

CS3219 OTOT Assignment

Task B: CRUD Application Task

(a) Student Name and Matriculation Number

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(b) Link to the GitHub repository

<https://github.com/oongjiexiang/CS3219-OTOT-Tasks>

(c) Instructions on how to

Run the API locally, including Postman calls used to demonstrate a working API

After cloning by using `git clone https://github.com/oongjiexiang/CS3219-OTOT-Tasks.git`, proceed with the tasks below.

1. At the root folder, run `npm install` in the terminal to install the node modules
2. `npm start` to start the server (Backend server as this task is for B1). The server listens at port 3000
3. In Postman, the configurations are as follows:

GET

Successful GET all jobs

GET `http://localhost:3000/job` Send

Params Authorization Headers (6) Body Pre-request Script Tests Settings Cookies

Body Cookies Headers (8) Test Results Status: 200 OK Time: 24 ms Size: 1.47 KB Save Response

Pretty Raw Preview Visualize JSON

```
1 {
2   {
3     "_id": "6184ce17c797e65bb0dbc64d",
4     "title": "Research Assistant",
5     "description": "Prepare documents and research findings for the landscape of maritime environment in Singapore. Must possess good Excel skills.",
6     "salary": 8,
7     "__v": 0
8   },
9   {
10    "_id": "6184ce43c797e65bb0dbc650",
```

Successfully GET one job

GET `http://localhost:3000/job/6184ce17c797e65bb0dbc64d` Send

Params Authorization Headers (6) Body Pre-request Script Tests Settings Cookies

Body Cookies Headers (8) Test Results Status: 200 OK Time: 20 ms Size: 505 B Save Response

Pretty Raw Preview Visualize JSON

```
1 {
2   "result": {
3     "_id": "6184ce17c797e65bb0dbc64d",
4     "title": "Research Assistant",
5     "description": "Prepare documents and research findings for the landscape of maritime environment in Singapore. Must possess good Excel skills.",
6     "salary": 8,
7     "__v": 0
8   }
9 }
```

Fail to GET a job as there is no such job ID

GET `http://localhost:3000/job/no-such-id` Send

Params Authorization Headers (6) Body Pre-request Script Tests Settings Cookies

Body Cookies Headers (8) Test Results Status: 404 Not Found Time: 16 ms Size: 297 B Save Response

Pretty Raw Preview Visualize JSON

```
1 {
2   "message": "Not found"
3 }
```

POST

Successfully POST a job

The screenshot displays the REST Client interface. At the top, a POST request is configured to `http://localhost:3000/job`. The 'Body' tab is selected, showing a JSON payload: `{ "title": "Research Assistant", "description": "Prepare documents and research findings for the landscape of maritime environment in Singapore. Must possess good Excel skills", "salary": "10", "jobType": "Research", "contact": "Ms. Fiona Lim at fiona@yahoo.com" }`. The 'Send' button is visible in the top right. Below the request, the response is shown with a status of 200 OK, a time of 27 ms, and a size of 290 B. The response body is `{ "message": "Job added" }`.

Fail to POST a job as `title` is not provided

POST

http://localhost:3000/job

Send

Params

Authorization

Headers (8)

Body

Pre-request Script

Tests

Settings

Cookies

Beautiful

none

form-data

x-www-form-urlencoded

raw

binary

GraphQL

JSON

```
1 {
2   ... "description": "Prepare documents and research findings for the landscape of maritime environment in Singapore. Must possess good Excel
3     skills",
4   ... "salary": "10",
5   ... "jobType": "Research",
6   ... "contact": "Ms. Fiona Lim at fiona@yahoo.com"
7 }
```

Body

Cookies

Headers (8)

Test Results

Status: 400 Bad Request

Time: 9 ms

Size: 362 B

Save Response

Pretty

Raw

Preview

Visualize

JSON

```
1 {
2   "message": "Job not created. Ensure that salary is an integer, and title is supplied"
3 }
```

Fail to POST a job as salary is not an integer

POST

http://localhost:3000/job

Send

Params

Authorization

Headers (8)

Body

Pre-request Script

Tests

Settings

Cookies

Beautiful

none

form-data

x-www-form-urlencoded

raw

binary

GraphQL

JSON

```
1 {
2   ... "title": "Research assistant",
3   ... "description": "Prepare documents and research findings for the landscape of maritime environment in Singapore. Must possess good Excel
      skills",
4   ... "salary": "not-an-integer",
5   ... "jobType": "Research",
6   ... "contact": "Ms. Fiona Lim at fiona@yahoo.com"
7 }
```

