QD3DViewer 3.0

Reference Manual

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QD3DViewer for REALbasic is a product of Essence Software
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QD3DViewer 3.0

QD3DViewer 3.0 is the latest revision of Essence Software's powerful REALbasic control that allows developers to use the QuickDraw 3D Viewer component in their applications. Version 3.0 adds a new level of control over the functionality of the viewer that has never been seen before!

QD3DViewer can be used to render and interact with 3DMF geometric data in a REALbasic application. The 3DMF data can either be read in from a file, passed in raw as a REALbasic String, or created using native calls to QuickDraw 3D and passed in as a native QuickDraw 3D Group.

The QD3DViewer control allows users to manipulate the geometry by moving, rotating and scaling it. Pictures of the geometry in various states can be retrieved programmatically, or the user can drag a picture clipping of the current view out to the desktop.

New to Version 3.0 is the ability to programatically control the camera and renderers, allowing the developer complete control over the QD3D view through code. Editable parameters include:

- Camera Position, Orientation and Point Of Interest
- Renderer Shading Mode (Gouraud/Phong)
- Lighting Mode (On/Off)
- ZBuffering (On/Off)
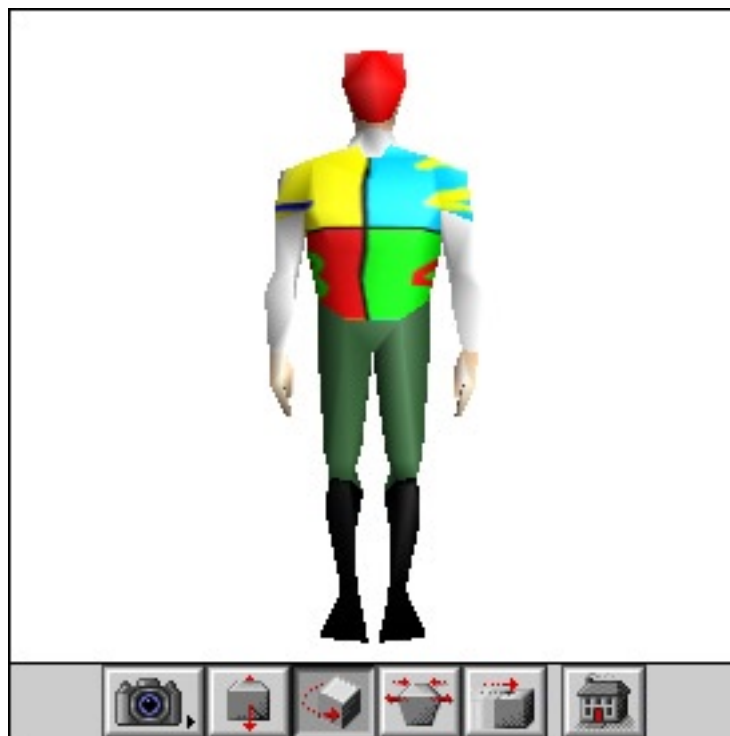- Renderer (Wireframe/Interactive/Other)

Fig 1. A screenshot of the QD3DViewer control in use

QD3DViewer Control

The QD3DViewer control is the central part of the QD3DViewer plugin. It provides the interface through which users may manipulate the 3D data you wish to display. It provides control over the cameras and mouse behaviour (rotation, translation, scaling.) These controls can be enabled or disabled through the Properties palette in the REALbasic IDE.

The QD3DViewer control also acts as the conduit through which users may drag snapshots of the current view out to the desktop or to other applications as a picture. This behaviour is also controllable through the Properties palette in REALbasic.

The QD3DViewer control can accept data from various sources:

- 3DMF files in either Binary or Text format
- 3DMF data in an internal REALbasic String buffer
- Native QD3D geometry stored in a QD3D group

The native QD3D geometry can be generated by making direct calls to the QuickDraw 3D™ libraries using Declare statements in REALbasic. See the example project "Native Geometry" for an example of how this works.

3DMF geometry can be loaded by first retrieving a FolderItem that points to the file you want to load, then passing this FolderItem to the QD3DViewer control's LoadFile method:

```
Sub LoadMyModel()
        Dim f as FolderItem

        f = GetOpenFolderItem("3DMF")

        if f <> nil then
                QD3DViewer1.LoadFile f
        end if
End Sub
```

Note!

