keywords:
- Radio buttons for selection:
  - Tool
  - Task
  - Workflow
- Buttons at the bottom: Clear,  Search, Close

Figure 5.17: Search window

When the user wants to launch a local tool in the "Invoke editor" he must select the "Local tool" then the tool will be invoked on the local machine without using a remote Tool Server. He must put the "path", the "working directory" and also the "value of the parameter". The fields: the name/description" and the "name of parameter" are optional. Note that "the definition of the local tool" one can also export to a XML file (the optional fields will be also exported).



The local tool invocation window contains the following elements:






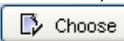
- Name:
- Info:
- Local tool checkbox:  Local tool
- Output tabs: local tool, std output, std error output
- Path:  
- Working directory:  
- Large text area for parameters with icons for copy, delete, and scroll.
- [Command line] section with a text area containing `<Actual command line>`
- Buttons at the bottom: Clear,  Export,  Import,  Invoke, Cancel

Figure 5.18: Local tool invocation window

The table consists of five columns which give the user basic information of the tools registered in TRMS. Data in **Name** and **Keyword** fields can be used for searching a tool. The other fields include info of tools, their location, as well as availability. Mark the searched tool and click on the  button. A proper window with details appears.

| Name              | Info                               | Keywords              | Name TS  | Availabl...                         |
|-------------------|------------------------------------|-----------------------|----------|-------------------------------------|
| 7z                | 7-Zip is a file archiver           | ZIP, CAB, RAR, A...   | TS1      | <input checked="" type="checkbox"/> |
| acdsee_Manuel     | to fill in                         | acdsee_Manuel         | TS10     | <input type="checkbox"/>            |
| art               |                                    |                       | kuba     | <input type="checkbox"/>            |
| bmp2jpg           | image converter                    | bmp2jpg               | TS1      | <input checked="" type="checkbox"/> |
| create file       |                                    |                       | TS5      | <input checked="" type="checkbox"/> |
| cvstrms           | cvs                                | cvs                   | TS5      | <input checked="" type="checkbox"/> |
| cvsupdate         | cvs                                | cvs                   | TS5      | <input checked="" type="checkbox"/> |
| dir               |                                    |                       | TS5      | <input checked="" type="checkbox"/> |
| dir pf1           | dir notebook                       |                       | TS6      | <input type="checkbox"/>            |
| get files         | Getting the files from Tool Ser... | det file              | Aros4    | <input type="checkbox"/>            |
| gvim              | viewer                             | gvim, view            | TS1      | <input checked="" type="checkbox"/> |
| gvim_17           | vim                                | vim                   | TS17     | <input type="checkbox"/>            |
| ipconfig          | IP configuration of Aros4          |                       | Aros4    | <input type="checkbox"/>            |
| ipconfig2         |                                    |                       | TS5      | <input checked="" type="checkbox"/> |
| jpg2bmp           | image converter                    | jpg2bmp               | TS1      | <input checked="" type="checkbox"/> |
| kuba_ping         |                                    |                       | kuba     | <input type="checkbox"/>            |
| laplaciien_Manuel | to fill in                         | laplaciien_Manuel     | TS10     | <input type="checkbox"/>            |
| map               | Part of ISE 6.1i                   |                       | Aros4    | <input type="checkbox"/>            |
| netgen            | part of ISE 6.1                    |                       | Aros4    | <input type="checkbox"/>            |
| netstat           | Shows the state of the netwo...    | network state inte... | Aros4    | <input type="checkbox"/>            |
| ngdbuild          | Part of ISE 6.1i                   |                       | Aros4    | <input type="checkbox"/>            |
| no23              | player                             | mp3,wav               | TS17     | <input type="checkbox"/>            |
| notepad           | text editor                        | txt, notepad          | LOCAL_TS | <input type="checkbox"/>            |

Figure 5.19: Search result

In this example the bmp2jpg tool was chosen. It makes a picture conversion from bmp to jpg standard. In a new window the user can see **Name** of the tool and its **Version**. **TS name** informs on which Tool Server the tool is installed. Clicking on the **Check TS** button the user can check if this Tool Server is available.

The screenshot shows a window titled 'Tool invocation menu' for the tool 'bmp2jpg'. It contains several input fields: 'Name' (filled with 'bmp2jpg'), 'Info' (filled with 'image converter'), 'Version', 'Keywords', and 'Working directory'. Below these are tabs for 'main info', 'parameters', 'input', 'output', 'std output', and 'std error output'. The 'main info' tab is active, showing 'Tool name' (bmp2jpg), 'Tool info' (image converter), 'TS name' (TS1), and 'IP' (157.158.97.14:8080). There is a 'Check TS' button and an 'Available TS' checkbox. At the bottom, a 'Command line' field shows 'd:\tools\bmp2jpg.exe' in red text. Buttons for 'Clear', 'Export', 'Import', 'Invoke', and 'Cancel' are at the bottom.

Figure 5.20: Tool invocation menu

The **Parameters** bookmark enables the user to specify parameters required for a correct tool invocation. Each parameter added by the user is visible in the **command line** displayed in red. With this command line the tool is remotely launched at the Tool Server side.

This screenshot shows the same tool invocation menu as Figure 5.20, but with the 'parameters' bookmark selected. It displays a list of parameters: '1: quality' with value '80' and '2: source' with value 'file\_name.bmp'. An 'Add' button is visible. The 'Command line' field now shows 'd:\tools\bmp2jpg.exe 80 file\_name.bmp' in red text. The 'Invoke' and 'Cancel' buttons are at the bottom.

Figure 5.21: Parameter bookmark

The **Input** bookmark shows location of the source file that will be sent to a remote tool. This parameter was entered in the **Parameters** bookmark.

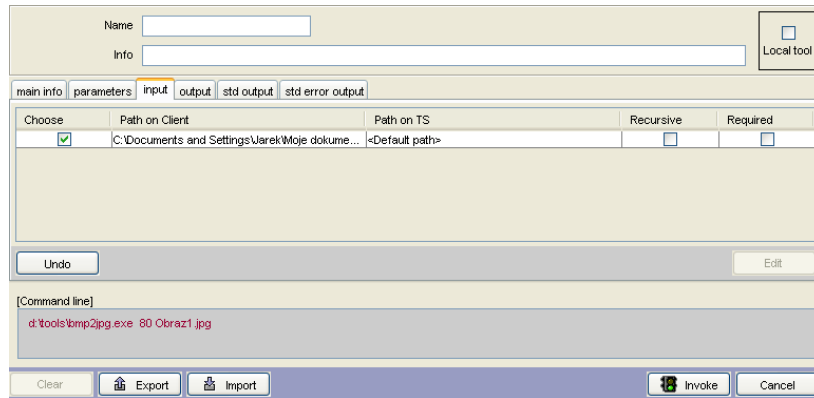


Figure 5.22: Input bookmark

The **Output** bookmark allows the user to specify a destination directory on the client side where the result of operation will be saved. Define default path and click on the **Edit** button. A new window will be displayed on the screen.

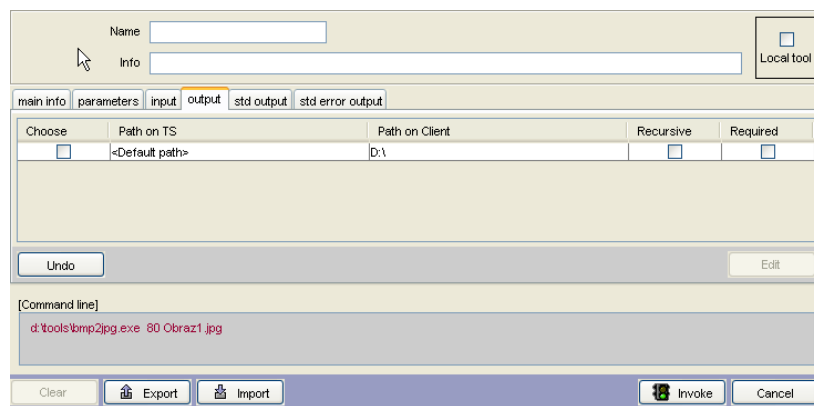


Figure 5.23: Output bookmark

Enter required location and click on **OK** button.

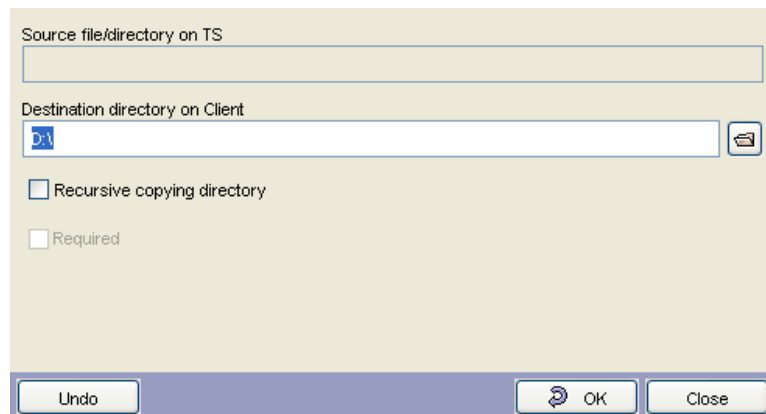
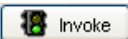
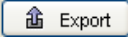


Figure 5.24: Destination directory window

Now, the user can launch the tool. Click on  button. The user's request will be sent to the Tool Server. Tool invocation parameters, may be saved with the use of the  button. In a new window the user can enter the localisation where parameters will be saved as an XML file. The saved file is described as a **task** and it includes complete list of parameters essential for the correct tool invocation. Later, the user can reuse the saved file for the same tool, as often as he wishes.

## 6 TOOL/TASK – HOW TO ?

### 6.1 Add a new tool

In the first place each tool jointly used in the TRMS, has to be registered in the Global Tool Lookup Service's database. After opening the **Tool/Task** Menu the **Register** item should be chosen. Below, a proper dialog window is shown.

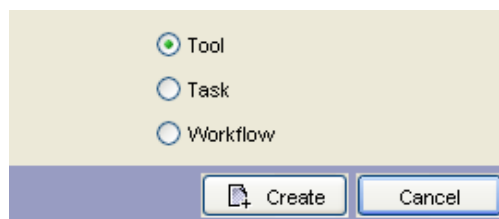


Figure 6.1: Choose window

Choose the Tool and click on the  button.

