Reliance
Industrial SCADA/HMI system

Reliance 4

DATA SERVERS

GEOVAP

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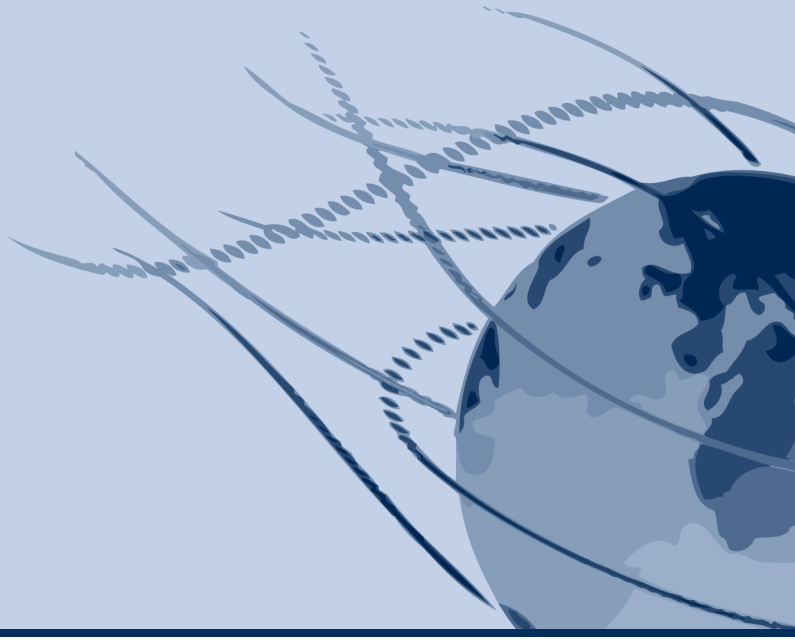

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1 Introduction

Reliance 4 Control Server and **Reliance 4 Server** programs are called *Data servers. Data servers* provide:

- data to other parts of a project running *Reliance runtime software* (including other data servers)
- www pages for web browser users
- data for the remote users of **Reliance 4** system *(Thin Clients)* or to third parties applications

This document describes last two points – web pages service and data providing web service.

Data servers contain in build web server which provides www pages (e.g. diagnostics of a visualization project or a data server and reports). Web service, which uses in build data server, can provide data for third party applications via **SOAP** protocol. Data for *Reliance 4 Thin clients* are provided by *Data servers*.

2 Data server start

The way how to start and run *data server* depends on whether it is the *Reliance Control Server* or the *Reliance Server* program. Visualization project have to be loaded before any client can connect to the server. For example *Reliance Control Server* can be started without a visualization project, but project have have to be loaded (command *Run Project*) manually via menu.

2.1 Reliance Control Server

The same rules apply for running the *Reliance Control Server* (`R_CtlSrv.exe`) as for other runtime software *(Reliance View* – `R_View.exe` *and Reliance Control* – `R_Ctl.exe`).
There are three ways how to load a visualization project to a runtime software:

- **To start a runtime software and select a visualization project** via command *File* > *Run Project.* If there are more than one computers defined in the project, the user will be asked to select a specific computer (configuration) defined in the project.
- **To start a project form Reliance Design development environment.** In *Reliance Design* open a visualization project *(File* > *Open Project)* and in the *Project Options* dialog *(Project* > *Options* > *Runtime module* > *Start and Shutdown)* specify runtime software (choose *Reliance Control Server*) and a computer name (configuration). Start the project in a selected runtime module via the *Project* > *Start* command.
- **From a command line (Shortcut).** Every runtime software (except *Reliance Server*) can be started from a command line with a following syntax: `"exe_file" "main_project_file" "project_computer_name"`.

For example to run the **Reliance Control Server** with the project named **Test** on the computer named **Server** command will have the following form:

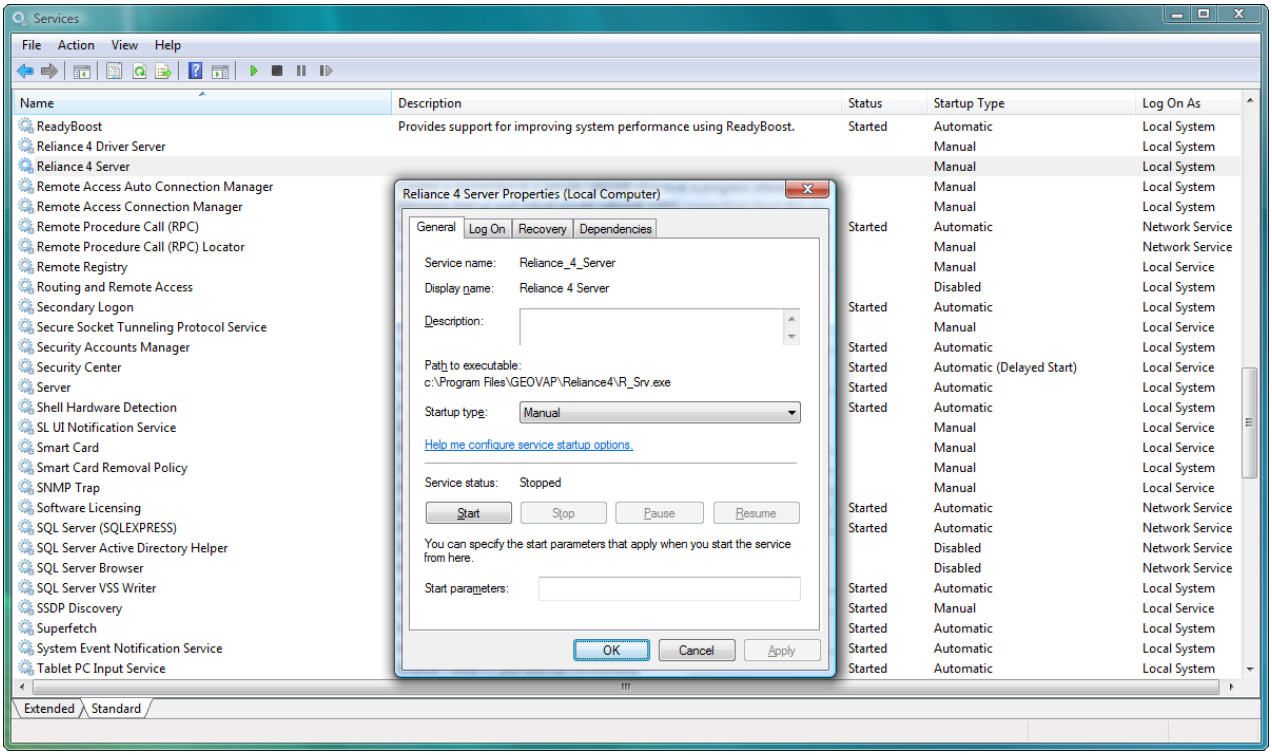
```
"C:\Program Files\GEOVAP\Reliance4\R_CtlSrv.exe" "C:
\MyProjects\Test\Test.rp4" "Server"
```

If the last parameter (computer name) is not defined, the user will be asked to specify it when runtime software starts.

Note: Design environment *Reliance Design* allows to automatically generate a *Shortcut* according to the syntax mentioned above. To generate a shortcut choose *Project* > *Create Shortcut* from the main menu.

2.2 Reliance Server (Windows system sevice)

Reliance Server (`R_Srv.exe`) is a non visual **Reliance** system runtime software. It runs as a so-called *Windows system service* and it is intended to run on computers without the user assistance (usually on servers). Every application which should run as a windows system service have to be registered to the Windows OS first. *Reliance Server* software is registered via the `R_Srv_RegService.bat` batch file. Successful registration of a service can be verified in the *System services* tool, easiest way to run this tool is with the *Start > Execute* dialog where you type `services.msc` and press `Enter`. Name of the service should be *Reliance_4_Server.*



Reliance Server – System service

After a registration of the *Reliance Server* service, program start is set to a manual mode. For starting the *Reliance Server* each time the Windows system starts change the start mode from *Manual* to *Automatic.* It is possible to *Start, Stop, Pause* and *Resume* the service via the system services tool. The same operations can be performed with batch files. You can start the *Reliance Server* service with a batch file `R_Srv_StartService.bat`, and to stop the service with `R_Srv_StopService.bat`. You can cancel the registration of the *Server service* with a batch file `R_Srv_UnRegService.bat`.

In the R_Srv.ini file, it is defined which visualization project will be loaded to the *Reliance Server.* The name of a computer is also defined in this file.

```
[ Main]
Language=0
[ Parameters]
Project=C:\Program Files\GEOVAP\Reliance4\Projects\Project1
\Project1.rp4
ProjectName=Project1
Computer=Computer1
```

The name of the registered service is *Reliance 4 Server.*

Note: The batch file R_Srv_StartApp.bat starts *Reliance Server* as a normal application. The *Reliance Server* icon is shown at a Windows Tray. For test purposes it is convenient to run the *Reliance Server* in this mode.

