Introduction to Realsoft 3D Version 6

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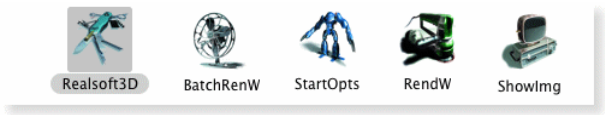
Getting Started

Installing and Starting the Program

Realsoft 3D uses the standard Apple installer, which should start automatically once you have downloaded the package. if not, click on the downloaded file. The file will be mounted as a virtual drive and you should see it in your drive list in the Finder. Open the virtual drive and click the actual setup file on it to start the installer. Alternatively, insert the install CD, open the mounted volume from your desktop and click the installer icon.

During the installation, you are prompted to enter the install key. Type the install key exactly as written in the sticker of the install CD or in the license registration message. Characters are case sensitive.

Realsoft 3D can be started in the same way as any standard Mac OS X application, by double clicking the Applications # Apple # Realsoft 3D program icon in Finder.



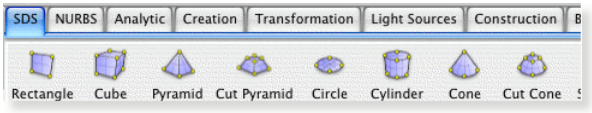
Program Icons

If you are a new Realsoft 3D user, remember to register your license! It qualifies you for technical support, upgrade announcements, special customer discounts and an access to free software updates at www.realsoft.com.

Default User Interface

When you start the program, the default user interface is loaded from the startup project. The default interface consists of the following elements:

Toolbar



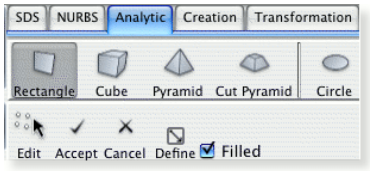
Tabbed Toolbar

The Toolbar allows you to activate such things as the creation and modification tools, as well as many others. The default configuration shows a 'tabbed' toolbar, with tool icons grouped under several tabs like SDS, Creation, Light Sources, and so on. You can hide/show the toolbar by clicking the header area at the top left corner of the toolbar.

Control Bar

The Control Bar is located right below the Toolbar. The control bar is context sensitive. When you select a tool (the Rectangle tool, for instance), the control bar contains the set of modifiers that are relevant to that tool. If you activate the Rectangle tool, valid rectangle-specific options are shown.

The Control Bar always shows options that are related to the action the user is currently performing. Therefore, its contents change frequently, and adapt to the workflow.



Rectangle tool selected. The control bar automatically shows the tool-specific controls

The Control Bar contain more tools than may fit into your screen. However, you can scroll the toolbar with the mouse wheel or by dragging it with the right mouse button while holding down the Apple key.

View Control Bar

The View Control Bar is a tall and narrow vertical window, located near the right edge of the main window. It allows you to control the view orientation, and other options specific to View Windows.

For example, the View Control Bar contains buttons for switching between Front/Side/Top views, activating different rendering methods, and rotating, zooming, and panning a view.

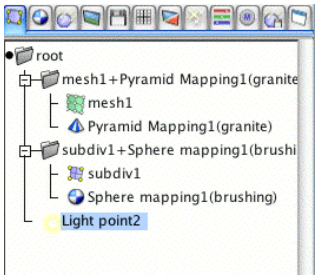
Note

Clicking the Front, Side and Top button while holding the **Shift** down will switch the view into the opposite direction.

The View Control Bar can be scrolled in the same way as the Toolbar if all the controls do not fit into the screen area.

Select Window

The Select Window is located near the left edge of the main window. It allows you to select objects based on their names. When working with large projects, this window is extremely useful for selecting all types of objects, from geometric ones to light sources and material maps. Through its various tabs, the Select window also allows you to manage such things as materials, rendering settings, post effects, and so on.



The Select Window

The Select Window allows you to manage the object hierarchy using a drag&drop interface. For example, you can drag one object inside another 'level' object. A drag box can be used for multi-selecting objects. You can also multi-select objects by holding down the **Shift** key while clicking objects.

If there are more objects than fit into the window, you can scroll the contents of the select window in the same way you can scroll the toolbar: just hold down the **Apple** key while dragging with the right mouse button.

View Window

The View Window is perhaps one of the most often needed windows. It renders geometric 3D objects using various rendering methods, such as wire frame, shaded OpenGL, or ray tracing. You can enter 3D data through the View Window using mouse or some other input device, such as a digital tablet.

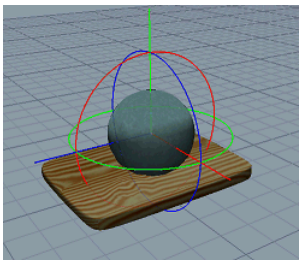
To Pan a view window (scroll it): **Apple** + drag right mouse

Note

The **Apple** key is the one with the Apple logo

Zoom a view window: **Shift** + drag right mouse vertically

To Rotate a view window: **Alt** + drag right mouse.



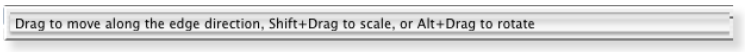
View in Shaded OpenGL mode

Note

It is highly recommended that you use two or three button mouse. The default single button mouse shipped with Mac systems works but does not allow you to take full advantage of Realsoft 3D

Status Window

The Status Window is where the program prints out messages and other feedback.



Status window

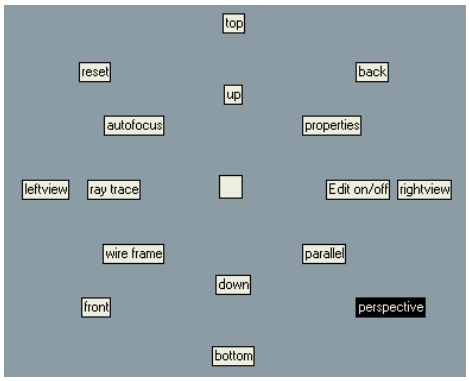
In addition to these, there are several other windows included with the standard startup project. You can open any of these windows through the View pull down menu.

Compass Menus

View window also support special purpose menus called Compass Menus. They are context sensitive. The contents of the compass are usually set to include those functions that are most likely needed in each situation. For example, if a curve object is selected, the compass menu includes the most frequently needed curve editing functions.

You access a Compass Menu by dragging the right mouse button in the view window. Where you drag, the mouse determines which compass menu is displayed. When you have moved the mouse more than a certain threshold distance, the compass menu is opened.

For example, to enable the perspective view projection, drag while pressing the right mouse button in the View Window. The compass menu is displayed. Keep moving the mouse until the perspective label is highlighted and release the mouse button.



Drag with the right mouse button to select far south-east compass menu

The big idea behind the compass menus is that your muscles can learn to use them. Selecting functions in this manner can become very fast after some practice, because it is not necessary to watch the menu while using it (unlike when using traditional menus, or buttons where you have to accurately position the mouse pointer over the desired item). Your hand remembers the necessary motions to pick an item.

Compass menus also can be bound to keys. For example, the View window compass menu (shown in the previous illustration) is bound to **v** key. Holding down the **v** key while dragging with the right mouse button overrides the default context sensitivity rules, allowing you to access the view specific options whenever you need.

Compass menus are an extremely powerful way to access tools in Realsoft 3D and we strongly suggest you learn to use them.

Building Your First Scene

This first tutorial project introduces you the basic workflow for building and rendering a simple animation in Realsoft 3D. It is intended for first time users including users familiar with previous Realsoft products, because it introduces several features not available in previous program versions.

In this tutorial, you will do the following:

- Model a wooden table with a marbled sphere on it
- Add a light source
- Create a camera
- Animate the sphere to move along the table
- Render the animation to a QuickTime file.

Tutorial level: Beginner

Modeling

To prepare the View Window for modeling the table, make sure OpenGL Shading and Perspective options are set in the View Control Bar. Depending on the screen resolution, you may have to scroll the View Control Bar all the way down. You can either drag with the LMB when the mouse is not over any of the gadgets of the View Controls bar (the cursor changes to an up/down arrow) or hold down the Apple while dragging with the right mouse button anywhere on the View Controls bar. Or simply use the Mouse Wheel for scrolling

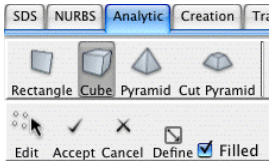
The first task is to model a simple rectangular table with a simple set of legs. All five of the pieces needed for the table can be constructed using the Analytic Cube tool. Let us start by creating the tabletop first.

We create the tabletop by defining it from the top view. To switch the view to the top view, click the Top button near the top edge of the View Controls Bar.

Tip

Shift modidier swaps the direction 180 degrees, so that you can also switch to Back, Right and Bottom views using the same view controls.

Make sure you are viewing the Analytic tab in the Toolbar, then click the Cube icon with the left mouse button to activate the tool.



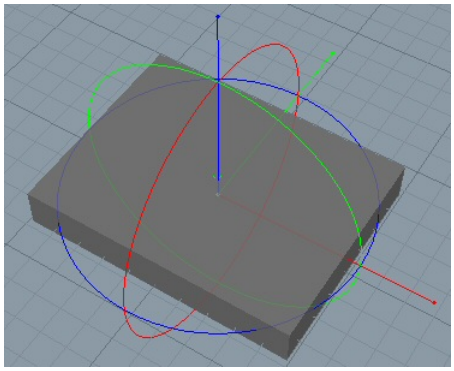
The Cube Tool activated

The Control bar now displays options related to creating cubes. The default settings are fine for the current task.

The Definition type is Corner-Corner, meaning you define the upper left corner and the lower right corner of the rectangle. Filled is checked, so a closed cube with six sides will be constructed.

Click the Left Mouse Button once near the top left corner of the view window to define the upper right corner (do NOT hold down the LMB, just click). Move the mouse down to the right bottom corner of the view. Click with the LMB button again. A cube is created.

Controlling the Orientation of the View Window


Rotate the view by dragging with the right mouse button while holding down the Alt key.

To verify that you really created a cube, you might want to rotate the view window a bit.

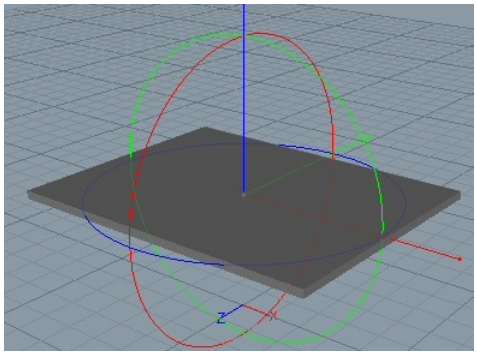
You can rotate the view window interactively, using the mouse and a key modifier. To rotate, zoom, or pan the View Window, hold down either the Alt (rotate), Ctrl (pan), or Shift (zoom) key and drag with the right mouse button.

There are several other ways for you to alter the View window or change its orientation. The view window's compass menu is one alternative. Hold down the 'v' key and drag the RMB in the view window until the compass menu appears. The outermost items are view orientation settings. Here, in addition to the Front, Top, and Left-side views, you can also find menus to rotate the current view left, right, up and down 90 degrees.

Compass menu

Transforming

The three circles and axes associated with the created cube are so called transformation handles. These handles are shown for all selected object and you can drag them to move, rotate or scale the object.



