Lights and Cameras

Learning Objectives

After completing this chapter, you will be able to:
- ***Work with standard lights***
- ***Work with photometric lights***
- ***Use the Place Highlight tool***
- ***Work with Camera tools***
- ***Understand camera viewport controls***
- ***Work with the Align Camera tool***

INTRODUCTION

In 3ds Max, lights are used to illuminate a scene and thereby making it more realistic. They are also used to create the sources of illumination such as street lights, flashlights, and so on. The two main categories of lights available in 3ds max are: **Standard** and **Photometric**. In these categories, different types of lights are available. You need to select one or more lights based on the requirement of a scene. The Photometric lights provide more realistic lighting effects but they are more complex than the Standard lights.

STANDARD LIGHTS

In 3ds Max, the Standard lights are objects that simulate lights. You can create eight types of Standard lights in 3ds Max. To create a light in a scene, choose **Create > Lights** in the **Command Panel**. By default, the **Photometric** option will be displayed in the drop-downlist below the **Lights** button. Select the **Standard** option from the drop-down list. You can choose one of the tools available in the **Object Type** rollout to create different types of lights in the viewport, refer to Figure 13-1. When you choose a tool from the **Object Type** rollout, various rollouts will be displayed. These rollouts are used to modify the parameters of lights. The tools in the **Object Type**rollout are discussed next.
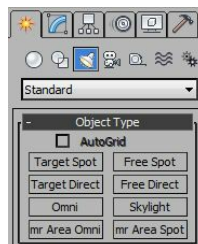

Figure 13-1 *The tools to create standard lights in the **Object Type** rollout*

Omni

Menu bar: Create > Lights > Standard Lights
> Omni

The **Omni** tool is used to create an omni light in the viewport. An omni light is a single point in space that projects the rays uniformly in all directions. To create an omni light, choose the **Omni** tool; the **Name and Color**, **General Parameters**, **Intensity/Color/Attenuation**, **Advanced Effects**, **Shadow Parameters**, and **Shadow Map Params** rollouts will be displayed in the Modify panel. Move the cursor in the viewport; the shape of the cursor will change. Click in the viewport to place the light. You can continue clicking in the viewport to add more than one light. Next, right-click in the viewport to exit the command. To modify the parameters of a light, select the light and choose the **Modify** tab in the **Command Panel**; various rollouts will be displayed. These rollouts are used to modify the parameters of the selected light. The most commonly used rollouts are discussed next.

Name and Color Rollout

This rollout is used to modify the name of the selected light by entering the new name in the text box. You can also modify the color of the selected light using the color swatch. But, this will only change the color of the geometry of the light in the viewport and will not affect the color of the light being emitted.

General Parameters Rollout

The options in this rollout are used to set the parameters of the selected light, refer to Figure 13-2. In the **Light Type** area of this rollout, the **On** check box is selected by default. As a result, the light will illuminate the scene, refer to Figures 13-3 and
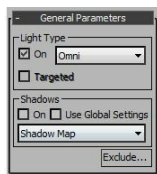

*Figure 13-2 The **General Parameters** rollout*

13-4. If you clear the **On** check box, then the light will not illuminate the scene. The drop-down list on the right side of the **On** check box is used to define the type of light. By default, the **Omni** option is selected in this drop-down list. You can also select the **Directional** or the **Spot** option to convert the omni light into directional or spot light. The **Targeted** check box is activated only if the **Directional** or **Spot Light** option is selected from the drop-down list. On selecting any of these options, a spinner will be displayed next to the **Targeted** check box. The value in the spinner is used to specify the distance of the target from the light. You will learn about the spot and directional lights later in this chapter.
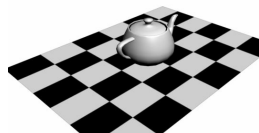

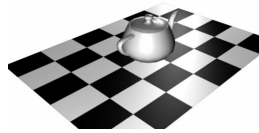*Figure 13-3 The scene without any light*

Figure 13-4 The scene with the omni lights applied

In the **Shadows** area, select the **On** check box. As a result, the light will cast the shadow of the object on rendering. You can also preview the shadows in the realistic viewports. The procedure for viewing the shadows in the shaded viewports is discussed next.

By default, the **Realistic** shading is displayed in the Perspective viewport. In the **Realistic** shading type, shadows are displayed by default in the viewport. When you click on it, a flyout will be displayed. First, choose the **Shaded** option and then choose the **Lighting and Shadows** option from the flyout; a cascading menu will be displayed, as shown in Figure 13-5. Note that in this menu the **Shadows** option is chosen by default.

Next, when you place a light in the viewport, select it and right-click on it; a quad menu will be displayed, as shown in Figure 13-6. Choose the **Cast Shadows** option; the shadows of the object will be displayed on rendering. Figure 13-7 shows the shadow of the object displayed in the Perspective viewport with the **Realistic** shading type.
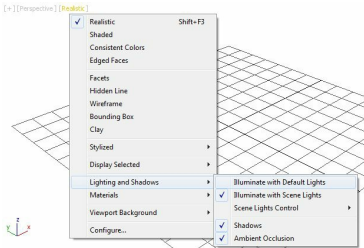

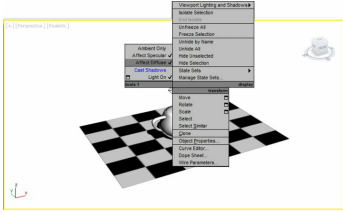*Figure 13-5 The cascading menu displayed in the viewport*

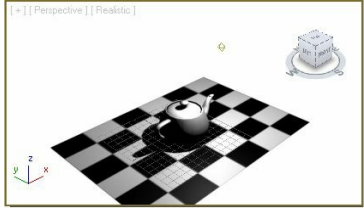*Figure 13-6 The quad menu displayed
in the viewport*

*Figure 13-7 The shadow of the object with the **Realistic** shading type*

To display the shadows for more than one lights in the scene, choose **Tools > Light Lister** from the menu bar; the **Light Lister** window will be displayed, as shown in Figure 13-8. This dialog box will display the description of all lights used in the scene. Now, select the check box(es) in the **Shadows** column; the shadows of the light corresponding to the selected check box(es) will be displayed in the viewport.
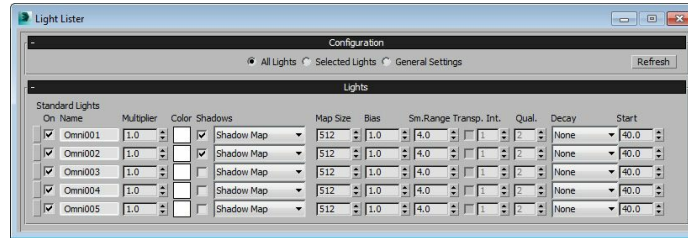

*Figure 13-8 The **Light Lister** window*

The drop-down list next to the **Shadows** check box in the **Light Lister** window is used to select the types of shadow for the light.

The **Use Global Settings** check box is located next to the **On** check box. This check box is used to cast shadows of the light as per the global settings. The drop-down list below the check boxes is used to specify the shadow map that the renderer will use while generating the shadows of the light. By default, the **Shadow Map** is selected in this drop-down list. It specifies the map which the renderer will use, while generating the shadows of the light.

The **Exclude** button is used to select the objects in the scene that you do not want to get affected by the light at rendering. By default, the light affects all objects in the scene. To exclude or include an object from the effect of the light, choose the **Exclude** button; the **Exclude/Include** dialog box will be displayed, as shown in Figure 13-9. The **Scene Objects** area on the left side of this dialog box displays the list of all objects in the current scene. On the top right of this dialog box, there are two radio buttons namely, **Include** and **Exclude**. By default, the **Exclude** radio button is selected. As a result, the objects will be excluded from the effect of light. To do so, select the objects that you want to exclude from the list displayed in the **Scene Objects** area. Then, choose the right arrow button;

the selected object will be excluded from the selected light. Also, they will be displayed in the area on the right side of this dialog box. Similarly, to include the excluded objects again, select the excluded objects from the area on the right side, and choose the left arrow button; the selected objects will be included. Next, choose the **OK** button.
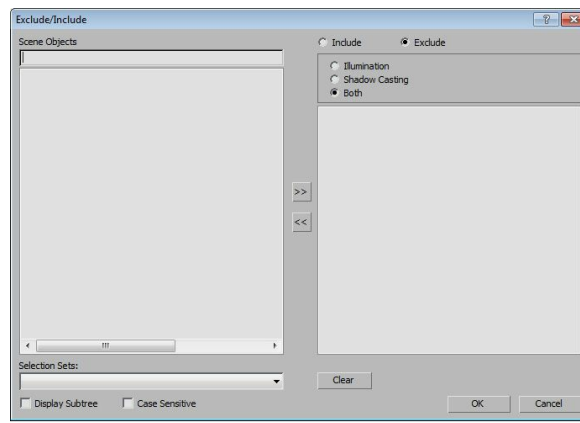
Figure 13-9 The **Exclude/Include** *dialog box*

Intensity/Color/Attenuation Rollout

The options in this rollout are used to set the color, intensity, and attenuation of the light, refer to Figure 13-10. The decrease in the intensity of light with distance is called attenuation.The **Multiplier** spinner in this rollout is used to set the intensity of the light. By default, the value in this spinner is 1.0. You can increase or decrease the value to increase or decrease the brightness of the light. Choose the color swatch on the right side of the **Multiplier** spinner; the **Color Selector: Light Color** dialog box will be displayed. Select the color of the light and choose the **OK** button to assign a new color to the light. The areas in the **Intensity/Color/Attenuation** rollout are discussed next.

Note

*If you increase the value in the **Multiplier** spinner to a very high extent, the scene will burned out. So, it is recommended that you increase the value gradually as required for the scene.*

Decay Area

The options in this area are used to reduce the intensity of the light over the distance. The **Type** drop-down list is used to define the type of decay that will be used for the selected light. By default, the **None** option is selected and therefore no decay is applied to the light, refer to Figure 13-11. In this case, if you use the options in the **Far Attenuation** area, then the decay will be applied to the light according to the values in the **Start** and **End** spinners. Select the **Inverse** option in the **Type** drop-down list to apply the light with intensity varying inversely with respect to distance, as shown in Figure 13-12. Select the **Inverse Square** option to apply the light intensity that varies with square inverse proportion with respect to distance, as shown in Figure 13-13. The **Inverse** and **Inverse Square** options use some mathematical equations to apply the decay effect on the light. When you select the **Inverse** or the **Inverse Square** option, the gizmo will be displayed in the viewport for the selected light to define the distance from where the decay starts. Set the value in the **Start** spinner of the **Decay** area to specify the distance from where the decay starts. On selecting the **Show** check box, a gizmo will be displayed even if the light is not selected.
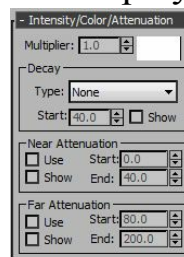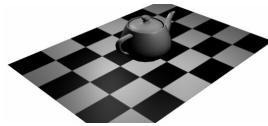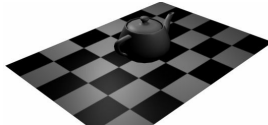
Figure 13-10 The *Intensity/Color/Attenuation* rollout

Figure 13-11 The effect of light on selecting the *None* option

Figure 13-12 The effect of light on selecting the *Inverse* option

Figure 13-13 The effect of light on selecting the *Inverse Square* option

Near Attenuation Area

The **Near Attenuation** area is used to set the distance at which the light begins to fade in. Select the **Use** check box to enable the near attenuation for the selected light; a gizmo will be displayed in the viewport to define the near attenuation. Select the **Show** check box to display the gizmo in the viewport even if the light is not selected. Set the value in the **Start** spinner to define the distance at which the light begins to fade in. Set the value in the **End** spinner to define the distance at which the light reaches its maximum value that is 100%.

Far Attenuation Area

The **Far Attenuation** area is used to set the distance at which the light begins to fade out. Select the **Use** check box to enable the far attenuation for the selected light; a gizmo will be displayed in the viewport to define the far attenuation. Select the **Show** check box to display the gizmo in the viewport even if the light is not selected. Set the value in the **Start** spinner to define the distance at which the light begins to fade out. Set the value in the **End** spinner to define the distance at which the light reaches its minimum value that is zero.

Advanced Effects Rollout

The options in this rollout are used to set the effects of light on surfaces, refer to Figure 13-14. This rollout is also used to provide settings for the projector lights. The areas in this rollout are discussed next.
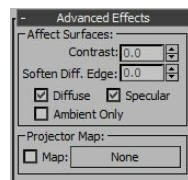
Figure 13-14 The *Advanced Effects* rollout

Affect Surfaces Area

The **Contrast** spinner in this area is used to adjust the contrast between different areas of the object that are affected by the diffuse and ambient lights. By default, the value in this spinner is 0, which provides the normal contrast. Set the value in the **Soften Diff. Edge** spinner to soften the transition between the ambient and the diffuse areas. The **Diffuse** and **Specular** check boxes are selected by default and are used to affect the diffuse and specular light areas, respectively. If you clear the **Diffuse** or **Specular** check box, the light will not affect the diffuse or specular property of the surface. On selecting the **Ambient Only** check box, the light will affect only the ambient area of the illumination.

Projector Map Area

This area is used to make a light act as a projector. To do so, select the light in the viewport and choose the **Modify** tab in the **Command Panel**. Now, in the **Projector Map** area of the **Advanced Effects** rollout, select the **Map** check box to enable the projector effect. Next, choose the **None** button; the **Material/Map Browser** dialog box will be displayed. Choose the map type from the **Material/Map Browser** dialog box; the name of the material will be displayed on the **None** button and the selected map will be projected in the scene at rendering.

Note
*You can adjust the settings of the projector map in the **Material Editor** dialog box.*

Shadow Parameters Rollout

The options in this rollout are used to control the properties of the shadow, refer to Figure 13-15. Choose the color swatch from the **Object Shadows** area to modify the color of the shadow. The **Dens.** spinner is used to adjust the density of the shadow. By default, the value in this spinner is 1.0. On increasing the value, the shadow will become denser or darker. Select the **Map** check box to assign a map to the shadow. To do so, choose the map button labeled as **None** and assign a map as discussed earlier; the selected map will be displayed in the shadow, as shown in Figure 13-16. Select the **Light Affects Shadow Color** check box to blend the color of the light with the shadow.

