INTRODUCTION

The basic concept of computer animation is to define different positions, rotations, and scaling of an object at different key points in a sequence in the time slider. These defined points are known as keyframes. The interpolation between the keyframes consists of the information of the actions performed between those keyframes. When you play the animation, the computer plays a series of frames quickly and the object seems to be moving.

In 3ds Max, the standard frame rate is 30 frames per second. It means, if you want to create an animation for one minute, then you need to adjust about 1,800 frames. Therefore, before starting an animation, you need to calculate the frames according to the time limit. Using this software, you can create character animation and animation based on different types of motions that you see in real life. You can also create special lighting effects in the scene by animating lights and cameras. In this chapter, you will learn basics of animation.

TIME SLIDER AND ANIMATION PLAYBACK CONTROLS

3ds Max provides various options to animate objects that you create in it. To do so, you need to be familiar with the animation playback controls and time slider. These controls enable you to play, pause, and stop an animation. They are available at the lower right corner of the 3ds Max interface and are discussed here briefly.

Time Slider

The time slider displays the current frame and the total number of frames in the current time segment, refer to Figure 14-1. You can view the animation at each frame by dragging the time slider.

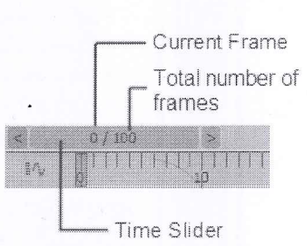

Figure 14-1 The time slider

Note

The time segment is the total range of frames that you can access using the time slider. By default, it ranges from 0 to 100. You can set the range using the ***Time Configuration*** *dialog box. You will learn about this dialog box in the later section.*

Animation Playback Controls

The animation playback controls are used to play and stop the animation in the active viewport. These controls are discussed next.

The **Play Animation** button is used to play or start the animation in the active viewport. When you click on the **Play Animation** button, it turns into a stop button.

The **Stop Animation** button is used to stop the animation. This button is displayed when you play the animation.

The **Go to Start** button is used to set the time slider at the first frame of the active time segment.

The **Go to End** button is used to set the time slider at the last frame of the active time segment.

The **Previous Frame** button is used to move the time slider one frame at a time in the reverse direction. You can view the current frame on the time slider when it moves from one frame to another.

The **Next Frame** button is used to move the time slider one frame at a time in the forward direction.

UNDERSTANDING ANIMATION AND TIME CONTROLS

In 3ds Max, different types of tools are available at the bottom of the screen to control animation and its time settings, refer to Figure 14-2. You have already learned about the time slider and the animation playback controls in the previous section. The other controls are discussed next.

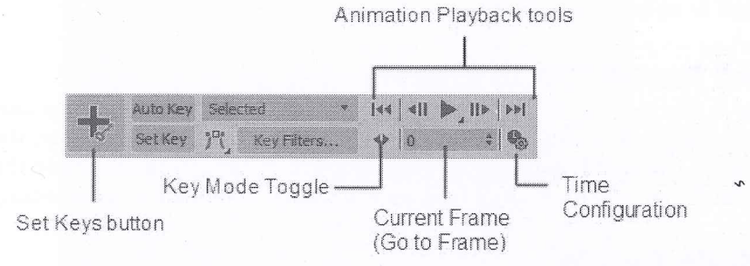

Figure 14-2 The time control tools

Toggle Auto Key Mode

The **Toggle Auto Key Mode** button, which is labeled as **Auto Key**, is used to turn on the auto key animation mode. When you choose the **Toggle Auto Key Mode** button, it turns red. Also, the background of the time slider and the border of the active viewport turns red, indicating that you are in the animation mode. Now, if you make any changes in the object, the changes will be keyframed in the time slider.

To perform an animation using the **Toggle Auto Key Mode** button, first you need to make sure that the object that you want to animate is selected in the viewport. Choose the **Go to Start** button to set the time slider to the first frame. Next, choose the **Toggle Auto Key Mode** button to turn on the auto key animation mode; it will turn red. Now, drag the time slider to a frame other than 0 and animate the selected object by modifying its parameters or by transforming the object; a keyframe will be created on that frame and at frame 0 on the track bar below the time slider. Again, move the time slider to another frame and change the parameters. You can continue this process until you get all the keyframes in a sequential order for your animation. Next, choose the **Toggle Auto Key Mode** button again to turn it off. Choose the **Play Animation** button to view the animation of the selected object in the current viewport.

Toggle Set Key Mode

The **Toggle Set Key Mode** button that is labeled as **Set Key** is used to turn on the set key animation mode. In this mode, you need to set keys for the animation of the selected object by choosing the **Set Keys** button on the left side of the **Toggle Set Key Mode** button.

To perform an animation using the **Toggle Set Key Mode** button, select the object in the viewport that you want to animate. Choose the **Go to Start** button to set the time slider to the first frame. Next, choose the **Toggle Set Key Mode** button to turn on the set key animation mode; the button will turn red. Choose the **Set Keys** button; it will flash in red color and a keyframe will be set for the current position of the selected object. Now, drag the time slider to set a frame other than 0 and animate the selected object. Again, choose the **Set Keys** button; it will flash in red color and another keyframe will be set on the track bar for the changed position. You can continue this process until you get all the keyframes in a sequential order for your animation. Then, choose the **Toggle Set Key Mode** button to turn it off. Also, choose the **Play Animation** button to view the animation of the selected object in the current viewport.

Note

*If you transform an object when the **Toggle Set Key Mode** button is chosen, then the keyframe will be set only when you choose the **Set Keys** button.*

Current Frame (Go To Frame)

The value in this spinner shows the current frame number at which the time slider is positioned. While animating your scene, if you want to go to another frame, you can enter the frame number directly in the **Current Frame (Go To Frame)** spinner. As you drag the time slider, the value in the Current Frame (Go To Frame) spinner will change automatically according to its position.

Key Mode Toggle

By default, the **Key Mode Toggle** button is not activated. If activated, it allows you to jump between the keyframes directly. To understand the function of this button, you need to select the animated object in the viewport. Next, choose the **Key Mode Toggle** button; the **Previous Frame** and **Next Frame** buttons in the animation playback controls will be replaced with the **Previous Key** and **Next Key** buttons, refer to Figures 14-3 and 14-4. Choose the **Previous Key** or **Next Key** button to move the time slider from one keyframe to the other.

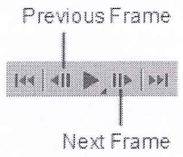

***Figure 14-3** Animation playback controls before choosing the **Key Mode Toggle** button*

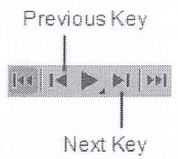

***Figure 14-4** Animation playback controls after choosing the **Key Mode Toggle** button*

Time Configuration

Enhanced

The **Time Configuration** button is used to set the length of an animation by defining the number of frames in the track bar. It is also used to set the frame rate, time display, and so on.

To set these parameters, choose the **Time Configuration** button; the **Time Configuration** dialog box will be displayed, as shown in Figure 14-5. You need to use the options in this dialog box to set

the animation length, frame rate, and time display. The options in this dialog box are discussed next.

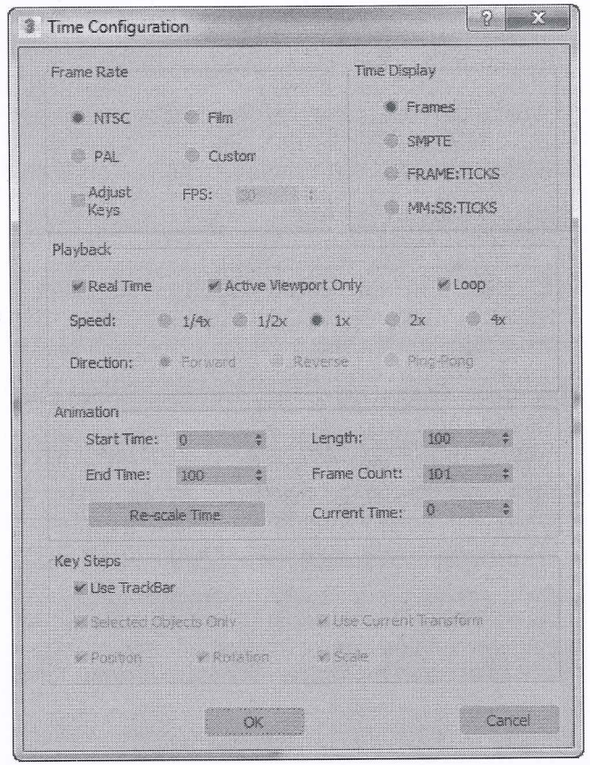

***Figure 14-5** The **Time Configuration** dialog box*

Frame Rate Area

There are four radio buttons in this area, namely **NTSC**, **Film**, **PAL**, and **Custom**. These radio buttons are used to define a particular frame rate for the animation in frames per second. By default, the **NTSC** radio button is selected. On selecting the **Custom** radio button, the **FPS** spinner is activated wherein you can specify the frame rate in seconds for the animation. If you select the **Adjust Keys** check box, 3ds Max scales the keys to whole frame when you rescale the animation length.

Time Display Area

The radio buttons in this area are used to define the method of time displayed in the time slider. The radio buttons in this area are **Frames**, **SMPTE**, **FRAME: TICKS**, and **MM:SS: TICKS**. By default, the **Frames** radio button is selected.

Playback Area

This area is used to specify the playback speed and the viewport in which the animation will be played. By default, the **Real Time** check box in this area is selected. As a result, animation is played at the selected playback speed and frames are skipped so that the animation synchronizes

with the current frame rate settings. You can select one of the radio buttons such as **1/4x**, **1/2x**, and so on in the **Speed** group to define the speed of the animation. If you clear the **Real Time** check box, then the **Speed** group will be deactivated and the **Direction** group will be activated. The radio buttons in the **Direction** group are used to define the direction of the animation. The direction of the animation can be forward, reverse, or ping-pong. The ping-pong direction means that first the animation will be played in the forward direction and then in the reverse direction. The **Active Viewport Only** check box is selected by default and is used to play the animation only in the active viewport. If you clear this check box, then the animation will be simultaneously played in all the viewports. The **Loop** check box is also selected by default and is used to play the animation repeatedly.

Animation Area

The options in this area are used to set the length of animation. The default values in the spinners of this area specify the number of frames for the animation. The **Start Time** and **End Time** spinners are used to specify the current time segment in the time slider. The current time segment is the total range of frames that you can access using the time slider. The **Length** spinner is used to specify the total number of frames in the current time segment or the length of the animation. The **Frame Count** spinner is used to specify the number of frames that will be rendered. The **Current Time** spinner is used to specify the current frame number at which the time slider is positioned. If you choose the **Re-scale Time** button, the **Re-scale Time** dialog box will be displayed. You can specify the options in this dialog box to change the existing time segment to a new time segment.

Track Bar

The track bar lies between the time slider and the status bar. It shows a timeline with the frame numbers in it, as shown in Figure 14-6.

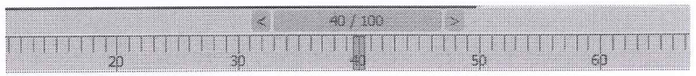

Figure 14-6 *Partial view of the track bar*

Track View

Menu bar:	Graph Editors > Track View - Curve Editor Graph Editors > Track View - Dope Sheet
Main Toolbar:	Curve Editor (Open)

The track view is used to control the animation keys in the animation created by you. You can also insert sound in the scene and create its notes. The track view uses two different modes, **Curve Editor** and **Dope Sheet**. In the **Curve Editor** mode, the animation is displayed as the function curve on a graph, refer to Figure 14-7. In the **Dope Sheet** mode, the animation is displayed as a spreadsheet of keys, refer to Figure 14-8.

To edit the animation of an object using **Curve Editor**, select the animated object and choose the **Curve Editor (Open)** tool from the **Main Toolbar**; the **Track View - Curve Editor** window will be displayed, refer to Figure 14-7. The pull-down menus on the top of this window are used to choose different options to edit the animation. The hierarchy on the left side of this window is used to display all the objects of the scene. To view the sub-options in this tree, you need to

click on the plus sign (+). The edit window on the right of the hierarchy tree is used to edit the animation of the objects using the tangent handles available on the keys found on the curves.

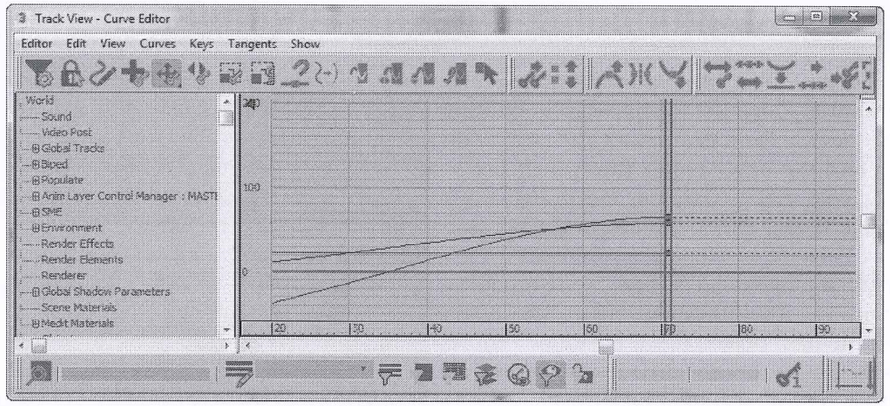

Figure 14-7 *The **Track View - Curve Editor** window*

To edit the animation of an object using **Dope Sheet**, select the animated object and choose **Graph Editors > Track View - Dope Sheet** from the menu bar; the **Track View - Dope Sheet** window will be displayed, refer to Figure 14-8.

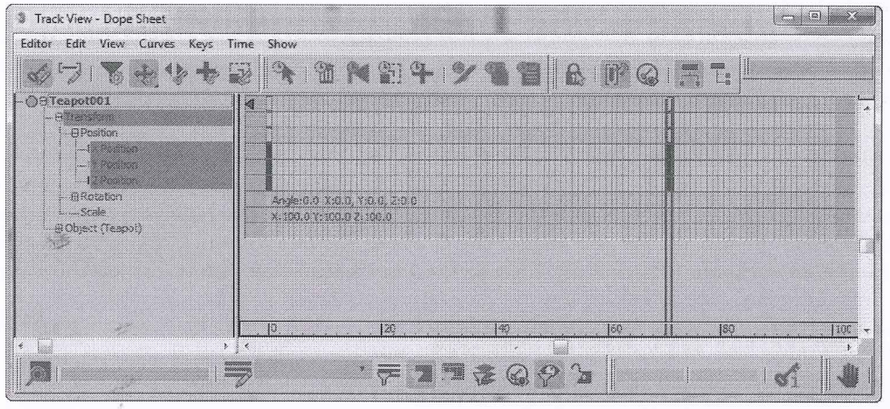

Figure 14-8 *The **Track View - Dope Sheet** window*

In this window, you can view all the keys in a spreadsheet format. You need to select the keys and edit them according to the animation.

Tip

*You can also invoke **Track View - Curve Editor** in place of the track bar. To do so, choose the **Open Mini Curve Editor** button on the left side of the track bar.*

MORPH COMPOUND OBJECT

Menu bar: Create > Compound > Morph
Main Toolbar: Create > Geometry > Compound Objects > Object Type rollout > Morph

The **Morph** tool is used to create morphing in the objects. The morphing is an animation technique in which the morph object combines two or more objects by matching their vertices in a sequential form to produce the animation result. The original object is known as the base object and the other object into which the base object gets morphed is known as the target object. Note that to perform morphing, the base and target objects must be mesh, patch, or poly objects and they should have the same number of vertices.

