In graphics (interpolating normals), tables, interpolation applies to colors, curve drawing, and other things. Originally used to approximate intermediate function values from parametric repres. .. Interpolation Ideal.

Match of lines and planes.

OpenGL

and File Format(s)

Data Structure

World Model

(Which means TREE-LIKE)

Hierarchical

BLENDER, etc.

(From Friday. Add suggestions for Blender topics for me to cover.)

Do I do Blender Quickstart (or something beyond) write 1/2 page report

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The PLANt associated with each vertex is used by OpenGL’s shading.

Although the normal is often viewed and described as a vector, it REALLY

is the equation for a PLANt.

In OpenGL, each vertex has, besides world coordinates, and color, etc., a

REALLY mean.

• Projective Geometry — we’ll see what homogeneous coordinates

representations of line segments are used together for clipping

• Implicit representations of clipping planes and parameterized

rectilinear (we studied Bresenham), clipping, SHADING, sectioning...

• Implicit (equation) reps...

• (texture mapping).

1. Interpolate colors over surfaces
2. Generate curved surfaces
3. Map a 2-d texture function or array of values onto a 2-d surface

2-d parameterizations are used to

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the polygon with that vertex reflects light.

mirror that is used by OpenGL to help calculate an approximation of how

each vertex, a normal. Each vertex normal associates to each vertex a little

An OpenGL graphics programmer must write code to SPECIFY, for each
normals to pass on to OpenGL with the vertex coordinates.

Software like BLENDER has implemented in it the calculations of the

done with a normal that is an interpolation between the vertex normals.

In some shading modes, the calculation for points WITHIN the polygon is
of us do. Change of detail and artifacts will mislead and confuse them.

Trained and experienced radiologists see things in those images that none

**But,' lossy compression is a BAD IDEA for medical diagnostic images.**

The sin and cosine functions.

The wavelet transform results from discards the terms with high frequency. The wavelet then replaces the Fourier series for each little region and then

- Produces artifacts (such as waveiness near originally sharp boundaries).
- Produces fewer bits.
- Replaces original fine details with other fine details that are stored.

Compression of image files.

Another example of approximation acceptable for many people is lossy

accurate visualization.

This course, like most college into computer science and
textbooks, emphasizes the goal of approximate image creation, NOT

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the whole model.

composed of other pieces. To draw, PHIGS would be commanded to draw
create and insert pieces of a model. Each piece is either a primitive or is
To draw graphics, a PHIGS programmer would write function calls to

PHIGS is an example of a retained mode API.

Graphics System.
A predecessor to OpenGL is PHIGS: Programmer’s Hierarchical Interactive
produce the Graphics. But the whole model is not implemented in OpenGL.
during traversal, OpenGL function calls are made to command OpenGL to

The software then runs procedures to TRAVERSE the model.

Independently of OpenGL, data structures for a model of a virtual world,
Graphics applications and tools (like Blender) have within them,
This time is saved when the graphics card has a feature to store display
libraries making a system call, plus the time to transmit the command
arguments on the call stack, making a function call, the OpenGL
memory, calculating arguments, return addresses, etc.; pushing
memroy lists enable some OpenGL implementations to be faster because:

- Example: to redraw the parts of the scene that change.
- Times, sequence of OpenGL function calls (with the same arguments) multiple
display lists are helpful when the application emits exactly the same
OpenGL has partial support for retained mode programming—In the form

To redraw a world, all the commands have to be executed again:

- Graphics engine, which executes it immediately:
- Each call to an immediate mode function transmits a command to the

The API style you know from CS1422 projects is immediate mode.
Philosophy in Chapter 7 of the RedBook.

You can read about Display Lists: How to use them and their design.

... last as possible, OpenGL explicitly forbids display lists from being changed.

For enable graphics card manufacturers to make display list processing as

the display list is executed.

display list. This behavior continues until the OpenGL command to close
executed immediately. Instead, each is appended to the currently open
All subsequent OpenGL commands (like glVertex or glRotate ) are NOT

instead of glBegin.

instead of glEnd.

function to start building a display list. That function would be coded
number to identify the display list. Then use that number in an OpenGL
How to use a display list: Call the OpenGL function to allocate a new

optimized way, so it can use it faster.

3. The graphics card might store the display list data in its own special
recomputed.

2. Arguments originally calculated from variables can be saved and not

Lists in its own memory.
I'll try to present the actual data structures of Blender's implementation.

OpenGL engine.

So the model must be stored in general (RAM) memory, not just the
application software, outside OpenGL.

But again, model editing (which Blender does) must be done by your
model editing code...

So, display lists support hierarchical modeling...

Implementation. The standard requires this limit be at least 64.

Can be nested to a depth whose limit is set by the OpenGL
happens if the other display list is not built. Such hierarchical execution
But it CAN contain a command to execute another display list. Nothing

A display list cannot contain a command to create a new display list.
indexes an entry in the edge array.

Polygon or Face array: an array of lists of index numbers, each number

polygons (or faces) that have the edge.

polygons in each edge array element. That list would specify all the

A variant of the data structure might include the list of numbers of

subscript of an entry in the vertex array.

Edge array: an array of pairs of index integers. Each index is the

numbers.

Vertex array: an array of the triple of coordinates (floating point

I showed an example of a mesh consisting of

models with material by Angel.

Read Chapter 14 quickly. I will supplement the topic of hierarchica