

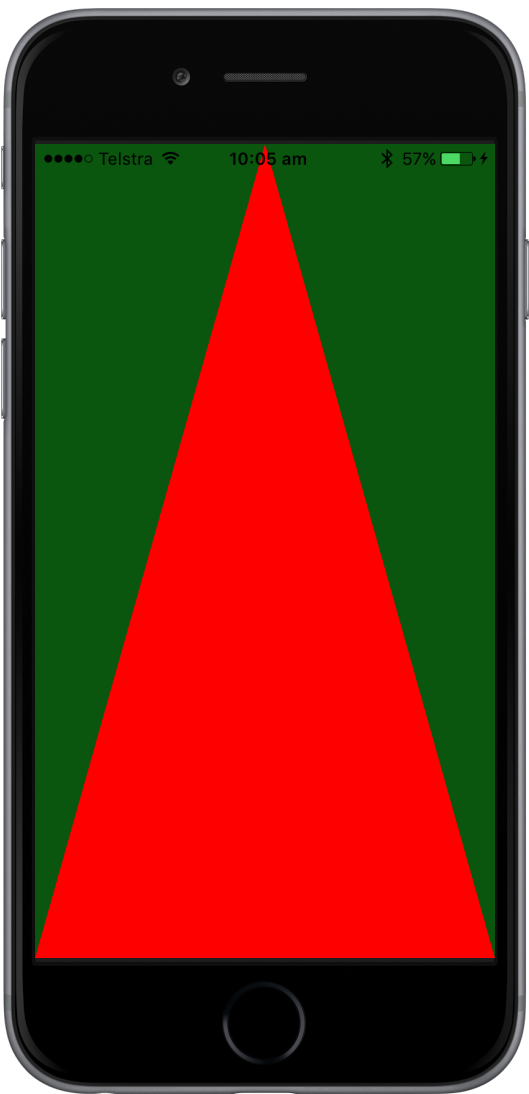
.....

BEGINNING METAL

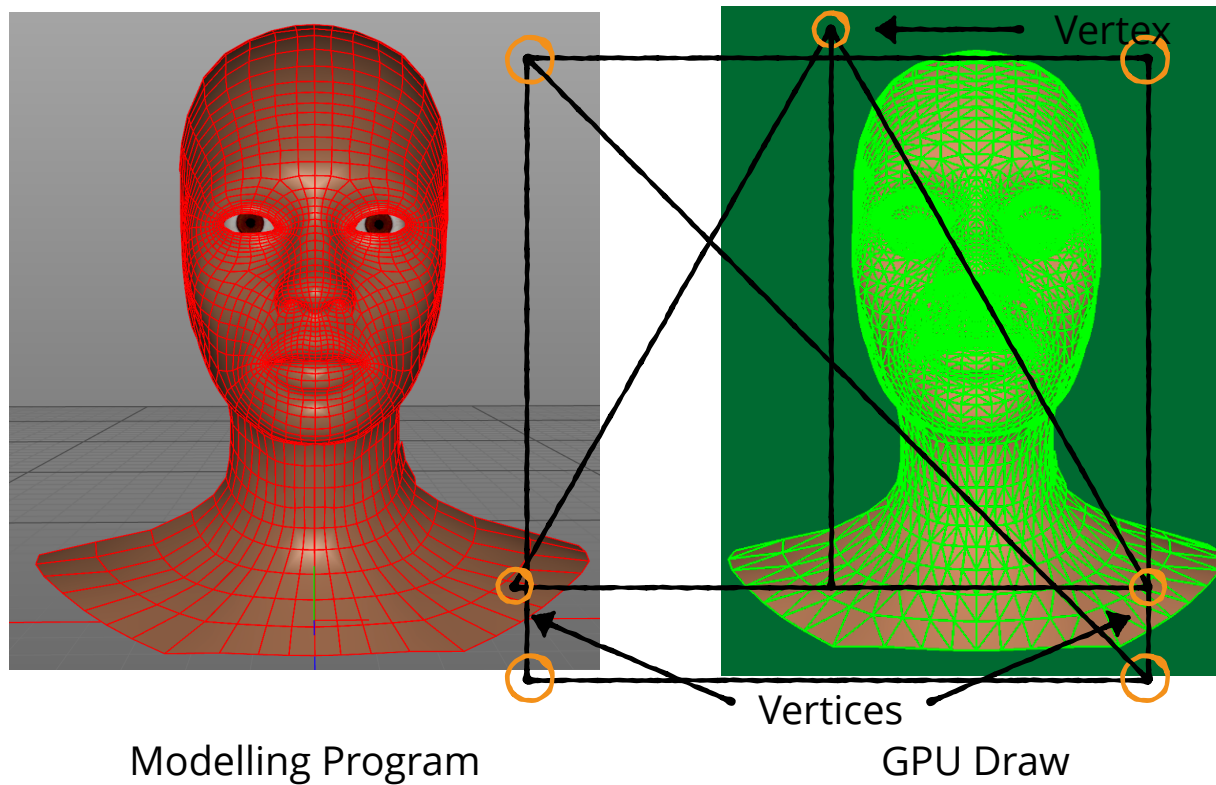
.....



