TABLE OF CONTENTS

1 INTRODUCTION

This education package is meant for people who want to be able to teach Cult3D as well as le arning to build interactive objects.

1.1 The purpose and goal of this material

The purpose of the material is to give you basic understanding of how to prepare and export your work in 3D Studio Max, work with Cult3D Designer to create interactive events and finally to present your Cult3D file on the Internet. The goal is to give you knowledge that you can apply in a meaningful way.

1.2 Composition of this material

This material is designed so that you may learn Cult3D from the ground and up. The material has four main chapters that will take you from start to goal in your work.

Chapter 1: Introduction
Presents the goals and composition as well as the pedagogic idea. This chapter also gives a brief presentation of the program and its components.

Chapter 2: The creation and export of a usable file
Prepares you for the work within the Cult3D Designer, gives you techniques and hints on how to maximise the quality of the exportable file from 3D Studio MAX. In this chapter you will learn how to install the export plug-in in 3D Studio Max. You will also be acquainted with the options of the Cult3D Exporter dialog and how to work efficiently with the Exporter plug-in.

Chapter 3: Working with the Cult3D Designer
Teaches you the basic steps to use objects and work with events, actions, scenes and much more. This chapter is the core for learning to understand Cult3D in practice.

Chapter 4: Presenting the final result
This chapter explains how you may compress your Cult3d file before you present the final project file on the Internet. You also get some useful examples of Java in connection with the Internet.

Appendix 1: An illustrated description of different events and actions in Cult3D Designer.

Index: A reference to what page the most important words can be found.

1.3 Pedagogical idea

This material is divided into different parts. The *Read* parts the *Look* parts the *Exercise* parts and the *Finish* parts. First you read then you practice. After you have completed the exercises you can test your skills in the Review and practice chapter.

 *The "Read" part:*

The read part gives a textual description of all the facts and exercises. It is very important to read and understand the material. You will find help text not only at the beginning of each exercise you're working on, but also in between exercises.

 *The "Look" part:*

The Look part is used only in chapter 3.4 Exercises. It provides you with a visual description of each separate tool used in each specific exercise.

 *The "Exercise" part:*

This is the icon for step-by-step exercises. Every step is described so you will know exactly what to do and in what order.

 *The "Finish" part:*

This part graphically presents the result you should get when you have completed an exercise. You will also find a textual description of how you can test the result. The "Finish" part is used only in chapter 3.4 Exercises

From now on we will use these symbols in every chapter and sub chapter to make the journey easier for you.

1.4 The practice CD-Rom


Included in this material is a CD-Rom with practice files. The formats of the practice files are **Cult3D designer (*.c3d)**, Cult3D project (***.c3p**) and 3D Studio Max (***.max**).

The practice files are included to make it easier for you to work. The Exercises in this material are based on the files on the CD-Rom.

When you install the Cult3D Designer it will be installed in **C:\Program File\Cult3D Designer.** The sub maps *classes*, *docs*, *objects*, *projects*, and *sound* will also be created.

You should save all the d**esigner (c3d)** files into the *object* map, the project (**c3p)** files into the *project* map and the sound (**wav)** files into the *sound* map.

1.5 A short presentation of Cult3D


Cult3D is a new Multi-platform 3D engine with the purpose to build interactive objects for your web pages. Cult3D is a huge technological breakthrough. You don't need a 3D-accelerator card to use Cult3D.

With Cult3D you can visualise different events and functions. You can apply various functions on an object and interact with the object.

Cult3D is composed of three different functions; the Cult3D Exporter plug-in, the Cult3D Designer and the Cult3D Player plug-in,

The Cult3D Exporter plug-in:
This is a plug-in for 3D Studio MAX. From the 3D program you can export a ***.max** file to a Cult3D Designer file ***.c3d**.

The Cult3D Designer:
This is the core of Cult3D. It is in Cult3D Designer that you create interactive Cult3D objects.

The Cult3D Player plug-in:
This is a plug-in for Netscape or Explorer. This function of Cult3D is all you need to view a Cult3D object on the Internet.

The formats ***.c3d**, ***.c3p** and ***.co** is Cult3Ds different file formats. When you export an object from 3D Studio MAX to the Cult3D Designer you can save the file as a ***.c3d** file. This is the format you need in the Cult3D Designer in order to work with the file. You save your Cult3D Designer project file with the format ***.c3p**. A designer file may include one or more project files.

When you are finished with your object, you can export it as a finished Cult3D object file. The file is saved in the format ***.co**. When you have done that you can then see the object on the Internet if you have the Cult3D player plug-in or include it in your office document.

2 THE CREATION AND EXPORT OF A USABLE FILE


The process to create a 3D presentation using Cult3D Designer can be divided into 4 steps:

Modelling
Use your 3D-modeling package (3D Studio Max) and take either an existing model or create one from scratch. Remember that even though Cult3D can handle very complex objects, the end-user experience is going to be much better with a model that is well balanced between not too many details and small size.

Exporting
Once you are happy with the way the model looks in your 3D modelling application, it is time to export it as a Cult3D Designer file *.c3d. This is the file format used to maintain a Cult3D object by the Cult3D Designer. (Later we will convert the data into something the end-user can view on the web.)

The Cult3D Designer
Open the *.c3d file into the Cult3D Designer. You can now edit the object in the Cult3D Designer by adding events, actions, sounds, etc.

You can preview the end-users view of the object inside Cult3D Designer. That gives you a quick and easy iteration process of the design until you are happy with the result. When you are finished you may save the changes of the object into a Cult3D Project file *.c3p. This allows you to make changes and modifications in the future.

*Exporting into a *.co file*
When you are finished with your Cult3D file it is time to create the file that the end user will actually view. This Cult3D Player file (*.co) is compressed and heavily optimised to reduce file size. This file is arranged to allow the Cult3D Player to start displaying the contents even before the whole file is downloaded.

The Exercises in this chapter are based on the assumption that you have a basic understanding of how 3D Studio Max works. If not, you should first get acquainted with this application.

2.1 Hints when you create an exportable file in 3D Studio Max

2.1.1 Planning your work

 Before you begin to make an object in 3D Studio MAX you must plan to get the best results. It's important to think about how the model will be as a *.co file. It is crucial that you plan your work according to the functions you want implemented in the object and to build your model from that.

2.1.2 Steps to have less polygons on your model:

 All spline curves are divided into small straight lines that approximate the true curve. The number of divisions between each vertex on the spline is called steps. The number of steps indicates how many segments you will have when it becomes a 3D object. The more steps you use the smoother the curve will appear.

It is recommended that you use the optimise option that you will find under interpolation. This will also enable the step option. With this option checked the program would remove unneeded steps from straight segments in the spline. In the step option you can set the number of divisions between each vertex. The valid range is between 0 and 100 steps. Splines with tight curves require many steps to look smooth while gentle curves require fewer steps. Don't use more steps than necessary.

By using a low segment number on a standard primitive you can reduce the amount of polygons on your object. Each segment is the sum of divisions along each axis of the object. The number of segments can be set before or after creation. Don't use more segments then you need.

2.1.3 Low polygon modelling

 There are many ways to make a low polygon object. Here are a few suggestions:

- You can either make an object with as few faces as possible from the beginning. It is sometimes easier to give the object more faces with smooth mesh while building the object.

- You can collapse or weld the vertex to remove some unnecessary faces. This is very useful on objects that aren't round and don't need segments to look" smooth.

- You can also combine previous suggestions with smoothing groups that gives the object a smooth surface. Each face on the object can have any number of smoothing groups. There are 32 different smoothing groups. If two faces don't share the same smoothing groups, the edges between them will render as a corner. This is useful if you want to create a cylinder like object by using only six or seven segments.

Exercise

Create and work with a spline

In this Exercise you will create a spline in 3D Studio Max. To do this you will create a line that only has a few steps.

1. Start 3D Studio Max and create a new file.
2. Create a line and shape it as a "V".
3. Select the modifier.
4. Click on **Sub object** and remain in **Vertex mode**.
5. Control nodes in a line constitute the Vertex. The complete line is called the spline. The area between two control nodes is called a segment. A segment is built up by several steps that determines how "soft" it will bend.
6. Select the vertex in the middle and click the right mouse button.
7. Select **Smooth**. The line will bend like an arc.
8. Select **General** under **Sub objects**.
9. There you will find **Steps.** Reduce the number of steps to 0 and look how it affects the object.
10. Give the number of steps the value 3. This value represents the number of steps the segment is divided in. The more steps you have in the segments the softer the arc will be.

2.1.4 Linking the objects in 3D Studio MAX

The Cult3D Designer support grouping and linking. Select and link is the hierarchical relationship between two objects by linking them as child and parent. You link from the currently selected object (the child) to any other object (the parent). The selected object flashes to show that you have linked to the object.

A child inherits the transformations (move, rotate, scale) applied to the parent, but the childs transformation has no effect on the parent. That is why it is very important to link according to the outcome of your animation in the Cult3D Designer.

In the designer you can only have one parent that will be used as the rotation point centre. If you have an object that has more than one parent it is advisable to link the parents to a dummy.

Exercise

Create links

In this Exercise you will learn how to create links in 3D Studio Max. The purpose of the links is to be able to create possibilities for animations and interactivity in Cult3D Designer.

1. Start 3D Studio Max and open the file *robotarmlinking.max*.
2. Select **box01** and **box02**.
3. Click the **Select and link**. Go to the selected boxes with the cursor.
4. Hold down the left mouse button and drag to **Spinn05** and release the mouse button. **Spinn05** will twinkle.
5. Select the **Spinn05**.
6. Hold the left mouse button down and drag to **Spinn04** and release the mouse button.
7. Select the **Spinn04**.
8. Hold the left mouse button down and drag to **box03** and release the mouse button.
9. Select the **box03**.
10. Hold the left mouse button down and drag to **spinn03** and release the mouse button.
11. Select the **spinn03**.

12. Hold the left mouse button down and drag to **spinn02** and release the mouse button.
13. Select the **spinn02**.
14. Hold the left mouse button down and drag to **cylinder01** and release the mouse button.
15. Select the **cylinder01**.
16. Hold the left mouse button down and drag to **spinn01** and release the mouse button.

2.1.5 Pivot points

All objects in 3D Studio MAX have a pivot point. The pivot point represents the objects local centre and local co-ordinate system.

The pivot point of an object is used as the centre for rotation and it defines the transformation origin for linked children, for example if you want a door to open.

Make sure that the pivot points are in the right position before exporting the object.

Exercise

Change of pivot points.

In this Exercise you will learn how to set the pivot point in a 3D Studio Max object. The pivot point doesn't necessarily have to be located in the centre of an object. It all depends on what you want the object to do.

1. Start 3D Studio Max and open the file *robotarm pivot.max*
2. Select **box01**.
3. Go to **Hierarchy** beside the Modifier button.
4. Select **Affect pivot only**.
5. All selectable choices can be seen under **Alignment**.
6. Click Centre to object. This sets the pivot point in the centre of the object.

7. Select the *box02* (You still should have **Affect pivot only selected).**
8. Click **Centre to object**.
9. Select *spinn03*.
10. Click **Centre to object.**
11. Switch to **Front view**. You can see that the pivot point is in centre of the object.
12. Set **Select and move** to **On**.
13. Select **Restrict to X**. This limits the movement to the x-axis.
14. Drag the pivot point to the red "X".
15. Select *spinn02*.
16. Select **Restrict to Y**. This limits the movement to the y-axis.
17. Drag the pivot point to the blue "X".

2.2 The Export plug-in

2.2.1 Installing the Cult3D Exporter into 3D Studio MAX


The Cult3D Designer Installer also includes the Cult3D Exporter plug-in for 3D Studio MAX. To install the Cult3D Exporter plug-in into 3D Studio MAX you need to place the plug-in in the 3D Studio MAX plug-in directory.

The Cult3D Designer Installer attempts to find the 3DStudio MAX plug-in directory and place the Cult3D Exporter plug-in there, or you can explicitly specify where the Installer should put the plug-in. unless the Cult3D Exporter plug-in is in 3D Studio MAX 's plug-in directory it will not work. It is important that you use the correct version.

2.2.2 Implemented Materials Features

Ambient Colour:
The exporter supports ambient colour.

Diffuse Colour:
Can be used with or without bitmap. Mixes the diffuse colour and bitmap if the bitmap amount is less than 100.

Specular Colour:
Supports specular colour.

Shininess:
Uses the amount setting for strength.

Reflection Bitmap:
(Environment mapping.) Uses the amount setting for strength.

Bump Mapping:
Uses the amount setting for strength.

2-Sided Materials:
Will support 2-sided materials in a future version

Tiling:
Supports tiling but not mirror tiling.
Compound Materials:
Standard and Multi/Sub-Object.

Compound Map Types:
Bitmap (still images.)

2.2.3 Special Considerations

Object Placement:
The objects you export use the world axis centre as the centre of the scene in Cult3D. The Exporter uses the current frame, so when the time slider is at Frame 14, the object's top viewpoint for Frame 14 will be exported.

Entire Worlds into One Object:
If you make an entire world within 3D Studio MAX, the Cult3D Exporter will always act as if it is a single object.

2-Sided Materials:
3D Studio MAX has an option in the rendering options dialog to force 2-sided polygons. Make sure you do not have this option set. If you do, the rendered object may be different than the exported one.

Use 2-sided materials with caution as they seriously affect real-time rendering performance. Currently the Cult3D Viewer doesn't use 2-sided materials, even if it is specified in the Cult3D object file. This feature will be used in a future version of the player.

Metal Shading:
The Exporter does not support metal shading.

Texture Mapping:
Currently every texture map you use has an additional footprint size of 256 KB during rendering, regardless of the size of your texture. Therefore you should be careful with the amount of different texture maps you use.

Bump and Texture Mapping:
There is one restriction when using bump and texture mapping together. The tile setting and image size must have exactly the same size and value.

2.2.4 Features of the exporter

Polygons:
Unlimited in each object:
Even though Cult3D has no limit for the amount of polygons, you should consider keeping the total amount low. Unnecessary polygons only slow down both download and presentation.

Texture:
Up to 2048 x 2048 pixels. If the bitmap is larger, it is resized to 2048 x 2048 pixels.

Texture Tiles:
Sizes from 23 (8) up to 210 (1024) pixels are allowed. Both the x and y sizes must be exact powers of 2. I.e., if a tiled bitmap is143 x 78 pixels, it must be shrunk or stretched to fit. (See Texture Map Options.)

Shading Methods:
Constant shading, Flat shading, Gouraud shading with highlights Phong shading are the selected shading mode in Exporter. Bump mapping requires Phong shading.

Light Source:
Infinite Omni Light

Export:
The Exporter translates object materials and their properties in 3D Studio MAX to Cult3D in order to reproduce the same output result within the possible limits.

Smoothing:
Smoothing groups are supported.

Optimisation:
The Optional polygon optimiser minimises the number of polygons in an object by merging continuous triangles in the same level. Under some circumstances the polygon optimiser may fail. To avoid this you can manually disable this option.

The File Format:
The file format is compressed and able to stream. It has advanced colour reduction for true-colour bitmaps and advanced bitmap compression for smaller file size.

Metrics:
Uses 3D Studio MAX unit settings for converting to Cult3Ds metrics when exporting.

Preview:
Viewer for instant preview of the exported object

Exercise

Export from 3D Studio max.
In this Exercise you will learn how to export an object from 3D Studio Max. You will set the background colour and work with the background picture. You will also select the quality of you export. The starting point is the file minidisc01.max.

Save file as

1. Start 3D Studio Max and open the file *minidisc01.max*.
2. Select **Cult3D Designer** in the **Save as type** menu.
3. Write *Minidisc* in the field filename and **Save**.

The background colour

4. Select **Background**.
5. Click the coloured square in **Background colour** dialog.
6. Select the colour you want by holding down the left mouse button while dragging the cursor over the coloured square.
7. Click **OK** when you have selected a colour**.**
8. Click **Apply** in order to make it visible in the **Viewer**.

With a background picture in 3D Studio Max

1. Open the **Material editor**.
2. Load a material that you want as background**.**
3. Select a sphere.
4. Set **Select and move** to **On**.
5. Select **Diffuse**.

6. Select **Bitmap**.
7. Click the Bitmap function (A big square under Bitmap parameters).
8. Select **Environment** in the **Rendering** menu.
9. Click the square under the **Environment map**.
10. Click the **MTL Editor** (Here are all the materials that are included in the scene and the spheres).
11. Find the material you selected earlier.
12. Double click on the material.
13. Select **Copy**. This will make the material remain in the material editor.
14. Close the dialog window.

In the Export dialog

15. Select **Background**.
16. Select quality of the picture by dragging the handle and pressing **Apply**.
17. Click **Stretch** and **Apply**. This will allow you to make the **Preview** window bigger. The background picture will adapt to the size of the **Preview** window.

Exercise

Bilenar filtering.

1. Select **Materials** in the **Exporter** window. All materials will be selected.
2. In the **Viewer** window; zoom the **Minidisc** so that you can see the text on the backside.
3. Select the **Option** menu.
4. Click the radio button **Bilinear filtering** located on the tab **Material**.

5. Click **Apply**.

6. You can now see that the text in the back of the **Minidsic** looks sharper in the **Viewer** window.

Nodes.

7. Select **Nodes** and make the list show.
   Three tabs will be seen on the right side; **General**, **Camera**, and **Mesh**.

8. Select the **Mesh** tab.
   You will find information about the number of polygons under **Object properties**.

9. Select **Optimize** on and click **Apply** (under **Pre optimization**).
   The numbers of polygons will decrease from 1920 to 1197. The quality of the object will not change.

Polygon reduction.

10. To get maximum effect you will have to deselect **Optimize on**.

11. Select **Polygon reduction**. You can now decide the amount of polygons. Set the value for the polygon to 1000.

12. Click **Apply** and then **Reduce**.

Textures.

This function makes it possible to decide the quality of one texture or all textures.

13. Select all textures.

14. Zoom the **Minidisc** in the **viewer**.

15. Select 24 bits in **Image compression** and click **Apply**.
    You will now get a high quality picture and reduced file size.

If you are satisfied with the result; click Save.

2.2.5 Known Problems


We have noticed that under some circumstances 3D Studio MAX will not tell the export plug-in that a texture has been updated or loaded. This sometimes occurs if you do not render the scene before exporting it, or when you have changed an existing texture via reload. The easiest workaround is simply to exit 3D Studio MAX and restart it.

2.2.6 The Cult3D Exporter Dialog with options


When running 3D Studio MAX, the Cult3D Exporter will be found under File/Export.

1. Select C3D in the Save as type List box
2. Type a filename for the object you want to export
3. Click Save and you will see the dialog with export options

The actual Exporter consists of a tree view with all the exported information, as you can see below. On the right side of the Exporter window you can see a tab representing what type of information you have selected in the tree view.

Initially you will see the Header and its tab. There are four different tabs. The *Material*, the *General*, the *Mesh* and the *Texture* Tabs are available.

