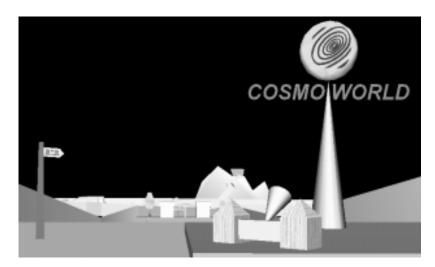# Hello Worlds—An Overview



*Take a tour of Cosmo Worlds and learn how to use the main features quickly while creating your first scene—a sign for the Cosmo World amusement park.*

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No doubt you're anxious to find out all about Cosmo Worlds—a powerful, dynamic authoring tool for creating exciting interactive 3D content for the World Wide Web. This quick tour of Cosmo Worlds, which takes about two hours to complete, introduces you to the major features of Cosmo Worlds, as well as the typical workflow process for creating and publishing a world for the Web. As you learn about the rich features in Cosmo Worlds, you will create a colorful, animated entry sign for your amusement park.

This quick tour is designed for a wide range of users and provides procedures to get you started quickly. However, unless you are familiar with Cosmo Worlds 1.0 or other VRML or 3D authoring tools, you may want to proceed to the basic tutorial lessons, which provide detailed explanations and procedures for using this powerful application.

## What you learn in this lesson

In this chapter, you learn how to:

- Start Cosmo Worlds, open a file, and set up your work area.

- Create, manipulate, and import objects in a scene.

- Create and edit complex objects—points, edges, and polygons (PEPs).

- Change the appearance of objects using materials and textures.

- Create a simple animation.

- Add a light and a sound.

- Optimize your world.

- Set navigation information and a viewpoint.

- Publish your world for the World Wide Web.

## Hello Worlds

This section describes how to start Cosmo Worlds and provides a brief overview of the user interface and basic techniques of working in Cosmo Worlds. Modeling 3D objects in 2D space

can be a challenge. Fortunately, Cosmo Worlds provides an intuitive user interface and powerful tools that make this process much easier.
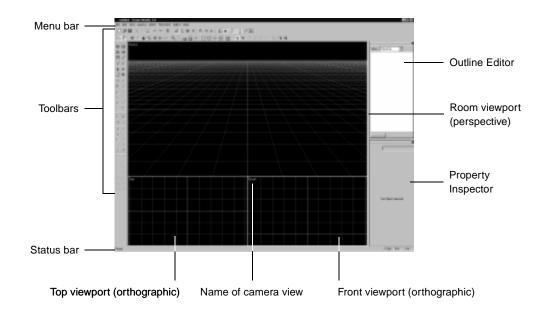
## Starting Cosmo Worlds

If Cosmo Worlds is not already running on your workstation, start it now by double-clicking the Cosmo Worlds icon on the desktop.

If you did not choose to create the Cosmo Worlds desktop shortcut during installation, start the program from the Task bar. The program file is in Start > Programs > Cosmo Worlds > Cosmo Worlds.

**NOTE:** This tutorial assumes the Cosmo Worlds files are installed in the default path *C:\ Program Files\CosmoWorlds*. If you installed in another location, substitute your pathname for the default.

## A glance at the user interface

Cosmo Worlds provides many powerful and versatile tools and functions that are organized in menus, toolbars, editors, and property sheets. Taking just a brief look at this feature-rich interface can help you work more effectively.

Menu bar

Toolbars

Status bar

Outline Editor

Room viewport
(perspective)

Property
Inspector

Top viewport (orthographic)    Name of camera view    Front viewport (orthographic)

**Take a brief look at the interface:**

1. The menus contain items and roll-over menus. Some menu items have corresponding buttons on toolbars and/or shortcut keys. Other items activate dialog windows for user input.

Menu items and toolbar buttons are enabled based on the mode in which you are working. This lets you know which functions are available.

2. Each toolbar contains buttons that activate related tools or functions. A tooltip is displayed when you leave the pointer over a button in the toolbar for a second or more. Each toolbar can be displayed or hidden through the View > Toolbars menu. A toolbar can also be undocked and moved to suit your working style. By default, all the toolbars are displayed and docked, except the Create Extras toolbar for creating objects less frequently used.

*Perspective mode is essential to use while creating 3D content. You may get surprising (and often unwanted) results using only 2D views.*

3. The three viewports are the areas you use for viewing and performing operations on objects in the scene. The default configuration consists of one main viewport with the Room perspective (3D) view, and two smaller viewports below it with Top and Front orthographic (2D) views. The active viewport is outlined in yellow. You can also choose three other viewport configurations, as well as a camera projection of the scene for each viewport and the same camera type in more than one viewport.

4. The two window areas on the right contain the Outline Editor and Property Inspector. The Outline Editor shows you a graphical view of the data in the file for your scene. As you add and modify objects to the scene, the changes appear in the Outline Editor. The Property Inspector window is blank until an object is selected in the scene. The Property Inspector contains pages for setting properties for the object. You can toggle the display of the Outline Editor and Property Inspector through the Editors menu.

5. The status bar displays informational messages about menu items, tool buttons, and actions performed in the scene. In the lower right corner, the status bar displays the number of frames per second when rendering, the number of triangles (polygons) in the selected object, and the number of polygons currently displayed in the scene.

## Coordinate system and grid

Cosmo Worlds uses a right-handed coordinate system in which the X axis is oriented horizontally, the Y axis vertically, and the Z axis toward you. When the grid is turned on, the X and Z axes are displayed. The Y axis is displayed only when you are manipulating an object in the Y direction.

```
        +Y
        ↑
        |
        |
        └──────→ +X
       ↙
    +Z
```

To help you model and locate objects in 3D space, Cosmo Worlds provides a world grid. The grid is displayed by default when you start Cosmo Worlds. You can interactively display and hide the grid and change some properties associated with it, such as the spacing and orientation, but you cannot relocate the grid.

The grid is one of two snapping layout guides (the Snap Target is the other). Only one snapping guide can be active at once. When the grid is the active snapping guide, the axes are displayed in blue. If the grid is displayed, but is not the active guide, the axes are white. The other grid lines are drawn in gray, with every tenth line in brighter white. The grid origin is 0,0,0, and the default spacing is meters, which is the VRML default unit for distance. The default grid spacing is 1 x 1 x 1.

## Undo and redo options

The undo and redo options provided in Cosmo Worlds are extremely useful, letting you freely experiment without fear of losing your original state. The Undo and Redo options are in the Edit menu, but you will quickly learn to use the shortcut keys for these actions—Ctrl+Z to undo and Ctrl+Y to redo. You can undo and redo up to 100 commands or 2 MB of memory, even across file saves.

**NOTE:** Cosmo Worlds provides an auto-save utility that periodically saves your working file in your current working directory. Cosmo Worlds also includes a journaling facility that records the commands during your session. The journal, called *default.cwj*, is written to your temporary directory. By default, it writes to *Program Files\CosmoSoftware\CosmoWorlds\tmp*.

## Setting up your work area for scene assembly

The detailed lesson on setting up Cosmo Worlds and assembling a scene is in Chapter 1, "Assembling Objects in a Scene."

This section describes how to set up your work area. You will open a file and set your working view.

## Opening a file

To get started, open the file that contains the grass area for the animated entry sign.
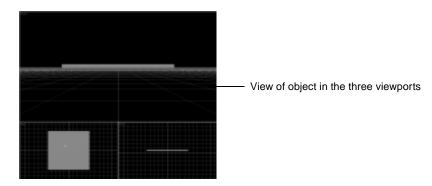
**Open a file:**

**1.** Choose File > Open.

By default, Cosmo Worlds installs on the C drive. If you installed on another drive, substitute that drive letter in the path for the files in the tutorial.

2. Navigate to the *overview* folder, select the file named *sign1.wrl*, and click the Open button.

**NOTE:** The pathname for the tutorial files assumes you installed in the default directory. If you installed in a non-default directory, substitute your pathname. Also, depending on the file view options for your system, you may not see the filename extension displayed.

The objects are shown in the three viewports, and the data are shown in the Outline Editor in a graphical view with the current object highlighted in yellow.


View of object in the three viewports

3. Save the file with a different name by choosing File > Save As.

## Switching temporarily between selection and view modes

Changing the view simply changes the camera position and does not move the location of the objects in the scene.

Now you are ready to start placing objects on the top surface of the platform. Because you can see only part of the front edge of the platform in the Room viewport, which will be your primary working view in the tutorial, you need to reposition the view. Changing the view is a fundamental action you perform when authoring 3D content, as is selecting objects for editing. These actions are controlled by two modes—Select Mode and View Mode.

If you want to change your primary mode from Select to View, you can choose Camera > View Mode or click the hand icon in the Camera toolbar.
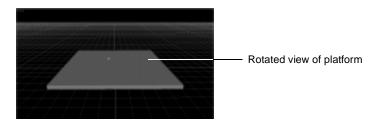
By default, Cosmo Worlds is in Select Mode. This mode lets you select objects for editing. Often while you are editing, you want to temporarily switch into View Mode to change the view of the scene to see how objects look from different vantage points. In this exercise, you learn how to easily switch between modes.

**NOTE:** To select objects and manipulate them as instructed in the tutorial, you must closely follow the instructions about when and how to change the view. The screen images provided in this tutorial show you what the view of scene should look like on your screen.

**Temporarily switch between Select and View modes to reposition the view of platform:**

The pointer changes when you switch between Select Mode and View Mode. In Select Mode, the pointer is an arrow. In View mode, the pointer changes to show which view submode you are in while navigating.

1.  To temporarily switch to View mode while in Select mode in order to rotate the view:

    •   Place the pointer in the Room viewport, and hold down the Spacebar. Notice that the single arrow changes to a rotate arrow icon. This indicates you are in the Rotate Camera submode, which is the default View submode for perspective views.

    •   With the Spacebar still pressed, click-drag the mouse to rotate the view.

    Rotated view of platform

By default, objects are rendered on the screen in wireframe mode while the view is being changed or they are being moved. You can change this in View > Render Style.

You can use Ctrl+Z to undo and Ctrl+Y to redo your actions.

2.  To move in or out (zoom), use Spacebar+Ctrl-drag. The pointer turns to a zoom icon.

3.  To slide right, left, up, or down without rotating (pan), use Spacebar+Shift-drag. The pointer turns to a pan icon.

    NOTE:   These movements can be done in one continuous step: Hold down the Spacebar and the left mouse button while toggling the Shift and Ctrl keys. Watch the pointer change to provide visual feedback for the action.

4.  Before moving on, play around with changing the view in each of the viewports using the Spacebar and modifier keys. For descriptions of the options, use the online help as described next.

NOTE:   If you are disoriented, you can press the Home key to restore the working camera view.

## Using online help

To quickly learn more about the many camera tools, viewing options, and other tasks and features while you are working in Cosmo Worlds, use the online help.

**Get help on camera tools and viewing options:**

1. To get information through the Contents page, choose Help > Help Topics and select Viewing Objects and Scenes from the list in the window.

2. To get specific information, choose Help > Help Topics, then select the Index or Find tab and enter the word(s) for the search, such as "camera."

3. To get context-sensitive help while using the tools, press F1.

# Basic modeling using primitive shapes and placement tools

The detailed lesson on basic modeling using the placement tools is in Chapter 2, "Modeling with Primitives and Placement Tools."

Cosmo Worlds provides tools to easily create primitive shapes and place them in the scene. You create new objects from the four basic primitives. You can interactively size an object before you click to place it in the scene, or you can resize it after you place it. Resizing the object to the desired dimensions before you click to place it in the scene is a good time-saving technique to learn.

**NOTE:** Whatever way you create and size a primitive, Cosmo Worlds creates a Shape node and a Transform node for the object in the file. The Shape node contains information about the geometry of the object and the appearance. The Transform node contains information about the object's scale, rotation, and location in 3D space. On creation, the size of the object in the Shape node is always the default VRML size for the object's type; and the center is located in the object's local space. You can always edit the size after you have created the object.

To help you easily place objects in the scene, Cosmo Worlds provides a variety of placement tools. These tools include object manipulators (DynaControl tools) for resizing, rotating, and moving objects in the scene, as well as guides (Snap Target and grid) that let you easily align objects with the grid or with other objects in the scene.

In this basic modeling section you will create the sign for the amusement park and the light structure for the spotlight that you will add later.
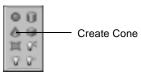
## Creating a cone for the base of the sign

The first object you create is a cone, which will be the base of the sign structure. You create the cone and resize it. First you try to create the cone using interactive sizing, which is a

technique to resize an object before you click to place it in the scene. Creating objects using interactive sizing takes some practice. If you get stuck and don't want to spend the time now to practice, you can skip to the next procedure where you click to place the object in the scene and then change its size, rotation, or orientation. It's a good idea to try both ways so you can see the difference.
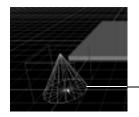
**Create a cone and interactively size it:**

1.  Click the Create Cone button and move the pointer into the Room viewport without clicking the mouse button.



Create Cone

The default grid spacing is 1 x 1 x 1.

The cone follows the pointer as you drag. Look at the orange box and notice how the object follows the pointer. Move the mouse around to see the visual feedback on the grid and other object as the cone moves around. Don't click to place just yet, but drag it to an intersection of two grid lines in front of the grass object. You see the intersecting lines turn yellow.
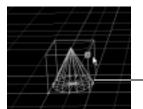


Cone on grid before being resized and placed

2.  Now press and hold the left mouse button and make a sweeping motion up and to the right. The cone initially becomes very small and then, as you drag, it becomes larger. Don't release the mouse button yet. Notice the box is now purple with a white handle on the box. You do not have to place the mouse directly on this handle as you move. It is there to indicate that you can resize the object. Also notice the yellow dots on the box, that indicate midpoints and ends of the edges.

Cone gets very small on initial sweep

The default size of a Cone shape is a radius of 1 unit and a height of 2 units, and is centered at its local axis at 0,0,0.

**3.** Continue to drag until the base of the cone is about half way between two grid lines so that the base has about a 0.5 unit radius. Don't release yet.
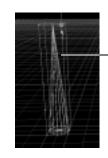


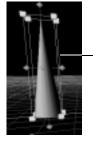Cone base with center on grid line and edges halfway between grid lines

You can turn off the audio feedback by choosing View > Audio Feedback.

**4.** Without clicking the mouse button, hold down the Shift key and drag upward to stretch the cone to 4 units high. Watch for the Y axis guide that appears. The guide is a vertical line with purple dots at 1-unit increments. The dots turn yellow when aligned with the bottom, middle, or top of an object. (You can also watch the Front viewport to see when you have reached 4 units on the grid.) When you have resized to 4 units high, you can release the Shift key and the mouse button to place the cone. You will hear a creation sound when the cone is placed.



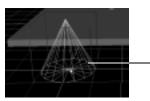Cone stretched in Y direction before placed



DynaBox on cone after cone is placed

Notice the box that is around the object. This box, called the DynaBox, is the basic object manipulator and is on by default. As you proceed through this lesson, you learn how to use the handles of the DynaBox to resize and rotate objects and the sides to move objects.

If you want to try another way of creating the same object, perform the next exercise, "Create a cone and size it after placing in scene:." Otherwise, proceed to the procedure where you create the sphere for the sign on page 15.
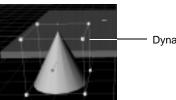
**Create a cone and size it after placing in scene:**

1.  If you have a cone in your scene already and it's still selected, delete it now by pressing the Delete key. If the cone is not selected, click it to select it and then press the Delete key to delete it.

2.  Click the Create Cone button and move the cone to the grid in the Room viewport. Try to center the bottom surface of the cone at the intersection of two grid lines, which will make it easier to resize later. You will see one grid line turn yellow when the midpoints of the edges are aligned with a grid line. You will see both grid lines turn yellow when the midpoint of the bottom surface is aligned with the intersection of the grid. When you see this, click to place the cone.



Cone on grid before being placed
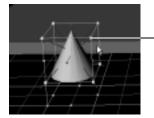
Notice the DynaBox now surrounds the cone.
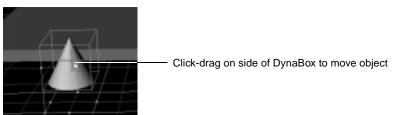


DynaBox on cone

**Use the DynaBox to resize the cone:**

1.  Use the DynaBox to uniformly resize the object about its center to half its size by moving the handle inward:

    •   Put the pointer over a white handle. Notice the handle turns orange.

    •   Click-drag a white handle on a corner of the DynaBox inward. Notice the purple arrows that let you know which way you can move. The DynaBox has lots of colorful visual feedback to guide you as you resize objects. You will become familiar with the color scheme as you work with objects.
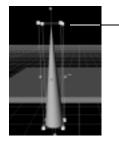


Click-drag on white handle of DynaBox
to resize object uniformly about its center

To use the sides of the DynaBox to move an object: click-drag to move freely in a plane, Shift-drag to move parallel along a line, Ctrl-drag to move perpendicular to a plane. You may want to refer to the Cosmo Worlds Video Tour for a visual and audio demonstration of how these tools work

2.  As a result of resizing, the cone is off the grid; move it back to the grid using the sides of the DynaBox. Put the pointer on the side of the DynaBox and see how the outline turns orange. Again, visual feedback helps guide you as you move the object. To move the bottom surface of the cone to the grid, click-drag downward on the front side of the DynaBox until there is a yellow dot at the base of the Y-axis guide. You can also watch the Front viewport for alignment.



Click-drag on side of DynaBox to move object

3.  Now that the cone is back on the grid, you can easily resize the height. To stretch the cone while keeping on the grid, put the pointer over an upper white handle on the DynaBox and then Shift+Ctrl-drag upward to a height of 4 units (meters, by default). Notice the Y

axis guide line with dots on it. These markers are at 1-unit intervals, the same as the X and Z grid lines. Release when the cone is 4 units tall. Again, you can also watch the Front viewport for alignment.



Ctrl+Shift-drag on white handle of DynaBox to move object along Y axis while anchoring opposite side

## Creating a Sphere for the top of the sign

You now create the sphere for the top of the sign. Create it with a 1-unit radius, which is the default, and then slightly flatten it to achieve the final shape.

**Create a sphere:**

• To create a sphere for the sign, click the Create Sphere button, move the pointer into the Room viewport, and click to place it on the grid in front of the grass object.
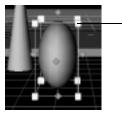


Create Sphere button



Default sphere on grid

## Using the DynaBox to resize and rotate the sphere

The DynaBox will now be used to both resize and rotate the sphere. As you will notice, the DynaBox is quite a versatile object manipulator. You have used the scale handles and the sides of the DynaBox for moving and resizing. In this section you will also use the green rotate handles to rotate the sphere.

**Use the DynaBox to flatten the sphere:**

When you want exact measurements for objects, you can set the grid spacing or enter the dimensions in the Outline Editor.

- To flatten the sphere, put the pointer over a front white handle. The handle turns orange when the pointer is over it. Then, Shift-drag sideways to a little more than half way between the two grid lines. The sphere is resized about its center along the X axis only. The final diameter of the sphere should be about two-thirds of the original size.



Shift-drag white handle of DynaBox to resize sphere along the X axis

**Use the green handles of the DynaBox to rotate the sphere:**

The rotation guide is displayed only when the grid is the active snapping guide.

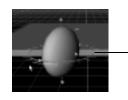- To rotate the sphere, click-drag the front green handle to the left 90 degrees. As you start to move, you see a purple rotation guide with a yellow line that draws an arc from the starting point of the rotation. The guide has tick marks every 15 degrees, which makes it easy to move 90 degrees.



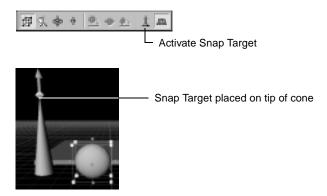Click-drag green rotate handle of DynaBox and use rotation guide to rotate 90 degrees

## Using the Snap Target to align the cone and sphere

Another helpful placement tool is the Snap Target. With this guide you can move a selected object easily to the surface of another object. In this exercise, you use the Snap Target to move the sphere to the tip of the cone you created earlier.
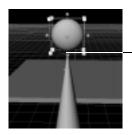
**Use the Snap Target to align the sphere with the cone:**

1.  Click the Activate Snap Target button in the Placement toolbar (or choose Placement > Set Active Guide > Snap Target) and move the Snap Target to the tip of the cone. When you see a yellow dot appear on the tip of the cone, click to place the Snap Target. The Snap Target is now the active placement guide, not the grid. Notice that the axes lines of the grid turned from blue to white.

If you have trouble placing the Snap Target on the tip of the cone, put the Snap Target near the middle of the cone's surface and then glide it up until you see the yellow dot appear on the tip of the cone.



Activate Snap Target



Snap Target placed on tip of cone

2.  Now you will align the bottom surface of the sphere with the tip of the cone. Make sure the sphere is still selected, and click the Move To Guide button in the Placement toolbar (or choose Placement > Move To Guide). The sphere snaps to the Snap Target on the tip of the cone.



Move To Guide

Bottom surface of sphere's DynaBox snapped to Snap Target on tip of cone

**3.** Choose File > Save to save the file.
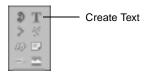
## Creating text for the sign

Now you will make the text for the sign. First, you need to display the toolbar for the Text creation tool. Then you create the text object, and use the Outline Editor to edit the default values of the text object to change the character string and the style.
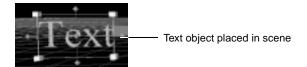
**Choose your file:**

• Continue with your file or open *sign2.wrl*, which contains the grass and sign structure.

**Create a text object for the sign text:**

**1.** To display the Create Extras toolbar, choose View > Toolbars > Create Extras.



Create Text

**2.** Click the Create Text button, then drag the text object into the scene and click to place it.
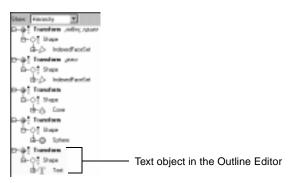


Text object placed in scene

**3.** Click the X on the right side of the title bar to dismiss the Create Extras toolbar window.

## Using the Outline Editor to edit the text

The Text creator simply lets you add a text object to the scene. Now you will change the text by using the Outline Editor to change the character string and the style of the text. The Outline Editor, which is the window in the upper right area of the main Cosmo Worlds window, follows and highlights the selection in the scene.

**Use the Outline Editor to change the character string and style of the text:**

1. Make sure the text object is selected in the Outline Editor.



Text object in the Outline Editor

2. Click the right mouse button on the bold Transform label of the highlighted text object and select Edit Node Name from the popup menu. In the text box, enter a name for the text object, such as "sign_text," and press Enter. You'll hear audio feedback to indicate a change was made.

3. Click the "+" next to the "T" icon to open the node. Then click the string field, click the "Text" field and enter "COSMO WORLD" in the text box, and press Enter. The text changes in the scene.

4. Click the "+" next to the "A" icon to open the FontStyle node. Then click the following field names, fill in the specified value, and press enter:

| Field | Value |
|-------|-------|
| family | SANS |

style      BOLDITALIC

justify    MIDDLE



New text values in Outline
Editor displayed in scene

**Use the Snap Target and Move Center To Guide to snap the text to the sign structure:**

•    The Snap Target is still on the tip of the cone. Use it again to move the center of the text
     object to the tip by clicking the Move Center To Guide button.



Move Center To Guide



Use Move Center To Guide to move
the center of the text to the tip of cone

**Use DynaBox to uniformly resize text and to align sign with Snap Target on tip of cone:**

1.   To uniformly resize the text, click-drag a white handle of the text object's DynaBox
     sideways to about 4-5 units in length.

The Snap Target provides feedback when for aligning objects. When the edges or midplane of an object is aligned with the Snap Target, a yellow plane highlight appears.

**2.** Move the text into its final position by Shift-dragging downward on a side of the DynaBox until you see a yellow highlight on the top plane of the DynaBox. This highlight appears when the surface of the DynaBox is aligned with the Snap Target on the cone.



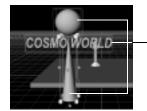Top edge of Text aligned with Snap Target

**3.** Use File > Save to save your file.

## Selecting and moving multiple objects with the Snap Target

Use the Snap Target again to move the sign to the marker on the grass. You will move the pieces simultaneously by first selecting them all and then snapping them to the Snap Target.

Sometimes the Snap Target is obscured by an object after snapping. You can sometimes access it in another viewport, or you can click the Activate Snap Target button to turn it off and then click again to turn it on and drag it into the scene. Yet another way is to choose Placement > Set Active Guide > Snap Target twice.

**1.** To move the Snap Target from the tip of the cone to the marker on the grass, click-drag the gray hub. The handle turns orange when the pointer is over it and yellow when you move. You will see a yellow dot when the Snap Target is on the edge of the marker, but don't worry about exact placement of the Snap Target, just click to place it.

**2.** The text should still be selected. Shift-click the sphere, and then Shift-click the cone to select them all. The order of selection is important. Notice the DynaBox is around the object you selected last. This object is known as the primary, or master, selection. Also notice the blue boxes, indicating multiple selections, that are around the other two objects.
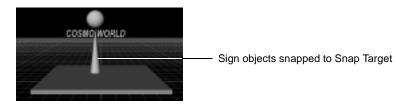
NOTE:   The order in which you select the objects is important because it is the primary selection on which the operation will act.



Three objects in sign selected

3. Click the Move To Guide button to move the sign to the marker (or choose Placement > Move To Guide). The bottom surface of the cone snaps to the Snap Target. (If you selected one of the other objects last, the bottom of its DynaBox would have aligned with the Snap Target, resulting in the objects being embedded in the grass instead of on top.)

4. Click the Activate Snap Target to turn off the Snap Target.



Sign objects snapped to Snap Target

Notice in the Front viewport that the grid lines are in front of the sign structure because these objects are now behind the axis line.

**NOTE:** When you turned off the Snap Target, you turned off the active guide for the scene. The grid is still displayed, but it is not the active guide. You must now explicitly set an active guide using Placement > Set Active Guide. Or, you can toggle the grid or Snap Target off and on again using their buttons in the Placement toolbar to set the active guide, which you will do later.

5. Choose File > Save to save the file.

## Creating and cloning a box to make the posts for a light structure

To create the light structure to support the spotlight that shines on the park sign, use a box for one of the two posts and then clone it. You create the middle piece from another box, and then you complete the light structure by creating a light fixture from a cone.
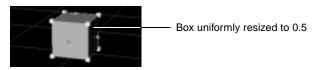
**Choose your file:**

• You can continue with your file or open *sign3.wrl*, which contains the grass and sign with text.

**Set the grid as the activate guide:**

- To activate the grid as the placement guide, choose Placement > Set Active Guide > Grid.

**Create a box and use View Selection to center it in the viewports:**

1. Click the Create Box button, move the box to the grid in front of the grass, and click-drag to uniformly size it to about 0.5 unit.
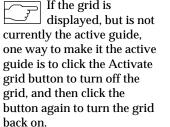


Box uniformly resized to 0.5

2. Align the right side of the box with a grid line by placing the pointer on the front surface of the DynaBox and Shift-dragging to the right. The grid line turns yellow when the edge of the DynaBox is aligned with it.

3. To work on the box easily, bring the object to the center of each viewport by clicking the View Selection button in the Camera toolbar (or choosing Camera > View Selection).



View Selection

In addition to moving the object to the center, the View Selection object changes the pivot point in the scene to the center of the selected object so when you rotate the view the scene will rotate around this object. Zoom out if the object is too close.
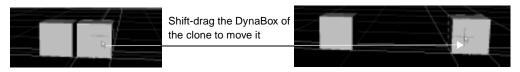
**Clone the first box and place the clone non-interactively:**

1. The box should still be selected. If not, select it.

2. To clone the box, choose Edit > Clone.

3. Before you paste the clone, turn off Interactive Paste Placement by choosing Edit > Interactive Paste Placement. You do not want to use interactive placement here because you want the clone to be put directly on top of the box so you can easily keep them aligned when you move the clone.

**4.** To paste the clone, choose Edit > Paste Clone. You will hear a creation sound and the DynaBox changes because the clone becomes the selected object; but you do not see the second box, because it's placed directly on top of the first one.

**5.** Put the pointer on the front surface of the DynaBox, and Shift-drag 1 unit to the right to create a 1-unit gap between the inner surfaces of the two boxes. The grid will highlight yellow when the left edge of the clone's DynaBox is aligned with it. You now have the two posts for the light structure.
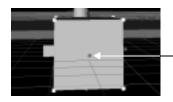


Shift-drag the DynaBox of the clone to move it

**6.** Save the file.
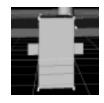
## Creating and aligning the middle piece

The final piece of the light structure is a middle piece that holds the light fixture. The piece is made from a box that is resized and placed between the two posts you just created.

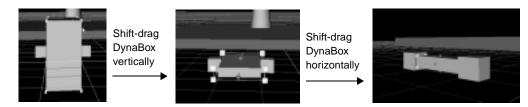**Create a box between the posts and use DynaBox to resize it:**

**1.** Click the Create Box button and drag the new box between the posts. You see the edges of the inner surface of the right post highlight in white, which indicates that the new object will align itself with this surface. You can also see that the center of the new box is aligned with the inner surface of the one of the boxes. Click to place the new box when you see the yellow dot at the center of the post.

**2.** To keep the side of the middle piece aligned with the inner surface of the post it's attached to, Ctrl+Shift-drag the white handle on the opposite corner towards the aligned side. Move this side until you see it align with the inner edge of the other post (which should also align with the grid). For example, if the middle piece is initially aligned with the inner surface of the left post, then Ctrl+Shift-drag the white handle on the right corner to the left.

When using the DynaBox to move an object, make sure you place the pointer away from the white and green handles; or you will end up resizing or rotating the object.

Ctrl+Shift-drag DynaBox
of middle piece to align it

3. Because you don't want the middle piece to snap at the grid lines, turn off the grid as the active guide by choosing Placement > Set Active Guide > None.

4. To shrink the middle piece, place the pointer on a white handle and Shift-drag to make it fit between the upper and lower edges of the posts. Then rotate the view and Shift-drag a white handle sideways to resize the depth.



Shift-drag
DynaBox
vertically

Shift-drag
DynaBox
horizontally
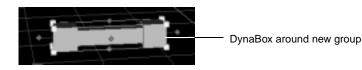
## Grouping the objects and using DynaBox to rotate

To rotate and move the light structure easily, you group the pieces together. Grouping is a common technique for organizing and easily manipulating objects in a scene.

**Group the three objects of the light support structure:**

1. The middle piece should still be selected. If not, click the piece to select it. Then Shift-click to select one post, and Shift-click again to select the other post. You will see the DynaBox on the objects change as the pieces are selected.
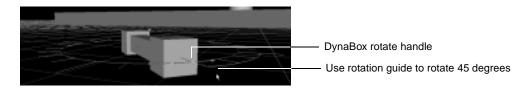
   **NOTE:** If the DynaBox on the middle piece obstructs the posts, rotate the view or zoom out until you can pick the posts.

2. Choose Edit > Group As Siblings to group the pieces together. Notice that one DynaBox now surrounds the group.

DynaBox around new group

**Use the DynaBox to rotate the structure 45 degrees in place:**

**1.** Before you rotate the group turn the grid back on by choosing Placement > Set Active Guide > Grid.

The rotation guide will not display unless the grid is the active guide.

**2.** Place the pointer over a green rotate handle on a side of the post and then click-drag clockwise to rotate the structure 45 degrees. Watch the rotation guide as you move.



DynaBox rotate handle
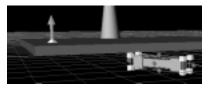
Use rotation guide to rotate 45 degrees

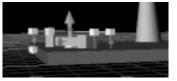## Using the Snap Target and DynaPlane to move the rotated group

To move the light structure group to the grass area quickly, use the Snap Target. The placement of the Snap Target doesn't need to be exact because you use the DynaPlane next to move the structure exactly where you want it. The DynaPlane is a handy tool for moving an object perpendicular or parallel to other objects.
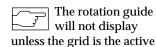
**Use the Snap Target to move the light structure group to the grass:**

**1.** Click the Activate Snap Target; and then drag the Snap Target to the left front corner of the grass, and click to place it. Now click the Move To Guide button in the Placement toolbar to snap the structure to the grass.
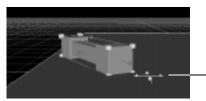


Move to guide

**2.** Click the Activate Snap Target button to turn off the Snap Target.

**Use the DynaPlane to move the rotated structure parallel to the surface of the grass:**

**1.** If you don't like the location of the light structure, you can use the DynaPlane control to move the rotated object relative to the grass surface. First, click the Toggle DynaPlane button and put the pointer over the surface of the grass. Then click-drag to move the light structure around to a position you like.



DynaPlane

As you move in the Room viewport, you may want to watch the Top viewport to help guide you. (You may need to zoom in using Spacebar+Ctrl in the Top viewport first to get the grass into the view.)



Use DynaPlane to move object relative to a plane

**2.** When you have positioned the structure, turn off DynaPlane by clicking the Toggle DynaPlane Translation button.
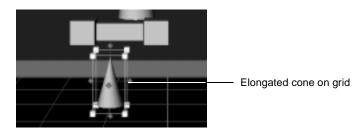
**3.** Save the file.

## Using a cone to create the light fixture

Now create the light fixture itself by interactively creating a cone. This fixture is used later as the geometry for the spotlight that you will add to this scene to light the sign.

**Use a cone to create the light fixture:**

**1.** Activate the grid by choosing Placement > Set Active Guide > Grid.

2. Click the Create Cone button and drag the cone onto the grid in the Room viewport. Without clicking to place the cone, click-drag to sweep out the cone until the base is about a 0.25-unit radius. Don't click to place yet.

3. Press and hold the Shift key and then drag a white handle upward to elongate the cone to a length of about 0.75 units. If you see a yellow dot in the upper left corner of the Y axis guide line, you have dragged to the 1-unit mark on the Y axis, which is too far.



Elongated cone on grid

To resize the cone after creation: click to place it on the grid, click-drag a white handle on the DynaBox to uniformly resize it, Shift-drag a surface of the DynaBox downward to place it on the grid, and then Ctrl+Shift-drag an upper handle to elongate the cone.

## Using the DynaDot to place the tip of the cone on the support structure

Now use the DynaDot control to place the tip of the cone on the light support structure. The DynaDot lets you easily align a point on an object with another object.
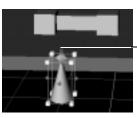
**Use the DynaDot to place the tip of the cone on the middle piece of the structure:**

1. Click the Toggle DynaDot button in the Placement toolbar and drag the DynaDot to the center of the top surface of the cone's DynaBox. When you see a yellow dot, which indicates that the DynaDot is aligned with the midpoint of the surface, click to place the DynaDot.



DynaDot

2. Rotate the view so you can see the top of the light structure. Place the pointer on the magenta handle of the DynaDot. It turns orange. Now click-drag to move the cone. The

handle turns yellow as you start to move, and you will see the DynaDot "flip" the cone, anticipating that the point of its attachment is to be aligned with another object. Drag the DynaDot to the front edge of the structure, and click to place the tip of the cone on the edge when you see the edge highlight yellow. You may need to move the cone in front of the middle piece and then bring it back up to the edge. The ease in placing the tool depends on the angle of the view—you sometimes just have to play around with it.



