CS460 Fall 2019
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Assignment 3: Three.js Cubes ... and other geometries

We will use Three.js to create multiple different geometries in an interactive fashion.

In class, we learned how to create a `THREE.Mesh` by combining the `THREE.BoxBufferGeometry` and the `THREE.MeshStandardMaterial`. We also learned how to *unproject* a mouse click from 2D (viewport / screen space) to a 3D position. This way, we were able use the `window.onclick` callback to move a cube to a new position in the 3D scene. Now, we will extend our code.

The goal of this assignment is to create multiple different geometries by clicking in the viewport. This means, rather than moving an existing mesh, we will create new ones in the `window.onclick` callback. On each click, our code will randomly choose a different geometry and a random color to place the object at the current mouse position.

We will be using six different geometries. Before we start coding, we want to understand their parameters. Please complete the table below. You can find this information in the Three.js documentation at `https://threejs.org/docs/` (scroll down to Geometries). In most cases, we only care about the first few parameters (**please replace the Xs**).

Constructor	Parameters
THREE.BoxBufferGeometry	(width, height, depth)
THREE.TorusKnotBufferGeometry	(radius, tube, tubularSegments, radialSegments)
THREE.SphereBufferGeometry	(radius, widthSegments, heightSegments)
THREE.OctahedronBufferGeometry	(radius)
THREE.ConeBufferGeometry	(radius, height)
THREE.RingBufferGeometry	(innerRadius, outerRadius, thetaSegment)

Please write code to create one of these six geometries with a random color on each click at the current mouse position. We will use the SHIFT-key to distinguish between geometry placement and regular camera movement. Copy the starter code from `https://cs460.org/shortcuts/08/` and save it as **03/index.html** in your github fork. This code includes the `window.onclick` callback, the SHIFT-key condition, and the `unproject` functionality.

After six clicks, if you are lucky and you don't have duplicate shapes, this could be your result:

Please make sure that your code is accessible through Github Pages. Also, please commit this PDF and your final code to your Github fork, and submit a pull request.

Link to your assignment: `YOUR_GITHUB_PAGES_URL`

Bonus (33 points):

Part 1 (5 points): Do you observe Z-Fighting? If yes, when?

Yes, I observe Z-Fighting and I observe it when you stack two of the same shape on top of each other.

Part 2 (10 points): Please change `window.onclick` to `window.onmousemove`. Now, holding `SHIFT` and moving the mouse draws a ton of shapes. Submit your changed code as part of your `03/index.html` file and **please replace the screenshot below with your drawing**.
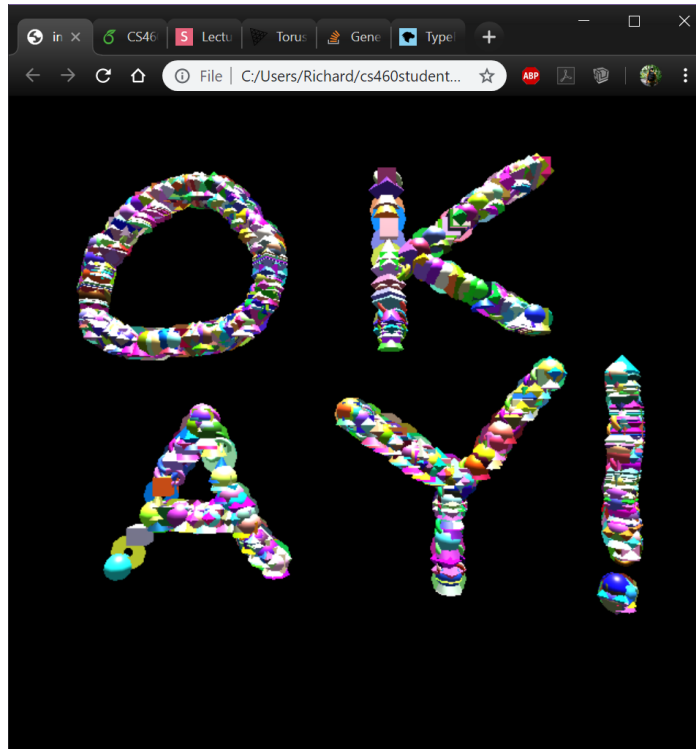
Part 3 (18 points): Please keep track of the number of placed objects and print the count in the JavaScript console. Now, with the change to `window.onmousemove`, after how many objects do you see a slower rendering performance?

It was taking a while to recognize any slowdown in the rendering performance until about 7000 shapes. At first, I wasn't entirely sure as to what a "slower rendering performance" would look like, but looking at the console, I could see that it was taking slower and slower for the console to print out the number of shapes it was keeping track of. I assumed this is what a slower rendering experience is.

What happens if the console is not open during drawing?

Nothing happens when the console is not open during drawing. It is the same experience and there are no noticable, if at all, changes.

Can you estimate the total number of triangles drawn as soon as slow-down occurs?

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If I were to estimate that there are 12 triangles in each shape, then I experienced a slow-down at around 7000 times 12 triangles, which is 84000 triangles.