Chapter 1

Exploring Maya Interface

Learning Objectives

After completing this chapter, you will be able to:

- *Start Autodesk Maya 2019*
- *Work with menusets in Autodesk Maya*
- *Understand various terms related to Maya interface*
- *Work with tools in Autodesk Maya 2019*

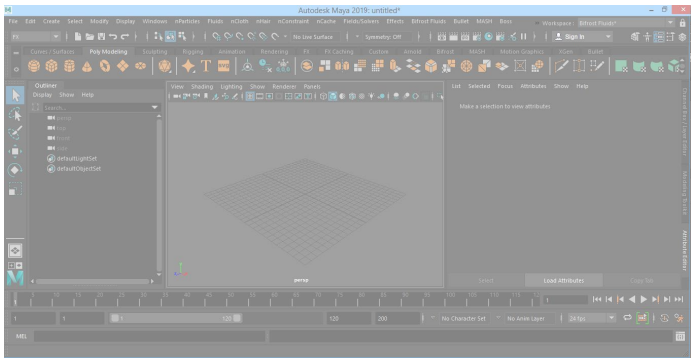

Figure 1-1 *Starting Autodesk Maya 2019 by choosing the icon from desktop*

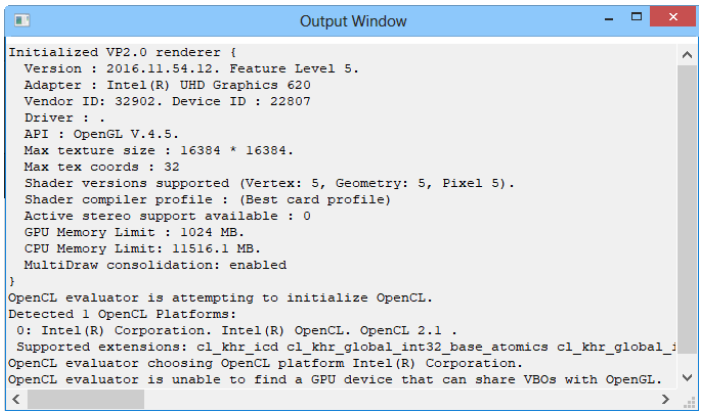

Figure 1-2 *The* ***Output Window***

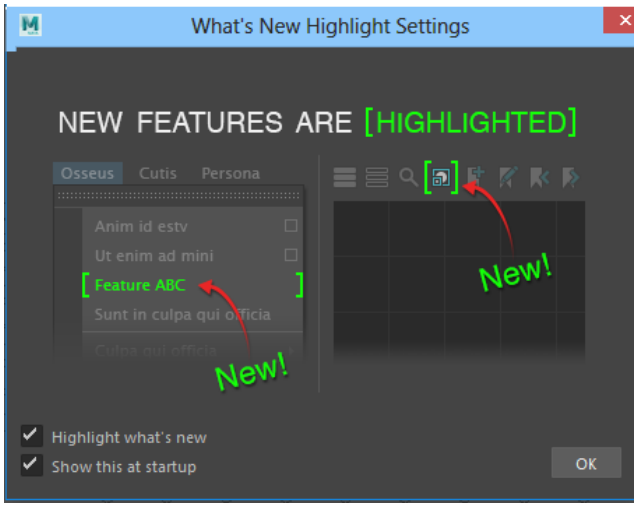

Figure 1-3 *The* ***What's New Highlight Settings*** *window*

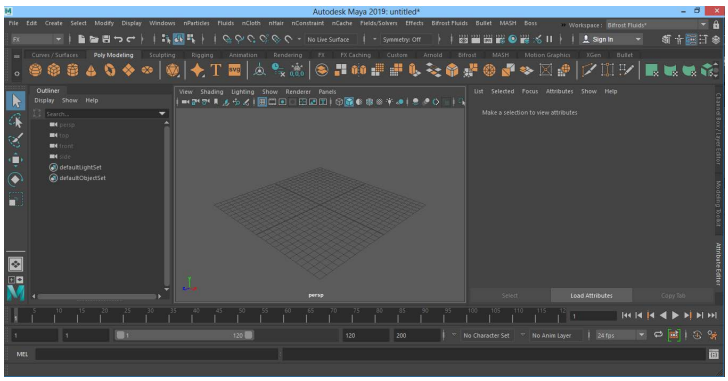

Figure 1-4 *The default interface of Autodesk Maya 2019 with persp viewport displayed*

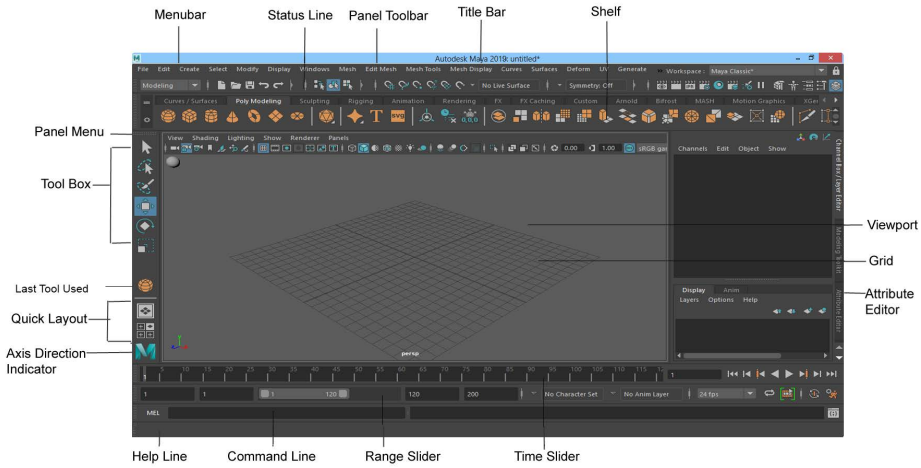

Figure 1-5 *Displaying various screen components of the Maya interface*

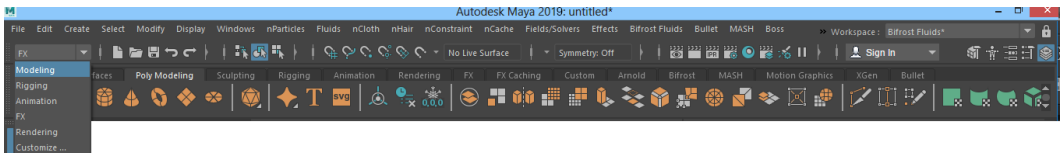

Figure 1-6 *Menubar displayed on choosing the* ***Modeling*** *menuset*

Figure 1-7 *The Status Line*

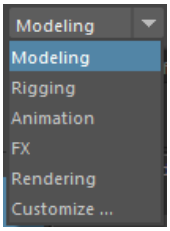

Figure 1-8 *The* ***Menuset*** *drop-down list*

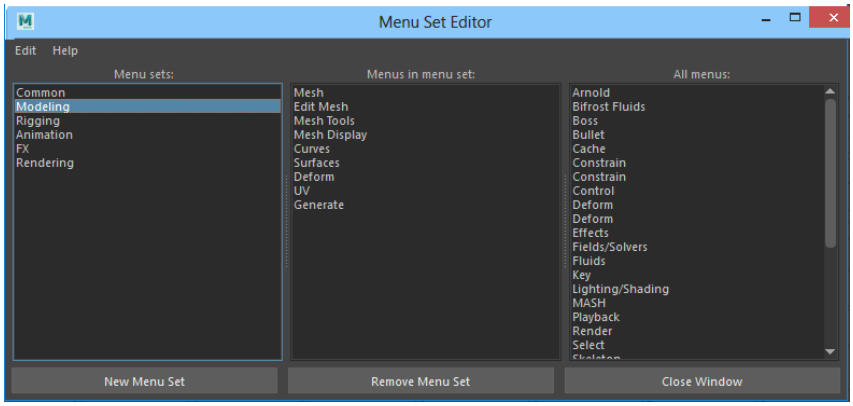

Figure 1-9 *The* ***Menu Set Editor*** *window*

Figure 1-10 *The File Buttons group*

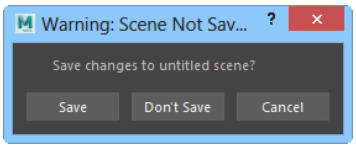

Figure 1-11 *The* ***Warning: Scene Not Saved*** *message box*

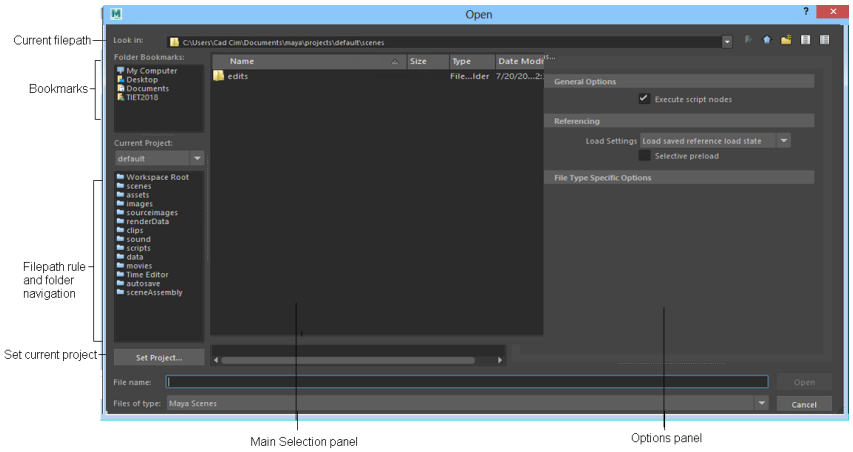

Figure 1-12 *The* ***Open*** *dialog box*

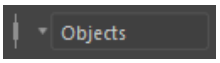

Figure 1-13 *The Selection set icons group*

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Figure 1-14 *The Selection Mask Icons group displayed on choosing the* ***Select by hierarchy and combinations*** *button*

Figure 1-15 *The Selection Mask Icons group displayed on choosing the* ***Select by component type*** *button*

Figure 1-16 *The Selection Mask Icons group displayed on choosing the* ***Select by object type*** *button*

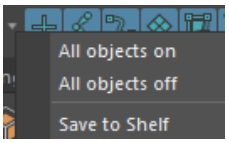


Figure 1-17 *Flyout displayed on choosing the* ***Set the object selection mask*** *button*

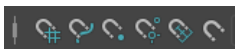


Figure 1-18 *The Snap Buttons group*

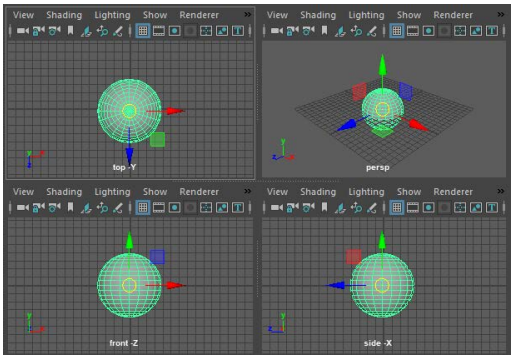


Figure 1-19 *The sphere snapped to the closest grid intersection point*

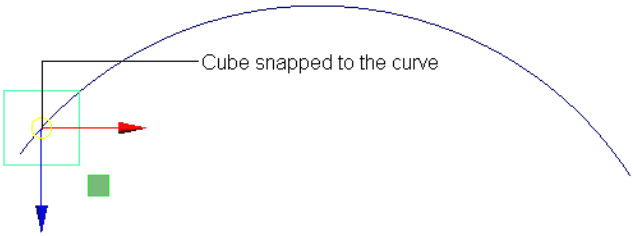


Figure 1-20 *The cube snapped to the curve*

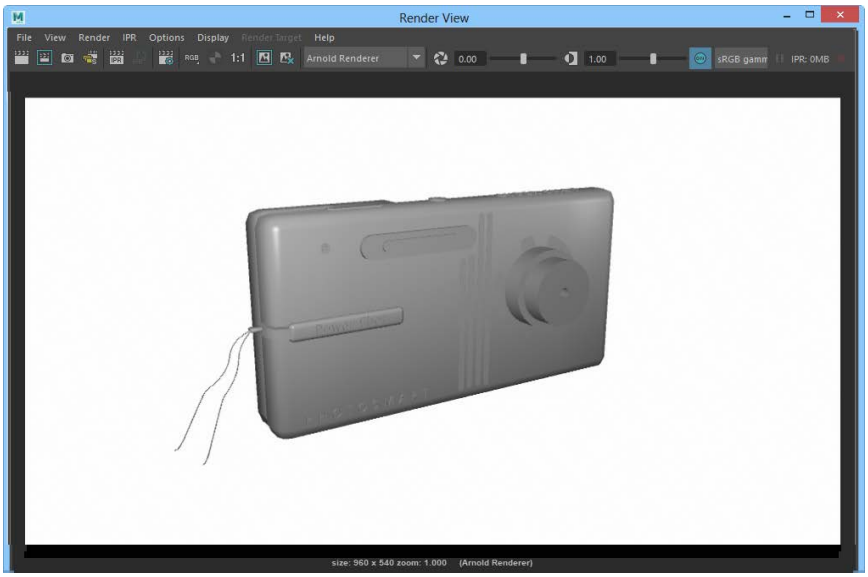


Figure 1-21 *The* ***Render View*** *window*

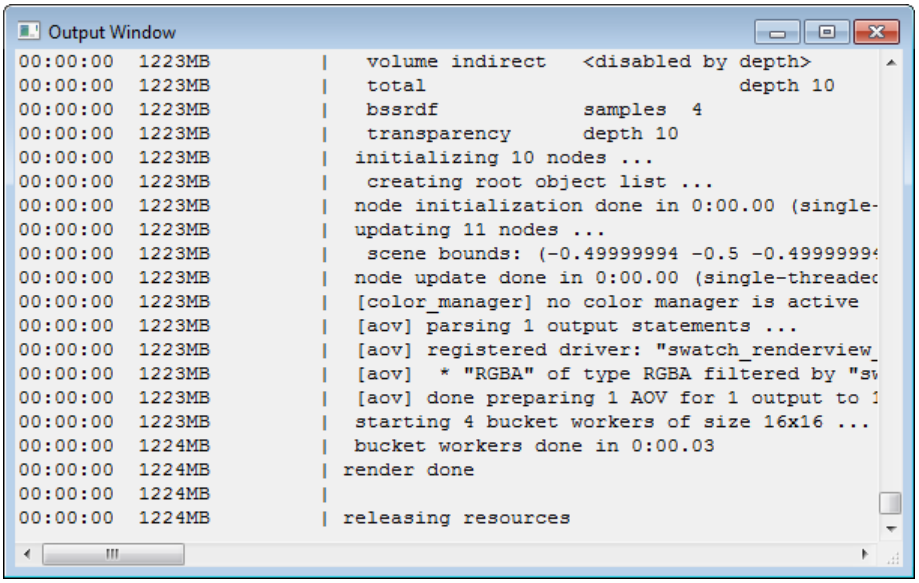


Figure 1-22 The ***Output Window***

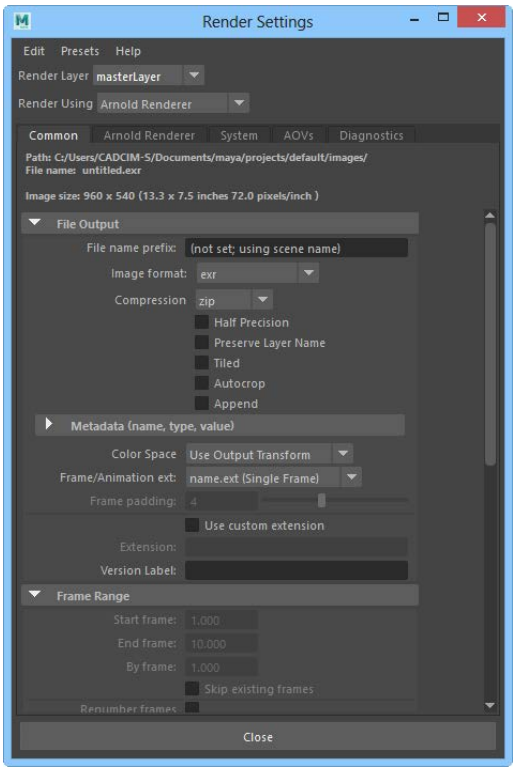


Figure 1-23 The ***Render Settings*** *window*

Figure 1-24 *The* ***Absolute transform*** *area*

Figure 1-25 *The* ***Relative transform*** *area*

Figure 1-26 *The* ***Rename*** *area*

Figure 1-27 *The* ***Select by name*** *area*

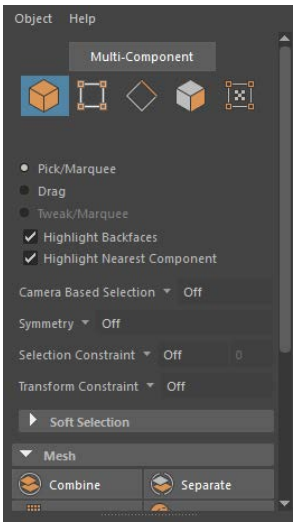


Figure 1-28 *The* ***Modeling Toolkit*** *window*

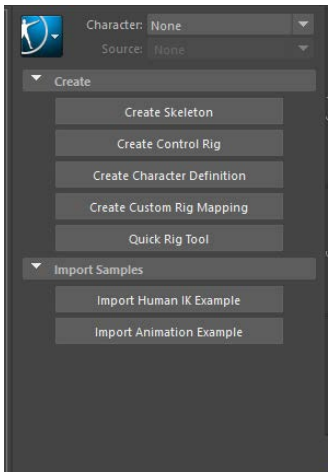


Figure 1-29 *The* ***Human IK*** *window*

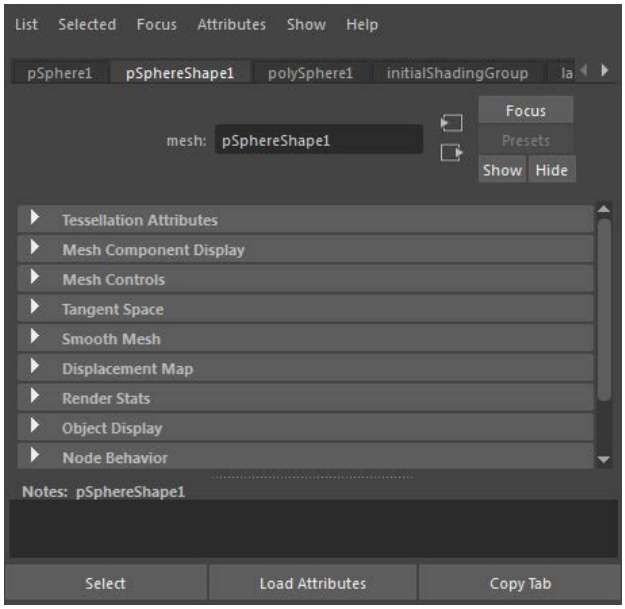


Figure 1-30 The ***Attribute Editor***

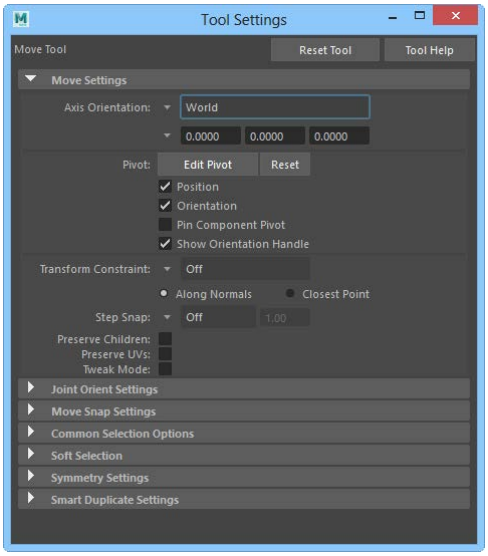


Figure 1-31 The ***Tool Settings (Move Tool)*** *window*

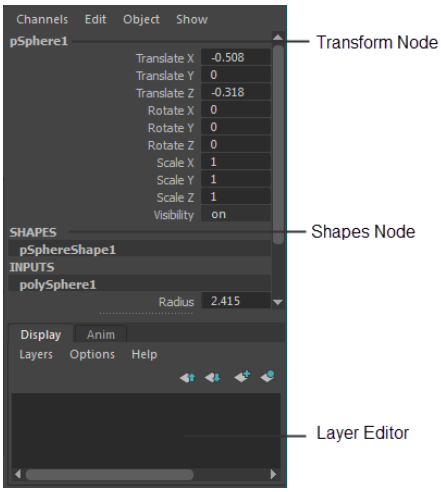


Figure 1-32 The ***Channel Box / Layer Editor***

Figure 1-33 *The Shelf*

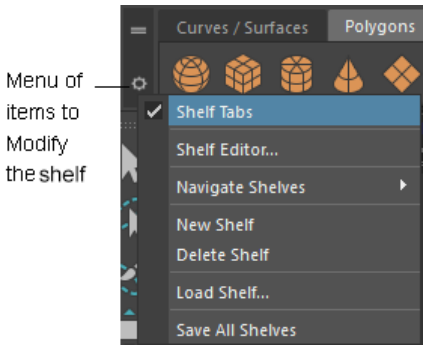


Figure 1-34 *Flyout displayed on choosing the* ***Menu of items to modify the shelf*** *button*

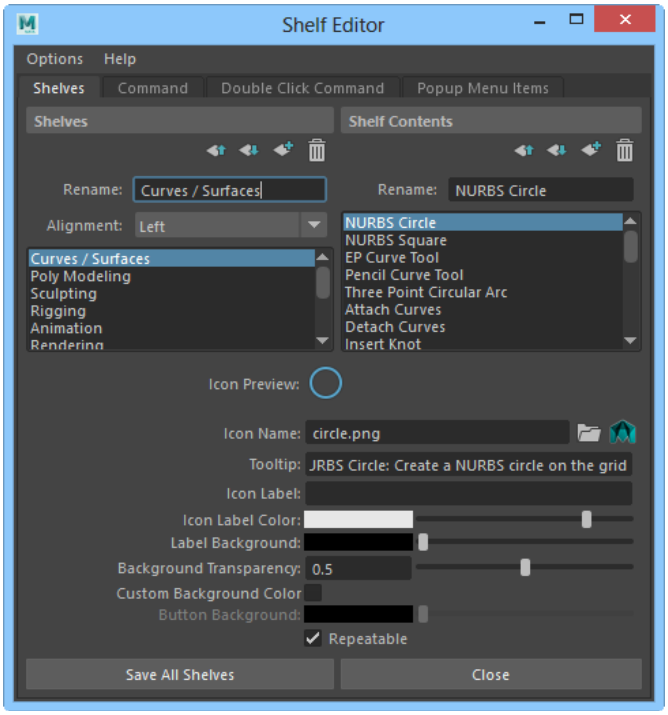


Figure 1-35 *The* ***Shelf Editor***

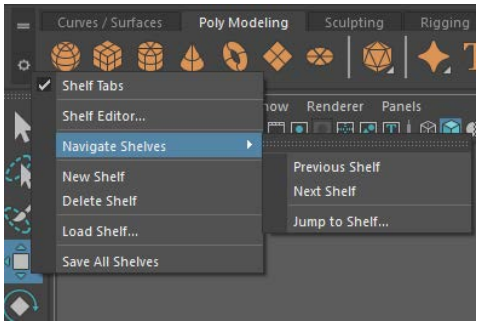


Figure 1-36 *Cascading menu displayed on choosing the* ***Navigate Shelves*** *option*

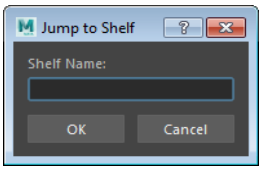


Figure 1-37 *The* ***Jump to Shelf*** *window*

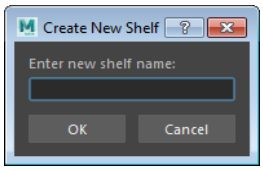


Figure 1-38 *The* ***Create New Shelf*** *window*

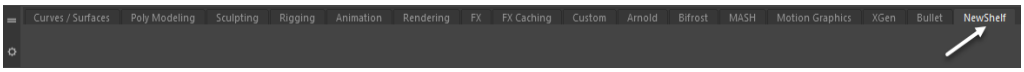


Figure 1-39 *A new Shelf added*

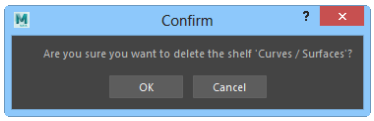


Figure 1-40 *The* ***Confirm*** *message box*

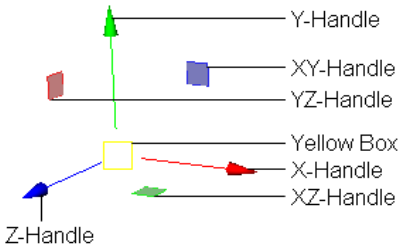


Figure 1-41 *The* ***Move Tool*** *manipulator*

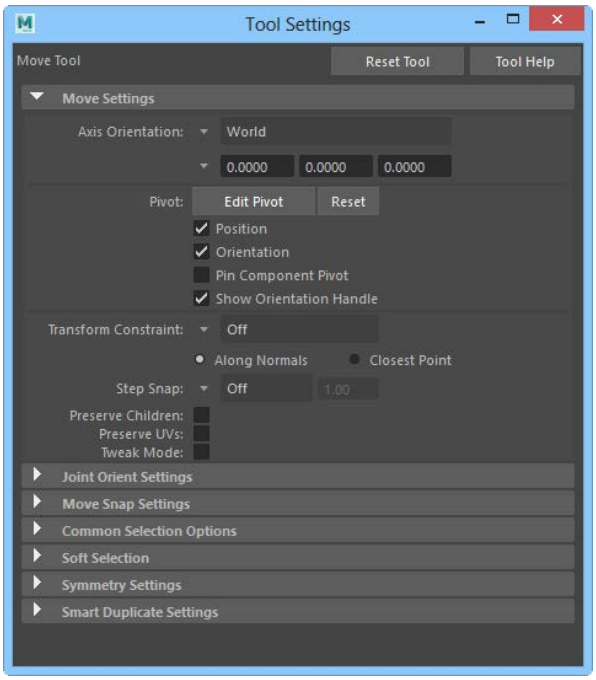


Figure 1-42 *The* ***Tool Settings (Move Tool)*** *window*

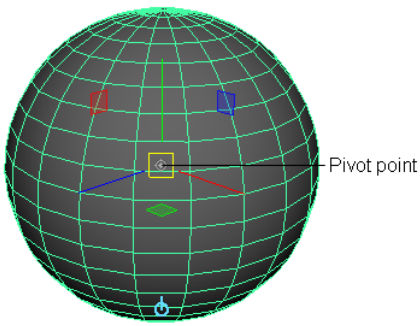


Figure 1-43 *The pivot point*

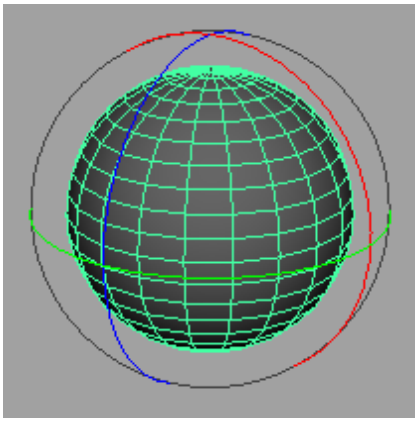


Figure 1-44 *The* ***Rotate Tool*** *manipulator*

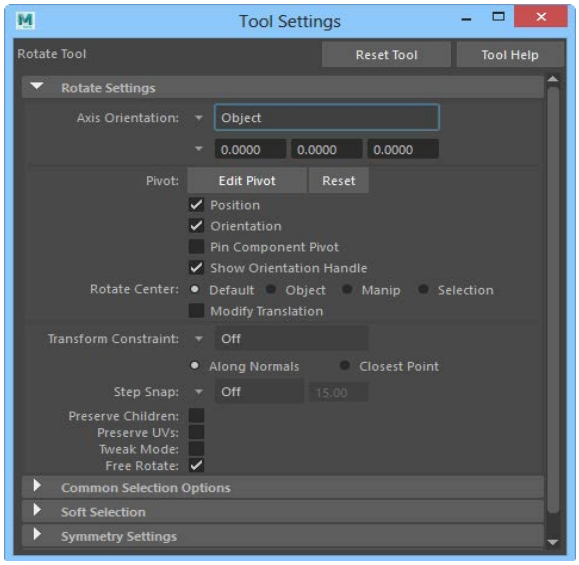


Figure 1-45 *Partial view of the* ***Tool Settings (Rotate Tool)*** *window*

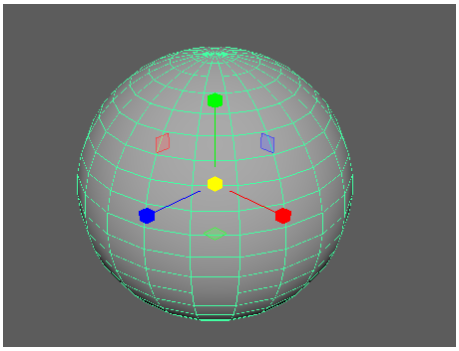


Figure 1-46 *The* ***Scale Tool*** *manipulator*

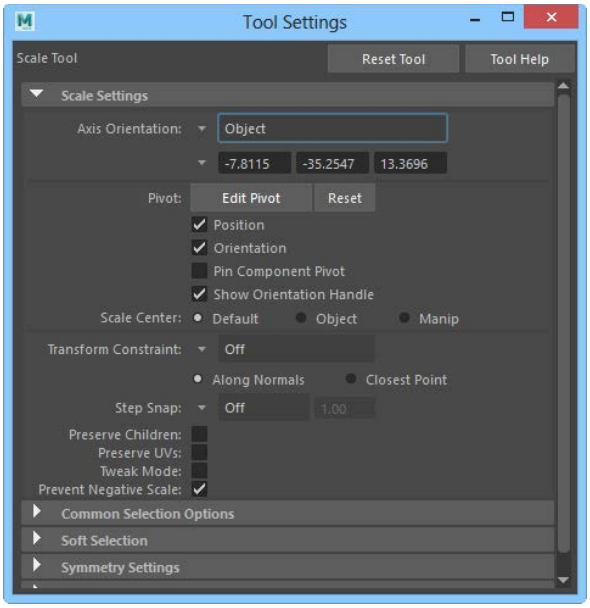


Figure 1-47 *Partial view of the* ***Tool Settings (Scale Tool)*** *window*

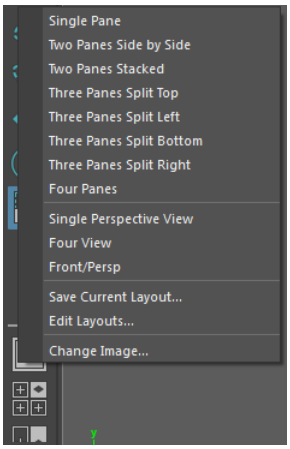


Figure 1-48 *A shortcut menu with various layout*

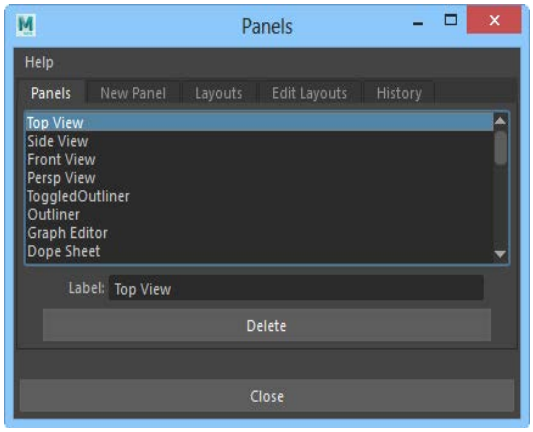


Figure 1-49 *The* ***Panels*** *window*

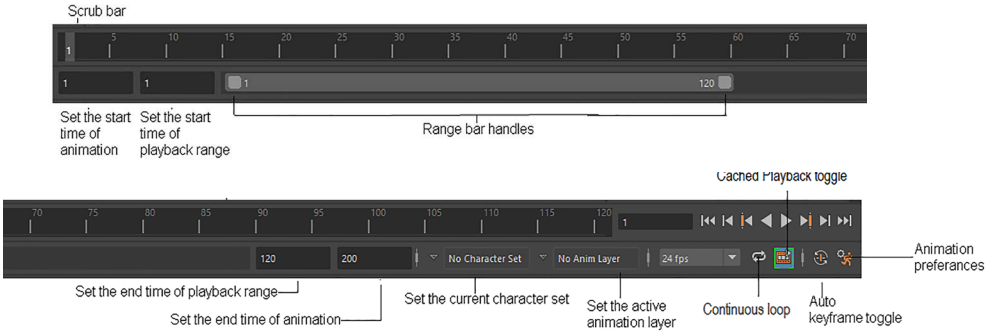


Figure 1-50 *The Time Slider and the Range Slider*

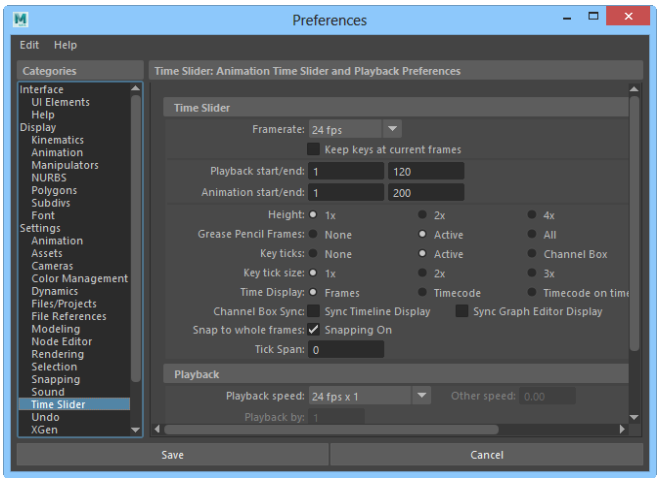


Figure 1-51 *The* ***Preferences*** *window*

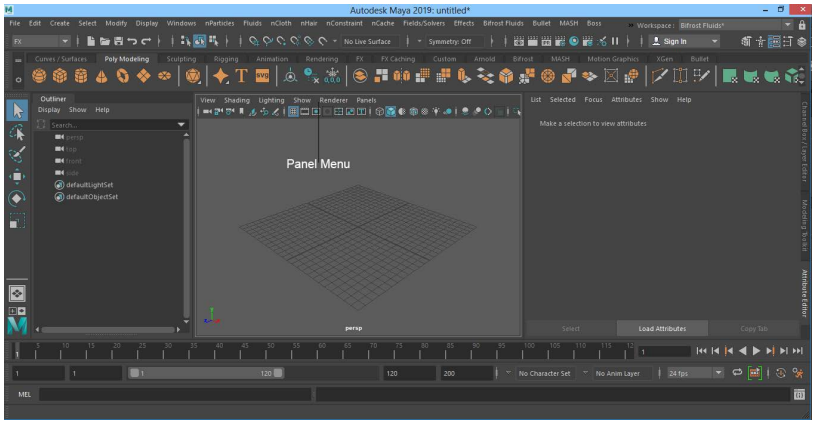


Figure 1-52 *The* ***Panel*** *menu*

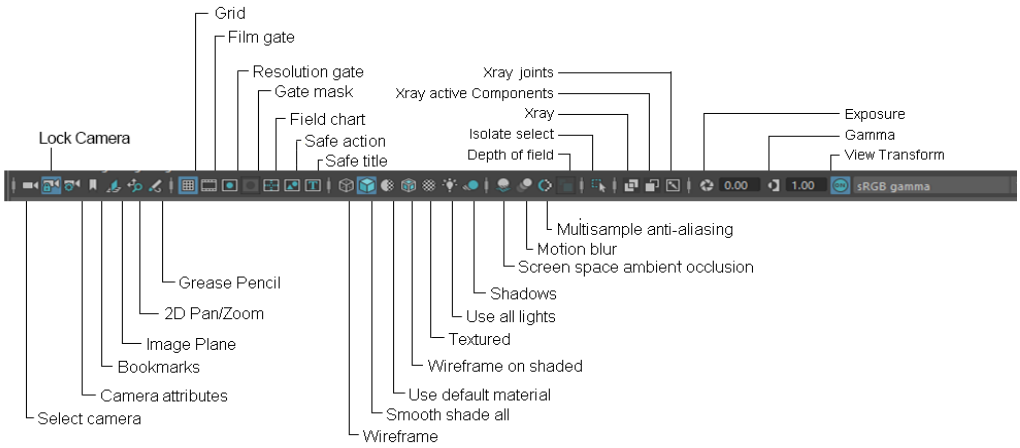


Figure 1-53 *The* ***Panel*** *toolbar*

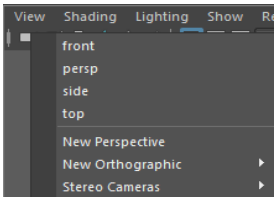


Figure 1-54 *The shortcut menu displayed on right-clicking on the* ***Select camera*** *tool*

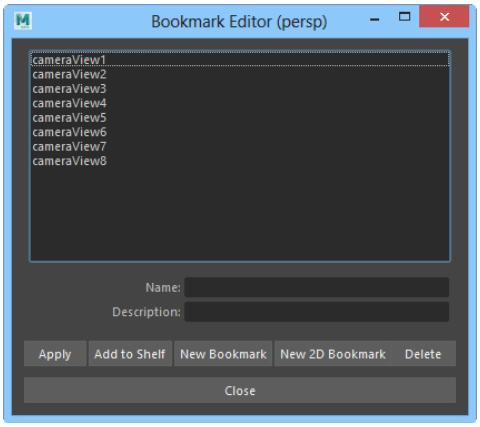


Figure 1-55 *The* ***Bookmark Editor (persp)*** *window*

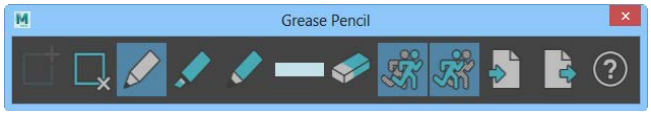


Figure 1-56 *The* ***Grease Pencil*** *window*

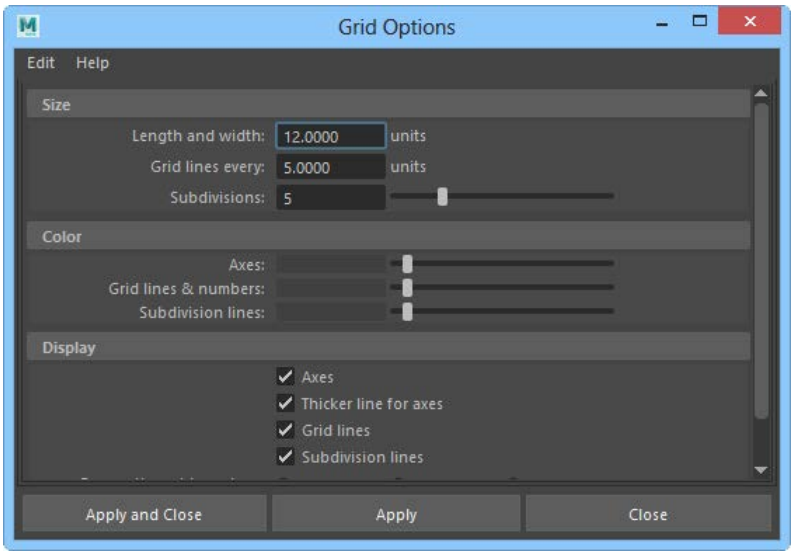


Figure 1-57 *The* ***Grid Options*** *window*

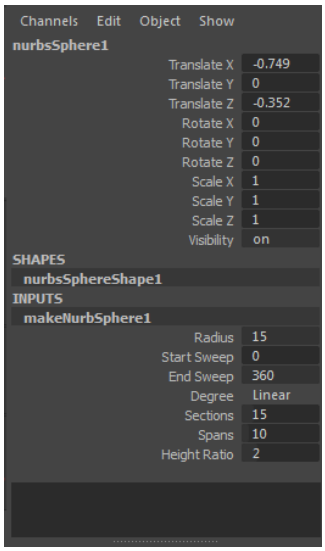


Figure 1-58 *The* ***Channel Box /Layer Editor***

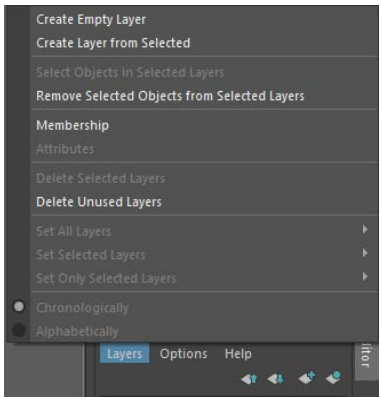


Figure 1-59 *Creating a new layer in the* ***Layer Editor***

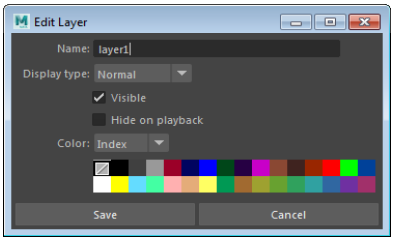


Figure 1-60 *The* ***Edit Layer*** *window*

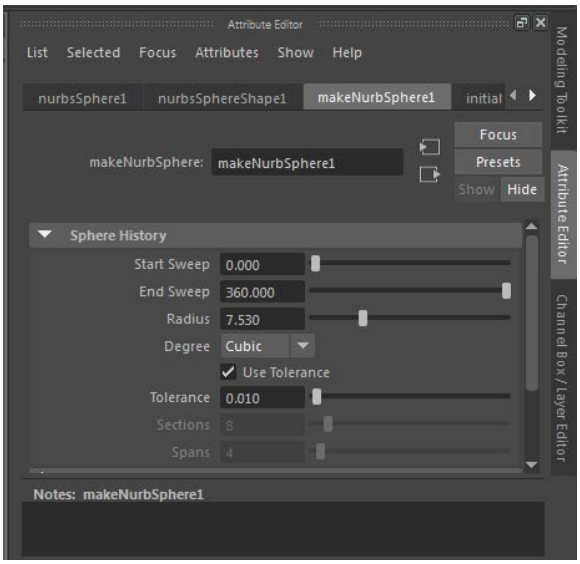


Figure 1-61 *The* ***Attribute Editor***

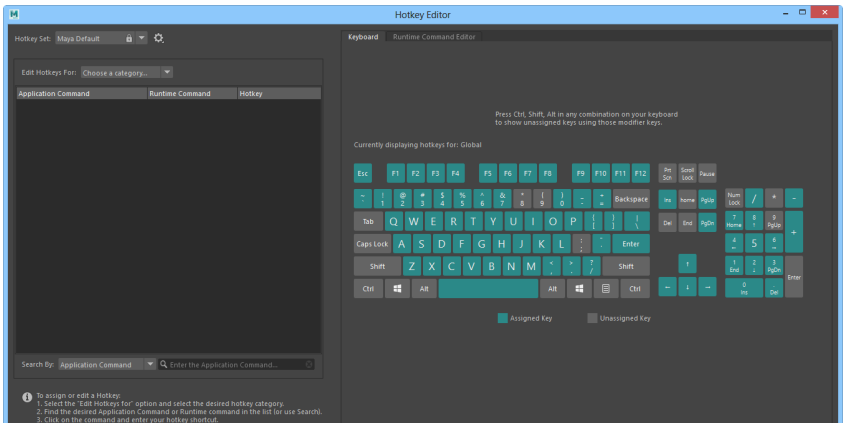


Figure 1-62 *The* ***Hotkey Editor***

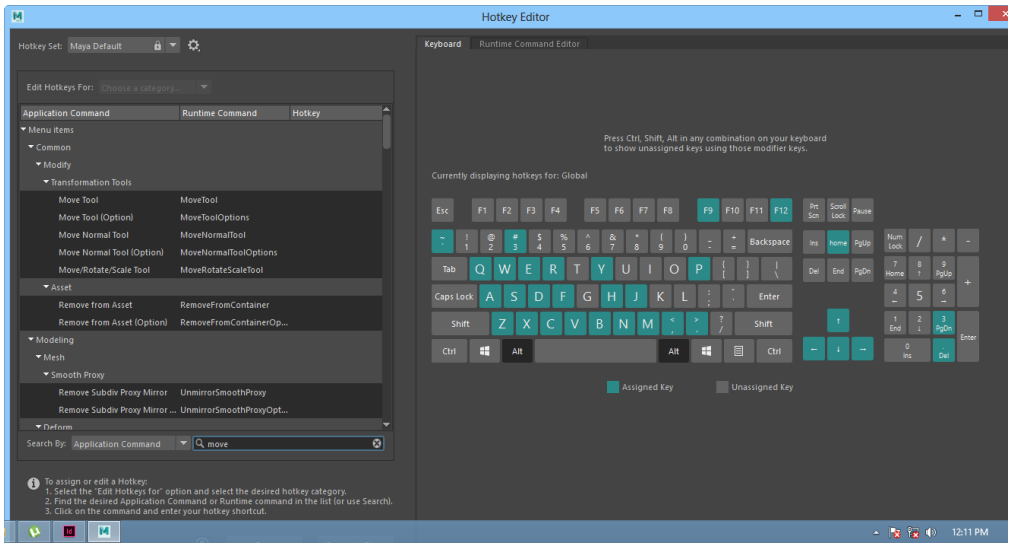


Figure 1-63 *Using the* ***Search By*** *filter*

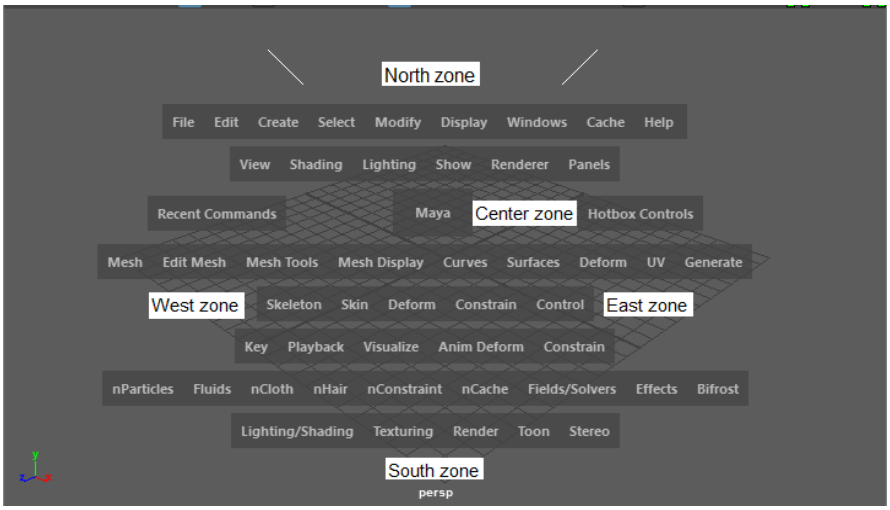


Figure 1-64 *The Hotbox*

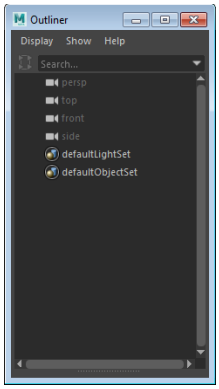


Figure 1-65 *Objects displayed in the* ***Outliner*** *window*

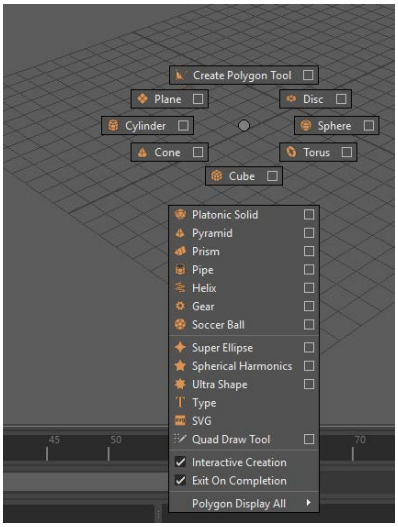


Figure 1-66 *Marking menu displaying options used for creating default objects*

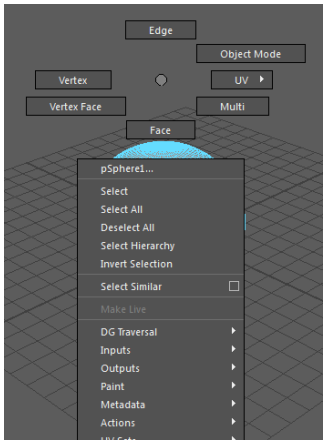


Figure 1-67 *Marking menu displaying components of the selected object*

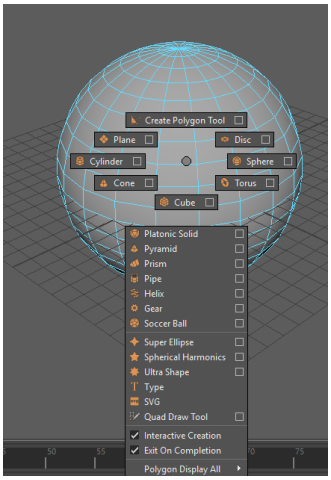


Figure 1-68 *The marking menu displaying various tools for modifying an object*

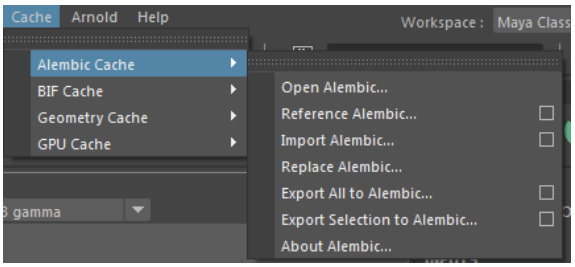


Figure 1-69 *Flyout displayed on choosing the* ***Alembic Cache*** *tool from the menubar*

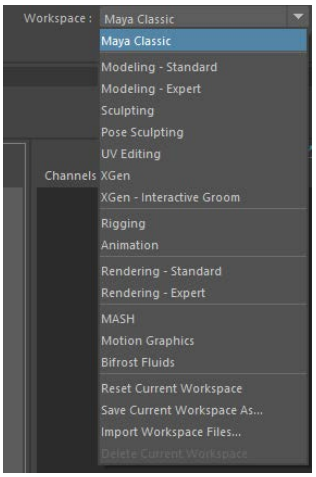


Figure 1-70 *Partial view of the* ***Workspace*** *drop-down list*

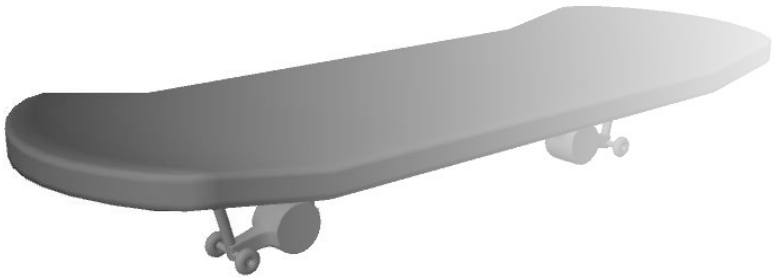
Chapter 2

Polygon Modeling

Learning Objectives

After completing this chapter, you will be able to:

- *Create polygon primitives*
- *Edit polygon primitives*
- *Modify the components of polygon primitives*
- *Create models using polygon primitives*



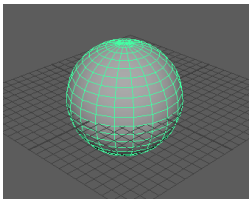


Figure 2-1 *A polygon sphere*

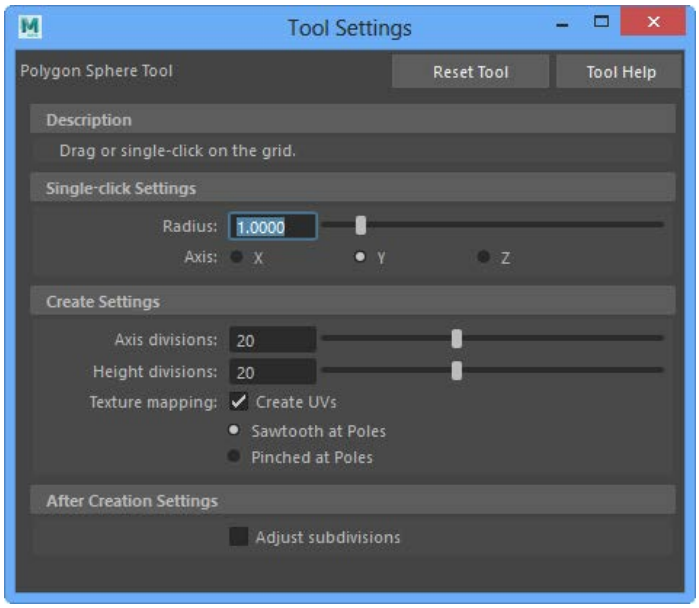


Figure 2-2 *The* ***Tool Settings (Polygon Sphere Tool)*** *panel*

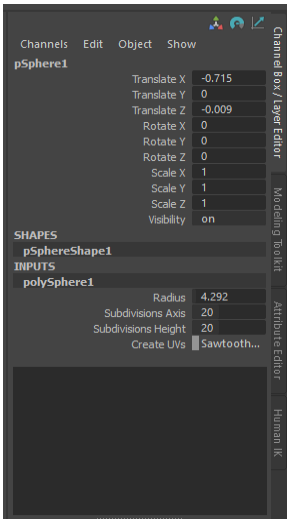


Figure 2-3 *The* ***Channel Box / Layer Editor***

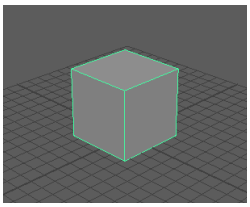


Figure 2-4 *A polygon cube*

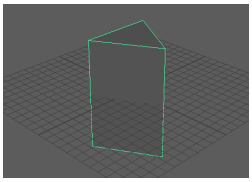


Figure 2-5 *A polygon prism*

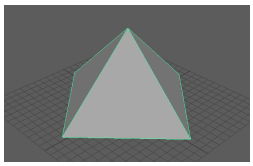


Figure 2-6 *A polygon pyramid*

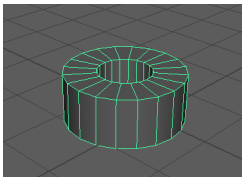


Figure 2-7 *A polygon pipe*

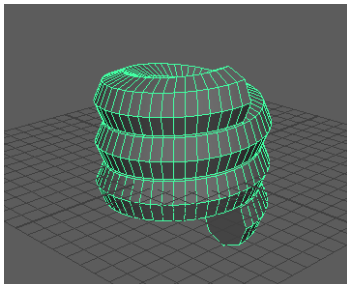


Figure 2-8 *A polygon helix*

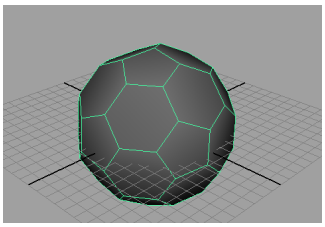


Figure 2-9 *A soccer ball*

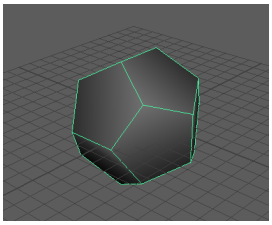


Figure 2-10 *A platonic solid*

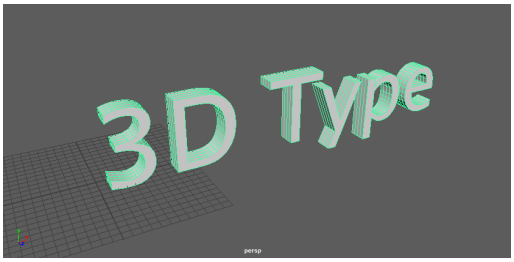


Figure 2-11 *The text **3D Type** displayed*

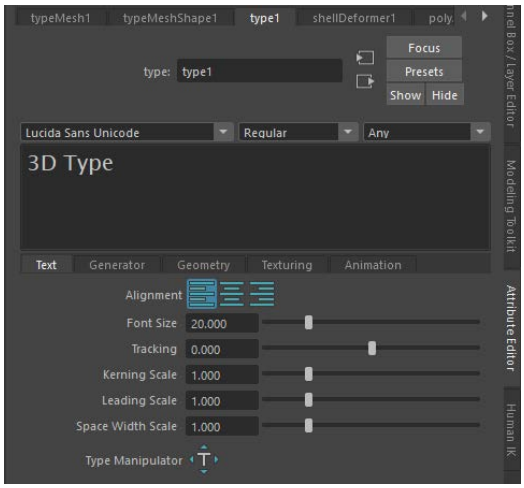


Figure 2-12 *The **type1** tab in **Attribute Editor***

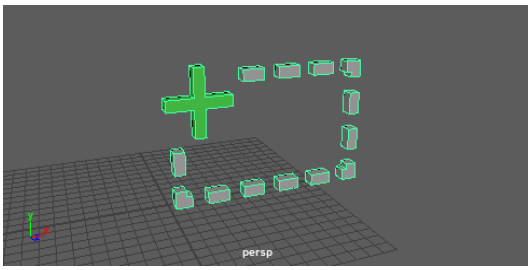


Figure 2-13 *The default SVG mesh displayed*

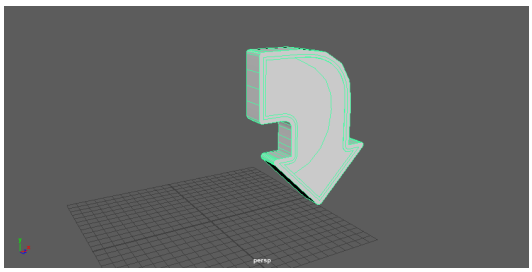


Figure 2-14 *The SVG mesh displayed*

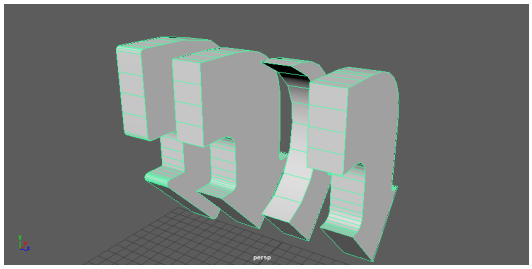


Figure 2-15 *The separated SVG mesh*

Figure 2-16 *The arrow shaped SVG file*

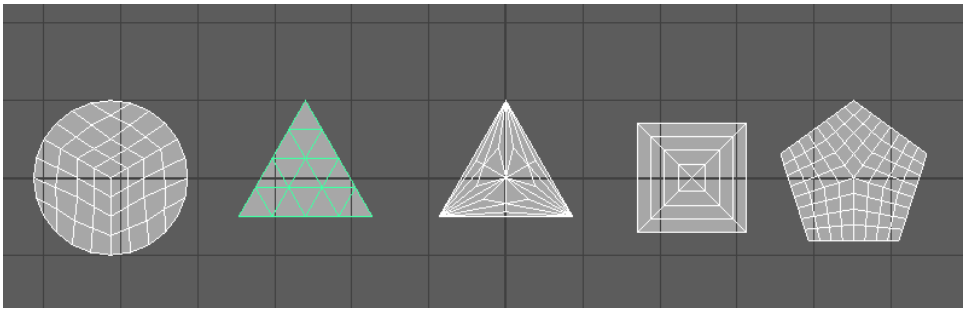


Figure 2-17 *The objects created using the* ***Disc*** *tool*

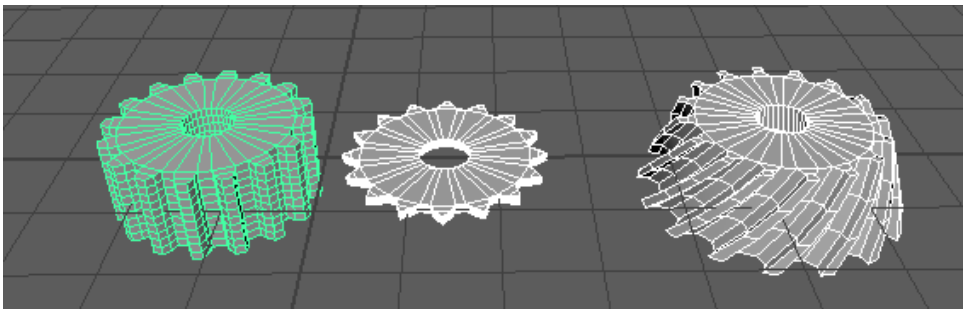


Figure 2-18 *The objects created using the* ***Gear*** *tool*

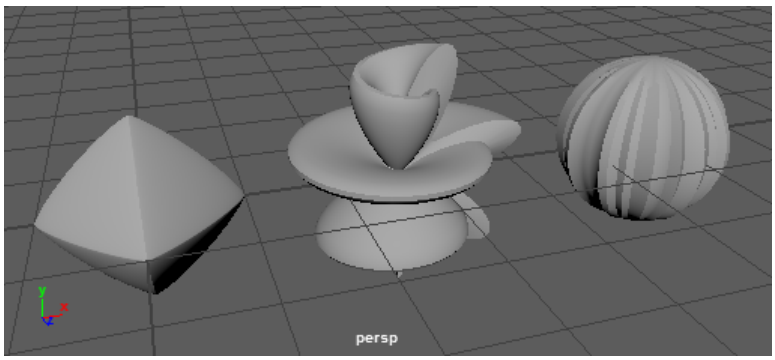


Figure 2-19 *Some super shapes created*

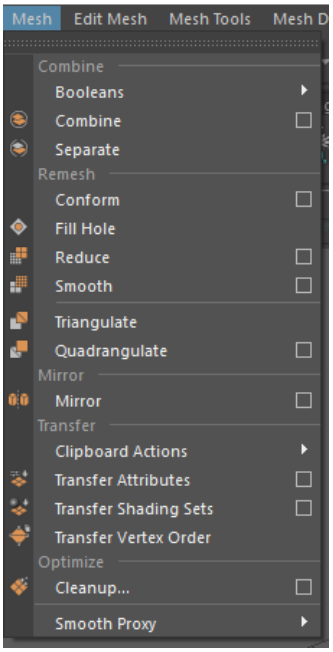


Figure 2-20 *The* ***Mesh*** *menu*

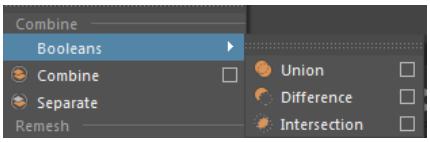


Figure 2-21 *The* ***Booleans*** *tools*

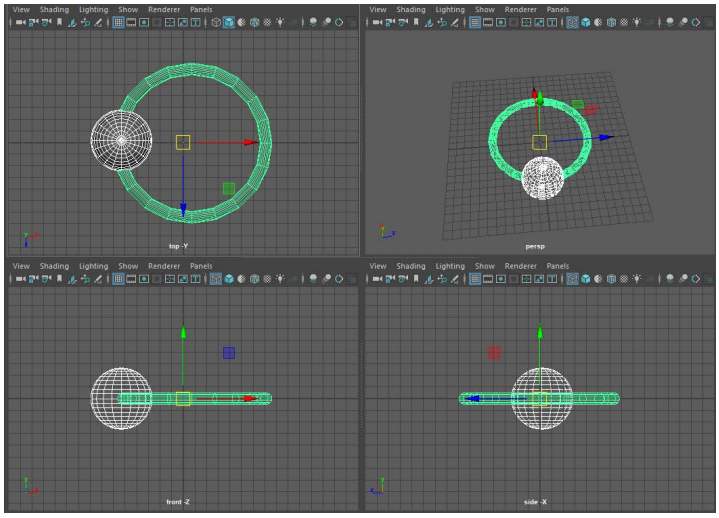


Figure 2-22 *A torus and a sphere placed in the viewports*

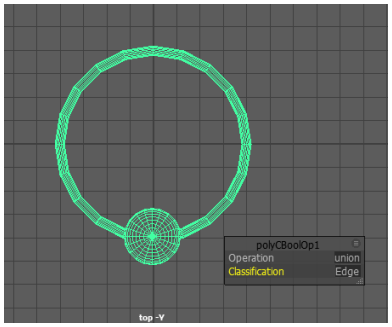


Figure 2-23 *The Union operation carried out on the torus and the sphere*

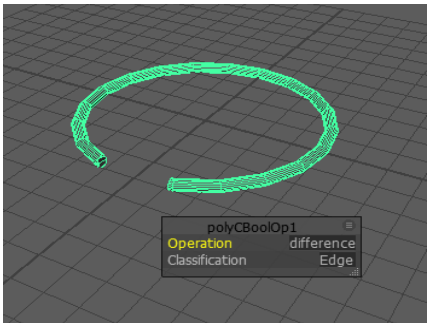


Figure 2-24 *The Difference operation carried out on the torus and the sphere*

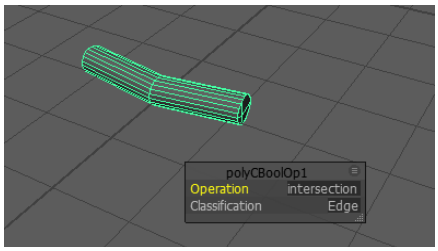


Figure 2-25 *The Intersection operation carried out on the torus and the sphere*

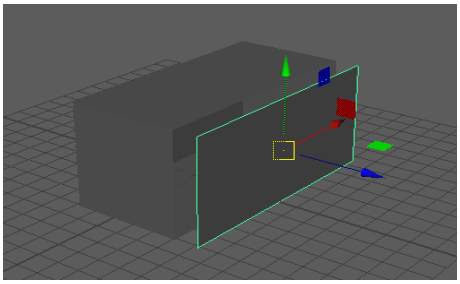


Figure 2-26 *The selected face separated from the polygon object*

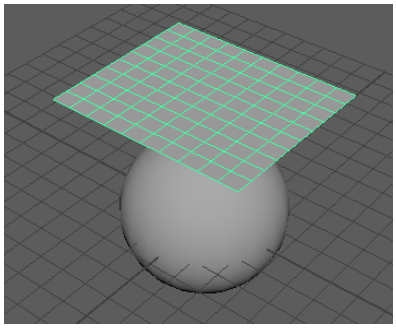


Figure 2-27 *The polygon objects*

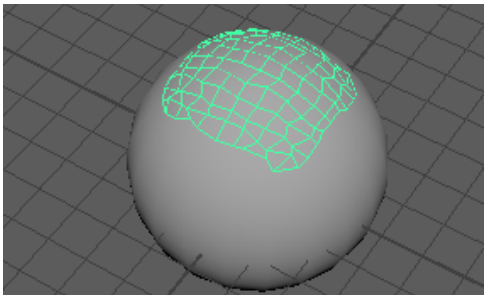


Figure 2-28 *The plane wrapped onto the polygon sphere*

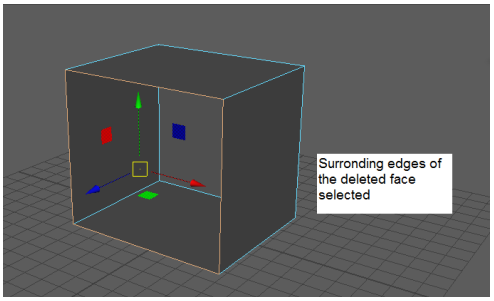


Figure 2-29 *Edges of the deleted face selected*

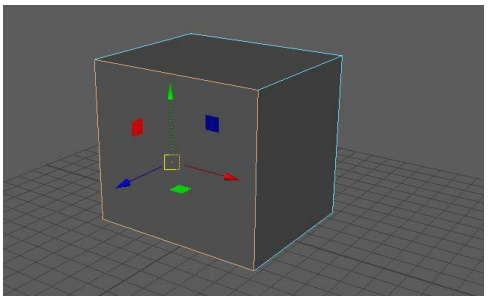


Figure 2-30 *Filled hole of the cube*

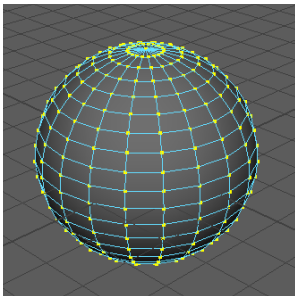


Figure 2-31 *Vertices of the sphere*

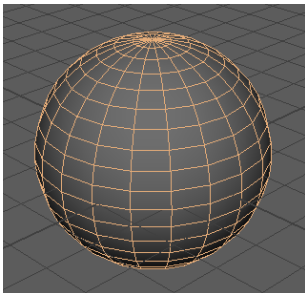


Figure 2-32 *Edges of the sphere*

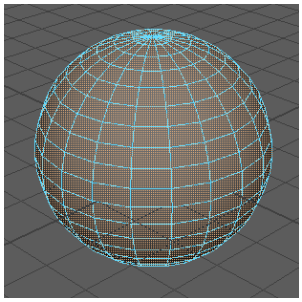


Figure 2-33 *Faces of the sphere*

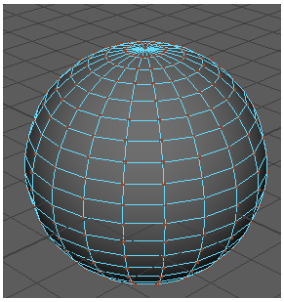


Figure 2-34 *UVs of the sphere*

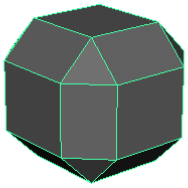


Figure 2-35 *Selected polygon object beveled*

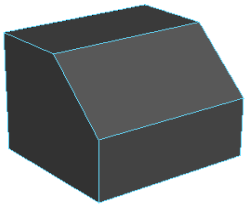


Figure 2-36 *Selected edge beveled*

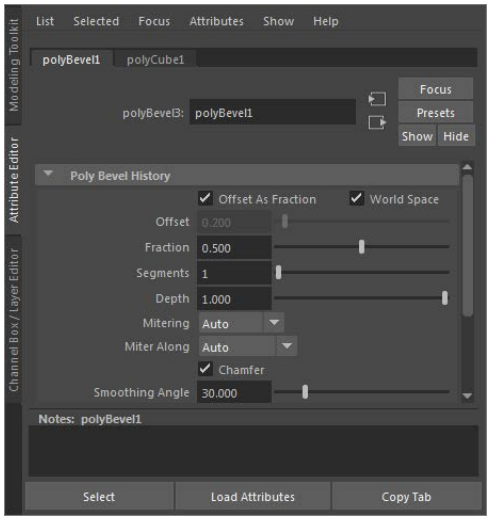


Figure 2-37 *Various bevel attributes in the* ***Attribute Editor***

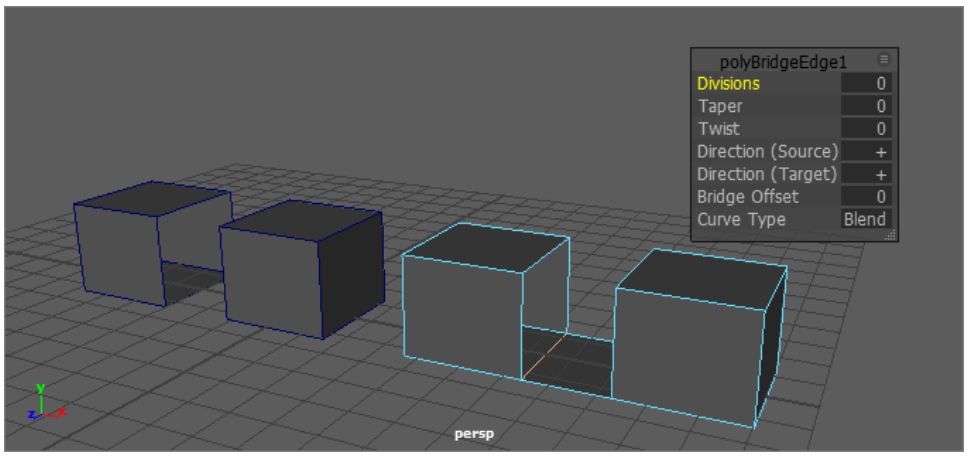


Figure 2-38 *The* ***Bridge*** *connection between the two edges*

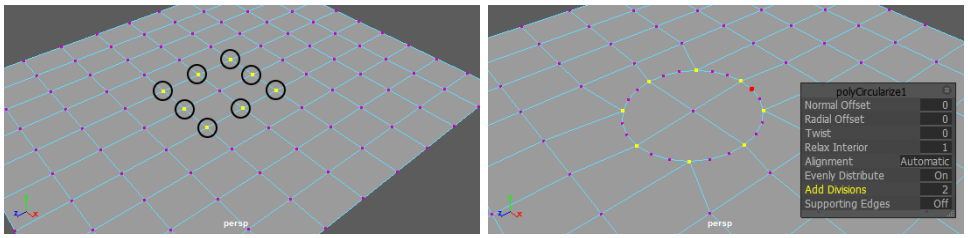


Figure 2-39 *A circular shape created using the* ***Circularize*** *command*

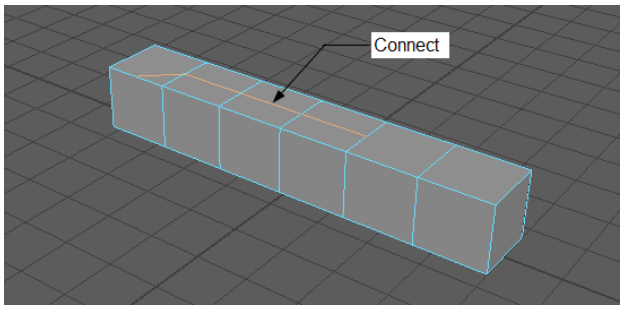


Figure 2-40 *The connected edge displayed*

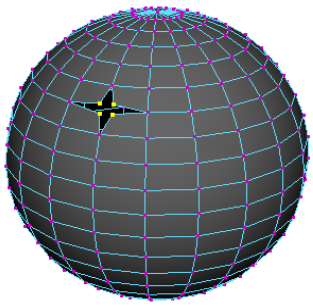


Figure 2-41 *Selected vertex gets split into multiple vertices*

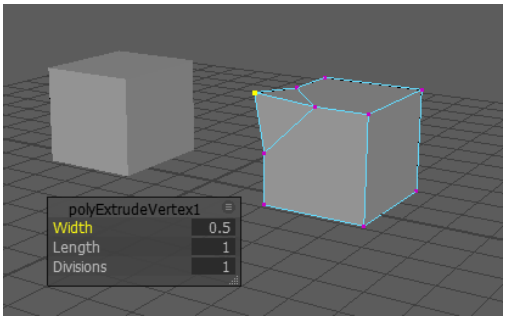


Figure 2-42 *The extruded vertex*

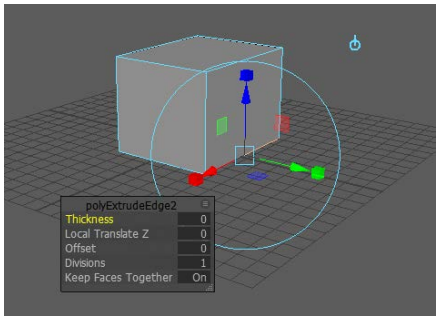


Figure 2-43 *The* ***polyExtrudedEdge#*** *In-View Editor*

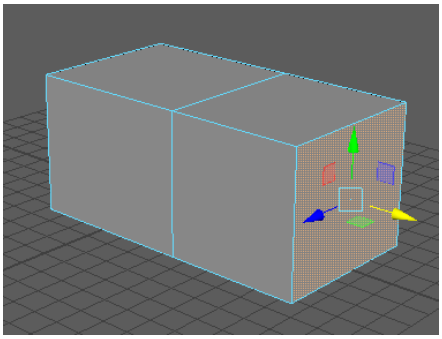


Figure 2-44 *The extruded face*

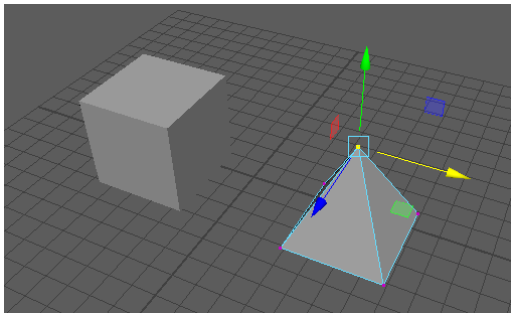


Figure 2-45 *Top vertices to be merged*

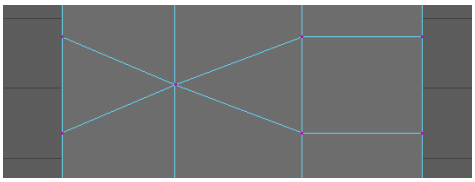


Figure 2-46 *Center vertices to be merged*

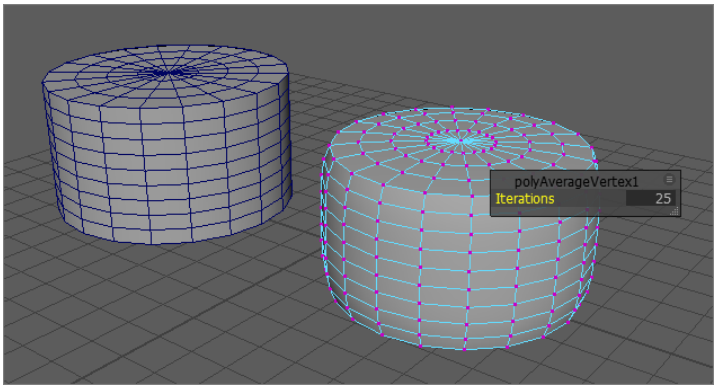


Figure 2-47 *The smoothing applied to the selection*

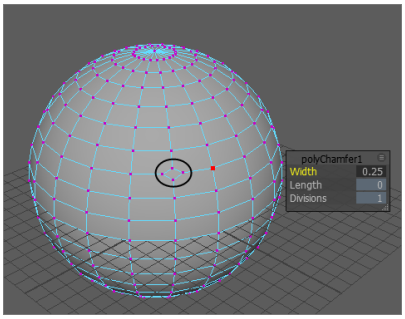


Figure 2-48 *A new polygon face created using the* ***Chamfer Vertices*** *tool*

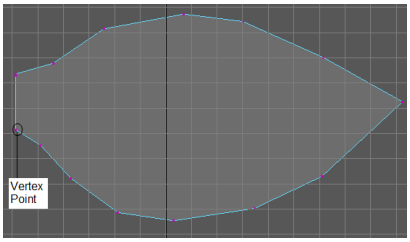


Figure 2-49 *A shape created using the* ***Create Polygon*** *tool*

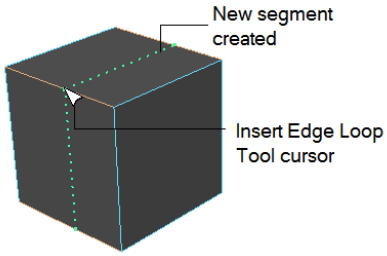


Figure 2-50 *A new segment created using the* ***Insert Edge Loop***

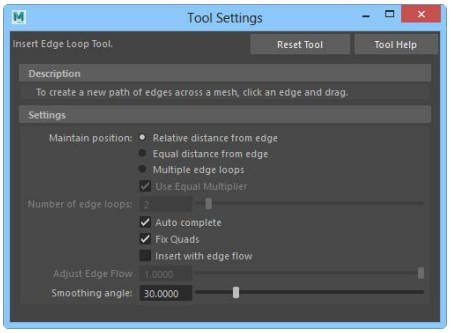


Figure 2-51 *The* ***Tool Settings (Insert Edge Loop tool)*** *panel*

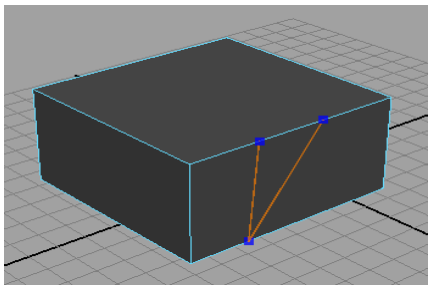


Figure 2-52 *Segments added using the* ***Multi-Cut*** *tool*

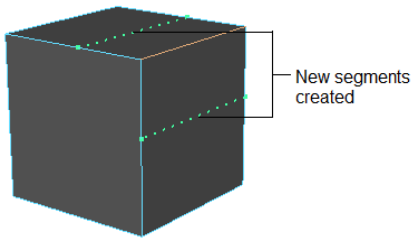


Figure 2-53 *New segments created using the* ***Offset Edge Loop*** *tool*

Figure 2-54 *The model of a coffee mug*

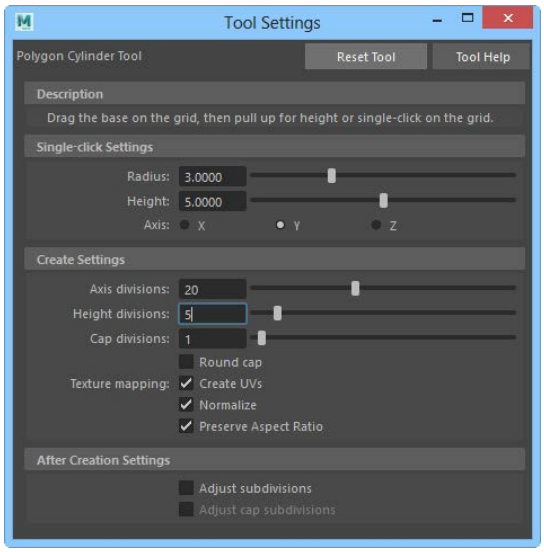


Figure 2-55 *The* ***Tool Settings*** *(****Polygon Cylinder Tool****) panel*

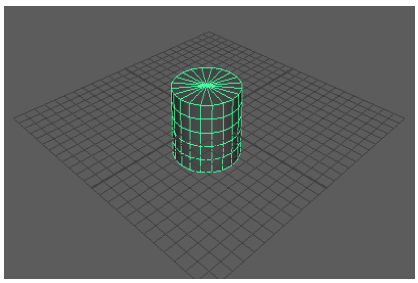


Figure 2-56 *Cylinder created in the viewport*

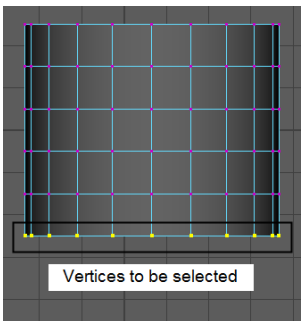


Figure 2-57 *Bottom vertices of the cylinder selected*

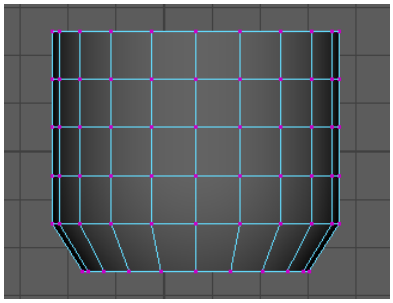


Figure 2-58 *Bottom vertices of the cylinder scaled*

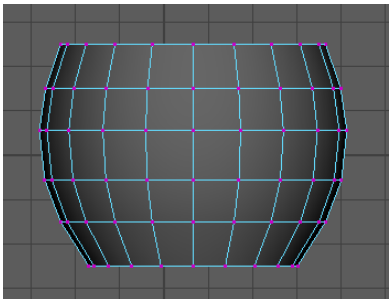


Figure 2-59 *Basic shape of the mug created*

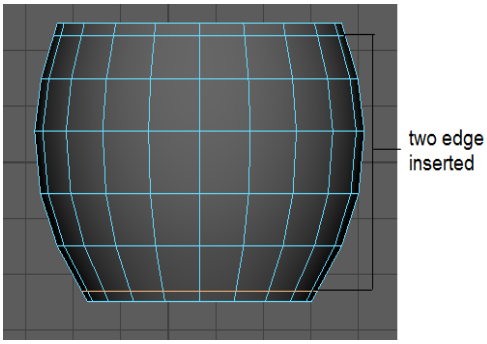


Figure 2-60 *Two edges inserted at the top and bottom of the cylinder*

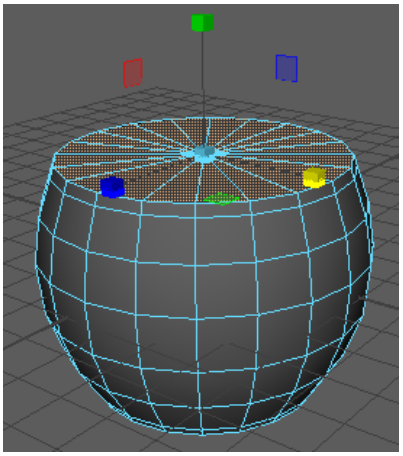


Figure 2-61 *Top faces of the cylinder selected*

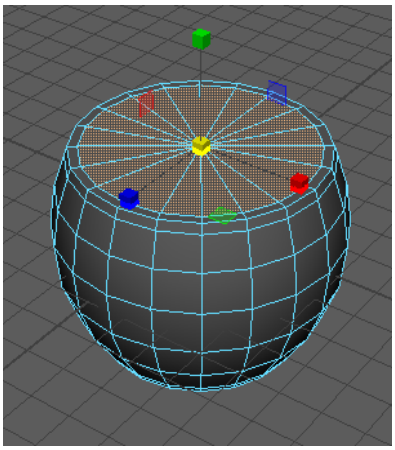


Figure 2-62 *The top selected faces of the mug scaled down using the* ***Scale Tool***

