

# BÁO CÁO PROJECT GIỮA KỲ VDT\_2024

Lê Minh Việt Anh – ĐHBKHN

Phát triển một 3-tier web đơn giản

Công nghệ sử dụng:

Web: react js

Api: node js

Test: jest, super test

Db: MongoDB

Maintain trên hai repo:

Web: [https://github.com/shukuchicoding/vdt2024\\_web.git](https://github.com/shukuchicoding/vdt2024_web.git)

Api: [https://github.com/shukuchicoding/vdt2024\\_api.git](https://github.com/shukuchicoding/vdt2024_api.git)

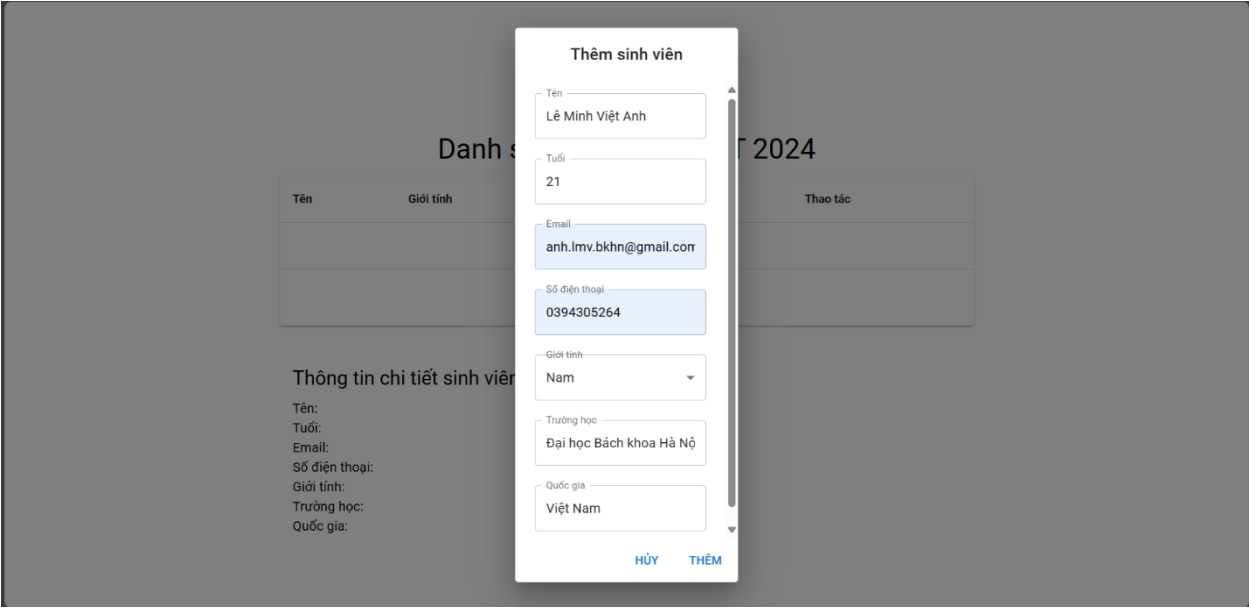
Danh sách sinh viên VDT 2024

Tên	Giới tính	Trường học	Thao tác
Lê Minh Việt Anh	Nam	Đại học Bách khoa Hà Nội	<a>XEM CHI TIẾT</a> <a>SỬA</a> <a>XÓA</a>
<a>THÊM SINH VIÊN</a>			

