

The Maya Interface

The Maya interface can be a bit intimidating, and it's not fair to expect yourself to pick it right up and remember where everything is. As you will see throughout this book, the best way to learn Maya is to put it to task, and you can use this chapter as a reference to the interface and the many windows and functions you will find yourself using in your work.

Try not to rush it, and don't be overly concerned with customizing the keys and using shelves or the hotbox for now; just access your commands and functions through the menus. Of course there are a few exceptions to this, as we'll see in Chapter 2, "Quick Start: Creating an Animation in Maya 8.5," but for the most part it is highly recommended that you familiarize yourself with where everything roughly should be through the menu system.

This chapter is a look at how to access functions and a fairly complete rundown of the often-used windows in Maya to get you familiar with their workings. Without further ado, let's get to the interface that makes Maya what it is.

- The interface
- Getting around
- Scene windows
- Window layouts
- The hotbox
- Menus and shelves
- The Outliner and the Hypergraph
- The Channel Box and the Attribute Editor
- The Timeline
- The Command line, the Feedback line, and the Script Editor
- Customizing the interface

The Interface

You can perform almost every task in Maya in more than one way. The most common way to access functions and tools is through the menu. In addition to menus, you can access functions through icons in the shelf, through hot keys, through marking menus, and through the hotbox. This is one of the charms of Maya and helps make it one of the most powerful CG creation tools on the market. Its adaptability to individual work flows makes it an essential tool for artists. This can be a double-edged sword for beginners though, since they often find themselves overwhelmed as to where to go or how to proceed. You will see all these options throughout the book and a rundown of them in this chapter. We recommend you familiarize yourself with the menus first and then get into the productivity-enhancing shortcuts.

If you are already experienced with other CG software and find it easy to get around in Maya, you can just use this chapter as a reference to come back to when you're already steeped in your scene. Artists who used other packages say that Maya's work flow and interface are important to learn because they can offer a faster, more efficient way of working.

If you're new to Maya and have not had a chance to set any defaults for yourself, reset the interface to the default settings to make sure everything lines up between your work and the exercises in this book. Choose **Window → Settings/Preferences → Preferences**. In the Preferences window, choose **Edit → Restore Default Settings**. This should restore settings to their original state. Be careful not to reset someone else's settings, though, if you are on a multiuser computer.

Let's take a look at what elements make up the default Maya screen, which is shown in Figure 1.1.

The reason we specifically mentioned the *default* Maya screen is that Maya has a highly customizable interface that you can tailor to the way you like to work. As you become experienced with Maya, you will begin customizing the interface for yourself easily. As an inexperienced user, it's best to leave everything at the default to have a level playing field.

In addition, for those systems that have multiple displays, Maya fully supports using a secondary display as long as your video card is capable. Keep in mind that both displays should be set to the same resolution and refresh rate for best OpenGL performance.

Experienced users should focus on the section "Customizing the Interface" later in this chapter.

The Nickel Tour

Let's take a look at the interface and identify the parts of the UI.

Running across the top of the screen (see Figure 1.1) are the *main menu bar*, the *Status line*, and the *shelf*. These provide access to the many functions in Maya. Running vertically to the left of the screen is the *Tool Box*, giving you fast access to common tools to manipulate your objects. Across the screen are the *Channel Box/Layer Editor* and sometimes the *Attribute Editor*. (The Attribute Editor is not displayed in Figure 1.1.) This part of the

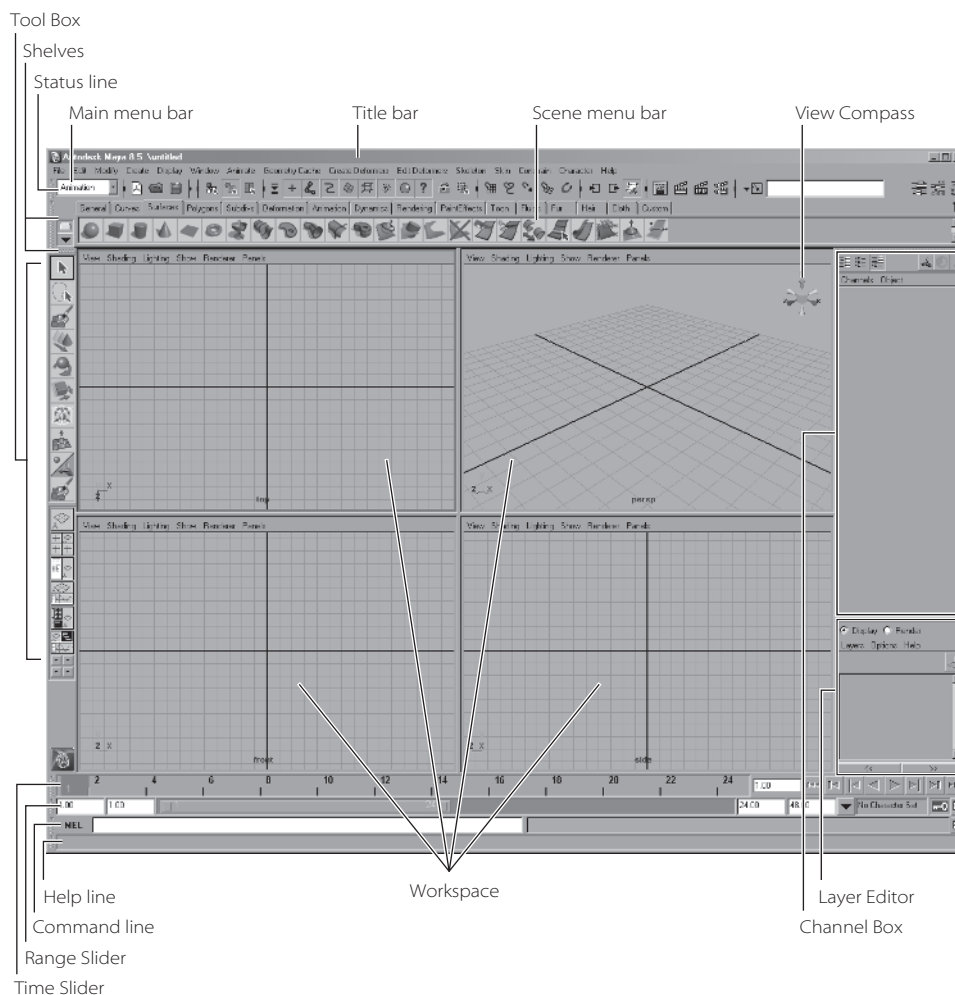


Figure 1.1
The Maya 8.5
interface

screen gives you access to information on the objects in your scene and allows you to manipulate and organize them as well.

Running horizontally at the bottom of the screen are the *Time Slider* and the *Range Slider*. These give you access to various functions and feedback from Maya itself.

In the middle of all these elements is the *workspace*, which hosts your *view panels* (or scene windows) and their own *scene menus*. These panels are known as views or viewports in some other 3D packages. You can change the options for each panel through its scene menus, from changing its view to changing how objects are displayed. Essentially, these panels are where you create and manipulate your 3D scenes. Figure 1.1 shows the panels with a grid displayed. This grid represents the ground axis of your 3D space and is useful for orienting yourself, especially in the perspective views.

The Workspace

When you first launch Maya, you will be presented with a full-screen perspective view, as shown in Figure 1.2. This view is essentially the view from a camera and shows real-world depth through the simulation of perspective. You use this window to see your scene in three dimensions. You can also move around a perspective view in real time to get a sense of proportion and depth.

Press the spacebar while in the panel to switch from the full-screen perspective to the four-panel layout originally shown in Figure 1.1. The four-panel layout shows the perspective view as well as three orthographic views (top, front, and side), each from a different side. Pressing the spacebar again returns your active view panel to full-screen mode.

Orthographic views are usually used for modeling and scene layout, because they convey exact dimensions and size relationships better than perspective views, as shown in Figure 1.3. Even though the cubes in this scene are all the same size, the perspective view displays the cubes farther away as being smaller than those closer to you. Orthographic views display proper proportions so you can see the four cubes identical in size and shape as well as their position in the scene.

Figure 1.2
The full
perspective view

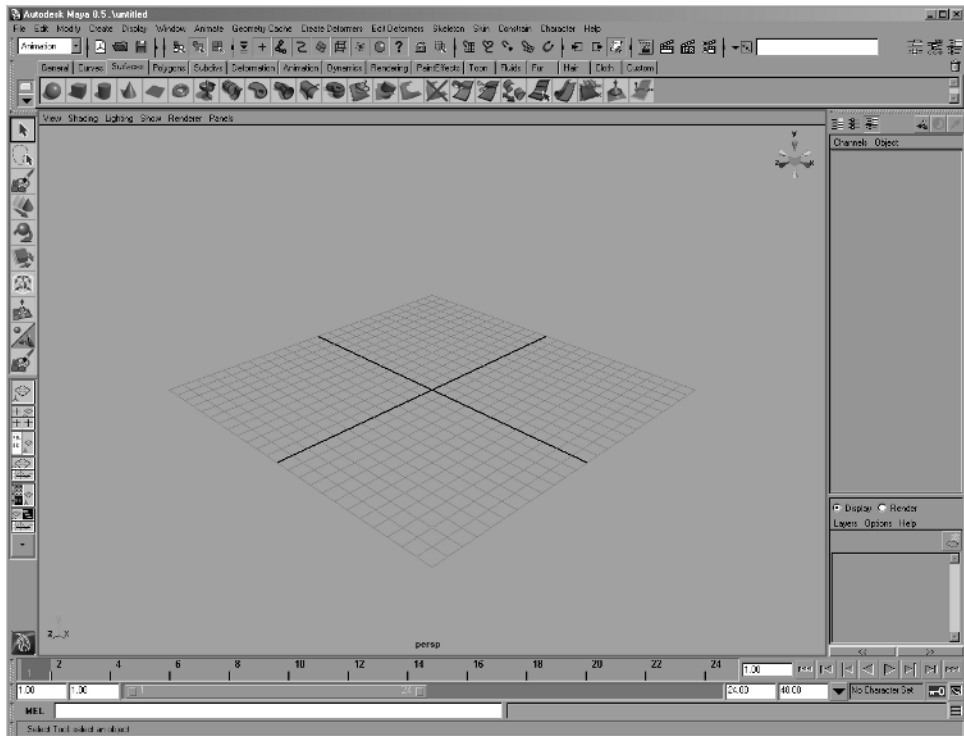
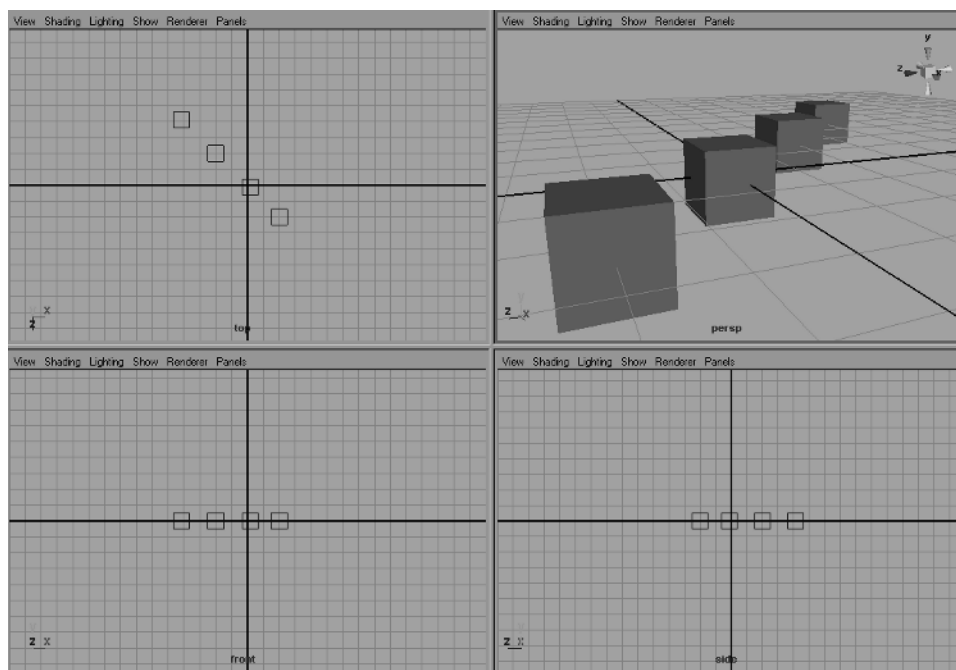


Figure 1.3
The four-panel layout



You can use any of the six presets in the Tool Box on the left side of the screen to adjust the panel layouts of your screen. You can also go through the main menu to make adjustments by choosing **Window → Saved Layouts**. Furthermore, you can change any panel's view by choosing another panel name from the Panels menu (this menu is found just above any panel), shown in Figure 1.4. You can choose any modeling view, orthographic or perspective, or another window to best suit your work flow. Last, you can change the size of any of the panels by clicking and dragging the separating borders between the panels.

The panels display a grid that you can use to align objects and for a general sense of placement and position. You can adjust the size and availability of the grids by choosing **Display → Grid** ☐. The grid is made of actual units of measure that you can adjust. Choose **Window → Settings/Preferences → Preferences** to open the Preferences dialog box, and in the Settings section make your adjustments.

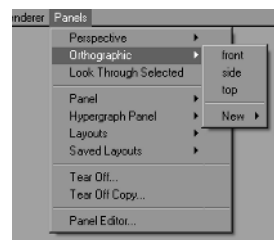


Figure 1.4
You can change your panel view through the scene menus in each of the panel views.

Getting Around

What's the use of all these views and UI elements if you can't get around? Just as with every other program on a computer, you will be using the keyboard and mouse to interact with Maya, although perhaps more in tandem with each other. Maya relies on the Alt key a great deal for the navigation in its work windows. Also, Maya requires the use of a three-button mouse, even with a Macintosh system. On a Macintosh, the Option key doubles as the Alt key. You use one of the mouse buttons in conjunction with the Alt key to move in your scene.

The Mouse Controls

The left mouse button (LM) is the primary selection key in Maya and is the most often used, obviously. But as far as getting around in a scene, when used with the Alt key, the LM button tumbles or orbits around your scene in perspective (camera) panels. The right mouse button (RM) activates shortcut menus, as it does in many software programs, and also Maya's system of marking menus, which are similar to shortcut menus. (For more on marking menus, stayed tuned to this chapter.) The RM button also allows you to dolly into or out of your scene. Dollying moves the camera closer to or farther from your subject in the scene. It is not accurate to call this type of move a zoom, though it often is, because a zoom changes the focal length of the lens of the camera as opposed to physically moving it in relation to the subject. Finally, the middle mouse button (MM) used with the Alt key allows you to pan around the scene, as well as acting as a *virtual slider*. You will see an example of a virtual slider later when we discuss the Channel Box.

Also note that if your mouse has a clickable middle wheel, you can use the wheel itself to dolly into or out of a Maya scene simply by rolling it up or down. This move is the same as an Alt+RM move. You may have to set up your mouse functions (through the mouse driver itself) for the mouse wheel to behave as a mouse's middle button when pressed.



Figure 1.5
The View Compass

View Compass

The View Compass, shown in Figure 1.5, lets you switch your view in the active panel. A panel, of course, is one of the working views in Maya; the workspace is shown through the panels in Maya's UI. By clicking one of the compass's axes, represented by the cyan, red, green, and blue cones, you can quickly change the active view to an orthographic view. Clicking the cyan cube at the heart of the View Compass returns you to your perspective view.

The Main Menu Bar

Starting with the menu bar, shown in Figure 1.6, you'll find a few of the familiar menu choices you've come to expect in many applications, such as File, Edit, and Help.



Figure 1.6
The main menu bar

CAMERA MOVEMENT TERMINOLOGY

Every kind of camera move has a different name. The following lists the type of camera moves you have and what each one means:

- Rotate (Tumble) view means to rotate the (perspective) camera; hold down the Alt key and the left mouse button, and then drag in the perspective window to rotate the view. This action physically moves the camera around the subject and can be effective only in a perspective view panel.
- Move view means to move any camera; hold down the Alt key and the middle mouse button, and then drag in any scene window. This will move the camera horizontally or vertically in the scene, effectively panning the view.
- Dolly view means to scale—commonly called a zoom—any camera; hold down the Alt key and the right mouse button (you can also hold down both the LM and MM), and then drag in any scene window to zoom (or scale) the view in or out.