The "3DMF" argument to GetOpenFolderItem assumes that you have added a File Type called "3DMF" to your REALbasic project through the REALbasic File Types dialog. This code also assumes that it resides within a window that has a QD3DViewer control named "QD3DViewer1" placed in it. The name "QD3DViewer1" can be substituted for whichever name you wish.

QD3DViewer 3.0

Properties

ShowController as Boolean

> The ShowController property can be used to control whether the QD3DViewer controller bar is made visible at runtime. The controller bar lets the user control how the mouse should manipulate the 3D view - rotate the view, translate the view, etc.

ShowBadge as Boolean

> The ShowBadge property controls the display of a small badge which appears in the bottom-right of the viewer. This badge is a recognised symbol which denotes that the view is interactive.

ShowFrame as Boolean

> The ShowFrame property controls the display of a black frame surrounding the QD3DViewer control.

CameraButton as Boolean

> The CameraButton property controls the display of a button on the Controller Bar that allows the user to switch between a selection of pre-defined camera positions.

TruckButton as Boolean

> The TruckButton property controls the display of a button on the Controller Bar that allows the user to set the mouse to move the object forwards or backwards when interacting with the 3D view.

OrbitButton as Boolean

> The OrbitButton property controls the display of a button on the Controller Bar that allows the user to set the mouse to spin the view around object when interacting with the 3D view.

ZoomButton as Boolean

> The ZoomButton property controls the display of a button on the Controller Bar that allows the user to the mouse to zoom the view in or out when interacting with the 3D view.

DollyButton as Boolean

The DollyButton property controls the display of a button in the Controller Bar which allows the user to move the 3D geometry around within the 3D view space of the QD3DViewer control.

ResetButton as Boolean

The ResetButton property controls the display of a button in the Controller Bar that allows the user to reset the 3D view back to the default view for the model.

CurrentButton as Integer

The CurrentButton property controls the currently selected button. This can be used to select the method of interaction to be used whilst the controller bar is hidden, as the user would be unable to specify the method of interaction.

Camera as Q3Camera

The Camera property returns a Q3Camera object which can be used to get information about the current 3D view, or to control it by moving or re-orientating the camera. This property is not visible in the Properties palette in REALbasic and can only be accessed in code. See the Q3Camera section for a description of the Q3Camera class.

Q3Group as Integer

The Q3Group property is a reference to a native TQ3GroupObject which contains the geometry to be rendered by the QD3DViewer control. This group may be retrieved to analyse the contents of the geometry, or may be set to have the QD3DViewer control render geometry created by calls made to the native QuickDraw 3D™ libraries through REALbasic Declare statements.

This TQ3GroupObject reference may only be manipulated using native QuickDraw 3D™ toolbox calls. Examine the "Native Geometry" example project to see how this works.

Renderer as Q3Renderer

The Renderer property is a reference to the QD3D Renderer used to draw the renderer the geometry assigned to the viewer control. A list of the available renderers can be retrieved using the GetQ3RendererList() function. Renderers from this list can be assigned to the this Renderer property, and the viewer will proceed to render all geometry using the new renderer.

Illumination as Integer

  The Illumination property is used to control the algorithm used to shade the geometry with respect to the lighting. There are three valid values for the Illumination property:

  0 - NULL Illumination
   Flat shading with no respect to the light source

  1 - Lambert shading
   Basic smooth shading algorithm

  2 - Phong shading
   Complex shading algorith, with support for highlights

Backfacing as Integer

  The Backfacing property is used to control the way in which the viewer handles polygons which are facing away from the camera. The Backfacing property can used to tell the viewer to skip the rendering of an geometry that is facing away from the camera, or draw in one of two modes. There are 3 valid values for the Backfacing property:

  0 - Draw

   This value will tell the viewer to draw any geometry regardless of the direction in which it is facing. The geometry facing away from the viewer will likely be darkly shaded as the surface normals of the geometry will be facing away from the camera.

  1 - Remove

   This value will cause any geometry facing away from the camera to be culled (not rendered.)

  2 - Flip

   This value will tell the viewer to draw any geometry regardless of the direction in which it is facing. However, the Flip value will also tell the viewer to invert the surface normals of the geometry so that it is regarding more brightly.

