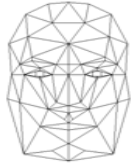


Debugging

There is no debugger! You must use other tricks!

- **Compiler error messages**
- **Signals using vertex shader**
- **Signals using fragment shader**
- **Use simple geometry - easy to understand**

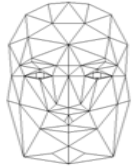


InfoLog

**glGetProgramInfoLog/glGetShaderInfoLog
(glGetInfoLogARB)**

**Retrieves information about compilation and
linking results**

**May include error messages, warnings... The
exact contents varies depending on GPU
brand.**



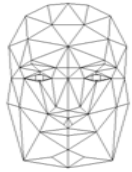
Development tools

**Shader development directly in large application
unreasonable**

Simple development shells are used to:

- **Edit source code for vertex and fragment shader**
 - **Recompile when desired**
 - **Test the shader on a model**
 - **Display compilation results**

**I.e. Rendermonkey, OpenGL Shader Builder,
and our lab shell for lab 3**



Information Coding / Computer Graphics, ISY, LiTH

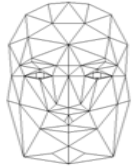
The screenshot displays the ATI RenderMonkey 1.6 software interface. The main window is titled "ATI RenderMonkey 1.6 : tom.rfx" and contains a menu bar (File, Edit, View, Window, Help) and a toolbar with various icons. The interface is divided into several panes:

- Shader Editor: Effect1**: This pane shows a dropdown menu set to "Pass 0" and tabs for "Vertex Program" and "Fragment Program". The code editor contains the following C-style code:

```
void main(void)
{
    gl_Position = ftransform();
    gl_TexCoord[0] = gl_MultiTexCoord0;
}
```

The status bar at the bottom of this pane indicates "Ln 5, Col 2".
- OpenGL Preview: Effect1 effect**: This pane displays a 3D rendered scene of a colorful, multi-colored elephant-like object with a rainbow gradient, standing on four legs. The background is black.
- Output**: This pane shows the following log messages:

```
OpenGL Preview Window: Compiling vertex shader API(OpenGL) /Effect G:
OpenGL Preview Window: Compiling fragment shader API(OpenGL) /Effect G:
OpenGL Preview Window: Linking program ... success
```

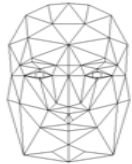


Information Coding / Computer Graphics, ISY, LiTH

The shader lab shell

Created by Lars Abrahamsson, more or less rewritten this year by Mikael Kalms.

- **Source code edited in separate editor, as two files put in a certain place.**
 - **Compilation results in the shell window**
 - **Two pre-installed textures**
- **Can switch between shader and fixed pipeline**



Information Coding / Computer Graphics, ISY, LiTH

The screenshot shows a Linux desktop environment with a window titled "shader" displaying a 3D rendering of a teapot. The window title bar includes the path "/home/ingis/valla-online/lasse/lab/shade" and the frame rate "fps: 7.74443". The teapot is rendered with realistic shading and reflections, set against a dark gray background. A blue dot is visible on the teapot's surface, and a red horizontal line is drawn across the scene.

The window contains a code editor with the following GLSL code:

```
File Edit View Search Tools Documents Help
New Open Save Print Undo Redo Cut Copy Paste Find Re
shader.frag x shader.vert x lab_guidelines.txt x
Name: /home/ingis/valla-online/lasse/lab/shader/shader.vert
MIME Type: plain text document (text/plain)
Encoding: Unicode (UTF-8)
// mynorm = gl_Normal; // Är normalerna noll?
// mynorm = normalize(gl_Vertex); // Är normale

vec3 ecPosition = vec3(gl_ModelViewMatrix *
lightVec = normalize(vec3(gl_LightSource[1].
lightVec2 = normalize(vec3(gl_LightSource[3]
// 1+3 är fin, matchar synliga reflektioner

vec4 v = gl_Vertex;

gl_TexCoord[0] = gl_MultiTexCoord0; // ??

// mynorm måste vridas!
mynorm = normalize(gl_NormalMatrix * gl_Norm
reflecVec = reflect(-lightVec, mynorm);
reflecVec2 = reflect(-lightVec2, mynorm);

camVec = normalize(-ecPosition);

// Test på om normalerna är något alls. Det är de!
if (mynorm.x*mynorm.x + mynorm.y*mynorm.y + mynorm.z*mynorm.z == 0) v.y = 0;
```

The desktop environment includes a taskbar at the bottom with icons for "shader", "lab", and "ingis@bk-03: /hom". The system tray shows the date and time "Sun 30 Oct, 11:31 AM" and the frame rate "fps: 7.74443".