Controlling Shape Drawing with Shaders

Change a shape node's appearance by supplying custom shader code.

Overview

When you want to go beyond the effects provided by a shape node's properties, you can take full control of its stroking or filling by using the `strokeShader` and `fillShader` properties, respectively. To do that, you supply custom OpenGL ES shader code embedded within a `SKShader` object. Custom shaders allow you to create custom effects, such as dashed lines and gradient strokes, and custom fills, such as checkerboards and random patterns.

Customize a Shape Node's Stroke

Shape nodes have two additional stroke-related properties that extend the properties defined by `SKShader`:

Symbol declaration	Type	Description
`float u_path_length;`	Uniform	The total length of the path, in points.
`float v_path_distance;`	Varying	The distance along the path, in points.

By dividing the distance along the path by the total length of the path, you get the normalized position (between 0 and 1) of each point along a shape node's path and use it to construct the color of each pixel along the shape node's stroke. The following code shows how you create a custom shader to do this:

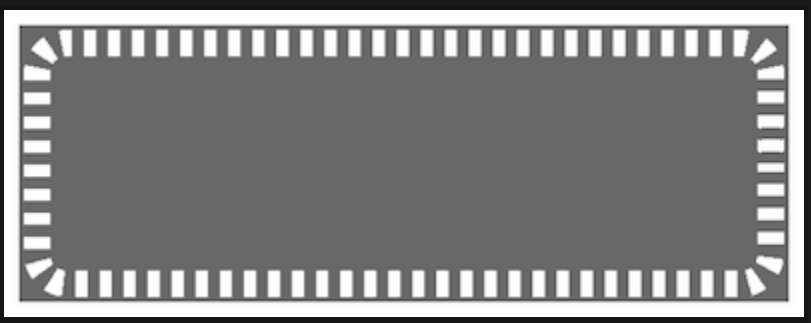
```
let gradientShader = SKShader(source: "void main() {" +
    "float normalisedPosition = v_path_distance / u_path_length;" +
    "gl_FragColor = vec4(normalisedPosition, normalisedPosition, 0.0, 1.0);" +
    "}")
let squareShapeNode = SKShapeNode(rectOf: CGSize(width: 610, height: 200),
                                  cornerRadius: 25)
squareShapeNode.fillColor = .clear
squareShapeNode.lineWidth = 20
squareShapeNode.strokeShader = gradientShader
```

The generated shape node looks like this:

Alternatively, by casting both symbols to integers and using the modulo operator, you get the same shape node with a shader that generates a dashed line, as shown in the following code:

```
let dashedShader = SKShader(source: "void main() {" +
    "int stripe = int(u_path_length) / 150;" +
    "int h = int(v_path_distance) / stripe % 2;" +
    "gl_FragColor = float4(h);" +
    "}")
```

The generated shape node looks like this:



Customize a Shape Node's Fill

You create a custom fill for a shape node by writing shader code and embedding it within an SKShaderobject. Assigning the shader to the fillShader property overrides the appearance that would otherwise be defined by fillColor and fillTexture.

The following shader code demonstrates filling a shape node with a simple checkerboard texture. Inside the shader, the variables h and v would, on their own, form horizontal and vertical stripes. The exclusive or operator, ^, creates the checkerboard pattern from those stripes.

```
let checkerboardShader = SKShader(source: "void main() {" +
    "int size = 20;" +
    "int h = int(v_tex_coord.x * u_texture_size.x) / size % 2;" +
    "int v = int(v_tex_coord.y * u_texture_size.y) / size % 2;" +
    "gl_FragColor = float4(v ^ h, v ^ h, v ^ h, 1.0);" +
    "}")

let size = CGSize(width: 610, height: 200)

checkerboardShader.uniforms = [
    SKUniform(name: "u_texture_size",
              vectorFloat2: vector_float2(Float(size.width), Float(size.height)))
]

let squareShapeNode = SKShapeNode(rectOf: size,
                                  cornerRadius: 25)
squareShapeNode.fillShader = checkerboardShader
```

The generated shape node looks like this: