

Udacity

AWS Cloud Developer Nanodegree

Cloud Capstone Project

Whatever You Want

Serverless Application

Richard EB Hartell

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<https://github.com/rebhartell/udacity-aws-cloud-developer-project-5>

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Overview

The purpose of the cloud developer capstone project is to give you a chance to combine what you've learned throughout the program. This project will be an important part of your portfolio that will help you achieve your Cloud-related career goals.

In this project, you will build a cloud-based application, and follow the principles of either the Microservices course (course 3) or the Serverless course (course 4). This will help you demonstrate to potential employers and colleagues that you can independently create and deploy applications using these principles.

Suggested Applications

Possible application ideas would be miniature versions of existing social media or video sharing applications -- any app that can take user input, store it, and allow for user retrieval. The app would also allow for users to log in to access data specific to each user.

Instructions

Step 1: Propose and Scope the Project

“Identify the use case for your app. We recommend keeping the functionality as simple as possible to start with.”

The proposal for the project is to take the existing pre-determined, single-purpose application that facilitates the collection and management of To Do items (Project 4) and extend it such that the user can collect and manage (if applicable) Whatever You Want items – such as:

- a Diary
- an Address Book
- a Film Collection
- a deck of Recipe Cards
- Whatever You Want

And instead of attempting to define a single data model and data entry form to ill-fit all category of user items, React JSON-Schema Form (RJSF) will be used to allow the user to both define the data model and data entry form specific to each category of Whatever You Want items without any need to change and rebuild the project application.

The application will have set of mainly prescribed web pages, API, data models, and storage, but with the addition of a flexible embedded payload to support the generic, user defined data items.

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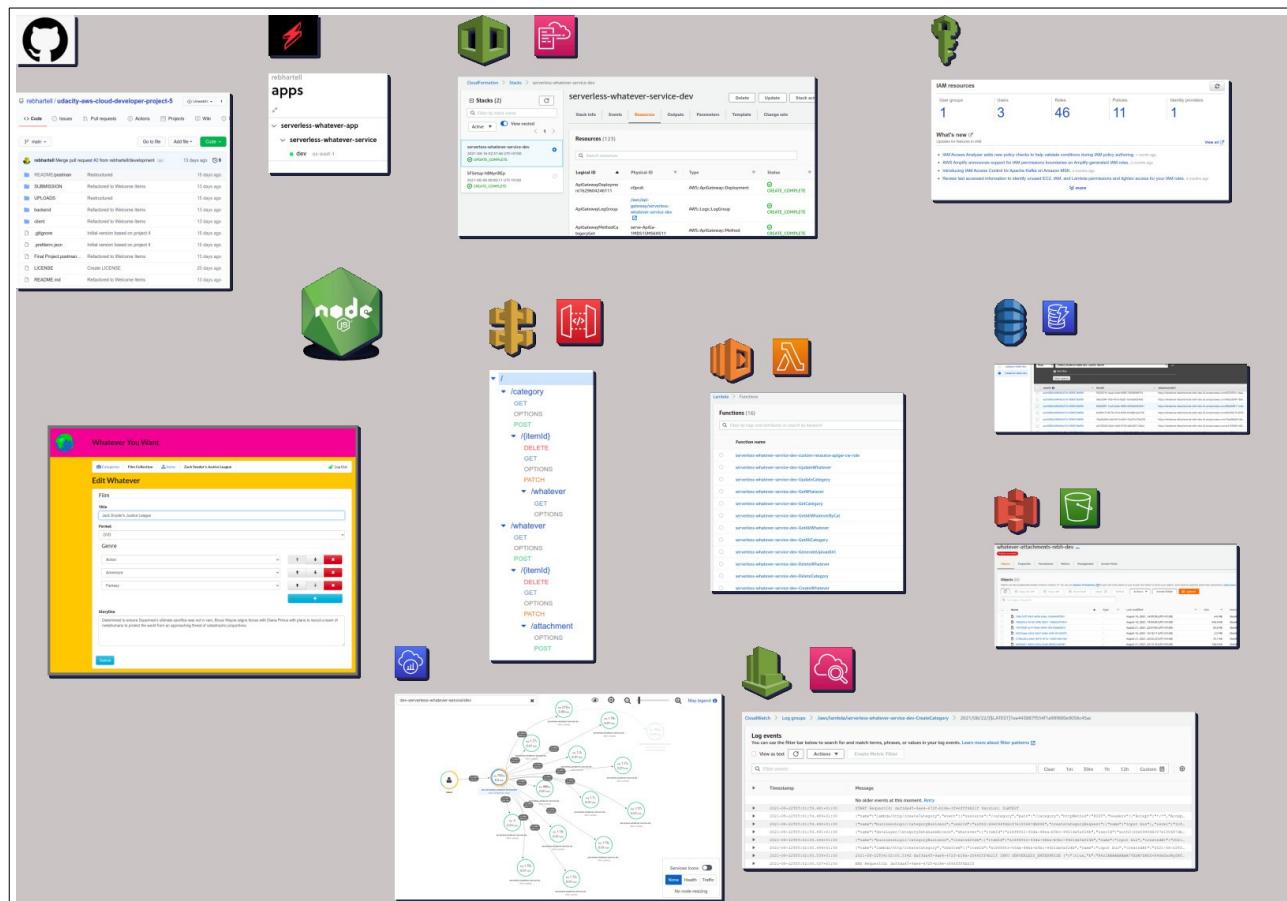
Step 2: Choose either microservices or serverless design

*"It's fine to re-use code from your course 3 or course 4 project as a starting point. Review the rubric for each option, to ensure that the application you build **satisfies at least 3 of the rubric requirements. Not all rubric items need to be satisfied in order to pass the project.** We hope that you'll feel that you have enough flexibility to focus on the aspects of your application that you are most interested in."*

Serverless Design

My Serverless Framework of Project 4 will be used as the starting point for this project and a Strangler Pattern approach will be used to progressively change my Project 4 into my Capstone Project delivery.

The high level serverless infrastructure design is:



See “Whatever You Want - AWS – Serverless” (jpg, svg, and draw.io)

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The application uses the following technologies:

- Visual Studio Code IDE
- Node Javascript server
- Node Package Manager
- React
- Semantic UI
- RJSF (themed with Bootstrap-3)
- Serverless Framework
- GitHub
- AWS:
 - IAM
 - CloudFormation
 - API Gateway
 - Lambda
 - DynamoDB
 - S3
 - CloudWatch
 - Xray
 - SDK
 - Command Line

Along the way, I will be pushing the existing boundaries of my knowledge across these technologies:

- Numerous AWS Cloud Computing services
- Modern Javascript and Node JS
- Typescript
- React
- Semantic UI
- React JSON-Schema Form
- the Serverless Framework

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Application Design

The actual application design, extends the concepts of the Project 4 – To Do application.

Instead of providing a UI and API allowing a user to manage a single collection of To Do items with a hard-coded data entry form, this application provides a UI and API allowing a user to manage multiple collections (categories) of Whatever items with a user defined data-driven data entry form specific to each category.

The UI and API support CRUD at both the Category and the Whatever level.

Data Model and React JSON-Schema Form (RJSF)

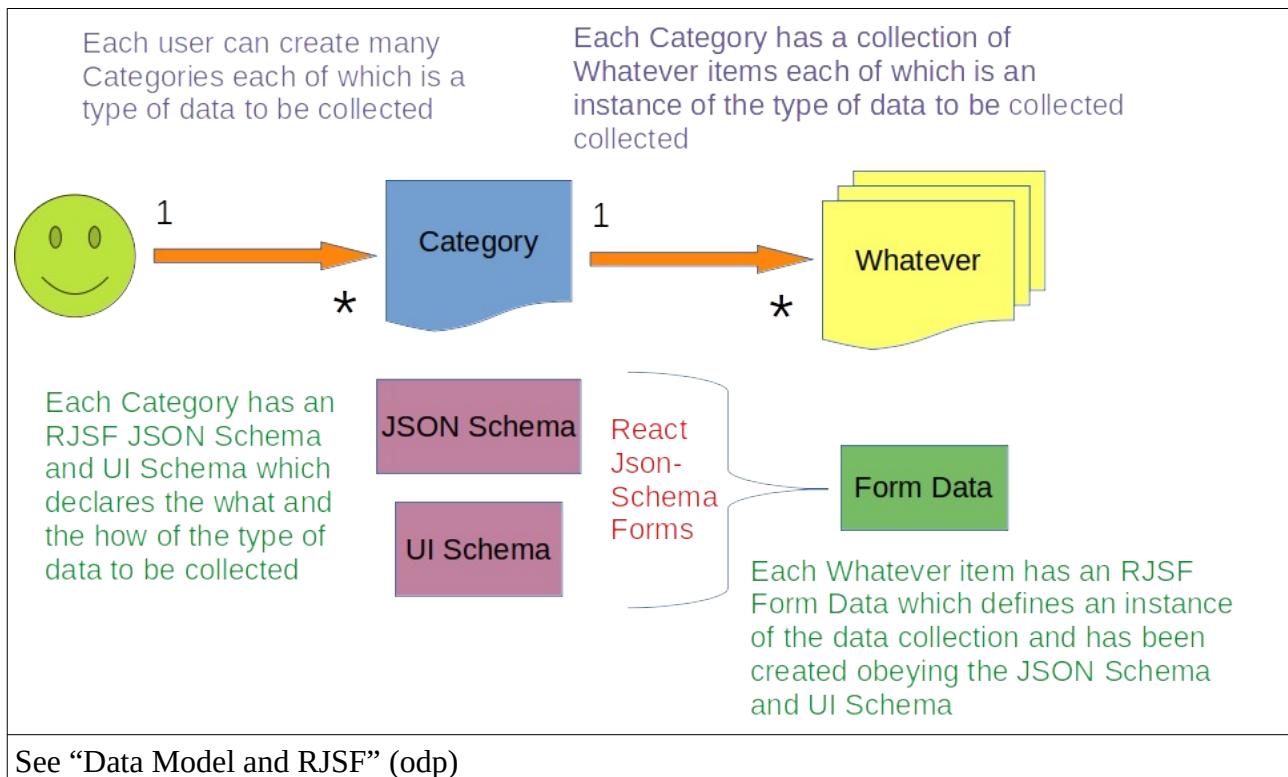
The under-pinning data model is a collection of Category items which has a 1-to-many relationship to Whatever items which make up the member instances within that category.

The data model is aligned with the principles behind React JSON-Schema Form (see

<https://github.com/rjsf-team/react-jsonschema-form>) which includes:

- a data-driven data model (JSON Schema)
- a data-driven UI form (JSON Schema)
- an instance of form data (JSON)

The following depiction illustrates the relationships within the Data Model and within RJSF and between the two of them:



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Data Model

Category

Name	Type	Example	Primary Key	Index
userId	String	auth0 60e094fd6c07e10123000000	HASH	HASH
itemId	String	c6723aef-24f3-442e-99db-d7dac0000000	RANGE	
name	String	<i>diary</i> - other examples include <i>recipe, music, address, etc</i>		RANGE
jsonSchema	String	See Appendix A		
uiSchema	String	See Appendix A		
createdAt	String	2021-08-08T09:57:47.954Z		

Whatever

Name	Type	Example	Primary Key	Index
userId	String	auth0 60e094fd6c07e10123000000	HASH	HASH
itemId	String	c6723aef-24f3-442e-99db-d7dac0999999	RANGE	
categoryId	String	c6723aef-24f3-442e-99db-d7dac0000000		RANGE
name	String	2021-01-01		
formData	Map	See Appendix A		
attachmentUrl	String	https://serverless-attachments-rebh-dev.s3.amazonaws.com/c6723aef-24f3-442e-99db-d7dac0273958		
createdAt	String	2021-08-08T09:57:47.954Z		

All entries are ‘owned’ by the user identified by the Auth0 id (**userId**).

The one-to-many relationship between Category and Whatever items is managed by matching the **Category.itemId** and the **Whatever.categoryId**.

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RJSF

Use the RJSF playground (<https://rjsf-team.github.io/react-jsonschema-form/>) to learn about and develop the JSON schema required to collect instances of Whatever You Want.

The screenshot shows a Google Chrome browser window with the title "react-jsonschema-form playground - Google Chrome". The address bar shows the URL <https://rjsf-team.github.io/react-jsonschema-form/>. The page content is titled "react-jsonschema-form" and displays a registration form example. On the left, there is a JSONSchema editor with the following code:

```
✓ JSONSchema
1 {
2   "title": "A registration form",
3   "description": "A simple form example.",
4   "type": "object",
5   "required": [
6     "firstName",
7     "lastName"
8   ],
9   "properties": {
10    "firstName": {
11      "type": "string",
12      "title": "First name",
13      "default": "Chuck"
14    },
15    "lastName": {
16      "type": "string",
17      "title": "Last name"
18    },
19    "telephone": {
20      "type": "string",
21      "title": "Telephone",
22    }
23 }
```

On the right, there is a "A registration form" section with the following fields:

- A simple form example.
- First name: Chuck
- Last name*
- Telephone

At the bottom right is a "Submit" button. Below the JSONSchema editor, there is a UISchema editor and a formData editor. The UISchema editor shows the following code:

```
✓ UISchema
1 {
2   "firstName": {
3     "ui:autofocus": true,
4     "ui:emptyValue": "",
5     "ui:autocomplete": "family-name"
6   },
7   "lastName": {
8     "ui:emptyValue": "",
9     "ui:autocomplete": "given-name"
10 },
11 "age": {
12   "ui:widget": "updown",
13   "ui:title": "Age of person",
14   "ui:description": "(earthian year)"
15 },
16 "bio": {
17   "ui:widget": "textarea"
18 },
19 "password": {
20   "ui:widget": "password",
21   "ui:help": "Hint: Make it strong!"
22 }
```

The formData editor shows the following code:

```
✓ formData
1 {
2   "firstName": "Chuck"
3 }
```

See **Appendix A** for examples of RJSF schema and data representing collections of:

- a Diary
- an Address Book
- a Movie Collection
- a Recipe Card deck

API

The API is fully defined in the Serverless deployment (serverless.yaml) and fully tested by the Postman Collection (Final Project.postman_collection.json) which details:

- URL endpoints
- Authorization
- Request Body
- Path Variables
- Expected Response

The API is summarised by the AWS API Gateway dashboard:

The screenshot shows the AWS API Gateway dashboard with a list of API resources. The first resource is expanded to show its methods:

- /category**
 - GET
 - OPTIONS
 - POST
- {itemId}**
 - DELETE
 - GET
 - OPTIONS
 - PATCH
- /whatever**
 - GET
 - OPTIONS
- /whatever**
 - GET
 - OPTIONS
 - POST
- {itemId}**
 - DELETE
 - GET
 - OPTIONS
 - PATCH
- /attachment**
 - OPTIONS
 - POST

Step 3: Build your application

“Build either a containerized microservices app, or a serverless app.”

Project Source Repository

(<https://github.com/rebhartell/udacity-aws-cloud-developer-project-5>)

The project source repository is divided across:

- backend server
- user interface
- Postman testing
- documentation
- upload files – images and schema

```
├── POSTMAN
│   ├── Postman.jpeg
│   ├── Udacity - Project Cloud Capstone - Whatever You Want.postman_collection.json
│   └── Udacity - Project Cloud Capstone - Whatever You Want.postman_test_run.json
├── PROJECT_DOCS
│   ├── images
│   ├── 000_My_Submission.pdf
│   ├── Capstone_Project_Report.odt
│   ├── Cloud_Capstone_Project_Report.odt
│   ├── Data Model and RJSF.odp
│   ├── RJSF_No_Semantic_UI.png
│   ├── RJSF_No_theme.png
│   ├── Whatever You Want - AWS - Serverless.drawio
│   ├── Whatever You Want - AWS - Serverless.jpg
│   └── Whatever You Want - AWS - Serverless.svg
├── UPLOADS
│   ├── images
│   └── schema
└── backend
    ├── db
    ├── models
    ├── node_modules
    ├── src
    │   ├── apiGateway-event.json
    │   ├── package-lock.json
    │   ├── package.json
    │   ├── run-db-cmd.sh
    │   ├── run-npm-install.sh
    │   ├── run-sls-deploy.sh
    │   ├── serverless.yml
    │   ├── tsconfig.json
    │   └── webpack.config.js
    └── client
        ├── build
        ├── node_modules
        ├── public
        ├── src
        │   ├── README.md
        │   ├── package-lock.json
        │   ├── package.json
        │   └── tsconfig.json
    └── LICENSE
        └── README.md
```

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README.md

See the main **README.md** in the project home directory.

Known Warnings with the backend packaging

```
cd backend
rm -rf node_modules/
rm -rf package-lock.json
npm install

npm WARN deprecated request-promise-native@1.0.9: request-promise-native has been deprecated because it extends the now deprecated request package, see https://github.com/request/request/issues/3142
npm WARN deprecated urix@0.1.0: Please see https://github.com/lydell/urix#deprecated
npm WARN deprecated har-validator@5.1.5: this library is no longer supported
npm WARN deprecated resolve-url@0.2.1: https://github.com/lydell/resolve-url#deprecated
npm WARN deprecated querystring@0.2.1: The querystring API is considered Legacy. new code should use the URLSearchParams API instead.
npm WARN deprecated querystring@0.2.0: The querystring API is considered Legacy. new code should use the URLSearchParams API instead.
npm WARN deprecated uuid@3.4.0: Please upgrade to version 7 or higher. Older versions may use Math.random() in certain circumstances, which is known to be problematic. See https://v8.dev/blog/math-random for details.
npm WARN deprecated uuid@3.4.0: Please upgrade to version 7 or higher. Older versions may use Math.random() in certain circumstances, which is known to be problematic. See https://v8.dev/blog/math-random for details.
npm WARN deprecated uuid@3.4.0: Please upgrade to version 7 or higher. Older versions may use Math.random() in certain circumstances, which is known to be problematic. See https://v8.dev/blog/math-random for details.
npm WARN deprecated uuid@3.3.2: Please upgrade to version 7 or higher. Older versions may use Math.random() in certain circumstances, which is known to be problematic. See https://v8.dev/blog/math-random for details.
npm WARN deprecated request@2.88.2: request has been deprecated, see https://github.com/request/request/issues/3142

added 936 packages, and audited 937 packages in 39s

60 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities
```

The presence of these warnings does not appear to impair the execution of the backend services.

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Known Warnings with the frontend packaging

```
rm -rf node_modules/
rm -rf package-lock.json
npm install

npm WARN ERESOLVE overriding peer dependency
npm WARN ERESOLVE overriding peer dependency
npm WARN deprecated flatten@1.0.3: flatten is deprecated in favor of utility frameworks such as lodash.
npm WARN deprecated @hapi/topo@3.1.6: This version has been deprecated and is no longer supported or maintained
npm WARN deprecated @hapi/bourne@1.3.2: This version has been deprecated and is no longer supported or maintained
npm WARN deprecated urix@0.1.0: Please see https://github.com/lydell/urix#deprecated
npm WARN deprecated resolve-url@0.2.1: https://github.com/lydell/resolve-url#deprecated
npm WARN deprecated querystring@0.2.1: The querystring API is considered Legacy. new code should use the URLSearchParams API instead.
npm WARN deprecated sane@4.1.0: some dependency vulnerabilities fixed, support for node < 10 dropped, and newer ECMAScript syntax/features added
npm WARN deprecated chokidar@2.1.8: Chokidar 2 will break on node v14+. Upgrade to chokidar 3 with 15x less dependencies.
npm WARN deprecated chokidar@2.1.8: Chokidar 2 will break on node v14+. Upgrade to chokidar 3 with 15x less dependencies.
npm WARN deprecated querystring@0.2.0: The querystring API is considered Legacy. new code should use the URLSearchParams API instead.
npm WARN deprecated babel-eslint@10.1.0: babel-eslint is now @babel/eslint-parser. This package will no longer receive updates.
npm WARN deprecated @hapi/address@2.1.4: Moved to 'npm install @sideway/address'
npm WARN deprecated rollup-plugin-babel@4.4.0: This package has been deprecated and is no longer maintained. Please use @rollup/plugin-babel.
npm WARN deprecated uuid@3.4.0: Please upgrade to version 7 or higher. Older versions may use Math.random() in certain circumstances, which is known to be problematic. See https://v8.dev/blog/math-random for details.
npm WARN deprecated uuid@3.4.0: Please upgrade to version 7 or higher. Older versions may use Math.random() in certain circumstances, which is known to be problematic. See https://v8.dev/blog/math-random for details.
npm WARN deprecated @hapi/hoek@8.5.1: This version has been deprecated and is no longer supported or maintained
npm WARN deprecated @hapi/joi@15.1.1: Switch to 'npm install joi'
npm WARN deprecated popper.js@1.16.1: You can find the new Popper v2 at @popperjs/core, this package is dedicated to the legacy v1
npm WARN deprecated core-js@2.6.12: core-js@<3.3 is no longer maintained and not recommended for usage due to the number of issues. Because of the V8 engine whims, feature detection in old core-js versions could cause a slowdown up to 100x even if nothing is polyfilled. Please, upgrade your dependencies to the actual version of core-js.

added 2061 packages, and audited 2062 packages in 59s

151 packages are looking for funding
  run `npm fund` for details

10 moderate severity vulnerabilities

To address issues that do not require attention, run:
  npm audit fix

To address all issues (including breaking changes), run:
  npm audit fix --force

Run `npm audit` for details.
```

The presence of these warnings does not appear to impair the execution of the frontend services.

