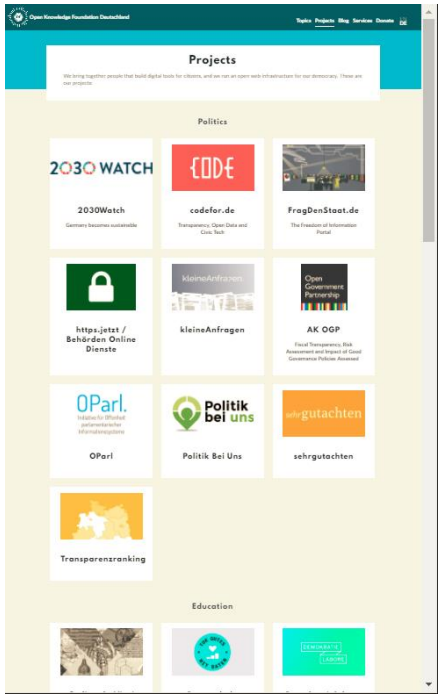
sensorplane.io

Nikolaus Pohle. OK Lab Hannover. Sep 28, 2017

OK Labs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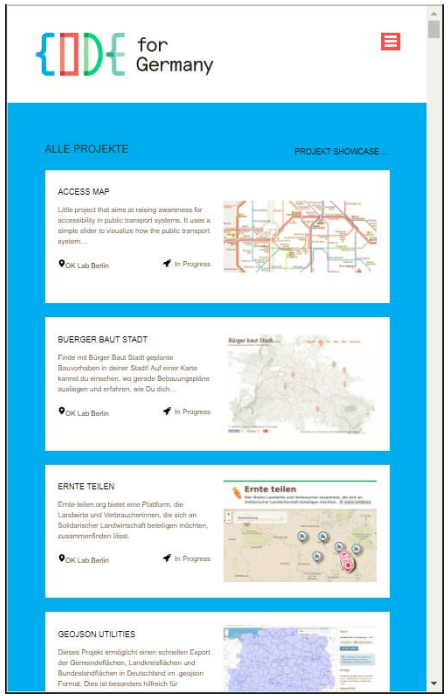
for Germany
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ACCESS MAP
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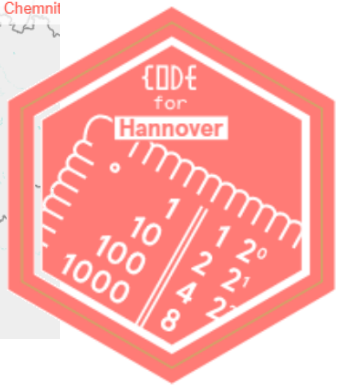
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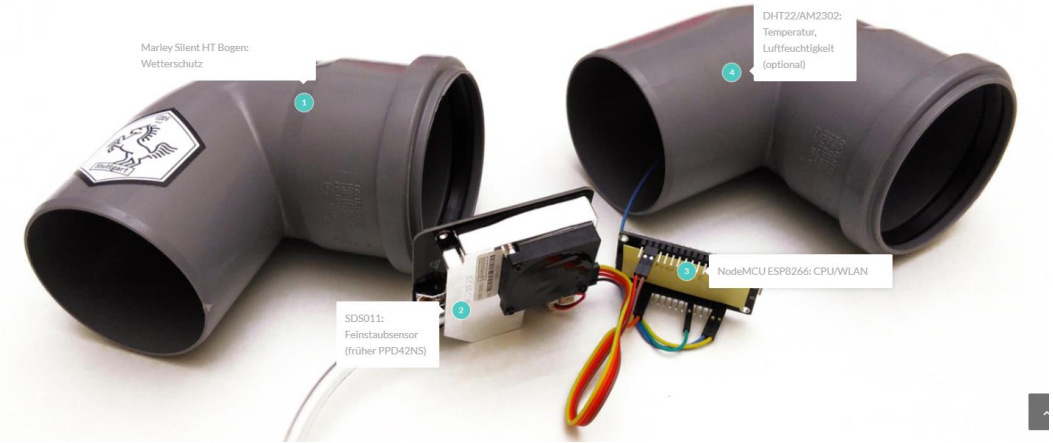
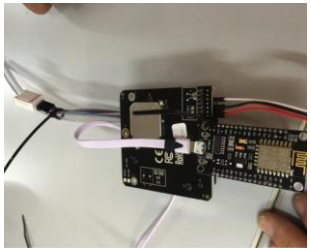
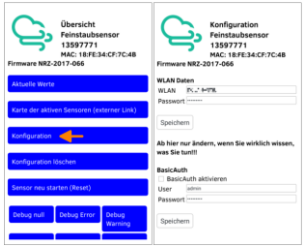
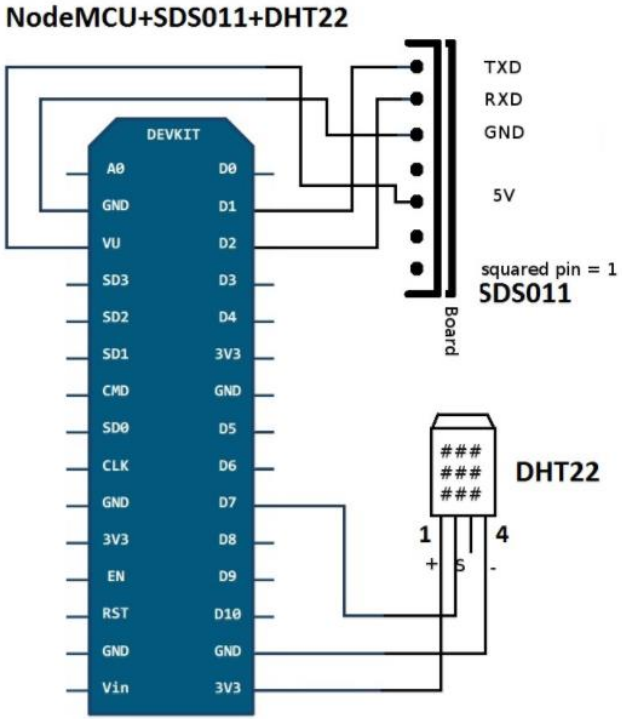
OKLab Stuttgart: DIY Feinstaubsensor



