pro-V® STUDIO

Reference Manual

for Windows®

Version 1.0

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PART 1

Introduction

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Chapter 1: Welcome to pro-V Studio!

Thank you for purchasing pro-V Studio by Curious Labs. pro-V Studio is the ultimate tool for 3D interactive Web authoring. Using pro-V Studio, you can create Viewpoint presentations in a fully visual environment. No programming required! Combine 3D objects, images, Macromedia Flash™ (*.SWF) animations, and more for spectacular results that make the Web come alive. Use pro-V Studio to create ad campaigns, visualize products, provide online learning, deliver online user documentation, setup online games- The possibilities are only limited by your imagination. pro-V Studio is the ultimate tool for 3D interactive web authoring

PRO-V STUDIO FEATURES

pro-V Studio has the following key features and benefits:

- *Visual authoring environment*: Until now, Viewpoint scenes had to be hand-created by editing XML files, a daunting task for most Web developers. pro-V Studio's visual interface lets any Web designer create 3D interactive Web content quickly and easily- no programming required!
- *Pre-configured drag and drop components*: You may edit any interaction component at any time. Attach interaction components by dragging and dropping them onto the target object. Create powerful state-based behaviors with just a few mouse clicks.
- *Increased productivity*: Standardized content handling assures reproducible quality for large projects. Need content? pro-V Studio accesses the Content Paradise Web portal, your gateway to a whole world of rich media content that you can add to your pro-V Studio Library.
- *Multiple Undo/Redo*: Multiple levels of undo/redo provide the flexible editing capabilities you expect from a professional application. Fireplace is fully XML based, making round-trip editing possible for project & configuration files, external library content descriptions, and export. This offers very tight integration with the Viewpoint platform. XML allows easy automated post processing or server-based data handling if desired.

- *Create breathtaking Web interfaces*: Build beautiful user interfaces using pro-V Studio's action primitives for buttons & checkboxes. Unlike other solutions such as Java Script, this method is platform-independent and functions with Internet Explorer & Netscape on Windows & Macintoshes, as well as with native Compuserve and AOL (non-HTML) pages. HyperView adds a new level of immersion to your scenes, allowing you to literally go beyond the traditional window boundary.
- *Add value to your existing media assets*: Import a wide variety of content in diverse formats such as SWF, ASE, OBJ, and/or existing Viewpoint scenes. Integrate this content into new scenes. Reusing content reduces production time and costs.
- *Flexible content library*: Import media assets using pro-V Studio's powerful Importer module and store them in the flexible Library.
- *Template-based publishing*: Integrate your scene into existing Web pages or use the included HTML templates. Select published quality on a per-object basis for easy scene optimization.
- *Easy scene setup*: pro-V Studio makes composing scenes easy. Built in tools let you quickly position and set up each object in an intuitive visual environment that lets you preview your work as you go.

For ease of use, pro-V Studio is divided into seven workspaces called *rooms*. This feature gives you a simple step-by-step workflow that presents the tools you need when you need them with no additional clutter. The pro-V Studio rooms are:

SCENE SETUP ROOM

The **Scene Setup** room is where you build and preview your scenes. Drag and drop assets to create instances in your scene, create hierarchies, and add interaction components here. See the results in real time. Test your scene as you go.

MATERIALS ROOM

Apply colors, alpha maps, bump, and light to give your objects realism or any effect you want using the **Materials** room.

ANIMATION ROOM

The **Animation** room lets you bring your scenes to life. Create animators, timelines, and keyframes. Edit existing animations. Preview your work.

INTERACTION ROOM

Build behaviors and other interactions in the **Interaction** room. Interactivity immerses viewers in your scene and gives it impact that no static presentation can ever hope to emulate.

WEB INTEGRATION ROOM

The **Web Integration** room loads HTML (either custom or premade templates), allowing you to preview your final output and integrate it into a Web page.

PUBLISH ROOM

Once your scene is built and tested, the **Publish** room creates and saves the final output ready for distribution and presentation to viewers.

CONTENT ROOM

Want to get additional pro-V Studio content? pro-V Studio's **Content** room hosts **Content Paradise**, your gateway to leading online marketplaces where you can purchase, download, and install new content in your library or project assets. You can search for, purchase, and download content from multiple marketplaces using a simple friendly interface. Best of all, pro-V Studio can detect and install many types of content automatically! Please refer to "Content Room" on page 62 for more information about the **Content** room.

INCLUDED DOCUMENTATION

pro-V Studio includes the following documentation:

- *pro-V Studio Reference Manual*: If you purchased pro-V Studio on CD, this Reference Manual is included in both hard copy and in electronic PDF format on your pro-V Studio CD. If you obtained pro-V Studio via download, this Reference Manual will appear in PDF only. Selecting **Help>pro-V Studio Help** within pro-V Studio will also launch this manual.

NOTE

IF YOU PURCHASED PRO-V STUDIO ON CD, THE ELECTRONIC EDITION OF THIS REFERENCE MANUAL MAY CONTAIN UPDATES TOO RECENT FOR THE HARD COPY EDITION. IF YOU PURCHASED PRO-V STUDIO VIA DOWNLOAD, THIS ELECTRONIC VERSION IS COMPLETELY UP-TO-DATE. THE ELECTRONIC VERSION ACCESSIBLE FROM THE HELP MENU IS OPTIMIZED FOR SCREEN VIEWING. IF YOU WISH TO PRINT IT OUT, YOUR PRO-V STUDIO CD CONTAINS A VERSION THAT IS OPTIMIZED FOR PRINT IN THE DOCUMENTATION FOLDER.

SYSTEM REQUIREMENTS

- Windows 2000 or XP
- 500MHz Pentium class or compatible (1GHz or greater recommended for large projects)
- 256 MB system RAM (512MB or greater recommended)
- 24-bit color display, 1024x768 resolution (1280 x 1024 or greater recommended)
- 250 MB free hard disk space
- Internet connection required for Content Paradise

OTHER CURIOUS LABS PRODUCTS

Check out these products from Curious Labs:

- *Poser 5*: Poser 5 is the ultimate 3D-character design and animation tool for artists and animators. Create 3D figures from a diverse collection of ready-to-use 3D human and animal models. Poser's innovative interface makes figure design, posing and animating fast and easy. Map facial photos, grow and style hair, and create dynamic cloth to add extraordinary realism to your figure. Quickly output movies and images from your posed figures for content in web, print and video projects. Add life to your 3D worlds using exported, posed figures. Whether you're new to 3D or an experienced artist, Poser 5 generates fast and dynamic results that will leave you speechless.
- *Poser Pro*: Want to host Poser scenes inside leading 3D applications such as 3D Studio Max, Lightwave, Cinema 4D, and others? The Poser Pro bundle (consisting of Poser 4 with the Pro Pack add-on) is the solution for you!
- *Avatar Lab*: Create custom avatars, bring them to life, and use them to explore and communicate with others in these online worlds. Your Web avatar can even have your own face! Create a custom 3D head simply using a front and side photograph of anyone you choose. Avatar Lab's intelligent face-mapping technology does the rest. Piece together pre-made body parts. Scale each part, and apply custom colors and materials to them. Avatar Lab' s pre-made content allows thousands of avatar combinations. Add personalized faces, and the possibilities are endless!

All Curious Labs products can export still and animated content usable by pro-V Studio!

WHEN YOU HAVE QUESTIONS

As you begin using pro-V Studio, you'll undoubtedly have questions or want to network with other pro-V Studio artists. You're not alone! There are many resources available for pro-V Studio artists. Here are just a few:

NEED HELP?

pro-V Studio includes the **Help** menu, which serves to answer most of your questions while using the application:

- *About*: Selecting **Help>About** displays the pro-V Studio version and copyright information. This option will be useful if you need to obtain technical support, since the Technical Support representative will need to know this information.
- *pro-V Studio Help*: Selecting **Help>pro-V Studio Help** opens the electronic version of this Reference Manual.
- *Tutorials*: Selecting **Help>Tutorials** opens the Curious Labs Tutorials page in your Web browser. Check back often as we will be updating this site regularly! You will need an Internet connection and a Web browser in order to access the tutorials.

CURIOUS LABS RESOURCES

- *Online Support*: For technical support, customer service, downloads, and to visit the Curious Labs pro-V Studio community and gallery, visit us at http://www.curiouslabs.com.
- *To Learn More*: If you'd like to learn more about Curious Labs, visit us at http://www.curiouslabs.com/aboutUs/aboutus.html.
- *Contacting Technical Support*: If our Web Knowledge Base does not resolve your situation, please email us at tech@curiouslabs.com. Please refer to "Technical Support" on page 180 to view our technical support policy.
- *Sales*: You may reach our sales department by emailing sales@curiouslabs.com.
- *Other Links*: Selecting **Help>Curious Lab Web Links** or **Help>Other Web Links** within pro-V Studio lists other valuable online resources.

OTHER IMPORTANT RESOURCES

Visit the following sites to learn about the technology supported by pro-V Studio:

- Viewpoint: Home of the Viewpoint 3D Web format.
  - The Viewpoint Web site is located at http://www.viewpoint.com.
  - The Viewpoint user forum is located at http://metastream.coolboard.com
  - Obtain Viewpoint developer information from http://developer.viewpoint.com
  - XML-based Viewpoint documentation is available at http://xml.viewpoint.com

ABOUT YOUR REFERENCE MANUAL

Curious Labs strives to provide documentation that is complete, accurate, informative, and friendly. Your feedback is always welcome. This Reference Manual uses several notational conventions to present information of special importance:

Lists of items, points to consider, or procedures that do not need to be performed in a specific order appear in bullet format:

- Item 1
- Item 2

Procedures that must be followed in a specific order appear in numbered steps:

1. Perform this step first
2. Perform this step second

Keyboard keys are depicted in square brackets and are capitalized. For example: [ESC]. If more than one key should be pressed simultaneously, the notation appears as [KEY1]+[KEY2], for example [ALT]+[F4].

Screen prompts, menu and window names, fields, buttons, boxes, etc. appear in **bold** type. Where you need to access a palette, command, or submenu, the syntax is **Menu>Submenu**. For example **File>Save As** means you should open the **File** pull-down menu and then select **Save As** to open the **Save As** dialog box.

Program and script code appears in standard Courier font, for example:

```
cd\letters\business\legal [ENTER]
```

NOTE

NOTES DETAIL TIPS, TRICKS, AND OTHER IMPORTANT INFORMATION.

WARNING

WARNINGS ALERT YOU TO POTENTIALLY HARMFUL CONSEQUENCES SUCH AS DATA LOSS.

Chapter 2: Installing pro-V Studio

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For technical support, please refer to “Technical Support” on page 180.

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INSTALLING PRO-V STUDIO

To install pro-V Studio:

1. Double-click the **Setup.exe** icon.
2. The **Welcome** screen appears. Click **Next** to continue.
3. The **Choose Destination Location** window appears. Select your desired folder in which to install pro-V Studio. Click **Browse** to navigate to the desired folder or enter any valid existing or new path to your pro-V Studio installation. Once you have made your selection, click **Next** to proceed.
4. The pro-V Studio EULA appears. You must accept the pro-V Studio EULA prior to installing pro-V Studio on your computer. Click **Next** to proceed.
5. The pro-V Studio Readme appears. This text file contains information that is too late to be incorporated into other documentation. Once you have read it, click **Next** to proceed.
6. pro-V Studio will be installed to your selected directory. Be sure to reboot your computer following installation.
7. Launch pro-V Studio by double-clicking the **pro-V Studio** icon.
8. Personalize your copy of pro-V Studio by entering your name and serial number.

Thank you for purchasing and installing pro-V Studio by Curious Labs!

PART 2

pro-V Studio Basics

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Chapter 3: The pro-V Studio Process

Before we can discuss how to use the application, it is important that you understand what is going on behind the scenes. This knowledge will make your work in pro-V Studio far easier and more enjoyable.

PROJECTS AND SCENES

Everything in pro-V Studio centers around *projects*, which act as containers for *scene*s. A project contains all of the *assets* (images, objects, settings, etc.) in a separate folder tree on your hard drive. Of all the assets available in a given project, you will use some or all of them to create scenes. The scene is what will actually be published to the Viewpoint format.

A *scene* is that collection of project assets that you decide to use. Once you finish your scene, it will be published to the Viewpoint format.

When you launch pro-V Studio, you will be prompted to open an existing project or create a new one. The project/scene architecture is central to pro-V Studio's functionality. When working in pro-V Studio, you are working in a project.

As mentioned above, pro-V Studio creates a folder tree on your hard drive for each project. It also creates a master project file named <name>.xml, where <name> is the name of your scene. This file stores all of your project settings and references to all objects in that project in XML format.

WARNING

DO NOT ALTER THE MASTER PROJECT FILE IN ANY WAY UNLESS YOU ARE AN EXPERT USER. DOING SO MAY CORRUPT THE FILE, WHICH COULD CAUSE YOUR PROJECT TO BEHAVE UNEXPECTEDLY AND/OR PRO-V STUDIO INSTABILITY.

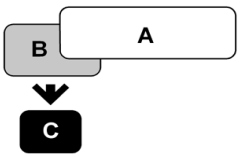
LIBRARY VS. PROJECT ASSETS

As mentioned above, assets consist of all items that can be used for scenes. In order to use an asset in a scene, you must either import it or access it. pro-V Studio supports three levels of assets:

- *pro-V Studio Library*: Assets in the pro-V Studio *Library* (A) can be used in any pro-V Studio project (C). The Library is where you store the assets you use most often.
- *Project*: Each project has its own assets, allowing you to create multiple scenes, each using different assets. For example, you could upload all content for a particular client to a project's assets and then create any number of scenes using those assets.

You can use assets in the pro-V Studio library in any of your projects and can use *project assets* (B) for that given project (C). Project assets do not have to be part of the pro-V Studio library.

If you use assets from the pro-V Studio Library in a project, those assets will be duplicated and added to your project assets. This prevents damage to one or more projects if you delete anything in your pro-V Studio library.



Please refer to "Import" on page 70 and "Content Room" on page 62 for more information about adding content to your Library or project assets.

PRIMITIVES

Primitives are a third category of content consisting of basic geometric shapes such as planes, spheres, and cones. They are available for use in all projects and do not need to be loaded into the libraries. Please refer to "Primitives Tab" on page 109 for more information on accessing primitives.

NOTE

FOR CLARITY, THIS MANUAL WILL USE THE TERM "LIBRARIES" WHEN DISCUSSING THE LIBRARY, PROJECT ASSETS, OR PRIMITIVES. THE SPECIFIC NAME WILL BE USED WHENEVER THE DISTINCTION BETWEEN LIBRARY, PROJECT ASSETS, AND PRIMITIVES IS IMPORTANT.

INSTANCES

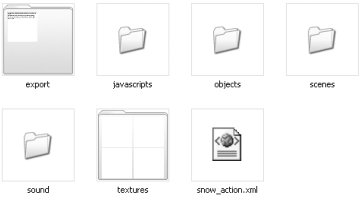
Once you load an asset into either library, adding it to your scene creates an *instance* of that asset. The remainder of this manual will call instanced assets either *objects* or *instances*. An instance is like a photocopy in that you will see however many copies of the asset you desire. Like a photocopy, pro-V Studio only needs to load the original file once. This can allow huge memory and other resource savings. For example, say you have a scene with three identical cars of different colors. If each car object is 1MB and you had to load it three times, your scene would require 3MB. By instancing, the car is loaded once and "duplicated", meaning you only need just over 1MB to display the three cars.

Each instance can have its own unique attributes such as scale (size), translation (location), material, lighting, etc.

PROJECT ORGANIZATION

pro-V Studio creates a folder tree on your hard drive for each new project you create. This tree looks as shown in the graphic.

In this example, "<project>" is the name of your project. The sub-folders in the project tree are:



- *Objects*: This folder contains all imported objects (*.OBJ or other meshes).
- *Sound*: This folder contains all imported sounds added to your project.
- *Textures*: This folder contains all 2D objects in your scene, including images and all of the maps (texture, bump, alpha, and light). Please refer to "Maps" on page 42 for information about maps.
- *Javascripts*: This folder contains all Java scripts added to your scene.
- *Scenes*: This folder contains all of your imported scenes in all supported formats (*.MTX/MTZ, ASE, and NFF).
- *Export*: By default, this folder contains scenes in the Viewpoint formats (MTS, MTX/MTZ, and HTML) ready for publication and incorporation into your Web site. You can alter this path when publishing your project. See "The Publish Room" on page 172 for more information.

WARNING

DO NOT ADD OR REMOVE CONTENT TO/FROM THESE FOLDERS. REMOVING FILES MAY CAUSE SCENES TO NOT UPDATE CORRECTLY. ADDING FILES WILL NOT IMPORT THEM INTO YOUR PROJECT. TO ADD ASSETS. ALWAYS IMPORT THEM USING THE PRO-V STUDIO INTERFACE.

EDITING ASSET FILES

With certain limitations, you may directly edit the files in your project folder trees. The limitations are:

- Do not rename or reformat asset files. For example, if you edit a JPG image, do not save it as a TIF.
- Do not edit any MTS or MTX/MTZ files unless you are an advanced user. Doing so could cause your project to crash or behave unexpectedly.
- Your project folders each contain a file called <project>.XML. Do not modify this file directly. You may lose data, and/or cause pro-V Studio or your scene to crash or behave unexpectedly.

WARNING

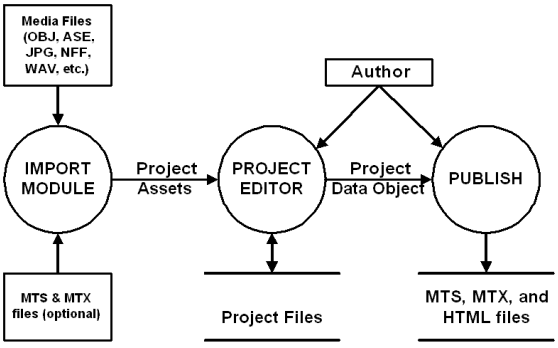
USE EXTREME CAUTION WHEN EDITING PROJECT ASSET FILES. FAILURE TO ADHERE TO THE ABOVE LIMITATIONS COULD LEAD TO DATA LOSS, APPLICATION INSTABILITY, AND/OR ERRATIC OR UNEXPECTED PROJECT/SCENE PERFORMANCE.

NAMING INSTANCES & OBJECTS

pro-V Studio does not allow you to reuse the same instance name in the same hierarchy. All instances in your scene must be uniquely named. pro-V Studio will automatically force unique names. This avoids potential confusion between instances.

HIGH LEVEL WORKFLOW

This diagram illustrates how pro-V Studio handles data:



As you have seen, all data imported into pro-V Studio becomes assets for the current project and/or the pro-V Studio Library. These assets can include files created in a variety of 2D and 3D authoring/modeling applications. After import, you add the assets you wish to use to the project assets for use with pro-V Studio's Project Editor. The Project Editor is the heart of pro-V Studio and is the portion of the application most visible to users. You create a scene using project assets and saving your work to project files that contain every asset and setting used in your scene.

When your project is finished and ready for publication to the Viewpoint format, pro-V Studio sends your project to the Publish process. This in turn generates the MTS, MTX/MTZ, and HTML files needed to distribute the project over the web in Viewpoint format.

THE PRO-V STUDIO PROCESS

The overall scene creation/publication process requires seven steps:

In more detail, these steps are:

1 Import all of the assets needed for your current project.

2 Lay out your scene and edit each object as desired.

3 Add materials, lighting, etc.

4 Add interaction to bring your scene to life.

5 Add any animation you want to your scene.

6 Debug and integrate your scene and prepare it for publishing.

7 Distribute your scene to a Web site ready for use.

MODES

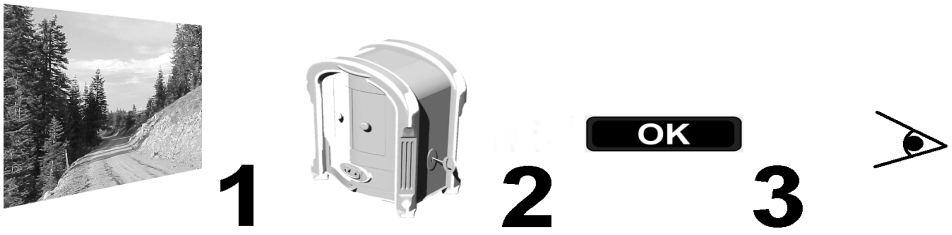
pro-V Studio has two modes:

- *Edit*: In **Edit** mode, you are manipulating your scene (adding objects, creating animation, etc.). You cannot view the results of your work in this mode.
- *Playback*: In **Playback** mode, you are viewing the results of your work. In general, you are in **Playback** mode whenever you are playing an animation using the **Play Controls** palette. You can preview animations (such as in the **Simple Animations** palette), but will remain in **Edit** mode. While in **Playback** mode, you cannot edit your scene. All extra palettes disappear when in **Playback** mode.

Switching between these modes occurs transparently.

LAYERS

Each pro-V Studio scene consists of four layers:



From back to front, these layers are:

BACKGROUND LAYER

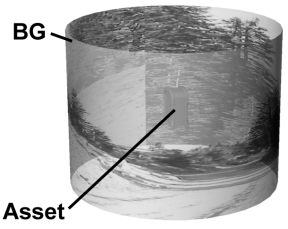
As its name implies, the background layer (1) acts as a backdrop for your scenes. It can hold standard images, SWF movies, or panoramas. This layer maintains its distance from the camera, meaning that you cannot zoom in or out of the background.

pro-V Studio allows you to place more than one file in the background layer. However, this layer does not allow you to order these files, meaning that you cannot control which file will appear in front of another once you add them to the layer. Each file is rendered in the order you add it to the scene, with the most recently added file appearing on top of the others. Panoramas and images will always appear in front of SWF (Macromedia Flash) animations. See "Transparency" on page 24 for more information.

The background layer supports three types of projection:

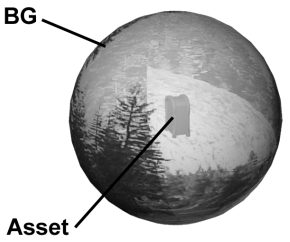
- Flat: This projection method places the image or SWF animation in the background as a fixed backdrop. This backdrop is anchored to the camera, meaning that it will not appear to move when the camera moves.

- Cylindrical: This projection method is designed to work with panoramic images (potentially imported from QuickTime VR). Rotating the camera will scroll the background. Horizontal rotation will keep the background within the camera's field of vision, however vertical rotation can exceed the panorama's boundaries. This type of panorama is useful for scenes such as a landscape where you constrain the user's ability to



rotate the camera vertically. When using this projection method, the bottom of the panorama is located at the scene's ground level.

- Spherical: This projection method is designed to work with unwrapped IPIX (<<EXTENSION>>) files. These are true spherical panoramas that scroll no matter how the camera rotates. This type of panorama could be used to hold a star map, for example.



All items in this layer are scaled to your scene window, meaning you cannot scale or position it. This layer does not capture user input and cannot support interactions.

NOTE

YOU MAY PLACE ZOOMVIEW IMAGES AND SWF ANIMATIONS IN ANY LAYER.. TYPICALLY, HOWEVER, ZOOMVIEW IMAGES ARE PLACED IN THE BACKGROUND LAYER, WITH SWF ANIMATIONS APPEARING IN ANY 2D LAYER.

Ordering Objects Within The Background Layer

Keep the following tips in mind if you opt to load multiple files into the background layer:

- Images and panoramas will appear in front of SWF movies. If you have both an image/panorama and one or more SWF movies, you must set the image/panorama to be partially transparent (see "Transparency" on page 24 for more information about opacity).
- SWF movies appear in the order you add them, with the most recently added file appearing in front of the others.
- You cannot adjust the order of SWF movies once you add them to this layer.

3D LAYER

The 3D layer (2) hosts all of the 3D objects in your scene. You have full control over 3D objects including transformation, animation, materials, interactions, etc. Much of this manual discusses handling 3D objects. This layer captures user input such as mouse clicks, etc., allowing you to add interaction to 3D objects (see "Interactions" on page 47).

2D LAYER

The 2D layer (3) is similar to the background layer. However, unlike the background, this layer does capture user input such as mouse clicks, etc. You can add *text hotspots* and *image hotspots* (see "Modifiers" on page 48), *action primitives* (see "Create Action Primitive" on page 89), as well as images and animations. In essence, action primitives are

2D objects with interactions or behaviors attached. pro-V Studio allows you to add 2D checkboxes and 2D buttons as action primitives.

This layer only supports flat projection, that is, objects in this layer cannot be cylindrical or spherical panoramas. Like the background and foreground layers, this layer retains its distance from the camera and always remains in the camera's field of view. You can position and scale objects in this layer.

Ordering Objects Within The 2D Layer

You can select the order in which 2D objects appear in this layer by setting the Viewpoint *render layer* in the **Object Attributes** dialog, which is discussed in "Object Attributes Palette" on page 141.

FOREGROUND LAYER

The foreground layer (not shown) functions similarly to the background layer. You can add images and movies to this layer. Like the background layer, these objects will be rendered in the order they are added, with the most recently added object appearing in front of the others. This layer does not capture user input. You can, however, mimic this functionality as discussed in "Foreground Interactivity" on page 24.

This layer only supports flat projection, that is, objects in this layer cannot be cylindrical or spherical panoramas. Like the background and 2D layers, this layer retains its distance from the camera and always remains in the camera's field of view. Objects in this layer are scaled to the scene window. You cannot scale or position them.

ABOUT RENDER LAYERS

So far, we have viewed the four pro-V Studio layers as being in a distinct order from back to front, implying that various objects must occupy certain spaces and appear in certain ways. In most cases, this description is sufficient. However, there are ways to expand on this basic functionality to achieve truly advanced results.

NOTE

THESE ADVANCED EXAMPLES ARE INTENDED FOR ADVANCED USERS ONLY SINCE MISUSE CAN RESULT IN UNEXPECTED SCENE BEHAVIOR. WE ENCOURAGE YOU TO EXPERIMENT WITH THESE AND OTHER ADVANCED SCENE MANIPULATIONS USING ONLY NON-CRITICAL TEST SCENES THAT WILL ALLOW YOU TO SAFELY EXPLORE AND ADVANCE YOUR PRO-V STUDIO SKILLS.

USING RENDER LAYERS

In "Ordering Objects Within The 2D Layer" on page 23, we only discussed using render layers to order objects in the 2D layer; however, this concept applies to most objects in most layers. Viewpoint renders objects by *render layer* (not to be confused with pro-V Studio's four object layers), beginning with the rearmost layer and proceeding forward. Each render layer is numbered, with lower-numbered layers appearing in front of higher-numbered layers. This gives you great flexibility. For example, you can give a 3D object a lower number than a 2D object and make the 3D object appear in front of the 2D object. Each object retains its basic abilities and limitations based on its assigned object layer, however. Modifying the default render layer settings will override the standard order in which objects are rendered.

In general, the higher the render number, the more distant the object will appear. For example, if you have a green square assigned to render layer 100, a blue circle with render layer assigned to 99, and a red triangle assigned to render layer 101, the square will render in front of the triangle with the circle in front of both objects

TRANSPARENCY

As mentioned above, certain objects appear in front of others by default. For example, in the 2D background layer, images and panoramas appear on top of SWF animations. Normally, the image/panorama would hide the SWF animations from view. By altering the image/panorama's transparency, you can make the SWF movies visible.

In the foreground layer, you can add images or animations that are partially transparent, allowing you to view the rest of your scene through the transparent portions as shown in the graphic.

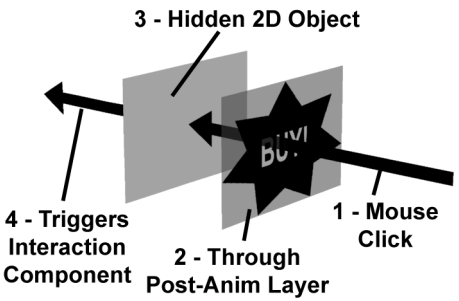
FOREGROUND INTERACTIVITY

The foreground layer does not support interactivity such as mouse clicks. You can emulate this functionality as follows:

1. Place your image (standard or ZoomView) or SWF animation into the foreground layer. This will become the interface (GUI) visible to your users once your scene is published.
2. Place one 2D object behind each location in the foreground content that you want users to be able to click on (such as an animated "Buy Now!" icon). These objects will be invisible when your scene is rendered.

3 Add the appropriate interactions to the 2D object(s). When users click the icon, the interactive 2D object behind the icon, the expected action will occur as if they had clicked the icon itself.

The image shows an animated interface applied to the foreground layer with hidden 2D objects actually handling the user input:



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Chapter 4: 3D Basics

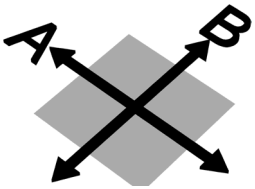
As described above, pro-V Studio contains a 3D layer where you can insert and edit 3D objects. It is therefore helpful to explain a few basic 3D concepts. The following discussion centers on pro-V Studio, however most of these concepts apply to all 3D applications. Novice 3D artists should read the entire chapter to gain valuable "behind the scenes" insight that will help in learning and using pro-V Studio. Veteran 3D users can use this chapter as a handy reference or refresher.

ABOUT 3D SPACE

Let's begin by defining the three dimensions:

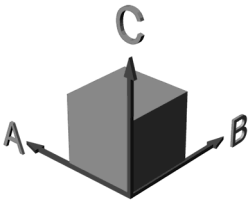
- *Zero dimension:* A point is an example of a zero-dimensional object. It defines a point in space but has no length, height, or width.
- *First dimension*: A one-dimensional object is a single line. It has length but no height or depth.
- *Second dimension*: A two-dimensional object has any two of the following three dimensions:
  - Length
  - Height
  - Depth

Pick any one of the three dimensions and call it A. Now pick either of the remaining two dimensions and call it B. In the graphic, the arrows represent the two dimensions and the rectangle represents a two-dimensional object. You will immediately notice that all two-dimensional objects are perfectly flat, like the surface of a sheet of paper. Two-dimensional objects are called *planes*.



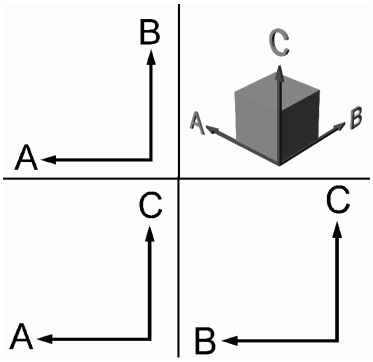
- *Third dimension*: Three-dimensional objects use all three of the dimensions (length, height, and depth).

  As you can see from the graphic, the cube is a three-dimensional object. It has length, height, and depth. That's pretty simple, right? Here's the hard part: You create 3D data using two-dimensional tools. Your computer screen is a two-dimensional object and your mouse can move in two dimensions; it can report left-right and front-back motion

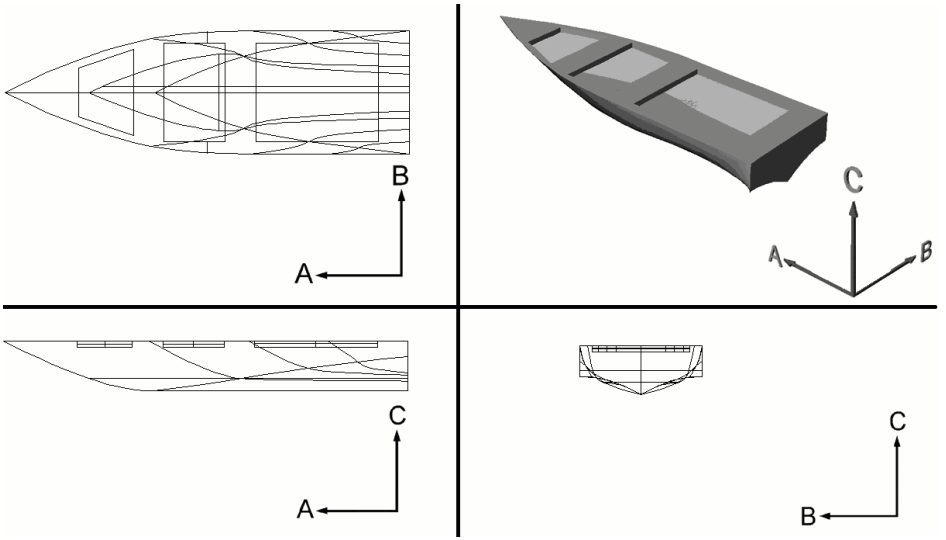


but cannot report how far above or below the desk it is. Furthermore, your output will always be two-dimensional. Look at the above graphic: It does not have depth. It does, however, represent three dimensions using a simple optical illusion called *perspective*, which is defined as the tendency of objects to appear progressively smaller the farther away they are until they disappear on the horizon at a location called the *vanishing point*. You can see this by standing at the corner of a long building and noticing how the roofline appears to get closer to the ground the farther away you look. Given these limitations, you ask, how can one create 3D information?

The short answer is that all 3D applications, pro-V Studio included, create a "virtual" 3D space. Look at the above graphic again. We can view and manipulate the cube in three dimensions by separating them into *views*. One view will display the A and B dimensions, the second will display the A and C dimensions, and the third will display the B and C dimensions. You will also have a fourth view that displays all three dimensions. This graphic shows how the four views might look in a 3D application.



Let's look at the same graphic again, only this time let's substitute a simple boat for the cube to better illustrate the concept. One of the benefits of this system is that it becomes possible to precisely control your 3D model. For example, you can determine the length of the boat using the AB or AC view, the width using the AB or BC view, and the height using the AC or BC view. Which view you use depends on what you are trying to accomplish. For example, to create the stern, you would probably use the BC view, and would probably use the AB view to create the overall shape.



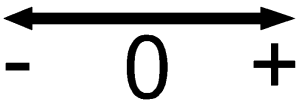
In these examples, the A, B, and C dimensions are collectively called *axes*. Taken individually, each dimension is called an *axis*. So far, we have used each axis to describe one of the three dimensions without caring about which axis describes which dimension. The A dimension could describe any of the three dimensions with B describing either one of the remaining two dimensions and so forth. We did this to illustrate the most basic theory behind 3D applications such as pro-V Studio. Let's expand on that.

It should be obvious that the AB, AC, and BC views lack perspective. Two-dimensional views without perspective are called *orthogonal* views. Each three-dimensional object has six orthogonal views: Top, Bottom, Left, Right, Front, and Rear. Pick up any object you like and look at it from all angles; you will see that this always holds true. So, while the boat example above shows the Top (AB), Left (AC), and Rear (BC) views, it could just as easily show any three of the six possible views. This is important because, like the boat, not all three-dimensional objects are symmetrical.

Now that you understand this fundamental concept, let's learn how it's used in the real world. To recap, the three dimensions are width, length, and height or depth, each dimension is represented by an axis, and we can view each pair of axes in two ways to generate a total of six possible views. So far so good, except for one small problem: If everyone used an arbitrary system of axes to define the three dimensions, then it would be difficult to pass data back and forth. In the above example, we are using the AB as the Left view. Someone else could just as easily define AB as any of the six available views. You can see the chaos that could ensue. To prevent this, both 2D and 3D objects conform to a standard system of axes called the *Cartesian coordinate system*. The term *Cartesian* is

used in honor of the French mathematician and philosopher Rene Descartes (1596–1650), who was one of the first to employ such coordinate systems.

CARTESIAN COORDINATES

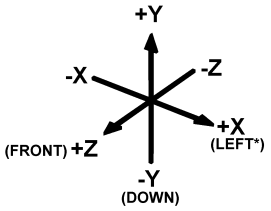


Before getting too far into Cartesian coordinates, let's pause for a quick math review: If you arranged all of the numbers from negative infinity to positive infinity along a line, the number 0 would be in the center of that line. Negative numbers would be on the left side of 0 with –1 being the closest to 0, and positive numbers would be on the right side of 0 with +1 being the closest to 0.

Negative numbers being on the left (or front) works for horizontal lines or axes. For vertical lines, negative numbers are beneath 0 with positive numbers above 0. This stands to reason, since negative numbers are literally less than 0. When dealing with coordinate systems, we assume that each dimension is infinite, with zero representing the dimension's center or *origin*.

The Cartesian coordinate system goes one step further by defining three axes, called X, Y, and Z. In our previous examples, we deliberately used the arbitrary letters A, B, and C to illustrate the concept of axes and avoided using the actual letters because we wanted to familiarize you with the general idea of axes and dimensions before focusing on how they are actually used. In the Cartesian coordinate system, the axes correspond to dimensions as follows:

- *X*: Width
- *Y*: Height
- *Z*: Depth



Let's combine the origin with the Cartesian axes as follows. As you can see, the Cartesian coordinate system uses three axes to represent each of the three dimensions: X, Y and Z. The positive X axis points to the right, the positive Y axis points up, and the positive Z axis points towards the front of the scene. The center of the 3D space is a single point, which is the midpoint (*origin*) of the three axes. Thus, the 3D space extends to infinity in both negative and positive directions along all three dimensions.

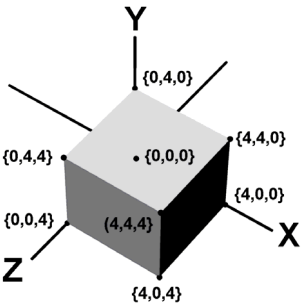
Now that we have a standard system for defining 3D space and objects within that space, we can use coordinates to define the object's shape. Remember that coordinates are always listed in XYZ order. Coordinates themselves are defined as the distance from the origin along each of the three axes. For example, the coordinate {1,1,1} signifies a point

that is 1 unit to the right of the X origin, 1 unit above the Y origin, and 1 unit behind the Z origin.

NOTE

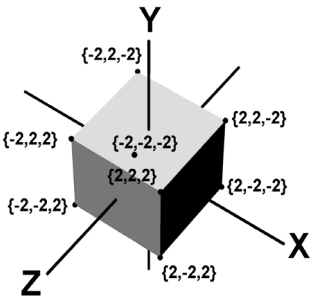
THE FORMAT OF LISTING THE X, Y, AND Z COORDINATES WITHIN BRACES AND SEPARATED BY COMMAS IS THE STANDARD SHORTHAND USED WITH THE CARTESIAN COORDINATE SYSTEM.

Remember the box we used in the previous 3D example? We can use Cartesian coordinates to define its corners. What if we move the box over somewhat? The graphics on the right show how that might affect the coordinates. As you can see, Cartesian coordinates serve to define an object's shape, size, and location in 3D space.



