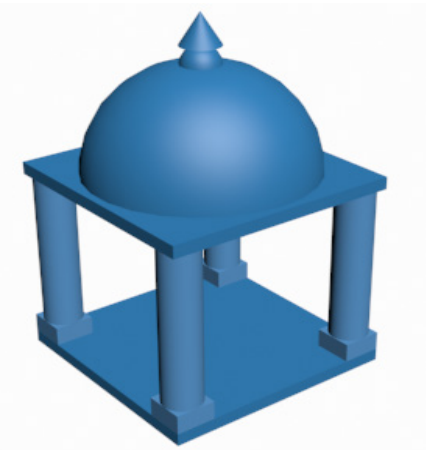
Chapter 2

Primitive Objects-I

Learning Objectives

After completing this chapter, you will be able to:

- *Create primitive objects*
- *Modify primitive objects*
- *Use the Mirror and Align tools*





INTRODUCTION

In this chapter, you will learn to create primitive objects and modify them using modifiers such as **Edit Mesh** and **Edit Poly**. In addition, you will learn to use the **Mirror** and **Align** tools.

TUTORIALS

Tutorial 1

In this tutorial, you will create the model of a temple, as shown in Figure 2-1, using various primitive objects. **(Expected time: 20 min)**



Figure 2-1 *The model of a temple*

The following steps are required to complete this tutorial:

a. Create the project folder.
b. Create bottom part of the temple.
c. Create pillars.
d. Create the roof.
e. Modify the roof objects.
f. Add details to the dome.
g. Change the background color of the scene.
h. Save and render the scene.

Creating the Project Folder

Before starting a new scene, it is recommended that you create the project folder. Creating a project folder helps you keep all files of a project in an organized manner. Open File Explorer and browse to the *Documents* folder. In this folder, create a new folder with the name *3dsmax 2024*. The *3dsmax 2024* folder will be the main folder and it will contain all project folders that you will create while working on the tutorials of this textbook. Next, you will create first project folder for Tutorial 1 of this chapter. To do so, you need to follow the steps given next.

1. Start 3ds Max 2024.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

2. If 3ds Max is already running, you need to reset it. To do so, choose the **Reset** option from the **File** menu; the **3ds Max** message box is displayed. Choose the **Yes** button from the message box; a new screen is displayed with default settings.



Note

*The **Reset** option is used to restore 3ds Max settings to its startup defaults.*

3. Create a new folder with the name *c02_tut1* at *\Documents\3dsmax2024*. Next, choose **File > Project > Create Default** from the menubar; the **Choose a folder** dialog box is displayed.

4. Navigate to *\Documents\3dsmax2024*. Next, select the **c02_tut1** folder and then choose the **Select Folder** button to close the **Choose a folder** dialog box; the *c02_tut1* folder is created.

5. Choose **Save** from the **File** menu; the **Save File As** dialog box is displayed.



Note

*1. The scenes created in 3ds Max are saved with the .max extension. As the project folder is already created, the **scenes** folder is displayed in the **Save in** drop-down list of the **Save File As** dialog box.*

*2. You can also save a scene to previous versions (2017, 2018, 2019, and 2020) of 3ds Max. To do so, select the desired option from the **Save as type** drop-down list in the **Save File As** dialog box.*

*3. After setting the project folder when you open or save a scene, the **scenes** folder of this project is selected by default in the **Save File As** and **Open File** dialog boxes.*

6. Enter **c02tut1** in the **File name** text box and then choose the **Save** button to close the dialog box.

When you start 3ds Max, the last project that you worked on will be active and an empty scene will be displayed with the name **Untitled**. It is recommended that you frequently save the files while you are working on them by pressing the CTRL+S keys.

Autodesk 3ds Max creates a backup of the scene and saves changes periodically. In case of system failure, you can open the auto backup scene file and continue working on it. If you have not created the project folder, the default path for windows to save the auto backup file is as follows: *C:\users\<username>\My Documents\3dsMax\autoback*. However, if you have created the project folder, the backup file will be saved in the *autoback* subfolder of the project folder. When 3ds Max is auto saving a file, the information, **Autosave in progress... (Press ESC to cancel)** is displayed in the prompt line at the bottom of the interface. If the size of the file is too large and consuming long time to save, you can press the ESC key to interrupt the saving process. You can also set the number of autoback files, specify the names for these files, and set the backup time interval. To do so, choose **Customize > Preferences** from the menu bar; the **Preferences Settings** dialog box will be displayed. Next, choose the **Files** tab and then set the options as required in the **Auto Backup** area of the dialog box.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

Creating Bottom Part of the Temple

In this section, you will create the bottom part of the temple using the **Box** tool.

1. Choose **Create > Geometry** in the **Command Panel**, if it is not already chosen; different tools and rollouts pertaining to the **Create** command are displayed in the **Command Panel**, refer to Figure 2-2.



When you start 3ds Max, the **Geometry** button is chosen by default.

2. Invoke the **Box** tool from the **Object Type** rollout; the rollouts corresponding to the **Box** tool such as **Name and Color**, **Creation Method**, **Keyboard Entry**, and **Parameters** are displayed.

The arrow sign on the left side of the rollout is used to expand or collapse the rollout, refer to Figure 2-2.

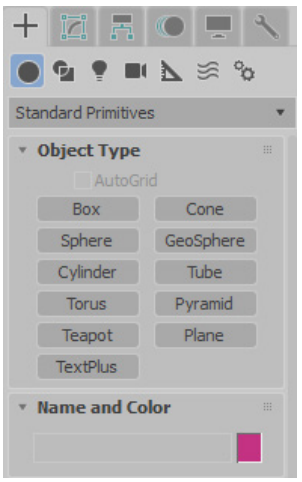


Figure 2-2 *The tools and rollouts in the* ***Command Panel***

3. Expand the **Keyboard Entry** rollout by clicking on its title bar and set the values as given next.

Length: **360** Width: **360**
Height: **20**

Choose the **Create** button; the box is created in all viewports with the name *Box001*. Enter **Bottom** in the **Name and Color** rollout; the box is renamed as *Bottom*.

4. Invoke the **Zoom Extents All** tool from the viewport navigation controls; *Bottom* is zoomed to its extents, refer to Figure 2-3.

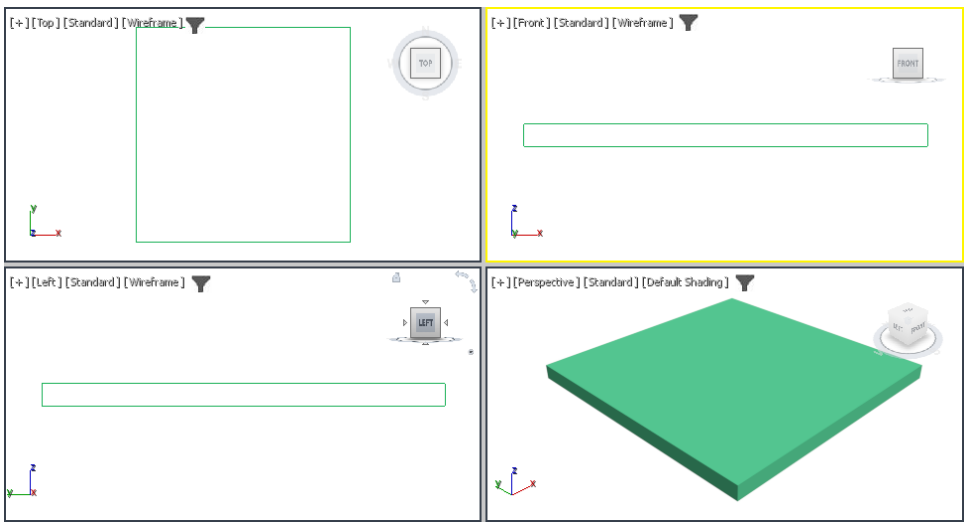


Figure 2-3 *Bottom zoomed to its extents*

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

5. Activate the Top viewport. Make sure the **Box** tool is invoked.

6. In the **Keyboard Entry** rollout, set the values as given next.

   Length: **60** Width: **60** Height: **30**

   Choose the **Create** button; a box is created at the center of *Bottom*. Enter **Base01** in the **Name and Color** rollout; the box is renamed as *Base01*. Next, right-click to exit the **Box** tool.