This setup allows a straightforward Alt key plus mouse button mapping of left=rotate, middle=pan, and right=zoom.

In Maya, your exact menu choices depend on your current menu set. By switching *menu sets*, you change your menu choices and the set's corresponding toolset. It may seem strange at first, but it makes the best sense to divide the menu headings into what kind of task you are involved in. The menu sets in Maya Complete are Animation, Polygons, Surfaces, Dynamics, and Rendering; Maya Unlimited adds the Classic Cloth, nCloth, and Maya Live menu sets to those four. The menu sets are available through the Status line, which is discussed in the next section.

The first six items in the main menu are constant, no matter what menu set you are in: File, Edit, Modify, Create, Display, and Window. The last menu, Help, is also constantly displayed. Their functions are as follows:

File Contains file operations, from saving and opening to optimizing scene size and export/import.

Edit Gives you access to the commands you use to edit characteristics of the scene, such as, for example, deleting and duplicating objects or undoing and redoing actions.

Modify Lets you edit the characteristics of objects in the scene, such as moving or scaling them or changing their pivot points.

Create Lets you make new objects, such as primitive geometries, curves, cameras, and so on.

Display Contains commands for adjusting elements of the GUI (graphical user interface) in Maya as well as objects in the scene, allowing you to toggle, or switch on and off, the display of certain elements as well as components of objects, such as vertices, hulls, pivots, and so on.

Window Gives you access to the many windows you will come to rely on, such as the Attribute Editor, Outliner, Graph Editor, and Hypergraph. The Window menu is broken down into submenus according to function, such as rendering editors and animation editors.

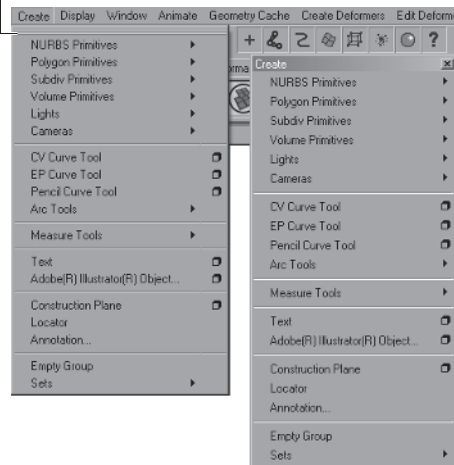
Help Gives you access to the extensive Maya help documentation in HTML format.

You'll notice two different icons to the right of some menu items: arrows and boxes (called *option boxes*). Clicking an arrow opens a submenu that contains more specific commands. Clicking an option box (□) opens a dialog box in which you can set the options for that particular tool.

Tear-Off Menus

At the top of every menu is a double line. Clicking the double line allows you to tear off the menu and place it as a toolbox anywhere on your screen (or screens if you have dual displays enabled). These tear-off menus are also called floating menus. Creating a tear-off menu makes accessing menu commands easier, especially when you need to use the same command repeatedly. Let's say, for example, that you need to create multiple polygonal spheres. You can tear off the **Create → Polygonal Primitives** menu and place it at the edge of your screen. You can then click the Sphere command as many times as you need without opening the dual-layered menu every time.

Click here and drag to tear off menu.



The Status Line

The Status line (see Figure 1.7) contains some important icons.

The first item in the Status line is the menu set drop-down menu. Selecting a particular menu set changes the menu headings in the main menu bar as we discussed earlier. You






Figure 1.7
The Status line

will notice immediately after the menu set drop-down menu, and intermittently throughout the Status line, black vertical line breaks with either a box or an arrow in the middle. Clicking a break opens or closes sections of the Status line.

Scene File Icons

The first section of tool icons in the Status line deals with file operations:

new




ICON	NAME	DESCRIPTION
	New Scene	Creates a new, blank scene file
	Open Scene	Displays a window in which you can find and open any scene file you've saved
	Save Scene	Displays a window in which you can specify a filename and location to save a new scene or, if the current scene has already been saved and named, save it to that location

Selection Modes

The second section is the *Selection Mode field*. This drop-down menu lets you use presets for *selection masks*. Selection masks give you the opportunity to choose one kind of object but not another. You can, therefore, select all the particles in the scene and none of the polygon models. This is useful when you have a heavy scene and you need to select some objects and not others. By choosing the *type* of objects you want to be able to select, you can speed up your work flow in large scene files. The menu selections here give you a few presets to optimize the selection modes for your convenience according to your current work flow (for example, select only deformers in a scene, or select from just the dynamic objects such as particles).

Presets are fine and good, but you might prefer to use the individual selection mask icons farther down the Status line to gain more control—you can turn on and off whether you can select individual object types such as particles, NURBS, polygons, and so on. We will cover these in just a moment.












The next group of icons in the Status line lets you click into three distinct *selection modes*. Maya is based on object hierarchy, in which components make up objects that can make up larger objects and so on. You will see this in action in the next chapter in the Quick Start exercise. Selection modes let you choose different levels of an object's hierarchy. For example, using a selection mode, you can choose an entire group of objects, only one of the objects in a group, or just the points on the surface or the poly faces that make up an object. The primary selection modes are *object mode* and *component mode*:

ICON	NAME	DESCRIPTION
	Hierarchy Mode	Lets you select groups of objects or parts of a group
	Object Mode	Lets you select objects such as geometry, cameras, lights, and so on
	Component Mode	Lets you select an object's components, such as vertices, faces, or the control vertices (CVs) of NURBS surfaces

For example, if you have grouped several objects together, being in hierarchy mode and clicking any of the member objects selects the entire group of objects. Being in object mode selects just the object you click. To toggle between object and component modes, press the F8 key, the default hot key.

Individual Selection Masks






The next set of icons between the section breaks deals with individual selection masks, which give you control over which objects or components you want to select. Exactly which icons are displayed here depends on the selection mode you're currently in. If you have many objects in your scene and you are having difficulty selecting a certain type of object with your cursor, you can use these filters to single out the object(s):

ICON	NAME	DESCRIPTION
	Set Object Selection Mask	Turns on or off all selection icons
	Select By Handles	Allows selection of object handles
	Select By Joints	Allows selection of joints
	Select By Curve	Allows selection of curves
	Select By Surfaces	Allows selection of surfaces
	Select By Deformations	Allows selection of lattices and other deformers
	Select By Dynamics	Allows selection of particles and dynamic objects
	Select By Rendering	Allows selection of rendering nodes and objects such as lights and cameras
	Select By Miscellaneous	Allows selection of miscellaneous objects such as locators and dimensions
	Lock Selection	Keeps selected objects locked in as selected
	Highlight Selection Mode	Turns off the automatic display of components when selecting in selection mode

You can get a quick preview of what each icon is called by rolling your mouse pointer over and hovering on each icon to see a pop-up tooltip that gives the icon name and describes its function. As a matter of fact, this is a great way to get to know Maya's UI—in addition to reading every word of this chapter, of course.

Snapping Functions or Snaps




The “magnet icons” are called snaps. Snaps let you snap or lock your cursor or object to specific points in the scene. You can snap to other objects, to CVs or vertices, and to grid intersections and more by toggling these icons. You can also enable some snaps by holding down their respective hot keys. While the respective key is pressed, your manipulator cursor will turn from a square to a circle.

ICON	NAME	HOT KEY	DESCRIPTION
	Snap To Grids	x	Lets you snap objects to inter sections of the view's grid.
	Snap To Curves		Lets you snap objects along a curve.
	Snap To Points	v	Lets you snap objects to object points such as CVs or vertices.
	Snap To View Planes		Lets you snap objects to view planes.
	Make The Selected Object Live		This has nothing to do with snapping. It lets you create objects such as curves directly on a surface.

Input and Output Connections




The two icons to the right of all the filters list the input and output connections of an object, and the third icon toggles on/off construction history. Objects in Maya can connect with each other for any variety of purposes, from animation to rendering. When an object is influenced by any attributes of another object or node in Maya, that object has an *input connection*. When a node's own attribute(s) is influencing another object, that node has an *output connection*. Now these icons aren't used that often in a typical work flow, but it's good to know what they are nonetheless. You will see much more work with input and output connections throughout this book, especially when rigging scenes for animation or creating shaders.

This third icon is for toggling on and off *construction history*. Construction history keeps track of the nodes and attributes that help make up an object, making it easier to edit those objects that have history.

ICON	NAME	DESCRIPTION
	Input Connections	Lets you select and edit all the input connections for the selected object. That is, you can select and edit any object that directly influences the selected object.
	Output Connections	Lets you select and edit the output connections or any objects the selection affects.
	Construction History	Toggles on/off the construction history.

Render Controls





The next three icons give you access to render controls:

ICON	NAME	DESCRIPTION
	Render Current View	Renders the active viewport at the current frame.
	IPR Render Current View	Renders the active view at the current frame into Interactive Photorealistic Rendering (IPR). You can change certain shading and texturing settings and view real-time updates in the IPR window.
	Render Settings	Opens a window that gives you access to all the rendering switches such as resolution, file type, frame range, and so on.

Input Box

new




New to Maya 8.5, the Input Box allows you to quickly transform, rename, or select objects and components. By clicking the arrow icon to the left of the input fields, you can choose the following operations:

ICON	NAME	DESCRIPTION
	Absolute Transform	Translates an object or component in a specified axis in reference to their original creation position.
	Relative Transform	Translates an object or component in a specified axis in reference to their current position.
	Rename	Edits the name of the currently selected object.
	Select By Name	Selects objects by their name. You can use the asterisk and text to select all objects with specified prefixes or suffixes.

The Channel Box/Layer Editor



The last part of the Status line deals with the area defined as the Channel Box/Layer Editor. These icons toggle through three available views in the area on the right side of the screen. Clicking the first button displays the Attribute Editor on the right part of the screen, with which you can edit Maya’s object attributes. Clicking the second turns on a window called Tool Options on the right part of the screen, giving you access to options for the currently active tool. Clicking the last icon restores the Channel Box/Layer Editor, showing you the most commonly animated attributes of an active object as well as the display and render layers in your scene.


ICON	NAME	DESCRIPTION
	Show/Hide Attribute Editor	Displays the Attribute Editor in this area
	Show/Hide Tool Settings	Displays the current tool's settings
	Show/Hide Channel Box/Layer Editor	Displays the Channel Box and Layer Editor


The Shelf

The *shelf*, shown in Figure 1.8, is an area where you keep icons for tools. The icons are separated into tabs that define the functions for the tool icons in the shelf. Select the appropriate tab in the shelf for what you're doing to access an array of common tool icons for that work flow. You can populate a Custom tab with the tools you find most useful for your own work flow.



Figure 1.8
The shelf

To customize the shelf so that your favorite tools are immediately accessible, click the Menu icon () to open a menu to edit the shelf. To simply add a menu item to the shelf, press Ctrl+Alt+Shift while selecting the command from any main menu (for Mac users, press ⌘+Option+Shift). That tool's icon will then appear on the current shelf.

To get rid of a shelf item, MMB drag the icon to the Trash icon to the right of the shelf. You can create multiple shelves, stack them on top of each other, and access them by clicking the Shelf Tab icon () above the Menu icon to the left of the shelf. As with the icons on the Status line, moving your mouse pointer over an icon in the shelf displays a tooltip that gives you the name and a description of that icon.

It's a good rule of thumb to know where the tools in the shelf are found in the menu, so if you are just starting out in Maya, try using the menus first before getting used to the shelf. It may be a bit more work, but it will give you a better understanding of how Maya is laid out.











The Tool Box

The Tool Box, shown in Figure 1.9, displays the most commonly used tools: Select, Lasso Select, Translate (or Move), Rotate, Scale, Universal Manipulator, Soft Modification, and Show Manipulator. These tools are most often accessed with hot keys. By default the layout is simple. The most-used tools—Select, Move, Rotate, and Scale—are mapped to the keys Q, W, E, and R, as shown in the following list. (Keep in mind that Maya's hot keys are case sensitive, which means that all commands in this book should be read as lowercase, even though they may be printed as uppercase. When an uppercase hot key is needed, it is referred to in this book as Shift+key.)



Figure 1.9
The Tool Box

new

ICON	NAME	HOT KEY	DESCRIPTION
	Select	q	Lets you select objects
	Lasso Select		Allows for a free-form selection using a lasso marquee
	Paint Selection Tool		Allows you to select components by painting over them with a brush (new to Maya 8)
	Translate (Move)	w	Moves selection
	Rotate	e	Rotates selection
	Scale	r	Scales selection
	Universal Manipulator		Allows for translation, rotation, and scale within one tool
	Soft Modification		Allows you to modify an area with a gradual drop-off of its effect
	Show Manipulator		Displays an object's specific manipulators
	Current Tool Display	t	Shows the currently selected tool (shown as blank)

In addition to these common tools, the Tool Box contains icons for several choices of screen layouts to let you change your interface quickly. This is convenient because different scenes and work flows can call for different view modes. Experiment with the layouts by clicking any of the six presets in the Tool Box.

The Channel Box

The area running vertically on the right side of the screen is usually for the *Channel Box* with the *Layer Editor* immediately below it. The Channel Box is a key element in Maya. It lists the commonly animated attributes of a selected object and lets you quickly adjust attributes and add animation and expressions without having to open the Attribute Editor (which is the window that lists *all* the attributes of an object; more on this later in this chapter). In addition, you can easily see input connections on an object's attributes through color coding. This way you can tell if an object is animated, constrained to another object, has an expression controlling it, is dynamic, or so on. Figure 1.10 shows the Channel Box with the Layer Editor just below it. The selected object shown in the Channel Box here is a polygon sphere with several connection types displayed as different colors.

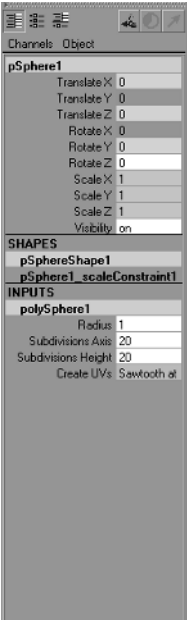


Figure 1.10
The Channel Box
and Layer Editor
below

Attribute Display in the Channel Box

The following list shows the colors and their connections for the attributes in the Channel Box:

INPUT CONNECTION	COLOR	DESCRIPTION
Keyframed	Orange	A keyframe is set for the attribute at some point in the Timeline.
Connected (to another attribute) or is dynamic	Yellow	This attribute shares the same value as another attribute on another object or has dynamic forces affecting it.
Expression Control	Purple	A written expression controls the value of this attribute.
Constraint	Blue	The attribute's value is constrained to the value of an attribute of another object.
Locked	Gray	You cannot change the value without first unlocking the attribute.
Muted Animation	Brown	There is animation on the attribute, but it is currently muted so it will not play back until it is unmuted.
Blended (with another attribute)	Green	The value of this attribute is blended with the value of another attribute.
Nonkeyable	Light Gray	This attribute cannot be animated.

Editing Attribute Values in the Channel Box

When an object is selected, its name appears at the top of the Channel Box. You can click the name and type a new name to rename the selected object. The channels (keyable attributes) for that object are listed vertically below with the attribute name to the left and the attribute value to the right in text boxes. You can click in the text box to change the value through the keyboard. You can also use a virtual slider in Maya by clicking a channel's name in the Channel Box and using the MM in a view panel to drag left or right to decrease or increase the value of the selected channel.

If you RM click an attribute name in the Channel Box, you will see a context menu that gives you access to several common commands, such as keyframing or locking and unlocking the selected channel or channels. You can animate any channel here by RM clicking the attribute name and choosing **Key Selected** from the shortcut menu. RM clicking the value itself displays a shortcut menu from which you can cut and paste values.

