3D Web™ Tutorial for Builder

In this tutorial you will create a simple office scene and add a desk and a coke machine to your office.

Builder Beta 1

Hello! Thank you for purchasing Builder, a scene layout tool for assembling VRML worlds in a realtime rendered environment. Using Builder, you will be able to import Autodesk's DXF, 3DS files, Sense8's objects into a . There are thousands of 3d files on the internet. Try the following URL for 3d freeware and shareware. Once you are at the URL below, choose the "model market":

http://www.lightside.com/~dani/

Conventions

The term 'scene' refers to a Builder file containing objects. When you save a scene it is saved as my_scene.3dw. You can export a scene to a VRML format which becomes my_scene.wrl. Keep in mind that you must 'Export' to VRML format not just save a file as a my_scene.wrl under the [File] [Save] menu.

Single menu items and multiple menu selections are represented with brackets as follows, respectively: [Key1] or [Key2] [Key3]. For example, [Object] [New Sphere] means click on the 'Object' menu option in the 3D View, drag the left mouse button to the submenu option 'New Sphere' then select that option.   Keystrokes that should be pressed simultaneousely are represented by brackets. For example, the bracketed items <Control> or <Select> indicate that you should hold down the Control key while selecting an object with your left mouse button. Also if we say <Control> click, this means hold the Control key while simultaneously clicking on an object with the left mouse button.

Whenever we say 'click on an object,' we mean, press the left mouse button then let go. So unless we specify a particular mouse button, we always mean the left mouse button. Right Mouse Click means to press the right mouse button.

When we say 'Drag' an object, we represent this action as clicking and holding the left mouse button while moving the cursor or an object around.

When we say 'Right and Left Mouse Click' we represent this action as simultaneously clicking on the left and right mous buttons. Usually we use this action to climb and dive (pitch, roll, yaw for all you 3D buffs).

Words in quotations usually mean to enter them with the keyboard (such as enter, "Light1" as the new light object). Words in quotations could also imply an action to be performed at dialog boxes. For example, click on the "Y" radio button or Click "Apply."   All other uses will use the 'single quotation marks.'

Overview Of Windows

The first two windows appear at the top of your monitor.

3D View   From this window, you can view the current scene in a real time 3D solid-filled rendered window. modifying the viewpoint (see 'Fly Mode' under Options menu). The user may also pick objects in the world (see 'Pick Mode' under Options menu) and move objects around inside the universe (see 'Object Fly' under options menu). This is also the windows where you pick individual polygons for editing.

Object Master   This window displays a tree of objects currently in the scene. The user may select different objects by clicking on the object name. If control is held down and you click on another object, multiple objects may be selected and modified. This is useful for using the alignment or moving multiple objects.

