# VR Movie Authoring in Windows

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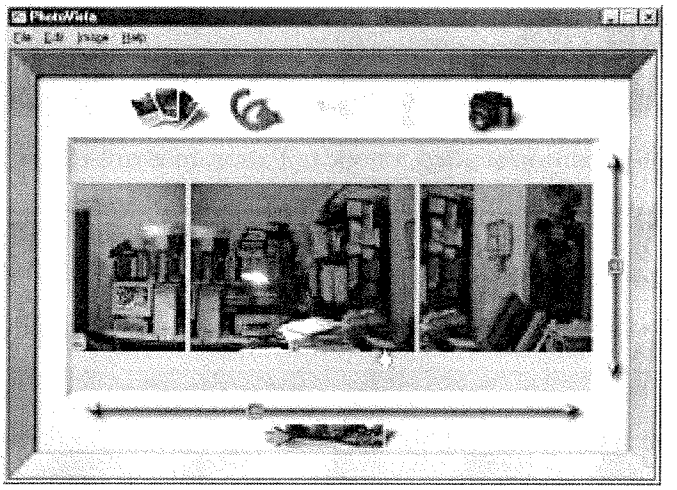

This workshop will walk through the process of building standard VR movies (panoramas and object movies), linking them, and setting them up for delivery via CD-ROM or over the web. We will use the Reality Studio Suite by Live Picture/MGI Software. A free demo version can be downloaded from.

**http://www.livepicture.com/download/content.html.**

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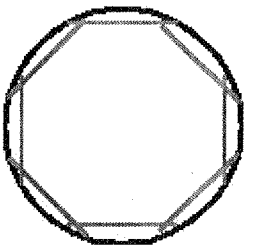
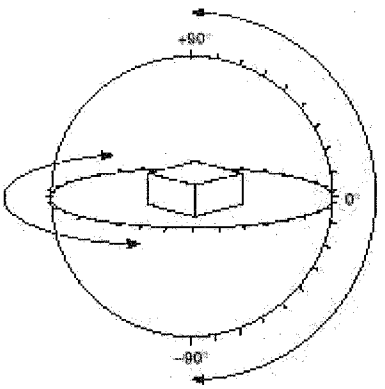
# Overview

**Panorama movies**. A panorama is a wide-angled photograph covering up to 360° shot from a single fixed position (called a node). Panoramas are either full (360 degrees) or partial (less than 360°). Of course, an extra tall image can be made as well as an extra wide one. Panoramas are also classified as cylindrical (a narrow vertical field of view, VFOV) or spherical (a full 180° FOV in any direction). Viewers also have the ability to zoom in until an image pixelates.

The typical process for constructing a (full cylindrical) panorama using a standard still camera is to shoot a series of overlapping pictures (12-20 depending on the camera lens) that cover the full 360°. Stitching software such a PhotoVista is used to stitch and blend the individual images into one . The wrapped JPEG image can be delivered using either a plugin or one of several java applets.



**Object movies**. An object movie is a series of views of an object from different vantage points or at different times. It can be thought of as an animation that gives a viewer control over the perspective. Object movies can be classified based on the size of object and/or whether a process is involved or not. In a typical case either the camera is fixed and the object is rotated by a specified number of degrees or the object is fixed and the camera is rotated about the object. In addition to a row giving the change in the horizontal perspective, rows produced by changing the azimuth can produce a multi-dimensional perspective of the object. An animation is formed from the images using software such as Object Modeler.




**Scenes**. A scene or a multi-node movie is the result of linking together various single node panoramas, object movies, or other types of media. Hotspots and a World Map provide the simplest ways to create linkages. Reality Studio is an authoring package for constructing scenes.

# Panorama Movies

**Planning considerations**

Up front planning can save a lot of time later. Here are some factors to consider.

The Storyboard

- How does the panorama fit in?
- What other media will be used with it?

User equipment and experience

- Will the project be delivered on CD-ROM? College intranet? WWW?
- Will user need to get a plugin?

Layout

- What is the location? Inside or outside?
- What light conditions are expected? Time of day? Movement present?

Camera

- Should you use film or digital?

**Image capture**

Problems in the stitching and processing stages can be reduced by careful attention to how images are captured.

Site preparation

- Try to assure even lighting. Inside and outside environments present different problems.
- Check the placement of objects you want to be visible.

Camera stability

- Mounting the camera on a stable tripod and using a pano head is desirable.
- Level the camera plane and align the nodal point with the axis of rotation to avoid parallax error.
- Using a self-timer can reduce potential camera jar due to clicking the shutter button.

Camera orientation

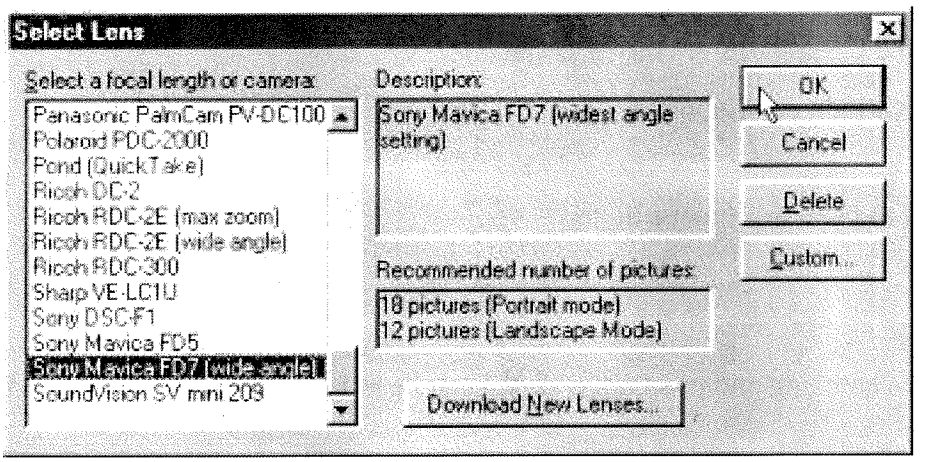
- A portrait orientation requires more images but provides a larger VFOV.