Another useful shortcut menu command is **Break Connections**, which removes any connections for the selected attributes and returns the value to a normal white color in the Channel Box. For example, if you have keyframes on the Rotate X channel of an object (with the text box shown in orange), clicking Rotate X in the Channel Box and right-clicking and choosing **Break Connections** from the shortcut menu deletes the keyframes and returns the text box to white. You will see more of this usage later in this book and as you learn how to animate in Maya.

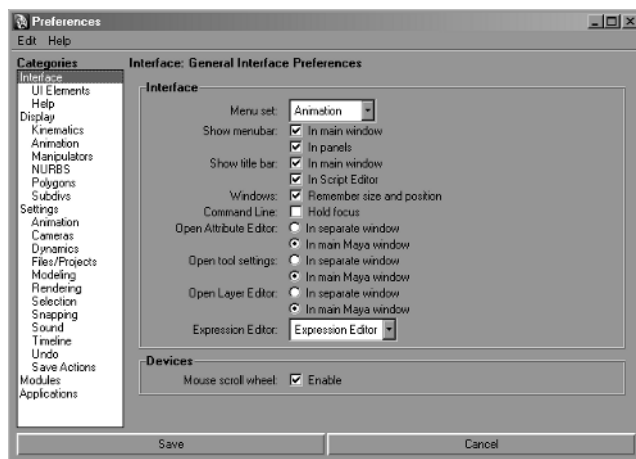
Below the channel values in Figure 1.10 (shown in the previous section), you can see the headings SHAPES and INPUTS. These correspond to the connections the selected polygon sphere already has. In this case, under SHAPES we see the selected pSphereShape1 and the pSphere1_scaleConstraint1 nodes. These nodes have inputs to the selected sphere and help define the object in Maya. In short, nodes in Maya are groups of attributes that define an object, its location, shape, and so on. There is animation and an expression on this sphere as well, shown under the INPUTS heading. Clicking the node names here gives you access to their own attributes so that you can quickly make adjustments to the selected object and its connected nodes.

Changing the Channel Box/Layer Editor View

Although it's typical to display the Channel Box and the Layer Editor all the time, you can replace this panel with one of two other windows—the Attribute Editor or the Tool Settings window—by clicking one of the three icons in the upper-right corner, shown in Figure 1.10. This gives you quick access to the three windows you may find most useful to have on screen.

Some find it inconvenient to have the Attribute Editor and Tool Settings windows open in this area. That's why it's wise to set Maya to open these tools in their own separate windows. To do this, choose **Window → Settings/Preferences → Preferences**. The Preferences window (Figure 1.11) is opened. Under the Interface category (on the left side of the window), set the settings Open Attribute Editor and Open Tool Settings both to In Separate Window.

Figure 1.11
The Preferences
window



You can switch between the Channel Box and the Layer Editor by toggling one of the icons in the upper-left corner. (See Figure 1.10.) The following list shows the icons that switch the views in this area of the UI:

ICON	NAME
	Show The Channel Box
	Show The Layer Editor
	Show The Channel Box And The Layer Editor


You can resize this area by clicking either of the double arrow buttons at the bottom of the panel below the Layer Editor, which we will look at next.

The Layer Editor

Immediately under the Channel Box is the Layer Editor. This layout with the Channel Box and Layer Editor together is opportune for most scenes since it gives you immediate access to the layering of a scene as well as the channels of a selected object or objects. The Layer Editor has a twofold purpose: displaying layers and rendering layers.

Display Layers

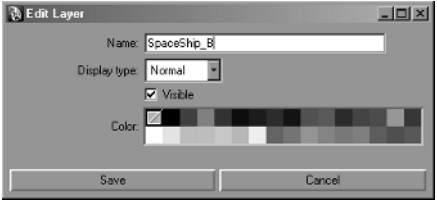
The first and immediately useful aspect of the Layer Editor is display layers. You can create display layers and assign objects to them to organize your scene. With objects on organized layers, you can quickly turn selections on and off by just toggling the View icon in the Layer Editor next to the appropriate layer name. Figure 1.12 shows just the Layer Editor with several layers already added to the scene.

To create a new layer, click the Create New Layer icon (). To add items to a layer, choose **Layers → Membership**. You can also select the objects for your layer and then choose **Options → Add New Objects To**

Current Layer to automatically place those objects in the current layer. You can also use the layers to select groups of objects by choosing **Layers → Select Objects In Selected Layers**. To change the name and color of a layer, simply double-click the layer to open the Edit Layer dialog box.



Figure 1.12
The Layer Editor shows off a space battle scene organized for a better work flow.



Render Layers

Like display layers, render layers control what objects are on which layers so that you can separate your renders into different layers or passes. Rendering in layers is powerful for later editing in a compositing package such as After Effects or Shake because it gives you ultimate control over the objects in your scene and how best to color correct or even place them. To see the render layers in your scene, click the Render Radio button to toggle away from the display layers. Creating and adjusting render layers is the same as display layers. We will cover rendering in layers in detail in Chapter 14.

The Time Slider/Range Slider

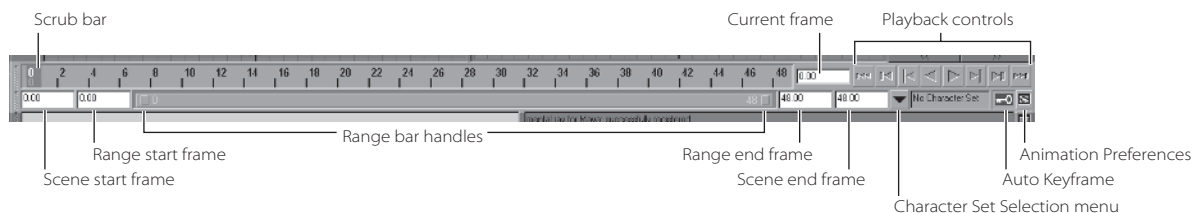
Horizontally across the bottom of the screen are the Time Slider and the Range Slider, shown in Figure 1.13. The Time Slider displays the range of frames currently in your animation. The gray bar on the Time Slider is known as the *Current Time Indicator*, which you can click and drag back and forth in a scrubbing motion to move through time in your sequence. Clicking the Time Slider will also position the slider to whatever frame you clicked, allowing you to jump around in your Timeline.

The text box to the right of the Time Slider displays the current frame. You can also use it to enter the frame you want to access. Immediately next to the current time readout is a set of VCR or DVD playback controls that you can use to play your animation.

Below the Time Slider is the Range Slider, which you can use to adjust the range of animation playback shown in your Time Slider. The text boxes on either side of this slider give you readouts for the start and end frames of the scene and of the range selected to display in the Time Slider. You can adjust this range by either typing in the text boxes or lengthening or shortening the slider with the handles on either end of the Range Slider bar.

When you change the range, you change only the viewable frame range of the scene; you don't adjust any of the animation. This just makes longer animations easier to read and deal with. Adjusting actual animation timing and lengthening or shortening animations are accomplished differently (see Chapters 8 and 10).

Figure 1.13
The Time Slider and
the Range Slider



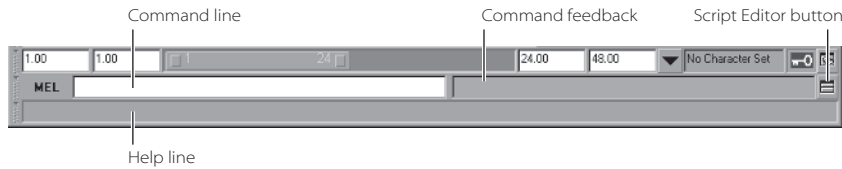


Figure 1.14
The Command line
and the Help line

To the right of the Range Slider are the Character Set Selection menu (which deals with the automation of character-animated objects), the Auto Keyframe button (which sets a keyframe automatically when an animated value is changed), and the Animation Preferences button. Clicking this button opens the Preferences window shown earlier in Figure 1.11.

The Command Line/Help Line

Maya is based on Maya Embedded Language (MEL), and all its functions and commands invoke an appropriate MEL command. MEL is a user-accessible programming language and is mostly what allows Maya to be as resourceful and flexible as it is.

You can write your own commands or scripts in MEL, entering them into either the Command line or a window called the Script Editor. Use the Command line (see Figure 1.14) to enter single MEL commands directly from the keyboard in the white text box portion of the bar. The Command line also displays command feedback and messages from the program in the gray portion of the bar. Try entering the following into this box: **sphere**. A new sphere should pop up in your Maya panels. You've created a basic sphere using the MEL command. To delete it, click it to select it and then press Delete.

Clicking the icon at the end of the Command line opens the Script Editor window, in which you can enter more complicated MEL commands and scripts.

Below the Command line is the Help line. When you hover your mouse pointer over an icon, the Help line tells you what it is. This is a terrific way to learn the UI. The Help line also prompts you for the next step in a particular function or the next required input for a task's completion. It's a great way to understand how some tools work when you're not really sure about the next step in a command, such as which object to select or which key to press to execute the command. You'll be surprised at how much you'll learn about tool functions by reading the prompts displayed here.

Working in View Panels

Let's get a quick taste for working in the view panels. Create a NURBS sphere by choosing **Create → NURBS Primitives → Sphere** and then clicking in any viewport. (With Maya 8,

primitives are typically created by choosing a primitive from the Create menu and then click-dragging in the interface.) A sphere will appear in your panels and will be selected, as shown in Figure 1.15. Notice its primary attributes in the Channel Box.

new

Now, press 2 and you will see the wireframe mesh become denser, as in the middle frame of Figure 1.15. Press 3 and the mesh becomes even denser (bottom frame). You can view all NURBS objects in three levels of display, such as this sphere. Pressing 1, 2, or 3 toggles between detail levels for any selected NURBS object. NURBS, as you will see in further detail in Chapter 4, are types of surfaces in Maya that can adjust detail level at any time to become more or less defined as needed. As such, the 1, 2, and 3 toggles only work on NURBS objects.

When working in the 3D views, you can view your 3D objects in *wireframe mode*, where you can see through each polygon (as in Figure 1.15), or in *shaded mode*, where objects are solid-looking (see Figure 1.16). Wireframe gives you the best performance on your computer's graphics system when working in a large scene, as well as the chance to see through the wireframe of one object to another object for position or comparison's sake.

When you increase the display feedback of your view panels, such as using shaded mode or textured mode, you increase the work your system and your graphics card have to do. This is not a concern until your scenes get larger and heavier, but if you notice that your computer is not responding as fast as you'd like with a scene, try decreasing the visual feedback of your scene to wireframe view or turning display layers on and off as needed.

Within shaded mode, you have a few display options to help you in your work. You can choose to display the wireframe mesh on top of a shade view to help you better model and manipulate the objects. To turn on wireframe shaded view while in shaded view, in the Scene menu, choose **Shading → Wireframe On Shaded**. Figure 1.17 shows a sphere and cube with wireframe on shaded view enabled. Also, you can make your objects shaded but yet semitransparent in the panel so you can see through them but still get a sense of volume. For X-Ray view, choose **Shading → X-Ray**. Figure 1.18 shows X-Ray as well as wireframe on shaded modes enabled. You will see under the Shading menu that you can change your view to flat shaded (which is faster than smooth shaded but still shaded), bounding box (which merely displays the extent of the objects in the view and is the fastest view), or even points (which shows just the points of the objects in the panel).

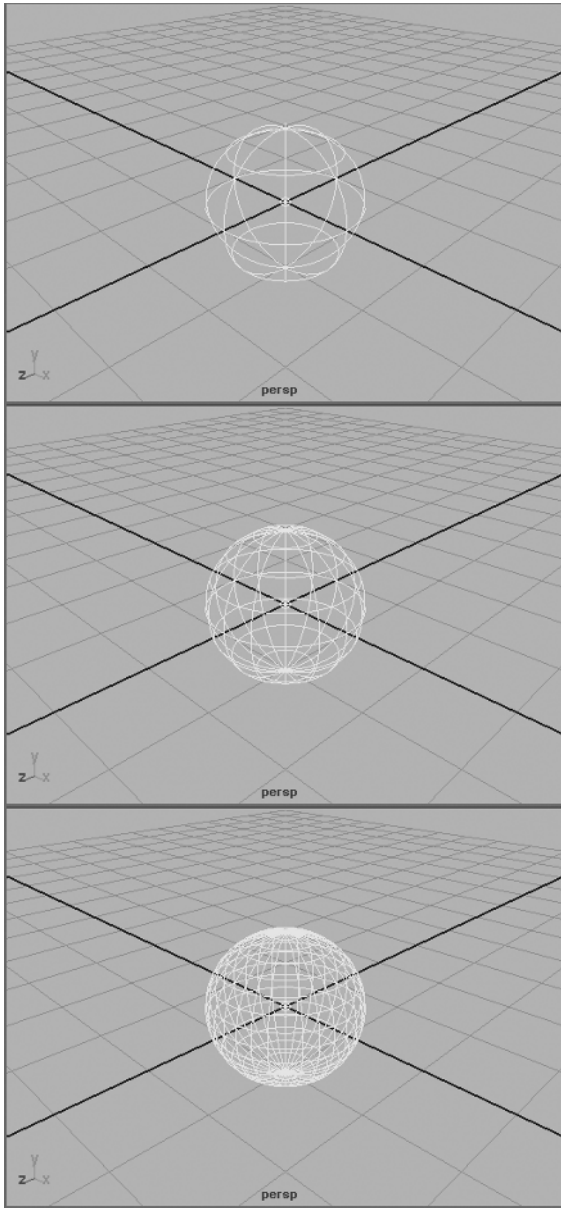


Figure 1.15
NURBS display smoothness.

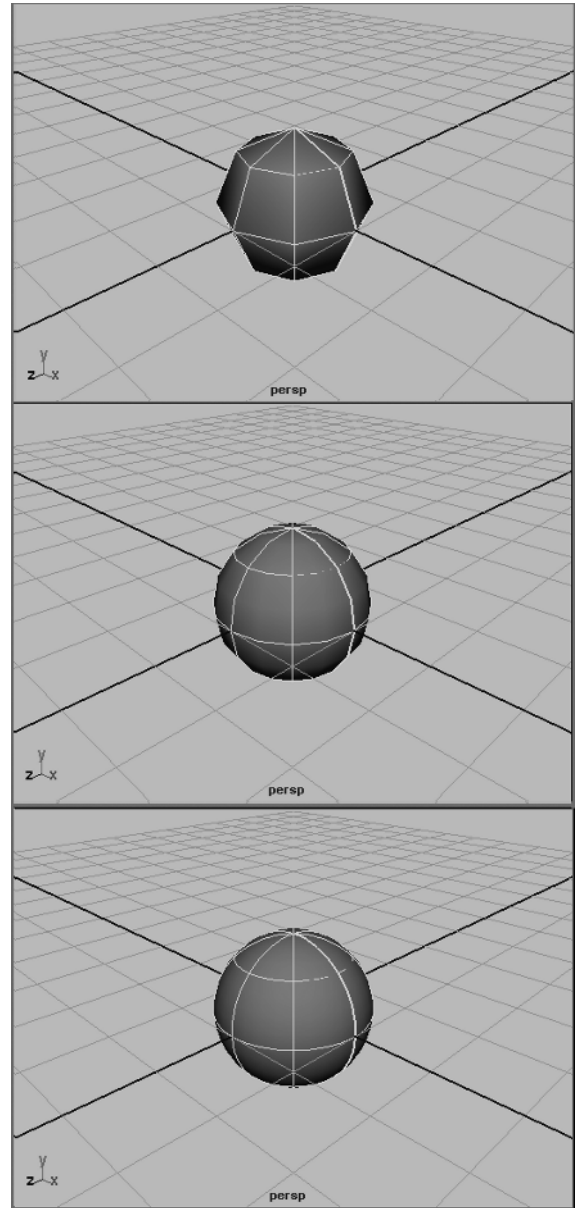


Figure 1.16
Shaded NURBS display smoothness.

Figure 1.17

Wireframe on shaded view gives you a good view to model on your shaded objects.

