

*Building a Simulation with the RealVue
Suite of Simulation Products*

SimAuthor Toolset User's Guide



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Welcome to the RealVue Suite of Simulation Products

The RealVue suite of simulation products are as follows:

- SimKernel™ framework, providing the core run-time for simulation execution.
- SimLib™ component libraries, providing reusable simulation components.
- SimAuthor™ toolset, providing a productive authoring environment.

RealVue's suite of simulation products provides a system for composing and delivering simulation-based technical training on equipment, machinery, and software-based systems.

SimKernel Framework

The SimKernel framework encapsulates the structure of the simulated system in a data model that is decomposed into its constituent simulation components. The behavior of the simulation is driven by the sequence of state changes, specifically reflected as changes to the values of the properties of the simulation components in the data model. The data model is defined and initialized using a structured data definition such as XML (Extensible Markup Language). The architecture of the SimKernel is shown below:

- **Data Model** includes the run-time objects that represent the simulation components and their properties. The Data Model provides an important listener interface that allows other modules to be notified when the data model changes or when properties on simulation components change.
- **Simulation Engine** manages and controls the flow of simulated time within the SimKernel.
- **Script Interpreter** (SimKernel uses Python) specifies the atomic simulation behaviors of simulation component property changes in response to user interactions (user events) and to changes in other simulation component properties.
- **Interface Engine** manages the user interface for a simulation, providing the user's simulated representation of the system, reflecting visual changes in response to simulation component property changes, and providing the conduit for user interactions with the simulation.
- **Simulation Client** provides the overall application resource management for the simulation during initial launch, execution, and shutdown. One of the important functions of the Simulation Client is to provide input the initial data definitions for the simulation structure and properties and initialize the Data Model module. In addition, the Simulation Client provides the overall user interface window(s) within which the simulation runs – also defined in data.

- **Component Libraries** are sets of reusable simulation components that encapsulate a visual representation, properties, and pre-defined behavior. The simulation components are integrated into a simulation by being referenced in the Data Model.

The internal interfaces support the integration of Extended Services that may include a wide variety of capabilities, including integration with external software systems, supporting collaboration between simulation users, and supporting various simulation applications for instruction, diagnostics, and certification.

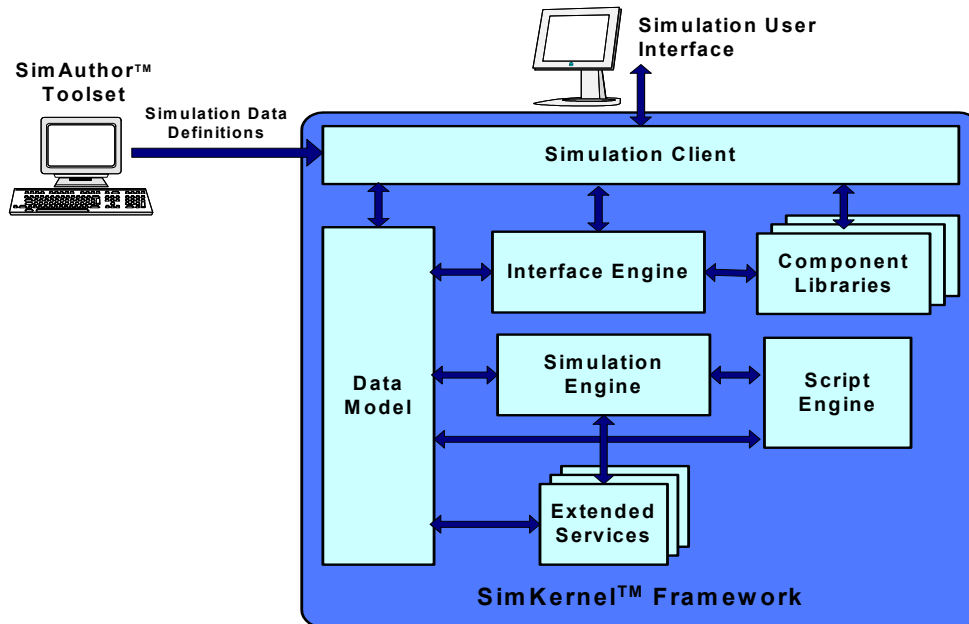


FIGURE 1: SimKernel Architecture with the SimAuthor Toolset

SimLib Component Libraries

The SimLib is the library manager that contains sets of available simulation components. Each SimComponent includes a default image, set properties, and pre-defined behavior through the use of script functions. The simulation components are integrated into a simulation by being referenced in the Data Model. Within the SimKernel architecture, SimLib is also known as Component Libraries. Within the SimAuthor toolset, the SimAuthor hierarchies are used as the simulation's data model for integrating SimComponents. There can be more than one library for each simulation, such as separate libraries for Tools, 3D objects, and default components.

SimAuthor Toolset

The SimAuthor toolset provides a highly-productive, simulation authoring environment supporting true Rapid Application Development (RAD). The toolset promotes incremental development by focusing on the current running simulation under development. As an interactive authoring tool, the SimAuthor Toolset contains multiple parts that contribute to designing, developing, and maintaining a simulation. The toolset provides tools and a user interface that help define the structure of the simulation, interactions between the SimComponents, and initial data definitions. The following sections describe the architecture of the SimAuthor toolset.

SimWindows

A SimWindow is the “glass pane” feature that allows graphical layout and other tool interactions within a running simulation under development. Each simulation may have any number of SimWindows to display

different views, such as zoomed in and zoomed out views of instrumentation, or the interaction between software and hardware devices. If a simulation requires multiple models of a hardware device, multiple windows can be used to display each model.

Simulation Mode vs. SimAuthor Mode

Simulation Mode is used as a real-time view of a running simulation that is under development. For instance, after you create a SimComponent (such as a switch), you can set the SimWindow to be in Simulation Mode and then see the switch as it would appear in an actual simulation. From there, the SimWindow will accept user input and will react to the input according to the properties you set for the SimComponent. You cannot change the design of the simulation while in Simulation Mode.

SimAuthor Mode is used to create and design the simulation under development. For instance, after you create a SimComponent (such as a switch), you can set the SimWindow to be in SimAuthor Mode and then rearrange or move the switch to the appropriate place on the SimWindow. Because SimAuthor Mode is the design mode, use the SimAuthor toolset to design the simulation and modify the properties of the SimComponent.

NOTE: Each SimWindow may independently be put into SimAuthor or Simulation mode.

SimLib

SimLib is a collection of visual and non-visual SimComponents that can be used as templates for elements or parts of a simulated system. In the SimAuthor toolset, the Component Selector contains the available libraries and its associated SimComponents. Refer to the “SimLib Tables” on page 75 to view more information about each SimComponent, such as properties, usage, and java class. SimLib supports drag-and-drop integration into the SimWindows and into the SimAuthor hierarchies of a running simulation.

SimAuthor Hierarchies

The SimAuthor hierarchies are used as a data model of a simulation. The hierarchies display the structure (parts within parts) of the simulation consisting of SimWindows, SimComponents, simulation properties, and Script Functions. Within the SimAuthor toolset, you can drag and drop SimComponents from the Component Selector into the hierarchies to be added to the data model. Also, the hierarchies are automatically updated when changes are made in the SimAuthor Mode of a SimWindow and vice versa.

SimComponents

A SimComponent can be a visual or non-visual element of a simulated system and is also a template for elements of a simulated system. The SimComponents individually contain a set of properties to help define the user interface characteristics and states of behavior. You can select components from the Component Selector and drag and drop the components into a SimWindow or into the SimAuthor hierarchies.

There are two types of SimComponents:

- **Visual SimComponents** - The visual element of the abstract model of a simulated system. As templates for the visual elements, the Visual SimComponents define the look and feel and possible states of the simulation. Examples include a menu, toggle button, or a switch.
- **Model SimComponents** - The non-visual element of the abstract model of a simulated system. Templates for the non-visual elements can be used to define the functional aspect of the simulation, such as user input values and triggers for the different states of the simulation.

Visual and Model SimComponents can also be extensible. An Extensible SimComponent allows the designer to extend its definition and structure through the SimAuthor toolset. SimComponents (templates) that are defined through XML allow the user to edit the definition, add/delete properties, and create property links. SimComponents (templates) that are defined in Java do not allow this extensibility. Visual and Model SimComponents may either be extensible or not.

Properties

The Property is the named attribute of a SimComponent that define the SimComponent's visual characteristics (e.g. size, color, screen location) or the behavior (e.g. disabled, enabled).

Inherent Properties vs. Simulation Properties

There are two types of properties for the SimComponent.

- The **inherent property** of a SimComponent reflects the more static, but configurable, characteristics of a SimComponent. Typically, inherent properties are set when the SimComponent is created and configured in the SimAuthor toolset, but most properties cannot be scripted against. Examples of inherent properties include images, background color, and cursors.
- The **simulation property** of a SimComponent reflects the dynamic and visual or non-visual characteristics of the SimComponent. Scripting against the set of simulation properties for all SimComponents specifies simulation behavior. Examples of simulation properties include states, such as on/off, toggle up/toggle down, or enabled/disabled.

Script Functions

The behavior and the interaction between the SimComponents of a simulation is specified through scripting language (Python) and XML. The scripting feature specifies the behavior of the simulation and the interaction between SimComponents through property triggers and state changes. In the SimAuthor toolset, a script file contains a single script function and parameters that tell each SimComponent how it will be used in the simulation. The script functions are then registered to an XML file that uses triggers to determine which function is used and what happens to the SimComponent. Each script function has a name, a type (rule or restriction), one or more triggers, and a set of script statements.

In the SimAuthor toolset, script functions can be accessed and viewed through the Script Editor, Script Console, and the Property Pane at the bottom of the SimAuthor hierarchies. For more information on the scripting language used for the toolset, refer to “Using Python for Scripting” on page 59.

Rules and Restrictions

A **Rule** is a type of script function that is triggered after a property change. A **Restriction** is a type of script function that is triggered before a property change. In the SimAuthor toolset, restrictions to a property are executed before. Use the Script Function Editor feature to define the rule or restriction of a script function.

Triggers

Triggers are used to initiate script functions and are required for any simulation. A trigger is usually embedded within a script to watch for an event to occur. When the event occurs, the trigger initiates the script function that tells the system what happens next in the simulation. There can be one to many triggers within each script. Use the Script Editor and Script Link features in the SimAuthor toolset to connect SimComponents together and to define the flow of a simulation.

Property Pane

The Property Pane of the SimAuthor Toolset window appears when a property is selected from the hierarchies. The Property Pane contains information about the selected SimComponent or property:

- **Name** - The fully qualified name.
- **Type** - The type of property.
- **Value** - The current value of that property, in an editable field. Values are maintained dynamically as the simulation is executed.

The Property Pane can also be hidden from the SimAuthor hierarchies window. Use the Menu bar options to hide/show the Property Pane.

Help

SimAuthor Help is available for information regarding any SimLib or SimAuthor function and can be accessed from the Menu bar of the Launcher or a SimWindow. The Help files include keyword search, table of contents, and index features.

Anatomy of a Simulation

A simulation designed and maintained within the SimAuthor toolset consists of the following:

[INSERT GRAPHIC.](#)

Using this Guide

The purpose of this guide is to provide step-by-step instructions on how to design, modify, and deploy a simulation using the SimAuthor toolset. From launching the toolset to testing and deploying a completed simulation, this guide can help software developers, instructional designers, and scripters create simulations for training purposes. Because a simulation has multiple levels and parts in order to be functional, the chapters are divided into high-level steps that, all together, can lead to a completed simulation. Each high-level step (chapter) is then divided into subchapters that describe various and detailed tasks and instructions.

The user's guide contains the following chapters:

- **Chapter 1: Introduction** Describes the RealVue suite of products, including the SimAuthor toolset used to create and manage simulations.
- **Chapter 2: Getting Started** Describes how to install and start the SimAuthor toolset and how to create, open, or close an existing simulation.
- **Chapter 3: Managing the SimWindows** Describes how to switch between SimWindow modes and how to increase or decrease the number of SimWindows for a simulation.
- **Chapter 4: Managing the SimComponents** Describes how SimAuthor hierarchies are used within a simulation and how to create and design the look and feel of a simulation.
- **Chapter 5: Defining Behavior Using Script Functions** Describes how to set the behavior of a simulation by combining script functions, user input, and SimComponents.
- **Chapter 6: Testing the Simulation** Describes how to use the various debugging tools of SimAuthor to test and experiment with a completed simulation.

The user's guide also contains Appendices that can supplement the material found within this guide. Refer to the following sections as needed:

- Appendix A: Keyboard Shortcuts
- Appendix B: Using Python for Scripting
- Appendix C: SimLib Tables
- Appendix D: Troubleshooting

Using the SimAuthor Toolset to Create a New Simulation

Below are some steps to consider when creating a new simulation:

1. Start the SimAuthor toolset.
2. Use the SimWizard to set up a new simulation.
3. Set up and name the SimWindows.
4. Add SimComponents.
5. Define how the SimComponents interact with each other with script functions.
6. Save and test the simulation.
7. Deploy the simulation.
8. Close the simulation and exit SimAuthor.

The steps required to create a new simulation can be found within the chapters in this user guide.

After reading some introductory information about the RealVue's suite of simulation products, you can install the simulation products and start using the SimAuthor toolset to create and design a new simulation. This chapter provides instructions on how to install and start the SimAuthor toolset, and from there, you can use the toolset to design a simulation.

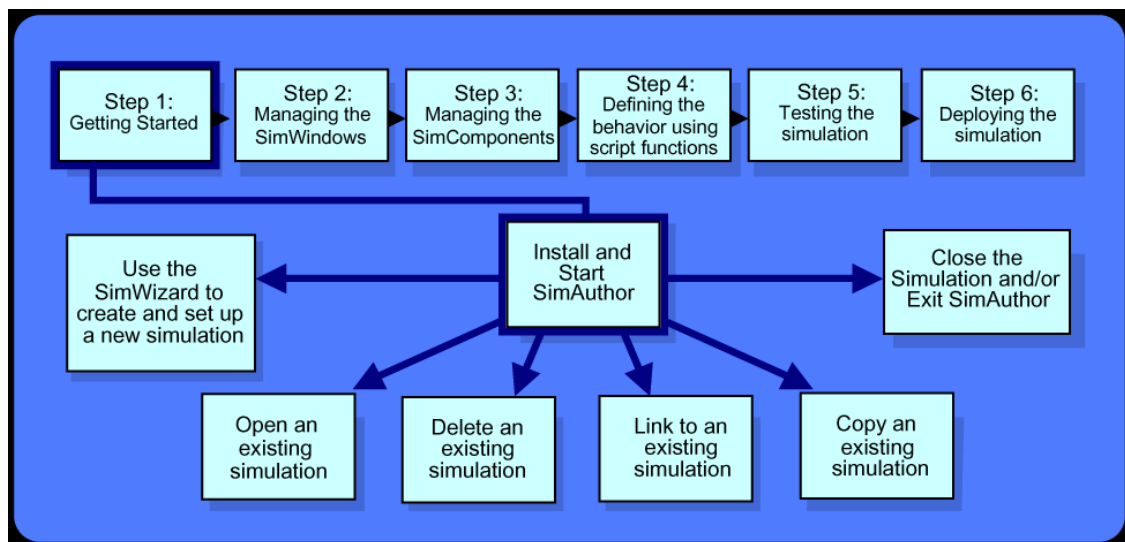


FIGURE 1: Designing a Simulation - Getting Started

After the installation, the SimAuthor Launcher appears to assist you with the initial steps of simulation design. From the Launcher, you can create a new simulation, opening an existing simulation, or even link to a simulation on the network drive. From there, you can design and modify the simulation according to your training purposes.

Installing SimAuthor, SimKernel, and SimLib

The installation of the SimAuthor toolset is available through an automated install wizard. The InstallWizard installs SimAuthor, SimKernel, SimLib, and other necessary files required to create and design simulations.

Minimum System Requirements

The following requirements are needed to install and run the SimAuthor toolset and the SimKernel framework. If the software is not installed, the Install Wizard will take you through steps to install the required software.

Hardware

- 800 mHz processor
- 512 mb of Ram

Software

- Java JDK 1.4.1_1 or greater
- Java 3D 1.3 or greater
- Java Advanced Image (JAI) 1.1.1_01 or greater

To install the RealVue suite of simulation products:

1. Insert the CD-ROM into the CD-ROM drive.*
2. Open a Windows Explorer window and navigate to the CD-ROM drive.*
3. Double-click the **Install.exe** file to begin the installation process.

The InstallAnywhere window appears and begins to extract the files for the simulation products. This will take a few minutes.

When the files have been extracted, the SimKernel Framework Installation dialog box appears and prepares the Install Wizard.

The Install Wizard appears with an Introduction to installing SimKernel.

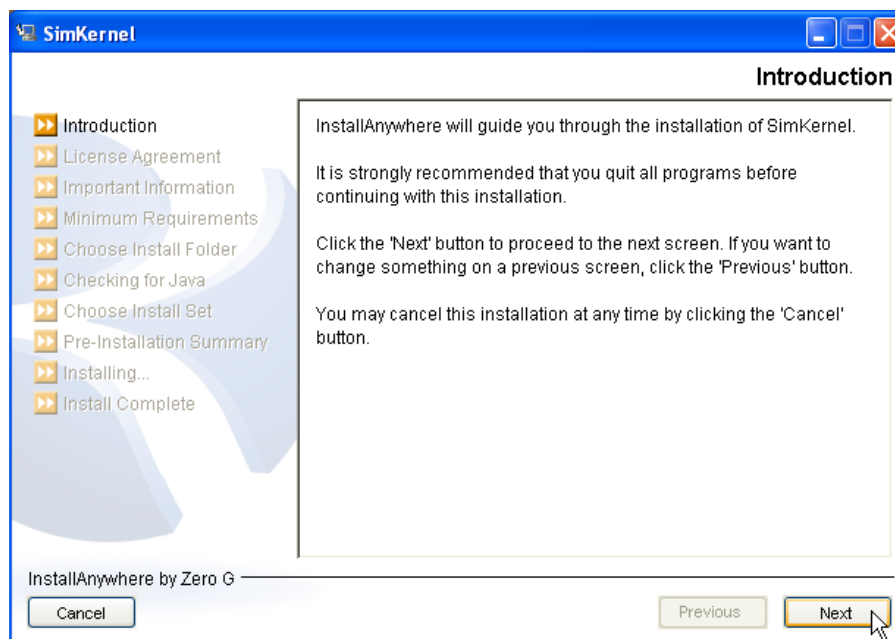


FIGURE 2: Introduction to the Install Wizard

NOTE: During the installation, click **Previous** to return to the previous screen, if needed. To cancel the installation, click **Cancel**, and the Install Wizard will close.

4. After reading the introduction, click **Next** to continue.
5. The License Agreement screen appears. Choose one of the following options:
 - To agree to the terms of the license, select the option button for **I accept the terms of the License Agreement** and continue to Step 6.
 - To decline the terms of the license, select the option for **I do NOT accept the terms of the License Agreement**. The Install Wizard will close and exit the install process.
6. Click **Next** in the License Agreement screen to continue.
7. The Important Information screen appears. Use the scroll bar to see the entire list of what's new in the SimKernel framework and then click **Next** to continue.
8. The Minimum Requirement screen appears. Check to make sure the system requirements have been installed. If not, the Install Wizard will scan for and install the requirements in a later step.
9. Click **Next** in the Minimum Requirements screen to continue.
10. The Choose Install Folder screen appears. Choose one of the following options:
 - To accept the default folder for the installation, continue to step 11.
 - To select a new folder for the installation, click **Choose** and navigate to the desired folder.
 - To enter the folder location manually, type the desired folder location in the text box.

NOTE: To restore the folder location to the default setting, click **Restore Default Folder**.
11. Click **Next** to continue.
The Install Wizard scans the system for the required software and displays the results when the Checking for Java screen appears.

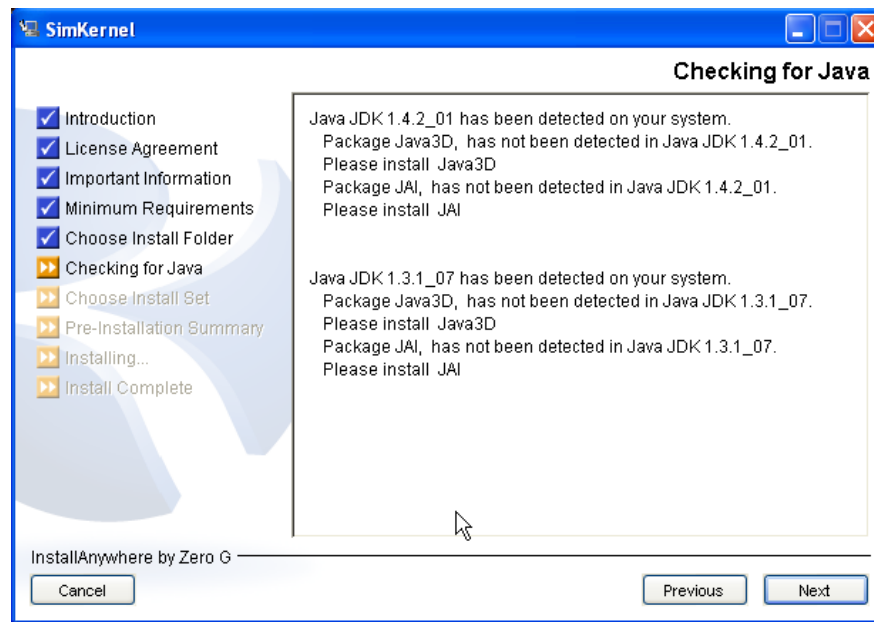


FIGURE 3: Checking for Java Screen

12. Click **Next** to continue.
13. The Choose Install Set screen appears with a list of the required software needed for the installation. The checkbox for **SimKernel** is automatically selected. Based on the Checking for Java results, select the checkbox(es) for the software that was not detected.
14. Click **Next** to continue.

15. The Pre-Installation Summary screen appears. Review the summary which includes the Product Name, Install Folder, Install Set, and Product Components.
16. Click **Install** to begin the installation process.
The installation process begins, and the Install SimKernel screen appears. Installation will take a few minutes.

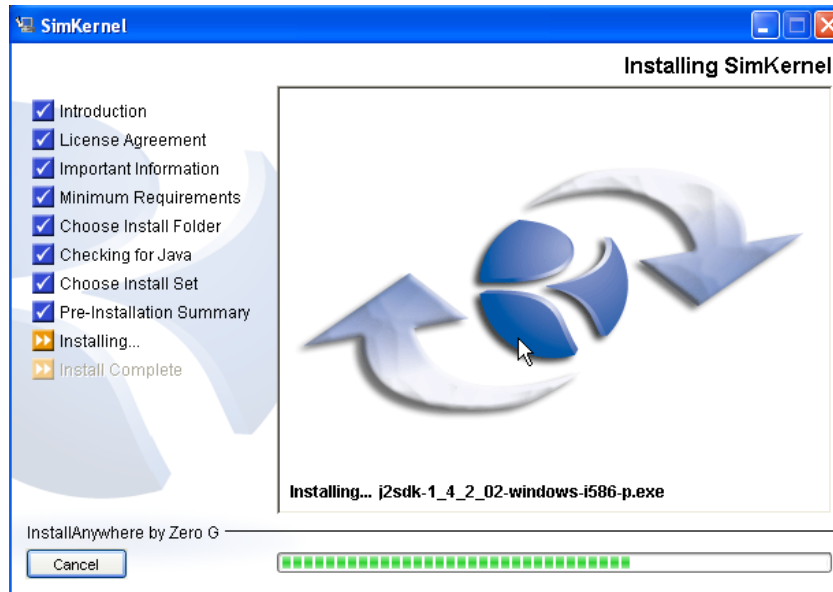


FIGURE 4: Installing SimKernel Screen

17. After the installation of SimKernel, the system will install the missing software requirements, if any. Follow the instructions for the installation accordingly.
18. When the installation is complete, the Install Complete screen appears. Click **Done** to complete the installation and close the Install Wizard.

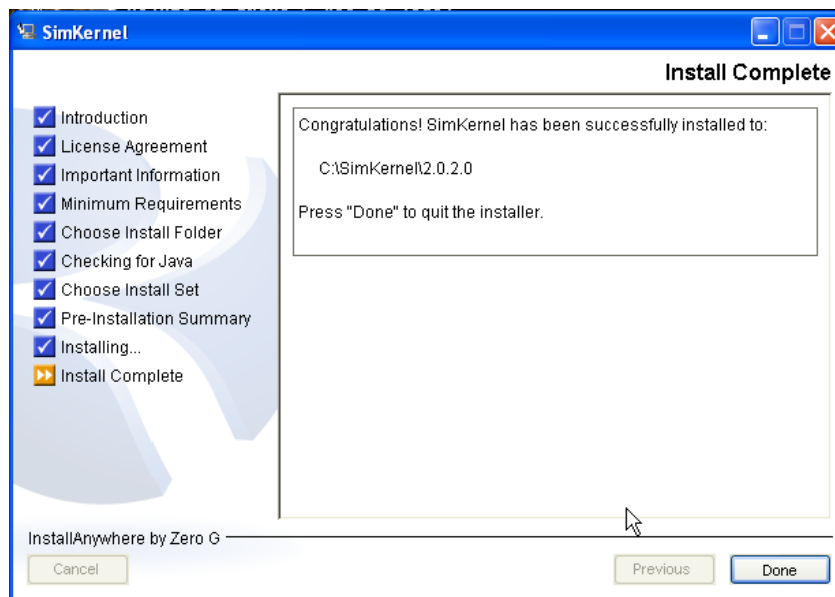


FIGURE 5: Install Complete Screen

The SimAuthor toolset appears as an icon on the desktop or in the install folder that was established in the Install Wizard.

Starting SimAuthor

1. After installing the SimAuthor toolset, there are two ways to launch the SimAuthor toolset:
 - On the desktop, click the **SimAuthor** icon.
 - Click the **Start** menu and select **Programs**, and then select **SimAuthor**.

The SimAuthor Launcher appears.

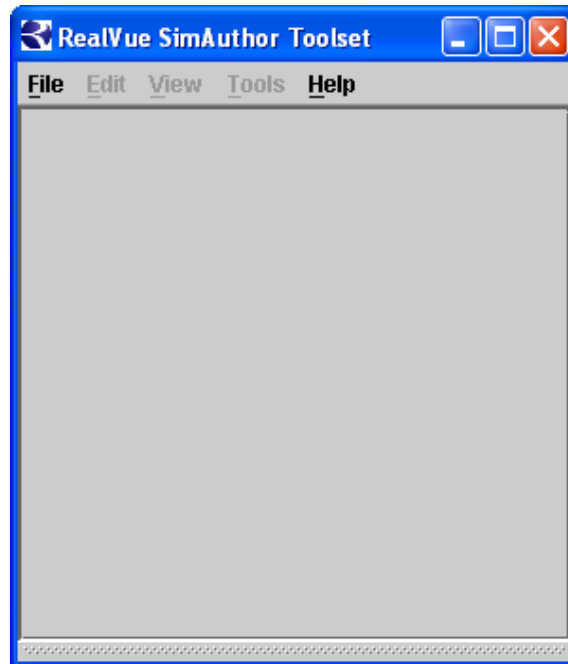


FIGURE 6: SimAuthor Launcher

NOTE: The SimAuthor Launcher is similar to the SimAuthor Toolset window except that the Launcher appears “empty” and only the **File** and **Help** menu items are active.

2. From the Launcher Menu bar, you can:
 - Create a new simulation.
 - Open an existing simulation.
 - Link a simulation. *
 - Copy a simulation. *
 - Remove a simulation. *
 - View a list of previously accessed simulations. *
 - Exit the SimAuthor Launcher and toolset.
 - View the Help files for SimAuthor or SimLib.
 - View the version number and date information for SimAuthor.

Refer to the following sections and chapters in this user guide for step-by-step instructions on developing a simulation.

Navigating SimAuthor

The SimAuthor toolset has three main windows that are used for simulations:

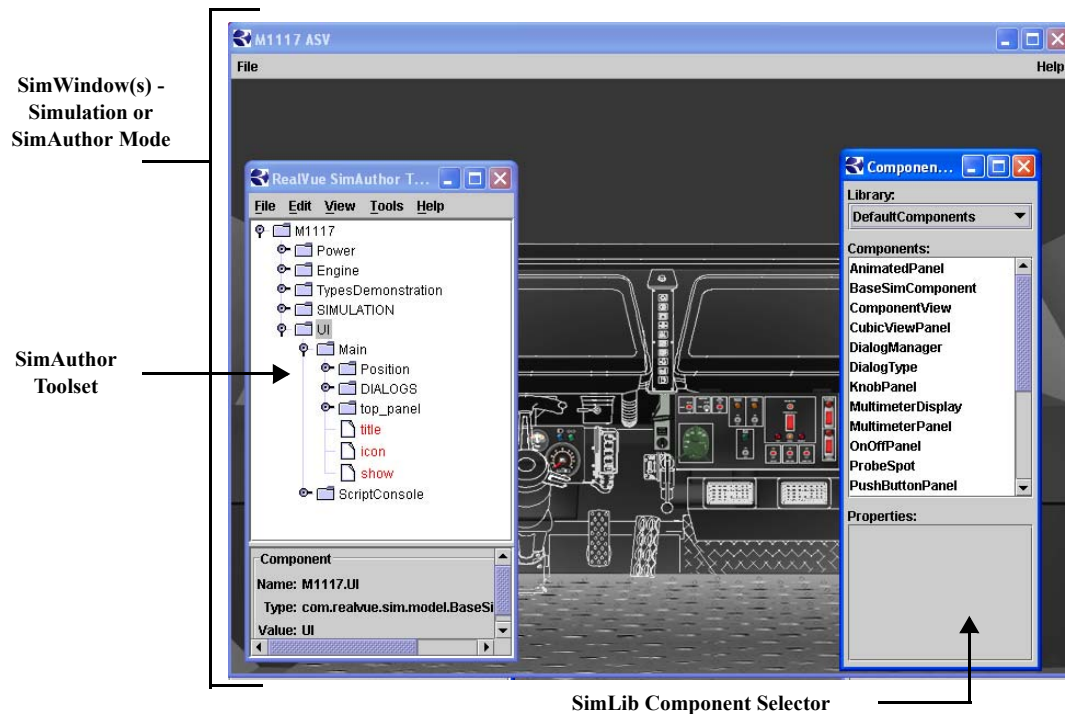


FIGURE 7: SimAuthor Toolset - Main Windows

- **SimWindows**, which can be one to many for each simulation, are used to display the design of the simulation being created or modified.
- **SimAuthor Toolset** contains the hierarchies that display the data model and structure of the simulation under development. The Toolset remains open on the desktop at all times.
- **Component Selector** contains the available libraries and SimComponents that are needed to design the simulation. The Selector can be viewed or hidden when using the toolset.

All of the main windows can interact with each other when integrating SimComponents into a simulation. Utilizing all three windows when designing the simulation allows you to view the design of the simulation from a visual perspective and from a data model perspective.

Setting up a New Simulation

After starting SimAuthor, you can create a new simulation.

To create a new simulation:

1. From the Launcher Menu bar, click **File** and select **New**.
The SimWizard appears.

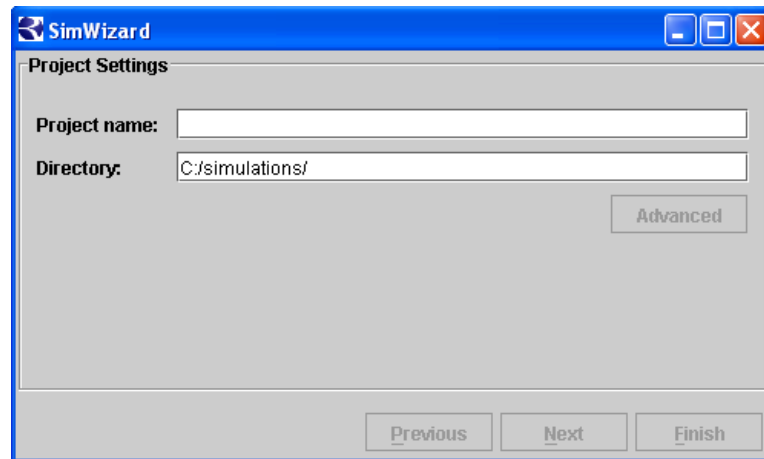


FIGURE 8: SimWizard

2. Enter a **Project name** for the new simulation.

NOTE: The *Name* will appear at the top of the simulation windows, and the *Short name* is used to label the simulation root. *
3. Enter the **Directory** of where to house the simulation files.

NOTE: In the **Directory** field, the project folder is automatically populated when you enter the **Project name**. You can change it accordingly.
4. Choose one of the following options:
 - To continue to the next screen of the SimWizard, click **Next** and continue to step 5.
 - To enter more information regarding the XML files, click **Advanced**. The Advanced Project Settings screen appears. Enter the desired names for the **Main XML file**, **Interface XML file**, **Model XML file**, and **Scripting file**. Click **Next** and continue to step 5.
 - To set the remaining project settings (splash screen, etc.) to the default settings, click **Finish**.
5. In the Simulation Settings screen, enter the **Splashscreen image** in the field or click the **Browse** button to navigate to the location of the image.
6. For the **Number of windows**, enter the number of windows in the field or use the up and down buttons to enter the number of windows.

NOTE: The number of windows and the names can be modified later.
7. Choose one of the following options:
 - To continue to the next screen of the SimWizard, click **Next** and continue to step 8.
 - To return to the previous screen, click **Previous**.
 - To set the remaining settings (SimWindow settings) to the default settings, click **Finish**.
8. In the SimWindow Settings screen, enter the following information for each of the SimWindows:
 - **Title**. Enter the title that will be displayed in the title bar of the window.

- **Name.** Enter the name of how it will be referred to in the simulation.
 - **Bounds.** Enter the bounds of the SimWindow, in pixels.
 - **Show at startup.** Use the drop-down menu to set if the SimWindow appears when the simulation is opened. Select **True** or **False**.
 - **Exit on close.** Use the drop-down menu to set if the SimWindow should close when the simulation is exited. Select **True** or **False**.
9. Choose one of the following options:
- To enter more information for additional SimWindows, click **Next** and repeat step 8 until all of the SimWindows have been set.
 - To return to the previous screen, click **Previous**.
 - To complete the setup of the new simulation, click **Finish**.
- NOTE:** If the setup of the new simulation failed, refer to the “Troubleshooting” on page 139 for more information and assistance.
10. The newly created simulation and its associated files and SimWindows appear. From here, you can:
- View the pertinent properties for the simulation. See “Viewing the Properties of the Simulation” below.
 - Add SimWindows. See “Managing the SimWindows” on page 23. *
 - Add SimComponents. See “Managing the SimComponents” on page 27.
 - Define the behavior of the simulation through Script Functions. See “Defining Behavior Using Script Functions” on page 41.

Viewing the Properties of the Simulation

After you set up and create a new simulation, you can view the properties of the simulation at any time.