Lenses

- Wide angle lenses give a greater VFOV but make objects smaller. In general, use the widest angle setting the camera has.
- The focal length needs to remain the same in each image. Use a camera with a manual focus and set the focus on the object you want to be sharpest. For outside panoramas setting the focus on infinity is a good choice.

Number of shots

- Stitching software requires an overlap of adjacent images ranging from 10% to 50%. It is generally felt that the closer the overlap is to 50% the better. The images should be captured by moving in a clockwise direction.
- How can the number of images be determined? There are two ways. First, if using PhotoVista, click on the camera icon (in the upper right) to open a collection of lens settings. For each camera listed there is a recommended number of images. You can also define your own lens setting. An updated list can be downloaded from the Live Picture web site.




- How is the number determined manually? There are two steps. First, determine the HFOV (Horizontal Field of View) for the lens using the formula

$2*\tan^{-1}(12/\text{FocalLength})$ if using portrait orientation or

$2*\tan^{-1}(18/\text{FocalLength})$ if using landscape orientation.

Finally, the number of images needed for a full panorama with P (percent) overlap is

$360/(\text{HFOV}*(1-P))$.

Resolution

- Higher resolution provides greater detail but creates larger files. The choice should depend on the ultimate use for the project. If you have the disk space, you can always downsize the resolution later.

Exposure

- Outside it is best to shoot with the sun directly overhead to avoid areas of strong shadows. If necessary the exposure for each frame can be set individually.
- Inside, add "backlights" if necessary to create as uniform lighting as possible. Setting can become tricky when there is a mixture of natural lighting (sunlight) and incandescent light.

**Processing/stitching**

Digitizing Images

- If a digital camera was used, no problem. If a film camera was used, the prints can be scanned or a process like Photo CD can digitize the images for you. Care is needed in using a developer to prepare the images however. Unless instructed otherwise they try to make each image look the best possible. This may result in individual images being cropped and color adjusted.
- Be sure the images are numbered (i.e., 001, 002, etc) so the increasing order corresponds to the positioning of the images in a clockwise rotation.

Adjusting Images

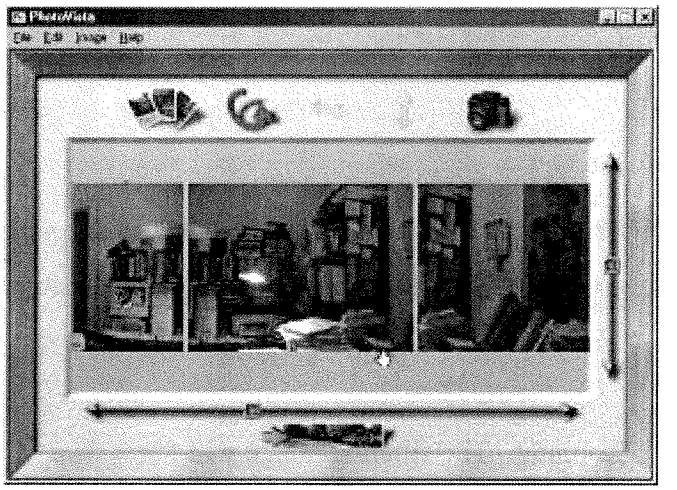
Using an image editor like Photoshop or Paint Shop Pro initial problem can be corrected.

- Adjust the lightness or color of individual images due to light conditions
- If images are large (say 1800x1200), resize to a more modest size (say 720x480 or 640x480) to save on processing. Be sure to preserve the aspect ratio.

**Warning:** every time a jpeg image is saved the image quality degrades.

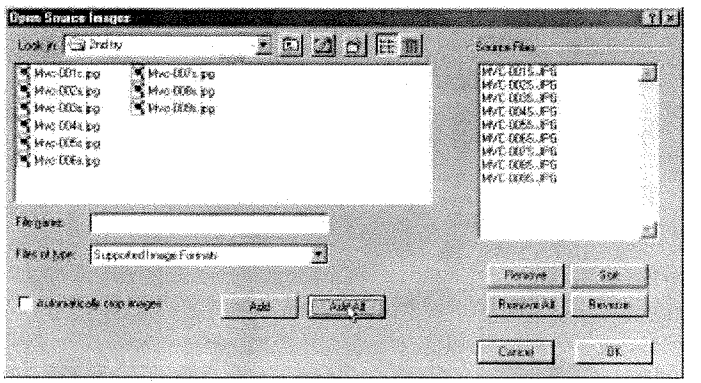
Stitching

Open PhotoVista. On the main screen (at the right) the icons across the top allow you to Open Images, rotate Images Counter-clockwise, Flip Images Horizontally, Flip Images vertically, and Specify Lens Type. The "panorama" icon at the bottom brings up the Stitch Menu.



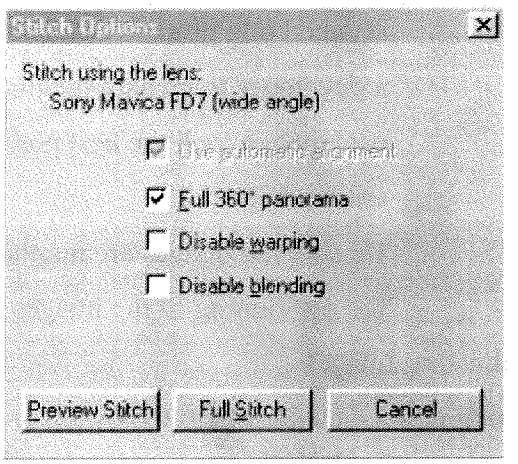
Here are the steps for using PhotoVista:

1. First, click the camera icon to make sure the lens used is selected.
2. Click on the icon to Open Images. Navigate to the folder with the images, Then either add the images one at a time or Use the Add All button to place all of the Images in the Source Image box. Click "OK"

