Aspects of VR Three.JS

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Outline

Motivation

High level view and learning path

Some structure of Three.JS
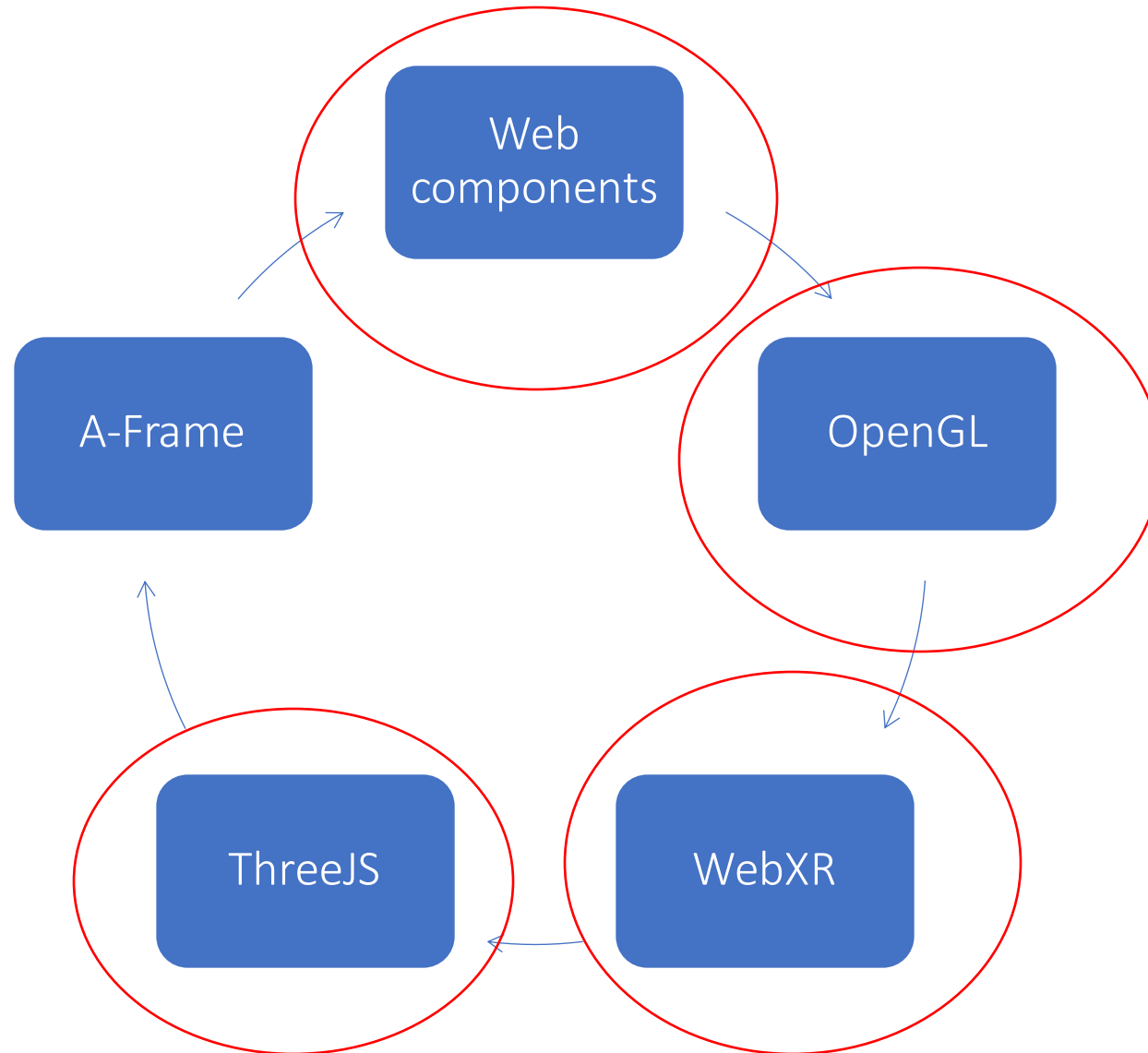
Examples

Motivation

Perhaps the most popular JavaScript graphics library

    Based on WebGL

    Leverages graphics cards

ThreeJS is built on WebXR which is built on WebGL which is built on OpenGL

High level view and learning path

Main components

Renderer

Scene

Camera

Set up

Make a directory: js

Download https://threejs.org/build/three.js
  Into js
    Windows <right-click> save as...