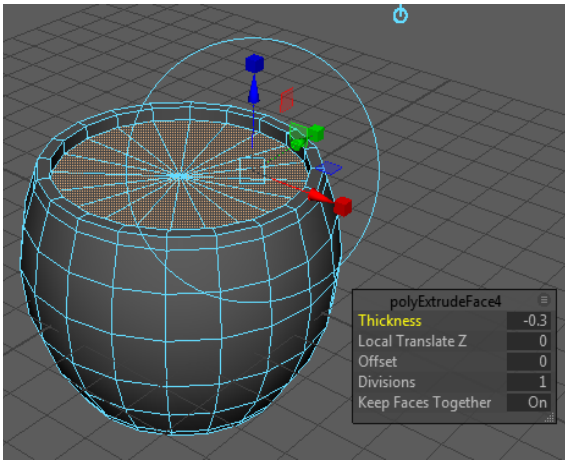


Figure 2-63 *The* ***polyExtrudeFace#*** *In-View Editor displayed*

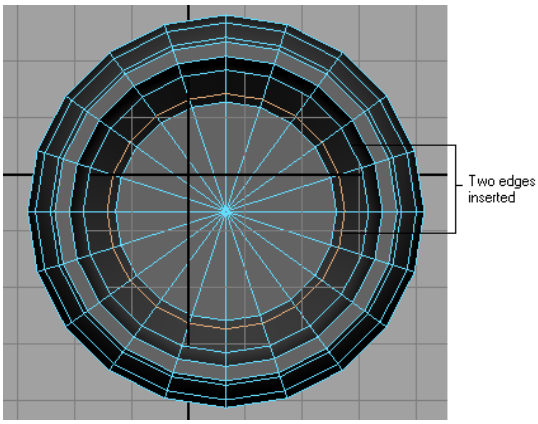


Figure 2-64 *Two edge loops added inside the mug*

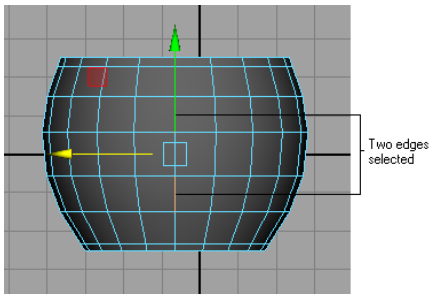


Figure 2-65 *Two edges of mug selected*

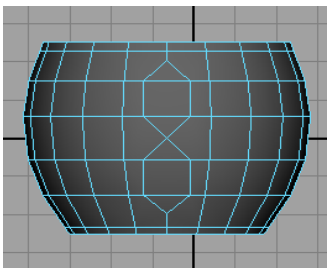


Figure 2-66 *Selected edges beveled*

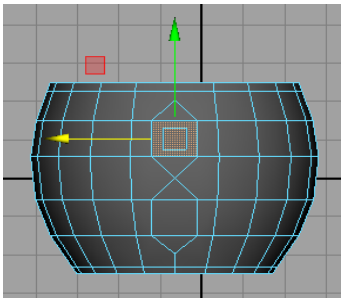


Figure 2-67 *A face of mug selected*

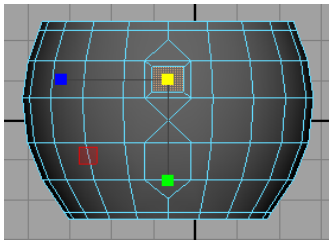


Figure 2-68 *Face of the mug scaled down*

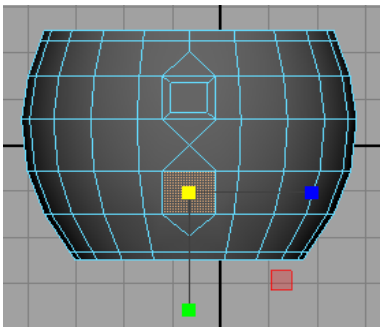


Figure 2-69 *A face of the mug selected*

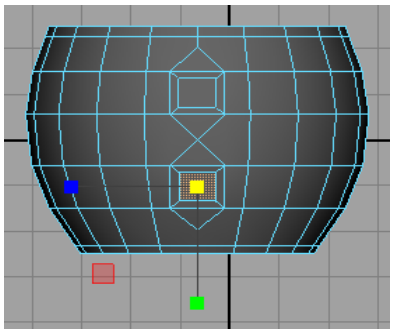


Figure 2-70 *A face of the mug scaled down*

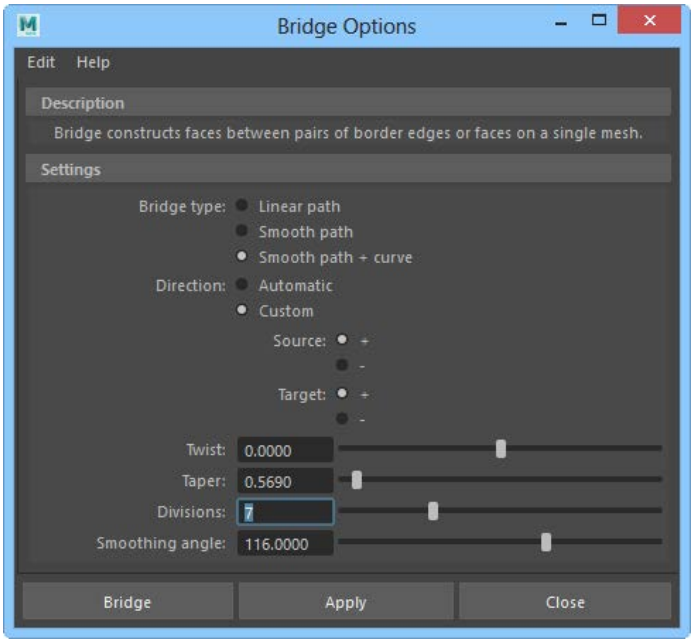


Figure 2-71 *The* ***Bridge Options*** *window*

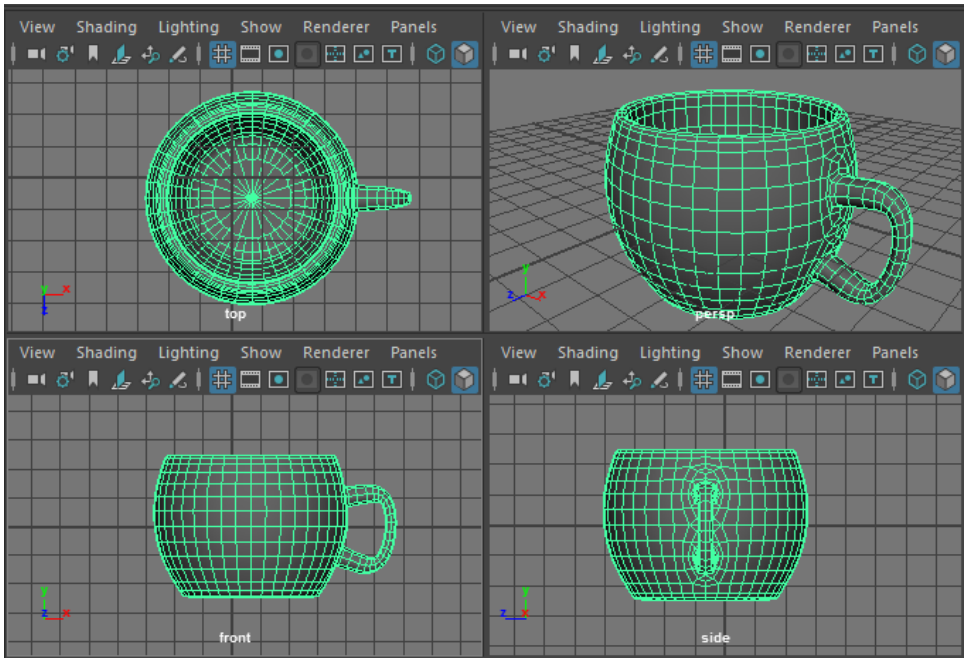


Figure 2-72 *The mug displayed in all viewports*

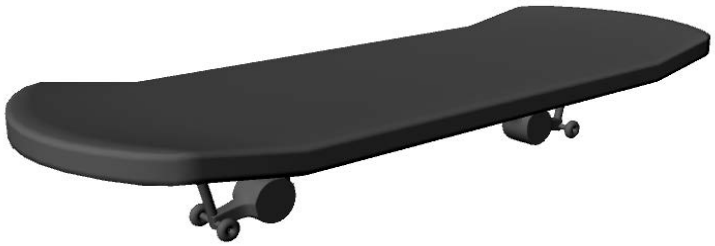


Figure 2-73 *The model of a skateboard*

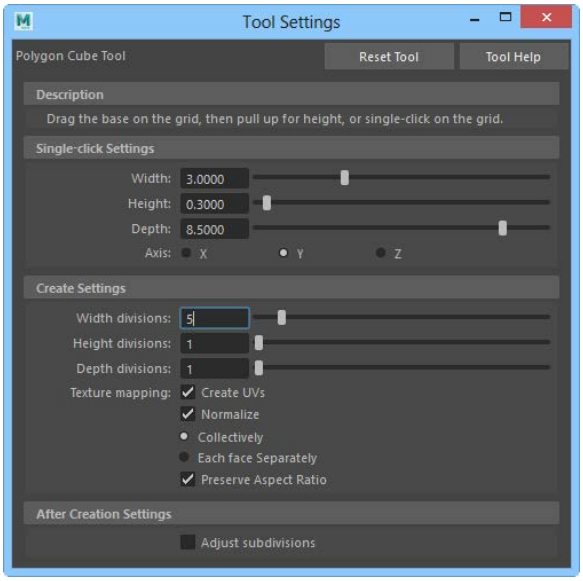


Figure 2-74 *The* ***Tool Settings (Polygon Cube Tool)*** *panel*

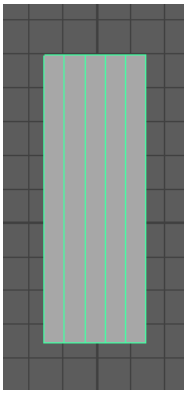


Figure 2-75 *A cube created*

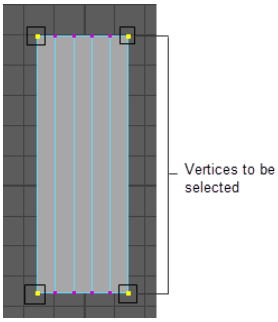


Figure 2-76 *The vertices selected*

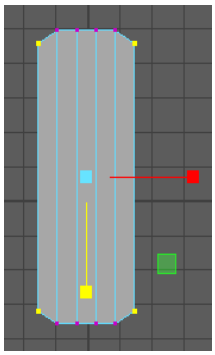


Figure 2-77 *The selected vertices scaled*

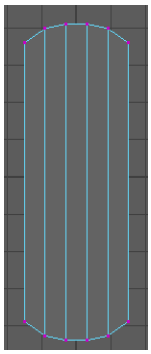


Figure 2-78 *The basic shape of the deck*

Figure 2-79 *Two new segments created in the front-Z viewport*

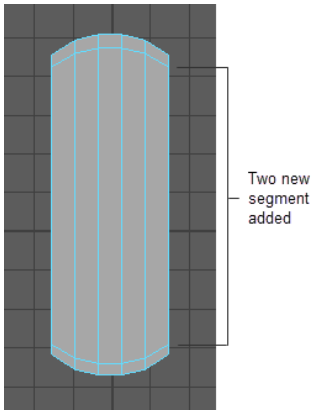


Figure 2-80 *Two segments created in the top-Y viewport*

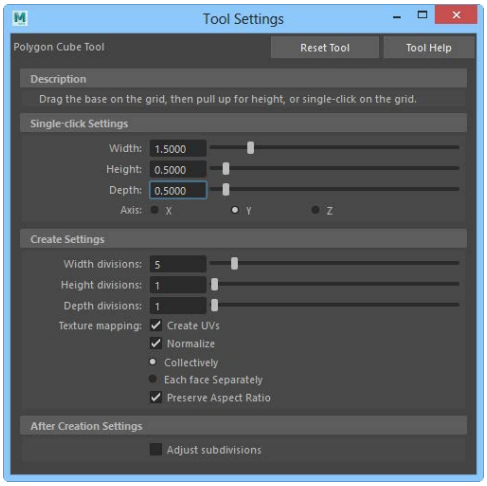


Figure 2-81 *The* ***Tool Settings (Polygon Cube Tool)*** *window*

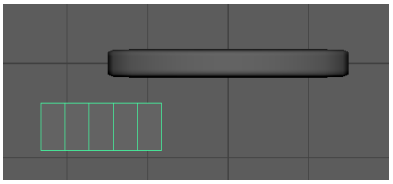


Figure 2-82 *The cube created*

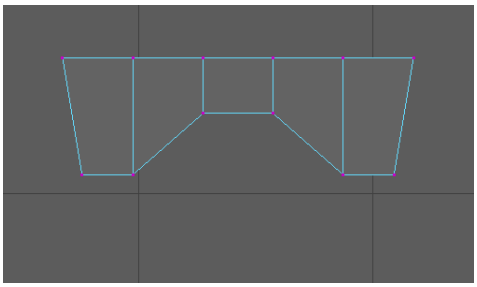


Figure 2-83 *The adjusted vertices of the base*

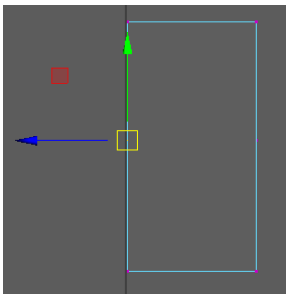


Figure 2-84 *Dragging the selected vertices along the -Z axis*

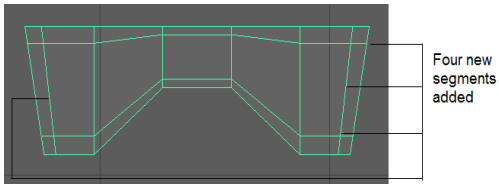


Figure 2-85 *Four new segments inserted in the front-Z viewport*

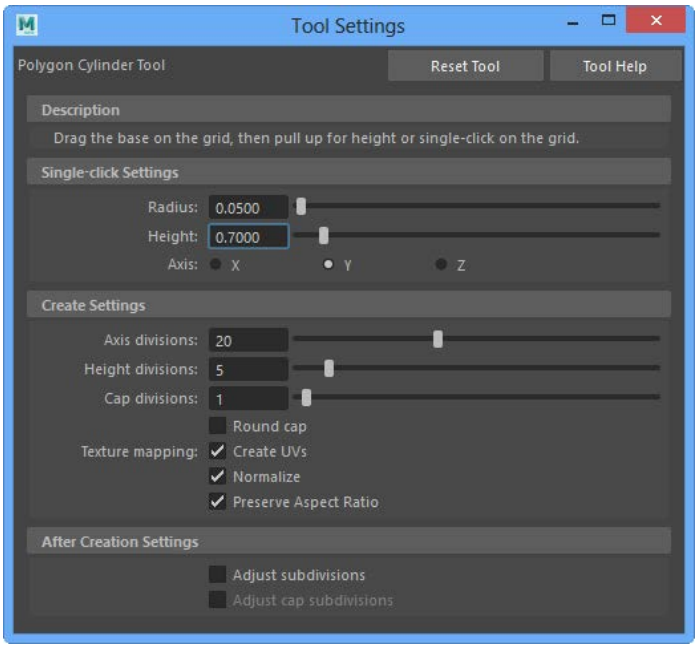


Figure 2-86 *The* ***Tool Settings*** *(****Polygon Cylinder Tool****) panel*

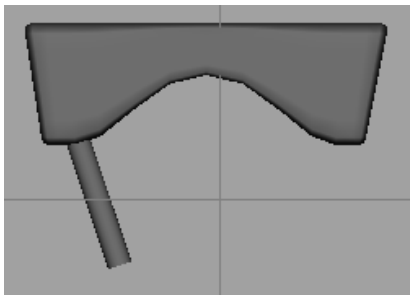


Figure 2-87 *The cylinder rotated and aligned in the front-Z viewport*

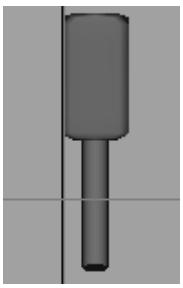


Figure 2-88 *The cylinder rotated and aligned in the side-X viewport*

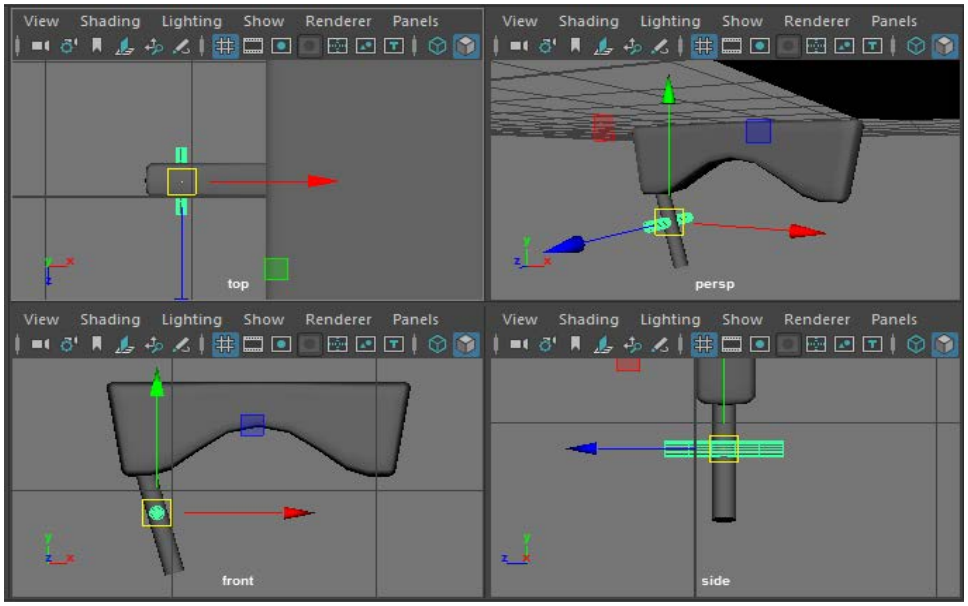


Figure 2-89 *Aligning bolt1 in all viewports*

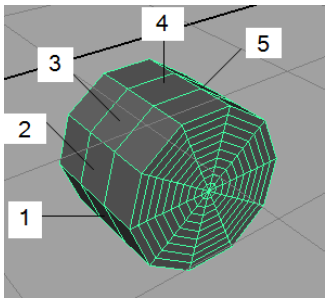


Figure 2-90 *The cylinder after extrusion in the persp viewport*

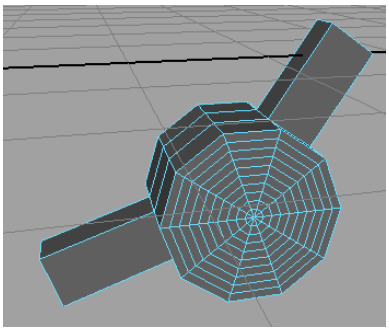


Figure 2-91 *The cylinder after extrusion in the persp viewport*

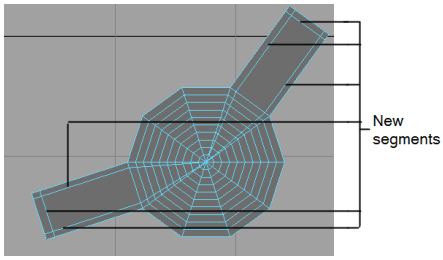


Figure 2-92 *New segments added to truck*

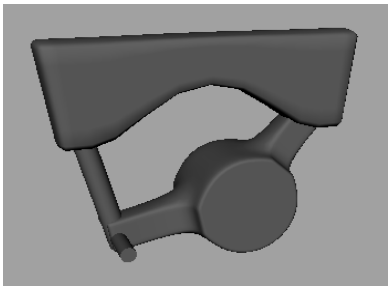


Figure 2-93 *The parts aligned with base in the front-Z viewport*

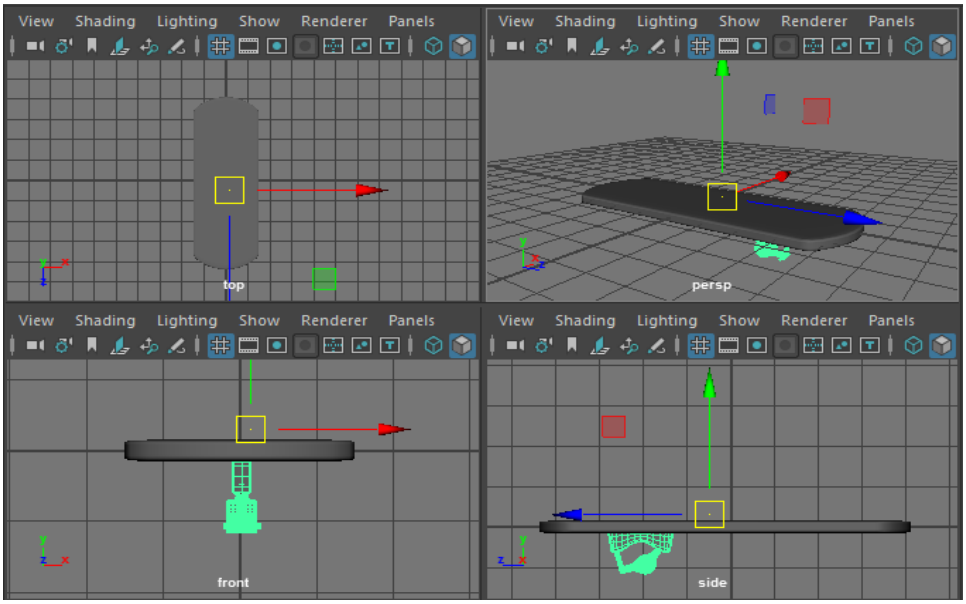


Figure 2-94 *The* ***base1*** *aligned in all viewports*

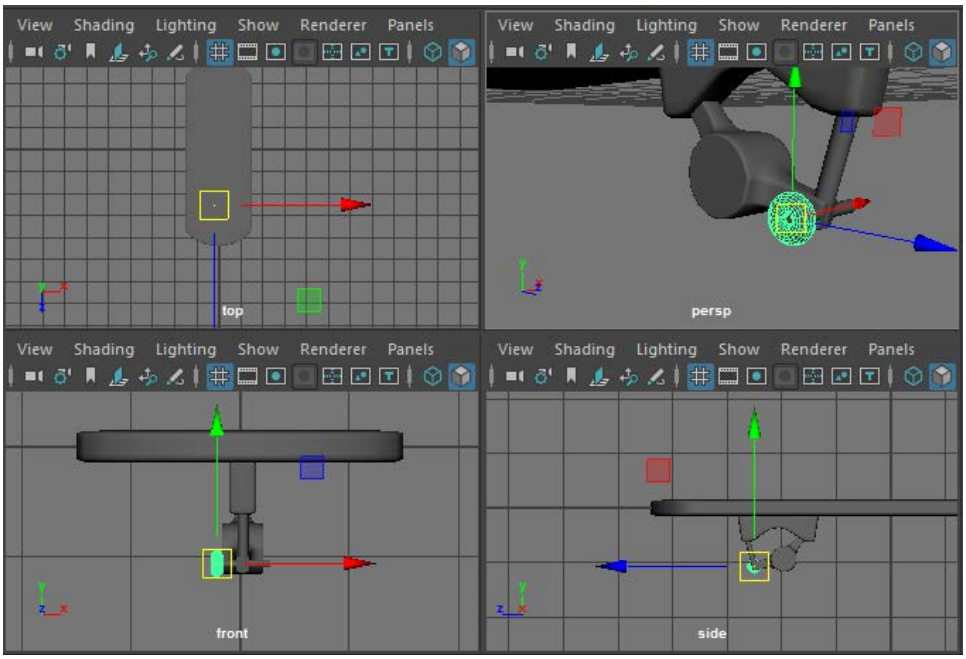


Figure 2-95 *The wheel aligned with bolt1 in all viewports*

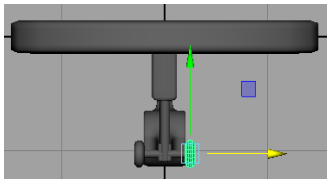


Figure 2-96 *The wheel1 moved to opposite direction of wheel*

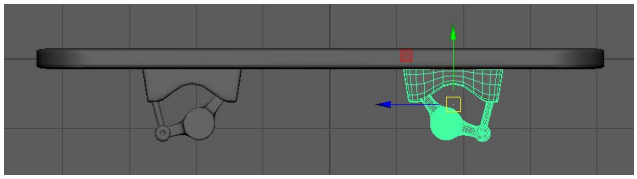


Figure 2-97 *The base3 moved and rotated*

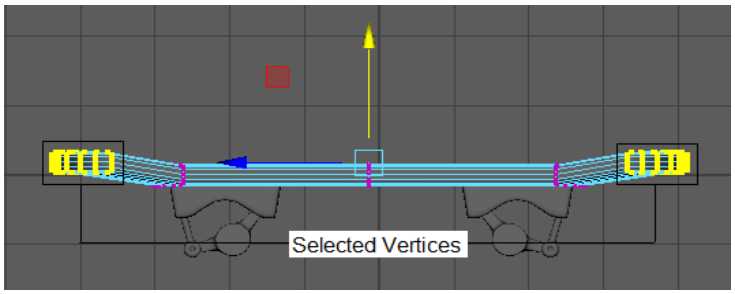


Figure 2-98 *Moving the selected vertices up along the Y axis*

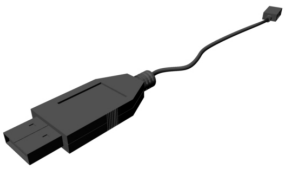


Figure 2-99 *Model to be created in Exercise 1*

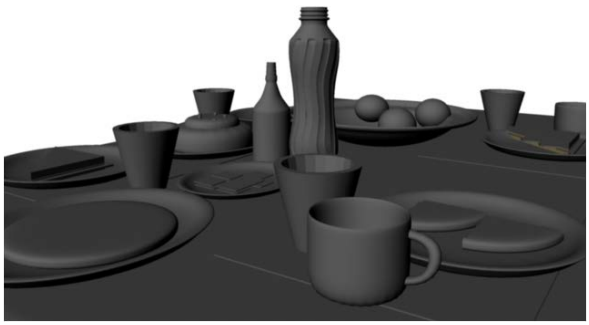


Figure 2-100 *Scene to be created in Exercise 2*

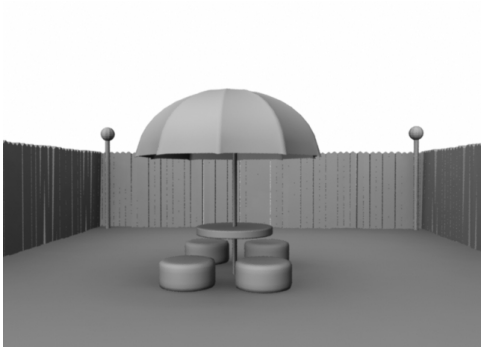


Figure 2-101 *Scene to be created in Exercise 3*

Chapter 3

NURBS Curves and Surfaces

Learning Objectives

After completing this chapter, you will be able to:

- *Create NURBS Primitives*
- *Create NURBS curves*
- *Create surfaces*

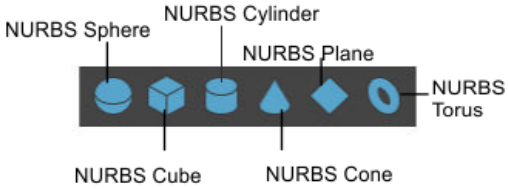


Figure 3-1 *Accessing NURBS primitives from the Shelf*

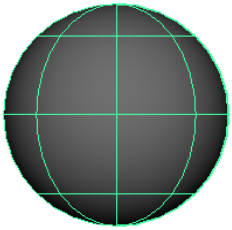


Figure 3-2 *The NURBS sphere*

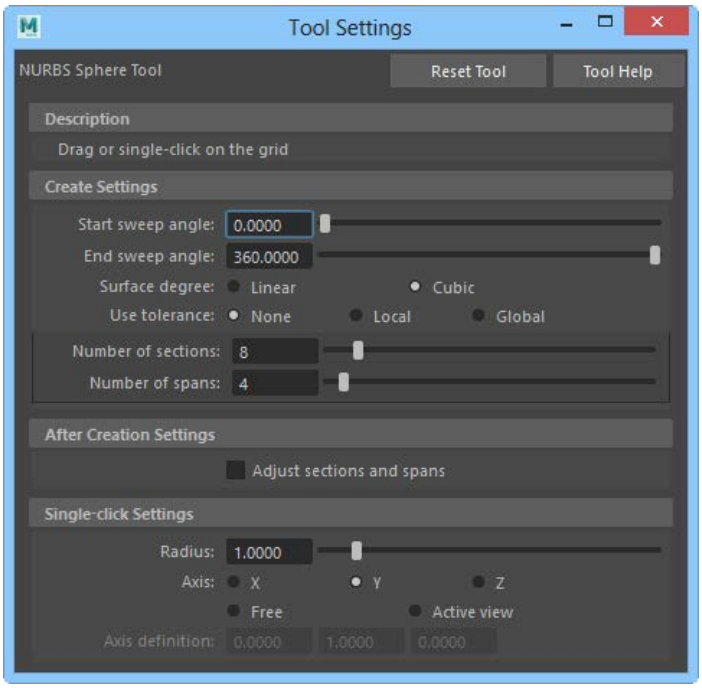


Figure 3-3 *The* ***Tool Settings (NURBS Sphere Tool)*** *panel*

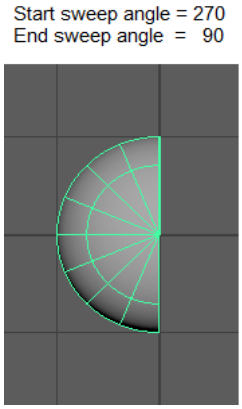


Figure 3-4 *Partial sphere created*

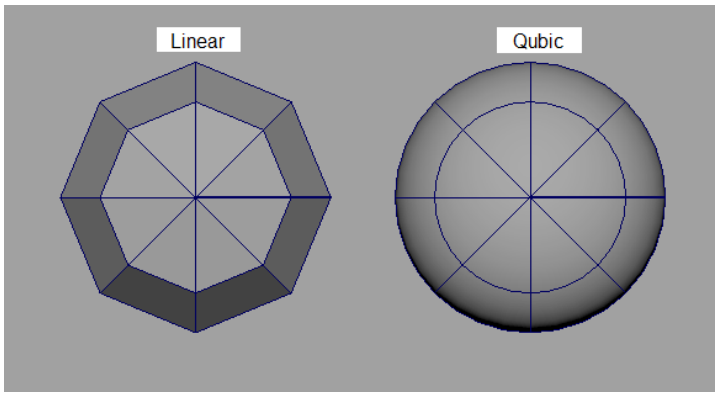


Figure 3-5 *The faceted and smooth appearances of spheres*

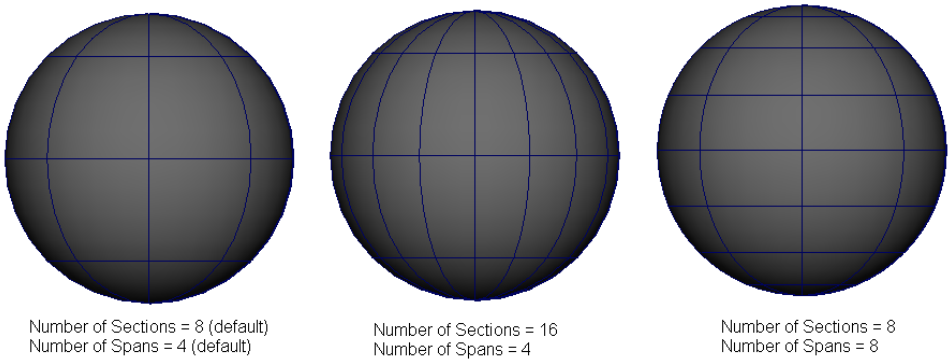


Figure 3-6 *The number of sections and spans on spheres*

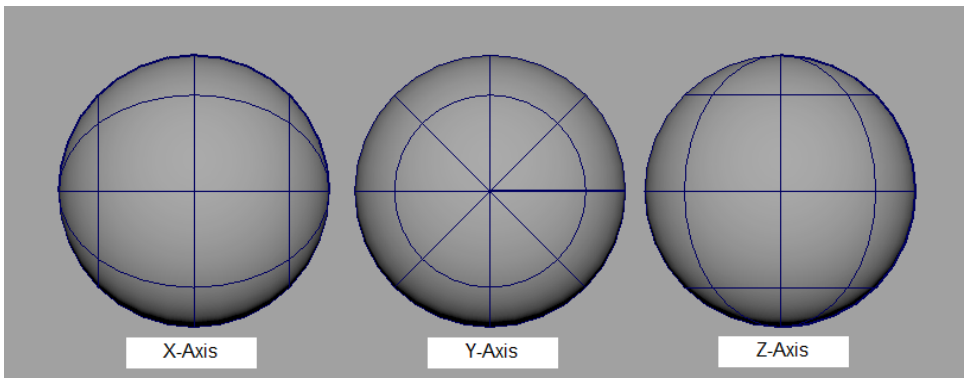


Figure 3-7 *Spheres created on X, Y, and Z axes*

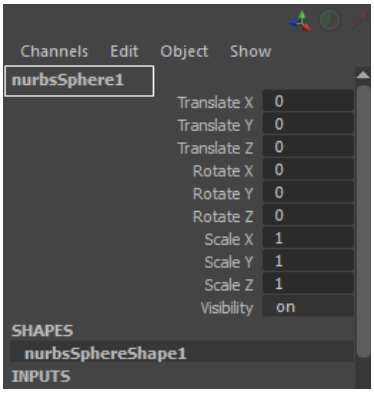


Figure 3-8 *The* ***Channel Box / Layer Editor***

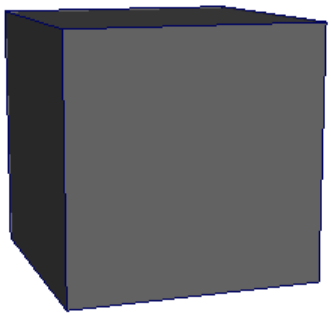


Figure 3-9 *The NURBS cube*

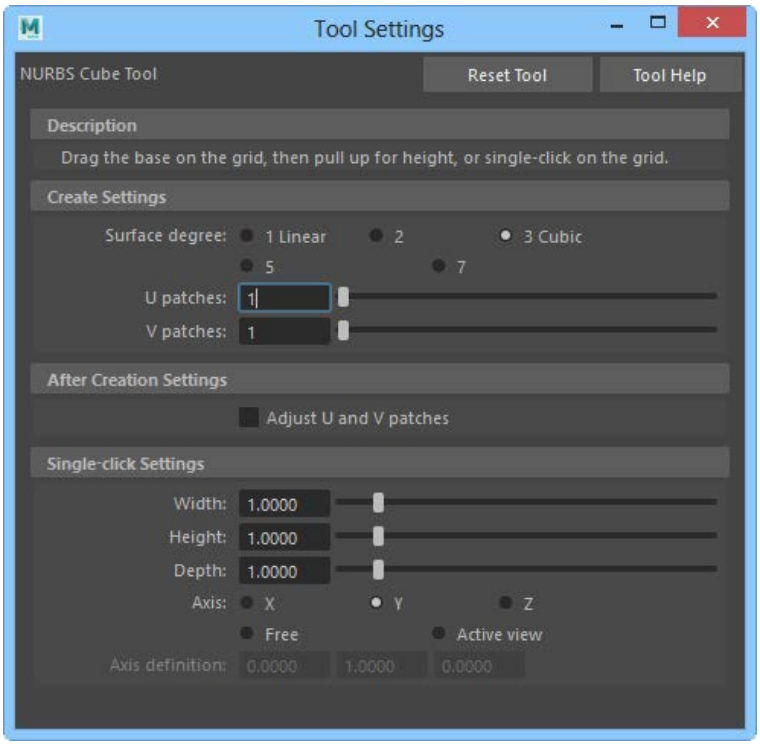


Figure 3-10 *The* ***Tool Settings (NURBS Cube Tool)*** *panel*

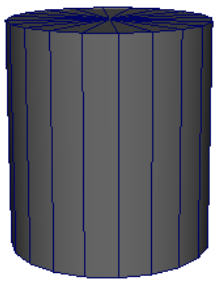


Figure 3-11 *The NURBS cylinder*

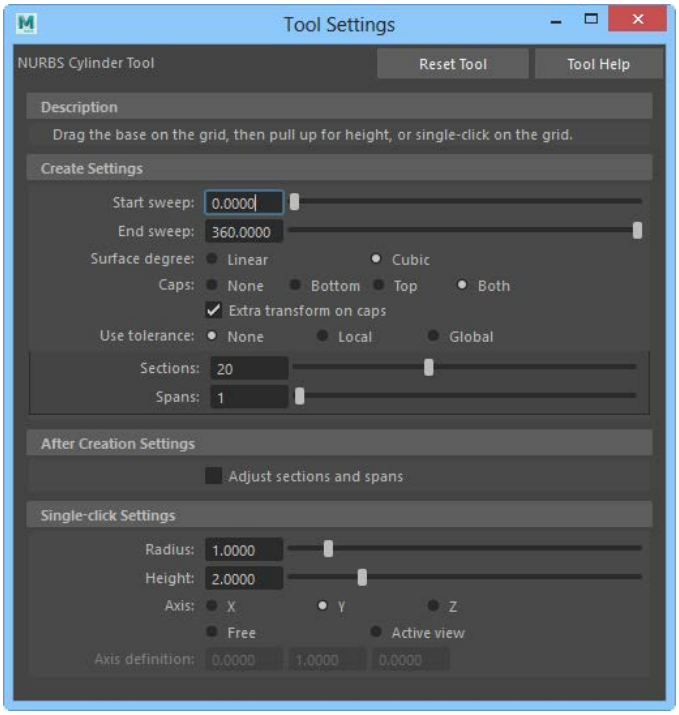


Figure 3-12 *The* ***Tool Settings (NURBS Cylinder Tool)*** *panel*

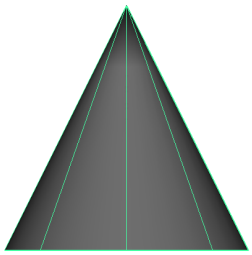


Figure 3-13 *The NURBS cone*

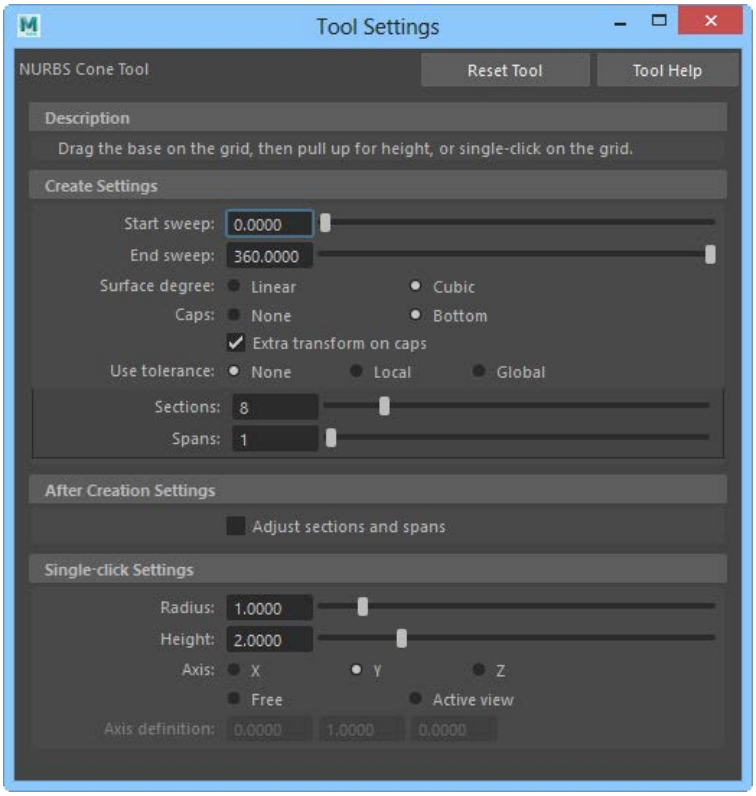


Figure 3-14 *The* ***Tool Settings (NURBS Cone Tool)*** *panel*

Figure 3-15 *The NURBS plane*

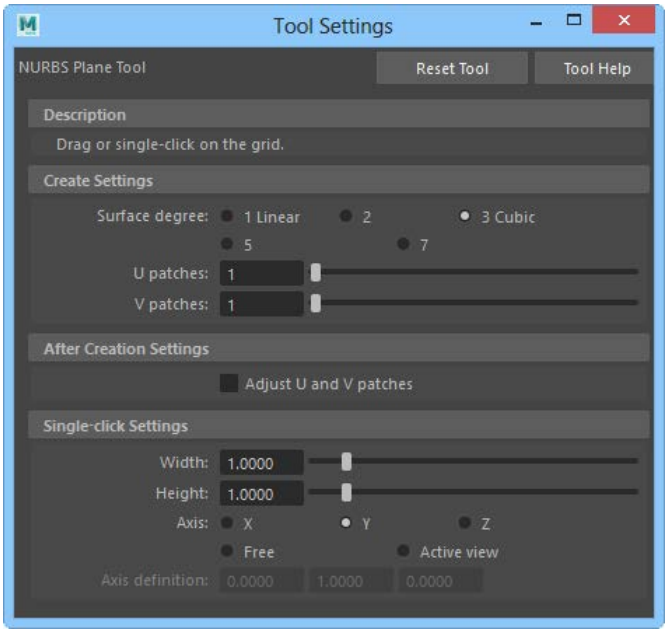


Figure 3-16 *The* ***Tool Settings (NURBS Plane Tool)*** *panel*

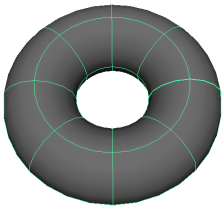


Figure 3-17 *The NURBS torus*

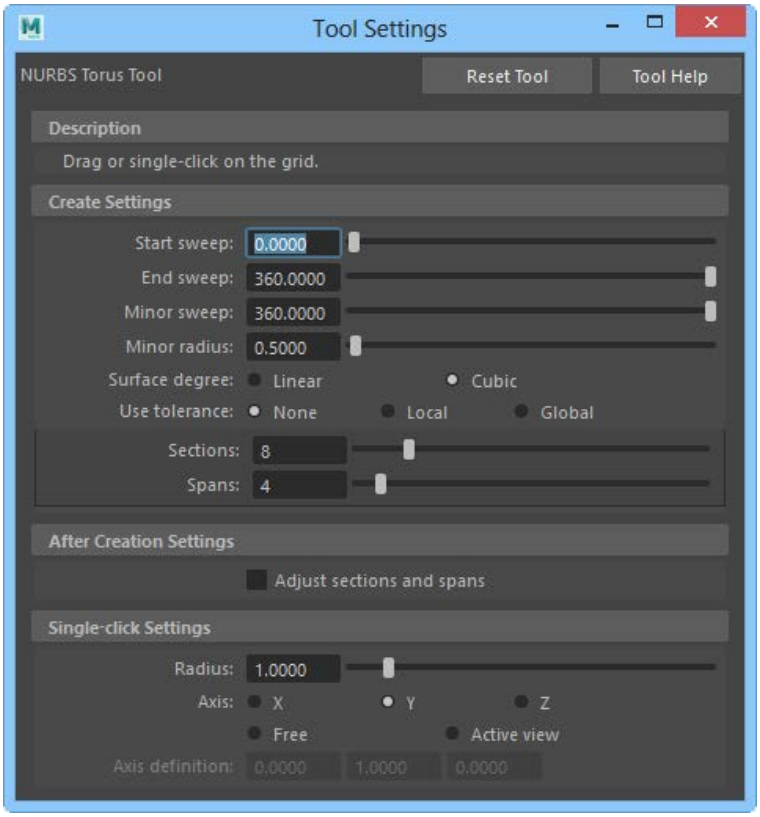


Figure 3-18 *The* ***Tool Settings (NURBS Torus Tool)*** *panel*

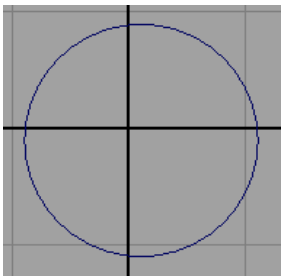


Figure 3-19 *The NURBS circle*

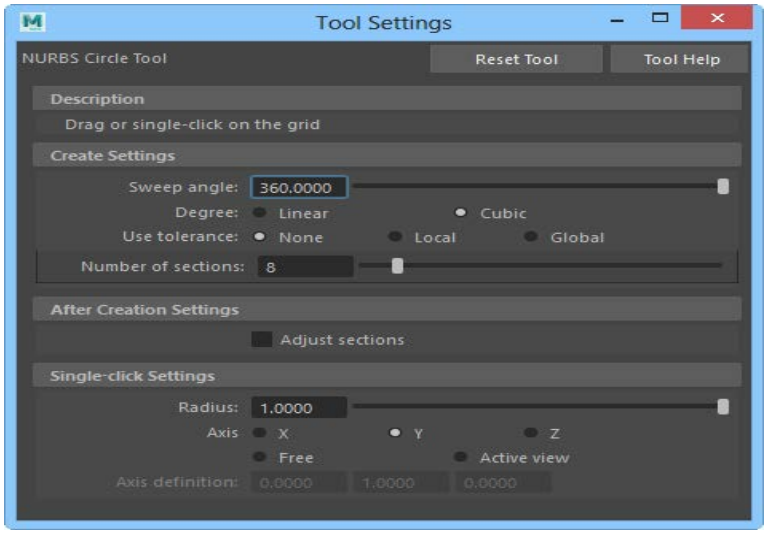


Figure 3-20 *The* ***Tool Setting (NURBS Circle Tool)*** *panel*

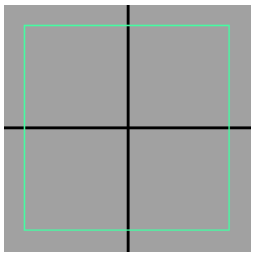


Figure 3-21 *The NURBS square*

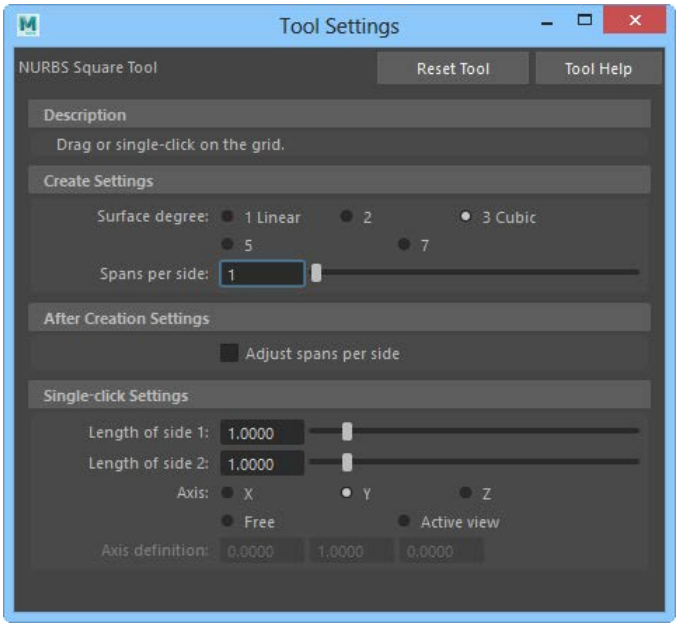


*Figure 3-22 The **Tool Setting (NURBS Square Tool)** panel*

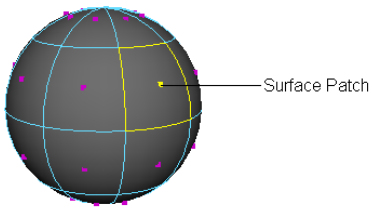


*Figure 3-23 **Surface Patch** of the NURBS*

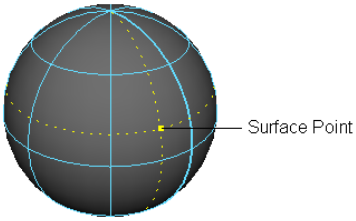


*Figure 3-24 **Surface Point** of the NURBS*

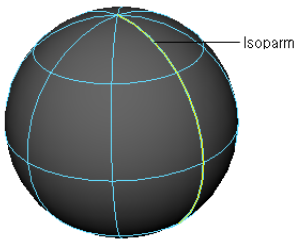


*Figure 3-25 **Isoparm** of the NURBS*

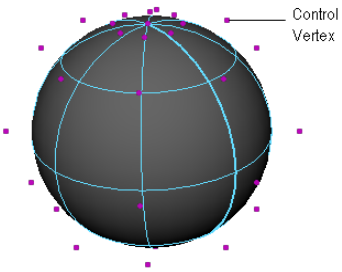


*Figure 3-26 **Control Vertex** of the NURBS*

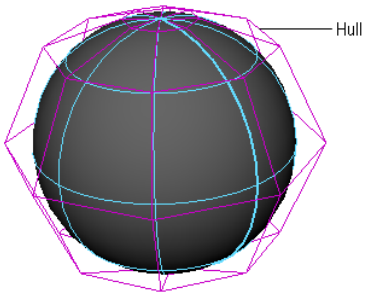


Figure 3-27 ***Hull*** *of the NURBS*

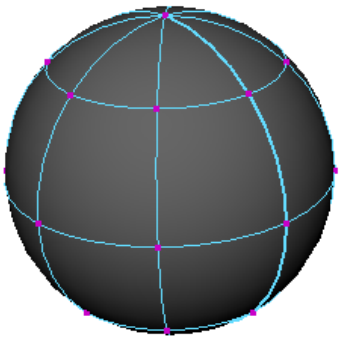


Figure 3-28 ***Surface UV*** *of the NURBS*

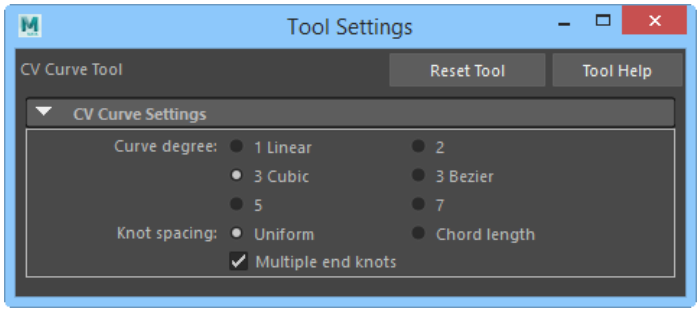


Figure 3-29 *The* ***Tool Settings (CV Curve Tool)*** *panel*

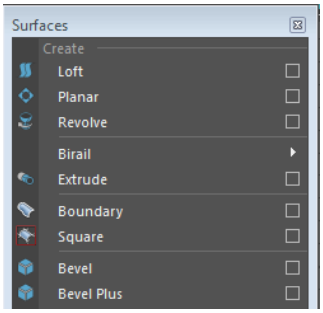


Figure 3-30 *The* ***Surface*** *floating menu*

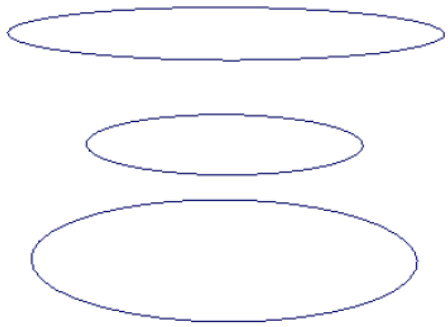


Figure 3-31 *The NURBS curves before applying the* ***Loft*** *tool*

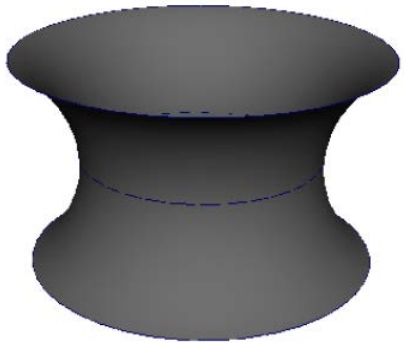


Figure 3-32 *The lofted surface created after applying the* ***Loft*** *tool*

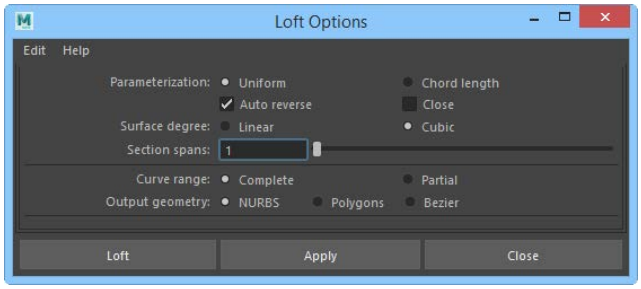


Figure 3-33 *The* ***Loft Options*** *window*

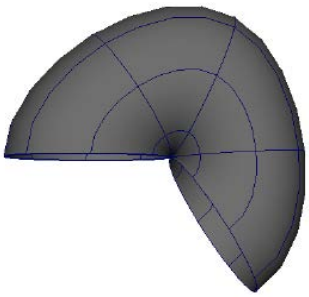


Figure 3-34 *Surface created with the* ***Close*** *check box cleared*

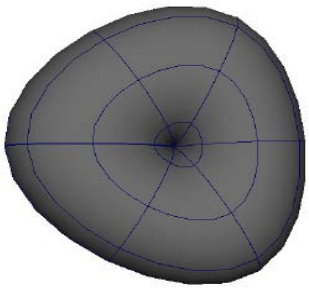


Figure 3-35 *Surface created with the* ***Close*** *check box selected*

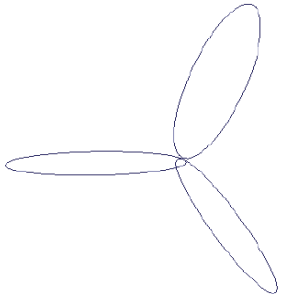


Figure 3-36 *NURBS curves for creating a surface*

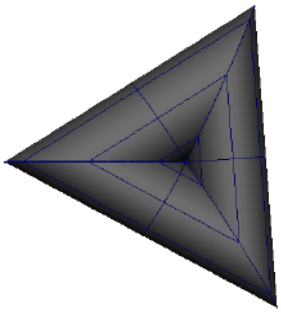


Figure 3-37 *Surface created on selecting the* ***Linear*** *radio button*

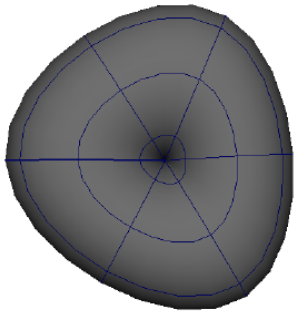


Figure 3-38 *Surface created on selecting the* ***Cubic*** *radio button*

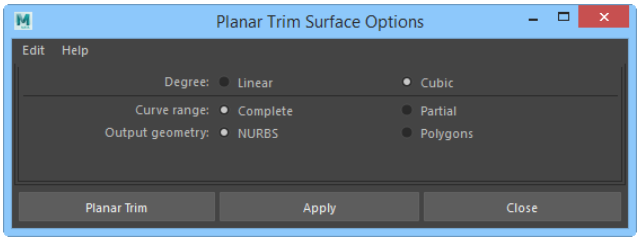


Figure 3-39 *The* ***Planar Trim Surface Options*** *window*

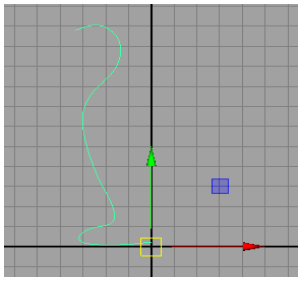


Figure 3-40 *The profile curve created*

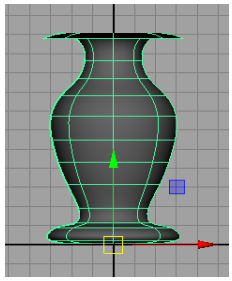


Figure 3-41 *The NURBS surface created after using the* ***Revolve*** *tool*

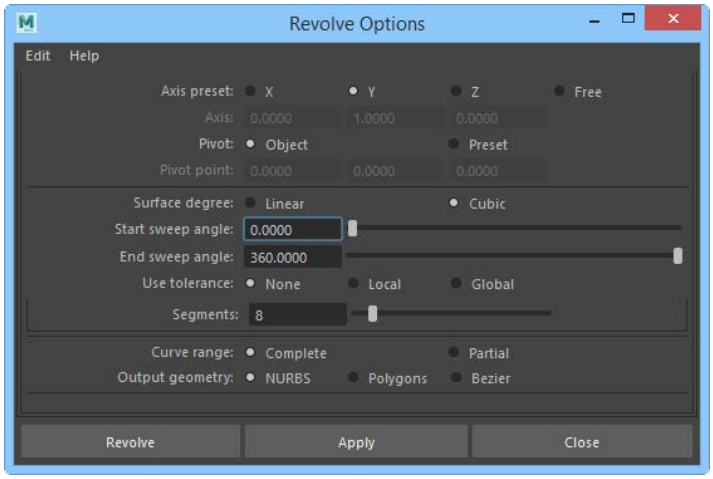


Figure 3-42 *The* ***Revolve Options*** *window*

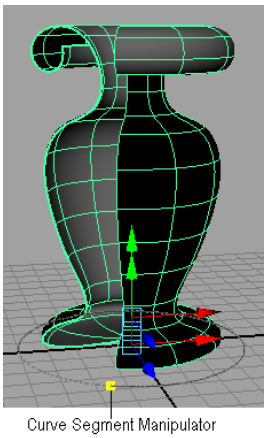


Figure 3-43 *Dragging the Curve Segment Manipulator*

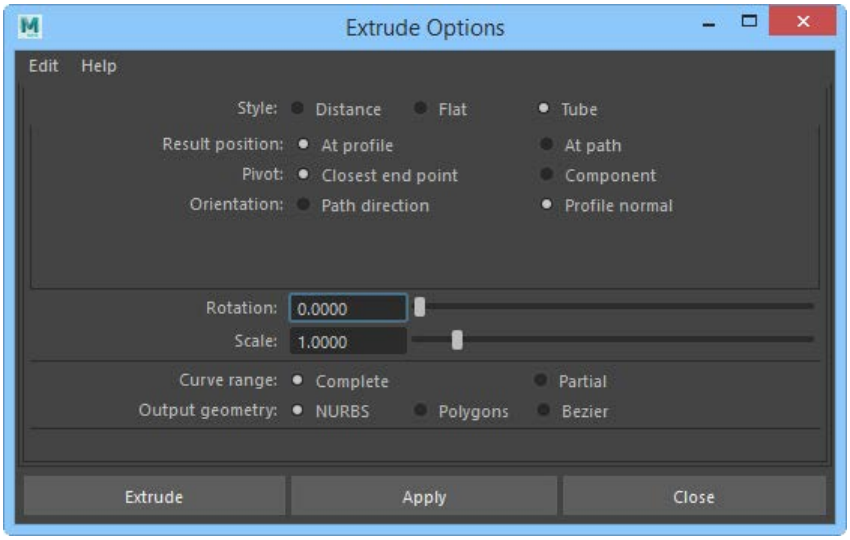


Figure 3-44 *The* ***Extrude Options*** *window*

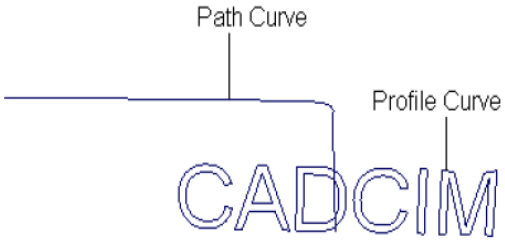


Figure 3-45 *The profile curve and the path curve for creating an extruded surface*

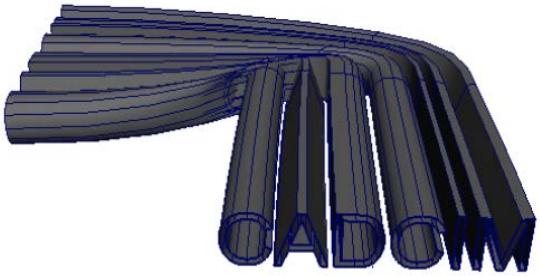


Figure 3-46 *Extruded surface created on selecting the* ***Closest end point*** *radio button*

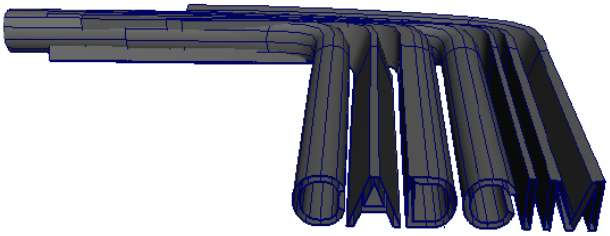


Figure 3-47 *Extruded surface created on selecting the* ***Component*** *radio button*

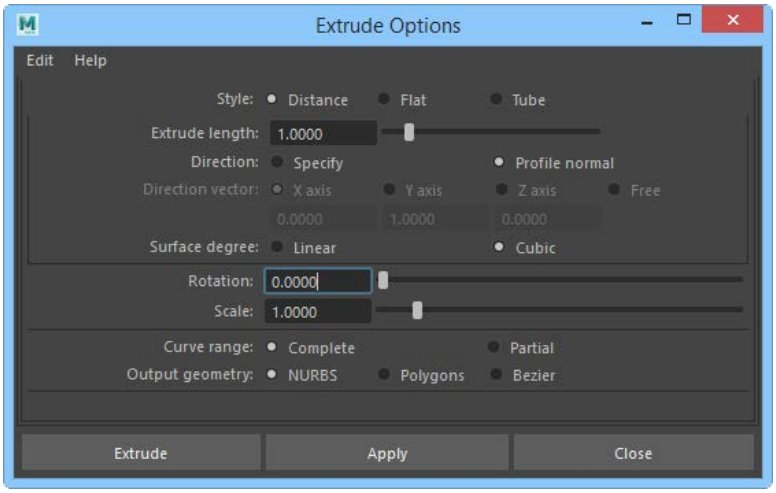


Figure 3-48 *The* ***Extrude Options*** *window with the* ***Distance*** *radio button selected*

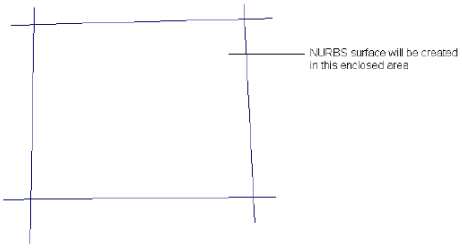


Figure 3-49 *Four NURBS curves created*

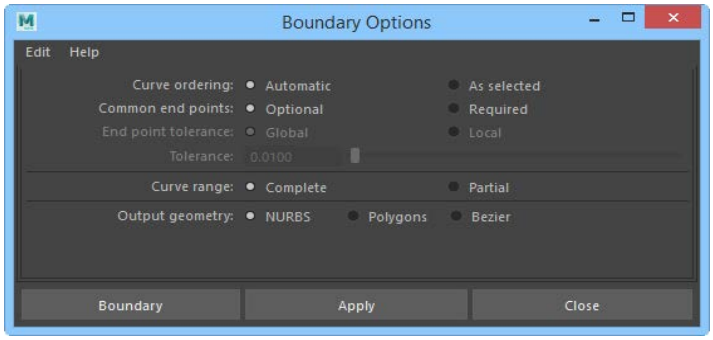


Figure 3-50 *The* ***Boundary Options*** *window*

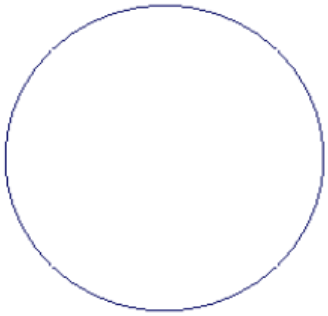


Figure 3-51 *A NURBS circle*

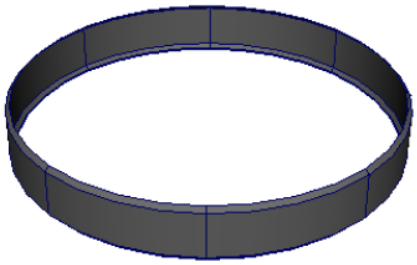


Figure 3-52 *The bevel surface created*

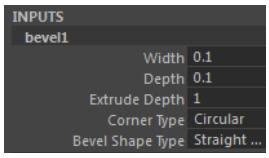


Figure 3-53 *The* ***bevel1*** *node in the* ***INPUTS*** *area*

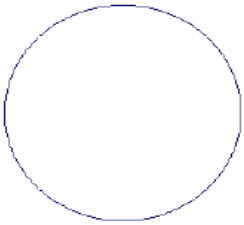


Figure 3-54 *A NURBS circle created in the top-Y viewport*

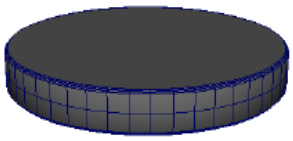


Figure 3-55 *The beveled surface created using the* ***Bevel Plus*** *tool*

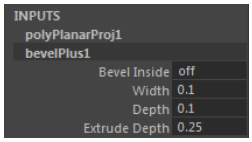


Figure 3-56 *The* ***bevelPlus1*** *node displayed in the* ***INPUTS*** *area*

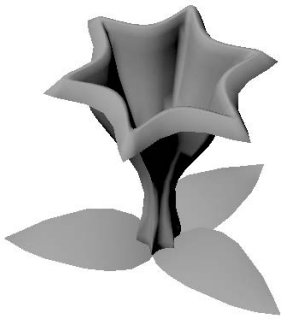


Figure 3-57 *The flower model*

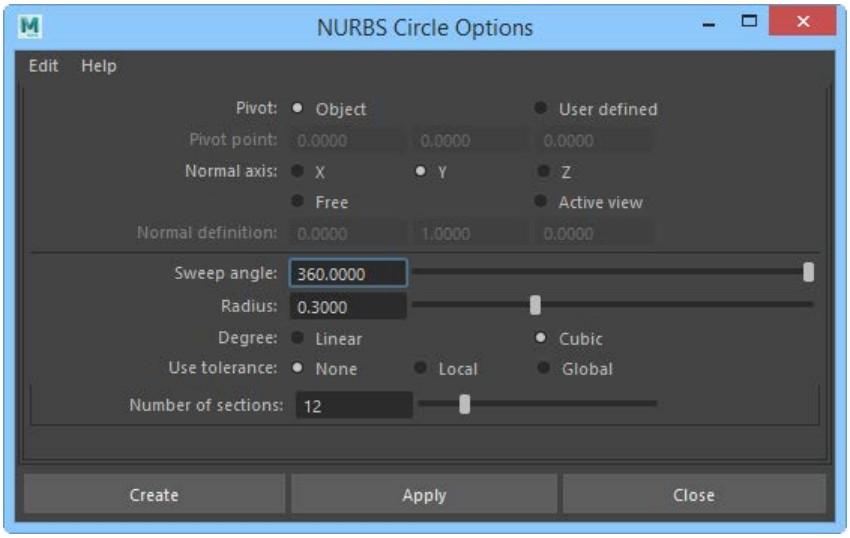


Figure 3-58 *The* ***NURBS Circle Options*** *window*

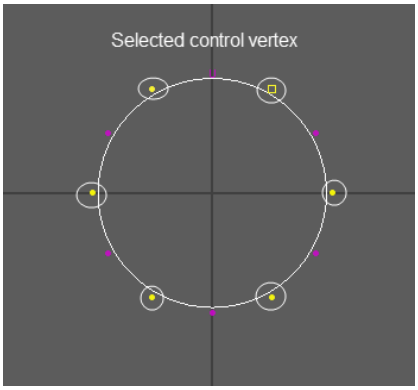


Figure 3-59 *Selected control vertices*

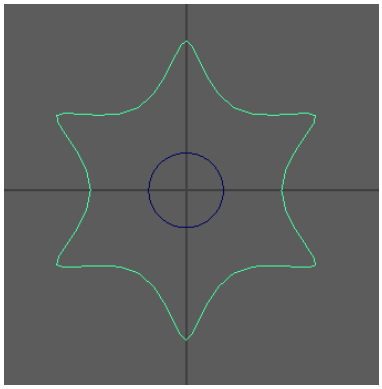


Figure 3-60 *Control vertices after scaling*

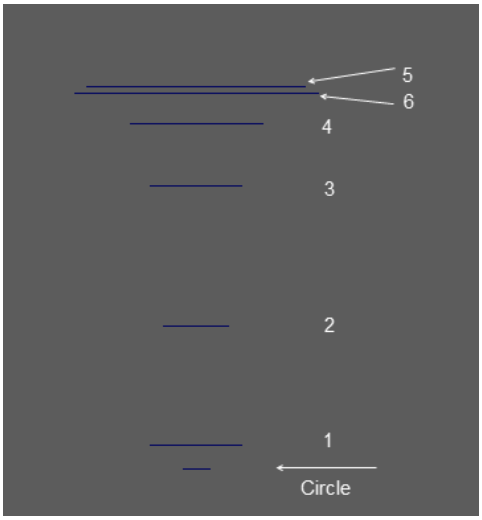


Figure 3-61 *The aligned shapes in the viewport*

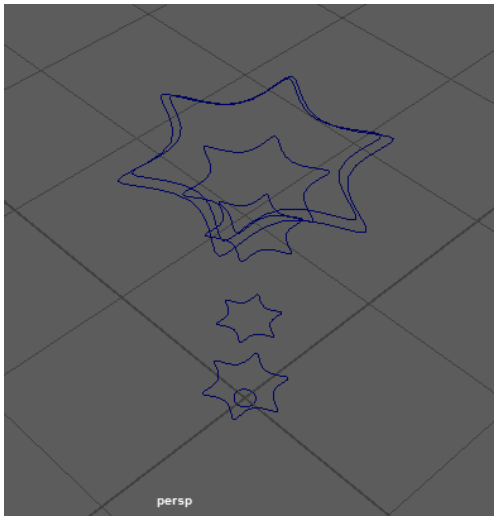


Figure 3-62 *Shapes after duplicate in persp viewport*

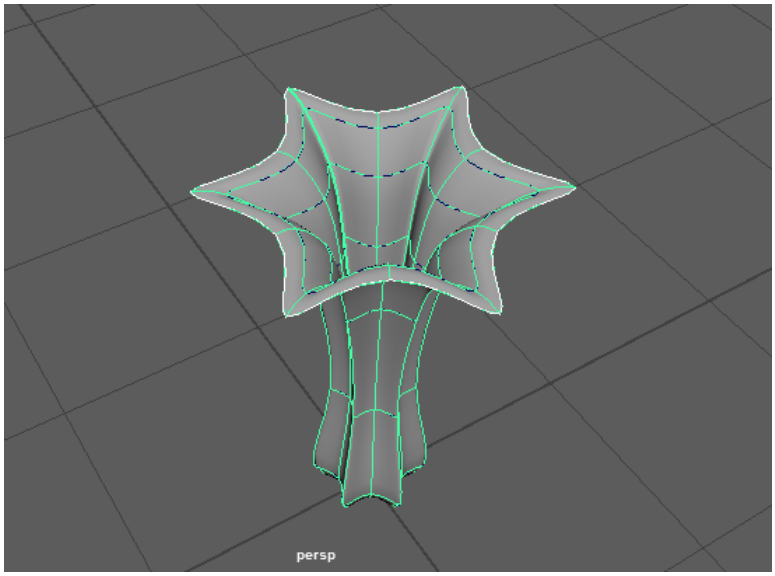


Figure 3-63 *Surface created*

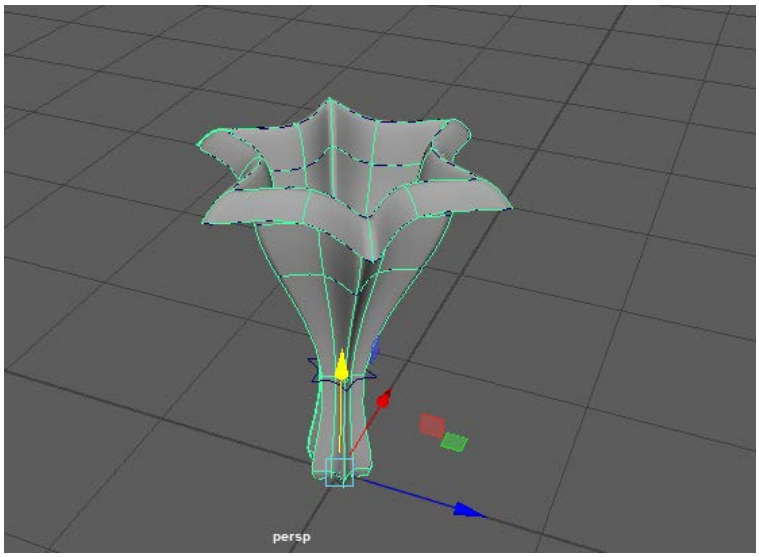


Figure 3-64 *The scaled shape of the flower*

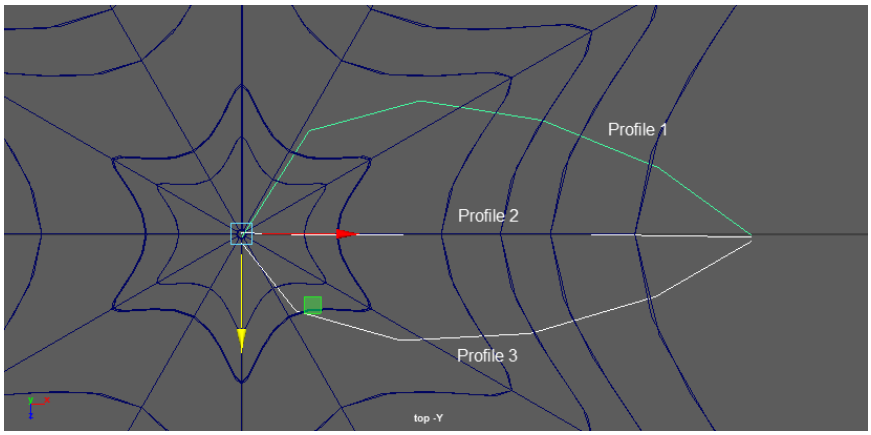


Figure 3-65 *Profile curves for leaf*

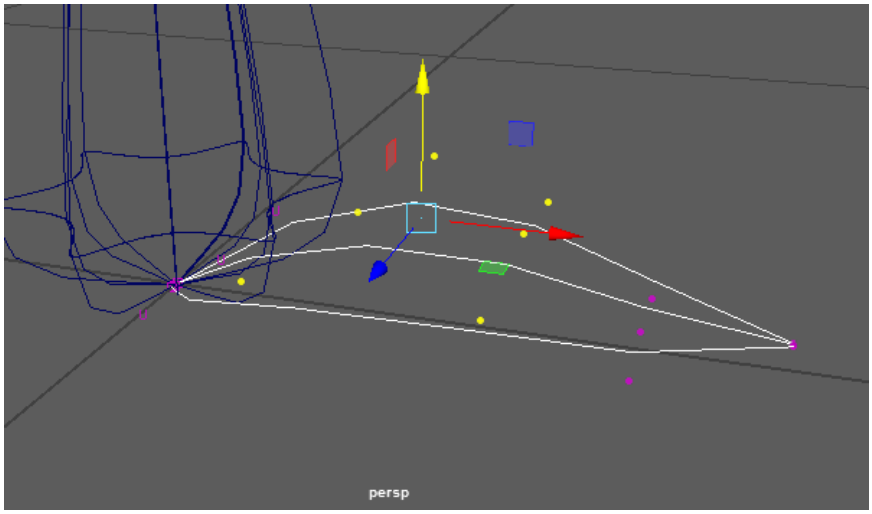


Figure 3-66 *Profile curves modified*

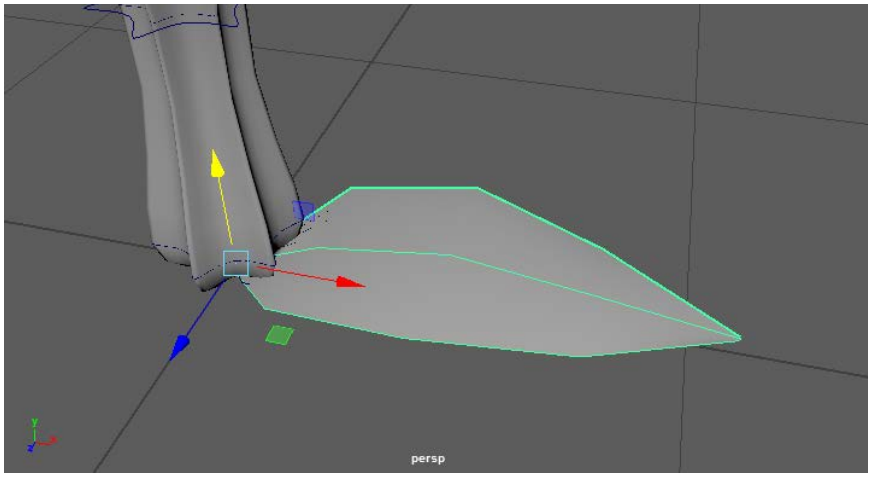


Figure 3-67 *Leaf created by using loft*

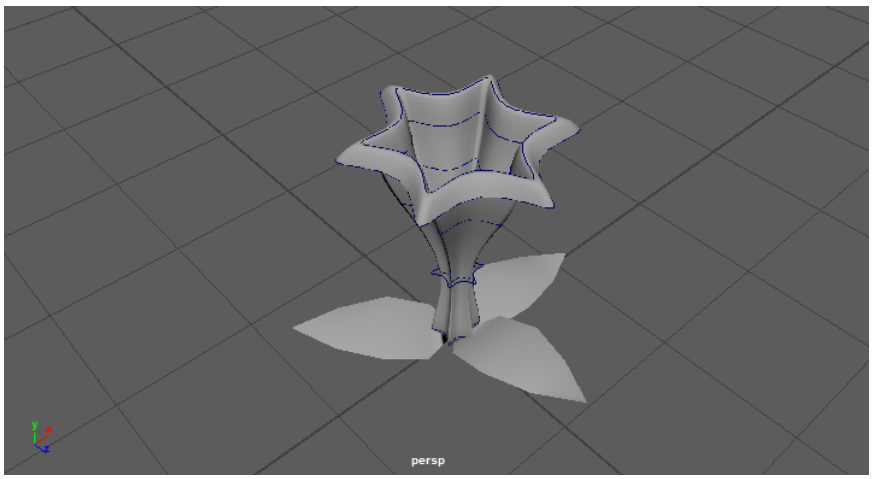


Figure 3-68 *Leaves created by using loft*

Figure 3-69 *The tea cup*

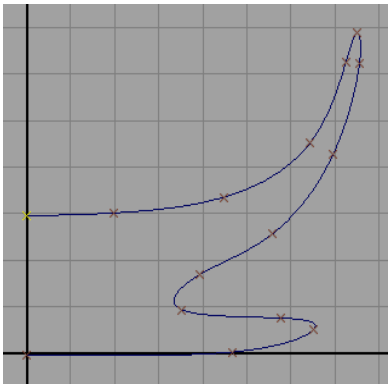


Figure 3-70 *The profile curve for the tea cup*

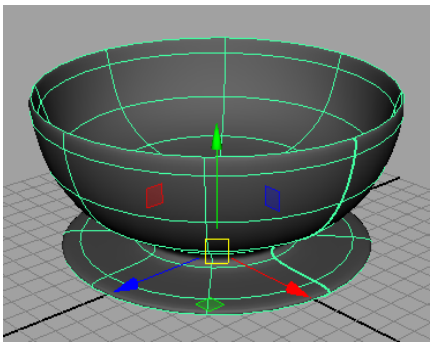


Figure 3-71 *The tea cup created*

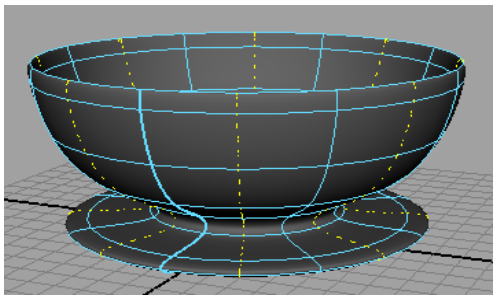


Figure 3-72 *Dotted impression of the isoparms*

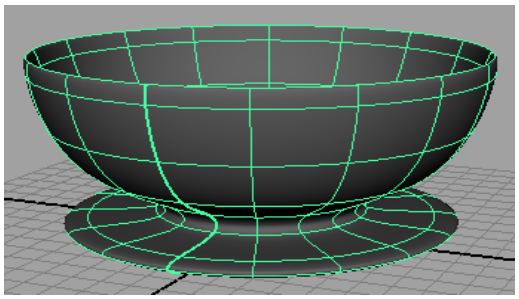


Figure 3-73 *New isoparms created*

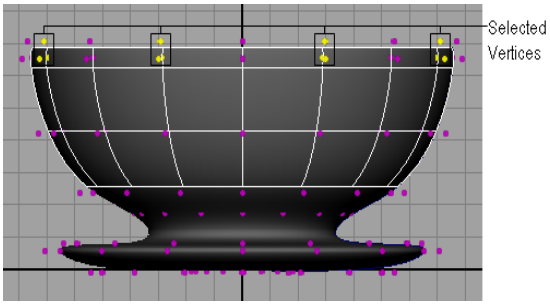


Figure 3-74 *Vertices selected*

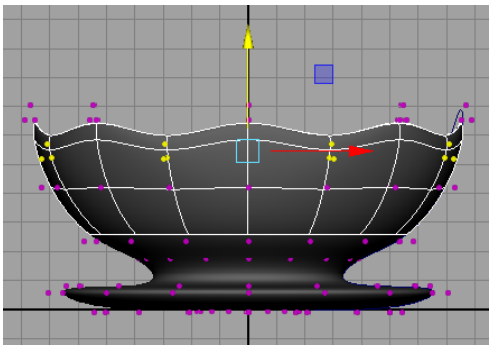


Figure 3-75 *Crease created in the tea cup*

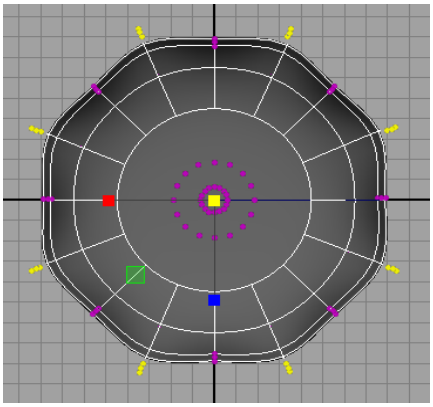


Figure 3-76 *Selected vertices scaled outward*

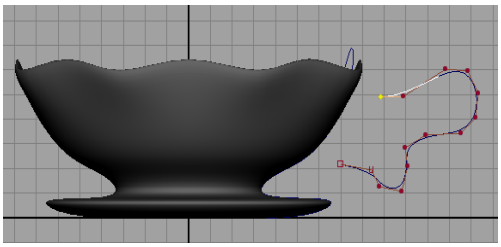


Figure 3-77 *The profile curve drawn*

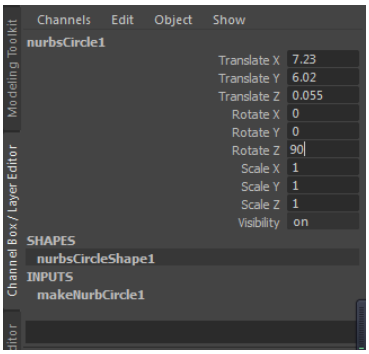


Figure 3-78 *The* ***nurbsCircle1*** *area in the* ***Channel Box / Layer Editor***