PLANES

As we discussed earlier, 3D applications must depict and manipulate 3D data using a series of 2D views and tools. You already know that 2D objects are planar because they exist on a mathematically defined plane. A plane is a formula defining the relationship between two dimensions, such as XZ. Combining these two facts with what we just learned about the Cartesian coordinate system and a quick glance at our monitor, we find that 3D applications like pro-V Studio use coordinate planes to help you locate points in 3D space.



WORLD VS. OBJECT COORDINATES

There is one last wrinkle to the Cartesian coordinate system. To explain this wrinkle, let's use the example of a motorcycle rider leaning into a turn. What just happened? For the sake of argument, let's assume that the headlight is 30 inches above the ground when the motorcycle is upright. If the rider leans the motorcycle 45 degrees to the left, then headlight will now be 21.2 inches to the left of center and 21.2 inches off the ground.

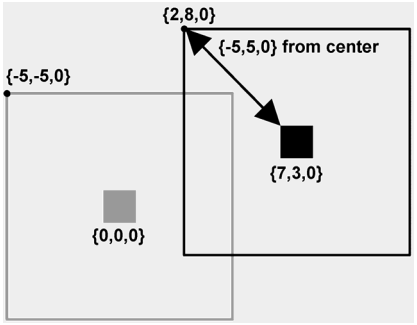
NOTE

FOR ANYONE INTO TRIGONOMETRY, WE FIND THE NEW LOCATION BY MULTIPLYING THE ORIGINAL LOCATION BY THE SIN AND COSINE OF THE ANGLE. IN THIS CASE, SIN(45) = COS(45) =.707, AND.707*30= APPROX. 21.2.

Thus, the headlight's coordinates will have changed from {0, 30,0} to {21.2, 21.2, 0}. However, nothing has changed about the motorcycle itself. The headlight is still in the exact same position *relative* to the rest of the machine. To demonstrate this, let's create a second 3D space using the motorcycle's center of gravity (balance point) as the origin. Let's further say that the headlight is 12 inches above and 30 inches in front of the center

of gravity. This means that the headlight's relative coordinates are {0, 12, -30}, and these relative coordinates do not change because the headlight does not move relative to the center of gravity. But what do we mean by *relative*?

Has the motorcycle leaned 45 degrees to the left, or has the world leaned 45 degrees to the right? To an observer standing on the ground, the motorcycle has leaned over 45 degrees. To the rider, s/he is still on top of the motorcycle and it is the world that has leaned over 45 degrees. Further, the rider maintains her or his relationship to the motorcycle, meaning (for example) that her or his head is still 30 inches behind and 32 inches above the headlight. Thus, while the motorcycle's *world* (or *global*) *coordinates* have changed, its *object* (or *local*) *coordinates* have remained the same.



If this seems a bit complex, bear with us as we use a far simpler example. Each object in pro-V Studio has its own object coordinate system. When an object is first created, its center and orientation are the same as the world's. As described above, this changes when the object moves. The world's center and orientation are still the same, but the object's center and orientation may have changed. Look at the square in the graphic. Say the upper-left corner is located at {-5,5,0}. When the object is first created, that point is the same in local and global coordinates because the object's center is at {0,0,0}. If we move the object +7 along the X axis and +3 along the Y axis, the upper-left corner would now be at {2,8,0} in global coordinates but would remain at {-5,5,0} in local coordinates, that is, relative to the object's center. In other words, any point can be specified relative to its object's local coordinate system (*object space*) or relative to the global coordinate system (*world space* or *global coordinates*) shared by all objects.

TRANSFORMATION

So far, you have learned about 3D objects, the Cartesian coordinate system, and the difference between object space and world space. Let's move on and learn how we can use XYZ values to define an object's *transformation* in addition to its size, shape, and position.

An object's *transformation* describes an object's position (*translation*), orientation (*rotation*), and size (*scale*) in 3D space. When an object is first created, its transformation is set to align with the global coordinates. Its position is set to {0,0,0}, its orientation is set to {0,0,0}, and its size is set to {1,1,1}. An object's transformation values are almost certain to change as you work with the object.

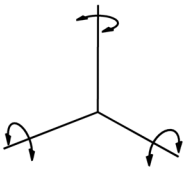
Translation

An object's *translation* describes its position in 3D space relative to its center and is measured in defined grid units. Let's take another look at the box we used in an earlier example:

As you can see, the box's center is the same as the origin ({0,0,0}). What happens if you want to move the box? You can move each one of the points, delete the existing box and draw a new one in its new location, or simply translate the box. For example, setting a Translate value of {2,2,2} would move box's lower left corner to {0,0,0} since (-2)+2=0. Again, the Translate value refers to the location of the center of the object relative to world space.

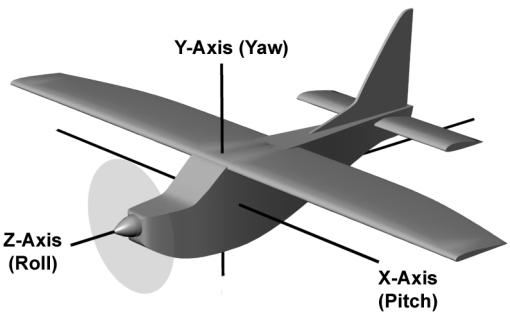
Rotation

An object's *rotation* value refers to its orientation in 3D space measured in degrees. As you probably know, any actual object will revolve around its center of gravity (balance point).



Let's think back to the motorcycle example. If you model a motorcycle and decide you wish to lean it 45 degrees, nothing is stopping you from performing trigonometric calculations to determine the new location of each part. Remember that each part of the motorcycle will move in at least two dimensions as the whole machine rotates. In this case, since the motorcycle is rotating about the Z axis, you could simply enter a rotation value of {0,0,45}. The trigonometric calculations will still need to be performed, however pro-V Studio will get stuck with the job instead of you.

Rotation can also be thought of in terms of *roll*, *pitch*, and *yaw*. To illustrate this, let's use the example of a small plane with its X, Y, and Z axes labeled:

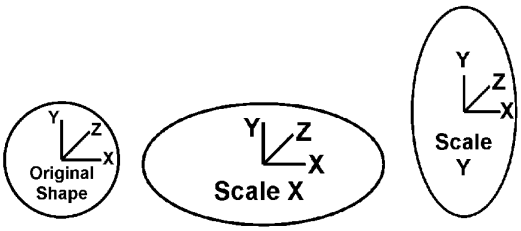


- *Pitch*: rotation of the selected object about its own X axis
- *Yaw*: rotation of the selected object about its own Y axis
- *Roll*: rotation of the selected object about its own Z axis

Scale

An object's *scale* value refers to its size in relation to itself and is measured in percent. In this case, a value of 1 corresponds to 100%. Take the example of a circle. As with all other pro-V Studio objects, it is initially created with a scale value of {1,1,1}, meaning that it is 100% of its original size in all three dimensions.

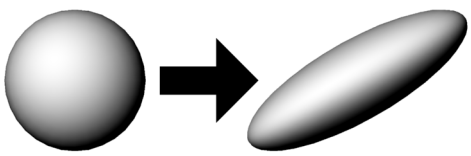
Now that your perfect circle is in place, you realize you need to double its height on the Y axis. Simply enter a scale value of {1,2,1} and the circle will turn into an ellipse that is twice as long on the Y axis as it is wide. To stretch it on the X axis, you would enter {2,1,1}.



To compute every point on a model, multiply the original coordinates by the X, Y, and Z components. With this in mind, it becomes easy to see how different values can change the size of your object. For example, entering a scale value of {2,2,2} would double the circle's size. pro-V Studio allows you to set each scaling factor independently in order to obtain squashing and stretching effects. This is called *differential scaling*.

Shear

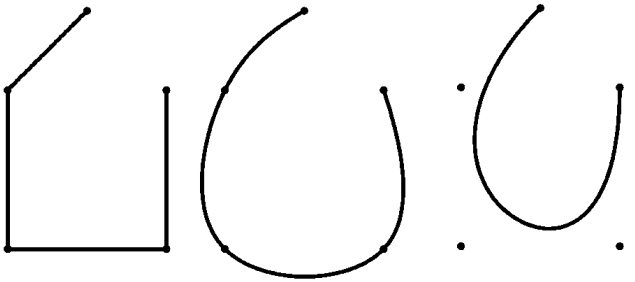
pro-V Studio also allows you to add *shear* effects. As the name implies, a shear involves a "tearing" motion along one or more axes.



Chapter 5: Additional 3D Elements

Now that we have learned the basics about how 3D works, let's discuss more advanced concepts applicable to pro-V Studio. Understanding these concepts will help you work with pro-V Studio more efficiently and get the most from this application.

SPLINES



Splines are lines that are defined by multiple *control points*. The graphic shows three basic types of splines. The simplest type of spline consists of a set of control points connected by straight lines, called a *linear spline* (shown on the near right). The other two splines are curved. You can curve a spline by adjusting its *basis*, or method used to compute the spline. Splines can be divided into *interpolating* and *approximating*.

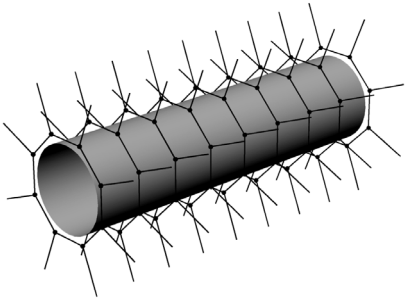
An interpolating spline will always touch the points that define it. In the above graphic, the two splines on the left are interpolating. This gives them a more drastic skin-like bend than approximating splines. Approximating splines, such as the rightmost example in the above graphic, have a softer curve because they don't necessarily touch the points that define them. Either type of spline requires three or more control points in order to show any curvature.pro-V Studio uses splines when calculating animations (see "Interpolation" on page 40 for more information).

THE PRO-V STUDIO STAGE

The pro-V Studio *Stage* is the virtual world in which you build your scenes. This world contains an origin and the three axes. Don't confuse the Stage with the *workspace*, which is the term we use to describe the pro-V Studio interface as a whole (you affect objects on the Stage using the workspace).

The **Scene Display** window acts as the viewfinder for the currently selected camera. By looking through this viewfinder, you can see the Studio. Please see "Scene Display Window" on page 54 for more information about the **Scene Display** window.

NORMALS



A surface *normal* is a line (*vector*) that points perpendicular to (away from) the surface it originates from. Since models have more than one surface, knowing which way the normals are facing can help you understand how a particular function will affect a model. This is important when rendering a model. If a model's normals are inverted, your model may render incorrectly. pro-V Studio gives you some control over the direction of the normals and automatically performs these calculations for you (see "Importing 3D Objects (OBJ)" on page 72 for more information).

CAMERA

The *camera* is the vantage point or portal from which you view the studio and your scene. Once your scene is published, viewers will see the finished scene from the camera.

pro-V Studio includes two cameras:

The *Edit* camera is the one you use when building your scene. You can position, rotate, and zoom this camera any way you like to get the best views. pro-V Studio does not record the Edit camera's movements, nor is this camera included in your published scene.

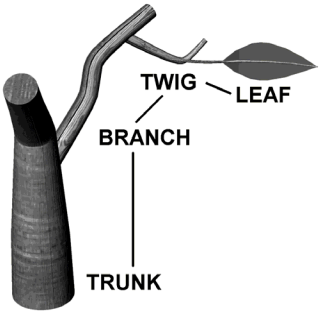
The *Runtime* camera is the camera that gets published with your scene and is the camera your viewers will use when viewing your scene. Like the Edit camera, you can position, rotate, and zoom this camera. pro-V Studio records the camera position for publication with your scene. You can also animate this camera to add interesting effects to your scene such as pan (pivoting to follow a passing race car) or follow (staying behind the car) shots.

NOTE
THE **SIMPLE ANIMATIONS** PALETTE IS A GREAT WAY TO ANIMATE THE RUNTIME CAMERA.

Chapter 6: Hierarchies

Now that you've learned about 3D objects, Cartesian coordinates, object space vs. world space, and object transformations, let's go ahead and learn a little about hierarchical (sometimes called *parent-child*) relationships.

pro-V Studio allows you to group objects in a *hierarchy* in order to facilitate manipulation. The original object is known as a *parent*, and each object linked to it is known as a *child*. The graphic shows an example of a simple hierarchy. In this example, the trunk is the parent. The branch is a child of the trunk, the twig is a child of the branch, and the leaf is a child of the twig. Selecting and moving the trunk will also move the branch, twig, and leaf. Moving the branch does not affect the trunk but moves the twig and leaf, and moving the twig moves the leaf without affecting the branch or trunk. Selecting the leaf only moves the leaf.



Let's try another example: Bend your arm at the shoulder. Notice that your shoulder rotation moves your upper arm, lower arm, wrist, hand, and fingers. In this case, your upper arm is a child of your shoulder and so forth. Now try bending a finger. Your hand, wrist, arm, and shoulder do not move.

The concept applies in pro-V Studio. A child object will move as its parent moves. For example, if you parent a sphere to a cube, the sphere will maintain the same relative position to the cube no matter you translate or rotate it. You can, however, move the child object without affecting the parent. For example, you could create an animation with the sphere close to the cube, add a keyframe, move the sphere away from the cube, add another keyframe, and move the cube. The sphere will now move with the cube relative to its most recently keyframed position.

NOTE
NOT ALL ATTRIBUTES PROPAGATE ACROSS HIERARCHIES. EXAMPLES INCLUDE VISIBILITY AND OPACITY.

pro-V Studio includes extensive support for hierarchies. You are allowed an almost unlimited number of hierarchical relationships in each scene. Create and rearrange hierarchies using a simple drag and drop interface. Please refer to "Hierarchy Viewer Window" on page 54 for more information.

COLLAPSING OBJECTS

Collapsing an object removes the selected instance and any children (but not parents). Removing unneeded objects from the rendering hierarchy improves performance on end viewer computers due to decreased resources and rendering times. This option is good if the currently selected object and its children are not currently needed when the interactor is triggered

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Chapter 7: Animation

Viewpoint Studio lets you animate virtually everything in your scene including objects, lights, materials, and the camera. Each scene object has different settings (*attributes*) that can also be animated. For example, you can animate an object's scale, rotation, translation, and shape. You can animate any component of an object's material and can simulate animating lights (pro-V Studio calculates shadows automatically). Plus, you can animate the camera's position and rotation. Creating animations involves making changes to these parameters over time and assigning these changes to *keyframes*.

KEYFRAMING

Animations are made up of individual images known as *frames*. An animation is created when a series of frames that vary slightly from one frame to the next are displayed one after another over time.

Keyframing is the core of computer animation and involves the following general process: First, a starting frame is created on a timeline and all attributes for each object in the scene are assigned to that frame. Next, an ending frame is created later on the timeline and all changes to any attributes are assigned to this frame. pro-V Studio then compares the attributes assigned to the starting and ending frames and calculates all of the intermediate (*tween*) frames that occur between the starting and ending frames. This calculation is called *interpolation* and is enabled when you check the **Tween** box for your selected timeline in the **Animation** room as described in "Animation Details Window" on page 158.

For example, if you tell pro-V Studio that a ball is large and red at the beginning of the animation then small and blue 10 seconds later, then 0 and 10 seconds become the *keyframes* for that object. pro-V Studio then calculates the intermediate values for all of the frames in between the keyframes. Thus, as the animation moves from 0 to 10 seconds, the large red ball will gradually shrink and turn blue with each passing frame until it reaches the values you set for it at the 10 second keyframe. In this example, the ball will probably be medium and purple 5 seconds into the animation. Keyframing and interpolation allow you to create complex animations with a minimum amount of work.

The overall animation sequence is called a *timeline*. Most 3D applications use a single timeline that contains the keyframes for the entire animation. For example, if you have a 10-second animation running at a speed (or *frame rate*) of 30 frames per second, your timeline is 300 frames long (frame rate * running time). All keyframes must reside on that one timeline.

pro-V Studio handles this a little differently. As you noticed above, keyframes are created at specific times instead of at specific frames. pro-V Studio scales its performance to each unique combination of bandwidth and performance and therefore cannot guarantee a single frame rate in all cases. Thus, three different users with different computers and Internet connections might see three different frame rates, since higher frame rates require more resources and vice-versa.

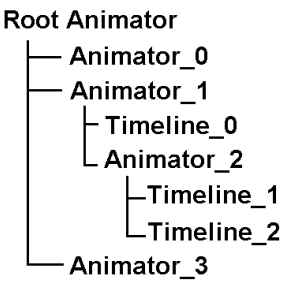
For this reason, pro-V Studio uses multiple timelines, one for each animated object/property combination in a scene. When setting up keyframes, you do it by time instead of frame number. Thus, instead of specifying that Frame 250 is a keyframe for a particular object, you would specify (for example) "Position A at 0:05 and Position B at 0:08". At worst, viewers may see choppy movement, however the objects will still be at their keyframed position on time. This feature provides the ultimate in flexibility for both the content creator and the widest possible range of viewers.

pro-V Studio supports two kinds of timelines:

- Normal timelines begin when the animator that contains them is triggered. You can disable timeline processing for each timeline. If you need to trigger animations separately, place each such timeline into separate animators. You can also contain normal timelines in animators that are set to begin playing when the scene loads (auto start). In this case, the normal timeline can behave similarly to an action timeline.
- *Action timelines* are a very powerful way to add more interaction. For example, if you are creating a game, you could have several seconds elapse after a character enters a room before a door closes. Several seconds later, a sound plays. Action timelines have action keyframes, which function very similarly to **Multi** reactors (see "Multi Reactors" on page 119 and "Action Timelines" on page 163 for more information). Each animator can contain one action timeline.

ANIMATION HIERARCHY

pro-V Studio uses a hierarchical animation system that gives you full control over animations within a scene. At its most basic, this hierarchy appears as shown in the image.



As you can see in the above image:

- The *root animator* is the master container for each scene's entire animation hierarchy. It cannot be modified.
- You can insert an arbitrary number of *animators* in your scene. Each animator can be a child of either the root animator or another animator. Note that it is possible to import other types of animators in existing scenes. These

imported animators may not be editable within pro-V Studio but will be published with the rest of your scene.

- Each animator can contain one or more *timelines* (but only one action timeline).
- Every timeline controls one *target*/*property* combination. A target is the object being controlled by the timeline, such as a sphere. A property is some attribute of the target object, such as its location in 3D space (translation) or rotation.
- Each timeline can contain an arbitrary number of keyframes.

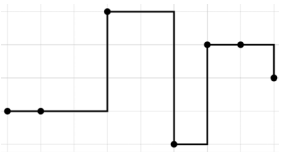
Please refer to "Creating Simple Animations" on page 112 for more information on creating/editing animations within pro-V Studio.

As mentioned above, pro-V Studio's hierarchical animation system gives you full control over your scene. You can only have one identical timeline per animator. For example, say you want clicking one button to move a sphere up. Clicking another button moves the sphere laterally. Each of these motions requires its own timeline, and each of these timelines controls the same target object (sphere) and property (translation). In this case, you would need to place each timeline in a separate animator.

INTERPOLATION

pro-V Studio uses splines (see "Splines" on page 34) to interpolate between keyframes. Please see "Keyframing" on page 38 for a discussion about keyframed animations. Different spline types produce different results. pro-V Studio supports the following spline types:

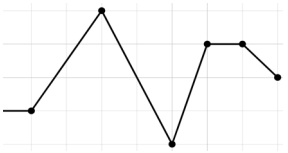
- *Constant*: This has no intermediate poses. If you set a change a property's value over time using different keyframes, the first value will be maintained until the second keyframe, at which point it will instantly change to the second value, which will be maintained until the third keyframe, and so on.



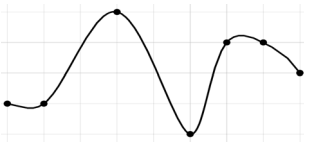
NOTE

CONSTANT OR "STEP" INTERPOLATION IS NOT DIRECTLY SUPPORTED IN PRO-V STUDIO. YOU CAN ACHIEVE THE SAME EFFECT BY DISABLING TWEEN FRAME GENERATION.

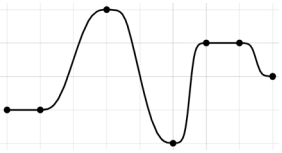
- *Linear*: Takes the two keyframes and divides the motion between them equally with no acceleration or deceleration of the moving objects. In the above example, the arm would move at a constant velocity from keyframe to keyframe. If you created a third keyframe with the arm back down, the change direction at the second keyframe would be abrupt.



- *Catmull-Rom*: Places tween frames on a curve. Motion begins at one keyframe, accelerates to full velocity, and gradually slows down as it approaches the next keyframe. For example, if the first keyframe has an arm by a figure's side and the second one has it raised, the arm will begin moving slowly, accelerate to a constant velocity, and slow as it reaches the second keyframe. This is not to say that the movement will be fast; actual speed of motion depends on the amount of change between keyframes and the number of tween frames. In our above example, having the second keyframe 1 second from the first would make a very rapid motion, while having 10 seconds between keyframes would make a very slow motion. The key thing to remember is that this type of animation resembles a smooth curve and is normally the most realistic.



- *TCB spline*: A TCB spline is similar to the Catmull-Rom spline discussed above. However, this type of spline remains tangential to its control points as shown to the right. By comparing this image with the one for the TCB spline, you can see how these interpolation methods are both similar to and different. TCB splines are useful for, among other things, simulating bouncing objects.



- *Smooth Rotation*: Rotation interpolation is only used when rotating an object. Smooth rotation is akin to linear interpolation. Rotation starts and stops abruptly with no acceleration or deceleration.
- *Catmull-Rom Spline Rotation*: Rotation will accelerate and decelerate smoothly to and from the keyframed values.
- *TCB Spline Rotation*: Rotation will accelerate and decelerate smoothly, but will "lag" behind the keyframed values. For example, if you specify a rotation to the left followed by one to the right in the same timeline, the rotation will continue to the left for a little ways beyond the left-most keyframe before moving back in the opposite direction.

Please refer to "Key Frame Settings Window" on page 162 for more information about selecting interpolation methods.

Chapter 8: Materials & Lights

This section describes how pro-V Studio handles object materials and scene lighting. pro-V Studio includes powerful materials and lighting support that give you great flexibility when working with your scenes.

MATERIALS

Look at any object. A *material* can consist of many things, including:

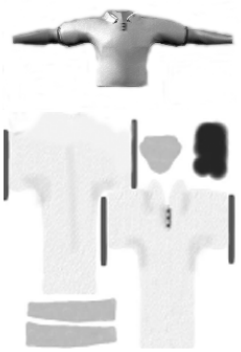
- Color
- Texture map (or *diffuse texture*)
- Bump map
- Alpha (Transparency) map (or *alpha channel*)
- Light map

Let's discuss these in a little more detail.

COLOR

pro-V Studio lets you specify an object's color. Please refer to "Material Tab" on page 149 for more information on selecting a color.

MAPS



Look at your own skin. Notice the differing colors, hairs, veins, moles, and other features. Look at any object. Is it smooth or rough? Opaque or transparent? If transparent, does it have the same transparency all over or in portions? Is it matte or glossy? Is it reflective? What sort of texture or pattern does it have? Now look at the objects around you. They all have different material properties. How can you capture these properties in your 3D objects? One answer is mapping. Each object in your pro-V Studio scene can have its own *map*, which provides an efficient way to add advanced effects to your objects. For example, if you had to model every detail, your object's polygon count (number of polygons) would quickly become prohibitive. In fact, most of the 3D figures and other objects you see in feature films have relatively low polygon counts and make extensive use of mapping. Here's an example of a shirt along with its *texture map*.

As you can see, the texture map looks like the shirt was cut down the middle and laid out on a flat sheet. It also looks like the artist who created this texture map "colored outside the lines". How can this possibly produce a smooth texture? The answer lies in something called U/V coordinates. The best way to explain U/V coordinates is to think of a map with latitude and longitude lines. Each coordinate on the flat map corresponds to a point on the round Earth. For example, 37°37'08"N/122°22'29"W corresponds to San Francisco International Airport. U/V coordinates have values between 0,0 and 1,1, with 0,0 being the upper left corner of the map and 1,1 being the bottom right corner. Thus, 0.5,0.5 is in the exact center of the map.

When the artist created the original shirt object, s/he assigned a UV coordinate value to each point on the shirt and created the texture map in such a way that the buttons, cuffs, underarms, etc. corresponded to the correct locations on the 3D geometry. The act of assigning 2D coordinates to locations on a 3D object is where the term *map* comes from.

Why did the artist color outside the lines and why don't the excess textures and colors appear on the 3D shirt? The 3D object only uses a portion of the U/V coordinates. Any color placed in an area where the U/V coordinates aren't mapped to the 3D object will not appear on the object. For example, if you drew a large red X on the lower right corner of the texture map, that X would not appear unless portions of it extended into the used portions of the texture map. If that happened, you'd only see those portions of the X that are within used portions of the U/V map.

Most of the content you obtain for use with pro-V Studio will already have U/V coordinates and all the maps you need. If you create your own content, you'll need to create maps and edit them to get your desired results. Please refer to your 3D modeling application's documentation for more information about creating U/V coordinates for any content you create. To edit the maps, use your favorite graphic editing software (such as Adobe Photoshop).

Whether your object has U/V coordinates or not, you can still apply an image to an object. In this case, however, you will get some unexpected results, as shown. You can apply textures to non-U/V-mapped 2D objects and 3D primitives. All other non-U/V-mapped 3D objects will display a warning when you attempt to texture them.

The important things to remember are that:

- Maps are 2D representations (images) of 3D surfaces.
- Each coordinate (location) on the 3D surface corresponds to a location on the map.
- The map may or may not resemble the 3D surface

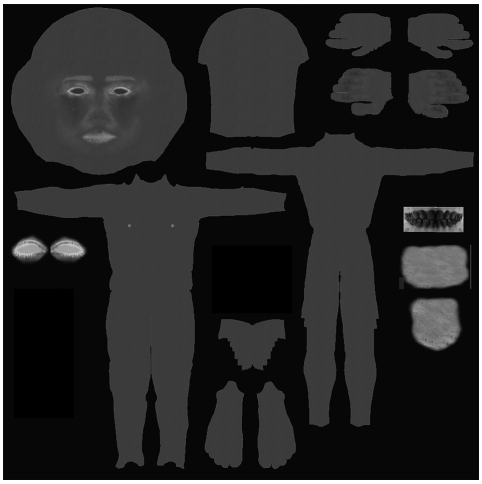
pro-V Studio supports four types of maps:

Texture Maps

From the above examples, you can see that texture maps can provide detailed color information and ensure that the colors/details appear in the correct location.

Bump Maps

A *bump map* is used to simulate roughness on a surface. Bump maps are grayscale images where dark gray/black signifies lower areas and bright white/light gray areas signify higher areas. They work by shifting the object's normals to give the illusion of depth. On a human figure, a bump map allows you to simulate wrinkles and other imperfections/textures. Unlike *displacement maps*, bump maps do not alter an object's actual geometry. Thus, a rough-looking object will appear smooth around the edges. Viewpoint does not currently support displacement maps.



Alpha Channel (Transparency Maps)

Many 3D applications use the term *transparency map* to describe what pro-V Studio and many photographic applications call an *alpha channel*. Used in this context, both terms mean the same thing.

An alpha channel map is like a bump map in that it is a grayscale image, however it regulates the amount of opacity in a given location. The darker the color is, the greater the transparency, and vice versa. Here's a sample transparency map for eyelashes.

Look at the bump map above. The lighter colored areas around the eyelashes indicate that they should have height, that is, they should stand out from the figure itself. The alpha channel map allows only those portions of the texture map corresponding to the lighter areas to show through. Combined with the texture map, the end result is eyelashes that stick out from the eyes. Where there are no eyelashes, you can see the skin beneath them. This is a great example of how combining maps can create very realistic effects.

Light Maps

pro-V Studio uses *light maps* to determine how 3D objects in a scene are lit. This is different from most 3D applications, which allow you to create and position individual lights. If you wish, you can load a map to specify how a scene or object is lit. If you load both scene and object light map, all object lightmaps will override the scene light map (in fact, all pro-V Studio object settings will override their corresponding scene settings). All objects without light maps will be lit using the scene map. Please refer to "Lightmap Settings" on page 82 for information on creating scene lightmaps and to "Light Map Palette" on page 156 for information on applying light maps to individual objects.

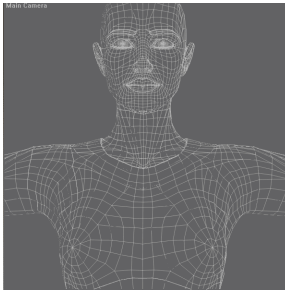
To ease the transition between creating lights and light maps, pro-V Studio allows you to create/edit light maps using a simple and intuitive light creation interface. Please refer to "Procedural Lightmaps" on page 82 for more information.

MATERIAL GROUPS

Imported assets can have one or more *material groups*. For example, say you export a figure from Curious Labs Poser and bring that figure into pro-V Studio. The figure itself is a single mesh object, as shown in the image. You can see several body parts in these images, including the head, eyeballs, neck, shoulders, chest, and abdomen.

Each polygon in the figure "belongs" to both a material group and a body part group. This makes the following group combinations possible:

- One body part may have one material assigned to it. For example, the neck has the "skin" material.
- Two or more body parts may use the same material. For example, the head, neck, and portions of the chest and shoulders may all use the "skin" material.
- One body part may use more than one material. For example, each eyeball may have separate materials for the eyeball, iris, and pupil.



In this example, the head, neck, and portions of the chest use the skin material. The chest and collars use the shirt material. The eyes use eyeball, pupil, and iris materials. The head uses several materials including skin, lips, and eyebrows.

This brief example demonstrates that a single mesh object can have more than one material group. pro-V Studio maintains all material groups when importing assets, and each material group can have its own image maps, color, etc. Materials assigned to the currently selected asset appear on the bottom

of the Hierarchy Viewer window when in the **Materials** room. Please see "Hierarchy Viewer Window" on page 54 for more information about the **Hierarchy Viewer** window and "Materials Room" on page 57 for more information about the **Materials** room.

Chapter 9: Interactions

Viewpoint's real power lies in its ability to add simple or complex interactions to scenes. Want to add a simple reaction to a mouse click? Build a complete 3D experience such as a game or virtual reality setting complete with complex interactions (such as puzzle solving, walkthroughs, etc.)? pro-V Studio makes it fast and easy!

pro-V Studio supports four types of *interaction components*. An interaction component is something that allows an interaction to occur. It will affect the selected target object(s) and any children (see "Hierarchies" on page 36 for an explanation of hierarchical relationships). In general, an interaction component alters the values of one or more of the target object's *attributes*. An object's *attributes* include details such as position, scale, color, transparency, etc. In short, interaction components alter the target in some manner. This change is permanent. For example, if an interaction component moves an object to the left, that object will remain there until another interactor changes that new position.

Viewpoint itself does not support interactors beyond the "native VET components" (see "Native VET Components" on page 48). pro-V Studio adds a list of custom interactors and seamlessly translates your specified settings into their Viewpoint equivalents. This saves you time when developing scenes since pro-V Studio does the translation and programming for you behind the scenes and allows you to take Viewpoint's powerful features to completely new heights, all with the absolute minimum effort.

Some interaction components change an object's *state*. For example, if one reactor causes an object to move up, that object is in a new state, meaning that some of its attributes have been changed. To return to the previous state or proceed to a third state, you would have to add a second reactor. Alternatively, you could assign a behavior that both changes object states and has internal states (see below). Behaviors can also have states, which must not be confused with object states.

You can apply the four types of interaction components to your scenes as easily as dragging and dropping them onto your desired object from the **Interaction** palette. Please see "Interaction Palette" on page 56 for more information about the **Interaction** palette.

REACTORS

Reactors are the simplest type of interaction: A triggering event occurs, and the reactor reacts. Depending on your settings, the reaction could be anything from animating the object to triggering other events. Please refer to "Reactors" on page 114 for more information about working with reactors.

BEHAVIORS

At their simplest, *behaviors* act as containers for other interaction components. Behaviors have initial (starting) states, which can be altered by reactors or other interactions contained within the behavior. Each state holds one or more reactors. When the behavior is in a given state, all of the interactors contained within that state are active and all other interactors within the same behavior are disabled. Changing states activates the interactors assigned to the new state and disables the interactors assigned to the previous state. Please refer to "About Behaviors" on page 167 for more information about working with behaviors.

NATIVE VET COMPONENTS

The *native VET components* are those directly supported by Viewpoint. Please refer to "Native VET Components" on page 120 for more information about working with native VET components.

MODIFIERS

Modifiers add a special level of interactivity to a scene or object by allowing you to add text or image hotspots to objects, zoom your scene beyond its window, and/or add sound to your scenes. You can enable or disable modifiers at will. Please refer to "Modifiers" on page 48 for more information about using modifiers.

PART 3

The pro-V Studio Interface

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Chapter 10: Common UI Elements

This chapter discusses the basic user interface (UI) elements common to pro-V Studio. For consistency, each of these common elements functions identically throughout the application.

COMMON ELEMENTS

The common UI elements found in pro-V Studio are:

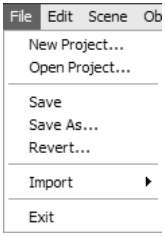
ROOMS

As discussed in "The pro-V Studio Process" on page 20, creating a finished scene involves several steps laid out in a logical order to provide you with full control while minimizing the work required to generate great-looking results. Placing all of this functionality in a single location would clutter the workspace and make pro-V Studio much harder to use. For this reason, pro-V Studio contains separate workspaces called *rooms* that make the workflow obvious and present only those interface elements (windows, etc.) necessary for that step of the process.

To switch between rooms, you may either click the room tabs as shown above and described in "Room Tabs" on page 53, or use the **Menu** bar as described in "The View Menu" on page 94.

MENUS

As in most restaurants, pro-V Studio menus provide a fixed list of choices grouped into a logical order. Menus may be hierarchical, meaning that a menu might have a sub-menu. This is most evident in areas like the pro-V Studio **Menu** bar, where (or example), selecting **File>Import** opens the **Import** sub-menu.

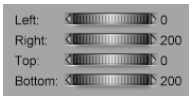


TABS

Tabs allow you to switch between areas within a window or within the pro-V Studio application itself (**Room** tabs).

DIALS

Dials allow you to alter values by “scrubbing”, i.e. clicking and dragging your mouse. pro-V Studio dials also have fields, allowing you to make precise changes.



FIELDS

Fields allow you enter textual information directly by typing.

NOTE

ASSET NAMES (TEXTURES, MATERIALS, ANIMATORS, INTERACTION COMPONENTS, ETC.) MUST BE ENTERED USING 7-BIT ASCII (PLAIN) TEXT. THE FIRST CHARACTER CANNOT NOT BE A SPACE OR A DIGIT. IN ADDITION, YOU CANNOT USE COLONS (:), BACKSLASHES (\),OR AMPERSANDS (&). YOU WILL RECEIVE AN ERROR MESSAGE IF YOU ENTER AN UNSUPPORTED NAME.

SLIDERS

Sliders are similar to dials, except that they may used to “scrub” between several preset options or values. Like dials, sliders also have fields, allowing you to make precise changes.

CHECKBOXES/RADIO BUTTONS

Both checkboxes and radio buttons allow you to toggle options on and off. A checkmark in a checkbox or a dot in a radio button signify that the specified option is enabled, and vice-versa. Typically, checkboxes are used when you may select multiple options (A and B), while radio buttons allow you to select one option or another but not both (A or B).

BUTTONS

Buttons perform their specified function when clicked. For example, clicking a button labeled **OK** accepts your current choice or launches your specified function and is typically the equivalent of pressing [ENTER].

AVAILABLE OPTIONS

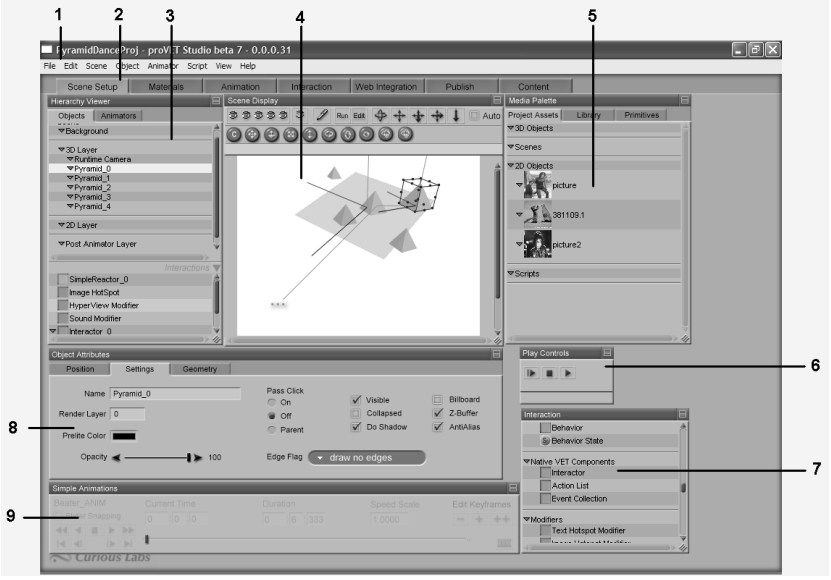
This manual describes all options available in all areas of the pro-V Studio interface. Some options may be enabled or disabled depending on the currently selected object. Disabled options will appear “grayed out” and will not be functional.

Chapter 11: pro-V Studio Rooms

Viewpoint Studio consists of seven separate workspaces, called *rooms*. This chapter provides some basic information about each room and cross-references more detailed information found later in this Reference Manual.

SCENE SETUP

The **Scene Setup** room is the core of the pro-V Studio application. This is where you assemble your scene, add content, work with your scene hierarchy, and add interactivity. The **Scene Setup** room appears as follows:



In addition to rooms, pro-V Studio uses floating palettes and windows. Much of its functionality is available within floating palettes and windows within the room itself. pro-V Studio rooms allow you to customize the workspace by hiding/displaying and relocating controls anywhere you like.

The numbers on the image above identify the controls available in the **Scene Setup** room:

- **Menu** bar (1)
- **Room** tabs (2)
- **Hierarchy Viewer** palette (3)

- **Scene Display** window (4)
- **Media** palette (5)
- **Play Controls** palette (6)
- **Interaction** palette (7)
- **Object Settings** palette (8)
- **Simple Animations** palette (9)

Please refer to "Preferences" on page 76 for more information about creating and saving custom workspace layouts. The following sections provide a brief description of the labeled interface elements and references to more detailed information.

