WebGL 3D player

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Artec Group

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MoscowJS 21

Contents

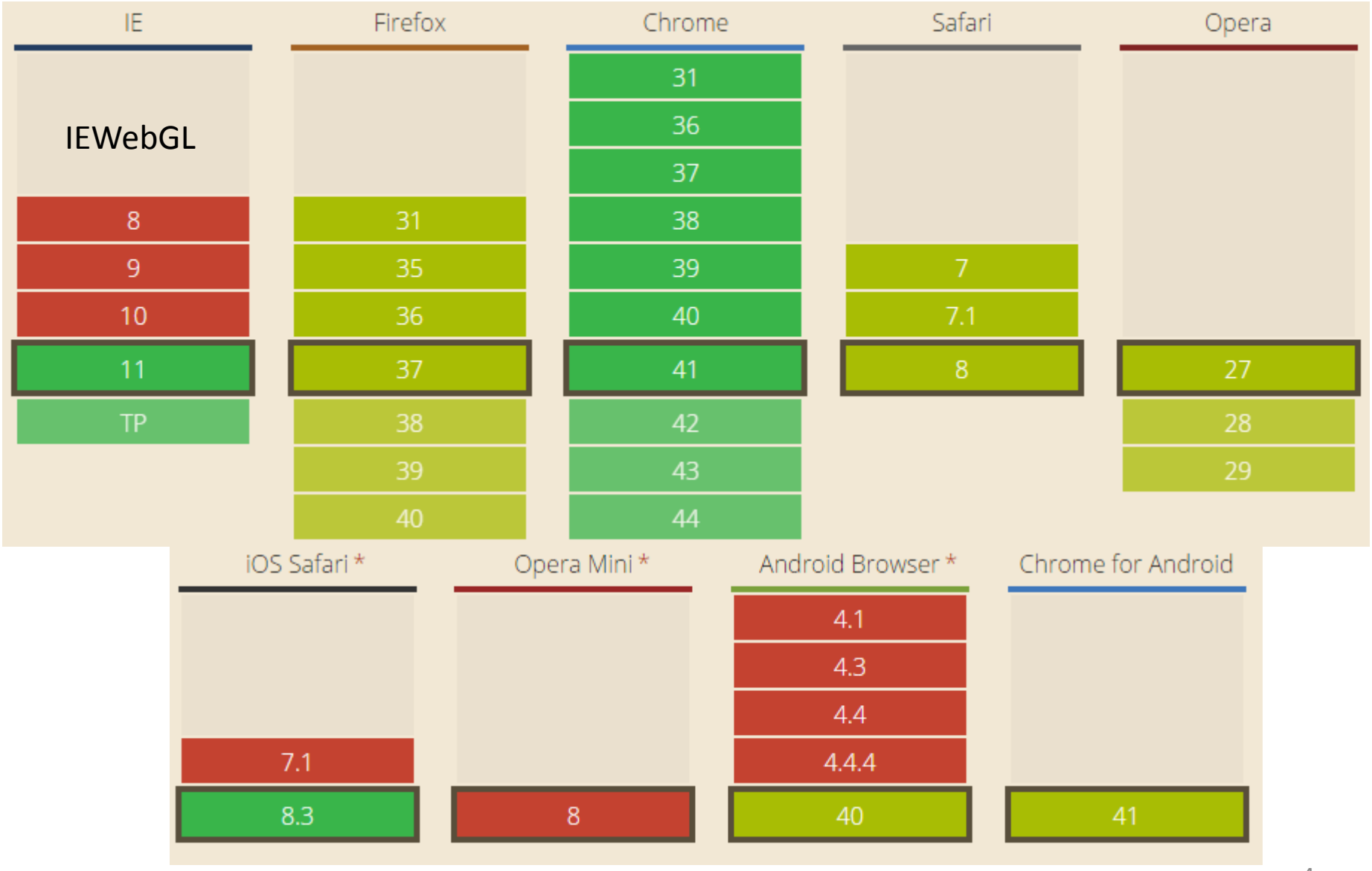
- The use of WebGL
- Advantages
- Basic concepts in 3D graphics
- Library Three.js
- Player to view 3D models

WebGL

- HTML5 <canvas>
- OpenGL ES 2.0
- GLSL ES
- 2D/3D

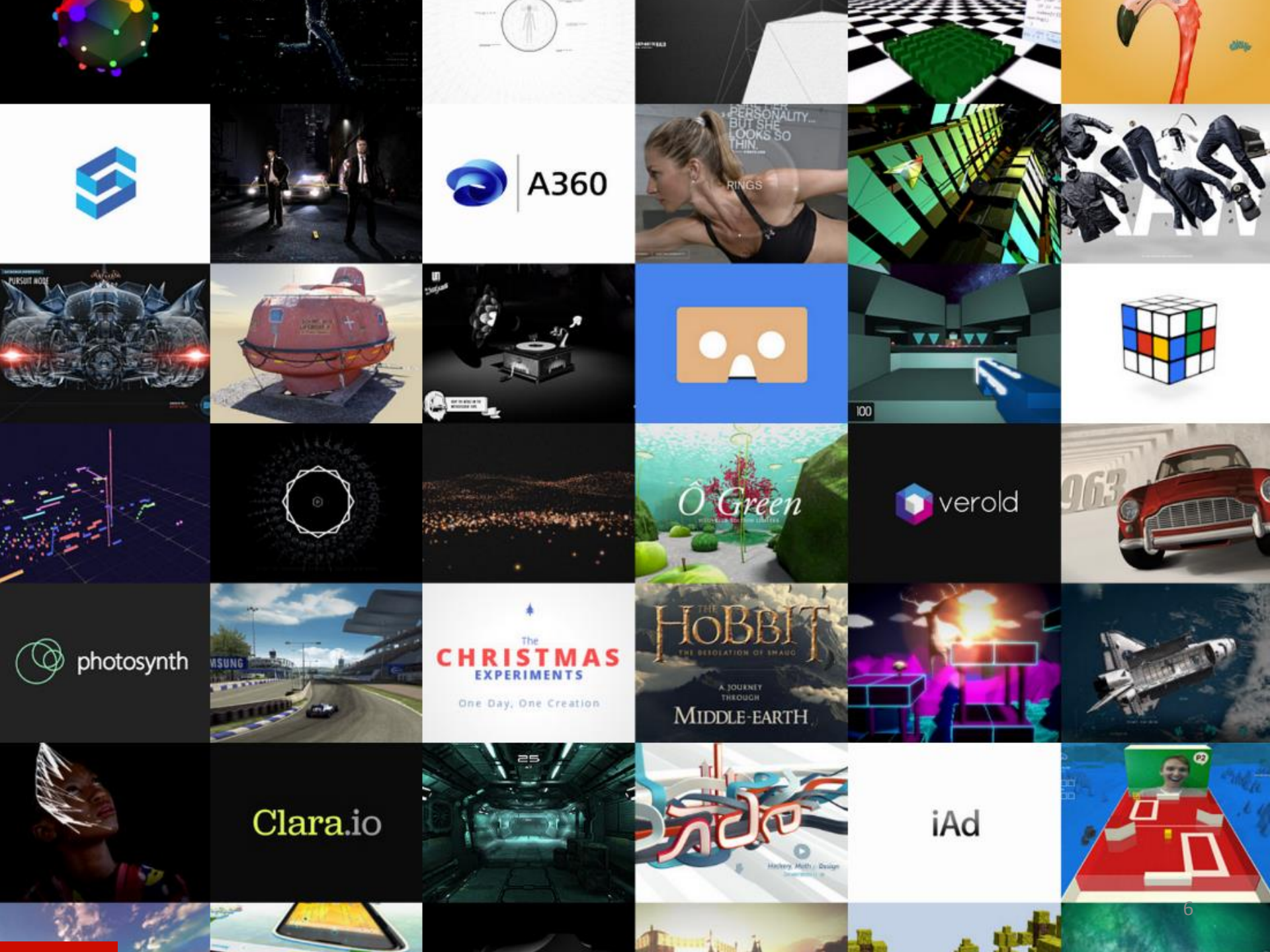
KHRONOS GROUP

caniuse.com/webgl

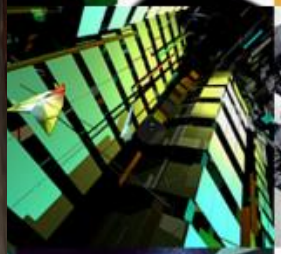


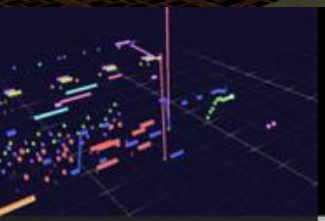
Games

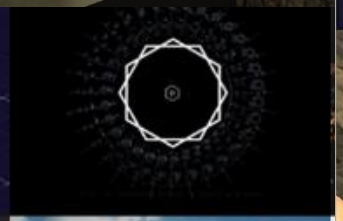
gooengine.com/pearl-boy


A360
PERSONALITY...
BUT SHE
LOOKS SO
THIN.
RINGS
PURSUIT MODE
Ô Green
verold
963
photosynth
The
CHRISTMAS
EXPERIMENTS
One Day, One Creation
THE HOBBIT
A JOURNEY
THROUGH
MIDDLE-EARTH
Clara.io
iAd


A360
PERSONALITY...
BUT SHE
LOOKS SO
THIN.
RINGS
PURSUIT MODE
18 FPS (5-27)
photosynth
Clara.io