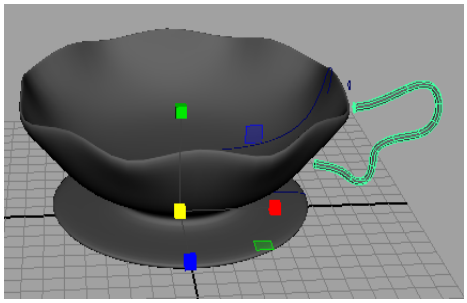


Figure 3-79 *The extruded surface displayed*

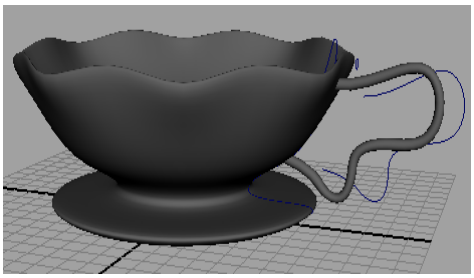


Figure 3-80 *Final output of the cup*

Figure 3-81 *Model of an apple*

Figure 3-82 *Model of a lantern*

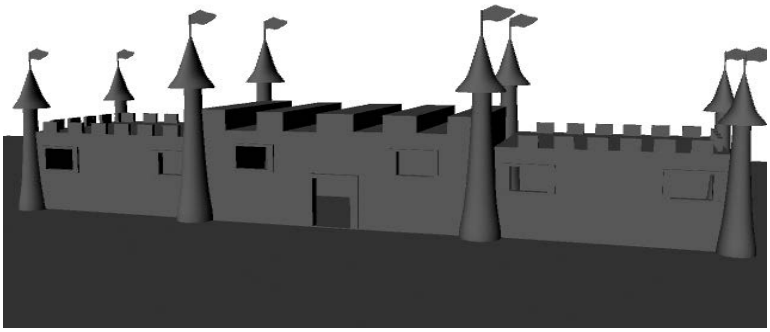


Figure 3-83 *Model of a castle*

Figure 3-84 *Model of a candle stand*

Figure 3-85 *Model of a Table*

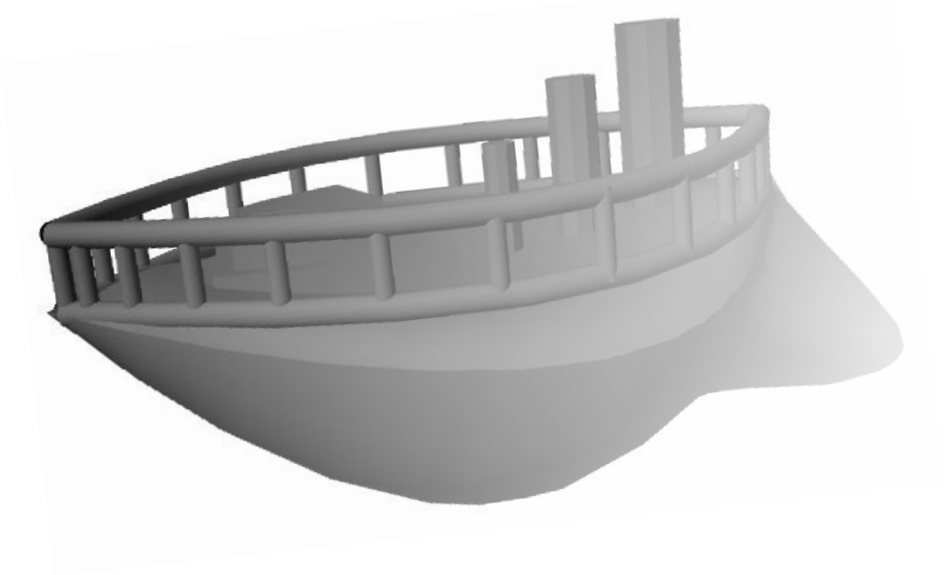
Chapter 4

NURBS Modeling

Learning Objectives

After completing this chapter, you will be able to:

- *Understand NURBS editing techniques*
- *Convert NURBS objects to polygons*



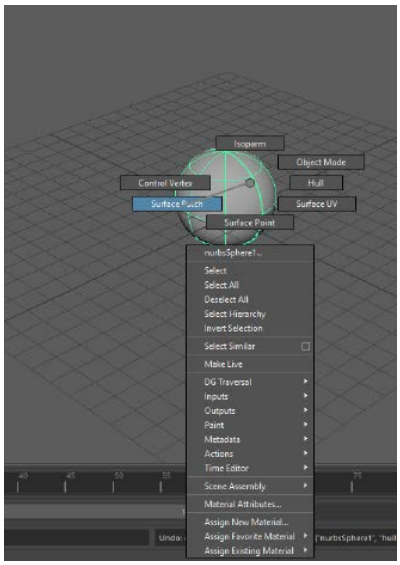


Figure 4-1 *Choosing* ***Surface Patch*** *from the marking menu*

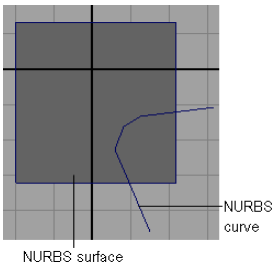


Figure 4-2 *The NURBS curve created*

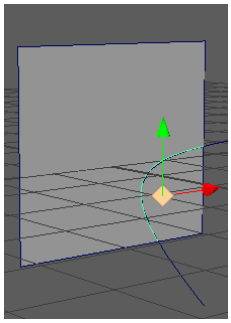


Figure 4-3 *The NURBS curve projected on the NURBS surface*

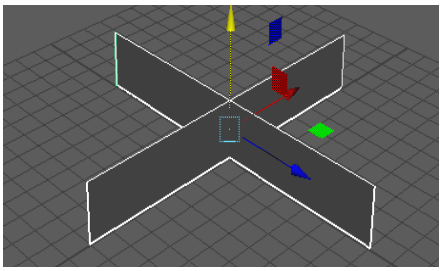


Figure 4-4 *The aligned surfaces and selection handles*

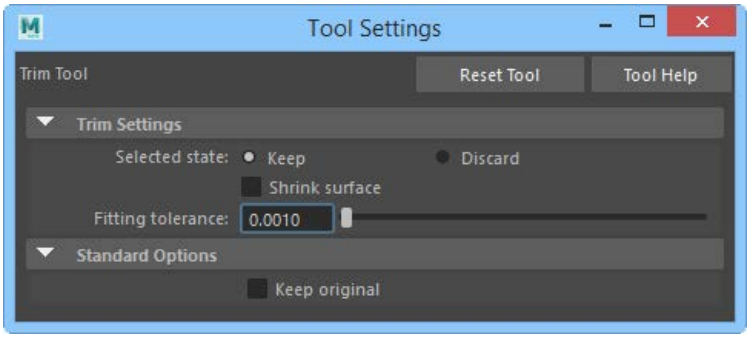


Figure 4-5 *The* ***Tool Settings*** *(****Trim Tool****) panel*

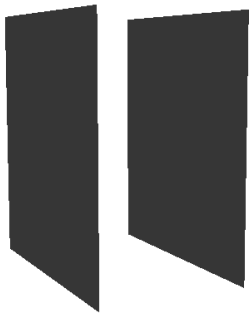


Figure 4-6 *The two NURBS surfaces*

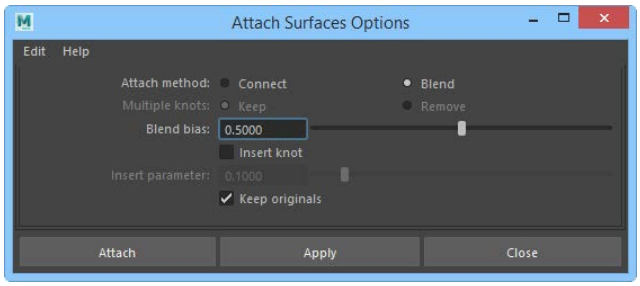


Figure 4-7 *The* ***Attach Surfaces Options*** *window*

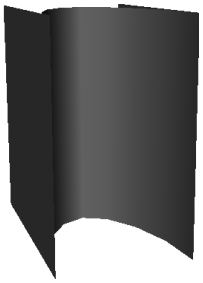


Figure 4-8 *Surfaces connected on selecting the* ***Blend*** *radio button*

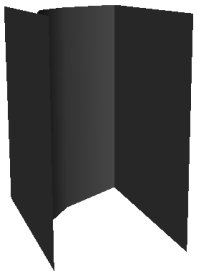


Figure 4-9 *The surfaces connected on selecting the* ***Connect*** *radio button*

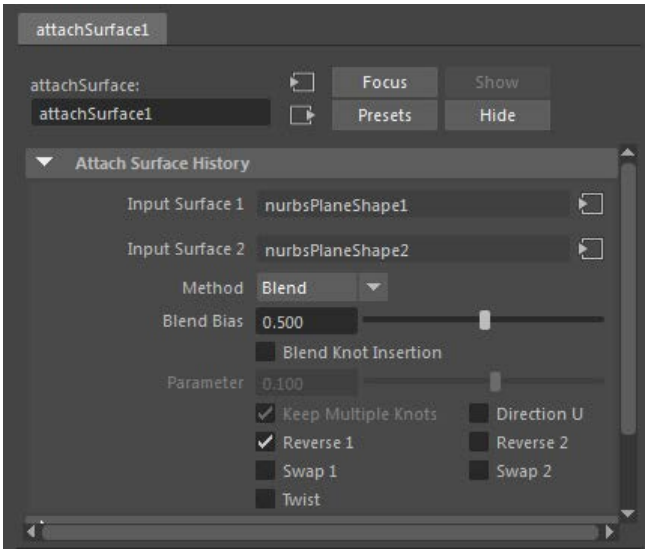


Figure 4-10 *The* ***attachSurface1*** *tab in the* ***Attribute Editor***

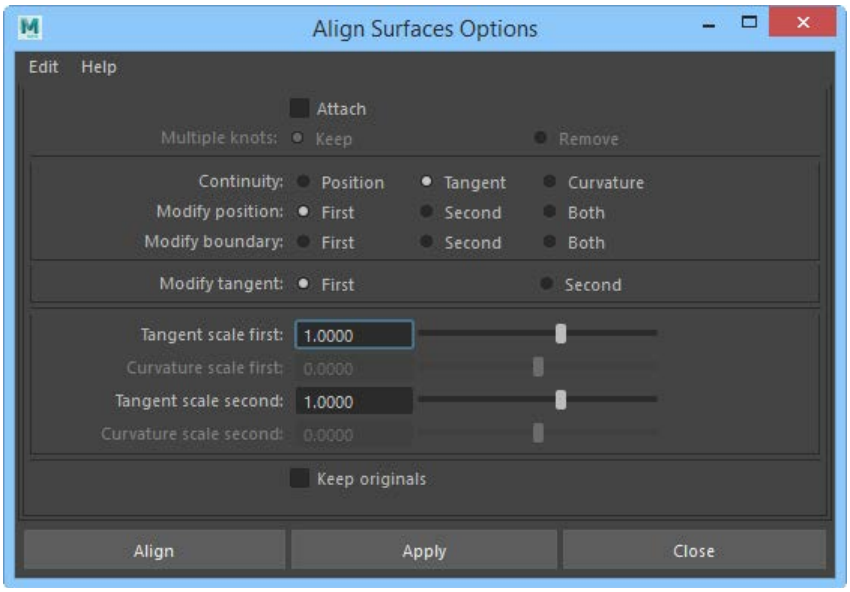


Figure 4-11 *The* ***Align Surfaces Options*** *window*

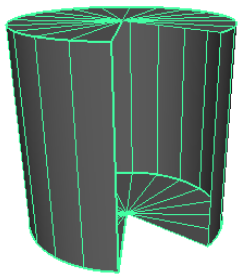


Figure 4-12 *The opened NURBS surface*

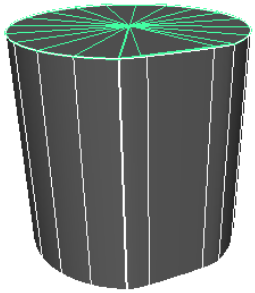


Figure 4-13 *The closed NURBS surface*

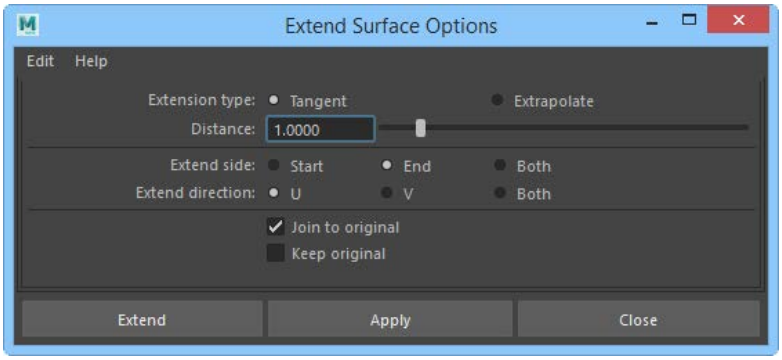


Figure 4-14 *The* ***Extend Surface Options*** *window*

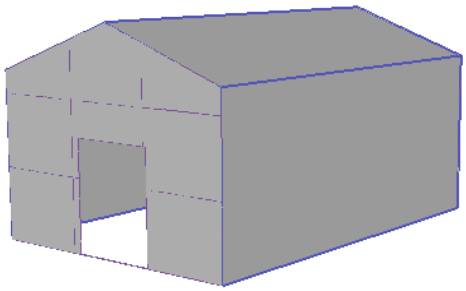


Figure 4-15 *The hut roof before using the* ***Extend Surfaces*** *tool*

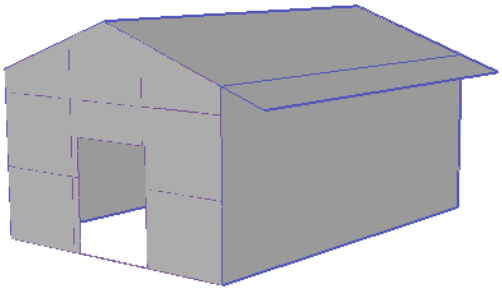


Figure 4-16 *The hut roof after using the* ***Extend Surfaces*** *tool*

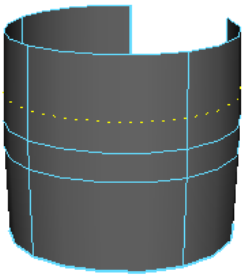


Figure 4-17 *The yellow dotted line displayed on the NURBS surface*

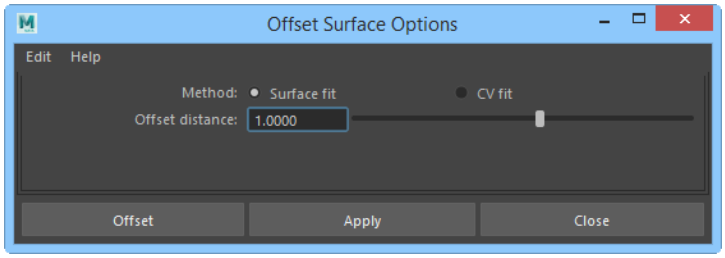


Figure 4-18 *The* ***Offset Surface Options*** *window*

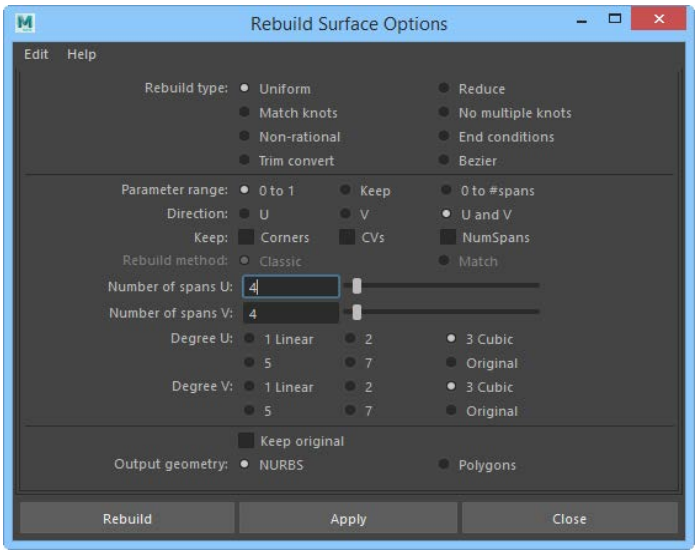


Figure 4-19 *The* ***Rebuild Surface Options*** *window*

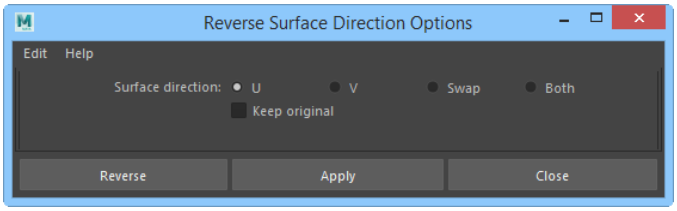


*Figure 4-20 The **Reverse Surface Direction Options** window*

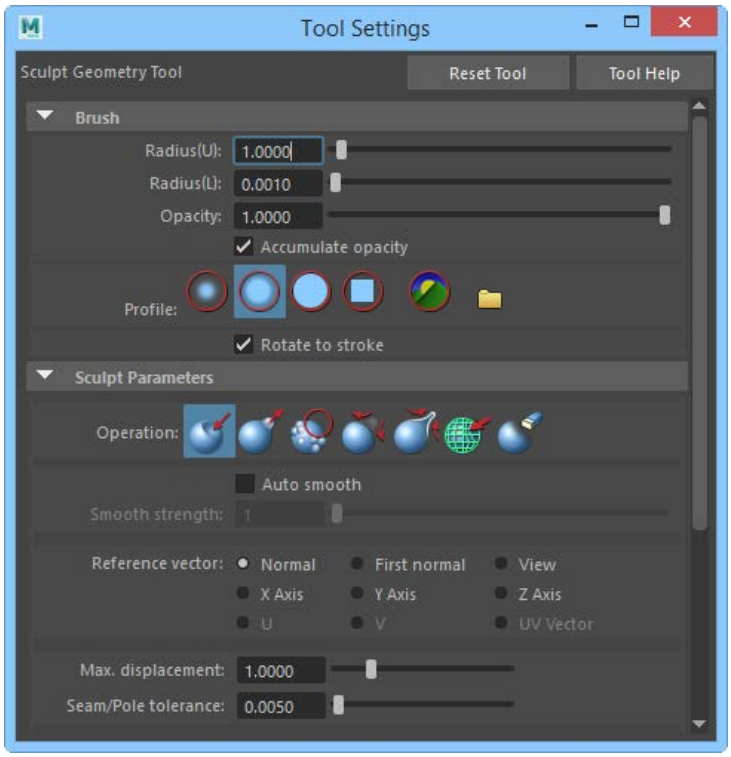


*Figure 4-21 Partial view of the **Tool Settings (Sculpt Geometry Tool)** panel*

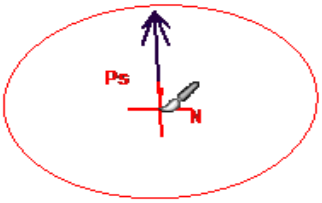


*Figure 4-22 The **Sculpt Geometry Tool** cursor*

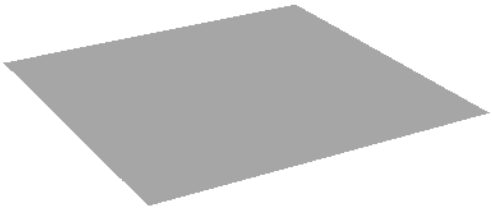


Figure 4-23 *The NURBS plane before sculpting*

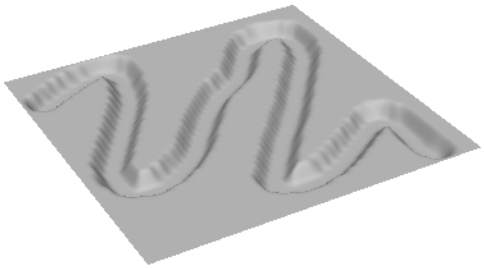


Figure 4-24 *The NURBS plane sculpted using the* ***Push*** *tool*

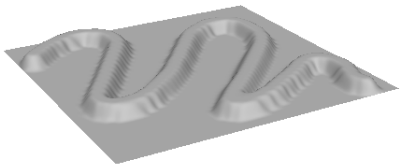


Figure 4-25 *The NURBS plane sculpted using the* ***Pull*** *tool*

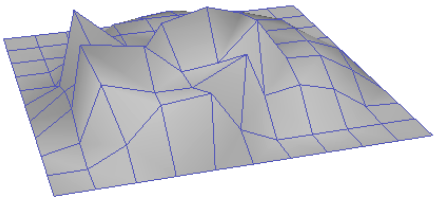


Figure 4-26 *Surface before smoothening*

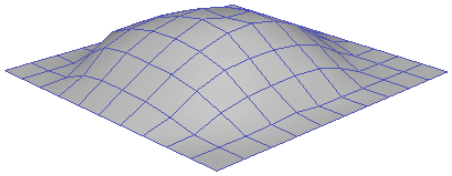


Figure 4-27 *Surface after smoothening*

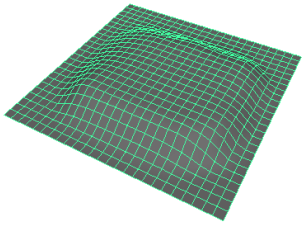


Figure 4-28 *Surface before sliding*

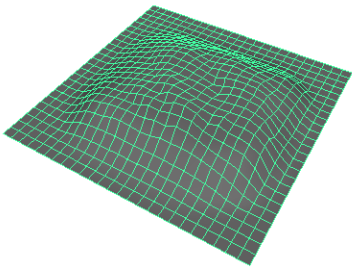


Figure 4-29 *Surface after sliding*

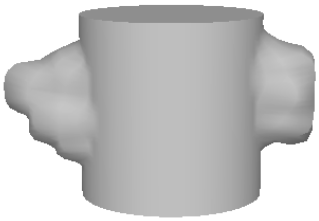


Figure 4-30 *Surface before erasing*

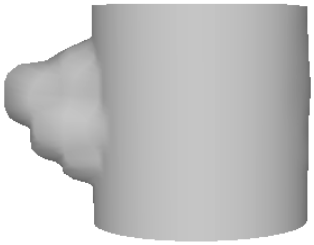


Figure 4-31 *Surface after erasing*

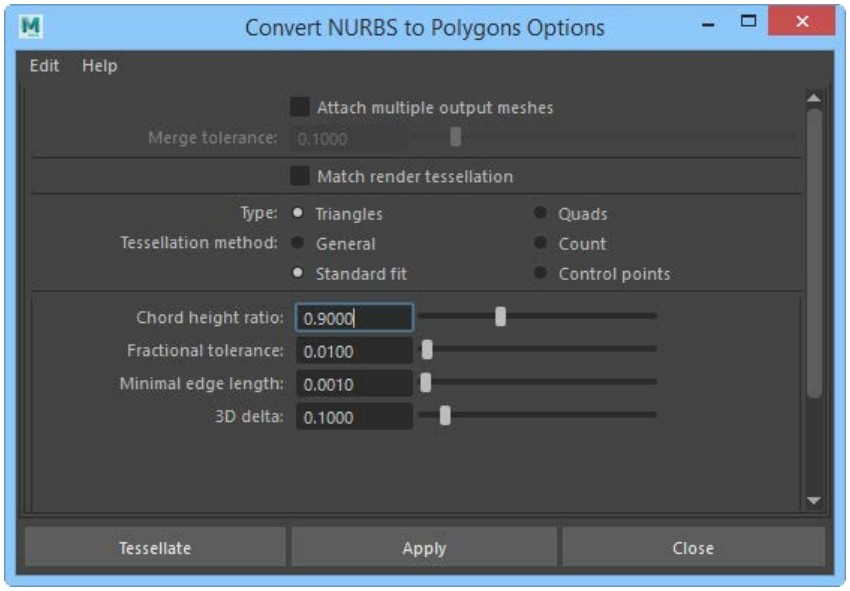


Figure 4-32 *The* ***Convert NURBS to Polygons Options*** *window*

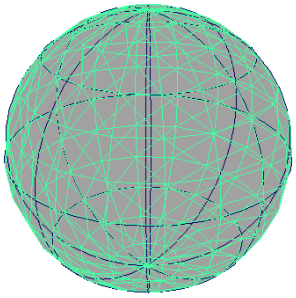


Figure 4-33 *Surface created on selecting the* ***Triangles*** *polygon type radio button*

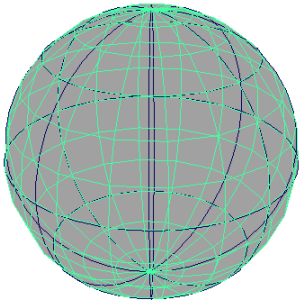


Figure 4-34 *Surface created on selecting the* ***Quads*** *polygon type radio button*

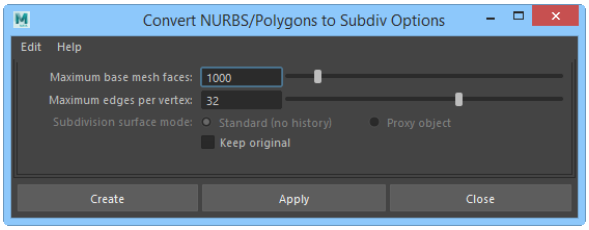


Figure 4-35 *The* ***Convert NURBS/Polygons to Subdiv Options*** *window*

Figure 4-36 *The model of a cowboy hat*

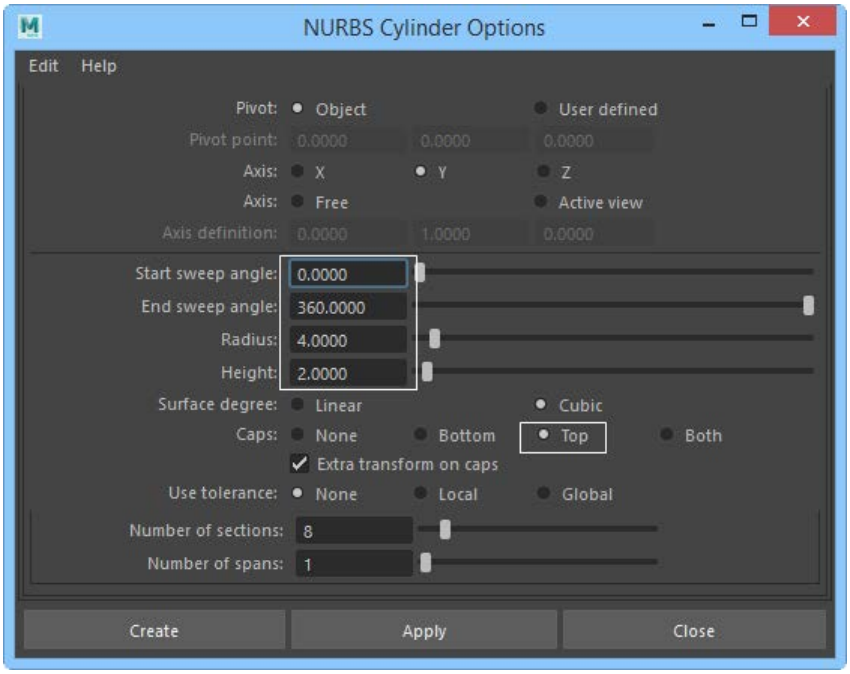


Figure 4-37 *The* ***NURBS Cylinder Options*** *window*

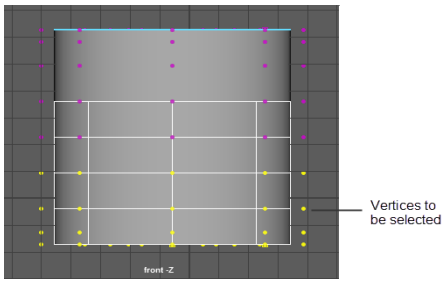


Figure 4-38 *Vertices to be selected*

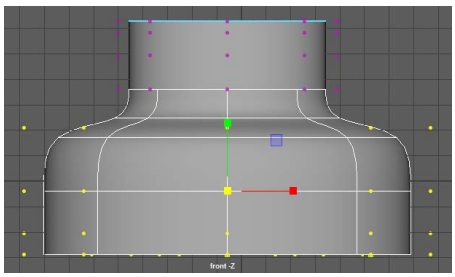


Figure 4-39 *Scaling the selected vertices uniformly*

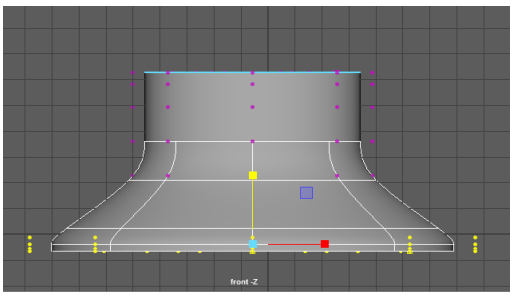


Figure 4-40 *Scaling the selected vertices along the Y axis*

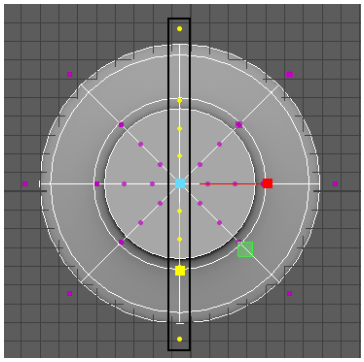


Figure 4-41 *The vertices selected*

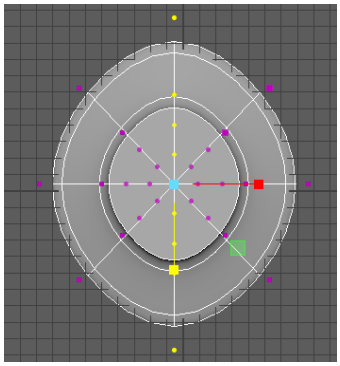


Figure 4-42 *Scaled mesh*

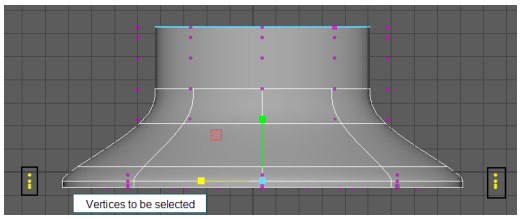


Figure 4-43 *Vertices to be selected*

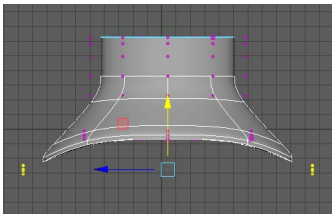


Figure 4-44 *The modified mesh after moving the vertices*

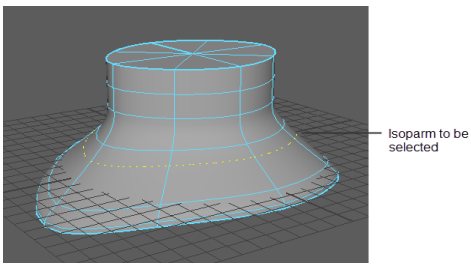


Figure 4-45 *Selecting an isoparm*

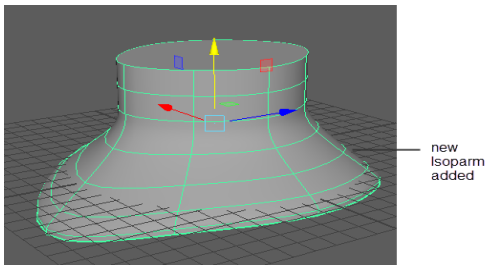


Figure 4-46 *A new isoparm added*

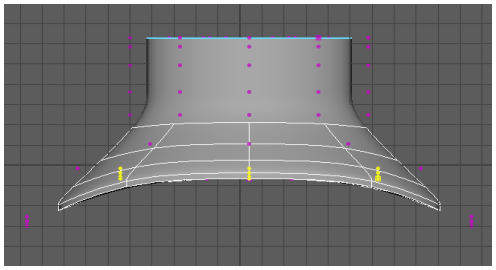


Figure 4-47 *Vertices to be selected*

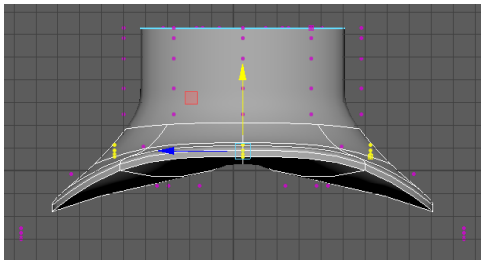


Figure 4-48 *The modified mesh*

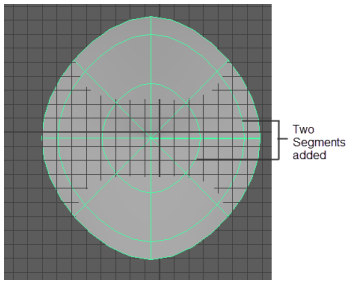


Figure 4-49 *The two new isoparms added*

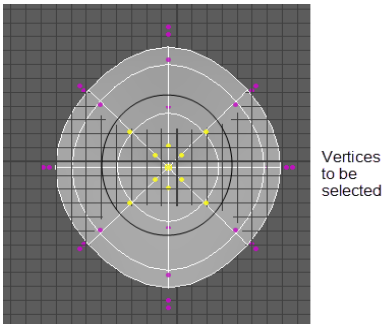


Figure 4-50 *Selecting vertices*

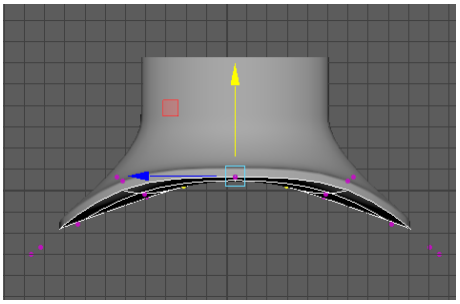


Figure 4-51 *The final output*

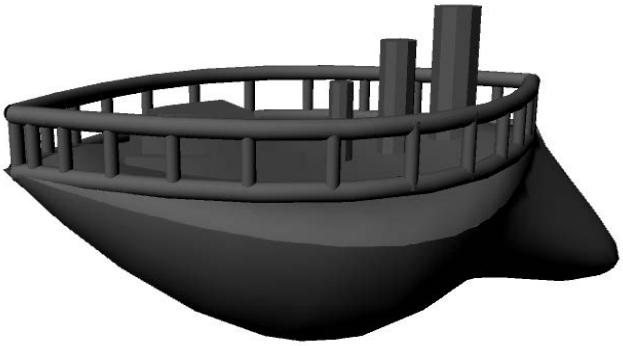


Figure 4-52 *Model of a ship*

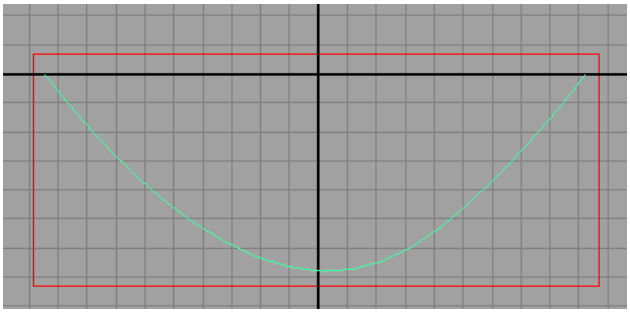


Figure 4-53 *Curve created for the base of the ship*

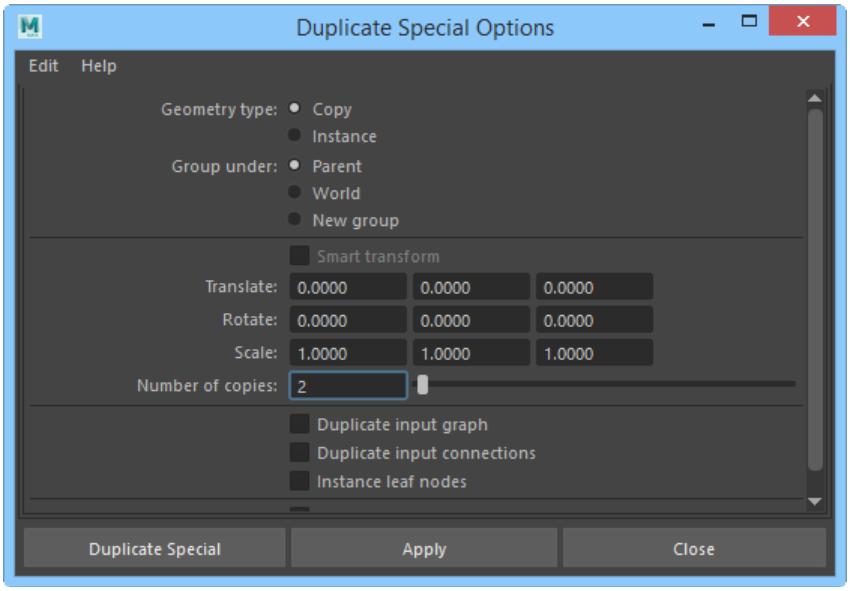


Figure 4-54 *The* ***Duplicate Special Options*** *window*

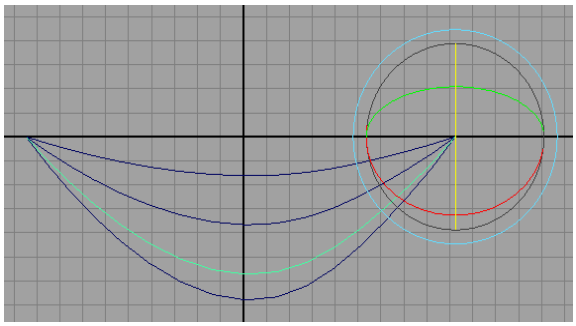


Figure 4-55 *The duplicate curve rotated*

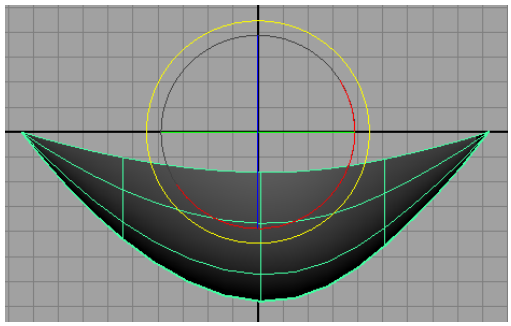


Figure 4-56 *Surface created*

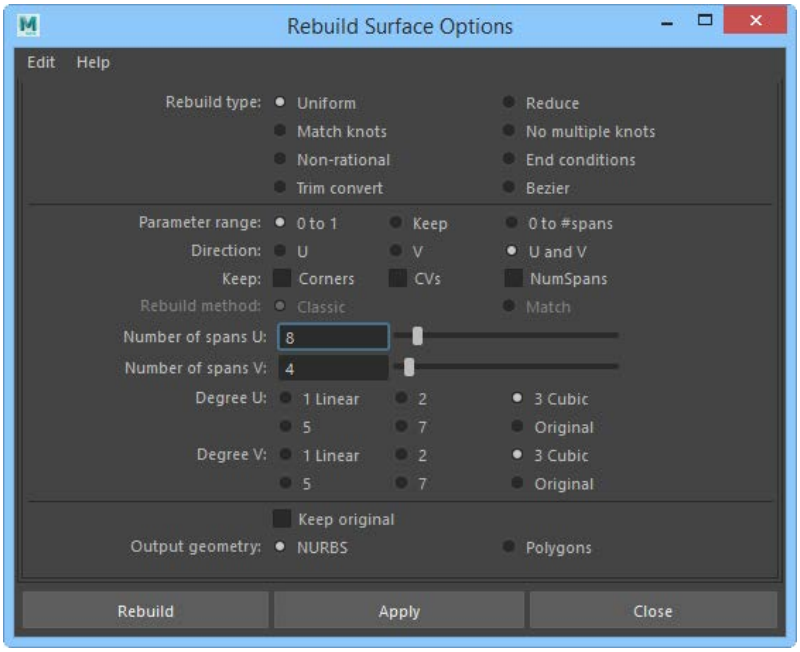


Figure 4-57 *The* ***Rebuild Surface Options*** *window*

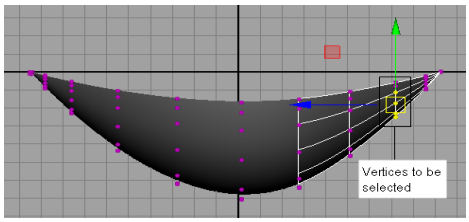


Figure 4-58 *Selecting vertices*

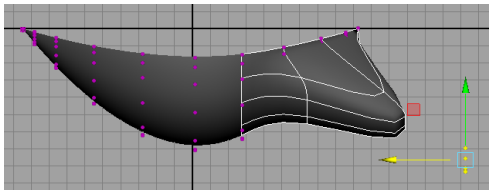


Figure 4-59 *Vertices moved downward to create the tail of the ship*

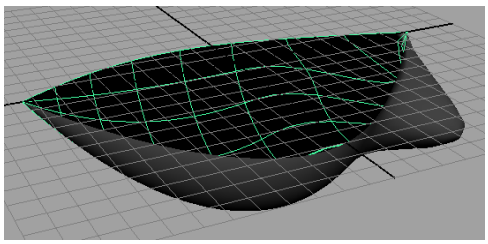


Figure 4-60 *The duplicate surface created*

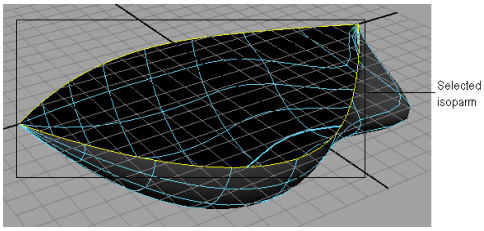


Figure 4-61 *The two selected isoparms*

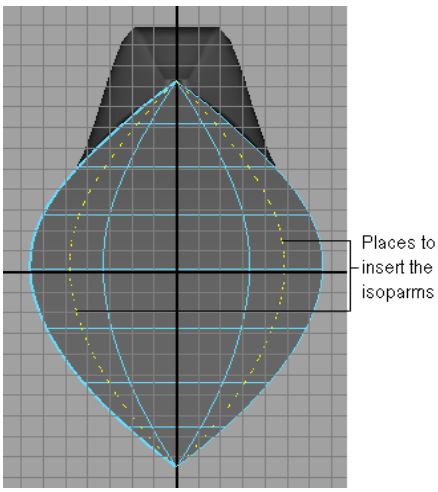


Figure 4-62 *Inserting isoparms*

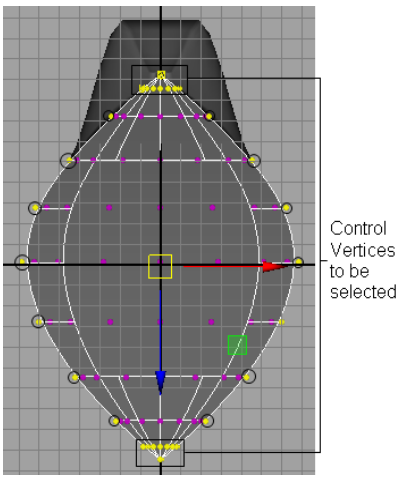


Figure 4-63 *The vertices selected*

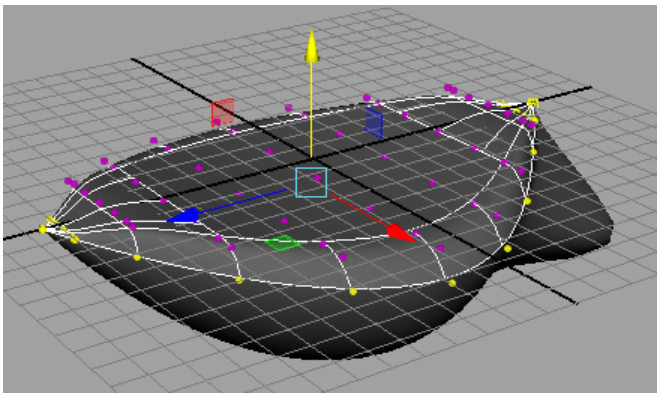


Figure 4-64 *Moving the vertices along the Y axis*

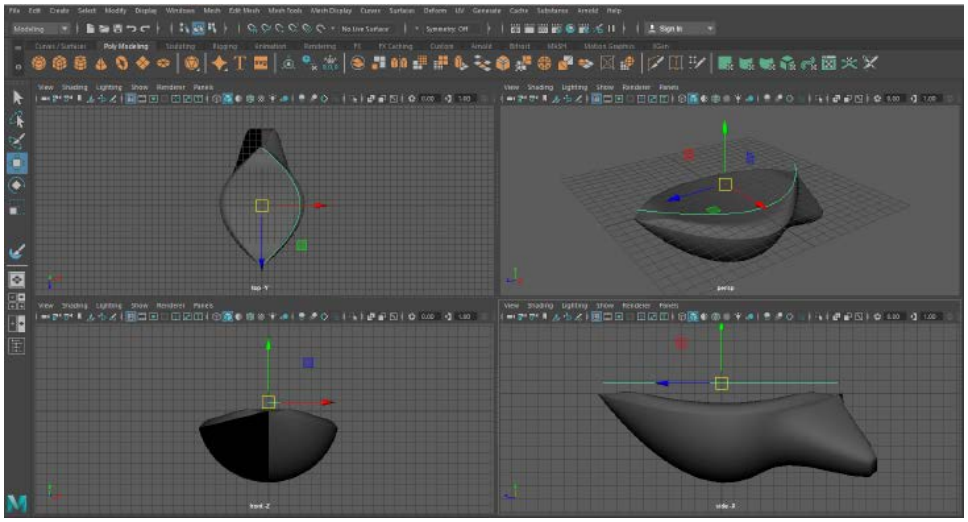


Figure 4-65 *The NURBS curve aligned in all viewports*

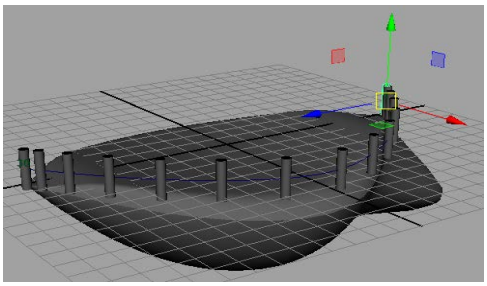


Figure 4-66 *The cylinders aligned on the curve surface*

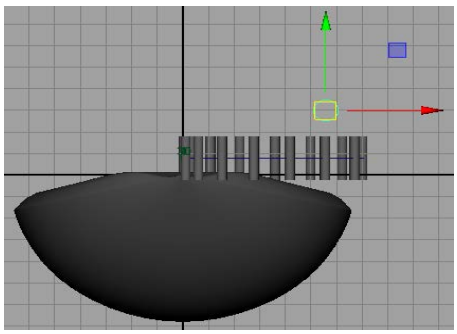


Figure 4-67 *The handrail created*

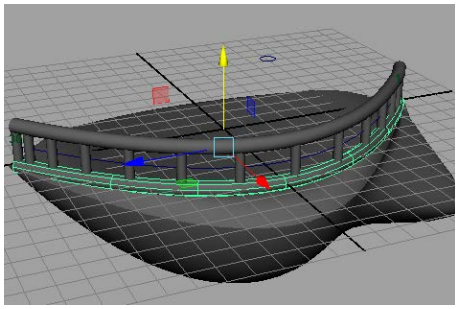


Figure 4-68 *The handrail aligned*

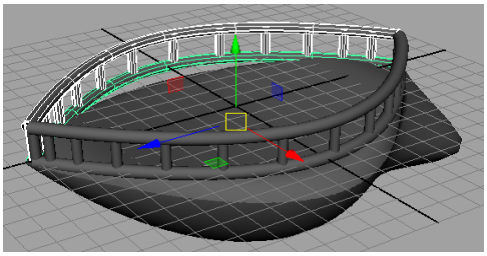


Figure 4-69 *Copied railing surface is reversed*

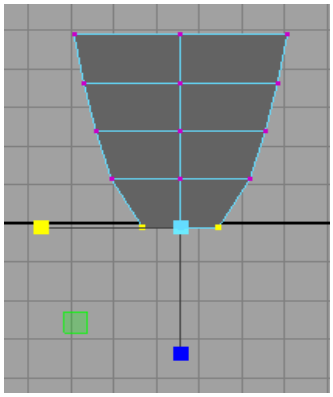


Figure 4-70 *The shape of the deck created*

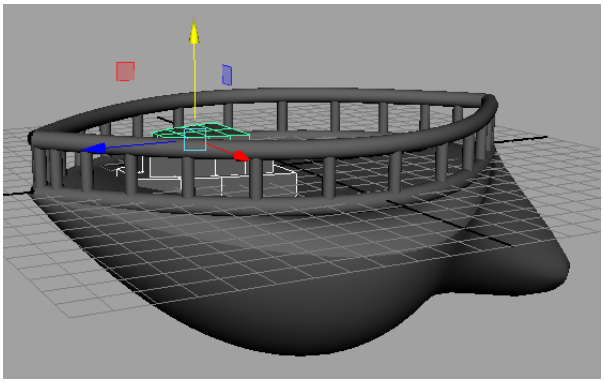


Figure 4-71 *The duplicate decks aligned together*

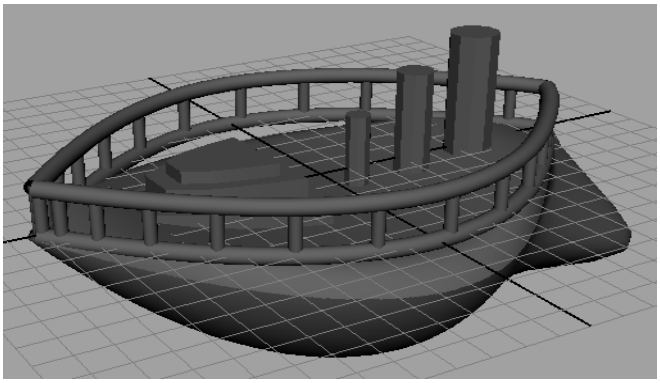


Figure 4-72 *The chimneys created*

Figure 4-73 *The model of a handbag*

Figure 4-74 *The model of a chair*

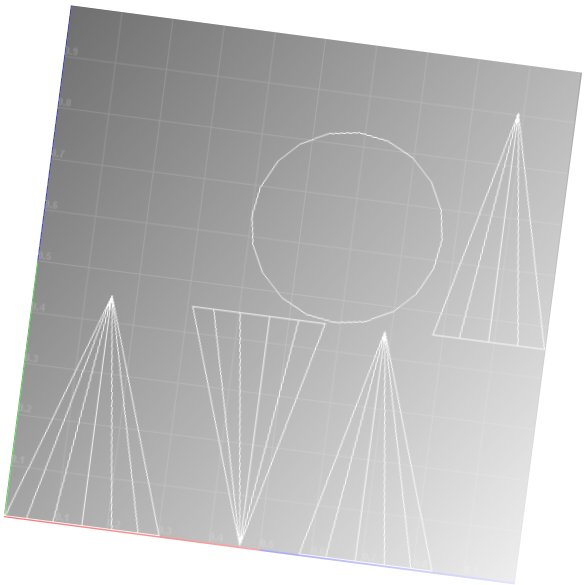
Chapter 5

UV Mapping

Learning Objectives

After completing this chapter, you will be able to:

- *Use different UV mapping techniques*
- *Use the UV Editor*
- *Use various tools and options in the UV Editor*



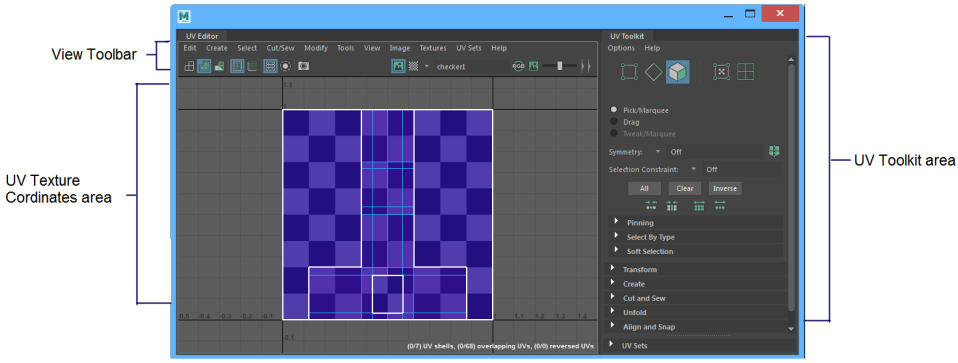


Figure 5-1 The ***UV Editor***

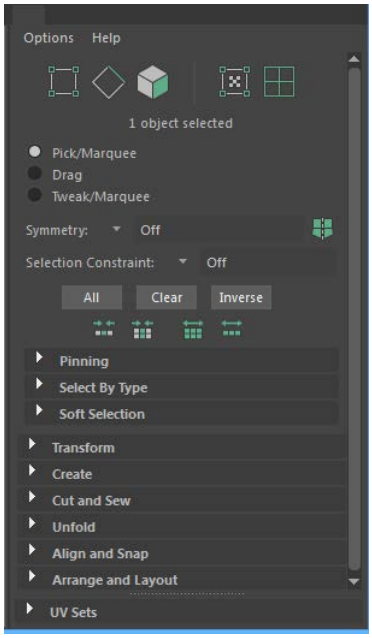


Figure 5-2 The ***UV Toolkit***

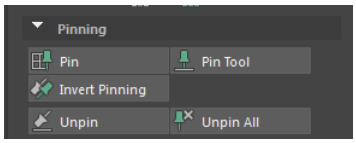


Figure 5-3 The ***Pinning*** *area*

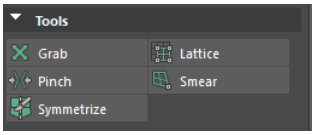


Figure 5-4 *The* ***Tools*** *area*

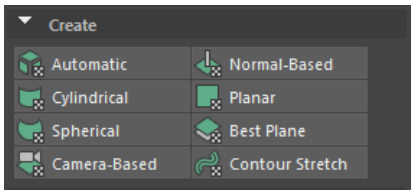


Figure 5-5 *The* ***Create*** *area*

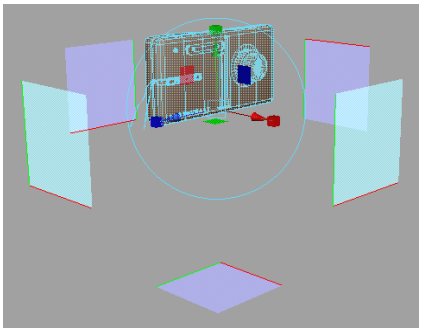


Figure 5-6 *The projection planes created on applying automatic mapping*

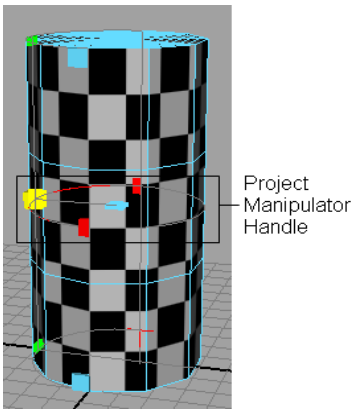


Figure 5-7 *The cylindrical mapping projection manipulators*

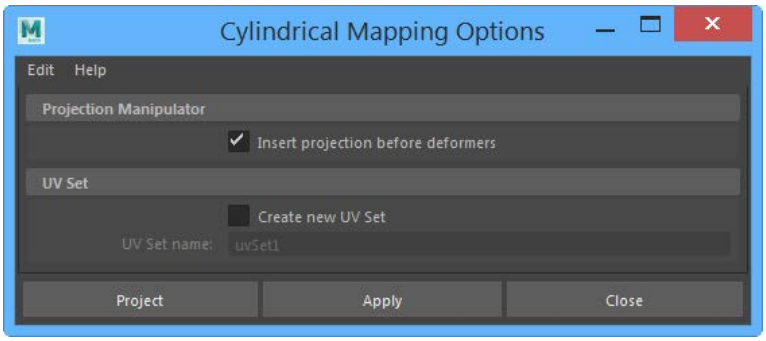


Figure 5-8 *The* ***Cylindrical Mapping Options*** *window*

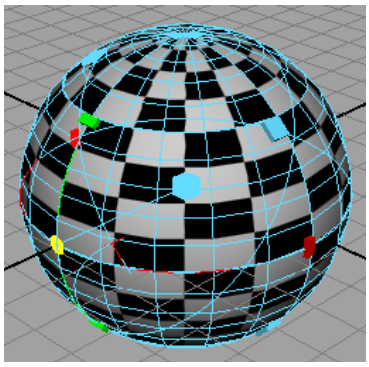


Figure 5-9 *The spherical mapping projection manipulators*

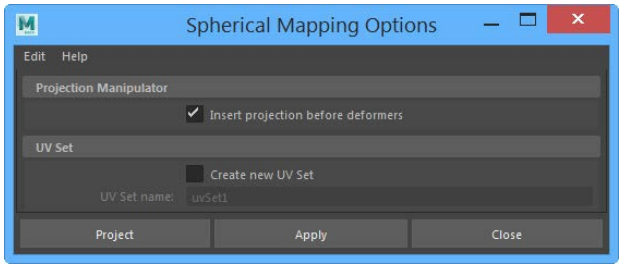


Figure 5-10 *The* ***Spherical Mapping Options*** *window*

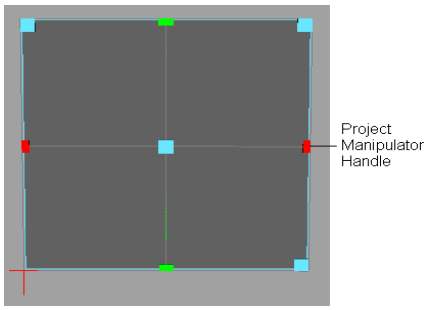


Figure 5-11 *The planar mapping projection manipulator handle*

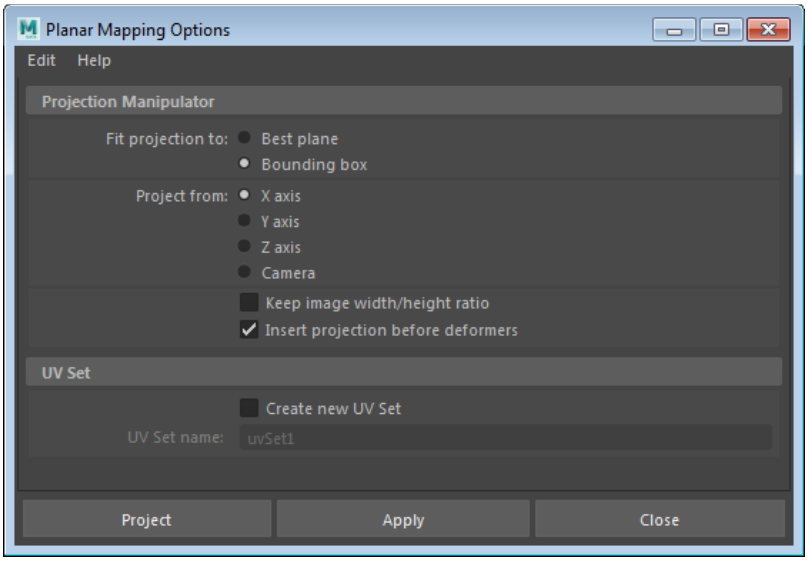


Figure 5-12 *The* ***Planar Mapping Options*** *window*

Figure 5-13 *The final rendered output of the model*

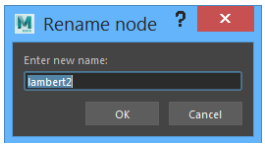


Figure 5-14 *The* ***Rename node*** *window*

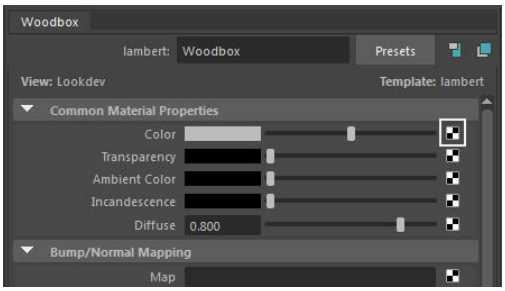


Figure 5-15 *Clicking on the checker button next to the* ***Color*** *attribute in the* ***Common Material Properties*** *panel*

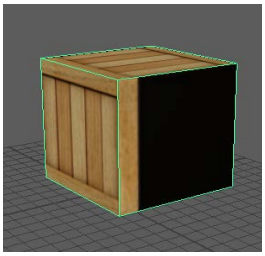


Figure 5-16 *The wood texture applied to the cube*

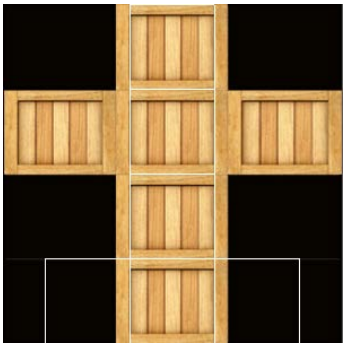


Figure 5-17 *The UV shell for cube*

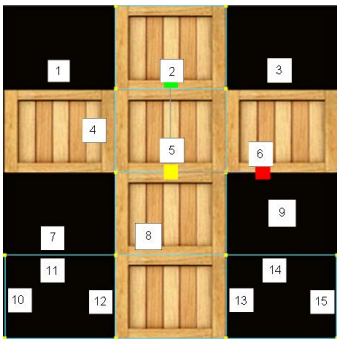


Figure 5-18 *The 2D UV texture coordinates after scaling*

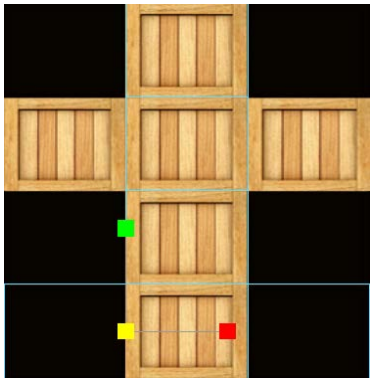


Figure 5-19 *Edge 12 to be selected from the* ***UV Editor***

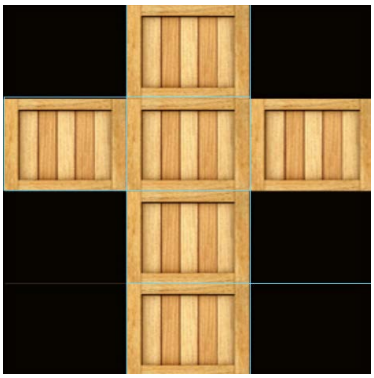


Figure 5-20 *The 2D UV coordinate partially mapped over the texture*

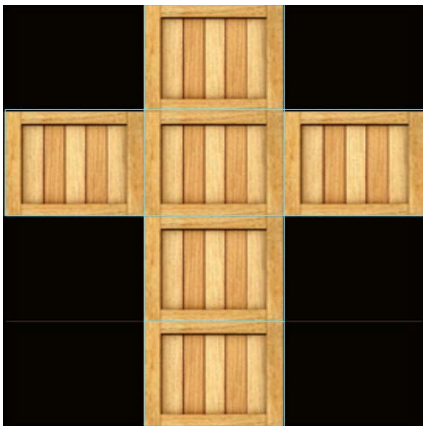


Figure 5-21 *The 2D UV coordinate completely mapped over the texture*

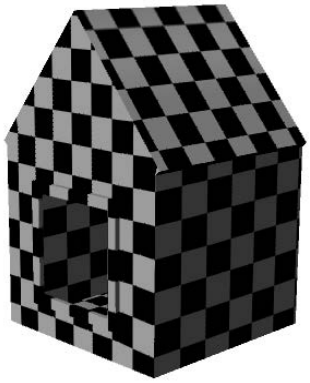


Figure 5-22 *Front view of the unwrapped model of the hut*

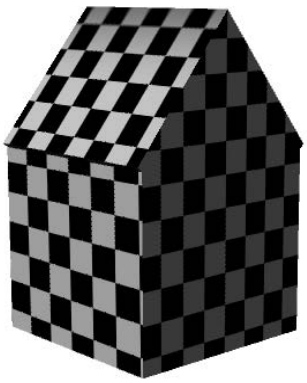


Figure 5-23 *Back view of the unwrapped model of the hut*

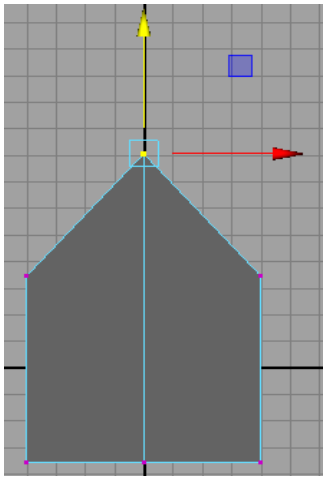


Figure 5-24 *Vertices moved upward*

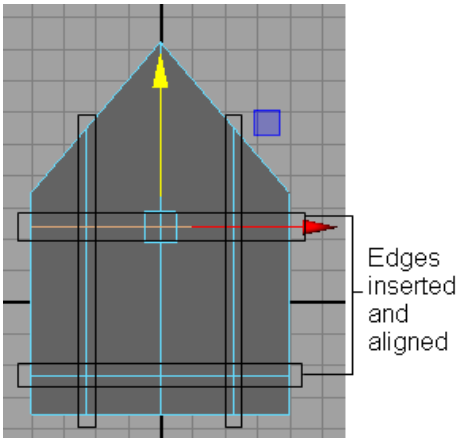


Figure 5-25 *Four edges inserted in the hut*

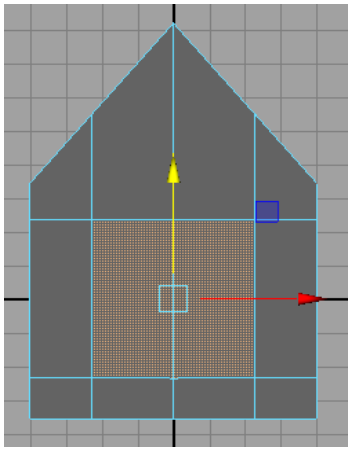


Figure 5-26 *The faces to be selected*

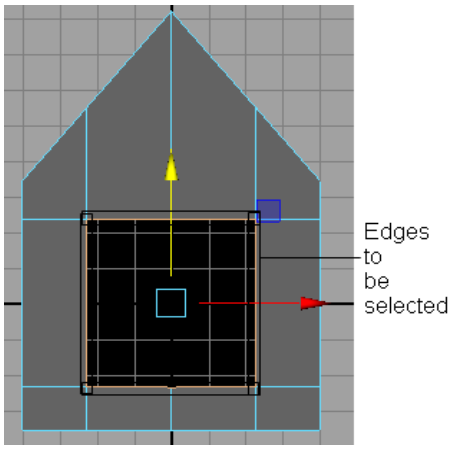


Figure 5-27 *The edges to be selected*

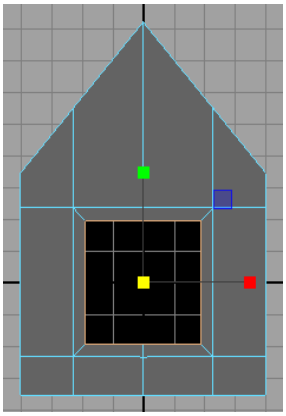


Figure 5-28 Scaling the edges of the hut inward

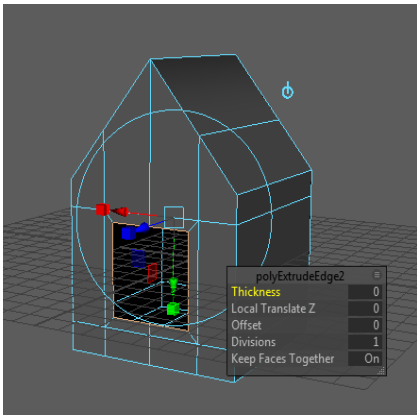


Figure 5-29 The faces of hut extruded

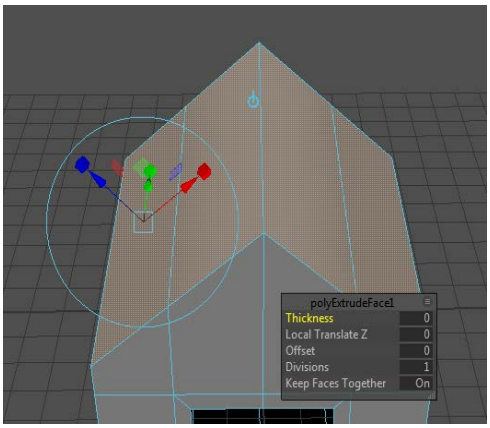


Figure 5-30 The selected faces of the hut

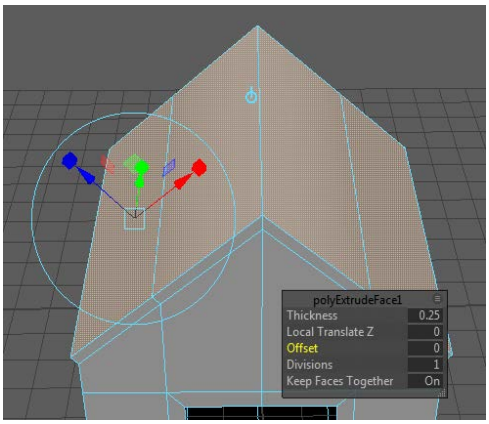


Figure 5-31 Selected faces of the hut extruded

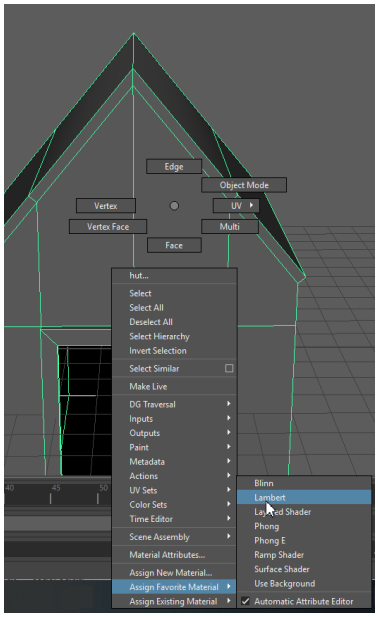


Figure 5-32 *Choosing the* ***Lambert*** *material from the marking menu*

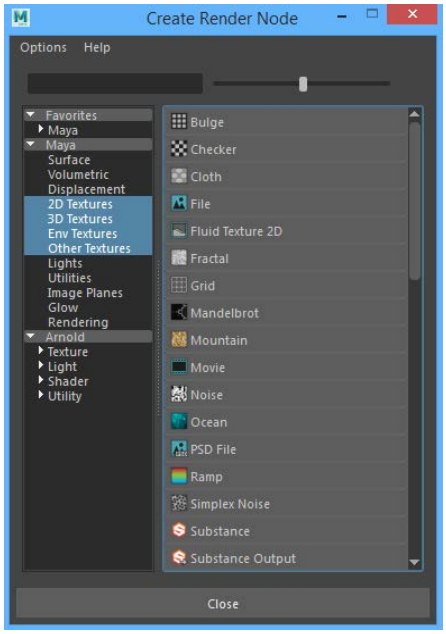


Figure 5-33 *Choosing the* ***Checker*** *button from the* ***Create Render Node*** *window*

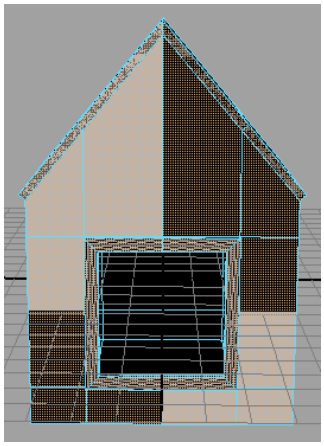


Figure 5-34 *Front faces of the hut selected*

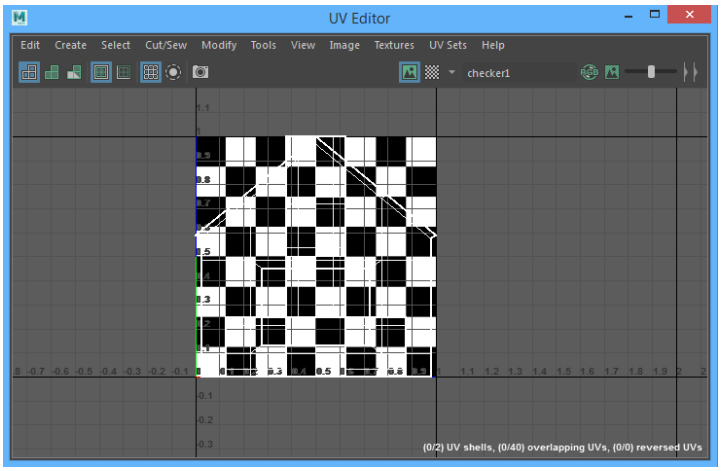


Figure 5-35 *The* ***UV Editor*** *displaying the unwrapped hut*

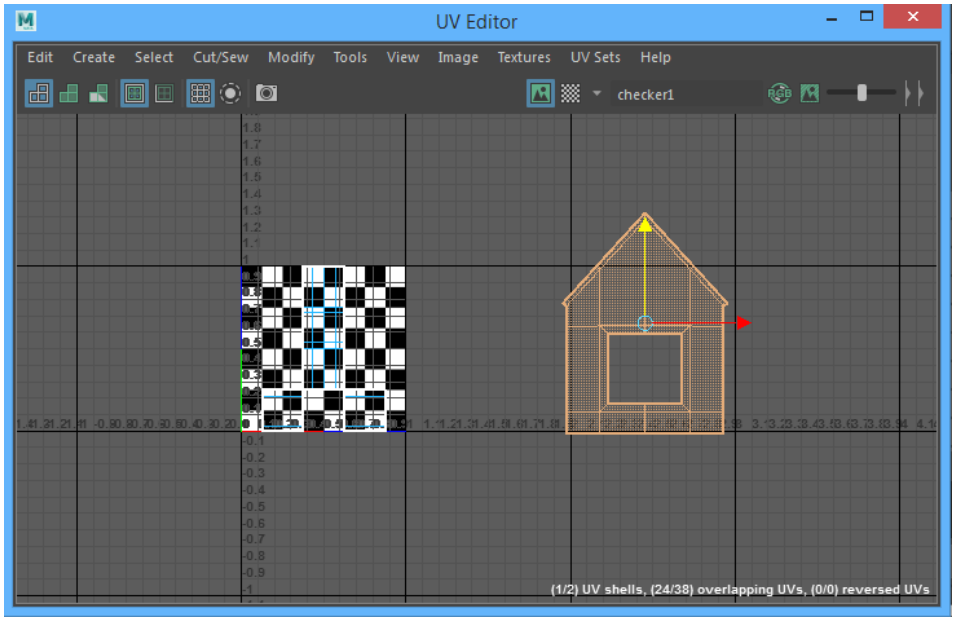


Figure 5-36 *Scaling the front part of the hut*

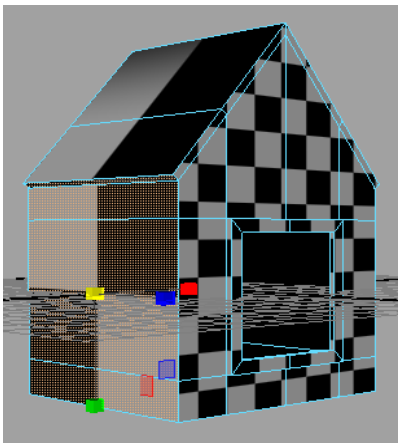


Figure 5-37 *Faces of the left part of hut selected*

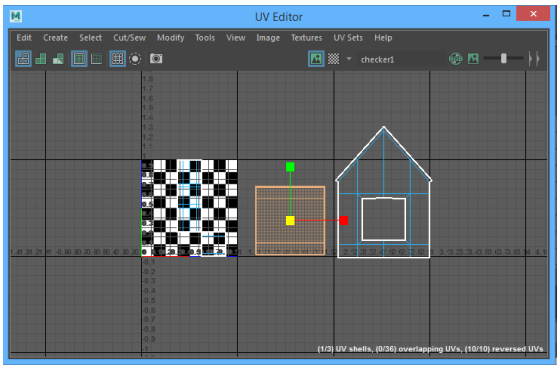


Figure 5-38 *Scaling the UVs of side and front parts of the hut*

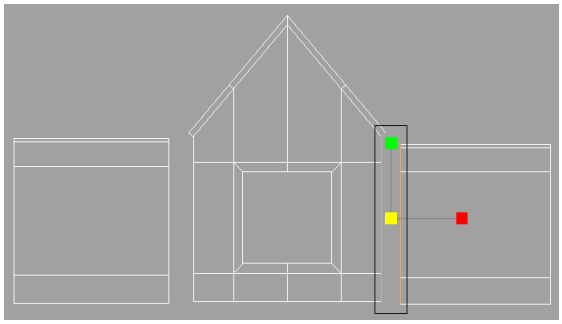


Figure 5-39 *Right edge of the front part selected*

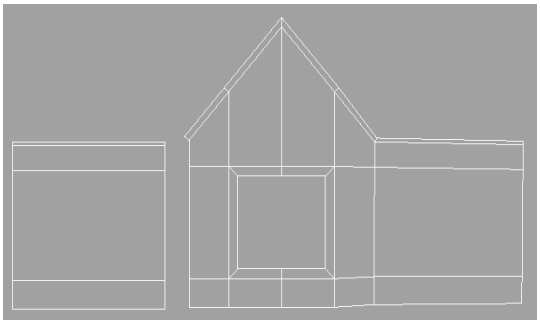


Figure 5-40 *The right side edges of the front attached to left side edges of the right part*