Select Materials, or any material under the expanded Materials in the tree view to see the materials tab. Likewise for textures. The Nodes info is a little bit different. Under the nodes, you will see a hierarchy of all the objects. They always have a General Tab, but if the object for instance is a mesh then the mesh tab also will be shown. We explore this later on in this guide. The one thing that doesn't change is the buttons and the status bar.[1]

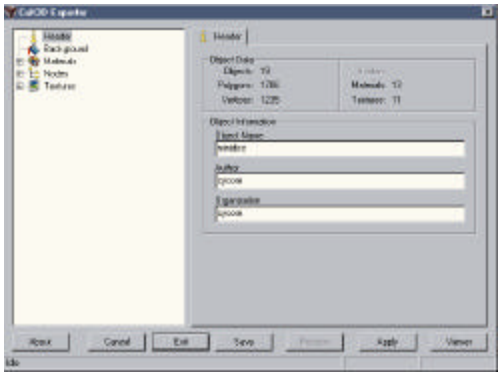


Figure 1: The Cult3D Exporter

[1] This applies to version 3 and earlier.

The tool bar

Figure 2: The tool bar

The About button:
The "About" button will show you our copyright text and contact information.

The Cancel button:
The "Cancel" button will cancel the operation and quit the Exporter.

The Exit button:
Exits the Export window.

The Save button:
The "Save" button exports all the settings and data into a *.c3d file and also into 3D Studio MAX memory. After it has saved all the data, the Exporter will quit.

The Reduce button:
When you have applied your polygon reduce settings on your object or objects, the “Reduce” button will get activated. Now you are able to press it to actually begin the reduction process.

The Apply button:
The "Apply" button is used to confirm the changes you have made in the different tabs. NOTE: If you have made some changes and have not pressed "Apply", then when you press the “OK” or the "Save" button those changes will NOT be included. This is also true regarding what you actually see in the Viewer. The changes take effect only after the "Apply" button has been pressed. If the "Apply" button is grey that tells you that no changes have been made.

The Viewer button:
The Viewer button will activate a window where you can see the exported data and the settings you have made or will make.

The status bar

The status bar consists of three different parts. Beginning from the left, we have the actual status text of the on-going procedure. The next part is a progress bar for the specified procedure and the last part is the progress bar for all the procedures. When the last part is finished, you can either save or do more changes.

The Tree view & Selection

The tree view in the Exporter is where you do all selections for the settings. You have five main categories, Header, Background, Materials, Nodes and Textures.

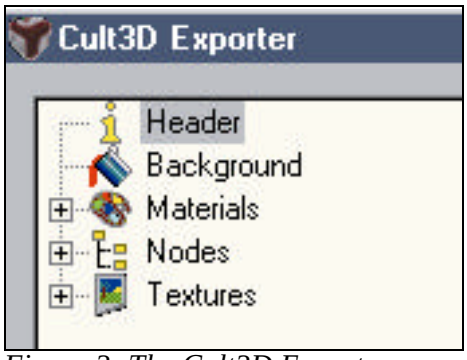


Figure 3: The Cult3D Exporter

All except Header and Background have multiple selections. If you for instance have selected Materials, you have then selected all the materials you have on a specified object/scene. If you want to individually select the materials, you can do so by opening up the Materials, either by double clicking on that category, or pressing the "+" button.

The Nodes categories do not only contain the actual objects or meshes as we have called them, but also cameras and dummy objects (Helpers). The hierarchies of the different nodes are also exported and can be seen in the tree view.

Multiple selection only works within each category. Selections of specific functions are done in a normal Windows fashion. To select multiple items you click the first one. Then press and hold down the Ctrl-key and click the other items you want. You can use the Shift key in the same way to select a range of items starting with the first one you click and ending with the second one you click.

The Header Tab

When you have selected the "Header" in the tree view, you will see the Header tab as shown in figure 4. You can see the information we got from the exported scene from 3D Studio MAX. Some of the information here can change. For instance, if you optimise the polygons on your meshes the total amount of polygons and vertices may be changed. Here you may also change the name of an object/scene and copyright notice.

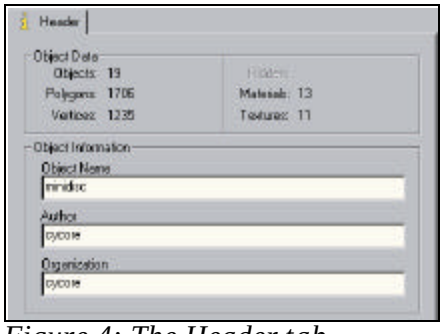


Figure 4: The Header tab

The Materials Tab

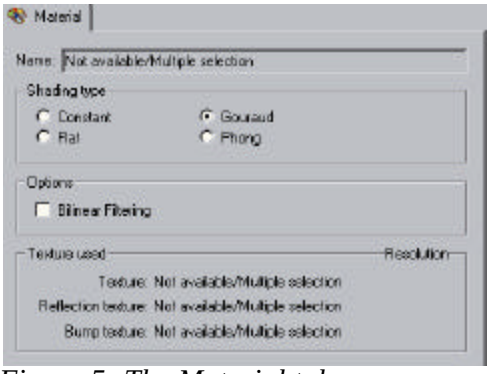


Figure 5: The Material tab

The Shading type area:
In the *Shading type* area you can set the desired shading on your object. You have four choices that are described below.

Constant shading:
The *Constant* shading type doesn't use any lighting.

Flat shading:
The *Flat* shading uses the lighting, but the objects using a material with flat shading will get faceted.

Gouraud shading:
The *Gouraud* shading uses the lighting and gives a smooth appearance of the object. Cult3D Gouraud shading also shows a highlight. This highlight is calculated at vertex level.

Phong:
Gives an even smoother appearance of the material since its highlight is calculated at pixel level.

The Options area:
By checking the Bilinear Filtering option, the texture in this material will get filtered. This applies only to a material where only one texture is used. If you are mixing textures, for instance applying a reflection texture onto a textured material, you cannot use the Bilinear Filtering. A single texture used for Bump mapping cannot use the Bilinear Filtering either.

Nodes

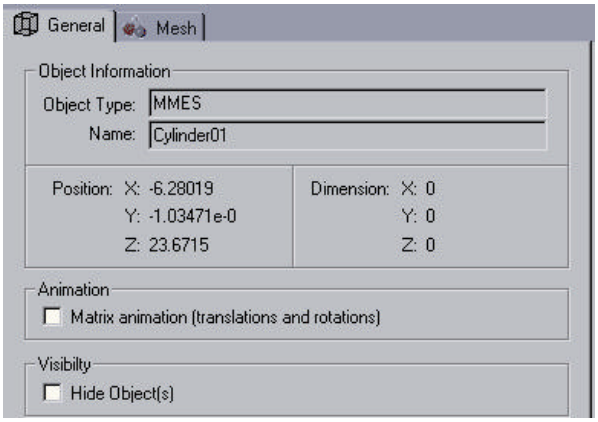


Figure 6: The General tab

The General tab

Every node that we export has a general tab. A node can also be a Mesh or a Camera or a dummy object. In the general tab you will see information of the selected node.

Animation:
If this is checked, then all matrix animation will be included in the selection. Matrix animation in other terms is the collection of rotation, scale, and translation of the object.

Hide Object(s):
If you have checked Hide Object(s) then the selected objects will be hidden. They will be included in the saved file, but they are initially hidden.

The Mesh Tab

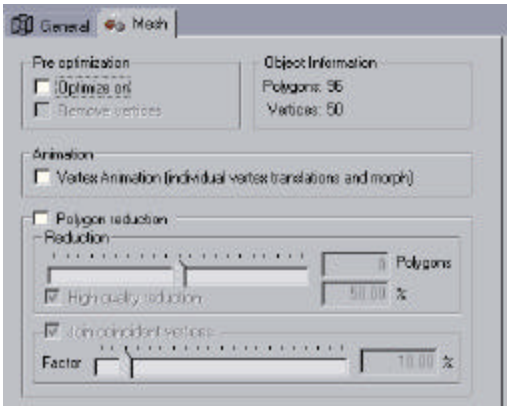


Figure 7: The Mesh tab

Pre Optimisation:
Setting “Optimise On” will enable the optimisation of your object. “Remove Vertices” is an extra setting that improves the optimisation result. If you intend to use polygon reduction you normally should turn off the "Optimise On" setting.

Object information:
From the tree view you can select one or multiple meshes, and all the selected meshes will calculate the total amount of polygons and vertices to be displayed here.

Vertex animation:
By checking this option you will include all the vertex animation of the object. Vertex animation is an individual movement of each vertex, so if you use a skin on a Character Studio character that deforms the skins when animating the bones, then you will need to check that we can export the Vertex animation of the object.

Polygon reduction:
This is an advanced feature for reducing the amount of polygons used in an object. This is a less drastic reduction than the optimiser performs. By reducing the number of polygons in your object, the rendering performance increases and the file size of the object gets smaller. The reducer employs a set of advanced algorithms, including differential evolution and experience-based algorithms.

The end result depends a lot of the object, so this is a feature you need to experiment with for each new object to get a result to your satisfaction. You can define a percentage to reduce or enter the amount of polygons you would like to get. The join “Coincident Vertex” check box is a feature used as a measure against problems with models where cracks show up in the model after the reduction process. If this happens on any of your models, click this check box and try again with the original model. If the cracks still show up, try a larger factor for the joining. What this technique does is to weld together vertices that are very close and are meant to have the same position. During reduction, such vertices might slide to their side making cracks appear in the reduced model.

The Texture tab:

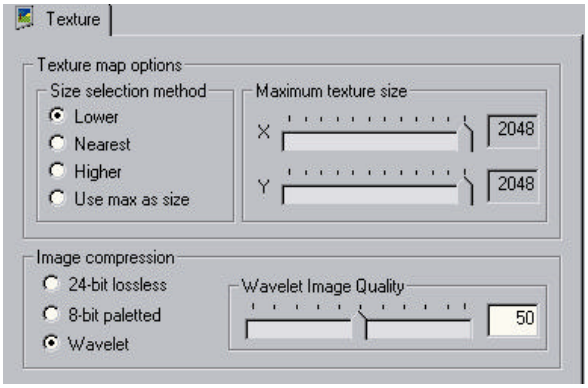


Figure 8: The texture tab

Texture map options:

Due to the power-of-2 limitation on texture sizes, the Exporter will automatically resize a "non-valid" size to a correct size depending on your settings. “Lower” means that it will resize to the next lower even power-of-2 size. “Nearest” chooses the nearest corresponding size. “Higher” chooses the next larger size.

For instance, if the bitmap is 260 x 200 pixels and you choose "Lower”, then the bitmap will be resized to 256 x 128 pixels. If you choose "Nearest" the result will be 256 x 256 pixels and if you choose “Higher” the result will be 512 x 256 pixels. None of these settings will go higher than the Maximum Texture size setting. If you choose “Use Max” as size, then all textures will be resized to the Maximum Texture size settings. For your convenience, you can set Lock XY-size so that when you drag the “X” slider, the “Y” slider follows.

Image Compression:

You have three different methods to save your textures in the Cult3D file. The first one is 24-bit lossless, which mean that the texture will be saved in 24-bit depth the program uses a simple RLE compression algorithm for this to compress the image with no loss of quality whatsoever. Using the 8-bit palliated option will save space compared to the 24-bit option. But the texture may become a bit loose. If the input image was a 24-bit image you need to quantify the image.

Normally, these two methods to save the textures will never be used because compressing with a wavelet algorithm will keep a lot of in formation and keep the size of data exceptionally small.

So if Wavelet is set, you will be able to set the compression slider. Cult3D uses an advanced compression algorithm to make your bitmaps as small as possible. In the slider you can set the desired image quality. The value is always depending on your objects texture maps. For a more detailed discussion, see the section on Compression below.

2.2.7 Different types of compression

Cult3D supports various levels of compression for several different areas of representation of an object.

Types of Compression		
	Loss-less:	Lossy:
Texture Maps:	The full texture map is stored.	Cult3D will use a wavelet based image compression algorithm to save space. The object author can set the fidelity of the compression.
Vertices:	The exact positions of each vertex is stored	The geometry compression algorithm can slightly distort the actual object geometry depending on the shape of the object.
Sound	The data is stored as is. Sounds from *.wav files are compressed roughly 50%. MIDI data is not compressed	The sound data is compressed using for instance a wavelet algorithm. The object creator can set the fidelity of the compression.

Let's look at a practical example of texture map compression. The image on the left is what we start with. It is a large (256x240pixels, 24bits, 184Kb) texture map.

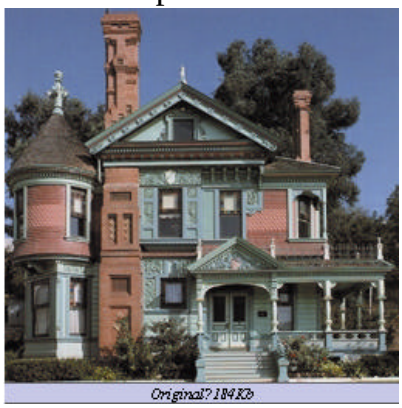


Figure 9: Texture map compression

Figure 10: A detail view

The pictures shown here are only approximations of the real textures stored inside the Cult3D Player file (*.co) since in reality the texture is stored using a special wavelet compressed image format.

By trading off a small amount of quality, we can greatly reduce the size (quality set for 50%, 256x240pixels, 24bits, 8.6Kb). For only a moderate change in quality we saved 175Kb (a savings of over 95%!).

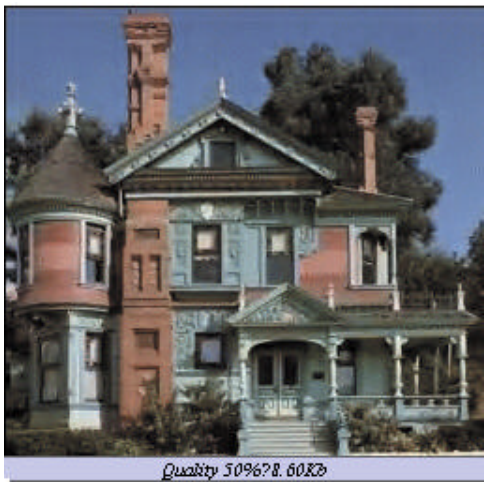


Figure 11: Quality reduction

Figure 12: A detail view

We can take this even further and set the quality to 0%. The resulting file is now down to a mere 0.925Kb (still 256x240pixels and 24bits). But as we can see the quality has suffered a great deal.

Figure 13: Zero quality

Figure 14: A detail view

This level of severe compression is very useful for reflection maps. If 0% is too much compression, try a value below 15%.

The Background Tab:
The background tab works almost like the texture tab. Here you can define the quality/compression of the background image. It only uses the Wavelet compression method. A background image doesn't have the power-of-2 limitation like a texture map has, and therefore the original bitmap resolution will be saved.

You may select “Tile” if the viewing area is larger than the actual background image, or you may "Stretch" (scale) the image to always fit into the viewing area. You can also override the background colour taken from 3D Studio MAX and select a new Background colour of your choice.

Figure 15: The background tab

The Viewer

The Viewer let you view the actual exported scene/objects. You can rotate and zoom in real-time and even play the animation if you have exported it. In the tool bar at the top, you have 3 buttons for the animation, *Play*, *Pause* and *Stop*. You also have six fast view buttons. With these buttons you can quickly choose an orientation for the view.

3 Working with the Cult3D Designer

This chapter is all about getting to know the Cult3D Designer in practice. First you will get acquainted with the basic functions of the program, then you will explore the user interface and finally you will create presentable files in practice.

3.1 Starting the program

Exercise

Start Cult3D Designer and open the file *Drawer.c3d*.

1. click the **Start** button
2. Select **Program** and **Cult3D Designer**
3. Scroll the text and click on the button **I agree**
4. Select **Load Cult3D Designer file** in the **File** menu
5. Select *drawer.c3d* and click the button **Open.**

3.2 The Basic Functions of the program

Read

This part deals with the basic functions of the Cult3D Designer such as opening different types of files, working in an interactive way and saving your work.

3.2.1 Open a designer file

Exercise

Open the designer file *minidisc.c3d*.

1. Select **Load Cult3D Designer file** in the **File** menu.
2. Select the designer *minidisc.c3d*.
3. Click the **OK** button.

3.2.2 Create user interactivity

When you want to achieve object interactivity you will always work with tools from the **Event map** window, the **Scene graph** window and the **Actions** window.

Exercise

Give the designer file user interactivity.

1. Drag and drop a **World start** object into the **Event map**
2. Select the minidisk object in the **Scene graph** window and drag it to the **Event map** window.
3. Drag and drop **Arcball** onto **Event_1**. You will find it under **actions/object motion**.
4. Drag the minidisk icon to the **Arcball**

3.2.3 Save your work

When you save the settings and work of your project the file will be saved as an ***.c3p** file. To be able to open the ***.c3p** file you must also have the ***.c3d** file. Everything is saved except the actual object. This makes it possible to change the object a without having to create the entire layout again.

Exercise

Save a project file.

1. Select the **File** menu.
2. Select **Save project as**.
3. Name the file *minidisc.c3p*

3.2.4 Open the project file

Exercise

Open the project file *minidisc.c3p.*

1. Select the **File** menu.
2. Select **Load project**.
3. Select *minidisc.c3p*

3.2.5 Summary

When you load a Cult3D project file this file include the designer file location, the entire event, actions and the layout of the presentation.

When you save your work the Cult3D project file will be updated and saved. If no project file previously was saved the program will show the dialog “Save project as”.

3.3 The user interface

It is important to get acquainted with the user interface and the special terminology used in the graphic world and in this application.

3.3.1 Acquainting yourself with the different windows

Under Cult3D Designer there are seven different windows. You can move them, make them smaller or make them bigger, whatever you desire.