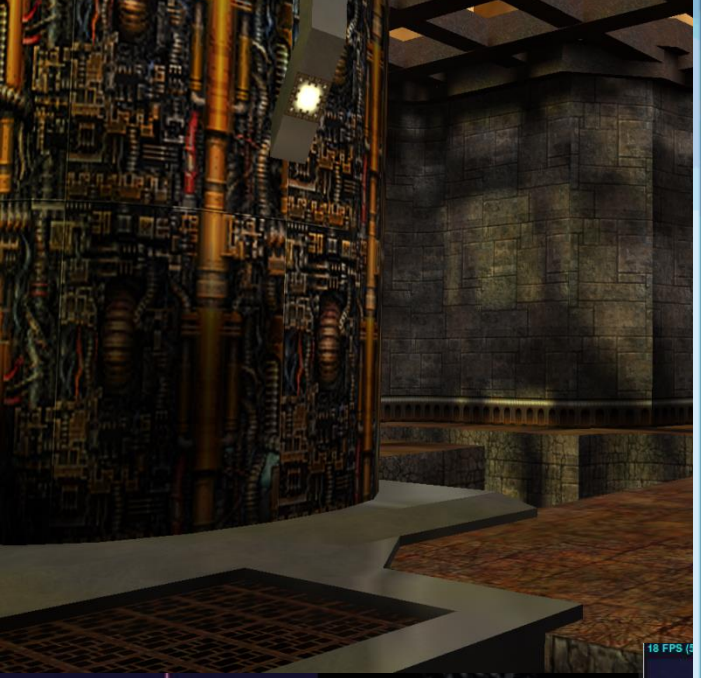


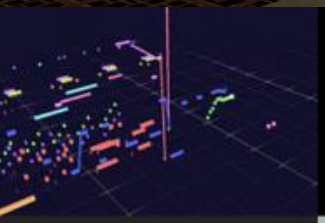


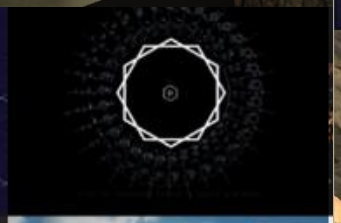


photosynth

Clara.io





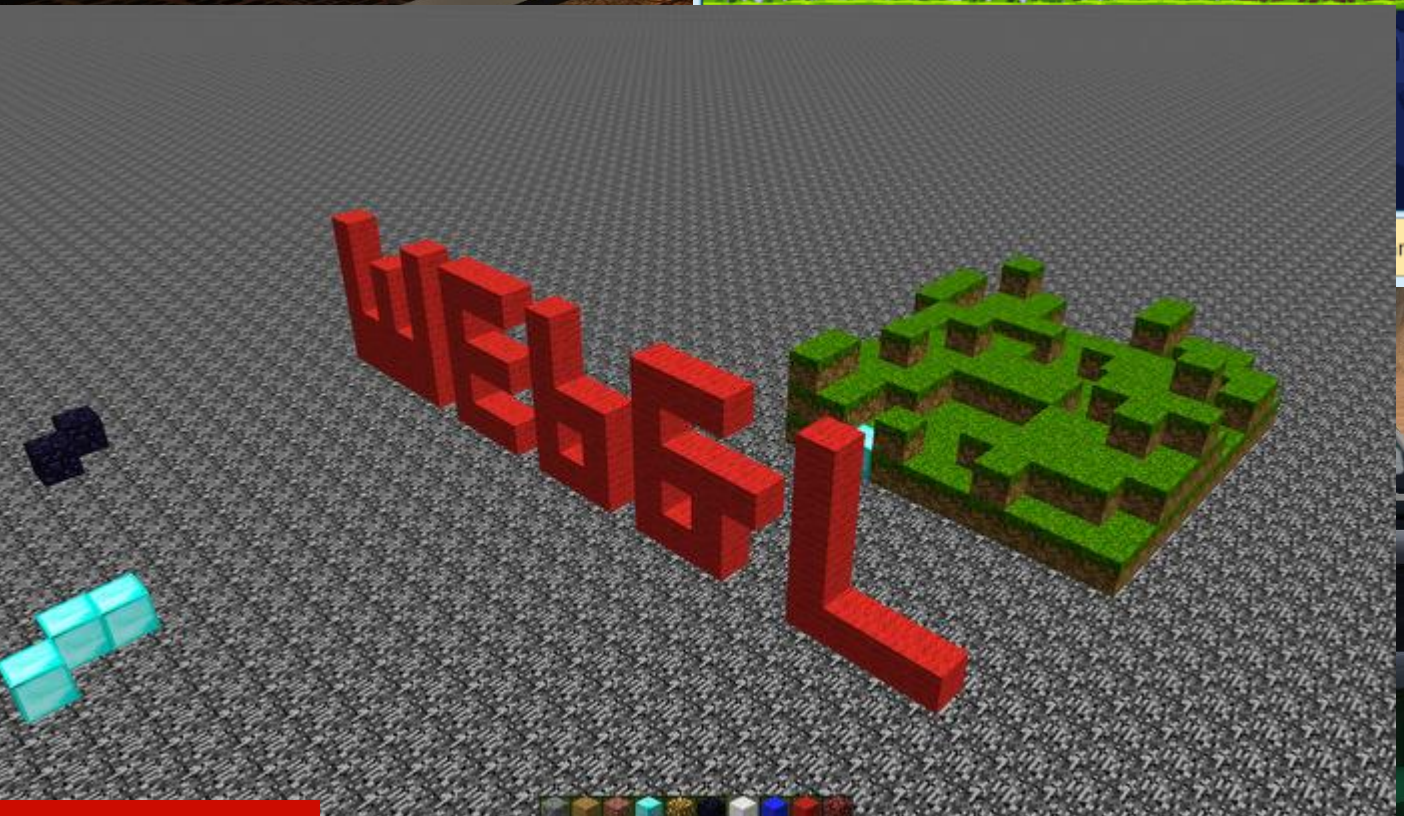


photosynth

Clara.io

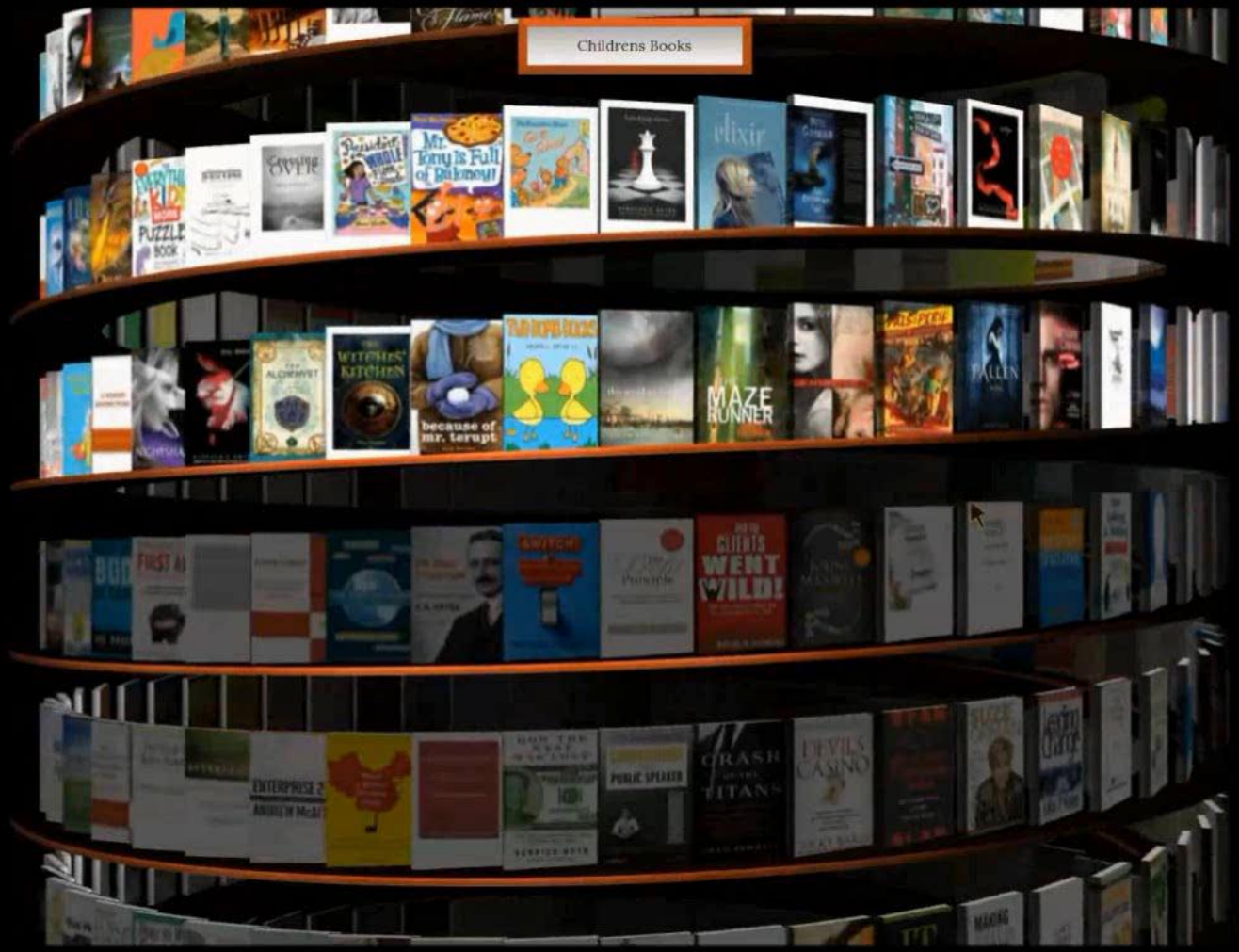
SD VERSION HD VERSION SQUAWK! Add this game to Chrome and play offline.


SCORE: 17970


WEBGL

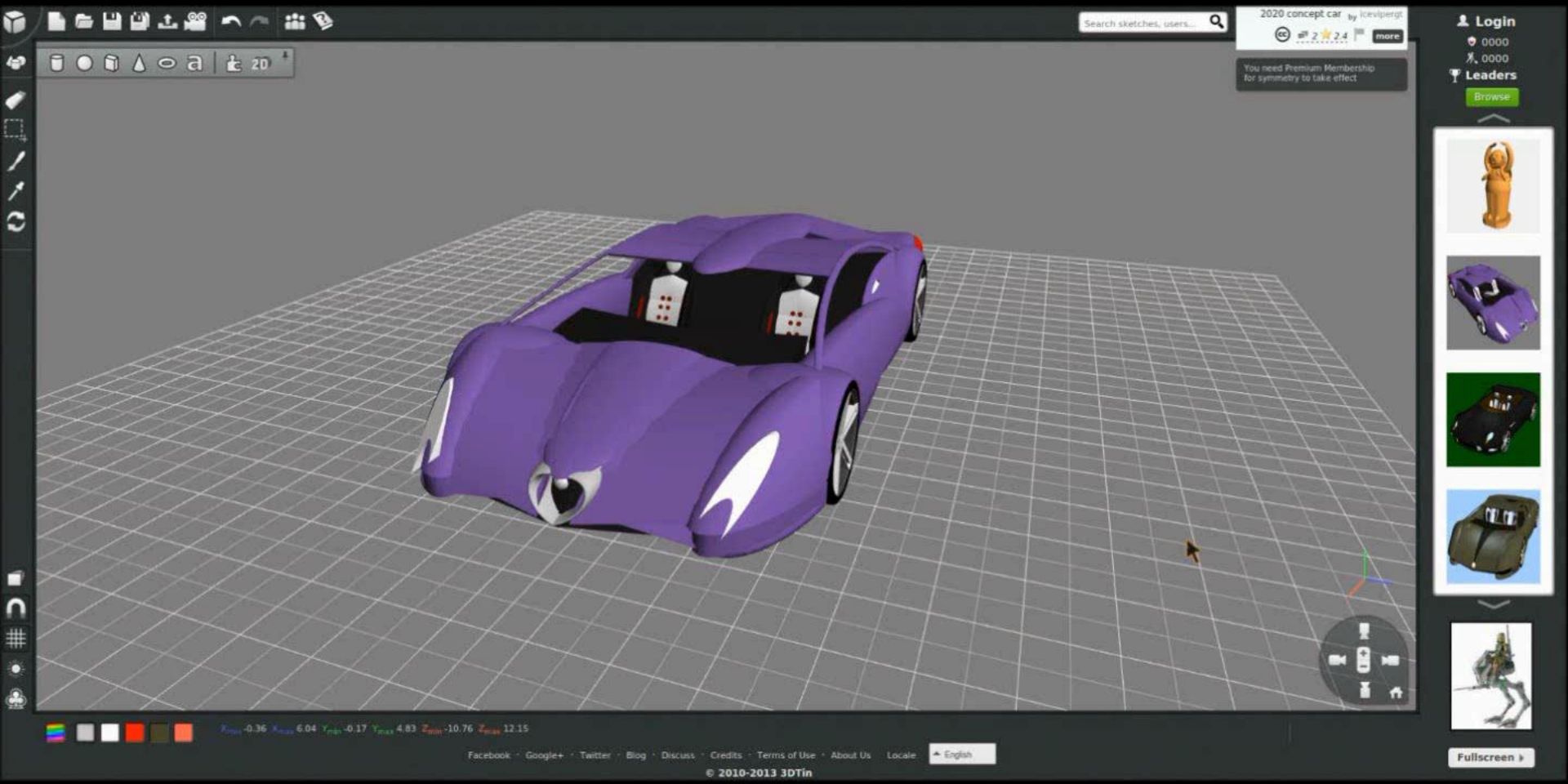

rome and play offline.