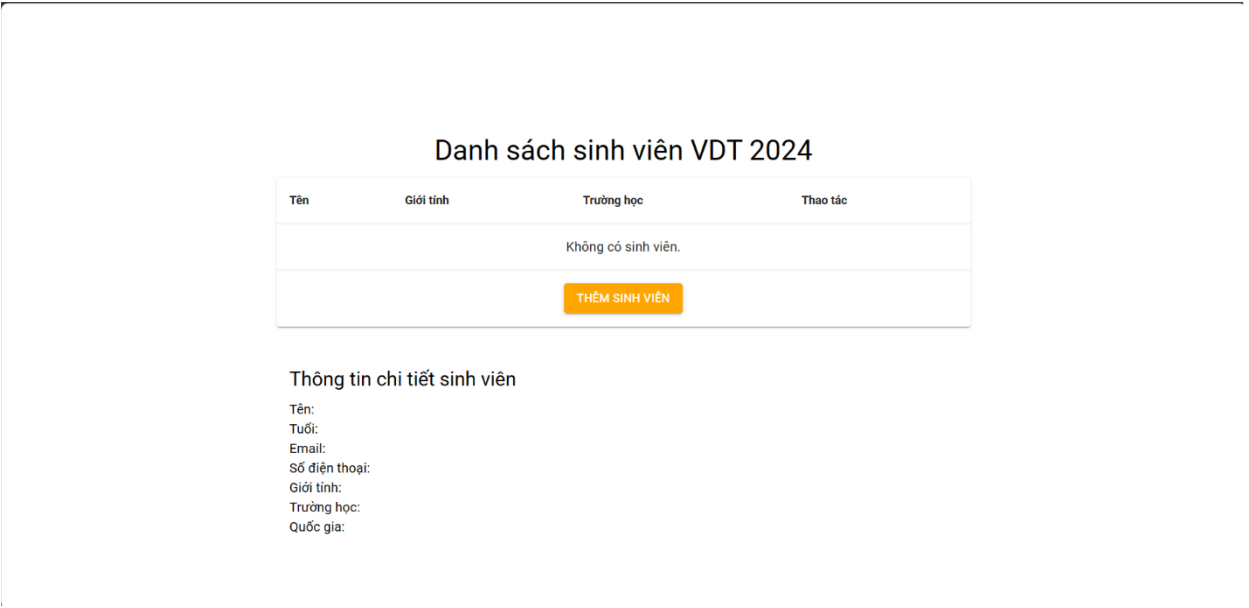
Thông tin chi tiết sinh viên

Tên: Lê Minh Việt Anh  
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Giới tính: Nam  
Trường học: Đại học Bách khoa Hà Nội  
Quốc gia: Việt Nam

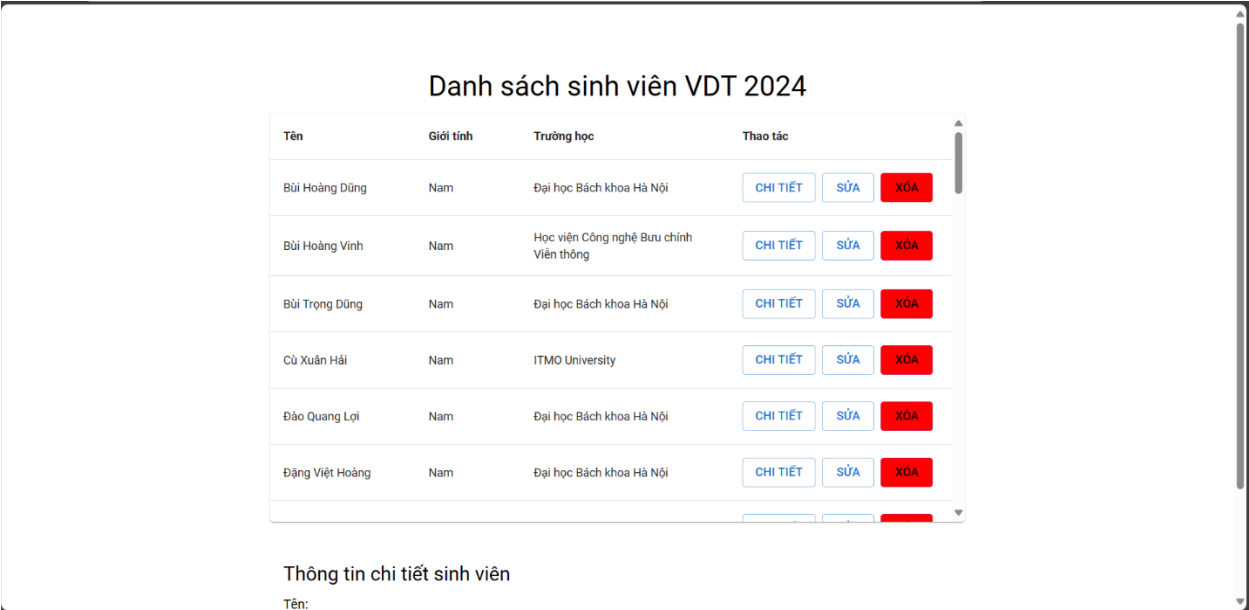
Ảnh 1: Giao diện chính



Ảnh 2: Giao diện add



Ảnh 3: Giao diện ban đầu



Ảnh 4: Giao diện sau khi thêm đầy đủ các thành viên

# Thông tin chi tiết sinh viên

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Quốc gia: Việt Nam

Ảnh 5: Hiển thị thông tin chi tiết, sau khi update

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS  POSTMAN C

✓ should delete (615 ms)