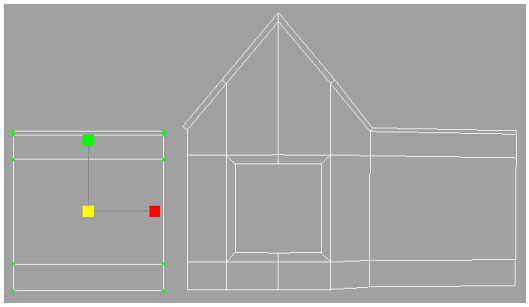


Figure 5-41 *UVs of the left part selected*

Figure 5-42 *Front and left parts of the hut*

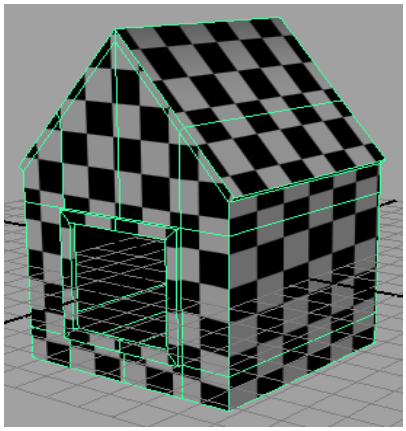


Figure 5-43 *Final model of hut with uniform distribution of checkers*

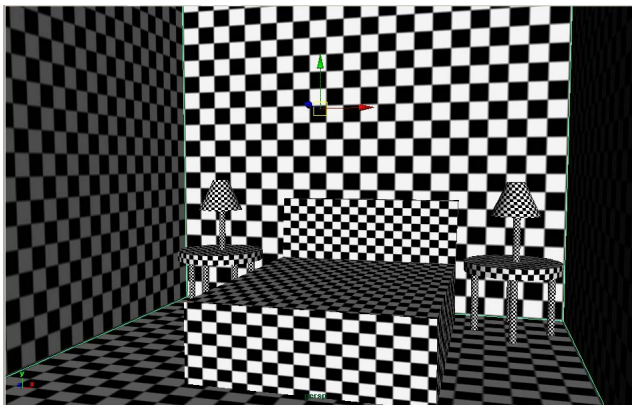


Figure 5-44 *The unwrapped model of the interior of a house*

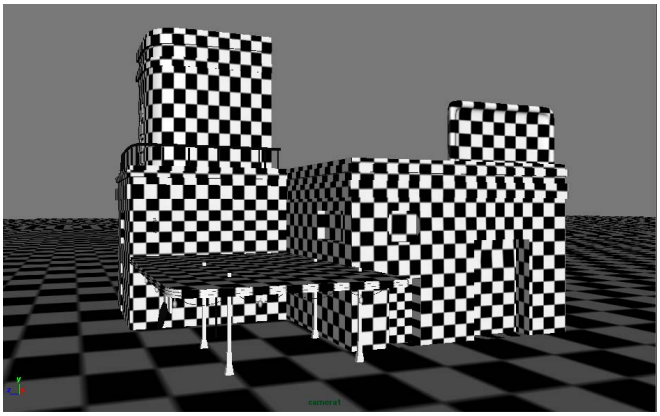


Figure 5-45 *The unwrapped model of the exterior of a house*

Chapter 6

Shading and Texturing

Learning Objectives

After completing this chapter, you will be able to:

- *Navigate in the Hypershade window*
- *Use shaders*
- *Apply textures and colors to objects*

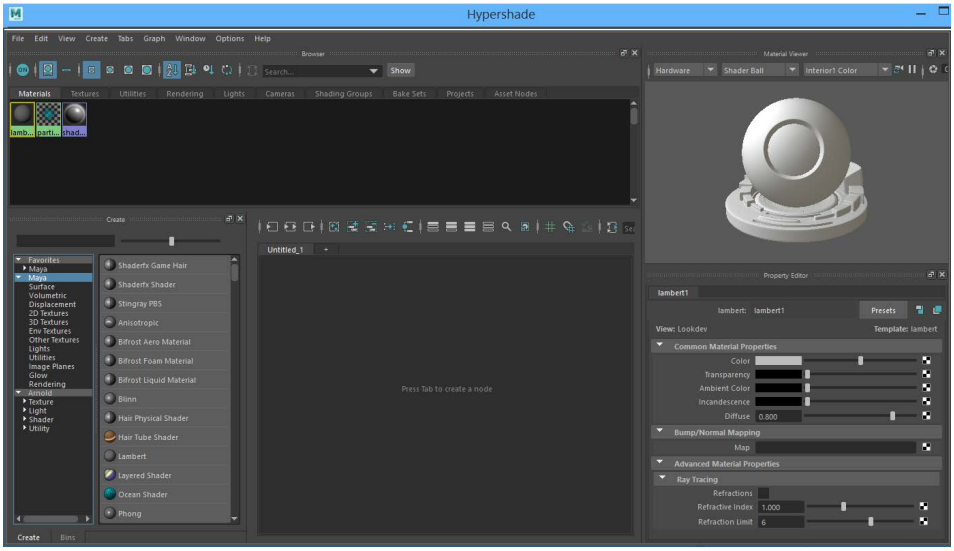


Figure 6-1 *The* ***Hypershade*** *window*

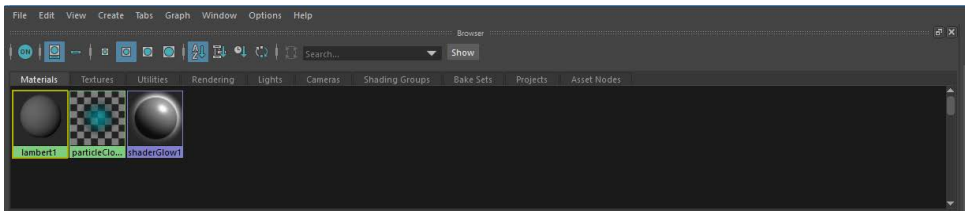


Figure 6-2 *The* ***Browser*** *tab in the* ***Hypershade*** *window*

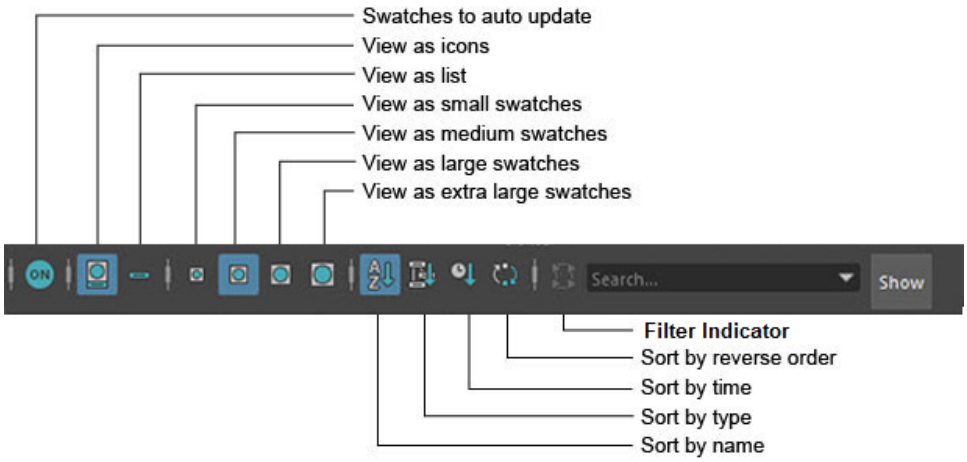


Figure 6-3 *The Browser panel toolbar in the* ***Hypershade*** *window*

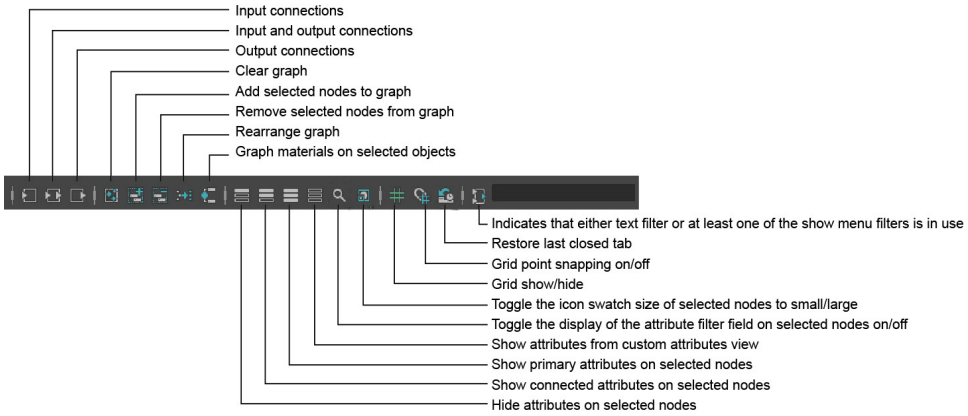


Figure 6-4 *The main toolbar of the* ***Hypershade*** *window*

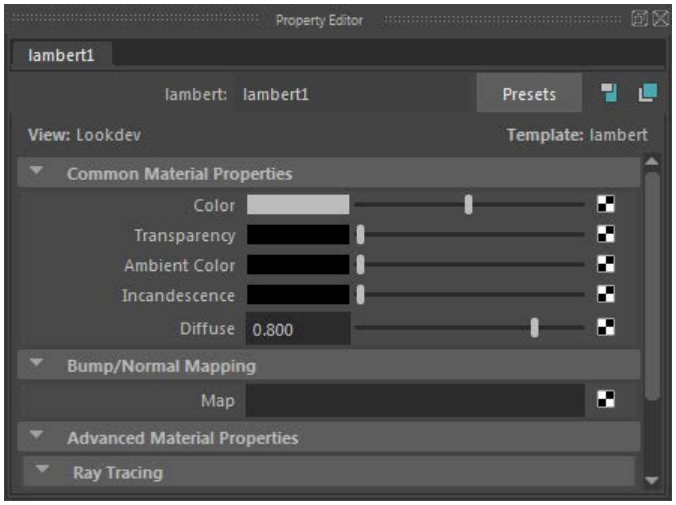


Figure 6-5 *The* ***Property Editor*** *displaying the Lambert shader attributes*

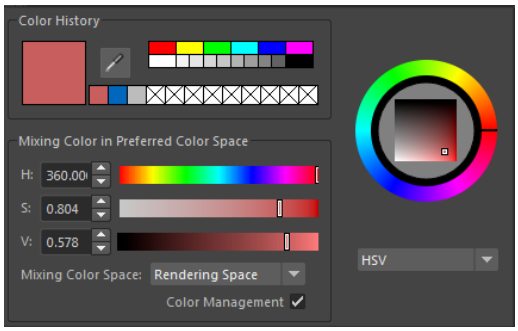


Figure 6-6 *The* ***Color History*** *palette*

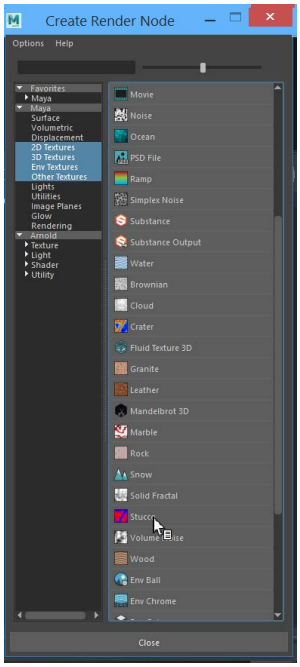


Figure 6-7 *The* ***Create Render Node*** *window*

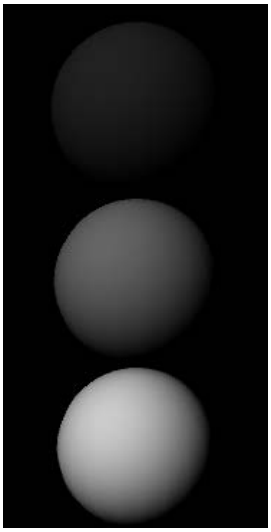


Figure 6-8 *The spheres showing the effect of the* ***Ambient Color*** *attribute*

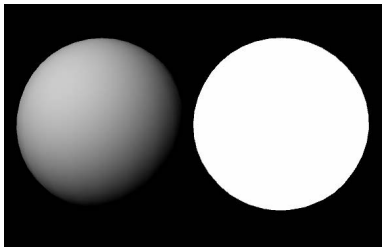


Figure 6-9 *Spheres showing the effect of the* ***Incandescence*** *attribute*

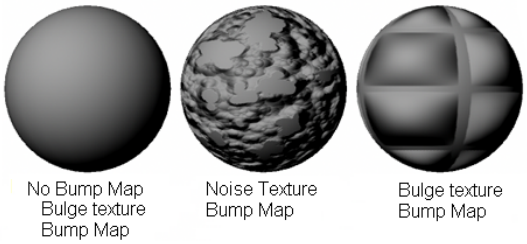


Figure 6-10 *Object after applying different textures to the* ***Bump Mapping*** *attribute*

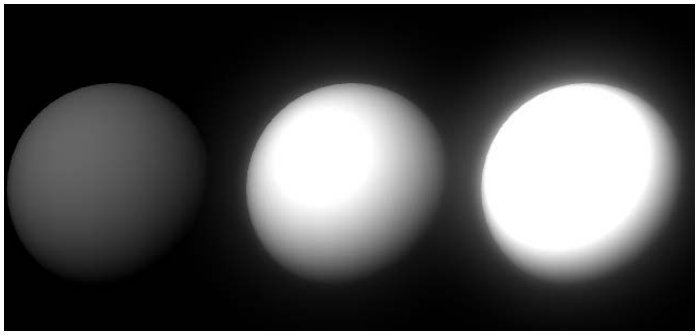


Figure 6-11 *Spheres with different glow intensities*

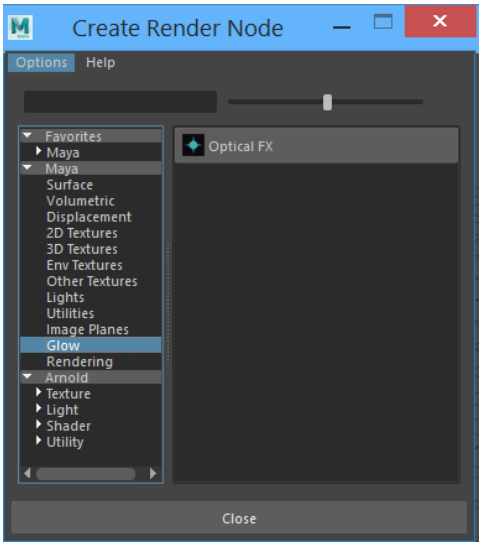


Figure 6-12 *The* ***Optical FX*** *option displayed*

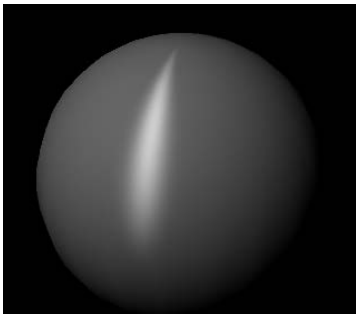


Figure 6-13 *The* ***Anisotropic*** *shader applied to an object*

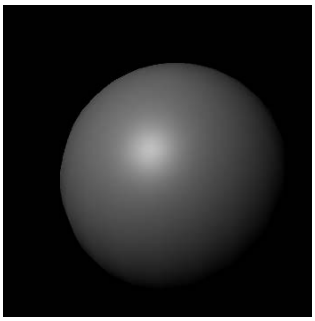


Figure 6-14 *The* ***Blinn*** *shader applied to a sphere*

Figure 6-15 *The* ***Lambert*** *shader applied to a sphere*

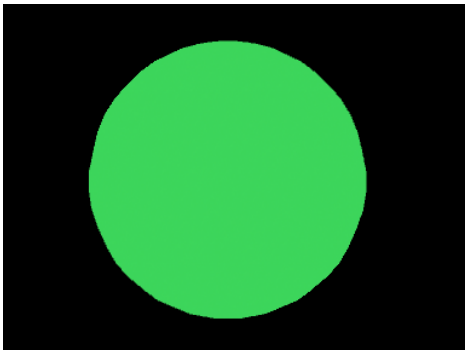


Figure 6-16 *The* ***Layered Shader*** *applied to an object*

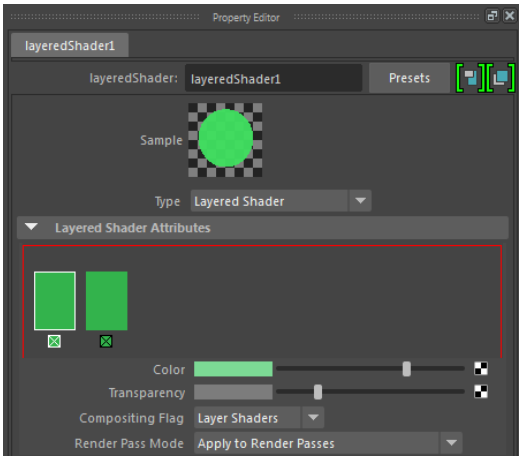


Figure 6-17 *The* ***layeredShader1*** *tab in the* ***Property Editor***

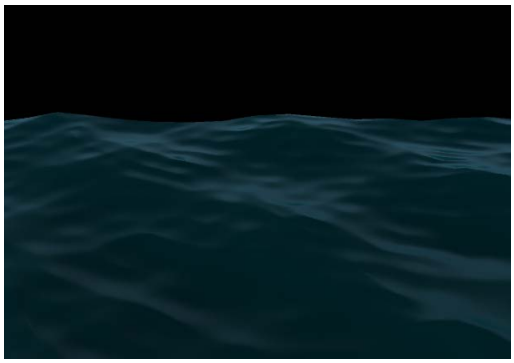


Figure 6-18 *The plane rendered using* ***Ocean Shader***

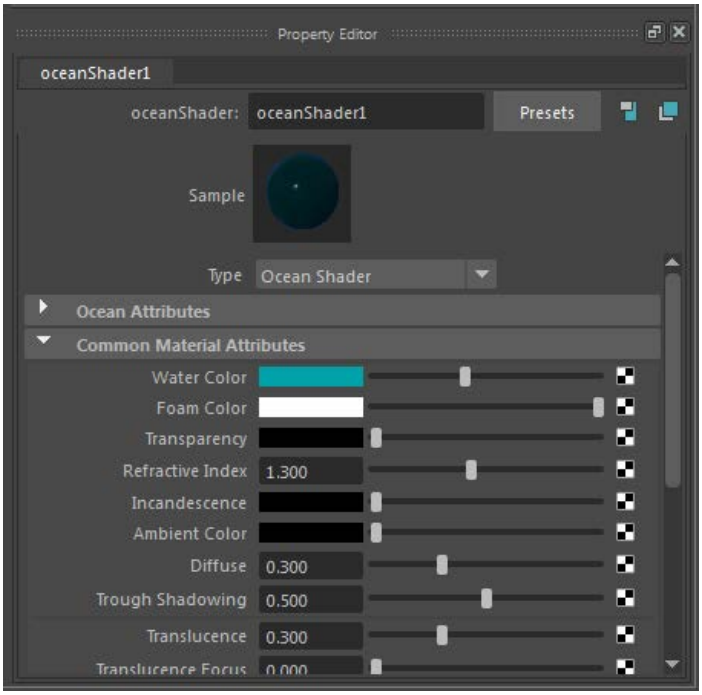


Figure 6-19 *The* ***Common Material Attributes*** *area of the* ***Ocean Shader***

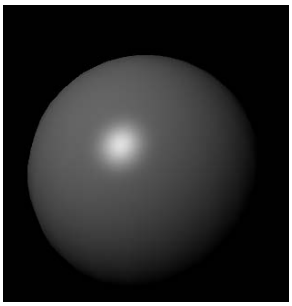


Figure 6-20 *The* ***Phong*** *shader applied to a sphere*

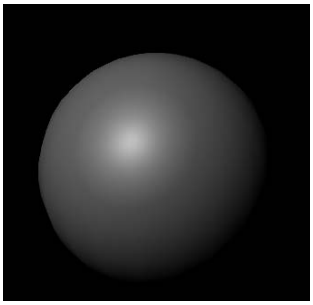


Figure 6-21 *The* ***Phong E*** *shader applied to a sphere*

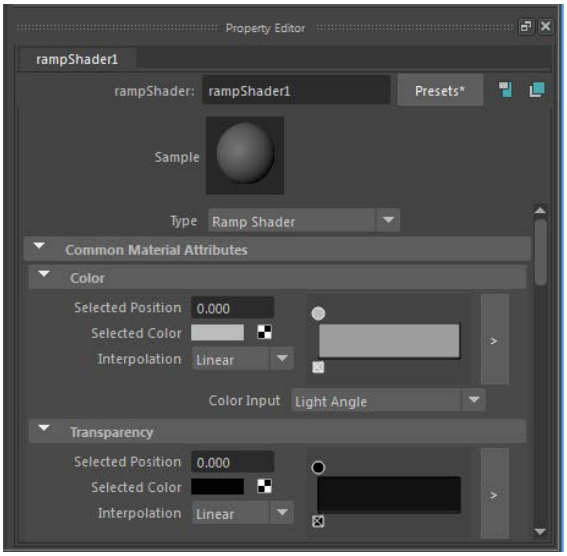


Figure 6-22 *The* ***rampShader1*** *tab in the* ***Property Editor***

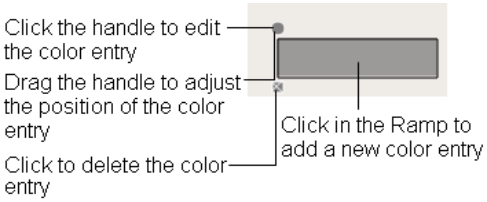


Figure 6-23 *The color ramp in the* ***Color*** *area of the* ***rampShader1***

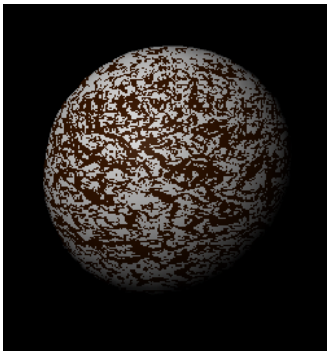


Figure 6-24 *The* ***Ramp Shader*** *applied to sphere*

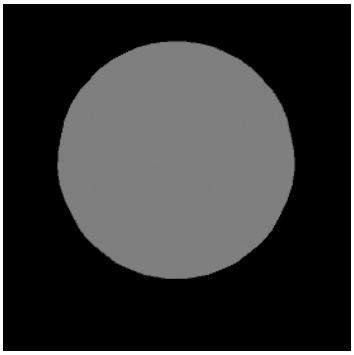


Figure 6-25 *The* ***Shading Map*** *shader applied to sphere*

Figure 6-26 *The textured model of the cube*

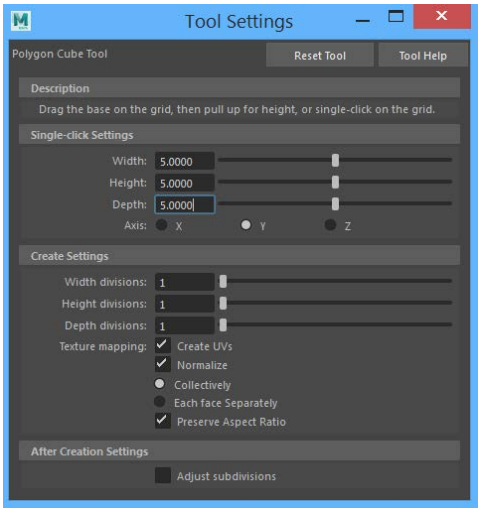


Figure 6-27 *The* ***Tool Settings (Polygon Cube Tool)*** *window*

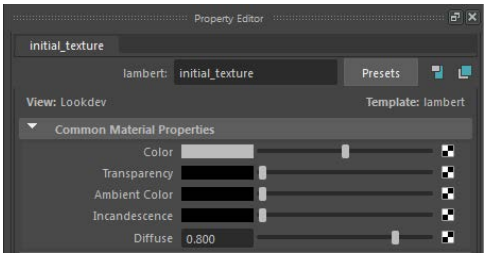


Figure 6-28 *Choosing the checker button corresponding to the* ***Color*** *attribute*

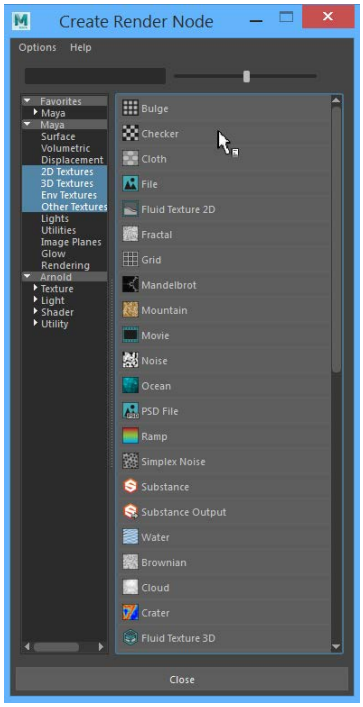


Figure 6-29 *Choosing the* ***Checker*** *button from the* ***Create Render Node*** *window*

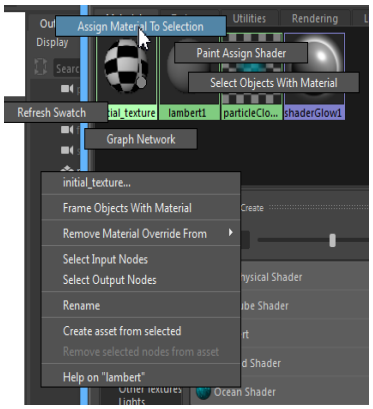


Figure 6-30 *Choosing* ***Assign Material To Selection*** *from the marking menu*

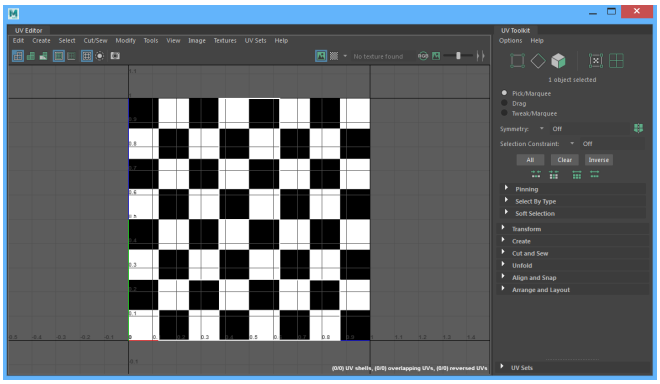


Figure 6-31 *The* ***UV Editor***

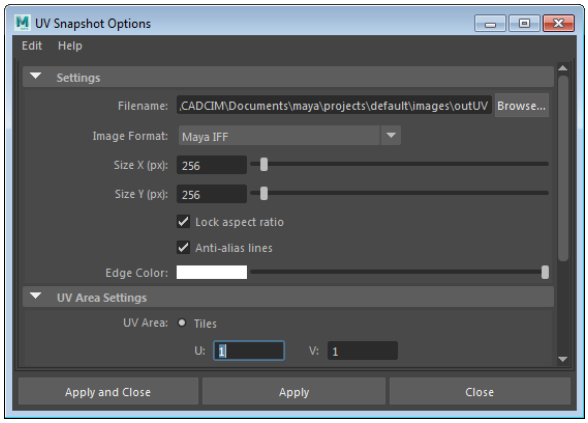


Figure 6-32 *The* ***UV Snapshot*** *window*

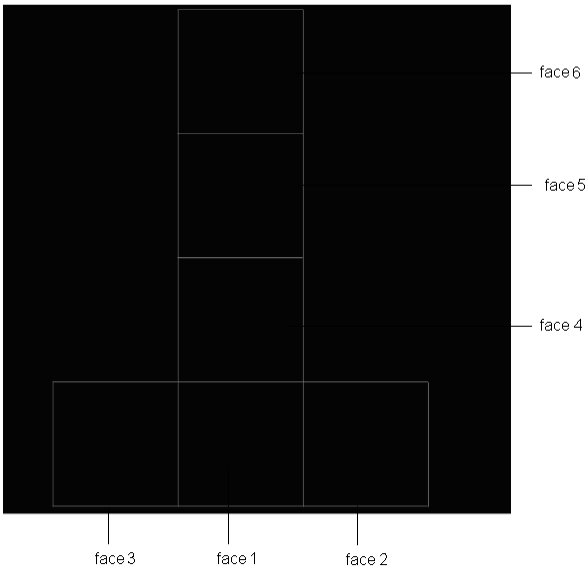


Figure 6-33 *UVs in the canvas area of Photoshop*

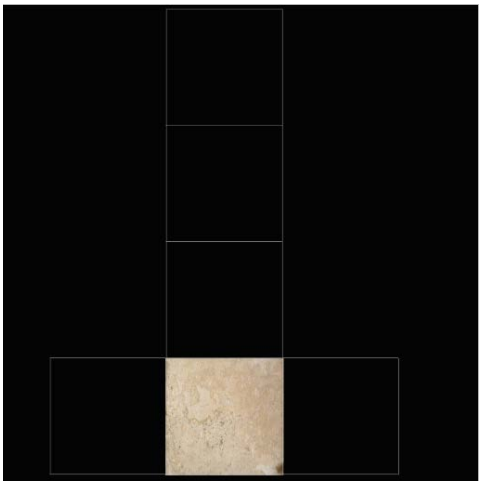


Figure 6-34 *Fitting the image into the face 1*

Figure 6-35 *Different patterns created on the image*

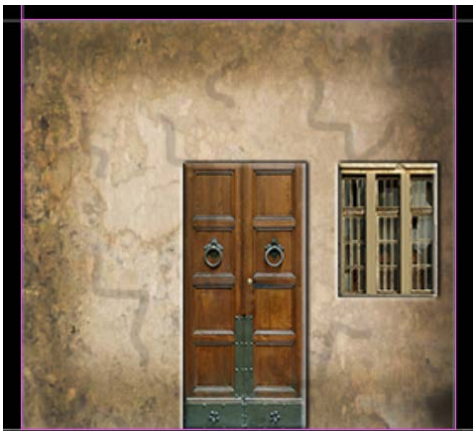


Figure 6-36 *The textures placed on the face 1*

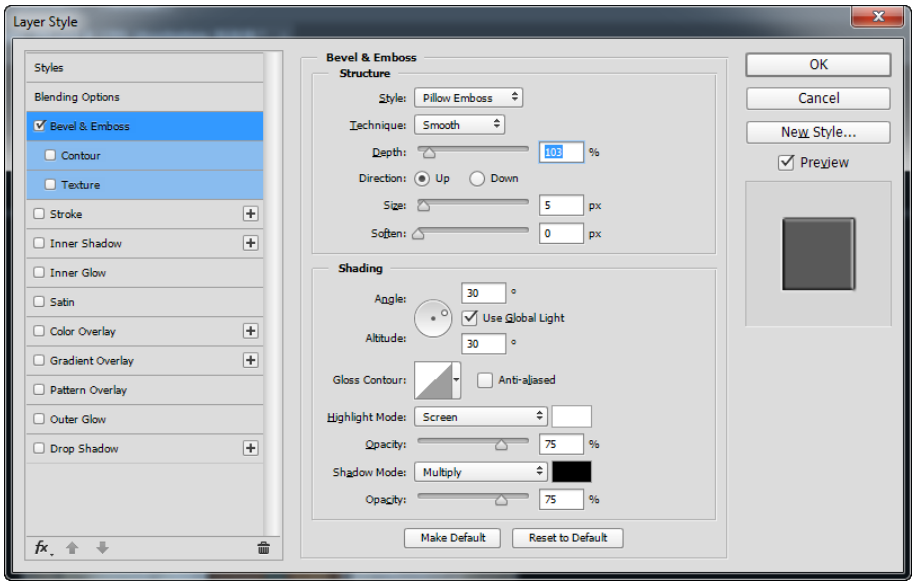


Figure 6-37 *The* ***Layer Style*** *dialog box*

Figure 6-38 *A copy of window created on face 1*

Figure 6-39 *Patterns created on face 2 and face 3*

Figure 6-40 *Patterns created on all faces*

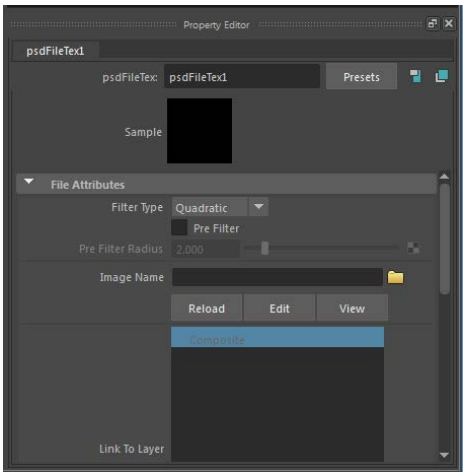


Figure 6-41 *The* ***psdFileTex1*** *tab*

Figure 6-42 *The texture applied to all sides of the cube*

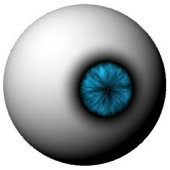


Figure 6-43 *Model of an eyeball*

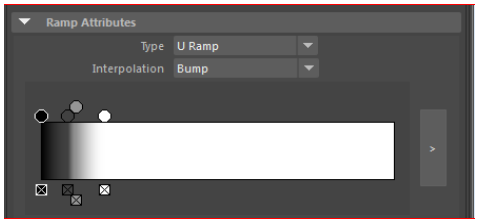


Figure 6-44 *The nodes in the color area of the* ***ramp1*** *shader*

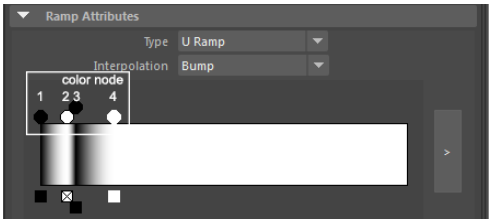


Figure 6-45 *The color nodes arranged in the color area*

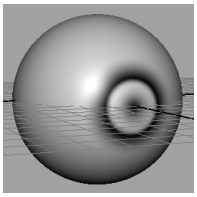


Figure 6-46 *Initial eyeball material applied to the NURBS sphere*

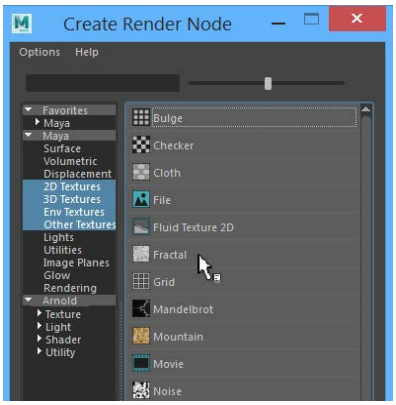


Figure 6-47 *Choosing* ***Fractal*** *from the* ***Create Render Node*** *window*

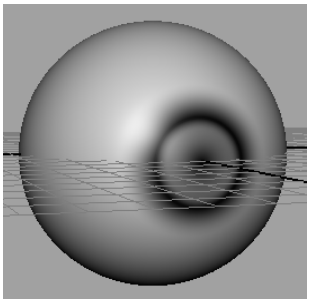


Figure 6-48 *Eyeball after applying the fractal texture*

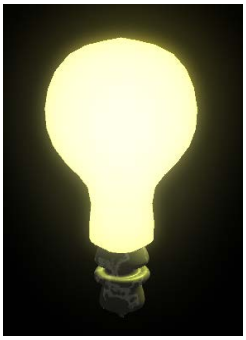


Figure 6-49 *The final rendered output*

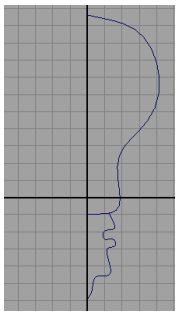


Figure 6-50 *The profile curves for the bulb*

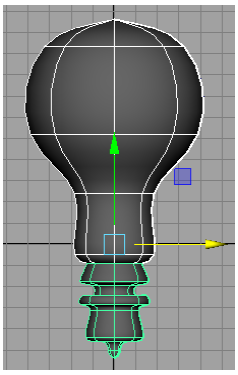


Figure 6-51 *The bulb created using the* ***Revolve*** *tool*

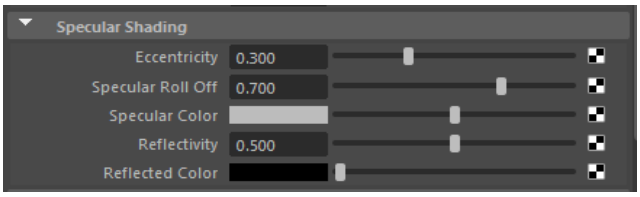


Figure 6-52 *The* ***Specular Shading*** *area*

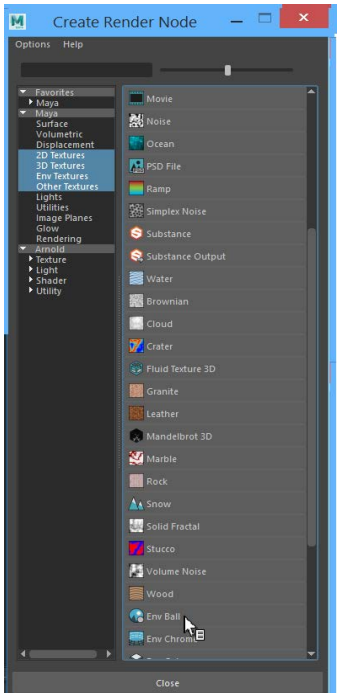


Figure 6-53 *Choosing* ***Env Ball*** *from the* ***Create Render Node*** *window*

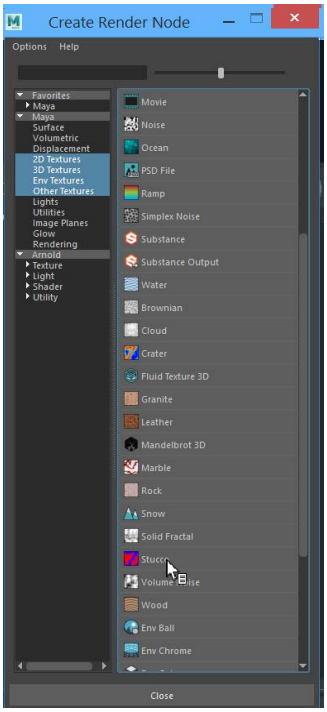


Figure 6-54 *Choosing* ***Stucco*** *from the* ***Create Render Node*** *window*

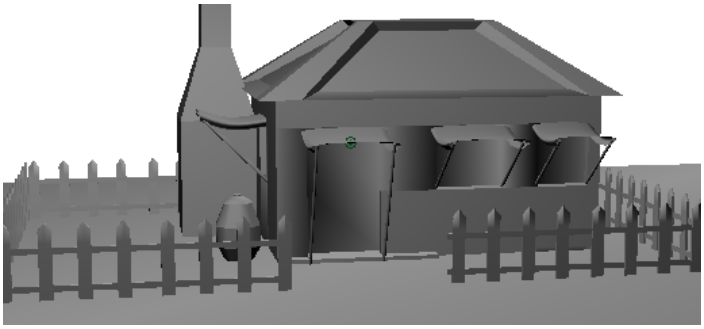


Figure 6-55 *The house model before applying the textures*

Figure 6-56 *The house model after applying the textures*

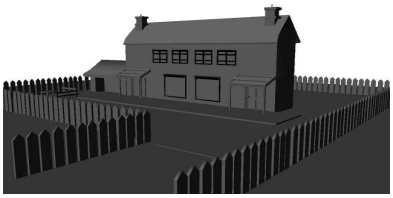


Figure 6-57 *The house model before applying the textures*

Figure 6-58 *The house model after applying the textures*

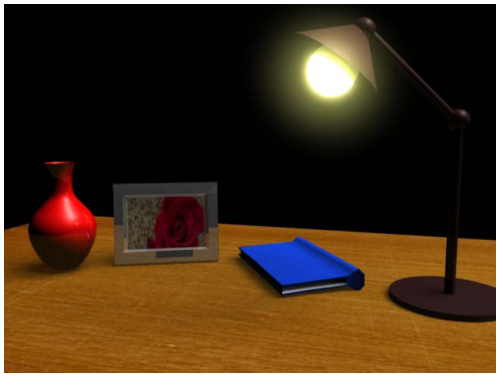


Figure 6-59 *Model of a study table after applying textures*

Chapter 7

Lighting

Learning Objectives

After completing this chapter, you will be able to:

- *Work with standard Maya lights*
- *Add glow and halo effects to lights*
- *Apply the Physical Sun and Sky effect to a scene*
- *Work with the camera*

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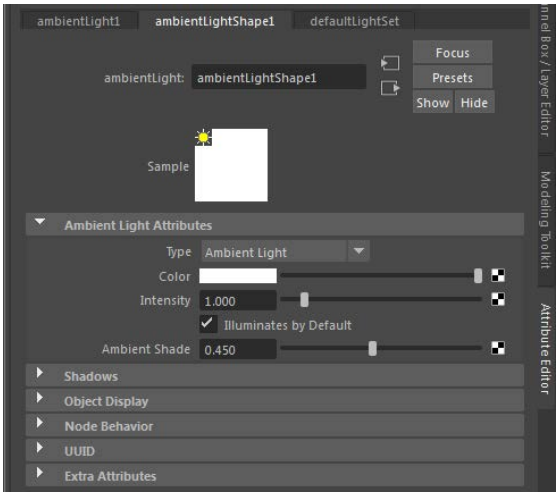


Figure 7-1 *The* ***Ambient Light Attributes*** *area*

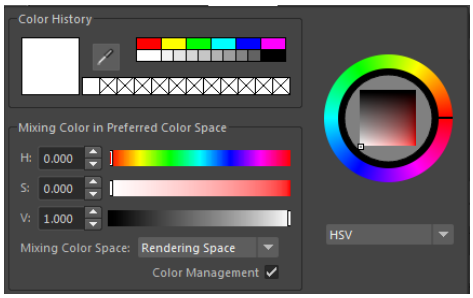


Figure 7-2 *The* ***Color History*** *palette*

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

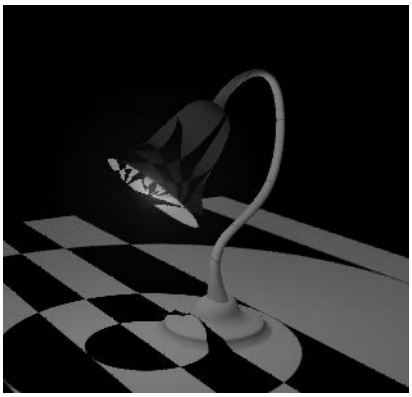


Figure 7-4 *Ambient light with the checker map assigned to the* ***Color*** *attribute*

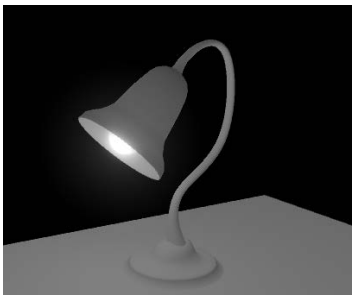


Figure 7-5 *Ambient light with the* ***Ambient Shade*** *value set to* ***0.25***

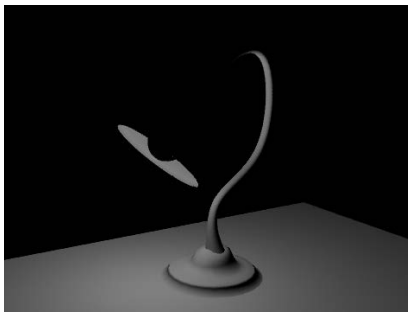


Figure 7-6 *Ambient light with the* ***Ambient Shade*** *value set to* ***1***

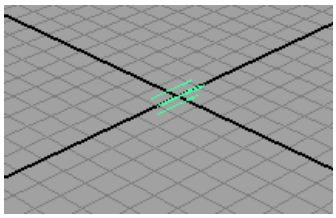


Figure 7-7 *A directional light created*

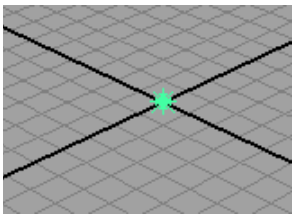


Figure 7-8 *A point light created*

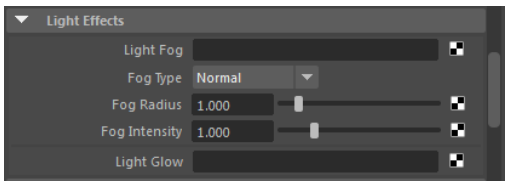


Figure 7-9 *The* ***Light Effects*** *area*

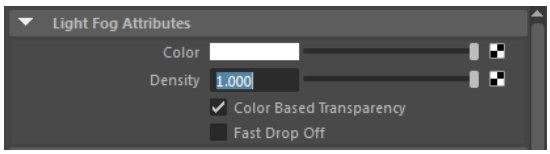


Figure 7-10 *The* ***Light Fog Attributes*** *area*

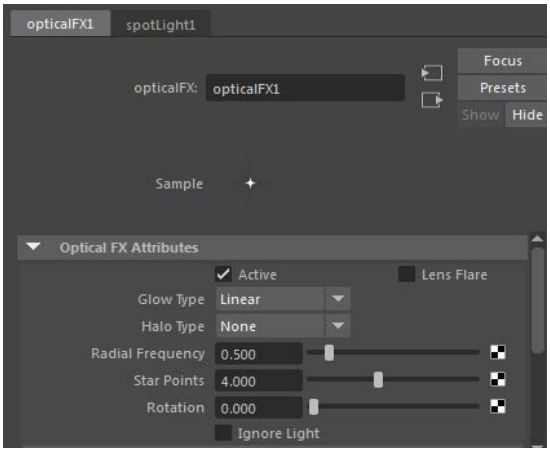


Figure 7-11 *The* ***opticalFX1*** *node added to the light*

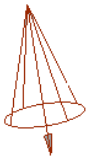


Figure 7-12 *The spot light*

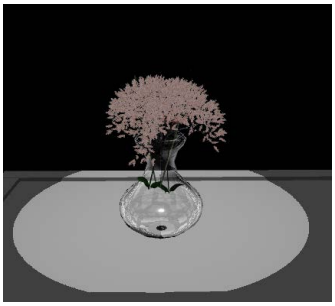


Figure 7-13 *A flower pot illuminated by a spot light*

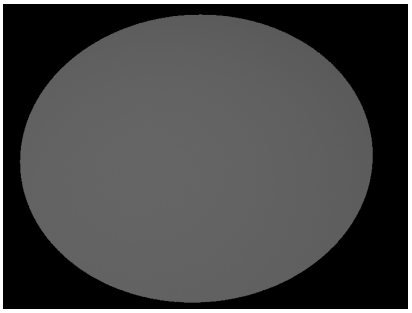


Figure 7-14 *Spot Light with* ***Penumbra Angle = 0***

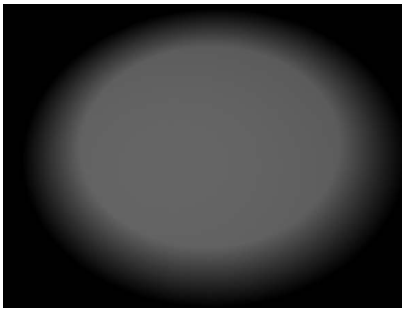


Figure 7-15 *Spot Light with* ***Penumbra Angle = 10***

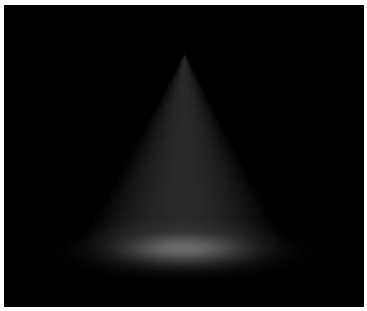


Figure 7-16 *Spot Light with* ***Fog Spread*** *= 1*

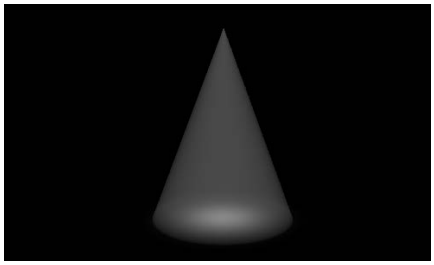


Figure 7-17 *Spot Light with* ***Fog Spread*** *= 5*

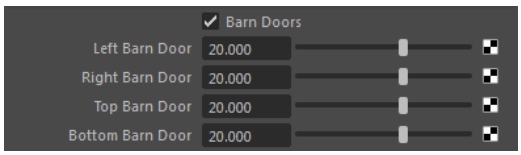


Figure 7-18 *The* ***Barn Doors*** *attributes*

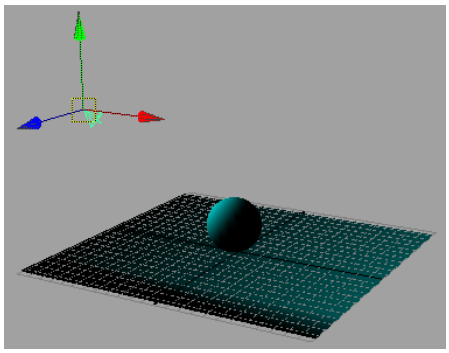


Figure 7-19 *The shadow effect displayed*

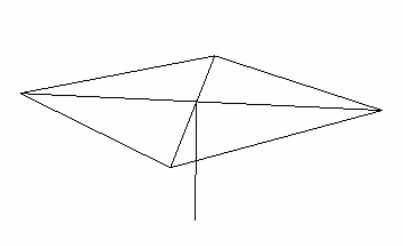


Figure 7-20 *The area light*

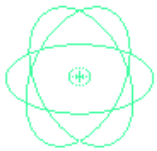


Figure 7-21 *The volume light*

Figure 7-22 *The volume light effect*

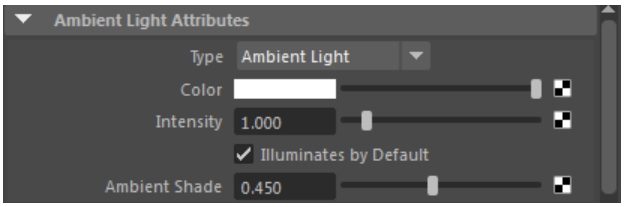


Figure 7-23 *Choosing the checker box next to the* ***Color*** *attribute*

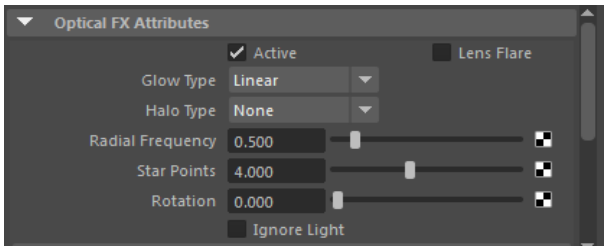


Figure 7-24 *The* ***Optical FX Attributes*** *area*

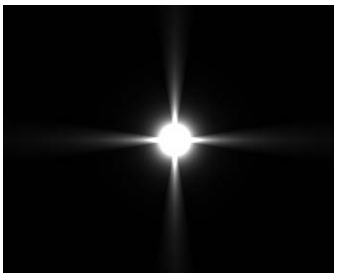


Figure 7-25 *Light without lens flare*

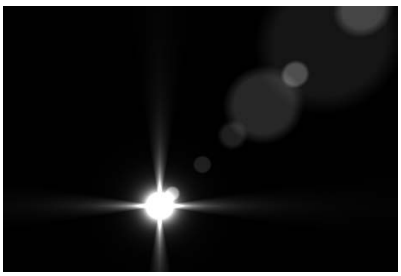


Figure 7-26 *Light with lens flare*

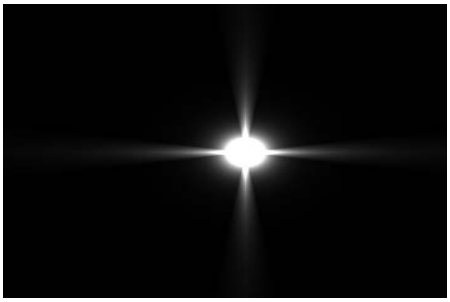


Figure 7-27 *The* ***Linear*** *glow effect*

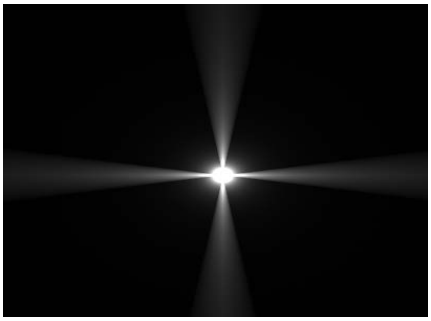


Figure 7-28 *The* ***Exponential*** *glow effect*

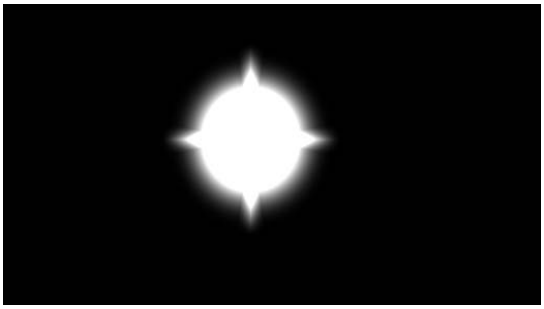


Figure 7-29 *The* ***Ball*** *glow effect*

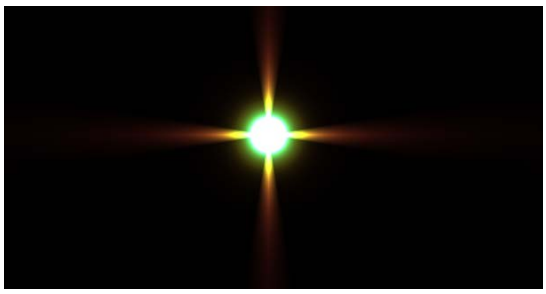


Figure 7-30 *The* ***Lens Flare*** *glow effect*

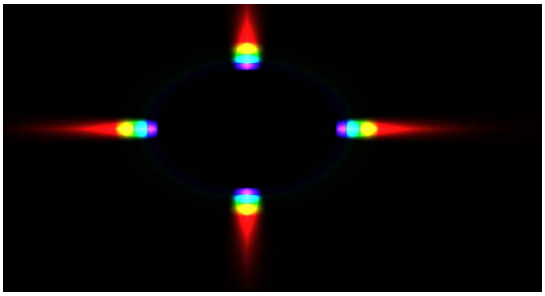


Figure 7-31 *The* ***Rim Halo*** *glow effect*

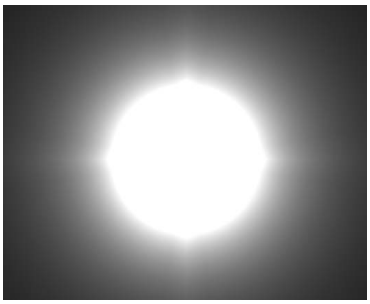


Figure 7-32 *The* ***Linear*** *halo effect*

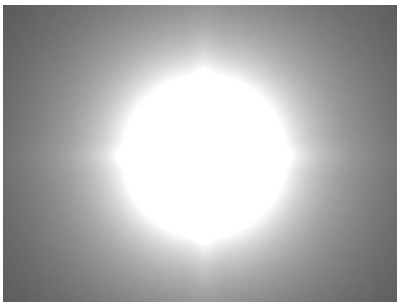


Figure 7-33 *The* ***Exponential*** *halo effect*

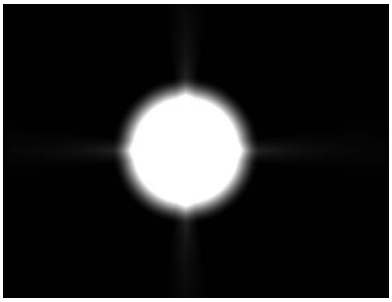


Figure 7-34 *The* ***Ball*** *halo effect*

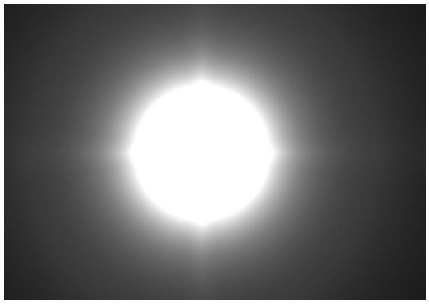


Figure 7-35 *The* ***Lens Flare*** *halo effect*

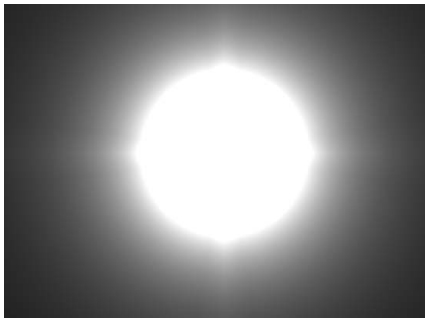


Figure 7-36 *The* ***Rim*** *halo effect*

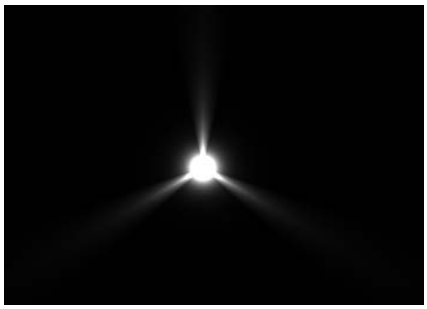


Figure 7-37 *Light with* ***Star Points = 3***

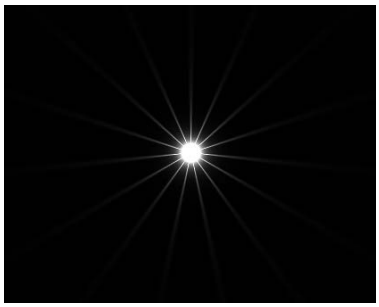


Figure 7-38 *Light with* ***Star Points = 15***

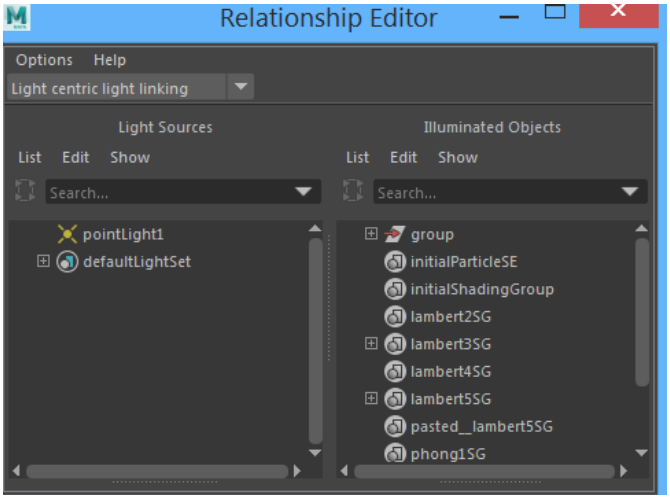


Figure 7-38A *The* ***Relationship Editor***

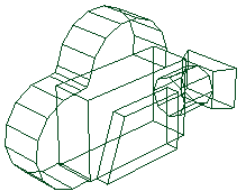


Figure 7-39 *A camera created*

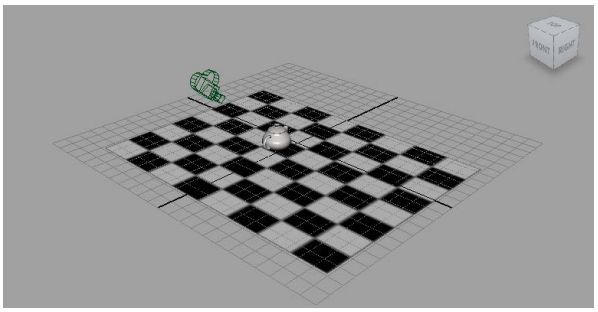


Figure 7-40 *The camera focusing on an object*

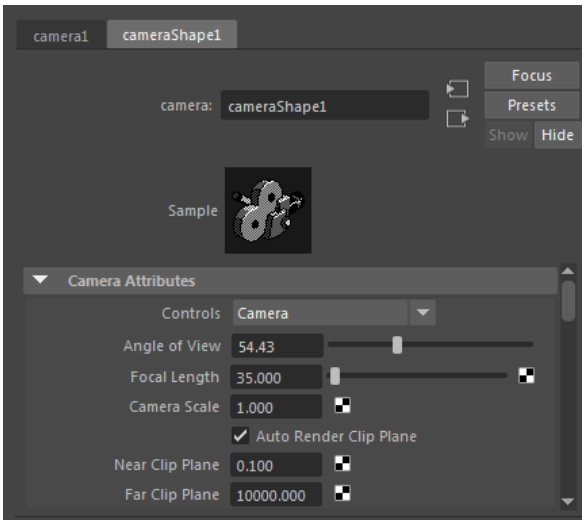


Figure 7-41 *Partial view of the* ***Camera Attributes*** *area in the* ***Attribute Editor***

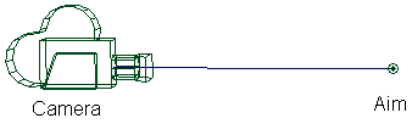


Figure 7-42 *A camera with an aim created*

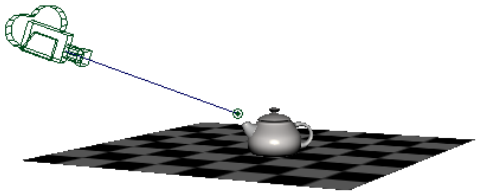


Figure 7-43 *The camera aiming at a point in the scene*

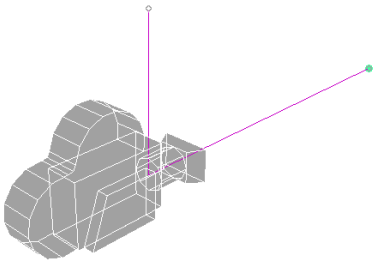


Figure 7-44 *A camera with the aim vector and up vector controls*

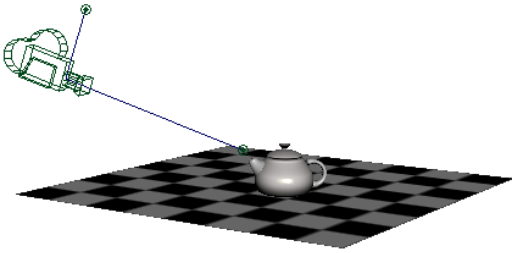


Figure 7-45 *A camera with the aim vector and up vector controls focusing on a point in the scene*

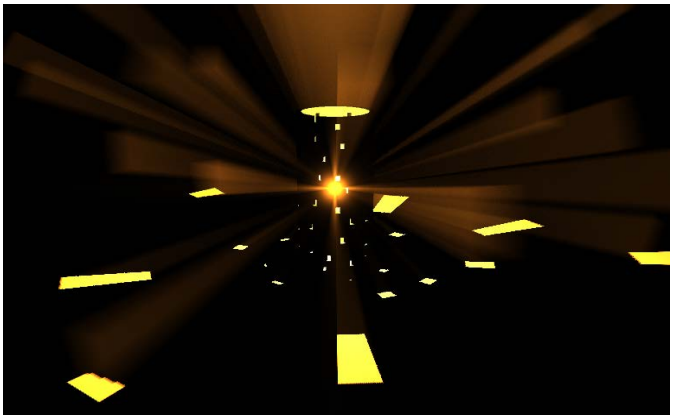


Figure 7-46 *The light scattering through a cylinder*

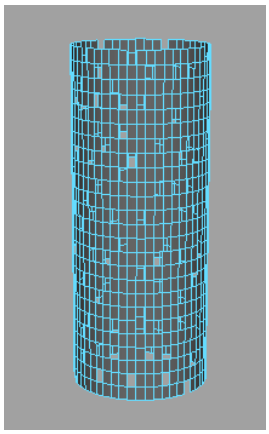


Figure 7-47 *Randomly deleted faces*

Figure 7-48 *The final output*

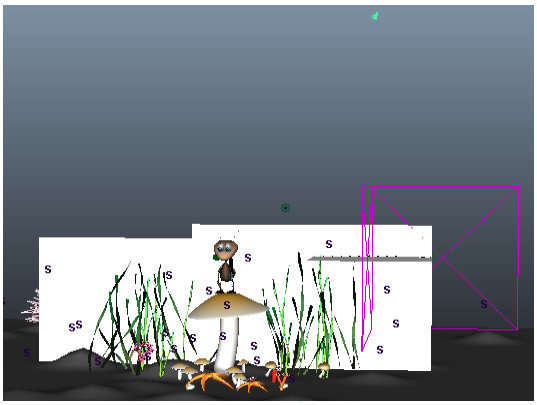


Figure 7-49 *The spot light in the front viewport*

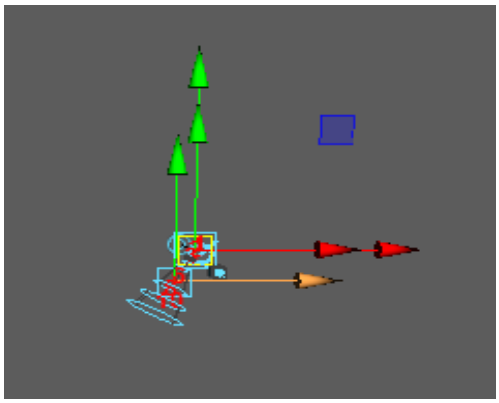


Figure 7-50 *The light manipulators*

Figure 7-51 *The Fog effect displayed*

Figure 7-52 *The textured scene*

Figure 7-53 *The physical sun and sky effect applied to the scene*

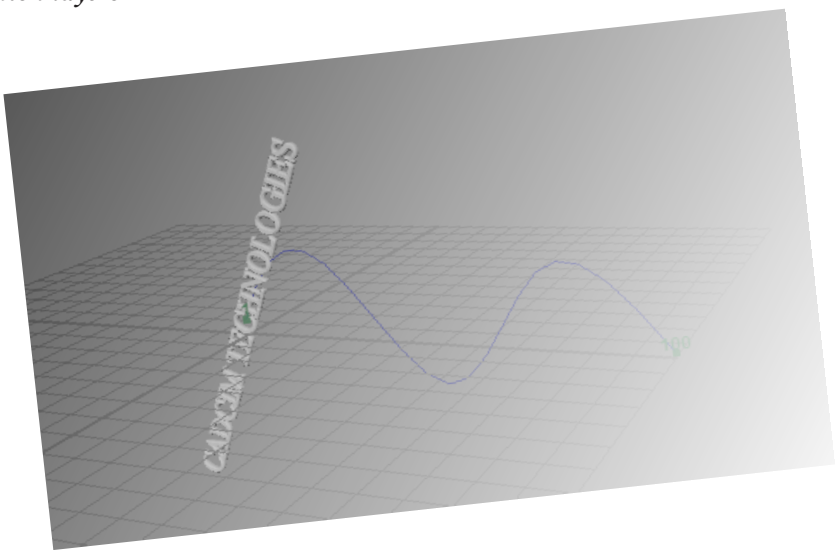
Chapter 8

Animation

Learning Objectives

After completing this chapter, you will be able to:

- *Understand the basic concepts of animation*
- *Understand different types of animation*
- *Use the Graph Editor for editing animation*
- *Use Animation layers*



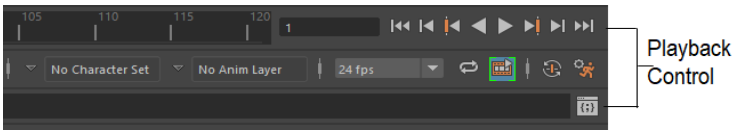


Figure 8-1 *The playback controls*

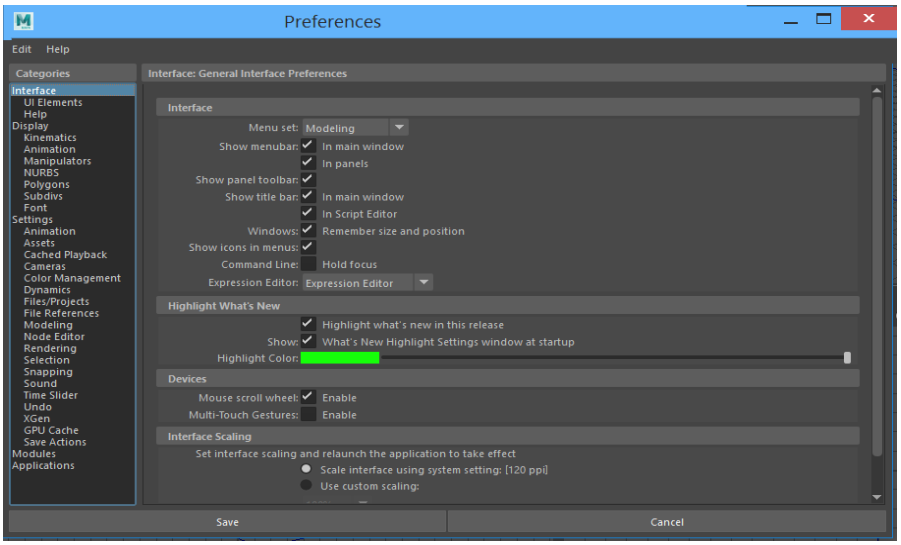


Figure 8-2 *The* ***Preferences*** *window*

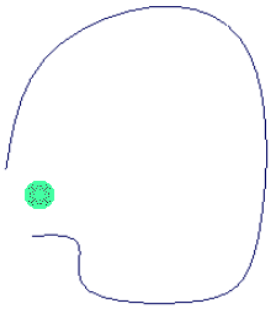


Figure 8-3 *The NURBS curve and the sphere*

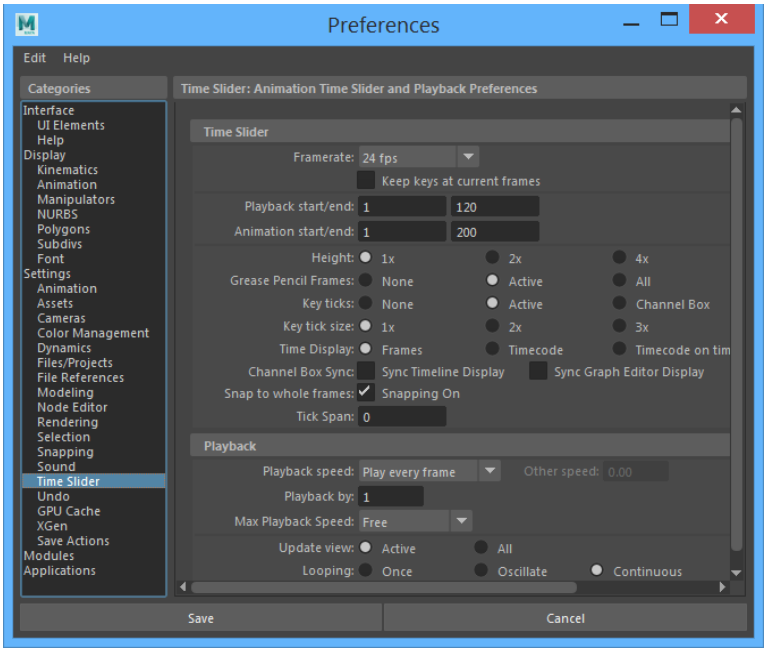


Figure 8-4 *The* ***Time Slider: Animation Time Slider and Playback Preferences*** *area in the Preferences window*

Figure 8-5 *The* ***Auto keyframe toggle*** *button*

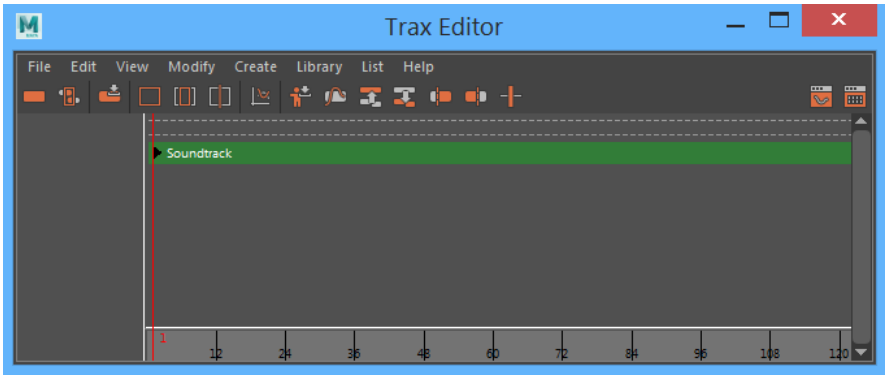


Figure 8-6 *The* ***Trax Editor***

Figure 8-7 *The keyframe created*

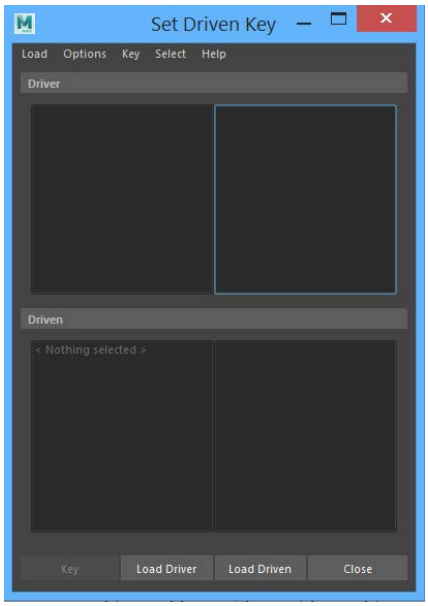


Figure 8-8 *The* ***Set Driven Key*** *window*

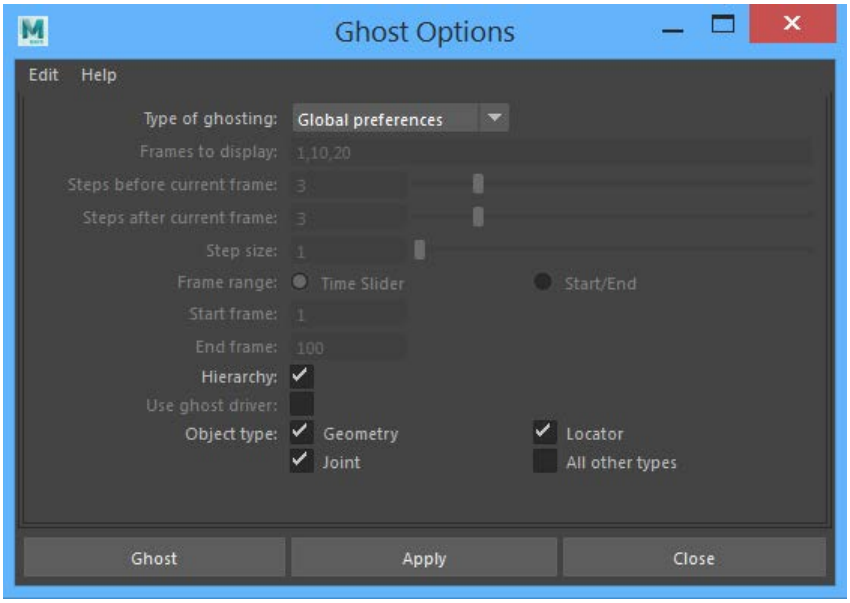


Figure 8-9 *The* ***Ghost Options*** *window*

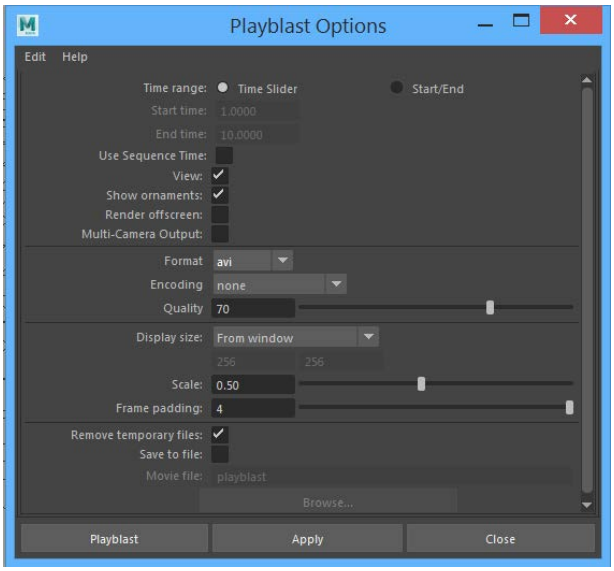


Figure 8-10 *The* ***Playblast Options*** *window*

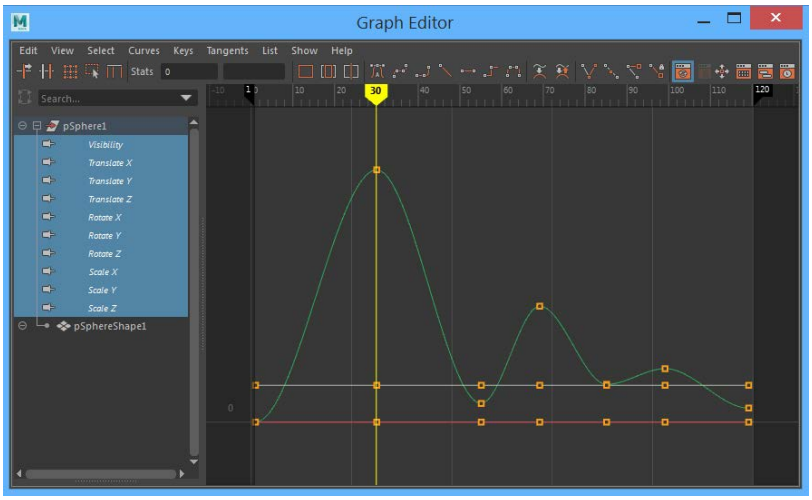


Figure 8-11 *The* ***Graph Editor***

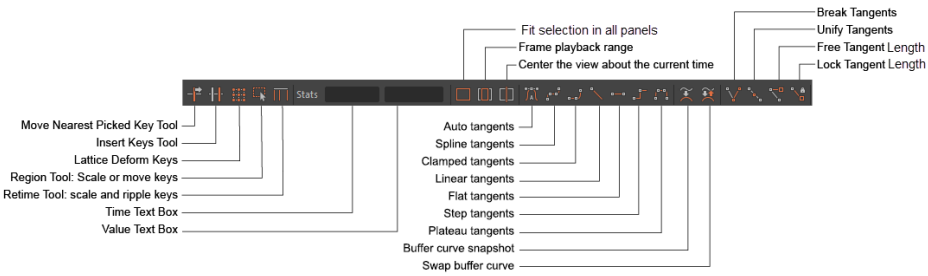


Figure 8-12 *The* ***Graph Editor*** *toolbar (part-I)*

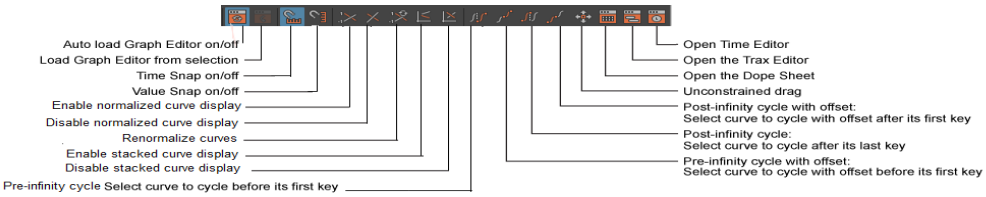


Figure 8-13 *The* ***Graph Editor*** *toolbar (part-II)*

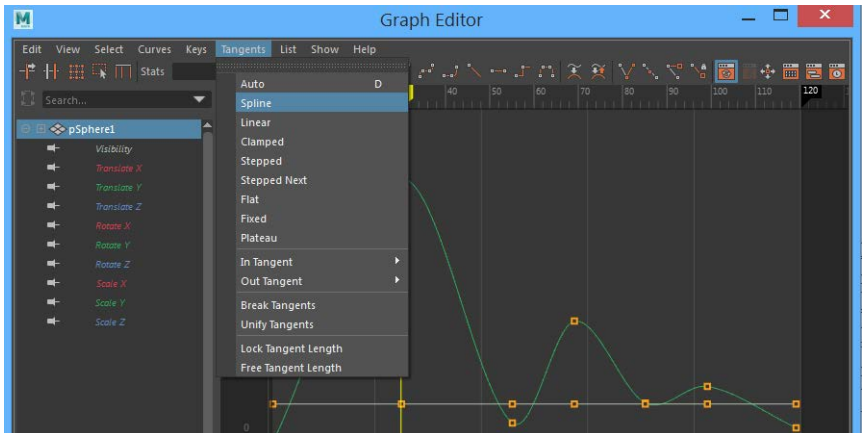


Figure 8-14 *The* ***Tangents*** *menu in the* ***Graph Editor***

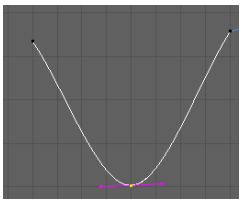


Figure 8-15 *The animation curve before using the* ***Linear tangents*** *tool*

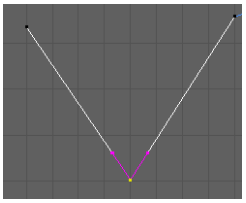


Figure 8-16 *The animation curve after using the* ***Linear tangents*** *tool*

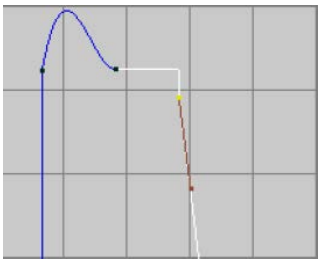


Figure 8-17 *The animation curve before using the* ***Flat tangents*** *tool*

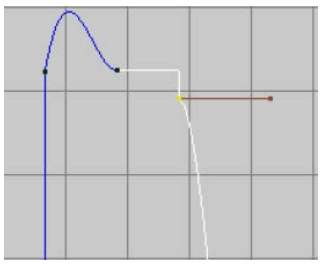


Figure 8-18 *The animation curve after using the* ***Flat tangents*** *tool*

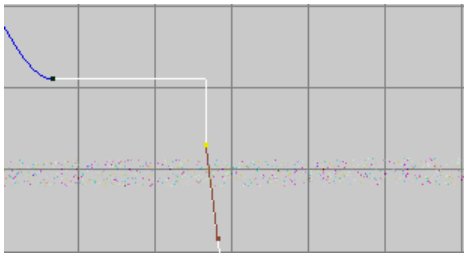


Figure 8-19 *The animation curve before using the* ***Step tangents*** *tool*

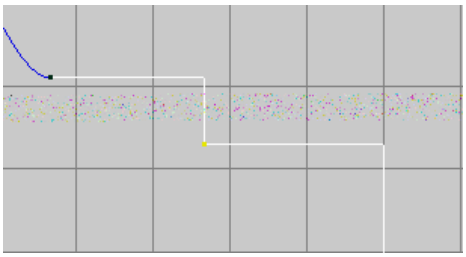


Figure 8-20 *The animation curve after using the* ***Step tangents*** *tool*

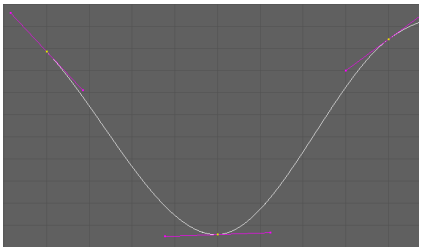


Figure 8-21 *The animation curve before using the* ***Plateau tangents*** *tool*

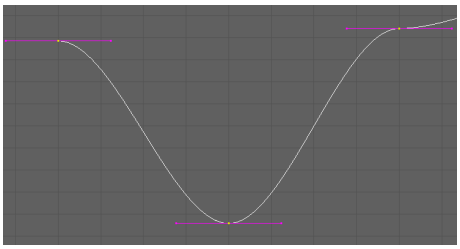


Figure 8-22 *The animation curve after using the* ***Plateau tangents*** *tool*

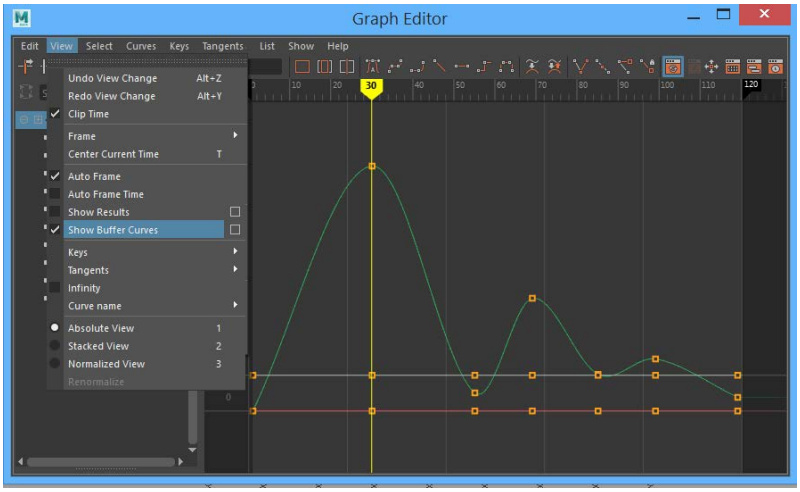


Figure 8-23 *Choosing the* ***Show Buffer Curves*** *option from the* ***View*** *menu in the* ***Graph Editor*** *menubar*