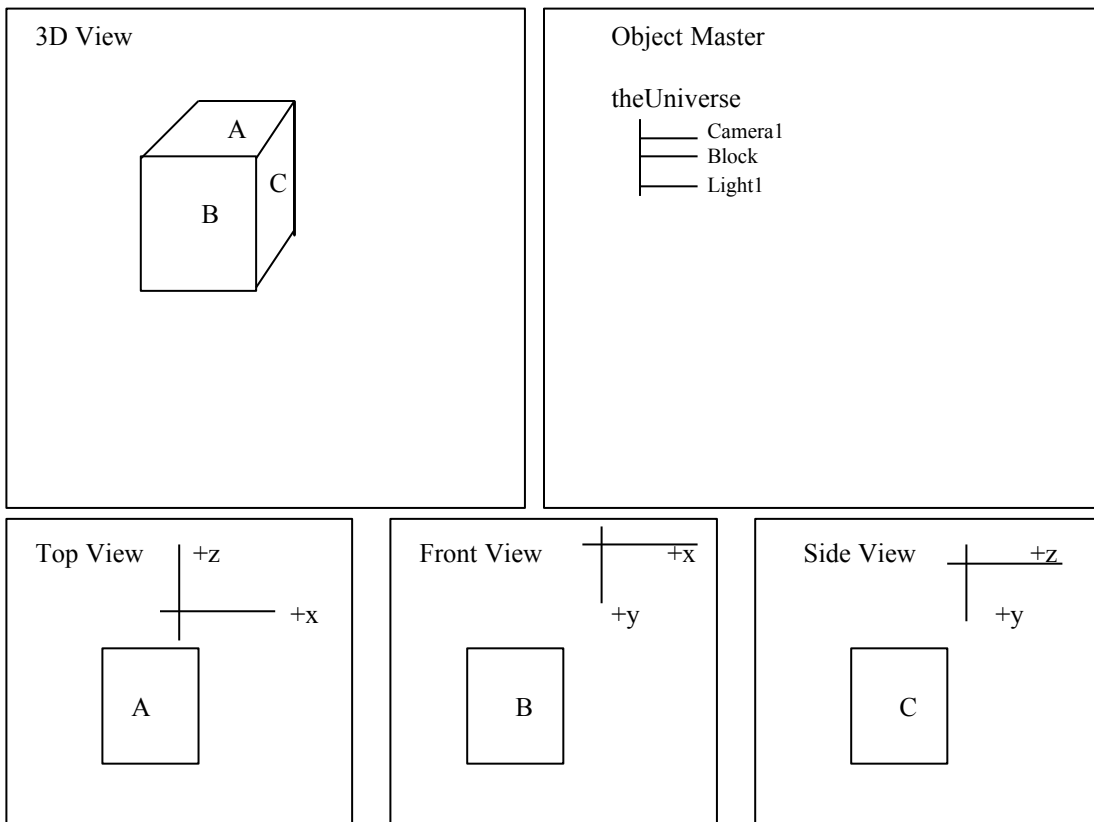The next three windows appear on the bottom of your monitor.

Ortho Windows: The bottom set of windows are called Orthogonal or Ortho Views. These windows are useful for visualizing your objects in one plane at a time. You can not pick (select) objects from these windows (in Beta I) but you can move and rotate preselected objects (objects highlighted in blue) in any of these windows. You can only move objects which are selected.   If you selected multipleobjects from the Object Master, you can move them simultaneously in any of the Ortho Views.

- **Top View**   A viewpoint looking down the scene (along the Y axis). This is also called the X-Z plane.

- **Front View** A viewpoint looking at the face of the scen in line (along the Z axis). This is also called the X-Y plane

- **Side View**   A viewpoint looking at the side of the scene (along the X axis). This is also called the Y-Z plane.

Builder obeys the left hand rule for describing 3d coordinates

+x

+z (into the monitor)

+y
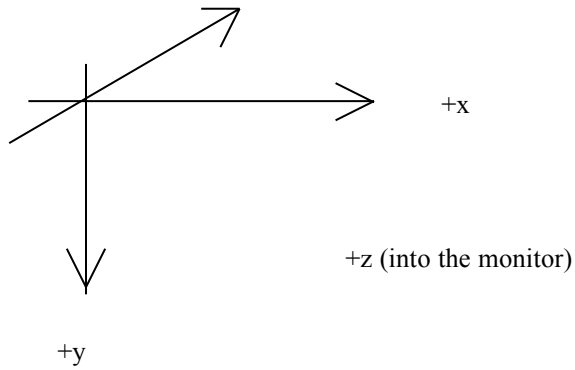
The Ortho Windows provide you, the 3D Web Builder, with three views to assist in moving and aligning objects. They are organized as follows:

3D View

A

C

B

Object Master

theUniverse

Camera1
Block
Light1

Top View   +z

+x

A

Front View   +x

+y

B

Side View   +z

+y

C

In this tutorial, we are going to creat a terrain, add an office, a desk, a lamp, a camera and anchor a URL to the lamp. If you just started Builder, you probably have our 3dweb.3dw file loaded. Click on the Document icon to build a new scene.