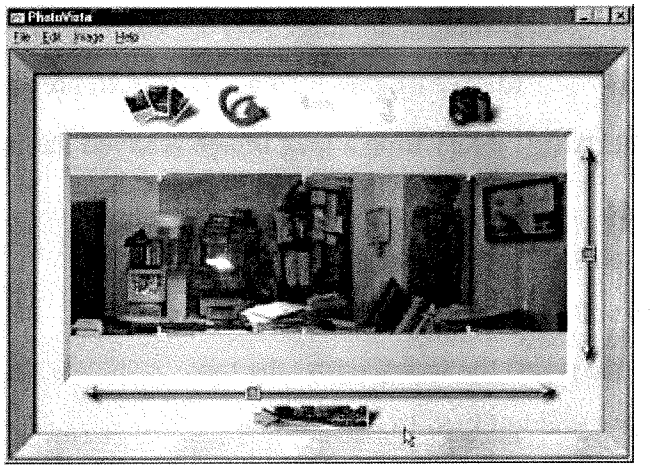


to move the images to the main screen

3. Rotate the images using the appropriate icons if necessary.
4. Selecting the Stitching ("panorama") icon at the bottom brings up the Stitch Option dialog box. Make sure the Full 360° box is checked if this is a full panorama, otherwise uncheck it. Click the Preview Stitch button to generate a preliminary panorama. Check the image carefully for misalignments. Then close the preview.

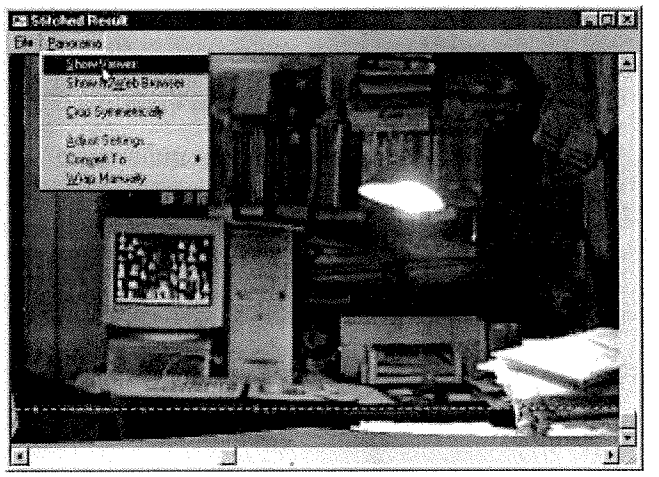



5. If necessary, manual alignment can be performed by visually adjusting the individual images. Double click an image to bring up a magnified view of adjacent images to help make an alignment.




6. When satisfied with the alignment select the panorama icon to bring up the Stitch Options dialog box again. This time select the Full Stitch button. If you are using a manual alignment, be sure the "Use automatic alignment" box is not checked.

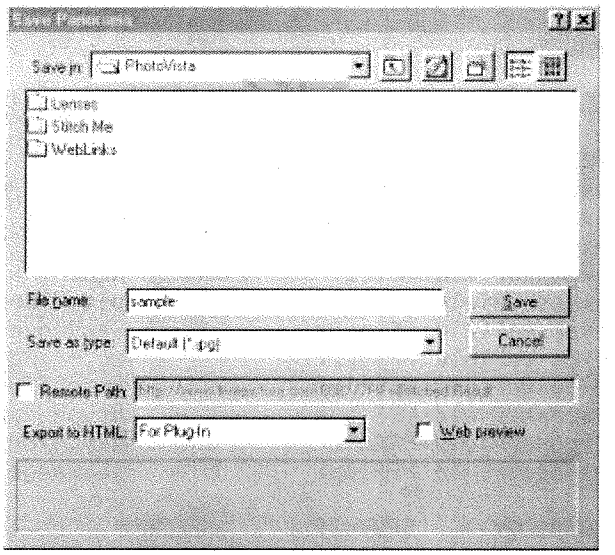
7. Cropping. The stitched image will more than likely have irregular edges on the top or bottom. First select the Panorama menu item and uncheck the "Crop Symmetrically" item. Now adjust the dashed crop line at the top and bottom to select the area for the final panorama.



8. To see the final result, select "Show Viewer" from the Panorama menu option.

Saving Images

Choose File, then Save As to bring up the Save Panorama dialog box. Specify the folder where the image is to be saved, the file name, type of image, and how it should be exported to HTML.




For File Type the choices are: jpg (the default), bitmap (bmp), FlashPix (fpx), and RealSpace (ric). A good strategy is to use bmp if you plan to make adjustments to the panorama such as resizing. If not, the standard choice is jpg. If your final goal is a QTVR (QuickTime) image, use jpg. Later use the free program VRMakePano from Apple to convert the jpg into a QTVR movie (versions 1 or 2 only).

The Export choices are: For Plug-In or For Java Applet or No (if you do not plan to export).
Click the Save button. PhotoVista creates three files: an image file, an IVR container file, and a HTML page. Each file has the specified name with the appropriate extension. If jpg is the chosen image type, a Compression dialog box opens. Remember a higher quality image produces a larger file size.

Final Image Editing

The panorama image produced above may need some final touching up. Common problems are:

- Some part of the image didn't blend well or some part needs fixing (eg., a lost arm!).
- A part of the sky or ground needs to be cloned in.

- The image needs to be resized for delivery using a java applet. The Live Picture java applet works best when the total number of pixels is between 500K-600K. This works out to an image which is about 2000x250 pixels.

The final editing can be done with a program like Photoshop or Paint Shop Pro.

**Delivery**

During the Save step PhotoVista generates the files needed to distribute a panorama using either a plug-in or a java applet. Namely, it provides the image file, an IVR container file, and an HTML file (and the applet files if that is the option taken).

The IVR file

An IVR container is a text file that gives the VRML 2.0 code used to play the panorama. Here is a sample file.

```
#VRML V2.0 utf8

EXTERNPROTO Vista [
       exposedField SFString     type
       exposedField MFNode       texture
       exposedField MFVec2f            vFov
       exposedField MFVec2f            hFov
       exposedField SFVec2f            pitchRange
       exposedField SFVec2f            yawRange
       exposedField SFVec2f            zoomRange
       exposedField MFColor            groundColor
       exposedField MFFloat            groundRange
       exposedField MFColor            skyColor
       exposedField MFFloat            skyRange

       eventOut     SFVec2f      clickPt
       eventOut     SFVec2f      overPt
       eventOut     SFBool isBound
       eventIn            SFBool set_bind
] "http://www.livepicture.com/proto/vistaproto15.wrl#Vista"

NavigationInfo {
       type "VISTA"
       headlight FALSE
}

Vista {
       texture ImageTexture { url "sample.bmp" }
       type "SPHERE"
       vFov -0.423 0.423
       pitchRange -0.423 0.423
}
```

The only change you normally will make in this file is to change the name of the image in the url field ("sample.bmp" in the text given). This is done with a standard text editor like Notepad.