1. Event map
2. Objects properties
3. Actions
4. Events
5. Scene graph
6. Preview
7. Object position and orientation

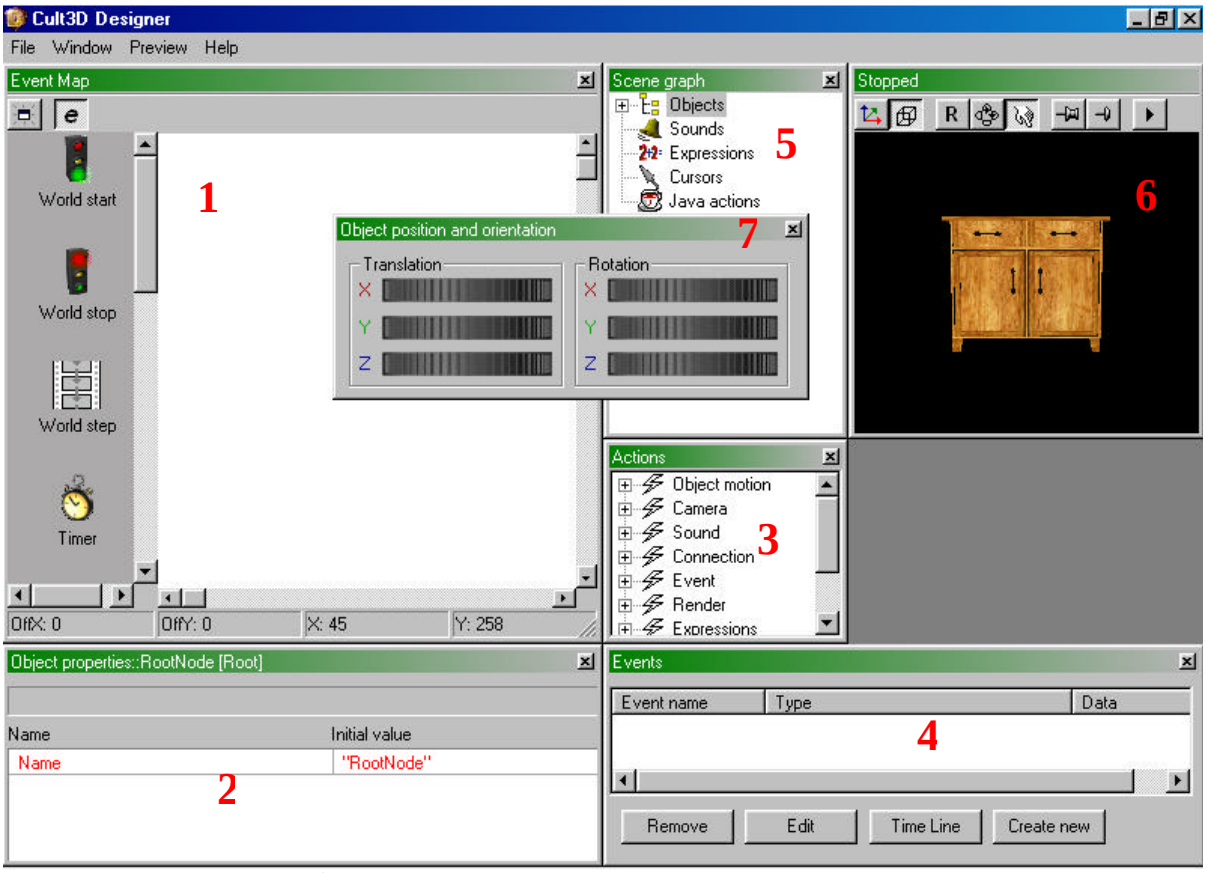


Figure 16: The user interface

3.3.2 Different events

An event is used to trigger an action. An event can be a “Left mouse click”, a “right mouse click” or a “middle mouse click”. It can also be a “pressed” or “released” key on the keyboard. Events specify the input that triggers or drives the actions in the scene.

3.3.3 The options menu listings for the settings of an event

If you click the right mouse button on an event you can select the Options menu

All new events that are added to the "Event map" window are initially set to "Initial activation" and Automatic Reset.

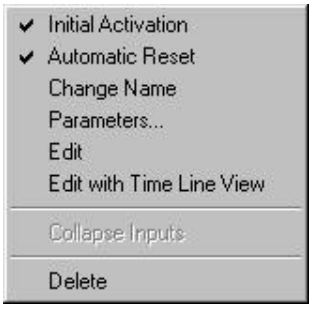


Figure 17: The Options menu

Initial activation:
An event can only be self-triggered if "Initial activation" in the option menu is selected. If you deselected "Initial activation" you have to attach another event that triggers the original event. Connecting the action "Activate event" to both events does this.

Automatic Reset:
Events can only be triggered when they are in the reset state. All events start out in the reset state, but once triggered they must be reset before they can be triggered again. You can either do an explicit reset with a Reset Event action, or you can set it to automatically reset after it has been triggered by checking the Automatic Reset option in this menu.

Example 1:
Attach a "Left mouse click" event to an object. Unless Automatic Reset is activated (or the event is explicitly reset with a Reset Event action) the end-user will only be able to trigger it once by clicking.

Example 2:
If you set a "Timer" event to trigger a "System Beep" action after 2000ms, and enable "Automatic Reset", then the beep will sound every two seconds.

Change Name:
Changes the name of the event.

Parameters:
As a drag and drop alternative you may choose this selection to connect Scene graph objects to the events.

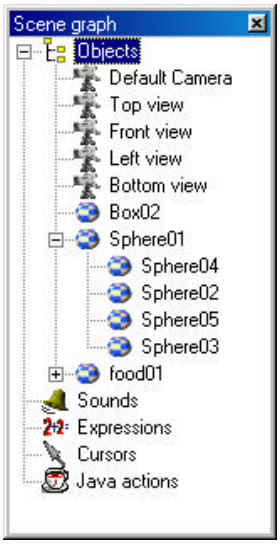
Edit:
This selection allows you to change the event name, and the event type. You may also select activation or deactivation for Initial activation. You can access the parameters for events and actions from this dialog box.

Edit with a time line view:
This dialog allows you to set the start and stop time and order for the actions connected to an event.

Collapse Inputs:
Collapses the tree of objects and actions to one icon. Deletes the event.

Delete:
If you select Delete you will remove the event and connected actions from the Event map window.

3.3.4 The Scene graph window



The Scene graph window shows a hierarchical view of the data associated with objects and cameras. You can use the "Scene graph" to drag object icons to the Event map.

It is possible to change the order and dependence of the visible scene graph objects by dragging and dropping them on each other in the desired hierarchy. By doing this you may connect and disconnect objects from each other.

Figure 18: The Scene graph window

3.3.5 The Preview window

Everything that is done to the object and scene is shown in this window. Here you can try out the scene, just as the end-user will do in a browser window. The Preview window is fully interactive and you can even left-click an object in the scene, and have that object highlighted in the Scene graph.

You can also drag an object directly from the Preview window to the "Event map" (by holding down the control key while left-dragging the object). The result is a rendered icon of the object in the "Event map", thus making it much easier to set up complex event maps.

The toolbar in the **Preview window** has eight different buttons:

 ***Show axis:***
Toggles the display of each object's pivot point (or "centre", i.e., the point the object rotates around).

 ***Show bounding box:***
Clicking this is button shows you the boundaries of the selected object.

 ***Reset object:***
Resets translation and rotation values of the object to initial values. Very usefulif you have been fiddling with the object for a while and want to get back to initial conditions.

 ***Use arcball:***
When this toolbar button is pressed, you can rotate, zoom, or translate the object by clicking and dragging with the mouse. When the toolbar button is not pressed, clicking with the mouse only affects object selection.

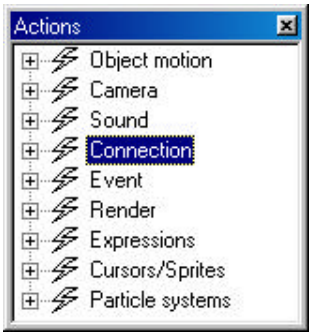
 ***Pick objects:***
This button allows you to select an object in the Preview window. The object you selected will be shown in the Scene graph window.

 ***Fix all objects:***
This button fixates all objects in the Preview window. This means that if you change position of one or many objects and click this button all objects will assume current positions when you later reset the Preview window.

 ***Fix selected object:***
This button fixates the selected object in the Preview window. This means that if you change position of one selected object and click this button the object will assume current position when you later reset the Preview window.

 ***Preview Run/Stop:***
Press this button when you want to start the preview session. Press again when you want to stop the session.

3.3.6 The Actions window



With Cult3D Designer, you get some pre-made actions. With these you can control your scene and object to your desire. You connect an action to an event, and then connect the selected data (i.e. object, sound, etc.) to the action you want the data to perform.

Figure 19: The Actions window

3.3.7 The object Properties window

Object properties stores data used by your presentation. Each object in the scene has a set of properties associated with it.

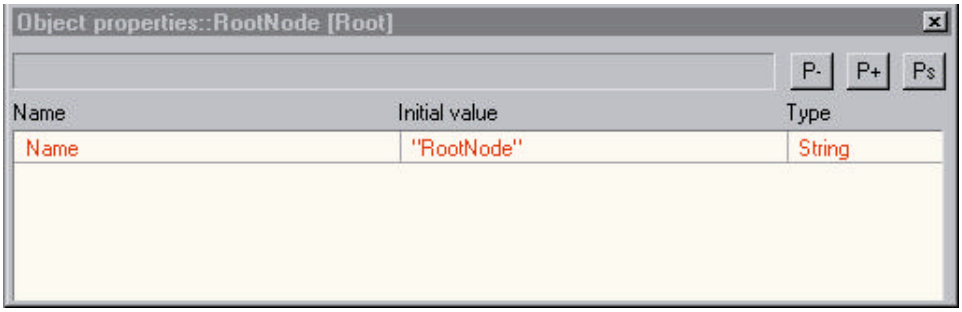


Figure 20: The object properties window

By opening the Object Properties window and selecting an object, you can view the list of properties currently bound to the object. The window shows three columns, one each for name, initial value, and data type.

Every ordinary object comes with a set of seven initial properties. There are seven system properties; Name, Translation, Rotation, Transform, ISBN, EAN, and Greenwich price. They cannot be removed from the object.

Camera objects have only four system properties: Name, Translation, Rotation, and Transform.

In addition to the provided system properties, you can add user properties. Press the **Add property** button in the Object Properties window to open the Add property dialog. Each added user property must be given a unique name.

TIP. The name must be 7 bit ASCII and must not contain the following special characters: period (.), minus (-), plus (+), asterisk (*), left and right parenthesis (()), colon (:), and slash (/), since these characters will confuse the expression parser.

By selecting a property and pressing the **Ps** button you can access an individual component of another property (Ps for sub-property). For example, if you want to access the y component of the object's Rotation property, you select Rotation and press **Done**. This shows the Add Property dialog so you can give the new sub-property a name and a type (in this case, let's choose the name “rotation Y” and the type Float or Integer).

When you click the Add button, a second dialog shows and let you specify what component of Rotation you want to attach “rotation Y” to. Click “Y axis” component and press **Done**. You will now be able to directly manipulate the y component of the Rotation property through the name “Rotation Y”. It will never be possible to delete system properties.

3.3.8 The events window

Here are all events in the scene displayed, for another view of your created scene criteria. This lets you manipulate existing events to change their types for instance. This is much quicker than deleting the old event, creating a new one to take its place and finally to reconnect all the connections.

If you for instance want to change an event type you can easily do it here, instead of removing the old event with all it's connections and then creating a the new one and connecting the old and new one together. You do this by selecting the desired event in the event window and clicking the edit button. Here you can change the event type and also see the parameters the event.

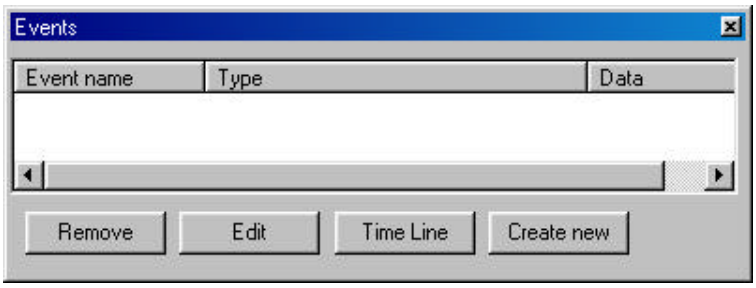


Figure 21: The Event window

3.4 Exercises

Read

Here you will explore the Cult3D Designer by doing. It is important to go through the Exercises for each file in chronological order since they are constructed to lead up to a presentable result step by step.

3.4.1 World start and Arcball

Read

Here you will make an object rotate round its own pivot point. You will use the World start event, the Arcball action and the Centerpoint scene to achieve this.

When using the Arcball action the object will be given special features like **rotate**, **zoom** and **translation** (movement).

You will work with the designer file Drawer.c3d.

Look

This is a description of the Events and Actions that you will use in the Exercise below.

Events:

World Start

You will find this Event on the left side of the Event map window.

This Event is triggered when the scene loads.

Actions:

Arcball

You will find this Action under the category Object motion in the Actions window. This Action lets the user manipulate the object directly.

A *Left mouse click* rotates the object.
A *Right mouse click* zooms the object.
Right and *Left mouse click* moves the object.

Rotation is relative to the object's pivot point.

Exercise

Open *drawer.c3d* and make the drawer object rotate around is own pivot point.

1. Click the **Start** button.
2. Select **Program** and **Cult3D Designer** to start the program.
3. Select **Load Cult3D Designer** file in the **File** menu
4. Select *drawer.c3d* and click the Open button**.**
5. Drag a **World start** object to the **Event map** window.
6. Activate the **Scene graph** window.
7. Select **Centerpoint** under **Root node**.
8. Drag and drop the **Centerpoint** to the **Event map** window.
9. Select **Object motion** in the **Actions** window.
10. Drag a **Arcball** action to the **World start (event_1)** and release the mouse button when you see a black square.
11. Drag the **Centerpoint** icon to the **Arcball** icon**.**
12. Save the project file as *drawer arcball.c3p***.**

Finish

When you are finished you will be able to see black lines that connects the icons to each other. If you select World start **(**Event_1**)** you'll see that the line will turn yellow. This is to indicate an action.

To try out all events and actions you made you can go to the preview window and press the **Play** button.

Hold down the left mouse button to rotate

Hold down the right mouse button to zoom.

Hold down the left and right mouse button to move the object.

3.4.2 Event and Translation

Read

Here you will make the drawer move. You will use the Left mouse click event, the Translation action and the Front left box scene to achieve this.

If you want an object to move from one point to another you will need an event that determines what will activate the sequence, an action that determines HOW it will move and an object that indicates WHAT is going to be moved.

You will continue to work with the designer file *Drawer.c3d* and the project file *drawer arcball.c3p.*

Look

This is a description of the Events and Actions that you will use in the Exercise below.

Events:

Left mouse click

You will find this Event on the left side of the Event map window.

This Event is triggered when you click the left mouse button.

Normally, Windows users have a two-button mouse (left and right) while Macintosh users use a one-button mouse (left). Macintosh users can use the control key to simulate the right mouse button.

Actions:

Translation

You will find this Action under the category **Object motion** in the **Actions** window.

Moves the selected object to a new position.

Deactivate event

You will find this Action under the category **Object motion** in the **Actions** window.

It deactivates an event that allows you to disable connected events.

Exercise

Continue to work with the designer file *Drawer.c3d* and the project file *drawer arcball.c3p*. In this Exercise you will make the drawer move.

1. Drag a **Left mouse click** object to the **Event map** window.
2. Activate the **Scene graph** window.
3. Select **Front left box**.
4. Drag the **Front left box** to the **Event map** window.
5. Drag and drop the **Front left box** onto the **Left mouse click** (now **Event_2**).
6. Select **Object motion** in the **Actions** window.
7. Drag a **Translation** action to the **Left mouse click** (**Event_2**).
8. Drag the **Front left box** icon to the **Translation** icon.
9. Double click the **Translation**. The **translation action details** window will appear (With the sliders you move to a new position. You can also write the actual X Y Z values directly for the new position).
10. Write the value 20 in the Y-axis field and press **Close**.
11. Try out the movement in the **Preview** window by pressing the **Play** button.

If you move the pointer over the front left box you will notice that the pointer turns into a hand. This is to mark that the **Front left box** has animation.

Left click on the front left box and it will open. If you click on it again the box will move 20 steps further. This will happen every time you click on the box.

You will now need the **Deactivate event** to deactivate the **Event_2** after the animation has been executed.

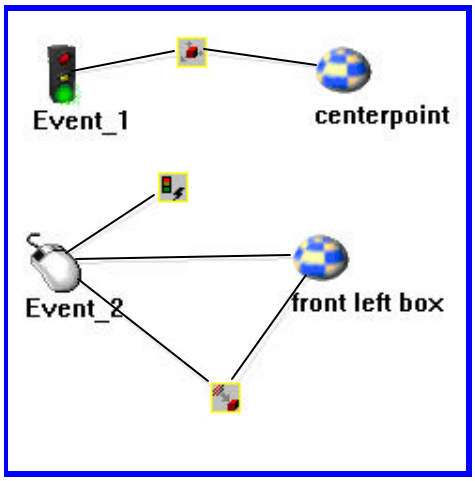
12. Select the **Actions** window.
13. Select the category **Event.** Drag and drop **Deactivate event**

onto **Event_2**.

14. Click the right mouse button on the **deactivate event** action and select Parameters.
15. Select **Event_2** on the left side and click the **Add** button and then **OK**.
16. Try out the movement in the **Preview** window by pressing the **Play** button.
17. Save the project file as *translation.c3p*

Finish

As you may notice the animation will be executed just once. If you go back to the **Event map** window and select **Event_2** you will see that the black line will turn green. This is to indicate a selected event.



The Event Map window should look like this when you are finished.

Figure 22: Event and translation

To try out all events and actions you made you can go to the preview window and press the **Play** button.

3.4.3 An event activating an other event

Read

In this exercise you will create the opposite movement (translation) to the last exercise. This event will be activated after the event in the previous exercise has been completed.

This should happen:
1. The drawer opens.
2. Close the drawer is activated.
3. The drawer closes.
4. Open the drawer is activated.

When you have two events attached to the same object and one event creates a movement of 20 and the other event creates a movement of –20 the result will be 0. The object will not move. It is important to isolate the events and then to connect them to each other.

You will continue to work with the designer file *Drawer.c3d* and the project file *translation.c3p.*

Look

This is a description of the Events and Actions that you will use in the Exercise below.

Events:

Left mouse click

You will find this Event on the left side of the Event map window.

This Event is triggered when you click the left mouse button.

Actions:

Translation

You will find this Action under the category **Object motion** in the **Actions** window.

Moves the selected object to a new position. Events can be either active or inactive. An inactive event cannot be triggered until it has been activated by an “Activate event” action.

Activate Event

Deactivate event

You will find this Action under the category **Object motion** in the **Actions** window. It deactivates an event that allows you to disable connected events.

Exercise

Continue to work with *drawer.c3d*. In this Exercise you will make the drawer close after it has been opened in the last exercise.

1. Drag and drop a **Left mouse click** to the **Event map window**.
2. Drag **Front left box** to **Event_3**.
3. Drag a **TranslationXYZ** to **Event_3**.
4. Drag the **Front left box** to **TranslationXYZ**.
5. Double click on the **TranslationXYZ** icon.
6. Write the value –20 for the y-axis. This is the opposite value for the y-axis for the translation connected to **Event_2**.

   Now you have to make sure that **Event_3** is deactivated. Event_3 has to be activated by **Event_2** in order to execute properly. If not, both events will neutralise each other and nothing will happen.

7. Click the right mouse button on **Event_3**.
8. Deselect **Initial Activation**. **Event_3** will be grey. The only way to trigger **Event_3** is that another event activates it.
9. Drag an **Activate event** action to **Event_2**.
10. Click the right mouse button on the **Activate event** icon.
11. Select **Parameters**.
12. Select **Event_3**. You do this since **Event_2** will activate **Event_3**.

    If you try the object in the preview window you can open and close the drawer. If you click a third time on the drawer it will move 20 steps inwards. To correct this you will need to make sure that **Event_3** only triggers once.

13. Drag a **Deactivate event** action to **Event_3**.
14. Click the right mouse button on the **Deactivate event** icon.
15. Select **Parameters**.
16. Select **Event_3**.
17. Drag an A**ctivate event** action to **Event_3**.
18. Click the right mouse button on the **Activate event** icon.
19. Select **Parameters**.
20. Select **Event_2**.
21. Save the project file as *Event activation.c3p*.

