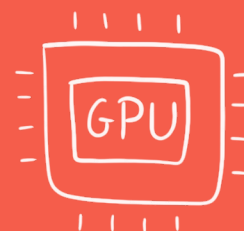




MAP YOUR HOLIDAY WORKSHOP

THE TECHNOLOGY BEHIND WEB MAPS



HI, I'M RALUCA!



 BUCHAREST

Studies in
Cartography

 MUNICH

GIS
Internship
Swiss
National Park

 ZERNEZ

Research assistant
Institute of
Cartography, ETH

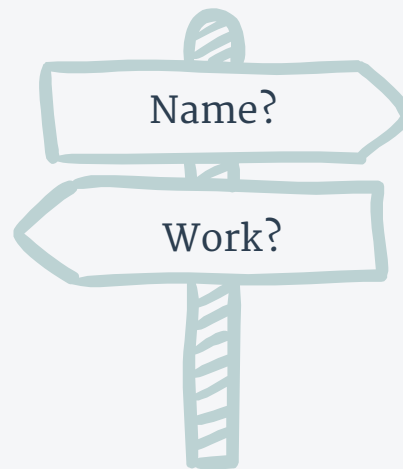
 ZURICH

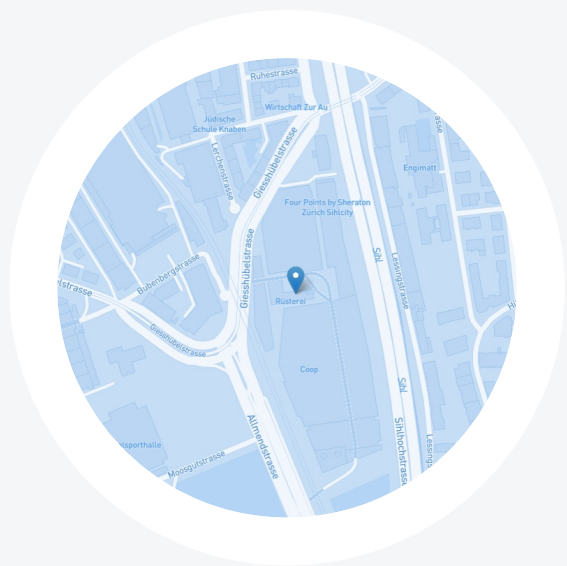
Product Engineer
ESRI R&D Center
Zurich

 ZURICH

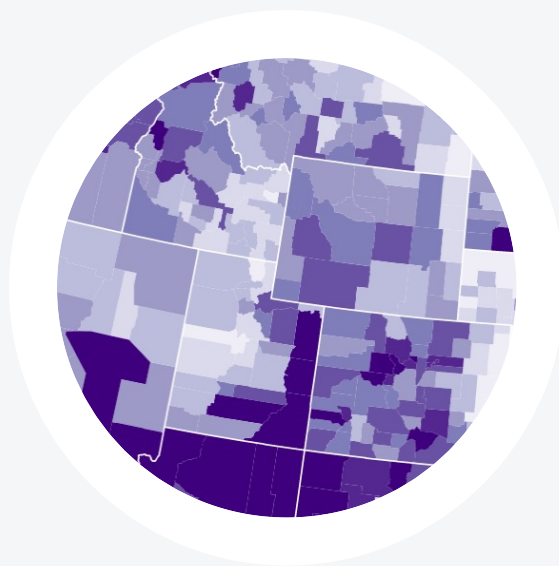


AND YOU?

