

## **IBM® Rational® Rhapsody® Gateway Add On**



## **RequisitePro Coupling Notes**



***Rhapsody<sup>®</sup>***

**IBM<sup>®</sup> Rational<sup>®</sup> Rhapsody<sup>®</sup>  
Gateway Add On**

**RequisitePro Coupling Notes**



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# Introduction

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This technical note describes how to capture the traceability information of requirements from RequisitePro and how to create objects in the RequisitePro Database using Rhapsody Gateway.

Some standard operations, such as RequisitePro document import, navigation or export to RequisitePro in the Rhapsody Gateway tool, require the RequisitePro tool to be installed.

Refer to the *Customization Guide* and run the Coupling example for more information about what is described in this technical note.



# RequisitePro Analysis

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This chapter describes how Rhapsody Gateway captures information items from RequisitePro, and how those information are analyzed to be used as requirements, attributes, text, and so on.

This chapter covers the following topics:

- ◆ Get the information items from RequisitePro.
- ◆ Configuring Rhapsody Gateway according to Requirements definition in RequisitePro.
- ◆ Analysing the information items to get the same definition in Rhapsody Gateway.

## RequisitePro Versions Supported

Rhapsody Gateway supports RequisitePro versions from 2003.06 to 7.1.3.

## Rhapsody Gateway Elements Compared to RequisitePro Elements

Rhapsody Gateway allows definition of the following traceability elements.

### Section

A section is a hierarchical file description element. The following are examples of sections:

- ◆ Heading levels in a Microsoft Word file
- ◆ Tabs in a Microsoft Excel spreadsheet
- ◆ UML packages, diagrams
- ◆ Modules, sub-modules and components of design models

The tree composed by the Rhapsody Gateway sections is the same as the one composed by the RequisitePro Packages.

## Macro-requirement

A macro-requirement is a "super-requirement" that includes requirements and passes its properties onto those requirements.

Any new element attached to a macro-requirement (attribute, text, link or coverage link) is also attached to requirements and derived requirements contained in the macro-requirement.

RequisitePro does not semantically include this concept of hierarchy between requirements. It includes a hierarchy of Parent Requirements and Child Requirements, with no inheritance concept between parents and children. For example, in RequisitePro if a user traces a parent requirements, the child requirements are not considered traced.

The macro-requirements should not be involved in the RequisitePro – Rhapsody Gateway interface.

## Requirement

A requirement expresses a need or constraint (technical constraints, costs, deadlines, etc.). The requirement is written either in natural language, or in the form of an expression which may be mathematical, geometric, computerized, etc.

This concept is equivalent between RequisitePro and Rhapsody Gateway.

Note that RequisitePro always manages requirements, that's why low-level elements, like UML model elements, will be created by Rhapsody Gateway as 'requirements' in RequisitePro, in order to allow creation of traceability links.

## Entity

An entity is the explicit definition of an element for mandatory analysis. This definition is used to check an element's contents and also to detect if it does not contain any traceability information. For example:

- ◆ a design model element
- ◆ a code module, etc.

An entity can only reference requirements, derived requirements or macro-requirements and cannot reference itself.

This concept does not exist directly in RequisitePro.

## Reference

A reference is the information indicating the coverage (implementation, verification, etc.) of a requirement. The reference points to a macro-requirement, requirement or derived requirement.

In Rhapsody Gateway the reference can be defined in a bottom-up direction, expressing that “The lower level element covers the higher level element” or in the top-down direction, expressing that “The higher level element is covered by the lower element”.

References are equivalent to RequisitePro **trace to** links.

## Attribute

Attributes complete the requirement. For example:

- ◆ type of check: test, observation, etc.
- ◆ category: functional, operational
- ◆ criticality: low, high, etc.
- ◆ flexibility: low, high,
- ◆ maturity: source, analyzed, approved, etc.

Rhapsody Gateway lets you define the attributes to be analyzed in the project files, and filter the display in accordance with these attributes.

Rhapsody Gateway Attributes are equivalent to the RequisitePro Attributes.

## Reference Attribute

A reference attribute is added to a reference to define the type of coverage. For example:

- ◆ partial coverage
- ◆ provisional

This concept is not directly supported by RequisitePro.

## Link

A link is reference information that does not concern coverage. For example:

- ◆ supported by
- ◆ issued by
- ◆ checked by
- ◆ valid under
- ◆ allocated to
- ◆ result of

The concept of links that are not directly traceability links is not directly supported by RequisitePro.



## Text

Text is the wording of a traceability element. Rhapsody Gateway attaches the text to the element (section, requirement, attribute) detected immediately above it.

