Midterm assignment for VDT Cloud 2024

I. Web development

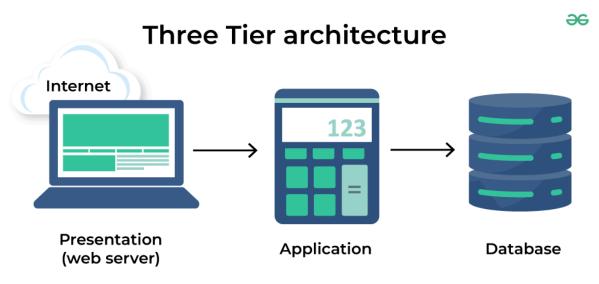
Display a list of students in VDT2024 in a table with the following information: Full name, Gender, and School they are attending.

Source code:

Allow viewing details, adding, deleting, and updating student information.

- web: ReactJs https://github.com/smugikity/vie-front
- api: Flask https://github.com/smugikity/vie-back
- db: MongoDB

Web application architecture:



Demo web application:

Student Management

Add Student



Student List

ID	Name	Gender	University	Actions
1	Ngo Cong	Nam	ITMO	Edit Delete
2	Nadeko	F	ITMO	Edit Delete
3	Bladee	М	Truong doi	Edit Delete
4	Pham Tuan	М	ITMO	Edit Delete
5	Pham Tuan Em	М	ITMO 2	Edit Delete
6	Ngo Khong	F	Bach Khoa	Edit Delete
7	Naruto	М	Back khoa	Edit Delete
8	Ronaldo	М	SEWEY	Edit Delete

Student Management

Edit Student



Student List

ID	Name	Gender	University	Actions
1	Ngo Cong	Nam	ITMO22	Edit Delete
3	Bladee	М	Truong doi	Edit Delete
4	Pham Tuan	М	ITMO	Edit Delete
5	Pham Tuan Em	М	ITMO 2	Edit Delete
6	Ngo Khong	F	Bach Khoa	Edit Delete
7	Naruto	М	Back khoa	Edit Delete
8	Ronaldo	M	SEWEY	Edit Delete

II. DevOps tools implementations

1. Containerization

Dockerfile backend:

```
FROM python:3.9-alpine3.17
WORKDIR /app
EXPOSE 5000
RUN pip install --no-cache-dir -U pip

COPY requirements.txt ./
RUN pip install --no-cache-dir -r requirements.txt && \
    rm requirements.txt
COPY . .
CMD [ "python3", "app.py" ]
```

Dockerfile frontend:

```
FROM node:16-alpine as build

WORKDIR /app

COPY package*.json ./

RUN npm install

COPY . .

RUN npm run build

FROM nginx:alpine

COPY --from=build /app/build /usr/share/nginx/html

EXPOSE 80

CMD ["nginx", "-g", "daemon off;"]
```

Docker compose file:

```
ontainer_name: mongodb
estart: unless-stopped
   - database:/data/db
   ealthcheck:
test: echo 'db.runCommand("ping").ok' | mongosh localhost:27017/test --quiet || exit 1
interval: 5s
retries: 3
start_period: 20s
eback:
image: 7upnamk/vie-back:latest
container_name: flask
restart: unless-stopped
   - MONGODB_HOSTNAME=mongodb
- MONGODB_DATABASE=database
   - 5000:5000
mongodb:
    condition: service_healthy
    iefront:
    image: 7upnamk/vie-front:latest
    container_name: nginx
    environment:
- REACT_APP_API_BASE_URL=http://vieback:5000
- REACT_APP_USERS_ENDPOINT=/students
ports:
networks:
- frontend
depends_on:
   - vieback
```

Docker history information of each image:

- Docker images:

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
7upnamk/vie-front	latest	be2d37184f7f	About an hour ago	48.9MB
7upnamk/vie-back	latest	85e97c2caa16	2 hours ago	70.4MB
mongo	5.0.17	ef8735eb905a	13 months ago	661MB

- Docker history information:

IMAGE be2d37184f7f le.v0	CREATED About an hour ago	CREATED BY CMD ["nginx" "-g" "daemon off;"]	SIZE 0B	COMMENT buildkit.dockerfi
<missing></missing>	About an hour ago	EXPOSE map[80/tcp:{}]	0B	buildkit.dockerfi
<missing></missing>	About an hour ago	COPY /app/build /usr/share/nginx/html # buil	567kB	buildkit.dockerfi
<missing></missing>	3 weeks ago	RUN /bin/sh -c set -x && apkArch="\$(cat	31.2MB	buildkit.dockerfi
<missing></missing>	3 weeks ago	ENV NJS_RELEASE=3	0B	buildkit.dockerfi
le.v0 <missing> le.v0</missing>	3 weeks ago	ENV NJS_VERSION=0.8.4	0B	buildkit.dockerfi

```
CREATED
IMAGE
                             CREATED BY
                                                                                       COMMENT
              2 hours ago
85e97c2caa16
                             CMD ["python3" "app.py"]
                                                                                       buildkit.dockerfile.
                                                                             0B
                             COPY . . # buildkit
                                                                             55.7kB
                                                                                      buildkit.dockerfile.
<missing>
              2 hours ago
                             RUN /bin/sh -c pip install --no-cache-dir -r...
<missing>
              2 hours ago
                                                                             7.71MB
                                                                                      buildkit.dockerfile.
<missing>
              2 hours ago
                             COPY requirements.txt ./ # buildkit
                                                                             43B
                                                                                       buildkit.dockerfile.
                             RUN /bin/sh -c pip install --no-cache-dir -U...
                                                                             14.9MB
                                                                                       buildkit.dockerfile.
<missing>
              2 hours ago
                             EXPOSE map[5000/tcp:{}]
<missing>
              2 hours ago
                                                                             0B
                                                                                       buildkit.dockerfile.
              2 hours ago
                             WORKDIR /app
                                                                                       buildkit.dockerfile.
<missina>
                                                                             0B
                  CREATED
                                      CREATED BY
IMAGE
                                                                                                 SIZE
ef8735eb905a
                  13 months ago
                                      /bin/sh -c #(nop) CMD ["mongod"]
                                                                                                0B
<missing>
                  13 months ago
                                      /bin/sh -c #(nop) EXPOSE 27017
                                                                                                0B
<missing>
                  13 months ago
                                      /bin/sh -c #(nop) ENTRYPOINT ["docker-entry...
                                                                                                 0B
<missing>
                  13 months ago
                                      /bin/sh -c #(nop) COPY file:e3d6a34db83fe880...
                                                                                                 14.2kB
                                      /bin/sh -c #(nop) ENV HOME=/data/db
<missing>
                  13 months ago
                                                                                                0B
                                     /bin/sh -c #(nop) VOLUME [/data/db /data/co...
/bin/sh -c set -x && export DEBIAN_FRONTEND...
/bin/sh -c #(nop) ENV MONGO_VERSION=5.0.17
<missing>
                  13 months ago
                                                                                                0B
<missing>
                  13 months ago
                                                                                                565MB
                  13 months ago
<missing>
                                                                                                0B
                                      /bin/sh -c echo "deb [ signed-by=/etc/apt/ke...
                  13 months ago
                                                                                                 116B
<missing>
<missing>
                  13 months ago
                                      /bin/sh -c #(nop) ENV MONGO_MAJOR=5.0
```

2. Continuous Integration

Workflow github actions:

```
build-and-test:
steps:
- name: Install dependencies
run: |
           pip install mongomock
            pip install -r requirements.txt
        - name: Lint Python code
  uses: ricardochaves/python-lint@v1.4.0
  with:
              ith:
  python-root-list: "."
  use-pylint: false
  use-pycodestyle: false
  use-flake8: true
  use-black: false
              use-mypy: false
use-isort: false
extra-flake8-options: "--exit-zero --max-line-length=127"
build-and-push-docker:
   runs-on: ubuntu-latest
    needs: build-and-test
   steps:
    name: Checkout repository
    uses: actions/checkout@v4
       - name: Set up Docker Buildx
  uses: docker/setup-buildx-action@v3

    name: Log in to Docker Hub
uses: docker/login-action@v3
with:

            username: ${{ secrets.DOCKER_USERNAME }}
password: ${{ secrets.DOCKER_PASSWORD }}
       - name: Build and push Docker image
  uses: docker/build-push-action@v4
  with:
    context: .
    file: Dockerfile
               push: true
tags: ${{ secrets.DOCKER_USERNAME }}/vie-back:latest
```

Workflow log:

Set up job
Build ricardochaves/python-lint@v1.4.0
Set up Python
Checkout code
Install dependencies
✓ Lint Python code
Post Checkout code
Post Set up Python
Complete job

build-and-push-docker succeeded 1 hour ago in 29s Set up job Checkout repository Set up Docker Buildx Log in to Docker Hub Build and push Docker image Post Build and push Docker image Post Log in to Docker Hub Post Set up Docker Buildx Post Checkout repository Complete job

3. Automation

Source code of Ansible: https://github.com/smugikity/vdt2024/tree/main/ansible
Deployment:

```
changed: [host2]
changed: [localhost]
TASK [db : Copy docker-compose-db.yaml to the target machine]
changed: [localhost]
changed: [host2]
changed: [localhost]
changed: [host2]
ok: [localhost]
ok: [host2]
changed: [localhost]
changed: [host2]
: ok=14 changed=4 unreachable=0 failed=0 skipped=0 rescued=0 ignored=0 : ok=14 changed=4 unreachable=0 failed=0 skipped=0 rescued=0 ignored=0
```

III. Article research

Article: https://github.com/smugikity/vdt2024/blob/main/article.pdf