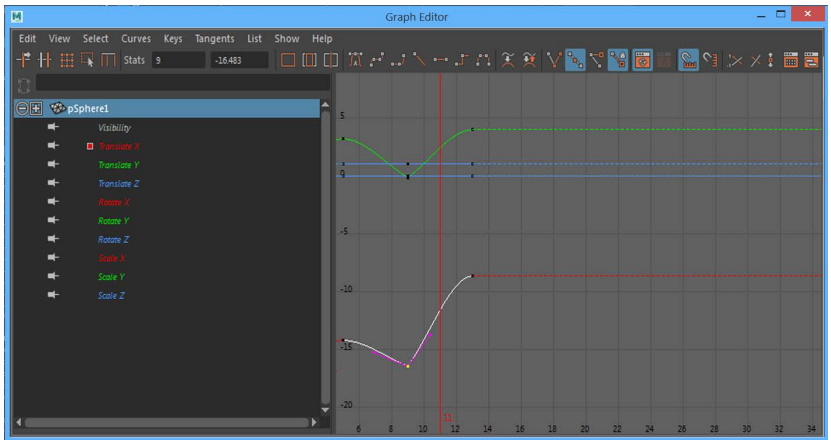


Figure 8-24 *The pre-infinity cycle graph in the* ***Graph Editor***

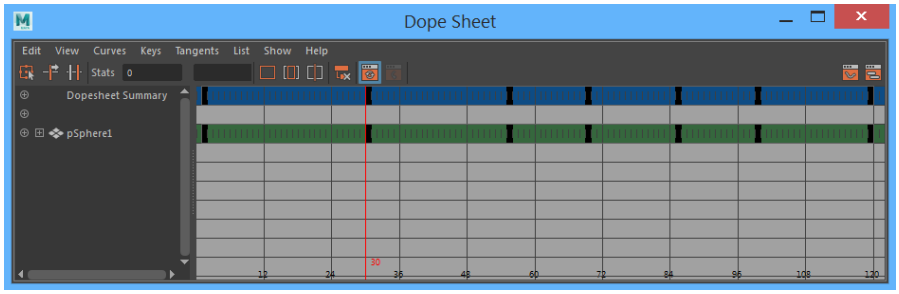


Figure 8-25 The ***Dope Sheet***

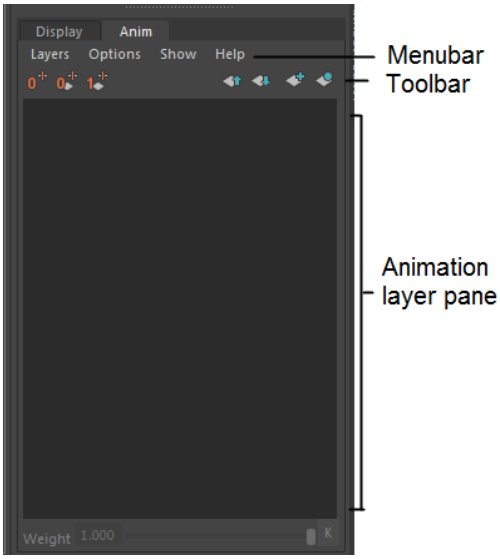


Figure 8-26 The ***Animation Layer Editor***

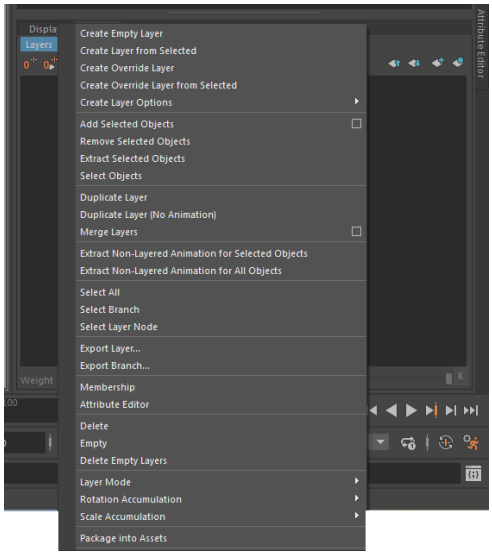


Figure 8-27 *Flyout displayed on choosing the* ***Layers*** *menu from the* ***Animation Layer Editor*** *menubar*

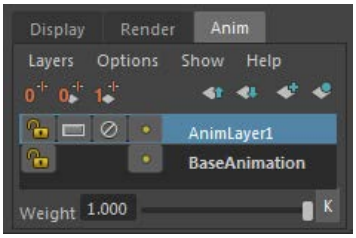


Figure 8-28 *A new layer created in the* ***Animation Layer Editor***

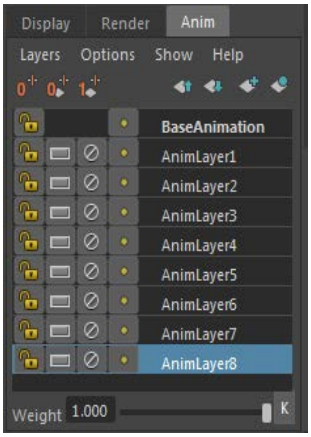


Figure 8-29 *Layer arrangement from bottom to top*

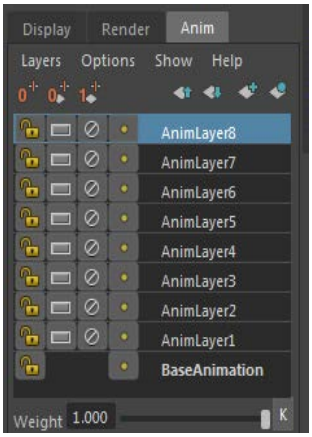


Figure 8-30 *Layer arrangement from top to bottom*

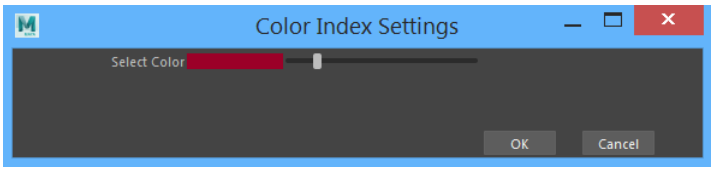


Figure 8-31 *The* ***Color Index Settings*** *window*

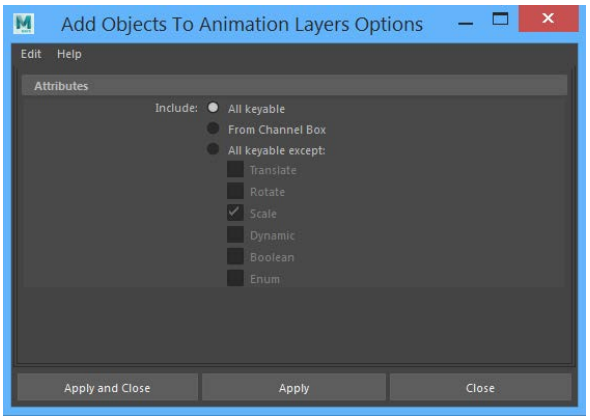


Figure 8-32 *The* ***Add Objects To Animation Layers Options*** *window*

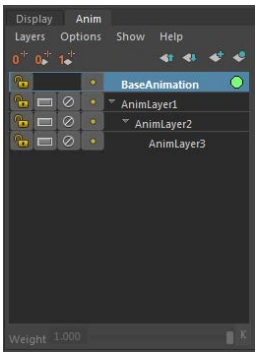


Figure 8-33 *Layers showing the parent-child relationship*

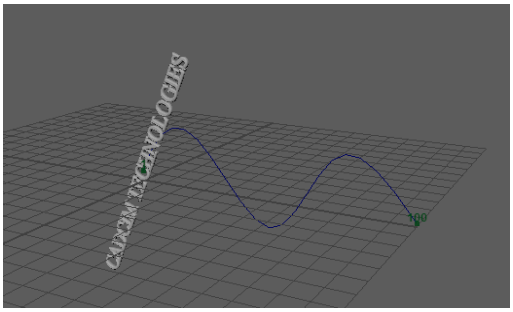


Figure 8-34 *The text animation at frame 42*

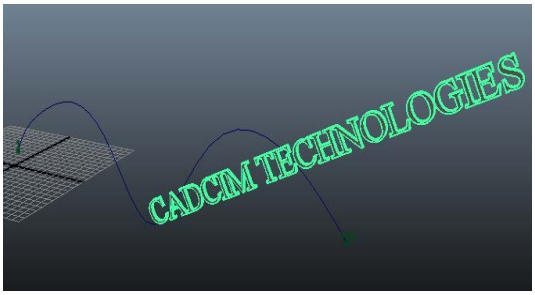


Figure 8-35 *The text animation at frame 54*

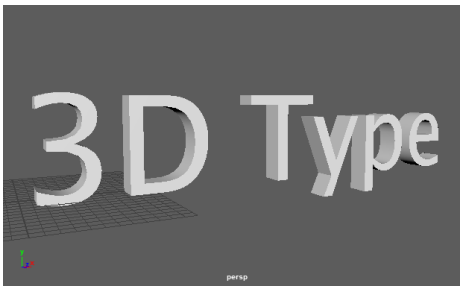


Figure 8-36 *3D Type text Displayed in persp viewport*

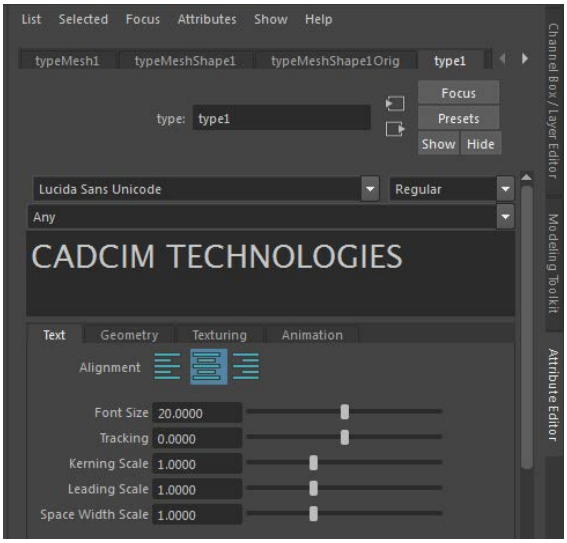


Figure 8-37 *Text changed in the edit box of the Attribute Editor*

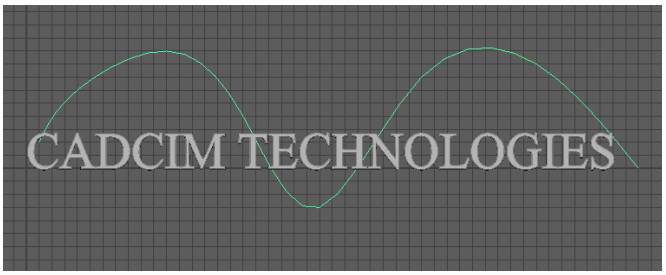


Figure 8-38 *The profile curve displayed in the front-Z viewport*

Figure 8-39 *The start and end frames set in the timeline*

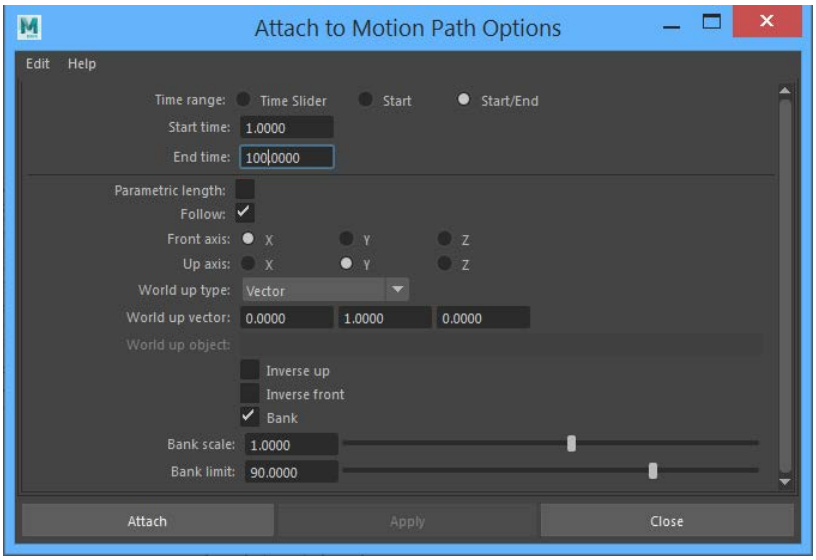


Figure 8-40 *The* ***Attach to Motion Path Options*** *window*

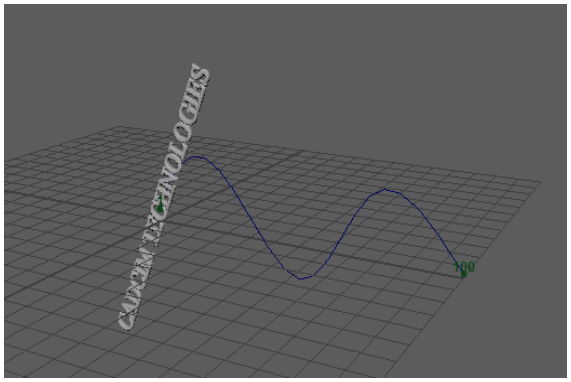


Figure 8-41 *The 3D text attached to the profile curve*

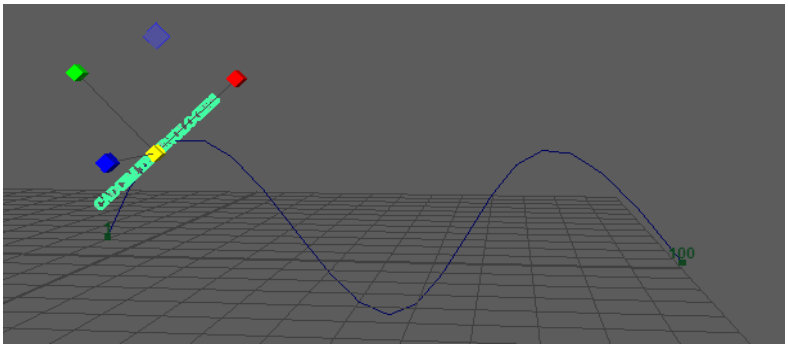


Figure 8-42 *The 3D text scaled*

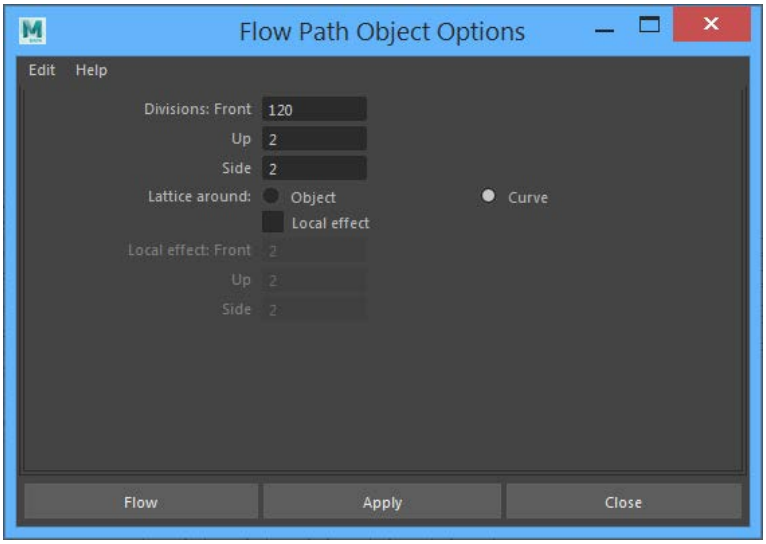


Figure 8-43 *The* ***Flow Path Object Options*** *window*

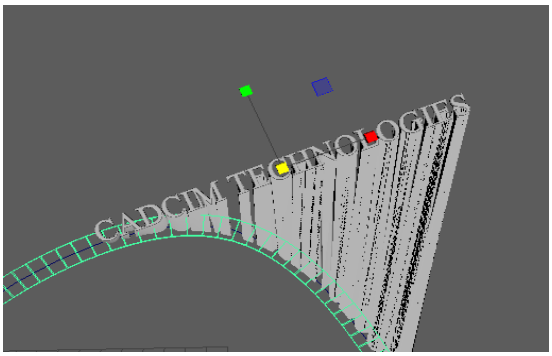


Figure 8-44 *The lattice around the curve*

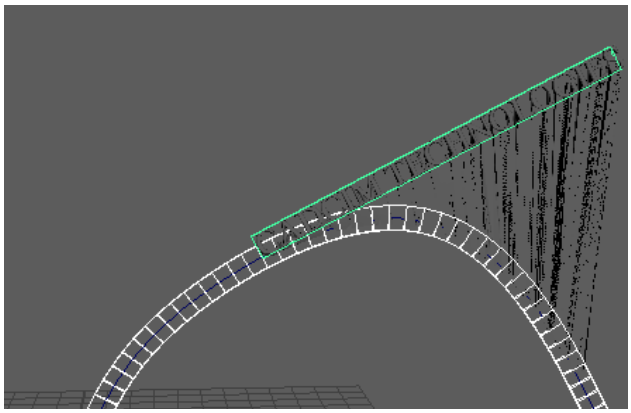


Figure 8-45 *The enlarged lattice area around the path*

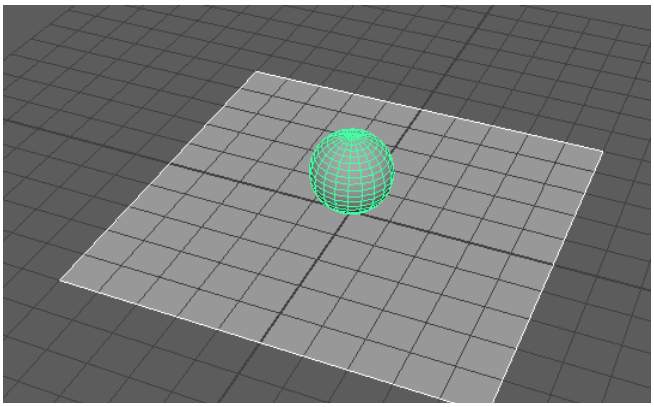


Figure 8-46 *Ball placed on the plane*

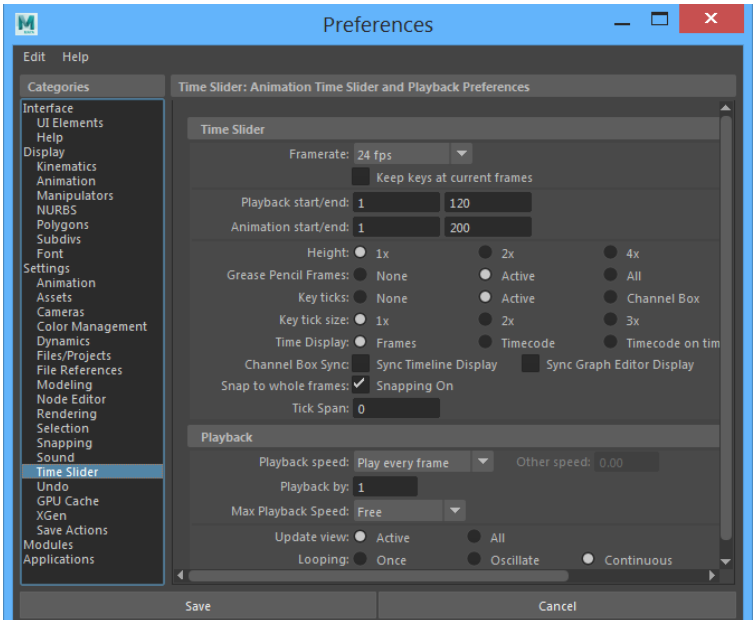


Figure 8-47 *Setting the options in the* ***Preferences*** *window*

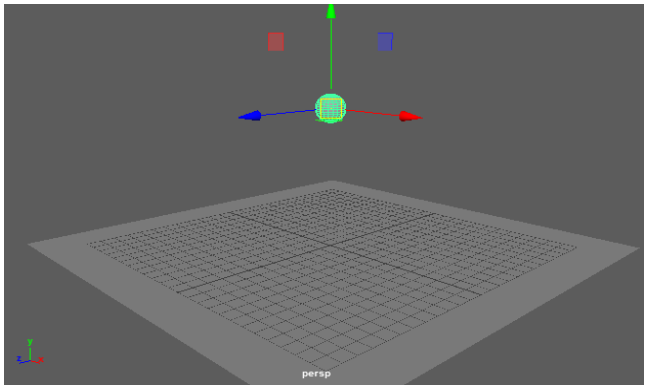


Figure 8-48 *Position of the ball changed*

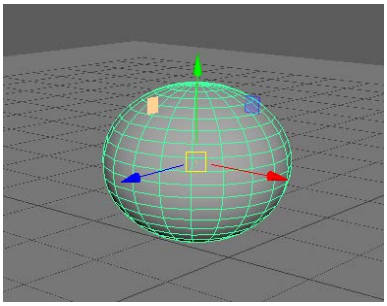


Figure 8-49 *The ball squashes*

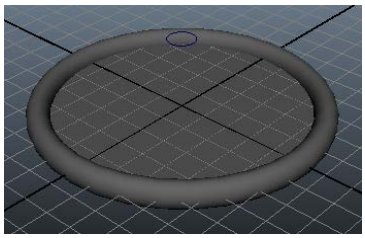


Figure 8-50 *The base of wall clock*

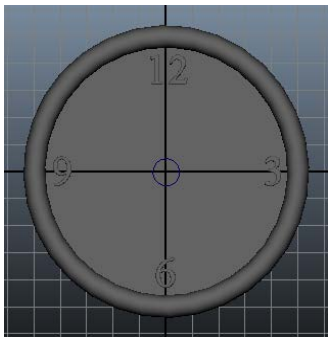


Figure 8-51 *The text arranged on the clock model*

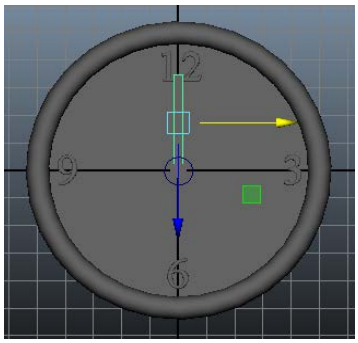


Figure 8-52 *The second hand of the clock*

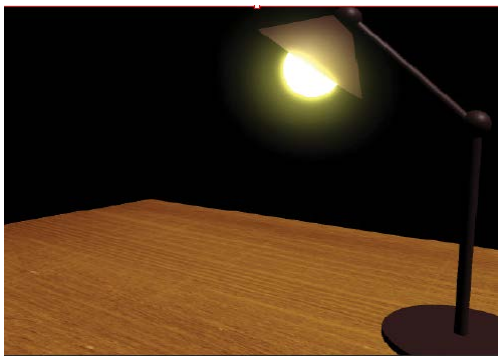


Figure 8-53 *The animated intensity of the bulb*

Chapter 9

Rigging, Constraints, and Deformers

Learning Objectives

After completing this chapter, you will be able to:

- *Understand different types of joints*
- *Understand the parent and child relationship*
- *Use different deformers for animating an object*
- *Use different types of constraints*
- *Use the set driven keys to link objects*

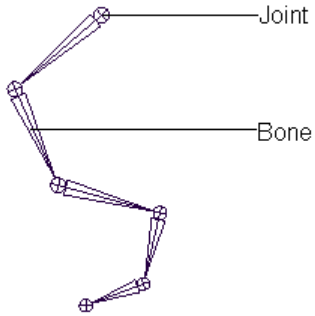


Figure 9-1 *The bones and joints*

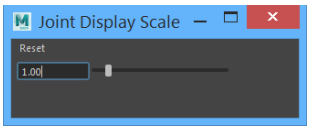


Figure 9-2 *The* ***Joint Display Scale*** *window*

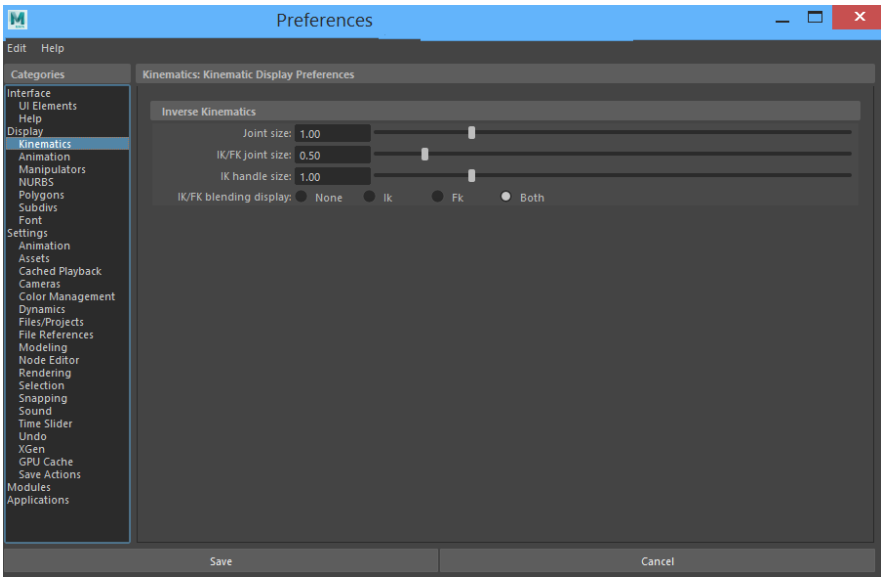


Figure 9-3 *The* ***Preferences*** *window*

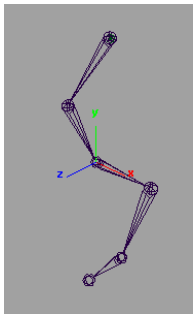


Figure 9-4 *The local axes displayed on a single joint*

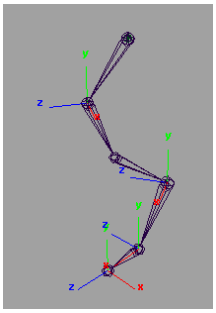


Figure 9-5 *The local axes displayed on the entire hierarchy*

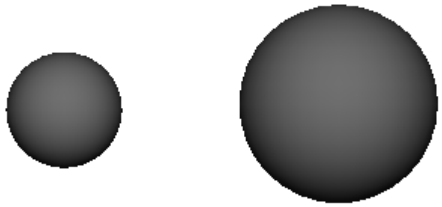


Figure 9-6 *The spheres created*

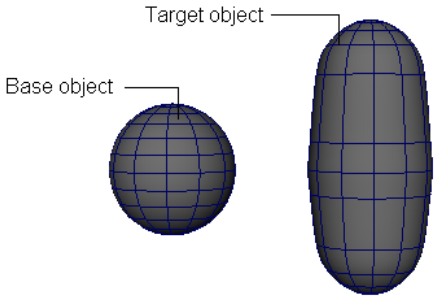


Figure 9-7 *The base and target objects*

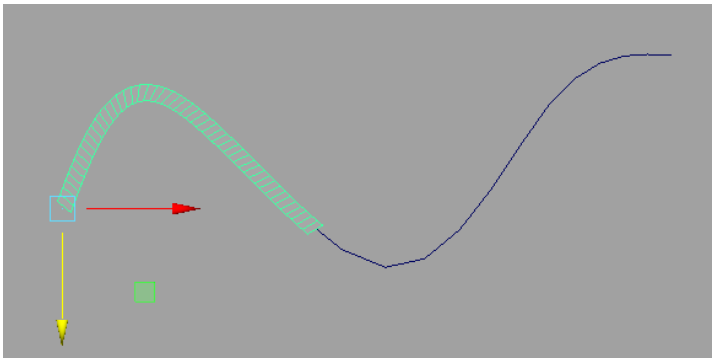


Figure 9-8 *The object after applying the* ***Curve Warp*** *deformer*

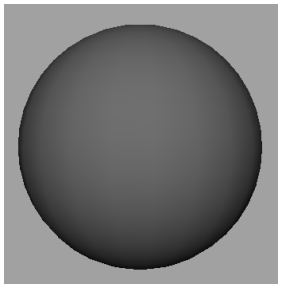


Figure 9-9 *The object before applying the* ***Cluster*** *deformer*

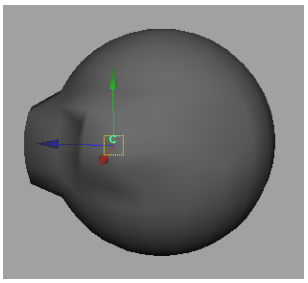


Figure 9-10 *The object after applying the* ***Cluster*** *deformer*

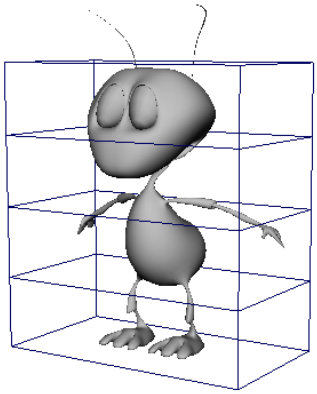


Figure 9-11 *Lattice created around the selected object*

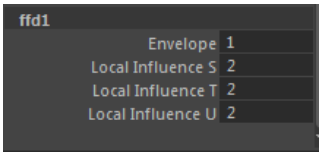


Figure 9-12 *The **ffd1** area in the **OUTPUTS** node*

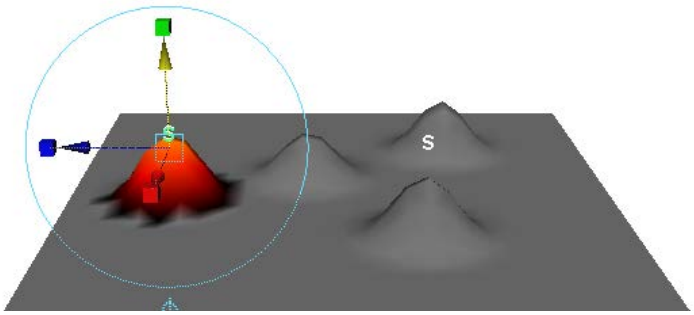


Figure 9-13 *A colorful falloff area created*

Figure 9-14 *The object before applying the **Bend** deformer*

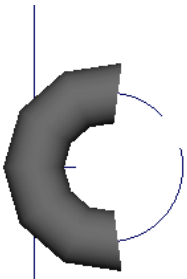


Figure 9-15 *The object after applying the **Bend** deformer*

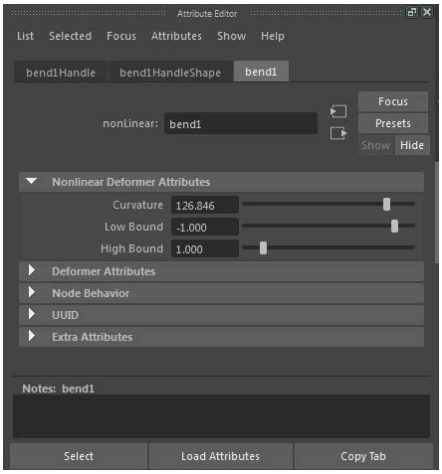


Figure 9-16 *The* ***Nonlinear Deformer Attributes*** *area in the* ***bend1*** *tab*

Figure 9-17 *The cylinder before applying the* ***Flare*** *deformer*

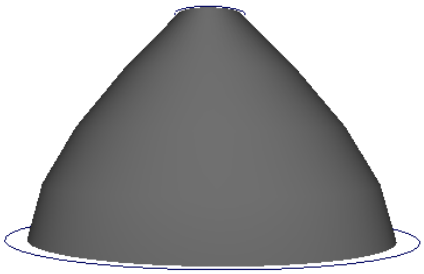


Figure 9-18 *The cylinder modified using the* ***Flare*** *deformer*

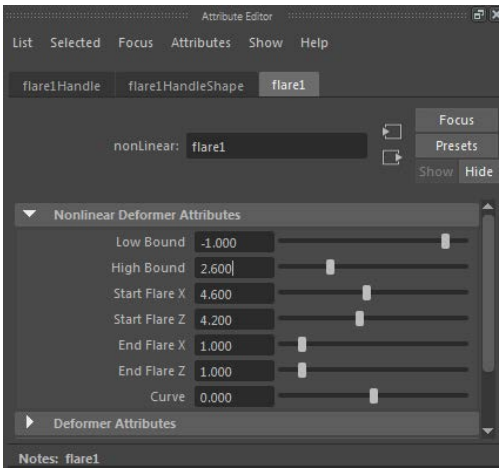


Figure 9-19 *Partial view of the* ***Flare*** *deformer attributes in the* ***Attribute Editor***

Figure 9-20 *The cylinder before applying the* ***Sine*** *deformer*

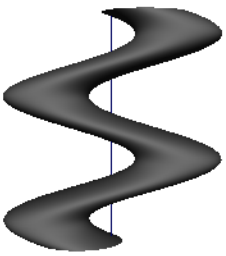


Figure 9-21 *The cylinder after applying the* ***Sine*** *deformer*

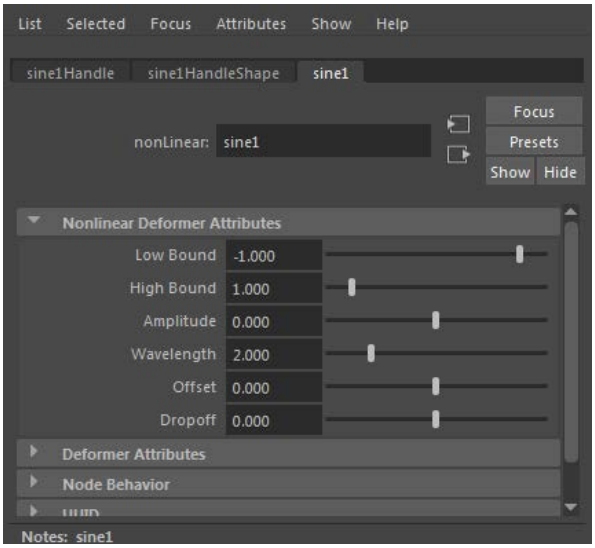


Figure 9-22 *Partial view of the* ***Sine*** *deformer attributes in the* ***Attribute Editor***

Figure 9-23 *An object before applying the* ***Squash*** *deformer*

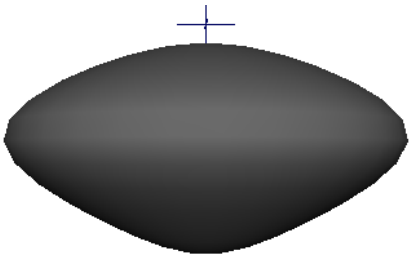


Figure 9-24 *An object after applying the* ***Squash*** *deformer*

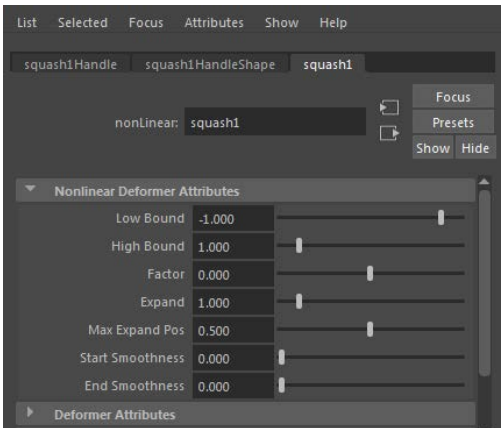


Figure 9-25 *Partial view of the* ***Squash*** *deformer attributes in the* ***Attribute Editor***

Figure 9-26 *The cylinder before applying the* ***Twist*** *deformer*

Figure 9-27 *The cylinder after applying the* ***Twist*** *deformer*

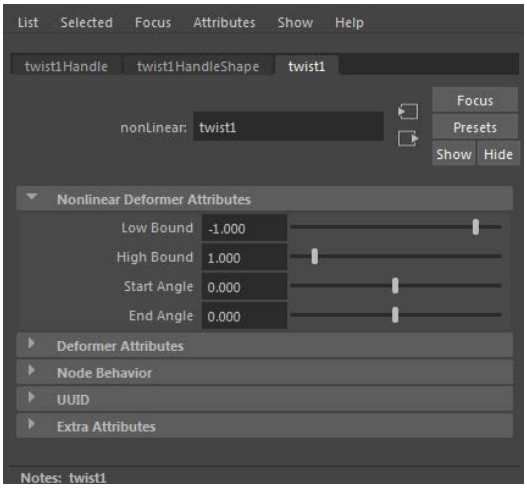


Figure 9-28 *The* ***Nonlinear Deformer Attributes*** *area in the* ***twist1*** *tab*

Figure 9-29 *The plane before applying the* ***Wave*** *deformer*

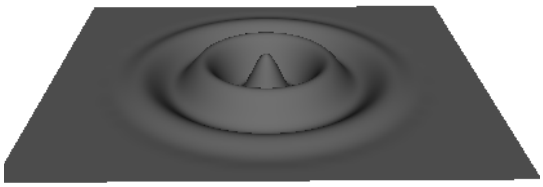


Figure 9-30 *The plane after applying the* ***Wave*** *deformer*

.

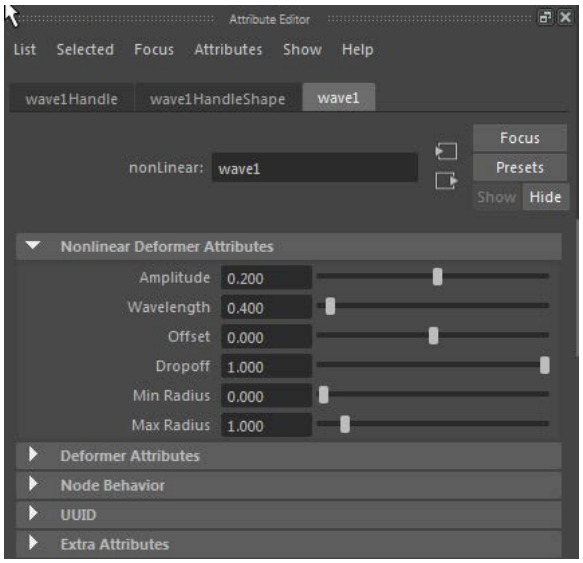


Figure 9-31 *Partial view of the* ***Wave*** *deformer attributes in the* ***Attribute Editor***

.

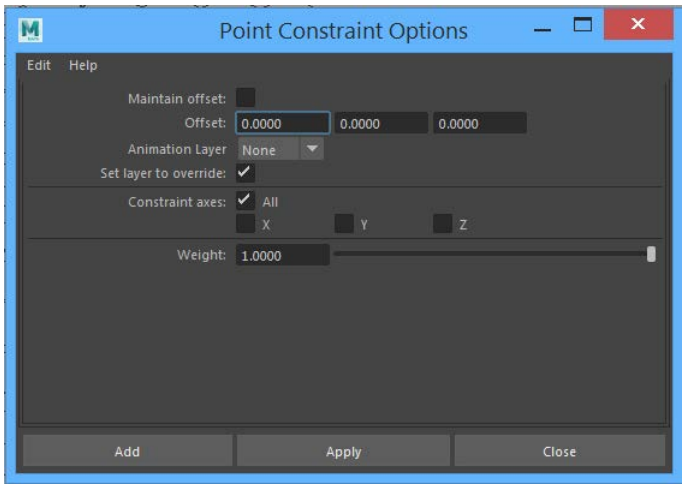


Figure 9-32 *The* ***Point Constraint Options*** *window*

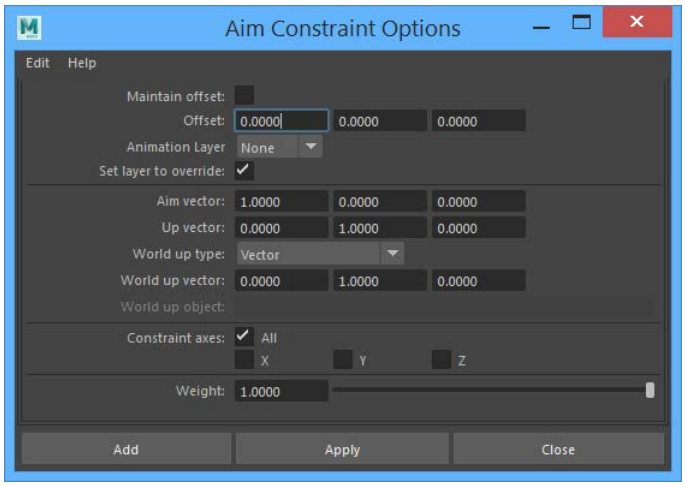


Figure 9-33 *The* ***Aim Constraint Options*** *window*

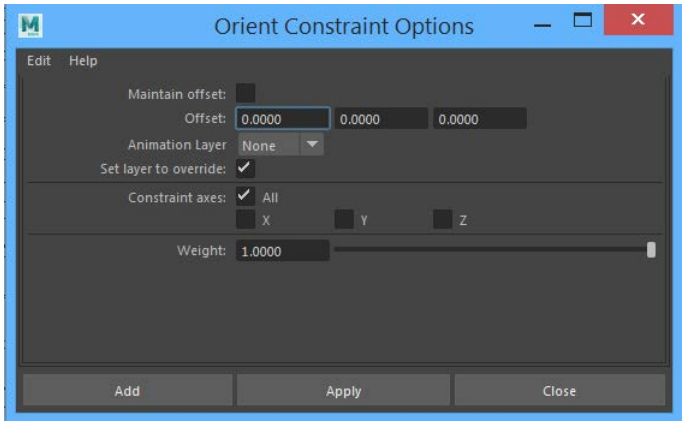


Figure 9-34 *The* ***Orient Constraint Options*** *window*

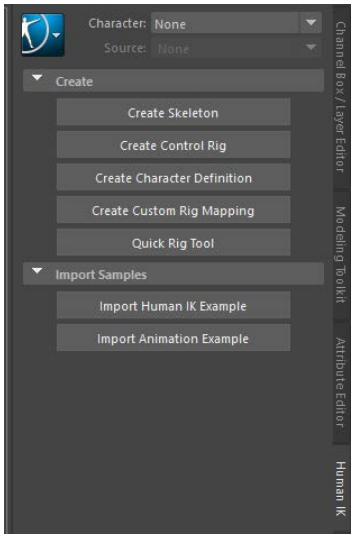


Figure 9-35 *The* ***Character Controls*** *window*

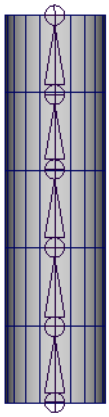


Figure 9-36 *The bone structure created*

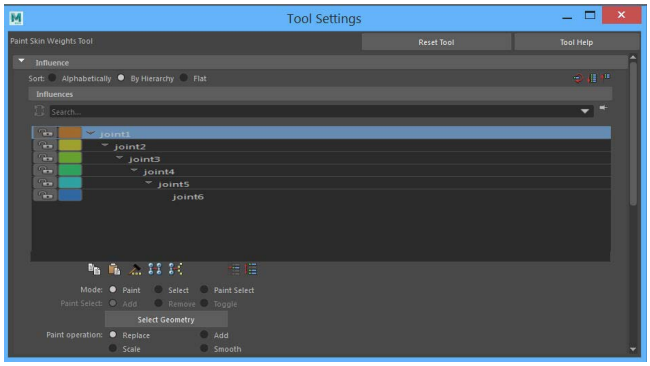


Figure 9-37 *Partial view of the* ***Tool Settings*** *(****Paint Skin Weights Tool****) panel*

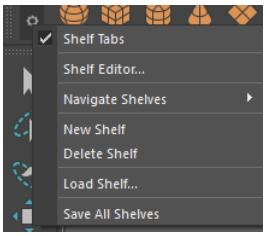


Figure 9-38 Load Shelf *from the Shelf area*

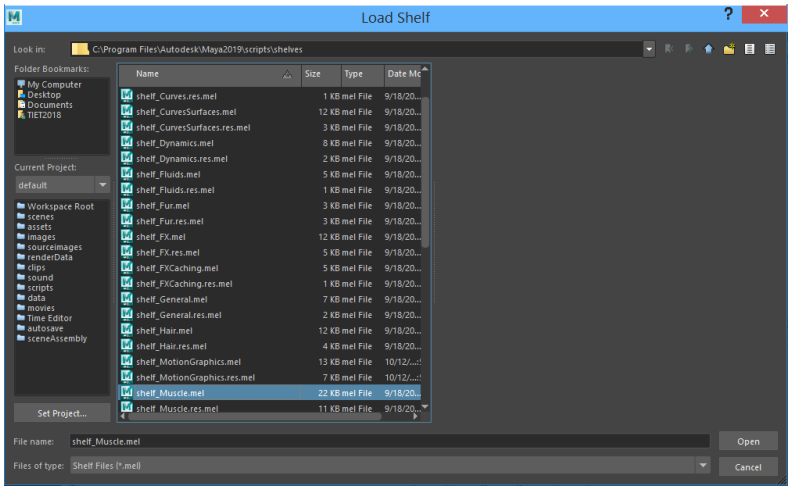


Figure 9-39 *The* ***Load Shelf*** *dialog box*

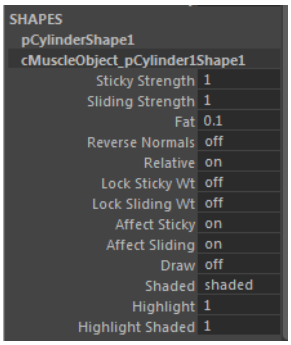


Figure 9-40 *The* ***Muscle Object Shape*** *attributes*

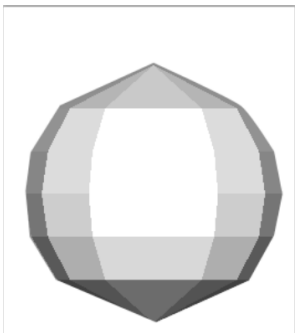


Figure 9-41 *A basic capsule object*

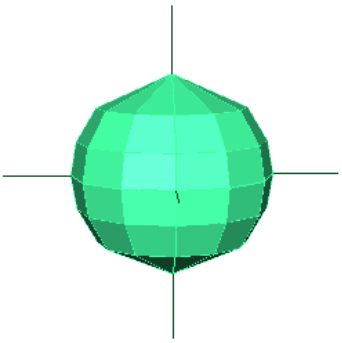


Figure 9-42 *The capsule with an end locator*

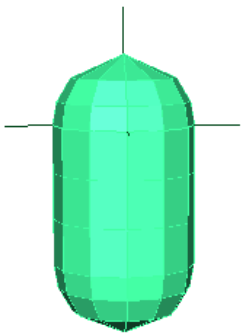


Figure 9-43 *The size of the capsule changes with the movement of locator*

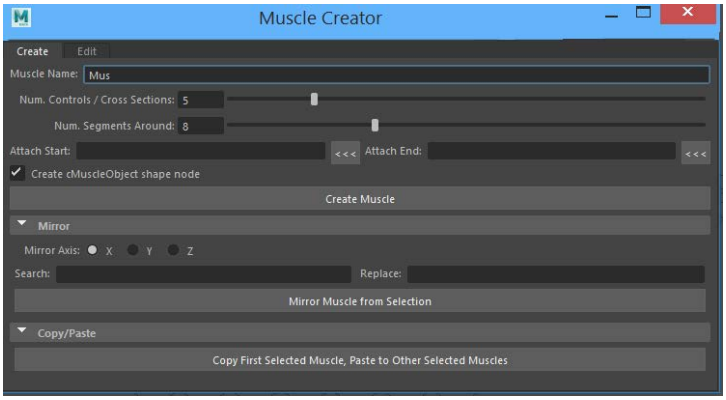


Figure 9-44 *The* ***Muscle Creator*** *window*

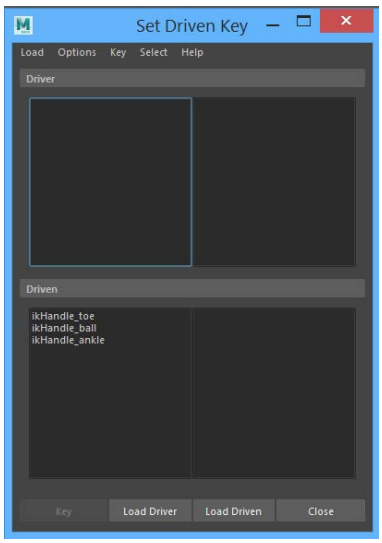


Figure 9-45 *The* ***Set Driven Key*** *window*

.

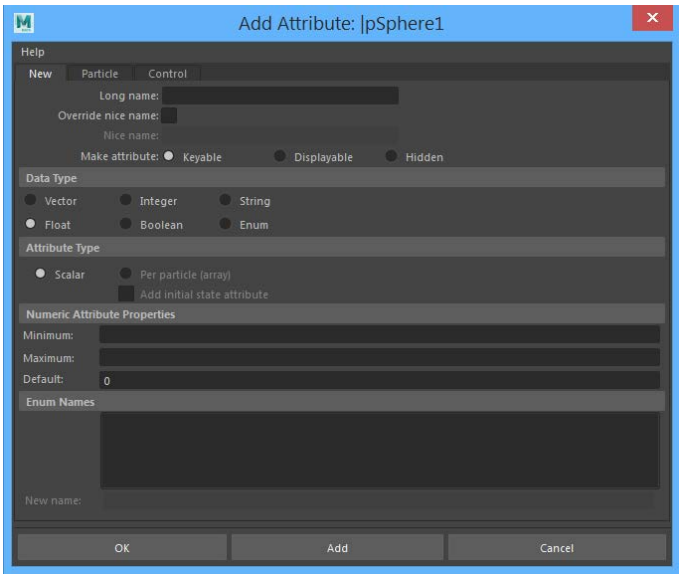


Figure 9-46 *The* ***Add Attribute*** *window*

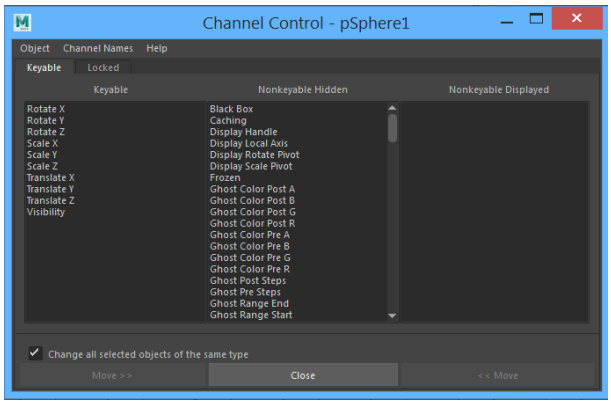


Figure 9-47 *The* ***Channel Control*** *window*

.

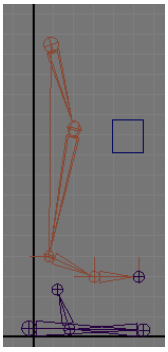


Figure 9-48 *The bone structure of a human leg*

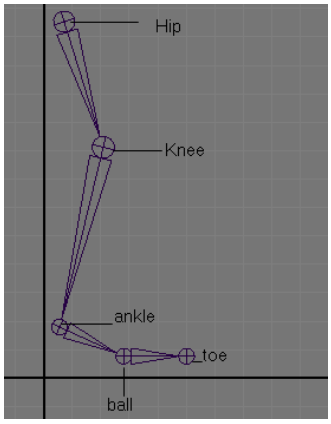


Figure 9-49 *The bone structure*

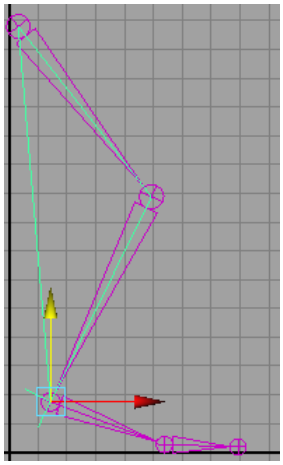


Figure 9-50 *An IK Handle created between joints*

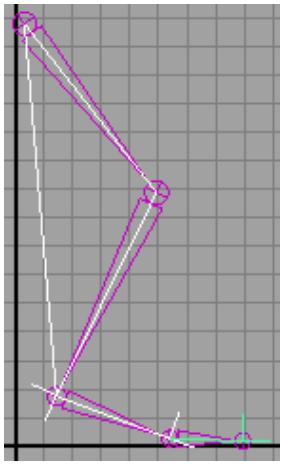


Figure 9-51 *The IK Handles*

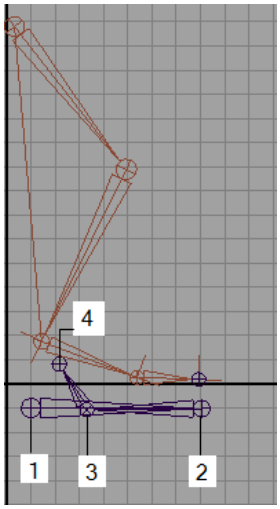


Figure 9-52 *The reverse foot setup*

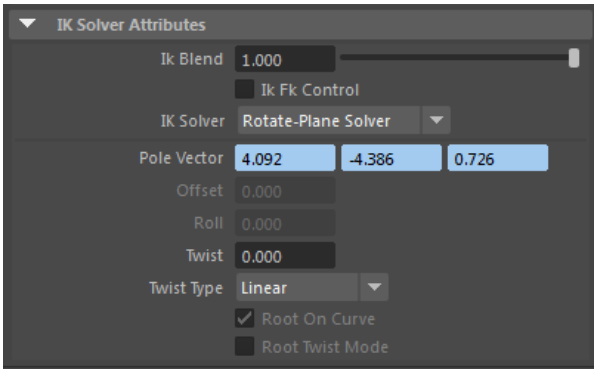


Figure 9-53 *Selecting* ***Rotate-Plane Solver*** *from the* ***IK Solver*** *drop-down list*

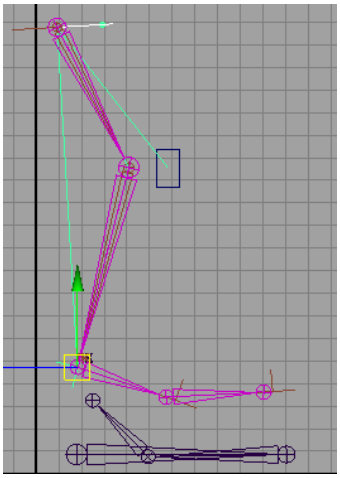


Figure 9-54 *The pole vector constrain*

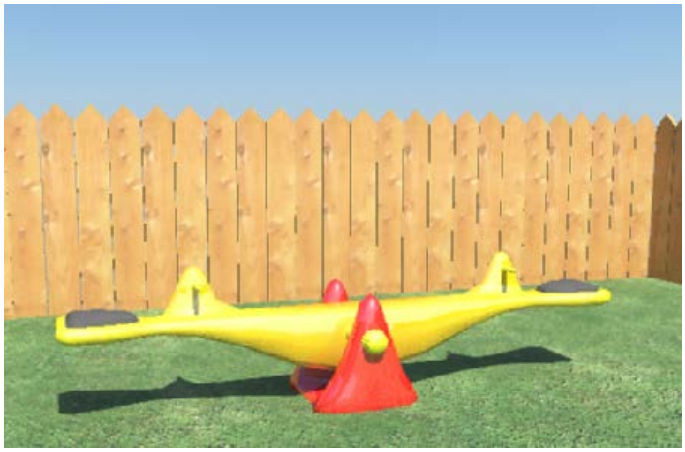


Figure 9-55 *A seesaw model*

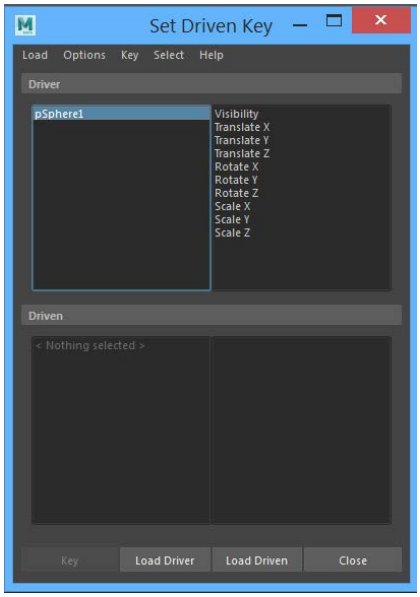


Figure 9-56 *The* ***Set Driven Key*** *window*

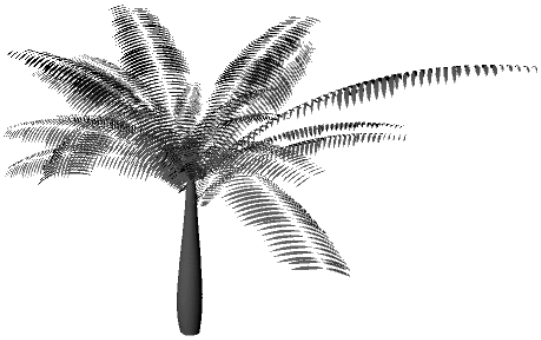


Figure 9-57 *The palm tree model*

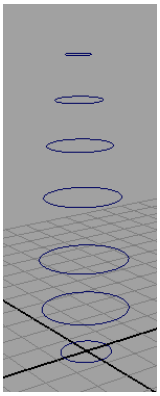


Figure 9-58 *Arrangement of NURBS circles*

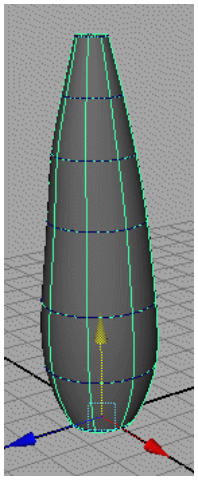


Figure 9-59 The trunk of palm tree

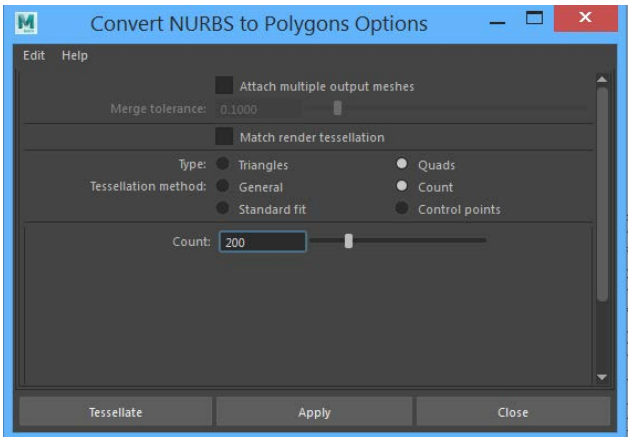


*Figure 9-60 The **Convert NURBS to Polygons Options** window*

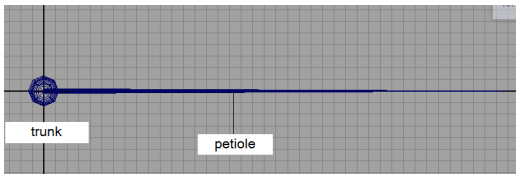


Figure 9-61 Aligning petiole with the trunk

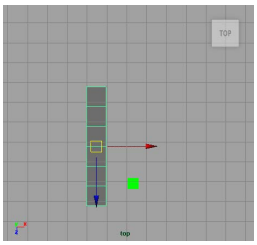


Figure 9-62 The plane for creating a leaf

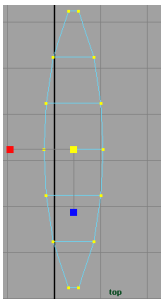


Figure 9-63 The final shape of the leaf

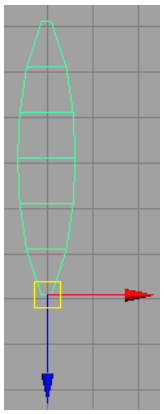


Figure 9-64 *Adjusting the pivot point of the leaf*

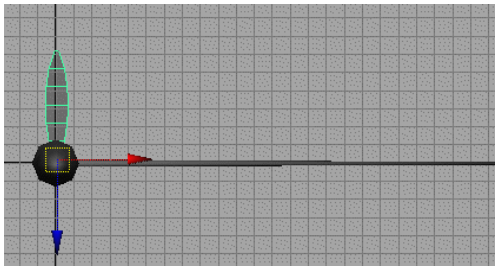


Figure 9-65 *A leaf aligned with the petiole*

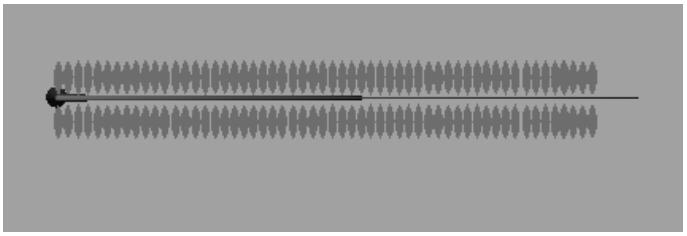


Figure 9-66 *Duplicate leaves aligned with the petiole*

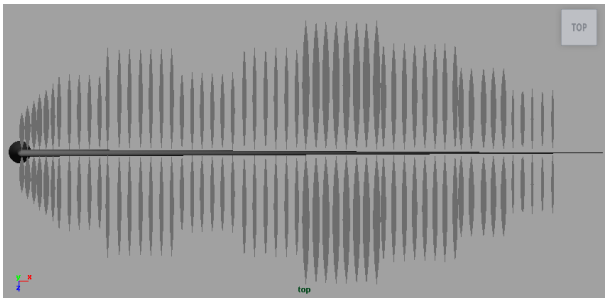


Figure 9-67 *Leaves after scaling*

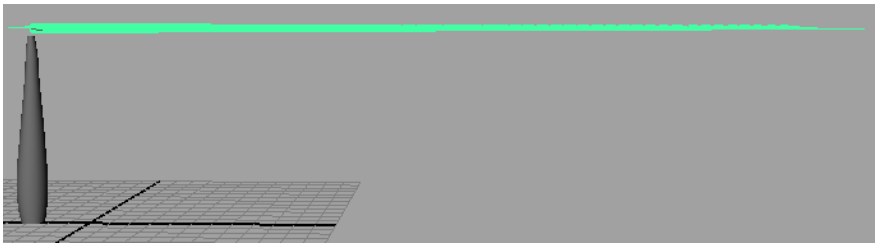


Figure 9-68 *Position of leaves and petiole*

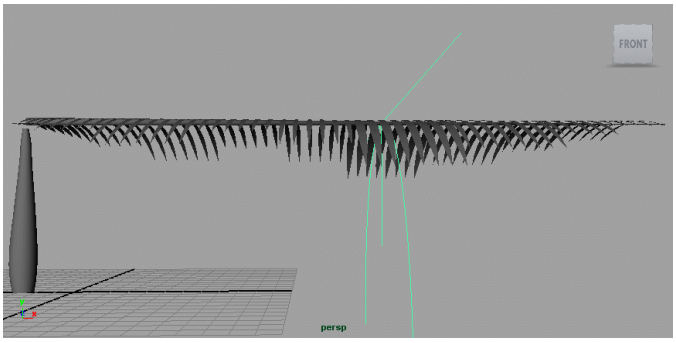


Figure 9-69 *Leaves after applying the* ***Bend*** *deformer*

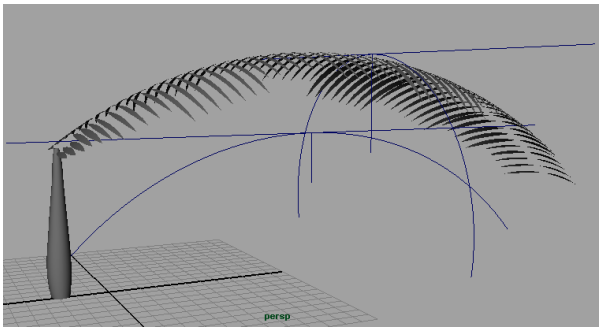


Figure 9-70 *Leaves aligned with the trunk*

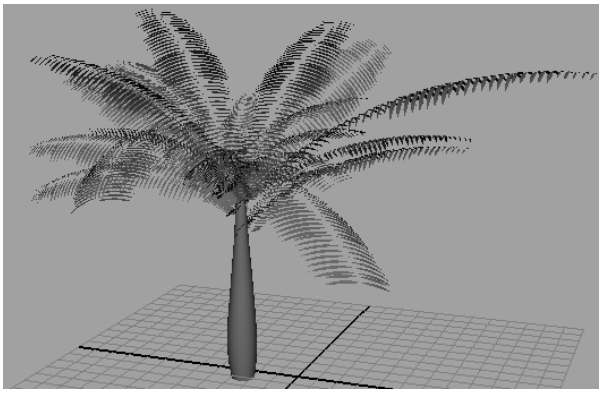


Figure 9-71 *The final output of the palm tree model*

Figure 9-72 *The pencil jumping out of the pencil stand*

Chapter 10

Paint Effects

Learning Objectives

After completing this chapter, you will be able to:

- *Use the Content Browser window*
- *Render the paint effect strokes*
- *Use shadow effects*
- *Modify the paint effect brush settings*

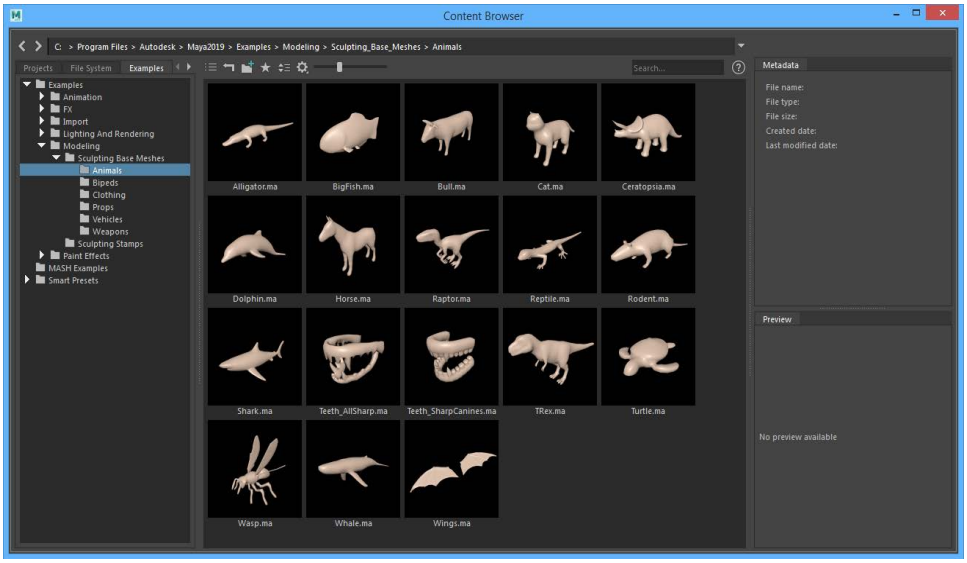


Figure 10-1 *The* ***Content Browser*** *window*

Figure 10-2 *The rendered image*

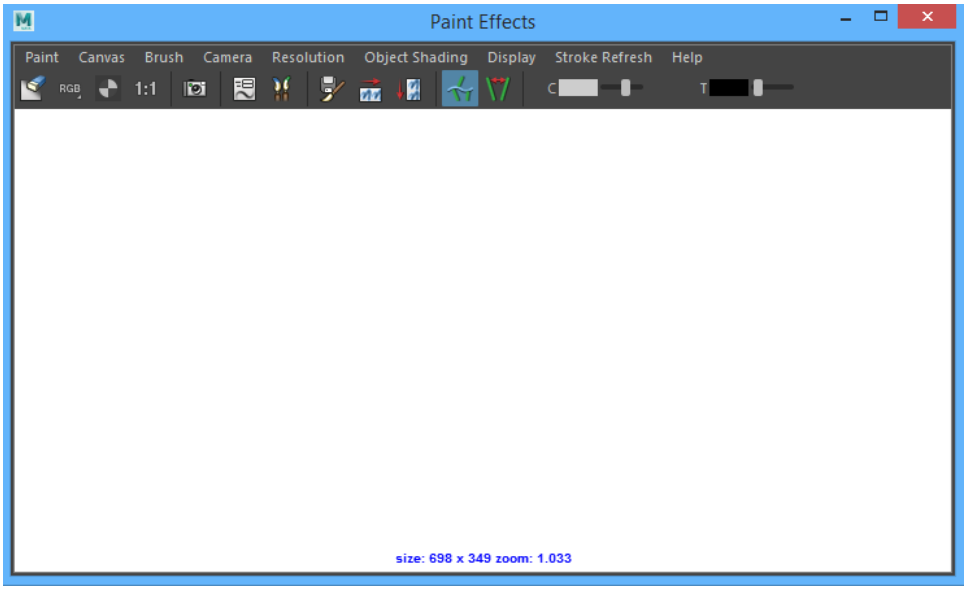


Figure 10-3 *The* ***Paint Effects*** *window*

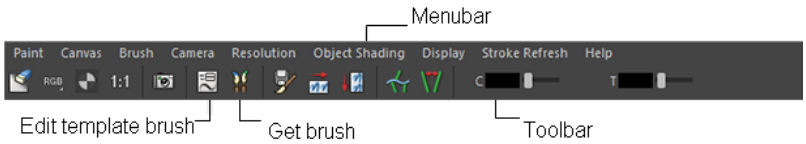


Figure 10-4 *The menubar and toolbar of the* ***Paint Effects*** *window*

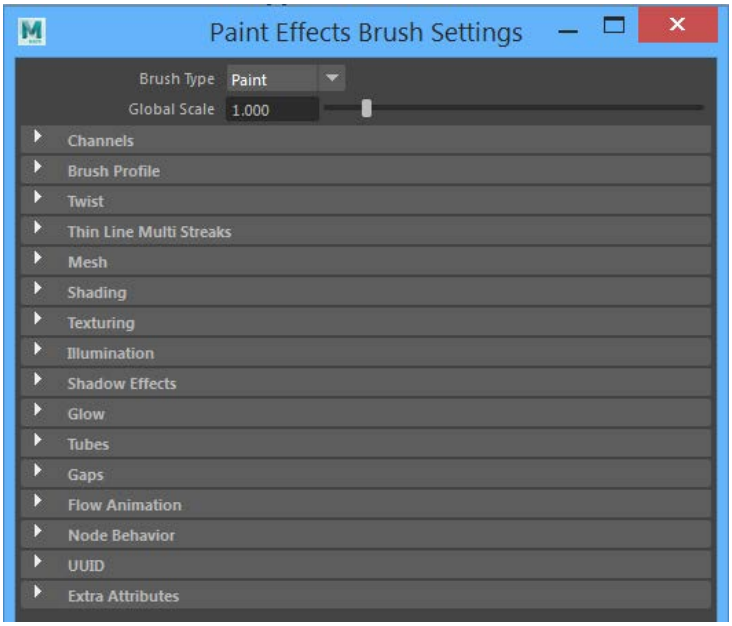


Figure 10-5 *The* ***Paint Effects Brush Settings*** *window*

Figure 10-6 *Object with the* ***Global Scale*** *value = 1*

Figure 10-7 *Object with the* ***Global Scale*** *value = 2*

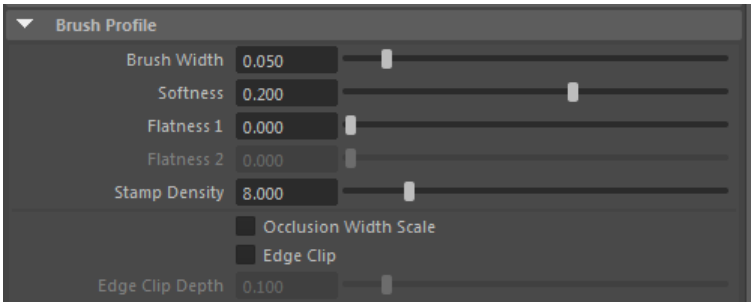


Figure 10-8 *The* ***Brush Profile*** *area*

Figure 10-9 *Paint stroke with* ***Softness = 0***

Figure 10-10 *Paint stroke with* ***Softness = 1***

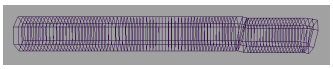


Figure 10-11 *Paint stroke with* ***Flatness 1 = 0***

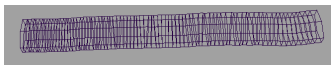


Figure 10-12 *Paint stroke with* ***Flatness 1 = 0.5***

.

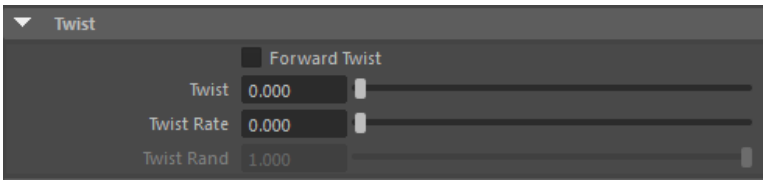


Figure 10-13 *The* ***Twist*** *area*

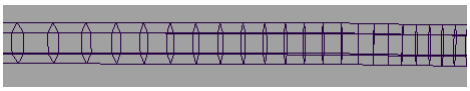


Figure 10-14 *Paint stroke with* ***Tube Rate = 0***

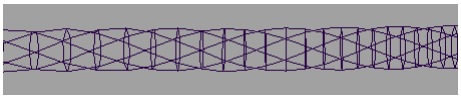


Figure 10-15 *Paint stroke with* ***Tube Rate = 3***

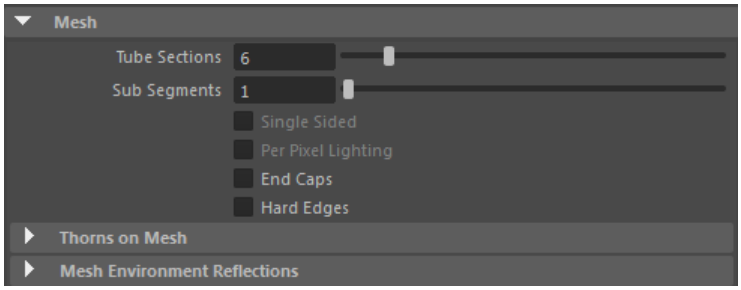


Figure 10-16 *The* ***Mesh*** *area*

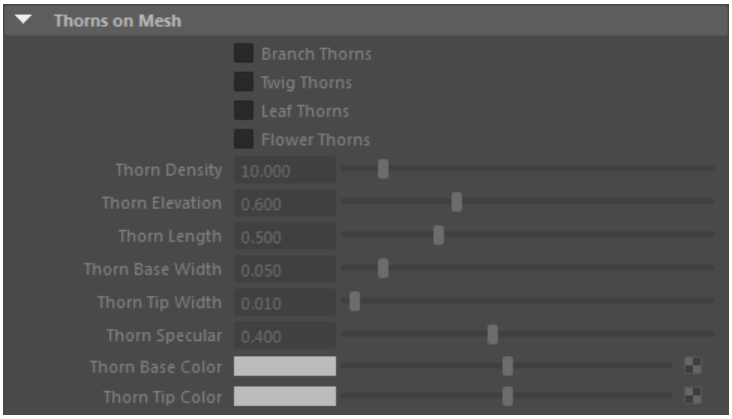


Figure 10-17 *The expanded* ***Thorns on Mesh*** *area*

Figure 10-18 *Paint stroke before using the* ***Thorns on Mesh*** *attribute*

Figure 10-19 *Paint stroke after using the* ***Thorns on Mesh*** *attribute*

Figure 10-20 *The* ***Shading*** *area*

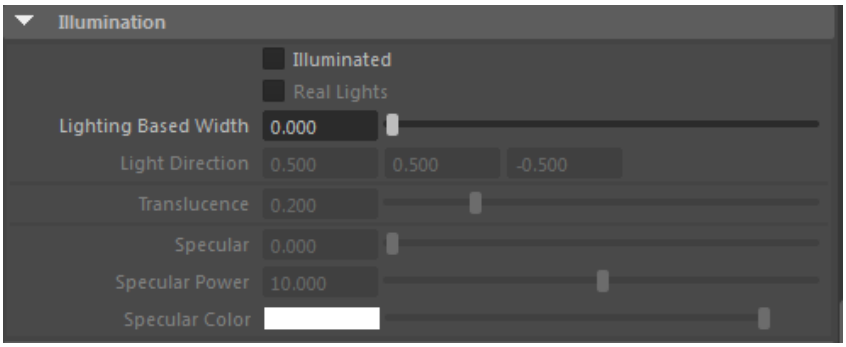


Figure 10-21 *The* ***Illumination*** *area*

Figure 10-22 *Paint stroke with the* ***Illuminated*** *check box cleared*

Figure 10-23 *Paint stroke with the* ***Illuminated*** *check box selected*

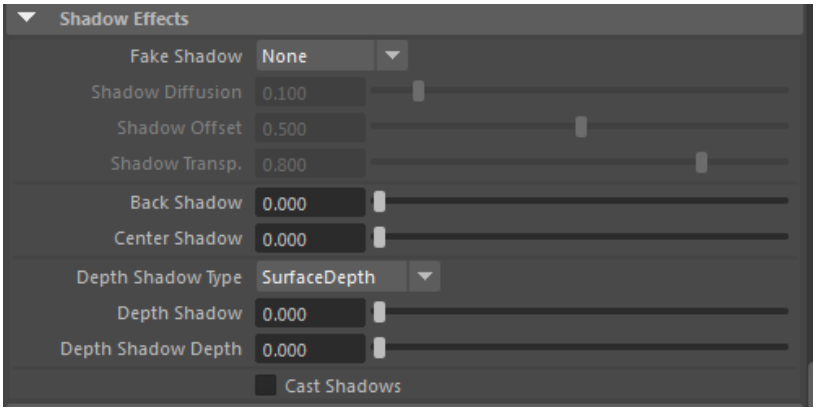


Figure 10-24 *The* ***Shadow Effects*** *area*

Figure 10-25 *Paint stroke with the* ***Shadow Diffusion*** *value* = ***0***

Figure 10-26 *Paint stroke with the* ***Shadow Diffusion*** *value* = ***1***

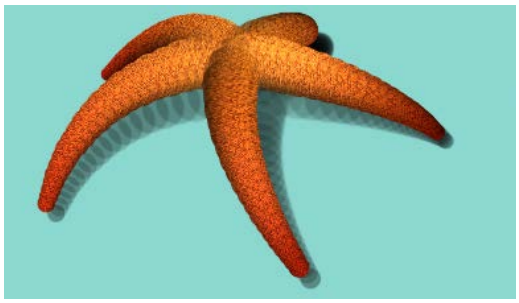


Figure 10-27 *Paint stroke with the* ***Shadow Offset*** *value* = ***0.5***

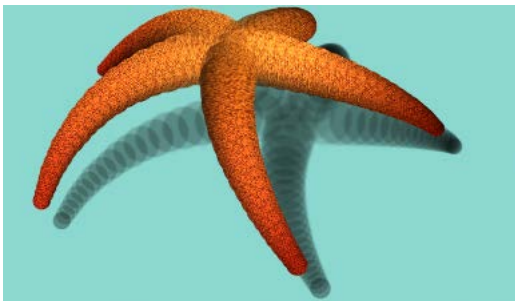


Figure 10-28 *Paint stroke with the* ***Shadow Offset*** *value* = ***1***

Figure 10-29 *Paint stroke with the* ***Shadow Transp*** *value* = ***0***

Figure 10-30 *Paint stroke with the* ***Shadow Transp*** *value* = ***0.8***

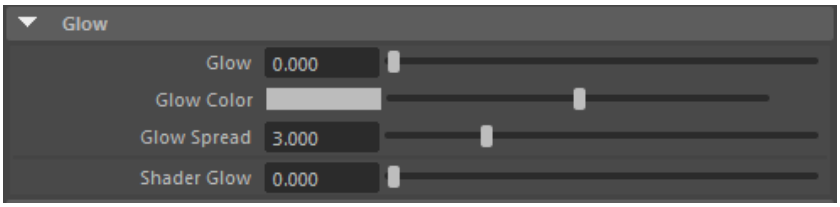


Figure 10-31 *The* ***Glow*** *area*

Figure 10-32 *Paint stroke with the* ***Glow*** *value = 0*

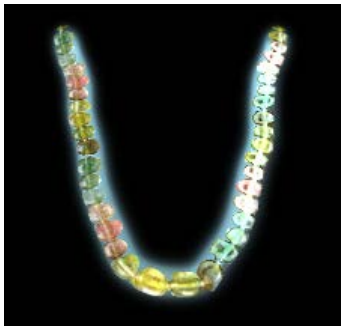


Figure 10-33 *Paint stroke with the* ***Glow*** *value = 0.2*

Figure 10-34 *A street scene*

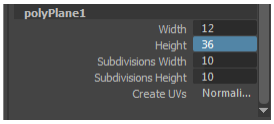


Figure 10-35 *Setting the parameters of* ***polyPlane1***

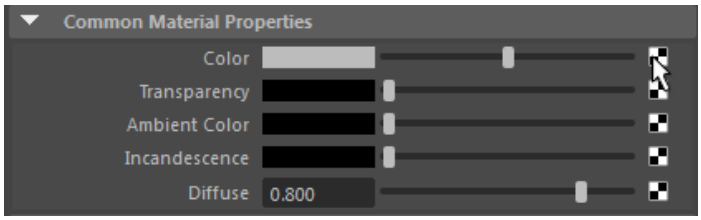


Figure 10-36 *The* ***Common Material Attributes*** *area*

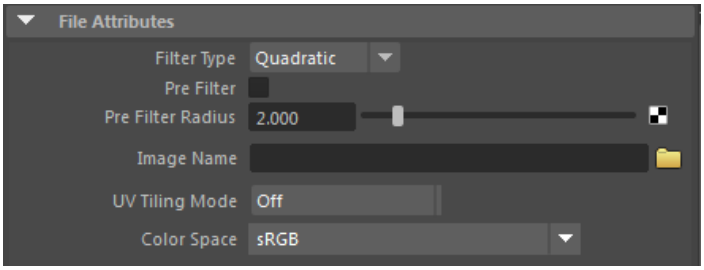


Figure 10-37 *The* ***File Attributes*** *area*

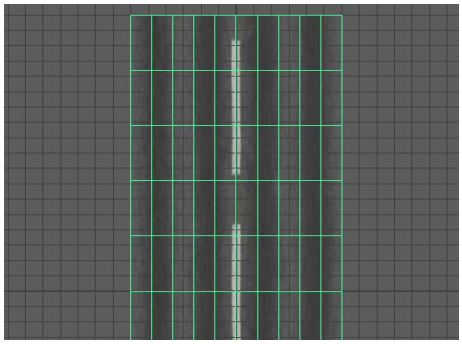


Figure 10-38 *Texture applied on the plane*

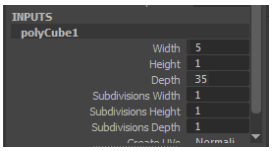


Figure 10-39 *Setting the parameters of* ***polyCube1***

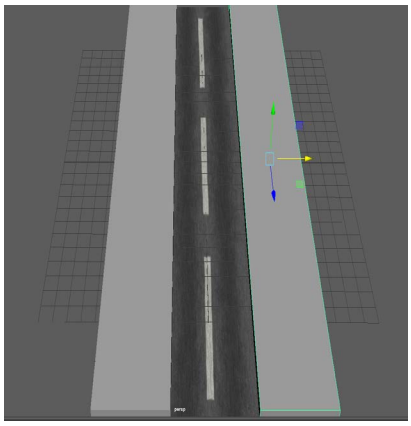


Figure 10-40 *The base for the street displayed*

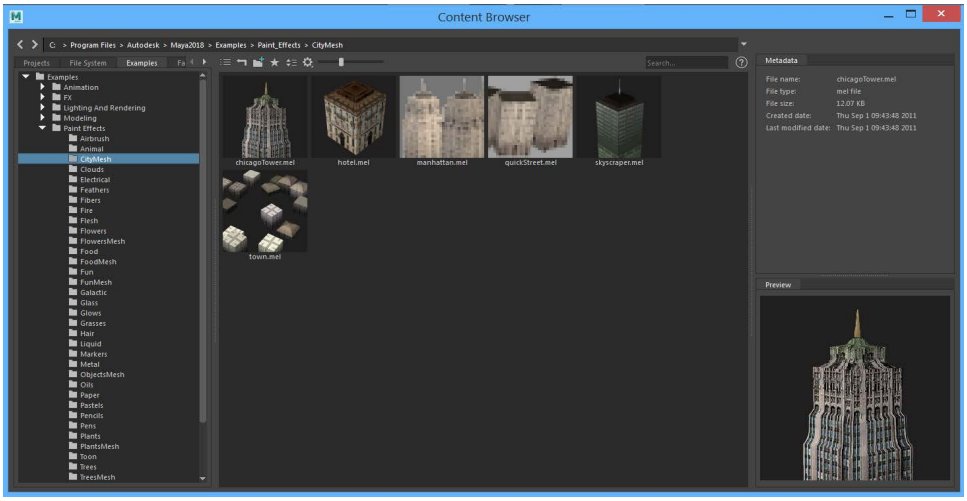


Figure 10-41 *Choosing the* ***chicagoTower.mel*** *paint stroke from the* ***Content Browser*** *window*

.