Create a Terrain. Choose [Object] [New Terrain].   Notice that their is a description box which describes patch colors. In Builder, you can define a terrain with multi colored patches similar to the black and white squares on a checkerboard. Click the "Color" button which is position under the number "1:." This launches a Color dialog box. Choose a light color such as fluorescent green then click "OK."   The word "Color" now has a dotted line surrounding it. This indicates that you have defined a color for one of the patches. Now click on the "Color" button under the number "2:." Let's choose white for the other patch in the terrain. Just press "OK" without choosing a color and the other patch will default to white. Now you are back at the Create a New Terrain dialog box. Click "OK" and you will create a terrain. In the 3D View, you should not see the terrain. But in the Top View Ortho View at the bottom you should see a ten-by-ten checkerboard outlined in blue. And in the Front and Side Views you should see a solid blue line. The reason you do not see the terrain in the 3D View is because your viewpoint is in line with the terrain (i.e., you're eyes are in line with the terrain). To see the terrain, click on the "Airplane" icon to fly the default camera (i.e., your viewpoint) and position the "Airplane" above the crosshairs in the 3D View. Click on the right mouse button 4 or 5 times. The terrain you just created should come into view. Keep the Airplane icon above the crosshairs in the 3D View and click the left mouse button 3 or 4 times. You should move forward while hovering over the terrain. Now position the "Airplane" below the crosshairs in the 3D View and press the left mouse button 3 or 4 times. You should move backward to where you started.

4. **Move and Rotate the Light.**   Click on the Light in the Object Master. Notice that a blue box appears in the 3D View in addition to all three Ortho Views. This box is called a bounding box because it bounds the object, which in this case is the camera. In Builder, a selected object or multiple selected objects are represented by a blue bounding box in the 3D View and the Ortho Views. Selected object are highlighted in red in the Object Master. Next, position the cursor anywhere in Top View Ortho window, click and hold the left mouse button and move it around. Notice the light (again, represented by a blue bounding box) moves in all four windows but the light never moves in the Y axis. Whenever you move an object in an Ortho window, the object will only move in one plane, depending on which Ortho view you position the cursor in. Our scene probably looks a bit dim. So let's boost up the ambient light. Choose <View> <Ambient Light> and slide the button bar to the right to about 2/3 'full power' to increase the ambient light in your scene. (Full power is when the button is touching the right arrow button. Ambient light in Builder is analogous to a turning up a dimmer switch in the real world.) Click "Close" to save your changes. Keep in mind that when you save your VRML scene, you must make sure that your scene is well lit with all ambient lights turned off because VRML does not recognize ambient lights. Now let's rotate the light in the Front View. Make sure the Light object is selected (Again, it shoud be highlighted in red in the Object Master and surrounded by a blue bounding box in the rest of the windows.) Position the cursor in the Front View. Press and hold the right mouse button. Notice that a faint, light blue circle with a hashmark breaking the circle appears in the center of the object you want to move.   This blue circle is always in the middle of each object to give you an indication of where you are in the rotation. Eventually we will keep one hashmark stationary and have a different colored hashmark update as you rotate the object. This way you can tell how many degrees you rotated an object by looking at the number of degrees between the two hashmarks.   Notice that when you move the mouse around the object, the object will move in all three Ortho views and the 3D View. Notice also that the objects become dimmer or brighter depending on the angle the light is shining. Remember that only directional lights are immediately visible within Builder but all three lights - point, directional and spot - will export to VRML (We're fixing this!). Now try rotating the light in the xz plane (Top View Ortho View). Notice that there is very little effect. This is because a directional light is analogous to the sun and rotating

the 'sun' in the top view is the same as rotating the the real sun - nothing would happen. Rotating the 'sun' in the other Ortho views is analogous to changing the time of day on earth - rotations in these Ortho Views do affect the scene.