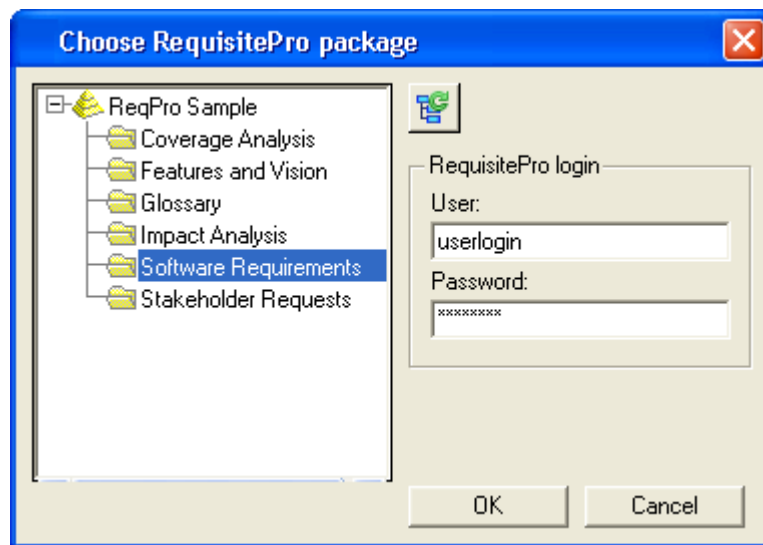
The Rhapsody Gateway requirement text is equivalent to the RequisitePro requirement text.

## Selecting the RequisitePro Project



The RequisitePro document to be analyzed is selected during the Project Configuration phase in Rhapsody Gateway. To insert RequisitePro files, follow these steps:

1. In the Project editor, click on the **Add a document**  button to insert a new document into the Traceability Description Area.
2. Select a **Type of Analysis** based on RequisitePro. Click on the **File or Directory** field then on the **Browse**  button to select a RequisitePro project (with the `rqs` extension—the same file you select when you ask **File > Open project...** from RequisitePro) from the Rhapsody Gateway selection window.

The following selecting window opens displaying the same tree as the one displayed by RequisitePro for the selected project.



Select a package in this tree. Click **OK** to validate your package choice.

Details   Modification Files   Covers							
Name	Type of Analysis	File or Directory	Ignor...	Inter...	Bloc...	Variable	Value
 Requirements	 RequisitePro	ReqPro Sample\Proj	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Package name	Software Requirements

## Specific Parameters of the RequisitePro Type

When inserting a RequisitePro project in the Rhapsody Gateway project editor, the user must specify additional parameters through variables available in the **Variable** drop down list. When the RequisitePro project is selected in the project configuration:

- ◆ **Package name**—This option allows the user to type the package to import in Rhapsody Gateway.

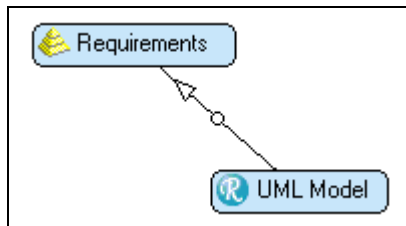
The package name can also be selected during the project selection:

Details   Modification Files   Covers							
Name	Type of Analysis	File or Directory	Ignor...	Inter...	Bloc...	Variable	Value
Requirements	RequisitePro	ReqPro Sample\Proj	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Package name	Software Requirements

## Adding a Cover

To define traceability, add a cover between the covering document and the covered document.

The Rhapsody Gateway project looks like the following:



Now the traceability analysis of the project can be performed.



# Access Rights and Other Impacts

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It must be noted that because RequisitePro is strongly based on Microsoft Word and Rhapsody Gateway is able to analyze Word documents, it is possible to analyze Word documents produced by RequisitePro as long as they are not in the “locked” format.

This note only describes the direct coupling between Rhapsody Gateway and RequisitePro.

It is important to know that in a multi-user environment, Rhapsody Gateway actions and needed access rights on the RequisitePro project can lead to unknown information messages.

## Secured RequisitePro Projects

RequisitePro allows users management of security on a project (**File > Project Administration > Security...**, with the **Enable security for this project** option activated).

If security is enabled for the RequisitePro project, you may need to provide valid User information to allow automatic operations by Rhapsody Gateway. See the RequisitePro *User Manual* for more information if necessary.

## Exclusive Access Rights

As explained below in this document, Rhapsody Gateway will create **Requirement Types**.

RequisitePro allows such a creation for a user having **Exclusive Access** rights.

The possible cases are:

- ◆ Rhapsody Gateway gained the **Exclusive access** rights: the dialog continues normally.
- ◆ RequisitePro refuses to allocate **Exclusive access** rights. Then Rhapsody Gateway displays an error message for the RequisitePro document:

```
document 'Requirements RequisitePro'....Error: Cannot get
Read-Write lock. Another user has an exclusive lock on the
RequisiteProProject.Exclusive User=<user_name>
```

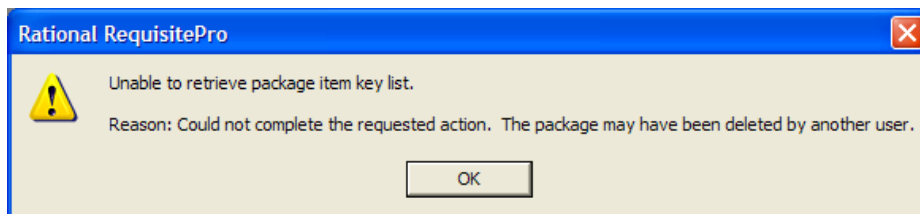
By definition, in this case no dialog or creation will be possible until the Exclusive User closes the RequisitePro project or releases the **Exclusive access**.