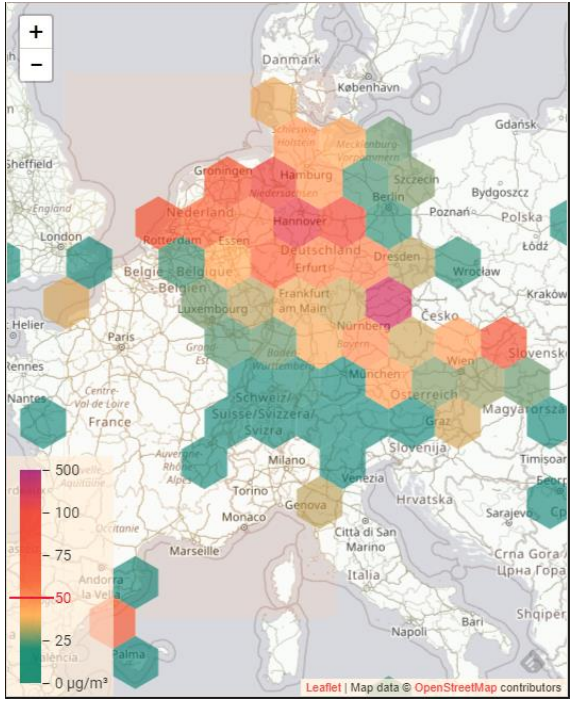


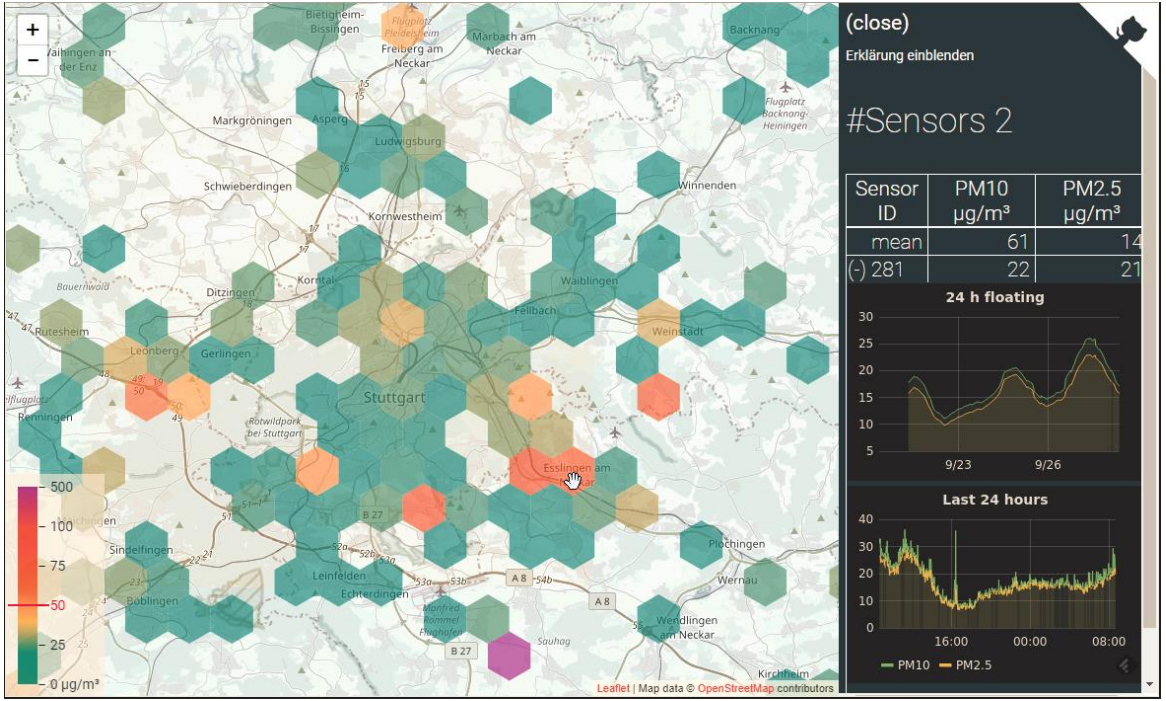




Source: http://luftdaten.info/

OK Lab Stuttgart: Data Visualization





Source: http://luftdaten.info/

