



addresscloud[®]
Serverless Zoomstack
on AWS

github.com/addresscloud/serverless-zoomstack

I am going to show you how to host
Zoomstack on AWS without using servers



Amazon
Lambda

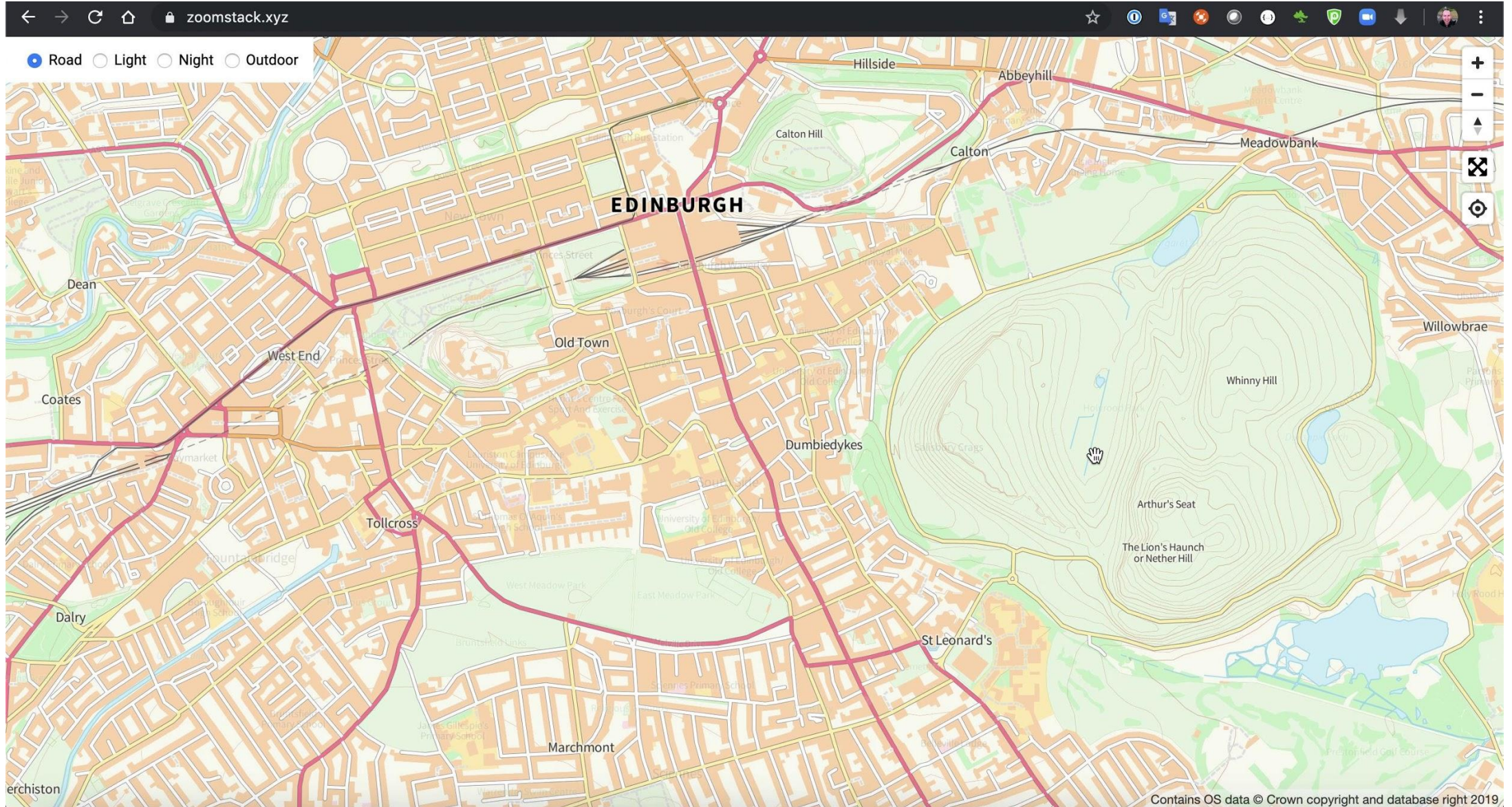


Amazon S3



Let's start with the end....

www.zoomstack.xyz



Other hosted Zoomstack options are
available...



