

Udacity

AWS Cloud Developer Nanodegree

Cloud Capstone Project

Whatever You Want

Serverless Application

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

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Cloud Capstone Project - Whatever You Want – Serverless Application

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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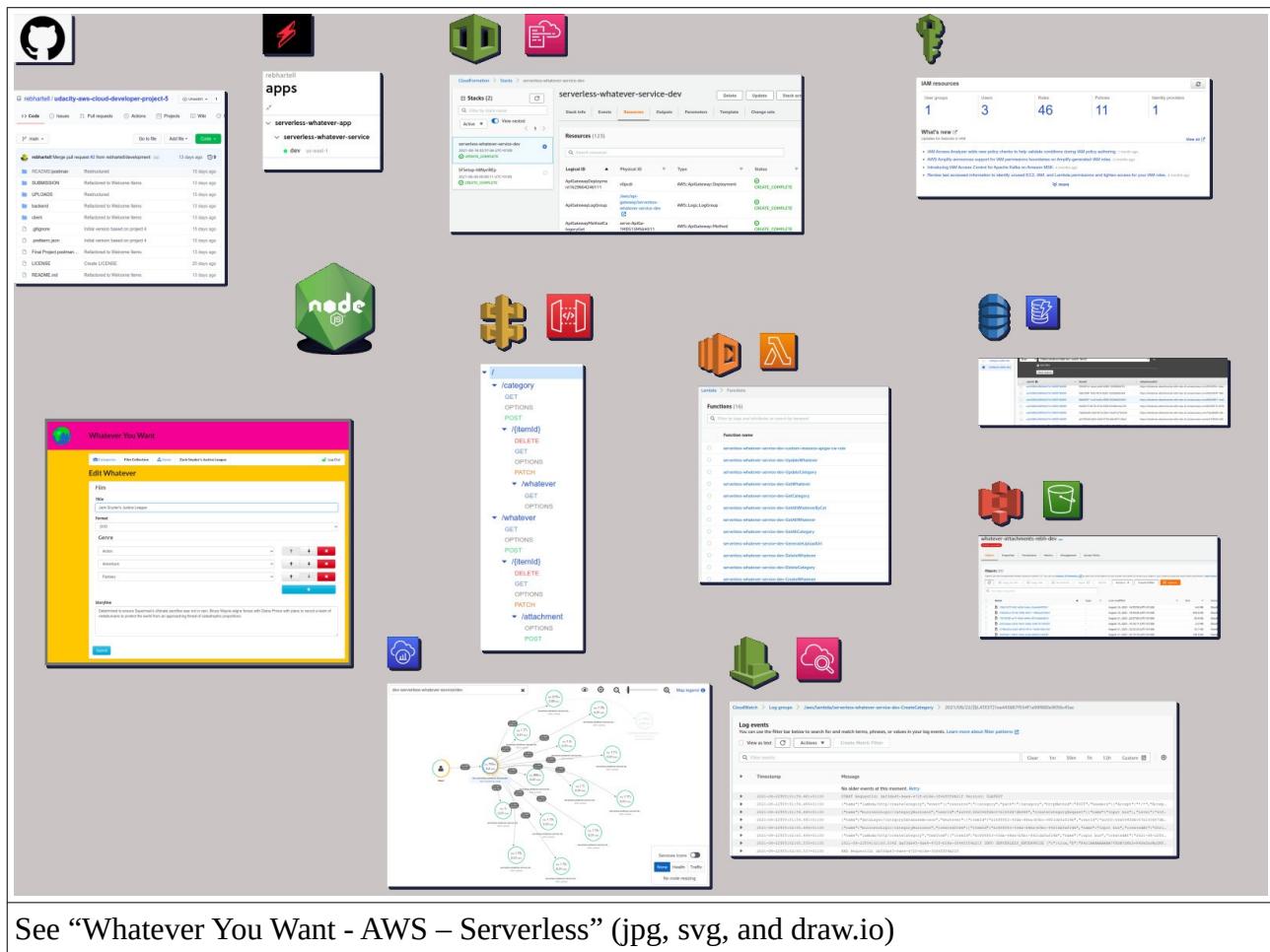
Step 2: Choose either microservices or serverless design

*"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)

Cloud Capstone Project - Whatever You Want – Serverless Application

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

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)

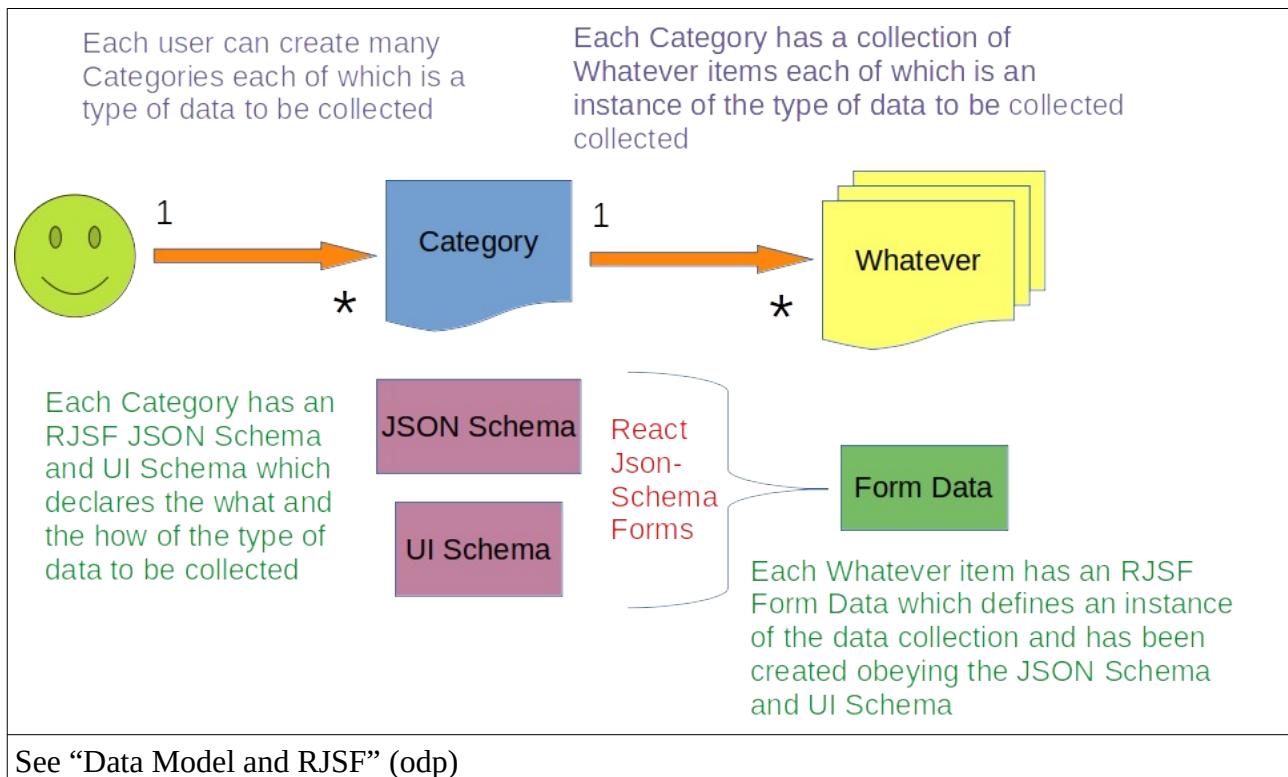
The under-pinning data model is a collection of Category items which has a 1-to-many relationship to Whatever items which make up the member instances within that category.

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:



Cloud Capstone Project - Whatever You Want – Serverless Application

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 the react-jsonschema-form playground in a browser window. On the left, there's a JSONSchema editor with the following code:

```
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    }
24  }
```

Below the JSONSchema editor is a UISchema editor with the following code:

```
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   }
23 }
```

To the right of the schema editors is a preview area titled "A registration form". It contains a form with three fields: "First name" (with value "Chuck"), "Last name*", and "Telephone". A "Submit" button is at the bottom of the form.

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
```

Pre-requisites

- Auth0 account (<https://manage.auth0.com>)
- GitHub account (<https://github.com>)
- NodeJS version up to 14.xx (<https://nodejs.org/en/download/package-manager>)
- A Serverless Framework account (<https://dashboard.serverless.com>)
 - Install the Serverless Framework’s CLI (up to VERSION=2.54.0). Refer to the official documentation for more help.

```
npm install -g serverless@2.54.0
serverless --version
```

- Login and configure serverless to use the AWS credentials

```
# Login to your dashboard from the CLI. It will ask to open your
# browser and finish the process.
serverless login

# Configure serverless to use the AWS credentials to deploy the
# application

# You need to have a pair of Access key (YOUR_ACCESS_KEY_ID and
# YOUR_SECRET_KEY) of an IAM user with Admin access permissions

sls config credentials --provider aws --key YOUR_ACCESS_KEY_ID --
secret YOUR_SECRET_KEY --profile serverless
```

Frontend Configuration

The **client** folder contains a web application that can use the **backend** API - the only file that you need to edit is the **config.ts** file in the **client** folder.

This file configures your client application and contains an API endpoint and Auth0 configuration:

```
// Once your application is deployed, copy an API id here so that the frontend
// can interact with it
const apiId = '...'
export const apiEndpoint = `https://${apiId}.execute-api.us-east-
1.amazonaws.com/dev` 

export const authConfig = {
  // Create an Auth0 application and copy values from it into this map
  domain: '...',           // Auth0 domain
  clientId: '...',          // Auth0 client id
  callbackUrl: 'http://localhost:3000/callback'
}
```

How to run the application

Backend

To deploy the backend serverless application run the following commands:

```
cd backend  
npm install  
sls deploy --verbose
```

NOTE:

FATAL ERROR: Ineffective mark-compacts near heap limit Allocation failed - JavaScript heap out of memory

The following export is required to avoid Out Of Memory (OOM) issues when using Serverless Framework configuration **package.individually: true**

```
export NODE_OPTIONS="--max-old-space-size=8192"
```

Alternatively, exclude the plugin **serverless-webpack**

Frontend

To run a client application first edit the **client/src/config.ts** file to set correct parameters – as detailed above - and then run the following commands:

```
cd client  
npm install  
npm run start
```

This should start a development server with the React application that will interact with the serverless Whatever You Want application.

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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
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
```

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```
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/GetAllCategory [490 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'
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
```

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```
'.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 -
CustomDashresourceDashapigwDashhwDashroleLambdaFunction
CloudFormation - UPDATE_IN_PROGRESS - AWS::Lambda::Function - DeleteCategoryLambdaFunction
CloudFormation - UPDATE_IN_PROGRESS - AWS::Lambda::Function - CreateWhateverLambdaFunction
CloudFormation - UPDATE_COMPLETE - AWS::Lambda::Function - GenerateUploadUrlLambdaFunction
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
```

Cloud Capstone Project - Whatever You Want – Serverless Application

```
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 -
DeleteWhateverLambdaVersion8rLW4Ur9n13902F4NhVjcTU3wlBkaZYyMBQoLdu81c
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
CreateCategoryLambdaVersionK1z4JK71QYZqa6Q1f4YcV829GZH9rcqETeuXGfh4GNU
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
GetCategoryLambdaVersionTQvVYgg6ibYGIByX39rssSHf8a5zuinDg7FR1jEqizc
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 -
DeleteCategoryLambdaVersionAxrXPHPWUCxKxRrj5jxAEQme1U61ZsusOApoVZsrsvI
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
UpdateWhateverLambdaVersionYHwZpViz703NwSrtjBLT9CScA54UXGivrnu5kSI
CloudFormation - CREATE_COMPLETE - AWS::Lambda::Version -
GetAllWhateverLambdaVersionpgUOeIhERW4xr92nXAEvouEN5nrK61eO36GgIwn4
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
DeleteWhateverLambdaVersion8rLW4Ur9n13902F4NhVjcTU3wlBkaZYyMBQoLdu81c
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
CreateCategoryLambdaVersionK1z4JK71QYZqa6Q1f4YcV829GZH9rcqETeuXGfh4GNU
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
GetCategoryLambdaVersionTQvVYgg6ibYGIByX39rssSHf8a5zuinDg7FR1jEqizc
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
UpdateCategoryLambdaVersionLMqwtwEeAigSV5m3qPHX6tme4dpHsWnks5NMFrHo
CloudFormation - CREATE_COMPLETE - AWS::Lambda::Version -
GetAllCategoryLambdaVersionZBXwrBj88gKfSjvpDHdhky6rInMStUiSSKEIo8KDFW
CloudFormation - CREATE_COMPLETE - AWS::Lambda::Version -
DeleteWhateverLambdaVersion8rLW4Ur9n13902F4NhVjcTU3wlBkaZYyMBQoLdu81c
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
GetWhateverLambdaVersionWPHiqUr2KCrP1sUh6pDbdVe3PQt6WfaQ0pMaNnIOf4Q
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
AuthLambdaVersion4r8uMWqouRIk1RFFhe5XWMXIJuM0bHoukQTNqdFCuA
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
CreateWhateverLambdaVersionQqc85s8Nq0SWiNyJ5LXnPvorxDIGRQNsUt1W3liobYA
CloudFormation - CREATE_COMPLETE - AWS::Lambda::Version -
GetCategoryLambdaVersionTQvVYgg6ibYGIByX39rssSHf8a5zuinDg7FR1jEqizc
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 -
GetAllWhateverByCatLambdaVersioni1My2f0iPcmPSO8djTHDkiU2UQRB2Pj4n0P5oLyk
CloudFormation - CREATE_COMPLETE - AWS::Lambda::Version -
UpdateCategoryLambdaVersionLMqwtwEeAigSV5m3qPHX6tme4dpHsWnks5NMFrHo
CloudFormation - CREATE_COMPLETE - AWS::Lambda::Version -
AuthLambdaVersion4r8uMWqouRIk1RFFhe5XWMXIJuM0bHoukQTNqdFCuA
```

Cloud Capstone Project - Whatever You Want – Serverless Application

```
CloudFormation - CREATE_IN_PROGRESS - AWS::Lambda::Version -
DeleteCategoryLambdaVersionAxrXPHpWUCxKxRrj5jxAEQme1U61ZsusOApoVZsrsvI
CloudFormation - CREATE_COMPLETE - AWS::Lambda::Version -
UpdateWhateverLambdaVersionYHwZpViz703NwsRtjBLT9CScA54UXGivrnu5kSI
CloudFormation - CREATE_COMPLETE - AWS::Lambda::Version -
DeleteCategoryLambdaVersionAxrXPHpWUCxKxRrj5jxAEQme1U61ZsusOApoVZsrsvI
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 -
CreateCategoryLambdaVersiongdJSTOIJg2dSafsdsFFnEDQSFWEHV2awFrluCSjOM
CloudFormation - DELETE_SKIPPED - AWS::Lambda::Version -
GetAllWhateverLambdaVersion57eMvNPhGXNBNUftpuKvKcbUNZv8NpSotCn12tcxc
CloudFormation - DELETE_SKIPPED - AWS::Lambda::Version -
GetAllCategoryLambdaVersionpum17xc4HXYgth6kRGLhBdmqJjmwac54ji0oGsew0E
CloudFormation - DELETE_SKIPPED - AWS::Lambda::Version -
DeleteWhateverLambdaVersionEV6zmgjnsk4PUpjQxOwmFfPT0o7iG4qAJOMPVE2tPnk
CloudFormation - DELETE_SKIPPED - AWS::Lambda::Version -
GetAllWhateverByCatLambdaVersionbxSoYhtPCdf0S359b4e62FysiPqnWRfHrS4e6jkjdo
CloudFormation - DELETE_IN_PROGRESS - AWS::ApiGateway::Deployment -
ApiGatewayDeployment1629604246111
CloudFormation - DELETE_SKIPPED - AWS::Lambda::Version -
UpdateCategoryLambdaVersionR0Fthk4I3ZduojgovnWtQo56g9r48VA1aSw77yAYto
CloudFormation - DELETE_SKIPPED - AWS::Lambda::Version -
DeleteCategoryLambdaVersion094vkuE4hE1ofcpbFH8Lf9fwzIZR8el9uApGNamZQ
CloudFormation - DELETE_SKIPPED - AWS::Lambda::Version -
GenerateUploadUrlLambdaVersionDTjdMMJwzZFKPri9X4ZttfS8lhqxBap8IZE4Aidcw
CloudFormation - DELETE_SKIPPED - AWS::Lambda::Version -
GetWhateverLambdaVersionj19YhPd0AMGZJejxbh5eoZPT3tSGDpqYgYsYlx4
CloudFormation - DELETE_SKIPPED - AWS::Lambda::Version -
UpdateWhateverLambdaVersionWHMqaK1N9ila5YeD5CeU05H6tKKOF6732fdncm0hc
CloudFormation - DELETE_SKIPPED - AWS::Lambda::Version -
GetCategoryLambdaVersionguFFvIxKPdiCN355QJaHy8VxBksaqh8mgjW3eg
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://wdjq4nvsaa.execute-api.us-east-1.amazonaws.com/dev/whatever
  GET - https://wdjq4nvsaa.execute-api.us-east-1.amazonaws.com/dev/category/{itemId}/whatever
  GET - https://wdjq4nvsaa.execute-api.us-east-1.amazonaws.com/dev/whatever/{itemId}
  POST - https://wdjq4nvsaa.execute-api.us-east-1.amazonaws.com/dev/whatever
  PATCH - https://wdjq4nvsaa.execute-api.us-east-1.amazonaws.com/dev/whatever/{itemId}
  DELETE - https://wdjq4nvsaa.execute-api.us-east-1.amazonaws.com/dev/whatever/{itemId}
  POST - https://wdjq4nvsaa.execute-api.us-east-1.amazonaws.com/dev/whatever/{itemId}/attachment
  GET - https://wdjq4nvsaa.execute-api.us-east-1.amazonaws.com/dev/category
  GET - https://wdjq4nvsaa.execute-api.us-east-1.amazonaws.com/dev/category/{itemId}
  POST - https://wdjq4nvsaa.execute-api.us-east-1.amazonaws.com/dev/category
  PATCH - https://wdjq4nvsaa.execute-api.us-east-1.amazonaws.com/dev/category/{itemId}
  DELETE - https://wdjq4nvsaa.execute-api.us-east-1.amazonaws.com/dev/category/{itemId}
```

Cloud Capstone Project - Whatever You Want – Serverless Application

```
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-1FP5J135LTY4U
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://wdjq4nvsas.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
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
```

Cloud Capstone Project - Whatever You Want – Serverless Application

```
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-UpdateCategory v7...
Serverless: Prune: serverless-whatever-service-dev-DeleteCategory 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
```

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"/>	apild	wdjq4nvs6	wdjq4nvs6			
<input checked="" type="checkbox"/>	authToken	eyJhbGciOiJSUzI1NlslnR5c...	eyJhbGciOiJSUzI1NlslnR5cCl6IkpxVCIsImtpZCI6Ik03OGRwVnEyWDI...			
<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

1

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

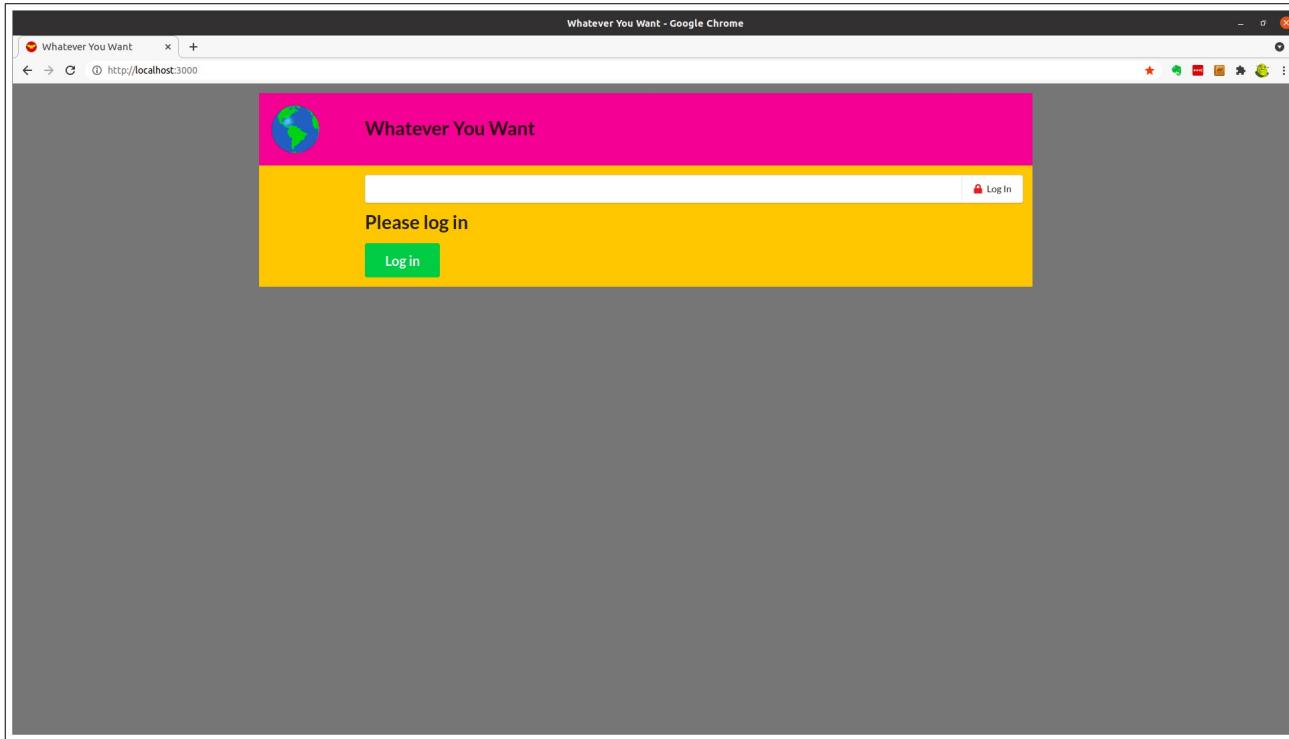
You can now view typescript-app in the browser.

