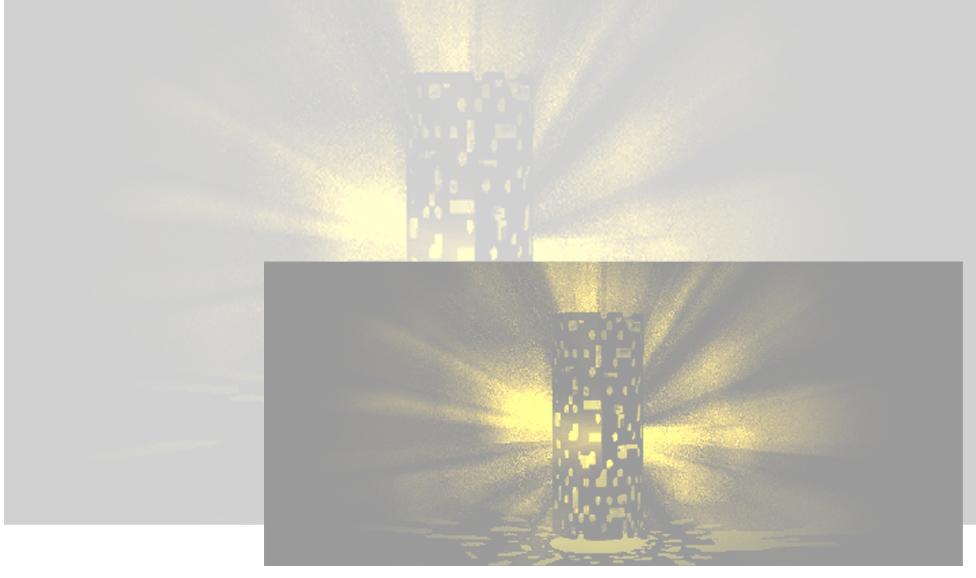
Chapter 7

Lighting

Learning Objectives

After completing this chapter, you will be able to:

- *Understand standard Maya lights*
- *Add the glow and halo effects to lights*
- *Apply physical sun and sky effect to a scene*
- *Work with the camera*



INTRODUCTION TO LIGHTS

In Maya, lights are objects that produce real lighting like street lights, flash lights, house-hold lights or office lamp, and so on. When there is no light in a scene, the scene is rendered with default lighting. In addition to illuminating the scene, light can be used to project the images. In this chapter, you will learn about various lights that you can use in your scene to give it realistic lighting effects.

TYPES OF LIGHTS

There are six types of lights in Maya. To create a light, choose **Create > Lights** from the menubar; a cascading menu will be displayed. Choose the required light from the cascading menu and click in the viewport; the light will be created in your scene. Different types of lights in Maya are discussed next.

1. Ambient Light
2. Directional Light
3. Point Light
4. Spot Light
5. Area Light
6. Volume Light

Ambient Light

Menubar: Create > Lights > Ambient Light

Ambient Light is a single point light that projects the rays uniformly in all directions and lights up the scene. To create an ambient light, choose **Create > Lights > Ambient Light** from the menubar; **Ambient Light** will be created at the center of the viewport. To modify the parameters of a light, select the light in the viewport. Then, choose **Window > Attribute Editor** from the menubar; the **Attribute Editor** displaying the properties of the light will be displayed on the right of the viewport. Some attributes in Maya are common for all the lights. These attributes are discussed next.

Ambient Light Attributes

The options in this area controls the general attributes related to the **Ambient Light**. To access these attributes, select the light in the viewport and choose **Window > Attribute Editor** from the menubar; the **Attribute Editor** will be displayed. Expand the **Ambient Light Attributes** area, if not already expanded; different options will be displayed in the area, refer to Figure 7-1. These options are discussed next.

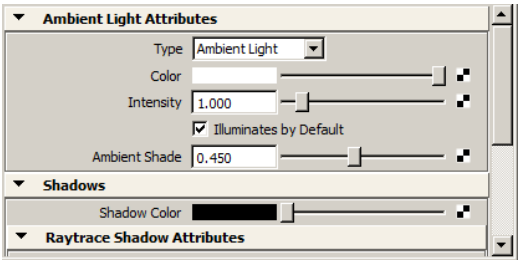


Figure 7-1 *The* ***Ambient Light Attributes*** *area*

Type

The **Type** option is used to change the type of light used in the viewport. To change a light type, select the required light type from the **Type** drop-down list; the current light will be replaced by the light selected from the drop-down list.

Color

The **Color** option is used to change the color of light. To do so, choose the white color swatch on the right of the **Color** option; the **Color History** palette will be displayed, as shown in Figure 7-2. Set the color of the light from this palette and click anywhere outside this palette; the selected color will be applied to the light. You can also assign a map to the selected light. To do so, choose the checker button on the right of the **Color** attribute, refer to Figure 7-1; the **Create Render Node** window will be displayed. Choose the map from the **Create Render Node** window and then choose the **Close** button; the texture will be assigned to the selected light. You need to render the scene to see the effect of light. To do so, invoke the **Render the current frame (Maya Software)** button from the Status Line. Figure 7-3 shows an ambient light without applying the checker map and Figure 7-4 shows the ambient light with the checker map assigned to it.

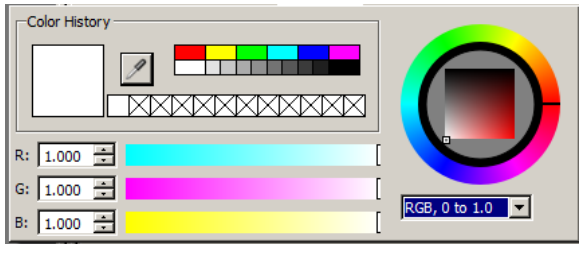


Figure 7-2 *The* ***Color History*** *palette*



Figure 7-3 *Ambient light without applying the checker map*



Figure 7-4 *Ambient light with the checker map assigned to it*

Intensity

The **Intensity** option is used to set the brightness of light. To do so, enter the value in the **Intensity** edit box or move the slider at its right to adjust the intensity. If there is 0 value in this edit box, no light will be simulated in the scene and the scene will appear completely dark on rendering. The **Illuminates by Default** check box is selected by default and is used to illuminate all objects in the viewport. When this check box is not selected, the light would only illuminate the objects to which it is linked. You will learn about the light linking later in the chapter.

Ambient Shade

The **Ambient Shade** option is used to control the proportion of directional light to the point light. To apply ambient shade, enter a value in the **Ambient Shade** edit box or adjust the slider placed next to this edit box. The **Ambient Shade** value ranges from 0 to 1. If the value of ambient shade is set to 0, the light will come from all directions and if the slider range value is 1, the light will come from a particular source. In other words, the ambient light will behave like a point light, when the value of the **Ambient Shade** parameter is 1. The default value in the **Ambient Shade** edit box is 0.45. Figure 7-5 shows the ambient light with the ambient shade value **0.25** and Figure 7-6 shows the ambient light with the ambient shade value **1**.

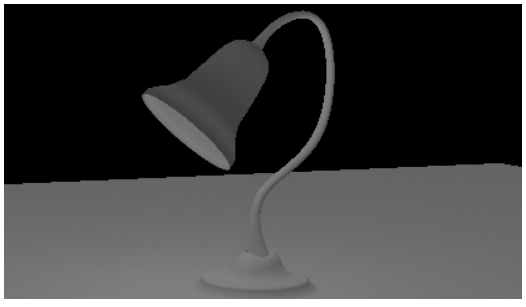


Figure 7-5 *Ambient light with the ambient shade value* ***0.25***

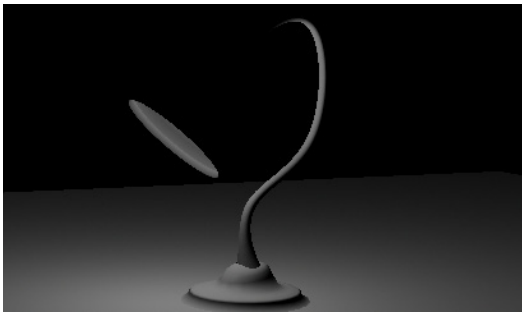


Figure 7-6 *Ambient light with the ambient shade value* ***1***

Shadows

The options in this area are used to define the color of the shadow produced by the light. The default shadow color is black. You can also map textures to the shadows.

Raytraced Shadow Attributes

These attributes are used to control the appearance of raytraced shadows produced by a light. Raytraced shadows produce soft and transparent shadows but they are computational intensive. These shadows will be visible in the render, only when raytrace is enabled in the **Global Render Settings**. To do so, choose **Window > Rendering Editors > Render Settings** from the menubar; the **Render Settings** window will be displayed. Choose the **Maya Software** tab and in the **Raytracing Quality** area, select the **Raytracing** check box to enable raytracing.

Use Raytrace Shadows

Select the **Use RayTrace Shadows** check box to ensure that the raytrace shadows is displayed in the scene.

Shadow Radius

This attribute is used to control the softness of the shadow edges.

Shadow Rays

This attribute is used to control the graininess of the shadow edges. The higher the number of shadow rays, the softer will be the graininess of the shadow edges but it will also increase the render time.

