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FUNDAMENTALS

3D Studio MAX® 3 FUNDAMENTALS

New Riders

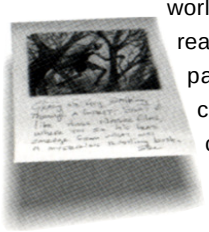
Michael Todd Peterson

Inside the Front Cover

Walking Man

Concept

The idea for this character came from a sketch I did a few years back. I liked the idea of a nomad who carried all of his worldly possessions on his back. I was getting ready to move at the time, and I think that was part of the inspiration. I also tried to capture some of the fascination I have with cultures who carry huge, implausible burdens on their heads and backs and do it with apparent ease.



Research

I did a lot of research on this scene since I needed to fill it up with all types of jewellery, artifacts, etc. I keep stacks of magazines and books handy for such occasions.

Modeling

All of the models were built in MAX. Most were built using Primitives and Editable Mesh / Sub-Object editing. The ropes on the pack were built with loft objects to allow flexibility in animation and to ensure proper mapping coordinates.

MeshSmooth was used on the character itself to increase the resolution of the model. I also used it on the cloth of the pack. I use MeshSmooth sparingly since it can lead to a very high polygon count. Now that MAX 3 allows for intelligent tessellation of meshes, MeshSmooth is practical in more situations than before.

Modeling in MAX 3 is speedy. With the advent of Editable Mesh hotkeys and built-in support for face bevelling the workflow has been greatly improved.

Materials

Once mapping coordinates had been assigned, I used Deep Paint from Right Hemisphere to paint the texture maps for the character. Deep Paint was a big help in getting the bitmaps to blend seamlessly across the different body parts. Final detailing of the textures was completed in Photoshop.
One of the most useful plugins ever created is Color Correct by Cuneyt Ozdas. It's a free plugin that gives you extensive Photoshop-style control over the look of a bitmap. With this plugin, I was able to make a huge variety of texture variations with a small number of bitmaps. All of the crates in the scene, for example, are mapped with the same wood texture. The differences in the look of each crate are due to varying Color Correct settings and by blending the submaterials differently.

I used bitmap masks in order to specify the position of the dirt, adjusting the tiling and offset parameters of the masks to get the best result. More detail was added by creating additional Blend materials each with a different function; small dirt, big dirt, bleached wood, painted woos, etc.

Almost all of the scene materials are semi-generic in nature. I use generic bitmaps and masks but use them in a way that seems to fit the object. One of the advantages to this method is speed. Most objects can be mapped in just a few minutes. This technique also allows for incredible variation since a material can be modified very easily to fit other objects. It is rarely necessary to make new bitmaps for any given material.

Lighting

The lighting setup is very simple. One Target Direct Light serves as the sun and casts ray-traced shadows. Three omni lights provide reflected light, two for the ground light reflection and one for the sky.

Rendering

I used BonesPro from Digimation to position the character before rendering. After rendering, I did some touch-up to the scene. There was some distortion to the fingers that I fixed and I also added some detail to the background of the scene.

Steve Burke
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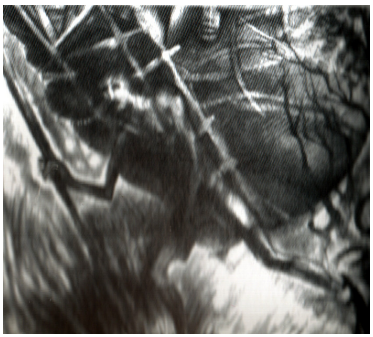

3D STUDIO MAX 3 FUNDAMENTALS

Michael Todd Peterson

Cover art by Steve Burke

New
Riders

201 West 103rd Street, Indianapolis Indiana 46290

3D Studio MAX 3 Fundamentals

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Dedication

In memory of Eric Baker

Contents at a Glance

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About the Author

Michael Todd Peterson is the owner of MTP Graphics (`www.mtpgrafx.com`), a full-service 3D animation shop that specializes in Architectural Rendering, Multimedia Development, Render Farm, and Special FX. In the past, Todd has taught at universities and community colleges. In addition to this book, Todd has also authored or coauthored a variety of other books for New Riders Publishing, including *Inside AutoCAD 14* and *Inside 3D Studio Max 2, Volumes II* and *III*.

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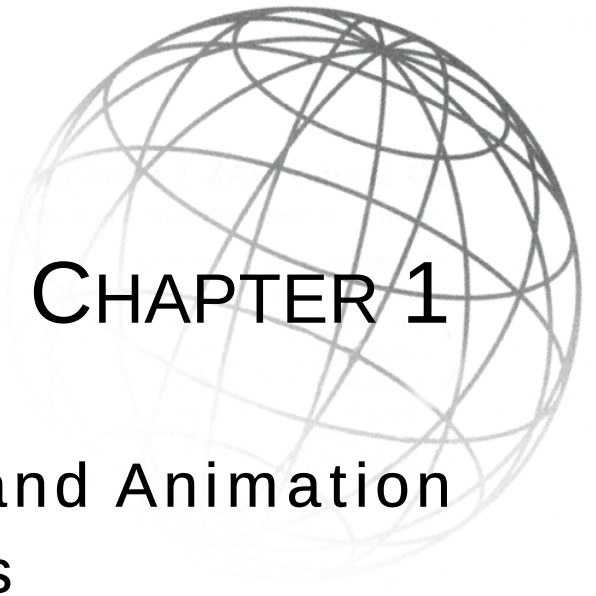
Fax: 317-581-4663

Email: `editors@newriders.com`

Mail: Steve Weiss
Executive Editor
Professional Graphics Design Team
New Riders Publishing
201 West 103rd Street
Indianapolis, IN 46290 USA

PART I

Overview of 3D Graphics and 3D Studio MAX 3



CHAPTER 1

3D Graphics and Animation Fundamentals

In today's world, we are getting more and more used to seeing computer-generated imagery (CGI) on the television or movie screen and even in magazines and newspapers. The field of computer graphics (CG) has grown from a haven for computer scientists to a mainstream career that many people would like to have. The leading computer graphics software package for use on a PC is 3D Studio MAX.

This book covers three-dimensional computer graphics and explains how to create images and animations with 3D Studio MAX. Before you begin to learn this wonderful software package and all its intricacies, however, you need to learn the basic terminology and concepts behind the beautiful CGI scenes and imagery that surround us. This chapter explores the terminology and concepts behind computer graphics. In particular, this chapter covers

- Defining 3D graphics
- Moving from 2D to 3D graphics
- Principles of 3D computer graphics in 3D Studio MAX

Defining 3D Graphics

Saying "3D" means you are working with three dimensions — in other words, width, depth and height. If you look around your room, everything you see is three-dimensional: the chair, desk, building, plants and even you. But, when you look at three-dimensional computer graphics, calling them 3D is a distortion of the truth. In reality, 3D computer graphics are a *two-dimensional* representation of a *virtual* three-dimensional world.

To help illustrate this, imagine that you have a video camera and are filming the room around you. As you move around the room, you encounter various 3D objects, but when you play back the video on your VCR, you are looking at a flat, two-dimensional image that is *representative* of the 3D world you filmed a minute ago. The scene appears realistic, thanks to the lights, colors and shadows that appear to give the scene life and three-dimensional depth, even though it is, in fact, 2D.

In computer graphics, objects exist only in the memory of the computer. They have no physical form — they are just mathematical formulas and little electrons running around. Because the objects don't exist outside the computer, the only way to record them is to add more formulas to represent the lights and cameras. Fortunately for you, 3D Studio MAX (often referred to as just MAX) takes care of the mathematical side of things, enabling you to explore the artistic side. Figure 1.1 shows you 3D Studio MAX with a 3D scene loaded.

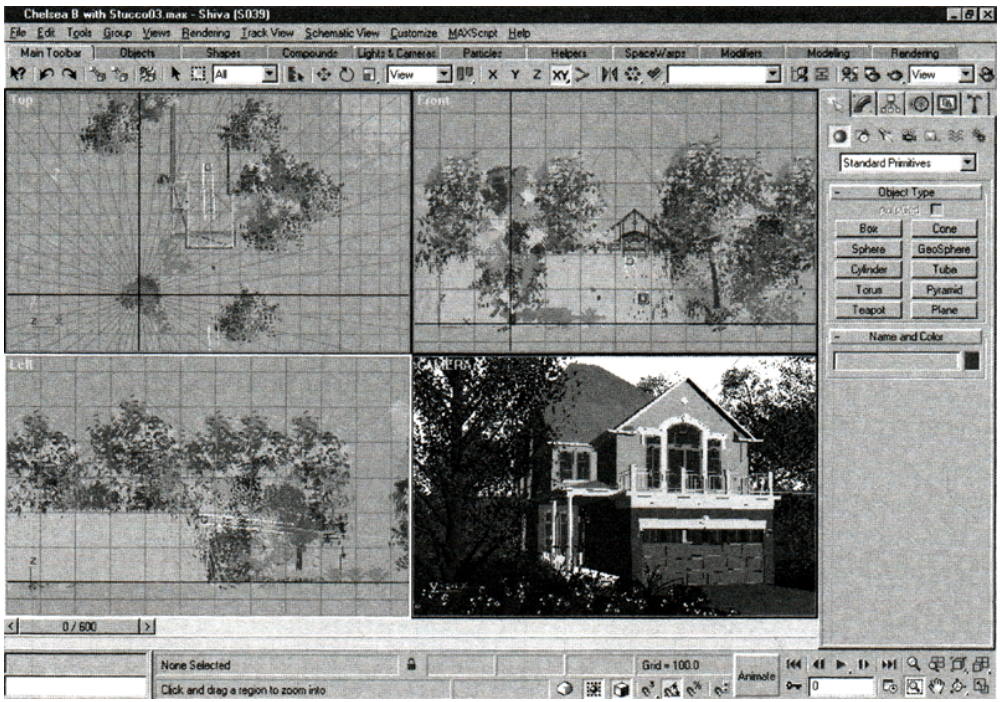


FIGURE 1.1 *3D Studio MAX with a scene loaded*

In many ways, using a program such as 3D Studio MAX is much like videotaping a room full of objects that you construct. MAX enables you to design the room and its contents, using a variety of basic 3D objects such as cubes, spheres, cylinders and cones that you can select and add to the scene. MAX also gives you the necessary tools — such as patch modeling or NURBS — to create more complex objects.

After you have created and positioned all of the objects in the scene, you can choose from a library of predefined materials and textures such as plastic, wood, or stone and apply them to the objects. You can also create your own materials through 3D Studio MAX's Material Editor, in which you can control color, shininess and transparency or even use painted or scanned images to make surfaces appear any way you like.

After you have added materials to the scene, you can create a "camera" to record and view the scene. By adjusting the settings of the virtual camera, you can create wide-angle effects or zoom in on a small detail. Correct positioning of cameras always adds to the drama or realism of the scene. MAX provides camera objects with real-world controls you can use to create the views you are looking for in your scene.

To further the realism of the scene, you can add lighting. With MAX, you can add several different kinds of lights and define their properties, such as their color or brightness. By positioning the lights in the scene, you can control how the objects are illuminated and how they cast shadows into the scene and onto other objects.

Then, you can bring the scene to life by moving the objects themselves, as well as the lights and cameras. You can make objects move mechanically or appear to take on human characteristics. You can use filmmaking techniques to tell a story with your animation, or simply create something that looks cool.

Finally, you can render the animation to videotape or a digital video file so you can view the finished results and share them with others. Using 3D Studio MAX, you can create just about anything you can imagine and then use it as a portfolio piece, a portion of a computer game, a scene from a science fiction epic, or any number of other possibilities. The possibilities are limitless with MAX at your side.

Moving from 2D to 3D Graphics

Working with MAX can be frustrating if you don't have a solid handle on the principle s and theories you're using. Although the theory is not as interesting as working with MAX itself, understanding the theory now will save you time and trouble later.

The easiest way to start is with a look at how 2D and 3D skills overlap. If you have any past experience with 2D programs such as AutoCAD or Illustrator, you can make good use of what you already know about making objects such as rectangles or circles (called *shapes* in MAX). The main difference between 2D and 3D is depth. 2D drawings have only height and width, with no depth whatsoever. A 2D object can be drawn to look like it's in 3D, but if you want to change the perspective or viewpoint in any way, you have to redraw the object from scratch. Figure 1.2 illustrates this.

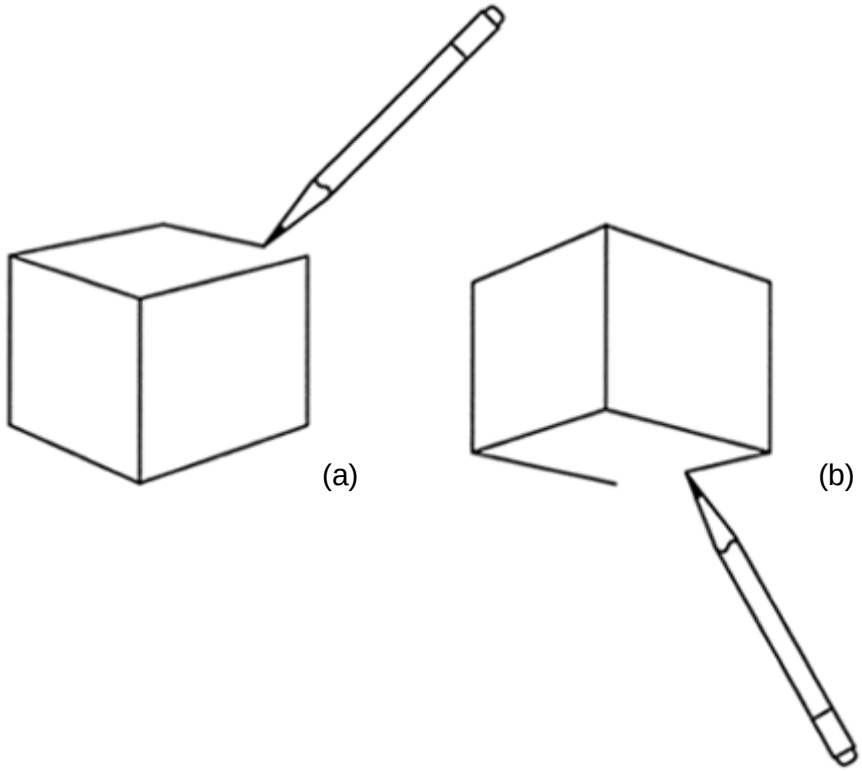


FIGURE 1.2 *2D drawing programs can be used to create images that look 3d, but if you want to view the object from a different perspective, you have to draw it again.*

Because objects have depth (at least in the virtual world), you only have to "draw" them once. Then, you can view them from any angle or perspective without starting from scratch. When you have a view of the objects in the scene, you can apply materials and lighting. At this point, MAX automatically calculates highlight and shadow information for the scene, based on how you arrange the objects and lighting (see Figure 1.3)

When using MAX, not only can you redraw your subject from any angle you choose, but MAX can also create a painting (called a *rendering* in CG terms) of the scene, based on the colors, textures and lighting you decided on when you built the model. With all of these benefits, it's no wonder many artists rarely go back to traditional drawing and painting after they get into 3D.

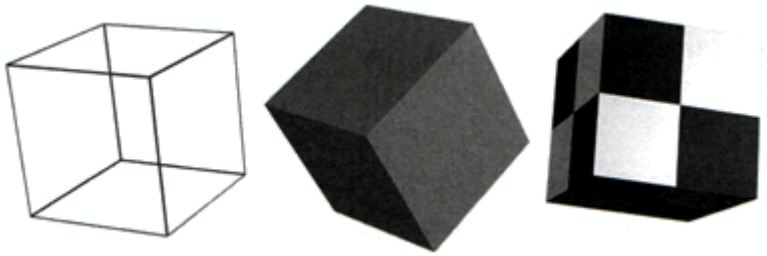


FIGURE 1.3 *After you construct an object in 3D Studio MAX, you can give it color and texture, light it, and then render it from any angle.*

Although major differences exist between 2D and 3D, many of the 2D drawing tools you might be familiar with are implemented in MAX as well. Tools such as line, arc, circle and polygon are available and used in much the same way as in an illustration program. The difference is that instead of using them to create a finished shape in a 2D environment, you use these tools as a starting point for creating a 3D object. Some of the most common 3D forms that start with a 2D shape are lofts, sweeps, lathes and extrudes. Objects such as wineglasses, bananas, phone handsets and many others are constructed with these methods. Actually constructing these types of objects is covered later in this book. What's important at this time is to remember that they rely on 2D techniques.

Although 2D programs make use of "layers" to separate objects and organize their drawings, MAX makes use of a powerful object-naming scheme whereby each object in the scene has a distinct name. Object-naming in MAX applies to 2D objects as well as 3D and is combined with advanced display controls as well as groups to accomplish the same things. With grouping, you can choose a related collection of objects and then temporarily combine them into a single unit. This makes it much easier to move, scale, or perform other operations on the group as a whole, because you don't have to choose elements individually every time you want to do something to them. Also, you can add objects to a group, remove them, or reassign them as you wish.

¤ tip If you are familiar with 2D programs such as AutoCAD or Adobe Illustrator, you can import 2D drawings from these programs into MAX and then convert them to 3D objects. See Chapter 2, "Touring the 3D Studio MAX 3 Interface", for more on importing files.

Principles of 3D Computer Graphics in 3D Studio MAX

When working with 3D Studio MAX, you must remember that you are dealing with a virtual computer world. As such, you must understand how objects are represented and stored in this world.

Within this virtual world, you'll encounter such things as coordinate systems, polylines, cameras and more. The following sections provide tips to help you better navigate 3D space.

Understanding 3D Space

3D space is a mathematically defined cube of cyberspace inside your computer and controlled by MAX. Cyberspace differs from physical space in that it exists only inside a piece of software.

Like real space, however, 3D space is infinitely large. Even with MAX, it's easy to get disorientated or to "lose" an object in cyberspace. Fortunately, avoiding this is made easier through the use of coordinates.

Coordinates

In 3D space, the smallest area it is possible to "occupy" is a *point.* Each point is defined by a unique set of three numbers, called *coordinates.* For example, the coordinates 0,0,0 define the centre point of 3D space, also called the *origin point.* Other examples of coordinates include 12,96,200 or 200,-349,-303.

Each point in cyberspace has three coordinates, representing the height, width and depth position of the point. As such, each coordinate represents a single axis in cyberspace.

Axes

An *axis* is an imaginary line in cyberspace that defines a direction. The three standard axes in MAX, referred to as X, Y and Z axes, are shown in Figure 1.4. In MAX, you can consider the X axis to be the width, the Y axis to be the depth, and the Z axis to be the height.

The intersection point of the three axes in MAX is the origin point 0,0,0. If you plot a point 1 unit away from the origin along the "right" side of the X axis, that point will be 1,0,0. (A *unit* can be defined as anything you want — such as a foot, an inch, a millimeter or centimeter.) If you move another unit in the same direction, the point becomes 2,0,0 and so on. If you move to the left of the origin point, the first point will be –1,0,0, followed by –2,0,0, and so on.

