Localstack practices

Localstack reference:

https://localstack.cloud

Benefits:

- You can work offline
- You don't need a shared 'dev' bucket that everyone on your team uses
- You can easily wipe & replace your local buckets
- You don't need to worry about paying for AWS usage
- You don't need to log into AWS 😛

Stack:

- Nodejs
- Express
- brew if is necesary
- Localstack (AWS suit)
- Docker & Docker Compose
- Jest & SuperTest for testing
- Swagger for documentation

First Goal (Fake AWS locally with LocalStack)

Reference

Localstack within a node app

Localstack allows you to emulate a number of AWS services on your computer. We are going to use a S3 iin this example.

Initial setup

1. Install docker if you haven't already.
2. Install **AWS CLI** oficial or using brew, even though we aren't going to be working with "real" AWS, we'll use this to talk to our local docker containers.
3. Once the AWS CLI is installed, run `aws configure` to create some credentials. Even though we're talking to our "fake" local service, we still need credentials. You can enter real credentials (as described here), or dummy ones. Localstack requires that these details are present, but doesn't actually validate them.
4. Create a new directory for you project, and within it a new nodejs project `npm init -y`.
5. Make a few files inside you project:

- aws.js
- docker-compose.yml
- test-upload.js

- .env

6. Add an image to your project directory and rename it to `test-upload.jpg`.
7. Install aws-sdk, dotenv `npm install --save aws-sdk dotenv`

Docker config

Run Localstack with docker-compose to set this up.

`docker-compose.yml`

```
version: "3.2"
services:
  localstack:
    image: localstack/localstack:0.11.3
    container_name: "fake-aws-s3"
    network_mode: bridge
    ports:
      - "4566:4566"
      - "8055:8080"
    environment:
      - SERVICES=s3
      - DEBUG=1
      - DATA_DIR=/tmp/localstack/data
    volumes:
      - "./.localstack:/tmp/localstack"
      - "/var/run/docker.sock:/var/run/docker.sock"
```

The line `4566:4566` does the same thing, but binds a whole range of ports. These particular port numbers are what Localstack uses as endpoints for the various APIs. We'll see more about this in a little bit.

`SERVICES=s3`: You can define a list of AWS services to emulate. In our case, we're just using S3, but you can include additional APIs, i.e.

`SERVICES=s3,lambda`: There's more on this in the Localstack docs.

`DEBUG=1`: Show me all of the logs!

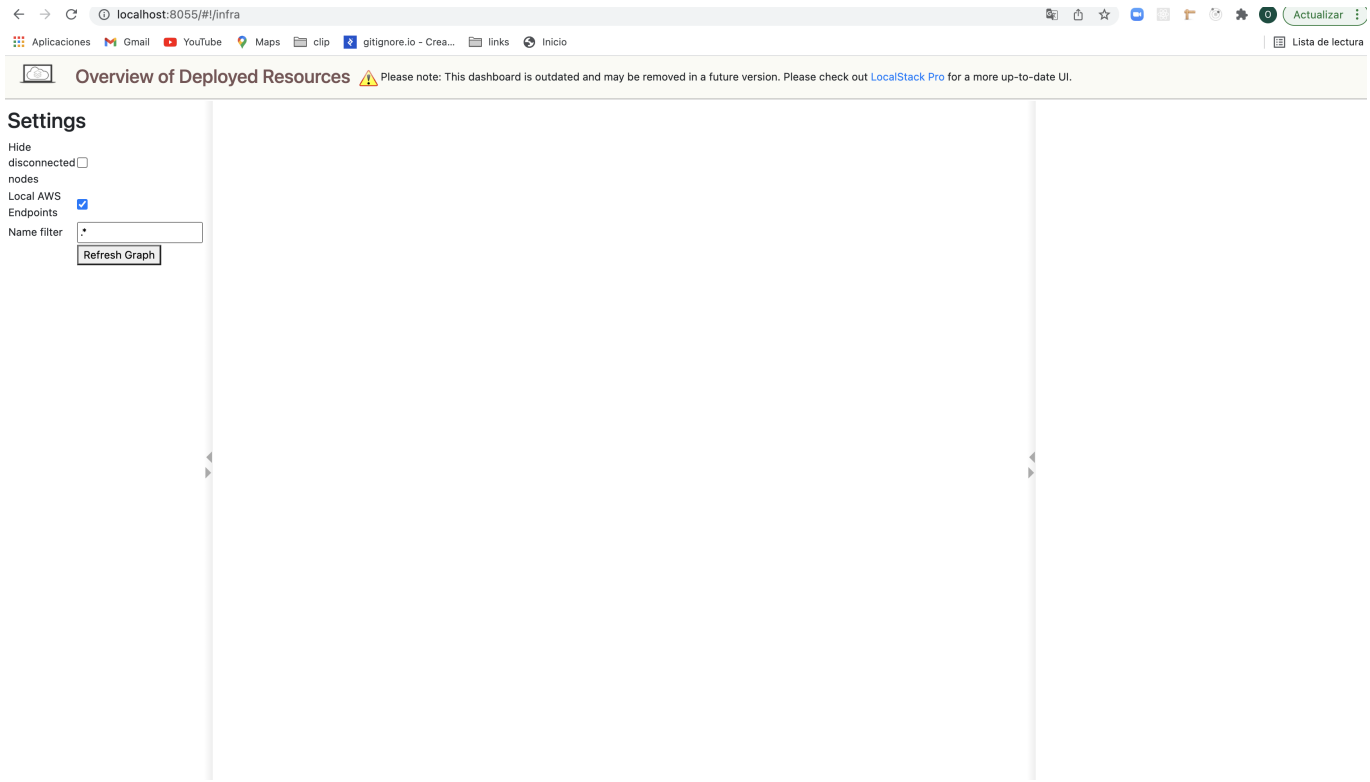
`DATA_DIR=/tmp/localstack/data`: This is the directory where Localstack will save its data internally.

Starting our container

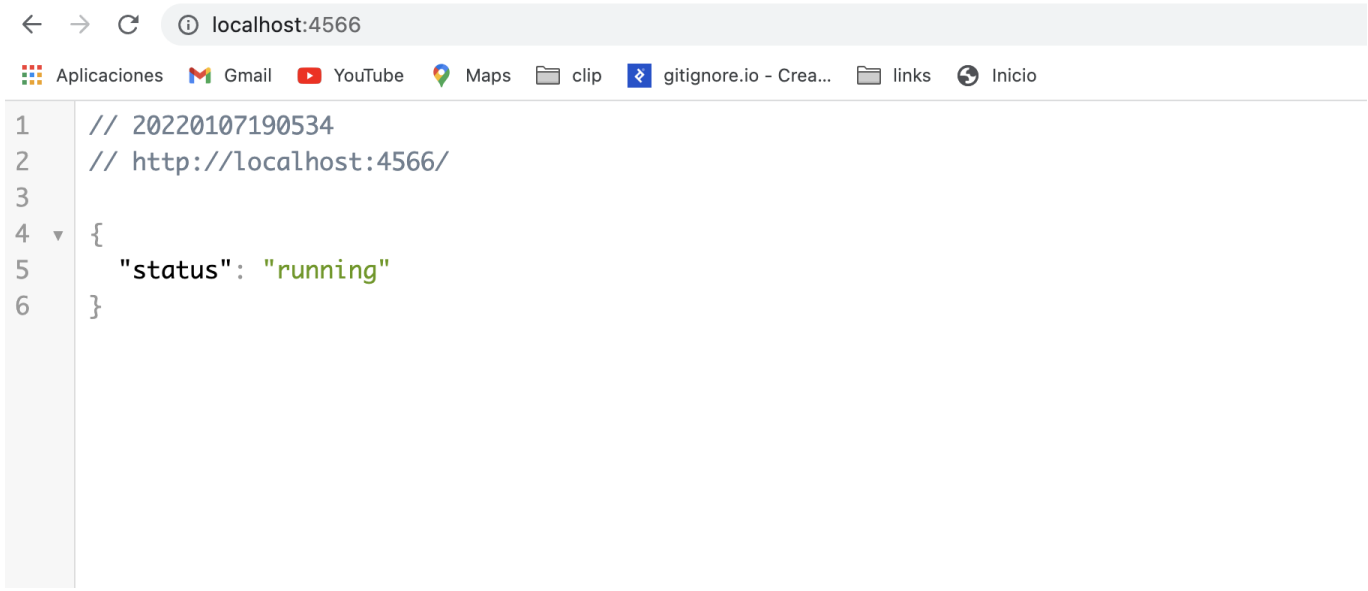
Run in terminal:

```
docker-compose up
```

To make sure it's working, we can visit http://localhost:8055 to see localstack's web UI:



Similary, our s3 endpoint http://localhost:4566:

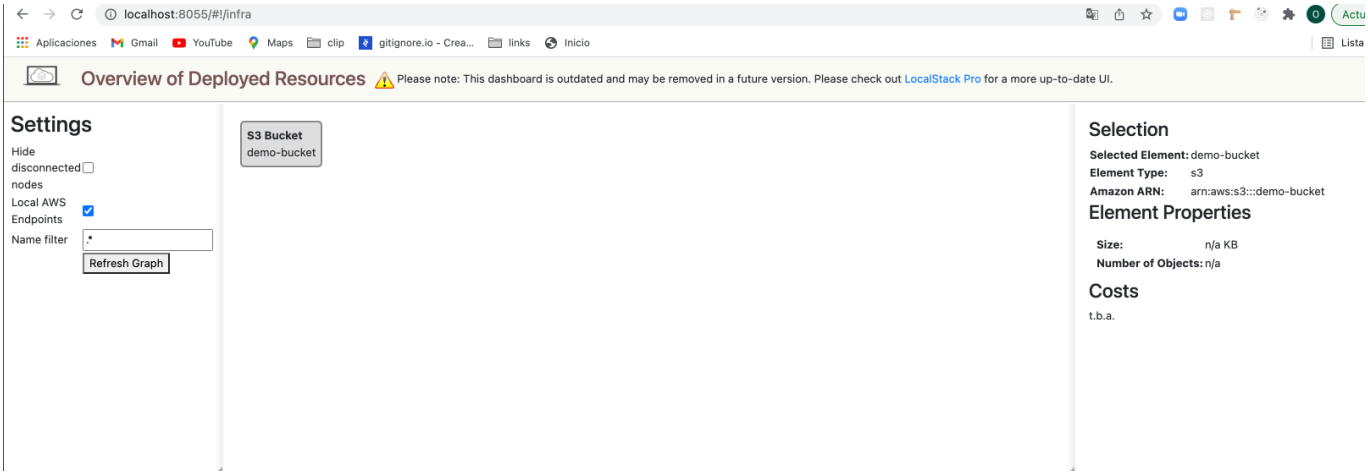


Working with Localstack

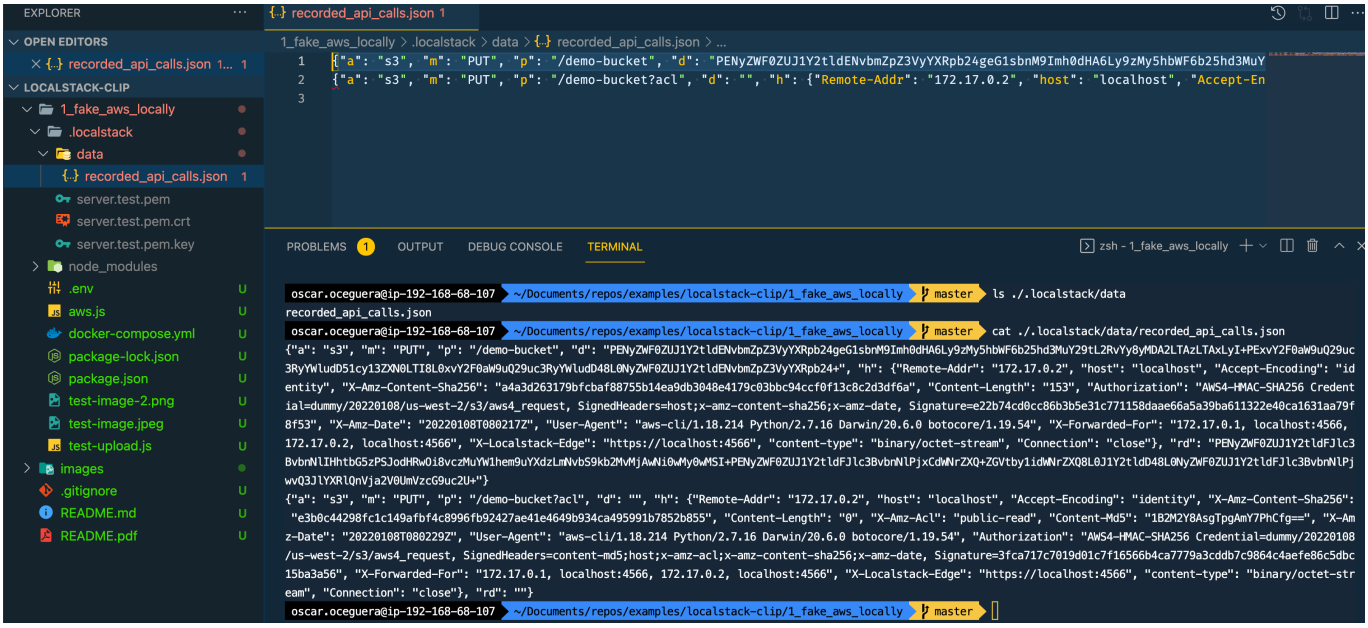
AWS is now inside our computer. After we start upload files, we need to create and configure a **bucket**. We will do this using rhw AWS CLI that we installed earlier, using the `-- endpoint-url` flag to talk to Localstack instead.

1. Create a bucket: `aws --endpoint-url=http://localhost:4566 s3 mb s3://demo-bucket`
2. Attach an ACL (Access control list) to the bucket so it's readable: `aws --endpoint-url=http://localhost:4566 s3api put-bucket-acl --bucket demo-bucket --acl public-read`

Now, when we visit the web UI, we will see our bucket:



If you use `volumes` in your docker settings, let's paause for a moment to look at what's going on in `./.localstack/data`:



Here, we can see that Localstack is recording all API calls in this JSON file. When the container restarts, it will re-apply these calls - this is how we are able to keep our data between restarts. Once we start uploading, we won't see new files appear in this directory. Instead, our uploads will be recorded in this file as raw data. (You could include this file in your repo if you wanted to share the state of the container with others - but depending on how much you upload, it's going to become a pretty big file)

Uploading from our app

We will just make a simple **upload** function and try uploading an image a few times to our S3 butcket.

`.env`, our enviroment variables

```
AWS_ACCESS_KEY_ID='123'
AWS_SECRET_KEY='xyz'
AWS_BUCKET_NAME='demo-bucket'
```

Note: it doesn't matter what your AWS key & secret are, as long as they aren't empty.

`aws.js`, the module for our upload function

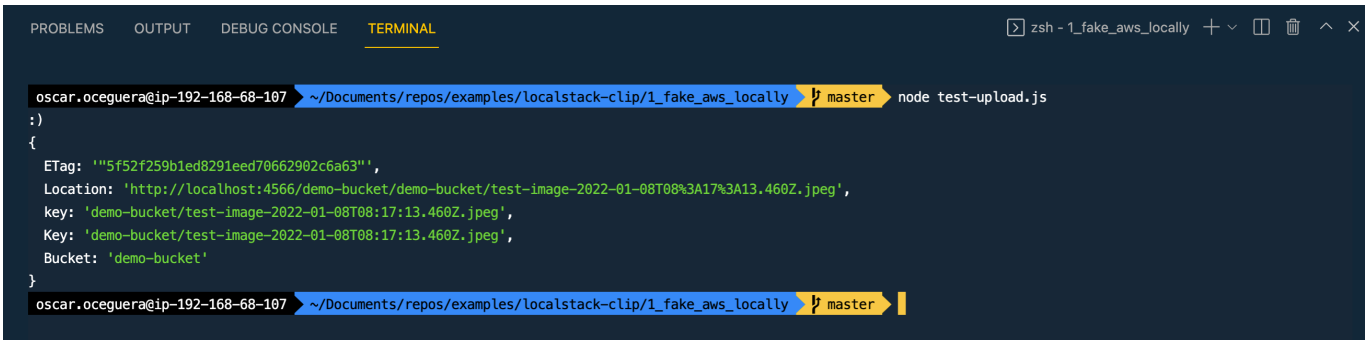
```
const AWS = require("aws-sdk");
require("dotenv").config();

const credentials = {
  accessKeyId: process.env.AWS_ACCESS_KEY_ID,
  secretAccessKey: process.env.AWS_SECRET_KEY,
};

const useLocal = process.env.NODE_ENV !== "production";

const bucketName = process.env.AWS_BUCKET_NAME;

const s3client = new AWS.S3({
  credentials,
  endpoint: useLocal ? "http://localhost:4566" : undefined,
  s3ForcePathStyle: true,
});

const uploadFile = async (data, name) =>
  new Promise((resolve) => {
    s3client.upload(
      {
        Bucket: bucketName,
        Key: `${bucketName}/${name}`,
        Body: data,
      },
      (err, response) => {
        if (err) throw err;
        resolve(response);
      }
    );
  });

module.exports = uploadFile;
```

`test-upload.js`, which implements th eupload function

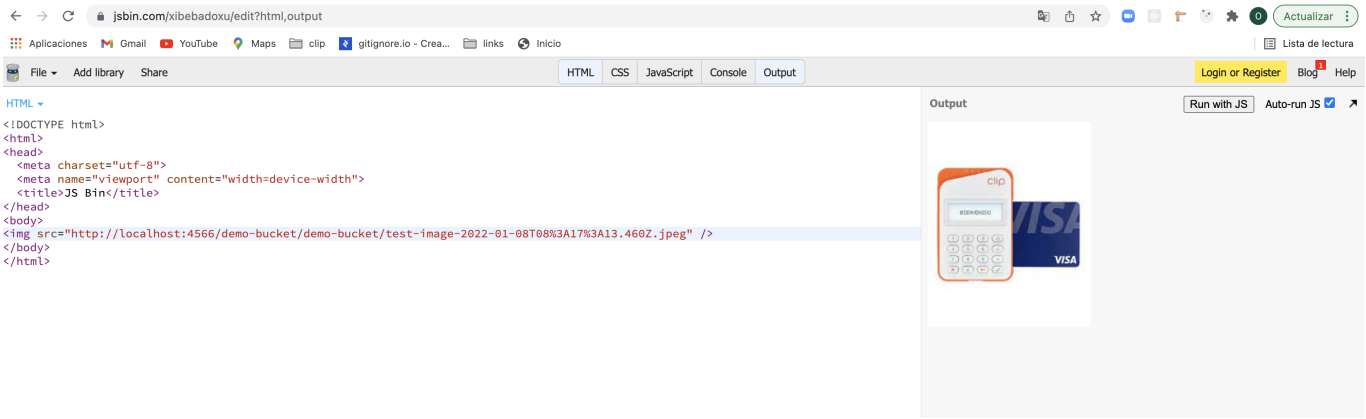
```
const fs = require("fs");
const path = require("path");
const uploadFile = require("./aws");

const testUpload = () => {
  const filePath = path.resolve(__dirname, "test-image.jpg");
  const fileStream = fs.createReadStream(filePath);
  const now = new Date();
  const fileName = `test-image-${now.toISOString()}.jpg`;
```

```
    uploadFile(fileStream, fileName)
      .then((response) => {
        console.log(":)");
        console.log(response);
      })
      .catch((err) => {
        console.log(":|");
        console.log(err);
      });
  };

  testUpload();
```

