Final Presentation

Trace.js

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The Trace.js Team

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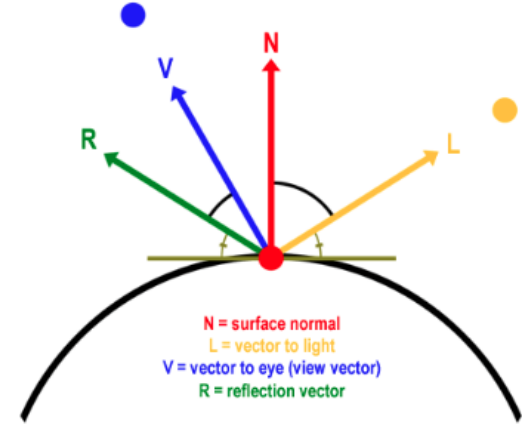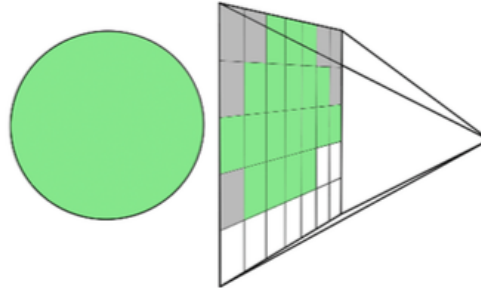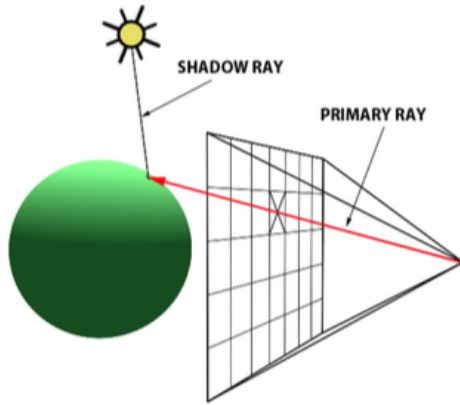John Haytko

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Engineering
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Trace.js – Main Goal

To create a Ray Tracer that allows users to define scenes and render them with custom configurations, all in the Web Browser. This deviates from traditional renderers which usually come in the form of large client-side applications.

It's kind of like RenderMan or Mental Ray in the Browser.
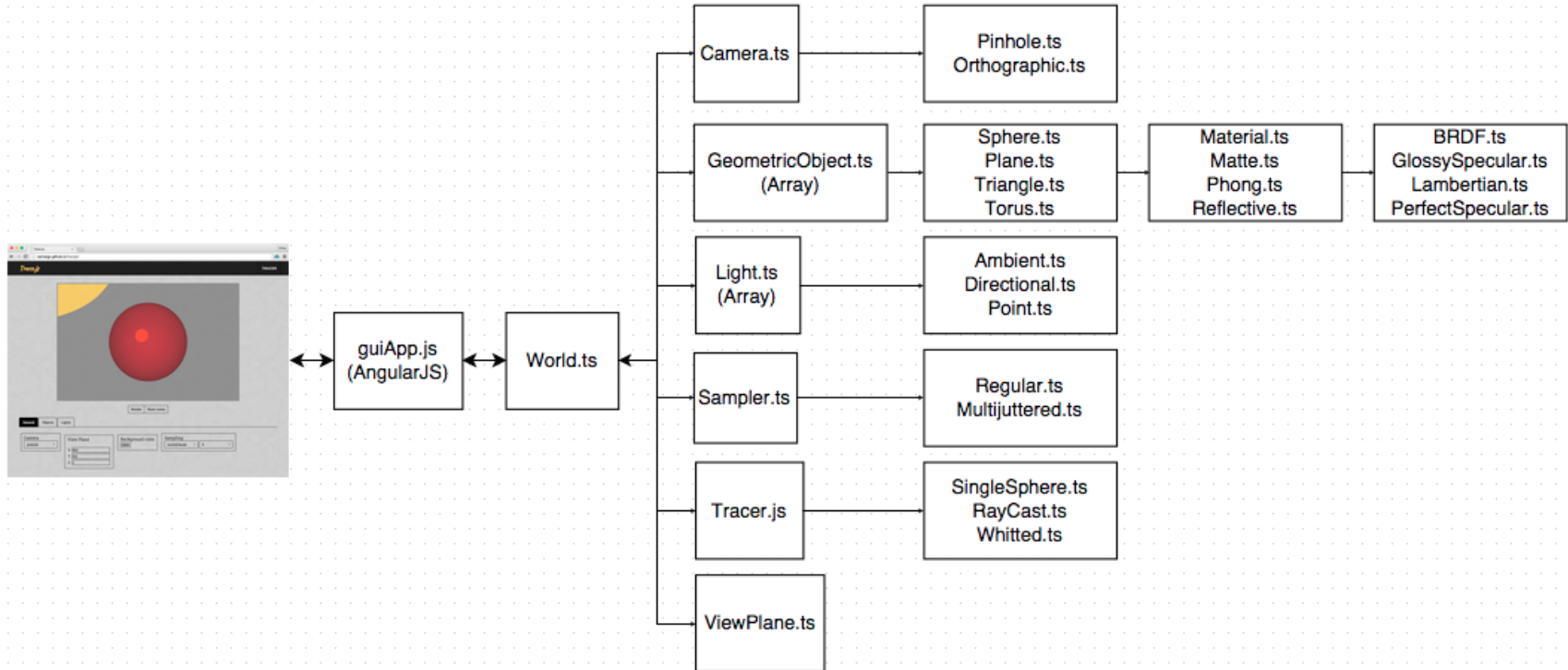
Trace.js - Ray Tracing Basics