MENU BAR

The **Menu Bar** consists of a series of pull-down menus used for accessing pro-V Studio functionality. Some menus and/or submenus duplicate other on-screen interface elements. The **Menu Bar** appears as follows and is available from every pro-V Studio room:

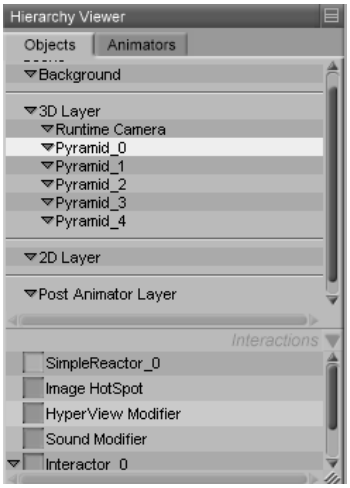
Please refer to "The pro-V Studio Menu Bar" on page 69 for complete descriptions of all **Menu Bar** pull-down menus and sub-menus.

ROOM TABS

The **Room** tabs allow you to switch from room to room within pro-V Studio. To enter a room, simply click its tab. Please see "Tabs" on page 50 for an image of the **Room** tabs.

HIERARCHY VIEWER WINDOW

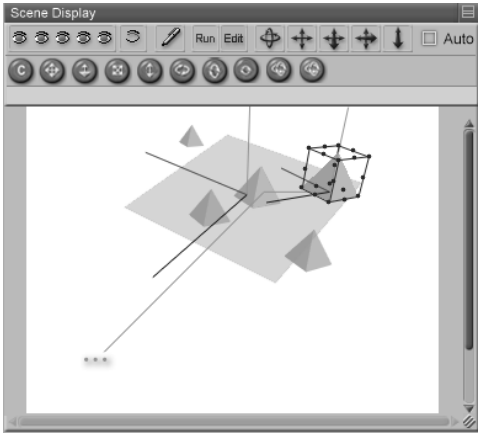
The **Hierarchy Viewer** window allows you to view and manipulate your scene's hierarchies, including objects, animators, timelines, and interaction elements.



Please refer to "The Hierarchy Viewer Window" on page 106 for a complete description of the **Hierarchy Viewer** palette.

SCENE DISPLAY WINDOW

The **Scene Display** window is your viewport into the pro-V Studio where you view and arrange your scene. Each view of the **Document** window is taken through a virtual camera, which means you can view each scene from two angles (either the Runtime or Edit camera).



You can position cameras to view your scene from any angle or distance. In addition, the **Scene Display** window has numerous controls around its edges that you use to change the appearance of scene elements. You can also select objects within your scene by clicking them directly within the **Scene Display** window.

Please refer to "The Scene Display Window" on page 100 for a complete description of the **Scene Display** window.

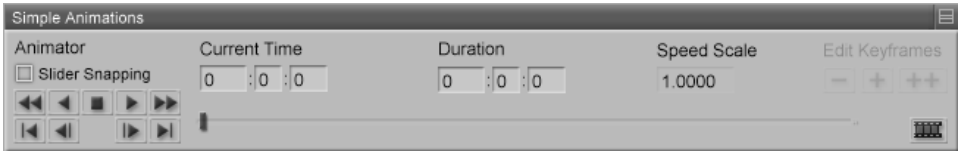
MEDIA PALETTE

The **Media** palette is where you add content instances to your scene from the pro-V Studio library, project library, or assorted primitive objects.

Please refer to “The Media Palette” on page 108 for a complete description of the **Media** palette.

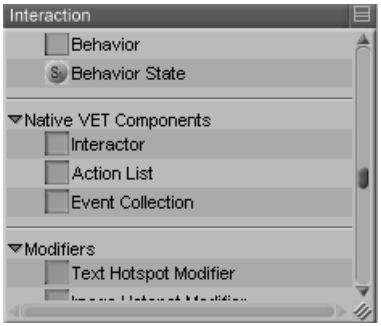
SIMPLE ANIMATIONS PALETTE

The **Simple Animations** palette allows you to quickly and easily add animations to scene objects and is particularly useful for animating the Runtime camera.



Please refer to "The Simple Animations Palette" on page 110 for a complete description of the **Simple Animations** palette.

INTERACTION PALETTE

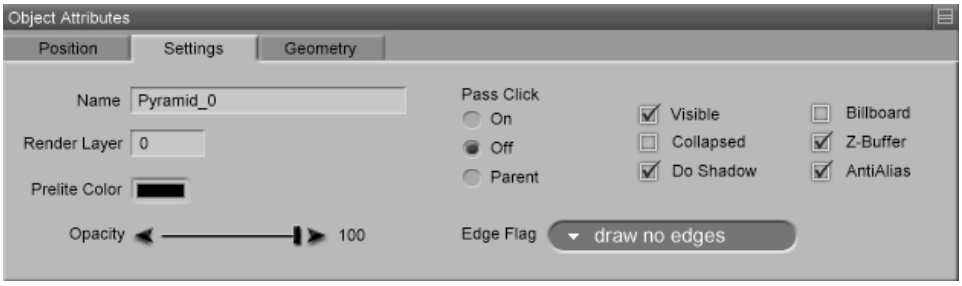


The **Interaction** palette stores all of the interaction components for inclusion in your scene.

Please refer to "The Interaction Palette" on page 114 for a complete description of the **Interaction** palette.

OBJECT ATTRIBUTES PALETTE

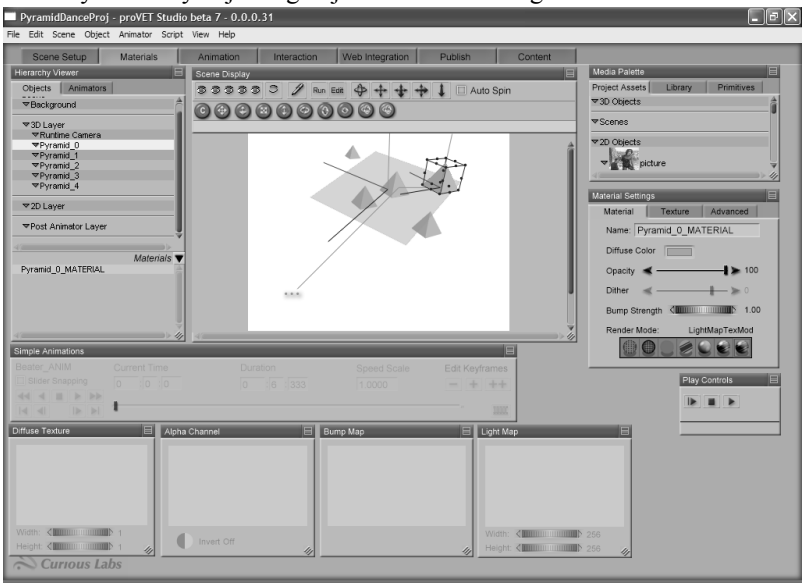
The **Object Attributes** palette allows you to control an object's attributes such s translation, rotation, scale, shear, and zoom.



Please refer to "Object Attributes Palette" on page 141 for a complete description of the **Object Attributes** palette.

MATERIALS ROOM

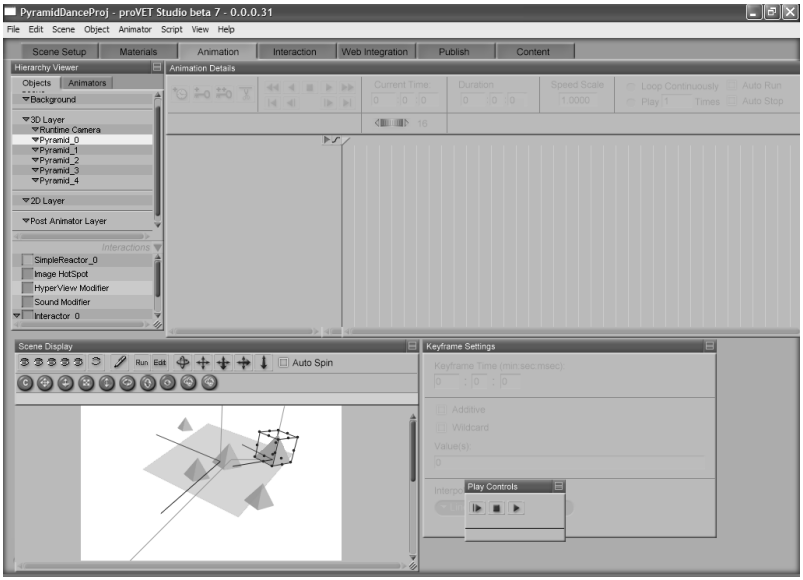
The **Materials** room is where you apply textures and bump, light, and alpha maps to your scene objects and apply additional material settings to control how your scene will appear when published. You can achieve amazingly realistic results in your Viewpoint presentations by carefully adjusting object material settings.



Please refer to "The Materials Room" on page 148 for more information about the **Materials** room.

ANIMATION ROOM

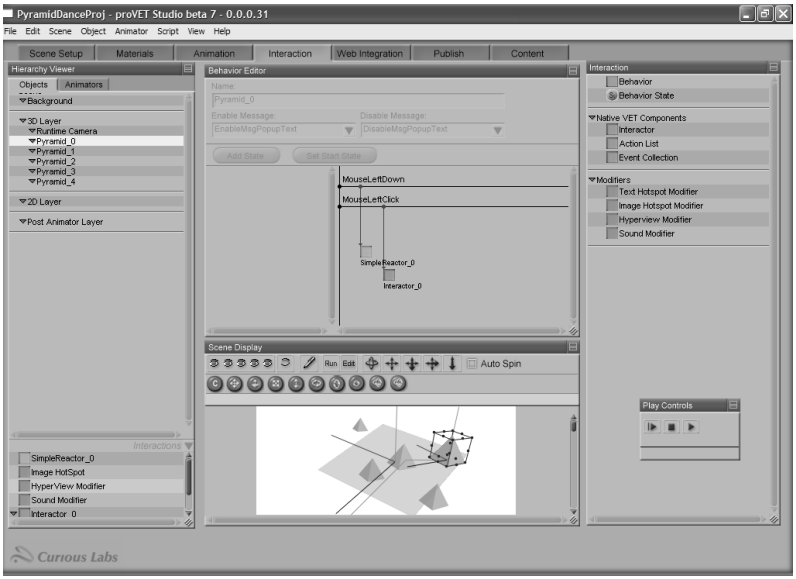
The **Animations** room provides detailed animation controls allowing you to create, edit, and delete animators and timelines.



Please refer to "The Animation Room" on page 158 for more information about the **Animation** room.

INTERACTION ROOM

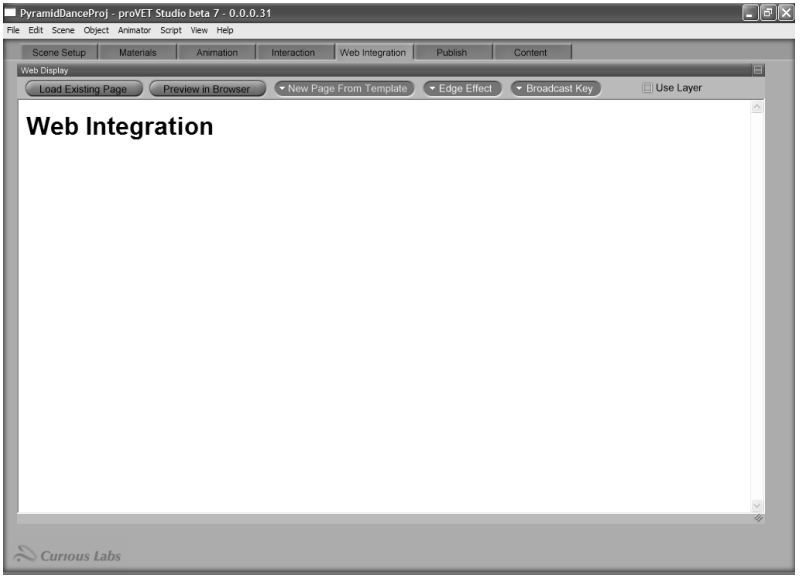
The **Interaction** room is where you work with behaviors in your scene. You can use either the **Interaction** or **Scene Setup** room to work with the other interaction component types. pro-V Studio lets you use your imagination to create rich interactive Viewpoint content.



Please refer to “The Interaction Room” on page 167 for more information about the **Interaction** room.

WEB INTEGRATION ROOM

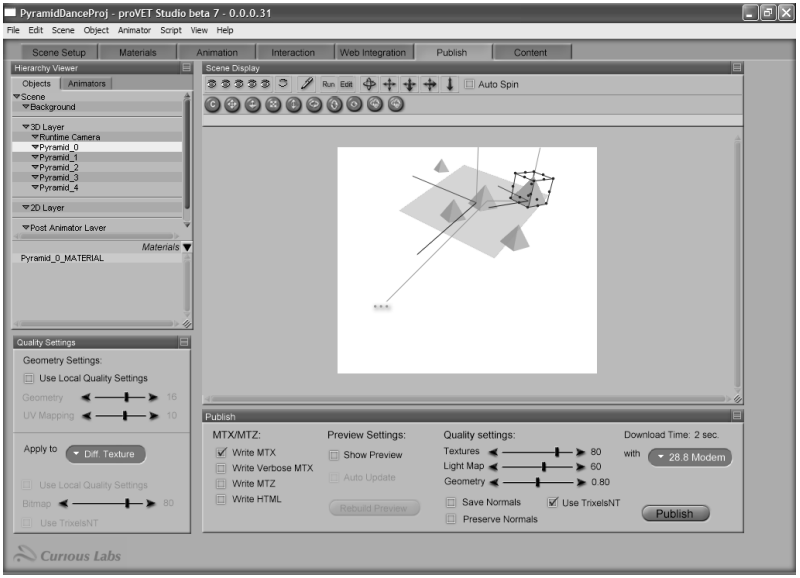
The **Web Integration** room is where you insert your scenes into pre-made HTML templates or into your own page to preview the published results and add the HTML code necessary to host your Viewpoint presentation (published scene) in your Web page.



Please refer to "The Web Integration Room" on page 170 for more information about the **Web Integration** room.

PUBLISH ROOM

The **Publish** room is where pro-V Studio outputs your scene and (if specified) accompanying HTML code to the Viewpoint Experience Technology (VET) format, ready for publication to your Web site, where viewers will be able to see/interact with your scene.



Please refer to “The Publish Room” on page 172 for more information about the **Publish** room.

CONTENT ROOM

Much of pro-V Studio's value comes from the capability to add custom content (such as figures, textures, props, hair, poses, etc.) to the libraries. Whether you create your own add-ons or purchase some of the rich variety of available content, you will find your artistic abilities and range growing with every new addition.

pro-V Studio includes the **Content** room gateway to the online Content Paradise portal, where you can obtain free or purchased content. To complement this feature, pro-V Studio can auto-detect and attempt to install your add-on content for you. Simply choose your content, download it, and pro-V Studio does the rest!

Please refer to "The Content Room" on page 177 for more information about the **Content** room.

PART 4

Your First pro-V Studio Projects

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Chapter 12: Let's Create a Project

This chapter guides you through creating two pro-V Studio projects. You'll add objects, edit materials, and add interaction. When you're finished, you'll publish your work and launch your Web browser to see the results.

PROJECT 1: DROPPING A BALL

For your first tutorial, you will insert a sphere into a scene and make it drop when clicked.

1. Launch pro-V Studio and select **New** to create a new project. Select your desired project name and hard drive folder using the **Create a New pro-V Studio Project** window. pro-V Studio will open to the **Scene Setup** room.
2. Select the **Media** palette's **Primitives** tab and select the **Sphere** asset. Click and drag it into the **Scene Display** window to create an instance of the soccer ball in your scene.
3. In the **Object Attributes** palette, set the **Translate Y** attribute to 3. This should raise the sphere above the ground plane without lifting it completely out of sight. If the sphere disappears, reduce the attribute's value until you can see the its bottom edge.
4. Create a new animator by selecting **Animator>New Animator**. Next, select the **Animators** tab in the **Hierarchy Viewer** palette to enable the **Simple Animations** palette.
5. Click the film symbol on the right side of the **Simple Animations** palette to open the **Property Selection** dialog. Select the sphere on the left side of this dialog. A list of animatable properties for that object appears on the right. Select the **loc_** property and click **OK**.
6. Enter 4 seconds in the **Duration** fields, then click the + button to add an initial keyframe.
7. Disable the animator's **Auto Run** feature, as described in "Animation Details Window" on page 158.
8. Move the time scrubber at the bottom of the **Simple Animation** palette to a new position such as 2 seconds. In this example, the slider will be in the middle of its run and you will see 2.0 seconds displayed in the **Current Time** fields.
9. Move the sphere down (change the **Translate Y** attribute to 2), then add a new keyframe by clicking the + button.
10. Drag the time control all the way to 4 seconds. Change the **Translate Y** attribute to 0 and add a third keyframe by clicking the + button. Preview your new animation by

clicking the **Play** button in the **Simple Animations** palette. The sphere will fall, accelerating as it goes.

11 Drag the timeline back to 0 and watch the sphere climb back to its original position. Now switch to the **Interaction** room, select a Simple Reactor in the **Interaction** palette, and drag it onto the sphere. This opens a **Simple Reactor** dialog.

12 Select the following attributes using the appropriate pull-down menus in the **Simple Reactor** dialog. Click **OK** when finished:

- *Incoming Message*: Mouse Left Down
- *Action*: Start Animation
- *Action Target*: <target>

13 Using the **Play Controls** palette, click the **Play from start** button. Next, click the sphere and watch it drop to the floor.

14 Switch to the **Web Integration** room, click the **New Page from Template** button, and select **generic.html**. This creates a blank Web page with your scene in it. Next, click the **Preview in Browser** button to launch your Web browser with your project in the Web page you just created.

15 Return to pro-V Studio and switch to the **Publish** room. Save your project by selecting **File>Save**. In the **Publish** dialog, check both the **Write MTX** and **Write HTML** checkboxes, set the **Bitmap quality** slider to 75, check the **Use TrixelsNT** checkbox, and click **Publish**.

Congratulations! In just a few minutes, you've created and published an animated Viewpoint presentation with a simple interaction. Let's move on to something a little more challenging.

PROJECT TWO: MORE ANIMATION

This tutorial continues the basic animations you learned above and provides another lesson in tying animators to reactors. You will practice animating different scene properties and how to trigger these animations using simple reactors. Please decide what object/property combination you want to animate before you start. Please see "Animation" on page 38 for more information about animation in pro-V Studio and "Interactions" on page 47 for more information about interaction components.

1 Launch pro-V Studio and open an existing project or create a new one.

2 Add a 3D object to your scene (use a primitive for fastest results).

3 Select **Animator>New Animator**. In the **Hierarchy Viewer** window, click the **Animators** tab and select your new animator.

4 In the **Scene Setup** room, click the **Add Timeline** button in the **Simple Animations** palette (see "The Simple Animations Palette" on page 110 for more information). This opens the **Property Selection** dialog. Select the object to animate on the left side of this window. A list of animatable properties appears on the right. Check your desired property and click **OK**. For a 3D object, try the following properties: **rot_** (rotation), **scl_** (scale), or **opac** (opacity). Repeat as many times as necessary.

5 Switch to the **Animation** room. The **Animation Details** window displays the timelines you created in the preceding step. Rename these timelines so that you know which animation you are currently working on. Click a timeline to highlight its default name. Click a second time to open a field allowing you to enter your desired timeline name. Enter your desired name and press [ENTER] when done.

6 Select the **Scale** tool in the **Scene Display** window (see "Scale" on page 105) and scale your object. In the **Animation Details** window, select the **Scale** timeline and click the **Add Keyframe** button. Be sure to set the desired scale before creating a keyframe. Enter a new time in the **Current Time** field, re-scale your object, and add a new keyframe. Repeat as often as desired. Repeat this step for the other two properties. Use the **Play Controls** palette (see "The Play Controls Palette" on page 140) to play your animations.

7 To animate materials, you must select a material property, then enter the room in question (such as the **Material Room** to change opacity). Change the values as needed, then return to the **Animation** room to set the keyframe as described above. Repeat these steps for all keyframes.

8 Now let's add some interactivity. We'll start the animation with a left-click and stop it with a right-click. In the **Scene Setup** room, select the **Objects** tab in the **Hierarchy Viewer** window. Drag and drop a **Simple** reactor from the **Interactions** palette (see "Simple Reactors" on page 115) and drop it onto your desired object in the **Hierarchy Viewer** window. When that object is selected, you will see its reactor at the bottom of the **Hierarchy Viewer** window.

9 Double-click the reactor in the **Hierarchy Viewer** window to open a **Simple Reactor** window and modify the reactor's properties. Enter the following information:

   a *Name*: Enter a name for this reactor in the **Name** field.

   b *Incoming Message*: Select **MouseLeftClick** using the **Incoming Message** pull-down menu.

   c Select **Trigger Animation** using the **Action** pull-down menu.

   d Select your desired animator using the **Action Target** pull-down menu.

10 Click **OK** to exit the **Simple Reactor** window.

11 Repeat Steps 8-10 to add a second Simple Reactor. In this reactor, select **MouseRightClick** using the **Incoming Message** pull-down, **Stop Animation** using the **Action** pull-down menu, and your desired animator in the **Action Target** pull-down menu.

12 Test your animation using the **Play Controls** window and publish your scene as described in "The Publish Room" on page 172.

KEYFRAMING ROTATIONS

When animating rotations, you should enter new keyframe settings numerically using the **Keyframe Settings** window. Be sure to use the same syntax shown in the **Data** field. Your numeric values will automatically be applied to the selected keyframe.

MORE PROJECTS & TUTORIALS

Want to try your hand at other sample projects? Need a tutorial? Select **Help>Tutorials** to open the Curious Labs pro-V Studio Tutorials page. We'll be updating it over time, so be sure to visit regularly.

PART 5

The pro-V Studio Menu Bar

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Chapter 13: The File Menu

As the name implies, the **File** menu is where you work with your pro-V Studio project files. Remember that everything in pro-V Studio revolves around a project. Whenever you work in pro-V Studio, you are working on a project.

NEW PROJECT

Selecting **File>New Project** or pressing [CTRL]+[N] creates a new project file tree on your hard drive. You may specify both the name and location for your new project. You will be prompted to save any unsaved changes in your current project.

OPEN PROJECT

Selecting **File>Open Project** or pressing [CTRL]+[O] opens an existing project. You will be prompted to save any unsaved changes in your current project.

SAVE

Selecting **File>Save** or pressing [CTRL]+[S] saves your current project to your hard drive. Curious Labs strongly recommends that you regularly save your work in case of problems.

SAVE AS

Selecting **File>Save As** or pressing [CTRL]+[SHIFT]+[S] saves your current project under a different filename. You will then continue working in your new project. Your previous project is retained in the same state as when you last saved it.

REVERT

Selecting **File>Revert** reverts your current project to its most recently saved state. You will lose all changes made to this project since your last save. use this option with caution.

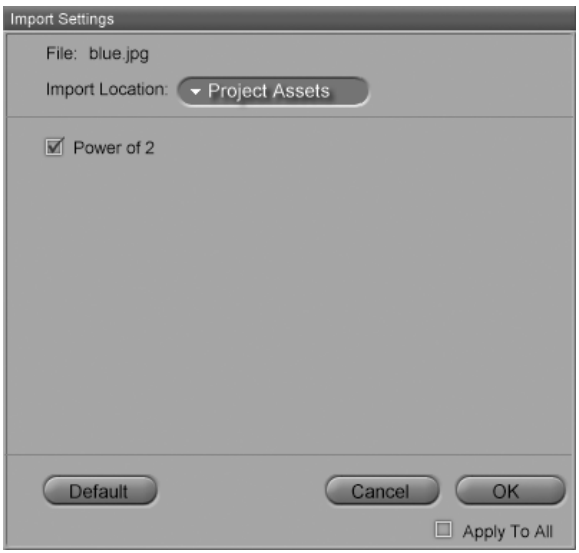
IMPORT

Selecting **File>Import** allows you to import a wide variety of content to your pro-V Studio or project library for use in projects and scenes. When importing, you may select the following options:

- *Single File*: Selecting **Single File** or pressing [CTRL]+[M] opens a standard **Open** dialog, allowing you to import a single file into either the pro-V Studio or project library.
- *Multiple Files*: Selecting **Multiple Files** or pressing [CTRL]+[SHIFT]+[M] opens a standard **Open** dialog, allowing you to select multiple files for import into either the pro-V Studio or project library. To select multiple files, press [CTR:L] while clicking your selections.
- *Entire Folder*: Selecting **Entire Folder** or pressing [CTRL]+[ALT]+[M] opens a standard **Browse for Folder** dialog, allowing you to import all supported files within a given folder into either the pro-V Studio or project library. Content in sub-folders is not imported.

THE IMPORT SETTINGS DIALOG

The **Import Settings** dialog appears after you have selected the file(s) to import.



This dialog appears once for each file you import. This dialog contains the following standard options:

- *Import Location*: Use the **Import Location** pull-down menu to select **Project Assets** or **Library** to import the content file(s) into the project or pro-V Studio libraries, respectively.
- *Default*: Clicking **Default** selects pro-V Studio default options for the content type being imported.
- *Cancel*: Clicking **Cancel** aborts the current import.
- *OK*: Clicking **OK** proceeds to import the selected file(s) with the selected options.
- *Apply To All*: Checking the **Apply To All** checkbox makes the **Import Options** dialog appear for each file being imported. Clearing this checkbox imports the remaining files (of the same type) with the same settings and hides the **Import Options** dialog.

- *Apply To All*: When importing multiple files, checking the **Apply to all** checkbox applies the current settings to all remaining files being imported. The **Import Options** dialog appears for subsequent files, allowing you to modify your specified settings on a per-file basis.

In addition, custom options will appear depending on the type of file(s) being imported. These custom options are:

Importing Images

The following option is available when importing images:

- *Power of 2*: Checking the **Power of 2** checkbox resizes the image so that its height and width in pixels are a power of 2 (2, 4, 8, 16, 32, etc.). This option will rescale arbitrarily sized images to the closest fit if selected.

pro-V Studio can import images in most popular formats. Imported images are automatically converted to JPG or PNG format based on your selected pro-V Studio preferences. See "Preferences" on page 76 for more information.

Importing 3D Objects (OBJ)

The following options are available when importing 3D (OBJ) objects:

- *Scale to unit cube*: Checking the **Scale to unit cube** checkbox rescales the imported OBJ object to fit within the default pro-V Studio bounding box, which is a cube equal to 1 Viewpoint unit with coordinates ranging from {0,0,0} to {1,1,1}. The imported object retains its proportions. If this checkbox is cleared and the object exceeds the default bounding box, the box will scale appropriately to fit the imported object.
- *Scale Percentage*: Entering a value in the **Scale Percentage** field scales the imported object to the selected percentage of its original size. For example, entering 50 imports the object at half of its original size. You should only use this option when you are sure of the imported object's size relative to your scene. Otherwise, use the **Scale to unit cube** option, above.
- *Drop to Floor*: Checking the **Drop to Floor** checkbox places the imported object's lower edge on the scene's ground plane.
- *Flip Normals*: Checking the **Flip Normals** checkbox reverses the imported object's normals.

Importing 3D Objects (ASE or NFF)

The following options are available when importing 3D (ASE or NFF) objects:

- *Scale to unit cube*: Checking the **Scale to unit cube** checkbox rescales the imported OBJ object to fit within the default pro-V Studio bounding box, which is a cube equal to 1 Viewpoint unit with coordinates ranging from {0,0,0} to {1,1,1}. The imported object retains its proportions. If this checkbox is cleared and the object exceeds the default bounding box, the box will scale appropriately to fit the imported object.
- *Scale Percentage*: Entering a value in the **Scale Percentage** field scales the imported object to the selected percentage of its original size. For example, entering 50 imports the object at half of its original size. You should only use this option when you are sure of the imported object's size relative to your scene. Otherwise, use the **Scale to unit cube** option, above.
- *Drop to Floor*: Checking the **Drop to Floor** checkbox places the imported object's lower edge on the scene's ground plane.

Importing Movies (Quicktime)

You must convert movies into Macromedia Flash (SWF) animations using the Viewpoint QuickTime Conversion Template availble from http://developer.viewpoint.com prior to importing them to pro-V Studio.

Importing SWF Animations

SWF animations are imported using the default import options described above.

Importing Viewpoint Scenes (MTX)

The following options are available when importing Viewpoint scenes:

- *Scale to unit cube*: Checking the **Scale to unit cube** checkbox rescales the imported OBJ object to fit within the default pro-V Studio bounding box, which is a cube equal to 1 Viewpoint unit with coordinates ranging from {0,0,0} to {1,1,1}. The imported object retains its proportions. If this checkbox is cleared and the object exceeds the default bounding box, the box will scale appropriately to fit the imported object.
- *Scale Percentage*: Entering a value in the **Scale Percentage** field scales the imported object to the selected percentage of its original size. For example, entering 50 imports the object at half of its original size. You should only use this option when you are sure of the imported object's size relative to your scene. Otherwise, use the **Scale to unit cube** option, above.
- *Drop to Floor*: Checking the **Drop to Floor** checkbox places the imported object's lower edge on the scene's ground plane.

- *Deep Copy*: Checking the **Deep Copy** checkbox copies the selected MTX file and all files and subfolders referenced by that MTX, preserving the exact file/folder structure. This function only works when the scene file with all of the references is on the same or higher level on the same folder tree as the files being referenced. In this case, the files are copies to the selected library intact to preserve quality. If the references include files in other folder trees and/or at a higher level, pro-V Studio will load the MTX file and its referenced content and republish the scene into a new MTS file. This can cause texture and geometry quality degradation. Further, this may lose SWF and sound files present in the original scene. This function is useful for importing Viewpoint scenes created in other applications and performing post-production work to create the finished product. For example, you could export a Viewpoint scene from Curious Labs' Poser and add interactivity in pro-V Studio.

Importing Audio

Please see "Sound Modifier" on page 138 for information about adding sound to your pro-V Studio scenes.

EXIT

Selecting **File>Exit** or pressing [CTRL]+[Q] closes pro-V Studio. You are prompted to save any unsaved changes.

Chapter 14: The Edit Menu

The **Edit** menu allows you to perform basic editing functions and access your pro-V Studio application's general preferences settings.

UNDO

Selecting **Edit>Undo** or pressing CTRL]+[Z] undoes your last action. pro-V Studio features multiple levels of undo and redo.

REDO

Selecting **Edit>Redo** or pressing [CTRL+[Y] restores the most recently undone action. pro-V Studio features multiple levels of undo and redo.

CUT

Selecting **Edit>Cut** or pressing [CTRL]+[X] removes the selected element(s) from your scene and places them in the system Clipboard for later pasting. You can do this for any object in your scene. This function also cuts children and interaction elements attached to cut elements, but does not alter any animations or change any references to the cut object(s).

COPY

Selecting **Edit>Copy** or pressing [CTRL]+[C] places a copy of the selected element(s) in the system Clipboard. This function also copies children and interaction elements attached to copied elements, but does not alter any animations or change any references to the copied object(s).

PASTE

Selecting **Edit>Paste** or pressing [CTRL]+[V] pastes an instance of all cut/copied elements from the system Clipboard into your scene. You can paste 3D objects anywhere you like in the scene hierarchy. Pasted objects will have their interaction elements, however all targets remain the same. Pasted objects will appear in the same locations they had when they were cut/copied, so there may be duplicates that won't be visible until you alter the position of either the original or pasted object. Pasted objects lose any animations previously assigned to the original objects. If your cut/copied object included children,

those children will also be pasted into the scene hierarchy when you paste the parent object.

NOTE
A WARNING DIALOG APPEARS IF YOU ATTEMPT AN UNSUPPORTED CUT/COPY/PASTE OPERATION.

DELETE

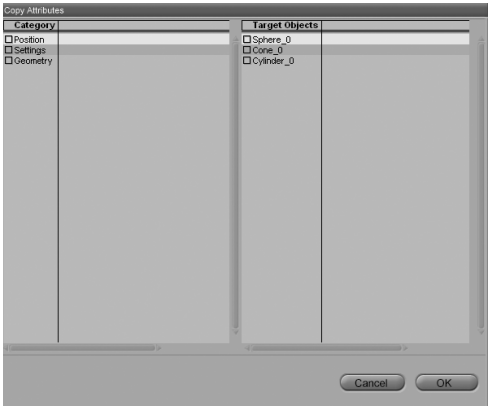
Selecting **Edit>Delete** or pressing [DEL] or [BACK] deletes the currently selected object. If you delete an object targeted by a reactor, the affected reactor is also deleted.

DESELECT ALL

Selecting **Edit>Deselect All** or pressing [CTRL]+[D] deselects all selected objects in your scene.

COPY ATTRIBUTES

Selecting **Edit>Copy Attributes** copies the attributes of the currently selected object to another compatible object and opens the **Copy Attributes** dialog.



To copy attributes from one object to the other, select the attribute(s) you wish to copy on the left side of the dialog and your desired target(s) on the right side. Click **OK** to confirm the copy, or **Cancel** to abort.

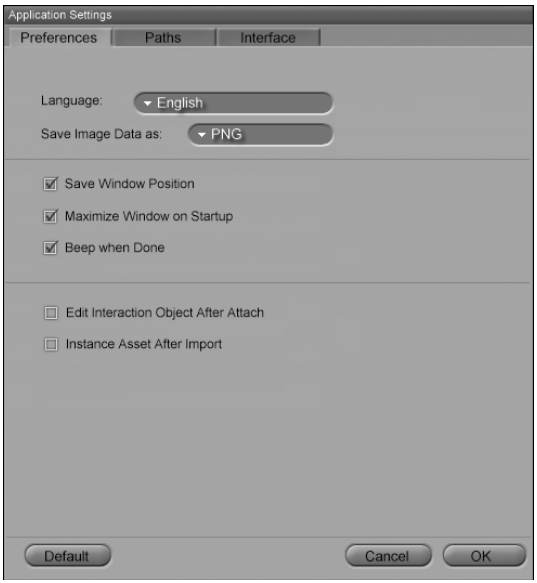
PREFERENCES

Selecting **Edit>Preferences** opens the **Application Settings** window, which allows you to specify global pro-V Studio preferences and default file paths. The **Application Settings** dialog has three tabs: **Preferences**, **Paths**, and **Advanced**. It also has three buttons, which are available in all three tabs:

- *Default*: Clicking **Default** restores the pro-V Studio default preferences/file paths.
- *Cancel*: Clicking **Cancel** exits this window and discards your changes.
- *OK*: Clicking **OK** accepts your changes and exits this window.

PREFERENCES TAB

The **Preferences** tab gives you the following choices:

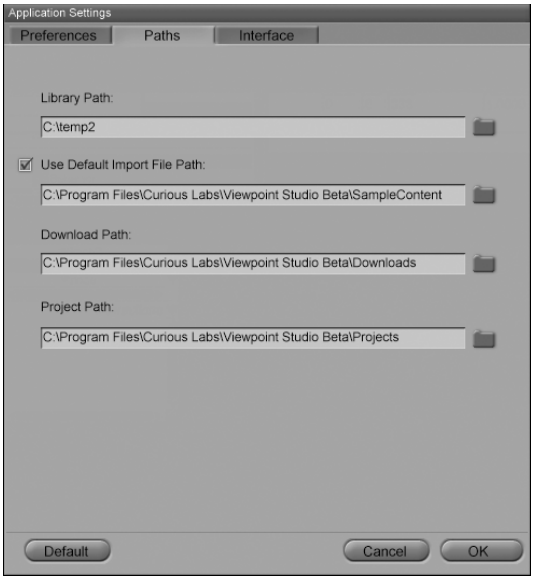


- *Save Image Data As*: All images imported into pro-V Studio are converted to either JPG or PNG format depending on your selection in the **Save Image Data as** pull-down menu. Selecting JPG optimizes image size for faster downloading but degrades quality, while the PNG option optimizes image quality while sacrificing download speed.
- *Save Window Position*: Checking the **Save Window Position** checkbox stores your last-used window positions and restores them when you exit and re-launch pro-V Studio.
- *Maximize Window on Startup*: Checking the **Maximize Window on Startup** checkbox opens the main pro-V Studio window maximized on your desktop. Clearing this checkbox causes pro-V Studio to open in partial-screen mode.
- *Beep when Done*: Some pro-V Studio functions can take a few minutes depending on your computer's resources and the complexity of the operation being performed. Checking the **Beep when Done** checkbox causes your computer to beep whenever a task is completed, allowing you to work on other applications with pro-V Studio in the background or leave your computer unattended and receive an audible alert. Clearing this checkbox makes pro-V Studio work in a "silent" mode.
- *Viewpoint Interaction Components*: Checking the **Viewpoint Interaction Components** checkbox makes the default Viewpoint interaction components available for use in your scene. Clearing this checkbox does not expose these components. Please see "Native VET Components" on page 48 and "Native VET Components" on page 120 for more information about Viewpoint and pro-V Studio interaction components.

- *Edit Interaction Object After Attach*: Checking the **Edit Interaction Object After Attach** automatically opens an interaction element's dialog when you bring it into your scene and saves you the step of manually opening the dialog. Clearing this checkbox does not automatically open this dialog.
- *Instance Asset After Import*: By default, importing an object, does not create an instance in the scene. Checking the **Instance Asset After Import** automatically creates an instance of the asset in your scene when you import it, and vice-versa.

PATHS TAB

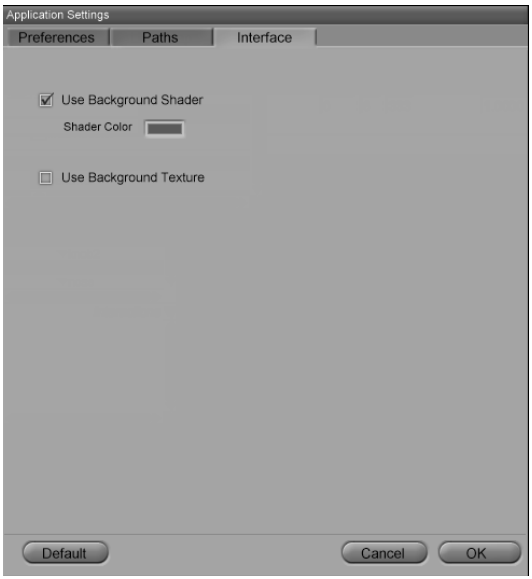
The **Library** tab is where you specify your desired default paths for various pro-V Studio functions. Your path choices are:



- *Library Path*: The **Library Path** is the drive/folder where the pro-V Studio library is stored. Please see "Library vs. Project Assets" on page 17 for more information about libraries.
- *Use Default File Import Path*: Checking the **Use Default File Import Path** button begins each import function in the specified folder when you first launch pro-V Studio. If this checkbox is blank, pro-V Studio remembers the last-used import path upon restarting. pro-V Studio will remember your last-used import path until you exit the application.
- *Download Path*: The **Download Path** is the default path for content downloaded using the **Content** room. Please see "The Content Room" on page 177 for more information about the **Content** room.
- *Project Path*: The **Project Path** is the default path for saving your pro-V Studio projects.