DynaDot flips the object and attaches it to the other object

3. Click the Toggle DynaDot button in the Placement toolbar to toggle off the DynaDot.

4. Shift-drag on the top of the DynaBox to move the cone into the middle piece a little bit.



Cone moved into middle piece

5. Choose Camera > View All to see how your scene looks

6. Save the file.

You have now finished the basic modeling section of this tour. You have a couple more short sections, importing a file and a brief introduction to editing points, edges, and polygons (PEPs), and then you'll be about half finished.

# Importing and cloning an object

In addition to creating new objects, you may have existing 3D objects that you would like to reuse. If the file is saved in a format that Cosmo Worlds supports, you can easily import the objects into your scene. In this section, you will import a tree that was created previously in Cosmo Worlds. When you import the tree, you will place it interactively, which means, you will control the placement. (When you use non-interactive placement, the object is automatically placed at the location in which it was originally modeled.)

After the tree is placed, you will clone it. Cloning (also called instancing) is an efficient way to keep down your file size. A clone is different from a copy. Unlike a copy, a clone inherits the geometry and appearance of the original, so the information doesn't have to be repeated in the file. Like a copy, a clone can have a size and location different from the original object.
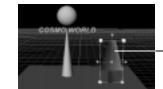
## Using Interactive Import Placement to import a tree

When you use interactive placement to import an object, you control where to place it in the scene, just as you did when you created primitives.

**Use interactive placement to import the tree:**

1. Make sure interactive placement is on by choosing File from the menu bar and looking at the state of the Interactive Import Placement item. If there is a check next to the item, it is on; and you can simply click to dismiss the menu. If it is not checked, select the item and release to dismiss the menu.

2. Import the file by choosing File > Import, selecting the file *sign_tree.wrl* in the dialog window, and then clicking the Open button.

The tree appears in the scene under the pointer. Drag the tree to the grass area on the right and front of the sign. Move the tree and click to place it where you want.

Imported tree placed on platform

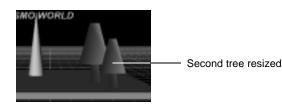## Cloning a tree and using Interactive Paste Placement to place it

To make the second tree easily, clone the first one and then use interactive paste placement to place it. Interactive paste works the same way as interactive import, that is you control the placement of the object in the scene.

**Clone the tree and interactively paste the clone:**

1. To clone the tree, choose Edit > Clone.

2. Make sure interactive placement is on by choosing Edit and looking at the state of Interactive Paste Placement. If it is checked, it is on and you can simply click to dismiss the menu. If it is off (not checked), select it and release to dismiss the window.

3. To paste the clone, choose Edit > Paste Clone and then drag the tree to place it in front of and to the right of the first tree.

**Use DynaBox to resize the second tree:**

1. Use the DynaBox again to resize the clone. With the pointer over an upper white handle on the DynaBox, Ctrl+Shift-drag to anchor the tree to the grass while you shorten it; and then release the Ctrl key and Shift-drag the handle to narrow the tree.

Second tree resized

2. Save your file.

The default paste mode is interactive placement. You can toggle this on and off by choosing Edit > Interactive Paste Placement.

Once an object is cloned, there is no "original." All instances are equal.

# Using basic PEP modeling to create capped posts

So far you have been using basic shapes and imported objects. You can create many interesting objects using primitives, but this is often polygon-intensive and somewhat limiting. Como Worlds provides a set of powerful tools that make it easy for you to easily manipulate objects into interesting shapes while keeping your polygon count to a minimum.

In this section you will see how you can take a box primitive and work on its individual points, edges, and polygons (PEPs) to easily manipulate the shape. You will split the top surface of a box and pull up the center point to make a capped post for a light structure.

## Converting primitive shapes to PEP objects

The posts of the light structure are functional, but not very attractive. They would look much nicer with a simple cap finish. To create this effect without using excessive polygons, you convert the posts to their individual points, edges, and polygons. You created the posts from a simple box primitive that was cloned. Now you convert them to a PEP object using the tool that transparently converts an object to its individual points, edges, and polygons.

The posts are part of the light structure group you created earlier, so when you click on the post, you will actually select the group. This exercise shows you how to select objects in a group.

**Select the group and use View Selection to center it in the viewports:**

1.  Click one box to select it. Notice that you select the entire group, so you need to select down in the hierarchy to select just the box. The group is considered the parent, and the box is a child of the parent group. To select the box, choose Select > Select Child.



Child box selected

Depending on the size and location of the selected object, View Selection might place the object too close for you to work comfortably with the object. If this happens, use Spacebar+Ctrl to zoom out from the object.

What you select when you click on a grouped object in the scene depends on the current state of the Selection Policy. The default in Cosmo Worlds is Selection Policy highest, which means you will select the object at its highest level Transform. You will learn later how to change the state of the selection policy.

2. To work on the structure easily, bring it to the center of each viewport by clicking the View Selection button in the Camera toolbar (or choosing Camera > View Selection).



View Selection

In addition to moving the object to the center, the View Selection object changes the pivot point in the scene to the center of the selected object so when you rotate the view the scene will rotate around this object.

**Convert the post to a PEP object:**

• To convert the post to a PEP object, click the Convert To PEP Object button in the PEP toolbar, which is on the left side of the viewports. You don't see any change in the object in the scene.



Convert To PEP Object

## Entering PEP Edit Mode

After an object is converted to a PEP object, you can edit any of its points, edges, or polygons. To do this, you must be in a special edit mode in Cosmo Worlds called PEP Edit Mode. When you enter PEP Edit Mode, you will see an orange box around the object. The post is a clone, so you must make sure you have all the instances of it selected before you enter PEP Edit Mode.

**Select both clones and enter PEP Edit Mode:**

1. To select the second instance of the clone, choose Select > Select Child. Both instances are now selected.

**2.** In the PEP toolbar, click the PEP Edit Mode button. You should see an orange outline around one box to indicate you are in PEP mode. The DynaBox no longer surrounds the box because PEP Edit Mode automatically disabled it and enabled the DynaPlane control tool. When you pass the pointer over the surfaces, you see the DynaPlane, which is a four-headed arrow, and you see the PEPs highlight as the pointer passes over them.



PEP Edit Mode button

When you are in PEP Edit mode, the pointer is the PEP Edit Mode icon; and the default DynaControl is the DynaPlane, which is used to move objects relative to planes.



PEP edit box

DynaPlane

Pep icon

## Splitting a polygon with the Split to Both Corners tool

To create the capped post, you need to pull up the center of the post. Before you can pull up this point, you must create it. To do this, you will split the top surface to the corners so when you pull the point, the edges will align with the corners. If you simply split the surface into four rectangles, the splits would be at the midpoints of the edges, which is not the effect you want.

Because this object is a clone, when you convert and edit one object, the same changes are applied to the other. Remember, clones share the same geometrical information.

**Select and split the top surface of the post:**

Cosmo Worlds uses a closed polygon connectivity model, in which all edges of the polygon must be connected.

$x+y=z$

**1.** If you can't see the top of the post, rotate the view.

**2.** Click in the middle of the top surface to select the top polygon. If you are too close to an individual edge or point, you will select only that edge or point. To select a polygon, all edges around it must be highlighted.
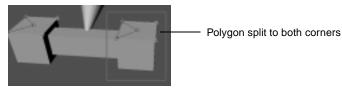
Selected polygon

The color scheme of the PEP edit mode selections are a combination of what is currently selected and where the pointer is placed. The current PEP selection is black with white highlights if the pointer is over it, and black with yellow highlights if the pointer is not over it. Blue with white highlights indicates the pointer is over a PEP, but it is not selected.

The selected PEPs are shown in black. When the pointer is over the PEPs, the highlight is white, when the pointer is over other PEPs, the highlight is yellow.

3. Split the top surface by clicking the "Split To Both Corners" tool in the PEP toolbar. The selected polygon is now equally split into four triangles with a common point at the center of the top of the post.



Split To Both Corners



Polygon split to both corners

## Pulling up a point using the DynaPlane tool

Common PEP editing tasks include moving PEPs relative to other surfaces. To easily perform these moves, Cosmo Worlds provides the DynaPlane control tool. As with the other DynaControl tools, you can use the DynaPlane to perform a variety of movements. You can use it to move a PEP freely in a plane, parallel to a plane, or perpendicular to a plane. In this exercise you will move the center point of the top surface parallel to the sides of the post.

### Use DynaPlane to pull up the center point:

1.  Click the center point to select it (which also deselects the other PEPs), and put the pointer over the front surface. Now Shift-drag to pull up the point parallel to the front surface about 0.5 unit. If you don't use the Shift key, you can pull the point freely, but you can't be sure it's parallel to the sides.



Pull up the center point parallel to the sides

2.  To exit PEP edit mode, click outside the orange box, and then save the file.

Congratulations! You've finished creating and assembling the objects in this scene, and now you can enhance these objects by applying materials and textures to them.

## Changing the appearance of objects

You can create interesting and appealing objects quickly by applying materials and textures to the objects you have created. Cosmo Worlds supports many image formats that are standard formats supported in VRML browsers. You should use formats that are best for the Web: PNG, GIF, JPEG.

## Applying materials

By default, the Property Inspector is docked in the lower right area of the main window. This editor can be hidden or undocked to suit your working style.
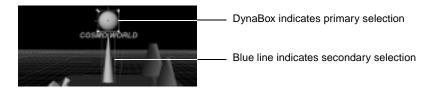
To enhance the appearance of objects in your scene quickly, you can apply materials from the many palettes in Cosmo Worlds. The material palettes are accessed through the Material Palette in the Property Inspector. You apply a variety of different materials from the material palettes to the sign and light structure objects. You also apply and edit a material to create a custom effect.

**Choose your file:**

• You can continue with your file or open *sign5.wrl*, which contains the sign, trees, and light structure and fixture.

**Apply a material from the metal palette to the base and top of the sign:**

1. In the Room viewport, click the cone that is the base of the sign, then Shift-click the sphere to select it also.

DynaBox indicates primary selection

Blue line indicates secondary selection

2. When you select an object in the scene, the Property Inspector, which occupies the lower right area of the main Cosmo Worlds window, displays the Material Palette by default.

Material Palette tab

A material palette

**3.** In the Material Palette, select the "metal" palette by clicking the down arrow in the box and selecting the name "metal."
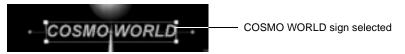
If you don't like the effect of the material, use Ctrl+Z to undo and select another material. You can also replace the current material by applying another one directly over it.

**4.** To apply the material to the objects, click the second sphere in the fourth row of the metal palette. The material appears on the objects in the scene.

**Apply a material to the text sign:**

**1.** Click the COSMO WORLD sign to select it.



COSMO WORLD sign selected

**2.** In the Material Palette, select the "sheen" material palette by clicking the down arrow next to the list box and selecting "sheen" from the list. In the fifth row of the sheen palette, click the sixth sphere to apply the purple material to the text.

**Select only the middle piece of the light structure group and apply a blue material:**

**1.** Click the middle piece of the light structure to select it. Notice when you click the middle piece to select it, you actually select the group. This is because the selection policy is set to select the highest level in the hierarchy for the object. Because the middle piece is a member of a group, the group is selected.

**2.** To select only the middle piece of the light structure group, change the selection policy from highest to lowest by choosing Select > Selection Policy Lowest. The middle piece should now be the only one selected.
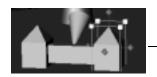


Selection policy changed from highest to lowest to select child in group

**3.** In the Material Palette, select the "santefe" palette by clicking the down arrow next to the list box and selecting "santefe" from the list. To apply the blue material, click the second sphere in the second row of the palette.

**Apply a material to a clone:**

1. To see the effect of applying a material to clones, apply a tan material from the santefe palette to the fence posts. Click one fence post to select it.