The HTML file

The code generated will depend on whether the plug-in option or java applet option was selected in the Save dialog box. In either case you need to open the HTML file in a text editor and copy the relevant code to your web page. For the plug-in version the relevant code is

```
<script language="JavaScript">
<!--//
// *** To enable use of ActiveX controls in Internet Explorer, uncomment
// *** the following section...
       // Put in the correct object, either plug-in or ActiveX control..
       // if (navigator.appName == "Microsoft Internet Explorer")
       // {
       //     document.writeln('<OBJECT ID="panoComponent" WIDTH=400 HEIGHT=300 ')
       //     document.writeln('CLASSID=" CLSID:79151DCF-348C-11D1-8A49-00A0247D99F6 ">');
       //     document.writeln('<PARAM NAME="IvrURL" VALUE="sample.ivr"></OBJECT>');
       // }
       // else if (navigator.appName == "Netscape")
       // {
       //     document.writeln('<embed src="sample.ivr" type="i-world/i-vrml" ');
       //     document.writeln('width=400 height=300 name="panoComponent">');
       // }
       // function GoToVista(name)
       // {
       //     document.embeds[0].generateEventIn(name, 'set_bind', '1');
       // }
// *** ...and comment out the following two lines:
document.writeln('<embed src="sample.ivr" type="i-world/i-vrml" ');
document.writeln('width=400 height=300 name="panoComponent">');
//-->
</script>
```

The only part you may have to edit is the IVR file name if you change it or the panorama window size which is set to 400x300 pixels by default. I find 400x250 a bit more pleasing.

The relevant code for a java applet implementation is

```
<script language="JavaScript">
<!--//
       var browser = navigator.appName;
       var version = parseFloat(navigator.appVersion);
       if (browser == 'Netscape' && version < 4.0) {
       document.write('<applet name="pano" code="pano.class" archive="rspanoNS3.zip"
width=320 height=240>');
       }
       else {
              document.write('<applet name=pano code="pano.class" archive="rspano.zip"
width=320 height=240>');
       }
       document.write('<param name=cabbase value="rspano.cab">');
       document.write('<param name=file value="sample.ivr">');
       document.write('<param name=initialView value="0.000000, 180.000005, 50.000001">');
       document.write('</applet>');
//-->
</script>
```

Again the only items you need to change are the IVR file name and the window size which in this case is set to 320x240 pixels.

When you upload your HTML page to the server for distribution be sure to place the IVR file, image file, and (if using java) the three java files (rspanoNS3.zip, rspano.zip, and rspano.cab) in the same directory as the HTML file.

Various java applets are available for delivering a panorama constructed from a jpg image. This includes the free Hotmedia applet from IBM, the free VRTour applet from Picture Works, and the modestly priced CylPan VR Player from Nemeng.com.

# Object Movies

**Planning considerations**

As with a panorama movie one must consider how the movie will fit in with the story, how it should be delivered and whether you will use a digital camera or a film camera and then scan. In addition there are a few special considerations.

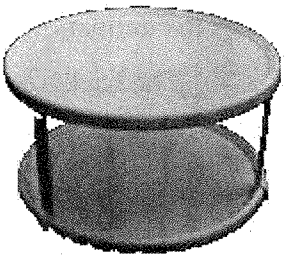
- How many rows of images will be needed? The rule of thumb is that each row will consist of 36 images. For multi-rowed movies specialized equipment may be needed.
- How should the image capture be set up? This will depend on the type of object; namely, whether it is a small object that will fit on a turntable, a person, a (large) immobile object, or a process (mechanical, natural, or mathematical). Each type of object will be considered in the next section.

**Image capture**

Basically the process is to capture images of the object from different positions. For a smooth transition between images the rule of thumb is to capture images every 10°. The details depends on the size and type of object.

Small Objects

In this case the camera can be placed in a fixed position and the object placed on a turntable and rotated, say clockwise. Commercial turntables are available and inexpensive ones are easily constructed.



- The object should be carefully placed so it will rotate about the axis of the turntable.
- Set up the layout so the background has a uniform color. Take a picture of the background without the object if you plan to do masking or to remove the background.
- Make sure lighting in the set up is uniform. Try to avoid a combination of natural light and artificial light.

A Person

In this case the camera again should be fixed. The person should rotate by small amounts (as close to 10° as possible) for each picture. This takes practice! As with small objects a uniform background and light conditions should be used.

Immobile Objects

In this case the camera must rotate around the object. The points from which the images are shot should be the same fixed distance from the "center" of the object. In planning the shots be sure there is clearance completely around the object if a full object movie is desired. The camera must be level and each image captured at the same height. Again the goal is for each shot to be approximately 10° apart. Since these movies will mostly be shot outside the best time to shoot is at mid-day to keep the lighting as consistent as possible and to avoid strong shadows.

Other "Objects"

Instead of capturing an object from different spatial perspectives one can capture images from a temporal perspective. For example, an image can be shot every minute, every 30 minutes, every hour, etc. In such a situation the exposure of each shot may need to be adjusted. Another variation is to use a series of computer generated images. These could be screen captures or images constructed with an image editor like Photoshop or Paint Shop Pro.