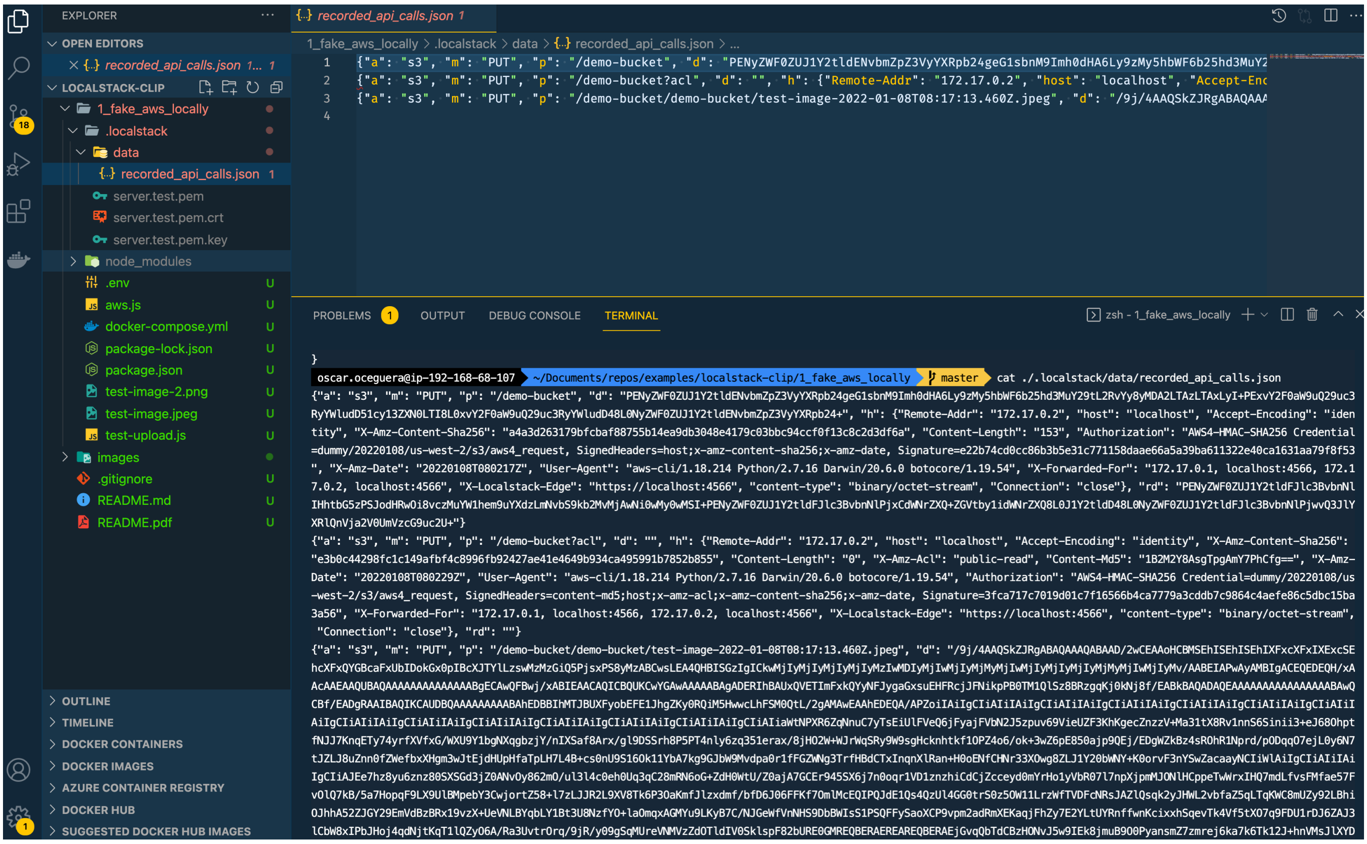
Run `node test-upload.js` in your terminal



Copy the URL in the Location property of the response and paste it into your browser. The browser will immediately download the image. If you want to see it in your browser, you can use something like JS Bin:



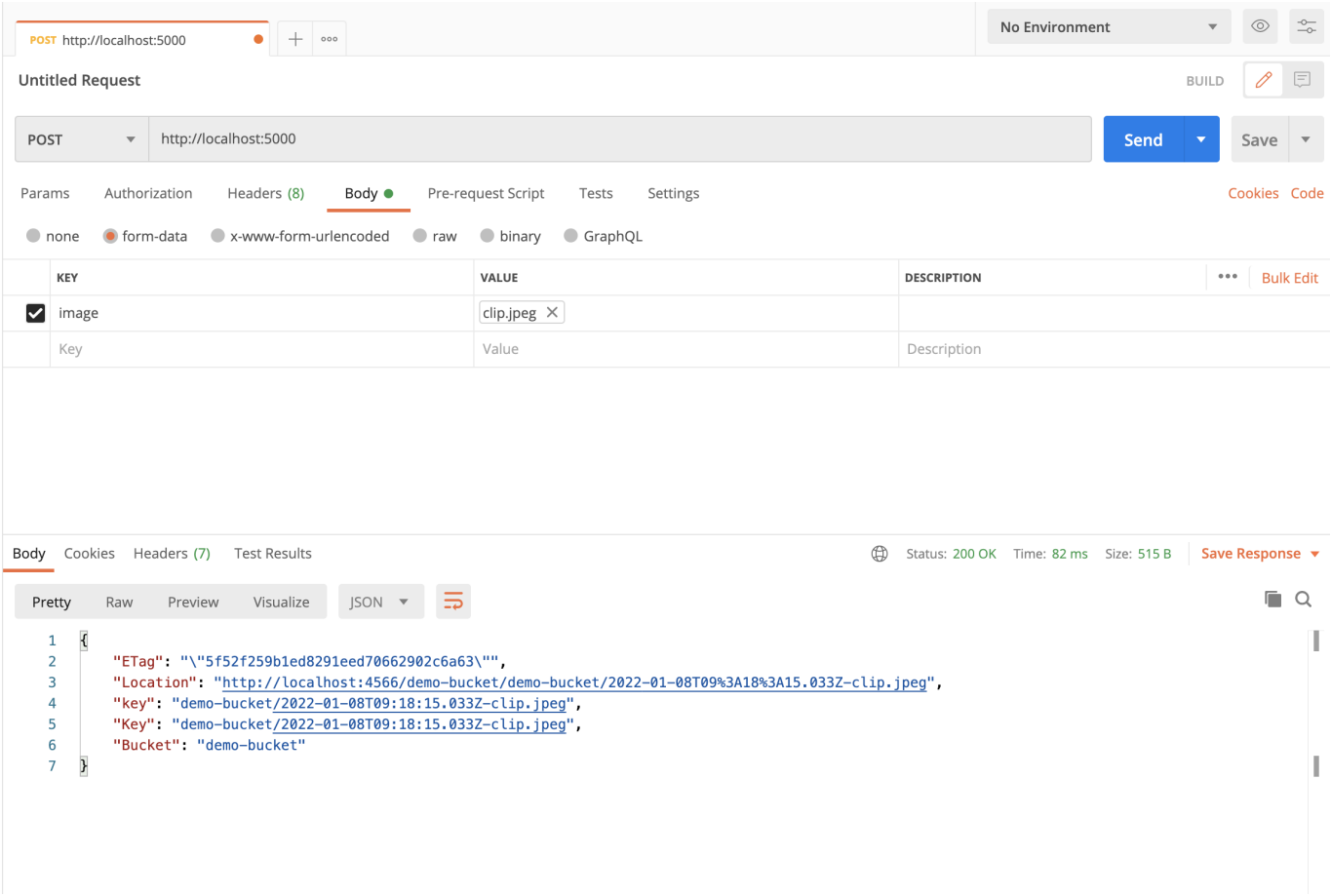
Then, if you look at .localstack/data/recorded_api_calls.json again, you'll see it filled up with the binary data of the image:



EXERCISE

Add a Endpoint to upload files (images) and other that list all images, install:

- express
- express-fileupload



Second Goal (Localstack/Nodejs/DynamoDB/Swagger/Jest)

Download NoSQL Workbench

- Create a new directory for you project
- Within it a new nodejs project `npm init -y`.
- install dependecies with npm:
  - `npm install --save aws-sdk body-parser cors express swagger-ui-express xid-js`
  - `npm install --save-dev jest nodemon supertest`
- Create new files:
  - src/index.js
  - src/app.js
  - src/router.js
  - src/tests/integration.test.js
  - src/swagger.json
  - Dockerfile
  - .dockerignore
  - config.js
  - docker-compose.yml
  - jest.config.js

Configs `src/config.js`

```
const required = ["NODE_ENV"];
required.forEach((param) => {
  if (!process.env[param]) {
    throw new Error(`Environment parameter ${param} is missing`);
  }
});
const config = {
  env: process.env["NODE_ENV"],
};

module.exports = config;
```

Setup routes `src/routes`

```
const express = require("express");
const router = express.Router();

module.exports = router;
```

Begin a simple express server `src/app.js`

```
const express = require("express");
const bodyParser = require("body-parser");
const cors = require("cors");

const router = require("./router");
const swaggerUI = require("swagger-ui-express");
const swaggerDocument = require("./swagger.json");
const app = express();

app.use(cors());

app.get("/", (req, res) => {
  const msg = {
    message: "Welcome to API!",
  };

  res.status(200).send(msg);
});

app.get("/status", (req, res) => {
  const status = {
    status: "ok",
    api: "soccer-player-api",
    time: Date.now(),
  };
  res.status(200).send(status);
});
```

```
router.use("/docs", swaggerUI.serve, swaggerUI.setup(swaggerDocument));

app.use(bodyParser.json());
app.use(
  bodyParser.urlencoded({
    extended: true,
  })
);

app.use((req, res, next) => {
  res.removeHeader("X-Powered-By");
  next();
});

app.use("/", router);

module.exports = app;
```