INTERFACE TAB

The **Interface** tab is has these choices:



- *Use Background Shader*: Checking the **Use Background Shader** checkbox enables a custom background color. Checking the **Shader Color** box opens a standard Color Picker, allowing you to choose your color.
- *Use Background Texture*: Checking the **Use Background Texture** checkbox enables a custom image, and vice-versa.

SETTING CUSTOM BACKGROUNDS

To set a custom background shader, either click the **Shader Color** box as described above, or:

1. Open the **AppSettings.xml** file located in your pro-V Studio's **Runtime** folder.
2. Modify the **UseBGShader** tag as follows: `UseBGShader="1"`.
3. Modify the **UseBGShaderColor** tag with any valid color number.
4. Save the modified **AppSettings.xml** file.

SETTING CUSTOM TEXTURES

To set a custom background shader:

1. Open the **AppSettings.xml** file located in your pro-V Studio's **Runtime** folder.
2. Modify the **UseBGTexture** tag as follows: `UseBGTexture="1"`
3. Modify the **BGTextureFileName** tag by inserting the complete path to your texture image between the quotation marks. For example: `BgTextureFileName="C:\My Pictures\image1.jpg"`.
4. Save the modified **AppSettings.xml** file.

WARNING

BE SURE TO SAVE A BACKUP COPY OF THE ORIGINAL **APPSETTINGS.XML** FILE. FAILURE TO DO SO CAN CAUSE DATA LOSS AND/OR UNEXPECTED BEHAVIOR. ONLY ADVANCED USERS SHOULD MODIFY XML FILES.

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Chapter 15: The Scene Menu

The **Scene** menu allows you to enable and disable viewing layers and also setup some global scene preferences.

CREATE ASSET INSTANCE

Selecting **Scene>Create Asset Instance** creates a new instance of the currently selected asset. Please see "Instances" on page 18 for more information about instances.

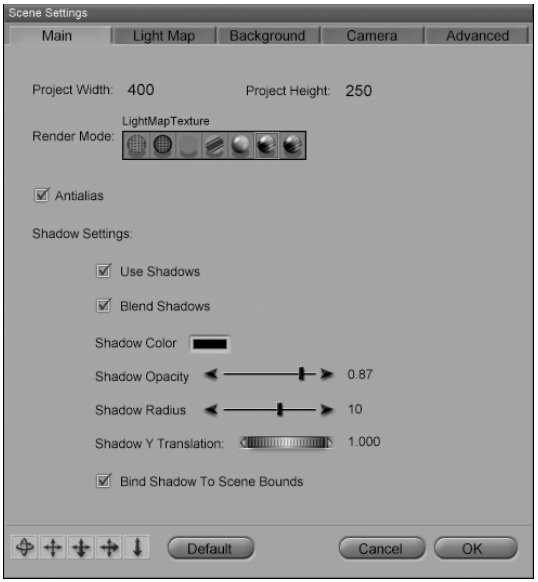
SCENE SETTINGS

Selecting **Scene>Scene Settings** opens the **Scene Settings** dialog with the **Main** tab selected. All tabs in this dialog have the following options:

- *Default*: Clicking **Default** restores the pro-V Studio default scene preferences.
- *Cancel*: Clicking **Cancel** exits this window and discards your changes.
- *OK*: Clicking **OK** accepts your changes and exits this window.
- *Edit Camera Controls*: The left bottom corner of the **Scene Settings** dialog contains a full set of **Edit Camera** controls so that you can view your changes in the **Scene Display** window in real time. Please see "Edit Camera Controls" on page 102 for more information about the **Edit Camera** controls. You may switch tabs at any time by clicking the desired tab.

MAIN TAB

The **Main** tab has the following options:



- *Project Width*: Enter your desired project width in pixels in the **Project Width** field.
- *Project Height*: Enter your desired project height in pixels in the **Project Height** field.
- *Render Mode*: Select your desired render mode by clicking your desired **Render Mode** icons. pro-V Studio supports seven render options. You can select different render options for your entire scene and/or on a per-project basis. Please refer to "Material Tab" on page 149 for more information about the supported render modes.
- *Use Shadows*: Checking the **Use Shadows** checkbox enables shadows for your scene and vice-versa.
- *Blend Shadows*: Checking the **Blend Shadows** checkbox blends overlapping shadows cast by different objects into one. Clearing this checkbox causes individual shadows to appear, which can lessen your scene's realism.
- *Shadow Color*: Clicking the **Shadow Color** box opens a standard Color Picker that allows you to specify your desired shadow color.
- *Shadow Opacity*: The **Shadow Opacity** slider controls the shadow transparency. A setting of 0 (slider all the way to the left) creates a fully transparent shadow, while a setting of 1.0 (slider all the way to the right) creates a fully opaque shadow. You can also enter your desired value in the field.
- *Shadow Radius*: The **Shadow Radius** slider determines the radius of the shadow around objects. Increasing this value causes larger shadows and vice-versa. You can also enter your desired number in the field.
- *Shadow Y Translation*: The **Shadow Y** dial translates (moves) the shadow up and down. Click and drag the dial to make your selection, and/or input your desired value

directly in the field to the right of the dial. This change is only visible when the shadow is not bound to the scene bounding box (see below).

- *Bind Shadow to Scene Bounds*: Checking the **Bind Shadow to Scene Bounds** forces shadows to remain within the scene's bounding box and vice-versa. Clearing this checkbox enables you to alter the **Shadow Y** parameter, above.

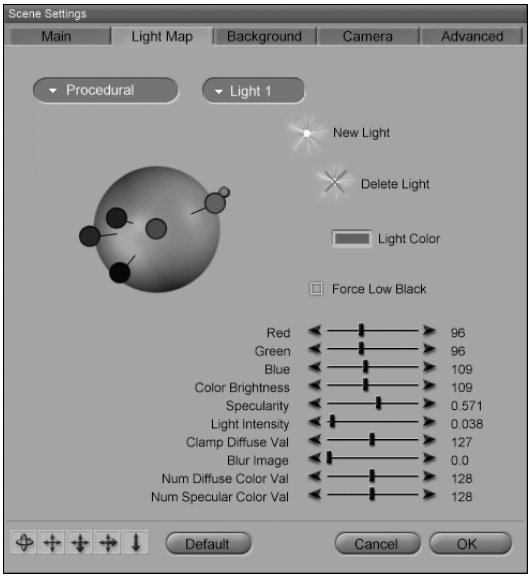
LIGHTMAP SETTINGS

Selecting **Scene>Lightmap Settings** opens the **Scene Settings** dialog with the **Lightmap** tab selected. pro-V Studio uses light maps, which are described in "Light Maps" on page 45. You may switch tabs at any time by clicking the desired tab. The **Lightmap** tab has the following options:

- *Procedural/Image*: You can load an image to use for a light map, or you can use a procedural method to create a custom light map using the **Lightmap Type** pull-down menu.

PROCEDURAL LIGHTMAPS

Selecting **Procedural** in the **Lightmap** tab allows you to create or modify a lightmap using a procedural system that emulates the lighting system found in some popular 3D rendering applications such as Curious Labs Poser. You can specify lightmaps on a scene or per-object level. Lightmaps applied to objects override scene settings.



You have the following options available when using procedural lightmaps:

- *Light Sphere*: The **Light Sphere** is a virtual spherical panorama representing the edges of your scene on all sides. The colored pins represent individual lights. You may select a light using the **Select Light** pull-down menu. To position a light, click and drag it anywhere you want. If you continue dragging a light past the sphere's edge, it will move to the back as shown in the image above. A small red dot indicates the currently selected light.

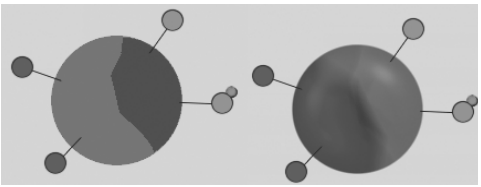
- *New Light*: Clicking the **New Light** icon creates a new light.
- *Delete Light*: Clicking the **Delete Light** icon deletes the currently selected light.
- *Light Color*: Clicking the **Light Color** box opens a standard Color Picker that allows you to specify your desired color for the currently selected light. You can also adjust the light's color using the sliders, as explained below.
- *Force Low Black*: Checking the **Force Low Black** checkbox creates a black border around the lightmap image, which can affect how objects appear in your scene.
- *Red*: The **Red** slider determines the amount of red in the light's color. A value of 0 (slider all the way to the left) indicates no red, while a value of 255 (slider all the way to the right) indicates maximum redness. You can also enter your desired value in the field.
- *Green*: The **Green** slider determines the amount of green in the light's color. A value of 0 (slider all the way to the left) indicates no green, while a value of 255 (slider all the way to the right) indicates maximum green. You can also enter your desired value in the field.
- *Blue*: The **Blue** slider determines the amount of red in the light's color. A value of 0 (slider all the way to the left) indicates no blue, while a value of 255 (slider all the way to the right) indicates maximum blueness. You can also enter your desired value in the field.

NOTE

SETTING THE RED, GREEN, AND BLUE VALUES TO 255 MAKES WHITE. SETTING ALL THREE VALUES TO 0 MAKES BLACK. YOU CAN SELECT OVER 16 MILLION LIGHT COLORS (255*255*255=16,581,375).

- *Color Brightness*: The **Color Brightness** slider determines the light's shade. Increasing this value (moving the slider to the right) lightens the shade, and vice-versa. This slider adjusts the **Red**, **Green**, and **Blue** sliders at once, preserving the relationships between them. You can also enter your desired value in the field
- *Specularity*: The **Specularity** slider adjusts the size of the highlight. Moving it to the right enlarges the highlight and vice-versa. You can also enter your desired value in the field
- *Light Intensity*: The **Light Intensity** slider controls the light's overall brightness. Moving it to the right increases this value and vice-versa. You can also enter your desired value in the field
- *Clamp Diffuse Val*: The **Clamp Diffuse Val** slider controls' the strength of the light's color. Moving it to the right increases this value and vice-versa. You can also enter your desired value in the field

- *Blur Image*: The **Blur Image** slider controls the amount of blurring in the current light map. Moving it to the right increases this value and vice-versa. You can also enter your desired value in the field.
- *Num Diffuse Color Val*: The **Num Diffuse Color Val** slider specifies the number of steps (increments) in the diffuse color. Moving it to the right increases this value and vice-versa. You can also enter your desired value in the field.



- *Num Specular Color Val*: The **Num Specular Color Val** slider specifies the number of steps (increments) in the specular color. Moving it to the right increases this value and vice-versa. You can also enter your desired value in the field.

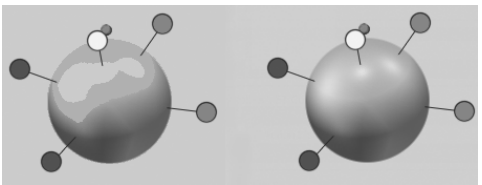
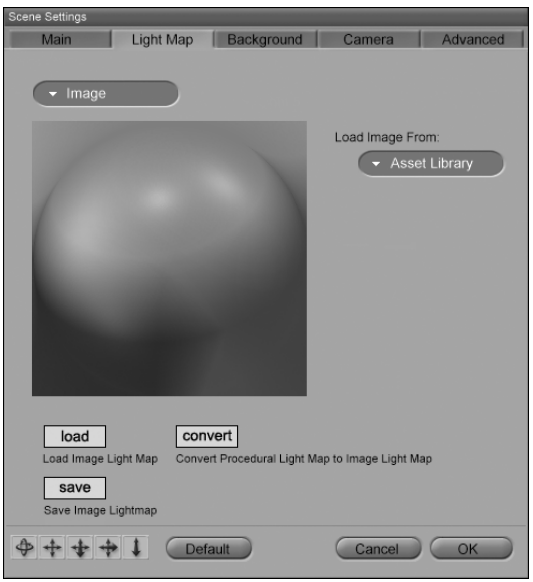


IMAGE LIGHTMAPS

Selecting **Image** in the **Lightmap** tab allows you to work with lightmap images.

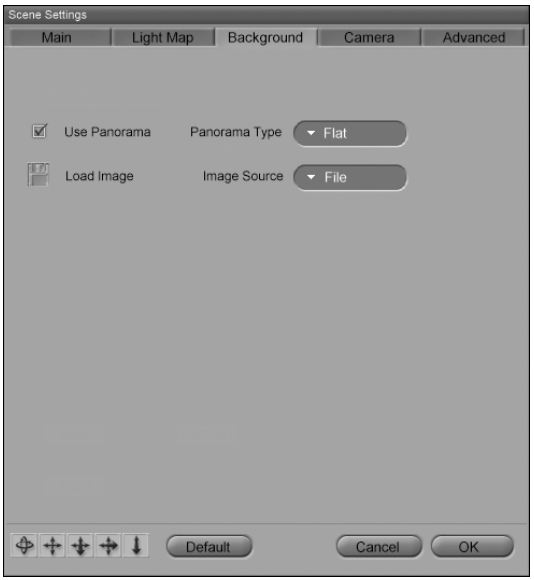


You have the following options when working with lightmap images:

- *Load Image From*: The **Load Image From** pull-down menu allows you to specify your desired source from which to load image maps. Your options are **File**, **pro-V Studio Library**, and **Project Library**. Please see "Library vs. Project Assets" for more information about the libraries.
- *Load*: Clicking the **Load** button allows you to load a lightmap file using a standard **Load** dialog.
- *Convert*: Clicking the **Convert** button converts a procedural lightmap to a lightmap image that can be saved to your hard drive.

- *Save*: Clicking the **Save** button opens a standard **Save** dialog, allowing you to save your current lightmap image to your hard drive. You can create as many custom light maps as you wish, save them as images, and apply them to individual objects within your scene. Object light maps override scene lightmaps. Please see "Light Map Palette" on page 156 for more information.

BACKGROUND SETTINGS



Selecting **Scene>Background Settings** opens the **Scene Settings** dialog with the **Background** tab selected. You may switch tabs at any time by clicking the desired tab.

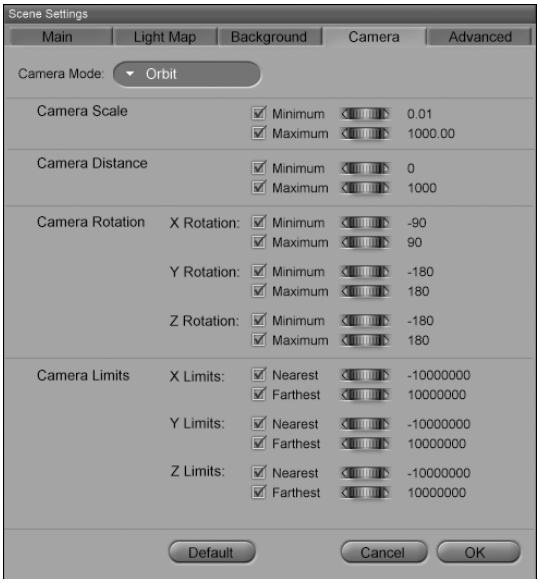
The **Background** tab has the following options:

- *Background Color*: Clicking the **Background Color** box opens a standard Color Picker that allows you to specify your desired background color.
- *Use Panorama*: Checking the **Use Panorama** checkbox enables loading images or animations into the background layer (see "Background Layer" on page 21 for more information) and vice-versa. Checking this box also enables the following options:
- *Panorama Type*: Use the **Panorama Type** pull-down menu to select the projection method for objects in this layer:
  - *Flat*: Selecting **Flat** places the image/animation in the background layer. This content is fixed, meaning you cannot scroll it.
  - *Cylinder*: Selecting **Cylindrical** allows you to scroll the background left and right.
  - *Sphere*: Selecting **Sphere** allows you to scroll the background in any direction.
- *Load Image*: Clicking the **Load Image** icon opens a standard **Open** dialog, allowing you to select a file to load directly into the background layer.

- *Image Source*: The **Image Source** pull-down menu allows you to specify your desired source from which to load background images, etc. Your options are **File**, **pro-V Studio Library**, and **Project Library**.

CAMERA SETTINGS

Selecting **Scene>Camera Settings** opens the **Scene Settings** dialog with the **Camera** tab selected. You may switch tabs at any time by clicking the desired tab.



The **Camera** tab has the following options:

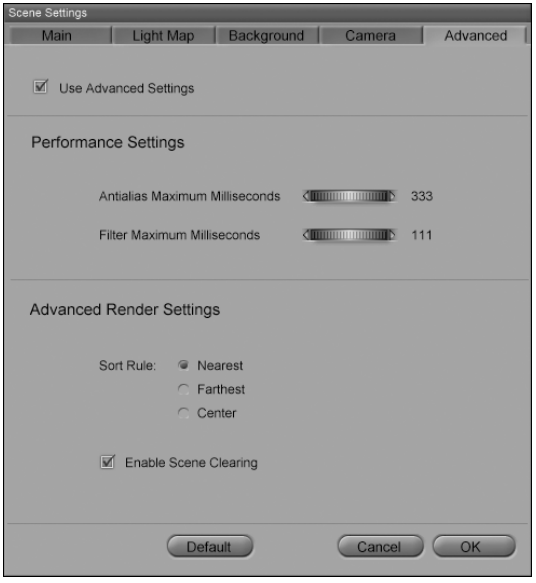
- *Camera Mode*: The **Camera Mode** pull-down allows you to select the camera mode. The available options are:
  - *Orbit*: Selecting **Orbit** places the camera at the end of an invisible stick that's anchored at the point defined by the **Pivot** tag. The camera always points at the pivot point and moves in relation to it at a fixed distance, allowing you to view the geometry from every possible vantage point.
  - *Walk*: Selecting **Walk** allows you to move the camera freely around the scene.
  - *Pano*: Selecting **Pano** pivots the camera right, left, up, and down from a fixed point in the middle of your scene.
  - *Still*: Selecting **Still** locks the camera in its current position.
- *Scale*: The **Scale Minimum** and **Scale Maximum** dials set the camera's minimum and maximum zoom, respectively. Checking a checkbox enables the selected limit and vice-versa. To adjust a value, click and drag the desired dial to the right (increase) or left (decrease). You can also enter your desired value in the appropriate field.
- *Distance*: The **Distance Minimum** and **Distance Maximum** dials set the camera's minimum and maximum distance from the scene's center, respectively. This is the absolute distance from the scene center along any axis. Checking a checkbox enables the selected limit and vice-versa. To adjust a value, click and drag the desired dial to

the right (increase) or left (decrease). You can also enter your desired value in the appropriate field.

- *XYZ Rotation*: The **XYZ Rotation Minimum** and **XYZ Rotation Maximum** dials set the camera's minimum and maximum rotation along each axis in degrees, respectively. Checking a checkbox enables the selected limit and vice-versa. To adjust a value, click and drag the desired dial to the right (increase) or left (decrease). You can also enter your desired value in the appropriate field.
- *XYZ Limits*: The **XYZ Limits Nearest** and **XY Z Limits Farthest** dials set the camera's minimum and maximum distance along each axis, respectively. This is the distance along an axis regardless of the distance from the scene center. Checking a checkbox enables the selected limit and vice-versa. To adjust a value, click and drag the desired dial to the right (increase) or left (decrease). You can also enter your desired value in the appropriate field.

ADVANCED SETTINGS

Selecting **Scene>Advanced Settings** opens the **Scene Settings** dialog with the **Advanced** tab selected. You may switch tabs at any time by clicking the desired tab. The **Advanced** tab has the following options:



- *Use Advanced Settings*: Checking the **Use Advanced Settings** checkbox enables the advanced settings for the current scene and vice-versa.
- *Antialias Maximum Milliseconds*: The **Antialias Maximum Milliseconds** value specifies the number of milliseconds that the viewer's computer should spend to antialias the scene. If not completed in the specified time, the process will stop. To adjust a value, click and drag the desired dial to the right (increase) or left (decrease). You can also enter your desired value in the appropriate field

- *Filter Maximum Milliseconds*: The **Filter Maximum Milliseconds** value specifies the number of milliseconds that the viewer's computer should spend to filter texture maps in the current scene. If not completed in the specified time, the process will stop. To adjust a value, click and drag the desired dial to the right (increase) or left (decrease). You can also enter your desired value in the appropriate field
- *Sort Rule*: The **Sort Rule** allows you to determine the order in which objects appear on the viewer's computer when your scene is accessed. Check the appropriate radio button to make your selection. Your choices are **Nearest** (objects closest to the camera appear first), **Farthest** (objects furthest from the camera appear first), or **Center** (objects in the center of the scene appear first).
- *Enable Scene Clearing*: Checking the **Enable Scene Clearing** causes the Viewpoint Media Player to clearing the previous frame's screen content (render buffer), and vice-versa. Viewpoint Media Player disables this mode when you have a panorama in your scene's background.

COPY SCENE ASSET SETTINGS

Selecting **Scene>Copy Scene Asset Settings** copies the settings from the selected scene asset (object) to your current scene. This function copies everything described in the **Scene Settings** dialog except for the light map and the camera position settings.

Chapter 16: The Object Menu

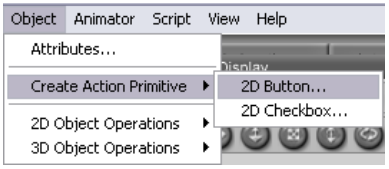
The **Object** menu allows you to control object attributes, create action primitives, and perform basic 2D and 3D object operations.

ATTRIBUTES

Selecting **Object>Attributes** opens the **Object Attributes** palette for the selected object in any pro-V Studio room. This window varies by object type and is visible in the **Scene Setup** room by default. You can also open it by double-clicking either the Runtime camera or any visible object listing in the **Hierarchy Viewer** window or by pressing [CTRL]+[I]. Please refer to "Object Attributes Palette" on page 141 for more information about the **Object Attributes** palette.

CREATE ACTION PRIMITIVE

The **Create Action Primitive** sub-menu allows you to create the following *action primitives*, which allow you to add interface elements to your scene.



To create an action primitive:

1. Select **Object>Create Action Primitive><primitive>**.
2. Add your desired images.
3. Configure the interaction components.

2D BUTTON

Selecting **Object>Create Action Primitive>2D Button** allows you to create a 2D button by opening the **2D Button Wizard** palette, which has the following options:

- *Up Image*: The **Up Image** is the image that appears when the button is "up", that is, not pressed with the mouse not over the button.
- *Roll Over Image*: The **Roll Over Image** is the image that appears when the mouse is on top of the button.
- *Down Image*: The **Down Image** is the image that appears when the button is pressed.

Each image has the following options:

- *Load Image*: Clicking the **Load Image** icon opens a standard **Open** dialog, allowing you to select a file to load directly into the background layer.
- *Image Source*: The **Image Source** pull-down menu allows you to specify your desired source from which to load background images, etc. Your options are **File**, **pro-V Studio Library**, and **Project Library**.

Buttons appear in the 2D layer. Each button can be up (default), rollover (mouse in on top of the button), or down (clicked). Creating a button also adds the following interaction components:

- *Button Up*: The **Button Up** has a Multi Reactor named **Button UP MultiReactor**.
- *Button Roll Over*: The **Button Roll Over** has two Multi Reactor named **Button RollOver MultiReactor 1** and **Button RollOver MultiReactor 2**.
- *Button Down*: The **Button Up** has a Multi Reactor named **Button Down MultiReactor** and a behavior named **Button Click Behavior**.

NOTE
IN THE ABOVE EXAMPLE, **<NAME>** REFERS TO THE NAME OF THE PARENT OBJECT (SUCH AS **BUTTON_0**).

Please refer to "Multi Reactors" for more information on Multi Reactors and to "About Behaviors" on page 167 for more information on behaviors.

2D CHECKBOX

Selecting **Object>Create Action Primitive>2D Checkbox** allows you to create a 2D checkbox by opening the **2D Checkbox Wizard** palette, which has the following options:

- Unchecked Image: The **Unchecked Image** is the image that appears when the checkbox is "clear", that is, not checked.
- Checked Image: The **Checked Image** is the image that appears when the checkbox is checked.

Each image has the following options:

- *Load Image*: Clicking the **Load Image** icon opens a standard **Open** dialog, allowing you to select a file to load directly into the background layer.
- *Image Source*: The **Image Source** pull-down menu allows you to specify your desired source from which to load background images, etc. Your options are **File**, **pro-V Studio Library**, and **Project Library**.

Checkboxes appear in the 2D layer. Each checkbox can be unchecked (clear) or checked. Creating a button also adds the following interaction components:

- *Checkbox Unchecked*: The **Checkbox Unchecked** has a Multi Reactor named **<name> Unchecked MultiReactor**.
- *Checkbox Checked*: The **Checkbox Checked** has a Multi Reactor named **<name> Checked MultiReactor**.

NOTE
IN THE ABOVE EXAMPLE, **<NAME>** REFERS TO THE NAME OF THE PARENT OBJECT (SUCH AS **CHECKBOX_0**).

Please refer to "Multi Reactors" on page 119 for more information on Multi Reactors and to "About Behaviors" on page 167 for more information on behaviors

2D OBJECT OPERATIONS

The **2D Operations** sub-menu allows you to perform basic operations to 2D objects:

CENTER VERTICALLY

Selecting **Object>2D Object Operations>Center Vertically** centers the selected 2D object vertically in your scene.

CENTER HORIZONTALLY

Selecting **Object>2D Object Operations>Center Horizontally** centers the selected 2D object horizontally in your scene.

3D OBJECT OPERATIONS

The **3D Operations** sub-menu allows you to perform basic operations to 3D objects:

MOVE TO WORLD ORIGIN

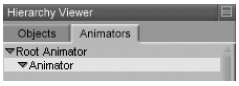
Selecting **Object>3D Object Operations>Move To World Origin** moves the selected object to the global origin in all three axes (0,0,0).

Chapter 17: The Animator Menu

The **Animator** menu allows you to work with animators, timelines, and keyframes. You can add, split, and play animators, and can add timelines and keyframes. Please refer to "Creating Simple Animations" on page 112 for more information on creating simple animations inside pro-V Studio and to "The Animation Room" on page 158 for more information about the **Animation** room.

NEW ANIMATOR

Selecting **Animator>New Animator** creates a new animator. To create a new animator:



1. Select the desired parent for the new animator.
2. Select **Animator>New Animator** to create the new animator.
3. Name the new animator by selecting it in the **Animators** tab of the **Hierarchy Viewer** window, then clicking it (slow double-click). Enter your desired animation name in the field. Press [ENTER] when finished.

You may rename animators at any time using this method.

NEW ACTION TIMELINE

Selection **Animation>New Action Timeline** creates a new action timeline in your selected animator. See "Action Timelines" on page 163 for more information.

SPLIT SELECTION

Selecting **Animator>Split Selection** splits an animator with multiple timelines into separate animators, each with one timeline. You can also split timelines and keyframes. Please see "Splitting Selections" on page 166 for more information.

This is a great way to refine control over animations in scenes. Splitting an animator does not delete the original animator or timelines. This allows you to revert your changes or perform other operations since no data is lost.

PLAY ANIMATOR

Selecting **Animator>Play Animator** plays the currently selected animator. You can also do this by clicking the **Play** button in the **Simple Animations** palette, as described in "The Simple Animations Palette" on page 110.

ADD TIMELINE

Selecting **Animator>Add Timeline** or pressing [CTRL]+[T] adds a new timeline to the currently selected animator.

ADD KEYFRAME

Selecting **Animator>Add Keyframe** or pressing [CTRL]+[K] adds a keyframe to the currently selected timeline.

Chapter 18: The View Menu

The **Project** menu is another convenient way of switching between rooms while using pro-V Studio.

HIDE/SHOW BACKGROUND

When the background layer is visible, selecting **Scene>Hide Background** hides the background layer. When the background layer is invisible, selecting **Scene>Show Background** displays the background layer. This function is also available directly within the **Scene Display** window. Please see "Layer Display" on page 101 for more information.

HIDE/SHOW 3D LAYER

When the 3D layer is visible, selecting **Scene>Hide 3D Layer** hides the 3D layer. When the 3D layer is invisible, selecting **Scene>Show 3D Layer** displays the 3D layer. This function is also available directly within the **Scene Display** window. Please see "Layer Display" on page 101 for more information.

HIDE/SHOW 2D LAYER

When the 2D layer is visible, selecting **Scene>Hide 2D Layer** hides the 2D layer. When the background layer is invisible, selecting **Scene>Show 2D Layer** displays the 2D layer. This function is also available directly within the **Scene Display** window. Please see "Layer Display" on page 101 for more information.

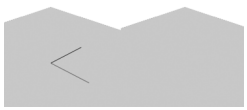
HIDE/SHOW FOREGROUND LAYER

When the foreground layer is visible, selecting **Scene>Hide Foreground Layer** hides the post-animation layer. When the post-animation layer is invisible, selecting **Scene>Show Foreground Layer** displays the foreground layer. This function is also available directly within the **Scene Display** window. Please see "Layer Display" on page 101 for more information.

HIDE/SHOW GROUND PLANE

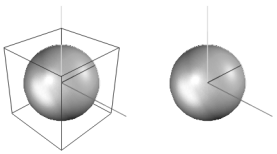
When the ground plane is visible, selecting **Scene>Hide Ground Plane** hides the 2D ground plane. When the ground plane is invisible, selecting **Scene>Show Ground Plane** displays the ground plane. This function is also available directly within the **Scene Display** window. Please see "Layer Display" on page 101 for more information.You may also toggle the ground plane on and off by pressing [CTRL]+[G].

HIDE/SHOW AXES



When the scene and object axes are visible, selecting **Scene>Hide Axes** hides them in the Scene Display window. When the scene and object axes are invisible, selecting **Scene>Show Axes** displays them.

HIDE/SHOW BOUNDING BOXES



When object bounding boxes are visible, selecting **Scene>Hide Bounding Boxes** hides them in the **Scene Display** window. When object bounding boxes are invisible, selecting **Scene>Show Bounding Boxes** displays them. You may also toggle bounding boxes on and off by pressing [CTRL]+[B].

SCENE SETUP

Selecting **Project>Scene Setup** switches to the **Scene Setup** room. This is the same as clicking the **Scene Setup** room tab.

MATERIALS

Selecting **Project>Materials** switches to the **Materials** room. This is the same as clicking the **Materials** room tab.

ANIMATION

Selecting **Project>Animation** switches to the **Animation** room. This is the same as clicking the **Animation** room tab.

INTERACTION

Selecting **Project>Interaction** switches to the **Interaction** room. This is the same as clicking the **Interaction** room tab.

WEB INTEGRATION

Selecting **Project>Web Integration** switches to the **Web Integration** room. This is the same as clicking the **Web Integration** room tab.

PUBLISH

Selecting **Project>Publish** switches to the **Publish** room. This is the same as clicking the **Publish** room tab.

CONTENT

Selecting **Project>Content** switches to the **Content** room and accesses the online Content Paradise portal. This is the same as clicking the **Content** room tab

Chapter 19: The Help Menu

The **Help** menu provides assistance while you're using pro-V Studio.

PRO-V STUDIO HELP

Selecting **Help>pro-V Studio Help** opens this manual in Adobe Acrobat (PDF) format.

CURIOUS LABS WEB LINKS

Selecting **Help>Curious Labs Web Links** opens Curious Labs Web pages containing lots of useful information about pro-V Studio.

TUTORIALS

Selecting **Help>Tutorials** opens a Web page containing tutorials on how to use pro-V Studio.

OTHER WEB LINKS

Selecting **Help>Other Web Links** opens an assortment of online Web pages containing lots of useful information about pro-V Studio.

ABOUT PRO-V STUDIO

Selecting **Help>About pro-V Studio** displays your pro-V Studio version and licensing information. You will need this information when contacting Curious Labs Technical Support.

PART 6

Workspace Reference

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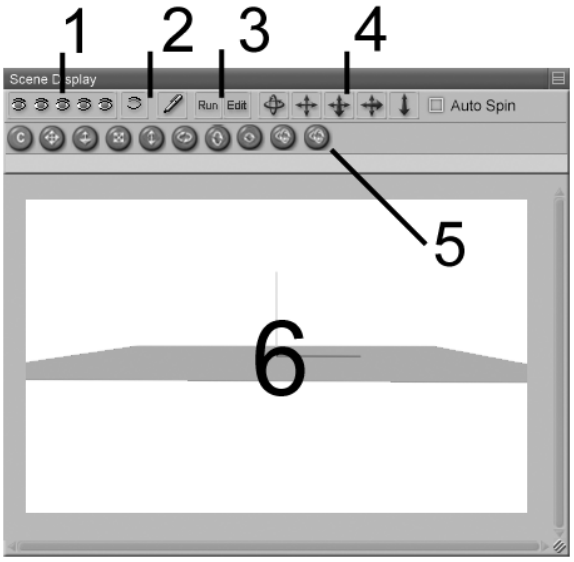
Chapter 20: The Scene Display Window

The **Scene Display** window is where you will view and work with your scenes as you build them. It appears in all pro-V Studio rooms except the **Web Integration** and **Content** rooms. This window appears as shown.



The **Scene Display** window has the following functional areas:

- *Layer Display (1)*: Toggle layers and the ground plane on and off.
- *Miscellaneous Tools (2)*: View the entire scene and add notes.
- *Camera Selection (3)*: Select your desired camera and toggle viewing the entire scene.
- *Edit Camera Controls (4)*: Manipulate the Edit camera.
- *Editing Tools (5)*: Position objects and the Runtime camera.
- *Scene Display (6)*: Directly manipulate objects in your scene using the **Editing** tools.

The following sections discuss each area in further detail:

LAYER DISPLAY

The **Layer Display** tools (area 1) allow you toggle both the pro-V Studio layers and the ground plane on and off. Toggling layers off can help visualization and provide added control when creating complex scenes. From left to right, these tools are:

- *Toggle Background Layer*: Clicking the **Toggle Background Layer** icon toggles displaying the background layer on and off.
- *Toggle 3D Layer*: Clicking the **Toggle 3D Layer** icon toggles displaying the 3D layer on and off.
- *Toggle 2D Layer*: Clicking the **Toggle 2D Layer** icon toggles displaying the 2D layer on and off.
- *Toggle Foreground Layer*: Clicking the **Toggle Foreground Layer** icon toggles displaying the foreground layer on and off.
- *Toggle Ground Plane*: Clicking the **Toggle Ground Plane** icon toggles displaying the ground plane on and off.

MISCELLANEOUS TOOLS

The **Scene Display** window includes two **Miscellaneous** tools (area 2). From left to right, these tools are:

- *View Whole Scene*: Clicking the **View Whole Scene** icon zooms the **Scene Display** window to view your entire scene for as long as the button remains pressed. Releasing the button reverts to your previous view. This function is good for getting an overview of your scene and overall progress.
- *Markup Tool*: Activating the **Markup** tool lets you "draw" on your scene, allowing you to (for example) visualize animation paths, highlight areas of concern, etc. This information is not saved and is not published with your scene. Deactivating the **Markup** tool clears all markups.

CAMERA SELECTION

The **Camera Selection** tools (area 3) allow you to select your current camera and get a "bird's eye" view of your scene:

- *Edit Camera*: Clicking the **Edit Camera** icon selects the Edit camera and activates the **Edit Camera** controls (see below). The **Scene Display** window changes to view your scene from this camera's current position. The Edit camera is the "working" camera you use to build your scene. The Edit camera's position and movements are not saved

and do not get published with your scene. You can also activate this camera by pressing [CTRL]+[E].

- *Runtime Camera*: Clicking the **Runtime Camera** icon selects the Runtime camera and deactivates the **Edit Camera** controls (see below). The **Scene Display** window changes to view your scene from this camera's current position. The Runtime camera is the "viewing" camera from which viewers see your published scene. The Runtime camera's position and movements are saved and get published with your scene. You can also activate this camera by pressing [CTRL]+[R] or by selecting it in the **Hierarchy Viewer** window.

EDIT CAMERA CONTROLS

The **Edit Camera** controls (area 4) allow you to move your **Edit** camera to view your scene from different angles without affecting any of the objects in your scene. They appear as shown.

From left to right, the **Edit Camera** controls are:

- *Trackball*: The **Trackball** tilts and spins the **Edit** camera about all three axes.
- *Move XY*: *Move XY*: The **Move XY** control constrains camera motions to the side/side (X) and up/down (Y) axes.
- *Move XZ*: The **Move XZ** control constrains camera motions to the side/side (X) and front/back (Z) axes.
- *Move YZ*: The **Move YZ** control constrains camera motions to the up/down (Y) and front/back (Z) axes.
- *Focal Length*: The **Focal Length** (or **Scale**) control increases or decreases the selected camera's focal length. Clicking the control and dragging right increases the focal length, while clicking and dragging to the left reduces the focal length. This zooms the camera view in and out of your scene without moving the camera or any objects.
- *Auto Spin*: Checking the **Auto Spin checkbox** causes the scene to keep spinning in the direction and velocity of the most recent click and drag in any empty portion in your scene. To spin in a new direction, click and drag in your desired direction. To stop spinning, click the mouse at any empty point in your scene. Clearing this checkbox disables this function.

EDITING TOOLS

The **Editing** tools (area 5) appear as follows in the **Scene Display** window:

The **Editing** tools let you move objects in many different ways. Moving a parent object also moves its children. To move an object:

1. Select the object by either clicking it in the **Scene Display** window or by selecting it in the **Hierarchy Viewer** window.
2. Click and drag your desired **Editing** tool to move the selected object and any children.

From left to right, the **Editing** tools are:

RUNTIME CAMERA 

The **Runtime Camera** tool selects the **Runtime** camera. Unlike the Edit camera, The Runtime camera's position is stored and published with your scene. Please see "Runtime Camera" on page 103 for more information. You can enable this tool by pressing [1].