Navigation



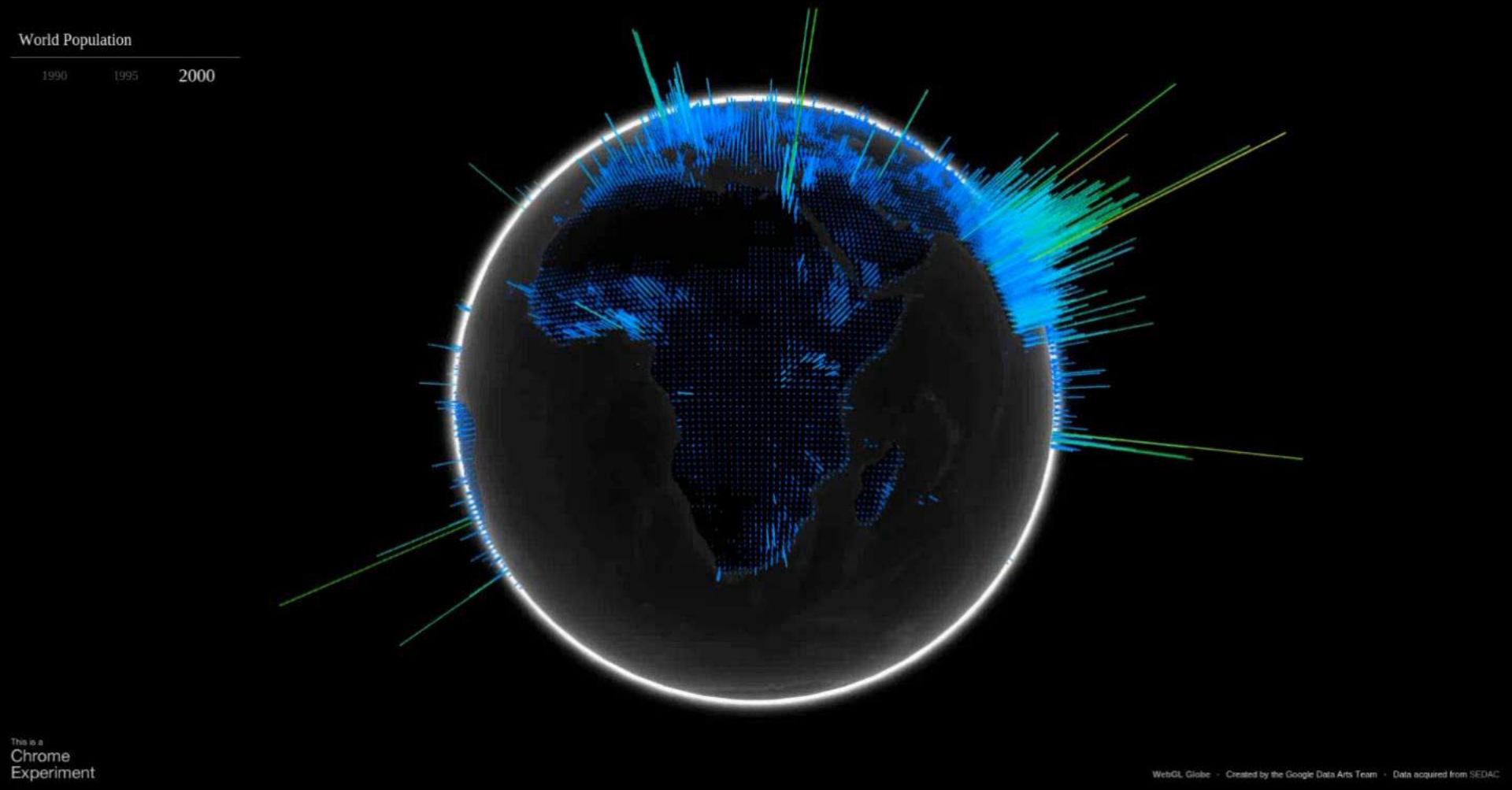
bookcase.chromeexperiments.com

Editors



3dtin.com

Infographics



globe.chromeexperiments.com

3D technology

Microsoft® Silverlight™

OpenGL™

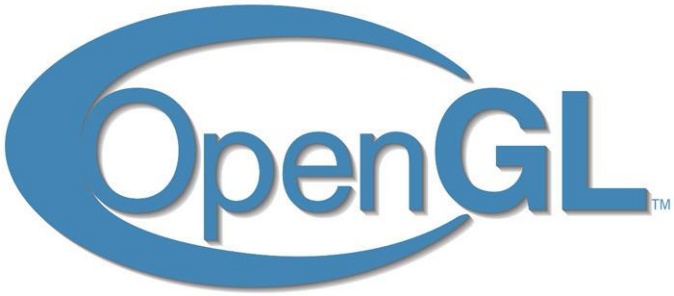
3D Technologies R&D

O3D

unity

VRML97

Advantages



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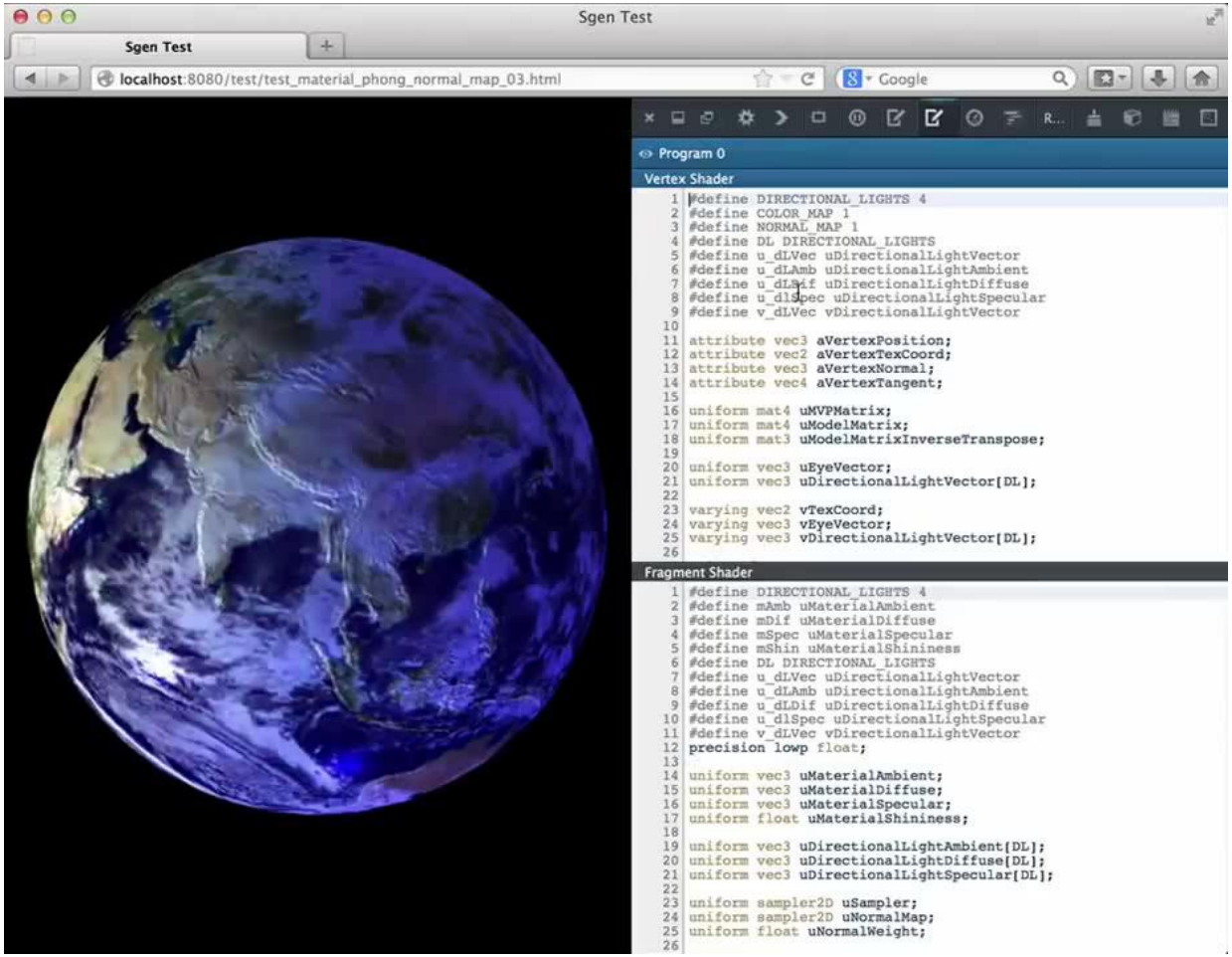
Advantages