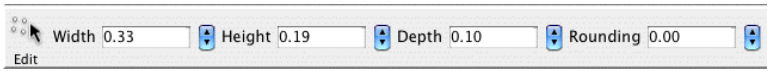
Cube translated and scaled in 'y' direction

The created cube appears to be slightly too thick, so let's scale it in its 'y' direction. To do this, move the mouse over the end point of the vertical 'y' axis handle. Then press the left mouse button key down to start scaling. Move the mouse downwards to see how the object gets scaled in its y direction. Release the mouse button when you are happy with the thickness of the tabletop.

The tabletop also lies now on the ground plane, so let's try moving it up a bit. To do this, move the mouse over the actual 'y' axis handle. Then press the left mouse button down and move the mouse upwards to lift the tabletop. Release the mouse to exit the move tool.

Similary, you would be able to rotate objects using the three cirular rotation handles.

When you select an object, the Control Bar (the context sensitive tool bar) shows you the most commonly needed tools for editing the selected object. In this case, it shows you the controls for editing the size and the edge roundings of the cube.



Cube specific controls

Most real world objects have slightly rounded edges. By default, the program displays measures using meter scale. Therefore, set the Rounding field to a small value, such as 0.005 = 5 mm. The preferred measuring unit can be selected using File/Preferences pull down menu.

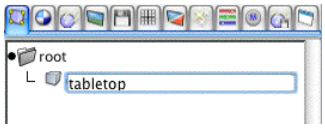
Note that the view window doesn't show you the rounding in any way. The rounding will show up later when we create an image using photo realistic ray tracing.

Renaming

The Select window at the left side of the screen has several tabs on it. Currently, it is displaying the Geometric Objects tab, which shows the hierarchical structure of the object geometry of your project.

In general, selecting objects from the Select window is more accurate and far less error prone than trying to select objects in a view window.

The default name for created objects is typically the name of the object type (cube for instance) followed by a number. Since this is not a good name name for our tabletop, we'll change it.



Rename the cube as tabletop

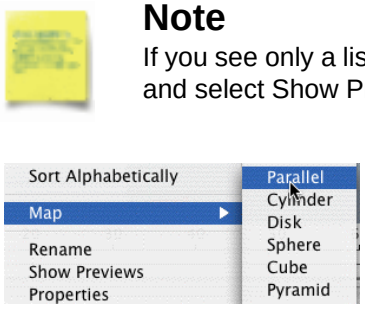
Move the mouse over the cube object in the select window, and then left click the name slowly two times. You can also select Rename from the pop-up menu of the select window. The default name of the level is highlighted and placed in an edit box. Type the word "tabletop" and press the Enter key.

Using Materials

The next step is to assign a 'wood' material with our tabletop object. Make sure the tabletop object is still selected and then click on the Materials tab. The select window now displays the current material library.

Select the 'wood' material

Click the Wood material to select it (you may need to scroll the material list first). Next, click the right mouse button over the wood material icon to open a popup menu. This popup menu is different from the menu that was available from the Select window. (The popup menu is context sensitive, and its contents depend on the place where you open it.)



Note

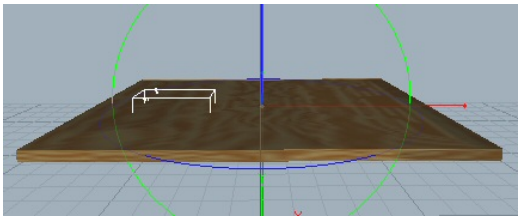
If you see only a list of material names instead of the preview images, click with the right mouse button and select Show Previews from the popup menu.

Select Parallel Map Tool

There is a Map submenu at the bottom of the popup menu. Move the cursor down the list to highlight the Map option. A submenu opens that displays the available mapping object types. A mapping object wraps a material to a target object according to a specific map geometry, which can be cube-like, disk-like, cylindrical, spherical, etc. Select Parallel mapping from the menu.

Which one is most suitable depends on both the characteristics of the material and the shape of the target object. The Wood material is designed so that it works best with parallel mapping.

Then in the view window, switch to the Side view and define the parallel map geometry with two mouse clicks. Just make the parallel mapping object smaller to achieve suitably dense wood grains.


The white parallel map box defines wood grain projection

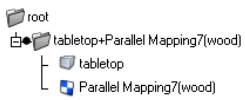
Note

The direction, from which you draw the parallel map (the Side view above) defines how wood grains travel trough the tabletob.

The Hierarchy

Click the Geometric Objects tab (first on the left) of the Select window. Notice that the structure has changed; now, instead of a "tabletop" object under the root, you have a new folder called "tabletop + Parallel Mapping(wood)". Open this folder by clicking the little box at the left side of the name. You can see that it contains the tabletop object and a parallel mapping object. When you drew the parallel map of the Wood material for the tabletop object, the mapping tool created a new hierarchy level and placed the wood mapping and the target cube into that level.

Realsoft 3D uses the concept of hierarchy extensively to manage the data a user places in the scene. For example, a human body consists of several parts: arms and legs, a head, a torso, etc. In turn, an arm has several subparts like upper arm, forearm, and hand; a hand consists of several more parts, and so on. The object hierarchy is designed to categorize and collect object groups, in the same way that the file system on your computer does.



Tabletop consists of a cube and a wood mapping

Similarly, the wooden tabletop in this example consists of a tabletop shape and a wood mapping object. Select the 'parallel mapping(wood)' object. If you want bigger wood grains, just scale the mapping object bigger. If you want to control the direction of the wood grain, rotate the mapping object. After adjusting the mapping, click the WF-Inv button in the MiscTools bar below the select window to hide the wireframe of the parallel map. We do not need to see it any more, so hiding it helps to keep the scene visually cleaner and simpler.

Tip

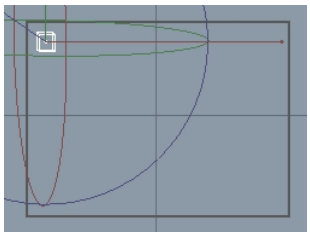
A mapping object only affects other objects that are in the same hierarchy level!

The next step is to create four legs for the table.

Modeling a wooden leg for our table is easy, now that we know how to create a wooden tabletop so we repeat the steps very briefly now.

Switch to the top view. The legs will be created under the tabletop. The shaded tabletop now blocks our view under the table, making further modeling hard. Therefore, turn Shaded OpenGL drawing off using the view control icon in the lowest group of the view control bar.

Turn Shaded OpenGL off



Create a cube representing a leg

Look at the select window; you should see so called Current Level marker (by default, a black dot) at the left side of the 'tabletop+parallel mapping(wood)' name. The Current Level defines where the program places new objects. A leg is not a part of the tabletop, so click the root folder to make it the current level.

Enable the Cube tool. Then enter two points in the view window, somewhere close a tabletop corner, to create a cube representing a leg.

Rename the created cube as 'leg'.

You may find it quite difficult to place the cube properly using perspective view. As intuitive as the perspective view is, it makes accurate modeling with the mouse difficult. Turn off the Perspective option either using View popup/ Camera/Perspective menu or from the View control bar's Perpective icon. Then switch to the front view. Use the transformation handles to scale the leg longer and fit it under the tabletop. The parallel view projection makes these steps easy and accurate.

Switch back to the top view. Attach wood the material to the leg exactly the same way as you attached it to the tabletop. This time use the top view when drawing the parallel map, to align the wood grains with the leg. If you used the side view, the wood grain would be perpendicular to the leg, which is quite unnatural.

Now the 'root' object consists of two sub objects: a wooden tabletop and a wooden leg.

Duplicating

Rather than making three more legs from scratch, we can just duplicate the one we already have. To do this, make first sure the 'leg + parallel map(wood)' object is selected, then click the RMB in the Select window, and choose Duplicate from the popup menu.

Then drag one of the translation handles in the view window to move the newly created leg to the opposite edge of the tabletop.

Rather than duplicating the remaining legs one by one, we can multi select both legs, duplicate and translate them in one simple operation.

To multi select the two legs, hold down the Shift key and click each leg object with the mouse. You can click them either in the select window or in the view window.

Legs multiselected

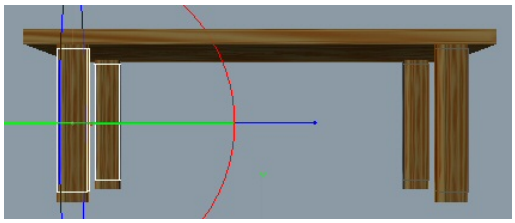
Tip

Realsoft 3D supports the following selection modifiers:

- Shift - multi select
- Apple - select range
- Alt - subtract from the current selection

We could again use the Duplicate menu to get more legs. However, there is even easier way: transformation handles support automatic duplication via Apple key. Let's try this.

Switch to the side view. Then press the Apple key down and drag the translation handle. The selected legs are instantly duplicated and the move operation is applied to them. Move the two new legs to the opposite edge of the tabletop.



Legs duplicated and translated

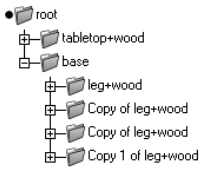
We have now created all the geometric objects we need for our table. Enable Perspective view and OpenGL shading again. Use the same controls as before - they toggle the mentioned View properties on and off.

Manipulating the Hierarchy

We have created all the table parts under the root level. It would be much better to put the legs inside a single dedicated level object 'base'. Such a structure has many advantages. For example, we can then modify all the four legs easily, simply by modifying the 'base' object.

To create a new level, open the popup menu of the Select window with a right mouse button click. Select New/Level from the popup menu. Rename the created new level object as 'base'.

Then multi select the four legs and drag & drop them inside the base level.



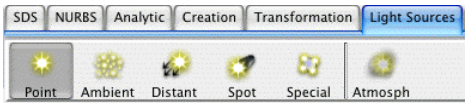
Legs moved inside a new level

In addition to drag & drop, you can group objects into new levels using the 'Drop to a level' tool. To move both the tabletop and the base in a separate level called 'table', multi select the objects and then select the item Drop to level from the pop-up menu of the select window. Rename the new level which now contains all modeled parts as 'table'. The root object nown consists of only one sub object, the table.

Creating Light Sources

We now have a wooden table, but the scene is quite dark. Only the dim flashlight of the View camera illuminates the objects. The next task is to add a light source to the scene.

Select the Light Sources section of the Toolbar at the top of the screen and click the Point light source icon.



Activate the point light tool

Switch to the side view and enter two points in the view window - somewhere above the table - to define the position and radius for the point light object. The distance between the two clicks will define the falloff rate of light intensity.

Now, there is also a Point light object in the hierarchy. The tool control bar displays some useful controls for it. Let's experiment with them. For example, change the Falloff property from the default value None to Distance, so that light intensity decreases by distance just like in the real world. Then increase the Intensity value to 1.0.

Note

Unlike the material mapping objects, which affect only objects at the same hierarchy level, light source objects, by default, illuminate all objects in the model regardless of the hierarchy.

Editing Geometry

Earlier, you transformed the tabletop cube using the the transformation handles, which automatically show up when you select an object.

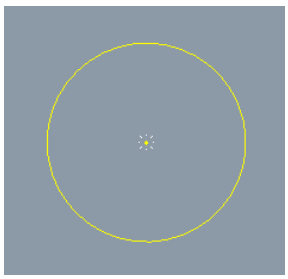
These transformation handles are common to all objects: for example, the rotate handle consisting of three perpendicular circles can be used for rotating all kinds of objects.

Some handles are object specific. You can ask the selected object to show its object specific handles by clicking the Edit button in the Control Bar.

We created the light source by entering two points, which defined the center and the fall-of radius for light source. Both properties can be edited after creation using the Edit mode.

