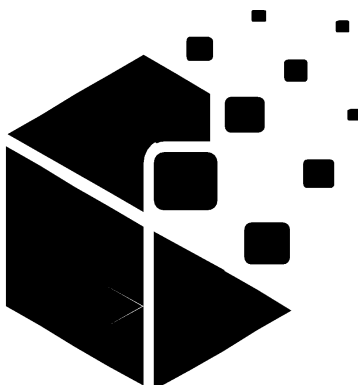# Contilio Code Challenge

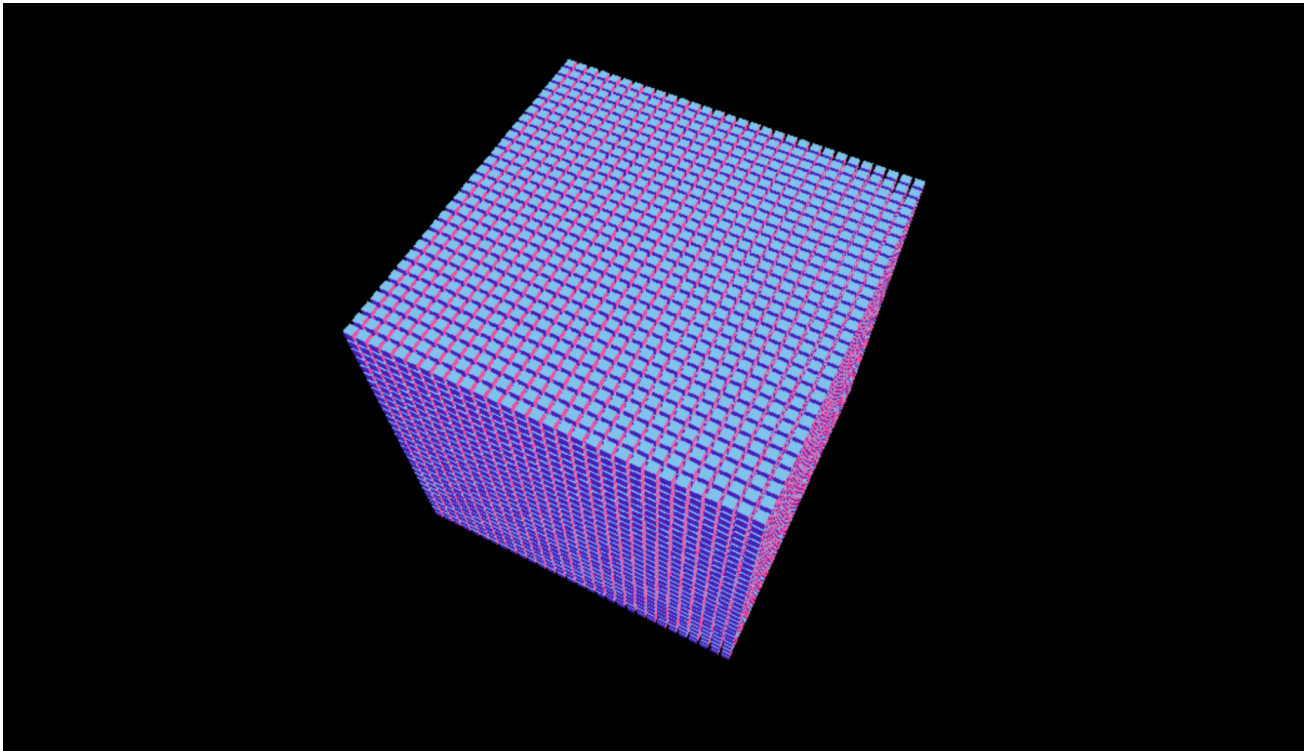**Three.js (add-on challenge)**

Estimated completion time: 10 minutes

Last updated: 21/06/2022

60fps Challenge

The code below renders 27,000 small cubes arranged 30 x 30 x 30 to make a larger cube, but it runs very slowly, at around 10fps or less on an average PC.

The Challenge

Copy the code below into an *index.html* file and edit it so that the output looks and animates in exactly the same way, but runs at a consistent 60fps.

```
<!DOCTYPE html>
<html lang="en">

<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <meta http-equiv="X-UA-Compatible" content="ie=edge">
  <title>Contilio Three.js Code Challenge</title>
  <style>
    * {
      margin: 0;
      padding: 0;
      overflow: hidden;
    }
  </style>
</head>

<body>
  <script
src="https://cdnjs.cloudflare.com/ajax/libs/three.js/r134/three.min.js"></script>
  <script>
    let width = window.innerWidth;
    let height = window.innerHeight;
```

```
    let renderer = new THREE.WebGLRenderer();
    renderer.setSize(width, height);
    document.body.appendChild(renderer.domElement);

    let scene = new THREE.Scene();
    let camera = new THREE.PerspectiveCamera(45, width / height, 0.1, 10000);

    camera.position.z = 75;
    scene.add(camera);

    let light = new THREE.PointLight(0xffffff);
    light.position.set(-100, 200, 100);
    scene.add(light);

    let group = new THREE.Group();

    for (let x = 0; x < 30; x++) {
      for (let y = 0; y < 30; y++) {
        for (let z = 0; z < 30; z++) {
          let geometry = new THREE.BoxGeometry(0.75, 0.75, 0.75);
          let material = new THREE.MeshNormalMaterial();
          let mesh = new THREE.Mesh(geometry, material);

          mesh.position.set(x - 15, y - 15, z - 15);
          group.add(mesh);
        }
      }
    }

    scene.add(group);

    function resize() {
      width = window.innerWidth;
      height = window.innerHeight;

      renderer.setSize(width, height);
      camera.aspect = width / height;
      camera.updateProjectionMatrix();
    }

    function animate() {
      renderer.render(scene, camera);
      group.rotation.x += 0.002;
      group.rotation.y += 0.004;
      requestAnimationFrame(animate);
    }

    resize();
    animate();
    window.addEventListener('resize', resize);
  </script>
</body>

</html>
```

Running the code

The easiest way to run the code is to install *serve* globally using NPM, then call it in the same folder as your *index.html* file:

1. *npm i -g serve*
2. *serve -l 1234*

Notes

Please do not spend more than 30 minutes trying to complete this challenge.

If you wish to do so, you are welcome to include one or more [utility classes](#) from the [Three.js repository](#) in your solution (optional).