TRANSLATE 

The **Translate** tool moves the selected object vertically around or laterally around the Camera's X and Y axes depending on how you drag. The translation may occur on the object's X, Y, and or Z axes depending on the position of the camera relative to the object. You can also adjust an object's translation using the **Object Attributes** palette, as described in "Object Attributes Palette" on page 141. You can enable this tool by pressing [2].

PUSH/PULL 

The **Push/Pull** tool moves the selected object along the camera's Z axis (in and out). This translation may take place along the object's X, Y, and/or Z axes. Dragging down pulls the object towards you, and vice versa. Moving an object towards you makes that items seem larger, and vice versa. You can also adjust an object's translation using the **Object Attributes** palette, as described in "Object Attributes Palette" on page 141. You can enable this tool by pressing [3].

TRANSLATE XZ 

The **Translate XZ** tool moves the selected object along the global X and Z axes regardless of the Camera's position. Dragging left and right moves the object along the X axis. Dragging up and down moves the object along the Z axis. You can also adjust an object's translation using the **Object Attributes** palette, as described in "Object Attributes Palette" on page 141. You can enable this tool by pressing [4].

TRANSLATE Y 

The **Translate Y** tool moves the selected object along the global Y axis regardless of the Camera's position. Dragging up and down moves the object along the Y axis. You can also adjust an object's translation using the **Object Attributes** palette, as described in "Object Attributes Palette" on page 141. You can enable this tool by pressing [5].

ROTATE Y 

The **Rotate Y** tool rotates the selected object along the Camera's Y axis (yaw - see "Rotation" on page 32). This rotation may take place along the object's X, Y, and/or Z axes. Drag left or right to rotate the object. You can also adjust an object's rotation using the **Object Attributes** palette, as described in "Object Attributes Palette" on page 141. You can enable this tool by pressing [6].

ROTATE X 

The **Rotate X** tool rotates the selected object along the Camera's X axis (pitch - see "Rotation" on page 32). This rotation may take place along the object's X, Y, and/or Z axes. Drag up or down to rotate the object. You can also adjust an object's rotation using the **Object Attributes** palette, as described in "Object Attributes Palette" on page 141. You can enable this tool by pressing [7].

ROTATE Z 

The **Rotate Z** tool rotates the selected object along the Camera's Z axis (roll - see "Rotation" on page 32). This rotation may take place along the object's X, Y, and/or Z axes. Drag left or right to rotate the object. You can also adjust an object's rotation using the **Object Attributes** palette, as described in "Object Attributes Palette" on page 141. You can enable this tool by pressing [8].

TUMBLE 

The **Tumble** tool rotates an object along the Camera's X, Y, or Z axes. This rotation may take place along the object's X, Y, and/or Z axes. Drag in any direction to rotate the object. You can also adjust an object's rotation using the **Object Attributes** palette, as described in "Object Attributes Palette" on page 141. You can enable this tool by pressing [0].

SCALE 

The **Scale** tool scales an object along the Camera's X, Y, or Z axes. This may take place along the object's X, Y, and/or Z axes. Select a control point (see image) and drag in any direction to scale the object. Selecting a control point in a corner scales the object uniformly. Selecting a control point that is not in a corner scales the object along the selected axis. You can also adjust an object's scale using the **Object Attributes** palette, as described in "Object Attributes Palette" on page 141. You can enable this tool by pressing [0].

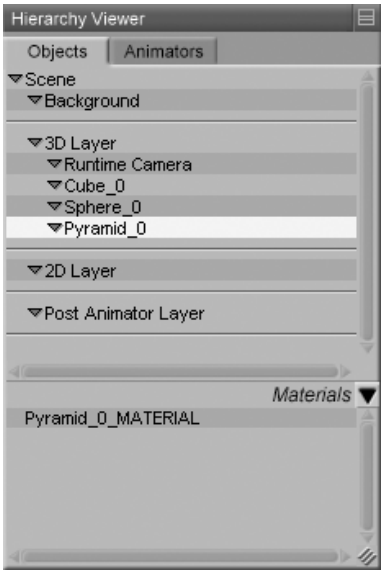
SCENE DISPLAY

The **Scene Display** area (area 6) displays your scene's objects.

- To access **Trackball** functionality, left-click and drag in any open area of the window.
- To zoom in and out, right-click and drag in any open area of the window.
- To add an object to your scene, you can select the desired object in the **Media** palette and drag the object into the window. Dragging a 2D object into the window places it in the background layer. Please see "Background Layer" on page 21 for more information.
- To directly manipulate an object, select an **Editing** tool then click and drag the selected object. Be sure your mouse is over the selected object when you do this to avoid rotating your viewing angle.
- The **Scene Display** window shows your scene in its set height and width. Resizing this window does not resize your scene. To resize your scene, use the **Scene Settings** window as described in "Scene Settings" on page 80.

Chapter 21: The Hierarchy Viewer Window

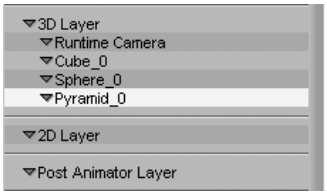
Fireplace's **Hierarchy View** window displays your scene's hierarchies. It appears in all pro-V Studio rooms except the **Web Integration** and **Content** rooms. Please see "Hierarchies" on page 36 for more information about hierarchies. This window breaks down hierarchies by layer, interaction components, materials, and animators. It appears as shown.

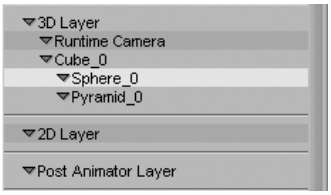


The **Hierarchy View** window has the following functional areas:

- *Objects Tab (1)*: The **Objects** tab displays the scene hierarchies by layer.
- *Animators Tab (2)*: The **Animators** tab displays your scene's animator hierarchy.
- *Interactions/Materials Area* (3): The **Interactions/Materials** area displays all interaction elements or materials assigned to each object.

OBJECTS TAB



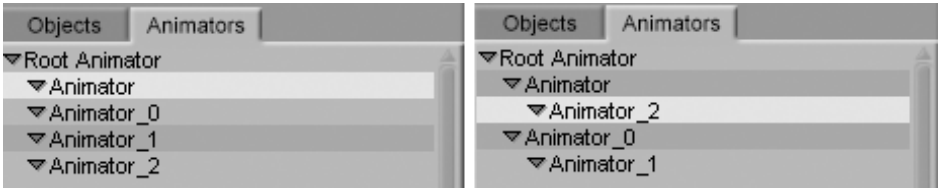


The **Objects** tab (area 1) displays your scene's object hierarchies by layer. Children appear indented in the hierarchy view. You can add objects to the 3D layer by dragging them from the **Media** palette to the **Hierarchy Viewer** window. Click the arrows next to objects to expand and collapse hierarchy branches. You can also rearrange the hierarchy in the 2D and 3D layers by dragging and dropping objects as shown in this example.

In the **Scene Setup** room, selecting an object in the 3D or 2D layer opens the **Object Attributes** window for that object. In other rooms, double-clicking the object has the same function. Please see "Object Attributes Palette" on page 141 for more information about the **Object Attributes** window.

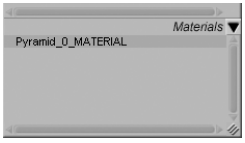
ANIMATORS TAB

The **Animators** tab (area 2) displays all of the animators and their hierarchy in your scene. As with the **Objects** tab, you can click and drag animators to create or modify the animator hierarchy as shown in this example:



When in the **Animation** room, selecting an animator in the **Hierarchy View** window opens the **Animation Details** window for that animator. Please see "The Simple Animations Palette" on page 110 for more information about animating within pro-V Studio.

INTERACTIONS/MATERIALS AREA



The **Interactions/Materials** area (area 3) displays either the interaction components or (if you are in the **Materials** room) the material assigned to the currently selected object in the scene hierarchy. Please see "Interactions" on page 47 for more information about interaction components and "Materials & Lights" on page 42 for more information about materials. Use the pull-down arrow to select whether you wish to view interaction components or materials for the selected object as shown.

NOTE

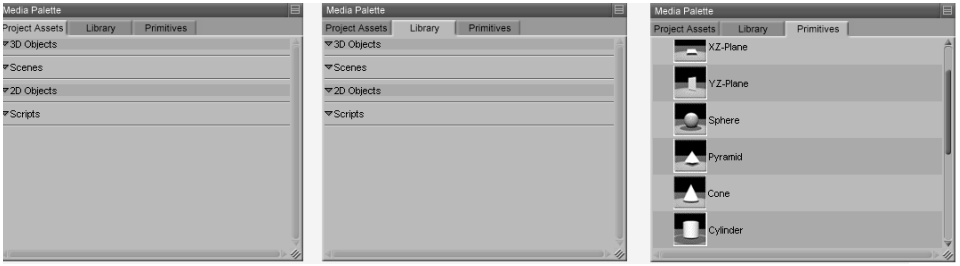
REMEMBER, YOU CAN VIEW INTERACTION COMPONENTS IN ANY PRO-V STUDIO ROOM. MATERIALS ARE ONLY AVAILABLE WHEN IN THE **MATERIALS** ROOM.

DELETING OBJECTS/ANIMATORS

To delete an object or animator, select the item to delete, then either select **Edit>Delete** or press [DEL] or [BACK]. Deleting a parent deletes its children as well. Deleting an object with interaction components attached also deletes those interaction components. You cannot have "empty" (unattached) interaction components in scenes.

Chapter 22: The Media Palette

The **Media** palette is where you access the project assets, pro-V Studio library, and primitives. It appears in the **Scene Setup** and **Materials** rooms. Please see "Library vs. Project Assets" on page 17 and "Primitives" on page 17 for more information about each of these content types. The **Media** palette has three tabs, one for each object type, which appear as follows:



PROJECT ASSETS TAB

The **Project Assets** tab contains all of the 2D and 3D objects in your current project/scene. These objects may be instanced from the **Library** tab or may be imported solely for your current project. Assets are organized into:

- *3D Objects*: contains all of the 3D objects in your current project.
- *Scenes*: contains all of the Viewpoint scene objects (such as ASE, NFF, and MTX) in your current project.
- *2D Objects*: contains all of the 2D objects (images and animations) in your current project.
- *Scripts*: contains all imported Java scripts in your current project.

Assets imported into the project assets are only available for that project. To import objects for use in more than one project, import them into the pro-V Studio Library. See "Library vs. Project Assets" on page 17 and "The Import Settings Dialog" on page 71 for more information.

To add an object from the **Media** palette to your current scene, click and drag the desired object into either the **Scene Display** or **Hierarchy Viewer** window. Dragging a 2D object into the scene adds it to the background layer. In the **Materials** room, you can also drag 2D objects to create and modify materials. Please see "Maps Palettes" on page 153 for more information.

LIBRARY TAB

The **Library** tab contains all of the 2D and 3D objects in your pro-V Studio Library. These objects are available for use in all of your projects. Assets are organized into:

- *3D Objects*: contains all of the 3D objects in your pro-V Studio Library.
- *Scenes*: contains all of the Viewpoint scenes in your pro-V Studio Library.
- *2D Objects*: contains all of the 2D objects (images and animations) in your pro-V Studio Library.
- *Scripts*: contains all imported Java scripts in your pro-V Studio Library.

To add an object from your pro-V Studio Library to your current scene, click and drag the desired object into either the **Scene Display** or **Hierarchy Viewer** window. Dragging a 2D object into the scene adds it to the background layer. In the **Materials** room, you can also drag 2D objects to create and modify materials. Please see "Maps Palettes" on page 153 for more information.

Adding an object from the pro-V Studio Library to your current project also adds that object to your project objects, and it will be accessible from the **Project Assets** tab. This is done to prevent data loss caused by deleting objects from the pro-V Studio Library that are in use in your scene.

PRIMITIVES TAB

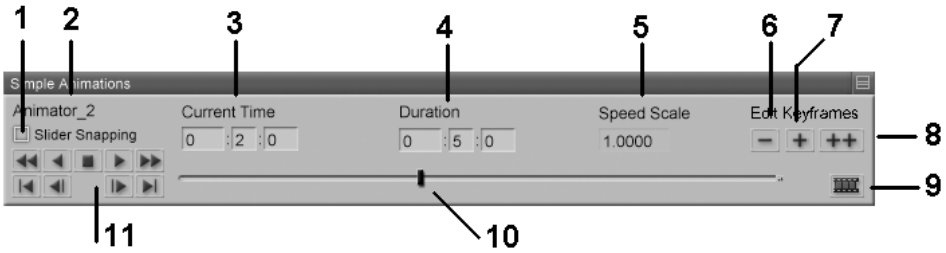
The **Primitives** tab contains an assortment of basic primitive shapes. These are available at all times while using pro-V Studio. To add an object from your primitives to your current scene, click and drag the desired object into either the **Scene Display** or **Hierarchy Viewer** window. All primitives are 3D objects. Primitives do not appear in the **Project Assets** tab because of their universal availability.

Chapter 23: The Simple Animations Palette

The **Simple Animations** palette lets you quickly add animations to your scene. For detailed animation control, you will need to go to the **Animation** room (see "The Animation Room" on page 158 for more information).

SIMPLE ANIMATION PALETTE CONTROLS

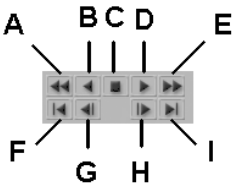
The **Simple Animations** palette appears as follows:



This palette has the following controls:

- *Slider Snapping (1)*: Checking the **Slider Snapping** checkbox causes the **Time** slider (1) to jump or *snap* to the nearest keyframe when dragged and released.
- *Animator Name (2)*: The **Animator Name** displays the currently selected animator.
- *Current Time (3)*: The **Current Time** fields display the animation's current location in minutes:seconds:milliseconds format. See the following section for more information.
- *Duration (4)*: The **Duration** fields display the animation's total length in minutes:seconds:milliseconds format. See the following section for more information.
- *Speed Scale (5)*: The **Scale** field displays the current time scale. A value of 2 means that the animation will play double speed. 0.5 means the animation will play at half speed, and so forth. Enter your desired scale using the **Animation Details** window, as described in "Animation Details Window" on page 158.
- *Remove Keyframe (6)*: Clicking the **Remove Keyframe** button removes the current keyframe.

- *Add Keyframe (7)*: Clicking the **Add Keyframe** button or pressing [CTRL]+[K] dds a keyframe at the time specified in the **Current Time** fields (3). If a keyframe already exists at the specified time, this function only adds keyframes to timelines without keyframes. To replace an existing keyframe, you must use the **Force Add Keyframe** button, described below.
- *Force Add Keyframe (8)*: Clicking the **Force Add Keyframe** button or pressing [CTRL]+[SHIFT]+[K] replaces keyframes at the current time with the new values. For example, if you have an existing keyframe with a Translate value of 3 and the object is at 5Y, this button replaces the TranslateY 3 keyframe with a TranslateY 5 keyframe.
- *Add Timeline (9)*: The **Add Timeline** button adds a timeline to the current animator and opens the **Property Selection** dialog. Please see "Animation Hierarchy" on page 39 for information about the pro-V Studio animation hierarchy and "The Property Selection Dialog" on page 113 for information about the **Property Selection** dialog. You can also create a new timeline by pressing [CTRL]+[T]
- *Time (10)*: The **Time** slider allows you to drag or *scrub* to any time in the animation.
- *Animation Controls (11)*: The **Animation Controls** allow you to preview your animation. They appear as shown.



The **Animation Controls** are as follows:

- *Rewind (A)*: Clicking the **Rewind** button returns to the beginning of the animation.
- *Reverse/Pause (B)*: Clicking the **Reverse** button plays the animation in reverse. While the animation is playing, clicking this button again pauses playback.
- *Stop (C)*: Clicking the **Stop** button stops the animation at its current position.
- *Play/Pause (D)*: Clicking the **Play** button plays the animation. While the animation is playing, clicking this button again pauses playback.
- *Fast Forward (E)*: Clicking the **Fast Forward** button plays the animation at higher speed.
- *First Keyframe (F)*: Clicking the **First Keyframe** button moves the animation to the first keyframe.
- *Previous Keyframe (G)*: Clicking the **Previous Keyframe** button moves the animation to the next previous keyframe.
- *Next Keyframe (H)*: Clicking the **Next Keyframe** button moves the animation to the next proceeding keyframe.
- *Last Keyframe (I)*: Clicking the **Last Keyframe** button moves the animation to the last keyframe.

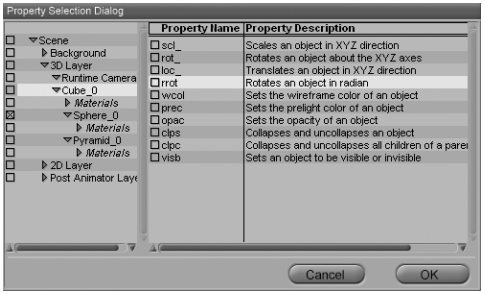
CREATING SIMPLE ANIMATIONS

To create a simple animation:

1. Create a new animator by selecting **Animation>New Animator**.
2. In the **Hierarchy Viewer** tab, select the **Animations** tab and select your new animator. This enables the **Simple Animations** palette.
3. Click the **Add Timeline** button and select your desired target object and properties in the **Property Selection** dialog (see below for more information about the **Property Selection** dialog).
4. Specify the total length of this animation by entering your desired time in minute:second:millisecond format in the **Duration** fields. For example, to create an animation that is 1 minute and 23.5 seconds long, you would enter `1` in the left field, `23` in the middle field, and `500` in the right field.
5. Click the **Add Keyframe** button to add an initial keyframe.
6. Move the **Time** slider to a new position or enter the time for the first keyframe in the **Current Time** fields using the same format described in Step 4, above.
7. Change the target object's properties. How you do this will depend on the property being animated. For example, if you are changing an object's location (translation), you may either click and drag the object in the **Scene Display** window or adjust its location using the **Object Attributes** dialog (see "Object Attributes Palette" on page 141 for more information).
8. Repeat steps 5-7 as often as desired to create your keyframes.
9. Preview your new animation.

To adjust an existing animation, go to the **Animation** room (see "The Animation Room" on page 158 for more information).

THE PROPERTY SELECTION DIALOG



As described in Step 3, above, clicking the **Add Keyframe** or **Force Add Keyframe** button in the **Simple Animations** palette (see "The Simple Animations Palette" on page 110) opens the **Property Selection** dialog box, which appears as shown.

The left side of this dialog contains a display of your scene's hierarchy, much like the **Hierarchy Viewer** window (see "The Hierarchy Viewer Window" on page 106 for more information).

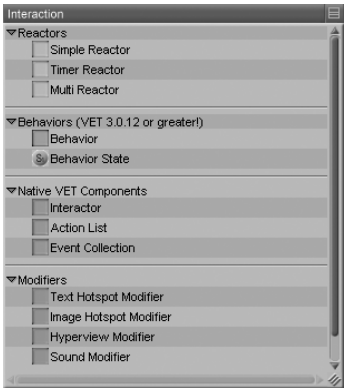
1. To create a new animator, select **Animator>New Animator**
2. To add a timeline to an existing animator, select the animator in which you wish to create the timeline in the Hierarchy Viewer window.
3. Select the object you want to animate just like you would in the **Hierarchy Viewer** window.
4. The right side of the **Property Selection** dialog displays a list of animatable attributes for the selected object. Select the property or properties you wish to animate and click **OK**. This creates one new timeline in the currently selected animator for each selected property. Preexisting timelines appear already checked. Unchecking the checkbox stops adding keyframes to the selected timeline until when and if you check the box again.

Chapter 24: The Interaction Palette

The **Interaction** palette allows you to add interaction components to your scene. There are four types of interaction components: reactors, behaviors, native VET components, and modifiers. This chapter discusses the **Interaction** palette and the different types of interaction components.

INTERACTION PALETTE

The **Interaction** palette appears as shown.



To add an interaction component:

1. Select the component you wish to add.
2. Drag the desired interaction component from the **Interaction** palette onto the desired object in the **Hierarchy Viewer** window.
3. Edit your newly added interaction component by double-clicking it in the **Hierarchy Viewer** window. Remember that you will only see the interaction components that are attached to your currently selected object, as shown below:

In the above example, if you have a reactor attached to the pyramid, selecting the pyramid will display that reactor.

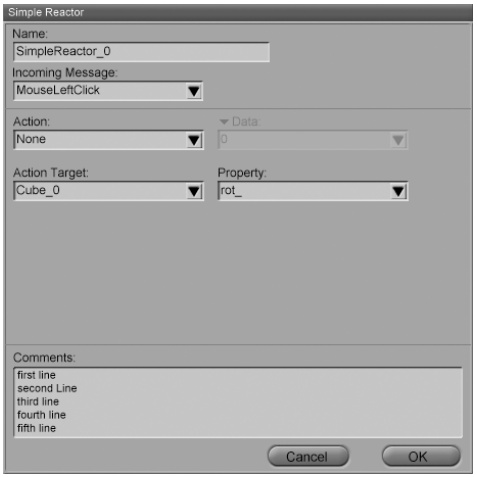
Checking the **Edit Interaction Object After Attach** checkbox in the **Application Settings** dialog automatically opens an interaction component's dialog box whenever you add an interaction component. Please see "Scene Settings" on page 80 for more information.

REACTORS

pro-V Studio supports three types of reactors: **Simple**, **Timer**, and **Multi**. Each type of reactor is discussed in further detail below. All reactors have the same basic function of making a pre-defined triggering event cause a pre-defined response. For example, a Simple Reactor reacts to a trigger (incoming message) that causes it to perform its specified action. The other reactor types are variations on this theme.

SIMPLE REACTORS

A Simple Reactor appears as shown. This reactor type has the following elements:



- *Name*: Enter a name for the reactor in the **Name** field (1). This must be an alpha or alphanumeric entry (no numeric entries). Further, this name must be unique and cannot contain any special or XML characters.
- *Incoming Message*: The **Incoming Message** pull-down menu (2) allows you to specify the reactor's trigger. pro-V Studio includes messages. You can also create custom messages. For example, if another reactor sends out the message `MYMESSAGE`, then you can set another reactor to be triggered when `MYMESSAGE` is posted to the system. The built-in options are:
  - *Scene Start*: Selecting **Scene Start** triggers the reactor when the scene begins playing on a viewer's computer.
  - *Mouse Left Down*: Selecting **Mouse Left Down** triggers the reactor when the left mouse button is pushed (but not necessarily released) while the mouse is on top of the selected object.
  - *Mouse Left Click*: Selecting **Mouse Left Click** triggers the reactor when the left mouse button is clicked (pushed and released) while the mouse is on top of the selected object.
  - *Mouse Left Up*: Selecting **Mouse Left Up** triggers the reactor when the left mouse button is released while the mouse is on top of the selected object.
  - *Mouse Right Down*: Selecting **Mouse Right Down** triggers the reactor when the right mouse button is pushed (but not necessarily released) while the mouse is on top of the selected object.
  - *Mouse Right Click*: Selecting **Mouse Right Click** triggers the reactor when the right mouse button is clicked (pushed and released) while the mouse is on top of the selected object.
  - *Mouse Right Up*: Selecting **Mouse Right Up** triggers the reactor when the right mouse button is released while the mouse is on top of the selected object.

- *Mouse Drag*: Selecting **Mouse Dragged** triggers the reactor when the mouse is dragged across the selected object (moved across the object with a button held down).
- *Mouse Move*: Selecting **Mouse Move** triggers the reactor when the mouse is moved across the selected object without a button pushed.
- *Mouse Enter*: Selecting **Mouse Enter** triggers the reactor when the mouse cursor crosses over any edge of the selected object.
- *Mouse Exit*: Selecting **Mouse Exit** triggers the reactor when the mouse cursor goes beyond any edge of the selected object.
- *Mouse Drag Enter*: Selecting **Mouse Drag Enter** triggers the reactor when the mouse cursor crosses over any edge of the selected object while a button is pushed.
- *Mouse Drag Exit*: Selecting **Mouse Drag Exit** triggers the reactor when the mouse cursor goes beyond any edge of the selected object while a button is pushed.
- *Mouse Wheel*: Selecting **Mouse Wheel** triggers the reactor when the mouse wheel is moved while the mouse is on top of the selected object.
- *Key Down*: Selecting **Mouse Left Down** triggers the reactor when a key is pressed.
- *Key Up*: Selecting **Mouse Left Down** triggers the reactor when a key is released.
- *Custom*: If you have custom messages output by other interaction components, you can use any of those messages to trigger another reactor. Simply select your desired message from the pull-down menu. For example, if you create a message called `MYMESSAGE`, then **MYMESSAGE** will appear as an option in the menu.

- *Action*: Once the reactor is triggered, it will perform the action specified in the **Action** pull-down menu (3). Available actions are:
  - *Post Message*: Selecting **Post Message** sends a custom message to the system when the current reactor is triggered. For example, if you select this option and enter `MYMESSAGE` in the **Message** field (see below), then **MYNMESSAGE** will appear as an option in the **Incoming Message** pull-down (described above) and can be used to trigger another reactor.
  - *Set Built In Property*: Selecting **Set Built In Property** allows you to set a property, which you select using the **Property** pull-down menu (see below).
  - *Collapse*: Selecting **Collapse** collapses the current object. Please see "Collapsing Objects" on page 37 for more information.
  - *Uncollapse*: Selecting **Uncollapse** uncollapses the selected object and children. Collapsing and uncollapsing objects allows you to create more complex scenes while conserving resources.

- *Hide*: Selecting **Hide** makes the current object invisible. Hidden objects are still present in the scene and can have interaction components, etc. They also consume resources.
- *Show*: Selecting **Show** makes the current object visible.
- *Set Object Opacity*: Selecting **Set Object Opacity** allows you to specify the object's opacity in the **Data** field.
- *Drag Object*: Selecting **Drag Object** allows the viewer to drag the current object to a new location.
- *Set Material Diffuse Color*: Selecting **Set Material Diffuse Color** allows you to set the current object's color. Please see "Material Settings Palette" on page 149 for more information.
- *Set Material Opacity*: Selecting **Set Material Opacity** allows you to specify the opacity of the object's material (not the object itself) in the **Data** field.
- *Trigger Animation*: Selecting **Trigger Animation** allows you to trigger an action animator that begins playing when the reactor is triggered.
- *Start Animation*: Selecting **Start Animation** starts the selected animator.
- *Stop Animation*: Selecting **Stop Animation** stops the selected animator.
- *Load MTX*: Selecting **Load MTX** loads the specified Viewpoint MTX file.
- *Execute VB Script*: Selecting **Execute VB Script** loads and executes a Visual Basic (VB) script.
- *Execute JavaScript*: Selecting **Execute JavaScript** loads and executes a Java Script script.

WARNING

USE SCRIPTS WITH CARE! SCRIPTS CAN CAUSE DATA LOSS AND UNPREDICTABLE BEHAVIOR ON DEVELOPMENT AND VIEWER COMPUTERS IF NOT THOROUGHLY TESTED.

- *Data*: Some of the actions allow you to send data to the system. For example, posting a message allows you to enter a custom message as described above. The **Data** field (4) is where you enter the data to be applied by the reactor. The displayed name of this field changes depending on the action you select using the **Action** pull-down menu. For some values, you can select the following by clicking the arrow to the left of the field name and using the pull-down menu:
  - *Value*: Selecting **Value** sends the specified value to the selected target.
  - *Append*: Selecting **Append** adds the value you enter to the existing value. For example, if the **rot_** value is currently 3 and you enter `2`, the **rot_** value will become 5 (2+3).

  - *Message*: As described above, you can create custom messages, post that value to the system, and have other interaction components react to that custom message. Messages have a "broadcast" effect, meaning that they exist throughout the scene once posted. Thus, one message can affect multiple targets.

- *Action Target*: The **Action Target** pull-down menu displays a hierarchical list of objects in your scene. This appears similarly to the list found in the **Hierarchy Viewer** window and functions identically. This is the object on which the reactor will act. For example, you could set up a reactor to begin an animation when a sphere is clicked. In this case, you would attach the reactor to the sphere and select the animator as the target object.
- *Property*: If you selected an action that requires you to select a property, you can select an available property using the **Property** pull-down menu.
- *Comments*: If desired, you may enter up to 5 lines of text as comments or explanations about the current reactor and its function. This can help with complex scenes, especially if more than one person is working on a scene or if the scene is subject to periodic revision.

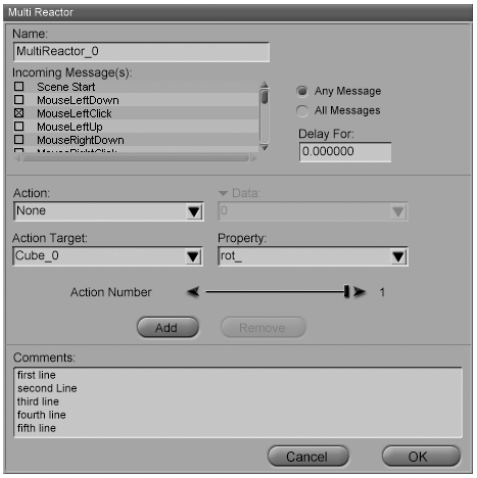
Depending on which combinations you select, different options and pull-downs will become enabled or disabled. This prevents inadvertent and impossible/useless/conflicting entries. Once you have finished making your selections, click **OK** to save your changes or **Cancel** to abort. You may access the reactor at any time by selecting the object it is attached to in the **Hierarchy Viewer** window and double-clicking the reactor.

TIMER REACTORS

A Timer Reactor is the same as a Simple Reactor (see "Simple Reactors" on page 115), except that it includes a **Delay** field. Enter your desired delay in seconds and fractions of a second in the **Delay** field. Once the reactor is triggered, the delay period will pass before the specified action occurs. Once you have finished making your selections, click **OK** to save your changes or **Cancel** to abort.

MULTI REACTORS

A Multi Reactor combines a **Simple** and **Timer** reactor with added functionality. This type of reactor can be triggered by any or all of a set of incoming messages and can perform multiple actions. Multi Reactors appear as shown.



- *Incoming Message(s)*: Instead of the **Incoming Message** pull-down menu that appears in Simple and Timer Reactors, Multi Reactors have an **Incoming Message(s)** list. Check the boxes to the left of the messages you wish to use to trigger this reactor. You can check one or as many messages as you like. Use the scroll bar on the right side of this list if necessary to view the entire list of available messages. Both built-in and custom messages will appear here.
- *Any/All Messages*: You can decide whether any one or all of your selected message(s) will trigger the reactor:
  - *Any Message*: Checking the **Any Message** radio button triggers the reactor when any one of your selected messages occurs.
  - *All Messages*: Checking the **All Messages** radio button only triggers the reactor once all selected messages have occurred. These messages may occur in any order.
- *Add/Remove Actions*: See below.

Defining Actions in Multi Reactors

As described above, Multi Reactors can perform multiple actions. To specify more than one action:

1. Click the **Add** button once for each action you wish to add. For example, if you want the reactor to perform five actions, click this button four times.
2. Set the first action just as you would for a Simple Reactor, as described in "Simple Reactors" on page 115.
3. Move the **Action Number** slider until the number to the right of the slider changes to the next number (for example, from **1** to **2**).
4. Set the second action just as you would for a Simple Reactor.

5 Repeat Steps 3 and 4 for each subsequent action.

To delete an action, move the **Action Number** slider to the action you wish to delete and click the **Delete** button. Once you have finished making your selections, click **OK** to save your changes or **Cancel** to abort.

Multi Reactors will perform all of their specified actions when triggered by any or all messages in any order. Specified actions occur simultaneously. If you need triggers and/or actions to occur in a pre-defined order, you need to use a behavior (see "About Behaviors" on page 167, and below).

BEHAVIORS

At their root, behaviors are containers for other interaction components. Like reactors, you assign them on a per-object basis. You can reorder and group behaviors into hierarchies, thereby affecting multiple items. Do this by dragging and dropping, just like you would for any other items in the **Hierarchy Viewer** window (see "The Hierarchy Viewer Window" on page 106)

NOTE

BEHAVIORS REQUIRE YOUR VIEWERS TO HAVE VIEWPOINT MEDIA PLAYER 3.0.12 OR LATER INSTALLED. PLEASE CONTACT VIEWPOINT AT WWW.VIEWPOINT.COM FOR MORE DETAILS.

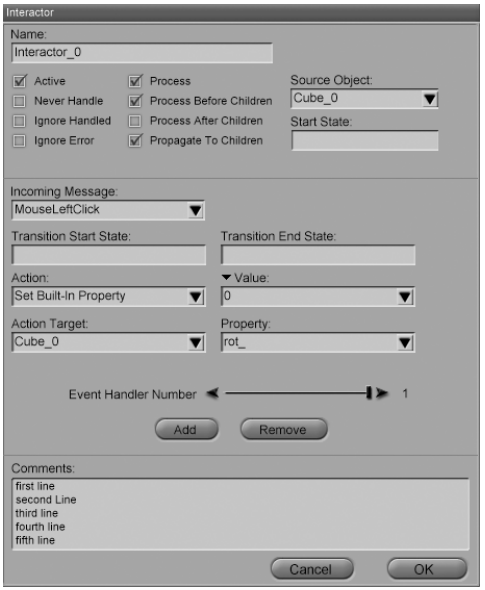
pro-V Studio's **Interaction** room is where you work with behaviors. You may add and remove behaviors in any room where the **Hierarchy Viewer** window. In any room other than the **Interaction** room, however, a simplified dialog will appear when you double-click a behavior. Please see "The Interaction Palette" on page 114 for more information about the **Interaction** room and working with behaviors.

NATIVE VET COMPONENTS

pro-V Studio includes support for native VET interaction components. We recommend using them if you import Viewpoint scenes that already have these components built in or if you wish to hand-edit published MTX files following publication from pro-V Studio or if you are an expert Viewpoint developer.

Please visit http://developer.viewpoint.com and http://xml.viewpoint.com for more information about native VET interaction components.

INTERACTOR



Viewpoint Interactors are similar to Multi Reactors (see "Multi Reactors" on page 119), except that each action can have its own message. Interactors also contain a fairly primitive state machine that enables them to combine some features of a pro-V Studio Behavior. To use the state engine, enter a start state (optional) then enter a transition start and end state. An action inside the Interactor will only take place if the Interactor is in the transition start state specified for that action. If no transition start state is entered, there is no state requirement for the current action. If you want to use states, you should normally enter the same value for both the start and transition start states. The transition end state sets the state once the action is completed.

- *Name*: Enter a name for the Interactor in the **Name** field. This must be an alpha or alphanumeric entry (no numeric entries). Further, this name must be unique and cannot contain any special or XML characters.
- *Active*: Checking the **Active** checkbox enables the Interactor and allows it to process events, and vice-versa.
- *Never Handle*: Checking the **Never Handle** checkbox causes events processed by the current Interactor to not be flagged as processed, allowing another Interactor to process the same event.
- *Ignore Handled*: Checking the **Ignore Handled** checkbox allows you to set the Interactor so that it processes messages (events) even if some other Interactor has already processed the message.
- *Ignore Error*: Checking the **Ignore Error** checkbox causes the Interactor to process messages that have already caused errors in other interaction components. Clearing this checkbox prevents Interactor processing in this case, meaning that the message is ignored if it previously caused an error.
- *Process*: Checking the **Process** checkbox allows the Interactor to process events and pass them to its children, and vice-versa.

- *Process Before Children*: Checking the **Process Before Children** checkbox causes the Interactor to be processed before its children, meaning that it is always processed first.
- *Process After Children*: Checking the **Process After Children** checkbox causes the Interactor to be processed after its children, meaning that it is always processed last. If both **Process Before Children** and **Process After Children** checkboxes are checked, the Interactor is processed twice: once before its children, and again afterward**.**
- *Propagate To Children*: Checking the **Propagate to Children** checkbox causes the Interactor to propagate an event to its children and vice-versa.
- *Source Object*: Use the **Source Object** pull-down menu to select the source object (scene element that originates the interactor). For example, if you select a cube and **Mouse Left Click**, the Interactor will process when a viewer left-clicks the cube.
- *Start State*: Enter your desired starting state in the **Start State** field (see "Interactions" on page 47 for more information about states).
- *Incoming Message*: The **Incoming Message** pull-down menu (2) allows you to specify the Interactor's trigger. pro-V Studio includes messages. You can also create custom messages. For example, if another Interactor sends out the message `MYMESSAGE`, then you can set another Interactor to be triggered when `MYMESSAGE` is posted to the system. The built-in options are:
  - *Scene Start*: Selecting **Scene Start** triggers the Interactor when the scene begins playing on a viewer's computer.
  - *Mouse Left Down*: Selecting **Mouse Left Down** triggers the Interactor when the left mouse button is pushed (but not necessarily released) while the mouse is on top of the selected object.
  - *Mouse Left Click*: Selecting **Mouse Left Click** triggers the Interactor when the left mouse button is clicked (pushed and released) while the mouse is on top of the selected object.
  - *Mouse Left Up*: Selecting **Mouse Left Up** triggers the Interactor when the left mouse button is released while the mouse is on top of the selected object.
  - *Mouse Right Down*: Selecting **Mouse Right Down** triggers the Interactor when the right mouse button is pushed (but not necessarily released) while the mouse is on top of the selected object.
  - *Mouse Right Click*: Selecting **Mouse Right Click** triggers the Interactor when the right mouse button is clicked (pushed and released) while the mouse is on top of the selected object.
  - *Mouse Right Up*: Selecting **Mouse Right Up** triggers the Interactor when the right mouse button is released while the mouse is on top of the selected object.

- *Mouse Drag*: Selecting **Mouse Dragged** triggers the Interactor when the mouse is dragged across the selected object (moved across the object with a button held down).
- *Mouse Move*: Selecting **Mouse Move** triggers the Interactor when the mouse is moved across the selected object without a button pushed.
- *Mouse Enter*: Selecting **Mouse Enter** triggers the Interactor when the mouse cursor crosses over any edge of the selected object.
- *Mouse Exit*: Selecting **Mouse Exit** triggers the Interactor when the mouse cursor goes beyond any edge of the selected object.
- *Mouse Drag Enter*: Selecting **Mouse Drag Enter** triggers the Interactor when the mouse cursor crosses over any edge of the selected object while a button is pushed.
- *Mouse Drag Exit*: Selecting **Mouse Drag Exit** triggers the Interactor when the mouse cursor goes beyond any edge of the selected object while a button is pushed.
- *Mouse Wheel*: Selecting **Mouse Wheel** triggers the Interactor when the mouse wheel is moved while the mouse is on top of the selected object.
- *Key Down*: Selecting **Mouse Left Down** triggers the Interactor when a key is pressed.
- *Key Up*: Selecting **Mouse Left Down** triggers the Interactor when a key is released.
- *Custom*: If you have custom messages output by other interaction components, you can use any of those messages to trigger another Interactor. Simply select your desired message from the pull-down menu. For example, if you create a message called `MYMESSAGE`, then **MYMESSAGE** will appear as an option in the menu.