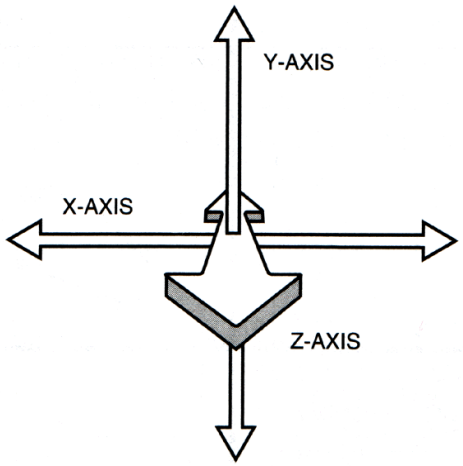


FIGURE 1.4 *An axis is an imaginary line in 3D space that defines a direction. The standard axes used in MAX are called X, Y and Z.*

The same holds true for the other axes. When you are travelling up the Y axis, numbers are positive; when you are travelling down, they are negative. For example, 0,-1,0 represents a point 1 unit below the origin, along the Y axis. The same rules apply for the Z axis. Therefore, if you are trying to determine where the coordinate 128,-16,25 is, you will find it 128 points to the right, 16 points below the X axis, and 25 points up in the Z direction.

Lines, Polylines and Polygons

If you connect two points in cyberspace, you create what is called a *line*. For example, by connecting point 0,0,0 to 5,5,0, you create a line (see Figure 1.5). If you continue the line to 9,3,0, you create a *polyline*, which is a line with more than one segment (a segment is a line that exists between two vertices). In MAX, lines and polylines are called *splines*. If you connect the last point back to the origin, you create a closed shape, with an "inside" and an "outside". This closed shape is a simple three-sided polygon (also called a triangle or face) and is the basis of objects created in the 3D environment. The concept of a closed shape versus an open shape is very important in 3D Studio MAX. Many 2D objects cannot be converted into 3D shapes without being closed first. You will see this in later chapters.

When you take a look at a polygon, you need to understand its basic components. These basic components, which you can manipulate in MAX, are vertices, edges and faces. Figure 1.6 shows a diagram of these components.

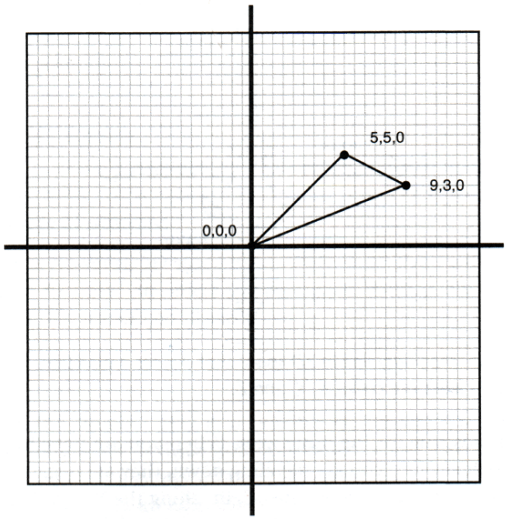


FIGURE 1.5 *When a connection is made between two points, a line is formed. If that line is extended to additional points, it is a polyline. If the line is further extended to the starting point, it forms a polygon or closed shape.*

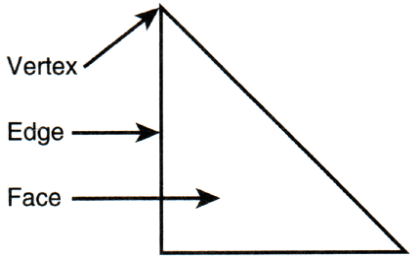


FIGURE 1.6 *Polygons are composed of vertices, edges and faces.*

A *vertex* (the plural is "vertices") is a point where any number of lines come together and connect to each other — in other words, an intersection point in 3D space. In the previous example, each point that was drawn became on of the vertices in the polygon. Similarly, each line formed a boundary, or *edge* of the polygon. Finally, when you closed the shape, you created an "inside" and an "outside". The area enclosed by the edges of the polygon — the "inside" — is called a *face*.

Although three-sided polygons (also called *triangles*) are used often in 3D Studio MAX, they are by no means the only type. Other polygons are also common. Four-sided polygons (called *quads* or *quadrilaterals*) are the most heavily used in MAX, but a polygon can have a number of sides, as shown in Figure 1.7. Although these dull-looking polygons are not much by themselves, they form complex objects when combined.

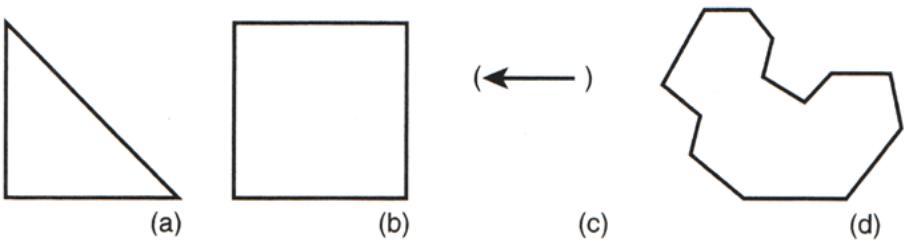


FIGURE 1.7 *Many polygons in 3D Studio MAX are either triangles, or quads. However, there is no limit to the number of sides a polygon can have.*

3D Objects

In 3D Studio MAX, objects are made up of polygons, patches, or non-uniform rational B-spline modeling surfaces (NURBS). Most objects are created as polygons. Even advanced object types such as patches and NURBS must be converted by MAX to polygons before rendering. In some cases, only few polygons are necessary to construct a convincing object. Most of the time, however, hundreds or thousands are needed, creating a massive amount of data. Thankfully, because computers are so good at handling reams of complex numbers, they are able to keep track of all the polygons, vertices, edges and faces in the scene.

For example, in the case of a simple cube, MAX has to keep track of eight vertices, six faces, and 12 visible edges (see Figure 1.8). For more complex objects, the number of polygon elements can soar into the tens of thousands.

¤ tip Even though polygons can have many sides, they are almost always made up of triangles with one or more edges hidden. For example, in MAX, a quad is two triangles that share a hidden edge, and this is true of more complex polygons as well. In other words, a polygon might look simple, but in reality, probably has more detail than you can see on the screen.

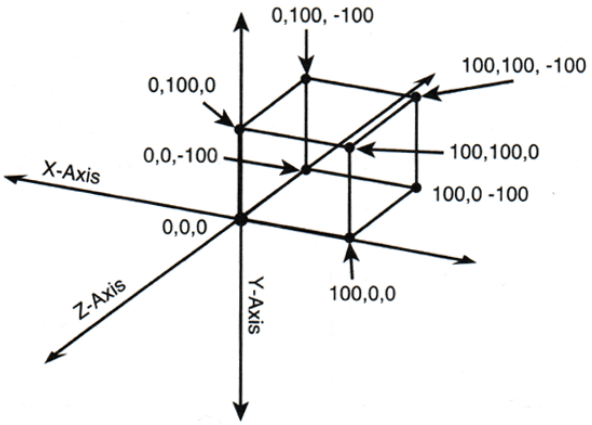


FIGURE 1.8 *A simple cube has eight vertices. Complex objects can have hundreds or thousands of vertices.*

Because these objects are made up of polygons, which are in turn defined by coordinates in cyberspace, the objects themselves take up space in our mathematical universe. For example, a cube might have one corner resting on at the origin point and be 101 points wide in each direction, like the one in Figure 1.8. That would mean that the corner of the cube immediately "above" the origin point resides at coordinates 0,100,0, which would be considered the "upper left front" of the cube. Because the cube is on the positive ("right") side of the X axis (the horizontal one), the next set of corners is at 100,0,0 (lower right front) and 100,100,0 (upper right front). Finally, because the cube is positioned "behind" the origin point along the Z axis (depth), the remaining corners are at 0,0,-100 (lower left rear), 0,100-100 (upper left rear), 100,0,-100 (lower right rear) and 100,100,-100 (upper right rear).

Understanding Viewpoints and Viewports

Just as it would be rather challenging to drive your car if it didn't have windows, manipulating the objects in 3D space is much easier when you can define a viewpoint (see Figure 1.9). A *viewpoint* is a position in or around cyberspace that represents the user's location. Viewpoints are analogous to *viewports* in 3D Studio MAX, which provide you with the view into 3D space from the viewpoint.

MAX has a default set of viewports, the Top, Left, Right and Perspective views. By default, the Top viewport has the X axis running horizontally, the Y axis vertically and the Z axis coming out of the screen at you, indicating depth. The viewpoint in the Top view is centred on the origin. The other viewports are similarly configured but view the 3D space at from different angles. Figure 1.9 shows you an example of how the Top viewport is configured.

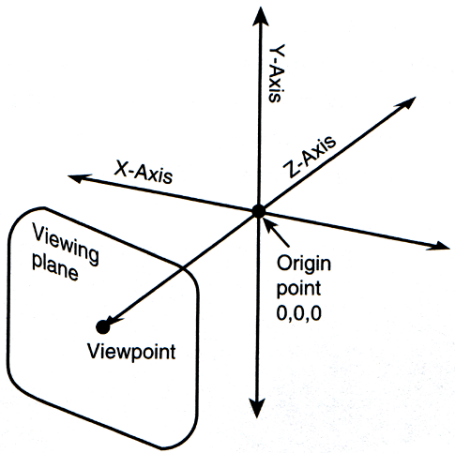


FIGURE 1.9 *The viewpoint represents the current vantage point of the user. The viewing plane indicates the limits of the user's view, because only objects in front of that plane are visible.*

Surrounding the viewpoint at a perpendicular angle is the *viewing plane* — an imaginary flat panel that defines the limits of the user's "sight". In other words, the user can see things only that are in front of the viewing plane, and everything else is "clipped off". In fact, another name for the viewing plane is the *clipping plane*.

To see anything "behind" the viewing plane, the user's viewpoint must change. In a sense, the viewing plane is like the limits of your peripheral vision. If you want to see something that's in back of you, you have to either turn your head (in other words, *rotate* the viewing plane) or step backward until the object is in front of you (*move* the viewing plane).

The monitor screen itself is akin to the viewing plane, because the user can only see what is "beyond" the monitor in cyberspace. This perspective is bound on the sides by the size of the viewport. In MAX, three of the four default views are orthographic, where objects are shown as orthographic projections, which might sound familiar if you have ever taken any mechanical drawing courses. *Orthographic* means that the viewer's location is infinitely distant from the object so that all lines along the same axis are parallel. The fourth default viewport in MAX, the Perspective viewport, is not orthographic and represents a truer view of 3D space, where lines converge to vanishing points as they do in real life.

¤ tip MAX 3 now supports viewport clipping in addition to camera clipping. Through viewport clipping, you can clip off the front or back of the geometry in the viewport so you can see what is happening inside of it. See Chapter 2, "Touring the 3D Studio Max 3 Interface" for more info on this feature.

Understanding Display Modes

Just what do you see when peering into cyberspace from your chosen perspective? Because it takes time to convert all of the polygons and data into a form you can see, MAX provides several ways of viewing 3D objects to keep things moving along at a reasonable pace, as shown by figure 1.10.

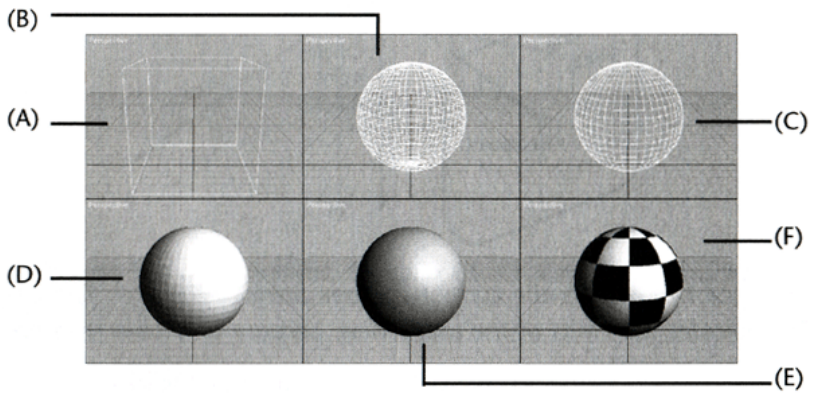


FIGURE 1.10 *MAX is capable of displaying geometry in the viewports in many ways, a few of which are shown here: (A) Bounding Box, (B) Wireframe, (C) Hidden Line, (D) Flat Shaded, (E) Smooth Shaded, (F) Smooth Textured.*

The fastest and simplest display format in MAX is the *bounding box* — a box with the same overall dimensions as the object. The bounding box is a very fast way to indicate an object's position and rough shape and is frequently used in MAX when you're playing back animations or moving an object around in the scene.

Wireframe mode draws the object by using lines to represent the visible edges of the polygon, making it resemble a sculpture made of wire mesh. This enables the user to see the true form of the object and have access to individual vertices for editing and modification.

For a higher level of realism, opt for a shaded display mode. In MAX, a *shaded* view is capable of displaying textures if the material definition is set to display the textures in the viewport. *Flat shaded* mode shows off the surface and color of the object in a coarse manner. The objects appear faceted, but the effects and lighting can be seen for the first time. *Smooth shaded* mode shows the surface of the object with color and smoothing and provides the highest level of realism in MAX. You can also opt for a combination mode called *shaded + edges*, with both shaded and wireframe displays.

MAX 3 also supports a special display mode called *X-Ray*. When this mode is active, all objects are drawn in a light gray color that is semitransparent. The X-Ray mode enables you to easily see inside of an object. It's especially helpful when you have objects, such as bones, inside of other objects.

Coordinate Systems

Until now, the focus has been on the fundamental coordinate system of 3D space, called the *world coordinate system*, as shown by figure 1.11. Although world coordinates are used by MAX to keep track of everything in 3D space, you might want to switch to different coordinate systems for convenience and more precise control over objects. Two of the most common alternatives for the world coordinate system are view coordinates and local coordinates.

¤ tip The more accurate or detailed the display mode, the longer it takes to redraw the viewport when something is changed. This can amount to quite a bit of time over the course of the project, especially with complex models or a scene with many objects. If you find things bogging down, hide unneeded objects or switch to a simpler display mode. These topics are covered in full detail in Chapter 2.

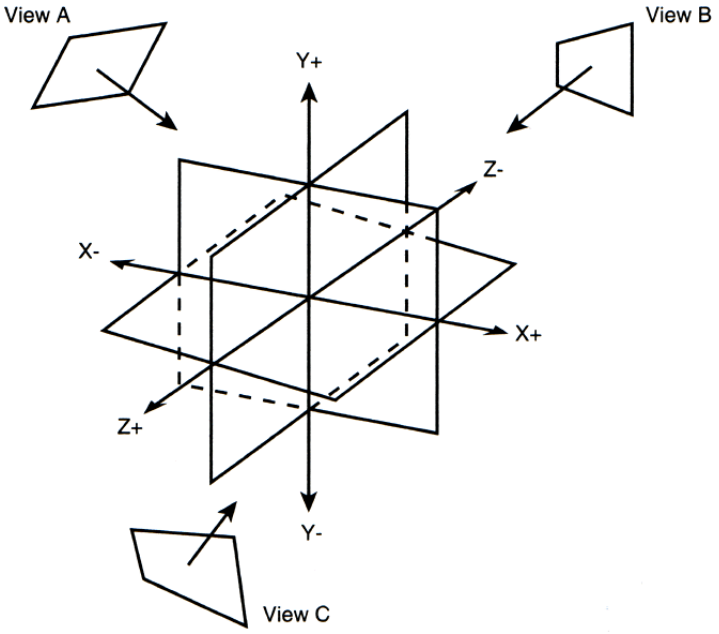


FIGURE 1.11 *The fundamental coordinate system of 3D space is world coordinates. They remain the same, regardless of viewpoint.*

View coordinates use the viewport as the basis for the X, Y and Z axes and remain the same, no matter how your viewpoint on the 3D scene changes (see Figure 1.12)

This can be convenient for repositioning objects. For example, to move an object to the right in your scene, you always have to move it positively along the X axis when you're using view coordinates. Almost all of MAX's default transformations (such as Move, Rotate and Scale) make use of view coordinates as their default coordinate system.

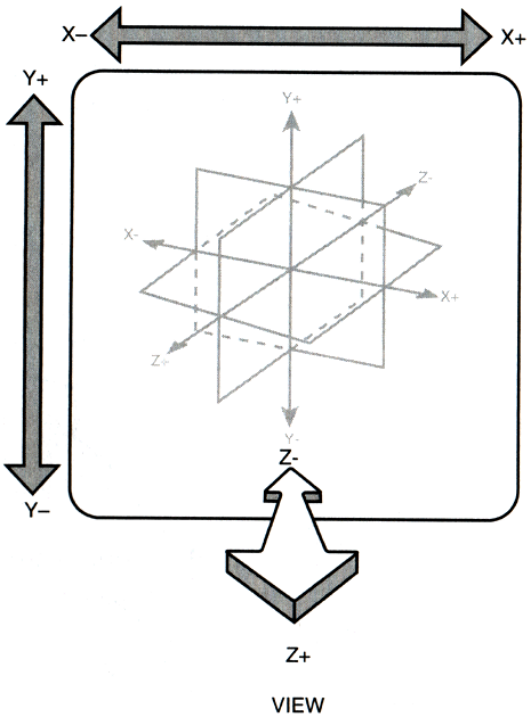


FIGURE 1.12 *View coordinates are tied to the viewport and are always orientated in the same manner.*

Even though you have world coordinate systems, each object in MAX also maintains its own local coordinate system. When you rotate the object in world coordinates, the *local coordinates* rotate with the object, as shown in Figure 1.13. This is very desirable when you are rotating the object because using coordinate systems other than view or local can produce unexpected results. For example, say you rotated a box 45 degrees in the Front viewport and then 45 degrees in the Left viewport. When you look at this box in the Top viewport, you'll need local coordinates to rotate the box correctly along its long axis.

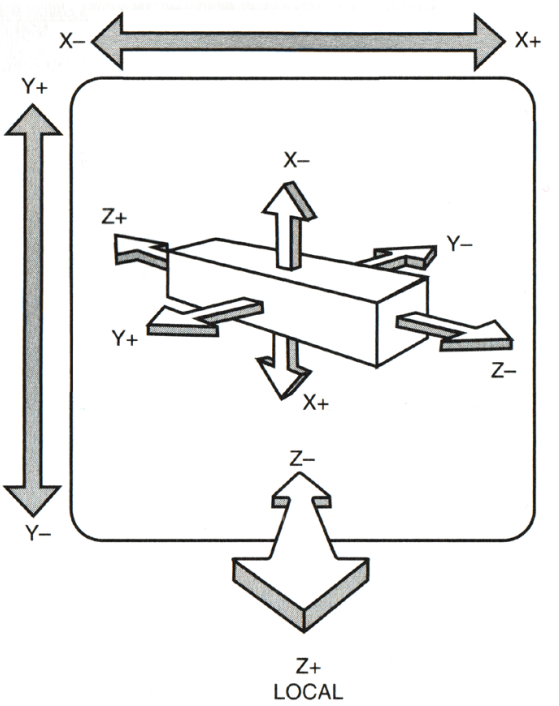


FIGURE 1.13 *Local coordinates are assigned on an object-by-object basis, making it easier to rotate individual objects predictably.*

Coordinate Systems and Rotation

When you rotate an object, three factors influence the way it turns:

- Which coordinate system (world, view, local or user) is currently active
- The location of the rotational center point (the pivot point in MAX)
- Which axis you choose to rotate the object around

As you know, the current coordinate system can have a big impact on how the axes are oriented, so which one to use is the first thing you should decide. In general, you will want to use the local coordinate system when rotating an object around on of its own axes.