General Three.js code structure

Context – canvas

Camera – create, setup, position

Geometry

Materials

Lights

Mesh

Draw

Animation loop - requestAnimationFrame(render)

Update resize

Animation loop

The function **requestAnimationFrame(render)** applied to render asks the browser to animate <u>when a state change occurs</u>

```
function animate() {
    requestAnimationFrame( animate );
    square.rotation.x += 0.025;   /* state change - browser re-renders */
    renderer.render( scene, camera );
}
animate();
```

Browser re-renders by calling animate(time) !

Changing the speed of the animation loop

```
const interval = setInterval( () => { line.rotation.x += 0.1; }, 1500);
function animate(time) {
    requestAnimationFrame( animate );
    renderer.render( scene, camera );
    //console.log('Animate:' + time.toString());
}
animate();
```

Set up html

```
<!DOCTYPE html>
  <html>
    <head> <meta charset="utf-8">
    <title>My first three.js app</title>
      <style> body { margin: 0; } </style>
    </head>
  <body> <script src="js/three.js"></script>
 <script> // Our Javascript will go here. </script>
</body>
</html>
```
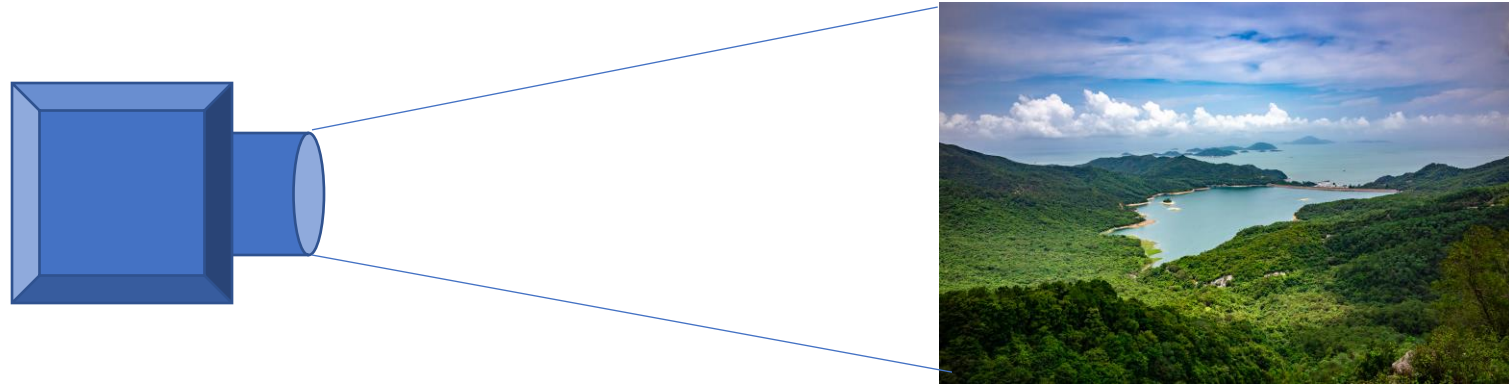
Camera

Scene

Camera

Renderer

Perspective Camera

const camera = new THREE.PerspectiveCamera(75,
window.innerWidth / window.innerHeight, 0.1, 1000);

Field of view: 75 degrees

Aspect ratio: width/height

0.1, 1000: Near, far clipping

75º

Perspective Camera()

```
camera = new THREE.PerspectiveCamera(45,
                          window.innerWidth / window.innerHeight,
                          0.1, 1000);
    // position and point the camera to the center
    camera.position.x = 15;
    camera.position.y = 16;
    camera.position.z = 13;
    camera.lookAt(scene.position);
```

THREE.Scene()

This data structure holds elements of a picture
   Also holds sub-components

Holds objects, lights, textures,

THREE.BoxGeometry(x,y,z)

   Lambert and Phong materials

THREE.WebGLRenderer() – uses canvas tag

const renderer = new THREE.WebGLRenderer();

Generating image via a model

renderer.setSize(window.innerWidth, window.innerHeight);

Fit to our screen

document.body.appendChild(renderer.domElement);

Web component

Object3D

https://github.com/mrdoob/three.js

https://threejs.org/docs/#api/en/core/Object3D

THREE.Line

THREE.CircleGeometry

const geometry = new THREE.BoxGeometry(1, 1, 1);

NPM and three

What is node? Npm?

 Installing npm, node,…

https://nodejs.org/en/download/

Windows> npx create-react-app test

Example node Three.js system

https://github.com/edwinwebb/three-seed.git

Blender – example from Ubuntu

References

https://cdn.jsdelivr.net/npm/three-orbitcontrols@2.110.1/