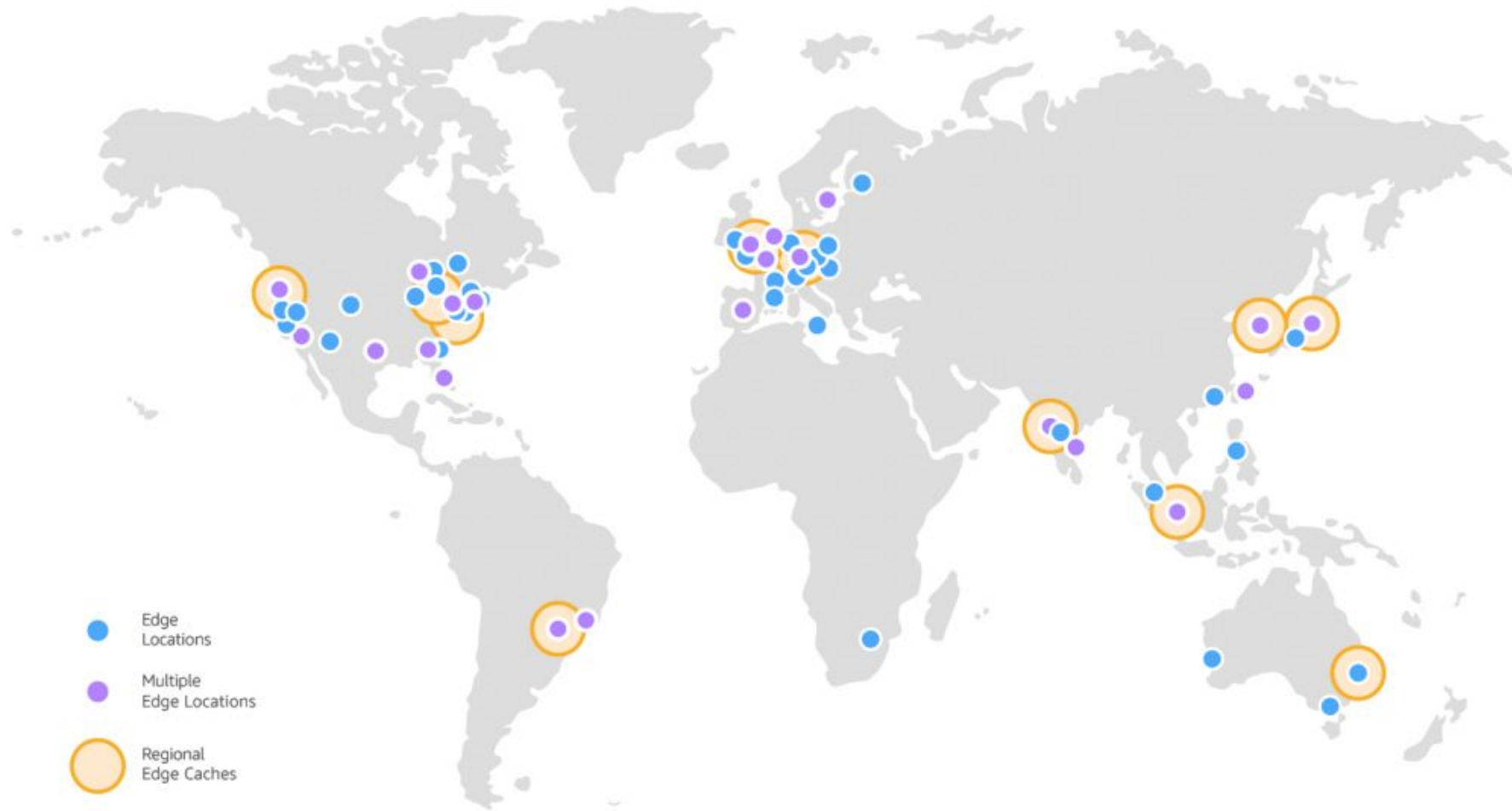
Ordnance
Survey



maptiler

Why would I want to host my own?