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

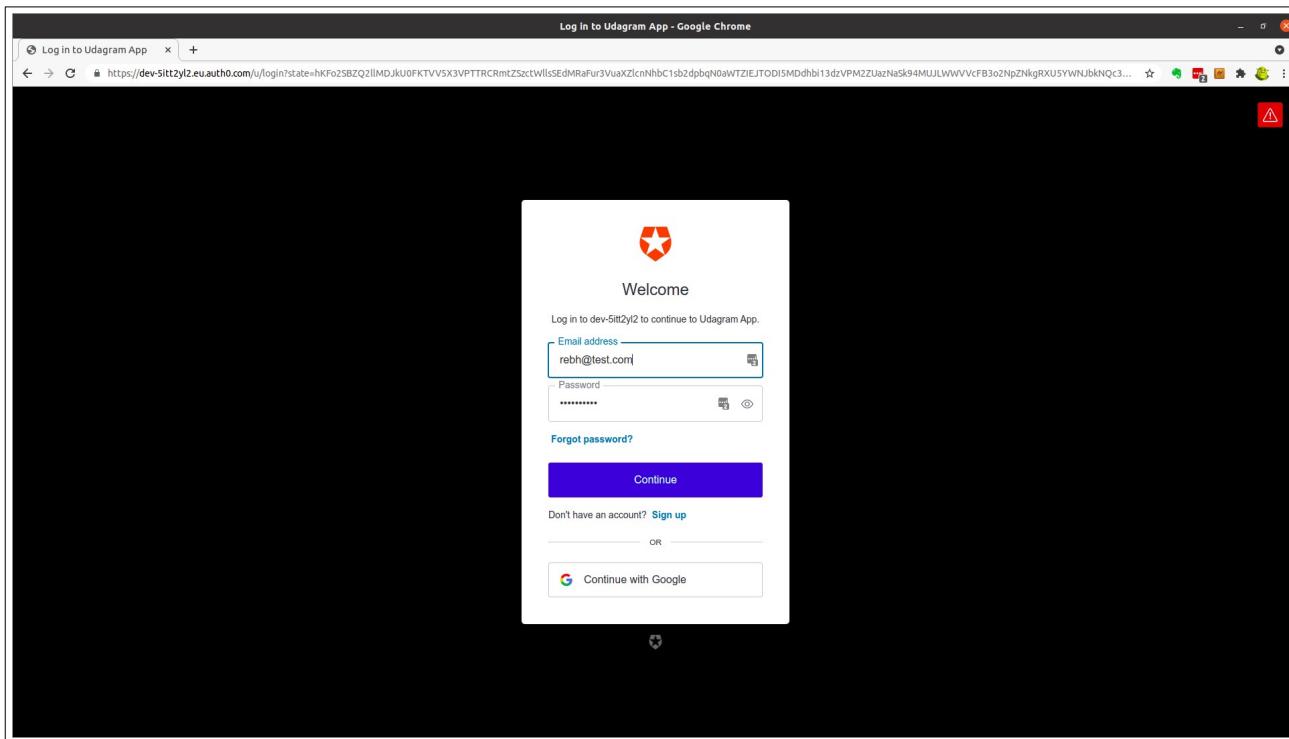
Note that the development build is not optimized.
To create a production build, use npm run build.
```

Cloud Capstone Project - Whatever You Want – Serverless Application

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

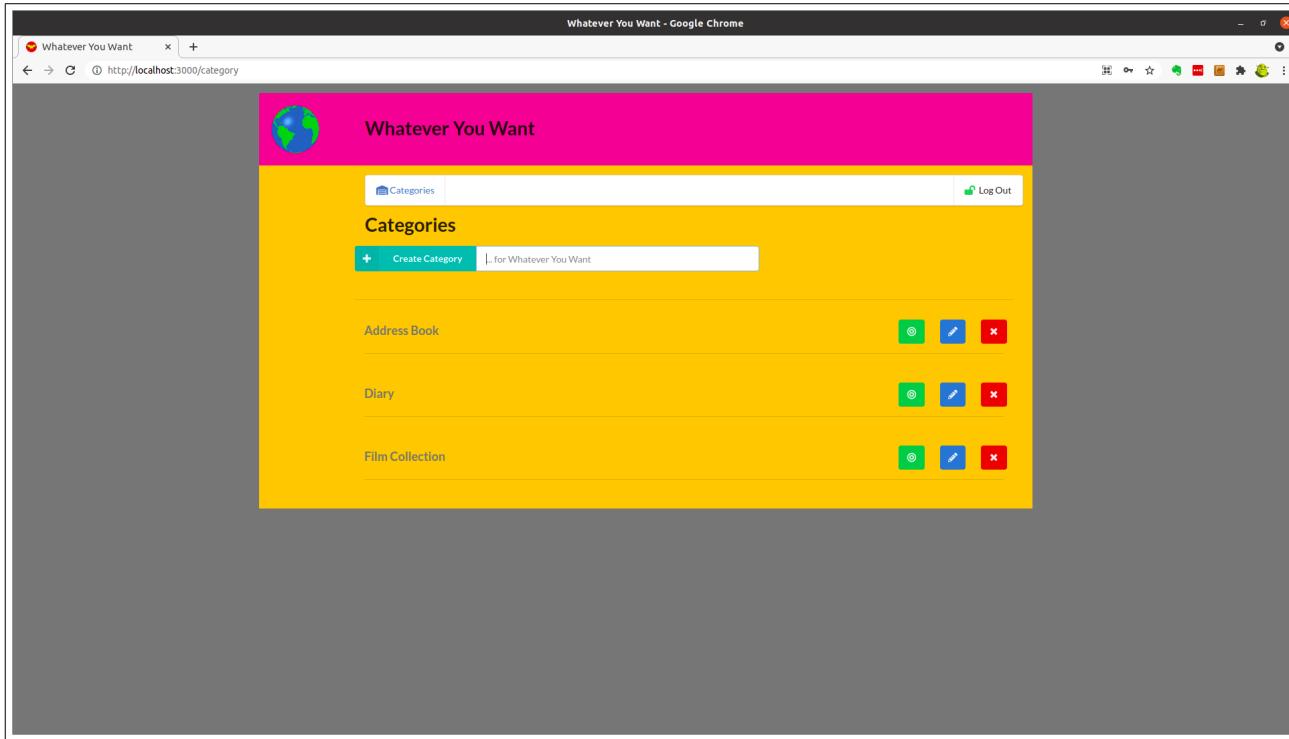


Auth0 Login



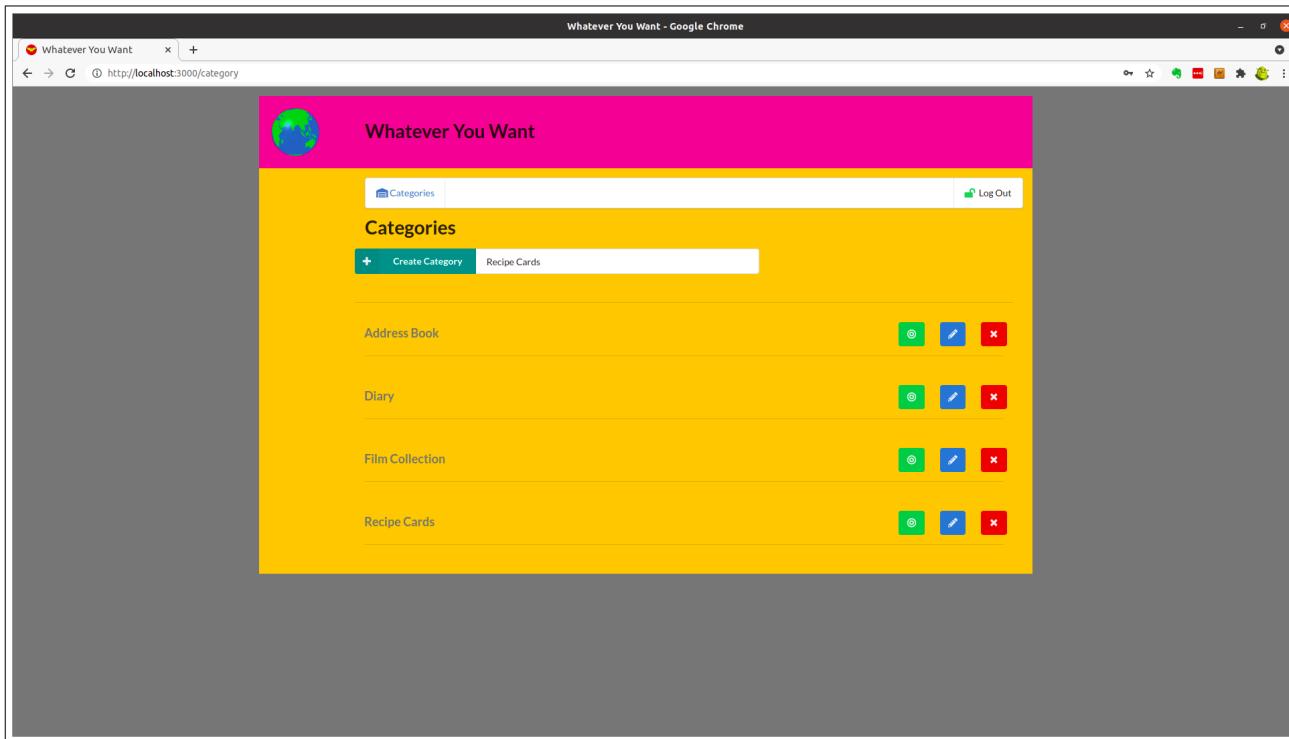
Cloud Capstone Project - Whatever You Want – Serverless Application

Categories Page



A screenshot of a web browser window titled "Whatever You Want - Google Chrome". The address bar shows the URL "http://localhost:3000/category". The main content area has a pink header with a globe icon and the text "Whatever You Want". Below this is a yellow section titled "Categories". A teal button labeled "+ Create Category" is visible. A search bar contains the placeholder text ". for Whatever You Want". Below the search bar is a list of categories: "Address Book", "Diary", and "Film Collection". Each category entry includes three small icons: a green circle with a white '@', a blue square with a white pencil, and a red square with a white 'x'.

Create New Category – Recipe Cards



A screenshot of a web browser window titled "Whatever You Want - Google Chrome". The address bar shows the URL "http://localhost:3000/category". The main content area has a pink header with a globe icon and the text "Whatever You Want". Below this is a yellow section titled "Categories". A teal button labeled "+ Create Category" is visible. A search bar contains the placeholder text ". for Whatever You Want". Below the search bar is a list of categories: "Address Book", "Diary", "Film Collection", and "Recipe Cards". Each category entry includes three small icons: a green circle with a white '@', a blue square with a white pencil, and a red square with a white 'x'.

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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". The main content area has a yellow background and is titled "Edit Category". It contains a "Name" input field with "Recipe Cards" typed in. Below it are two sections: "JSON Schema" and "UI Schema", both of which are currently empty. At the bottom is a "Save" button.

Populate New Category – Recipe Cards

This screenshot shows the same "Edit Category" page as above, but with more detailed JSON and UI schema definitions. In the "JSON Schema" section, there is a code editor containing the following JSON:

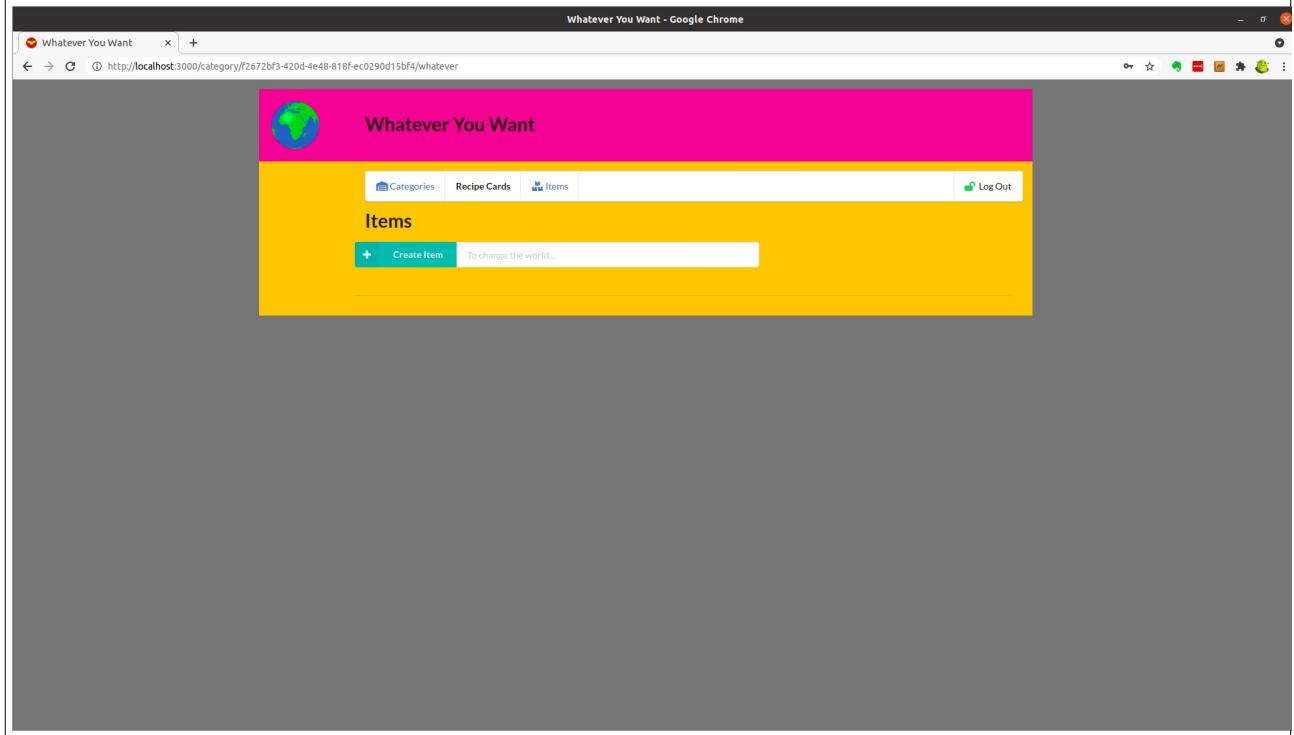
```
{
  "title": "Recipe Card",
  "type": "object",
  "properties": {
    "recipeName": {
      "type": "string",
      "title": "Recipe Name"