Test Suites: 1 passed, 1 total
Tests:       4 passed, 4 total
Snapshots:   0 total
Time:        4.902 s
Ran all test suites.
█
```

Ảnh 6: Passed test cases

## Triển khai web application sử dụng devops tools & practices

### Containerization

```
api > 🐳 Dockerfile
1  FROM node:lts-alpine as builder
2  WORKDIR /app
3  RUN chown node:node /app
4  USER node
5  COPY --chown=node:node package*.json ./
6  RUN npm i --production
7  COPY --chmod=node:node . .
8  FROM node:lts-alpine
9  WORKDIR /app
10 COPY --chmod=node:node --from=builder /app ./
11 EXPOSE 5000
12 CMD ["node", "index.js"]
```

Ảnh 7: Dockerfile cho API

Các kỹ thuật áp dụng: Multi stage, chỉ định quyền user node để tăng tính an toàn cho hệ thống, tối ưu câu lệnh RUN (không cài các công cụ dev trong package json)

```

web > Dockerfile
1  #1. Build
2  FROM node:lts-alpine as builder
3  WORKDIR /app
4  RUN chown node:node /app
5  USER node
6  COPY --chown=node:node package*.json ./
7  RUN npm install
8  COPY --chmod=node:node . .
9  RUN npm run build
10 CMD ["node"]
11 #2. Serve - production
12 FROM nginx:stable-alpine
13 COPY --chmod=node:node --from=builder /app/build /usr/share/nginx/html
14 COPY --chmod=node:node --from=builder /app/nginx/nginx.conf /etc/nginx/conf.d/default.conf
15 EXPOSE 3000
16 CMD ["nginx", "-g", "daemon off;"]

```

Ảnh 8: Dockerfile cho WEB

Các kỹ thuật áp dụng: Multi-stage build (build stage và production stage), optimized RUN instruction, layer caching

```

View build details: docker-desktop:///dashboard/build/default/default/geobc6g7j8j2b3b7cud51b7dt
PS D:\VDT_2024\Midterm\api> docker build -t vdt-api:1.0.0 .
[+] Building 0.0s (0/0)  docker:default
2024/05/22 23:53:28 http2: server: error reading preface from client //./pipe/docker_engine: file has already been close
[+] Building 14.3s (12/12) FINISHED  docker:default
=> [internal] load build definition from Dockerfile 0.0s
=> => transferring dockerfile: 269B 0.0s
=> [internal] load metadata for docker.io/library/node:lts-alpine 2.3s
=> [auth] library/node:pull token for registry-1.docker.io 0.0s
=> [internal] load .dockerignore 0.0s
=> => transferring context: 75B 0.0s
=> [internal] load build context 1.1s
=> => transferring context: 476.39kB 1.0s
=> [1/6] FROM docker.io/library/node:lts-alpine@sha256:291e84d956f1aff38454bbd3da38941461ad569a185c20aa289f71f37 0.0s
=> CACHED [2/6] WORKDIR /app 0.0s
=> CACHED [3/6] RUN chown node:node /app 0.0s
=> CACHED [4/6] COPY --chown=node:node package*.json ./ 0.0s
=> CACHED [5/6] RUN npm i --production 0.0s
=> [6/6] COPY --chmod=node:node . . 10.0s
=> exporting to image 0.6s
=> => exporting layers 0.6s
=> => writing image sha256:da2963e9793a586534216e41dc8ef9281d52e2a479a851d2b8172bef39530290 0.0s
=> => naming to docker.io/library/vdt-api:1.0.0 0.0s

View build details: docker-desktop:///dashboard/build/default/default/xzyb69xoomq3aj31mtrm2xp8v