The **Atmosphere Shadows** area in the **Shadow Parameters** rollout is used to enable the different atmospheric effects, such as volume fog, to cast shadows in a scene. The **On** check box is used to cast the shadow by using the atmospheric effect, when the light passes through them. The **Opacity** spinner is used to control the opacity of the shadows cast by the atmospheric effect. The **Color Amount** spinner is used to adjust the blending of the atmosphere's color and the shadow color.
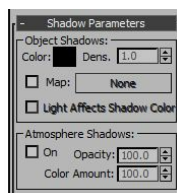
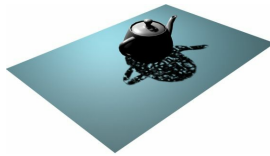***Figure 13-15*** *The **Shadow Parameters** rollout*

Figure 13-16 *A dent map used as a shadow map*

Atmospheres & Effects Rollout

The options in this rollout are used to assign special effects such as fog, lighting effects, and so on to the environment on rendering, refer to Figures 13-17 and 13-18. To assign a special effect to the scene, select the light in the viewport and expand the **Atmospheres & Effects** rollout. Now, choose the **Add** button; the **Add Atmosphere or Effect** dialog box will be displayed, as shown in Figure 13-19. Select the effect from this dialog box to add it to the light selected in the viewport and choose the **OK** button; the selected effect will be displayed in the **Atmospheres & Effects** rollout. Next, select the effect from the **Atmospheres & Effects** rollout and choose the **Setup** button; the **Environment and Effects** dialog box will be displayed, refer to Figure 13-20. You can set the parameters of the selected effect using the corresponding rollout in this dialog box. If you want to delete an effect from the scene, select the effect in the **Atmospheres & Effects** rollout and choose the **Delete** button.

Note

*To view the hidden rollouts of the selected effect in the **Environment and Effects** dialog box, hover the cursor over the dialog box until the shape of the cursor changes to the hand icon. Next, drag the cursor up or down to see the hidden rollouts.*
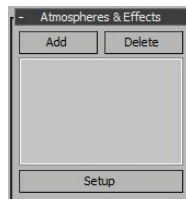

Figure 13-17 *The **Atmospheres & Effects** rollout*

Figure 13-18 *The lens effect applied to the omni light*
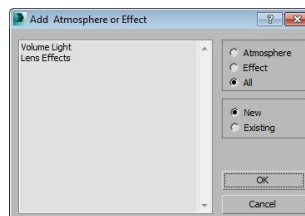

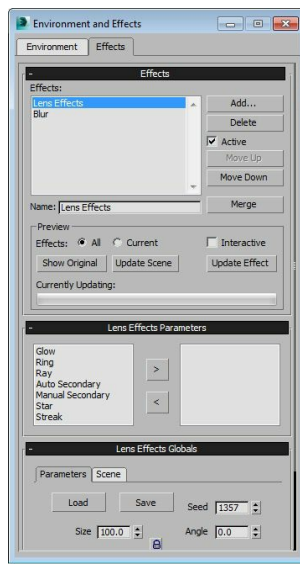***Figure 13-19*** *The **Add Atmosphere or Effect** dialog box*

*Figure 13-20 The **Environment and Effects** dialog box*

Target Spot

<u>Menu bar: Create > Lights > Standard Lights > Target Spotlight</u>
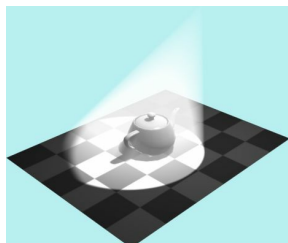<u>Command Panel: Create > Lights > Standard > Object Type rollout > Target Spot</u>

The **Target Spot** tool is used to create the spot lights. A spot light projects the rays in a particular direction from a source, refer to Figure 13-21. The target spot light also has a target spot to locate the target, refer to Figure 13-22.

To create a target spot light, choose the **Target Spot** tool; the **Name and Color**, **General Parameters**, **Intensity/Color/Attenuation**, **Spotlight Parameters**, **Advanced Effects**, **Shadow Parameters**, and **Shadow Map Params** rollouts will be displayed. Now, move the cursor over the viewport; the shape of the cursor will change. Press and hold the left mouse button to specify the starting point of the light and drag the cursor to locate the target of the light. Release the left mouse button; a target spot light will be created. Next, you can modify the parameters of the light using various rollouts displayed in the **Command Panel**. To exit the light command, right-click in the viewport. The most commonly used rollouts are discussed next.

Note

*The **Name and Color**, **General Parameters**, **Intensity/Color/Attenuation**, **Advanced Effects**, **Shadow Parameters**, and **Atmospheric Effects** rollouts are same for all types of lights as discussed in the omni light.*
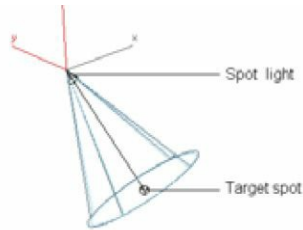
Figure 13-22 *The target spot light*

Spotlight Parameters Rollout

The options in the **Light Cone** area of this rollout are used to set the effects of the target spotlight, refer to Figure 13-23. Select the **Show Cone** check box to view the cone in the viewport even if the light is not selected. Select the **Overshoot** check box to project the light in all directions, but the shadows of the light will fall within the distance specified in the **Falloff/Field** spinner. When you select the **Overshoot** check box, the **Hotspot/Beam** spinner will be deactivated. The **Hotspot/Beam** spinner is used to set the angle of the cone of the target spot light in degrees. The hotspot is the part of the light cone that provides the most acute illumination. Set the value in the **Falloff/Field** spinner to adjust the angle of the falloff of the light. The falloff is the area at which the light intensity falls to zero.
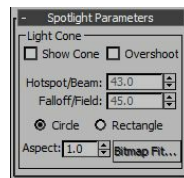
Figure 13-23 *The* **Spotlight Parameters** *rollout*

By default, the **Circle** radio button is selected. It provides a circular shape to the hotspot and falloff areas. Select the **Rectangle** radio button to provide a rectangular shape to the hotspot and falloff areas. On selecting the **Rectangle** radio button, the **Aspect** spinner and **Bitmap Fit** button gets activated. Set the value in the **Aspect** spinner to adjust the aspect ratio. The aspect ratio is the ratio of the width to the height. You need to set the aspect ratio to match a particular bitmap. Choose the **Bitmap Fit** button; the **Select Image File to Fit** dialog box will be displayed. Select the bitmap image and choose the **Open** button; 3ds Max will adjust the aspect ratio in the **Aspect** spinner according to the image selected in the **Select Image File to Fit** dialog box.

Free Spot

Menu bar: Create > Lights > Standard Lights > Free Spotlight
Command Panel: Create > Lights > Standard > Object Type rollout > Free Spot

The **Free Spot** tool is similar to the **Target Spot** tool but a free spot light does not have any target, refer to Figure 13-24. All the rollouts used to adjust the free spot light are the same as those discussed in the target spot light.

Figure 13-24 The free spot light

Target Direct

The **Target Direct** tool is used to create direct lights. A direct light projects the rays in a particular direction from a source. But it projects the parallel rays instead of a cone, refer to Figures 13-25 and 13-26. The target direct light simulates the sunlight.
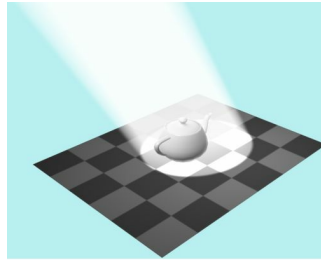

Figure 13-25 The effect of the target direct light
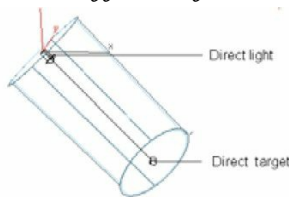

Figure 13-26 The target direct light

To create a target direct light, choose the **Target Direct** tool; the **Name and Color**, **General Parameters**, **Intensity/Color/Attenuation**, **Directional Parameters**, **Advanced Effects**, **Shadow Parameters**, and **Shadow Map Params** rollouts will be displayed. Move the cursor over the viewport; the shape of the cursor will change. Next, press and hold the left mouse button to specify the starting point of the light and drag the mouse to
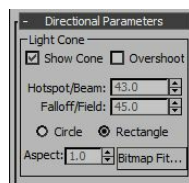
*Figure 13-27 The **Directional Parameters** rollout*

specify the target of the light. Release the left mouse button; the target direct light will be displayed in viewports. Next, you can modify the parameters of the light using various rollouts in the **Command Panel**. Most of the rollouts are same as discussed earlier in this chapter, except the **Directional Parameters** rollout. The options in the **Directional Parameters** rollout are same as those discussed in the **Spotlight** Parameters rollout of the target spot light, refer to Figure 13-27.

Free Direct

The **Free Direct** tool is also used to create the direct light but unlike the Target direct light, this light does not have a target, refer to Figure 13-28. All the rollouts to adjust the free direct light are same as those discussed in the target spot light.
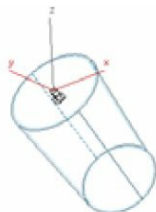

Figure 13-28 The free direct light

Skylight

The **Skylight** tool is used to create daylights. The best effect of the skylight comes when you use it with the **Light Tracer**. To create a skylight, choose the **Skylight** tool; the **Name and Color** and **Skylight Parameters** rollouts will be displayed. Now, move the cursor over the viewport; the shape of the cursor will change. Click in the viewport; the light will be displayed in the viewport. Figure 13-29 shows the skylight displayed in the Perspective viewport. Now, choose **Rendering > Light Tracer** from the menu bar; the **Render Setup: Default Scanline Renderer** dialog box will be displayed. In the **Advanced Lighting** tab of this dialog box, set the parameters as required and then choose the **Render** button; the effect of the light will be displayed, refer to Figure 13-30. The **Name and Color** rollout is similar to other tools as discussed earlier. The **Skylight Parameters** rollout is discussed next.

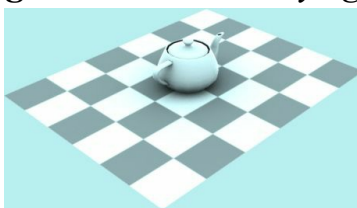*Figure 13-29* The skylight

Figure 13-30 The effect of the skylight

Skylight Parameters Rollout

The **On** check box is selected by default in this rollout, which enables the skylight to be used in the scene, refer to Figure 13-31. Set the value in the **Multiplier** spinner to define the intensity of the light. The areas in this rollout are discussed next.
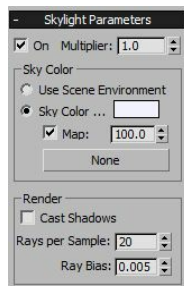
*Figure 13-31 The **Skylight Parameters** rollout*

Sky Color Area

By default, the **Sky Color** radio button is selected. Choose the color swatch on the right side of the **Sky Color** radio button to select the color for the skylight. The **Map** check box is selected by default. It is used to insert a map along with the light that affects the skylight. By default, the value in the spinner on the right side of the **Map** check box is 100.0. If you decrease the value, the color of the map will be mixed with the sky color. Choose the **Map** button labeled as **None**; the **Material/Map Browser** dialog box will be displayed. Select the desired map and choose the **OK** button to display the map along with the light.

Select the **Use Scene Environment** radio button to use the color that you have set in the **Environment and Effects** dialog box for the skylight.

Render Area

The parameters in this area are deactivated if the **Light Tracer** or **Radiosity** plugin is used. Select the **Cast Shadows** check box to project a shadow with the light. Set the value in the **Rays per Sample** spinner to define the number of rays in the skylight projecting in the scene. Set the value in the **Ray Bias** spinner to define the closest distance at which an object can project the shadows in the scene.

mr Area Omni

Menu bar: Create > Lights > Standard Lights > mr Area Omni
Command Panel: Create > Lights > Standard > Object Type rollout > mr Area Omni

The **mr Area Omni** tool is used with the mental ray renderer. It is used to create an area omni light, refer to Figure 13-32. If you use the area omni light and render the scene using the default scanline renderer, then its effects will be similar to the standard omni light. To view the best effect of the mr area omni light, you need to change the renderer.
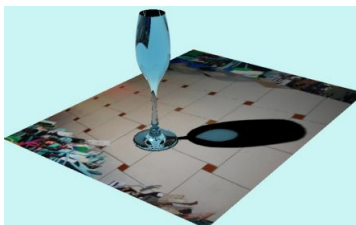

Figure 13-32 The effect of the area omni light

To render the scene with the **NVIDIA mental ray** renderer, choose the **Render Setup** tool from the **Main Toolbar**; the **Render Setup: Default Scanline Renderer** dialog box will be displayed. The **Common** tab is chosen by default in this dialog box. Now, scroll down in the dialog box and expand the **Assign Renderer** rollout. Choose the **Choose Renderer** button on the right side of the **Production** text box, as shown in Figure 13-33; the **Choose Renderer** dialog box will be displayed, as shown in Figure 13-34. Select the **NVIDIA mental ray** option and choose the **OK** button; the **Default Scanline Renderer** text will be replaced with the **NVIDIA mental ray** text in the **Production** text box. Choose the **Render** button and close the **Render Setup** dialog box. Now, the scene will be rendered using the mental ray renderer.
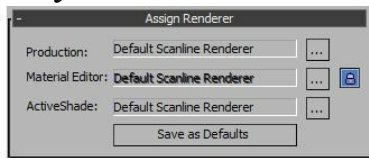

*Figure 13-33 The **Choose Renderer** button highlighted in the **Assign Renderer** rollout*
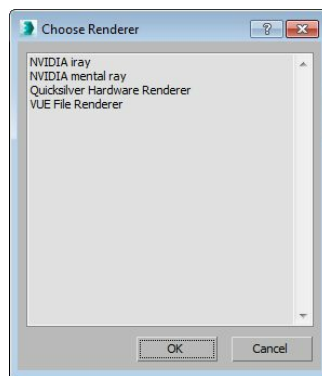

*Figure 13-34 The **Choose Renderer** dialog box*

Note

*To get the best results with the mental ray rendering, choose the **mr Area Omni** tool and choose the **Modify** tab in the **Command Panel**. Next, set the parameters in the **Indirect Illumination** and mental ray **Light Shader** rollouts.*

To create an area omni light, choose the **mr Area Omni** tool; the **Name and Color**, **General Parameters**, **Intensity/Color/Attenuation**, **Advanced Effects**, **Shadow Parameters**, **Ray Traced Shadow Params**, and **Area Light Parameters** rollouts will be displayed in the Modify panel. Now, move the cursor over the viewport; the shape of the cursor will change. Click in the viewport; the light will be displayed in the viewport. Next, you can modify the parameters of the light using various rollouts in the **Command Panel**. Most of the rollouts are same as discussed earlier in the omni light. The **Area Light Parameters** rollout is discussed next.