2.2.1 Reliance Server (several instances)

Each *Runtime software* can be run in several instances – more than one *Runtime* program can run at a time (but different visualization projects must be loaded in each module). In a case of the *Reliance Server* (Windows system service) the list of instances is defined at the R_Srv.ini file:

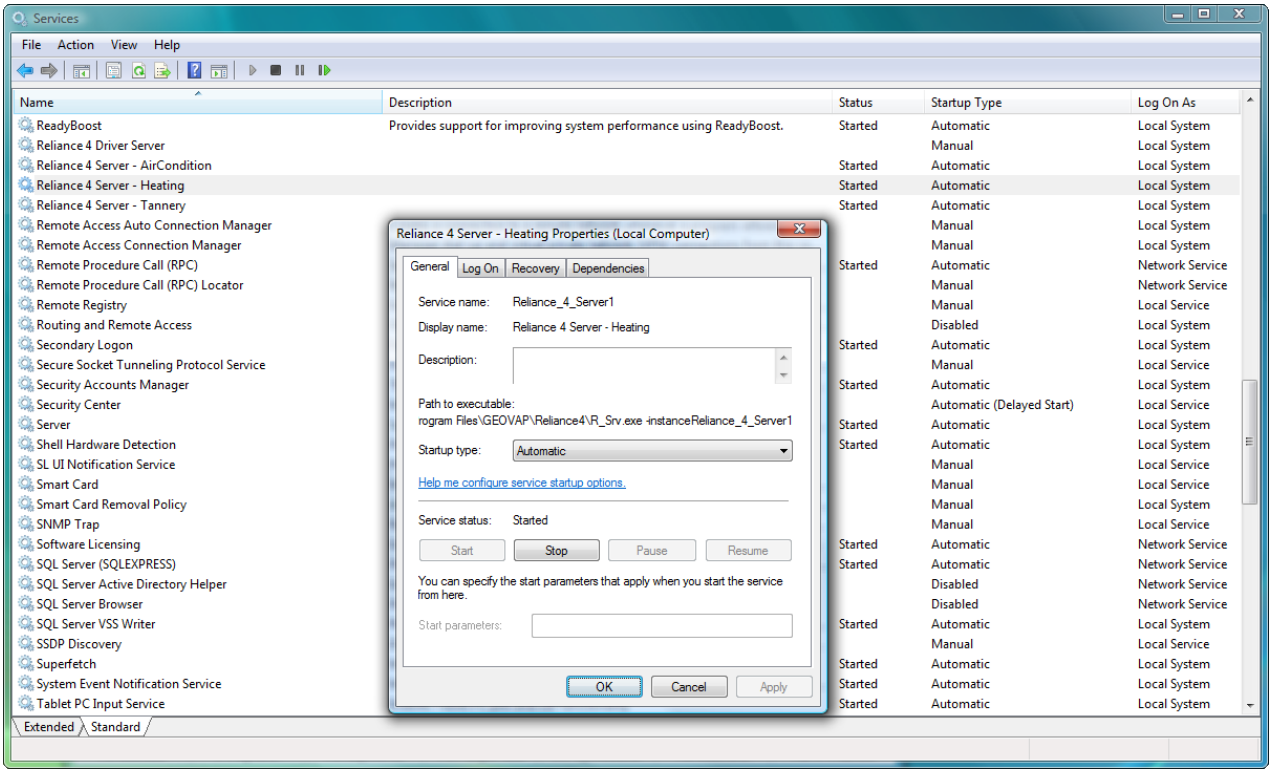
```
[ Main]
Language=0

[ Parameters]
Project=C:\Program Files\GEOVAP\Reliance4
\Projects\Tannery\Tannery.rp4
ProjectName=Tannery
Computer=pc1

[ Parameters1]
Project=C:\Program Files\GEOVAP\Reliance4
\Projects\Heating\Heating.rp4
ProjectName=Heating
Computer=Server1
```

```
[Parameters2]
Project=C:\Program Files\GEOVAP\Reliance4
\Projects\AirCondition\AirCondition.rp4
ProjectName=AirCondition
Computer=Computer1
```

Batch files `R_Srv_RegService.bat` and `R_Srv_UnRegService.bat` start or stop all instances of the *Reliance Server* defined in `R_Srv.ini`. Batch files `R_Srv_RegService.bat` and `R_Srv_UnRegService.bat` register or unregister all instances at once.



Reliance Server - Several instances

A name of each registered *Reliance Server* instance have the following format: "`Reliance Server – <Project_name>`", where `<Project_name>` is the name of a visualization project defined in `R_Srv.ini` file as value of a parameter `ProjectName`.

3 Data server web page

WWW page of the data server can be accessed via Internet/intranet with an address in the following format (URL):

`http://<Computer_name>:<tcp_port_number>`

where `<Computer_name>` is a network address or an IP address of a computer running server, `<tcp_port_number>` is a TCP port number defined in the *Project Options*. Address can be for example:

`http://MyServer:40000` for computer in a local network

`http://www.reliance.cz:40000` for an Internet network server

Port number of an *in-build* server can be changed in *Reliance Design* at Project options *(Project > Project options > Web > Port number).* Default value is 40000. HTTP protocol default value is TCP port number 80. If there is no risk of conflict with other WWW server running on the computer, TCP port number can be set to 80, so there is no need to specify it in web browser.