What's Next?
View a summary of image vulnerabilities and recommendations → docker scout quickview
PS D:\VDT_2024\Midterm\api>

```

Ảnh 9: Output câu lệnh build của API Dockerfile

View build details: `docker-desktop://dashboard/build/default/default/xzyb69xoomq3aj31mtrm2xp8v`

#### What's Next?

View a summary of image vulnerabilities and recommendations → [docker scout quickview](#)

PS D:\VDT\_2024\Midterm\api> **docker** history vdt-api:1.0.0

IMAGE	CREATED	CREATED BY	SIZE	COMMENT
da2963e9793a	29 seconds ago	CMD ["node" "index.js"]	0B	buildkit.dockerfile.v0
<missing>	29 seconds ago	EXPOSE map[5000/tcp:{}]	0B	buildkit.dockerfile.v0
<missing>	29 seconds ago	COPY --chmod=node:node . . # buildkit	11.6MB	buildkit.dockerfile.v0
<missing>	About an hour ago	RUN /bin/sh -c npm i --production # buildkit	16.5MB	buildkit.dockerfile.v0
<missing>	About an hour ago	COPY --chown=node:node package*.json ./ # bu...	185kB	buildkit.dockerfile.v0
<missing>	About an hour ago	USER node	0B	buildkit.dockerfile.v0
<missing>	About an hour ago	RUN /bin/sh -c chown node:node /app # buildk...	0B	buildkit.dockerfile.v0
<missing>	2 hours ago	WORKDIR /app	0B	buildkit.dockerfile.v0
<missing>	12 days ago	/bin/sh -c #(nop) CMD ["node"]	0B	
<missing>	12 days ago	/bin/sh -c #(nop) ENTRYPOINT ["docker-entry...	0B	
<missing>	12 days ago	/bin/sh -c #(nop) COPY file:4d192565a7220e13...	388B	
<missing>	12 days ago	/bin/sh -c apk add --no-cache --virtual .bui...	5.57MB	
<missing>	12 days ago	/bin/sh -c #(nop) ENV YARN_VERSION=1.22.19	0B	
<missing>	12 days ago	/bin/sh -c addgroup -g 1000 node && addu...	120MB	
<missing>	12 days ago	/bin/sh -c #(nop) ENV NODE_VERSION=20.13.1	0B	
<missing>	3 months ago	/bin/sh -c #(nop) CMD ["/bin/sh"]	0B	
<missing>	3 months ago	/bin/sh -c #(nop) ADD file:37a76ec18f9887751...	7.38MB	

PS D:\VDT\_2024\Midterm\api>

Ảnh 10: API Dockerfile history

```
PS D:\VDT_2024\Midterm\web> docker build -t vdt-web:1.0.0 .
[+] Building 0.0s (0/0) docker:default
2024/05/22 23:42:43 http2: server: error reading preface from client //.pipe/docker_engine: file has already been close
[+] Building 3.4s (18/18) FINISHED docker:default
=> [internal] load build definition from Dockerfile 0.1s
=> => transferring dockerfile: 527B 0.0s
=> [internal] load metadata for docker.io/library/node:lts-alpine 2.9s
=> [internal] load metadata for docker.io/library/nginx:stable-alpine 2.9s
=> [auth] library/node:pull token for registry-1.docker.io 0.0s
=> [auth] library/nginx:pull token for registry-1.docker.io 0.0s
=> [internal] load .dockerignore 0.0s
=> => transferring context: 104B 0.0s
=> [stage-1 1/3] FROM docker.io/library/nginx:stable-alpine@sha256:ef587d1eb99e991291c582bfb74f27db27f7ca2c095d4 0.0s
=> [builder 1/7] FROM docker.io/library/node:lts-alpine@sha256:291e84d956f1aff38454bbd3da38941461ad569a185c20aa2 0.0s
=> [internal] load build context 0.1s
=> => transferring context: 855B 0.0s
=> CACHED [builder 2/7] WORKDIR /app 0.0s
=> CACHED [builder 3/7] RUN chown node:node /app 0.0s
=> CACHED [builder 4/7] COPY --chown=node:node package*.json ./ 0.0s
=> CACHED [builder 5/7] RUN npm install 0.0s
=> CACHED [builder 6/7] COPY --chmod=node:node . . 0.0s
=> CACHED [builder 7/7] RUN npm run build 0.0s
=> CACHED [stage-1 2/3] COPY --chmod=node:node --from=builder /app/build /usr/share/nginx/html 0.0s
=> CACHED [stage-1 3/3] COPY --chmod=node:node --from=builder /app/nginx/nginx.conf /etc/nginx/conf.d/default.co 0.0s
=> exporting to image 0.1s
=> exporting layers 0.0s
=> => writing image sha256:f50304aa3bbdfef8f1ce6d583d3742948dc6af9f4c791621a14c5eeaf67ad1f74 0.0s
=> => naming to docker.io/library/vdt-web:1.0.0 0.0s
```

View build details: `docker-desktop://dashboard/build/default/default/y8j6w41rqd5gkljislldn8txg`

Ảnh 11: Output câu lệnh build Web Dockerfile

```
View build details: docker-desktop://dashboard/build/default/default/y8j6w41rqd5gkljislldn8txg