- Open standard
- Cross-platform
- High perfomance

Advantages

- Automatic memory management
- No compilation

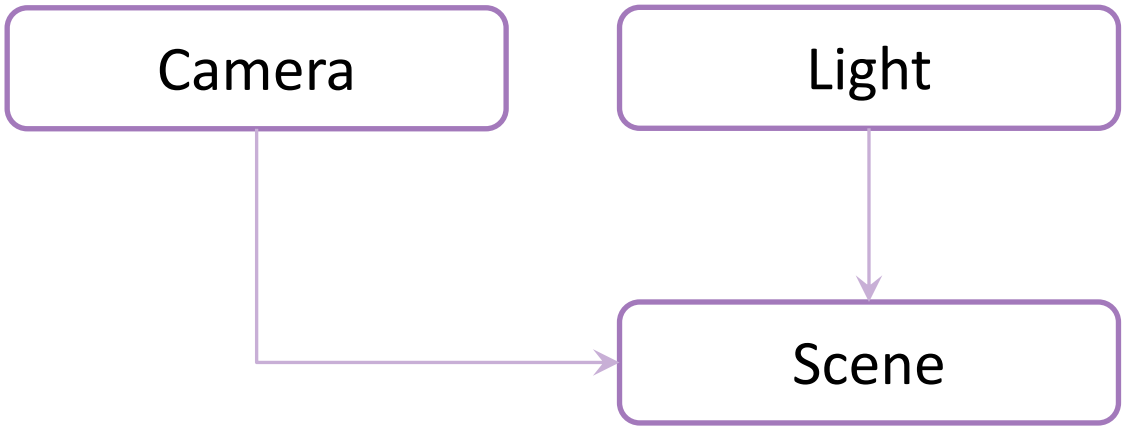


GLSL

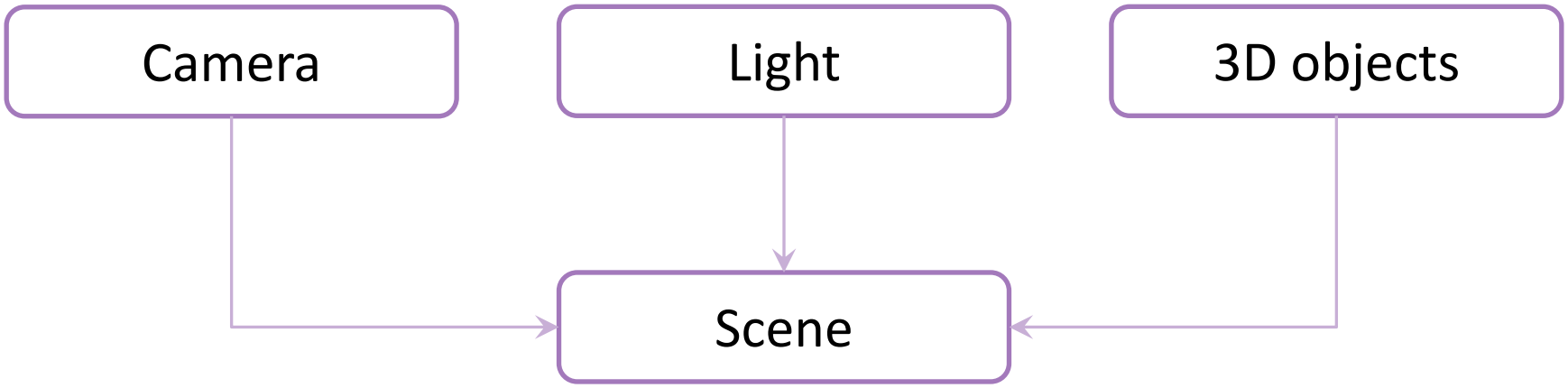
Basic concepts

- Scene
- Light
- Camera

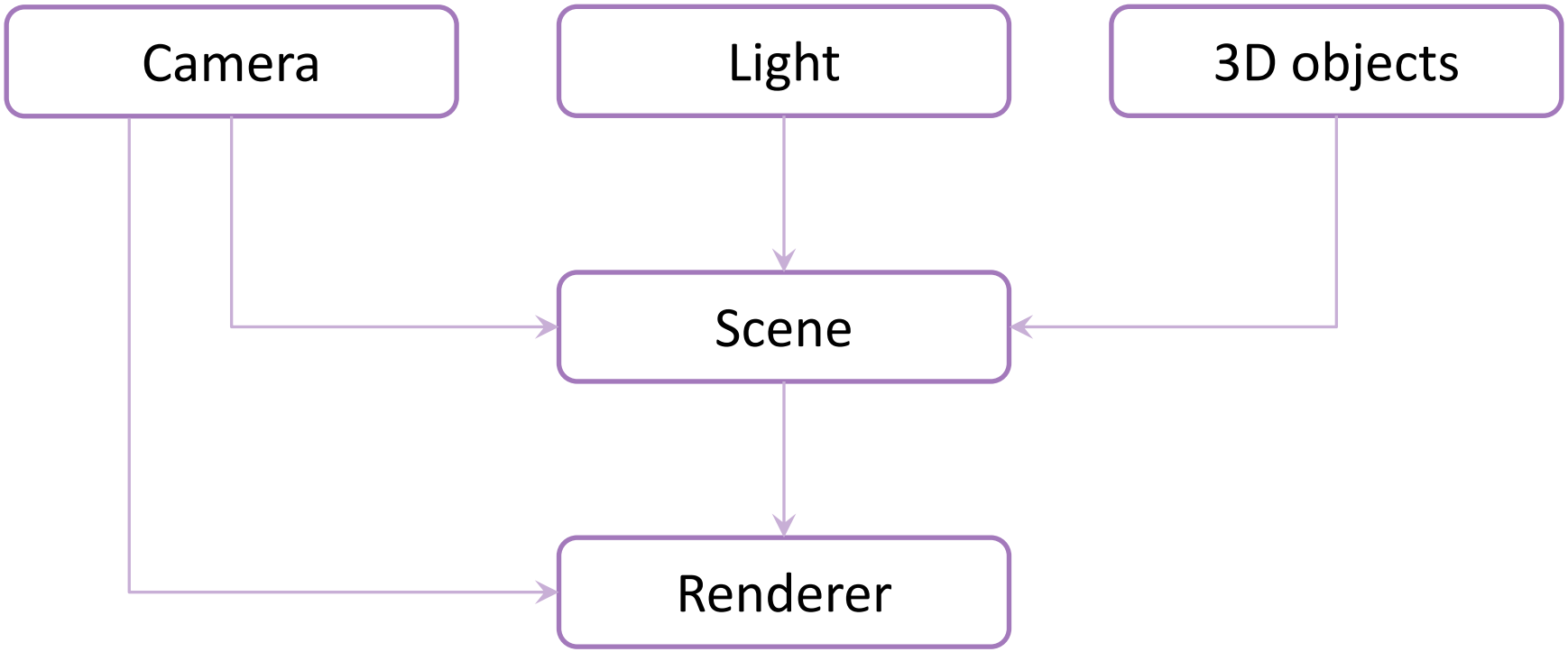
Interconnection objects



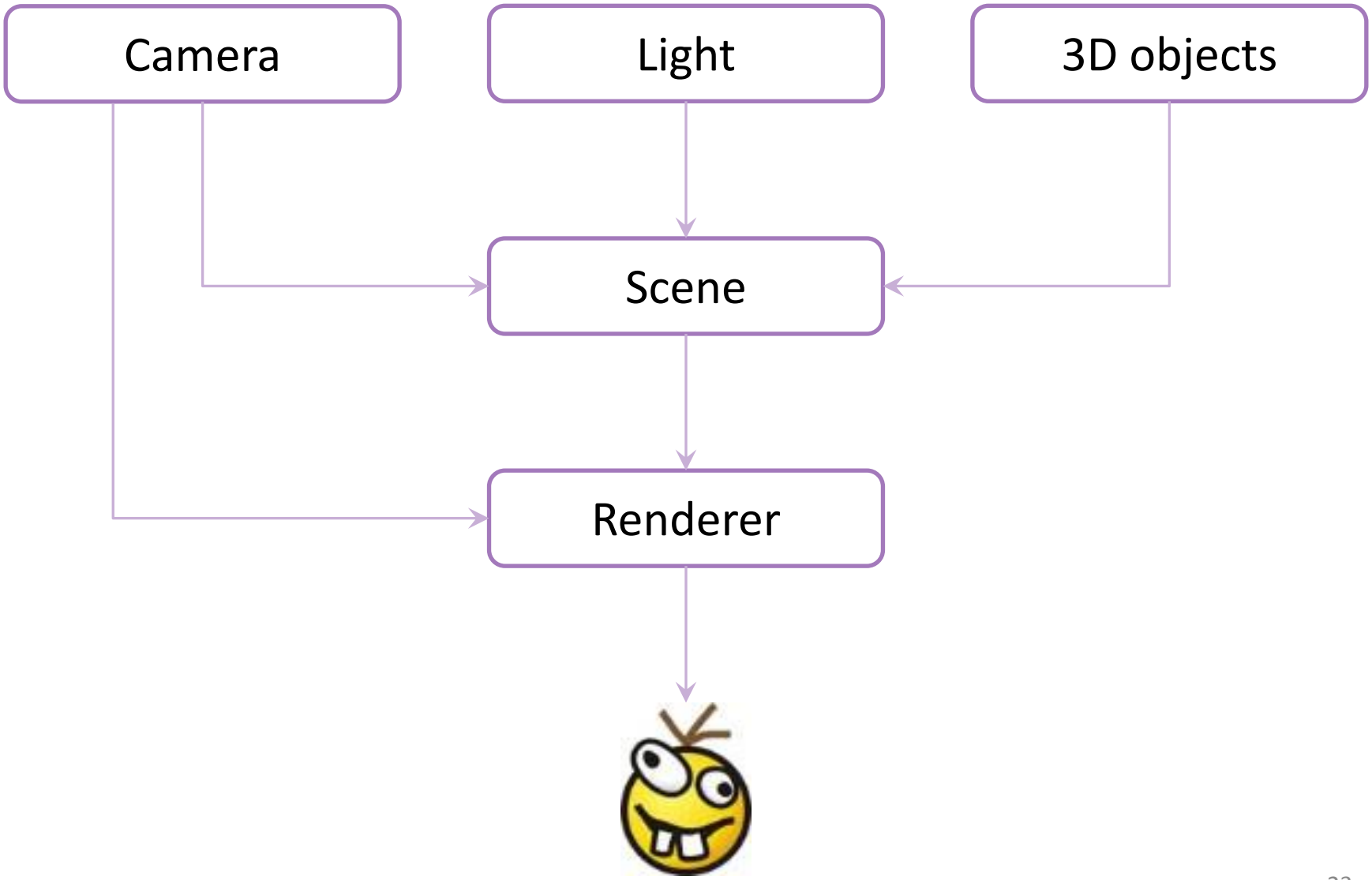
Interconnection objects



Interconnection objects

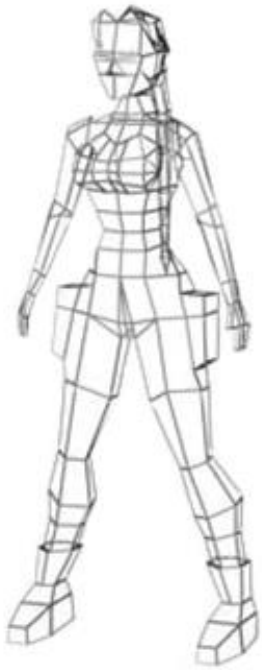


Interconnection objects

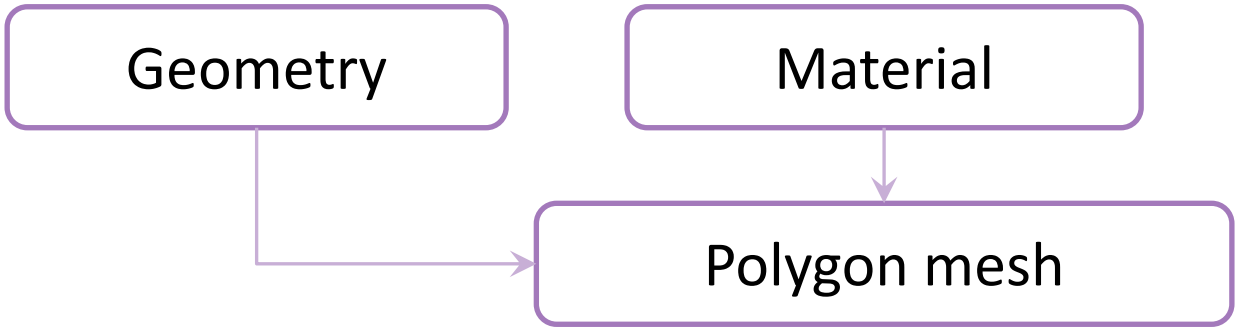


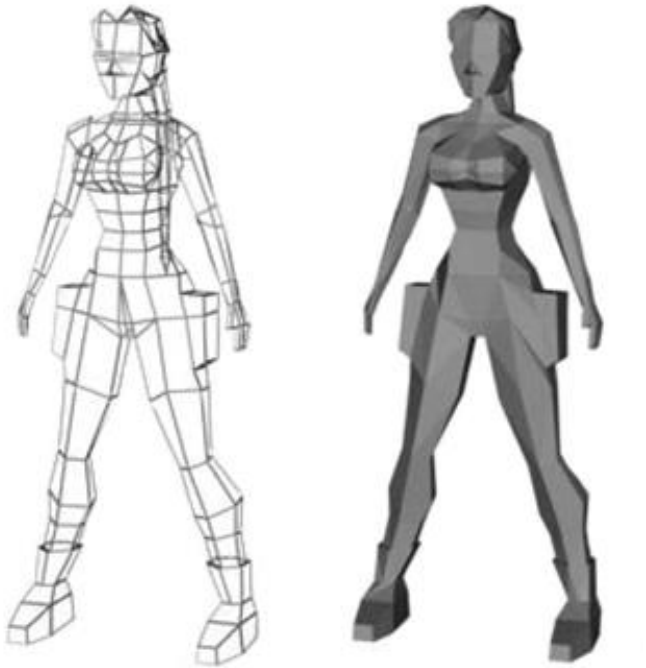
3D object

Geometry

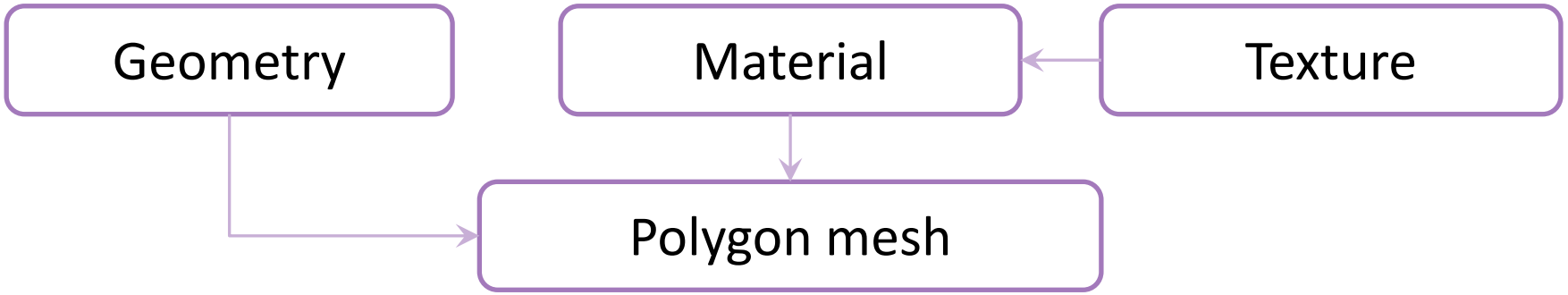


3D object





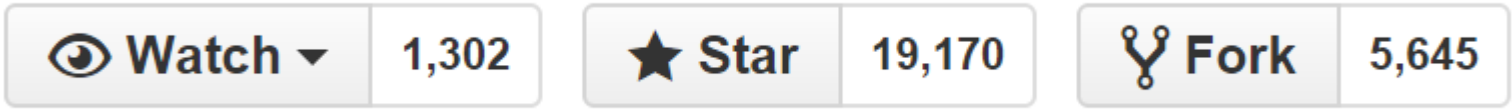
3D object



Visualization

- Renderer
- Shader
- Animation

Three.js



- three.min.js 420 kb
- OBJLoader.js 8 kb
- TrackballControls.js 14 kb

@mrdoob threejs.org

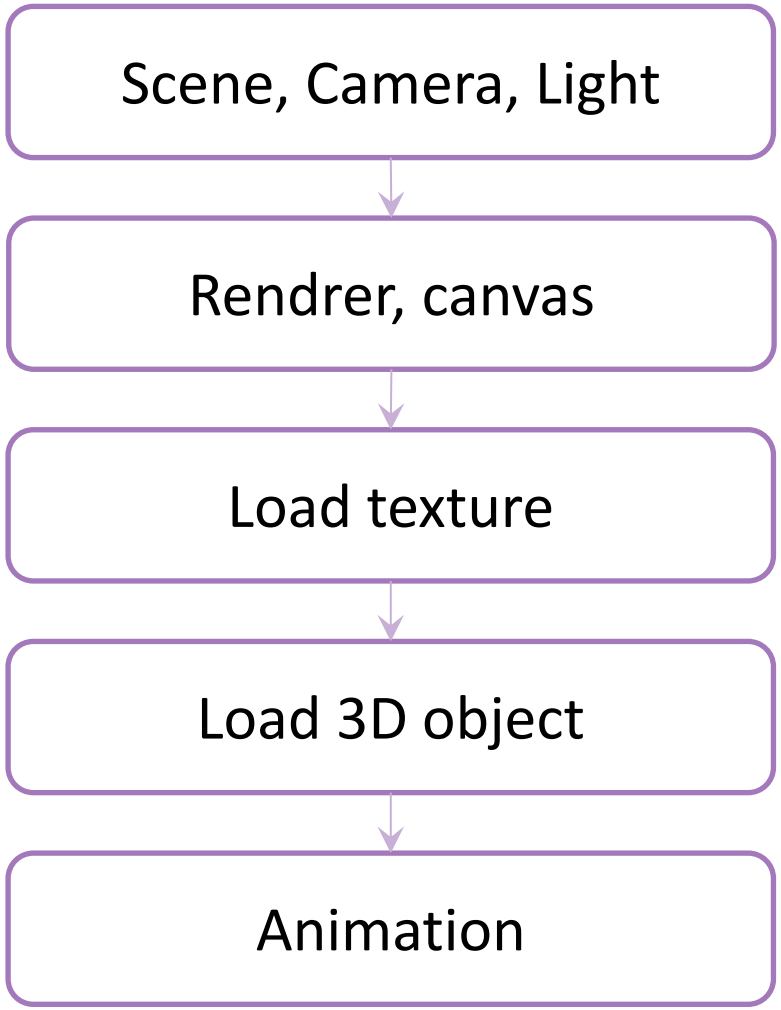
Data-in

texture.jpg

object.obj

```
v 13.825026512145996 -96.140419006347656 3.6714630126953125
v 15.503727912902832 -96.428817749023438 2.1252975463867187
v 14.864977836608887 -95.269874572753906 1.5220794677734375
v 12.35379695892334 -91.997489929199219 1.42974853515625
v 13.748141288757324 -93.280204772949219 1.0182418823242187
v 7.9108209609985352 -85.125518798828125 3.9087066650390625
v 11.508156776428223 -94.102958679199219 4.5504951477050781
v 13.997708320617676 -95.774742126464844 2.4739608764648437
v 13.337004661560059 -94.254402160644531 1.780059814453125
v 10.512875556945801 -90.527717590332031 2.5589218139648438
v 9.9423093795776367 -91.974296569824219 4.4449958801269531
v 12.121970176696777 -93.814460754394531 2.7707862854003906