7. Make sure the Top, Front, and Left viewports are in the wireframe mode, refer to Figure 2-4.

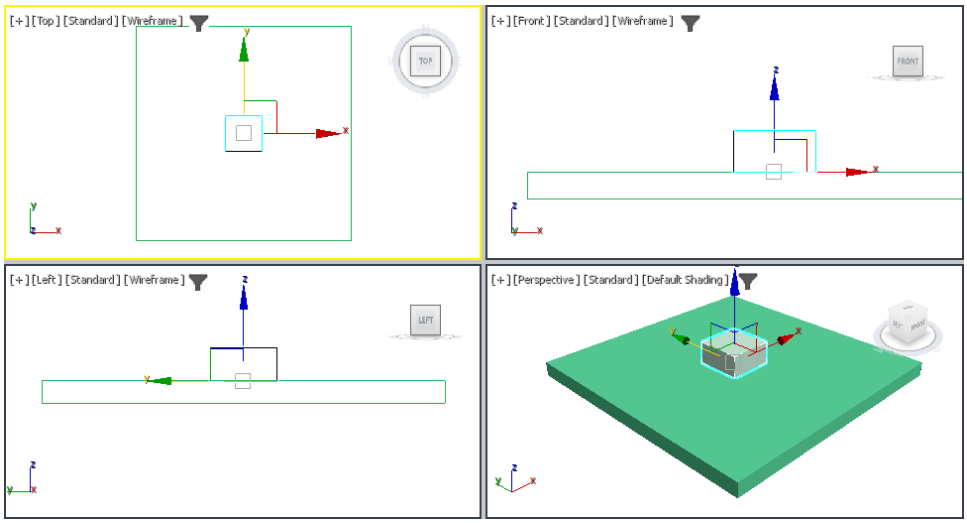


Figure 2-4 *Bottom and Base01 displayed in viewports*



Tip: *You can press ALT+W to toggle between the active viewport display and four viewport display. You can use the G key to toggle the display of the grid in the viewports.*

8. Activate the Front viewport by clicking the MMB button. Next, invoke the **Zoom** tool from the viewport navigation controls and zoom in the small box in the Front viewport.



Note

You can switch between the viewports to make a particular viewport active by using the WINDOWS +SHIFT keys. The active viewport in 3ds Max is marked with a yellow highlighted border. Only one viewport can remain active at a time. If all viewports are visible, press the WINDOWS+SHIFT keys to make the subsequent viewports active. However, if only one viewport is maximized, then on pressing the WINDOWS+SHIFT keys repeatedly, a window with available viewports will be displayed. When the WINDOWS+SHIFT keys are released, the window will disappear and the selected viewport will become active. You can use this process to activate a viewport whenever you need to do so.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

9. Invoke the **Select and Move** tool by pressing the W key. In the Front viewport, select *Base01* and move it up along the Y-axis such that its bottom touches the top of the object *Bottom*. Now, release the left mouse button. Next, select the *Bottom* and invoke the **Zoom Extents** tool to zoom *Bottom*.

10. Activate the Top viewport and invoke the **Zoom Extents** tool from the viewport navigation controls area. Next, invoke the **Maximize Viewport Toggle** tool from the viewport navigation controls to maximize the viewport.



11. Move *Base01* to the lower-left corner of *Bottom*, as shown in Figure 2-5.

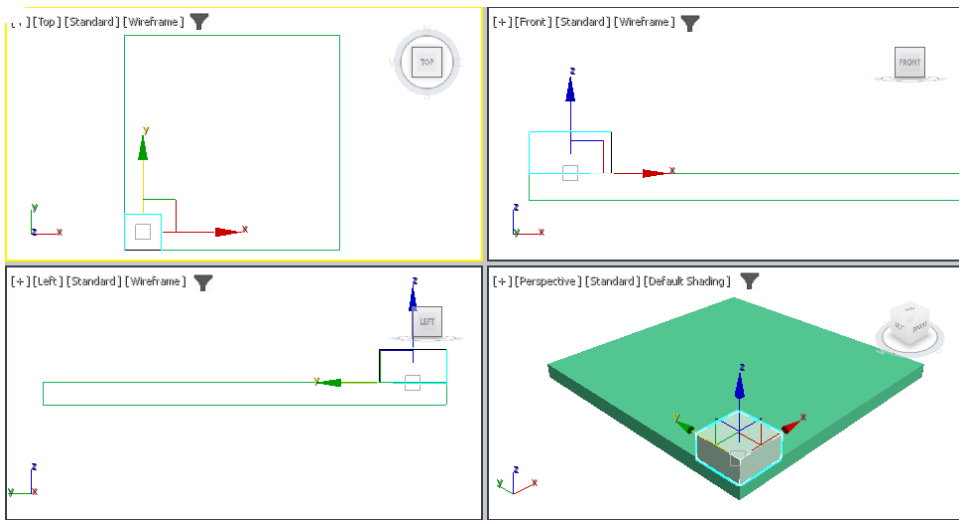


Figure 2-5 *Alignment of Base01 to the lower-left corner of Bottom*

Note

*The **Axis Constraints** toolbar is not displayed by default. To display this toolbar, right-click on the empty area of the **Main Toolbar** and then choose the **Axis Constraints** option from the shortcut menu displayed.*

12. Press and hold the left mouse button along with the SHIFT key, and then drag *Base01* to the upper-left corner of *Bottom* using the Y axis handle of the gizmo. Next, release the left mouse button; the **Clone Options** dialog box is displayed. In this dialog box, make sure the **Copy** radio button is selected and then enter **Base02** in the **Name** text box, as shown in Figure 2-6. Next, choose the **OK** button to close the dialog box; *Base02* is created in the viewport.

Note

When multiple objects are selected and moved with the SHIFT key pressed, a copy of each selected object is created.

13. Make sure the **Select and Move** tool is invoked and *Base02* is selected. Next, press and hold the CTRL key and select *Base01*. Now, release the CTRL key.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

The CTRL key enables you to select multiple objects.

14. Press and hold the SHIFT key and drag both the objects to the right side of *Bottom* using the X axis handle of the gizmo. Now, release the left mouse button; the **Clone Options** dialog box is displayed. In this dialog box, make sure the **Copy** radio button is selected and then enter **Base03** in the **Name** text box. Next, choose the **OK** button; a copy each of *Base01* and *Base02* is created. One of the copies is already renamed as *Base03*. Rename the other copy as **Base04**.

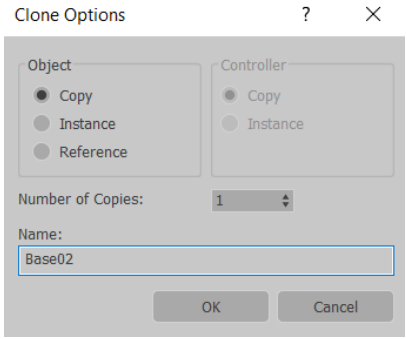


Figure 2-6 *The* ***Clone Options*** *dialog box*

15. Invoke the **Maximize Viewport Toggle** tool from the viewport navigation controls to restore the previous viewport configuration or press ALT+W. Next, invoke the **Zoom Extents All** tool. Adjust the Perspective viewport. Figure 2-7 shows the four bases of the temple.

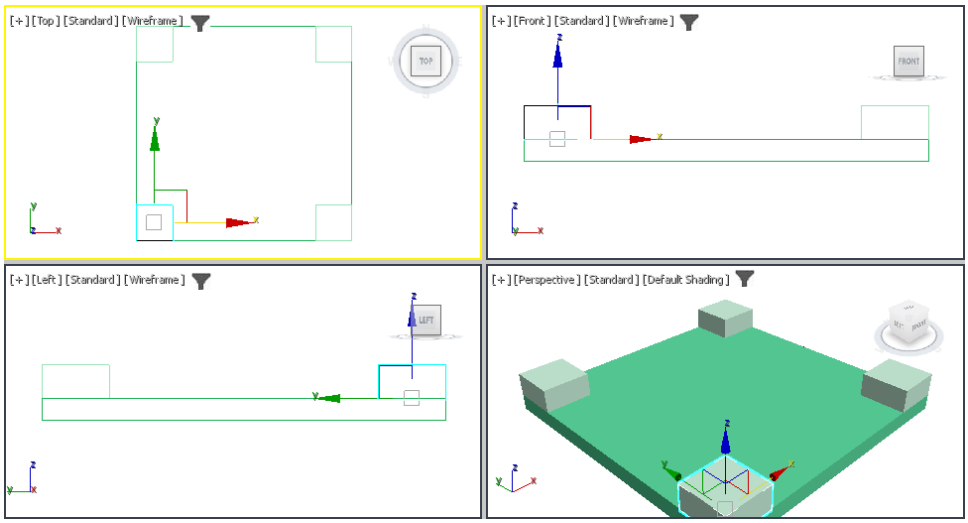


Figure 2-7 *Four bases of the temple*

Creating Pillars

In this section, you will create pillars for the temple by using the **Cylinder** tool.

1. Maximize the Top viewport using the **Maximize Viewport Toggle** tool from the viewport navigation controls. Next, choose **Create > Geometry** in the **Command Panel** and then invoke the **Cylinder** tool.

