RenderWare Graphics

Tool

PVS Editor

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1.1 Introduction

The PVS editor is a tool that allows the PVS data associated with world sectors to be edited.

1.2 Navigation and visualization

1.2.1 Navigating Around a World

There are two navigation modes. The current navigation mode is shown by the depressed navigation button at the bottom of the screen ().

- The camera icon is the *fly* mode. This allows you to walk and turn in the world. It is the default mode.
- The globe icon is the *orbit* mode. This allows you to rotate the world and zoom into it. If a sector selected, the world is centered on that.

To change mode, click on the desired icon.

Holding down one of the mouse buttons and dragging controls navigation.

MOUSE BUTTON	MODIFIER KEY	ACTION
Left	-	Rotate
Left	Ctrl	Zoom
Right	Ctrl	Strafe & elevation

In *orbit* mode, the selected sector is snapped to the center of the screen automatically. In *fly* mode, the *F7* key can be used to achieve this.

To change navigation speed the numerical keypad can be used. Numbers 0 through 9 control the speed from slow to fast, respectively, with 5 being default.

1.2.2 Coordinates and Teleporting

To teleport from place to place, right click and select *Teleport…* from the pop-up menu. The current coordinates can be overwritten, upon which the viewer will be teleported to the new location.

The coordinates of the viewer are displayed in the status bar, at the bottom of the screen when no sector is selected.

1.2.3 Changing Views

The number of windows can be altered by clicking on the window icons at the bottom of the screen (). The icons, from left to right, vary between four-screen, single-screen, two-screen vertical and two-screen horizontal views.

Sliding the central divisions can alter the size of the windows.

1.2.4 Changing Lighting

A main light and ambient light can be turned on and off, by clicking the lighting buttons at the bottom of the screen.

1.2.5 Viewing the Geometry and the Wireframe

The geometry can be toggled on and off from the menu option *View* → *Geometry*. Likewise, the wireframe can be toggled on and off by selecting *View* → *Wireframe*.

In addition, a world with PVS data culls geometry in hidden sectors.

1.2.6 Viewing the Sectors

Sectors show how the world is subdivided together with color-coding PVS data if it exists. The sectors in the scene can be displayed or turned off by the menu option *View* → *Sectors*.

1.2.7 Changing Color of the Sectors

The sectors are yellow without PVS data, and red or blue with PVS data depending whether they are invisible or visible respectively. The *F4* key toggles between color and gray-scale color schemes.

1.2.8 Changing Translucency of the Sectors

So that all sectors can be observed at once, they are drawn translucently. The translucency of the partitions in the scene can be altered using the translucency sliders at the bottom of the screen. These can be set to fully transparent by sliding it to the far left and fully opaque by sliding it to the far right. There is one for visible sectors and one for hidden sectors.

1.2.9 Viewing the Sector Hierarchy

The hierarchy of the bsp tree can be viewed in levels using the numerical keypad. The "+" and "-" keys move through the levels, so for example, one press of "+" will show the root sector, another press will show the root and its immediate children, and another press will show the root with its children and grandchildren, etc. Pressing "/" shows only the one level, e.g. child sectors at level one (no parent). To view all sectors again, press "*".

1.2.10 Viewing Statistics

Statistics about the selected sector are displayed in the status bar, at the bottom of the screen.

1.2.11 Selecting

Holding down the *Shift* key and clicking will initially pick the nearest sector. Subsequent clicks will highlight more distant sectors.

A sector can be deselected by clicking outside the world, or by pressing the *Escape* key.

1.3 File commands

Note: PVS editor is BSP tool; while RWS files can be read by PVS editor, only the BSP information is loaded and ultimately saved out.

1.3.1 Loading a BSP

A BSP (or RWS file) can be loaded from *File* → *Open…* . This will load and display the file within the viewing window and will display the partitions within the world. It can also be opened, if recently edited, by selecting the file from the four most recently edited in the *File* menu. Note that the loaded file will contain any splits generated when the BSP was last saved out, and any new partitioning will retain these former splits. However, during the editing phase (between a load and save operation) the initially loaded geometry is always used.