To create a morph object, first create an object and convert it into an editable object. This object will be the base object. Next, create two copies of the object and modify their shapes by selecting the **Vertex** sub-object level, refer to Figure 14-9. You can also give the shape of your choice to the objects. These objects will be the target objects. Now, choose the **Toggle Auto Key Mode** button to turn it on and choose the **Go to Start** button to move the time slider to frame 0. Select the base object and choose **Create > Compound > Morph** from the menu bar; the **Pick Targets** and **Current Targets** rollouts will be displayed in the modify panel. Next, set the value **35** in the **Current Frame (Go To Frame)** spinner to move the time slider to frame 35. In the **Pick Targets** rollout, choose the **Pick Target** button and move the cursor over the first target object; a selection cursor will be displayed. Select the first target object in the viewport. Similarly, set the value **70** in the **Current Frame (Go To Frame)** spinner to move the time slider to frame 70 and select the second target object. When you select the target objects in the viewport, the names of the base and target objects will be displayed in the **Morph Targets** area of the **Current Targets** rollout. Choose the **Toggle Auto Key Mode** button again to turn it off. Choose the **Play Animation** button to view the animation.

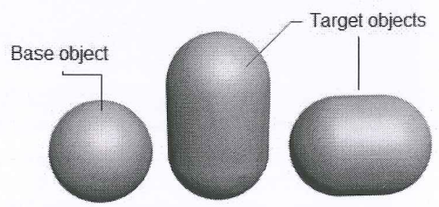

Figure 14-9 *The base and target objects for morphing*

RENDERING AN ANIMATION

Menu bar: Rendering > Render Setup
Main Toolbar: Render Setup
Keyboard: F10

Rendering is a process of generating a 2-dimensional image from a 3-dimensional scene. It shows the lighting effects, materials applied, background, and other settings that you set for the scene. In earlier chapters, you have already learned about the basic rendering for still images. The advanced rendering used for the animated scene is discussed next.

To render the final animation, choose the **Render Setup** tool; the **Render Setup: Scanline Renderer** dialog box will be displayed, as shown in Figure 14-10. The **Common** tab is chosen by default in this dialog box. Set the parameters in different rollouts displayed in the **Common** tab. Also, in the **View to Render** drop-down list located at the top area of this dialog box, select the viewport that you want to render.

Next, choose the **Render** button; the **Perspective, frame 0, Display Gamma:2.2, RGBA Color 16 Bits/Channel (1:1)** dialog box and the **Rendering** dialog box will be invoked, displaying the rendering progress, refer to Figure 14-11. Various options and rollouts in the **Render Setup: Scanline Renderer** dialog box are discussed next.

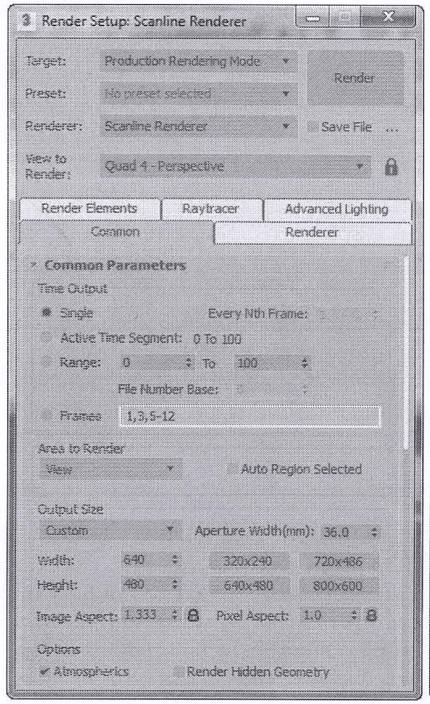

Figure 14-10 *The* ***Render Setup: Scanline Renderer*** *dialog box*

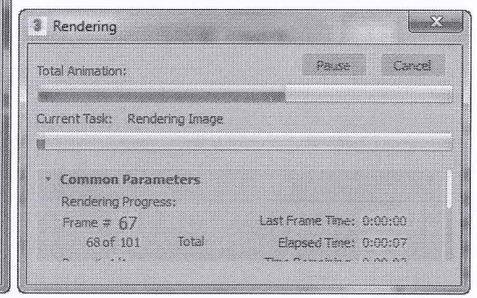

Figure 14-11 *The* ***Rendering*** *dialog box*

Target

This drop-down list is used for specifying rendering mode. Some of the rendering modes available in this drop-down list are **Production Rendering Mode**, **Iterative Rendering Mode**, **A360 Cloud Rendering Mode**.

Preset

This drop-down list is used for specifying presets. Some of the presets available in this drop-down list are **3dsmax.scanlight.radiosity.high**, and **lighting.analysis.assistant.preset**. You can also load and save a preset using the **Load Preset** and **Save Preset** options, respectively, from the drop-down list.

Renderer

This drop-down list is used for specifying renderer. By default, the **Scanline renderer** is selected.

View to Render

You can select a view to be rendered from this drop-down list. By default, **Quad 4 - Perspective** is selected in it.

Common Parameters Rollout

There are different types of renderers to render the scene in 3ds Max such as **NVIDIA mental ray** renderer, **VUE File Renderer**, and so on. The options in this rollout are used to set the parameters common for all types of renderers. The commonly used areas in this rollout are discussed next.

Time Output Area

This area is used to set the number of frames that you want to render. By default, the **Single** radio button is selected that enables you to render only a single frame. To render the animation, you need to select the **Active Time Segment** radio button. This radio button renders all the frames in the current time segment. Select the **Range** radio button to specify a range of frames for rendering by entering the start and end frame numbers in the spinners given on the right of this radio button. The **Frames** radio button allows you to render the frame numbers of your choice. To do so, select this radio button and enter the required frame number in the text box given on the right of this radio button.

Output Size Area

The options in this area are used to define the size of the rendered image. The drop-down list in this area is used to specify industry-standard film and video aspect ratios. You can choose one of the formats and then use the remaining group controls to set the output resolution. You can also set the aspect ratio and resolution of your choice by using the **Custom** option. Choose one of the default buttons, **320x240**, **640x480**, **720x486**, or **800x600** to define the size of the output window. When you choose any of these buttons, the corresponding values will be displayed in the **Width** and **Height** spinners. You can also set the values manually in the **Width** and **Height** spinners to define the size.

Options Area

The check boxes in this area are used to filter the options to render for the final output such as atmosphere, lighting effects, and so on.

Advanced Lighting Area

The check boxes in this area are used to select options for using advanced lighting and for computing it on per-frame basis when required.

Bitmap Performance and Memory Options Area

This area is used to decide whether 3ds Max will use the full resolutions maps or the proxies of the maps at rendering. To assign the settings, choose the **Setup** button in this area; the **Global Settings and Defaults for Bitmap Proxies** dialog box will be displayed. You can set the required parameters in this dialog box.

Render Output Area

This area is used to specify a file where the rendered animation can be saved. To do so, choose the **Files** button; the **Render Output File** dialog box will be displayed. Enter the name of the

file in the **File name** text box and then select the type of file from the **Save as type** drop-down list. Next, choose the **Save** button. If you have selected the **AVI File (*.avi)** file type, the **AVI File Compression Setup** dialog box will be displayed. Use the default settings and choose the **OK** button; the **Save File** check box will get selected and the path of the file will be displayed just below the **Files** button in the **Render Output** area.

Assign Renderer Rollout

This rollout is used to set the renderer for the scene. The **Production** option is used to assign a renderer for the graphics. The **Material Editor** option is used to assign a renderer for the sample slots in the **Material Editor** dialog box. The **ActiveShade** option is used to assign a renderer for the lighting effects in the scene, refer to Figure 14-12.

To assign the renderer, choose the **Choose Renderer** button on the right of the options given in this rollout; the **Choose Renderer** dialog box will be displayed, as shown in Figure 14-13. Select the renderer and choose the **OK** button; the name of the selected renderer will be displayed in the text box on the right of the selected option. Choose the **Save as Defaults** button in the **Assign Renderer** rollout to save the settings as default settings for further use.

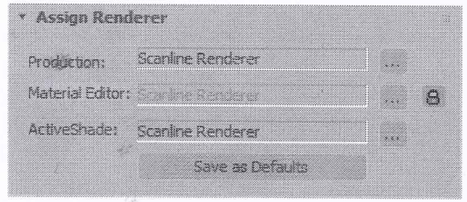

*Figure 14-12 The **Assign Renderer** rollout*

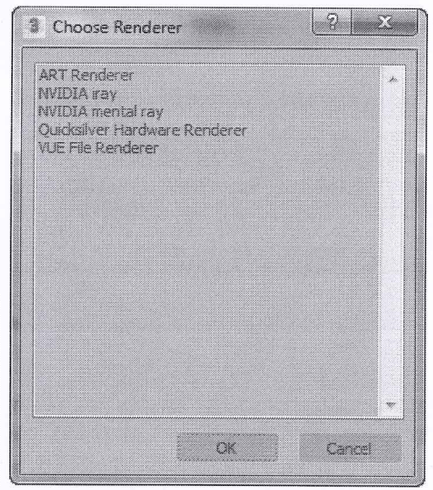

*Figure 14-13 The **Choose Renderer** dialog box*

Note

*If you install any additional renderer plug-ins in 3ds Max, the renderer types will be added to the **Choose Renderer** list.*

PREVIEWING AN ANIMATION

If a scene has a large number of objects, lights, and special effects, it may take a longer time to render the final animation and therefore, you will not be able to know how the final render would look like. However, in 3ds Max, you can preview its render. Note that the preview will be in low resolution and will display the diffuse color maps only. Therefore, it takes lesser time to render. You can have a look at your animation before the final rendering.

To create a preview animation, choose **Tools > Preview - Grab Viewport > Create Preview Animation** from the menu bar; the **Make Preview** dialog box will be displayed, as shown in Figure 14-14. Alternatively, choose **Create Preview > Create Preview Animation** from the General viewport label menu to invoke the **Make Preview** dialog box, refer to Figure 14-15. Set the parameters for different options in this dialog box and select the viewport that you want to render from the **Render Viewport** drop-down list which is located at the bottom of the dialog box. Next, choose the **Create** button; the **Video Compression** dialog box will be displayed. Use the default settings and choose the **OK** button; the rendering of the preview will start. Once the preview has been created, it will automatically start in the Windows Media Player.

To view the last preview animation, choose **Tools > Preview - Grab Viewport > Play Preview Animation** from the menu bar; the animation will start playing in the Windows Media Player. Alternatively, choose **Create Preview > Play Preview Animation** from the General viewport label menu, refer to Figure 14-15.

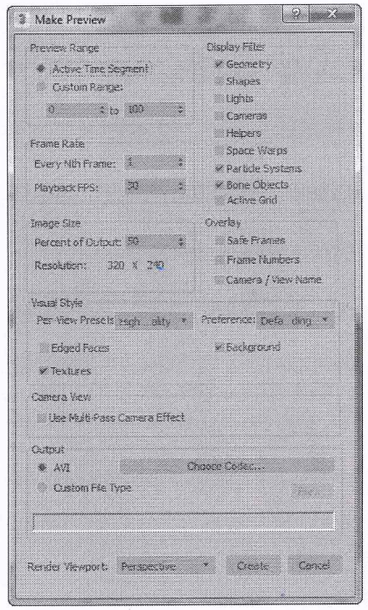

*Figure 14-14 The **Make Preview** dialog box*

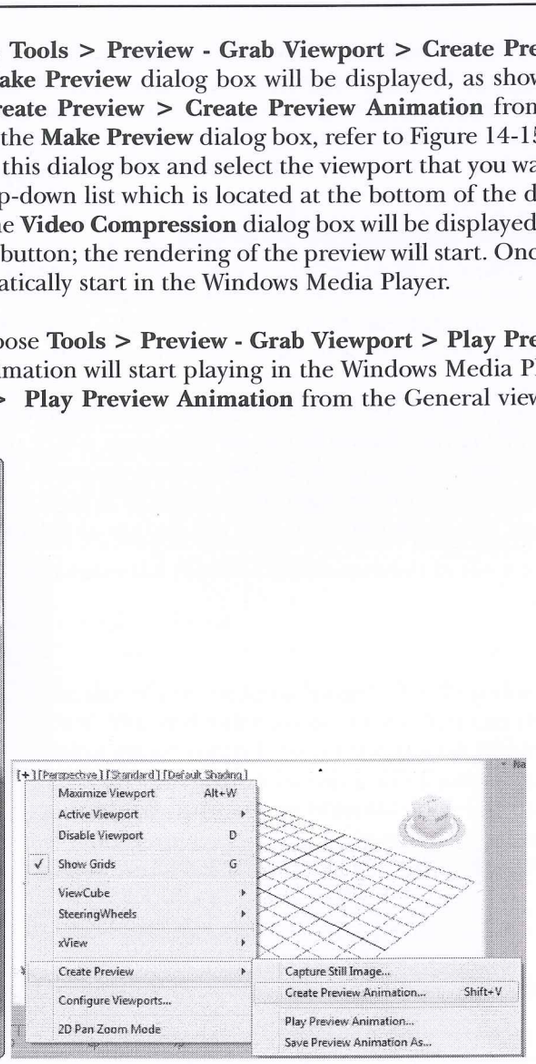

Figure 14-15 The flyout and the cascading menu of the General viewport label

RENDERING EFFECTS

The Rendering effects are the special effects assigned to a scene. These effects are visible only on rendering. To assign a rendering effect to a scene, choose **Rendering > Effects** from the menu bar; the **Environment and Effects** dialog box will be displayed, as shown in Figure 14-16. The **Effects** tab is chosen by default. In the **Effects** rollout of this tab, choose the **Add** button; the **Add Effect** dialog box will be displayed, as shown in Figure 14-17. Select the rendering effect from the list given in this dialog box and choose the **OK** button; the selected rendering effect will be displayed in the **Effects** text area of the **Effects** rollout. Also, the rollouts related to the selected effect will be displayed in the **Environment and Effects** dialog box. Next, set the parameters for

the selected rendering effect in these rollouts and close the dialog box. Now, render the final scene; the rendering effects will be displayed in the final rendered image.