v 8.8889608383178711 -89.88848876953125 4.7834281921386719
v 8.5577688217163086 -87.575393676757813 3.7520294189453125
v 65.255134582519531 50.347309112548828 32.405288696289063
v 66.766136169433594 50.430992126464844 33.477485656738281
v 63.850997924804687 51.162227630615234 31.309993743896484
v 61.49749755859375 53.767066955566406 30.037763595581055
v 62.612274169921875 55.586418151855469 32.590259552001953
v 63.765449523925781 56.516639709472656 34.983329772949219
v 86.712333679199219 -29.699516296386719 67.651824951171875
v 86.298973083496094 -27.467063903808594 67.311981201171875
v 87.931144714355469 -26.754478454589844 69.544113159179688
v 87.254051208496094 -28.534954071044922 69.252769470214844
v 54.208457946777344 52.926681518554688 17.700454711914063
v 55.330917358398438 51.7030029296875 17.893693923950195
v 53.690010070800781 55.85009765625 21.359037399291992
v 82.511604309082031 -2.7372913360595703 12.380489349365234
v 83.751579284667969 -5.7412242889404297 13.007619857788086
v 83.226371765136719 -4.3318452835083008 12.781660079956055
v 82.699913024902344 -2.9909400939941406 12.637807846069336
v 81.90118408203125 -1.2090244293212891 12.495655059814453
v -22.076648712158203 72.794937133789063 6.7714595794677734
v -22.850921630859375 71.858016967773438 5.16961669921875
```

Algorithm


Scene, Camera, Light
Rendrer, canvas
Load texture
Load 3D object
Animation

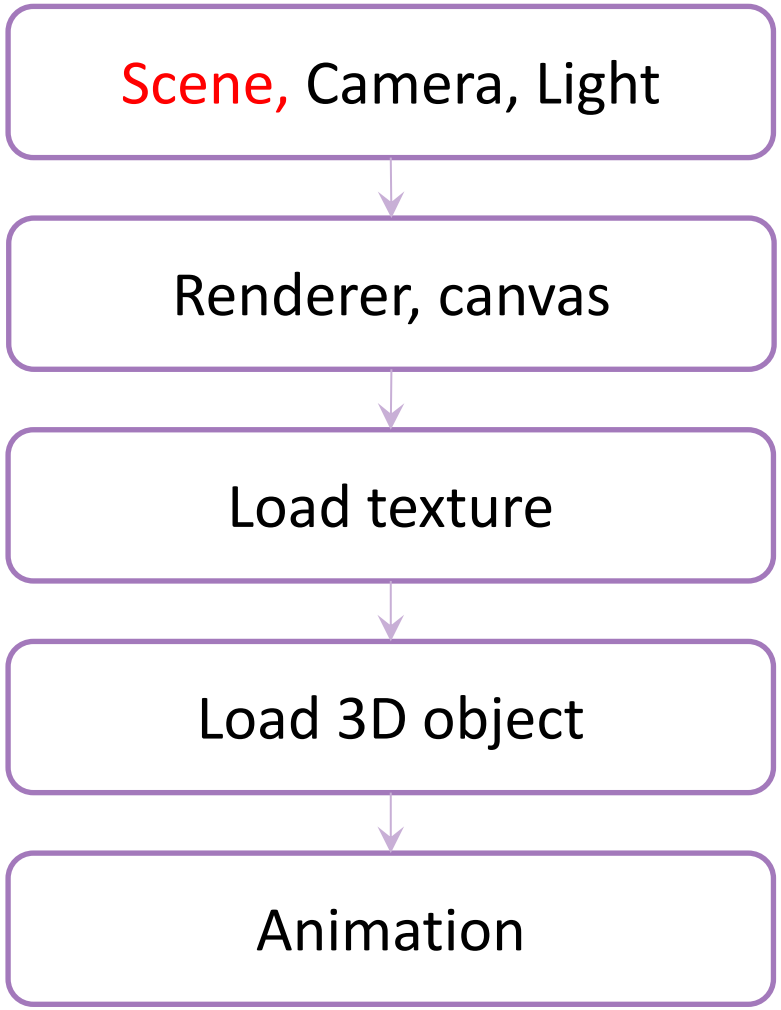
Scene

```
Player.container = document.getElementById("webgl-player");


Player.size = {
      width: Player.container.offsetWidth,
      height: Player.container.offsetHeight
};

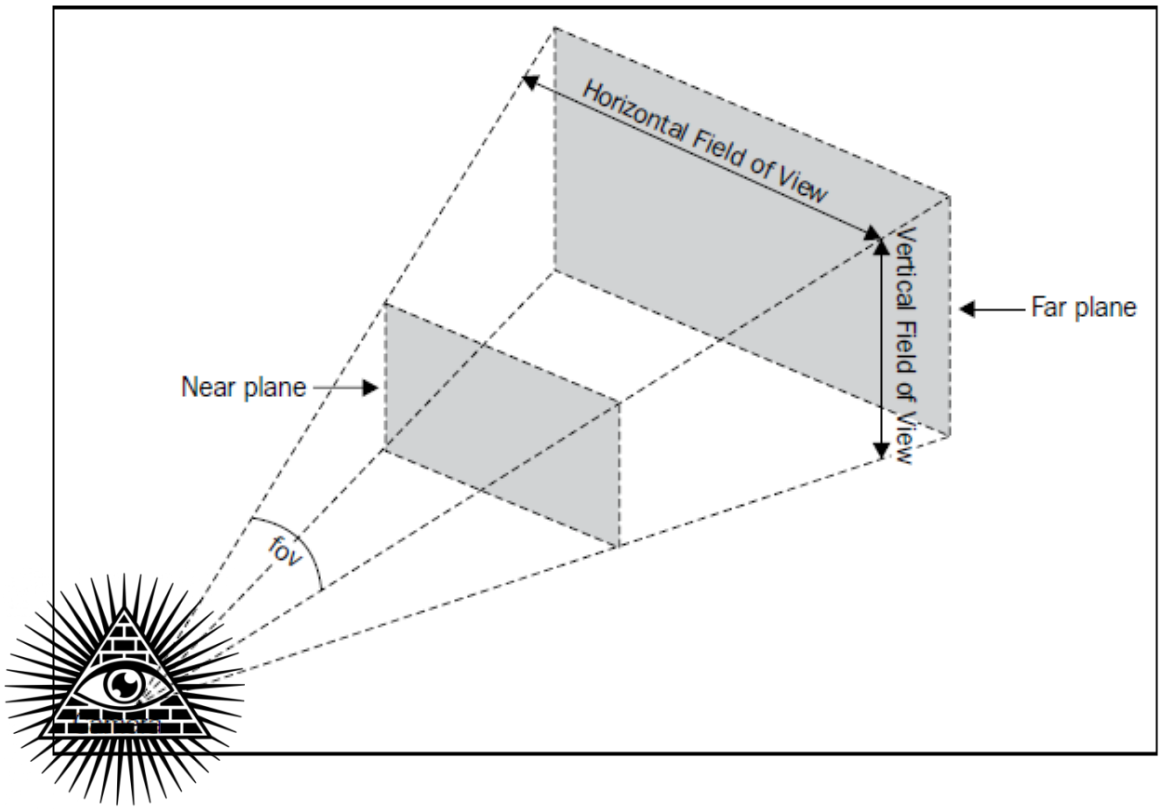

Player.scene = new THREE.Scene();
```