Address format would be as follows:

`http://<Computer_name>` or `http://MyServer`

3.1 Accessing data server WWW page

Enter the server address and the port number to your internet browser's address bar to open the data server's home page. In the case of the *Reliance Control Server* it is possible to open the web page with the *File > Server web page* command. The page is opened via the local IP address (loopback).

Example:

`http://localhost:40000` or `http://127.0.0.1:40000`

Note: This address is only valid when browser and server are running on the same computer.

3.2 Main page

The **Main page** of the data server provides the basic information about the server and about loaded visualization project(s). The *Main page* allows users to:

- start the web client *(Reliance Web Client)*
- download the mobile client *(Reliance Mobile Client)*
- display values of visualization tags
- display reports and custom reports in HTML or PDF
- perform basic server administration

Reliance Control Server – Main page

3.3 Starting Web Client

The page contains a list of configurations (depending on computers defined in a visualization project) exported by the *Reliance Design* development environment (Enterprise version). Web client can be started from www pages in two ways:

- as a Java *applet*
- as an application via *Java Web Start* (the advised way)

For more information about the difference between these two ways see the Reliance *Web Client* document.

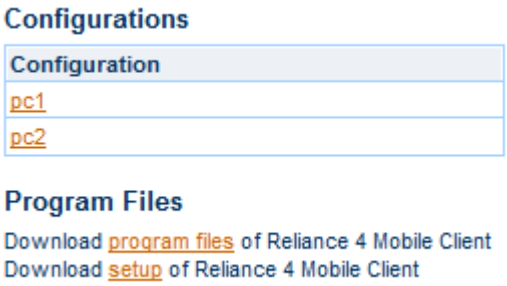
Web client **requires** a runtime environment for the Java language – *Java Runtime Environment (JRE) version 6.0* from *Sun Microsystems*. *JRE 6.0* have to be installed on client computer (JRE is not required for the server).

Web Client – Configurations list

3.4 Mobile Client dowload

Similar to the *Web Client* page, *Mobile Client* page contains *Configurations* (computers) exported with *Reliance Design Enterprise*. Additionally to run *Mobile Client*, it is required to download and install *Mobile Client* program files.

Hardware and software requirements of a mobile device and the installation and configuration of a mobile client is described in a specialized document (see Reliance Mobile Client documentation).