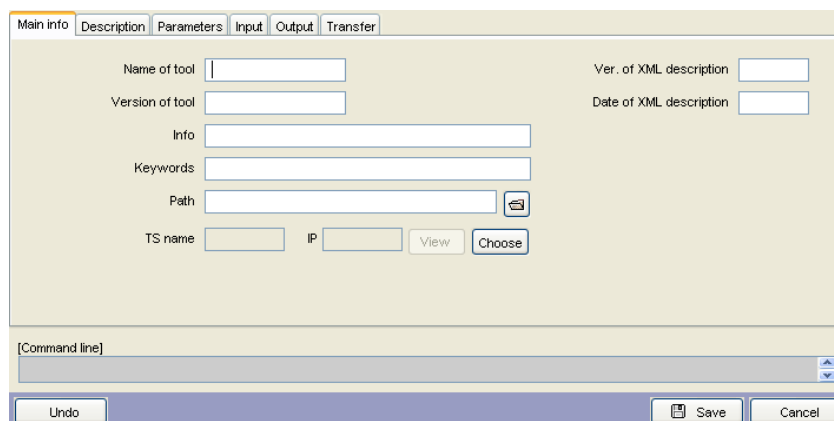


Figure 6.2: Main info bookmark

All fields should be filled in following the labels. The tool location in the file system could be chosen by means of the FileChooser window. The Tool Server that serves registering tool can be selected only from the Tool Servers currently registered in the GTLS's database. In this purpose click on the **Choose** button and check the available Tool Servers. Additionally, the dialog window includes fields with version of tool's XML description and date of its creation. At the bottom of the dialog window the command line that will be used for launching the tool is displayed in the red colour.

The **Description** bookmark allows the user to add a short description of the registered tool.



Figure 6.3: Description bookmark

The tool can be launched with many characteristic parameters. The bookmark **Parameters** provide a possibility to declare them. It enables the user to specify the name of a parameter, a position in the command line, a type of the parameter, default value and its description. The user can also declare whether the parameter is required or can be changed while it is being invoked. Parameters only defined in this bookmark will be available for other users. This way, access to the tool can be limited to the registered user. Click on the **Add** button in order to add a new parameter. A new dialog window will be opened.

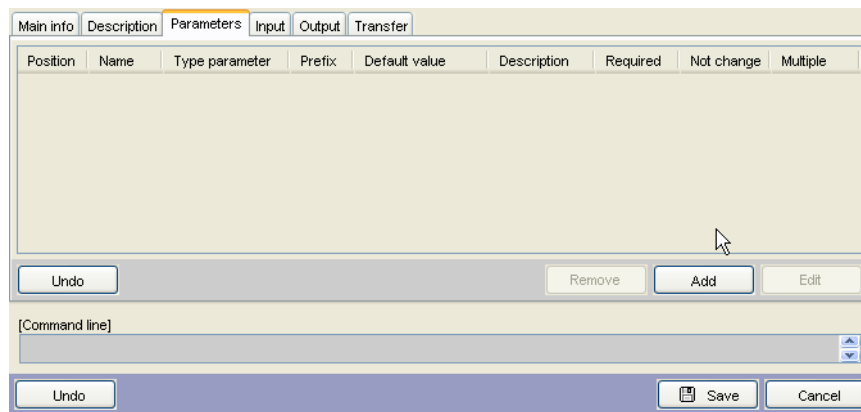


Figure 6.4: Parameters bookmark

Fill out all fields in accordance with labels. The **Position** field defines on which position in the command line the parameter will be added during tool invocation. The **Type** field defines a type of added parameter and must be chosen from the existing list. If parameter must be added to each invocation mark **Required**. If parameter can not be changed during tool invocation mark **Not change**.

Name  Position

Type   Required

Prefix   Not change

Default value   Multiple

Description

[Command line]

Undo OK Close

Figure 6.5: Add a parameter window

Name

Type   Required

Prefix

Default value

Description

Text parameter

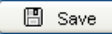
Number

File parameter

Without value

Selection parameter

Figure 6.6: Type of a parameter list

The user finishes editing parameter clicking on OK button. After edition a proper number of parameters user saves them in GTLS' database clicking on  Save button. This way, a new tool registration has been ended.

| Position | Name      | Type parameter | Prefix | Default value | Description | Required                            | Not change               | Multiple                 |
|----------|-----------|----------------|--------|---------------|-------------|-------------------------------------|--------------------------|--------------------------|
| 1        | par1      | Text parameter |        |               |             | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2        | File Name | File parameter |        |               |             | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Undo Remove Add Edit

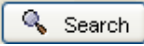
[Command line]

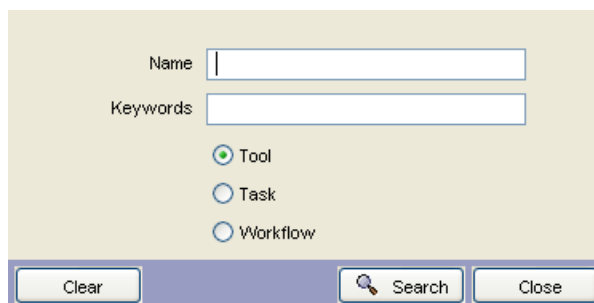
Undo Save Cancel

Figure 6.7: Parameters bookmark

## 6.2 Modify a tool

This mechanism allows the user to modify tools' characteristics registered in the TRMS database. Open the **Tools** menu and select the **Modify** item. After activation of this item a proper dialog window appears. **Tool name** and also **Keywords** can be entered as the

attributes of the searched Tool. Next press the  button. The result of searching is displayed in the table form. If the user enters no attributes, all tools currently registered in the TRMS' database will be displayed.



The search window contains two text input fields: 'Name' and 'Keywords'. Below these fields are three radio buttons: 'Tool' (selected), 'Task', and 'Workflow'. At the bottom of the window are three buttons: 'Clear', 'Search' (with a magnifying glass icon), and 'Close'.

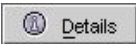
Figure 6.8: Search window

The result of searching is displayed as a table. The **Name** column shows tool's name as it was registered in the TRMS. The **Info** column contains short tool description. The **Keywords** column includes words which are characteristic for this tool. The **Name TS** column gives the user information of the tool location and **Available TS** indicates that the Tool Server is currently available. **Tool name** as well as **keywords** could be used for searching the tools registered in TRMS.

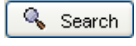
| Tool name | Tool info       | Keywords | Name TS | Available...             |
|-----------|-----------------|----------|---------|--------------------------|
| bmp2jpg   | image converter | bmp2jpg  | TS1     | <input type="checkbox"/> |

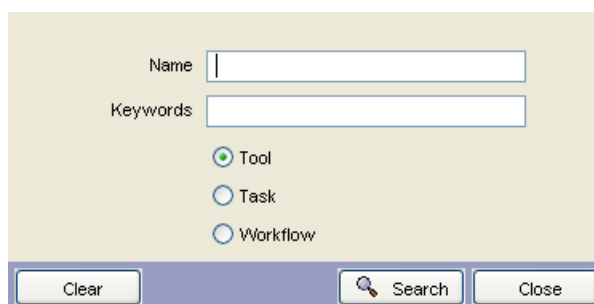
Below the table are five buttons: 'Refresh' (with a circular arrow icon), 'New search', 'Details' (with a magnifying glass icon), and 'Close'.

Figure 6.9: Search result

Mark the selected tool and click on the  button. A new window with additional bookmarks appears. All fields are available for editing. In a similar way, as in the case of new tool registration, one can change attributes of a tool.

### 6.3 Remove a tool

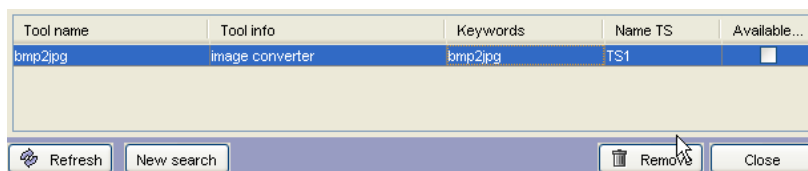
This mechanism allows removal of tools registered in the TRMS database. Open the **Tools** menu and select the **Remove** item. After activation of this item a proper dialog window is displayed. **Tool name** and also **Keywords** can be entered as the attributes of the searched Tool. Next, press the  button. The result of searching is displayed in the table form. If the user enters no attributes, all tools currently registered in the TRMS' database will be displayed.



This is an identical copy of the search window shown in Figure 6.8, featuring 'Name' and 'Keywords' input fields, radio buttons for 'Tool', 'Task', and 'Workflow', and 'Clear', 'Search', and 'Close' buttons.

Figure 6.10: Search window

The **Name** column shows tool's name, as it was registered in the TRMS. The **Info** column contains a short tool description. The **Keywords** column includes words which are attributes for this tool. The **Name TS** column gives the user information of the tool location and **Available TS** indicates that Tool Server is currently available. Tool name as well as keywords could be used for searching for tools registered in TRMS.



| Tool name | Tool info       | Keywords | Name TS | Available...                        |
|-----------|-----------------|----------|---------|-------------------------------------|
| bmp2jpg   | image converter | bmp2jpg  | TS1     | <input checked="" type="checkbox"/> |

Figure 6.11: Search result

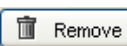
Mark a chosen tool and click on the  **Remove** button. You will be asked for confirmation of operation. Click **Yes** button.



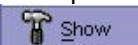
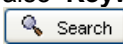
Figure 6.12: Confirmation window

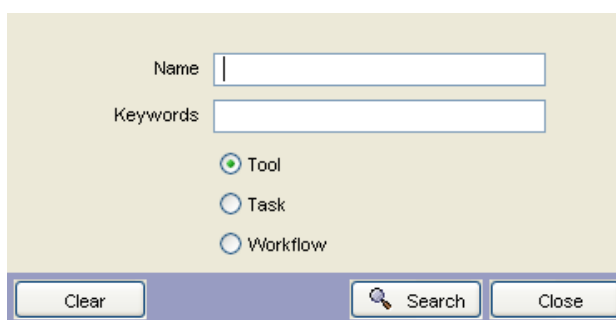
The chosen tool has been deleted from the GTLS database. System will display a suitable message.



Figure 6.13: Info box

#### 6.4 Browse registered tools

This mechanism allows a user to lookup for tools currently registered in the TRMS. Open the **Tools** menu and select the  **Show** item. After activation of this item a proper dialog window is displayed. **Tool name** and also **Keywords** can be entered as the attributes of the searched Tool. Next, press the  **Search** button. The result of search is displayed in the table form. If a user enters no attributes, all tools currently registered in TRMS' database will be displayed.



A search window dialog box with a light beige background. It contains two text input fields: 'Name' and 'Keywords'. Below these fields are three radio buttons: 'Tool' (selected), 'Task', and 'Workflow'. At the bottom, there are three buttons: 'Clear', 'Search' (with a magnifying glass icon), and 'Close'.


