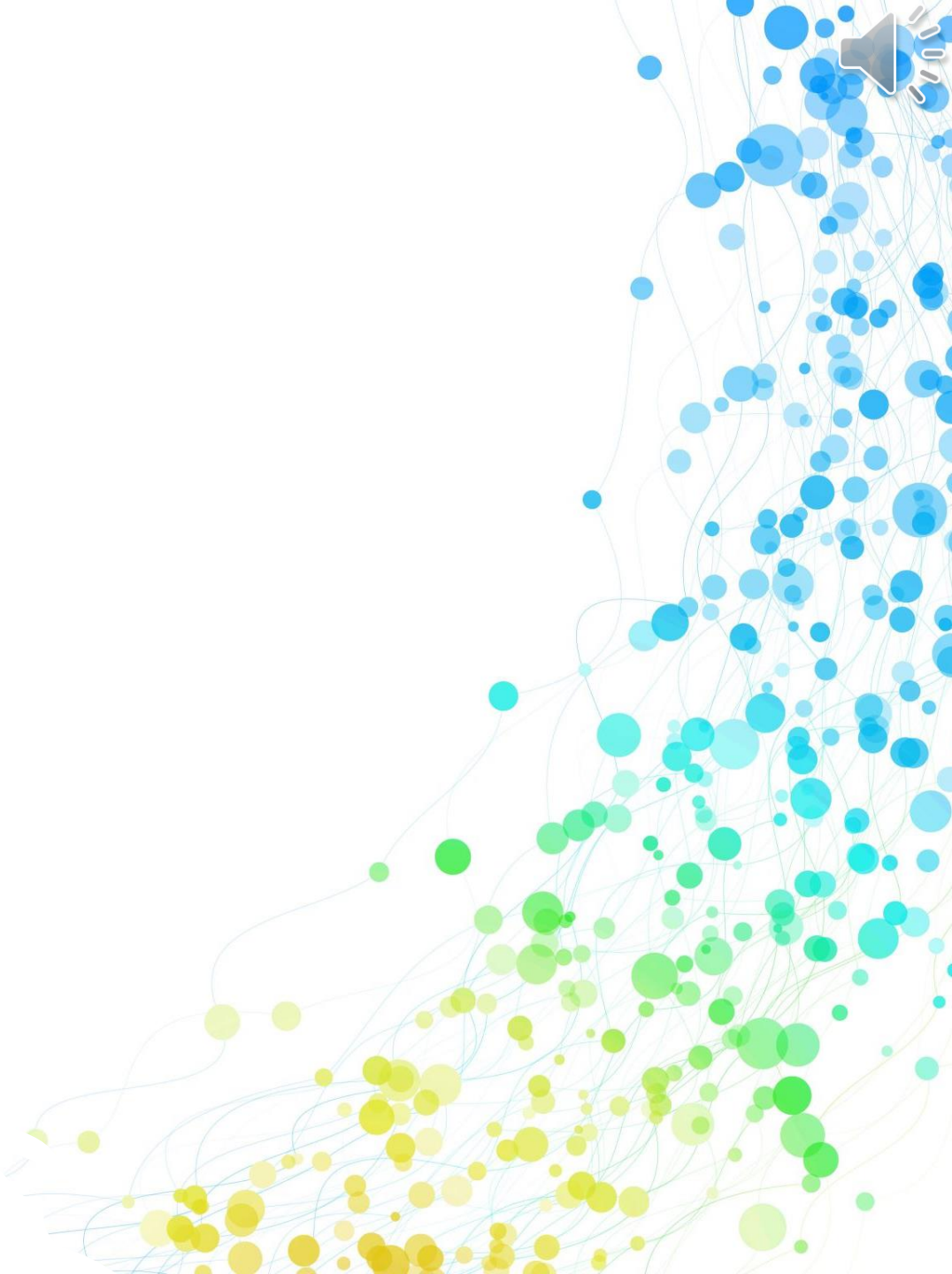
Graphics Programming

1ST WEEK, 2021



Example: Draw a Triangle

- Each application consists of (at least) two files
  - HTML file + a JavaScript file