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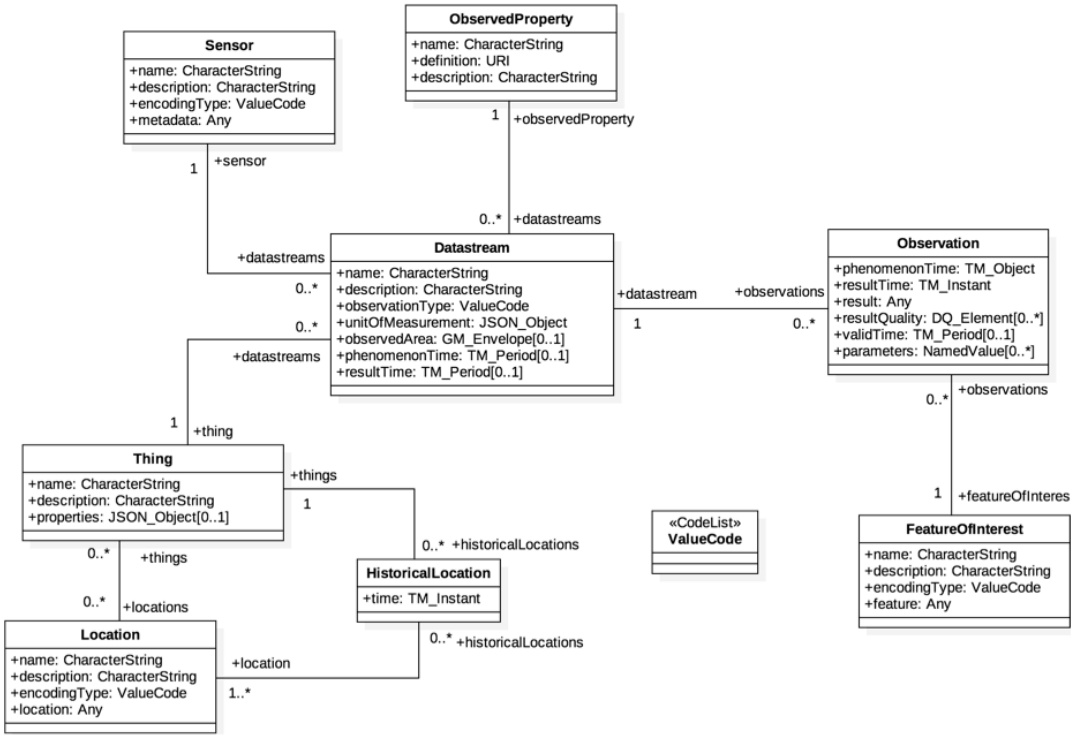
While the existing Backend API is effective it comes with a couple of downsides:

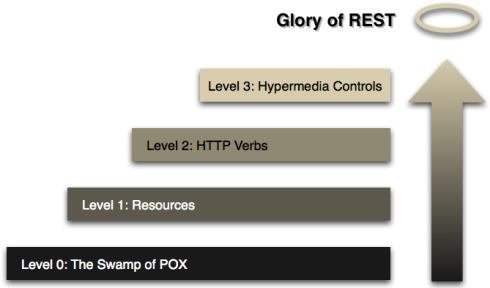
- not flexible: fixed number of measurement dimensions.
- not rich: no support for metadata.
- not elastic: architecture not cloud native.

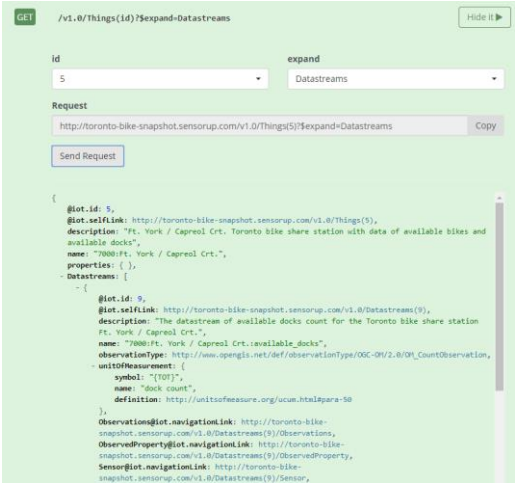
PaaS services like AWS are potentially a very good fit for a project like this:

- Fully elastic with costs close to zero during ramp up phase. Super easy to scale out and in.
- Security and availability are covered out of the box. No patching, no Restores, no DDOS
- Multiple runtimes available (Node, Java, PHP, etc.)
- Availability of deployment frameworks like serverless.com