During the dialog, Rhapsody Gateway uses the RequisitePro project as an exclusive user. Therefore, even if this dialog lasts for only a few seconds, this situation may lead to Exclusive Access rights refused to another RequisitePro user requesting these rights. However, Rhapsody Gateway closes the project at the end of the dialog, therefore this situation is very fugitive.

## Possible Warning Messages for RequisitePro Users

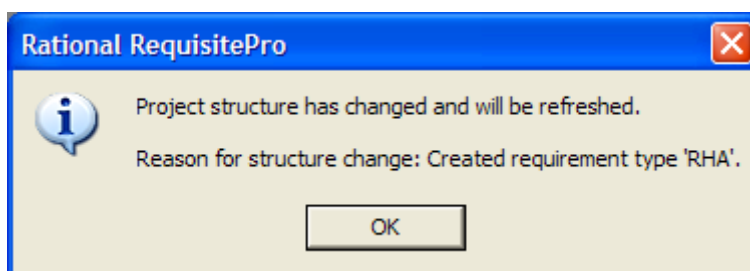
If a user is working within RequisitePro with non exclusive access rights on parts of the project managed by Rhapsody Gateway, Rhapsody Gateway will be able to create the Requirement type.

While expanding a tree previously created by Rhapsody Gateway and updated by the last upload action, the user may get the following RequisitePro dialog box:



The solution is simply to close and re-open the project tree, and in some rare cases to close and re-open the project itself. There is no risk of data loss.

If a user is working within RequisitePro on part of the project traced by elements managed by Rhapsody Gateway (i.e. High-Level Requirements), the following information box may appear after the first requirements creating dialog:



Simply close and re-open the project tree, and in some rare cases close and re-open the project itself. There is no risk of data loss.

# Connection Profiles

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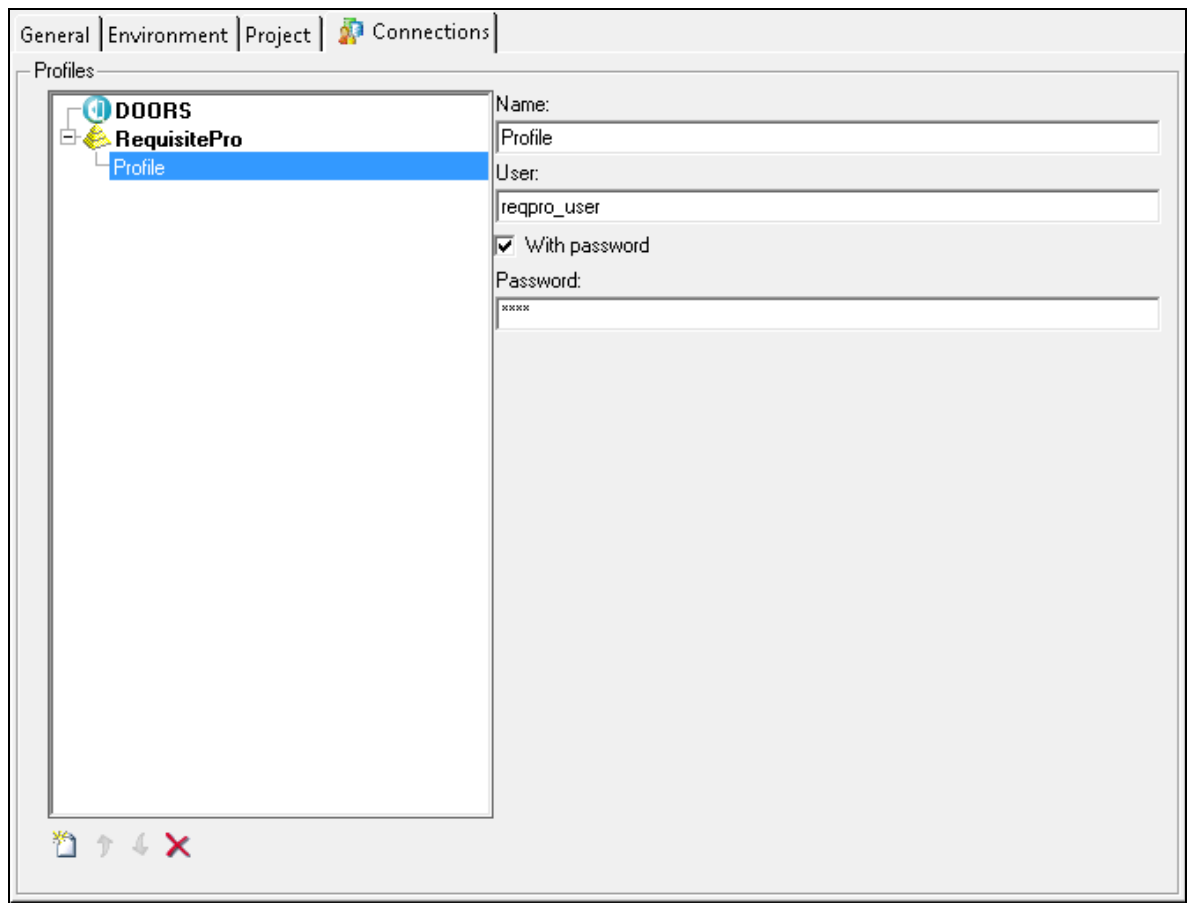
Connection parameters can be defined to configure the servers you often connect to. In order to, you can define few connections profiles to easily change of RequisitePro connection.