When local coordinates are selected, the center point is usually in the center of the object (unless it has been repositioned) and is located at the origin of the local coordinate system.

The final factor, the selected axis, determines which of the three axes to spin the object around, subject to the position of the center (pivot) point.

To illustrate why you must often switch to using the local coordinate system for rotation, imagine that you have created an elongated box like the one in Figure 1.14.

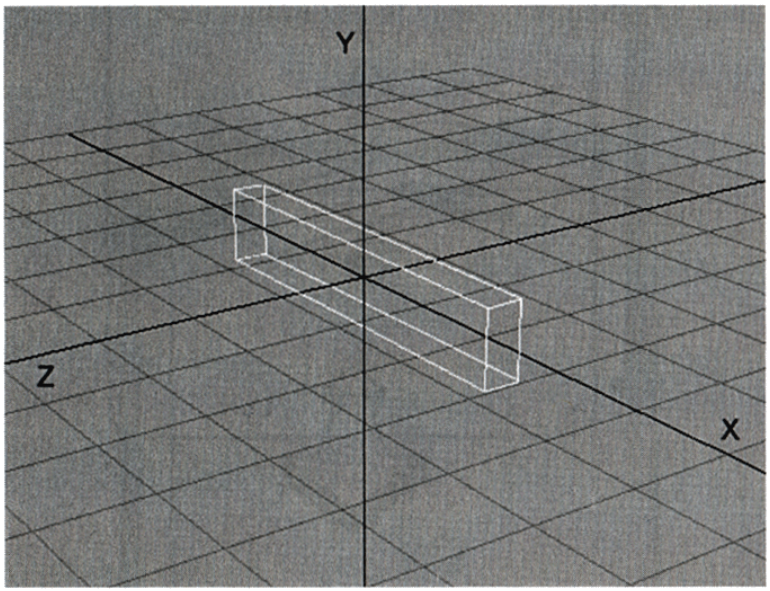


FIGURE 1.14 *When an object is in alignment with the world coordinates, the world coordinates can be used to manipulate it predictably.*

By default, the box is created in alignment with the world coordinate systems. At this point, then, you could rotate the object by using world coordinates without any problems. After you rotate the box at something other than a 90, 180 or 270 degree angle, however, the object's local axes are no longer aligned to the world coordinates (see Figure 1.15). Therefore, you'll be out of luck if you try to use anything except the local coordinates to rotate the object along its X axis, because the object's local X axis and the world X axis are not the same anymore. Indeed, the object would rotate at some oddball angle and it would take some effort to get it rotated in the proper manner.

There are some ways to accomplish a controlled rotation without relying on the local axis. One way is to carefully position the viewpoint to make the view and local axes align and then rotate the object by using the viewpoint coordinate system axes.

A better method is to define a user coordinate system, as shown in Figure 1.16. A *user axis* is just what it sounds like — an axis you define. A user axis can be at any angle, or it can be aligned to an existing axis. In this case, you could define your axis along the same line as the object's local X axis. Then, you could rotate the object around the user axis to accomplish the same result.

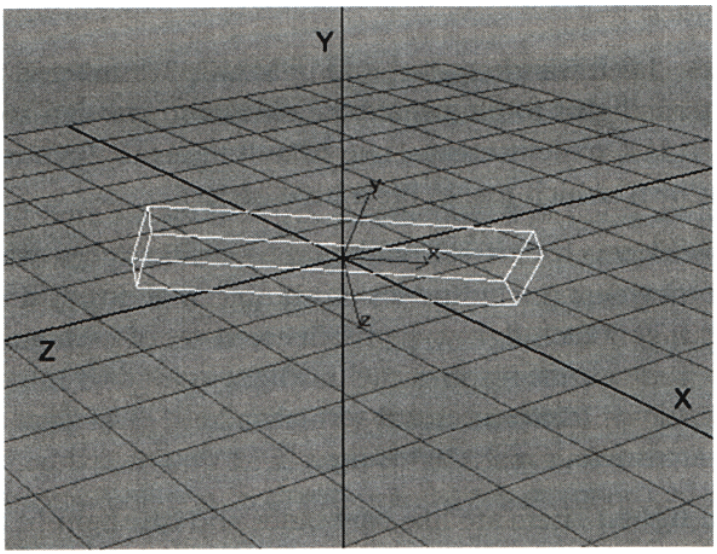


FIGURE 1.15 *When an object is no longer aligned with the world coordinate system, you must switch to local or view coordinates to properly rotate the object around on of its axes.*

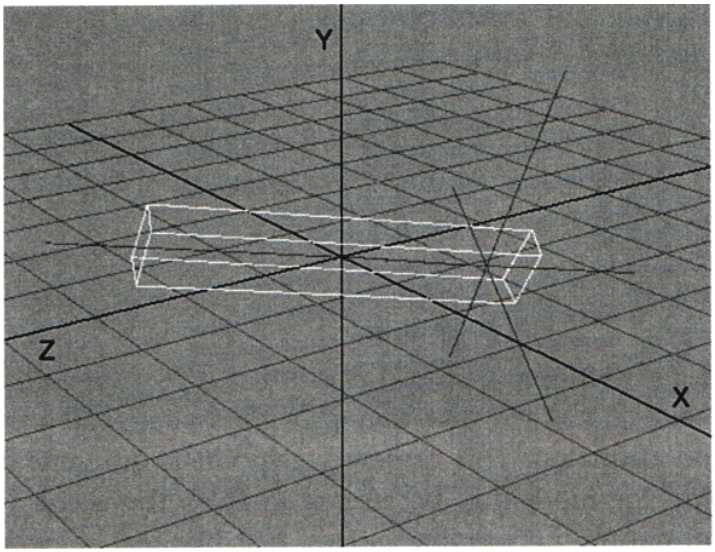


FIGURE 1.16 *An alternative to using the local or view coordinates is to define a user axis, which can be at any angle. User axes are often used for defining joint rotation points in character animation.*

Lights

So far, you've been wandering around in MAX's 3D universe practically in the dark. You need some lights to illuminate the objects so you can see them in the finished rendering. (MAX actually creates two default lights to illuminate the scene until you create your own, which makes life a little easier).

3D lights work much like real photography studio lights except that you can position them anywhere (including inside an object) and they don't fall down if objects bump into them. Each light type has its own set of configuration parameters with which you can control features such as light color and intensity. Also, most lights can cast shadows (different sorts), which add a great deal of realism to a scene. Following are the four main lights used in MAX:

- **Omni lights:** These are like bare bulbs and cast in all directions.
- **Spot lights:** These are directional sources and are often used to highlight portions of an object or provide the main source of illumination for a scene.
- **Distant lights:** Also directional, but used to simulated very distant light sources, such as the sun, that cast parallel shadows.
- **Ambient light:** Present everywhere in the 3D space, illuminating all surfaces equally. Ambient lights generally are used to define a consistent brightness throughout the scene.

MAX allows you to use as many lights in a scene as you like, but adding more lights to a scene increases the rendering time. Lights are covered in full detail in Chapter 11, "Working with Lights and Cameras"

Cameras

Cameras are non-rendering objects that you can position in the 3D scene. They work like real world cameras in that they provide a viewpoint on the scene that can be adjusted and animated. This camera viewpoint is different from most of the ones users employ for modeling, because it enables the scene to be viewed in more realistic and natural perspective modes. Just like real cameras, MAX cameras have different settings for lens lengths and focal lengths, for example, which you can use to precisely control the view of the scene.

MAX gives you two types of cameras: a target camera and a free camera. A *target camera* makes use of a target — a point in 3D space where the camera is aimed — making it easy to see where a camera is aimed in non-camera viewports. A *free camera* doesn't have a target; its view is changed by rotating or moving the camera itself instead of by repositioning a target. Cameras are explored in further detail in Chapter 11.

Rendering

Rendering is the process by which MAX interprets all of the objects in the scene, in the context of lighting, materials, and viewpoint, to produce a finished image. The resulting image may be either a still or a frame in an animation sequence.

To understand how 3D Studio MAX takes a bunch of polygons and turns them into a finished rendering, you have to examine how the computer interprets polygon surfaces. First of all, to be "seen" by MAX as a surface, a polygon must have a normal. A *normal*, represented by an arrow sticking out of the centre of the face, indicates which side of the face is visible and which direction it's facing, as shown in Figure 1.17. If the normal faces away from the camera, the face is invisible. The opposite is true if the normal faces the camera. When MAX begins rendering, it calculates how much lighting is striking a particular polygon face (and from which direction), based on the orientation of the normal.

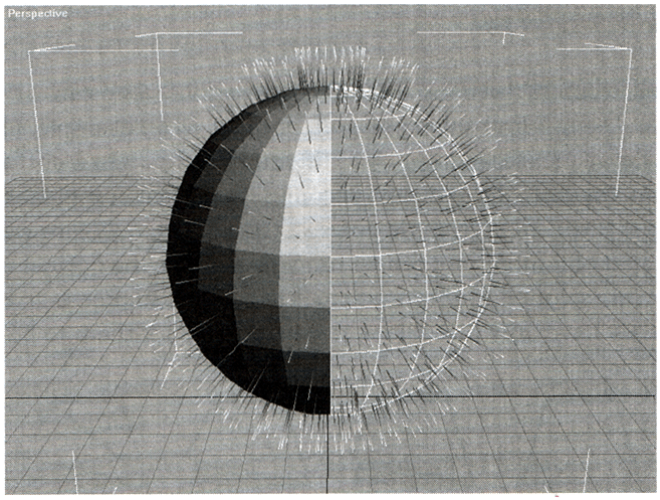


FIGURE 1.17 *Normals are imaginary lines extending from polygon faces. They are used by the software to calculate the intensity and direction of light striking the face. They also determine the visibility of a face. If a normal is facing away from the camera, the face is invisible.*

Most of the time, only one side of a polygon face has a normal, making it a *single-sided polygon*. Single-sided polygons can only be "seen" from the side with the normal, which can cause some problems in some rendering situations (such as when a camera is moved to the inside of an object), as shown in Figures 1.18a and 1.18b. Therefore, the MAX rendering engine can be instructed to make a polygon double-sided, so it can be viewed from either side, as shown in Figures 1.18c and 1.18d.

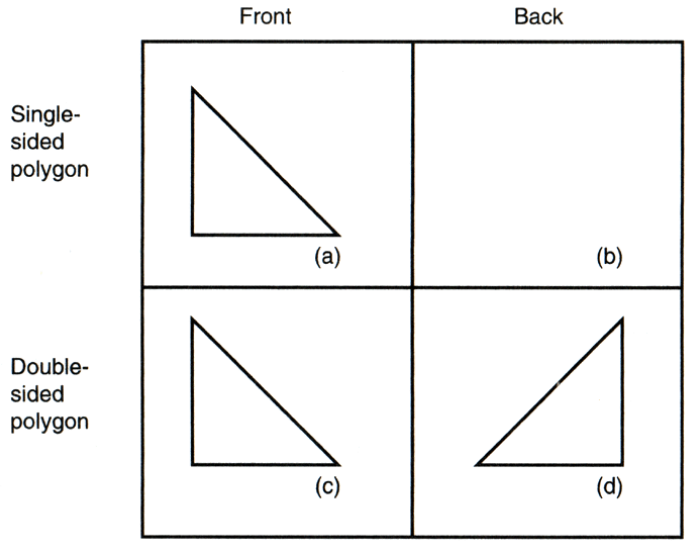


FIGURE 1.18 *Single-sided polygons have only one visible face, but double-sided polys are visible from either side.*

Rendering troubles such as "invisible" polygons also can arise if a polygon is nonplanar. Using a four-sided polygon, or quad, as an example, imagine that it's resting on a flat plane (see Figure 1.19a). If you take the right front vertex and pull it up away from the rest, the polygon becomes "bent", or nonplanar (see Figure 1.19b). Although it is still an acceptable polygon (remember, polygons can have any number of sides), part of it might not render properly because the normal won't be in the right position. One solution to the problem is to convert all objects to triangular polygons. Because they only have three sides, it is impossible for them to become nonplanar.

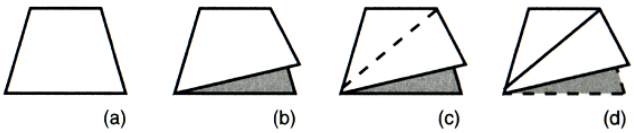


FIGURE 1.19 *Polygons with more than three vertices can become nonplanar if one of the vertices is out of alignment with the others. This can result in rendering errors.*

In addition to taking into account the position of normals, when the MAX rendering engine renders a scene, it considers any color or texture (material) that has been applied to a polygon, the positions of lights, their intensity and color, and many other factors. Then MAX renders the results of these calculations on the screen as an image.

MAX supports several rendering modes (either natively or through plug-ins) in a material-by-material basis. In other words, you define the rendering modes on an object-by-object basis by assigning different materials with different types of properties. MAX 3 provides basic support for nine different shading modes.

MAX 3 supports the following rendering modes.

- **Wireframe.** This is the fastest and most basic rendering mode. It is very similar to a wireframe display in a viewport.
- **Phong.** In this mode, MAX calculates the color at each vertex of the face and then interpolates the result across the polygon face. The effect is smoothly blended object surfaces that are much more realistic than a flat rendering's surface. In addition, *specular highlights* (the bright reflections of light seen on glossy objects) are added for more realism.
- **Blinn.** Similar to Phong, but produces a more subtle highlight that tends to look a little more realistic.
- **Metal.** Provides enhanced highlights and deep rich colors within the material itself. This gives the material a deep metallic appearance.
- **Oren-Nayar Blinn.** Very similar to the Blinn mode; the difference is in the highlights. Oren-Nayar has a very subtle highlight, making this type of shading excellent for fabrics and other non-reflective surfaces.
- **Anisotropic.** A modified version of Ward anisotropic, which stretches the anisotropic shading in one direction only. Ward provides you with two directions of controls.
- **Strauss.** This shader is used to create enhanced metal effects and generally is better than the older metal shader. Strauss does a better job of handling the highlights and deep color effects that appear in metal objects when the shininess is high.
- **Multi-Layer.** This shader is the last anisotropic shader. It is called a multi-layer shader because it enables you to layer specular highlights on top of each other. If the highlights are different, you can create an anisotropic effect.
- **Raytracing.** The color and value of each pixel on the screen is calculated by casting an imaginary ray backward from the viewer's perspective into the model, to determine what light and surface factors are influencing it. The difference between raytracing and the other methods mentioned (called collectively *scanline rendering* techniques) is that the ray can be bounced of surfaces and bent just like real light, producing excellent shadows, reflections and refractive effects.

¤ upgrader's note

MAX 2 supported only five shading modes. To get the most out of MAX 3, you will probably want to convert some of your materials over to the newer MAX 3 materials and shading modes. See Chapter 12, "Fundamentals of Materials" and Chapter 13, "More on Materials" for more on these features.

> MAX actually implements raytracing as a material instead of as a completely different rendering mode. This gives you the advantage of selectively raytracing objects in the scene, as well as increasing the speed.

Beyond these basic shading modes, you can make use of other modes in MAX through the use of plug-in rendering engines. Through plug-ins, you can add raytracing engines with advanced features or even make use of advanced radiosity rendering techniques. *Radiosity* is a global illumination system by which light is distributed throughout the entire model, enabling a single light to correctly illuminate the scene. Lightscape and RadioRay are examples of radiosity that work with MAX. With radiosity, you can produce extremely accurate lighting for a scene, but at the cost of very long rendering times. The materials mentioned here are explored in chapter 12 and 13, and rendering is discussed in Chapter 14, "Rendering".

Animation

The last topic of 3D graphics to discuss here is *animation*, which can be defined as the movement of objects over time. Time in the digital world is interpreted as frames. By displaying still frames at a quick enough rate, you create the illusion of animation. This is the principle behind traditional animation and is also the principle that enables us to watch films. Three standards of time are used the most: NTSC, PAL, and FILM. NTSC is defined as 30 frames per second, PAL as 25 frames per second, FILM as 24 frames per second.

Animation is created in MAX by using keyframes. A *keyframe* is a frame in which a particular animation event must occur. Keyframes are placed in different frames along a timeline, and then animation is interpreted between the keyframes. This enables you to quickly and easily create animation without having to position the objects in every frame, as in stop animation or traditional cell animation.

MAX enables you to animate just about everything, from the position of an object to the actual object creation parameters (such as length and width in the case of a box). You can move and change objects, pieces of objects, lights, cameras and even materials. You can view the animation as a timeline or function curve in MAX's TrackView utility. Chapter 15, "Understanding Animation Concepts", Chapter 16, "Exploring Basic Animation Methods" and Chapter 17, "Exploring Other Animation Methods" explore the methods by which MAX enables you to create animation.

Conclusion

In this chapter, you explored the following topics:

- 3D graphics defined
- Moving from 2D to 3D graphics
- Principles of 3D computer graphics

That's it for basic 3D theory behind MAX. In other sections of the book, you will find more on 3D theory, with in-depth explanations of specific aspects of 3D theory, where applicable. This chapter provided an overview to help familiarize you with the terminology and basic process.

Now it is time to start becoming familiar with MAX. The next chapter gets you started by introducing you to the MAX 3 user interface and how to work with it.

CHAPTER 2

Touring the 3D Studio MAX 3 Interface

Before exploring how to make the most out of 3D Studio MAX 3, you need to learn how to navigate around in the program. In other words, you need to get a little practical experience working with the MAX 3 interface and some of the features it presents to you.

At the end of this chapter, you'll create and animation of a basic corporate logo. This exercise helps demonstrate the overall workflow process of MAX and gives you some practical experience in using the MAX interface. This same exercise is also used in other chapters in this book to explore relevant topics. In particular, this chapter covers the following topics:

- The MAX 3 Interface
- Working with Files
- Working with Xrefs
- Working with Viewports
- Selecting Commands
- Customizing the MAX Interface
- Controlling the Display of Objects
- Object Naming
- Working with Groups
- Working with Object Selection
- Bringing it All Together
- Using the Asset Manager
- Using Plug-ins with MAX

The MAX 3 Interface

The 3D Studio MAX 3 interface is quite powerful and provides a highly streamlined workflow process. Thanks to this advanced interface, you will find working with MAX to be extremely intuitive, enabling you to learn the software quickly and grow with it well into the future. The interface in MAX 3 has been totally reworked from the MAX 1 and MAX 2 interfaces, and you can now customize the interface fully. Figure 2.1 shows you the new MAX 3 interface.