1. In the SimAuthor Toolset window, in the Menu bar, click **File** and select **Properties**.
2. The Simulation Properties window appears.

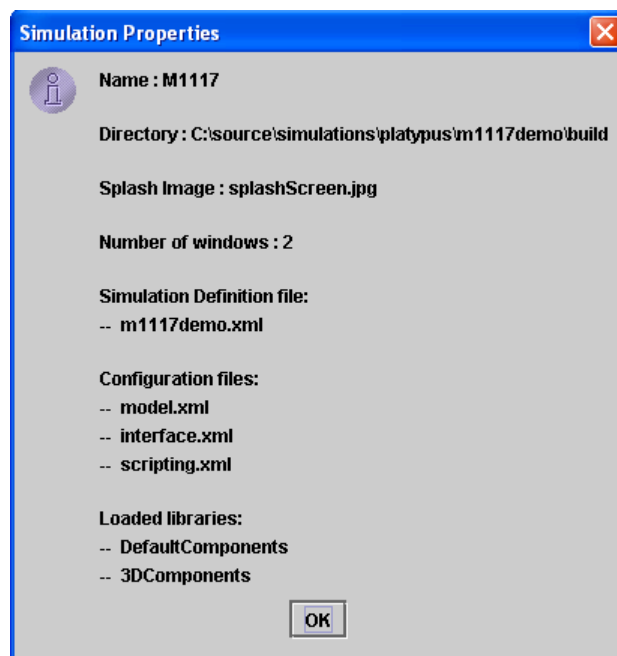


FIGURE 9: Simulation Properties Window

The Simulation Properties window displays the **Name**, **Directory** location, **Splash Image** used for the splash screen, **Number of windows**, **Simulation Definition XML** and **Configuration files**, and available **libraries** for the current simulation under development.

3. To close the Simulation Properties window, click **OK**.

Saving a Simulation

In the SimAuthor toolset, you can save the simulation's design changes at any time while the simulation is under development.

1. In the Menu bar of the SimAuthor Toolset window, click **File** and select **Save Simulation**.
2. After saving the simulation, you can:
 - Continue to modify the SimComponents, SimWindows, or Script Functions. Refer to the chapters in this user guide for assistance.
 - Restart and test the simulation. See "Testing the Simulation" on page 47.
 - Close the simulation and exit SimAuthor. See "Closing a Simulation" on page 19 and "Exiting SimAuthor *" on page 21.

Closing a Simulation

To close a simulation that is currently open in the SimAuthor toolset:

1. In the Menu bar of the SimAuthor Toolset window, click **File** and select **Close**.
The current simulation and its associated files and windows closes, and the Launcher reappears.
2. From the Launcher, you can:
 - Exit the SimAuthor toolset. See "Exiting SimAuthor *" on page 21.
 - Open another simulation. See "Opening an Existing Simulation" below.

Opening an Existing Simulation

1. From the Launcher Menu bar, click **File** and select **Open**.
An Open window appears.
2. Navigate to the location of the simulation to be opened and click **Open**.

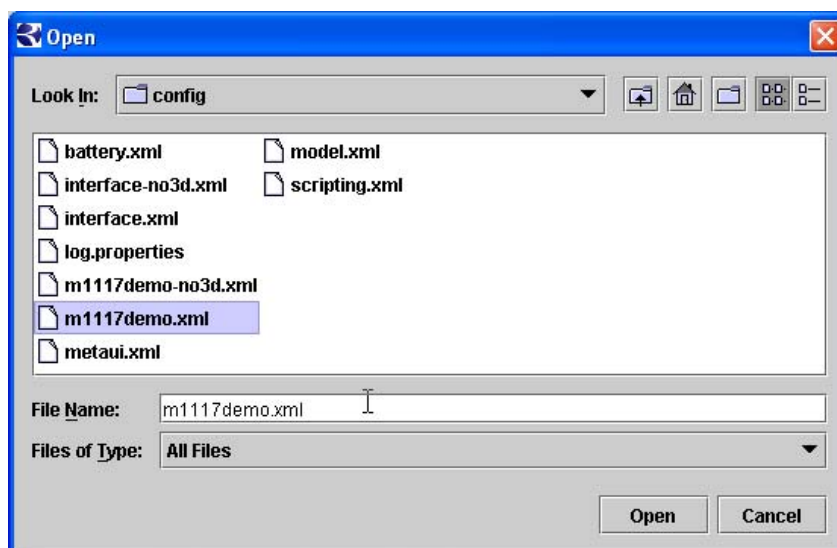


FIGURE 10: Open Window

NOTE: Only one simulation can be opened at any time.

The simulation's associated files, SimAuthor Toolset window, and the SimWindow(s) appear.

3. From here, you can:

- Create new or modify the SimWindows. See “Managing the SimWindows” on page 23.
- Add, edit, or delete the SimComponents. See “Managing the SimComponents” on page 27.
- Define the behavior of the simulation through the Script Functions. See “Defining Behavior Using Script Functions” on page 41.

Linking to an Existing Simulation*

To open a simulation whose files have been copied onto a computer or to open a simulation created on a network drive, you can use the SimAuthor toolset to link to an existing simulation. Linking consists of navigating to an existing simulation directory to make it visible for opening.

1. From the Launcher Menu bar, click **File** and select **Link**.

A Windows file dialog box appears

2. Navigate to the desired drive and directory tree to find the simulation.

3. Select the desired simulation and click **OK**.*

The toolset opens the associated files, relevant SimWindow(s), and SimAuthor Toolset window of the selected simulation.

4. From here, you can:

- Manage the SimWindows. See “Managing the SimWindows” on page 23.
- Manage the SimComponents. See “Managing the SimComponents” on page 27.
- Define the behavior of the simulation through the Script Functions. See “Defining Behavior Using Script Functions” on page 41.

Copying an Existing Simulation*

To copy or clone an existing simulation and its associated files, SimWindow(s), and SimComponents:

1. From the Launcher Menu bar, click **File** and select **Clone**.

A dialog box appears with a list of available simulations to copy.

2. Select a simulation and click **OK**.*

3. A dialog box appears. Enter the name for the simulation and navigate to the location of where you want to place the simulation. Click **OK**.*

4. The newly copied simulation appears in the list of available simulations.*

Deleting an Existing Simulation*

To remove an existing simulation and all of the files associated with that simulation:

1. From the Launcher Menu bar, click **File** and select **Remove**.

A dialog box appears with a list of simulations.

2. Select the desired simulation from the list and click **OK**.*

A confirmation dialog box appears.

3. Choose one of the following options:

- To remove the simulation, click **Yes**.
- To disregard the deletion and return to the Launcher, click **No**.

When the simulation is deleted, the simulation no longer appears in the list of available simulations.

Viewing Past Simulations*

The SimAuthor toolset allows you to view a list of the past four simulations that were recently opened. The most recent simulation appears at the top of the list. These simulations could be simulations that are under development or were recently completed. Refer to the following steps to view the list of past simulations.

1. From the Launcher Menu bar, click **File** and, at the bottom of the File drop-down menu, view the list of simulations that were last opened.
2. Select a simulation from the drop-down menu to open that simulation.
The files associated with the selected simulation appear in the SimAuthor Toolset and the SimWindow(s). From here, you can modify the simulation accordingly. Refer to the chapters in this user guide for assistance.

Accessing SimAuthor Help

SimAuthor Help can be used at any time for assistance for any SimAuthor function. Access the Help files from the Launcher or from a SimAuthor window.

To access SimAuthor Help:

1. In the Menu bar, click **Help** and select **SimAuthor Help**.
The SimAuthor Help window appears.
2. The following search options are available in the right pane:
 - Click the **Table of Contents** tab to search for a specific chapter or sections.*
 - Click the **Index** tab to search through an alphabetized list of the words and section headings.*
 - Click the **Search** tab to enter a keyword and allow the Help system to search through the guide's text.*
3. To close the Help system, click the **Close** button in the upper right corner of the window.

Accessing SimLibs Help

SimAuthor Help can be used for assistance for any SimLib SimComponents function and can be accessed from the Launcher or from a SimAuthor window.

To access SimLibs Help:

1. In the Menu bar, click **Help** and select **SimLib Help**.
The SimLib Help window appears.
2. The following search options are available in the right pane:
 - Select the SimLib and then select the SimComponent Name from an alphabetized list.*
 - Select the SimComponent name from a unified, alphabetic list from all of the SimLibs.*
 - Select from a categorized list of SimComponents.*
 - Use the **Search** tab to enter a specific name or any text specific to the SimLib.*
 - Click **More** in the Component Selector to view the SimComponent's short and long name, description, default simulation properties, inherent properties and default initial values, Java class name and class path, Java methods exposed, and Usage notes.*
3. To close the Help system, click the **Close** button in the upper right corner of the window.

Exiting SimAuthor *

To exit the SimAuthor toolset, from the Launcher Menu bar, click **File** and select **Exit**. The SimAuthor toolset and the Launcher close.

After you set up a new simulation or open an existing simulation, you can continue to the process of creating SimWindows for the simulation.

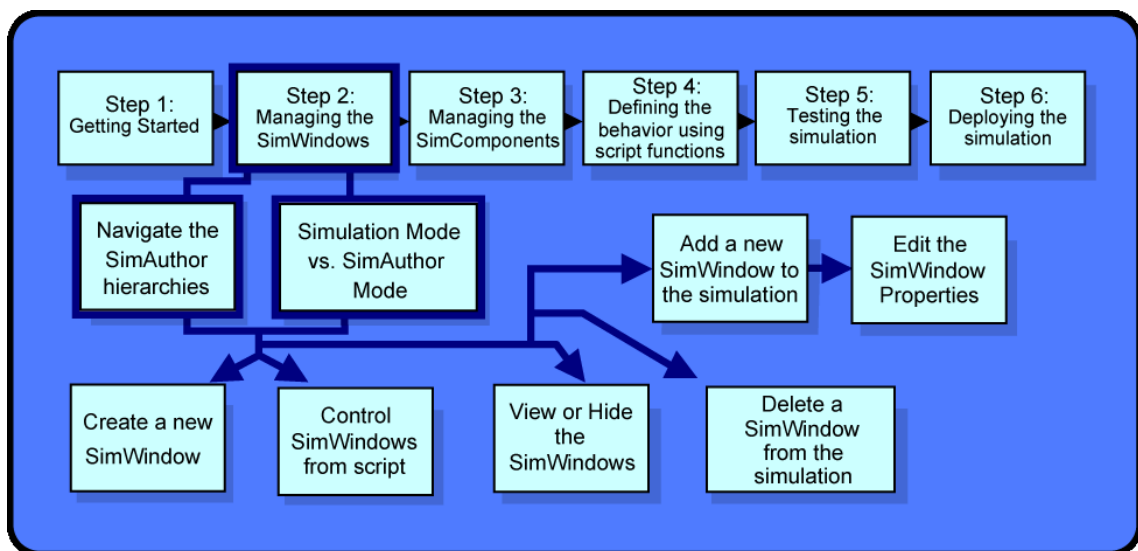


FIGURE 1: Designing a Simulation - Managing the SimWindows

SimWindows are an integral part of a simulation because they display the multiple views of a simulation. A simulation currently under development may have any number of SimWindows to display different views, such as the interaction between hardware and software components. The SimAuthor toolset allows you to view the graphical layout of the SimComponents in the SimWindows and to toggle between Simulation and SimAuthor mode to alter the look and feel and to test the SimComponents with user input.

NOTE: Each SimWindow may independently be put into SimAuthor or Simulation mode.

Alternating between Simulation Mode and SimAuthor Mode

The SimAuthor toolset offers the Simulation and SimAuthor mode feature to assist you in creating and maintaining simulations. The SimAuthor Mode is mainly used for the design of a simulation because it allows you to drag and drop SimComponents onto the SimWindow and to modify the look and feel of the simulation. After the design of the simulation is complete, Simulation Mode allows you to test the SimComponents in a running simulation through user input. Simulation Mode does not allow you to make design changes from the SimAuthor Toolset.

To switch the active SimWindow between Simulation Mode and SimAuthor Mode, there are two options:

- Hold down the **CTRL+SHIFT+A** keys on the keyboard.
- In the Menu bar, click **SimWindows** and select **<SimWindow> Mode**. *

In **SimAuthor Mode**, the title bar will state “SimAuthor Mode: <Simulation Name>” and a SimAuthor icon is used in the title bar to distinguish between the two modes.



FIGURE 2: SimAuthor Mode - Title Bar of the SimWindow

In this mode, you can:

- Highlight an element in the SimAuthor hierarchies by holding down **CTRL + SHIFT** and clicking on a visual element in the SimWindow.
- Drag a SimComponent from the Component Selector into the SimWindow and insert an instance of that SimComponent into the simulation. The default image of the SimComponent appears in the SimWindow, and the SimComponent Property Editor automatically opens.

In **Simulation Mode**, the name of the simulation appears in the title bar of the SimWindow.



FIGURE 3: Simulation Mode - Title Bar of the SimWindow

In this mode, you can:

- Enter values into the fields, if any.
- Push, pull, or toggle the buttons in the running simulation, if any.

Adding a New SimWindow*

To add a new SimWindow to the simulation:

1. In the Menu bar of the SimAuthor Toolset window, click **SimWindow** and select **New**. *
A dialog box for the SimWindow appears.
2. Enter the following information for the SimWindow:
 - **Title**. Enter the title that will be displayed in the title bar of the window.
 - **Name**. Enter the name of how it will be referred to in the simulation.
 - **Bounds**. Enter the bounds of the SimWindow, in pixels.
 - **Show at startup**. Use the drop-down menu to set if the SimWindow appears when the simulation is opened. Select **True** or **False**.

- **Exit on close.** Use the drop-down menu to set if the SimWindow should close when the simulation is exited. Select **True** or **False**.
3. Click **OK**.*
 4. The new SimWindow with the defined settings appears in the simulation. From here, you can:
 - Add SimComponents to the SimWindow. See “Managing the SimComponents” on page 27.
 - View the properties of the SimWindow. See “Viewing Properties of a SimWindow” below.

Viewing Properties of a SimWindow*

To view and edit the properties of the current SimWindow, refer to the following steps.

1. In the Menu bar of the SimAuthor Toolset window, click **SimWindow** and select **Properties**.*
2. The Properties window for the SimWindow appears and displays the following information:
 - **Title.** The title that is displayed in the title bar of the window.
 - **Name.** The name of the window, as it appears in the simulation.
 - **Bounds.** The boundaries of the SimWindow, in pixels.
 - **Show at startup.** Determines if the SimWindow appears when the simulation is opened.
 - **Exit on close.** Determines if the SimWindow should close when the simulation is exited.
3. To close the Properties window, close **OK**.

Deleting a SimWindow*

To delete a SimWindow from the simulation, refer to the following steps.

1. In the Menu bar of the SimAuthor Toolset window, click **SimWindow** and select **Delete**.
A confirmation dialog box appears.
2. Choose one of the following options:
 - To delete the SimWindow, click **Yes**.
 - To disregard the deletion and keep the SimWindow, click **No**.The deleted SimWindow no longer appears in the simulation.

Viewing/Hiding SimWindows

To view or hide a SimWindow in the simulation:

1. In the Menu bar of the SimAuthor Toolset window, click **View**.
2. At the bottom of the **View** drop-down menu, select a SimWindow name from the list of SimWindows to view or hide.
The simulation changes according to your selection.

Controlling SimWindows from Script*

After you've created a new simulation or opened an existing simulation, you can begin to create, modify, and monitor the simulation's appearance and behavior in the SimWindows.

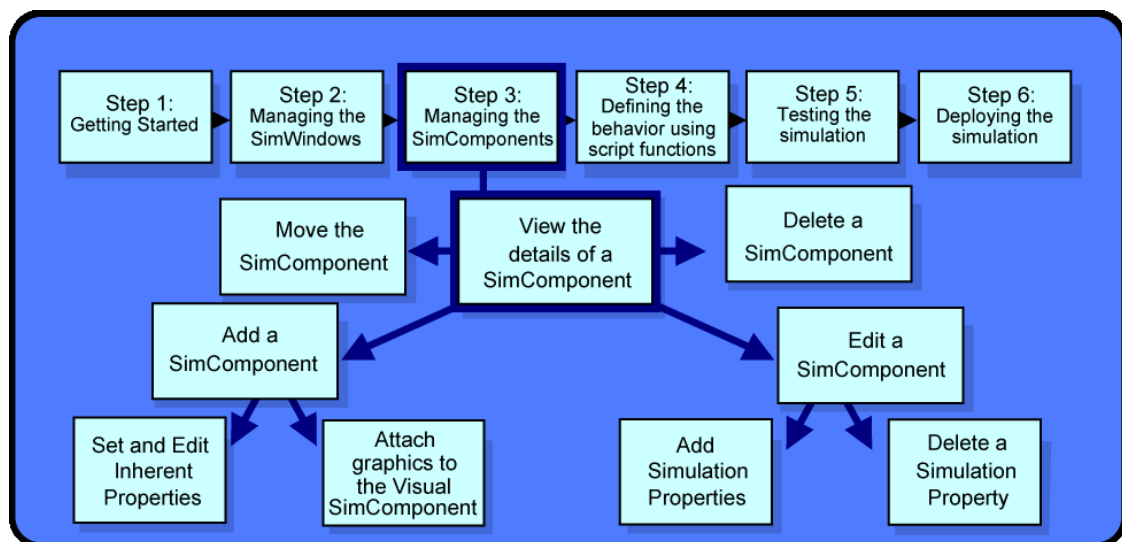


FIGURE 1: Designing a Simulation - Manage the SimComponents

To manage the look and feel of the simulation and to define the behavior of the SimComponents, modify the Visual SimComponents and their properties. To manage how the simulation behaves and how the simulation reacts with user input, modify the Model SimComponents. Refer to the SimLibs reference material in the “SimLib Tables” on page 75 to view detailed information about all of the SimComponents. Integrating SimComponents into a simulation can take place in a SimWindow or in the SimAuthor hierarchies. The SimAuthor toolset also provides a drag-and-drop feature for easier integration.

SimAuthor Hierarchies

The SimAuthor hierarchies display the organization of the SimWindows, Model SimComponents, Visual SimComponents, and the internal SimComponents associated with the internal simulation structure. The hierarchies appear in the SimAuthor Toolset window.

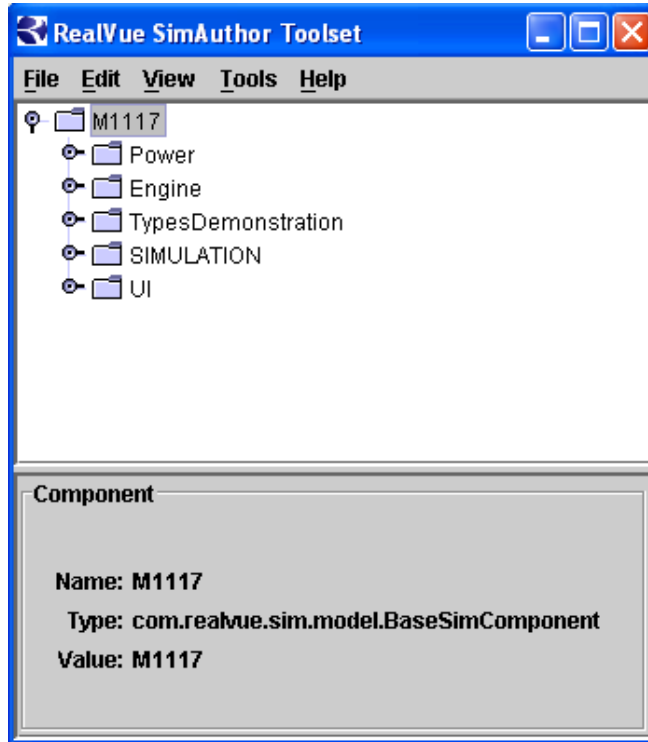


FIGURE 2: SimAuthor Toolset Window - Hierarchies

The SimAuthor hierarchies are currently divided into the following areas:

- **Data Model and Simulation State** - At the top level, the internal simulation structure contains the data models and the states of the simulation that are necessary to run the overall simulation. For example, if power needed to be on and an engine needed to be running in order for the simulation to be running, a Power folder and an Engine folder could be created to relay this requirement. The state property of Power would be ON, and the state property of Engine could be RUNNING.
- **SIMULATION** - A part of the internal simulation structure in the SimAuthor hierarchies that is automatically generated for every simulation. This folder contains the system properties, such as plugins, SimComponent libraries, and modules, that are available for the simulation. When creating or modifying a simulation, this folder is not normally used, but modifications to the internal structure can be made through scripting only.
- **UI** - The main folder used to modify all of the SimComponents in the simulation. This folder controls the look and feel, user input values, functionality, triggers, and states of the simulation. In the hierarchies, the SimComponents are broken down into different levels of simulation properties and script functions. Modifications to the UI can be made in the SimAuthor Mode SimWindow or in the hierarchies.

Navigating the Hierarchies

Use the following conventions to navigate the hierarchies:

- To expand the entire hierarchy to SimComponent, Property, or Script Function levels, click **View** in the Menu bar and select **Expand All**.
- To minimize the entire hierarchy, click **View** in the Menu bar and select **Collapse All**.
- To expand or minimize individual levels of the hierarchies, click the + or - icons accordingly.
- To view the Property Pane, click **View** in the Menu bar and select the checkbox for **Show Property Pane**.
- To hide the Property Pane, click **View** in the Menu bar and de-select the **Show Property Pane** checkbox.

When the tree expands, the SimComponent's **properties** appear in **red**. When a SimComponent property is selected from the tree, the tree expands to include the **script functions** (in **blue**) triggered for each property. The Value and Scripts associated with that script function appear in the Property Pane.

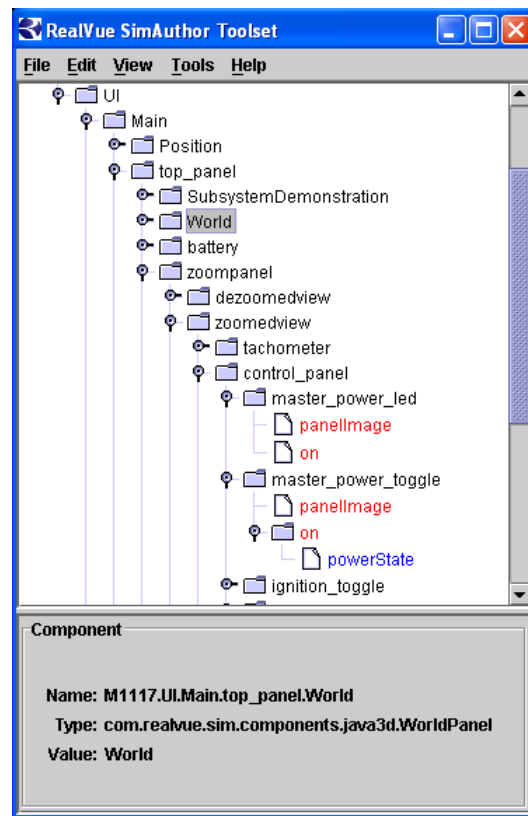


FIGURE 3: SimAuthor Toolset Window - Expanded Hierarchy

Finding a SimComponent

The SimAuthor toolset provides a Find feature to search for SimComponents within the hierarchies of the simulation.

1. To find a SimComponent, in the SimAuthor Toolset Menu bar, click **Edit** and select **Find**.
The Find window appears.

2. Enter or select the following information:

- In the **Find what** field, enter the entire or part of the name of the SimComponent.
- To search for the text as written in the field, select the **Match case** checkbox.
- To search for all of the text written in the field, select the **Match whole word** checkbox.
- To search forward or backward from the current location in the hierarchies, select **Forward** or **Backward** accordingly.

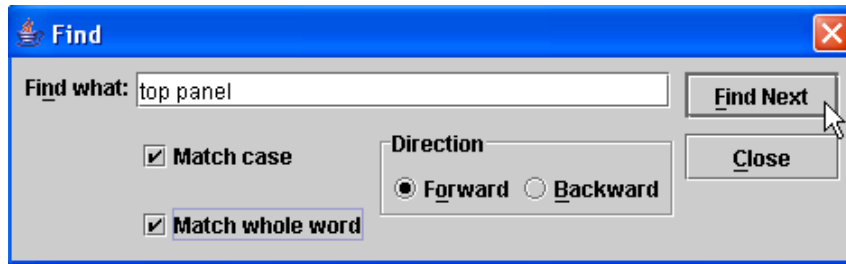


FIGURE 4: Find Window

3. Click **Find Next** to begin the search.

The system searches for the text in the SimAuthor hierarchies. Results of the search are highlighted in the hierarchies.

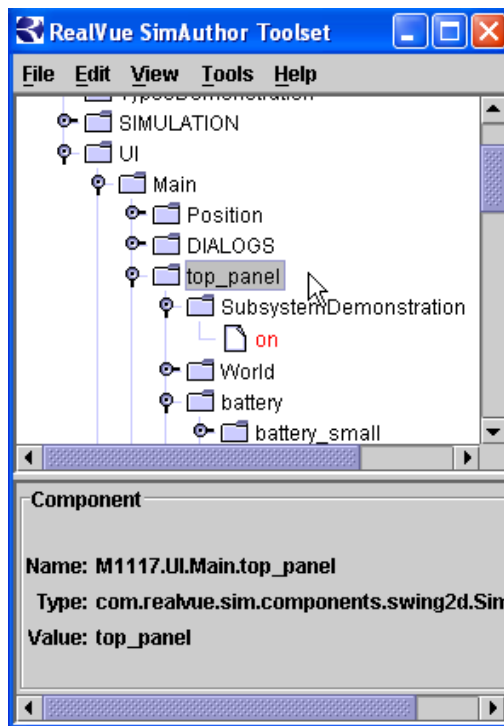


FIGURE 5: SimAuthor Hierarchies - SimComponent Search

4. Choose one of the following options:

- To continue the search, continue clicking **Find Next** until you find the SimComponent you are searching for.
- To end the search, click **Close**.

Managing the Visual SimComponents

The characteristics of the user interface and the look and feel of the simulation are defined with Visual SimComponents, such as toggle buttons, menus, and switches. SimComponents are made up of properties, script functions, values, types, and rules and restrictions.

Managing the SimComponents consists of:

- Adding, editing, and/or deleting properties of a SimComponent or the entire SimComponent
- Defining the states of the SimComponent

To make the changes, use the SimAuthor hierarchies or the SimWindows. Changes made in the hierarchies or in the windows are automatically reflected in the other. To view more information about each SimComponent, refer to the “SimLib Tables” on page 75. In the tables, you will find information about the available libraries and SimComponents, their available properties and java class, and how they can be used within a simulation.

Viewing the details of a Visual SimComponent

When a SimComponent is selected in the hierarchical tree, the Property Pane at the bottom of the window displays the SimComponent’s **Name**, **Type**, and **Value**. The tree also expands to include the SimComponent’s **properties** (in red). When a SimComponent property is selected from the tree, the tree expands to include the **script functions** (in blue) triggered for each property. The Value and Scripts associated with that script function appear in the Property Pane. To add, edit, or delete a SimComponent, see the sections below.

Adding a Visual SimComponent

To add a Visual SimComponent to the simulation:

1. In the Component Selector window, use the **Library** drop-down menu to select the desired SimLib.

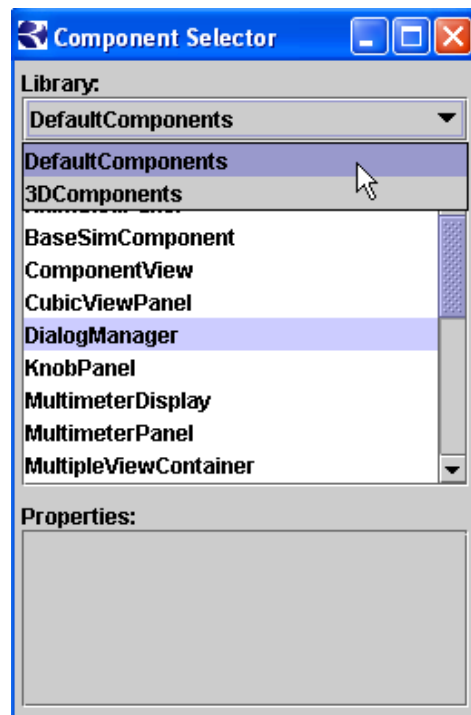


FIGURE 6: SimLibs’ Component Selector - Library Drop-down Menu

When selected, the available SimComponents for that SimLib appear in the Components section.

2. To view the full name, description, package, and library of each SimComponent in the Property Pane, select the desired SimComponent from the list.*

NOTE: For more information regarding which SimComponent to select and how it can be used in the simulation, see “SimLib Tables” on page 75.

3. To add the SimComponent to the running simulation, choose one of the following options:
 - In the Component Selector, drag the SimComponent from the Selector and drop it into a SimWindow. Make sure the SimWindow is in SimAuthor Mode. A default for the SimComponent appears in the SimWindow, see the red circle in figure below.

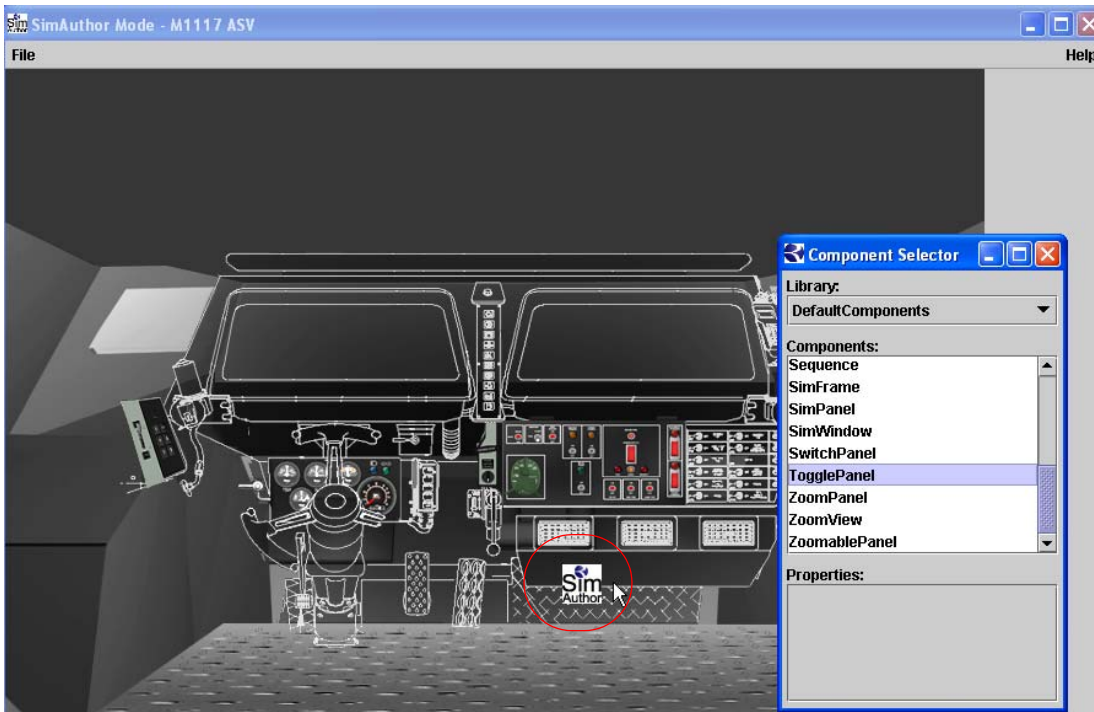


FIGURE 7: SimAuthor Mode and Component Selector

NOTE: If the involved SimWindow is not in SimAuthor Mode, the SimWindow is automatically placed into that mode when the SimComponent is added.

- In the Component Selector, drag the SimComponent from the Selector and drop it into the SimAuthor hierarchies.*
- In the SimAuthor Mode SimWindow, use the mouse to select an area of the window to place the SimComponent. You can change the location later. A default for the SimComponent appears in the SimWindow, see the red circle in figure above.

The Property window with the specified SimComponent's name in the title bar appears with three tabs: Attributes, PanellImage, and PropertyLink.

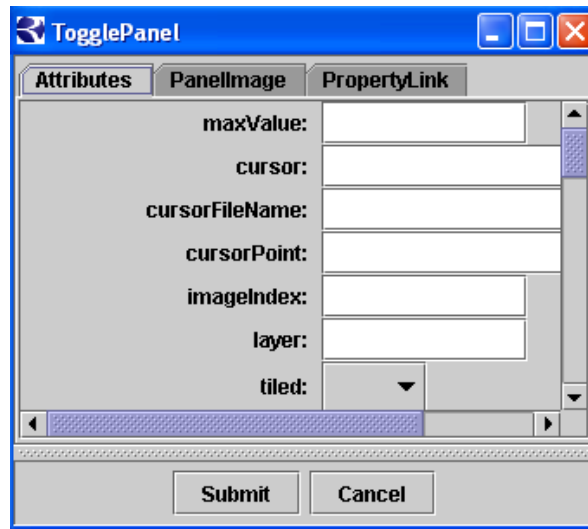


FIGURE 8: Property Window

Setting the Inherent Properties

4. In the Attributes tab of the Property window, enter the required information for the specified SimComponent. Properties displayed will differ according to the SimComponent. Refer to the “SimLib Tables” on page 75 for the property definitions and available attributes and values.

Attaching Graphics to a SimComponent

5. Click the **PanellImage** tab to assign an image to the SimComponent. To enter an image, click **New Row**.
6. A new row appears in the table. Click within the **fileName** field to enter the filename of the image.

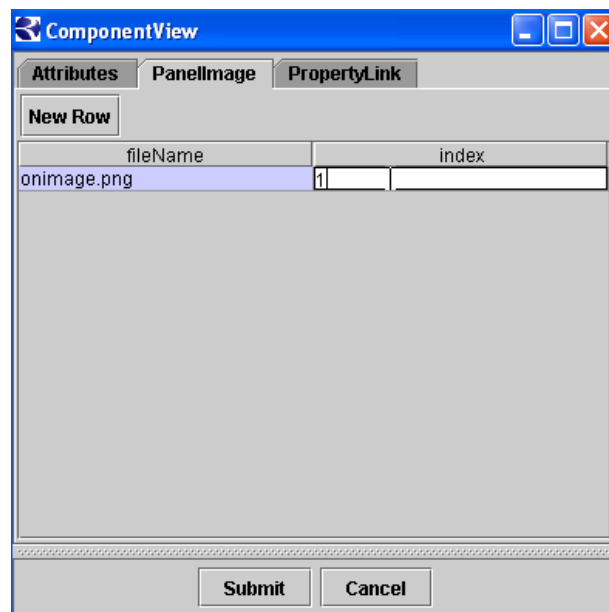


FIGURE 9: Property Window - PanellImage Tab

- Click within the **index** field to enter the value of the image, usually 1 or 0.

NOTE: If the SimComponent has more than one image, add another row and enter the filename and the value.

Adding a Property Link to a SimComponent

- Click the **PropertyLink** tab to set the property links for the SimComponent.
- Click within the **dst** field to enter the destination of the link.
- Click within the **src** field to enter the source of the link.