Ray Depth Limit

This attribute is used to specify the number of times a light ray can be reflected and refracted to cast the shadows.

Directional Light

Menubar: Create > Lights > Directional Light

The **Directional Light** is used to simulate a very distant point light source. The light rays coming from the directional light are parallel to each other. To create a directional light, choose **Create > Lights > Directional Light** from the menubar; a directional light will be created on the grid in the viewport, as shown in Figure 7-7. To modify the parameters of the light, select the light and choose **Window > Attribute Editor** from the menubar; the **Attribute Editor** showing the attributes of the directional light will be displayed on the right of the viewport. Some of the attributes of the directional light are same as those of the ambient light as discussed earlier. Rest of them are discussed next.



Figure 7-7 *A directional light created*

Depth Map Shadow Attribute

These attributes are used to control the depth map shadows produced by the lights. A depth map shadow is simply an image output. It gives good result and does not take more render time. A depth map contains the depth data rendered from a light's position in the scene.

Use Depth Map Shadows

This attribute is used to enable depth map shadow calculations.

Resolution

This attribute is used to set the resolution of the depth map shadows. When you increase the resolution, the render time of the depth map shadows also increases.

Filter Size

This attribute is used to control the softness of the shadow edges. Higher the value of the filter size, softer will be the shadow edges.

Bias

This attribute is used to offset the shadow map towards or away from the light.

Directional light can be used to view the area illuminated by that particular light. To do so, choose **Panels > Look Through Selected** from the **Panels** menu; you can now look through the selected light. Use ALT+MMB to pan the view; ALT+ RMB to zoom in and out of the view, and the ALT+ LMB to rotate in the viewport. To go back to the previous view, choose **Panels > Perspective > persp** from the **Panels** menu; the persp view will be activated.



Note

MMB stands for Middle Mouse Button, LMB for Left Mouse Button, and RMB for Right Mouse Button. These conventions will be followed throughout the textbook.

You can set the focus point of the selected light by using the light manipulators from the menubar. To do so, choose **Display > Show > Light Manipulators** from the menubar; the light manipulators will be displayed on the selected light. To hide it, choose **Display > Hide > Light Manipulators** from the menubar. Similarly, you can add the light manipulators to all the lights in Maya.

Point Light

Menubar: Create > Lights > Point Light

The **Point Light** is a single source of light that projects light evenly in all directions. It is very much similar to the ambient light. To create a point light, choose **Create > Lights > Point Light** from the menubar; a point light will be created at the center of the viewport, as shown in Figure 7-8. The attributes of the point light are similar to the attributes discussed under the ambient light section. Some of its other attributes are discussed next.



Figure 7-8 *A point light created*

Light Effects Attribute

The options in this area are used to add additional parameters to a selected light. To access this area, select the light in the viewport and choose **Window > Attribute Editor** from the menubar; the **Attribute Editor** will be displayed. Expand the **Light Effects** area in the **Attribute Editor**, if it is not already expanded. The attributes in the **Light Effects** area of the **Attribute Editor** are shown in Figure 7-9 and are discussed next.

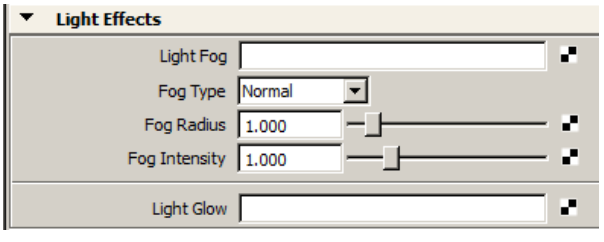


Figure 7-9 *The **Light Effects** area*

Light Fog

The **Light Fog** attribute is used to add the fog effect to a selected light. To do so, choose the checker button on the right of the **Light Fog** option in the **Attribute Editor**, refer to Figure 7-9; the **Light Fog Attributes** area will be displayed. Adjust the light fog attributes in the **Light Fog Attributes** area of the **Attribute Editor**, refer to Figure 7-10. Adjust the **Color** and **Density** attributes as discussed earlier. The density of the fog will be high near the light and will gradually decrease as you move away from it.

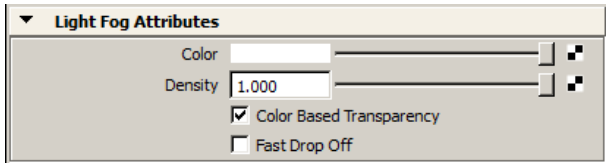


Figure 7-10 *The* ***Light Fog Attributes*** *area*

Fog Type

The **Fog Type** drop-down list is used to select the type of the fog. By default, **Normal** is selected in the **Fog Type** drop-down list. Choose **Linear** to diminish the fog slowly from the centre of the light, or choose **Exponential** to diminish the fog quickly from the center of the light.

Fog Radius

The **Fog Radius** attribute is used to set the radius of the fog for the selected light. To do so, enter the radius value in the edit box or adjust the slider bar at its right.

Fog Intensity

The **Fog Intensity** attribute is used to increase or decrease the intensity of the fog. To do so, enter the required value in the edit box or adjust the slider bar at its right.

Light Glow

The **Light Glow** attribute is used to add glow to a selected light. Choose the checker box on the right of the **Light Glow** attribute; the **opticalFX1** node will be added to the selected light, refer to Figure 7-11.



Figure 7-11 *The* ***opticalFX1*** *node added to the light*

Spot Light

Menubar: Create > Lights > Spot Light

The **Spot Light** is used to put focus on a particular object. This light is projected in the shape of a cone, refer to Figure 7-12. It emits light from a specific point, which is radiated out in a conical shape. Figure 7-13 shows a flower pot with a spot light. The working of the spot light is very much similar to that of the directional light. To create a spot light, choose **Create > Lights > Spot Light** from the menubar; the spot light will be created at the center of the viewport. Most of the attributes of the spot light are similar to those discussed under the ambient light section. Some of its other attributes are discussed next.

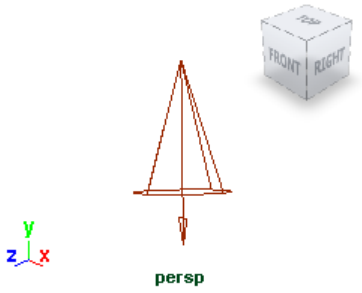


Figure 7-12 The spot light



Figure 7-13 A flower pot illuminated by a spot light

Spot Light Attributes

The options in this are used to adjust the attributes related to the spot light such as adjusting the cone angle, penumbra angle, and so on. To access these attributes, choose **Window > Attribute Editor** from the menubar; the **Attribute Editor** will be displayed. Expand the **Spot Light Attributes** tab, if not already expanded. The attributes in this area are discussed next.

Cone Angle

The **Cone Angle** attribute is used to set the focus area for the spot light. To do so, enter the value in the edit box or move the slider bar at its right. By default, the value is set to 40.00.

Penumbra Angle

The **Penumbra Angle** attribute is used to control the brightness of a spot light near edges. Higher the value of the **Penumbra Angle** attribute, lower will be the intensity at edges, as shown in Figure 7-14 and Figure 7-15.



Figure 7-14 Spot Light with Penumbra Angle: 0

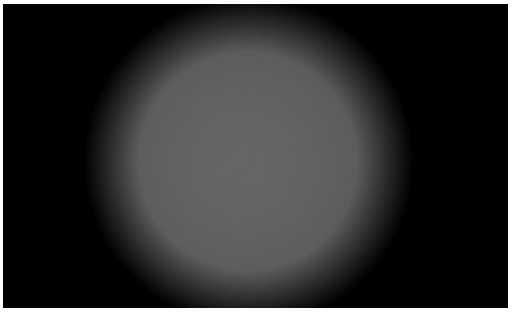


Figure 7-15 Spot Light with Penumbra Angle: 10

Dropoff

The **Dropoff** attribute is used to control the intensity of the light from the center to the edge of the spot light beam area. Higher the value of the **Dropoff** attribute, lower will be the intensity of the spot light beam.

Light Effects

The **Light Effects** area in the **Attribute Editor** is used to assign fog effects to light. To access these attributes, choose **Window > Attribute Editor** from the menubar; the **Attribute Editor** will be displayed. Expand the **Light Effects** area, if not already expanded. The attributes in this area are discussed next.

Light Fog

The **Light Fog** attribute is used to add fog effect to the selected light. To do so, select a light and then choose the checker button on the right of the **Light Fog** attribute; the light fog attributes will be added to the selected light in the **Attribute Editor**.

Fog Spread

The **Fog Spread** attribute is used to spread fog coming from a spot light. The more the **Fog Spread** value, the thicker will be the fog at the edges of the spot light, as shown in Figure 7-16 and Figure 7-17.