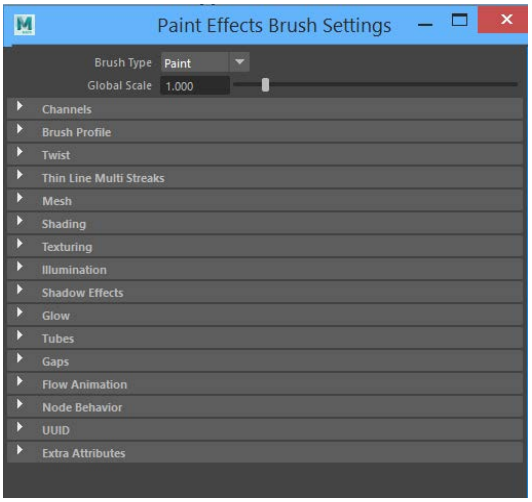


Figure 10-42 *The* ***Paint Effects Brush Settings*** *window*

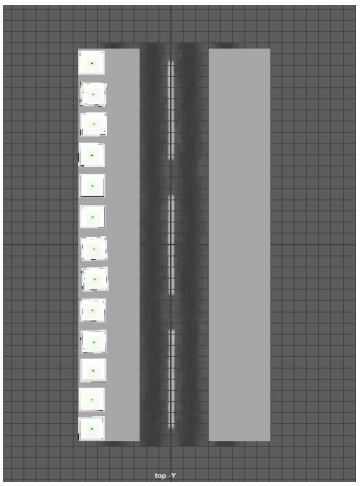


Figure 10-43 *Buildings created*

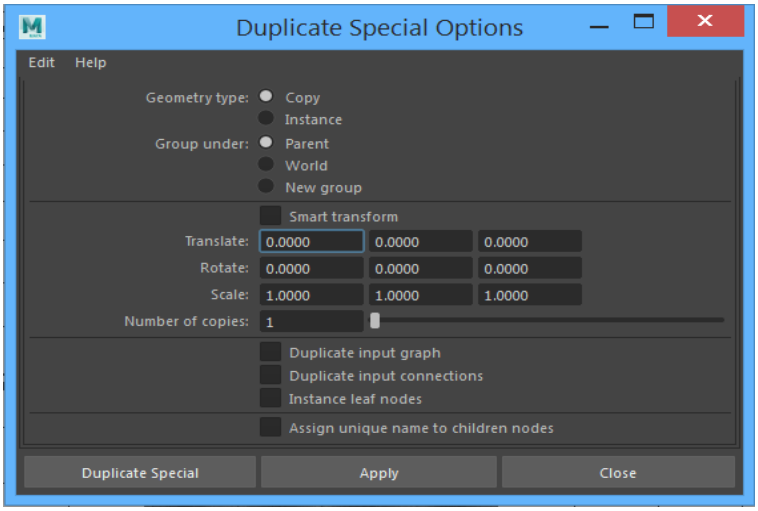


Figure 10-44 *The* ***Duplicate Special Options*** *window*

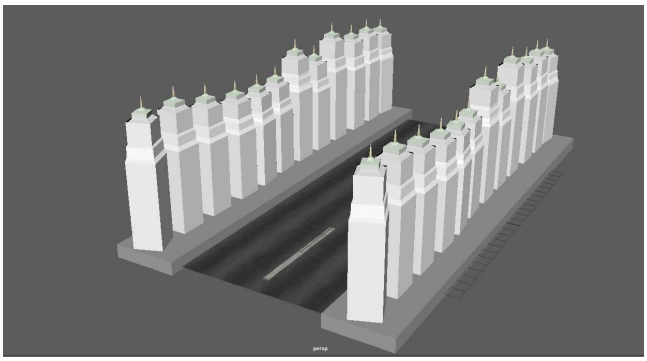


Figure 10-45 *Building paint stroke created on the opposite side of the plane*

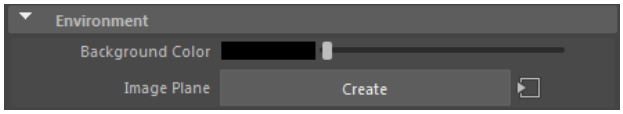


Figure 10-46 *Attributes in the* ***Environment*** *area*

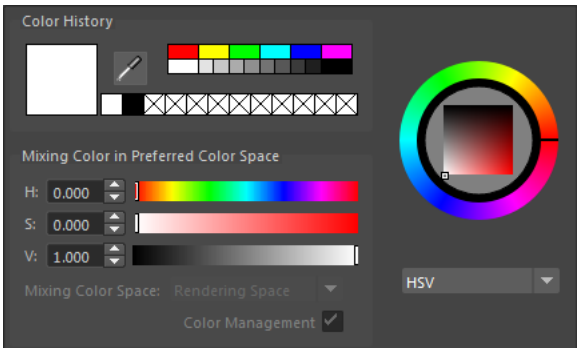


Figure 10-47 *The* ***Color History*** *palette*

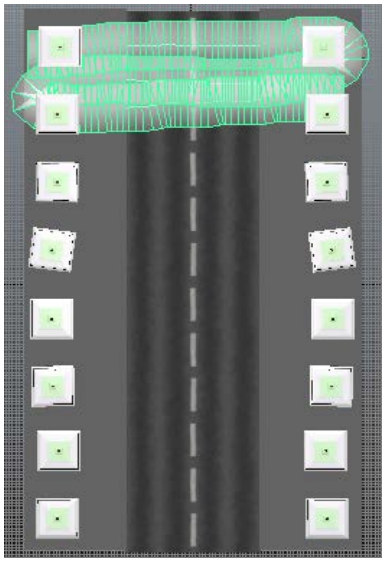


Figure 10-48 *Cloud painted in the top-Y viewport*

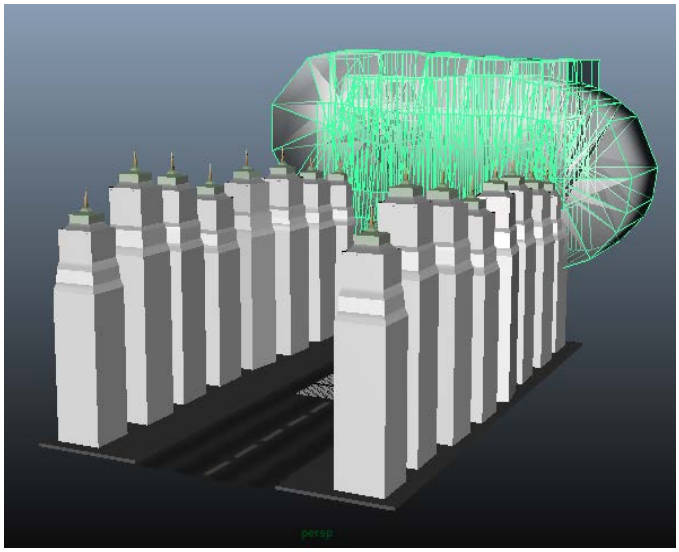


Figure 10-49 *Clouds aligned behind the buildings*

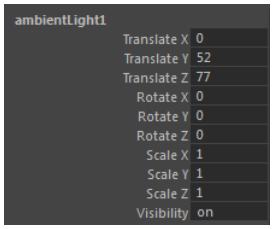


Figure 10-50 *The ambientLight1 parameters*

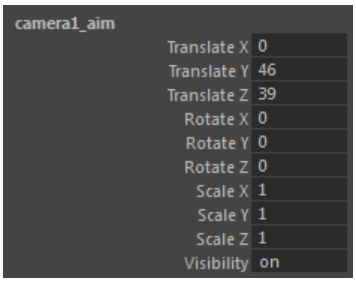


Figure 10-51 *The* ***camera1_aim*** *parameters*

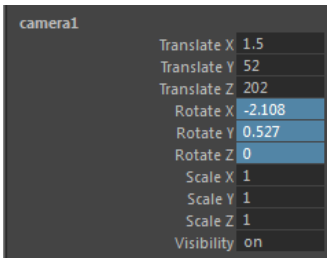


Figure 10-52 *The* ***camera1*** *parameters*

Figure 10-53 *The final output after rendering*

Figure 10-54 *A desert scene*

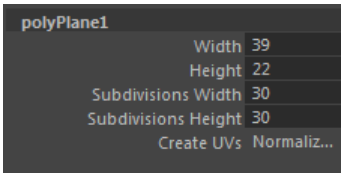


Figure 10-55 *Setting the parameters of the plane in the* ***Channel Box / Layer Editor***

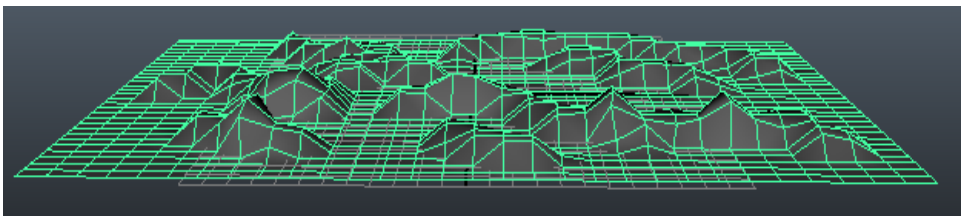


Figure 10-56 *The sculpted plane*

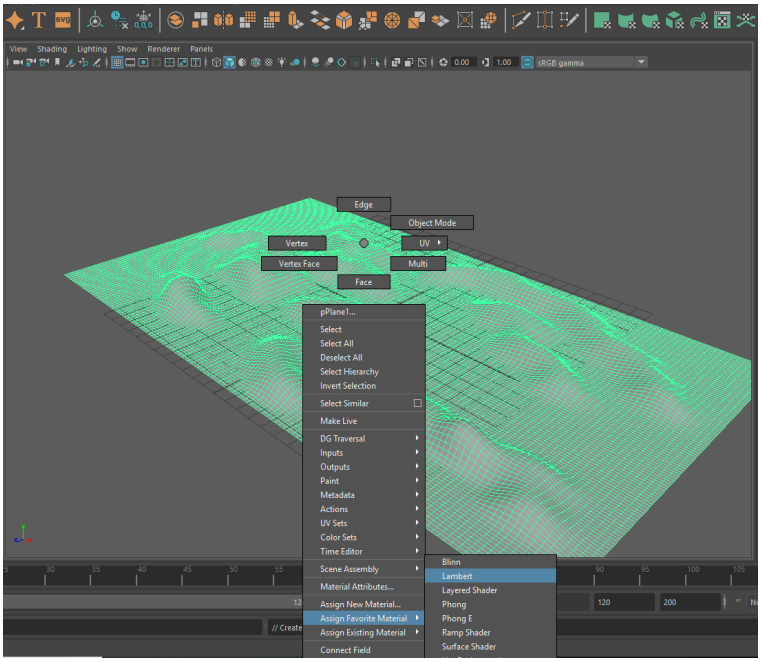


Figure 10-57 *Choosing the* ***Lambert*** *option from the marking menu*

Figure 10-58 *Texture applied on the plane*

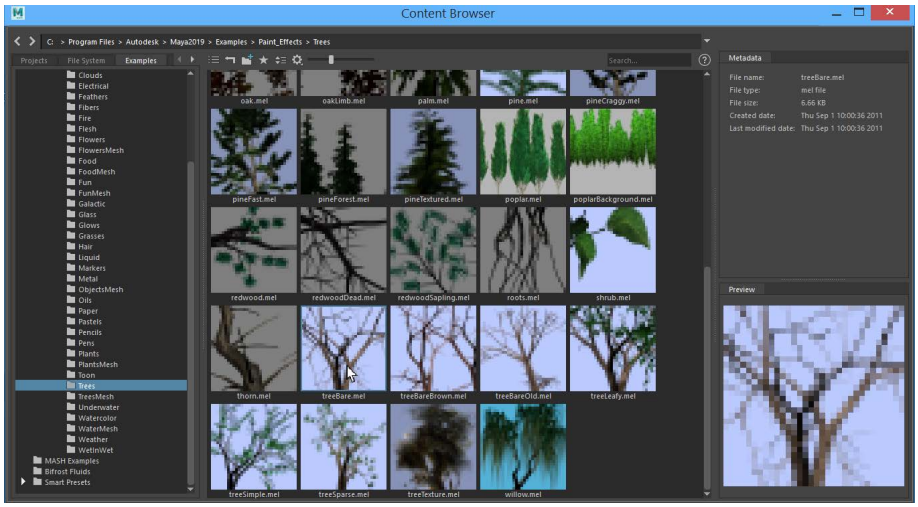


Figure 10-59 *Selecting the* ***treeBare.mel*** *paint stroke from the* ***Content Browser*** *window*

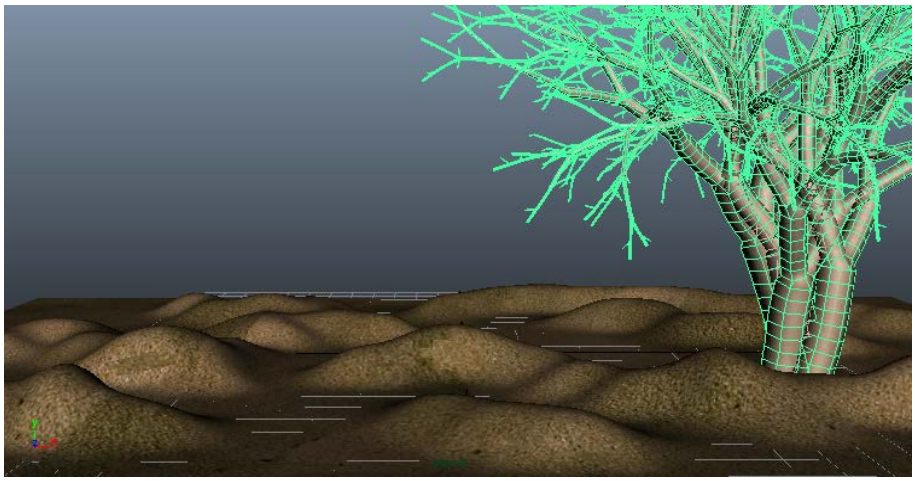


Figure 10-60 *Tree created using the* ***treeBare.mel*** *paint stroke*

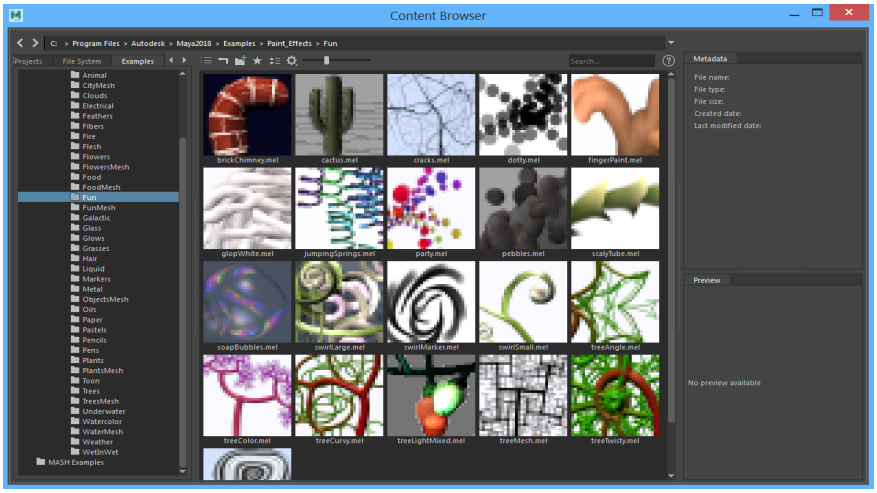


Figure 10-61 *Selecting the* ***cactus.mel*** *paint stroke from the* ***Content Browser*** *window*

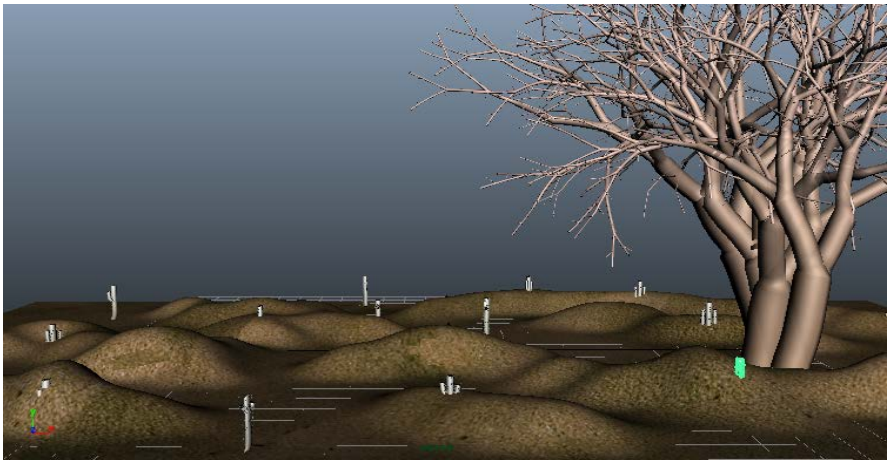


Figure 10-62 *Cactus plants created using the* ***cactus.mel*** *paint stroke*

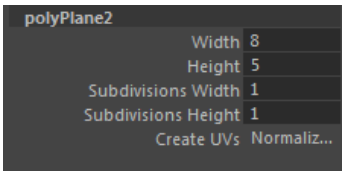


Figure 10-63 *Setting the parameters of the plane in the* ***Channel Box / Layer Editor***

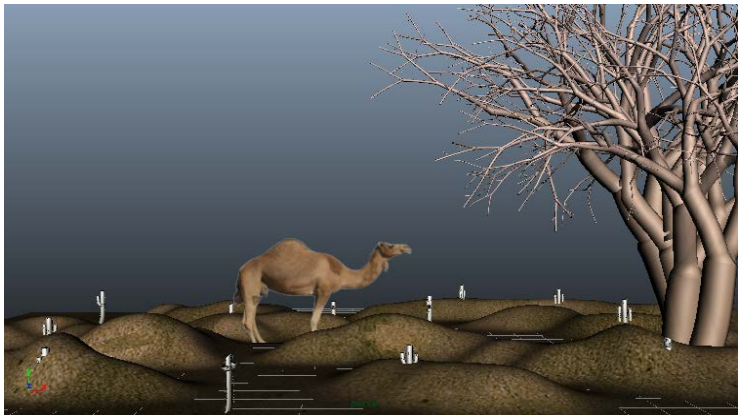


Figure 10-64 *The plane adjusted in the scene*

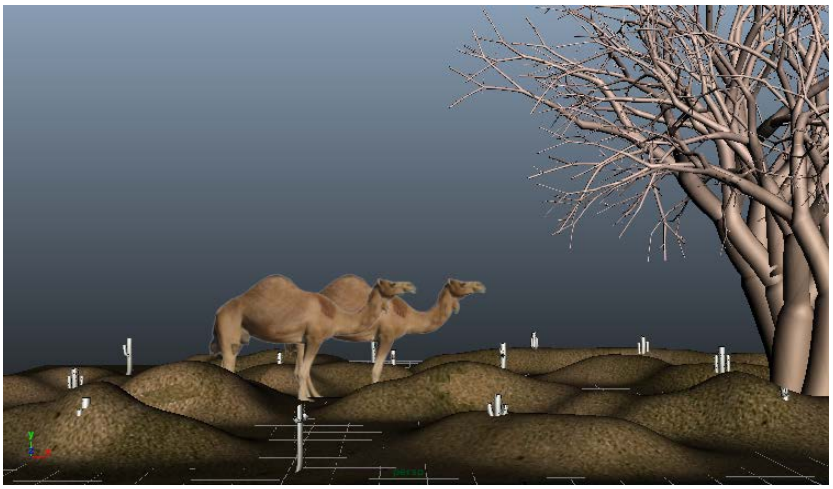


Figure 10-65 *The copy of the plane created and aligned*

Figure 10-66 *The* ***Environment*** *area*

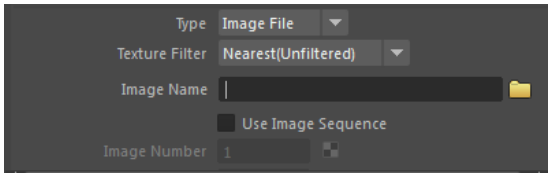


Figure 10-67 *The folder icon on the right of the* ***Image Name*** *attribute*

Figure 10-68 *The final rendered scene*

Figure 10-69 *The underwater scene*

Figure 10-70 *The tree created on the left side of a hut model*

Figure 10-71 *The flower pot*

Figure 10-72 *The rendered flower pot*

Chapter 11

Rendering

Learning Objectives

After completing this chapter, you will be able to:

- *Use the Render Setup*
- *Understand the basic concepts of rendering*
- *Use Arnold and Maya Software renderers*
- *Use Maya Hardware and Maya Vector renderers*

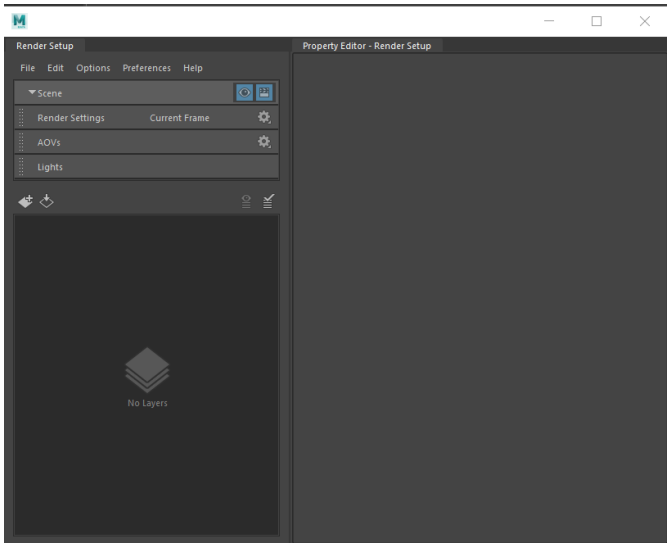


Figure 11-1 *The* ***Render Setup*** *window*

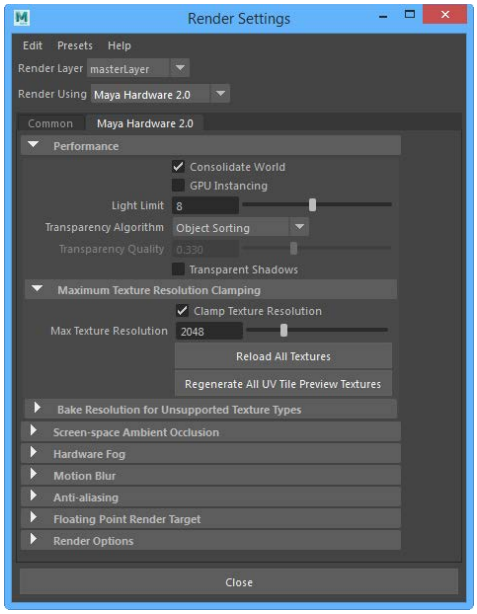


Figure 11-2 *The partial view of hardware renderer settings displayed*

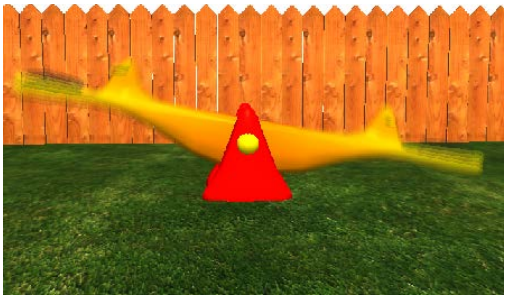


Figure 11-3 *An object with the motion blur effect*

Figure 11-4 *The vector rendered image*

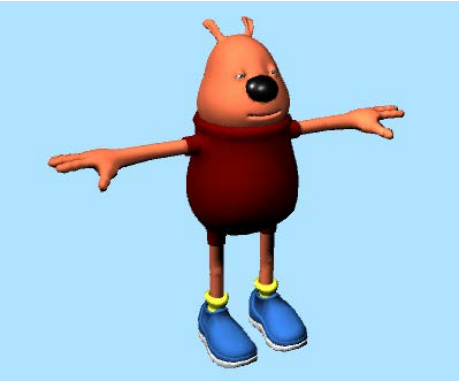


Figure 11-5 *An image rendered using the* ***Maya Software*** *renderer*

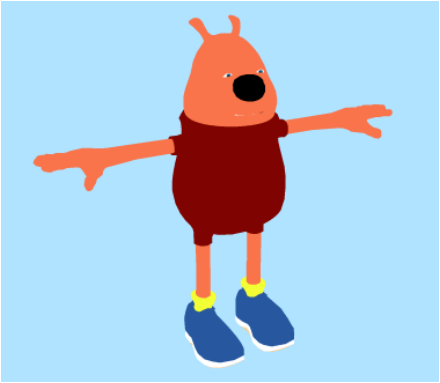


Figure 11-6 *An image rendered using the* ***Maya Vector renderer***

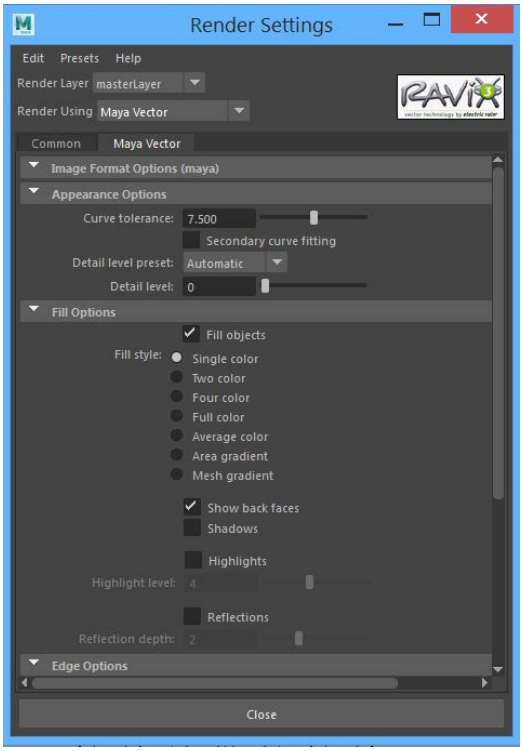


Figure 11-7 *The partial view of vector renderer settings displayed*

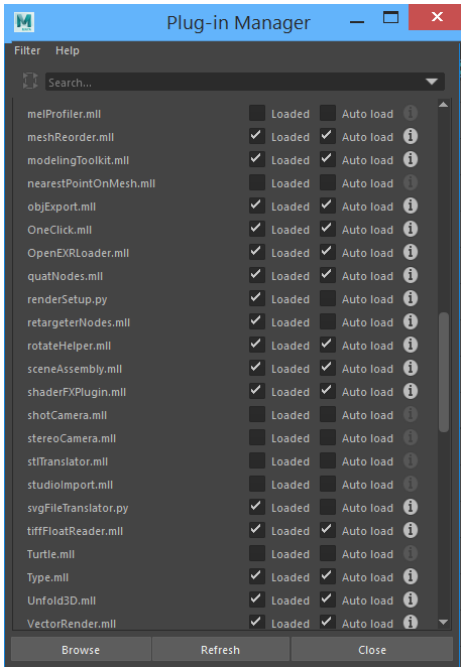


Figure 11-8 *The* ***vectorRender.mll*** *check box in the* ***Plug-in Manager*** *window*

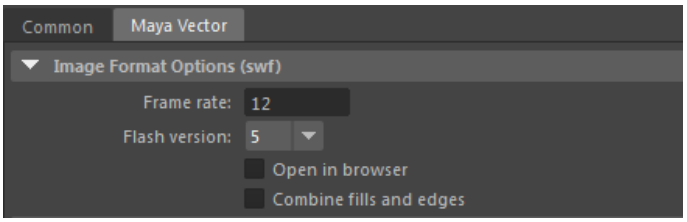


Figure 11-9 *The* ***Image Format Options (swf)*** *area*

Figure 11-10 *Image with the* ***Low*** *option selected*

Figure 11-11 *Image with the* ***High*** *option selected*

Figure 11-12 *Image rendered using the* ***Single color*** *fill style*

Figure 11-13 *Image rendered using the* ***Two color*** *fill style*

Figure 11-14 *Image rendered on applying the* ***Four color*** *fill style*

Figure 11-15 *Image rendered on applying the* ***Full color*** *fill style*

Figure 11-16 *Image rendered on applying the* ***Average color*** *fill style*

Figure 11-17 *Rendered image before selecting the* ***Include edges*** *check box*

Figure 11-18 *Rendered image after selecting the* ***Include edges*** *check box*

Figure 11-19 *Image with the* ***Edge weight*** *value = 3*

Figure 11-20 *Image with the* ***Edge weight*** *value = 10*

Figure 11-21 *Image rendered on selecting the* ***Outlines*** *option*

Figure 11-22 *Image rendered on selecting the* ***Entire Mesh*** *option*

Figure 11-23 *Image displayed after selecting the* ***Hidden edges*** *check box*

Figure 11-24 *Image displayed on selecting the* ***Edge detail*** *check box*

t.

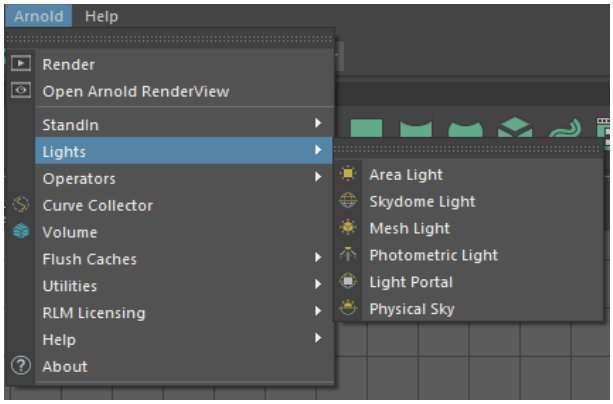


Figure 11-25 *The* ***Arnold*** *menu*

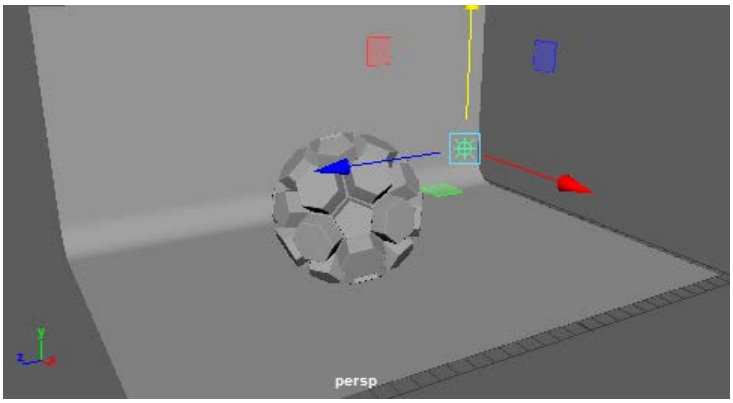


Figure 11-26 *The position of the* ***Point Light*** *in the scene*

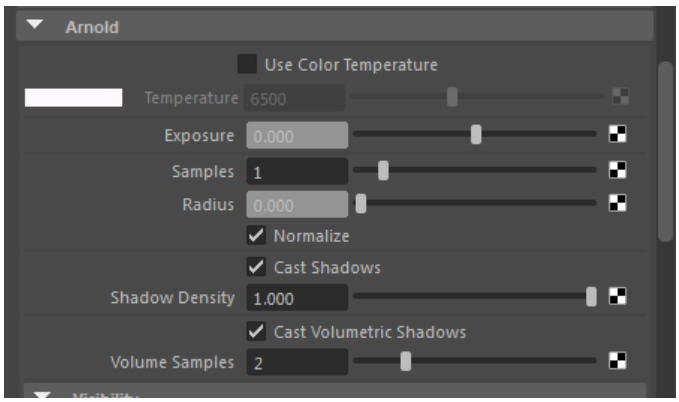


Figure 11-27 *The* ***Arnold*** *area in the* ***Attribute Editor***

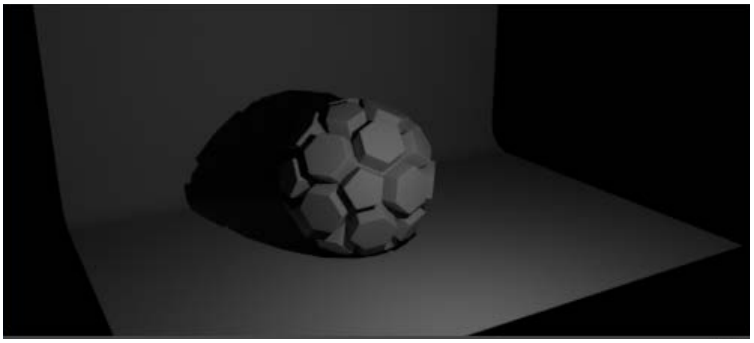


Figure 11-28 *The render with the values of the* ***Intensity*** *and* ***Exposure*** *set to* ***3*** *and* ***5***

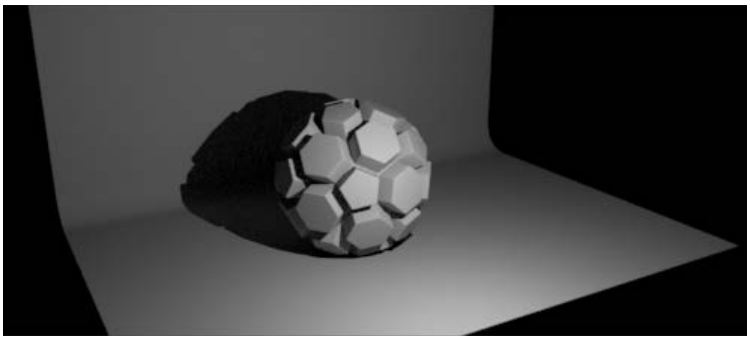


Figure 11-29 *The render with the values of the* ***Intensity*** *and* ***Exposure*** *set to* ***3*** *and* ***7***

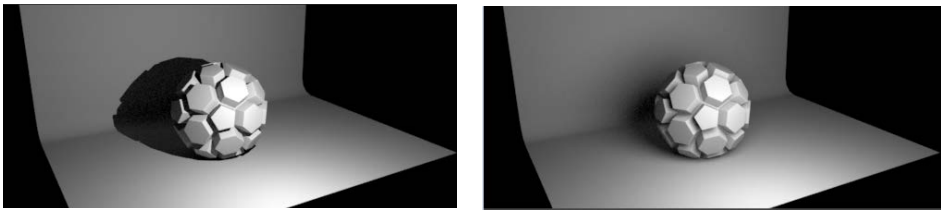


Figure 11-30 *The renders with the values of the* ***Radius*** *attribute set to* ***0*** *and* ***5***

.

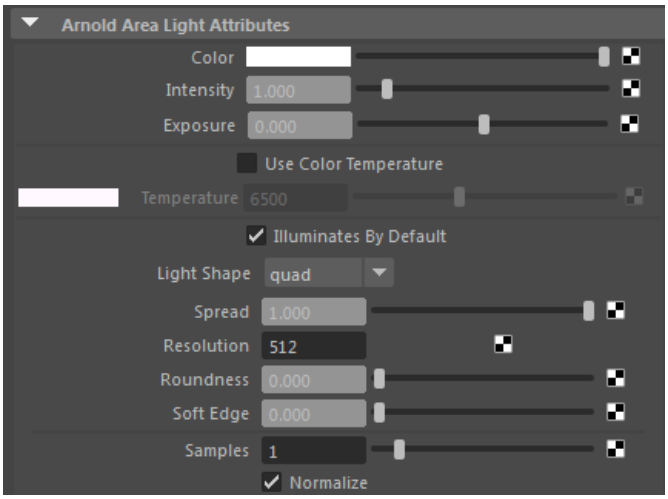


Figure 11-31 *The* ***Light Shape*** *drop-down list*

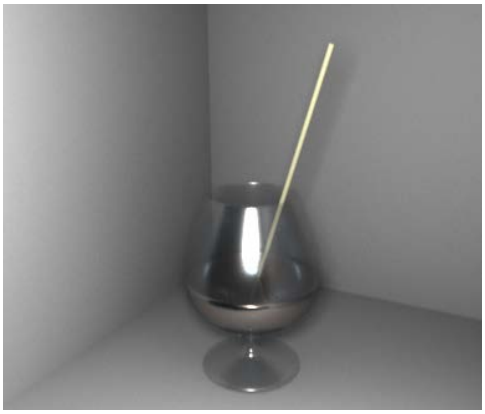


Figure 11-32 *The rendered image of a glass using the* ***Arnold*** *renderer*

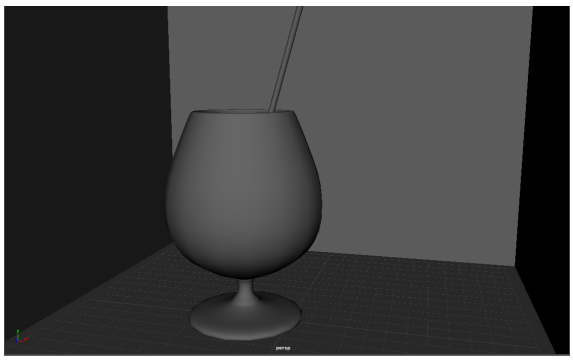


Figure 11-33 *The model of a glass in the scene*

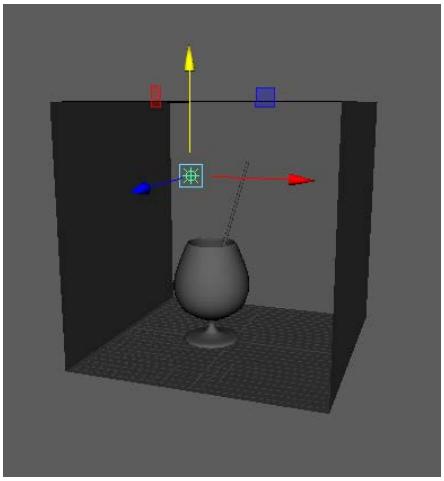


Figure 11-34 *The geometry aligned in the scene*

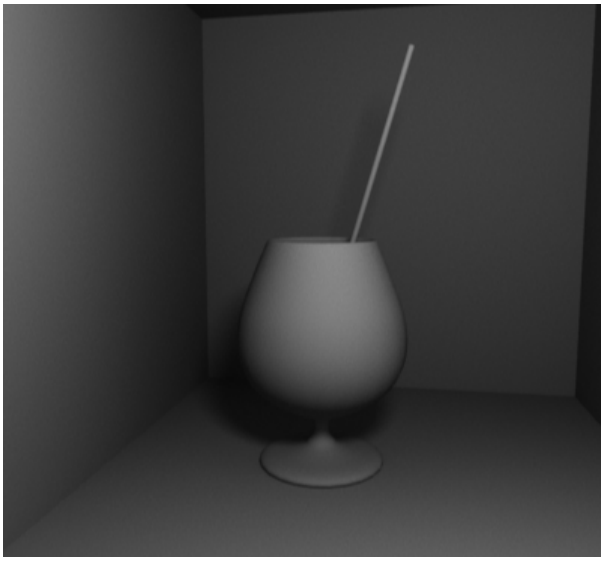


Figure 11-35 *The render image of the scene*

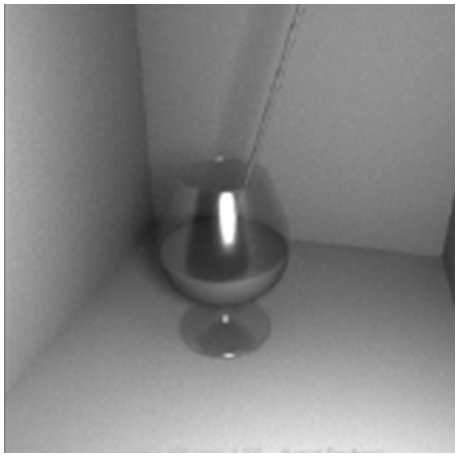


Figure 11-36 *The rendered image of the glass*

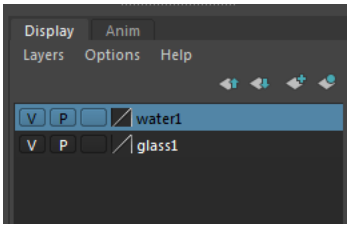


Figure 11-37 *Hiding the* ***glass1*** *layer*

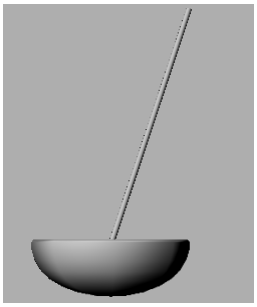


Figure 11-38 *The water mesh*

Figure 11-39 *The rendered glass after applying the raytrace attributes*

Figure 11-40 *The rendered image of a geometry using the* ***Arnold*** *renderer*

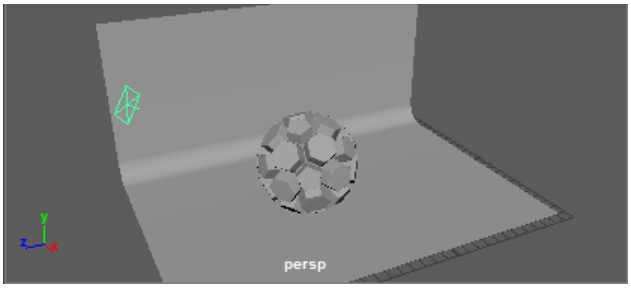


Figure 11-41 *The Arnold light placed in the scene*

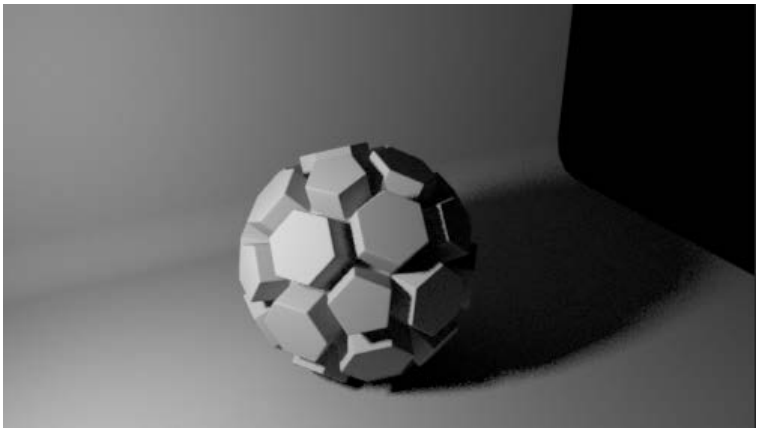


Figure 11-42 *The render of the scene*

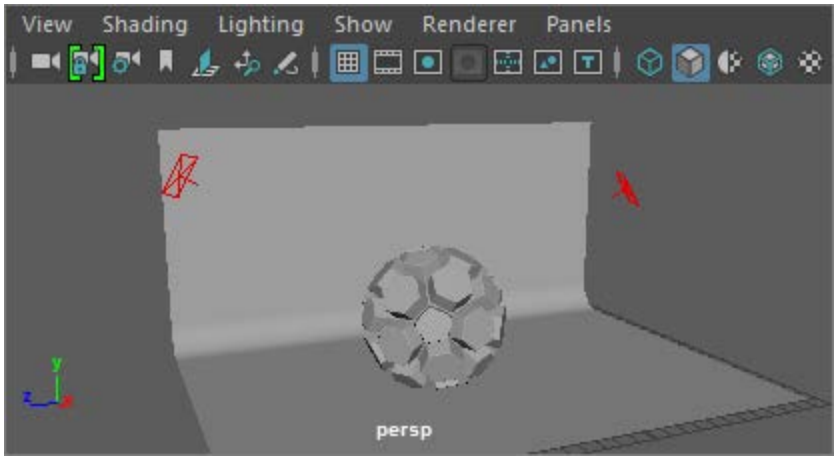


Figure 11-43 *The other Arnold light placed in the scene*

Figure 11-44 *The render with noise in the specular highlights*

Figure 11-45 *Scene before rendering*

Figure 11-46 *Scene after rendering*

Figure 11-47 *The tree created in the scene*

Figure 11-48 *The rendered scene*

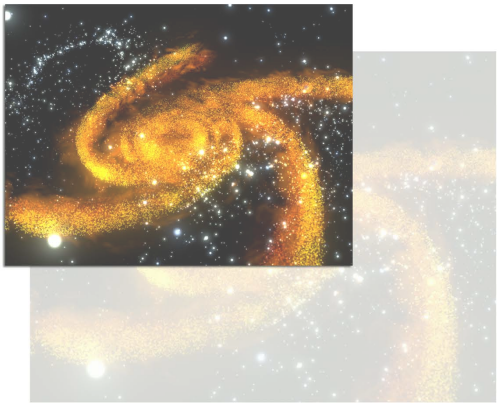
Chapter 12

Particle System

Learning Objectives

After completing this chapter, you will be able to:

- *Create particles*
- *Create emitters*
- *Modify the render attributes of particles*
- *Collide particles*
- *Use Hardware Renderer*
- *Apply different types of fields and pre-defined effects*



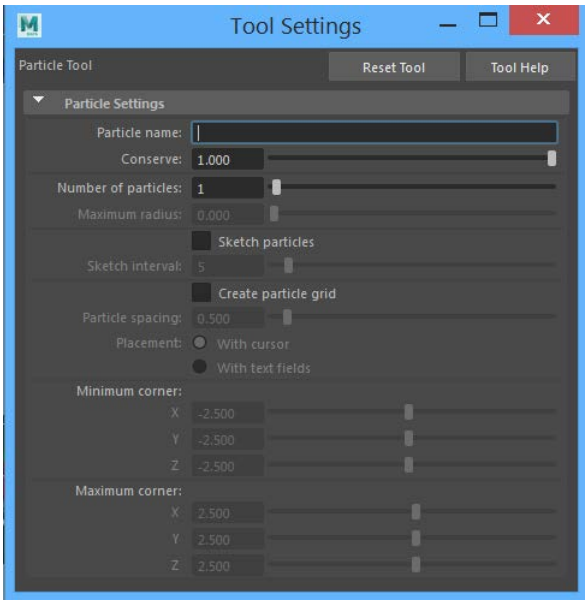


Figure 12-1 *The* ***Tool Settings (Particle Tool)*** *panel*

Figure 12-2 *The emitter created in viewport*

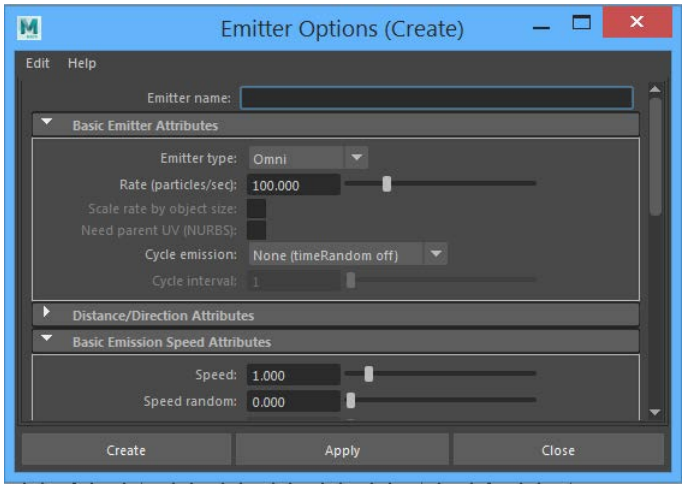


Figure 12-3 *The* ***Emitter Options (Create)*** *window*

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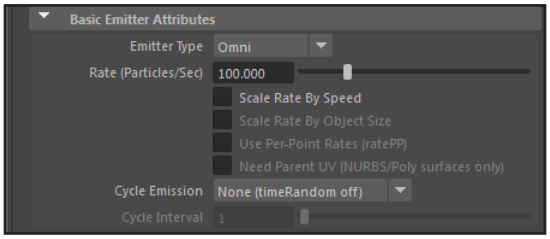

Figure 12-4 *The* ***Basic Emitter Attributes*** *area*

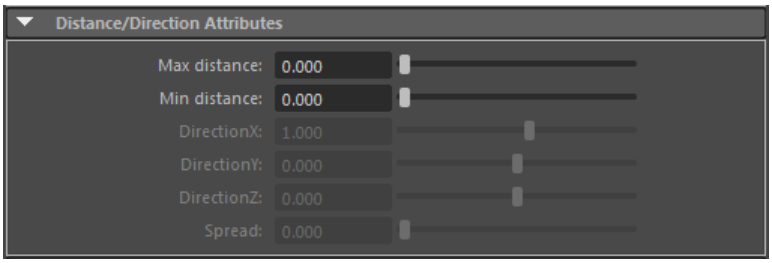

Figure 12-5 *The* ***Distance/Direction Attributes*** *area*

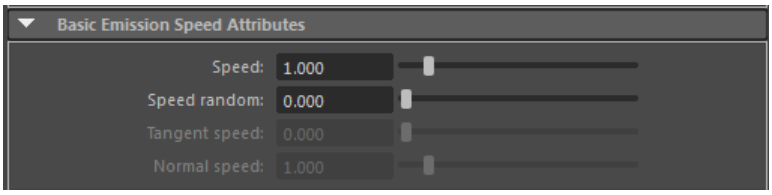

Figure 12-6 *The* ***Basic Emission Speed Attributes*** *area*

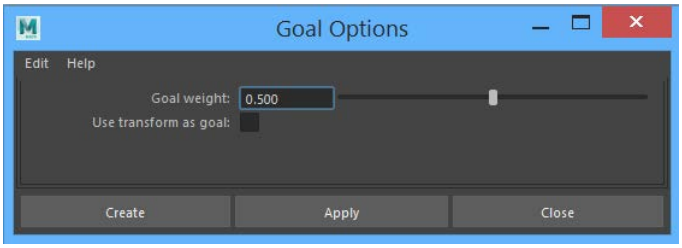

Figure 12-7 *The* ***Goal Options*** *window*

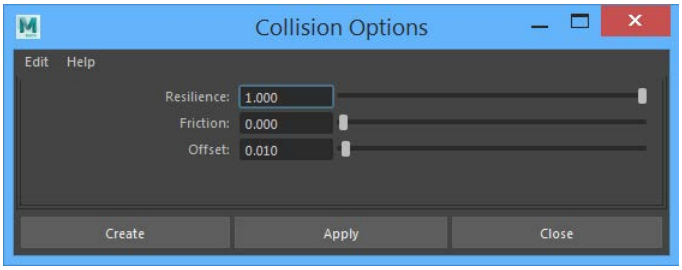

Figure 12-8 *The* ***Collision Options*** *window*

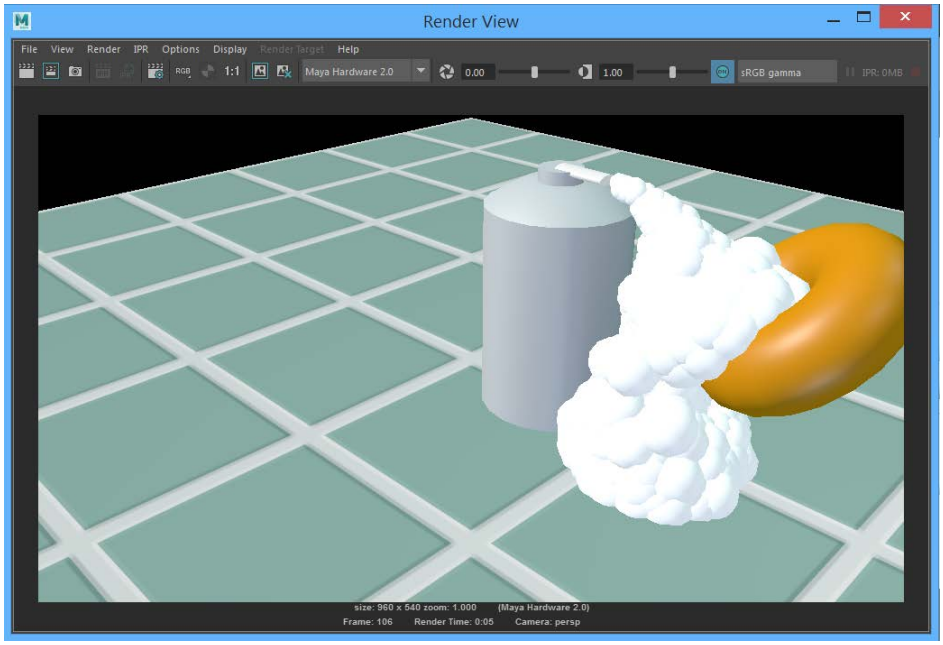

Figure 12-9 *Particles rendered using Maya Hardware Renderer 2.0*

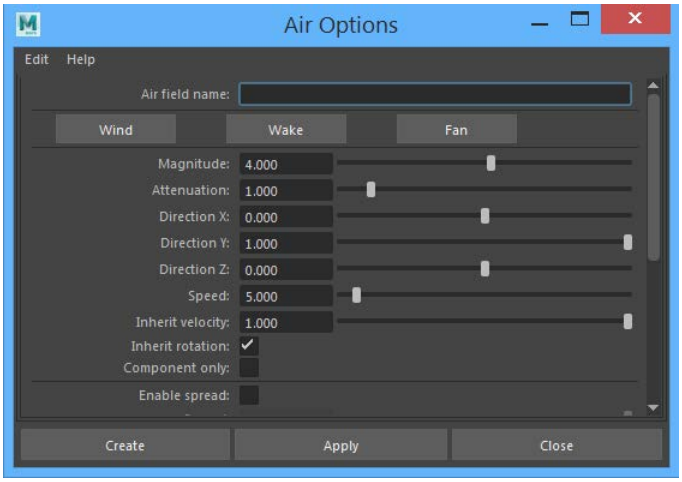

Figure 12-10 *The* ***Air Options*** *window*

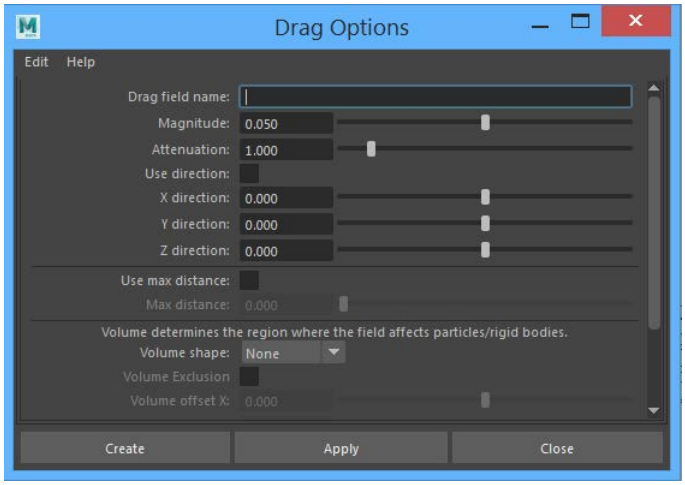

Figure 12-11 *The* ***Drag Options*** *window*

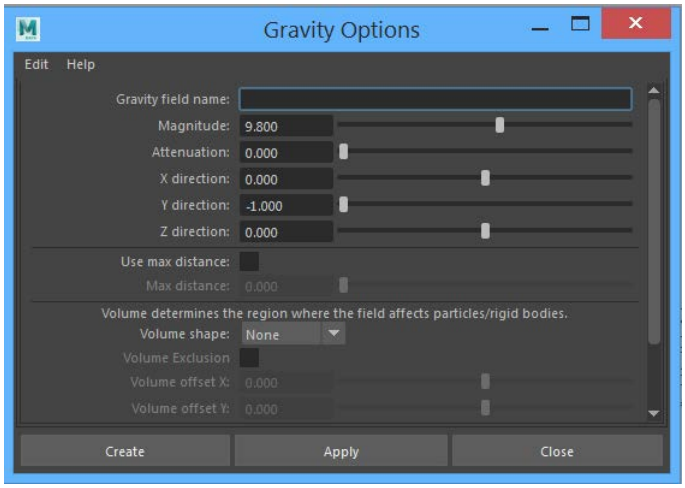

Figure 12-12 *The* ***Gravity Options*** *window*

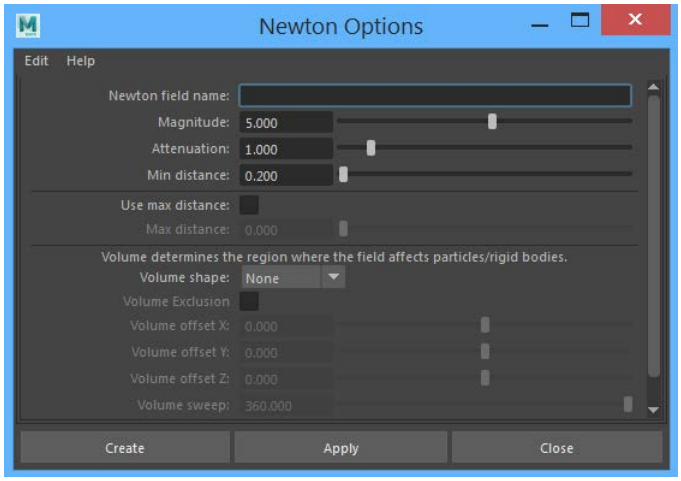

Figure 12-13 *The* ***Newton Options*** *window*

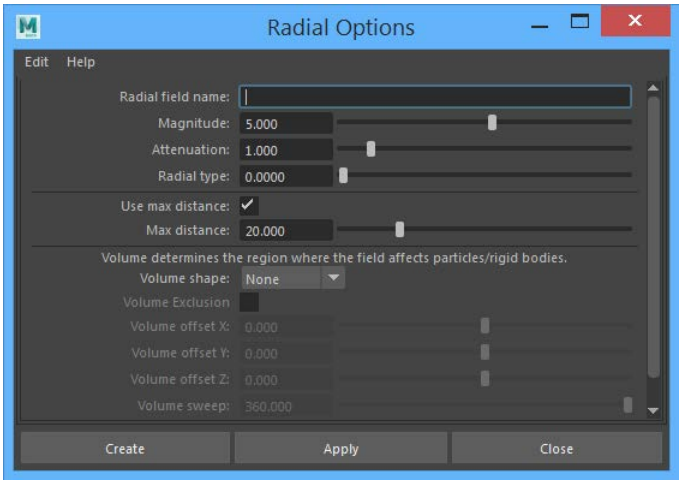

Figure 12-14 *The* ***Radial Options*** *window*

Figure 12-15 *A plane before applying the* ***Turbulence*** *field*

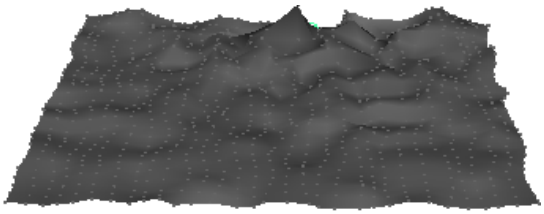

Figure 12-16 *A plane after applying the* ***Turbulence*** *field*

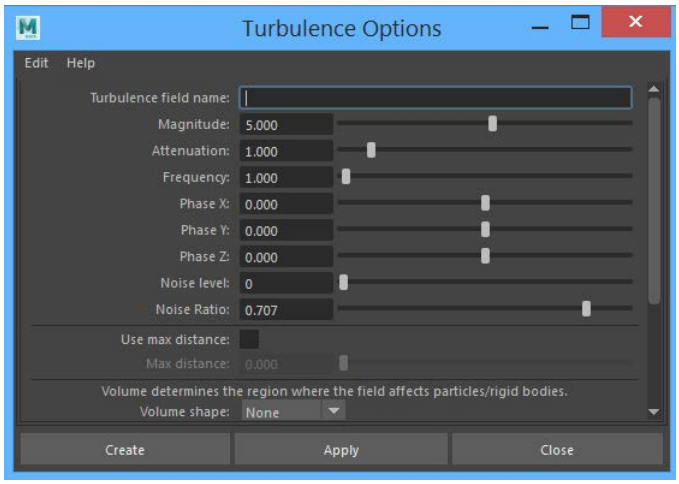

Figure 12-17 *The* ***Turbulence Options*** *window*

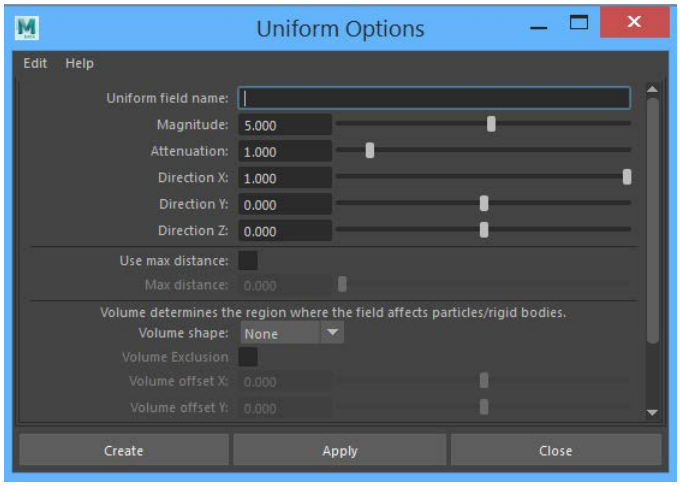

Figure 12-18 *The* ***Uniform Options*** *window*

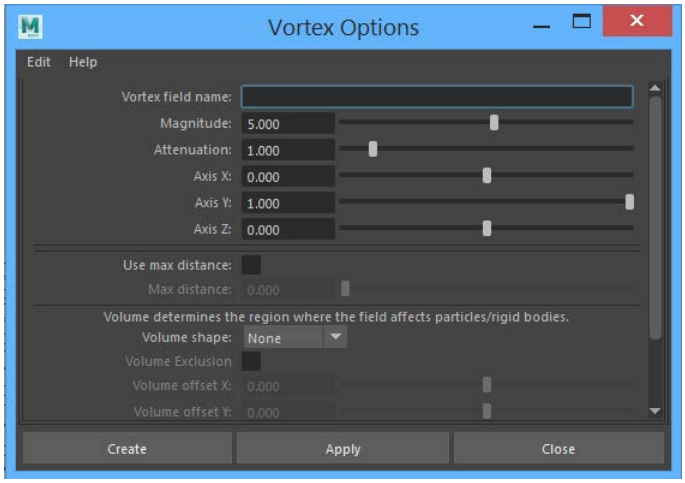

Figure 12-19 *The* ***Vortex Options*** *window*

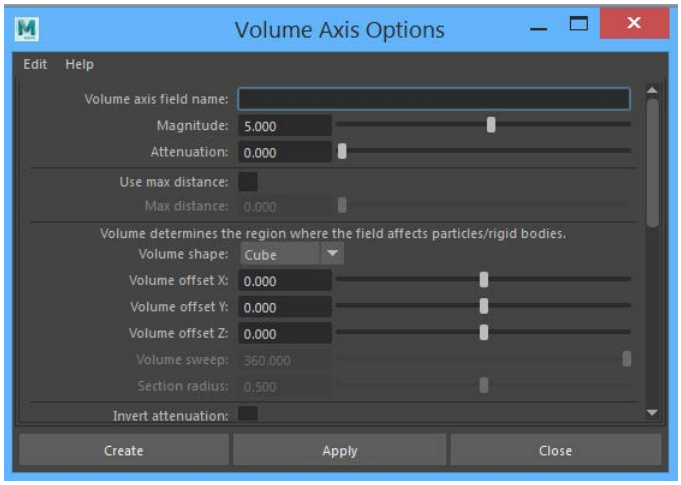

Figure 12-20 *The* ***Volume Axis Options*** *window*

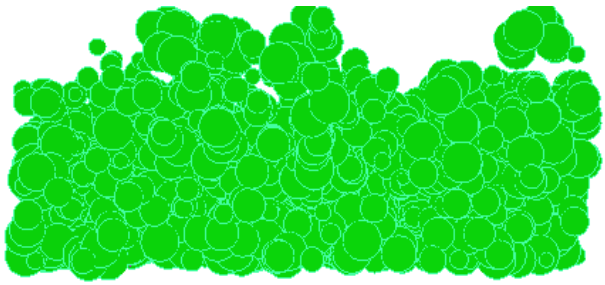

Figure 12-21 *The fire created using the* ***Fire*** *option*

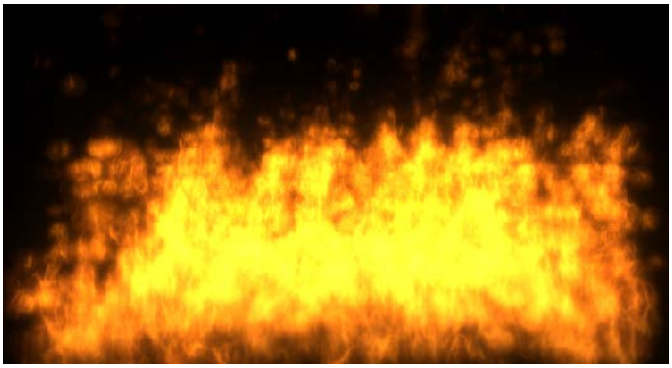

Figure 12-22 *The rendered fire effect*

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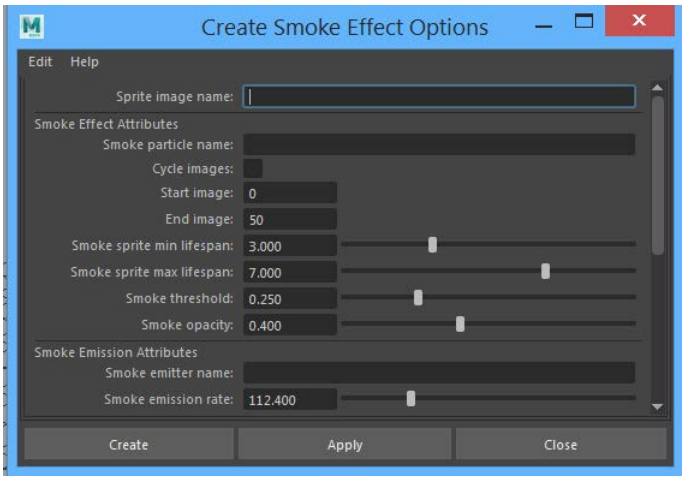

Figure 12-23 *The* ***Create Smoke Effect Options*** *window*

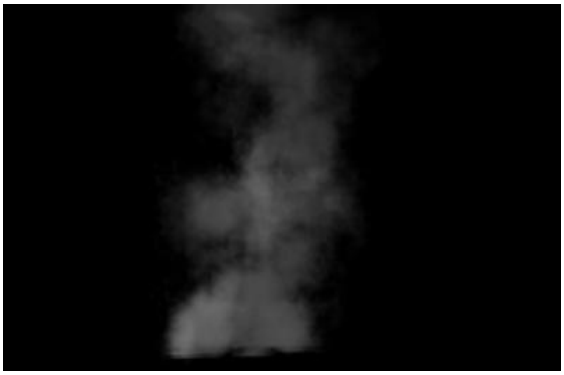

Figure 12-24 *The smoke emitting from an object*

Figure 12-25 *The fireworks effect*

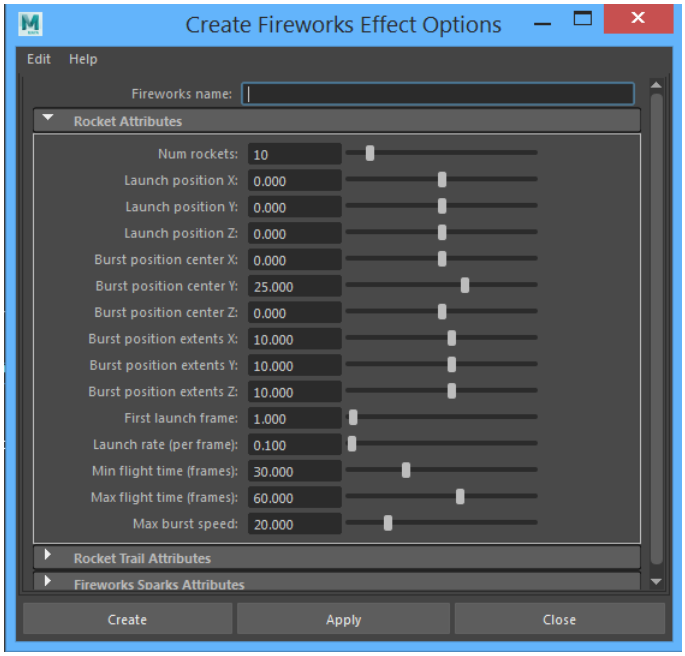

Figure 12-26 *The* ***Create Fireworks Effect Options*** *window*

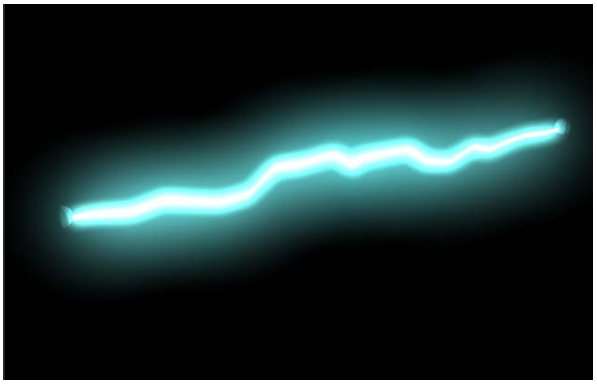

Figure 12-27 *The lightning effect*

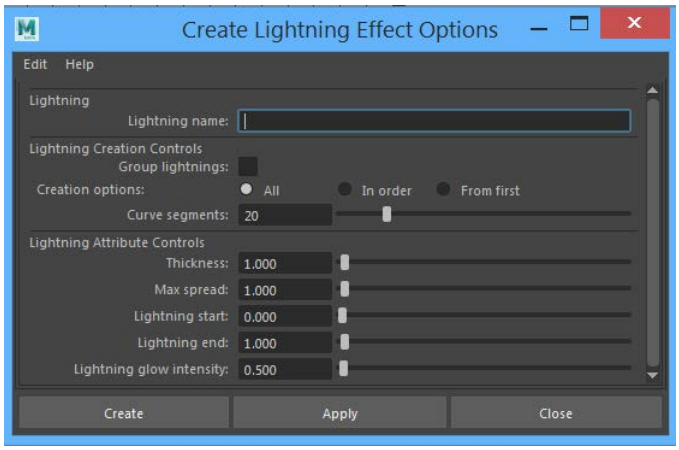

Figure 12-28 *The* ***Create Lightning Effect Options*** *window*

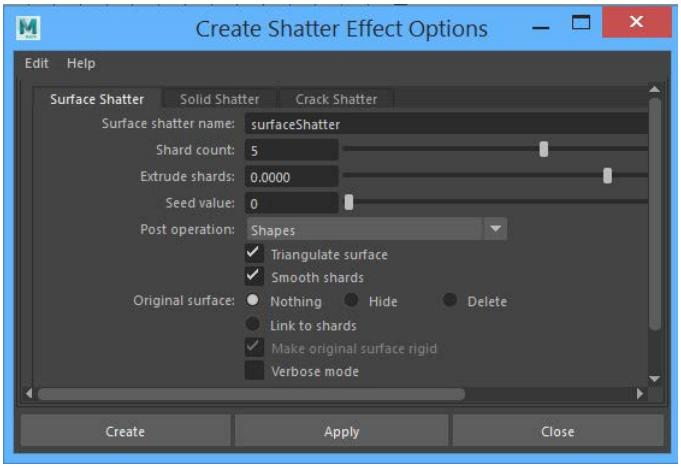

Figure 12-29 *The* ***Create Shatter Effect Options*** *window*

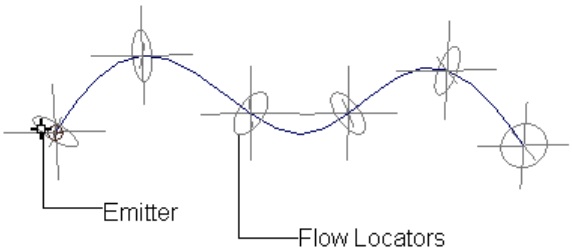

Figure 12-30 *The curve flow*

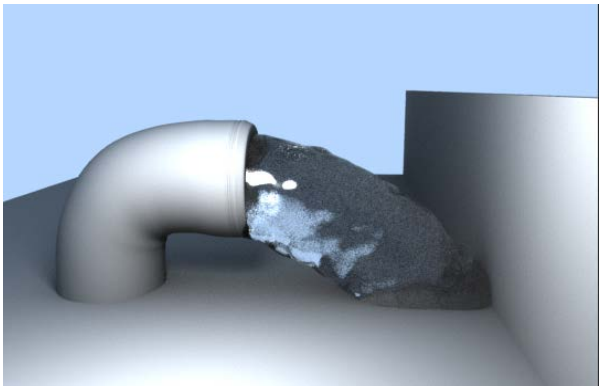

Figure 12-31 *The final rendered scene at frame 100*

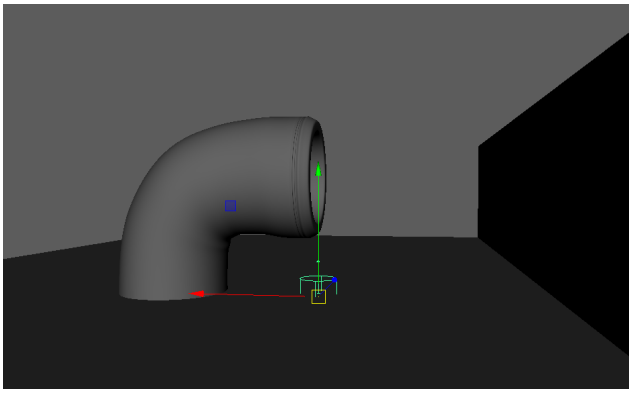

Figure 12-32 *The emitter created in the viewport*

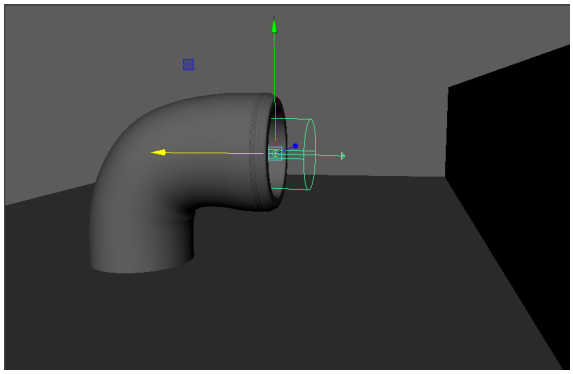

Figure 12-33 *The emitter aligned with the pipe*

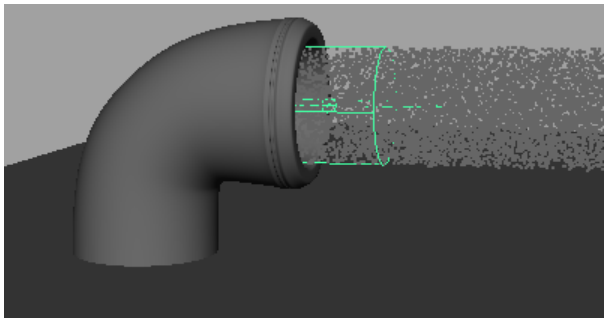

Figure 12-34 *Particles emitted from the emitter*

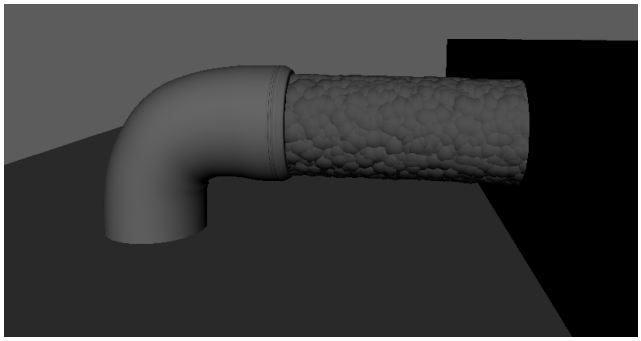

Figure 12-35 *The particle render type set to blobmesh*

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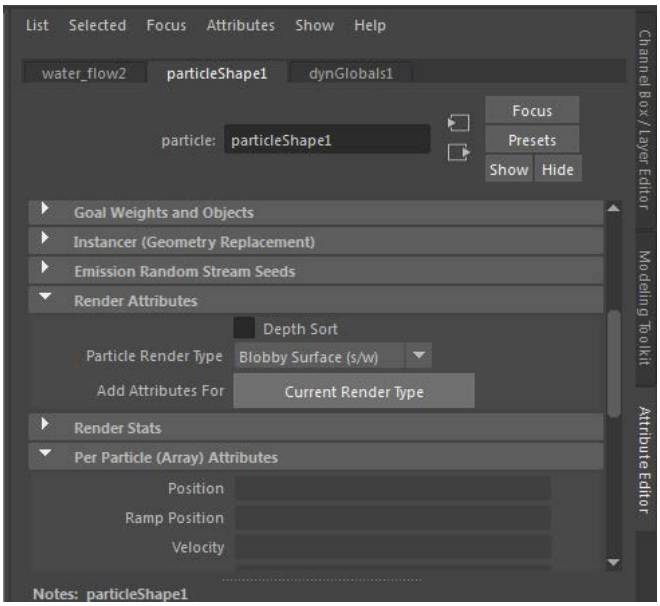