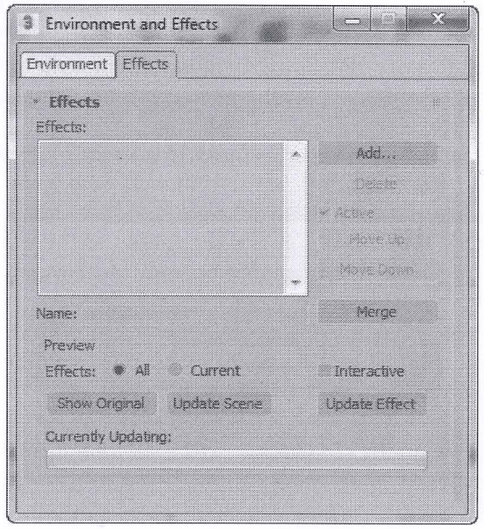

*Figure 14-16 The **Environment and Effects** dialog box*

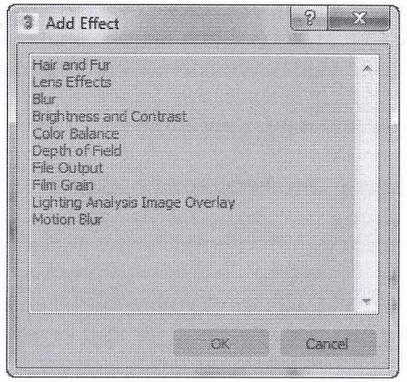

*Figure 14-17 The **Add Effect** dialog box*

TUTORIALS

Before starting the tutorials, you need to download the *c14_3dsmax_2017_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 2017: 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 walkthrough in a water tunnel, refer to Figures 14-18 and 14-19. **(Expected time: 60 min)**

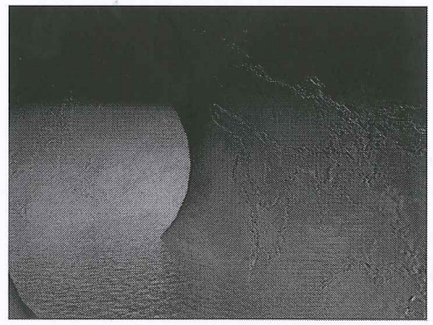

Figure 14-18 Animated scene for tunnel at frame 600

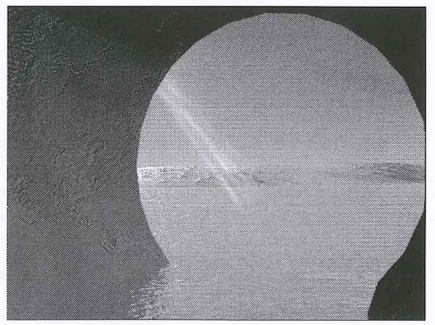

Figure 14-19 Animated scene for tunnel at frame 920

The following steps are required to complete this tutorial:

a. Create the project folder.
b. Create a tunnel.
c. Create a camera.
d. Create water surface.
e. Create and assign materials to water surface.
f. Create walkthrough.
g. Rescale the active time segment.
h. Create animation in water.
i. Assign environment to the scene.
j. Save and render the scene.

Creating the Project Folder

1. Create a new project folder with the name *c14_tut1* at *\Documents\3dsmax2017* and then save the file with the name *c14tut1*, as discussed in Tutorial 1 of Chapter 2.

2. Open the Windows Explorer and then browse to the *c14_3dsmax_2017_tut* folder. Next, copy the files *tunnel_material.jpg* and *ice_environment.jpg* at the location *\Documents\3dsmax2017\c14_tut1\sceneassets\images*.

Creating a Tunnel

To create a tunnel, you need to use various splines and the **Loft** tool from **Compound Objects**.

1. Activate the Front viewport. Choose **Create > Shapes** in the **Command Panel**; the **Splines** option is displayed by default in the drop-down list below the **Shapes** button. Choose the **Donut** tool from the **Object Type** rollout.

2. Create a donut in the Front viewport. It is automatically named as *Donut001*. Now, set its parameters in the **Parameters** rollout as follows:

   Radius 1: **720.539** Radius 2: **848.293**

3. In the **Interpolation** rollout, set the value **20** in the **Steps** spinner.

4. Choose the **Zoom Extents All** tool to view *Donut001* in the viewports properly.

5. Activate the Top viewport. Choose the **Zoom** tool and zoom out the viewport so that *Donut001* is visible to half of its original size.

6. Choose the **Line** tool from **Create > Shapes > Splines > Object Type** rollout in the **Command Panel**. In the **Creation Method** rollout, select the **Corner** and **Smooth** radio buttons in the **Initial Type** and **Drag Type** areas, respectively.

7. Create a line in the Top viewport, as shown in Figure 14-20. It is automatically named as *Line001*.

Next, you need to create a loft compound object.

8. Make sure *Line001* is selected in the Top viewport. Choose **Create > Geometry** in the **Command Panel**; the **Standard Primitives** option is displayed by default in the drop-down list below the **Geometry** button. Select the **Compound Objects** option from the drop-down list and choose the **Loft** tool from the **Object Type** rollout.

9. In the **Creation Method** rollout of the **Loft** tool, choose the **Get Shape** button and move the cursor over *Donut001* in the Front viewport; the shape of the cursor changes, as shown in Figure 14-21. Click on *Donut001*; the shape of a tunnel is created in the viewports. Right-click to exit the command. Choose the **Zoom Extents All** tool to view the entire shape in the viewports, as shown in Figure 14-22.

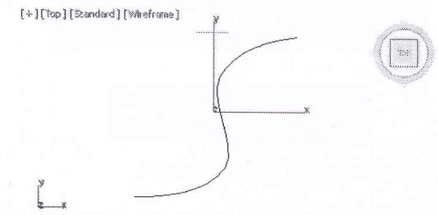

Figure 14-20 *A line created for the tunnel*

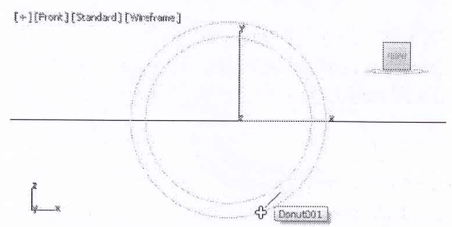

Figure 14-21 *The cursor displayed after moving it over Donut001*

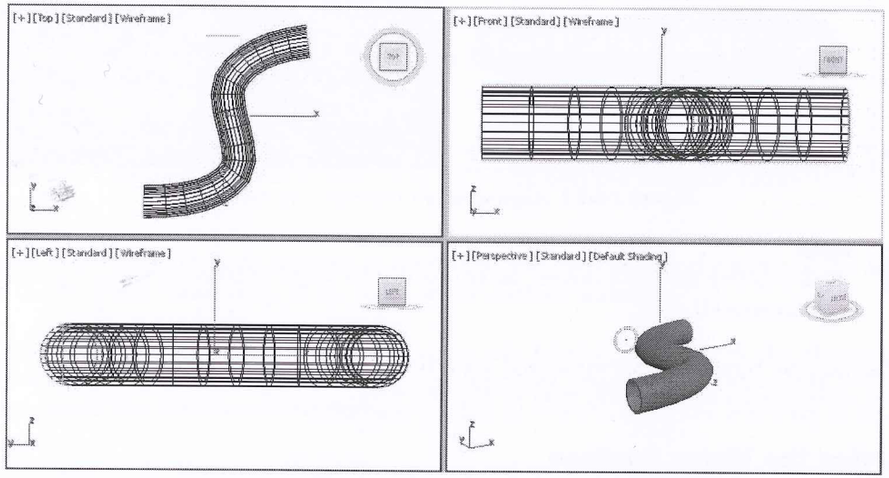

Figure 14-22 *The shape of the tunnel created in the viewports using the* ***Loft*** *tool*

Note

If the shape displayed after using the ***Loft*** *tool is not similar to the tunnel shown in Figure 14-22, you need to modify the placement of vertices of Line001 spline at the* ***Vertex*** *sub-object level.*

10. The lofted object is automatically named as *Loft001*. Modify its name to *water tunnel*.

Creating a Camera

In this section, you will create a walkthrough inside *water tunnel* by using the **Target** camera tool.

1. Activate the Front viewport. Choose **Create > Cameras** in the **Command Panel** and then choose the **Target** tool from the **Object Type** rollout.

2. In the Front viewport, create a target camera and align it in all the viewports using the **Select and Move** and **Select and Rotate** tools, refer to Figure 14-23. It is automatically named as *Camera001*.

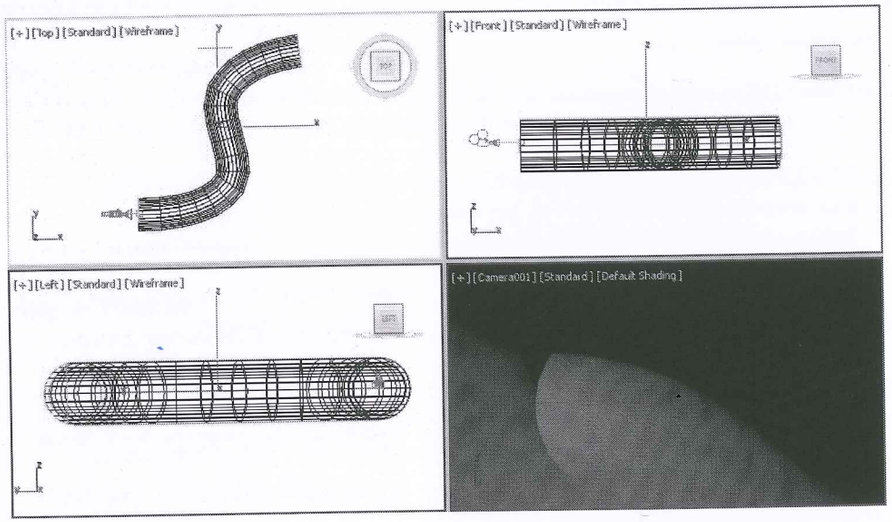

Figure 14-23 *Alignment of Camera001 in viewports*

Note
While aligning the target camera, make sure that the target of the camera is also selected along with Camera001.

3. Activate the Perspective viewport and press the C key to switch to the Camera001 viewport; the camera view is displayed, refer to Figure 14-23.

Creating the Water Surface

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

1. Choose the **Plane** tool from **Standard Primitives** in the **Command Panel**. Create a plane in the Top viewport.

2. In the **Parameters** rollout, set the values in the **Length** and **Width** spinners so that the plane covers the area around the tunnel, refer to Figure 14-24. Also, set the values in the **Length Segs** and **Width Segs** spinners to **30**.

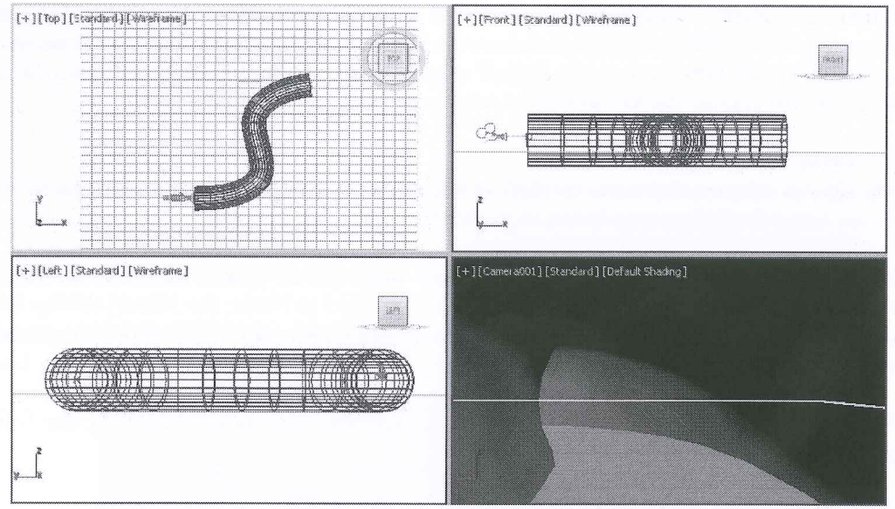

Figure 14-24 *The water surface created and aligned in viewports*

3. Name the plane in the **Name and Color** rollout as **water surface** and align it in the viewports, refer to Figure 14-24.

   Next, you need to create and assign materials to *water tunnel* and *water surface*.

Creating and Assigning Materials to Water Surface

In this section, you will create materials for *water surface*.

1. Make sure *water surface* is selected in any viewport and then choose **Rendering > Material Editor > Compact Material Editor** from the menu bar; the **Material Editor** dialog box is displayed.

2. Make sure the **01-Default** sample slot is selected and then modify the name of the material in the **Material Name** drop-down list 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 **Materials > General** and choose the **OK** button; the **Standard** material is replaced by the **Raytrace** material.

   Make sure in the **Raytrace Basic Parameters** rollout, 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. Set the following values and then choose the **OK** button.

   Red: **136** Green: **210** Blue: **213**

5. Choose the **Reflect** map button on the right of the **Reflect** color swatch; the **Material/Map Browser** dialog box is displayed. Select the **Falloff** map from the **Maps > General** rollout and choose the **OK** button; the **Falloff** map is displayed as sub-material. Use the default settings and choose the **Go to Parent** tool to go back to the parent level.

Note
*You can assign a map using the **Reflect** map button in the **Raytrace Basic Parameters** rollout or using the **Reflect** map button in the **Maps** rollout.*

6. Select the **Bump** check box in the **Raytrace Basic Parameters** rollout. Next, choose the button on the right of the **Bump** spinner that is labeled as **None**; the **Material/Map Browser** dialog box is displayed. Select the **Noise** map and choose the **OK** button; the **Noise** map is displayed as sub-material.

7. In the **Noise Parameters** rollout, select the **Fractal** radio button and set the following parameters:

   Size: **30.0** Low: **1.0**

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

9. Make sure that *water surface* is selected in the viewport, and then choose the **Assign Material to Selection** tool; the *water surface material* is assigned to *water surface* in the viewport.

   Next, you need to create material for *water tunnel* to make it look more realistic.

10. Select the **02-Default** sample slot and modify its name in the **Material Name** drop-down list to **water tunnel material**.

11. 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 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. 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 *tunnel_material.jpg* from this folder and choose the **Open** button; the selected image is displayed in the sample slot.

13. Choose the **Go to Parent** tool. Expand the **Maps** rollout and then select the **Bump** check box to make it available for material. Choose the **Bump** map button that is labeled as **None**; 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. Browse to the same image *(tunnel_material.jpg)* that you used for the **Diffuse** map and choose the **Open** button; various rollouts are displayed to modify the coordinates of the map.

14. In the **Coordinates** rollout, set the value to **4** in the **U Tiling** and **V Tiling** spinners. Next, choose the **Go to Parent** tool to go back to the parent level; the name of the selected image is displayed over the **Bump** map button.

15. In the **Bump** spinner, set the value to **40**.

16. Make sure that *water tunnel* is selected in the viewport, and then choose the **Assign Material to Selection** tool; the *water tunnel material* is assigned to *water tunnel* in the viewport.

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

18. Activate the Camera001 viewport and choose the **Render Production** tool to view the maps and materials assigned to the objects. The scene is displayed, as shown in Figure 14-25.

***Figure 14-25** The scene after assigning the materials*

Creating Walkthrough

In this section, you will create a walkthrough.

1. Activate the Top viewport and choose the **Maximize Viewport Toggle** tool to maximize it.

2. Create a line from the lower left side to the upper right side of the viewport according to the shape of the *water tunnel*, as shown in Figure 14-26. Alternatively, you can also use the *Line001* spline created earlier to loft the tunnel.