What's Next?
View a summary of image vulnerabilities and recommendations → docker scout quickview
PS D:\VDT_2024\Midterm\Web> docker history vdt-web:1.0.0
IMAGE          CREATED          CREATED BY                                      SIZE      COMMENT
f50304aa3bbd   23 minutes ago  CMD ["nginx" "-g" "daemon off;"]              0B        buildkit.dockerfile.v0
<missing>      23 minutes ago  EXPOSE map[3000/tcp:{}]                        0B        buildkit.dockerfile.v0
<missing>      23 minutes ago  COPY --chmod=node:node /app/nginx/nginx.conf... 177B      buildkit.dockerfile.v0
<missing>      28 minutes ago  COPY --chmod=node:node /app/build /usr/share... 1.97MB    buildkit.dockerfile.v0
<missing>      2 weeks ago    RUN /bin/sh -c set -x      && apkArch="$(cat ... 31.2MB    buildkit.dockerfile.v0
<missing>      2 weeks ago    ENV NJS_RELEASE=2                                     0B        buildkit.dockerfile.v0
<missing>      2 weeks ago    ENV NJS_VERSION=0.8.4                               0B        buildkit.dockerfile.v0
<missing>      2 weeks ago    CMD ["nginx" "-g" "daemon off;"]                  0B        buildkit.dockerfile.v0
<missing>      2 weeks ago    STOPSIGNAL SIGQUIT                                0B        buildkit.dockerfile.v0
<missing>      2 weeks ago    EXPOSE map[80/tcp:{}]                              0B        buildkit.dockerfile.v0
<missing>      2 weeks ago    ENTRYPOINT ["/docker-entrypoint.sh"]              0B        buildkit.dockerfile.v0
<missing>      2 weeks ago    COPY 30-tune-worker-processes.sh /docker-ent...   4.62kB    buildkit.dockerfile.v0
<missing>      2 weeks ago    COPY 20-envsubst-on-templates.sh /docker-ent...   3.02kB    buildkit.dockerfile.v0
<missing>      2 weeks ago    COPY 15-local-resolvers.envsh /docker-entryp...   336B      buildkit.dockerfile.v0
<missing>      2 weeks ago    COPY 10-listen-on-ipv6-by-default.sh /docker...   2.12kB    buildkit.dockerfile.v0
<missing>      2 weeks ago    COPY docker-entrypoint.sh / # buildkit            1.62kB    buildkit.dockerfile.v0