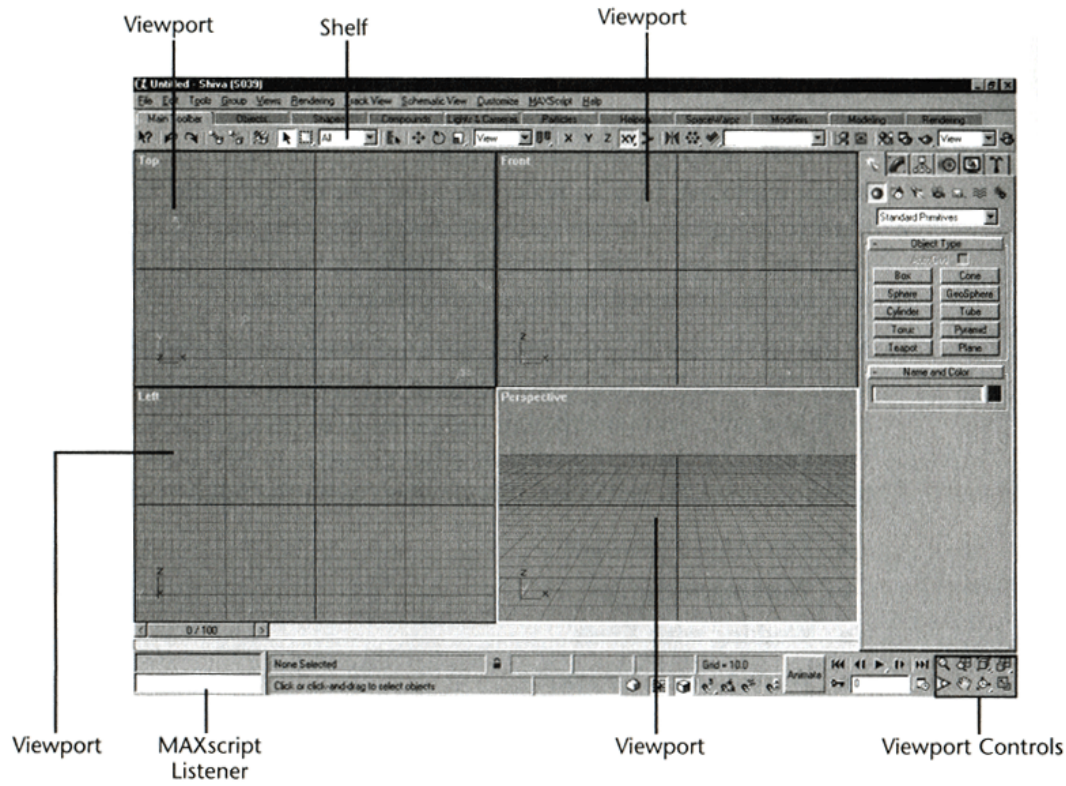


FIGURE 2.1 *Important areas of the MAX 3 interface include the viewports, the command panel, the Main toolbar, the Tab Panel, the viewport controls, and the MAXScript listener window. This screen shot uses the smaller toolbar icons.*

Working with Files

Before further exploring the interface, this is a good time to look at how MAX works with files. 3D Studio MAX files are loaded and saved with a **.MAX** extension. By choosing File, Open or File, Save, you can use standard Windows Open and Save dialog boxes, but MAX provides you with more file functionality than that.

In MAX, you are also able to merge files, replace files and import files.

File Properties

Another new feature to MAX 3 is the capability to save file properties with the MAX file. File properties are simply text-based information strings that are saved with the file, enabling you to fully describe the file. Some examples of properties include Title, Subject, Author, Category and Keywords. You can access the File Properties dialog box, shown in Figure 2.2, by selecting File, Properties from the pull down menus.

In addition to the basic file properties, the Contents tab of the File Properties dialog box displays important information about the file, such as objects, materials, number of faces, and even what plug-ins are used in the file. Last, the Custom tab enables you to add your own custom text fields, such as Checked By or Date Completed so you can perform basic project tracking through the file properties.

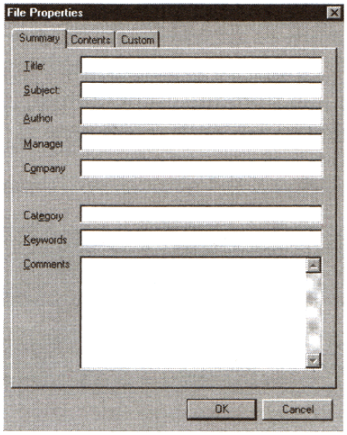


FIGURE 2.2 *In the File Properties dialog box, you can add full text descriptions of your file.*

The nice thing about file properties is that they are exposed directly in the MAX file itself. If you are browsing your system with the NT or Windows 98 Explorer and you run across a MAX file, you can right click the file, choose Properties, and access this information. Figure 2.3 shows you an example of this in Windows NT 4.0.

¤ upgrader's note

MAX 3 does support the opening of MAX 1.x or 2.x files by simply opening the file with File, Open. In most cases, the file imports but you will need to make changes to the lights, materials and antialiasing settings to take advantage of the new features in MAX 3. If, for some reason, the file will not load with File, Open, try using File, Merge and then saving the file, which converts it to MAX 3 format.

Unfortunately, MAX 3 files cannot be opened in MAX 1.x or 2.x. In this case, you need to use File, Export and export the file as a .3ds file.

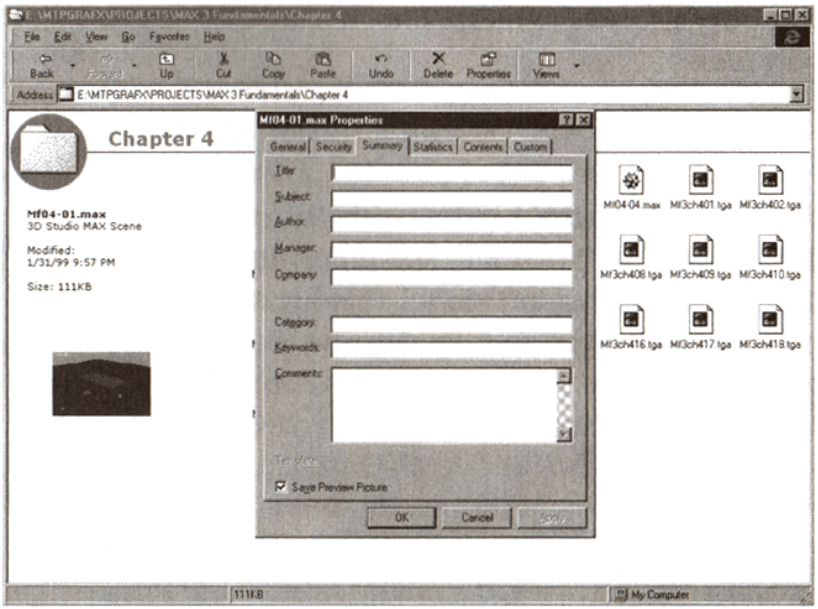


FIGURE 2.3 *The MAX file properties exposed through the NT Explorer. You can access these properties without loading the file.*

The last benefit of the MAX file properties involves the MAX File Finder. The MAX File Finder utility enables you to search your hard drive or network for files. In other words, by using a custom file property field, you could search for all MAX files created by a particular animator in your company or for all files related to a specific client.

To access the MAX File Finder, go to the Utility command panel. Click the More button, select MAX File Finder from the list of utilities, and click OK. When a Start button appears in the command panel, click this button to launch the File Finder, shown in Figure 2.4

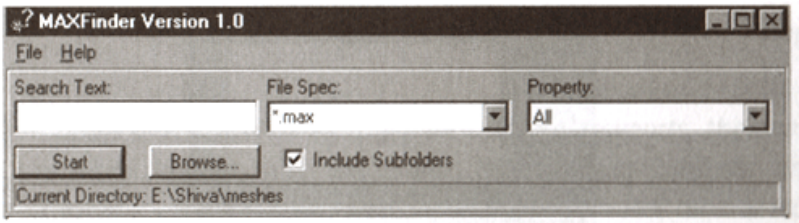


FIGURE 2.4 *The MAX File Finder, where you can search your systems for MAX files, based on filename or file property information.*

Using the file properties and the MAX File Finder provides complete control over your MAX files, from information to organization. A good idea is to start using the file properties to document your MAX files as you create them. You'll find the files easier to work with in the future.

Merging Files

One of the nicer file features of MAX 3 is the capability to load a file and merge it with the current scene. This is handy anytime you want to bring an object in from another scene and use it in the current scene. Even more useful is that you don't have to merge the entire file. When you select the file, MAX prompts you with a Select by Name dialog box where you can select objects, lights, cameras and such that you want to merge from that file. It's extremely easy to reuse components from scenes you have created in the past. Worth noting is that you can merge only other 3D Studio MAX files. To bring non-MAX files into your scene, you must use File, Import instead. The following exercise merges several objects from one scene to another.

Merging a File into a Scene

1. Choose File, Merge. You are presented with a File Open dialog box.
2. Select the file **MF02-01.MAX** from the accompanying CD. The Object Selection dialog box appears, where you can select the objects from the file that you want to merge into your scene. Select all objects in the list and choose OK.
3. If you selected any objects that have the same name as objects in your current scene, you are prompted to rename them. At this point, you're merging a table with a teapot on it into the scene.

   A similar merge command available in MAX is File, Insert Tracks, which enables you to pull animation tracks from one file and insert them on another. This feature is covered in Chapter 16, "Exploring Basic Animation Methods".

Replacing Files

As an alternative to merging files, you can replace objects in your scene with objects from another MAX file. Select this option by choosing File, Replace. When you select a file with which to replace objects, MAX searches the selected file for object names that match those in your current scene. Because object naming in MAX (discussed later in this chapter) is case sensitive, only exact matches are processed. If MAX finds any exact matches, the objects are replaced. This command relies on the naming of objects to perform the replacement. Make sure you do not give two objects in your scene the same name.

For example, if you are working on a complex animation, you can replace complex objects with simple stand-in objects to make editing the animation quicker. Then, when it comes time to render the file image, replace the proxy objects with the real objects.

Importing Files

The last file operation to look at is MAX's capability to import files from other formats. You can import other file formats by selecting File, Import. You can also export files by choosing File, Export. Natively, MAX supports 3D Studio 4 (3DS, PRJ and SHP), Adobe Illustrator, IGES, StereoLithography (STL) and AutoCAD (DWG and DXF) for imports, and supports 3D Studio 4, ASE, DXF, STL, DWG and VRML WRL files for exporting. Additional file formats are supported for input or output through the use of plug-ins. This provides you with practically unlimited file-exchange capabilities with the appropriate plug-ins.

After you have opened, imported, or merged your files into MAX, you can see the data in the MAX viewports. The viewports are powerful tools for viewing your scene from a variety of angles as you create and modify the geometry and generally work with your scene.

Working with XRefs

One of the major new features added to 3D Studio MAX 3 is that of XRefs. *XRefs* (also called external references) are a method of placing objects or entire scenes in your current scene (called the parent scene) by referencing an existing MAX file. If you then make a change to the referenced scene or object, MAX updates all parent scenes to which the changed scene is referenced. If you have worked with programs such as AutoCAD in the past, you will find this concept very familiar. MAX supports two types of XRefs: objects and scenes. You can access both commands through the File menu.

XRef Objects

XRef objects enable you to reference one or more objects from one or more external files into your scene. This saves time and promotes efficient workflow in a workgroup situation. You can access the XRef object's controls by choosing File, XRef Objects to open the dialog box shown in Figure 2.5.

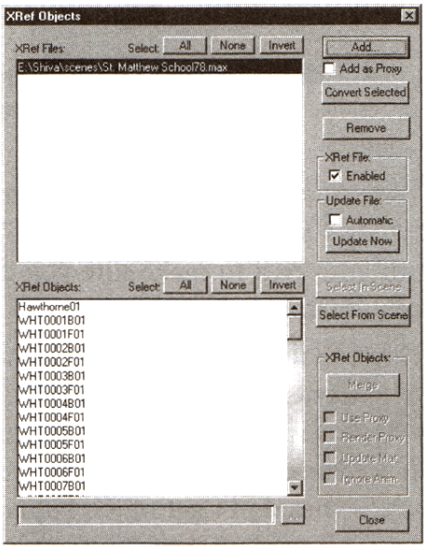


FIGURE 2.5 *The XRef Objects dialog box. Here, you can select a scene and any objects in that scene to be referenced into the current scene. You can also use this dialog box to manage those references.*

Adding XRef objects is a very simple process:

1. Select the Add button in the upper-right corner.
2. Select the MAX file that contains the objects you want to XRef into the current scene.
3. A list appears of objects in that scene. Select the objects you want.
4. Choose Close and the objects are loaded into the scene.

When objects are referenced into the current scene, they are treated as standard MAX objects with a few exceptions. You can scale, rotate and move the objects around in the scene as you like; you can even change the materials on the object. But, you cannot apply modifiers or change the geometry short of the basic transforms in MAX.

You can return to the XRef Objects dialog box to manage your XRef objects. One thing you might want to do is update the current XRef in your scene. If someone else is working on the object on another machine, you can simply update the XRef to reload it. You can also enable Automatic Updates; that way, if a change is made, it is automatically updated in your scene.

More importantly, you can select referenced objects in the bottom portion of the dialog box. After you select these objects, you can "bind" them to the scene by clicking the Merge button to merge the object instead of creating a reference to it.

Following are several advantages of XRef objects:

- You can create repositories of objects in individual MAX files. For example, you can create files for trees, cars, people and more, and then simply XRef the objects into your scenes.

- If you want to change one of the reference objects, changing the repository file updates the object for all scenes that reference it. This, of course, requires good file management on your part to make sure you don't inadvertently update an object that shouldn't be updated.

- You can also use XRefs to manage the parent scene's file size. In the past, if you merged objects into a scene, they became part of the scene, increasing the size of the scene. Now, only a marker is saved in the scene, telling MAX where and how to load and place the object the next time you load the scene. Hence, the MAX files for parent scenes don't get much larger in size.

- The biggest advantage of XRefs comes when you are working as part of a group on a large scene. Through this system, several people can be working on different objects in the same scene and another person can be collecting these objects and placing them in a scene to see how they work.

One thing to be careful of when working with XRefs is file locations. When an object is referenced into a scene, the location of that file on your system or network becomes important. If you move or rename the referenced file, you will have a broken link in your scene. You can fix this link in the XRef Objects dialog box. To fix the link, you need to remove the XRef and then recreate it by using the Add button. As a rule, if you have sets of files that you consistently XRef into scenes, place them in a directory or set of directories you will not change.

XRef Scenes

XRef scenes work on a similar principle to XRef objects, but you reference an entire scene rather than just objects out of that scene. If you choose File, XRef Scenes, you receive the dialog box shown in Figure 2.6.

The process of adding XRef scenes to your current scene is the same as for XRef objects, except you don't have to select any objects. When a scene is referenced, you can choose to ignore various parts of the scene, such as cameras, lights, shapes, helpers or even any animation contained in the scene. You can also bind the scene to another object in your scene so the object becomes a parent of the referenced scene. Then, when the bound object moves, so does the scene.

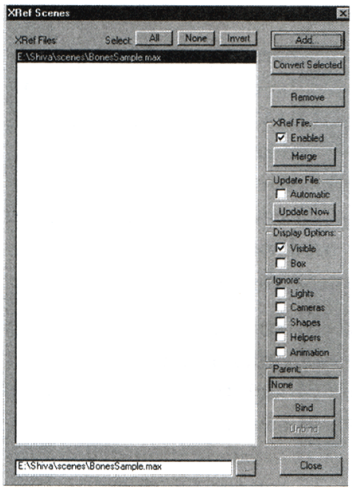


FIGURE 2.6 *The XRef Scenes dialog box, where you can manage entire scenes.*

The most important difference between XRef scenes and objects is the fact that XRef scenes, when loaded into the current scene, cannot be selected, moved, or otherwise modified. You can't even use Move, Transform or Scale on these scenes unless you bind them to another object. As a result, if you are going to create scenes for referencing into other scenes, you must be careful about the size, scale and location of all objects in the scenes or they might not match you import them.

Overall, XRefs are powerful tools for both workgroups and individual animators. By making use of these features, you can create links between files that enable you to make broad changes to large numbers of different scenes without much difficulty or time.

Now that you have a good sense of how files are handled by MAX, it is time to take a look at the MAX viewports.

Working with Viewports

One of the most important user-interface features is the MAX viewports. MAX *viewports* enable you to view your scene from any of a variety of angles. Without the viewports, you cannot select objects, apply materials, or perform any other operation on the scene itself.

Obviously, working with the MAX viewports is very important. MAX comes up with a default setting of four viewports: Top, Front, Left and Perspective, as shown in Figure 2.1. These views can be changed, manipulated, and controlled in just about every way you could possibly need. As a result, the capability to configure your viewports becomes important.

Configuring Viewports

MAX viewports support many types of settings and modes, all of which can be configured by you, the user. You can configure MAX viewports in one of two ways. The first method is to right- click the viewport name in the upper-left corner of each viewport window. This pops up a menu where you can adjust the most commonly used viewport settings. Figure 2.7 shows you this pop-up menu.

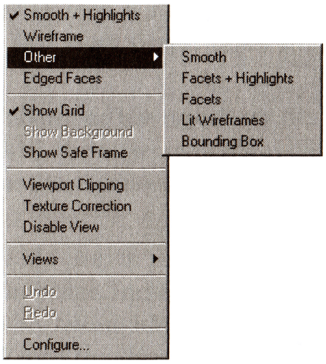


FIGURE 2.7
The viewport pop-up menu where you can select the shading level, view, or other viewport options with a right click.

The second method of controlling viewports is through the Viewport Configuration dialog box, which can be accessed through the pop-up menu, or by selecting Customize, Viewport Configuration (See Figure 2.8). The Viewport Configuration dialog box provides you with more options for the viewports than the pop-up menu. In general, you use this dialog box to set viewport features permanently or to apply the features to more than one viewport at the same time.

The tabs on the Viewport Configuration dialog box include the following:

- **Rendering Method:** On this tab, you can set the Rendering Level, Apply To, Rendering Options, Fast View and Perspective User options. Figure 2.9 shows you the various rendering methods in MAX viewports.