SHADOW RAY

PRIMARY RAY

N = surface normal
L = vector to light
V = vector to eye (view vector)
R = reflection vector

Trace.js - Ray Tracing Basics
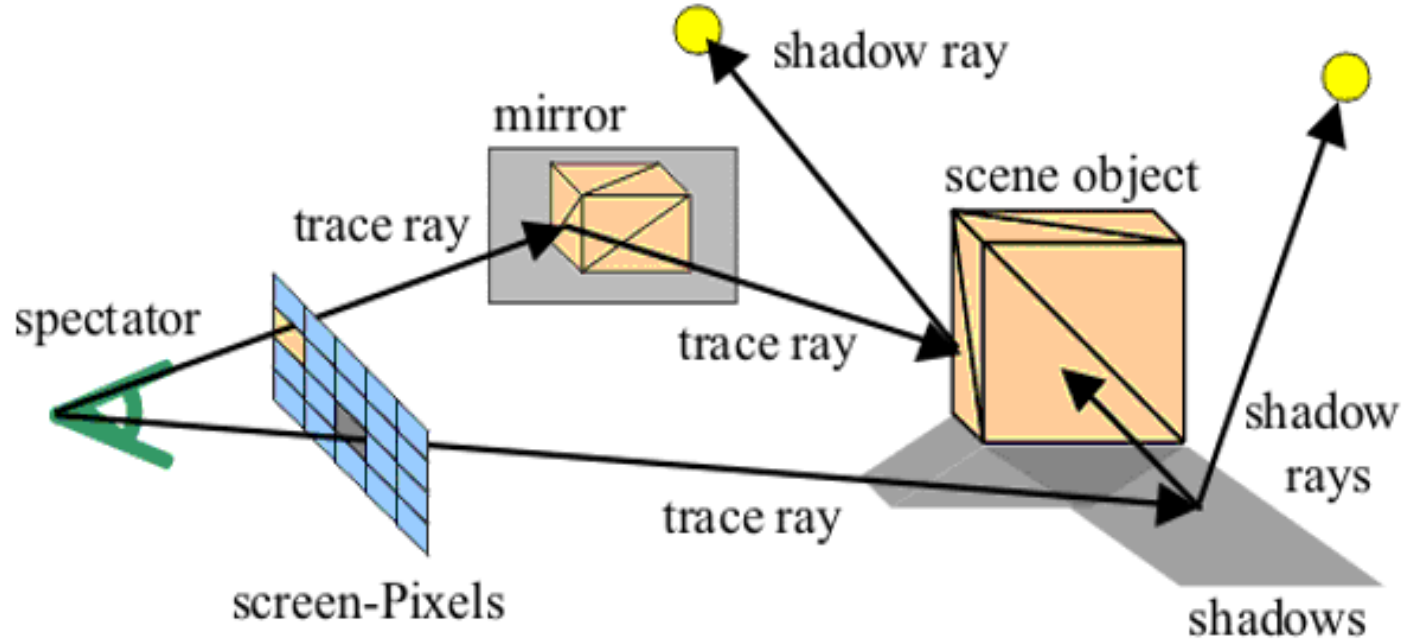
Trace.js - Language Decision