Interpolation as Integer

  The Interpolation property is used to control the way in which the renderers draw surfaces. If the interpolation is set to None, then the renderer will draw all the polygons as flat

surfaces. If the interpolation is set to something other than None, the renderer will draw a smooth surface interpolated from the geometry. There are 3 valid values for the Interpolation property:

0   -   None - Don't interpolate the faces
1   -   Vertex - Interpolate the faces on a per-vertex basis
2   -   Pixel - Interpolate the faces on a per-pixel basis

FillStyle as Integer

The FillStyle property controls the way in which the geometry is rendered - either as solid faces, outlines or as a point cloud. There are 2 valid values for the FillStyle property:

0   -   Filled - Draw the geometry as solid, filled faces
1   -   Edges - Draw the edges of the geometry
2   -   Points - Draw points at the vertices of the geometry

Methods

LoadFile(f as FolderItem)

The LoadFile function tells the renderer to load the 3D geometry from the file specified in that FolderItem that you pass in as f. The file will be opened, the geometry read in, then the file will be closed. This geometry will remain the current geometry until the view is either disposed of or the geometry it changed using another function of the viewer of the Q3Group property. The file must contain data in 3DMF format.

LoadData(data as String)

The LoadData functions tells the renderer to load the 3D geometry from the string supplied. This string can contain 3DMF geometry that you have generated yourself or have loaded in manually from another source.

Undo()

The Undo function tells the renderer to reverse whatever the last action of the user was.

GrabPicture() as Picture

The GrabPicture function returns a snapshot of the current view being drawn by the viewer in a REALbasic Picture object. This Picture object may be manipulated in whichever manner you desire, or saved out to a file.

GetCameraCount() as Integer

GetCameraCount returns the number of default camera configurations available to the viewer.

UseCamera(*index* as Integer)

The UseCamera method allows the developer to specify which of the default camera configurations should be used to view the current geometry. The valid values for *index* are:

1 - Default Camera (model-specific)
2 - Fit to View
3 - Front Camera
4 - Back Camera
5 - Left Camera
6 - Right Camera
7 - Top Camera
8 - Bottom Camera

Q3Camera Class

The Q3Camera class allows the developer programmatic control over the camera used to render the geometry show in the QD3DViewer control. Aspects of the camera such as its location, orientation and point of interest can be controlled using this class. The camera for a QD3DViewer control can be retrieved through the control's Camera property.

All of these properties are both readable and writable.

Properties

Position as Q3Point3D

The Position property controls the position in 3D space of the camera. The property contains an object of type Q3Point3D, which has the properties X, Y and Z which relate to the X, Y and Z components of the camera's position in 3D space.

UpVector as Q3Vector3D

The UpVector property is used to specify (or retrieve) the direction in global 3D space which the camera considers to be 'up.' Typically, this a vector (0,1,0) which has the upward direction of the camera pointing exactly along Y axis. The property contains an object of type Q3Vector3D, which has the properties X, Y and Z which relate to the X, Y and Z components of the camera's upwards direction vector.

PointOfInterest as Q3Point3D

The PointOfInterest property specifies which point in 3D space the camera is pointing towards. The property contains on object of type Q3Point3D, which has the properties X, Y and Z which relate to the X, Y and Z components of the point that the camera will point towards.

Q3Renderer Class / Q3RendererList Class

The Q3Renderer class is used to represent the renderer that will be used to renderer the geometry associated with the QD3DViewer control. A list of the installed QuickDraw™ 3D renderers can be retrieved using the GetQ3RendererList() method, which returns a Q3RendererList object. The Q3RendererList can be interrogated to retrieve Q3Renderer objects for each renderer. The Q3Renderer supplies the name of the renderer, and a function that lets you present the renderer's configuration dialog.

Q3Renderer Properties

Name as String

Returns the name of the Renderer

HasConfigurationDialog as Boolean

Returns true if the Renderer supports a configuration dialog, false if it doesn't.

ConfigurationData as String

This property can be used to save and restore specific configuration information for the current renderer. This information can be used to re-instate the current viewer state at a later time.

Q3Renderer Methods

ShowConfigureDialog()

If the Renderer supports a configuration dialog, this methods will tell the renderer to present it. This dialog can be used to customise some of the more specific rendering parameters associated with the renderer.

Q3RendererList Properties

Count as Integer

Returns the number of installed renderers

Renderer(index as Integer) as Q3Renderer

Returns the Q3Renderer object at the specific index. This Q3Renderer object can be used to configure the QD3DViewer control.

Addendum

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