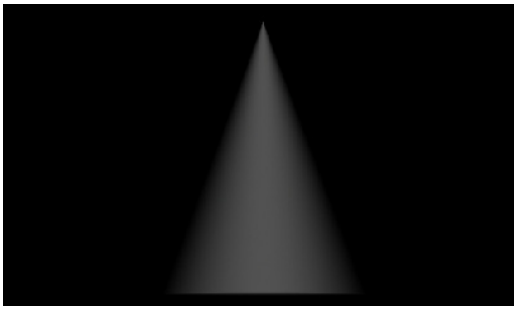


Figure 7-16 *Spot Light with* ***Fog Spread****: 1*

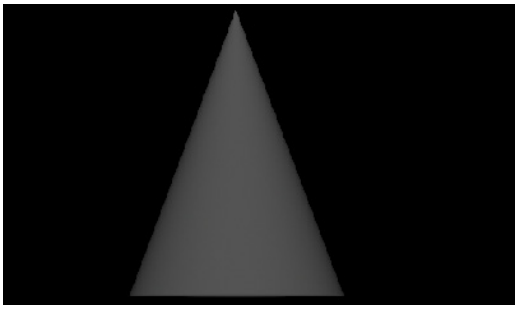


Figure 7-17 *Spot Light with* ***Fog Spread****: 5*

Fog Intensity

The **Fog Intensity** attribute is used to adjust the intensity of the selected light. To do so, enter the value in the edit box or move the slider at the right of the **Fog Intensity** attribute.

If you want the light to be displayed in a certain shape, or as if it is coming from a half opened door, you can do so by adjusting its parameters. To do so, select the **Barn Doors** check box in the **Light Effects** area of the **Attribute Editor**; the attributes related to the barn doors will be activated. Enter the required values in the **Barn Doors** attributes and render the scene to display the effect. The default values in all the edit boxes are shown in Figure 7-18.

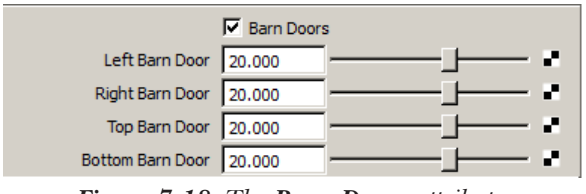


Figure 7-18 *The* ***Barn Doors*** *attributes*

You can also set shadows for an object in viewport. To do so, expand the **Shadows** attribute tab in the **Attribute Editor**. Next, choose the **Use Depth Map Shadows** checker box from the **Depth Map Shadow Attributes** area to make shadows active in the viewport. Render the scene to view the shadow effect, as shown in Figure 7-19.

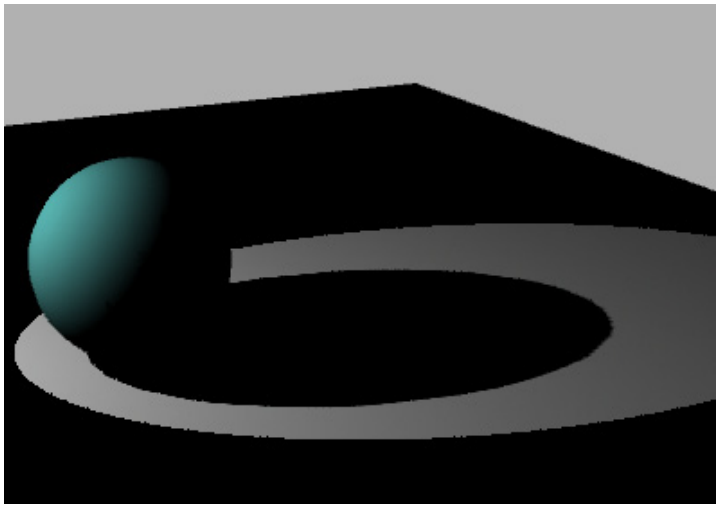


Figure 7-19 *The shadow attribute applied to the spot light*

Area Light

Menubar: Create > Lights > Area Light

The light effect created by an area light is similar to the one created by a point light. It emits light from a rectangular area. The larger the size of the light, more the scene will illuminate. To create an **Area Light**, choose **Create > Lights > Area Light** from the menubar; an area light will be created at the center of the viewport, as shown in Figure 7-20. The area light can be used to create high quality still images. The scene with an area light will take more time for rendering as compared to other lights. The attributes of the area light are similar to those discussed under the ambient light section except **Decay Rate** and it is discussed next.

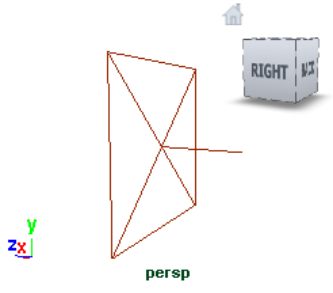


Figure 7-20 *An area light created*

Decay Rate

This attribute is found only in **Spot Light**, **Area Light**, and **Point Light**. It is used to determine the rate at which the light decreases or fades away with distance. The options in **Decay Rate** are discussed next.

No Decay
If you use this option, the light will not fade away with distance. It will illuminate all the objects in the scene.

Linear
If you use this option, then on increasing the distance of the light, the intensity of light will decrease on a linear rate. This rate is slower than the real world light.

Quadratic
If you use this option, then as the distance from the light increases, the intensity of light will decrease with the square of the distance. This rate imitates the real world decay rate.

Cubic
If you use this option, then the instensity of light will decrease faster.

Volume Light

Menubar: Create > Lights > Volume Light

A **Volume Light** is used to add light only to the area that is enclosed within a volume light icon. To create a volume light, choose **Create > Lights > Volume Light** from the menubar; a volume light will be created at the center of the viewport, as shown in Figure 7-21. Figure 7-22 shows the volume light effect. The attributes of the volume light are similar to those discussed in other lights.

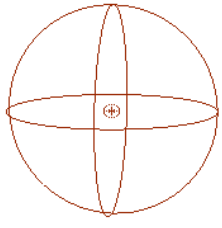


Figure 7-21 *The volume light*



Figure 7-22 *The volume light effect*

GLOW AND HALO EFFECTS

The glow and halo effects add realistic effect to a scene. The glow and halo effects can be added to any light using the **Attribute Editor**. To do so, create a light in the viewport. Next, select the light and choose **Window > Attribute Editor** from the menubar; the **Attribute Editor** displaying the attributes of the selected light will be displayed. Choose the checker button on the right of the **Color** attribute, as shown in Figure 7-23; the **Create Render Node** window will be displayed in the viewport. Choose the **Glow** attribute from the left of the **Create Render Node** window. Next, choose **Optical FX** from the right of the window; the **Optical FX Attributes** area will be displayed in the **Attribute Editor**, as shown in Figure 7-24. Various attributes in the **Optical FX Attributes** area are discussed next.

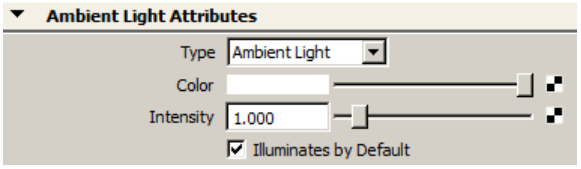


Figure 7-23 *Choosing the checker button*

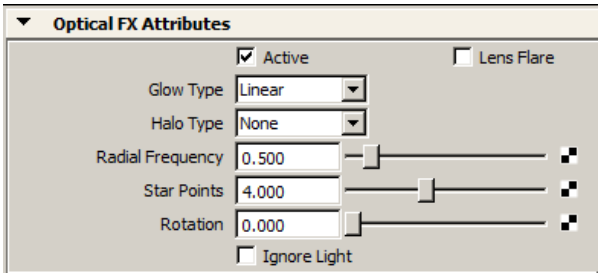


Figure 7-24 *The* ***Optical FX Attributes*** *area*

Active

The **Active** check box is used to switch the optical effects on or off. This check box is selected by default.

Lens Flare

The **Lens Flare** check box is used to simulate a bright light source illuminating the surfaces of a lens of a camera. It results in the reduction of contrast and creation of bright streak patterns on an image. To apply the lens effect to a scene, select the **Lens Flare** check box from the **Optical FX Attributes** area; the lens effect will be created on the selected light. Figure 7-25 shows the light without lens flare and Figure 7-26 shows the light with lens flare.



Figure 7-25 *Light without lens flare*

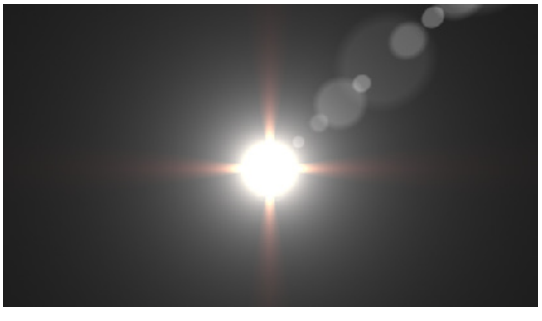


Figure 7-26 *Light with lens flare*

Glow Type

The **Glow Type** drop-down list is used to apply various glow effects to a selected light. The options available in this drop-down list are: **Linear**, **Exponential**, **Ball**, **Lens Flare**, and **Rim Halo**. Figures 7-27 through 7-31 show all these glow effects.