**Processing/animating**

Preparation

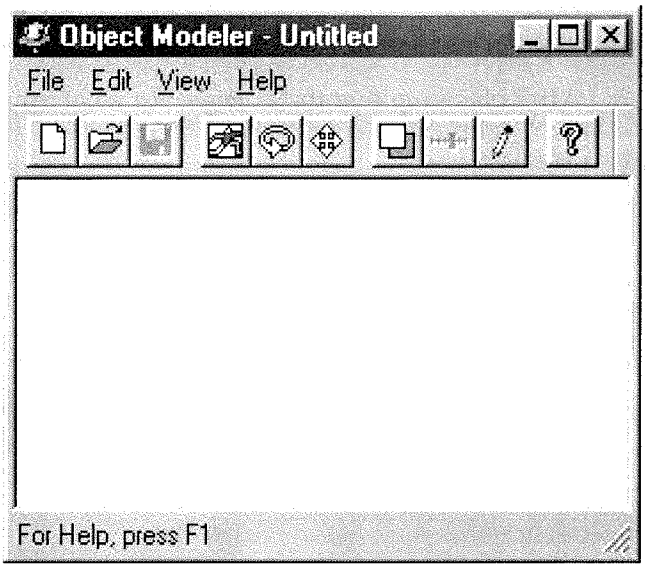
After acquiring the images in digital form they need to be prepared for use with the software that produces the animation. In particular,

- The background should be cleaned up and the color balance corrected. This can be done with your favorite image editor.
- The images should be resized to either 240x320 (or 320x240) to conserve file size. Movies constructed from larger images won't download easily from the web so the size may as well be reduced at the start. All images should be the same size.
- Make sure all the images are named sequentially (obj001.jpg, obj002.jpg, ...) corresponding to a clockwise or counter-clockwise rotation of the object. Most software allows the movie to be played in reverse order once it has been made, but the images must be labeled consistently. Put all the images in the same folder for easy access.

Movie Construction

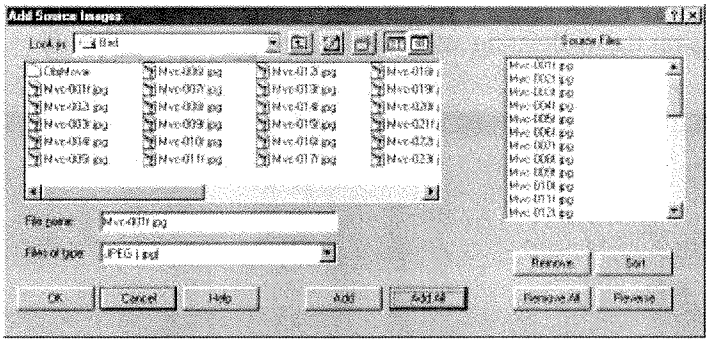
The software we will use to construct an object movie is Object Modeler by Live Picture/MGI Software. Load the program to bring up the main window.

The Open command (the second button on the toolbar or Open under the File menu) allows you to continue working on a project already saved.

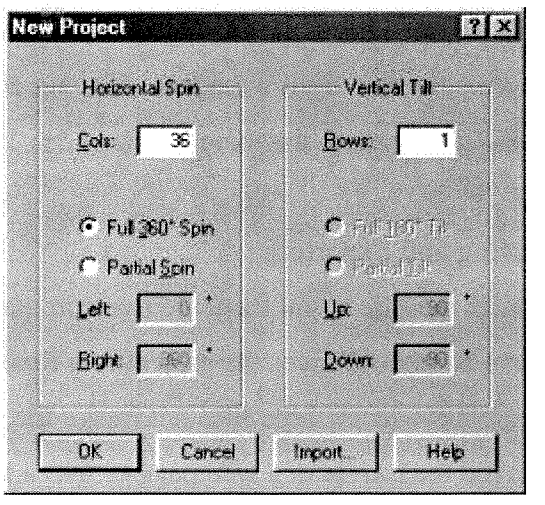



1. To start a new project either select New under the File menu or the "New"(leftmost) icon on the toolbar. This brings up a New Project dialog box.

2. Don't worry right now about the settings. Just click the Import button so we can get images. This will bring up the Add Source Images dialog box.

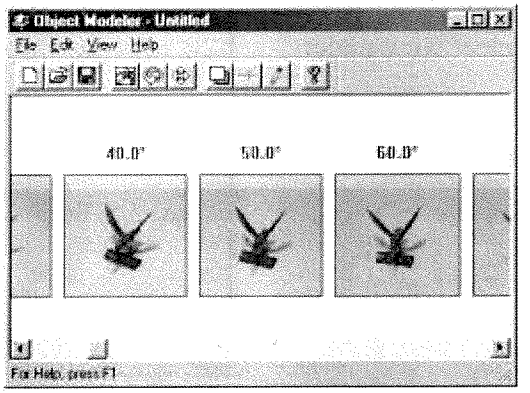



3. Navigate to the folder that contains the images and click "Add All". After checking that the images are in the correct order and "extra" images have been removed click "OK". This brings up the New Project dialog box again.

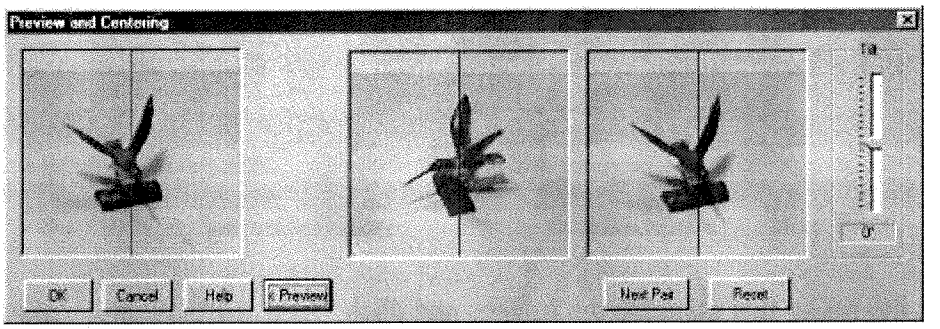



4. Verify the settings. In the Horizontal (left) panel the Columns should correspond to the number of images in each row. If you are not doing a Full Spin, check the Partial Spin box and set the number of degrees you want. If using more than one row, enter the number in the right panel. The same number of images must be in each row. So, for example, if you are doing 2 rows with 10 images

each, images numbered 01 to 10 should form the top row and images 11 to 20 should form the second row. After checking that the settings are what you want, click "OK". This loads the images into the main window.



