D3D9Client documentation

Installation

You need a DirectX February 2010 or newer to run D3D9Client. To install the client itself you need to extract the zip package in the root folder of the Orbiter. In order to use a graphics client you need to run "Orbiter_ng.exe" instead of "Orbiter.exe". Also the client must be activated from the Modules tab.

DirectX Runtimes

If the redistributable package isn't installed in your computer you will receive an error message "The program can't start because d3dx9_42.dll is missing from your computer". Or you may see a pop-up window in Orbiter LaunchPad telling about a missing runtimes. If that happens then download and extract the content of the package in any empty directory you want and then find a Setup.exe and run it. You can delete the contents of the directory after the setup is completed. The directory is just a temporary storage for the installation files.

Here is a link: http://www.microsoft.com/en-us/download/details.aspx?id=9033

Orbiter Sound, Spacecraft3.dll

In order to use Spacecraft3.dll and Orbiter Sound with a graphics client. A symbolic links must be created in /Modules/Server/ folder for "Config" and "Sound" folders those are located in a root folder of the Orbiter. If you are using Windows XP or newer and your installation is on a NTFS filesystem, these links can be created from Video Tab -> Advanced Setup. If you have problem with the links you can also use a software called **Link Shell Extension** (see link below) or you can simply copy the Config and Sound folders into /Modules/Server/ but then you have to keep them updated manually.

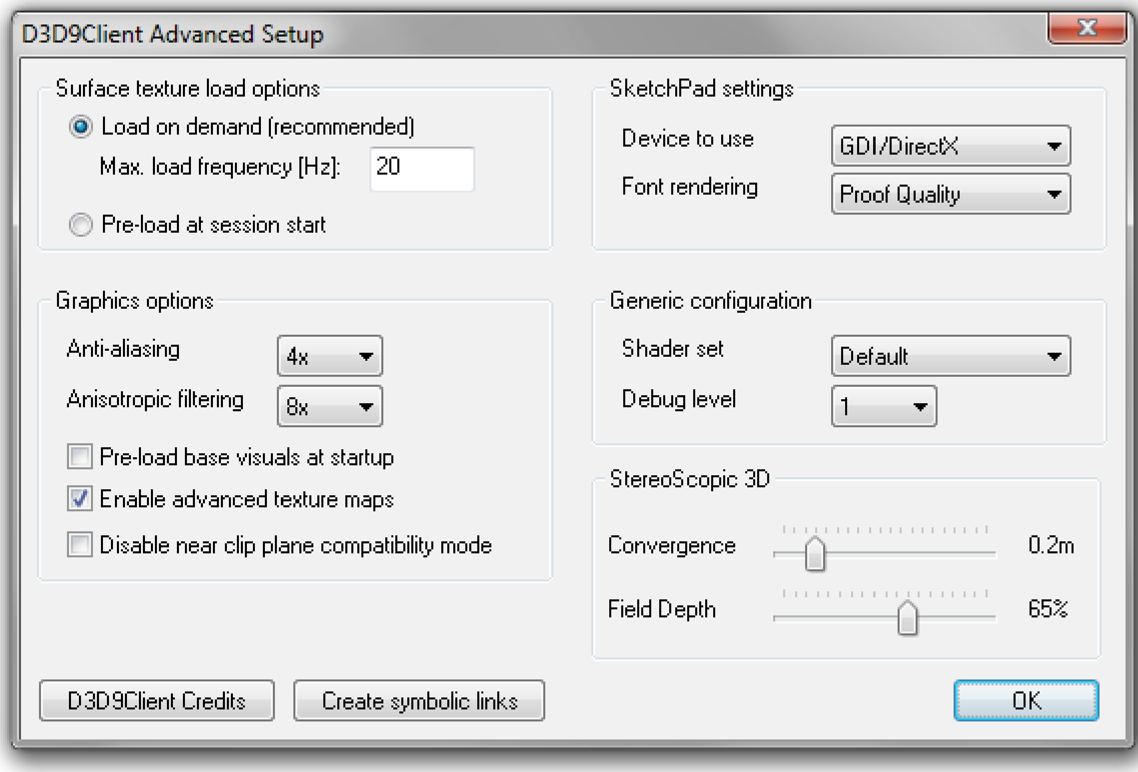
Here is the link: http://schinagl.priv.at/nt/hardlinkshellext/hardlinkshellext.html