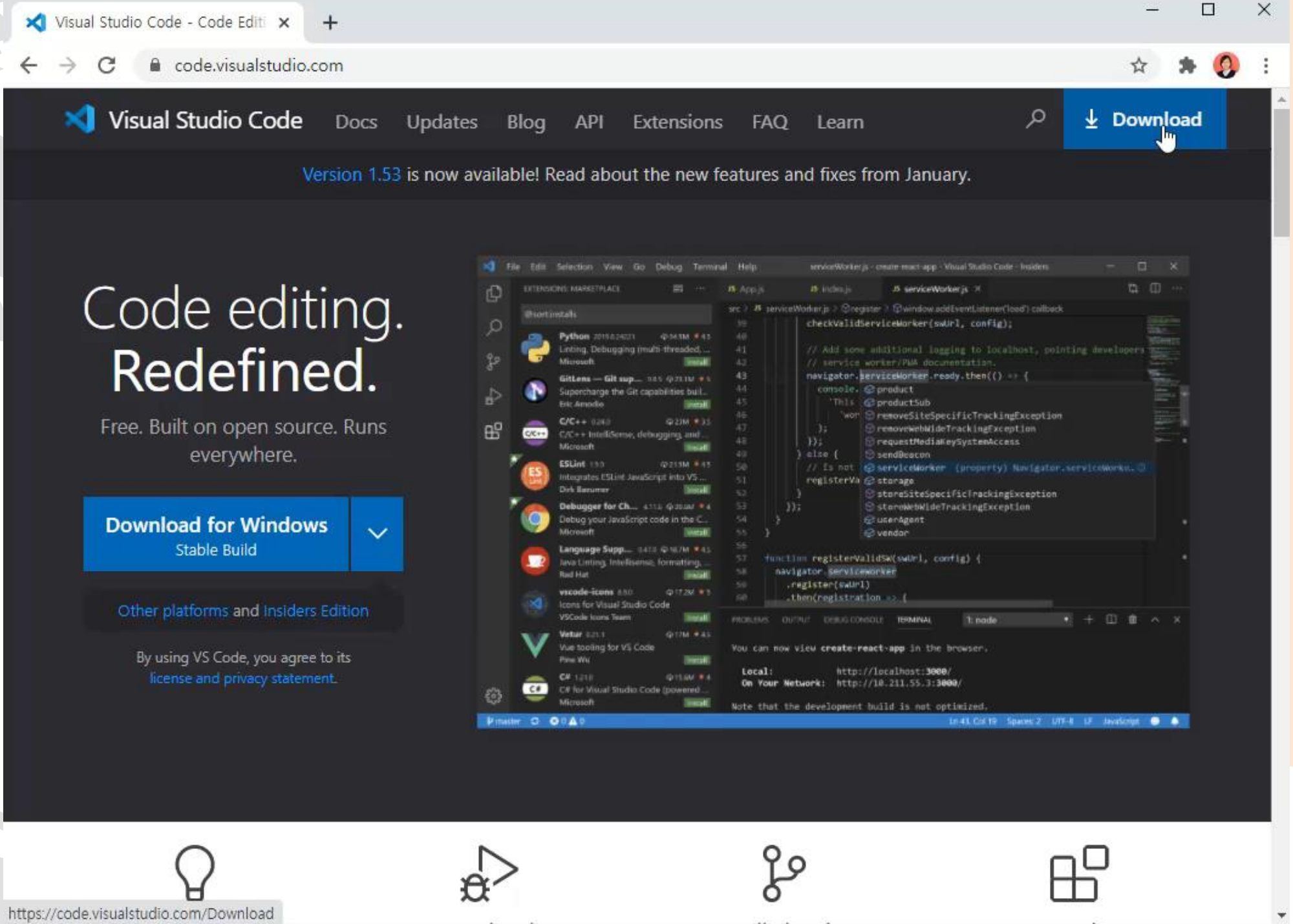
- HTML
  - Describes page
  - Includes utilities
  - Includes shaders

- Java Script
  - Contains the graphics

Coding in WebGL

- Can run WebGL on any recent browser
  - Chrome
  - Firefox
  - Safari
  - IE
- Code written in JavaScript
- JS runs within browser
  - Use local resources