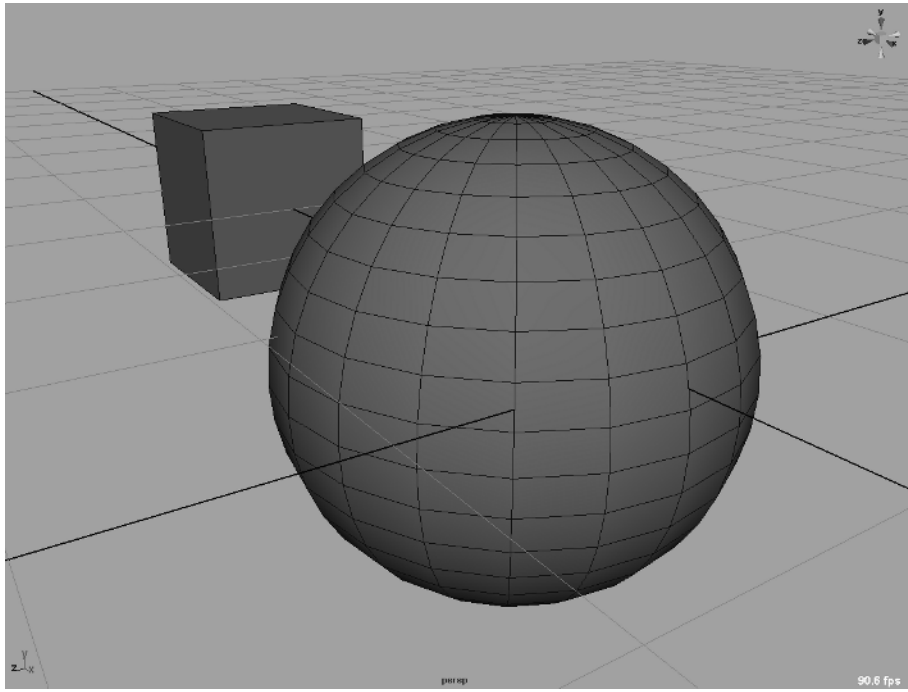
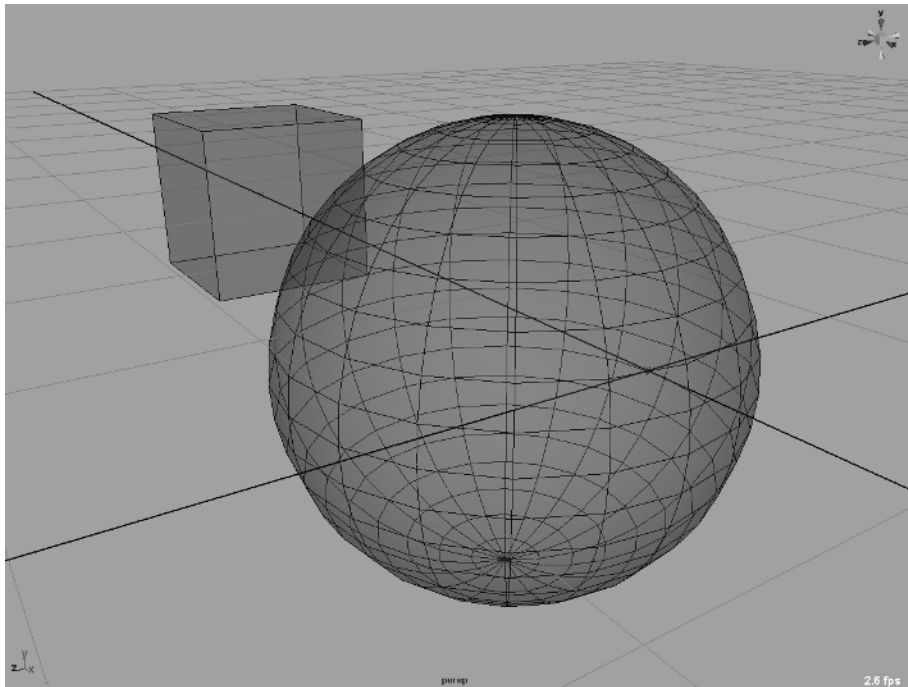


Figure 1.18

X-Ray view allows you to see through an object while still seeing it shaded and in this case with wireframe on shaded as well.



Shaded, Textured, and Lighted Modes

You can select from varying degrees of shading detail, going as far as seeing your objects with textures and lighting detail. You can cycle through the levels of detail by pressing 4, 5, 6, and 7. Wireframe mode is 4, shaded mode is 5, texture shaded mode is 6, and lighted mode is 7. Lighted mode will only work if you are already in mode 5 or 6. While in mode 6, pressing 7 will give you a lighted and textured mode. These modes give you a basic idea of lighting and/or texture detail.

Texture shaded mode (6) displays the actual image textures that have been applied to the object as long as Hardware Texturing is already enabled. (In the view panel, choose **Shading → Hardware Texturing** and make sure it is checked on.) Lighted mode (7) is a hardware preview of the object or objects as they are lit in the scene. Its accuracy depends on your graphics hardware. Here's a summary:

KEY	FUNCTION
4	Toggles into wireframe mode
5	Toggles into shaded mode
6	Toggles into textured mode
7	Toggles into lighted mode

It is handy to toggle between modes 4 and 5 to get a good feel for the weight and shape of your objects. Furthermore, lighted mode (mode 7) is useful for spotting proper lighting direction and object highlights when you first begin lighting a scene. It helps to see the direction of lights within your scene without rendering frames all the time. The number of lights you see in the modeling window depends on your computer's graphics and overall capabilities.

You can display a higher-textured view of your models by enabling High Quality Rendering view. In your view panel, choose **Renderer → High Quality Rendering**. This will give you a good idea of the texturing and lighting in your scene but at the expense of speed.

Display Shortcuts

In the view panel's View menu, you will find two handy UI features, Frame All (hot key A) and Frame Selection (hot key F), and a third slightly homely cousin, Look At Selection. Frame All animates the camera or orthogonal views in or out to see all the objects in a scene. Frame Selection animates the camera view to focus on the selected object or the center of selected objects. Look At Selection snaps the selected object into the middle of your view without moving in close to it.

If you find yourself wondering why pressing a hot key isn't working, Caps Lock may be enabled. Some hot keys have multiple meanings for the lower- and uppercase of the same letter, so check the Caps Lock key.

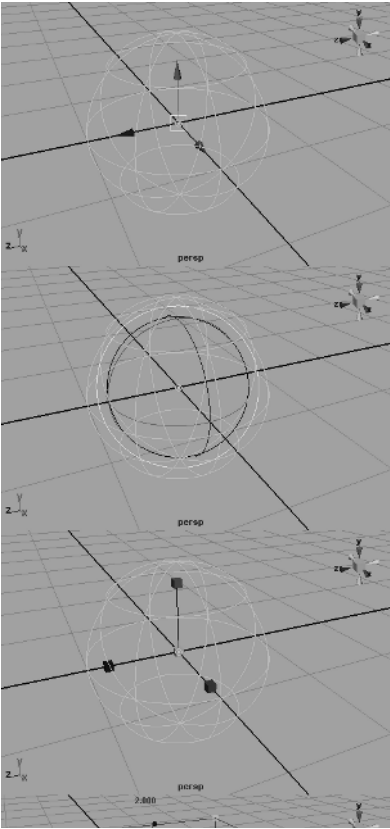
The Manipulators

Manipulators are on-screen handles that you use to *manipulate* the selected object in true form. Figure 1.19 shows the four distinct and most common manipulators for all objects in Maya: Move, Rotate, Scale, and Universal Manipulator. You use the handles on the manipulators to adjust your objects in real time in any of the axes, as we discuss later in this section. Some tools or objects have *special manipulators* that allow you to interactively adjust certain attributes particular to the tool or object, such as the cone angle of a spotlight.

You can access the manipulators using either the icons from the Tool Box or the following hot keys:

KEY	FUNCTION
W	Activates the Move tool
E	Activates the Rotate tool
R	Activates the Scale tool
Q	Deselects any translation tool to hide its manipulator and reverts to the Select tool

Figure 1.19
Manipulators let you control your object's position, rotation, and scale with ease.



The default hot keys let you easily select your transformation tools (Move, Rotate, Scale) since they rest on the left side of the keyboard. You can, of course, change these key layouts as you see fit. We'll discuss how to customize the interface at the end of this chapter.

Each of the manipulators has a handle for a particular axis, designated by its color. Red is for the X axis, green is for the Y axis, and blue is for the Z axis. A cyan colored axis allows for free movement in both axes of the active panel view. When you select a particular handle, it turns yellow. You can then only transform (move, scale, or rotate) the object in that axis.


As shown in the first panel of Figure 1.19, the Move tool (a.k.a. the translate tool) displays arrows for the axis of movement. You can grab any one of the handles (axis arrow lines) to move the selected object in just the translation axis. The Rotate tool (shown in the second panel) displays circles around the object's pivot point that act as axis handles. You drag on one of the circles to rotate the selected object in just the rotation axis. The Scale tool (shown in the third panel) displays handles with colored cubes, which, when dragged, scale the object in the scale axis.


The Universal Manipulator is shown in the fourth panel of Figure 1.19 and acts in place of all three tools. You can select the arrows to move the object with the Universal Manipulator just like with the Move tool. Select any of the curved arrows in the middle of the box edges of the manipulator to rotate the object in the Universal Manipulator's axis. Finally, selecting and dragging the cyan boxes in the corners of the manipulator box lets you scale the sphere. If you hold down the Ctrl key as you drag, you can scale the sphere in just one axis.

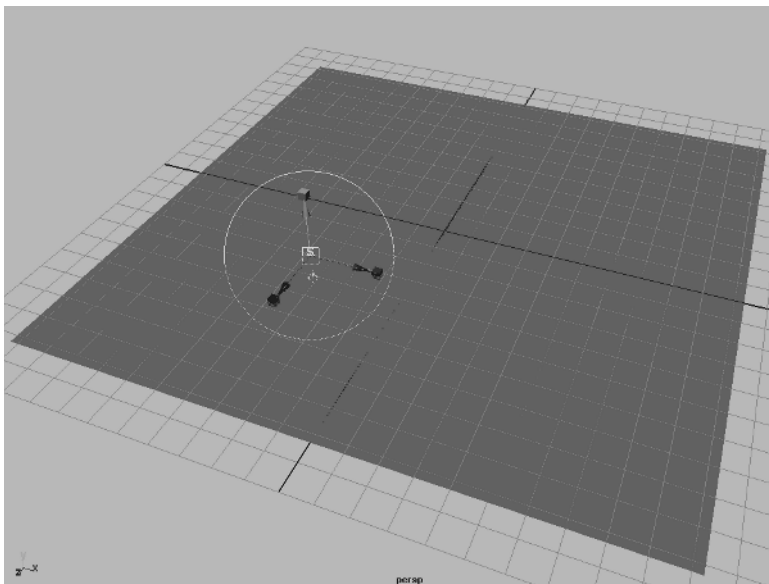
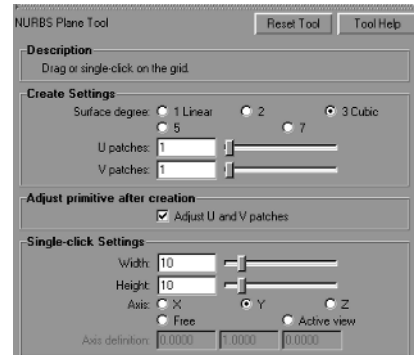
It is much easier to use the default hot keys defined for these transformation tools than to select them from the Tool Box. If the keys aren't working, make sure Caps Lock is off. You must use the lowercase keys.

The Universal Manipulator interactively shows you the movement, rotation, or scale as you manipulate your object. As you move an object, the Universal Manipulator shows you the coordinates. Likewise, rotating with the Universal Manipulator displays the degree of change. Last, scale values in dark gray on the three outside edges of the manipulator box are displayed as you scale the sphere with the Universal Manipulator.

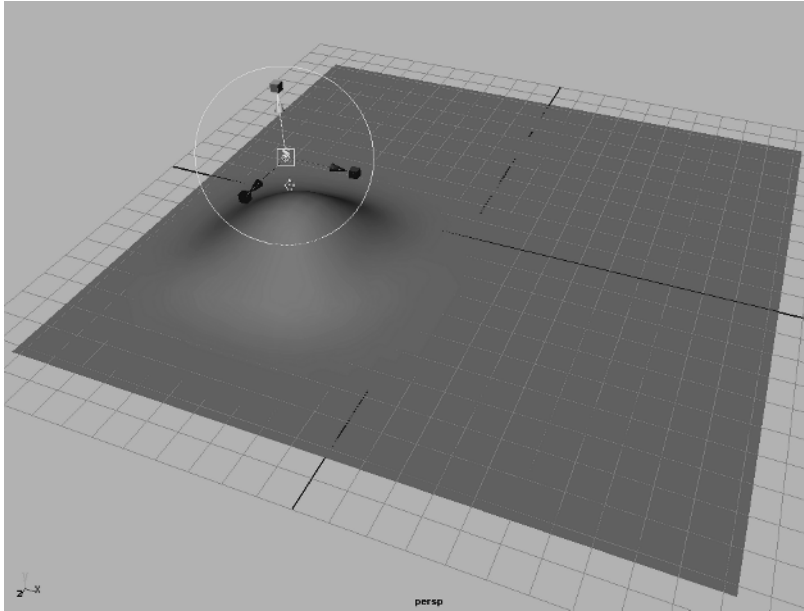
Now these four tools offer you two different ways to move, rotate, or scale your objects. However, the next tool down in the Tool Box is a bit different. The Soft Modification tool allows you to select an area on your surface or model and adjust the surface. The adjustments gradually taper off away from the initial place of selection to “soft modify” an area of the model.

For instance, create a NURBS plane by choosing **Create → NURBS Primitives → Plane** . This opens the options for creating a plane. Set both the U Patches and V Patches sliders to 10 and click/drag your mouse cursor to create a plane on the grid.

Select the Scale tool and scale the plane up to about the size of the grid. Then, select the Soft Modification tool () from the Tool Box and click the plane, somewhere just off the middle. This will create an S and a special manipulator to allow you to move, rotate, or scale this soft selection.



Grab the cone handle and drag it up to move the soft selection up. Notice the plane lifts up in that area only, gradually falling off as if you were picking up a napkin.



The cube handle on the Soft Modification tool scales the soft selection, and dragging on the circle rotates it. Simply select another transformation tool to exit the Soft Modification tool. You can always go back and select the S on the surface to edit the selection or even keyframe it for animation. You can place as many soft selections as you need on a surface.

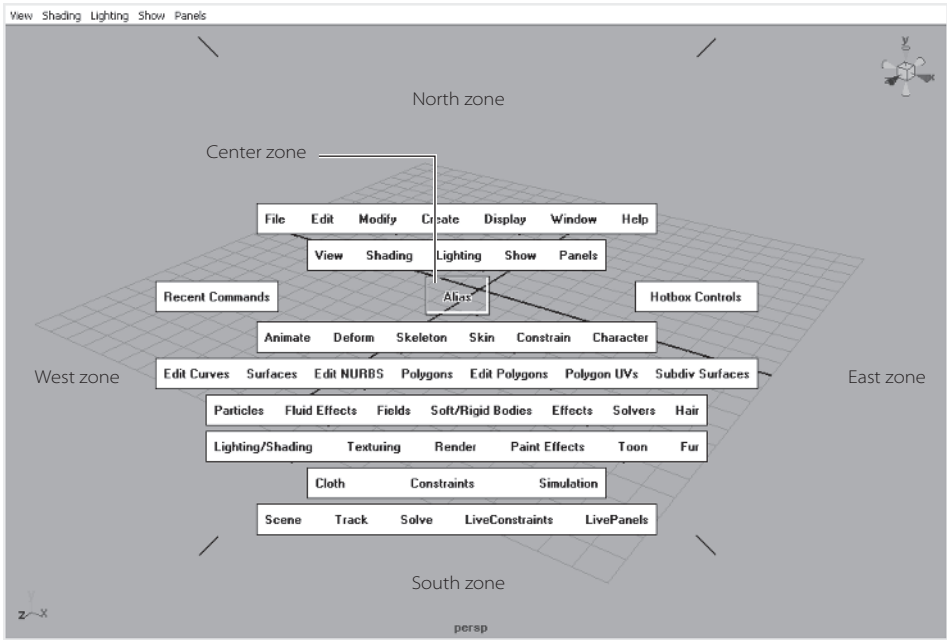
Tip: To scale the manipulator handles to make them more noticeable or less obtrusive, press the plus key (+) to increase a manipulator's size or press the minus key (–) to decrease it.

