

Contents

Computer Graphic Panoramas

Computer Graphic Panoramas

The Panorama Building Process

Creating Computer Graphic Panoramas

Advanced Topics

The Panorama Building Process

Whether you are a developer using photographic imagery or computer generated imagery, you are sure to find that the production of SmoothMove Panoramas is straightforward.

In its simplest form, the production of SmoothMove Panoramas requires only two steps. The developer must first obtain a set of source images. These images are then seamed together to form a complete panorama. If the developer wants to associate URLs, actions or files with regions of the image, Hot Spot editing is added to the process as a third and final step.

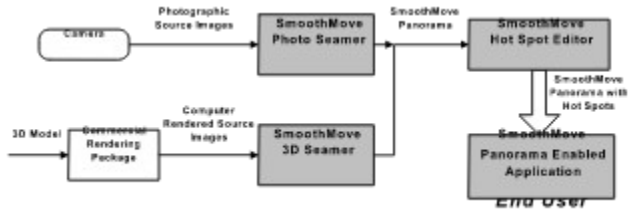
Developers using photographic imagery will obtain source images with a standard camera and a fisheye lens. The source images are then merged using the SmoothMove Photo Seamer.

Those working with computer graphic imagery will obtain source images from nearly any commercial 3D modeling and rendering package. The source images are then merged using the SmoothMove 3D Seamer.

As seen in the [SmoothMove Panorama Creation Process diagram](#), the two processes come together as soon as the SmoothMove Panoramas are created. Both types of panoramas are stored in the same file format and are completely compatible with the SmoothMove Plug-in for Internet Browsers and the SmoothMove Viewer.

Hot Spots can be added to any SmoothMove Panorama using the SmoothMove Hot Spot Editor.

The panoramas can be placed on a World Wide Web page and viewed with the SmoothMove Plug-in for Internet Browsers. The files can also be used with the SmoothMove Viewer, a standalone program for navigating panoramas.



Creating Computer Graphic Panoramas

The SmoothMove 3D Seamer (*3D Seamer*) allows developers with computer modeled scenes to generate SmoothMove Panoramas. With the 3D Seamer, developers will be able to create panoramic imagery from existing models, using nearly any rendering package.

Further information for this topic:

[Overview of the Creation Process](#)

[3D Modeling Discussion](#)

[Creating Source Images for a SmoothMove Panorama](#)

[Seaming The Rendered Images - Forming the SmoothMove Panorama](#)

Overview of the Creation Process

The process for creating computer graphics based panoramas is quite simple. First, create six source images as described below. Next, load the six images into the 3D Seamer, ensure that the images are oriented correctly and click the **Seam** button. The 3D Seamer will then automatically produce the panorama which can be saved to disk.

3D Modeling Discussion

Any 3D scene can readily be converted into a panorama by following the steps below. Artists will be pleased to find that no special steps are required in composing models for SmoothMove Panoramas. Source images can be rendered with nearly any modeling and illustration package, including Autodesk 3D-Studio, NewTek Lightwave3D, and RayDream Ray Dream Designer.

Creating Source Images for a SmoothMove Panorama

The 3D Seamer builds a SmoothMove panoramic sphere from six source images. Each image corresponds to a left, front, right, back, top or bottom side of an image cube. The six faces fit together as shown below:

[View the source image arrangements.](#)

These images are warped by the 3D Seamer and placed into the panorama. For this to work properly, the images must fulfill the requirements described below.

Each image must have a 90 degree field of view horizontally *and* vertically. Alternatively, this can be specified as having a focal length equal to one-half of the image width. For example, an image with a width and height of 500 pixels should be rendered using a focal length of 250 pixels.

The centers of projection for the six images must be the same point. This means that all six images should be rendered with the camera/view position in the same place. Only the direction should be changed to produce each face.

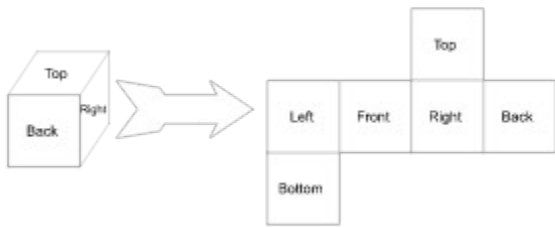
The image planes must intersect with adjacent images at 90 degree angles.

Each image must be a perspective projection. This is the type of projection used by default in most 3D modeling packages. Any projection that is not close to a camera-type projection will not give the desired effect.

Each image should be saved as a Windows .BMP file.

The Advanced Topics section contains more detail about the creation of images using a few common modeling and rendering packages.

Each source image should have a width and height approximately equal to one half of the height of the destination panorama. We recommend that the panorama be about four times as high and four times as wide as the default window size of the viewer. Therefore, a viewer with the window size set to 512x256 pixels should have a panorama size of approximately 2000x1000 pixels. This would result in a recommended source image size of 500x500 pixels. Smaller images will degrade image quality; larger images will allow a larger view window at run-time without image degradation. Downloading times will increase, however, with file size.



Seaming The Rendered Images - Forming the SmoothMove Panorama

With six images fitting the above criteria, construction of a SmoothMove Panorama is straightforward and fast. The process is described below. Six sample images are included in the distribution package. These images, left.bmp, front.bmp, etc. may be used in this process for tutorial purposes.

The steps involved in seaming the six source images are:

1. Start the 3D Seamer program by running "3D Seamer.exe".
2. The 3D Seamer application has six buttons that load the source images. These buttons are labeled **Left, Front, Right, Back, Top, and Bottom**. Selecting one of these buttons will present an Open File dialog box to select an image to load.
3. Click each button, selecting the appropriate file for each face of the cube.
4. When the six source images are loaded into 3D Seamer, it may be necessary to rotate or even flip some of these images to get them to align correctly.