Finish

Now you should be able to open and close the drawer many times in a row without any strange effects. The **Event map** window should like the picture below when you are finished.

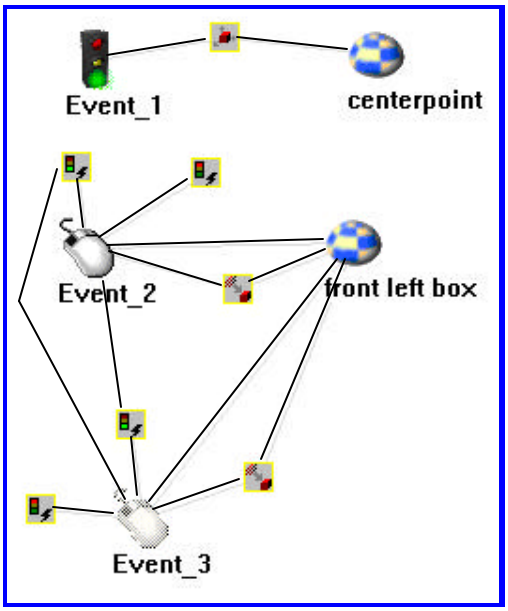


Figure 23: An event activating an other event

To try out all events and actions you made you can go to the preview window and press the **Play** button.

3.4.4 Rotation

Read

This section deals with the problem to make a part of an object rotate from its local centre. You will use the Left mouse click event, the Rotation action and the Right door scene to achieve this.

You will continue to work with the designer file *Drawer.c3d* and the project file *Event activation.c3p.*

Look

This is a description of the Events and Actions that you will use in the Exercise below.

Events:

Left mouse click

You will find this Event on the left side of the Event map window.

This Event is triggered when you click the left mouse button.

Actions:

Rotation

You will find this action under the category Action/Object in the Actions window.

Rotates the selected object.

Exercise

In this exercise you will make a part of an object rotate from its local centre. You will work with the designer file *Drawer.c3d* and the project file *Event activation.c3p.*

1. Drag and drop a **Left mouse click** to the **Event map** window.
2. Drag a **Right door** object from the category **Centerpoint** in the **Scene graph** window to the **Left mouse click** event (**Event_4**).
3. Drag and drop a **RotationXYZ** action from the category **actions/object motion** to the **Event_4** .
4. Drag the **Right door** object to the **RotationXYZ** action.
5. Double click the **RotationXYZ** action in the **Event map**

window.

6. Set the value for the Z-axis to 90.
7. Click **OK**.

When you set the value in either translation or rotation you'll be able to see the action in real-time in the preview window.
Sometimes it can be difficult to know which axis to select.
In the preview window you'll find this button  **.**
If you click on it you will be able to see three lines in three different colours: red, green and blue, RGB. It's equivalent to X Y Z.
R=X, G=Y, B=Z

8. Drag the action **Deactivate event** from the category actions**/event** to the **Event_4** in the Event map window.
9. Drag **Event_4** back to the **Deactivate event**.
10. Save the project file as *rotation.c3p.*

Finish

When you are finished the **Event map** window should look like this:

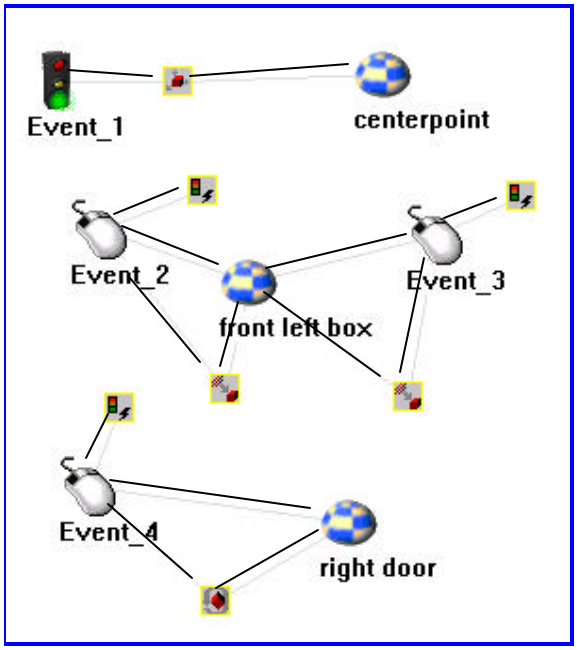


Figure 24: Rotation

To try out all events and actions you made you select the **Preview** window and press the Play button. Click the **right door** in the drawer. The right door should open.

When you click the right door again it should close.

3.4.5 Animation Play

Read

With the function **Animation Play** you can control the movements of an object that is pre-animated in 3D Studio Max.

Look

This is a description of the Events and Actions that you will use in the Exercise below.

Events:

Left mouse click

You will find this Event on the left side of the **Event Map** window.

This Event is triggered when you click the left mouse button.

Actions:

Deactivate event.

You will find this Action under the category **Event** in the **Actions** window.
It deactivates an event and allows you to disable connected events.

Vertex Animation play

You will find this Action under the category **Object motions** in the **Actions** window.
Control the movements of an object that is vertex animated in 3D Studio Max.

Exercise

Start Cult3D Designer and select LOAD Cult3D Designer file in the File menu.

1. Select *animation play.c3d* and click the **Open** button.

2. Drag a **Left mouse click** object to the **Event map** window. (It will be named Event_1).

3. Select **Deactivate event** (under **Event** in the **Actions** window).

4. Drag and drop a **Deactivate event** onto **Event_1**.

5. **Drag the Event_1** back to the **Deactivate event**.

6. Activate the **Scene graph** window.

7. Select the **Taper** (under **Objects**).

8. Drag the **Taper** to the **Event map** window and drop it onto **Event_1**.

9. Activate the **Actions** window and select **Vertex-level animation**. You can now see the action **Vertex Animation play**.

10. Drag **Vertex animation play** the **Event map** window and drop it onto **Event_1**.

11. Drag the **Taper** onto **Vertex animation play**.

12. Double-click the **Vertex animation play** in the **Event map window.** The **Transform controller action details** window will now show.

13. Set **Starting key frame** to **0** and **Ending key frame** to **14**.

14. Select **Stretch duration** and set the value to 2000 ms.

When you change the value of the key frame you'll see the changes in the preview window. You can also select and change the time duration on the animation. You can either prolong or shorten the duration of the animation.

Transition time defines how long the transition should take between the current object animation position to the next start.

With the loop option checked the animation will play over and over again.

15. Click the **Close** button.

16.Save the project file as *animation play.c3p*

Finish

Now you see a black line that connects the icons to each other. If you select Left mouse click (Event_1) you will see that the lines turn yellow. This is to indicate an action.

When you are finished the **Event map** window should look like this.

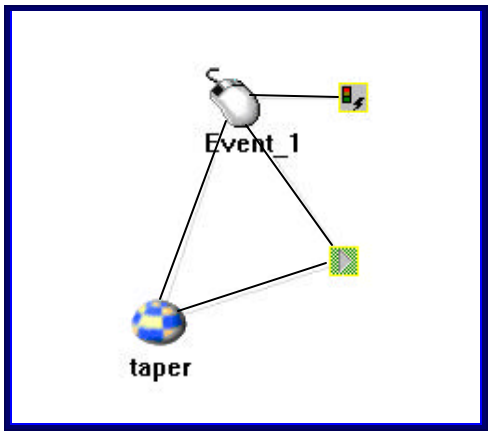


Figure 25: Vertex animation play

Try the **Animation play** by pressing play in the preview window.

Point at the Taper icon and click the left mouse button.

3.4.6 Vertex animation jump to

Read

The **Animation jump to** function makes an object jump to a desired position. It will morph from the current position to the new position.

Look

This is a description of the Events and Actions that you will use in the Exercise below.

Events:

Left mouse click

You will find this Event on the left side of the **Event Map** window.

This Event is triggered when you click the left mouse button.

Actions:

Deactivate event.

You will find this Action under the category **Event** in the **Actions** window.
It deactivates an event and allows you to disable connected events.

Vertex Animation jump to

This Action you will find under the category **Vertex level animation** in the **Actions** window.
Function; jumps directly to a desired position in the animation. Setting the Transition Time to be greater than 0 makes the object morphing between the current position and the new position during the specified time.

Exercise

Start Cult3D Designer and select LOAD Cult3D Designer file in the File menu.

1. Select *animation jump to.c3d* and click the **Open** button.

2. Drag a **Left mouse click** object to the **Event map** window. (It will be named Event_1).
3. Select **Deactivate event** (under **Event** in the **Actions** window).

4. Drag and drop a **Deactivate event** onto **Event_1**.

5. **Drag the Event_1** back to the **Deactivate event**.

6. Activate the **Scene graph** window.

7. Select the **Taper** (under **Objects**).

8. Drag the **Taper** to the **Event map** window and drop it onto Event_1.

9. Activate the **Actions** window and select **Vertex level animation**.
   You can now see the action **Vertex Animation jump to**.

10. Drag **Vertex animation jump to** the **Event map** window and drop it onto **Event_1**.

11. Drag the **Taper** onto **Vertex animation jump to**.

12. Double-click the **Vertex animation jump to** in the **Event map window.** The **Vertex animation jump to** details window will now show.

13. Give both **Transition time** and **Key frame** the value 2.

14. Click the **Close** button.

15. Save the project file as animation jump to.c3p

Finish

Now you see a black line that connects the icons to each other. If you select Left mouse click (Event_1) you will see that the lines turn yellow. This is to indicate an action.

When you are finished the **Event map** window should look like this.

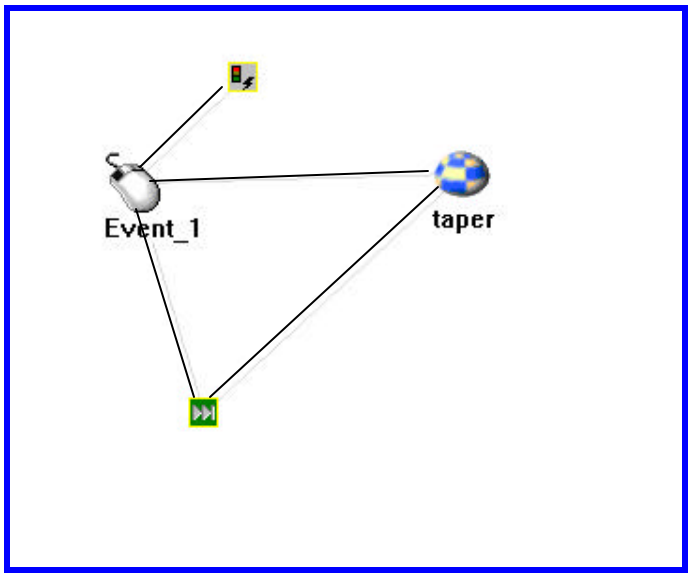


Figure 26: Vertex animation jump to

Try out the Vertex animation jump to by pressing play in the preview window.

Point at the Taper icon and click the left mouse button.

3.4.7 Edit with time line

Read

This practise will show how to make sequences start in the order we want them too. You will see that the time lineview is necessary to make actions start, one after the other.

Look

This is a description of the Events and Actions that you will use in the Exercise below.

Events:

Left mouse click

You will find this Event on the left side of the **Event Map** window.

This Event is triggered when you click the left mouse button.

Actions:

Deactivate event

You will find this Action under the category **Event** in the **Actions** window.
It deactivates an event, which allows you to disable connected events.

Rotation **XYZ**

Rotates the selected object. You can select different values for X, Y and Z rotation.

Exercise

Start Cult3D Designer and select LOAD Cult3D Designer file in the File menu.

1. Select **minidisc.c3d** and click the **Open** button.

2. Drag a **Left mouse click** object to the **Event map** window (It will be named Event_1).

3. Select **Deactivate event** (under **Event** in the **Actions** window).

4. Drag and drop a **Deactivate event** onto **Event_1**.

5. **Drag the Event_1** back to the **Deactivate event**.

6. Activate the **Scene graph** window.

7. Under Objects you will find Minidisc.

8. Open the Minidsic structure by clicking the + sign. Now you can see the object **Level-eject**.

9. Select the **Level-eject** and drag in onto **Event_1** the **Event map** window.

10. Select **Rotation XYZ** (under **Object motion** in the **Actions** window) and drag it onto the **Event_1**.

11. Drag the **Level-eject** to Rotation.

12. Now you will have to repeat the steps 11 and 12 to give the Level-eject two rotations.

Below you will learn how to make the **Level-eject** rotate.

13. Double click the **Rotation XYZ** action to show the R**otation action details** window.

14. Set the value for the x-axis to 54 and press **Close**.

15. Double click the second **Rotation**.

16. Set the value for the x-axis to -54 and Set **Performance duration** to 500, it will make the Level-eject move up faster.

17. press **Close**.

    Press **Play** in the preview window. So far it does not work properly because we have not checked the blocking option. The first action needs to be finished before the next one starts.

18. Click the right mouse button on **Event_1**. Select **Edit with time line**.

19. Drag the second rotation starting point to the point where the first rotation ends.

20. Save the project file as *Minidisk time line.c3p*.

Finish

Now try out the animation by pressing **Play** in the **Preview** window.

When you are finished the Event map window should look like this.

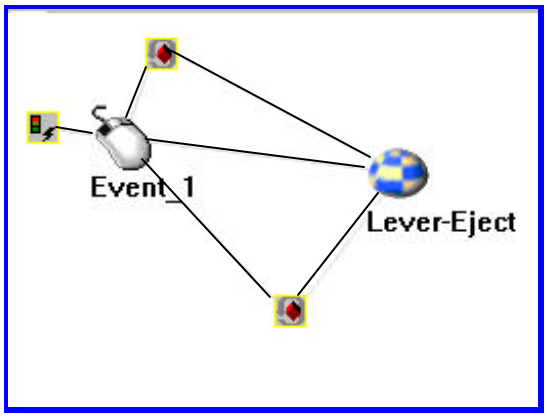


Figure 27: Time line view

Point at the Eject-level and click the left mouse button.

3.4.8 Play sound.

Read

Here you will make the Minidisk play music when its **Play button** is pressed.

Look

This is a description of the Events and Actions that you will use in the Exercise below.

Events:

Left mouse click

You will find this Event on the left side of the **Event Map** window.

This Event is triggered when you click the left mouse button.

Actions:

Deactivate event

You will find this Action under the category **Event** in the **Actions** window.
It deactivates an event, which allows you to disable connected events.

Play Sound

This Action is located under the category **Sound** in the **Actions** window.
Plays a sound as defined by a sound resource (sample, MIDI, wav.)

Exercise

Start Cult3D Designer and select **LOAD project** in the File **menu.** This exercise should be made after exercise 3.4.7.

1. Select the file *Minidisk time line.c3p* and click the **Open** button.

2. Drag a **Left mouse click** object to the **Event map** window (It will be named Event_2).

3. Select the **Left mouse click** (Event_2) and click the right mouse button. In the menu that will show, select **Change name**.

4. Change the name **Event_2** to **Sound on** and press **OK**.

5. Activate the **Scene graph** window.

6. Under Objects you will find Minidisc.

7. Open the Minidsic structure by clicking the **+** sign. Now you can see the object **Button-PlayPause**.

8. Select the **Button-PlayPause** and drag in onto the **Sound on** event in the **Event map** window.

9. Select **Play Sound** (under **Sound** in the **Actions** window) and drag it onto the **Sound on** event in the **Event map** window.

10. To select sound, go to the Window menu and select Sound.

11. Press the Add button and you will go directly to the to the sound catalogue for Cult3D Designer.

12. Select the sound file **guitardelay01.wav** and press the Open button.

13. Grab the file **guitardelay01.wav** from the sound-window and drop it in the **Event map** window.

14. Close the Sound window.

15. Drag the file *guitardelay01.wav* on to the **Play sound** action.

16. Save the project file as *minidiscsound.c3p*.

Finish

Now try the Sound by pressing Play in the preview window.
If you want to change the starting- or ending position of the song, double-click the Play sound icon and make your selections.

When you are finished the Event map window should look like this.

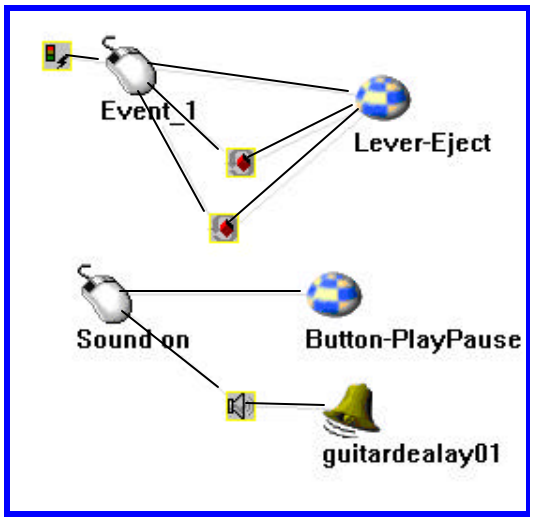


Figure 28: Play sound

Click the left mouse button to start the music.

3.4.9 Stop sound.

Read

Here you will make it possible to stop the music from playing.

Look

This is a description of the Events and Actions that you will use in the Exercise below.

Events:

Left mouse click

You will find this Event on the left side of the **Event Map** window.

This Event is triggered when you click the left mouse button.

Actions:

Stop Sound

This Action is located under the category **Sound** in the **Actions** window.
Stops playing selected sound.

Exercise

This exercise should be made after exercise 3.4.8 .

Start Cult3D Designer and select LOAD Project in the File menu.

1. Select the file *minidiscsound.c3p* and click the **Open** button.

2. Drag a **Left mouse click** object to the **Event map** window (It will be named Event_3).

3. Select the **Left mouse click** (Event_3) and click the right mouse button. In the menu that will show, select **Change name**.

4. Change the name **Event_3** to **Sound off** and press **OK**.

5. Activate the **Scene graph** window.

6. Select the **Button stop** and drag in onto **the Sound off** event in the **Event map** window.

7. Select **Stop Sound** (under **Sound** in the **Actions** window) and drag it onto the **Sound off** event in the **Event map** window.

8. Drag the file *guitardelay01.wav* on to the **Stop sound** action.

9. Save the project file as *minidiscstop sound.c3p*.

Finish

Now you can both play the music and turn it off.

When you are finished the Event map window should look like this.