NOTE: Property links are used as a direct mapping between two properties. The source of the link is the property being watched. The destination link is the property that's going to change when the source property changes.

- Choose one of the following options:

- To save and add the SimComponent to the simulation, click **Submit**.
- To close the Property window without adding the new SimComponent, click **Cancel**.

The Property window closes, and you can view the new SimComponent's name in the SimAuthor hierarchies or in the SimWindow.

Editing the Inherent Properties

Inherent properties are attributes of a SimComponent that typically reflect static, but configurable, characteristics, such as background color and bounds.

- To edit the inherent properties of a SimComponent, first select the SimComponent to be modified. Choose one of the following options:

- In the SimAuthor hierarchies, select a SimComponent from the tree, right-click, and select **Edit Definition** from the shortcut menu.
- In the SimAuthor hierarchies, double-click a SimComponent from the tree. *

The Property window for the SimComponent appears with the SimComponent's name in the title bar.

- Edit the information for the specified SimComponent in the Attributes, PanelImage, and PropertyLink tabs accordingly. Properties displayed will differ according to the SimComponent. Refer to the "SimLib Tables" on page 75 for the property definitions and available attributes and values.

Changing the Graphic of a SimComponent

- Click the **PanelImage** tab to change the image of the SimComponent.
- Click within the **fileName** field to change the name of the image. To enter an additional image, click **New Row** and enter the name of the image in the **fileName** field.
- Click within the **index** field to change or enter the value of the image, usually 1 or 0.

NOTE: If the SimComponent has more than one image, add another row and enter the filename and the value.

Changing the Property Links of a SimComponent

- Click the **PropertyLink** tab to change the property links for the SimComponent.
- Click within the **dst** field to change the destination of the link.
- Click within the **src** field to change the source of the link.

NOTE: Property links are used as a direct mapping between two properties. The *source* of the link is the property being watched. The *destination* link is the property that's going to change when the source property changes.

9. After editing the SimComponent, choose one of the following options:

- To save the changes to the inherent properties, click **Submit**.
- To close the window without saving the property changes, click **Cancel**.

The Property window closes, and you can view the SimComponent changes in the SimAuthor hierarchies or in the SimWindow.

Editing the Simulation Properties

When editing a Visual SimComponent, you can add or delete the simulation properties. Simulation properties are attributes that reflect the user interface characteristics and states of a SimComponent, such as toggle up/down and enable/disable. Scripting against a set of simulation properties for a SimComponent specifies the simulation's behavior.

Adding a Simulation Property

You can only add a simulation property to SimComponents that are extensible.* To add a simulation property to a SimComponent:

1. Select the desired SimComponent. Choose one of the following options:
 - In the SimAuthor hierarchies, select a SimComponent from the tree, right-click, and select **Insert Property** from the shortcut menu.
 - In the SimAuthor window, in the Menu bar, click **Insert** and select **Property**.*

The Insert Property window appears.

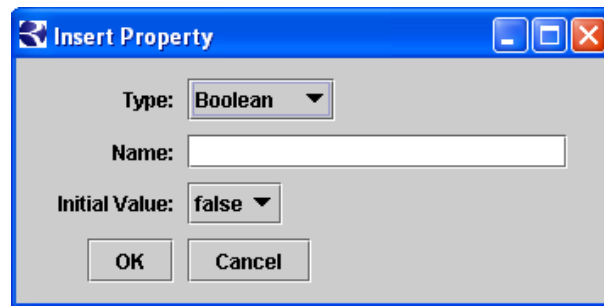


FIGURE 10: Insert Property window

2. Enter the following information for the simulation property:
 - **Type.** Use the drop-down menu to select **Boolean**, **Double**, **Int**, **Reference**, **String** for the property type.
 - **Name.** Enter a name for the property.
 - **Initial Value.** Use the drop-down menu to select **True** or **False** for the initial value.
3. Choose one of the following options:
 - To save the new property information, click **OK**. The Insert Property window closes, and you can view the property in the SimAuthor hierarchies.
 - To disregard the new property, click **Cancel**.* The Insert Property window closes without confirming the cancellation.

Deleting a Simulation Property

When a property is deleted from a SimComponent, any attached scripts triggered by the properties are also deleted. To delete a simulation property, refer to the following steps.

NOTE: You can only delete a simulation property from SimComponents that are extensible.

1. In the SimAuthor hierarchies, select the desired SimComponent and Property.
2. To remove the property, press the **DELETE** key* or right-click and select **Delete**.

A confirmation dialog box appears asking to confirm the deletion of the property and its triggers.

3. Choose one of the following options for the dialog box:
 - To delete the simulation property from the SimComponent, click **Yes**. The dialog box closes, and the property is removed from the SimAuthor hierarchies.
 - To keep the simulation property, click **No**. The dialog box closes, and the property remains in the SimAuthor hierarchies.

NOTE: Any remaining triggered script referencing the deleted property should be marked as being in error.

Moving and Resizing a Visual SimComponent

After creating a Visual SimComponent and attaching a graphic to the SimComponent, you can move and resize the image in the SimAuthor Mode of a SimWindow. The SimComponent Move Tool provides fine-grained control of the X-Y placement of the Visual SimComponent.

1. Select the desired SimComponent to move/resize. Choose one of the following options:
 - In the SimAuthor hierarchies, select the SimComponent and then right-click and select **Move/Resize Component** from the shortcut menu.
 - In the SimAuthor hierarchies, select the SimComponent and then in the Menu bar, click **Edit** and select **Move/Resize Component**.
 - In the SimWindow, hold down **CTRL+SHIFT** and then click the Visual SimComponent in the SimWindow. *

The Move/Resize window appears with a table that includes the X-Y pixel coordinates and the height and width of the image in pixels.

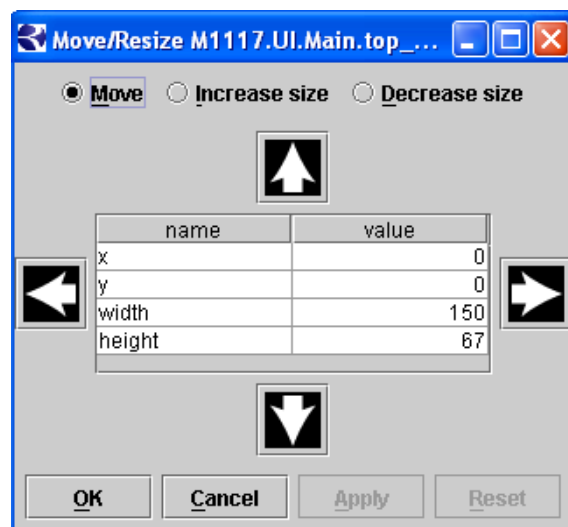


FIGURE 11: Move/Resize window

TIP: Open the SimWindow in SimAuthor Mode and place the Move/Resize window next to the SimWindow to view the moving and resizing of the image as you make them.

To Move the SimComponent

2. Select the **Move** option button, and choose any of the following options:
 - Enter the desired **X** and **Y** values in the **Value** fields and press **ENTER**.
 - Click the up and down arrows to incrementally move the **y** coordinate.
 - Click the left and right arrows to incrementally move the **x** coordinate.

To Make the SimComponent Image Larger

3. Select the **Increase size** option button and choose any of the following options:
 - Enter the desired **width** and **height** in the fields and press **ENTER**.
 - Click the left, right, up and down arrows to incrementally increase the image size.

To Make the SimComponent Image Smaller

4. Select the **Decrease size** option button and then:
 - Enter the desired **width** and **height** in the fields and press **ENTER**.
 - Click the left, right, up, and down arrows to incrementally decrease the image size.
5. After the changes, choose one of the following options:
 - To temporarily apply the changes to the SimWindow, click **Apply**.
 - To reset the image size and location to its original state, click **Reset**.

The SimWindow applies the changes to the image accordingly.

6. Choose one of the following options:
 - To save the image changes, click **OK**.
 - To disregard the image changes, click **Cancel**.

The Move/Resize window closes, and you can view the SimWindow for the changes to the image.

Deleting a Visual SimComponent

When a SimComponent is deleted from a simulation, the SimComponent, all of its properties, and any attached scripts triggered by the properties of this SimComponent are also deleted. Refer to the following steps to delete a Visual SimComponent from the simulation.

1. Select the desired SimComponent to be deleted. Choose one of the following options:
 - In the SimAuthor hierarchies, select the SimComponent and then right-click and select **Delete** from the shortcut menu.
 - In the SimAuthor hierarchies, select the SimComponent and then press the **DELETE** key. *
 - In the SimAuthor hierarchies, select the SimComponent and then in the Menu bar, click **Edit** and select **Delete**. (This is for extensible SimComponents only.) *

A confirmation dialog box appears.

2. Choose one of the following options for the dialog box:
 - To delete the SimComponent, click **Yes**. The dialog box closes, and the SimComponent and its properties are removed from the SimAuthor hierarchies and from the SimWindow.
 - To keep the SimComponent, click **No**. The confirmation dialog box closes.

NOTE: Any remaining triggered script referencing the deleted SimComponent should be marked as being an error.

Managing the Model SimComponents

A Model SimComponent is a non-visual element of the abstract model of a simulated system. Templates for the Model SimComponents can be used to define the functional aspect of the simulation, such as user input values and triggers for the different states of the simulation.

Managing the SimComponents consists of:

- adding, editing, and/or deleting properties of a SimComponent or the entire SimComponent.
- defining the states of the SimComponent.

To make the changes, use the SimAuthor hierarchies or the SimWindow. Changes made in the hierarchies or in the window are automatically reflected in the other. To view more information about each SimComponent, refer to the “SimLib Tables” on page 75. In the tables, you will find information about the available libraries and SimComponents.

Adding a Model SimComponent*

Adding a Model SimComponent in the SimAuthor toolset is similar to adding a Visual SimComponent except that a visual representation of the SimComponent is not available. The Component Selector contains a list of Visual and Model SimComponents that can be added to a SimWindow.

1. In the Component Selector window, use the **Library** drop-down menu to select the desired SimLib. When selected, the available SimComponents for that SimLib appear in the Components section.
2. To view the full name, description, package, and library of each SimComponent in the Property Pane, select the desired SimComponent from the list.*

NOTE: For more information regarding which SimComponent to select and how it can be used in the simulation, see “SimLib Tables” on page 75.

3. To add the SimComponent to the running simulation, choose one of the following options:

- In the Component Selector, drag the SimComponent from the Selector and drop it into a SimWindow. Make sure the SimWindow is in SimAuthor Mode.

NOTE: If the involved SimWindow is not in SimAuthor Mode, the SimWindow is automatically placed into that mode when the SimComponent is added.

- In the Component Selector, drag the SimComponent from the Selector and drop it into the SimAuthor hierarchies.*
- In the SimAuthor Mode SimWindow, select a SimComponent from the Selector and then use the mouse to select an area of the window to place the SimComponent. You can change the location later.

NOTE: A default image for the SimComponent does not appear in the SimWindow.

The Property window with the specified SimComponent’s name in the title bar appears.

4. In the Property window, enter the required information for the specified SimComponent. Properties displayed will differ according to the SimComponent. Refer to the “SimLib Tables” on page 75 for the property definitions and available attributes and values.
5. Choose one of the following options:
 - To save the SimComponent and add it to the simulation, click **Submit**. The Property window closes, you can view the SimAuthor hierarchies for the added SimComponent.
 - To disregard the addition of the SimComponent to the simulation, click **Cancel**. The Property window closes.

Editing the Simulation Properties

When editing a Model SimComponent, you can add or delete the simulation properties. Simulation properties are attributes that reflect the user interface characteristics and states of a SimComponent, such as toggle up/down and enable/disable. Scripting against a set of simulation properties for a SimComponent specifies the simulation's behavior.

Adding a Simulation Property

To add a simulation property to a Model SimComponent, refer to the following steps.

1. Select the desired SimComponent. Choose one of the following options:
 - In the SimAuthor hierarchies, select a SimComponent from the tree, right-click, and select **Insert Property** from the shortcut menu.
 - In the SimAuthor window, in the Menu bar, click **Insert** and select **Property**.*

The Insert Property window appears.

2. Enter the following information for the simulation property:
 - **Type**. Use the drop-down menu to select **Boolean**, **Double**, **Int**, **Reference**, **String** for the property type.
 - **Name**. Enter a name for the property.
 - **Initial Value**. Use the drop-down menu to select **True** or **False** for the initial value.
3. Choose one of the following options:
 - To save the new property information, click **OK**. The Insert Property window closes, and you can view the property in the SimAuthor hierarchies.
 - To disregard the new property, click **Cancel**.* The Insert Property window closes without confirming the cancellation.

Deleting a Simulation Property

When a property is deleted from a SimComponent, any attached scripts triggered by the properties are also deleted. To delete a simulation property, refer to the following steps.

1. In the SimAuthor hierarchies, select the desired SimComponent and Property.
2. To remove the property, press the **DELETE** key* or right-click and select **Delete**.
A confirmation dialog box appears asking to confirm the deletion of the property and its triggers.
3. Choose one of the following options for the dialog box:
 - To delete the simulation property from the SimComponent, click **Yes**. The dialog box closes, and the property is removed from the SimAuthor hierarchies.
 - To keep the simulation property, click **No**. The dialog box closes, and the property remains in the SimAuthor hierarchies.

NOTE: Any remaining triggered script referencing the deleted property should be marked as being in error.

Deleting a Model SimComponent

When a SimComponent is deleted from a simulation, the SimComponent, all of its properties, and any attached scripts triggered by the properties of this SimComponent are also deleted. Refer to the following steps to delete a Model SimComponent from the simulation.

1. Select the desired SimComponent to be deleted. Choose one of the following options:
 - In the SimAuthor hierarchies, select the SimComponent and then right-click and select **Delete** from the shortcut menu.
 - In the SimAuthor hierarchies, select the SimComponent and then press the **DELETE** key. *
 - In the SimAuthor hierarchies, select the SimComponent and then in the Menu bar, click **Edit** and select **Delete**. (This is for extensible SimComponents only.) *

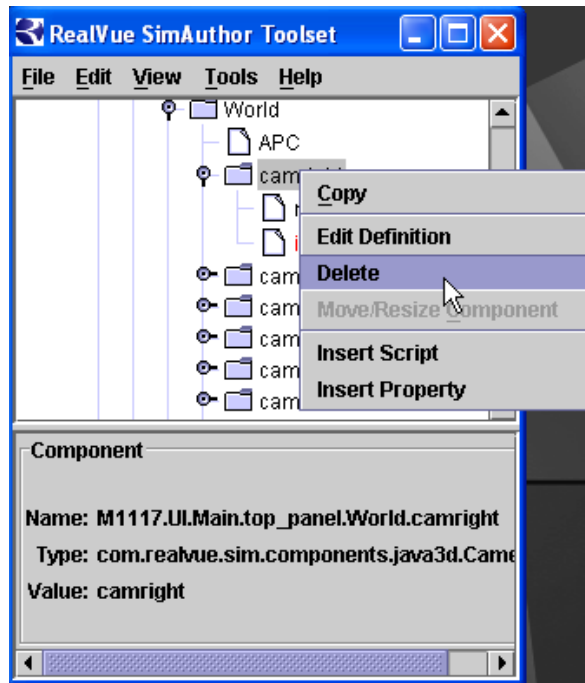


FIGURE 12: Shortcut Menu - Delete

A confirmation dialog box appears.

2. Choose one of the following options for the dialog box:
 - To delete the SimComponent, click **Yes**. The dialog box closes, and the SimComponent and its properties are removed from the SimAuthor hierarchies and from the SimWindow.
 - To keep the SimComponent, click **No**. The confirmation dialog box closes.

NOTE: Any remaining triggered script referencing the deleted SimComponent should be marked as being an error.

When you have established the data model and structure of the simulation with SimWindows and defined the look and feel with the SimComponents, you can customize how the simulation will behave. This chapter provides an overview of scripting and how to create, edit, and delete script functions and script files.

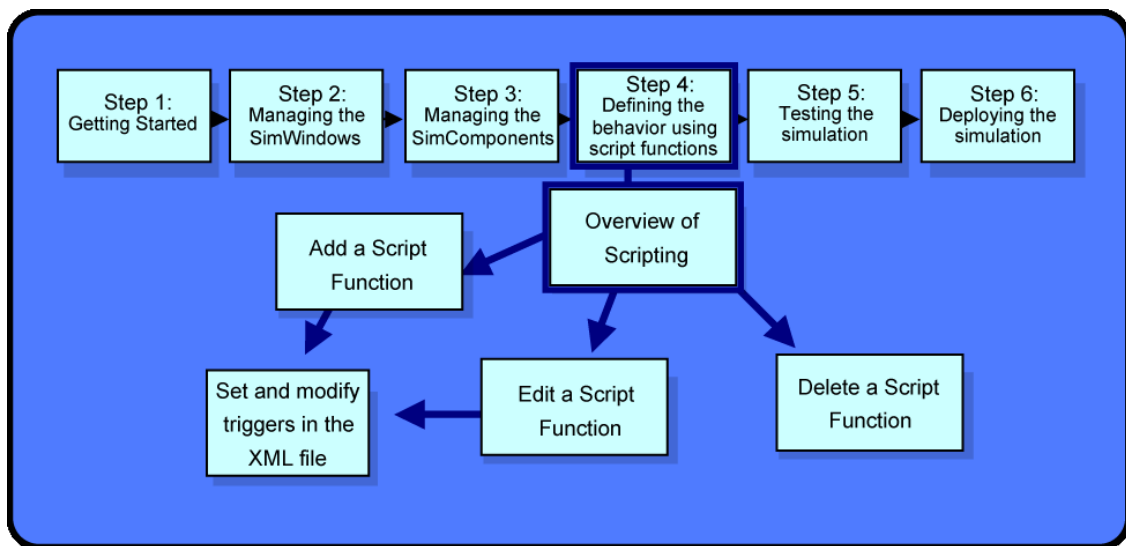


FIGURE 1: Designing a Simulation - Defining the Behavior

Overview

Defining the behavior of a simulation takes place within the script functions of the SimComponents. The behavior and the interaction between the SimComponents of a simulation is specified through scripting language (Python) and XML (scripting.xml). Each SimComponent has simulation properties that describe its possible states. The script statement defines the functions of a SimComponent and the parameters of the functions. The script functions are then registered to an XML file and that file is used as the “glue” between SimComponents and script functions.

A trigger is usually embedded within a script to watch for an event to occur. When the event occurs, a script is triggered to initialize the script function to change the behavior of the simulation. There can be one to many triggers within each script.

Each script function has a name, a type (rule or restriction), one or more triggers, and a set of script statements. In the SimAuthor toolset, script functions can be accessed and viewed through the Script Editor, Script Console, and the Property Pane at the bottom of the SimAuthor hierarchies. In the SimAuthor hierarchies, script functions appear as [blue text](#).

Below is an example of a script function within a script file. There can be multiple functions within a script file.

```
def led (component, change):
    if model.ui.main.switch1.on == 1:
        model.ui.main.LED1.on = 1
        model.ui.main.LED2.on = 1
    else:
        model.ui.main.LED1.on = 0
        model.ui.main.LED2.on = 0
```

“led” is the name of the script function. `switch1`, `LED1`, and `LED2` are all `SimComponents` in the simulation. “on” is the state of the `SimComponent`. When the switch is turned “on” by the user in a running simulation, the system initiates the XML file. The trigger in this example is the user turning the switch on. The XML file registers the trigger and finds the script file that is associated with that `SimComponent` and trigger. The system then runs the “led” function and from there, the script tells “LED1” and “LED2” to be turned on. If the switch is turned “off” (value = 0), the “LED1” and “LED2” are also turned off (value = 0). For more information about scripting, refer to “Using Python for Scripting” on page 59.

Rules and Restrictions

Rules and restrictions are two types of script functions used to determine when the script function occurs within a simulation. A **Rule** is a type of script function that is triggered after a property change. A **Restriction** is a type of script function that is triggered before a property change. In the SimAuthor toolset, restrictions to a property are executed before rules are applied. Use the Script Function Editor feature to define the rule or restriction of a script function.

Triggers

Triggers are used to initiate script functions and are required for any simulation. Use the Script Editor and Script Link features in the SimAuthor toolset to connect `SimComponents` together and to define the flow of a simulation.

Managing the Script Functions

Adding a Script Function

After you add a `SimComponent` to the simulation, add a script function to determine the behavior of the `SimComponent`.

1. To add a script function to a `SimComponent`, choose one of the following options:
 - In the SimAuthor hierarchies, in the Menu bar, click **Insert** and select **Script Function**.*
 - In the SimAuthor hierarchies, select a `SimComponent` from the tree, and then select a property within that `SimComponent`. Right-click on the property and select **Insert Script** from the shortcut menu.

The Script Function Editor window appears.

2. To enter script information, choose one of the following options:
 - In the Script Function Editor, enter the following information:
 - **Name.** Enter a name for the script function that is unique for the entire simulation.
 - **Function.** Enter the text for the script function.
 - **Triggers.** The property selected when a script function is added is automatically placed in the Trigger table. To define if the trigger is a rule or restriction, click within the type field and select **Rule** or **Restriction** from the drop-down menu.
 - In the SimAuthor hierarchies, select a property from the tree and drag the property into the **Function** script text area or into the **Triggers** area, accordingly. The fully qualified name of the property appears in the script area or the Triggers table.
 - In the SimAuthor hierarchies, select a property from the tree and then press **CTRL+C** or right-click and select **Copy** from the shortcut menu to copy the property's name. Return to the Script Function Editor and press **CTRL+V** to paste the property into the script text editing area or into the Triggers table, accordingly.

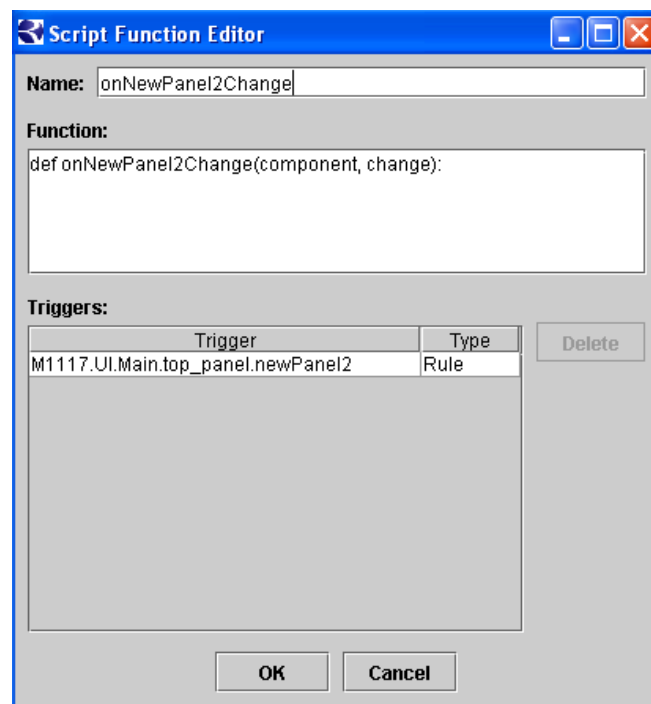


FIGURE 2: Script Function Editor

- NOTE:** Additions made in the Script Function Editor also appear in the hierarchies in the related property triggers. The same script function appears in the hierarchy under each of the property triggers identified.
3. Choose one of the following options:
 - To verify and save the new script function, click **OK**.*
 - To close the Script Function Editor window without adding the new script function, click **Cancel**.

NOTE: If errors are found during the validation of the script function, a dialog box appears with the list of errors. Resolve the errors and return to Step 2.

The Script Function Editor window closes.

Editing a Script Function

1. To edit a script function to the simulation, choose one of the following options:

- In the SimAuthor hierarchies, double-click on a Script Function in the tree.*
- In the SimAuthor hierarchies, select a SimComponent, a property, and its Script Function. Right-click and select **Edit Definition** from the shortcut menu.

The Script Function Editor appears.

2. In the Script Function Editor, choose one of the following options:

- Edit the following information accordingly:
 - **Name.** Modify the name of the script function. The name must be unique for the entire simulation.
 - **Function.** Edit the text for the script.
 - **Triggers.** The property selected when a script function is inserted is automatically placed in the list. To edit if the trigger is a rule or restriction, click within the **Type** field and select **Rule** or **Restriction** from the drop-down menu.
- In the SimAuthor hierarchies, select a property from the tree and drag the property into the **Function** script text area or into the **Triggers** area, accordingly. The fully qualified name of the property appears in the script area or the Triggers table.
- In the Sim Author hierarchies, select a property from the tree and then press **CTRL+C** or right-click and select **Copy** from the shortcut menu to copy the property's name. Return to the Script Function Editor and press **CTRL+V** to paste the property into the script text editing area or into the Triggers table, accordingly.

To Delete a Trigger

3. In the Triggers area, select a trigger from the table.
4. Click the **Delete** button.

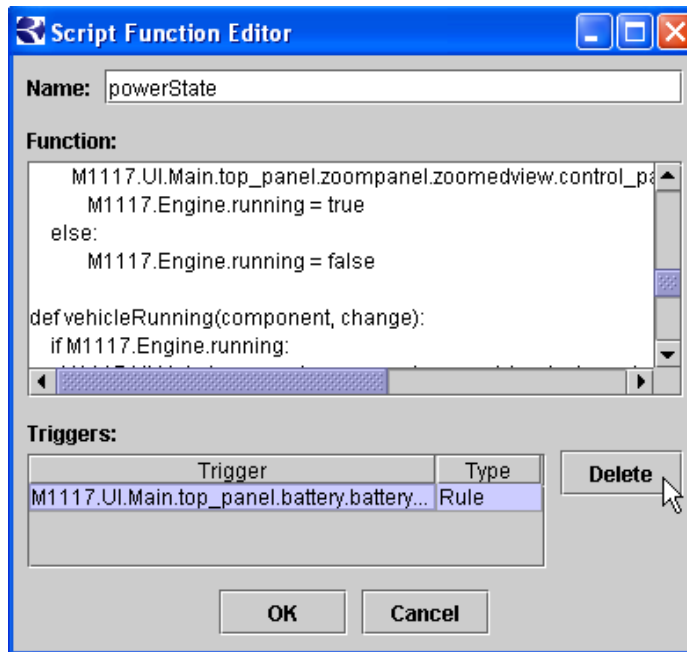


FIGURE 3: Script Function Editor - Delete a Trigger

5. Choose one of the following options:
 - To save the modified function information and close the Script Function Editor window*, click **OK**.
 - To disregard the changes and close the Script Function Editor window, click **Cancel**.

Deleting a Script Function*

1. To delete a script function from the property of a SimComponent, in the SimAuthor hierarchies, select a SimComponent, a property, and its Script Function.
2. Right-click and select **Delete** from the shortcut menu.*
A dialog box appears asking to confirm to deletion.
3. Choose one of the following option in the dialog box:
 - To delete the script function, click **Yes**. The Script Function no longer appears in the SimAuthor hierarchies.
 - To keep the script function, click **No**. the Script Function remains in the SimAuthor hierarchies.

NOTE: If the script function had multiple triggers, it is also deleted in the hierarchy.

Managing the Script Files

Within a simulation, you can have multiple script files. Each script file contains one script function. The Script Editor is used to maintain the script files.

Creating a Script File

1. Open the Script Editor from the SimAuthor Toolset window. In the Menu bar, click **Edit** and select **Script Editor**.
The Script Editor window appears. If there are multiple script files within the simulation, the bottom of the window contains tabs for the separate script files.

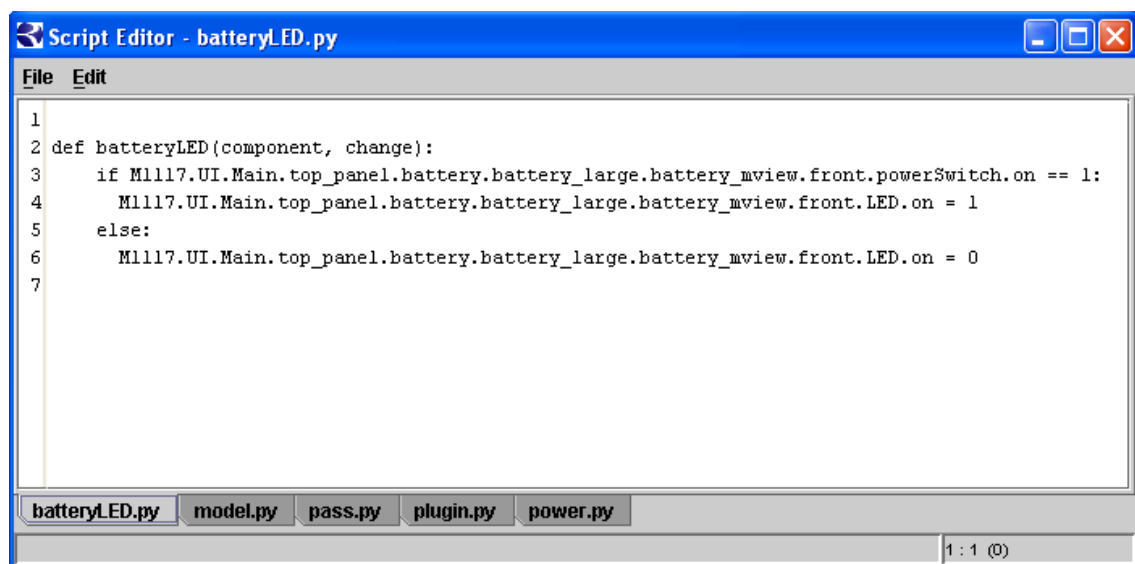


FIGURE 4: Script Editor Window with Multiple Tabs

2. To create a new script, select all of the text in the script text area and then remove all of the text. Choose one of the following options:
 - Press the **DELETE** key.
 - From the Menu bar, click **Edit** and select **Cut**.
 - Press the **CTRL + X** keys to remove the text.
3. After removing the text, enter the desired script functions. See “Using Python for Scripting” on page 59 for guidelines and assistance.
4. To save the new script file, click **File** in the Menu bar and select **Save as**.
A Save window appears.
5. Enter the name and desired location of the script file and click **Save**. To disregard the new name and close the Save window, click **Cancel**.
6. The Script Editor reappears, but the new script file does not appear in the Script Editor. You must close the Script Editor and then reopen it to see the new script file.
7. In the Menu bar of the Script Editor window, click **File** and select **Exit**.
8. Reopen the Script Editor from the SimAuthor Toolset window. In the Menu bar, click **Edit** and select **Script Editor**.
The Script Editor window appears with the newly added script file.*

Editing a Script File

1. Open the Script Editor from the SimAuthor Toolset window. In the Menu bar, click **Edit** and select **Script Editor**.
The Script Editor window appears.
2. If there are multiple script files within the simulation, the bottom of the window contains tabs for the separate script files. Click the tabs according to the script file you want to modify.
3. To make changes to a script, click within the text area and edit accordingly. Refer to “Using Python for Scripting” on page 59 for assistance.
4. Choose one of the following options:
 - To save the changes to a single script, click **File** in the Menu bar and select **Save**.
 - To save the changes to all of the script files, if any, click **File** in the Menu bar and select **Save All**.
5. If there are no more modifications, close the Script Editor window. Click **File** in the Menu bar and select **Exit**.

Deleting a Script File*

After defining the simulation's appearance, structure, and behavior, the next step is to test the design of the newly created or modified simulation. The SimAuthor toolset provides multiple debugging methods, such as the SimLab, SimLog, and Script Console, to ensure effective and efficient testing. If you prefer to view the XML to test the simulation, that feature is also available in the toolset.

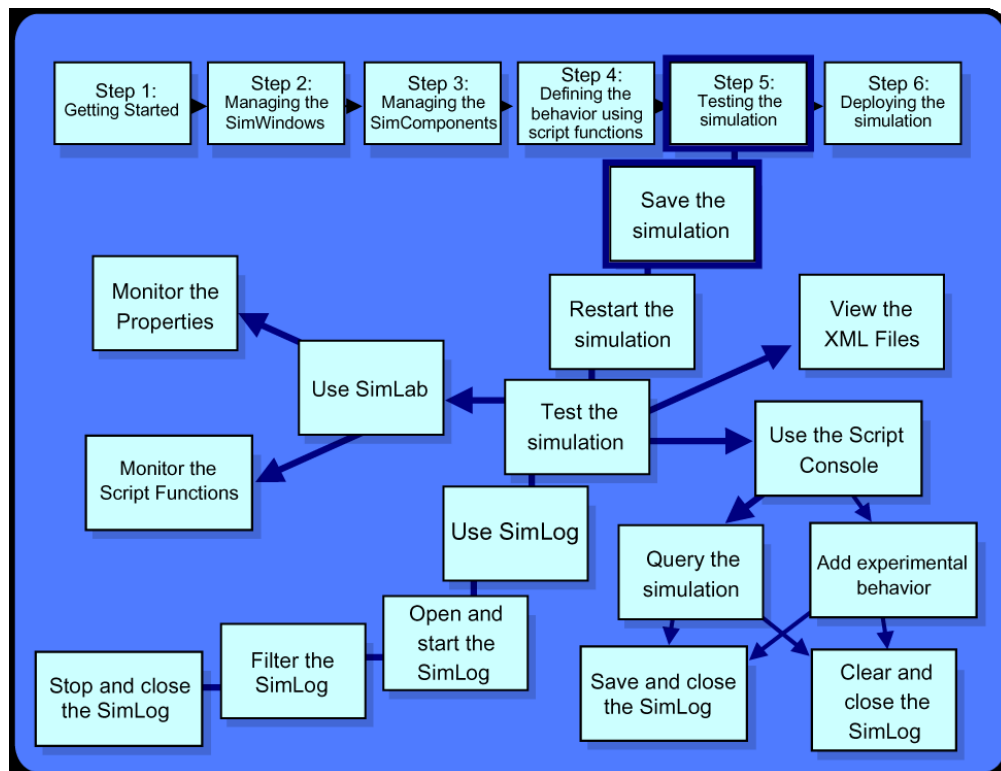


FIGURE 1: Designing a Simulation - Test the Simulation

Refer to the sections below for available testing methods using the SimAuthor toolset.

Restarting the Simulation

1. In order to save all the information in the simulation, first save the simulation. In the SimAuthor Toolset window, in the Menu bar, click **File** and select **Save Simulation**.
2. Next, restart the current simulation to its initialization point. In the Menu bar, click **File** and select **Restart Simulation**.
3. The system will take a few minutes to close and restart the simulation and all of its associated files and windows.
4. When the simulation has restarted, continue with the testing methods below.

Alternating between Simulation Mode and SimAuthor Mode

The SimAuthor toolset offers the Simulation and SimAuthor mode feature to assist you in creating and maintaining simulations. The SimAuthor Mode is mainly used for the design of a simulation because it allows you to drag and drop SimComponents onto the SimWindow and to modify the look and feel of the simulation. After the design of the simulation is complete, Simulation Mode allows you to test the SimComponents in a running simulation through user input. Simulation Mode does not allow you to make design changes from the SimAuthor Toolset.