    },
    "countryOfOrigin": {
      "type": "string",
      "title": "Country of Origin"
    }
  }
}
```

In the "UI Schema" section, there is a code editor containing the following JSON:

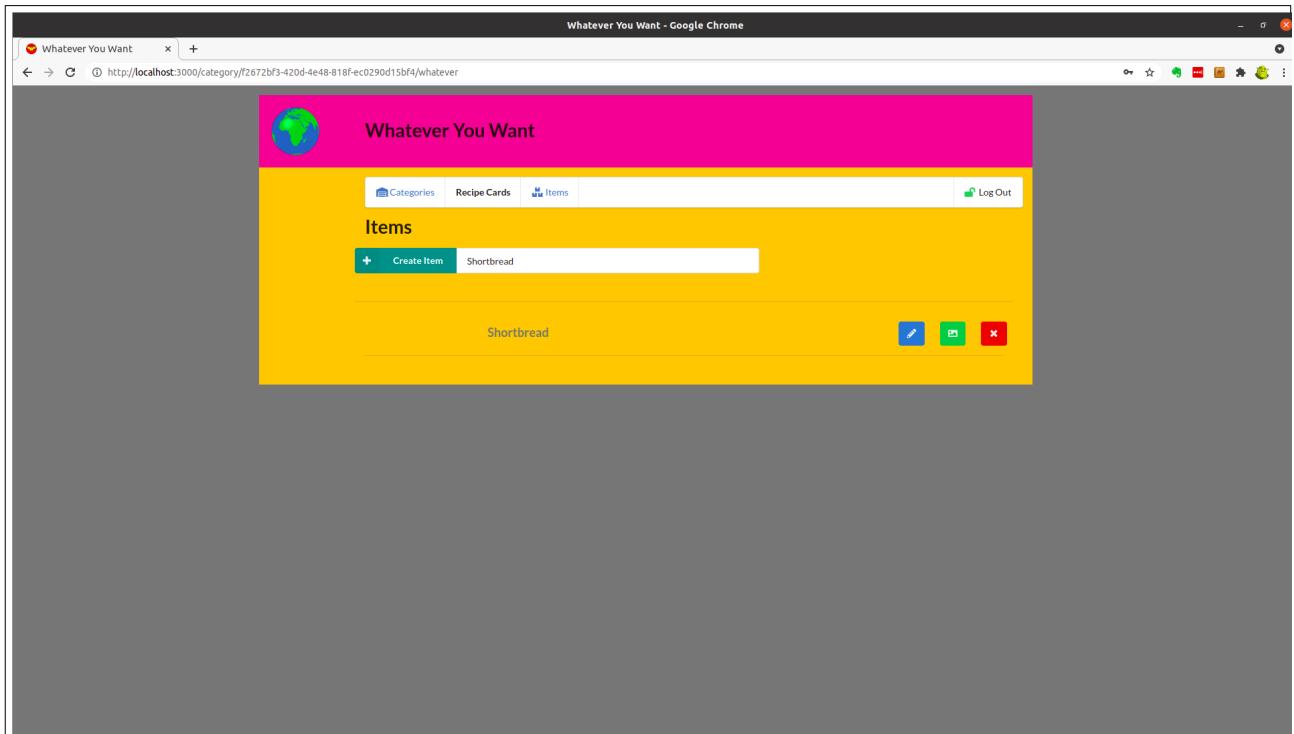
```
{
  "recipeName": {
    "ui:autofocus": true,
    "ui:placeholder": "Nan's traditional Welsh tea"
  },
  "countryOfOrigin": {
    "ui:widget": "select",
    "ui:placeholder": "Choose ..."
  },
  "feeder": {
    "ui:widget": "dropdown"
  }
}
```

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Save New Category – Recipe Cards

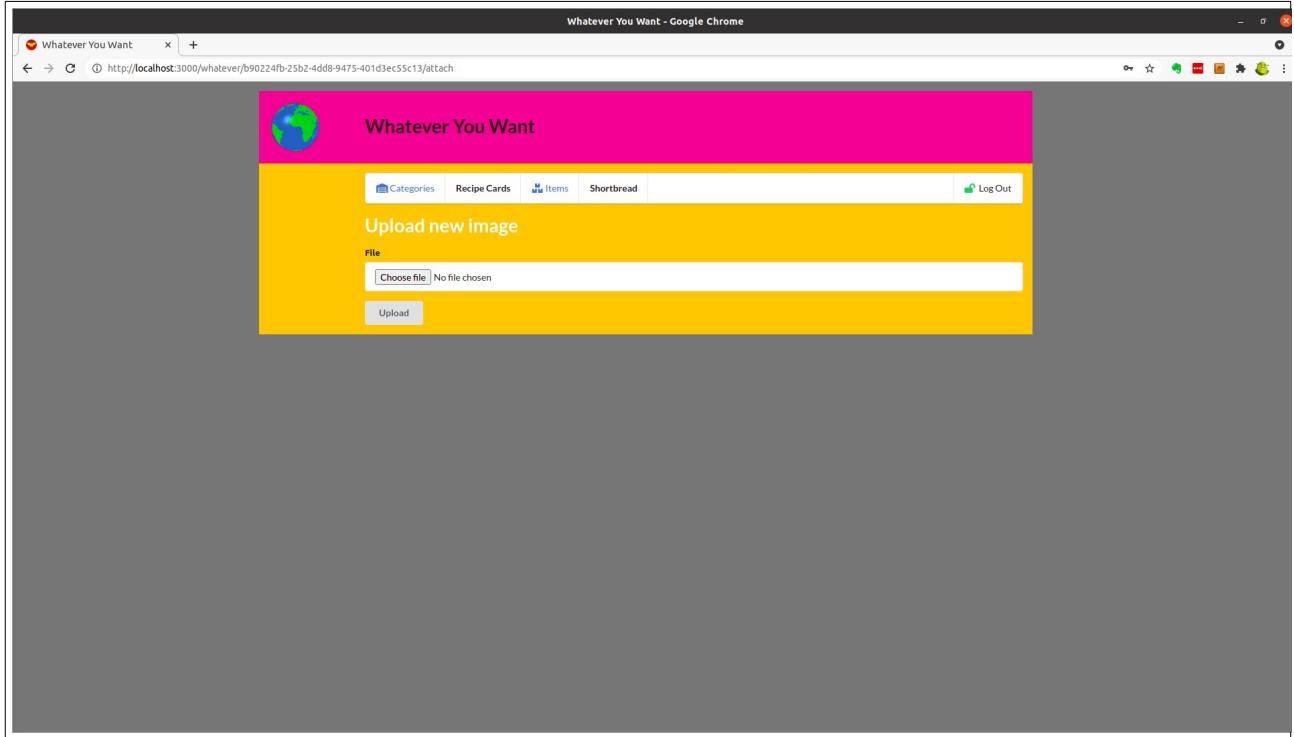


Create New Item – Recipe Cards - Shortbread

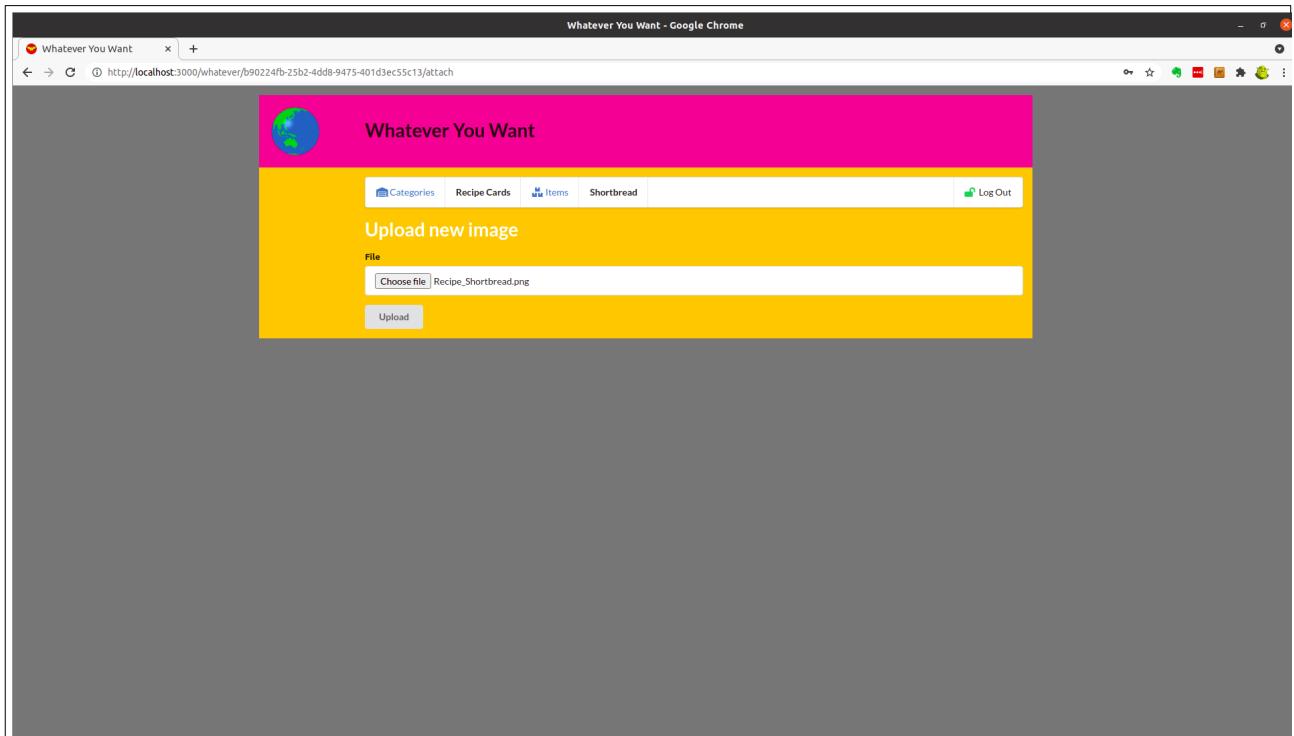


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Add Image to New Item – Recipe Cards - Shortbread

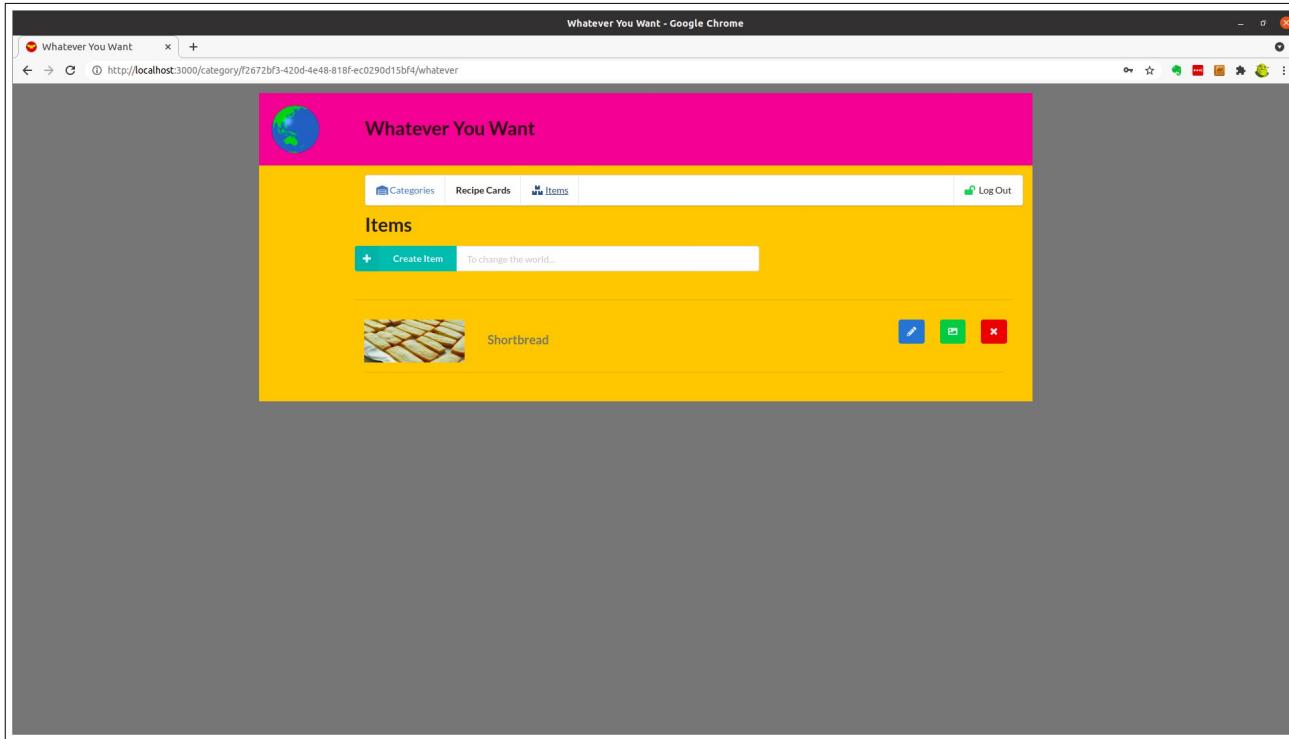


Choose and Upload Image forn New Item – Recipe Cards - Shortbread

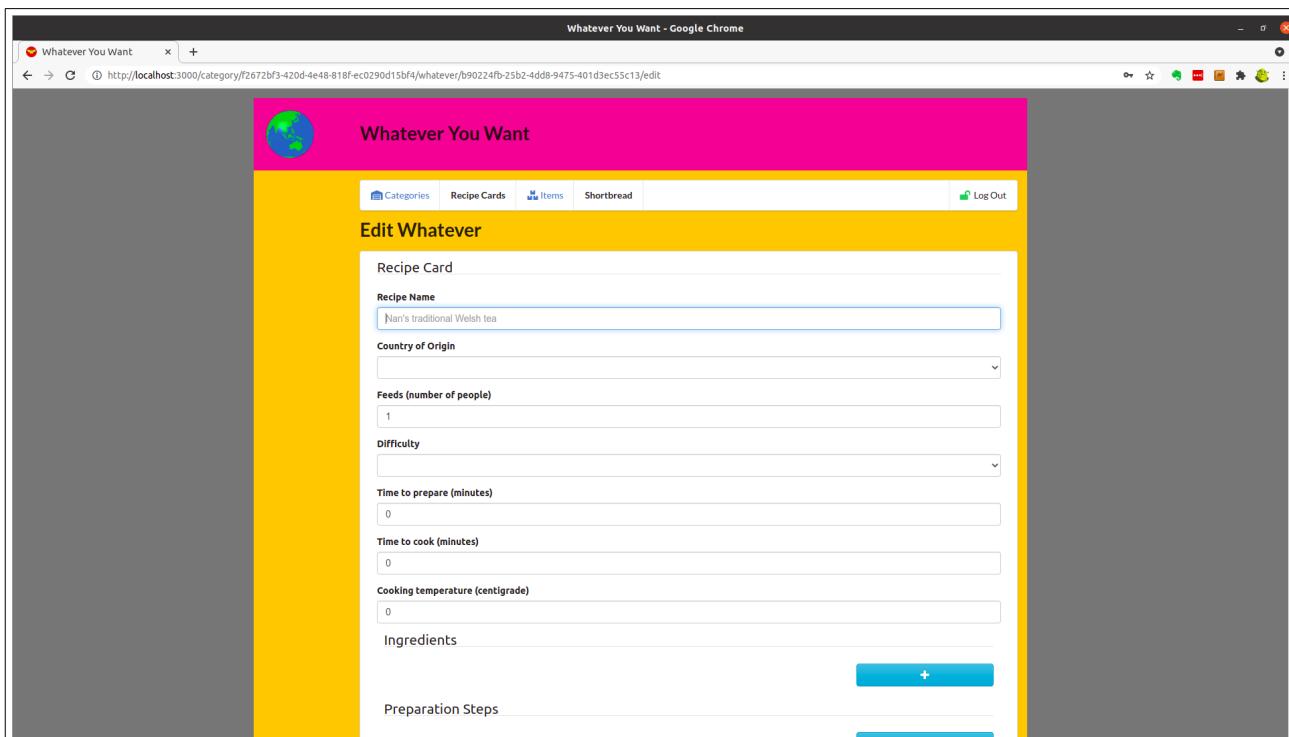


Cloud Capstone Project - Whatever You Want – Serverless Application

Create New Item – Recipe Cards - Shortbread



Edit New Whatever Item – Recipe Cards - Shortbread



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

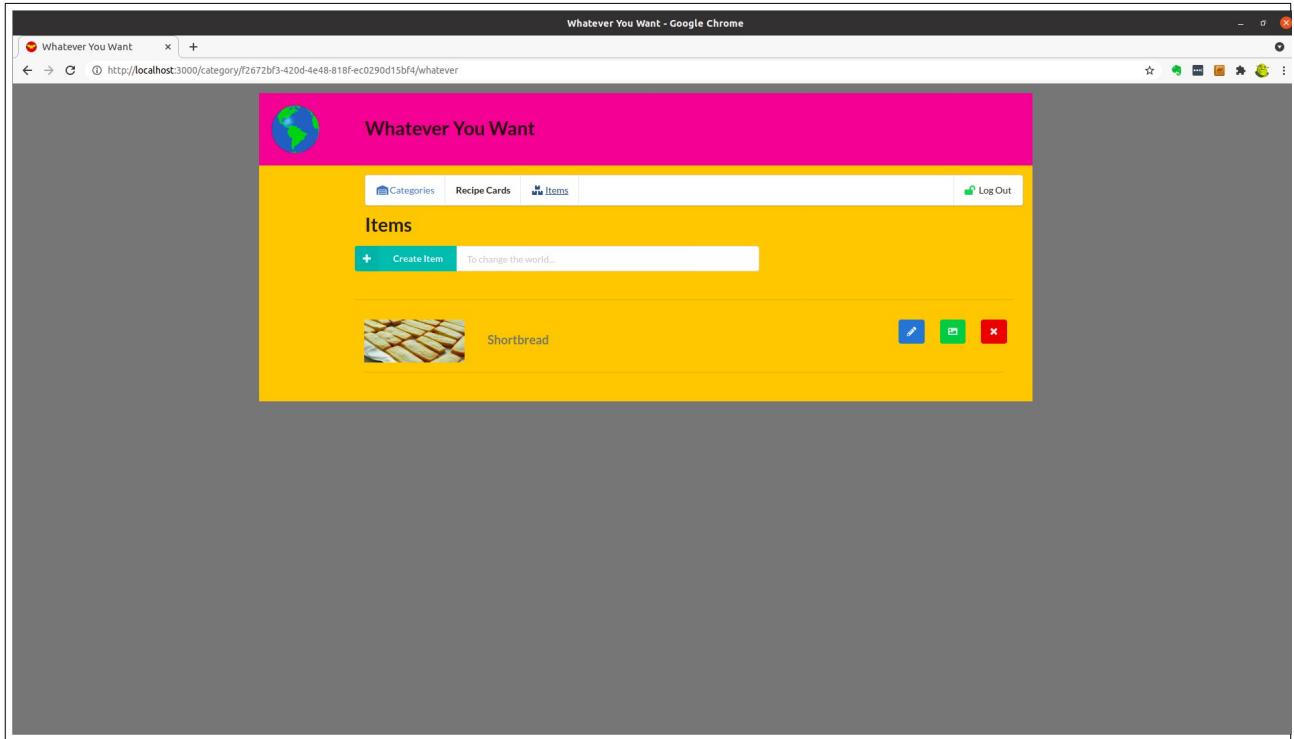
The screenshot shows a web browser window titled "Whatever You Want - Google Chrome". The URL is <http://localhost:3000/category/f2672bf3-420d-4e48-818f-ec0290d15bf4/whatever/b90224fb-25b2-4dd8-9475-401d3ec55c13/edit>. The page has a pink header with a globe icon and the text "Whatever You Want". A yellow sidebar on the left contains navigation links: Categories, Recipe Cards, Items, and Shortbread. The main content area is titled "Edit Whatever" and "Recipe Card". It includes fields for "Recipe Name" (Shortbread), "Country of Origin" (Scottish), "Feeds (number of people)" (10), "Difficulty" (Medium), "Time to prepare (minutes)" (30), "Time to cook (minutes)" (30), and "Cooking temperature (centigrade)" (190). Below these are sections for "Ingredients" and "Preparation Steps". The "Ingredients" section lists three items: "125g / 4oz unsalted butter, softened", "55g / 2oz caster sugar, plus extra to finish", and "180g / 6oz plain flour". The "Preparation Steps" section lists 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.

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

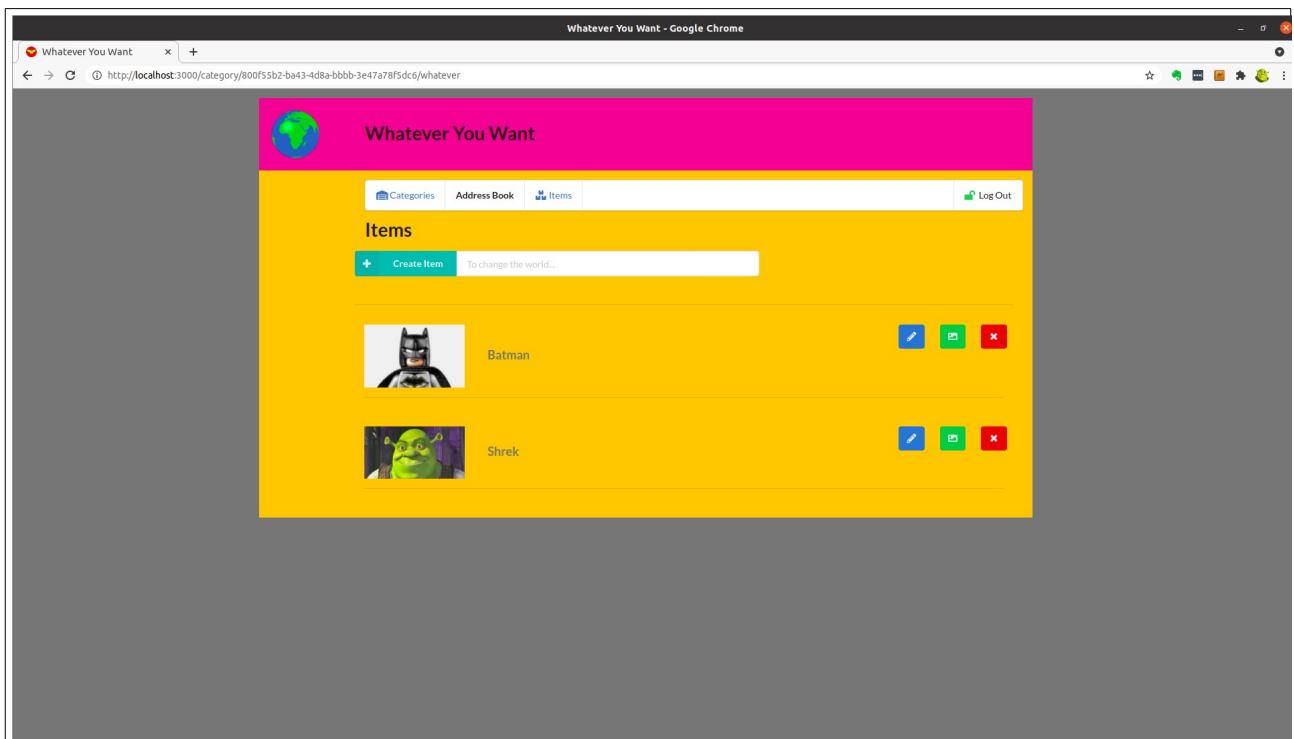
The screenshot shows the same web browser window and URL as the previous image. The "Edit Whatever" page now displays the completed Shortbread recipe card. The "Preparation Steps" section has been expanded to show all eight steps listed above. The "Submit" button at the bottom of the preparation steps section is visible.