NPM List for the backend

```
npm list

serverless-whatever-app@1.0.0 /home/rebh/Development/udacity-aws-cloud-
developer-project-5/backend
├── @types/aws-lambda@8.10.83
├── @types/jsonwebtoken@8.5.5
├── @types/uuid@8.3.1
└── aws-lambda@1.0.6
  ├── aws-sdk@2.973.0
  ├── aws-xray-sdk@3.3.3
  ├── axios@0.21.1
  ├── debug@4.3.2
  ├── jsonwebtoken@8.5.1
  ├── serverless-iam-roles-per-function@3.2.0
  ├── serverless-jetpack@0.11.1
  ├── serverless-plugin-tracing@2.0.0
  ├── serverless-prune-plugin@1.5.1
  ├── serverless-webpack@5.5.1
  ├── serverless@2.55.0
  ├── source-map-support@0.5.19
  ├── ts-loader@9.2.5
  ├── uuid@8.3.2
  └── webpack@5.51.1
    └── winston@3.3.3
```

NPM List for the frontend

```
npm list

typescript-app@0.1.0 /home/rebh/Development/udacity-aws-cloud-developer-
project-5/client
├── @popperjs/core@2.9.3
├── @rjsf/core@3.1.0
├── @rjsf/semantic-ui@3.1.0
├── @types/dateformat@3.0.1
├── @types/json-schema@7.0.9
├── @types/react-dom@17.0.9
├── @types/react-jsonschema-form@1.7.6
├── @types/react-router-dom@5.1.8
├── @types/react@17.0.19
├── auth0-js@9.16.2
├── axios@0.21.1
├── bindings@1.5.0 extraneous
├── bootstrap@3.4.1
├── dateformat@4.5.1
├── file-uri-to-path@1.0.0 extraneous
├── immutability-helper@3.1.1
├── jquery@3.6.0
├── nan@2.15.0 extraneous
├── react-dom@17.0.2
├── react-jsonschema-form@1.8.1
├── react-router-dom@5.2.0
├── react-scripts@4.0.3
├── semantic-ui-css@2.4.1
├── semantic-ui-react@2.0.3
├── typescript@4.3.5
└── winston@3.3.3
```

NPM List for global

```
npm list -g
/home/rebh/.nvm/versions/node/v14.16.0/lib
└─ npm@7.20.5
```

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Serverless Verbose output

Here is the output when re-deploying the serverless.yml configuration:

```
Serverless: Running "serverless" installed locally (in service node_modules)
Serverless: Using provider credentials, configured via dashboard:
https://app.serverless.com/rebhartell/apps/serverless-whatever-app/serverless-whatever-service/
dev/us-east-1/providers
Serverless: Using configuration:
{
  "concurrency": 2,
  "serializedCompile": false,
  "webpackConfig": "webpack.config.js",
  "includeModules": false,
  "packager": "npm",
  "packagerOptions": {},
  "keepOutputDirectory": false
}
Serverless: Removing /home/rebh/Development/udacity-aws-cloud-developer-project-5/backend/.webpack
Serverless: Individually packaging with concurrency at 2 entries a time.
Serverless: Bundling with Webpack...
asset src/lambda/auth/auth0Authorizer.js 255 KiB [emitted] [minimized] (name:
src/lambda/auth/auth0Authorizer) 2 related assets
runtime modules 1.04 KiB 5 modules
orphan modules 497 bytes [orphan] 1 module
cacheable modules 762 KiB
  javascript modules 759 KiB 176 modules
  json modules 3.51 KiB
    ./node_modules/winston/package.json 1.51 KiB [built] [code generated]
    ./node_modules/axios/package.json 1.99 KiB [built] [code generated]
17 modules
webpack 5.50.0 compiled successfully in 24412 ms
asset src/lambda/http/getAllWhatever.js 6.53 MiB [emitted] [minimized] (name:
src/lambda/http/getAllWhatever) 2 related assets
1350 modules
webpack 5.50.0 compiled successfully in 38596 ms
asset src/lambda/http/deleteCategory.js 6.53 MiB [emitted] [minimized] (name:
src/lambda/http/deleteCategory) 2 related assets
1349 modules
webpack 5.50.0 compiled successfully in 30848 ms
asset src/lambda/http/updateCategory.js 6.53 MiB [emitted] [minimized] (name:
src/lambda/http/updateCategory) 2 related assets
1349 modules
webpack 5.50.0 compiled successfully in 32976 ms
asset src/lambda/http/createCategory.js 6.53 MiB [emitted] [minimized] (name:
src/lambda/http/createCategory) 2 related assets
1350 modules
webpack 5.50.0 compiled successfully in 32665 ms
asset src/lambda/http/getCategory.js 6.53 MiB [emitted] [minimized] (name:
src/lambda/http/getCategory) 2 related assets
1349 modules
webpack 5.50.0 compiled successfully in 31375 ms
asset src/lambda/http/getAllCategory.js 6.53 MiB [emitted] [minimized] (name:
src/lambda/http/getAllCategory) 2 related assets
1349 modules
webpack 5.50.0 compiled successfully in 32061 ms
asset src/lambda/http/generateUploadUrl.js 6.53 MiB [emitted] [minimized] (name:
src/lambda/http/generateUploadUrl) 2 related assets
1350 modules
webpack 5.50.0 compiled successfully in 34885 ms
asset src/lambda/http/deleteWhatever.js 6.53 MiB [emitted] [minimized] (name:
src/lambda/http/deleteWhatever) 2 related assets
1350 modules
webpack 5.50.0 compiled successfully in 35062 ms
asset src/lambda/http/updateWhatever.js 6.53 MiB [emitted] [minimized] (name:
src/lambda/http/updateWhatever) 2 related assets
1350 modules
webpack 5.50.0 compiled successfully in 33083 ms
asset src/lambda/http/createWhatever.js 6.54 MiB [emitted] [minimized] (name:
src/lambda/http/createWhatever) 2 related assets
```

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```
1351 modules
webpack 5.50.0 compiled successfully in 33151 ms
asset src/lambda/http/getWhatever.js 6.53 MiB [emitted] [minimized] (name:
src/lambda/http/getWhatever) 2 related assets
1350 modules
webpack 5.50.0 compiled successfully in 32761 ms
asset src/lambda/http/getAllWhateverByCategory.js 6.53 MiB [emitted] [minimized] (name:
src/lambda/http/getAllWhateverByCategory) 2 related assets
1350 modules
webpack 5.50.0 compiled successfully in 28153 ms
Serverless: Zip method used: native
Serverless: Zip function:
/home/rebh/Development/udacity-aws-cloud-developer-project-5/backend/.webpack/Auth [274 ms]
Serverless: Zip method used: native
Serverless: Zip function:
/home/rebh/Development/udacity-aws-cloud-developer-project-5/backend/.webpack/GetAllWhatever [485 ms]
Serverless: Zip method used: native
Serverless: Zip function:
/home/rebh/Development/udacity-aws-cloud-developer-project-5/backend/.webpack/GetAllWhateverByCat [515 ms]
Serverless: Zip method used: native
Serverless: Zip function:
/home/rebh/Development/udacity-aws-cloud-developer-project-5/backend/.webpack/GetWhatever [485 ms]
Serverless: Zip method used: native
Serverless: Zip function:
/home/rebh/Development/udacity-aws-cloud-developer-project-5/backend/.webpack/CreateWhatever [487 ms]
Serverless: Zip method used: native
Serverless: Zip function:
/home/rebh/Development/udacity-aws-cloud-developer-project-5/backend/.webpack/UpdateWhatever [556 ms]
Serverless: Zip method used: native
Serverless: Zip function:
/home/rebh/Development/udacity-aws-cloud-developer-project-5/backend/.webpack/DeleteWhatever [484 ms]
Serverless: Zip method used: native
Serverless: Zip function:
/home/rebh/Development/udacity-aws-cloud-developer-project-5/backend/.webpack/GenerateUploadUrl [496 ms]
Serverless: Zip method used: native
Serverless: Zip function:
/home/rebh/Development/udacity-aws-cloud-developer-project-5/backend/.webpack/GetCategory [503 ms]
Serverless: Zip method used: native
Serverless: Zip function:
/home/rebh/Development/udacity-aws-cloud-developer-project-5/backend/.webpack/CreateCategory [543 ms]
Serverless: Zip method used: native
Serverless: Zip function:
/home/rebh/Development/udacity-aws-cloud-developer-project-5/backend/.webpack/UpdateCategory [502 ms]
Serverless: Zip method used: native
Serverless: Zip function:
/home/rebh/Development/udacity-aws-cloud-developer-project-5/backend/.webpack/DeleteCategory [484 ms]
Serverless: Copying existing artifacts...
Serverless: Setting artifact for function 'Auth' to '.serverless/Auth.zip'
Serverless: Setting artifact for function 'GetAllWhatever' to '.serverless/GetAllWhatever.zip'
Serverless: Setting artifact for function 'GetAllWhateverByCat' to
'.serverless/GetAllWhateverByCat.zip'
Serverless: Setting artifact for function 'GetWhatever' to '.serverless/GetWhatever.zip'
Serverless: Setting artifact for function 'CreateWhatever' to '.serverless/CreateWhatever.zip'
Serverless: Setting artifact for function 'UpdateWhatever' to '.serverless/UpdateWhatever.zip'
Serverless: Setting artifact for function 'DeleteWhatever' to '.serverless/DeleteWhatever.zip'
Serverless: Setting artifact for function 'GenerateUploadUrl' to
'.serverless/GenerateUploadUrl.zip'
Serverless: Setting artifact for function 'GetAllCategory' to '.serverless/GetAllCategory.zip'
Serverless: Setting artifact for function 'GetCategory' to '.serverless/GetCategory.zip'
Serverless: Setting artifact for function 'CreateCategory' to '.serverless/CreateCategory.zip'
```

Cloud Capstone Project - Whatever You Want – Serverless Application

```
Serverless: Setting artifact for function 'UpdateCategory' to '.serverless/UpdateCategory.zip'
Serverless: Setting artifact for function 'DeleteCategory' to '.serverless/DeleteCategory.zip'
Serverless: Setting artifact for function 'Auth' to '.serverless/Auth.zip'
Serverless: Setting artifact for function 'GetAllWhatever' to '.serverless/GetAllWhatever.zip'
Serverless: Setting artifact for function 'GetAllWhateverByCat' to
'.serverless/GetAllWhateverByCat.zip'
Serverless: Setting artifact for function 'GetWhatever' to '.serverless/GetWhatever.zip'
Serverless: Setting artifact for function 'CreateWhatever' to '.serverless/CreateWhatever.zip'
Serverless: Setting artifact for function 'UpdateWhatever' to '.serverless/UpdateWhatever.zip'
Serverless: Setting artifact for function 'DeleteWhatever' to '.serverless/DeleteWhatever.zip'
Serverless: Setting artifact for function 'GenerateUploadUrl' to
'.serverless/GenerateUploadUrl.zip'
Serverless: Setting artifact for function ' GetAllCategory' to '.serverless/GetAllCategory.zip'
Serverless: Setting artifact for function 'GetCategory' to '.serverless/GetCategory.zip'
Serverless: Setting artifact for function 'CreateCategory' to '.serverless/CreateCategory.zip'
Serverless: Setting artifact for function 'UpdateCategory' to '.serverless/UpdateCategory.zip'
Serverless: Setting artifact for function 'DeleteCategory' to '.serverless/DeleteCategory.zip'
Serverless: [serverless-jetpack] Skipping individual packaging for 13 functions
Serverless: [serverless-jetpack] Packaging 0 functions, 0 services, and 0 layers with concurrency 1
Serverless: Packaging service...
Serverless: Remove /home/rebh/Development/udacity-aws-cloud-developer-project-5/backend/.webpack
Serverless: Removing /home/rebh/Development/udacity-aws-cloud-developer-project-5/backend/.webpack
done
Serverless: Installing dependencies for custom CloudFormation resources...
Serverless: Tracing DISABLED for function "serverless-whatever-service-dev-Auth"
Serverless: Tracing DISABLED for function "serverless-whatever-service-dev-GetAllWhatever"
Serverless: Tracing DISABLED for function "serverless-whatever-service-dev-GetAllWhateverByCat"
Serverless: Tracing DISABLED for function "serverless-whatever-service-dev-GetWhatever"
Serverless: Tracing DISABLED for function "serverless-whatever-service-dev-CreateWhatever"
Serverless: Tracing DISABLED for function "serverless-whatever-service-dev-UpdateWhatever"
Serverless: Tracing DISABLED for function "serverless-whatever-service-dev-DeleteWhatever"
Serverless: Tracing DISABLED for function "serverless-whatever-service-dev-GenerateUploadUrl"
Serverless: Tracing DISABLED for function "serverless-whatever-service-dev-GetAllCategory"
Serverless: Tracing DISABLED for function "serverless-whatever-service-dev-GetCategory"
Serverless: Tracing DISABLED for function "serverless-whatever-service-dev-CreateCategory"
Serverless: Tracing DISABLED for function "serverless-whatever-service-dev-UpdateCategory"
Serverless: Tracing DISABLED for function "serverless-whatever-service-dev-DeleteCategory"
Serverless: Uploading CloudFormation file to S3...
Serverless: Uploading artifacts...
Serverless: Uploading service Auth.zip file to S3 (563.13 KB)...
Serverless: Uploading service GetAllWhatever.zip file to S3 (1.62 MB)...
Serverless: Uploading service GetAllWhateverByCat.zip file to S3 (1.62 MB)...
Serverless: Uploading service DeleteCategory.zip file to S3 (1.62 MB)...
Serverless: Uploading service UpdateCategory.zip file to S3 (1.62 MB)...
Serverless: Uploading service CreateCategory.zip file to S3 (1.62 MB)...
Serverless: Uploading service GetCategory.zip file to S3 (1.62 MB)...
Serverless: Uploading service GetAllCategory.zip file to S3 (1.62 MB)...
Serverless: Uploading service GenerateUploadUrl.zip file to S3 (1.62 MB)...
Serverless: Uploading service DeleteWhatever.zip file to S3 (1.62 MB)...
Serverless: Uploading service UpdateWhatever.zip file to S3 (1.62 MB)...
Serverless: Uploading service CreateWhatever.zip file to S3 (1.62 MB)...
Serverless: Uploading service GetWhatever.zip file to S3 (1.62 MB)...
Serverless: Uploading custom CloudFormation resources...
Serverless: Validating template...
Serverless: Updating Stack...
Serverless: Checking Stack update progress...
CloudFormation - UPDATE_IN_PROGRESS - AWS::CloudFormation::Stack - serverless-whatever-service-dev
CloudFormation - UPDATE_IN_PROGRESS - AWS::Lambda::Function - GenerateUploadUrlLambdaFunction
CloudFormation - UPDATE_IN_PROGRESS - AWS::Lambda::Function - UpdateCategoryLambdaFunction
CloudFormation - UPDATE_IN_PROGRESS - AWS::Lambda::Function - GetAllCategoryLambdaFunction
CloudFormation - UPDATE_IN_PROGRESS - AWS::Lambda::Function - GetAllWhateverLambdaFunction
CloudFormation - UPDATE_IN_PROGRESS - AWS::Lambda::Function - AuthLambdaFunction
CloudFormation - UPDATE_IN_PROGRESS - AWS::Lambda::Function - UpdateWhateverLambdaFunction
CloudFormation - UPDATE_IN_PROGRESS - AWS::Lambda::Function - CreateCategoryLambdaFunction
CloudFormation - UPDATE_IN_PROGRESS - AWS::Lambda::Function - GetAllWhateverByCatLambdaFunction
CloudFormation - UPDATE_IN_PROGRESS - AWS::Lambda::Function - GetCategoryLambdaFunction
CloudFormation - UPDATE_IN_PROGRESS - AWS::Lambda::Function - DeleteWhateverLambdaFunction
CloudFormation - UPDATE_IN_PROGRESS - AWS::Lambda::Function - GetWhateverLambdaFunction
CloudFormation - UPDATE_IN_PROGRESS - AWS::Lambda::Function -
CustomDashresourceDashapigwDashcwDashroleLambdaFunction
CloudFormation - UPDATE_IN_PROGRESS - AWS::Lambda::Function - DeleteCategoryLambdaFunction
CloudFormation - UPDATE_IN_PROGRESS - AWS::Lambda::Function - CreateWhateverLambdaFunction
CloudFormation - UPDATE_COMPLETE - AWS::Lambda::Function - GenerateUploadUrlLambdaFunction
```

Cloud Capstone Project - Whatever You Want – Serverless Application

```
CloudFormation - UPDATE_COMPLETE - AWS::Lambda::Function - GetAllWhateverLambdaFunction
CloudFormation - UPDATE_COMPLETE - AWS::Lambda::Function - UpdateCategoryLambdaFunction
CloudFormation - UPDATE_COMPLETE - AWS::Lambda::Function - GetCategoryLambdaFunction
CloudFormation - UPDATE_COMPLETE - AWS::Lambda::Function - AuthLambdaFunction
CloudFormation - UPDATE_COMPLETE - AWS::Lambda::Function - GetAllCategoryLambdaFunction
CloudFormation - UPDATE_COMPLETE - AWS::Lambda::Function - DeleteWhateverLambdaFunction
CloudFormation - UPDATE_COMPLETE - AWS::Lambda::Function -
CustomDashresourceDashapigwDashcwDashroleLambdaFunction
CloudFormation - UPDATE_COMPLETE - AWS::Lambda::Function - GetAllWhateverByCatLambdaFunction
CloudFormation - UPDATE_COMPLETE - AWS::Lambda::Function - UpdateWhateverLambdaFunction
CloudFormation - UPDATE_COMPLETE - AWS::Lambda::Function - DeleteCategoryLambdaFunction
CloudFormation - UPDATE_COMPLETE - AWS::Lambda::Function - GetWhateverLambdaFunction
CloudFormation - UPDATE_COMPLETE - AWS::Lambda::Function - CreateCategoryLambdaFunction
CloudFormation - UPDATE_COMPLETE - AWS::Lambda::Function - CreateWhateverLambdaFunction
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
GetAllWhateverLambdaVersionpgUOeIhERW4xr92nXAEvouEN5nrK61eO36GgIwn4
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
GenerateUploadUrlLambdaVersionroXGNvAiB5in7RSIY9E0PDamb5FsFiEOa2beY6OULCI
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
GetAllCategoryLambdaVersionZBXwrBj88gKfSjvpDHdhky6rInMStUissKEIo8KDFw
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
UpdateCategoryLambdaVersionLmqwtwEeAigSV5m3qPHX6tme4dpHsWnks5NMFrHo
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
GetAllWhateverLambdaVersionpgUOeIhERW4xr92nXAEvouEN5nrK61eO36GgIwn4
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
DeleteWhateverLambdaVersion8rLW4Ur9n139O2F4NhVjctU3wlBkaZYyMBQoLdu81c
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
CreateCategoryLambdaVersionK1z4JK71QYZqa6Q1f4YcV829GZH9rcqETeuXGfh4GNU
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
GetCategoryLambdaVersionTQvVYgg6ibYGIbyX39rssHf8a5zuinDg7FR1jEqizc
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
GenerateUploadUrlLambdaVersionroXGNvAiB5in7RSIY9E0PDamb5FsFiEOa2beY6OULCI
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
GetWhateverLambdaVersionWPHiqUr2KCrP1sUh6pDbdVe3PQt6WfaQ0pMaNnIOf4Q
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
AuthLambdaVersion4r8uMWqouRIk1RFFhe5XWMXIJuM0bHoukQTNqdFCuA
CloudFormation - CREATE_COMPLETE - AWS::Lambda::Version -
GenerateUploadUrlLambdaVersionroXGNvAiB5in7RSIY9E0PDamb5FsFiEOa2beY6OULCI
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
GetAllCategoryLambdaVersionZBXwrBj88gKfSjvpDHdhky6rInMStUissKEIo8KDFw
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
DeleteCategoryLambdaVersionAxrXPhpWUCxKxRrj5jxAEQme1U61zsusOapoVzsrvsI
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
UpdateWhateverLambdaVersionYHwZpViz703NwSrtjBLT9CScA54UXGivrnu5kSI
CloudFormation - CREATE_COMPLETE - AWS::Lambda::Version -
GetAllWhateverLambdaVersionpgUOeIhERW4xr92nXAEvouEN5nrK61eO36GgIwn4
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
DeleteWhateverLambdaVersion8rLW4Ur9n139O2F4NhVjctU3wlBkaZYyMBQoLdu81c
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
CreateCategoryLambdaVersionK1z4JK71QYZqa6Q1f4YcV829GZH9rcqETeuXGfh4GNU
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
GetCategoryLambdaVersionTQvVYgg6ibYGIbyX39rssHf8a5zuinDg7FR1jEqizc
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
UpdateCategoryLambdaVersionLmqwtwEeAigSV5m3qPHX6tme4dpHsWnks5NMFrHo
CloudFormation - CREATE_COMPLETE - AWS::Lambda::Version -
GetAllCategoryLambdaVersionZBXwrBj88gKfSjvpDHdhky6rInMStUissKEIo8KDFw
CloudFormation - CREATE_COMPLETE - AWS::Lambda::Version -
DeleteWhateverLambdaVersion8rLW4Ur9n139O2F4NhVjctU3wlBkaZYyMBQoLdu81c
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
GetWhateverLambdaVersionWPHiqUr2KCrP1sUh6pDbdVe3PQt6WfaQ0pMaNnIOf4Q
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
AuthLambdaVersion4r8uMWqouRIk1RFFhe5XWMXIJuM0bHoukQTNqdFCuA
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
CreateWhateverLambdaVersionQqc85s8NqOSWiNyJ5LXnPvorxDIGRQNsUt1W3liobYA
CloudFormation - CREATE_COMPLETE - AWS::Lambda::Version -
GetCategoryLambdaVersionTQvVYgg6ibYGIbyX39rssHf8a5zuinDg7FR1jEqizc
CloudFormation - CREATE_COMPLETE - AWS::Lambda::Version -
CreateCategoryLambdaVersionK1z4JK71QYZqa6Q1f4YcV829GZH9rcqETeuXGfh4GNU
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
UpdateWhateverLambdaVersionYHwZpViz703NwSrtjBLT9CScA54UXGivrnu5kSI
CloudFormation - CREATE_COMPLETE - AWS::Lambda::Version -
GetWhateverLambdaVersionWPHiqUr2KCrP1sUh6pDbdVe3PQt6WfaQ0pMaNnIOf4Q
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
```

Cloud Capstone Project - Whatever You Want – Serverless Application