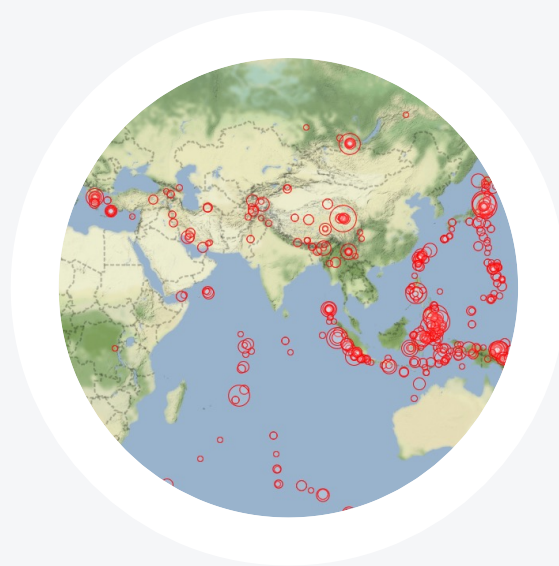




DOM ELEMENTS



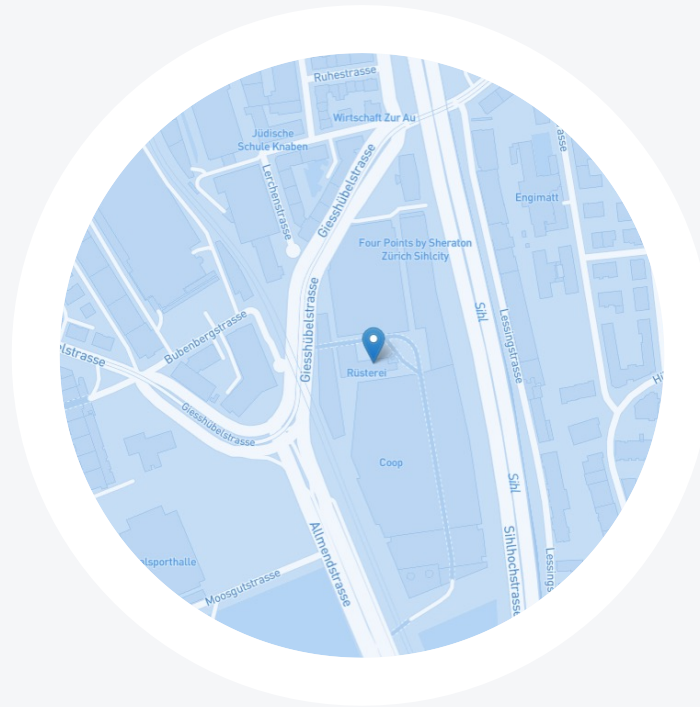
SVG



CANVAS 2D

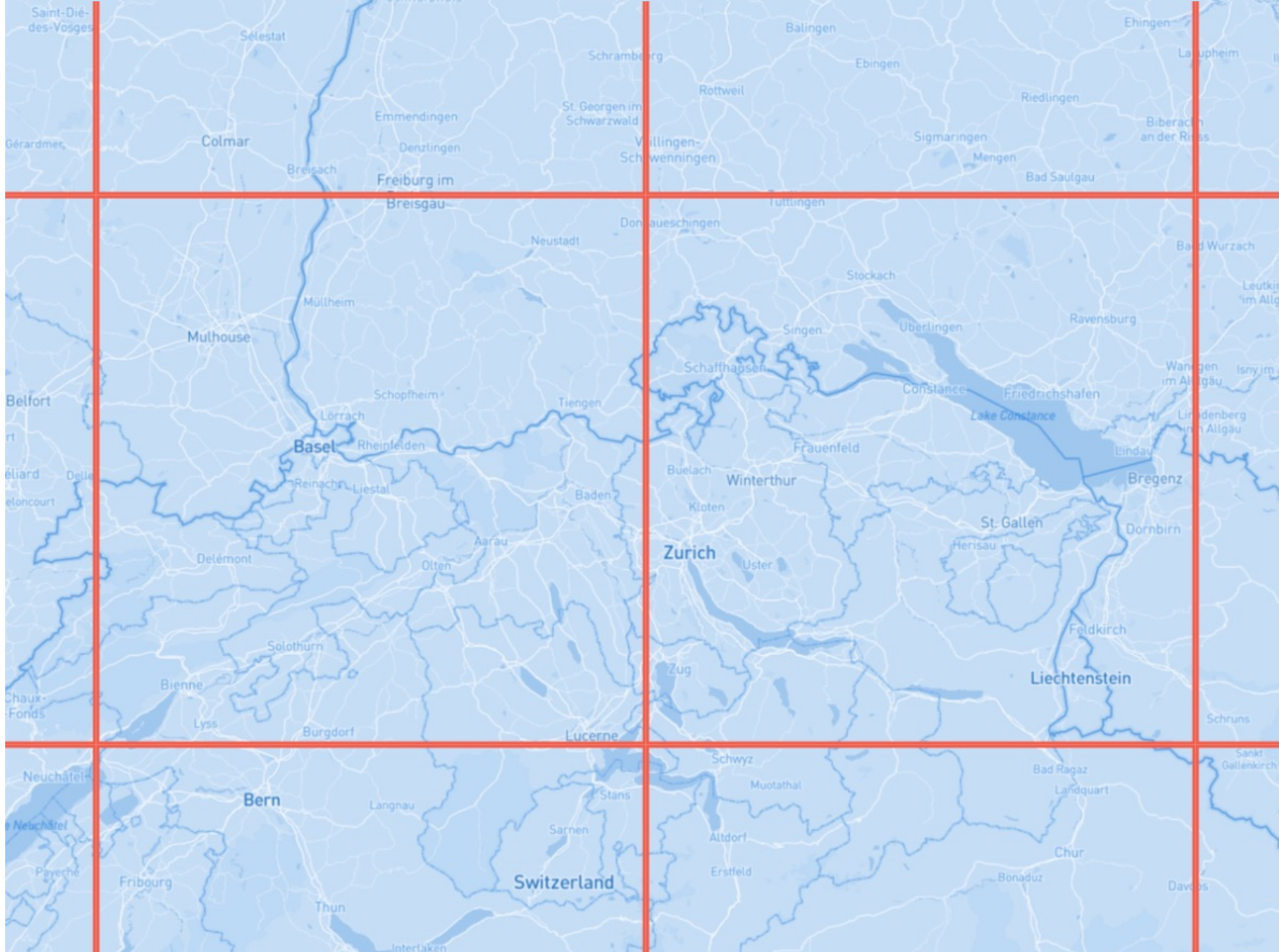