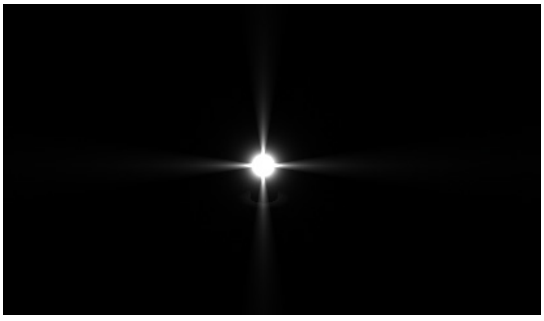


Figure 7-27 *Glow* ***Linear*** *effect*

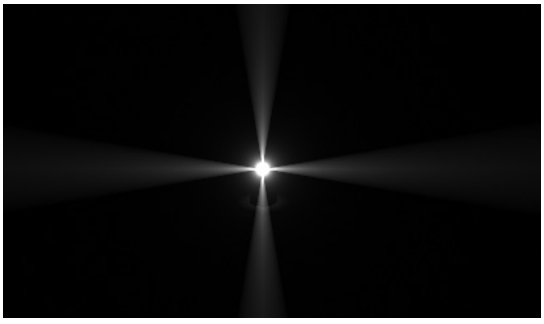


Figure 7-28 *Glow* ***Exponential*** *effect*



Figure 7-29 *Glow* ***Ball*** *effect*

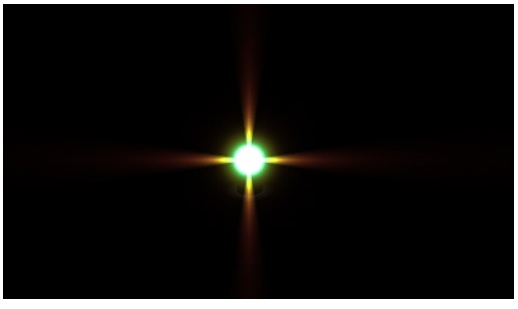


Figure 7-30 *Glow* ***Lens Flare*** *effect*

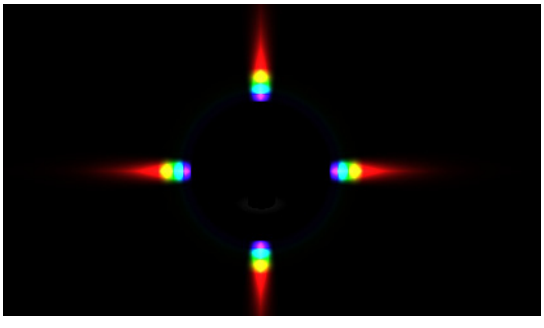


Figure 7-31 *Glow* ***Rim Halo*** *effect*

Radial Frequency

The **Radial Frequency** attribute is used to control the smoothness of the glow radial noise. To do so, enter the value in the **Radial Frequency** edit box or adjust the slider. The default range of slider is from 0 to 5, but manually you can enter a value to any extent in the edit box.

Halo Type

The **Halo Type** drop-down list is used to apply various halo effects to a selected light. Various halo type options available in this drop-down list are: **Linear**, **Exponential**, **Ball**, **Lens Flare**, and **Rim Halo**. Figures 7-32 through 7-36 show various halo effects.



Figure 7-32 *Halo* ***Linear*** *effect*

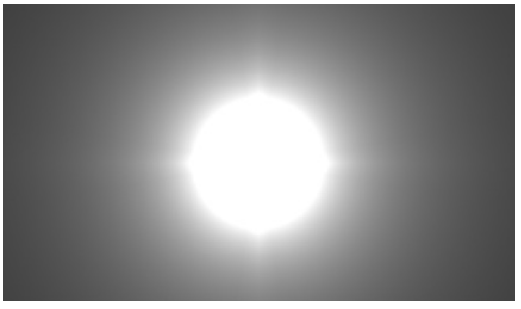


Figure 7-33 *Halo* ***Exponential*** *effect*



Figure 7-34 *Halo* ***Ball*** *effect*



Figure 7-35 *Halo* ***Lens Flare*** *effect*

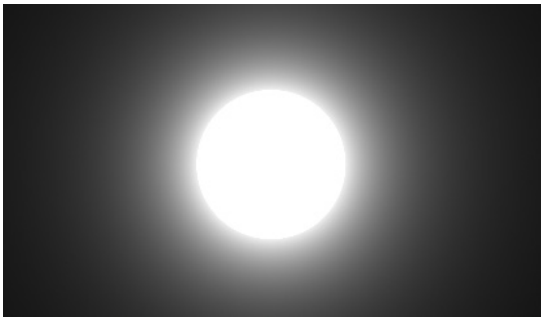


Figure 7-36 *Halo* ***Rim Halo*** *effect*

Star Points

The **Star Points** attribute is used to change the number of star points emitting from a light. Figures 7-37 and 7-38 show lights with different values in the **Star Points** edit box.

Rotation

The **Rotation** attribute is used to rotate the star effects and glow noise from the center of the light. To do so, enter a value in the **Rotation** edit box or adjust the slider to its right. The value of slider ranges from 0 to 360, but you can also enter any other value as per your requirement in the edit box. Its default value is 0 degree. Below the **Optical FX Attributes** area, other attributes such as **Glow Attributes, Halo Attributes**, **Lens Flare**, and so on are available. You can modify these attributes using the **Attribute Editor** to get the desired effects.



Figure 7-37 Light with ***Star Points*** *= 3*

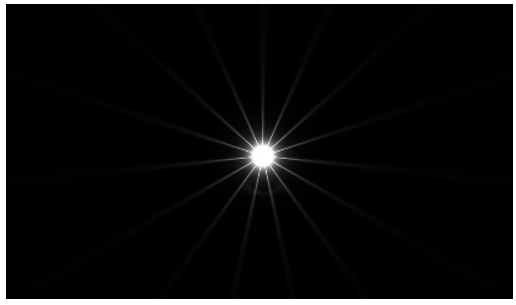


Figure 7-38 Light with ***Star Points*** *= 15*

PHYSICAL SUN AND SKY EFFECT

The **Physical Sun and Sky** feature is used to simulate natural daylight effect in a scene by using the **mental ray** renderer. To apply the **Physical Sun and Sky** effect to your scene, choose **Window > Settings/Preferences > Plug-in Manager** from the menubar; the **Plug-in Manager** dialog box will be displayed, as shown in Figure 7-39. In this dialog box, select the **Loaded** check box on the right of the **Mayatomr.mll** plug-in type and choose the **Refresh** button. Next, choose the **Close** button; the **Physical Sun and Sky** feature will be activated.

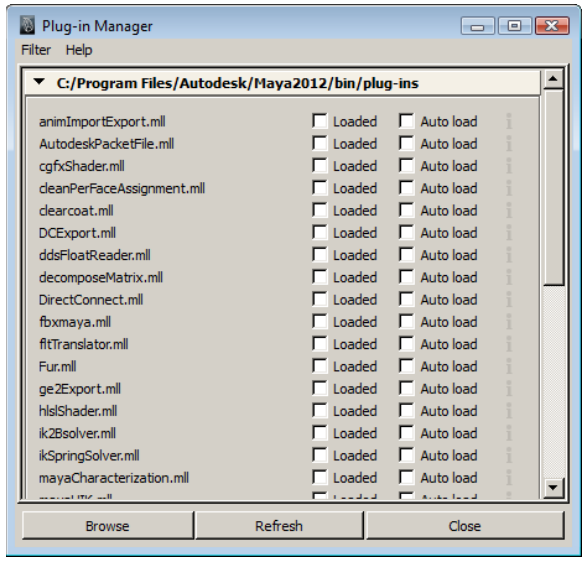


Figure 7-39 The ***Plug-in Manager*** *dialog box*

Next, choose the **Display Render Settings Window (Maya Software)** button from the Status Line; the **Render Settings** window will be displayed in the viewport. Select **mental ray** from the **Render Using** drop-down list; the **mental ray** renderer for rendering the scene will be activated. Choose the **Indirect Lighting** tab from this window; all attributes of indirect lighting will be displayed. Expand the **Environment** area, as shown in Figure 7-40 and then choose the **Create** button on the right of the **Physical Sun and Sky** attribute; a directional light will be created in the viewport. The directional light displays the effect of physical sun and sky in the scene. Figure 7-41 shows the Physical Sun and Sky effect applied to a scene.



Figure 7-40 *The* ***Environment*** *area*

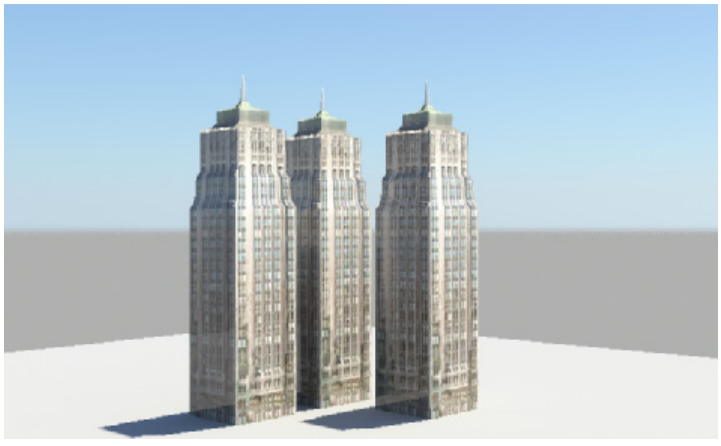


Figure 7-41 *The physical sun and sky effect applied to a scene*

LIGHT LINKING

Light linking is a phenomenon of linking light to specific objects in a scene. On linking light to an object, the light affects only the linked object in a scene. To do so, create a light in the scene and choose the **Rendering** menuset from the Status Line. Next, choose **Lighting/Shading > Light Linking Editor > Light-centric** from the menubar; the **Relationship Editor** will be displayed in the viewport, as shown in Figure 7-42. Choose the light source that you want to link and then select the object from the **Illuminated Objects** area of the **Relationship Editor**; the light source will illuminate only the linked object. Next, close the **Relationship Editor**.

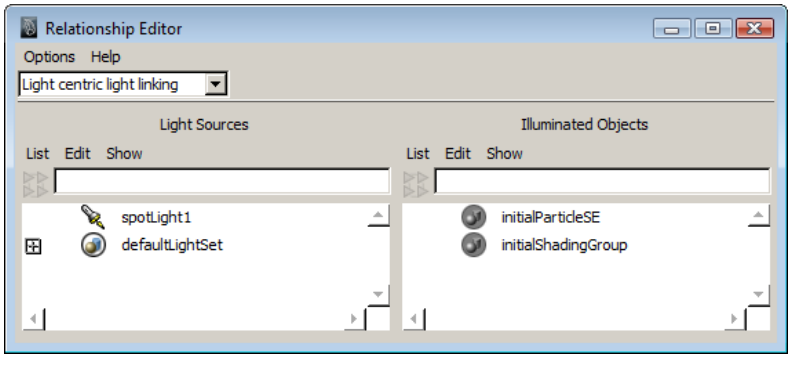


Figure 7-42 *The* ***Relationship Editor***

CAMERAS

In Autodesk Maya, **Cameras** are used to present a scene from different angles. These cameras play the role of still and video cameras of the real world. There are four types of cameras in Maya: **Camera**, **Camera and Aim**, **Camera Aim and Up**, and **Stereo Camera**. These camera types are discussed next.

Camera

Menubar: Create > Cameras > Camera

To create a camera, choose **Create > Cameras > Camera** from the menubar; a camera will be created in the viewport, as shown in Figure 7-43. You can adjust this camera to focus on any object, as shown in Figure 7-44. You can set the properties of the **Camera** camera type in the **Attribute Editor**. To do so, select the camera and choose **Display > UI Elements > Attribute Editor** from the menubar; the **Attribute Editor** will be displayed with camera attributes, as shown in Figure 7-45. These attributes are discussed next.

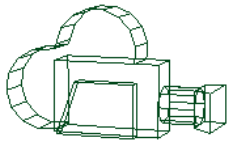


Figure 7-43 *A camera created*

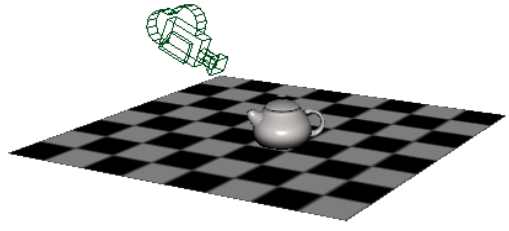


Figure 7-44 *The camera focusing on an object*

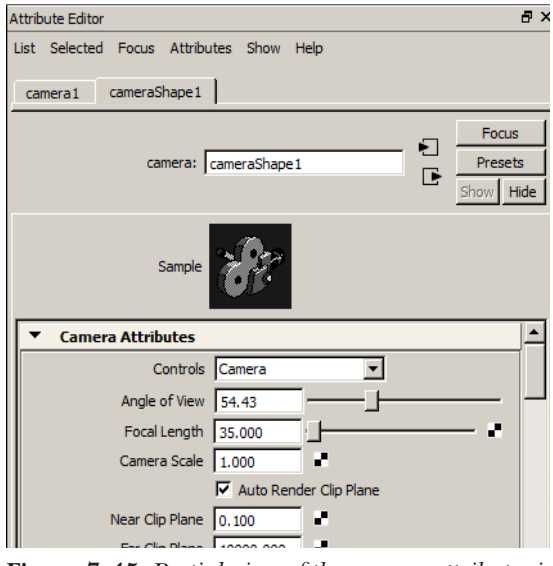


Figure 7-45 *Partial view of the camera attributes in the* ***Attribute Editor***

Controls

The **Controls** drop-down list is used to change the type of camera in the viewport. To do so, select the required camera from the drop-down list; the selected camera will be displayed in the viewport.

Angle of View

The **Angle of View** option is used to set the view angle of a camera. Choose **Panels > Perspective > camera1** from the **Panel** menu to switch from current view to the camera view. Next, move the **Angle of View** slider or enter a value in the edit box to set the view angle. By changing the view angle, you can view the effect of the camera on the screen simultaneously.

Focal Length

The **Focal Length** option is used to zoom in and zoom out the camera. Choose **Panels > Perspective > camera1** from the **Panel** menu to switch the current view to the camera view. Next, move the **Focal Length** slider or enter a value in the edit box to set the focal length. Increasing the **Focal Length** value will allow you to zoom in the view, thereby enabling you to have an enlarged view of the objects, whereas decreasing this value will make the objects appear smaller.

Camera Scale

The **Camera Scale** option is used to scale the size of the camera that is indirectly proportional to the scene. For example, on increasing the size of the camera, the scene will zoom out and vice versa.

Auto Render Clip Plane

This option is turned on by default. It automatically sets near and far clipping planes in such a way that all the objects in the scene come within the camera view.

Near and Far Clipping Planes

The **Near and Far Clipping Planes** are defined as two separate clipping planes set at some distance from the camera.



Note

Only objects placed between the clipping planes will be rendered.

Camera and Aim

Menubar: Create > Cameras > Camera and Aim

This type of camera has a target and an aim handle. It stays in accordance to the level of horizon. To create a **Camera and Aim** camera, choose **Create > Cameras > Camera and Aim** from the menubar; a camera with aim will be created in the viewport, as shown in Figure 7-46. Select the aim of the camera to focus it on an object, as shown in Figure 7-47. To modify the attributes of the **Camera and Aim** camera, select the camera in the viewport and choose **Window > Attribute Editor** from the menubar; the **Attribute Editor** with the properties of the **Camera and Aim** camera will be displayed. The attributes of the **Camera and Aim** camera are the same as those discussed in the **Camera** section.

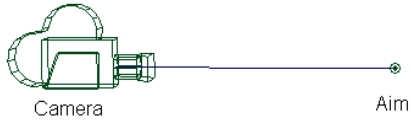


Figure 7-46 A camera with aim created

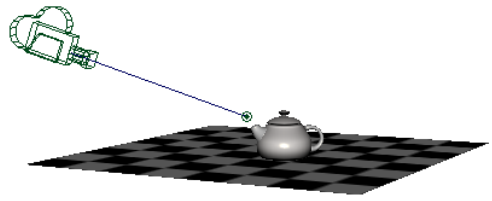


Figure 7-47 The camera with aim focusing on an object

Camera, Aim and Up

Menubar: Create > Cameras > Camera, Aim and Up

This type of camera has two handles: a **Direction Aim** handle and a **Target Aim** handle. To create a **Camera, Aim and Up** camera, choose **Create > Cameras > Camera, Aim and Up** from the menubar; a camera with the **Direction Aim** and **Target Aim** handles will be created in the viewport, as shown in Figure 7-48. Select the target aim of the camera to focus it on an object, as shown in Figure 7-49. You can select the direction aim of the camera to rotate it, that keeps the target fixed.

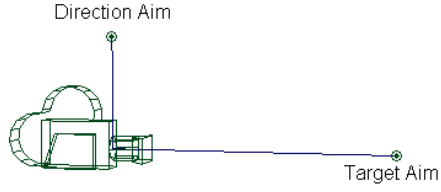


*Figure 7-48 A camera with the **Direction Aim** and **Target Aim** handles created*

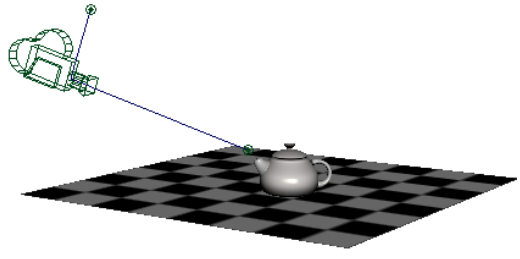


*Figure 7-49 The camera with **Direction Aim** and **Target Aim** handles focusing on an object*

To modify the attributes of the **Camera, Aim and Up** camera, select the camera in the viewport and choose **Window > Attribute Editor** from the menubar; the **Attribute Editor** will be displayed. The attributes of **Camera, Aim and Up** are same as those discussed in the **Camera** type section.

Stereo Camera

Menubar: Create > Cameras > Stereo Camera

This type of camera is used to create renders with illusion of a 3D depth of a scene. In this type of setting, Maya calculates all stereoscopic camera attributes to produce anaglyph/parallel kind of image. To create a **Stereo Camera**, choose **Create > Cameras > Stereo Cameras** from the menubar; a stereo camera will be created in the viewport. To change the view to a stereo camera view, choose **Panels > Stereo > Stereo Camera** from the **Panels** menu; the viewport will switch to a stereo camera view.