- *Transition Start State*: Enter your desired starting state for the current action in the **Transition Start State** field. If the Interactor is in the specified state for the current action (see "About Behaviors" on page 167), that action occurs.
- *Transition End State*: If you want an action to create a state change, enter your desired ending state in the **Transition End State** field. For example, say you have a red object in your scene. Clicking the object should toggle between red and green. Set a start state and set up the desired action, being sure to specify an end state. Add an action and set the previous action's end state as the new action's start state. This allows subsequent clicks to toggle between states and toggle the object color from red to green.

- *Action*: Once the Interactor is triggered, it will perform the action specified in the **Action** pull-down menu (3). Available actions are:
  - *Post Message*: Selecting **Post Message** sends a custom message to the system when the current Interactor is triggered. For example, if you select this option and enter `MYMESSAGE` in the **Message** field (see below), then **MYNMESSAGE** will appear as an option in the **Incoming Message** pull-down (described above) and can be used to trigger another interaction component.
  - *Set Built In Property*: Selecting **Set Built In Property** allows you to set a property, which you select using the **Property** pull-down menu (see below).
  - *Collapse*: Selecting **Collapse** collapses the current object. Please see "Collapsing Objects" on page 37 for more information.
  - *Uncollapse*: Selecting **Uncollapse** uncollapses the selected object and children. Collapsing and uncollapsing objects allows you to create more complex scenes while conserving resources.
  - *Hide*: Selecting **Hide** makes the current object invisible. Hidden objects are still present in the scene and can have interaction components, etc. They also consume resources.
  - *Show*: Selecting **Show** makes the current object visible.
  - *Set Object Opacity*: Selecting **Set Object Opacity** allows you to specify the object's opacity in the **Data** field.
  - *Drag Object*: Selecting **Drag Object** allows the viewer to drag the current object to a new location.
  - *Set Material Diffuse Color*: Selecting **Set Material Diffuse Color** allows you to set the current object's color.
  - *Set Material Opacity*: Selecting **Set Material Opacity** allows you to specify the opacity of the object's material (not the object itself) in the **Data** field.
  - *Trigger Animation*: Selecting **Trigger Animation** allows you to trigger an action animator that begins playing when the Interactor is triggered.
  - *Start Animation*: Selecting **Start Animation** starts the selected animator.
  - *Stop Animation*: Selecting **Stop Animation** stops the selected animator.
  - *Load MTX*: Selecting **Load MTX** loads the specified Viewpoint MTX file.
  - *Execute VB Script*: Selecting **Execute VB Script** loads and executes a Visual Basic (VB) script.
  - *Execute JavaScript*: Selecting **Execute JavaScript** loads and executes a Java Script script.

- *Value*: Some of the actions allow you to send data to the system. For example, posting a message allows you to enter a custom message as described above. The **Value** field (4) is where you enter the data to be applied by the Interactor. The displayed name of this field changes depending on the action you select using the **Action** pull-down menu. For some values, you can select the following by clicking the arrow to the left of the field name and using the pull-down menu:
  - *Value*: Selecting **Value** sends the specified value to the selected target.
  - *Append*: Selecting **Append** adds the value you enter to the existing value. For example, if the **rot_** value is currently 3 and you enter 2, the **rot_** value will become 5 (2+3).
  - *Message*: As described above, you can create custom messages, post that value to the system, and have other interaction components react to that custom message. Messages have a "broadcast" effect, meaning that they exist throughout the scene once posted. Thus, one message can affect multiple targets.
- *Action Target*: The **Action Target** pull-down menu displays a hierarchical list of objects in your scene. This appears similarly to the list found in the **Hierarchy Viewer** window and functions identically. This is the object on which the Interactor will act. For example, you could set up an Interactor to begin an animation when a sphere is clicked. In this case, you would attach the Interactor to the sphere and select the animator as the target object.
- *Property*: If you selected an action that requires you to select a property, you can select an available property using the **Property** pull-down menu.
- *Add/Remove Actions*: See below.
- *Comments*: If desired, you may enter up to 5 lines of text as comments or explanations about the current reactor and its function. This can help with complex scenes, especially if more than one person is working on a scene or if the scene is subject to periodic revision.

Defining Actions in Interactors

As described above, Interactors can perform multiple actions. To specify more than one action:

1. Click the **Add** button once for each action you wish to add. For example, if you want the Interactor to perform five actions, click this button four times.
2. Set the first action using the **Action** pull-down menu as described above.
3. Move the **Event Handler Number** slider until the number to the right of the slider changes to the next number (for example, from **1** to **2**).
4. Set the second action just as you did in Step 2, above.

5 Repeat Steps 3 and 4 for each subsequent action.

To delete an action, move the **Event Handler Number** slider to the action you wish to delete and click the **Delete** button. Once you have finished making your selections, click **OK** to save your changes or **Cancel** to abort.

ACTION LIST

An Action List can trigger actions such as playing animations, posting messages, etc. If you add an Action List to your scene, you can call it by name from the Action field of any other interaction component.

You can specify an arbitrary number of actions and an arbitrary number of parameters per action and then call these parameters and pass values to them using other interaction components. Think of parameters as placeholders for real objects and values. You supply the actual values for these parameters when configuring the calls to these parameters and the Action List performs the specified action(s) using the parameters and values given to it by other interaction components. Thus, an Action List functions similarly to a programming function.

Parameter names must be entered in plain ASCII text using no special characters or spaces.

Name: Enter your desired name for the Action List in the **Name** field.

- *Parameter Names*: The **Parameter Names** area lists the parameters in the current Action List. Selecting a parameter and then clicking it again allows you to rename the selected parameter.
- *Add Parameter*: To add a parameter, click the **Delete Parameter** button. A new parameter appears in the **Parameter Names** area.
- *Delete Parameter*: To delete a parameter, select it in the **Parameter Names** area and click the **Delete Parameter** button.
- *Value*: Some of the actions allow you to send data to the system. For example, posting a message allows you to enter a custom message as described above. The **Value** field (4) is where you enter the data to be applied by the Action List. The displayed name of

this field changes depending on the action you select using the **Action** pull-down menu. For some values, you can select the following by clicking the arrow to the left of the field name and using the pull-down menu:

- *Value*: Selecting **Value** sends the specified value to the selected target.
- *Append*: Selecting **Append** adds the value you enter to the existing value. For example, if the **rot_** value is currently 3 and you enter 2, the **rot_** value will become 5 (2+3).
- *Message*: As described above, you can create custom messages, post that value to the system, and have other interaction components react to that custom message. Messages have a "broadcast" effect, meaning that they exist throughout the scene once posted. Thus, one message can affect multiple targets.

- *Action Target*: The **Action Target** pull-down menu displays a hierarchical list of objects in your scene. This appears similarly to the list found in the **Hierarchy Viewer** window and functions identically. This is the object on which the **Action List** will act. For example, you could set up an Action List to begin an animation when a sphere is clicked. In this case, you would attach the it to the sphere and select the animator as the target object
- *Action Target*: The Action Target pull-down menu displays a hierarchical list of objects in your scene.scene. This appears similarly to the list found in the **Hierarchy Viewer** window and functions identically. This is the object on which the Action List will act. For example, you could set up an Action List to begin an animation when a sphere is clicked. In this case, you would attach it to the sphere and select the animator as the target object.
- *Property*: If you selected an action that requires you to select a property, you can select an available property using the **Property** pull-down menu.
- *Add/Remove Actions*: See "Defining Actions in Interactors" on page 125, above.
- *Comments*: If desired, you may enter up to 5 lines of text as comments or explanations about the current reactor and its function. This can help with complex scenes, especially if more than one person is working on a scene or if the scene is subject to periodic revision.

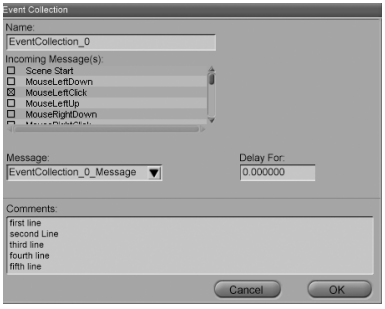
Once you have finished making your selections, click **OK** to save your changes or **Cancel** to abort.

Action List Example

The following example shows a simple Action List:

1. Create a new scene and add a sphere and a pyramid. Locate the pyramid above the sphere.
2. Add an Action List to the sphere.
3. Add two params by clicking the **Add Parameter** button twice. By default, the new parameters are named **param1** and **param2**. Leave the default names.
4. In the **Action** field, select **Show**. In the **Action Target** field, select or type `param1`.
5. Click the **Add** button to add an action.
6. In the **Action** field, select **Set Object Opacity**. In the **Action Target** field, select or type `param2`. Click **OK** when finished.
7. Now add a **Simple Reactor** to the pyramid and open its dialog.
8. Type `ActionList_0` (case sensitive) in the **Action** field. The **Data** field now says **param1**. Select or type `Sphere_0` (also case-sensitive). Then use the pull-down menu above the field to select **param2**. Enter `0.5` in the field. Click **OK** when finished.
9. Select the sphere and make it invisible by clearing the **Visible** checkbox in the **Settings** tab of the **Object Attributes** palette.
10. Click the **Play** button in the **Play Controls** and click the pyramid. The sphere appears semi-transparent.

EVENT COLLECTION



An Event Collection collects one or more incoming messages and generates an outgoing message. Event Collections appear as shown. You can make the following selections:

- *Name*: Enter your desired name for the **Event Collection** in the **Name** field.
- *Incoming Message(s)*: Event Collections have an **Incoming Message(s)** list. Check the boxes to the left of the messages you wish to use to trigger this Event Collection. You can check one or as many messages as you like. Use the scroll bar on the right side of this list if necessary to view the entire list of available messages. Both built-in and custom messages will appear here. If all of the selected messages occur, the Event Collection will generate the outgoing message.

- *Message*: Enter your desired message in the **Message** field.
- *Delay*: Enter your desired delay in seconds and fractions of a second in the **Delay** field. Once the Event Collection is triggered, the delay period will pass before the specified action occurs.
- *Comments*: If desired, you may enter up to 5 lines of text as comments or explanations about the current reactor and its function in the **Comments** field. This can help with complex scenes, especially if more than one person is working on a scene or if the scene is subject to periodic revision.

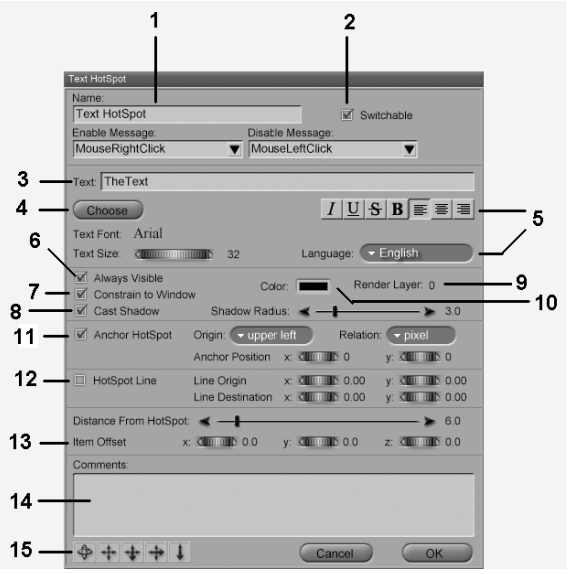
Once you have finished making your selections, click **OK** to save your changes or **Cancel** to abort.

MODIFIERS

Modifiers allow you to add text or image-based descriptions, sounds, and special effects to your pro-V Studio scenes. There are four types of modifiers: Text Hotspot, Image Hotspot, HyperView, and Sound.

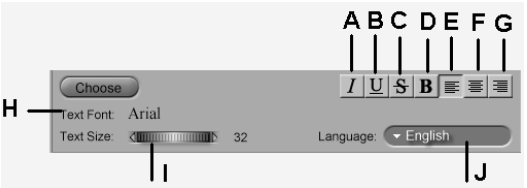
TEXT HOTSPOT MODIFIER

Text Hotspots allow you to add a pop-up text callout that is attached to your selected object. They appear as shown. and have the following options:



- *Name (1)*: Enter your desired name for the Text Hotspot in the **Name** field.
- *Switchable (2)*: Checking the **Switchable** checkbox causes the modifier to be enabled and disabled using messages. For example, you could set up a modifier to only display when the mouse cursor is over the selected object. Clearing this checkbox causes the modifier to always be active.
  - *Enable Message*: Use the **Enable Message** pull-down menus to select your desired enabling message. You can select from the list of built-in and custom messages. Please see "Interactor" on page 121 for a complete list of built-in messages.
  - *Disable Message*: Use the **Disable Message** pull-down menus to select your desired disabling message. You can select from the list of built-in and custom messages.
- *Text (3)*: Enter the text you wish the Text Hotspot modifier to display in the **Text** field.
- *Choose (4)*: Clicking the **Choose** button opens a **Font** dialog containing all of the following options. You can make your selection using this dialog box and/or any of the methods outlined below.

- *Text Formatting Options (5)*: You have the following text formatting options. Each option applies to the entire text block; you cannot format different portions of the same hotspot differently:



  - *Italics (A)*: Clicking the **Italics** box makes your text *italic*.
  - *Underline (B)*: Clicking the **Underline** box places a line underneath your text.
  - *Strikethrough (C)*: Clicking the **Strikethrough** box places a line through your ~~text~~.
  - *Bold (D)*: Clicking the **Bold** box makes your text **bold**.
  - *Left Align (E)*: Clicking the **Left Align** box justifies the text on its own left side.
  - *Center Align (F)*: Clicking the **Center Align** box justifies the text on its own center.
  - *Right Align (G)*: Clicking the **Right Align** box justifies the text on its own right side.
  - *Text Font (H)*: Clicking the **Text Font** label opens the **Font** dialog box. Use the pull-down menus and checkboxes to make your selection. This is the same as clicking the **Choose** button, above. The **Font** dialog box is OS-standard. Please refer to your operating system documentation for information using this dialog box, adding fonts, etc.
  - *Text Size (I)*: Click and drag the **Text Size** dial to set the text size in points. You may also click the text to the right of this dial and directly enter the font size in the field that appears.
  - *Language (J)*: Use the **Language** pull-down menu to select your desired language for the hotspot.
- *Always Visible (6)*: Checking the **Always Visible** checkbox forces the hotspot to always remain in the camera's field of vision, and vice-versa. This option allows the hotspot to move as needed as the camera moves.
- *Constrain To Window (7)*: Checking the **Constrain To Window** checkbox causes the text to remain within the bounds of the original scene window if a HyperView Modifier is being used in your scene. Clearing this checkbox allows the hotspot to extend into the HyperView area. Please see "HyperView Modifier" on page 136 for more information about HyperView.
- *Cast Shadow (8)*: Checking the **Cast Shadow** checkbox causes the hotspot to cast a shadow, and vice-versa.

- *Shadow Radius*: If **Cast Shadow** is enabled, use the **Shadow Radius** to define the radius of the shadow surrounding the hotspot. Alternatively, you can enter your desired value in the field to the right of the slider.

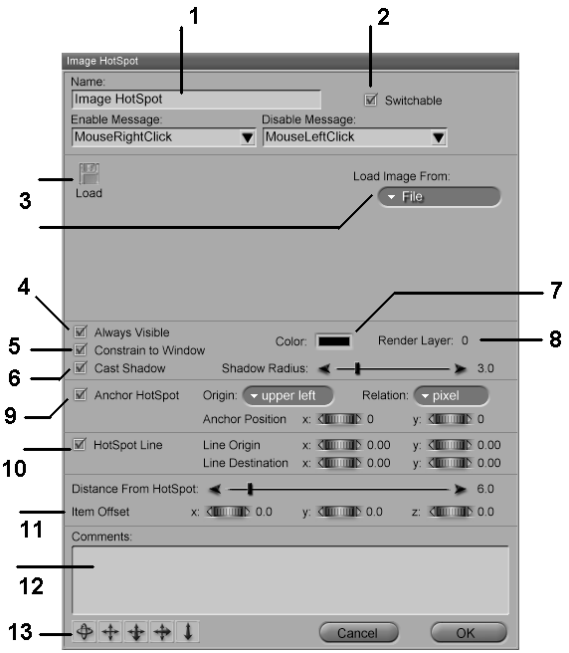
- *Render Layer (9)*: Enter your desired render layer in the **Render Layer** field. Please see "About Render Layers" on page 23 for more information about render layers.
- *Color (10)*: Checking the **Color** box opens an OS-standard Color Picker. This defines the hotspot's text and line colors.
- *Anchor Hotspot (11)*: Checking the **Anchor Hotspot** checkbox anchors the hotspot in its current position no matter how the camera moves, and vice-versa. When this option is enabled, you have the following options:
  - *Origin*: Use the **Origin** pull-down menu to select which window corner to use as the anchor.
  - *Relation*: Use the **Relation** pull-down menu to determine if you want the hotspot anchored using pixels or percent of window size. This affects the **Anchor Position** dials, below.
  - *Anchor Position XY*: Click and drag the **Anchor Position X** and **Anchor Position Y** dials to set the X and Y anchor points for the hotspot. You can also enter your desired value in the fields to the right of the dials.
- *HotSpot Line (12)*: Checking the **Hotspot Line** checkbox creates a line between the hotspot and the target object, and vice-versa. When checked, you have the following options:
  - *Line Origin XY*: Click and drag the **Line Origin X** and **Line Origin Y dials** to adjust the connecting line's origin point location at the target object end. You can also enter your desired value in the fields to the right of the dials.
  - *Line Destination XY*: Click and drag the **Line Destination X** and **Line Destination Y dials** to adjust the connecting line's destination point location at the hotspot end. You can also enter your desired value in the fields to the right of the dials.
  - *Distance From HotSpot*: Drag the **Distance From HotSpot** slider to set the hotspot's distance from the target object. You can also enter your desired value in the field to the right of the slider.
- *Item Offset XYZ (13)*: Click and drag the **Item Offset X**, **Item Offset Y**, and **Item Offset Z** dials to adjust the hotspot's offset (shift) along the selected axis or axes. You can also enter your desired value in the fields to the right of the dials.

- *Comments (14)*: If desired, you may enter up to 5 lines of text as comments or explanations about the current reactor and its function in the **Comments** field. This can help with complex scenes, especially if more than one person is working on a scene or if the scene is subject to periodic revision
- *Edit Camera Controls (15)*: These **Edit Camera** controls are identical to those found in the **Scene Setup** window. Please see "Edit Camera Controls" on page 102 for more information.

Once you have finished making your selections, click **OK** to save your changes or **Cancel** to abort.

IMAGE HOTSPOT MODIFIER

Image Hotspots allow you to add a text callout to your selected object. They appear as shown and have the following options:



- *Name (1)*: Enter your desired name for the Image Hotspot in the **Name** field.
- *Switchable (2)*: Checking the **Switchable** checkbox causes the modifier to be enabled and disabled using messages. For example, you could set up a modifier to only display when the mouse cursor is over the selected object. Clearing this checkbox causes the modifier to always be active.
  - *Enable Message*: Use the **Enable Message** pull-down menus to select your desired enabling message. You can select from the list of built-in and custom messages. Please see "Interactor" on page 121 for a complete list of built-in messages.
  - *Disable Message*: Use the **Disable Message** pull-down menus to select your desired disabling message. You can select from the list of built-in and custom messages.

- *Image Load Controls (3)*: The **Image Load** controls allow you to load the image into the hotspot. You have the following options:
  - *Load Images From*: The **Load Images From** pull-down menu allows you to specify where to locate the image for the hotspot. Selecting **File** allows you to import an image that is not part of your Library or project assets. If you have any valid images in your Library and/or project assets, those selections will display a sub-menu with all available choices.
  - *Load*: If you selected **File** in the pull-down menu, clicking the **Load** button opens a standard **Open** dialog that allows you to browse for and import your desired image. Imported images are added to the project assets.
- *Always Visible (4)*: Checking the **Always Visible** checkbox forces the hotspot to always remain in the camera's field of vision, and vice-versa. This option allows the hotspot to move as needed as the camera moves.
- *Constrain To Window (5)*: Checking the **Constrain To Window** checkbox causes the text to remain within the bounds of the original scene window if a HyperView Modifier is being used in your scene. Clearing this checkbox allows the hotspot to extend into the HyperView area. Please see "HyperView Modifier" on page 136 for more information about HyperView.
- *Cast Shadow (6)*: Checking the **Cast Shadow** checkbox causes the hotspot to cast a shadow, and vice-versa.
  - *Shadow Radius*: If **Cast Shadow** is enabled, use the **Shadow Radius** to define the radius of the shadow surrounding the hotspot. Alternatively, you can enter your desired value in the field to the right of the slider.:
- *Color (7)*: Checking the **Color** box opens an OS-standard Color Picker. This defines the hotspot's connecting line color.
- *Render Layer (8)*: Enter your desired render layer in the **Render Layer** field. Please see "About Render Layers" on page 23 for more information about render layers.
- *Anchor Hotspot (9)*: Checking the **Anchor Hotspot** checkbox anchors the hotspot in its current position no matter how the camera moves, and vice-versa. When this option is enabled, you have the following options:
  - *Origin*: Use the **Origin** pull-down menu to select which window corner to use as the anchor.
  - *Relation*: Use the **Relation** pull-down menu to determine if you want the hotspot anchored using pixels or percent of window size. This affects the **Anchor Position** dials, below.

- *Anchor Position XY*: Click and drag the **Anchor Position X** and **Anchor Position Y** dials to set the X and Y anchor points for the hotspot. You can also enter your desired value in the fields to the right of the dials.

- *HotSpot Line (10)*: Checking the **Hotspot Line** checkbox creates a line between the hotspot and the target object, and vice-versa. When checked, you have the following options:
  - *Line Origin XY*: Click and drag the **Line Origin X** and **Line Origin Y dials** to adjust the connecting line's origin point location at the target object end. You can also enter your desired value in the fields to the right of the dials.
  - *Line Destination XY*: Click and drag the **Line Destination X** and **Line Destination Y dials** to adjust the connecting line's destination point location at the hotspot end. You can also enter your desired value in the fields to the right of the dials.
  - *Distance From HotSpot*: Drag the **Distance From HotSpot** slider to set the hotspot's distance from the target object. You can also enter your desired value in the field to the right of the slider.

- *Item Offset XYZ (11)*: Click and drag the **Item Offset X**, **Item Offset Y**, and **Item Offset Z** dials to adjust the hotspot's offset (shift) along the selected axis or axes. You can also enter your desired value in the fields to the right of the dials.

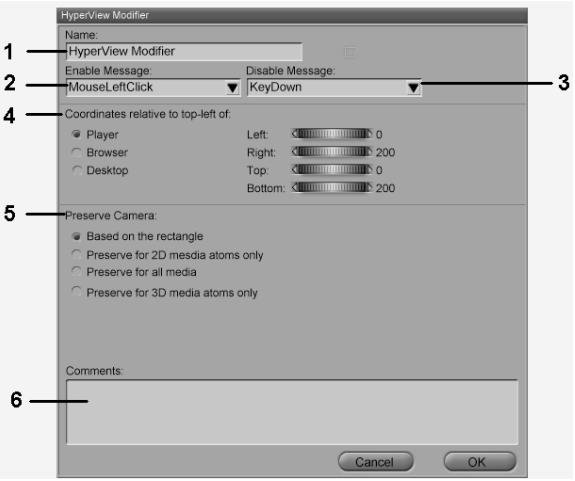
- *Comments (12)*: If desired, you may enter up to 5 lines of text as comments or explanations about the current reactor and its function in the **Comments** field. This can help with complex scenes, especially if more than one person is working on a scene or if the scene is subject to periodic revision.

- *Edit Camera Controls (13)*: These **Edit Camera** controls are identical to those found in the **Scene Setup** window. Please see "Edit Camera Controls" on page 102 for more information:

Once you have finished making your selections, click **OK** to save your changes or **Cancel** to abort.

HYPERVIEW MODIFIER

HyperView modifiers allow your scene or selected objects to go beyond the normal scene window when playing on viewers' computers, thereby creating a truly immersive experience.



- *Name (1)*: Enter your desired name for the HyperView in the **Name** field.
- *Enable Message (2)*: Use the **Enable Message** pull-down menus to select your desired enabling message. You can select from the list of built-in and custom messages. To avoid confusion and possible settings collisions, only one HyperView modifier can be used at once. All are therefore switchable. Please see "Interactor" on page 121 for a complete list of built-in messages.
- *Disable Message (3)*: Use the **Disable Message** pull-down menus to select your desired disabling message. You can select from the list of built-in and custom messages.
- *Relative Coordinates (4)*: The **Relative Coordinates** controls allow you to specify the reference frame and size of the HyperView window.Your available options are:
  - *Player*: Checking the **Player** radio button makes the HyperView window relative to the VMP window when playing scenes.
  - *Browser*: Checking the **Browser** radio button makes the HyperView window relative to the viewer's Web browser when playing scenes.
  - *Desktop*: Checking the **Desktop** radio button makes the HyperView window relative to the viewer's desktop when playing scenes.
  - *Left*: Click and drag the **Left** dial to specify the number of pixels to the left of the selected reference (player, browser, or desktop) to expand the HyperView window. You may also enter your desired value in the field to the right of the dial.
  - *Right*: Click and drag the **Right** dial to specify the number of pixels to the right of the selected reference (player, browser, or desktop) to expand the HyperView window. You may also enter your desired value in the field to the right of the dial.

  - *Top*: Click and drag the **Top** dial to specify the number of pixels above of the selected reference (player, browser, or desktop) to expand the HyperView window. You may also enter your desired value in the field to the right of the dial.
  - *Bottom*: Click and drag the **Bottom** dial to specify the number of pixels below the selected reference (player, browser, or desktop) to expand the HyperView window. You may also enter your desired value in the field to the right of the dial.

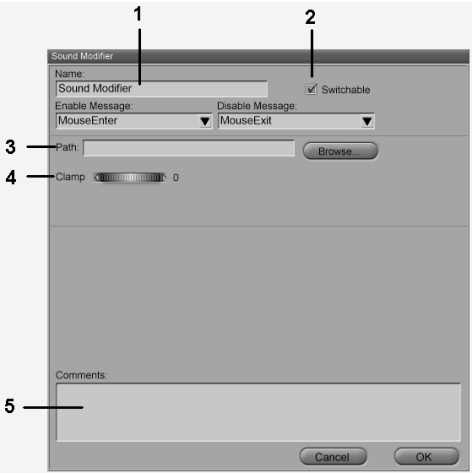
- *Preserve Camera Controls (5)*:
  - *Based on rectangle*: Checking the **Based on rectangle** radio button preserves the expanded view as if that expansion was the normal view. The camera is repositioned so as to capture the same view of the larger scene window. Content in the scene therefore appears larger, which can create dramatic effects.
  - *Preserve for 2D Media Atoms Only*: Checking the **Preserve for 2D Media Atoms** radio button preserves the camera settings for 2D objects in your scene. 3D objects will appear larger.
  - *Preserve for All Media*: Checking the **Preserve for All Media** radio button leaves the camera and content in their current positions. Since the window is larger, you may see more of the objects in your scene but they will not appear larger.
  - *Preserve for 3D Media Atoms Only*: Checking the **Preserve for 3D Media Atoms** radio button preserves the camera settings for 3D objects in your scene. 2D objects will appear larger.

- *Comments (6)*: If desired, you may enter up to 5 lines of text as comments or explanations about the current reactor and its function in the **Comments** field. This can help with complex scenes, especially if more than one person is working on a scene or if the scene is subject to periodic revision.

Once you have finished making your selections, click **OK** to save your changes or **Cancel** to abort.

SOUND MODIFIER

Sound modifiers allow you to add sound to your selected object/scene. They appear as shown and have the following options:



- *Name (1)*: Enter your desired name for the Sound modifier in the **Name** field.
- *Switchable (2)*: Checking the **Switchable** checkbox causes the modifier to be enabled and disabled using messages. For example, you could set up a modifier to only display when the mouse cursor is over the selected object. Clearing this checkbox causes the modifier to always be active.
  - *Enable Message*: Use the **Enable Message** pull-down menus to select your desired enabling message. You can select from the list of built-in and custom messages. Please see "Interactor" on page 121 for a complete list of built-in messages.
  - *Disable Message*: Use the **Disable Message** pull-down menus to select your desired disabling message. You can select from the list of built-in and custom messages.
- *Path (3)*: See "Using Audio in Scenes" on page 139, below.
- *Clamp (4)*: The **Clamp** dial controls the number of times the sound plays. Click and drag the dial or enter your desired value in the field.
- *Comments (5)*: If desired, you may enter up to 5 lines of text as comments or explanations about the current reactor and its function in the **Comments** field. This can help with complex scenes, especially if more than one person is working on a scene or if the scene is subject to periodic revision.

Once you have finished making your selections, click **OK** to save your changes or **Cancel** to abort.

Using Audio in Scenes

You cannot directly import audio into your Library or project assets. To use audio in your scenes:

1. Download and install the Viewpoint TalkNow converter utility from http://www.viewpoint.com.
2. Convert your audio file to the Viewpoint MTS format using the converter. Please see the TalkNow documentation for information on using this utility.
3. Add a **Sound Modifier** hotspot to an object.
4. Enter a path to the MTS file you created in Step 2 in the **Path** field or click the **Browse** button to open a standard **Browse** dialog allowing you to locate the file. This path is converted to a relative path when your scene is published.
5. Enter your other settings in the **Sound Modifier** as described above.

The TalkNow converter is optimized for spoken text. Results with other audio may vary.

Chapter 25: The Play Controls Palette

Your scene is complete. Congratulations! Before publishing it, you should perform some testing and dry runs to ensure that it functions as you intended before publishing it. The **Play Controls** palette is the place to do this. This palette appears in the **Scene Setup**, **Materials**, **Animation**, and **Interaction** rooms.

As described in "Modes" on page 20, pro-V Studio runs in two modes: **Edit** and **Run**. The **Play Controls** palette lets you switch between these modes to run and troubleshoot your scene. While in **Run** mode, all windows and palettes disappear from your current room except for the **Scene Display** window and the **Play Controls** palette. All palettes reappear when pro-V Studio switches back to **Edit** mode.

PLAY CONTROLS PALETTE

The **Play Controls** window has three buttons. From left to right, these are:

- *Play from Start*: Clicking the **Play from Start** button places pro-V Studio in **Run** mode and plays your scene from the beginning.
- *Stop*: Clicking the **Stop** button stops scene playback, returns the scene to its beginning and resets all changed states, and returns pro-V Studio to **Edit** mode.
- *Play/Pause*: While your scene is stopped, clicking the **Play** button places pro-V Studio in **Run** mode and continues playing your scene from where it stopped. While your scene is playing, clicking the **Pause** button returns pro-V Studio to **Edit** mode and freezes scene playback at the current location.

Chapter 26: The Scene Setup Room

The **Scene Setup** room is where you add assets to your scene and complete most of the basic arranging prior to adding materials, animations, and interactions. This room contains the following windows and palettes:

- *Scene Display Window*: Please see "The Scene Display Window" on page 100 for more information about the **Scene Display** window.
- *Hierarchy Viewer Window*: Please see "The Hierarchy Viewer Window" on page 106 for more information about the **Hierarchy Viewer** window.
- *Media Palette*: Please see "The Media Palette" on page 108 for more information about the **Media** palette.
- *Simple Animations Palette*: Please see "The Simple Animations Palette" on page 110 for more information about the **Simple Animations** palette.
- *Interaction Palette*: Please see "The Interaction Palette" on page 114 for more information about the **Interaction** palette.
- *Play Controls Palette*: Please see "The Play Controls Palette" on page 140 for more information about the **Play Controls** palette.
- *Object Attributes Palette*: Please see below for more information about the **Object Attributes** palette.

OBJECT ATTRIBUTES PALETTE

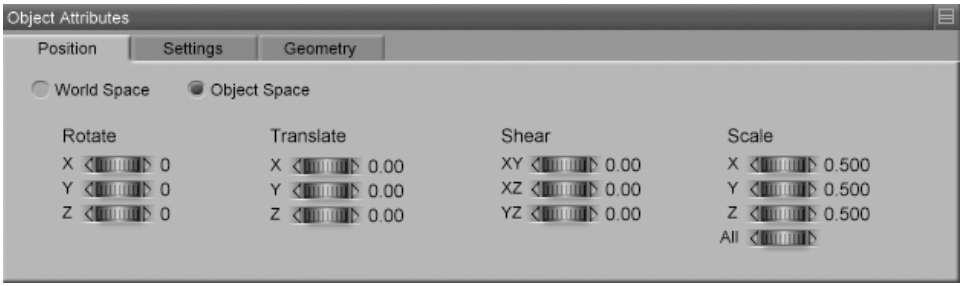
The **Object Attributes** palette allows you to access and edit object attributes. This palette is available in the **Scene Setup** room. You may also access it from any pro-V Studio room by selecting **Object>Attributes**. Available attributes will vary by type of object (asset) selected. As shown, this palette has three tabs.

NOTE

IF YOU HAVE THE **RUNTIME** CAMERA SELECTED, THE **OBJECT SETTINGS** PALETTE WILL DISPLAY THE **CAMERA** TAB, WHICH IS DISCUSSED BELOW.

POSITION TAB

The **Object Settings** palette's **Position** tab appears as follows:

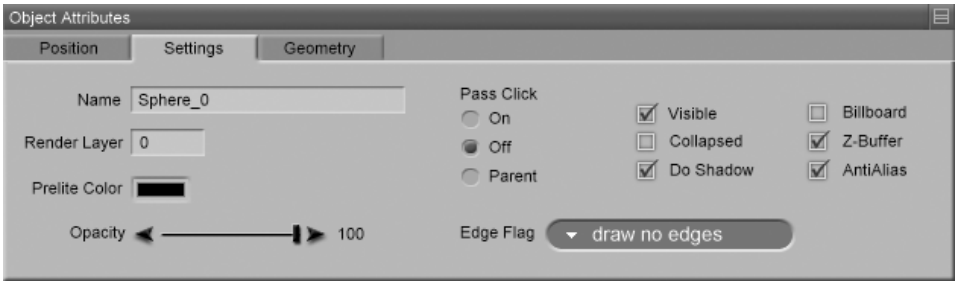


This tab controls an object's *transformation*. Please refer to "Transformation" on page 31 for more information about transformations. The available options are:

- *World/Object Space*: Check the appropriate radio button to determine if transformations should occur in **World Space** or **Object Space**. Please see "World vs. Object Coordinates" on page 30 for more information about world vs. object space.
- *Rotate XYZ*: Use the **Rotate X**, **Rotate Y**, and/or **Rotate Z** dials to rotate the object along the selected axis. Clicking a number next to a dial opens a text field, allowing you to directly enter your desired value. Please see "Rotation" on page 32 for more information about rotation.
- *Translate XYZ*: Use the **Translate X**, **Translate Y**, and/or **Translate Z** dials to move the object along the selected axis. Clicking a number next to a dial opens a text field, allowing you to directly enter your desired value. Please see "Translation" on page 32 for more information about translation.
- *Shear XY*, *XZ*, *YZ*: Use the **Shear XY**, **Shear XZ**, and/or **Shear YZ** dials to shear (or stretch) the object along the selected axes. Clicking a number next to a dial opens a text field, allowing you to directly enter your desired value. Please see "Shear" on page 33 for more information about shear.
- *Scale All*: Use the **Scale All** dial to enlarge or shrink the object uniformly along all three axes. Clicking a number next to a dial opens a text field, allowing you to directly enter your desired value. Please see "Scale" on page 33 for more information about scale.
- *Scale XYZ*: Use the **Scale X**, **Scale Y**, and/or **Scale Z** dials to enlarge or shrink the object along the selected axis. Clicking a number next to a dial opens a text field, allowing you to directly enter your desired value. Please see "Scale" on page 33 for more information about scale.

SETTINGS TAB

The **Object Settings** palette's **Settings** tab appears as follows:



This tab controls an object's general settings. The available options are:

- *Name*: Enter your desired name for the selected object by clicking the **Name** field and entering your desired text. Each object must be uniquely named to prevent confusion. pro-V Studio does not allow duplicate names to be used.
- *Render Layer*: Enter your desired render layer in the **Render Layer** field. Please see "About Render Layers" on page 23 for more information about using render layers.
- *Prelite Color*: Clicking the **Prelite Color** box opens a standard Color Picker, which allows you to select the desired pre-light color for the currently selected object.
- *Opacity*: The **Opacity** slider allows you to set the selected material's transparency. You can also enter your desired value (in percent) in the field to the right of the slider. A value of 0 indicates that the material is completely transparent, and a value of 1 indicates complete opacity.

NOTE

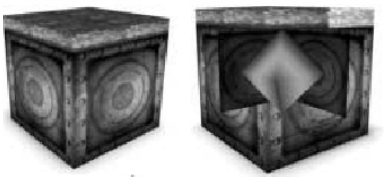
THE DIFFERENCE BETWEEN OBJECT AND MATERIAL OPACITY CAN SEEM CONFUSING AT FIRST. EXPERIMENT WITH OBJECTS THAT HAVE MORE THAN ONE MATERIAL GROUP TO SEE THE DIFFERENCE.

- *Pass Click On/Off/Parent*: Select your desired mouse click behavior using the **Pass Click** radio buttons, as follows:
  - *On*: Checking the **Pass Click On** radio button causes mouse clicks to pass through the selected object, meaning that the object will not capture a mouse click. Enabling this option allows an object that is behind another object to record a mouse click.
  - *Off*: Checking the **Pass Click Off** radio button causes mouse clicks to be caught by the selected object, meaning that the object will record a mouse click. This is useful for interaction components. Please see "Interactions" on page 47 for more information about using interaction components inside pro-V Studio. When this

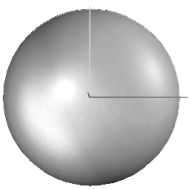
option is enabled, objects that are behind the currently selected object will not record mouse clicks.

- *Parent*: Checking the **Pass Click Parent** radio button causes mouse clicks to either pass through or be caught by the selected object based on the setting used by that object's parent.