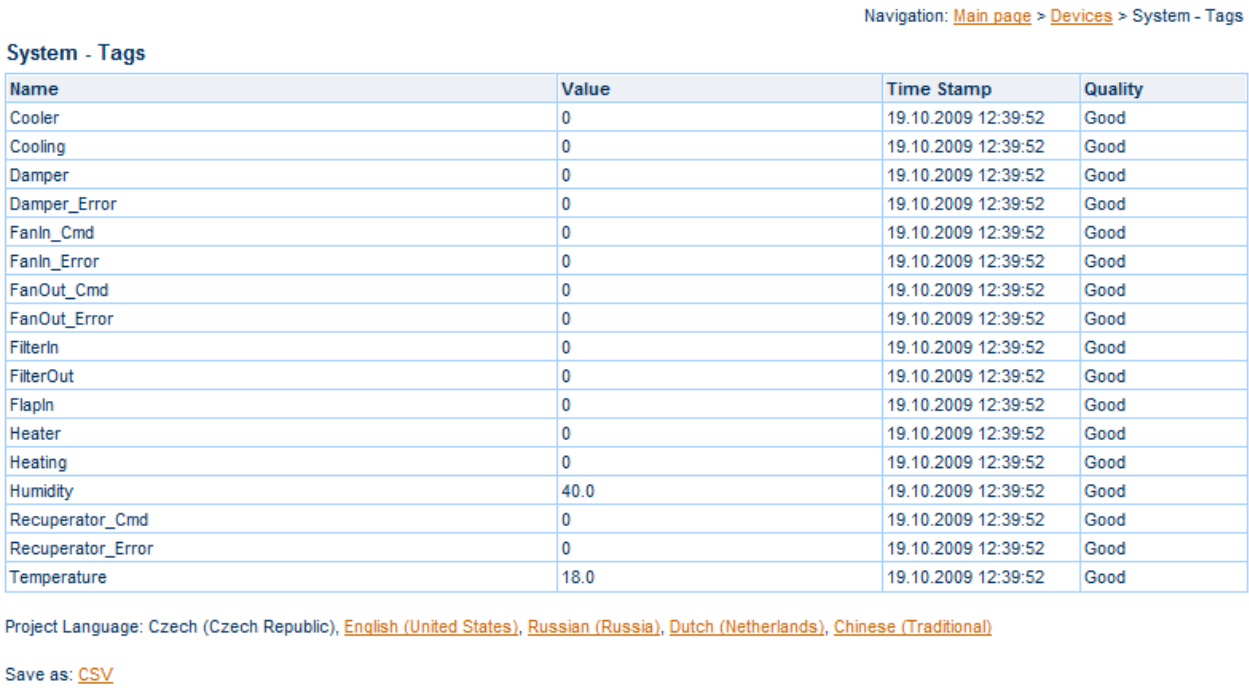


Mobile Client – Configurations list

3.5 Tag value list

Click on **Devices** in section **Project** to show a page with the devices table from a visualization project. Select a device to show page with the table of tags. Every row contains a name (alias) of tag with the following values:

- current value of a tag
- time stamp of a value
- information about quality of a value



Navigation: Main page > Devices > System - Tags

System - Tags

Name	Value	Time Stamp	Quality
Cooler	0	19.10.2009 12:39:52	Good
Cooling	0	19.10.2009 12:39:52	Good
Damper	0	19.10.2009 12:39:52	Good
Damper_Error	0	19.10.2009 12:39:52	Good
FanIn_Cmd	0	19.10.2009 12:39:52	Good
FanIn_Error	0	19.10.2009 12:39:52	Good
FanOut_Cmd	0	19.10.2009 12:39:52	Good
FanOut_Error	0	19.10.2009 12:39:52	Good
FilterIn	0	19.10.2009 12:39:52	Good
FilterOut	0	19.10.2009 12:39:52	Good
FlapIn	0	19.10.2009 12:39:52	Good
Heater	0	19.10.2009 12:39:52	Good
Heating	0	19.10.2009 12:39:52	Good
Humidity	40.0	19.10.2009 12:39:52	Good
Recuperator_Cmd	0	19.10.2009 12:39:52	Good
Recuperator_Error	0	19.10.2009 12:39:52	Good
Temperature	18.0	19.10.2009 12:39:52	Good

Project Language: Czech (Czech Republic), English (United States), Russian (Russia), Dutch (Netherlands), Chinese (Traditional)

Save as: CSV

Devices – Tag values

The information on a page is automatically updated every 60 seconds.

List generated by the data server contains html anchors. Anchor can be used to make a link to a specific item (the page is scrolled vertically to show this item).

`http://<computer_name>:<TCP_port_number>/?req_type=1&lang=0&obj_type=12&obj_id=1#<row_id>`

where *<row_id>* specifies the anchor – in this case it corresponds to a tag ID (a page is scrolled to show this tag). The `lang` parameter defines the language (0 = English, 1 = Czech), `obj_id` specifies a device ID. Object ID is displayed on the bottom left of most managers.

Any row in the list can be highlighted with the following syntax:

```
http://<computer_name>:<TCP_port_number>/?
req_type=1&lang=0&obj_type=12&obj_id=1&highlight_obj_id=<highligh
t_obj_id>#<row_id>
```

where <highlight_obj_id> is a tag ID.

To display a page containing only selected row, use the following syntax:

```
http://<computer_name>:<TCP_port_number>/?
req_type=1&lang=0&obj_type=9&obj_id=<obj_id>
```

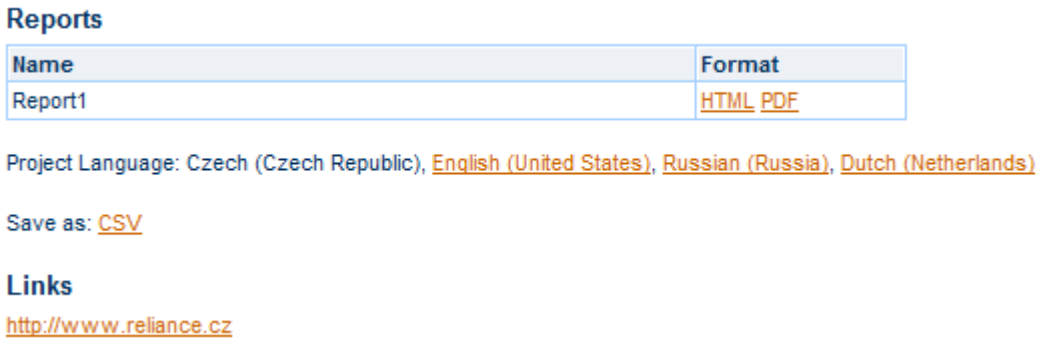
where <obj_id> is tag ID.

The links created with this syntax can be used for example in an external application to show the tag value in a default browser.