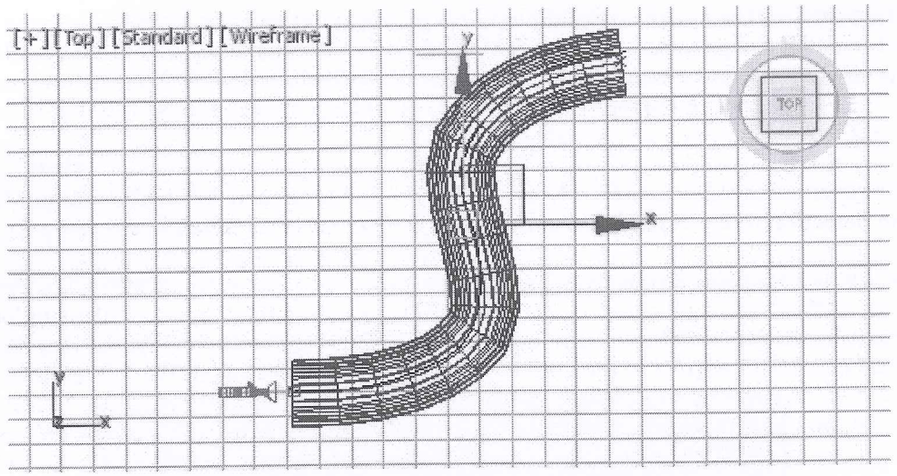

Figure 14-26 *A line created for the path*

3. Modify the name of the line as *path* and align it in the viewports, as shown in Figure 14-27. Next, choose the **Maximize Viewport Toggle** tool.

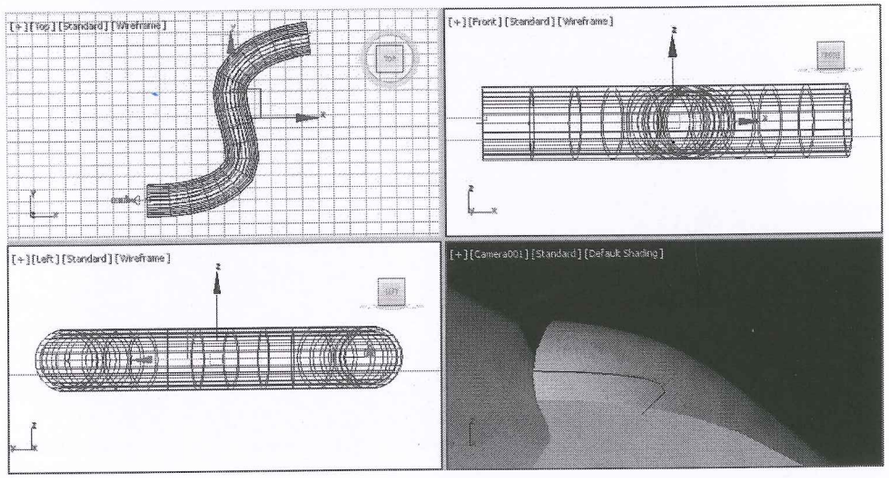

Figure 14-27 *The path aligned in viewports*

Next, you need to increase the number of frames in the track bar to create a smooth animation.

4. Choose the **Time Configuration** button at the bottom of the screen; the **Time Configuration** dialog box is displayed. In the **Animation** area of this dialog box, set the value **1000** in the **End Time** spinner and press the ENTER key; the number of frames increases in the track bar. Choose the **OK** button to exit the dialog box.

Next, you need to move *Camera001* along with *path*.

5. Select *Camera001* in any viewport and choose the **Motion** tab in the **Command Panel**. By default, the **Parameters** tab is chosen in this panel.

6. Expand the **Assign Controller** rollout in the **Parameters** tab and then choose the **Position : Position XYZ** option from it; the **Assign Controller** button is activated, as shown in Figure 14-28.

7. Choose the **Assign Controller** button; the **Assign Position Controller** dialog box is displayed. Choose the **Path Constraint** option and then choose the **OK** button to exit the dialog box; various rollouts are displayed below the **Assign Controller** rollout.

8. In the **Path Parameters** rollout, choose the **Add Path** button, refer to Figure 14-29. Next, select *path* from the Scene Explorer. Also, *Camera001* is moved along with *path* in the viewport. Right-click to exit the command.

Figure 14-28 *The* ***Assign Controller*** *rollout*

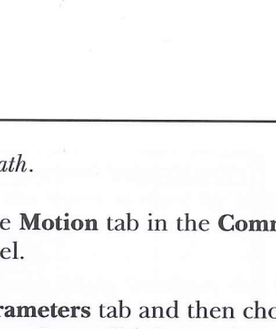

Figure 14-29 *Partial view of the* ***Path Parameters*** *rollout*

9. Activate the Top viewport and choose the **Play Animation** button from the time controls area; you will notice that *Camera001* moves along with *path* but the movement is not proper. To create a proper movement, you need to adjust the target of *Camera001* at different frames.

10. Choose the **Go to Start** button to drag the time slider to frame 0. Next, choose the **Toggle Auto Key Mode** button to turn on the animation mode.

11. Select *Camera001.Target* from the Scene Explorer.

12. In the Top viewport, position *Camera001.Target* using the **Select and Move** tool, as shown in Figure 14-30.

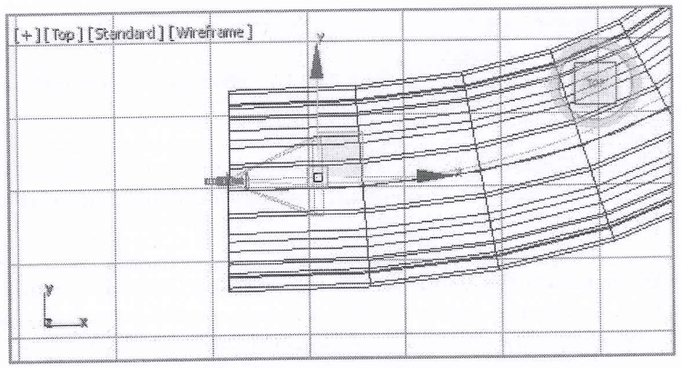

Figure 14-30 *The camera and its target at frame 0*

Note
While aligning the Camera001.Target, you need to view Camera001 viewport simultaneously to make sure that the animation is proper.

13. Drag the time slider to frame 153 and move *Camera001.Target* along the path, as shown in Figure 14-31. To move the time slider to a particular frame, you can also enter the frame number in the Current Frame (Go to frame) spinner.

14. Similarly, add keyframes at 300, 429, 581, 700, 801, 935, and 1000 frames.

After creating the frame-by-frame animation, the frames are displayed in the track bar, as shown in Figure 14-31.

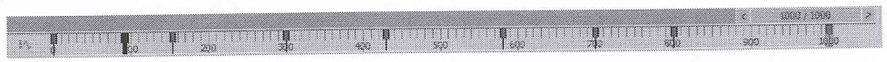

Figure 14-31 *The track bar after creating the animation*

15. Choose the **Toggle Auto Key Mode** button to turn off the animation mode and activate Camera001 viewport. Next, choose the **Play Animation** button; *Camera001* starts moving along *path* inside the tunnel.

Note
You can also use your own dimensions to align Camera001.Target at different frames.

Rescaling the Active Time Segment

While playing animation, if you feel that the pace of animation is very fast, you can increase the number of frames in the active time segment to make it slow and smooth.

1. Choose the **Time Configuration** button at the bottom of the 3ds Max screen; the **Time Configuration** dialog box is displayed. In the **Animation** area of this dialog box, choose the **Re-scale Time** button; the **Re-scale Time** dialog box is displayed.

2. In the **New** area, set a new value in the **End Time** spinner and choose the **OK** button to exit the dialog box; the active time segment and animation keys are adjusted accordingly. Choose the **OK** button in the **Time Configuration** dialog box to close it.

Creating Animation in Water

In this section, you will create animated waves on the water surface by using the **Compact Material Editor** tool.

1. Choose the **Compact Material Editor** tool from the **Main Toolbar**; the **Material Editor** dialog box is displayed.

2. Select the **water surface material** sample slot. Now, in the **Raytrace Basic Parameters** rollout, choose the **Bump** map button that is labeled as **Map# X (Noise)**; various rollouts are displayed for the **Noise** modifier.

   Next, you need to set the keys on the parameters of the **Noise** modifier to animate *water surface*.

3. Choose the **Go to Start** button to drag the time slider to frame 0. Next, choose the **Toggle Auto Key Mode** button to turn on the animation mode; the selected sample slot is surrounded by a red border, which indicates that the animation mode is active.

4. In the **Noise Parameters** rollout, make sure that the value in the **Phase** spinner is 0.0 at frame 0. Next, choose the **Go to End** button to move the time slider to the end frame, and then set the value **7.0** in the **Phase** spinner and then press ENTER; the color of the border of arrows of the spinner turns red.

5. Choose the **Toggle Auto Key Mode** button to turn off the animation mode and close the **Material Editor** dialog box.

Assigning Environment to the Scene

In this section, you will create environment to the scene.

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 **Background** area of the **Common Parameters** rollout, choose the **Environment Map** button that is 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. Select *ice_environment.jpg* image and choose the **Open** button; the selected image is displayed as background after rendering. Close the **Environment and Effects** dialog box.

   Note that when *Camera001* moves toward the end frames, then only the background of the scene is displayed in the animation.

Saving and Rendering the Scene

In this section, you will save the scene and then render it. You can also view the final rendered image sequence by downloading the file *c14_3dsmax_2017_rndr.zip* from *www.cadcim.com*. The

path of the file is as follows: *Textbooks > Animation and Visual Effects > 3ds Max > Autodesk 3ds Max 2017: A Comprehensive Guide*

1. Choose the **Render Setup** tool from the **Main Toolbar**; the **Render Setup: Default Scanline Renderer** dialog box is displayed. In this dialog box, the **Common** tab is chosen by default. Also, various rollouts are displayed in the **Common** tab.

2. In the **Common Parameters** rollout, select the **Active Time Segment** radio button in the **Time Output** area.

3. In the **Output Size** area, choose the **640x480** button.

4. In the **Render Output** area, choose the **Files** button; the **Render Output File** dialog box is displayed. Enter a name for the file in the **File name** text box and then select the **AVI File (*.avi)** file type from the **Save as type** drop-down list and specify the desired location of the file in the **Save in** text box. Next, choose the **Save** button; the **AVI File Compression Setup** dialog box is displayed. Use the default settings and choose the **OK** button to exit the dialog box.

5. Choose **Save** from the **Application** menu.

6. Make sure the **Quad 4 - Camera001** option is selected in the **View to Render** drop-down list in the **Render Setup: Default Scanline Renderer** dialog box. Next, choose the **Render** button; both the **Camera001, frame#** window and the **Rendering** dialog box are displayed showing the rendering process.

   After the completion of the rendering process, the final output of the animation is saved at the specified location in the **.AVI* format. You can view the final output of the animation by opening the corresponding **.AVI* file.

Tutorial 2

In this tutorial, you will create an animated scene that contains light effects and animation of lights and objects, as shown in Figure 14-32. **(Expected time: 60 min)**

The following steps are required to complete this tutorial:

a. Create the project folder.
b. Create the wireframe earth sphere.
c. Create the text.
d. Add camera to the scene.
e. Create the animated space background.
f. Create and animate lights in the scene.
g. Animate the wireframe earth sphere and the text.
h. Save and render the scene.

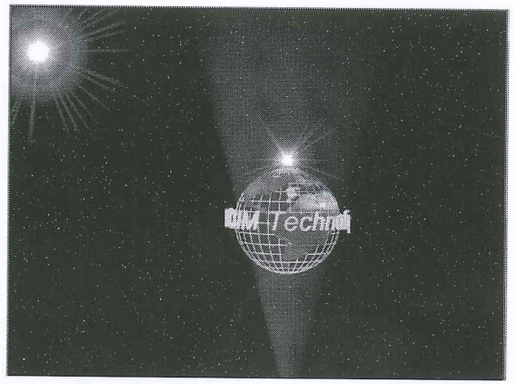

Figure 14-32 *The animated scene*

Creating the Project Folder

1. Create a new project folder with the name *c14_tut2* at *\Documents\3dsmax2017* and then save the file with the name *c14tut2*, as discussed in Tutorial 1 of Chapter 2.

2. Open the Windows Explorer and then browse to the *c14_3dsmax_2017_tut* folder. Next, copy *EarthMap_colored.jpg* and *EarthMap_b&w.jpg* at the location *\Documents\3dsmax2017\c14_tut2\sceneassets\images*.

Creating the Wireframe Earth Sphere

In this section, you will create two spheres to create a wireframe earth sphere.

1. Choose the **Sphere** tool from **Standard Primitives** in the **Command Panel** and create a sphere in the Top viewport.

2. Modify the name of the sphere to *earth sphere*. Set the value of the **Radius** spinner to **58.42** in the **Parameters** rollout. Next, right-click to exit the tool.

3. Make sure that *earth sphere* is selected and then choose **Edit > Clone** from the menu bar; the **Clone Options** dialog box is displayed.

4. Select the **Copy** radio button in the **Object** area and enter *wireframe sphere* in the **Name** text box. Next, choose the **OK** button to close the dialog box. In the **Parameters** rollout, set the radius of *wireframe sphere* to **58.0** in the **Radius** spinner.

   Next, you need to apply maps and material to the *earth sphere* and the *wireframe sphere*.

5. Select *earth sphere* in any viewport and press the M key; the **Material Editor** dialog box is displayed.

6. 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 **earth map**.

7. In the **Shader Basic Parameters** rollout, make sure that the **Blinn** shader is selected in the drop-down list, and then select the **2-Sided** check box.

   Next, you need to assign a map to the shader.

8. In the **Blinn Basic Parameters** rollout, choose the **Diffuse** map button on the right 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. 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 *EarthMap_colored.jpg* and choose the **Open** button; the selected image is displayed in the sample slot. Also, various rollouts are displayed to modify the coordinates of the map.

9. Choose the **Go to Parent** tool to go back to the parent level and then choose the **Opacity** map button in the **Blinn Basic Parameters** rollout; 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 *EarthMap_b&w.jpg* image and choose the **Open** button; the selected image is displayed in the sample slot, as shown in Figure 14-33.

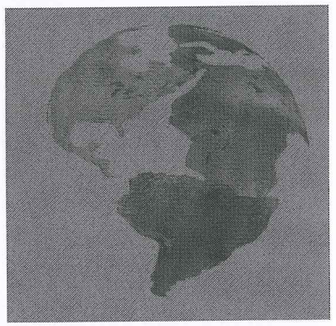

Figure 14-33 *The earth map in the sample slot*

10. Choose the **Go to Parent** tool again and make sure *earth sphere* is selected in the viewport. Next, choose the **Assign Material to Selection** tool; *earth map* is assigned to *earth sphere* in the viewport.

11. Choose the **Show Shaded Material in Viewport** tool to view the assigned map in the viewport.

12. Render the Perspective viewport to view the map applied using the **Render Production** tool, as shown in Figure 14-34.

    Next, you need to create material for *wireframe sphere*.

13. Select the **02-Default** sample slot and modify its name in the **Material Name** drop-down list to **wireframe map**.

14. In the **Shader Basic Parameters** rollout, make sure that the **Blinn** shader is selected in the drop-down list and then select the **Wire** check box; wireframes are displayed in the sample slot, as shown in Figure 14-35.

15. In the **Blinn Basic Parameters** rollout, choose the **Diffuse** color swatch; the **Color Selector: Diffuse Color** dialog box is displayed. Set the values in the **Red**, **Green**, and **Blue** spinners as given next and choose the **OK** button to exit the dialog box.

    Red: **239** Green: **106** Blue: **18**

Figure 14-34 *The earth map applied to the earth sphere after rendering*

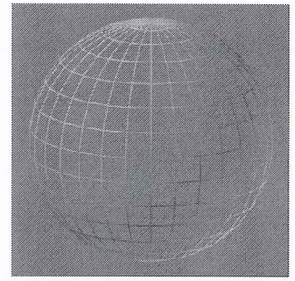

Figure 14-35 *Wireframes displayed in the sample slot*

16. In the **Specular Highlights** area, set the value **53** in the **Specular Level** spinner.

17. Select *wireframe sphere* in the viewport and then choose the **Assign Material to Selection** tool; the **wireframe map** is assigned to *wireframe sphere* in the viewport.

