

RealiMation Display Driver Notes

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Introduction

RealiMation is 'renderer independent', i.e. it is not built upon one particular display technology such as OpenGL. It has been designed so that different 3D display mechanisms can be used, and, given underlying operating system support, that these renderers can even be dynamically swapped at run time.

There are several reasons we decided to take this approach:

1. Portability - One particular rendering technology may not be available on all the different combinations of CPU type and operating system that our customers want to use with RealiMation.
2. User choice - This is actually very important. Different 3D display technologies have different rendering 'artifacts', normally determined by the tradeoffs that each technology decided to make when being developed. For example, one renderer might decide to sacrifice quality of display for speed. Since every user has a different set of requirements, we decided not to limit our users to one particular set of rendering tradeoffs. The user can decide what rendering artifacts are acceptable in their particular application.
3. Future Proof - There are new 3D display technologies being announced all the time. By not being tied to any one renderer, RealiMation can expand its capabilities in line with new developments.

This document gives further details on the currently available display drivers, including some of the pros and cons. There is also information on how to work around certain problems caused by 3D hardware accelerators.

Criterion Renderware Driver

Available under DOS, Windows 95, and Windows NT (both Intel and DEC Alpha), Renderware is a very fast software rendering library. RealiMation tends to use this as the default renderer, because it is both fast and runs on just about all platforms.

Some of the disadvantages of this driver are:

- Currently only uses a 16 bit z-buffer, so some hidden surface problems can manifest themselves in some scenes. You can alleviate this in the STE by moving your front and back clip planes so that they surround you scene as tightly as possible.
- Only supports 256 and 65535 colour displays (i.e. 8 and 16 bits per pixel).
- Transparency is achieved by pixel dithering, rather than by blending. This, while fast, does not produce the best quality image.
- Does not support advanced texturing features such as filtering and mip mapping.

Important Notice: Developers cannot redistribute the Renderware runtime without entering into a separate licensing agreement with Criterion Software. Contact information is:

Criterion Software
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Buryfields
Guildford
Surrey GU2 5AZ
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OpenGL Driver

Available only on Windows platforms that support OpenGL. This includes all processor versions of Windows NT 3.5 and upwards. OpenGL also now ships with the latest versions of Windows 95. If OpenGL is not on your system, then the RealMation installation will automatically add the Windows 95 OpenGL runtime components.

OpenGL gives very high quality results. For example, transparency is done by true pixel blending, and so looks very good.

The price of this is performance. Textures are not handled very well at all - and in fact without hardware acceleration the presence of textures in your scenes can make display with OpenGL at least 10 times slower than Renderware. The RealMation OpenGL implementation does support the new OpenGL 1.1 texture object extensions, and this can help texture performance considerably when used with a hardware accelerator, for example the GLINT and Permedia chipsets from 3DLabs, and the R3D-100 chipset from Real3D.

There are a number of GLINT based OpenGL accelerator cards commercially available. Using one of these under Windows NT can make for very fast displays at large view sizes.

RealMation's implementation of OpenGL supports all pixel depths and resolutions.

Intel 3DR

Support for Intel 3DR has been removed with this release.

Null Driver

The null driver is a special display driver that does not produce any output! Its purpose is to do everything except draw polygons. It can be used to optimise the geometry processing overhead of a scene.

This driver is only of interest to a minority of users, and is not installed by default, unless you have the full developer version of RealMation.

Microsoft Direct 3D

Direct3D is a new rendering API from Microsoft designed for use under Windows 95. To use Direct3D, RealMation assumes that you have installed the D3D runtimes first. If you have not done this, you can find the Direct setup program on the RealMation CD under the DirectX directory.

The most recent release of Windows 95 comes with Direct3D installed, so you will not have to do anything further after installation. We recommend that you try the Direct3D driver with RealMation first - if it fails, then install DirectX from the RealMation CD.

3Dfx Obsidian Pro

This card is a very fast graphics card that works in addition to your 2D Windows 95/NT accelerator. It works best with a second monitor. The driver for this card should work with any 3Dfx-based products, e.g. Orchid's Righteous 3D, Diamond's Monster3D.