Install Visual Studio Code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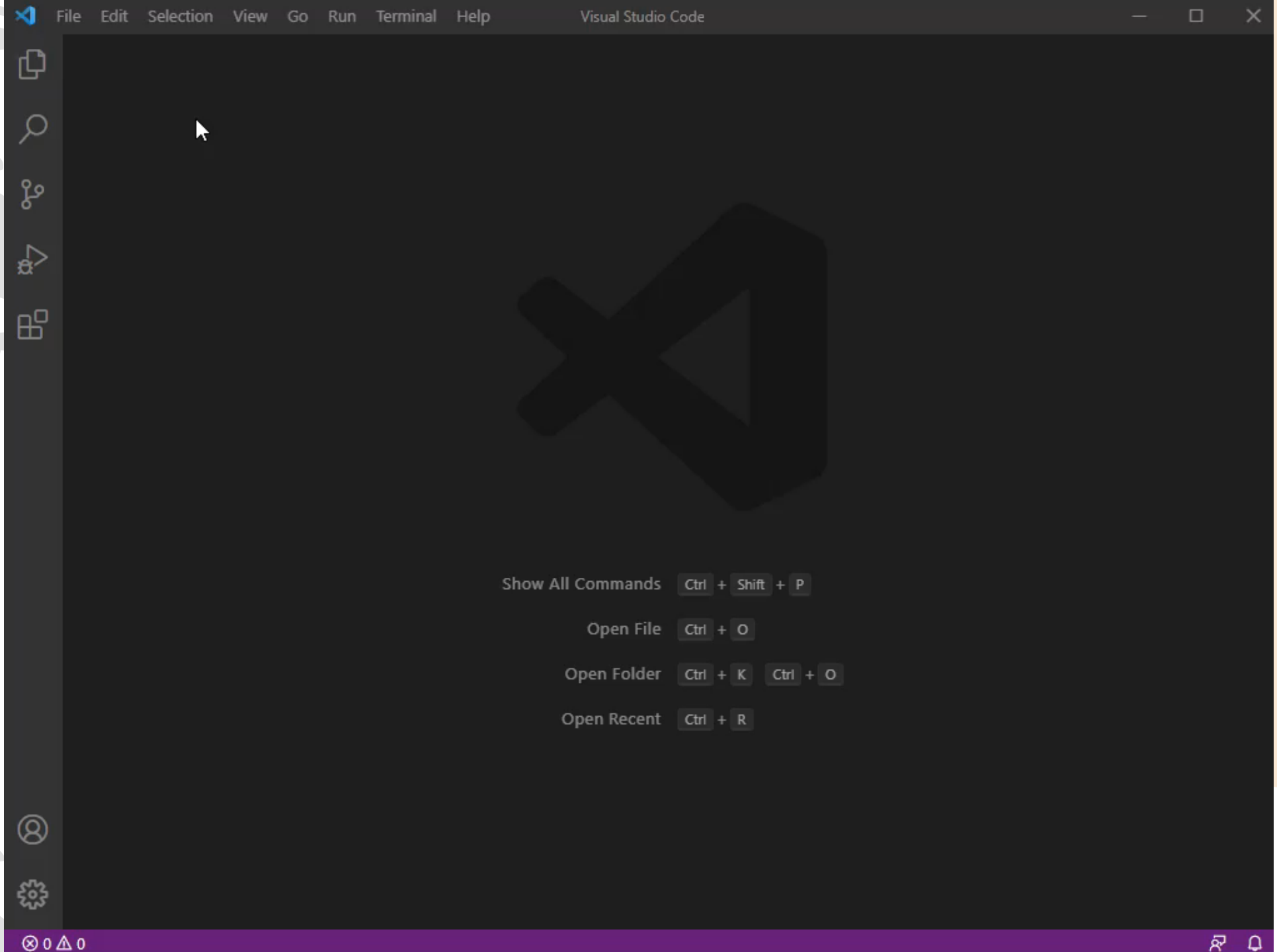
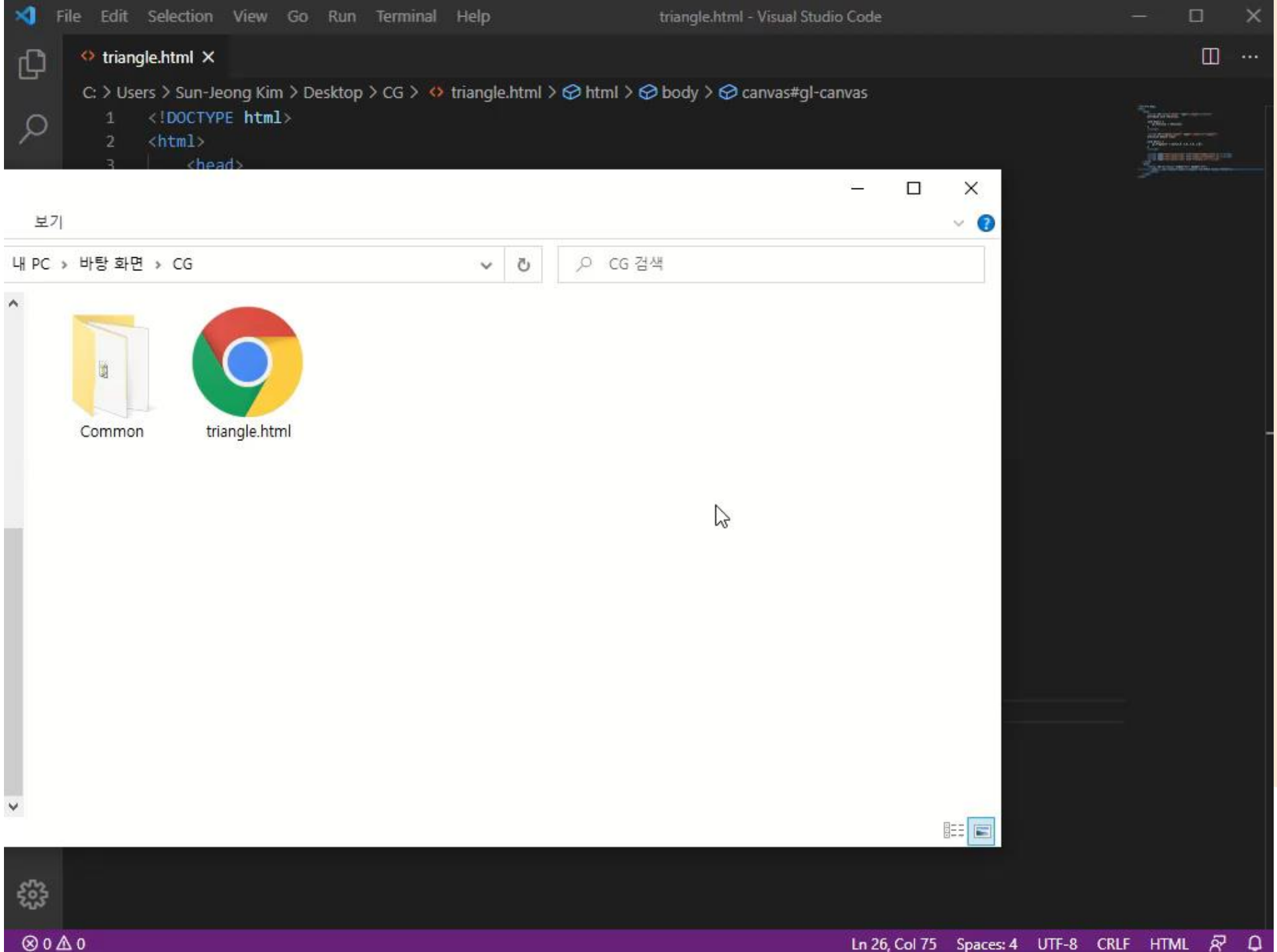