18. Choose the **Show Shaded Material in Viewport** button to view the assigned map in the viewport. Close the **Material Editor** dialog box.

19. Choose the **Zoom Extents All** tool to view both the spheres in the viewports.

    Next, you need to align *wireframe sphere* with *earth sphere*.

20. Select *wireframe sphere* in the viewport and choose the **Align** tool from the **Main Toolbar**; the shape of the cursor changes. Next, select *earth sphere* in the viewport; the **Align Selection (earth sphere)** dialog box is displayed.

21. In the **Align Position (earth sphere)** area, select the **X Position**, **Y Position**, and **Z Position** check boxes. Next, select the **Pivot Point** radio button both in the **Current Object** and **Target Object** areas. Next, choose the **OK** button to close the dialog box.

22. Choose the **Zoom Extents All** tool; *wireframe sphere* is aligned with *earth sphere* in the viewports, as shown in Figure 14-36.

23. Activate the Perspective viewport. Choose the **Render Production** tool from the **Main Toolbar**; the rendered sphere is displayed in the **Rendered Frame** window, as shown in Figure 14-37.

24. Select *wireframe sphere* and *earth sphere* in the viewport simultaneously and then group them as *wireframe earth sphere*.

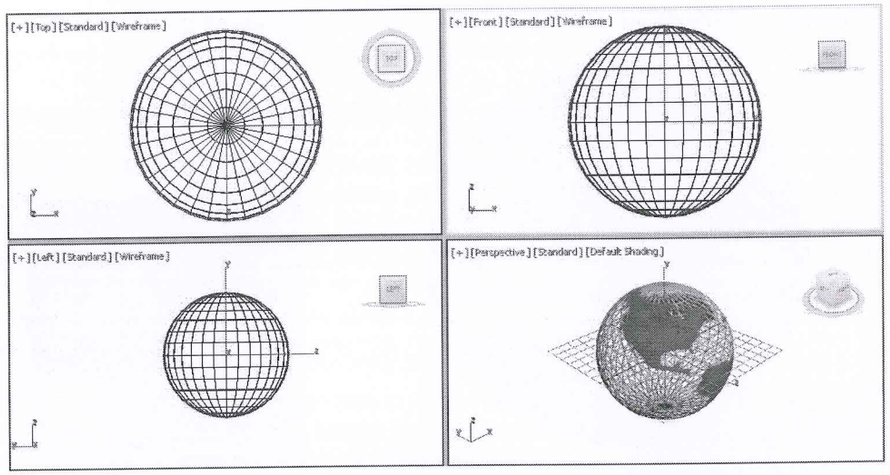

Figure 14-36 *Alignment of the wireframe and the earth sphere in viewports*

Figure 14-37 *The sphere at rendering*

Creating the Text

In this section, you will create the text around the *wireframe earth sphere* by using the **Text** tool.

1. Choose the **Text** tool from **Create > Shapes > Splines > Object Type** rollout in the **Command Panel**. In the **Parameters** rollout, set the values as follows:

   Select the **Arial Italic** font type from the drop-down list located on the top of the rollout.

   Make sure that the left alignment button is chosen.
   Size: **30.0**

   Text area
   Enter **CADCIM Technologies**.

2. Click in the center of Front viewport; the **CADCIM Technologies** text is displayed in viewports. It is automatically named as *Text001*.

3. Choose the **Zoom Extents All** tool and align *Text001* in the viewports, as shown in Figure 14-38.

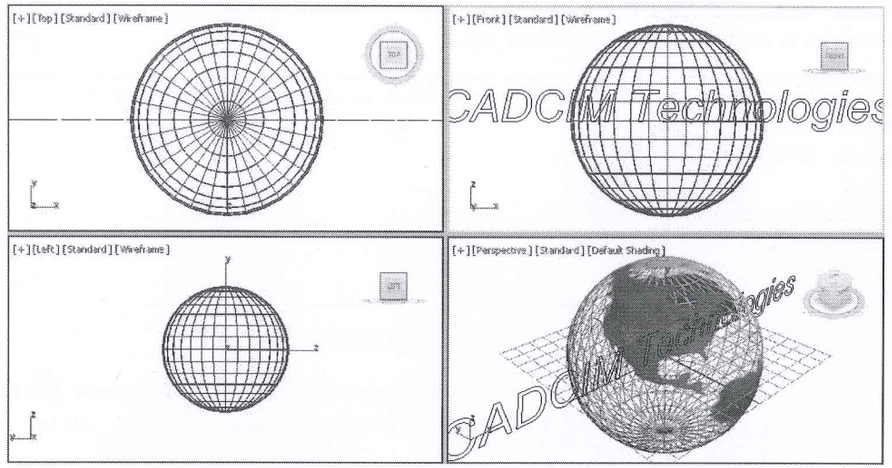

Figure 14-38 *Alignment of Text001 in viewports*

   Now, you need to apply the **Extrude** modifier to add depth to the text.

4. Make sure that *Text001* is selected in the viewport. Choose the **Modify** tab in the **Command Panel**. Next, select the **Extrude** modifier from the **Modifier List** drop-down list; the **Extrude** modifier is displayed in the modifier stack.

5. In the **Parameters** rollout of the **Extrude** modifier, set the value **3.0** in the **Amount** spinner.

   Next, you need to apply material to *Text001*.

6. Choose the **Material Editor** tool; the **Material Editor** dialog box is displayed. Select the **03-Default** sample slot and change its name to **text material** in the **Material Name** drop-down list.

7. In the **Blinn Basic Parameters** rollout, choose the **Diffuse** color swatch; the **Color Selector: Diffuse Color** dialog box is displayed. Set the following values in the **Red**, **Green**, and **Blue** spinners and then choose the **OK** button to exit the dialog box.

   Red: **253** Green: **185** Blue: **2**

8. Make sure *Text001* is selected in the viewport and then choose the **Assign Material to Selection** tool; the **text material** is assigned to *Text001* in the viewport. Close the **Material Editor** dialog box.

Next, you need to apply the **Bend** modifier to *Text001* such that it is set around *wireframe earth sphere*.

9. Make sure *Text001* is selected in the viewport and then choose the **Modify** tab in the **Command Panel**. Next, select the **Bend** modifier from the **Modifier List** drop-down list; the **Bend** modifier is displayed in the modifier stack.

10. In the **Parameters** rollout of the **Bend** modifier, set the values as follows:
Bend area
Angle: **237.5**

Bend Axis area
Select the **X** radio button.

11. Align *Text001* in viewports, as shown in Figure 14-39.

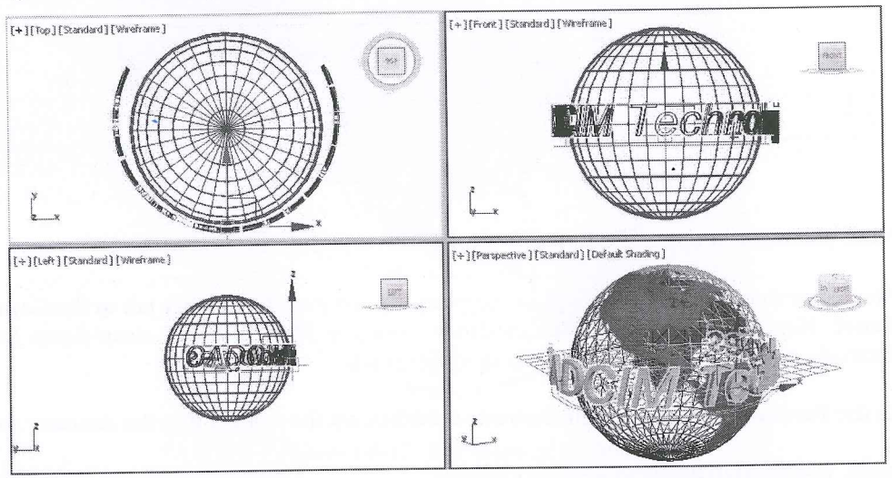

Figure 14-39 *The Text001 aligned in viewports after applying the* ***Extrude*** *and* ***Bend*** *modifiers*

Adding Camera to the Scene

In this section, you will add camera to the scene.

1. Choose the **Zoom All** tool and zoom out all viewports simultaneously to make a proper room around *wireframe earth sphere*.

2. Choose the **Free** tool from **Create > Cameras** in the **Command Panel** and click in the Front viewport; a free camera is displayed in all the viewports and is automatically named as *Camera001*.

3. Align *Camera001* in viewports to view the front side of the scene and then press the C key in the Perspective viewport to activate the Camera001 viewport, as shown in Figure 14-40.

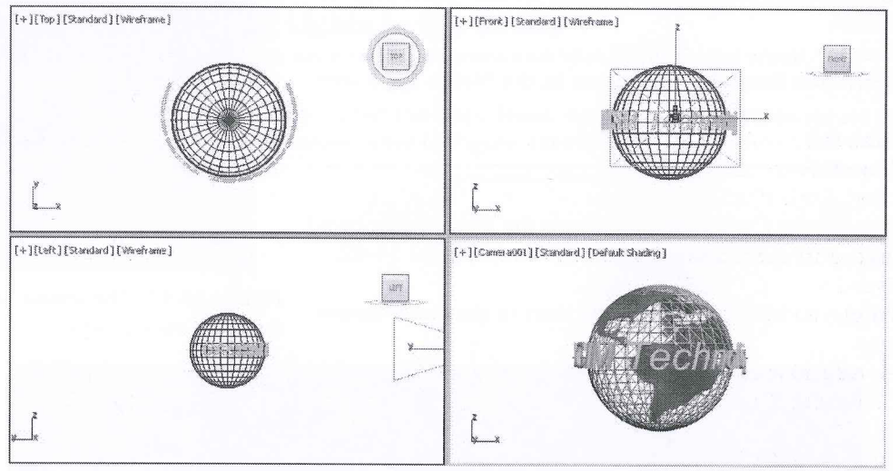

Figure 14-40 *The Camera001 aligned in viewports*

Creating Animated Space Background

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

1. Choose **Rendering > Environment** from the menu bar; the **Environment and Effects** dialog box is displayed with the **Environment** tab chosen by default. Also, various rollouts are displayed in the **Environment** tab.

2. In the **Common Parameters** rollout, choose the **Environment Map** button in the **Background** area; the **Material/Map Browser** dialog box is displayed. Select the **Noise** map from the **Maps > General** rollout and choose the **OK** button; the **Noise** map is displayed on the **Environment Map** button and applied as background.

Next, you need to set the parameters of the **Noise** map.

3. Press the M key to invoke the **Material Editor** dialog box. Select the **04-Default** sample slot.

4. In the **Environment and Effects** dialog box, press and hold the cursor over the **Environment Map** button and drag it to the **04-Default** sample slot in the **Material Editor** dialog box. Next, release the left mouse button; the **Instance (Copy) Map** dialog box is displayed. Make sure the **Instance** radio button is selected and choose the **OK** button; the **04-Default** sample slot is displayed, as shown in Figure 14-41. Also, various rollouts to modify the **Noise** map are displayed.

5. Modify the name of the sample slot in the **Material Name** drop-down list to **space environment map**.

Next, you need to modify the parameters of the **Noise** map.

6. In the **Noise Parameters** rollout, set the values as given below:

   Select the **Fractal** radio button in the **Noise Type** area.

   Size: **0.2** High: **0.8**
   Low: **0.7**

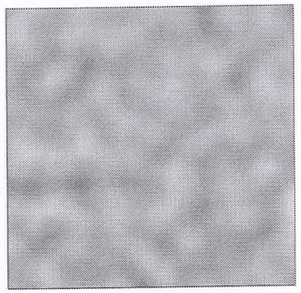

Figure 14-41 *The sample slot with the* ***Noise*** *environment*

7. Render the Camera001 viewport; the scene is displayed with *space environment map*, as shown in Figure 14-42.

   Next, you need to animate the stars in *space environment map*.

Figure 14-42 *The scene with the space environment map*

8. Choose the **Time Configuration** button; the **Time Configuration** dialog box is displayed. In the **Animation** area of this dialog box, set the value **1000** in the **End Time** spinner and press the ENTER key; the number of frames in the active time segment increases to 1000. Choose the **OK** button to exit the dialog box.

9. Choose the **Toggle Auto Key Mode** button to turn on the animation mode and then make sure the time slider is set to frame 0. In the **Noise Parameters** rollout of the **Material Editor** dialog box, make sure that the value in the **Phase** spinner is 0.0 at frame 0.

10. Choose the **Go to End** button to move the time slider to frame 1000. In the **Noise Parameters** rollout, set the value **7.0** in the **Phase** spinner. The stars in *space environment map* appear to be blinking in the final output at rendering.

11. Choose the **Toggle Auto Key Mode** button to turn off the animation mode and then close the **Material Editor** dialog box. Also, close the **Environment and Effects** dialog box.

Creating and Animating Lights in the Scene

To create light in the scene, you need to create omni and spot lights in the scene.

1. Choose the **Zoom** tool and zoom out the Top, Front, and Left viewports to create proper room around *wireframe earth sphere*, refer to Figure 14-43.

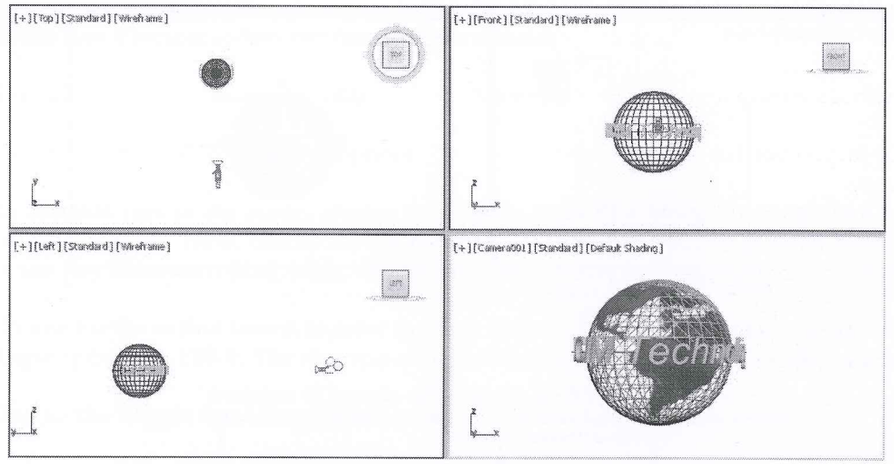

Figure 14-43 *The wireframe earth sphere zoomed out*

2. Activate the Top viewport and choose the **Omni** tool from **Create > Lights > Standard > Object Type** rollout in the **Command Panel**. In the Top viewport, click at the center of *wireframe earth sphere*; an omni light is displayed in all the viewports. It is automatically named as *Omni001*. Right-click to exit the command. Next, align *Omni001* light in all the viewports, refer to Figure 14-44.

3. Create four copies of *Omni001* light and align all lights, as shown in Figure 14-44.

Note

If your scene has more lighting effects, then choose the ***Modify*** *tab from the* ***Command Panel*** *and set the intensity of omni lights. To do so, you need to modify the value in the* ***Multiplier*** *spinner of the* ***Intensity/Color/Attenuation*** *rollout.*

Next, you need to add advance effects to omni lights.