Write document `src/swagger.json`

```
{
  "openapi": "3.0.0",
  "info": {
    "title": "Soccer Players API",
    "description": "Tiny RESTful API using Node.js: allows you to manage
soccer players.",
    "contact": {
      "name": "Mauro Bonfietti",
      "url": "https://github.com/maurobonfietti"
    },
    "version": "1.0"
  },
  "paths": {
    "/": {
      "get": {
        "tags": ["Info"],
        "summary": "Get help",
        "description": "Get help about this API.",
        "operationId": "Gethelp",
        "parameters": [],
        "responses": {
          "200": {
            "description": "",
            "headers": {
              "X-Powered-By": {
                "content": {
                  "text/plain": {
                    "schema": {
                      "type": "string"
                    },
                    "example": "Express"
                  }
```

```
          }
        },
        "Access-Control-Allow-Origin": {
          "content": {
            "text/plain": {
              "schema": {
                "type": "string"
              },
              "example": "*"
            }
          }
        },
        "Content-Length": {
          "content": {
            "text/plain": {
              "schema": {
                "type": "string"
              },
              "example": "43"
            }
          }
        },
        "ETag": {
          "content": {
            "text/plain": {
              "schema": {
                "type": "string"
              },
              "example": "W/\"2b-h6BMmxGhWkCo5dA5bJgq/pDo3sQ\""
            }
          }
        },
        "Date": {
          "content": {
            "text/plain": {
              "schema": {
                "type": "string"
              },
              "example": "Mon, 23 Dec 2019 21:03:20 GMT"
            }
          }
        },
        "Connection": {
          "content": {
            "text/plain": {
              "schema": {
                "type": "string"
              },
              "example": "keep-alive"
            }
          }
        }
      },
      "content": {
```

```
              "application/json; charset=utf-8": {
                "schema": {
                  "$ref": "#/components/schemas/Gethelp"
                },
                "example": {
                  "message": "Welcome to Soccer Player API!"
                }
              }
            }
          }
        },
        "deprecated": false
      }
    },
    "/status": {
      "get": {
        "tags": ["Info"],
        "summary": "Health check",
        "description": "Get status of this API.",
        "operationId": "Healthcheck",
        "parameters": [],
        "responses": {
          "200": {
            "description": "",
            "headers": {
              "X-Powered-By": {
                "content": {
                  "text/plain": {
                    "schema": {
                      "type": "string"
                    },
                    "example": "Express"
                  }
                }
              },
              "Access-Control-Allow-Origin": {
                "content": {
                  "text/plain": {
                    "schema": {
                      "type": "string"
                    },
                    "example": "*"
                  }
                }
              },
              "Content-Length": {
                "content": {
                  "text/plain": {
                    "schema": {
                      "type": "string"
                    },
                    "example": "62"
                  }
                }
```

```
            },
            "ETag": {
              "content": {
                "text/plain": {
                  "schema": {
                    "type": "string"
                  },
                  "example": "W/\"3e-r8UILbmoe9Rk/g5iPSk00uuUUuk\""
                }
              }
            },
            "Date": {
              "content": {
                "text/plain": {
                  "schema": {
                    "type": "string"
                  },
                  "example": "Mon, 23 Dec 2019 21:03:27 GMT"
                }
              }
            },
            "Connection": {
              "content": {
                "text/plain": {
                  "schema": {
                    "type": "string"
                  },
                  "example": "keep-alive"
                }
              }
            }
          },
          "content": {
            "application/json; charset=utf-8": {
              "schema": {
                "$ref": "#/components/schemas/Healthcheck"
              },
              "example": {
                "status": "ok",
                "api": "soccer-player-api",
                "time": 1577135007891
              }
            }
          }
        }
      },
      "deprecated": false
    }
  }
},
"components": {
  "schemas": {
    "Gethelp": {
      "title": "Gethelp",
```

```
          "required": ["message"],
          "type": "object",
          "properties": {
            "message": {
              "type": "string"
            }
          },
          "example": {
            "message": "Welcome to Soccer Player API!"
          }
        },
        "Healthcheck": {
          "title": "Healthcheck",
          "required": ["status", "api", "time"],
          "type": "object",
          "properties": {
            "status": {
              "type": "string"
            },
            "api": {
              "type": "string"
            },
            "time": {
              "type": "integer",
              "format": "int64"
            }
          },
          "example": {
            "status": "ok",
            "api": "soccer-player-api",
            "time": 1577135007891
          }
        }
      }
    },
    "tags": [
      {
        "name": "Info",
        "description": "Endpoints to get info about the API."
      },
      {
        "name": "Players",
        "description": "Endpoints to get and manage soccer players."
      }
    ]
  }
```

Listening the server `src/index.js`

```
const app = require("./app");
const PORT = 3000;
```

```
app.use((req, res) => {
  res.status(404);
  res.send({ error: "Not Found -  Error 404." });
});

app.listen(PORT, () =>
  console.log(`Server listening @ http://localhost:${PORT}`)
);
```

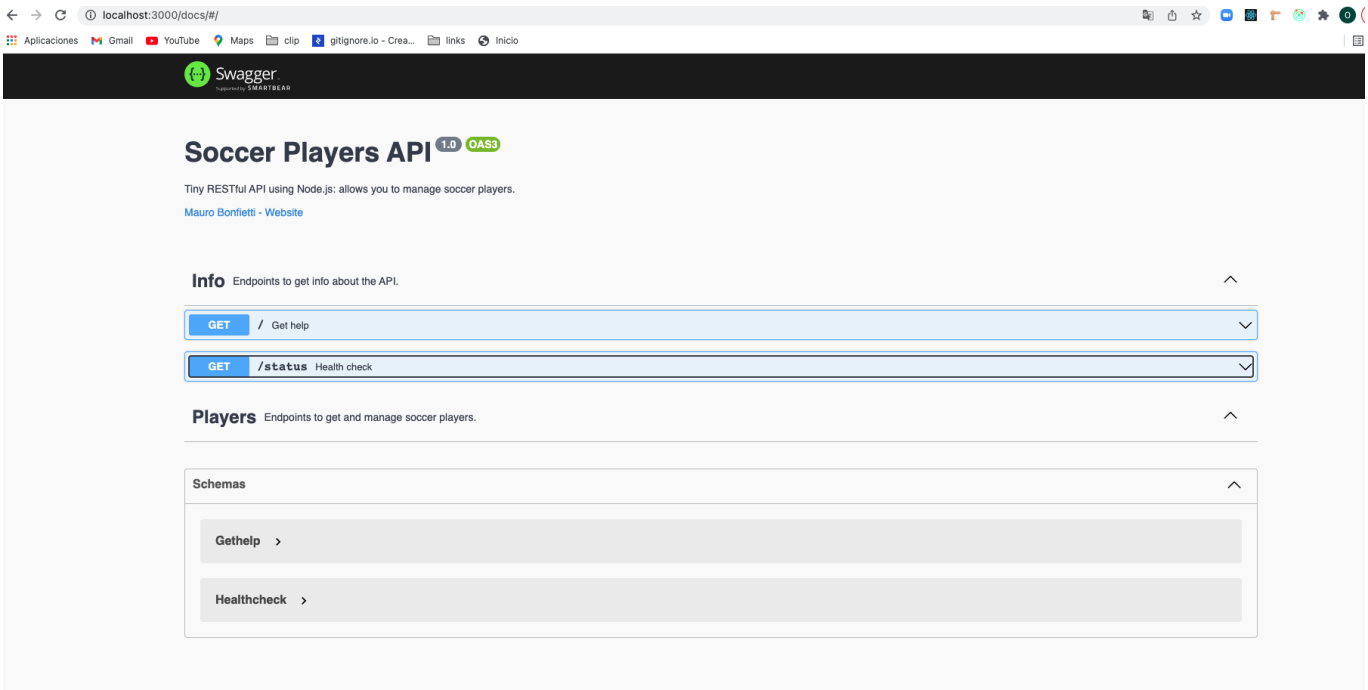
Modify the package.json script section

```
...
"scripts": {
        "start": "node src/index.js",
        "local": "nodemon --inspect=0.0.0.0:9229 src/index.js",
        "test": "jest --coverage"
    },
...
```

Start the server with `npm start`

```
oscar.oceguera@192 ~/Documents/repos/examples/localstack-clip/2_node_dynamodb master ± npm start

> 2_node_dynamodb@1.0.0 start /Users/oscar.oceguera/Documents/repos/examples/localstack-clip/2_node_dynamodb
> node src/index.js

Server listening @ http://localhost:3000
```

Consult documentation `http://localhost:3000/docs`



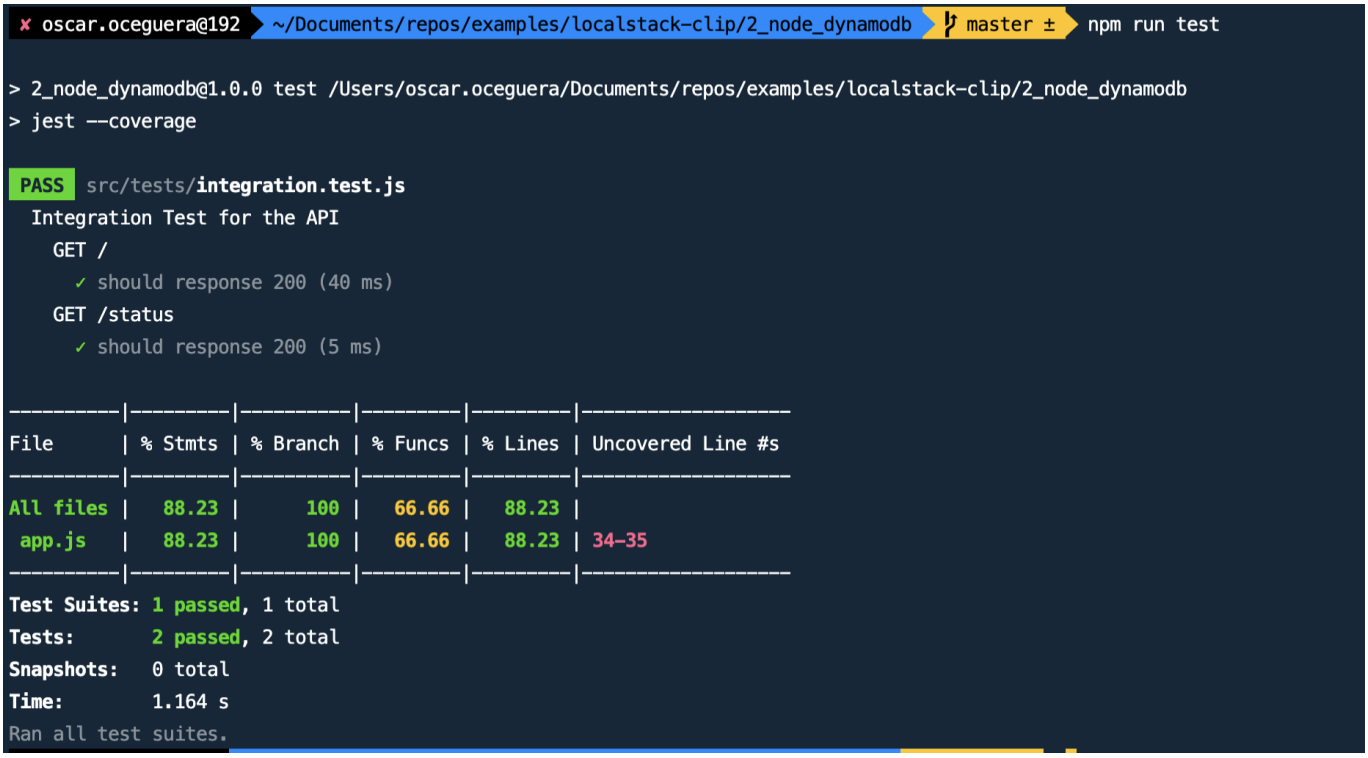
Write some simple tests `src/tests/integration.test.js`

```
const request = require("supertest");
const app = require("../app");

describe("Integration Test for the API", () => {
  describe("GET /", () => {
    it("should response 200", async () => {
      const res = await request(app).get("/");
      expect(res.statusCode).toEqual(200);
      expect(res.body).toHaveProperty("message");
    });
  });

  describe("GET /status", () => {
    it("should response 200", async () => {
      const res = await request(app).get("/status");
      expect(res.statusCode).toEqual(200);
      expect(res.body).toHaveProperty("status", "api", "time");
    });
  });
});
```