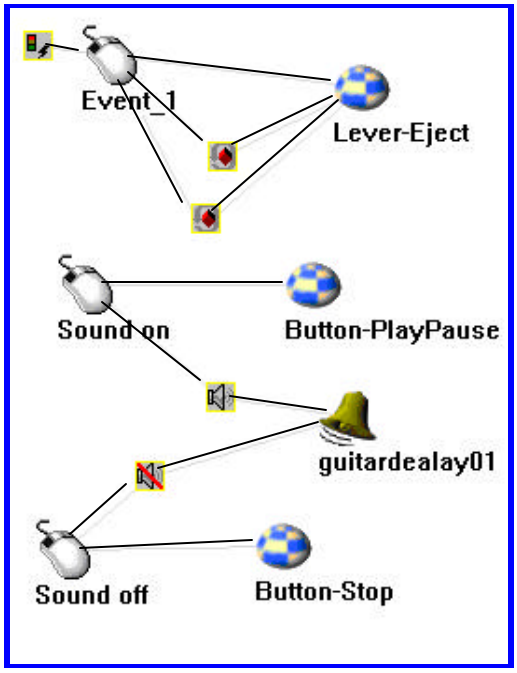


Figure 29: Stop sound

Click the left mouse button to start the music and click it again to stop.

3.4.10 The Timer

Read

The timer event starts after defin able duration of time. By double clicking on the timer icon you can enter a time value. The time value may vary depending on your computer capacity.

We will use a timer from an event. Therefore we will continue to work with the *minidiscstopsound.c3p* file
You can also do this exercise by using the edit time line view.

Look

This is a description of the Events and Actions that you will use in the Exercise below.

Events:

Timer

This event is triggered after an author definable duration. By double-clicking the timer icon you can change the delay. The delay time is dependent on the speed of the processor.

Actions:

Activate Event

Events can be either active or inactive. An inactive event cannot be triggered until it has been activated by an “Activate event” action.

Deactivate Event

This action deactivates an event, which allows you to disable other events.

Translation

Moves the selected object to a new position.

Exercise

Continue to work with *minidiscstopsound*.c3d. In this Exercise you will create and set a timer for an event.

1. Drag an **Activate event** action from **actions/event** and drop in on the **Event_1** event**.**
2. Drag a **Timer** event and drop it in the Event map window.
3. Drag the **Timer** event to the Activate event action.
4. Click the right mouse button on the **Timer** event and deselect the option **Initial activation** (it will be activated by **Event_1).**
5. Drag a Deactivate event **action** to the **Timer** event
6. Drag the **Timer** event to the Deactivate event action and drop it when you see a black square.
7. Drag a **Translation** action from the action category **actions/object motion** to the **Timer** (Event_4)
8. Drag the **minidisc-media** scene from the Scene graph **window** to the **Translation** action
9. Double click on the **Translation** action.
10. Set the value for the y-axis to **–20**.
11. Double click on the **Timer** to make the parameter input window pop up.
12. Set the value to 800.
13. Save the project file as *minidisctimer.c3p***.**

Finish

After 800ms after triggered “Event_1” the minidisk-media will move.

The Event map window should like this when you are finished.

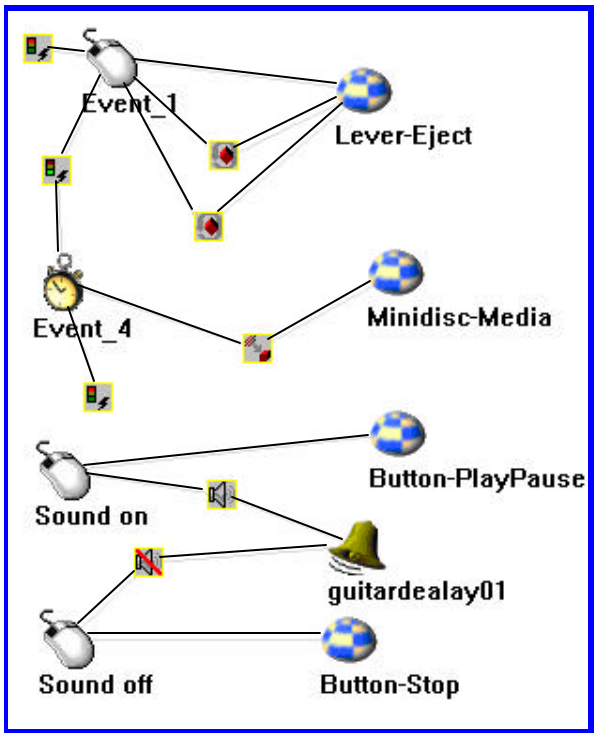


Figure 30: The Timer

To try out all events and actions you made you can select the **Preview** window and press the **Play** button.

You may also use the feature Edit with time line to do this exercise.

3.4.11 Event activating an other event

Read

In this exercise you will learn how to make an event activate another event. This function makes it possible to activate a chain of events by starting one event.

Look

This is a description of the Events and Actions that you will use in the Exercise below.

Events:

You will find Events on the left side of the **Event Map** window.

Left mouse click

This Event is triggered when you click the left mouse button.

Timer

This event is triggered by the duration that you define. By double-clicking the timer icon you can change the delay. The delay time is dependent on the speed of the processor.

Actions:

Activate event

This Action is placed in the category **Event** in the **Actions** window.
Events can be either active or inactive. An inactive event cannot be triggered until it has been activated by an “Activate event” action.

Deactivate event

This Action is placed in the category **Event** in the **Actions** window.
It deactivates an event and allows you to disable connected events.

Translation

This action is found in the category **Object motion** in the **Actions** window.
A selected object is moved to a new desired position.

Exercise

This exercise should be made after exercise 3.4.9 .
You must open two files, one Cult3D Designer file and one Cult3D Project file, to do this exercise.

1. Start Cult3D Designer and select **Load Project file** in the **File** menu.

2. Select *minidisc timer.c3p* and click the **Open** button.

3. Drag a **Left mouse click** object to the **Event map** window (It will be named Event_4).

4. Select **Deactivate event** (under **Event** in the **Actions** window).

5. Drag and drop a **Deactivate event** onto **Event_4**.

6. Drag the **Event_4** back to the **Deactivate event** action.

7. Activate the **Scene graph** window.

8. Select the **Minidisc-Media** and drag it onto **Event_4** in the **Event map** window. This makes it possible to click the **Minidisc-Media**.

9. Select **Translation XYZ** (under **Object motion** in the **Actions** window).

10. Drag and drop **Translation XYZ** to the **Event_4**.

Now the **Minidisc-Media** must be linked to the **Translation XYZ**.

18. Drop the **Minidisc-Media** to the **Translation XYZ** action in the **Event map** window.

19. Double-click the action **Translation XYZ** that is linked to e **Event_4** in the Event Map window.

20. Set the value for the y-axis to 20.

Now you can test the function ”Event activating an other event” by pressing **Play** in the **Preview** window and clicking the **Level_Eject**.

The Minidisc will move 20 steps on the y-axis. If you click the **Minidisc-Media** the Minidisc will move back to the starting position. So far we have not made it possible to start any action when clicking the Lever-eject again in the preview window.

Below you will learn how to activate the Level-eject again.

21. Click with the right mouse button on **Event_4** in the **Event Map** window and deselect **Initial activation**.

22. Select **Activate event** (under **Event** in the **Actions** window).

23. Drag and drop the **Activate event** to the **Event_1** in the **Event Map** window.

24. Drag **Event_4** to the **Activate event** action in the **Event map** window (to activate **Event_4** after **Event_1** is triggered).

25. Select a new **Activate event** (under **Event** in the **Actions** window).

26. Drag and drop the **Activate event** to the **Event_4** in the **Event Map** window.

27. Drag **Event_1** to the **Activate event** action in the **Event map** window.

28. Save the project file as *minidiscactivate.c3p*.

Finish

Try out the function ”Event activating an other event” by pressing **Play** in the **Preview** window and clicking the **Level_Eject**.

The Minidisc will move 20 steps on the y-axis. If you click the Minidisc-Media the Minidisc will move back to the starting position.

When you are finished the Event map window should look like this.

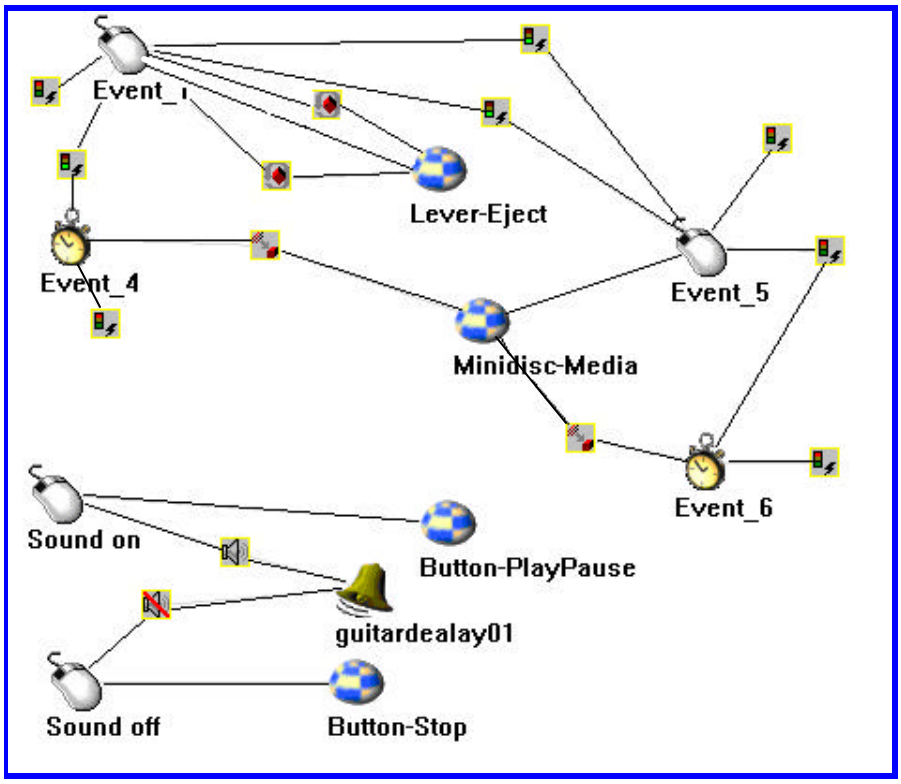


Figure 31: Event activating an other event

3.4.12 Event deactivating an other event

Read

In this exercise you will learn how to make an event deactivate another event. In the exercise 3.4.10 we still have the problem to prevent the music from playing when the Minidisc media is out.

Look

This is a description of the Events and Actions that you will use in the Exercise below.

Events:

You will find Events on the left side of the **Event Map** window.

Left mouse click

This Event is triggered when you click the left mouse button.

Timer

This event is triggered by the duration that you define. By double-clicking the timer icon you can change the delay. The delay time is dependent on the speed of the processor.

Exercise

This exercise should be made after exercise 3.4.10.
You must open two files, one Cult3D Designer file and one Cult3D Project file to do this exercise.

1. Select **LOAD Cult3D Project file** in the **File** menu**.**

2. Select *minidiscactivate.c3p* and click the **Open** button.

   To prevent the music to play when the Level-Eject is triggered follow the instructions in step 5 and 6.

3. Select **Deactivate event** (under **Event** in the **Actions** window).

4. Drag and drop a **Deactivate event** action to **Event_1**.

5. Drag and drop the action **Sound on** to the new **Deactivate event**.

   Now we have to make it possible to play the music when the Minidisc-Media is in. See step 6 – 8 below.

6. Select **Activate event** (under **Event** in the **Actions** window).

7. Drag and drop the action **Activate event** to **Event_4** in the **Event map** window.

8. Drag the event **Sound on** to the **Activate event** in the **Event map** window.

   The next step is to prevent the Minidisc-Media from being triggered when the music is playing. See step 9-11 below.

9. Select **Deactivate event** (under **Event** in the **Actions** window).

10. Drag and drop a **Deactivate event** to the event **Sound on** in the **Event map** window.

11. Drag the **Event_1** to the new **Deactivate event** in the **Event map** window.

    The Level_eject must be activated when the music is turned off. See step 12-18 below.

12. Select **Deactivate event** (under **Event** in the **Actions** window).

13. Drag and drop a **Deactivate event** to the event **Sound off** in the **Event map** window.

14. Drag the event **Sound off** to the new **Deactivate event** in the **Event map** window.

15. Select **Activate event** (under **Event** in the **Actions** window).

16. Drag and drop an **Activate event** to the event **Sound off** in the **Event map** window.

17. Drag the event **Event_1** to the new **Activate event** in the

Event map window.

18. Select **Activate event** (under **Event** in the **Actions** window).

19. Drag and drop an **Activate event** to the event **Sound on** in the **Event map** window.

20. Drag the event **Sound off** to the new **Activate event** in the **Event map** window.

21. Select **Activate event** (under **Event** in the **Actions** window).

22. Drag and drop an **Activate event** to the event **Sound off** in the **Event map** window.

23. Drag the event **Sound on** to the new **Activate event** in the **Event map** window.

24. Select **Deactivate event** (under **Event** in the **Actions** window).

25. Drag and drop a **Deactivate event** to the event **Sound on** in the **Event map** window.

26. Drag the event **Sound on** back to the new **Deactivate event** in the **Event map** window.

27. Save the project file as *minidisc complete.c3p***.**

Finish

Try the functions for the Minidisc by pressing **Play** in the **Preview window**.

The Minidisc will move on the y-axis. If you click the Minidisc-Media the Minidisc will move back to the starting position. Music will play/stop playing when you click the play button.

When you are finished the **Event map** window should look like this.

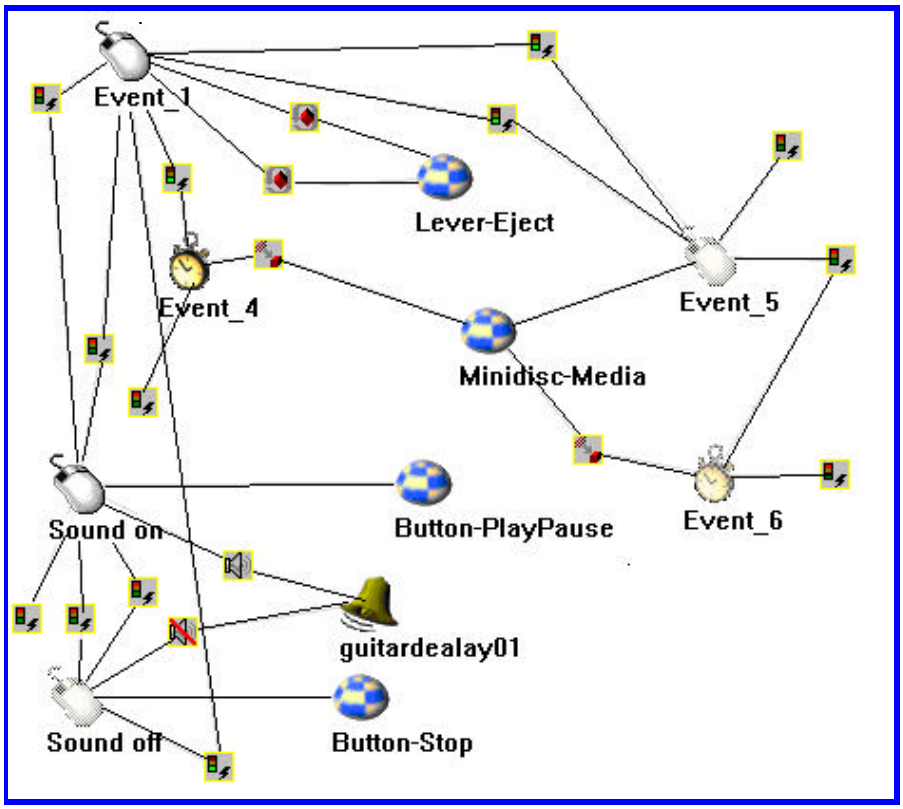


Figure 32: Event deactivating an other event

Point at the Eject-level in the preview window and click the left mouse button.

3.4.13 Keyboard key press

Read

In this exercise you will learn how use a keyboard key to control an action. We will make a fish move when we press a key.

Look

This is a description of the Events and Actions that you will use in the Exercise below.

Events:

You will find Events on the left side of the **Event Map** window.

World start

This event is triggered when the scene loads.

Keyboards key press

This event occurs when the end-user presses the specified key on the object associated with the event.

Timer

This event is triggered after an author definable duration. By double-clicking the timer icon you can change the delay. The delay time is dependent on the speed of the processor.

Actions:

Arcball

"Left mouse click" rotates the object
Right mouse click zooms in the object
Right and "Left mouse click" allows you to move the object
Rotation is relative to the object's pivot point.

Activate event

Events can be either active or inactive. An inactive event cannot be triggered until it has been activated by an "Activate event" action. If "Initial activation" is checked, then the event is active. If it is not checked, then you need to activate the event before it can be triggered

activate the event before it can be triggered.
Moves the selected object to a new position.

Translation XYZ

Vertex animation jump to

This action is only used when you have changed one or several vertexes in 3D Studio Max. It creates a morph from the starting point to the stop point in a vertex.

Exercise

You have to open the Cult3D Designer file *fish.c3d* to do this exercise.

1. Start Cult3D Designer and select **LOAD Cult3D Designer file** in the **File** menu.

2. Select the file *fish.c3d* and click the **Open** button.

3. Drag the **World start** event (from the left side of the **Event map** window) to the **Event map** window. **World start** will be named **Event_1**.

4. Select **Arcball** (under **Object motion** in the **Actions** window).

5. Drag and drop the **Arcball** action to the **World start** event (**Event_1**) in the **Event map** window.

6. Select **box02** in the **Scene graph**-window.

7. Drag and drop **box02** to the **Arcball** action in the **Event map** window.

8. Drag the **Keyboards key press** event (from the left side of the **Event map** window) to the **Event map** window. **Keyboards key press** will be named **Event_2**.

9. Double click on the **keyboards key press** and select key nr 1 on your keyboard then press add

10. Select **Activate event** (under **Event** in the **Actions** window).

11. Drag and drop a **Activate event** on the **Keyboards key press** event (**Event_2**) in the **Event map** window.

12. Drag a **Timer** event to the **Event map** window.

13. Click the right mouse button on the **Timer** (**Event_3**) and deselect **Initial activation**.

14. Select **TranslationXYZ** (under **Object motion** in the **Actions** window).

15. Drag and drop the **TranslationXYZ** on **Timer** (**Event_3**) in the **Event map** window.

16. Drag **box02** in the **Event map** window to the **TranslationXYZ** action.

17. Double click the **TranslationXYZ** action so the **Action details** window will show.

18. Set the x-axis value to –50.

19. Drag and drop a **Vertex animation jump to** action to **Event_3**.

20. Drag **box02** to the **Vertex animation jump to**.

21. Double click the **Vertex animation jump to** action.

22. Type 500 in the **Transition type** field and drag **Ending keyframe** to 3. Click the close button.

23. Drag a new **Vertex animation jump to** action to **Event_3**.

24. Drag **box02** to the **Vertex animation jump to**.

25. Double click the second **Vertex animation jump to** action.

26. Type 500 in the **Transition type** field and drag **Ending keyframe** to 2. Click the close button.

27. Click the right mouse button on the **Event_3** and select **Edit time line view**.

28. Drag the starting point of the second **Vertex animation jump to** action to the point where the first **Vertex animation jump to** action ends.

29. Save this project-file as *fish keypress.c3p.*

Finish

Try the functions for the Fish by pressing **Play** in the **Preview window**. Hold keyboard key **1** down to start the motion and steer the fish with the pointer. Don't be alarmed when the fish won't stop, we will correct that in exercise 3.4.14.