Multi-Stereo Rig

Menubar: Create > Cameras > Multi Stereo Rig

This tool is used to create multi-camera rig for stereo cameras. By default, it is done by three layered multi-layered camera rig.

TUTORIALS

Tutorial 1

In this tutorial, you will create a scene in which the light is scattering through a cylinder, as shown in Figure 7-50. **(Expected time: 15 min)**

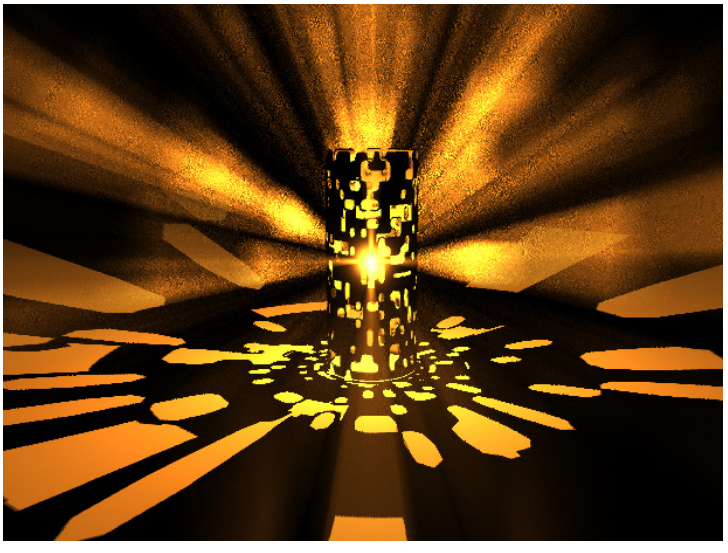


Figure 7-50 *The scene of a light scattering through a cylinder*

The following steps are required to complete this tutorial:

a. Create the project folder.
b. Create a cylinder.
c. Apply point light to the cylinder.
d. Save and render the scene.

Creating the Project Folder

Create a new project folder with the name *c07_tut1* at *\Documents\Maya_Tutorials* and then save the file with the name *c07tut1*, as discussed in Tutorial 1 of Chapter 2.

Creating a Cylinder

In this section, you need to create a cylinder through which the light will scatter in all directions.

1. Maximize the top viewport. Next, choose **Create > Polygon Primitives > Cylinder** from the menubar and then create a cylinder in the viewport.

2. Choose **Display > UI Elements > Channel Box/Layer Editor** from the menubar; **Channel Box/Layer Editor** is displayed. Enter the following values in the **Channel Box/Layer Editor** to set the properties of the cylinder:

   Translate Y: **5**

   INPUTS node
   Radius: **2** Height: **10** Subdivisions Axis: **50**
   Subdivisions Height: **25**

3. Press the numeric key 5 to switch to the shaded mode. Next, press and hold the right mouse button on the cylinder and then choose **Face** from the marking menu.

4. Maximize the persp viewport and press 5 to switch to the shaded mode. Next, delete the top and bottom faces of the cylinder .

5. Similarly, delete the other faces of the cylinder randomly, as shown in Figure 7-51.

6. Choose **Create > Polygon Primitives > Plane** from the menubar. Next, create a plane in the viewport. Now, choose the **Move Tool** from the Tool Box and place the plane below the cylinder.

7. Select **Polygons** from the **Menuset** drop-down list in the Status Line. Select all faces of the cylinder. Next, choose **Edit Mesh > Extrude** from the menubar; the **Thickness** slider is displayed. Move the slider toward the right to increase the thickness. Alternatively, enter the thickness value in the **Thickness** edit box.

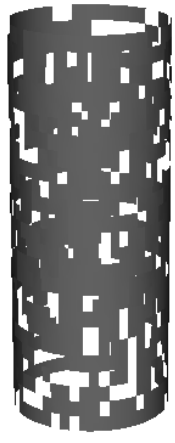


Figure 7-51 *Randomly deleted faces*

8. Select the cylinder and then choose **Mesh > Smooth** from the menubar to make the cylinder smooth.

Applying the Point Light to the Cylinder

In this section, you need to create a point light at the center of the cylinder. It will act as the source of light.

1. Choose **Create > Lights > Point Light** from the menubar to create a point light. Next, press CTRL+a; the **Channel Box/ Layer Editor** is displayed.

2. Enter **5** in the **Translate Y** edit box in **Channel Box/ Layer Editor**.

3. Select the light and press CTRL+a; the **Attribute Editor** is displayed with the properties of the point light.

4. In the **pointLightShape1** tab, click on the white color box on the right of the **Color** attribute; the **Color History** palette is displayed. Set the color of the light to orange. Alternatively set the values as given next:

   R: **0.667** G: **0.35** B: **0.078**

   Next, click anywhere outside the palette to close it. Enter **10** in the **Intensity** edit box.

5. Expand the **Light Effects** area. Click on the checker box on the right side of the **Light Fog** attribute; the **lightFog1** tab is displayed in the **Attribute Editor**.

6. Select the point light in the viewport. Next, choose **pointlightShape1** tab in the **Attribute Editor** and specify the parameters as follows:

   Fog Radius : **20** Fog Intensity: **4**

7. Click on the checker box beside the **Light Glow** attribute; a light glow is created in the scene.

8. In the **pointLightshape1** tab in the **Attribute Editor**, expand the **Shadows** area and select the **Use Depth Map Shadows** check box in the **Depth Map Shadow Attributes** area.

9. In the **Depth Map Shadow Attributes** area, specify the values of the parameters as follows:

   Resolution: **1024**
   Fog Shadow Intensity: **2** Fog Shadow Samples: **25**

10. In the **sphereShape1** tab, expand the **Render Stats** area. Next, select the **Volume Sample Override** check box and enter **2** in the **Volume Samples** edit box.

Saving and Rendering the Scene

In this section, you will save the scene that you have created and then render it. You can view the final rendered image of the scene by downloading the *c07_maya_2013_rndr.zip* file from *http://www.cadcim.com*. The path of the file is as follows:

Textbooks > Animation and Visual Effects > Maya > Autodesk Maya 2013: A Comprehensive Guide

1. Choose **File > Save Scene** from the menubar.

2. Maximize the persp viewport, if it is not already maximized. Choose the **Render the current frame (Maya Software)** button from the Status Line; the **Render View** window is displayed. This window shows the final output of the scene, refer to Figure 7-52.

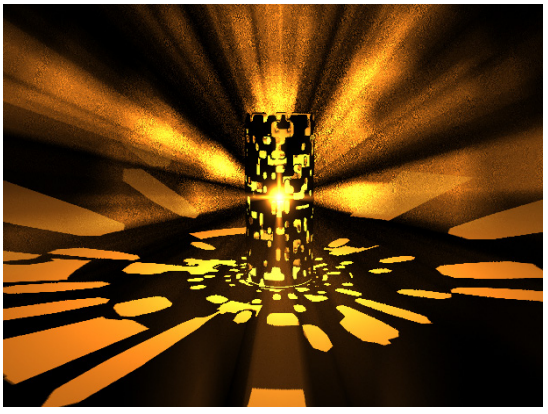


Figure 7-52 *The final rendered scene*

Tutorial 2

In this tutorial, you will create an underwater scene, as shown in Figure 7-53.

(Expected time: 30 min)



Figure 7-53 *An underwater scene*

The following steps are required to complete this tutorial:

a. Create the project folder.
b. Download and open the file.
c. Apply lights to the scene.
d. Save and render the scene.

Creating the Project Folder

Create a new project folder with the name *c07_tut2* at *\Documents\Maya_Tutorials* and then save the file with the name *c07tut2*, as discussed in Tutorial 1 of Chapter 2.

Downloading and Opening the File

In this section, you will download and open the file.

1. Download the *c07_maya_2013_tut.zip* file from *http://www.cadcim.com*. The path of the file is as follows:

   Textbooks > Animation and Visual Effects > Maya> Autodesk Maya 2013: A Comprehensive Guide

2. Extract the contents of the zipped file to the *Documents* folder. Next, copy *texture_light.jpg* file to the *sourceimages* folder at the location *\Documents\Maya_Tutori*als*\c07_tut2.*

3. Choose **File > Open Scene** from the menubar; the **Open** dialog box is displayed. In this dialog box, browse to *\Documents\c07_maya_2013_tut* and select *c07_tut2_start.mb* file in it. Choose the **Open** button; the file opens.

4. Now, choose **File > Save Scene As** from the menubar; the **Save As** dialog box is displayed. As the project folder is already set, the path *\Documents\Maya_Tutorials\c07_tut2\scenes* is displayed in the **Look In** drop-down list. Save the file with the name **c07tut2.mb** in this folder.

Applying Lights to the Scene

In this section, you need to apply lights to the scene.

1. Choose **Create > Lights > Spot Light** from the menubar; the spot light is created in the viewport.

2. Maximize the front viewport; the light is displayed in the viewport, as shown in Figure 7-54. Use the **Rotate Tool** and **Move Tool** to adjust the spot light, as shown in Figure 7-55.