## Creating Profiles

Open the **Connections** tab of the **Options** dialog box in order to create a profile.

To create a new RequisitePro profile, follow these steps:

1. Select RequisitePro in the Profile area.
2. Click the **Add new profile** button. A blank profile appears.
3. Fill out the fields of the profile:
  - ◆ **Name**—Name the profile.
  - ◆ **User**—Enter the login of the user.
  - ◆ **With password**—Check this combo-box if you want to define a password associated to the profile in next field.
  - ◆ **Password**—Enter the password of the user.



## Using Profiles

The created profiles can be used in the dialog box which allows the selection of a RequisitePro project.

See the *Selecting the RequisitePro Project* section.

# Exporting to RequisitePro

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The traceability information captured by Rhapsody Gateway can be exported to RequisitePro.

## Note 1

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See the section about **Exclusive Access Rights** and **Possible Warning Messages** in **Access Rights** chapter that may appear during these operations.

## Note 2

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See the section about **Collaborative Traceability** if the traceability is performed in both Rhapsody and RequisitePro environments.

## Preliminary Actions Performed in Rhapsody Gateway

Rhapsody Gateway checks if the following elements exist, and creates them automatically if needed:

- ◆ A Requirement Type for the requirements coming from Rhapsody Gateway, with the type named applied to this document in the Project configuration, and using the Requirement tag prefix 'TTT' where TTT are the three first letters of the type's name.
- ◆ A Package named like the type name.
- ◆ A traceability view between each type of requirements imported from RequisitePro and the downstream elements managed by Rhapsody Gateway.

### Example:

The project contains a RequisitePro document, named 'Software Requirements' covered by a document using the 'Excel' type of analysis and named 'Specifications'.

Rhapsody Gateway will create:

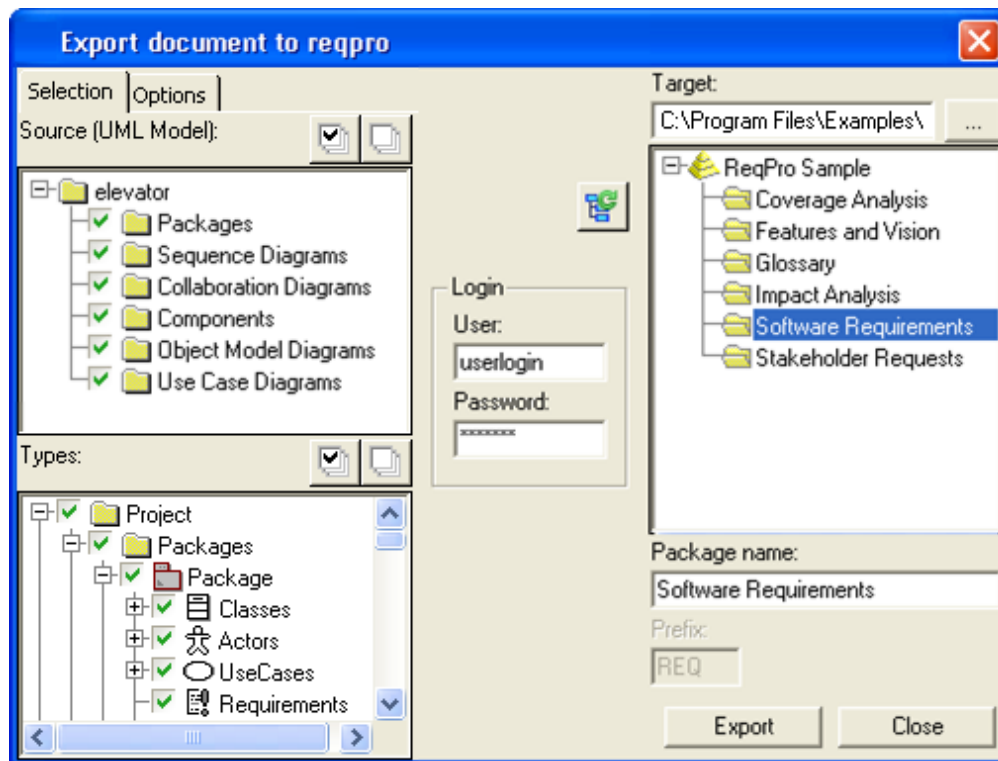
- ◆ A Requirement Type named Excel, and using the Requirement tag prefix EXC
- ◆ A Package named 'Specifications Excel'
- ◆ A traceability view between RequisitePro Software requirements and Excel elements (imported in RequisitePro as requirements)