4. In the Front viewport, select the omni light that is placed on the left side of *wireframe earth sphere*, as shown in Figure 14-45.

5. Choose the **Modify** tab in the **Command Panel** and expand the **Atmospheres & Effects** rollout. Choose the **Add** button; the **Add Atmosphere or Effect** dialog box is displayed. Select the **Lens Effects** option and choose the **OK** button to exit the dialog box; the **Lens Effects** option is displayed in the **Atmospheres & Effects** rollout.

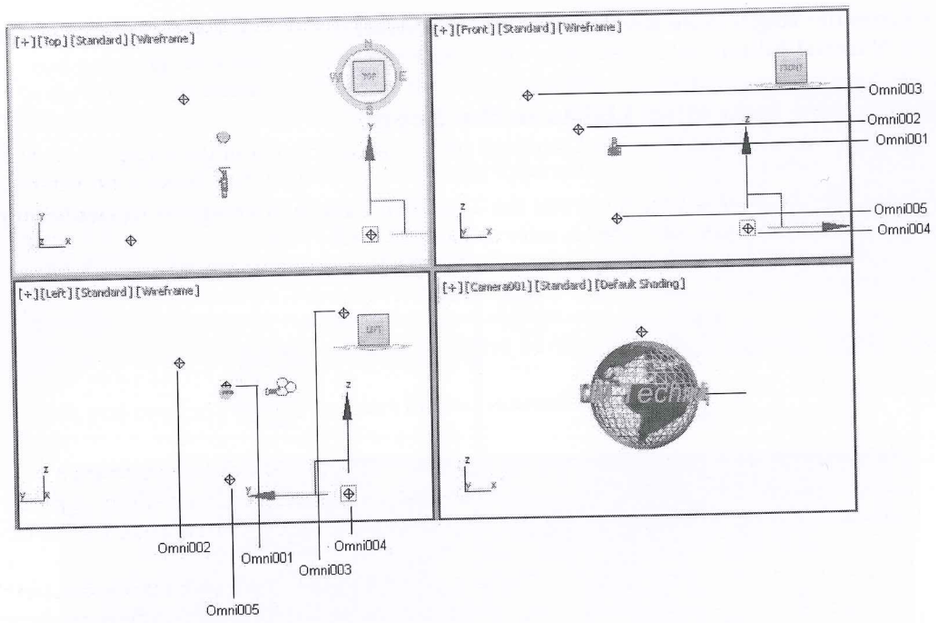

Figure 14-44 *Omni lights aligned in viewports*

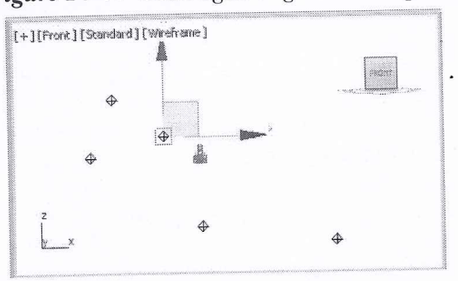

Figure 14-45 *Omni light selected to add the advance effects*

Next, you need to set the parameters for the **Lens Effects**.

6. Select the **Lens Effects** option in the **Atmospheres & Effects** rollout and choose the **Setup** button; the **Environment and Effects** dialog box is displayed with the **Effects** tab chosen. Also, various rollouts are displayed in this tab.

7. In the **Lens Effects Parameters** rollout, select the **Glow** option and choose the arrow that is pointing toward the right; the **Glow** effect is now available for the omni light at rendering. Also, the **Glow Element** rollout is displayed in the **Environment and Effects** dialog box to modify the parameters of the **Glow** effect.

8. In the **Glow Element** rollout, set the values as follows:

   Size: **6** Intensity: **150.0**

9. In the **Lens Effects Parameters** rollout, select **Ray** and then choose the arrow that is pointing toward right; the **Ray** effect is now available for the omni light at rendering. Also, the **Ray Element** rollout is displayed in the **Environment and Effects** dialog box to modify the parameters of the **Ray** effect.

10. In the **Ray Element** rollout, set the values as follows:

    Size: **15** Intensity: **10.0** Num: **50**

    Use the default values for other options.

11. To animate rays in the scene, choose the **Toggle Auto Key Mode** button to turn on the animation mode. Next, choose the **Go to Start** button to move the time slider to frame 0. In the **Ray Element** rollout, make sure that the value in the **Angle** spinner is 0.0 at frame 0.

12. Choose the **Go to End** button to move the time slider to frame 1000, and set the value in the **Angle** spinner to **180.0**. The rays appear to be rotating in the final output after rendering.

13. Choose the **Toggle Auto Key Mode** button to turn off the animation mode.

14. In the **Lens Effects Parameters** rollout, select the **Ring** option and then choose the arrow that is pointing toward right; the **Ring** effect becomes available for the omni light at rendering. Also, the **Ring Element** rollout is displayed in the **Environment and Effects** dialog box to modify the parameters of the **Ring** effect.

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

    Size: **3.0** Intensity: **15.0**

    Use the default values for other options.

16. Close the **Environment and Effects** dialog box and render the Camera001 viewport; the omni light is displayed, refer to Figure 14-46.

Note

If you are not able to view the Omni Light in your render, move Camera001 so that you can see the Omni light in your render.

17. In the Front viewport, select the omni light that is placed just above the *wireframe earth sphere*. Align it to the top of *wireframe earth sphere*, as shown in Figure 14-47. Next, add the **Lens Effects** as described above and set the parameters of different effects in the **Environment and Effects** dialog box as follows:

Glow effect
Size: **3.0** Intensity: **150.0**

Ray effect
Size: **1** Intensity: **30.0** Num: **10**

Star effect
Size: **3** Intensity: **20** Width: **1.0**

Figure 14-46 *The effect of the omni light displayed at rendering*

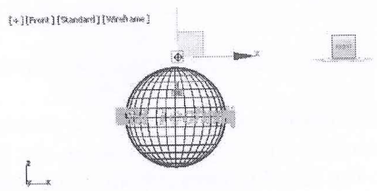

Figure 14-47 *The omni light aligned just above the wireframe earth sphere*

18. To animate the effects of this omni light in the scene, choose the **Toggle Auto Key Mode** button to turn on the animation mode. Now, choose the **Go to Start** button to move the time slider to frame 0. Also, in the **Star Element** rollout, make sure that the value in the **Angle** spinner is 0.0 at frame 0.

19. Choose the **Go to End** button to move the time slider to frame 1000 and set the value in the **Angle** spinner to **90.0**. The stars appear to be rotating in the final output after rendering.

20. Choose the **Toggle Auto Key Mode** button to turn off the animation mode.

    After applying the effects, the omni light with the lens effect is displayed after rendering, as shown in Figure 14-48.

    Next, you need to add spot lights to the scene.

21. Choose the **Target Spot** tool from **Create > Lights > Standard > Object Type** rollout in the **Command Panel** and then create a spot light in the Front viewport, as shown in Figure 14-49. Also, create another spot light in the Top viewport, as shown in Figure 14-50.

    The spotlights are automatically named as *Spot001* and *Spot002*.

    Next, you need to modify the parameters of the spot lights.

22. Select *Spot001* from the Scene Explorer and choose the **Modify** tab in the **Command Panel**; various rollouts are displayed to modify the parameters of the spotlight.

Figure 14-48 *The omini light with lens effect displayed*

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

    Hotspot/Beam: **25.3** Falloff/Field: **30.0**

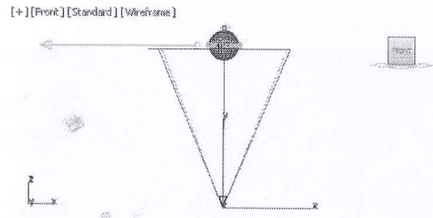

Figure 14-49 *Spot light created in the Front viewport*

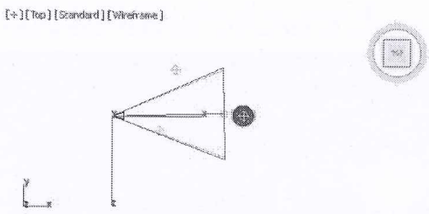

Figure 14-50 *Spot light created in the Top viewport*

24. In the **Atmospheres & Effects** rollout, add the **Volume Light** effect, select the **Volume Light** option in the rollout, and choose the **Setup** button; the **Environment and Effects** dialog box is displayed. In the **Volume** area of the **Volume Light Parameters** rollout, set the value in the **Density** spinner to **1.5**. Close the **Environment and Effects** dialog box.

25. Render the Camera001 viewport; the scene is displayed, refer to Figure 14-51.

26. In the **Advance Effects** rollout of the Modify panel, select the **Map** check box in the **Projector Map** area. Then, choose the **Projector Map** button labeled as **None** and assign a bitmap image of your choice to this map to give a more realistic effect to the **Volume Light** at rendering, refer to Figure 14-52.

Figure 14-51 *The scene at rendering after applying the* ***Volume Light*** *effect in the Spot001 light*

Figure 14-52 *The scene at rendering after assigning a map to* ***Projector Map***

27. After rendering, you will notice that the **Volume Light** is visible up to the infinite distance. To control the distance of the **Volume Light**, set the parameters in the **Far Attenuation** area in the **Intensity/Color/Attenuation** rollout as follows:

Select the **Use** and **Show** check boxes.
Start: **10** End: **850**

Note
You may need to adjust the values in the ***Start*** *and* ***End*** *spinners as the values may differ depending on the placement of the light in the scene.*

28. Render the Camera001 viewport; the scene is displayed, refer to Figure 14-53.

Figure 14-53 *The scene displayed at rendering after setting the parameters in the* ***Far Attenuation*** *area*

29. Select *Spot002* in the viewport and choose the **Modify** tab in the **Command Panel**; all the rollouts are displayed to modify the parameters of the selected light.

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

Hotspot/Beam: **5.0** Falloff/Field: **7.0**

31. Choose the **Zoom Extents All** tool and align *Spot002 and Spot002.Target* in the viewports, as shown in Figure 14-54.

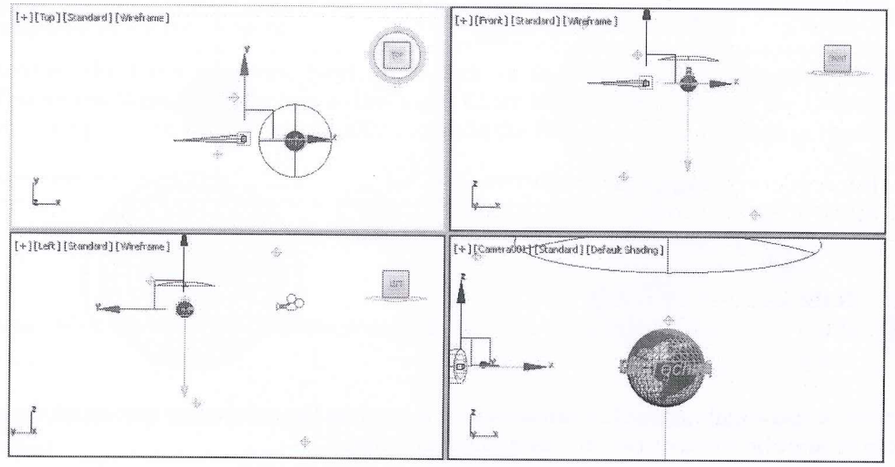

Figure 14-54 *The Spot002 and Spot002.Target light aligned in viewports*

Next, you need to animate *Spot001*.

32. Select *Spot001* and *Spot001.Target* from the Scene Explorer. Next, choose the **Zoom Extents All Selected** tool to view the selected light properly.

33. Choose the **Toggle Auto Key Mode** button to turn on the animation mode and then choose the **Go to Start** button to move the time slider to frame 0.

34. Choose the **Go to End** button to move the time slider to frame 1000 and choose the **Select and Rotate** tool. Next, in the Top viewport, move the cursor over the Z-axis and rotate the *Spot001* and *Spot001.Target* in the clockwise direction until the value in the **Z** spinner becomes **-360** in the coordinate display.

35. Choose the **Toggle Auto Key Mode** button to turn off the animation mode.

Animating Wireframe Earth Sphere and Text

In this section, you will animate *wireframe earth sphere* and *Text001* in the opposite directions.

1. Activate the Top viewport and select *wireframe earth sphere*. Next, choose the **Zoom Extents All Selected** tool; *wireframe earth sphere* is zoomed in all the viewports, as shown in Figure 14-55.

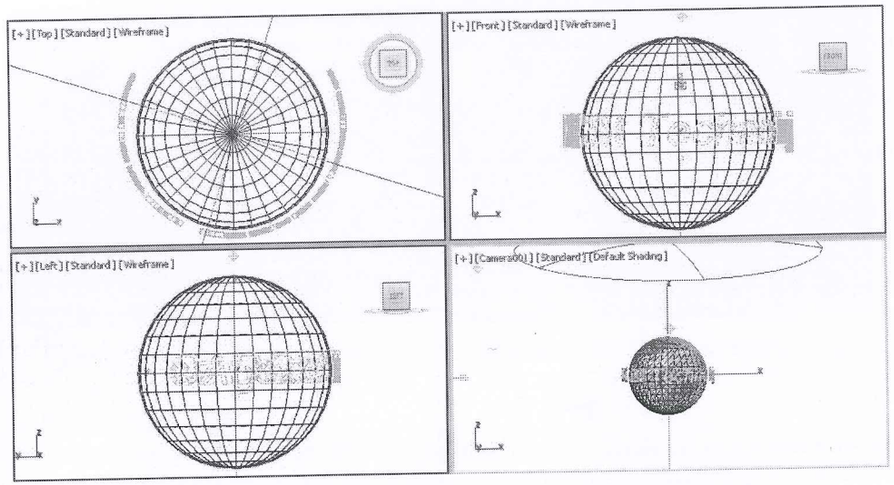

Figure 14-55 *The wireframe earth sphere zoomed in viewports*

Note
When you choose a tool from the viewport navigation controls, it does not affect the Camera001 viewport.

2. Choose the **Toggle Auto Key Mode** button to turn on the animation mode and choose the **Go to Start** button to move the time slider to frame 0.

3. Choose the **Go to End** button to move the time slider to frame 1000 and then choose the **Select and Rotate** tool. In the Top viewport, move the cursor over the X-axis and rotate *wireframe earth sphere* in the counterclockwise direction until the value in the **Z** spinner becomes **360** in the coordinate display.

4. Choose the **Toggle Auto Key Mode** button to turn off the animation mode.

   Next, you need to animate *Text001* around *wireframe earth sphere*.

5. Select *Text001* in the Top viewport and choose the **Hierarchy** tab in the **Command Panel**. In the **Adjust Pivot** rollout, choose the **Affect Pivot Only** button; the pivot point of *Text001* is displayed in the viewport, as shown in Figure 14-56.

6. Align the pivot point of *Text001* at the center of *wireframe earth sphere*, as shown in Figure 14-57. Then, choose the **Affect Pivot Only** button again to deactivate it.

7. Choose the **Select and Rotate** tool and rotate *Text001* in the Top viewport along the Z-axis until the value in the **Z** spinner becomes **-180** in the coordinate display. Next, choose the **Select and Move** tool and align *Text001*, as shown in Figure 14-58.