Body

Cookies

Headers (8)

Test Results

Status: 400 Bad Request

Time: 38 ms

Size: 362 B

Save Response

Pretty

Raw

Preview

Visualize

JSON

```
1 {
2   "message": "Job not created. Ensure that salary is an integer, and title is supplied"
3 }
```

PUT

Successfully UPDATE a job

PUT

http://localhost:3000/job/6184ce43c797e65bb0dbc650

Send

Params Authorization Headers (8) **Body** Pre-request Script Tests Settings Cookies Beautify

none form-data x-www-form-urlencoded raw binary GraphQL JSON

```
1 {
2   ...: "title": "Librarian (update!)",
3   ...: "description": "Take care of all books, assist senior librarians in daily tasks.",
4   ...: "salary": 10
5 }
```

Body Cookies Headers (8) Test Results Status: 200 OK Time: 41 ms Size: 301 B Save Response

Pretty Raw Preview Visualize JSON

```
1 {
2   "message": "Successfully updated"
3 }
```

Fail to UPDATE a job as there is no such job ID

PUT

http://localhost:3000/job/no-such-id

Send

Params Authorization Headers (8) **Body** Pre-request Script Tests Settings Cookies Beautify

none form-data x-www-form-urlencoded raw binary GraphQL JSON

```
1 {
2   ...: "title": "Librarian (update!)",
3   ...: "description": "Take care of all books, assist senior librarians in daily tasks.",
4   ...: "salary": 10
5 }
```

Body Cookies Headers (8) Test Results Status: 404 Not Found Time: 7 ms Size: 313 B Save Response

Pretty Raw Preview Visualize JSON

```
1 {
2   "message": "No such job id no-such-id"
3 }
```

DELETE

Successfully DELETE a job

DELETE

http://localhost:3000/job/6176ba2ad0066d61be53e5c2

Send

Params Authorization Headers (6) **Body** Pre-request Script Tests Settings Cookies Beautify

none form-data x-www-form-urlencoded raw binary GraphQL JSON

```
1 {
2   ...: "title": "Librarian (update!)",
3   ...: "description": "Take care of all books, assist senior librarians in daily tasks.",
4   ...: "salary": 10
5 }
```

Body Cookies Headers (8) Test Results Status: 200 OK Time: 29 ms Size: 301 B Save Response

Pretty Raw Preview Visualize JSON

```
1 {
2   "message": "Successfully deleted"
3 }
```

Fail to DELETE a job as there is no such job ID

DELETE

http://localhost:3000/job/no-such-id

Send

Params Authorization Headers (6) **Body** Pre-request Script Tests Settings Cookies Beautify

none form-data x-www-form-urlencoded raw binary GraphQL JSON

```
1 {
2   ...: "title": "Librarian (update!)",
3   ...: "description": "Take care of all books, assist senior librarians in daily tasks.",
4   ...: "salary": 10
5 }
```

Body Cookies Headers (8) Test Results Status: 400 Bad Request Time: 21 ms Size: 301 B Save Response

Pretty Raw Preview Visualize JSON

```
1 {
2   "message": "No such job"
3 }
```

1. To try out the deployed endpoints, simply replace `http://localhost:3000` with `https://cs3219-otot-b1.herokuapp.com/` or `https://cs3219-otot-b3-ojx-mv57od22ua-uc.a.run.app/`
2. **Assumption made:** Valid JSON string is always passed

Access the deployed API (B1/B3)

1. When attempting B1 initially, backend was deployed on [Heroku \(https://cs3219-otot-b1.herokuapp.com/\)](https://cs3219-otot-b1.herokuapp.com/) as well
2. [Cloud Run \(https://cs3219-otot-b3-ojx-mv57od22ua-uc.a.run.app/\)](https://cs3219-otot-b3-ojx-mv57od22ua-uc.a.run.app/) is then the serverless service (for B3) used to deploy the backend
 - To have ContinuousDeployment, I wrote a Dockerfile (found in root folder) and added additional workflow actions in `.github/workflows/node.js.yml`. The code for B3 is shown in the screenshot below. Essentially, it checks out the branch, builds and image, and then deploy this image. `gcloud` image is used to execute these actions.
 - Note: The code is referred from [Towards Data Science article \(https://towardsdatascience.com/deploy-to-google-cloud-run-using-github-actions-590ecf957af0\)](https://towardsdatascience.com/deploy-to-google-cloud-run-using-github-actions-590ecf957af0)

```

39 ✓ --setup-build-publish-deploy:
40   --name: Setup, Build, Publish, and Deploy
41   --runs-on: ubuntu-latest
42   --needs: build
43   --steps:
44 ✓   -- name: Checkout
45   -- uses: actions/checkout@v2
46
47   --# Setup gcloud CLI
48 ✓   -- uses: google-github-actions/setup-gcloud@master
49 ✓   -- with:
50   --   service_account_email: ${{ secrets.GCP_EMAIL }}
51   --   service_account_key: ${{ secrets.GCP_CREDENTIALS }}
52   --   export_default_credentials: true
53
54   --# Configure Docker with Credentials
55 ✓   -- name: Configure Docker
56 ✓   -- run: |
57   --   gcloud auth configure-docker
58   --
59   --# Build the Docker image
60 ✓   -- name: Build & Publish
61 ✓   -- run: |
62   --   gcloud config set project ${{ secrets.GCP_PROJECT }}
63   --   gcloud builds submit --tag gcr.io/${{ secrets.GCP_PROJECT }}/${{ secrets.GCP_APPLICATION }}
64   --   gcloud config set run/region us-central1
65   --
66   --# Deploy the Docker image to the GKE cluster
67 ✓   -- name: Deploy
68 ✓   -- run: |
69   --   gcloud run deploy ${{ secrets.GCP_APPLICATION }} --image gcr.io/${{ secrets.GCP_PROJECT }}/${{ secrets.GCP_APPLICATION }} \
70   --   --platform managed \
71   --   --allow-unauthenticated \
72   --   --memory 512M

```

- If the build is successful, a green tick will be shown beside the trigger name

Filter Enter property name or value									
<input type="checkbox"/>	Status	Build	Source	Ref	Commit	Trigger Name	Created	Duration	
<input type="checkbox"/>	✓	b8d41afc	Google Cloud Storage	-	-	-	11/5/21, 9:24 PM	37 sec	⋮
<input type="checkbox"/>	✓	4473f062	oongjexiang/CS3219-OTOT-T...	main	a870548	rmgpgab-cs3219-otot-tasks-us-central1-oongjie...	11/5/21, 9:22 PM	28 sec	⋮ ▼
<input type="checkbox"/>	✓	c33246e9	Google Cloud Storage	-	-	-	11/5/21, 9:14 PM	35 sec	⋮
<input type="checkbox"/>	✓	b9891086	oongjexiang/CS3219-OTOT-T...	main	eda8c2f	rmgpgab-cs3219-otot-tasks-us-central1-oongjie...	11/5/21, 9:13 PM	29 sec	⋮ ▼

- The following screenshot shows the build logs

Successful: b8d41afc

Source
gs://otot-task-b-330600_cloudbuild/source/1636118646.841191-d297a8b030004ae2bd6ab364f1b14519.tgz

Started on Nov 5, 2021, 9:24:08 PM

Steps	Duration	BUILD LOG	EXECUTION DETAILS
Build Summary 1 Step	00:00:37	<input type="checkbox"/> Wrap lines <input type="checkbox"/> Show newest entries first	EXPAND VIEW RAW
0: gcr.io/cloud-builders/docker build --network cloudbuild --no-cache -t g...	00:00:20		

Run tests locally and via GitHub (B2)

To test locally, run `npm test` in the terminal

```
C:\Users\oongj\Desktop\OTOT\B>npm test

> b@1.0.0 test
> mocha ./test --exit

Listening at 3000

Job API
  POST /job/
Database connected
  ✓ It should POST a job's info (83ms)
  ✓ It should NOT POST a job's info without title
  ✓ It should POST a job without salary when salary is not a Number
  GET /job/
  ✓ It should GET a job's info
  ✓ It should Not GET a job's info
  UPDATE /job/
  ✓ It should UPDATE a job's info when the ID specified is correct
  ✓ It should NOT UPDATE a job when the ID specified does not exist
  ✓ It should UPDATE a job without salary when salary is not an integer
  DELETE /job/:id
  ✓ It should DELETE a job when the database is online
  ✓ It should NOT DELETE a job when there is no such ID

Student API
  POST /student/
  ✓ It should POST a student's info
  ✓ It should NOT POST a student's info without age

12 passing (355ms)
```