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Submit New Whatever Item – Recipe Cards – Shortbread



Return to Categories and Select Existing Category – Address Book



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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 a globe icon and the text "Whatever You Want". Below the header is a navigation bar with links for "Categories", "Address Book", "Items", and "Batman". On the right side of the navigation bar is 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

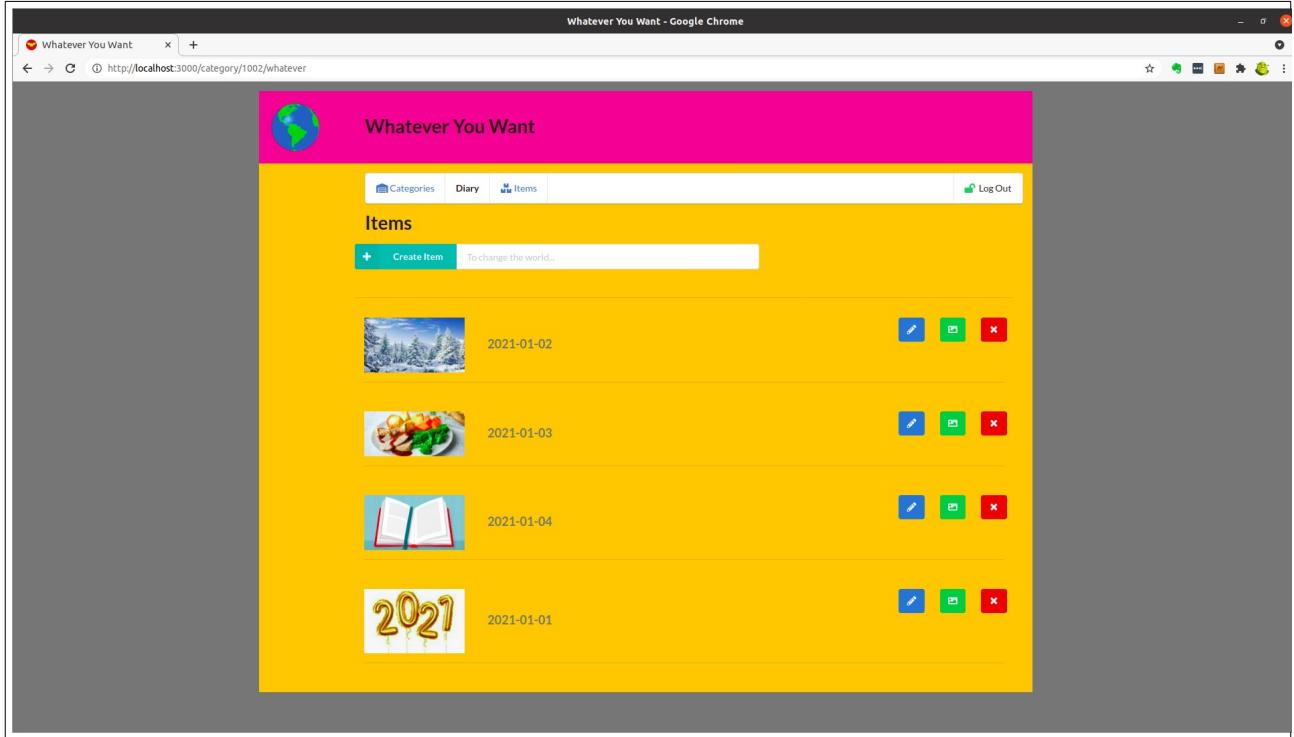
The screenshot shows the same web browser window as the previous one, but the page has been scrolled down to the bottom. The additional information section is now visible, containing the following details:

Additional Information
Butler: Alfred Pennyworth
Ward: Dick Grayson
Sidekick: Robin

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

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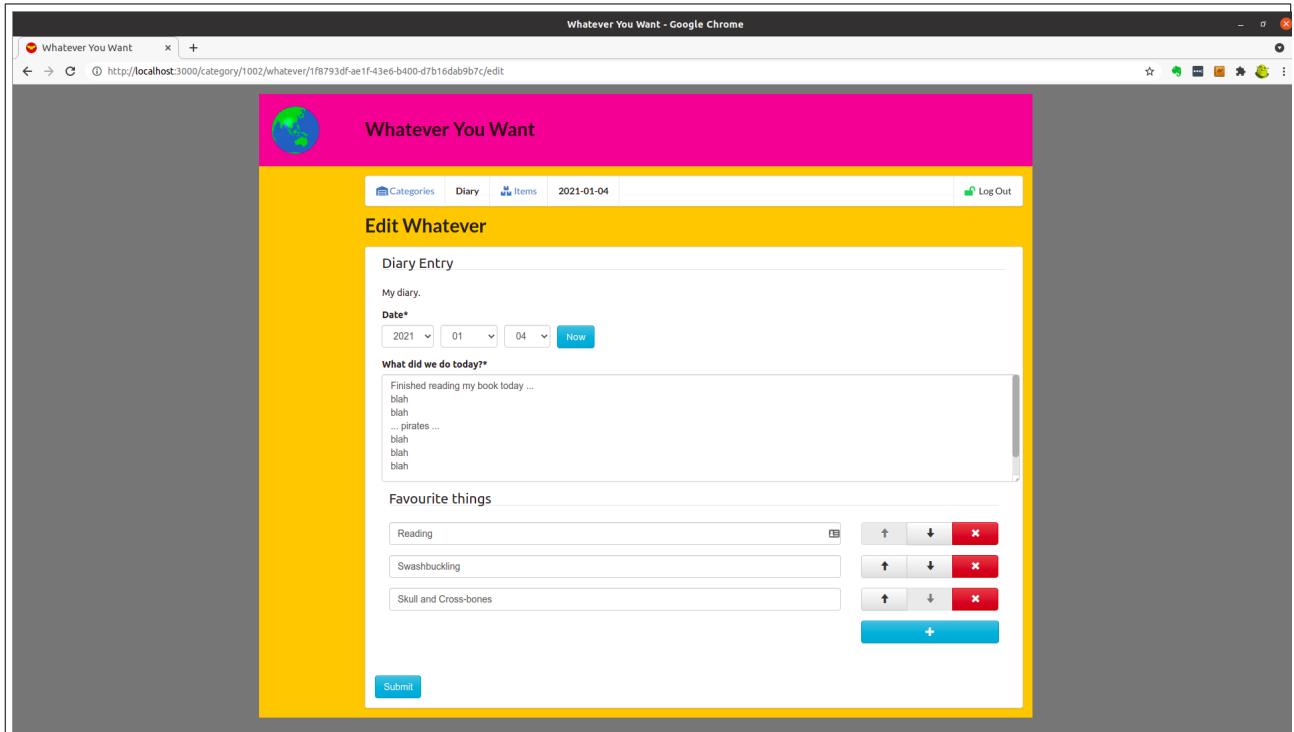
Return to Categories and Select Existing Category – Diary



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)

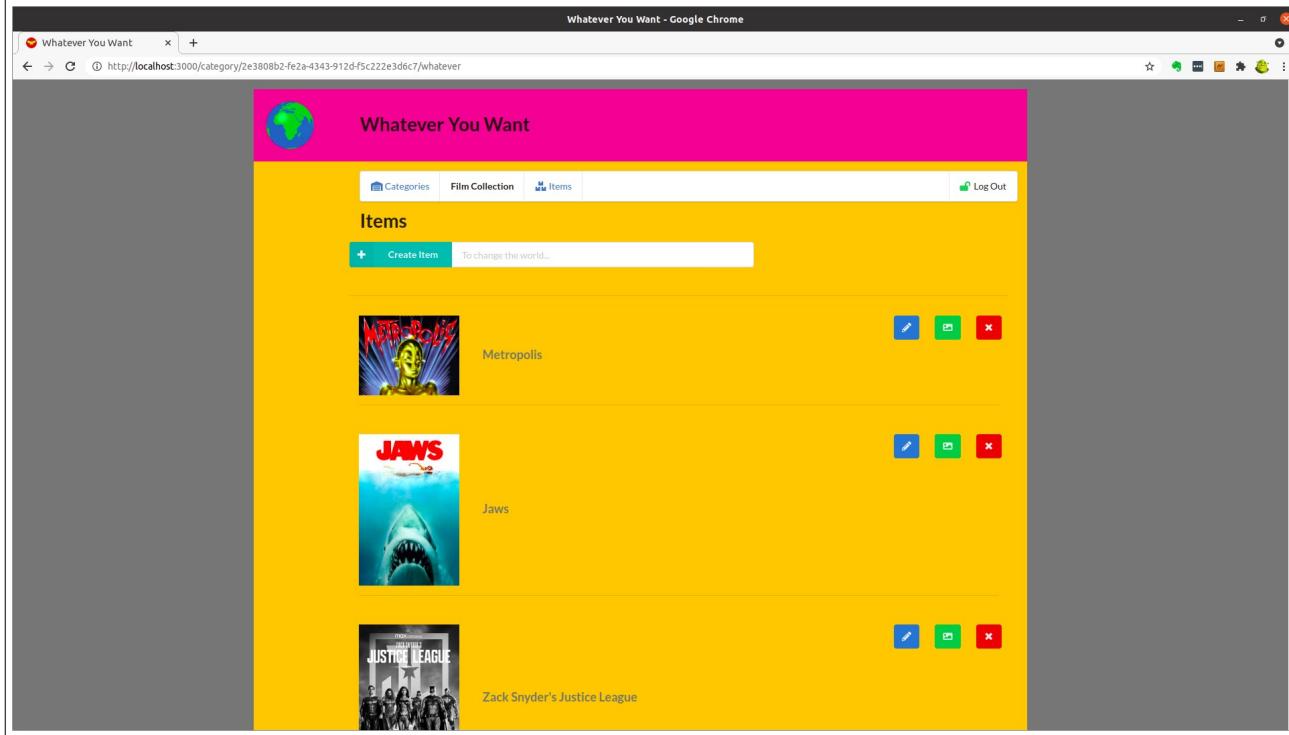
Select Existing Item – Diary - 2021-01-04



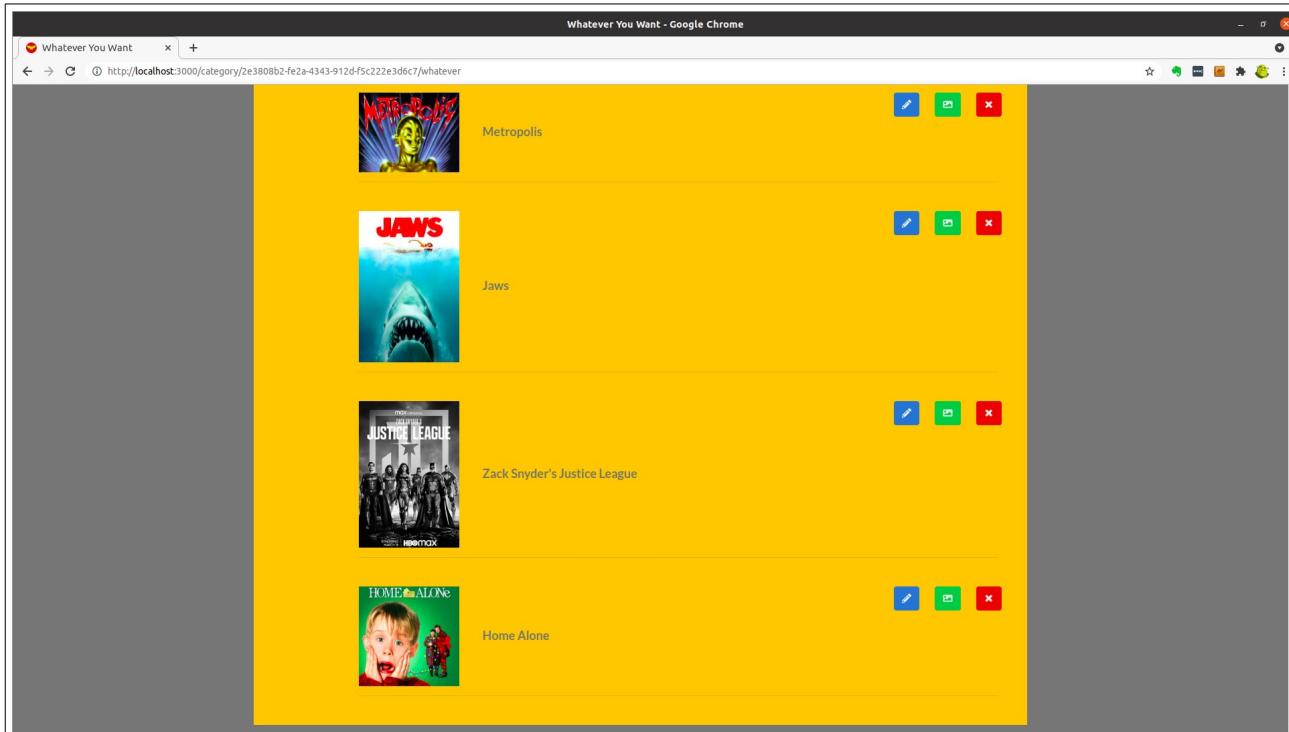
The screenshot shows a web browser window titled "Whatever You Want - Google Chrome". The URL is <http://localhost:3000/category/1002/whatever/1f8793df-ae1f-43e6-b400-d7b16dab9b7c/edit>. The page has a pink header with the title "Whatever You Want" and a globe icon. Below the header is a navigation bar 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.

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Return to Categories and Select Existing Category – Film Collection



Scroll to the Bottom of the Category – Film Collection



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

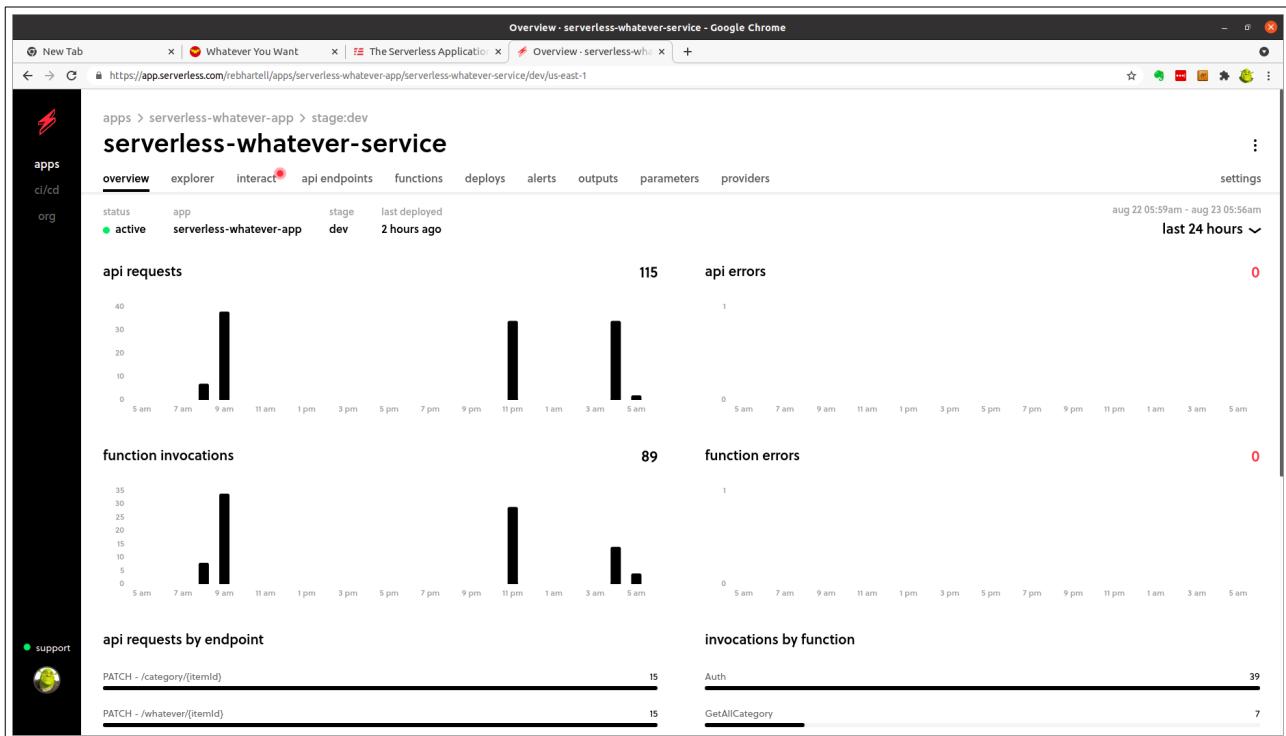
The screenshot shows a web browser window titled "Whatever You Want - Google Chrome". The URL in the address bar is <http://localhost:3000/category/2e3808b2-fe2a-4343-912d-f5c22e3d6c7/whatever/4eebd645-d82e-4ace-b2f8-65a3d9b4376c/edit>. The page has a pink header with a globe icon and the text "Whatever You Want". Below the header is a navigation bar with links for "Categories", "Film Collection", "Items", and "Zack Snyder's Justice League". There is also a "Log Out" button. The main content area is titled "Edit Whatever" and contains a "Film" section. The "Title" field is populated with "Jack Snyder's Justice League". The "Format" dropdown is set to "DVD". Under "Genre", there are three dropdown menus: "Action", "Adventure", and "Fantasy", each with up, down, and delete buttons. A large text area for "Storyline" contains 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.