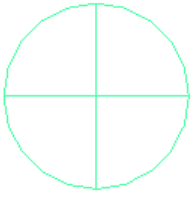


Figure 7-54 *Placement of spot light in the front viewport*

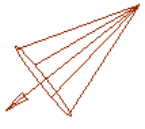


Figure 7-55 *Spot light after the adjustment in the front viewport*

3. Choose **Display > Show > Light Manipulators** from the menubar; the light manipulators are displayed, as shown in Figure 7-56. Select the manipulator ring 10, press and hold the left mouse button on it, and then move it downward till the number on the ring changes to 100; the fog area of the light is increased.

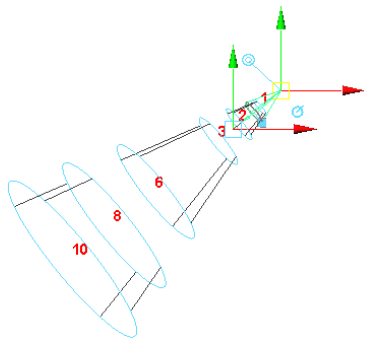


Figure 7-56 *The light manipulators*

4. Choose **Display > Hide > Light Manipulators** from the menubar to hide the manipulators. Next, select the light and choose **Display > UI Elements > Channel Box/Layer Editor** from the menubar; the **Channel Box/Layer Editor** is displayed. Enter **20** in the **Translate Y** edit box of the **Channel Box/Layer Editor** to position the spot light.

5. Select the spot light and choose **Window > Attribute Editor** from the menubar; the **Attribute Editor** is displayed. Next, choose the checker button on the right of the **Color** attribute; the **Create Render Node** window is displayed. Choose the **File** button from the **Create Render Node** window; the **File Attributes** area is displayed in the **Attribute Editor**.

6. Choose the folder icon from the **Image Name** attribute in the **Attribute Editor**; the **Open** dialog box is displayed. Select **texture_light.jpg** in this dialog box and then choose the **Open** button to open the selected file.

7. Select the spot light and enter **60** in the **Cone Angle** in the **Attribute Editor**. Expand the **Light Effects** area in the **Attribute Editor**. Next, choose the checker button on the right of the **Light Fog** attribute to apply the fog effect to the spot light.

8. Select the spot light, and then set **Fog Spread** to **1.5** and **Fog Intensity** to **2** in the **Attribute Editor**.

9. Press CTRL+a; the **Channel Box/Layer Editor** is displayed. Enter the values of the following parameters:

Translate X: **1.034**	Translate Y: **51.527**	Translate Z: **1.499**
Rotate X: **121.306**	Rotate Y: **73.369**	Rotate Z: **-180**

10. Maximize the persp viewport and choose the **Render the current frame (Maya Software)** button from the Status Line to view the fog effect, as shown in Figure 7-57.

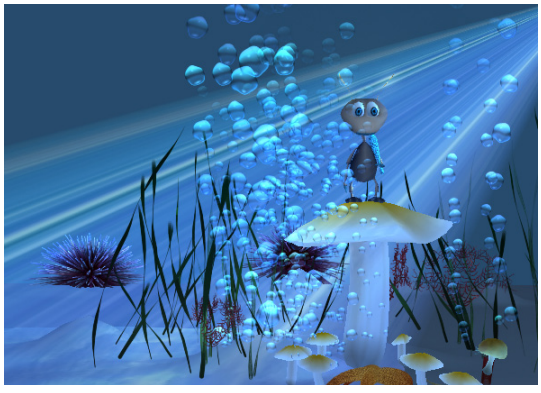


Figure 7-57 *The Fog effect*

11. Choose **Create > Lights > Ambient Light** from the menubar to create an ambient light in the scene. Set the parameters of the ambient light in the **Channel Box/Layer Editor** as follows:

    Translate X: **65** Translate Y: **26** Translate Z: **152**

12. Choose the **Rendering** menuset from the **Menuset** drop-down list Status Line. Next, choose **Lighting/Shading > Light Linking Editor > Light-Centric** from the menubar; the **Relationship Editor** is displayed.

13. Choose spot light from the **Light Sources** area and **group1** from the **Illuminated Objects** area in the **Relationship Editor** to link the light to the object.

14. Choose **Panels > Perspective > camera1** from the **Panels** menu to switch from the persp view to the camera view. Adjust the camera, if required.

Saving and Rendering the Scene

In this section, you will save the scene that you have created and then render it. You can view the final rendered image of the scene by downloading the *c07_maya_2013_rndr.zip* file from *http://www.cadcim.com*. The path of the file is as follows:

Textbooks > Animation and Visual Effects > Maya > Autodesk Maya 2013: A Comprehensive Guide

1. Choose **File > Save Scene** from the menubar.

2. Maximize the persp viewport, if it is not already maximized. Choose the **Render the current frame (Maya Software)** button from the Status Line; the **Render View** window is displayed. This window shows the final output of the scene, refer to Figure 7-53.

Tutorial 3

In this tutorial, you will add lighting effects to a living room, as shown in Figure 7-58.

(Expected time: 15 min)



Figure 7-58 *The living room*

The following steps are required to complete this tutorial:

a. Create the project folder.
b. Download and open the file.
c. Apply lights to the scene.
d. Save and render the scene.

Creating the Project Folder

Create a new project folder with the name *c07_tut3* at *\Documents\Maya_Tutorials* and then save the file with the name *c07tut3*, as discussed in Tutorial 1 of Chapter 2.

Downloading and Opening the File

In this section, you need to download and open the file.

1. Download the *c07_maya_2013_tut.zip* file from *http://www.cadcim.com*. The path of the file is as follows:

   Textbooks > Animation and Visual Effects > Maya> Autodesk Maya 2013: A Comprehensive Guide

2. Choose **File > Open Scene** from the menubar; the **Open** dialog box is displayed. In this dialog box, browse to *\Documents\c07_maya_2013_tut* and select *c07_tut3_start.mb* file in it. Choose the **Open** button; the file opens.

3. Now, choose **File > Save Scene As** from the menubar; the **Save As** dialog box is displayed. As the project folder is already set, the path *\Documents\Maya_Tutorials\c07_tut3\scenes* is displayed in the **Look In** drop-down list. Save the file with the name *c07tut3.mb* in this folder.

Applying Lights to the Scene

In this section, you need to create point lights and then apply them to the scene.

1. Maximize the top viewport. Choose **Create > Lights > Point Light** from the menubar; a point light is created.

2. Choose the **Move Tool** from the Tool Box and move the point light to point 1 in the top viewport, refer to Figure 7-60. Select the light and choose **Window > Attribute Editor** from the menubar; the **Attribute Editor** is displayed. Set the parameters of the light in the **Attribute Editor** as follows:

   Intensity : **0.3** Decay rate : **Quadratic**

3. Similarly, create more point lights and adjust them to different points in the dining room, as shown in Figure 7-59. Now, enter values for these lights in the **Attribute Editor**. The point lights with their intensity and decay rate values are shown in Table 7-1.

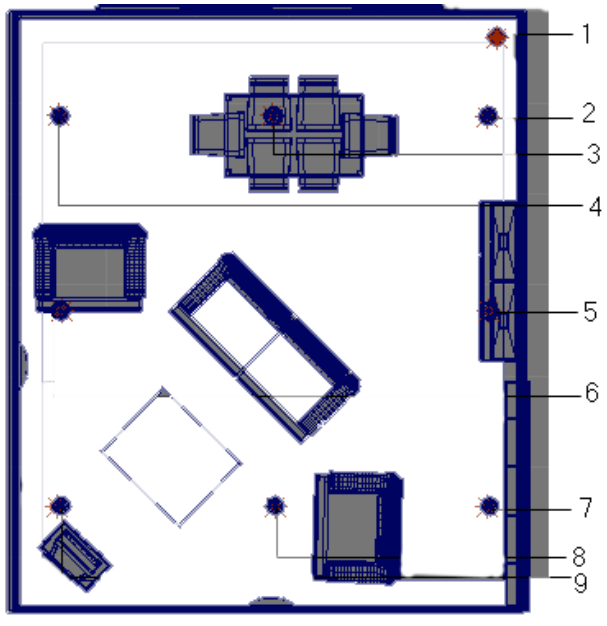


Figure 7-59 *Point lights in the living room*

Light No.	Intensity	Decay Rate
1	0.3	Quadratic
2	0.2	Quadratic
3	0.2	Quadratic
4	0.3	Quadratic
5	0.2	Quadratic
6	0.3	Quadratic
7	0.3	Quadratic
8	0.3	Quadratic
9	0.2	Quadratic

Table 7-1 *Point lights with their intensity and decay rate values*

4. Maximize the side viewport. Select all lights in the viewport. Next, choose the **Move Tool** and move all the lights upward along the Y axis, toward the ceiling of the room, as shown in Figure 7-60.