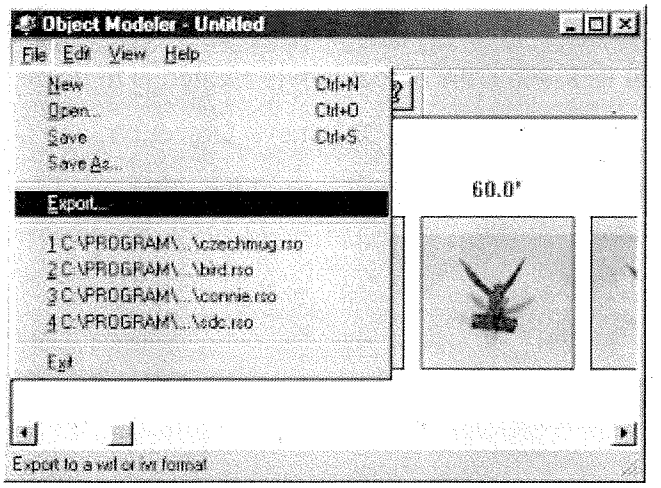

5. At this stage you can Preview the movie, make adjustments to the center alignment, and create masks. For the mask options consult the User's Guide. To Preview or remove jitters click the Center button to bring up the following window.



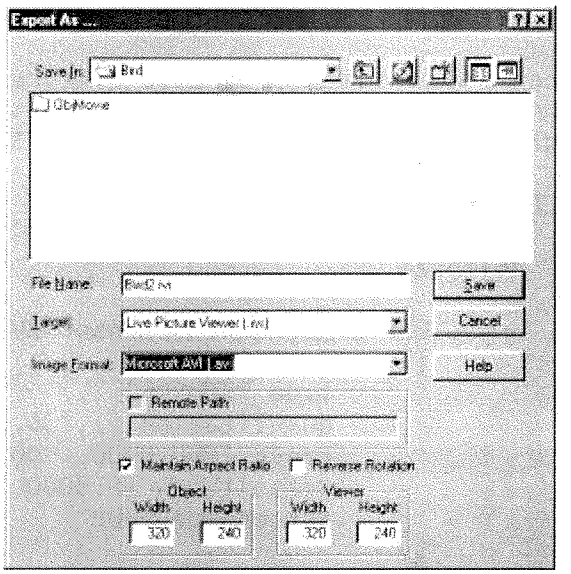

The left window is for the preview and the two right windows are for centering. If you go to View and select Quick Preview only the left window appears. Clicking the Preview/Center button either hides or reveals the two right windows. Moving either the red or blue lines will adjust the centering. Click "OK" to return to the main window.

Saving and Exporting

Under the File menu there are two commands you need to know: Save (or Save As) and Export. The Save command saves the project as a Reality Studio Object (.rso) file which can be reopened later. Export produces three files (an image file, an IVR (or WRI) file, and an HTML file) that can be used to embed the movie in a web page or into a Reality Studio scene.




Select Export from the File menu to bring up the Export dialog box. Here, the location, name, and movie properties are specified.

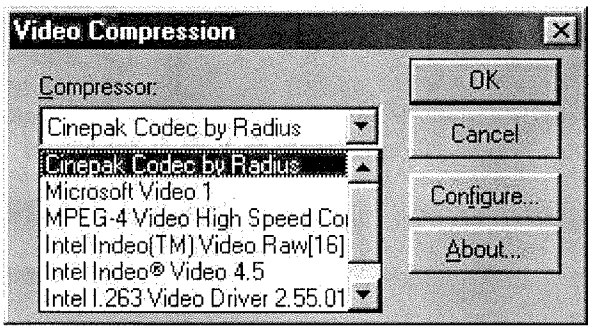



1. Navigate to the folder the movie is to be saved in. This should appear in the Save In box.

2. Specify the File Name. Don't worry about the extension; it will be automatically provided when the other choices are made.

3. Target. There are two choices: Live Picture Viewer (.ivr) for web viewing and Reality Studio (.wri) for importing into Reality Studio.

4. For Image Format use the MS AVI (.avi) choice unless the movie will be ported to a FlashPix server.




5. Finally, set the height and width of both the object and movie. Clicking the Save button brings up a dialog box for setting the compression. The standard choice is Cinepak. For information on when to use the different codeces consult Codec Central (www.codeccentral.com). Click "OK" to produce the three export files: the movie as an .avi (or .fpx) file, an .ivr (or .wri) container file, and an HTML file. We look at these in the next section.

**Delivery**

For the sake of simplicity let us assume the object movie created is to be displayed over the web. In the Export step Object Modeler creates three files, Object.avi, Object.ivr, and Object.html. The .avi file is the movie and can be used as any avi file. We will look at the other two files to see how they can be edited.

The IVR file

The IVR file is an ordinary text file that gives the code, written in VRML 2.0, for displaying the object movie. Here is a sample file.

```
#VRML V2.0 utf8

#Screen IMob - Created by Live Picture's Image Object Modeler

Background { skyColor 0.753 0.753 0.753 }

DEF LP_ScreenIMob Group
{
	children
	[
		DEF LP_ScreenIMobSensor IMobSensor
		{
			type "SPHERE"
			quantization [1, 36, 1]
			range [-90.0000,  90.0000,   0.0000, 360.0000, 0.0000, 0.0000]
			defaultView [0.0000, 0.0000, 0.0000]
			screenIMob TRUE
		},
		Shape
		{
		geometry DEF LP_IMobElement ScreenElement { width 320  height 240 }
			appearance Appearance
			{
				texture DEF LP_ScreenIMobTexture SlideShowTexture
				{
					url "Object.avi"
					frameWidth 320
					frameHeight 240
					chromaKey 0.753 0.753 0.753
					padded TRUE
				}
				material Material
				{
					diffuseColor 0.753 0.753 0.753
				}
			}
		}
	]
}

ROUTE LP_ScreenIMobSensor.currentFrame_changed TO
LP_ScreenIMobTexture.set_currentFrame
ROUTE LP_ScreenIMobSensor.zoomIn TO LP_IMobElement.zoomIn
```

```
ROUTE LP_ScreenIMobSensor.zoomOut TO LP_IMobElement.zoomOut
ROUTE LP_ScreenIMobSensor.panImage TO LP_IMobElement.panImage
```

The only change you would normally make in this file is in the url of the texture node which in the sample above is called Object.avi. The file is edited with any text editor such as NotePad.