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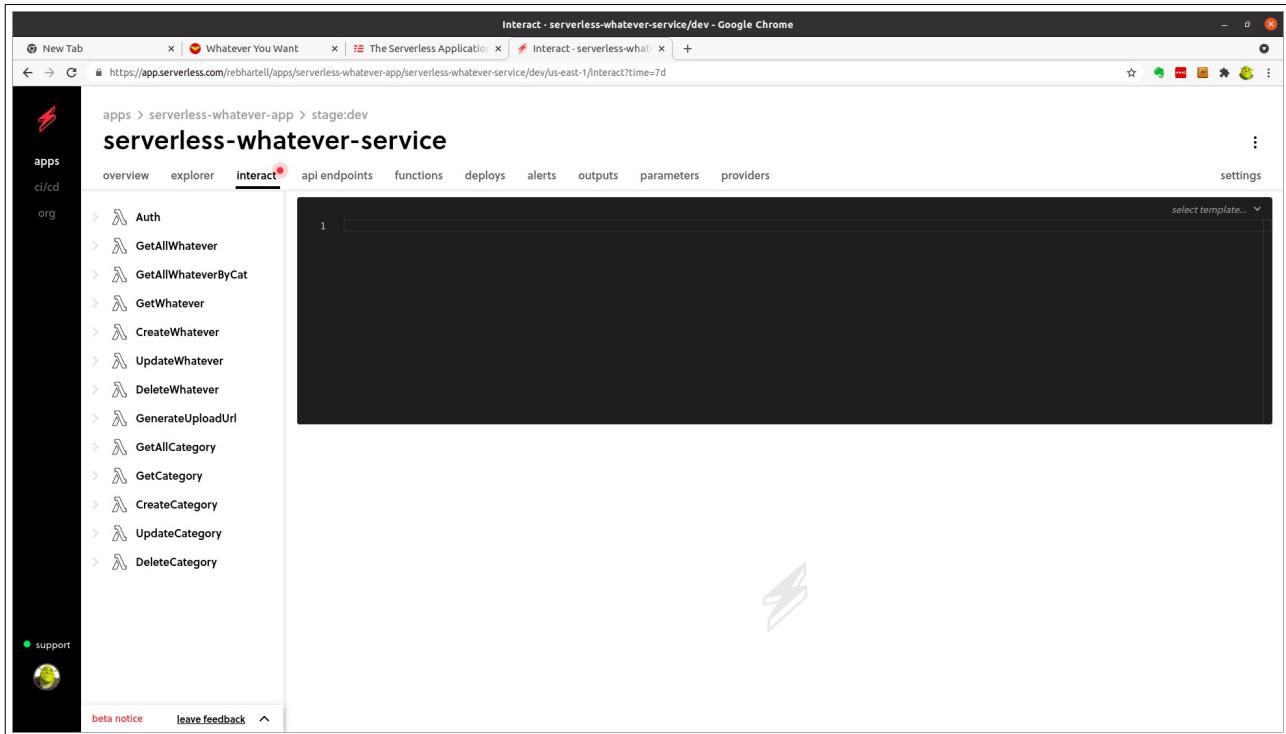
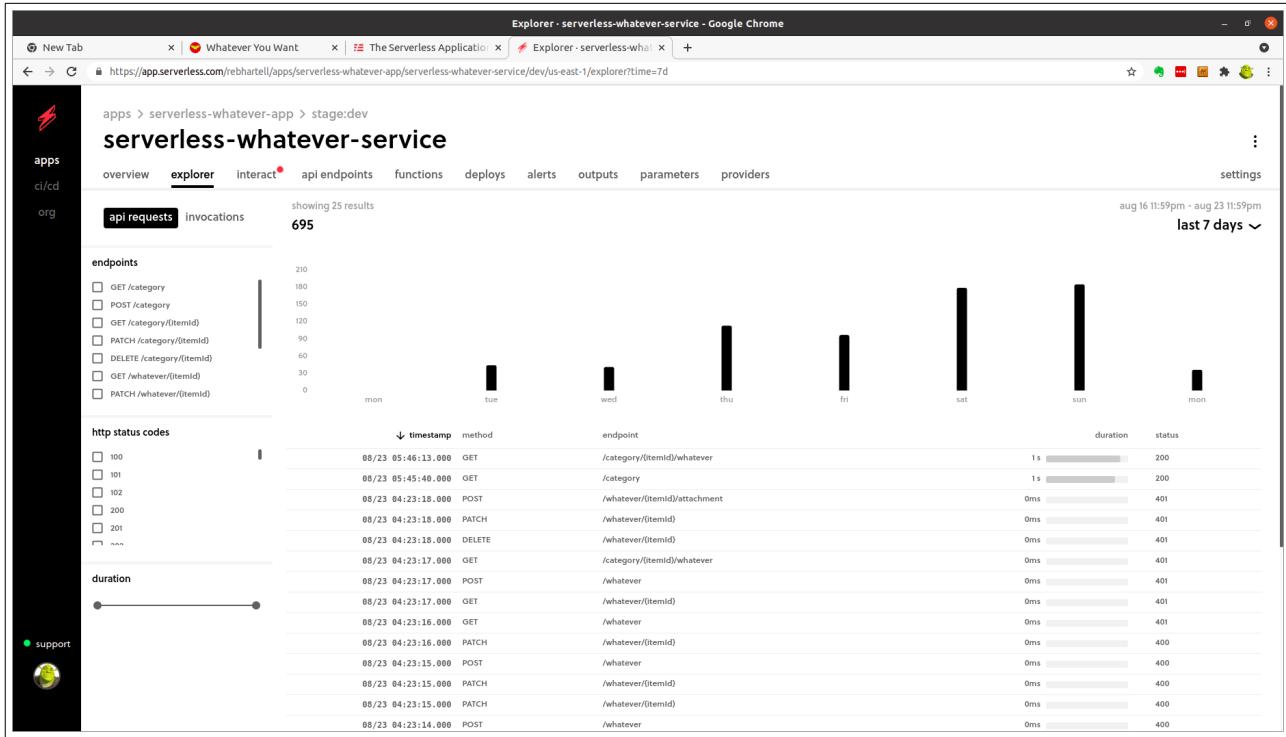
Deployed Services

Serverless.com Dashboard

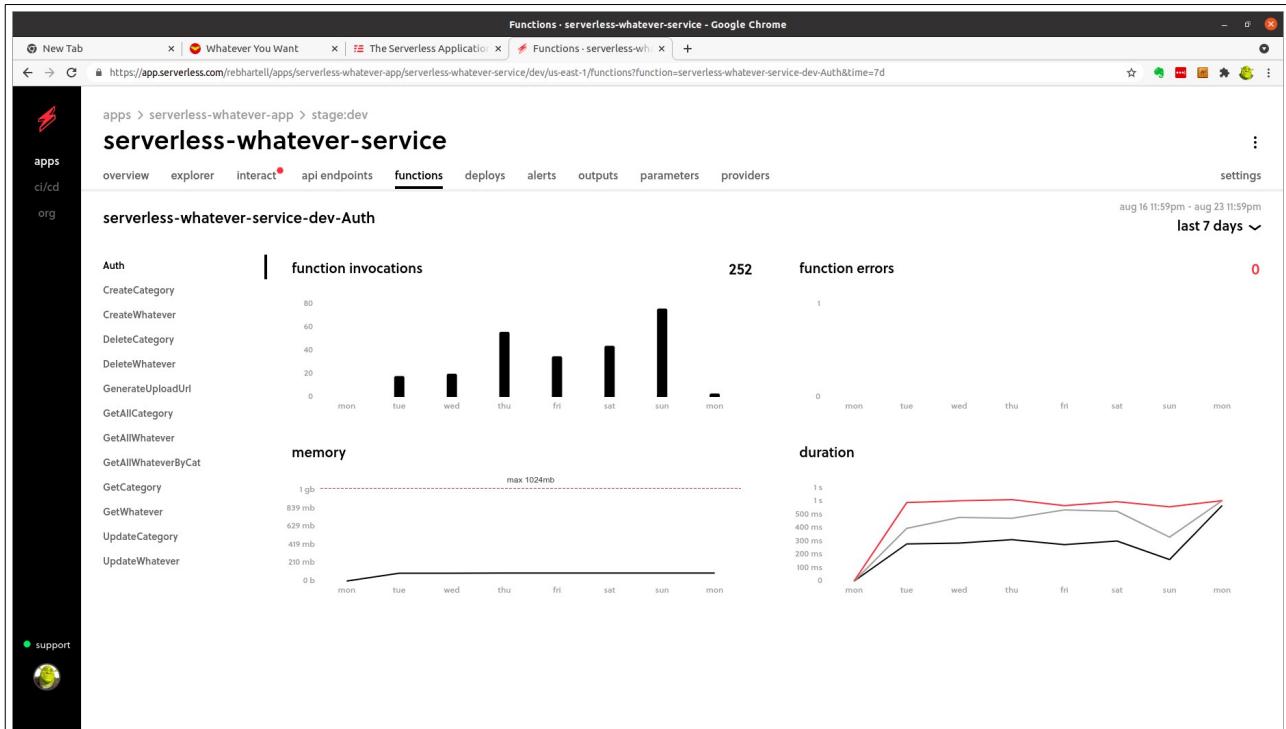
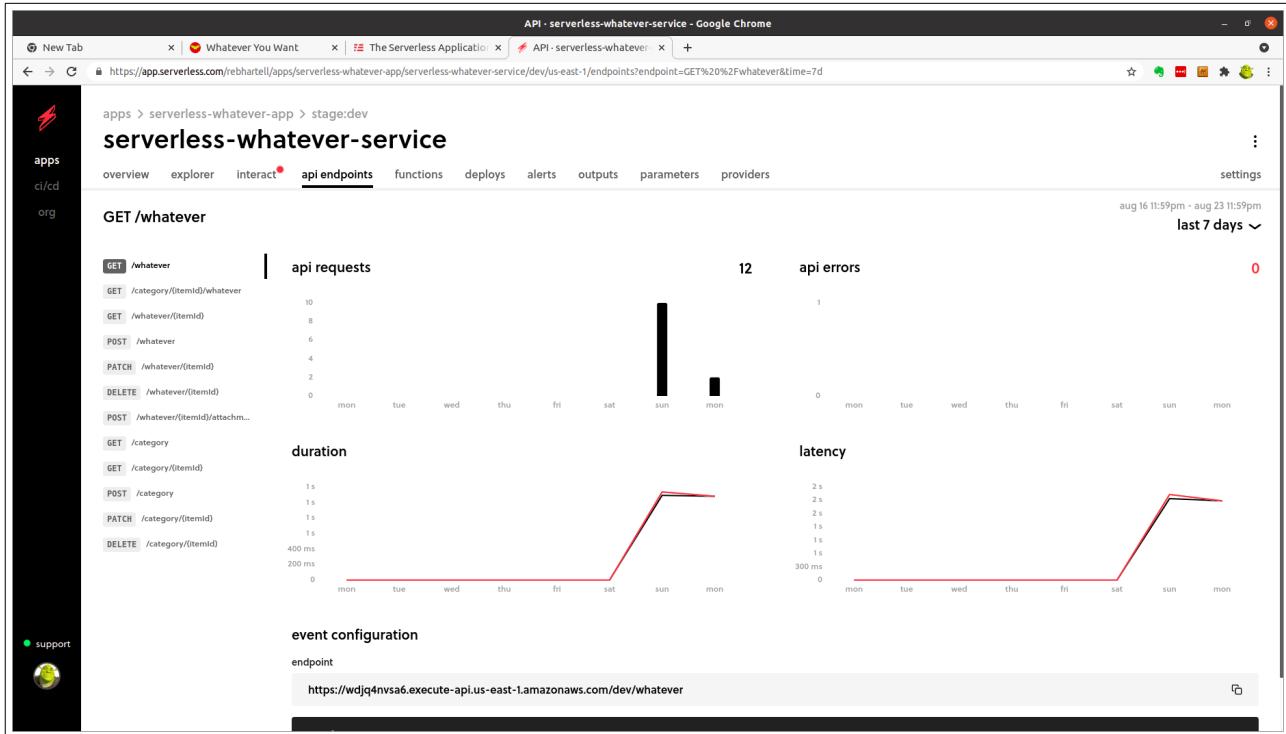
The screenshot shows the Serverless.com Apps dashboard. On the left sidebar, there are icons for 'apps', 'ci/cd', 'org', and 'support'. The main area displays a tree structure under 'apps': 'serverless-whatever-app' (expanded) > 'serverless-whatever-service' (expanded) > 'dev' (selected). A status bar at the bottom right indicates the app was deployed 2 hours ago by 'rebhartell'. The URL in the browser is <https://app.serverless.com/rebhartell>.



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The screenshot shows the 'Deployments' section of the Serverless application interface. It displays a list of deployment history entries, each with a status (e.g., SUCCESS), time, author, message, commit, and branch. A 'git metadata' panel shows the author, message, commit hash (31f971c), and branch (development). The 'outputs' section indicates 'no configured outputs'. A 'serverless config diff' panel shows the changes made to the serverless.yml file, specifically adding the 'serverless-plugin-tracing' plugin.

status	time	author	message	commit	branch
success	1 day ago, aug 22 04:55am	reb.hartell@gmail.com	RJSF working with Bootstrap and jQ...		
success	1 day ago, aug 22 04:55am	reb.hartell@gmail.com	RJSF working with Bootstrap and jQ...		
SUCCESS	7 days ago, aug 16 10:00am	reb.hartell@gmail.com	Category management works		
success	7 days ago, aug 16 09:46am	reb.hartell@gmail.com	Category management works		
success	7 days ago, aug 16 08:56am	reb.hartell@gmail.com	Category management works		
SUCCESS	1 week ago, aug 16 02:39am	reb.hartell@gmail.com	Category management works		
success	1 week ago, aug 16 02:31am	rebhartell			

The screenshot shows the 'Providers' section of the Serverless application interface. It lists the AWS provider configuration, which includes the AWS Access Role ARN (arn:awsiam::016523083343:role/SFRole-hBNyriREp) and notes that it is 'inherited from default provider'.

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AWS CloudFormation

The screenshot shows the AWS CloudFormation console with the following details:

- Stacks (2)**:
 - serverless-whatever-service-dev**: Status: **UPDATE_COMPLETE**, Last updated: 2021-08-16 02:37:46 UTC+0100.
 - SFSetup-hByriRfp**: Status: **CREATE_COMPLETE**, Last updated: 2021-08-08 00:00:11 UTC+0100.