Select the light source and click the Edit button, or simply hit the space bar key, which does the same thing.

A circular handle shows up around the light source. This circle represents the fall-off radius, which specifies the distance where the intensity decreases to 50%. If the light source doesn't seem to illuminate objects of you scene enough, drag this intensity handle bigger.



Point light specific handles

Only the point light source has this kind of handle. For example, a cube defines other kind of handles (six face handles), which can be simpy dragged around to edit the size of the cube.

Ray Tracing

So far, we have worked with our table in shaded mode, so let's see what our table looks like when it is ray traced. Make any adjustments you want to the view orientation using Alt+dragRMB to get a nice view of the table. You can then render the view window by clicking the Render View button, which is at the bottom group of the View Control bar.

Note that all icons have tool tips. If you do not know what a particular button represents, move the cursor over the icon, and in a moment a short message explaining the icon is displayed. You can also activate rendering using the view popup menu Render/Ray Trace.

Shadows and Reflections

Light sources cast shadows by default. In order to see shadows, we need something the table can shadow. So let us use create a floor.

The floor we need can be represented by a large rectangle. Now, you should already have a pretty good idea how to do this: switch the view window to the Top view, use Shift+RMB to zoom out so that you can create quite large floor. Then enable the Rectangle tool in the Analytic tab of the tool bar and enter two points in the view window to define the size for the rectangle. Take a side view and move the floor just below the table.

To make the floor more interesting, you might want to attach a nice material to it too.

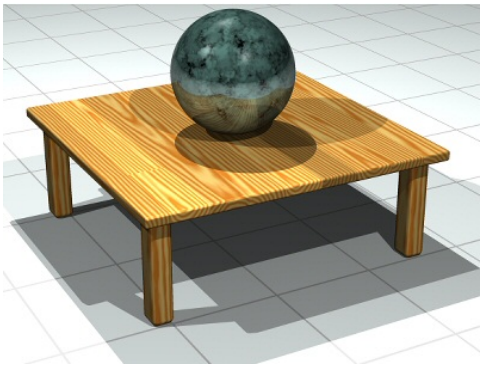
Some of the materials define reflectivity, in which case they automatically reflect the surrounding world in a physically correct way. Let's see how this work.

Switch to the front view, then select the Analytic Sphere tool from the Analytic tab of the Toolbar. Click twice in the view window above the table to define the center and the radius for the sphere.

A gray sphere is quite boring, so let's apply a material to the sphere, but this time using the drag&drop interface.

Make sure that the sphere is selected, then switch to Materials tab of the Select window. Move the mouse pointer over the dark 'marble1' material, and press and hold down the left mouse button. You have just "grabbed" the marble material. Now drag the mouse into the view window and release the mouse button. The sphere has been assigned the marble material. To verify this, switch back to the Geometric Objects tab of the Select window and look at your hierarchy.

Drag&Drop is another way to map materials to objects and very useful when you don't have to define a specific mapping geometry. Earlier, when assigning wood to table legs, we wanted to make sure that grains follow the leg direction,and therefore explictly drew the required parallel map. Now we did not worry about the orientation of the marble pattern, and therefore the quickest way to assign a material was quite suitable.



A marbled sphere on a wooden table

Rotate the view upwards (Alt + dragRMB) and click the Ray Trace button in the View Controls bar to check the result.

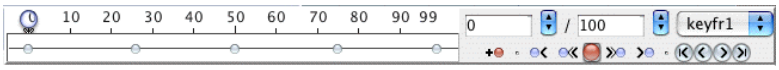
The image is starting to look more interesting. The table casts shadows on the floor. The marble sphere should reflect the table.

Creating an Animation

The next part of our task is to animate the sphere so it rolls across the table. There is much to say about animation, and we will get to that in later tutorials. For now, what you need to know is that you "key" the position, rotation, etc. of objects at particular frames, and let the computer fill in the in-between frames (often called "tweens"). So how do you do it?

Realsoft 3D has the normal main menu below the program title bar. It contains all the general-purpose tools, and if the icon of some tool is not included in the toolbar (because of lack of screen space, etc.), you can find it from here. The main menu also includes the functions that are needed for project management and changing the working environment.

We need to display the Animation window. It appears at the bottom of the main window, below the view window, and looks like the following.

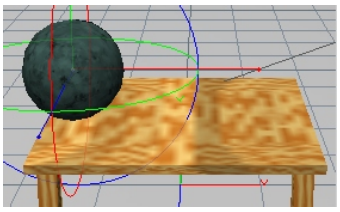


The Animation Window

If this window is not visible already, go to the View menu (main menu bar) and select Animation window from the list. If you don't need animation controls, you can hide the window to save some screen space.

We want to animate the marbled sphere, so select the 'sphere+marble' object from the hierarchy tree of the Select window.

Place the sphere at the position where you want the animation to start (in other words, your initial scene). For example, use the 'x' translation handle to place the sphere at the back of the table.

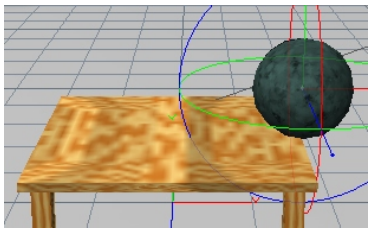


Sphere in frame 0

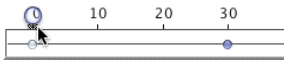
At the right end of the Animation window, there is a red circular button. Click this button. Now animation recording is on and all modifications to the table scene applied while the recording is on are stored as into the animation.

Move the time slider in the Animation window to frame 30, which represents 1 second in NTSC format. If you prefer, move the time slider to frame 25 for 1 second in PAL format.

Drag the 'x' translation handle to move the sphere to the right edge of the table. Congratulations - you have just created an animation!



Sphere in frame 30



Key frames

The Animation Window should now show you two knots, placed at frames 0 and 30 correspondingly. These represent the sphere position in time.

Try moving the time slider between these two knot to verify that the sphere really moves between the two edges of the table when you move the time slider between the two knots in the time line.

You can move these knots to adjust timing. For example, if the sphere moves too slowly on the table, drag the second keyframe from the frame 30 to frame 20 so that the sphere will reach the edge of the table in frame 20.

Let's create a few more key frames. Move the time slider to the frame 60, drag the sphere further over the table edge and then drag the 'y' translation handle to move the sphere down to the floor. Move the time slider to the frame 90. Drag the 'y' translation handle to move the sphere up a bit, as if it had bounced from the floor.

You have now created an animation where the sphere moves on the table, then falls down to the floor and bounce up once.

Click the red animation Record button again to turn off the recording mode.

- Click the Play button in the Animation Window to see your animation.

Animation may not look that realistic yet, as only a couple of key frames is not sufficient to represent a realistic bouncing motion. You can fine tune the animation the same way you created it in the first place: enter animation recording mode and modify the sphere in desired frames to fine tune the motions.

Note

You can also modify the animated sphere animation recording mode disabled. For example, if you animate a sphere to bounce on a table, and you then move it down the floor recording turned off, the sphere bounces on the floor. In other words, if you transform the object in animation recording mode, you edit/create key frames. If you modify the object without animation recording on, then the transformation affects uniformly all motions.

Saving Projects

At this point, we must also perform one important step: save the work done so far. Therefore, select File/Save As from the main menu. Choose a suitable folder and file name for saving the project using the browse button. Press OK to finish the Save operation.

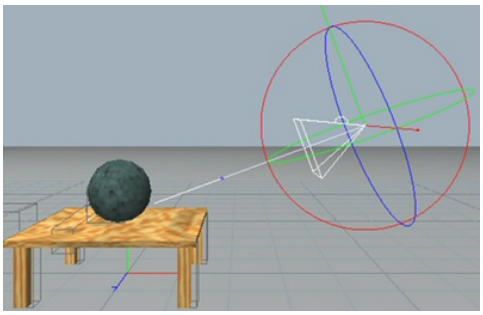
Rendering the Animation

In most cases, the created animation must be rendered to a suitable file format, so that it can be presented as a part of a multimedia show or in a home page, etc. This is the final step for this tutorial.

When rendering images to disk files, it is necessary to create a camera object for the scene. The camera defines how the scene is viewed in the rendered pictures. The view window cannot define this, because there may be many views opened simultaneously, or no views at all.

Click the Camera tool icon on the Creation section of the Toolbar. Then enter three points through the view window to specify the position, the aimpoint and the viewing angle for the camera.

As you can see, the created camera has the standard transformation handles. The camera object is also added to your object hierarchy. It can be selected, modified and animated similar to any geometric object, such as the bouncing sphere above.



Camera object created

Tip

If you click the Accept button in the Control Bar without entering any points in the view window, the orientation of the current view window will be used for determining the orientation of the created camera.

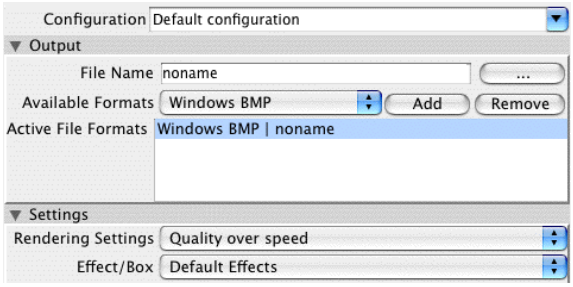
If you want to see how things look from the cameras stand point, simply drag&drop the camera object from the select window into the view window. If you lost your sphere or table in the view window (for example, you accidentally panned the view too much) just drag the desired object from the select window into the view window. This turns the view to show the dropped object.

Adjust the camera position and other attributes until the camera shows the scene in a suitable way.

Select File/Render from the main menu. This opens a File Rendering window with settings for controlling the final rendering of the animation. Do the following:

In the Output section, enter a suitable path and filename (e.g. 'images/myanim') in the File Name field. Use the browse gadget if necessary.

By default the file rendering window renders images and animations to .BMP format, which is not what we want now. Left click to highlight BMP from the Active File Formats list, then press the Remove button to remove the BMP format from the list.



The Rendering Window

Press the downward pointing arrow to the right of the Available Formats field. Select 'MOV Animation' from the list, and then click the Add button.

In the Settings section, select the value 'Reasonable quality' for the Rendering Settings field.

In the Resolution section, set the Width field to 400 and the Height field to 400. The height and width should be the same, because the camera we created above has a symmetric image aspect ratio 1.0 (=square). If the resolution ratio h/w and the image aspect of the camera do not match, rendered pixels will not be perfect squares but stretched rectangles.

Press the Render Animation button to start rendering the scene. This button renders the entire animation, whereas the Render Image button renders a single still image, based on the current position of the time slider.

Wait until the progress indicator shows 100% and the Render Animation button and Render Image button become enabled again. This indicates that rendering has completed. You can now play the animation using your favorite media player. On many systems, all you need to do is double-click the AVI file from the File Manager.

Summary

This first tutorial has introduced several of the basic concepts of Realsoft 3D . An important element of this tutorial was to show you that there are a number of ways to activate various functions in Realsoft 3D.

All these different methods of performing the same function may seem confusing at first, but it allows for much flexibility as you learn the program. Beginners may use simple methods like tool icons or menus, whereas experienced users may use fast methods like keyboard shortcuts and compass menus. The program includes thousands of features, and all the input devices - mouse, keyboard, etc. - are loaded with power features. As you learn to use the program, it becomes possible to execute a complicated workflow surprisingly fast by combining these techniques.