Fullscreen Mode and Alt-Tabing

D3D9Client doesn't support alt-tabing in a so-called "True Fullscreen Mode". Therefore, it's recommended that you use a windowed fullscreen mode that will run the orbiter in a fullscreen sized borderless window. There is also a conflict between a GDI based dialog (i.e. pop-up) windows and anti-aliasing in a true fullscreen mode which will disable the anti-aliasing.

D3D9Client Advanced Setup

Under the regular Video Tab of the Orbiter (Orbiter_NG) Launchpad you find the "Advanced" Button that will show the "D3D9Client Advanced Setup" Dialog. Here you can change several settings to tweak your experience with the D3D9Client.



On the lower left side of the Dialog you'll find the "**Create symbolic links**" button that will create the symbolic links that are needed for some add-ons. The symbolic-links can only be created on an NTFS filesystem, so if you have installed your Orbiter installation for example on an FAT32 of extFS filesystem this feature will not work. In this case you have to copy the according folders as explained in the "Orbiter Sound, Spacecraft3.dll" chapter (above).

Surface texture load options

Here you can change the behavior how the D3D9Client will load surface textures. The two options available are either "Load on demand (recommended)" or "Pre-load at session start":

Load on demand (recommended)

With this recommended option selected the D3D9Client will only load surface textures when they come into view while you are orbiting a planet. The value in the "Max. load frequency [Hz]" input field lets you tune the maximum frequency the D3D9Client will check whether some new surface textures have come into view.

Pre-load at session start

With this option selected the D3D9Client will load all surface textures at startup of a scenario which results in a longer loading time.

Graphics options

Here you can change settings according to your graphic hardware:

Anti-aliasing

Depending on your hardware you can select the anti-aliasing feature that will ”smoothen” the visual artifacts that occur when displaying edges.

Anisotropic filtering

Depending on your hardware you can select the level of anisotropic filtering. For further details about this topic take a look at Anisotropi filtering at wikipedia.

Following checkboxes can be checked (enabled) or unchecked (disabled) to further fine-tune your D3D9Client experience:

Pre-load base visuals at startup

With this option **enabled** the D3D9Client will load all base visuals at startup of a scenario which results in a longer loading time.
With this option **disabled** the D3D9Client will only load base visuals when they come into view while you are e.g. flying through the atmosphere or orbiting a planet.

Enable advanced texture maps

With this option **enabled** D3D9Client will try to add additional texture information for meshes that supply them. This advanced texture maps define for example how ”rough” or ”shiny” a texture appears.

Disable near clip plane compatibility mode

If the near clip-plane compatibility mode is enabled then the minimum clip-plane distance is 1.0 meters as is in the Orbiter's internal engine. If the compatibility mode is disabled then the client can reduce the clip distance down to 0.1 meters, if there is a graphics close to the camera. This setting will only effect in so-called exterior pass. Virtual cockpit near clip-plane distance is defined in D3D9Client.cfg and the default value is 0.1 meters.

SketchPad settings

The SketchPad is used in Orbiter to draw 2D graphics onto surfaces. These are for example MFD Displays or announcements in the Simulation.

Device to use

The two options you can choose from at ”Device to use” are ”GDI/DirectX” and ”GDI Only”.
GDI/DirectX will use the DirectX 2D drawing capabilities of your graphic hardware to draw 2D surfaces. Normally this is the recommended setting, because it will not produce so much CPU load that the ”GDI Only” option.
GDI Only will only use GDI to draw 2D surfaces which might be the option when you experience any glitches or graphical artifacts in MFD screens. This mode is used for older graphic hardware to be able to run Orbiter.

Font rendering

The four options you can choose from at ”Font rendering” are ”Crisp”, ”Default”, ”Cleartype” and ”Proof Quality”.
Each setting will render fonts more smooth but uses a bit more graphic hardware performance.