When you are finished the **Event map** window should look like this.

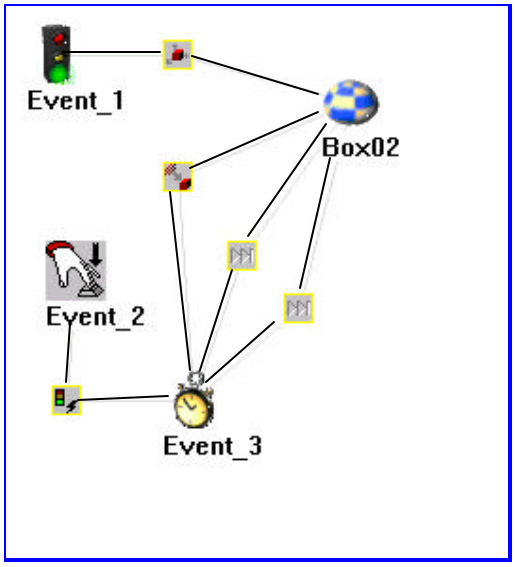


Figure 33: Keyboard key press

3.4.14 Keyboard key release and stop translation

Read

In the exercise 3.4.13 we made it possible to start the movement of a fish and steer it with the mouse pointer. Now we will add functions that will stop the movement when we release a keyboard key. We will also learn how to control movements in the vertex-structure.

Look

This is a description of the Events and Actions that you will use in the Exercise below. You will find Events on the left side of the **Event Map**

Events:

Keyboards key press

This event occurs when the end-user presses the specified key on the object associated with the event. By double clicking the "Keyboard Button Pressed" event you can define which keys or sequences of keys that should trigger the event.

Actions:

Deactivate event

This action deactivates an event, which allows you to disable other events. (See the example under "Activate event" for a discussion of how to use the activation state of an event.)

Stop

Stops object motion actions

Vertex Animation jump to

This action is only used when you have changed one or several vertexes in 3D Studio Max. It creates a morph from the starting point to the stop point in a vertex.

Exercise

This exercise should be made after exercise 3.4.13.
You must open two files, one Cult3D Designer file and one Cult3D Project file, to do this exercise.

1. Select **LOAD Cult3D Project file** in the **File** menu.

2. Select *fish keypress.c3p* and click the **Open** button.

3. Drag the event **Keyboards key release** (from the left side of the Event map window) to the **Event map** window. **Keyboards key release** will be named **Event_4**.

4. Double click on the **keyboards key press** and select key nr 1 on your keyboard then press add

5. Drag and drop a **Deactivate event** action to the event **Keyboards key release** (**Event_4**) in the **Event map** window.

6. Drag **Event_3 (**the timer) to the **Deactivate event** action.

7. Drag a **Stop** action from the **Object motion** category to **Event_4**.

8. Drag **box02** to the **Stop** icon.

9. Double click the **Stop** action and select all actions except **Arcball**. Click the arrow that points to the right.

10. Drag and drop a **Vertex animation jump to** onto **Event_4**.

11. Drag box02 to the **Vertex animation jump to** action.

12. Double click the **Vertex animation jump to** and type 500 in the **Transition time** field. Let **Ending keyframe** remain on 0.

13. Save the project file as *fish keyrelease.c3p* .

Finish

Try the functions for the Fish by pressing **Play** in the **Preview window**. Hold keyboard key **1** down to start the motion and steer the fish with the pointer. Notice the smooth movement of the fish.

When you are finished the **Event map** window should look like this.

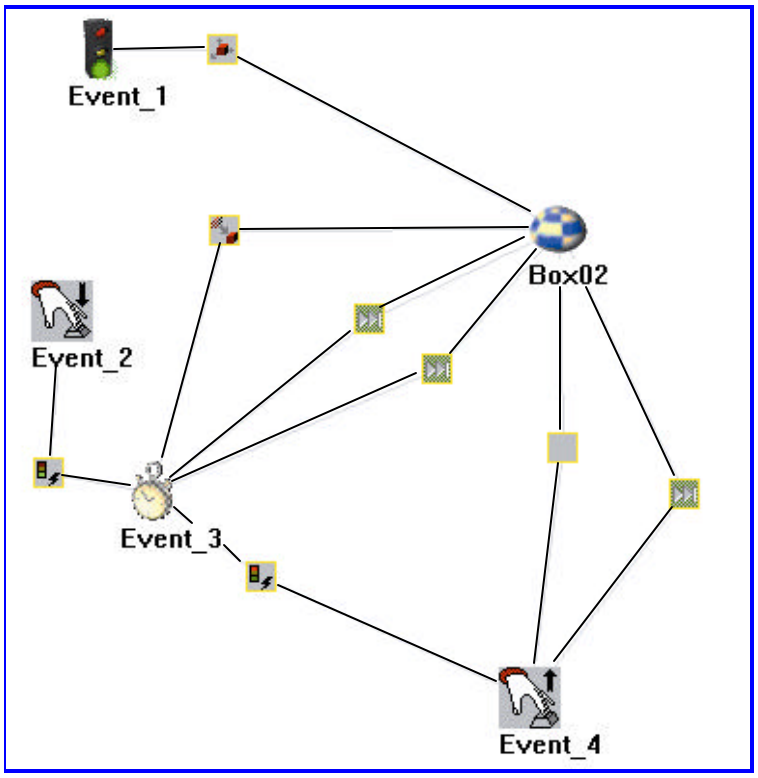


Figure 34: Keyboard key release and stop

3.4.15 Reset

Read

Reset stops any animation in progress and resets the object to its original translation, rotation and zoom values.

An event must be reset to be able to be triggered a second time. Normally you use automate reset that you will find when you right click on an event. If this option is not selected then you must use a reset event.

You will continue to work with the *fish.c3d* and the *fish keyrelease.c3p*.

Look

This is a description of the Events and Actions that you will use in the Exercise below.

Events:

Keyboards key press

This event occurs when the end-user presses the specified key on the object associated with the event. By double clicking the "Keyboard Button Pressed" event you can define which keys or sequences of keys that should trigger the event.

Actions:

Reset

Reset is different from **Reset event**. An object or an action doesn't need to be reset unless you want everything go back to its original position.

Exercise

Continue to work with the *fish.c3d* and the *fish keyrelease.c3p*. In this exercise you will reset the objects when a key is pressed.

1. Drag and drop a **Keyboard's key press** event to the **Event map** window.
2. Drag a **Reset** action from the **actions/object motion** action category and drop it on the **Event_5** event.
3. Drag **box02** to the **Reset** action.
4. Double click on the **Event_5** event.
5. Select **2** and press Add.
6. press **OK**.
7. Drag and drop a **Deactivate event** action to **Event_5.**
8. Drag and drop Event**_3** (the timer) onto the Deactivate event
9. Save the project file as *Fish reset.c3p.*

Finish

The Event map window should like this when you are finished.

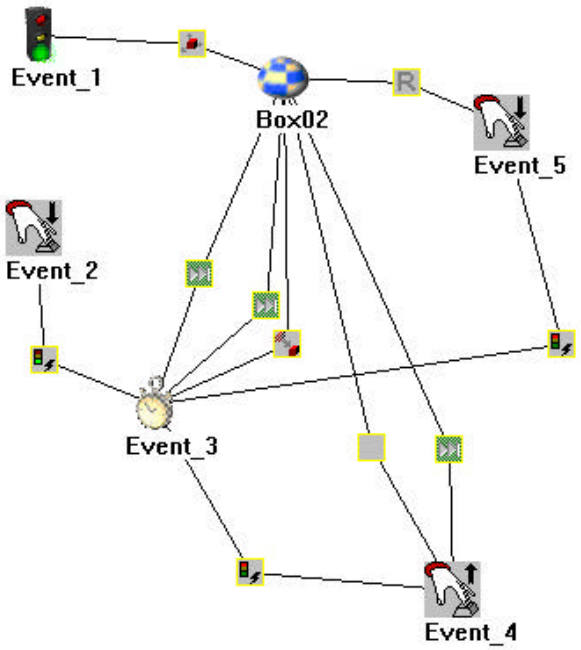


Figure 35: Reset

Run the animation in the **Preview** window. When holding down **keyboard key 2** the animation will go back to its original position.

3.4.16 Hide and unhide

Read

You will use this action if you have an object that you don't want to be shown from the beginning of the animation and show it later.

You will work with the designer file *tv.c3d.*

Look

This is a description of the Events and Actions that you will use in the Exercise below.

Events:

This event is triggered when the scene loads.

World start

Left mouse click

The end-user presses the left mouse button on the object associated with this event.

Actions:

Activate Event

Events can be either active or inactive. An inactive event cannot be triggered until it has been activated by an "Activate event" action.

Deactivate Event

This action deactivates an event, which allows you to disable other events.

Hide object

Hides the connected object from the viewer.

Unhide object

If the object is hidden this action makes it visible.

Exercise

In this exercise you will work with the designer file *tv.c3d*. In this designer file there are two screen objects. One shows a black TV-screen and the other shows a picture. When we start the animation the black TV-screen will be visible. Later on the TV-screen will be shown and the black TV-screen will be hidden.

1. Open the *tv.c3d* file in the Cult3D Designer
2. Drag a **World start** event to the **Event map** window.
3. Drag **screen02** under **circle01** in the **Scene graph** window to the **Event map** window.
4. Drag the action **Hide object** from the category **render** in the Actions window and drop it on the **Event_1** event in the **Event map** window.
5. Drag **screen02** to the **Hide object** action.

6. Drag a **Left mouse click** event to the **Event map** window.
7. Drag **cylinder01** from the **Scene graph** window to the **Event_2** event.
8. Drag the action **Unhide object** from the action category render to the **Event_2** event.
9. Drag **screen02** to the action **Unhide object**.
10. Drag a **Deactivate event** action to **Event_2** event.
11. Drag **Event_2** to the **Deactivate event**.
12. Drag **screen01** from the **Scene graph** window to the **Event map** window.
13. Drag the action **Hide object** from action category **Render** to the **Event_2** event.
14. Drag **screen01** to the **Hide object** action.
15. Click the **Play** button in the **Preview** window.

If you click the red button the TV-screen with a picture will appear.

16. Drag a **Left mouse click** event to the **Event map** window.
17. Drag **cylinder01** to the **Event_3** event.
18. Drag the action **Unhide object** from the action category **Render** to the **Event_3** event.
19. Drag **screen01** to the **Unhide object** action.
20. Drag the action **Hide object** from the action category **Render** to the **Event_3** event.
21. Drag **screen02** to the **Hide object** action.

Step 15-21 makes it possible to show screen01 and hide screen02 invisible.

22. Click the right mouse button on the **Event_3 event** and deselect **Initial activation**.
23. Drag a **Deactivate event** action from actions/event to the

Event_3 event.

24. Drag the **Event_3** to the **Deactivate event** action.
25. Drag an **Activate event** action from the **Event** category in the **Actions** window to the **Event_2** event.
26. Drag the **Event_3** event to the **Activate event** action.
27. Drag an **Activate event** action from the **Event** category in the **Actions** window to the **Event_3** event.
28. Drag **Event_2** to the new **Activate event** action.
29. Save the project file as *TV hide unhide.c3p*.

Now you can turn it of and on again.

Finish

Now you can “turn on” and “turn off” the television.

The Event map window should like this when you are finished.

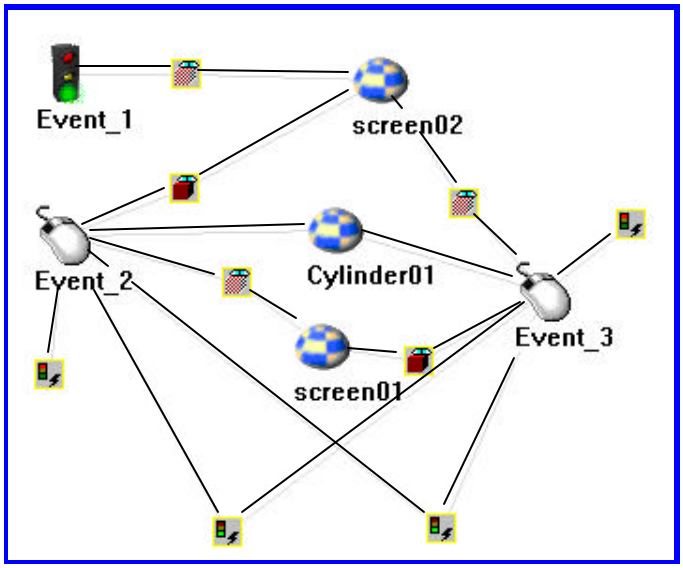


Figure 36: Hide and unhide

To try out all events and actions you made you can select the **Preview** window and press the **Play** button.

3.4.17 Set the background colour

Read

In this exercise you will change the background colour for the preview window.

You will continue to work with the designer file *tv.c3d* and the project file *TV hide unhide.c3p*.

Look

This is a description of the Events and Actions that you will use in the Exercise below.

Actions:

Set background colour

Sets the background to a new definable colour.

Exercise

Change the background colour.

Continue to work with the designer file *tv.c3d* and the project file *TV hide unhide.c3p*.

1. Drag a **Set background colour** action from the actions category **Render** to the **Event_1** ("**World start**") event.
2. Double click on the **Set background colour** action.
3. Select a colour.
4. Click the **OK** button.
5. Click the **Play** button in the **Preview** window.

You can also link it to another type of event.

6. Drag the **Set background colour** action from actions/render to the **Event_2** event.

7. Double click the **Set background colour** action.
8. Select a colour.
9. Click the **OK** button.
10. Click the **Play** button in the **Preview** window.

Finish

When you click the left mouse button in the Preview window the background should change to your selected colour.

The Event map window should like this when you are finished.

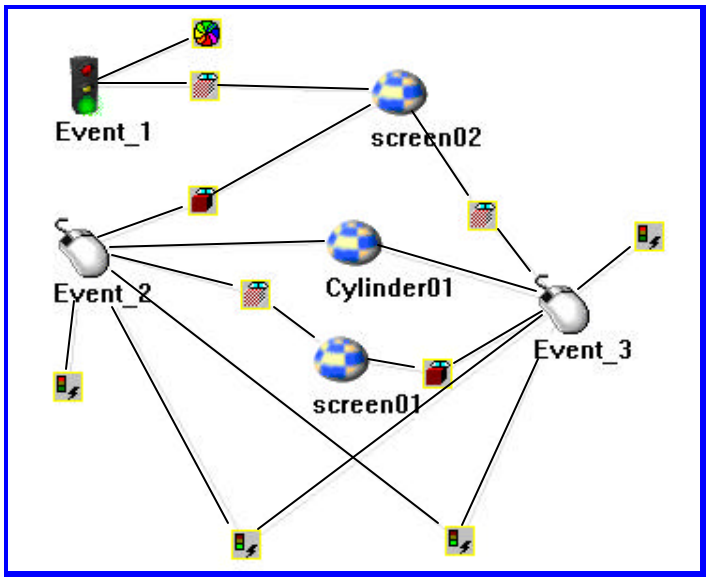


Figure 37: Set the background colour

To try out all events and actions you made you can select the **Preview** window and press the **Play** button.

3.4.18 Links in the Scene graph.

Read

When you create a link from one object to a second object and the second object has a movement or an animation attached to it the first object will automatically be affected by the movement /animation.

You will continue to work with the designer file *Link.c3d* and the project file *Link.c3p*.

Look

This is a description of the Events and Actions that you will use in the Exercise below.

Events:

Keyboard key press

This event occurs when the end-user presses the specified key on the object associated with the event. By double clicking the “Keyboard Button Pressed” event you can define which keys or sequences of keys that should trigger the event.

Actions:

Rotation xyz

You will find this Action under the category **Object motion** in the **Actions** window.

Rotates the selected object.

Exercise

In this exercise you will give three objects (the sun, the earth and the moon) different rotation. They will all rotate around their own pivot point. You will later change the links and observe how the objects affect each other.

The earth and the sun have their pivot point in the centre. The moon has its pivot point in the centre of the earth. You can control this by selecting the object you want to examine in the **Scene graph** window.

1. Open the file *link.c3d*.
2. Drag and drop a **Keyboard key press** to the **Event map** window.
3. Double click the **Keyboard key press** event and give it keyboard key nr 1.
4. Drag **Earth** from the **Scene graph** window to the **Event map** window.
5. Drag a **Rotation xyz** action to **Event_1**.
6. Drag the **Earth** to the **Rotation xyz** action.
7. Double click the **Rotation xyz** action.
8. Select **Show axis** in the **Preview** window. Now you can see the pivot point of the object.
9. Write 360 in the z-axis.
10. Click **loop** and **close**.
11. Drag and drop a new **Keyboard key press** to the **Event map** window.
12. Double click the **Keyboard key press** event **(Event_2)** and give it keyboard key nr 2.
13. Drag a **Rotation xyz** action to **Event_2**.
14. Drag the **Sun** to the **Rotation xyz** icon.
15. Select Camera02 in the **Scene graph** window. You can now see the **Sun** in the **Preview** window.

16. Double click the **Rotation xyz**.
17. Give the z-axis the value 360.
18. To make the sun rotate slowly you write the value 5000 in the **time** field next to **Z**.
19. Click **loop** and then close.
20. Test the rotation in the **Preview** window.
21. Click nr1 and the **Earth** will rotate around its own axis.
22. Click nr2 and the **Sun** will rotate around its own axis.
23. Stop the preview.
24. Drag a **Keyboard key press** event to the **Event map** window.
25. Drag a **Rotation xyz** action to the **Event_3**.
26. Drag the **moon** to the **Rotation xyz** action.
27. Double click on **Event_3** and give it the value nr3.
28. Double click the **Rotation xyz** and give the z-axis the value -360.
29. Write 2000 in the **Time** field for the z-axis.
30. Select **loop**.
31. Select the **Scene graph** window.
32. Drag Earth to the Sun. This will link the earth to the sun, which means that sun will not be affected by the rotation of the earth, but the earth will be affected by the rotation of the sun.
33. Test in the **Preview** window.
34. Click nr1 and the earth will start rotating round its own axis.
35. Click nr2 and the sun will start rotating round its own axis. The earth will now follow the rotation of the sun.
36. Return to the **Scene graph** window.
37. Drag the moon to the sun. The moon will now be linked to

the sun.

38. Test in the **Preview** window.
39. Click nr3 and the moon will start rotating round the earth.
40. Click nr1 and the earth will start rotating round its own axis
41. Click nr2 and the sun will start rotating round its own axis. The earth will follow the rotation of the sun and the moon will follow the rotation of the sun and at the same time keep its own rotation round the earth.

Finish

When pressing the key nr1, 2 and 3 more then once the objects will start to rotate faster, this because the rotation will accumulate. To prevent this you just deactivate the events with a deactivate event. (*see exerciser3.4.2 nr12*)

You should see the picture below in the Event map window.