Algorithm


Scene, Camera, Light
Renderer, canvas
Load texture
Load 3D object
Animation

Camera

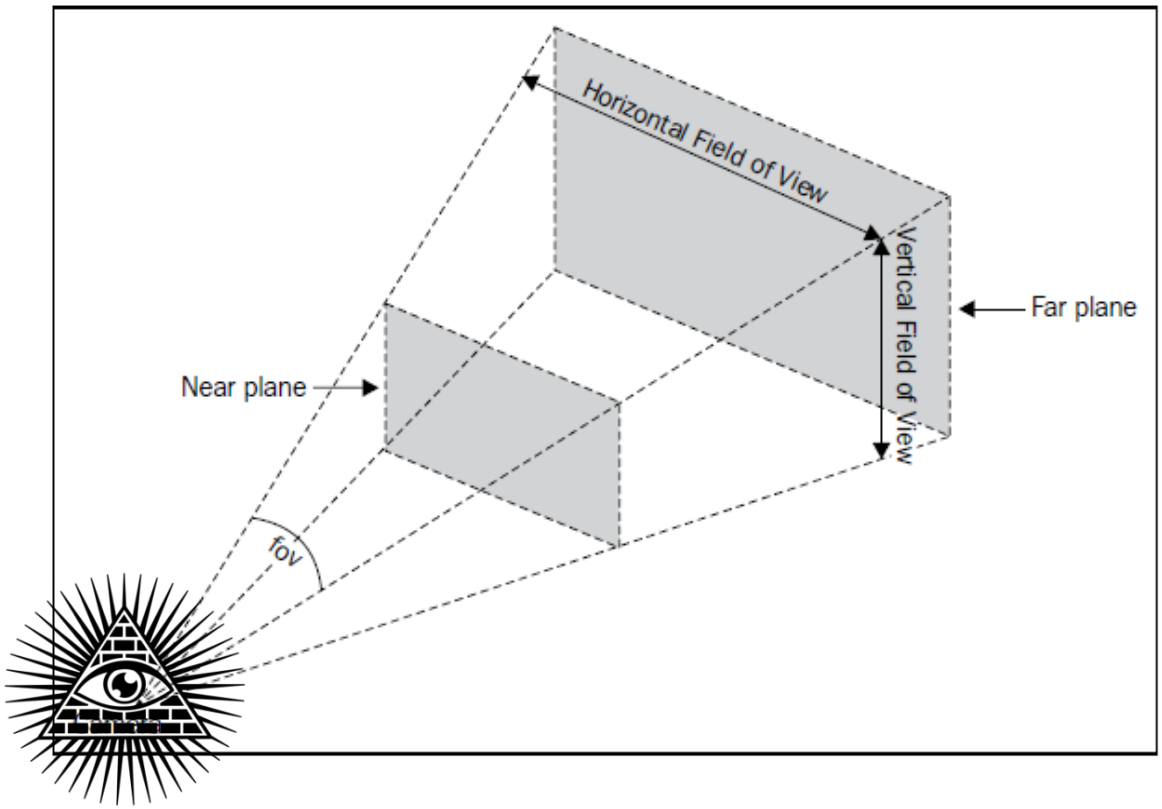
```
// PerspectiveCamera( fov, aspect, near, far )
aspect = Player.size.width / Player.size.height;
Player.camera = new THREE.PerspectiveCamera(45.0, aspect, 2, 8000);
```



Camera

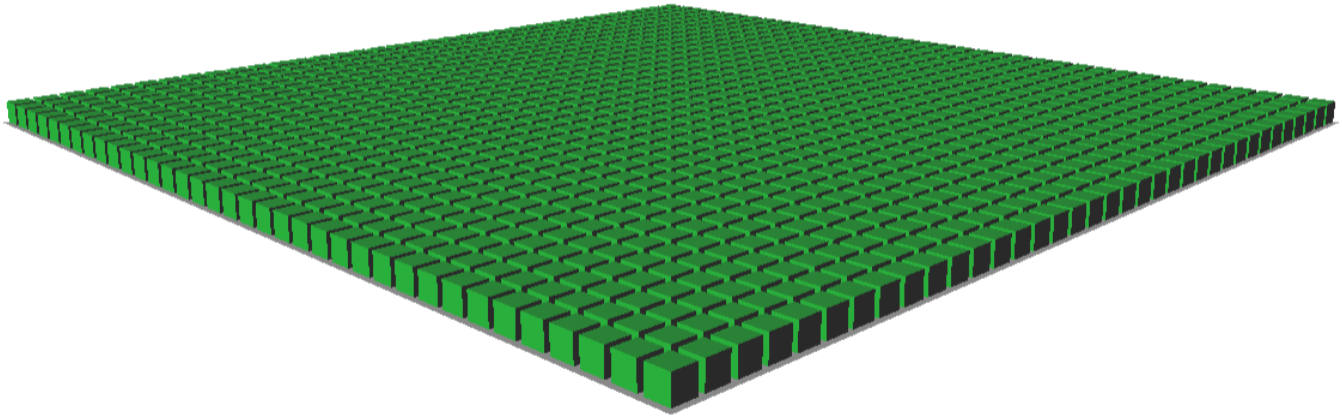
```
// PerspectiveCamera( fov, aspect, near, far )
aspect = Player.size.width / Player.size.height;
Player.camera = new THREE.PerspectiveCamera(45.0, aspect, 2, 8000);

Player.camera.position.z = 300;
Player.scene.add(Player.camera);
```

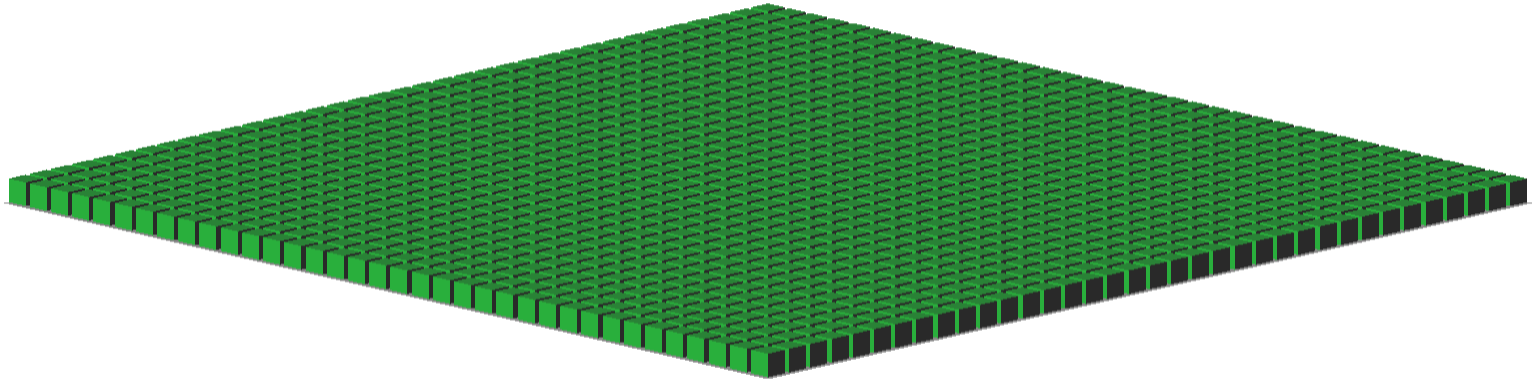


Camera types

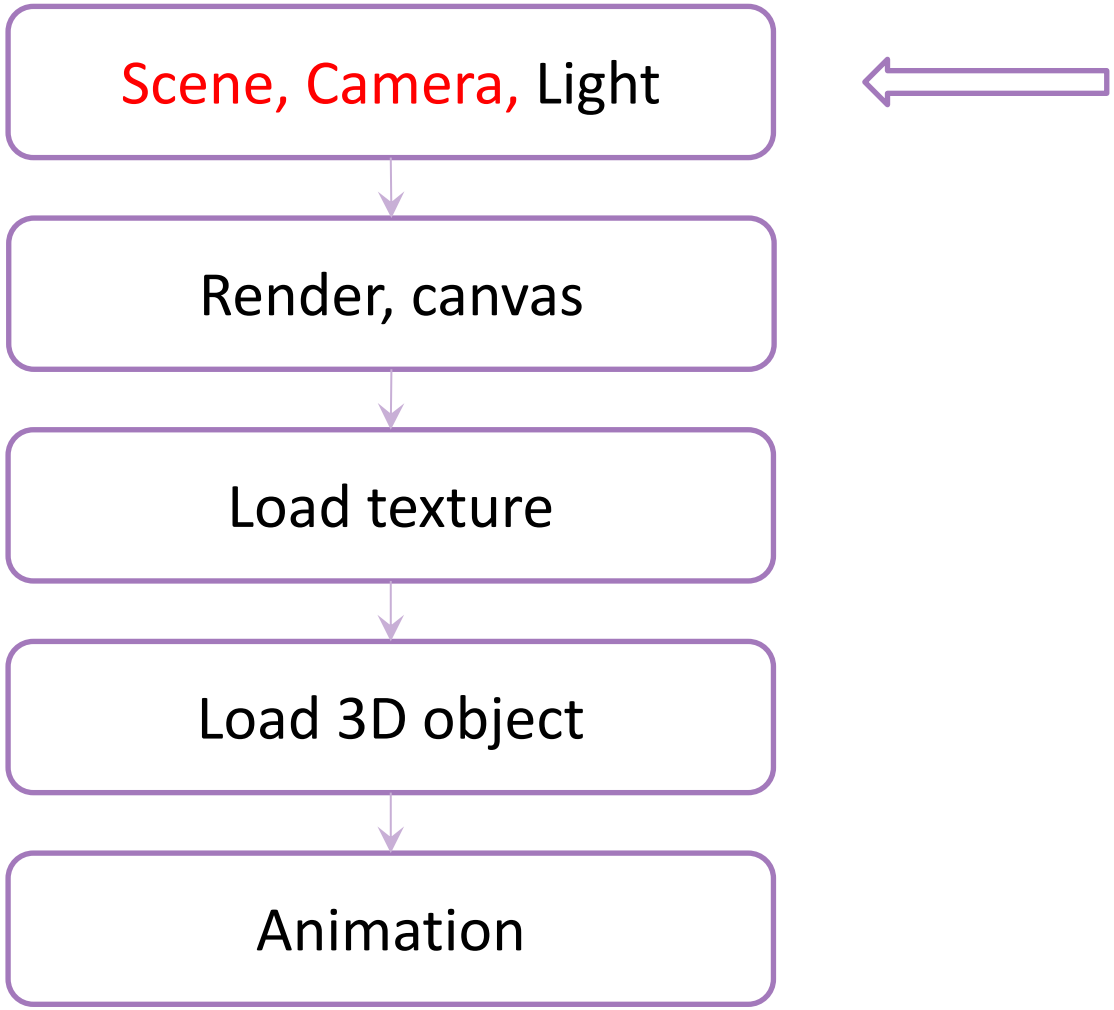
Perspective projection
PerspectiveCamera