- Wrote the main Trace.js classes using TypeScript (http://www.typescriptlang.org/)
  - JavaScript is not a statically typed language

```typescript
1   // Trace.js - Material.ts
2
3   /// <reference path="./../Utilities/RGBColor.ts" />
4   /// <reference path="./../Utilities/ShadeRec.ts" />
5
6   module Tracejs {
7     export class Material {
8       shade(sr : ShadeRec) : RGBColor {
9         //Set RGBColor to black
10        var black = new Tracejs.RGBColor(0,0,0);
11        return black;
12      }
13
14      area_light_shade(sr : ShadeRec) : RGBColor {
15        //Set RGBColor to black
16        var black = new Tracejs.RGBColor(0,0,0);
17        return black;
18      }
19
20      path_shade(sr : ShadeRec) : RGBColor {
21        //Set RGBColor to black
22        var black = new Tracejs.RGBColor(0,0,0);
23        return black;
24      }
25    }
26  }
```

```javascript
1   var Tracejs;
2   (function (Tracejs) {
3       var Material = (function () {
4           function Material() {
5           }
6           Material.prototype.shade = function (sr) {
7               var black = new Tracejs.RGBColor(0, 0, 0);
8               return black;
9           };
10          Material.prototype.area_light_shade = function (sr) {
11              var black = new Tracejs.RGBColor(0, 0, 0);
12              return black;
13          };
14          Material.prototype.path_shade = function (sr) {
15              var black = new Tracejs.RGBColor(0, 0, 0);
16              return black;
17          };
18          return Material;
19      })();
20      Tracejs.Material = Material;
21  })(Tracejs || (Tracejs = {}));
```
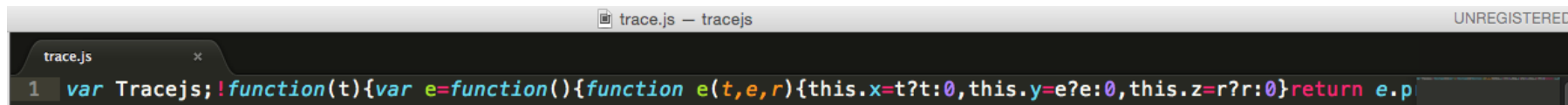
Trace.js - Architecture
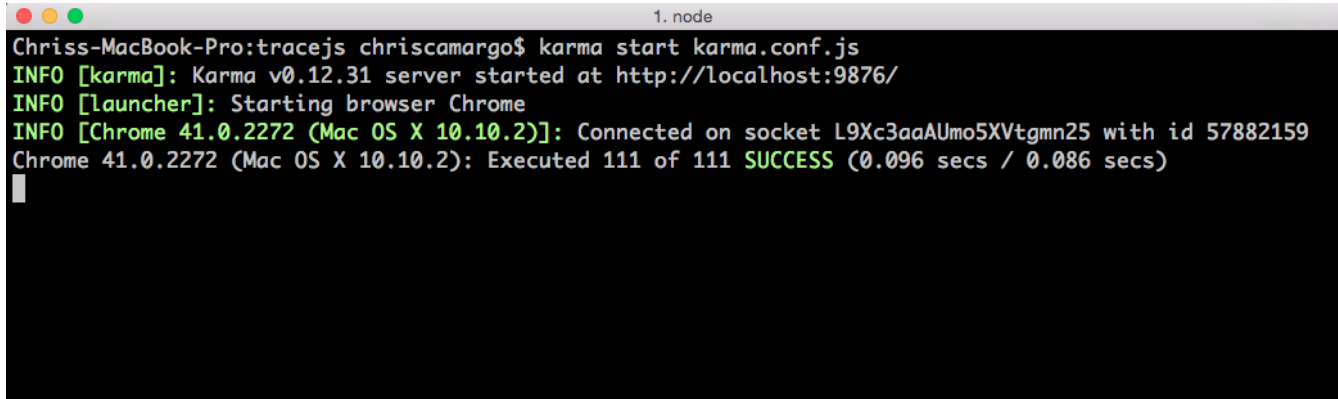
- The Trace.js code base currently contains 36 classes:
  - https://github.com/camargo/tracejs/tree/master/src/ts

Geometric Objects	Tracers	Materials	BRDFs	Cameras	Samplers	Lights	Utility	World
GeometricObject (base-class)	Tracer (base-class)	Material (base-class)	BRDF (base-class)	Camera (base-class)	Sampler (base-class)	Light (base-class)	Point3D	ViewPlane
Sphere	SingleSphere	Matte	Glossy	Orthographic	Regular	Ambient	Vector3D	World
Plane	RayCast	Phong	Lambertian	Pinhole	MultiJittered	Directional	Ray	
Triangle	Whitted	Reflective	Specular			Point	Normal	
Torus							ShadeRec	
							RGBColor	
							Point2D	

Trace.js - Architecture

Trace.js – Building

- Built project using Gulp (http://gulpjs.com/)
  - This allowed us to streamline complex build tasks like:
    i. TypeScript compilation
    ii. JavaScript concatenation and minification

trace.js — tracejs   UNREGISTERED

trace.js   ×

1 `var Tracejs;!function(t){var e=function(){function e(t,e,r){this.x=t?t:0,this.y=e?e:0,this.z=r?r:0}return e.p`

Trace.js - Unit Testing

- Jasmine (http://jasmine.github.io/) to write our unit tests
- Karma (http://karma-runner.github.io/0.12/) to run our unit tests
- At the time of writing our code-base has 111 unit tests

```
Chriss-MacBook-Pro:tracejs chriscamargo$ karma start karma.conf.js
INFO [karma]: Karma v0.12.31 server started at http://localhost:9876/
INFO [launcher]: Starting browser Chrome
INFO [Chrome 41.0.2272 (Mac OS X 10.10.2)]: Connected on socket L9Xc3aaAUmo5XVtgmn25 with id 57882159
Chrome 41.0.2272 (Mac OS X 10.10.2): Executed 111 of 111 SUCCESS (0.096 secs / 0.086 secs)
```

Trace.js - Demo

- Live Demo: http://camargo.github.io/tracejs/#/

- Github Repo: https://github.com/camargo/tracejs

- Scrum Board: https://trello.com/b/hDYuaHtJ/tracejs-scrum-board