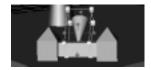 ———— One clone selected at lowest selection policy

2. Click the first sphere in the fourth row of the santefe palette to apply the material. The material is applied to both posts simultaneously. Remember, clones share the same appearance information, so when you apply a material to one clone, it is applied to all instances of the clone.

## Applying and editing a material

You can customize the materials in the material palettes to create just the effect you want by editing their properties in the Material Editor. As you see when you open the Material Editor, materials contain many characteristics besides color that affect their display on the screen. In this exercise, you change the color, and then play with the other characteristics to see the effect.

**Apply and edit light fixture material:**

1. Click the cone on the light structure to select it.



2. In the Material page, select the metal material palette and click the second sphere in the fifth row.

3. To display the Material Editor, click the Material Editor tab, which is the second tab on the left.

Material Editor tab

Color wheel

If you don't like the effect you created, use Ctrl+Z to undo.

4. To change the color to slightly more red, click-drag the square in the middle of the color wheel to the right. Watch the color change on the object in the editor as well as the cone in the scene.

5. Use the sliders or type in values for the other fields to change the other characteristics. For example, to change how shiny the object appears, edit the Shininess field by click-dragging the slider next to the field name or by entering a value directly in the text field.

NOTE: You will not see the effects of the ambient slider unless you alter the ambientIntensity of a new light in the Outline Editor.

## Applying textures

In addition to materials, Cosmo Worlds provides many textures you can use to make your objects more interesting and life-like. You can apply these materials directly and edit them to change their appearance. You can also add your own custom textures to a palette and then apply it. You apply two textures in this section: one from a default palette to the posts and one custom texture to the sphere. Then you will edit the custom texture to adjust how it fits on the sphere.
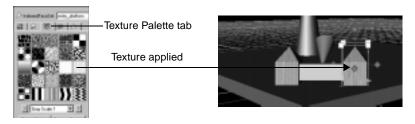
**Apply texture from a default texture palette to light support posts:**

1. Click one post to select it.

One clone selected

**2.** Click the Texture Palette tab, and elect the last tile in the third row of the Gray Scale 1 palette to apply the texture over the material of the fence post. Applying a grayscale texture over a material makes a much more interesting effect than a plain grayscale texture. This is an economical way to create special effects for objects, such as this wood-grain appearance.
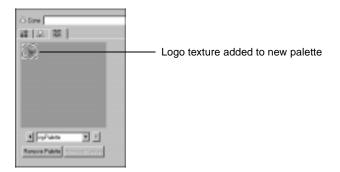


Texture Palette tab

Texture applied

## Editing a texture

You would like everyone to see your logo as they walk in. However, your standard image is not the right size for the sphere, so you need to adjust it to fit.

**Adding a texture to the palette:**

**1.** To add a texture to the palette:

- Open the file browser window (such as Windows NT Explorer) on your system, and navigate to the *overview* folder.

- Click-drag the file *logo.png* to the texture palette. Because the palette is full, a window pops up and asks you if you want to create a palette. The dialog window may pop up behind the file browser, so minimize the browser window if you can't see the dialog box.

**2.** To create the palette, type in a name and click OK. The palette appears in the Texture palette page.



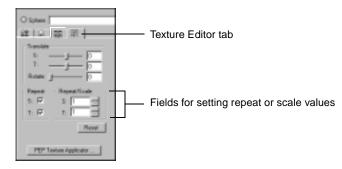Logo texture added to new palette

**Editing a custom texture**

**1.** Click the sphere to select it, and then click the logo tile in the palette. The logo is applied, but you can see that it doesn't fit very nicely—it "distorts" to fill the surface of the sphere.
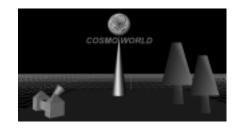


Texture fills surface of sphere

**2.** To fit the texture on the sphere, change its size and position it on the sphere. Click the Texture Editor tab to display the page that lets you modify the texture.

Texture Editor tab

Fields for setting repeat or scale values

3. In the Repeat section, click the boxes to uncheck both the S and T boxes. You won't see any change in the texture in the scene, but this will clamp the texture to the surface, so the pattern won't repeat to fill the object.

4. Reduce the size of the image by changing the scale values. Enter 0.25 in the S: Repeat/Scale field, and then enter 0.5 in the T: Repeat/Scale field. The image moves on the sphere, and may not be visible in your view at this point.

5. Center the image on the sphere by moving it in the horizontal and vertical directions. In the Translate S and T fields, move the slider bars to the left to center the image. The final values, which should be around -0.38 and -0.26, depend on the size of your sphere. (You can use the green rotate handle of the DynaBox as a guide for the center!)



6. Save the file.

# Animating 3D objects

The detailed lesson on animation is Chapter 4, "Animating Objects and Properties."

Animation is a key factor in creating an interactive, life-like world. Cosmo Worlds provides a sophisticated animation tool called the Keyframe Animator. To learn about the Keyframe Animator, you animate the text sign and sphere to rotate continuously in opposite directions, and you set the trigger to be world entry so the animation starts when the file is loaded in a browser.

**Choose your file:**

You can continue with the sign file you've been working on, or you can open the *sign6.wrl*, which includes the content created to this point.

## Setting up a new animation for the sign

To create a new animation sequence, open the Keyframe Animator, add a new animation, and set up the parameters for the animation.

**Open the Keyframe Animator and set up a new animation:**

1. To open the Keyframe Animator, click the Toggle Keyframe Animator button (or choose Editors > Keyframe Animator).



Toggle Keyframe Animator

By default the Keyframe Animator window is docked below the viewports. You can undock the window by double-clicking the double line on the left edge of the Keyframe Animator window, and then locate the window that's best for your working style.

2. In the Keyframe Animator toolbar, click the New Animation button (or choose Animation > New).

Animation menu    New Animation



The Animator Properties window is displayed.

3. In the Animation page, fill in the following values:

- In the Name field, type in the name "sign" and press Enter. The name is now displayed above the Master Timeline label in the Keyframe Animator. It's really important to name your animations uniquely so you can easily identify them.

- In the Length field, type in 80 and press Enter.

- In the Frames per second field, leave the value 10. This is the number of frames displayed in the animation timeline for each second. The value is not related to the frame rate when the animation is viewed.

- Click the check box in the Loop Animation field. This lets the animation continue to play while the scene is in the browser.

4. To create a trigger that causes the animation to start when the scene is loaded, click the Trigger page tab, and then click the World Entry button.



World Entry trigger

5. Dismiss the Animator Properties window now by clicking the X in the right corner of the its title bar.

6. To display all 80 frames in the Keyframe Animator window, click the Zoom To Fit button in the Keyframe Animator toolbar. The Zoom To Fit button is the magnifying glass with a two-sided arrow. This button automatically sizes the animation frames to fit into your window. If the view is too small for you, use the Zoom Out button to the left of the Zoom to Fit button.

   **NOTE:** Your window might display different numbers on the timeline. The timeline adjusts the display of numbers to the size of the window in increments of five.



Zoom To Fit

## Adding the text object as an actor in the sign animation

Now that the animation is set up, add the text object as an actor.

**Add the text object as an actor:**

1. In the Room viewport, click the COSMO WORLD text to select it.

2. Choose Animation > Add Actor (or click the Add Actor button which is next to the New Animation button). The actor and its timeline is added in the Keyframe Animator. Notice the unnamed Transform is added. When an actor is added, all objects and properties underneath it are eligible to be animated.

3. Edit the name of the Transform in the Outline Editor by clicking the Transform label, right-clicking the bring up the menu, selecting Edit Node Name, and entering "sign_text" in the text field.

It's really important to name the objects in your scene, so you can easily identify them in the Keyframe Animator. Unnamed objects are simply added using the Transform label, so if you have many unnamed actors, you will have difficulty identifying the actors.

Actor

## Creating the keyframes for the text rotation sequence

The text sign animation you create is one complete rotation in 80 frames. In VRML you can rotate only 90 degrees at a time for one keyframe and be certain that the rotation happened in the right direction, so to create a complete rotation you will create four keyframes at 20-frame intervals. The Keyframe Animator will calculate the motion for each frame in between the keyframes for you.

The general procedure for creating each keyframe is accomplished by alternating between the Keyframe Animator window and the object in the viewport using the following steps:

- In the Keyframe animator, move the scrub bar to the desired frame.

- In the scene, pose the actor.

- In the Keyframe Animator, record the event.

**Create the keyframes for the text sign rotation:**

You can also move the scrub bar by clicking in the gray area in the Master Timeline above the frame number, or by entering the frame number in the Frame text field in the menu bar.

1. In the Keyframe Animator, move the scrub bar to frame 20 by click-dragging its yellow diamond-shaped handle.



Scrub bar moved to frame 20

2. Active the grid by choosing Placement > Set Active Guide > Grid.

3. In the scene, rotate the text sign 90 degrees by click-dragging the green rotate handle on the DynaBox of the text to the left. Notice that the red button next to the actor line turns red to indicate that an event occurred.

**NOTE:** You may want to use the Top viewport to perform the rotation because it is very easy to see the rotation guide in this view. You may need to use Spacebar+Ctrl to zoom out to see the guide in the viewport. Rotate clockwise.



Rotating the sign 90 degrees in the Top viewport

A red marker indicates the currently selected keyframe(s). A blue marker indicates keyframes that are not currently selected.

4. In the Keyframe Animator, record the keyframe by clicking the red button in the sign_text's timeline. Notice when you do this, a keyframe is recorded at frame 0 in addition to the keyframe at frame 20. The keyframe at frame 0 represents the initial position of the object. The red marker indicates the currently selected keyframe, and the blue marker indicates a keyframe that is not selected.



Keyframe recorded at frame 20 and currently selected (red)

Keyframe automatically recorded at frame 0 and currently not selected (blue)

5. Record the next keyframe by moving the scrub bar to frame 40, rotating the sign another 90 degrees in the same direction, and recording the keyframe.

6. Record the next keyframe by moving the scrub bar to frame 60, rotating the sign another 90 degrees in the same direction, and recording the keyframe.

## Copying a keyframe

To record the final position and make sure the object ends up exactly where it started the rotation, copy the keyframe at frame 0 to frame 80.

**Copy the keyframe at frame 0 to frame 80:**

1. To create a copy of the initial keyframe, click the blue keyframe marker at frame 0 in the "sign_text" timeline; and then choose Keyframe > Copy.

2. To paste the keyframe, move the scrub bar to frame 80; and then choose Keyframe > Paste.



Keyframe at frame 0 copied to frame 80

## Testing the animation

To see how the animation looks, first play it back in the Keyframe Animator. You can play the animation in the scene by pressing the Play button in the Keyframe Animator. To test the trigger, use the Cosmo Worlds Preview feature so you can see what your scene will look like on the Web. Preview uses the Cosmo Player browser by default.

**Play back the animation to test it:**

**1.** To start the animation at the beginning, click the left double arrow playback button (or move the scrub bar to frame 0), and then click the Play button (right blue arrow) in the Keyframe Animator toolbar. You should see the text sign rotating.

The animation will continue to play until you click the Stop button, which is the square button in the center of the playback controls.
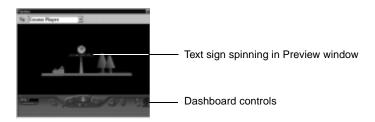
**2.** Save the file.

**Use Preview to test the trigger:**

**1.** Choose View > Preview or click the Toggle Preview Window button.



Toggle Preview Window

If Preview encounters a problem in the file, such as a missing file, a blinking yellow or red set of lights is displayed on the dashboard control. Click the light to display the warning or error messages.

**2.** The Cosmo Player window opens. The text sign should be rotating.



Text sign spinning in Preview window

Dashboard controls

**NOTE:** To navigate in the Preview window, use the dashboard controls. You will learn later how to set a viewpoint to position the view of your world when it is loaded in the browser.