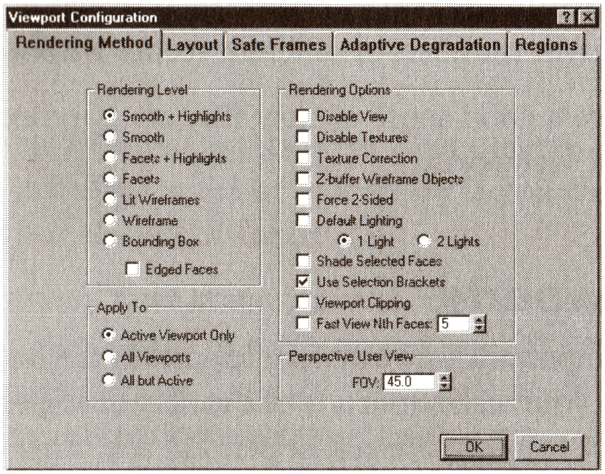


FIGURE 2.8 *The Viewport Configuration dialog box where you can completely control the viewports in MAX, from the shading level to the layout.*

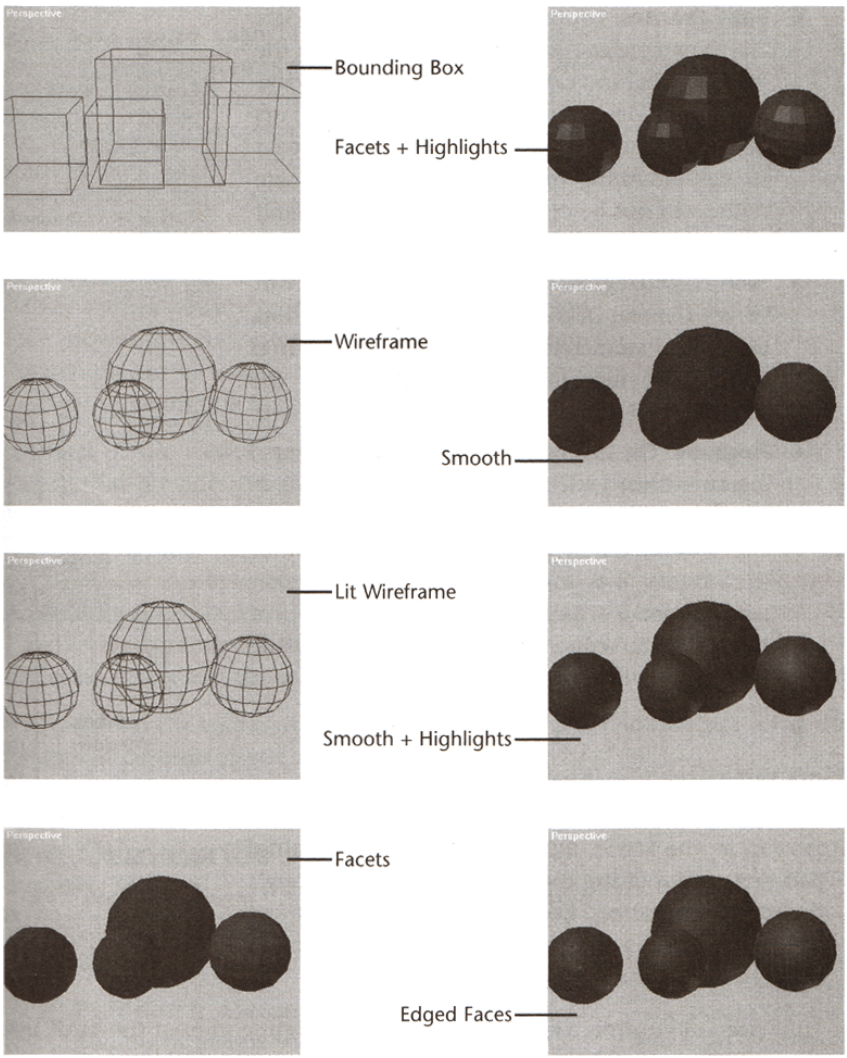


FIGURE 2.9 *The rendering levels available in the Viewport Configuration dialog box. Controlling the rendering level directly affects the performance of your system.*

- **Layout:** At the top of this tab are several predefined layouts from which you can select. You can change the viewports by clicking each shaded area and selecting the view you want from the pop-up menu that appears. You should select the viewport layouts you think will enable you to work with MAX most efficiently.

- **Safe Frames.** On this tab, you can set the Safe Frame parameters. *Safe Frames* create a box in the viewport that indicates the safe area of the view. When you view your animations on a TV, parts of the image are chopped off to fit the TV screen format. Anything that appears within the safe frame will not be cropped on a TV. The default safe frame is 90 percent of the original frame.

- **Adaptive Degradation.** On this tab, you can set the General Degradation, Active Degradation, Degrade Parameters and Interrupt Settings options. These control how MAX adjusts the shading level of the viewports to optimize speed.

- **Regions.** On this tab, you can set up a zoomed region within which to work for camera viewports. In other words, you can temporarily convert a camera view to a blowup of a portion of the camera view so you can work at a higher level of detail. The Virtual Viewport option of the regions is only available when you are using the OpenGL driver.

¤ upgrader's note

Previous versions of MAX supported a Swap Layouts feature enabling you to use a hotkey to switch between two different layouts (A and B). That feature is no longer supported in MAX 3 because of changes to the interface.

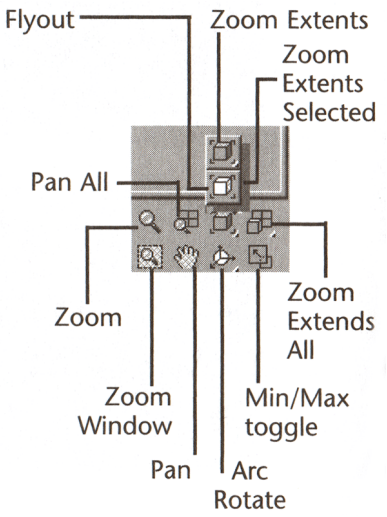


FIGURE 2.10
The MAX Viewport controls, with which you can zoom, pan or rotate your view of the scene.

Working with the Viewport Controls

The viewport controls enable you to maneuvre around in the scene. Operations such as zooming, panning and rotating the view are handled through the viewport controls. Even camera views and others that are created as objects in MAX can be controlled through the viewport controls.

The viewport controls are located in the lower-right corner of the MAX interface, as shown in Figure 2.1. Depending on the type of viewport currently active, the buttons shown here will change. For example, a different set of buttons is available for a camera view than a top view. When you select a viewport control, the button turns green to indicate it is active for the current viewport. Figure 2.10 shows you each of the standard MAX viewport controls.

In addition to the color change on the selected button, the MAX cursor changes to indicate the currently selected viewport control command. Almost all of the viewport controls are based on a click-and-drag methodology. Zoom, which enables you to zoom in and out of your scene, works by clicking and dragging the mouse up and down in the current viewport.

¤ note MAX 3 provides full support for the Microsoft Intellimouse. This enables you to use the wheel to perform functions, such as zooming, in any viewport. Three-button mice are also supported, enabling you to pan and zoom with the middle mouse button.

In addition, MAX supports *cursor wrapping*, which occurs when you are using a command such as Zoom. When you are zooming in on a viewport, you are moving the cursor toward the top of the screen. When the cursor reaches the top, it automatically wraps to the bottom of the screen so you can continue to zoom in further.

Several of the viewport controls have flyout toolbars (shown previously in Figure 2.10) that provide additional viewport controls. The presence of a flyout toolbar is indicated by a small black triangle in the lower-right corner of the button. To access the flyout, click the button and hold the mouse button down until the flyout appears. For example, the Zoom Extents command has a sister command that performs the Zoom Extents command but limits it to the currently selected object. The Arc Rotate command has two sister commands: one to rotate around the currently selected object and the other to rotate around the currently selected sub-object.

Throughout the course of this book, you will get plenty of practice using the various viewport controls as you work through the exercises.

Selecting Commands

MAX provides several primary methods for selecting commands in its user interface. Commands can be selected from the following:

- **Pull-down menus:** MAX has a total of 11 pull-down menus you can use to access certain commands, such as file commands or rendering commands. These pull-down menus work just like pull-downs from other Windows programs.

- **Tab Panel:** A new addition to MAX 3 is the Tab Panel. The Tab Panel is a toolbar that supports a tabbed interface with each tab representing a different toolbar (refer to figure 2.1).

¤ upgrader's note

The short toolbar that was available in MAX 2.5 and earlier is no longer available in MAX 3. You will need to run your interface at a minimum of 1024x768 to see all of the toolbar when using the small icons. If you are not able to do this, you can click the toolbar and drag it left and right to access commands that are offscreen.

The Tab Panel is powerful and flexible enough that the Main Toolbar has been moved to the Tab Panel as its own tab. Most of the commands available in MAX are found on the Tab Panel. In addition, you can add your own commands and MAXScript Macros to the Tab Panel as well. The Tab Panel can be easily displayed or hidden by pressing the Y or 2 keys on your keyboard. This hotkey toggle is very useful when you need more screen space to work on your scene.

- **Command panels:** MAX has six command panels (Create, Modify, Hierarchy, Motion, Display and Utility), each with its own set of commands and functionality. You switch command panels by clicking the appropriate tab to bring that command panel to the front.

- **Floating command palettes:** These palettes are replicas of specific commands found in certain command panels. Because they are floating, they are modeless dialog boxes, meaning you can access them at any time without canceling other commands. An example of such a command panel is the Display floater which provides you with all the object display controls on a floating panel.

- **Keyboard shortcuts:** These are simply quick methods of accessing commands by one and two key combinations on the keyboard. To create or adjust your own keyboard shortcuts, select Customize, Preferences from the pull-down menus. Then, select the Keyboard tab in the Preferences dialog box. You may save your own set of keyboard shortcuts to a file if you want to be able to load them into a different MAX session.

In some cases, there are multiple methods for accessing the same command, but most commands are found only in one place in the interface.

When you use MAX plug-ins, they integrate seamlessly into the interface. As such, plug-in commands are accessed in the same way as the standard commands in MAX.

¤ note The first time you load 3d Studio MAX 3, you will notice that the Main Toolbar uses larger icons (24x24 pixels) than it did in previous versions (16x16). The larger icons are intended to be used on system running at a screen resolution of 1280x1024. If your system is not capable of running that high, you can switch to a smaller set of icons by choosing Customize, Preferences and turning off Use Large Toolbar Buttons on the General tab. You will then need to run your system at 1024x768 to be able to see all of the small icons. All screen shots in this book use the 16x16 pixel icons, so your screen might look different, depending on how it is configured.

¤ tip MAX 3 supports keyboard shortcuts for both MAX itself and any plug-in that might be running in MAX. At the bottom of the screen, to the left of the Crossing/ Window select button, is a Plug-in Keyboard Shortcut toggle. When it is toggled to active, all keyboard shortcuts work with plug-ins. When inactive, they work within MAX itself.

Command Panels

The next method for selecting commands is through the command panels. By far, you will use the method more than any other, especially if you do a lot of work with plug-ins in MAX. Figure 2.11 shows you the Create command panel and its various parts.

3D Studio MAX provides six command panels (Create, Modify, Hierarchy, Motion, Display and Utility), each with its own set of commands and functionality. You can switch among command panels by clicking the appropriate tab to bring that command panel to the front. Switching command panels cancels the currently selected command.

Take a closer look at Figure 2.11 and notice the layout of the Create command panel. Across the top of the command panel are seven buttons, each with a drop-down menu. The seven buttons categorize different types of MAX objects you can create — Geometry, Shapes, Lights, Cameras, Helpers, Space Warps and Systems.

When you select the Geometry button, for example, a drop-down list appears below the button, categorizing the different types of geometry you can create. Figure 2.12 shows you the drop-down list.

The command panel is hierarchically organized to enable you to quickly and easily find a specific command. After you select a set of commands under the Geometry button, such as Standard Primitives, a rollout appears and lists the types of standard primitives you can create. By selecting any of these buttons, you are actually selecting a command in MAX. When you do so, further rollouts appear blow the Name and Color rollouts.

The box command has three rollouts, two of which are open. The keyboard entry rollout is closed, indicated by the + symbol to the left of the rollout header. Clicking the header once expands the rollout; clicking a rollout header that is already open closes the rollout.

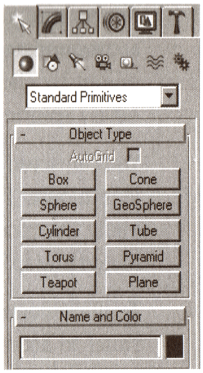


FIGURE 2.11
The Create command panel is where you access most of the commands that generate geometry in your scene.

¤ tip The entire command panel can be undocked from the right side of the scene and turned into a floating command panel. This makes accessing commands quick and easy. See the section on "Customizing the MAX Interface" later in this chapter.

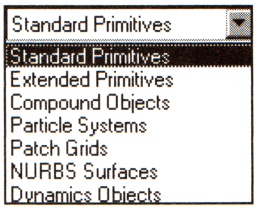


FIGURE 2.12
The Geometry drop-down list, where you can select the type of geometry you want to create. Selecting a type of geometry changes the buttons listed below in the command panel rollout area.

As you can guess, sometimes the rollouts become much longer than the screen can accommodate. In these instances, you can use the mouse to scroll up and down the rollout by clicking and dragging vertically on any area of the rollout that does not have a spinner or text box.

You can speed up the scrolling of rollouts by holding down the Ctrl key while dragging your mouse. This increases the scrolling speed substantially. You can use this feature in many instances, including zooming or panning in the viewports or browsing in the Material/Map browser.

To make command panel access even easier, you can now right-click the command panel to access a pop-up menu with rollout controls. These controls enable you to maneuver around in the rollouts quickly and easily. Figure 2.13 shows you this pop-up menu.

At the top of the menu shown in Figure 2.13, you can expand or collapse the current rollout or all of the rollouts. In the bottom half of the menu, in a context-sensitive area, you can selectively open and close rollouts specific to the command with which you are working.

The rest of the command panels are similarly configured with command buttons at the top and rollouts at the bottom. Only the Modify and Utility command panels enable you to customize the buttons that appear at the top of the command panel. As you progress through the rest of this book, you will become accustomed to using these command panels.

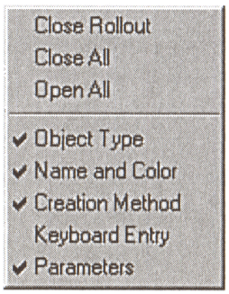


FIGURE 2.13
The command panel rollout pop-up menu where you can quickly manipulate a command panel.

Keyboard Shortcuts

Another method of accessing commands in MAX is through the use of keyboard shortcuts. Keyboard shortcuts are simply quick methods of accessing commands by a key or a two key combination on the keyboard. Many people find this is the fastest method of accessing commands.

To create or adjust your own keyboard shortcuts, choose Customize, Preferences from the pull-down menus. Then, select the Keyboard tab in the Preferences dialog box to get the screen shown in Figure 2.14.

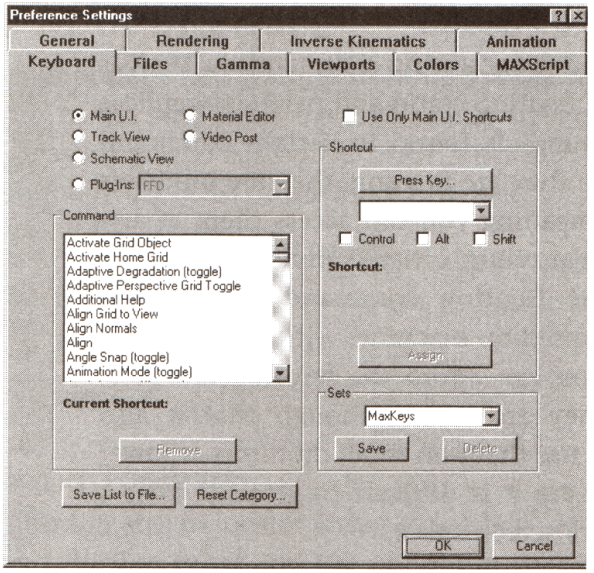


FIGURE 2.14 *The keyboard shortcut controls in the Preference dialog box. Here, you can create and customize your own keyboard shortcuts to enable quick access to MAX commands.*

At the top of the Preferences dialog box are six categories of keyboard shortcuts to work with: Main UI, Track View, Schematic View, Material Editor, Video Post and Plug-ins. Any plug-ins you have installed in your system that work with custom keyboard shortcuts will appear in this drop-down list. MAX, by default, supports shortcuts for FFD modifiers, NURBS plug-ins and video post plug-ins in addition to the standard Video post shortcuts. When you select a category, the commands that can have keyboard shortcuts assigned to them appear in the command window.

To assign a keyboard shortcut, first select the command from the list. Under the shortcut section of the dialog box, select whether you want to use a Ctrl, Alt or Shift key modifier and then select the Press Key button. When you now press a key on the keyboard, it is assigned to the command. If you select a key modifier (for example, Shift), you need to hold down that key when you select the key to make the command active. After you select a key, it appears in the drop-down list below the Press Key button. Additionally, three checkboxes are available by which you can assign Ctrl, Shift or Alt modifiers after the fact. If the keyboard shortcut you choose is already assigned to another command, MAX notifies you with a note above the Assign button.

Floating Command Palettes

Another method for accessing commands in MAX is to make use of floating command palettes — replicas of specific commands found in certain command panels. Because they are floating, they are modeless dialog boxes, meaning you can access them at any time without cancelling any other commands. For the most part, the floating command palettes are intended to be used on a machine with a dual screen setup where you can afford the screen real estate. Fortunately, they are handy enough that it also makes sense to use them on small monitors at lower resolutions, where it is difficult to give up even a small amount of screen space.

A good example of such a command palette is the Display palette shown in Figure 2.15. This palette is activated by choosing Display Floater from the pull-down Tools menu. The Display command floating palette provides you with a method of accessing the commands found in the Display command panel without having to leave another command panel.

¤ tip MAX now supports an Expert mode for working with keyboard shortcuts. In Expert mode, the entire MAX interface (except for viewports) is removed and you work completely with shortcuts. This provides you with much-needed screen real estate. Expert mode is activated by choosing View, Expert mode from the pull-down menus or by pressing Ctrl+X. A Cancel button is provided in the lower-right corner of the screen for returning to normal operation.

Another good example is the Object Selection floater, which enables you to perform Select by Name operations at any given time, again without leaving the current command panel.

FIGURE 2.15 *The Display Floater provides you with modeless access to display commands so you do not need to access the Display command panel.*

You might remember from the earlier discussion on command panels that when you switch command panels, the current command is canceled. Using floaters avoids this problem and the associated waste of time. Otherwise, the commands found in the floaters are functionally the same as the commands found in the command panels.

Customizing the MAX Interface

One of the most important new features in MAX 3 is the capability to customize the interface of MAX. In the past, MAX has had a fairly rigid and straightforward interface, with few areas for you to customize. MAX 3 has changed this by enabling you to customize the following areas of the MAX interface:

- Floating toolbars and command panels
- The Tab Panel
- Your own toolbars
- Your own commands

Working with Floating Toolbars

The first customization area to look at is that of toolbars. At the top of the MAX interface you will find the Tab Panel and the pull-down menus. The pull-down menus themselves are actually toolbars, and the Tab Panel is a place where you can put toolbars for quick access. By default, these are in a "docked" position; in other words, they are locked to the top part of the screen.

To undock a toolbar, simply position the cursor near the edge of the toolbar until the cursor changes to an arrow over the top of a white box. When you have this cursor, click and drag to undock the toolbar and place it in a floating position. The Tab Panel cannot be undocked, but you can undock the toolbars on the Tab Panel by right clicking the Tab Panel and choosing Convert to Toolbar. At this point, the toolbar is removed from the Tab Panel and converted to a floating toolbar. Figure 2.16 shows you the MAX interface with the pull-down menus and command panel floating.

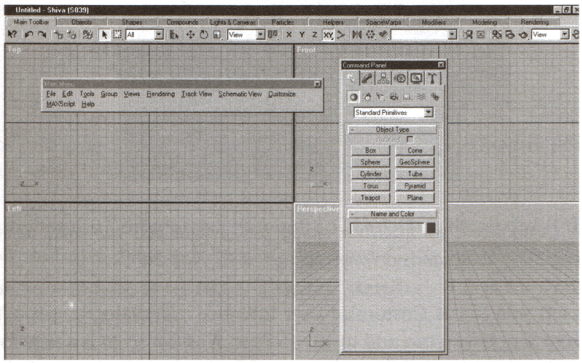


FIGURE 2.15 *The MAX interface with the pull-down menus and command panel floating. These floating toolbars work just like floating toolbars in Microsoft Office. You can resize or reposition them, or even dock them to any part of the screen.*

When a toolbar is undocked, you can dock it in two ways. The first way is to click the toolbar and drag it to the edge of the screen until the outline changes shape. Then, let go and the toolbar docks. You can dock the toolbar on the top, bottom, left or right edge of the screen. The other way to dock the toolbar is to right-click the title of the toolbar. A pop-up menu appears, as previously shown in Figure 2.17, enabling you to modify the toolbar.