2. Expand the **Keyboard Entry** rollout and set **30** in the **Radius** spinner and **250** in the **Height** spinner. Next, choose the **Create** button from the **Keyboard Entry** rollout; the cylinder is created at the center of the object *Bottom*. Enter **Pillar01** in the **Name and Color** rollout. This cylinder will act as a pillar in the model of the temple.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

3. Press the ESC key to exit the **Cylinder** tool.

4. Make sure the **Select and Move** tool is invoked from the **Main Toolbar** and then drag *Pillar01* to the lower-left corner such that it is positioned on *Base01*, as shown in Figure 2-8.

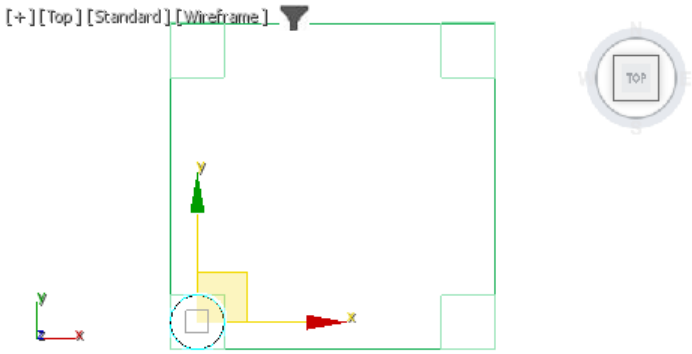


Figure 2-8 *Aligning Pillar01 to Base01 in the Top viewport*

5. Return to the four-viewport configuration by invoking the **Maximize Viewport Toggle** tool from the viewport navigation controls. Activate the Front viewport and maximize it. Next, click and drag *Pillar01* up using the Y axis handle of the gizmo such that its bottom touches the top of *Base01* in the viewport.

6. Return to the four-viewport configuration and activate the Top viewport. Next, maximize the Top viewport.

7. Make sure the **Select and Move** tool is invoked. Next, press and hold the SHIFT key and move *Pillar01* to the upper-left corner and position it on *Base02*. Next, release the left mouse button; the **Clone Options** dialog box is displayed. In this dialog box, make sure the **Copy** radio button is selected and enter **Pillar02** in the **Name** text box. Choose the **OK** button to close this dialog box; a copy with the name *Pillar02* is created.

8. Make sure that *Pillar02* is selected. Press and hold the CTRL key and select *Pillar01*.

9. Press and hold the left mouse button along with the SHIFT key and move both objects to the right using the X axis handle of the gizmo such that they are centered on the remaining two bases. Next, release the left mouse button; the **Clone Options** dialog box is displayed. In this dialog box, make sure the **Copy** radio button is selected and then enter **Pillar03** in the **Name** text box. Choose the **OK** button; two pillars are created. Name the other copy as **Pillar04**.

10. Return to the four-viewport configuration and invoke the **Zoom Extents All** tool from the viewport navigation controls, refer to Figure 2-9.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

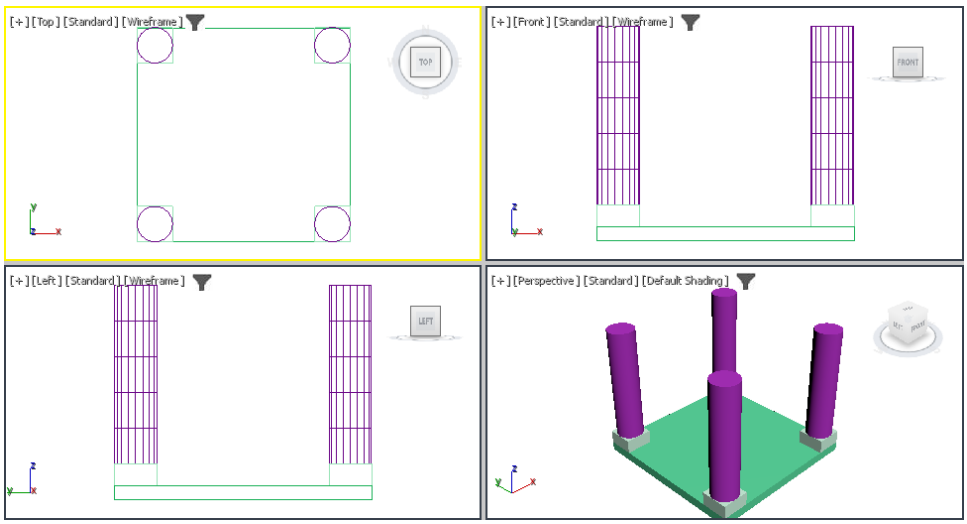


Figure 2-9 *The pillars created for the temple*

Creating the Roof

In this section, you will create the roof of the temple by using the **Sphere** tool.

1. Select *Bottom* and maximize the Front viewport. Press and hold the left mouse button along with the SHIFT key and drag *Bottom* upward. Next, release the left mouse button; the **Clone Options** dialog box is displayed. In this dialog box, make sure the **Copy** radio button is selected and then enter **Top** in the **Name** text box. Now, choose the **OK** button; a copy of *Bottom* with the name *Top* is created. Now, align it on top of the pillars using the **Select and Move** tool.

2. Return to the four-viewport configuration and invoke the **Zoom Extents All** tool to view the objects properly, refer to Figure 2-10.

3. Activate the Top viewport and choose **Create > Geometry** in the **Command Panel**. Next, invoke the **Sphere** tool.

4. In the **Keyboard Entry** rollout, set **170** in the **Radius** spinner. In the **Parameters** rollout, set **0.5** in the **Hemisphere** spinner.

   A hemisphere of 0.5 value will create one-half of a sphere.

5. Choose the **Create** button in the **Keyboard Entry** rollout. Enter the name **Dome** in the **Name and Color** rollout; the sphere is renamed as *Dome*.

6. Maximize the Front viewport. Next, invoke the **Select and Move** tool from the **Main Toolbar** and move *Dome* up such that its base is on the top surface of *Top*.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

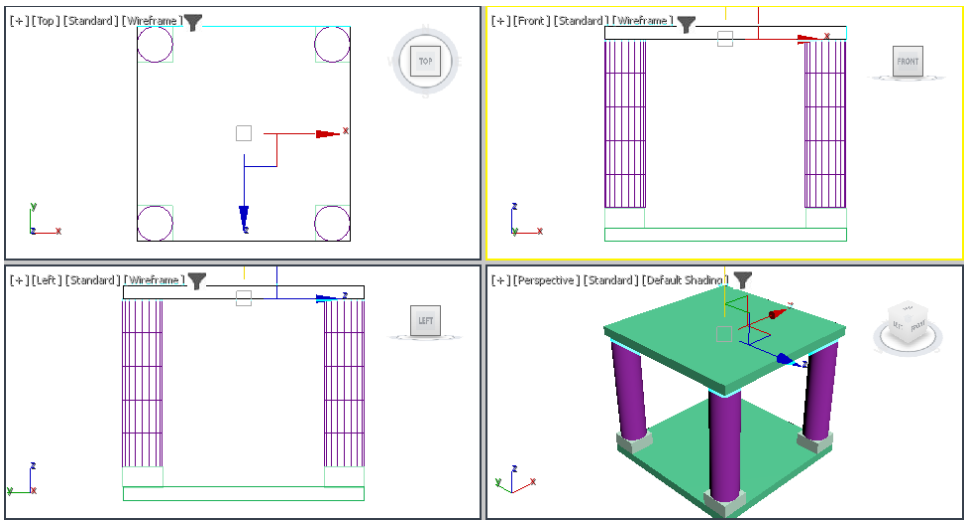


Figure 2-10 *Bottom copied to create top of temple*

7. Invoke the **Zoom Extents All** tool. Make sure the **Geometry** button is chosen in the **Create** tab of the **Command Panel**. Activate the Top viewport. Next, invoke the **Sphere** tool.

8. In the **Keyboard Entry** rollout, set **110** in the **Radius** spinner. In the **Parameters** rollout, set **26** in the **Segments** spinner. Next, choose the **Create** button in the **Keyboard Entry** rollout; a sphere is created with the name *Sphere001*.

9. Make sure *Sphere001* is selected and then activate the Front viewport. Next, invoke the **Align** tool from the **Main Toolbar**; the cursor changes to reflect the active command.

   The **Align** tool can also be used to easily and quickly move the object.

10. Now, select *Dome*; the **Align Selection (Dome)** dialog box is displayed. Set the values as shown in Figure 2-11. Now, choose the **OK** button; *Sphere001* is now vertically aligned with the flat surface of *Dome*, as shown in Figure 2-12.

Modifying Roof Objects

In this section, you will modify roof objects using the **Boolean** tool and **Edit Mesh** modifier.