Area Light Parameters Rollout

In this rollout, the **On** check box is selected by default, refer to Figure 13-35. As a result, light effects are displayed on rendering. Select the **Show Icon in Renderer** check box to display a shape at the location of the area light on rendering. To view the shape on rendering, you need to render the scene using the **NVIDIA mental ray** renderer. The **Type** drop-down list is used to select the type of shape

for the area light. By default, the **Sphere** option is selected. Select the **Cylinder** option to display a cylindrical shape. Set the value in the **Radius** spinner to set the radius of the shape displayed. Note that when you select **Cylinder** in the **Type** drop-down list, the **Height** spinner is also activated. Set the value in this spinner to define the height of the cylindrical shape displayed. The **Samples** area in this rollout is discussed next.
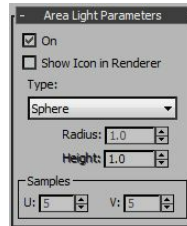

Figure 13-35 The *Area Light Parameters* rollout

Samples Area
The options in this area are used to set the quality of the shadow projected by the area omni light. Set the value in the **U** spinner to specify the number of subdivisions along the radius, or the height of the sphere or cylinder. Set the value in the **V** spinner to specify the number of angular subdivisions in the shape.

Note
*You need to use the **NVIDIA mental ray** renderer to view the effects of the parameters set in the **Area Light Parameters** rollout.*

mr Area Spot
Menu bar: Create > Lights > Standard Lights > mr Area Spot
Command Panel: Create > Lights > Standard > Object Type rollout > mr Area Spot

The **mr Area Spot** tool is used to create an area spot light, as shown in Figure 13-36. It is same as the **mr Area Omni** light and is used with the **NVIDIA mental ray** renderer. The only difference is that it projects the rays in a particular direction from the source.

To create an area spot light, choose the **mr Area Spot** tool; the **Name and Color**, **General Parameters**, **Intensity/Color/Attenuation**, **Spotlight Parameters**, **Advanced Effects**, **Shadow Parameters**, **Ray Traced Shadow Params**, and **Area Light Parameters** rollouts will be displayed. Move the cursor over the viewport; the shape of the cursor will change. Now, press and hold the left mouse button to specify the location of the light, drag the cursor to locate the target of the light, and release the left mouse button; the light will be displayed in the viewports. You can modify the parameters of the light using various rollouts displayed in the **Command Panel**. Most of the rollouts have already been discussed. The **Area Light Parameters** rollout for the area spot light is discussed next.

Area Light Parameters Rollout

The options in this rollout are same as discussed for the **mr Area Omni** tool, refer to Figure 13-37. In the **Type** drop-down list, the **Rectangle** shape is selected by default. It is used to display the area spot light in a rectangular shape. Specify the height and width in the **Height** and **Width** spinners, respectively. Select the **Disc** shape in the **Type** drop-down list to display the light in circular shape; the **Radius** spinner will get activated. Set the value in this spinner to specify the radius of the shape.
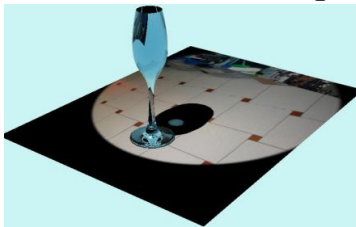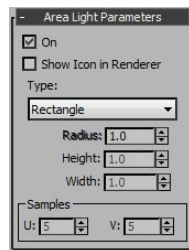

Figure 13-36 The effect of the area spot light

Figure 13-37 The **Area Light Parameters** *rollout*

PHOTOMETRIC LIGHTS

The photometric lights are used to add realistic light effects to the scenes. The photometric lights use the light energy values to calculate the lights accurately as they are in the real world.

There are three types of photometric lights in 3ds max. To create a photometric light in a scene, choose **Create > Lights** in the **Command Panel**; the **Photometric** light will be displayed by default in the drop-down list below the **Lights** button. Also, various tools to create photometric lights will be displayed in the **Object Type** rollout. These tools are **Target Light**, **Free Light**, and **mr Sky Portal**, refer to Figure 13-38. Choose one of these tools and create the light in the viewport. If you choose the **Target Light** or **Free Light** tool, the **Photometric Light Creation** message box will be displayed, asking if you want to use the Logarithmic Exposure Control, refer to Figure 13-39. Choose the **Yes** button in this message box. When you choose a tool from the **Object Type** rollout, various rollouts will be displayed to modify the parameters of the corresponding light.
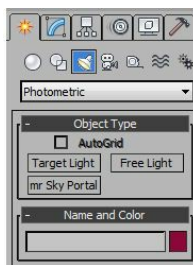

Figure 13-38 Various tools to create **Photometric** lights

The **Name and Color**, **General Parameters**, **Shadow Parameters**, **Advanced Effects**, and **Atmospheres & Effects** rollouts for photometric lights are same as discussed in the standard lights.

The **Intensity/Color/Attenuation**, **Templates**, and **Shape/Area Shadows** rollouts for the target light and the free light are discussed next.

Templates Rollout

The options in this rollout are used to specify preset light types such as 40W bulb, Street 400W Lamp, and so on, refer to Figure 13-40. To do so, select a light in the viewport and click on the down arrow at the bottom of the **Templates** rollout; a drop-down list will be displayed, as shown in Figure 13-41. Select the required light type from the drop-down list. You will notice a change in the light effect in the viewport. Also, the description of the selected light will be displayed in the text area just above the drop-down list.
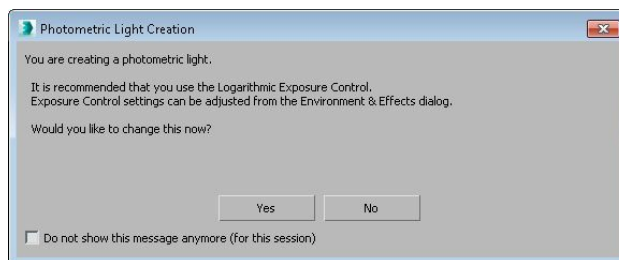

*Figure 13-39 The **Photometric Light Creation** message box*
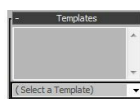
*Figure 13-40 The **Templates** rollout*

Figure 13-41 The drop-down list displayed to select the type of light

Tip: *1.To get more familiar with the photometric lights, place them in the scenes and try out various options in the rollouts.*

*2. To get the best effect of the photometric lights, render the scene using **Light Tracer** or **Radiosity** from the **Advanced Lighting** tab in the **Render Setup** dialog box.*

Intensity/Color/Attenuation Rollout

The options in this rollout are used to set the intensity, color, dimness, and attenuation of the light, refer to Figure 13-42. The areas in this rollout are discussed next.

Color Area

The drop-down list on the top of this area displays different common lamp specifications. By default, the **D65 Illuminant (Reference)** option is selected in the drop-down list. Select the other options; the

color in the color swatch on the right side of the **Kelvin** radio button will change according to the selection in this drop-down list. Select the **Kelvin** radio button to specify the color of the light by setting the color temperature in the spinner on the right of this radio button. The value in this spinner is in kelvin unit. As you change the value (temperature) of this spinner, the color in the color swatch will change accordingly. Choose the **Filter Color** color swatch to specify the color of the color filter.
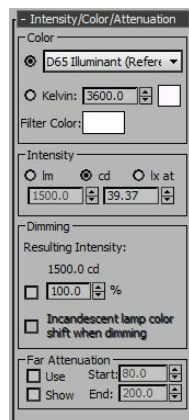

*Figure 13-42 The **Intensity/Color/Attenuation** rollout*

Intensity Area

The options in this area specify the intensity of the light. By default, the **cd** radio button is selected that measures the intensity of the light in candela unit. Select the **lm** radio button to measure the intensity of the light in lumen unit. Select the **lx at** radio button to measure the intensity in lux unit. Set the values in the spinners below these radio buttons to specify the intensity of the light.

Dimming Area

The options in this area are used to set the intensity by dimming the light. The resulting intensity is set by the value specified in the **Resulting Intensity** spinner. By default, this spinner is not active. Select the **Resulting Intensity** check box. Next, enter a value in the spinner. A value of 100 indicates that the light will be displayed with its full intensity. Select the **Incandescent lamp color shift when dimming** check box to simulate an incandescent light as the light gets dimmed.

Shape/Area Shadows Rollout

The options in this rollout are used to specify a light shape that generates the shadows, refer to Figure 13-43. The controls in this rollout work with the **NVIDIA mental ray** renderer. To get a similar effect in the scanline renderer, you can select **Area Shadows** from the **GeneralParameters** rollout, since photometric area shadows are not calculated in the scanline renderer. The areas in this rollout are discussed next.
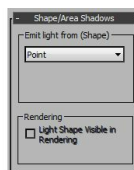

*Figure 13-43 The **Shape/Area Shadows** rollout*

Emit light from (Shape) Area

The drop-down list on the top in this area is used to select the shape for generating the shadows. On selecting an option from the drop-down list (except the **Point** option), the dimension controls related to the selected option will be displayed at the bottom of this area. You can set the dimensions in the respective spinners to modify the shape. Also, the **Shadows Samples** drop-down list will be displayed in the **Rendering** area.

Note

*If you choose the **Point** shape from the drop-down list in the **Emit light from (Shape)** area, then the **Shadows Samples** drop-down list will not be available in the **Rendering** area.*

Rendering Area

Select the **Light Shape Visible in Rendering** check box to view the light shape at rendering. The different options in the **Shadows Samples** drop-down list are used to set the quality of the shadows of the light.

DEFAULT LIGHTS

When there are no lights in the scene, the scene is illuminated or rendered with the default lights. There are two invisible default lights in the scene, one is above and to the left of the scene, and the other is below and to the right. You can control these lights using the options in the **Viewport Configuration** dialog box. To invoke this dialog box, click on the General viewport label in any of the viewports; a shortcut menu will be displayed. Choose **Configure Viewports** from the shortcut menu; the **Viewport Configuration** dialog box will be displayed, as shown in Figure 13-44. By default, the **Visual Style & Appearance** tab is chosen in this dialog box. In this tab, the **Scene Lights** radio button is selected in the **Lighting and Shadows** area. As a result, only scene lights are used in the scene.
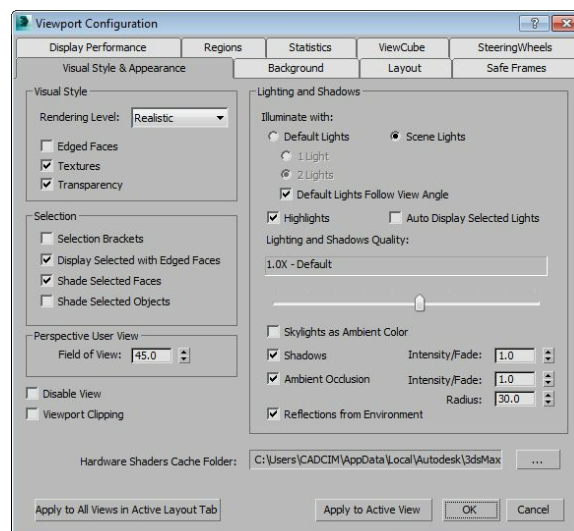

*Figure 13-44 The **Viewport Configuration** dialog box*

Note

*If no light exists in the scene, the default lighting is used automatically even when the **Scene Lights** radio button is selected in the **Lighting and Shadows** area of the **Viewport Configuration** dialog box.*

Sometimes, the light which we create in the scene does not illuminate the object properly in a scene. In that case, you can use the default lighting to evenly illuminate the scene. To do so, choose **Create > Lights > Standard Lights > Add Default Lights to Scene** from the menu bar; the **Add Default Lights to Scene** dialog box will be displayed, as shown in Figure 13-45. In this dialog box, the **Add Default Key Light** and **Add Default Fill Light** check boxes are selected, by default. Choose the **OK** button; the default key light and fill light will be added to the scene. Both these lights will be Omni lights.
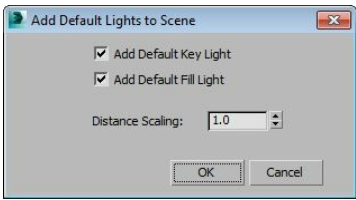

*Figure 13-45 The **Add Default Lights to Scene** dialog box*

PLACE HIGHLIGHT TOOL

Menu bar: Tools > Align > Place Highlight
Main Toolbar: Align flyout > Place Highlight
Keyboard: CTRL + H

The **Place Highlight** tool is used to align a light with an object to position its highlight accurately. Before performing the alignment, make sure that the object with highlight is visible in the viewport. Now, select the light in the viewport and choose the **Place Highlight** tool; the shape of the cursor will change. Next, move the cursor over the object on which you want to place the highlight; a selection cursor will be displayed, as shown in Figure 13-46. Click on it; the light will be aligned accordingly and the highlight will be repositioned, refer to Figure 13-47.
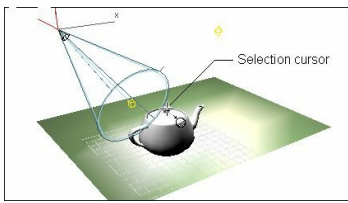

*Figure 13-46 The selection cursor displayed after invoking the **Place Highlight** tool*
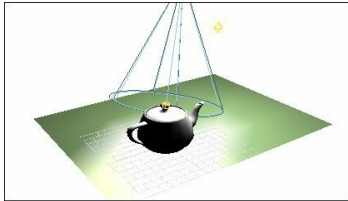

Figure 13-47 The light aligned as per the selection of the face of the object

CAMERAS

In 3ds Max, the cameras are used to adjust a particular view in a scene. These cameras act as the still image or video cameras in the real world. There are two types of cameras in 3ds Max, namely Target and Free. The target camera has two parts, the target camera and a target object, as shown in Figure 13-48. It displays the view according to the position of the target object. You can move the target object and the target camera independently. The free camera does not have any target object, as shown in Figure 13-49. It displays the view in the direction of the camera. You can use the free camera to perform the walkthrough animation.
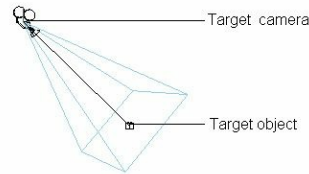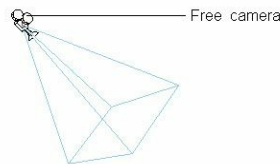

Figure 13-48 The target camera

Figure 13-49 The free camera

Creating a Target Camera

Menu bar: Create > Cameras > Target Camera
Command Panel: Create > Cameras > Standard > Object Type rollout > Target

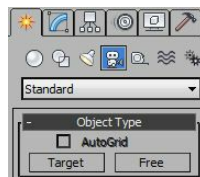To create a target camera, choose **Create > Cameras** in the **Command**

Figure 13-50 The **Object Type** rollout with tools to create cameras

Panel; the **Standard** option will be displayed in the drop-down list below the **Cameras** button. You can use the tools in the **Object Type** rollout to create cameras, refer to Figure 13-50. Choose the **Target** tool; the **Name and Color**, **Parameters**, and **Depth of Field Parameters** rollouts will be displayed in the **Command Panel**. Next, move the cursor over the viewport; the shape of cursor will change. Press and hold the left mouse button to specify the location of the camera, drag the cursor to specify the target of the camera, and release the left mouse button; the target camera will be displayed in the viewports. You can modify the parameters of the camera using the rollouts displayed in the **Command Panel**. Next, right-click in the viewport to exit the command.