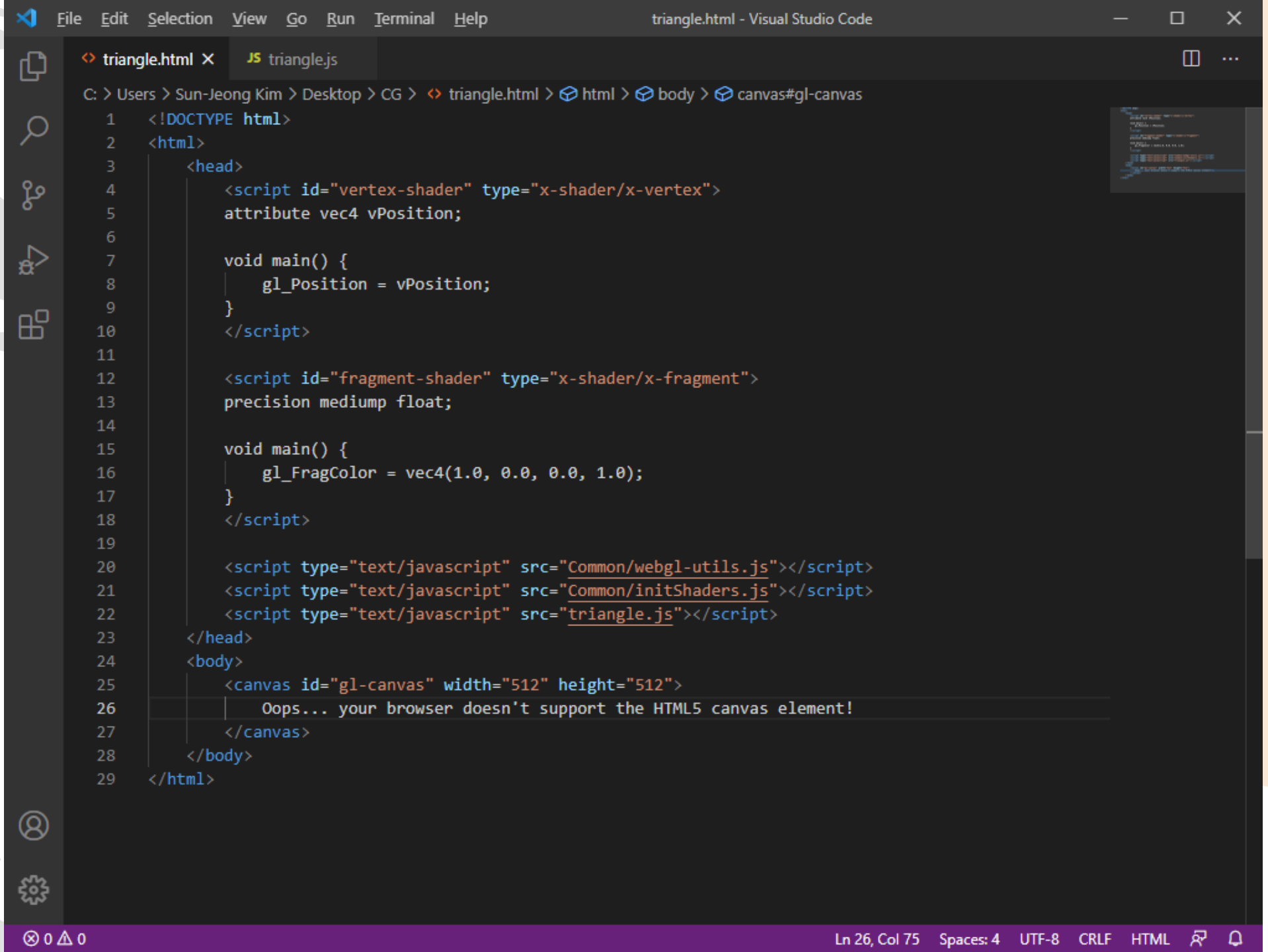