1. Maximize the Front viewport. Select *Top* from the **Scene Explorer**, as shown in Figure 2-13.

2. Select **Compound Objects** from the drop-down list below the **Geometry** button. Next, invoke the **Boolean** tool from the **Object Type** rollout; the rollouts corresponding to the **Boolean** tool are displayed. Note that Top is displayed in the **Operands** list of the **Boolean Parameters** rollout. Choose the **Add Operands** button and then select *Sphere001* in a viewport; *Sphere001* is also displayed in the **Operands** list.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

3. Make sure the **Sphere001** option is selected in the **Operands** list and then choose the **Subtract** button in the **Operand Parameters** rollout; *Sphere001* is subtracted from the *Top*, thus creating a hole.

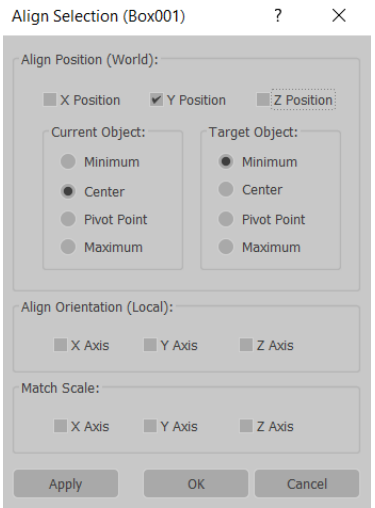


Figure 2-11 *The* ***Align Selection (Dome)*** *dialog box*

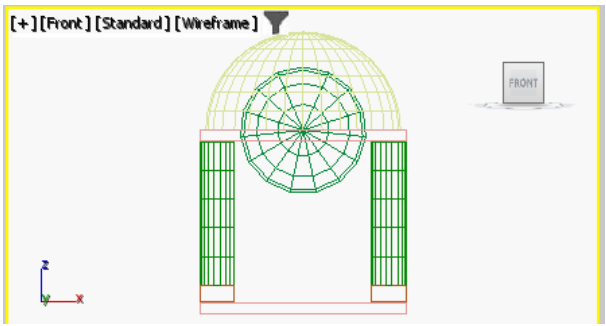


Figure 2-12 *Alignment of Sphere001 with Dome*

After performing the Boolean operation, invoke the **Select Object** tool from the **Main Toolbar** to prevent accidental selection of a different operand.

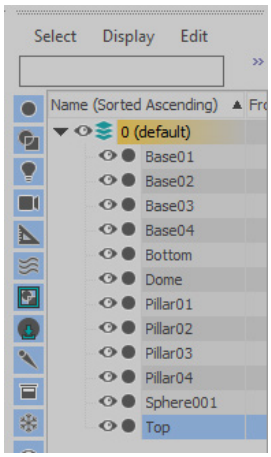


Figure 2-13 *Selecting Top from the* ***Scene Explorer***

4. Select *Dome* in the Front viewport.

5. Choose the **Modify** tab in the **Command Panel**. From the **Modifier List** drop-down list, select the **Edit Mesh** option in the **OBJECT-SPACE MODIFIER** section. Next, choose the **Vertex** button in the **Selection** rollout; vertices of *Dome* are displayed, as shown in Figure 2-14.



By choosing the **Vertex** button, you have entered the **Vertex** sub-object mode. The vertices which are not selected will be displayed in blue whereas the selected vertices will be displayed in red.

6. Invoke the **Select and Move** tool and then select the top single vertex of the dome and drag it down to about -3 units, using the coordinate display in the status bar. Release the left mouse button.

7. Choose the **Vertex** button from the **Selection** rollout to exit the sub-object mode. Next, return to the four-viewport configuration.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

Adding Details to the Dome

In this section, you will use the **Sphere** and **Cone** tools to add more details to *Dome*.

1. Activate the Top viewport. Choose **Create > Geometry** in the **Command Panel**. Select **Standard Primitives** from the drop-down list. Then, invoke the **Sphere** tool from the **Object Type** rollout.

2. In the **Keyboard Entry** rollout, set the value **30** in the **Radius** spinner and choose the **Create** button; a sphere is created. Enter **Sphere** in the **Name and Color** rollout.

3. Invoke the **Select and Move** tool from the **Main Toolbar** and then move *Sphere* up in the Front viewport to place it on top of *Dome*.

4. Activate the Top viewport. Make sure the **Geometry** button is chosen in the **Create** tab of the **Command Panel**. Next, invoke the **Cone** tool from the **Object Type** rollout.

5. In the **Keyboard Entry** rollout, set the values as given next.

   Radius 1: **30** Height: **50**

   Choose the **Create** button; a cone is created. Enter **Cone** in the **Name and Color** rollout.

6. Activate the Front viewport and move *Cone* on the top of *Sphere* by using the **Select and Move** tool from the **Main Toolbar**. Next, invoke the **Zoom Extents All** tool from the viewport navigation controls, refer to Figure 2-15.

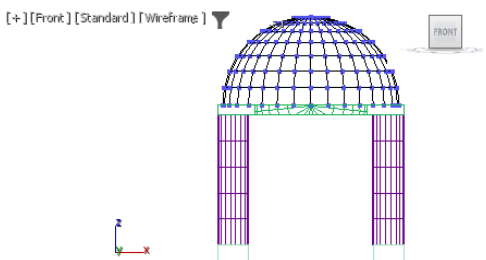


Figure 2-14 *Vertices of the Dome displayed*

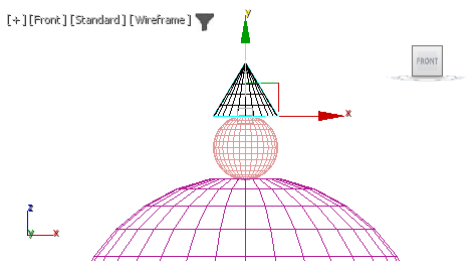


Figure 2-15 *The details added to the top of Dome*

7. Activate the Top viewport. Make sure the **Geometry** button is chosen in the **Create** tab of the **Command Panel**. Next, invoke the **Cone** tool in the **Object Type** rollout.

8. In the **Keyboard Entry** rollout, set the values as given next.

   Radius 1: **40** Radius 2: **10** Height: **70**

   Choose the **Create** button. Enter **Bell** in the **Name and Color** rollout.

9. Activate the Front viewport and invoke the **Select and Move** tool from the **Main Toolbar**. Move *Bell* such that half of it lies above *Top* and the other half of *Bell* lies below it, refer to Figure 2-16. Also, assign same color to all the objects of temple.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

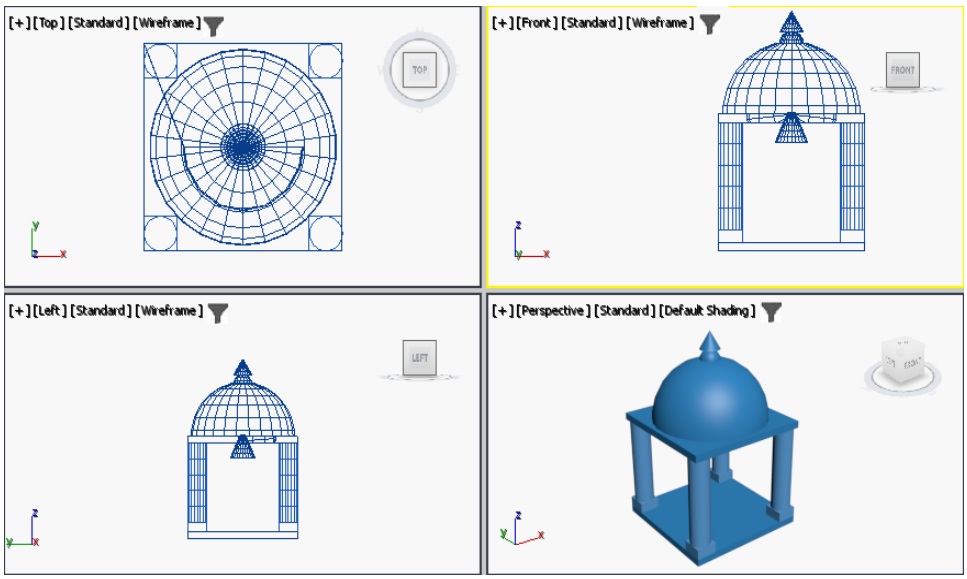


Figure 2-16 *Adjustment of Bell at the center of Dome*

Changing the Background Color of the Scene

In this section, you will change the background color of the scene.

1. Choose **Rendering > Environment** from the menu bar or press 8; the **Environment and Effects** dialog box is displayed with the **Environment** tab chosen.

2. In the **Background** area of the **Common Parameters** rollout, choose the color swatch corresponding to the **Color** parameter; the **Color Selector: Background Color** dialog box is displayed. In this dialog box, select the white color and choose the **OK** button. Next, close the **Environment and Effects** dialog box.