To display the camera view in the viewport, move the cursor over the POV viewport label and click on it; a flyout will be displayed. Choose the **Cameras** option; a cascading menu will be displayed, as shown in Figure 13-51. Choose the **Camera001** option; the current viewport label will be replaced by the Camera001 label. Alternatively, you can press the C key to display the camera view. The **Parameters** rollout is used to modify the parameters of the camera and is discussed next.

Parameters Rollout

To modify the parameters of the camera, make sure that the camera is selected in the viewport. Next, choose the **Modify** tab in the **Command Panel**; the **Parameters** rollout will be displayed, as shown in Figure 13-52.

The **Lens** spinner in this rollout is used to specify the focal length of the camera in millimeters. The focal length is the distance between the camera lens and its focus. Set the value in the **FOV** spinner to specify the field of view of the camera in degrees. The field of view (FOV) determines the area that the camera can view in the viewport. The **Stock Lenses** area in this rollout is discussed next.
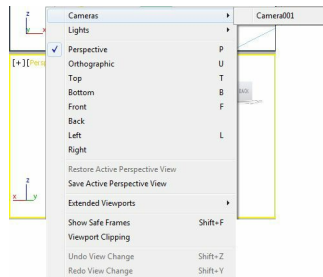
Figure 13-51 *The cascading menu displayed on choosing the **Cameras** option*
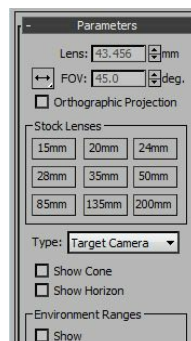
Figure 13-52 *Partial view of the **Parameters** rollout*

Stock Lenses Area

Choose one of the buttons in this area to set the focal length of the camera in millimeters. On choosing a button in this area, the value in the **Lens** and **FOV** spinners will also change automatically.

The **Type** drop-down list is used to set the type of camera in the viewport. The **Target Camera** is selected by default in this drop-down list. Select the **Free Camera** option to use the free camera. Select the **Show Cone** check box to view the FOV cone in all viewports, even if the camera is not selected. Select the **Show Horizon** check box to view the horizon line displayed in dark gray color in the Camera viewport.

Creating a Free Camera

Menu bar: Create > Cameras > Free Camera
Command Panel: Create > Cameras > Standard > Object Type rollout > Free

To create a free camera, choose **Create > Cameras** in the **Command Panel**; the **Standard** option will be displayed in the drop-down list. Choose the **Free** tool from the **Object Type** rollout; the **Name and Color**, **Parameters**, and **Depth of Field Parameters** rollouts will be displayed. Move the cursor over the viewport; the shape of the cursor will change. Now, click in the viewport; the camera will be displayed in the viewports. You can modify the parameters of the camera using the rollouts displayed in the **Command Panel**. The options in these rollouts are the same as those discussed in the target camera.

ALIGN CAMERA TOOL

Menu bar: Tools > Align > Align Camera
Main Toolbar: Align flyout > Align Camera

The **Align Camera** tool is used to align a camera normal to a selected surface. To align a camera, select it in the viewport and then choose the **Align Camera** tool; the shape of the cursor will change. Next, move the cursor over the surface of the object; a selection cursor will be displayed, as shown in Figure 13-53. Select the face; the camera will be aligned accordingly, refer to Figures 13-54, 13-55, and 13-56.
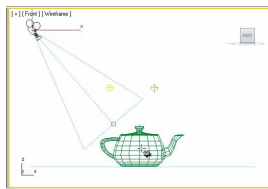

Figure 13-53 The cursor displayed on the object to get the proper alignment
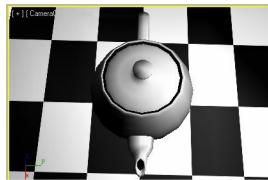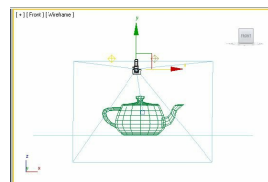

Figure 13-54 The Camera viewport before alignment

*Figure 13-55 The new position of the camera after using the **Align Camera** tool*

*Figure 13-56 The Camera viewport after using the **Align Camera** tool*

TUTORIALS

Before starting the tutorials, you need to download the *c13_3dsmax_2015_tut.zip* file from *www.cadcim.com*. The path of the file is as follows: *Textbooks > Animation and Visual Effects > 3ds Max > Autodesk 3ds Max 2015: A comprehensive Guide*

Extract the contents of the zipped file and save them in the *Documents* folder.

Tutorial 1

In this tutorial, you will create a scene, as shown in Figure 13-57, by using the lights, materials and maps. **(Expected time: 30 min)**

Figure 13-57 *The scene to be created*

The following steps are required to complete this tutorial:

a. Create the project folder.
b. Download the file.
c. Create a plane for water surface.
d. Create the camera.
e. Create the background.
f. Assign the maps and materials.
g. Create the lights.
h. Save and render the scene.

Creating the Project Folder

1. Create a new project folder with the name *c13_tut1* at *\Documents\3dsmax2015* and then save the file with the name *c13tut1*, as discussed in Tutorial 1 of Chapter 2.

2. Open the Windows Explorer and then browse to the *c13_3dsmax_2015_tut* folder and copy the *sky_1.jpg* file from this folder to *\Documents\3dsmax2015\c13_tut1\sceneassets\images*.

Creating a Plane for Water Surface

In this section, you will create a plane for the water surface by using the **Plane** tool.

1. Activate the Top viewport and choose **Create > Geometry** in the **Command Panel**; the **Standard Primitives** option is displayed in the drop-down list below the **Geometry** button. Now, choose the **Plane** tool from the **Object Type** rollout.

2. Create a plane in the Top viewport and set the values in the **Parameters** rollout as follows:
Length: **273.604** Width: **297.462**

3. In the **Name and Color** rollout, rename the plane as *water surface*.

4. Choose the **Zoom Extents All** tool to display *water surface* in the viewports, as shown in Figure 13-58.

Creating the Camera

In this section, you will add a camera to the scene by using the **Free** camera tool.

1. Activate the Front viewport. Choose **Create > Cameras** in the **Command Panel**; the **Standard** option is displayed in the drop-down list.

2. Choose the **Free** tool from the **Object Type** rollout to create a free camera for adjusting the view. In the Front viewport, click on the middle of *water surface*; the free camera is displayed in the viewports. It is automatically named as *Camera001*.

Note

If you use more than one camera in a scene, then it is recommended that you modify the name of the cameras depending on the view you have adjusted.
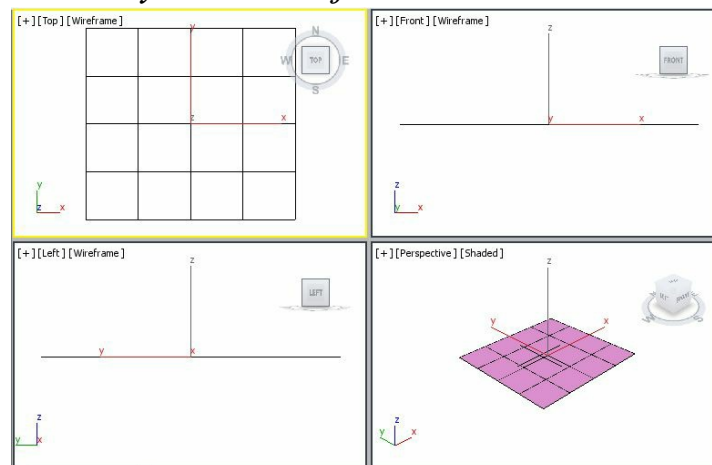
***Figure 13-58** A plane created for the water surface in viewports*

3. Right-click anywhere in the viewport to exit the command.

4. Align *Camera001* in all viewports by using the **Select and Move** and **Select and Rotate** tools, refer to Figure 13-59. Next, activate the Perspective viewport and press the C key; the Perspective label is replaced by *Camera001* label and the view is changed according to the position of the camera, refer to Figure 13-59.
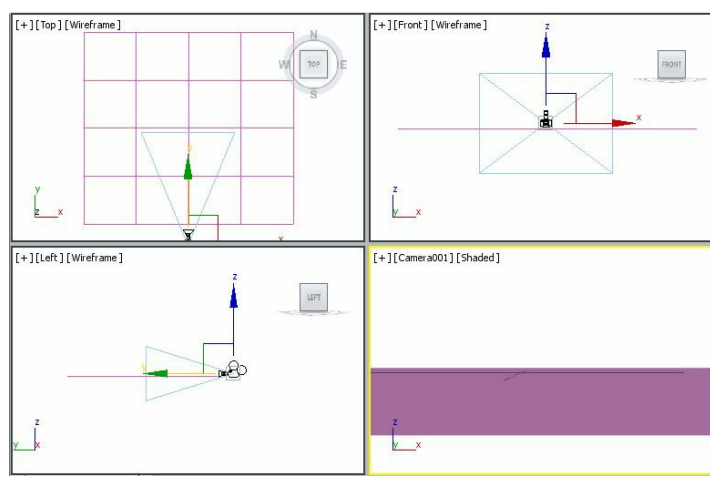
Figure 13-59 Alignment of Camera001 in viewports

Creating the Background

In this section, you will create a background of the scene by using the **Sphere** tool.

1. Activate the Top viewport and choose **Create > Geometry** in the **Command Panel**; the **Standard Primitives** option is displayed in the drop-down list below the **Geometry** button. Now, choose the **Sphere** tool from the **Object Type** rollout.

2. Move the cursor at the center of *water surface* and create a sphere in the Top viewport. Set the values in the **Parameters** rollout as follows:

Radius: **72.0** Hemisphere: **0.74**

3. In the **Name and Color** rollout, modify the name of the sphere as *background*.

4. Make sure that *background* is selected in the Top viewport. Next, right-click on the ⬒**Select and Uniform Scale** tool; the **Scale Transform Type-In** dialog box is displayed. In the **Offset: Screen** area of the dialog box, set the value **260** in the **%** spinner; *background* is scaled, as shown in Figure 13-60. Close this dialog box.

Figure 13-60 The background after scaling

5. Make sure that *background* is selected and choose the **Modify** tab in the **Command Panel**. Select the **Normal** modifier from the **Modifier List** drop-down list; the rollouts are displayed in the Modify panel. In the **Parameters** rollout of the **Normal** modifier, make sure that the **Flip Normals** check box is selected.

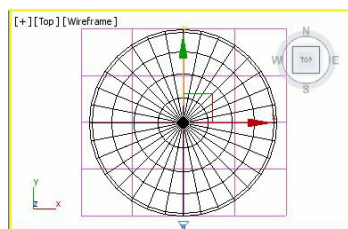6. Choose the **Select and Move** tool and align *background* and *Camera001* in viewports, as shown in Figure 13-61.
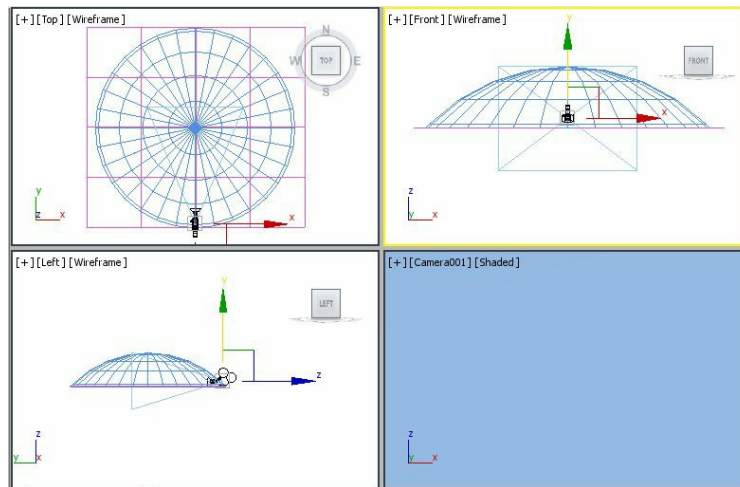

Figure 13-61 Camera001 and background aligned in viewports

Assigning Maps and Materials

Next, you need to assign the maps and materials to the *background* and *water surface*.

1. Select *water surface* in any viewport and choose the **Compact Material Editor** tool; the **Material Editor** dialog box is displayed.

First, you will create the material for *water surface* in the **Material Editor** dialog box.

2. Make sure the **01-Default** sample slot is selected. Modify its name in the **Material Name** text box to **water surface material**.

3. Choose the **Material Type** button that is currently labeled as **Standard**; the **Material/Map Browser** dialog box is displayed. Select the **Raytrace** material from the **Materials > Standard** rollout and choose the **OK** button; the **Standard** material is replaced by the **Raytrace** material. In the **Raytrace Basic Parameters** rollout, make sure that the **Phong** shader is selected in the **Shading** drop-down list.

4. Choose the **Diffuse** color swatch; the **Color Selector: Diffuse** dialog box is displayed. Select the black color and choose the **OK** button to close the dialog box.

5. Choose the **Reflect** color swatch; the **Color Selector: Reflect** dialog box is displayed. Enter values in the **Red**, **Green**, and **Blue** spinners as follows:

Red: **139** Green: **139** Blue: **139**

Now, choose the **OK** button to close this dialog box.

6. In the **Raytrace Basic Parameters** rollout, select the **Bump** check box and choose the **Bump** button labeled as **None** to assign a map to it; the **Material/Map Browser** dialog box is displayed. Select the **Noise** map from the **Maps > Standard** rollout and choose the **OK** button; the **Noise** map

is displayed as the sub-material.

7. In the **Noise Parameters** rollout, set the values as follows:

Select the **Fractal** radio button.

Size: **5.0** Low: **1.0**

8. Choose the **Go to Parent** tool to go back to the parent level. Alternatively, you can select **water surface material** from the **Material Name** drop-down list.

9. Expand the **Maps** rollout and select the **Reflect** check box to make it available for the material. Choose the **Reflect** map button labeled as **None**; the **Material/Map Browser** dialog box is displayed. Select the **Falloff** map and choose the **OK** button; the **Falloff** map is displayed as the sub-material. Use the default settings and choose the **Go to Parent** tool to go back to the parent level; the **None** label is replaced by **Map X (Falloff)**.

10. Make sure that *water surface* is selected in the viewport and choose the **Assign Material to Selection** button; **water surface material** is assigned to the *water surface* in the viewport.

Next, you need to create the material for *background*.

11. Select the **02-Default** sample slot and modify its name as **background material** in the **Material Name** drop-down list. In the **Shader Basic Parameters** rollout, make sure that the **Blinn** shader is selected in the drop-down list.