Figure 6.14: Search window

The **Name** column shows tool's name as it was registered in the TRMS. The **Info** column contains a short tool description. The **Keywords** column includes words which are characteristic for this tool. The **Name TS** column gives the user information on the tool location and **Available TS** indicates that Tool Server is currently available. Tool name as well as keywords could be used for searching the tools registered in TRMS.

| Tool name | Tool info       | Keywords | Name TS | Available...             |
|-----------|-----------------|----------|---------|--------------------------|
| bmp2jpg   | image converter | bmp2jpg  | TS1     | <input type="checkbox"/> |

Below the table are buttons: Refresh, New search, Details, and Close.

Figure 6.15: Search result

If one wants to browse detailed information on the tool, that was found, one has to mark the right user and click on the  button. A new window pops up. More information on the contents of this window one can find in section **How to add a new tool?**

## 7 TOOL SERVER – HOW TO...?

### 7.1 Add a new Tool Server

Each Tool Server jointly exploited in the TRMS has to be registered in the Global Tool Lookup Service's database. After opening **Tool Servers** menu, the **Add** item should be chosen. Below, a proper dialog window is showed.

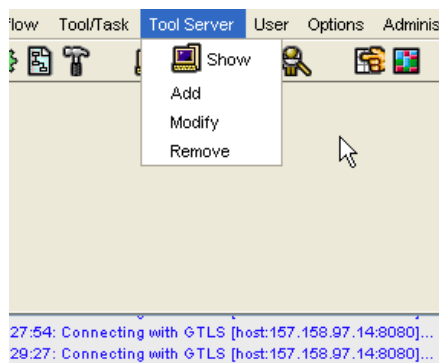


Figure 7.1: Tool Server menu

All fields should be filled in following the labels. The **Tool Server Name** is a registered name of the Tool Server in the database. The **Type communication** field allows an administrator to choose a type of communication used by the specific Tool Server. Tomcat communication or ANTS communication types are available. The **IP** field determines IP and the port number utilised by Tool Server. The **Expired** field comprises expiry date. The **Read Public Key** allows the user to take Tool Server's public key from a certificate file and record them into the GTLS database.

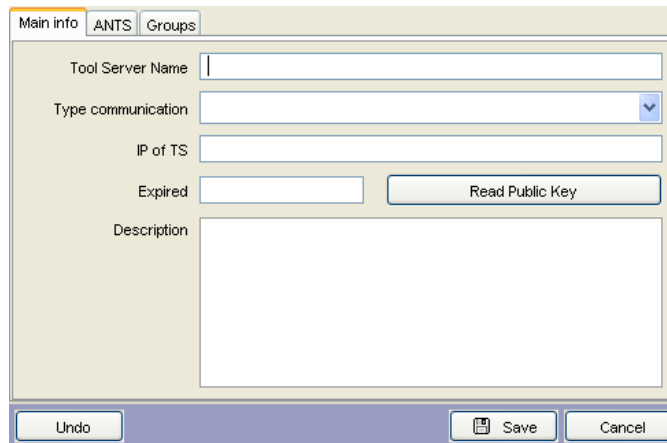


Figure 7.2: Main info bookmark

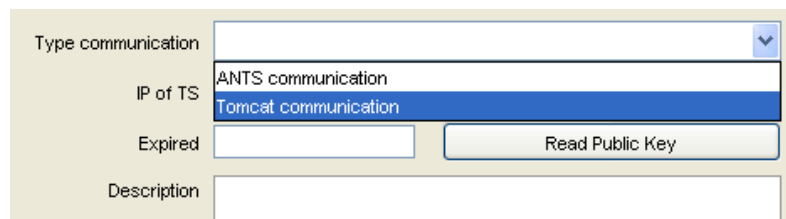


Figure 7.3: Type of communication list

The **ANTS** bookmark enables the user to specify **Node Id** for the registered Tool Server. Node Id is indispensable when ANTS is chosen as the type of communication.

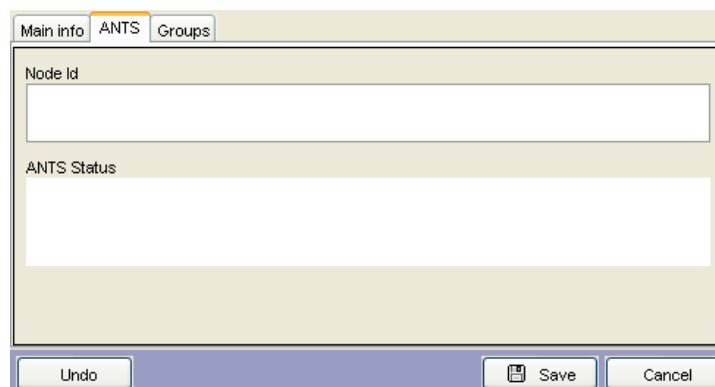


Figure 7.4: ANTS bookmark

**Groups** bookmark allows the user to define who can access to the registered tool server.

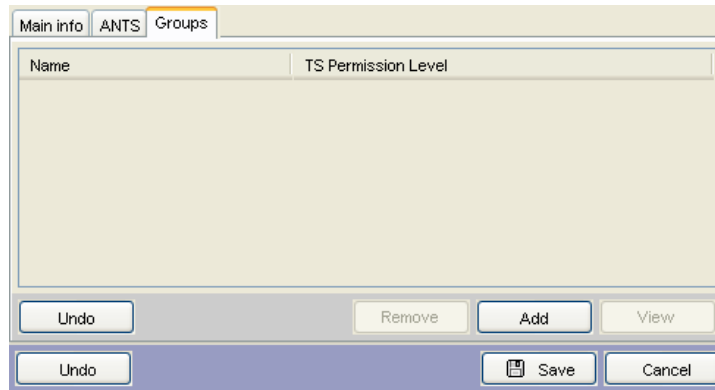


Figure 7.5: Groups bookmark

Click on the **Add** button. A new window appears. The user can enter the name of the required group. If the user provides no group name, all groups currently registered in the TRMS' database will be displayed.



Figure 7.6: Search window

Mark the required group or role and click on the **Choose** button. A new item in the **Group** bookmark will be added.

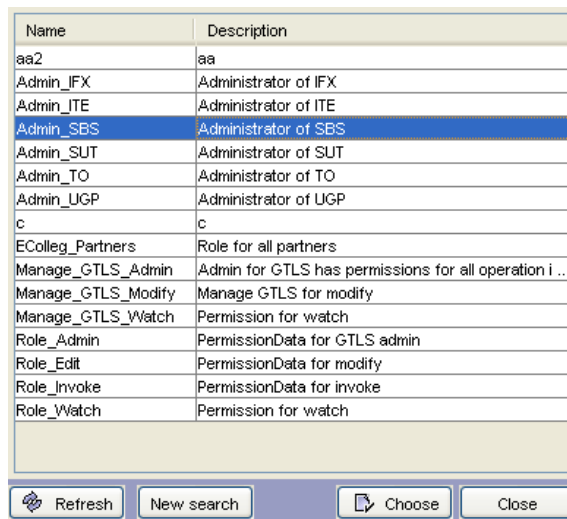


Figure 7.7: Search result

The user can repeat this action several times for adding all required groups and roles. Next, click on **TS Permission Level** for each group and role, and select an adequate level.

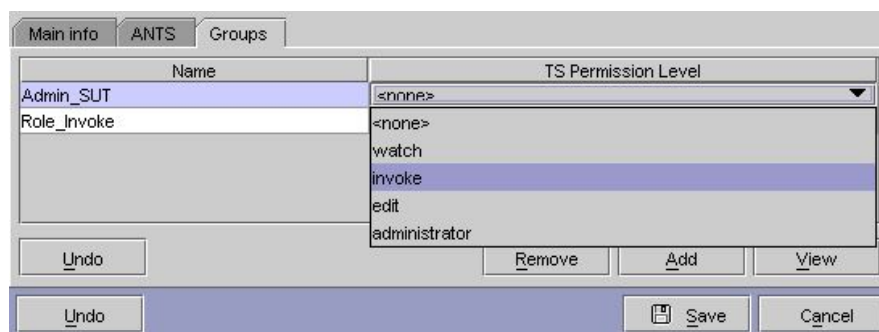


Figure 7.8: Permission list

If you want to browse detailed information of the granted privileges you mark appropriate group or role and click on the  button. A new window with two additional bookmarks appears.



Figure 7.9: Permission bookmark

## 7.2 Modify a Tool Server

This mechanism allows the user to modify the attributes of the Tool Servers which are registered in the TRMS database. Open the **Tool Server** menu and select the **Modify** item. After activation of this item a proper dialog window will be displayed. Tool Server Name and also Tool Server IP can be entered as the attributes of the modified Tool Server. Next, press the  button. The result of searching is displayed as a table. If the user enters no attributes, all Tool Servers currently registered in TRMS' database will be displayed.

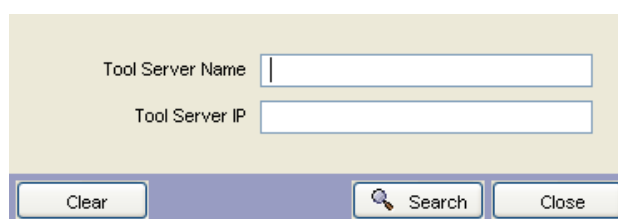


Figure 7.10: Search window

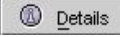
The result of searching is displayed in the table form. The **Name** column shows Tool Server's name as it was registered in the TRMS. The **Description** column contains a short description. The **Valid until** column includes the expiration date for this Tool Server. The **IP** column gives the user information of Tool Server location in the network and

**Available** indicates that Tool Server is currently available. Tool Server Name, as well as Tool Server IP could be used for searching the tool servers registered in TRMS.