The Hotbox

The hotbox (see Figure 1.20) gives you convenient access to all menu commands in Maya. It is a quick way to get to the menu selections without accessing the menu bar itself. This is useful if you want to turn off the menu bar and other UI elements to give you the maximum screen space for your scene. To open the hotbox, simply hold down the spacebar in an active view panel. You can then select menu options with the mouse.

All the menu commands that are available from the main menu bar are available through the hotbox. You can display some or all of the menu headings to give you quick access to whatever commands and features you use most. The hotbox is separated into five distinct zones, delineated by short black diagonal lines: North, East, West, South, and

Figure 1.20
The hotbox
and its zones



Center. To adjust the hotbox to your liking, press and hold the spacebar and click Hotbox Controls to the right of the Center zone. From here you can select to display some or all of the menu headings.

Activating the hotbox and clicking a zone with the mouse displays a set of shortcut menu commands called *marking menus*, discussed in the next section.

Marking Menus

In addition to menu selections, the hotbox has *marking menus* in each of the five zones. Using marking menus is yet another way to quickly access the commands you use the most. The marking menus are classified as follows:

ZONE	MARKING MENU
North Zone	Selects the display layout, similar to the display layout buttons in the Tool Box.
East Zone	Toggles the visibility of UI elements such as the Help line or Status line. You can quickly toggle the display of several UI elements to maximize your screen space.
South Zone	Changes the current view panel to an information panel window such as the Outliner or Hypershade windows.
West Zone	Activates Selection Masks, as if using the Selection Mask icons in the Status line discussed earlier in the chapter. You can use a marking menu like this to quickly set your selection to vertices without needing to access the Status line, for example.
Center Zone	Sets the view panel to any of the modeling or perspective windows in your scene.



Figure 1.21

The menu sets drop-down menu

As you become more familiar with Maya, your use of the hotbox and the marking menus will greatly increase your productivity. If you are just starting out, it's advisable to begin with accessing the menus and commands such as selection sets through the Status line and main menu bar until you are familiar with where everything is. It is easy when you're a beginner to get lost in all the options you have when selecting some tools and work flows, so it's best to start with the plain and simple and work your way up to the faster work flows such as marking menus.

Menu Sets

As we discussed earlier, menu sets are organized according to function. The menu sets are Animation, Polygons, Surfaces, Dynamics, and Rendering, all of which are available in Maya Complete and Maya Unlimited. However, with Maya Unlimited, you are given access to the Classic Cloth, nCloth, and Maya Live menu sets as well. Each menu set gives you access to the commands associated with its broader function set. The Polygons menu set, for example, displays in the main menu bar all the menu headers that correspond to polygon modeling functions.

The menu sets drop-down (shown in Figure 1.21) is the first thing on the Status line. Changing between menu sets is simpler if you use the default hot keys shown here:

KEY	FUNCTION
F2	Animation menu set
F3	Polygons menu set
F4	Surfaces menu set
F5	Dynamics menu set
F6	Rendering menu set

Customizing Menu Sets

new

New to Maya 8, you can customize menu sets by opening the Menu Set Editor and choosing the Customize option in the menu sets drop-down. The Menu Set Editor (Figure 1.22) allows you to modify existing menu sets or to create your own. To make your own menu set, select the New Menu Set button and enter a name for your set. To add menus to your set, scroll through the available menus on the right, highlight the ones you wish to add, right-click and select Add to Menu Set.

This wraps up the interactive parts of Maya's UI. You will find all this information a bit much at first, but as soon as you begin using Maya, you will find it becomes second nature quickly. You might want to skip ahead to the next chapter to begin working a simple scene in Maya to apply what you've learned here and then come back for a description of the windows you will be using, or you can stick around and get your feet wet on the most commonly used Maya windows in the next section.

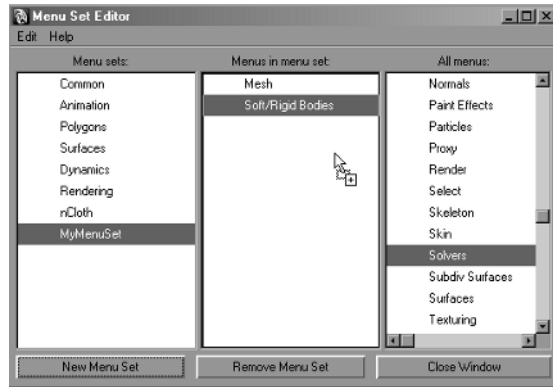


Figure 1.22
You can create your own menu sets or edit existing ones.

The Main Maya Windows

Maya has a few important windows in which you will be working frequently. The following sections introduce the location and function of each window, tell you when you will come across them, and describe how to use them.

The Attribute Editor Window

As you've already seen to some extent, every object is defined by a series of attributes, all placed in nodes. You can edit some of these attributes in the Channel Box as you have seen, but to see all the attributes available for a selected object, you will need the Attribute Editor, which is possibly the most important window in Maya. Through this window you can change an object's attributes, set keyframes, connect to other attributes, attach expressions, or simply view their values.

Create an object in Maya. Choose **Create → NURBS Primitives → Sphere** and then click anywhere in the scene view to put a NURBS sphere in your scene.

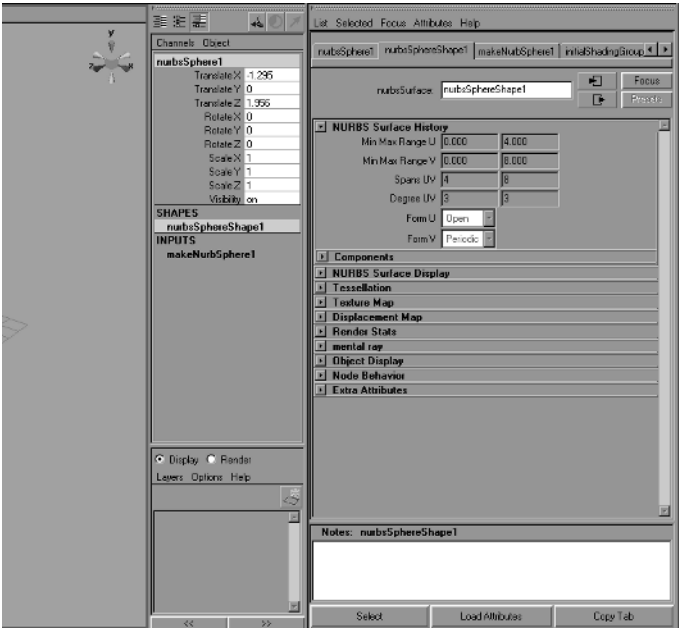
With the sphere still selected, open the Attribute Editor by choosing **Window → Attribute Editor** or by pressing the default hot key Ctrl+A.

You will see that the Channel Box displays the commonly used attributes for the sphere but that the Attribute Editor shows an entire collection of attributes. Figure 1.23 shows the sphere and its attributes. The attributes in the Channel Box and Attribute Editor are the same. If you move or otherwise transform the sphere, the values are consistent in both displays.

Connected Nodes

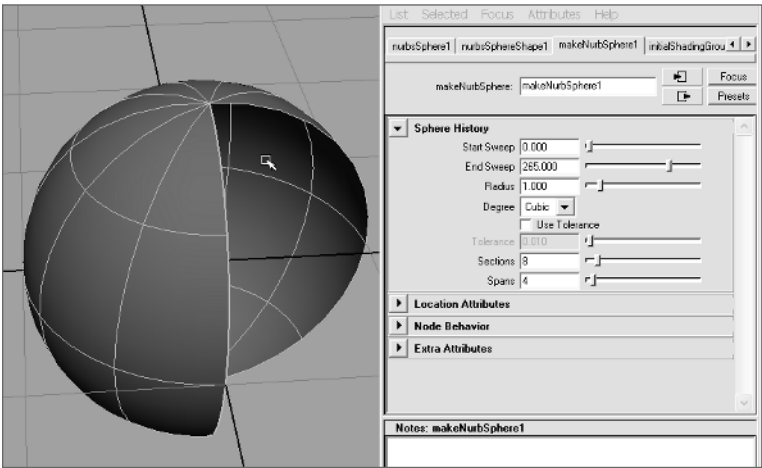
Notice the tabs running across the top of the Attribute Editor. These tabs correspond to the object's node structure. Each tab displays the attributes of another tab that is in some way connected to the sphere that is currently selected. You can easily adjust any of the settings for any node that is linked to the selected object by just selecting its tab in the

Figure 1.23
The Attribute Editor and Channel Box display the values for the selected sphere.



Attribute Editor. For example, if you click the `nurbsSphere1` tab, you will see the *DAG node* attributes. A DAG node is the placement, or transforms node, of the object. This node tells the object where it is and what its rotation and scale is. Click the `nurbsSphereShape1` tab to see the *shape node* of the sphere. The shape node contains the attributes that define the shape of the object. Click the `makeNurbsSphere1` tab to access to the *creation node* of the sphere.

The creation node displays attributes for *how* the object was made. For example, try changing the value for the **Start Sweep** attribute. This will change the sweep of the sphere, effectively slicing a chunk out of it, so it looks like a cut-open, hollow orange, as shown here.



What's more, you can animate almost any of the attributes in any of these nodes (Attribute Editor tabs). All you need to do is RM click the attribute in the Attribute Editor and choose Set Key from the shortcut menu. This sets a keyframe for that attribute at the current frame, just like RM clicking in the Channel Box.

If your sphere does not have a makeNurbsSphere1 tab in the Attribute Editor, check to make sure the Construction History button in the Status line is toggled on. Without it, the sphere is created without history, so its creation node is deleted right after the sphere is made.

Notes

At the bottom of the Attribute Editor is a Notes area where you can type and record comments that stay with the object's Attribute Editor window. Simply drag the separator bar as shown to create more or less space in the Notes section; this area is handy for remembering how certain things are set up or to pass secret notes about your boss around the studio.

Multiple Selections

The Attribute Editor can display only one object at a time. If you have multiple objects selected, you can toggle through them through the Attribute Editor's menu by choosing Selected and then choosing the object from the menu.

The Outliner

The Outliner and Hypergraph (covered next) use two different approaches to the same end: organization. Maya is based on node structure, meaning every object in Maya is represented by a node. A node is a collection of attributes that define how the object looks, to make a long story short. Some nodes interconnect to form more complex objects or to give you the best control over their shape or behavior.

As you grow your scene, you will create more and more nodes, and you will need a way to organize your objects. Furthermore, you can group objects and place objects into hierarchies. By creating *groups*, you can control objects as a single unit in which all the members of the group move, rotate, and scale as one. Additionally, with *parenting*, you place one object (the child) under the influence of another object (the parent) to control the objects together.

With a parent-child hierarchy, the child can move independently under the parents as well as inherit the movements of the parent. The child node inherits the transforms (movements) of all the parents above it and moves (or rotates or scales) however the parents move, but it can move on its own as well. Imagine, if you will, a ball bouncing on a cart.

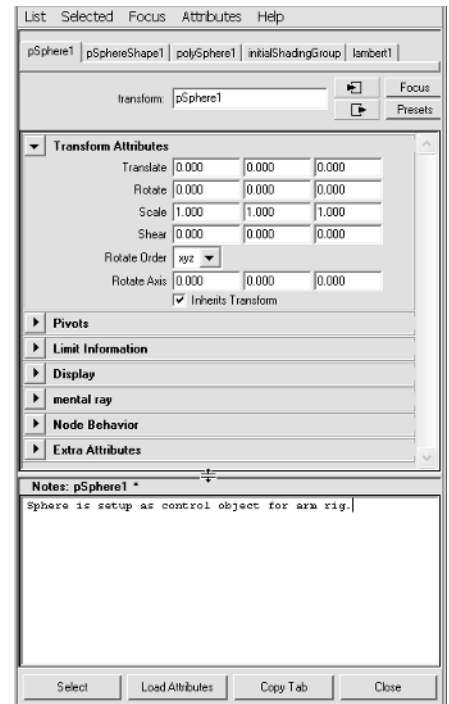




Figure 1.24
The Outliner

The cart rolls along while the ball bounces on top. The ball is a child of the cart and moves along with the cart as it rolls along, but the ball has its own movement on the cart as it bounces up and down. Creating good hierarchies is the backbone of animation in Maya and is covered throughout this book.

Both windows display the objects in your scene and allow you to make hierarchy (or grouping) decisions, as well as more intricate connections between attributes. The Outliner displays your scene objects as an outline, and the Hypergraph uses a flowchart layout that gives you more finite control. You access the Outliner by choosing **Window → Outliner**.

The Outliner (see Figure 1.24) displays all the objects in your scene as an outline. You can select any object in a scene by simply clicking its name.

You can reorganize objects listed in the Outliner by MMB dragging an object to a new location in the window. By default, objects are listed in order of creation in the scene. You have easy control over organization in your scene:

- You can select objects in your scene by selecting them in the Outliner.
- To rename a node, double-click its Outliner entry, and type the new name.
- To relocate an object's entry in the Outliner to another location in the Outliner, MM drag the node's entry and place it in-between two other node entries.
- To parent one object under another, MM drag the node onto the new parent.
- To pull an object out of a group, MM drag the node to a different location in the Outliner.

You can separate the Outliner into two independent scrolling displays, which is useful when you have a large scene with a long Outliner list of nodes. The separator bar is located at the bottom of the Outliner window; simply click it and drag it up or down for a second Outliner display area. This is also useful when you need to parent one node at the bottom of the list onto another node toward the top of the list.

The Hypergraph

Using a flowchart or graph view, the Hypergraph (see Figure 1.25) also displays all the objects in your scene. The Hypergraph, however, is a more detailed view of your nodes and how they connect with each other. You can easily parent objects to each other through this window by MM dragging the node to be parented onto the node you wish to be the parent, just as in the Outliner. And since you can have several objects in your scene (indeed hundreds or more), you will need to move around in the Hypergraph. Navigating the Hypergraph is the same as navigating in any modeling panel using the familiar Alt key and mouse combinations for tracking and zooming. You access the Hypergraph by choosing **Window → Hypergraph:Hierarchy Or Hypergraph:Connections**.

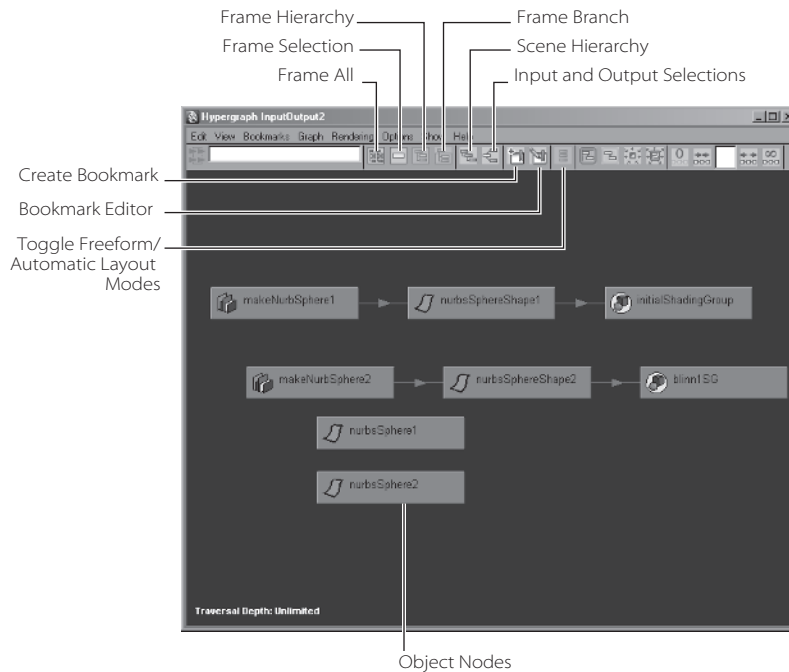


Figure 1.25
The Hypergraph displays your objects in a flowchart format.