Next, you need to assign a map to the selected sample slot.

12. In the **Blinn Basic Parameters** rollout, choose the **Diffuse** map button on the right side of the **Diffuse** color swatch; the **Material/Map Browser** dialog box is displayed. Select the **Bitmap** map from the **Maps > Standard** rollout and choose the **OK** button; the **Select Bitmap Image File** dialog box is displayed. As the project folder is already set, the *images* folder is displayed in the **Look in** drop-down list of this dialog box. Select the file *sky_1.jpg* and choose the **Open** button; the selected image is displayed in the **background material** sample slot.

13. Make sure that *background* is selected in the viewport and then choose the **Assign Material to Selection** button; the *background material* is assigned to *background* in the viewport. Close the **Material Editor** dialog box.

Next, you will apply the **UVW Map** modifier to *background* to align the map properly.

14. Choose the **Modify** tab in the **Command Panel** and select the **UVW Map** modifier from the **Modifier List** drop-down list; the **UVW Map** is displayed in the modifier stack. The **Parameters**

rollout is displayed below the modifier stack.

15. In the **Parameters** rollout, set the values as follows:

Mapping area
Select the **Box** radio button.

Length: **-1.374** Width: **93.147** Height: **31.408**

Alignment area
Make sure that the **Z** radio button is selected.

16. Render *Camera001* viewport using the **Render Production** tool; you will notice that the scene is not visible properly, as shown in Figure 13-62. Therefore, you need to create the lights to view the scene clearly.

Creating Lights
In this section, you will create lights by using the **Omni** tool.

1. Activate the Top viewport. Choose **Create > Lights** in the **Command Panel**; the **Photometric** option is displayed in the drop-down list below the **Lights** button. Choose the **Standard** option from the drop-down list.
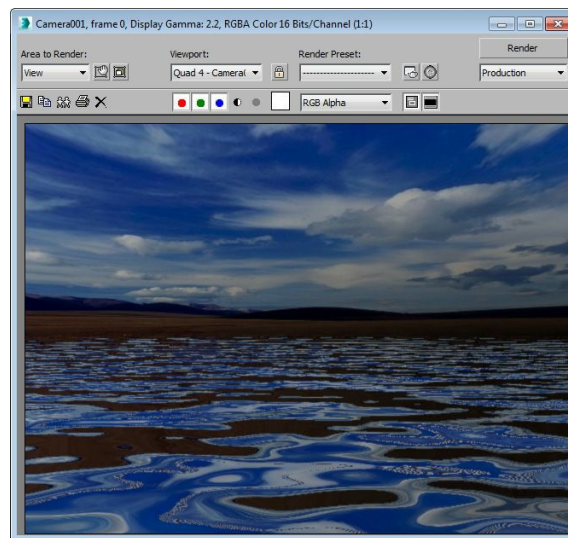
Figure 13-62 The scene after rendering

2. Choose the **Omni** tool from the **Object Type** rollout in the **Command Panel** and click in the Top viewport; the omni light is displayed in the viewports. It is automatically named as *Omni001*.

3. Choose the **Select and Move** tool and align *Omni001* in the viewports, as shown in Figure 13-63.

4. Create one more omni light at the center of *background* in the Top viewport. It is automatically named as *Omni002*. Now, align *Omni002* in all viewports, as shown in Figure 13-64.

Next, you need to modify *Omni002* light to create the sun effect.

5. Make sure that *Omni002* light is selected and then choose the **Modify** tab in the **Command Panel**; the rollouts to modify the light are displayed in the modify panel.

6. Expand the **Atmospheres & Effects** rollout and choose the **Add** button; the **Add Atmosphere or Effect** dialog box is displayed. Select the **Lens Effects** option and then choose the **OK** button; the **Lens Effects** option is displayed in the text area of the **Atmospheres & Effects** rollout.

Next, you need to modify the parameters of **Lens Effects**.
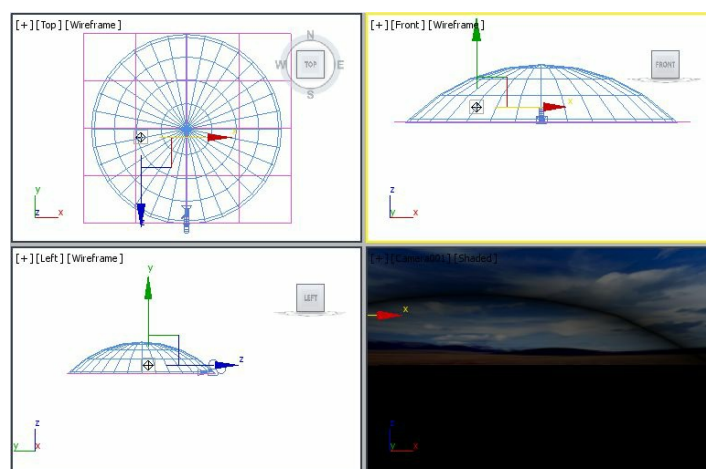
***Figure 13-63** Alignment of Omni001 in the viewports*
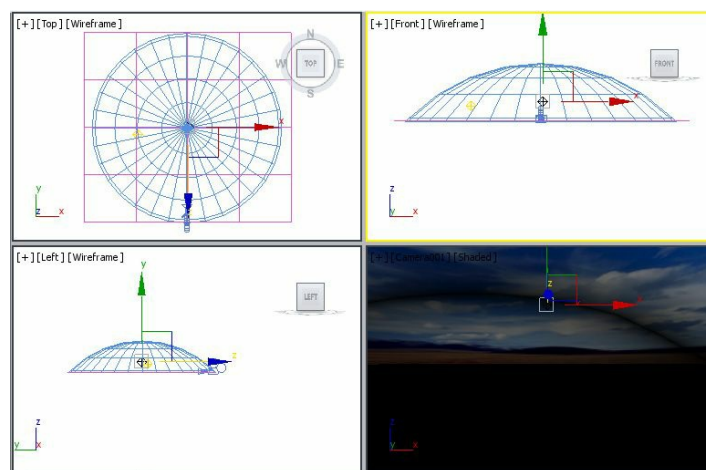
***Figure 13-64** Alignment of Omni002 in the viewports*

7. Select **Lens Effects** in the **Atmospheres & Effects** rollout and choose the **Setup** button; the **Environment and Effects** dialog box is displayed. By default, the **Effects** tab is chosen in the **Environment and Effects** dialog box.

8. In the **Effects** rollout, make sure the **Lens Effects** option is selected under the **Effects** area. Select the **Glow** effect and choose the right arrow button in the **Lens Effects Parameters** rollout; the **Glow** effect is displayed in the list available on the right side, as shown in Figure 13-65. Also, the **Glow Element** rollout is displayed at the bottom of the **Environment and Effects** dialog box to

modify the parameters of the **Glow** effect.

*Figure 13-65 The **Lens Effects Parameters** rollout*

![Note icon] Note

1. To view all rollouts, you need to scroll inside the dialog box.

*2. You can view the effects of the **Lens Effects** option only after rendering.*

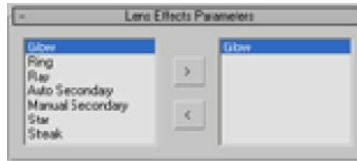9. In the **Glow Element** rollout, set the value **20.0** in the **Size** spinner. Use the default values for other options.

10. In the **Lens Effects Parameters** rollout, select the **Ray** effect and choose the right arrow button; the **Ray** effect is displayed in the text area available on the right side. Also, the **Ray Element** rollout is displayed at the bottom of the **Environment and Effects** dialog box to modify the parameters of the **Ray** effect.

11. In the **Ray Element** rollout, set the values in the spinners as follows:

Size: **50.0** Num: **20**

12. Close the **Environment and Effects** dialog box.

Saving and Rendering the Scene

1. Choose **Save** from the **Application** menu. Next, activate the Camera001 viewport.

2. Choose the **Render Production** tool; the **Rendered Frame** window is displayed showing the final output of the scene at one frame, as shown in Figure 13-66.

3. Close the **Rendered Frame** window.
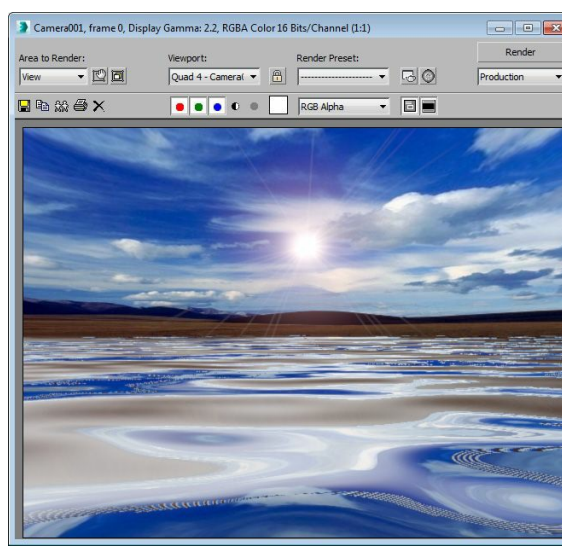
Figure 13-66 The final output of the scene

Tutorial 2

In this tutorial, you will illuminate a room by using the **Omni** and **Target Direct** tools, as shown in Figure 13-67. **(Expected time: 60 min)**
The following steps are required to complete this tutorial:

a. Create the project folder.
b. Create the floor of room.
c. Create the walls of room.
d. Create the camera.
e. Create the roof of room.
f. Create the window of room.
g. Create the POP design of room.
h. Apply maps and materials to objects.
i. Create lights.
j. Create the background.
k. Save and render the scene.

Figure 13-67 The illuminated room

Creating the Project Folder

Create a new project folder with the name *c13_tut2* at *\Documents\3dsmax2015* and then save the file with the name *c13tut2*, as discussed in Tutorial 1 of Chapter 2.

Creating the Floor of Room

In this section, you will create a floor for the room by using the **Plane** tool.

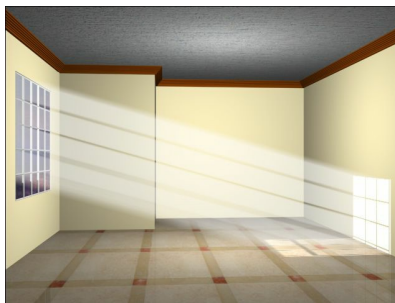1. Activate the Top viewport and choose **Create > Geometry** in the **Command Panel**; the **Standard Primitives** option is displayed in the drop-down list below the **Geometry** button. Now, choose the **Plane** tool from the **Object Type** rollout.

2. Create a plane in the Top viewport and set the values in the **Parameters** rollout as follows:
Length: **867.0** Width: **600.0**

3. In the **Name and Color** rollout, modify the name of the plane to *floor*.

4. Choose the **Zoom Extents All** tool to display the entire *floor* in viewports.

Creating the Walls of Room

In this section, you will create walls for the room by using the **Wall** tool.

1. Activate the Top viewport. Choose **Create > Geometry** in the **Command Panel**; the **Standard Primitives** option is displayed by default in the drop-down list. Select the **AEC Extended** option from the list and choose the **Wall** tool from the **Object Type** rollout.

2. In the **Parameters** rollout, set the values as follows:

Width: **5.0** Height: **300.0**

3. In the Top viewport, create a closed wall as discussed earlier, as shown in Figure 13-68. It is automatically named as *Wall001*. Choose the **Zoom Extents All** tool.
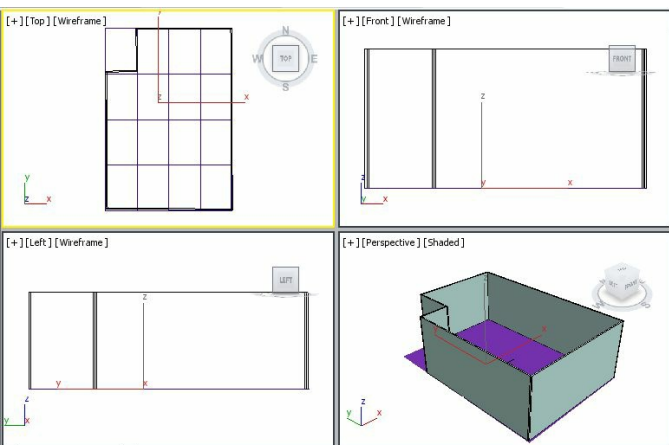

Figure 13-68 *The Wall001 geometry created in viewports*

Creating Camera

In this section, you will create a camera using the **Free** camera tool to adjust the view.

1. Activate the Front viewport and choose **Create > Cameras** in the **Command Panel**; the **Standard** option is displayed in the drop-down list. Now, choose the **Free** tool from the **Object Type** rollout.

2. Click at the middle point on *Wall001*; the free camera is displayed in all viewports. Now, right-click anywhere in the viewport to exit the command. The free camera is automatically named as *Camera001*.

3. Make sure that *Camera001* is selected. Choose the **Modify** tab in the **Command Panel**. In the **Parameters** rollout, set the value **73.0** in the **FOV** spinner.

4. Activate the Perspective viewport and press the C key to view the Camera viewport; the Perspective label is replaced with the Camera001 label. Also, the view is changed based on the position of the camera. Choose the **Select and Move** tool and align *Camera001* in all viewports to display the view properly, refer to Figure 13-69.
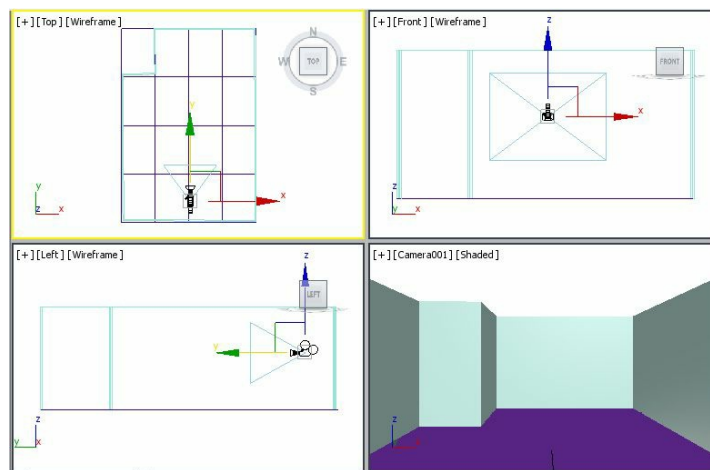
Figure 13-69 Alignment of Camera001 in viewports

Creating the Roof of Room

In this section, you will create the roof of room by using the **Plane** tool.

1. Activate the Top viewport and choose the **Plane** tool from **Create > Geometry > Standard Primitives > Object Type** rollout.