Figure 12-36 *The* ***Render Attributes*** *area*

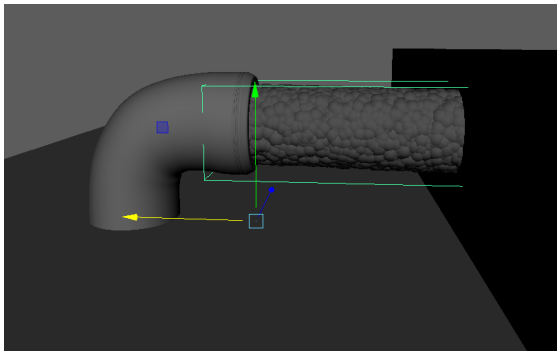


Figure 12-37 *The particles after modifying the* ***Radius*** *and* ***Threshold*** *attributes*

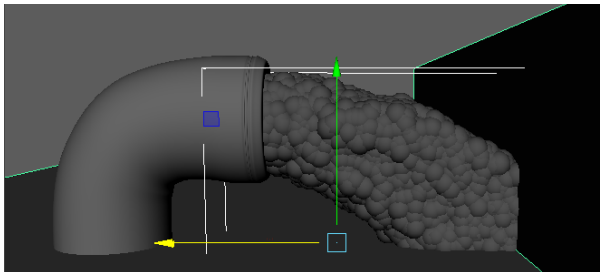


Figure 12-38 *The gravity applied to the particles*

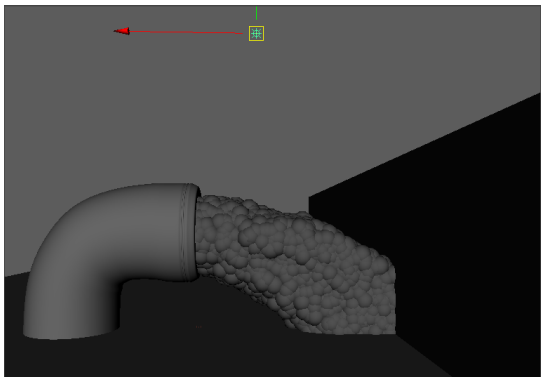


Figure 12-39 *Alignment of the Point light*

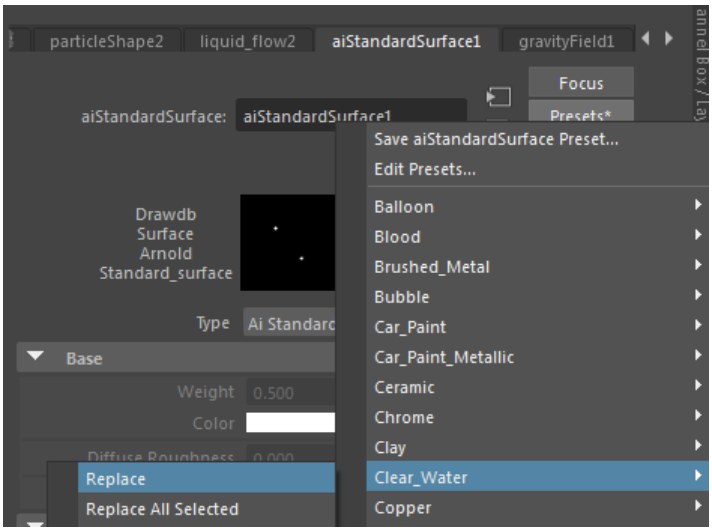


Figure 12-40 *The flyout is displayed*

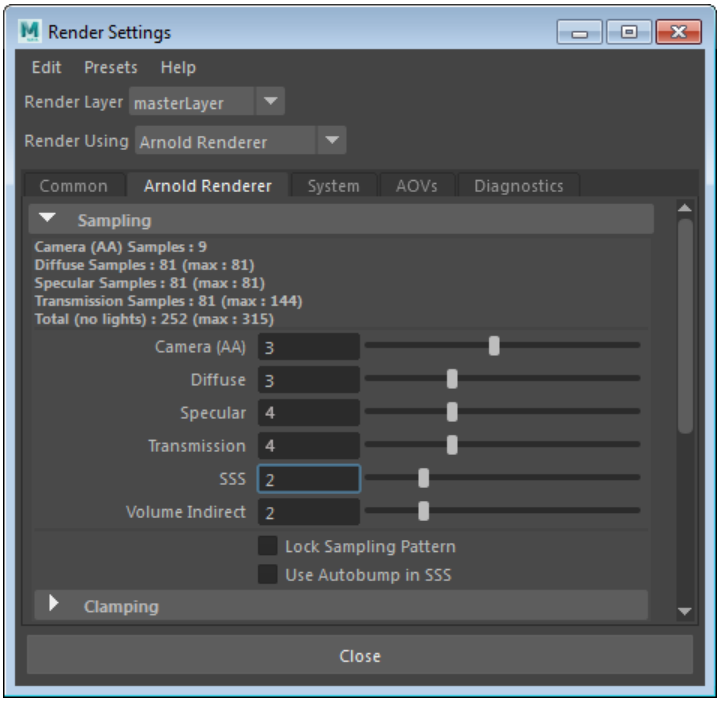


Figure 12-41 *The values of attributes in the* ***Render Settings*** *window*

Figure 12-42 *The spiral galaxy*

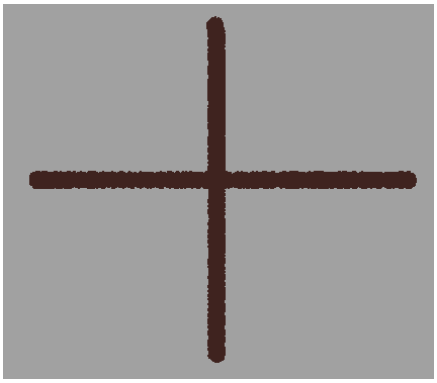


Figure 12-43 *Particles created in the top-Y viewport*

Figure 12-44 *The shape of the particles*

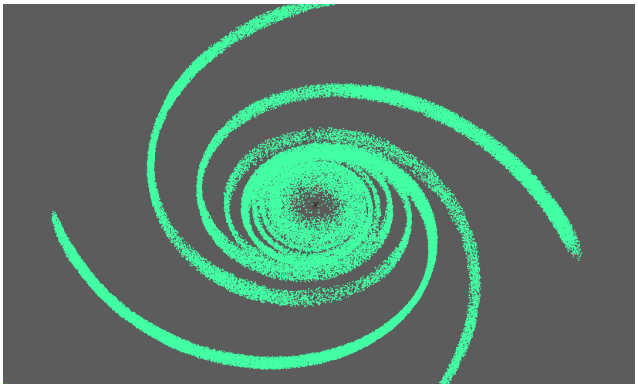


Figure 12-45 *The particles rotating about the X axis*

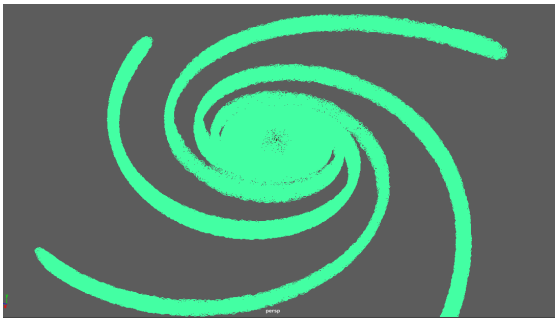


Figure 12-46 *The particle shape changed to the* ***Tube(s/w)*** *render type*

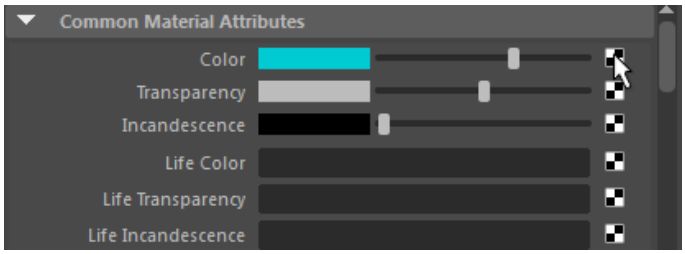


Figure 12-47 *The* ***Common Material Attributes*** *area*

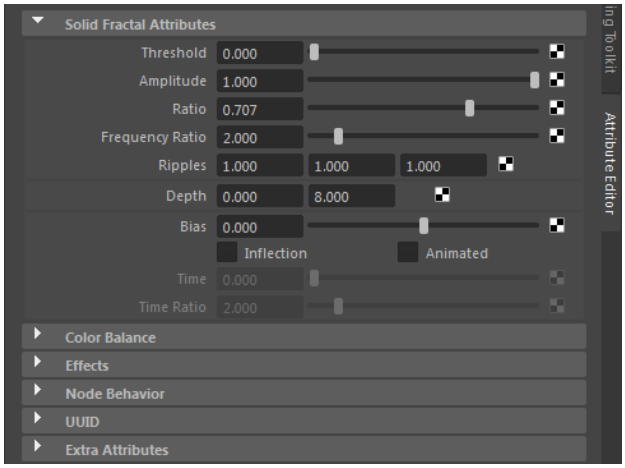


Figure 12-48 *The* ***Solid Fractal Attributes*** *area*

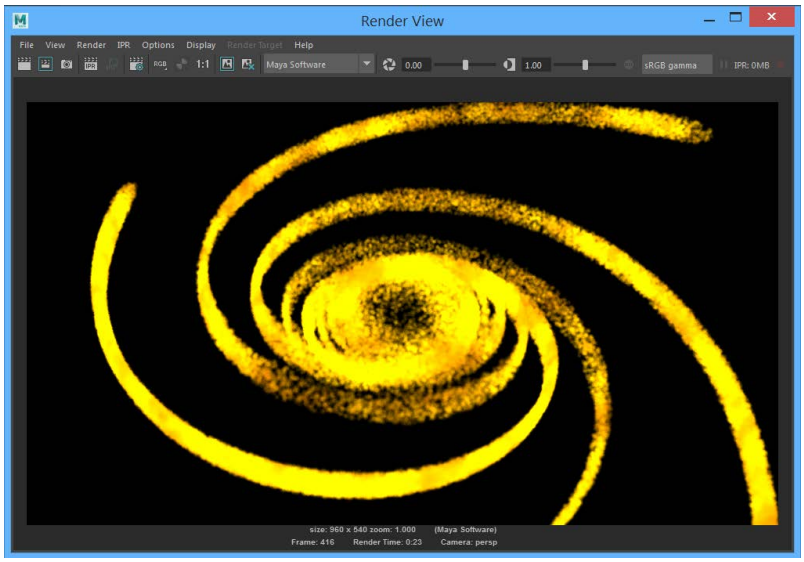


Figure 12-49 *The rendered scene at frame 410*

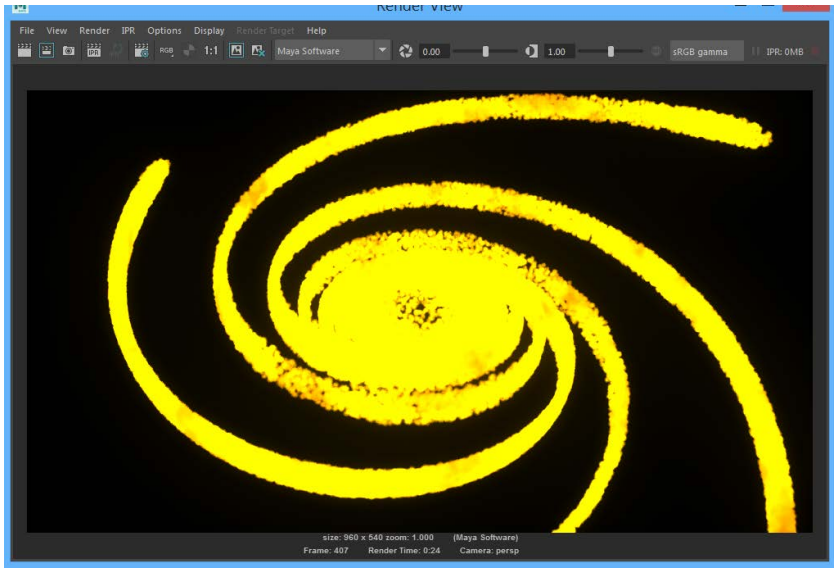


Figure 12-50 *The rendered scene*

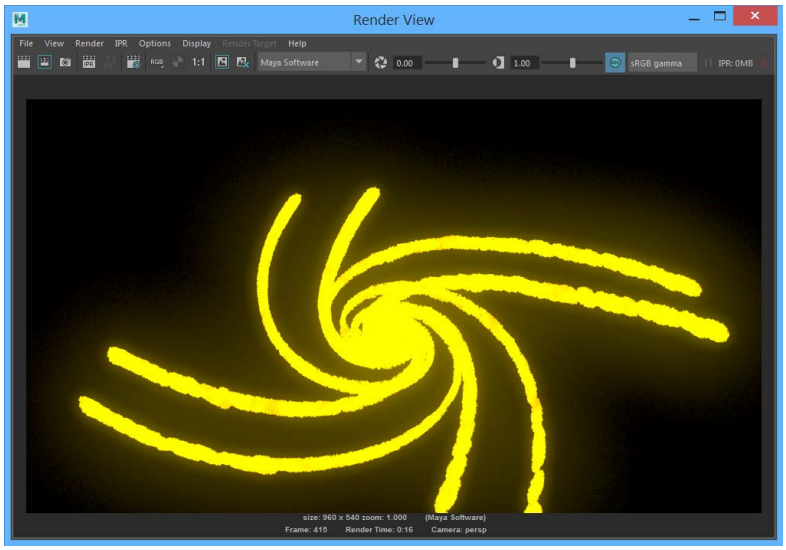


Figure 12-51 *The render in the* ***Render View*** *window at frame 415*

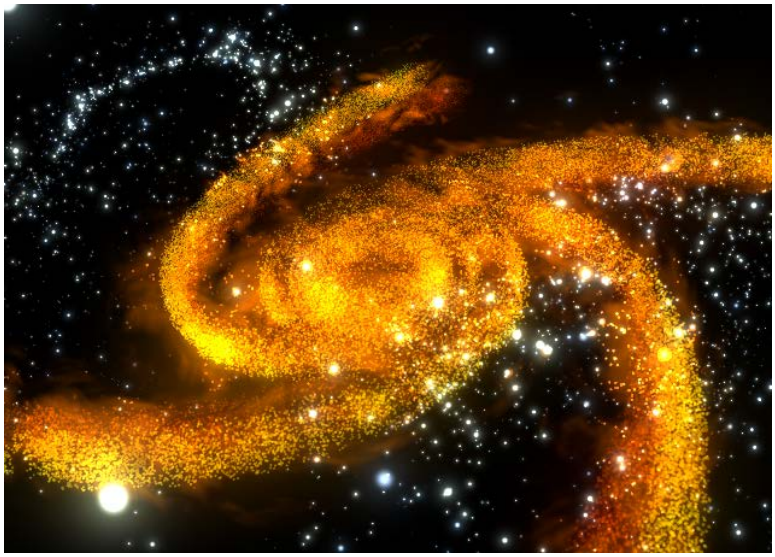


Figure 12-52 *The spiral galaxy after adding paint strokes*

Figure 12-53 *The fireworks effect*

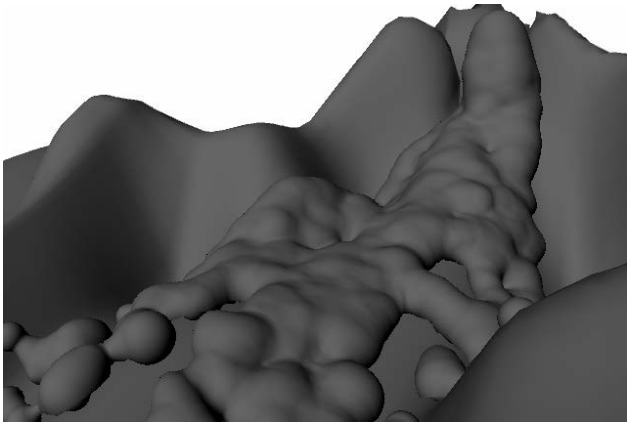


Figure 12-54 *Model of mountains and water*

Figure 12-55 *The scene after rendering*

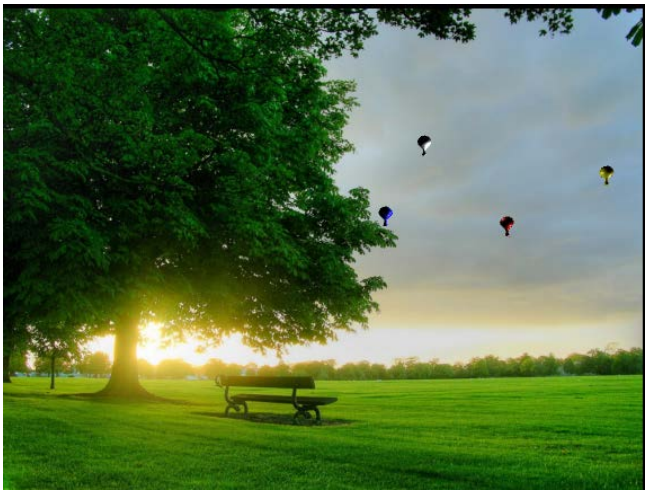


Figure 12-56 *The balloons in the scene*

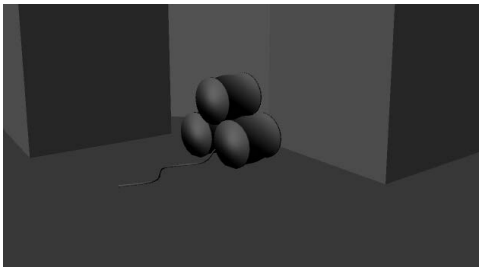


Figure 12-57 *The scene of a warehouse*

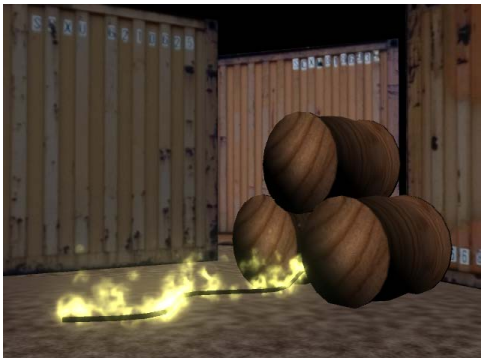


Figure 12-58 *The scene after rendering*

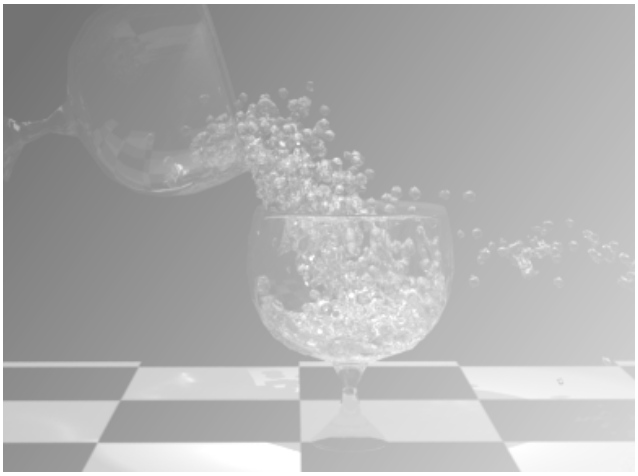
Chapter 13

Introduction to nParticles

Learning Objectives

After completing this chapter, you will be able to:

- *Create nParticles*
- *Collide nParticles with geometry*
- *Simulate liquids*
- *Work with the Maya Nucleus solver*
- *Use the force fields*



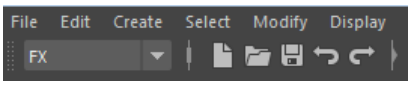


Figure 13-1 *The* ***FX*** *menuset selected from the* ***Menuset*** *drop-down list in the status line*

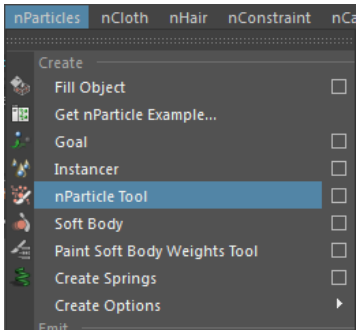


Figure 13-2 *Choosing* ***nParticle Tool*** *from the menubar*

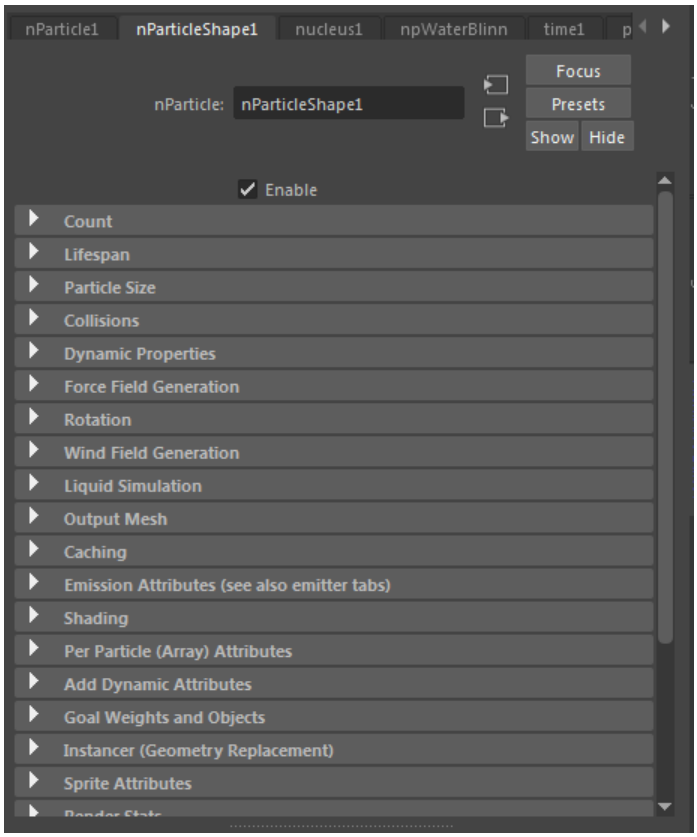


Figure 13-3 *The* ***nParticleShape1*** *tab displayed in the* ***Attribute Editor***

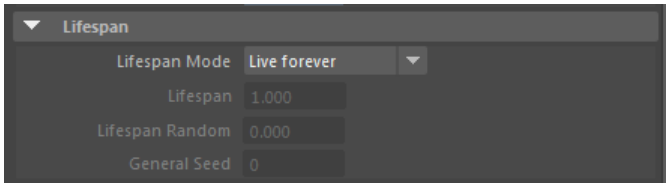


Figure 13-4 *The* ***Lifespan*** *area*

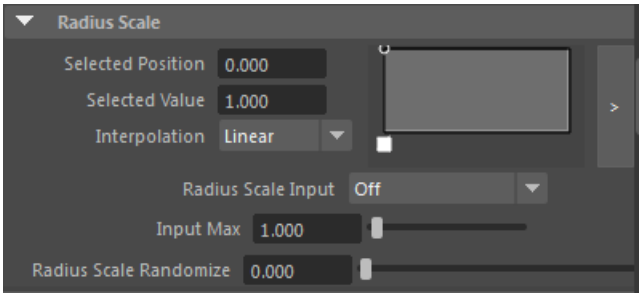


Figure 13-5 *The* ***Radius Scale*** *area in the* ***Attribute Editor***

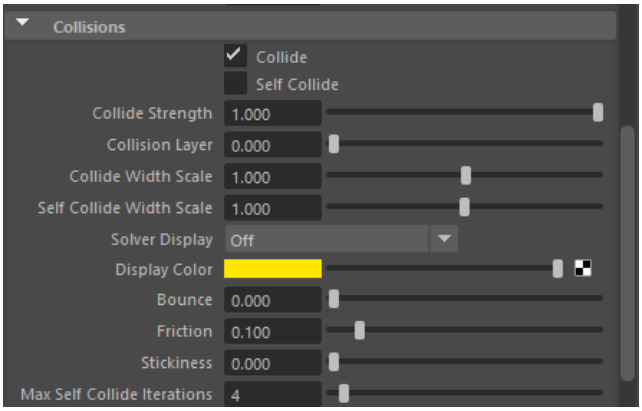


Figure 13-6 *Partial view of the* ***Collisions*** *area*

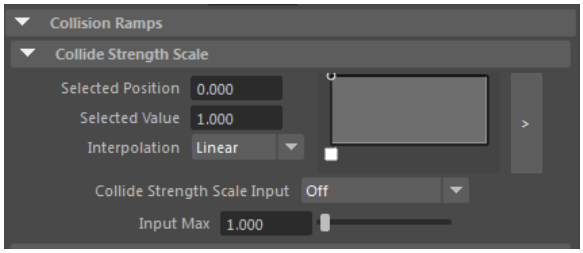


Figure 13-7 *Partial view of the* ***Collision Ramps*** *area*

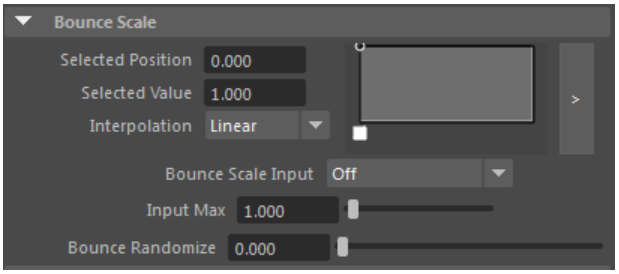


Figure 13-8 *The* ***Bounce Scale*** *area*

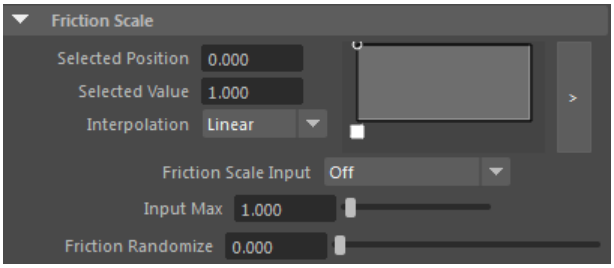


Figure 13-9 *The* ***Friction Scale*** *area*

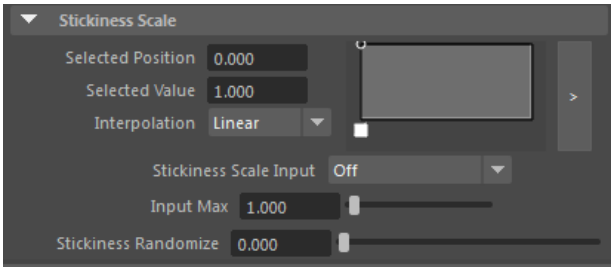


Figure 13-10 *The* ***Stickiness Scale*** *area*

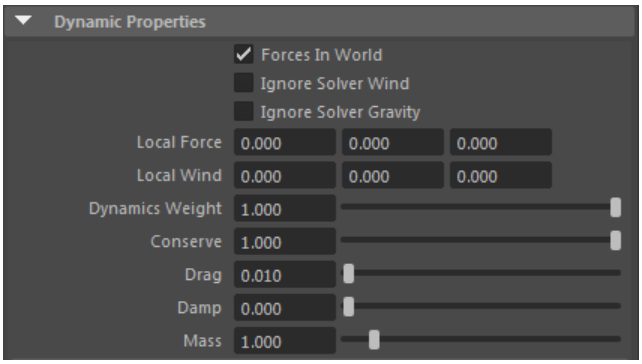


Figure 13-11 *The* ***Dynamic Properties*** *area*

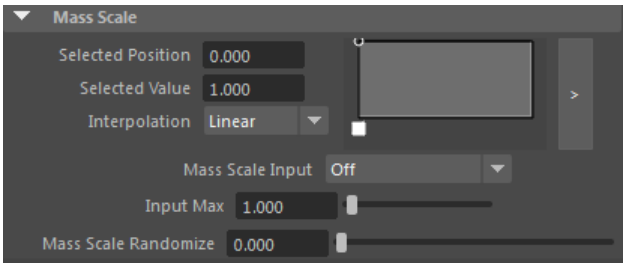


Figure 13-12 *The* ***Mass Scale*** *area*

Figure 13-13 *The* ***Force Field Generation*** *area*

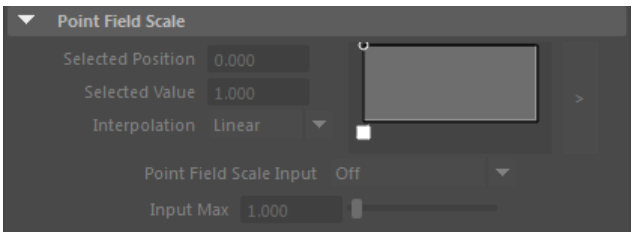


Figure 13-14 *The* ***Point Field Scale*** *area*

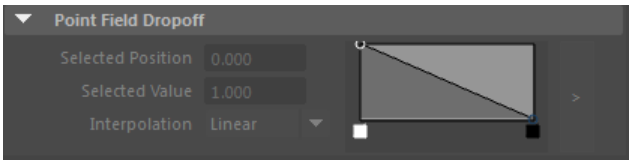


Figure 13-15 *The* ***Point Field Dropoff*** *area*

.

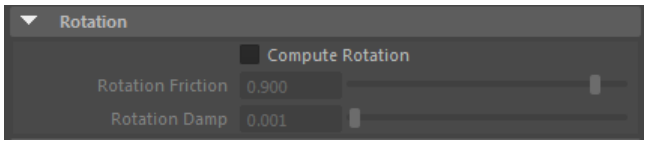


Figure 13-16 *The* ***Rotation*** *area*

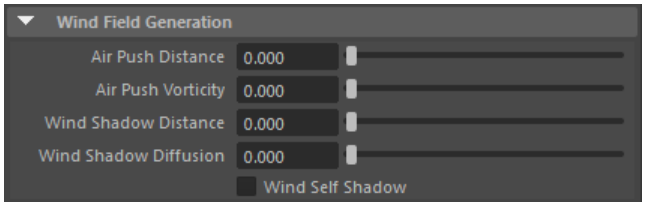


Figure 13-17 *The* ***Wind Field Generation*** *area*

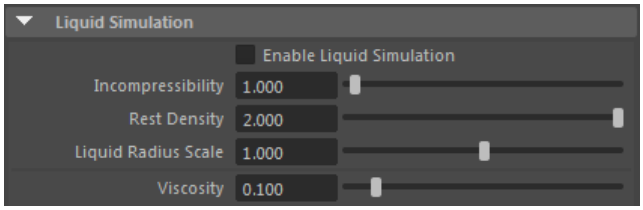


Figure 13-18 *Partial view of the* ***Liquid Simulation*** *area*

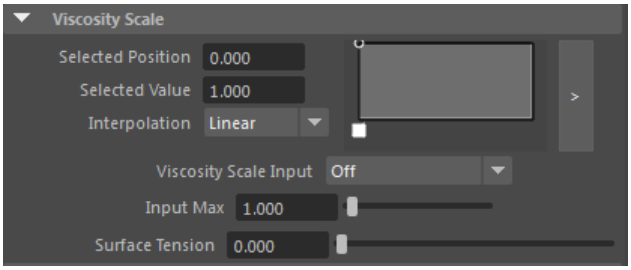


Figure 13-19 *The* ***Viscosity Scale*** *area*

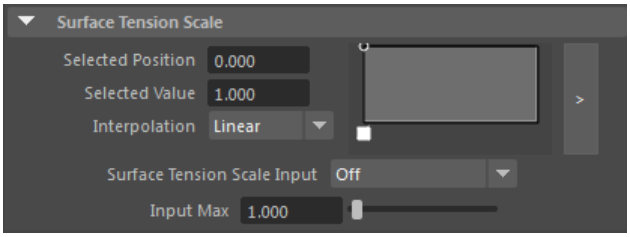


Figure 13-20 *The* ***Surface Tension Scale*** *area*

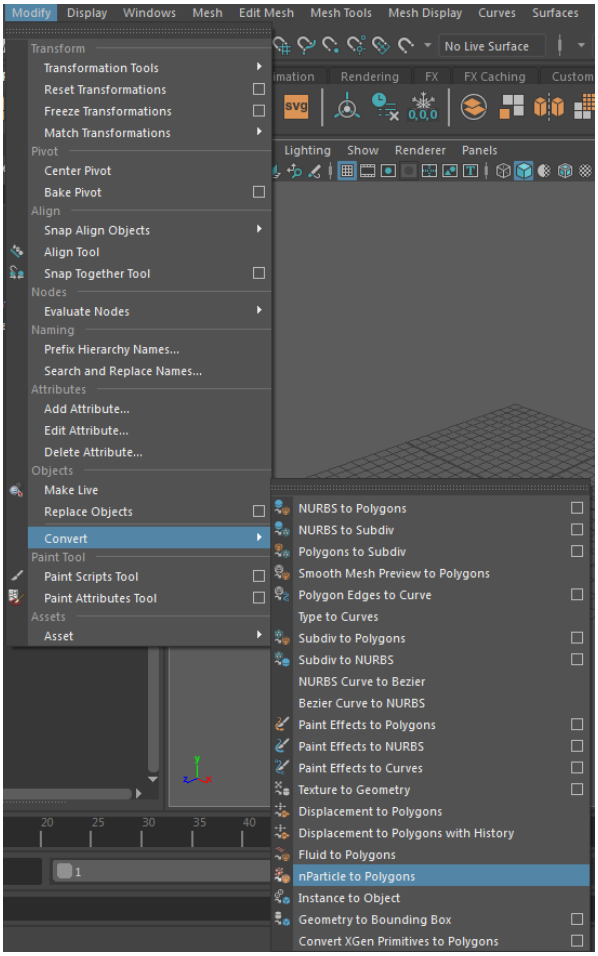


Figure 13-21 *Choosing the* ***nParticle to Polygons*** *option from the menubar*

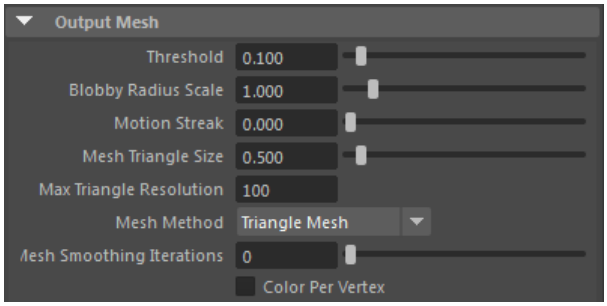


Figure 13-22 *Partial view of the* ***Output Mesh*** *area*

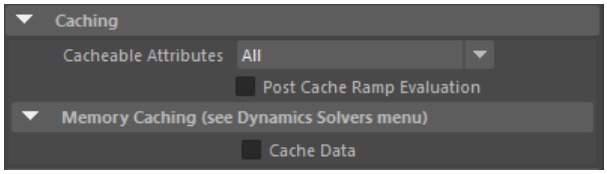


Figure 13-23 *The* ***Caching*** *area*

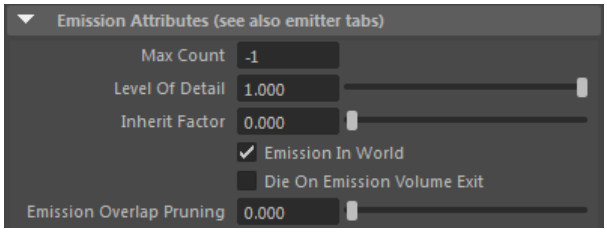


Figure 13-24 *The* ***Emission Attributes*** *area*

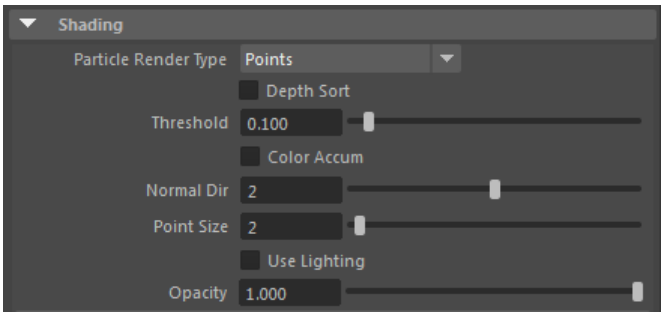


Figure 13-25 *Partial view of the* ***Shading*** *area*

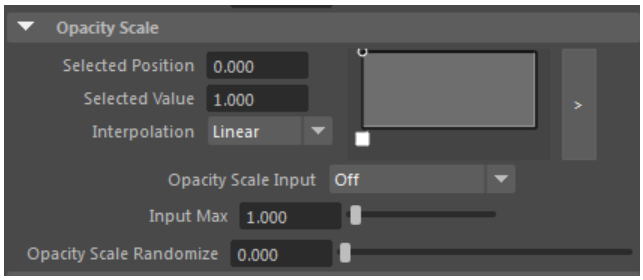


Figure 13-26 *The* ***Opacity Scale*** *area*

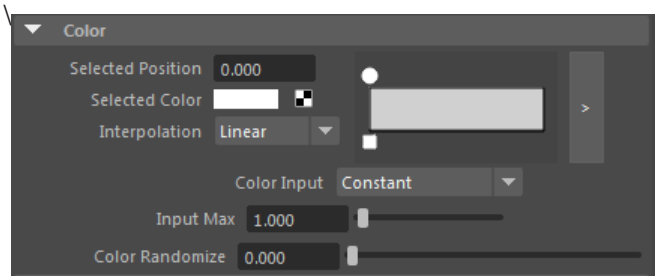


Figure 13-27 *The* ***Color*** *area*

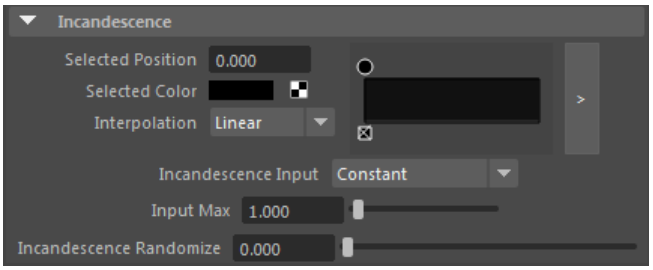


Figure 13-28 *The* ***Incandescence*** *area*

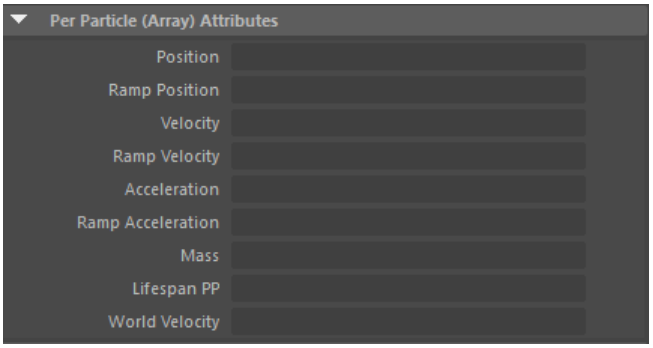


Figure 13-29 *Partial view of the* ***Per Particle (Array) Attributes*** *area*

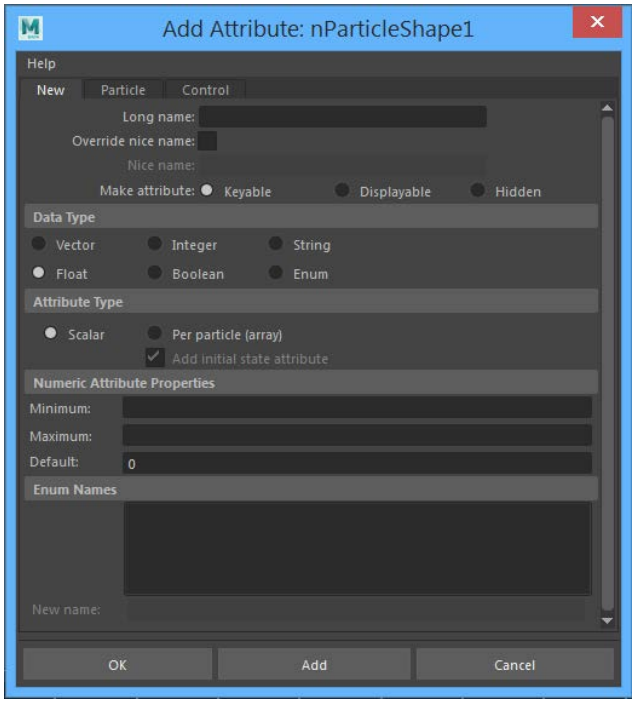


Figure 13-30 *The* ***Add Attribute: nParticleShape1*** *window*

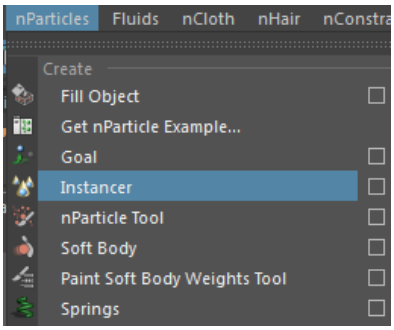


Figure 13-31 *Choosing* ***Instancer*** *from the* ***nParticles*** *menu*

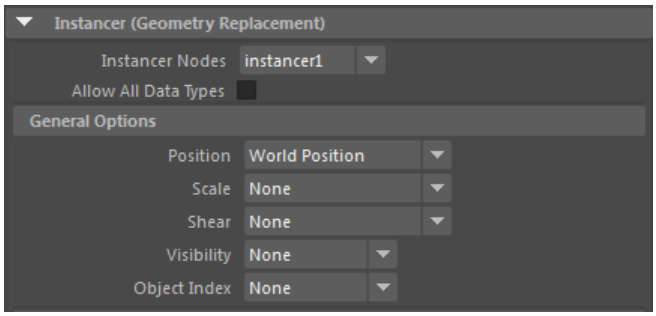


Figure 13-32 *Partial view of the* ***Instancer (Geometry Replacement)*** *area*

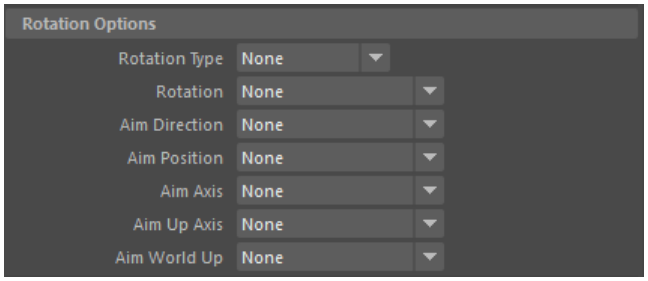


*Figure 13-33 The **Rotation Options** area*

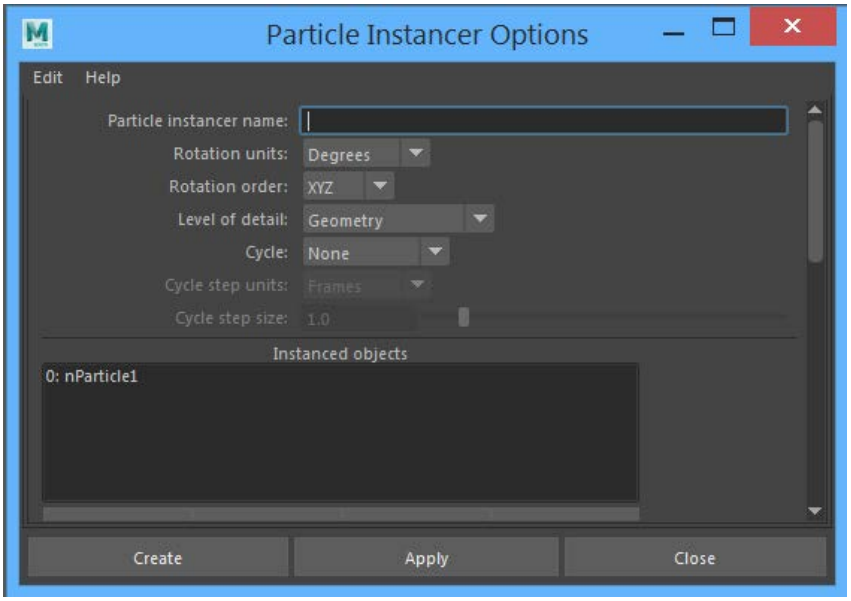


*Figure 13-34 The **Particle Instancer Options** window*

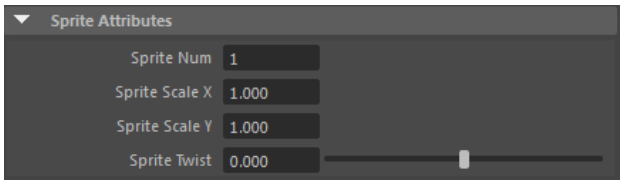


*Figure 13-35 The **Sprites Attributes** area*

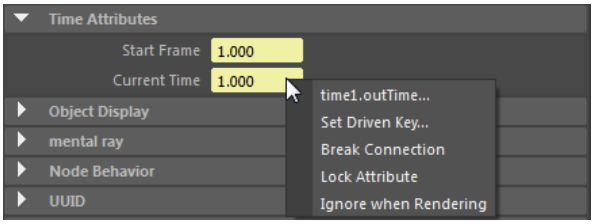


Figure 13-36 *The* ***Break Connection*** *option in the shortcut menu*

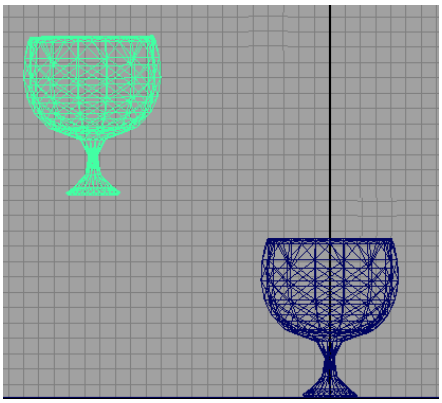


Figure 13-37 *The glass to be selected*

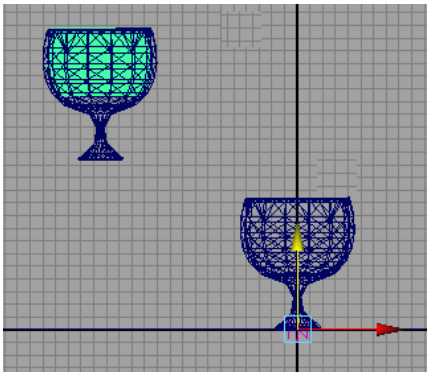


Figure 13-38 *The glass filled with nParticles*

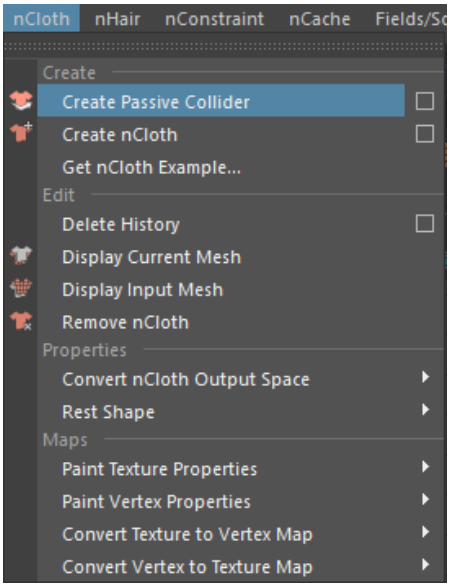


Figure 13-39 *Choosing the* ***Create Passive Collider*** *option from the menubar*

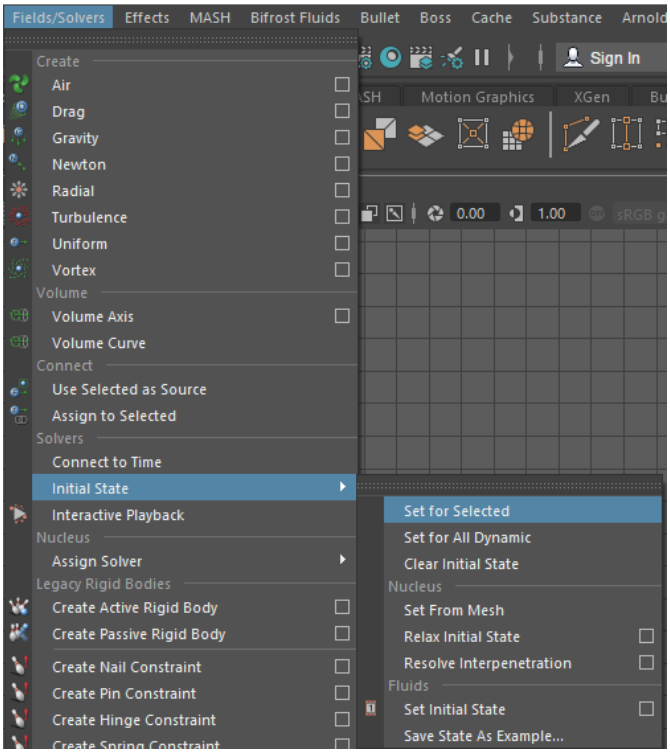


Figure 13-40 *Choosing the* ***Set for Selected*** *option from the menubar*

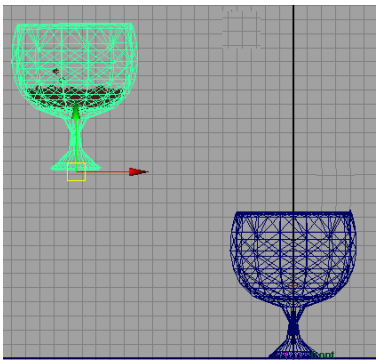


Figure 13-41 *The glass to be selected*

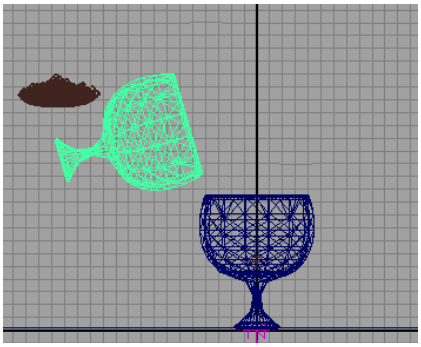


Figure 13-42 *The position of glass at frame 30*

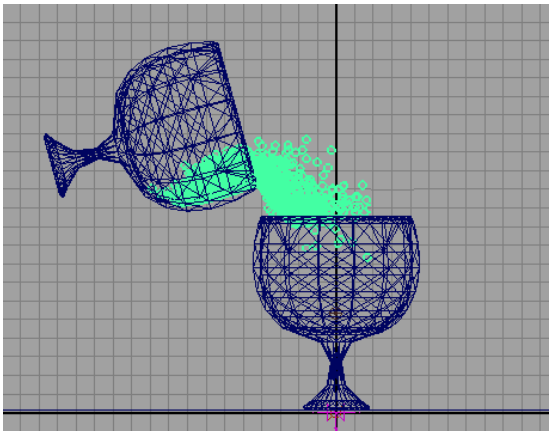


Figure 13-43 *The nParticles flowing out of the glass*

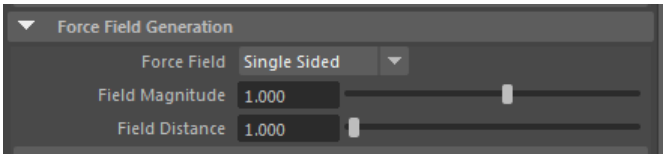


Figure 13-44 *The* ***Force Field Generation*** *area*

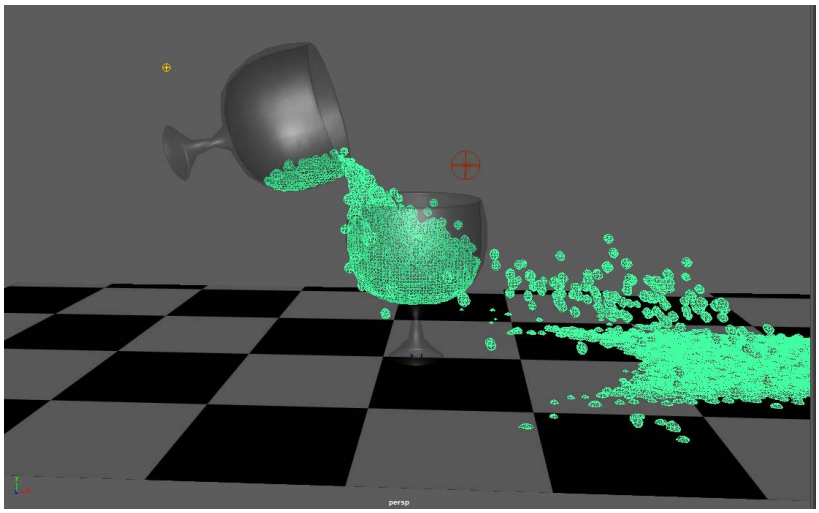


Figure 13-45 *The nParticle converted into smooth mesh*

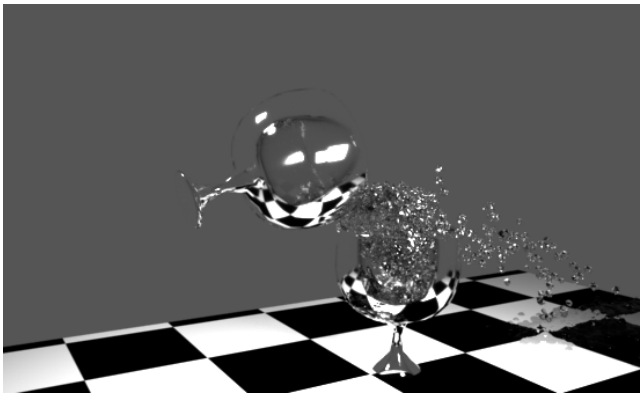


Figure 13-46 *The final output at frame 70*

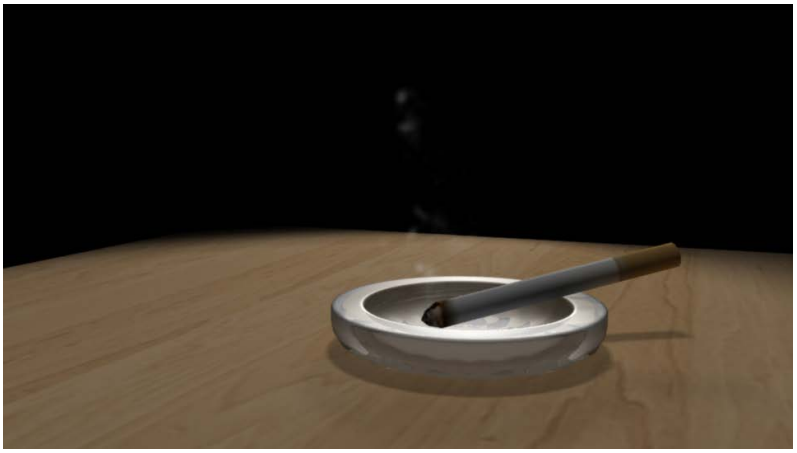


Figure 13-47 *The final output*

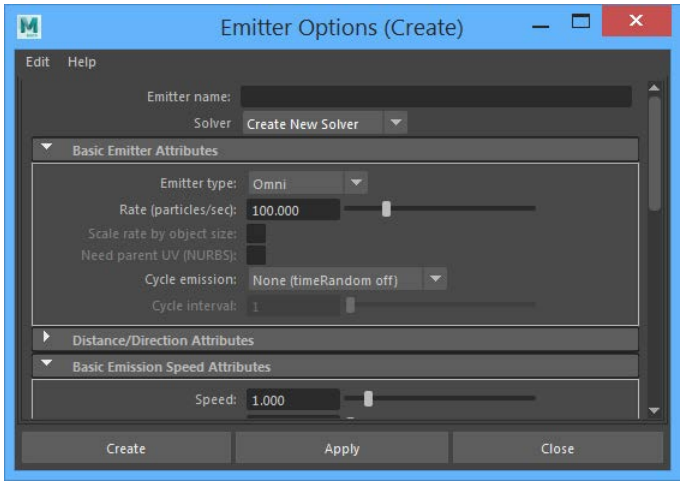


Figure 13-48 *The* ***Emitter Options (Create)*** *window*

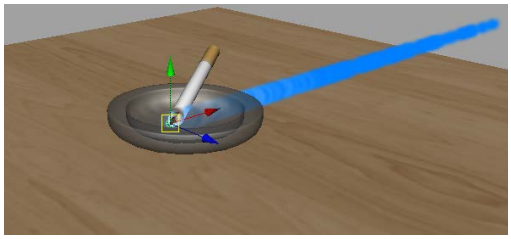


Figure 13-49 *The particles flowing along x axis*

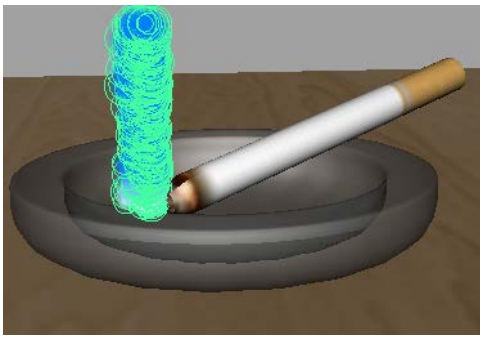


Figure 13-50 *The nParticles moving upward*

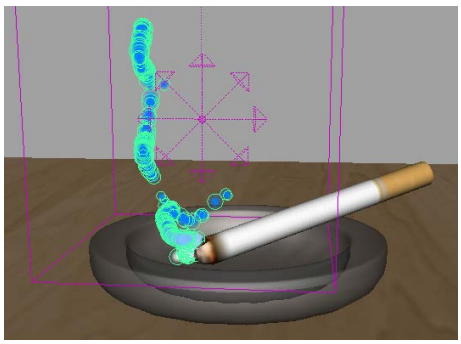


Figure 13-51 *The nParticles flowing upward in curls*

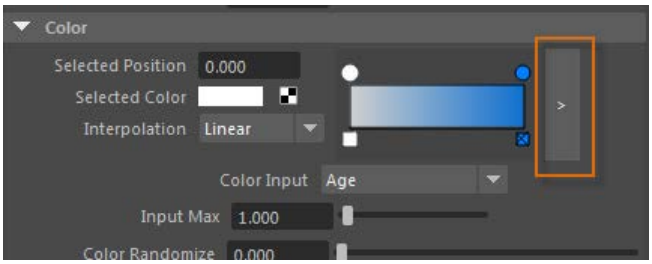


Figure 13-52 *Choosing the arrow button in the* ***Color*** *area*

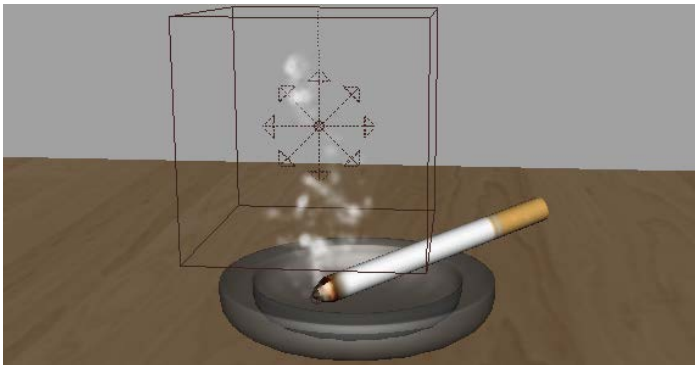


Figure 13-53 *The changed color of nParticles*

Figure 13-54 *The hailstorm effect*

Figure 13-55 *The constellation*

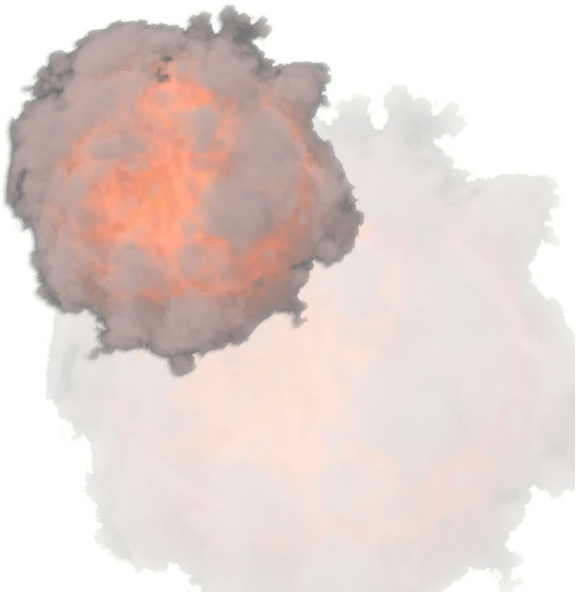
Chapter 14

Fluids

Learning Objectives

After completing this chapter, you will be able to:

- *Use various types of fluids in Maya*
- *Apply the dynamic and non-dynamic fluid effects*
- *Modify the fluid components*
- *Paint in the fluid containers*
- *Add ocean and pond effects to your scene*
- *Connect Maya fields to a container*



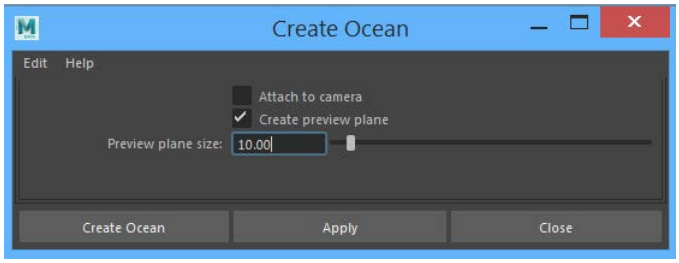


Figure 14-1 *The* ***Create Ocean*** *window*

Figure 14-2 *The ocean*

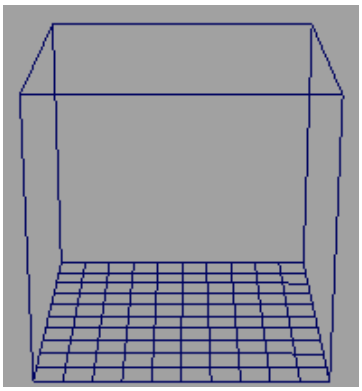


Figure 14-3 *The 3D fluid container*

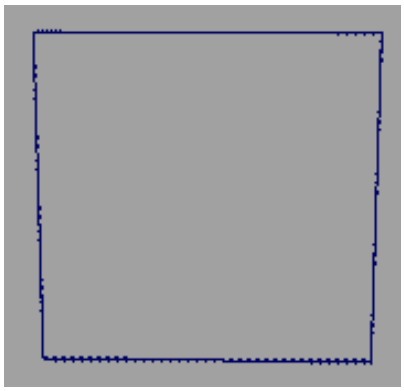


Figure 14-4 *The 2D fluid container*

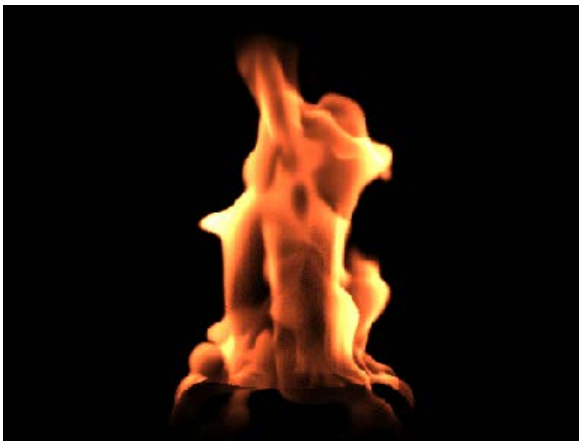


Figure 14-5 *Fire or flames created using the dynamic fluid effect*

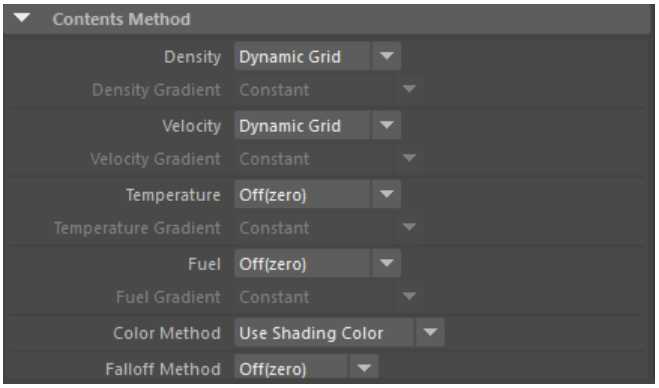


Figure 14-6 *The* ***Contents Method*** *area*

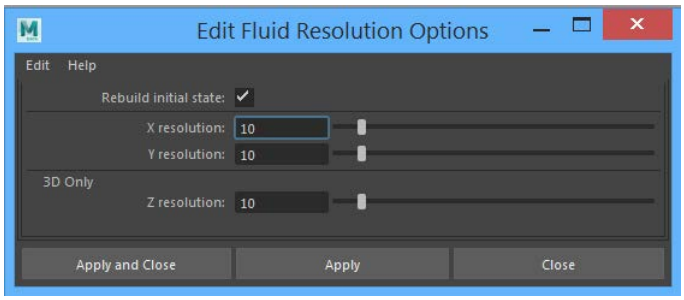


Figure 14-7 *The* ***Edit Fluid Resolution Options*** *window*

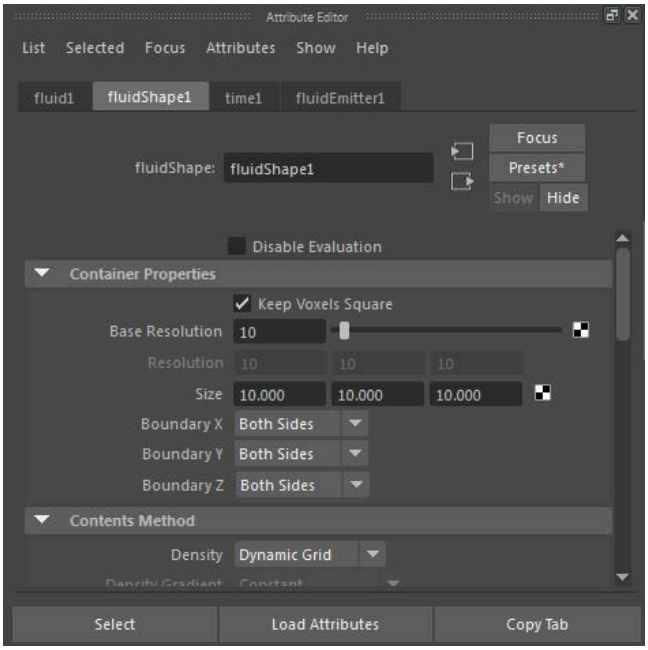


Figure 14-8 *The* ***fluidshape1*** *tab chosen in the* ***Attribute Editor***

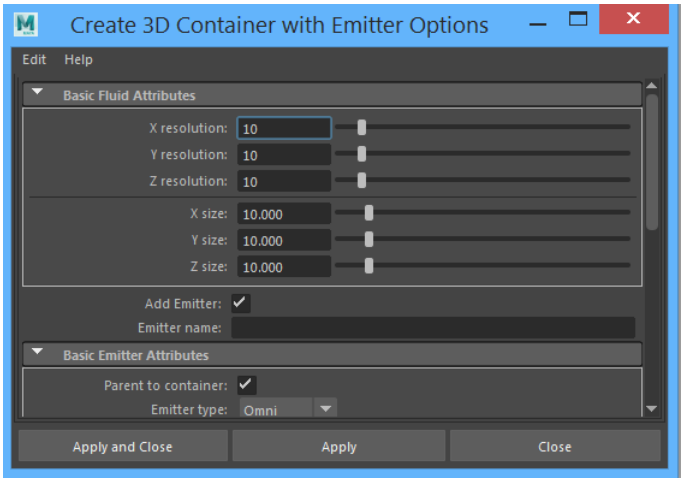


Figure 14-9 *The* ***Create 3D Container with Emitter Options*** *window*

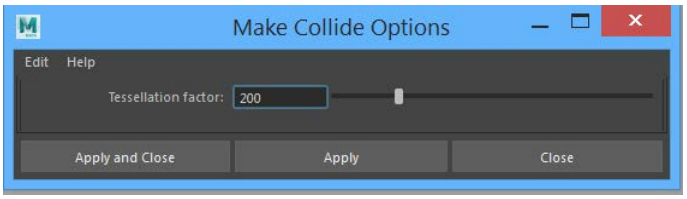


Figure 14-10 *The* ***Make Collide Options*** *window*

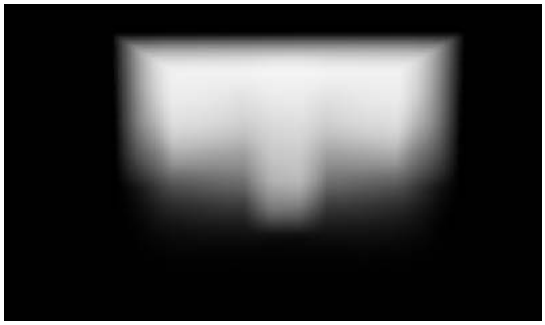


Figure 14-11 *Fluid simulation before colliding with a geometry*

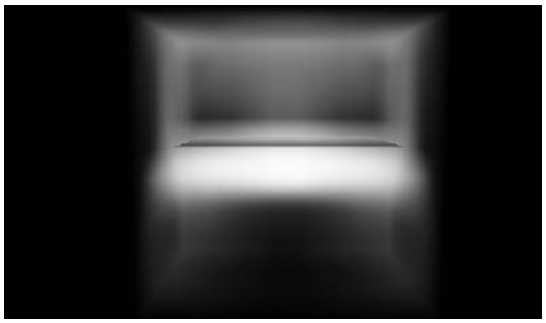


Figure 14-12 *Fluid simulation after colliding with a geometry*

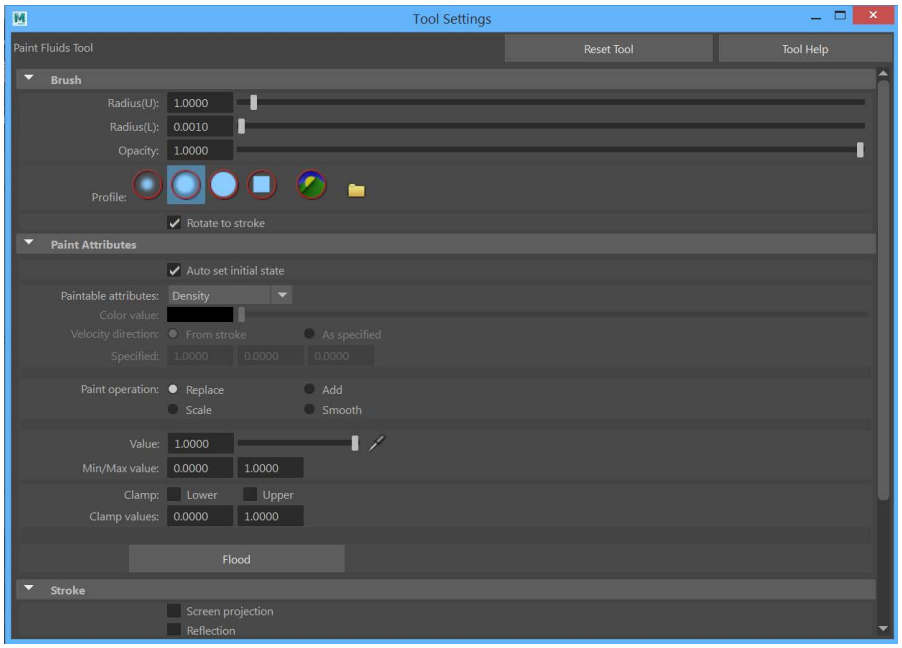


Figure 14-13 *The* ***Tool Settings (Paint Fluids Tool)*** *panel*

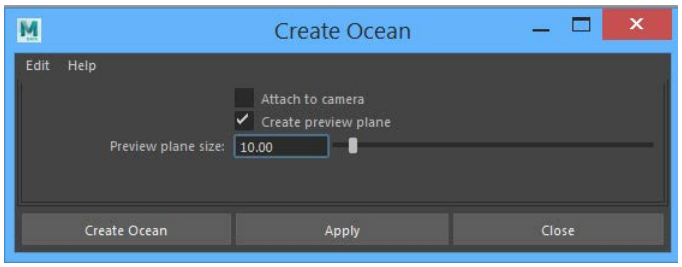


Figure 14-14 *The* ***Create Ocean*** *window*

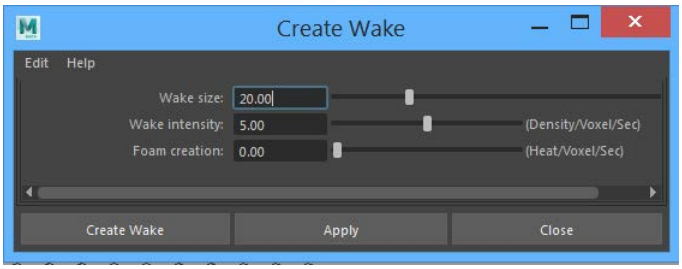


Figure 14-15 *The* ***Create Wake*** *window*

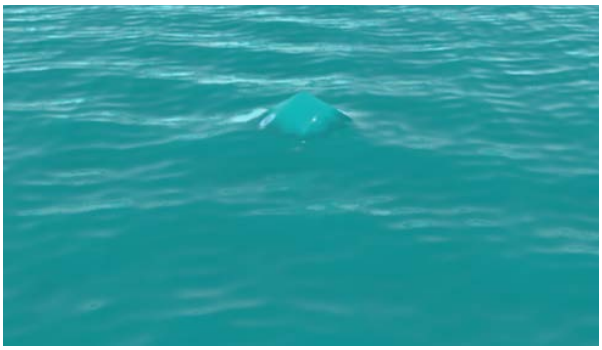


Figure 14-16 *Wakes added to an ocean*

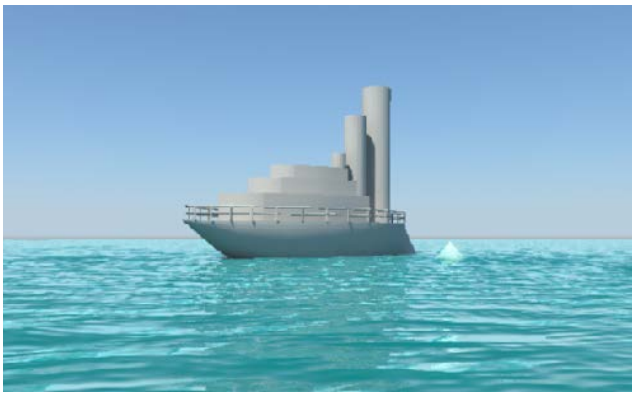


Figure 14-17 *An object floating on the surface of the ocean*

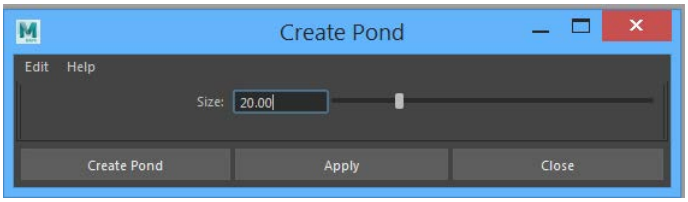


Figure 14-18 *The* ***Create Pond*** *window*

Figure 14-19 *The wakes in the pond*

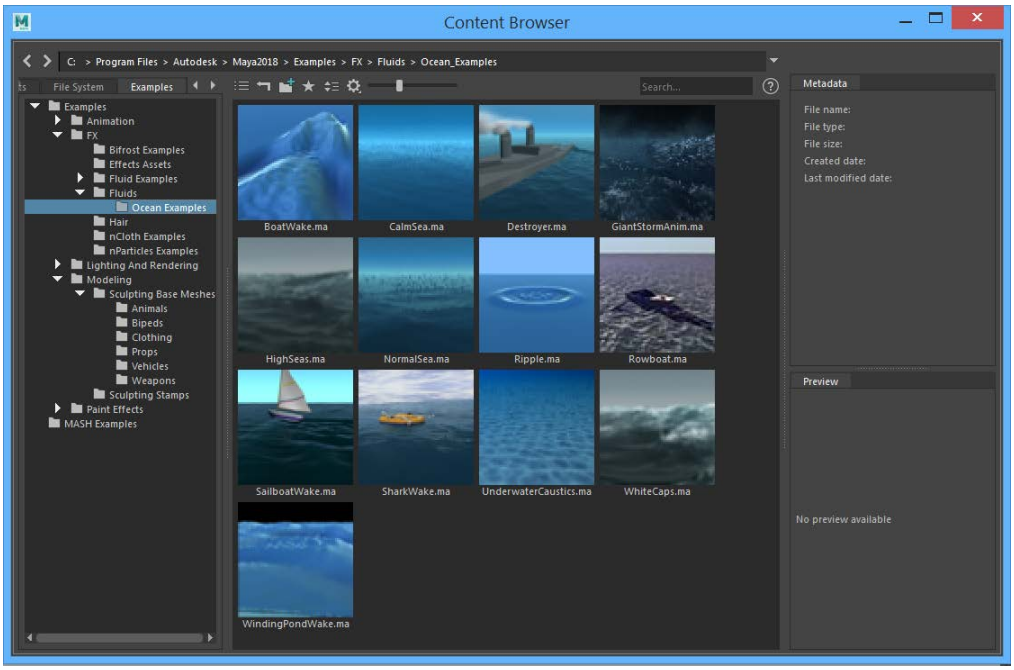


Figure 14-20 *The* ***Content Browser*** *window*

Figure 14-21 *The cigarette smoke effect*

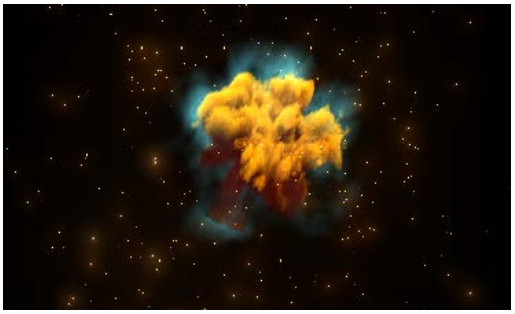


Figure 14-22 *The eagle nebula effect*

Figure 14-23 *The clouds sun effect*

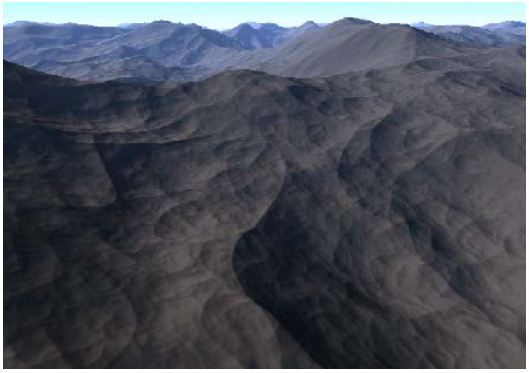


Figure 14-24 *The terrain effect*

Figure 14-25 *The underwater caustics effect*

Figure 14-26 *The giantstorm scene effect*

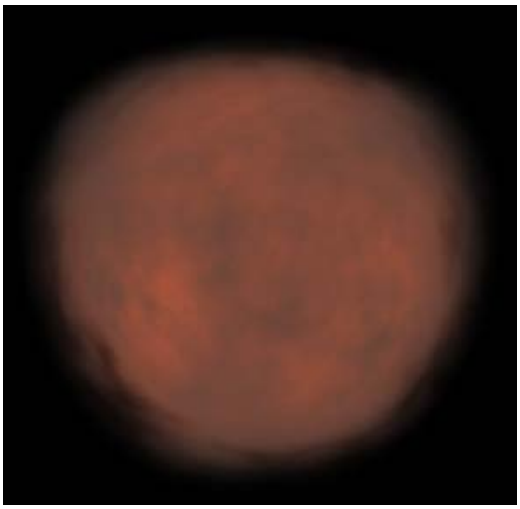


Figure 14-27 *The puffy fire explosion*

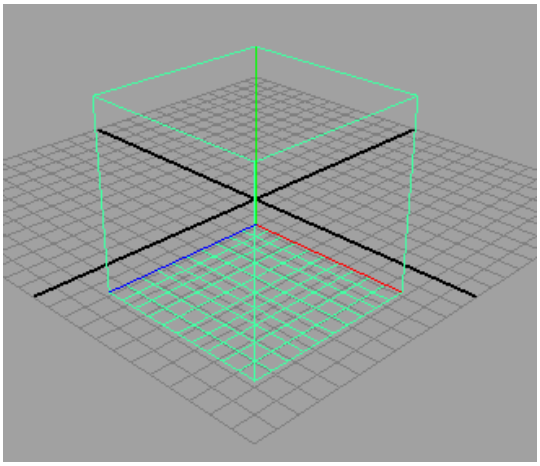


Figure 14-28 *The 3D fluid container*

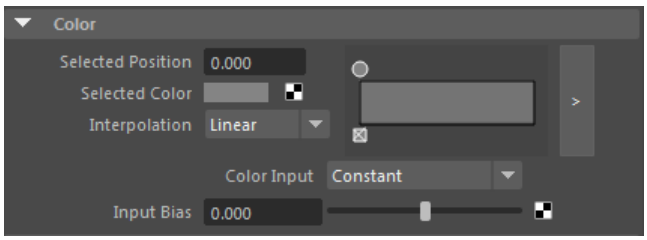


Figure 14-29 *The* ***Color*** *area*

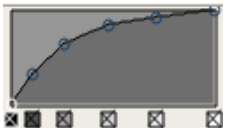


Figure 14-30 *The opacity value graph*

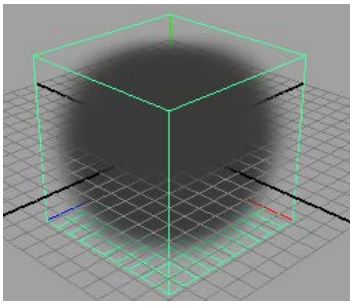


Figure 14-31 *The explosion displayed in the viewport*

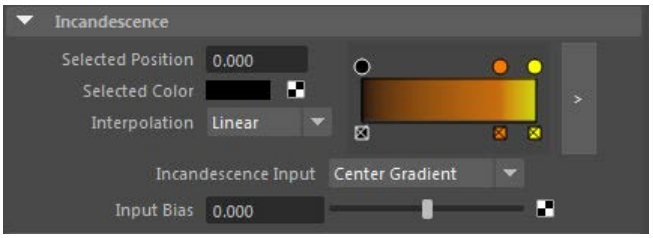


Figure 14-32 *The* ***Incandescence*** *area*

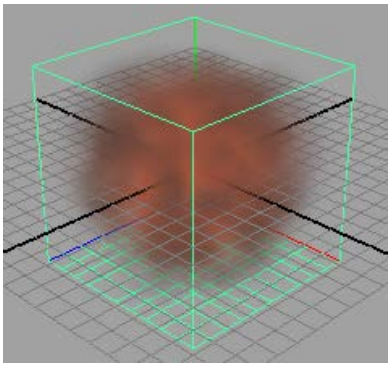


Figure 14-33 *The 3D container after setting the attributes in the* ***Textures*** *area*