| Name          | IP                   | Valid until | Description                     | Available                           |
|---------------|----------------------|-------------|---------------------------------|-------------------------------------|
| Aros4         | 148.81.189.95        |             | x86 machine with 800MHz Athl... | <input checked="" type="checkbox"/> |
| BOB           | 157.158.97.14:8080   |             | CIEL                            | <input type="checkbox"/>            |
| ITE1          | 148.81.189.95        |             | qqq"                            | <input type="checkbox"/>            |
| jarek         | 80.54.93.200         |             |                                 | <input type="checkbox"/>            |
| kuba          | 148.81.128.223       |             | SUN machine Processor: 443 M... | <input checked="" type="checkbox"/> |
| LOCAL_TS      | 127.0.0.1            |             | Local TS                        | <input type="checkbox"/>            |
| LOCAL_TS_TOSA | 127.0.0.1            |             | TOSA TS                         | <input type="checkbox"/>            |
| PF1@Home      | 10.2.1.209           |             | PF                              | <input type="checkbox"/>            |
| tk_test       | sddd                 |             | ddd                             | <input type="checkbox"/>            |
| TS Mandrake   | 10.2.1.210           |             | Mandrake 9.2                    | <input type="checkbox"/>            |
| TS1           | 157.158.97.14:8080   |             | CIEL-Tomcat                     | <input type="checkbox"/>            |
| TS14          | 157.158.97.14        |             | CIEL-Ants                       | <input checked="" type="checkbox"/> |
| TS17          | 157.158.97.17:8080   |             | MS-ATHLON                       | <input type="checkbox"/>            |
| TS3           | 157.158.97.3:8880    |             | CIEL                            | <input type="checkbox"/>            |
| TS4           | 157.158.97.17:8080   |             | CIEL                            | <input type="checkbox"/>            |
| TS5           | 157.158.97.5:8080    |             | PF (Win2000)                    | <input checked="" type="checkbox"/> |
| TS6           | 157.158.97.6:8880    |             | PF (XP)                         | <input type="checkbox"/>            |
| TS7           | 157.158.97.14:80     |             | CIEL                            | <input type="checkbox"/>            |
| TSExample     | 255.255.255.255:8080 |             | TSExample                       | <input type="checkbox"/>            |
| TSTO          | 140.0.120.155        |             | Thales Optronique TS            | <input type="checkbox"/>            |

Refresh    New\_search    Details    Close

Figure 7.11: Search result

Mark the chosen Tool Server and click on the  button. A new window with additional bookmarks pops up. All fields are available for editing. In a similar way one can change other attributes of the Tool Server.

Main info    ANTS    Groups

Tool Server Name: Aros4

Type communication: ANTS communication

IP of TS: 148.81.189.95

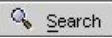
Expired:

Description: x86 machine with 800MHz Athlon processor 256 MB RAM and MS Windows2000 inst

Figure 7.12: Main info bookmark

### 7.3 Remove a Tool Server

This mechanism allows the user to remove the Tool Server registered in the TRMS database. Open the **Tool Server** menu and select the **Remove** item. After item activation a proper dialog window will be displayed. Tool Server Name and also Tool Server IP can be entered as the attributes of the removed Tool Server. Next, press the  button. The result of searching is displayed in the table form. If the user enters no attributes, all Tool Servers currently registered in the TRMS' database will be displayed.



A search window dialog box with a light gray background. It contains two text input fields: "Tool Server Name" and "Tool Server IP". Below the fields are three buttons: "Clear", "Search" (with a magnifying glass icon), and "Close".

Figure 7.13: Search widow


The search result is displayed as a table. The **Name** column shows Tool Server's name as was registered in the TRMS. The **Description** column contains a short description. The **Valid until** column includes the expiration date for this Tool Server. The **IP** column gives the user information of the Tool Server location in the network and **Available** indicates that the Tool Server is currently available.



| Name | IP            | Valid until | Description | Available                           |
|------|---------------|-------------|-------------|-------------------------------------|
| TS14 | 157.158.97.14 |             | CIEL-Ants   | <input checked="" type="checkbox"/> |

Below the table are four buttons: "Refresh" (with a circular arrow icon), "New search", "Remove" (with a trash can icon), and "Close".

Figure 7.14: Search result

Mark the chosen tool server and click on the  button. You will be asked for the confirmation of operation. Click on **Yes** button.



A confirmation dialog box with a light gray background. It features a green question mark icon on the left. The text "Remove selected item?" is centered. Below the text are two buttons: "Yes" and "No".

Figure 7.15: Confirmation box


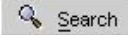
The chosen tool server has been deleted from the GTLS database. System will display a suitable message.



An information dialog box with a light gray background. It features a purple information icon on the left. The text "Operation remove done" is centered. Below the text is a single button: "OK".

Figure 7.16: Info box.

## 7.4 Browse registered Tool Servers

This mechanism allows the user to browse Tool Servers registered in the TRMS database. Open the **Tool Server** menu and select the  **Show** item. After activation of this item a proper dialog window will be displayed. Tool Server Name and also Tool Server IP can be entered as the attributes of searched Tool Server. Next, press the  **Search** button. The result of searching is displayed in the table form. If the user enters no attributes, all Tool Servers currently registered in the TRMS' database will be displayed.



The search window is a dialog box with a light gray background. It contains two text input fields: 'Tool Server Name' and 'Tool Server IP'. Below the input fields is a horizontal bar containing three buttons: 'Clear', 'Search' (with a magnifying glass icon), and 'Close'.

Figure 7.17: Search window.

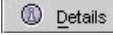
The search result is displayed as a table. The **Name** column shows the Tool Server's name as it was registered in the TRMS. The **Description** column contains a short description. The **Valid until** column indicates the expiration date for this Tool Server. The **IP** column gives the user information of the Tool Server location in the network and **Available** indicates that the Tool Server is currently available.



| Name | IP            | Valid until | Description | Available                           |
|------|---------------|-------------|-------------|-------------------------------------|
| TS14 | 157.158.97.14 |             | CIEL-Ants   | <input checked="" type="checkbox"/> |


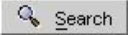
Below the table is a horizontal bar with four buttons: 'Refresh' (with a refresh icon), 'New search', 'Details' (with a magnifying glass icon), and 'Close'.


Figure 7.18: Search result

If one wants to browse detailed information of the found tool server, one marks the appropriate one and clicks on the  **Details** button. A new window appears. More information about the contents of this window is available in section **How to add a new Tool Server?**

## 8 USERS – HOW TO ...?

### 8.1 Browsing registered users

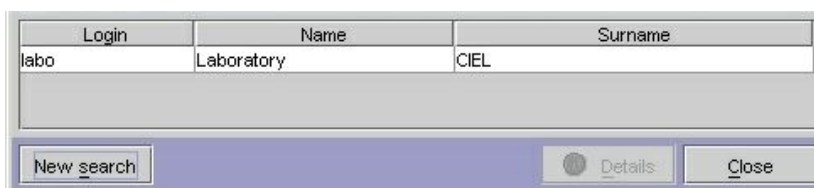
This mechanism allows the user to lookup for other users who are currently registered in the TRMS. Open the **Users Submenu** and select the  **Show** item. After activation of this item a proper dialog window will be displayed. Login, name and also surname can be entered as the attributes of the user searched for. Next, press the  **Search** button. The search result is displayed in the table form. If the user enters no attributes, all users currently registered in the TRMS' database will be displayed.



A search window with three input fields: 'Login name' containing 'labo', 'Name', and 'Surname'. Below the fields are three buttons: 'Clear', 'Search' (with a magnifying glass icon), and 'Close'.

Figure 8.1: Search window

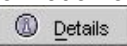
The **Login** column shows user's login as it was registered in the TRMS. The **Name** column contains user's name. The **Surname** column shows his surname. These three elements could be used for searching users registered in TRMS.

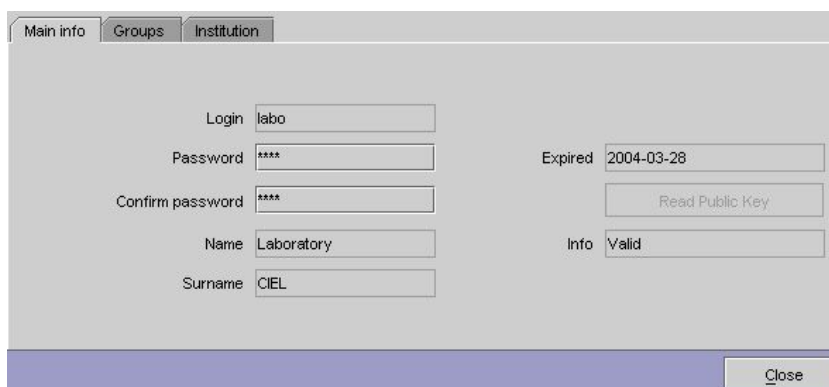


| Login | Name       | Surname |
|-------|------------|---------|
| labo  | Laboratory | CIEL    |

Below the table are three buttons: 'New search', 'Details' (with a magnifying glass icon), and 'Close'.

Figure 8.2: Search result

If one wants to browse detailed information on the found user then the appropriate one needs to be marked. Click on the  button. A new window with three additional bookmarks is available. The **Main Info** bookmark includes basic information on the registered user. All displayed information can be read but not modified.



A window with three tabs: 'Main info', 'Groups', and 'Institution'. The 'Main info' tab is active, showing the following fields:

|                  |            |         |  |
|------------------|------------|---------|--|
| Login            | labo       | Expired | 2004-03-28                                     |
| Password         | ****       |         |  |
| Confirm password | ****       |         | <input type="button" value="Read Public Key"/> |
| Name             | Laboratory | Info    | Valid  |
| Surname          | CIEL       |         |  |

At the bottom right is a 'Close' button.

Figure 8.3: Main info bookmark

The **Groups** bookmark shows an extent of granted permissions. The table consists of two columns. The first one contains name of the granted privileges. The second one contains description of the granted permissions.

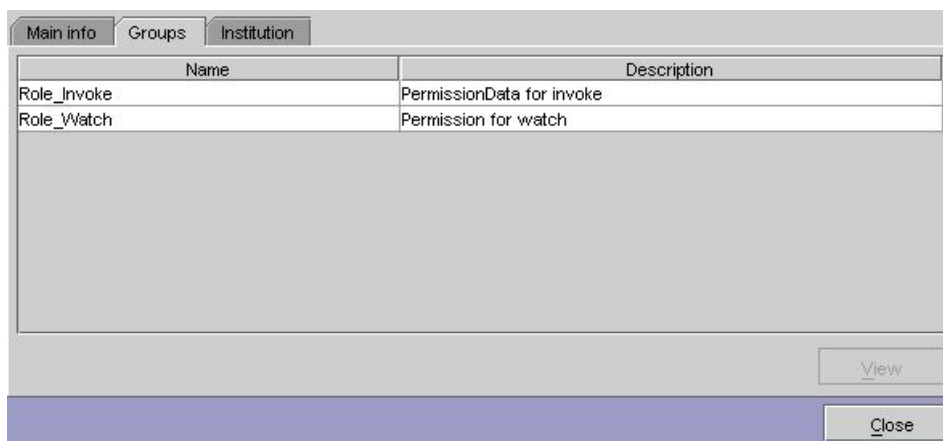


Figure 8.4: Groups bookmark

The **Institution** bookmark shows to which institution the registered user belongs.