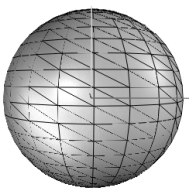
- *Visible*: Checking the **Visible** checkbox makes the selected object visible, and vice-versa. Invisible objects remain instantiated and can have all of the attributes of visible objects. Use invisible objects with caution, since they will use resources and increase the size of your published scene.
- *Collapsed*: Checking the **Collapsed** checkbox collapses the current object and vice-versa. Please see "Collapsing Objects" on page 37 for more information.
- *Do Shadow*: Checking the **Do Shadow** checkbox causes the selected object to cast a shadow and vice-versa.
- *Billboard*: Checking the **Billboard** checkbox causes the selected object's positive Z axis to face the Runtime camera at all times no matter what else is happening in the scene. Clearing this checkbox disables this option. This is useful if, for example, you always want an object facing the viewer.
- *Z-Buffer*: The **Z-Buffer** option determines the perceived depth of a scene and which geometries are ahead or behind other geometries. Clearing the **Z-Buffer** checkbox optimizes your scene so that only polygons that are showing are rendered (right, on right), and vice-versa (right, on left).



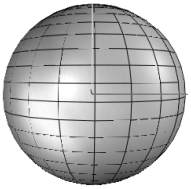
- *Edge Flag*: The **Edge Flag** pull-down menu allows you to determine how an object's edges are drawn. Your available options are:
  - *Draw No Edges*: Selecting **Draw No Edges** makes the selected object appear normally with no edges drawn, and vice-versa:



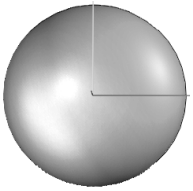
  - *Draw All Edges*: Selecting **Draw All Edges** displays the edges of all polygons comprising the selected object, and vice-versa:



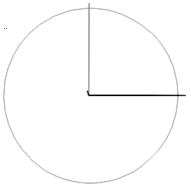
- *Draw Quad Edges*: Selecting **Draw Quad Edges** displays the edges of all four-sided polygons comprising the selected object, and vice-versa:



- *Draw Solid Edges*: Selecting **Draw Solid Edges** displays the object's object edges, and vice-versa:

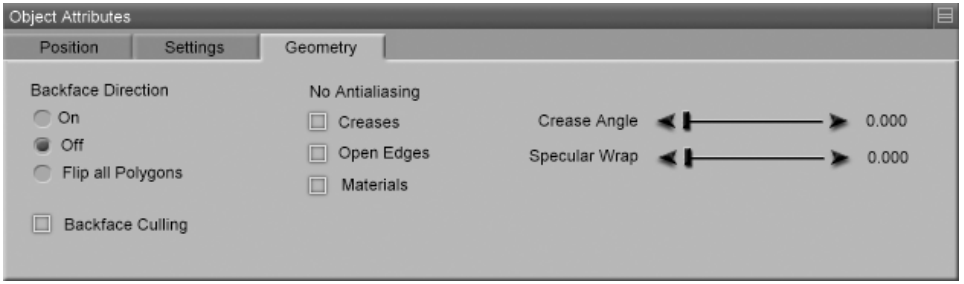


- *Draw Edges Only*: Selecting **Draw Edges Only** only displays the object's object edges, and vice-versa:



GEOMETRY TAB

The **Object Settings** palette's **Geometry** tab controls a 3D object's geometry settings, giving you detailed control over how the geometry will appear in an end viewers' computer. This tab appears as follows:



The available options in this tab are:

- *Backface Direction*: The **Backface Direction** radio buttons determine which direction the selected object's polygons face.
  - *On*: Checking the **Backface Direction On** radio button reverses the normals of back-facing polygons.
  - *Off*: Checking the **Backface Direction Off** radio button leaves polygon normals facing in their original directions.
  - *Flip All Polygons*: Checking the **Flip All Polygons** radio button reverses all normals. Please see "Normals" on page 35 for more information.

- *Backface Culling*: Checking the **Backface Culling** checkbox saves resources by rendering only those portions of the selected object that are visible from the viewer's location. Clearing this checkbox renders all portions of the object whether visible or not.
- *Antialiasing*: Antialiasing is a process of applying a small amount of blur to object edges to smooth them and avoid a "pixelated" appearance. The images show a test render both without (left) and with (right) antialiasing enabled.

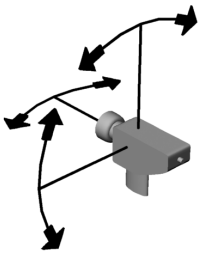
Enabling antialiasing makes objects look better on viewers' computers but also increases the amount of resources needed for rendering. Please see "Advanced Settings" on page 87 for information about forcing limits on the amount of time a viewer's computer will spend antialiasing objects. Check the appropriate **Antialiasing** checkbox(es) to apply antialiasing as follows:

  - *Creases*: Checking the **Creases** checkbox applies antialiasing at points where an object *creases* or folds sharply. If this checkbox is checked, you can choose the desired crease angle at which to begin applying antialiasing using the **Crease Angle** slider (see below).
  - *Open Edges*: Checking the **Open Edges** checkbox antialiases open edges on the selected object (such as the rim of a bucket) and vice-versa.
  - *Materials*: Checking the **Materials** checkbox antialiases the edges of the current object's material(s) and vice-versa.
- *Crease Angle*: The **Crease Angle** slider allows you to specify the crease angle at which antialiasing will be applied to the current object. You can also specify your desired value by entering it in the field on the right of the slider. Decreasing this angle makes your objects appear smoother but consumes more resources.
- *Specular Wrap*: The **Specular Wrap** slider enhances the lightmap's effect (see "Light Maps" on page 45 for more information about lightmaps). Valid values are 0 to 10. You can also specify your desired value by entering it in the field on the right of the slider.

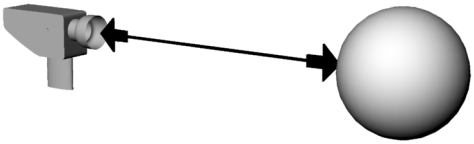
CAMERA TAB

The **Camera** tab appears in place of the three tabs discussed above whenever you have the **Runtime** camera selected. This tab has the following options:

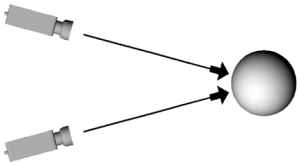
- *Pivot XYZ*: Use the **Pivot X**, **Pivot Y**, and/or **Pivot Z** dials to rotate the camera about its own axes, as shown here. You can also enter your desired value in the fields to the right of the dials.



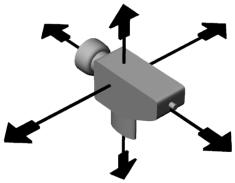
- *Orbit Distance*: Use the **Orbit Distance** dial to specify the camera's distance from the global origin, as shown. You can also enter your desired value in the fields to the right of the dials.



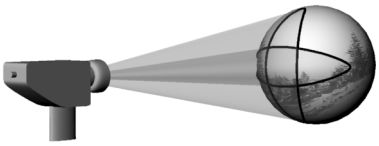
- *Rotate3D XYZ*: Use the **Rotate3D X**, **Rotate3D Y**, and/or **Rotate3D Z** dials to rotate the camera about the global axes, as shown here. You can also enter your desired value in the fields to the right of the dials.



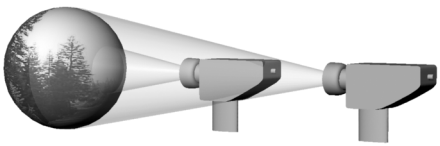
- *Translate3D XYZ*: Use the **Translate3D X**, **Translate3D Y**, and/or **Translate3D Z** dials to move the Runtime camera along the selected axis. You can also enter your desired value in the fields to the right of the dials.



- *Scale3D XYZ*: Use the **Scale3D X**, **Scale3D Y**, and/or **Scale3D Z** dials to zoom in or out along the selected axis. You can also enter your desired value in the fields to the right of the dials.



- *Scale 3D All*: Use the **Scale3D All** dial to zoom in or out along all three axes at once. You can also enter your desired value in the fields to the right of the dials.



Chapter 27: The Materials Room

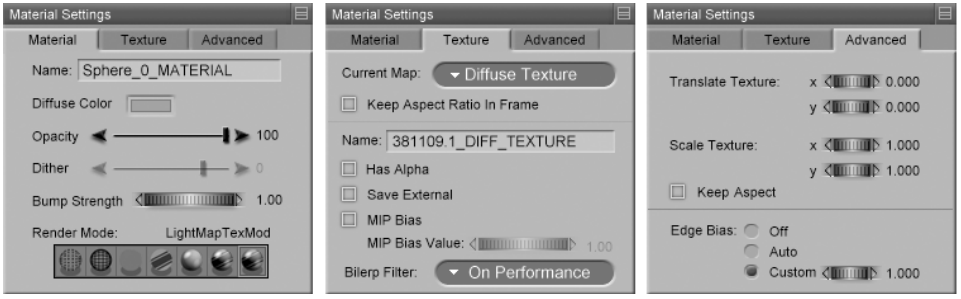
Once you have built your scene in the **Scene Setup** room, you are ready to assign materials to the objects in your scene using the **Materials** room. pro-V Studio gives you powerful control over your scene's look and feel. Please see "Materials & Lights" on page 42 for information about materials. This room contains the following windows and palettes:

- *Scene Display Window*: Please see "The Scene Display Window" on page 100 for more information about the **Scene Display** palette.
- *Hierarchy Viewer Window*: Please see "The Hierarchy Viewer Window" on page 106 for more information about the **Hierarchy Viewer** window.
- *Media Palette*: Please see "The Media Palette" on page 108 for more information about the **Media** palette.
- *Material Settings Palette*: Please see below for more information about the **Material Settings** palette.
- *Maps Palette*: Please see below for more information about the **Maps** palettes. pro-V Studio has four **Maps** palettes:
  - *Texture Palette*: The **Texture** palette is where you assign texture maps (see "Texture Maps" on page 44) to your selected object. This palette is discussed in "Texture Tab" on page 151.
  - *Alpha Channel*: The **Alpha Channel** palette is where you assign alpha maps (see "Alpha Channel (Transparency Maps)" on page 44) to your selected object. This palette is discussed in "Alpha Channel Palette" on page 155.
  - *Bumpmap Texture*: The **Bumpmap Texture** palette is where you assign bump maps (see "Bump Maps" on page 44) to your selected object. This palette is discussed in "Bump Map Palette" on page 155.
  - *Light Map:* The **Light Map** palette is where you assign light maps (see "Light Maps" on page 45) to your selected object. This palette is discussed in "Light Map Palette" on page 156.
- *Simple Animations Palette*: Please see "The Simple Animations Palette" on page 110 for more information about the **Simple Animations** palette.
- *Play Controls Palette*: Please see "The Play Controls Palette" on page 140 for more information about the **Play Controls** palette

The following topics describe the **Materials** room interface in detail. The last topic in this chapter, "Working With Materials" on page 156, provides some tips on working with materials inside pro-V Studio.

MATERIAL SETTINGS PALETTE

The **Material Settings** palette has three tabs: **Material**, **Texture**, and **Advanced**. These tabs appear as follows:



The following topics discuss each **Material Settings** tab in detail.

MATERIAL TAB

The **Materials** tab allows you to set certain global options for the currently selected object's material. It has the following functionality:

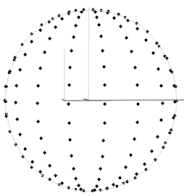
- *Name*: Enter your desired name in the **Name** field. Special characters are not allowed. You must enter a unique name.
- *Diffuse Color*: An object's *diffuse color* is the color that is displayed prior to applying a lightmap. Clicking the **Diffuse Color** box opens a standard Color Picker allowing you pick the desired diffuse color for this object.
- *Opacity*: The **Opacity** slider allows you to set the selected material's transparency. You can also enter your desired value (in percent) in the field to the right of the slider. A value of 0 indicates that the material is completely transparent, and a value of 100 indicates complete opacity.

NOTE

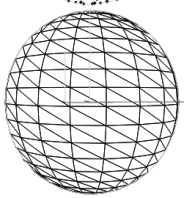
THE DIFFERENCE BETWEEN OBJECT AND MATERIAL OPACITY CAN SEEM CONFUSING AT FIRST. EXPERIMENT WITH OBJECTS THAT HAVE MORE THAN ONE MATERIAL GROUP TO SEE THE DIFFERENCE.

- *Dither*: Checking the **Dither** checkbox enables texture *dithering*, or filtration that cuts down on pixelated or "jagged" looking texture. When the **Dither** checkbox is checked, you can use the **Dither** slider to specify the amount of dithering you wish. You can also enter your desired value in the field to the right of the slider.

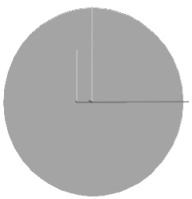
- *Bump Strength*: The **Bump Strength** dial controls the amount of bumps generated by a bump map (see "Bump Maps" on page 44 for information about bump maps). Increasing this value exaggerates bumps, and vice-versa. Negative values reverse the bump effect. Click and drag the dial and/or enter your desired value in the field to the right of the dial.
- *Render Mode*: pro-V Studio supports seven render modes, described below. You can set global rendering modes using the **Scene Settings** dialog as described in "Scene Settings" on page 80 and can also select your desired rendering mode on a per-object basis using the **Materials** tab. Local settings always override global settings, meaning that any changes you make to one object's render mode will not affect other objects. **Flat** for a sphere, all objects in that scene will appear as point clouds, while The supported render modes are:
  - *Point*: Selecting **Point (1)** displays the selected object as a series of points, with each point representing one vertex. Pressing [1] selects this render mode for the current object. Pressing [CTRL]+[1] selects this render mode for the entire scene.



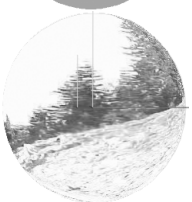
  - *Wire*: Selecting **Wire (2)** displays the selected object's polygon edges. Pressing [2] selects this render mode for the current object. Pressing [CTRL]+[2] selects this render mode for the entire scene.



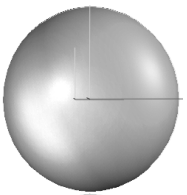
  - *Flat*: Selecting **Flat (3)** displays the selected object as a solid object with no depth. 3D objects rendered in this mode will appear two-dimensional. Pressing [3] selects this render mode for the current object. Pressing [CTRL]+[3] selects this render mode for the entire scene.



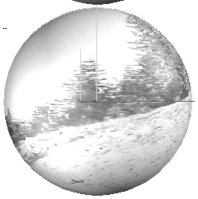
  - *Texture*: Selecting **Texture (4)** displays the selected object with its texture applied but does not display lightmaps, diffuse color, etc. Pressing [4] selects this render mode for the current object. Pressing [CTRL]+[4] selects this render mode for the entire scene.



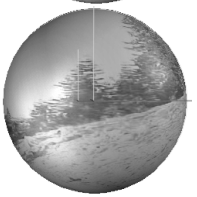
- *LightMap*: Selecting **LightMap (5)** displays the selected object's diffuse color with the global or object lightmap applied, as appropriate. Pressing [5] selects this render mode for the current object. Pressing [CTRL]+[5] selects this render mode for the entire scene.



- *LightMap Texture*: Selecting **LightMap Texture (6)** displays the selected object's texture with the global or object lightmap applied, as appropriate. Pressing [6] selects this render mode for the current object. Pressing [CTRL]+[6] selects this render mode for the entire scene.



- *LightMap TexMod*: Selecting **LightMap TexMod (7)** displays both the selected object's diffuse color and texture with the global or object lightmap applied, as appropriate. This render mode displays all material settings applied to an object. Pressing [7] selects this render mode for the current object. Pressing [CTRL]+[7] selects this render mode for the entire scene.



TEXTURE TAB

Some of the following options may or may not appear depending on the type of texture being used (image, SWF, etc.):

- *Current Map*: The **Current Map** pull-down menu allows you to select the image map you are applying settings to. Your options are **Diffuse Texture**, **Alpha Texture**, **Bumpmap Texture**, and **Lightmap Texture**. Different options in this tab will be enabled or disabled based on your map selection.
- *Keep Aspect Ratio In Frame*: Checking the **Keep Aspect Ratio In Frame** checkbox forces image maps to appear in their original *aspect ratio* (ratio of width to height) in the **Maps** palettes. Please see below for details about the **Maps** palettes.
- *Name*: Enter your desired name for the current texture in the **Name** field. You may not use special characters, and your selected name must be unique.
- *Has Alpha*: Every diffuse texture consists of both a diffuse channel (each pixel's color information) and an alpha channel (each pixel's transparency information). Checking the **Has Alpha** checkbox causes pro-V Studio to use the alpha channel and the object will become transparent according to the alpha map. Clearing this checkbox disregards all alpha information. Please see "Maps" on page 42 for more information about maps. Enabling this option affects all instances of the same texture map in your scene. If you drag a apply a texture to an object with an existing alpha map, this checkbox will be

cleared because pro-V Studio is unable to detect if a texture has an alpha channel. In this case, simply check the checkbox if appropriate.

- *Save External*: Checking the **Save External** checkbox forces pro-V Studio to not insert the texture map into the MTS file (see "Publish Window" on page 174). Instead, the texture will be saved as a JPG image in the same folder as the MTS file and will be loaded into your scene when played in the Viewpoint Media Player using an image stream animator. Clearing this checkbox saves the texture map in the MTS file. Enabling this option affects all instances of the same texture map in your scene.
- *Auto Run*: If you have applied a SWF animation as a texture, checking the **Auto Run** checkbox automatically starts the animation. If this checkbox is cleared, you must trigger the playback like you would any other animation.
- *Compose*: The **Compose** checkbox determines whether the background of a SWF animation or SVG content is composited onto the texture.
- *Loop*: Checking the **Loop** checkbox plays the SWF animation continuously. Clearing it plays the animation once and stops at the last frame.
- *MIP Bias*: Checking the **MIP Bias** checkbox enables MIP Bias texture filtering. This feature is useful if you have a large texture map applied to an object. When seen from close up, the texture will look good. However, zooming out may degrade its appearance due to arbitrary pixels being introduced as the texture shrinks and loses detail. MIP filtering builds a pyramid using the original texture and new textures sized at 50%, 25%, and 12.5% of the original size. This requires 33% more memory but greatly enhances appearance. The Viewpoint renderer automatically decides which filter to use. Leaving this box cleared only performs bilinear interpolation (see below).
- *MIP Bias Value*: Adjusting the **MIP Bias Value** allows you to control the amount of blurring applied to the texture, giving you finer control over the MIP biasing function. You can also enter a numeric value in the fields to the right of the dial.
- *Bilerp Filter*: Bilinear interpolation is a method of reducing texture pixelation where neighboring pixels are blended or separated to create a smoother appearance. Use the **Bilerp Filter** pull-down menu to select bilinear interpolation settings for the current object:
  - *Always On*: Selecting **Always On** forces bilinear interpolation to complete for the currently selected object. This can increase the number of resources required to render a scene and can degrade performance, but does produce optimum results.
  - *By Performance*: Selecting **By Performance** allows bilinear interpolation to proceed until the maximum allowable time is exceeded, at which point it stops. This option can provide a reasonable compromise between quality and performance. You set the global interpolation timeout by selecting

Scene>Advanced Settings and adjusting the **Filter Maximum Seconds** dial, as explained in "Advanced Settings" on page 87.

- *Always Off*: Selecting **Always Off** disables bilinear interpolation.

NOTE
DO NOT CONFUSE BILINEAR INTERPOLATION WITH ANTIALIASING. THEY ARE DIFFERENT FUNCTIONS.

ADVANCED TAB

- *Translate Texture XY*: Use the **Translate Texture X** and **Translate Texture Y** dials to move the texture horizontally and/or vertically. You can also enter a numeric value in the fields to the right of the dials. These settings are used for animation or interaction; they are not directly published to your finished scene.
- *Scale Texture XY*: Use the **Scale Texture X** and **Scale Texture Y** dials to expand or shrink the texture along the desired axis. You can also enter a numeric value in the fields to the right of the dials. These settings are used for animation or interaction; they are not directly published to your finished scene.
- *Keep Aspect*: Checking the **Keep Aspect** checkbox forces the texture to keep its original aspect ratio (width/height). When this box is checked, moving either of the **Scale** dials will move the other as well, to preserve the aspect ratio.
- *Edge Bias*: The **Edge Bias** options allow you to remove edge artifacts than can appear when viewing geometry objects close up. Check the appropriate radio button to make your selection. Your available options are:
  - *Off*: Checking the **Off** radio button disables edge biasing.
  - *Auto*: Checking the **Auto** radio button enables edge biasing.
  - *Custom*: Checking the **Custom** radio button allows the Viewpoint Media Player to determine if edge biasing is needed or not when the scene is rendered on the viewer's computer.

MAPS PALETTES

The **Materials** room contains four **Map** palettes, one for each map type supported by pro-V Studio. Please see "Maps" on page 42 for more information about maps. To load a map:

1. Select the object on which to apply the map using either the **Scene Display** or the **Hierarchy Viewer** window.
2. In the **Media** palette, find the image map you wish to load.
3. Click and drag your selected map to your desired **Map** palette.

NOTE
IN ADDITION TO IMAGES, PRO-V STUDIO SUPPORTS THE USE OF SWF AND ZOOMVIEW CONTENT AS MAPS.

The **Map** palettes are:

TEXTURE PALETTE

The **Texture** palette is where you load a texture map. It appears as shown.

If you checked the **Keep Aspect Ratio In Frame** checkbox (see "Texture Palette" on page 154), your image will appear in its original height/width proportions. Clearing that checkbox stretches the image to fit the palette. You have the following options:

- *Height*: Adjust the texture's height in pixels using the **Height** dial. You can also entered your desired value in the field to the right of the dial.
- *Width*: Adjust the texture's width in pixels using the **Width** dial. You can also entered your desired value in the field to the right of the dial.

Sizing Textures

SWF movies used as textures on 3D objects must be sized to a power of 2. See "Importing Images" on page 72 for more information. Adjusting the **Height** and **Width** dials will adjust the size up or down by powers of 2. 2D objects (hotspots and action primitives) can accept arbitrarily sized SWF textures, meaning that you can specify your desired height and width.

Image textures (JPG and PNG) cannot be resized when applied to 3D objects but can be resized if applied to 2D objects.

Adding SWF Textures to Objects

Adding a Macromedia Flash (SWF) texture to an object uses the same procedure as normal image maps.

ALPHA CHANNEL PALETTE

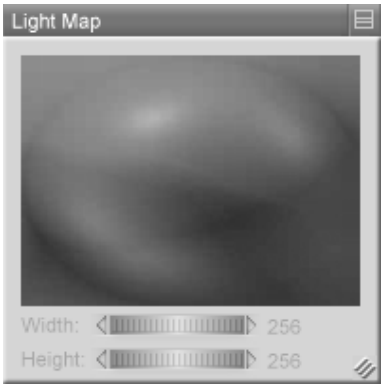
The **Alpha Channel** palette is where you load an alpha channel map. pro-V Studio supports 256 levels of transparency when using alpha maps. 256-color grayscale images are optimal for use as alpha maps, however you can use any image desired. This palette appears as shown.

If the selected object's transparency appears reversed (opaque where you want it transparent and vice-versa), you can press the **Invert** button to toggle alpha inversion on and off.

BUMP MAP PALETTE

The **Bump Map** palette is where you load a bump map. It appears as shown. You cannot make adjustments to bump maps. To view a bump map, you must first load a diffuse texture.

LIGHT MAP PALETTE



The **Light Map** palette is where you load a light map. It appears as shown on the right. As with most pro-V Studio functions, loading a light map for an object overrides the scene light map. You can use any imported image as a light map. You can also create custom light maps as described in "Lightmap Settings" on page 82. To use a custom lightmap:

1. Create your light map.
2. Save the light map as an image.
3. Import the image to the **Media** palette (see "The Media Palette" on page 108).
4. Apply the imported image to the selected object as described above.

WORKING WITH MATERIALS

Please keep the following tips in mind when working with materials:

- The **Materials** room and its palettes display the materials for the currently selected object. Selecting a different object updates the palettes accordingly.
- In the **Materials** room, the bottom of the **Hierarchy Viewer** window can display the materials assigned to the currently selected object. Remember that objects can have more than one material group. Please see "Animators Tab" on page 107 for more information.
- You can edit each material group separately by selecting the group to edit in the **Hierarchy Viewer** window.
- Asset material options override global settings except for the bilinear interpolation filter timeout.
- Image hotspots can use texture and alpha maps. They do not support bump or light maps. Please see "Image Hotspot Modifier" on page 133 for more information.
- You must have an object selected in order to apply material settings.

ADDITIONAL MAPPING CONSIDERATIONS

Using the same texture, alpha, bump, and/or light map on several primitives can result in a large MTS file (see "Viewpoint Files" on page 176) because of the duplicate images. To avoid this:

1. Select the first 3D object.
2. Drag your desired image map onto the 3D object. pro-V Studio creates a new project object with the image map.
3. Use the project object created in Step 2 for the second and subsequent 3D objects on which you wish to use the same map.

LIGHT MAPS

Every light map must be sized at 256x256 pixels. pro-V Studio automatically resizes smaller or larger light maps and creates a new project object. Using the same light map again repeats this process.

For example, let's assume that you want to use the same light map (one that's 200x200 pixels) on three different 3D objects. Drag your desired light map image into the selected object's **Light Map** palette. Since this map is a different size, pro-V Studio automatically creates a new object with the map resized to 256x256. If you keep using the original 200x200 image, you'll wind up with three identical light maps. Use the 256x256 light map (it will have the name of your original lightmap plus the suffix **_L**) for the second and third objects, and you'll only have one image in your MTS file.

ALPHA & TEXTURE MAPS

The above-described functionality also occurs with texture and alpha maps. Resized alpha maps have the suffix **_A**. An deleted alpha image creates an object with the suffix **_OA**.

In this example, let's assume you have the same three 3D objects described above. In this case, you want to use the same texture and alpha maps for each object. Drag the textures and alpha maps to their appropriate palettes. This creates new project object for every 3D object which consists of both texture and alpha information. Simply use this newly created map for the other two 3D objects.

BUMP MAPS

Bump maps must be the same size as their corresponding image maps. If your selected bump map is a different size than your texture map, pro-V Studio resizes it and create a new project object. Simply reuse this newly created as described above. Newly created bump maps have the suffix **_R**.

Chapter 28: The Animation Room

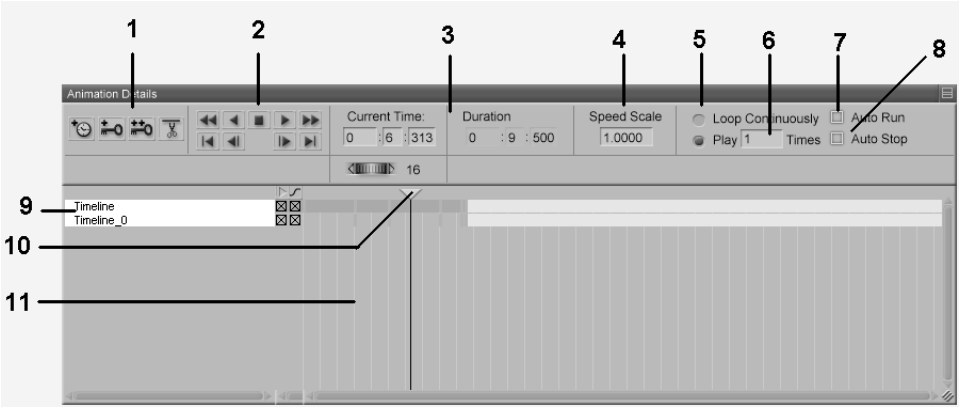
The **Animation** room allows you to add and edit animations. To create most simple animations, you can use the **Simple Animations** palette, as described in "The Simple Animations Palette" on page 110. This room gives you total control over your scene's animations. it has the following windows and palettes:

- *Scene Display Window*: Please see "The Scene Display Window" on page 100 for more information about the **Scene Display** palette.
- *Hierarchy Viewer Window*: Please see "The Hierarchy Viewer Window" on page 106 for more information about the **Hierarchy Viewer** window.*x*
- *Play Controls Palette*: Please see "The Play Controls Palette" on page 140 for more information about the **Play Controls** palette.
- *Animation Details Window*: Please see below for more information about the **Animation Details** window.
- *Keyframe Settings Window*: Please see below for more information about the **Keyframe Settings** window.

Following the palette descriptions, this chapter discusses various additional tips for working with pro-V Studio animations. See "Working With Animations" on page 166.

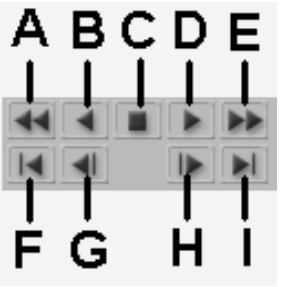
ANIMATION DETAILS WINDOW

The **Animation Details** window lets you view and edit your animators and keyframes from a single convenient location. It appears as follows:



The **Animation Details** window has the following controls, some of which function identically to their counterparts in the **Simple Animations** palette, which is discussed in "The Simple Animations Palette" on page 110.

- *Timeline Controls (1)*: The **Timeline** controls allow you to perform basic timeline functions. From left to right, these controls are:
  - *Add Timeline*: The **Add Timeline** button adds a timeline to the current animator and opens the **Property Selection** dialog. Please see "Animation Hierarchy" on page 39 for information about the pro-V Studio animation hierarchy and "The Property Selection Dialog" on page 113 for information about the **Property Selection** dialog. You can also create a new timeline by pressing [CTRL]+[T].
  - *Add Keyframe*: Clicking the **Add Keyframe** button or pressing [CTRL]+[K] dds a keyframe at the time specified in the **Current Time** fields (3). If a keyframe already exists at the specified time, this function only adds keyframes to timelines without keyframes. To replace an existing keyframe, you must use the **Force Add Keyframe** button, described below.
  - *Force Add Keyframe*: Clicking the **Force Add Keyframe** button or pressing [CTRL]+[SHIFT]+[K] replaces keyframes at the current time with the new values. For example, if you have an existing keyframe with a Translate value of 3 and the object is at 5Y, this button replaces the TranslateY 3 keyframe with a TranslateY 5 keyframe.
  - *Split Selection*: Clicking the **Split Selection** button splits the currently selected timeline(s) based on your keyframe selections. Please see "Splitting Selections" on page 166 for more information about splitting timeline.
- *Playback Controls (2)*: The **Playback** controls allow you to play the currently selected timeline. The labels in the image on the right correspond to the following detailed explanations:



  - *Fast Reverse (A)*: Clicking the **Fast Reverse** button plays the current timeline backwards at high speed (similar to doing a fast search on a VCR).
  - *Normal Reverse (B)*: Clicking the **Normal Reverse** button or pressing [SHIFT]+[SPACE] plays the timeline in reverse. While the timeline is playing, clicking this button again pauses playback.
  - *Stop (C)*: Clicking the **Stop** button stops the timeline at its current position.
  - *Play/Pause (D)*: Clicking the **Play** button or pressing [SPACE] plays the timeline. While the timeline is playing, clicking this button again pauses playback

- *Fast Forward (E)*: Clicking the **Fast Forward** button plays the current timeline forward at high speed (similar to doing a fast search on a VCR).
- *Start (F)*: Clicking the **Start** button moves the timeline to its beginning.
- *Previous Keyframe (G)*: Clicking the **Previous Keyframe** button moves the timeline to the next previous keyframe
- *Next Keyframe (H)*: Clicking the **Next Keyframe** button moves the timeline to the next proceeding keyframe
- *Last Keyframe (I)*: Clicking the **Last Keyframe** button moves the timeline to the last keyframe.

- *Time/Duration Controls (3)*: The **Time**/Duration controls allow you to specify the current animator's total length and quickly skip to any point in the total duration.
  - *Current Time Field*: The **Current Time** fields display the animator's current location in minutes:seconds:milliseconds format. Please see "Simple Animation Palette Controls" on page 110 for more information on using this field.
  - *Spread*: The **Spread** dial allows you to expand or compress the timeline display in the Keyframe Display Area (see #13, below). This allows you to either see more of your animator's total duration at once or zoom in for precise control. Click and drag the dial to set your desired value.
  - *Duration Field*: The **Duration** fields display the animator's total length in minutes:seconds:milliseconds format. Please see "Simple Animation Palette Controls" on page 110 for more information on using this field.
- *Speed Scale (4)*: The **Speed Scale** field allows you to rescale time. Setting this value to 1 plays the animation at normal speed. Setting this value to 2 plays the animation at double speed. 0.5 plays the animation at half speed, and so forth. Enter your desired numeric value in the field.
- *Loop Continuously (5)*: Checking the **Loop Continuously** radio button forces the current animator to play continually once started. The animator will play from beginning to end and will keep repeating if this option is enabled. If you do not want this animator to loop, you will need to check the **Play/Repeat** radio button.
- *Play X Times (6)*: Checking the **Play X Times** radio button disables looping and forces the animator to play from beginning to end. Enter the desired number of repetitions in the field. This must be an integer. Decimals (such as 3.5) are not allowed.

- *Auto Run (7)*: Checking the **Auto Run** checkbox makes the current animator begin running when your scene is opened. If this box is not checked, you will need to add an explicit trigger for the animation (such as a message sent by an interaction component). Alternatively, loading a template in the **Web Integration** room (see "The Web Integration Room" on page 170) will add a pair of Java script buttons labeled **Start <animation>** and **End <animation>**, where **<animation>** is the name of the selected animator. This option is hierarchical and operational so long as the entire hierarchy above the selected timeline has this option enabled. For example, if a parent animator has **Auto Run** enabled and its child does not, then the "grandchild" animator cannot be set to auto run.
- *Auto Stop (8)*: Once an animator starts, it continues until stopped by another property unless you check the **AutoStop** checkbox.
- *Timeline List (9)*: The **Timeline List** area displays all of your current timelines. To rename a timeline, select the desired then click again in a slow double-clicking motion and enter your desired name in the field that appears. Timelines must have unique names that do not have special characters. Each timeline has two checkboxes. From left to right, these checkboxes are:
  - *Animation On/Off*: Checking the **Animation** checkbox enables animation for the currently selected timeline and vice-versa. This is for previewing and testing purposes only and does not affect your published scene.
  - *Tween*: Checking the **Tween** checkbox makes pro-V Studio interpolate keyframes. Clearing this checkbox disables tweening. Please see "Interpolation" on page 40 for more information.

  By default, both boxes are checked.
- *Current Position Indicator (10)*: The **Current Position Indicator** is a visual indicator of where the current animator is in its current run. You can click and drag this slider and/or enter numeric values in the **Current Time** fields, described in #3, above.
- *Keyframe Display Area(11)*: The **Keyframe Display** area shows all of the keyframes in the timelines comprising the current animator. You can select a single keyframe by clicking it or select multiple keyframes by clicking and dragging to create a rectangular selection area. Selecting one or more keyframes enables the **Key Frame Settings** window, described below.

KEY FRAME SETTINGS WINDOW

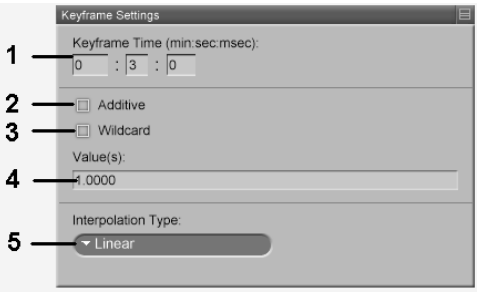
The **Keyframe Settings** window has two separate interfaces, one for normal timelines, the other for action timelines (see "Keyframing" on page 38 for more information about timeline types). To activate this window, select a keyframe in the **Animation Details** window, as described above.

NOTE

IF YOU SELECT MULTIPLE KEYFRAMES ON ONE OR MORE TIMELINES, THE **KEYFRAME SETTINGS** WINDOW WILL ONLY SHOW THOSE ATTRIBUTES THAT ARE COMMON TO ALL SELECTED KEYFRAMES - IF ANY.

NORMAL TIMELINES

The **Keyframe Settings** window appears as shown when working with normal timelines. This window has the following controls:



- *Keyframe Time (1)*: The **Keyframe Time** field displays the current keyframe's position in minutes:seconds:milliseconds format. If you enter a new time, the keyframe will move to the newly created time. This can speed up or slow down the rate of change between the moved keyframe and those just before and just after.
- *Additive (2)*: If you check the **Additive** checkbox, the value you enter in the Value field (#5, below) is added to the previous keyframe's value. For example, if your previous keyframe had a **TranslateY** value of 3, entering 2 would translate the affected object to +5 on the Y axis.
- *Wildcard (3)*: Normally, timelines begin playing in their initial state. Checking the **Wildcard** checkbox does not return the timeline to its pre-playback state. For wildcard to be truly effective, all timelines in the current animator must have this option enabled or they may not exhibit wildcard behavior.
- *Value (4)*: You may enter or modify your desired keyframe value in the **Value** field. Depending on the object/attribute being controlled, the required syntax may vary. use caution to enter the correct information using the exact syntax displayed.

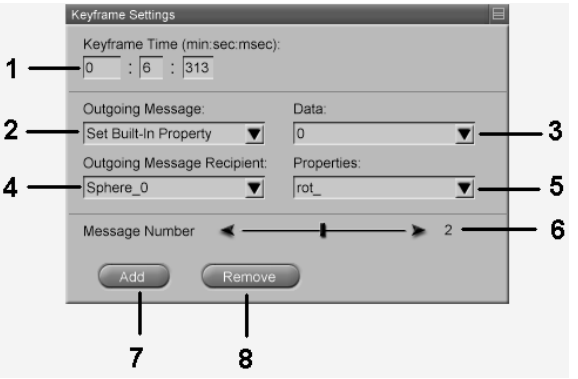
- *Interpolation Method (5)*: The **Interpolation Method** pull-down menu allows yo to select your desired interpolation method for the current timeline. pro-V Studio supports the following interpolation methods: **Linear**, **Catmull-Rom Spline**, **TCB Spline**, **Smooth Rotation**, **Catmull-Rom Spline Rotation**, and **TCB Spline Rotation**. Please see "Interpolation" on page 40 for more information about these keyframe interpolation methods.