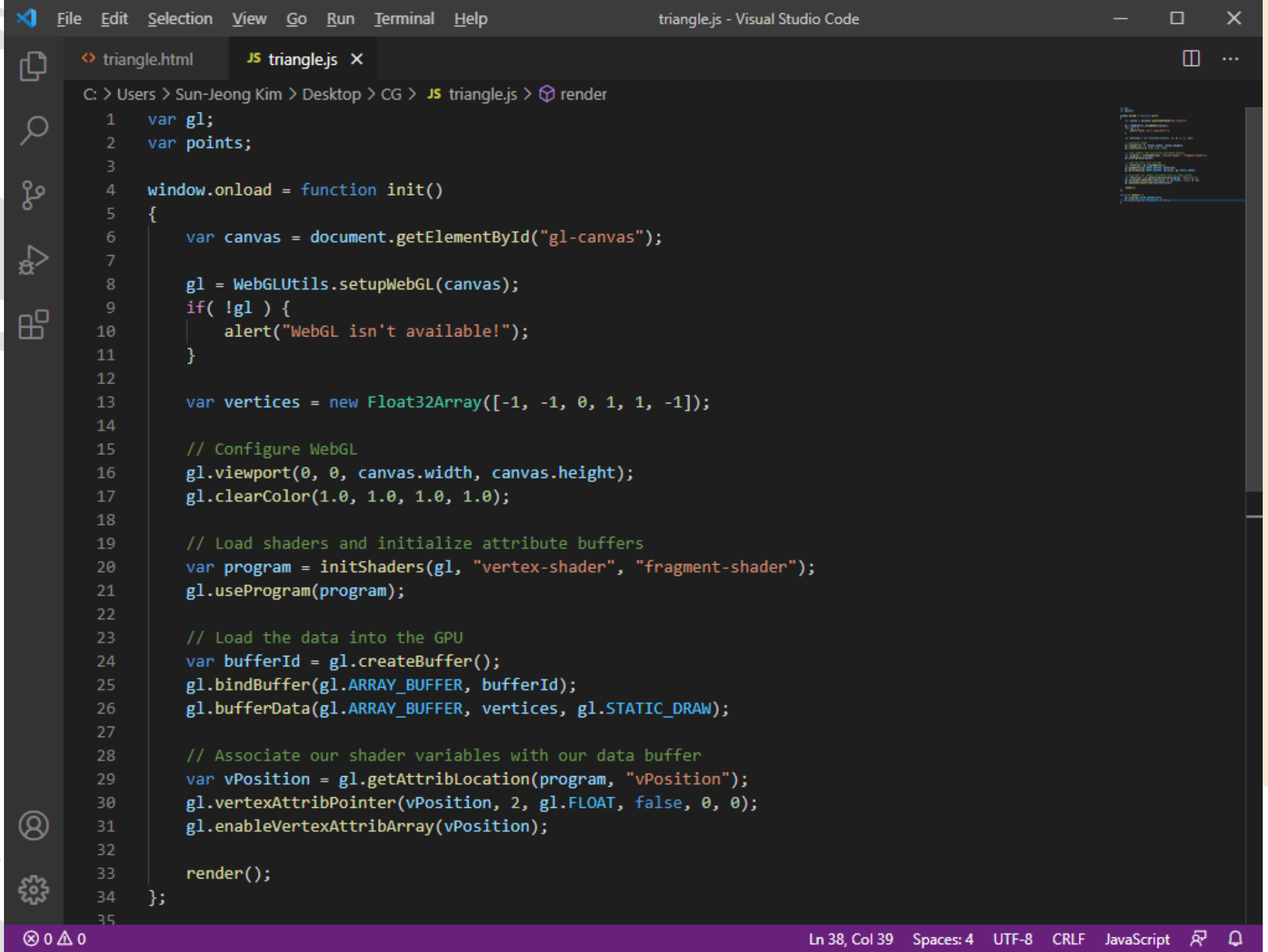
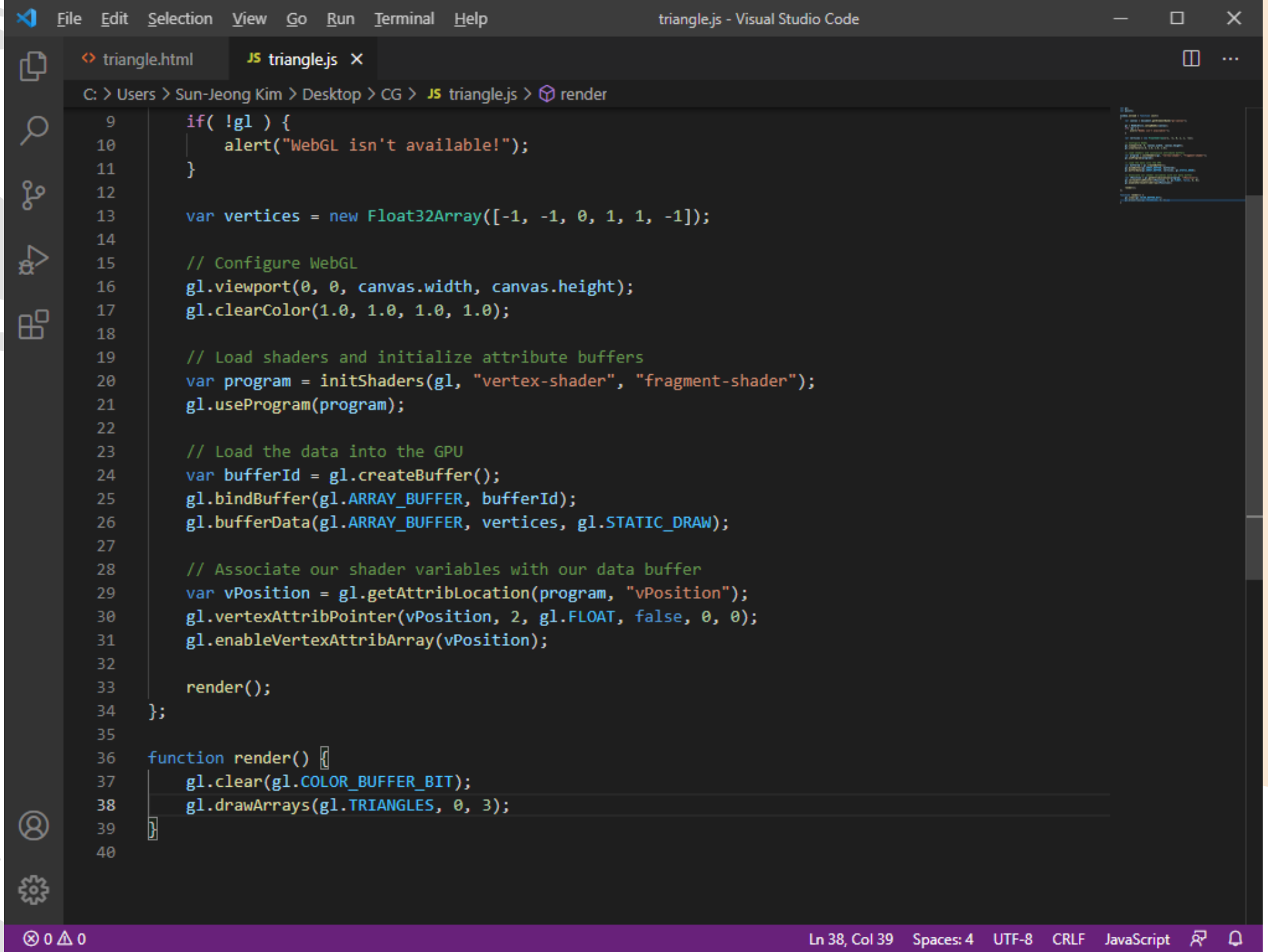