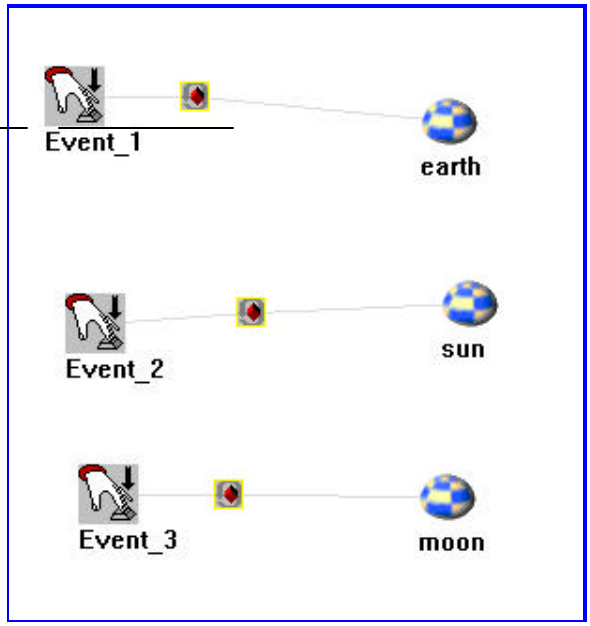


Figure 38: Links in the Scene graph

3.4.19 Change the pointer icon

Read

It is possible to select or create your own pointer icon in Cult3D. In order to create your own pointer icons you need a program, like Microangelo or similar.

Look

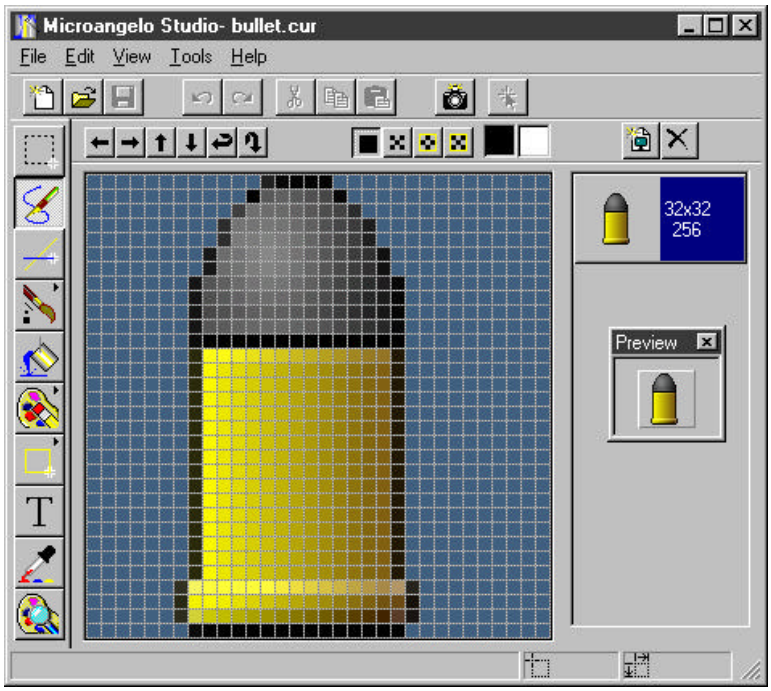


Figure 39: The icon program Microangelo

Actions:

Set mouse pointer

Sets the mouse pointer icon.

Exercise

In this exercise you will "load" the pointer icon of your choice. You will later on change the pointer icon.

1. Select **Cursor** in the **Window** menu.
2. Click the **Add** button. A dialog box will appear.
3. Click the **Add** button in the new dialog box.
4. Find and select the cursor icon of your choice and click the **add** button. You can select more than one if you want to.
5. When you are finished click the **Close** button.
6. Select the cursor of your selection.
7. Press the **Hot Spot** button.
8. Mark on a cell to define the new Hot Spot position.
9. Press close.

Now you will try the new pointer icon.

6. Select **Cursor** in the **Window** menu.
7. Click the **Edit** button.
8. Click the **Test drive** button.
9. Click the **Try it** button to see what it looks like.
10. Click the **Close** button when you are finished.

You will now change the pointer icon within the Cult3D object.

11. Drag and drop a **Set mouse pointer** action from the action category **Cursors/Sprites** to the desired event in the **Event map** window.
12. Click the right mouse button on the **Set mouse pointer** action in the **Event map** window and select **Parameters**.
13. Click on the desired pointer icon and then click **OK**.

14. Test the icon in the Preview window by using the event it is connected to.

Finish

You should see a picture that looks something like the one below in the Event map window.

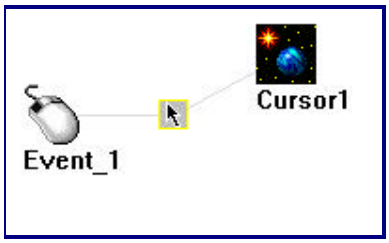


Figure 40:The Set mouse pointer action with an attached cursor.

You can try the new cursor in the preview window by pressing the Play button.

3.4.20 The particle system part 1: Periodic waveform

Read

The particle system can be used to obtain flare and rain effects. As always it is your own imagination that sets the limits for what you can achieve. However, it is perhaps advisable to get acquainted with this particular feature of the program before you let your creativity flow freely.

Look

This is a description of the Events and Actions that you will use in the Exercise below.

Events:

Left mouse click

You will find this Event on the left side of the Event map window.

This Event is triggered when you click the left mouse button.

Actions:

Translation XYZ

You will find this Action under the category **Object motion** in the **Actions** window.

Moves the selected object to a new position.

Rotation xyz

You will find this Action under the category **Object motion** in the **Actions** window.

Rotates the selected object.

Periodic waveform

You'll find this under translation and rotation under the category **Object motion** in the **Actions** window. The **Periodic waveform** controller generates different mathematically periodic waveform, sine for an example. Choose the periodic waveform in the menu, click on the **Set** button and the waveform generator window is shown.

Exercise

The purpose of this exercise is to explore the particle system. You will also use actions Translation and Rotation that you already are familiar with. Before you start please open the file *Match.c3d.*

1. Drag and drop a **Left mouse click** to the **Event map window**.
2. Drag **Match** from the **Scene graph** window to **Event_1**.
3. Drag a **Translation** action to **Event_1**.
4. Drag **Match** to the **Translation** action.
5. Double click the **Translation** icon.
6. Set the value for **X** to 126.
7. Select **Repeat count**, write 1 and then close.
8. Drag a **Rotation xyz** action to **Event_1**.
9. Drag **Match** to **Rotation xyz**.
10. Double click the **Rotation** icon.
11. Set the value for **Z** to –18.
12. Drag a new **Translation** action to **Event_1**.
13. Drag **Match** to the **Translation** action.
14. Double click the **Translation** icon.
15. Hold down the left mouse button on the V in the y-axis.
16. Select the periodic waveform.
17. Click on the **Set** button on the y-axis.
18. Write 500 in the **Time** field in the **Sustain** square.
19. Write –750 in the **Amplitude** field.
20. Unlock the period and the final period.
21. Write 500 in the **Period** field.
22. Write 10000 in the **Final period** field.
23. Select the **Absolute** checkbox.
24. Close the windows.

All actions will happen at the same time. You have to change this in order to accomplish a proper movement.

25. Click with the right mouse button on **Event_1**.
26. Select **Edit with time line view**.
27. Drag the third **Translation** to the point on the time line where the **Rotation** ends. You do this by dragging the white square at zero to the right.
28. Save as *Match.c3p*

Finish

You should see the picture below in the Event map window.

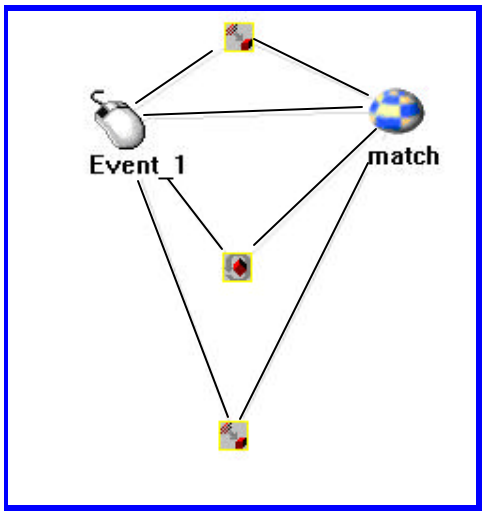


Figure 41: The particle system part I

To try out all events and actions you made you can go to the preview window and press the **Play** button.

3.4.21 The particle system part 2: A flame

Read

Here you will continue to explore the particle system. You will place particles on the Chamfer box and explore how they appear in the preview window. You should be able to see a flame.

Continue to work with the file *Match.c3p*.

Actions:

Start Particle

Starts the particle action

Exercise

In this exercise you will write the settings to accomplish a flame. You will also select

10. Click the right mouse button on the **ChamferBox02** under match in the **Scene graph** window.
11. Select **New** and **Particle system**.
12. Right click on the **Particle** and select **Details**. You will now write colour values to create a flame.
13. Select the first arrow to the left in the colour setting.
14. Write 0 on **Red Green and Blue**.
15. Select the second arrow to the left.
16. Write 255 on **Red Green and Blue**.
17. Select the third arrow to the left.
18. Write 255 on **Red and Green**. Write 0 for **Blue**.
19. Select the fourth arrow to the left.
20. Write 255 on **Red**.
21. Write 0 on **Green and blue**.
22. Select the last arrow to the left.
23. Write 0 on **Red Green and Blue**.

24. Press the **start test** button.
25. Write the value 10 in the **Particle size** square**.**
26. Write the value 80 in the **Emit speed** square.
27. Go to the **Action** window
28. Drag a **Start Particle emission** action from the category particle system to the **Event_1**.
29. Drag **Particle** from the **Scene graph** window to the **Start particle** icon.

    All actions will happen at the same time. You have to change this in order to accomplish a proper flame.

30. Click with the right mouse button on **Event_1**.
31. Drag the **Particle systems** so it starts a little after the **Translation** starts.

Finish

You should see the picture below in the Event map window.

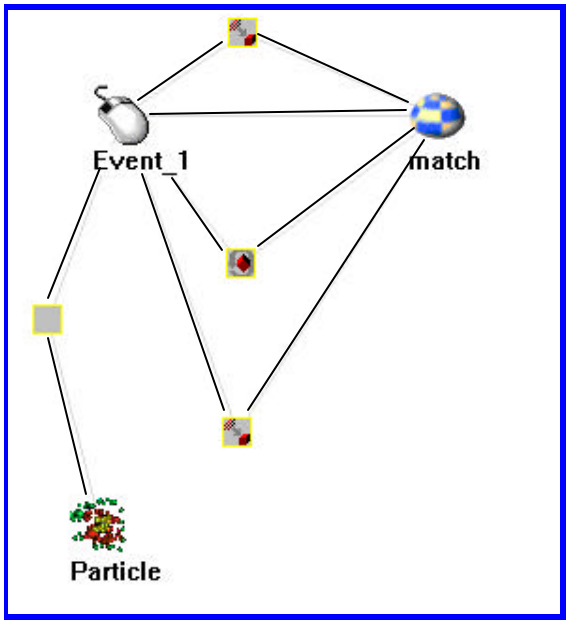


Figure 42: The particle system part II

To try out all events and actions you made you can go to the preview window and press the **Play** button.

3.4.22 Rotation look at

Read

The purpose of this exercise is to make an objects movement depend of the movement of another object.

Look

This is a description of the Events and Actions that you will use in the Exercise below.

Events:

World Start:
This event is triggered when the scene loads.

Actions:

Arcball

You will find this Action under the category **Object motion** in the **Actions** window.
Lets the end-user manipulate the object directly.
Left mouse click rotates the object
Right mouse click zooms in on the object
Right and **Left mouse click** moves the object.
Rotation is relative to the object's pivot point.

Exercise

Start **Cult3D Designer** and select **LOAD Cult3D Designer file** in the **File** menu**.**

1. Select the file **lookat.c3d** and click the **Open** button

   We will start making it possible rotating the head.

2. Drag a **World start** object to the **Event map** window.
   (It will be named Event_1).

3. Select **Arcball** (under **Object mo tion** in the **Actions** window).

4. Drag and drop an **Arcball** onto **Event_1 (World** start**)**.

5. Activate the **Scene graph** window.

6. Select **Quad Patch** (under **Objects**).

7. Drag the **Quad Patch** to the **Event map** window and drop it onto the action **Arcball**.

8. Double click the action **Arcball** in the **Event map** window. The window **Transform controller action details** will show. Select the value **Camera Frame** in the filed named **Frame**.

9. Click **Close**.

   Below we will make the eyes fixate on a given spot.

10. Select **Rotation look at** (under **Object motion** in the **Actions** window).

11. Drag and drop a **Rotation look at** onto **Event_1 (World** start**)**.

12. Click the right mouse button on **Rotation look at** in the **Event map window** and select parameters.

13. Select **sphere02** in the left table, click **Add** and then **OK**.

14. Double click **Rotation look at**. The window **Transform controller action details** will show.
    In the middle of the window there is a white square, which is used to decide the direction of the eyes (focus).
    Keep the window open and proceed with step 15-20.

15. Activate the **Scene graph** window.

16. Select **camera01** (under **Objects**).

17. Drag the target **camera01** to the white square in the **Transform controller action details** window. You can change camera angle when you want to (select another camera).

18. Click the radio button Z (Axis to keep aligned) and Inver sign.

19. Click the radio button Loop (to keep the motion going).

20. Click **Close**.

21. Drag and drop another **Rotation look at** onto **Event_1 (World** start**)**.

22. Click the right mouse button on the new **Rotation look at** in the **Event map window** and select parameters.

23. Select **sphere01** in the left table, click **Add** and then **OK**.

24. Double click the new **Rotation look at**. The window **Transform controller action details** will show. Keep the window open and proceed with step 25-30.

25. Activate the **Scene graph** window.

26. Select **camera01** (under **Objects**).

27. Drag the target **camera01** to the white square in the **Transform controller action details** window.

28. Click the radio button Z (Axis to keep aligned).

29. Click the radio button Loop.

30. Click **Close**.

31. Save the project file as look at.c3p.

Finish

We have now made it possible to move the head while the eyes are focused on a fixed point.
If the head is further away from the target the eyes will look more real.
The **Event map** window should like the picture below when you are finished.

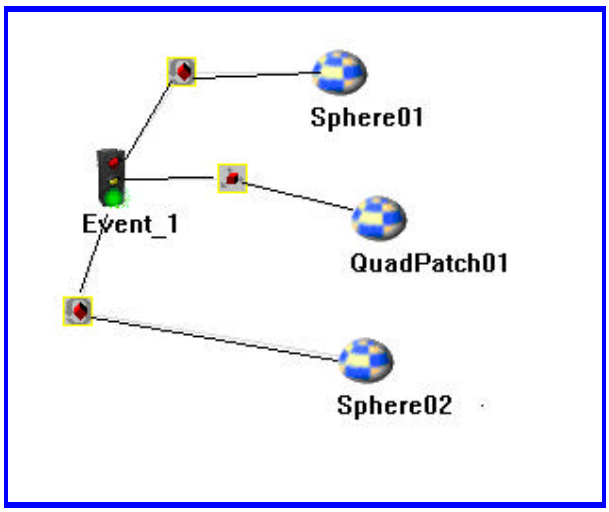


Figure 43: Rotation look at

Try out the Rotation look at by pressing play in the preview window.

Point at the Head, hold down the left mouse button and move the mouse. The eyes will look in the same direction regardless of the position of the head.

4 Presenting the final result

Now you have reached the stage when you are ready to present the result of your work.

4.1 Compression Settings in the Save Object Dialog

You have to consider compression in order to make your presentation file execute properly. Down below you can read about the compression possibilities when you save your work

4.1.1 The Object motion tab

Object level animation controls the compression levels for the animation matrices. "Object level" means that the animation in question is the matrix channel.

The matrix channel provides uniform rigid translations and orientations for each object in the scene.

Therefore, the first slider controls the compression level for the translation channel, while the second slider controls the compression level for the orientation channel.

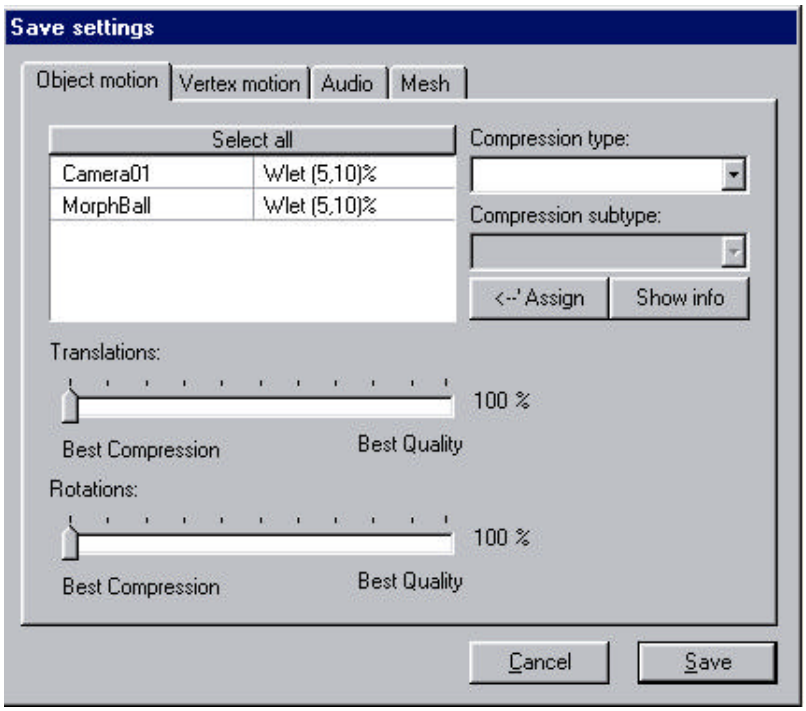


Figure 44: The object motion tab

4.1.2 The Vertex motion tab

Vertex level animation is a secondary animation channel. It controls the motions for each vertex in each object. At this level, each vertex is associated with its own motion path. Therefore, objects containing vertex level animations are usually much larger than those containing only plain object level animations.

This tab contains a check box called Optimise. If the optimise option is set, the Designer will try to export the minimum vertex level animation information required to run the current presentation. The Optimise option is particularly effective when the animations in the presentation are controlled by Animation "jump to" actions.

This option should not be selected when the Vertex Compression slider (just below the Optimise checkbox) is set to a value lower than 100%.