You can rotate objects another way - Click on the four-way arrow in the toolbar (to the left of the block icon). You are now in object fly mode. Refer to the reference manual and you can get a full breakdown of the mouse buttons or you can experiment with the right, left and simultaneous left and right buttons.

If you have multiple objects selected (by <Control> clicking on multiple objects) and you rotate objects in an Ortho View with the right mouse button, the blue circle will appear at the center of the object that your mouse is closest. Also, both objects will rotate around their own axis. This is convenient if you want to position a parking lot full of cars on a terrain.

Import an Office Plan. Before importing an office plan, make sure you can see the terrain. You may have to raise your viewpoint a few 'right mouse clicks.'   Choose <Object> <Import> then click the "Browse" icon. Browse in the Builder\Models directory and choose "oplan.nff".   Click OK and an office plan will appear in the scene. Move around this plan to get a feel for flying. Notice that your terrain has 'disappeared' but it is still included in the Object Master. The terrain is really there, it's just too small compared to this office plan. This problem will happen often when you import your own objects because objects created in Builder do not necessarily have the same unit size as objects you import.

Scale the Terrain and drop the Office Plan EXACTLY onto the Terrain. Double click on terrain object in the Object Master.   From the Scale / Stretch area, Click and hold the right scale arrow (you should see the terrain become larger and slice the office plan in the xy and yz planes. Continue enlarging the terrain until it is larger than the bounding box of the office plan.   Close the Edit Object dialog box by clicking on "Close."

Now we want to drop the office plan EXACTLY onto the terrain. The reason we capitalized EXACTLY is because sometimes we don't want objects such as the office plan to be approximately on top of the terrain, but rather EXACTLY on top of it. To do this we need to use the allignment tool. (We may add a 'snap to grid' feature soon; the problem with this option . We are planning to vastly improve the GUI for alligning objects, in Release 1). <Control> click on the Oplan from the Object Master. Both the terrain and oplan should be highlighted in red. Choose <Allignment> <Allign>. Choose the terrain as the anchor (this means the terrain will be stationary and the oplan will move.) Look at the Front and Side Ortho views. Imagine lowering the office plan onto the terrain in both of these windows. What would you do? Visually, you want to raise the "oplan" object.   Now look at the menu options of the alignment tool. There are two radio buttons we need to select: one of the axises and the one point we want the objects to touch at (i.e., center, touch, top or bottom of the anchor, which in this case is the terrain). In Builder, objects touch at their their blue <u>bounding</u>. So visually You want the "bottom" of both objects to share the same Y value. Choose the "Y" radio button then click "A<u>p</u>ply."   You should see the oplan object position itself on top of the terrain in all views.

Add a Desk. Choose [Object] [Import] then click the "Browse" icon. Browse the Models directory and choose "desk.nff" then click "OK".   You will not see the desk object because like the Terrain object, it is too small. To 'find' it, click on the desk object in the Object Master. Position the cursor in the Front Ortho View and move your cursor up and down in this window. You should see a tiny black dot moving up and down with your cursor. This is your desk! Pretty small, huh. Double click on the Desk object in the Object Master and scale it larger similar to the way you enlarged the Terrain. Click close. Position the cursor anywhere in the Top View window. Click and hold the left mouse button

and move the desk around. You should see the desk moving away from you (into the screen) in the View window. Position the desk in the center of the terrain. <Control> click on the "Terrain" in the Object Master. You should see both Terrain and Desk objects highlighted. Choose [Allignment] [Align].   In the Alignment Tool window select "Y" circle in the axis section. Click and hold the down arrow in the "Anchor" section. Select "Terrain" from the list and release the mouse. Select the bottom button. Click on Apply. Click on Close. You have now dropped the desk onto the terrain. The 'Bottom' of the desk should now touch the terrain. Now position the desk somewhere on the terrain without touching any of the objects in Oplan: Make sure only the Desk is highlighted in the Object Master then from the Top View Ortho View, move the desk in the appropriate position.

