


OpenGL

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Graphics I
Faramarz Samavati



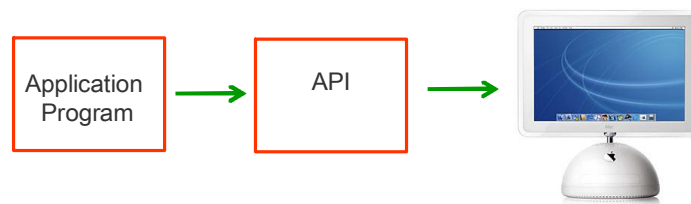
Goals of this lecture

- ❖ To get started writing graphics programs
- ❖ To introduce OpenGL
- ❖ To learn basic ingredients of every OpenGL program

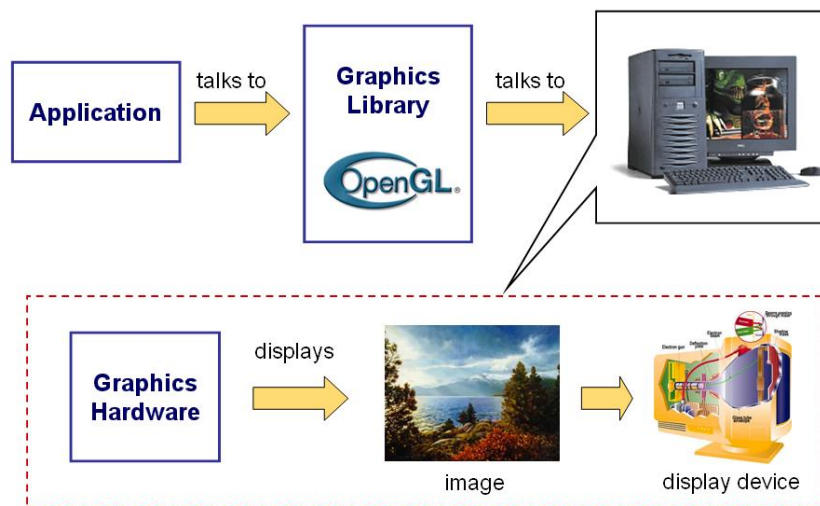
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Graphics Programming

- ❖ Our approach is programming oriented
- ❖ Application programmer's interface (API)
- ❖ OpenGL as our API



Modern Graphics System





OpenGL

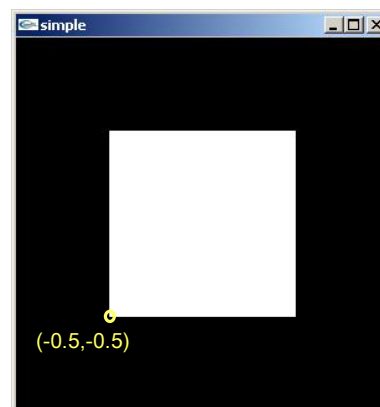
- ❖ GL in SGI
- ❖ Close to hardware /easy to use
- ❖ 200 functions in OpenGL
- ❖ Portable and platform independent
- ❖ OpenGL is concerned primarily with rendering
- ❖ General information and resources: www.opengl.org
- ❖ OpenGL Ver 1.1 was released in 1992
- ❖ OpenGL Ver 2.0 was released in 2004(GLSL:OpenGL Shading Language)
- ❖ designed for use with the C and C++ but there are also bindings for FORTRAN, Java, and Ada.

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Simple Program

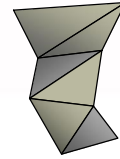
```
#include <gl.h>
main(){
    //Initialize a window please!
    glClear(GL_COLOR_BUFFER_BIT);
    glBegin(GL_POLYGON);
        glVertex2f(-0.5, -0.5);
        glVertex2f(-0.5, 0.5);
        glVertex2f(0.5, 0.5);
        glVertex2f(0.5, -0.5);
    glEnd();
    glFlush();
}
```



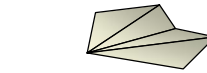
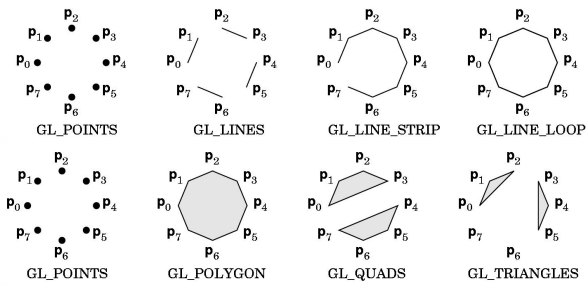
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Primitives

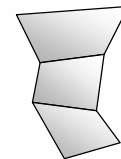
- ❖ glBegin
- ❖ glEnd
- ❖ GL_POINTS, GL_LINES, GL_POLYGON, ...



GL_TRIANGLE_STRIP



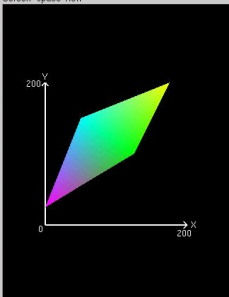
GL_TRIANGLE_FAN



GL_QUAD_STRIP

Shapes Tutorial

Screen-space view

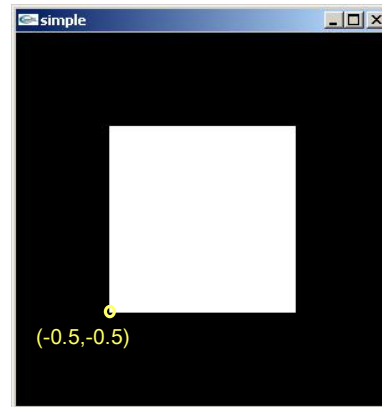


Command manipulation window

```
glBegin (GL_TRIANGLE_STRIP);
glColor3f (1.00 , 0.00 , 1.00 );
glVertex2f (0.0 , 25.0 );
glColor3f (0.00 , 1.00 , 1.00 );
glVertex2f (50.0 , 150.0 );
glColor3f (0.00 , 1.00 , 0.00 );
glVertex2f (125.0 , 100.0 );
glColor3f (1.00 , 1.00 , 0.00 );
glVertex2f (175.0 , 200.0 );
glEnd();
```

Simple Program

```
#include <glut.h>
#include <gl.h>
void mydisplay() {
    glClear(GL_COLOR_BUFFER_BIT);
    glBegin(GL_POLYGON);
        glVertex2f(-0.5, -0.5);
        glVertex2f(-0.5, 0.5);
        glVertex2f(0.5, 0.5);
        glVertex2f(0.5, -0.5);
    glEnd();
    glFlush();
}
int main(int argc, char** argv){
    glutInit(&argc, argv);
    glutCreateWindow("simple");
    glutDisplayFunc(mydisplay);
    glutMainLoop();
}
```



GLUT(in the tutorial)

- ❖ OpenGL utility toolkit
- ❖ A minimum functionality for a windowing system
- ❖ glutInit
- ❖ glutCreateWindow
- ❖ Default values

Events Loops and Callback Functions

- ❖ Events based programming
- ❖ Events queue
- ❖ Callback functions
- ❖ glutDisplayFunc
- ❖ glutMainLoop()