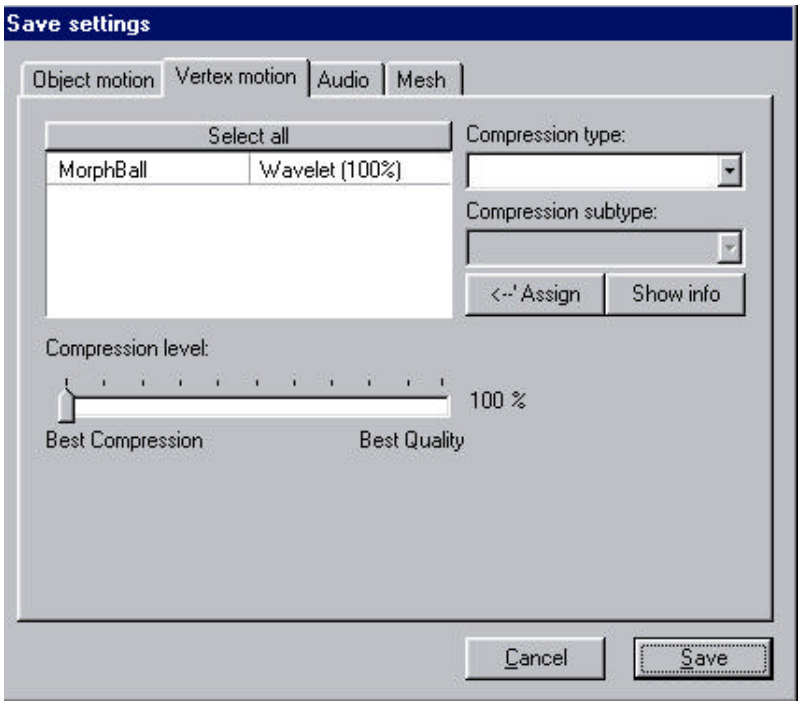


Figure 45: The vertex motion tab

4.1.3 The Audio tab

The slider controls the compression for the digital sound (WAVE files). MIDI files are not affected by this setting. The compression setting will not change the sample frequency or stereo/mono setting. So if the sample is a 44.1KHz stereo sample, then it will still be a 44.1KHz stereo sample after the compression. The samples will only get more and more distorted the higher the compression level, while the size of the sample will decrease.

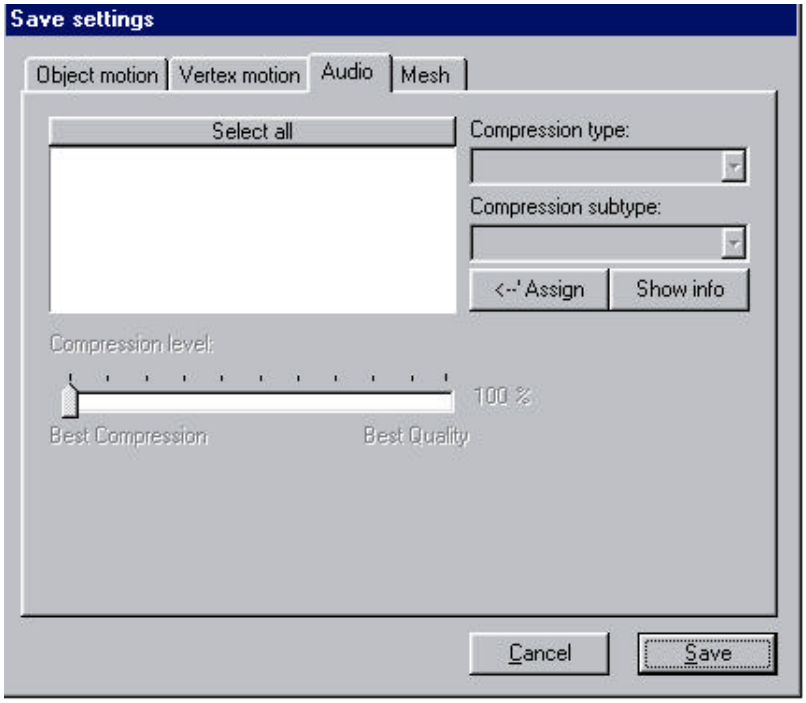


Figure 46: The audio tab

Types of Compression		
	Loss-less:	Lossy:
Sound	The data is stored as is. Sounds from *.wav files are compressed roughly 50%. MIDI data is not compressed	The sound data is compressed using for instance a wavelet algorithm. The object creator can set the fidelity of the compression.

4.1.4 The Mesh tab

The mesh compression tab contains a set of combo boxes. These are used to set the compression level for the meshes contained in the presentation. Since it is a geometric compression, it does not reduce the number of polygons in the mesh, only the geometric precision of the objects.

The mesh compression algorithm is not lossy in any other respect than that it can lose precision of the objects' geometry data.

Losing precision of the geometry can generate small visual artefacts on some objects when high compression is used. If that should occur, try using a lower compression for the mesh. However, the High setting works for the majority of objects.

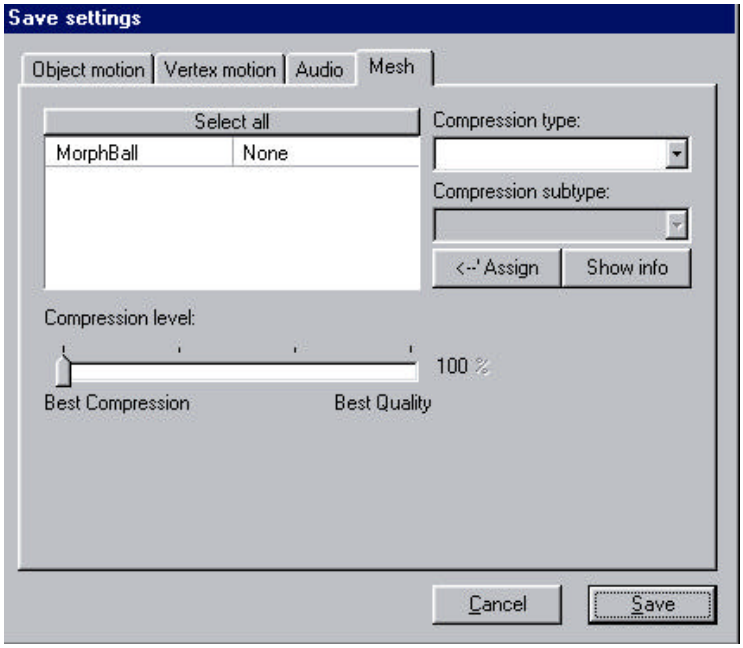


Figure 47: The mesh tab

4.2 The Internet

This will help you to get Cult3D objects placed on your site. There are some things you need to do in order to make Cult3D run smoothly on your website.

Add a new mime-type on your web server.
Adding the mime-type is necessary for any plug-in or file format that isn't standard or default for the server. It helps the server to execute the embedded cult3d section better. The mime-type for Cult3D is:

application/x-cult3d-object
and the default suffix is .co

Add some special Cult3D HTML code. The Cult3D HTML code needs some special attributes. A correct code should look like this:

```
<object classid="clsid:31B7EB4E-8B4B-11D1-A789-00A0CC6651A8"
width="400" height="300"
codebase="http://www.cult3d.com/download/
cult.cab">
<param name="SRC" value="file.co">
<embed pluginspage="http://www.cult3d.com/newuser/index.html"
src="file.co" width="400" height="300" color="000000"
type="application/x-cult3d-object"
bgcolor="000000"></embed></object>
```

Code explanation:
The **<object>** code is read by Internet explorer, and the **<embed>** code by Netscape. That is why you need to write things like the filename at two places.

4.2.1 General notes about Java in Cult3D

Every project that uses Java must have one (and only one) start up class. The start-up class must implement Cult3DScript and the method "public void Cult3dDestroy()".

The Cult3dDestroy() Java method is automatically called upon when the Cult3D object is exited as when closing the application that started the Cult3D object (Web browser, Acrobat, activeX enabled programs etc).

For the Java method to show up in the designer the Java method must be declared as public and return void and have a String as its only parameter, for example public void methodName(String s). The Java Startup class must contain a public constructor with no parameter.

To add Java to the Designer choose window->Java Action, click Add and choose the Java classes you will use in the project. In the "startup class" text field enter the Java startup class file, which implements Cult3DScript (Ex. ChangeTexture.class). NOTE: the .class must also be entered.

If you create a project with more than one Java class, it should prove wiser to let the startup class have instances of the subclasses and call the subclasses methods.

Example:

```
import com.cult3d.*;

public class StartupClass implements Cult3DScript
{
    private SubClass subclass = new SubClass();

    public StartupClass()
    {
    }

    public void cultMethod(String s)
    {
        subclass.doThing();
    }

    public void cult3dDestroy()
```

```
        {
        }
}
```

Change Texture
This example class shows how to change textures on Cult3D objects. To begin with you have to know the name of the texture you want to change. You can see the texture name when exporting models in 3D Studio Max. You must also load the images you want to change to as resources.

Choose Window->Resources in Cult3D Designer.

EXAMPLE CODE

```
import com.cult3d.*;
import com.cult3d.world.*;

import java.awt.*;
import java.util.*;

public class ChangeTexture implements Cult3DScript
{
        private static final int MAX_DISPLAYS = 10;

        // Name of texture from 3D Studio Max
        private String texName = "texture_name";

        private Hashtable       hash = new Hashtable();
        private Texture     tex;

    private int counter = 0;

        public ChangeTexture()
        {
        }

        // the method which will be called from Cult3D Designer
        public void change(String s)
        {
                if (counter == 0)
                {
                        setTexture("texture1.jpg");
                        counter++;
                }
```

```
            else if (counter == 1)
            {
                setTexture("texture2.jpg");
                counter++;
            }
            else if (counter == 2)
            {
                setTexture("texture3.gif");
                counter=0;
            }
        }

        private void setTexture(String imgName)
        {
            TexureImage img = (TextureImage)hash.get(imgName);

            if (img == null)
            {
                // warning: can lock the cultobject until loaded.
                // Experienced Java programmer can use a  thread to load
                // the texture.
                img = (TextureImage)Cult.getImage(imgName);
                hash.put(imgName, img);
            }

// Warning: can lock the cult object until loaded.
            // Experienced Java programmer can use a thread to load
            //the texture.
            if (tex == null)
            {
                tex = new Texture(texName);
            }

            tex.setTexture(img);
        }

        public void cult3dDestroy()
        {
        }
}
```

Change Colour

Changing the colour of a Cult3D object.

The Java method setDiffuseColor() takes an RGB value as its parameters. The RGB values are between 0..1

If you want colour black use (1, 1, 1) and so on.

To convert from colour range 0..255 to 0..1 divide the 255 with your desired 255-value.

Example: To get the colour grey which is 127,127,127 converted to 0..1 range divide 255 with 127 for all three parameters.

EXAMPLE CODE

```
import com.cult3d.*;
import com.cult3d.world.*;

public class ChangeColor implements Cult3DScript
{
   private CultObject pen         = new CultObject("Cylinder02");
      private Material   penMaterial = new Material(true);

      public ChangeColor()
      {
      }

      public void changeToYellow(String s)
      {
      penMaterial.setDiffuseColor(1, 1, 0);
      pen.setMaterialAt(0, penMaterial, false, false);
      }

      public void cult3Destroy()
      {
      }
}
```

5 Practice your skills

Practice 1: Steer an object

Use the designer file *shark.c3d*

In this practice you will use the object Line01 and the proper events and actions to steer the shark at the same time as it swims forward. The Shark object is pre-animated in 3D Studio Max in order to make a realistic fin movement.

The final result should look something like *shark.co*

Practice 2: Make a camera lens retract

Use the designer file *crowncamera.c3d*

You will make the lens go in to the camera. After that the hatch should close. Some parts are pre-animated between 0 and 30 in order to make the "accordion" retract.

Following parts are pre-animated:

Accordion
Big Metal Square
Front lentil
Lens
Back lentil
Trigger

Practice 3: Fly an airplane

Use the designer file *Sopwith3.c3d*

You will make the propeller spin. The plane should be able to fly and be controlled by the user. You will also add sound to the airplane. The sound should vary depending on if the plane is stationed on the ground or is flying in the air. Use particles to create smoke when the plane is flying.

Appendix 1: Events and Actions

Events:

World Start:
This event is triggered when the scene loads.

World Stop:
Occurs when you quit the scene, i.e., load another scene.

World Step:
Gets triggered every time that the scene gets rendered, which normally happens about 15 or 30 times per second. All this depends on the user computer and the scene and object running. If for instance the object is small and uses very few polygons, then this event can get triggered up to 200 times per second. This event is useful to call Java actions, which have real time constraints or things that should continuously happen.

Timer:
This event is triggered after an author definable duration. By double-clicking the timer icon you can change the delay. The delay time is dependent on the speed of the processor.

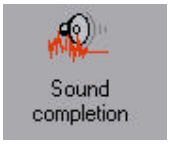
(Left, Middle, Right) Mouse click on object:
The end-user presses the specified mouse button on the object associated with this event. By selecting the left, middle or right event type you can choose to trigger on the left, middle or right mouse button.

Normally, Windows users have a two-button mouse (left and right), while Macintosh users use a one-button mouse (left). Macintosh users can use the control key to simulate the right mouse button.

Keyboard's key press:
This event occurs when the end-user presses the specified key on the object associated with the event. By double clicking the "Keyboard Button Pressed" event you can define which keys or sequences of keys that should trigger the event.

Keyboard's key release:
Works like the "Keyboard's key press" event, but activates only when the end-user has released the key specified. By double clicking the "Keyboard's key Release" event you can define which keys or sequences of keys that should trigger the event.

Object Motion Completion:
An object motion action has been completed.



Sound Completion:
A sound action has been completed.

Manual:
The only time this event is triggered is when another event triggers it.

Actions:

The Object motions category

Reset:
Resets translation and rotation values of the object to initial values. Very useful if you have been fiddling with the object for a while and want to get back to initial conditions.

Rotation LookAt:
This action enables a node to "look at" another node. Which means that the object or camera is always aimed at the target object, no matter where the target object is. Choose X, Y, or Z-axis to "look" with.

Rotation XYZ:
Rotates the selected object.

Translation XYZ:
Moves the selected object to a new position. With the sliders, you select a new position for the object, or you can type the new x, y, and z values directly into the provided fields. The Performance duration field lets you set the duration of the

translation in milliseconds (ms). (For example, to make a move take 5 seconds, set the Performance duration to 5000.) If Loop is checked, then the translation is repeated.

 ***Animation play:***
Plays the Matrix animation (rotation and translation) that you have created in 3D Studio MAX.

 ***Animation jump to:***
Plays the Matrix animation (rotation and translation). Jumps to a desired position in the animation. When setting the Transition Time to be greater than 0, the object will morph between the current position and the new position during the specified time.

 ***stop:***
Stops the playing and movements of the selected object.

 ***Arcball:***
Lets the end-user manipulate the object directly.
"Left mouse click" rotates the object
Right mouse click zooms in on the object
Right and "Left mouse click" you can move the object
Rotation is relative to the object's pivot point.

Vertex-level animation

 ***Vertex animation play***
Plays the Vertex animation (individual vertex translations and morph) that you have created in 3D Studio MAX.

 ***Vertex animation "jump to"***
Plays the Vertex animation (individual vertex translations and morph) that you have created in 3D Studio MAX. When setting the Transition Time to be greater than 0, the object will morph between the current position and the new position during the specified time.

The Camera category

 ***Select Camera:***
Selects a camera for the scene.

 ***Stereoscopic features:***
Selects a camera for the scene but with the option to add stereoscopic rendering from the selected camera

The Sound category

 ***System Beep:***
Plays a system beep.

 ***Play Sound:***
Plays a sound as defined by a sound resource (sample, MIDI, wav.) To select a sound resource, use the menu window and then Sounds.

Tip: Under Windows, it is currently only possible to play one sound and one MIDI song at the same time. (Unless you have more than one sound board, properly installed and configured in an MCI compatible way. Since MIDI tracks are also played using MCI, they are subjected to all the above restrictions.)

 ***Stop Sound:***
Stops the playing of the selected sound resource.

The Connection category

 ***Load URL:***
Double-click the load URL icon to enter destination and target. The URL specifies what to load and target field (optional) allows you to specify what frame to load the URL into. You would enter "http://www.Cult3D.com" in the URL field and "main" in the target field. If you want the same effect as when activating the HTML link: <A TARGET="main" HREF="http://www.Cult3D.com">

 ***Load Cult3D File:***
Double click the action icon to enter the destination where you can load an Internet file *.co file.

 ***Send message to host:***
This action is used for sending a text message; for instance, the message can be seen using JavaScript. If you want your JavaScript programmed into an HTML page to get information from a Cult3D object, then this is the action to do it with.

The Event category

 ***Trigger Event:***

The Trigger Event action lets you trigger any event at any time. For example, if you trigger a Timer Event, it is as if you suddenly forced that events clock to the ending value, thus causing any actions which the Timer Event is associated with to run immediately. Events of type Manual can only be triggered by a Trigger Event action.

 ***Reset Event:***

Events can only be triggered when they are in the reset state. All events start out reset, but once triggered they must be reset before they can be triggered again. You can either do an explicit reset with a Reset Event action, or you can set it to automatically reset after it triggers by checking the Automatic Reset option in the event popup menu in the "Event map" (right-click the event to show it).

 **Activate Event:**

Events can be either active or inactive. An inactive event cannot be triggered until it has been activated by an "Activate event" action. If "Initial activation" is checked, then the event is active. If it is not checked, then you need to activate the event before it can be triggered.

Example: Create a Timer Event with a duration of 60000ms (1 minute). To have the Timer Event trigger a System Beep action. Use the popup menu in the "Event map" to make the event inactive by default. Then bind an "Activate event" action to the left click of some object and have it activate the Timer Event. When the end-user left clicks the object, the "Activate event" will activate the Timer Event. One minute later the Timer Event will trigger the System Beep action and the user will hear a beep.

 ***Deactivate event:***

This action deactivates an event, which allows you to disable other events. (See the example under "Activate event" for a discussion of how to use the activation state of an event).

 ***Toggle Event Activation:***

Toggles the activation state of an event. If the event is already active, the Toggle Event Activation action deactivates it. If the event is not active, it gets activated.

 ***Swap to event:***

Swaps between event actions.

The Render category

 ***Set Background Colour:***

Sets the background to a new definable colour.

 ***Hide Object:***

Hides the connected object from the viewer.

 ***Unhide Object:***
If the object was hidden, the object becomes visible.

 ***Bilinear Filter:***
Gives all textures in the scene bilinear textures filter

The Expression category

 **Execute Expression:**
The Execute Expression action is used to execute the attached expression. Dragging an expression from the Expression window, to the ”Event map” accesses expressions. The icon represents the Execute Expression action itself.

 **Conditional Test:**
You connect other actions on either the True or False side of the Conditional Test action. You then use the Conditional Test action dialog to specify the details of the test.

The action needs a property to test. To point the action to a property:

1. Drag the property from the Object Property window for the object that owns the property to be tested and drop it on the Conditional Test icon ().

2. In the dialog you can specify the exact condition to test and any comparison values needed.

3. It is even possible to compare two different object properties. Simply drag the specific object property from the Object Properties window and release it in the Compare with “Edit Box”.

Cursors/sprites

 ***Set mouse pointer:***
Under the Window menu, you have a resource window called “Cursors”. In that dialogue box, you can add your own mouse pointers/cursors. You can also edit them to set your hotspot on them.

You can also test-drive them, and see them in different resolutions and colors, to get a better understanding on how the custom cursor may look for the user that is viewing your object.

If you do not attach a Cursor resource to this action, Cult3D will reset the cursor to the default ones.

Particle system

 **Start particle emission:**
Starts the emission of particles.

 **Stop particle emission:**
Stops the emission of particles.

Table of figures

Index