Write `jest.config.js`

```
// For a detailed explanation regarding each configuration property,
visit:
// https://jestjs.io/docs/en/configuration.html

module.exports = {
  coverageDirectory: "coverage",
  testEnvironment: "node",
};
```

Run `npm test`



Setup

Create a folder **setup** and add the next files:

- Create-players.json
- players-v1.json
- players-v2.json
- players-v3.json
- setup.sh

Dockerizing node.js web app `Dockerfile`

```
FROM node:13-alpine
WORKDIR /app
COPY . .
RUN ["npm", "install"]
EXPOSE 3000
ENTRYPOINT ["npm", "start"]
```

Config your `docker-compose.yml` file

```
version: "3.6"
x-common-variables: &common-variables
  NODE_ENV: local
  AWS_ACCESS_KEY_ID: anykey
  AWS_SECRET_ACCESS_KEY: anysecret
  AWS_REGION: us-east-2
services:
```

```
  local:
    build:
      context: .
    image: soccer-player-api
    volumes:
      - ./src:/app/src
    container_name: soccer-player-api_local
    environment: *common-variables
    ports:
      - "3000:3000"
      - "9229:9229"
    tty: true
    entrypoint: ["npm", "run", "local"]
  test:
    build:
      context: .
    image: soccer-player-api
    volumes:
      - ./src:/app/src
      - ./coverage/unit:/app/coverage
    container_name: soccer-player-api_test
    environment: *common-variables
    tty: true
    entrypoint: ["npm", "test"]
  localstack:
    image: localstack/localstack
    container_name: soccer-player-api_localstack
    environment:
      SERVICES: dynamodb
    ports:
      - "4569:4569"
  setup:
    image: mesosphere/aws-cli
    container_name: soccer-player-api_setup
    volumes:
      - ./setup:/setup
    environment:
      AWS_ACCESS_KEY_ID: anykey
      AWS_SECRET_ACCESS_KEY: anysecret
      AWS_DEFAULT_REGION: us-east-2
    depends_on:
      - localstack
    entrypoint: [""]
    command: ["/setup/setup.sh"]
networks:
  default:
    name: soccer-player-api
```

NOTE: use `chmod +x the_file_name` if you need permission for setup.sh file

Run `docker-compose up localstack setup`

```
oscar.oceguera@192 ~/Documents/repos/examples/localstack-clip/2_node_dynamodb master ± docker-compose up  localstack setup

Removing soccer-player-api_setup
soccer-player-api_localstack is up-to-date
Recreating 4359f8142475_soccer-player-api_setup ... done
Attaching to soccer-player-api_localstack, soccer-player-api_setup
soccer-player-api_localstack | Waiting for all LocalStack services to be ready
soccer-player-api_localstack | 2022-01-18 01:08:34,676 CRIT Supervisor is running as root.  Privileges were not dropped because no user is specified in the
 config file.  If you intend to run as root, you can set user=root in the config file to avoid this message.
soccer-player-api_localstack | 2022-01-18 01:08:34,694 INFO supervisord started with pid 14
soccer-player-api_localstack | 2022-01-18 01:08:35,700 INFO spawned: 'infra' with pid 20
soccer-player-api_localstack | . .venv/bin/activate; LOCALSTACK_INFRA_PROCESS=1 exec bin/localstack start --host --no-banner
soccer-player-api_localstack | 2022-01-18 01:08:36,734 INFO success: infra entered RUNNING state, process has stayed up for > than 1 seconds (startsecs)
soccer-player-api_localstack |
soccer-player-api_localstack | LocalStack version: 0.13.0.7
soccer-player-api_localstack | LocalStack build date: 2021-11-25
soccer-player-api_localstack | LocalStack build git hash: c39a0c16
soccer-player-api_localstack |
soccer-player-api_localstack | Starting edge router (https port 4566)...
soccer-player-api_localstack | 2022-01-18T01:08:39.413:INFO:bootstrap.py: Execution of "prepare_environment" took 732.51ms
soccer-player-api_localstack | Waiting for all LocalStack services to be ready
soccer-player-api_localstack | Ready.
soccer-player-api_localstack | [2022-01-18 01:08:40 +0000] [21] [INFO] Running on https://0.0.0.0:4566 (CTRL + C to quit)
soccer-player-api_localstack | 2022-01-18T01:08:40.358:INFO:hypercorn.error: Running on https://0.0.0.0:4566 (CTRL + C to quit)
soccer-player-api_localstack | 2022-01-18T01:08:40.387:INFO:bootstrap.py: Execution of "start_runtime_components" took 520.63ms
soccer-player-api_setup |
```

Run `docker-compose up local`

```
oscar.oceguera@192 ~/Documents/repos/examples/localstack-clip/2_node_dynamodb master ± docker-compose up local

Starting soccer-player-api_local ... done
Attaching to soccer-player-api_local
soccer-player-api_local |
soccer-player-api_local | > 2_node_dynamodb@1.0.0 local /app
soccer-player-api_local | > nodemon --inspect=0.0.0.0:9229 src/index.js
soccer-player-api_local |
soccer-player-api_local | [nodemon] 2.0.15
soccer-player-api_local | [nodemon] to restart at any time, enter `rs`
soccer-player-api_local | [nodemon] watching path(s): *.*
soccer-player-api_local | [nodemon] watching extensions: js,mjs,json
soccer-player-api_local | [nodemon] starting `node --inspect=0.0.0.0:9229 src/index.js`
soccer-player-api_local | Debugger listening on ws://0.0.0.0:9229/0366994d-0bef-4a48-addd-cbcc8450b905
soccer-player-api_local | For help, see: https://nodejs.org/en/docs/inspector
soccer-player-api_local | Server listening @ http://localhost:3000
```

Run `docker-compose up test`

```
✘ oscar.oceguera@192 ~/Documents/repos/examples/localstack-clip/2_node_dynamodb  master ± docker-compose up test

Creating soccer-player-api_test ... done
Attaching to soccer-player-api_test
soccer-player-api_test |
soccer-player-api_test | > 2_node_dynamodb@1.0.0 test /app
soccer-player-api_test | > jest --coverage
soccer-player-api_test |
  console.log
soccer-player-api_test |     res.body { status: 'ok', api: 'soccer-player-api', time: 1642469094570 }
soccer-player-api_test |
soccer-player-api_test |       at Object.<anonymous> (src/tests/integration.test.js:17:15)
soccer-player-api_test |
 PASS  src/tests/integration.test.js
  Integration Test for the API
    GET /ayer-api_test |
      ✓ should response 200 (60 ms)
    GET /statuspi_test |
      ✓ should response 200 (41 ms)
soccer-player-api_test |
----------|---------|----------|---------|---------|-------------------
soccer-player-api_test | File       | % Stmts | % Branch | % Funcs | % Lines | Uncovered Line #s
soccer-player-api_test | -----------|---------|----------|---------|---------|-------------------
soccer-player-api_test | All files  |      92 |      100 |   66.66 |      92 |
soccer-player-api_test |  app.js    |    90.9 |      100 |   66.66 |    90.9 | 39-40
soccer-player-api_test |  router.js |     100 |      100 |     100 |     100 |
soccer-player-api_test | -----------|---------|----------|---------|---------|-------------------
soccer-player-api_test | Test Suites: 1 passed, 1 total
soccer-player-api_test | Tests:       2 passed, 2 total
soccer-player-api_test | Snapshots:   0 total
soccer-player-api_test | Time:        2.908 s
soccer-player-api_test | Ran all test suites.
soccer-player-api_test exited with code 0
```

Build our EndPoints

- Add new files:
  - src/repositories/dynamodb.repository.js
  - src/daos/players.dao.js
  - src/models/players.model.js
  - src/controllers/players.controller.js

Connect to DynamoDB `src/repositories/dynamodb.repository.js`

```
const AWS = require("aws-sdk");

const dynamodb = new AWS.DynamoDB.DocumentClient({
  service: new AWS.DynamoDB({ apiVersion: "2012-08-10" }),
});

const manageRequest = (method, params) => {
  return new Promise((resolve, reject) => {
    dynamodb[method](params, (error, response) => {
      if (error) {
        reject(error);
      } else {
        resolve(response);
```

```
      }
    });
  });
};

class DynamodbRepository {
  static get(params) {
    return manageRequest("get", params);
  }

  static query(params) {
    return manageRequest("query", params);
  }

  static update(params) {
    return manageRequest("update", params);
  }

  static put(params) {
    return manageRequest("put", params);
  }

  static delete(params) {
    return manageRequest("delete", params);
  }
}

module.exports = DynamodbRepository;
```