## Exporting Document to RequisitePro

### Setting RequisitePro Export

To export a document to RequisitePro, it is necessary to configure export settings.

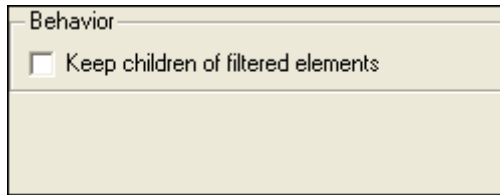
Select the low-level document to export then click the **Export Document to RequisitePro** option from the Rhapsody Gateway **Tools** menu. The following **Export configuration** dialog box is displayed:



In the **Selection** tab of this window, following standard options in the form of lists, view, or fields are available:

- ◆ **Source** list—displays the two first levels of the current document.
- ◆ **Types** list—displays the types of the elements which are selected in the Source list. Select the elements that are to be uploaded. Within this subset, select the specific element types designated for upload.
- ◆ **Target** view—Use this view to select a package in RequisitePro.
- ◆ **Package name**—Enter a package name. The default name will be the name of the document defined in the Rhapsody Gateway project editor for the uploaded document.
- ◆ **Prefix** field—Enter a prefix if you want the created RequisitePro elements to have a particular prefix.

In the **Options** tab, advanced options are available, as shown below:



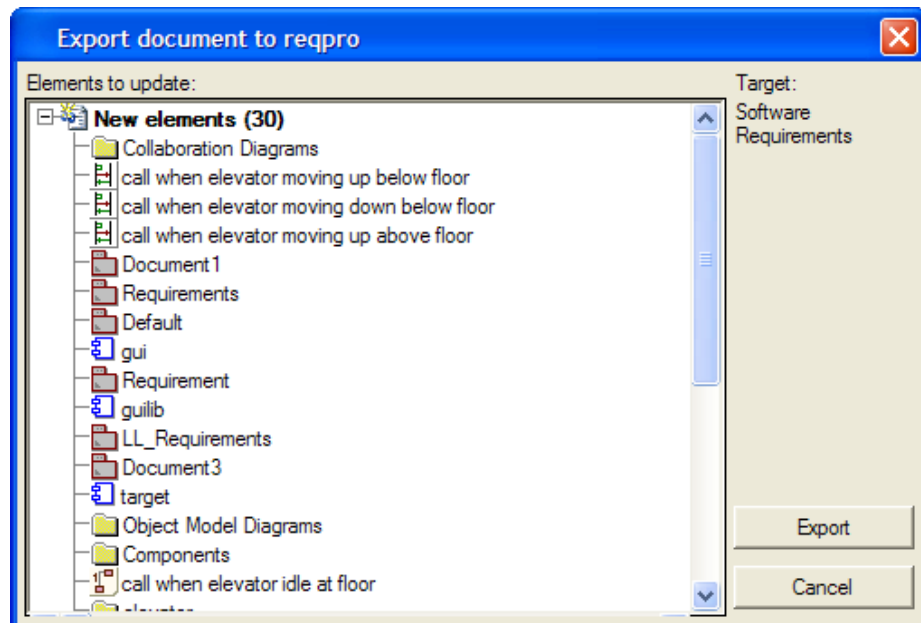
- ◆ **Keep children of filtered elements**—Use this option if you want to export even if parent types (like headers) is unchecked. Only selected type elements will be visible in preview window.

## Synchronizing the Document

Follow these steps to perform the export:

1. Make sure everything is configured in the **Export** dialog box.
2. Click **Export** to begin the synchronization. Rhapsody Gateway communicates with RequisitePro in order to check what needs to be updated.

An information window appears:



If it is the first upload, you will have all the imported document elements presented as “New elements”.

3. Click **Export** to launch the upload of the information into RequisitePro. Use the **Cancel** option to close the window without any action in RequisitePro.

## Structure of the Elements Exported in RequisitePro

Because RequisitePro only manages **requirements** in its **traceability views**, the elements are created as RequisitePro **requirements**.