```
GetAllWhateverByCatLambdaVersioni1My2f0iPcmPSO8djthDkiU2UQRB2Pj4n0P5oLyk
CloudFormation - CREATE_COMPLETE - AWS::Lambda::Version -
UpdateCategoryLambdaVersionLMqwtwEeAIGSV5m3qPHX6tme4dpHsWnks5NMFrHo
CloudFormation - CREATE_COMPLETE - AWS::Lambda::Version -
AuthLambdaVersion4r8uMqouRIk1RFhe5XWMXIJuM0bHoukQTNqdFCuA
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
DeleteCategoryLambdaVersionAxrXPHpWUCxKxRrj5jxAEQme1U61ZsusOApoVZsrvsI
CloudFormation - CREATE_COMPLETE - AWS::Lambda::Version -
UpdateWhateverLambdaVersionYHwZpViz7O3NwSrtjBLT9CScA54UXGivrnu5kSI
CloudFormation - CREATE_COMPLETE - AWS::Lambda::Version -
DeleteCategoryLambdaVersionAxrXPHpWUCxKxRrj5jxAEQme1U61ZsusOApoVZsrvsI
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
CreateWhateverLambdaVersionQqc85s8Nq0SWiNyJ5LXnPvrxDIGRQNsUt1W3liobYA
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
GetAllWhateverByCatLambdaVersioni1My2f0iPcmPSO8djthDkiU2UQRB2Pj4n0P5oLyk
CloudFormation - CREATE_COMPLETE - AWS::Lambda::Version -
CreateWhateverLambdaVersionQqc85s8Nq0SWiNyJ5LXnPvrxDIGRQNsUt1W3liobYA
CloudFormation - CREATE_COMPLETE - AWS::Lambda::Version -
GetAllWhateverByCatLambdaVersioni1My2f0iPcmPSO8djthDkiU2UQRB2Pj4n0P5oLyk
CloudFormation - CREATE_IN_PROGRESS - AWS::ApiGateway::Deployment -
ApiGatewayDeployment1629687270178
CloudFormation - CREATE_IN_PROGRESS - AWS::ApiGateway::Deployment -
ApiGatewayDeployment1629687270178
CloudFormation - CREATE_COMPLETE - AWS::ApiGateway::Deployment - ApiGatewayDeployment1629687270178
CloudFormation - UPDATE_COMPLETE_CLEANUP_IN_PROGRESS - AWS::CloudFormation::Stack - serverless-
whatever-service-dev
CloudFormation - DELETE_SKIPPED - AWS::Lambda::Version -
CreateCategoryLambdaVersiongdJSTOIJg2dSafsdFFnEDQSFWEHV2awFrluCSjOM
CloudFormation - DELETE_SKIPPED - AWS::Lambda::Version -
GetAllWhateverLambdaVersion57eMvNPhGXNBNTNUftpuKvKcbUNZv8NpSotCn12tcxc
CloudFormation - DELETE_SKIPPED - AWS::Lambda::Version -
GetAllCategoryLambdaVersionpum17xc4HXYgth6kRGLhBdmgJjmwac54ji0oGsew0E
CloudFormation - DELETE_SKIPPED - AWS::Lambda::Version -
DeleteWhateverLambdaVersionEV6zmgjnsk4PUpjQxOwmFFPT0o7iG4qAJOMPVE2tPnk
CloudFormation - DELETE_SKIPPED - AWS::Lambda::Version -
GetAllWhateverByCatLambdaVersionbxSoYhtPCdf0S359b4e62FysipQqnWRfHrS4e6jkdo
CloudFormation - DELETE_IN_PROGRESS - AWS::ApiGateway::Deployment -
ApiGatewayDeployment1629604246111
CloudFormation - DELETE_SKIPPED - AWS::Lambda::Version -
UpdateCategoryLambdaVersionR0Fthk4I3ZduojgovnWt0q056g9r48VA1aSw77yAYto
CloudFormation - DELETE_SKIPPED - AWS::Lambda::Version -
DeleteCategoryLambdaVersion094vkuE4hEl0fcpbFH8Lf9fwIZR8e19uApGNamZQ
CloudFormation - DELETE_SKIPPED - AWS::Lambda::Version -
GenerateUploadUrlLambdaVersionDTjdMMJwzZFKPri9X4Zttfs8lhqxBap8IZE4Aidcw
CloudFormation - DELETE_SKIPPED - AWS::Lambda::Version -
GetWhateverLambdaVersionj19YhPd0AMGZJejxbh5eoZPT3SGDpqYgYsYlx4
CloudFormation - DELETE_SKIPPED - AWS::Lambda::Version -
UpdateWhateverLambdaVersionWHMqaKln9ila5YeD5CeU05H6tKKOF6732fdncm0hc
CloudFormation - DELETE_SKIPPED - AWS::Lambda::Version -
GetCategoryLambdaVersionguFfvIxKPdiCN355QJaHy8VxNBksaqh8mgjW3eg
CloudFormation - DELETE_SKIPPED - AWS::Lambda::Version -
AuthLambdaVersion8Mn14aRyoZ7PMsds9F8WXTxEEUgDPPCYtpFAF9ot7w
CloudFormation - DELETE_SKIPPED - AWS::Lambda::Version -
CreateWhateverLambdaVersionvR5ScOFTzAOxqQGcp3fJlaeY861iKJ7bAWSU3942e0k
CloudFormation - DELETE_COMPLETE - AWS::ApiGateway::Deployment - ApiGatewayDeployment1629604246111
CloudFormation - UPDATE_COMPLETE - AWS::CloudFormation::Stack - serverless-whatever-service-dev
Serverless: Stack update finished...
Service Information
service: serverless-whatever-service
stage: dev
region: us-east-1
stack: serverless-whatever-service-dev
resources: 123
api keys:
None
endpoints:
  GET - https://wdjq4nvsa6.execute-api.us-east-1.amazonaws.com/dev/whatever
  GET - https://wdjq4nvsa6.execute-api.us-east-1.amazonaws.com/dev/category/{itemId}/whatever
  GET - https://wdjq4nvsa6.execute-api.us-east-1.amazonaws.com/dev/whatever/{itemId}
  POST - https://wdjq4nvsa6.execute-api.us-east-1.amazonaws.com/dev/whatever
  PATCH - https://wdjq4nvsa6.execute-api.us-east-1.amazonaws.com/dev/whatever/{itemId}
  DELETE - https://wdjq4nvsa6.execute-api.us-east-1.amazonaws.com/dev/whatever/{itemId}
  POST - https://wdjq4nvsa6.execute-api.us-east-1.amazonaws.com/dev/whatever/{itemId}/attachment
```

Cloud Capstone Project - Whatever You Want – Serverless Application

```
GET - https://wdjq4nvs6.execute-api.us-east-1.amazonaws.com/dev/category
GET - https://wdjq4nvs6.execute-api.us-east-1.amazonaws.com/dev/category/{itemId}
POST - https://wdjq4nvs6.execute-api.us-east-1.amazonaws.com/dev/category
PATCH - https://wdjq4nvs6.execute-api.us-east-1.amazonaws.com/dev/category/{itemId}
DELETE - https://wdjq4nvs6.execute-api.us-east-1.amazonaws.com/dev/category/{itemId}

functions:
Auth: serverless-whatever-service-dev-Auth
GetAllWhatever: serverless-whatever-service-dev-GetAllWhatever
GetAllWhateverByCat: serverless-whatever-service-dev-GetAllWhateverByCat
GetWhatever: serverless-whatever-service-dev-GetWhatever
CreateWhatever: serverless-whatever-service-dev-CreateWhatever
UpdateWhatever: serverless-whatever-service-dev-UpdateWhatever
DeleteWhatever: serverless-whatever-service-dev-DeleteWhatever
GenerateUploadUrl: serverless-whatever-service-dev-GenerateUploadUrl
GetAllCategory: serverless-whatever-service-dev-GetAllCategory
GetCategory: serverless-whatever-service-dev-GetCategory
CreateCategory: serverless-whatever-service-dev-CreateCategory
UpdateCategory: serverless-whatever-service-dev-UpdateCategory
DeleteCategory: serverless-whatever-service-dev-DeleteCategory

layers:
None

Stack Outputs
AuthLambdaFunctionQualifiedArn: arn:aws:lambda:us-east-1:016523083343:function:serverless-whatever-service-dev-Auth:20
DeleteWhateverLambdaFunctionQualifiedArn: arn:aws:lambda:us-east-1:016523083343:function:serverless-whatever-service-dev>DeleteWhatever:20
GenerateUploadUrlLambdaFunctionQualifiedArn: arn:aws:lambda:us-east-1:016523083343:function:serverless-whatever-service-dev-GenerateUploadUrl:20
CreateWhateverLambdaFunctionQualifiedArn: arn:aws:lambda:us-east-1:016523083343:function:serverless-whatever-service-dev-CreateWhatever:20
UpdateCategoryLambdaFunctionQualifiedArn: arn:aws:lambda:us-east-1:016523083343:function:serverless-whatever-service-dev-UpdateCategory:9
GetWhateverLambdaFunctionQualifiedArn: arn:aws:lambda:us-east-1:016523083343:function:serverless-whatever-service-dev-GetWhatever:20
UpdateWhateverLambdaFunctionQualifiedArn: arn:aws:lambda:us-east-1:016523083343:function:serverless-whatever-service-dev-UpdateWhatever:20
GetAllCategoryLambdaFunctionQualifiedArn: arn:aws:lambda:us-east-1:016523083343:function:serverless-whatever-service-dev-GetAllCategory:8
ServerlessDeploymentBucketName: serverless-whatever-serv-serverlessdeploymentbuck-1wo7mf9horr3z
CreateCategoryLambdaFunctionQualifiedArn: arn:aws:lambda:us-east-1:016523083343:function:serverless-whatever-service-dev>CreateCategory:9
GetCategoryLambdaFunctionQualifiedArn: arn:aws:lambda:us-east-1:016523083343:function:serverless-whatever-service-dev-GetCategory:9
DeleteCategoryLambdaFunctionQualifiedArn: arn:aws:lambda:us-east-1:016523083343:function:serverless-whatever-service-dev>DeleteCategory:9
EnterpriseLogAccessIamRole: arn:aws:iam::016523083343:role/serverless-whatever-servi-
EnterpriseLogAccessIamRo-1FP5J135LY4U
GetAllWhateverByCatLambdaFunctionQualifiedArn: arn:aws:lambda:us-east-1:016523083343:function:serverless-whatever-service-dev-GetAllWhateverByCat:7
GetAllWhateverLambdaFunctionQualifiedArn: arn:aws:lambda:us-east-1:016523083343:function:serverless-whatever-service-dev-GetAllWhatever:13
ServiceEndpoint: https://wdjq4nvs6.execute-api.us-east-1.amazonaws.com/dev

Serverless: Prune: Running post-deployment pruning
Serverless: Prune: Querying for deployed function versions
Serverless: Prune: serverless-whatever-service-dev-Auth has 3 additional versions published and 0 aliases, 1 version selected for deletion
Serverless: Prune: Deleting Function serverless-whatever-service-dev-Auth v18...
Serverless: Prune: serverless-whatever-service-dev-GetAllWhatever has 3 additional versions published and 0 aliases, 1 version selected for deletion
Serverless: Prune: Deleting Function serverless-whatever-service-dev-GetAllWhatever v11...
Serverless: Prune: serverless-whatever-service-dev-GetAllWhateverByCat has 3 additional versions published and 0 aliases, 1 version selected for deletion
Serverless: Prune: Deleting Function serverless-whatever-service-dev-GetAllWhateverByCat v5...
Serverless: Prune: serverless-whatever-service-dev-GetWhatever has 3 additional versions published and 0 aliases, 1 version selected for deletion
Serverless: Prune: Deleting Function serverless-whatever-service-dev-GetWhatever v18...
Serverless: Prune: serverless-whatever-service-dev-CreateWhatever has 3 additional versions published and 0 aliases, 1 version selected for deletion
Serverless: Prune: Deleting Function serverless-whatever-service-dev-CreateWhatever v18...
Serverless: Prune: serverless-whatever-service-dev-UpdateWhatever has 3 additional versions published and 0 aliases, 1 version selected for deletion
```

Cloud Capstone Project - Whatever You Want – Serverless Application

```
Serverless: Prune: Deleting Function serverless-whatever-service-dev-UpdateWhatever v18...
Serverless: Prune: serverless-whatever-service-dev-DeleteWhatever has 3 additional versions
published and 0 aliases, 1 version selected for deletion
Serverless: Prune: Deleting Function serverless-whatever-service-dev-DeleteWhatever v18...
Serverless: Prune: serverless-whatever-service-dev-GenerateUploadUrl has 3 additional versions
published and 0 aliases, 1 version selected for deletion
Serverless: Prune: Deleting Function serverless-whatever-service-dev-GenerateUploadUrl v18...
Serverless: Prune: serverless-whatever-service-dev-GetAllCategory has 3 additional versions
published and 0 aliases, 1 version selected for deletion
Serverless: Prune: Deleting Function serverless-whatever-service-dev-GetAllCategory v6...
Serverless: Prune: serverless-whatever-service-dev-GetCategory has 3 additional versions published
and 0 aliases, 1 version selected for deletion
Serverless: Prune: Deleting Function serverless-whatever-service-dev-GetCategory v7...
Serverless: Prune: serverless-whatever-service-dev-CreateCategory has 3 additional versions
published and 0 aliases, 1 version selected for deletion
Serverless: Prune: Deleting Function serverless-whatever-service-dev-CreateCategory v7...
Serverless: Prune: serverless-whatever-service-dev-UpdateCategory has 3 additional versions
published and 0 aliases, 1 version selected for deletion
Serverless: Prune: Deleting Function serverless-whatever-service-dev-DeleteCategory v7...
Serverless: Prune: Pruning complete.
Serverless: Removing old service artifacts from S3...
Serverless: Publishing service to the Serverless Dashboard...
Serverless: Successfully published your service to the Serverless Dashboard:
https://app.serverless.com/rebhartell/apps/serverless-whatever-app/serverless-whatever-service/
dev/us-east-1
```

Issues with the initial submission (v3.0.0)

Unable to review

Your project could not be reviewed. Please resubmit after you address the issue noted below by the reviewer.

Hi There !!

Your project couldn't be reviewed as it gave the following error on running the client module. 

```
/rebhartell-udacity-aws-cloud-developer-project-5-7ed9ae9/client$ npm start
> typescript-app@0.1.0 start
> react-scripts start
The following changes are being made to your tsconfig.json file:
- compilerOptions.jsx must be react (to support the new JSX transform in React 17)
rebhartell-udacity-aws-cloud-developer-project-5-7ed9ae9/client/node_modules/terser-webpack-plugin/node_modules/p-limit/index.js:29
    } catch {}^

SyntaxError: Unexpected token {
  at createScript (vm.js:80:10)
  at Object.runInThisContext (vm.js:139:10)
  at Module._compile (module.js:616:28)
  at Object.Module._extensions..js (module.js:663:10)
  at Module.load (module.js:565:32)
  at tryModuleLoad (module.js:505:12)
  at Function.Module._load (module.js:497:3)
  at Module.require (module.js:596:17)
  at require (internal/module.js:11:18)
  at Object.<anonymous> (rebhartell-udacity-aws-cloud-developer-project-5-7ed9ae9/client/node_modules/terser-webpack-plugin/dist/index.js:24:38)
npm ERR! code ELIFECYCLE
npm ERR! errno 1
npm ERR! typescript-app@0.1.0 start: `react-scripts start`
npm ERR! Exit status 1
npm ERR!
npm ERR! Failed at the typescript-app@0.1.0 start script.
npm ERR! This is probably not a problem with npm. There is likely additional logging output above.

npm ERR! A complete log of this run can be found in:
npm ERR!     ./npm/_logs/2021-08-23T07_12_19_955Z-debug.log
```

Please ensure that you send a fully working project or update the README instruction for successful build

Hope you make the required changes soon. We look forward to receiving your future project submissions soon .

Have a Good Day and Stay Safe

Keep Learning and Stay Udacious

Cloud Capstone Project - Whatever You Want – Serverless Application

Review #1 (this review)

Reviewed 8h ago

STUDENT NOTES

<https://github.com/rebhartell/udacity-aws-cloud-developer-project-5/tree/v3.0.0>

All documentation and images are in https://github.com/rebhartell/udacity-aws-cloud-developer-project-5/blob/v3.0.0/PROJECT_DOCS/Cloud_Capstone_Project_Report.pdf

Response

Downloaded the exact same source code <https://github.com/rebhartell/udacity-aws-cloud-developer-project-5/tree/v3.0.0>

Builds and runs OK !!!

Possible sources of issue are:

- the module versions are not specific enough and slightly different versions are being brought in
 - use **npm ci** for a deterministic, repeatable build - updated documentation
- different versions of build tools
 - specify the tool versions (**package.json**) and check in the build (**.npmrc**)
- potentially different versions of Typescript when building from VS Code as opposed to the commandline
 - **build from the commandline** and not in VS Code
- Pre-installed Global modules are different
 - be specific about the global modules required - **none**
 - prefer local modules (--save-dev) over global modules (-g)
 - removed all global package – except **npm** – no change
 - **serverless** now needs to be run using **npx**
- Other differences due to the platform – e.g. Ubuntu vs MacOS vs Windows
 - I have specified the **known working environment**
- Known warnings are harmless in one environment but are significant in another environment
 - **eliminate the warnings**
 - have attempted to do this before but ended up with breaking changes
 - **NOT DONE YET – MAY INTRODUCE OTHER ISSUES**
- other config files in the project
 - **NOT INVESTIGATED YET**
- other config files in the host environment
 - **NOT INVESTIGATED YET**
- Other possibilities?

Step 4: Test your application

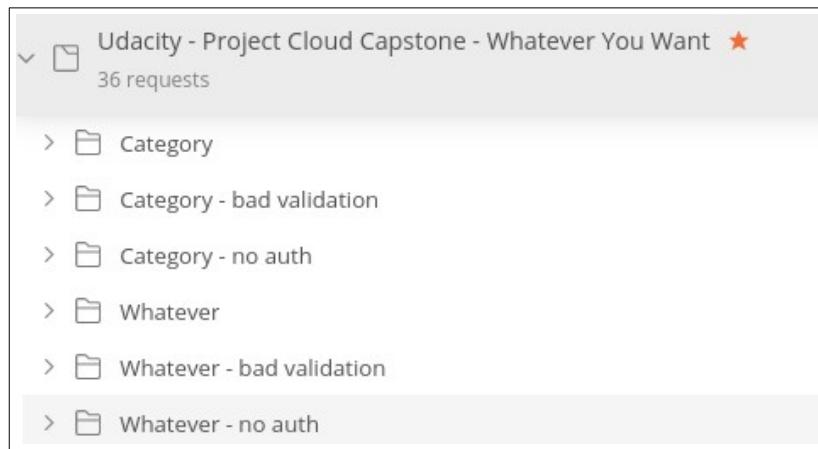
“Write unit tests and perform integration tests or user based testing.”

API Integration and Regression Testing using Postman

The Postman scripts are collected together in:

POSTMAN/Udacity - Project Cloud Capstone - Whatever You Want.postman_collection.json

The tests are split across positive testing, negative testing, and unauthorised testing:



The tests rely on initial configuration including the AWS API Id needed to connect to the API endpoints and an up-to-date authorisation token (as it has a limited time-to-live).

Other variables are declared that are dynamic and calculated – or extracted – as the tests progress in order.

Many of the tests rely on being executed in the correct order – for example, the category item created at the beginning is used in a number of tests including update and delete.

Quite often, random appropriate data is used in a request body to provide variety and further test the API.

Cloud Capstone Project - Whatever You Want – Serverless Application

EDIT COLLECTION

Name
Udacity - Project Cloud Capstone - Whatever You Want

Description Authorization Pre-request Scripts Tests **Variables** ●

These variables are specific to this collection and its requests. [Learn more about collection variables.](#)

	VARIABLE	INITIAL VALUE i	CURRENT VALUE i	...	Persist All	Reset All
<input checked="" type="checkbox"/>	apilid	wdjq4nvs6	wdjq4nvs6			
<input checked="" type="checkbox"/>	authToken	eyJhbGciOiJSUzI1NlslnR5c...	eyJhbGciOiJSUzI1NlslnR5cCl6IkpXVClsImtpZCI6Ik03OGRwVnEyWDI...			
<input checked="" type="checkbox"/>	randomDueDate		2021-08-24			
<input checked="" type="checkbox"/>	itemId		f75e32ca-e035-4968-bc63-d65392fd7986			
<input checked="" type="checkbox"/>	uploadAttachmentUrl		https://whatever-attachments-rebh-dev.s3.amazonaws.com/f75e3...			
<input checked="" type="checkbox"/>	getAttachmentUrl		https://whatever-attachments-rebh-dev.s3.amazonaws.com/f75e3...			
<input checked="" type="checkbox"/>	categoryId		66602485-6eea-4edb-8ce3-2c491c633739			
	Add a new variable					

Use the Postman Collection Runner to run all tests – obviously, the target serverless backend must be running first and the aforementioned variables configured.

Collection Runner

File Edit View Help

Collection Runner Run Results My Workspace Run in Command Line Docs

115 PASSED 0 FAILED just now

Udacity - Project Cloud Capstone - Whatever Y... No Environment

Run Summary Export Results Retry New

■ GET Get all whatever by category - no auth https://{{(apilid)}}.execute-... / Whatever - no auth / Get all wha...	401 Unauthorized	343 ms	736 B
■ Status code is 401			
■ message 'Unauthorized' is returned			
■ Response time is less than 5000ms			
■ GET Get whatever - no auth https://{{(apilid)}}.execute-... / Whatever - no auth / Get whatev...	401 Unauthorized	266 ms	736 B
■ Status code is 401			
■ message 'Unauthorized' is returned			
■ Response time is less than 5000ms			
■ PATCH Update whatever - no auth https://{{(apilid)}}.execute-... / Whatever - no auth / Update wh...	401 Unauthorized	95 ms	736 B
■ Status code is 401			
■ message 'Unauthorized' is returned			
■ Response time is less than 5000ms			
■ POST Get attachment upload URL - no auth https://{{(apilid)}}.execute-... / Whatever - no auth / Get attach...	401 Unauthorized	95 ms	736 B
■ Status code is 401			
■ message 'Unauthorized' is returned			
■ Response time is less than 5000ms			
■ DELETE Delete whatever - no auth https://{{(apilid)}}.execute-... / Whatever - no auth / Delete wha...	401 Unauthorized	94 ms	736 B
■ Status code is 401			

Console 1 WARNING

Cloud Capstone Project - Whatever You Want – Serverless Application

Frontend – User-based Testing

Currently there is no automated frontend testing, so the following pages detail a comprehensive set of User Interface testing – it also acts as a User Guide.

The pre-requisite is that the Node / React server utils are providing the UI webserver.

```
rebh@WEAPON-X:client$ npm start
> typescript-app@0.1.0 start
> react-scripts start

Starting the development server...

Compiled successfully!