This marks the end of the first tutorial. Congratulations on creating your first scene. Hopefully, this first lesson has whetted your appetite, and demonstrated some of the power of Realsoft 3D. Happily, there is much, much more. Further lessons introduce and explore more specific features and techniques. All that can be said at this point is: be patient. 3D modeling is a huge topic, but isn't learning fun!

Subdivision Surface Modeling

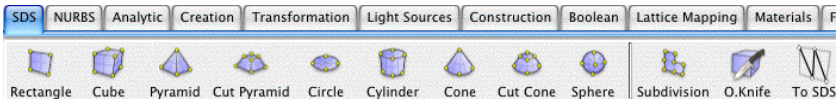
Subdivision surfaces combine all the good features of NURBS and polygonal surfaces; they allow organic shapes to be modeled easily and define perfectly smooth shapes with a varying surface.

Realsoft 3D provides a very powerful set of tools for modeling with subdivision surfaces.

This tutorial goes through a number of basic modeling examples for beginners.

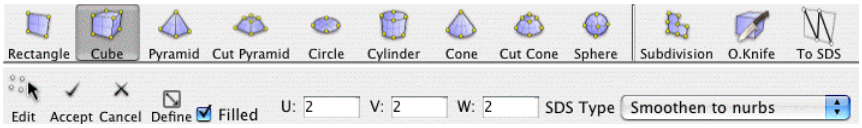
Creating a coffee cup

The SDS toolbar allows you to create basic subdivision surface objects.



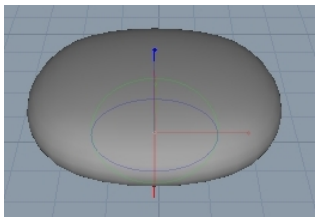
SDS tool bar

Click the SDS/Cube tool button. As usual, the control bar now shows you a number of subdivision cube specific options.



The options for the subdivision surface cube tool

Now switch to the top view either by clicking the top view button in the view control bar at the right side of the view winsow or from the view's popup menu Camera/ Top. Define the cube through the view window by entering two points with the mouse. While doing this, you may hold down the Shift key in order to achieve a symmetric cube. A subdivision cube is created.



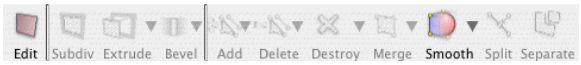
A subdivision surface defined by a cube-like control polygon

As you can see, the created cube defines an object which doesn't look like a cube at all. In fact, the cube tool created an object, which more or less looks like a sphere!

However, it is relatively easy to turn this spherical object to a coffee cup, or whatever other shape, as we will see soon.

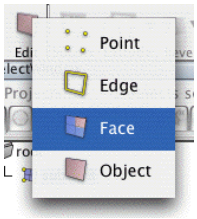
This is actually a very common situation when modeling with subdivision surfaces. One starts from a very simple object, such as a cube, and adds details to it using different subdivision modeling tools.

The new subdivision object should be automatically selected after its creation. If you accidentallyy deselected it, click its name in the select window. As usual, the tool control bar automatically shows you the appropriate subdivision modeling tools as soon as a subdivision object becomes selected.



The control bar shows you the tools, which can be applied to the selected subdivision object

As you can see, most of the tools are disabled. The reason for this is that most of the subdivision modeling tools can only be applied in the 'Edit' mode.



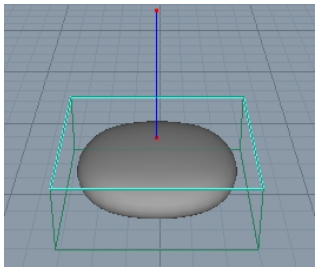
Select Face edit mode

Subdivision objects provide three kinds of editing handles: faces, edges and points.

Point handles allow you to single point edit the subdivision object. There are also a number of tools, which can be applied to points. There are also edge and face handles available - they modify several points at a time.

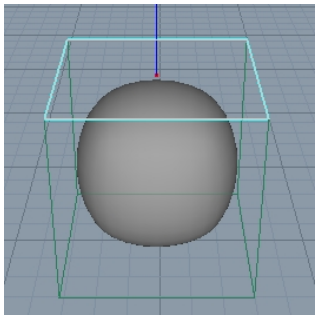
In order to turn our cube into a cup, we will be using the face handle mode. Select Face from the Control Bar's Edit field.

Select the top face by clicking it with the left mouse button. The selected face is highlighted.



Top face selected

Rotate the view window (drag downwards with the right mouse button Alt key held down) so that you can see the object's front and top sides. You can see a so called *face normal handle* sticking out from the selected top face. The face normal handle is perpendicular to the selected face and allows you to move the selected face.



Top face moved along its normal

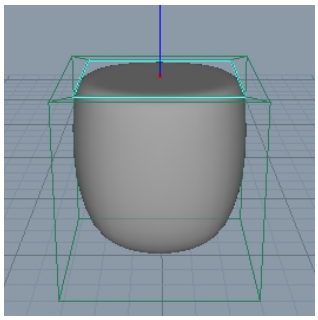
Let's move the face to make our 'sphere' a bit higher. To do this, simply move the mouse over the center of the face normal handle and drag it. Note: don't drag the end points of the handle. They scale and rotate the face.

When you selected the top face, many of the subdivision modeling tools in the control bar were enabled. This indicates that they can be applied to the selected face.

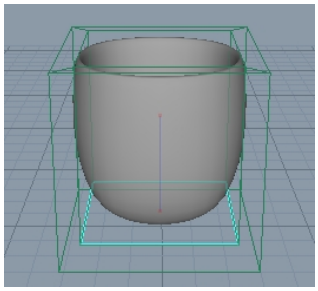
Activate the Subdiv tool (Subdivide Face) and LMB click in the view window.

Subdivide Face tool

When you now move the mouse up/down, you can see the effect of the subdivision tool. When an appropriate subdivision degree is achieved, click the left mouse button again to accept the operation.



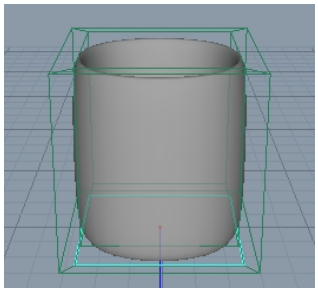
Top face subdivided



Top face extruded inwards

Now activate the Extrude tool and enter one point through the view window. By moving the mouse up/down you can extrude the top face up/down. If you extrude it downwards, the object starts to look like a cup.

The bottom of the cup is too round. Subdividing the bottom face adds new geometry, which will help to flatten the base. So, alt-drag with the right mouse button held down to rotate the view so that you see the cup from below. Click the bottom face to select it. Instead of pressing the Subdiv tool button, let's use the object handles. Hold the Ctrl key down and LMB drag the outer end knob of the face handle line. A new face appears and changes its size while you move the mouse. Make the new face almost as large as the original bottom face and release the mouse.



Bottom face subdivided

As you noticed, many useful subdivision tools can be activated by dragging the handles while holding a suitable modifier key down. The extrude tool which was applied above can be activated by Ctrl-dragging the actual face handle line, not its end knob. The handles usually provide the fastest way to achieve a certain action, because the tool is available at the same place where your focus is.

Now our cup is able to stand stable which is one of the basic requirements for a decent cup.

As you can see, with just a dozen of control points, we can define a cup with a smooth surface.

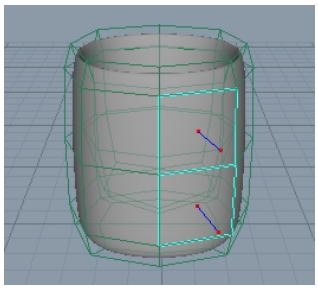
Extruding the handle

Most coffee cups have a handle. Let's see how we can use the Realsoft 3D modeling tools to create one.

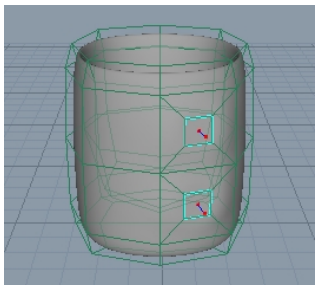
There are numerous ways to create handles for the cup. Which one is the best method, depends on the case. For example, we can use the Extrude tool to extrude two "tentacles" out and connect the ends of the tentacles. Let's try this.

Click the Smooth tool. This subdivides the entire control polygon of the cup, producing a more dense control polygon. However, the actual shape of the cup is not changed by this operation.

Now, select two of the side faces (one on top of the other). Keep the Shift modifier pressed when selecting multiple faces.



Select two side faces and..



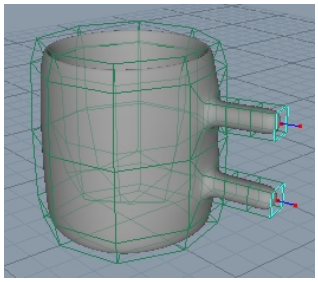
..apply the Subdivide Face tool

Now apply the Subdiv tool. Subdivide the selected faces just like we did when we subdivided the top face in the beginning of this example.

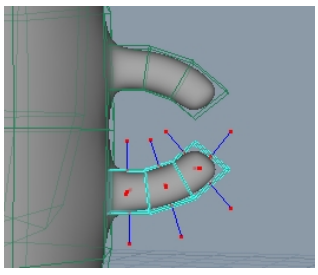
Activate the Extrude tool. When the tool is activated, the control bar shows you the available extrude tool specific options. Enter 3 into the Sections field in the control bar.

Extrude three cross sections

Now enter two points through the View window to get two tentacles extruded.



Two faces extruded with 3 sections



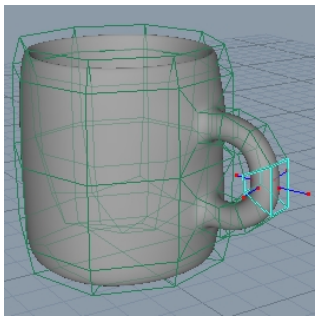
Extruded tentacles bent

Use the Realsoft 3D Bend tool (in the Transformation toolbar tab) to give the desired shape to the handle tentacles. To do this, rotate the view until you see the tentacles directly from the side. In the view window, LMB-drag a selection box, which includes the faces of the upper tentacle. The faces inside the box become selected. In edit mode, transformations modify only selected handles, and we can now bend only the upper tentacle.

Click the bend tool to activate it. Click once in the middle of the first cross section of the tentacle and click another time at the end of the tentacle. Move the mouse to find a suitable bend and click to finish the tool. Drag-select the bottom tentacle area and bend it, too.

Now we only need to connect the ends of the tentacles to finish the cup. To do this, zoom and rotate the view window to see the end face of the upper tentacle from below. Click to select it. Rotate the view upwards to see the end of the lower tentacle well. Press the Shift key (=multi select modifier) down and click the end face of the lower tentacle. When both faces are selected, the Tunnel tool in the toolbar becomes enabled. Click it to connect the selected faces. The cup is now ready.

 *The Tunnel tool*



Tentacles connected

The Font Tool

The *Font* tool creates font outlines. Outlines are represented as regular NURBS curves. You can use them with all surface construction tools.

Let's experiment with the tool.

1. Activate the Font tool. It's in the NURBS tab.

You can now see a number of tool specific options in the control bar.

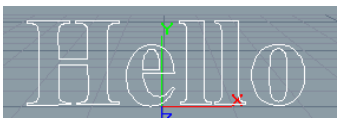
The Font tool activated

2. Specify the desired font properties and type in a string 'Hello' into the Text field.

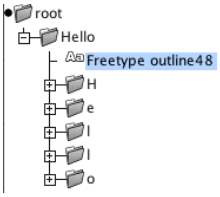
Note

Use the Browse button to bring up the standard font selector window and select a font, style and size.