To switch the active SimWindow between Simulation Mode and SimAuthor Mode, there are two options:

- Hold down the **CTRL+SHIFT+A** keys on the keyboard.
- In the Menu bar, click **SimWindows** and select **<SimWindow> Mode. ***

In **SimAuthor Mode**, the title bar will state “SimAuthor Mode: <Simulation Name>” and a SimAuthor icon is used in the title bar to distinguish between the two modes. In this mode, you can:

- Highlight an element in the SimAuthor hierarchies by holding down **CTRL + SHIFT** and clicking on a visual element in the SimWindow.
- Drag a SimComponent from the Component Selector into the SimWindow and insert an instance of that SimComponent into the simulation. The default image of the SimComponent appears in the SimWindow, and the SimComponent Property Editor automatically opens.

In **Simulation Mode**, the name of the simulation appears in the title bar of the SimWindow. In this mode, you can:

- Enter values into the fields, if any.
- Push, pull, or toggle the buttons in the running simulation, if any.

Using the SimLab for Testing

The SimLab is used to test the simulation’s behavior. When you defined the simulation’s appearance and behavior, you also set values for each property and script function. SimLab allows you to test all the available entries for the values while viewing the changes in the SimWindow and allows you to set monitors to watch selected properties.

Opening SimLab

Open the SimLab to monitor simulation properties and scripts functions.

1. To open the SimLab, in the SimAuthor Toolset window, click **Tools** and select the checkbox for **Show SimLab**.

NOTE: When opening the SimLab, if it first appears blank, properties have not been selected to be monitored. See the following sections to set monitors.

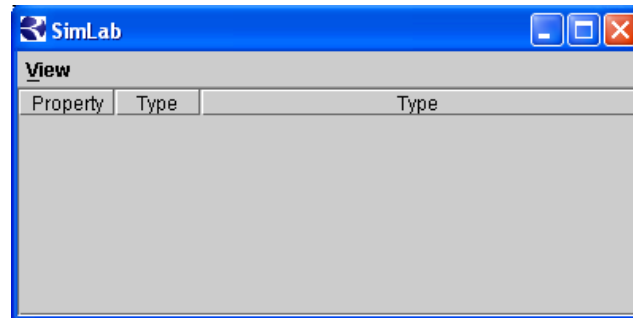


FIGURE 2: SimLab Window - Empty

2. From here, you can:
 - Add/Delete properties being monitored. See the sections below.
 - Test the SimComponent properties. See “Testing the Properties” on page 51.
 - Add/Delete script functions being monitored. See “Monitoring the Script Functions” on page 51.
 - Test the Script Functions. See “Testing the Script Functions *” on page 52.
 - Hide the SimLab window. Click **Tools** and de-select the **Show SimLab** checkbox.

Adding a Property to the SimLab

To add a property to be monitored in the SimLab:

1. In the SimAuthor hierarchies, select a property from the tree, right-click, and then select **Add Watch** from the shortcut menu.

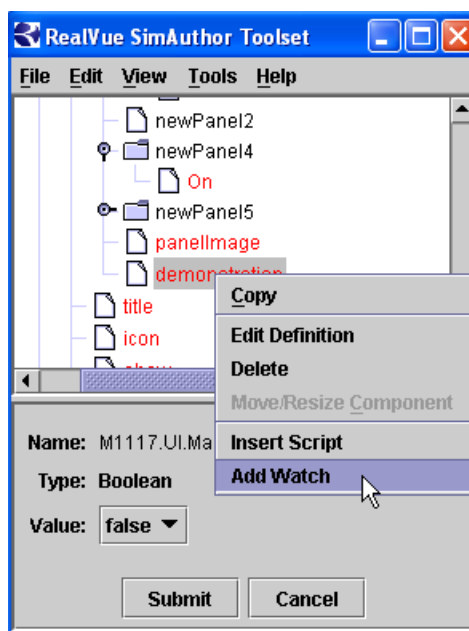


FIGURE 3: SimLab Window - Add Watch

The SimLab window is updated with the property's information in the table.

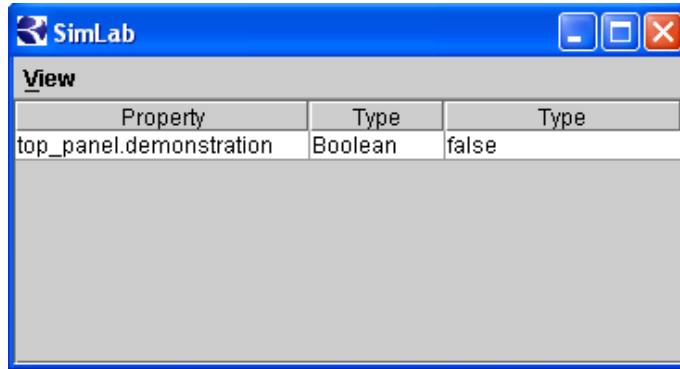


FIGURE 4: SimLab - Watch Added

NOTE: To view the fully qualified name of the Property, click **View** in the Menu bar and select the **Show Full Property Name** checkbox. To view the short name of the Property only, click **View** in the Menu bar and de-select the **Show Full Property Name** checkbox.

From here, you can:

- Add more property monitors to the SimLab, return to step 1.
 - Delete a property from the SimLab, see “Deleting a Property from the SimLab” below.
2. After adding the desired property monitors, see “Testing the Properties” on page 51 to test the property values.
 3. To close the SimLab window, click the **Close** button in the upper right corner of the window.

Deleting a Property from the SimLab

1. To remove a property monitor from the SimLab, choose one of the following options:
 - In the SimLab window, select the property to be removed, right-click, and then select **Remove Watch** from the shortcut menu.
 - In the SimAuthor Toolset window, select the property to be removed, right-click, and then select **Remove Watch**.

The SimLab is updated, and the selected property does not appear in the SimLab.

2. From here, you can:
 - Add property monitors to the SimLab, see “Adding a Property to the SimLab” above.
 - Delete additional properties from the SimLab, repeat step 1.
3. After deleting the necessary property monitors, see “Testing the Properties” on page 51 to test the property values.
4. To close the SimLab window, click the **Close** button in the upper right corner of the window.

Deleting all Properties from the SimLab

Currently, the SimLab does not allow the deletion of all of the properties from the SimLab. While you can select multiple properties in the table, you cannot delete them all at the same time.

1. To clear the SimLab of all property monitors, press the **SHIFT** key and select all of the properties in the SimLab window.
2. Right-click and then select **Remove Watch** from the shortcut menu.

NOTE: Deleting all of the properties from the SimLab does not delete the property from the simulation.

The SimLab is updated and emptied of all the property monitors.

3. From here, you can:
 - Add property monitors to the SimLab, see “Adding a Property to the SimLab” above.
 - Close the SimLab window, click the **Close** button in the upper right corner of the window.

Testing the Properties

1. Open the SimLab to view the current properties being monitored. In the SimAuthor hierarchies, click **Tools** and select the **Show SimLab** checkbox.
The SimLab window appears with the Property, Type, Value, and Owner of each property being monitored. If the window is blank, properties have not been selected to be monitored yet.
2. In the SimLab, the Property, Type, and Owner fields cannot be changed, but the Value field can be changed to test the simulation. To change a property value, click within the **Value** field and change the value.

TIP: Place the SimLab window and the SimAuthor Mode window side by side to view what happens when you alter the value of the monitored property or script function. For instance, in the SimLab window, when you change the Value of a ZoomPanel from 1 to 0, the SimAuthor Mode SimWindow changes its view from zoom in to zoom out accordingly.

The SimAuthor Mode SimWindow changes according to the changed value.

To Resolve Errors

3. If the SimComponent is not acting as designed, to resolve the error, there are two options:
 - Open the Script Function Editor and review the script. Make sure the values are set correctly and that the script is written correctly.
 - Open the Property window for the SimComponent and review the attributes and values. Make sure the values are set correctly.
4. After resolving the errors, retest the SimComponent by repeating step 2.
5. If the SimComponent acts as designed, you can:
 - Continue to test other SimComponents and their properties.
 - Close the SimLab window. Click the **Close** button in the upper-right corner of the window, or in the SimAuthor hierarchies, click **Tools** and de-select the **Show SimLab** checkbox.

Monitoring the Script Functions

*Adding a Script Function**

To add a script function to the SimLab to be monitored:

1. In the SimAuthor Toolset window, select a property and its script function from the tree, right-click, and then select **Watch** from the shortcut menu.
2. The SimLab window is updated with the new script function.

*Deleting a Script Function**

To delete a script function to be monitored from the SimLab:

1. In the SimLab, select a script function, right-click, and then select **Delete** from the shortcut menu.
2. The SimLab window is updated with the changes.

Deleting all Script Functions*

To delete all of the script functions to be monitored in the SimLab:

1. To clear the SimLab of all script function monitors, press the **SHIFT** key and select all of the functions in the SimLab window.

The SimLab window is updated and emptied of all script functions.

2. From here, you can:

- Add script function monitors to the SimLab. See “Adding a Script Function” above.
- Close the SimLab window. Click the Close button in the upper-right corner of the window.

Clearing the Script Monitor Symbols *

Testing the Script Functions *

Using the SimLog for Testing *

The SimLog is used to keep track of the simulation properties, script function executions, and user events that occur during testing.

Opening SimLog*

1. In SimAuthor, in the Menu bar, click **Tools** and select **SimLog**.

The SimLog window appears.

2. From here, you can:

- Start the SimLog.
- Enable/Disable simulation property change logging.
- Enable/Disable script function execution logging.
- Enable/Disable user event logging.
- Clear the SimLog.
- Save the SimLog.
- Hide the SimLog. Click **Tools** and de-select the **Show SimLog checkbox**.

Starting the SimLog*

Enabling/Disabling Simulation Property Change Logging*

Enabling/Disabling Script Function Execution Logging*

Enabling/Disabling User Event Logging*

Filtering the SimLog*

Stopping the SimLog*

Saving the SimLog*

Closing the SimLog*

To close the SimLog window, click the **Close** button in the upper right corner of the window.

Using the Script Console

The Script Console is used to directly enter and execute scripts in a running simulation.

1. To access the Script Console window, in the SimAuthor Toolset window, in the Menu bar, click **Tools** and select the **Show Script Console** checkbox.
The Scripting Console window appears.
2. To enter information into the Script Console, choose one of the following options:
 - In the SimAuthor hierarchies, drag a property from the tree and drop it into the Script Console. The full qualified name of the property appears in the window.
 - In the SimAuthor hierarchies, select a property from the tree, and then right-click and select **Copy** or press **CTRL+C** to copy the fully qualified name of the property into the script console area. In the SimLog window, press **CTRL+ V** to paste the copied text into the text area.
3. To close the Script Console window, click the **Close** button in the upper-right corner of the window.

NOTE: Remove script console from simulation menus.?

Opening the SimLog*

Using the SimLog to Query the Simulation*

Using SimLog to Add Experimental Behavior*

Saving the SimLog to a File*

Clearing the SimLog*

Closing the SimLog*

Viewing the XML Files

Viewing the XML files allows you to view how the SimComponents and Script Functions interact within the simulation. The SimAuthor toolset does not allow you to modify the XML files

1. In the SimAuthor Toolset window, click **File** and select **View XML**.
The View XML window appears with three tabs at the bottom of the window: interface.xml, model.xml, and scripting.xml.

NOTE: The XML files are Read-Only when accessed through the View XML window in the SimAuthor toolset.

After you've set up the SimWindows and SimComponents and tested the behavior of the simulation, you can deploy the completed simulation. The SimAuthor toolset provides five options for deployment. There are:

- CD-ROM
- Java WebStart
- Applet
- SCORM-compliant Applet
- Terminal Server

Before deploying the simulation, you must prepare all the associated files of the simulation.

The keyboard shortcuts available for the SimAuthor toolset follow some of the same conventions of the Windows shortcuts. Below are some conventional and some SimAuthor-specific shortcuts.

Shortcut	Action
DELETE	<ul style="list-style-type: none"> To delete the selected SimComponent and its simulation properties (for Extensible SimComponents only). To delete the selected text (property or script function) from SimLab monitoring (it does not delete the property or the script function)
Double-click	<ul style="list-style-type: none"> To open the Property Editor for a selected SimComponent in the SimAuthor hierarchies. To open a Property window for a property selected in SimAuthor or SimLab. To open the Script Function Editor for a selected script function. To open the detailed description of a selected SimComponent in the Component Selector.
CTRL + C	To copy the selected text.
CTRL + N	To start the New Simulation Wizard.
CTRL + O	To open a dialog box listing the available simulations to open. When selected, the simulation and SimAuthor starts.
CTRL + S	To save all changes to the simulation design
CTRL + V	To paste the selected text or insert the property of a script function in the paste buffer into the SimLab table for monitoring.
CTRL + X	To cut the selected text.
CTRL + Z	To undo the last action.
CTRL + SHIFT + A	To alternate SimWindow modes between SimAuthor Mode and Simulation Mode.
CTRL + SHIFT + click	To highlight in the SimAuthor hierarchies a SimComponent that is selected in the SimWindow.

Script Language Syntax Summary

This Appendix provides an overview of scripting, pointers for using Python to create simulation scripts, the syntax for writing these scripts, and how to use triggers to initialize the scripts.

Using Python

Python is a very high-level language and comes with SimKernel. If you are new to Python, see the following for more information and to find a tutorial:

- <http://www.python.org/doc/current/tut/>
- <http://www.hetland.org/python/instant-hacking.php>.
- <http://diveintopython.org/>
- <http://www.python.org/doc/current/lib/lib.html> for the Python library reference

The following sections on using Python are from Richard Gruet's Python Quick Reference (<http://rgruet.free.fr>).

Python Keywords

and	del	for	is	return
assert	elif	from	lambda	try
break	else	global	not	or
class	exec	if	pass	while
continue	except	import	print	yield
def	finally	in	raise	

- A statement must all be on a single line. To break a statement over multiple lines, use “\”, as with the C preprocessor.
Exception: You can always break when inside any (), [], or {} pair, or in triple-quoted strings.
- More than one statement can appear on a line if they are separated with semicolons.
- Comments start with “#” and continue to the end of the line.

Identifiers

Python identifiers keywords, attributes, etc., are case-sensitive.

```
(letter | "_" ) (letter | digit | "_" )*
```

String literals

```
"a string enclosed by double quotes"
```

```
'another string delimited by single quotes and with a " inside'
```

```
'''a string containing embedded newlines and quote (') marks, can be delimited with triple quotes.'''
```

```
""" may also use 3- double quotes as delimiters """
```

- Use `\` at end the of the line to continue a string on the next line.
- Adjacent strings are concatenated, e.g. `'Monty' ' Python'` is the same as `'Monty Python'`.
- `u'hello' + ' world' --> u'hello world'` (coerced to unicode)

Numbers

- **Decimal integer:** 1234, 1234567890546378940L (or l)
- **Octal integer:** 0177, 017777777777777777L (begin with a 0)
- **Hex integer:** 0xFF, 0xFFFFFFFFFFFFFFFFL (begin with 0x or 0X)
- **Long integer (unlimited precision):** 1234567890123456L (ends with L or l) or **long**(1234)
- **Float (double precision):** 3.14e-10, .001, 10., 1E3
- **Complex:** 1J, 2+3J, 4+5j (ends with J or j, + separates (float) real and imaginary parts)

Integers and long integers are **unified** starting from release 2.2 (the L suffix is no longer required).

Sequences

String of length 0, 1, 2 (see “String Literals”, above)

```
", '1', "12", 'hello\n'
```

Tuple of length 0, 1, 2, etc:

```
() (1,) (1,2) # parentheses are optional if len > 0
```

List of length 0, 1, 2, etc:

```
[] [1] [1,2]
```

- Indexing is **0**-based. Negative indices (usually) mean count backwards from end of sequence.
- Sequence **slicing** [*starting-at-index* : *but-less-than-index*]. Start defaults to '0'; End defaults to 'sequence-length'.

```
a = (0,1,2,3,4,5,6,7)
a[3] == 3
a[-1] == 7
a[2:4] == (2, 3)
a[1:] == (1, 2, 3, 4, 5, 6, 7)
a[:3] == (0, 1, 2)
a[:] == (0,1,2,3,4,5,6,7) # makes a copy of the sequence.
```

Dictionaries (mappings)

Dictionary of length 0, 1, 2, etc:
 {} {1 : 'first'} {1 : 'first', 'next': 'second'}

Operators and their evaluation order

TABLE 1: Python operators and their evaluation order

Highest	Operator	Comment
	, [...] {...} `...`	Tuple, list & dict. creation; string conv.
	s[i] s[i:] s.attr f(...)	indexing & slicing; attributes, fct calls
	+x, -x, ~x	Unary operators
	x**y	Power
	x*y x/y x%y	mult, division, modulo
	x+y x-y	addition, subtraction
	x<<y x>>y	Bit shifting
	x&y	Bitwise and
	x^y	Bitwise exclusive or
	x y	Bitwise or
	x<y x<=y x>y x>=y x==y x!=y x<>y x is y x is not y x in s x not in s	Comparison, identity, membership
	not x	boolean negation
	x and y	boolean and
	x or y	boolean or
Lowest	lambda args: expr	anonymous function

- Alternate names are defined in module operator (e.g. `__add__` and `add` for +)
- Most operators are overridable.

Comparisons (defined between *any* types)

TABLE 2: Comparisons

Comparison	Meaning	Notes
<	strictly less than	(1)
<=	less than or equal to	
>	strictly greater than	

TABLE 2: Comparisons

<code>>=</code>	greater than or equal to	
<code>==</code>	equal to	
<code>!=</code> or <code><></code>	not equal to	
<code>is</code>	object identity	(2)
<code>is not</code>	negated object identity	(2)

Notes are found on the next page.

- Comparison behavior can be overridden for a given class by defining special method `__cmp__`.
- (1) `X < Y < Z < W` has expected meaning, unlike C
- (2) Compare object identities (i.e. `id(object)`), not object values.

Boolean values and operators

TABLE 3: Boolean values and operators

Value or Operator	Evaluates to	Notes
constant True	1	
constant False	0	
built-in <code>bool(expr)</code>	True if <code>expr</code> is true, False otherwise.	
None , numeric zeros, empty sequences and mappings	false	
all other values	true	
<code>not x</code>	True if <code>x</code> is False , else True	
<code>x or y</code>	if <code>x</code> is false then <code>y</code> , else <code>x</code>	(1)
<code>x and y</code>	if <code>x</code> is false then <code>x</code> , else <code>y</code>	(1)

Notes:

- Truth testing behavior can be overridden for a given class by defining special method `__nonzero__`.
- (1) Evaluate second arg only if necessary to determine outcome.

None

- `None` is used as default return value on functions. Built-in single object with type `NoneType`.
- Input that evaluates to `None` does not print when running Python interactively.

Floats, integers and long integers

- Floats are implemented with C doubles.
- Integers are implemented with C longs (signed 32 bits, maximum value is `sys.maxint`).
- Long integers have unlimited size (only limit is system resources).

- Integers and long integers are **unified** starting from release 2.2 (the **L** suffix is no longer required).

Operators on all numeric types

TABLE 4: Operators on all numeric types

Operation	Result
abs (x)	the absolute value of x
int (x)	x converted to integer
long (x)	x converted to long integer
float (x)	x converted to floating point
$-x$	x negated
$+x$	x unchanged
$x + y$	the sum of x and y
$x - y$	difference of x and y
$x * y$	product of x and y
x / y	true division of x by y : $1/2 \rightarrow 0.5$ (1)
$x // y$	floor division operator: $1//2 \rightarrow 0$ (1)
$x \% y$	remainder of x / y
divmod (x, y)	the tuple ($x/y, x\%y$)
$x ** y$	x to the power y (the same as pow (x,y))

Notes:

- (1) $/$ is still a *floor* division ($1/2 == 0$) unless validated by a `from __future__ import division`.
- classes may override methods `__truediv__` and `__floordiv__` to redefine these operators.

Operations on all sequence types

TABLE 5: Operations on all sequence types

Operation	Result	Notes
x in s	True if an item of s is equal to x , else False	
x not in s	False if an item of s is equal to x , else True	
$s + t$	the concatenation of s and t	
$s * n, n*s$	n copies of s concatenated	
$s[i]$	i 'th item of s , origin 0	(1)
$s[i:j]$	slice of s from i (included) to j (excluded)	(1), (2)
len (s)	length of s	

TABLE 5: Operations on all sequence types

min (<i>s</i>)	smallest item of <i>s</i>	
max (<i>s</i>)	largest item of (<i>s</i>)	

Notes:

- (1) if *i* or *j* is negative, the index is relative to the end of the string; i.e., $\text{len}(s)+i$ or $\text{len}(s)+j$ is substituted. But note that -0 is still 0.
- (2) The slice of *s* from *i* to *j* is defined as the sequence of items with index *k* such that $i \leq k < j$.

If *i* or *j* is greater than $\text{len}(s)$, use $\text{len}(s)$. If *i* is omitted, use 0. If *i* is greater than or equal to *j*, the slice is empty.

Operations on mutable (=modifiable) sequences (lists)

TABLE 6: Operations on mutable sequences

Operation	Result	Notes
<i>s</i> [<i>i</i>] = <i>x</i>	item <i>i</i> of <i>s</i> is replaced by <i>x</i>	
<i>s</i> [<i>i</i> : <i>j</i>] = <i>t</i>	slice of <i>s</i> from <i>i</i> to <i>j</i> is replaced by <i>t</i>	
del <i>s</i> [<i>i</i> : <i>j</i>]	same as <i>s</i> [<i>i</i> : <i>j</i>] = []	
<i>s</i> . append (<i>x</i>)	same as <i>s</i> [$\text{len}(s) : \text{len}(s)$] = [<i>x</i>]	
<i>s</i> . extend (<i>x</i>)	same as <i>s</i> [$\text{len}(s) : \text{len}(s)$] = <i>x</i>	(5)
<i>s</i> . count (<i>x</i>)	return number of <i>i</i> 's for which <i>s</i> [<i>i</i>] == <i>x</i>	
<i>s</i> . index (<i>x</i>)	return smallest <i>i</i> such that <i>s</i> [<i>i</i>] == <i>x</i>	(1)
<i>s</i> . insert (<i>i</i> , <i>x</i>)	same as <i>s</i> [<i>i</i> : <i>i</i>] = [<i>x</i>] if $i \geq 0$	
<i>s</i> . remove (<i>x</i>)	same as del <i>s</i> [<i>s</i> . index (<i>x</i>)]	(1)
<i>s</i> . pop ([<i>i</i>])	same as <i>x</i> = <i>s</i> [<i>i</i>]; del <i>s</i> [<i>i</i>]; return <i>x</i>	(4)
<i>s</i> . reverse ()	reverse the items of <i>s</i> in place	(3)
<i>s</i> . sort ([<i>cmpFct</i>])	sort the items of <i>s</i> in place	(2), (3)

Notes:

- (1) Raises a `ValueError` exception when *x* is not found in *s* (i.e. out of range).
- (2) The `sort()` method takes an optional argument specifying a comparison function of 2 arguments (list items) which should return -1, 0, or 1 depending on whether the 1st argument is considered smaller than, equal to, or larger than the 2nd argument. Note that this slows the sorting process down considerably.

- (3) The `sort()` and `reverse()` methods **modify** the list **in place** for economy of space when sorting or reversing a large list. They don't return the sorted or reversed list to remind you of this side effect.
- (4) The `pop()` method is not supported by mutable sequence types other than lists. The optional argument `i` defaults to `-1`, so that by default the last item is removed and returned.
- (5) Raises a `TypeError` when `x` is not a list object.

Operations on mappings (dictionaries)

TABLE 7: Operations on mappings (dictionaries)

Operation	Result	Notes
<code>len(d)</code>	The number of items in <i>d</i>	
<code>d[k]</code>	The item of <i>d</i> with key <i>k</i>	(1)
<code>d[k] = x</code>	Set <code>d[k]</code> to <i>x</i>	
<code>del d[k]</code>	Remove <code>d[k]</code> from <i>d</i>	(1)
<code>d.clear()</code>	Remove all items from <i>d</i>	
<code>d.copy()</code>	A shallow copy of <i>d</i>	
<code>d.has_key(k)</code> <i>k in d</i>	True if <i>d</i> has key <i>k</i> , else False	
<code>d.items()</code>	A copy of <i>d</i> 's list of (key, item) pairs	(2)
<code>d.keys()</code>	A copy of <i>d</i> 's list of keys	(2)
<code>d1.update(d2)</code>	<code>for k, v in d2.items(): d1[k] = v</code>	(3)
<code>d.values()</code>	A copy of <i>d</i> 's list of values	(2)
<code>d.get(k, defaultval)</code>	The item of <i>d</i> with key <i>k</i>	(4)
<code>d.setdefault(k, defaultval)</code>	<code>d[k]</code> if <i>k</i> in <i>d</i> , else <i>defaultval</i> (also setting it)	(5)
<code>d.iteritems()</code>	Returns an <u>iterator</u> over (key, value) pairs .	
<code>d.iterkeys()</code>	Returns an <u>iterator</u> over the mapping's keys .	
<code>d.itervalues()</code>	Returns an <u>iterator</u> over the mapping's values .	
<code>d.popitem()</code>	Remove and return an arbitrary (key, value) pair from <i>d</i>	

Notes:

- `TypeError` is raised if key is not acceptable.
- (1) `KeyError` is raised if key *k* is not in the map.
- (2) Keys and values are listed in random order.
- (3) *d2* must be of the same type as *d1*.

- (4) Never raises an exception if *k* is not in the map, instead it returns *defaultval*. *defaultval* is optional, when not provided and *k* is not in the map, `None` is returned.
- (5) Never raises an exception if *k* is not in the map, instead it returns *defaultVal*, and adds *k* to map with value *defaultVal*. *defaultVal* is optional. When not provided and *k* is not in the map, `None` is returned and added to map.

Operations on strings

Note that these string methods largely (but not completely) supersede the functions available in the string module.

TABLE 8: Operations on strings

Operation	Result	Notes
<code>s.capitalize()</code>	Returns a copy of <i>s</i> with only its first character capitalized.	
<code>s.center(width)</code>	Returns a copy of <i>s</i> centered in a string of length <i>width</i> .	(1)
<code>s.count(sub[,start[,end]])</code>	Returns the number of occurrences of substring <i>sub</i> in string <i>s</i> .	(2)
<code>s.encode([encoding[,errors]])</code>	Returns an encoded version of <i>s</i> . Default encoding is the current default string encoding.	(3)
<code>s.endswith(suffix [,start[,end]])</code>	Returns <code>True</code> if <i>s</i> ends with the specified <i>suffix</i> , otherwise return <code>false</code> .	(2)
<code>s.expandtabs([tabsize])</code>	Returns a copy of <i>s</i> where all tab characters are expanded using spaces.	(4)
<code>s.find(sub[,start[,end]])</code>	Returns the lowest index in <i>s</i> where substring <i>sub</i> is found. Return <code>-1</code> if <i>sub</i> is not found.	(2)
<code>s.index(sub[,start[,end]])</code>	Like <code>find()</code> , but raises <code>ValueError</code> when the substring is not found.	(2)
<code>s.isalnum()</code>	Returns <code>True</code> if all characters in <i>s</i> are alphanumeric, <code>False</code> otherwise.	(5)
<code>s.isalpha()</code>	Returns <code>True</code> if all characters in <i>s</i> are alphabetic, <code>False</code> otherwise.	(5)
<code>s.isdigit()</code>	Returns <code>True</code> if all characters in <i>s</i> are digit characters, <code>False</code> otherwise.	(5)
<code>s.islower()</code>	Returns <code>True</code> if all characters in <i>s</i> are lowercase, <code>False</code> otherwise.	(6)
<code>s.isspace()</code>	Returns <code>True</code> if all characters in <i>s</i> are whitespace characters, <code>False</code> otherwise.	(5)

TABLE 8: Operations on strings

<code>s.istitle()</code>	Returns <code>True</code> if string <code>s</code> is a titlecased string, <code>False</code> otherwise.	(7)
<code>s.isupper()</code>	Returns <code>True</code> if all characters in <code>s</code> are uppercase, <code>False</code> otherwise.	(6)
<code>separator.join(seq)</code>	Returns a concatenation of the strings in the sequence <code>seq</code> , separated by string <code>separator</code> , e.g.: <code>" ".join(['A', 'B', 'C']) -> "A, B, C"</code>	
<code>s.ljust(width)</code>	Returns <code>s</code> left justified in a string of length <code>width</code> .	(1), (8)
<code>s.lower()</code>	Returns a copy of <code>s</code> converted to lowercase.	
<code>s.lstrip([chars])</code>	Returns a copy of <code>s</code> with leading <code>chars</code> (default: whitespaces) removed.	
<code>s.replace(old, new[, maxsplit])</code>	Returns a copy of <code>s</code> with all occurrences of substring <code>old</code> replaced by <code>new</code> .	(9)
<code>s.rfind(sub[, start[, end]])</code>	Returns the highest index in <code>s</code> where substring <code>sub</code> is found. Return <code>-1</code> if <code>sub</code> is not found.	(2)
<code>s.rindex(sub[, start[, end]])</code>	like <code>rfind()</code> , but raises <code>ValueError</code> when the substring is not found.	(2)
<code>s.rjust(width)</code>	Returns <code>s</code> right justified in a string of length <code>width</code> .	(1), (8)
<code>s.rstrip([chars])</code>	Returns a copy of <code>s</code> with trailing <code>chars</code> (default: whitespaces) removed.	
<code>s.split([separator[, maxsplit]])</code>	Returns a list of the words in <code>s</code> , using <code>separator</code> as the delimiter string.	(10)
<code>s.splitlines([keepends])</code>	Returns a list of the lines in <code>s</code> , breaking at line boundaries.	(11)
<code>s.startswith(prefix [, start[, end]])</code>	Returns <code>True</code> if <code>s</code> starts with the specified <code>prefix</code> , otherwise return <code>False</code> .	(2)
<code>s.strip([chars])</code>	Returns a copy of <code>s</code> with leading and trailing <code>chars</code> (default: whitespaces) removed.	
<code>s.swapcase()</code>	Returns a copy of <code>s</code> with uppercase characters converted to lowercase and vice versa.	
<code>s.title()</code>	Returns a titlecased copy of <code>s</code> , i.e. words start with uppercase characters, all remaining cased characters are lowercase.	

TABLE 8: Operations on strings

<code>s.translate(table [, deletechars])</code>	Returns a copy of <i>s</i> mapped through translation table <i>table</i> .	(12)
<code>s.upper()</code>	Returns a copy of <i>s</i> converted to uppercase.	
<code>s.zfill(width)</code>	Returns the numeric string left filled with zeros in a string of length <i>width</i> .	

Notes:

- (1) Padding is done using spaces.
- (2) If optional argument *start* is supplied, substring *s[start:]* is processed. If optional arguments *start* and *end* are supplied, substring *s[start:end]* is processed.
- (3) Optional argument *errors* may be given to set a different error handling scheme. The default for *errors* is **'strict'**, meaning that encoding errors raise a **ValueError**. Other possible values are **'ignore'** and **'replace'**.
- (4) If optional argument *tabsize* is not given, a tab size of 8 characters is assumed.
- (5) Returns `False` if string *s* does not contain at least one character.
- (6) Returns `False` if string *s* does not contain at least one cased character.
- (7) A titlecased string is a string in which uppercase characters may only follow uncased characters and lowercase characters only cased ones.
- (8) *s* is returned if *width* is less than `len(s)`.
- (9) If the optional argument *maxsplit* is given, only the first *maxsplit* occurrences are replaced.
- (10) If *sep* is not specified or `None`, any whitespace string is a separator. If *maxsplit* is given, at most *maxsplit* splits are done.
- (11) Line breaks are not included in the resulting list unless *keepends* is given and true.
- (12) *table* must be a string of length 256. All characters occurring in the optional argument *deletechars* are removed prior to translation.

String formatting with the % operator

```
formatString % args--> evaluates to a string
```

- *formatString* uses C printf format codes : %, c, s, i, d, u, o, x, X, e, E, f, g, G, r (details below).
- Width and precision may be a * to specify that an integer argument gives the actual width or precision.
- The flag characters -, +, blank, # and 0 are understood. (details below)
- %s will convert any type argument to string (uses *str()* function)
- *args* may be a single arg or a tuple of args

```
'%s has %03d quote types.' % ('Python', 2) == 'Python has 002 quote types.'
```

- Right-hand-side can also be a *mapping*:

```
a = '%(lang)s has %(c)03d quote types.' % {'c':2, 'lang':'Python'}
(vars() function very handy to use on right-hand-side.)
```

Format codes

TABLE 9: Python format codes

Conversion	Meaning
d	Signed integer decimal.
i	Signed integer decimal.
o	Unsigned octal.
u	Unsigned decimal.
x	Unsigned hexadecimal (lowercase).
X	Unsigned hexadecimal (uppercase).
e	Floating point exponential format (lowercase).
E	Floating point exponential format (uppercase).
f	Floating point decimal format.
F	Floating point decimal format.
g	Same as "e" if exponent is greater than -4 or less than precision, "f" otherwise.
G	Same as "E" if exponent is greater than -4 or less than precision, "F" otherwise.
c	Single character (accepts integer or single character string).
r	String (converts any python object using repr()).
s	String (converts any python object using str()).
%	No argument is converted, results in a "%" character in the result. (The complete specification is %%.)

TABLE 10: Conversion flag characters

Flag	Meaning
#	The value conversion will use the ``alternate form".
0	The conversion will be zero padded.
-	The converted value is left adjusted (overrides "-").
	(a space) A blank should be left before a positive number (or empty string) produced by a signed conversion.
+	A sign character ("+" or "-") will precede the conversion (overrides a "space" flag).

Assignment operators

TABLE 11: Python's assignment operators

Operator	Result	Notes
$a = b$	Basic assignment - assign object b to label a	(1)
$a += b$	Roughly equivalent to $a = a + b$	(2)
$a -= b$	Roughly equivalent to $a = a - b$	(2)
$a *= b$	Roughly equivalent to $a = a * b$	(2)
$a /= b$	Roughly equivalent to $a = a / b$	(2)
$a //= b$	Roughly equivalent to $a = a // b$	(2)
$a \% = b$	Roughly equivalent to $a = a \% b$	(2)
$a ** = b$	Roughly equivalent to $a = a ** b$	(2)
$a \& = b$	Roughly equivalent to $a = a \& b$	(2)
$a = b$	Roughly equivalent to $a = a b$	(2)
$a ^= b$	Roughly equivalent to $a = a ^ b$	(2)
$a >> = b$	Roughly equivalent to $a = a >> b$	(2)
$a << = b$	Roughly equivalent to $a = a << b$	(2)

Notes:

- (1) Can unpack tuples, lists, and strings:

```
first, second = a[0:2]
[f, s] = range(2)
c1,c2,c3='abc'
```
- Tip: $x, y = y, x$ swaps x and y .
- (2) Not exactly equivalent - a is evaluated only once. Also, where possible, operation performed in-place - a is modified rather than replaced.