3.6 Reports and custom reports

Click on the **Custom reports** in the **Project** section to view the the list of available custom reports. The report is generated after a selection of appropriate link. Report can be generated in two formats (HTML or PDF). Generated *custom reports* are viewed at browser window. *Adobe Reader* (or a similar viewer) have to be installed to view document in the PDF format.

Similar steps should be taken to view project **Reports** (choose **Reports** in section **Project**).



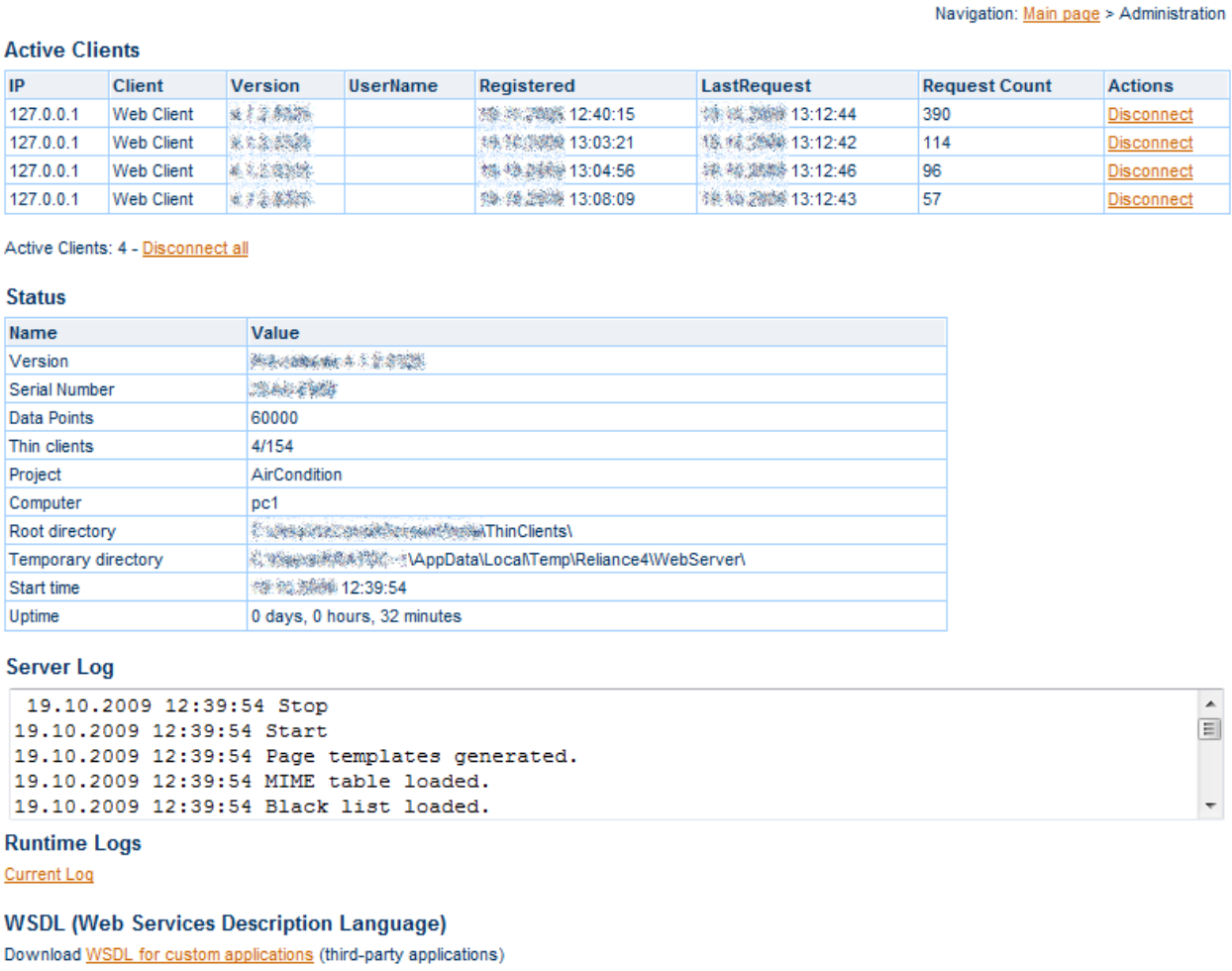
Device – Reports

To scroll the list or highlight a report or custom report, use the syntax described in the topic Tag value list.

3.7 Server administration

Click on the link **Administration** in the **Server** section to display a web page with data server administration. This page allows users to:

- view and manage the list of connected thin clients
- view the information about running data server and loaded projects
- to view the log files generated by data server
- to view the definition of WSDL


Navigation: Main page > Administration

Active Clients

IP	Client	Version	UserName	Registered	LastRequest	Request Count	Actions
127.0.0.1	Web Client	[illegible]		[illegible] 12:40:15	[illegible] 13:12:44	390	Disconnect
127.0.0.1	Web Client	[illegible]		[illegible] 13:03:21	[illegible] 13:12:42	114	Disconnect
127.0.0.1	Web Client	[illegible]		[illegible] 13:04:56	[illegible] 13:12:46	96	Disconnect
127.0.0.1	Web Client	[illegible]		[illegible] 13:08:09	[illegible] 13:12:43	57	Disconnect

Active Clients: 4 - Disconnect all

Status

Name	Value
Version	[illegible]
Serial Number	[illegible]
Data Points	60000
Thin clients	4/154
Project	AirCondition
Computer	pc1
Root directory	[illegible]\ThinClients\
Temporary directory	[illegible]\AppData\Local\Temp\Reliance4\WebServer\
Start time	[illegible] 12:39:54
Uptime	0 days, 0 hours, 32 minutes

Server Log

```
 19.10.2009 12:39:54 Stop
19.10.2009 12:39:54 Start
19.10.2009 12:39:54 Page templates generated.
19.10.2009 12:39:54 MIME table loaded.
19.10.2009 12:39:54 Black list loaded.
```

Runtime Logs

Current Log

WSDL (Web Services Description Language)

Download WSDL for custom applications (third-party applications)

Data server Administration

Section **Active clients** contains the table of active (connected) thin clients. Following information is available about connected clients:

- IP address
- type (web or mobile client)
- version
- logged user name
- date and time of client connection to the server
- date and time of last request received by the server
- requests count received by the server

Each client can be disconnected via the **Disconnect** link. User of a thin client is notified when disconnected. The **Disconnect all** command can be used to disconnect all thin clients.

Section **Status** contains basic information about a data server and loaded project. Parameter **Root** defines the root (home) folder. Custom files can be located in this folder (file can be provided to the users with an appropriate address).

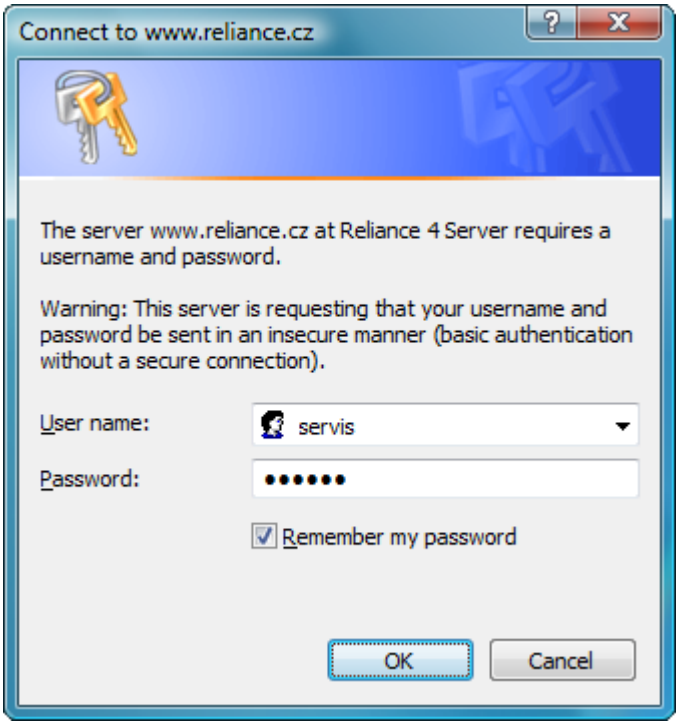
Section **Server log** contains information (log) about web server and web clients. It is possible to find information about start/stop of the server and times when clients connected or disconnected from the server.

Section **Runtime logs** contains information (logs) about the server logged into a file. Log for a current day is always present. Format and type of the information in this file is similar to all runtime modules.

4 Advanced

4.1 How to secure web pages

Access to the web pages or to the administration of the data server is possible to secure with a password on the level of HTTP protocol. Standard web browser dialog window is displayed when such secured page is accessed.



Web pages - Secured access

Login information (name and password) have to correspond to the user defined in a visualization project (User manager. The user have to have sufficient access rights to display a web page. Required access rights can be set via development environment *Reliance Design* in the *Project options* dialog window *(Project > Project options > Web > Secure server's Web page, Require log-on for server administration).*

4.2 How to secure the server with white/black list

Secure logon to the web pages is not the only way to limit an access to the server. It is possible to limit the access to the server only from defined IP addresses with a black/white list. *White list* contains IP addresses that are accepted by a data server. *Black list* contains addresses which are to be refused by a server. The server don't respond to requests from IP addresses listed in the black list. White list is located in the `<Reliance>\WebServer\Filter_WhiteList.txt` file, black list in the `<Reliance>\WebServer\Filter_BlackList.txt` file, where `<Reliance>` is a folder with installation of the *Reliance* system. Both files are plain text and contains lines as follows:

```
; Blacklisted IP's
192.168.0.43
192.168.0.57
192.168.0.17
```

- **Neither black nor white list contains any IP address**
  In this case (default setting) requests from all IP addresses are accepted.
- **Only black list defined (no IP addresses in white list)**
  In this case all IP addresses except those defined in the *black list* are accepted.
- **White list is defined**
  In this case requests only from computers with IP addresses defined in the *white list* are accepted. Contents of the *black list* is ignored.