3. Then enter two points through the view window to define a base line for the outline curves. When the second point is entered, the tool is automatically accepted and the curves are inserted to the scene.



Hello using Times New Roman

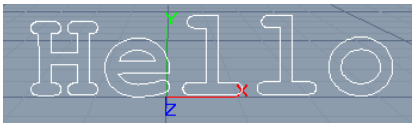


Select font manager

4. Let's assume we made a mistake. Instead of using the Times font, we should have used the Courier font.

In the select window, you can see an object whose name matches the text you specified into the Text field ('Hello', in this case). Open this level and you can see a font manager object. The font manager object is named according to the font class you specified (Truetype, for example). Select the font manager object.

5. Open the property window. In the Spec tab, change the font type to Courier New, for example. The curves in the view window are instantly updated to reflect the new selected font.



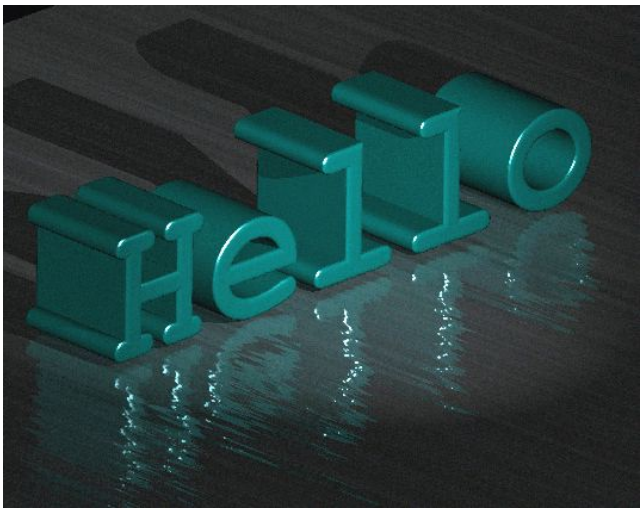
Hello with Courier font

Let's end this tutorial by creating a 3D logo from the curves. The Extrude tool can be used for this.

Extrude tool

6. Select the entire 'Hello' folder from the Select Window. Click the Extrude icon in the NURBS toolbar.

7. Select and specify the desired extrusion options through the control bar. For example, set Beveling Type to Round. When done, click Accept to finish the tool.



Extruded outline fonts on a semi reflective floor

8. Drag and drop a material such as 'Gold' from the Select Window's material tab into the view window to assign a nice material to the new 3D text object. Add a point light source above the text. Use the Analytic Rectangle tool to model a floor below the text. Hit '0' key to render the view and check the result.

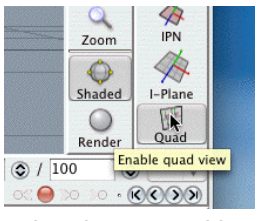
Tutorial project: 'tutorprojects\modeling\nurbs\fonts\hello'

Modeling Your First Building

Building Walls

Start the program. Change the view window to the quadview mode by clicking the quadview button. The mentioned button, as well as many other useful view navigation and control tools are grouped into the vertical view control bar at the right side of the view window.

Click the top left quadrant of the view (labeled as 'Top) to activate it. Then click the Quadview button again to maximize the selected top view. Alternatively, you can press Alt key down and double click the selected view quadrant to maximize it.



The view control bar is located at the right side of the view window. The Quadview button is highlighted and shows the tool tip.

Use the navigation controls to zoom out and move the view camera far enough from the origin, so that you will see enough space for modeling a complete building. Note that the status window displays changed camera parameters while you use the navigation controls. The view window should display about at least 15 meters wide area of space, and the camera should be moved at least 10 meters away from the origin. Undesired clipping problems arise, if parts of the building reach out all the way behind the camera.

Zoom and Distance controls

Note

In this software, the XZ plane is the ground plane and Y axis points upwards. You can see the orientation of world from the coordinate system drawn in the view window. The direction convention can be changed using the Space selector of the File/Preferences window.

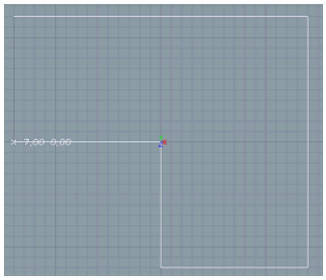
Activate the Building tool. It is located in the Creation tab of the toolbar.

First you need to draw a continuous loop, which defines the outer walls of the house. Click somewhere on the top left corner of the view window to start drawing the walls.

Note

Click the left button - do not drag the mouse while holding the left button down. Dragging operation is reserved for point snapping.

Move the mouse to see a rectangular shape drawn on the view window. By default, the building tool is in automatic mode, which draws a frequently needed rectangular base for the building. However, if the second click is exactly in a vertical or horizontal line from the first click, the tool continues accepting an arbitrary sequence of wall segments. Let's use the latter alternative.



Draw a line sequence, which defines the walls

Move the mouse to the opposite side of the view window horizontally. To easily find an exact horizontal level, just hold the Shift key down. When the first wall segment is 14 meters wide, click second time. Then continue drawing the base of the house until you have an L shaped form shown in the example picture. To finish the drawing, either click the Accept button in the toolbar or click again on top of the first wall point to close the loop.

Note

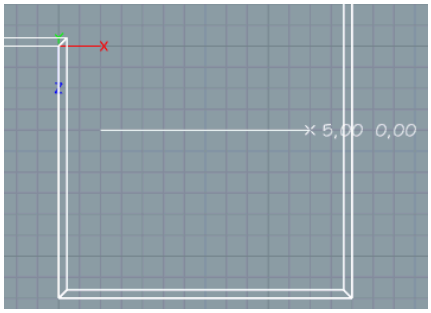
If you accidentally enter a point in a wrong position, hit the backspace key to step back in drawing.

A new object called 'buildingX' appears into the select window, which is located at the left side of the screen. The select window shows you the structure of your current scene. It is very important tool and we will learn more about it later.

Let's draw some inner walls next. While a building object is selected, the second row of the toolbar automatically shows you some frequently needed controls and tools, which are useful for building construction. Click the Sub Wall tool.

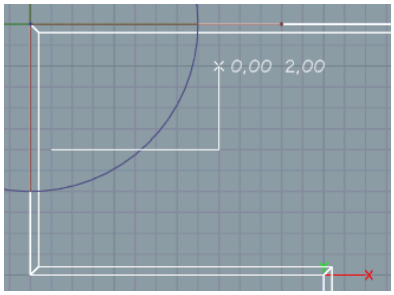
Sub Wall

Click two times to draw a horizontal wall as shown in the picture Note that you do not have to aim carefully to match the inner wall with outer walls. After activating the Sub Wall tool, take a look at the second row of the toolbar; it now shows the options of the Sub Wall tool. Snap Start and Snap End options are active by default, indicating that the tool will automatically fill the gaps. Finish wall drawing by clicking Accept or hitting the Enter key.

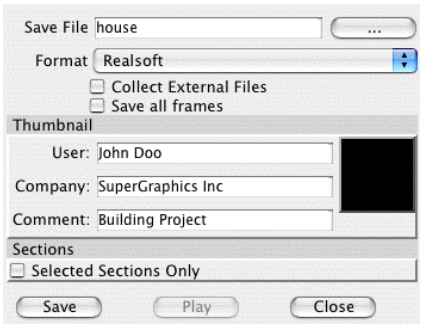


Draw the first sub wall with 2 mouse clicks. Length does not matter.

Activate the Sub Wall tool again and draw a second set of inner walls as shown in the picture. As you can see, sub walls can have multiple points and turns.



The second sub wall has 3 points



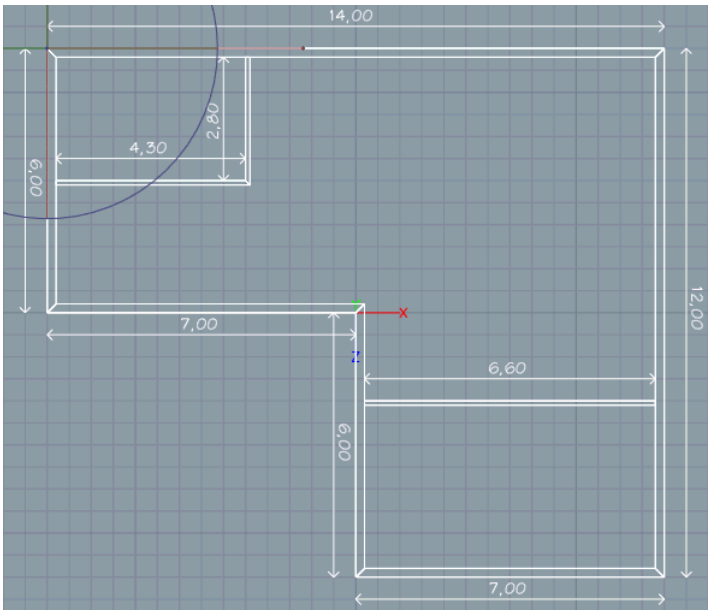
Remember to save the project at regular intervals

It's time to save the work. Select the pull down menu File/Save As. After the save window has opened, define a suitable file name for saving, such as 'house'. You can also fill in some information to the Thumbnail fields. By clicking the thumbnail image, you can record the contents of the view into the thumbnail. Click OK to save the project.

Editing the Walls

The dimensions and walls of the building can be changed easily. All parameters can be found from the hierarchical structure of the building. The building system is fully parametric. When any part of a building definition is modified, the required parts of the geometry are rebuilt again.

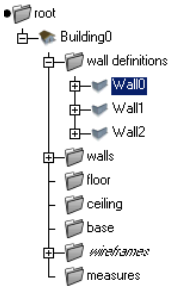
Make sure that the building object is still selected (its name is highlighted in the select window). You can see the dimensions of the walls by selecting Measure Lines=Left from the tool bar.



Measuring lines enabled

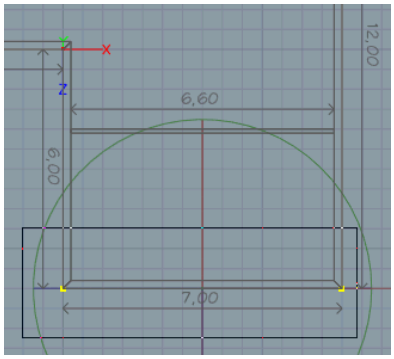
Click the little square which has a + sign inside it at the left side of the building item on the select window. The building folder opens and shows its sub objects. Open the first sub level called wall definitions. It contains three wall objects. The first one is what we drew first, the outer walls. Select it.

Note how the second row of the toolbar immediately shows some options for the selected wall. Change the thickness of the wall from 0.2 meters to 0.25 meters. Then change the extrusion side from Right to Left. The polyline for outer walls originally defined the outer dimensions of the building, but now the walls are built outside the polyline. While you made the changes, sub walls automatically adjusted their length, thanks to the auto snap option.



The hierarchy of the building opened. Outer wall definition selected.

Open the up most wall level on the select window, and select the polyline object called 'nurbsXX' inside it. Hit Spacebar or click the Edit button in the toolbar to put it into the edit mode. The line displays some little red squares - its point edit handles - on the view window. Drag-select (move the mouse holding the left button down) a point pair on the bottom part of the wall, as seen on the picture.