File Edit Selection View Go Run Terminal Help
Visual Studio Code
Show All Commands Ctrl + Shift + P
Open File Ctrl + O
Open Folder Ctrl + K Ctrl + O
Open Recent Ctrl + R
0 0


File Edit Selection View Go Run Terminal Help
triangle.html - Visual Studio Code
triangle.html
C: > Users > Sun-Jeong Kim > Desktop > CG > triangle.html > html > body > canvas#gl-canvas
1 <!DOCTYPE html>
2 <html>
보기
내 PC › 바탕 화면 › CG
CG 검색
Common
triangle.html
Ln 26, Col 75 Spaces: 4 UTF-8 CRLF HTML


File Edit Selection View Go Run Terminal Help
triangle.html - Visual Studio Code
triangle.html
triangle.js
C: > Users > Sun-Jeong Kim > Desktop > CG > triangle.html > html > body > canvas#gl-canvas
1 <!DOCTYPE html>
2 <html>
3 <head>
4 <script id="vertex-shader" type="x-shader/x-vertex">
5 attribute vec4 vPosition;
6
7 void main() {
8 gl_Position = vPosition;
9 }
10 </script>
11
12 <script id="fragment-shader" type="x-shader/x-fragment">
13 precision mediump float;
14
15 void main() {
16 gl_FragColor = vec4(1.0, 0.0, 0.0, 1.0);
17 }
18 </script>
19
20 <script type="text/javascript" src="Common/webgl-utils.js"></script>
21 <script type="text/javascript" src="Common/initShaders.js"></script>
22 <script type="text/javascript" src="triangle.js"></script>
23 </head>
24 <body>
25 <canvas id="gl-canvas" width="512" height="512">
26 Oops... your browser doesn't support the HTML5 canvas element!
27 </canvas>
28 </body>
29 </html>
Ln 26, Col 75 Spaces: 4 UTF-8 CRLF HTML