Saving and Rendering the Scene

In this section, you will save the scene that you have created and then render it. You can also view the final rendered image of this model by downloading the *c02_3dsmax_2024_rndr.zip* file from *www.cadcim.com*. The path of the file is as follows: *Textbooks > Animation and Visual Effects > Autodesk 3ds Max > Autodesk 3ds Max 2024 for Beginners: A Tutorial Approach*

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

2. Activate the Perspective viewport. Next, invoke the **Render Production** tool from the **Main Toolbar**; the rendered image is displayed, refer to Figure 2-17.



Tip

You can press SHIFT+Q or F9 to render the active viewport.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

Note
The process of texturing this model is discussed in Chapter 11.

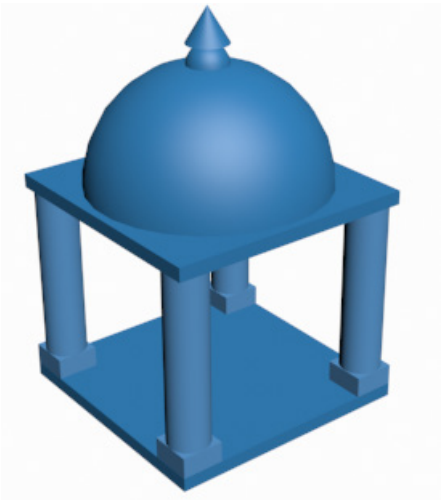


Figure 2-17 *The rendered image*

Tutorial 2

In this tutorial, you will create the model of the table and the benches, as shown in Figure 2-18. **(Expected time: 30 min)**



Figure 2-18 *The table and benches*

The following steps are required to complete this tutorial:

a. Create the project folder.
b. Create the top of the table.
c. Create the legs of the table.
d. Create the base of the table.
e. Create the rivets of the table.
f. Group the objects and smoothen the edges of table.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

g. Create the benches.
h. Save and render the scene.

Creating the Project Folder

Create the project folder with the name *c02_tut2* in the *3dsmax2024* folder, as discussed in Tutorial 1.

Creating the Top of the Table

In this section, you will create the top of the table by using the **Box** tool.

1. Choose **Create > Geometry** in the **Command Panel**; **Standard Primitives** is displayed in the drop-down list located below it. Next, invoke the **Box** tool from the **Object Type** rollout; various rollouts are displayed in the **Command Panel**.

2. Expand the **Keyboard Entry** rollout and set the values as given next.

   Length: **100** Width: **70** Height: **1.5**

3. Choose the **Create** button from the **Keyboard Entry** rollout; a box is created in all viewports, refer to Figure 2-19. In the **Name and Color** rollout, enter **Top** and press the ENTER key; the box is named as *Top*.

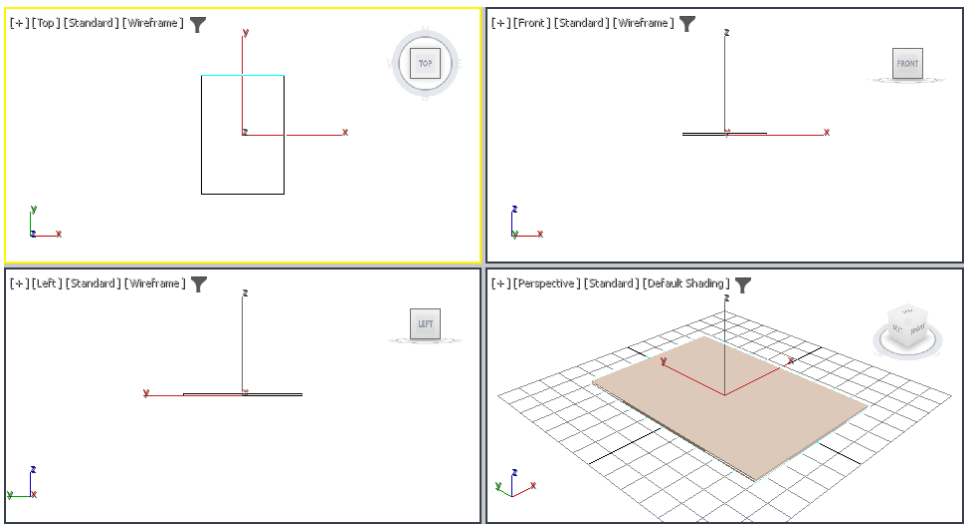


Figure 2-19 *The box created in all viewports*

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

4. Choose the **Modify** tab in the **Command Panel**. In the **Parameters** rollout, set the values as given next.

   Length Segs: **12** Width Segs: **6** Height Segs: **2**

   Next, you need to convert *Top* to editable poly to modify it at the sub-object level.

5. Make sure the **Modify** tab is chosen and then select the **Edit Poly** option from the **OBJECT-SPACE MODIFIERS** section of the **Modifier List** drop-down list; the **Edit Poly** modifier is displayed in the modifier stack. In the modifier stack, click on the arrow sign on the left of the **Editable Poly** to view all the sub-object levels.

6. Make sure the Top viewport is activated and press the W key to invoke the **Select and Move** tool. Next, select the **Edge** sub-object level in the modifier stack. Select five vertical edges of *Top* using the CTRL key, as shown in Figure 2-20. In the **Selection** rollout, choose the **Loop** button; five edge loops are selected.

7. In the **Edit Edges** rollout, choose the **Settings** button on the right of the **Chamfer** button; the **Chamfer** caddy control is displayed in the viewport. Set the value **0.2** in the **Chamfer-Amount** spinner, as shown in Figure 2-21, and choose the **OK** button; the selected edges are chamfered, as shown in Figure 2-22.

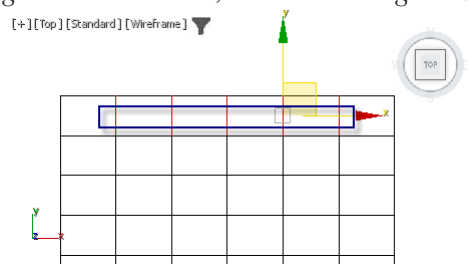


Figure 2-20 *Five vertical edges selected*

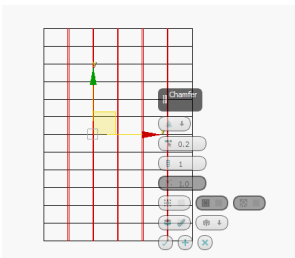


Figure 2-21 *Setting the value in the* ***Chamfer-Amount*** *spinner*

8. Maximize the Top viewport. Select the **Polygon** sub-object level in the modifier stack. In the **Selection** rollout, select the **Ignore Backfacing** check box and select the polygons, as shown in Figure 2-23. Next, press and hold the ALT key and draw a cross window around the polygons on the extreme left side of *Top*, as shown in Figure 2-24; the polygons in the cross window are deselected, as shown in Figure 2-25.

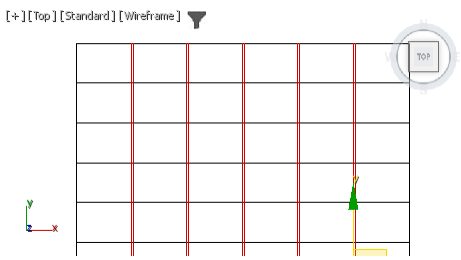


Figure 2-22 *The edges chamfered*

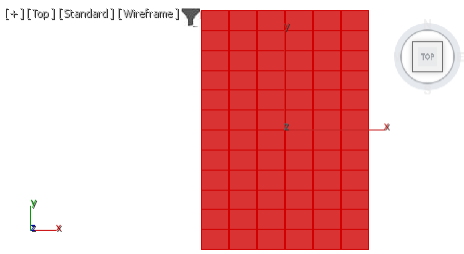


Figure 2-23 *The polygons selected*

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

The **Ignore Backfacing** check box is selected to avoid selection of polygons from the opposite side of the object. You will notice that the polygons on the bottom of *Top* are not selected.

9. Similarly, press the ALT key and deselect the polygons, refer to Figure 2-26. Notice that only the polygons between the chamfered edges remain selected. Now, delete these polygons.

Creating the Legs of the Table

In this section, you will create the legs of the table by extruding the polygons of *Top*.

1. Activate the Bottom viewport and select the **Edge** sub-object level in the modifier stack. Select two horizontal edges from the viewport by using the CTRL key, as shown in Figure 2-27. Next, in the **Selection** rollout, choose the **Loop** button; two edge loops are selected.

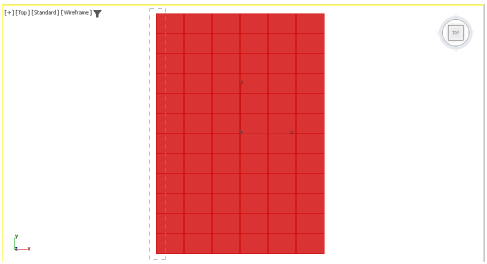


Figure 2-24 *Drawing a cross window around the polygons*

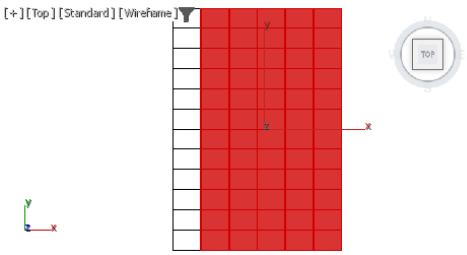


Figure 2-25 *The polygons deselected*

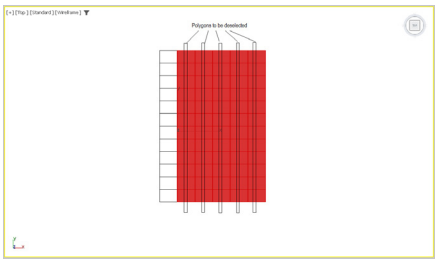


Figure 2-26 *The polygons to be deselected*

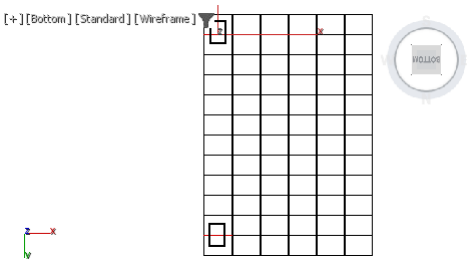


Figure 2-27 *Two horizontal edges selected in the Bottom viewport*



Note

To activate the Bottom viewport, click on the POV viewport label in the Top viewport; a flyout is displayed. Choose the ***Bottom*** *option; the Top viewport is switched to the Bottom viewport. Similarly, you can switch to any viewport by clicking on the POV viewport label.*

2. In the **Edit Edges** rollout, choose the **Settings** button on the right of the **Chamfer** button; the **Chamfer** caddy control is displayed in the viewport. Set the value **4** in the **Chamfer-Amount** spinner and **2** in the **Chamfer-Segments** spinner. Next, choose the **OK** button; the selected edges are chamfered.

3. Select the **Polygon** sub-object level from the modifier stack and select the polygons in the Bottom viewport by using the CTRL key, as shown in Figure 2-28. In the **Edit Polygons**

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

rollout, choose the **Settings** button on the right of the **Extrude** button; the **Extrude Polygons** caddy control is displayed in the viewport. Set **7** in the **Extrude Polygons-Height** spinner, and choose the **OK** button; the selected polygons are extruded.

4. Make sure the Bottom viewport is activated. Again, select the polygons by using the CTRL key, as shown in Figure 2-29. In the **Edit Polygons** rollout, choose the **Settings** button on the right of the **Extrude** button; the **Extrude Polygons** caddy control is displayed in the viewport. Set **50** in the **Extrude Polygons-Height** spinner, and choose the **OK** button; the selected polygons are extruded, refer to Figure 2-30.

   Next, you need to add edges to the extruded part of legs to add some details to them.

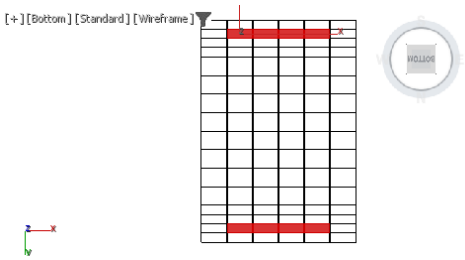


Figure 2-28 *The polygons selected in the Bottom viewport*

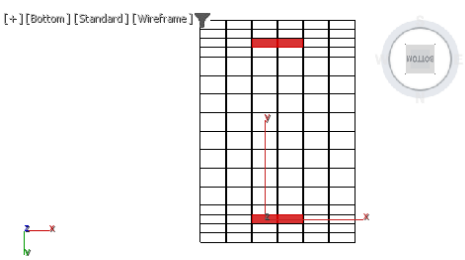


Figure 2-29 *The polygons selected*

Creating the Base of the Table

In this section, you will create the base of the table using the **Box** tool and the **Edit Poly** modifier.

1. Activate the Front viewport. Choose **Create > Geometry** in the **Command Panel** and invoke the **Box** tool from the **Object Type** rollout. Expand the **Keyboard Entry** rollout and set the values as given next.

   Length: **12** Width: **45** Height: **5**

2. Choose the **Create** button from the **Keyboard Entry** rollout; a box is created in all viewports. In the **Name and Color** rollout, enter **base1** and press ENTER; the box is named as *base1*. Now, invoke the **Select and Move** tool from the **Main Toolbar** and move *base1* at the bottom of the leg.

3. Choose the **Modify** tab in the **Command Panel**. Next, in the **Parameters** rollout, set the values as given next.

   Length Segs: **4** Width Segs: **12** Height Segs: **2**

4. Make sure the **Modify** tab is chosen and then select the **Edit Poly** modifier from the **OBJECT-SPACE MODIFIERS** section of the **Modifier List** drop-down list; the **Edit Poly** modifier is displayed in the modifier stack. In the modifier stack, click on the arrow on the left of the **Editable Poly** to view all sub-object levels.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

5. Select the **Vertex** sub-object level. Make sure the Front viewport is activated. Next, select the vertices using the CTRL key, as shown in Figure 2-31 and move them slightly downward. Similarly, move other vertices of *base1* to get a shape, as shown in Figure 2-32. Next, select the **Vertex** sub-object level again in the modifier stack to deactivate it.

6. Activate the Bottom viewport and then switch to the Top viewport, as discussed earlier. Next, align *base1* in all viewports, as shown in Figure 2-33.

   Next, you need to create a copy of *base1* which will act as a base for the other leg.

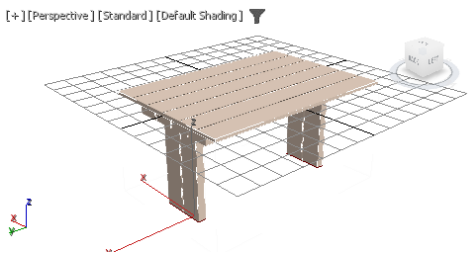


Figure 2-30 *The polygons extruded*

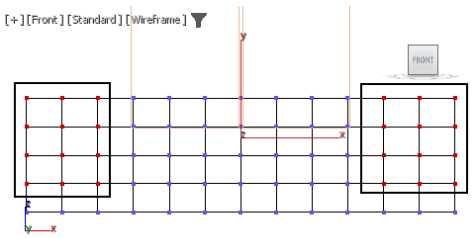


Figure 2-31 *The vertices to be selected*

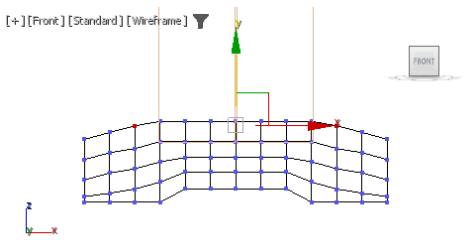


Figure 2-32 *The shape of base1*

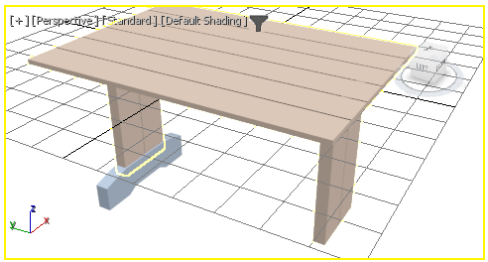


Figure 2-33 *The base1 object aligned in all viewports*

7. Activate the Left viewport and make sure *base1* is selected. Press and hold the left mouse button along with the SHIFT key and then move the cursor toward the other leg. Next, release the left mouse button; the **Clone Options** dialog box is displayed. In this dialog box, make sure the **Copy** radio button is selected in the **Object** area and 1 is displayed in the **Number of Copies** spinner. Now, enter **base2** in the **Name** text box and choose the **OK** button; a copy of *base1* with the name *base2* is created.

8. Align *base2* in all the viewports to position it at the bottom of the other leg, as shown in Figure 2-34.

   Next, you need to create the footrests for *table*.

9. Make sure the Left viewport is activated. Choose **Create > Geometry** in the **Command Panel** and invoke the **Box** tool from the **Object Type** rollout. Expand the **Keyboard Entry** rollout and set the values as given next.

   Length: **5** Width: **80** Height: **2**

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

10. Choose the **Create** button from the **Keyboard Entry** rollout; a box is created in all viewports. Enter **footrest1** in the **Name and Color** rollout, and press the ENTER key; the box is named as *footrest1*. Invoke the **Select and Move** tool from the **Main Toolbar** and align *footrest1* in all viewports, as shown in Figure 2-35.

11. Create the copy of *footrest1* in the Front viewport as done in Step 7 and then align it in all viewports, as shown in Figure 2-36.