Stretch the Desk to Make it Longer. Choose [Object] [Deselect All]. This command unselects all the objects in the Object Master.   From the Object Master, double click on Desk. This will launch an Edit Object dialog box. Click on the right arrow of the Scale/Stretch box. The Desk object will enlarge in all directions. Click "Close" to activate changes.

Add a Desk Lamp with a Light. First import a desk lamp. Choose [Object] [Import] and browse in the Models directory for "Lampa.nff." Click "OK" and the lamp will appear under the desk. Put the lamp on the desk using the alignment tool. Now we will stick a point light on our desk lamp. Due to the limitations of the Builder beta, point lights do not illuminate correctly in the view window, but if they are converted into Webspace they will appear as they should. Using the Alignment Tool, choose "Touch" "Y", then "Center" "Z."   The lamp shoud now be floating in space but in the same xz plane as the desk. Deselect the Desk and using the Top View Ortho View, move the lamp so that it is on top of the desk. Choose [Object] [Deselect All] to deselect all objects. Choose [Object] [New Light] and select a Point light. Name the new light "Light2" and click on OK.   Click on Light2 in the Object Master then click on the Four Way Arrow icon in the toolbar to fly the light under the lamp. Alternately you can move the lamp from the Ortho Views. Because this is a point light, this lamp does not have a a shade (ie a point light has no directional attributes). You probably have a pretty big object representing your light bulb. You can make the Light objects invisible by unchecking [View] [Lights visible].   Now Light objects are only visible if you select them in the Object Master. Now we have a point light source under the desk lamp. If you export this file to a VRML browser, the point light will illuminate the desk directly under the desk lamp.

Add Textures. This process will be made much easier when Drag and Drop is implemented in Beta 2, but for now we will use this process. Another point of note is that in the early alpha of Worldview and the NT beta of Webspace textures did not seem to be properly loaded. This will inevitably be fixed, and the textures that are saved into the .WRL file by Builder are fully VRML spec 1.0 compliant.

Choose [Object] [Deselect All]. Fly over to the waterfall picture in the Office. Right Mouse Click on the Waterfall. This will launch a Polygon dialog box. Click "Add" then then choose the "Psych" texture then click "OK." Close the Polygon box. Now Right Mouse Clikc on outside of the "Psych" texture on the wall of the office. Click "Add" then choose the "Paper" texture. Click "Close."   If you wanted to texture the terrain with the same texture, you would doulbe click on the Terrain object in the Object Master then click "Apply."

Create another Camera. Fly around so that your viewpoint is positioned at the Psychedelic picture on the wall. Now click on the icon that looks like an airplane with a plus sign. It is to the right of the open box. A dialog box will appear. Enter the word, "Waterfall" then click "OK" Now fly around a bit more and stop. Now double click on the camera marked Waterfall. You should be staring at the

Waterfall again. This feature is useful if you want someone to look at something and not have them go through the trouble of exactly positioning themselves at this certain spot.

Embed a URL link onto an object

Choose [Object] [New Group] This will launch the Create New Group window. Alternatively, you could have clicked on the icon which looks like an Open Box. Click on name and enter "Link1". Click on the Anchor circle. Click on the entry field in the Link area and type in a URL such as http://www.lamp.com. Click on Close. This created a group with a link to WWW.LAMPS.COM, a fictional lamp reseller. But we have a group with no object in it. Let's drag the lamp object and drop it onto the Group object. Click on the Lamp object to select it. Let go of the mouse button. Drag the Lamp object and drop it onto the Link1 object. While doing this you should have seen a document icon appear.   This makes Lamp1 a clickable URL link to WWW.LAMPS.COM when it is in a VRML browser. When you are viewing this URL with a VRML browser you will see this the desk lamp turn orange in WebSpace and in WorldView it will turn into a hand icon.

Have fun!