The HTML file

The code generated in the HTML file assumes you plan to display the movie with the Live Picture Plug-in. To do so, copy the following code from the generated HTML file into the HTML page that will display the movie.

```
<EMBED SRC="Object.ivr" type="i-world/i-vrml" WIDTH=320 HEIGHT=240>
```

Of course the size of the displayed movie can be changed by editing the Width and Height attributes.

Other Delivery Formats

It is possible to display an object movie using a java applet so a viewer will not have to download and install a plug-in. Such an applet together with the appropriate sample code is available from Live Pictures Developer's site. However, the applet only seem to work with object movies constructed from no more than 12 images. If you plan to distribute the movie with a java applet, a better choice is to use HotMedia, available free from IBM. Hotmedia will construct an object animation (in IBM's MVR format) from either an avi file or from the images directly. Other authoring tools such as Spin PhotoObject from Picture Works will allow the movie to be saved in a QuickTime MOV format.

# Scenes (multi-node movies)

In this section we take a quick look at how to link together single node movies to form a multi-node scene. We will use Reality Studio as the authoring tool and illustrate the process with a collection of files in the folder JoeMedia.

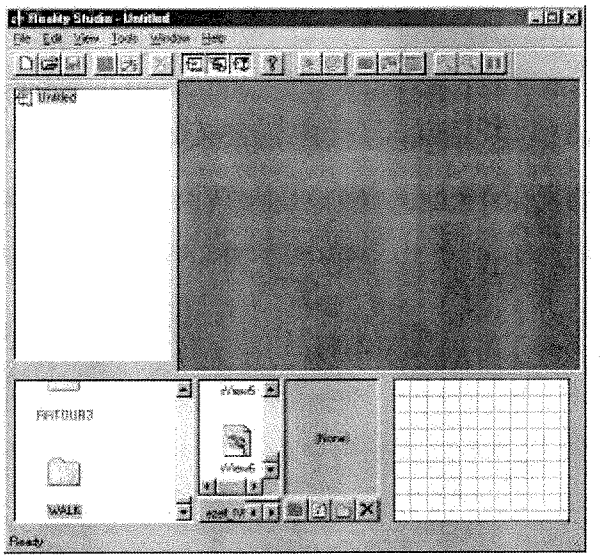
**Preparation**

Before putting together a multi-node movie all of the individual pieces need to have been prepared. Create a folder and place in it the files that will be needed to include

1. the image files and IVR files for each panorama node
2. the AVI and WRL files for each object movie
3. WAV files for sounds and QuickTime MOV files
4. Image files for buttons, overlays, and a World Map

This folder will be called the project assets.

**Reality Studio Basics**



The main Reality Studio window is at the right. Below the toolbar there are two panels – the left is the Project Manager which will contain a hierarchical representation of the project's media elements and the right panel is the Viewport which is the working area. The four panels along the bottom contain, from left to right, the available asset folders, the asset browser (displaying assets available in the folder selected), thumbnails of selected assets, and the world map of the project. The various panels can be "undocked" and moved or hidden using toolbar icons.

Adding Assets

To use the files created we need to add them to the asset collections available to reality Studio. Click the Add Collection icon (the folder icon near the bottom center). Navigate to the folder of assets to be added (JoeMedia, in our case) and click "OK".

Adding Nodes (Vistas)

Select the JoeMedia asset collection so that its files appear in the Asset Browser window. The first vista of the project is UpStand. To add it to the project select the vista icon called UpStand; then drag and drop it into the Viewport. When this happens, three folders (the flat, 3D, and overlay folders) associated with the vista are added to the Project Manager. To add a second vista to the project, say Rt_Field, drag and drop it into the Project Manager. Do the same with L_Field. Now we have a project with three vistas.

World Map

Notice that when a vista is added to the project a circle representing it is added to the world map panel. Later when the vistas are linked the corresponding circles will be connected by segments. To replace the default grid for the world map by an appropriate background drag and drop the JowMap image from the Asset Browser to the World Map panel. Move the L_field circle to section 213, the UpStand circle to section 209 and the Rt_field circle to Shoeless Hill.

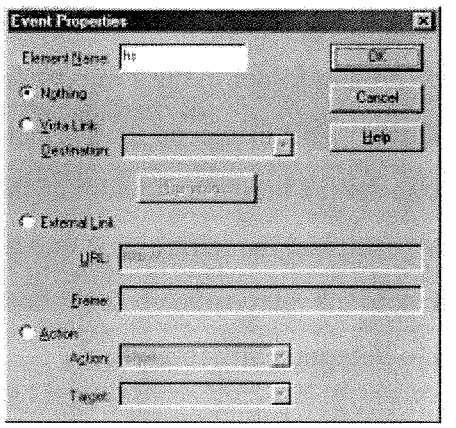
Saving Project

From the File menu chose Save As (or Save). Navigate to where you want to save the project and give it the name Joe. It is saved as an RSD file. The choice of the folder for saving the project is important because when the project is exported for publishing the data will be placed in the same location.

Linking Vistas

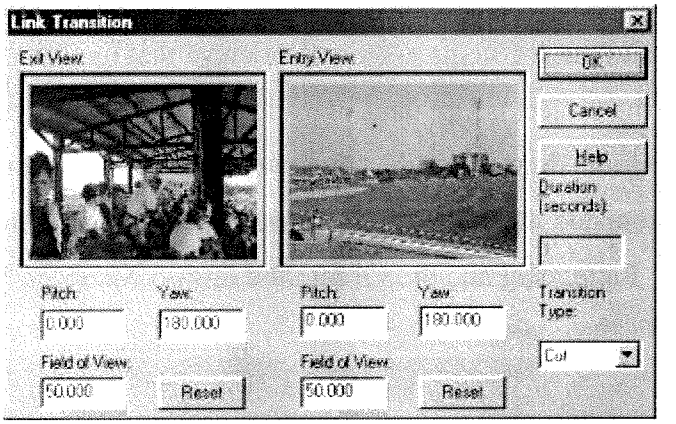
There are several ways to introduce hotspots to link vistas. We will just look at one way. Place the UpStand vista in the Viewport and pan it until the grass area on the right field line is visible. We will create a linkage to the Rt_fld vista at that spot.