Generic configuration

The generic configuration contains options that will change the general behavior of D3D9Client. For most of the time the default setup should be fine (”Default” Shader set and Debug Level ”1”). But you can for example change the verbosity of the internal logging system to be able to report more detailed issue information when you experience an error/failure.

Shader set
If you have different shader sets you like to switch between, this select box lets you choose between them.
Note however, that this option is not always available and strongly depends on the version of D3D9Client! The R6 release for example has only the "Default" shader set to select.

Debug level
The five options you can choose from here [0...4] represent the level of information that will be written into the log-file. The log-file is called *D3D9ClientLog.html* which can be found in *\Modules\D3D9Client* directory. Higher values will create more detailed output.
Until you have any problems and like to have more detailed information what's going on, you should keep this level reasonably low as higher values will result in more disk I/O what slows down the Simulation.

StereoScopic 3D

The stereoScopic 3D settings allow you to tweak the 3D experience if you are using a NVIDIA graphic card that provides this feature.

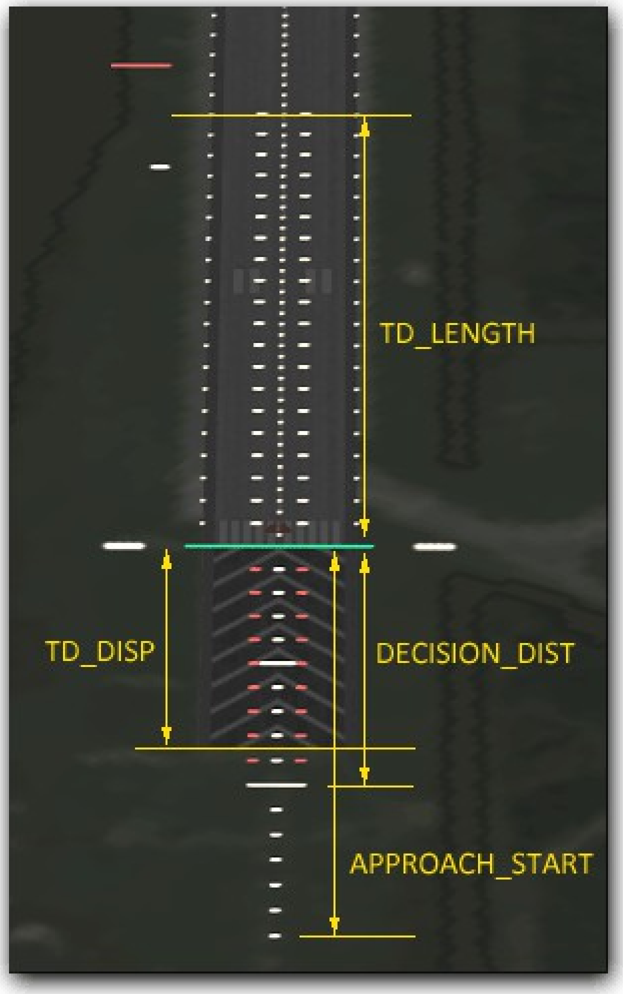
Convergence
The convergence value lets you choose "how far your eyes are apart". The default value is 0.2 meters (20 cm / 7.8 inches) which is round about the average distance between your eyes. Increasing this value might result in a view with "more depth".

Field Depth
In optics, particularly as it relates to film and photography, depth of field (DOF) is the distance between the nearest and farthest objects in a scene that appear acceptably sharp in an image. In the context of Stereoscopic 3D it defines the distance where the relative position between the "right eye objects" and the "left eye objects" are overlapping exactly and switch their position when further away or closer that that "point". For further details about this topic take a look at Depth of field at wikipedia.

Base Configuration settings

The D3D9Client allows you to to configure some more details when settings up runway lights. Additionally to the parameters that Orbiter itself defines (see *.\Doc\OrbiterConfig.pdf* for further details) there are some extra parameters you can define.