At the top of the pop-up menu are commands to dock or float the selected toolbar. At the bottom of the pop-up menu are commands to enable or disable the display of the toolbars. To conserve more screen real estate, you might turn off certain toolbars you don't use that often. Toolbars can also be moved to the Tab Panel, which is discussed in the next section.

More importantly, you can customize or even create your own toolbars through this pop-up menu by choosing the Customize option and opening the Customize User Interface dialog box shown in Figure 2.18

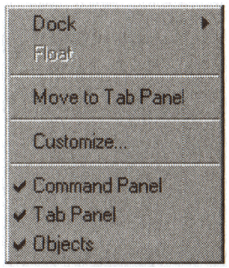


FIGURE 2.17
The toolbar customization pop-up menu. Here you can select various options for customizing the toolbars in MAX.

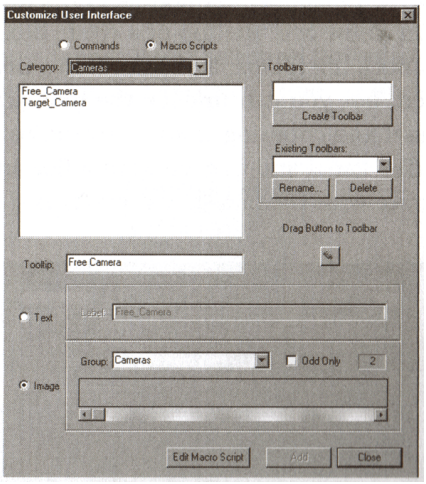


FIGURE 2.18 *The Customize UI Interface dialog box, where you can add, delete or change any commands on any toolbars or the Tab Panel.*

On the left side of the Customize User Interface (UI) dialog box is a list of commands and Macro Scripts you can add to any toolbar. A *Macro Script* is a new form of MAXScript command with which you can quickly and easily create macros and place them on toolbars. This feature is covered in Chapter 18, "Exploring Post Processing Techniques."

The following tutorial shows you how to use the Customize UI dialog box to create your own toolbar of commands.

Creating Your Own Toolbar

1. On any toolbar, right-click the edge of the toolbar to access the pop-up menu. If the toolbar is floating, right-click the titlebar.

2. Choose Customize from the pop-up menu to load the Customize User Interface dialog box.

3. In the upper-right corner of the dialog box, find the Toolbars section. In the top blank area, type the name of the toolbar you want to create. In this case, name the toolbar **MAX 3 Fundamentals**.

4. Choose Create Toolbar, a prototype toolbar is created with the specified name. Figure 2.19 shows you the toolbar at this point.

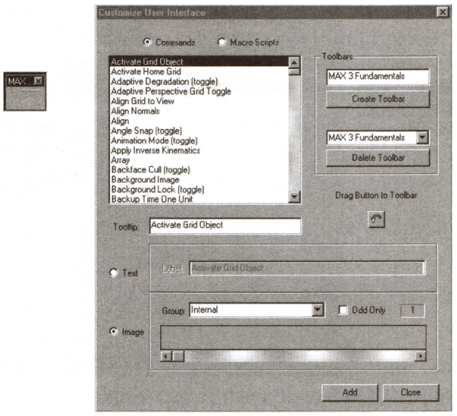


FIGURE 2.19 *The prototype MAX 3 Fundamentals toolbar. Now all you have to do is add commands to it.*

5. Ensure that the Commands radio button is selected. Scroll down the list of commands and find the Quick Render command. Click this command once to select it.
6. In the Tooltip box, enter **MAX 3 Quick Render**. This is the Tooltip that will appear over this button.

7. At the bottom of the dialog box, click the Image radio button, if it is not already selected. This enables you to use any predefined image you want for the image on the button. Under the Group pull-down list box, select internal and then select any image you want.

8. Click and drag the sample button and drop it on your new toolbar. After you do this, you might need to resize the toolbar to see the button. Figure 2.20 shows you the toolbar at this point.

9. Choose Close to return to MAX. You can now dock the toolbar or use it as you would any other toolbar.

For added practice, you might try creating additional commands on this toolbar or creating your own.

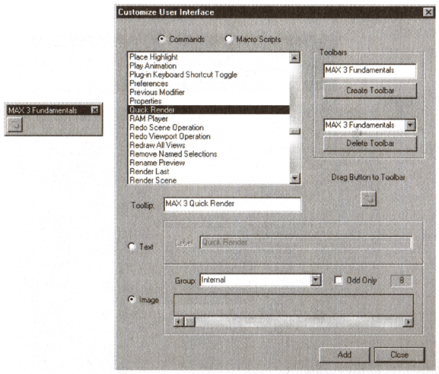


FIGURE 2.20 *The MAX 3 Fundamentals toolbar with a single command added.*

In the previous exercise, the images you used for the buttons were already built into 3D Studio MAX, but you can create your own images for use on buttons. To do so, you must follow a few rules:

1. You might have noticed that when you selected the image for your button in the exercise, you selected an icon from a predefined group. You may create your own groups by careful naming of the image files you are going to use for the buttons. Image filenames must use the format Groupname_16i.bmp and Goupname_24i.bmp. The numbers 16 and 24 represent the sizes of the images.

You must create both a 16-pixel-square image and a 24-pixel-square image for use on the small and large icon toolbars. If both aren't present, the image will not be made available. Image files should be saved in the UI directory of your MAX installation.

2. You may use images that have an alpha channel, but you must tell MAX whether the alpha channel is standard or premultiplied. To do so, the filename should be groupname_16a.bmp for standard images or groupname_16b.bmp if the alpha channel is premultiplied.

3. If a mask channel is present in the image, it is used. If an alpha channel is available in the image, it is used. Otherwise, the color of the pixel in the upper-left corner of the image is used as a transparent color and the mask is generated based on that color.

It is worth mentioning at this point that you do have the option of editing any button you create on a toolbar, after you have created it. Simply right-click the button and choose Edit Button Appearance or Customize to change the button.

Up to this point, only toolbars at the top of the screen have been mentioned. In reality, there is on other toolbar: the entire command panel. The command panel can be pulled off as a floating panel. Unlike the other toolbars, the command panel can not be moved to the Tab Panel and cannot be docked at the top or bottom of the screen but only the left or right side of the screen. If you use the command panel in a floating mode, you will probably find you're not using the other floating palettes nearly as much.

Now that you've seen basic toolbars, it is time to take a look at the most flexible area of the MAX interface: the Tab Panel.

Using the Tab Panel

The Tab Panel is another UI addition to MAX. The Tab Panel is a special toolbar that is designed to be highly customized. By default, the Tab Panel contains 11 separate tabs or toolbars for each of the main categories of MAX commands. The Tab Panel, shown in Figure 2.21, is where you will access many of your commands and most of your custom commands, if you choose to create any.

FIGURE 2.21 *The MAX Tab Panel is a great place to put custom commands or customized toolbars for quick and easy access.*

Unlike other toolbars, the Tab Panel works on a tabbed window basis. Multiple toolbars are stored on the Tab Panel under different tab names. You can add or delete tabs by right-clicking the Tab Panel tabs and choosing Add Tab, Delete Tab or Rename Tab. Each tab, in reality, is a small toolbar. As such, any tab can be converted to a toolbar and vice versa.

To add a toolbar to the Tab Panel as a new tab, right-click the title bar of the toolbar and choose Move to Tab Panel. Now the toolbar appears as the far right tab on the Tab Panel. The only toolbar you can't move to the Tab Panel is the pull-down menu toolbar.

Toolbars that exist on the Tab Panel are just as easy to customize as the regular toolbars. As a matter of fact, the method is exactly the same, with the only difference being that you must right-click the Tab Panel to access specific controls. There is one exception — you cannot modify the Main Toolbar on the Tab Panel.

Loading and Saving Custom UIs

Up to this point, you have seen many different ways to customize your system. All of these changes can be saved to custom .cui files you can load into any copy of MAX 3. For example, you might create custom interfaces for different types of tasks, such as modeling, material-editing and animation. Or, if you have different users who use the same machine at different times, each user can now have a personal user interface. To get an idea of how powerful it is to be able to create your own interface, Figures 2.22 and 2.23 show you two different interface layouts that ship as custom UI's for MAX. Figure 2.22 shows you an alternate default layout; Figure 2.23 shows you a games modeling layout.

MAX 3 starts with two different custom UI files, the DefaultUI.cui file and the MAXStart.cui file. The default file contains all the standard MAX interface defaults, enabling you to quickly restore MAX to its factory condition. The MAXStart.cui file is updated with the latest settings every time you end your MAX session to ensure that the interface wil be the same next time you load MAX.

You can save custom interfaces by choosing Customize, Save Custom UI. The default UI is saved at the end of every session. You can also load custom UIs by choosing Customize, Load Custom UI. UI files are saved in your UI directory in your 3dsmax installation. What exactly is saved in the .cui file? Basically, the layout of the interface, the toolbars, and the command panels are saved, but many items — such as the preferences — are saved to the 3dsmax.ini file instead and apply to all users.

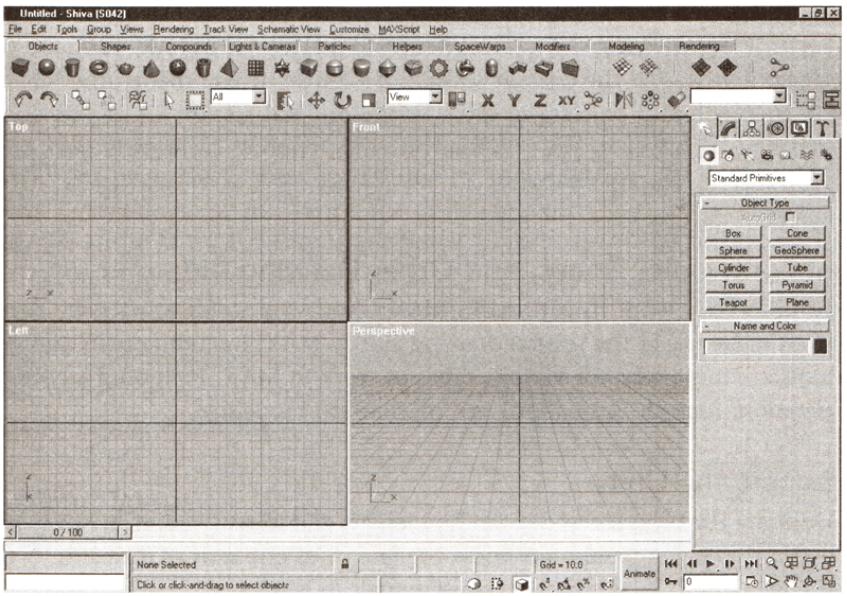


FIGURE 2.22 *An alternate default interface layout.*

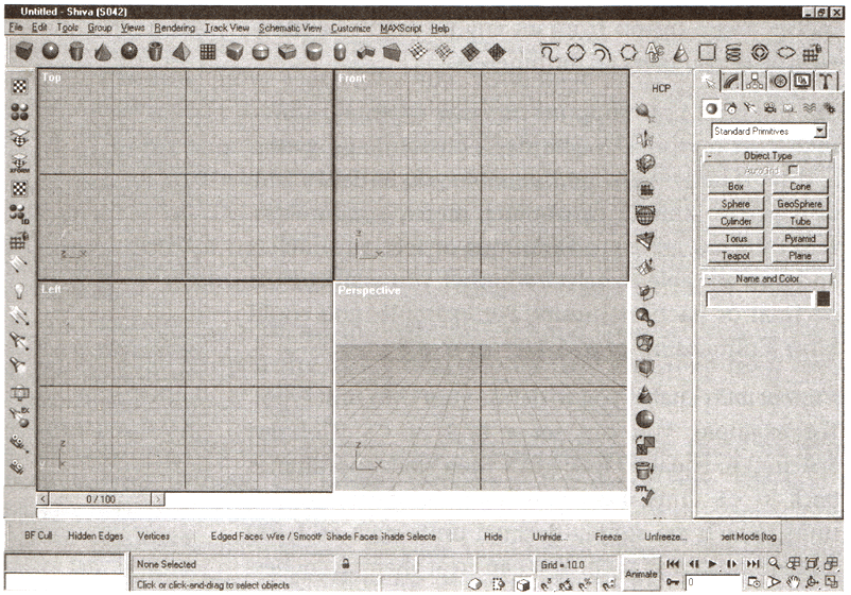


FIGURE 2.23 *A games modeling layout.*

If you happen to make a change to the UI that you didn't mean to do, don't worry about it. By selecting Customize, Revert to Startup UI Layout, you load UI with which you started the current session. Of course, if you made other changes to the UI, they will also be reset in favor of the original session UI. If you don't want to make any changes to your UI inadvertently, choose Customize, Lock UI Layout to prevent any unnecessary changes.

Working with Units, Snaps and Other Drawing Aids

To accurately work in 3D Studio MAX when you are creating your drawings, you must make use of the several drawing aids in MAX, including *units* and *snaps*. These tools are important for various types of work in MAX, including architectural visualization, forensic animation and mechanical modeling.

Setting the Units

Units are the basis for understanding length and measurement in MAX. Without the use of units, you would not know the length of one unit as it relates to anything in the real world. To accurately create models in MAX, you must set up a unit system that is appropriate for the type of model with which you are working. For example, a house might be modeled in feet and inches and a piston from an engine might be modeled in centimeters or millimeters.

3D Studio MAX supports several types of units, including metric, U.S. Standard, custom and generic (the default). *Metric units* enable you to define one unit as a millimeter, centimeter, meter or kilometer. *U.S. Standard units* are variations of feet and inches and you are able to select whether you want to use decimal or fractional units. For example, you could have a dimension of 6'-5 1/2" or 6'-5.5".

Custom units enable you to define your own unit types. For example, you can set a unit of CS (Column Spacing) to equal 10 feet; MAX then reads coordinates back in CS units. Last, you have default *generic* units, which are simply decimal units such as 1.100 and are treated as such. You can treat them as inches, feet or anything you like.

¤ tip In the world of computers, you can deal with numbers only up to a certain size. Because of this, scenes in MAX become less accurate as they grow larger. For example, at 1-foot resolution, MAX is very accurate, but at a resolution of 671,089 feet, MAX can only be accurate to 0.0625 feet. Although that is still quite accurate, the degree of inaccuracy increases as you get larger. To help compensate for this, an Accuracy Explorer is now included in MAX and appears under the Units settings on the General tab of the Preferences dialog box. Select your units and then adjust the slider to see how accurate you can get.

Units are defined through the use of the Units Setup dialog box. You can access this dialog box, shown in Figure 2.24, by selecting Units Setup from the Customize pull-down menu. When you finish selecting your units and choose OK, the units are immediately put into effect. You can see this by watching your coordinate readout. When the units are selected, the entire MAX interface immediately makes use of them. When you're selecting units, you must take care to type in values with the correct units as well.

After setting your units in your MAX file to the units you want to work with, you can set up your snaps to enable accurate drawing.

¤ note Below the U.S. Standard dop-down list, you will see two radio buttons: Feet and Inches. Use these to determine which unit to use if you type in a value without specifying whether it is feet or inches. For example, if you type in a value of 5, is it five feet or five inches? What you set here determines the result.

Setting Snaps

Snaps force the cursor to jump to a specific place in your scene when you are selecting a point, such as the corner of a box (generally called a vertex). Snaps enable you to precisely position points you select as you are creating or editing an object. For example, if you create a staircase in your scene, you can use snaps to create each step in the correct position so you don't have to move a step after you create it. To accomplish this, set a Vertex snap so you can accurately select the corner vertices of the previous step. You can snap to a wide variety of places, including parts of objects — such as vertices, edges and pivot points — or parts of the MAX interface — such as the home grid or construction grid.

Snap commands are accessed through the Grid and Snap Setting dialog box shown in Figure 2.25. To open the dialog box, choose Grid and Snap from the Customize drop-down menu.

¤ note The coordinate readouts at the bottom of the MAX screen are extremely powerful in helping you to understand what is going on in MAX. They tell you the position of the cursor in the current viewport. They also tell you how far you move an object, when you use the Move command, or how many degrees you have rotated the object. When you work through the exercises, take the opportunity to watch the coordinate readout and make use of it.

As you can see from the Grid and Snap Setting dialog box, there are four areas you can configure through the tabbed sections of the dialog box. The first one is the snaps. MAX has 12 snap types that enable you to control placement or creation of objects. The basic snaps shown here are valid for all objects, but MAX also supports a second set of snaps specifically for use with the NURBS systems. You can access these through the drop-down list in the dialog box.

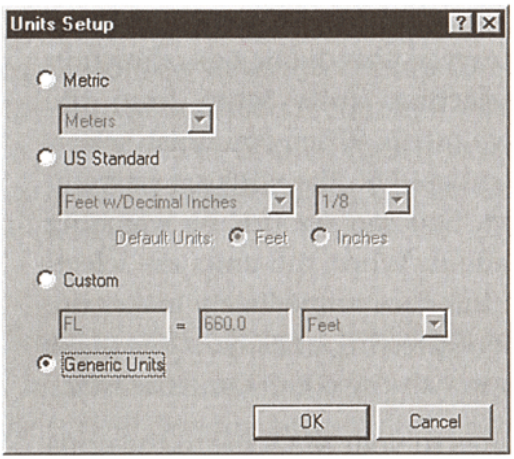


FIGURE 2.24 *The Units Setup dialog box Is where you can select the type of units you are most comfortable working with in MAX.*

Next to each snap you can select a small symbol. When you activate snaps in MAX and try to pick a point, MAX displays the appropriate symbol for all active snaps. This gives you a clear indication of exactly what you are selecting and where it is in the scene.

Even though you may select one or more snaps in the Grid and Snaps Settings dialog box, snaps are not active until you turn on a snaps toggle, several of which are located at the bottom of the screen, as shown in Figure 2.26. When these are enabled, you can use any combination of Snap modes to create very accurate models inside of 3D Studio MAX.

The Options tab of the Grid and Snap Settings dialog box enables you to define the settings for some of the other snap toggle buttons, including the Angle snap toggle. By setting the Angle spinner under Snap Values, you can determine the degree increments MAX will use while rotating objects when the Angle snap toggle is active. The default is five degrees, forcing you to rotate objects in five-degree increments when it's active.

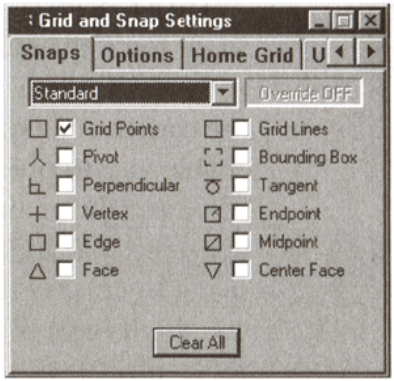


FIGURE 2.25
The Grid and Snap Settings dialog box, where you can define the type of snaps that are active, as well as the grid spacing

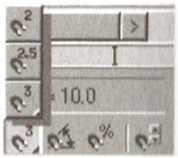


FIGURE 2.26
The snap toggle buttons for MAX. Snaps are not enabled until you enable one or more of the snap toggle buttons.