1) It's infinitely scalable



2) It's **cheap**....

AWS Service Charges

- API Gateway
- CloudFront
- CloudTrail
- CloudWatch
- Data Transfer
- DynamoDB
- Elastic Compute Cloud

\$1,

\$1.82

\$

\$

Total AWS bill for August 2019 supporting **400 active users!***

* Not only Zoomstack

3) It can be controlled and secured

Enable Geo-Restriction

☒ Yes
☐ No



Restriction Type

☒ Whitelist
☐ Blacklist



Countries



GB -- UNITED KINGDOM

Add >>

<< Remove

GB -- UNITED KINGDOM

zoomstack.xyz

Connection is secure

Your information (for example, passwords or credit card numbers) is private when it is sent to this site. [Learn more](#)

**Restrict Viewer Access
(Use Signed URLs or
Signed Cookies)**

☒ Yes
☐ No



So how do we do it?

1) Download Zoomstack*

www.ordnancesurvey.co.uk/opendatadownload/products.html

* To an EC2 for optimal I/O speed

2) Expand vector tiles into a directory*

```
mb-util /data/oszoom/oszoom.mbtiles /data/oszoom/YYYYMMDD --image_format pbf --silent
```

3) Create an S3 bucket with the correct
CORS settings

[Block public access](#)[Access Control List](#)[Bucket Policy](#)[CORS configuration](#)

CORS configuration editor ARN: arn:aws:s3:::tiles.zoomstack.xyz

Add a new cors configuration or edit an existing one in the text area below.

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <CORSConfiguration xmlns="http://s3.amazonaws.com/doc/2006-03-01/">
3   <CORSRule>
4     <AllowedOrigin>*</AllowedOrigin>
5     <AllowedMethod>GET</AllowedMethod>
6     <MaxAgeSeconds>3000</MaxAgeSeconds>
7     <AllowedHeader>Authorization</AllowedHeader>
8   </CORSRule>
9 </CORSConfiguration>
```


4) Create a root SSL certificate for free with
ACM*

* ACM must be in us-east-1

Add domain names



Type the fully qualified domain name of the site you want to secure with an SSL/TLS certificate (for example, `www.example.com`). Use an asterisk (*) to request a wildcard certificate to protect several sites in the same domain. For example: `*.example.com` protects `www.example.com`, `site.example.com` and `images.example.com`.

Domain name*	Remove
<input type="text" value="*.zoomstack.xyz"/>	
<input type="text" value="*.tiles.zoomstack.xyz"/>	

Add another name to this certificate

You can add additional names to this certificate. For example, if you're requesting a certificate for "`www.example.com`", you might want to add the name "`example.com`" so that customers can reach your site by either name. [Learn more](#).

5) Create a Cloudfront distribution with the correct configuration

Create Distribution

Origin Settings

Origin Domain Name



Origin Path



Origin ID



Restrict Bucket Access ☒ Yes
☐ No



Origin Access Identity ☒ Create a New Identity
☐ Use an Existing Identity



Comment



Grant Read Permissions on Bucket ☒ Yes, Update Bucket Policy
☐ No, I Will Update Permissions



Origin Custom Headers

Header Name

Value



Default Cache Behavior Settings

Path Pattern Default (*)



Viewer Protocol Policy ☐ HTTP and HTTPS
☒ Redirect HTTP to HTTPS
☐ HTTPS Only



Origin or Origin Group

S3-tiles.myvectortiles.xyz

i

Viewer Protocol Policy

☐ HTTP and HTTPS

☒ Redirect HTTP to HTTPS

☐ HTTPS Only

i

Allowed HTTP Methods

☐ GET, HEAD

☒ GET, HEAD, OPTIONS

☐ GET, HEAD, OPTIONS, PUT, POST, PATCH, DELETE

i

Field-level Encryption Config

i

Cached HTTP Methods

GET, HEAD (Cached by default)
☐ OPTIONS

i

Cache Based on Selected Request Headers

Whitelist

[Learn More](#)

i

Whitelist Headers

Filter headers or enter a custom header

Accept-Charset
Accept-Datetime
Accept-Encoding
Accept-Language
Access-Control-Request-Headers
Access-Control-Request-Method

Add Custom >>

Add >>

<< Remove

1 header(s) whitelisted

Accept

Avoid Whitelisting headers with an S3 origin, unless you need to implement [cross-origin resource sharing \(CORS\)](#) or personalize content using [Lambda@Edge](#) in origin-facing events.

Compress Objects Automatically

☐ Yes

☒ No

[Learn More](#)



Lambda Function Associations



CloudFront Event

Lambda Function ARN

Include Body

Select Event Type ▼

☐

[Learn More](#)

Distribution Settings

Price Class

Use All Edge Locations (Best Performance) ▼



AWS WAF Web ACL

None ▼



**Alternate Domain Names
(CNAMEs)**

tiles.zoomstack.xyz, a.tiles.zoomstack.x
yz, b.tiles.zoomstack.xyz,



SSL Certificate

☐ Default CloudFront Certificate (*.cloudfront.net)

Choose this option if you want your users to use HTTPS or HTTP to access your content with the CloudFront domain name (such as <https://d111111abcdef8.cloudfront.net/logo.jpg>).

Important: If you choose this option, CloudFront requires that browsers or devices support TLSv1 or later to access your content.

☒ Custom SSL Certificate (example.com):

Choose this option if you want your users to access your content by using an alternate domain name, such as <https://www.example.com/logo.jpg>. You can use a certificate stored in AWS Certificate Manager (ACM) in the US East (N. Virginia) Region, or you can use a certificate stored in IAM.

*.zoomstack.xyz (970defb3-d845-4523-9



6) Wire up Route 53 for the DNS

<input type="checkbox"/>	a.tiles.zoomstack.xyz.	A	ALIAS [REDACTED].cloudfront.net. (z2fdtn
<input type="checkbox"/>	b.tiles.zoomstack.xyz.	A	ALIAS [REDACTED].cloudfront.net. (z2fdtn
<input type="checkbox"/>	tiles.zoomstack.xyz.	A	ALIAS [REDACTED].cloudfront.net. (z2fdtn
<input type="checkbox"/>	www.zoomstack.xyz.	A	ALIAS [REDACTED]oudfront.net. (z2fdtn
<input type="checkbox"/>	zoomstack.xyz.	A	ALIAS s3-website-eu-west-1.amazonaws.com.

7) Upload the tiles to S3* setting the all-important headers

```
aws s3 cp YYYYMMDD s3://tiles.zoomstack.xyz/oszoom/YYYYMMDD/ --recursive --content-type application/x-protobuf --content-encoding 'gzip' --quiet
```

* Be patient, will take over an hour

8) Prepare the tile.json file*

* The only real manual step

Amazon S3 > tiles.zoomstack.xyz > oszoom > 20190909 > metadata.json

metadata.json [Latest version](#) ▼

Overview

Properties

Permissions

Select from

Storage class

Use the most appropriate storage class based on frequency of access.

[Learn more](#)

☒ Standard

Encryption

Use encryption to protect your data while in-transit and at rest.

[Learn more](#)

☐ None

Metadata

[+ Add Metadata](#) [Delete](#) [Edit](#) [i](#)

Key

Value



Content-Encoding



application/json

Cancel

Save

```
metadata (2).json — Downloads Add License
1 {
2   "center": "-0.173,51.3859,10",
3   "format": "pbf",
4   "json": "{\\\"vector_layers\\\": [{\\\"id\\\":\\\"sea\\\",\\\"description\\\":\\\"\\\",\\\"fields\\\":{}}],{\\\"id\\\":\\\"names\\\",\\\"description\\\":\\\"\\\",\\\"fields\\\":{\\\"type\\\":\\\"String\\\",\\\"name1\\\":\\\"String\\\",\\\"name1language\\\":\\\"\\\",\\\"name2\\\":\\\"String\\\",\\\"name2language\\\":\\\"\\\"}}]}",
5   "minzoom": "0",
6   "maxzoom": "14",
7   "name": "OS_Open_Zoomstack"
8 }
```

Find

Find: \

Replace: "

Options: ☐ Regular Expression ☐ Ignore Whitespace ☐ Ignore Case ☐ Wrap Around

In: Document matching *

Replaced 77 occurrences of ""composite"".

Find All Replace All Replace Replace & Find Previous Next

```
{
  "center": [-0.173, 51.3859, 10],
  "description": "Ordnance Survey Open Zoomstack 2019",
  "attribution": "<a href='\"https://www.ordnancesurvey.co.uk/legal/\"' target='\"_blank\"'>Contains OS data &copy; Crown copyright and geodata copyright &copy; Ordnance Survey 2019.",
  "format": "pbf",
  "id": "oszoom",
  "maxzoom": 14,
  "minzoom": 0,
  "name": "oszoom",
  "scheme": "xyz",
  "tilejson": "2.2.0",
  "tiles": ["https://a.tiles.vectortiles.xyz/oszoom/20190909/{z}/{x}/{y}.pbf", "https://b.tiles.vectortiles.xyz/oszoom/20190909/{z}/{x}/{y}.pbf"],
  "vector_layers": [
    {
      "id": "sea"
    },
    {
      "id": "names",
      "fields": {
        "type": "String",
        "name1": "String",
        "name1language": "String",
        "name2": "String",
        "name2language": "String"
      }
    },
    {
      "id": "rail",
      "fields": {
        "type": "String"
      }
    },
    {
      "id": "waterlines",
      "fields": {
        "type": "String"
      }
    }
  ]
}
```