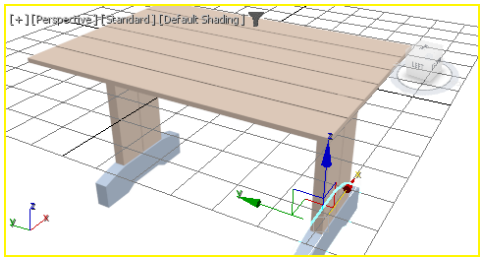


Figure 2-34 *The base2 object aligned in all viewports*

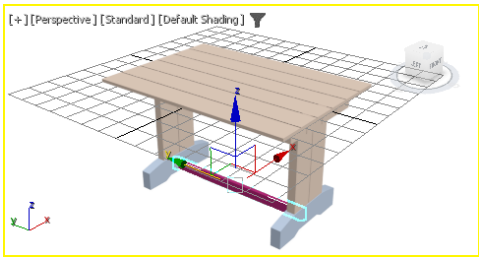


Figure 2-35 *The footrest1 object aligned in all viewports*

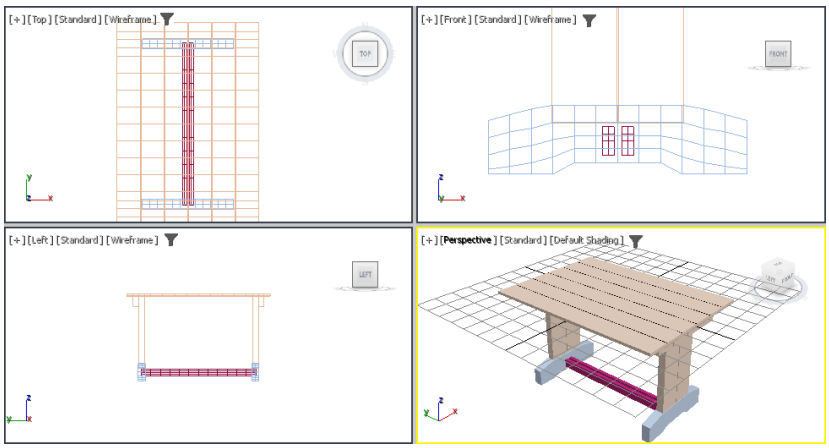


Figure 2-36 *The copy of footrest1 object aligned in all viewports*

Creating the Rivets of the Table

In this section, you will create a sphere and a cylinder to create the cap and the body of rivet, respectively.

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

2. Expand the **Keyboard Entry** rollout and set the value **0.65** in the **Radius** spinner and choose the **Create** button; a sphere is created in all the viewports.

3. In the **Parameters** rollout, make sure that the **Smooth** check box and the **Chop** radio button are selected. Set the value **0.5** in the **Hemisphere** spinner.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

4. Enter **cap** in the **Name and Color** rollout and use the color swatch in this rollout to change the color to black.

   Next, you need to create a cylinder for the body of the rivet.

5. Choose the **Cylinder** tool from **Create > Geometry > Standard Primitives > Object Type** rollout in the **Command Panel**.

6. In the **Keyboard Entry** rollout, set the values as given next.

   Radius: **0.241** Height: **3.5**

7. Choose the **Create** button from the **Keyboard Entry** rollout; a cylinder is created.

8. Enter **body** in the **Name and Color** rollout and use the color swatch in this rollout to change the color to black. Next, right-click to exit the **Cylinder** tool.

9. Activate the Left viewport and invoke the **Name** tool from the **Main Toolbar**; the **Select From Scene** dialog box is displayed. In this dialog box, select *cap* and *body* simultaneously by holding the CTRL key and then choose the **OK** button; the *cap* and the *body* are selected in the viewport.

Note
*You can also select cap and body from the **Scene Explorer** located at the left of the interface.*

10. Invoke the **Zoom Extents All Selected** tool from the **Main Toolbar** to magnify the selected objects in all viewports and click on an empty area of the screen to deselect the objects.

11. Align *cap* and *body* of the rivet in the Left viewport using the **Select and Move** tool, as shown in Figure 2-37.

Note
*You can use the **Zoom Region** and **Pan View** tools from the viewport navigation controls to align the cap and body of the rivet.*

   Next, you need to group *body* and *cap* to create the rivet.

12. Select *cap* and *body* of the rivet in the **Scene Explorer**. Choose **Group > Group** from the menu bar; the **Group** dialog box is displayed. In this dialog box, enter **rivet001** in the **Group Name** text box and then choose the **OK** button; the **rivet001** group is created.

   Next, you need to align *rivet001*.

13. In the Left viewport, make sure *rivet001* is selected. Next, right-click on the **Select and Rotate** tool in the **Main Toolbar**; the **Rotate Transform Type-In** dialog box is displayed. Also, a circular gizmo along with the X, Y, and Z axes is displayed.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

14. In the **Offset:Screen** area of the **Rotate Transform Type-In** dialog box, set **-90** in the **Z** spinner and press the ENTER key; *rivet001* gets rotated, as shown in Figure 2-38. Now, close the **Rotate Transform Type-In** dialog box.

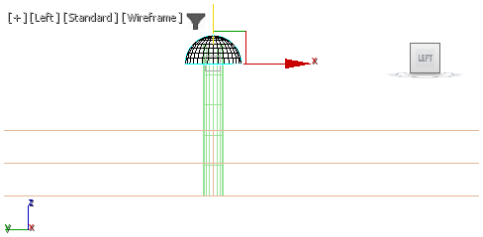


Figure 2-37 *The cap and body objects aligned in all viewports*

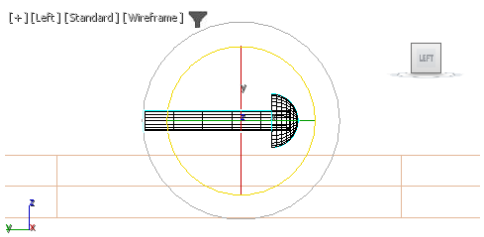


Figure 2-38 *The rivet001 object rotated*

15. Activate the Perspective viewport. Invoke the **Select and Place** tool from the **Main Toolbar**. Next, drag *rivet001* and place it on the *base2*. Now, align *rivet001* in all viewports, as shown in Figure 2-39.



The **Select and Place** tool is used to accurately position an object on the other object.

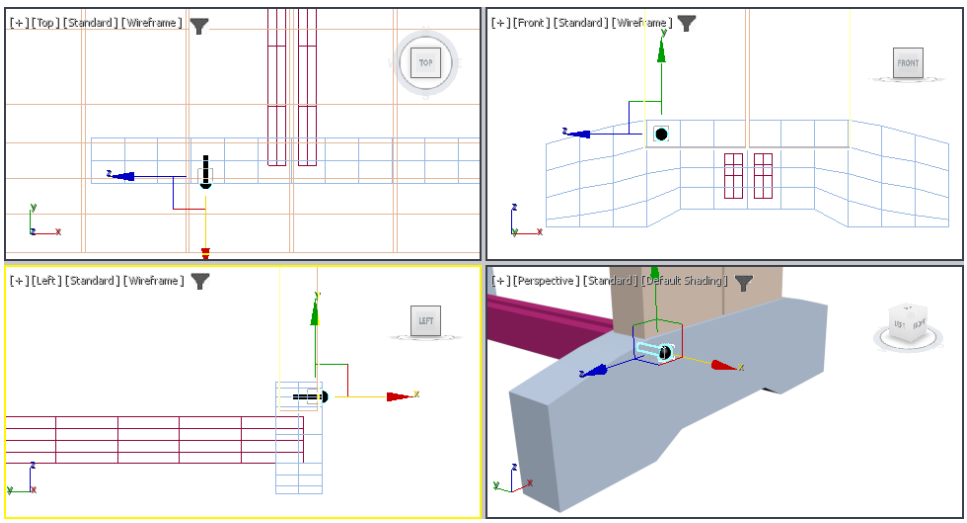


Figure 2-39 *The rivet001 object aligned in all viewports*

16. Activate the Front viewport. Create 3 more copies of *rivet001* as done earlier and align them in all viewports, as shown in Figure 2-40.

Next, you will use the **Mirror** tool to create a copy of these rivets.

17. Activate the Left viewport and select all rivets. Invoke the **Mirror** tool from the **Main Toolbar**; the **Mirror: Screen Coordinates** dialog box is displayed. In this dialog box, make sure the **X** radio button is selected in the **Mirror Axis** area and set the value **-83** in the **Offset** spinner. Next, select the **Copy** radio button in the **Clone Selection** area and choose the **OK** button; the copy of rivets is created, as shown in Figure 2-41.