**3.** Dismiss the window by clicking the X in the right corner of the Preview title bar.

## Adding the sphere as a second actor in the sign animation

You can include separate objects and animate them independently by adding them as actors in an animation. In this exercise, you add the sign's sphere to the animation you just made, and then you create separate keyframes for the sphere so it rotates twice as fast and in the opposite direction of the text.

**Add the sphere as a second actor:**

1.  In the scene, click the sphere to select it.

2.  In the Keyframe Animator, add the sphere as an actor in the sign animation by choosing Animation > Add Actor (or click the Add Actor button next to the Add Animation button). The unnamed Transform is added to the animation.

3.  In the Outline Editor, edit the name of the Transform by clicking the Transform label, right-clicking the bring up the menu, selecting Edit Node Name, and entering "sign_sphere" in the text field.



Sphere added

**Record the keyframes for the sphere's rotation:**

1.  To make the first keyframe:

    •   Move the scrub bar to frame 10. The text moves to its position at that frame in the animation.

    •   Rotate the sphere counter-clockwise by click-dragging a green handle on the DynaBox to the right 90 degrees. The red button next to the "sign_sphere" actor line turns red to indicate an event occurred.

    •   Click the red button next to the sign_sphere actor line to record the event. The event keyframe is recorded at frame 10 and the initial position keyframe at frame 0.

2.  Create the next keyframe by moving the scrub bar to frame 20, rotating the sign 90 degrees, and recording the keyframe.

3.  Create the next keyframe by moving the scrub bar to frame 30, rotating the sign 90 degrees, and recording the keyframe.

4.  To complete the first rotation, create the next keyframe by moving the scrub bar to frame 40, rotating the sign 90 degrees, and recording the keyframe.

## Copying multiple keyframes

To finish the animation sequence for the sphere, copy the existing keyframes to create the remaining ones.

**Copy keyframes to finish animation for the sphere:**

1.  To make the rest of the keyframes, copy the ones you just created in the line for this actor:

    *   In the "sign_sphere" actor line, click the marker at frame 10 to select it

    *   Shift-click the markers at frames at 20, 30, and 40; and choose Keyframe > Copy.

    *   Move the scrub bar to frame 50, and choose Keyframe > Paste to paste the four keyframes that complete the animation.



## Playing back the animation in the Keyframe Animator

See how the animation looks by playing it back in the Keyframe Animator. You can trigger the animation in the scene only by pressing the Play button. To test the trigger, you must use the Preview feature.

**Test the animation:**

1.  To start the animation at the beginning, click the left double arrow playback button (or move the scrub bar to frame 0), and then click the Play button (right blue arrow) in the Keyframe Animator toolbar. You should see the text sign and the sphere rotating in opposite directions, with the sphere rotating twice as fast as the text.

    The animation will continue to play until you click the Stop button, which is the square button in the center of the playback controls.

2.  Rewind to frame 0 before you close the window and save the file. If you don't, the current position of the scrub bar becomes the starting point for the animation.

3.  Close the Keyframe Animator by clicking the "X" in the upper left corner of the Keyframe Animator window, or by clicking the Toggle Keyframe Animator button in the Editors toolbar.

4.  Save the file.

5.  Use Preview, if you want to preview the animation in the Preview window.

## Adding lights and sounds

The detailed lesson on adding lights and sounds is in Chapter 5, "Adding Lights and Sounds."

To create a realistic environment for your scene, add a spotlight to light the COSMO WORLD sign and an ambient sound that simulates the noise of an amusement park crowd. Lights and sounds are parts of a group of "special objects" that includes viewpoints and sensors. These items are represented in the scene in Cosmo Worlds by icons, but do not appear as objects in browsers. Visitors to your scene see only the effects of these special objects. You will again use the sign file.
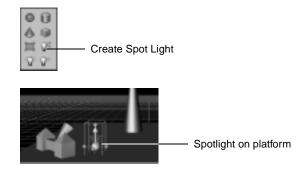
### Adding a spotlight for the sign

You now add a spot light to light the sign area of the scene. You will align the light with the conical light fixture and point it at the sign.
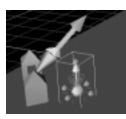
**Open the sign file and create a spot light:**

1.  Either continue with the sign file you've created, or open *sign7.wrl*.
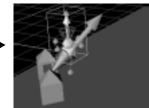
2. In the Create toolbar, click the Create Spot Light button, drag the light icon into the scene near the light structure, and click to place it. You see an icon for the light and hear a creation sound. The exact position of the light doesn't matter at this point, but you should rotate the view so you see the end of the cone.
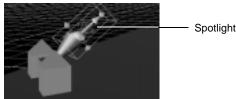


Create Spot Light



Spotlight on platform

3. To snap the light to the cone on the light structure, first place the Snap Target on the end of the cone by clicking the Activate Snap Target button, dragging the Snap Target to the cone, and clicking to place it on the end of the cone; then click the Move To Guide button (or choose Placement > Move To Guide).



Spotlight snapped to
Snap Target

4. Turn off the Snap Target by clicking the Activate Snap Target button.

5. Rotate the light to align it with the light fixture by click-dragging a green rotate handle of the DynaBox until the light icon is in a line with the cone.
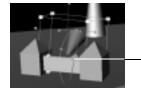
Spotlight in line with cone

**Select the light and the light fixture and use DynaWheel to rotate about the tip:**

1. Select the light fixture along with the light icon so you can rotate the objects together by Shift-clicking the light fixture.

   **NOTE:**   If you can't select the cone because the light is in the way, you can either hide the light temporarily or change your view until the light's bounding box isn't in the way.

   Now you can rotate the pieces together to properly position the light. You will use the DynaWheel to rotate the light and fixture about the tip of the cone as you did previously when you created the cone.

   *The DynaWheel lets you rotate an object about an arbitrary point in the scene. By default, the DynaBox rotates an object around its center.*

2. Click the Toggle DynaWheel button, drag the DynaWheel into the scene, and orient the DynaWheel on the middle piece so you can rotate the light group about the tip of the cone.



Tip of cone rotated using DynaWheel

   **NOTE:**   Aligning the DynaWheel can be tricky. If you have trouble orienting the DynaWheel, move it around by click-dragging the middle hub until it's the right orientation, then hold the Ctrl key, move the DynaWheel to the tip of the cone, and then click to place before releasing the Ctrl key.

3. Click-drag a green handle to rotate the light. As you move it around, see its effect on objects in the scene. Orient the light toward the text sign for its final position.

4. Click the Toggle DynaWheel button to turn off the DynaWheel.

**Turn off the light icon:**

Each time you create a light, all the light icons in the scene are displayed.

1.  The icon for the light is handy to have when you are working with the light, but usually you want these icons hidden. To hide the light icon now, choose View > Show Special Objects > Show Lights.

2.  Save the file.

## Adding an ambient sound

To simulate the background noise of an amusement park, add a global ambient sound that is triggered when the file is loaded in the browser. A sound consists of an audio file, as well as information about the sound's source, location, and direction.
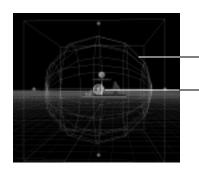
**Add a sound:**

Each time you create a sound, all the sound icons in the scene are displayed.

1.  Click the Create Sound button, and double-click the filename *ambientmusic.wav* in the "Choose a sound" window.

    Create Sound

    After you select the file, the window dismisses and the sound icon appears in the scene under the pointer.

2.  Move the sound icon into the scene and click to place it on the grass. The sound icon and range indicator are rendered in the scene. (Zoom out to see the entire audible range indicator.) You won't hear the sound until you preview the file and are in audible range.

    Audible range sphere (maxFront and maxBack)

    Full-intensity range sphere (minFront and minBack)

**Use the Outline Editor to edit the Audio Clip node to loop the sound and start at world entry:**

1.  In the Outline Editor, click the "+" next to the Sound icon to expand it and then click the Sound icon to show all the fields. Change the spatialize field by clicking "spatialize" and then clicking "TRUE" and changing it to "FALSE." This changes the sound to be non-directional, or ambient.

2.  To edit the AudioClip information, click the "+" next to the AudioClip icon to expand it, and then click the AudioClip icon display all the fields. Change the following fields:

    •   To play the sound continuously, change the loop field to TRUE by clicking the "loop" field name and then clicking the "FALSE" value to open the field for editing. Enter "TRUE" in the text field.

    •   To have the sound start when the file is loaded (world entry), change the startTime field to 0.



Set spatialize to FALSE for ambient sound

Set loop to TRUE to play sound continuously
Set startTime to 0 to trigger sound on entry

**Use Preview to test the sound:**

1.  Choose View > Preview or click the Toggle Preview Window button.



Toggle Preview Window

2.  The sound should start playing as soon as the file is loaded in the Preview window. You may not hear it until you move closer to the sign.

**Hide the sound icon:**

1.  The icon for the sound is handy to have when you are working with the sound, but usually you want these icons hidden. To hide the sound icons, choose View > Show Special Objects > Show Sounds.

2.  Save the file.

# Optimizing the scene

The detailed lesson on optimizing is in Chapter 8, "Optimizing Your World."

Optimization is a reiterative process that starts with good design and consideration of the requirements for producing content for the Web, such as low polygon-count models, image and sound formats, and so forth. However, there is a lot that you can do with your work in progress. A few of these techniques are presented here: billboarding, deleting extraneous polygons, level of detail modeling, and inlining.
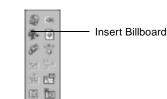
## Billboarding the trees

Billboarding is a technique you can use to create the illusion of a 3D object from a flat planar object through rotation about an axis. In this section, you will billboard the two trees so they rotate around the Y axis and give the illusion that they are "full" trees.
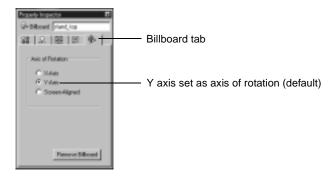
**Choose your file:**

•   You can continue with your file or open *sign8.wrl*.

**Billboard the trees:**

Clones are identified in the Outline Editor by a number after their Transform label. The number displayed is the number of instances of the clone in the file.
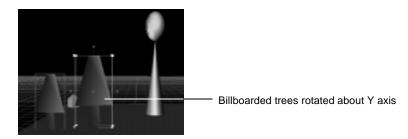
1.  Click one of the trees to select it, and then Shift-click the other.

2.  Click the Insert Billboard button in the Create toolbar. A Billboard node is added to each trees.



Insert Billboard

3. By default, the billboard is created to rotate around the Y axis. To see this, you can look at the Billboard page in the Property Inspector by clicking the Billboard tab.



Billboard tab

Y axis set as axis of rotation (default)

4. In the Room viewport, rotate the view to see how the trees rotate to face you all the time to give the illusion of a 3D object.
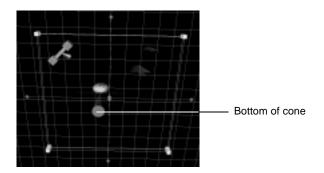


Billboarded trees rotated about Y axis

5. Save the file.

## Deleting extraneous polygons

Another technique for improving performance of your world is to reduce the polygons in your scene. The base of each cone contains 16 polygons. You don't see the base of the sign, which is on the grass, so you can delete the polygons here to reduce the polygon count without affecting the scene. Before the polygons can be deleted, the object must be converted to a PEP object. You can also delete the polygons on the end of the light fixture.

**Convert the conical base of the sign to a PEP object and delete the polygons on the bottom:**
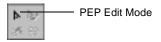
1. Click to select the cone base of the sign, and then rotate the scene about the X axis so you can see the bottom of the cone.



Bottom of cone

Cosmo Worlds uses
$x+y=z$ backface culling, a
process that eliminates
drawing polygonal faces
whose normals point away
from the viewer. To change
the backface culling property,
select the object and use the
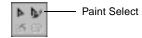Faceset Properties page in the
Property Inspector.

2. Although you can see the bottom, you can't select it because the grass is actually in the way. It's not being drawn because of backface culling. To hide the grass, choose View > Hide Unselected objects. Then choose Camera > View Selection.

