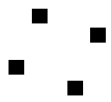
OpenGL Basics

OpenGL

- Is a low-level 3D graphics API
  - Interface to hardware
- Is an interface made up of functions
- Is **not** object-oriented
- Is a state machine
  - State is global and remain as you set them until you set them again
- Is primitive-based
  - Primitives are points, line-segments, triangles, quads, polygons, …
  - Complex objects have to be constructed from these primitives

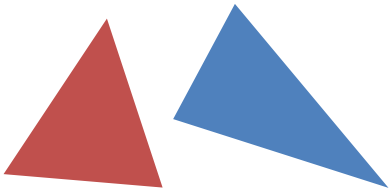
Geometric Primitive Types

- Are specified by vertices

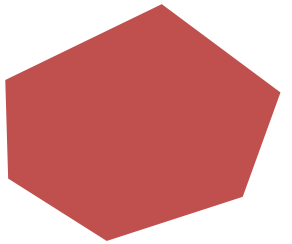


Points

Lines



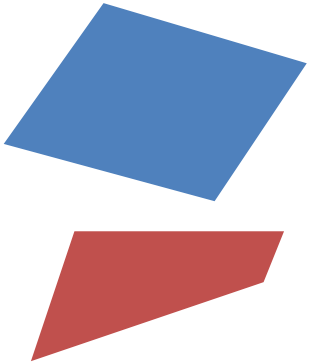
Triangles



Polygon

LineStrip

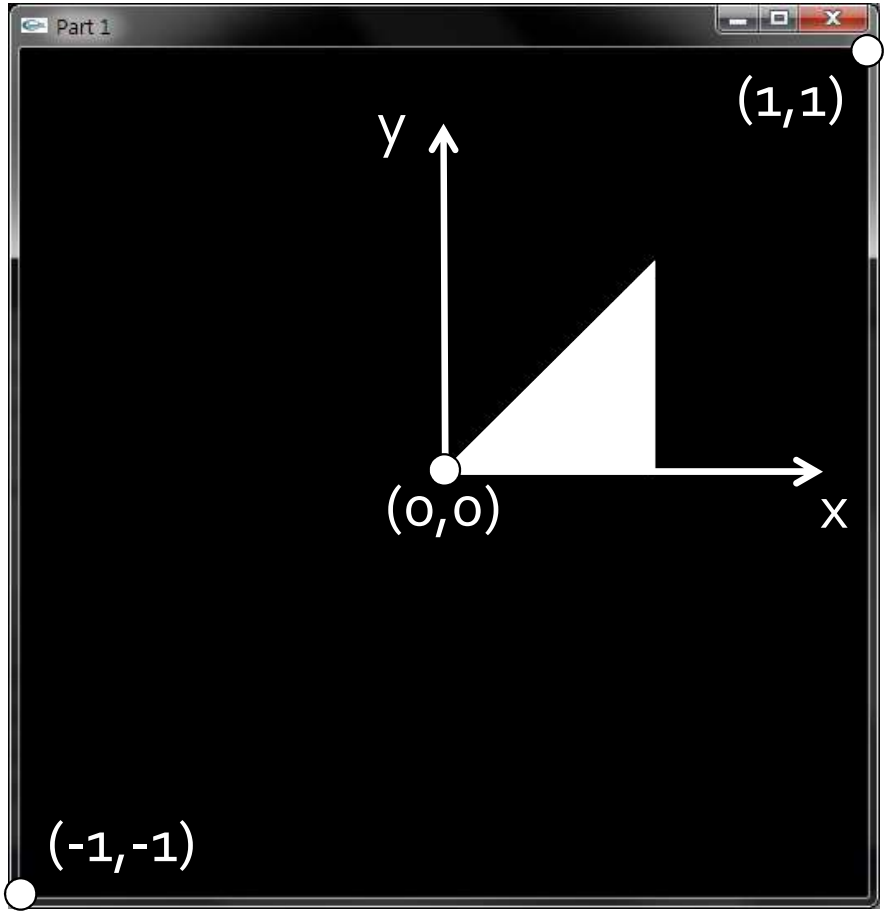
LineLoop



Quads

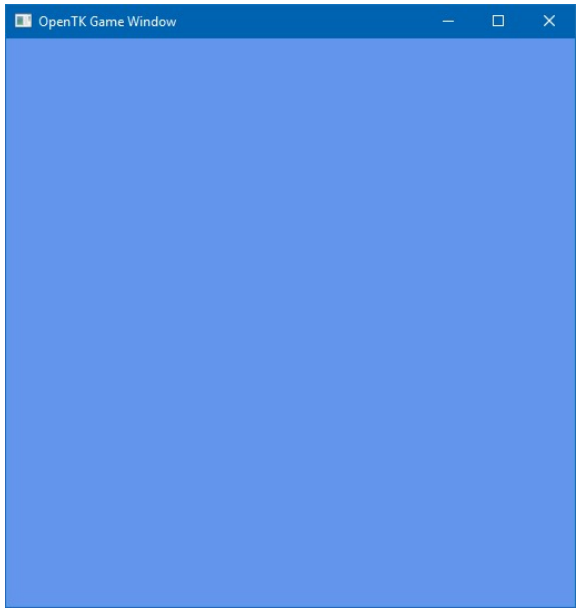
Default Coordinate System

```
void DrawTriangle()
{
  GL.Begin(PrimitiveType.Triangles);
    GL.Vertex2(0.0f, 0.0f);
    GL.Vertex2(0.5f, 0.0f);
    GL.Vertex2(0.5f, 0.5f);
  GL.End();
}
```



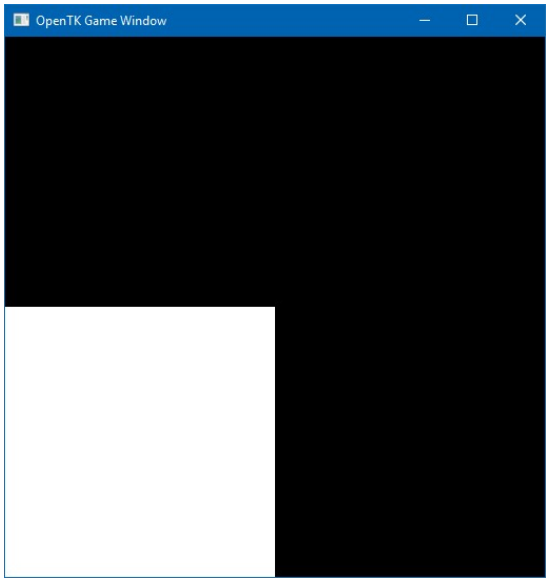
Clearing the Screen

```
GL.ClearColor(Color.CornflowerBlue);
GL.ClearColor(red, green, blue, alpha);
GL.Clear(ClearBufferMask.ColorBufferBit);
```



Specifying on what Part of the Window to Draw

```
GL.Viewport(left, bottom, width, height); //in pixels
GL.Viewport(0, 0, winWidth, winHeight); //full window
GL.Viewport(0, 0, winWidth / 2, winHeight / 2);
```



Specifying Color

```
GL.Begin(PrimitiveType.Quads);
   //color stays active till new
   GL.Color3(Color.Cyan);
   GL.Vertex2(-1f, -1f);
   GL.Vertex2(.5f, -1f);
   GL.Color4(1f, 1f, 1f, 1f);
   GL.Vertex2(.5f, .5f);
   GL.Vertex2(.0f, .5f);
GL.End();
```