Control flow statements

TABLE 12: Control flow statements

Statement	Result
if <i>condition</i> : <i>suite</i> [elif <i>condition</i> : <i>suite</i>]* [else : <i>suite</i>]	Usual if/else if/else statement
while <i>condition</i> : <i>suite</i> [else : <i>suite</i>]	Usual while statement. The <i>else suite</i> is executed after loop exits, unless the loop is exited with <code>break</code> .
for <i>element in sequence</i> : <i>suite</i> [else : <i>suite</i>]	Iterates over <i>sequence</i> , assigning each element to <i>element</i> . Use built-in <code>range</code> function to iterate a number of times. The <i>else suite</i> is executed at end unless loop exited with <code>break</code> .
break	Immediately exits <code>for</code> or <code>while</code> loop.
continue	Immediately does next iteration of <code>for</code> or <code>while</code> loop.
return [<i>result</i>]	Exits from function (or method) and returns <i>result</i> (use a tuple to return more than one value). If no result given, then returns <code>None</code> .

TABLE 13: Control-flow exception statements

Statement	Result
assert <i>expr</i> [, <i>message</i>]	<i>expr</i> is evaluated. if false, raises exception <code>AssertionError</code> with <i>message</i> . Inhibited if <code>__debug__</code> is 0.
try : <i>suite1</i> [except [<i>exception</i> [, <i>value</i>]: <i>suite2</i>]+ [else : <i>suite3</i>]	Statements in <i>suite1</i> are executed. If an exception occurs, looking <code>except</code> clauses for matching <i>exception</i> . If matches or bare <code>except</code> , execute <i>suite</i> of that clause. If no exception happens, <i>suite</i> in <code>else</code> clause is executed after <i>suite1</i> . If <i>exception</i> has a value, it is put in variable <i>value</i> . <i>exception</i> can also be tuple of exceptions, e.g. <code>except (KeyError, NameError), val: print val</code> .

TABLE 13: Control-flow exception statements

try: <i>suite1</i> finally: <i>suite2</i>	Statements in <i>suite1</i> are executed. If no exception, execute <i>suite2</i> (even if <i>suite1</i> is exited with a <code>return</code> , <code>break</code> or <code>continue</code> statement). If exception did occur, executes <i>suite2</i> and then immediately re-raises exception.
raise <i>exceptionInstance</i>	Raises an instance of a class derived from <code>Exception</code> (preferred form of <code>raise</code>).
raise <i>exceptionClass</i> [, <i>value</i> [, <i>traceback</i>]]	Raises <i>exception</i> of given class <i>exceptionClass</i> with optional value <i>value</i> . Arg <i>traceback</i> specifies a traceback object to use when printing the exception's backtrace.
raise	A <code>raise</code> statement without arguments re-raises the last exception raised in the current function.

- An exception is an *instance* of an *exception class* (before 2.0, it may also be a mere *string*).
- Exception classes must be derived from the predefined class: `Exception`, e.g.:
- ```
class TextException(Exception): pass
try:
 if bad:
 raise TextException()
except Exception:
 print 'Oops'
This will be printed because
TextException is a subclass of Exception
```
- When an error message is printed for an unhandled exception, the class name is printed, then a colon and a space, and finally the instance converted to a string using the built-in function `str()`.

All built-in exception classes derives from `StandardError`, itself derived from `Exception`.

## Name space statements

TABLE 14: Name space statements

| Statement                                                             | Result                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>import</b> <i>module1</i> [ <i>as name1</i> ] [, <i>module2</i> ]* | Imports modules. Members of module must be referred to by qualifying with [ <i>package.</i> ]module name, e.g.:<br><pre>import sys; print sys.argv import package1.subpackage.module package1.subpackage.module.foo() <i>module1</i> renamed as <i>name1</i>, if supplied.</pre> Imports names from module <i>module</i> in current namespace. |

TABLE 14: Name space statements

|                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <pre><b>from module import name1</b> [as <i>othername1</i>] [, <i>name2</i>]*</pre> | <pre>from sys import argv; print argv from package1 import module; module.foo() from package1.module import foo; foo()</pre> <p><i>name1</i> renamed as <i>othername1</i>, if supplied.<br/>Imports <b>all</b> names in <i>module</i>, except those starting with "<u>" Use <b>sparingly, beware of name clashes!</b></u></p> <pre>from sys import *; print argv from package.module import *; print x</pre> |
| <pre><b>from module import</b></pre>                                                | <p>Only legal at the top level of a module.</p> <p>If <i>module</i> defines an <code>__all__</code> attribute, only names listed in <code>__all__</code> will be imported.</p> <p>NB: "from package import *" only imports the symbols defined in the package's <code>__init__.py</code> file, not those in the package's modules !</p>                                                                      |

## Function Definition

```
def func_id ([param_list]):
 suite
```

Creates a function object and binds it to name *func\_id*.

```
param_list ::= [id [, id]*]
id ::= value | id = value | *id | **id
```

Args are passed by **value**. Thus only args representing a *mutable* object can be modified (are *inout* parameters). Use a **tuple** to return more than one value.

Example:

```
def test (p1, p2 = 1+1, *rest, **keywords):
```

Parameters with "=" have default value (*v* is evaluated when function defined).

If list has "*\*id*" then *id* is assigned a tuple of all remaining args passed to function (like C *vararg*) If list has "*\*\*id*" then *id* is assigned a dictionary of all extra arguments passed as keywords.

## Iterators

- An *iterator* enumerates elements of a *collection*. It is an object with a single method `next()` returning the next element or raising `StopIteration`.
- You get an iterator on *obj* via the new built-in function `iter(obj)`, which calls `obj.__class__.__iter__()`.
- A collection may be its **own** iterator by implementing both `__iter__()` and `next()`.

- Built-in collections (lists, tuples, strings, dict) implement `__iter__()`; dictionaries (maps) enumerate their keys; files enumerates their lines.
- Python uses implicitly iterators wherever it has to **loop** :  

```
for elt in collection:
 if elt in collection:
 when assigning tuples: x,y,z= collection
```

## Python Naming Conventions

Python naming conventions are shown in the following example:

```
vehiclesim.Power.on
```

Where:

- `vehiclesim` is the Sim name (all case sensitive)
- `Power` is the SimComponent
- `on` is the Property.

---

Below is a list of SimComponents that can be used within the SimAuthor toolset.

|                      |                            |                      |
|----------------------|----------------------------|----------------------|
| AnimatedObject, 80   | FileSystem, 100            | PushButtonPanel, 119 |
| AnimatedPanel, 81    | FloatingPanel, 101         | Sequence, 121        |
| AnimatedToggle, 82   | Folder, 102                | ShowCasePanel, 122   |
| BaseSimComponent, 84 | HotSpotPanel, 103          | SimFrame, 123        |
| Cable, 85            | Interactive Panel, 105     | SimMessageBox, 125   |
| CablePalette, 86     | IntermediateCameras, 106   | SimPanel, 127        |
| Camera, 87           | KnobPanel, 107             | SimWindow, 129       |
| ComponentView, 88    | Model3D, 108               | SwitchPanel, 130     |
| ComputerModel, 90    | MultimeterDisplay, 109     | TogglePanel, 131     |
| Connector, 92        | MultimeterPanel, 110       | Volume, 132          |
| Controller, 93       | MultipleViewContainer, 112 | WindowsDrive, 133    |
| CubicViewPanel, 94   | OnOffPanel, 113            | WorldObject, 134     |
| Device, 95           | PickBehavior, 114          | WorldPanel, 136      |
| DialogManager, 96    | PickPoint, 115             | ZoomablePanel, 137   |
| Disk, 97             | Port, 116                  | ZoomPanel, 139       |
| Drive, 98            | ProbeSpot, 117             | ZoomView, 139        |
| File, 99             |                            |                      |

**SimComponent Name:** AnimatedObject

|                              |                                                                                                                                                               |             |                                                                                                                                                                                |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Short Name</b>            | AnimatedObject                                                                                                                                                |             |                                                                                                                                                                                |
| <b>Long Name</b>             | com.realvue.sim.components.java3d.AnimatedObject                                                                                                              |             |                                                                                                                                                                                |
| <b>Type of SimComponent</b>  | Visual                                                                                                                                                        |             |                                                                                                                                                                                |
| <b>Description</b>           | Represents a 3D object that can be displayed with animation behaviors in a 3D world. It publishes one property, “on”, that will start and stop the animation. |             |                                                                                                                                                                                |
| <b>Usage</b>                 | Typically used to represent a 3D object                                                                                                                       |             |                                                                                                                                                                                |
| <b>Simulation Properties</b> | <b>Property Name</b>                                                                                                                                          | <b>Type</b> | <b>Description</b>                                                                                                                                                             |
|                              | getInterpolator                                                                                                                                               |             | Gets the interpolator responsible for the animation of this object                                                                                                             |
|                              | getLeafGroup                                                                                                                                                  |             | Gets the group to which other WorldObjects should be attached                                                                                                                  |
|                              | getOnProperty                                                                                                                                                 |             | Returns the property that represents the on status of this object                                                                                                              |
|                              | setLive                                                                                                                                                       |             | Adds the objects for this object to the 3D world and adds all children as children in the 3D world graph                                                                       |
|                              | setRootGroup                                                                                                                                                  |             | Sets the root group which will be used to add this object to other objects and finds the transform group used as the target for the interpolator and sets it as the leaf group |
|                              | turnOff                                                                                                                                                       |             | Called when this animated object should be turned off                                                                                                                          |
|                              | turnOn                                                                                                                                                        |             | Called when this animated object should be turned on                                                                                                                           |
| <b>Inherent Properties</b>   | <b>Property Name</b>                                                                                                                                          | <b>Type</b> | <b>Description</b>                                                                                                                                                             |
|                              |                                                                                                                                                               |             |                                                                                                                                                                                |
|                              |                                                                                                                                                               |             |                                                                                                                                                                                |
| <b>Java Class Name</b>       | AnimatedObject                                                                                                                                                |             |                                                                                                                                                                                |
| <b>Java Class Path</b>       | com.realvue.sim.components.java3d.AnimatedObject                                                                                                              |             |                                                                                                                                                                                |

|                                                                                     |             |  |  |  |
|-------------------------------------------------------------------------------------|-------------|--|--|--|
| <b>Java Methods Exposed</b>                                                         |             |  |  |  |
| <b>Attributes</b><br><b>Type</b><br><b>Possible Values</b><br><b>Default Values</b> |             |  |  |  |
| <b>Extends to</b>                                                                   | WorldObject |  |  |  |
| <b>Special Considerations</b>                                                       |             |  |  |  |

### SimComponent Name: AnimatedPanel

|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |             |                                                                                                                                                                                   |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Short Name</b>            | AnimatedPanel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |                                                                                                                                                                                   |
| <b>Long Name</b>             | com.realvue.sim.components.swing2d.AnimatedPanel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |             |                                                                                                                                                                                   |
| <b>Type of SimComponent</b>  | Generic Visual                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                                                                                                                                                                                   |
| <b>Description</b>           | <p>A component which provides a simple 2D animation function which runs through a series of supplied images. The component uses a sequence object to manage the actual running and timing issues in the animation. A SequencePanel is a SimPanel which has three potential states and n images. The three potential states are STOP, GO, and LOOP. In the STOP state, it shows the 0 index image. In the GO state, it shows images 1-n at specified intervals (NOTE: you can't yet specify the interval but will be able to), and then transitions back to the STOP state. In the LOOP state, it shows images 1-n repeatedly until the state is set to something else.</p> |             |                                                                                                                                                                                   |
| <b>Usage</b>                 | Typically used as a generic provider of a looping set of images                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |             |                                                                                                                                                                                   |
| <b>Simulation Properties</b> | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>Type</b> | <b>Description</b>                                                                                                                                                                |
|                              | getIncrement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |             | Gets "increment" attribute processDataChange. This method is called when the data is changing in a SimComponent through one of the Property objects contained in the SimComponent |
|                              | processModelChange                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |             | This method is called when the model is changing in a SimComponent, by either adding/removing a logical child or adding/removing a Property                                       |

|                                  |                                                                                                      |             |                                                                                                                                        |
|----------------------------------|------------------------------------------------------------------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------|
|                                  | setEndIndex                                                                                          |             | Sets “endIndex” attribute                                                                                                              |
|                                  | setIncrement                                                                                         |             | Sets “increment” attribute                                                                                                             |
|                                  | simulationRunning                                                                                    |             | During simulationRunning, the SimPanel object resets its layer/position within its parent, if those values were set via XML attributes |
| <b>Inherent Properties</b>       | <b>Property Name</b>                                                                                 | <b>Type</b> | <b>Description</b>                                                                                                                     |
|                                  |                                                                                                      |             |                                                                                                                                        |
|                                  |                                                                                                      |             |                                                                                                                                        |
| <b>Java Class Name</b>           | AnimatedPanel                                                                                        |             |                                                                                                                                        |
| <b>Java Class Path</b>           | com.realvue.sim.components.swing2d.AnimatedPanel                                                     |             |                                                                                                                                        |
| <b>Java Methods Exposed</b>      |                                                                                                      |             |                                                                                                                                        |
| <b>Attributes</b>                | <b>Attribute Name</b>                                                                                | <b>Type</b> | <b>Description</b>                                                                                                                     |
| <b>Additional XML Attributes</b> | increment                                                                                            |             | Time between images, in milliseconds                                                                                                   |
| <b>Extends to</b>                | SimPanel                                                                                             |             |                                                                                                                                        |
| <b>Special Considerations</b>    | This component's animation functions should be managed through manipulating its associated sequence. |             |                                                                                                                                        |

### SimComponent Name: AnimatedToggle

|                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Short Name</b>           | AnimatedToggle                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Long Name</b>            | com.realvue.sim.components.java3d.AnimatedToggle                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Type of SimComponent</b> | Visual                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Description</b>          | Represents a 3D object that can be displayed with animation behaviors in a 3D world. When the “on” property is set to 1, the animation begins. When the on property is set to 0, the animation runs in reverse. When the “toggle” property is changed to anything, the “on” property is changed to 1. If it is 0 and 0 if it is anything else. Typically, the object with a pick listener added to it would be this same object and manipulate its behavior but not necessarily. |
| <b>Usage</b>                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| <b>Simulation Properties</b>  | <b>Property Name</b>                             | <b>Type</b> | <b>Description</b>                                                                                                           |
|-------------------------------|--------------------------------------------------|-------------|------------------------------------------------------------------------------------------------------------------------------|
|                               | animate                                          |             | Animates for on cycle up or down depending on the value of Alpha Constant Alpha.DECREASING_ENABLE or Alpha.INCREASING_ENABLE |
|                               | setToggleOffSound                                |             | Sets the sound to be played when this object is toggled to off                                                               |
|                               | setToggleOnSound                                 |             | Sets the sound to be played when this object is toggled to on                                                                |
|                               | turnOff                                          |             | Called when this animated object should be turned off                                                                        |
|                               | turnOn                                           |             | Called when this animated object should be turned on                                                                         |
| <b>Inherent Properties</b>    | <b>Property Name</b>                             | <b>Type</b> | <b>Description</b>                                                                                                           |
|                               |                                                  |             |                                                                                                                              |
| <b>Java Class Name</b>        | AnimatedToggle                                   |             |                                                                                                                              |
| <b>Java Class Path</b>        | com.realvue.sim.components.java3d.AnimatedToggle |             |                                                                                                                              |
| <b>Java Methods Exposed</b>   |                                                  |             |                                                                                                                              |
| <b>Attributes</b>             |                                                  |             |                                                                                                                              |
| <b>Type</b>                   |                                                  |             |                                                                                                                              |
| <b>Possible Values</b>        |                                                  |             |                                                                                                                              |
| <b>Default Values</b>         |                                                  |             |                                                                                                                              |
| <b>Extends to</b>             | AnimatedObject                                   |             |                                                                                                                              |
| <b>Special Considerations</b> |                                                  |             |                                                                                                                              |

### **SimComponent Name:** BaseSimComponent

| <b>Short Name</b>           | BaseSimComponent                       |
|-----------------------------|----------------------------------------|
| <b>Long Name</b>            | com.realvue.sim.model.BaseSimComponent |
| <b>Type of SimComponent</b> |                                        |

|                                                                                     |                                                                                                                                                                                                                               |             |                    |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------|
| <b>Description</b>                                                                  | The simplest form of a SimComponent, which implements the SimComponent interface and delegates most operations to a ModelNode. In its default form, this class does nothing other than contain other elements and properties. |             |                    |
| <b>Usage</b>                                                                        | Typically used as a container for other model elements (SimComponents) and model properties.                                                                                                                                  |             |                    |
| <b>Simulation Properties</b>                                                        | <b>Property Name</b>                                                                                                                                                                                                          | <b>Type</b> | <b>Description</b> |
|                                                                                     |                                                                                                                                                                                                                               |             |                    |
|                                                                                     |                                                                                                                                                                                                                               |             |                    |
| <b>Inherent Properties</b>                                                          | <b>Property Name</b>                                                                                                                                                                                                          | <b>Type</b> | <b>Description</b> |
|                                                                                     |                                                                                                                                                                                                                               |             |                    |
|                                                                                     |                                                                                                                                                                                                                               |             |                    |
| <b>Java Class Name</b>                                                              | BaseSimComponent                                                                                                                                                                                                              |             |                    |
| <b>Java Class Path</b>                                                              | com.realvue.sim.model.BaseSimComponent                                                                                                                                                                                        |             |                    |
| <b>Java Methods Exposed</b>                                                         |                                                                                                                                                                                                                               |             |                    |
| <b>Attributes</b><br><b>Type</b><br><b>Possible Values</b><br><b>Default Values</b> |                                                                                                                                                                                                                               |             |                    |
| <b>Extends to</b>                                                                   | Object                                                                                                                                                                                                                        |             |                    |
| <b>Special Considerations</b>                                                       |                                                                                                                                                                                                                               |             |                    |

**SimComponent Name: Cable**

|                             |                                                  |
|-----------------------------|--------------------------------------------------|
| <b>Short Name</b>           | Cable                                            |
| <b>Long Name</b>            | com.realvue.sim.components.swing2d.cabling.Cable |
| <b>Type of SimComponent</b> | Visual                                           |

|                                                                |                                                                                                                                                                                                                                                                                    |             |                                                                                            |  |
|----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------------------------------------------|--|
| <b>Description</b>                                             | Connects Port objects together; they are managed by the CablePalette. Cables contain two Connector objects. These connectors have a type and a reference to what they are connected to. A cable can only connect to a port if the port type and one of the connector type's match. |             |                                                                                            |  |
| <b>Usage</b>                                                   | Typically used like a wire                                                                                                                                                                                                                                                         |             |                                                                                            |  |
| <b>Simulation Properties</b>                                   | <b>Property Name</b>                                                                                                                                                                                                                                                               | <b>Type</b> | <b>Description</b>                                                                         |  |
|                                                                | addComponentElement                                                                                                                                                                                                                                                                |             | Used in XML loading, to initialize the connector types                                     |  |
|                                                                | getDisplayText                                                                                                                                                                                                                                                                     |             | Gets the text that is displayed over this Cable component                                  |  |
|                                                                | handleImageIndexPropertyChange                                                                                                                                                                                                                                                     |             | Fixing a problem; Cables are contained in a JList which is contained inside a CablePalette |  |
|                                                                | setDisplayText                                                                                                                                                                                                                                                                     |             | Sets the text that is displayed over this Cable component                                  |  |
| <b>Inherent/Model Properties</b>                               | <b>Property Name</b>                                                                                                                                                                                                                                                               | <b>Type</b> | <b>Description</b>                                                                         |  |
|                                                                |                                                                                                                                                                                                                                                                                    |             |                                                                                            |  |
|                                                                |                                                                                                                                                                                                                                                                                    |             |                                                                                            |  |
| <b>Java Class Name</b>                                         | Cable                                                                                                                                                                                                                                                                              |             |                                                                                            |  |
| <b>Java Class Path</b>                                         | com.realvue.sim.components.swing2d.cabling.Cable                                                                                                                                                                                                                                   |             |                                                                                            |  |
| <b>Java Methods Exposed</b>                                    |                                                                                                                                                                                                                                                                                    |             |                                                                                            |  |
| <b>Attributes</b><br>Type<br>Possible Values<br>Default Values |                                                                                                                                                                                                                                                                                    |             |                                                                                            |  |
| <b>Extends to</b>                                              | SimPanel                                                                                                                                                                                                                                                                           |             |                                                                                            |  |
| <b>Special Considerations</b>                                  |                                                                                                                                                                                                                                                                                    |             |                                                                                            |  |

### SimComponent Name: CablePalette

|                   |                                                         |
|-------------------|---------------------------------------------------------|
| <b>Short Name</b> | CablePalette                                            |
| <b>Long Name</b>  | com.realvue.sim.components.swing2d.cabling.CablePalette |

|                                  |                                                                                                                                                                                                                                                                                                                                                                                                      |             |                                                                                                                            |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------|
| <b>Type of SimComponent</b>      | Visual                                                                                                                                                                                                                                                                                                                                                                                               |             |                                                                                                                            |
| <b>Description</b>               | <p>A floating window that contains two areas; one with Cable types and another with partially connected Cables. Cables are attached to Port and used to connect them. You can only connect a Cable to a Port if the Connector types match.</p> <p>For example, a Port may have type “rj-45”. A Connector may have type “rj-45”. This indicates that the Port and the Connector can be connected.</p> |             |                                                                                                                            |
| <b>Usage</b>                     | Typically used as a floating object that contains all the cabling and cables (builds on FloatingPanel)                                                                                                                                                                                                                                                                                               |             |                                                                                                                            |
| <b>Simulation Properties</b>     | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                 | <b>Type</b> | <b>Description</b>                                                                                                         |
|                                  | connect                                                                                                                                                                                                                                                                                                                                                                                              |             | Starts the connection process for this port                                                                                |
|                                  | disconnect                                                                                                                                                                                                                                                                                                                                                                                           |             | Starts the disconnect process for this port                                                                                |
|                                  | handleCableListHelper                                                                                                                                                                                                                                                                                                                                                                                |             | Turns on the selected panel in thisList and turns off all the others in the otherList                                      |
|                                  | handleNewCableListSelection                                                                                                                                                                                                                                                                                                                                                                          |             | Selects a cable on the loose cable list                                                                                    |
|                                  | italizeSimComponents                                                                                                                                                                                                                                                                                                                                                                                 |             | Initializes the Property and SimComponent simulation objects this palette contains                                         |
|                                  | initializeSimComponents                                                                                                                                                                                                                                                                                                                                                                              |             | Initializes the Swing components in this palette                                                                           |
|                                  | setCableDisplayText                                                                                                                                                                                                                                                                                                                                                                                  |             | When a Port connects to a new cable, a partial cable is created, and a text label is set for that cable, using this method |
| <b>Inherent/Model Properties</b> | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                 | <b>Type</b> | <b>Description</b>                                                                                                         |
|                                  |                                                                                                                                                                                                                                                                                                                                                                                                      |             |                                                                                                                            |
|                                  |                                                                                                                                                                                                                                                                                                                                                                                                      |             |                                                                                                                            |
| <b>Java Class Name</b>           | CablePalette                                                                                                                                                                                                                                                                                                                                                                                         |             |                                                                                                                            |
| <b>Java Class Path</b>           | com.realvue.sim.components.swing2d.cabling.CablePalette                                                                                                                                                                                                                                                                                                                                              |             |                                                                                                                            |
| <b>Java Methods Exposed</b>      |                                                                                                                                                                                                                                                                                                                                                                                                      |             |                                                                                                                            |

|                                                                |               |  |  |  |
|----------------------------------------------------------------|---------------|--|--|--|
| <b>Attributes</b><br>Type<br>Possible Values<br>Default Values |               |  |  |  |
| <b>Extends to</b>                                              | FloatingPanel |  |  |  |
| <b>Special Considerations</b>                                  |               |  |  |  |

## SimComponent Name: Camera

|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |                                                                                                          |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------------------------------------------------------------------------------------------------------|
| <b>Short Name</b>                | Camera                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                    |                                                                                                          |
| <b>Long Name</b>                 | com.realvue.sim.components.java3d.Camera                                                                                                                                                                                                                                                                                                                                                                                                                 |                    |                                                                                                          |
| <b>Type of SimComponent</b>      | Visual                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                    |                                                                                                          |
| <b>Description</b>               | <p>Represents a camera that can be used to view objects in a 3D world. It's considered good form to use at least one camera as a default view for a 3D world since the position and orientation of the 3D objects built by an artist is unknown to the system.</p> <p>Cameras are capable of informing an interpolator object which intermediate cameras' transforms should be in its list of interpolator transforms, on the way to another camera.</p> |                    |                                                                                                          |
| <b>Usage</b>                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |                                                                                                          |
| <b>Simulation Properties</b>     | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>Type</b>        | <b>Description</b>                                                                                       |
|                                  | addComponentElement                                                                                                                                                                                                                                                                                                                                                                                                                                      |                    | Sets the cameras used as way-points when this triggers an interpolator to begin moving to another camera |
|                                  | setDefault                                                                                                                                                                                                                                                                                                                                                                                                                                               | boolean is default | Designates this camera as a default camera                                                               |
| <b>Inherent/Model Properties</b> | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>Type</b>        | <b>Description</b>                                                                                       |
|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |                                                                                                          |
|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |                                                                                                          |
|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |                                                                                                          |
| <b>Java Class Name</b>           | Camera                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                    |                                                                                                          |
| <b>Java Class Path</b>           | com.realvue.sim.components.java3d.Camera                                                                                                                                                                                                                                                                                                                                                                                                                 |                    |                                                                                                          |

|                                                                |             |  |  |  |
|----------------------------------------------------------------|-------------|--|--|--|
| <b>Java Methods Exposed</b>                                    |             |  |  |  |
| <b>Attributes</b><br>Type<br>Possible Values<br>Default Values |             |  |  |  |
| <b>Extends to</b>                                              | WorldObject |  |  |  |
| <b>Special Considerations</b>                                  |             |  |  |  |

### SimComponent Name: ComponentView

|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |             |                                                                                             |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------------------------------------------------------------------------------|
| <b>Short Name</b>            | ComponentView                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                                                                                             |
| <b>Long Name</b>             | com.realvue.sim.components.swing2d.ComponentView                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             |                                                                                             |
| <b>Type of SimComponent</b>  | Visual                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |                                                                                             |
| <b>Description</b>           | Represents one of possibly many views of a parent container (MultipleViewContainer (or its subclasses such as CubicViewPanel)), with hotspots which can tell the parent container to switch to another view. One or more regions of the component area should be set up as hotspots to allow navigation to other ComponentViews. Components of this class should only be added to MultipleViewContainer components or derived components. Note that the viewIndex of the component MUST BE SET by calling the setViewIndex method (or by specifying the viewIndex attribute in XML) before the component is added to its container, or a RuntimeException will be thrown. |             |                                                                                             |
| <b>Usage</b>                 | Typically used as one “side” or “view” of a MultipleViewContainer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |             |                                                                                             |
| <b>Simulation Properties</b> | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>Type</b> | <b>Description</b>                                                                          |
|                              | getViewIndex                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             | Returns the view index for this component, which must be unique within the parent container |

|                                                 |                                                                                                             |             |                                                                                                                                                                                            |
|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                 | handleStatusPropertyChange                                                                                  |             | This override prevents the automatic mapping of changes in the “status” property to changes in the “image index” property which would otherwise occur due to the superclass implementation |
|                                                 | handleViewPropertyChange                                                                                    |             | Handle changes in the view property by mapping change to owner, which will display a different view if necessary                                                                           |
|                                                 | setOwner                                                                                                    |             | Set the owner of this componentView (which is the MultipleViewContainer which logically contains it)                                                                                       |
|                                                 | setViewIndex                                                                                                |             | Set the view index for this component, which must be unique within the parent container                                                                                                    |
| <b>Inherent/Model Properties</b>                | <b>Property Name</b>                                                                                        | <b>Type</b> | <b>Description</b>                                                                                                                                                                         |
|                                                 |                                                                                                             |             |                                                                                                                                                                                            |
|                                                 |                                                                                                             |             |                                                                                                                                                                                            |
| <b>Java Class Name</b>                          | ComponentView                                                                                               |             |                                                                                                                                                                                            |
| <b>Java Class Path</b>                          | com.realvue.sim.components.swing2d.ComponentView                                                            |             |                                                                                                                                                                                            |
| <b>Java Methods Exposed</b>                     |                                                                                                             |             |                                                                                                                                                                                            |
| <b>Attributes</b>                               |                                                                                                             |             |                                                                                                                                                                                            |
| <b>Inherits Properties and Attributes from:</b> | HotSpotPanel                                                                                                |             |                                                                                                                                                                                            |
| <b>Extends to</b>                               | HotSpotPanel                                                                                                |             |                                                                                                                                                                                            |
| <b>Special Considerations</b>                   | ComponentViews should not be added to anything other than a MultipleViewContainer or one of its subclasses. |             |                                                                                                                                                                                            |

**SimComponent Name:** ComputerModel

|                              |                                                                                                                                                                                                                                                                                                                           |                                                                   |                                                                                                                                                                                                                  |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Short Name</b>            | ComputerModel                                                                                                                                                                                                                                                                                                             |                                                                   |                                                                                                                                                                                                                  |
| <b>Long Name</b>             | com.realvue.sim.components.computer.ComputerModel                                                                                                                                                                                                                                                                         |                                                                   |                                                                                                                                                                                                                  |
| <b>Type of SimComponent</b>  | Visual                                                                                                                                                                                                                                                                                                                    |                                                                   |                                                                                                                                                                                                                  |
| <b>Description</b>           | A container for various model components and properties which describe the current state of a computer system. Certain elements of the model can be preinitialized to useful defaults by specifying the computerType in the XML attribute when the component is initialized or by calling setComputerType from java code. |                                                                   |                                                                                                                                                                                                                  |
| <b>Usage</b>                 |                                                                                                                                                                                                                                                                                                                           |                                                                   |                                                                                                                                                                                                                  |
| <b>Simulation Properties</b> | <b>Property Name</b>                                                                                                                                                                                                                                                                                                      | <b>Type</b>                                                       | <b>Description</b>                                                                                                                                                                                               |
|                              | addCustomElement                                                                                                                                                                                                                                                                                                          |                                                                   | Makes a call to addFileSystem. Adds the logical children of the provided component to the volume container of the model. Adds the logical children of the provided component to the physical branch of the model |
|                              | addFileSystem                                                                                                                                                                                                                                                                                                             |                                                                   | Adds a new filesystem to the filesystem container (logical model)                                                                                                                                                |
|                              | addFolder                                                                                                                                                                                                                                                                                                                 |                                                                   | Adds a new folder to an existing filesystem which has already been initialized and added to this computer model                                                                                                  |
|                              | addVolume                                                                                                                                                                                                                                                                                                                 |                                                                   | Helper method to add a volume (for XML initialization - this lets you add one volume to a partially filled computer model which was set up by using one of the computerType values)                              |
|                              | getAllControllers                                                                                                                                                                                                                                                                                                         |                                                                   | Convenience method to return all objects of type Controller contained directly in the physical branch of the computer model                                                                                      |
| getComputerType              |                                                                                                                                                                                                                                                                                                                           | Gets the type of computer currently being simulated in this model |                                                                                                                                                                                                                  |

|                                                                |                                                   |             |                                                                                      |
|----------------------------------------------------------------|---------------------------------------------------|-------------|--------------------------------------------------------------------------------------|
|                                                                | getFileSystems                                    |             | Helper method to get the complete set of filesystems defined for this computer model |
|                                                                | getHardDisk                                       |             | Convenience method to return physical disk specified by parameter i                  |
|                                                                | getPhysicalBranch                                 |             | Gets the physical branch of the computer model                                       |
|                                                                | getWindowsMyComputerFolder                        |             |                                                                                      |
| <b>Inherent/Model Properties</b>                               | <b>Property Name</b>                              | <b>Type</b> | <b>Description</b>                                                                   |
|                                                                |                                                   |             |                                                                                      |
|                                                                |                                                   |             |                                                                                      |
| <b>Java Class Name</b>                                         | ComputerModel                                     |             |                                                                                      |
| <b>Java Class Path</b>                                         | com.realvue.sim.components.computer.ComputerModel |             |                                                                                      |
| <b>Java Methods Exposed</b>                                    |                                                   |             |                                                                                      |
| <b>Attributes</b><br>Type<br>Possible Values<br>Default Values |                                                   |             |                                                                                      |
| <b>Extends to</b>                                              | BaseSimComponent                                  |             |                                                                                      |
| <b>Special Considerations</b>                                  |                                                   |             |                                                                                      |

## SimComponent Name: Connector

|                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                         |
|----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------------------|
| <b>Short Name</b>                                              | Connector                                                                                                                                                                                                                                                                                                                                                                                                           |             |                         |
| <b>Long Name</b>                                               | com.realvue.sim.components.swing2d.cabling.Connector                                                                                                                                                                                                                                                                                                                                                                |             |                         |
| <b>Type of SimComponent</b>                                    | Visual                                                                                                                                                                                                                                                                                                                                                                                                              |             |                         |
| <b>Description</b>                                             | <p>Contained by a Cable and represents a connection to a Port. Connectors have a TYPE_PROPERTY_NAME that defines them, and they have a CONNECTED_TO_PROPERTY_NAME reference to the Port they are connected to.</p> <p>For example, a rj-45 cable, will have two connectors; these connectors will have "type=rj-45". If a port has "type=rj-45", then this connector (and this cable) can connect to that Port.</p> |             |                         |
| <b>Usage</b>                                                   | Typically used as the end of a wire                                                                                                                                                                                                                                                                                                                                                                                 |             |                         |
| <b>Simulation Properties</b>                                   | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                                | <b>Type</b> | <b>Description</b>      |
|                                                                | getType                                                                                                                                                                                                                                                                                                                                                                                                             |             | Gets the connector type |
|                                                                | setType                                                                                                                                                                                                                                                                                                                                                                                                             |             | Sets the connector type |
| <b>Inherent/Model Properties</b>                               | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                                | <b>Type</b> | <b>Description</b>      |
|                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                         |
|                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                         |
|                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                         |
| <b>Java Class Name</b>                                         | Connector                                                                                                                                                                                                                                                                                                                                                                                                           |             |                         |
| <b>Java Class Path</b>                                         | com.realvue.sim.components.swing2d.cabling.Connector                                                                                                                                                                                                                                                                                                                                                                |             |                         |
| <b>Java Methods Exposed</b>                                    |                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                         |
| <b>Attributes</b><br>Type<br>Possible Values<br>Default Values |                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                         |
| <b>Extends to</b>                                              | BaseSimComponent                                                                                                                                                                                                                                                                                                                                                                                                    |             |                         |
| <b>Special Considerations</b>                                  |                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                         |