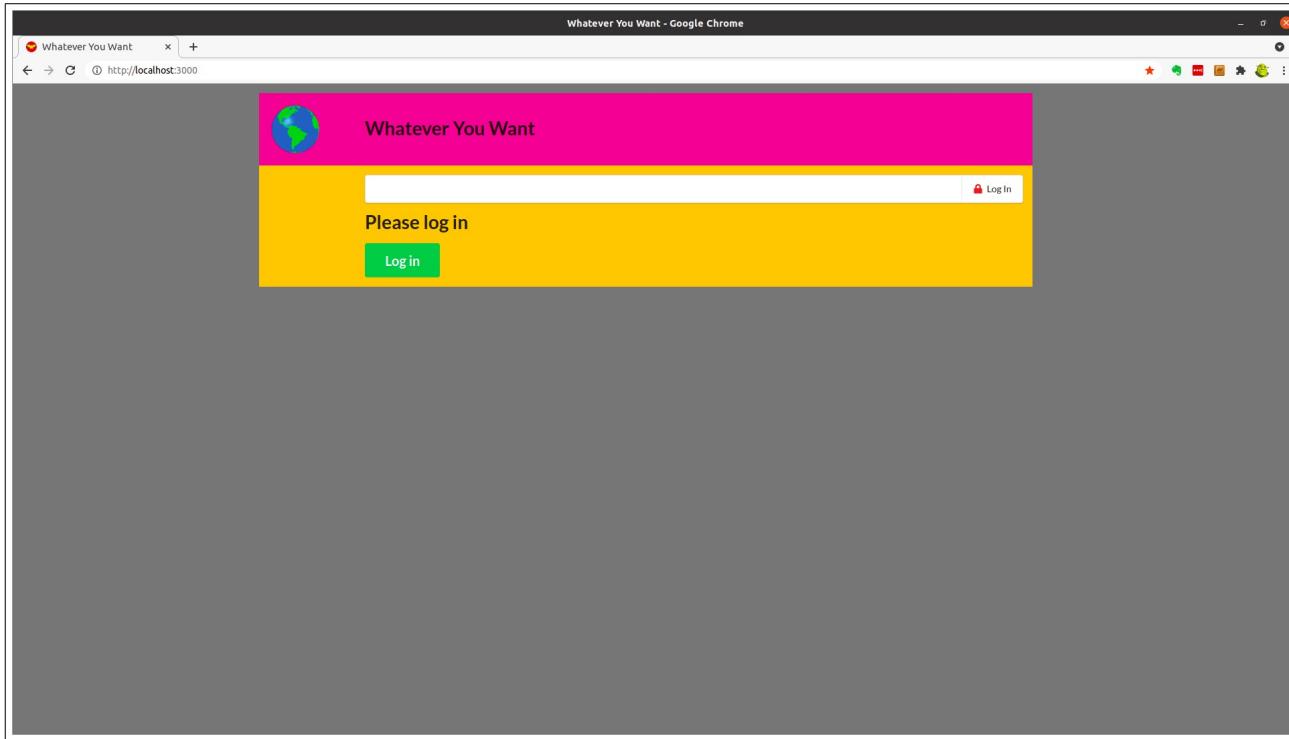
You can now view typescript-app in the browser.

  Local:          http://localhost:3000
  On Your Network: http://192.168.1.89:3000