3. Convert the cone to a PEP object by clicking the Convert to PEP button in the PEP toolbar. You see no change in the scene.



Convert To PEP Object

4. Enter PEP Edit Mode by clicking the PEP Edit Mode button. The orange PEP edit box appears around the cone.
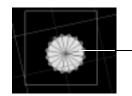


PEP Edit Mode

5. To select the polygons easily, click the Paint Select button and click-drag the paint brush icon over the end of the cone to select the all the polygons.
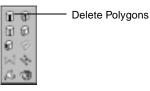


Paint Select

Cones selected with Paint Select tool

6. To delete the polygons, click the Delete Polygon button in the PEP toolbar (or press the Delete key).



Delete Polygons

7. Click in empty space in the scene to get out of PEP mode, and then show all the objects in the scene again by choosing View > Show All Objects.

**Delete the polygons at the end of the light fixture cone:**

1. Rotate the view so you can see the light fixture cone, and click to select it.

2. Choose Camera > View Selection (or click the View Selection button in the Camera toolbar) to bring the cone to the center of the viewports, and then rotate the scene so you can see the end of the cone.
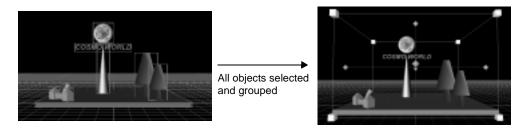


View All ——— —— View Selection

3. Select and delete the polygons on the end of the cone as you just did for the sign cone: Convert the cone to a PEP object by clicking the Convert to PEP button, enter PEP mode by clicking the PEP Edit Mode button, use the Paint Select button to select the polygons, and then click the Delete Polygons button to delete the selected polygons. You see "through" the cone from this angle because backface culling is on.

4. Choose Camera > View All and then save the file.

## Using level of detail (LOD) models

An effective way to optimize the rendering of objects in your world is to create different levels of detail for the objects in your scenes. You can use high level-of-detail (LOD) models when visitors are close to the objects, and low-detail models when they are far away. You create a low detail model using your high-detail sign model as a template, and then you create an LOD with two levels of detail.
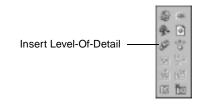
**Create a high-detail group:**

1. Select all the objects in the scene by choosing Select > Select All, and then group them together by choosing Edit > Group As Siblings.



All objects selected
and grouped

2. In the Outline Editor, name this new group "CWSignHighDetail" by right-clicking the Transform label of the selected group, selecting "Edit Node Name" from the menu, and entering the name in the text field.

**Insert an LOD:**

1. Insert an LOD grouping by clicking the Insert Level-Of-Detail button in the Create toolbar.

Insert Level-Of-Detail ———

The LOD page is displayed in the Property Inspector, and the LOD node is added to the Outline Editor. (If you have other property sheets or editors in the Property Inspector, your window will have the tabs for them showing also.)
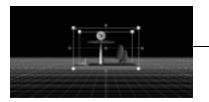


LOD name field

2. In the LOD name field, enter the name "CWSignLOD" and press Enter.

When you insert the LOD, a Transform node is created above the group. After you insert the LOD, the LOD editor provides a function that lets you duplicate the current model. You then edit the duplicated model to create the low-detail model.

**Adjust view for LOD range and duplicate the current level of LOD:**

LODs switch only in perspective viewports.

1. In the Room viewport, zoom out until you are at a distance where you want to see the high-detail and low-detail models switch. The range is automatically calculated from the view in the Room (or other perspective) viewport. If the range isn't right, you can change it later in the LOD editor.
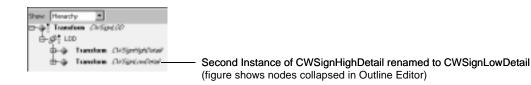


Zoom out to set view for LOD range

2. Click the "Duplicate Current Level" button. You see no change in the scene, but the LOD editor places a copy of the model directly on top of the original, and the copy is added to

the Outline Editor under the LOD Transform. Scroll down to see the second Transform labeled "CWSignHighDetail."

3. In the Outline Editor, rename the copy of the model by clicking the second instance of the "CWSignHighDetail" name and changing it to "CWSignLowDetail." You might have to scroll down in the Outline Editor to see the second copy of "CWSignHighDetail."

To collapse the nodes in the Outline Editor, click the "-" next to the Transform icon.



Second Instance of CWSignHighDetail renamed to CWSignLowDetail
(figure shows nodes collapsed in Outline Editor)

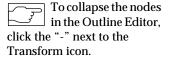## Creating a low-detail version from the duplicated level

The LOD is inserted and now you can edit the duplicated model into a low-detail version. A good rule of thumb is to use at least a 10:1 ratio of polygons. In this exercise, the high-detail sign model renders 643 triangles on the screen, and the low-detail one renders 16, so this model is optimized quite nicely.

**Select the low-detail pavilion for editing:**

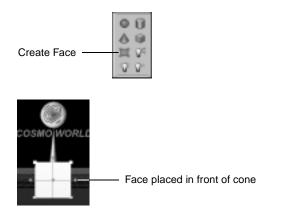When working with LODs, always start with the highest level and work out to the lowest level.

1. If the low-detail model is not still selected, select it in the Outline Editor by clicking the bold Transform label for "CWSignLowDetail." Now you can work on editing the model, which is first deleting objects and then creating a low-detail version of the sign structure.

2. Use the Outline Editor to delete the pieces you don't want to include in the low-detail version, which is everything except the grass. To do this, click the Transform labels of the objects to select them, and press the Delete key.
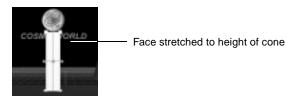
**Create the low detail version of the sign:**

1. Zoom in so you can work easily with the cone and sphere. You will create the objects using the high-detail version as a template and then you will add the low-detail versions to the low-detail Transform group.

2. To create the triangle object for the low detail version of the base of the sign, use the Create Face tool to create a piece that represents the cone:

- Click the Create Face button in the Create toolbar and drag the face into the scene in front of the cone. If the face flips, move it around until it is straight, then hold down the Ctrl key and move it to the front of the cone. When the yellow dot appears at the middle of the bottom edge of the cone, click to place the face.
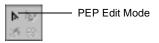
Create Face ————— 



————— Face placed in front of cone

- Narrow the width of the face by Shift-dragging an upper white handle of the DynaBox sideways until it is the width of the base of the cone. Then stretch the height of the face to the same height as the tip of the cone by Shift+Ctrl-dragging an upper white handle of the DynaBox.



————— Face stretched to height of cone

**Use PEP Edit Mode to make a triangular shaped face:**

1. Use PEP edit mode to move the two upper corner points to the center of the edge to create a tip for the new triangle that represents the cone in the low-detail version. To enter PEP Edit Mode, click the PEP Edit Mode button in the PEP toolbar.

PEP Edit Mode

2. Click the point on the left upper corner of the face to select it, and then click-drag the point inward to the tip of the cone, following the line of the cone. Make sure the pointer is over the face when you start to drag; if it's not, you will do a sweep select.


Point on upper left corner selected and moved to center

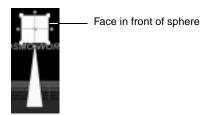3. Select the point on the right upper corner, and move it to the center to create a triangle.


Corner points moved to center

4. Click in the scene outside the orange box to exit PEP Edit Mode.

**Create a face for the sphere:**

1. Click the Create Face button in the Create toolbar and move the face into the scene and place it on top of the triangular face you just created. You may need to hold the Ctrl key again after orienting the face. The logo may show through partially.

2. Resize the face to align with the outer edges of the sphere by Shift-dragging inward on an upper white handle to the diameter of the sphere, and then Shift+Ctrl-dragging downward on an upper handle.

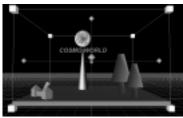Face in front of sphere

**Apply material to low detail sign objects:**

1. With the rectangular face still selected, Shift-click the triangular face to select them both.

2. In the Material Palette page, select the metal palette and click the second sphere in the fourth row to apply the material. The material will look different than the high-detail cone and sphere because these surfaces are flat so the light doesn't reflect the same.

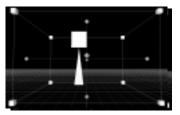**Group the two faces with the low-detail model:**

3. In the Outline Editor, Shift-click to select the "CWSignLowDetail" Transform. Then choose Edit > Add Sibling to add the faces to the "CWSignLowDetail" group.

**Test the LOD:**

1. To test the LOD switching, click the LOD Transform label named "CWSignLOD" to select the LOD, and zoom in and out to watch the models switch. Use Spacebar+Ctrl to zoom in and out to see the range where the high-detail and low-detail versions switch. By default, the distance was automatically calculated for you from the camera distance when you create the LOD.



LOD switch between high-detail and low-detail models

2. If you want to add an empty level when you are far, far away, you can zoom out and then check the Add Empty Level button.

3. If you want to change the range, you can use the LOD editor. Uncheck the Auto-calculate level box, change the view, and click the Match Camera Distance. Then, to verify the switching, check Auto-calculate on and zoom in and out to see the LODs.

4. Save the file.

## Using inlines

Inlines are useful for organizing your world into files and reducing file size of the main world file.

When you have a large world with many objects, one way to organize it for efficiency is to use inline files. An inline is a reference to an external file containing objects that you want to include in your world, but that don't need to be displayed immediately. Most browsers display the data in the file first, and then download the data in inline files. An inline file can also be used to organize the objects in your world efficiently by keeping them together in one file and reducing the file size of the main file.

You can move, rotate, or resize the objects in an inline file within Cosmo Worlds, but you can't edit the objects unless you fold the inline into the scene. After you edit, you can convert it back to an inline.

This exercise shows you how to incorporate the sign with rest of the scenes in the Cosmo World amusement park. You import the sign as an inline file in the main file for the amusement park world. The main file also contains inlines for other scenes in the park, which were created previously.

**Open the file for the park world and import the sign as an inline:**

1. To open the file for the world, choose File > Open, select *Park_noCWsign.wrl* and click the Open button.
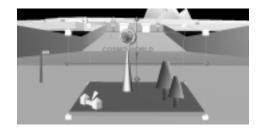


2. Zoom out so you can see the blue marker on the platform. This is where you will place the sign.

3. To control the placement of the inline file when you import it, make sure Interactive Import Placement is on by choosing File and looking at the Interactive Import Paste item. If it is not checked on, select it. If it is checked on, simply dismiss the menu.

4. Import the sign file as an inline by choosing File > Import As Inline and selecting the name of your sign file (if you don't want to use the sign file you created, use *sign9.wrl*, which contains a completed sign model).

5. Move the sign to the blue marker and make sure its front is facing you before you click to place it. As with other imported objects, the box around the inline aligns itself with the edges of the other objects in the scene. Move the pointer over the front edge of the blue marker. When the yellow dot appears in the middle of the edge, click to place the inline in the correct orientation. Because the sign contains an LOD, the objects may switch between the two levels as you are moving it around.



6. Save the file.

## Adding navigation information and viewpoints

Even the most visually exciting world won't interest visitors very long if they can't get around in it. To help your visitors navigate in your world, you can add navigation information and viewpoints to make it easy and fun for them to explore your world. The park file already has viewpoints set for the scenes except for the sign. In this exercise, you create one for the sign, and you add navigation information so your visitors navigate around the park.

### Creating and setting navigation style

Navigation information tells the VRML browser how you want the visitors in your world to navigate and what the physical dimensions of the avatar are. You can let visitors navigate in any style, or you can limit them to certain styles appropriate for exploring your world, such

as flying. The scenes in the park were created for visitors with human dimensions, so you will set the navigation information accordingly.

**Create navigation information:**

**1.** In the middle section of the Create toolbar, click the Create Navigation Info button.

Create Navigation Info ———— 

The NavigationInfo node is added to the scene. You don't see any change in the scene, but the node is highlighted in the Outline Editor, and the Property Inspector displays the NavigationInfo pages.