For example, an UML model tree including traceability will be imported with a **package** tree equivalent to the model tree, containing RequisitePro **requirements** corresponding to the model elements.

The screenshot shows the 'Requirement Properties' dialog box for a requirement named 'RHA2: call when elevator idle above or below f...'. The 'General' tab is selected. The 'Type' is 'RHA: Rhapsody'. The 'Name' is 'call when elevator idle above or below floor'. The 'Text' field is empty. The 'Package' is 'Sequence Diagrams' and the 'Location' is 'Database'. There are 'OK', 'Cancel', and 'Help' buttons at the bottom.

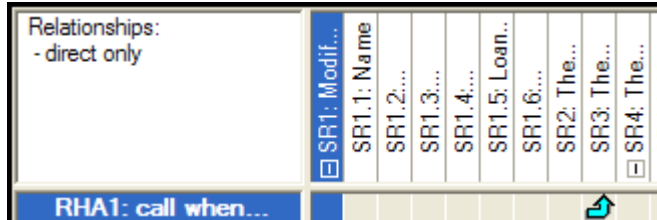
**Trace to** links are automatically created, see below in the Properties dialog.

The screenshot shows the 'Requirement Properties' dialog box for the same requirement, but with the 'Traceability' tab selected. The 'From' field is empty, and the 'To' field contains 'SR3: The system shall generate an error message stating that an invalid'. There are 'Add...' and 'Remove' buttons for both fields. There are 'OK', 'Cancel', and 'Help' buttons at the bottom.

To get the **Trace To** filled in, the RequisitePro document needs to cover another document or itself. To get the **Trace From** filled in, the RequisitePro document needs to be covered by another document or by itself.

## Creating a Traceability Matrix

Rhapsody Gateway automatically creates a Traceability Matrix between RequisitePro requirements and the exported elements in the root package of the exported tree:



Rhapsody Gateway will create as many matrixes as the number of RequisitePro documents that are covered by the exported document.

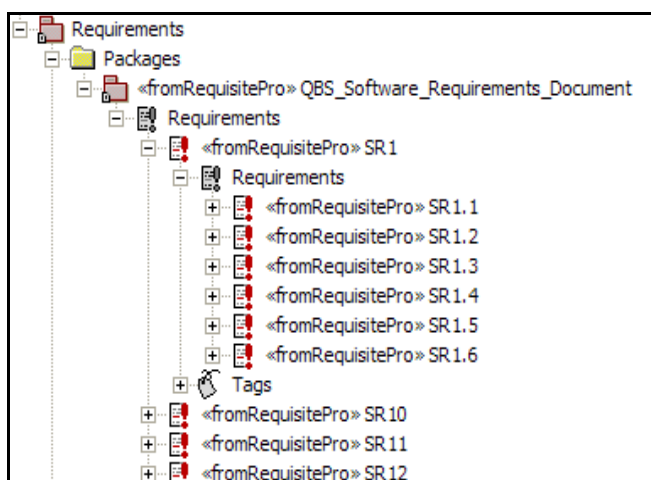
## Low-level Requirements in RequisitePro

To present a view equivalent to the low-level one, created elements are as follow:

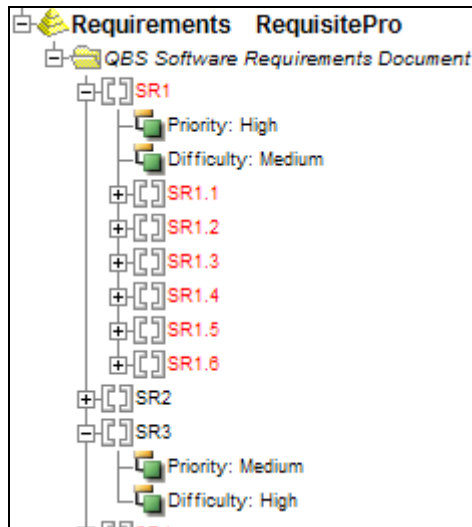
- ◆ The **root** becomes a Package.
- ◆ All other elements become a Requirement. The **Name** of each RequisitePro requirement is the **Name** of the low-level requirement or the section defined in the Rhapsody Gateway type of analysis, and the **Text** in RequisitePro is the text of the low-level requirement or the section.

The following figures give an example of a RequisitePro project and its view in Rhapsody:

### View in Rhapsody



### Corresponding View in Rhapsody Gateway



### Note

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Hierarchy between requirements is supported by Rhapsody Gateway.

# Manage Collaborative Traceability

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Rhapsody Gateway can use its analysis results and re-created information about requirements and traceability in an advanced tool supporting these notions (DOORS from IBM, Rhapsody from IBM, Quality Center from HP-Mercury, etc.).