<missing>      2 weeks ago    RUN /bin/sh -c set -x      && addgroup -g 101...   9.68MB    buildkit.dockerfile.v0
<missing>      2 weeks ago    ENV PKG_RELEASE=1                                    0B        buildkit.dockerfile.v0
<missing>      2 weeks ago    ENV NGINX_VERSION=1.26.0                           0B        buildkit.dockerfile.v0
<missing>      2 weeks ago    LABEL maintainer=NGINX Docker Maintainers <d...  0B        buildkit.dockerfile.v0
<missing>      3 months ago   /bin/sh -c #(nop)  CMD ["/bin/sh"]                0B        buildkit.dockerfile.v0
<missing>      3 months ago   /bin/sh -c #(nop)  ADD file:37a76ec18f9887751...  7.38MB    buildkit.dockerfile.v0
PS D:\VDT_2024\Midterm\Web>
```

Ảnh 12: Web Dockerfile history

## Continuous Integration

Triggered via push 21 minutes ago

Status

Total duration

Artifacts

shukuchicoding pushed -> 6f2b6fd master

Success

39s

—

nodejs.yml

on: push

Matrix: build

✓ build (18.x)

27s

✓ build (20.x)

26s

✓ build (21.x)

29s

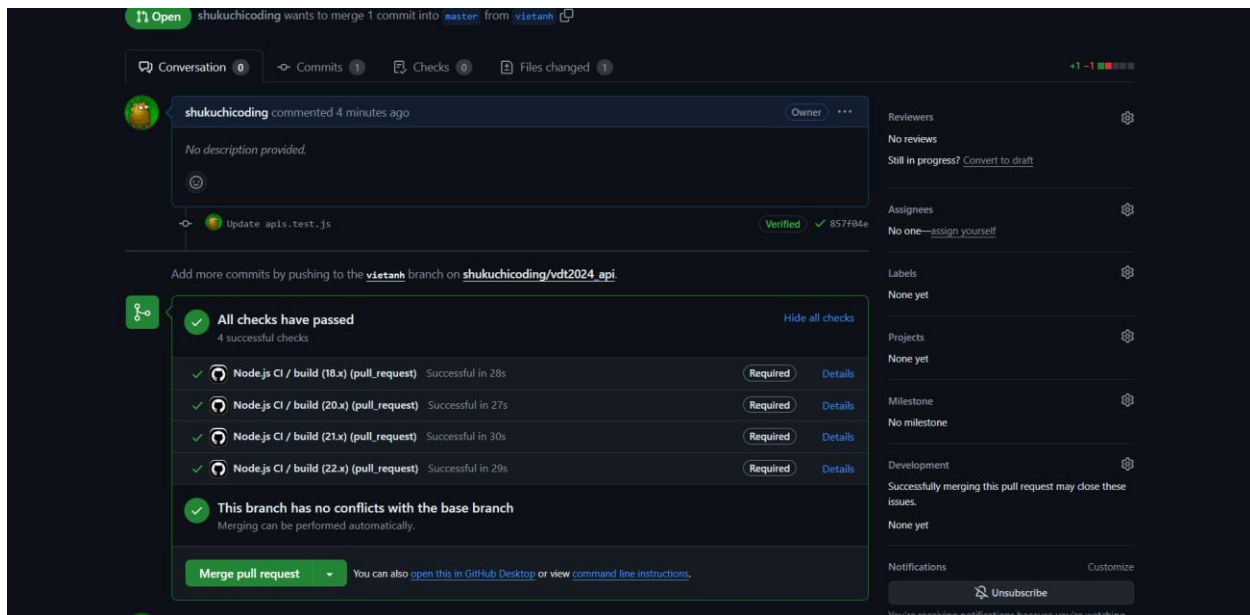
✓ build (22.x)

30s

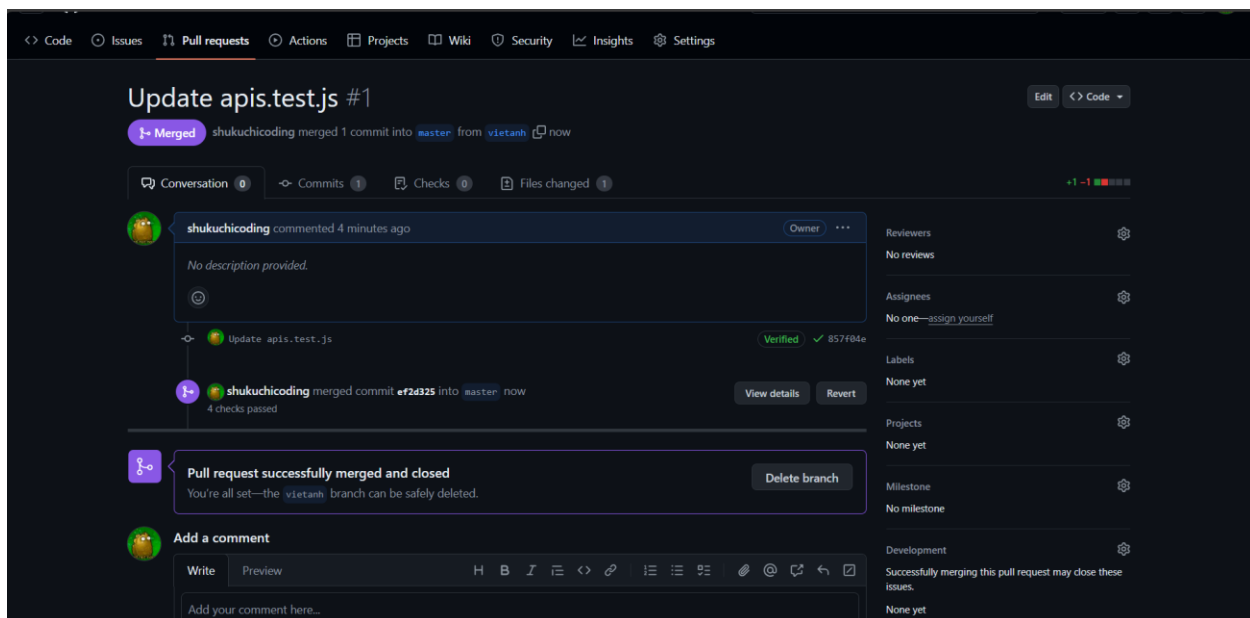
[-]

[+]

Ảnh 13: Output 1 - CI



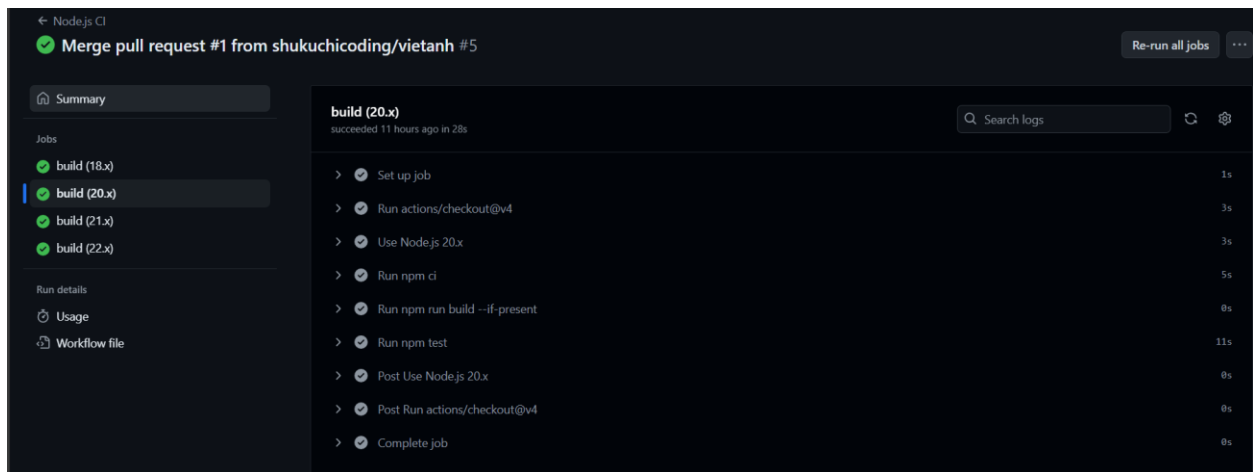
Ảnh 14: Output 2



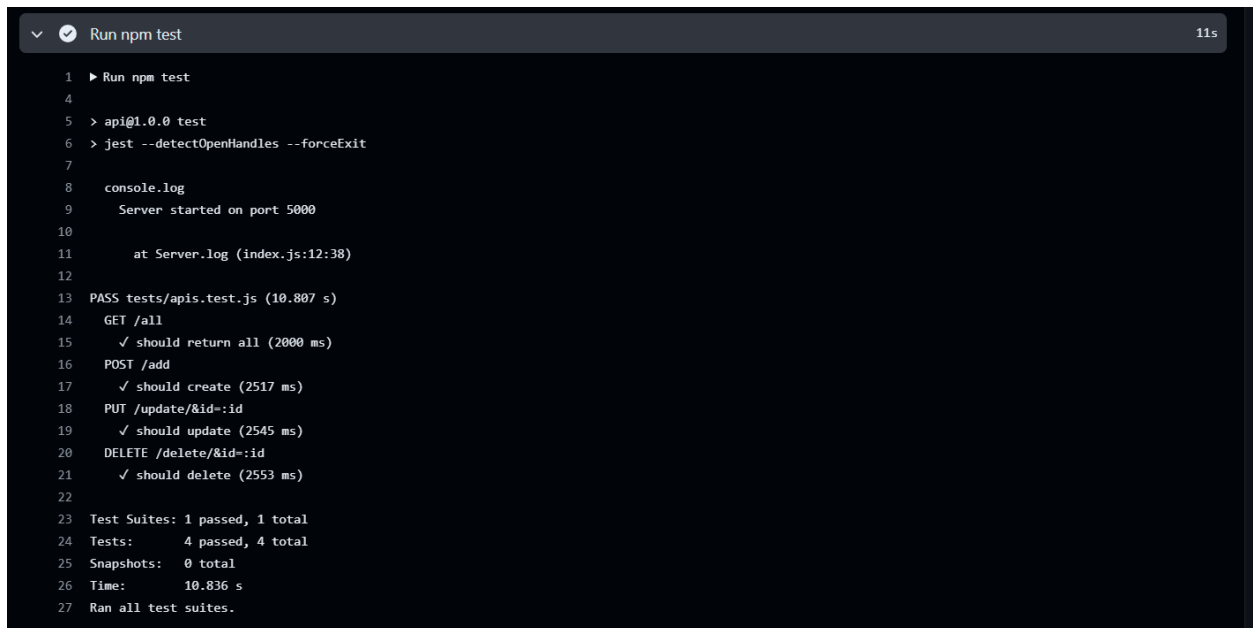
Ảnh 15: Output 3

Khi tạo thêm một nhánh “vietanh” trên repo api, sau khi người dùng nhánh “vietanh” tạo pull request, để merge vào nhánh merge, người quản trị sử dụng công cụ Github Action để tạo luồng tự động tích hợp, chạy các test cases để đảm bảo không có xung đột giữa các phiên bản. Sau quá trình đó, code được merge vào nhánh main, như kết quả ở ảnh 15.





Ảnh 16: Kết quả CI sau khi merge nhánh "vietanh" vào "master" của phiên bản node 20.x



Ảnh 17: Tự động chạy test cases

build (18.x)  
succeeded 11 hours ago in 29s

Search logs

Refresh

Settings

Set up job1s

1

Current runner version: '2.316.1'

2

▶ Operating System

6

▶ Runner Image

11

▶ Runner Image Provisioner

13

▶ GITHUB\_TOKEN Permissions

17

Secret source: Actions

18

Prepare workflow directory