Orthographic projection
OrthographicCamera



Algorithm


Scene, Camera, Light
Render, canvas
Load texture
Load 3D object
Animation

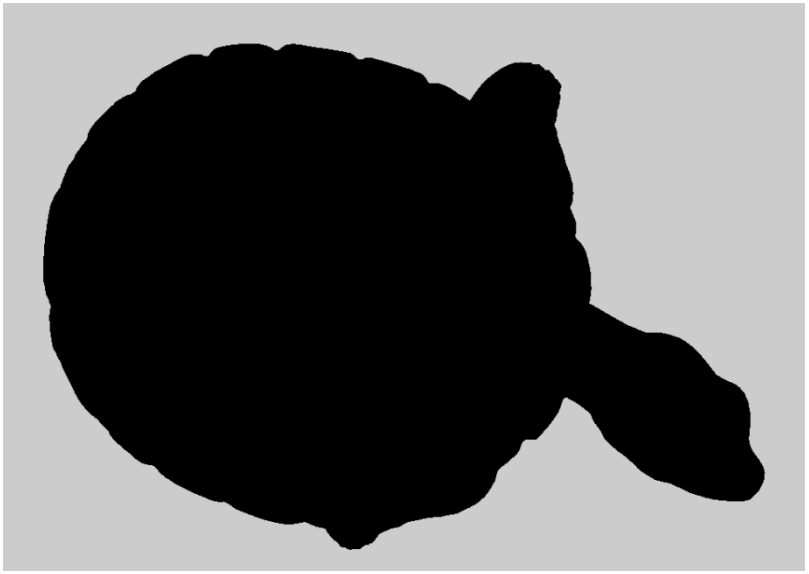
Light, renderer, canvas

```
Player.light = new THREE.AmbientLight();
Player.scene.add(Player.light);


Player.renderer = new THREE.WebGLRenderer({alpha: true});
Player.renderer.setSize(Player.size.width, Player.size.height);


// canvas
Player.container.appendChild(Player.renderer.domElement);
```

Light



```
// Player.scene.add(Player.light)
```

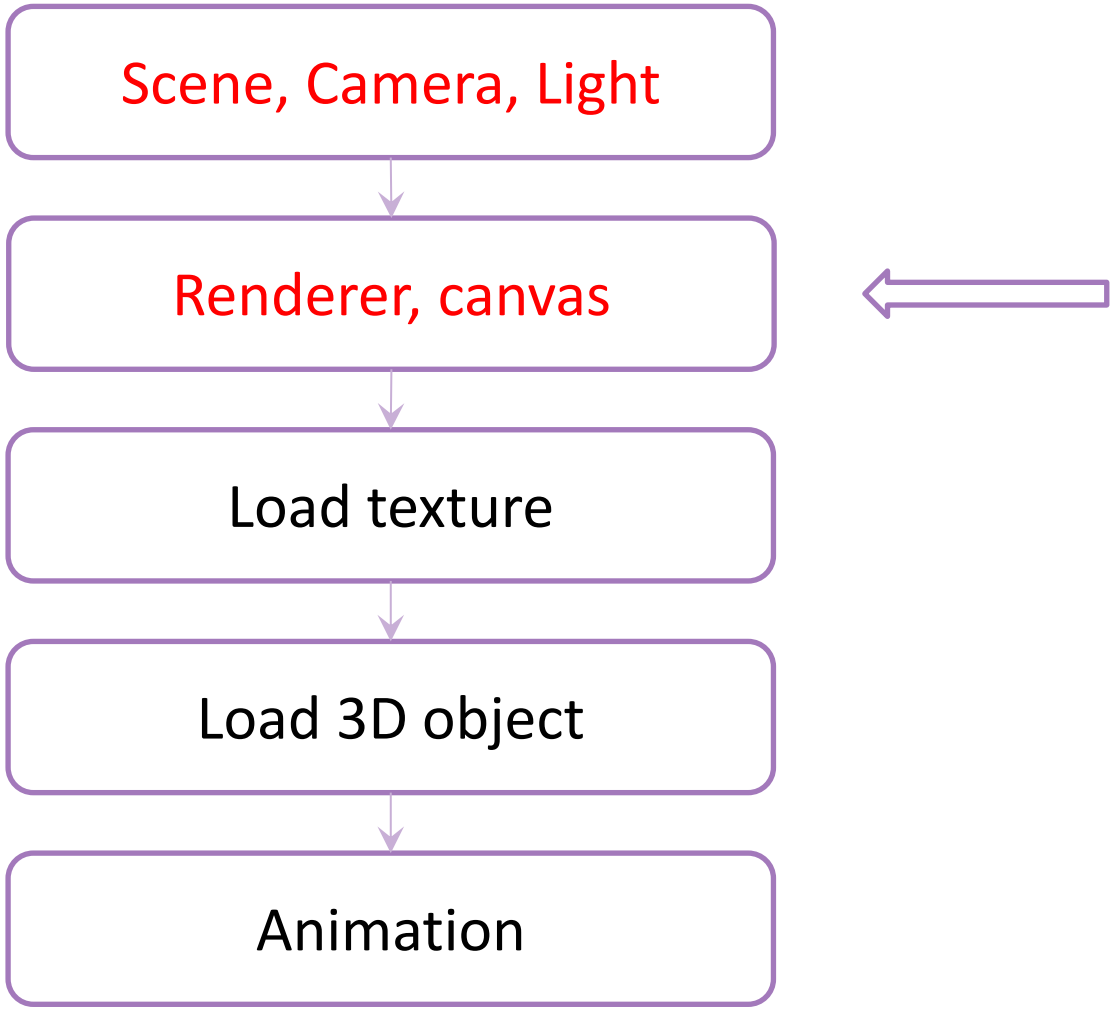
```
Player.scene.add(Player.light)
```

WebGLRenderer

```
THREE.WebGLRenderer()
```

```
THREE.WebGLRenderer({alpha: true})
```

Algorithm

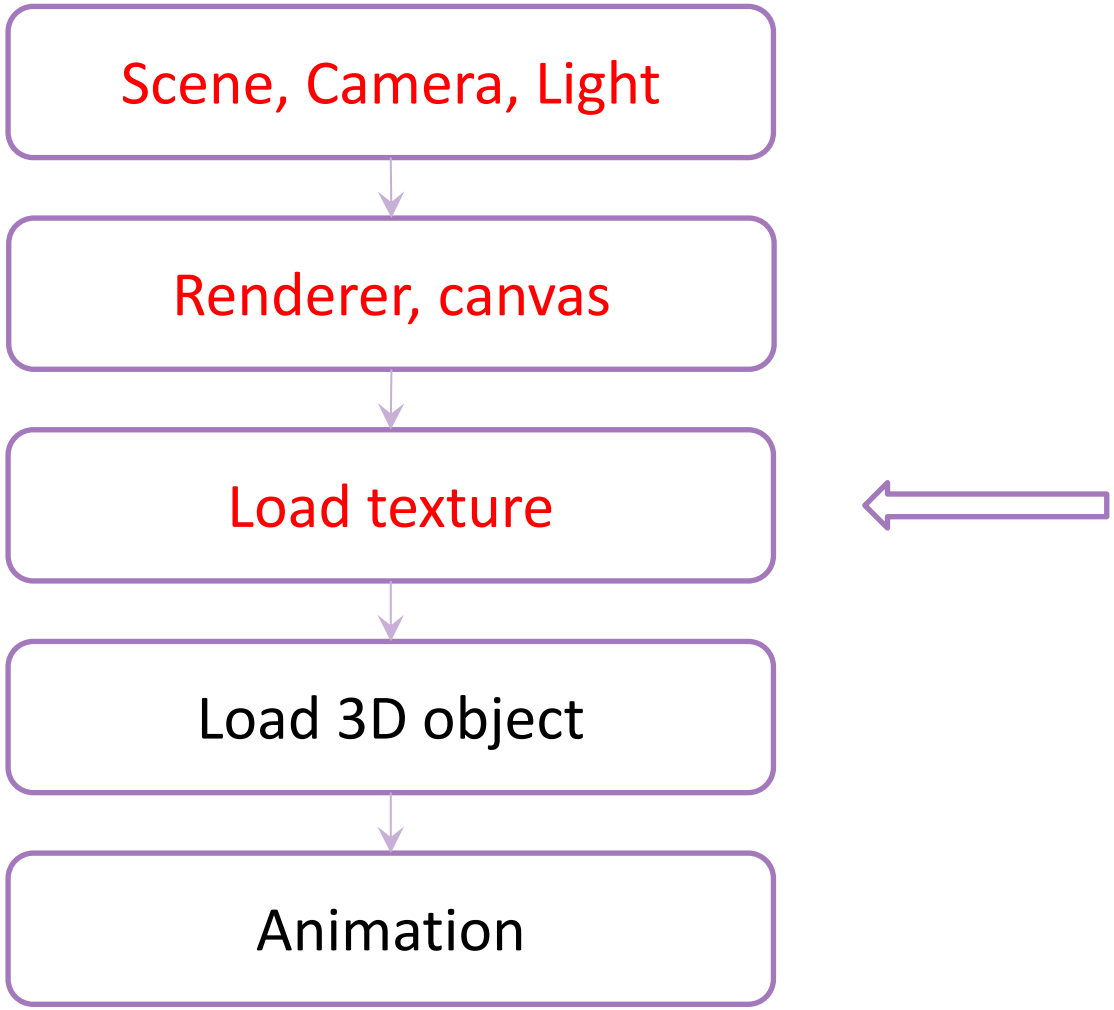

Scene, Camera, Light
Renderer, canvas
Load texture
Load 3D object
Animation

Texture

```
Player.textureLoader = new THREE.TextureLoader();
```

```
Player.textureLoader.load("texture.jpg", function(texture) {
	Player.texture = texture;
	Player.loadModel();
});
```

Algorithm


Scene, Camera, Light
Renderer, canvas
Load texture
Load 3D object
Animation

Load 3D model

```
loadModel: function() {
    objectLoader = new THREE.OBJLoader();

    objectLoader.load("object.obj", function(object) {
        object.traverse(function(child) {
            if (child instanceof THREE.Mesh) {
                child.material.map = Player.texture;
            }
        });
        Player.scene.add(object);
    });
}
```