- Template**: The template is displayed in a large text area, showing the CloudFormation JSON template for the application.

AWS IAM

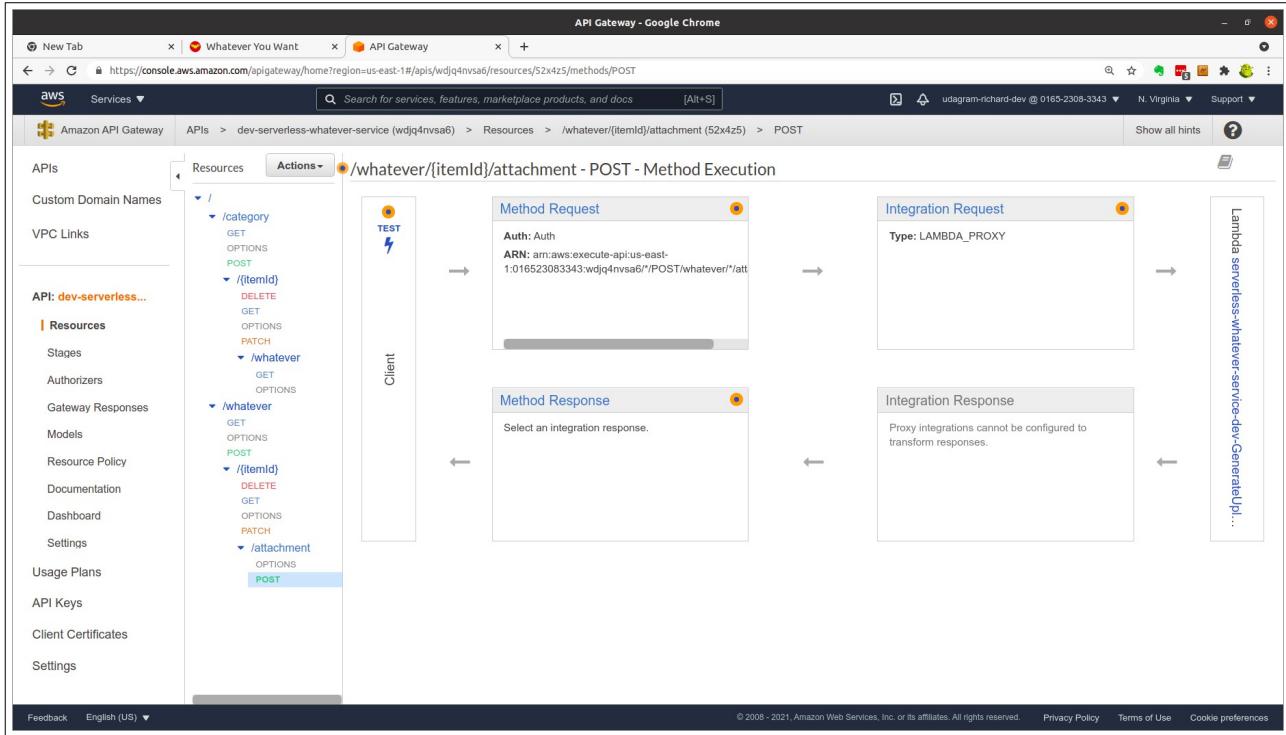
The screenshot shows the AWS IAM Management Console with the following details:

- IAM resources**: Summary table:

User groups	Users	Roles	Policies	Identity providers
1	3	46	11	1
- What's new**: A list of recent updates:
 - 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
- Quick Links**:
 - My security credentials
 - Policy simulator
 - Web identity federation playground
 - Additional information
- Related services**:
 - AWS Organizations
 - AWS Single Sign-on (SSO)

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AWS API Gateway



AWS Lambda (1)

The screenshot shows the AWS Lambda console in Google Chrome. The URL is <https://console.aws.amazon.com/lambda/home?region=us-east-1#/functions>. The left sidebar shows the Lambda service navigation. The main area displays a table of 16 Lambda functions, all created 2 hours ago. The columns include Function name, Description, Package type, Runtime, Code size, and Last modified.

Function name	Description	Package type	Runtime	Code size	Last modified
serverless-whatever-service-dev-custom-resource-apigw-cw-role	-	Zip	Node.js 12.x	10.3 kB	2 hours ago
serverless-whatever-service-dev-UpdateWhatever	-	Zip	Node.js 14.x	1.6 MB	2 hours ago
serverless-whatever-service-dev-UpdateCategory	-	Zip	Node.js 14.x	1.6 MB	2 hours ago
serverless-whatever-service-dev-GetWhatever	-	Zip	Node.js 14.x	1.6 MB	2 hours ago
serverless-whatever-service-dev-GetCategory	-	Zip	Node.js 14.x	1.6 MB	2 hours ago
serverless-whatever-service-dev-GetAllWhateverByCat	-	Zip	Node.js 14.x	1.6 MB	2 hours ago
serverless-whatever-service-dev-GetAllWhatever	-	Zip	Node.js 14.x	1.6 MB	2 hours ago
serverless-whatever-service-dev-GetAllCategory	-	Zip	Node.js 14.x	1.6 MB	2 hours ago
serverless-whatever-service-dev-GenerateUploadUrl	-	Zip	Node.js 14.x	1.6 MB	2 hours ago
serverless-whatever-service-dev-DeleteWhatever	-	Zip	Node.js 14.x	1.6 MB	2 hours ago
serverless-whatever-service-dev-DeleteCategory	-	Zip	Node.js 14.x	1.6 MB	2 hours ago
serverless-whatever-service-dev-CreateWhatever	-	Zip	Node.js 14.x	1.6 MB	2 hours ago
serverless-whatever-service-dev-CreateCategory	-	Zip	Node.js 14.x	1.6 MB	2 hours ago
serverless-whatever-service-dev-Auth	-	Zip	Node.js 14.x	563.1 kB	2 hours ago

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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 associated with the application 'serverless-whatever-service-dev'. The 'Code' tab is selected, showing the code source for the 's_UpdateWhatever' file. The code is as follows:

```
1 var serverlessSDK = require('./serverless_sdk/index.js');
2 serverlessSDK = new serverlessSDK({
3   orgId: 'redacted',
4   application: 'serverless-whatever-app',
5   appid: 'j3Ty4dnj5582397cv',
6   deploymentId: 'tfs528fa-40b8-4ec2-9b08-8371bd78337c',
7   deploymentUid: 'tfs528fa-40b8-4ec2-9b08-8371bd78337c',
8   serviceName: 'serverless-whatever-service',
9   serviceVersion: '1.0.0',
10  shouldCompressLogs: true,
11  disableAWSLogs: false,
12  disableMetrics: false,
13  stageName: 'dev',
14  serverlessPlatformStage: 'prod',
15  getRootContainer: () => {}
```

AWS S3 – serverless application

The screenshot shows the AWS S3 Objects page for the bucket 'serverless-whatever-service-dev'. 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, 08:56:07 (UTC+01:00)	1.6 MB	Standard
custom-resources.zip	zip	August 16, 2021, 08:56:05 (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

Cloud Capstone Project - Whatever You Want – Serverless Application

AWS S3 - attachments

Name	Type	Last modified	Size	Storage class
106a7a3-fdca-4d24-babe-2cdeb64f5361	-	August 16, 2021, 14:35:59 (UTC+01:00)	4.6 MB	Standard
106ab3c-8148-43fb-9621-146b2a872441	-	August 16, 2021, 13:54:26 (UTC+01:00)	344.0 KB	Standard
1f6793df-aef1-43e6-b400-d7b16dab9b7c	-	August 21, 2021, 22:57:00 (UTC+01:00)	65.0 KB	Standard
2025aaa-e282-4ad1-babe-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
4ef8fe61-49b5-42ba-bead-dbf01e4af43	-	August 21, 2021, 23:13:10 (UTC+01:00)	188.9 KB	Standard
4eebbd45-d82e-4aca-b2f8-65a3d9b4376c	-	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-b885-7406f9ff761	-	August 16, 2021, 13:53:46 (UTC+01:00)	2.5 MB	Standard
56dc504f-1f55-457a-8a20-1e50a5fdb4b8	-	August 22, 2021, 04:28:25 (UTC+01:00)	4.3 KB	Standard
69a10961-1ca0-4e6a-9909-2829ed54941	-	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
75928145-2dd4-42bd-8082-61737fe04c85	-	August 22, 2021, 04:40:12 (UTC+01:00)	537.9 KB	Standard
7abd6dd9-c9a0-4b7a-8e51-0e251e70e329	-	August 21, 2021, 23:12:38 (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-7cd563cc6ff	2021-08-22T08:04:57.155Z	<empty>
auth0 60e094fd6c07e100687db898	2e3008b2-f62a-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	942fb5b18-370a-4a6e-ab0e-e742c382f814	2021-08-23T03:22:59.174Z	<empty>
auth0 60e094fd6c07e100687db898	b0ceef50-179d-40cd-bba6-940e1365660	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-ec0290d15b4	2021-08-21T17:47:50.058Z	{"title": "Recipe Card", "type": "object", "properties": {"recipeName": {"type": ...}}

Cloud Capstone Project - Whatever You Want – Serverless Application

AWS DynamoDB – Whatever table

DynamoDB - AWS Console - Google Chrome

New Tab | Whatever You Want | DynamoDB - AWS Console | +

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

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

udagram-richard-dev @ 0185-2308-3343 N. Virginia Support

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 ▾

Scan: [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 joue094fd6c07e100687db898	4eebd645-d82e-4ac8-b2f8-b5a3d9b43/bc	https://whatever-attachments-rebh-dev.s3.amazonaws.com/4eebd645-d82...ze3808b2-1e2a-4343-912d-f5cc22e3...	
auth0 joue094fd6c07e100687db898	553297e1-daa4-4e4f-b885-7406f49fd761	https://whatever-attachments-rebh-dev.s3.amazonaws.com/553297e1-daa...1003	
auth0 joue094fd6c07e100687db898	56dc504f-1fa5-457a-8a20-1e50a5fd4b8	https://whatever-attachments-rebh-dev.s3.amazonaws.com/56dc504f-1fa5...800f55b2-ba43-4d8a-bbbb-3e47a785...	
auth0 joue094fd6c07e100687db898	69af0961-1ca0-4e6a-9909-2829e0d54941	https://whatever-attachments-rebh-dev.s3.amazonaws.com/69af0961-1ca0...2e3808b2-1e2a-4343-912d-f5cc22e3...	
auth0 joue094fd6c07e100687db898	6e599171-4076-47c8-8304-63496cdce726	https://whatever-attachments-rebh-dev.s3.amazonaws.com/6e599171-4076...800f55b2-ba43-4d8a-bbbb-3e47a785...	
auth0 joue094fd6c07e100687db898	7abd6dd9-c9a0-4b7a-8e51-0e251e70e329	https://whatever-attachments-rebh-dev.s3.amazonaws.com/7abd6dd9-c9a0...2e3808b2-1e2a-4343-912d-f5cc22e3...	
auth0 joue094fd6c07e100687db898	a41505d5-e82e-44d1-9729-a6b46311d5a2	https://whatever-attachments-rebh-dev.s3.amazonaws.com/a41505d5-e82...1002	
auth0 joue094fd6c07e100687db898	aca546d1-cabb-4833-bd6c-3a53-505eb0	https://whatever-attachments-rebh-dev.s3.amazonaws.com/aca546d1-cabb...2e3808b2-1e2a-4343-912d-f5cc22e3...	
auth0 joue094fd6c07e100687db898	b90224fb-25b2-4dd8-9475-401d3ec55c13	https://whatever-attachments-rebh-dev.s3.amazonaws.com/b90224fb-25b2...f2672bf3-420d-4e48-818f-ec0290d1b...	
auth0 joue094fd6c07e100687db898	c4b423db-8a96-4b21-bd8c-482e143c1b7d	null	69e96829-c04e-40b4-8b3c-3422da3e...
auth0 joue094fd6c07e100687db898	da950131-1680-49c9-9786-48cb3f3ae64	https://whatever-attachments-rebh-dev.s3.amazonaws.com/da950131-168...	800f55b2-ba43-4d8a-bbbb-3e47a785...
auth0 joue094fd6c07e100687db898	e37694a9-c93c-49b6-9706-ecab680a44a	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 | +

https://console.aws.amazon.com/cloudwatch/home?region=us-east-1#logsV2:log-groups/log-group/\$252Faws\$252Flambda\$252Fserverless-whatever-service-dev-GetAllWhateverByCat/log-events/2021\$252F08\$252F23\$252F... | Search for services, features, marketplace products, and docs | [Alt+S]

AWS Services ▾

CloudWatch New menu experience

Favorites ▾

Dashboards

Alarms ▾ Actions Clear 1m 30m 1h 12h Custom Filter events

In alarm

All alarms

Billing

Logs

Log groups

Logs Insights

Metrics

All metrics

Explorer

Streams

Events

Application monitoring

Insights

Settings

Getting Started

CloudWatch Management Console - Google Chrome

CloudWatch > Log groups > /aws/lambda/serverless-whatever-service-dev-GetAllWhateverByCat > 2021/08/23/[\$LATEST]d7d3ae547a2490586a8d35f4e6e7efe

Log events

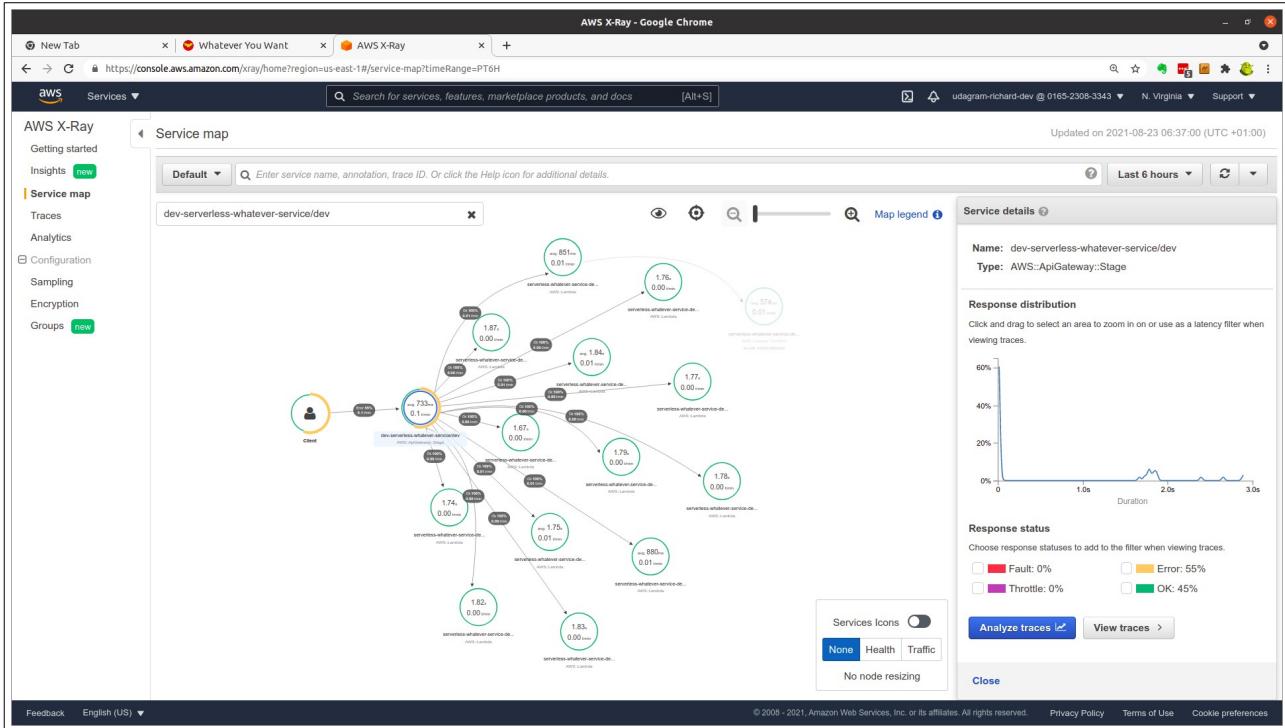
You can use the filter bar below to search for and match terms, phrases, or values in your log events. [Learn more about filter patterns](#)

View as text Filter Actions Create Metric Filter

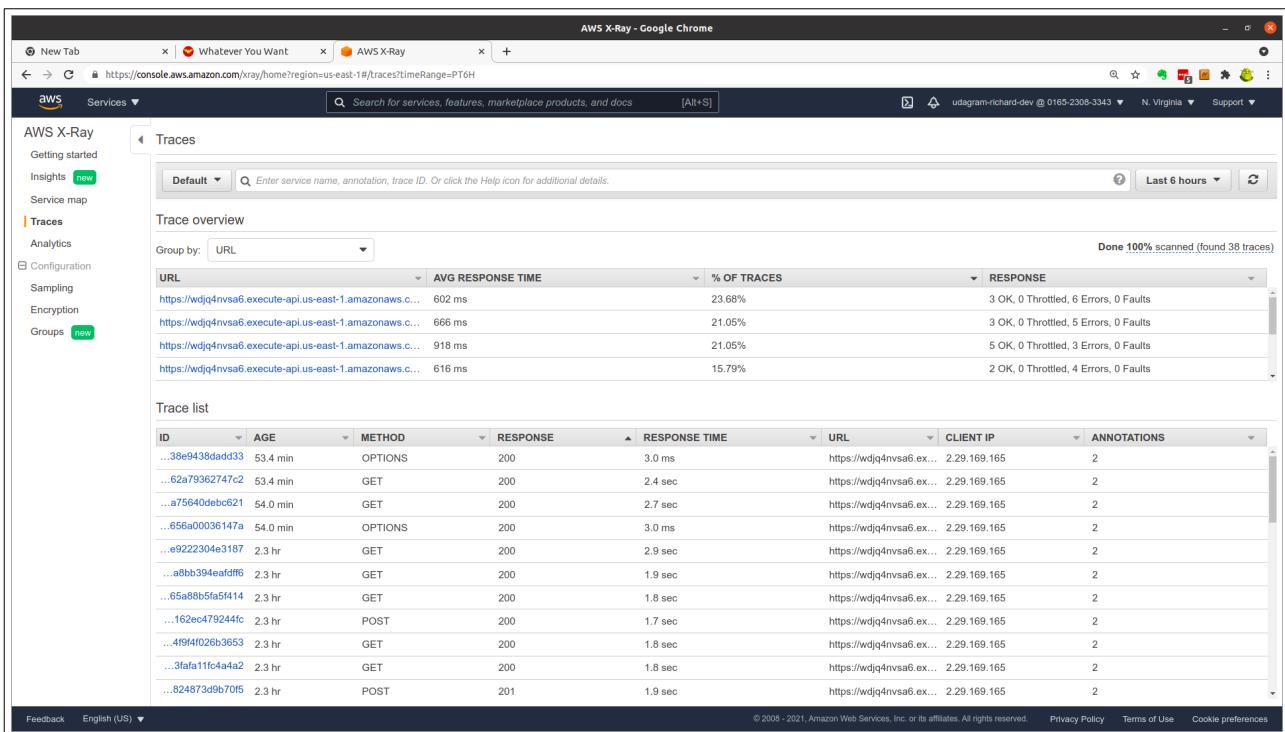
	Timestamp	Message
No older events at this moment. <i>Retry</i>		
▶	2021-08-23T05:46:14.676+01:00	START RequestId: 50309661-637f-45f1-95be-cc1bef07eb5 Version: \$LATEST
▶	2021-08-23T05:46:14.685+01:00	{"name": "lambda://http/getAllWhateverByCategory", "event": {"resource": "/category/{itemId}/whatever", "path": "/category/2e3808b2-fe2a-4343-912d-f..."}, "method": "GET", "headers": {"host": "127.0.0.1:3000", "user-agent": "aws-lambda/1.4.0"}, "stage": "\$LATEST", "pathParameters": {"itemId": "2e3808b2-fe2a-4343-912d-f..."}, "queryStringParameters": {}, "cookies": {}, "body": null}
▶	2021-08-23T05:46:14.686+01:00	{"name": "businessLogic/whateverBusiness", "userId": "auth0 60e094fd6c07e100687db898", "categoryId": "2e3808b2-fe2a-4343-912d-f..."}, "method": "GET", "headers": {"host": "127.0.0.1:3000", "user-agent": "aws-lambda/1.4.0"}, "stage": "\$LATEST", "pathParameters": {"category": "2e3808b2-fe2a-4343-912d-f..."}, "queryStringParameters": {}, "cookies": {}, "body": null}
▶	2021-08-23T05:46:14.686+01:00	{"name": "dataLayer/WhateverDatabaseAccess", "userId": "auth0 60e094fd6c07e100687db898", "categoryId": "2e3808b2-fe2a-4343-912d-f..."}, "method": "GET", "headers": {"host": "127.0.0.1:3000", "user-agent": "aws-lambda/1.4.0"}, "stage": "\$LATEST", "pathParameters": {"category": "2e3808b2-fe2a-4343-912d-f..."}, "queryStringParameters": {}, "cookies": {}, "body": null}
▶	2021-08-23T05:46:15.652+01:00	{"name": "businessLogic/whateverBusiness", "whateverItems": "[]"}, "level": "INFO", "message": "getAllWhateverByCategory - retrieved all whatever for ...", "method": "GET", "headers": {"host": "127.0.0.1:3000", "user-agent": "aws-lambda/1.4.0"}, "stage": "\$LATEST", "pathParameters": {"category": "2e3808b2-fe2a-4343-912d-f..."}, "queryStringParameters": {}, "cookies": {}, "body": null}
▶	2021-08-23T05:46:15.794+01:00	{"name": "lambda://http/getAllWhateverByCategory", "items": [{"attachmentUrl": "https://whatever-attachments-reb-h-dev.s3.amazonaws.com/ca546d1-ca..."}], "method": "GET", "headers": {"host": "127.0.0.1:3000", "user-agent": "aws-lambda/1.4.0"}, "stage": "\$LATEST", "pathParameters": {"category": "2e3808b2-fe2a-4343-912d-f..."}, "queryStringParameters": {}, "cookies": {}, "body": null}
▶	2021-08-23T05:46:15.805+01:00	2021-08-23T04:46:15.805Z 50309661-637f-45f1-95be-cc1bef07eb5 INFO SERVERLESS_ENTERPRISE {"c":true,"b":"H4sIAAAAAAAA7VXbN/bNhD+K4awDyOWyRR..."}, "method": "GET", "headers": {"host": "127.0.0.1:3000", "user-agent": "aws-lambda/1.4.0"}, "stage": "\$LATEST", "pathParameters": {"category": "2e3808b2-fe2a-4343-912d-f..."}, "queryStringParameters": {}, "cookies": {}, "body": null}
▶	2021-08-23T05:46:15.809+01:00	END RequestId: 50309661-637f-45f1-95be-cc1bef07eb5
▶	2021-08-23T05:46:15.809+01:00	REPORT RequestId: 50309661-637f-45f1-95be-cc1bef07eb5 Duration: 1132.12 ms Billed Duration: 1133 ms Memory Size: 1024 MB Max Memory Used: 2...
No newer events at this moment. <i>Auto retry paused. Resume</i>		

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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"  
,  
    }  
  }  
}
```

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UI Schema

```
{  
  "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"  
  },  
}
```

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```
"postcode": {  
    "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"  
    }  
  }  
}
```

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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": {  
    }
```

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```
"type": "integer",
"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": {
```

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```
"ui:widget": "updown"
},
"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"
}
}
```