PART 3: TRIANGLES



TRIANGLES



VERTEX BUFFER

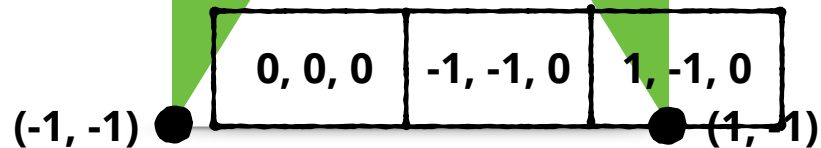
$(-1, 1)$ $(1, 1)$

```
let vertices: [Float] = [  
    0, 0, 0,  
    -1, -1, 0,  
    1, -1, 0]
```

$(0, 0)$

```
var vertexBuffer: MTLBuffer?
```

```
vertexBuffer = device.makeBuffer(bytes: vertices,  
    length: vertices.count * MemoryLayout<Float>.size,  
    options: [])
```



PIPELINE STATE

- ▶ MTLRenderPipelineState
- ▶ MTLRenderPipelineDescriptor

```
let pipelineDescriptor = MTLRenderPipelineDescriptor()
pipelineDescriptor.vertexFunction = vertexFunction
pipelineDescriptor.fragmentFunction = fragmentFunction
pipelineDescriptor.colorAttachments[0].pixelFormat = .bgra8Unorm
pipelineState = try!
    device.makeRenderPipelineState(descriptor: pipelineDescriptor)
```

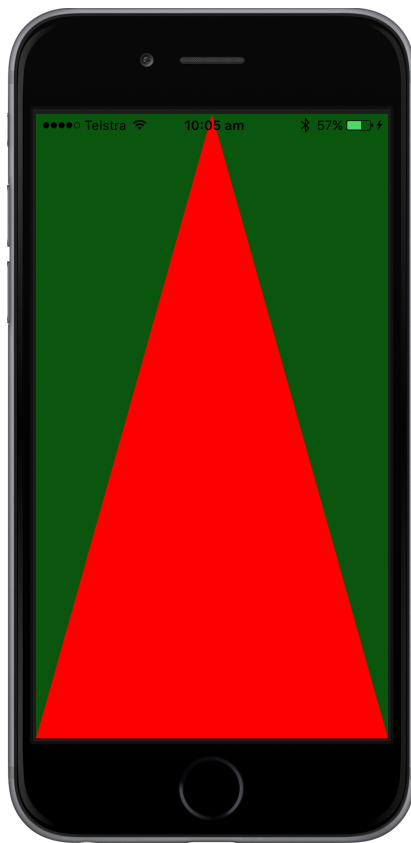
- ▶ Blue head
- ▶ Red nose
- ▶ Orange arial



RENDER

```
let commandBuffer = commandQueue.makeCommandBuffer()  
let commandEncoder = commandBuffer.makeRenderCommandEncoder(descriptor: descriptor)  
  
commandEncoder.setRenderPipelineState(pipelineState)  
commandEncoder.setVertexBuffer(vertexBuffer, offset: 0, at: 0)  
commandEncoder.drawPrimitives(type: .triangle,  
                               vertexStart: 0,  
                               vertexCount: vertices.count)
```





CHALLENGE TIME!