Load 3D model

```
loadModel: function() {
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Load 3D model

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    });
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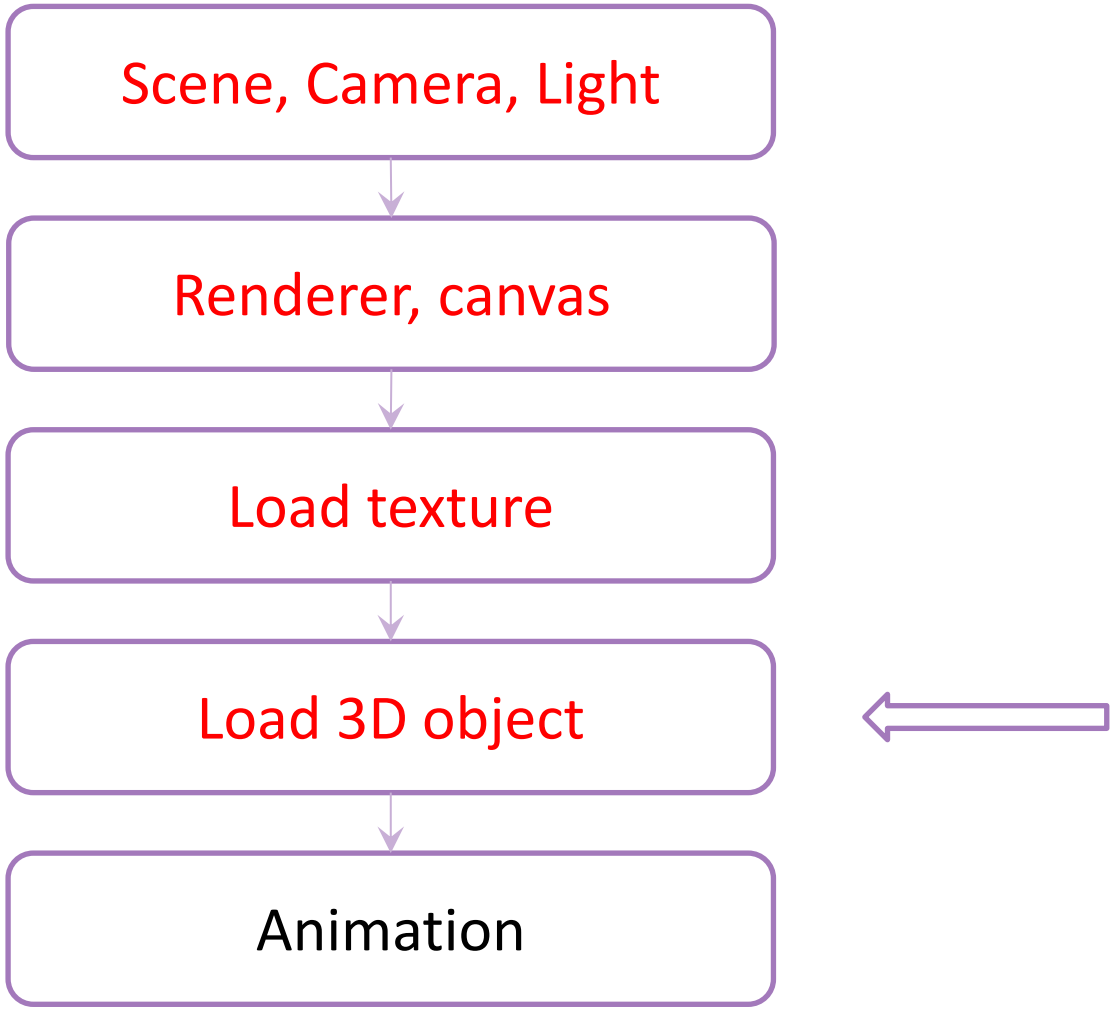
Algorithm


Scene, Camera, Light
Renderer, canvas
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Animation

Animation

```
Player.animate();
```

```
animate: function() {
    requestAnimationFrame(Player.animate);

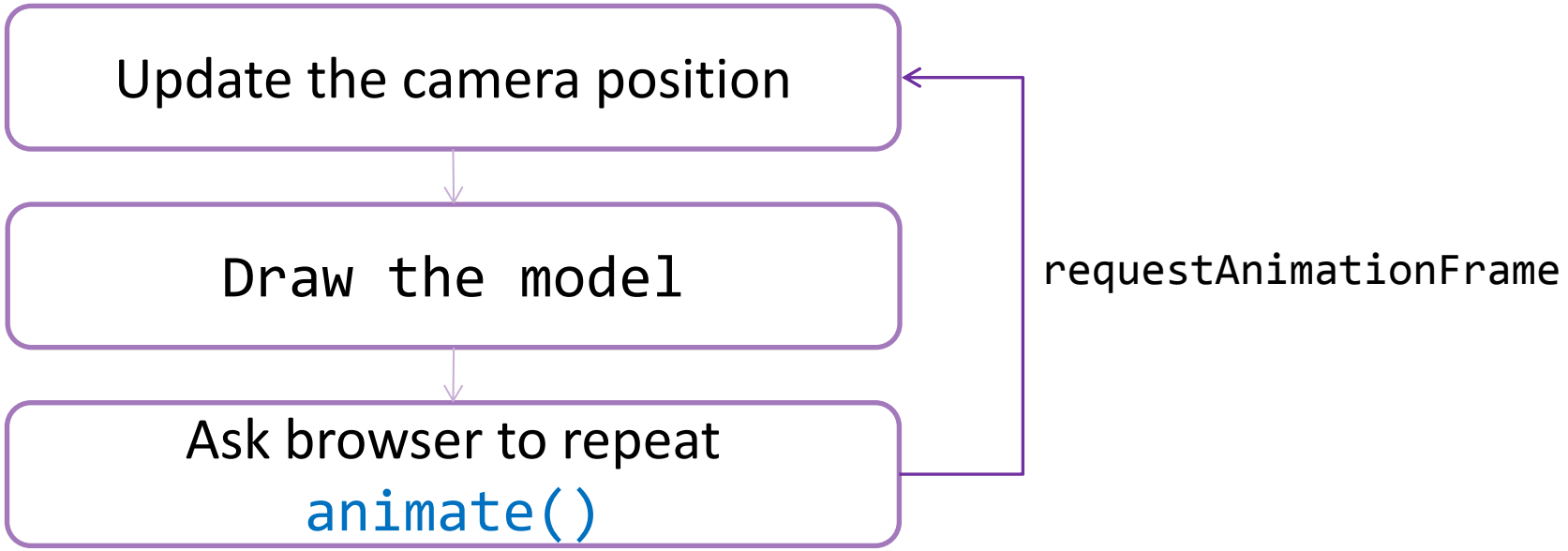
    Player.renderer.render(Player.scene, Player.camera);
}
```

Animation

```
Player.controls = new THREE.TrackballControls(Player.camera,
                                              Player.container);
Player.animate();
```

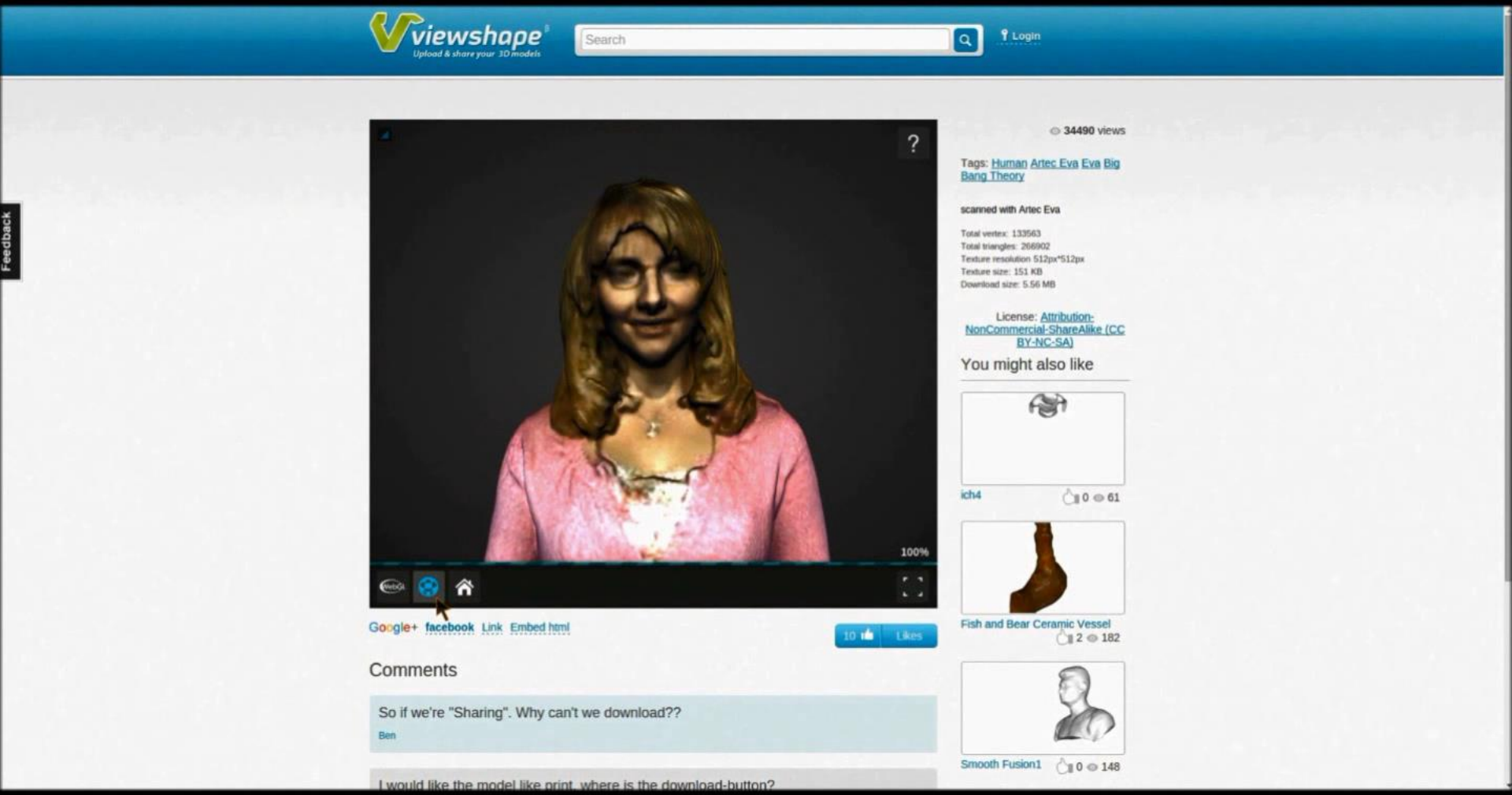
```
animate: function() {
    requestAnimationFrame(Player.animate);
    Player.controls.update();
    Player.renderer.render(Player.scene, Player.camera);
}
```

Animation




```
animate: function() {
    requestAnimationFrame(Player.animate);
    Player.controls.update();
    Player.renderer.render(Player.scene, Player.camera);
}
```

viewshape.com



WebGL libraries

- Three.js
- Babylon.js
- Turbulenz
- PhiloGL

Useful links

- davidscottlyons.com/threejs
- Book Learning Three.js: The JavaScript 3D Library for WebGL

Source

github.com/Likita

Interactivity

Gamification

Vasilika Klimova


likita


vasilika.klimova


lik04ka

Thank You!