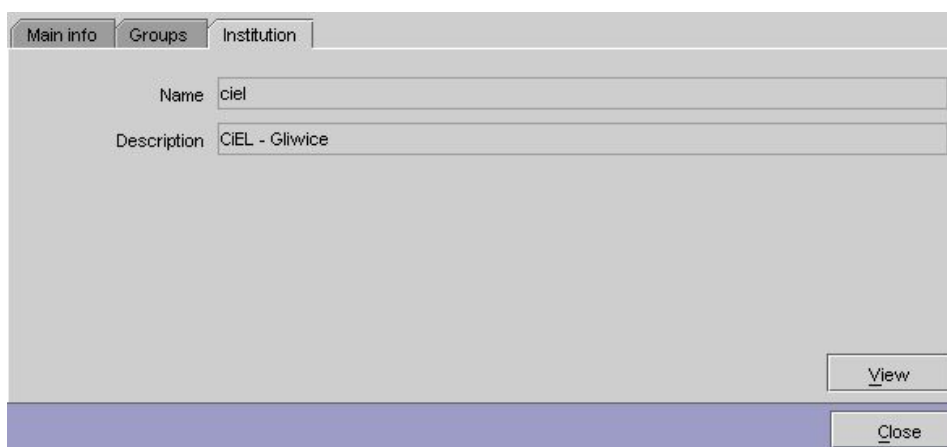


Figure 8.5: Institution bookmark

## 8.2 Add a new user

At the beginning each user, who wants to use TRMS, has to be registered in the Global Tool Lookup Service's database. After opening the **Users** submenu, the **Add** item should be chosen. Below, the proper dialog window is shown. All fields should be filled in in accordance with labels. The User's Public key is read from a certificate file. Click on the  button. The File Selection window will be displayed. Enter the location of the file comprising the user certificate. The public key will be loaded. Fields with the expiration date and info will be filled in automatically by the system.

The screenshot shows a window titled 'Main info' with three tabs: 'Main info', 'Groups', and 'Institution'. The 'Main info' tab is selected. The window contains the following fields and buttons:

- Input fields: Login, Password, Confirm password, Name, Surname.
- Input field: Expired.
- Input field: Info (displaying 'Invalid').
- Button: Read Public Key (located next to the Expired field).
- Buttons at the bottom: Undo, Save, Cancel.

Figure 8.6: Main info bookmark

The **Groups** bookmark is used to specify user permissions. The table consists of two columns. First column contains a name of a group, while the second one contains a description of a granted permission. Click on the **Add** button and the **Group search criteria** window will be opened. You can enter the searched name or the description. If the user enters nothing, all accessible groups will be displayed.

The screenshot shows a window titled 'Groups' with three tabs: 'Main info', 'Groups', and 'Institution'. The 'Groups' tab is selected. The window contains a table with two columns: 'Name' and 'Description'. A dialog box titled 'Group search criteria' is open over the table. The dialog box has two input fields: 'Name' and 'Description'. Below the input fields are 'Clear', 'Search', and 'Close' buttons. At the bottom of the main window, there are 'Undo', 'Remove', 'Add', 'View', 'Save', and 'Cancel' buttons.




Figure 8.7: Search group window

Mark the searched group and press the **Choose** button. The chosen group will be added. You can repeat this action several times. Finally, click on the **Close** button that closes the window.

| Name               | Description  |
|--------------------|--|
| aa                 | aa   |
| Admin_IFX          | Administrator of IFX                                   |
| Admin_ITE          | Administrator of ITE                                   |
| Admin_SBS          | Administrator of SBS                                   |
| Admin_SUT          | Administrator of SUT                                   |
| Admin_TO           | Administrator of TO                                    |
| Admin_UGP          | Administrator of UGP                                   |
| EColleg_Partners   | Role for all partners                                  |
| Manage_GTLS_Admin  | Admin for GTLS has permissions for all operation i ... |
| Manage_GTLS_Modify | Manage GTLS for modify                                 |
| Manage_GTLS_Watch  | Permission for watch                                   |
| Role_Admin         | PermissionData for GTLS admin                          |
| Role_Edit          | PermissionData for modify                              |
| Role_Invoke        | PermissionData for invoke                              |
| Role_Watch         | Permission for watch                                   |

New\_search      Choose      Close

Figure 8.8: Search result

This way, one can define permissions that will be possessed by the added user. If you want to delete some registration, you mark it and click on the  Remove button. The  View button enables viewing of marked permissions in the new window. The last task constitutes writing of data into the GTLS database. Click on the  Save button.

| Main info        |                           | Groups | Institution |
|------------------|---------------------------|--------|-------------|
| Name             | Description               |        |             |
| EColleg_Partners | Role for all partners     |        |             |
| Role_Invoke      | PermissionData for invoke |        |             |
| Role_Watch       | Permission for watch      |        |             |

Undo      Remove      Add      View

Undo      Save      Cancel

Figure 8.9: Groups bookmark

The **Institution** bookmark allows the user to assign the institution name where he is employed. We proceed just as in case of user permissions. One can enter the searched name or the description. If the user enters nothing as a Name or Description all accessible institutions will be displayed.

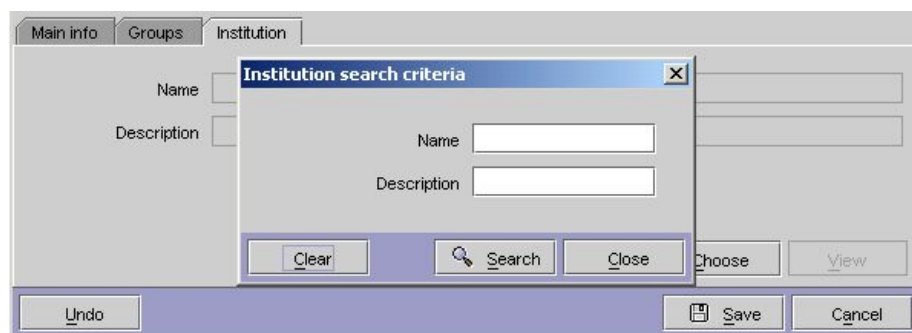


Figure 8.10: Search institution window.

Mark the proper institution and click on the  button. You can choose one only. The last task is writing data into the GTLS database. Click on the  button. This way, you have completed registration of the new user in TRMS.

| Name | Description                            |
|------|--|
| aa   | aa                                     |
| ciel | CIEL - Gliwice                         |
| ifx  | Infineon Technologies AG               |
| ite  | Institute of Electron Technology       |
| sbs  | Siemens Business Services              |
| sut  | Silesian University of Technology      |
| to   | Thales Optronique                      |
| ugp  | University Gesamthochschule Paderborna |

Buttons:

Figure 8.11: Search result.

### 8.3 Modify user

This mechanism allows the user to modify users' attributes registered in the TRMS database. Open the **Users** menu and select the **Modify** item. After activation of this item a proper dialog window will be displayed. Login, name and also surname can be entered as the attributes of the modified user. Next, click the  button. The result of searching is displayed as a table. If the user enters no attributes, all users currently registered in the TRMS' database will be displayed.

Figure 8.12: Search window.

The result of searching is displayed in the table form. The **Login** column shows user's login, as it was registered in the TRMS. The **Name** column contains user's name. The **Surname** column shows his surname. These three elements could be used for searching the users registered in TRMS.

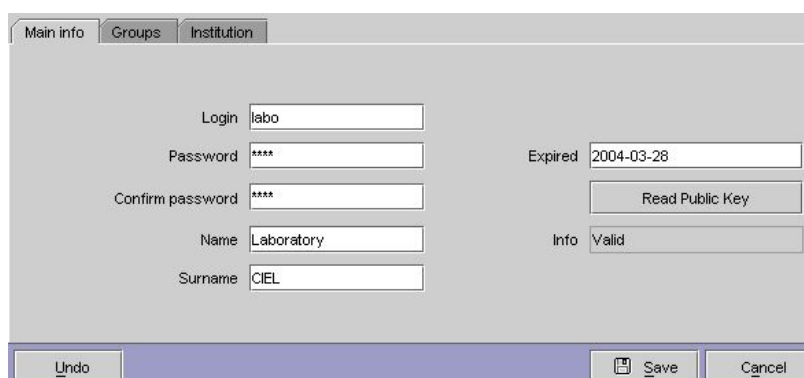


| Login | Name       | Surname |
|-------|------------|---------|
| labo  | Laboratory | CIEL    |

New search   Details   Close

Figure 8.13: Search result

Mark user and click on the  **Details** button. A new window with three additional bookmarks is available. All fields are available for editing. In a similar way to a new user registration, one can modify user's attributes.



Main info   Groups   Institution

Login labo

Password \*\*\*\*

Confirm password \*\*\*\*

Name Laboratory

Surname CIEL

Expired 2004-03-28

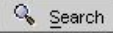
Read Public Key

Info Valid

Undo   Save   Cancel

Figure 8.15: Main info bookmark

#### 8.4 Remove a user

This mechanism allows a user to remove users registered in the TRMS database. Open the **Users** menu and select the **Remove** item. After activation of this item a proper dialog window will be displayed. Login, name and also surname can be entered as the attributes of the removed user. Next, press the  **Search** button. The result of searching is displayed as a table. If the user enters no attributes, all users currently registered in the TRMS' database will be displayed.



Login name labo

Name

Surname

Clear   Search   Close

Figure 8.15: Search window

The **Login** column shows user's login as it was registered in the TRMS. The **Name** column contains user's name. The **Surname** column shows his surname. These three elements could be used for searching the users registered in TRMS.



| Login | Name       | Surname |
|-------|------------|---------|
| labo  | Laboratory | CIEL    |

New search Remove Close

Figure 8.16: Search result

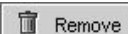
Mark the user and click on the  **Remove** button. You will be asked for confirmation of the operation. Click on the **Yes** button.



Figure 8.17: Confirmation box

The chosen user has been deleted from the GTLS database. System displays the suitable message.



Figure 8.18: Info box

## 9 OPTIONS

The **Options Menu** includes four items.