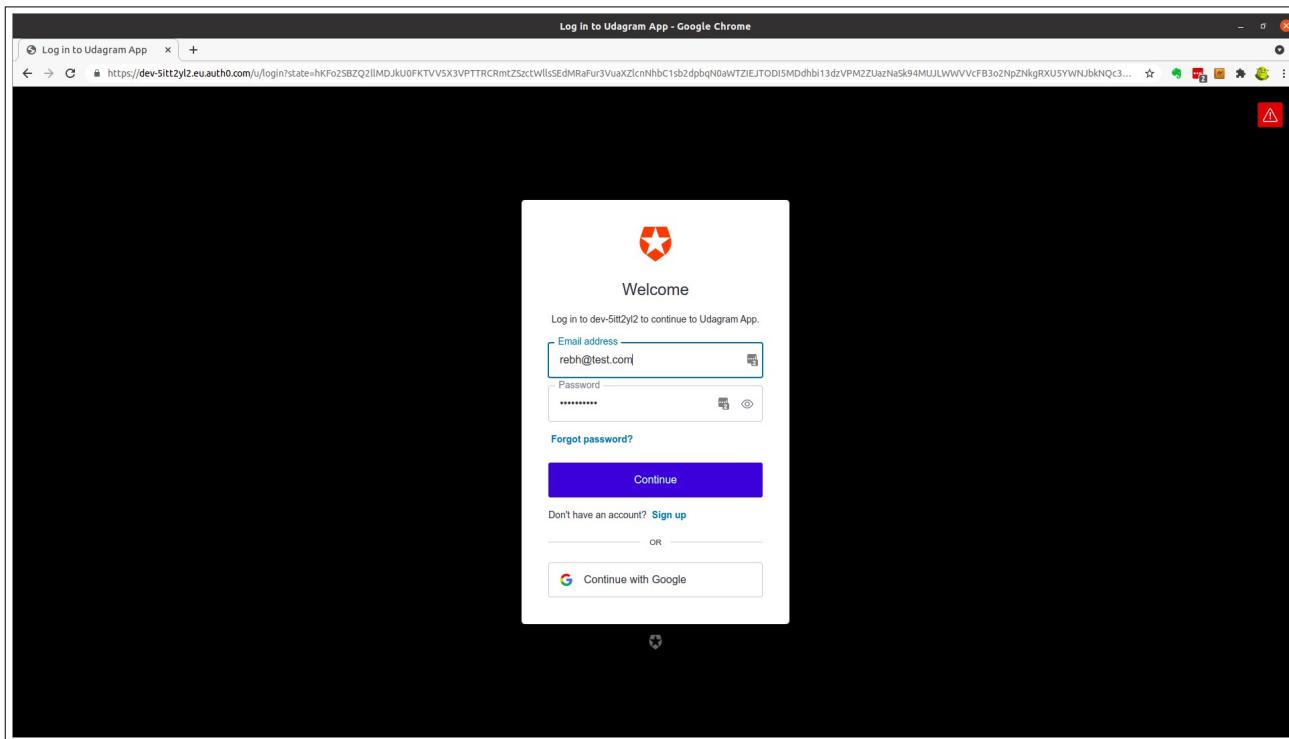
Note that the development build is not optimized.
To create a production build, use npm run build.
```

Cloud Capstone Project - Whatever You Want – Serverless Application

Connect to webserver - <http://localhost:3000/>

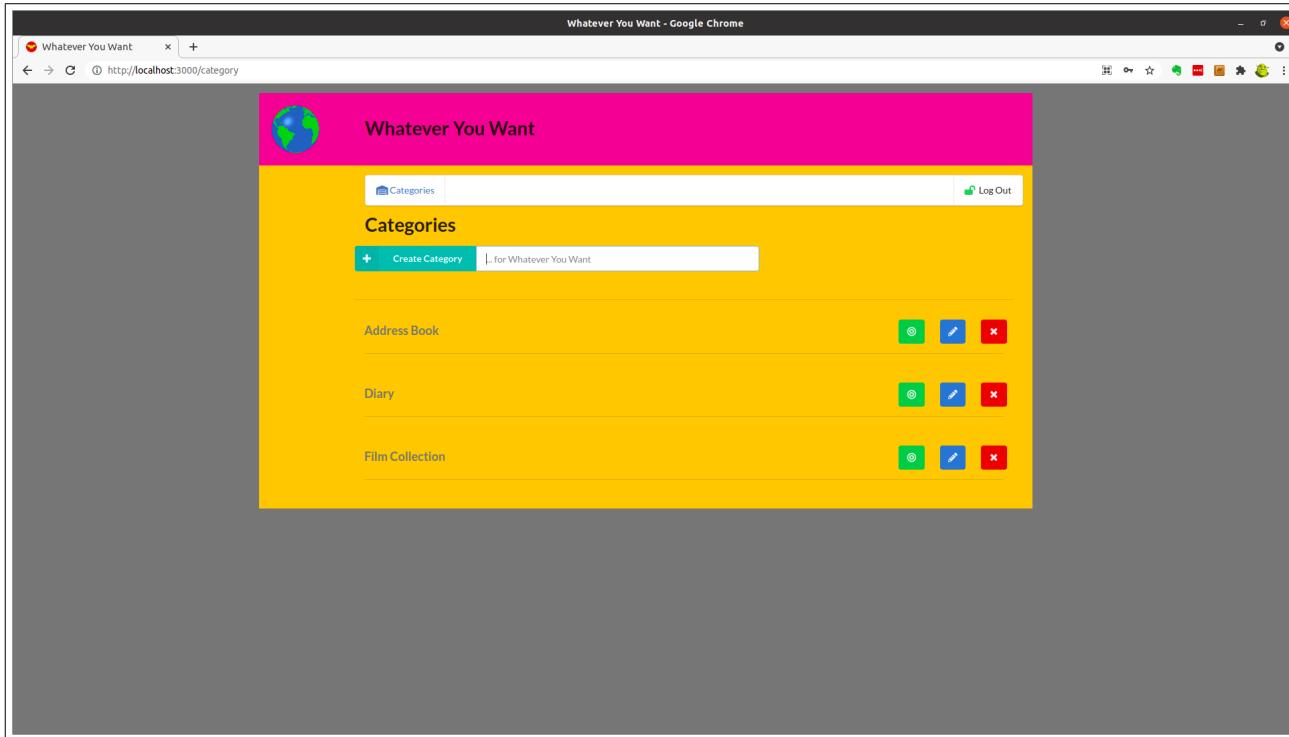


Auth0 Login

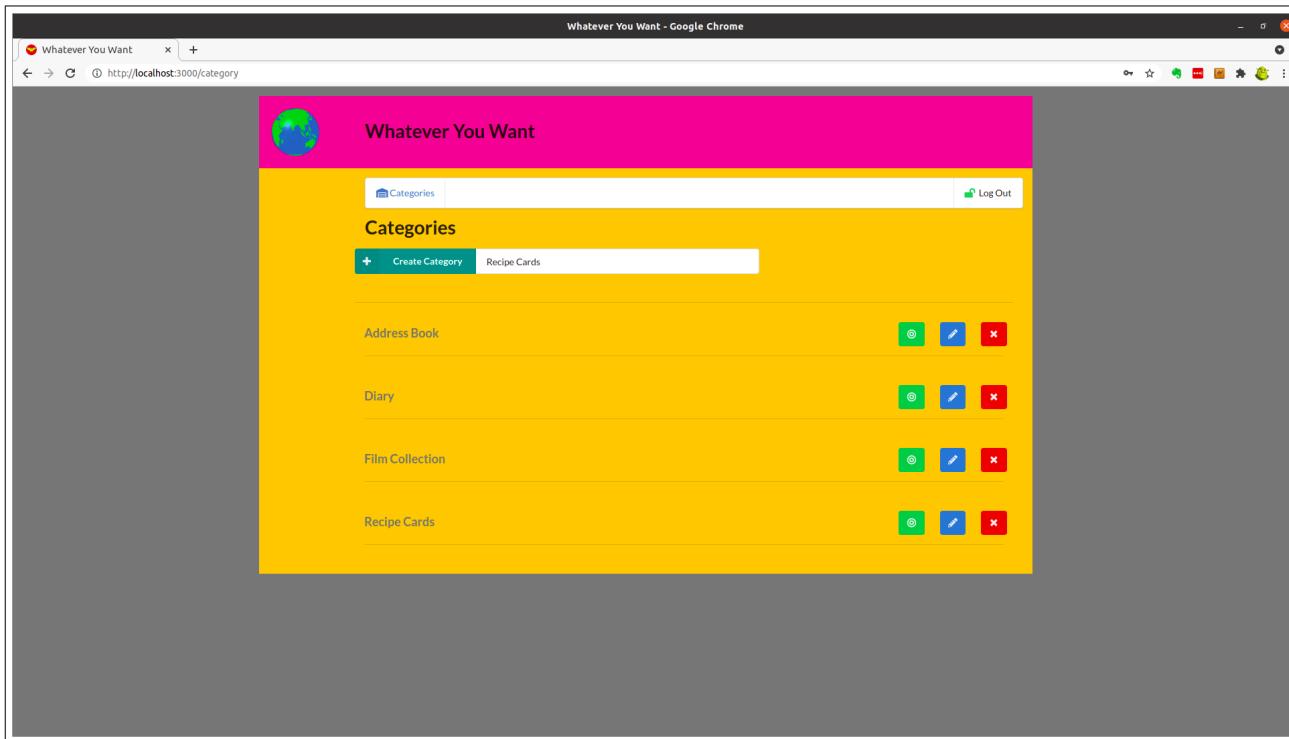


Cloud Capstone Project - Whatever You Want – Serverless Application

Categories Page



Create New Category – Recipe Cards



Cloud Capstone Project - Whatever You Want – Serverless Application

Edit New Category – Recipe Cards

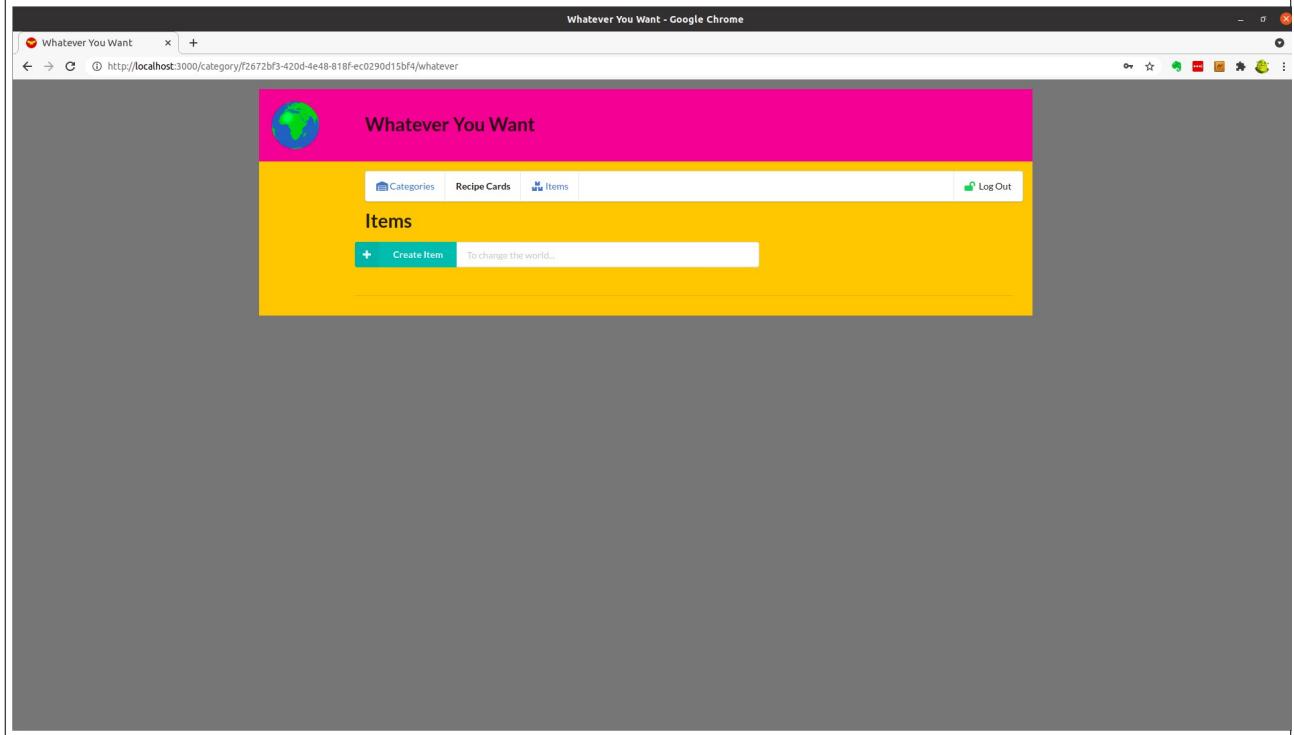
The screenshot shows a web browser window titled "Whatever You Want - Google Chrome". The URL is <http://localhost:3000/category/f2672bf3-420d-4e48-818f-ec0290d15bf4/edit>. The page has a pink header with a globe icon and the text "Whatever You Want". Below the header is a navigation bar with tabs: "Categories", "Recipe Cards" (which is selected), and "Items". There is also a "Log Out" button. The main content area is yellow and titled "Edit Category". It contains a "Name" input field with "Recipe Cards" typed in. Below the input fields are two sections: "JSON Schema" and "UI Schema", both containing JSON definitions. At the bottom is a "Save" button.

Populate New Category – Recipe Cards

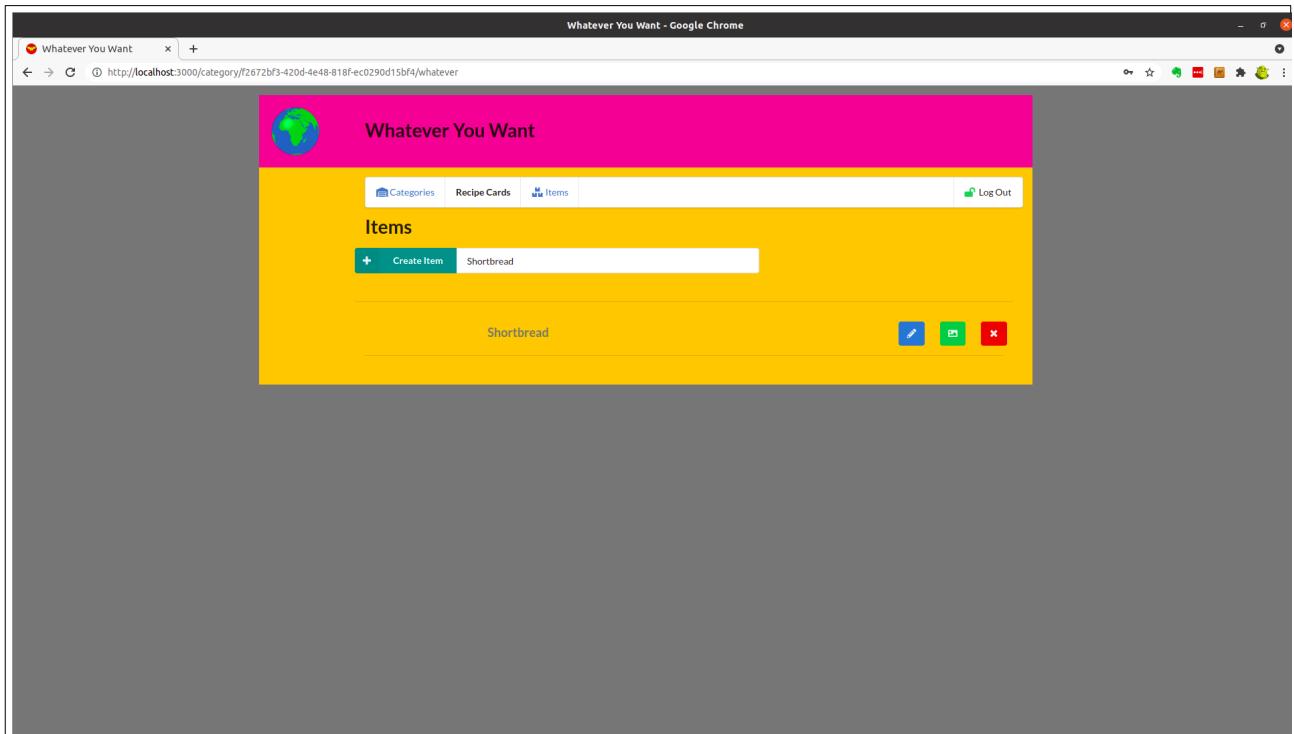
This screenshot shows the same "Edit Category" page as the previous one, but with more detailed JSON definitions in the "JSON Schema" and "UI Schema" sections. The "JSON Schema" section now includes a title for the category and properties for "recipeName" and "countryOfOrigin". The "UI Schema" section includes a placeholder for "recipeName" and a dropdown for "countryOfOrigin". The rest of the page remains the same, with the "Name" input field set to "Recipe Cards" and a "Save" button at the bottom.

Cloud Capstone Project - Whatever You Want – Serverless Application

Save New Category – Recipe Cards

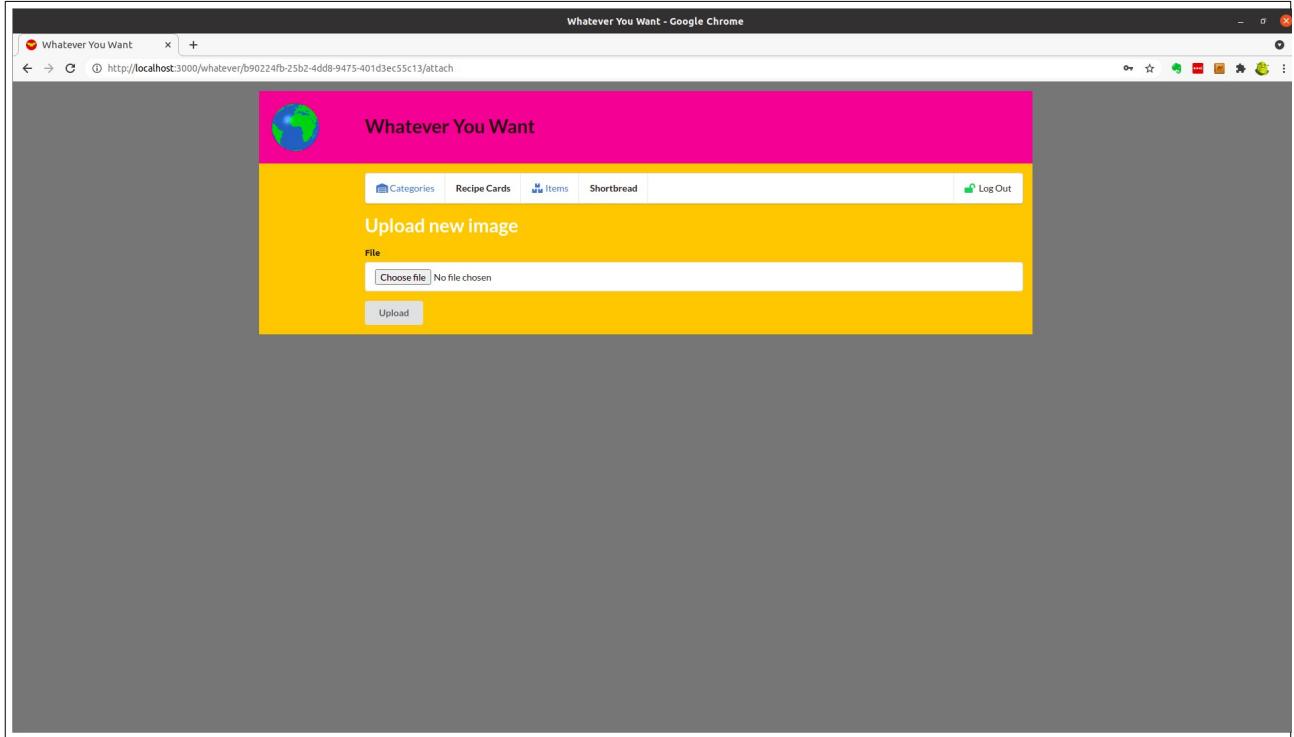


Create New Item – Recipe Cards - Shortbread

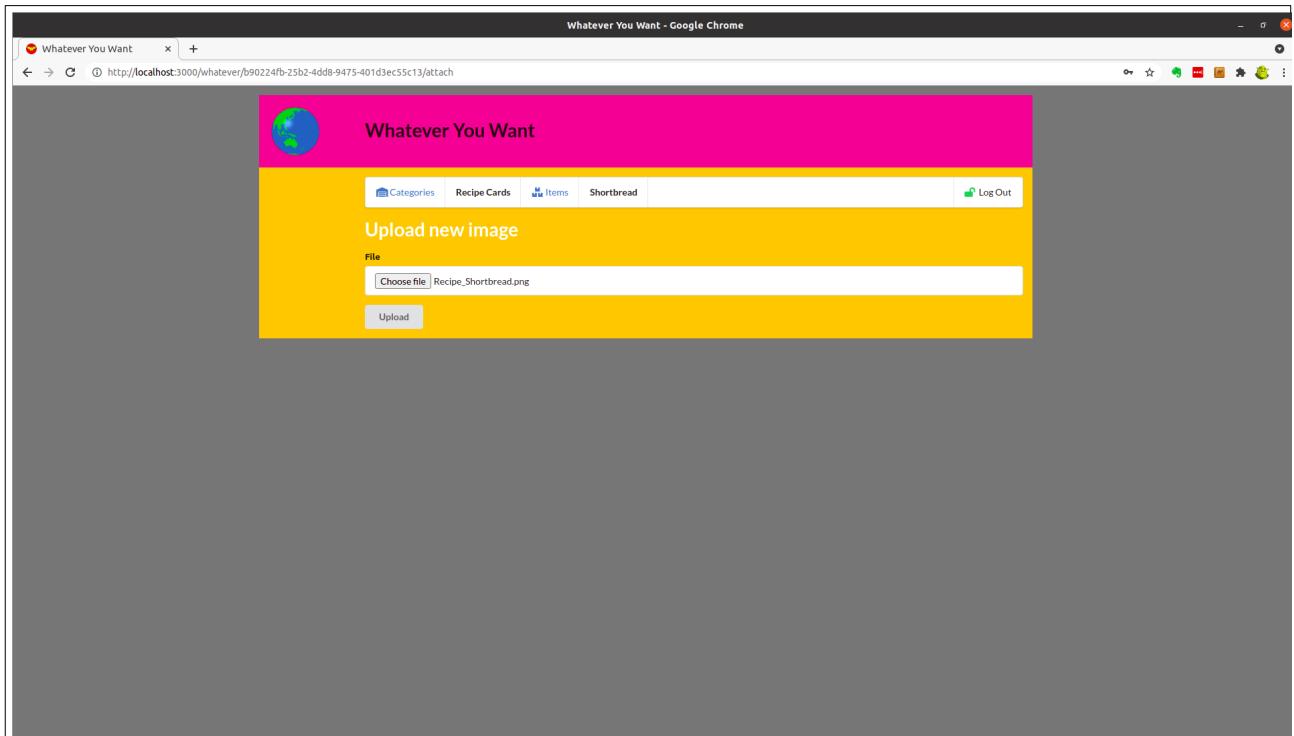


Cloud Capstone Project - Whatever You Want – Serverless Application

Add Image to New Item – Recipe Cards - Shortbread

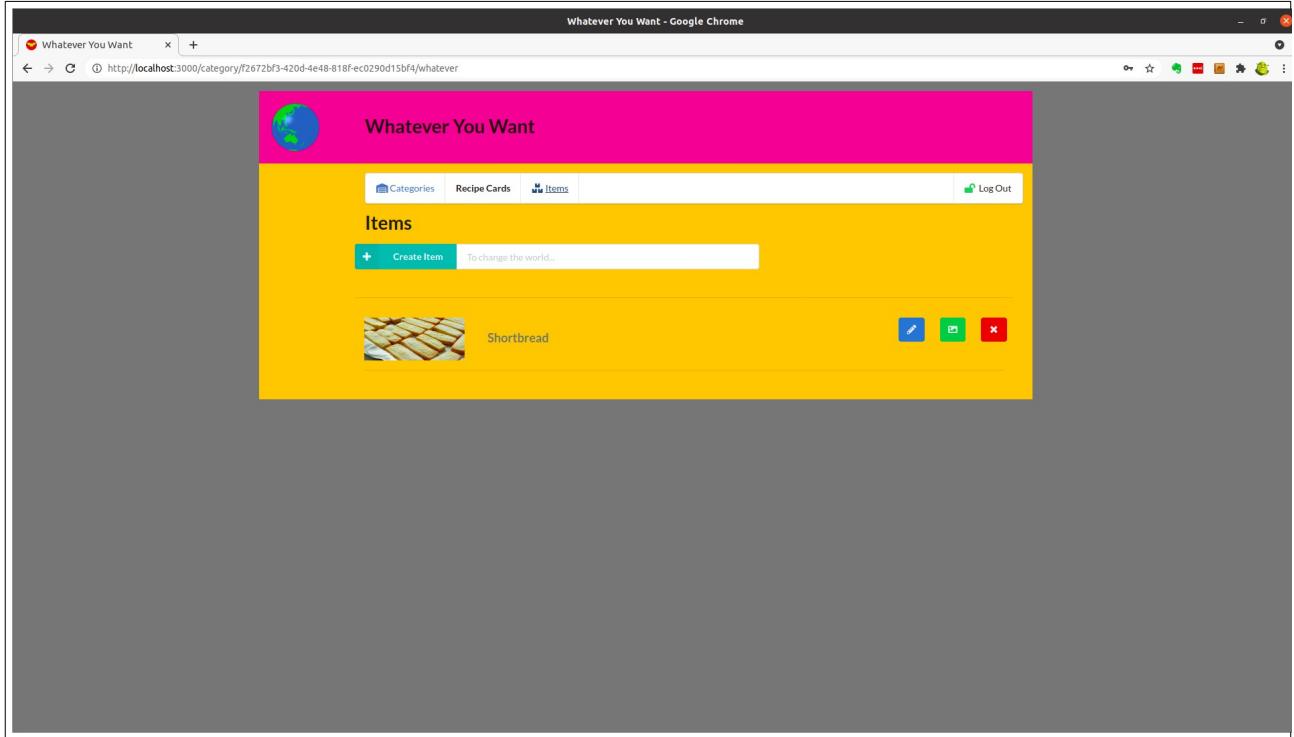


Choose and Upload Image forn New Item – Recipe Cards - Shortbread

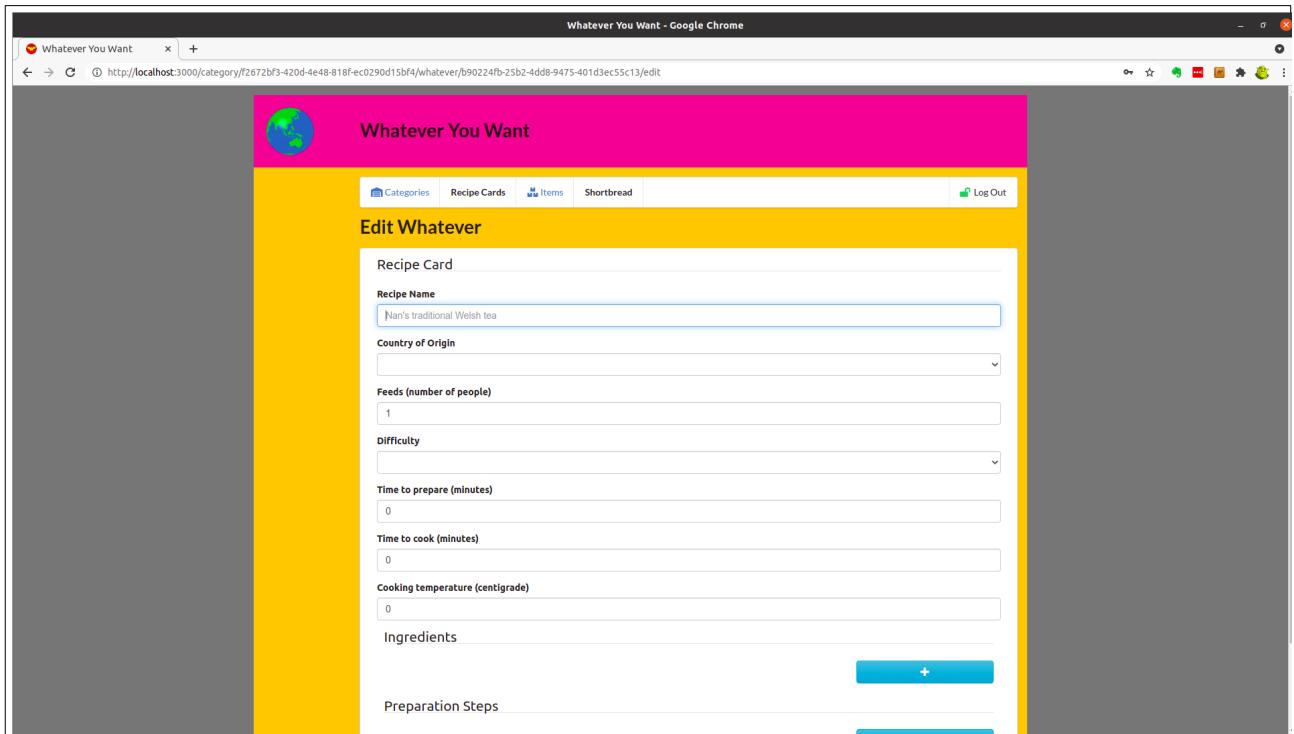


Cloud Capstone Project - Whatever You Want – Serverless Application

Create New Item – Recipe Cards - Shortbread



Edit New Whatever Item – Recipe Cards - Shortbread



Cloud Capstone Project - Whatever You Want – Serverless Application

Populate New Whatever Item – Recipe Cards – Shortbread (1)

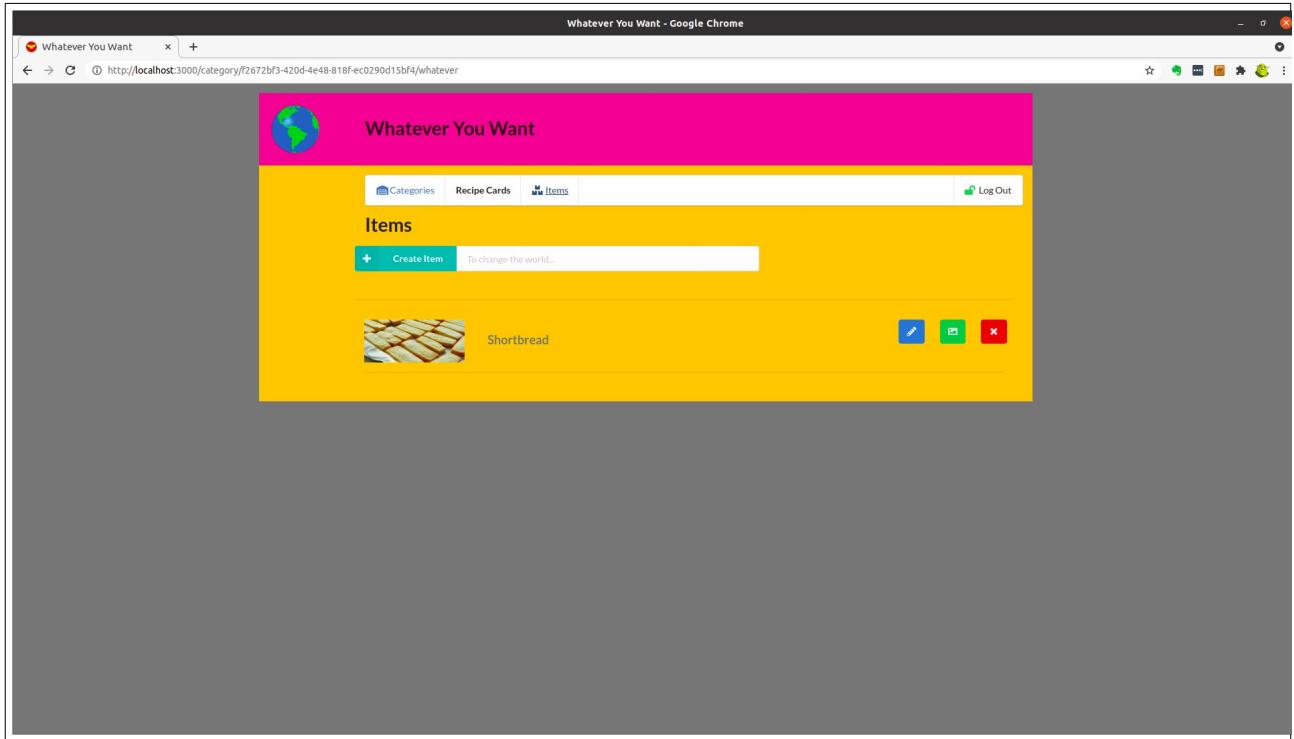
The screenshot shows a web browser window titled "Whatever You Want - Google Chrome". The URL is <http://localhost:3000/category/f2672bf3-420d-4e48-818f-ec0290d15bf4/whatever/b90224fb-25b2-4dd8-9475-401d3ec55c13/edit>. The page has a pink header with a globe icon and the text "Whatever You Want". Below the header is a navigation bar with links for "Categories", "Recipe Cards", "Items", and "Shortbread". A "Log Out" button is also present. The main content area is titled "Edit Whatever" and contains a "Recipe Card" form. The "Recipe Name" field is populated with "Shortbread". The "Country of Origin" dropdown is set to "Scottish". The "Feeds (number of people)" input field contains "10". The "Difficulty" dropdown is set to "Medium". The "Time to prepare (minutes)" input field contains "30". The "Time to cook (minutes)" input field contains "30". The "Cooking temperature (centigrade)" input field contains "190". Below the form is a section titled "Ingredients" containing three items: "125g / 4oz unsalted butter, softened", "55g / 2oz caster sugar, plus extra to finish", and "180g / 6oz plain flour". Each ingredient has up and down arrow buttons and a red delete button.

Populate New Whatever Item – Recipe Cards – Shortbread (2)

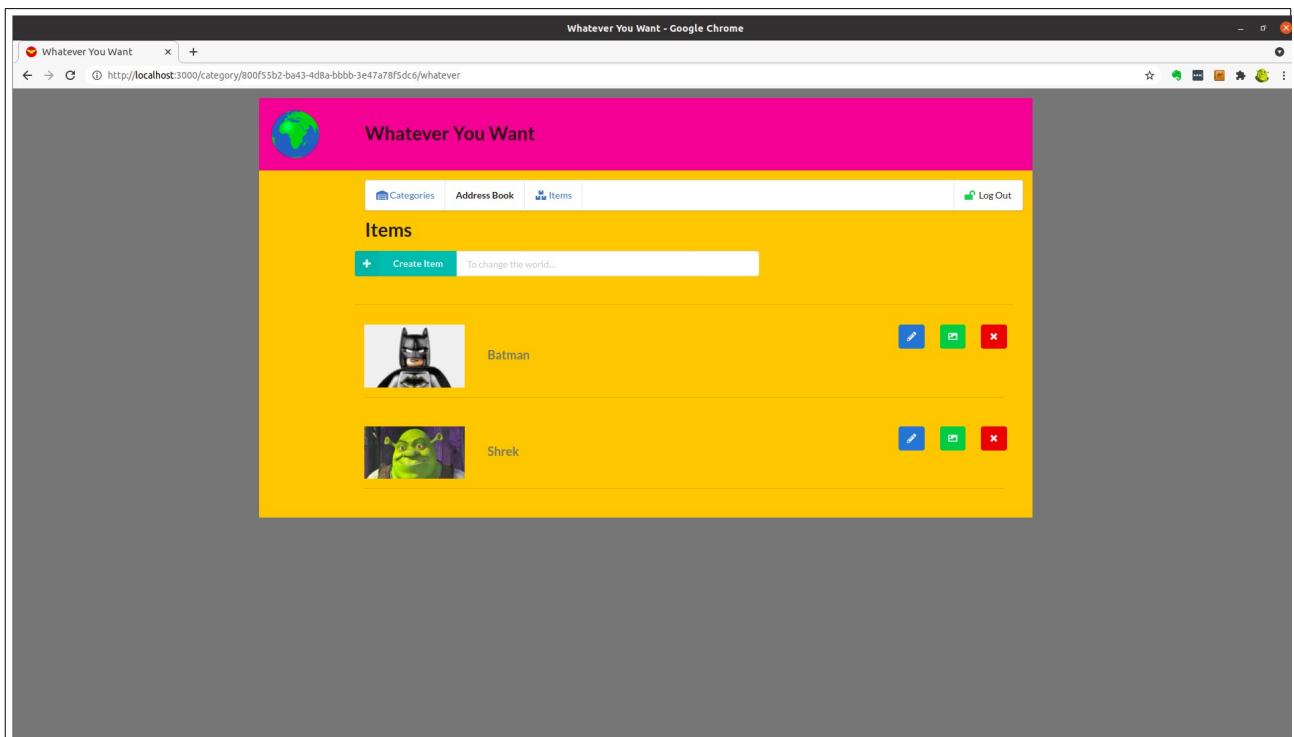
The screenshot shows the same web browser window as the previous one, but now with additional content. The "Cooking temperature (centigrade)" field now contains "190". The "Ingredients" section now includes "180g / 6oz plain flour". The "Preparation Steps" section contains eight steps: "Preheat the oven to 190C / 170C Fan / Gas 5.", "Beat the butter and the sugar together until smooth.", "Stir in the flour to get a smooth paste.", "Turn out to a work surface and gently roll out until the paste is 1cm / ½in thick.", "Cut into rounds or fingers and place onto a baking tray.", "Sprinkle with caster sugar and chill in the fridge for 20 minutes.", "Bake in the oven for 15-20 minutes, or until pale golden-brown.", and "Set aside to cool on a wire rack.". Each step has up and down arrow buttons and a red delete button. A blue "+" button is located at the bottom right of the preparation steps section. At the very bottom of the page is a blue "Submit" button.

Cloud Capstone Project - Whatever You Want – Serverless Application

Submit New Whatever Item – Recipe Cards – Shortbread



Return to Categories and Select Existing Category – Address Book



Cloud Capstone Project - Whatever You Want – Serverless Application

Select Existing Item - Address Book – Batman

The screenshot shows a web browser window titled "Whatever You Want - Google Chrome". The URL is <http://localhost:3000/category/800f55b2-ba43-4d8a-bbbb-3e47a78f5dc6/whatever/69af0961-1ca0-4e6a-9909-2829e0d54941/edit>. The page has a pink header with the title "Whatever You Want" and a globe icon. Below the header is a navigation bar with tabs: "Categories", "Address Book" (which is selected), "Items", and "Batman". There is also a "Log Out" button. The main content area is titled "Edit Whatever" and contains a form for an "Address Book Entry". The form fields are as follows:

First name*	Bruce
Middle name(s)	Batman
Last name*	Wayne
Address line 1	Secret Cave
Address line 2	Under Wayne Mansion
Town	Gotham
County	DC Universe
Post Code	BATCAVE 001
Telephone	Red Bat Phone

Scroll to the bottom of Existing Item - Address Book – Batman

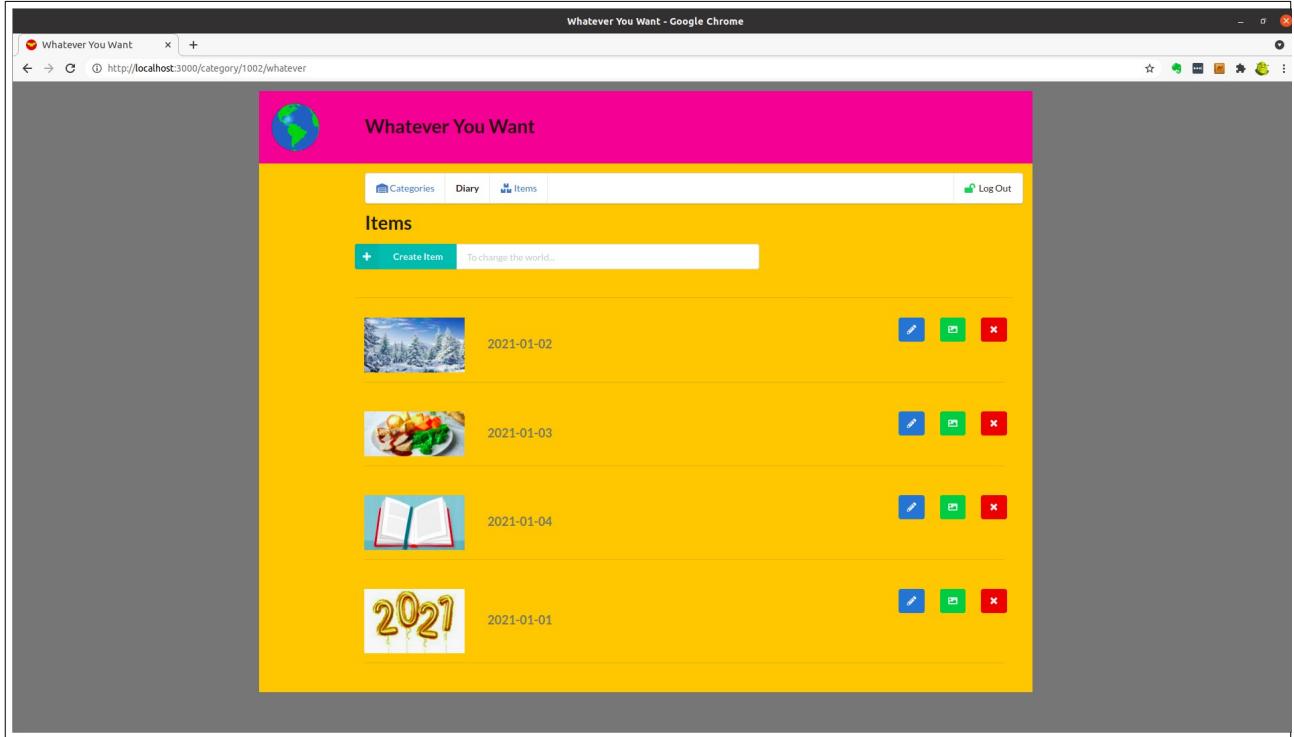
This screenshot is identical to the one above, showing the "Edit Whatever" page for Batman. However, it includes a scroll bar on the right side of the content area, indicating that the page has been scrolled down to view more content. At the bottom of the page, there is an "Additional Information" section containing the following text:

Butler: Alfred Pennyworth
Ward: Dick Grayson
Sidekick: Robin

At the very bottom of the page is a blue "Submit" button.

Cloud Capstone Project - Whatever You Want – Serverless Application

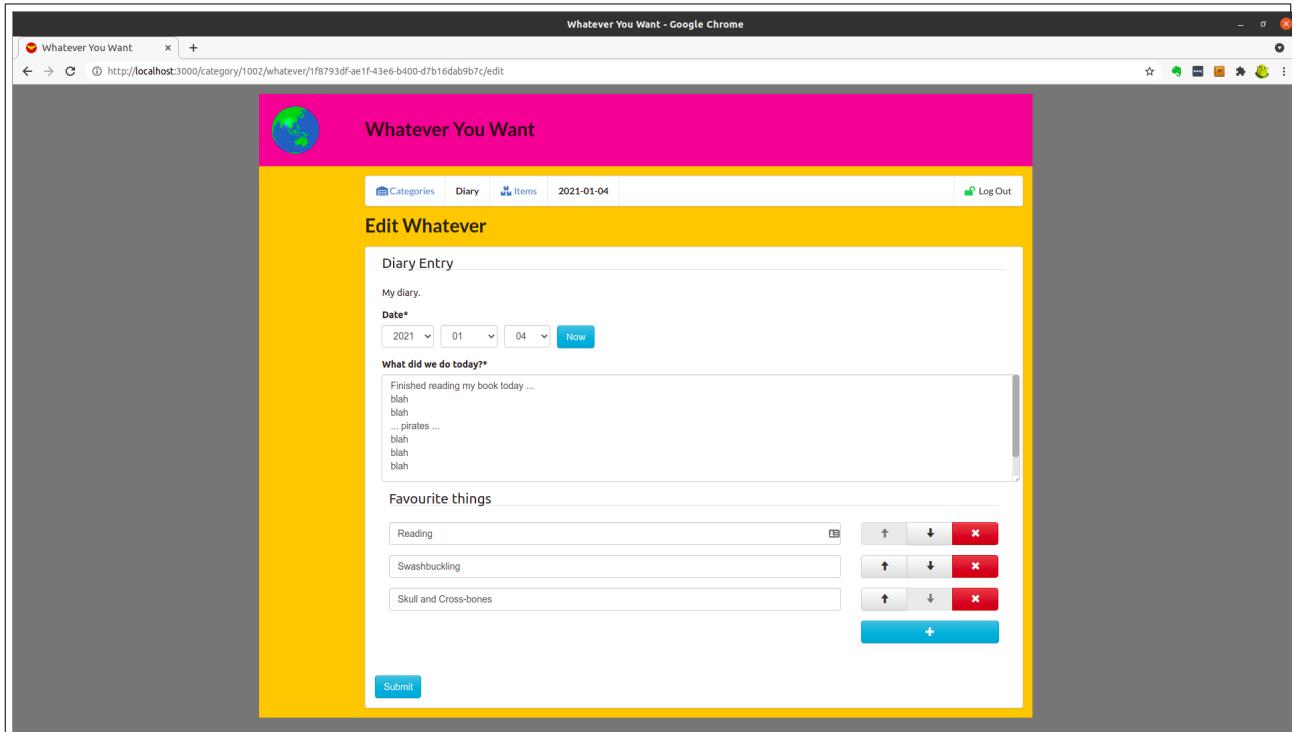
Return to Categories and Select Existing Category – Diary



The screenshot shows a web browser window titled "Whatever You Want - Google Chrome". The URL is <http://localhost:3000/category/1002/whatever>. The page has a pink header with the title "Whatever You Want" and a globe icon. Below the header is a navigation bar with "Categories", "Diary" (which is highlighted in blue), and "Items". On the right is a "Log Out" button. The main content area is yellow and titled "Items". It features a search bar with the placeholder "To change the world...". Below the search bar are four diary entries, each with a small thumbnail image, the date, and edit/delete buttons:

- 2021-01-02 (Thumbnail: snowy landscape)
- 2021-01-03 (Thumbnail: food)
- 2021-01-04 (Thumbnail: open book)
- 2021-01-01 (Thumbnail: 2021)

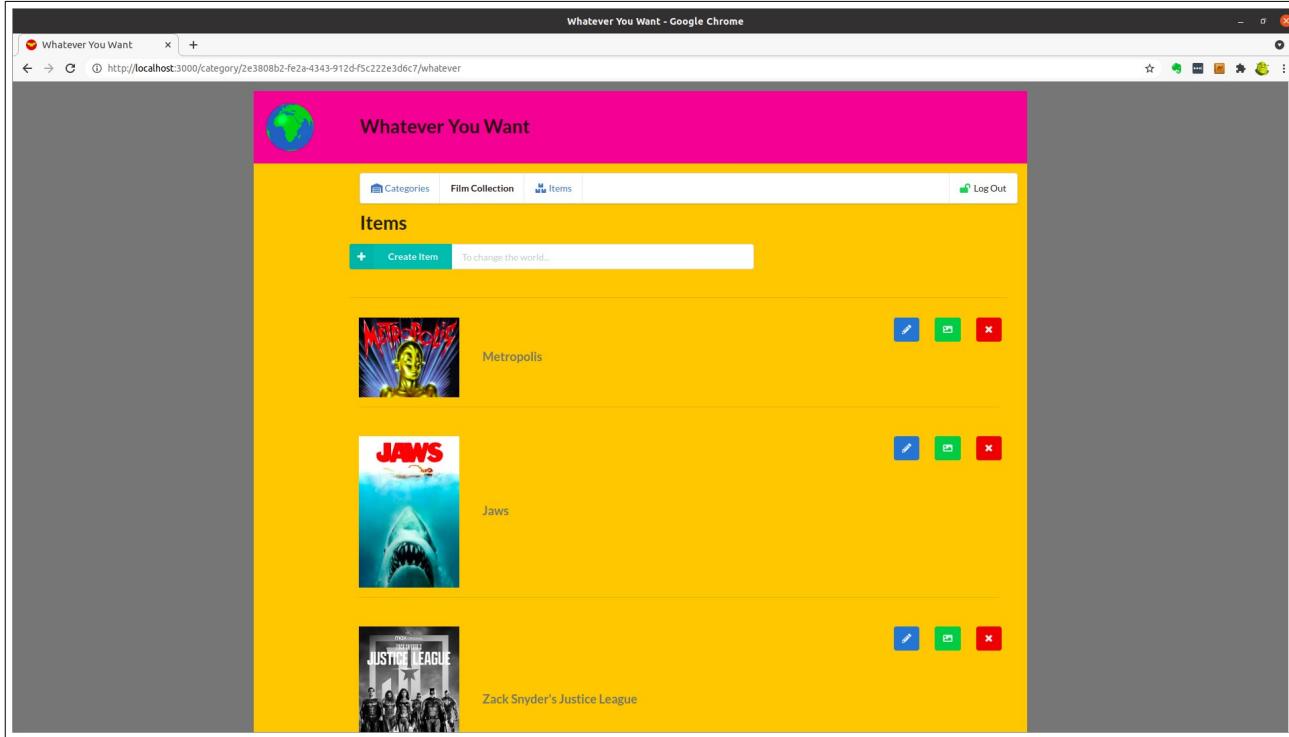
Select Existing Item – Diary - 2021-01-04



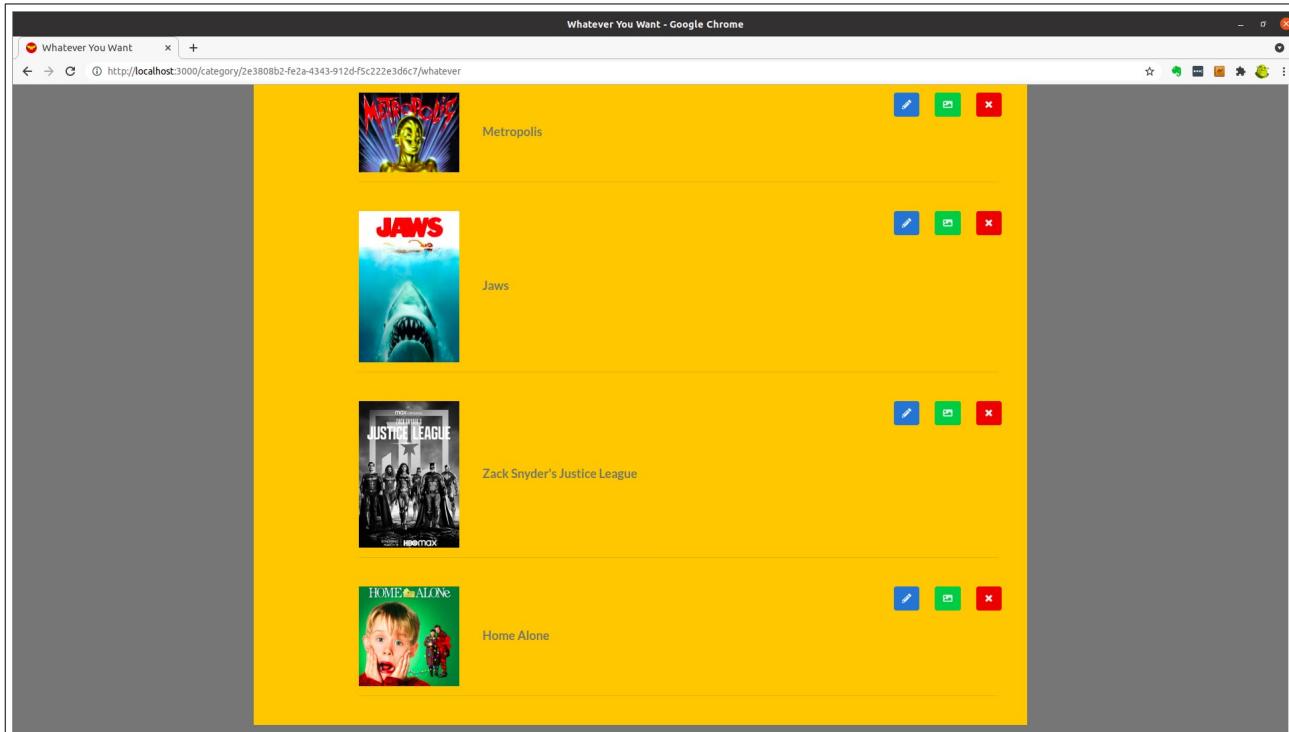
The screenshot shows a web browser window titled "Whatever You Want - Google Chrome". The URL is <http://localhost:3000/category/1002/whatever/1f8793df-ae1f-43e6-b400-d7b16dab9b7c/edit>. The page has a pink header with the title "Whatever You Want" and a globe icon. Below the header is a navigation bar with "Categories", "Diary" (which is highlighted in blue), and "Items". The main content area is yellow and titled "Edit Whatever". It shows a "Diary Entry" section with the date set to "2021-01-04". Below that is a text area labeled "What did we do today?" containing the text "Finished reading my book today ... blah blah ... pirates ... blah blah blah". There is also a "Favourite things" section with three items: "Reading", "Swashbuckling", and "Skull and Cross-bones". Each item has an up/down arrow and a delete button. At the bottom is a "Submit" button.