9) Pray you didn't miss anything


10) Sit back and enjoy those sweet
Zoomstack tiles...




This pattern works for more than just
(base)maps tiles....

← → ↺ 🏠 🔒 maps.addresscloud.com

 addresscloud®





13 St Leonard's Ln Flat 3, Edinburgh, Scotland EH8





Police Scotland, St. Leonards
Police Station, 14 St. Leonards
Street


Edinburgh EH8 9QW (UPRN: 906234554)


 Risk Summary


 PoolRe Zone
D

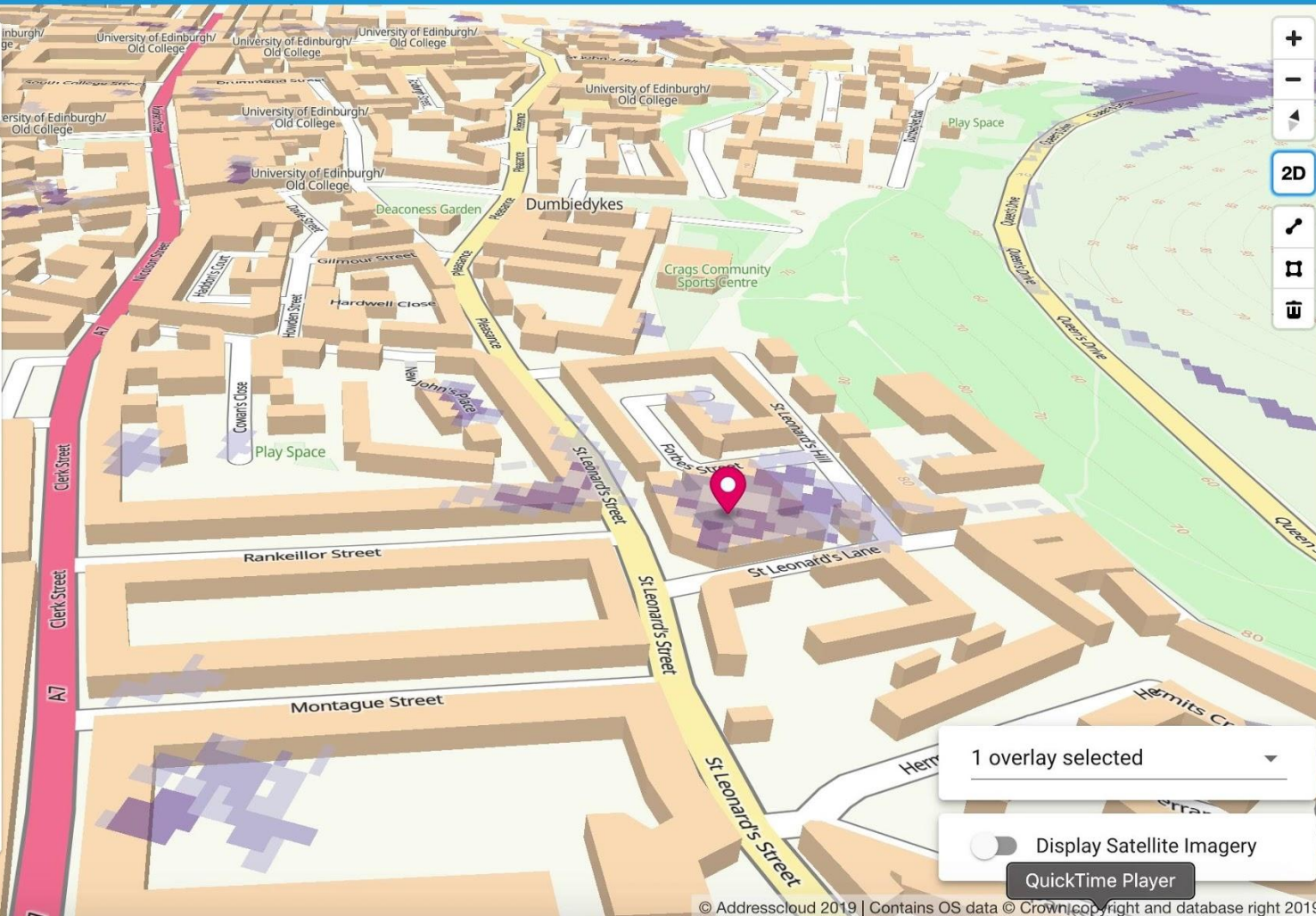
 Subsidence Risk
Negligible


 Building Area (Footprint)
1994


 Absolute Height 2 (Principle Building)
80.1


 Flood Risk Score (Defended /53)
5


 Distance to River (m)
8878




 2D








1 overlay selected

 Display Satellite Imagery



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In case you missed a step.... 🤗

github.com/addresscloud/serverless-tiles

**Steve Bennett**

@stevage1

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My achievement of the week: I have finally got vector tiles set up serving directly from AWS S3. No server required at all. It's...quite complicated. You need S3, Route53, CloudFront and ACM (certificate management).

This tutorial is ace:

**addresscloud/serverless-tiles**

Serverless Vector Tiles on AWS. Contribute to addresscloud/serverless-tiles development by creating an account on GitHub.

github.com

7:50 PM - 3 Apr 2019

11 Retweets 65 Likes



7



11



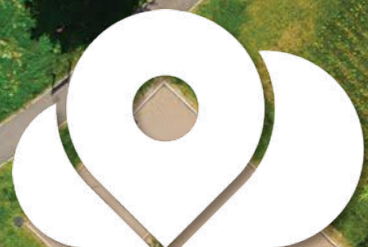
65

AWS S3 + Cloudfront is a very powerful combination for building applications that can scale infinitely at very low cost

There is a learning curve in configuring the service but the reward outweighs the effort

Thank you for you time and enjoy the rest
of the conference!

P.S. We will be hiring in 2020, come and speak to us 😁



addresscloud[®]
mark@addresscloud.com