Note that you can only use the 3Dfx chipset from RealView (including Internet plugin), and from the VSG Developer Edition of the STE. It will not be available from the Professional edition of the STE.

RealMation will install the current versions of the 3Dfx hardware drivers for both Windows 95 and Windows NT. During installation, however, if existing 3Dfx drivers are found, they are copied into a Safe directory under the RealMation Glide subdirectory. If you find existing 3Dfx applications do

not work after installing RealMation, you can restore the original 3Dfx drivers from this safe directory. Please let Datapath know if this happens - we have not yet come across such a situation, but we guard against it just in case.

3DLabs Glint

If you have a 3DLabs GLINT based accelerator, you can use this with the OpenGL driver, in which case it will work within a window as normal. You can, however, also driver the chip direct to a second monitor, in which case you will need an ordinary graphics accelerator to handle the Windows desktop.

By driving the chip directly, you can get much higher performance out of the GLINT chipset than by going through OpenGL.

Rendition Verite Driver

This driver directly drives the chip as an external non-Windows frame buffer. It can be used as a 'slave' window from the VSG Developer edition of the STE. One of a new generation of cheap high performance 3D rendering chips, it provides high quality texturing modes (bilinear filtering and trilinear mip mapping, for example) with fast rendering speeds.

Other Drivers

There are various other drivers in development, and which will be available in the near future.

Other platforms that may be of interest to you are Silicon Graphics and Apple PowerMac. If you have any requests for particular drivers, or wish to develop your own, then please contact Datapath Ltd directly. See the README file for contact information.

Display Problems with Hardware Accelerator Cards

The RealMation STE supports multiple views, and uses small 3D "preview" windows to show materials, textures, shapes etc within dialogs.

We have found, however, that most 3D accelerator chips only seem to handle a single 3D view properly. For example, if you have a OpenGL accelerator, you will quite reasonably want to select OpenGL as the default driver for RealMation STE to use. Unfortunately, the STE uses the default driver (as set using the Customise | Display Driver menu) for the preview windows and texture editors aswell. This problem can also affect Direct3D accelerator chips.

If you are having problems with preview windows, you can edit the Registry to tell the RealMation STE to use another display driver for the preview windows. In most cases, you will want to use the software RenderWare driver to do all the previews, since this always works correctly for multiple views.

For information on how to work around this, see the RealMation STE help file, search for "Registry".

Texture Loading

The underlying RealMation API (Application Programming Interface) has the ability to load textures into memory either on demand (i.e. when a polygon using that texture comes into view), or by loading all at once when the view is first displayed on screen.

The advantage of loading on demand is that a scene with many textures will be first displayed much quicker than if it has to go off and load all textures first. The disadvantage is that when you start to interact with a scene (or start a flythrough), you may get a visible pause when a new texture is loaded.

By default, the STE loads textures on demand. You can override this by editing the Registry (see

the RealiMation STE help file, search for "Registry").

True Colour Displays

The different RealiMation display drivers (RenderWare, OpenGL, Intel 3DR), deal with different Windows display resolutions differently. More details on the characteristics of the different display drivers are to be found in the "Display Drivers Readme" file that is installed whenever you install RealiMation.

Users should be aware that RenderWare is only designed to work with 8 and 16 bit per pixel displays, giving 256 and 65,535 colours respectively. 8 bit is best for speed, whereas 16 bit is better quality, yet is still very fast. You should not have your Windows display mode set to a True Colour mode (24 or 32 bit) if you intend to use RenderWare drivers. Your graphics will be very slow.

OpenGL generally supports all colour resolutions. You do, however, suffer a performance hit using True Colour displays. It is advised to keep your Windows display mode to 16 bits per pixel or less. Some hardware accelerated OpenGL drivers work best at 12 bits per pixel, which works well, but has the disadvantage that the RenderWare driver will behave badly if used (wrong colours, slow etc.).