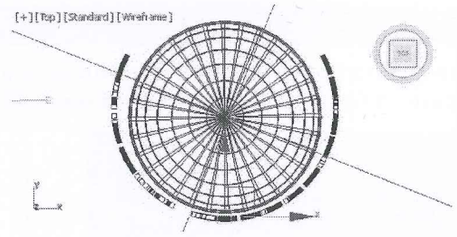

Figure 14-56 *The pivot point of the Text001 displayed in the Top viewport*

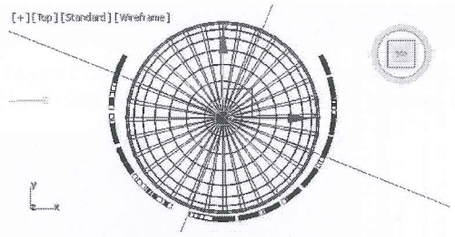

Figure 14-57 *The pivot point of the Text001 aligned in the Top viewport*

8. Activate the Front viewport. Next, right-click on the **Select and Rotate** tool; the **Rotate Transform Type-In** dialog box is displayed. Enter **10** in the **Z** spinner of the **Offset:Screen** area and press the ENTER key; *Text001* rotates in the Front viewport, as shown in Figure 14-59.

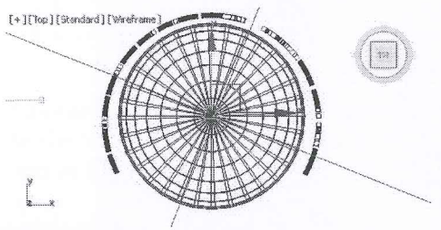

Figure 14-58 *The Text001 rotated in the Top viewport*

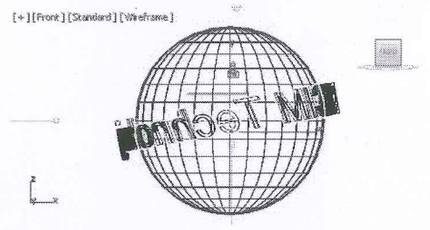

Figure 14-59 *The Text001 rotated in the Front viewport*

9. Choose the **Toggle Auto Key Mode** button to turn on the animation mode. Choose the **Go to End** button to move the time slider to frame 1000 and make sure that *Text001* is selected. Enter **-360** in the **Y** spinner of the **Offset:Screen** area of the **Rotate Transform Type-In** dialog box and press the ENTER key. Now, close this dialog box.

10. Choose the **Toggle Auto Key Mode** button to turn off the animation mode and choose the **Play Animation** button to view the animation.

Saving and Rendering the Scene

In this section, you will save the scene and then render it. You can also view the final rendered image sequence by downloading the file *c14_3dsmax_2017_rndr.zip* from *www.cadcim.com*. The path of the file is as follows: *Textbooks > Animation and Visual Effects > 3ds Max > Autodesk 3ds Max 2017: A Comprehensive Guide*

1. Choose **Save** from the **Application** menu.

2. To view the final output of the scene that contains all the movements, textures, lights, and animations, you need to render the scene. To do so, follow the procedure described in Tutorial 1 of this chapter.

Tutorial 3

In this tutorial, you will create a walkthrough in an architectural setting. You will draw a path and make a camera follow the path, refer to Figure 14-60. **(Expected time: 45 min)**

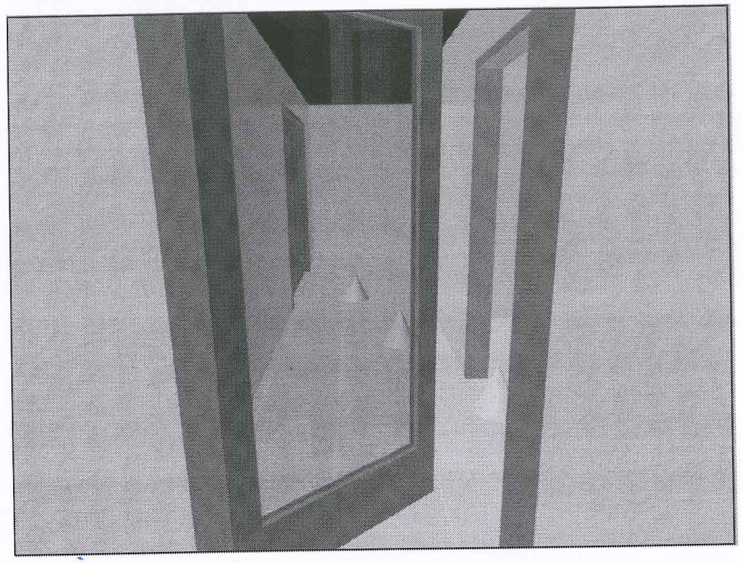

Figure 14-60 *The final walkthrough at frame 70*

The following steps are required to complete this tutorial:

a. Create the project folder.
b. Open the file.
c. Create the motion path.
d. Specify the length of the animation.
e. Use the walkthrough assistant.
f. Adjust the head tilt angle.
g. Animate objects in the scene.
h. Preview the animation.
i. Render and save the final animation.

Creating the Project Folder

1. Create a new project folder with the name *c14_tut3* at *\Documents\3dsmax2017* and then save the file with the name *c14tut3*, as discussed in Tutorial 1 of Chapter 2. Open the Windows Explorer and then browse to the *c14_3dsmax_2017_tut* folder. Next, copy *floor.jpeg* and *wall.jpeg* to *\Documents\3dsmax2017\c14_tut3\sceneassets\images*.

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\c14_3dsmax2017_tut* and select the **c14_tut3_start.max** file from it. Choose the **Open** button to open the file, refer to Figure 14-61.

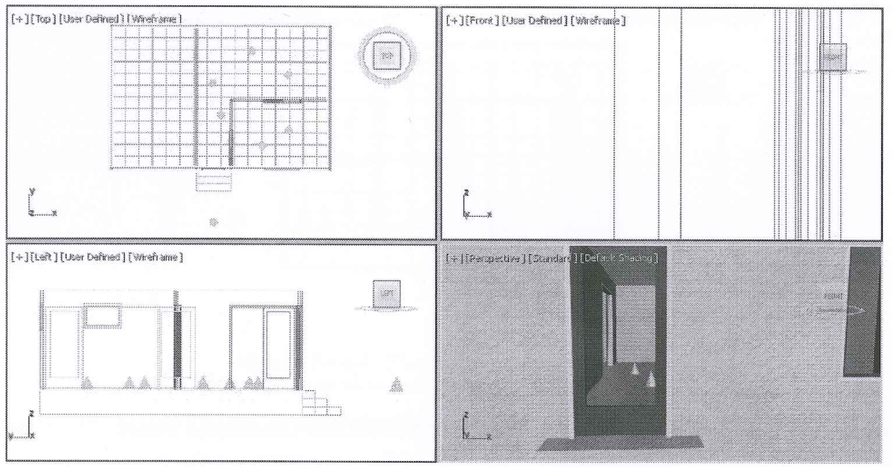

Figure 14-61 *The c14_tut3_start file*

2. Choose **Save As** from the **Application** menu; the **Save File As** dialog box is displayed. Browse to the location *\Documents\3dsmax2017\c14_tut3\scenes*. Save the file with the name *c14tut3.max* at this location.

Creating the Motion Path

In this section, you will create the motion path by using the **Line** tool. This path needs to have round corners to represent the naturally smooth path a person takes as he walks. Also, the path must not lie too close to any of the walls and must pass through the center of door openings.

1. Activate the Top viewport and maximize it by invoking the **Maximize Viewport Toggle** tool.

2. Invoke the **Zoom Extents All** tool to zoom in the viewports.

3. Choose **Create > Shapes** in the **Command Panel** and make sure **Splines** is selected in the drop-down list below the **Shapes** button, if it is not already selected.

4. Invoke the **Line** tool from the **Object Type** rollout.

5. Select the **Smooth** radio button in the **Initial Type** area from the **Creation Method** rollout.

6. Use the cones as a guide to create a line, starting from the bottom cone, as shown in Figure 14-62.

   The line thus created will be used as a motion path for the camera.

7. Right-click to exit the command. In the **Name and Color** rollout, enter the name of the spline as **Walkthrough-Path**.

   Next, you will refine *Walkthrough-Path*.

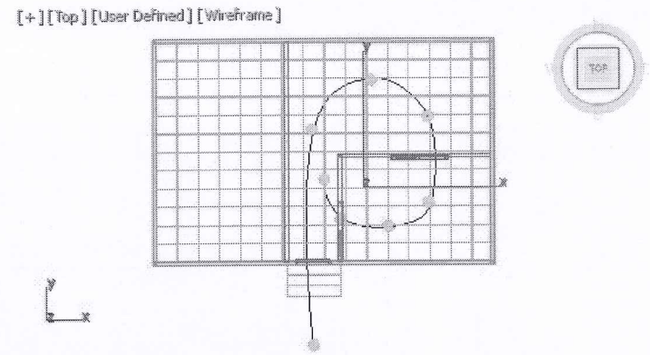

Figure 14-62 *A line created to be used as a path*

8. With the line selected, choose the **Modify** tab from the **Command Panel**.

9. In the **Selection** rollout, choose the **Vertex** button to activate the vertex sub-object mode to display each individual vertex of the path.

10. Choose the **Refine** button from the **Geometry** rollout.

11. Add a new vertex where the path enters the building by clicking on the line at that point; a new vertex appears on the path, as shown in Figure 14-63.

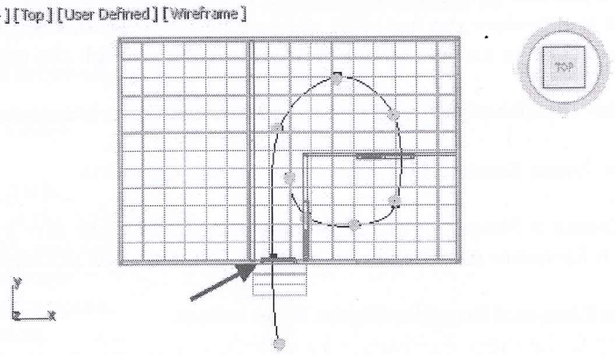

Figure 14-63 *A new vertex added to the path*

12. Invoke the **Select and Move** tool and select the newly added vertex. Now, move it such that it is centered in the doorway.

13. Invoke the **Maximize Viewport Toggle** tool. Activate the Left viewport and maximize it.

14. Move the first vertex down so that it is at the same level as the bottom of the house, as shown in Figure 14-64.

    The motion path is modified such that it follows the stairs into the building.

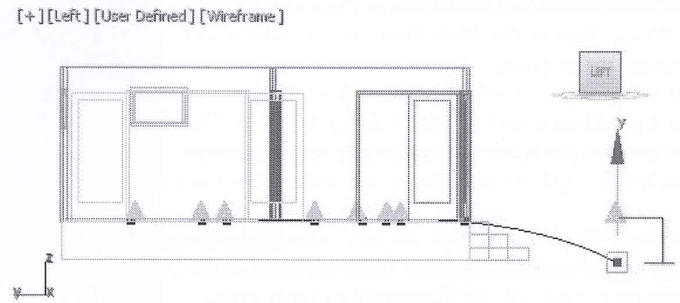

Figure 14-64 *The first vertex moved down*

15. Choose the **Vertex** button in the **Selection** rollout to exit the **Vertex** sub-object mode.

16. Move *Walkthrough-Path* 66.0 units up on the Y axis.

    The motion path is moved up to the height of an average person's line of sight.

Specifying the Length of the Animation

Walkthrough animations need a large number of frames. If less number of frames are used for the animation, the camera will appear to be turning at the corners very quickly. In addition, it will appear as if the person is running in the scene, instead of walking. Therefore, the more the number of frames in the animation, the smoother will be the final motion created. In this section, you will change the length of animation to increase the number of frames in it.

1. Choose the **Time Configuration** button in the animation controls; the **Time Configuration** dialog box is displayed.

2. Set the value **1000** in the **Length** spinner of the **Animation** area of this dialog box.

   The total number of frames in the animation is set to 1000. This represents a little over 30 seconds of animation.

3. Choose the **OK** button to close the dialog box.

Using the Walkthrough Assistant

The **Walkthrough Assistant** automates the process of creating a camera and makes it follow the path you created. It provides settings for the camera height and head angles.

1. Choose **Animation > Walkthrough Assistant** from the menu bar; the **Walkthrough Assistant** dialog box is displayed, as shown in Figure 14-65. You can activate any viewport in this case.

2. In the **Camera Creation** area of the **Main Controls** rollout, make sure the **Free** radio button is selected. Next, choose the **Create New Camera** button; a free camera is automatically created with the name *Walkthrough_Cam001*. Now, the camera must be moved to the start of the path.

3. In the **Path Control** area, select the **Move Path to Eye level** check box. Next, choose the **Pick Path** button and select the line created as the path.

   The camera is positioned and oriented along the path. The camera and motion path are automatically set at average person's eye level.

4. In the **Advanced Controls** rollout, set the value **75** in the **Field of View** spinner and make sure **160** is entered in the **Target Distance** spinner of the **Camera Controls** area.

   This sets the accurate camera view.

5. Activate the Perspective viewport. Change the display to *Walkthrough_Cam001* view by pressing the C key.

6. Drag the time slider to the right and left to replay the animation of the camera following the motion path.

   If the animation does not seem to be correct, you need to check it and remove the flaw. You may need to close the **Walkthrough Assistant** dialog box and delete the camera. You can then start over again by opening the **Walkthrough Assistant** dialog box and creating a new camera.

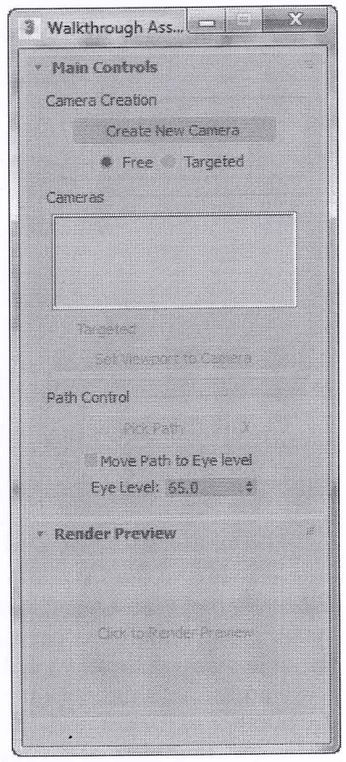

*Figure 14-65 The **Walkthrough Assistant** dialog box*

Adjusting the Head Tilt Angle

As the camera follows the motion path up toward the stairs, it tilts up to follow the path. However, a person walking up to the stairs usually does not tilt his head in this manner. In this section, you will adjust the head tilt angle.

1. Drag the time slider bar to frame 0.

2. Open the **Walkthrough Assistant** dialog box, if it is not already open. Scroll down and set the value **–45** in the **Head Tilt Angle** spinner in the **View Controls** rollout.

   The camera's line of sight is slightly below horizontal in frame 0 of the animation.

3. Choose the **Toggle Auto Key Mode** button to turn on the animation mode.

4. Drag the time slider to the frame in your animation (most probably frame 134) where the camera is halfway through the doorway.

5. Set the value **–10** in the **Head Tilt Angle** spinner.

6. Choose the **Toggle Auto Key Mode** button to turn off the animation mode. Next, drag the time slider bar to frame 0.

7. Make sure the *Walkthrough_Cam001* viewport is activated and then close the **Walkthrough Assistant** dialog box.

8. Choose the **Play Animation** button in the animation playback controls; the animation begins to play in the active viewport.