Connections and the Hypergraph

You can edit connections of attributes between nodes graphically to set up some rather complex relationships, though this is not immediately evident when you first open the window. Create a NURBS sphere and cone in a scene, place them side by side, and open the Hypergraph window.

In Figure 1.26, you see the simple scene in the Hypergraph's main node view. The Hypergraph shows nodes for the four panel views (persp, top, front, side) as well as the NURBS sphere (`nurbsSphere1`) and the NURBS cone (`nurbsCone1`). Select them both in the Hypergraph, and then click the Input And Output Selections icon (see to Figure 1.25 for its location). This connections view shows you all the nodes that interact with the selected node(s). In this case, as shown in Figure 1.27, you see our object's DAG nodes (`nurbsSphere1` and `nurbsCone1`) and their shape nodes (`nurbsSphereShape1` and `nurbsConeShape1`) and creation nodes (`makeNurbSphere1` and `makeNurbCone1`) as well as the default gray shader they are assigned to upon creation (`initialShadingGroup`). For more on hierarchies, see Chapter 2.

The lines connecting the nodes represent connections, with the arrows displaying which node is feeding the other. Here, the creation nodes feed the shape nodes. The DAG nodes are displayed separately on the left. In the example in Figure 1.27, the `nurbsCone1`

node is connected into the nurbsSphere1 node. The line represents a connection made in this example to lock their rotations together. You will get more practice on this in Chapter 8, but for now, as an exercise in how the Hypergraph works, we'll show you how to make this connection yourself, to match Figure 1.27.

In this connections display, if you MM drag one node on top of another, Maya presents an option to connect attributes between the nodes. The node you drag will connect *into* the node you drag it to. In this case, MM drag nurbsSphere1 onto nurbsCone1. A pop-up menu appears, as shown in Figure 1.28.

Figure 1.26
A scene in the
Hypergraph

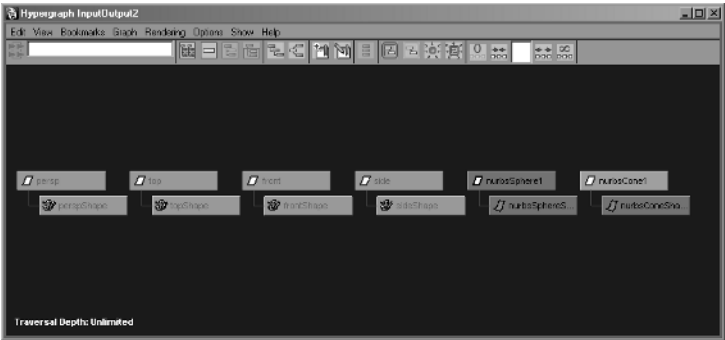


Figure 1.27
Detailed connections
are displayed
and edited in the
Hypergraph display.

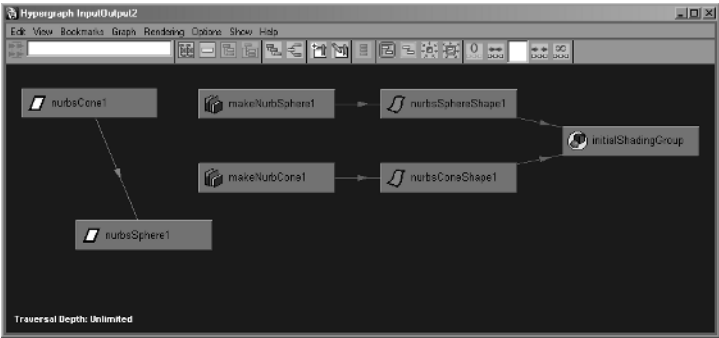
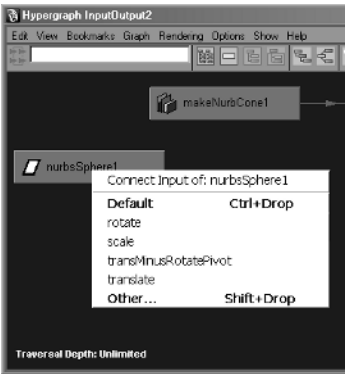


Figure 1.28
Connecting
attributes in the
Hypergraph

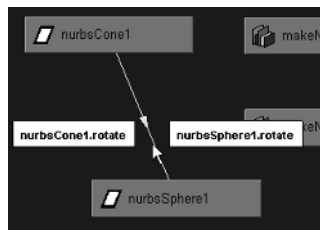


Select Other from the menu to open a new window called the Connection Editor, shown here and explained later in this chapter. In the Connection Editor, scroll down and select Rotate on both sides of the window.



This action connects the rotations of the sphere to the cone. Select the cone and rotate it in the perspective view. You will see the sphere rotating as well. In the Hypergraph, move your mouse over any of the connecting lines to display the attributes that are connected, as shown here.

The connecting lines are also color coded. A green line, as in our example, represents a *vector* connection. A vector connection is a connection of three attributes (or channels), such as **RotateX**, **RotateY**, and **RotateZ**. A single channel connection is made with a blue line.



Notice now that you can no longer rotate the sphere directly if you select the sphere and try to rotate it in your scene. The sphere's rotations are locked to the cone until you sever the connections either through the Channel Box (RM click the attribute in the Channel Box and choose Break Connection) or through the Hypergraph. To disconnect in the Hypergraph, click the green connecting line and press Delete.

To see additional connections between nodes, such as expressions and deformers, choose **Options** → **Display** and select the type of connection you want to see.

To return to the regular node view at any time when you are editing connections in the Hypergraph, simply click the Scene Hierarchy icon.



Figure 1.29

The Hypergraph's
vertical layout

Changing Layout

Using the icons across the top of the window, called out in Figure 1.25 earlier in this chapter, you can change your view quickly. For example, if you select an object in the perspective panel but can't find it in the Hypergraph view, just click the Frame Selection icon. If you prefer a vertical layout similar to the Outliner (shown in Figure 1.29), in the Hypergraph menu choose **Options** → **Orientation** → **Vertical**.

The nodes in the Hypergraph are lined up by default. If you would like a free-form display so that you can move your nodes however you wish (instead of horizontally or vertically), click the Toggle Freeform/Automatic Layout Modes icon shown in Figure 1.25. You can also import an image as the Hypergraph background in free-form mode to place nodes on parts of an image. Just toggle **View** → **Show Background Image** and select your image by selecting **View** → **Set Background Image**. This is handy for making character rigs when you want to place the appropriate character nodes on the character's parts for making selections and reference faster.

Bookmarks

Another convenience of the Hypergraph is the use of bookmarks. When you frame a certain selection of nodes in the window, you can bookmark the view to return to it later easily. To bookmark a Hypergraph view, choose **Bookmarks** → **Create Bookmark**, or click the Create Bookmark icon called out in Figure 1.25 earlier in this chapter. You can then just select the view from the Bookmark menu at a later time.

Traversal Depth

To help better organize complex connection hierarchies, you can specify a traversal depth when viewing input and output connections in the Hypergraph. You can set the depth by using the icons and text field in the toolbar, as shown in Figure 30. By default, the depth is set to infinity (–1). The lower the traversal depth, the more pruned the hierarchy will appear.

Containers

New to Maya 8.5, containers let you organize nodes within the dependency graph, allowing you to simplify your layout by grouping nodes together. Container nodes differentiate themselves from other nodes by their thick outline, as seen in Figure 1.31.

To create a container, select the nodes in the Hypergraph that you wish to add, and choose **Edit** → **Create Container**. To look inside a container, simply double-click on the container node. To add a node to a container, Alt+Shift+drag the node on top of the container node. Likewise, to remove a node from a container, Alt+Shift+drag the node outside of the container. Nodes within a container do not change their hierarchy or connections; they simply act as organizational groupings.

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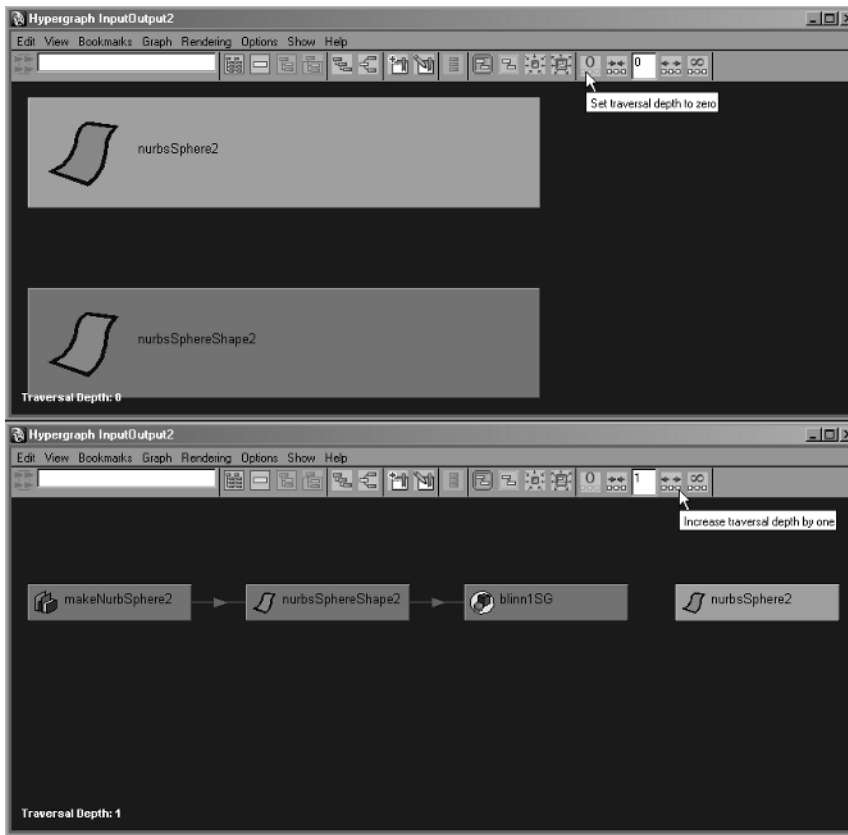


Figure 1.30
Traversal depth
prunes a displayed
connection hierarchy.

The Connection Editor

You can use the Connection Editor (choose **Window** → **General Editors** → **Connection Editor**; see Figure 1.32) to connect attributes between almost any two objects, as you have just seen in the discussion on the Hypergraph. The connection we made there attached the rotations of a sphere to that of a cone. Simple enough, but we can make connections far more complex. For example, the height of a cube in the Y axis can control the amount of red in a sphere's rendered color. You will see how to make complex animations and relationships later in this book, in Chapter 8, when you begin to rig a scene for animation.

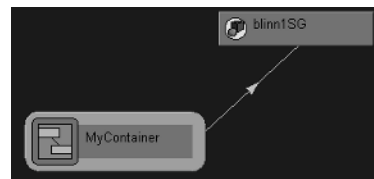
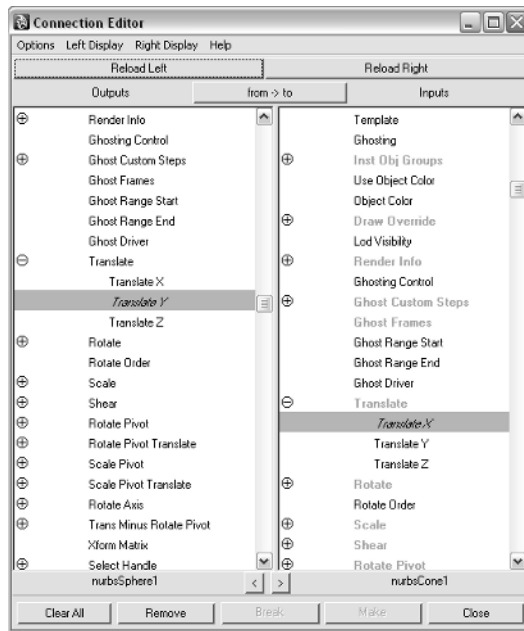


Figure 1.31
Containers allow
you to group similar
nodes in the Hyper-
graph without
changing their input
and output connec-
tions.

Figure 1.32
The Connection
Editor



Creating and Editing Connections

The Connection Editor is separated into two vertical panes. Each pane represents one of two objects in the connection. By selecting an object and clicking the Reload Left button, you can load into the Connection Editor's left column all the attributes of the selected object. By selecting a second object and clicking Reload Right, you can load the attributes of the second object. As you saw earlier, clicking attributes in both columns creates a direct relationship between the two objects' attributes.

When you want to edit connections on attributes or channels already connected, simply click one object's attribute to show you what channel it is connected to on the other object. Maya will highlight the other connected channel when you select the first object's attributes in one of the panes. To disconnect a connection through the Connection Editor, click the channel and simply click the other object's highlighted channel(s).

Connections are the cornerstone of animation and a significant reason for animation being so open ended in Maya. You can create any kind of relationship between almost any attributes of almost any object to create highly complex, interconnected animations.

Filtering the Display of Connections

Since there can be so many attributes and connections even between just two objects, you can filter the view in the Connection Editor to show or hide attribute *types* entirely. You can access view filters through the window's menu bar. Choose **Left Display** or **Right Display** menu headings to toggle the connections you want to display.

CHANNEL FILTERS	DESCRIPTION
Readable	Displays all the attributes of an object, regardless of whether they can be keyframed
Outputs Only	Shows attributes that can only be connected to other nodes
Inputs Only	Presents attributes that can only be connected <i>into</i>
Non-Keyable	Displays attributes that you cannot create connections with or for
Connected Only	Shows attributes that already have connections
Hidden	Displays hidden attributes for that node

The Multilister

As the Outliner and Hypergraph list the objects in the scene, the Multilister and Hypershade (see the next section) windows list the render nodes of your scene—textures, lights, cameras, and so on. In Maya terminology, adding textures and such to objects is called *shading* (called surfacing in Lightwave-speak, for example). And as with the Outliner and Hypergraph, these windows approach presenting the shaders of your scenes differently to accommodate the best of options in your work flow. You will have a small taste of shading in the next chapter.

The Multilister (accessed through **Window → Rendering Editors → Multilister**; see Figure 1.33) lays out not just the shaders of your scene, but also lights, cameras, and the shaders' textures, in a table format. All the shaders in the scene are displayed under their respective tabs in this window and are represented by named thumbnail icons.

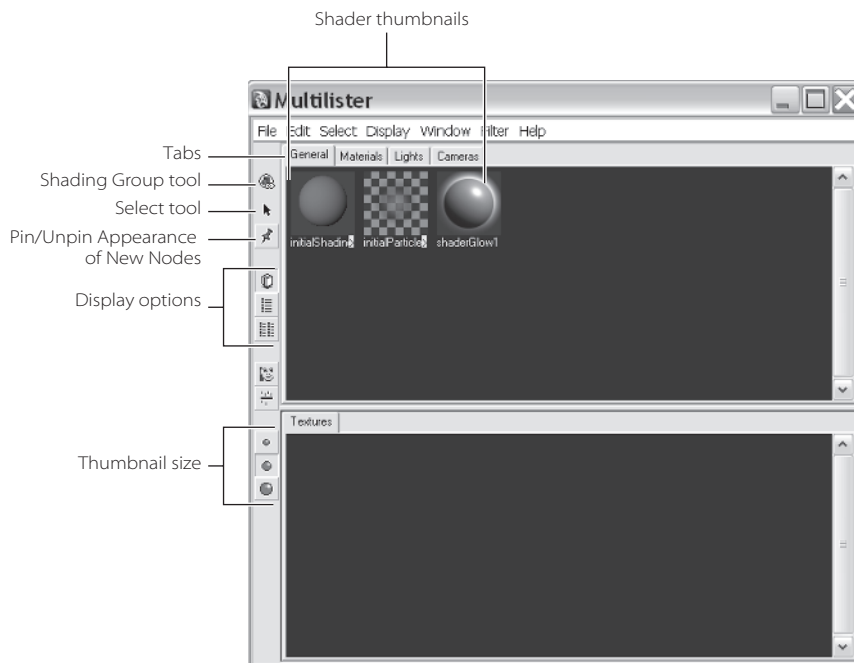


Figure 1.33
The Multilister

Double-clicking any of the names under the thumbnails lets you change the name of the shader or render node. Clicking the thumbnails themselves selects the shader for use, and double-clicking the thumbnail (and not the name) opens its Attribute Editor.