For a better understanding how some of those parameters will affect the rendering of the runway lights this image might help:



<**RUNWAYLIGHTS**>

<**END1** *V*>
First end point of runway (center line).

<**END2** *V*>
Second end point of runway (center line).

<**WIDTH** *F*>
Runway width [m]
Note: Two different light configurations exists [wide>59m] and [narrow<59m]

<**PAPI *F F F I***>
Precision Approach Path Indicator (PAPI).
Parameters:
Designated approach angle [deg]
Approach cone aperture [deg]
Offset of PAPI location from runway endpoints. [m]
PAPI Mode [int:0-3] (*this is optional parameter*)

PAPI Modes:
0: On center line
1: On left side
2: On right side
3 or none: On both sides

Note: Runwaylights can have 3 PAPI entries. Orbiter's inline engine will ignore the last parameter. If more than one PAPI entries exists in the runwaylights the inline engine will only use the last one.

<**VASI *F F F***>
Visual Approach Slope Indicator (VASI).
Parameters:
Designated approach angle [deg]
Distance between white and red indicator lights [m]
Offset of VASI (red bar) location from runway endpoints [m]

<**TD_DISP *F***>
Touch Down displacement [m]. (default: 0m)
Displacement between runway endpoint and the green line.

<**TD_LENGTH *F***>
Length of the Touchdown zone [m]. (default: 600m)
Two columns of lights on a runway each containing 3 parallel lights.

<**DECISION_DIST *F***>
Length of the ”red lights” zone [m]. (default: 257m)
This zone contains 2 x 3 x 9 red lights and the spacing between lights will depend about the length of the zone. The touchdown zone will use the same spacing about 30m

<**APPROACH_START *F***>
Length of the approach lights from the green line [m]. (default: 900m)
It's the long column of 5 parallel lights.

<SINGLEENDED>
If the singleended keyword is defined then the lights are only rendered when approaching a runway from END1 towards END2. If you want a asymmetric runwaylights then you need two runwaylight sections in a base configuration file.

Example of runway lights for KSC:

```
RUNWAYLIGHTS
      END1 -8220 -3 -600
      END2 -12670 -12 -3155
      WIDTH 100
      PAPI 5.0 3.0 257 3      ; both sides of the green line (example)
      PAPI 20.0 3.0 -2000 0   ; on a center line 2km before rwy
      VASI 1.5 152 671
      TD_DISP 257
      TD_LENGTH 600
      DECISION_DIST 257
      APPROACH_START 900
END
```

<u>Advanced Texture Maps</u>

Additional texture maps can be automatically assigned for a mesh simply by placing additional textures into a texture folder. Additional textures are identified by using an identifier in the end of the texture's name like "*dgmk4_1_norm.dds*" where "*dgmk4_1.dds*" is the name of the base texture.

Available identifiers are:

<**_norm**>
Tangent space normal map and the valid formats are
<R8G8B8> 3-bytes per pixel. Best quality [uncompressed]
<V8U8> 2-bytes per pixel. Good quality [uncompressed]
<DXT1> 1-byte per pixel. Bad quality [compressed]

V8U8 offers the best quality for 2-bytes per pixel. This format can be created with nVidia texture tools.

<**_spec**>
Specular map controls a specular reflection in per pixel basis. Alpha channel is containing a specular power setting. Value 255 is mapped to 80.0 and 0 to 0.0. Valid formats are <R8G8B8A8> , <DXT3> or <DXT5>. If a specular map is assigned then a material specific settings are ignored.

<**_emis**>
Currently emission map works more like a light map and the simplified equation is:

pixel_color.*rgb* = texture.*rgb* * clamp(emission_map.*rgb* + sun_light.*rgb* + local_lights.*rgb*)

Alpha channel is ignored therefore the recommended formats are <R8G8B8> or <DXT1>.
The exact implementation would require some discussion with an add-on developers to define the function for the emission map. An other possibility is:

pixel_color.*rgb* = texture.*rgb* * clamp(sun_light.*rgb* + local_lights.*rgb*) + emission_map.*rgb*

Of course, the clamp function can be changed to a different kind of color curve manipulation function to control contrast and lightness.