Evaluation Copy. Do not reproduce. For information visit www.cadcim.com



Note

*You may need to change the value in the **Offset** spinner as per your requirement.*

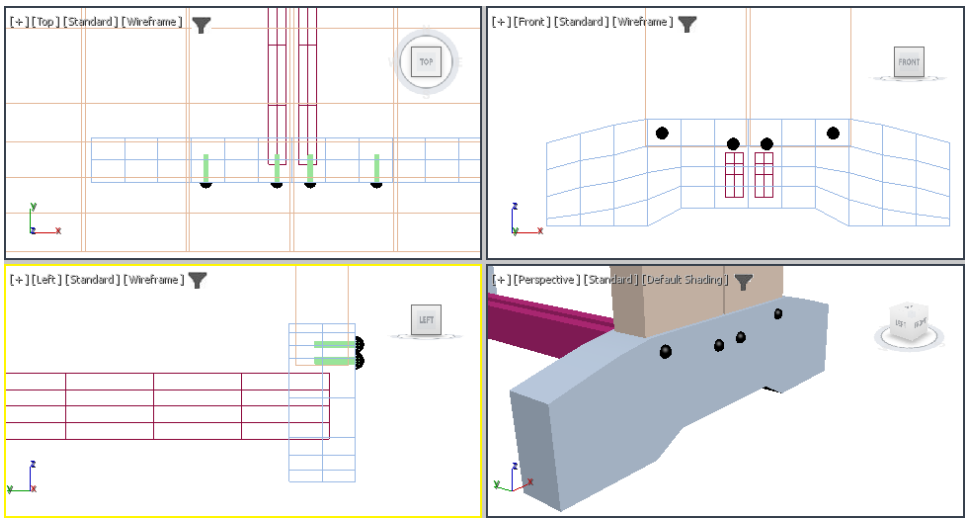


Figure 2-40 *The copies of rivet001 aligned in all viewports*

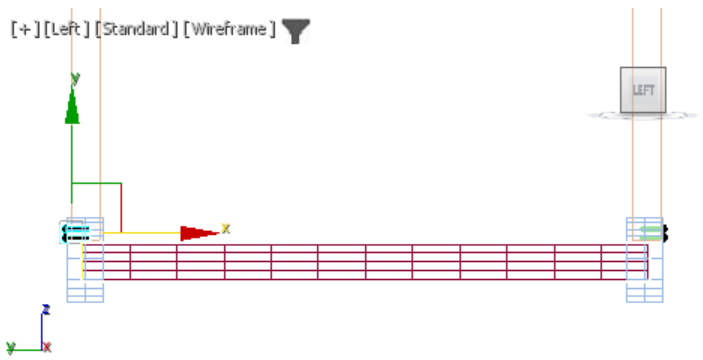


Figure 2-41 *The copy of rivets created*

Grouping the Objects and Smoothening the Edges of Table

In this section, you will group all the objects in the scene and then apply the **Chamfer** modifier to smoothen the edges of the group formed.

1. Select all the objects in the viewport. Next, choose **Group > Group** from the menu bar; the **Group** dialog box is displayed. Enter **Table** in the **Group Name** text box and then choose **OK** to close the dialog box.

2. Make sure *Table* is selected. Next, click on the **Modifier List** drop-down list in the **Command Panel** and then select **Chamfer** from it; the **Chamfer** modifier is applied to *Table* and is displayed in the modifier stack. Also, the **Parameters** rollout is displayed in the Modify panel.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

3. In the **Parameters** rollout, set the parameters, as shown in Figure 2-42. You will notice all the edges of *Table* are smoothened.

4. Change the color of *Table* by using the color swatch in the **Command Panel**.

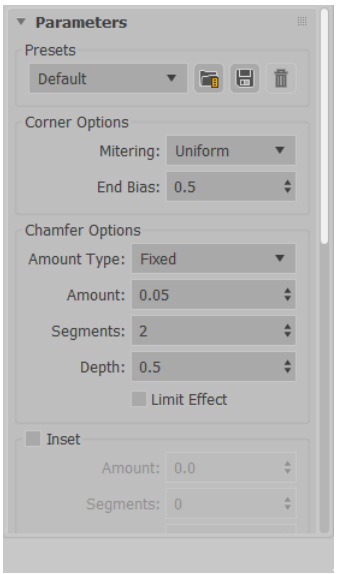


Figure 2-42 *The* ***Parameters*** *rollout*

Creating the Benches

In this section, you will create the benches.

1. Create two copies of *Table*. Next, scale and align them as benches, as shown in Figure 2-43.

Saving and Rendering the Scene

In this section, you will save the scene that you have created and then render it. You can also view the final rendered image of this model by downloading the *c02_3dsmax_2024_rndr.zip* file from *www.cadcim.com*. The path of the file is as follows: *Textbooks > Animation and Visual Effects > Autodesk 3ds Max > Autodesk 3ds Max 2024 for Beginners: A Tutorial Approach*

1. Change the background color of the scene to white by following the steps as given in Tutorial 1.

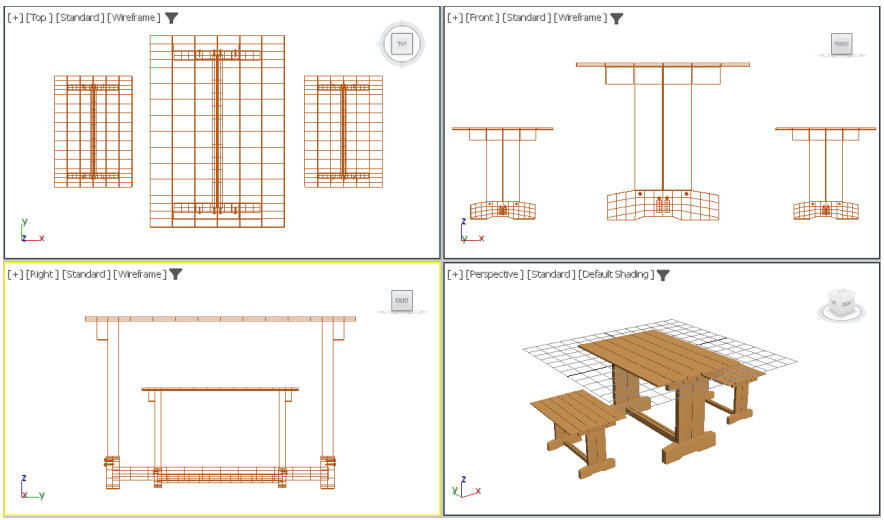


Figure 2-43 *The table and benches aligned*

2. Choose **Save** from the **File** menu.

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

3. Activate the Perspective viewport. Next, invoke the **Render Production** tool from the **Main Toolbar**; the rendered image is displayed, refer to Figure 2-44.



Figure 2-44 *The rendered image*

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 shortcut keys is used to toggle between the active viewport and four viewport display?

   (a) ALT+W (b) ALT+S
   (c) SHIFT+Q (d) None of these

2. Which of the following tools is used to accurately position an object on the other object?

   (a) **Select and Scale** (b) **Select and Place**
   (c) **Select and Rotate** (d) **Select and Squash**

3. You need to press and hold the _____ key while moving the object using the **Select and Move** tool to create a copy of an object.

4. You need to set the value in the _____ spinner of the **Parameters** rollout to create a hemisphere.

5. You need to choose the **Geometry** button in the **Create** tab of the **Command Panel** and then select **Compound Objects** from the drop-down list to apply boolean operations on the objects. (T/F)

6. The **Ignore Backfacing** check box in the **Selection** rollout is used to avoid selection of polygons from the opposite side of the object. (T/F)

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com

Review Questions

Answer the following questions:

1. Which of the following shortcut keys is used to render the active viewport?

(a) ALT+Q
(b) SHIFT+Q
(c) CTRL+S
(d) None of these

2. Which of the following options provides the additional functionality to select, rename, delete, freeze, and hide the objects in the viewports?

(a) **Select Object**
(b) **Select and Manipulate**
(c) **Scene Explorer**
(d) **Schematic View**

3. The _____ tool available in the **Main Toolbar** is used to align the current object with the target object.

4. The _____ dialog box is used to create the copies of the selected object(s).

5. The _____ key is used to toggle the display of grids in the viewport.

6. The **Edit Mesh** modifier is used to modify the object at sub-object level. (T/F)

EXERCISE

The rendered output of the model used in the following exercise can be accessed by downloading the *c02_3dsmax_2024_exr.zip* from *www.cadcim.com*. The path of the file is as follows: *Textbooks > Animation and Visual Effects > Autodesk 3ds Max > Autodesk 3ds Max 2024 for Beginners: A Tutorial Approach*

Exercise 1

Create the model of chairs and center table, as shown in Figure 2-45.



Figure 2-45 *The model of chairs and center table*

Answers to Self-Evaluation Test

1. a, **2.** b, **3.** SHIFT, **4. Hemisphere**, **5.** T, **6.** T

Evaluation Copy. Do not reproduce. For information visit www.cadcim.com