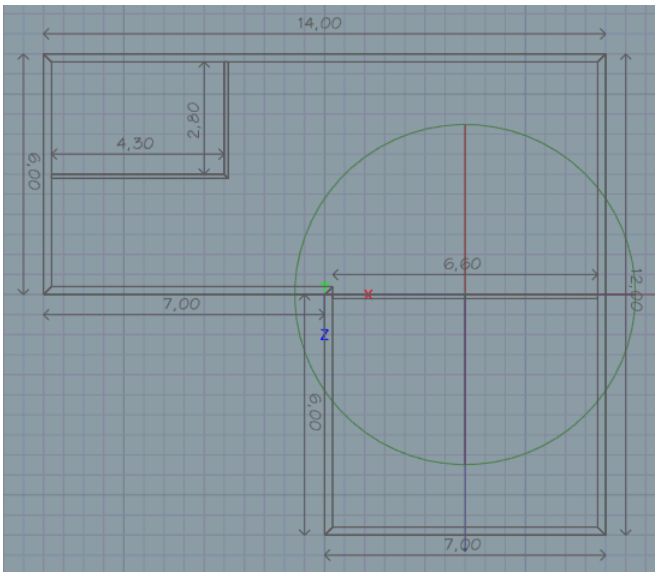
A point pair selected. The drag selection box is also included in the picture.

A circle and some axis lines show up around the point pair. The circle is the rotation handle, and lines are translation handles. The end knobs of axis lines are for scaling. Try modifying the point pair by dragging these handles with the mouse. Note that you can cancel an experiment by hitting Esc key, and undo the action afterwards using the Exit/Undo pull down menu. After experiments, expand the building to Z axis direction by dragging the blue axis line 2 grid units downwards.

Note

When you select the nurbs polyline, the toolbar displays a large set of tools for editing the line. With these tools, you can for example add more points or delete existing ones.

Above, we used point editing to modify the walls. A wall can be modified as a complete object, too. Select the second wall object from the select window. Then drag blue axis line on the view window to move the sub wall. Note how the sub wall automatically expands while you move it. Place the wall exactly in the corner as shown in the picture below.



Sub wall moved to a new position

Now we can stop experimenting with wall editing. Close the level 'wall definitions' in the select window to keep the hierarchy display simple. Then select the whole building object from the select window. Turn measuring lines off using the control in the tool bar.

So far, the results of our modeling actions were seen in a simple wireframe model. Next we will experiment how to model in perspective shaded view. But before that, let's add a light source. Alt-double click the view to see the quadview, then Alt-double click the Side view quadrant to maximize it.

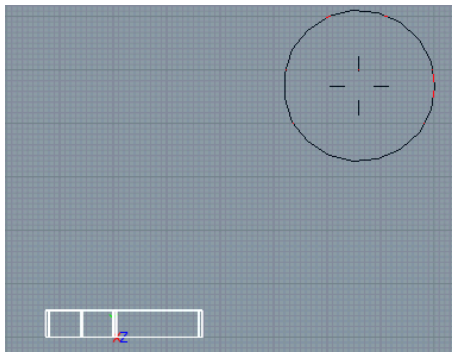
The Zoom button is located in the top part of the view control window.

 *Zoom Tool*

Move the mouse on top of it, press LMB down and drag downwards, so that you will see a larger area of space around the house.

Tip

The quickest way to zoom in and out is to hold the Shift key and the right mouse button down and move the mouse up and down above the view window.



Adding a point light

Switch to the Light Sources tab and activate the Point Light tool. Click somewhere above and in front of the house. The falloff radius defined by the second click does not matter this time, so click a second time anywhere on the view.

Go back to Quadview (Alt-doubleclick) and maximize the bottom right quandrant, which shows the perspective shaded view.

Switch the select window to the second tab from the left. It shows the current material library. The default startup library includes a large collection of materials, but we will need only some of them. So, select Purge from the popup menu of the select window. Only one material called building remains in the material library. Double click it select it and to open the property window.

The building material was actually created by the building tool, when we applied it in the beginning of the tutorial. So called Auto Texture option does this unless the user explicitly turns it off. So, all we need to do now is to click the browse button at the right side of the Filename control, and select a texture map using the file browser. Pick for example bricks.jpg from the textures folder. Then close the property window.

Note

The sub folder 'Walls' of the building contains a texture mapping object 'Default mapping(building)'. It assigns the material to the walls. If you select this material map object, you can change its target material to another alternative using the material selector gadget, which appears in the tool bar as soon as the material map object becomes selected.

Select a brick texture for the walls of the building

Go back to the leftmost tab of the Select Window. Click the building object to select it. Currently the building has only walls. To add a base plate under it, go to the second row of the toolbar and set Base=Fitted to Walls.

Note

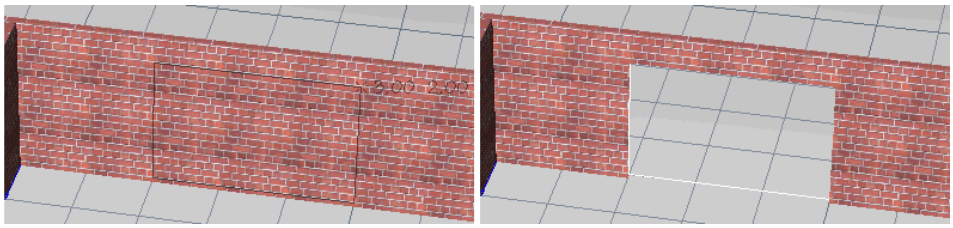
The narrow toolbar has room for only the basic options. For more detailed control, open the Property Window (from the popup menu of the select window, by double clicking the object or using the 'p' hotkey). Then you can adjust the height of the base plate etc.

Rotate the view around the house using the view rotate button in the view control bar. Another way is to hold the Alt key down and drag in the view window with the right mouse button. The view rotates to the direction where you move the mouse. Another useful navigation control of the view control bar is the pan tool (available also via Apple +RMB dragging). Try these controls to find a view where you see the straight inner wall.

Let's cut away part of the inner wall. Click the Hole tool in the toolbar.

Hole Tool

Move the mouse pointer to a position where the wall meets the floor and click to define the bottom left corner of the hole. Move the mouse to the left and upward. Note how the hole snaps to the 0.5 meter grid units. Click second time when the hole is 3 meters wide and 2 meters high.



Cutting a wall with the hole tool

Note

Just like the wall definitions, you can find the new hole object from the hierarchy of the building. It is located under a sub level called holes. Open the level and select the hole. Go to the tool bar and change its Width to a new value, say, 2.5 meters. You can also move the hole around using its transformation handles.

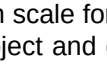
It's again time to save the project. Select File/Save As from the pull down menu. Change the file name for example to 'house2'. This way you will get multiple backups of the project, representing different stages of the modeling process.

Windows and Doors

We could add all windows and doors to the building using the hole tool. However, there is even quicker method available: drag and drop from object libraries.

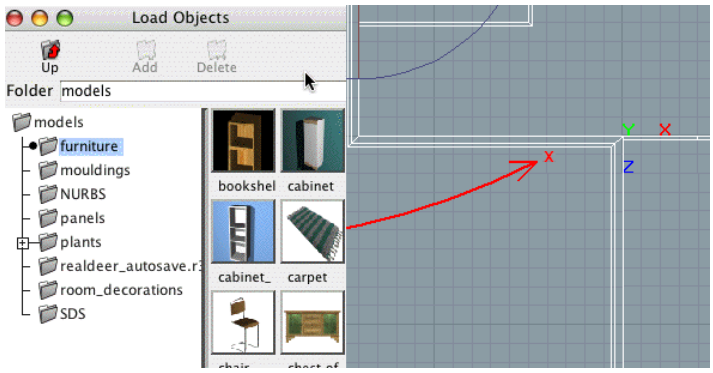
Modeling in shaded perspective view is fun but often the best accuracy is obtained by using parallel projection and a wireframe view. So, alt-double click the view to get back to the quad view and then alt-doubleclick the top view to maximize it.

To find a good zoom scale for further modeling, switch to the leftmost geometry tab of the select window, drag the building object and drop it into the view window. Dropping an object to view performs an Auto Focus operation. The view window will zoom exactly around the selected target. You can also use the Auto Focus tool in the view control bar after selecting the building.


Auto Focus

The loaded window and door items should go under the building hierarchy. Therefore, click the 'Building' object in the Select Window. The current level marker jumps from the root to the building level. Then select Browse Object Library from the popup menu. This opens the loader window, which shows disk library objects conveniently as small thumbnails.

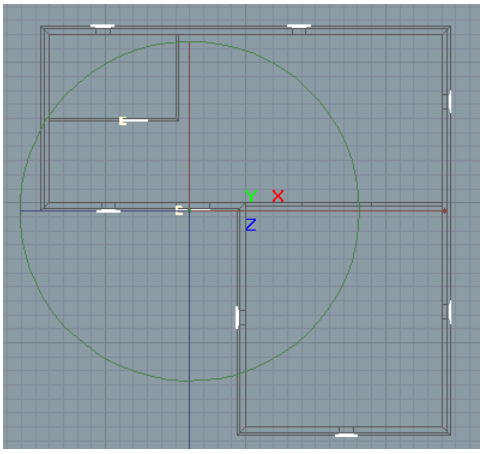
Click the library folder called furniture, and find the item door. Drag the door icon over the view window and drop it just outside the point where you want to insert the main door of the building. Do not drop it too far away from the wall; the door has auto-snapping properties, which become active if a wall surface is found closer than one meter. If the drop position was correct, the door snaps exactly to the wall and rotates itself to the direction of the wall.



A door snaps to the wall when dropped close enough

The loaded door object appears in the view window and in the select window's hierarchy tree. It is automatically selected and displays useful attributes in the toolbar. Try changing the width to 1.2 meters.

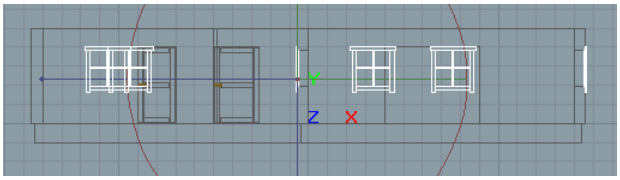
Next drag and drop another door for the small closed room in the upper corner of the house. The width of this door can be smaller, say 0.8 meters - change it using the toolbar control. Then drag and drop several windows so that every wall and room gets at least one window. Note that you have to drop the windows outside the building; otherwise the outer mouldings of the window may rotate to the wrong side of the wall.



Two doors and seven windows added

Close the loader window and take a front view. The windows are quite small; let's make them bigger. In the select window, drag a selection box around all objects called window. You can also select them all by clicking them one by one holding down the Shift key, which is the multi selection modifier.

The windows are parametric objects, which automatically display the dimensions in the tool bar. Change width and height to 1.2 meters. If the upper edge of the windows got too high, simply drag the green translation axis downwards on the view window. Note that holding down the Shift key releases grid snapping temporarily and allows you to align the windows with the upper edge of the door.



Windows resized and aligned with the door

Before proceeding into other steps of building construction, let's clean up the hierarchy. Multi select all doors and windows, and select Drop to a level from the popup menu of the select window. The selected objects are placed under a new folder. Use the Rename tool of the popup menu to rename the folder as doors_and_windows and close the folder. This action keeps your scene hierarchy more compact and better manageable. You can naturally later open the folder, select and edit any door or window if you like. Then save the project with a new name.

Decorating Rooms

Now all walls are made of solid brick, and the floor is just the base plate under the building. The room object allows individual decoration of rooms. This modeling stage happens best in the shaded perspective view. Turn it on as before and rotate the view so that you see the building from above.