It is possible to use wildcard character star `(*)` in the list definition. For example to deny all IP addresses beginning with `"192.168"` the *black list* file should contain following expression:

```
; Blacklisted IP's
192.168.*
```

All requests to the data server are filtered. This is true even for messages from thin clients.

Note: There is no need to restart *Data server* when lists are changed. Files are reloaded automatically.

4.3 Changing the web pages visual appearance

Web pages generated on data server are designed in such a way, that it is simple to change the visual appearance. For example request of the end user that pages should contain his Company logo can be easily accommodated. Files with the web pages are located in the archive file `<Reliance>\WebServer\Pages.zip`, where `<Reliance>` is the **Reliance** system home folder. Content of this archive is copied to the web server home folder every time data server starts. It is not advised to change the content of this archive file, because when **Reliance** is upgraded to a newer version all the changes made in this archive would be lost.

Special file `<Reliance>\WebServer\CustomPages.zi_` is designed for the user changes to the web pages. Rename the extension of this file from `.zi_` to `.zip` and define contents of this file (copy inside changed and/or new files). All files contained in the `CustomPages.zip` archive are copied to the web server home folder after the content of the `Pages.zip` file is copied there.

Note: HTML page templates in `Pages.zip` archive contain special strings which are dynamically generated before page is send to the HTML browser. All special strings begin and end with "`$`" (e.g. `$OBJECT_LIST$`). When string is changed or deleted page will not show dynamically generated data for this string (for example table with tag values).

4.4 Interface for third party applications (WSDL)

It is possible to integrate the **Reliance system** with a third party application (for example with a company information system). As mentioned above data server communicates with *Thin clients* via the **SOAP** protocol provided by in-build web server. This is just one interface from several which data server provides. Other interface is intended for third party applications. Every interface of web service is defined with **WSDL** *(Web Service Definition Language).* It has a form of a XML file, which can be downloaded directly from the data server. Many current programming environments *(MS Visual Studio, Borland Delphi, etc.)* are able to create an application which can work as a data server client. The WSDL file which describes interface for third party applications location is:

```
http://<computer_name>:<tcp_portu_number>/WSDL/
IRswCustomClientWS.xml
```

where <*computer_name*> is a computer network name or an IP address, <*tcp_port_number*> is a TCP port number defined in *Project Options*.

An example demonstrating the communication with a data server is a part of the **Reliance** installation. The example is provided for different programming languages (environments): **Object Pacal** *(Borland Delphi 7),* **C#** *(Microsoft Visual Studio).*

Note: To establish a connection to a server via the *IRswCustomClientWS* interface, password is required. The password can be set in the *Project Options* dialog in the *Custom applications* field.

5 Glossary

Windows system service

Program running in the Windows operation system, which doesn't have any user interface. System service runs independently on whether the user is logged into the system or not.

HTTP protocol *(Hypertext Transfer Protocol)*

Often used protocol for communication between servers and www clients via Internet.

WSDL *(Web Service Definition Language)*

Language which describes the web server interface.

XML *(eXtensible Markup Language)*

General markup language designed for easy creation of other markup languages for specific purposes.

Data servers

Common name for **Reliance Server** and **Reliance Control Server** runtime software.

Thin clients

Common name for the web client *(Reliance Web Client),* for the mobile client *(Reliance Mobile Client)* and the client designed for use with smartphones and tablets *(Reliance Smart Client).*

Web server

Program responsible for responses to **HTTP requests**, usually from web browsers. Response to the HTTP request is for example a web page.

Web service

Part of a program which provides capability to exchange the data with a client application via the Internet by means of **SOAP** protocol. *Web service* is a part of a web server.

SOAP *(Simple Object Access Protocol)*

Protocol for exchange of the messages based on **XML** format via the Internet, usually by means of HTTP protocol.

TCP port

Special number which maps a communication packet to a certain application.

Java Web Start

The system from Sun Microsystems which provides easy start and automatic actualization of programs written in the Java language directly from the web pages.

JRE *(Java Runtime Environment)*

The runtime environment for programs written in the *Java* programming language.

HTML *(HyperText Markup Language)*

Markup language designed for web pages description.