The Multilister is in two panels. Both panels let you select what type of shading/render node is displayed. By default, the top panel displays all the shaders in the scene in the General tab—with materials, lights, and camera nodes under their respective tabs. The bottom panel is typically used to display texture nodes that are in use or are already connected to shaders.

You can add or edit tabs to filter just the nodes you need to work on. For example, if you would like to view only the type(s) of nodes you want, pay a visit to the **Display → Tabs** menu. There you can create new tabs with special filters using the Create Filtered command from that menu.

Many of the commands accessible through the menu system are also available through shortcut menus when you RM click the shaders in the Multilister panes. To assign a shader, for example, select your object in Maya, click your desired shader to select it, and then RM click and choose **Edit → Assign** from the shortcut menu.

You can customize the look of the Multilister by clicking the option display icons of the thumbnail size icons running down the left side of the window, shown in Figure 1.33. Each thumbnail has a small arrow in the lower-right corner. Clicking this arrow expands on that shader's network of connection nodes, if you have textures or images attached.

The Multilister is good for fast shader management and assignment if you are connecting and editing attribute connections, even more so than the Hypergraph. It does, however, lack the brawn of the Hypershade to get into serious shader network management.

The Hypershade

The Hypershade is accessed through **Window → Rendering Editors → Hypershade** (see Figure 1.34) and displays the shaders and textures in your scene in a graphical flowchart layout similar to the Hypergraph window. You connect and disconnect render node attributes through the Hypershade to create shader networks from the simple to the intricately complex. The Hypershade window has three main areas: the *Create/Bins panel*, the *render node display*, and the *work area*. The three icons in the upper right let you switch views.

The Create/Bins Panel

The Create/Bins panel on the left is divided into two tabs: Create and Bins. Selecting the Create tab displays the icons to create several render nodes from materials such as Lambert and Blinn to procedural textures such as ramps and fractal noise. To create a node,

simply click its icon in the Create panel and it will appear in the node display and work area for immediate editing. The Create icons are separated into types of render nodes, from surfaces to utility nodes. You will have plenty of exposure to these nodes and how to best edit them in Chapter 12.

The bar at the top of this pane lets you select the kind of node you want to create; you can switch between Maya shading nodes and mental ray nodes. Since mental ray is a fully integrated plug-in, you will need to make sure it is loaded before you see the mental ray option in this panel. We'll discuss plug-ins later in this chapter in the section “Customizing the Interface.”

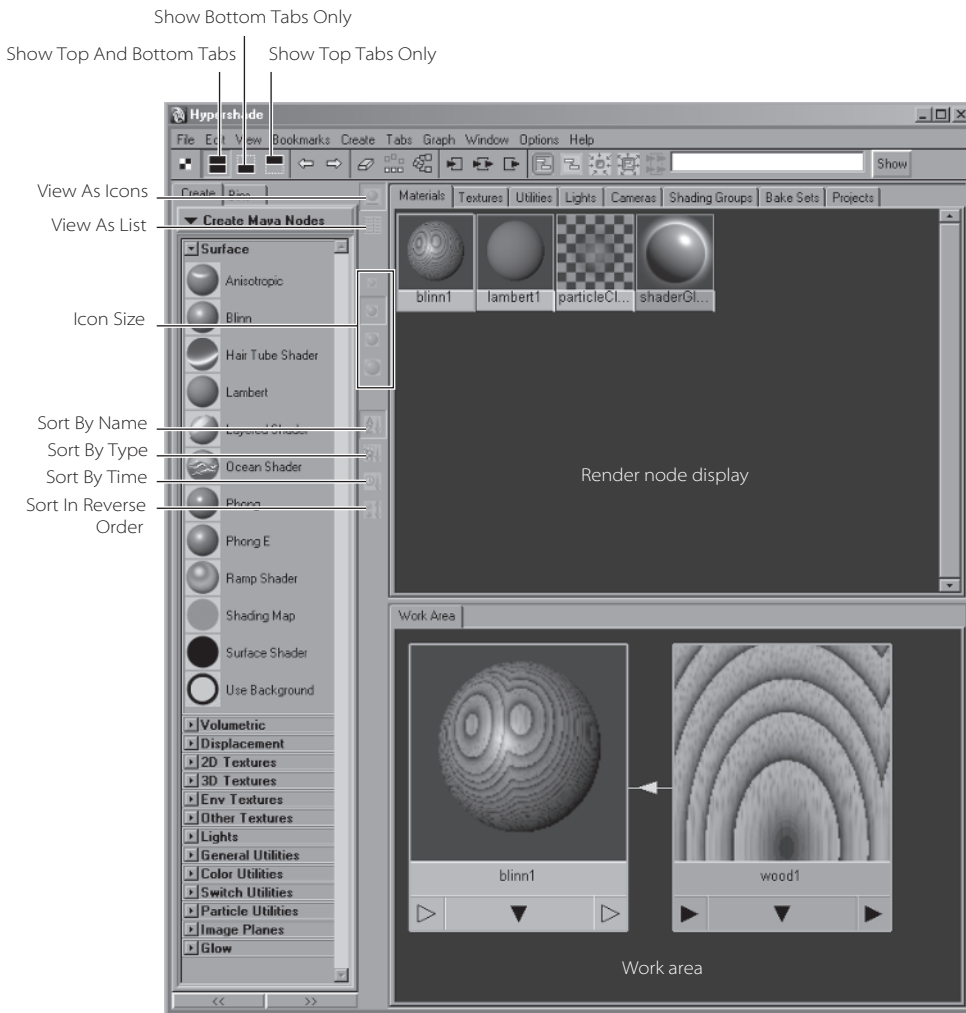


Figure 1.34
The Hypershade

The Bins tab lets you store sets of shaders in bins to manage them better, especially if you have a heavy scene to work in. You use the icons at the top of the Bins tab to organize your shaders. If you hover the mouse pointer over the icons, Maya will show you a pop-up description for each.

The Render Node Display Area

After you create render nodes, they appear in the display area as thumbnail icons. Clicking a render node's icon selects that node for use, and double-clicking it opens the Attribute Editor. If you want to edit a shading network, MM drag the thumbnail icon to the work area below. Navigating in this area of the Hypershade, as well as the work area, is similar to navigating the Hypergraph and work windows in that you use the Alt key and mouse controls. The Hypershade zooms in levels as opposed to the smooth zooms in a work panel, though it still uses the Alt+RM. And although you cannot freely pan around this window, you can use Alt+MM to scroll up and down when you have enough shaders to fill the panel. The bottom panel, the work area, however, reacts much the same as a normal view panel with the panning and zooming moves.

The Work Area

The work area is a free-form workspace where you connect render node attributes to form shading networks for your scene. This is by far the easiest place to create and edit complex shaders, because it gives you a clear flowchart of the network, much like the Hypergraph view of object nodes. To work on a shading node from the node display panel, just MM drag it down into the work area.

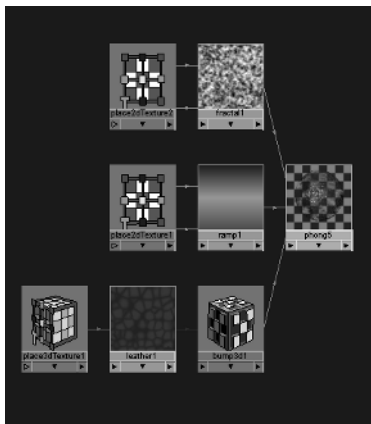
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The most efficient way to work with shaders is to use marking menus in the Hypershade window panels. RM click a shading icon to display a marking menu. This marking menu lets you assign the shader to the current selection of objects, select objects that have that shader already assigned to them, or to graph the network. Graphing the network of a shader gives you a display similar to the Hypergraph's connection display. Also like the

Hypergraph, Maya 8.5 introduces containers to the work area, helping you to group nodes together. See the Hypergraph section on containers for details on how to create and modify container nodes. Figure 1.35 shows how you can edit the connections between shading nodes graphically.

As you saw with the Hypergraph earlier in this chapter, the connections between nodes is handled with color-coded lines and arrows. In this example, a Phong material has connections coming in from a fractal node, a ramp node, and a bump map with a leather node.

Figure 1.35
Seeing a render
node's network
gives you access
to editing its
connections.



Using the Hypershade

Open the Hypershade and create a Phong shader by clicking the Phong icon in the Create Maya Nodes panel. Double-click the Phong's thumbnail to open the Attribute Editor (Figure 1.36). In the Attribute Editor, if you click the color swatch next to the **Color** (or other attribute) of the shader, you can change the color of the material. To map a texture (such as a procedural texture—that is, a texture that is created entirely in Maya) or an image file to a color or other attribute, click the map icon (the checkered button) to the right of that attribute. For this example, click the map icon next to the **Color** attribute. The Create Render Node window opens (Figure 1.37). Click the Ramp icon to create a ramp node for the color of this Phong material. If you open your Attribute Editor, you'll notice a green line connecting a new ramp node to the Phong material.

As with the Hypergraph, you can mouse over the connecting lines to see which attributes are connected. You can also select the connection lines and press Delete to disconnect those connections.

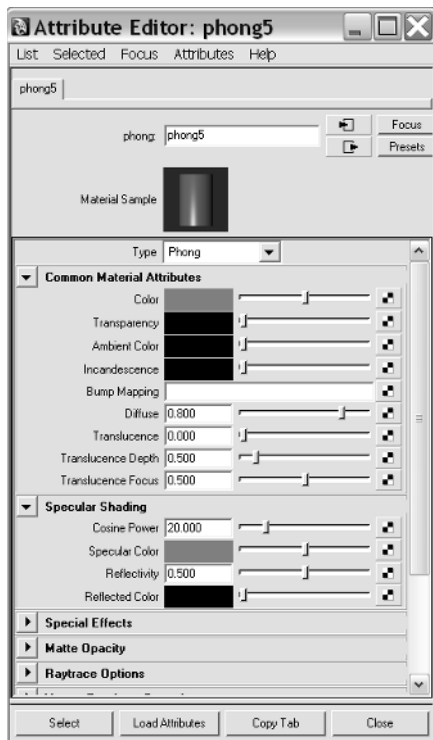


Figure 1.36
A Phong shader



Figure 1.37
The Create Render Node window

The Graph Editor

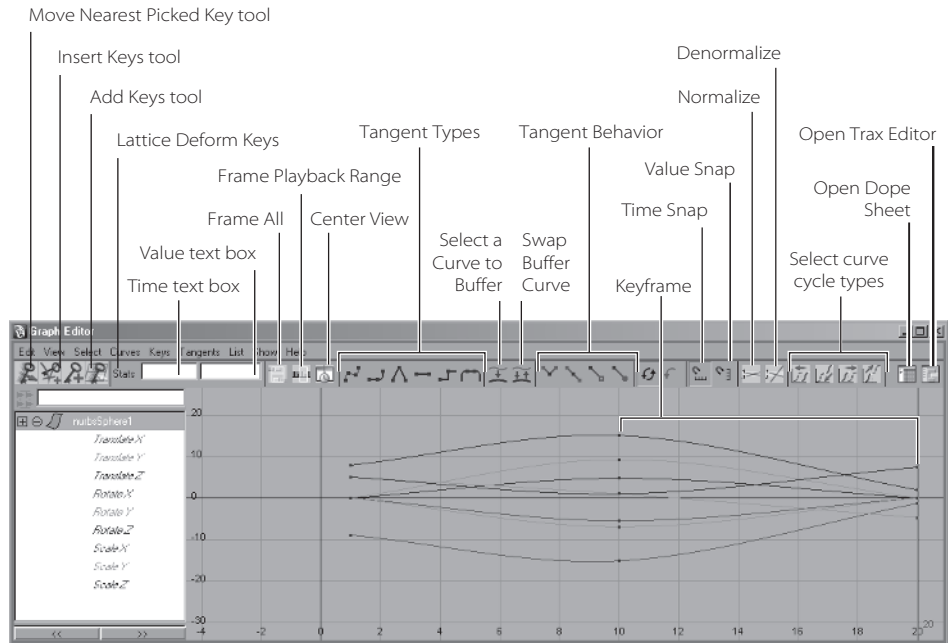
Maya's Graph Editor (choose **Window → Animation Editors → Graph Editor**) is a truly powerful editing tool for the animator (see Figure 1.38).

Since 3D data is stored digitally as vector information, every movement that is set in Maya generates a graph of value vs. time. The Graph Editor provides direct access to the curves generated by your animation to let you fine-tune and edit, even create, your animation in this window.

The left panel of the Graph Editor is much like the Outliner and displays the selected objects and their hierarchy along with a listing of their animated channels or attributes. By default, all of an object's keyframed channels display as colored curves in the display to the right of the list, with red, green, and blue for the X, Y, and Z axes, respectively. Selecting an object or an object's channel in the list, you isolate only those curves you want to see on the right.

The Graph Editor displays these animation curves as value vs. time, with value running vertically and time horizontally. Keyframes are represented as points on the curves that can be freely moved to adjust timing and/or value. This is where most animators spend their time animating.

Figure 1.38
The Graph Editor



To move a keyframe in the Graph Editor, click to select (or drag a marquee around the keys to select them) and MM drag the keys as needed. You can also select the entire curve and move them with the MM as well. Using the snap icons shown in Figure 1.38, you can snap your keyframes to whole numbers in time or value. This is useful for snapping keys to whole frames.

Navigation in the Graph Editor is the same as the Alt+mouse combinations you are familiar with by now. You can pan and zoom in this window with Alt+MM and Alt+RM respectively.

You can adjust the Graph Editor's curve display with Normalize or Denormalize functions. For example, when you have a translate X curve with vertical values from 1 to 3, and a Rotate Y curve with values from 1 to 360 degrees, seeing the detail of the curves in relation to each other is difficult since you would need to zoom out in the Graph Editor to see values as high as 360. Figure 1.39 shows an animation in which the curves' values stretch up high. In Figure 1.40 we have normalized the curve view so that the full range of values fits between -1 and 1 in the Curve Editor, giving you the opportunity to compare timings between curves with very different value ranges. To normalize the view, click the Normalize icon shown in Figure 1.38. To return to your regular view, click Denormalize.

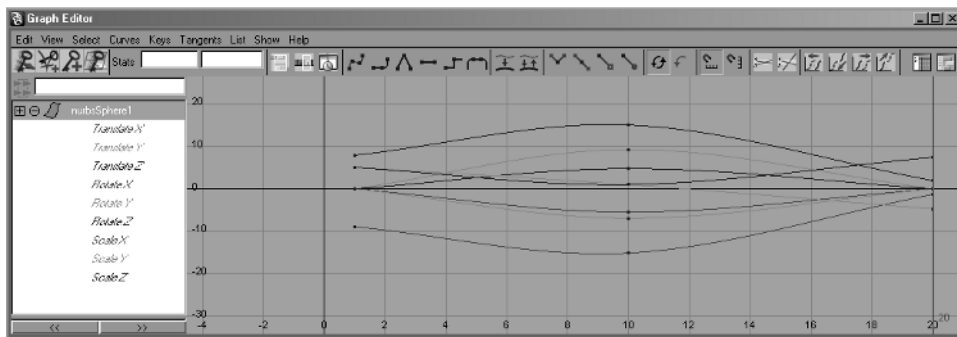


Figure 1.39
Different value ranges can make it difficult to compare timings in animation curves.