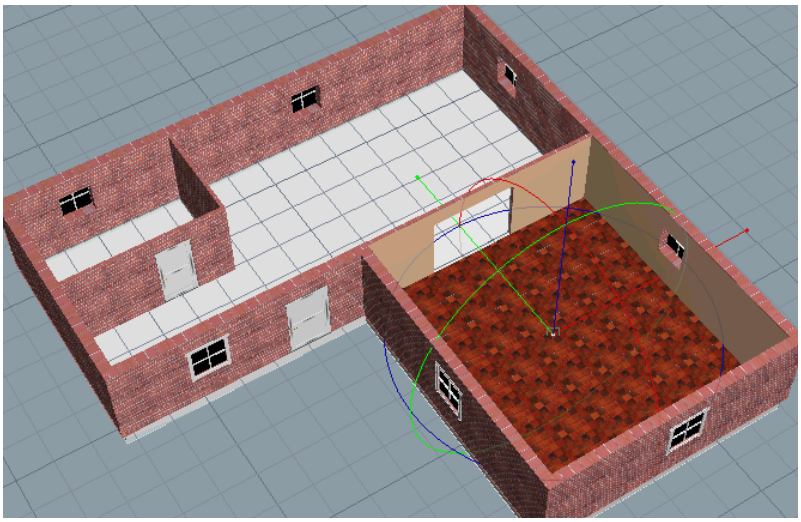
Select the building object. As usual, some useful tools for this type of object appear on the toolbar. Click the Room tool button 

Room Tool

When the room tool is activated, the tool bar shows some tool options. Change the name of the room to 'kitchen'. Click in the middle of the room, which is located in the lower right end of the house. The tool adds a new room object into the hierarchy, and white surfaces enclose the space around the clicked point. Select the room object from hierarchy, and turn off Ceiling option from the tool bar. Now we can see again into the room.

Go to the second tab of the select window, which includes the material library. The room tool has inserted a set of new material templates. Double click the material building_kitchen_floor to open the property window. Open the file selector using the filename browse button and select a texture, for example plates.jpg.

Select a second material, building_kitchen_walls. All surfaces need not to have a pattern. The Wizard selector in the property window shows Color; just click the Add button and a color selector appears on the bottom of the property window. Pick a constant color for walls, for example some nice shade of light brown.



One room decorated

Switch back to the geometry tab of the select window. Open the hierarchy of the kitchen folder. Select a folder called floormouldingsample. Apply Make Current from the select window's popup menu to make it the current level. Then pick the popup menu Browse Object Library. The loader window, which we already used for doors and windows opens. Select the mouldings folder from the browser window. Then drag and drop the item floormoulding_pine somewhere in the view window. Drop position does not matter, as long as it is in the view window. A moulding made of pinewood appears.

Then select the folder ceilingmouldingsample from the select window and apply Make Current popup tool to it. Then drag and drop the item ceilingmoulding_birch from the browser window to the view. Now the decoration of the first room is ready. Select the kitchen object. Just for fun, drag the kitchen object around using the axis handles in the view window. As soon as the indicator reaches another room, the selected surface materials spread around the new room! Easy and fun, isn't it! Finally put the decoration back to its original place and check the Ceiling option in the tool bar. We will leave the ceiling plain white this time.

Note

Instead of loading some predefined mouldings, you can model the profile of the moulding yourself using the toolkit of the Nurbs tab of the toolbar.

We will decorate another room using a method that is even quicker and easier. Select the building object from the select window. Rotate the view so that you can see inside the little corner room. In the object browser window, select the folder called room_decorations. Drag the item 'bathroom' and drop it inside the little room. The room gets fully decorated right away. After viewing the result, just check the Ceiling option in the tool bar to add the top surface to the bathroom. It was initially disabled so that you could immediately check the result after loading the decoration.

If you look at the object hierarchy, you can see that the dropped bathroom object is placed into the building folder. If you do not like the decoration it defines or want to try another alternative, just delete the object.

Decorate the third room either step by step or using predefined decorations. Note that you can easily customize predefined library decorations by changing the textures or mouldings. When all rooms are decorated, close the browser window. You can also close the room object folders in the select window hierarchy to hide the details, which are no longer under our attention. Save the project.

The Roof

To add a roof above the building, select the building object and click the Roof tool in the toolbar.

Roof Tool

By default, the roof has a rectangular base shape and a pyramid like structure. The shaded view shows that again, all surfaces are plain white by default. Switch to the material tab of the select window and double click the material building_roof. After the property window has opened, use the file browser to select a texture map called roof1.jpg.

Textured roof

The roof properties, such as the height, width of eaves etc. can be adjusted from the tool control bar and in more detail using the property window. The actual roof shape can be changed using the Roofline tool.

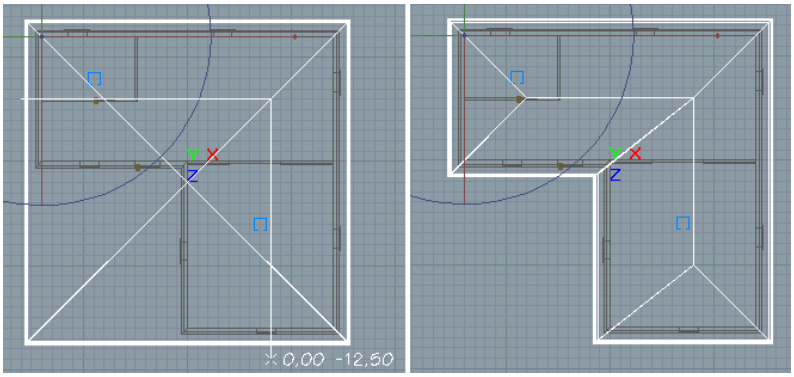
Go to the unshaded top view. Make sure that the roof object is selected and click the roof line tool.

Roof Line tool

Click three times to draw a line that travels in the middle of the L-shape of the building. It does not matter how far the lines reach outside the building. After the third point, click Accept or hit Enter.

Note

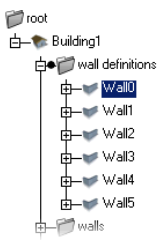
You can use Shift, x and y modifier keys to easily define exact horizontal and vertical lines.



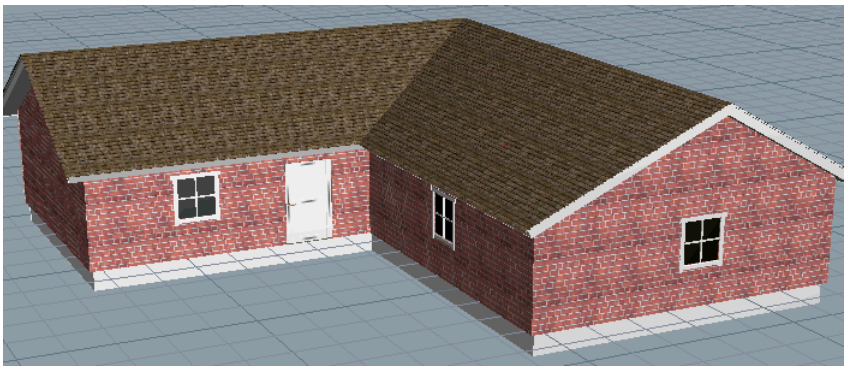
Defining the roof line

The building now has a hip roof. Change it to a gable roof by selecting Roof End = Straight from the tool bar.

Switch back to shaded perspective view and rotate around the house. As you can see, there are triangular holes below the roof at both ends of the house. To fix that, open the wall definitions folder under the building. Select the first wall object (it defines the outer walls). Then activate the Extend to Roof option from the tool bar. The roof is now ready.



Select the outer wall object



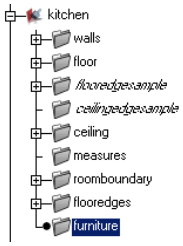
The gable roof finished

Furniture

Furniture can be modeled manually using the general modeling tools. The easiest way is to use the intelligent drag and drop tools and predefined furniture libraries.

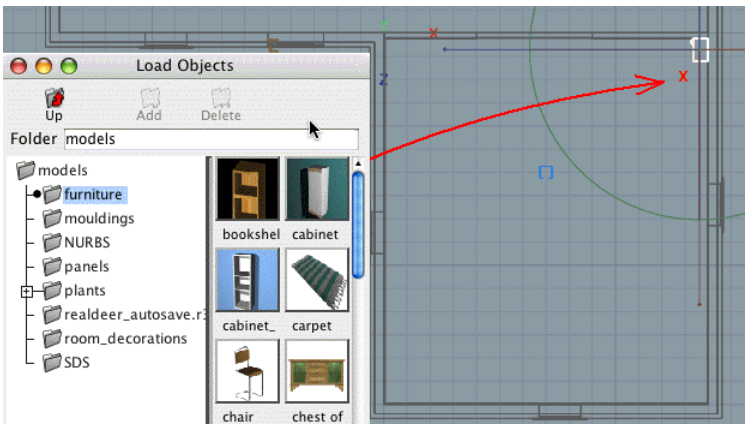
Take the top view (OpenGL shading switched off). Let's handle the kitchen first. Zoom in so that the kitchen fills the view window. Select kitchen from the select window and open its hierarchy, if not open yet. Make sure the kitchen is the current level; note that a small indicator at the left side of the hierarchy level shows what the current level is.

To keep the scene hierarchy in order, all pieces of furniture will be collected to a new level. Select New/Level from the popup menu of the select window. A new hierarchy folder appears to the end of the sub object list of the kitchen. Rename the level as 'furniture'. Then make the level current so that all loaded items will be placed there automatically.



A new level for furniture added into the kitchen and made current

Pick Browse Object Library from the popup menu of the select window. Click the furniture folder in the browser window. Find the item called cabinet. Drag and drop it to the top right corner of the kitchen, 2 grid units down from the corner and one grid unit away from the wall. The drop position is marked with a red cross in the picture below. If the drop position was correct, the cabinet snaps into the corner and aligns with the back wall of the kitchen, which was closest to the drop position.



Drop position of the cabinet and the loaded object. The cabinet aligns itself with the closest wall.

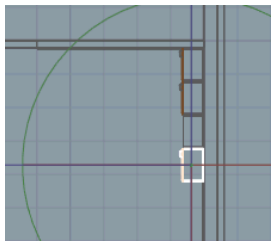
Drag the same cabinet and drop to the same position - 2 grid units down and 1 unit away from the wall. The new cabinet snaps to the end of the first cabinet.

Note

Do not drop the cabinet inside the wall. It may align to the wrong side of the wallpaper!

Check the tool bar after you dropped the second cabinet. It is a parametric object, and you can easily change its width from 0.4 meters to, say, 0.6 meters.

Next drop the cabinet_open to the end of the cabinet row. This time you must shift the drag position one grid unit further. Then add one more cabinet to finish the cabinet group.