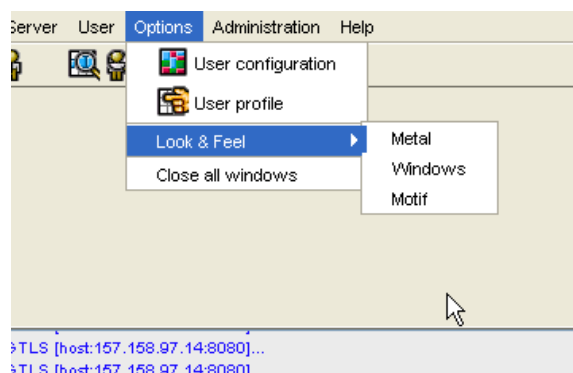


Figure 9.1: Options menu

The **User configuration** item enables a suitable configuration of a client application through the setup of proper parameters determining cooperation with the GTLS and Tool Servers. Three bookmarks are available. The **Global** bookmark allows the user to specify a type of communication with the GTLS server. Tomcat and ANTS communication are possible. **Frequency of ping to GTLS** field determines in seconds how often pings to GTLS are sent. **Encryption** thick switches on and switches off encryption methods for communication protection. Affirmation of a secure data transport in TRMS is realized through the utilisation of cryptographic methods and the digital signature technology. Design data are encrypted during transportation. Encryption with the public key method, as well as encryption with the symmetric key method is used simultaneously. **Compression** thick switches on and switches off compression methods. Compression of data before their dispatch to a receiver allows limitation of network traffic and significant decrease of data transmission time. **Proxy server** thick enables cooperation between TRMS and the Proxy Server.

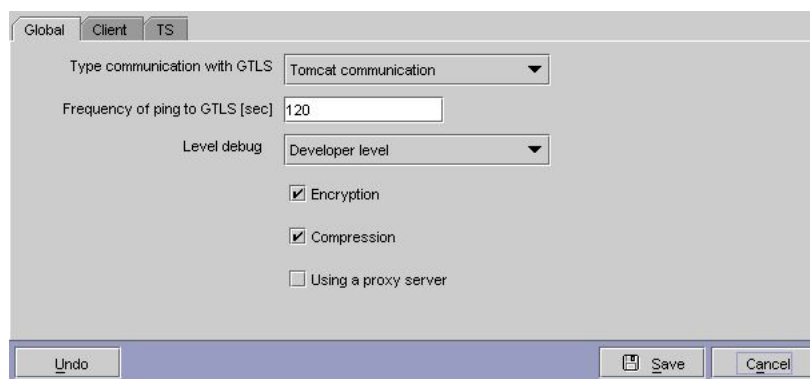


Figure 9.2: Global bookmark

The **Client** bookmark enables the user to choose a type of the used Client GUI. GUI for end-user, Tool Server administrator GUI, as well as the GTLS administrator GUI are available. Remaining fields store information on the location of files with user and GTLS' keys, user's working directory, as well as the IP number of the GTLS server.

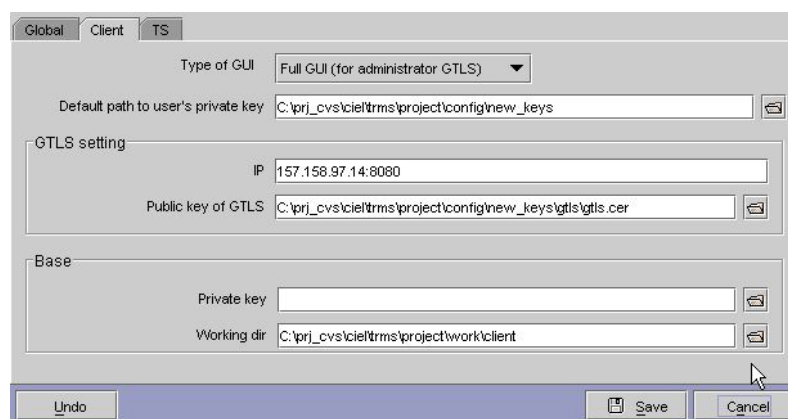
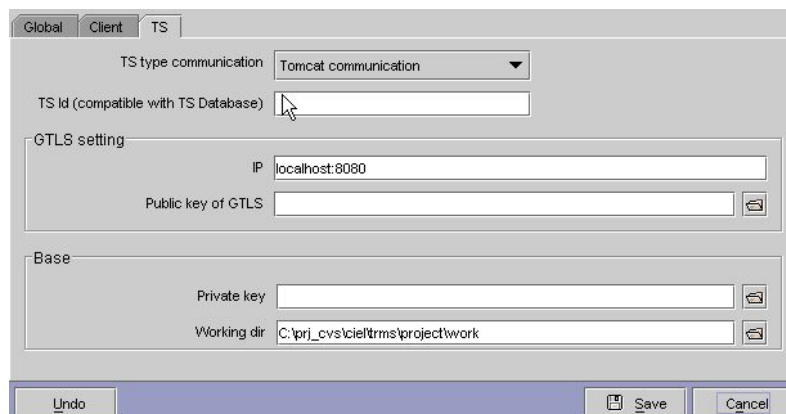


Figure 9.3: Client bookmark

The **TS** bookmark enables the user to specify essential parameters for the Tool Server administrated by him.

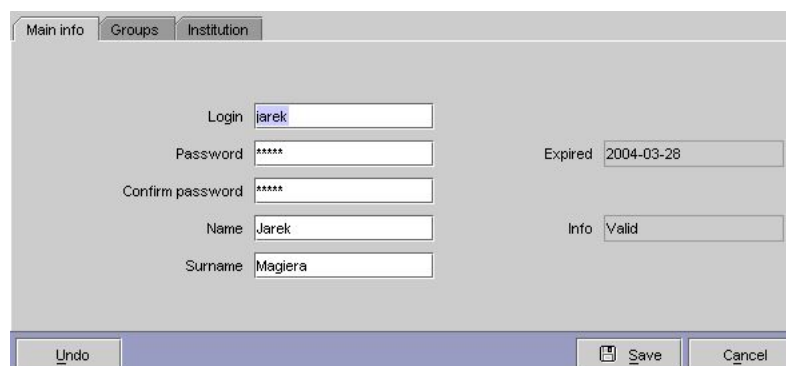


The screenshot shows a dialog box titled 'TS' with three tabs: 'Global', 'Client', and 'TS'. The 'TS' tab is active. It contains the following fields and controls:

- 'TS type communication' dropdown menu set to 'Tomcat communication'.
- 'TS Id (compatible with TS Database)' text input field.
- 'GTLS setting' section containing:
  - 'IP' text input field with 'localhost:8080'.
  - 'Public key of GTLS' text input field with a file selection icon.
- 'Base' section containing:
  - 'Private key' text input field with a file selection icon.
  - 'Working dir' text input field with 'C:\prj\_cvs\ciele\trms\projectwork' and a file selection icon.
- Buttons at the bottom: 'Undo', 'Save', and 'Cancel'.

Figure 9.4: TS bookmark

The **User profile** item displays complete information of the logged user. All data could be browsed and modified. More details about modification of user's parameters one can find in section **Users – How to ...?**



The screenshot shows a dialog box titled 'Main info' with three tabs: 'Main info', 'Groups', and 'Institution'. The 'Main info' tab is active. It contains the following fields and controls:

- 'Login' text input field with 'jarek'.
- 'Password' text input field with '\*\*\*\*\*'.
- 'Confirm password' text input field with '\*\*\*\*\*'.
- 'Name' text input field with 'Jarek'.
- 'Surname' text input field with 'Magiera'.
- 'Expired' text input field with '2004-03-26'.
- 'Info' text input field with 'Valid'.
- Buttons at the bottom: 'Undo', 'Save', and 'Cancel'.

Figure 9.5: Main info bookmark

The **Look & Feel** item allows user to change appearance of the client application. **Metal**, **Windows** as well as **Motif** colour schemes are possible. The **Close all Windows** item closes all opened windows.

## 10 ADMINISTRATION

The **Administration** menu allows a suitable configuration of GTLS, as well as supervision of users' behaviour and system operations. It includes four items.

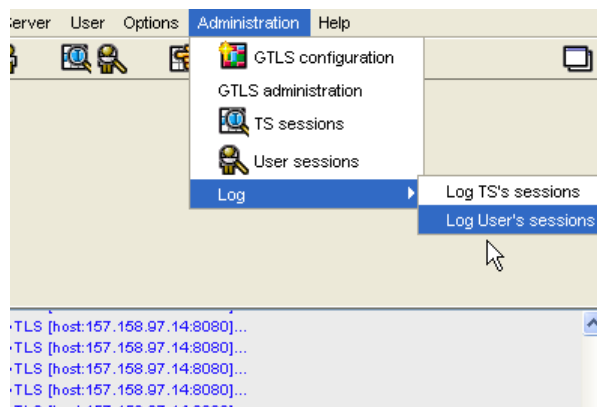


Figure 10.1: Administration menu

The **GTLS configuration** item is used for configuration of GTLS and its Databases. There are two bookmarks. The **Database** bookmark allows the user to setup essential parameters for getting a correct service of databases. Two databases are utilized by TRMS. In the first one, information on registered users, and in the second one the registered tools are stored. All fields should be filled out in accordance with labels.

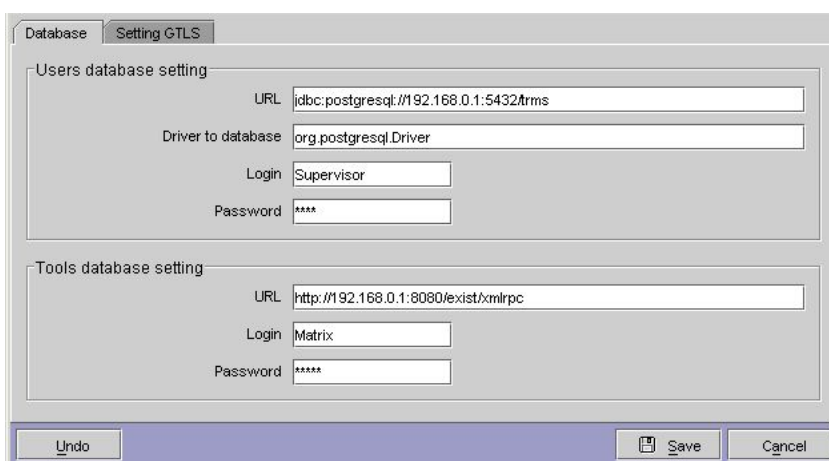


Figure 10.2: Database bookmark

The **Setting GTLS** bookmark enables the user to enter suitable parameters for correct cooperation between the client application and the GTLS Server.

**Encryption** thick switches on and off encryption methods for communication protection. A secure data transport in TRMS is realized through utilization of cryptographic methods and the digital signature technology. Design data are encrypted during the transport. Encryption with the public key method and the one with the symmetric key method are used simultaneously.