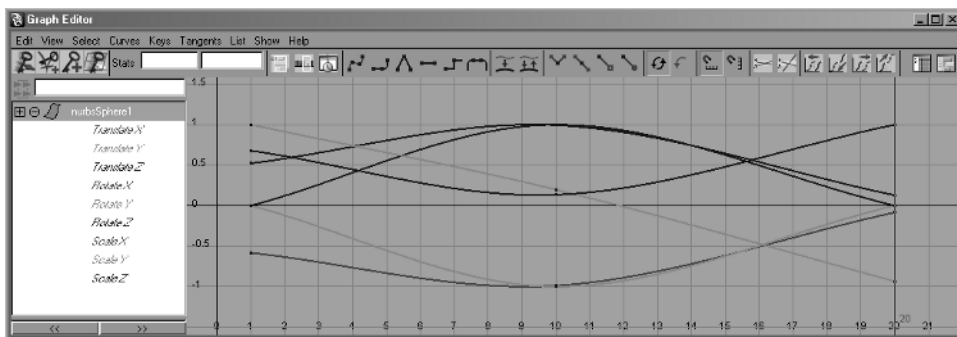


Figure 1.40
Normalizing the view makes it easier to compare timings.

Keep in mind that normalizing does not change the animation in the scene. It only allows you to see all the curves and their relative motions. Normalizing your view is particularly helpful in busy scenes when you want to adjust both the smallest scale of values alongside the largest scale of values without having to constantly zoom in and out of the Graph Editor to see the appropriate curves.

You will get hands-on experience with the Graph Editor in Chapter 7 of this book.

The Script Editor

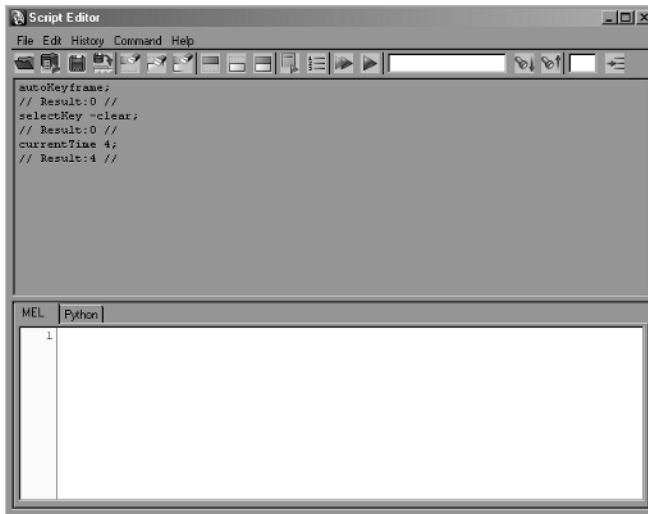
You access the Script Editor (see Figure 1.41) by clicking the icon in the bottom-right corner of the screen at the end of the Command line or by choosing **Window → General Editors → Script Editor**. Since almost everything in Maya is built on MEL, every command you initiate generates some sort of MEL script or MEL argument. A history of these commands is available in the Script Editor.

You can use this window when you need to reference a command that was issued or an argument or a comment that was displayed in the Help line but was too long to read on one line.

Of course, this window is also useful in scripting or creating macros of MEL commands to execute compound actions. When you want to create a custom procedure, you can copy and paste MEL from this window to form macros. As a matter of fact, the Script Editor is great to use to learn how to script in the first place. By reading the command feedback and the MEL commands issued whenever you execute a button or tool, you will start to pick up on how MEL works. Maya 8.5 introduces support for Python commands. Python support and other new Script Editor features are discussed in Chapter 16.

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Figure 1.41
The Script Editor



The window is in two halves. The top half is the Script Editor's feedback history, and the bottom half is its Command line, where new MEL commands can be issued. By highlighting text in the upper window, you can copy and paste the command back into the Command line. Once you have some commands that are working for you, you can add them to the shelf by highlighting the text and choosing **File → Save Script To Shelf**.

Using the Script Editor is also a good way to check on error messages that are too long to fully view in the Command line's feedback box. If you see an error message pop up and something goes wrong, open the Script Editor to see what sort of error(s) have scrolled by.

Customizing the Interface

You've probably noticed that we've run into the same tools more than once as we've gone through the aspects of the user interface so far. Simply put, for everything you need to do in Maya, there are not only a few ways to do so, but at least a couple of ways to access the tools to do so.

Most of Maya's commands and tools can be found in at least two places. This may be confusing at first, but you'll discover that in the long run it is most advantageous. It allows for the greatest flexibility in individual work flow and in part accounts for Maya's being easily customized.

Once you are confident with your Maya know-how, you'll develop your own ideas about how to use all the other user interface methods to customize your work flow. You'll want to return to this section when you're ready to do some serious customization.

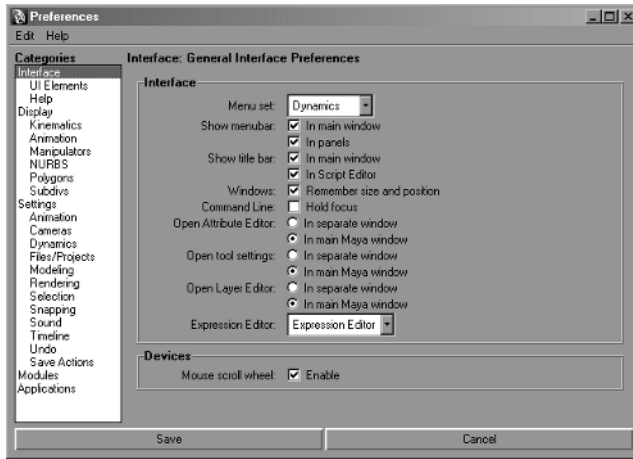
User Preferences

To customize Maya, you use the Preferences window (choose **Window → Settings/Preferences**), as shown in Figure 1.42.

The Preferences window is separated into categories that define aspects of the program.

- Interface options to change the main user interface:
 - UI Elements lets you change which parts of the UI are displayed. You've seen in this chapter how you can access these preferences through marking menus, but you also have access here.
 - Help lets you specify whether you want tooltip pop-up windows when you mouse over icons or buttons, as well as how you view the HTML documentation that comes with Maya.
- Display options to specify how objects are displayed in the workspace.

Figure 1.42
The Preferences
window



- Settings lets you change the default values of several tools and their general operation. An essential aspect of this category is the Working Units section under the Settings category itself. These options set the working parameters of your scene, including the frame rate. It's important to set the time units and frame rate properly. Some important subsections are as follows:
 - Files/Projects initially specifies where Maya looks for your projects and files. Maya keeps things organized as projects. This setting allows you to specify where Maya always goes first when you try setting a project or loading/saving a scene.
 - Timeline sets your playback rate for the scene. Keep in mind this is *not* the same as setting the scene's frame rate, but merely adjusts how fast Maya will attempt to playback your animation in the view panels.
 - Undo sets the size of the undo queue. It is a good idea to set this to Infinite, which will give you the opportunity to undo almost all your actions in any working session in case something does not work out quite as planned. This will not use up that much more memory, so it's quite worth it.
 - Selection allows you to specify the order of preferred selection. Maya has a selection queue that marks some objects as more selectable than others. If you marquee select a bunch of objects of different types in the scene, Maya will select the more important object types instead of the others. This is where you set your preference of what is selected over another object.

- Modules specifies which modules are loaded by default whenever you start Maya. By default, both Dynamics and Paint Effects are loaded. This is not the same as loading plug-ins such as fur and mental ray, which are accessed through the Plugin Manager (covered later in this chapter).
- Applications lets you set the path of applications that are commonly used in conjunction with Maya. This makes work flow much faster, allowing you to launch an application such as Photoshop to edit a texture map from within Maya itself.

Colors

You can change just about any of the UI and object display colors in Maya by choosing **Window → Settings/Preferences → Color Settings** to open the Colors window, as shown in Figure 1.43. You can click the color swatch to change the colors or use the slider to toggle through common preset colors.

For example, to change the background color of the 3D view panels, click the 3D View heading and select your color. The Active and Inactive tabs give you access to colors of objects that are currently selected (or active) or not selected (inactive).

As you will see throughout exercises in this book, organizing your scene elements using groups with different display colors is different from using the Colors window. These changes affect all scenes and UI elements for the particular user in Maya and are used to customize the display for your convenience, not for scene management or organization. You will be using display layers and the like for organizing.

Shelves

Choose **Window → Settings/Preferences → Shelf Editor** to manage your shelves (see Figure 1.44). You can create or delete shelves or manage the items on the shelf with this function.



Figure 1.43

Adjusting the colors of your UI elements, windows, and scene objects is easy.

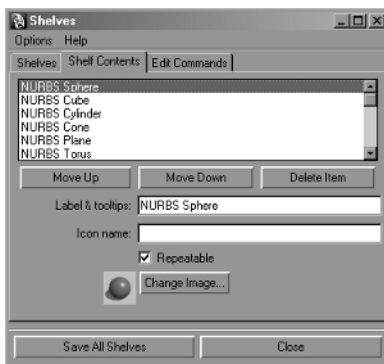


Figure 1.44

The Shelves window

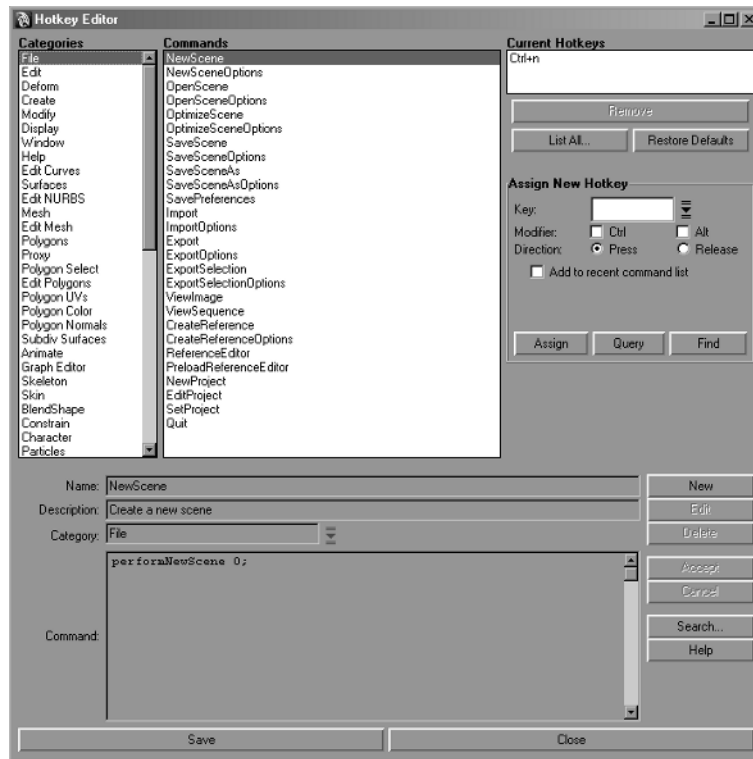
You can easily add any menu item or Toolbox item to your shelf:

- To add an item from the Toolbox, simply MMB drag its icon from the Toolbox into the appropriate shelf.
- To add an item from a menu to the shelf, hold down Ctrl+Shift+Alt while selecting the item from the menu.
- To add an item (a MEL command) from the Script Editor, highlight the text of the MEL command in the Script Editor, and MMB drag it onto the shelf. A MEL icon will be created that will run the command when you click it.
- To remove an item from a Shelf, MMB drag its icon to the Trash icon at the end of the shelf, or choose **Window → Settings/Preferences → Shelf Editor**.

Hot Keys

Hot keys are keyboard shortcuts that can access almost any Maya tool or command. You have already encountered quite a few so far in our exploration of the interface. You can create even more through the Hotkey Editor, shown in Figure 1.45.

Figure 1.45
The Hotkey Editor



Through this monolith of a window, you can set virtually any key combination to be used as a shortcut to virtually any command in Maya. Since so many tools already have hot keys assigned by default, it is important to get to know them first before you decide to start changing things around to suit how you work. If you are coming to Maya from another 3D package, you can set up your hot keys to resemble your old work flow.

Every menu command is represented by menu categories on the left, and the right side allows you to view the current hot key or to assign a new hot key to the selected command. Ctrl and Alt key combinations can be used with any letter keys on the keyboard. Keep in mind that Maya is *case sensitive*, meaning it differentiates between upper- and lowercase letters. For example, one of our personal hot keys is Ctrl+h to hide a selected object from view, and Ctrl+shift+H is to unhide it.

When you are ready to start setting your own hot keys, query your intended hot key with the Query button to find out if it is assigned to a command that suits that hot key better.

The lower section of this window displays the MEL command that the menu command invokes. It also allows you to type your own MEL commands, name them as new commands, categorize them with the other commands, and assign hot keys to them.

Marking Menus

Customizing your marking menus can give a huge boost to your work flow. You might want more modeling tools at your fingertips than general UI controls such as the defaults. You can customize the marking menus by choosing **Window → Settings/Preferences → Marking Menu Editor**. Figure 1.46 shows the Marking Menu Editor window.

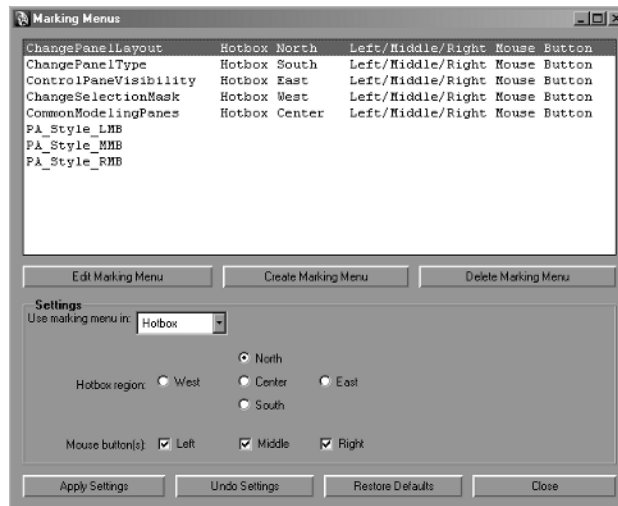


Figure 1.46
The Marking Menu
Editor window

The marking menu is divided into zones. Select the zone you want to customize in the top panel and click Edit Marking Menu, as shown in Figure 1.47.

To change a marking menu entry, drag its icon or menu item directly onto the location where you want it to appear in the marking menu for the current zone.

The Plugin Manager

The Plugin Manager, accessed by choosing **Window** → **Settings/Preferences** → **Plug-in Manager**, lets you load and unload plug-ins for Maya. For example, mental ray for Maya

is a plug-in that must be loaded to have mental ray rendering in your scenes. You load a plug-in by clicking the Loaded button. To unload, simply uncheck the box. If you want the plug-in to always load on Maya startup, check the Auto Load box. You can load third-party plug-ins by clicking the Browse button at the bottom of the window. Most third-party plug-ins provide instructions for installing them properly.

Summary

Once you have wrapped your head around how the challenging Maya interface works at its defaults, you will applaud the ability to change it to make it work best for you.

This chapter gave you an overview of all the major components of Maya's UI and major windows and will be useful as a reference whenever you need a quick brush-up on how something works or is loaded. We explored the interface, navigation, scene windows, and window layouts before looking at the hotbox, menus, and shelves. You should also have a good idea of how to use the Outliner and Hypergraph as well as the Channel Box and Attribute Editor. We also explored the Timeline, Command line, Feedback line, and Script Editor before discussing the interface customization options available.

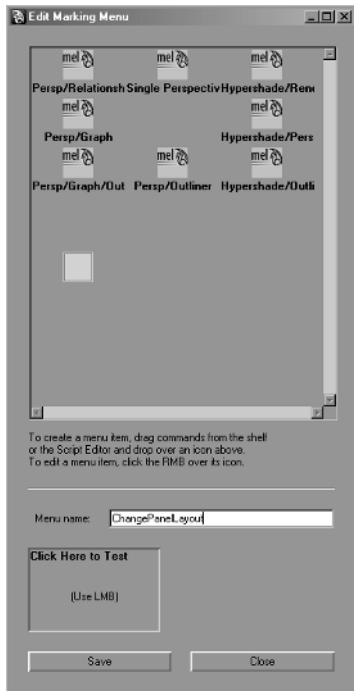


Figure 1.47

Editing the North Zone of our marking menus