The Home Grid tab of the Grid and Snap Settings dialog box enables you to set the spacing, in units, of the grid that appears in your viewports. The default is 10 units, with major lines every 10 lines. For example, you might want to change this when you are working in U.S. Standard units. Because you are working in feet and inches, it might be better to set the grid to 12 units so your grid is spaced at 1-foot increments instead of 10 inches.

¤ tip If you don't want to turn on a snap that is always on, you can enable snaps for single-click selections. To do this, hold down the Shift key and right-click your scene. A pop-up menu appears, where you can select the various snap options.

Along with snaps, construction grids are valuable drawing aids. You can use construction grids to work on completely different planes than with the home grids (XY, YZ or ZX planes) that are default construction planes in MAX.

Working with Construction Grids

Construction grids are helper objects that enable you to work on a plane other than the home grid. Working on a different grid can sometimes give you an easier way to work with objects that are rotated in an unusual manner. They are also helpful for creating a group of objects on a plane rather than that of the home grid.

For example, you might want to create a sloped table and place objects on the table. You can work in the home grid and rotate and move each object into place on the table. Alternatively, you can create a construction grid on the surface of the sloped table and work directly on the slope as if it were flat.

¤ upgrader's note

MAX 3 now supports the use of floating grids in addition to helper grids. Floating grids are temporary grids you use only while you are creating an object. Helper grids are in the scene until you delete them. Floating grids are accessed in the Create command panel. Their properties are defined in the Grid and Snap Settings dialog box on the User Grids tab. See Chapter 4, "Working with Objects", for more information on how to use floating grids.

You can create construction grids by selecting Helpers, Grid from the Create command panel. Then, you create the construction grid by clicking and dragging out a square. After you create the grid, it must be activated before you can use it. In the following exercise, you can create a simple box on a construction plane that has been rotated out of alignment with the home grid.

Working on a Construction Plane

1. Open the file **MF02-02.MAX** from the accompanying CD. This file contains a single construction grid helper that has already been created.

2. Select the grid object and then choose Views, Grids, Activate Grid Object. The home grid disappears and a new, smaller grid appears on the helper object.

3. In the Create command panel, select the Box command and create a box in the Perspective view. Notice how the box is aligned with the new construction grid.

4. Choose Views, Grids, Activate Home Grid to return to the original construction plane.

When put together, units, snaps and construction grids enable you to work as accurately as you need to when modeling in MAX. Depending on the type of scene, accuracy in your modeling can be very important. With all the accuracy you gain from snaps and grids, however, they do not help when the scene has many objects in it. This is where the capability to control the displays of objects comes in.

Controlling the Display of Objects

One of the more important skills that helps speed the work process in MAX is controlling the display of objects in the viewport. In other words, you need to be able to control whether an object is displayed. If, for example, you have a large, complex scene, turning off the display of several objects helps you focus on one particular object.

First, take a look at hiding objects, which you will find very useful when you start creating more complex scenes.

Hiding Objects

MAX provides two methods of controlling the display — using the Display command panel and using the Display floater. The floater is easier to use because you can turn the display of objects on or off without ever leaving the command panel in which you are currently working (Remember, leaving a command panel cancels the command you are working with in that command panel). The Display floater is accessed under the Tool pull-down menu.

Here are several display commands you can make use of to hide objects in the scene:

- **Hide Selected:** Hides any selected object in that scene.

- **Hide Unselected:** Hides any objects that are not selected. This command is particularly useful you want to work on a single object. You can select that object and then choose Hide Unselected to hide all the other objects in the scene.

- **Hide by Name:** Makes use of the Select by Name dialog box to help you select objects to hide in a scene. This dialog box, which you will see in many other commands in MAX, enables you to select objects by name. In Figure 2.27, you can see the list of objects in the scene.

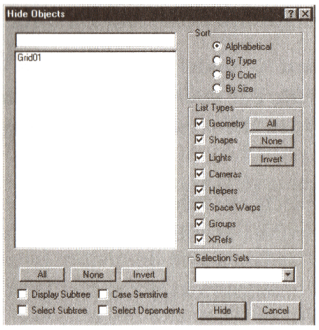


FIGURE 2.27 *The Hide Objects dialog box, where you can select objects by name or type and hide them.*

- **Hide by Color:** All objects have some sort of color assigned to them as they are created. By default, MAX assigns colors randomly, but you can change the color of objects to anything you like. In such circumstances, you can use Hide by Color to hide all objects that are the same color in the scene.

- **Hide by Category:** All objects exist as a part of one or more categories of geometry. For example, objects are categorized as geometry, lights, helpers, particle systems or cameras. You can hide all the objects in a particular category in one command.

- **Hide by Hit:** Enables you to simply click objects to hide them.

¤ tip When using Hide by Category, the Unhide all button is disabled. To unhide any objects that were hidden with Hide by Category, simply turn off that option.

After you have hidden objects, you can also unhide them. MAX provides two commands to accomplish this. You can hide all the objects at once or unhide them by name.

By making use of the display controls in MAX, you can hide and unhide objects at will, making it easier for you to concentrate on specific objects in your scene.

Sometimes, you will want to have an object stay visible in your scene for reference, without being able to make changes to that object. This is where the capability to freeze an object comes in.

Freezing Objects

In both Floater and Command Panel rollouts, you will find a freeze command. This command works in the same way as the Hide command, but it freezes an object so it cannot be edited or even selected. When an object is frozen, it turns a different color (dark gray for geometry, blue for space warps) to indicate it is frozen. You cannot perform any operations on frozen objects until they are unfrozen.

For example, if you want to model some hair for a human head, you need the head as a reference for the hair, but you do not want to make changes to the head. If you freeze the head, it stays in the scene for reference purposes but cannot be modified as you create the hair.

Hiding and freezing objects are valuable tools for working with objects in MAX. The most valuable tool, however, is still simply giving each object a distinct name.

Object Naming

Regardless of the modeling method you choose, you must develop good work habits to make your life easier — the most important is good object-naming skills. Each individual object in MAX has a name associated with it; for example, when you create boxes, they are named Box01, Box02 and so on. Unfortunately, these object names are not particularly useful in scenes with hundreds of objects.

An extremely helpful approach throughout the project is following a consistent naming convention for all objects, and this is vital when the scene is passed on to others for mapping or animation work. Naming conventions are a matter of personal taste. In MAX, you can name objects just about anything you want and to practically any length. MAX object names are case sensitive; in other words, *Leftwheel* and *leftwheel* are two different objects.

Objects in MAX can be named when they are created or by renaming them at any time. Whenever you select an object, the object name and color appear on most command rollouts. You can change the name by simply selecting the object name and typing in a new one; there aren't any special commands.

As an example of good object-naming, if you are planning an animation of a single jet fighter, names such as Nose, Right Wing and Left Wing are okay. But if you are planning a dogfight, you want to distinguish between the right wing objects for each plane, perhaps naming the right wing objects J1Rwing and J2Rwing to indicate Jet 1 and Jet 2 right wings.

¤ tip Be careful with your naming scheme in MAX. MAX does allow the use of duplicate object names, which can complicate and confuse the scene enormously. Don't use the same name for objects twice in the scene, even if you distinguish the difference with a capital or lowercase letter combination.

Because you can name objects just about anything, be creative with your names so you and others can easily distinguish them when looking at your scene.

Naming conventions become visibly important when you use the Select by Name functions to select object by name only.

Working with Groups

Even when you have a good naming scheme in place, working in scenes with large numbers of objects can be difficult. Many times, you will want to transform related objects as one object but won't want to go through the hassle of selecting all the objects in question. You can get around this by using the Groups function of MAX.

Groups are collections of objects that are treated as a single object when the group is closed but are accessible as individual objects when the group is open. The following steps show you how to create a group of objects.

1. Select the objects you want in the group.

2. Choose Group, Group. The dialog box appears.

3. In this dialog box, you can name this group. Group names should be treated like object names.

After you have created the group, all of the objects in the group are treated as one unless the group is open. You can also ungroup the objects, explode the group, detach objects from the group or attach objects to the group.

Groups are very powerful and provide a great way of organizing scenes with many objects. Get into the habit of using groups as early as possible to make your work a little easier.

Working with Object Selection

One of the most important features of MAX and the MAX interface is object selection. Many commands and operations in MAX require you to select one or more objects beforehand. For example, if you want to move an object from one position to another in the scene, you must be able to select the object to move it.

MAX provides you with many different methods for selecting one or more objects in your scene. These methods include

- Selecting by Object
- Selecting by Region
- Selecting by Name
- Selecting by Color
- Selecting by Named Selection Sets

One of the most common methods of selecting objects in MAX is to use the Select Object button from the Main Toolbar. Select Object is most commonly used to select individual objects but can be used to select groups of objects through the use of regions (which is discussed later in this chapter). Figure 2.28 shows you all of the selection tools on the Main Toolbar tab of the Tab Panel.

Selecting by Object

Selecting by object works by simply choosing the command and selecting a single object. Most of the time, however, you will probably want to select more than one object in your scene to apply materials or perform other operations. In these cases, you can modify the Select Objects command to create additive selections — clicking one object after another and adding each to the current selection. To do this in MAX, hold down the Ctrl key as you select; you will see a small plus sign appear next to the cursor. By the same token, you can hold down the Alt key while using select objects to subtract objects from the current selection. In this case, a small minus sign appears next to the cursor.

FIGURE 2.28
The selection tools on the Main Toolbar. Each of these tools enables you to select objects in a different way.

Select by Objects is good for selecting individual objects or a small number of objects, but you will often want to select a group of objects in an area in the scene quickly and easily. This is where selecting by region comes in.

Selecting by Region

Selecting by region is actually an extension of the Select Object command but makes use of "windowed" selection areas. To create a windowed selection area, define a rectangle (or other shape) around the objects you want to select (the rectangle appears as a dashed black line in MAX). There are two different types of windowed selection areas in MAX: Window and Crossing.

A *windowed* region selects any objects that rest entirely within the region rectangle. If any portion of an object is outside the rectangle, it is not selected. A crossing is the same as a window except that a *crossing* selects any object that is inside of or touches the rectangle. Figure 2.29 shows you an example of a region selection.

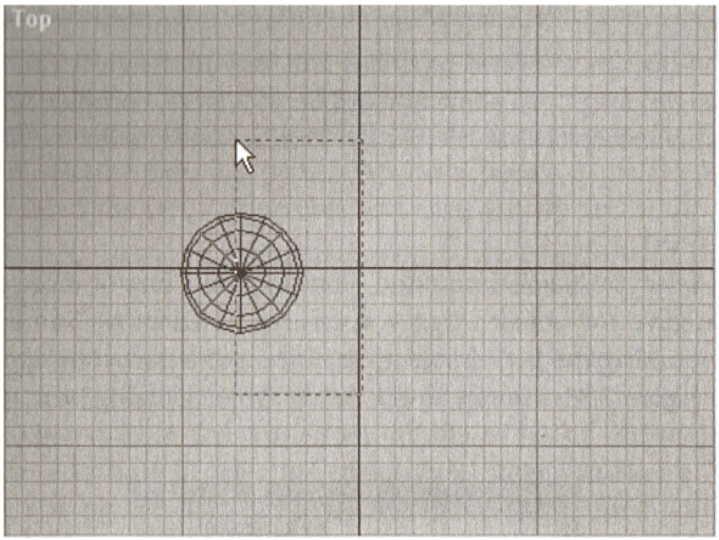


FIGURE 2.29 *A rectangular region selection that crosses the area of a sphere. In this example, a window will not select the sphere, but a crossing will.*

As you can imagine, region select is very powerful, but being limited to a rectangular region can make selecting objects in a complex scene somewhat difficult. Fortunately, MAX enables you to use rectangular, circular or polygonal shapes for your regions. You can choose any shape by opening the flyout toolbar (click the button to the right of Select Objects on the Main Toolbar). Other than the different shape, these select by region commands all work the same way.

To take region selections a step further, you can even filter the selection set. In other words, you can select only objects of certain types that exist within the selection set. MAX enables you to do this through the Selection Filter drop-down list that is just to the right of the Region Shape control. Figure 2.30 shows you this drop-down list.

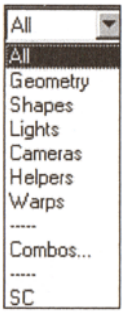


FIGURE 2.30
The Selection Filter drop-down list, where you can choose the type of selection filter you want to use.

For example, if you select Warps from the Selection Filter list, you will only be able to select space warps. This filter applies to all select commands except Select by Name. MAX enables you to create "combos" of selection filters, such as warps and shapes instead of just warps. To do this, select the Combos option, which brings up the Filter Combinations dialog box. Each combo you create end up with a name such as SC (Shapes and Cameras) and appears in the drop-down list.

Although Select by Region is powerful and very intuitive, it can be a difficult way to select a single object you want to work on in a large, complex scene. You always end up selecting an object that is close by. This is where select by name comes in.

Selecting by Name

With the Select by Name command, you can select one or more objects based on the name you gave the object when you created it. Select by Name also has the advantage of restricting the list of objects to objects of a particular type, such as geometry or lights. Figure 2.31 shows you the Select Objects dialog box.

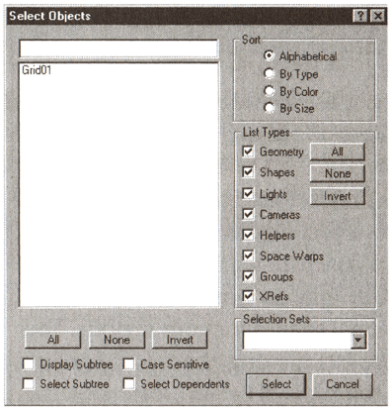


FIGURE 2.31 *The Select Objects dialog box, where you can select one or more objects based on the name of the objects.*

Selecting by Color

In addition to selecting by name, MAX provides you with the capability to select one or more objects by the object color. This can be very handy if you are careful about the colors you select for objects you create. You can access the Select by Color command through the Edit pull-down menu.

Selection Sets

> **¤ tip** In named selection sets, an object can be a member of any or all of the selection sets you create. Objects are not restricted to one selection set.

As you can probably guess at this point, you might run across an object — or more appropriately, a group of objects — that you select and unselect quite frequently during the course of creating your scene. There are two ways to handle selecting this group of objects quickly. The first way is to make a group out of them, which is effective but has its limitations. The other way is to make use of named selection sets (which can also include groups). A named selection set is a group of selected objects to which you have given a name. Because you have named it, you can select the same group over and over, quickly and easily.

Named selection sets are handled in the blank drop-down list on the right hand side of the Main Toolbar.

Although named selections are great, being able to edit the sets is important. For example, you might want to delete a named selection set when you are done with it, or remove objects from the named set, or add to it. For this purpose, MAX provides you with an Edit Named Selection dialog box, shown in Figure 2.32. You can access this dialog box by choosing Edit Named Selections from the Edit pull-down menu.

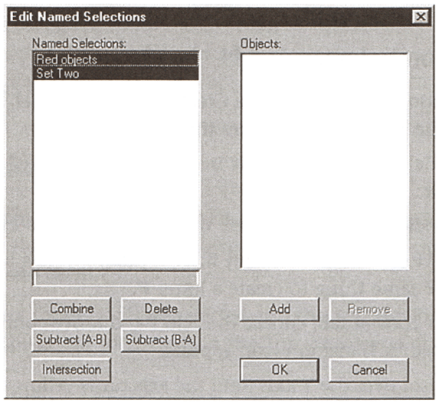


FIGURE 2.32 *The Edit Named Selections dialog box, where you can edit any named selection sets you have already created.*

You have now seen two floating dialog boxes that are available in MAX: Display and Selection. With the addition of customizable toolbars and a floating command panel,

you could easily run out of screen real estate. If you plan on using these dialog boxes or interface features heavily, consider running MAX at 1280x1024 or higher or using a dual monitor setup (They are excellent production tools, so you probably will make heavy use of them). As an alternative, consider learning the keyboard shortcuts and running MAX in Expert mode.

Object selection, naming, groups and drawing aids combine to enable you to work quickly and accurately in your MAX scene. Now it is time to look at how these features and the MAX interface work together to provide you with a truly productive and efficient animation environment.

Bringing it All Together

Now that you have a basic idea of what MAX is and how its interface works, it is time to make use of it. In the following exercise, you get a brief overview of the basic features of MAX, from modeling a simple object all the way through applying materials and animating the object.

Modeling the Letters

In this section you will model the first part of the elements for the corporate logo.

Creating a Corporate Logo

1. Start by creating some text. In the Create command panel, click the Shapes button. Then click the Text command from resulting rollout.
2. In the Text field, type the letter **N** instead of "MAX Text" under the Name and Color rollout.
3. In the Top viewport, click to create the letter. Name the object **N**.
4. Click the Text command to restart it. This time, create a letter **R** and name it **R**. Then, do the same thing to create a letter **P**.
5. On the Main Toolbar tab, choose the Select and Move command. Click the N letter so it is selected. A Transform icon appears.
6. Place the cursor over the Y axis until the axis turns yellow, then, click and drag. You can now move the letter only along the Y axis. Move the letter until the bottom of the letter matches the main X axis line.
7. Repeat steps 5 and 6 for the R and P letters until they are all resting on the X axis line.
8. Now use the Move command along the X axis to position the letters so they are nicely spaced, with approximately half the width of a letter between them. Figure 2.33 shows you how the scene should appear at this point.

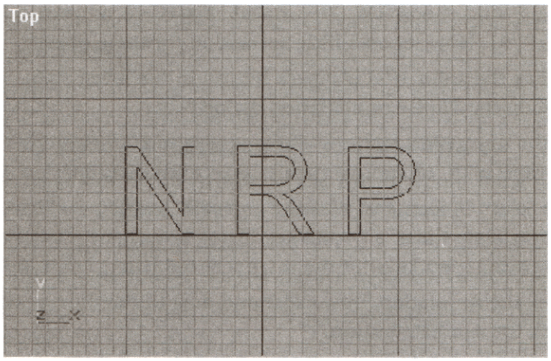


FIGURE 2.33 *The scene, with the letters N, R and P on the X axis.*

9. On the Main Toolbar tab, click the Select Objects button. In the top viewport, click the lower left of the letters and drag to the upper right, creating a window around the letters. When you let go, all the letters will be selected.
10. Click the Modify command panel tab to access the modifier commands.
11. Click the Extrude command. The extrude modifier is now applied to all three letters, and the rollouts appear in the command panel.
12. Set the Amount of the extrusion to **14.5**.
13. Save the file as **MF02-03a.MAX**.

Animating the Letters

Up to this point, you have created three letters, positioned them in the scene and extruded them to form 3D objects. Next, you create duplicates of the letters and animate them.

1. All three letters should now be selected and the Top viewport should still be active. Click the Zoom tool. Click in the Top viewport and drag down. This zooms you out.
2. Click Select and Move in the Main Toolbar tab. Hold down the Shift key and then place the cursor over the X axis of the Transform icon until the axis turns yellow.
3. Move the three letters approximately 400 units to the right while holding down the Shift key. Watch your coordinate readouts at the bottom of the screen to see how far you have moved the objects. When you let go of the mouse, a dialog pops up, prompting you with Clone options.