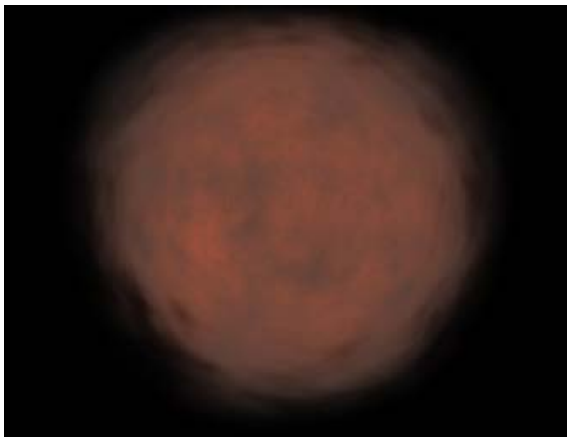


Figure 14-34 *The rendered output of explosion in Maya Renderer*

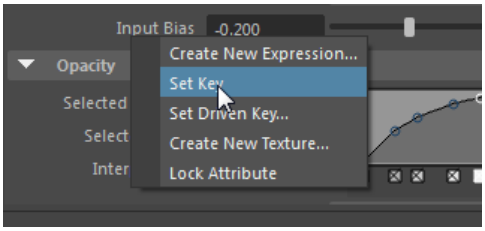


Figure 14-35 *Choosing* ***Set Key*** *from the shortcut menu*

Figure 14-36 *The melting text effect*

Figure 14-37 *The scaled 2D fluid container*

Figure 14-38 *The text visible in the fluid container*

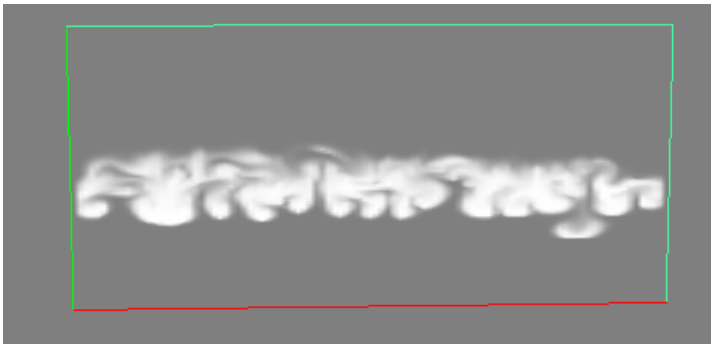


Figure 14-39 *Downward movement of the fluid as the* ***Gravity*** *attribute is set to* ***-10***

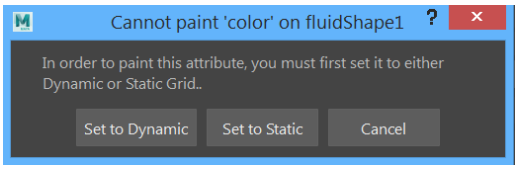


Figure 14-40 *The* ***Cannot paint 'color' on fluidShape1*** *message box*

Figure 14-41 *The colored text in the fluid container*

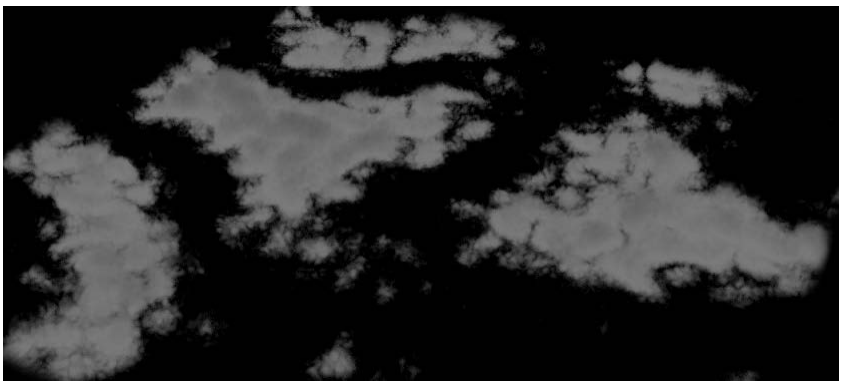


Figure 14-42 *The time lapse effect on frame 74*

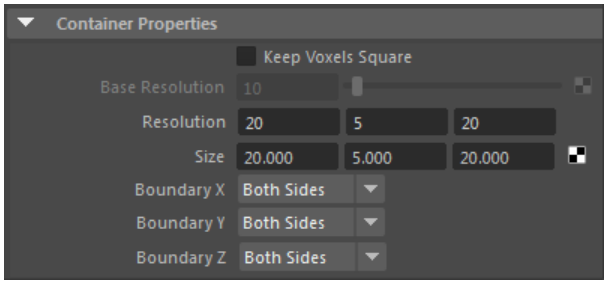


Figure 14-43 *Setting the attributes for the resolution of the container*

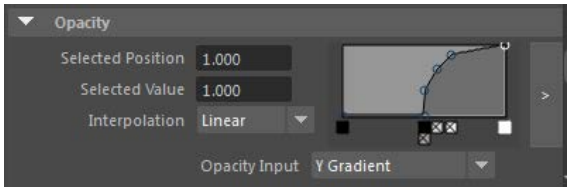


Figure 14-44 *Setting the shading ramp*

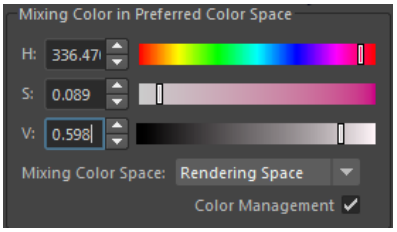


Figure 14-45 *The gradient of the* ***Selected Color*** *swatch*

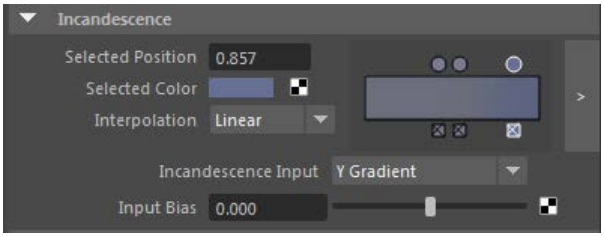


Figure 14-46 *The gradient of the* ***Selected Color*** *swatch in the* ***Incandescence*** *area*

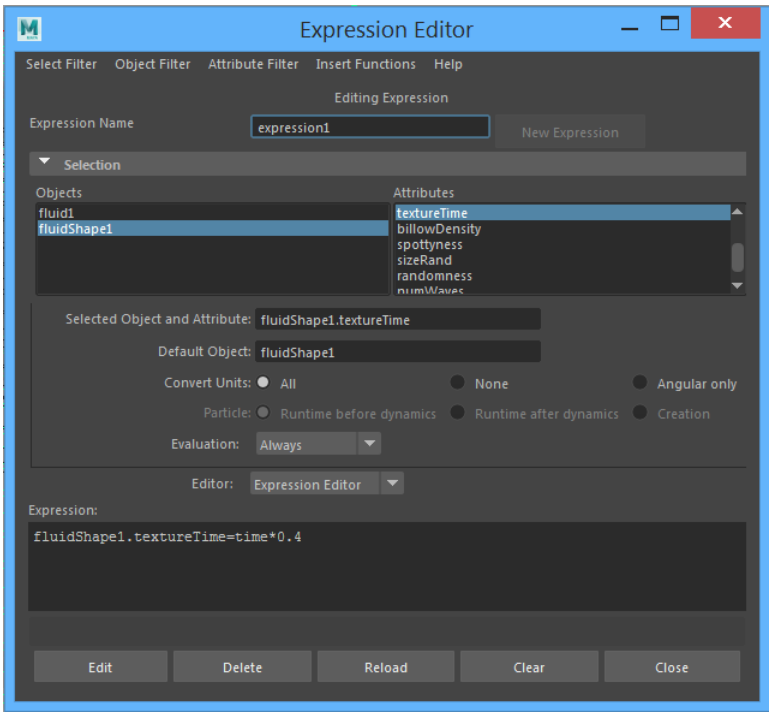


Figure 14-47 *The* ***Expression Editor*** *window*

Figure 14-48 *The effect created using the* ***Radial*** *field*

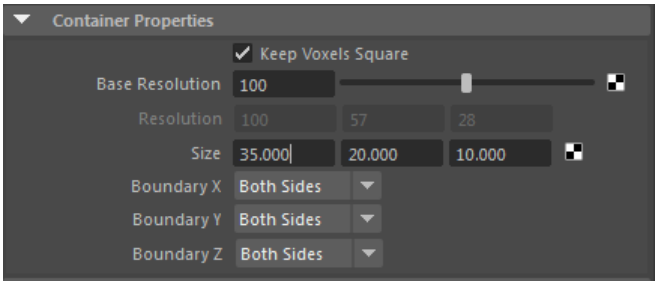


Figure 14-49 *The* ***Container Properties*** *area*

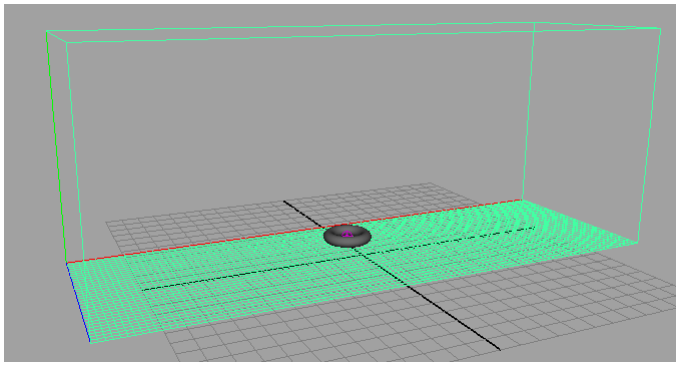


Figure 14-50 *The torus placed inside the container*

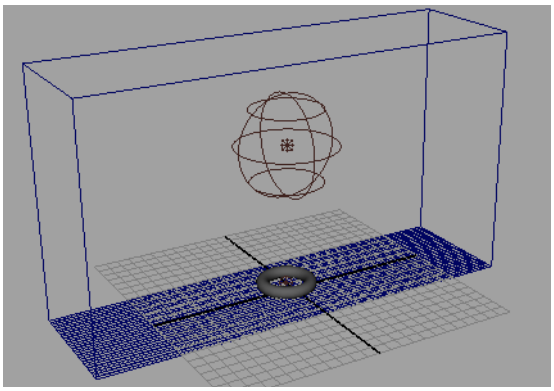


Figure 14-51 *The scaled radial field in the viewport*

Figure 14-52 *The ocean scene*

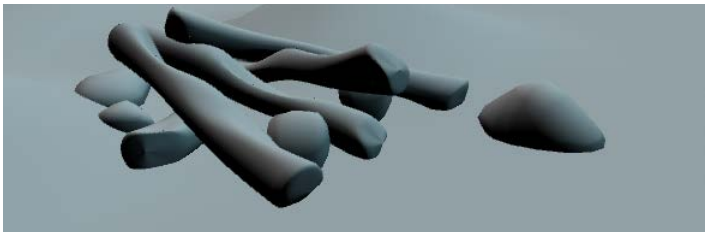


Figure 14-53 *The 3D models of wood and stone*

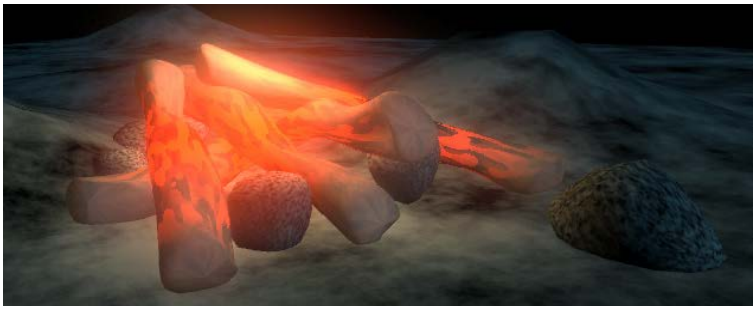


Figure 14-54 *The fire effect in the scene*

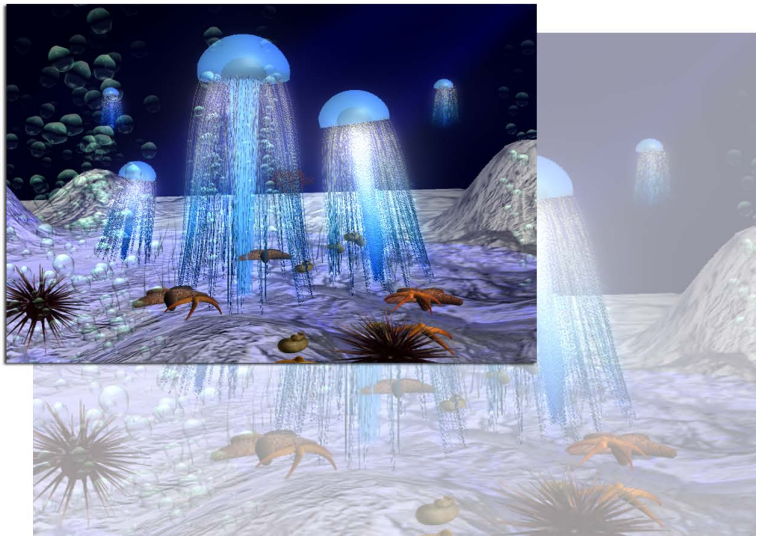
Chapter 15

nHair

Learning Objectives

After completing this chapter, you will be able to:

- *Apply nHair to objects*
- *Simulate nHair*
- *Paint textures on nHair*



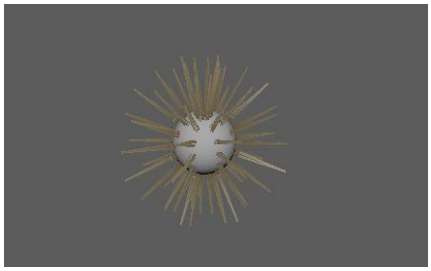


Figure 15-1 *The nHair created on a polygon sphere*

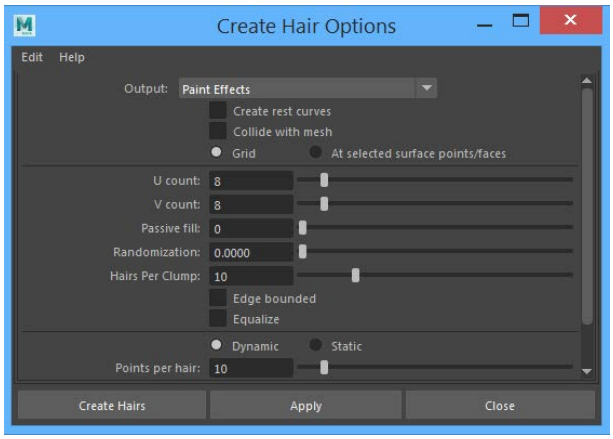


Figure 15-2 *The* ***Create Hair Options*** *window*

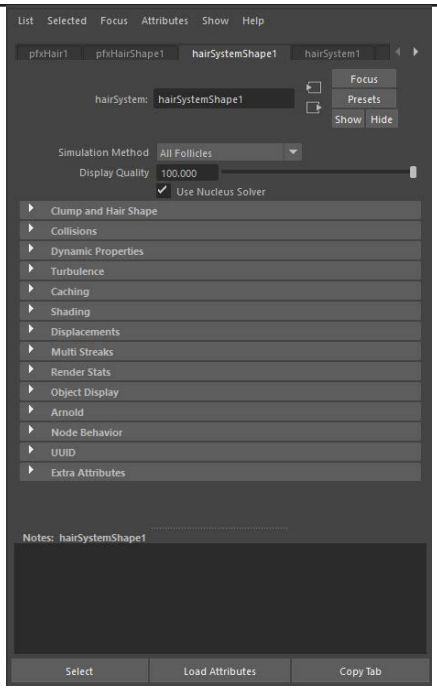


Figure 15-3 *The* ***Attribute Editor*** *displayed on choosing the* ***pfxHair1*** *node from the* ***Outliner*** *window*

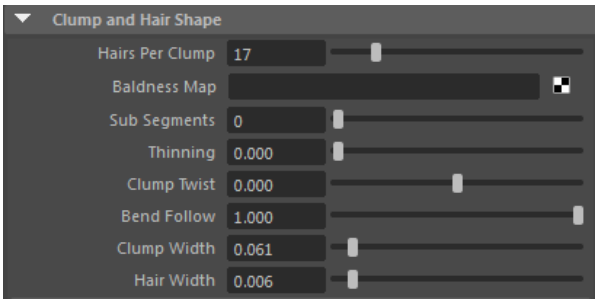


Figure 15-4 *The attributes in the* ***Clump and Hair Shape*** *area*

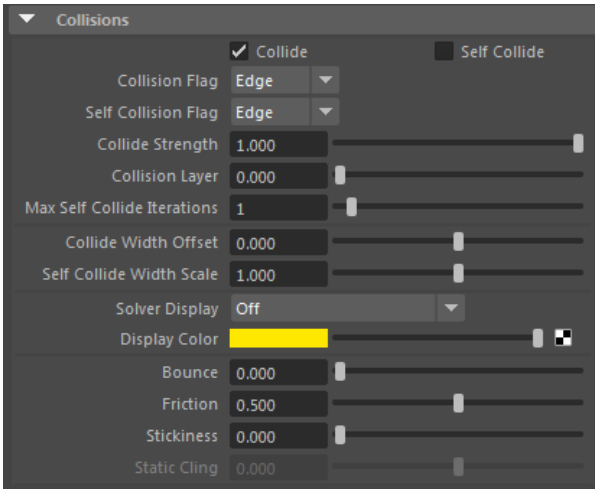


Figure 15-5 *The attributes in the* ***Collisions*** *area*

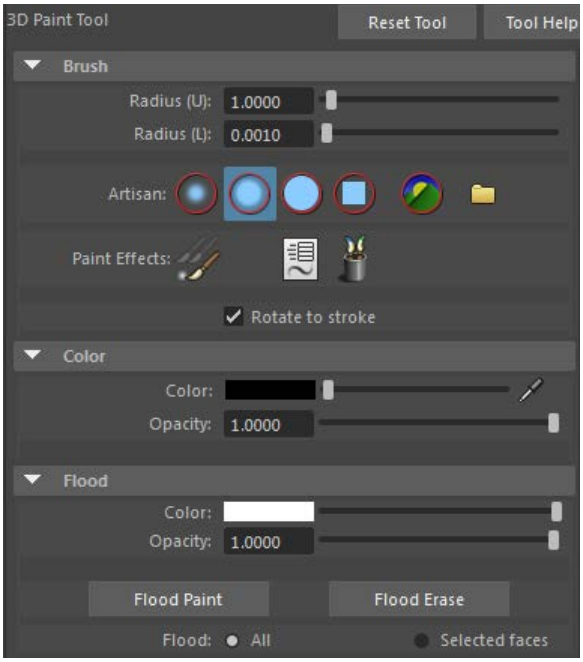


Figure 15-6 *Partial view of the* ***Tool Settings (3D Paint Tool)*** *panel*

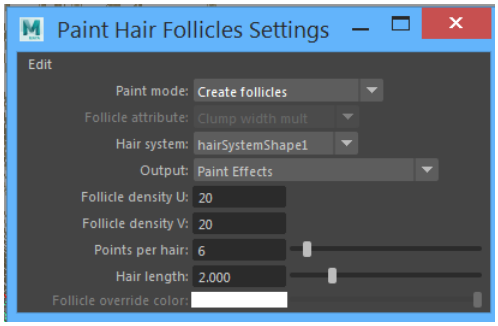


Figure 15-7 *The* ***Paint Hair Follicles Settings*** *window*

Figure 15-8 *The braid*

Figure 15-9 *Braid after applying the shadow*

Figure 15-10 *The underwater scene*

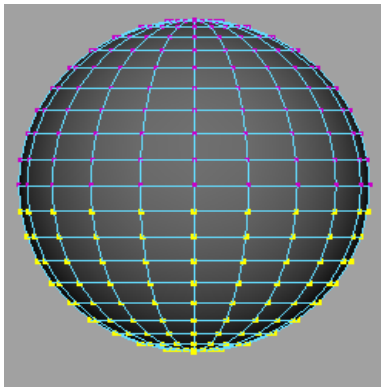


Figure 15-11 *Bottom vertices selected*

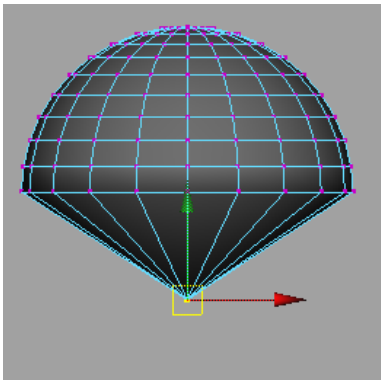


Figure 15-12 *Selected vertices merged at the center*

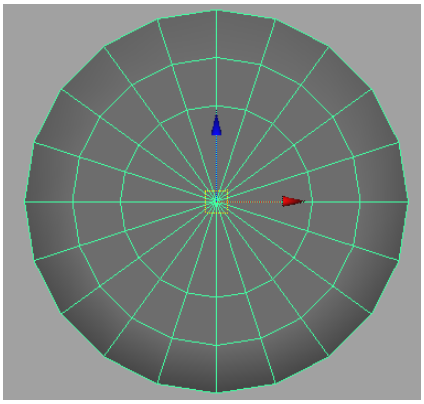


Figure 15-13 *Edge loops created using the* ***Insert Edge Loop*** *tool*

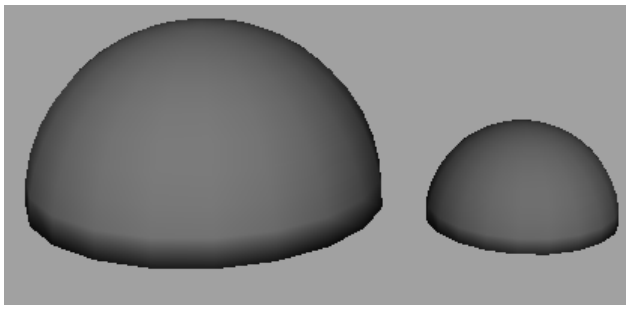


Figure 15-14 *The spheres displayed in the persp viewport*

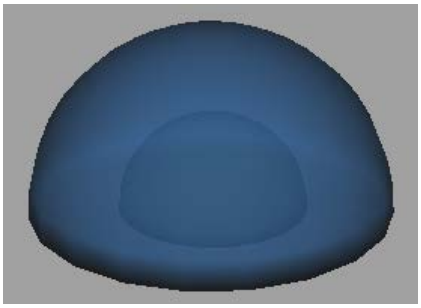


Figure 15-15 *Both shells aligned in the viewport*

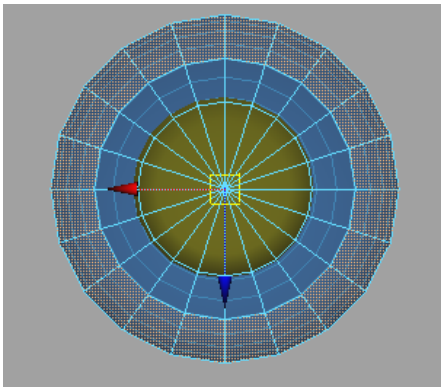


Figure 15-16 *The faces selected on shell_1*

Figure 15-17 *The appearance of hair*

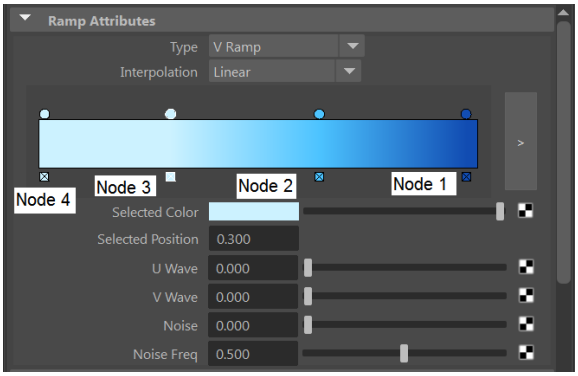


Figure 15-18 *Nodes arranged on the ramp in the* ***Attribute Editor***

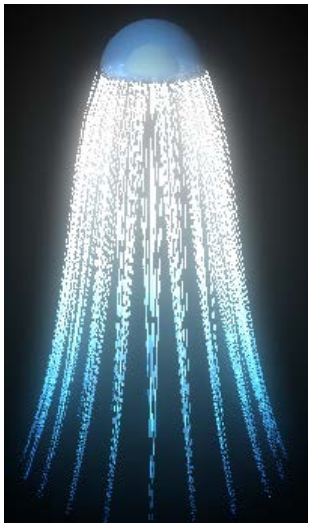


Figure 15-19 The rendered view of the jellyfish

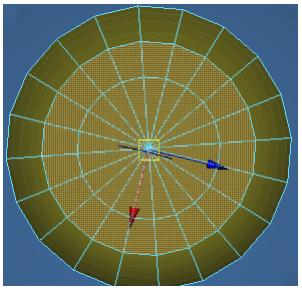


Figure 15-20 The faces at the center

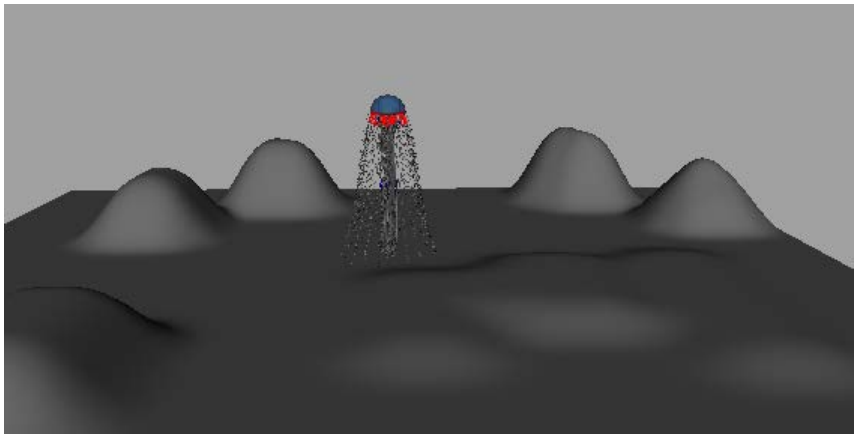


Figure 15-21 The plane after using the **Smooth** tool

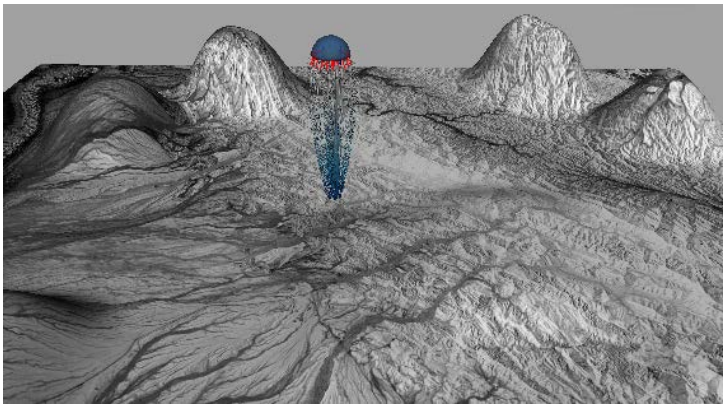


Figure 15-22 *Texture applied on the plane*

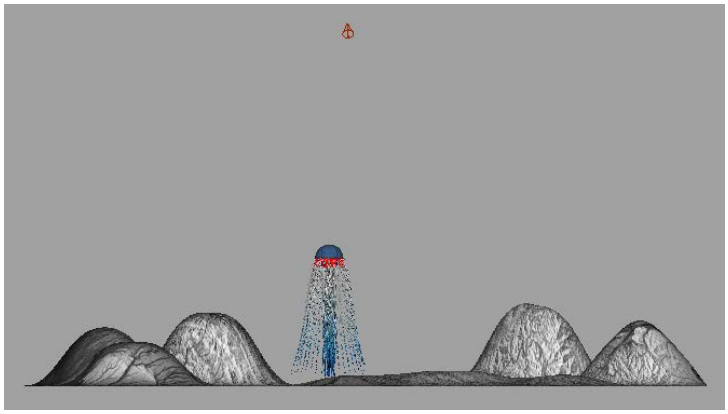


Figure 15-23 *The adjusted spot light*

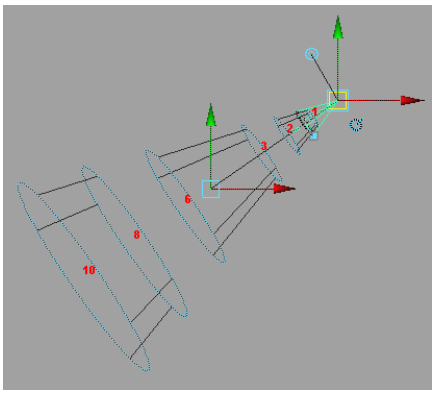


Figure 15-24 *The light manipulators*

Figure 15-25 *The final rendered scene*

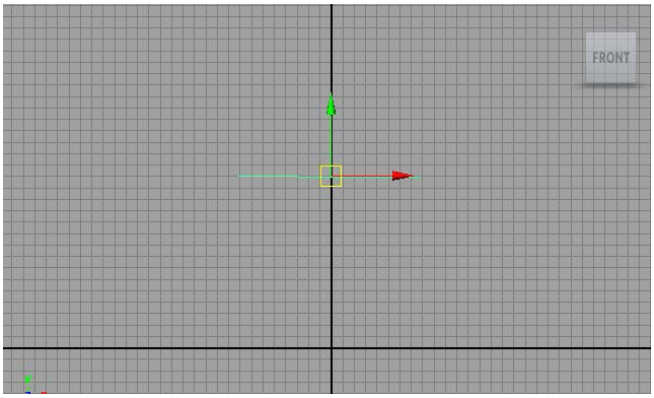


Figure 15-26 *Profile curve for a rope*

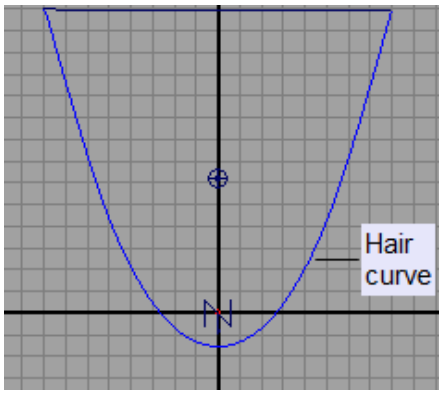


Figure 15-27 *Hair curve at frame 200*

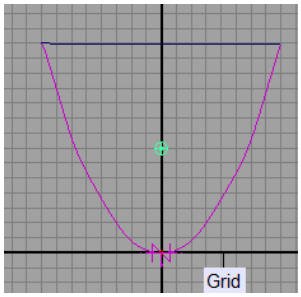


Figure 15-28 *Hair curve colliding with the grid*

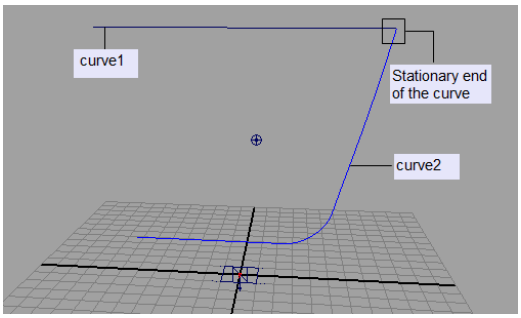


Figure 15-29 *The curve after selecting the* ***Tip*** *option*

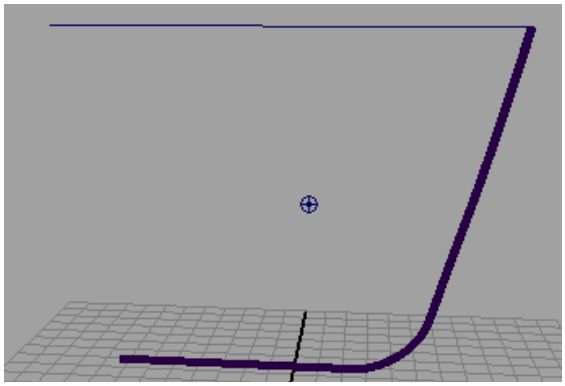


Figure 15-30 *Curve after choosing the* ***Attach Brush to Curves*** *option*

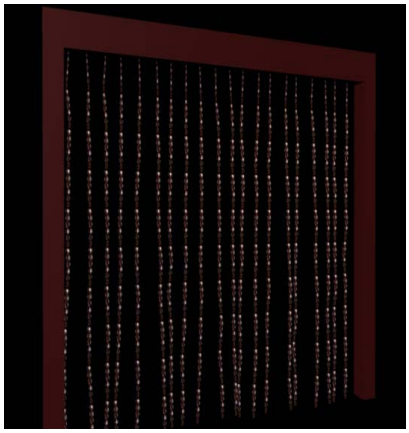


Figure 15-31 *A beaded curtain*

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Chapter 16

Bifrost

Learning Objectives

After completing this chapter, you will be able to:

- *Understand the fundamental concept of Bifrost*
- *Create and optimize Bifrost fluids*
- *Add collider to Bifrost fluids*
- *Add mesh to Bifrost particles*

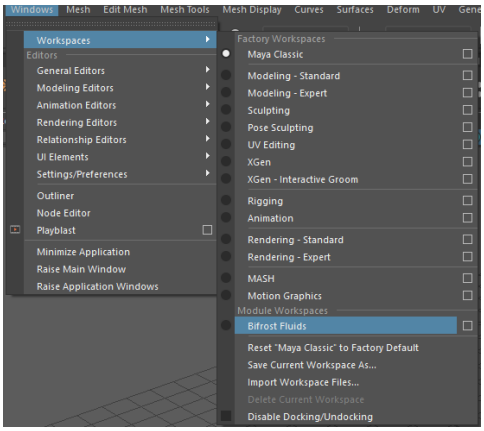


Figure 16-1 *Selecting the* ***Bifrost Fluids*** *option from the cascading menu*

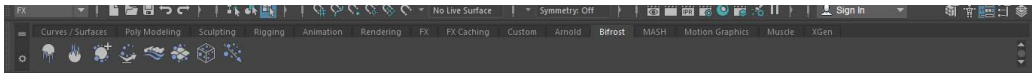


Figure 16-2 *The* ***Bifrost*** *and* ***Bifrost Fluids*** *menus displayed in the menubar*

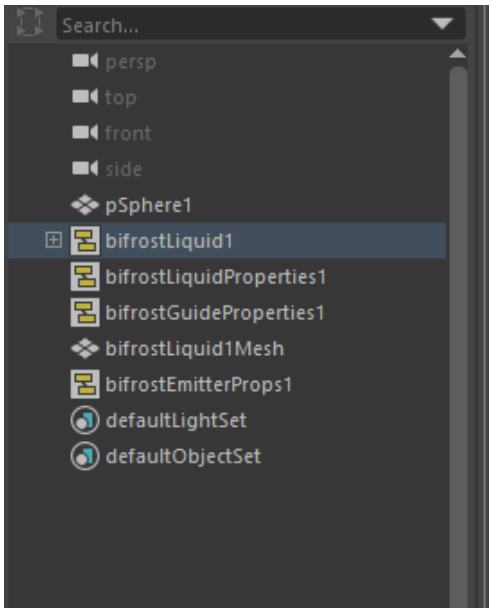


Figure 16-3 *Nodes in the* ***Outliner*** *window*

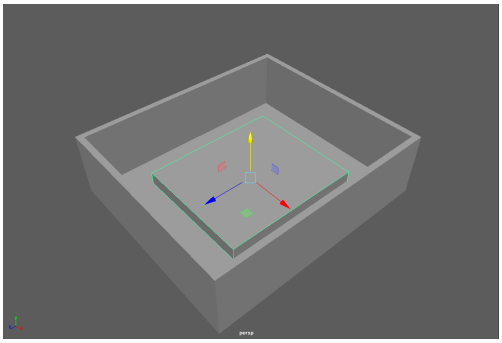


Figure 16-4 *The object before creating the Bifrost liquid*

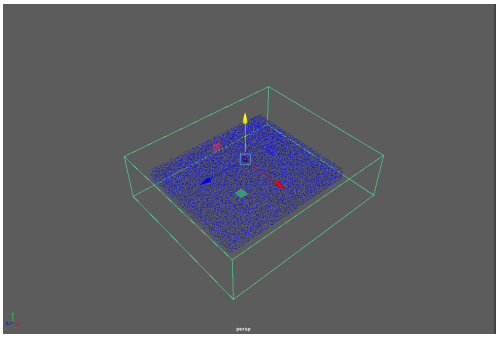


Figure 16-5 *The object after creating the Bifrost liquid*

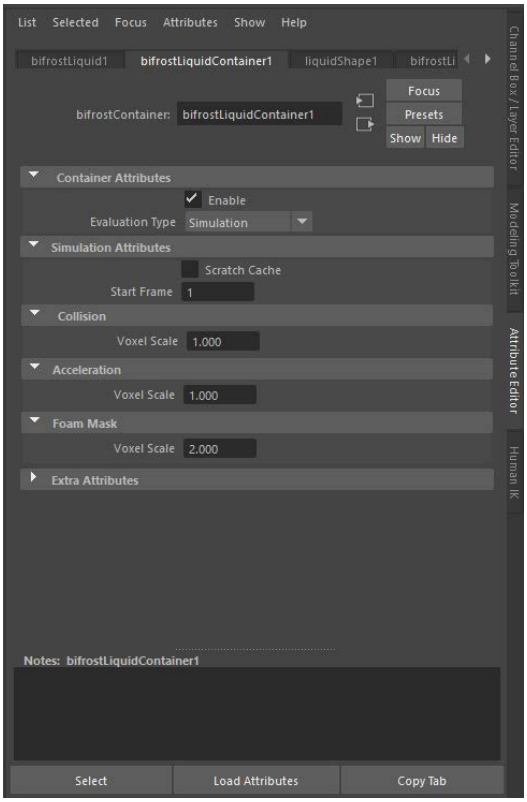


Figure 16-6 *Various attributes of the Bifrost liquid in* ***Attribute Editor***

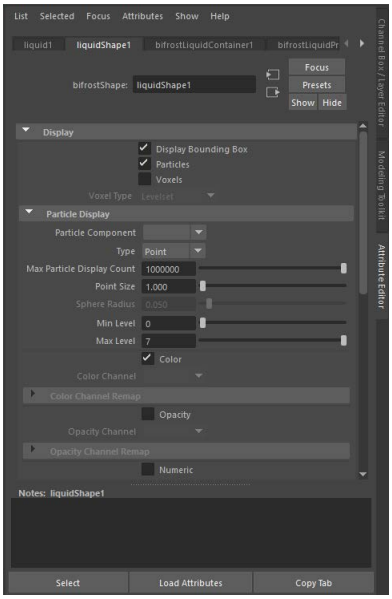


Figure 16-7 *Various attributes of the* ***liquidShape1*** *tab in* ***Attribute Editor***

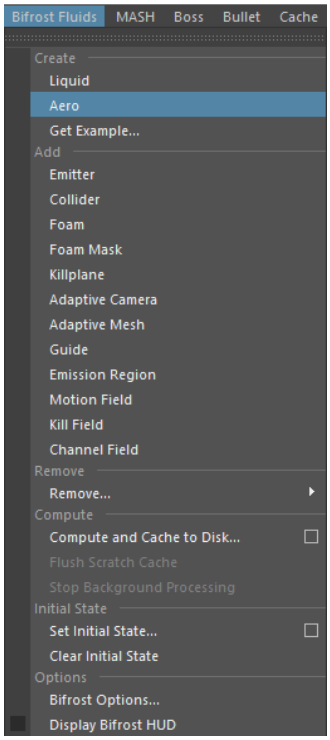


Figure 16-8 *The* ***Aero*** *option in the* ***Bifrost Fluids*** *menu*

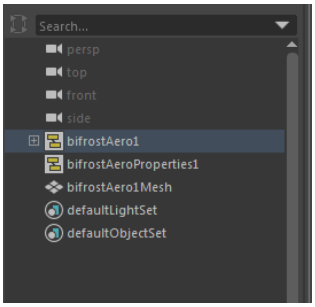


Figure 16-9 *Nodes in the* ***Outliner*** *window*

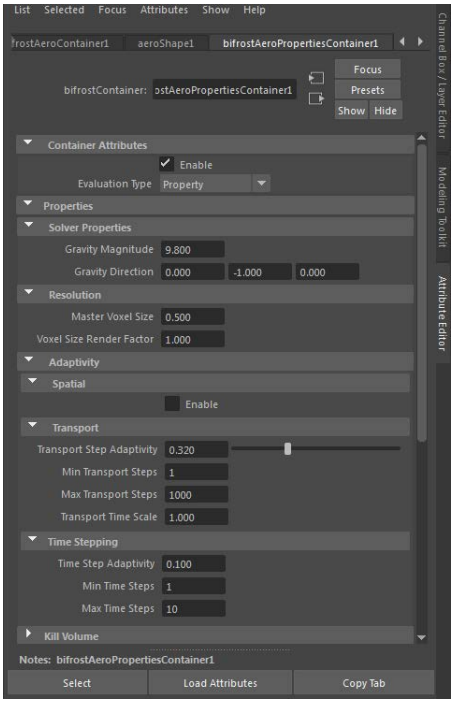


Figure 16-10 *Various attributes of the Bifrost Aero in* ***Attribute Editor***

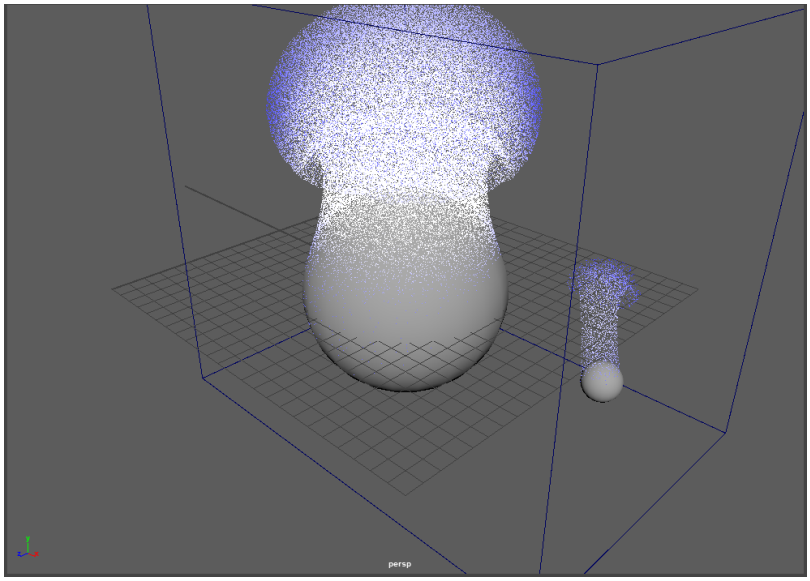


Figure 16-11 *Adding emitter to an existing Bifrost simulation*

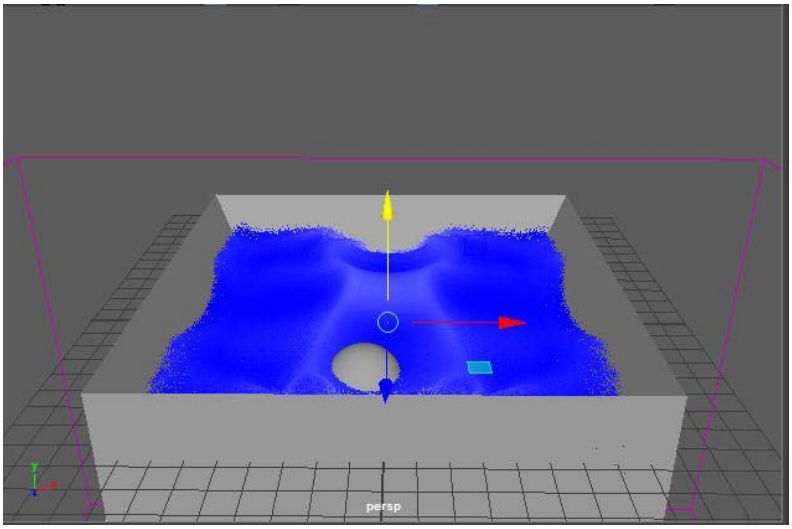


Figure 16-12 *The meshes interacting with liquid*

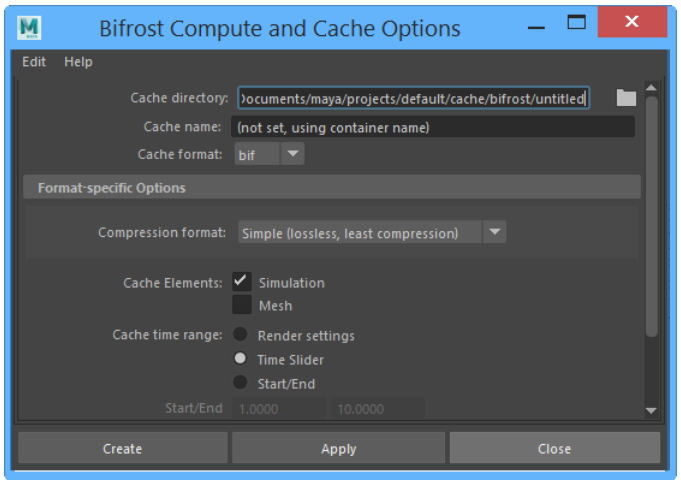


Figure 16-13 *The* ***Bifrost Compute and Cache Options*** *window*

Figure 16-14 *The final rendered scene*

Figure 16-15 *The scene displayed in the viewport*

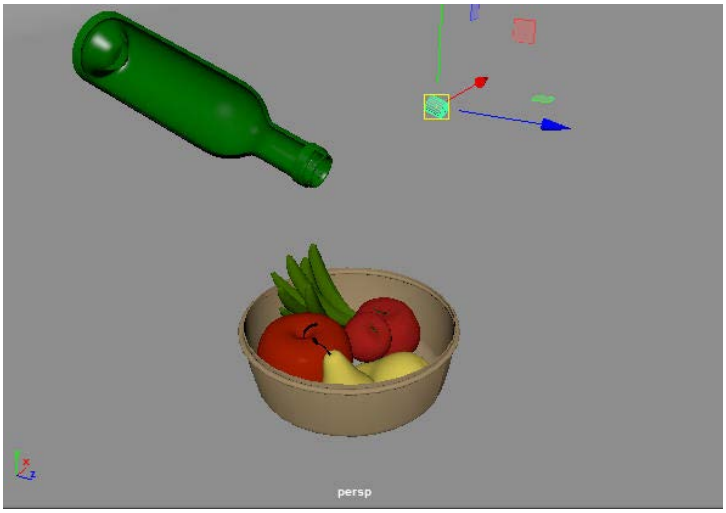


Figure 16-16 *Cylinder created in the viewport*

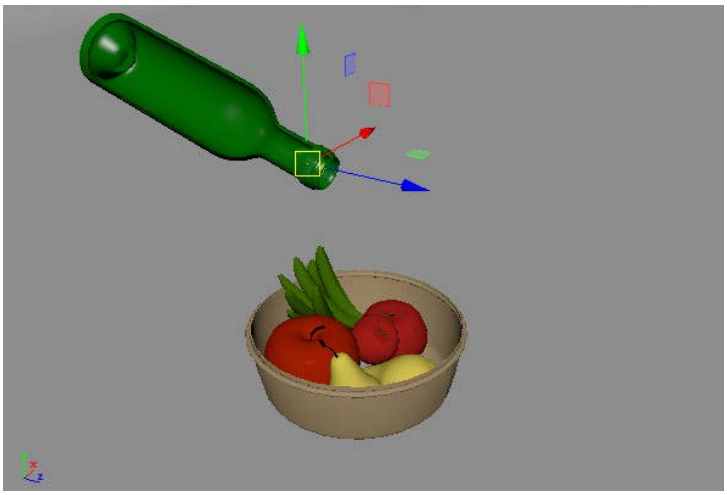


Figure 16-17 *The liquid is aligned with bottle*

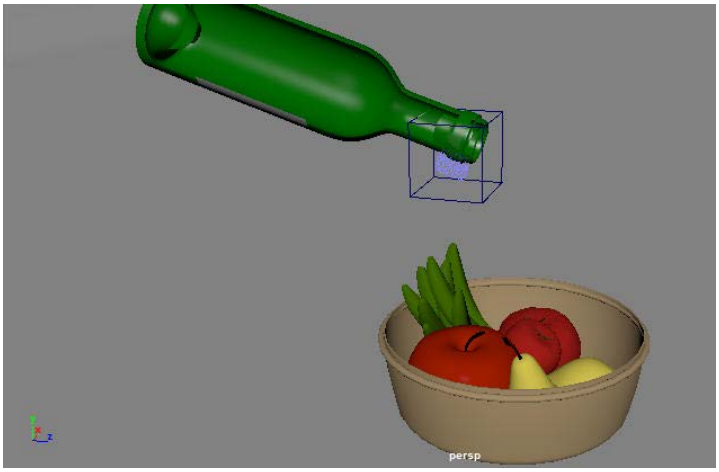


Figure 16-18 *The liquid dropping straight from the bottle*

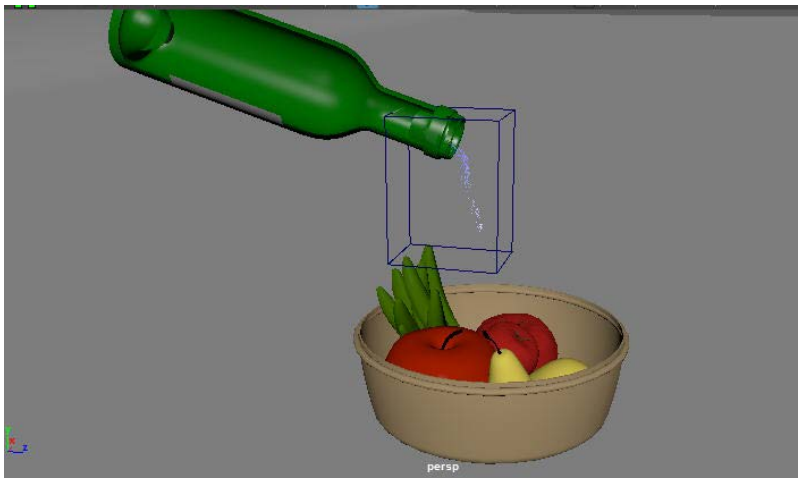


Figure 16-19 *The Bifrost simulation in the viewport*

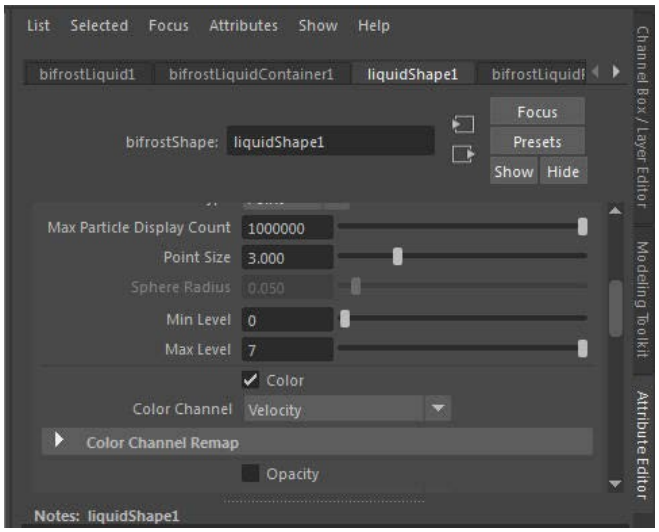


Figure 16-20 *The* ***Point Size*** *attribute in the* ***liquidShape1*** *tab*

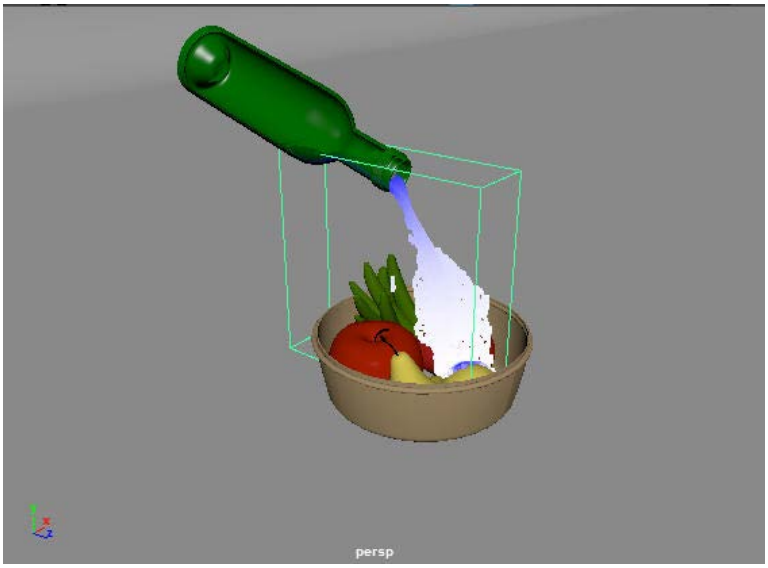


Figure 16-21 *Bifrost liquid after setting the strength*

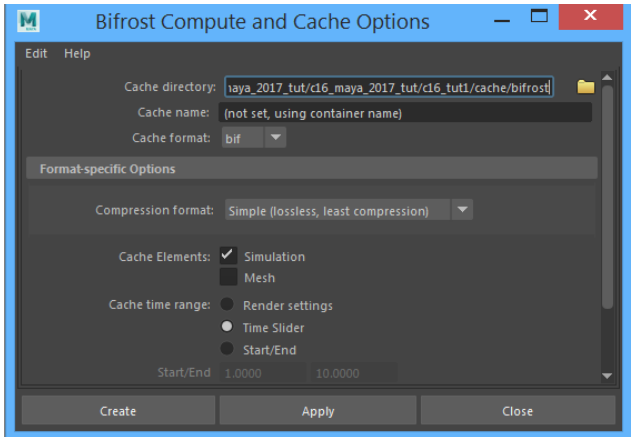


Figure 16-22 *Setting the location for cache*

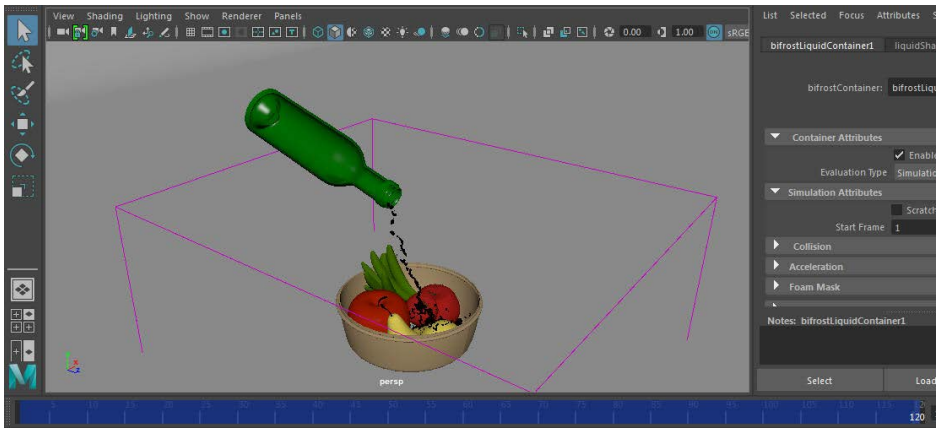


Figure 16-23 *The Timeline is displayed in blue color*

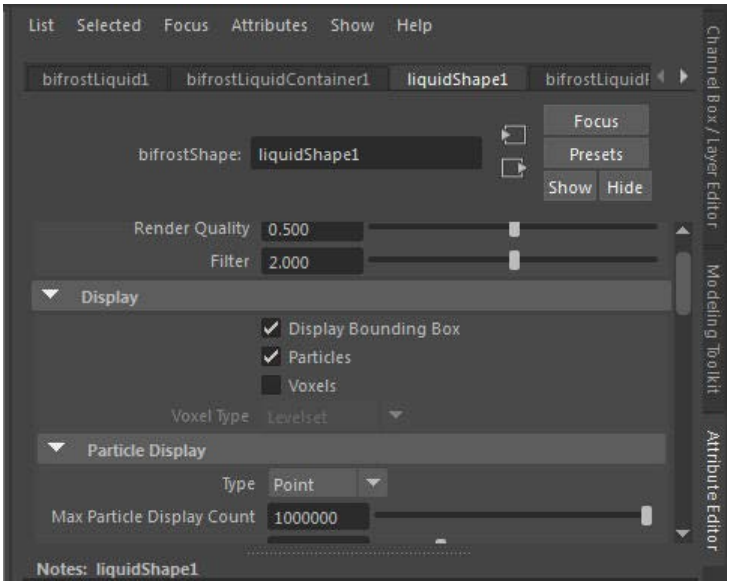


Figure 16-24 *The* ***Particles*** *check box in the* ***Display*** *area*

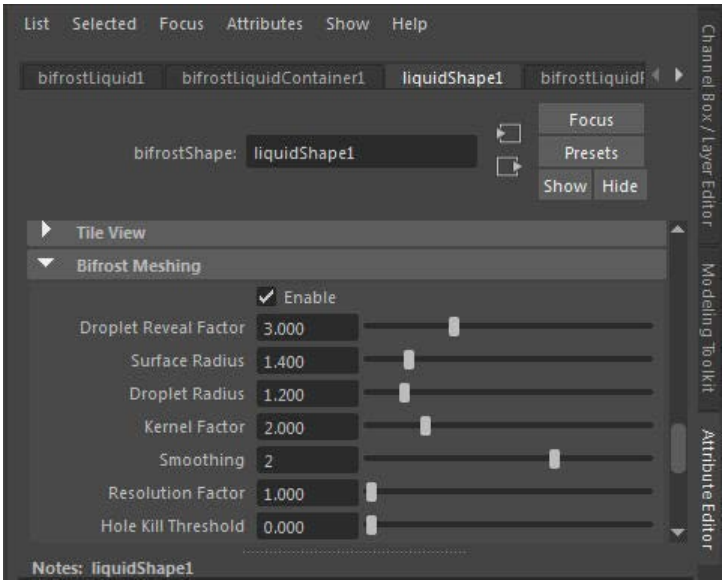


Figure 16-25 *The* ***Enable*** *check box selected*

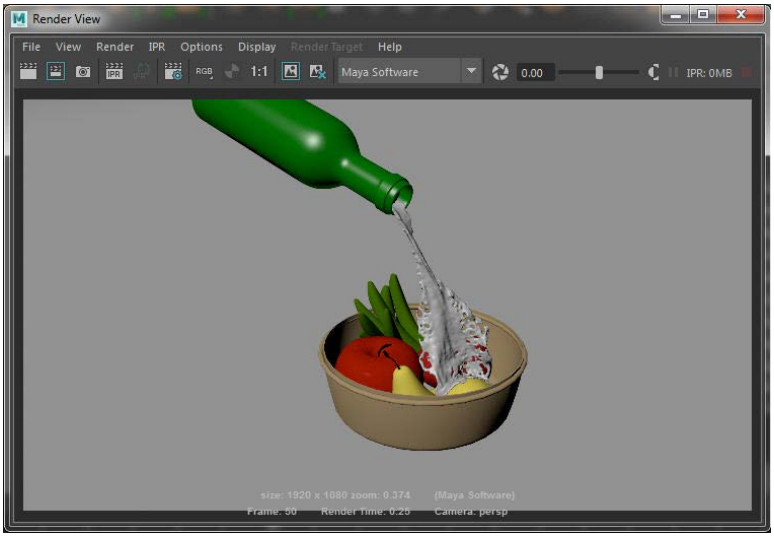


Figure 16-26 *The mesh created*

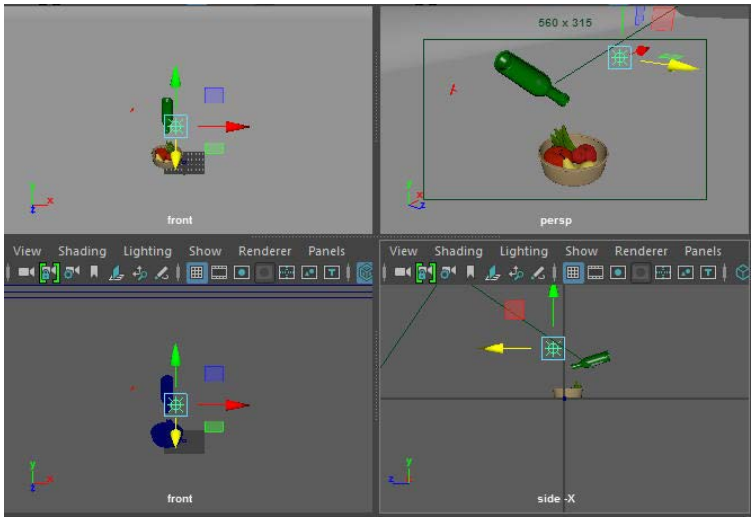


Figure 16-27 *Aligned point light*

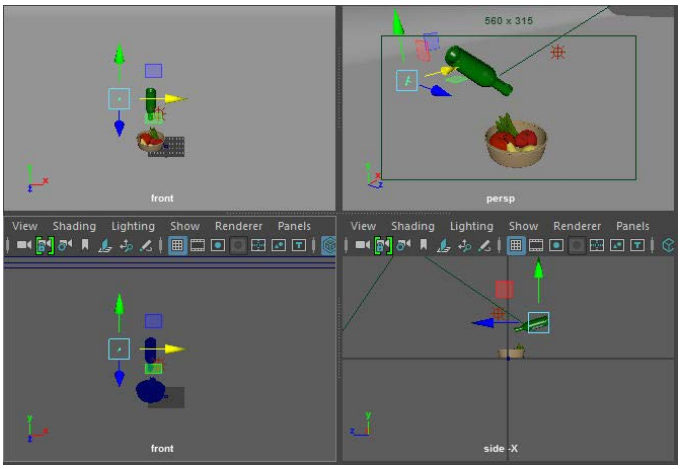


Figure 16-28 *Aligned area light*

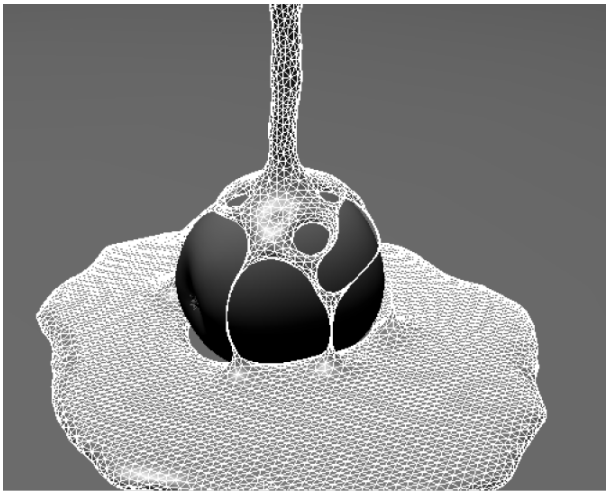


Figure 16-29 *Honey simulation by using Bifrost*

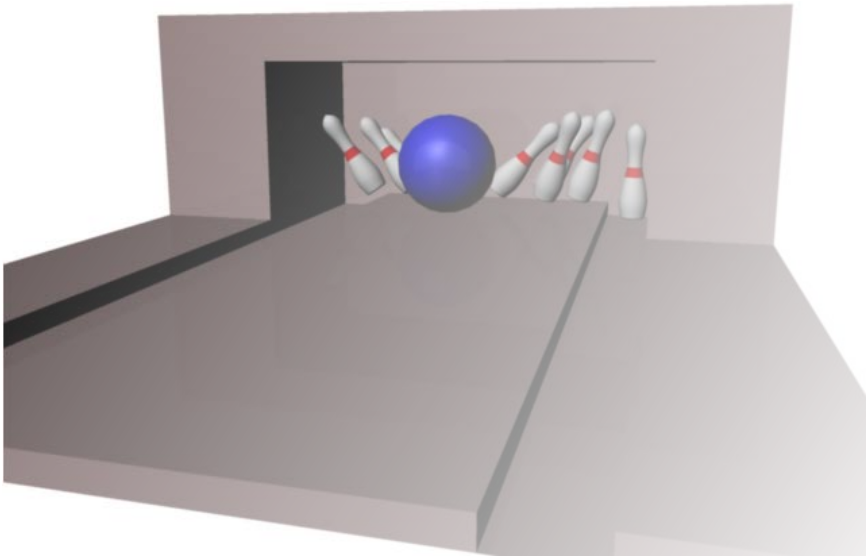
Chapter 17

Bullet Physics

Learning Objectives

After completing this chapter, you will be able to:

- *Work with rigid and soft bodies*
- *Create a soft body*
- *Create constraints*



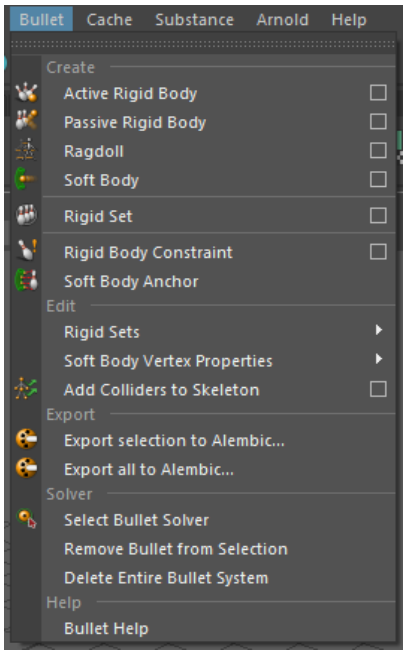


Figure 17-1 *The* ***Bullet*** *menu*

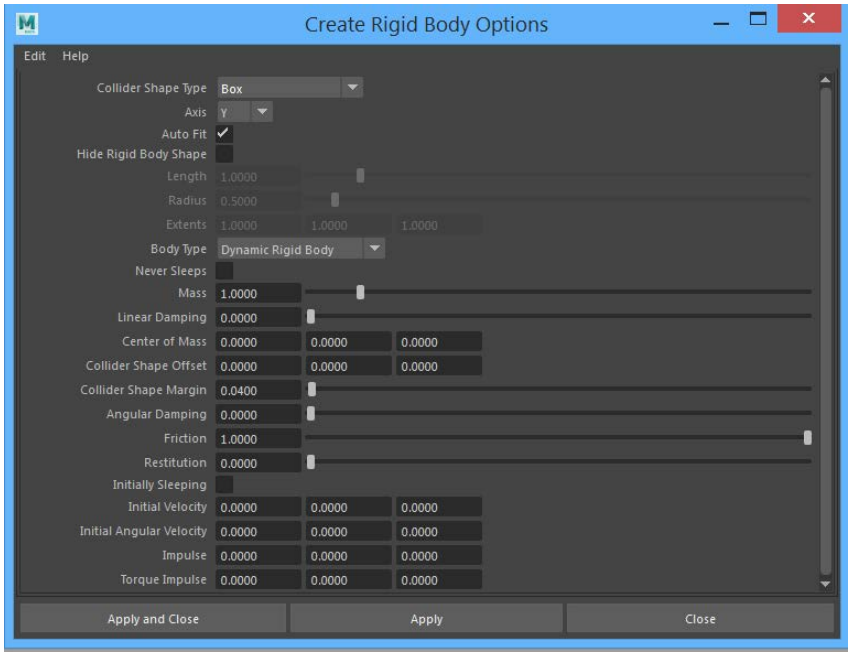


Figure 17-2 *The* ***Create Rigid Body Options*** *window*

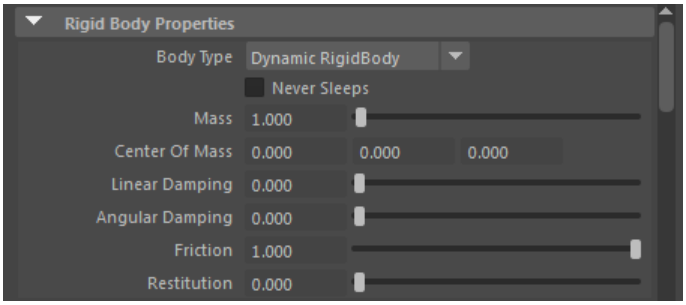


Figure 17-3 *The* ***Rigid Body Properties*** *area*

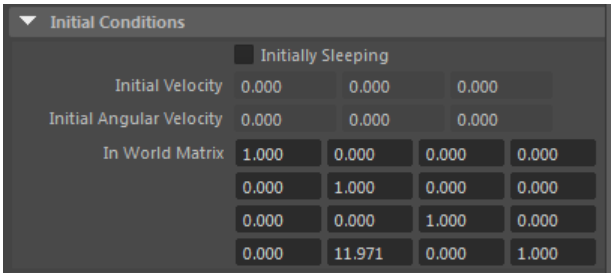


Figure 17-4 *The* ***Initial Conditions*** *area*

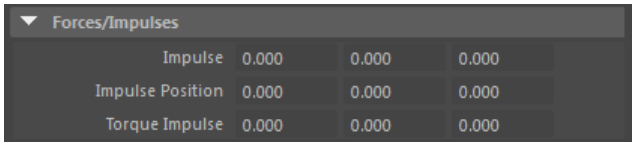


Figure 17-5 *The* ***Forces/Impulses*** *area*

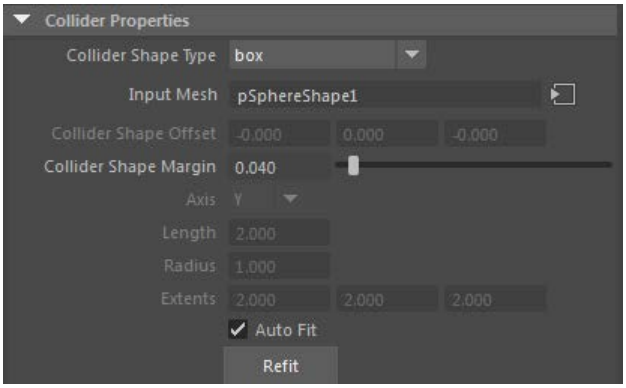


Figure 17-6 *The* ***Collider Properties*** *area*

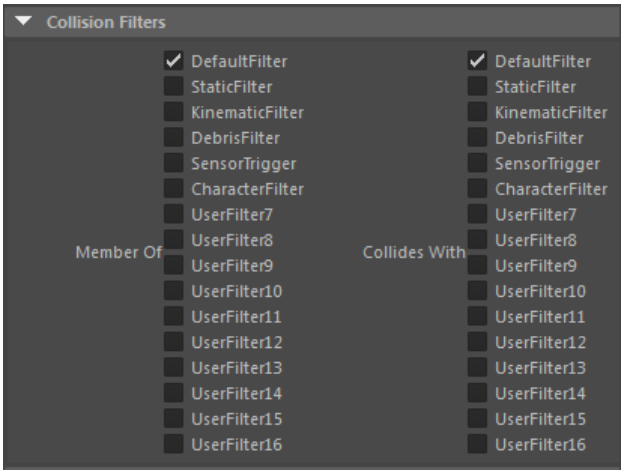


Figure 17-7 *The* ***Collision Filters*** *area*

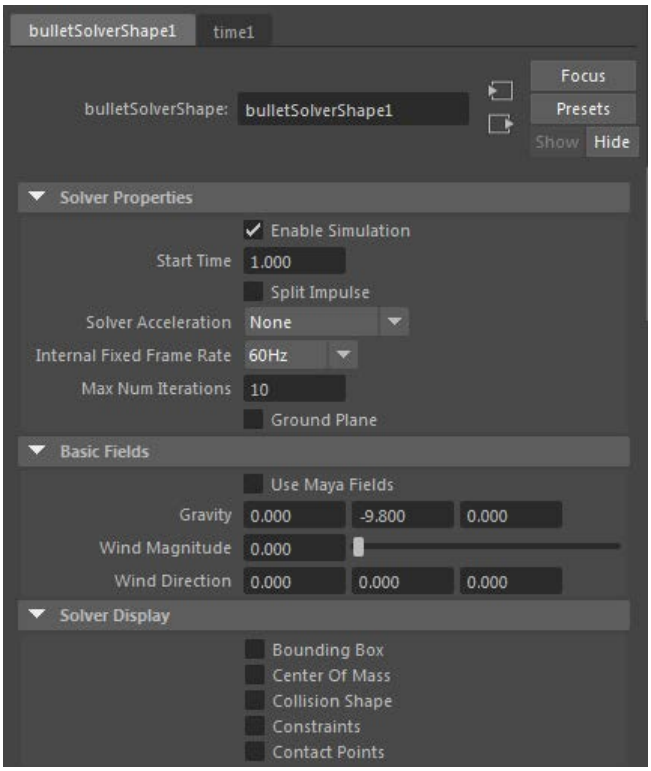


Figure 17-8 *Different attributes under the* ***bulletSolverShape#*** *tab*

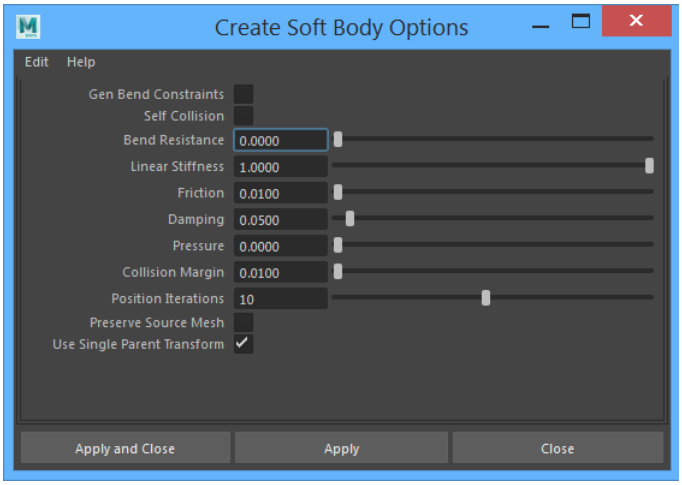


Figure 17-9 *The* ***Create Soft Body Options*** *window*

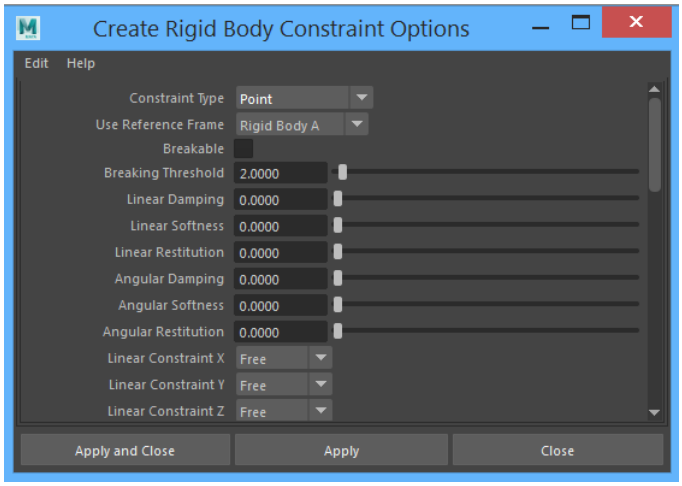


Figure 17-10 *The* ***Create Rigid Body Constraint Options*** *window*

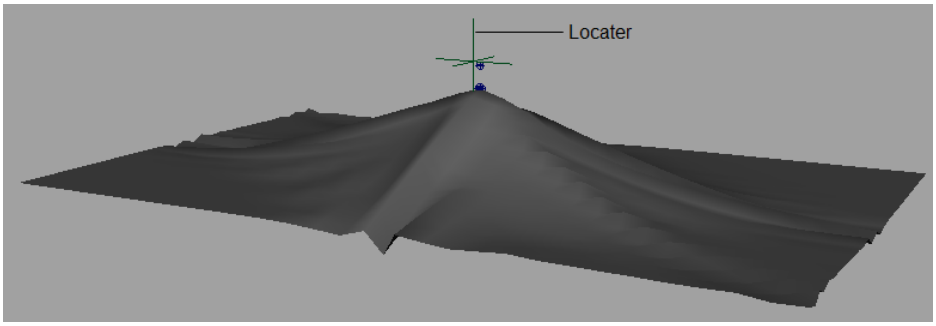


Figure 17-11 *The soft body during simulation*

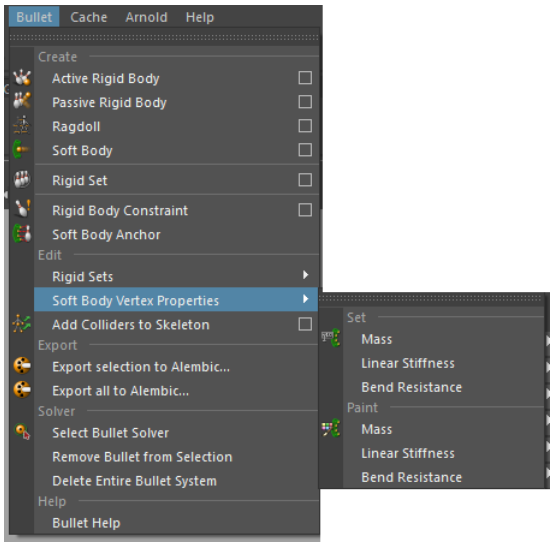


Figure 17-12 *Cascading menu displayed on choosing the* ***Soft Body Vertex Properties*** *option*

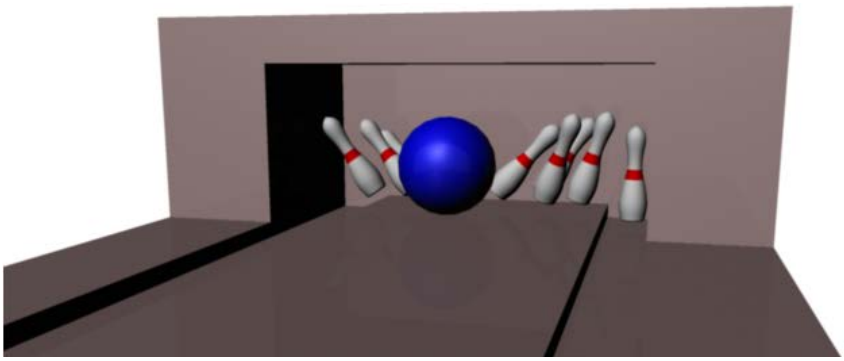


Figure 17-13 *Bowling pins after collision*

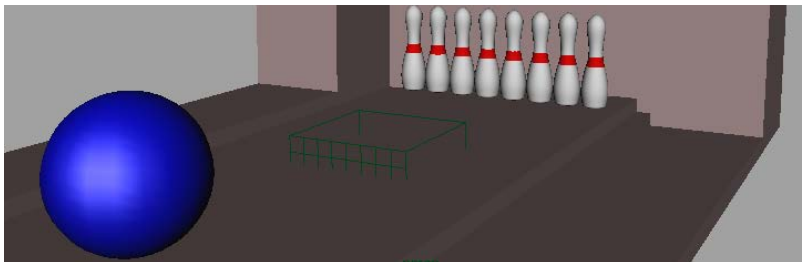


Figure 17-14 *Bowling pins and the ball*

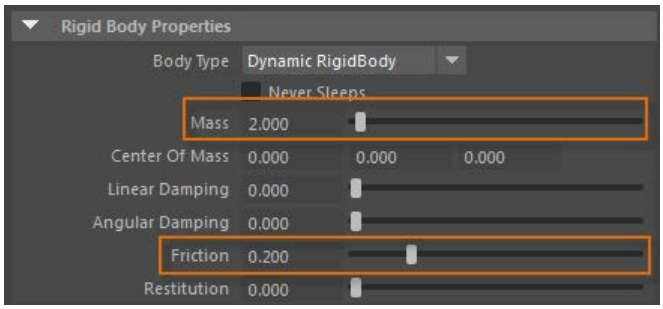


Figure 17-15 *Setting the attributes in the* ***Rigid Body Properties*** *area*

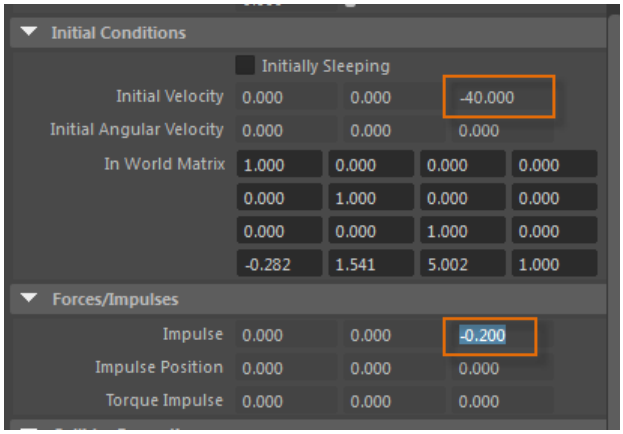


Figure 17-16 *Setting the values of* ***Initial Velocity*** *and* ***Impulse***

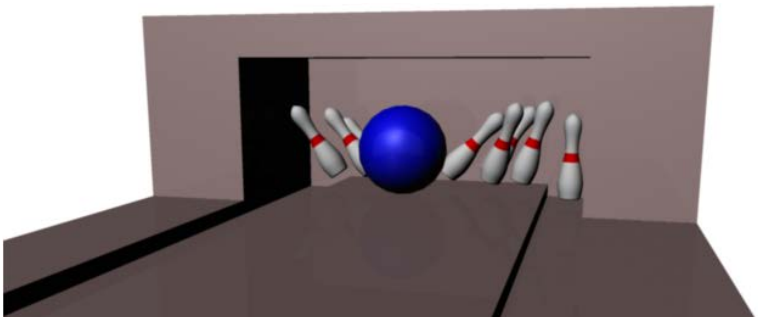


Figure 17-17 *The final output*