**Compression** thick switches on and off compression methods. Compression of data before their dispatch to receiver allows limitation of the network traffic and decreases significantly the time of data transmission.

**Proxy server** thick enables cooperation between TRMS and the Proxy Server. Information included in the **Base** frame preliminarily configures GTLS. They point at location of the file with GTLS' keys pair and the working folder.

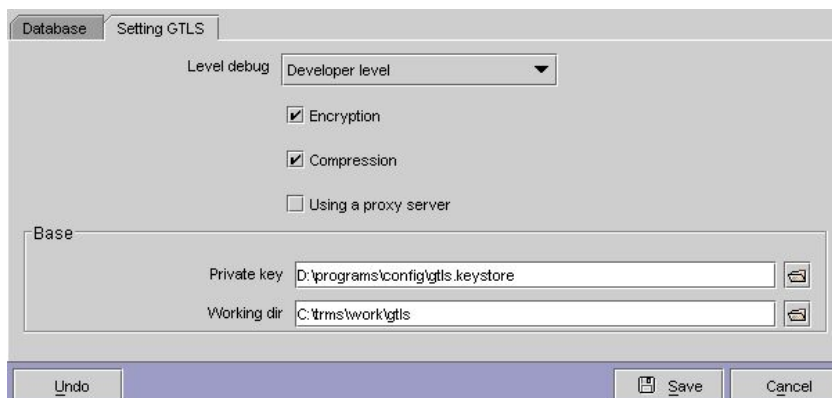


Figure 10.3: Setting GTLS bookmark

## 11 PERMISSIONS

### 11.1 User permissions

The range of user permissions in the TRMS environment is related to the membership of a given group. A number of groups is optional. Each user who possesses adequate permissions can create a new group.

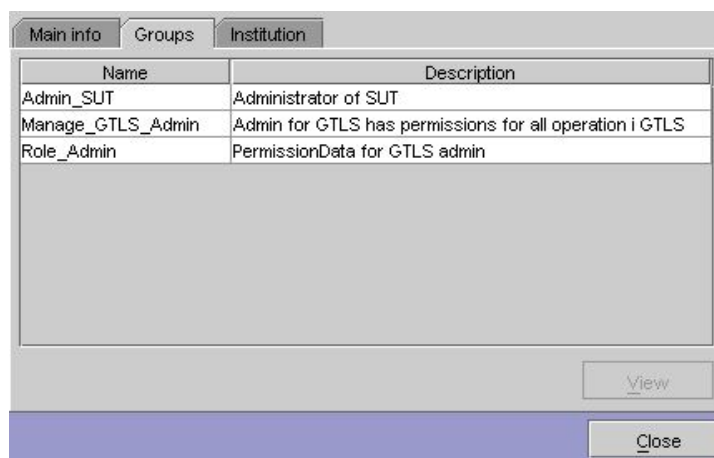
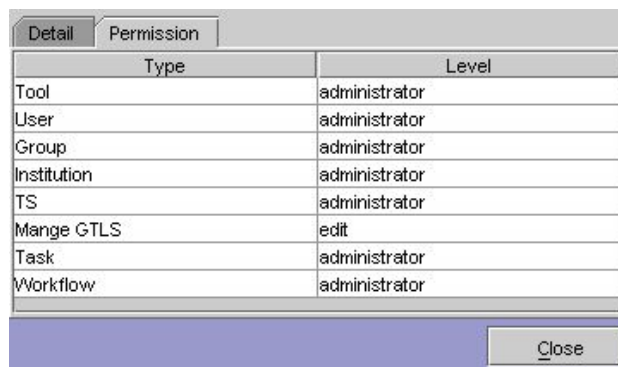


Figure 11.1: Groups bookmark

The system of privileges for a specific group is divided into five levels (none, watch, invoke, edit, administrator) and is related with operations performed on eight objects (Tool, User, Group, Institution, TS, Manage GTLS, Task, Workflow). For each object the user can choose one of five levels. Upper level includes lower level permissions.



| Type        | Level         |
|-------------|---------------|
| Tool        | administrator |
| User        | administrator |
| Group       | administrator |
| Institution | administrator |
| TS          | administrator |
| Mange GTLS  | edit          |
| Task        | administrator |
| Workflow    | administrator |

Figure 11.2: Permission bookmark

## 11.2 Tool Server Permissions

The granted permissions of a given group control access to Tool Server resources. The user receives the adequate permissions in the moment of accession to the group. The TS administrator makes an additional control of the specific group permissions for accessing to a given Tool Server. The TS administrator can limit or grant additional permissions to the concrete group to perform operation in the moment of Tool Server registration.



Figure 11.3: Group list

## 12 FURTER DEVELOPMENT OF TRMS

R & D on TRMS is being continued. The progress is monitored on TRMS web pages, i.e. on [www.ecolleg.org/trms](http://www.ecolleg.org/trms)

## REFERENCES

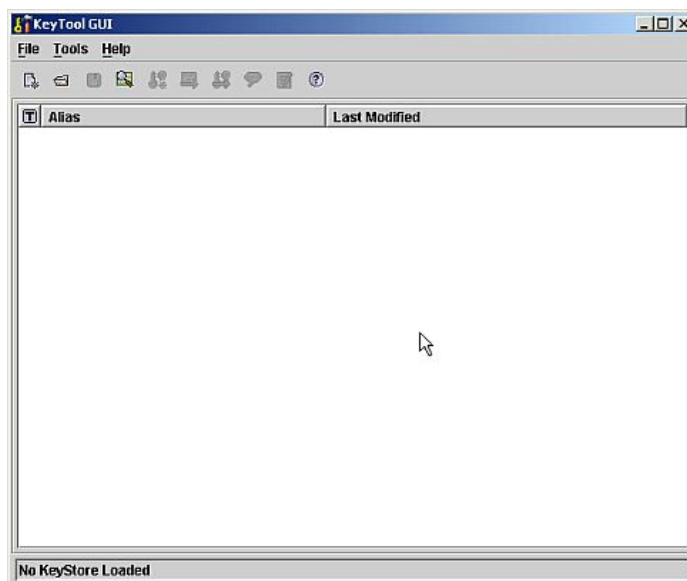
The list below comprises selected publications from the former E-Colleg consortium that are related to TRMS concepts, development, and applications. Some of them are available on [www.ecolleg.org](http://www.ecolleg.org).

- [1] K. Siekierska, D.Obrębski, A.Kokoszka, N. Ługowski, A.Pawlak, M.Carballeda, B.Schlichter, *Verification of Advanced Collaborative Infrastructure By Affine FPGA Design*, Workshop on Challenges in Collaborative Engineering (CCE'04), Tatranska Lomnica, Slovakia, April 18-21 2004.
- [2] K. Siekierska, D.Obrębski, A.Kokoszka, N. Ługowski, P. Fraś, T. Kostienko, J. Magiera, A.Pawlak, M. Szlęzak, *Verification of TRMS with IP Component Design*, Mixdes 2004, Szczecin, Poland, June 24-26 2004.
- [3] P. Frasz, T. Kostienko, J. Magiera, A. Pawlak, P. Penkala, D. Stachanczyk, M. Szlęzak, M. Witczynski, *TRMS Deployment in Distributed Engineering Applications*, CCE'04, Tatranska Lomnica, Slovakia, April 18-21 2004.
- [4] T. Schattkowsky, W. Mueller, A. Pawlak. *Workflow Management Middleware for Secure Distance-Spanning Collaborative Engineering*. In L. Fischer (ed.) *Workflow Handbook 2004*, WfMC, Lighthouse Point, FL, USA, 2004.
- [5] W. Mueller, T. Schattkowsky, H.J. Eikerling, J. Wegner. *Dynamic Tool Integration in Heterogeneous Computer Networks*, In Proc.Design Automation and Test in Europe DATE 2003, Munich, Germany, 3-7 March 2003.
- [6] M. Bauer, W. Ecker, P. Penkala, D. Stachanczyk, A. Pawlak, *Testbench development in a distributed collaborative environment*, E-Colleg Workshop on Challenges in Collaborative Engineering (CCE'03), 15th-16th, April 2003, Poznań.
- [7] T. Schattkowsky, W. Mueller. *Distributed Engineering Environment for the Design of Electronic Systems*. CCE'03, April 15-16, 2003, Poznan Poland.
- [8] A. Kokoszka, N. Ługowski, N.Q. Trung, D.Obrębski, A. Pawlak, K. Siekierska, M. Carballeda, B. Schlichter, *Collaborative Design of the FPGA Pulse Width Modulator*, E-Colleg Workshop on Challenges in Collaborative Engineering, 15th-16th, April 2003, Poznań.
- [9] T. Kostienko, P. Fraś, M. Szlęzak, A. Pawlak, *Development of TRMS/GTLS - Global Tool Lookup Services*, E-Colleg Workshop on Challenges in Collaborative Engineering, 15th-16th, April 2003, Poznań.
- [10] J. Magiera, T. Kostienko, P. Fraś, M. Szlęzak, *Security issues in Tool Registration and Management System*, E-Colleg Workshop on Challenges in Collaborative Engineering (CCE'03), 15th-16th, April 2003, Poznań.
- [11] M. Witczynski, A. Pawlak, D. Kostienko, P. Fraś, M. Szlęzak, J. Magiera, *Tool management as a key integration feature for an engineering design virtual organisation*, 9<sup>th</sup> Int. Conference of Concurrent Enterprising Espoo, Finland, 16-18 June 2003.
- [12] P. Penkala, D. Stachanczyk, A. Pawlak, M. Bauer: *Testbench development in a distributed collaborative environment*, 4<sup>th</sup> Conf. on Electronic Circuits and Systems Conf., Bratislava, Slovakia, Sept. 11-12, 2003.
- [13] T. Kostienko, W. Mueller, A. Pawlak, T. Schattkowsky, *Advanced Infrastructure for Collaborative Engineering in Electronic Design Automation*, 10th ISPE Int. Conf. on Concurrent Engineering: Research and Applications, Madeira Island, Portugal, 26-30.07.2003.

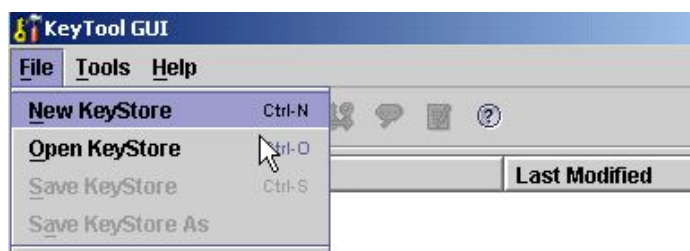
## Appendix A How to generate user's keys?