4. Click Copy and choose OK. The copied objects are automatically named N01, R01 and P01. Now set up a little animation for these objects.
5. Right-click the animation playback button in the lower-right corner of the screen to bring up the Time Configuration dialog box.
6. Under the Animation section, set the length to 900. This creates 900 frames for you to work with, or approximately 30 seconds of animation. Click OK.
7. Choose Select Objects and click the copied N to select it. Right-click the Animation Time slider; a Create Key dialog box opens. Click OK in the dialog box to create animation keys for the three selected letters at frame 0.
8. Left-click the Animation Time slider and drag to the right until you reach frame 30. Click the Animate button.
9. Choose Select and Move from the main Toolbar and click the Copied N01 object. Place the cursor over the X axis until the axis turns yellow and then drag the letter back to its original position (the original N). This creates another animation key. Now, from frame 0 to frame 30, then N moves from right to left.
10. Choose Select Objects again. This time, select the copied R letter. Right-click the Animation Time Slider and choose OK to create a key at frame 30.
11. Move the Time Slider to fram 60. Choose Select and Move, and move the copied R back into position.
12. Choose Select Object again. This time select the copied P letter. Right-click the Animation Time slider and choose okay to create a key at frame 60.
13. Move the Animation Time slider to frame 90. Choose Select and Move, and move the P back into position.

Modeling and Animating the Words

You have now created some basic animation of having three letters move from the right to left at different time points. To see this, drag the Animation Time slider back to 0 and then click the Play button. You should see the copied N move into position over the original N, followed by the R and then followed by the P. Now, you are going to add three words to the scene and give them some animation.

1. Click the Create command panel again. This should place you into the Spline commands. Click Text.

¤ note You have now played with the Move command a bit. From this point on, you will simply be instructed to move an object along a selected axis at a selected distance. This means to select the command, select the object in question, place the cursor over the correct axis and then move the object.

2. Set the size of the text to 20.0. In the text field, highlight the existing text and type the word **New**.
3. Click anywhere in the Top viewport to create the text. You will position the text later in the exercise. Name the object **New**. Reactivate the Text command and create the word **Riders**. Repeat again and create **Publishing**.
4. Select the three words you created. In the Top viewport, move them into the area around the copied letters. Make sure you are at frame 0.
5. Click in the Front viewport to activate it. Then, click the Zoom Extents window control. This zooms you out so you can see all of the objects from this view.
6. From the Main Toolbar tab, click Select by Name and select the New, Riders and Publishing objects.
7. Choose Select and Move and move the objects approximately –120 units along the Y axis. This places the words physically below the copied NRP letters. Now you are ready to animate each of these words.
8. Select the New object. Move the Animation Time slider to frame 60. Right-click the Time slider and choose OK to create a key. This locks the word New into its current position.
9. Move the Animation Time slider to frame 120. Click the word "Top" in the Top viewport to activate that viewport without deselecting the object. If by chance the word New does get deselected, reselect it.
10. Turn on the Animate button. Move the word New along the X axis until it is just a few units to the right of the original N.
11. Move the Animation Time slider to frame 180. In the Front viewport, move the word New along the Y axis (local Z) until it is just below the letter N. In the top viewport, move the word until it is centred around the N.
12. Move the Animation Time slider to frame 230. In the Front viewport, move the word New along the Y axis until it is about 120 units above the letter N. Watch your coordinate readouts.

Applying Space Warps to the Letters

At this point, you have created animation for the word New. What now occurs is that the word New comes up from behind the letter N. At frame 180, the word New and the letter N occupy pretty close to the same position. Later in this exercise, you will explode the letter N at this point so word New seems to be breaking through. The animation range for the word New is frames 120 to 230. See if you can set up similar animations for the words Riders and Publishing for animation ranges 210 to 320 and 300 to 410, respectively.

Each word should pass through the letter with which it is associated. After you have completed this on your own, continue and create the bombs that will explode the letters.

1. Move the Animation Time slider to frame 0.
2. In the Create command panel, click the Space Warps button. Then, click the Bomb button.
3. In the Top viewport, click in the center of the original N to create the bomb. Set the following parameters for the bomb:

   Strength: 0.75
   Max Size: 6
   Gravity: 0.0
   Detonation: 180 (this is the frame where the bomb goes off)

4. Click in the center of the R and P letters, as well, to create other bombs. Set the same settings, except the detonation, which should be set to frames 270 and 360 respectively.
5. From the Main toolbar of the Tab Panel, click the Select and Bind tool. Click one of the space warps and drag to the letter around it. When you do, the cursor will change. Let go of the mouse at this point. You will see the letter change white briefly then back to normally. The space warp is now bound to the letter and will only affect it. Repeat for the other two letters and space warps.
6. Move the Animation Time slider to frame 0 and play back the animation. You should see the letters explode as the words pass through them, as shown in Figure 2.34.

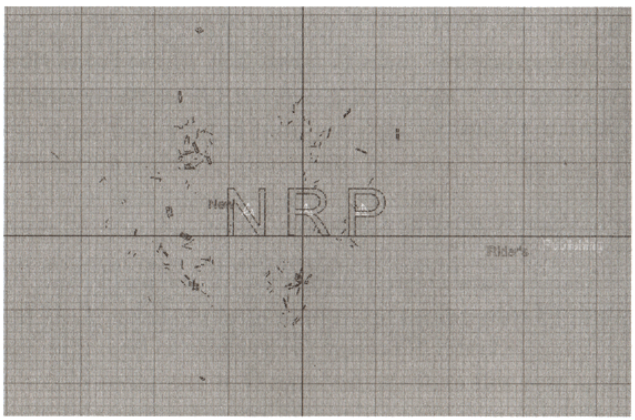


FIGURE 2.34 *The scene as letters explode when words pass through them.*

Adding Cameras and Lights

At this point, you have some decent animation going. Now, create a camera for viewing the scene and a light for lighting it.

1. Move the Animation Time slider to frame 0. In the Create command panel, click the Cameras button to expand the Cameras rollout. Click the Free Camera command.
2. In the Top viewport, click in the centre of the letter R. This creates the camera in the centre of the original letters.
3. Activate the Perspective viewport and then press the C key on your keyboard. This converts the Perspective view into the view from the camera you just created.
4. In the Front viewport, move the camera along the Y axis until the Camera view shows you all of the letters NRP with a little extra to spare. Don't move the camera far enough to see the second set of letters or the words.
5. In the Create command panel, click the Lights button to expand the Lights rollouts. Click the Omni light.
6. In the Front viewport, click just to the right of the camera icon and at the same height. This creates the light. Right-click the word Camera01 in the Camera viewport and choose Smooth + Highlights. The lighting appears immediately as a light above the letters.

Adding Visibility Tracks to the Original Letters

Up to this point, you might have been asking, "What about the original letters?". You have been creating all of this animation with those original letters always in the way. Now you are going to take care of them by controlling their visibility. By controlling the visibility of the letters, you can control when they render. For this logo, you want the original letters to remain invisible until after the words New Riders Publishing have passed by the camera. Then, the letters will appear one by one to spell NRP. You can set that up quickly now.

1. Select the original N. You can use Select by Name to accomplish this quickly. With the N selected, right-click it and choose Properties from the pop-up menu. This launches the object properties for the letter N. Adjust the Visibility spinner to 0.5 and click OK. You haven't really changed anything yet.
2. Right-click the N again and choose TrackView Selected. This launches the TrackView window and displays the animation tracks for the currently selected object. TrackView enables you to fine-tune animation keys. Figure 2.35 shows you TrackView at this point.

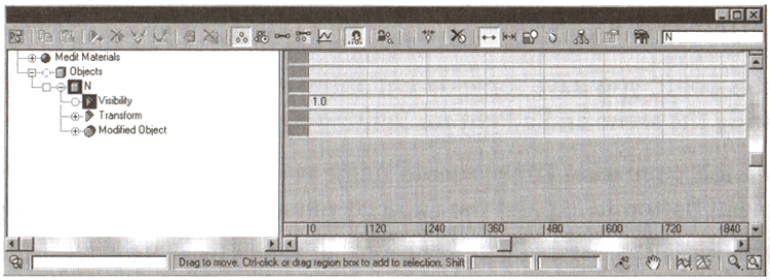


FIGURE 2.35 *TrackView with the N object loaded, ready for you to manually create some keys to control the visibility of the object.*

3. On the TrackView toolbar, find the Add Keys button.
4. Below the N object in TrackView, locate a track named Visibility. Click in this Track and a white dot appears/ At the bottom of TrackView, a number appears in a box. Highlight this number and set it to 0. This creates a key and places it at frame 0.
5. Click in the track again and place the key at frame 500. Create another key at frame 501 (If you have trouble seeing frames 500 and 501, click the Zoom horizontal Extents button in the lower right corner of the TrackView Window).
6. Go back to the key at frame 0 and right-click it. This brings up a KeyInfo dialog box with Time and Value spinners; the Time spinner should read frame 0. Set the Value to 0.
7. In the upper-left corner, click the right arrow button and move to the next key, which is at frame 500. Set the value to 0.
8. Click the right arrow again to go to the key at frame 501. Set the Value to 1.0. This causes the letter to become fully visible at frame 501. Now close the TrackView window.
9. Repeat the necessary steps for the R and P letters. Set the appearance time for the letter R to frame 561 and for the letter P to frame 621. Don't forget to create keys at frame 560 and 620.
10. Save the file.

If you activate the Camera viewport and play back the animation, you will see the letters start out as a see-through mesh. At the appropriate time, the letters will become solid.

Adding Materials to the Scene

Now, it is time to add some materials to the scene to make it look more realistic. Because there are only letters and words, the materials will be fairly simple, so let's get to it.

1. Click the Material Editor button on the Main toolbar tab of the Tab Panel. This launches the Material editor dialog box where you will see preview windows and controls for editing materials in MAX.
2. The upper left material preview window should be the current. First, click in the Material name drop-down list and rename the material to Main Letters.
3. In the Shader rollout, choose Anisotropic from the drop-down list.
4. In the Anisotropic rollout, set the following parameters:

   Specular Level: 75
   Glossiness: 50
   Orientation: 90
5. Click the Diffuse color swatch. This launches a color selector where you can choose the color based on RGB or HSV colors. Set the diffuse to 63, 50, 160 for the Red, Green, Blue colors respectively. Close the color selector.
6. In the scene, select the N, R and P objects (the original letters). In the Material Editor, choose the Assign Material to Selection button on the Material toolbar. This assigns the material to the letters.
7. In the Materials Editor, click the next material preview window. Name this material Words.
8. The default shader type is Blinn, which is fine for this material. In the Blinn Parameters rollout, click the blank button next to the diffuse color swatch. This enables you to use a map instead of a color for the Diffuse color. This also launches the Material/Map browser.
9. In the Material/Map browser, select Bitmap and choose OK. This assigns a bitmap to the Diffuse slot of the material. When you choose OK, you will be prompted with a File Open dialog box.
10. Select the file Marbteal.tga and choose OK. The Bitmap Parameters rollout appears with the map.
11. Click the Go to Parent button on the Material Editor toolbar. This takes you back up to the main material level.
12. Set the Specular level to 70 and the Glossiness to 40.
13. In the scene, select the New, Riders and Publishing words.
14. In the Materials Editor, choose Assign Material to Selection.
15. One last material. Click the Main Letters material preview you created earlier. Click and drag this preview and drop it on the third materials slot. When you do, a copy is made.
16. Rename this copy to Main Letters After.
17. Set the Diffuse color to 159, 50, 119 and assign it to the NRP letters that appear at the end of the animation.

Working with Render Effects in the Scene

Now, you have assigned all of the materials to the scene. All that is left is to add one special effect called a Rendering Effect. After the last NRP letters appear, you will make them glow for a few seconds, and then return to normal.

1. Select the NRP letters that appear at the end of the scene.
2. Right-click on the letters and choose Properties. This launches the Object properties dialog box.
3. Set the G-Buffer spinner to 2. This assigns a unique ID to these objects that you can key the glow to work off.
4. Choose Rendering, Effects from the pull-down menus. This launches the effects dialog box where you can add these effects.
5. Click the Add button. Select Lens Effects from the list that appears and choose OK. When you do, the Lens Effects Parameters rollout appears.
6. In the list in the left window, click Glow and hit the right arrow button. This adds the glow to the scene. Click the Glow entry in the right window to access its controls which appear as a Glow Element rollout at the bottom of the dialog box.
7. Under Parameters, set the Size to 50.
8. Click the Options tab. Under Apply Element to, select Image.
9. Under Image Sources, enable Object ID and set the spinner to 2. This matches the G-Buffer setting you created earlier.
10. Set the Animation Time slider to frame 750. Scroll back up in the Effects dialog box and turn on Interactive in the Effects rollout. The scene will be quickly rendered and the glow will be applied as shown in Figure 2.36.
11. Turn Interactive back off. Scroll back down to the Glow Element rollout. Click the Parameters tab. Now, you will animate the intensity to make the glow appear to start slowly, brighten to full, then return back to nothing.
12. Set the Intensity spinner to 0.
13. Set the Animation Time slider to frame 550. Turn on the Animate button.
14. Set the Intensity spinner to 1.0. Set the Animation Time slider to frame 650.
15. Set the Intensity spinner to 2.0. Set the Animation Time slider to frame 750.
16. Set the Intensity spinner to 75.0. Set the Animation Time slider to 850.
17. Set the Intensity spinner to 0. Turn off the Animate button and close the Render Effects dialog box.
18. Save the file. You have now animated the glow. Now, all that is left is to render the scene.

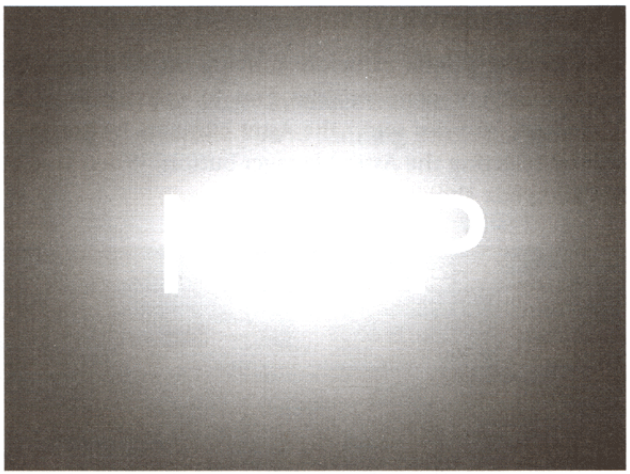


FIGURE 2.36 *The scene after applying a glow. Now, all you have to do is animate the glow.*

19. Click the Render Scene button on the Main Toolbar tab of the Tab Panel. This launches the Render Scene dialog box.

20. Under Time Output, select Active Time Segment. Under Output size, choose 320x240.

21. Under Render Output, click the files button. A file save dialog box will appear. Enter the name MF02-03.AVI and choose OK. When you do, a Video Compression dialog box appears. Select Cinepak and choose OK.

22. Click the Render button and kick back and wait. When the animation is done rendering, you will have an AVI file that you can playback with the RAM player or the Windows Media Player (Note: It may take several hours to render the animation depending upon the speed of your machine)

This exercise should have given you a good run through some of the basics of the MAX system. Many of the basic elements you explored here such as modeling, creating and assigning materials, creating cameras and so on, are used in daily work with MAX. For your use, a copy of this file completed has been provided on the accompanying CD as MF02-03.MAX. The prerendered animation has also been provided as MF02-03.AVI.

As you can see from this exercise, even a simple animation requires heavy use of many features of the MAX interface. Don't worry if some commands you saw in previous exercises were somewhat confusing. You will understand them better as you progress through the book.

Using the Asset Manager

The last item to take a look at before moving on to modeling is the MAX Asset Manager. This utility program enables you to manage your MAX files, material bitmaps and so on. You can select the Asset Manager by going to the Utilities command panel and selecting the Asset Manager button. When you launch the manager, you get the dialog box shown in Figure 2.37.

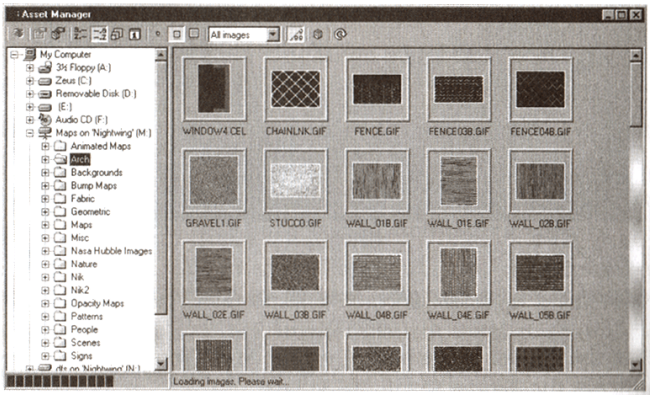


FIGURE 2.37 *The Asset Manager interface, showing you how easy it is to manage files.*

On the left side of the interface is a directory tree of your machine and on the right side are bitmap previews of supported files in the current directory. The Asset manager supports all bitmaps supported by MAX, as well as MAX files that have previews turned on. From the drop-down list on the toolbar of the Asset Manager, you can select the types of files that will Be displayed. Figure 2.38 shows you the Asset Manager with MAX files.

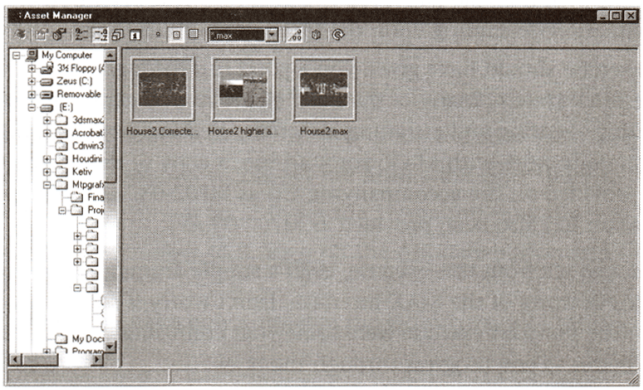


FIGURE 2.38 *The Asset manager, demonstrating management of all file types supported by MAX.*

You can drag and drop files from the Asset Manager into the scene or into the Material Editor. By double-clicking bitmap files, you can look at a blowup of the file.

Although technically not a user interface feature, the Asset Manager is very handy to know and use early on while you're learning MAX. Future exercises in the book will use it.

Conclusion

This chapter introduced you to the basic concepts behind the MAX 3.0 interface, including:

- The interface layout
- Viewport controls
- Working with files and Xrefs
- Command access
- Customizing the interface
- Basic drawing aids, including snaps and grids
- Object display, naming and grouping
- Creating a project from start to finish (the Corporate Logo)
- The Asset Manager

The tools introduced in this chapter are very important to making efficient use of MAX. By the end of the book, these tools will be second nature to you. The interface might seem awkward at first, but after a few minutes of practice, you will become comfortable very quickly.

The interface is very important for working with MAX commands. Now it is time to start learning how to model. The next chapter covers the principles and theory behind the modeling methods used in MAX 3.