ACTION TIMELINES

As described in "Keyframing" on page 38, each new animator contains one action timeline. If you discard this timeline, you can select **Animator>New Action Timeline**. To work with an action timeline:

1. Select the action timeline in the **Animation Details** window.
2. Scrub the **Current Position Indicator** or enter a time in the **Current Time** field.
3. Click the **Add Keyframe** button or press [CTRL]+[K].
4. Input your desired setting in the **Keyframe Settings** window.

The **Keyframe Settings** window appears as shown when working with action timelines. It has the following controls:



- *Keyframe Time (1)*: The **Keyframe Time** field displays the current keyframe's position in minutes:seconds:milliseconds format. If you enter a new time, the keyframe will move to the newly created time. This can speed up or slow down the rate of change between the moved keyframe and those just before and just after.
- *Outgoing Message (2)*: Action timelines care capable of posting messages to the system, thereby triggering other animations or interaction components. When the keyframe is played, it will perform the action specified in the **Outgoing Message** pull-down menu (3). Available messages are:
  - *Post Message*: Selecting **Post Message** sends a custom message to the system when the current reactor is triggered. For example, if you select this option and enter `MYMESSAGE` in the **Message** field (see below), then **MYMESSAGE** will appear as an option in the **Incoming Message** pull-down (described above) and can be used to trigger another reactor.

- *Set Built In Property*: Selecting **Set Built In Property** allows you to set a property, which you select using the **Property** pull-down menu (see below).
- *Collapse*: Please see "Collapsing Objects" on page 37 for more information.
- *Uncollapse*: Selecting **Uncollapse** uncollapses the selected object and children. Collapsing and uncollapsing objects allows you to create more complex scenes while conserving resources.
- *Hide*: Selecting **Hide** makes the current object invisible. Hidden objects are still present in the scene and can have interaction components, etc. They also consume resources.
- *Show*: Selecting **Show** makes the current object visible.
- *Set Object Opacity*: Selecting **Set Object Opacity** allows you to specify the object's opacity in the **Data** field.
- *Drag Object*: Selecting **Drag Object** allows the viewer to drag the current object to a new location.
- *Set Material Diffuse Color*: Selecting **Set Material Diffuse Color** allows you to set the current object's color. Please see "Material Settings Palette" on page 149 for more information.
- *Set Material Opacity*: Selecting **Set Material Opacity** allows you to specify the opacity of the object's material (not the object itself) in the **Data** field.
- *Trigger Animation*: Selecting **Trigger Animation** allows you to trigger an action animator that begins playing when the reactor is triggered.
- *Start Animation*: Selecting **Start Animation** starts the selected animator.
- *Stop Animation*: Selecting **Stop Animation** stops the selected animator.
- *Load MTX*: Selecting **Load MTX** loads the specified Viewpoint MTX file.
- *Execute VB Script*: Selecting **Execute VB Script** loads and executes a Visual Basic (VB) script.
- *Execute JavaScript*: Selecting **Execute JavaScript** loads and executes a Java Script script.

- *Data (3)*: Some of the actions allow you to send data to the system. For example, posting a message allows you to enter a custom message as described above. The **Data** field is where you enter the data to be applied by the reactor. The displayed name of this field changes depending on the action you select using the **Action** pull-down menu. For some values, you can select the following by clicking the arrow to the left of the field name and using the pull-down menu:
  - *Value*: Selecting **Value** sends the specified value to the selected target.

- *Append*: Selecting **Append** adds the value you enter to the existing value. For example, if the **rot_** value is currently 3 and you enter 2, the **rot_** value will become 5 (2+3).
- *Message*: As described above, you can create custom messages, post that value to the system, and have other interaction components react to that custom message. Messages have a "broadcast" effect, meaning that they exist throughout the scene once posted. Thus, one message can affect multiple targets

- *Outgoing Message Recipient (4)*: The **Outgoing Message Recipient** pull-down menu displays a hierarchical list of objects in your scene. This appears similarly to the list found in the **Hierarchy Viewer** window and functions identically. This is the object on which the reactor will act. For example, you could set up a reactor to begin an animation when a sphere is clicked. In this case, you would attach the reactor to the sphere and select the animator as the target object
- *Properties (5)*: If you selected an action that requires you to select a property, you can select an available property using the **Property** pull-down menu.
- *Add/Remove Actions*: See below.

Defining Actions in Action Timelines

Action timelines can perform multiple actions. To specify more than one action:

1. Click the **Add** button (7) once for each action you wish to add. For example, if you want the reactor to perform five actions, click this button four times.
2. Set the first action just as you would for a Simple Reactor, as described in "Simple Reactors" on page 115.
3. Move the **Action Number** slider (6) until the number to the right of the slider changes to the next number (for example, from **1** to **2**).
4. Set the second action just as you would for a Simple Reactor.
5. Repeat Steps 3 and 4 for each subsequent action.

To delete an action, move the **Action Number** slider to the action you wish to delete and click the **Delete** button (8). Once you have finished making your selections, click **OK** to save your changes or **Cancel** to abort.

As you can see, this functions in a manner similar to that of a Multi Reactor. Please see "Multi Reactors" on page 119 for more information.

WORKING WITH ANIMATIONS

This topic contains additional information about working with animations:

SPLITTING SELECTIONS

You can split animators or timelines, as follows:

- Splitting an animator creates a new animator for each timeline in the original animator.
- Splitting a timeline creates two new animators, one with the keyframes before the current time, the other with the keyframes after the current time.
- Selecting keyframes with a rectangular selection creates a new animator with the selected keyframes.

Splitting is a non-destructive process, meaning that original keyframes and animators are preserved.

EDITING MULTIPLE KEYFRAMES

If you have a timeline with multiple keyframes, selecting multiple keyframes displays the left-most keyframe's time in the **Current Time** field. Changing this time moves the left-most keyframe and all those to the right relative to the change. For example, say you have a timeline with keyframes at 1, 2, and 3 seconds. Selecting the right two keyframes displays **2** in the **Current Time** field. If you change that to 5, then the left-most selected keyframe move to 5 seconds and the next one to 6. This allows you to quickly re-time animations. You cannot, however, change the order in which keyframes appear.

With this technique you can move many keyframes by editing the new time

ANIMATING MATERIALS

To animate materials, you must select a material property, then enter the room in question (such as the **Material Room** to change opacity). Change the values as needed, then return to the **Animation** room to set the keyframe as described above. Repeat these steps for all keyframes.

Chapter 29: The Interaction Room

Behaviors offer an extremely powerful state-based means of adding interactivity to your scene. The **Interaction** room is where you work with behaviors. You may also work with any other interaction component you desire and preview your work. This room has the following windows and palettes:

- *Scene Display Window*: Please see "The Scene Display Window" on page 100 for more information about the **Scene Display** palette.
- *Hierarchy Viewer Window*: Please see "The Hierarchy Viewer Window" on page 106 for more information about the **Hierarchy Viewer** window.
- *Interaction Palette*: Please see "The Interaction Palette" on page 114 for more information about the **Interaction** palette.
- *Play Controls Palette*: Please see "The Play Controls Palette" on page 140 for more information about the **Play Controls** palette.
- *Behavior Editor Dialog*: Please see below for information about the **Behavior Editor** dialog.

Please see "The Interaction Palette" on page 114 for information on working with other types of interaction components. This chapter solely concerns itself with behaviors.

ABOUT BEHAVIORS

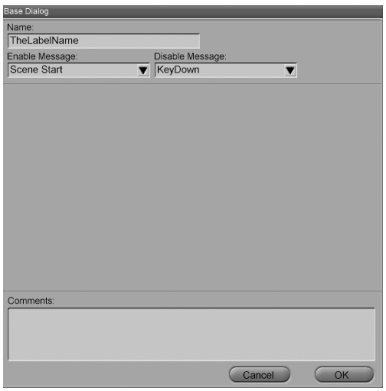
Behaviors are hierarchical interaction components that can contain states, reactors, behaviors, and/or modifiers. Each state can contain multiple interaction components, each with the same or different triggers.

Reactors have a "global" state. Any interaction components places into this global state will function as if they were not contained within a behavior, with the only difference that behaviors can be enabled or disabled, whereas an interaction component not within a behavior is always enabled.

By themselves, most interaction components do not set behavior states. Within a behavior, however, state changes are possible. Each behavior contains a starting state. If a behavior has two or more states, you can set your desired starting state, meaning that the behavior will be in your selected state until something happens to change it.

Interaction components are activated and deactivated by state. All interaction components within a state are active then that state is active. In any given state, only those interactions assigned to the current state and the global state are active. If a behavior has no states, then all interaction components within that behavior are active.

BEHAVIOR BASE DIALOG

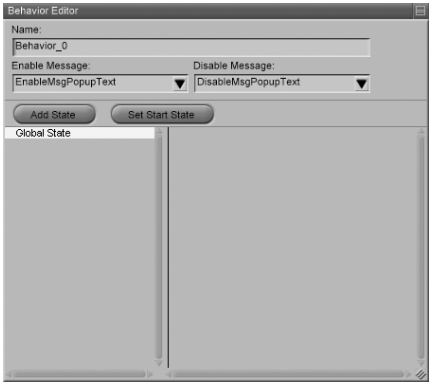


To add a behavior, click and drag a behavior from the **Interaction** palette to your desired object in the **Hierarchy Viewer** window. Double-clicking this behavior opens the **Base Dialog** as shown here. The **Base Dialog** has the following options:

- *Name*: Enter your desired name in the Name field.
- *Enable Message*: Use the Enable Message pull-down menu to select a message (built-in or custom) that activates the current behavior. Your options are the same as the those suppled with Simple Reactors (see "Simple Reactors" on page 115 for more information).
- *Disable Message*: Use the Disable Message pull-down menu to select a message (custom or built-in) that disables the current behavior. Your options are the same as those available in the Enable Message pull-down. See above.
- *Comments*: If desired, you may enter up to 5 lines of text as comments or explanations about the current reactor and its function. This can help with complex scenes, especially if more than one person is working on a scene or if the scene is subject to periodic revision.

You can access the **Base Dialog** from any room. To edit a behavior, however, you must enter the **Interaction** room, which displays the **Behavior Editor** (see below).

BEHAVIOR EDITOR DIALOG

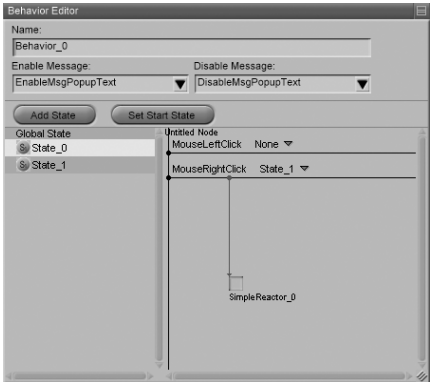


The **Interaction** room contains the **Behavior Editor** dialog, which appears as shown. This dialog is the same as the **Base Dialog** shown above with the following additions:

- *Add State*: Clicking the **Add State** button adds a state to the current behavior. You can also drag states from the **Interaction** palette to the behavior in the **Hierarchy Viewer** window.
- *Set Start State*: Clicking the **Set Start State** button makes the currently selected state the behavior's starting state. To set a start state,

select the state on the left side of the **Behavior Editor** dialog, then click the button. The current start state appears in *italics*.

WORKING WITH STATES



The image shows a behavior with three states, including the global state and two added states.

To add an interaction component to a state, drag the desired component from the **Interaction** palette to the desired state in the **Hierarchy Viewer**. You can see and edit these interaction components in the **Behavior Editor** dialog. Selecting a state on the left side of the **Behavior Editor** shows the interaction components assigned to that state, if any.

EVENT LINES

The right side of the **Behavior Editor** dialog contains one or more *event lines*. Each event line is labeled according to the action that will trigger that line (such as **MouseLeftClick**). In this example, there are no interaction components tied to a left mouse click.

To add an event line, select any interaction component within the desired state using the **Hierarchy Viewer** window. If you add or switch the interaction component's incoming message(s), that interaction component will move to the specified event line (if the line already exists) or will create a new even line (if no corresponding event line exists). In the above example, a mouse left click does nothing while a mouse right click triggers the reactor and switches the behavior from **State_0** to **State_1**. Remember that the event line has nothing to do with time, only with triggering events.

To cause an event line to set a new state, click the arrow at the right of the event timeline to open the **States** pull-down menu, which lists all states in the behavior, and make your selection. Each event line can trigger a different state, the same state, or no state.

Event timelines can be set to either built-in or custom messages.

REARRANGING TIMELINES

To rearrange the event line display, click and drag interaction components. To move interaction components between event lines, press [CTRL] while dragging your selected interaction component to your desired event line.

NOTE

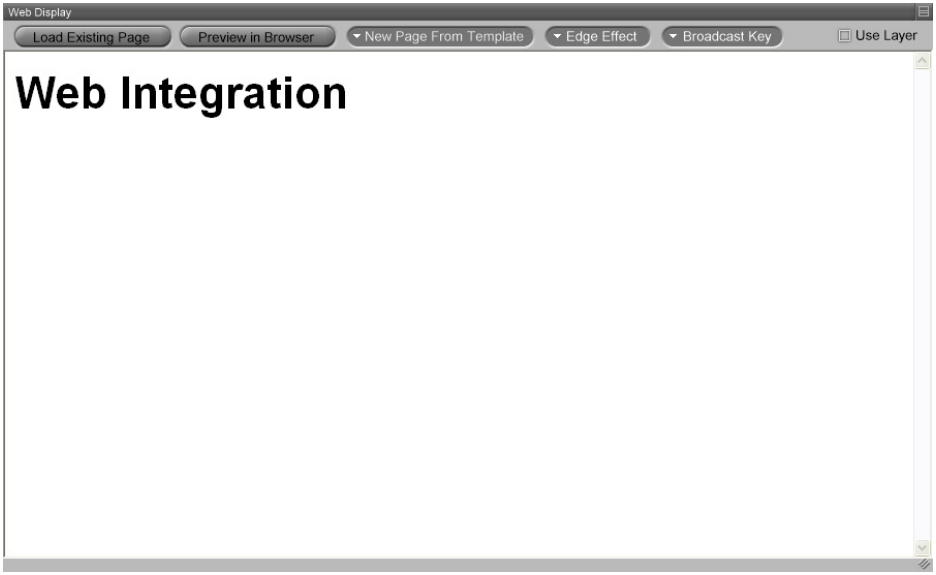
BE SURE TO ADD DESCRIPTIVE NAMES TO INTERACTION COMPONENTS TO AVOID CONFUSION.

Chapter 30: The Web Integration Room

Now that your scene has been published, you're ready to insert it into a Web page in preparation for publication. The **Web Integration** room lets you do this. You may load and preview scenes in HTML pages and process Viewpoint Media Player (VMP) templates. This step is optional; you can insert the code to call your Viewpoint scene into any HTML after publishing your scene. You can publish just your scene or your scene with the HTML page. This room contains the **Web Display** window, described below.

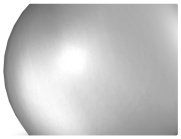
WEB DISPLAY WINDOW

The **Web Display** window appears as follows:



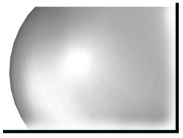
This window has the following buttons:

- *Load Existing Page*: Clicking the **Load Existing Page** button opens a standard **Open** dialog box, allowing you to browse for and load an HTML page. Once loaded, your scene appears in the page.
- *Preview In Browser*: Clicking the **Preview In Browser** button launches your Web browser and displays the currently loaded HTML page with your scene in it.
- *New Page From Template*: pro-V Studio includes an assortment of basic HTML templates that you can use to publish your scene. Use the **New Page From Template** pull-down menu to make your selection.
- *Edge Effect*: The **Edge Effect** pull-down menu allows you to specify how you wish objects to appear when they reach the edge of your scene window (such as when zooming in). Your available options are:
  - *No Edge Effect:* Selecting **No Edge Effect** makes your scene window's edges invisible. Assets extending beyond the window edge appear cut off, as shown.



  - *Soft, Invisible Edge*: Selecting **Soft, Invisible Edge** makes your scene window's edges invisible. Assets extending beyond the window edge fade out as they approach the edge, as shown.

  - *Soft, Visible Edge*: Selecting **Soft, Visible Edge** displays your scene window's edges. Assets extending beyond the window edge fade out as they approach the edge, as shown.



- *Broadcast Key*: You must obtain a broadcast key from Viewpoint in order to publicly display published scenes. Please see "Distribution" on page 10 for more information. The **Broadcast Key** pull-down menu allows you to enter your broadcast key. Your available options are:
  - *Choose File*: Selecting **Choose File** opens a standard **Open** dialog allowing you to browse for and load a broadcast key contained in a text file.
  - *Direct Input*: Selecting **Direct Input** opens the **Enter Broadcast Key** dialog. Enter your Viewpoint broadcast key in the field, then click **OK**.
- *Use Layers*: Modern HTML browsers support multiple HTML layers using the <DIV> HTML tag. Checking the **Use Layers** checkbox places your scene in a new HTML layer that you can position at will. Clearing this checkbox places your scene at the bottom of the currently loaded HTML page. When layers are enabled, you can drag the scene layer to position it. Be sure not to place it on top of any Java script buttons as they cannot accept mouse clicks when behind your scene.

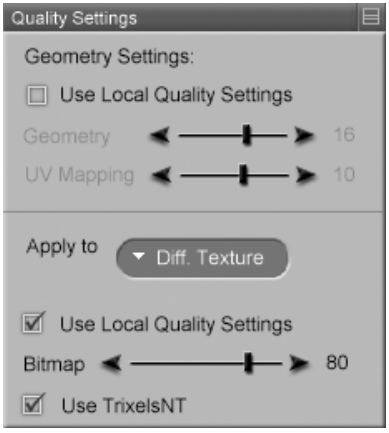
Chapter 31: The Publish Room

Publishing. You've added and arranged objects, inserted animations and interaction components, and integrated your scene into a Web page. Now you're ready for the last step. The **Publish** room publishes your scene files to a hard drive ready for uploading to the Web. This room contains the following windows and palettes:

- *Scene Display Window*: Please see "The Scene Display Window" on page 100 for more information about the **Scene Display** palette.
- *Hierarchy Viewer Window*: Please see "The Hierarchy Viewer Window" on page 106 for more information about the **Hierarchy Viewer** window.
- *Quality Settings Palette*: Please see below for more information about the **Quality Settings** palette.
- *Publish Palette*: Please see below for more information about the **Publish** palette.

QUALITY SETTINGS PALETTE

The **Quality Settings** palette allows you to specify quality settings on a per-object basis. Per-object selections override scene selections. To specify quality settings for the entire scene, use the **Publish** window (see below). The **Quality Settings** palette appears as shown.



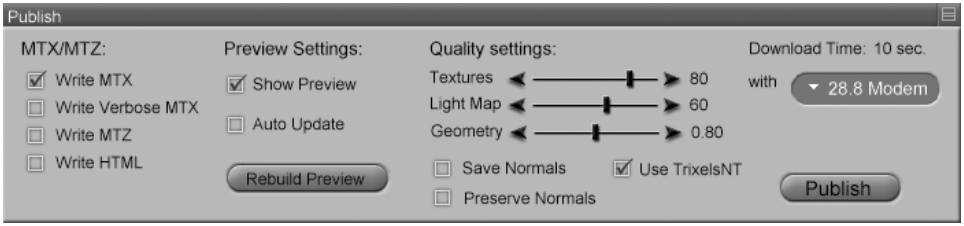
To enable the **Quality Settings** palette, select an object in either the **Scene Display** window or the **Hierarchy Viewer** window. Your settings will be applied to the currently selected object. This palette allows you to specify geometry and map quality. It has the following controls:

- *Use Local Geometry Settings*: Checking the **Use Local Geometry Settings** checkbox allows you to apply custom geometry quality settings to the currently selected object and enables the top half of the **Quality Settings** palette. Clearing this checkbox forces the currently selected object to use the scene quality settings. This feature is useful if, for example, you have one item you wish to highlight in a scene with several items. In this case, enabling this option enhances your highlighted item while minimizing overall scene size.

- *Geometry*: The **Geometry** slider allows you to specify your desired geometry (2D and 3D mesh) quality settings. Dragging to the right increases both geometry quality and scene size, and vice-versa. You can also enter your desired value in the field to the right of the slider.
- *UV-Mapping*: The **UV-Mapping** slider allows you to specify your desired UV map quality settings. Please see "Maps" on page 42 for more information about maps. Dragging to the right increases geometry quality and your scene size, and vice-versa. You can also enter your desired value in the field to the right of the slider.
- *Apply to*: The **Apply To** pull-down menu allows you to specify custom quality settings for the currently selected object's maps. Your available options are:
  - *Texture*: Selecting **Texture** applies quality settings to the object's texture map.
  - *Bump Map*: Selecting **Bump Map** applies quality settings to the object's bump map.
  - *Light Map*: Selecting **Light Map** applies quality settings to the object's light map.
- *Use Local Map Settings*: Checking the **Use Local Map Settings** checkbox allows you to apply custom image map quality settings to the currently selected object and enables the bottom half of the **Quality Settings** palette. Clearing this checkbox forces the currently selected object to use the scene quality settings. This feature is useful if, for example, you have one item you wish to highlight in a scene with several items. In this case, enabling this option enhances your highlighted item while minimizing overall scene size.
- *Bitmap*: The **Bitmap** slider allows you to specify your desired image map quality settings. Dragging to the right increases both map quality and scene size, and vice-versa. You can also enter your desired value in the field to the right of the slider.
- *Use TrixelsNT*: Checking the **Use TrixelsNT** checkbox enables the use of Viewpoint's proprietary TrixelsNT wavelet-based compression, which dramatically reduces the size of certain image maps, and vice-versa.

PUBLISH WINDOW

The **Publish** window allows you to specify global quality settings, set publishing options, view your scene's size and download times, and publish your finished scene. This window appears as follows:



- *MTX/MTZ*: The **MTX/MTZ** controls allow you to specify which scene files to publish:
  - *Write MTX (1)*: Checking the **Write MTX** checkbox writes an XML-based file to the proprietary Viewpoint MTX format, and vice-versa. MTX files contain the hierarchical relationships between objects in your scene and contains a script for staging your scene. Think of the MTX file as your scene's blueprint.
  - *Write Verbose MTX (2)*: Checking the **Write Verbose MTX** checkbox writes an MTX file containing all of the possible XML tags for a Viewpoint scene, including those that are set to default values. You can use a verbose MTX file much as an auto mechanic uses extra cars for parts. Simply cut and paste MTX file elements from the verbose MTX file into the non-verbose MTX file and edit the attributes.

WARNING

VERBOSE MTX FILES ARE AN ADVANCED FEATURE THAT SHOULD ONLY BE USED BY ADVANCED USERS. EDITING MTX FILES CAN CAUSE SCENE CORRUPTION AND DATA LOSS.

  - *Write MTZ (3)*: Checking the **Write MTZ** checkbox writes an MTZ file, which is a compressed form of MTX file, and vice-versa. MTZ is the preferred format for Web-enabled Viewpoint content, especially if your scene contains large animations. Compressing MTX files speeds up downloading of Viewpoint scenes.
  - *Write HTML (4)*: Checking the **Write HTML** checkbox includes an HTML file with your published scene, and vice-versa. If you loaded an HTML page (template or custom) in the **Web Integration** room (see "The Web Integration Room" on page 170), your scene will be published with this HTML file. If you did not load an HTML file, pro-V Studio will generate a generic HTML page that loads your scene when opened in a Web browser.

- *Preview Settings*: The **Preview Settings** controls allow you to control your scene's preview:
  - *Show Preview (5)*: Checking the **Show Preview** checkbox allows you to preview the effect of your selected quality settings and vice-versa.
  - *Auto-Update (6)*: If the **Show Preview** checkbox is checked, checking the **Auto-Update** checkbox automatically refreshes the preview every time you change a settings. Clearing the checkbox disables this feature.
  - *Rebuild Preview (7)*: Clicking the **Rebuild Preview** button refreshes your scene preview.
- *Quality Settings*: The **Quality** controls allow you to specify quality settings for your entire scene. If you wish to apply custom quality settings to a particular object without affecting the rest of the scene, select your desired object and use the **Quality Settings** palette as described above. The available **Quality** controls are:
  - *Bitmap (8)*: The **Bitmap** slider allows you to specify your desired image map quality settings. Dragging to the right increases both map quality and scene size, and vice-versa. You can also enter your desired value in the field to the right of the slider.
  - *Lightmap (9)*: The **Lightmap** slider allows you to specify your desired light map quality settings. Dragging to the right increases both map quality and scene size, and vice-versa. You can also enter your desired value in the field to the right of the slider.
  - *Geometry (10)*: The **Geometry** slider allows you to specify your desired geometry (2D and 3D mesh) quality settings. Dragging to the right increases both geometry quality and scene size, and vice-versa. You can also enter your desired value in the field to the right of the slider.
  - *Use TrixelsNT (11)*: Checking the **Use TrixelsNT** checkbox enables the use of Viewpoint's proprietary TrixelsNT wavelet-based compression, which dramatically reduces the size of certain image maps, and vice-versa.
- *Download Time (12)*: The **Download Time** display shows your scene's download time at the selected speed (see below).
- *Speed (13)*: Use the **Speed** pull-down menu to select a download speed. This updates the **Download Time** display (see above) and allows you to see how long viewer downloads will take.
- *Size (14)*: The **Size** display shows your scene's current size.
- *Publish (15)*: Clicking the **Publish** button publishes your current scene with all objects, interaction components, animations, quality settings, etc. exactly as they appear within pro-V Studio. The **Publish pro-V Studio Project** window appears,

allowing you to browse to the folder where your scene will be published. Please see "Paths Tab" on page 78 for information about changing the default publish folder.

VIEWPOINT FILES

Viewpoint uses the following file formats:

- *MTS*: MTS files store a scene's building blocks (sounds, images, geometry meshes, etc.)
- *MTX/MTZ*: MTX files (compressed, an MTX file becomes an MTZ file) contain the information needed to build and run the scene such as settings, interactions, animators, etc.)
- *HTML*: HTML files can host Viewpoint scenes and call the scene to load and begin playing.

A good way to think of these files is that MTS files provide the lumber and bricks, MTX files provide the blueprints, and HTML can provides the truck that brings these components where they're needed.

Chapter 32: The Content Room

Welcome to Content Paradise by Curious Labs! pro-V Studio's **Content** room accesses Content Paradise, which is your gateway to leading marketplaces that provide both free and for-sale pro-V Studio content. Need a pro-V Studio object, texture, animation, or something else? Content Paradise has you covered. And, pro-V Studio's Download Manager can auto-install most downloaded content and add it to the **Media** palette. Clicking the **Content** room tab at the top of the pro-V Studio workspace opens the **Content** room:

Aside from the Download Manager, the **Content** room accesses the online Content Paradise Web server and seamlessly displays Web pages in the pro-V Studio workspace. The Content Paradise features and interface are subject to change as Curious Labs adds to and refines this service. Because of this, the discussion in this reference manual is limited to discussing the Download Manager.

Content Paradise includes comprehensive online help, which is accessible from anywhere in the interface by clicking the **Help** links. Please be sure to read all of the applicable Terms of Service, including the Privacy Policy. Curious Labs reserves the right to alter these policies at any time without prior notice.

DOWNLOADING AND INSTALLING CONTENT

After you purchase your content and check out of the marketplace(s), you will be able to download it to your computer. A progress meter keeps you informed of your download's status. Follow the on-screen instructions to begin the download. Once the data transfer is complete, you can begin the installation process:

The **Installation Options** window appears for each downloaded file once data transfer is complete, with the following options:

- *Install*: Clicking the **Install** button installs the downloaded content to your pro-V Studio library. Please see "Library vs. Project Assets" on page 17 for information about the pro-V Studio library and project objects. The content will be placed in the folder specified in the **Paths** field in the **Paths** tab (see "Paths Tab" on page 78). To change the folder that content is installed to, enter a new path in the **Paths** tab.
- *Copy*: Clicking the **Copy** button copies downloaded content to the path specified in the **Install Path** field.
- *Cancel*: Clicking the **Cancel** button cancels the installation process. Downloaded content will remain uninstalled in the folder used by pro-V Studio for temporary storage. You will need to re-download cancelled content in order to install it.

If the file being installed already exists, a dialog pops up asking if you want to overwrite the existing file. Click **Cancel** to abort, or **OK** to proceed with overwriting the old file.

A confirmation dialog appears once installation is complete. Click **OK** to acknowledge successful installation of your downloaded content.

If pro-V Studio cannot recognize the content or cannot install content (such as an executable file), the **Copy to Folder** window appears again with the notification and allows you to browse for a folder. Clicking the **Copy** button copies the content to the specified folder where you can access and process it, and clicking **Cancel** exits the Download Manager.

PART 7

Appendices

Appendix A: Technical Support

We've worked hard to ensure that pro-V Studio's powerful features are both easy to use and available to users running a wide variety of computers. However, there may be times when you need technical support. Curious Labs is pleased to offer free technical support to registered users of our products. To receive technical support, please visit our Web site at http://www.curiouslabs.com/support and browse through our extensive product FAQs.

Please use the following checklist before contacting Technical Support:

- *Manual*: This Reference Manual answers most pro-V Studio questions. Before contacting Technical Support, please read the pertinent section(s) of this manual thoroughly.
- *FAQ*: Please visit the product FAQs at the above-listed URL.

Still don't see your question answered? Please contact Technical Support by clicking the link on the product FAQ (Frequently Asked Questions) page and completing our online support form. When contacting Technical Support, please fill out the form as completely as possible and include as much information as possible. This will help us resolve your issue faster. Once the form is complete, a Technical Support representative will contact you directly as soon as possible. Support requests are answered via email in the order they are received. Online support is free to all registered pro-V Studio users. pro-V Studio users are automatically registered while installing the application. You may also email support requests to tech@curiouslabs.com.

Telephone support is also free to registered users. Before using telephone support, please check the resources listed above. Phone support is intended to solve critical technical issues. We are unable to answer project-based questions.

In order to receive support, we require the following information:

- Your name
- Email address
- Telephone number (including international dialing information, if applicable)
- Your current operating system
- Your computer specifications (CPU, RAM, hard drive, video card, etc.)
- pro-V Studio serial number

- Detailed description of the problem

This information will help us isolate and resolve your issue. We require this information in order to provide support services and are unable to respond to incomplete requests in a timely fashion.

For international support, please contact your local distributor. Curious Labs maintains a list of our international distributors at http://www.curiouslabs.com.

NOTE

CURIOUS LABS RESERVES THE RIGHT TO ALTER OUR TECHNICAL SUPPORT POLICIES AT ANY TIME WITHOUT ADVANCE NOTICE.

Appendix B: Glossary

This Appendix contains some important pro-V Studio terms and their definitions.

GLOSSARY

- *2D Layer*: This is a layer contained within every pro-V Studio scene, which is displayed in front of the 3D layer. The 2D layer can contain any number of 2D objects. As with the Background Layer, the 2D Front Layer tracks with the camera so that camera movements do not change the user's view of the layer, and objects are drawn at their full size (camera distance does not effect scale).
- *3D Layer*: This layer is a normal 3D space that contains all the 3D objects in the scene. It is drawn in front of the Background and the 2D Back Layer, and behind the 2D Front Layer. As the camera is moved in three-dimensional space, the view on the objects in the 3D Layer will change accordingly.
- *Action Primitive*: Action primitives are high-level objects such as 2D buttons, 3D buttons, etc., which pro-V Studio supports as primitive object types, and which it translates into multiple Viewpoint objects and interactors when publishing to Viewpoint format. These high-level objects inherently contain all the necessary interactions to function, without the user having to create several objects and specify the interactions explicitly.
- *Animator*: Animators in pro-V Studio are the objects which embody most animations that pro-V Studio can perform. They are nearly analogous to Viewpoint animators, each having a timeline made up of keyframes. At each keyframe, any number of project attributes can take on a new value. As a simple example, within the one animator the z position of an object might be animated to move the object away from the camera, while the opacity of the object is also animating to make the object more and more transparent. Attribute values at keyframes may also be wild-carded, as in Viewpoint. Additionally, at each keyframe of an animator, any system or user-defined message may be sent to any object. A single project may have any number of animators, and animators are arranged in a hierarchy in pro-V Studio, as in Viewpoint.
- *Background*: The background is a layer in the scene that can contain a flat image, an iPIX or QTVR panorama, a flat image, or simply a background color. The background layer is drawn behind all other layers in the scene.

- *Behavior*: Behaviors are a part of the pro-V Studio interaction system that allow for complex grouping of other interaction components, and provide support for a state machine. Each behavior contains a set of states, which will always contain at least one state. The user can create as many states as desired in any one behavior. Each state can have a completely different set of reactors and modifiers. Additionally, state changes can be accomplished by setting the state change field of a reactor that is contained within a behavior state. Behaviors may also be added to the application library and generalized with generic object placeholder names to fill the place of any actual objects referenced by the behavior. When a generalized behavior is removed taken out of the library, the user is then asked to assign actual objects to the placeholders used in the generic behavior.
- *Interaction Palette*: The interaction palette is the source from which the user can instantiate reactors, modifiers, and behaviors. An iconic representation of each type of interaction component is contained in this palette. To instantiate any interaction component, the user simply drags the desired type of component from the interaction palette and drops it on either the object itself, or the object's entry in the interaction hierarchy.
- *Library*: Application repository for 2D and 3D objects, behaviors, etc. Elements can be dragged out of the library and dropped into the scene, onto an object, etc. Elements of a project may also be added to the library by dragging and dropping them onto the library pane of the media palette.
- *Media Palette*: An important UI palette that houses the project assets collection, library, and primitive creation tools.
- *Modifier*: Modifiers are designed to house specialized interactions and media effects not supported elsewhere in pro-V Studio. As with other components of the pro-V Studio reaction system, modifiers may be attached to objects directly, or they may be attached to any state of a behavior. Examples of modifiers include a pop-up label modifier which supports the same textual pop-up behavior as "widgets" in Viewpoint, as well as a sound-effect modifier, which will play a particular sound upon receipt of a specified message.
- *Primitive*: Primitives are objects whose shapes are drawn entirely procedurally. pro-V Studio supports a number of basic 3D primitive shapes: sphere, cube, box, pyramid, cone, cylinder, 2D plane.
- *Project*: Each pro-V Studio project consists of global project settings, a collection of project media assets, and a hierarchy of pro-V Studio scenes. In the first version of the application, this hierarchy of scenes will not be exposed, and each project will just contain one scene, with no controls to create more scenes. However, pro-V Studio is intended to support an arbitrary number of scenes.

- *Project Assets*: Collection of media assets imported for use in the current project. Housed in the project assets pane of the media palette. Objects can be imported from outside of pro-V Studio to the project assets collect. They can also be removed from the assets collection. Objects in the assets collection can be instantiated in the current scene by dragging and dropping.
- *Scene Settings*: The scene settings dialog is a tabbed dialog which supports the selection of various project and scene-wide settings, including project dimensions, shadow parameters, anti-aliasing, scene background color and panorama selection, and camera type selection and constraints.
- *Reactor*: Reactors are an integral part of the pro-V Studio interactions system. Reactors can be attached directly to objects, or to any state of a behavior. Reactors react to incoming messages by sending a message or command to another object, along with optional data. For example, a reactor could be attached to a 3D object which would respond to a mouse click on that 3D object by starting an animation. Additionally, if a reactor resides inside of a behavior, it may also cause a state change in the state machine of the behavior.

- *Scene*: A pro-V Studio scene consists of four layers. The first (backmost) layer of the scene is the background layer, which can contain a QTVR or iPIX panorama, a still 2D image, or simply a background color. The next layer is the background 2D layer (called 2D Back Layer), which can contain any number of 2D objects. The next layer is 3D layer, which contains any number of 3D objects. Finally, the foreground 2D layer (called 2D Front Layer), which can also contain any number of 2D objects. The background and 3D layers will operate as they do in Viewpoint. The primary difference is the addition of the two special 2D layers, one drawn behind the 3D scene and the other drawn in front of it. Images in these layers will be drawn at their full pixel size.
- *Scene Display*: An important UI window, which displays the current scene, and which is present in most of the user interface tabs. The scene display may be resized, and if it is smaller than the size of the actual project, then the scene will be scaled to fit within the window. The scene display will allow selective display of any of the four layers in the scene. Additionally, it contains controls to display a grid over the scene, temporarily mark up the scene with a virtual dry erase pen, set the render mode for the entire scene, or choose a modal in-scene editing tool.
- *Timer Reactor*: Works just like a standard reactor, except that the user can set an amount of time to delay between the time that the reactor is triggered and the time when it takes effect.

Appendix C: Keyboard Shortcuts

As you have read throughout this manual, pro-V Studio includes many keyboard shortcuts to make creating scenes faster and easier. This Appendix contains a comprehensive list of all keyboard shortcuts that pro-V Studio supports:

FILE SHORTCUTS

The following **File** shortcuts are available:

- *New*: [CTRL]+[N]
- *Open*: [CTRL]+[O]
- *Save*: [CTRL]+[S]
- *Save as*: [CTRL]+[SHIFT]+[S]
- *Import Single File*: [CTRL]+[M]
- *Import Multiple Files*: [CTRL]+[SHIFT]+[M]
- *Import Entire Directory*: [CTRL]+[ALT]+[M]
- *Quit*: [CTRL]+[Q]

EDIT SHORTCUTS

The following **Edit** shortcuts are available:

- *Undo*: [CTRL]+[Z]
- *Redo*: [CTRL]+[Y]
- *Cut*: [CTRL]+[X]
- *Copy*: [CTRL]+[C]
- *Paste*: [CTRL]+[V]
- *Deselect All*: [CTRL]+[D]
- *Delete*: [DEL] or [BACKSPACE]

OBJECT SHORTCUTS

The following **Object** shortcuts are available:

- *Object Attributes*: [CTRL]+[I]

VIEW SHORTCUTS

The following **View** shortcuts are available:

- *Toggle Ground Plane*: [CTRL]+[G]
- *Switch to Edit Cam*: {CTRL]+[E]
- *Switch to Runtime Cam*: [CTRL]+[R]

GENERAL SHORTCUTS

The following general shortcuts are available:

- *Runtime Camera Tool*: [1]
- *Translate Tool*: [2]
- *Push/Pull Tool*: [3]
- *Translate XZ Tool*: [4]
- *Translate Y Tool*: [5]
- *Rotate Y Tool*: [6]
- *Rotate X Tool:* [7]
- *Rotate Z Tool*: [8]
- *Tumble Tool*: [9]
- *Scale Tool*: [0]
- *Toggle Selection, Add Selection (Multiple Items)*: [CTRL]+left mouse click