To test on GitHub, I wrote `.github/workflows/node.js.yml` to trigger testing on every push or pull request from `main` branch, where GitHub will run `npm test` itself. The code for B2 is shown in the screenshot below. Essentially, for every combination of (node version, mongoDB version) combination specified, GitHub Action will

1. Checkout the branch
2. Set up Node.js environment
3. Set up MongoDB environment
4. Run the build
5. Run tests (`npm test`)

```

4   name: Node.js CI
5
6   on:
7     push:
8       branches: [ main ]
9     pull_request:
10      branches: [ main ]
11
12   jobs:
13     build:
14
15       runs-on: ubuntu-latest
16
17       strategy:
18         matrix:
19           node-version: [ 14.x, 16.x ]
20           mongodb-version: [ '4.2', '4.4' ]
21
22       steps:
23         - uses: actions/checkout@v2
24         - name: Use Node.js ${{ matrix.node-version }}
25           uses: actions/setup-node@v2
26           with:
27             node-version: ${{ matrix.node-version }}
28             cache: 'npm'
29
30         - name: Start MongoDB
31           uses: supercharge/mongodb-github-action@1.6.0
32           with:
33             mongodb-version: ${{ matrix.mongodb-version }}
34
35         - run: npm ci
36         - run: npm run build --if-present
37         - run: npm test

```

- The two screenshots below illustrate how GitHub Action (CI tool used in this task) reports the test results

All workflows

Showing runs from all workflows

18 workflow runs		Event ▾	Status ▾	Branch ▾	Actor ▾
✓	finished B1,2,3,4 Node.js CI #12: Commit a870548 pushed by oongjiexiang			main	7 days ago 2m 11s ...
✓	successfully combined workflow Node.js CI #11: Commit eda8c2f pushed by oongjiexiang			main	7 days ago 2m 11s ...

- Detailed build logs when clicking into one triggered action

✓ finished B1,2,3,4 Node.js CI #12

Summary

Jobs

✓ build (14.x, 4.2)

✓ build (14.x, 4.4)

✓ build (16.x, 4.2)

✓ build (16.x, 4.4)

✓ Setup, Build, Publish, and Deploy

build (14.x, 4.2)

succeeded 7 days ago in 30s

- > ✓ Set up job
- > ✓ Build supercharge/mongodb-github-action@1.6.0
- > ✓ Run actions/checkout@v2
- > ✓ Use Node.js 14.x
- > ✓ Start MongoDB
- > ✓ Run npm ci
- > ✓ Run npm run build --if-present
- > ✓ Run npm test
- > ✓ Post Use Node.js 14.x
- > ✓ Post Run actions/checkout@v2
- > ✓ Complete job

Set up frontend (B4)

1. `cd frontend`
2. `npm start` to begin the frontend server. Note that all frontend communicates with the deployed backend by Cloud Run
3. `Bootstrap` is used (`index.html`) to quick-start styling

When the server starts, it will direct the browser to the home page. GET request is launched

Jobs Available

[Home](#) [Create Job](#)

Opportunities

Research Assistant

Update

Salary per hour: \$8

Prepare documents and research findings for the landscape of maritime environment in Singapore. Must possess good Excel skills.

Librarian

Update

Salary per hour: \$10

Take care of all books, assist senior librarians in daily tasks.

Peer Tutor

Update

Salary per hour: \$12

Helping students who face difficulties in Operating Systems course. Create revision materials, understanding their problems, and provide mentorship

Clicking on a job card leads to the Job Detail Page. This launches a request to GET only one job. Click on the 'Delete' button to launch a DELETE request

Jobs Available

[Home](#) [Create Job](#)

Research Assistant

Delete

Salary: \$8

Job Category: Not Available

Description

Prepare documents and research findings for the landscape of maritime environment in Singapore. Must possess good Excel skills.

Contact person

Not Available

From the Home Page, click on 'Update' button to proceed to Update Page. In the Job Update Page as shown in the screenshot below, click 'Update' to update the job details.

Jobs Available

[Home](#) [Create Job](#)

Job Title

Description

Salary per hour

Job Type

Update

To create a job, click 'Create Job' at the navigation bar atop the website, fill up the form and click 'Submit' to launch a POST request

Jobs Available

[Home](#) [Create Job](#)

Job Title

Description

Salary per hour

Job Type

Create Job