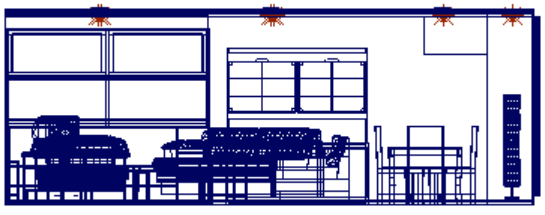


Figure 7-60 *The lights moved toward the ceiling*

5. Maximize the top viewport and then create a point light in the viewport, as shown in Figure 7-61. This light acts as a fill light for the scene. Select the light and choose **Display > UI Elements > Channel Box/Layer Editor** from the menubar; the **Channel Box/Layer Editor** is displayed. In the **Channel Box/Layer Editor**, set the value in **Translate Y** to **2.8**.

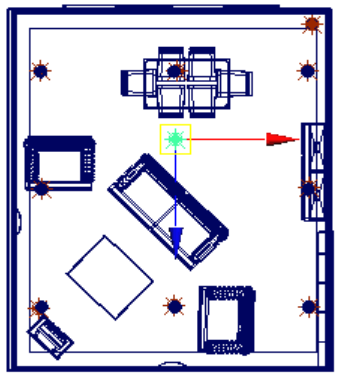


Figure 7-61 *Point light created*

6. Select the light and choose **Edit > Duplicate** from the menubar; a duplicate selected light is created in the viewport, overlapping the selected light. Place the duplicate light near the point light 8, refer to Figure 7-60. Next, choose **Window > Attribute Editor** from the menubar; the **Attribute Editor** is displayed. Specify the following parameters for the point light in the **Attribute Editor**:

Intensity : **0.8** Decay Rate : **No decay**

7. Choose **Panels > Perspective> persp1** from the **Panel** menu to set the current view to the camera view. *Persp1* is the name of the camera used in the scene. Render the scene to preview the lighting of the scene, as shown in Figure 7-62.

Note
You can try different options to get different light effects in the scene.

8. There are certain areas in the scene that are still not lit up. To light up those areas, apply the light through the camera angle and create point lights, as shown in Figure 7-63.

9. Choose **Window > Attribute Editor** from the menubar; the attributes of the selected light are displayed. Set **Intensity** to **0.7** and **Decay Rate** to **Quadratic** for the selected light in the **Attribute Editor**.



Figure 7-62 *The preview*

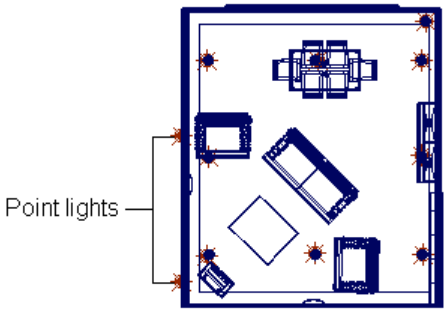


Figure 7-63 *Point lights created*

Saving and Rendering the Scene

In this section, you will save the scene that you have created and then render it. You can view the final rendered image of the scene by downloading the *c07_maya_2013_rndr.zip* file from *http://www.cadcim.com*. The path of the file is as follows:

Textbooks > Animation and Visual Effects > Maya > Autodesk Maya 2013: A Comprehensive Guide

1. Choose **File > Save Scene** from the menubar.

2. Maximize the persp viewport, if it is not already maximized. Choose the **Render the current frame (Maya Software)** button from the Status Line; the **Render View** window is displayed. This window shows the final output of the scene, refer to Figure 7-64.



Figure 7-64 *The final scene after rendering*

Self-Evaluation Test

Answer the following questions and then compare them to those given at the end of this chapter:

1. In which of the following area is the **Light Effects** attribute located?

(a) **Attribute Editor** (b) **Channel Box/Layer Editor**
(c) Tool Settings (d) None of these

2. Which of the following lights is particularly used to focus on an object?

(a) **Spot Light** (b) **Ambient Light**
(c) **Area Light** (d) None of these

3. A _____ emits light from a specific point and radiates it out in a conical shape.

4. The _____ behaves more like a point light as its **Ambient Shade** parameter approaches to 1.

5. The _____ is a phenomenon of linking light to particular objects in a scene.

6. The _____ attribute is used to control the brightness of the spot light near edges.

7. The _____ **Frequency** attribute helps you control the smoothness of the glow radial noise.

8. The **Physical Sun and Sky** option works only with the **mental ray** renderer. (T/F)

9. The **Focal Length** option is used to zoom in and out of the camera. (T/F)

10. The working of the spot light is similar to that of the directional light. (T/F)

Review Questions

Answer the following questions:

1. How many types of cameras are there in Maya?

   (a) Two (b) Five
   (c) Four (d) One

2. Which of the following attributes is used to control the smoothness of the glow radial noise?

   (a) **Halo Type** (b) **Radial frequency**
   (c) **Star Points** (d) **Rotation**

3. A _____ attribute is used to spread fog coming from the spot light.

4. The _____ attribute is used to control the intensity of the light from the center to the edge of the spot light beam area.

5. The _____ **Angle** attribute is used to set the focus area of the spot light.

6. The _____ check box is used to add the lens flare effect to a selected light.

7. The _____ light is like a point light that projects rays uniformly in all directions.

8. The **Cone Angle** attribute is used to control the brightness of the spot light near edges. (T/F)

9. The halo types in the **Halo Type** drop-down list are: **Linear**, **Exponential**, **Ball**, **Lens Flare**, and **Rim Halo**. (T/F)

10. The **Bias** attribute in **Raytraced Shadow Attributes** area is used to control the softness of shadow edge. (T/F)

Exercises

Exercise 1

Download the file *c07_maya_2013_exr.zip* from *http://www.cadcim.com*. Extract the contents of the zipped file. Next, open the scene, refer to Figure 7-65 and apply textures to it. You can view the final rendered image of this model by downloading the *c07_maya_2013_exr.zip* file from *http://www.cadcim.com*. The path of the file is as follows: **(Expected time: 15 min)**

Textbooks > Animation and Visual Effects > Maya > Autodesk Maya 2013: A Comprehensive Guide

Apply the physical sun and sky effect to the textured model to get the output shown in Figure 7-66.

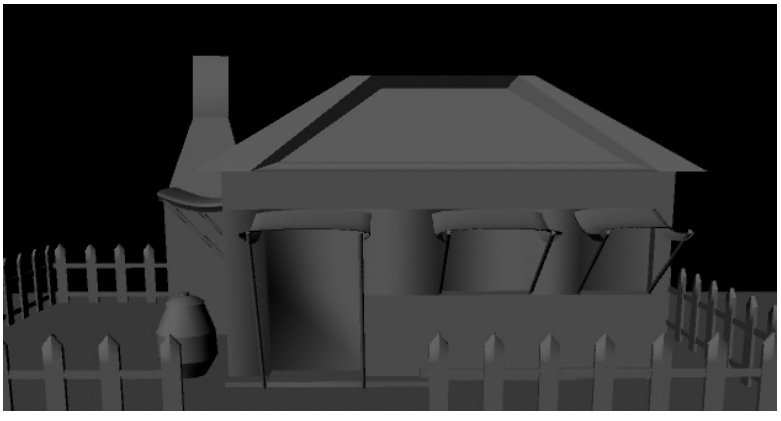


Figure 7-65 *The untextured model*



Figure 7-66 *The physical sun and sky effect applied to the model*

Exercise 2

Download the file *c07_maya_2013_exr.zip* from *http://www.cadcim.com*. Extract the contents of the zipped file and open the scene. The textured scene of an interior is shown in Figure 7-67. You can view the final rendered image of this scene by downloading the *c07_maya_2013_exr.zip* file from *http://www.cadcim.com*. The path of the file is mentioned in Exercise 1.

(**Expected time: 30 min**)

By default, the textured model will be visible in the viewport, refer to Figure 7-68. Apply lights to the textured model to get the output shown in Figure 7-68.



Figure 7-67 *The textured model of an interior*

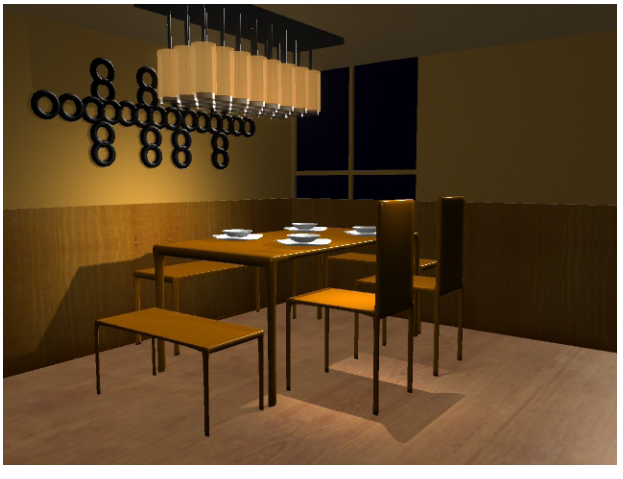


Figure 7-68 *The model after applying lights*

Answers to Self-Evaluation Test

1. a, **2.** a, **3. Spot Light**, **4.** Ambient Light, **5.** Light linking, **6. Drop-off**, **7. Radial**, **8.** T, **9.** T, **10.** T