1.3.2 Saving a BSP

BSPs can be saved from the *File* → *Save* or *Save as…* menu option. Note that saving a BSP will also save any splits created within the geometry. This means that re-loading this model into the editor will also re-load the splits, and this can have an undesirable cumulative effect.

1.3.3 Importing PVS data

A previously saved PVS data file can be imported from a `.pvs` file from the *File* → *Import PVS* menu option. Note the arrangement and number of sectors from the exported PVS data file must be identical to the ones in the world it is being imported into. If this is not the case, unreliable and surprising results are likely to occur.

1.3.4 Exporting PVS data

The PVS data from a scene can be exported into a .pvs from the *File* → *Export PVS* Menu option

1.3.5 Exporting Partitions

The partitions (that define the sectors) can be exported into an **`.xml`** format by the menu *File* → *Export Partitions* – and can be edited manually. This is useful if the geometry needs to be altered slightly, but the partitioners are placed correctly – the geometry can be edited, and loaded into the editor, and then the partitions imported back into the modified geometry. This is a handy solution to the accumulation of splits mentioned in the previous section.

1.3.6 Importing Partitions

A previously saved set of partitions can be imported from an **`.xml`** file from the *File* menu, under *Import Partitions…* . Note that the partitions are tested during the loading phase – any invalid partitions are repositioned into the middle of the sector. Invalid partitions may result, for example, if they are imported into a different model than that used to create them.

1.4 PVS Operations

1.4.1 Single Operations

Viewing PVS Data

If a world has PVS data, the wireframe view of the world is color coded with respect to the current view sector. Visible sectors have triangles colored cyan, while hidden sectors have orange. Furthermore, when PVS data is detected, the sectors are colored (unless a gray-scale scheme is selected).

Generating PVS Data

From the *PVS* menu, select *Generate All*. The PVS data is generated using a few sample points per sector, and might lead to visibility gaps. However, selecting *Generate All* again will add more sample points, progressively improving the model. Note the generation time for PVS can take hours in large scenes!

Clearing PVS Data

PVS data can be "cleared" from the menu option *PVS* → *Clear*. This does not destroy the PVS data, but it does "neutralize" it – it sets all sectors to invisible. This is useful for testing single points or sectors in a new world for prototyping.

Destroying PVS Data

A world can have all its PVS data destroyed from the menu option *PVS* → *Destroy all PVS data*.

Adding a Single Sample Point

There are two options to add a single sample point. Both are under the *PVS* menu. The first option (*Add sample from viewpoint*) adds a PVS sample from your current viewpoint without any further testing. The second option (*Add sample point if valid*) only tests for visibility if the sample point is located inside geometry, i.e. it is not on the back-face of nearby geometry or in an area of the world considered to be out-of-bounds. The latter option is the default sampling that is done with the *Generate All* option.

Sampling PVS from a Sector

Visibility from an entire sector can be generated from the menu option *PVS* → *Generate for Viewpoint's Sector*. This is a speedy way of testing visibility without having to generate data for the entire world.

Clearing a Sector's PVS Data

Visibility from an entire sector can be cleared (set to invisible) from the menu option *PVS* → *Clear Viewpoint's Sector*. This can be used prior to assigning PVS data to the sector manually, using a series of sample additions.

1.4.2 Group Operations

If necessary, it is possible to edit the PVS for a world entirely by hand. To do this, there needs to be a from-sector and a to-sector – the later can be a single leaf sector or a non-leaf sector where all visibility operations are performed on its children. (See the *Viewing the Sector Hierarchy* section.)

The from-sector can be specified as the viewer's current location – the "in-sector" – or from the "locked-sector" achieved by locking the viewpoint or the selected sector via the *lock* check box at the bottom of the screen. Using the locked-sector allows the observer to move around the scene, whilst visibility edits are applied to the locked sector – highlighted green.

Once the from-sector is set-up, picking a sector, or super-sector specifies the to-sector.

The sectors are colored as follows:

- Yellow the from-sector
- White the to-sector
- Cyan a visible sector or super-sector
- Orange an invisible sector or super-sector
- Green a super-sector with partly visible and partly invisible children