**Set the navigation style:**

**1.** In the displayed page, enter a name for the NavigationInfo text field. This name is for your information only. It appears in your file and is helpful for identifying the node, especially if there are multiple navigation nodes in your file.

**2.** In the Allowable Style field, click the "Any" box. The Any option allows any type of navigation in the scene. When you want to limit the type of navigation in your scene, click one or more of the other boxes. It might be appropriate to allow only walk style in the Cosmo World park, but because it is an amusement park, you probably want visitors to be able to do almost anything!

**3.** In the First Choice field, leave WALK as the preferred style of navigation. If you allow other navigation styles in this scene, the preferred style is the one that is initially set in the VRML browser and remains the style until the viewer or a script changes it.
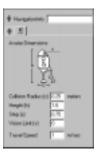
4. Leave the Headlight on. The headlight is a directional light that provides the default light for the scene and for the VRML browser. When you specify your own lights, especially to create a special effect, you may want to turn off the headlight using NavigationInfo.

## Setting avatar dimensions

You can adjust the physical characteristics of the avatar to the physical dimensions of your scene. The avatar is the representative of your viewer in the scene, so you should set the dimensions accordingly. Most of the time, you will probably set these dimension to "human" factors, but if want to create special effect views, you can set the avatar dimensions to the appropriate size. You could have your visitors experience your world as if they were mice, or giants, or any size creature you can imagine.

**Use the Avatar page to set avatar dimensions:**

1. To display the page for setting the avatar dimensions, click the Avatar tab in Navigation Info page.



2. Set the following values:

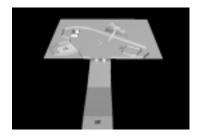| | | |
|---|---|---|
| Collision | 0.1 | Shoulder width of avatar, which determines what it can pass through |
| Height | 1.75 | Height of avatar, which sets the eye site level |
| Step | 1.0 | Height the avatar can step up |

## Creating Viewpoints

In this exercise, you set a viewpoint for a view of the Cosmo World amusement park sign. You can set viewpoints only in perspective views, so you set the view in the Room viewpoint. When you set a viewpoint, be sure to give it a name that is descriptive of its view because it will appear in the list of viewpoints in the VRML browsers.

**NOTE:** The file already has viewpoints in it for other scenes.

**Create a viewpoint:**

1. In the Room viewport, position the view of the scene that you want to set as a viewpoint. For example, you might want an aerial view of the entire park, as if you were looking down on it from an airplane.



2. Click the "Create Viewpoint" button, which is in the middle section of the Create toolbar. A yellow camera icon is placed in the scene for this viewpoint, and all other viewpoint camera icons are displayed in the scene. You won't see the icon for the viewpoint you just created because the view of the scene is the from the front of the camera icon. If you zoom out you will see a camera icon that is surrounded by a DynaBox.



Create Viewpoint

The Viewpoint page is displayed in the Property Inspector window.



3. In the Viewpoint page, fill in the fields, type in the name and press Enter or move the mouse focus to another field:

   • In the Viewpoint text field enter the name the viewpoint (this is for your own identification in the file). If you don't put in a name, you cannot select the viewpoint as a link in Cosmo Worlds, because the viewpoint won't show up in the viewpoint list.

   • In the Description in browser field, enter a name (this is the name that you want to display in the list of viewpoints in the browser, so it should not be too long—the name can be different than the Viewpoint name). If you don't put in a name, the browser will not display the viewpoint in its Viewpoint List.

4. To check the viewpoint, change your view in the scene and then click the Go To button in the Viewpoint page. You should jump to the viewpoint you just set.

5. If you want to change the position of the viewpoint you set, navigate to a new position and click the Update button on the Viewpoint page.

## Adding a background

Backgrounds help provide realism to your scene. You can set the mood and location for your scene with the right colors and shading—a moonscape, a tropical island, or a whatever you desire. If you create more than one background, the first background in the scene is displayed unless you explicitly bind them.

In this exercise, you create a background using the default provided in the Create Background tool. The Create Background button is on the Create Extras toolbar, which is the only toolbar not displayed by default.

**Create a background:**

1.  To display the Create Extras toolbar, choose View > Toolbars > Create Extras.


Create Background

2.  Click the Create Background button to add the default background. Backgrounds are displayed in perspective viewports only.

**NOTE:** You can use the Outline Editor to edit the fields in the Background node.

## Previewing

The Preview window lets you check how your file appears in a typical VRML browser. Cosmo Worlds uses Cosmo Player as the default browser, but you can set up other browsers to use. The Preview utility is an excellent way to verify how your scene looks and behaves before you publish your file for the World Wide Web. You used the Preview window previously in the exercises for animation, light, and sound.
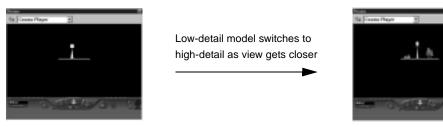
**NOTE:** Often during the authoring process, you may experience warnings or errors when you preview your files because you have incomplete or missing files. For example, if you specify a sound file that has been moved from the location specified in the file, you will get a warning message that says the file doesn't exist. The browser indicates warnings and errors by displaying yellow or red flashing lights on the dashboard control. You can read the messages for the warnings and errors by clicking the lights. Usually you can still see the world in the browser, but you may not be able to hear a sound, see a material, link to an external file, and so forth.

**Preview your scene:**

1.  Choose View > Preview, or click the Toggle Preview Window button.

Toggle Preview Window

2. The Preview window opens with the scene in it.

3. Check the following items that you created previously to make sure the information in the file is correct:

• Materials and textures—Make sure the materials and textures are loaded and displayed correctly for the sign and the light structure.

• Animation—The text and sphere should be rotating in opposite directions as soon as the file is loaded in the Preview window.

• Light and sound—The light should be shining on the sign and the audio clip should be continuously playing as soon as the file is loaded in the Preview window.

• LOD range—Zoom in and out of the scene to make sure the LOD is working.



Low-detail model switches to high-detail as view gets closer

• CylinderSensor—drag the mouse across the knob from left to right while watching the clown head rotate

• Navigation information and viewpoints—select the viewpoint you set from the list and see how it looks. Also, try different styles of navigation using the dashboard navigation controls.

# Publishing the scene

Now that you have verified the sign for the entrance to the amusement park, you can prepare the scene for the Web. Cosmo Worlds provides an easy-to-use packaging utility for you to publish your content for the Web.

## What publishing does

The Publishing Wizard consists of a series of steps that finds all the files for the world, checks all the references to other files, resolves naming conflicts, and makes a clean copy of the relevant files in the location you specify.

## How to publish your world

You can publish your world easily using the Cosmo Publishing Wizard. The Publisher contains windows that prompt you for information about which files you want to publish, the location and structure of the package directory, and optional operations on the files, such as compression, optimization of textures by instancing them, floating point precision settings.

**NOTE:** The screen shots in this section show the tutorial files installed on *C:\Program Files\ CosmoSoftware\CosmoWorlds*. If you did not install in the default directory, your publishing session may fail to find files referenced in inlined files. You can manually change the pathnames of these files by editing their URLs in the Outline Editor.

**Start the Publishing Wizard:**

1. If you haven't saved your file, save it now. The Publisher won't let you publish until the file is saved.

2. Choose File > Publish to start the Publishing Wizard.



3. Enter the name of the directory where you want the package to be located. For example, if you enter "C:\CWPark" in the text box, a folder named CWPark is created on your C: drive and your published files will be copied into it. You can use the Browser button to select a directory from a file browse window.

4. Click Next to go to the screen where you specify your top-level document(s).

**Specify top-level documents:**

1. In the "Specify top-level documents" window, enter the name of the top-level documents. These documents are the entry points into your world. In this exercise, there is only one entry point, so there is only one top-level document to list. The name of the current file appears in the list, so you don't need to enter anything here.

2. Click Next to go to the screen where you specify which files to exclude from publishing. If you know you have files on a server already and don't need to re-publish them, enter the filenames in the text box. You don't want to exclude any files, so click Next to go to the screen where you specify your preferences for file optimization.

**Specify VRML preferences:**

1. In the "Specify VRML Preferences" window, you tell the Publisher the options you want to use for your VRML files:

   • Leave the "Gzip VRML files" box checked if you want the Publisher to compress the VRML files using gzip compression format.

- Leave the "Optimize textures" box checked if you want the Publisher to create instances of textures that are used for more than one object instead of making copies for each object.

- Leave the "Floating point precision" at Default if you want the decimal numbers in you files to remain unchanged.

Before you go on, make sure everything is set up the way you want it, because you can't come back to this step. If you want to change anything after you go to the next screen, you'll have to start the publishing process over.

2. When you are sure everything is set up the way you want it, click Next to go to the window where you specify the directory structure and mappings for your package.

**Specify the package directory structure and mappings:**

1. In the "Specifying directory structure" window, click the radio button for the HIERARCHICAL option. This retains the same directory structure as your source files.

If you don't specify any mappings, the entire pathname of the tutorial files is included in the final directory structure. To remove these extraneous levels of subdirectories, map them to another location.

2. In the Mappings section, remove the extra subdirectory locations for the files in the \*overview* subdirectory. Click the Add button, and enter the following:

- In the "from:" field, use the drop-down list box to scroll down to select the entry that has *"overview\"* at the end.

- In the "to:" field, enter ".\" to map the files to the top-level directory, and click OK.

3. Again, in the Mappings section, remove the extra subdirectory locations for the files in the \*grayscale* subdirectory. Click the Add button, and enter the following:

- In the "from:" field, use the drop-down list box to scroll down to select *C:\Program Files\CosmoSoftware\Shared\textures\* from the list

- In the "to:" field, enter "textures\" to map the files to the \*textures* subdirectory. Click OK.

The mappings screen should look similar to the following screen:



Mappings

4. Click the Next button to review the new package directory structure.

**Review the directory structure:**

1. Look at the structure in the "Review directory structure" window to see if all the files and directories are listed as you specified.

2. If the files are not correct, you can click the Back button to go to the previous screen and edit or remove the mapping by selecting the mapping item in the list and clicking the appropriate button for the task you want to perform.

3. Before you click the Next button, make sure the structure is what you want, because you can't back up from here.

4. Click Next.

The Publisher saves the published versions of your files in the package directory you specified. During the stage of the publishing process, the Publisher automatically changes all filename references to match any mappings you specified. If there are any problems or errors, a dialog window is displayed. Two possible situations are that you don't have enough disk space, or that a package with the same name already exists.

**Preview the world if desired:**

1. If you want to preview the world before writing it to the destination directory, click the Preview button to use your default Web browser, or click the "Preview Using" button and specify the Web browser you want to use.

If a package directory with the same name exists as the one currently being published, the Publisher asks you to confirm moving the existing one to the Recycle Bin

You can create a list of preferred browsers by clicking "Preview Using" and setting up other browsers. The list of browsers is saved with your Cosmo Worlds preferences.



Packaged world in browser window

2. Click the "X" in the browser's title bar to dismiss the browser.

**Finish the publishing session:**

1. After you dismiss the browser, click Finish. A results dialog window is displayed that shows you what files have been published and to which location.

2. Click OK to end the publishing session. The files can now be found at the location you specified at the beginning of this process.

3. When the package is complete, copy the directory contents to a Web server for viewing.

## Presenting your world

Now you can present your world on the World Wide Web, on a CD, or whatever medium you choose.

# Where to go from here

Congratulations! You've just completed the overview tutorial for Cosmo Worlds, and now you're ready to use the skills and techniques you've learned to create exciting, interactive 3D content for the Web. You may want to explore Cosmo Worlds on your own; or you may want to learn more details about the features Cosmo Worlds by performing any or all of the lessons in the Basic Tutorial—chapters 1-10.

**Hello Worlds—An Overview**