SensorThing API







https://github.com/opengeospatial/sensorthings

https://martinfowler.com/articles/richardsonMaturityModel.html

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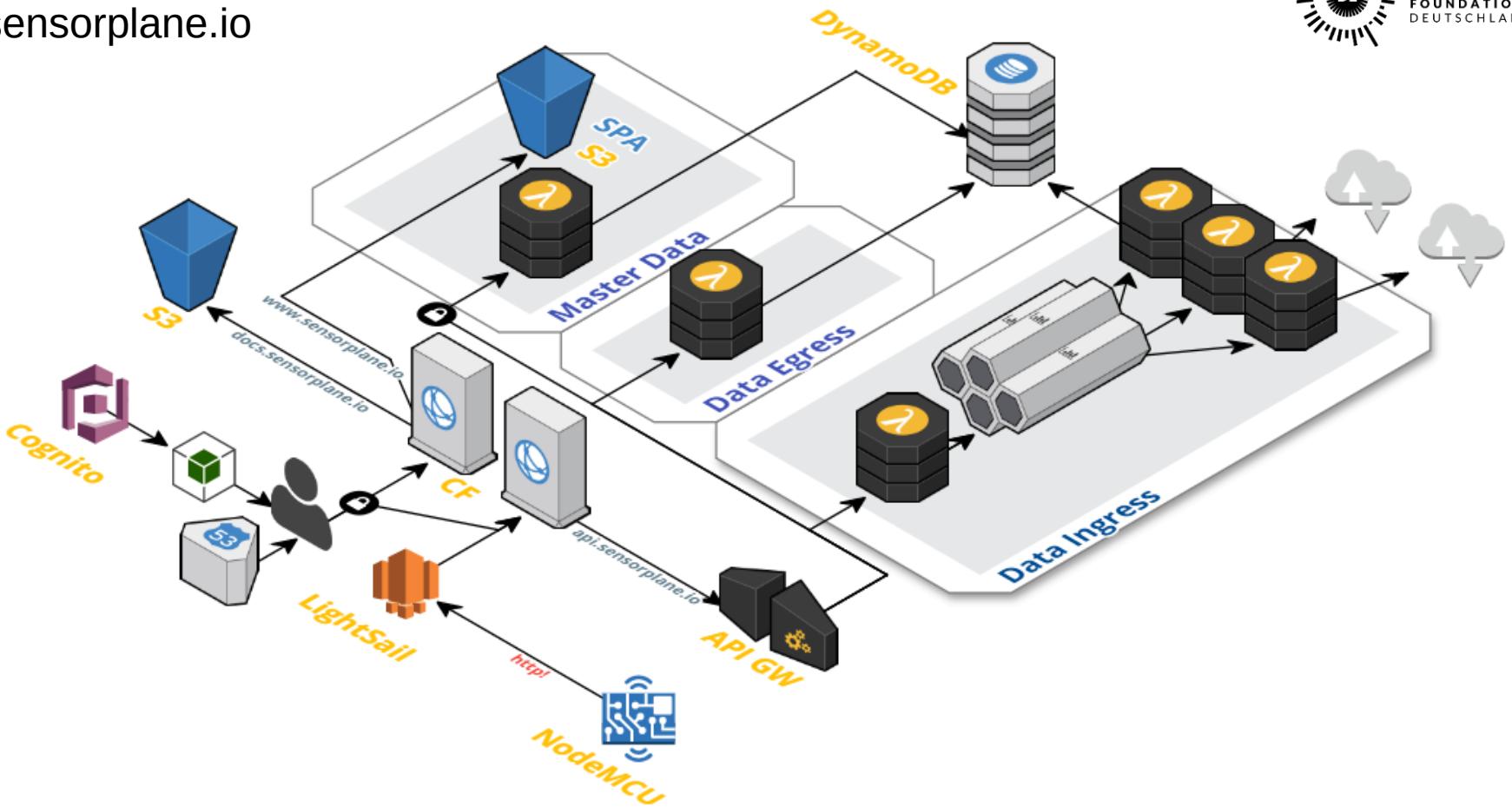

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- Entities are represented as POJOs with some business logic.
- List, Find, Save, Render JSON output (recursively)

```
1   'use strict';
2   var AWS = require("aws-sdk");
3
4   var Datastream = function (data) {
7   }
8
9   Datastream.prototype.data = {}
10
11  Datastream.prototype.renderAPIOutput = function(baseurl) {
37
38  }
39
40  Datastream.prototype.save = function(author) {
92
93  };
94
95  Datastream.prototype.expandObservedProperty = function() {
104 }
105
106 Datastream.list = function (top, start) {
133
134 }
135
136 Datastream.findById = function (datastream_id) {
169
170 }
171
172 Datastream.guid = function () {
180 }
181
182 module.exports = Datastream;
183
184 var ObservedProperty = require('model/ObservedProperty');
185 var Sensor = require('model/Sensor');
186 var Thing = require('model/Thing');
```

```
1   'use strict';
2   var AWS = require("aws-sdk");
3
4   var Sensor = function (data) {
7   }
8
9   Sensor.prototype.data = {}
10
11  Sensor.prototype.renderAPIOutput = function(baseurl) {
23
24  }
25
26  Sensor.prototype.save = function(author) {
45
46  };
47
48  Sensor.list = function (top, start) {
71
72  }
73
74  Sensor.findById = function (sensor_id) {
96
97  }
98
99  module.exports = Sensor;
100
```

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```
'use strict';
var AWS = require("aws-sdk");
var jsonpath = require('jsonpath');
var sensorthing = require('sensorthing');

var Sensor = require('model/Sensor');
var ObservedProperty = require('model/ObservedProperty');
var Datastream = require('model/Datastream');
var Thing = require('model/Thing');
var Location = require('model/Location');
var Sensor = require('model/Sensor');
```