WEBGL



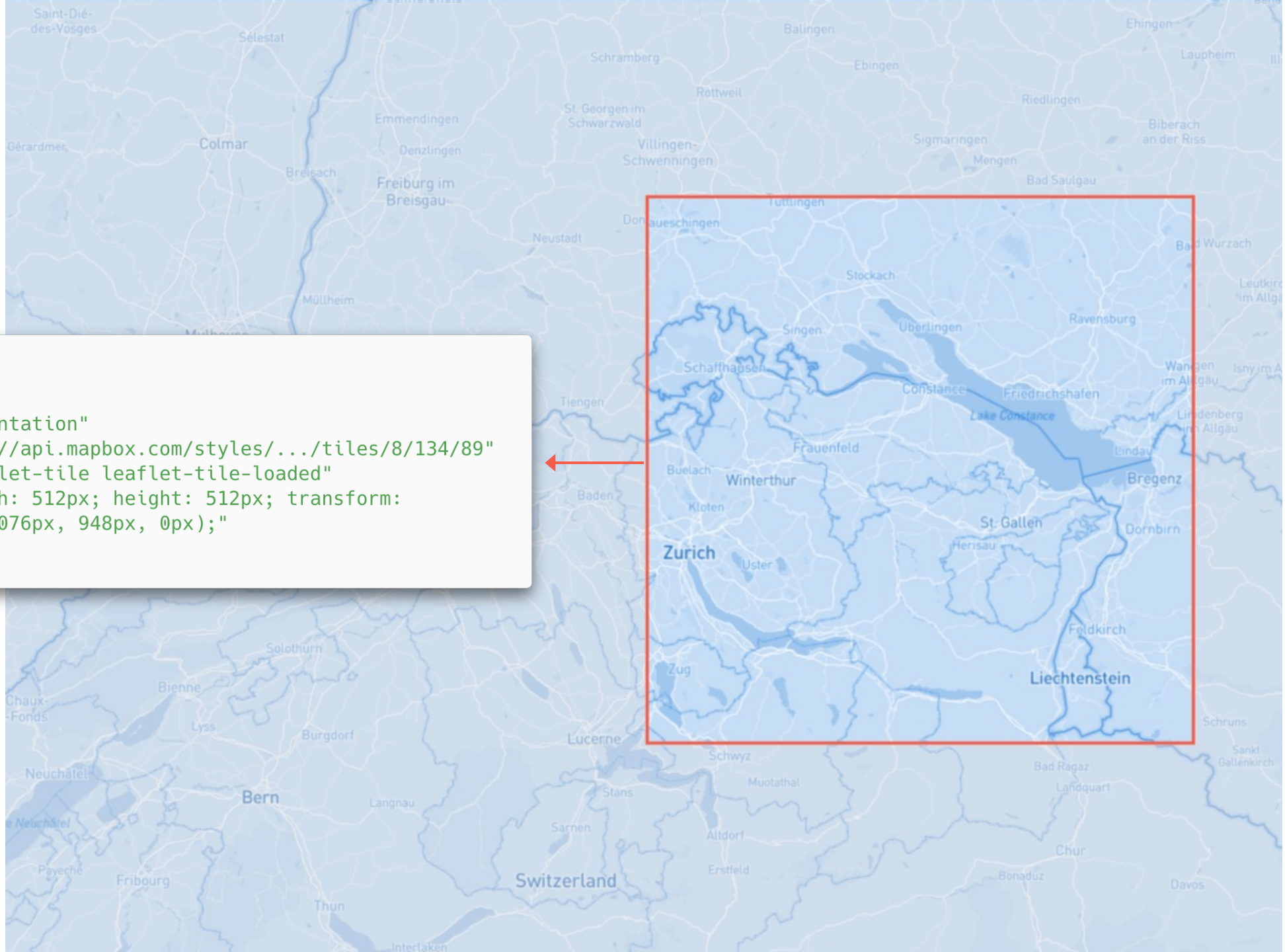
DOM ELEMENTS



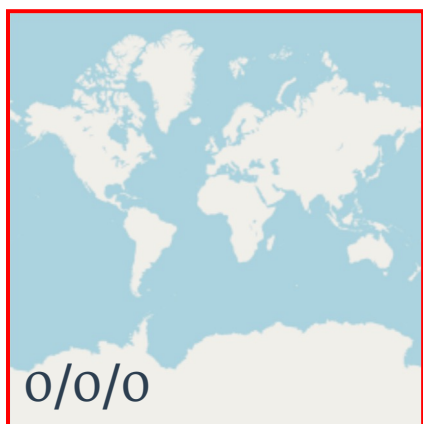


```

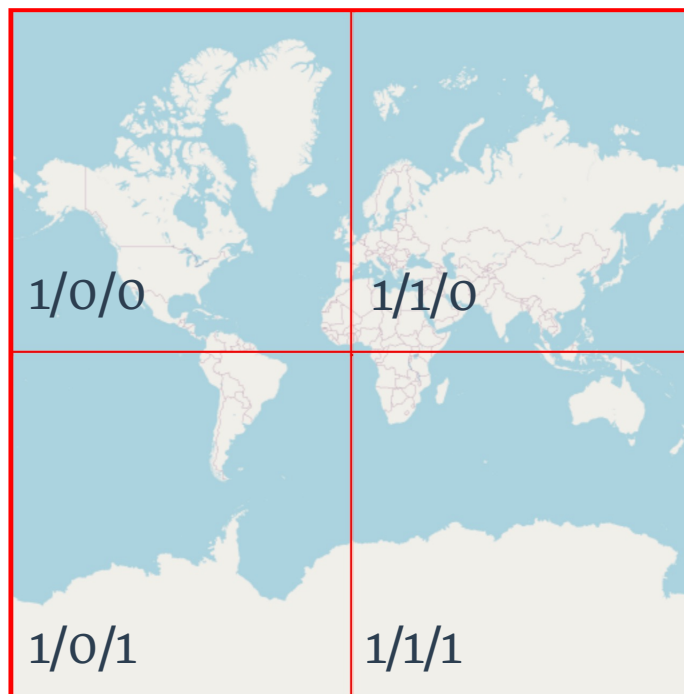
```



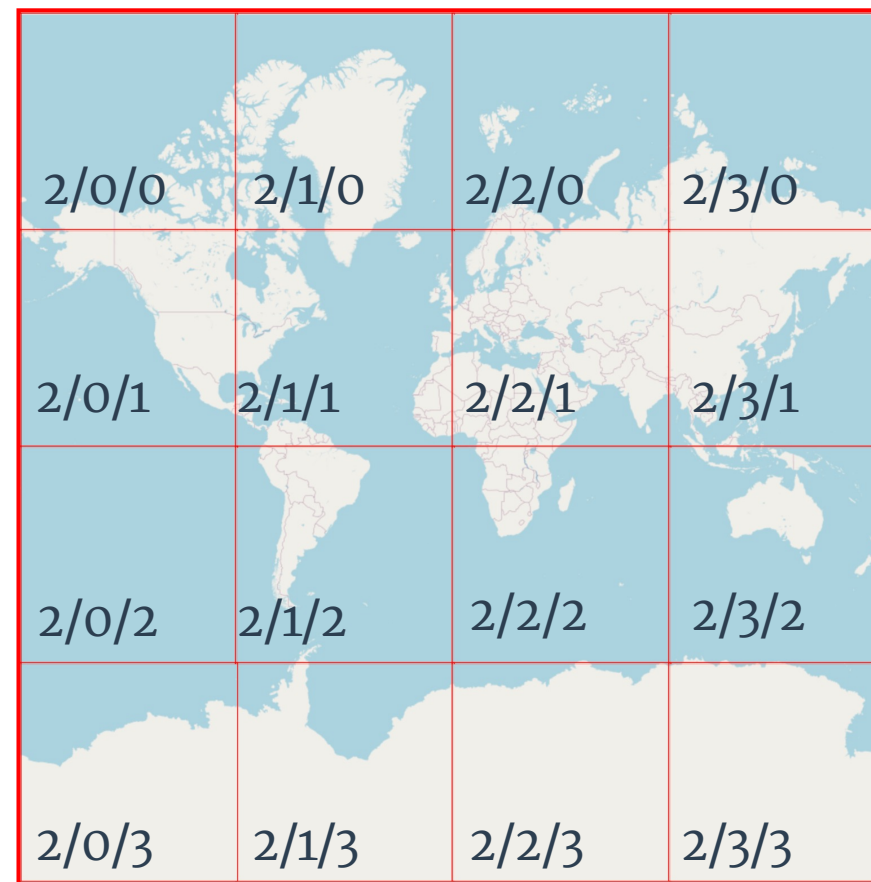
TILE HIERARCHY



Zoom level 0



Zoom level 1



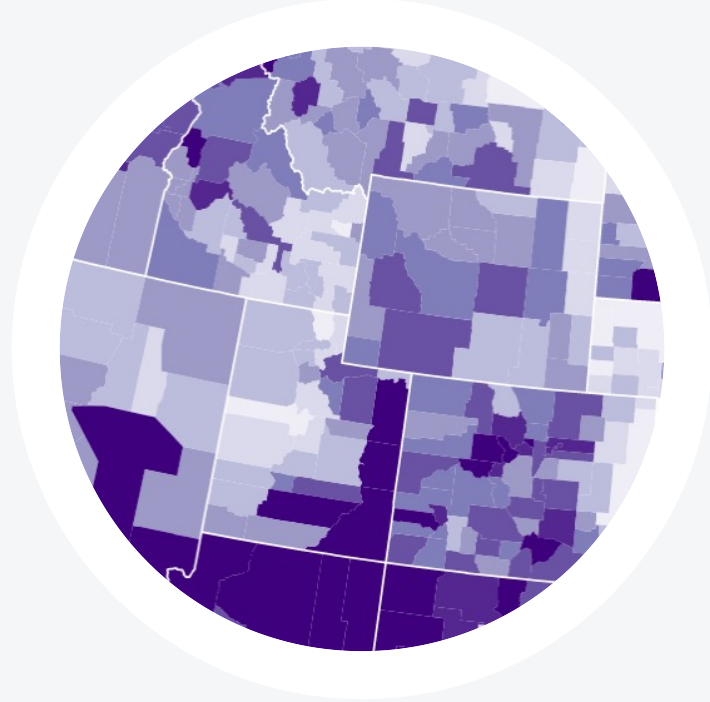
Zoom level 2

<https://tile.openstreetmap.org/{z}/{x}/{y}.png>

DEMO

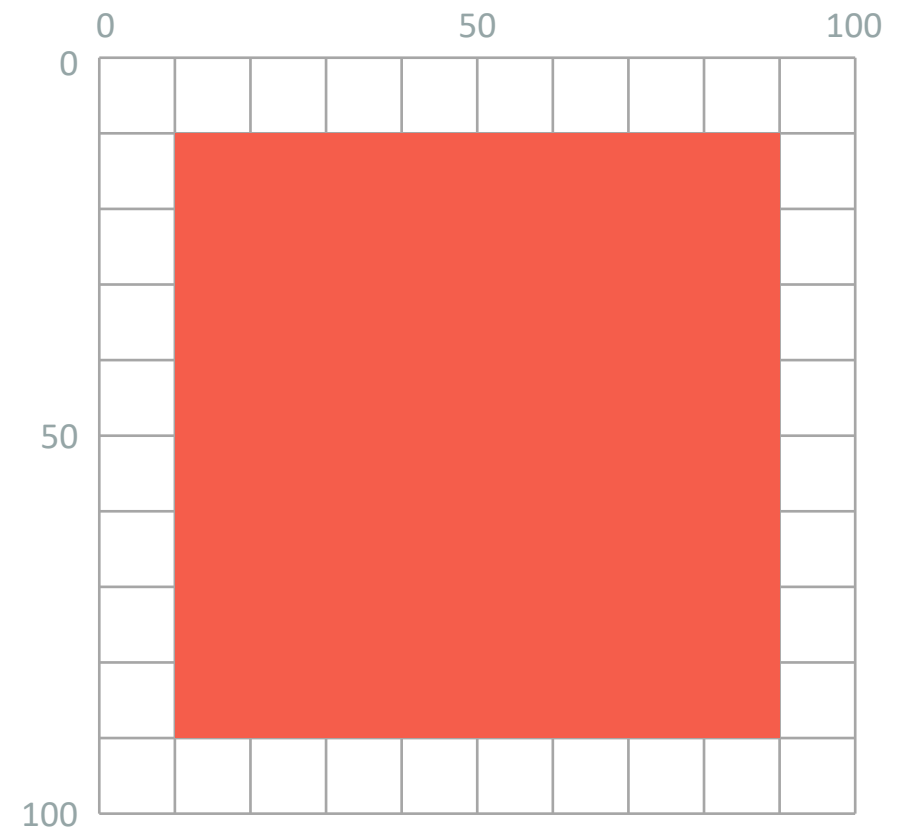
<https://codepen.io/ralucanicola/pen/VwWYZJy>



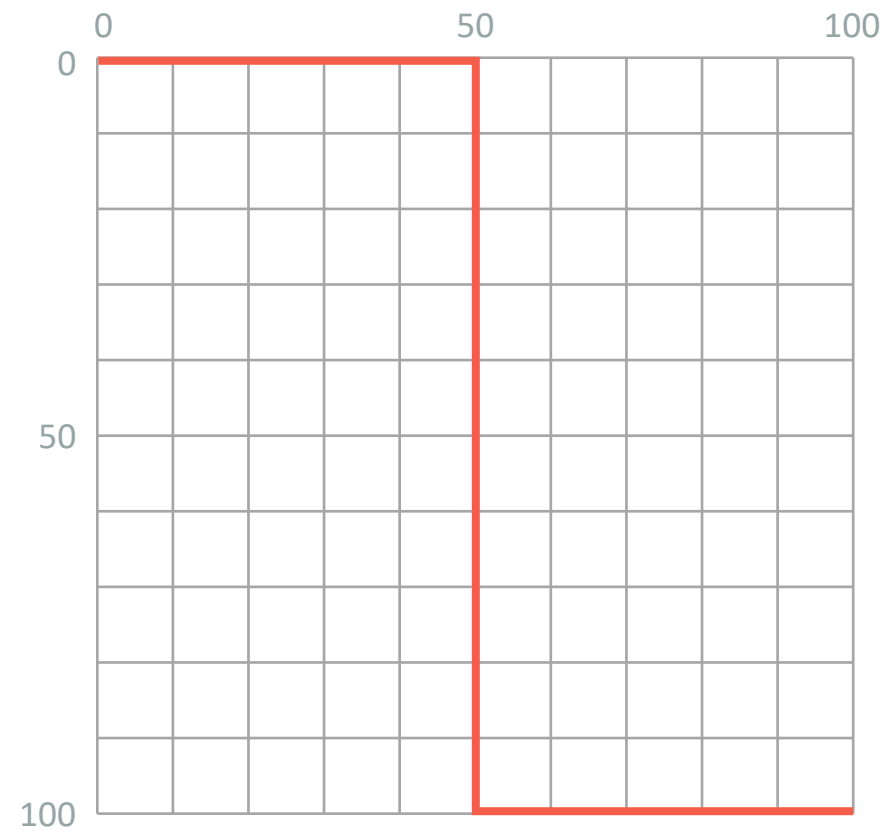


SVG (SCALABLE VECTOR GRAPHICS)

```
<svg>  
  <rect  
    x="10" y="10"  
    height=80 width=80  
    fill="orange"  
  />  
</svg>
```



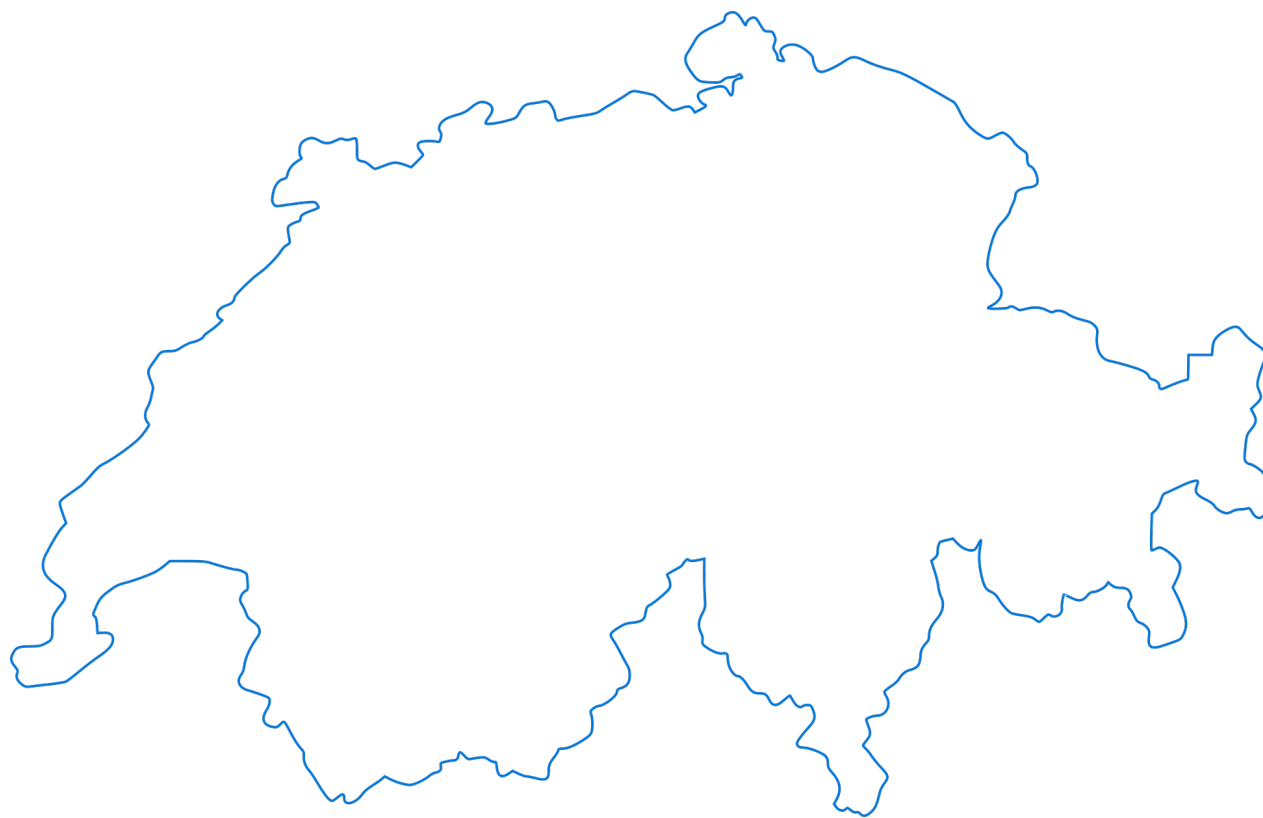

```
<svg>  
  <path  
    d="M0,0 h50 v100 h50"  
    stroke="orange"  
    fill="none"/>  
</svg>
```





<svg>

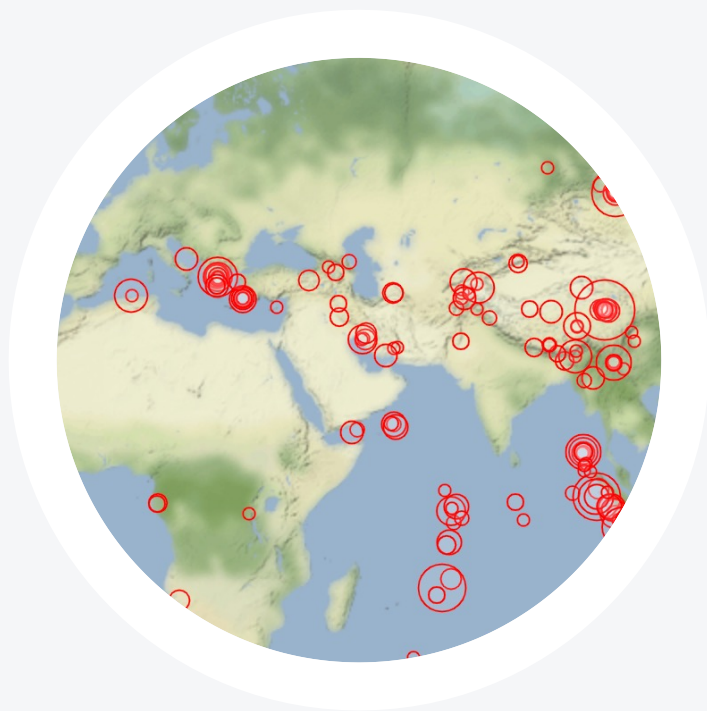
```
<path d="M7180,10357c-17-9-26-  
22-28-44c-3-29-10-34-108-79c-118-  
54-143-75-185-154c-17-30-41-71-55-  
90c-34-46-28-93,21-165c71-102,83-  
110,189113c874,942,123,22c22,18,43,  
26,70,26c21,0,49,7,62,17c23,15,25,1  
5,38-3c13-17,11-20-17-25c-48-10-60-  
26-60-79c0-50-7-80-19-80c-4,0-  
17,18-29,39c-29,52-55,56-155,29c-  
98-26-127-43-127-73c0-27,33-72,60-  
80c27-9,18-21-40-50l-49-25l-17,25c-  
23,35-47,39-109,16c-31-12-66-21-78-  
21c-13,0-51,28-96,70c-41,38-81,72-  
90,74c-49,15-156,36-181,36c-16,0-  
41-11-57-23c-15-13-73-50-128-81c-  
55-32-115-69-132-82c-27-20-59-29-  
169-45c-74-11-156-27-182-35c-43-15-  
47-15-59,2c-7,10-13,27-13,38c-1,34-  
36,103-62,120c-18,12-32,13-58,6  
...z"/></svg>
```