**SimComponent Name:** Controller

|                                                                |                                                                                                                                              |             |                                                                                                                                             |
|----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Short Name</b>                                              | Controller                                                                                                                                   |             |                                                                                                                                             |
| <b>Long Name</b>                                               | com.realvue.sim.components.computer.Controller                                                                                               |             |                                                                                                                                             |
| <b>Type of SimComponent</b>                                    | Visual                                                                                                                                       |             |                                                                                                                                             |
| <b>Description</b>                                             | A model element that simulates a device which contains/controls other devices. Examples include a disk controller or a bus controller (pci). |             |                                                                                                                                             |
| <b>Usage</b>                                                   |                                                                                                                                              |             |                                                                                                                                             |
| <b>Simulation Properties</b>                                   | <b>Property Name</b>                                                                                                                         | <b>Type</b> | <b>Description</b>                                                                                                                          |
|                                                                | getALLDisks                                                                                                                                  |             | Convenience method to return all objects of type Disk which are directly contained within this component (i.e. are direct logicalChildren). |
| <b>Inherent Properties</b>                                     | <b>Property Name</b>                                                                                                                         | <b>Type</b> | <b>Description</b>                                                                                                                          |
|                                                                |                                                                                                                                              |             |                                                                                                                                             |
|                                                                |                                                                                                                                              |             |                                                                                                                                             |
| <b>Java Class Name</b>                                         | Controller                                                                                                                                   |             |                                                                                                                                             |
| <b>Java Class Path</b>                                         | com.realvue.sim.components.computer.Controller                                                                                               |             |                                                                                                                                             |
| <b>Java Methods Exposed</b>                                    |                                                                                                                                              |             |                                                                                                                                             |
| <b>Attributes</b><br>Type<br>Possible Values<br>Default Values |                                                                                                                                              |             |                                                                                                                                             |
| <b>Extends to</b>                                              | Device                                                                                                                                       |             |                                                                                                                                             |
| <b>Special Considerations</b>                                  |                                                                                                                                              |             |                                                                                                                                             |

## SimComponent Name: CubicViewPanel

|                              |                                                                                                                                                                                                                                                                                                                    |             |                    |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------|
| <b>Short Name</b>            | CubicViewPanel                                                                                                                                                                                                                                                                                                     |             |                    |
| <b>Long Name</b>             | com.realvue.sim.components.swing2d.CubicViewPanel                                                                                                                                                                                                                                                                  |             |                    |
| <b>Type of SimComponent</b>  | Visual                                                                                                                                                                                                                                                                                                             |             |                    |
| <b>Description</b>           | A simple 6-sided cube implementation of a MultipleViewContainer. This implementation assumes that up to 6 views are present. Each side, simulated by a ComponentView, should be able to navigate to the contiguous sides by clicking in the appropriate region. Allows the setup of animations between views, etc. |             |                    |
| <b>Usage</b>                 | Typically used as a box with six sides (uses ComponentView for each side)                                                                                                                                                                                                                                          |             |                    |
| <b>Simulation Properties</b> | <b>Property Name</b>                                                                                                                                                                                                                                                                                               | <b>Type</b> | <b>Description</b> |
|                              | getBottomTurnCursor                                                                                                                                                                                                                                                                                                |             |                    |
|                              | getDefaultBottomTurnCursor                                                                                                                                                                                                                                                                                         |             |                    |
|                              | getDefaultLeftTurnCursor                                                                                                                                                                                                                                                                                           |             |                    |
|                              | getDefaultRightTurnCursor                                                                                                                                                                                                                                                                                          |             |                    |
|                              | getLeftTurnCursor                                                                                                                                                                                                                                                                                                  |             |                    |
|                              | getRightTurnCursor                                                                                                                                                                                                                                                                                                 |             |                    |
|                              | getTopTurnCursor                                                                                                                                                                                                                                                                                                   |             |                    |
|                              | handleViewPropertyChange                                                                                                                                                                                                                                                                                           |             |                    |
|                              | setBottomTurnCursor                                                                                                                                                                                                                                                                                                |             |                    |
|                              | setDefaultBottomTurnCursor                                                                                                                                                                                                                                                                                         |             |                    |
|                              | setDefaultLeftTurnCursor                                                                                                                                                                                                                                                                                           |             |                    |
|                              | setDefaultRightTurnCursor                                                                                                                                                                                                                                                                                          |             |                    |
|                              | setLeftTurnCursor                                                                                                                                                                                                                                                                                                  |             |                    |
|                              | setRightTurnCursor                                                                                                                                                                                                                                                                                                 |             |                    |
| setTopTurnCursor             |                                                                                                                                                                                                                                                                                                                    |             |                    |

|                                                 |                                                                                                                                                                                          |             |                                                                                                                                                           |
|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                 | simulationRunning                                                                                                                                                                        |             | This override sets default cursors for all of the possible view-to-view navigations in the subcomponents which have not already registered custom cursors |
| <b>Inherent/Model Properties</b>                | <b>Property Name</b>                                                                                                                                                                     | <b>Type</b> | <b>Description</b>                                                                                                                                        |
|                                                 | currentView                                                                                                                                                                              | int         | Current component view being displayed (current side)                                                                                                     |
| <b>Java Class Name</b>                          | CubicViewPanel                                                                                                                                                                           |             |                                                                                                                                                           |
| <b>Java Class Path</b>                          | com.realvue.sim.components.swing2d.CubicViewPanel                                                                                                                                        |             |                                                                                                                                                           |
| <b>Java Methods Exposed</b>                     |                                                                                                                                                                                          |             |                                                                                                                                                           |
| <b>Attributes</b>                               |                                                                                                                                                                                          |             |                                                                                                                                                           |
| <b>Inherits Properties and Attributes from:</b> | SimPanel                                                                                                                                                                                 |             |                                                                                                                                                           |
| <b>Extends to</b>                               | MultipleViewContainer                                                                                                                                                                    |             |                                                                                                                                                           |
| <b>Special Considerations</b>                   | Inherits directly from MultipleViewContainer which is abstract and not initializeable from XML. The model property currentView is actually contained in the MultipleViewContainer class. |             |                                                                                                                                                           |

### SimComponent Name: Device

|                              |                                                                                                                                                                                                                                        |             |                                                                                                    |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------------------------------------------------------------------------------|
| <b>Short Name</b>            | Device                                                                                                                                                                                                                                 |             |                                                                                                    |
| <b>Long Name</b>             | com.realvue.sim.components.computer.Device                                                                                                                                                                                             |             |                                                                                                    |
| <b>Type of SimComponent</b>  | Visual                                                                                                                                                                                                                                 |             |                                                                                                    |
| <b>Description</b>           | A Part which can be interacted with by software (i.e. it would have a driver of some sort in the real computer). This includes devices such as controllers, cards, disks, etc. It excludes components such as power supplies and fans. |             |                                                                                                    |
| <b>Usage</b>                 |                                                                                                                                                                                                                                        |             |                                                                                                    |
| <b>Simulation Properties</b> | <b>Property Name</b>                                                                                                                                                                                                                   | <b>Type</b> | <b>Description</b>                                                                                 |
|                              | addLogicalChild                                                                                                                                                                                                                        |             | This override ensures that only components of type Part can be added to a component of type Device |

| Inherent Properties                                            | Property Name                              | Type | Description |  |
|----------------------------------------------------------------|--------------------------------------------|------|-------------|--|
|                                                                |                                            |      |             |  |
|                                                                |                                            |      |             |  |
| <b>Java Class Name</b>                                         | Device                                     |      |             |  |
| <b>Java Class Path</b>                                         | com.realvue.sim.components.computer.Device |      |             |  |
| <b>Java Methods Exposed</b>                                    |                                            |      |             |  |
| <b>Attributes</b><br>Type<br>Possible Values<br>Default Values |                                            |      |             |  |
| <b>Extends to</b>                                              | Part                                       |      |             |  |
| <b>Special Considerations</b>                                  |                                            |      |             |  |

**SimComponent Name:** DialogManager

| <b>Short Name</b>           | SimWindowDialogManager                        |      |             |  |
|-----------------------------|-----------------------------------------------|------|-------------|--|
| <b>Long Name</b>            | com.realvue.sim.client.SimWindowDialogManager |      |             |  |
| <b>Type of SimComponent</b> |                                               |      |             |  |
| <b>Description</b>          |                                               |      |             |  |
| <b>Usage</b>                |                                               |      |             |  |
| Simulation Properties       | Property Name                                 | Type | Description |  |
|                             |                                               |      |             |  |
|                             |                                               |      |             |  |
| Inherent/Model Properties   | Property Name                                 | Type | Description |  |
|                             |                                               |      |             |  |
|                             |                                               |      |             |  |
| <b>Java Class Name</b>      | SimWindowDialogManager                        |      |             |  |
| <b>Java Class Path</b>      | com.realvue.sim.client.SimWindowDialogManager |      |             |  |

|                                                                                     |  |  |  |  |
|-------------------------------------------------------------------------------------|--|--|--|--|
| <b>Java Methods Exposed</b>                                                         |  |  |  |  |
| <b>Attributes</b><br><b>Type</b><br><b>Possible Values</b><br><b>Default Values</b> |  |  |  |  |
| <b>Extends to</b>                                                                   |  |  |  |  |
| <b>Special Considerations</b>                                                       |  |  |  |  |

### SimComponent Name: Disk

|                                  |                                                                                                                                                                                                                                                    |             |                                                                      |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------------------------------------------------|
| <b>Short Name</b>                | Disk                                                                                                                                                                                                                                               |             |                                                                      |
| <b>Long Name</b>                 | com.realvue.sim.components.computer.Disk                                                                                                                                                                                                           |             |                                                                      |
| <b>Type of SimComponent</b>      | Visual                                                                                                                                                                                                                                             |             |                                                                      |
| <b>Description</b>               | A a model of a physical storage device in a computer. It exposes a physical capacity field which can be used in simulations of partitioning, for instance. Software simulations are more likely to want to get this information from a FileSystem. |             |                                                                      |
| <b>Usage</b>                     |                                                                                                                                                                                                                                                    |             |                                                                      |
| <b>Simulation Properties</b>     | <b>Property Name</b>                                                                                                                                                                                                                               | <b>Type</b> | <b>Description</b>                                                   |
|                                  | getCapacity                                                                                                                                                                                                                                        |             |                                                                      |
|                                  | setCapacity                                                                                                                                                                                                                                        |             | Sets the capacity of this model element (will change model property) |
|                                  | handleCapacityPropertyChange                                                                                                                                                                                                                       |             |                                                                      |
| <b>Inherent/Model Properties</b> | <b>Property Name</b>                                                                                                                                                                                                                               | <b>Type</b> | <b>Description</b>                                                   |
|                                  |                                                                                                                                                                                                                                                    |             |                                                                      |
|                                  |                                                                                                                                                                                                                                                    |             |                                                                      |
| <b>Java Class Name</b>           | Disk                                                                                                                                                                                                                                               |             |                                                                      |
| <b>Java Class Path</b>           | com.realvue.sim.components.computer.Disk                                                                                                                                                                                                           |             |                                                                      |
| <b>Java Methods Exposed</b>      |                                                                                                                                                                                                                                                    |             |                                                                      |

|                                                                |        |  |  |  |
|----------------------------------------------------------------|--------|--|--|--|
| <b>Attributes</b><br>Type<br>Possible Values<br>Default Values |        |  |  |  |
| <b>Extends to</b>                                              | Device |  |  |  |
| <b>Special Considerations</b>                                  |        |  |  |  |

**SimComponent Name: Drive**

|                                                                |                      |             |                    |  |
|----------------------------------------------------------------|----------------------|-------------|--------------------|--|
| <b>Long Name</b>                                               |                      |             |                    |  |
| <b>Short Name</b>                                              |                      |             |                    |  |
| <b>Type of SimComponent</b>                                    |                      |             |                    |  |
| <b>Description</b>                                             |                      |             |                    |  |
| <b>Usage</b>                                                   |                      |             |                    |  |
| <b>Simulation Properties</b>                                   | <b>Property Name</b> | <b>Type</b> | <b>Description</b> |  |
|                                                                |                      |             |                    |  |
|                                                                |                      |             |                    |  |
|                                                                |                      |             |                    |  |
| <b>Inherent/Model Properties</b>                               | <b>Property Name</b> | <b>Type</b> | <b>Description</b> |  |
|                                                                |                      |             |                    |  |
|                                                                |                      |             |                    |  |
| <b>Java Class Name</b>                                         |                      |             |                    |  |
| <b>Java Class Path</b>                                         |                      |             |                    |  |
| <b>Java Methods Exposed</b>                                    |                      |             |                    |  |
| <b>Attributes</b><br>Type<br>Possible Values<br>Default Values |                      |             |                    |  |
| <b>Extends to</b>                                              |                      |             |                    |  |
| <b>Special Considerations</b>                                  |                      |             |                    |  |

**SimComponent Name:** File

|                                                                |                      |             |                    |  |
|----------------------------------------------------------------|----------------------|-------------|--------------------|--|
| <b>Short Name</b>                                              |                      |             |                    |  |
| <b>Long Name</b>                                               |                      |             |                    |  |
| <b>Type of SimComponent</b>                                    |                      |             |                    |  |
| <b>Description</b>                                             |                      |             |                    |  |
| <b>Usage</b>                                                   |                      |             |                    |  |
| <b>Simulation Properties</b>                                   | <b>Property Name</b> | <b>Type</b> | <b>Description</b> |  |
|                                                                |                      |             |                    |  |
|                                                                |                      |             |                    |  |
|                                                                |                      |             |                    |  |
| <b>Inherent/Model Properties</b>                               | <b>Property Name</b> | <b>Type</b> | <b>Description</b> |  |
|                                                                |                      |             |                    |  |
|                                                                |                      |             |                    |  |
| <b>Java Class Name</b>                                         |                      |             |                    |  |
| <b>Java Class Path</b>                                         |                      |             |                    |  |
| <b>Java Methods Exposed</b>                                    |                      |             |                    |  |
| <b>Attributes</b><br>Type<br>Possible Values<br>Default Values |                      |             |                    |  |
| <b>Extends to</b>                                              |                      |             |                    |  |
| <b>Special Considerations</b>                                  |                      |             |                    |  |

**SimComponent Name:** FileSystem

|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                      |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------------------------------------------------|
| <b>Short Name</b>                | FileSystem                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             |                                                                      |
| <b>Long Name</b>                 | com.realvue.sim.components.computer.FileSystem                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |             |                                                                      |
| <b>Type of SimComponent</b>      | Visual                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             |                                                                      |
| <b>Description</b>               | <p>A model element which is the base class for logical storage (not physical). It's common between many different types of computer models and can be used in an abstract sense; while the subclasses are likely to be more restrictive (for instance, no restriction is placed on the label of a volume; while a Windows environment would restrict volumes to drive letters).</p> <p>A filesystem in the abstract is defined as a “root” container of filesystem objects. Filesystems are also sometimes referred to in the abstract as “volumes”. Like a physical disk, a volume will expose a capacity in double form. (you quite often need to know, or at least display, the size of a volume, i.e. “this drive is 20GB in size”). Unlike physical disks, the volume will also expose a “free space” property of the same form. A volume will be linked to a partition on a physical disk (but not contained within it in the simulation hierarchy). i.e. - there will be a PropertyReference link to the partition which “contains” the logical volume but in the simulation hierarchy, the “volumes” container of the logical branch of the computer-model will contain the volume.</p> |             |                                                                      |
| <b>Usage</b>                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                      |
| <b>Simulation Properties</b>     | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Type</b> | <b>Description</b>                                                   |
|                                  | addFolder                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |             | Adds a root folder to the filesystem                                 |
|                                  | getCapacity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                                                                      |
|                                  | handleCapacityPropertyChange                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |                                                                      |
|                                  | handlePartitionPropertyChange                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |             |                                                                      |
|                                  | removeFolder                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |                                                                      |
|                                  | setCapacity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             | Sets the capacity of this model element (will change model property) |
| <b>Inherent/Model Properties</b> | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Type</b> | <b>Description</b>                                                   |
|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                      |
|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                      |
| <b>Java Class Name</b>           | FileSystem                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             |                                                                      |

|                                                                |                                                |  |  |  |
|----------------------------------------------------------------|------------------------------------------------|--|--|--|
| <b>Java Class Path</b>                                         | com.realvue.sim.components.computer.FileSystem |  |  |  |
| <b>Java Methods Exposed</b>                                    |                                                |  |  |  |
| <b>Attributes</b><br>Type<br>Possible Values<br>Default Values |                                                |  |  |  |
| <b>Extends to</b>                                              | BaseSimComponent                               |  |  |  |
| <b>Special Considerations</b>                                  |                                                |  |  |  |

### SimComponent Name: FloatingPanel

|                              |                                                                                                                                                                                                                                                                                                                                                    |             |                                                                                                                                                                            |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Short Name</b>            | FloatingPanel                                                                                                                                                                                                                                                                                                                                      |             |                                                                                                                                                                            |
| <b>Long Name</b>             | com.realvue.sim.components.swing2d.FloatingPanel                                                                                                                                                                                                                                                                                                   |             |                                                                                                                                                                            |
| <b>Type of SimComponent</b>  | Generic Visual                                                                                                                                                                                                                                                                                                                                     |             |                                                                                                                                                                            |
| <b>Description</b>           | A simple implementation of a draggable component which can be moved within the bounds of its parent component but not resized. Simulations seeking resizing behavior should use a JInternalFrame / JDesktopPane solution. Any part of this component's screen space that is not overlaid with another component will be responsive to mouse drags. |             |                                                                                                                                                                            |
| <b>Usage</b>                 | Typically used as a generic object that can float on top and be dragged around                                                                                                                                                                                                                                                                     |             |                                                                                                                                                                            |
| <b>Simulation Properties</b> | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                               | <b>Type</b> | <b>Description</b>                                                                                                                                                         |
|                              | addMouseMotionListener                                                                                                                                                                                                                                                                                                                             |             | Sets up the mouse motion listener by which this component handles drag actions                                                                                             |
|                              | handleMouseDragged                                                                                                                                                                                                                                                                                                                                 |             | This method handles the dragging of the mouse by one or more pixels in either or both directions by calculating a new position for the component and moving it accordingly |
|                              | handleMouseReleased                                                                                                                                                                                                                                                                                                                                |             | This override handles the mouse released operation by notifying the component that the drag operation has ended                                                            |

|                                                                                     |                                                  |             |                    |  |
|-------------------------------------------------------------------------------------|--------------------------------------------------|-------------|--------------------|--|
| <b>Inherent/Model Properties</b>                                                    | <b>Property Name</b>                             | <b>Type</b> | <b>Description</b> |  |
|                                                                                     |                                                  |             |                    |  |
|                                                                                     |                                                  |             |                    |  |
| <b>Java Class Name</b>                                                              | FloatingPanel                                    |             |                    |  |
| <b>Java Class Path</b>                                                              | com.realvue.sim.components.swing2d.FloatingPanel |             |                    |  |
| <b>Java Methods Exposed</b>                                                         |                                                  |             |                    |  |
| <b>Attributes</b><br><b>Type</b><br><b>Possible Values</b><br><b>Default Values</b> |                                                  |             |                    |  |
| <b>Extends to</b>                                                                   | InteractivePanel                                 |             |                    |  |
| <b>Special Considerations</b>                                                       |                                                  |             |                    |  |

**SimComponent Name:** Folder

|                                  |                      |             |                    |
|----------------------------------|----------------------|-------------|--------------------|
| <b>Short Name</b>                |                      |             |                    |
| <b>Long Name</b>                 |                      |             |                    |
| <b>Type of SimComponent</b>      |                      |             |                    |
| <b>Description</b>               |                      |             |                    |
| <b>Usage</b>                     |                      |             |                    |
| <b>Simulation Properties</b>     | <b>Property Name</b> | <b>Type</b> | <b>Description</b> |
|                                  |                      |             |                    |
|                                  |                      |             |                    |
| <b>Inherent/Model Properties</b> | <b>Property Name</b> | <b>Type</b> | <b>Description</b> |
|                                  |                      |             |                    |
|                                  |                      |             |                    |
| <b>Java Class Name</b>           |                      |             |                    |
| <b>Java Class Path</b>           |                      |             |                    |

|                                                                |  |  |  |  |
|----------------------------------------------------------------|--|--|--|--|
| <b>Java Methods Exposed</b>                                    |  |  |  |  |
| <b>Attributes</b><br>Type<br>Possible Values<br>Default Values |  |  |  |  |
| <b>Extends to</b>                                              |  |  |  |  |
| <b>Special Considerations</b>                                  |  |  |  |  |

### SimComponent Name: HotSpotPanel

|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                                                                                                                                                                 |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Short Name</b>            | HotSpotPanel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |             |                                                                                                                                                                 |
| <b>Long Name</b>             | com.realvue.sim.components.swing2d.HotSpotPanel                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                                                                                                                                                                 |
| <b>Type of SimComponent</b>  | Generic Visual                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             |                                                                                                                                                                 |
| <b>Description</b>           | <p>The abstract superclass for components such as knobs and switches, in which a specified region of the component, when clicked, will change the status state of the component to a specified value. This mapping of regions (or “hotspots”) to values is a common function in many hardware components. Typically, subclasses will change the name of the status property (InteractivePanel.setStatusPropertyName(java.lang.String)) to something which makes more sense for their particular implementation.</p> |             |                                                                                                                                                                 |
| <b>Usage</b>                 | Typically used as a panel where you click on an area to set a certain variable to a supplied value (builds on InteractivePanel)                                                                                                                                                                                                                                                                                                                                                                                     |             |                                                                                                                                                                 |
| <b>Simulation Properties</b> | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>Type</b> | <b>Description</b>                                                                                                                                              |
|                              | addComponentElement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             | Adds an XML-defined rectangular HotSpot to this panel                                                                                                           |
|                              | getHotSpot                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             | Returns the hotspot at the specified index. Return the hotspot, if any, which contains the point provided. -1 will be returned if no hotspot contains the point |
|                              | getHotspotCursor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             | Gets the cursor currently used for the specified hotspot                                                                                                        |

|                                                                |                                                 |             |                                                                                                                                                                                                                                                   |
|----------------------------------------------------------------|-------------------------------------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                | getHotSpots                                     |             | Returns all hotspots currently defined, in an array where their position in the array defines their corresponding state value                                                                                                                     |
|                                                                | getMaxValue                                     |             | Gets the maximum allowed value for the status state (used by subclasses to restrict to sensible values)                                                                                                                                           |
|                                                                | setHotSpot                                      |             | Sets a specified hotspot in the list (will be grown if necessary) with the specified index                                                                                                                                                        |
|                                                                | setHotSpotCursor                                |             | Sets a cursor for the specified hotspot, which will be displayed when the mouse pointer enters the bounds of the hotspot. Set a cursor for the specified hotspot, which will be displayed when the mouse pointer enters the bounds of the hotspot |
|                                                                | setMaxValue                                     |             | Sets the maximum allowed value for the status state (used by subclasses to restrict to sensible values)                                                                                                                                           |
|                                                                | setupMouseMotionListener                        |             | Creates and registers the mouse listener for cursor changes over hotspots                                                                                                                                                                         |
| <b>Inherent/Model Properties</b>                               | <b>Property Name</b>                            | <b>Type</b> | <b>Description</b>                                                                                                                                                                                                                                |
|                                                                |                                                 |             |                                                                                                                                                                                                                                                   |
| <b>Java Class Name</b>                                         | HotSpotPanel                                    |             |                                                                                                                                                                                                                                                   |
| <b>Java Class Path</b>                                         | com.realvue.sim.components.swing2d.HotSpotPanel |             |                                                                                                                                                                                                                                                   |
| <b>Java Methods Exposed</b>                                    |                                                 |             |                                                                                                                                                                                                                                                   |
| <b>Attributes</b><br>Type<br>Possible Values<br>Default Values |                                                 |             |                                                                                                                                                                                                                                                   |
| <b>Extends to</b>                                              | InteractivePanel                                |             |                                                                                                                                                                                                                                                   |
| <b>Special Considerations</b>                                  |                                                 |             |                                                                                                                                                                                                                                                   |

**SimComponent Name:** Interactive Panel

|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             |                                                                                                   |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------------------------------------------------------------------------------------|
| <b>Short Name</b>                | InteractivePanel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |             |                                                                                                   |
| <b>Long Name</b>                 | com.realvue.sim.components.swing2d.InteractivePanel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             |                                                                                                   |
| <b>Type of SimComponent</b>      | Visual                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |             |                                                                                                   |
| <b>Description</b>               | <p>An implementation of a simulation component which is sensitive to mouse events. It contains handler methods for the basic mouse events but NOT for the mouseMoved events. Subclasses which want to track that level of mouse activity must add their own listener in order to do so.</p> <p>The InteractivePanel also includes a “status” property which maintains a one-way link with the “panellImage” property from the SimPanel class. That is, if the value of the “status” property is changed, the “panellImage” property will be set to that value; but if the value of the “panellImage” property is changed; the “status” property will not be changed.</p> |             |                                                                                                   |
| <b>Usage</b>                     | Typically used as a panel that responds to the mouse                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                                                                                                   |
| <b>Simulation Properties</b>     | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>Type</b> | <b>Description</b>                                                                                |
|                                  | getStatusProperty                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |             | Gets the status property                                                                          |
|                                  | setCursorFileName                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |             | Instructs this InteractivePanel to load and use a new cursor, specified by the file name provided |
|                                  | setCursorPoint                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |             |                                                                                                   |
| <b>Inherent/Model Properties</b> | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>Type</b> | <b>Description</b>                                                                                |
|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             |                                                                                                   |
|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             |                                                                                                   |
| <b>Java Class Name</b>           | InteractivePanel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |             |                                                                                                   |
| <b>Java Class Path</b>           | com.realvue.sim.components.swing2d.InteractivePanel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             |                                                                                                   |
| <b>Java Methods Exposed</b>      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             |                                                                                                   |
| <b>Attributes</b>                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             |                                                                                                   |
| <b>Type</b>                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             |                                                                                                   |
| <b>Possible Values</b>           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             |                                                                                                   |
| <b>Default Values</b>            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             |                                                                                                   |
| <b>Extends to</b>                | SimPanel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                                                   |
| <b>Special Considerations</b>    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             |                                                                                                   |

**SimComponent Name:** IntermediateCameras

|                                  |                                                                                                                                                                                                                                                                                                                                     |             |                                                                                                                                                                                           |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Short Name</b>                | IntermediateCameras                                                                                                                                                                                                                                                                                                                 |             |                                                                                                                                                                                           |
| <b>Long Name</b>                 | com.realvue.sim.components.java3d.IntermediateCameras                                                                                                                                                                                                                                                                               |             |                                                                                                                                                                                           |
| <b>Type of SimComponent</b>      | Visual                                                                                                                                                                                                                                                                                                                              |             |                                                                                                                                                                                           |
| <b>Description</b>               | Represents references to cameras that will be used as transition points when a 3D view is moving from one camera to another. This holds a reference to a group of intermediate cameras. These belong to a camera so that when a transition occurs from the containing camera to the target camera, these cameras are moved through. |             |                                                                                                                                                                                           |
| <b>Usage</b>                     |                                                                                                                                                                                                                                                                                                                                     |             |                                                                                                                                                                                           |
| <b>Simulation Properties</b>     | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                | <b>Type</b> | <b>Description</b>                                                                                                                                                                        |
|                                  | addComponentElement                                                                                                                                                                                                                                                                                                                 |             | Adds a reference to a camera, the transform of which, will be used during transitions from the transform of the camera to which this object belongs to the transform of the target camera |
|                                  | getCameraTransform                                                                                                                                                                                                                                                                                                                  |             | Gets the transform from the camera at the specified index                                                                                                                                 |
|                                  | getDuration                                                                                                                                                                                                                                                                                                                         |             | Gets the amount of time (in milliseconds) it should take to go through all the cameras                                                                                                    |
|                                  | getOnTarget                                                                                                                                                                                                                                                                                                                         |             | Gets the target camera for this IntermediateCameras object                                                                                                                                |
|                                  | setDuration                                                                                                                                                                                                                                                                                                                         |             | Sets the amount of time it should take for all the cameras to be traversed                                                                                                                |
|                                  | setOnTarget                                                                                                                                                                                                                                                                                                                         |             | Sets the target camera name for this IntermediateCameras object                                                                                                                           |
| <b>Inherent/Model Properties</b> | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                | <b>Type</b> | <b>Description</b>                                                                                                                                                                        |
|                                  |                                                                                                                                                                                                                                                                                                                                     |             |                                                                                                                                                                                           |
|                                  |                                                                                                                                                                                                                                                                                                                                     |             |                                                                                                                                                                                           |
| <b>Java Class Name</b>           | IntermediateCameras                                                                                                                                                                                                                                                                                                                 |             |                                                                                                                                                                                           |
| <b>Java Class Path</b>           | com.realvue.sim.components.java3d.IntermediateCameras                                                                                                                                                                                                                                                                               |             |                                                                                                                                                                                           |

|                                                                |                 |  |  |  |
|----------------------------------------------------------------|-----------------|--|--|--|
| <b>Java Methods Exposed</b>                                    |                 |  |  |  |
| <b>Attributes</b><br>Type<br>Possible Values<br>Default Values |                 |  |  |  |
| <b>Extends to</b>                                              | TransformObject |  |  |  |
| <b>Special Considerations</b>                                  |                 |  |  |  |

### SimComponent Name: KnobPanel

|                                                 |                                                                                                                                                                                                                                        |             |                                    |
|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------------------------|
| <b>Short Name</b>                               | KnobPanel                                                                                                                                                                                                                              |             |                                    |
| <b>Long Name</b>                                | com.realvue.sim.components.swing2d.KnobPanel                                                                                                                                                                                           |             |                                    |
| <b>Type of SimComponent</b>                     | Visual                                                                                                                                                                                                                                 |             |                                    |
| <b>Description</b>                              | Simulates a hardware knob which has two or more positions indicated with hotspots. Active areas of the component should be specified as hotspots corresponding to a certain state value and a certain panel image.                     |             |                                    |
| <b>Usage</b>                                    | Typical used in creating hotspots that correspond to labels or other markings on the original knob image which match the desired knobPosition value (and the index of the panel image which corresponds to that position of the knob). |             |                                    |
| <b>Simulation Properties</b>                    | <b>Property Name</b>                                                                                                                                                                                                                   | <b>Type</b> | <b>Description</b>                 |
|                                                 |                                                                                                                                                                                                                                        |             |                                    |
|                                                 |                                                                                                                                                                                                                                        |             |                                    |
| <b>Inherent/Model Properties</b>                | <b>Property Name</b>                                                                                                                                                                                                                   | <b>Type</b> | <b>Description</b>                 |
|                                                 | knobPosition                                                                                                                                                                                                                           | int         | Position of the knob (starts at 0) |
| <b>Java Class Name</b>                          | KnobPanel                                                                                                                                                                                                                              |             |                                    |
| <b>Java Class Path</b>                          | com.realvue.sim.components.swing2d.KnobPanel                                                                                                                                                                                           |             |                                    |
| <b>Java Methods Exposed</b>                     |                                                                                                                                                                                                                                        |             |                                    |
| <b>Attributes</b>                               |                                                                                                                                                                                                                                        |             |                                    |
| <b>Inherits Properties and Attributes from:</b> | SimPanel                                                                                                                                                                                                                               |             |                                    |

|                               |                                                                                                       |
|-------------------------------|-------------------------------------------------------------------------------------------------------|
| <b>Extends to</b>             | HotSpotPanel                                                                                          |
| <b>Special Considerations</b> | This component inherits directly from HotSpotPanel which is abstract and not initializeable from XML. |

**SimComponent Name: Model3D**

|                                                                |                                                                             |             |                                                                    |
|----------------------------------------------------------------|-----------------------------------------------------------------------------|-------------|--------------------------------------------------------------------|
| <b>Short Name</b>                                              | Model3D                                                                     |             |                                                                    |
| <b>Long Name</b>                                               | com.realvue.sim.components.java3d.Model3D                                   |             |                                                                    |
| <b>Type of SimComponent</b>                                    | Visual                                                                      |             |                                                                    |
| <b>Description</b>                                             | Models that can be loaded into a simulation. Built to wrap the 3D api used. |             |                                                                    |
| <b>Usage</b>                                                   |                                                                             |             |                                                                    |
| <b>Simulation Properties</b>                                   | <b>Property Name</b>                                                        | <b>Type</b> | <b>Description</b>                                                 |
|                                                                | getNamedObjects                                                             |             | Gets all the named objects loaded into the model                   |
|                                                                | getSceneGroup                                                               |             | Gets the scene group that was loaded as a result of the model load |
|                                                                | load                                                                        |             | Loads the model from the URL specified in the constructor          |
| <b>Inherent Properties</b>                                     | <b>Property Name</b>                                                        | <b>Type</b> | <b>Description</b>                                                 |
|                                                                |                                                                             |             |                                                                    |
|                                                                |                                                                             |             |                                                                    |
| <b>Java Class Name</b>                                         | Model3D                                                                     |             |                                                                    |
| <b>Java Class Path</b>                                         | com.realvue.sim.components.java3d.Model3D                                   |             |                                                                    |
| <b>Java Methods Exposed</b>                                    |                                                                             |             |                                                                    |
| <b>Attributes</b><br>Type<br>Possible Values<br>Default Values |                                                                             |             |                                                                    |
| <b>Extends to</b>                                              | Object                                                                      |             |                                                                    |
| <b>Special Considerations</b>                                  |                                                                             |             |                                                                    |

**SimComponent Name:** MultimeterDisplay

|                                                                |                                                                                                                                                                                                                    |             |                    |
|----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------|
| <b>Short Name</b>                                              | MultimeterDisplay                                                                                                                                                                                                  |             |                    |
| <b>Long Name</b>                                               | com.realvue.sim.components.swing2d.tools.MultimeterDisplay                                                                                                                                                         |             |                    |
| <b>Type of SimComponent</b>                                    |                                                                                                                                                                                                                    |             |                    |
| <b>Description</b>                                             | Maintains a fileName, an index, and a value (if necessary) for the main image of a multimeter without the black and red probes. It's a simulation of the display of a multimeter and a placeholder for future use. |             |                    |
| <b>Usage</b>                                                   |                                                                                                                                                                                                                    |             |                    |
| <b>Simulation Properties</b>                                   | <b>Property Name</b>                                                                                                                                                                                               | <b>Type</b> | <b>Description</b> |
|                                                                |                                                                                                                                                                                                                    |             |                    |
|                                                                |                                                                                                                                                                                                                    |             |                    |
| <b>Inherent/Model Properties</b>                               | <b>Property Name</b>                                                                                                                                                                                               | <b>Type</b> | <b>Description</b> |
|                                                                |                                                                                                                                                                                                                    |             |                    |
|                                                                |                                                                                                                                                                                                                    |             |                    |
| <b>Java Class Name</b>                                         | MultimeterDisplay                                                                                                                                                                                                  |             |                    |
| <b>Java Class Path</b>                                         | com.realvue.sim.components.swing2d.tools.MultimeterDisplay                                                                                                                                                         |             |                    |
| <b>Java Methods Exposed</b>                                    |                                                                                                                                                                                                                    |             |                    |
| <b>Attributes</b><br>Type<br>Possible Values<br>Default Values |                                                                                                                                                                                                                    |             |                    |
| <b>Extends to</b>                                              | SimPanel                                                                                                                                                                                                           |             |                    |
| <b>Special Considerations</b>                                  |                                                                                                                                                                                                                    |             |                    |