These operations can be accessed by selecting the face to be manipulated, and then using the **Edit** menu item or the right mouse button to select the necessary flip or rotate operation. When all of the images are aligned correctly, the objects and textures of the left, front, right, and back images will line up at their borders. Most lines will have sharp bends at the borders, but this will be fixed in the seaming process. The bottom edge of the top image should be oriented in such a way that it would line up with the top edge of the right image. Similarly, the top edge of the bottom image should be oriented in such a way that it would line up with the bottom edge of the left image.

5. Select the **Seam** button to start generating the SmoothMove Panorama file. When the seaming process is complete, the **Seam** window will display the SmoothMove Panorama image, ready to be saved to disk and viewed using the SmoothMove Viewer.

The distortions of the panorama will be dynamically removed by the SmoothMove Panorama Viewer, or SmoothMove Plug-in for Internet Browsers.

[View the SmoothMove 3D Seamer screen shot.](#)

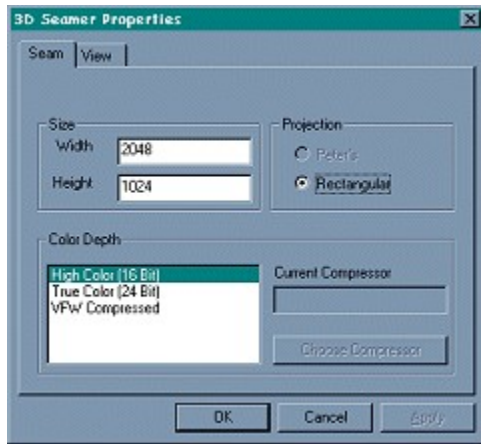
6. Before saving the image, select the format of the SmoothMove Panorama file by selecting the **File:Properties** menu item. Choose the desired color depth, or the "VFW Compressed" item to use the Microsoft Video For Windows image compression tools.

[View the SmoothMove 3D Seamer properties dialog screen shot](#)

7. If you are saving the file in a compressed format, please note that not all codecs are supported. Currently we support Cinepak Codec by Radius, Microsoft Video 1, and Intel Indeo Video Interactive codecs.
8. Select the **File:Save** menu item. You will be prompted for a file name.

At this point, you have a complete SmoothMove Panorama. It can be viewed with any SmoothMove Panorama enabled application. To associate actions with regions of the image, skip ahead to the section about the SmoothMove Hot Spot Editor.





Advanced Topics

[Tips for Rendering Images from Third Party Computer Graphics Packages](#)

[Command Line Interface to the 3D Seamer](#)

Tips for Rendering Images from Third Party Computer Graphics Packages

To render for the 3D Seamer, create six rendered image for each panorama where the images are the six sides of a cube surrounding the view point. The images are with the camera looking to the left, front, right, back, top, and bottom. The camera and rendering settings should be set so that each view has a 90 degree field of view and produces a square .bmp image using a perspective projection.

Further information for this topic:

[3D Studio:](#)

[Lightwave 3D](#)

[Macromedia Extreme 3D](#)

[Ray Dream Designer 4](#)

3D Studio:

- The camera's focal length should be set to 26.6666666 to produce a 90 degree field of view.
- Rendering can be sped up by using a .vue file to batch a series of renders as detailed in the *3D Studio Advanced Users Guide*.
- When batch rendering using a .vue file, setting **Driver** to **NULL** in 3ds.set allows the rendered images to be the desired square size.
- When batch rendering using a .vue file, shading models better than **gouraud** may cause incorrect placement of the rendering camera.

Lightwave 3D

- In the camera properties for rendering, the **width** and **height** need to be equal, the **Zoom Factor** should be 1.0, and the pixels should be **Square Pixels**.
- Batch rendering is achieved by using the motion graph capability and a .mot file as is detailed in the *Lightwave 3D User Guide*.

Macromedia Extreme 3D

- We have come closest to correct 90 degree field of view rendering by setting up the camera with a **Scale** of 1.0, a **View Distance** of 3.5417, a **Camera Center Offset** of 0,0,0, and a custom image size of 512x512.
- The above settings do not create the correct seaming to the top and bottom images as the pixels are not square. It may be possible to render larger images and chop the binaries down.

Ray Dream Designer 4

- We have come closest to correct 90 degree field of view rendering by setting up the camera as a Conical camera with a Zoom of 12 and rendering 512 by 512 images. This does not produce exactly a 90 degree of view, and the appropriate zoom factor would be between 12 and 13, however, only integer zooms are allowed. It may be possible to write a plug-in through the "Extensions Portfolio" interface.

Command Line Interface to the 3D Seamer

The 3D Seamer also provides a command line interface. Each of the six source image files and the seamed output file can be specified on the command line. They *must* be specified in the following order: left, front, right, back, top, bottom, seam. Rotation and flip operations can also be specified on the command line by using the following flags:

```
/Rotate90      or   /r90
/Rotate180     or   /r180
/Rotate270     or   /r270
/FlipVertical  or   /fv
/FlipHorizontal or /fh
```

Example: the following command would load all six source images, rotating the front face by 90 degrees, and save off the final image in "seam.bmp":

```
C:\> "3D Seamer.exe" left.bmp front.bmp /r90 right.bmp
      back.bmp top.bmp bottom.bmp seam.pan
```

Note that command line arguments are not case sensitive.

When using the 3D Seamer from a batch file, be sure to precede each command line with the start /w option. This will ensure that each execution of the 3D Seamer begins only after the previous execution is complete.

Example: the following command would execute the 3D Seamer only after the previous execution in the batch file was completed.

```
Start /w "3D Seamer.exe" left.bmp front.bmp /r90 right.bmp back.bmp
top.bmp bottom.bmp seam.pan
```