Click the red bull's eye icon in the toolbar. Click the Viewport and drag the mouse to create a rectangular hotspot area over the grassy area. Releasing the left mouse button brings up the Event Property dialog box. This is where the link is specified.




Enter the name "ToRightField" in the Element Name box. Make sure the Vista Link option is selected and open the Destination drop down list. Select Rt_fld.

To specify the transition is more detail click the Transition button. The Link Transition dialog box appears.




Click the Exit View and pan until you have the view desired for exiting to the Rt_fld vista. Click and pan the Entry View to obtain the first view of this vista to be seen. There are two choices for Transition Type: Cut, Pan and Zoom. Select Pan and Zoom. Make sure the Duration is 1 second then click the Exit View again. The shift key decreases the Field of View (zooms in) and the Ctrl key increases it (zooms out). From the desired exit view zoom in until the image pixelates. This will create a cinematic effect.

Click "OK" to exit the Link Transition box and click "OK" again to exit the Event Property dialog box.

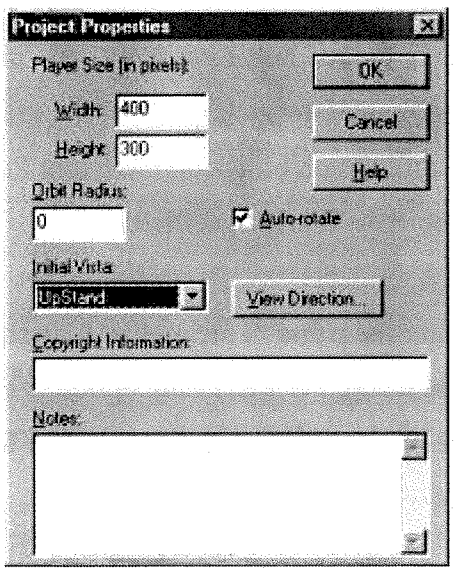
Create additional links between the three vistas. Be sure to Save the project occasionally.

Preview

To check how a project looks use either Quick Preview or a Browser Preview. These can be activated either by selecting the appropriate icon on the tool bar or through Preview from the File menu. The hotspots can be located either by pressing the space bar while panning or by expanding the small logo in the lower left corner and selecting the red bull's eye to turn on all hotspots. After previewing you may want to adjust the hotspot locations and the exit/entry views.

**Publishing**

Now it is time to prepare the project for distribution. The first step is to set the properties of the project. To do this right click on the project folder in the Project Manager and select Properties. This brings up the Project Properties dialog box. In this box set the height and width of the viewer window, the initial vista, and the initial view that the viewer will see. Also, make sure the Auto-rotate box is checked if you want the initial vista to automatically rotate.




Now we are ready to "publish" or export the project so it can be viewed in a web browser.

Exporting

Select Export from the File menu. Then choose Plug-in Target (or Java Applet Target). Reality Studio automatically creates a folder with the name ProjectName_IVR (in our case Joe_IVR) in the same directory where the RSD file was placed. This project folder contains an HTML file, IVR file and all of the image, sound, or movie files associated with the project.

The IVR file

The IVR file is a text file that contains the VRML 2.0 code for displaying the images in a browser. The code can be edited and additional features incorporated.

The HTML file

The HTML file generated provides sample code for placing the scene on a web page. The standard procedure is to open the file in a text editor and copy the indicated code to place where it is to appear in your web document. The following is the sample code for using the plug-in to view.

```
<embed src="joe.ivr" type="i-world/i-vrml" width=400 height=300 autospin=1
name="panoComponent">
<P><MAP NAME="world_map">
</MAP>
<IMG SRC="world_map.jpg" ALIGN="BOTTOM"       BORDER="0" ALT="World Map" ISMAP
USEMAP="#world_map">
```

A few comments are in order. If a background image had NOT been added to the World Map panel, only the <embed> tag would be present. As it stands the world map will be included on the web page, but there are no hotspots to help a viewer navigate.

Adding Hotspots to World Maps

This is done like setting up an image map. Suppose we look at the world map in an image editor and decide to place a circular hotspot at point (100,160) with radius 30 pixels. When this spot is clicked we want the vista to return to our original view, that is, the initial vista for the file Joe.html. To set this up replace the code following the <MAP> tag above by the code

```
<MAP NAME="world_map">
<AREA SHAPE="circle" COORDS="100,160,30" HREF="joe.html">
</MAP>
<IMG SRC="world_map.jpg" ALIGN="BOTTOM"  BORDER="0" ALT="World Map" ISMAP
USEMAP="#world_map">
```

Other hotspots can be added as above. To use a world map for navigation with multiple hotspots the project must be saved separately with each vista as the initial view. The final collection of files only need include each image file once, but there will be a separate HTML and IVR file for each view.

# Additional Information

**Books and Articles**

Chavez, Conrad, "Sweeping Views", Adobe Magazine, vol 11, no. 2, March-April 2000, pp. 49-52
Kitchen, Susan A., The QuickTime VR Book, Peachpit Press, 1998.

**On-line Documents**

| | |
|---|---|
| James Rigg's Guide to Panoramas | www.pinefarm.demon.co.uk/james/panoguide/ |
| Helmut Dersch's Panoramic Tools | www.fh-furtwangen.de/~dersch/ |
| Short Courses in Digital Photography | www.shortcourses.com/ |

**Authoring Tools**

| Company | Panorama | Object | Scene |
|---|---|---|---|
| IBM<br>www.ibm.com/hotmedia | PanEdit Lite/HotMedia | HotMedia | HotMedia |
| Live Picture/MGI Software<br>www.livepicture.com | PhotoVista | Object Modeler | Reality Studio |
| Picture Works/IPIX<br>www.pictureworks.com | Spin Panorama | Spin PhotoObject | |
| VR Toolbox<br>www.vrtoolbox.com | VR PanoWorx | VR ObjWorx | VR SceneWorx |

**Equipment**

| | |
|---|---|
| Kaidan<br>www.kaidan.com | Pano heads, turntables, object rigs, photographic equipment |