DEMO

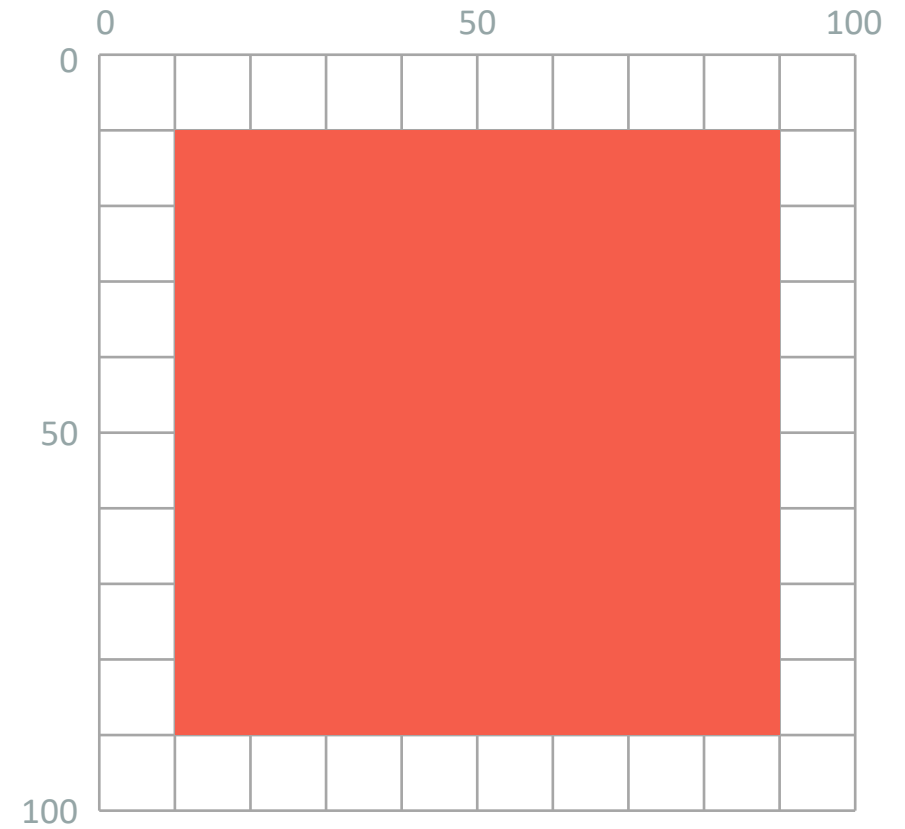
<https://codepen.io/ralucanicolu/pen/jOwEOqE>