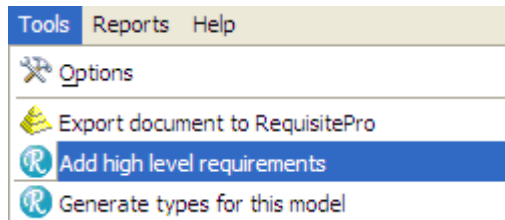
The explanations below are based on Rhapsody but can easily be transposed to another tool.

## Creating Requirements in the Third Party Tool

The requirements are imported in the interfaced tool automatically, and their elements are used to create a tree.

**Rhapsody** is taken as an example of third party tool.

1. Select the Rhapsody document in the Rhapsody Gateway main window, and then select **Add high level requirements** in the **Tools** menu of Rhapsody Gateway to export requirements to the third party tool (here is the Rhapsody menu item).



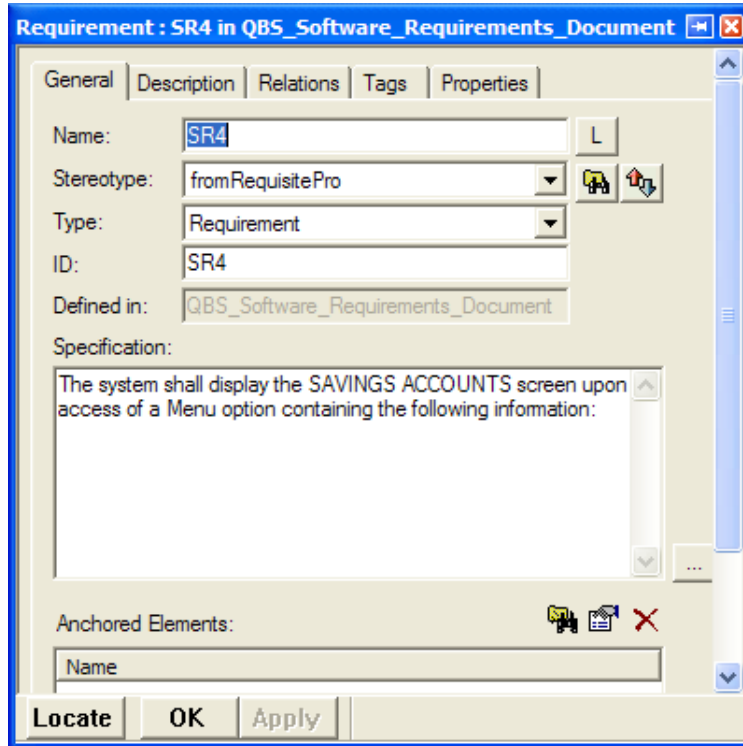
2. When the export process is completed, Rhapsody Gateway opens an information window.



Click **OK** to close the window.

3. Each requirement is created in Rhapsody with the following information:

- ◆ A Stereotype named from<Type>, Type being the type defined in the Rhapsody Gateway Project Editor.
- ◆ A specification field containing the Text of the RequisitePro requirement.

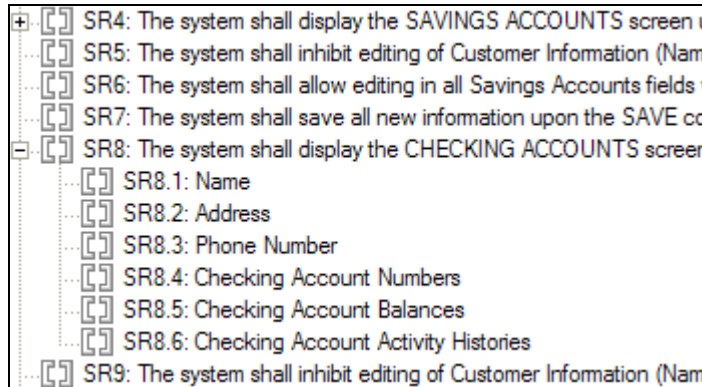


### Important Note

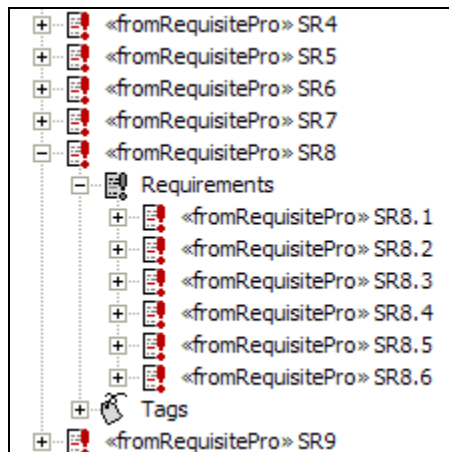
This transfer of the requirements from RequisitePro to a tool used at a lower level is a great help for users, however it does not represent a traceability action. As Rhapsody Gateway manages requirements traceability, it does not display the RequisitePro requirements created by this operation.