```
module.exports.post_datastream = (event, context, callback) => {

  console.log("Received event:", event);

  var eventBody = event.body;

  var datastream = new Datastream(event.body);
  var datapromise = datastream.save(event.cognitoPoolClaims.sub);

  datapromise
    .then(function(datastream) {
      callback(null, datastream.renderAPIOutput(getBaseUrl(event)));
    })
    .catch(function(error) {
      console.log(error);
    });

};
```

```
Datastream.prototype.save = function(author) {

  var self = this;
  console.log("save Datastream ID", this.data.id);

  this.data.authors = [author];

  var docClient = new AWS.DynamoDB.DocumentClient();
  var dynamopromise = docClient.put(
        {
        "TableName": "sensorplane_datastreams",
        "Item" : this.data
        })
      .promise()
      .then(function() {
        console.log("put into DynamoDB: ", self.data);
        var sensor = Sensor.findById(self.data.sensor_id);
        var property = ObservedProperty.findById(self.data.observedproperty_id);
        var thing = Thing.findById(self.data.thing_id);
        return Promise.all([sensor, property, thing]);
      })
      .then(function(data) {
        console.log("found dependent entries: ", data);
        var sensor = data[0];
        var property = data[1];
        var thing = data[2];

        if (!sensor.data.datastream_ids.some(function(entry) {return entry == self.data.id;})) {
          sensor.data.datastream_ids.push(self.data.id);
        }
        var sensorpromise = sensor.save();

        if (!property.data.datastream_ids.some(function(entry) {return entry == self.data.id;})) {
          property.data.datastream_ids.push(self.data.id);
        }
        var propertypromise = property.save();

        if (!thing.data.datastream_ids.some(function(entry) {return entry == self.data.id;})) {
          thing.data.datastream_ids.push(self.data.id);
        }
        var thingpromise = thing.save();

        return Promise.all([sensorpromise, propertypromise, thingpromise]);
      })
      .then(function(data) {
        return self;
      })
      .catch(function(error) {
        console.log("Error in Datastream.save(): ", error);
      });

module.exports = Datastream;

var ObservedProperty = require('model/ObservedProperty');
var Sensor = require('model/Sensor');
var Thing = require('model/Thing');
```

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- serverless.yaml maps events to JS functions.
- Events can be https requests or Kinesis messages

```
httpgetdatastreamlist:
   handler: egress.get_datastreamlist
   events:
     - http:
         path: Datastreams/
         method: get
         integration: lambda
         cors: true
   environment:
     stage: ${opt:stage, self:provider.stage}
```

```
 httpgetdatastreamroot:
   handler: egress.get_datastream
   events:
     - http:
         path: Datastreams/{id}
         method: get
         integration: lambda
         cors: true
         request:
           parameters:
             paths:
               id: true
   environment:
     stage: ${opt:stage, self:provider.stage}
```

```
 httppostdatastreamroot:
    handler: ingest.post_datastream
    events:
      - http:
          path: Datastreams
          method: post
          integration: lambda
          cors: true
          authorizer:
            arn: arn:aws:cognito-idp:us-east-1:06
            claims:
              - email
    environment:
      stage: ${opt:stage, self:provider.stage}
```

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```yaml
swagger: "2.0"
info:
  description: "This is a service inspired by the <a href='http://docs.opengeospatia
  version: "1.0.0"
  title: "Sensor Map"
  contact:
    email: "nikolaus.pohle@sensormap.io"
host: "api.open.sensormap.io"
basePath: "/v1"
tags:
- name: "Things"
  description: "Everything about your Things"
- name: "Oberservations"
  description: "Access to collected observations"
schemes:
- "https"

securityDefinitions:
  ApiKeyAuth:
    type: apiKey
    in: header
    name: Authorization

paths:
  /Things/:
    get:
      tags:
      - "Things"
      summary: "List all Things"
      description: "No support for filters and selectors yet"
      operationId: "things"
      produces:
      - "application/json"
      responses:
        200:
          description: "successful operation"
          schema:
            type: "object"
            properties:
              "@iot.count":
                type: "integer"
              "@iot.nextLink":
                type: "string"
              value:
                type: "array"
                items:
                  $ref: "#/definitions/Thing"
        400:
          description: "Invalid status value"
  /Things/{thingId}/:
```