Four cabinets loaded

Note

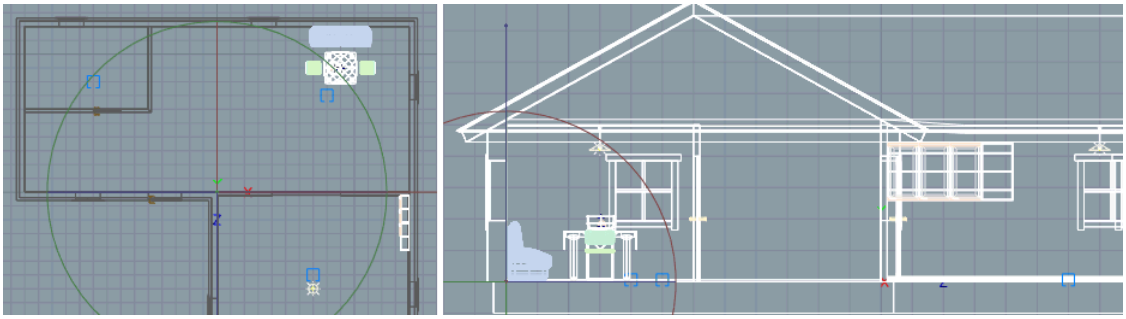
If you accidentally drop a cabinet to a wrong place, just move the cabinet to its intended place or apply Edit/Undo pull down menu and try again.

To finish the experiments in the kitchen, drop the object simple_lamp to the middle of the kitchen. Lamp does not snap to any wall, but it moves in view's orthogonal direction to find the ceiling. If you forgot to enable Ceiling after decorating the kitchen, lamp will travel all the way up to the roof.

Add also some furniture to the middle room. First make it the current level, then add a new sub level called furniture, then make the furniture level the current level. Add the furniture as follows:

- Drop a sofa object close to a wall so that it snaps to the wall.
- Drop a table object in front of the sofa. The table snaps only in Y direction to the floor.
- Drop a chair by the table. Rotate it with the circular rotation handle if necessary.
- Apple-drag the chair to the opposite side of the table. Dragging an object with Apple key automatically duplicates the object. Rotate the copy 180 degrees.
- Drop a lamp object on top of the table.

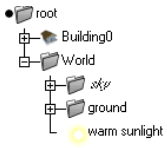
After these steps, take a side view to verify that all objects have snapped vertically to a correct height.



Some pieces of furniture added. Top and side view.

Landscape

The house is floating in empty space. You can model and texture the environment manually, or use predefined world models. We will now use the latter approach. Select the pull down menu Layers/World/flat_ground. New objects appear into the select window hierarchy. The loaded world model also includes a sun, so select the original light point from the select window and hit Del key to delete it.

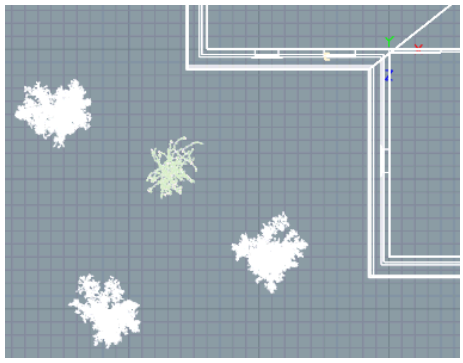


Add a world around the house

Take the front view. Make sure that the base of the house meets the ground level. If not, you can fix it easily:

- Method 1: Select the ground level and move it upwards using the translation handle (hold Shift to release grid snapping)
- Method 2: Select the building and move it up or down
- Method 3: Select the building, open the property window, go to the Spec tab and change the height of the base with the numeric slider

Go to the top view. Select the level called World. Make it the current level. From now on, new items will be loaded to the world level. Zoom out so that you can see the whole building and the surrounding area. We will plant some trees next.



Some trees planted

Open the object browser window from the popup menu of the select window. Go to the folder models/Plants/simple and drag and drop an object called flowertree in front of the house. Then drop three camelia trees to the front yard.

Close the object browser window. The 3 camelia trees are identical, which is quite unnatural. Multi select the trees and click the Randomize tool on the tool bar. Each tree becomes unique.

Close the world level on the select window and click the root level. Then click the Camera tool on the toolbar. First click on the position where you want to place the camera, for example in the front yard. Click second time where you want to aim the camera - in the middle of the house. The third click defines the opening angle of the camera.

Create a second camera inside the house, for example into the kitchen. Take a front view. Move the cameras upwards to a natural height, say 1.5 meters from the ground level.

Drag and drop the first camera to the view window. The view takes the projection parameters from the dropped camera object. Click the render button, which is located in the lowest icon group of the view control bar. Note that you can scroll the bar with the mouse wheel in case the button is hidden below the visible area. The last step is to save the finished project.

Note

You can save the contents of the view to an image file using the view popup menu Render/Save to File. To create print resolution images, use the File/Render pull down menu.

Ray traced image of the house and its environment

Snapping to Points Using Dragging

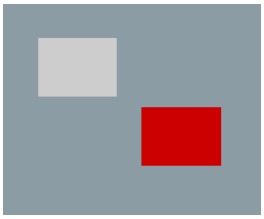
Many tools in the program require 3D geometry points as inputs. Typically, these geometry points are entered using the mouse, which is not a very accurate input device.

Snapping allows you to snap the entered mouse points to existing geometry points, achieving exact results during various modeling tasks.

In this tutorial we go through some basic snapping techniques, such as using the drag box and the lasso selector, as well as snapping to nearest point. You will find this functionality very useful in many modeling tasks.

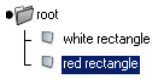
Dragging supported by the View window is a very powerful modeling aid. It allows you to snap to all existing points, pivot points, mid points and so on, all in one simple operation.

Consider the following situation: You have created two rectangles (red and white) and you have to align them so that the left top corner of the white rectangle matches exactly the right bottom corner of the red rectangle.



Initial position: two displaced rectangles

Do this:



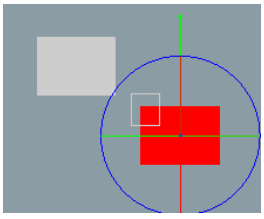
1. Create two analytic rectangles as shown in the image.

2. Select the red rectangle ...

... and activate the Move tool by hitting 'm' key or from the Transformation tab of the toolbar.

3. Move the mouse near the left top corner of the red rectangle. Press down the left mouse button and move the mouse. Drag box is shown. Move the mouse so that the left top corner is inside the drag box. Then release the mouse.

The corner of the rectangle was snapped into the mouse pointer. Now, move the mouse and the left top corner of the red rectangle follows the mouse precisely.

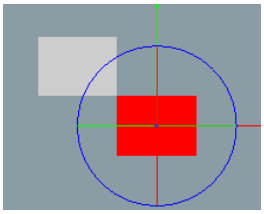


Drag over the left top corner of the red rectangle to snap to the corner

4. Now, drag over the right bottom corner of the white rectangle to snap the target point of the move tool there.

You can also drag over multiple points. In this case, all points inside the drag box are averaged. This allows you to snap to the middle point of the dragged points.

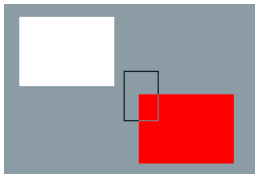
For example, let's move the left top edge of the red rectangle to the middle of the right vertical edge of the white rectangle.



Left top corner of the red rectangle snapped precisely to the right bottom corner of the white rectangle

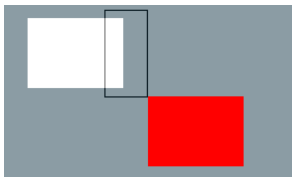
1. Select Edit/Undo from the pulldown menu to restore the original situation. Select the red rectangle and activate the Move tool.

2. Drag over the top left corner of the red rectangle. Move is activated and the dragged corner follows precisely the mouse.



Drag over the top left corner

3. Drag over the right vertical edge of the white rectangle so that its right edge is completely inside the drag box, and release the mouse.

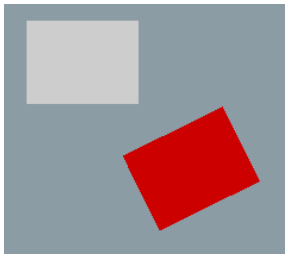


Drag over the vertical edge..

to snap to its middle point

Correspondingly, you can snap to the center of an object by dragging over the entire object. This averaging feature built in to the dragging makes the dragging very powerful feature because it allows you to achieve several important snapping methods through one easy to use interface. Dragging works with all transformation tools. Whenever you have to click the mouse in the view window, you can also snap to existing points using dragging.

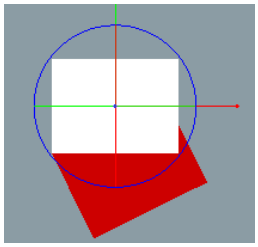
Let's see how you can take advantage of the dragging feature with the Rotate tool. The starting situation is like in the adjacent image. The task is to move and rotate the white rectangle so that its bottom edge matches exactly the top edge of the red rectangle. Thanks to dragging, it takes just a couple of mouse clicks to do this.



Initial positions

1. Select the white rectangle and activate the Move tool.

2. Now, using dragging, move the left bottom edge of the white rectangle to the left top edge of the red rectangle just like we did in the previous examples.



Corners snapped together

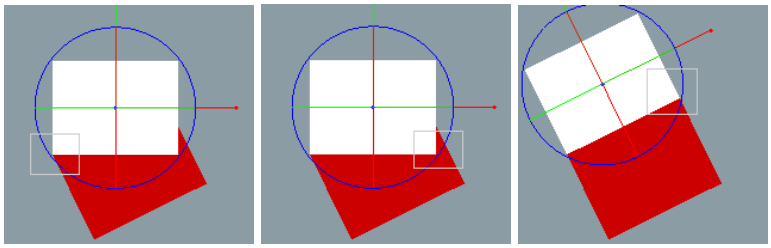
Next we should rotate the white rectangle about its left bottom corner to get the edges aligned.

1. Make sure the white rectangle is still selected and activate the Transformation/Rotate tool.

2. Drag over the left bottom edge of the white rectangle. This snaps the rotation center to the corner.

3. Enter the second point for the Rotate tool by dragging over the right bottom corner of the white rectangle. If you now move the mouse, the bottom edge points precisely towards the mouse.

4. Enter the last point for the Rotate tool by dragging over the right top corner of the red rectangle. Edges are now precisely aligned!



Drag three points for the Rotate tool: center, from point and to point

Note

Dragging averages *all* points inside the dragged area, including overlapping ones. For example, dragging over the white rectangle in the image above does not snap to the center of it, because the top edge of the red rectangle becomes included as well. The average of two points of the white top edge, two points of the white bottom edge and two points of the red top edge is not the middle point.

As you can see, dragging is an extremely simple but extremely powerful feature. With just a couple of mouse clicks you can move, rotate and scale about any point.

Lasso selector

In addition to the rectangular drag box, you can use a lasso selector to pick up geometry points. You can activate the lasso selector by holding down the lasso selector modifier. By default, this modifier is bound to the key '4'. Press down this key and drag on the view window to see the lasso selector.

3D snapping

Most people still use a two dimensional monitor and a mouse. This means that you can only see the position of a point using two coordinates x and y.

By default, dragging eliminates the third z (depth) coordinate so that when you, for example, move objects using dragging, their depth is not affected - the distance from view's camera to the two rectangles above did not change in the dragging operations.

By holding down a special *depth modifier* you can override the default behavior and dragged points are entered as true 3D points. The default key for depth modifier is ',' (comma).

Snapping to the nearest point

In addition to dragging, you can snap to single geometry points using snap to nearest modifier. Current mouse position is snapped to the nearest snap point when you hold down the key '5'. The nearest point snapping works always in 3D (the depth changes as well). Note, that snapping starts as soon as you press down the left mouse button. This means that you can drag the mouse around and see which snap point becomes selected - release the mouse button when a suitable one is found.

Snapping to the nearest curve

By holding down the key '6', you can project the current mouse position on the nearest curve point (any point, not only edge/control point).