Below is an example of the creation resulting from Rhapsody requirements taken from DOORS:

#### View of the RequisitePro tree



#### Corresponding View of the Rhapsody tree



## Requirements Traceability in Third Party Tools – Low-level Requirements

**Rhapsody** is taken as an example of third party tool.

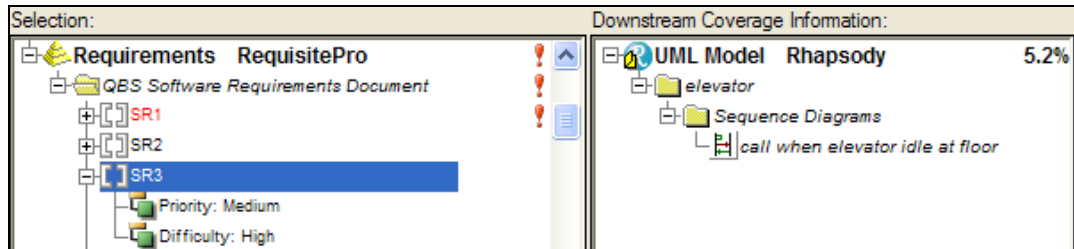
#### Note

See the section about Collaborative Traceability if the traceability is performed in both Rhapsody and RequisitePro environments.

These actions are performed classically in the Rhapsody environment.

Each time Rhapsody Gateway reloads the project, it presents the traceability between the Rhapsody model and the RequisitePro requirements.

The screenshot below presents the SR3 requirement in RequisitePro covered by the sequence diagram `call when...` in Rhapsody.



See the Rhapsody and Rhapsody Gateway Manuals for more information.

With two tools allowing the user to define requirements and traceability, it is necessary to check and manage actions that can be performed in one or the other tool.

To do so, Rhapsody Gateway:

- ◆ Captures the requirements and the traceability performed in RequisitePro between RequisitePro and the elements of the third party tool.
- ◆ Creates the traceability information in the third party tool, as presented above for requirements.

## Transferring Traceability Links from RequisitePro to the Third Party Tool

Rhapsody Gateway can create traceability information in the third party tool.

For example, the traceability links are imported in Rhapsody automatically with the creation of **anchors** or **dependencies**. The transfer of the traceability information is the same as explained above for Add high level.

## Transferring Traceability Links from the Third Party Tool to RequisitePro


As it is requested by Rhapsody Gateway to have all the traceability information previously captured and integrated in third party tool, the transfer of the traceability information is the same as explained above for Export.

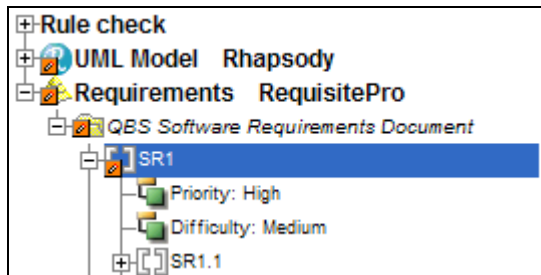
# High Level Requirements Process

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## Detecting Modified Elements

Every time the project is reloaded, Rhapsody Gateway shows the differences detected compared with the previous time, in the main window.

For example, if a change occurs in the RequisitePro database for one or several requirements, after synchronization with RequisitePro the changes will be identified in the main window by the icon . In the example below, the requirement SR1 has been changed:



The definition of the changed requirements (text, etc.), if captured, is automatically updated in the Rhapsody Gateway main window but also in the third party tool tree.

This orange logo information shows only the difference between two consecutive analyses, allowing the Rhapsody Gateway user to immediately concentrate on the modifications and impact analysis.

The orange logos will disappear if you reload while the RequisitePro requirements did not change. Therefore, if you want the orange logo to disappear, simply reload.

## Deleted Requirements

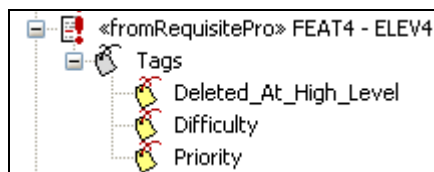
If some RequisitePro requirements have been deleted, Rhapsody Gateway will not directly delete them in third party tool because an analysis by the user may be necessary before deletion.

If the third party tool supports the addition of information to an element, this notion can be used to highlight the deletion of the requirement in RequisitePro.

For example, Rhapsody Gateway will open the following information window after the dialog with Rhapsody.



RequisitePro requirements that have been deleted are marked using a **Deleted at high level** tag in Rhapsody.



Of course the name of this tag can be customized to comply with a given customer process.

## Snapshot Management

The snapshots are a way to keep the information about requirements modifications, deletions or creations.

The Snapshot editor allows you to:

- ◆ allocate a snapshot title with comments on the current analysis,
- ◆ compare previously saved results with the current analysis results,
- ◆ consult and document the life of an element in the project,
- ◆ consult the analysis results at earlier steps of the project.

Analysis of differences between snapshots is performed with the same precision as the analysis shown in the main window. You can distinguish between modifications to text, attributes, etc.