Create a DAO (Data Access Object) `src/daos/players.dao.js`

```
const dynamodbRepository = require("../repositories/dynamodb.repository");

class PlayersDao {
  static async getPlayers(limit = 500) {
    const params = {
      TableName: "players",
      KeyConditionExpression: "mytype = :mytype",
      ExpressionAttributeValues: {
        ":mytype": "player",
      },
      ProjectionExpression: "playerId, fullname, myposition",
      ScanIndexForward: true,
      Limit: limit,
    };
    const result = await dynamodbRepository.query(params);

    return result.Items;
  }

  static async getPlayer(playerId) {
    const params = {
```

```
      TableName: "players",
      IndexName: "playerId-index",
      KeyConditionExpression: "playerId = :playerId",
      ExpressionAttributeValues: {
        ":playerId": playerId,
      },
      ProjectionExpression: "playerId, fullname, myposition",
      Limit: 1,
    };
    const result = await dynamodbRepository.query(params);

    return result.Items;
  }

  static async insertPlayer(item) {
    const params = {
      TableName: "players",
      Item: item,
      ReturnValues: "NONE",
    };

    return dynamodbRepository.put(params);
  }

  static async updatePlayer(playerId, myposition, fullname) {
    const params = {
      TableName: "players",
      Key: {
        mytype: "player",
        playerId: playerId.toString(),
      },
      UpdateExpression: `set fullname = :fullname, myposition =
:myposition`,
      ExpressionAttributeValues: {
        ":myposition": myposition,
        ":fullname": fullname,
      },
      ReturnValues: "ALL_NEW",
    };

    return dynamodbRepository.update(params);
  }

  static async deletePlayer(playerId) {
    const params = {
      TableName: "players",
      Key: {
        mytype: "player",
        playerId: playerId.toString(),
      },
    };

    return dynamodbRepository.delete(params);
  }
```

```
  static async getPlayersByPosition(myposition, limit = 25) {
    const params = {
      TableName: "players",
      IndexName: "myposition-playerId-index",
      KeyConditionExpression: "myposition = :myposition",
      ExpressionAttributeValues: {
        ":myposition": myposition,
      },
      ProjectionExpression: "fullname, myposition",
      ScanIndexForward: false,
      Limit: limit,
    };
    const result = await dynamodbRepository.query(params);

    return result.Items;
  }
}

module.exports = PlayersDao;
```

Create model `src/models/players.model.js`

```
const playersDao = require("../daos/players.dao");

const shuffle = (array) => {
  for (let i = array.length - 1; i > 0; i--) {
    let j = Math.floor(Math.random() * (i + 1));
    [array[i], array[j]] = [array[j], array[i]];
  }
};

class PlayersModel {
  static getPlayers() {
    return playersDao.getPlayers();
  }

  static getPlayer(playerId) {
    return playersDao.getPlayer(playerId);
  }

  static async insertPlayer(playerId, mytype, myposition, fullname) {
    const item = { playerId, mytype, myposition, fullname };

    return playersDao.insertPlayer(item);
  }

  static async updatePlayer(playerId, myposition, fullname) {
    return playersDao.updatePlayer(playerId, myposition, fullname);
  }

  static deletePlayer(playerId) {
```

```
    return playersDao.deletePlayer(playerId);
  }

  static async getDreamTeam() {
    const goalkeeper = await this.getPlayersByPosition("goalkeeper", 1);
    const defenders = await this.getPlayersByPosition("defender", 4);
    const midfielders = await this.getPlayersByPosition("midfielder", 3);
    const forwards = await this.getPlayersByPosition("forward", 3);

    return [goalkeeper, defenders, midfielders, forwards];
  }

  static async getPlayersByPosition(position, quantity) {
    const p = await playersDao.getPlayersByPosition(position);
    console.log(p.length);
    shuffle(p);
    const players = [];
    for (var i = 0; i < quantity; i++) {
      players.push(p[i]);
    }

    return players;
  }
}

module.exports = PlayersModel;
```

Create our controllers `src/controllers/players.controllers.js`

```
const playersModel = require("../models/players.model");
const xid = require("xid-js");

const generateUuid = () => {
  return xid.next();
};

const isValidString = (value) => {
  return typeof value === "string" && value.trim().length > 0;
};

class PlayersController {
  static async getPlayers(req, res) {
    const callId = generateUuid();
    console.log("Call %s %s id: %s", req.method, req.url, callId);
    try {
      const result = await playersModel.getPlayers();
      console.log("Call id: %s response: %s", callId,
JSON.stringify(result));
      console.log(result.length);
      res.status(200).send(result);
    } catch (error) {
      console.log("Call id: %s error: %s", callId, error);
```

```
      res.status(500).send({ error: "Internal Server Error." });
    }
  }

  static async getPlayer(req, res) {
    const playerId = req.params.playerId;
    const callId = generateUuid();
    console.log("Call %s %s id: %s", req.method, req.url, callId);
    try {
      const result = await playersModel.getPlayer(playerId);
      console.log("Call id: %s response: %s", callId,
JSON.stringify(result));
      if (Array.isArray(result) && result.length) {
        res.status(200).send(result);
      } else {
        res.status(404).send({ error: "Player Not Found." });
      }
    } catch (error) {
      console.log("Call id: %s error: %s", callId, error);
      res.status(500).send({ error: "Internal Server Error." });
    }
  }

  static async insertPlayer(req, res) {
    const { playerId, myposition, fullname } = req.body;
    const callId = generateUuid();
    const mytype = "player";
    console.log(
      "Call %s %s id: %s body: %s",
      req.method,
      req.url,
      callId,
      JSON.stringify(req.body)
    );
    if (
      !isValidString(playerId) ||
      !isValidString(myposition) ||
      !isValidString(fullname)
    ) {
      console.log(
        "Call id: %s error:%s",
        callId,
        JSON.stringify("Missing info.")
      );
      return res.status(400).send({ error: "Player info is incomplete."
});
    }
    try {
      await playersModel.insertPlayer(playerId, mytype, myposition,
fullname);
      console.log("Call id: %s response: %s", callId, "Player created.");
      res.status(201).send({ message: "Player created." });
    } catch (error) {
      console.log("Call id: %s error: %s", callId, error);
```

```
      res.status(500).send({ error: "Internal Server Error." });
    }
  }

  static async updatePlayer(req, res) {
    const playerId = req.params.playerId;
    const { myposition, fullname } = req.body;
    const callId = generateUuid();
    console.log(
      "Call %s %s id: %s body: %s params: %s",
      req.method,
      req.url,
      callId,
      JSON.stringify(req.body),
      JSON.stringify(req.params)
    );
    if (
      !isValidString(playerId) ||
      !isValidString(myposition) ||
      !isValidString(fullname)
    ) {
      console.log(
        "call id: %s error:%s",
        callId,
        JSON.stringify("Missing info.")
      );
      return res.status(400).send({ error: "Player info is incomplete."
});
    }
    try {
      await playersModel.updatePlayer(playerId, myposition, fullname);
      console.log("call id:%s result:%s ", callId, "Player updated.");
      res.status(200).send({ message: "Player updated." });
    } catch (error) {
      console.log("Call id: %s error: %s", callId, error);
      res.status(500).send({ error: "Internal Server Error." });
    }
  }

  static async deletePlayer(req, res) {
    const playerId = req.params.playerId;
    const callId = generateUuid();
    console.log("Call %s %s id: %s", req.method, req.url, callId);
    try {
      const result = await playersModel.deletePlayer(playerId);
      console.log("Call id: %s response: %s", callId,
JSON.stringify(result));
      res.status(204).send(result);
    } catch (error) {
      console.log("Call id: %s error: %s", callId, error);
      res.status(500).send({ error: "Internal Server Error." });
    }
  }
```

```
  static async getDreamTeam(req, res) {
    const callId = generateUuid();
    console.log("Call %s %s id: %s", req.method, req.url, callId);
    try {
      const team = await playersModel.getDreamTeam();
      console.log("Call id: %s response: %s", callId,
JSON.stringify(team));
      console.log(team);
      res.status(200).send(team);
    } catch (error) {
      console.log("Call id: %s error: %s", callId, error);
      res.status(500).send({ error: "Internal Server Error." });
    }
  }
}

module.exports = PlayersController;
```

Add controllers within `src/router.js`

```
const express = require("express");
const router = express.Router();
const version = "v1";
const playersController = require("./controllers/players.controller");

router.get(`/${version}/players`, playersController.getPlayers);
router.get(`/${version}/players/dream-team`,
playersController.getDreamTeam);
router.get(`/${version}/players/:playerId`, playersController.getPlayer);
router.post(`/${version}/players`, playersController.insertPlayer);
router.patch(`/${version}/players/:playerId`,
playersController.updatePlayer);
router.delete(`/${version}/players/:playerId`,
playersController.deletePlayer);

module.exports = router;
```

Add routes and aws connection `src/app.js`

```
const express = require("express");
const bodyParser = require("body-parser");
const cors = require("cors");
const AWS = require("aws-sdk");
const config = require("./config");
if (config.env === "local") {
  AWS.config.dynamodb = { endpoint: "http://localstack:4569" };
}
const router = require("./router");
const swaggerUI = require("swagger-ui-express");
```

```
const swaggerDocument = require("./swagger.json");
const app = express();

app.use(cors());

app.get("/", (req, res) => {
  const msg = {
    message: "Welcome to Soccer Player API!",
  };
  res.status(200).send(msg);
});

app.get("/status", (req, res) => {
  const status = {
    status: "ok",
    api: "soccer-player-api",
    time: Date.now(),
  };
  res.status(200).send(status);
});

router.use("/docs", swaggerUI.serve, swaggerUI.setup(swaggerDocument));

app.use(bodyParser.json());
app.use(
  bodyParser.urlencoded({
    extended: true,
  })
);

app.use((req, res, next) => {
  res.removeHeader("X-Powered-By");
  next();
});

app.use("/", router);

module.exports = app;
```

Run localstack, dynamoDB and local API

- `docker-compose up localstack setup`
- `docker-compose up local`

Try:

- Get All Players: `GET http://localhost:3000/v1/players`
- Create Player: `POST http://localhost:3000/v1/players`
- Get One Player: `GET http://localhost:3000/v1/players/`
- Update Player: `PATCH http://localhost:3000/v1/players/`
- Delete Player: `DELETE http://localhost:3000/v1/players/`
- Dream Team: `GET http://localhost:3000/v1/players/dream-team`

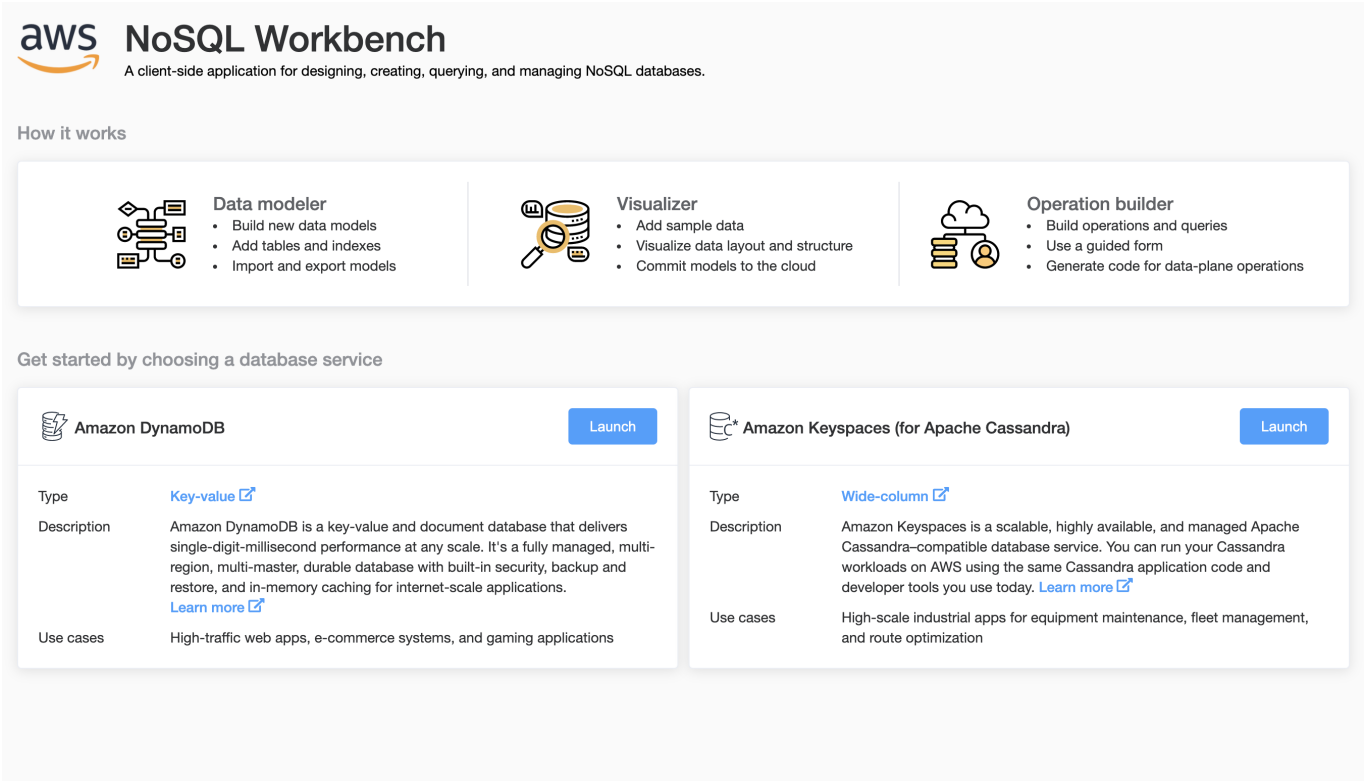
Update documentation

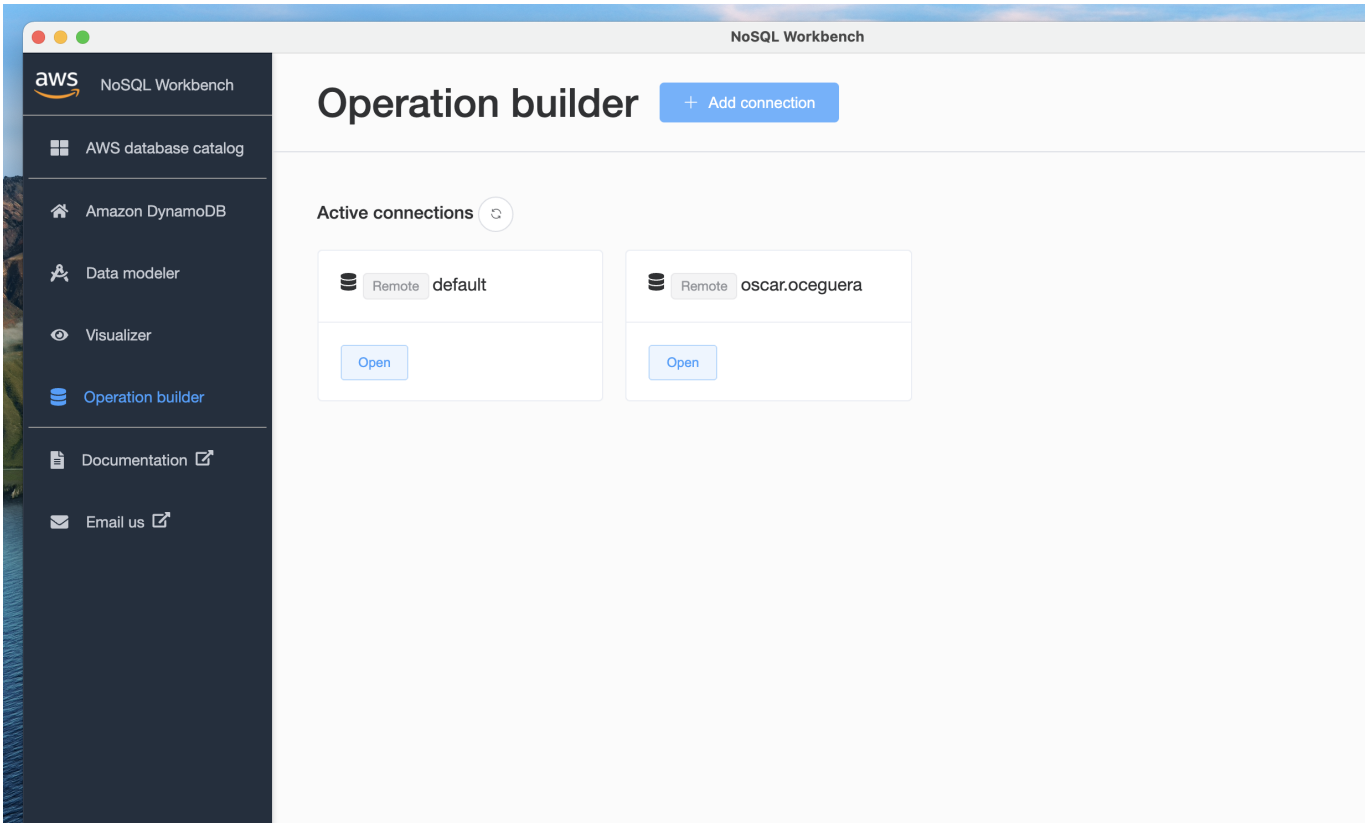
Use the gist for that link

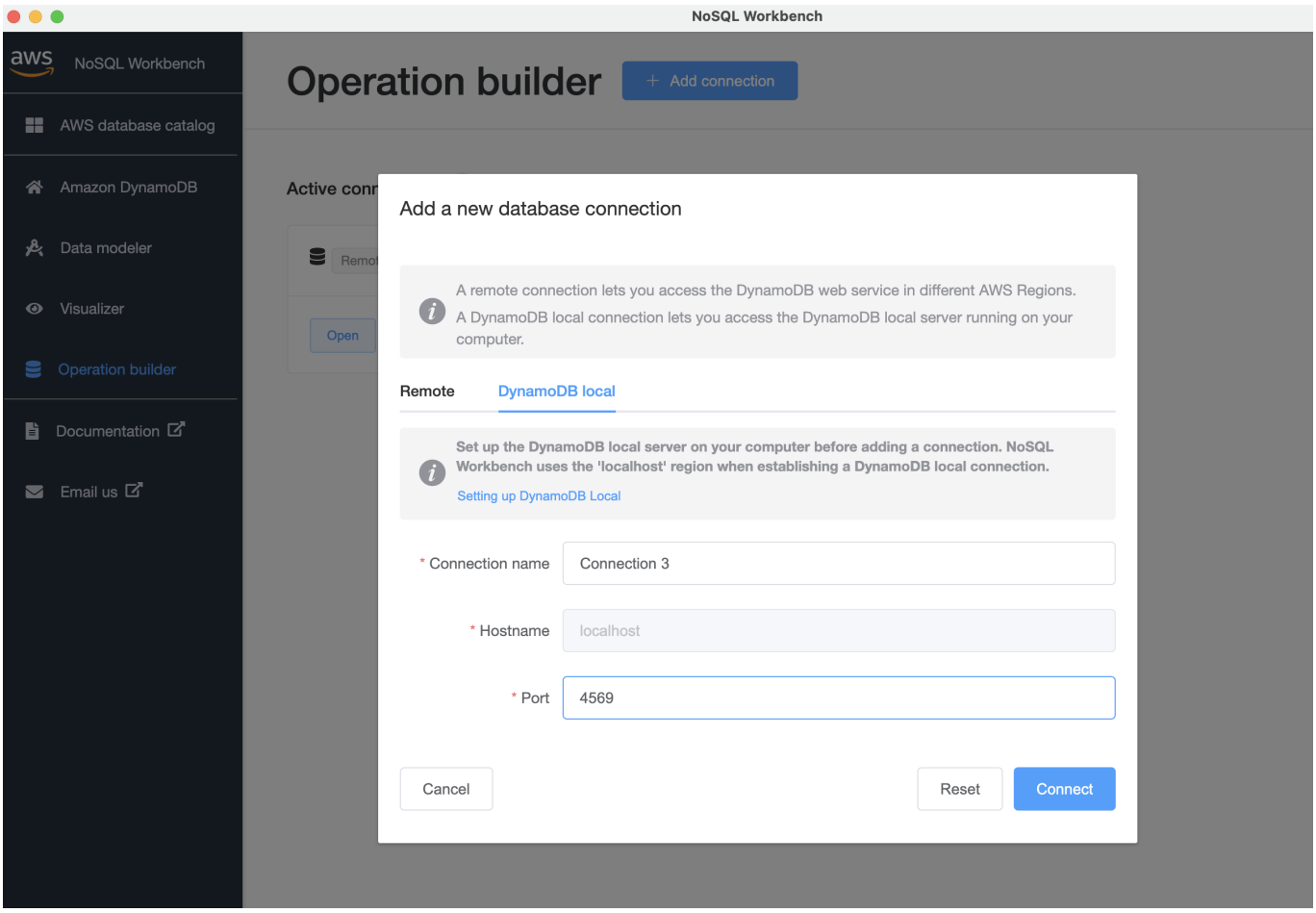
Consulting DynamoDB tables

Download NoSQL workbench:

- Launch Amazon DynamoDB
- Operation builder > + add connection
- Select DynamoDB local and add port
- Open the conection
- Consulting the table


NoSQL Workbench
A client-side application for designing, creating, querying, and managing NoSQL databases.
How it works
Data modeler
Build new data models
Add tables and indexes
Import and export models
Visualizer
Add sample data
Visvisualize data layout and structure
Commit models to the cloud
Operation builder
Build operations and queries
Use a guided form
Generate code for data-plane operations
Get started by choosing a database service
Amazon DynamoDB
Launch
Type
Key-value
Description
Amazon DynamoDB is a key-value and document database that delivers single-digit-millisecond performance at any scale. It's a fully managed, multi-region, multi-master, durable database with built-in security, backup and restore, and in-memory caching for internet-scale applications.
Learn more
Use cases
High-traffic web apps, e-commerce systems, and gaming applications
Amazon Keyspaces (for Apache Cassandra)
Launch
Type
Wide-column
Description
Amazon Keyspaces is a scalable, highly available, and managed Apache Cassandra–compatible database service. You can run your Cassandra workloads on AWS using the same Cassandra application code and developer tools you use today. Learn more
Use cases
High-scale industrial apps for equipment maintenance, fleet management, and route optimization


NoSQL Workbench
NoSQL Workbench
AWS database catalog
Amazon DynamoDB
Data modeler
Visualizer
Operation builder
Documentation
Email us
Operation builder
Add connection
Active connections
Remote
default
Open
Remote
oscar.oceguera
Open


NoSQL Workbench
NoSQL Workbench
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Amazon DynamoDB
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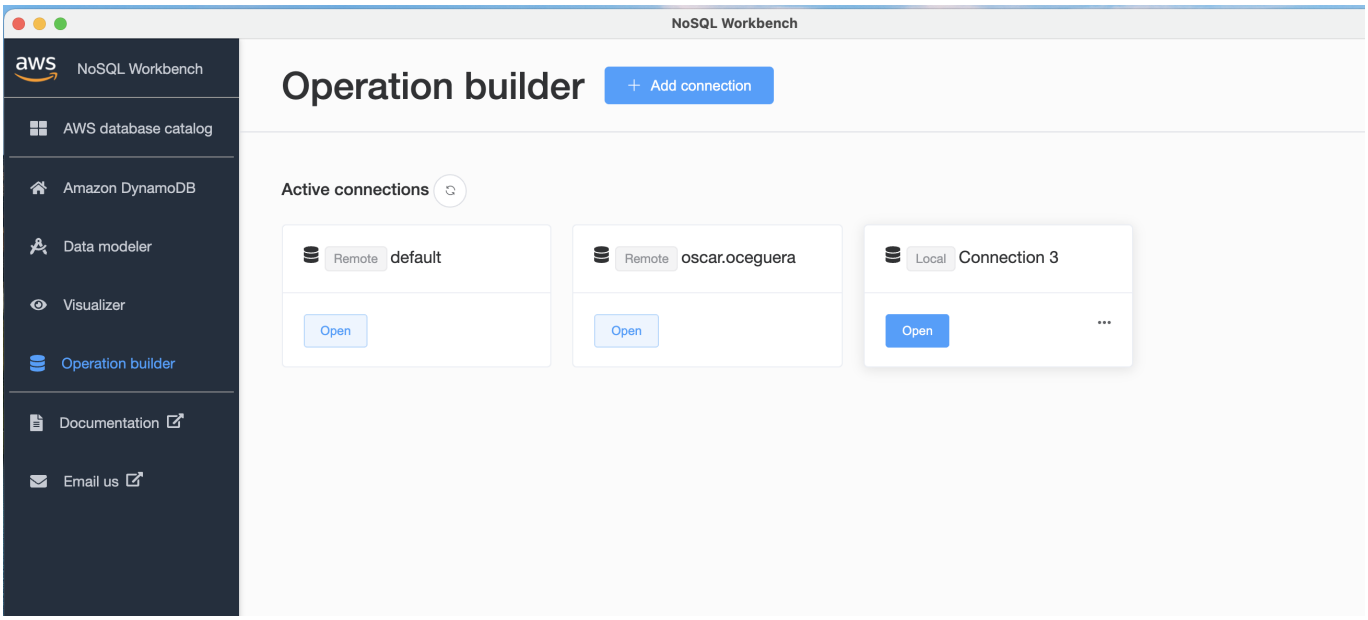
Operation builder
Documentation
Email us
Operation builder
Add connection
Add a new database connection
A remote connection lets you access the DynamoDB web service in different AWS Regions.
A DynamoDB local connection lets you access the DynamoDB local server running on your computer.
Remote
DynamoDB local
Set up the DynamoDB local server on your computer before adding a connection. NoSQL Workbench uses the 'localhost' region when establishing a DynamoDB local connection.
Setting up DynamoDB Local
* Connection name
Connection 3
* Hostname
localhost
* Port
4569
Cancel
Reset
Connect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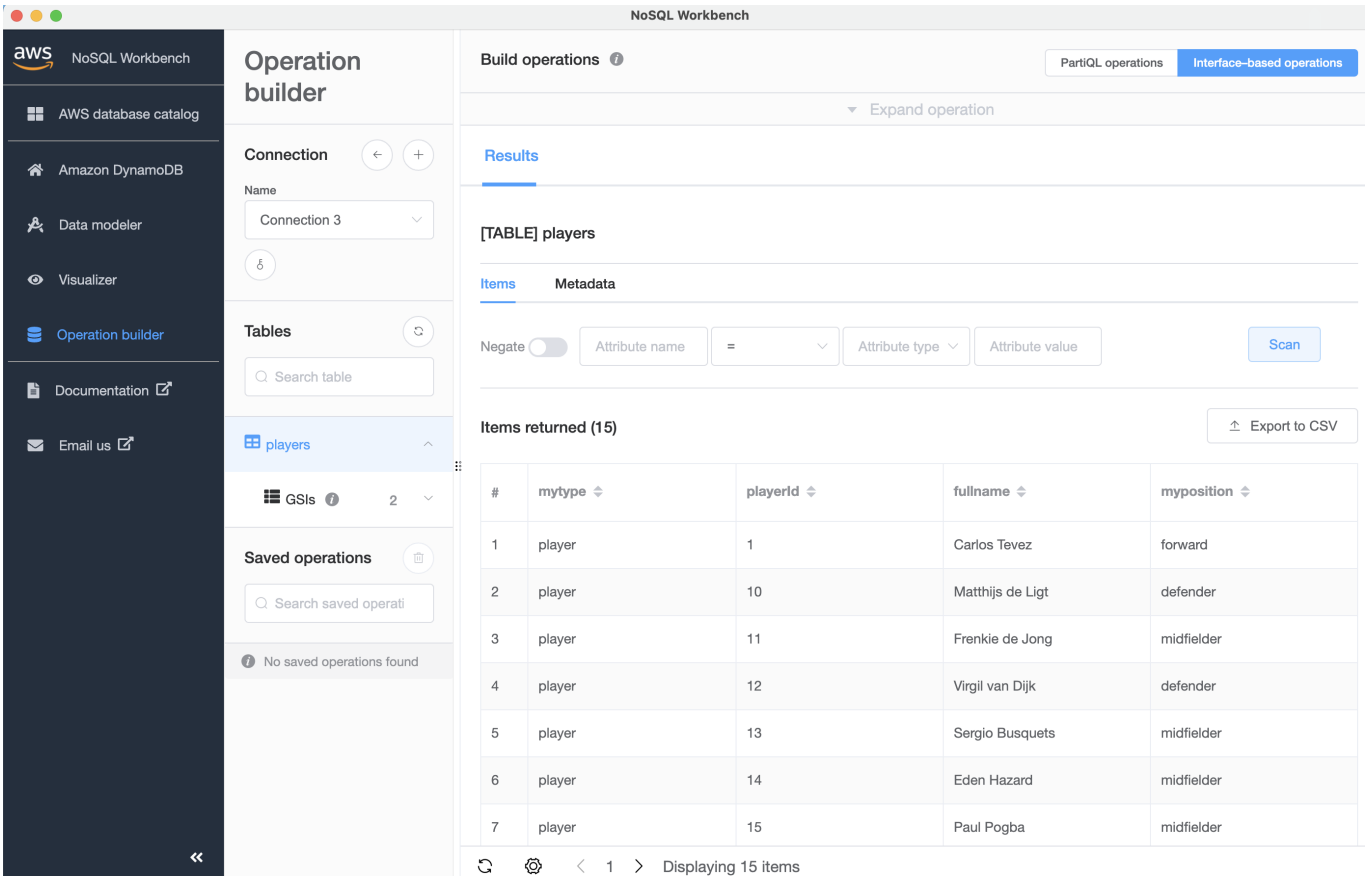
Remote oscar.oceguera
Open
Local Connection 3
Open



EXERCISE

Create a CRUD for Movies.