19

Prepare all required actions

20

Getting action download info

21

Download action repository 'actions/checkout@v4' (SHA:a5ac7e51b41094c92402da3b24376905380afc29)

22

Download action repository 'actions/setup-node@v3' (SHA:1a4442cacd436585916779262731d5b162bc6ec7)

23

Complete job name: build (18.x)

Ánh 18: CI Log 18.x (1)

Run actions/checkout@v44s

1

▶ Run actions/checkout@v4

16

Syncing repository: shukuchicoding/vdt2024\_api

17

▶ Getting Git version info

21

Temporarily overriding HOME='/home/runner/work/\_temp/f3ace230-9ca8-4780-bb23-92e30ca3a3f1' before making global git config changes

22

Adding repository directory to the temporary git global config as a safe directory

23

/usr/bin/git config --global --add safe.directory /home/runner/work/vdt2024\_api/vdt2024\_api

24

Deleting the contents of '/home/runner/work/vdt2024\_api/vdt2024\_api'

25

▶ Initializing the repository

39

▶ Disabling automatic garbage collection

41

▶ Setting up auth

47

▶ Fetching the repository

51

▶ Determining the checkout info

52

/usr/bin/git sparse-checkout disable

53

/usr/bin/git config --local --unset-all extensions.worktreeConfig

54

▶ Checking out the ref

58

/usr/bin/git log -1 --format='%H'

59

'ef2d3259cf1d0b516a37afa0ee7f8d8cdf22a4ad'

Ánh 19: CI Log 18.x (2)

Use Nodejs 18.x3s

1

▶ Run actions/setup-node@v3

8

Found in cache @ /opt/hostedtoolcache/node/18.20.2/x64

9

▶ Environment details

13

/opt/hostedtoolcache/node/18.20.2/x64/bin/npm config get cache

14

/home/runner/.npm

15

Received 0 of 11981497 (0.0%), 0.0 MBs/sec

16

Cache Size: ~11 MB (11981497 B)

17

/usr/bin/tar -xf /home/runner/work/\_temp/b5689e4b-e67d-419f-ba9f-0043319e402c/cache.tzst -P -C /home/runner/work/vdt2024\_api/vdt2024\_api --use-compress-program unxzstd

18

Cache restored successfully

19

Cache restored from key: node-cache-linux-npm-3d774f5857fbf164a8cddf7711e716edbcd60942df085548711b17581d37bdfc

20

Received 11981497 of 11981497 (100.0%), 5.7 MBs/sec

Run npm ci5s

Ánh 20: CI Log 18.x (3)