File Edit Selection View Go Run Terminal Help
triangle.js - Visual Studio Code
triangle.html
triangle.js
C: > Users > Sun-Jeong Kim > Desktop > CG > triangle.js > render
1 var gl;
2 var points;
3
4 window.onload = function init()
5 {
6 var canvas = document.getElementById("gl-canvas");
7
8 gl = WebGLUtils.setupWebGL(canvas);
9 if(!gl) {
10 alert("WebGL isn't available!");
11 }
12
13 var vertices = new Float32Array([-1, -1, 0, 1, 1, -1]);
14
15 // Configure WebGL
16 gl.viewport(0, 0, canvas.width, canvas.height);
17 gl.clearColor(1.0, 1.0, 1.0, 1.0);
18
19 // Load shaders and initialize attribute buffers
20 var program = initShaders(gl, "vertex-shader", "fragment-shader");
21 gl.useProgram(program);
22
23 // Load the data into the GPU
24 var bufferId = gl.createBuffer();
25 gl.bindBuffer(gl.ARRAY_BUFFER, bufferId);
26 gl.bufferData(gl.ARRAY_BUFFER, vertices, gl.STATIC_DRAW);
27
28 // Associate our shader variables with our data buffer
29 var vPosition = gl.getAttribLocation(program, "vPosition");
30 gl.vertexAttribPointer(vPosition, 2, gl.FLOAT, false, 0, 0);
31 gl.enableVertexAttribArray(vPosition);
32
33 render();
34 };
35
⊗ 0 ⚠ 0
Ln 38, Col 39 Spaces: 4 UTF-8 CRLF JavaScript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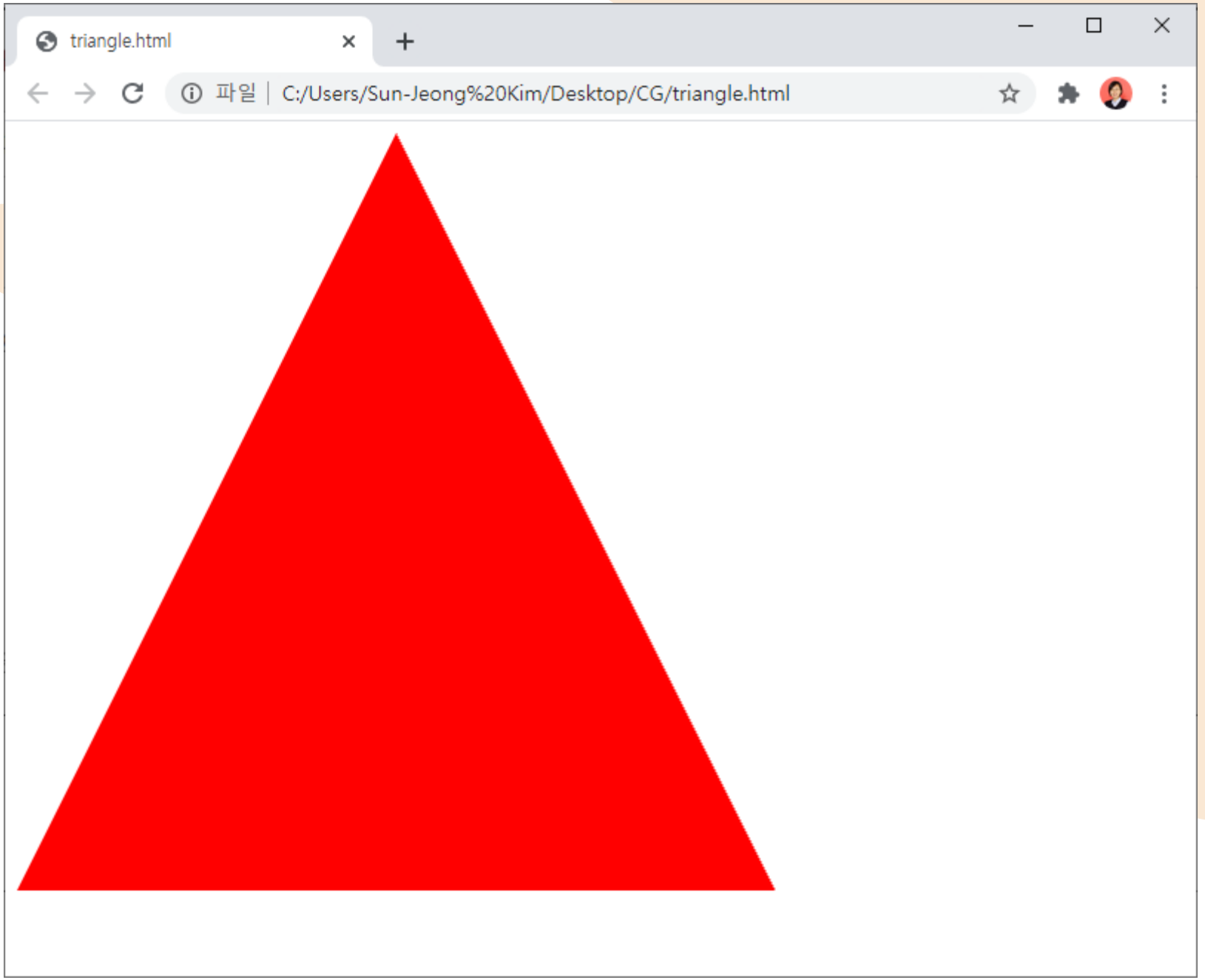
gl.vertexAttribPointer(vPosition, 2, gl.FLOAT, false, 0, 0);
gl.enableVertexAttribArray(vPosition);
render();
};
function render() {
gl.clear(gl.COLOR_BUFFER_BIT);
gl.drawArrays(gl.TRIANGLES, 0, 3);
}
⊗ 0 ⚠ 0
Ln 38, Col 39 Spaces: 4 UTF-8 CRLF JavaScript


triangle.html
파일 | C:/Users/Sun-Jeong%20Kim/Desktop/CG/triangle.html

연습 문제 (1)

- 배경색을 변경해보시오.
  - 예) 흰색 → 검정색

- 삼각형의 색상을 변경해보시오.
  - 예) 빨강 → 파랑색