**SimComponent Name:** MultimeterPanel

|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                                                                                          |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Short Name</b>            | MultimeterPanel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                                                                                          |
| <b>Long Name</b>             | com.realvue.sim.components.swing2d.tools.MultimeterPanel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |             |                                                                                                                                          |
| <b>Type of SimComponent</b>  | Visual - Tools                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |             |                                                                                                                                          |
| <b>Description</b>           | <p>A simulation of a common electrical tool with two probes (red/black), which can be connected to other components which satisfy the MultimeterProbeable java interface (see the ProbeSpot component). Default graphics are provided; however, in almost all cases, some of these graphics must be replaced or extended in a simulation to provide desired electrical readings.</p> <p>Only one instance of the MultimeterPanel can be created per simulation (to allow the static location methods to work correctly). However, this instance can be destroyed (allowing a new one to be created) by means of the destroyMultimeter() method.</p> <p>A generic “display area” is provided and panel images for this subcomponent can be set and changed via the special interfaces (TBD). Simulations which need “live” components in this area (a live dial and/or live readout for instance) need to replace the display area with their own class by using the method.</p> |             |                                                                                                                                          |
| <b>Usage</b>                 | Typically used as an electrical tool with the red/black probes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |             |                                                                                                                                          |
| <b>Simulation Properties</b> | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Type</b> | <b>Description</b>                                                                                                                       |
|                              | redProbeConnection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | string      | Contains the fullName value of the component that is connected to the red probe; it is an Empty string if it's not connected to anything |
|                              | blackProbeConnection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | string      | Contains the fullName value of the component that is connected to the red probe; it is an Empty string if it's not connected to anything |
|                              | probeSelected                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | string      | Either “black”, “red”, or “none” - probe has been selected on the multimeter                                                             |
|                              | addComponentElement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             | Designates the file name for the image of the black and red probe image                                                                  |
|                              | addLogicalChild                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             | Designates the file name for the image of the multimeter image                                                                           |

|                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |             |                                                                                                          |
|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------|
|                                                 | getActiveMultimeter                                                                                                                                                                                                                                                                                                                                                                                                                                   |             |                                                                                                          |
|                                                 | getActiveProbe                                                                                                                                                                                                                                                                                                                                                                                                                                        |             |                                                                                                          |
|                                                 | getBlackProbe                                                                                                                                                                                                                                                                                                                                                                                                                                         |             |                                                                                                          |
|                                                 | getMainDisplay                                                                                                                                                                                                                                                                                                                                                                                                                                        |             | Returns the part of the meter which is NOT the probes (the remaining area)                               |
|                                                 | getMultimeter                                                                                                                                                                                                                                                                                                                                                                                                                                         |             | Static method to return the first (or only) multimeter panel for this simulation                         |
|                                                 | setActiveMultimeter                                                                                                                                                                                                                                                                                                                                                                                                                                   |             |                                                                                                          |
|                                                 | setMainDisplay                                                                                                                                                                                                                                                                                                                                                                                                                                        |             | Replaces the part of the meter which is NOT the probes (the remaining area) with the specified component |
|                                                 | setupSubComponents                                                                                                                                                                                                                                                                                                                                                                                                                                    |             | Initializes and lays out subcomponents (readout, probes) after construction                              |
| <b>Inherent/Model Properties</b>                | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>Type</b> | <b>Description</b>                                                                                       |
|                                                 | redProbeConnection                                                                                                                                                                                                                                                                                                                                                                                                                                    | string      | Fully qualified name of component to which the red probe is connected, if any                            |
|                                                 | blackProbeConnection                                                                                                                                                                                                                                                                                                                                                                                                                                  | string      | Fully qualified name of component to which the black probe is connected, if any                          |
| <b>Java Class Name</b>                          | MultimeterPanel                                                                                                                                                                                                                                                                                                                                                                                                                                       |             |                                                                                                          |
| <b>Java Class Path</b>                          | com.realvue.sim.components.swing2d.tools.MultimeterPanel                                                                                                                                                                                                                                                                                                                                                                                              |             |                                                                                                          |
| <b>Java Methods Exposed</b>                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |             |                                                                                                          |
| <b>Attributes</b>                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |             |                                                                                                          |
| <b>Inherits Properties and Attributes from:</b> | SimPanel                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |                                                                                                          |
| <b>Extends to</b>                               | FloatingPanel                                                                                                                                                                                                                                                                                                                                                                                                                                         |             |                                                                                                          |
| <b>Special Considerations</b>                   | <p>The parent component or another component must handle any graphical changes which occur as a result of connecting or disconnecting a multimeter probe to a ProbeSpot component. The component actually inherits from the FloatingPanel class, but all properties/attributes come from SimPanel.</p> <p>The autoDrawProbes behavior specified by the MultimeterProbeable interface is currently not implemented but is provided for future use.</p> |             |                                                                                                          |

**SimComponent Name:** MultipleViewContainer

|                              |                                                                                                                                                 |             |                                                                                                                                                                                                          |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Short Name</b>            | MultipleViewContainer                                                                                                                           |             |                                                                                                                                                                                                          |
| <b>Long Name</b>             | com.realvue.sim.components.swing2d.MultipleViewContainer                                                                                        |             |                                                                                                                                                                                                          |
| <b>Type of SimComponent</b>  | Visual                                                                                                                                          |             |                                                                                                                                                                                                          |
| <b>Description</b>           | Abstract container for multiple components occupying the same logical layer intended to represent multiple views of the same real-world device. |             |                                                                                                                                                                                                          |
| <b>Usage</b>                 | Typical uses include zoom (small/large views of a component) or a cubic view (2D representation of a 6-sided shape).                            |             |                                                                                                                                                                                                          |
| <b>Simulation Properties</b> | <b>Property Name</b>                                                                                                                            | <b>Type</b> | <b>Description</b>                                                                                                                                                                                       |
|                              | addImpl                                                                                                                                         |             | This override adds objects of type componentView to an internal list                                                                                                                                     |
|                              | addLogicalChild                                                                                                                                 |             | This override adds the child to an internal list of component views, if it is an instance of the ComponentView class                                                                                     |
|                              | addPropertyLink                                                                                                                                 |             | This override turns off autoLink, if necessary, when a specific PropertyLink is set on this component                                                                                                    |
|                              | getViewProperty                                                                                                                                 |             | Gets the Property that controls the view behavior                                                                                                                                                        |
|                              | handleViewPropertyChange                                                                                                                        |             | This method must be implemented by subclasses to handle changes in the view property (typically this will result in a visibility change in one or more of the component views managed by this component) |
|                              | setView                                                                                                                                         |             | Sets the zoomView for a specified index to a provided zoomView component                                                                                                                                 |
|                              | setViewProperty                                                                                                                                 |             | Sets the property that will be used to represent the view status                                                                                                                                         |
| <b>Inherent Properties</b>   | <b>Property Name</b>                                                                                                                            | <b>Type</b> | <b>Description</b>                                                                                                                                                                                       |
|                              |                                                                                                                                                 |             |                                                                                                                                                                                                          |
|                              |                                                                                                                                                 |             |                                                                                                                                                                                                          |

|                                                                |                                                          |  |  |  |
|----------------------------------------------------------------|----------------------------------------------------------|--|--|--|
| <b>Java Class Name</b>                                         | MultipleViewContainer                                    |  |  |  |
| <b>Java Class Path</b>                                         | com.realvue.sim.components.swing2d.MultipleViewContainer |  |  |  |
| <b>Java Methods Exposed</b>                                    |                                                          |  |  |  |
| <b>Attributes</b><br>Type<br>Possible Values<br>Default Values |                                                          |  |  |  |
| <b>Extends to</b>                                              | SimPanel                                                 |  |  |  |
| <b>Special Considerations</b>                                  |                                                          |  |  |  |

### SimComponent Name: OnOffPanel

|                              |                                                                                                                                                                                                                                                                                                                                                                                                        |             |                                                                                                                             |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------|
| <b>Short Name</b>            | OnOffPanel                                                                                                                                                                                                                                                                                                                                                                                             |             |                                                                                                                             |
| <b>Long Name</b>             | com.realvue.sim.components.swing2d.OnOffPanel                                                                                                                                                                                                                                                                                                                                                          |             |                                                                                                                             |
| <b>Type of SimComponent</b>  | Visual                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                                                                             |
| <b>Description</b>           | <p>Provides a simple mapping between an “on” state and the inherent panellImage property inherited from the SimPanel class. A two-state non-interactive component (meaning it does not respond to mouse clicks) is provided with a property named by the ON_PROPERTY_NAME.</p> <p>This class can be used as a convenience for scripts that wish to specify “X.on=1” rather than “X.panellImage=1”.</p> |             |                                                                                                                             |
| <b>Usage</b>                 | Typically used as an LED or light with multiple images and an “on” variable                                                                                                                                                                                                                                                                                                                            |             |                                                                                                                             |
| <b>Simulation Properties</b> | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                   | <b>Type</b> | <b>Description</b>                                                                                                          |
|                              | getOnPropertyName                                                                                                                                                                                                                                                                                                                                                                                      |             | Returns the name for the “on” property                                                                                      |
|                              | handleOnPropertyName                                                                                                                                                                                                                                                                                                                                                                                   |             | Handles a change in the “on” property by changing the image index property of the component (inherited from the superclass) |

|                                                 |                                               |             |                                                                                                                                                                                |
|-------------------------------------------------|-----------------------------------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                 | setOnPropertyName                             |             | Sets the name for the “on” property<br>(ON_PROPERTY_NAME is used if this method is not called)<br>ON_PROPERTY_NAME - Name of property, which can be changed in code if desired |
| <b>Inherent/Model Properties</b>                | <b>Property Name</b>                          | <b>Type</b> | <b>Description</b>                                                                                                                                                             |
|                                                 | on                                            | int         | Component on/off state                                                                                                                                                         |
| <b>Java Class Name</b>                          | OnOffPanel                                    |             |                                                                                                                                                                                |
| <b>Java Class Path</b>                          | com.realvue.sim.components.swing2d.OnOffPanel |             |                                                                                                                                                                                |
| <b>Java Methods Exposed</b>                     |                                               |             |                                                                                                                                                                                |
| <b>Attributes</b>                               |                                               |             |                                                                                                                                                                                |
| <b>Inherits Properties and Attributes from:</b> | SimPanel                                      |             |                                                                                                                                                                                |
| <b>Extends to</b>                               | SimPanel                                      |             |                                                                                                                                                                                |
| <b>Special Considerations</b>                   |                                               |             |                                                                                                                                                                                |

### SimComponent Name: PickBehavior

|                              |                                                                                                                                                                                |             |                                                                                                                                                                                    |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Short Name</b>            | PickBehavior                                                                                                                                                                   |             |                                                                                                                                                                                    |
| <b>Long Name</b>             | com.realvue.sim.components.java3d.PickBehavior                                                                                                                                 |             |                                                                                                                                                                                    |
| <b>Type of SimComponent</b>  | Visual                                                                                                                                                                         |             |                                                                                                                                                                                    |
| <b>Description</b>           | Maintains a registry of listeners for TransformObjects that, when clicked, will fire listener changes on the corresponding Pick3DObjects they were originally registered with. |             |                                                                                                                                                                                    |
| <b>Usage</b>                 |                                                                                                                                                                                |             |                                                                                                                                                                                    |
| <b>Simulation Properties</b> | <b>Property Name</b>                                                                                                                                                           | <b>Type</b> | <b>Description</b>                                                                                                                                                                 |
|                              | getMotionListener                                                                                                                                                              |             | Gets the object that would be picked if the cursor is over xpos,ypos, checks if there are listeners registered for it, and if there is an InterfaceMouseMotionListener, returns it |

| Inherent/Model Properties                               | Property Name                                         | Type | Description |  |
|---------------------------------------------------------|-------------------------------------------------------|------|-------------|--|
|                                                         |                                                       |      |             |  |
| Java Class Name                                         | PickBehavior                                          |      |             |  |
| Java Class Path                                         | com.realvue.sim.components.java3d.PickBehavior        |      |             |  |
| Java Methods Exposed                                    |                                                       |      |             |  |
| Extends to                                              | com.sun.j3d.utils.picking.behaviors.PickMouseBehavior |      |             |  |
| Attributes<br>Type<br>Possible Values<br>Default Values |                                                       |      |             |  |
| Extends to                                              |                                                       |      |             |  |
| Special Considerations                                  |                                                       |      |             |  |

### SimComponent Name: PickPoint

| Short Name            | PickPoint                                                         |      |                                                                                                          |  |
|-----------------------|-------------------------------------------------------------------|------|----------------------------------------------------------------------------------------------------------|--|
| Long Name             | com.realvue.sim.components.java3d.PickPoint                       |      |                                                                                                          |  |
| Type of SimComponent  | Visual                                                            |      |                                                                                                          |  |
| Description           | A morphing object that will morph between one or more geometries. |      |                                                                                                          |  |
| Usage                 |                                                                   |      |                                                                                                          |  |
| Simulation Properties | Property Name                                                     | Type | Description                                                                                              |  |
|                       | setLive                                                           |      | Adds the objects for this object to the 3D world and adds all children as children in the 3D world graph |  |
|                       | toString                                                          |      | Returns a string representation of this object                                                           |  |
| Inherent Properties   | Property Name                                                     | Type | Description                                                                                              |  |
|                       |                                                                   |      |                                                                                                          |  |
|                       |                                                                   |      |                                                                                                          |  |
| Java Class Name       | PickPoint                                                         |      |                                                                                                          |  |

|                                                                |                                             |  |  |  |
|----------------------------------------------------------------|---------------------------------------------|--|--|--|
| <b>Java Class Path</b>                                         | com.realvue.sim.components.java3d.PickPoint |  |  |  |
| <b>Java Methods Exposed</b>                                    |                                             |  |  |  |
| <b>Attributes</b><br>Type<br>Possible Values<br>Default Values |                                             |  |  |  |
| <b>Extends to</b>                                              | TransformObject                             |  |  |  |
| <b>Special Considerations</b>                                  |                                             |  |  |  |

### SimComponent Name: Port

|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             |                                                                       |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------------------------------------------------------------|
| <b>Short Name</b>            | Port                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                                                                       |
| <b>Long Name</b>             | com.realvue.sim.components.swing2d.cabling.Port                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             |                                                                       |
| <b>Type of SimComponent</b>  | Visual                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |             |                                                                       |
| <b>Description</b>           | <p>Connects to other Ports using the CablePalette and Cable objects. They have a type that specifies what type of port this is. For example, a rj-45 port might have a type of “rj-45”.</p> <p>Ports have a Property that references the CablePalette. This PALETTE_PROPERTY_NAME property is used for communicating with the palette. It must be initialized in code or in XML. Typical subclasses will override the constructor and their specific type, using the setType(java.lang.String) call.</p> |             |                                                                       |
| <b>Usage</b>                 | Typically used as the object the wire plugs into                                                                                                                                                                                                                                                                                                                                                                                                                                                         |             |                                                                       |
| <b>Simulation Properties</b> | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>Type</b> | <b>Description</b>                                                    |
|                              | addComponentElement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             | Initializes the port from XML                                         |
|                              | getDisplayText                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |             | Gets the display text used on Tooltips and partially connected cables |
|                              | getType                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |             | A convenience for getting the type property, TYPE_PROPERTY_NAME       |
|                              | setDisplayText                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |             | Sets the display text used on Tooltips and partially connected cables |

|                                                                |                                                |             |                                                                 |
|----------------------------------------------------------------|------------------------------------------------|-------------|-----------------------------------------------------------------|
|                                                                | setPalette                                     |             | Sets the fully qualified name of the cable palette object       |
|                                                                | setType                                        |             | A convenience for setting the type property, TYPE_PROPERTY_NAME |
| <b>Inherent Properties</b>                                     | <b>Property Name</b>                           | <b>Type</b> | <b>Description</b>                                              |
|                                                                |                                                |             |                                                                 |
|                                                                |                                                |             |                                                                 |
| <b>Java Class Name</b>                                         | Port                                           |             |                                                                 |
| <b>Java Class Path</b>                                         | om.realvue.sim.components.swing2d.cabling.Port |             |                                                                 |
| <b>Java Methods Exposed</b>                                    |                                                |             |                                                                 |
| <b>Attributes</b><br>Type<br>Possible Values<br>Default Values |                                                |             |                                                                 |
| <b>Extends to</b>                                              | SimPanel                                       |             |                                                                 |
| <b>Special Considerations</b>                                  |                                                |             |                                                                 |

### SimComponent Name: ProbeSpot

|                              |                                                                                                                                               |             |                                                                                                           |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------|
| <b>Short Name</b>            | ProbeSpot                                                                                                                                     |             |                                                                                                           |
| <b>Long Name</b>             | com.realvue.sim.components.swing2d.tools.ProbeSpot                                                                                            |             |                                                                                                           |
| <b>Type of SimComponent</b>  | Visual - Tools                                                                                                                                |             |                                                                                                           |
| <b>Description</b>           | A component that responds to probe attachment by the MultimeterPanel with corresponding properties which can be set or queried via the model. |             |                                                                                                           |
| <b>Usage</b>                 | Typically used to provide an area which will respond to multimeter probes (the red probe or the black probe can be attached)                  |             |                                                                                                           |
| <b>Simulation Properties</b> | <b>Property Name</b>                                                                                                                          | <b>Type</b> | <b>Description</b>                                                                                        |
|                              | blackProbeConnected                                                                                                                           |             | Called to notify this component that the black probe from the specified multimeter has just been attached |

|                                                 |                                                                                                                                                                                                                                                                                                |             |                                                                                                                  |
|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------------------------------------------------------------------------------------------------------|
|                                                 | blackProbeDisconnected                                                                                                                                                                                                                                                                         |             | Called to notify this component that the black probe from the specified multimeter has just been disconnected    |
|                                                 | connectProbe                                                                                                                                                                                                                                                                                   |             | Responds to a property change request by connecting a probe to this component                                    |
|                                                 | redProbeConnected                                                                                                                                                                                                                                                                              |             | Called to notify this component that the red probe from the specified multimeter has just been attached          |
|                                                 | redProbeDisconnected                                                                                                                                                                                                                                                                           |             | Called to notify this component that the red probe from the specified multimeter has just been disconnected      |
|                                                 | setupProperties                                                                                                                                                                                                                                                                                |             | Called from both constructors and sets up the probeConnected property and adds it to this component in the model |
| <b>Inherent/Model Properties</b>                | <b>Property Name</b>                                                                                                                                                                                                                                                                           | <b>Type</b> | <b>Description</b>                                                                                               |
|                                                 | probeConnected                                                                                                                                                                                                                                                                                 | string      | Fully qualified name of multimeter probe connected to this component, if any                                     |
| <b>Java Class Name</b>                          | ProbeSpot                                                                                                                                                                                                                                                                                      |             |                                                                                                                  |
| <b>Java Class Path</b>                          | com.realvue.sim.components.swing2d.tools.ProbeSpot                                                                                                                                                                                                                                             |             |                                                                                                                  |
| <b>Java Methods Exposed</b>                     |                                                                                                                                                                                                                                                                                                |             |                                                                                                                  |
| <b>Attributes</b>                               |                                                                                                                                                                                                                                                                                                |             |                                                                                                                  |
| <b>Inherits Properties and Attributes from:</b> | SimPanel                                                                                                                                                                                                                                                                                       |             |                                                                                                                  |
| <b>Extends to</b>                               | InteractivePanel                                                                                                                                                                                                                                                                               |             |                                                                                                                  |
| <b>Special Considerations</b>                   | The parent component or another component must handle any graphical changes which occur as a result of connecting or disconnecting a multimeter probe to a ProbeSpot component. The component actually inherits from InteractivePanel class, but all properties/attributes come from SimPanel. |             |                                                                                                                  |

**SimComponent Name:** PushButtonPanel

|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |             |                                                                                                                                                                                           |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Short Name</b>            | PushButtonPanel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |             |                                                                                                                                                                                           |
| <b>Long Name</b>             | com.realvue.sim.components.swing2d.PushButtonPanel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |             |                                                                                                                                                                                           |
| <b>Type of SimComponent</b>  | Generic Visual                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |             |                                                                                                                                                                                           |
| <b>Description</b>           | <p>Simulates a hardware push-button that can operate in various modes specifying how and when the model property is set on or off. Unlike the TogglePanel, the visual state of this button and the model “on” property can differ, depending on the mode of the button.</p> <p>This button’s visual state always matches the state of the mouse (when the mouse is “down” or “pressed”, the button will use panelImage 1; when the mouse is “up” or “released”, the button will use panelImage 0). The status state (inherited from the superclass and renamed to ON_PROPERTY_NAME), however, will be changed according to the rules of the mode for this push button; which must be one of the following:</p> <ul style="list-style-type: none"> <li>• PB_MODE_0 (or “shift” mode): the model property is 1 when the mouse is pressed and held down and 0 when the mouse is released</li> <li>• PB_MODE_1 (or “toggle” mode): the model property toggles between 0 and 1 when mouse is clicked.</li> <li>• PB_MODE_2 (or “capslock” mode): the model property toggles between 0 and 1 when mouse is pressed.</li> </ul> <p>Again remember that the PushButtonPanel’s visual state ALWAYS matches the state of the mouse button (so when the mouse is released, the panelImage will always be set to 0).<br/>The entire area of this component will respond to the mouse, even if the panel image or images do not take up the full bounds of the component.</p> |             |                                                                                                                                                                                           |
| <b>Usage</b>                 | Typically used as a push button like a keyboard key                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |                                                                                                                                                                                           |
| <b>Simulation Properties</b> | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>Type</b> | <b>Description</b>                                                                                                                                                                        |
|                              | handleStatusPropertyChange                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |             | This override prevents the automatic superclass mapping between the status property and the image index property (which this class handles differently depending on the push button mode) |

|                                                 |                                                    |             |                                                                                                                                                                                                                   |
|-------------------------------------------------|----------------------------------------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                 | setPBMode                                          |             | Changes the mode of the push button; this class understands these modes: PB_MODE_0 (or “shift” mode): status state is 1 only as long as mouse is held down; when the mouse is released, status state returns to 0 |
|                                                 | toggleStatusState                                  |             | Toggles the status state (if the state is currently 0, this method will set it to 1.)                                                                                                                             |
| <b>Inherent Properties</b>                      | <b>Property Name</b>                               | <b>Type</b> | <b>Description</b>                                                                                                                                                                                                |
|                                                 | on                                                 | int         | Button is on (1) or off (0)                                                                                                                                                                                       |
| <b>Java Class Name</b>                          | PushButtonPanel                                    |             |                                                                                                                                                                                                                   |
| <b>Java Class Path</b>                          | com.realvue.sim.components.swing2d.PushButtonPanel |             |                                                                                                                                                                                                                   |
| <b>Java Methods Exposed</b>                     |                                                    |             |                                                                                                                                                                                                                   |
| <b>Attributes</b>                               | <b>Attribute Name</b>                              | <b>Type</b> | <b>Description</b>                                                                                                                                                                                                |
| <b>Additional XML Attributes:</b>               | pBMode                                             |             | Specifies the mode of the push-button                                                                                                                                                                             |
| <b>Inherits Properties and Attributes from:</b> | SimPanel                                           |             |                                                                                                                                                                                                                   |
| <b>Extends to</b>                               | InteractivePanel                                   |             |                                                                                                                                                                                                                   |
| <b>Special Considerations</b>                   |                                                    |             |                                                                                                                                                                                                                   |

**SimComponent Name:** Sequence

|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                                                                                                       |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------------------------------------------------------------------------------------------------|
| <b>Short Name</b>            | Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |                                                                                                       |
| <b>Long Name</b>             | com.realvue.sim.components.nonvisual.Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |             |                                                                                                       |
| <b>Type of SimComponent</b>  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                                                                                                       |
| <b>Description</b>           | <p>A component that can be started and stopped and causes a series of property changes to happen at defined times. Sequences expose two boolean properties: run and loop.</p> <ul style="list-style-type: none"> <li>Setting loop=1 and run=1 will cause the Sequence to repeat until run is set to 0.</li> <li>Setting loop=0 and run=1 will cause the Sequence to run once. Run is set to 0 when the Sequence is finished.</li> </ul> <p>Model changes are encapsulated in DeltaValueBean objects specified by the &lt;delta&gt; tag.</p> |             |                                                                                                       |
| <b>Usage</b>                 | Typically used as a container for a set of model changes over time which can be run in looping or non-looping mode. Also used to implement sequence-scheduling in another component by passing that component in the Sequence constructor. In this case, Sequence will register its properties on the target component.                                                                                                                                                                                                                     |             |                                                                                                       |
| <b>Simulation Properties</b> | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>Type</b> | <b>Description</b>                                                                                    |
|                              | addChange                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |             | Adds a scheduled change to this sequence                                                              |
|                              | getLoopProperty                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             | Gets the Property that handles loop                                                                   |
|                              | getRunProperty                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             | Gets the Property that handles run                                                                    |
|                              | loop                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |             | Convenience method to start a looping sequence                                                        |
|                              | run                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |             | Schedules the events for this sequence                                                                |
|                              | start                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |             | Starts a sequence running                                                                             |
|                              | stop                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |             | Stops a running sequence                                                                              |
|                              | unschedule                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |             | Provides a best-effort attempt to stop execution of the sequence by unscheduling all remaining events |

| Inherent/Model Properties                                      | Property Name                                 | Type    | Description                                                                                  |
|----------------------------------------------------------------|-----------------------------------------------|---------|----------------------------------------------------------------------------------------------|
|                                                                | run                                           | boolean | Runs or stops the sequence                                                                   |
|                                                                | loop                                          | boolean | Sets the looping property of the sequence (if true, then when sequence is run, it will loop) |
| <b>Java Class Name</b>                                         | Sequence                                      |         |                                                                                              |
| <b>Java Class Path</b>                                         | com.realvue.sim.components.nonvisual.Sequence |         |                                                                                              |
| <b>Java Methods Exposed</b>                                    |                                               |         |                                                                                              |
| <b>Attributes</b><br>Type<br>Possible Values<br>Default Values |                                               |         |                                                                                              |
| <b>Extends to</b>                                              | BaseSimComponent                              |         |                                                                                              |
| <b>Special Considerations</b>                                  |                                               |         |                                                                                              |

**SimComponent Name: ShowCasePanel**

|                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Short Name</b>           | ShowCasePanel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Long Name</b>            | com.realvue.sim.components.java3d.ShowCasePanel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Type of SimComponent</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Description</b>          | <p>Can have several model files added to it for viewing. Several properties are also monitored to display the models differently based on their states. Showcase Component.</p> <ul style="list-style-type: none"> <li>• GOING_PROPERTY_NAME: 1 spins the models, 0 stops them from spinning.</li> <li>• SPEED_PROPERTY_NAME: the Value sets the speed of the spin to have a period of 4000/value, e.g. setting it to 4; the models will make one rotation every second.</li> <li>• OBJECTS_SHOWING: the index of the object which should be shown. ALL will cause them all to be shown.</li> <li>• DISABLED_PROPERTY_NAME: Objects which will not be shown.</li> </ul> |
| <b>Usage</b>                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

| <b>Simulation Properties</b>                                                        | <b>Property Name</b>                            | <b>Type</b> | <b>Description</b>                                                                    |
|-------------------------------------------------------------------------------------|-------------------------------------------------|-------------|---------------------------------------------------------------------------------------|
|                                                                                     | add3DObject                                     |             | Adds a 3D object to the panel's scene                                                 |
|                                                                                     | setLive                                         |             | Sets this panel as live so it can be displayed by the builder                         |
|                                                                                     | setModel                                        |             | Adds the model for fileName to the list of models to be displayed for the given index |
| <b>Inherent/Model Properties</b>                                                    | <b>Property Name</b>                            | <b>Type</b> | <b>Description</b>                                                                    |
|                                                                                     |                                                 |             |                                                                                       |
|                                                                                     |                                                 |             |                                                                                       |
| <b>Java Class Name</b>                                                              | ShowCasePanel                                   |             |                                                                                       |
| <b>Java Class Path</b>                                                              | com.realvue.sim.components.java3d.ShowCasePanel |             |                                                                                       |
| <b>Java Methods Exposed</b>                                                         |                                                 |             |                                                                                       |
| <b>Attributes</b><br><b>Type</b><br><b>Possible Values</b><br><b>Default Values</b> |                                                 |             |                                                                                       |
| <b>Extends to</b>                                                                   | WordPanel                                       |             |                                                                                       |
| <b>Special Considerations</b>                                                       |                                                 |             |                                                                                       |

### **SimComponent Name:** SimFrame

|                             |                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Short Name</b>           | SimFrame                                                                                                                                                                                                                                                                                                                                  |
| <b>Long Name</b>            | com.realvue.sim.components.swing2d.SimFrame                                                                                                                                                                                                                                                                                               |
| <b>Type of SimComponent</b> |                                                                                                                                                                                                                                                                                                                                           |
| <b>Description</b>          | A standard multi-purpose, simulation-aware wrapped JFrame object that exposes positioning and decoration properties to the model and acts as a separate application window if desired. It implements the SimComponent interface in a similar fashion to SimPanel but cannot be used in most places where a SimPanel would be appropriate. |
| <b>Usage</b>                | Typically used as a sibling to other frames in a simulation (top-level citizen/simulation window of the user's desktop)                                                                                                                                                                                                                   |

| <b>Simulation Properties</b>     | <b>Property Name</b> | <b>Type</b> | <b>Description</b>                                                                                                                                                                                                                                      |
|----------------------------------|----------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                  | addLink              |             | A convenience method to link all the Properties of this SimComponent with the Properties of another SimComponent                                                                                                                                        |
|                                  | addLogicalChild      |             | Handles this method in a similar fashion to the SimPanel class by delegating simulation functionality to the ModelNode delegate and then performing a Swing.add (in this case, to the frame's content-pane) if no Swing parent for this child was found |
|                                  | getFullName          |             | The full name of the SimComponent                                                                                                                                                                                                                       |
|                                  | removeLogicalChild   |             | Removes a logical child from this SimComponent                                                                                                                                                                                                          |
|                                  | removeProperty       |             | Removes a Property from this component                                                                                                                                                                                                                  |
|                                  | setLogicalParent     |             | Sets the logical parent of this component                                                                                                                                                                                                               |
|                                  | simulationRunning    |             | Lifecycle method called when the simulation is completely initialized and is considered to be in its running state                                                                                                                                      |
| <b>Inherent/Model Properties</b> | <b>Property Name</b> | <b>Type</b> | <b>Description</b>                                                                                                                                                                                                                                      |
|                                  | show                 | boolean     | Visibility of frame, whether this frame should be visible or not                                                                                                                                                                                        |
|                                  | title                | string      | Text displayed in the frame's title bar                                                                                                                                                                                                                 |
|                                  | x                    | int         | x position of the frame on the screen                                                                                                                                                                                                                   |
|                                  | y                    | int         | y position of the frame on the screen                                                                                                                                                                                                                   |
|                                  | width                | int         | Width of the frame in pixels                                                                                                                                                                                                                            |
|                                  | height               | int         | Height of the frame in pixels                                                                                                                                                                                                                           |

|                                                                                     |                                                                                                                                                                                                                                     |         |                                                                                      |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--------------------------------------------------------------------------------------|
|                                                                                     | center                                                                                                                                                                                                                              | boolean | Centering of the frame, specify if the frame should be centered on the screen or not |
| <b>Java Class Name</b>                                                              | SimFrame                                                                                                                                                                                                                            |         |                                                                                      |
| <b>Java Class Path</b>                                                              | com.realvue.sim.components.swing2d.SimFrame                                                                                                                                                                                         |         |                                                                                      |
| <b>Java Methods Exposed</b>                                                         |                                                                                                                                                                                                                                     |         |                                                                                      |
| <b>Attributes</b><br><b>Type</b><br><b>Possible Values</b><br><b>Default Values</b> |                                                                                                                                                                                                                                     |         |                                                                                      |
| <b>Extends to</b>                                                                   | JFrame                                                                                                                                                                                                                              |         |                                                                                      |
| <b>Special Considerations</b>                                                       | <ul style="list-style-type: none"> <li>• The “center” property overrides any previously set values for the x, y, w, and h properties.</li> <li>• The SimFrame's hierarchy in the model will not match its AWT hierarchy.</li> </ul> |         |                                                                                      |

### SimComponent Name: SimMessageBox

|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |             |                                                                                |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------------------------------|
| <b>Short Name</b>            | SimMessageBox                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |                                                                                |
| <b>Long Name</b>             | com.realvue.sim.components.swing2d.SimMessageBox                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |             |                                                                                |
| <b>Type of SimComponent</b>  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |             |                                                                                |
| <b>Description</b>           | <p>A facility by which a simulation can display a message of varying degrees of severity. It can be dragged by any region not overlaid with another component. Its panel image can be changed programmatically (not via script). The text of the message is contained within a JTextArea component which can be replaced by subclasses if desired (they then must also override the setMessageText method accordingly). This component is not sim-aware; i.e., it does not have a presence in the data model. However, the SimulationMessageBoxManager object is sim-aware and is responsible for managing one or more of these SimMessageBox objects.</p> |             |                                                                                |
| <b>Usage</b>                 | Typically used as a dialog box to display simulation messages                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |                                                                                |
| <b>Simulation Properties</b> | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>Type</b> | <b>Description</b>                                                             |
|                              | addMouseMotionListener                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             | Sets up the mouse motion listener by which this component handles drag actions |

|                                                                |                                                  |             |                                                                                                   |
|----------------------------------------------------------------|--------------------------------------------------|-------------|---------------------------------------------------------------------------------------------------|
|                                                                | getMessageComponent                              |             | Gets a handle on the text area or derivative currently used to display the message                |
|                                                                | getMessageText                                   |             |                                                                                                   |
|                                                                | setBackgroundImageName                           |             | Changes the image used for the background of this dialog box                                      |
|                                                                | setMessageComponent                              |             | Replaces the message component for this message box with the specified JLabel or subclass thereof |
|                                                                | setMessageText                                   |             | Changes the text of the message to be displayed inside the message text component                 |
| <b>Inherent Properties</b>                                     | <b>Property Name</b>                             | <b>Type</b> | <b>Description</b>                                                                                |
|                                                                |                                                  |             |                                                                                                   |
|                                                                |                                                  |             |                                                                                                   |
| <b>Java Class Name</b>                                         | SimMessageBox                                    |             |                                                                                                   |
| <b>Java Class Path</b>                                         | com.realvue.sim.components.swing2d.SimMessageBox |             |                                                                                                   |
| <b>Java Methods Exposed</b>                                    |                                                  |             |                                                                                                   |
| <b>Attributes</b><br>Type<br>Possible Values<br>Default Values |                                                  |             |                                                                                                   |
| <b>Extends to</b>                                              | JPanel                                           |             |                                                                                                   |
| <b>Special Considerations</b>                                  |                                                  |             |                                                                                                   |

**SimComponent Name:** SimPanel

|                              |                                                                                                                                                                                                                                                                                                                                                                     |             |                                                                                                                                                  |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Short Name</b>            | SimPanel                                                                                                                                                                                                                                                                                                                                                            |             |                                                                                                                                                  |
| <b>Long Name</b>             | com.realvue.sim.components.swing2d.SimPanel                                                                                                                                                                                                                                                                                                                         |             |                                                                                                                                                  |
| <b>Type of SimComponent</b>  |                                                                                                                                                                                                                                                                                                                                                                     |             |                                                                                                                                                  |
| <b>Description</b>           | A standard multi-purpose, simulation-aware panel that is a base class for many hardware components and some software components. The panel exposes property “panellImage” to allow selection of one of a set of images by code or script. The image displayed may be tiled if setTiled(boolean) is specified somehow. The panel can contain other Swing components. |             |                                                                                                                                                  |
| <b>Usage</b>                 | Typically used to display images and the containment of other, more active, simulation controls; a basic component for almost everything, only displays images                                                                                                                                                                                                      |             |                                                                                                                                                  |
| <b>Simulation Properties</b> | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                | <b>Type</b> | <b>Description</b>                                                                                                                               |
|                              | addComponentElement                                                                                                                                                                                                                                                                                                                                                 |             | Adds an XML-defined panellImage and Property link to this SimPanel                                                                               |
|                              | addLink                                                                                                                                                                                                                                                                                                                                                             |             | A convenience method to link all the Properties of this SimComponent with the Properties of another SimComponent                                 |
|                              | addLogicalChild                                                                                                                                                                                                                                                                                                                                                     |             | This method satisfies a requirement of the SimComponent interface by establishing a logical relationship between the parent and child components |
|                              | addPropertyChangeListener                                                                                                                                                                                                                                                                                                                                           |             | Adds property listener to a property contained within our OWN subsystem                                                                          |
|                              | addPropertyLink                                                                                                                                                                                                                                                                                                                                                     |             | Adds a link between two properties (either contained within this component or within a subcomponent of this component)                           |
|                              | findComponent                                                                                                                                                                                                                                                                                                                                                       |             | Finds a component (lightweight or heavyweight) with the given name fragment which exists inside this component                                   |

|                                                                |                                                         |             |                                                                                                                                                                 |
|----------------------------------------------------------------|---------------------------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                | getALLLightweightDecendents                             |             | Returns all components which exist in this UI metaphor whose closest sim-aware ancestor is this SimPanel                                                        |
|                                                                | getFullyQualifiedID                                     |             | This method delegates to the InterfaceEngine to navigate the tree of heavyweight and possibly lightweight components to generate a fully qualified component ID |
|                                                                | getLightweightChildren                                  |             | Returns the child components of this SimPanel which are not simulation-aware (must be AWT or Swing components in this UI metaphor)                              |
|                                                                | setPanelImage                                           |             | Sets an image at the specified index for the provided fileName                                                                                                  |
|                                                                | setPanelImages                                          |             | Sets the panel images for this component from an array of file names                                                                                            |
|                                                                | setVisible                                              |             | Handles visibility changes, when the visibilityEnabled flag is true, otherwise default to regular swing behavior                                                |
| <b>Inherent/Model Properties</b>                               | <b>Property Name</b>                                    | <b>Type</b> | <b>Description</b>                                                                                                                                              |
|                                                                | panellImage                                             | int         | The description of the panellImage property                                                                                                                     |
| <b>Java Class Name</b>                                         | SimPanel                                                |             |                                                                                                                                                                 |
| <b>Java Class Path</b>                                         | com.realvue.sim.components.swing2d.SimPanel             |             |                                                                                                                                                                 |
| <b>Java Methods Exposed</b>                                    |                                                         |             |                                                                                                                                                                 |
| <b>Attributes</b><br>Type<br>Possible Values<br>Default Values |                                                         |             |                                                                                                                                                                 |
| <b>Extends to</b>                                              | JLayerPane                                              |             |                                                                                                                                                                 |
| <b>Special Considerations</b>                                  | Specify panel images by use of the PanellImage XML tag. |             |                                                                                                                                                                 |

**SimComponent Name:** SimWindow

|                                  |                                                                               |               |                                                                                         |                                                                        |
|----------------------------------|-------------------------------------------------------------------------------|---------------|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| <b>Short Name</b>                | SimWindow                                                                     |               |                                                                                         |                                                                        |
| <b>Long Name</b>                 | com.realvue.sim.client.SimWindow                                              |               |                                                                                         |                                                                        |
| <b>Type of SimComponent</b>      |                                                                               |               |                                                                                         |                                                                        |
| <b>Description</b>               | A top-level simulation-aware desktop window that is an extension of SimFrame. |               |                                                                                         |                                                                        |
| <b>Usage</b>                     |                                                                               |               |                                                                                         |                                                                        |
| <b>Simulation Properties</b>     | <b>Property Name</b>                                                          | <b>Type</b>   | <b>Description</b>                                                                      |                                                                        |
|                                  | getShowAtStartup                                                              |               | Gets the property that this SimWindow will be made visible as the simulation starts     |                                                                        |
|                                  | setConfirmExit                                                                |               | Sets the property that closing this window will display a confirmation dialog           |                                                                        |
|                                  | setExitOnClose                                                                |               | Sets the property that closing this simulation window will cause the simulation to exit |                                                                        |
|                                  | setShowAtStartup                                                              |               | Sets the property that this SimWindow will be made visible as the simulation starts     |                                                                        |
| <b>Inherent/Model Properties</b> | <b>Property Name</b>                                                          | <b>Type</b>   | <b>Description</b>                                                                      |                                                                        |
|                                  |                                                                               |               |                                                                                         |                                                                        |
|                                  |                                                                               |               |                                                                                         |                                                                        |
|                                  |                                                                               |               |                                                                                         |                                                                        |
| <b>Java Class Name</b>           | SimWindow                                                                     |               |                                                                                         |                                                                        |
| <b>Java Class Path</b>           | com.realvue.sim.client.SimWindow                                              |               |                                                                                         |                                                                        |
| <b>Java Methods Exposed</b>      |                                                                               |               |                                                                                         |                                                                        |
| <b>Attributes</b>                | <b>Attribute Name</b>                                                         | <b>Type</b>   | <b>Description</b>                                                                      |                                                                        |
|                                  | <b>Additional XML Attributes</b>                                              | showAtStartup | boolean                                                                                 | When true, causes this window to be made visible at simulation startup |
|                                  |                                                                               | exitOnClose   | boolean                                                                                 | When true, causes the simulation to exit when this window is closed    |

|                                  |          |
|----------------------------------|----------|
| <b>Inherits Attributes from:</b> | SimFrame |
| <b>Extends to</b>                | SimFrame |
| <b>Special Considerations</b>    |          |

### SimComponent Name: SwitchPanel

|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |             |                                                                                                                                                        |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Short Name</b>                | SwitchPanel                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |             |                                                                                                                                                        |
| <b>Long Name</b>                 | com.realvue.sim.components.swing2d.SwitchPanel                                                                                                                                                                                                                                                                                                                                                                                                                                         |             |                                                                                                                                                        |
| <b>Type of SimComponent</b>      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |             |                                                                                                                                                        |
| <b>Description</b>               | A specific implementation of the HotSpotPanel. Simulates a hardware switch which has two positions (on and off) and, by default, is restricted to two hotspots and status values of 0 or 1. Subclasses of this component can provide additional behavior by calling the HotSpotPanel.setMaxValue(int) method accordingly. The “autoDivide” feature is provided for switches that just want the area of the switch divided into two equal-sized regions, either vertical or horizontal. |             |                                                                                                                                                        |
| <b>Usage</b>                     | Typically used as a switch; where two positions are indicated with hotspots, or provided by default according to the autoDivide setting                                                                                                                                                                                                                                                                                                                                                |             |                                                                                                                                                        |
| <b>Simulation Properties</b>     | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Type</b> | <b>Description</b>                                                                                                                                     |
|                                  | getAutoDivide                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             | Returns the current autodivide setting of this switch                                                                                                  |
|                                  | setAutoDivide                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             | Changes the “autodivide” setting for this switch                                                                                                       |
|                                  | setHotSpot                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             | This override ensures that a hotspot whose index exceeds the maximum allowed status value for this component (or a subclass thereof) will not be added |
| <b>Inherent/Model Properties</b> | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Type</b> | <b>Description</b>                                                                                                                                     |
|                                  | on                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | int         | Switch is on (1) or off (0)                                                                                                                            |
| <b>Java Class Name</b>           | SwitchPanel                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |             |                                                                                                                                                        |
| <b>Java Class Path</b>           | com.realvue.sim.components.swing2d.SwitchPanel                                                                                                                                                                                                                                                                                                                                                                                                                                         |             |                                                                                                                                                        |
| <b>Java Methods Exposed</b>      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |             |                                                                                                                                                        |

|                                                 |                                                                                                       |  |  |  |
|-------------------------------------------------|-------------------------------------------------------------------------------------------------------|--|--|--|
| <b>Attributes</b>                               |                                                                                                       |  |  |  |
| <b>Inherits Properties and Attributes from:</b> | SimPanel                                                                                              |  |  |  |
| <b>Extends to</b>                               | HotSpotPanel                                                                                          |  |  |  |
| <b>Special Considerations</b>                   | This component inherits directly from HotSpotPanel which is abstract and not initializeable from XML. |  |  |  |

## SimComponent Name: TogglePanel

|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |             |                                                                        |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------------------------------------------------------------|
| <b>Long Name</b>             | com.realvue.sim.components.swing2d.TogglePanel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |             |                                                                        |
| <b>Short Name</b>            | TogglePanel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             |                                                                        |
| <b>Type of SimComponent</b>  | Generic Visual                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |             |                                                                        |
| <b>Description</b>           | <p>Extends InteractivePanel to provide a common class for implementing simulation components where a mouse-click should toggle a property value and the visual state. This component can toggle through a series of values, bounded by the maxValu setting, i.e., if three values are desired, the maxValu setting would be 2 (since values 0, 1, and 2 are possible for the status property inherited from InteractivePanel). The component can provide 1 hotspot (no more) to narrow the responsive area of the component. If no hotspot is provided, the entire area of the component will be used. If more than one hotspot is provided, only the last one will be used.</p> |             |                                                                        |
| <b>Usage</b>                 | <p>Typically used to simulate a hardware item/button that toggles between two different states; flips between two images when clicked on<br/>The visual state always matches its abstract state; i.e. a button which you would push once to turn “on” and once again to turn “off”.</p>                                                                                                                                                                                                                                                                                                                                                                                          |             |                                                                        |
| <b>Simulation Properties</b> | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>Type</b> | <b>Description</b>                                                     |
|                              | addComponentElement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             | Adds the user XML-defined hotspot to this TogglePanel                  |
|                              | getMaxValue                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             | Gets the maximum allowable zero-based value for the status property    |
|                              | seeHotSpot                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |             | Changes the responsive area of this component to the specified regions |
|                              | setMaxValue                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             | Sets the maximum allowable zero-based value for the status property    |

|                                                 |                                                                                                           |             |                                                                 |
|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------|-------------|-----------------------------------------------------------------|
|                                                 | setDefaultHotSpot                                                                                         |             | Sets up the default hotspot (the entire area of this component) |
|                                                 | setupHotSpot                                                                                              |             | Implementation of hotspot changes                               |
| <b>Inherent Properties</b>                      | <b>Property Name</b>                                                                                      | <b>Type</b> | <b>Description</b>                                              |
|                                                 | on                                                                                                        | int         | Component is on (1) or off (0)                                  |
| <b>Java Class Name</b>                          | TogglePanel                                                                                               |             |                                                                 |
| <b>Java Class Path</b>                          | com.realvue.sim.components.swing2d.TogglePanel                                                            |             |                                                                 |
| <b>Java Methods Exposed</b>                     |                                                                                                           |             |                                                                 |
| <b>Attributes</b>                               |                                                                                                           |             |                                                                 |
| <b>Inherits Properties and Attributes from:</b> | SimPanel                                                                                                  |             |                                                                 |
| <b>Extends to</b>                               | InteractivePanel                                                                                          |             |                                                                 |
| <b>Special Considerations</b>                   | This component inherits directly from InteractivePanel which is abstract and not initializeable from XML. |             |                                                                 |

**SimComponent Name: Volume**

|                              |                      |             |                    |
|------------------------------|----------------------|-------------|--------------------|
| <b>Short Name</b>            |                      |             |                    |
| <b>Long Name</b>             |                      |             |                    |
| <b>Type of SimComponent</b>  |                      |             |                    |
| <b>Description</b>           |                      |             |                    |
| <b>Usage</b>                 |                      |             |                    |
| <b>Simulation Properties</b> | <b>Property Name</b> | <b>Type</b> | <b>Description</b> |
|                              |                      |             |                    |
|                              |                      |             |                    |
|                              |                      |             |                    |

| Inherent/Model Properties                                      | Property Name | Type | Description |  |
|----------------------------------------------------------------|---------------|------|-------------|--|
|                                                                |               |      |             |  |
|                                                                |               |      |             |  |
| <b>Java Class Name</b>                                         |               |      |             |  |
| <b>Java Class Path</b>                                         |               |      |             |  |
| <b>Java Methods Exposed</b>                                    |               |      |             |  |
| <b>Attributes</b><br>Type<br>Possible Values<br>Default Values |               |      |             |  |
| <b>Extends to</b>                                              |               |      |             |  |
| <b>Special Considerations</b>                                  |               |      |             |  |

### SimComponent Name: WindowsDrive

|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |             |                                                                                                                        |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------------------------------------------------------------------------------------------------------------|
| <b>Short Name</b>            | WindowsDrive                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |             |                                                                                                                        |
| <b>Long Name</b>             | com.realvue.sim.components.computer.WindowsDrive                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |                                                                                                                        |
| <b>Type of SimComponent</b>  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |             |                                                                                                                        |
| <b>Description</b>           | <p>A FileSystem with the following restrictions:</p> <ol style="list-style-type: none"> <li>1. One and only one root folder, which must be named “\”</li> <li>2. DisplayName of this object must be one letter followed by a colon An additional model property for “label” is provided so that a drive of the typical Windows form can be correctly simulated. The “displayName” property inherited from Part should be the drive letter with the colon (“C:”); the “label” property should be used for the descriptive label allowed by DOS and Windows. Typically, the model name should be the drive letter without the colon.</li> </ol> |             |                                                                                                                        |
| <b>Usage</b>                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |             |                                                                                                                        |
| <b>Simulation Properties</b> | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>Type</b> | <b>Description</b>                                                                                                     |
|                              | addFolder                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             | This override ensures that only one root folder can be contained within a Windows Drive, and that it must be named “\” |

|                                                                |                                                  |             |                                                             |
|----------------------------------------------------------------|--------------------------------------------------|-------------|-------------------------------------------------------------|
|                                                                | getRootFolder                                    |             | Returns the root folder for this WindowsDrive, if it exists |
|                                                                | handleLabelPropertyChange                        |             |                                                             |
| <b>Inherent/Model Properties</b>                               | <b>Property Name</b>                             | <b>Type</b> | <b>Description</b>                                          |
|                                                                |                                                  |             |                                                             |
|                                                                |                                                  |             |                                                             |
| <b>Java Class Name</b>                                         | WindowsDrive                                     |             |                                                             |
| <b>Java Class Path</b>                                         | com.realvue.sim.components.computer.WindowsDrive |             |                                                             |
| <b>Java Methods Exposed</b>                                    |                                                  |             |                                                             |
| <b>Attributes</b><br>Type<br>Possible Values<br>Default Values |                                                  |             |                                                             |
| <b>Extends to</b>                                              | FileSystem                                       |             |                                                             |
| <b>Special Considerations</b>                                  |                                                  |             |                                                             |

### SimComponent Name: WorldObject

|                              |                                                                                                                                                                                                               |             |                                                        |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------|
| <b>Short Name</b>            | WorldObject                                                                                                                                                                                                   |             |                                                        |
| <b>Long Name</b>             | com.realvue.sim.components.java3d.WorldObject                                                                                                                                                                 |             |                                                        |
| <b>Type of SimComponent</b>  |                                                                                                                                                                                                               |             |                                                        |
| <b>Description</b>           | Represents a 3D object that can be displayed in a 3D world. A WorldObject has a 3D node. The Group is what actually gets attached to the 3D world. Objects attached to this node will appear in the 3D world. |             |                                                        |
| <b>Usage</b>                 |                                                                                                                                                                                                               |             |                                                        |
| <b>Simulation Properties</b> | <b>Property Name</b>                                                                                                                                                                                          | <b>Type</b> | <b>Description</b>                                     |
|                              | getFileName                                                                                                                                                                                                   |             | Retrieves the filename in which this object is defined |
|                              | getName                                                                                                                                                                                                       |             | Returns the name of this object                        |

|                                                                                     |                                               |             |                                                                                                          |
|-------------------------------------------------------------------------------------|-----------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------|
|                                                                                     | getObjectName                                 |             | Gets the name of the object as it is defined in the 3D file                                              |
|                                                                                     | setFileName                                   |             | Sets the filename of the model from which this object will be loaded                                     |
|                                                                                     | setLive                                       |             | Adds the objects for this object to the 3D world and adds all children as children in the 3D world graph |
|                                                                                     | setMouseoverCursor                            |             | Sets the cursor for this world object that will be shown when the mouse is over it                       |
|                                                                                     | setName                                       |             | Sets the name of this 3D object                                                                          |
|                                                                                     | setObjectName                                 |             | Sets the name of the object in the file in which it is defined                                           |
|                                                                                     | toString                                      |             | Returns a string representation of this object                                                           |
| <b>Inherent Properties</b>                                                          | <b>Property Name</b>                          | <b>Type</b> | <b>Description</b>                                                                                       |
|                                                                                     |                                               |             |                                                                                                          |
|                                                                                     |                                               |             |                                                                                                          |
| <b>Java Class Name</b>                                                              | WorldObject                                   |             |                                                                                                          |
| <b>Java Class Path</b>                                                              | com.realvue.sim.components.java3d.WorldObject |             |                                                                                                          |
| <b>Java Methods Exposed</b>                                                         |                                               |             |                                                                                                          |
| <b>Attributes</b><br><b>Type</b><br><b>Possible Values</b><br><b>Default Values</b> |                                               |             |                                                                                                          |
| <b>Extends to</b>                                                                   | TransformObject                               |             |                                                                                                          |
| <b>Special Considerations</b>                                                       |                                               |             |                                                                                                          |

**SimComponent Name:** WorldPanel

|                              |                                                      |             |                                                                                                                                                                                 |
|------------------------------|------------------------------------------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Short Name</b>            | WorldPanel                                           |             |                                                                                                                                                                                 |
| <b>Long Name</b>             | com.realvue.sim.components.java3d.WorldPanel         |             |                                                                                                                                                                                 |
| <b>Type of SimComponent</b>  |                                                      |             |                                                                                                                                                                                 |
| <b>Description</b>           | 3D WorldPanel to which TransformObjects may be added |             |                                                                                                                                                                                 |
| <b>Usage</b>                 |                                                      |             |                                                                                                                                                                                 |
| <b>Simulation Properties</b> | <b>Property Name</b>                                 | <b>Type</b> | <b>Description</b>                                                                                                                                                              |
|                              | add3DObject                                          |             | Adds a 3D object to this panel                                                                                                                                                  |
|                              | addCamera                                            |             | Adds a camera to the list of cameras that can be used in this panel                                                                                                             |
|                              | addLogicalChild                                      |             | Adds a 3D object to be displayed in this panel<br>findComponent - Find a component (lightweight or heavyweight) with the given name fragment which exists inside this component |
|                              | get3DObjects                                         |             | Fetches the Objects that have been added to this panel                                                                                                                          |
|                              | getBuilder                                           |             | Gets the builder that manages the 3D universe for this panel                                                                                                                    |
|                              | getCachedNamedObjects                                |             | Gets all the named objects for the file filename and caches them before returning them                                                                                          |
|                              | getLogicalChildren                                   |             | Gets all of the logical children for this component                                                                                                                             |
|                              | setBackground                                        |             | Sets the background color of the panel                                                                                                                                          |
|                              | setBounds                                            |             | Sets the size of the 3D panel                                                                                                                                                   |
|                              | setDefaultLighting                                   |             | Turns on ambient lighting for scenes                                                                                                                                            |
|                              | setLive                                              |             | Causes all children to be set live                                                                                                                                              |

|                                                                                     |                                              |             |                                              |
|-------------------------------------------------------------------------------------|----------------------------------------------|-------------|----------------------------------------------|
|                                                                                     | setMaximumFrameRate                          |             | Sets the maximum frame rate for this panel   |
|                                                                                     | setVisible                                   |             | Sets this panel and the 3D canvas to visible |
| <b>Inherent/Model Properties</b>                                                    | <b>Property Name</b>                         | <b>Type</b> | <b>Description</b>                           |
|                                                                                     |                                              |             |                                              |
| <b>Java Class Name</b>                                                              | WorldPanel                                   |             |                                              |
| <b>Java Class Path</b>                                                              | com.realvue.sim.components.java3d.WorldPanel |             |                                              |
| <b>Java Methods Exposed</b>                                                         |                                              |             |                                              |
| <b>Attributes</b><br><b>Type</b><br><b>Possible Values</b><br><b>Default Values</b> |                                              |             |                                              |
| <b>Extends to</b>                                                                   | SimPanel                                     |             |                                              |
| <b>Special Considerations</b>                                                       |                                              |             |                                              |

### SimComponent Name: ZoomablePanel

|                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Short Name</b>           | ZoomablePanel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Long Name</b>            | com.realvue.sim.components.swing2d.ZoomablePanel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Type of SimComponent</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b>          | <p>A container for at least two ZoomViews which are the components that show the zoomed in and zoomed out versions of a component. Each view, simulated by a ZoomView, should be able to navigate to additional ZoomViews by clicking on specified regions. Typically, two views will be provided with a ZoomPanel (a zoom-in view and a normal or zoom-out view). All mouse interaction must happen in the ZoomViews. They will define one or more hotspots which will change the zoom state of this component.</p> <p>The ZoomViews will all share the parent subsystem (this class being their parent). The ZoomViews will be able to specify a different visual parent for themselves (so they can escape the bounds of the original parent). The zoomed out view should completely fill the bounds of the parent (this object). It will always exist within this component. The zoom views, on the other hand, will be invisible when not “zoomed” to. Both the original concept for zoom where the small version is a simple back image and the large is active is supported; and the final concept for zoom where both</p> |

|                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                                                                                                           |
|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------|
| <b>Description (continued)</b>                  | contain the same components which hook to the same subsystems. The latter will be supported by the fact that the ZoomView component's getSubsystem call will return the parent (ZoomablePanel) subsystem. When a zoomed view is to be displayed, special processing will be taken to ensure that the zoomView is added to the correct level of the Swing hierarchy before being made visible. This may mean multiple add/removes for the same view, i.e., it is first added to this class; then removed and added to top_panel when zoomed; then removed and re-added here when dezoomed. Attributes on the zoomView class will control where it links up when it is to be displayed. Common default choices will be "parent" (within this component), "grandparent", and "top" as well as (hopefully) specifying a specific component by its fqcn. |             |                                                                                                           |
| <b>Usage</b>                                    | Typically used to zoom in or out to multiple views (uses ZoomView and builds on MultipleViewContainer)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |                                                                                                           |
| <b>Simulation Properties</b>                    | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>Type</b> | <b>Description</b>                                                                                        |
|                                                 | addImpl                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             | This override adds objects of type componentView to an internal list                                      |
|                                                 | getDefaultDezoomCursor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |                                                                                                           |
|                                                 | getDefaultZoomCursor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |                                                                                                           |
|                                                 | getZoomCursor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |             |                                                                                                           |
|                                                 | getZoomProperty                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             | Used by zoomView to get handle on zoomProperty, which they need to manipulate in their hotspot processing |
|                                                 | setDezoomCursor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                                                                                                           |
|                                                 | setZoomCursor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |             |                                                                                                           |
| <b>Inherent/Model Properties</b>                | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>Type</b> | <b>Description</b>                                                                                        |
|                                                 | currentView                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | int         | Current component view being displayed (current side)                                                     |
| <b>Java Class Name</b>                          | ZoomablePanel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |             |                                                                                                           |
| <b>Java Class Path</b>                          | com.realvue.sim.components.swing2d.ZoomablePanel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |                                                                                                           |
| <b>Java Methods Exposed</b>                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                                                                                                           |
| <b>Attributes</b>                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                                                                                                           |
| <b>Inherits Properties and Attributes from:</b> | SimPanel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |             |                                                                                                           |

|                               |                                                                                                                                                                                                                      |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Extends to</b>             | MultipleViewContainer                                                                                                                                                                                                |
| <b>Special Considerations</b> | This component inherits directly from MultipleViewContainer which is abstract and not initializeable from XML. The model property <code>currentView</code> is actually contained in the MultipleViewContainer class. |

### SimComponent Name: ZoomPanel

|                               |                                                  |  |  |
|-------------------------------|--------------------------------------------------|--|--|
| <b>Short Name</b>             | ZoomPanel (see ZoomablePanel)                    |  |  |
| <b>Long Name</b>              | com.realvue.sim.components.swing2d.ZoomablePanel |  |  |
| <b>Type of SimComponent</b>   |                                                  |  |  |
| <b>Description</b>            |                                                  |  |  |
| <b>Usage</b>                  |                                                  |  |  |
| <b>Simulation Properties</b>  |                                                  |  |  |
| <b>Inherent Properties</b>    |                                                  |  |  |
| <b>Java Class Name</b>        | ZoomablePanel                                    |  |  |
| <b>Java Class Path</b>        | com.realvue.sim.components.swing2d.ZoomablePanel |  |  |
| <b>Java Methods Exposed</b>   |                                                  |  |  |
| <b>Attributes</b>             |                                                  |  |  |
| <b>Type</b>                   |                                                  |  |  |
| <b>Possible Values</b>        |                                                  |  |  |
| <b>Default Values</b>         |                                                  |  |  |
| <b>Extends to</b>             |                                                  |  |  |
| <b>Special Considerations</b> |                                                  |  |  |

### SimComponent Name: ZoomView

|                             |                                             |
|-----------------------------|---------------------------------------------|
| <b>Short Name</b>           | ZoomView                                    |
| <b>Long Name</b>            | com.realvue.sim.components.swing2d.ZoomView |
| <b>Type of SimComponent</b> |                                             |

|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                                                                                                                                  |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------|
| <b>Description</b>               | <p>Implements and manages one of two or more views of a ZoomPanel. One of the views will always be displayed if the ZoomPanel itself is visible. It will specify a region or regions which will change the value of the “zoom” property on the parent. It will connect to its parent’s subsystem automatically (will not have a subsystem of its own). The zoomView can be added/removed at arbitrary levels depending on its settings; but the logicalParent will always return the original containing zoomablePanel.</p> |             |                                                                                                                                  |
| <b>Usage</b>                     | <p>Typically used as one of the “views” of the ZoomPanel. Depending on the parentWhenZoomed attribute, a ZoomView can be displayed outside its parent (ZoomPanel) bounds.</p>                                                                                                                                                                                                                                                                                                                                               |             |                                                                                                                                  |
| <b>Simulation Properties</b>     | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>Type</b> | <b>Description</b>                                                                                                               |
|                                  | getParentWhenZoomed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |             | Returns the AWT/Swing component which will contain this zoomview when it is being displayed as the current view of its zoomPanel |
|                                  | getZoomIndex                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             | Gets the zoom index                                                                                                              |
|                                  | setParentWhenZoomed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |             | ParentString must be either a fully-qualified component name or one of several predefined constants defined above                |
|                                  | setupCursors                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |                                                                                                                                  |
|                                  | setZoomIndex                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |                                                                                                                                  |
|                                  | setZoomPanel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             | Notification method used by ZoomablePanel to notify ZoomView when it has been added to a ZoomablePanel                           |
| <b>Inherent/Model Properties</b> | <b>Property Name</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>Type</b> | <b>Description</b>                                                                                                               |
|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                                                                                                                                  |
|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                                                                                                                                  |
| <b>Java Class Name</b>           | ZoomView                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             |                                                                                                                                  |
| <b>Java Class Path</b>           | com.realvue.sim.components.swing2d.ZoomView                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |                                                                                                                                  |
| <b>Java Methods Exposed</b>      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |                                                                                                                                  |
| <b>Attributes</b>                | <b>Attribute Name</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>Type</b> | <b>Description</b>                                                                                                               |
| <b>Additional XML Attributes</b> | parentWhenZoomed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |             | Fully qualified name of component inside which this view will be displayed                                                       |

---

|                                                 |               |
|-------------------------------------------------|---------------|
| <b>Inherits Properties and Attributes from:</b> | ComponentView |
| <b>Extends to</b>                               | ComponentView |
| <b>Special Considerations</b>                   |               |

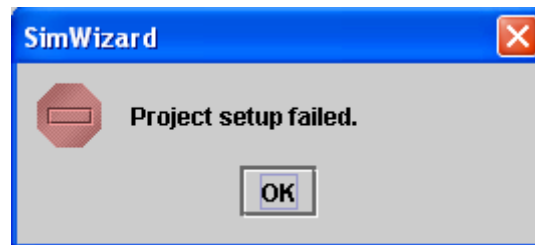


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## *Troubleshooting*

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If the SimWizard was not able to set up the new simulation, the following dialog box may appear:



**FIGURE 1:** SimWizard - Project Setup Failed

To close the dialog box, click **OK**. The SimWizard closes and the Launcher reappears.



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## *Glossary*

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The list below includes some terms that are used within this User Guide and throughout the SimAuthor Toolset.

| <b>Term</b>                    | <b>Definition</b>                                                                                                                                                                                                                                       |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Close button</b>            | The Windows icon (X) that appears in the upper-right corner of the window. Clicking the icon closes the window.                                                                                                                                         |
| <b>Extensible SimComponent</b> | A SimComponent whose definition and structure can be extended by the designer through the SimAuthor Toolset.                                                                                                                                            |
| <b>Inherent Property</b>       | A named attribute of a SimComponent that typically reflects static, but configurable, characteristics of a SimComponent. These are set in SimAuthor when the SimComponent is created and configured. An inherent property is not a simulation property. |
| <b>Insert Property</b>         | A dialog box that allows the user to enter property and type information when inserting a new property to a SimComponent.                                                                                                                               |
| <b>Launcher</b>                | The initial SimAuthor window that appears when the user starts SimAuthor. From here, the user can create, open, link, clone, or remove an existing simulation, view Help, or exit SimAuthor.                                                            |
| <b>Library</b>                 | A collection of SimComponents that holds templates for visual and non-visual elements or parts of a simulated system.                                                                                                                                   |
| <b>Model SimComponent</b>      | A non-visual SimComponent of the abstract model of a simulated system.                                                                                                                                                                                  |
| <b>Property</b>                | A named attribute of a SimComponent that defines the SimComponent's visual characteristics (e.g., size, color, screen location) or the state of the SimComponent (e.g., enabled, disabled).                                                             |

| <b>Term</b>                         | <b>Definition</b>                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Property Pane</b>                | Displays the property's fully qualified name, type, and current value. The user can view or hide the pane. Changes to the current value of the property in the pane is reflected in the execution of the simulation.                                                                                                                                                     |
| <b>Restriction</b>                  | A type of script function that is triggered before a property change.                                                                                                                                                                                                                                                                                                    |
| <b>Rule</b>                         | A type of script function that is triggered after a property change.                                                                                                                                                                                                                                                                                                     |
| <b>Script</b>                       | The language through which the simulation behavior is specified.                                                                                                                                                                                                                                                                                                         |
| <b>Script Console</b>               | A window that allows the user to directly enter and execute scripts in a running simulation.                                                                                                                                                                                                                                                                             |
| <b>Script File</b>                  | A file that contains one to many script functions.                                                                                                                                                                                                                                                                                                                       |
| <b>Script Function</b>              | A set of script statements that are triggered by a change in one or more simulation properties. Each script function has a name, type, one or more properties as a trigger, and a set of script statements. Script functions are attached, defined, and accessed through the simulation properties that trigger them.                                                    |
| <b>Script Function Editor</b>       | A window that allows the user to create and/or edit script function information, such as the name, script text, and property triggers.                                                                                                                                                                                                                                   |
| <b>SimAuthor</b>                    | The core authoring tool where the user can create and modify the elements of a simulation, such as the SimWindows, SimComponents, property values, and script functions.                                                                                                                                                                                                 |
| <b>SimAuthor Hierarchies</b>        | The set of hierarchies in SimAuthor that reflects the structure (the parts within parts) of the simulation consisting of SimWindows, SimComponents, simulation properties, and Script Functions.                                                                                                                                                                         |
| <b>SimAuthor Mode</b>               | The mode that indicates the active simulation is under development and can accept design changes from the SimAuthor Toolset. In this mode, the SimAuthor Toolset can be used to create and modify properties, SimWindows, SimComponents, and other elements. See Appendix C: Keyboard Shortcuts on page 57.                                                              |
| <b>SimComponent</b>                 | A visual or non-visual element or part of a simulated system. Each SimComponent contains a set of properties that define the user interface characteristics and the states of that SimComponent.                                                                                                                                                                         |
| <b>SimComponent Property Editor</b> | A window that displays a collection of inherent properties that can be edited according to its property type. The user can also assign an image to specific properties and edit the user interface characteristics and states.                                                                                                                                           |
| <b>SimComponent Move Tool</b>       | A tool that allows the user to control the placement of the SimComponent image on the screen. The tool displays the X-Y pixel coordinates and the width and height of the SimComponent image. The user can directly enter the coordinates or use the movement tools to move the image up, down, left, or right to place the Visual SimComponent in the desired position. |

| <b>Term</b>                | <b>Definition</b>                                                                                                                                                                                                                                                                          |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>SimLab</b>              | A testing tool that monitors a simulation's behavior. The SimLab can be used to create and/or modify property and script function information.                                                                                                                                             |
| <b>SimLibs' Selector</b>   | A window that lists available libraries of SimComponents.                                                                                                                                                                                                                                  |
| <b>SimLog</b>              | A window that displays a timed log trace of simulation properties, script function executions, and user events. The user can also start/stop logging and enable/disable the log entries.                                                                                                   |
| <b>Simulation Mode</b>     | The mode where the active simulation does not accept design changes from the SimAuthor Toolset. In this mode, the simulation is under development but only accepts user input (such as field names and checkboxes) as a running simulation. See Appendix C: Keyboard Shortcuts on page 57. |
| <b>Simulation Property</b> | A named attribute of a SimComponent that reflects the user interface characteristics (e.g., toggle up, toggle down) and states (e.g., enabled, disabled) of a SimComponent. Scripting against the set of simulation properties for all SimComponents specifies simulation behavior.        |
| <b>SimWindow</b>           | A window of the simulation under development. A simulation can have any number of SimWindows.                                                                                                                                                                                              |
| <b>Trigger</b>             | The action of beginning the execution of a script function or the SimComponent property that begins the execution of a script function.                                                                                                                                                    |
| <b>Visual SimComponent</b> | A visual SimComponent of the abstract model of a simulated system. An example would be a button, toggle button, or a switch.                                                                                                                                                               |
| <b>XML File Viewer</b>     | Displays various underlying XML files in read-only mode. The Viewer opens each XML file in its own window.                                                                                                                                                                                 |

