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

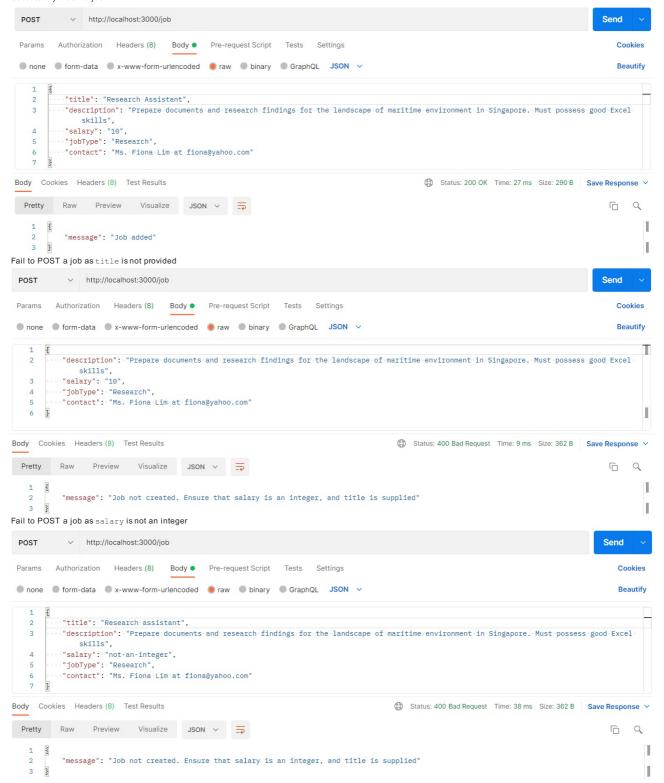### Run the API locally, including Postman calls used to demonstrate a working API

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
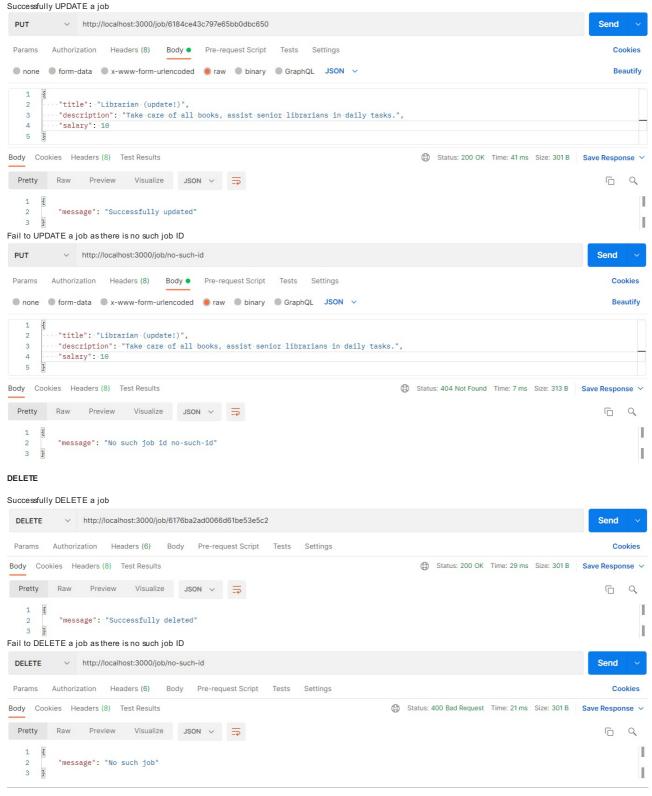3. In Postman, the configurations are as follows:

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

| POST | ∨ | http://localhost:3000/job | Send | ∨ |

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

○ none   ○ form-data   ○ x-www-form-urlencoded   ● raw   ○ binary   ○ GraphQL   JSON ∨   Beautify

```
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": "10",
5      "jobType": "Research",
6      "contact": "Ms. Fiona Lim at fiona@yahoo.com"
7  }
```

Body   Cookies   Headers (8)   Test Results   ⊕ Status: 200 OK   Time: 27 ms   Size: 290 B   Save Response ∨

Pretty   Raw   Preview   Visualize   JSON ∨

```
1  {
2      "message": "Job added"
3  }
```

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

○ none   ○ form-data   ○ x-www-form-urlencoded   ● raw   ○ binary   ○ GraphQL   JSON ∨   Beautify

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

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

○ none   ○ form-data   ○ x-www-form-urlencoded   ● raw   ○ binary   ○ GraphQL   JSON ∨   Beautify

```
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

● none ● form-data ● x-www-form-urlencoded ● raw ● binary ● GraphQL   JSON ∨   Beautify

```
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

● none ● form-data ● x-www-form-urlencoded ● raw ● binary ● GraphQL   JSON ∨   Beautify

```
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

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

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/) as well
2. Cloud Run (https://cs3219-otot-b3-ojx-mv57od22ua-uc.a.run.app/) is then the serverless service (for B3) used to deploy the backend

   ○ To have Continuous Deployment, 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)

```
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

	Status	Build	Source	Ref	Commit	Trigger Name	Created ❔	Duration		
☐	✅	b8d41afc	Google Cloud Storage	-	-	-	11/5/21, 9:24 PM	37 sec	⋮	
☐	✅	4473f062	oongjiexiang/CS3219-OTOT-T...	main	a870548 ☒	rmgpgab-cs3219-otot-tasks-us-central1-oongjie...	11/5/21, 9:22 PM	28 sec	⋮	∨
☐	✅	c33246e9	Google Cloud Storage	-	-	-	11/5/21, 9:14 PM	35 sec	⋮	
☐	✅	b9891086	oongjiexiang/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**
Started on Nov 5, 2021, 9:24:08 PM

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

Steps	Duration
✅ **Build Summary** 1 Step	00:00:37
✅ 0: gcr.io/cloud-builders/docker build --network cloudbuild --no-cache -t g...	00:00:20

BUILD LOG   EXECUTION DETAILS

☐ Wrap lines   ☐ Show newest entries first ⊤ ⊥   [ ] EXPAND   VIEW RAW ☒

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 (57ms)
      ✓ 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


  10 passing (262ms)
```

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. Check out 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

🔍 Filter workflow runs

18 workflow runs		Event ▾	Status ▾	Branch ▾	Actor ▾

✅ **finished B1,2,3,4**   `main`   📅 7 days ago   ···
Node.js CI #12: Commit a870548 pushed by oongjiexiang   ⏱ 2m 11s

✅ **successfully combined workflow**   `main`   📅 7 days ago   ···
Node.js CI #11: Commit eda8c2f pushed by oongjiexiang   ⏱ 2m 11s

- Detailed build logs when clicking into one triggered action

✅ finished **B1,2,3,4** Node.js CI #12
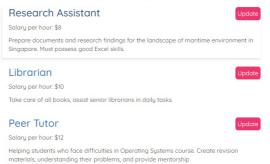
⌂ Summary

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

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

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

Job Title

Librarian

Description

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

Salary per hour

10

Job Type

Technology

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

Job Title

Description

Salary per hour

Job Type

Technology

Create Job