Cloud Capstone Project - Whatever You Want – Serverless Application

Return to Categories and Select Existing Category – Film Collection



Scroll to the Bottom of the Category – Film Collection



Cloud Capstone Project - Whatever You Want – Serverless Application

Select Existing Item – FilmCollection - Zack Snyder's Justice League

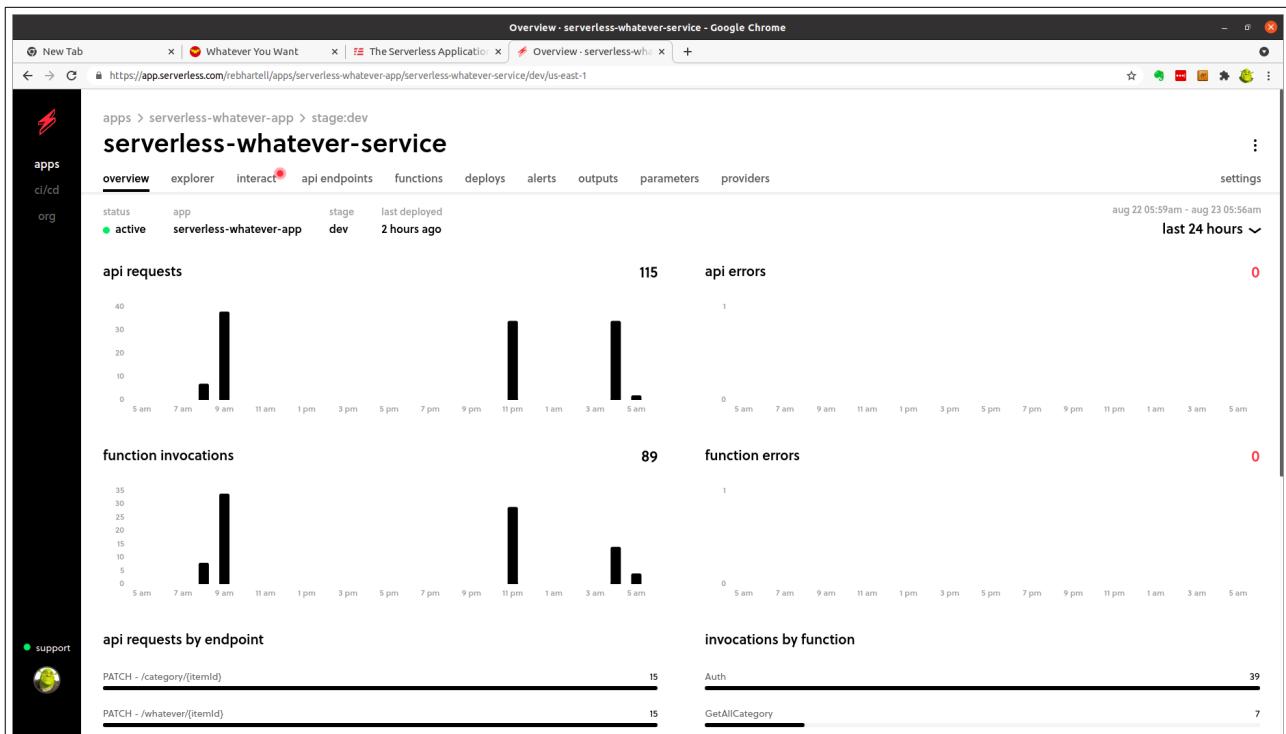
The screenshot shows a web browser window titled "Whatever You Want - Google Chrome". The URL is <http://localhost:3000/category/2e3808b2-fe2a-4343-912d-f5c222e3d6c7/whatever/4eebd645-d82e-4ace-b2f8-65a3d9b4376c/edit>. The page has a pink header with a globe icon and the text "Whatever You Want". A navigation bar at the top includes "Categories", "Film Collection", "Items", "Zack Snyder's Justice League", and "Log Out". The main content area is titled "Edit Whatever" and contains a "Film" section. It shows the "Title" as "Jack Snyder's Justice League", "Format" as "DVD", and "Genre" as "Action", "Adventure", and "Fantasy". There are up/down arrows and a delete button next to each genre entry. Below the genres is a "Storyline" text area containing the following text: "Determined to ensure Superman's ultimate sacrifice was not in vain, Bruce Wayne aligns forces with Diana Prince with plans to recruit a team of metahumans to protect the world from an approaching threat of catastrophic proportions." At the bottom is a blue "Submit" button.

Cloud Capstone Project - Whatever You Want – Serverless Application

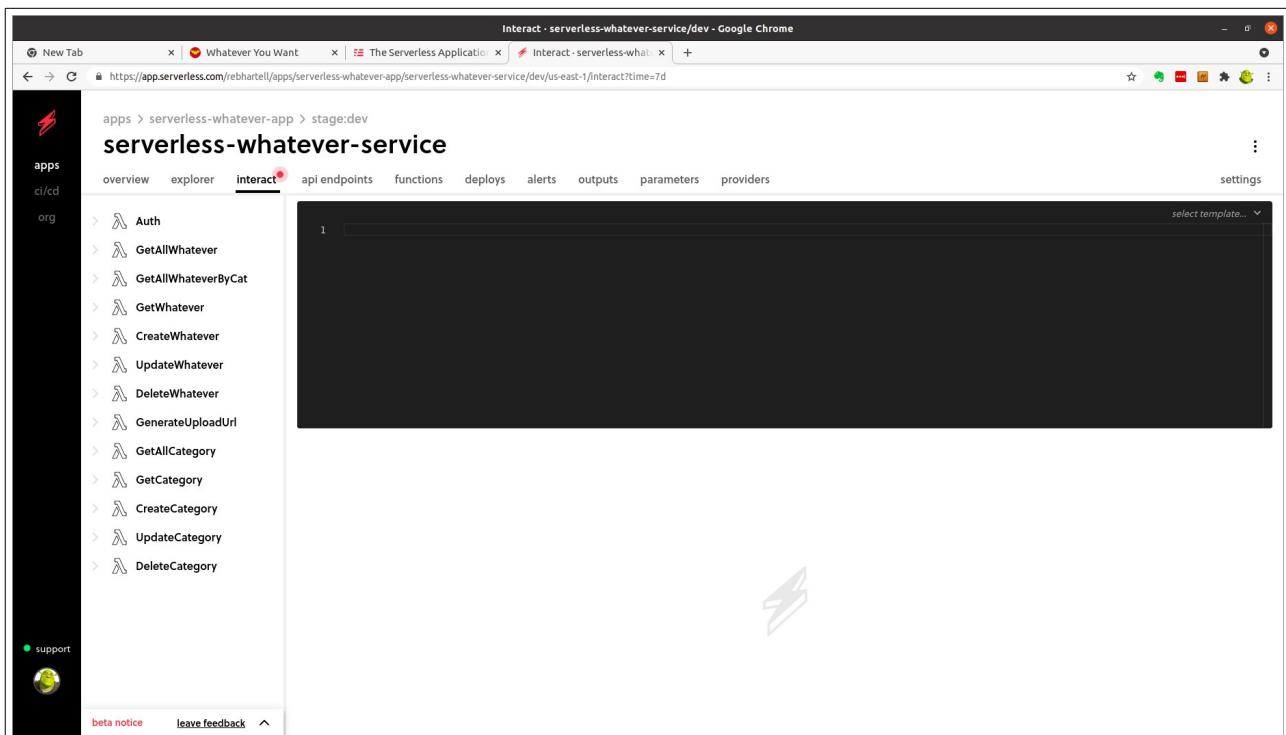
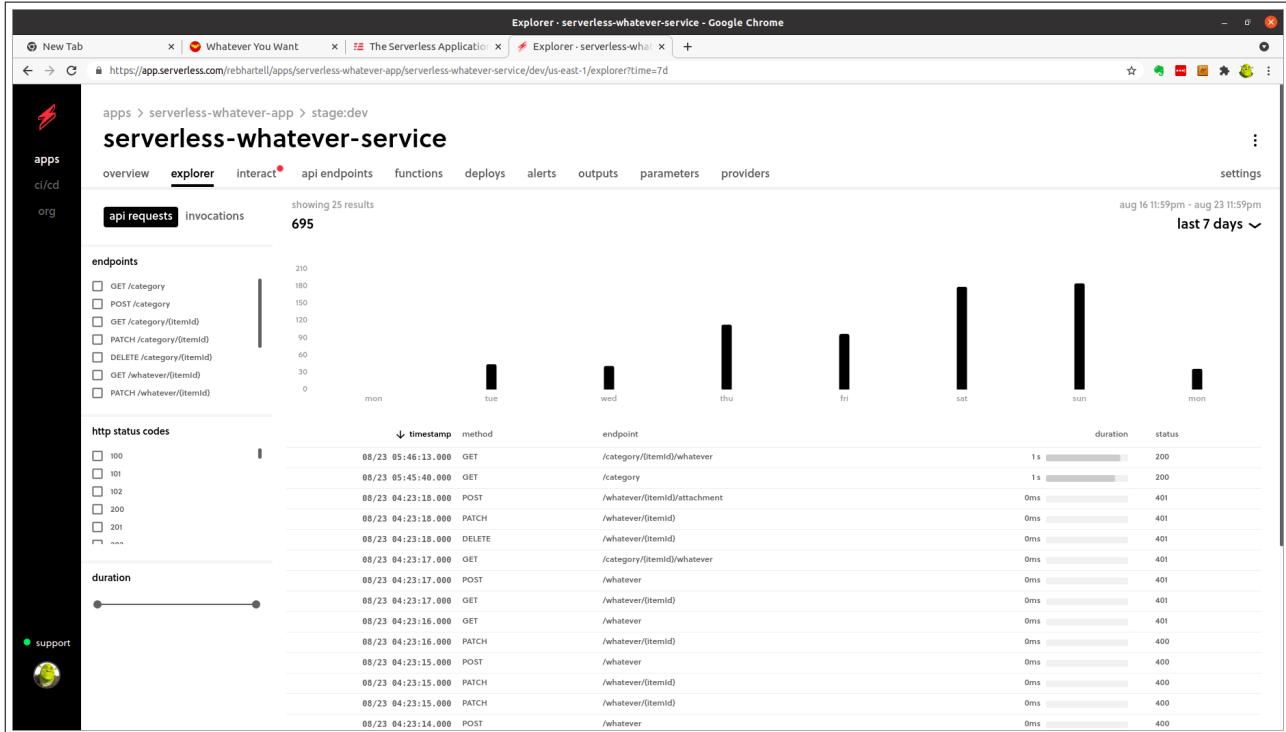
Deployed Services

Serverless.com Dashboard

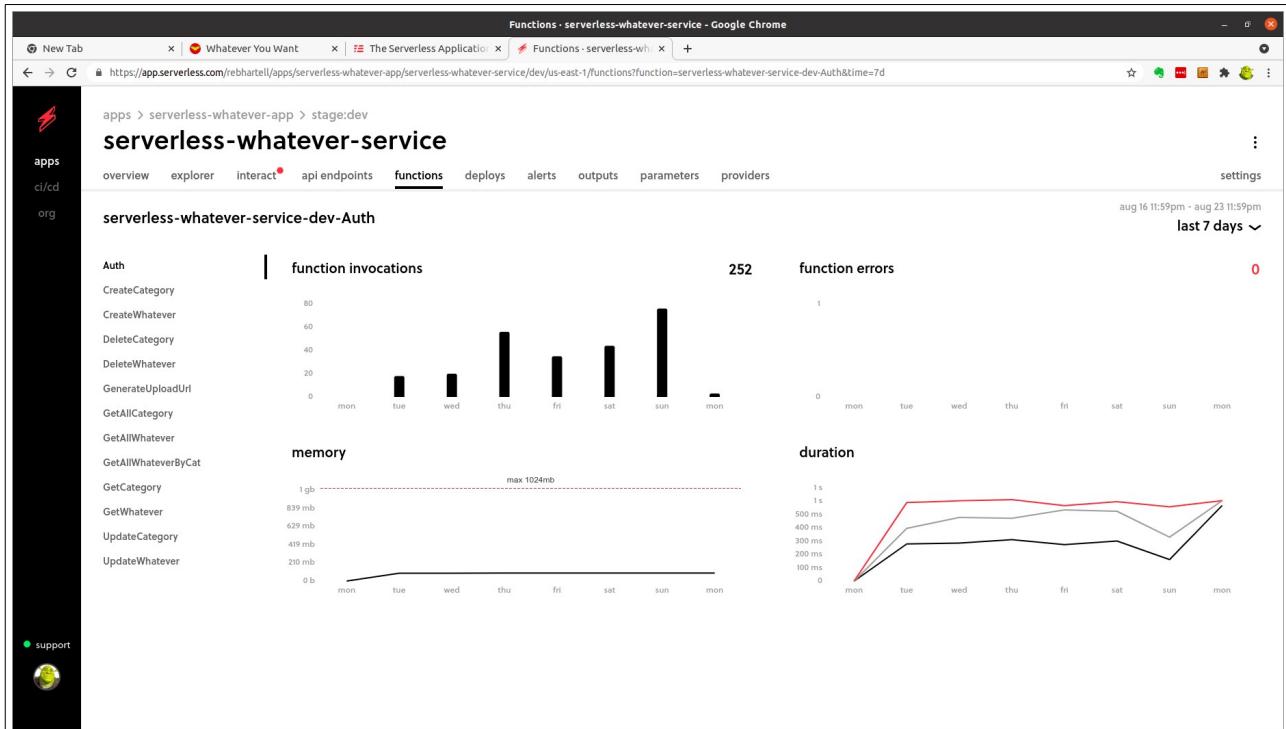
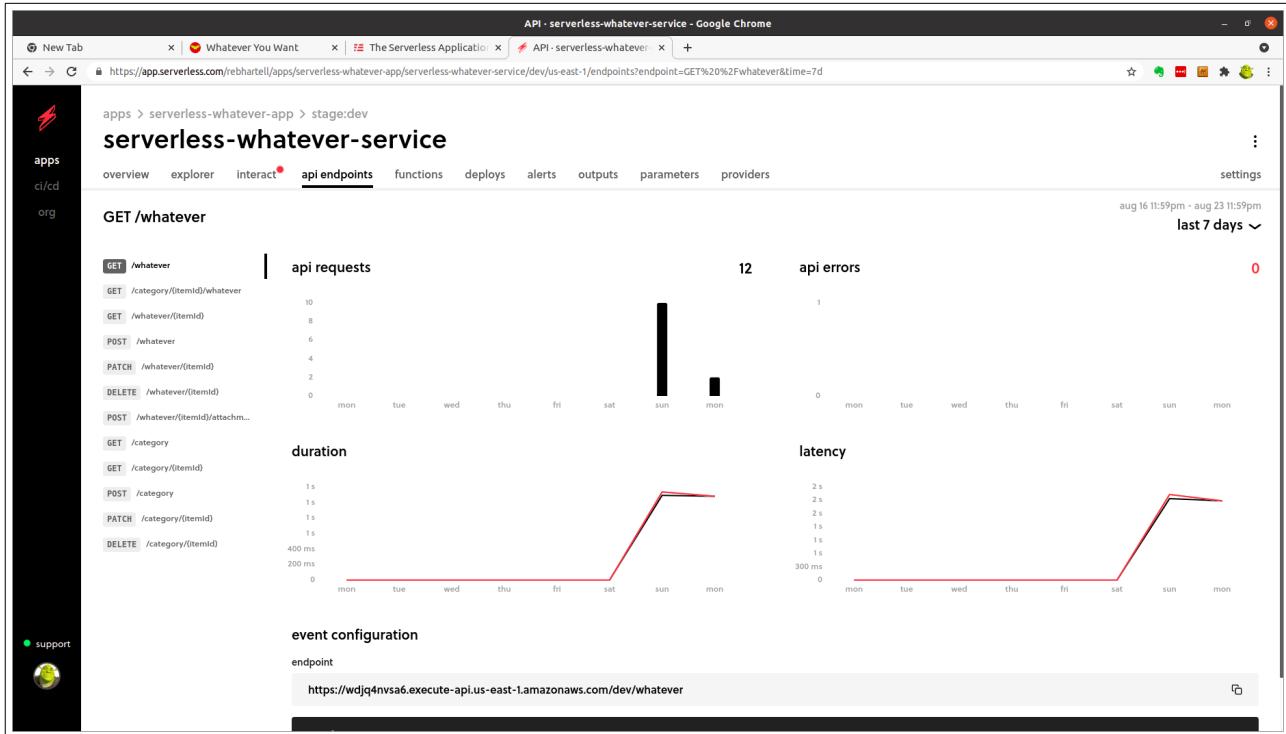
The screenshot shows the Serverless.com dashboard interface. At the top, there's a navigation bar with tabs for 'New Tab', 'Whatever You Want', 'The Serverless Application', and 'Apps'. Below the navigation is a search bar and a red 'create app' button. The main content area has a sidebar on the left with icons for 'apps', 'ci/cd', 'org', and 'support'. The main panel displays a hierarchical tree structure under 'apps': 'serverless-whatever-app' > 'serverless-whatever-service' > 'dev' (us-east-1). A status message at the bottom right indicates 'deployed 2 hours ago by rebhartell'.



Cloud Capstone Project - Whatever You Want – Serverless Application



Cloud Capstone Project - Whatever You Want – Serverless Application



Cloud Capstone Project - Whatever You Want – Serverless Application

The screenshot shows the 'Deployments' section of the serverless-whatever-service application. It lists several successful deployments:

- 2 hours ago, aug 23 03:59am: by reb.hartell@gmail.com, RJSF working with Bootstrap and jQ...
- 1 day ago, aug 22 04:55am: by reb.hartell@gmail.com, RJSF working with Bootstrap and jQ...
- 1 day ago, aug 22 04:55am: by reb.hartell@gmail.com, RJSF working with Bootstrap and jQ...
- 7 days ago, aug 16 10:00am: by reb.hartell@gmail.com, Category management works
- 7 days ago, aug 16 09:46am: by reb.hartell@gmail.com, Category management works
- 7 days ago, aug 16 08:56am: by reb.hartell@gmail.com, Category management works
- 1 week ago, aug 16 02:39am: by reb.hartell@gmail.com, Category management works
- 1 week ago, aug 16 02:31am: by rebhartell, Category management works

Git metadata details:

- author: reb.hartell@gmail.com
- message: RJSF working with Bootstrap and jQuery
- commit: 31f971c
- branch: development

Outputs: no configured outputs

serverless config diff:

serverless.yml	CHANGED
10	- serverless-iam-roles-per-function
11	- serverless-jetpack
12	- serverless-prune-plugin
13	- serverless-plugin-tracing
14	+ serverless-plugin-tracing

The screenshot shows the 'Providers' section of the serverless-whatever-service application. It displays the configuration for the AWS provider:

- AWS Amazon Web Services Access Role ARN: arn:aws:siam::016523083343:role/SFRole-hBNyriREp
- Inherited from default provider

Cloud Capstone Project - Whatever You Want – Serverless Application

AWS CloudFormation

AWS IAM

IAM Management Console - Google Chrome

New Tab | Whatever You Want | IAM Management Console

https://console.aws.amazon.com/iamv2/home#/home

Services ▾

Identity and Access Management (IAM)

Dashboard

Access management

User groups

Users

Roles

Policies

Identity providers

Account settings

Access reports

Access analyzer

Archive rules

Analyzers

Settings

Credential report

Organization activity

Service control policies (SCPs)

Search for services, features, marketplace products, and docs [Alt+S]

udagram-richard-dev @ 0165-2308-3343 ▾ Global ▾ Support ▾

IAM resources

User groups	Users	Roles	Policies	Identity providers
1	3	46	11	1

What's new

Updates for features in IAM

- IAM Access Analyzer adds new policy checks to help validate conditions during IAM policy authoring. 1 month ago
- AWS Amplify announces support for IAM permissions boundaries on Amplify-generated IAM roles. 2 months ago
- Introducing IAM Access Control for Apache Kafka on Amazon MSK. 4 months ago
- Review last accessed information to identify unused EC2, IAM, and Lambda permissions and tighten access for your IAM roles. 4 months ago
- AWS Identity and Access Management now makes it easier to relate a user's IAM role activity to their corporate identity. 4 months ago
- IAM Access Analyzer makes it easier to implement least privilege permissions by generating IAM policies based on access activity. 5 months ago
- Announcing support for IAM Condition Keys and CMK for custom models for Amazon Comprehend. 5 months ago
- Amazon API Gateway now provides IAM condition keys for governing endpoint, authorization, and logging configurations. 5 months ago
- IAM Access Analyzer now supports over 100 policy checks with actionable recommendations to help you author secure and functional policies. 5 months ago
- IAM Access Analyzer now enables you to validate public and cross-account access before deploying permissions changes. 6 months ago

[View all](#)

[less](#)

Quick Links

My security credentials

Manage your access keys, multi-factor authentication (MFA) and other credentials.

Tools

Policy simulator

The simulator evaluates the policies that you choose and determines the effective permissions for each of the actions that you specify.

Web identity federation playground

Authenticate yourself to any of the supported web identity providers, see the requests and responses, obtain a set of temporary security credentials, and make calls to the Amazon S3 API using the credentials.

Additional information

Best practices for Identity and Access Management

IAM documentation

Videos, IAM release history, and additional resources

Related services

 AWS Organizations

Centrally create and manage all your AWS accounts.

 AWS Single Sign-on (SSO)

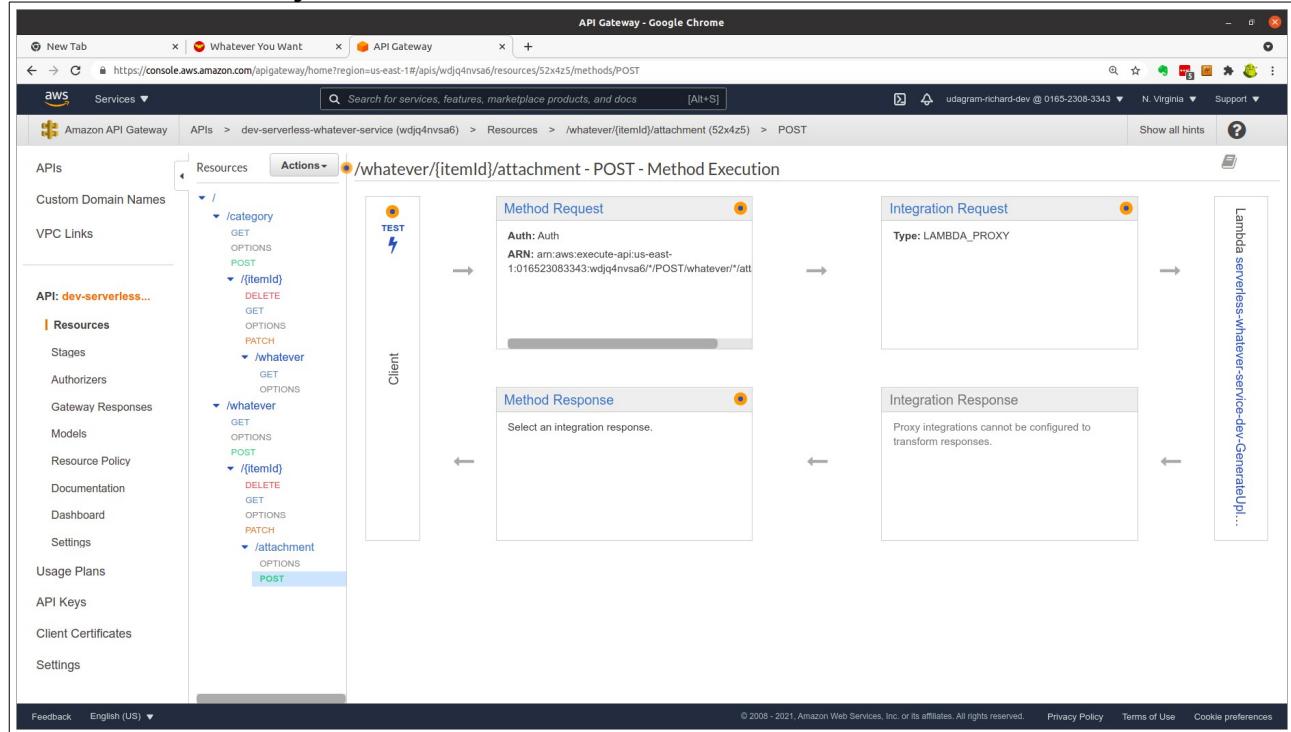
Feedback English (US) ▾

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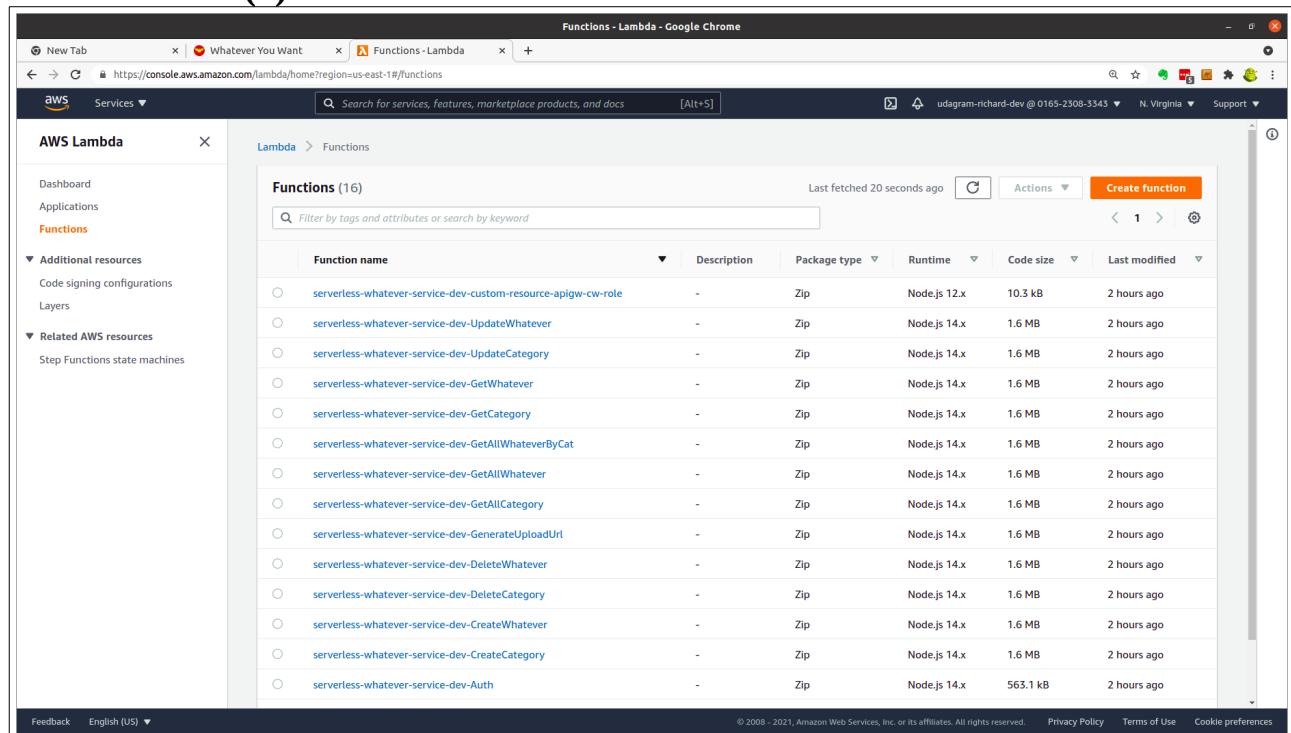
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Cloud Capstone Project - Whatever You Want – Serverless Application

AWS API Gateway



AWS Lambda (1)



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AWS Lambda (2)

The screenshot shows the AWS Lambda Function Overview page for the function 'serverless-whatever-service-dev-UpdateWhatever'. The function was last modified 2 hours ago. It has a Function ARN of arn:aws:lambda:us-east-1:016523083343:function:serverless-whatever-service-dev-UpdateWhatever and is part of the application 'serverless-whatever-service-dev'. The code source is displayed in a code editor window, showing the 'Test' tab selected. The code is as follows:

```
1 var serverlessSDK = require('./serverless_sdk/index.js');
2 serverlessSDK = new serverlessSDK({
3   provider: 'aws',
4   region: 'us-east-1',
5   applicationName: 'serverless-whatever-app',
6   appId: 'jTMy4dnj558239cv',
7   stageName: 'dev',
8   deploymentId: 'fd528fa-408b-4ec2d-9b08-83710d78337c',
9   service: 'serverless-whatever-service',
10   logLevel: 'info',
11   shouldCompressLogs: true,
12   disableAWSLogs: false,
13   disableCloudWatchMetrics: false,
14   stageName: 'dev',
15   serverlessPlatformStage: 'prod',
16   devModeEnabled: false,
```

AWS S3 – serverless application

The screenshot shows the AWS S3 Objects page for the bucket 'serverless-whatever-service'. There are 15 objects listed, all of which are zip files. The objects are:

Name	Type	Last modified	Size	Storage class
Auth.zip	zip	August 16, 2021, 08:55:53 (UTC+01:00)	563.1 KB	Standard
compiled-cloudformation-template.json	json	August 16, 2021, 08:55:51 (UTC+01:00)	70.2 KB	Standard
CreateCategory.zip	zip	August 16, 2021, 08:55:57 (UTC+01:00)	1.6 MB	Standard
CreateWhatever.zip	zip	August 16, 2021, 08:56:02 (UTC+01:00)	1.6 MB	Standard
custom-resources.zip	zip	August 16, 2021, 08:56:03 (UTC+01:00)	10.3 KB	Standard
DeleteCategory.zip	zip	August 16, 2021, 08:55:54 (UTC+01:00)	1.6 MB	Standard
DeleteWhatever.zip	zip	August 16, 2021, 08:56:00 (UTC+01:00)	1.6 MB	Standard
GenerateUploadUrl.zip	zip	August 16, 2021, 08:55:59 (UTC+01:00)	1.6 MB	Standard
GetAllCategory.zip	zip	August 16, 2021, 08:55:59 (UTC+01:00)	1.6 MB	Standard
GetAllWhatever.zip	zip	August 16, 2021, 08:55:52 (UTC+01:00)	1.6 MB	Standard
GetAllWhateverByCat.zip	zip	August 16, 2021, 08:55:53 (UTC+01:00)	1.6 MB	Standard
GetCategory.zip	zip	August 16, 2021, 08:55:57 (UTC+01:00)	1.6 MB	Standard
GetWhatever.zip	zip	August 16, 2021, 08:56:03 (UTC+01:00)	1.6 MB	Standard
UpdateCategory.zip	zip	August 16, 2021, 08:55:55 (UTC+01:00)	1.6 MB	Standard
UpdateWhatever.zip	zip	August 16, 2021, 08:56:02 (UTC+01:00)	1.6 MB	Standard

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AWS S3 - attachments

Name	Type	Last modified	Size	Storage class
106a73-fdcf-4d24-babe-2cdeb64f5361	-	August 16, 2021, 14:35:59 (UTC+01:00)	4.6 MB	Standard
106a83c2-814b-43fb-9621-146b2a872441	-	August 16, 2021, 13:54:26 (UTC+01:00)	544.0 KB	Standard
1f6793df-aef1-43e6-b404-d7b16dab9b7c	-	August 21, 2021, 22:57:00 (UTC+01:00)	65.0 KB	Standard
2025eaaa-e282-4ad1-8abe-c04e1b102993	-	August 16, 2021, 10:18:11 (UTC+01:00)	2.5 MB	Standard
27d6e2ba-2da3-4678-9f1e-13e801d6c3bd	-	August 21, 2021, 22:52:23 (UTC+01:00)	35.7 KB	Standard
4ebf4e61-49b5-42ba-bead-dfe01e4af43	-	August 21, 2021, 23:13:10 (UTC+01:00)	188.9 KB	Standard
4eebbd45-d92e-4aca-b2f8-65a53d9b4376c	-	August 21, 2021, 15:56:07 (UTC+01:00)	568.2 KB	Standard
549a365f-3dfe-4e5d-951a-1261015e5946	-	August 22, 2021, 05:52:00 (UTC+01:00)	0 B	Standard
553297e1-daa4-4ef4-bb85-7406f49fd761	-	August 16, 2021, 13:53:46 (UTC+01:00)	2.5 MB	Standard
56dc504f-1fa5-457a-8a20-1e50a5fdb4b8	-	August 22, 2021, 04:28:25 (UTC+01:00)	4.3 KB	Standard
69af0961-1ca0-4e6a-9909-2829ed5d4941	-	August 21, 2021, 21:28:04 (UTC+01:00)	43.2 KB	Standard
6e59917f-4076-47c6-8304-63496cdce726	-	August 22, 2021, 05:00:41 (UTC+01:00)	4.3 KB	Standard
75928145-2dd2-42bd-8082-61737fe04c85	-	August 20, 2021, 00:40:12 (UTC+01:00)	557.9 KB	Standard
7abd6ddd-c9a0-4b7a-8e51-0e251e70e329	-	August 21, 2021, 23:12:58 (UTC+01:00)	466.1 KB	Standard

AWS DynamoDB – Category table

userid	itemid	createdAt	jsonSchema
auth0 60e094fd6c07e100687db898	0ad72ce0-3254-4700-8fd1-4d7057dc7ddd	2021-08-22T04:02:10.834Z	<empty>
auth0 60e094fd6c07e100687db898	1002	2019-07-27T20:01:45.424Z	{"title": "Diary Entry", "description": "My diary.", "type": "object", "required": [...]}
auth0 60e094fd6c07e100687db898	1e256cc0-dcd0-47f4-b52e-7cd563ccd6ff	2021-08-22T08:04:57.155Z	<empty>
auth0 60e094fd6c07e100687db898	2e3808b2-fe2a-4343-912d-f5c222e3d6c7	2021-08-21T14:13:55.977Z	{"title": "Film", "type": "object", "properties": {"title": {"type": "string", "title": ...}}
auth0 60e094fd6c07e100687db898	66602485-6eea-4edb-8ce3-2c491c633739	2021-08-22T22:59:33.479Z	<empty>
auth0 60e094fd6c07e100687db898	800f55b2-ba43-4d8a-bbbb-3e47a78f5dc6	2021-08-21T13:45:47.245Z	{"title": "Address Book Entry", "description": "My contacts.", "type": "object", "...}
auth0 60e094fd6c07e100687db898	942f5b18-370a-4a6e-ab0e-e742c382f8f4	2021-08-23T03:22:59.174Z	<empty>
auth0 60e094fd6c07e100687db898	b0cee5c0-179d-40cd-bba6-c940e1365860	2021-08-22T04:51:46.173Z	<empty>
auth0 60e094fd6c07e100687db898	d750bd55-6e7b-466a-bbbc-26dce046ae97	2021-08-22T03:32:03.640Z	<empty>
auth0 60e094fd6c07e100687db898	f2672bf3-420d-4e48-818f-ec0290d15bf4	2021-08-21T17:47:50.058Z	{"title": "Recipe Card", "type": "object", "properties": {"recipeName": {"type": ...}}

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AWS DynamoDB – Whatever table

DynamoDB - AWS Console - Google Chrome

Whatever You Want | DynamoDB - AWS Console | New Tab

https://console.aws.amazon.com/dynamodb/home?region=us-east-1#tableselected=whatever-table-dev;tab=items

Search for services, features, marketplace products, and docs [Alt+S]

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Create table Services ▾

whatever-table-dev Close

Overview Items Metrics Alarms Capacity Indexes Global Tables Backups Contributor Insights Triggers Access control Tags

Create item Actions ▾

Scanning [Table] whatever-table-dev: userId, itemId ▾ Viewing 1 to 26 items

Scan [Table] whatever-table-dev: userId, itemId ▾ Add filter Start search

userId	itemId	attachmentUrl	categoryId
auth0 j0Ue094fd6c07e100687db898	4eebd64b-d8e-4aca-b2fb-b5a3d9b43\bc	https://whatever-attachments-rebh-dev.s3.amazonaws.com/4eebd64b-d8e...ze3808b2-fe2a-4343-912d-f5c222e3...	
auth0 60e094fd6c07e100687db898	553297e1-daa4-404f-b885-7406f49fd761	https://whatever-attachments-rebh-dev.s3.amazonaws.com/553297e1-daa...1003	
auth0 60e094fd6c07e100687db898	56dc504f-1fa5-457a-sa20-1e50a5fd4b8	https://whatever-attachments-rebh-dev.s3.amazonaws.com/56dc504f-1fa5...5	
auth0 60e094fd6c07e100687db898	69a0f961-1ca0-4e6a-9909-2829e0d54941	https://whatever-attachments-rebh-dev.s3.amazonaws.com/69a0f961-1ca0...800f55b2-ba43-4d8a-bbbb-3e47a785...	
auth0 60e094fd6c07e100687db898	6e599171-4076-47c6-8304-63496cdce726	https://whatever-attachments-rebh-dev.s3.amazonaws.com/6e599171-4076...ze3808b2-fe2a-4343-912d-f5c222e3...	
auth0 60e094fd6c07e100687db898	7ab0d6dd9-c9a0-4b7a-8e51-0e251e70e329	https://whatever-attachments-rebh-dev.s3.amazonaws.com/7ab0d6dd9-c9a...ze3808b2-fe2a-4343-912d-f5c222e3...	
auth0 60e094fd6c07e100687db898	a41505d5-e82e-44df-9729-a6b46311d5a2	https://whatever-attachments-rebh-dev.s3.amazonaws.com/a41505d5-e82...1002	
auth0 60e094fd6c07e100687db898	ac548d1-cabb-4833-bd6c-3a53-505eb0	https://whatever-attachments-rebh-dev.s3.amazonaws.com/ac548d1-cabb...2e3808b2-fe2a-4343-912d-f5c222e3...	
auth0 60e094fd6c07e100687db898	b90224fb-25b2-4dd8-9475-401d3ec55c13	https://whatever-attachments-rebh-dev.s3.amazonaws.com/b90224fb-25b2...f2672bf3-420d-4e48-81bf-ec209d15...	
auth0 60e094fd6c07e100687db898	c4b423d8-596e-4b21-bdbc-482e143cb17d	null	69e96829-c04e-40b4-8b3c-3422da3e...
auth0 60e094fd6c07e100687db898	da950131-1680-49c9-9786-48cb3fe3ea64	https://whatever-attachments-rebh-dev.s3.amazonaws.com/da950131-168...	
auth0 60e094fd6c07e100687db898	e37694a9-c93c-49b6-9706-ebcab680a44e	https://whatever-attachments-rebh-dev.s3.amazonaws.com/e37694a9-c93...	1002

AWS CloudWatch

CloudWatch Management Console - Google Chrome

New Tab Whatever You Want CloudWatch Management

aws Services Search for services, features, marketplace products, and docs [Alt+S]

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CloudWatch New menu experience

Favorites Dashboards Alarms In alarm All alarms Billing Logs Log groups Logs Insights Metrics All metrics Explorer Streams Events Application monitoring Insights Settings Getting Started

CloudWatch > Log groups > /aws/lambda/serverless-whatever-service-dev-GetAllWhateverByCat > 2021/08/23/[\$LATEST]d7d3ae547a2490586a8d35f4e6e7fe

Log events

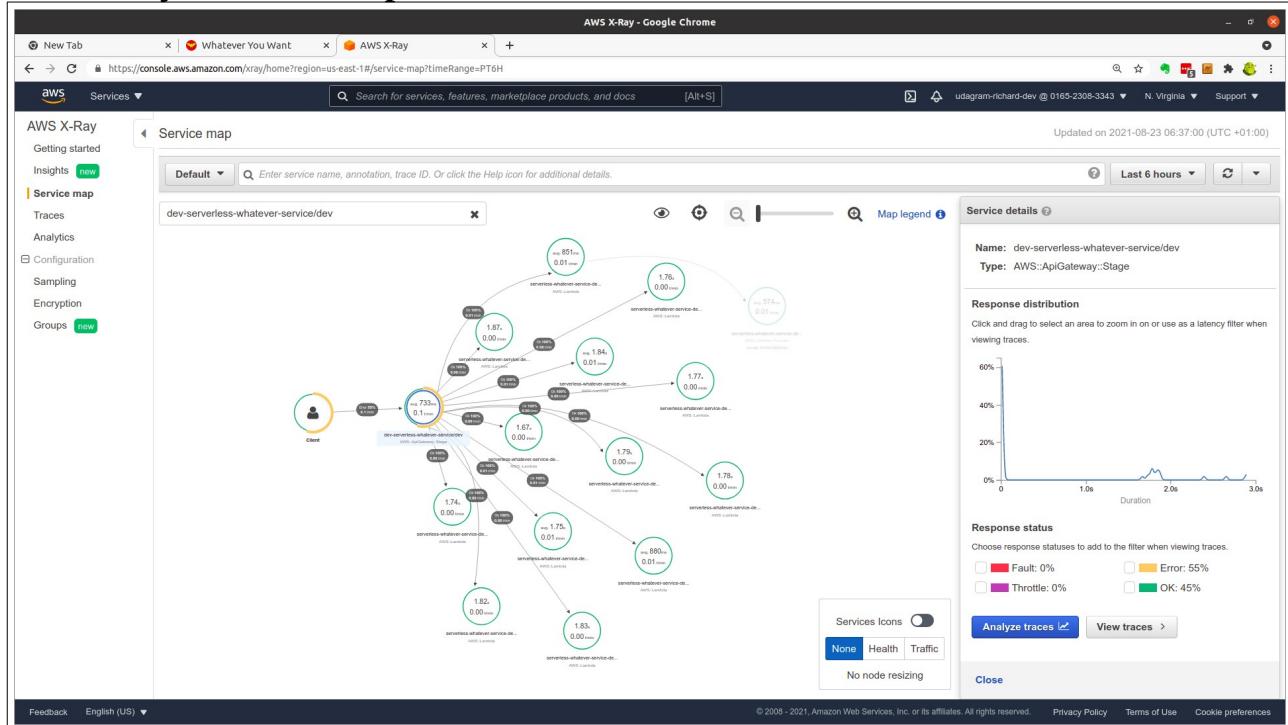
You can use the filter bar below to search for and match terms, phrases, or values in your log events. Learn more about filter patterns [\[?\]](#)

View as text Actions Clear 1m 30m 1h 12h Custom [\[?\]](#)

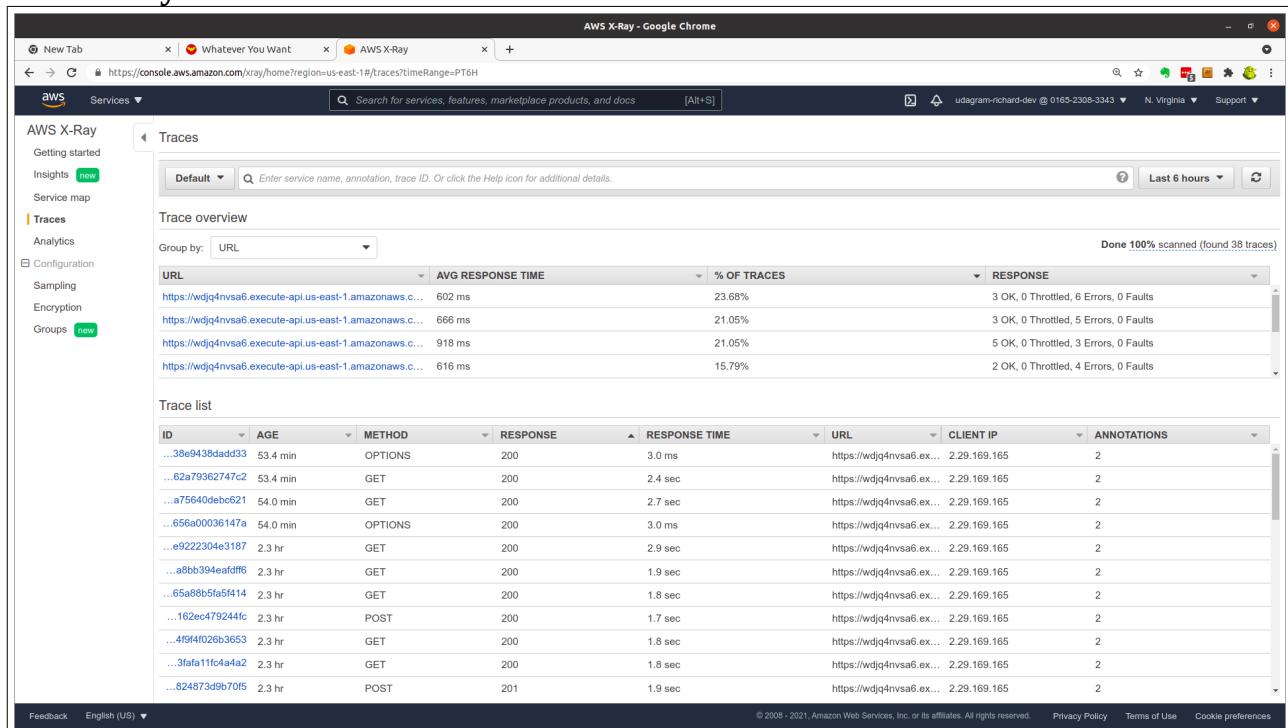
	Timestamp	Message
		No older events at this moment. Retry
	2021-08-23T05:46:14.676+01:00	START RequestId: 50309661-637f-45f1-95be-cc1bef07elb Version: \$LATEST
	2021-08-23T05:46:14.689+01:00	("name": "lambda/http/getAllWhateverByCategory", "event": {"resource": "/category/{itemId}/whatever", "path": "/category/2e308b2-fe2a-4343-912d-f...")
	2021-08-23T05:46:14.689+01:00	("name": "businessLogic/whateverBusiness", "userId": "auth0 60e0944d6c07e100687db898", "categoryId": "2e308b2-fe2a-4343-912d-fc52223d6c7", "level": "INFO")
	2021-08-23T05:46:14.689+01:00	("name": "dataLayer/WhateverDatabaseAccess", "userId": "auth0 60e0944d6c07e100687db898", "categoryId": "2e308b2-fe2a-4343-912d-fc52223d6c7", "level": "INFO")
	2021-08-23T05:46:15.652+01:00	("name": "businessLogic/whateverBusiness", "whateverItems": {}, "level": "INFO", "message": "getAllWhateverByCategory - retrieved all whatever for ...")
	2021-08-23T05:46:15.794+01:00	("name": "lambda/http/getAllWhateverByCategory", "items": [{"attachmentUrl": "https://whatever-attachments-reb-dev.s3.amazonaws.com/ca544d1-ca...")
	2021-08-23T05:46:15.805+01:00	2021-08-23T04:46:15.805Z 50309661-637f-45f1-95be-cc1bef07elb INFO SERVERLESS_ENTERPRISE {"c":true,"b": "H4sIAAAAAAAA7VXbW/bNhD+K4wDyOwYRRe...")
	2021-08-23T05:46:15.809+01:00	END RequestId: 50309661-637f-45f1-95be-cc1bef07elb5
	2021-08-23T05:46:15.809+01:00	REPORT RequestId: 50309661-637f-45f1-95be-cc1bef07elb5 Duration: 1132.12 ms Billed Duration: 1133 ms Memory Size: 1024 MB Max Memory Used: 2...
		No newer events at this moment. Auto retry paused. Resume

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AWS Xray – service map



AWS Xray - traces



Appendix A – Example JSON Schema, UI Schema, and FormData

Diary

JSON Schema