2. Create a plane in the Top viewport and set the values in the **Parameters** rollout as follows:

Length: **867.0** Width: **600.0**

3. In the **Name and Color** rollout, modify the name of the plane to *roof*.

4. Align *roof* at the top of *Wall001* using the **Select and Move** tool, refer to Figure 13-70.

Creating the Window of Room

In this section, you will create a window of room by using the **Box** and **Boolean** tools.

1. Create a box in the Top viewport and modify its dimensions in the **Parameters** rollout as follows:

Length: **165.569** Width: **20.0** Height: **195.984**

2. Align the box with *Wall001* in the viewports, as shown in Figure 13-71.
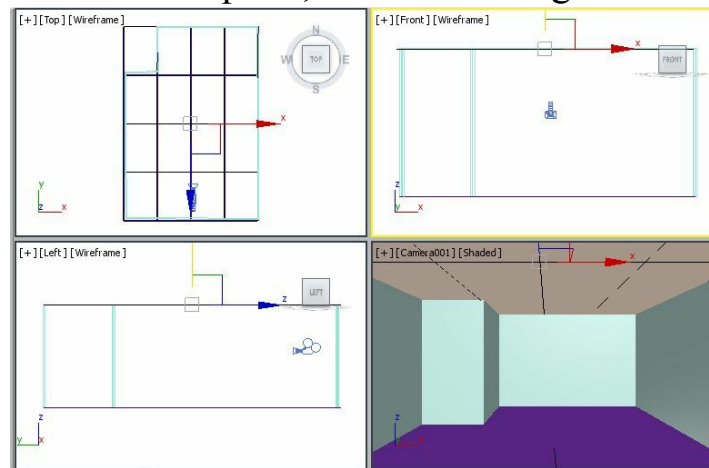
Figure 13-70 *The roof geometry aligned at the top of Wall001 in viewports*
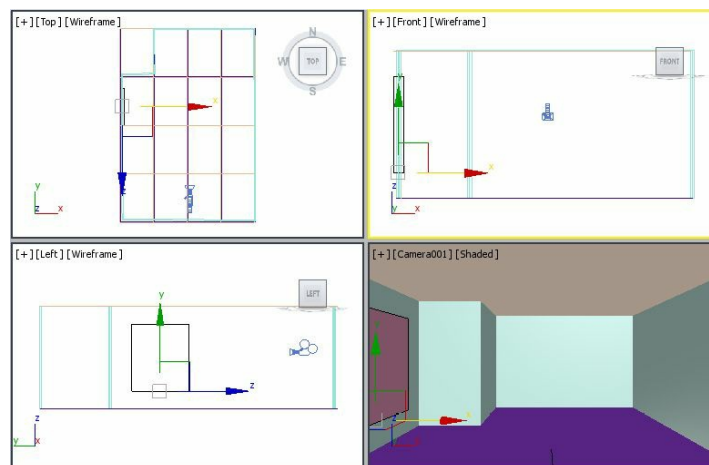
Figure 13-71 *Alignment of box with Wall001 in viewports*

Next, you need to perform the boolean operation on *Wall001* to create a hole for the window.

3. Select *Wall001* in the Top viewport. Choose **Create > Geometry** in the **Command Panel**. Select the **Compound Objects** option from the drop-down list displayed below the **Geometry** button. Now, choose the **Boolean** tool from the **Object Type** rollout.

4. In the Parameters rollout, make sure that the **Subtraction(A-B)** radio button is selected in the **Operation** area.

5. Choose the **Pick Operand B** button in the **Pick Boolean** rollout. Next, move the cursor over the box that you have created and then click on it; a hole is created in *Wall001*, as shown in Figure 13-72. Right-click in the viewport to exit the **Boolean** command.
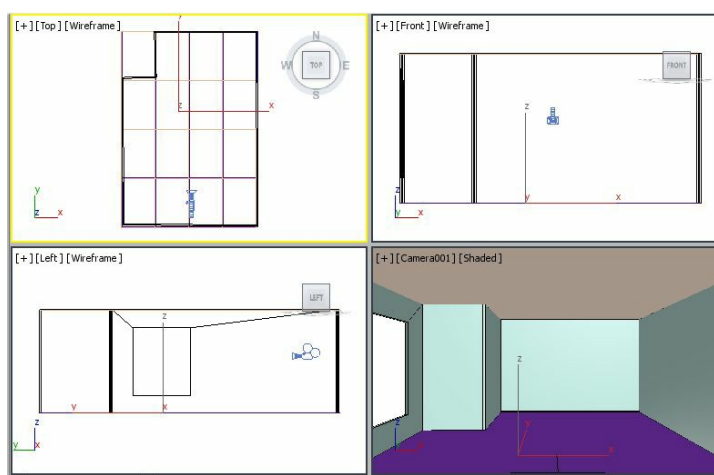
Figure 13-72 A hole created in Wall001

Next, you need to create another box to create the window.

6. Create another box in the Top viewport and modify its dimensions in the **Parameters** rollout as follows:

Length: **165.569** Width: **2.0** Height: **195.984**
Length Segs: **5** Width Segs: **1** Height Segs: **5**

7. Modify the name of the box to *window* and color to black. Also, align it in all viewports to cover the hole in *Wall001*, as shown in Figure 13-73.

Next, you need to apply the **Lattice** modifier to *window*.
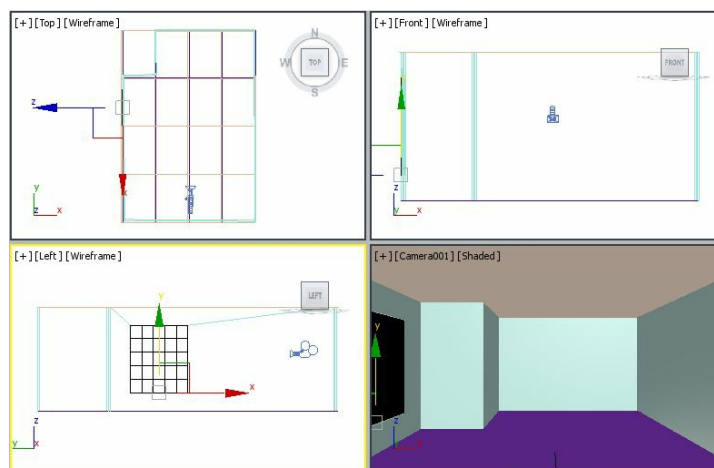
Figure 13-73 Alignment of window in viewports

8. Make sure that *window* is selected and then choose the **Modify** tab in the **Command Panel**. Next, select the **Lattice** modifier from the **Modifier List** drop-down list; the segments and edges of *window* are converted into wireframes.

9. In the **Parameters** rollout of the **Lattice** modifier, set the values as follows:

Geometry area

Select the **Struts Only from Edges** radio button.

Struts area

Radius: **1.0**

Use the default values for other options.

The *window* geometry is displayed, as shown in Figure 13-74.

Creating the POP Design of Room

In this section, you will create the POP design to decorate room.

1. Create a box in the Top viewport. In the **Parameters** rollout, set the values in the spinners as follows:

Length: **5.0** Width: **210.581** Height: **33.843**
Length Segs: **1** Width Segs: **1** Height Segs: **7**

2. Name the box as *design01*.
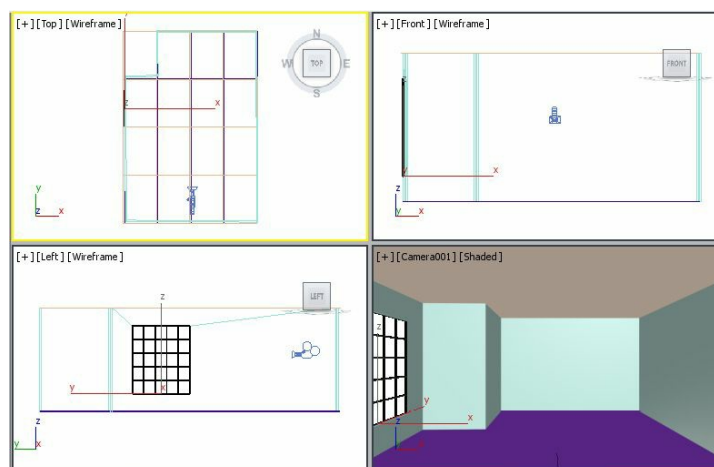
Figure 13-74 The window geometry after applying the Lattice modifier

Next, you need to modify the *design01* at the sub-object level.

3. Make sure that *design01* is selected and choose the **Display** tab in the **Command Panel**. In the **Hide** rollout, choose the **Hide Unselected** button; all unselected objects are hidden in the viewports.

4. Activate the Camera001 viewport and press the P key to display the Perspective viewport.

5. Choose the **Zoom Extents All** tool to zoom into *design01*.

6. Select *design01* and convert it into an editable mesh object; the sub-object levels of *design01* are displayed in the modifier stack.

7. Choose the **Zoom** tool and zoom into *design01* to its maximum extent, as shown in Figure 13-75.

8. Choose the **Maximize Viewport Toggle** tool to maximize the Perspective viewport.

9. In the **Selection** rollout, choose the **Edge** button to activate the **Edge** sub-object level. Select the six inner edges of *design01* by holding the CTRL key in the Perspective viewport, as shown in Figure 13-76.

10. In the **Edit Geometry** rollout, set the value **1** in the **Chamfer** spinner and press ENTER; the selected edges are chamfered, as shown in Figure 13-77.
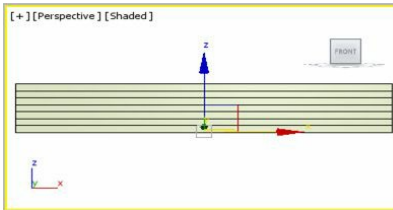
Figure 13-75 *The design01 geometry zoomed to its maximum extent in the Perspective viewport*
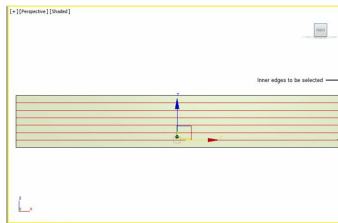
Figure 13-76 *The inner edges selected in design01*

11. In the **Selection** rollout, choose the **Polygon** button to activate the **Polygon** sub-object level. Select the polygon at the bottom of *design01*, as shown in Figure 13-78.
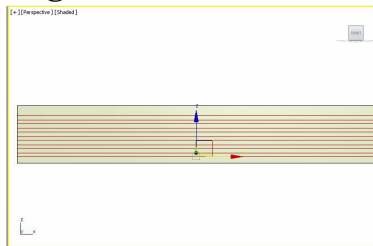
Figure 13-77 *The selected edges after chamfering*
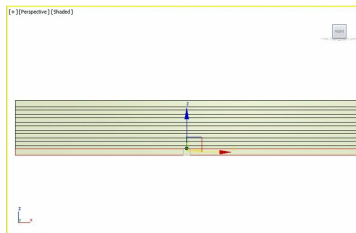
Figure 13-78 *The polygon selected to be extruded*

12. In the **Edit Geometry** rollout, enter the value **2.0** in the **Extrude** spinner to extrude the polygon. Next, select every odd polygon one by one from the first polygon and enter the values in multiples of 2 such as 4, 6, 8 and so on in the respective **Extrude** spinners, refer to Figure 13-79. Select the **Polygon** sub-object level in the **Selection** rollout to disable it.

13. Choose the **Maximize Viewport Toggle** tool to view the four viewports; *design01* is displayed in the viewports.

14. Choose the **Display** tab in the **Command Panel** and then choose the **Unhide All** button in the **Hide** rollout; all objects are displayed in the viewports.

15. Activate the Perspective viewport and press the C key to view the Camera001 viewport. Now, choose the **Zoom Extents All** tool to view all objects in the viewports.

16. Align *design01* with a portion of *Wall001* in the viewports, refer to Figure 13-80. You can adjust the size of *design01* using the tools in the **Select and Scale** flyout in the **Main Toolbar**.
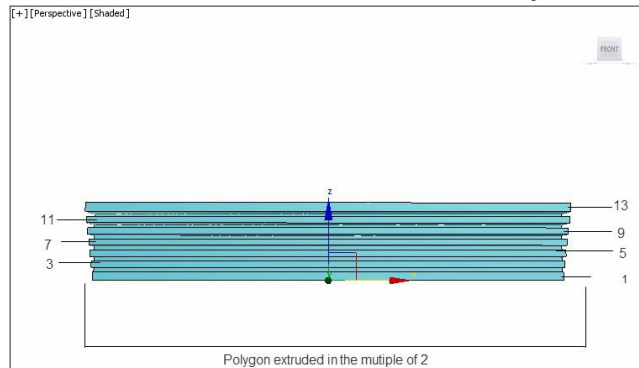
Figure 13-79 *The design01 displayed after extruding the alternate polygons*
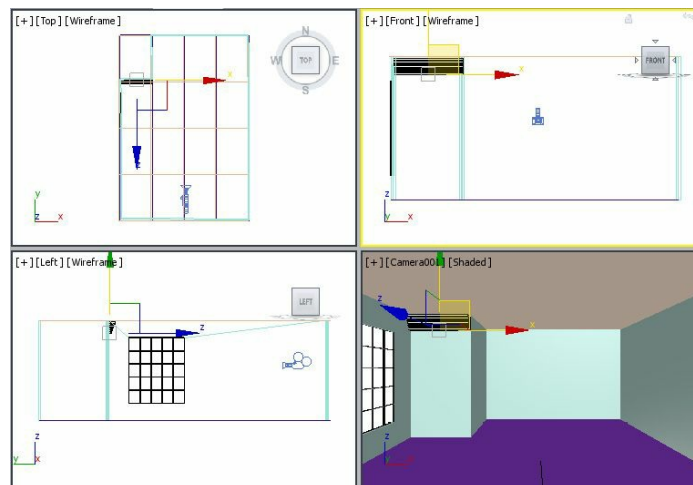
Figure 13-80 *Alignment of design01 in viewports*

Note

*To align design01 properly, you can use the **Zoom Extent All Selected** tool.*

17. Create five copies of *design01*; they are automatically named as *design002, design003, design004, design005,* and *design006*. Align all designs at the joining point of *Wall001* and *roof,* as shown in Figure 13-81. You need to adjust the size of all designs using the **Select and Scale** tool accordingly. Also, you need to modify the corners at the **Vertex** sub-object level.
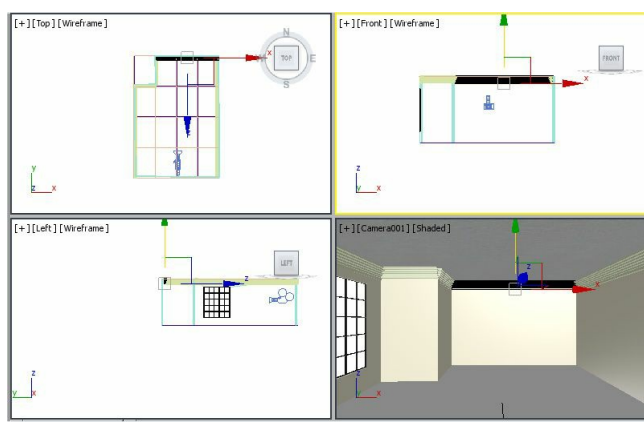
Figure 13-81 *Alignment of all designs at the joining point of the Wall001 and roof*

Applying Maps and Materials

In this section, you will apply materials and maps to wall, roof, floor, and Pop design geometries.