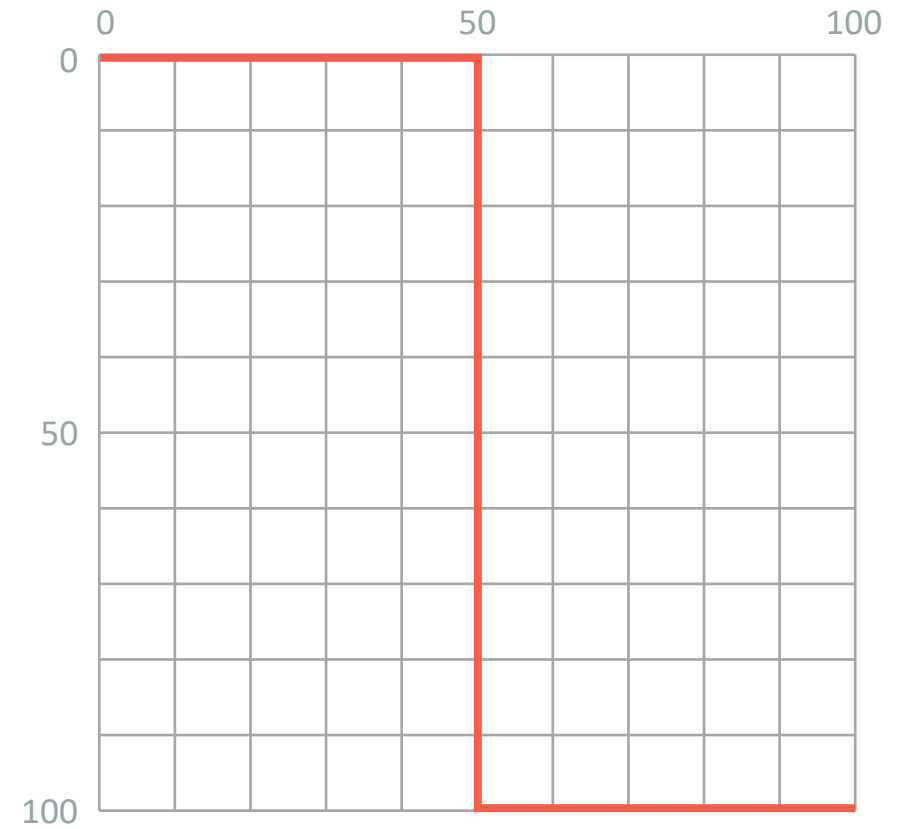


CANVAS 2D


```
const canvas = document.getElementById("canvas");  
const ctx = canvas.getContext("2d");  
ctx.fillStyle = "orange";  
ctx.fillRect(10, 10, 80, 80);
```



```
const canvas = document.getElementById("canvas");
const ctx = canvas.getContext("2d");
ctx.strokeStyle = "orange";
ctx.beginPath();
ctx.moveTo(0, 0);
ctx.lineTo(50, 0);
ctx.lineTo(50, 100);
ctx.lineTo(100, 100);
ctx.stroke();
```



DEMO

<https://codepen.io/ralucanicola/pen/gORbObQ>

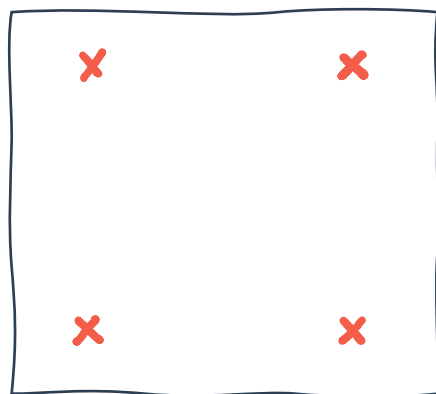




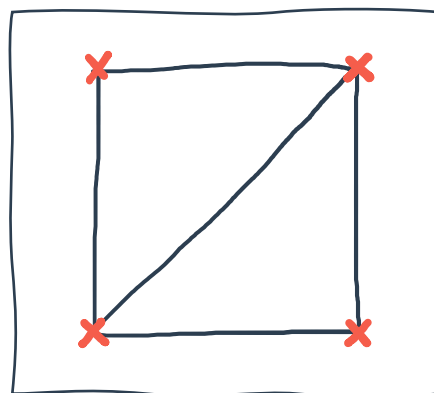
WEBGL


```
const verts = [  
  10,  10,  0.0,  
  90,  10,  0.0,  
  10,  90,  0.0,  
  90,  90,  0.0  
];
```

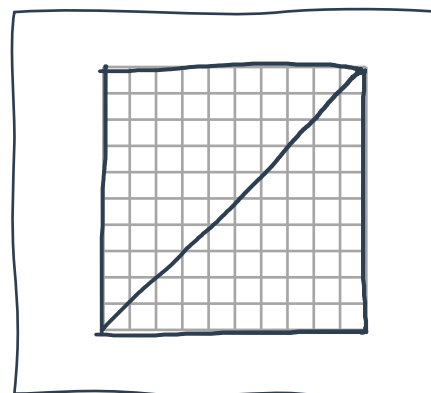
GEOMETRY



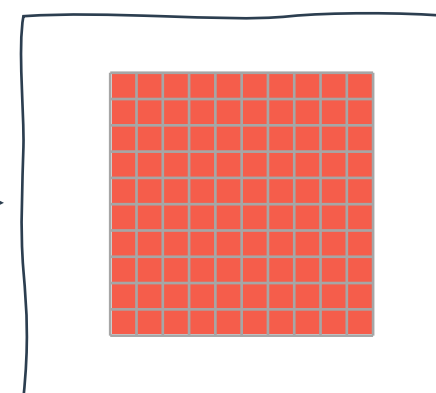
VERTEX SHADER



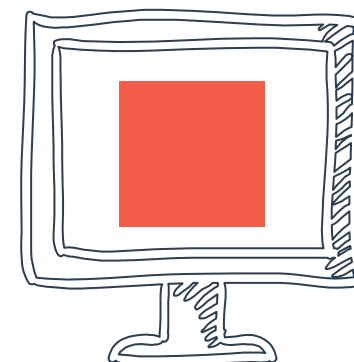
PRIMITIVE ASSEMBLY



RASTERIZATION



FRAGMENT SHADER



DEMO

<https://codepen.io/ralucanicola/pen/MWoYWey>



JAVASCRIPT LIBRARIES



 Leaflet

 ArcGIS API for JavaScript

 Mapbox GL JS

 D3

 deck.gl

 CesiumJS

 ThreeJS

 OpenLayers

 Google Maps Platform – Maps JavaScript API

 HERE Maps API for JavaScript

 General visualization purpose

 Mapping specific

JAVASCRIPT LIBRARIES



 Leaflet

 ArcGIS API for JavaScript

 Mapbox GL JS

 D3

 deck.gl

 CesiumJS

 ThreeJS

 OpenLayers

 Google Maps Platform – Maps JavaScript API

 HERE Maps API for JavaScript

 2D only

 2D and 3D

THANKS!
Any questions?



ralucagnicola@gmail.com



<https://raluca-nicola.net>