The keystore file with user's public and private keys can be generated in two ways. Directly, with the *keytool* tool attached to each Java 2 SDK edition or with KeyTool GUI, the small program available under the GNU Public License on the Web. This text concerns the second case. Below, some screenshots and advises are given.

1. Open **KeyTool GUI**.



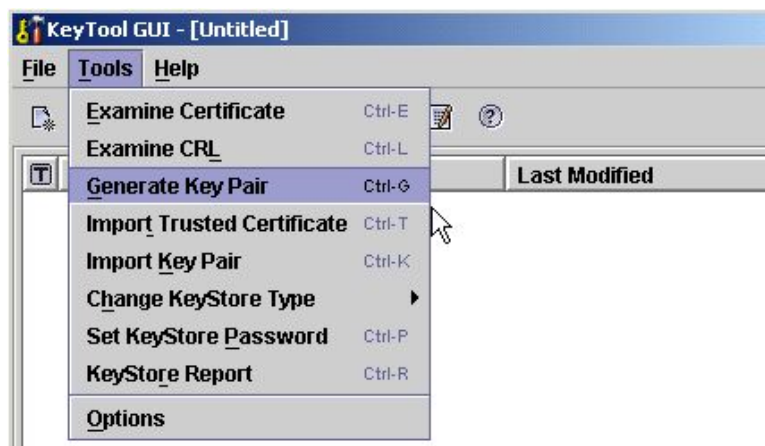
2. Open the **File** submenu in the main menu and choose the **New KeyStore** item.



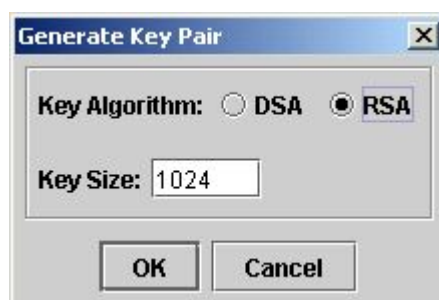
3. Select JCEKS as the type of the new KeyStore and click on the **OK** button.



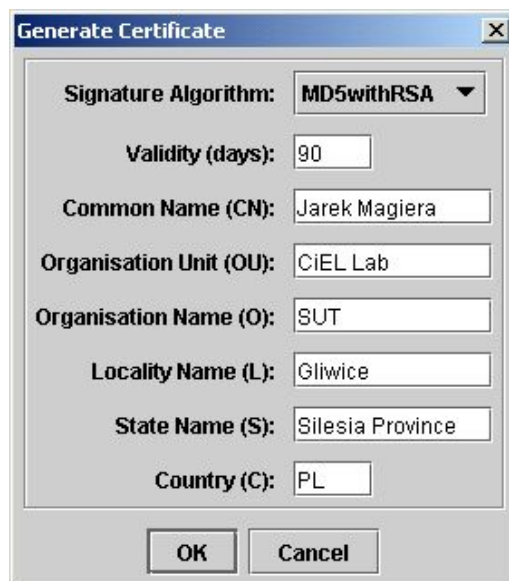
4. Open the **Tools** submenu and choose **Generate Key Pair** item.



5. Select RSA as the key algorithm and enter key size 1024 bits, then click on the OK button.



6. Select MD5 with RSA as the signature algorithm and fill in all fields in accordance with labels.



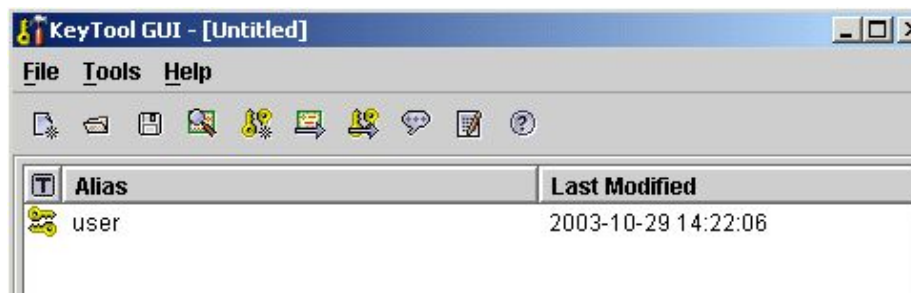
7. **VERY IMPORTANT:** TRMS requires “user” as an alias name.



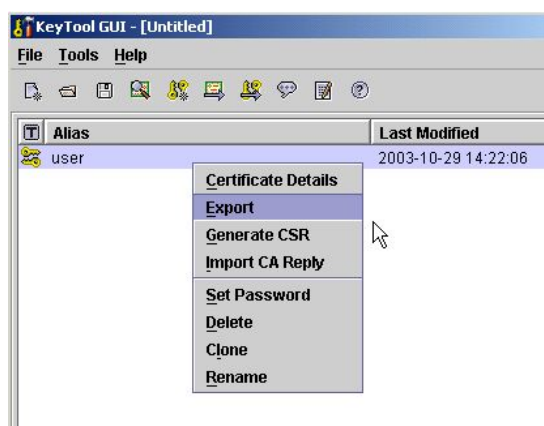
8. Enter password and confirm. The keystore file uses two passwords. First password protects access to the keystore file. Another password protects access to the user private key. If one wants to get a certificate from keystore only, the first key is needed. But if one wants to get the private key, one must know both passwords. The passwords can be different or the same. **In the TRMS both passwords are the same.** This simplifies logging.



9. Keys are generated.



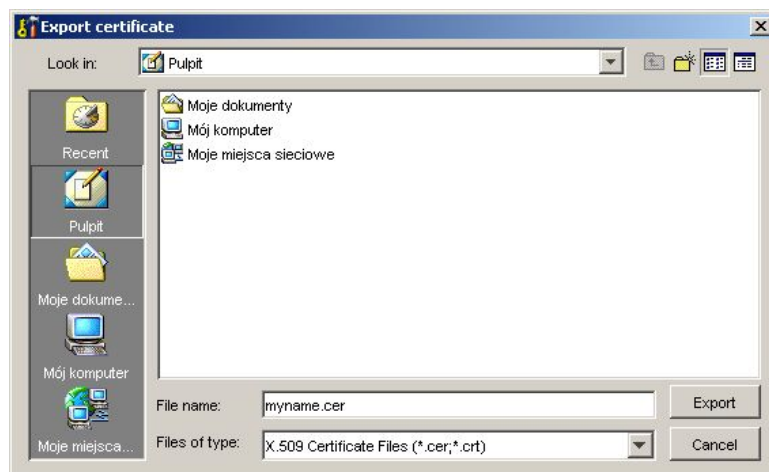
10. Now, one has to create a certificate with one's public key. The certificate will be sent to the TRMS' administrator. Mark "user" entry and right-click on. Then select the **Export** item.



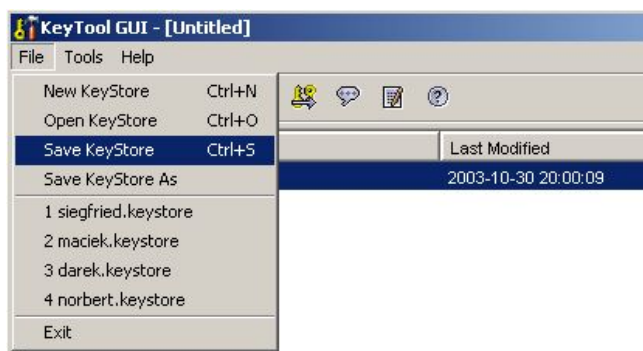
11. Select **Head Certificate** and **DER Encoded**.



12. Define where the certificate file has to be stored.



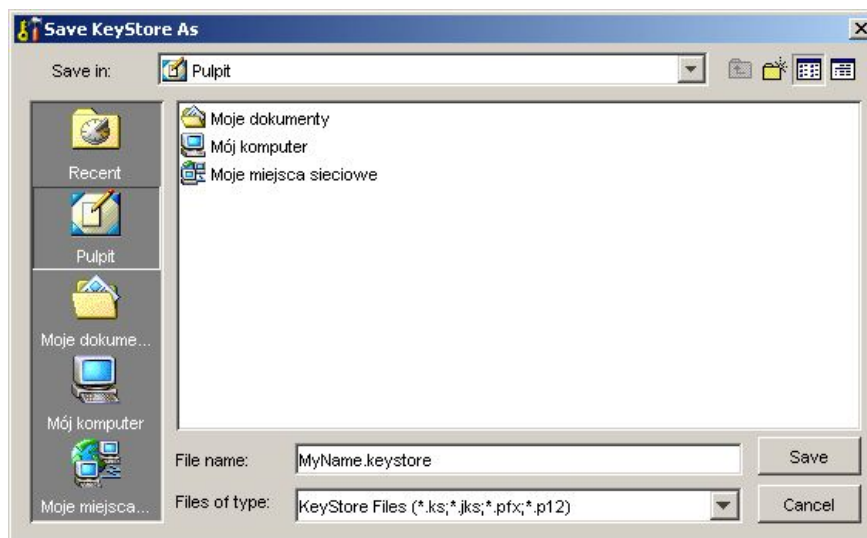
13. Save your keystore.



14. Enter password and confirm. **IMPORTANT** look at point 8.



15. Define, where the keystore file has to be stored.



16. Creation of the keystore file is ended. Send your certificate file to the TRMS administrator.

## APPENDIX B TRMS support

Support is available to all registered TRMS users through the web pages:

**[www.ecolleg.org/trms](http://www.ecolleg.org/trms)**

and on e-mail:

**[trms-support@ciel.pl](mailto:trms-support@ciel.pl)**

At **www.ecolleg.org** the following demonstrations are available:

### TRMS demonstrations

1. **TRMS concept** [ [www.ecolleg.org/DISSEMINATION/Demos/trms\\_idea.html](http://www.ecolleg.org/DISSEMINATION/Demos/trms_idea.html) ]  
- demonstrates basic concepts in TRMS.
2. **A Client to the TRMS environment**  
[ [www.ecolleg.org/DISSEMINATION/Demos/trms\\_intro.html](http://www.ecolleg.org/DISSEMINATION/Demos/trms_intro.html) ] - a short description of the graphical interface.
3. **SUT / Infineon Technologies application scenario**  
[ [www.ecolleg.org/DISSEMINATION/Demos/scenario\\_sut\\_ifx.html](http://www.ecolleg.org/DISSEMINATION/Demos/scenario_sut_ifx.html) ].
4. **Encryption** [ [www.ecolleg.org/DISSEMINATION/Demos/encryption.html](http://www.ecolleg.org/DISSEMINATION/Demos/encryption.html) ] - security issues in TRMS.