1. Select **Wall001** from the Scene Explorer and choose **Rendering > Material Editor > Compact Material Editor** from the menu bar; the **Material Editor** dialog box is displayed.

Next, you need to create the material for *Wall001* in the **Material Editor** dialog box.

2. Select the **01-Default** sample slot if it is not already selected, and then modify its name in the **Material Name** drop-down list to *wall material*.

3. Choose the **Material Type** button that is currently labeled as **Standard**; the **Material/Map Browser** dialog box is displayed. Select the **Architectural** material from **Materials > Standard** rollout and choose the **OK** button; the **Standard** material is replaced by the **Architectural** material. Also, various rollouts are displayed in the **Material Editor** dialog box to modify the **Architectural** material.

4. In the **Templates** rollout, select the **Paint Semi-gloss** option from the drop-down list. In the **Physical Qualities** rollout, choose the **Diffuse Color** color swatch; the **Color Selector: Diffuse** dialog box is displayed. Set the values in the **Red**, **Green**, and **Blue** spinners as follows:

Red: **251** Green: **239** Blue: **191**

Now, choose the **OK** button.

5. Make sure that *Wall001* is selected in the viewport and then choose the **Assign Material to Selection** button; the *wall material* is assigned to *Wall001*.

Next, you need to create a material for *floor*.

6. Select the **02-Default** sample slot and modify its name in the **Material Name** text box to *floor material*. In the **Shader Basic Parameters** rollout, make sure that the **Blinn** shader is selected in

the drop-down list.

Next, you need to assign a map.

7. In the **Blinn Basic Parameters** rollout, choose the **Diffuse** map button on the right side of the **Diffuse** color swatch; the **Material/Map Browser** dialog box is displayed. Select the **Bitmap** map from the **Maps > Standard** rollout and choose the **OK** button; the **Select Bitmap Image File** dialog box is displayed. As the project folder is already set, the *images* folder is displayed in the **Look in** drop-down list of this dialog box. Select the file *Finishes.Masonry Flooring Marble.Beige-Grid.jpg* and choose the **Open** button; the selected image is displayed in the selected sample slot. Also, the rollouts are displayed to modify the coordinates of the assigned map.

8. In the **Coordinates** rollout, set the value **4** in the **U Tiling** and **V Tiling** spinners. Next, choose the **Go to Parent** button to go back to the parent level.

9. Expand the **Maps** rollout and then select the **Reflection** check box to make it available for the material. Choose the **Reflection** map button labeled as **None**; the **Material/Map Browser** dialog box is displayed. Select the **Raytrace** map from the **Maps > Standard** rollout and choose the **OK** button; the **Raytrace** map is displayed as the sub-material. Use the default settings and then choose the **Go to Parent** button to go back to the parent level; the **None** label is replaced by **Map#x (Raytrace)**. Next, set the value **5** in the **Reflection** spinner.

10. Select **floor** from the Scene Explorer and then choose the **Assign Material to Selection** button; the *floor material* is assigned to *floor*. Choose the **Show Shaded Material in Viewport** button to display the *floor material* on *floor* in the viewport.

Next, you will assign a material to *roof*.

11. Select the **03-Default** sample slot and modify its name in the **Material Name** text box as *roof material*.

12. In the **Shader Basic Parameters** rollout, select the **2-Sided** check box. Next, you need to assign a map to the selected sample slot.

13. In the **Blinn Basic Parameters** rollout, choose the **Diffuse** map button on the right side of the **Diffuse** color swatch; the **Material/Map Browser** dialog box is displayed. Select the **Bitmap** map and choose the **OK** button; the **Select Bitmap Image File** dialog box is displayed. Select the file *Concrete.Cast-In-Place.Flat.Brown.Grey.jpg* and then choose the **Open** button; the selected image is displayed in the selected sample slot. Also, the rollouts are displayed to modify the coordinates of the assigned map.

14. In the **Coordinates** rollout, set the value **2** in both the **U Tiling** and **V Tiling** spinners. Next, choose the **Go to Parent** button to go back to the parent level.

15. Make sure that *roof* is selected and then choose the **Assign Material to Selection** button; the *roof material* is assigned to the *roof* in the viewport. Choose the **Show Shaded Material in Viewport** button to display the *roof material* on the *roof* in the viewport.

Next, you will assign the material to the POP designs.

16. Select all designs simultaneously in the viewport using the **Select by Name** tool, and then group them as *design*.

17. Select the **04-Default** sample slot in the **Material Editor** dialog box and modify its name in the **Material Name** text box to *design material*.

18. In the **Blinn Basic Parameters** rollout, choose the **Diffuse** color swatch; the **Color Selector: Diffuse Color** dialog box is displayed. Enter the values in the **Red**, **Green**, and **Blue** spinners as given below and then choose the **OK** button.

Red: **146** Green: **68** Blue: **5**

19. Make sure the group *design* is selected in the viewport and then choose the **Assign Material to Selection** button; the *design material* is assigned to *design*. Also, choose the **Show Shaded Material in Viewport** button to display the *design material* on *design* in the viewport.

20. Close the **Material Editor** dialog box.

Next, you need to add lights to the scene to illuminate it.

Creating Lights

In this section, you will create lights by using the **Omni** and **Target Direct** tools.

1. Activate the Top viewport. Choose **Create > Lights** in the **Command Panel** and choose the **Standard** option from the drop-down list. Next, choose the **Omni** tool from the **Object Type** rollout. Next, click in the Top viewport; the omni light is displayed in the viewport and it is automatically named as *Omni001*.

2. In the **Modify** tab, set the following parameters:

General Parameters rollout
Select the **On** check box in the **Shadows** area

Intensity/Color/Attenuation rollout
Set the value **0.6** in the **Multiplier** spinner

3. Select the **Multiplier** color swatch and modify the colors by setting the following parameters:

Red: **255** Green: **219** Red: **181**

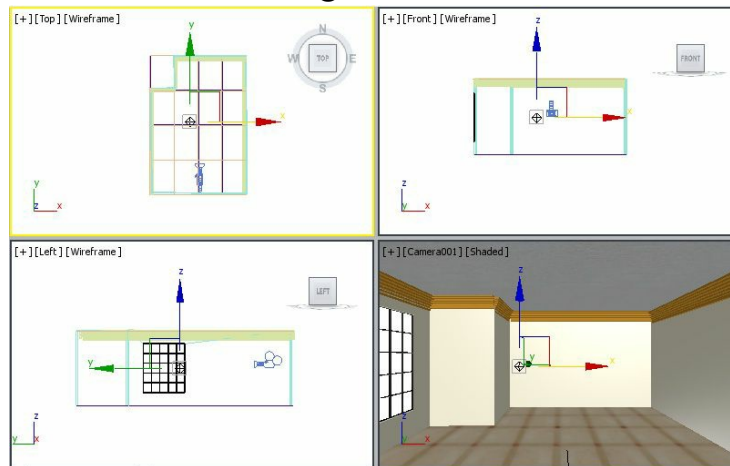4. Align *Omni001* in viewports, as shown in Figure 13-82.

Figure 13-82 The Omni001 light in viewports

Next, you need to create the target direct light in the scene to give the shadow effect.

5. Activate the Front viewport, choose the **Zoom** tool, and zoom out until the objects are displayed about half of their original size.

6. Choose the **Target Direct** tool from **Create > Lights > Standard > Object Type** rollout in the **Command Panel**. Move the cursor on the left side of the Front viewport; the shape of the cursor changes. Next, press and hold the left mouse button to specify the location of the light and drag the cursor near the front portion of *wall001* to specify the target of the light. Release the left mouse button; the light is displayed in all viewports and it is automatically named as *Direct001*.

7. Choose the **Modify** tab in the **Command Panel**; various rollouts to modify the target direct are displayed to modify the target direct light.

8. Expand the **General Parameters** rollout and select the **On** check box in the **Shadows** area.

9. In the **Directional Parameters** rollout, select the **Rectangle** radio button and set the values in the respective spinners as given below:

Hotspot/Beam: **84.0** Falloff/Field: **86.0**

10. Expand the **Atmospheres & Effects** rollout and choose the **Add** button; the **Add Atmosphere or Effect** dialog box is displayed. Select the **Volume Light** option and choose the **OK** button; the **Volume Light** option is displayed in the text area of the **Atmospheres & Effects** rollout.

Next, you need to modify the parameters of the **Volume Light**.

11. Select the **Volume Light** option in the **Atmospheres & Effects** rollout and choose the **Setup**

button; the **Environment and Effects** dialog box is displayed. The **Environment** tab is chosen by default in the **Environment and Effects** dialog box.

12. In the **Atmosphere** rollout, make sure the **Volume Light** option is selected in the **Effects** area. Set the value **1.5** in the **Density** spinner of the **Volume** area in the **Volume Light Parameters** rollout. Use the default values for other options and close the **Environment and Effects** dialog box.

⊘Note

*You can also use different settings in the **Volume Light Parameters** rollout to give different effects in the scene.*

13. Align *Direct001* light in the viewports to cover window, as shown in Figure 13-83.

⊘Note

You can adjust the position of the Camera001 to view the scene with desired light effects.

Creating Background

In this section, you will create a background for the scene across the window.

1. Choose **Rendering > Environment** from the menu bar; the **Environment and Effects** dialog box is displayed.

2. The **Environment** tab is chosen by default in the **Environment and Effects** dialog box. In the **Background** area of the **Common Parameters** rollout, choose the **Environment Map** button that is currently labeled as **None**; the **Material/Map Browser** dialog box is displayed.

3. Select the **Bitmap** map and choose the **OK** button; the **Select Bitmap Image File** dialog box is displayed. As the project folder is already set, the *images* folder is displayed in the **Look in** drop-down list of this dialog box. Select the *CLOUDS4.jpg* file and choose the **Open** button; the selected image is displayed in the background after rendering. Close the **Environment and Effects** dialog box.

Figure 13-83 *Alignment of the Direct001 light in viewports*
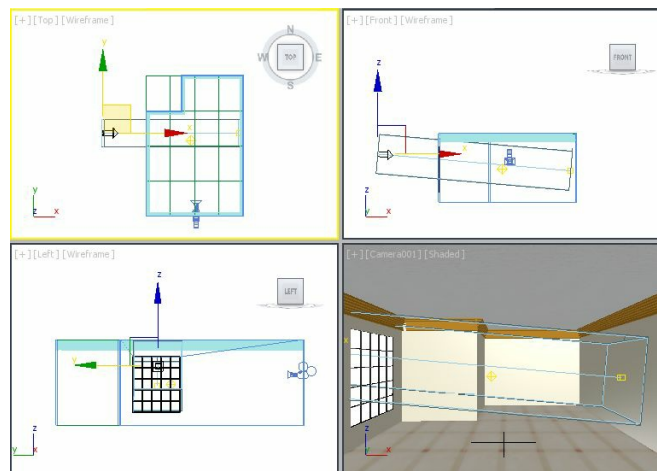
Saving and Rendering the Scene

1. Choose **Save** from the **Application** menu. Activate the Camera001 viewport.

2. Choose the **Render Production** tool in the **Main Toolbar**; the **Rendered Frame** window is displayed, showing the final output of the scene, as shown in Figure 13-84.

3. Close this window.
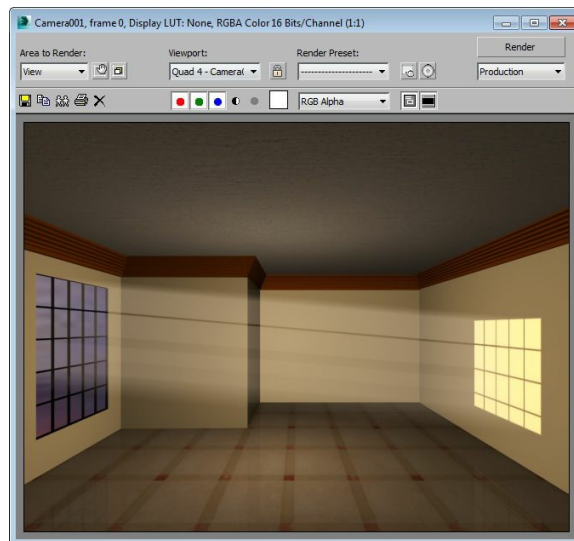

Figure 13-84 *The final output after rendering*

Tutorial 3

In this tutorial, you will illuminate a night scene of a room using photometric lights, refer to Figure 13-85. **(Expected time: 30 min)**

The following steps are required to complete this tutorial:

a. Create the project folder.
b. Open the file.
c. Create the roof light.
d. Create wall lights.
e. Save and render the scene.

Creating the Project Folder

1. Create a project folder with the name *c13_tut3* in the *3dsmax2015* folder, as discussed in Tutorial 1 of Chapter 2.

2. Open Windows Explorer and then browse to *\Documents\c13_3dsmax_2015_tut*. Next, copy all jpeg files to *\Documents\3dsmax2015\c13_tut3\sceneassets\images*. Also, copy *1.IES* file to *\Documents\3dsmax2015\c13_tut3\sceneassets\photometric*.

Figure 13-85 *The illuminated night scene of a room*

Opening the File

1. Choose **Open** from the **Application** menu; the **Open File** dialog box is displayed. In this dialog box, browse to the location *\Documents\c13_3dsmax_2015_tut* and select the **c13_tut3_start.max** file from it. Choose the **Open** button to open the file, refer to Figure 13-86.

2. Choose **Save As** from the **Application** menu; the **Save File As** dialog box is displayed. Browse to the location *\Documents\3dsmax2015\c13_tut3\scenes*. Save the file with the name *c13tut3.max* at this location.

Creating the Roof Light

In this section, you will create the roof light by using the **Free Light** tool.

1. Choose the **Maximize Viewport Toggle** tool to view all the viewports and activate the Top viewport. Choose **Create > Lights** in the **Command Panel**. By default, the **Photometric** option is displayed in the drop-down list below the **Lights** button.