```
{  
  "title": "Diary Entry",  
  "description": "My diary.",  
  "type": "object",  
  "required": [  
    "date",  
    "whatDidWeDo"  
,  
  "properties": {  
    "date": {  
      "type": "string",  
      "title": "Date"  
    },  
    "whatDidWeDo": {  
      "type": "string",  
      "title": "What did we do today?"  
    },  
    "favouriteThings": {  
      "type": "array",  
      "items": {  
        "type": "string"  
      },  
      "title": "Favourite things"  
    }  
  }  
}
```

UI Schema

```
{  
  "date": {  
    "ui:widget": "alt-date",  
    "ui:options": {  
      "yearsRange": [2000, 2100],  
      "hideNowButton": false,  
      "hideClearButton": true  
    }  
,  
  "whatDidWeDo": {  
    "ui:widget": "textarea"  
  },  
  "favouriteThings": {  
    "ui:options": {  
      "orderable": true  
    }  
  }  
}
```

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Form Data

```
{  
  "date": {  
    "S": "2021-01-04"  
  },  
  "favouriteThings": {  
    "L": [  
      {  
        "S": "Reading"  
      },  
      {  
        "S": "Swashbuckling"  
      },  
      {  
        "S": "Skull and Cross-bones"  
      }  
    ]  
  },  
  "whatDidWeDo": {  
    "S": "Finished reading my book today ...\\nblah\\nblah\\n... pirates ...\\nblah\\nblah\\nblah\\n\\n"  
  }  
}
```

Address Book

JSON Schema

```
{  
  "title": "Address Book Entry",  
  "description": "My contacts.",  
  "type": "object",  
  "required": [  
    "firstName",  
    "lastName"  
,  
  "properties": {  
    "firstName": {  
      "type": "string",  
      "title": "First name"  
,  
    "middleNames": {  
      "type": "string",  
      "title": "Middle name(s)"  
,  
    "lastName": {  
      "type": "string",  
      "title": "Last name"  
,  
    "address1": {  
      "type": "string",  
      "title": "Address line 1"  
,  
    "address2": {  
      "type": "string",  
      "title": "Address line 2"  
,  
    "town": {  
      "type": "string",  
      "title": "Town"  
,  
    "county": {  
      "type": "string",  
      "title": "County"  
,  
    "postcode": {  
      "type": "string",  
      "title": "Post Code"  
,  
    "telephone": {  
      "type": "string",  
      "title": "Telephone",  
      "minLength": 10  
,  
    "additionalInfo": {  
      "type": "string",  
      "title": "Additional Information"  
    }  
  }  
}
```

UI Schema

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```
{  
    "firstName": {  
        "ui:autofocus": true,  
        "ui:emptyValue": "",  
        "ui:autocomplete": "family-name"  
    },  
    "lastName": {  
        "ui:emptyValue": "",  
        "ui:autocomplete": "given-name"  
    },  
    "middleNames": {  
        "ui:emptyValue": ""  
    },  
    "address1": {},  
    "address2": {},  
    "town": {},  
    "county": {},  
    "postcode": {},  
    "telephone": {  
        "ui:options": {  
            "inputType": "tel"  
        }  
    },  
    "additionalInfo": {  
        "title": "Additional Information",  
        "ui:widget": "textarea",  
        "ui:options": {  
            "rows": 5  
        }  
    }  
}
```

Form Data

```
{  
    "additionalInfo": {  
        "S": "Butler: Alfred Pennyworth\\nWard: Dick Grayson\\nSidekick: Robin"  
    },  
    "address1": {  
        "S": "Secret Cave"  
    },  
    "address2": {  
        "S": "Under Wayne Mansion"  
    },  
    "county": {  
        "S": "DC Universe"  
    },  
    "firstName": {  
        "S": "Bruce"  
    },  
    "lastName": {  
        "S": "Wayne"  
    },  
    "middleNames": {  
        "S": "Batman"  
    },  
    "postcode": {  
        "S": "10000"  
    }  
}
```

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```
"S": "BATCAVE 001"
},
"telephone": {
    "S": "Red Bat Phone"
},
"town": {
    "S": "Gotham"
}
```

Film Collection

JSON Schema

```
{  
    "title": "Film",  
    "type": "object",  
    "properties": {  
        "title": {  
            "type": "string",  
            "title": "Title"  
        },  
        "format": {  
            "type": "string",  
            "title": "Format",  
            "enum": [  
                "",  
                "cloud",  
                "DVD",  
                "VHS",  
                "Betamax",  
                "LaserDisk",  
                "Reel"  
            ],  
            "default": ""  
        },  
        "genre": {  
            "type": "array",  
            "title": "Genre",  
            "items": {  
                "type": "string",  
                "enum": [  
                    "",  
                    "Adventure",  
                    "Action",  
                    "Fantasy",  
                    "Comedy",  
                    "Family",  
                    "Horror",  
                    "Drama",  
                    "Animated",  
                    "Crime",  
                    "Mystery",  
                    "Science Fiction"  
                ],  
                "default": ""  
            }  
        },  
        "storyline": {  
            "type": "string",  
            "title": "Storyline"  
        }  
    }  
}
```

Cloud Capstone Project - Whatever You Want – Serverless Application

UI Schema

```
{  
  "title": {  
    "ui:autofocus": true  
  },  
  "format": {  
    "ui:widget": "select",  
    "ui:placeholder": "Choose ..."  
  },  
  "genre": {  
    "ui:widget": "select",  
    "ui:placeholder": "Choose ..."  
  },  
  "storyline": {  
    "ui:widget": "textarea",  
    "ui:options": {  
      "rows": 5  
    }  
  }  
}
```

Form Data

```
{  
  "format": {  
    "S": "DVD"  
  },  
  "genre": {  
    "L": [  
      {  
        "S": "Action"  
      },  
      {  
        "S": "Adventure"  
      },  
      {  
        "S": "Fantasy"  
      }  
    ]  
  },  
  "storyline": {  
    "S": "Determined to ensure Superman's ultimate sacrifice was not in vain,  
Bruce Wayne aligns forces with Diana Prince with plans to recruit a team of  
metahumans to protect the world from an approaching threat of catastrophic  
proportions."  
  },  
  "title": {  
    "S": "Jack Snyder's Justice League"  
  }  
}
```

Recipe Card

JSON Schema

```
{
  "title": "Recipe Card",
  "type": "object",
  "properties": {
    "recipeName": {
      "type": "string",
      "title": "Recipe Name"
    },
    "countryOfOrigin": {
      "type": "string",
      "title": "Country of Origin",
      "enum": [
        "",
        "English",
        "Welsh",
        "Scottish",
        "Irish",
        "French",
        "German",
        "Spanish",
        "Italian",
        "Scandinavian",
        "American",
        "Canadian",
        "Mexican"
      ]
    },
    "feeds": {
      "type": "integer",
      "title": "Feeds (number of people)",
      "minimum": 1,
      "maximum": 5000,
      "default": 1
    },
    "difficulty": {
      "type": "string",
      "title": "Difficulty",
      "enum": [
        "Very Easy",
        "Easy",
        "Medium",
        "Complicated",
        "Very Complicated"
      ]
    },
    "timeToPrepare": {
      "type": "integer",
      "title": "Time to prepare (minutes)",
      "minimum": 0,
      "maximum": 5000,
      "multipleOf": 5,
      "default": 0
    },
    "timeToCook": {
      "type": "integer",
      "title": "Time to cook (minutes)"
    }
  }
}
```

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```
"title": "Time to cook (minutes)",
"minimum": 0,
"maximum": 5000,
"multipleOf": 5,
"default": 0
},
"cookingTemperature": {
  "type": "integer",
  "title": "Cooking temperature (centigrade)",
  "minimum": 0,
  "maximum": 1000,
  "multipleOf": 5,
  "default": 0
},
"ingredients": {
  "type": "array",
  "title": "Ingredients",
  "items": {
    "type": "string"
  }
},
"preparationSteps": {
  "type": "array",
  "title": "Preparation Steps",
  "items": {
    "type": "string"
  }
}
}
```

UI Schema

```
{
  "recipeName": {
    "ui:autofocus": true,
    "ui:placeholder": "Nan's traditional Welsh tea"
  },
  "countryOfOrigin": {
    "ui:widget": "select",
    "ui:placeholder": "Choose ..."
  },
  "feeds": {
    "ui:widget": "updown"
  },
  "difficulty": {
    "ui:widget": "select",
    "ui:placeholder": "Choose ..."
  },
  "timeToPrepare": {
    "ui:widget": "updown"
  },
  "timeToCook": {
    "ui:widget": "updown"
  },
  "cookingTemperature": {
    "ui:widget": "updown"
  }
}
```

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```
},
  "ingredients": {
    "items": {
      "ui:placeholder": "a measure of an ingredient ..."
    }
  },
  "preparationSteps": {
    "items": {
      "ui:widget": "textarea",
      "ui:placeholder": "step ..."
    }
  }
}
```

Form Data

```
{
  "cookingTemperature": {
    "N": "190"
  },
  "countryOfOrigin": {
    "S": "Scottish"
  },
  "difficulty": {
    "S": "Medium"
  },
  "feeds": {
    "N": "10"
  },
  "ingredients": {
    "L": [
      {
        "S": "125g / 4oz unsalted butter, softened"
      },
      {
        "S": "55g / 2oz caster sugar, plus extra to finish"
      },
      {
        "S": "180g / 6oz plain flour"
      }
    ]
  },
  "preparationSteps": {
    "L": [
      {
        "S": "Preheat the oven to 190C / 170C Fan / Gas 5."
      },
      {
        "S": "Beat the butter and the sugar together until smooth."
      },
      {
        "S": "Stir in the flour to get a smooth paste. "
      },
      {
        "S": "Turn on to a work surface and gently roll out until the paste is 1cm / ½in thick."
      },
    ]
  }
}
```

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```
{  
    "S": "Cut into rounds or fingers and place onto a baking tray."  
,  
{  
    "S": "Sprinkle with caster sugar and chill in the fridge for 20  
minutes."  
,  
{  
    "S": "Bake in the oven for 15-20 minutes, or until pale golden-brown."  
,  
{  
    "S": "Set aside to cool on a wire rack."  
}  
]  
,  
"recipeName": {  
    "S": "Shortbread"  
,  
"timeToCook": {  
    "N": "30"  
,  
"timeToPrepare": {  
    "N": "30"  
}  
}
```