9. Choose the **Stop Animation** button to stop the animation replay.

Animating Objects in the Scene

In this section, you will animate the entrance door so that it opens when the camera passes through it and closes after some time.

1. Drag the time slider to frame 50.

   This is the frame where the door should begin to open.

2. Choose the **Graph Editors > Track View - Dope Sheet** from the menu bar.

3. Select *Entrance Door* in the viewport. In the **Track View - Dope Sheet** window, click on the plus sign on the left side of *Entrance Door* and then on the **Object (PivotDoor)** to expand the tree.

   The **Track View - Dope Sheet** window displays the **Open (degrees)** track for *Entrance Door*, as shown Figure 14-66.

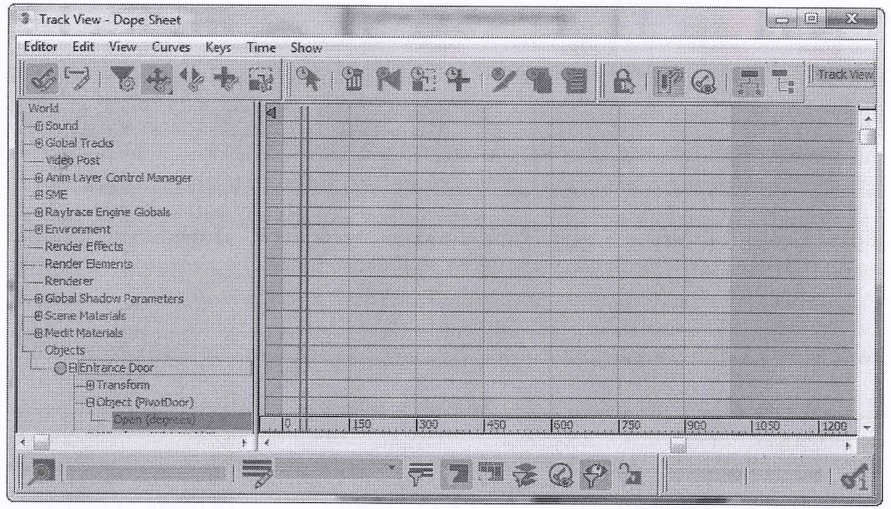

*Figure 14-66 The **Track View - Dope Sheet** window*

4. Choose the **Add/Remove Key** button on the top of the **Track View-Dope Sheet** window.

5. Click on the **Open (degrees)** track at frame 50 for *Entrance Door*.

A key for *Entrance Door* is created at frame 50. The value of this key is 0 which means the door is closed. This key sets the frame where the door begins to open.

6. Close the **Track View-Dope Sheet** window.

7. Drag the time slider to frame 100 and activate the animation mode, if it is not already active.

8. Make sure *Entrance Door* is selected in any viewport.

9. Choose the **Modify** tab in the **Command Panel**.

10. In the **Parameters** rollout, set the value **90** in the **Open** spinner; *Entrance Door* is opened 90 degrees at frame 100, as shown Figure 14-67.

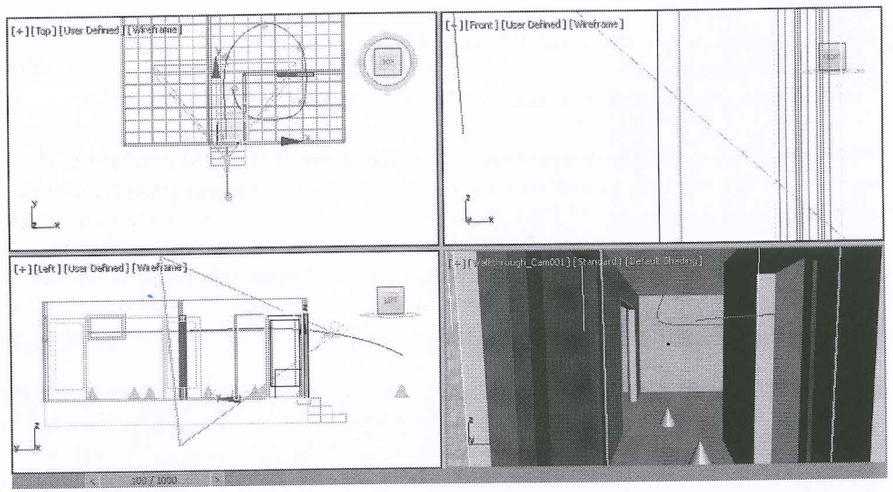

Figure 14-67 *The Entrance Door is opened 90 degrees at frame 100*

11. Choose **Graph Editors > Saved Track Views > Track View - Dope Sheet** from the menu bar; the **Track View - Dope Sheet** window is displayed with the previous settings active.

12. Choose the **Add/Remove Key** button on the top of the **Track View - Dope Sheet** window.

13. Click on the **Open (degrees)** track at frame 224 for *Entrance Door*.

14. Right-click on the new key; the **Entrance Door\Open(degrees)** dialog box for the new key is displayed, as shown in Figure 14-68.

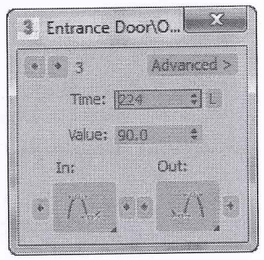

Figure 14-68 *The* ***Entrance Door\Open (degrees)*** *dialog box*

15. Make sure 90 is displayed as the value in the **Value** spinner.
The value 90 degrees sets the *Entrance Door* to the fully open position.

16. Close both the **Entrance Door\Open (degrees)** dialog box as well as the **Track View - Dope Sheet** window.

17. Drag the time slider to frame 275.

18. Make sure the **Toggle Auto Key Mode** button is chosen. Next, set the value **0** in the **Open** spinner in the **Parameters** rollout. The *Entrance Door* is closed at frame 275.

19. Choose the **Toggle Auto Key Mode** button to exit the animation mode.

20. Make sure the Walkthrough_Cam001 viewport is active and then choose the **Play Animation** button in the animation controls to play the animation.

21. Choose the **Stop Animation** button in the animation controls to stop the animation.

Previewing the Animation

Now, you can view the animation you have created by rendering a quick preview. The preview of animation will give you a good idea of whether the animation is working correctly. Before the animation is rendered, hide any object that you do not want to be visible in the preview or the final animation.

1. Invoke the **Select Object** tool from the **Main Toolbar** and select the *Walkthrough-Path* in any viewport; the motion path becomes the active object.

2. Right-click in the viewport to display the quad menu. Choose **Hide Selection** from the upper-right quadrant of this quad menu; the path is hidden and will not be visible in the animation.

3. Choose **Tools > Preview - Grab Viewport > Create Preview Animation** from the menu bar; the **Make Preview** dialog box is displayed.

4. In this dialog box, choose the **Create** button to accept the default settings and render the preview.

   The preview is generated and then played in Windows Media Player.

Rendering the Final Animation

Now that the animation has been completed and verified with the help of its preview, you can render the final animation. The final animation contains all movements and is rendered with colors, textures, and shadows. This process can take some time, depending on the speed of the computer's processor and the length, complexity, and resolution of the animation.

1. Activate the Walkthrough_Cam001 viewport and then invoke the **Render Setup** tool from the **Main Toolbar**; the **Render Setup: NVIDIA mental ray** dialog box is displayed.

2. In the **Time Output** area, select the **Active Time Segment** radio button.

   This sets all the active frames in the animation to be rendered.

3. In the **Output Size** area of the dialog box, choose the **320×240** button.

   This sets the animation to be rendered at a resolution of 320 × 240 pixels. This animation does not need to be of high resolution. The higher the resolution, the longer it will take to render the animation and also the resulting file size will be large.

4. In the **Render Output** area of this dialog box, choose the **Files** button; the **Render Output File** dialog box is displayed. As the project folder is already set, the *renderoutput* folder of this project is displayed in the **Save in** drop-down list.

5. Select **AVI File (*.avi)** from the **Save as type** drop-down list. In the **File name** text box, enter **c14tut3Render** and choose the **Save** button; the path of the file is displayed in the **Render Output** area of the **Render Setup** dialog box.

   The **AVI File Compression Setup** dialog box is displayed, if this file type has not been saved during the current drawing session. This dialog box allows you to adjust the quality and keyframe rate of the animation.

6. Choose the **OK** button to accept the default AVI settings.

Note

*If the **Save File** check box is not selected, the animation will only be rendered on the screen. You will not be able to replay the animation.*

7. Choose the **Render** button in the **Render Setup: NVIDIA mental ray** dialog box; the **Rendered Frame** window and the **Rendering** dialog box are displayed. When the rendering is complete, the **Rendering** dialog box will be closed and the last frame of the animation will be displayed. The animation has been saved to the disk and must be viewed to see the results.

8. Close the **Rendered Frame** window and the **Render Setup: NVIDIA mental ray** dialog box.

9. Choose **Rendering > View Image File** from the menu bar; the **View File** dialog box is displayed. As the project folder is already set, the *renderoutput* folder of this project is displayed in the **Look in** drop-down list.

10. Choose the **Open** button; the animation file is opened and played in Windows Media Player. Now, save the scene.

Self-Evaluation Test

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

1. Which of the following buttons is used to turn on the animation mode?

   (a) **Toggle Auto Key Mode** (b) **Toggle Set Key Mode**
   (c) Both a and b (d) None of these

2. Which of the following tools is used to control the animation keys in an animation?

   (a) **Track View** (b) **Key Mode Toggle**
   (c) **Play Animation** (d) **Time Configuration**

3. Which of the following modifiers is used to create morphing in objects?

   (a) **Morph** (b) **Scatter**
   (c) **Mesher** (d) **Terrain**

4. Which of the following options in the **Rendering** pull-down menu is used to add special effects on rendering?

   (a) **Render** (b) **Material Editor**
   (c) **Effects** (d) None of these

5. The _____ button is used to jump between the keyframes directly.

6. The _____ displays the timeline with the frame numbers in it.

7. To render the final animation, you need to choose the _____ tool in the **Main Toolbar**.

8. In the set key animation mode, you need to set the keys for the animation of the selected object by choosing the **Set Keys** button. (T/F)

9. To move the time slider to another frame, you can enter the frame number directly in the **Current Frame (Go to frame)** spinner. (T/F)

10. The **Time Configuration** button is used to set the animation length by defining the number of frames in the **End Time** spinner. (T/F)

Review Questions

Answer the following questions:

1. Which of the following effects can be assigned to the rendered scene from **Rendering > Effects** in the menu bar?

   (a) **Blur** (b) **Lens Effects**
   (c) **Motion Blur** (d) All of these

2. To create the preview of an animation, select the _____ option from the _____ pull-down menu.

3. To save the rendered animation, you need to define a file with the _____ extension in the _____ area of the **Render Setup** dialog box.

4. The _____ button is used to play animation of an object in the viewport.

5. In the **Curve Editor** mode of the track view, the animation is displayed as a spreadsheet of keys. (T/F)

6. The options in the **Frame Rate** area of the **Time Configuration** dialog box are used to define a particular frame rate for animation in frames per second. (T/F)

7. The **Playback** area in the **Time Configuration** dialog box is used to change the speed of the animation. (T/F)

8. To assign the **NVIDIA mental ray** renderer for rendering the animation, you need to choose the **Quick Render (Production)** tool in the **Main Toolbar**. (T/F)

EXERCISES

The rendered output of the scene used in following exercises can be accessed by downloading the *c14_3dsmax_2017_exr.zip* file from *www.cadcim.com*. The path of the file is as follows: *Textbooks > Animation and Visual Effects > 3ds Max > Autodesk 3ds Max 2017: A Comprehensive Guide*

Exercise 1

Create an early morning scene and animate the sea water, refer to Figure 14-69.

(Expected time: 30 min)

Hints:

1. Create an omni light for the sun effect and use the **Lens** effects in it.
2. Create water effect as discussed in Tutorial 1 of this chapter.

Figure 14-69 *The morning scene*

Exercise 2

Create the solar system using the standard primitives and lights, as shown in Figure 14-70.

(Expected time: 60 min)

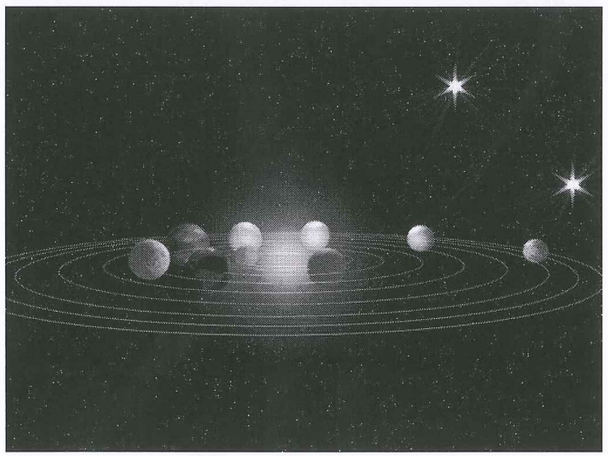

Figure 14-70 *The solar system*

Exercise 3

Extract the contents of *c14_3dsmax_2017_exr.zip* and then open *c14_exr03_start.max*. Create a walkthrough for the lobby, as shown in Figure 14-71. **(Expected time: 30 min)**

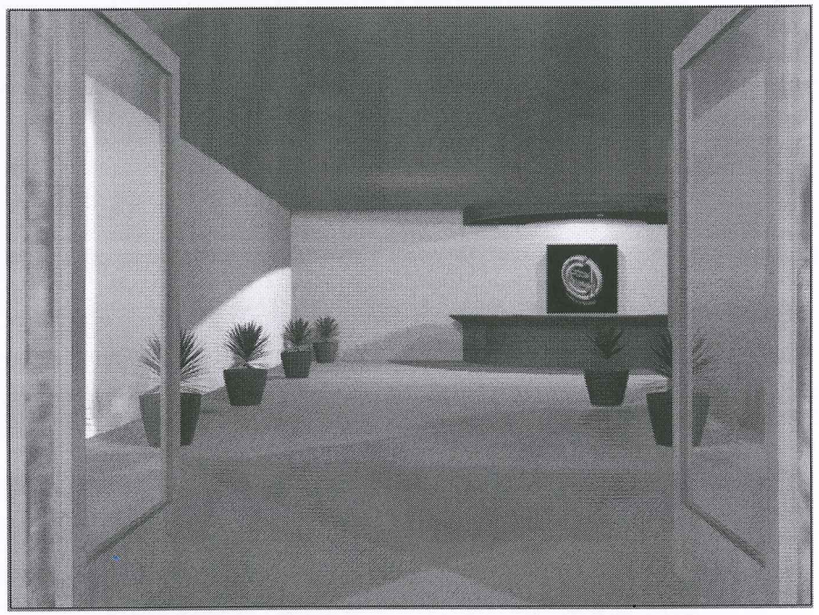

Figure 14-71 *Walkthrough for the lobby*

Answers to Self-Evaluation Test

1. c, **2.** a, **3.** a, **4.** c, **5. Key Mode Toggle**, **6.** track bar, **7. Render Production**, **8.** T, **9.** T, **10.** T

15

Systems, Hierarchy, and Kinematics

Learning Objectives

After completing this chapter, you will be able to:

- *Create a Ring Array system*
- *Create a Sunlight system*
- *Create a Daylight system*
- *Understand hierarchy and kinematics*
- *Create a bone system*
- *Understand IK solver, interactive IK, and applied IK*
- *Create a biped system*