2. Choose the **Free Light** tool from the **Object Type** rollout; the **Photometric Light Creation** message box is displayed, as shown in Figure 13-87. Next, choose **Yes** from this message box. Also, various rollouts are displayed in the **Command Panel**.
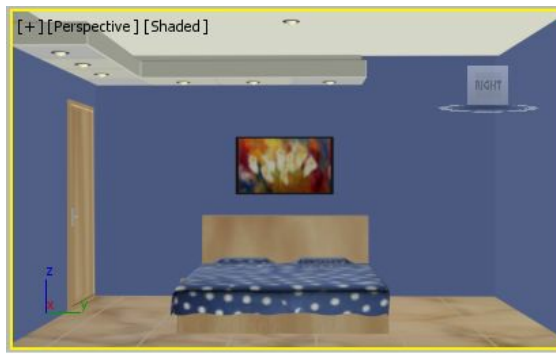
Figure 13-86 *The c13_tut3_start.max file*

Figure 13-87 *The **Photometric Light Creation** message box*

3. Click at the center of the room; the free light is created with the name *PhotometricLight001.* Enter **rooflight** in the **Name and Color** rollout.

4. Choose the **Select and Move** tool and align *rooflight* in the viewports, as shown in Figure 13-88.

Next, you will modify the shape of *rooflight*.

5. Choose the **Modify** tab in the **Command Panel**. Next, in the **Emit Light from (Shape)** area of the **Shape/Area Shadows** rollout, select the **Sphere** option from the drop-down list; the shape of the light changes in the viewport and the **Radius** spinner is displayed in the **Emit Light from (Shape)** area. Also, the **Shadow Samples** drop-down list is added to the **Rendering** area located below it.

6. Set the value **85** in the **Radius** spinner to increase the spread of the light; the shape of *rooflight* is modified, as shown in Figure 13-89.
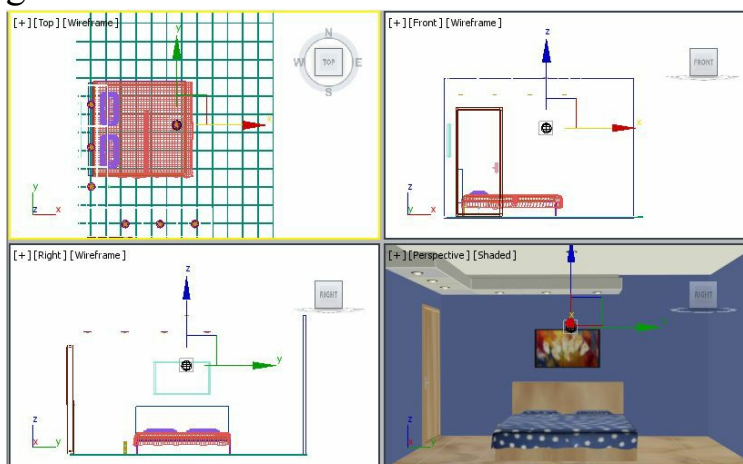

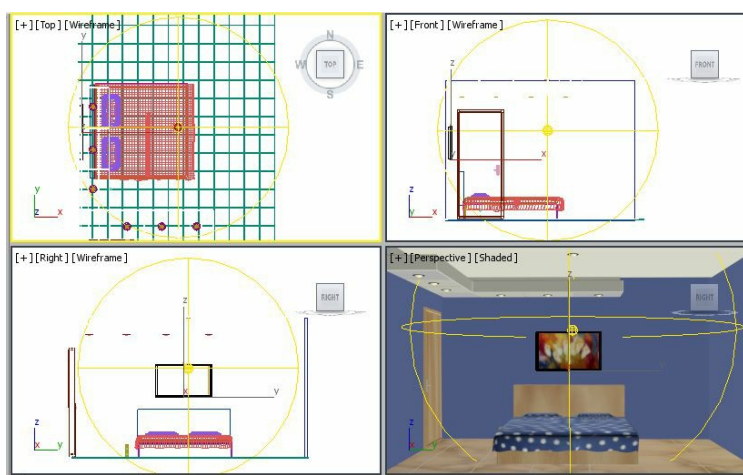***Figure 13-88*** *The rooflight aligned in the viewports*

Figure 13-89 The shape of rooflight changed

Next, you will modify the parameters of *rooflight* to lit the room with proper intensity, colors, and shadows.

7. In the **General Parameters** rollout, make sure the **On** check box is selected in the **Shadows** area. Next, select **Ray Traced Shadows** in the drop-down list below this check box.

8. Make sure the **Uniform Spherical** option is selected in the drop-down list located in the **Light Distribution (Type)** area.

The **Uniform Spherical** option is used to spread light in all directions.

9. Select the radio button located near the **Kelvin** Spinner; the **Kelvin** spinner is activated.

10. Set the value **6372** in the **Kelvin** spinner; the color swatch located next to the **Kelvin** spinner is changed to white. Next, choose the **Filter Color** color swatch located below it; the **Color Selector: Filter Color** dialog box is displayed. In this dialog box, make sure the value in the **Red**, **Green**, and **Blue** spinners is set to **255** and then choose the **OK** button to close the dialog box.

Note

*The value in the **Kelvin** spinner and the color in the **Filter Color** color swatch together define the color shade of the light being created. You can use different combinations of the spinner value and color shade in the color swatch to achieve a variety of light color shades.*

Next, you will set the intensity of *rooflight*.

11. In the **Intensity** area of the **Intensity/Color/Attenuation** rollout, select the **lm** radio button; the value in the first spinner located below the **lm** radio button changes and displays the intensity of the light in Lumen. Next, set the value **700** in this spinner; the intensity of the light is changed.

Now, you will render the scene to view the effect of modifying rooflight parameters in the scene.

12. Activate the Perspective viewport and adjust its view. Next, choose the **Render Production** tool from the **Main Toolbar**; the rendered image is displayed, refer to Figure 13-90.

You will notice the grains in the rendered image. Next, you will remove grains in the image by using higher shadow samples.

13. In the **Rendering** area of the **Shape/Area Shadows** rollout, select **256** from the **Shadow Samples** drop-down list.

Note

*If you select higher values for sampling shadows from the **Shadow Samples** drop-down list, the quality of the render is improved but the rendering time also increases.*

14. Render the Perspective viewport again, as discussed earlier. The rendered image is displayed, refer to Figure 13-91.

Figure 13-90 The rendered image with grains

Figure 13-91 The rendered image without grains

Creating Wall Lights

In this section, you will create wall lights by using the **Target Light** tool. You will also use IES file to achieve a specific light pattern.

1. Switch from the Left viewport to the Right viewport. Now, activate the Front viewport. Choose **Create > Lights** in the **Command Panel**. Next, choose the **Target Light** tool from the **Object Type** rollout; various rollouts are displayed in the **Command Panel**.

2. Click at a point and drag the cursor downward. Next, release the left mouse button; a target light is created. In the **Name and Color** rollout, enter **spot light1**. Next, choose the **Select and Move** tool and then select *spot light1* and *spot light1.Target*. Now, align them in the viewports, as shown in Figure 13-92.
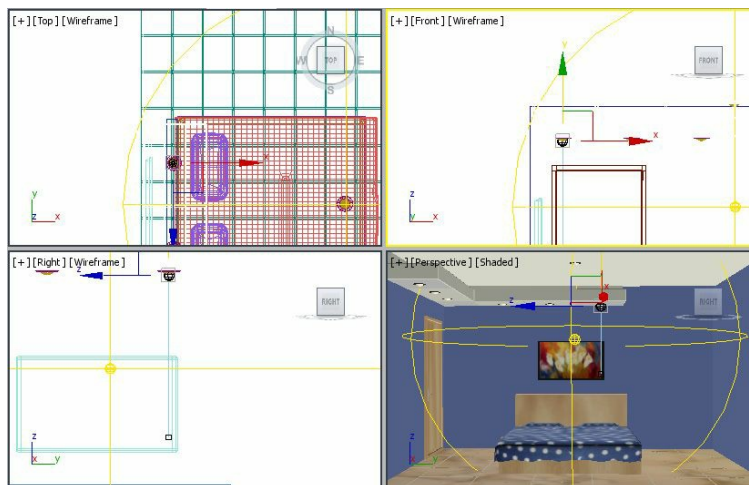

Figure 13-92 *The spot light1 and spot light1.Target aligned in the viewports*

Next, you need to modify the parameters of *spot light1*.

3. Select *spot light1* and then choose the **Modify** tab in the **Command Panel**. In the General Parameters rollout, select the **Photometric Web** option in the drop-down list from the **Light Distribution (Type)** area; a **Distribution (Photometric Web)** rollout is displayed in the **Command Panel**.

Now, you will use a standard photometric IES file to create a specific lighting pattern. These IES files are standard files provided by light manufacturers and are available on the internet for free download.

4. In the **Emit Light from (Shape)** area of the **Shape/Area Shadows** rollout, make sure the **Point** option is selected in the drop-down list.

5. Choose the **< Choose Photometric File >** button from the **Distribution (Photometric Web)** rollout; the **Open a Photometric Web File** dialog box is displayed. As the project folder is already set, the *photometric* folder of this project is displayed in the **Look in** drop-down list. Next, select the **1.ies** file from this dialog box and then choose the **Open** button; label of the button is replaced by the name of the selected file. Also, the lighting pattern is displayed in the window located above this button. Next, set the value **-38** in the **Y Rotation** spinner.

Next, you need to set the intensity and color of *spot light1*.

6. Select the radio button located near the **Kelvin** Spinner; the **Kelvin** spinner is activated.

7. Choose the **Filter Color** color swatch located below it; the **Color Selector: Filter Color** dialog box is displayed. In this dialog box, set the value in the **Red**, **Green**, and **Blue** spinners as given next:

Red: **164** Green: **165** Blue: **112**
Choose the **OK** button to close the dialog box; the color in the **Filter Color** color swatch is changed.

8. In the **Intensity** area of the **Intensity/Color/Attenuation** rollout, select the **lm** radio button; the value in the first spinner located below this radio button changes and displays the intensity of the light in Lumen. Next, set the value **9** in this spinner; the intensity of the light is increased.

9. In the **Far Attenuation** area of the **Intensity/Color/Attenuation** rollout, select the **Use** and **Show** check boxes. Next, set **10** and **34** in the **Start** and **End** spinners, respectively.

10. Activate the Perspective viewport. Next, choose the **Render Production** tool from the **Main Toolbar**; the rendered image is displayed, refer to Figure 13-93.

Next, you will add glow to the source of *spot light1*.

11. Choose **Rendering > Material Editor > Compact Material Editor** from the menu bar; the **Material Editor** dialog box is displayed. Select the empty slot in it and modify its name in the **Material Name** text box to *lamp dome material*.

12. Choose the **Material Type** button that is labeled as **Arch & Design**; the **Material /Map Browser** dialog box is displayed. Select **Standard** from the **Materials > Standard** rollouts and choose the **OK** button; the **Standard** material is displayed in the **Material Editor** dialog box.

13. Select the **Color** check box in the **Self-Illumination** area of the **Blinn Basic Parameters** rollout. Next, choose the **Color** color swatch and change its color to white.

14. Choose the **Diffuse**, **Specular** color swatches from the **Blinn Basic Parameters** rollout and change its color to white.

Figure 13-93 The rendered image

15. Set the value **81** in the **Specular Level** spinner and **51** in the **Glossiness** spinner of the **Blinn Basic Parameters** rollout.

16. Select *lamp holder dome* from the Scene Explorer. Next, choose the **Assign Material to Selection** button from the **Material Editor** dialog box; the self illuminating material is applied to *lamp holder dome*.

17. Choose the **Render Production** tool from the **Main Toolbar**; the rendered image is displayed, as shown in Figure 13-94. You will notice glow at the source of *spot light1*.

18. Activate the Right viewport and select *spot light1* and *spot light1.Target*. Next, press and hold the SHIFT key and drag the cursor to lamp holder located at the left of *spot light1*. Release the left mouse button; the **Clone Options** dialog box is displayed. In this dialog box, select the **Copy** radio button. Set the value **2** in the **Number of Copies** spinner and choose the **OK** button; two copies of *spot light1* and *spot light1.Target* are created in the viewports. Next, choose the **Select and Move** tool and align these lights in the viewports, as shown in Figure 13-95.
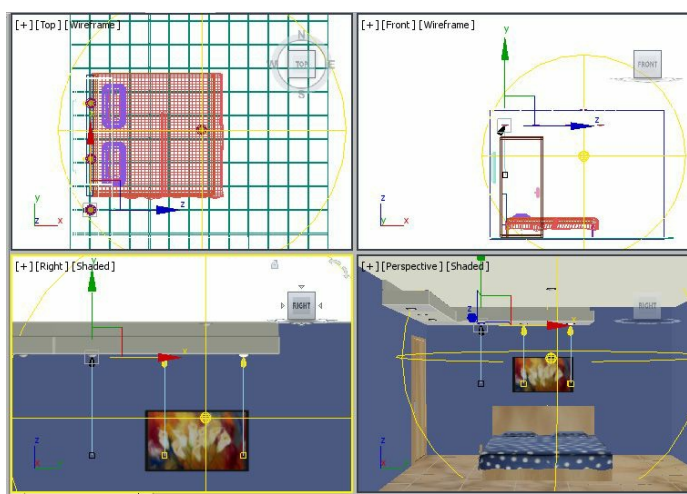

Figure 13-94 The rendered image

Figure 13-95 *Copies of spot light1 and spot light1.Target aligned in the viewports*

19. Assign the *lamp dome material* to *lamp holder dome 001* and *lamp holder dome 002* to add glow at the source of copied spot lights.

20. Similarly, you can create copies of *spot light1* and *spot light1.Target* and place them at the remaining spot lights of the false ceiling. You need to assign the *lamp dome material* to remaining lamp holder domes.

Saving and Rendering the Scene
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1. Choose **Save** from the **Application** menu.

2. Activate the Perspective viewport. Next, choose the **Render Production** tool from the **Main Toolbar**; the rendered image is displayed, refer to Figure 13-96.
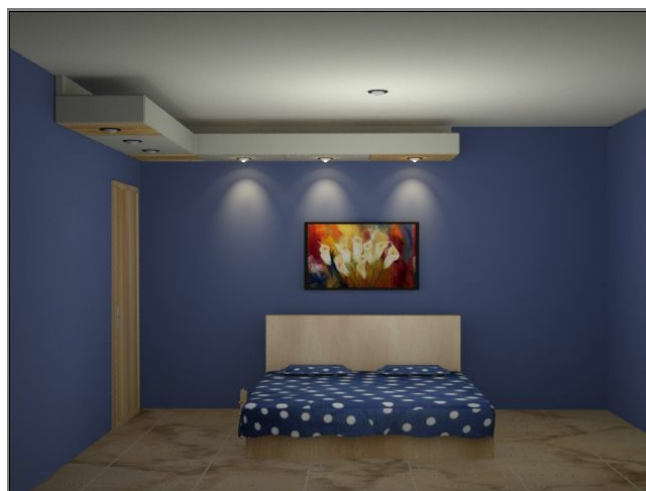

Figure 13-96 *The rendered image*