```
▼ ✓ Run npm ci 5s
1 ▶ Run npm ci
4
5 added 570 packages, and audited 571 packages in 5s
6
7 62 packages are looking for funding
8   run `npm fund` for details
9
10 found 0 vulnerabilities

▼ ✓ Run npm run build --if-present 0s
1 ▶ Run npm run build --if-present
```

Ảnh 21: CI Log 18.x (4)

```
▼ ✓ Run npm test 12s
1 ▶ Run npm test
4
5 > api@1.0.0 test
6 > jest --detectOpenHandles --forceExit
7
8 console.log
9   Server started on port 5000
10
11   at Server.log (index.js:12:38)
12
13 PASS tests/apis.test.js (10.991 s)
14   GET /all
15     ✓ should return all (2104 ms)
16   POST /add
17     ✓ should create (2551 ms)
18   PUT /update/&id=:id
19     ✓ should update (2508 ms)
20   DELETE /delete/&id=:id
21     ✓ should delete (2483 ms)
22
23 Test Suites: 1 passed, 1 total
24 Tests:      4 passed, 4 total
25 Snapshots:  0 total
26 Time:       11.025 s
27 Ran all test suites.
```

Ảnh 22: CI Log 18.x (5)

```
▼ ✓ Post Use Node.js 18.x 0s
1 Post job cleanup.
2 Cache hit occurred on the primary key node-cache-Linux-npm-3d774f5857fbf164a8cdd7711e716edbcd60942df085548711b17581d37bdfc, not saving cache.

> ✓ Post Run actions/checkout@v4 0s

▼ ✓ Complete job 0s
1 Cleaning up orphan processes
```

Ảnh 23: CI Log 18.x (6)

## Automation

Link github ansible: [https://github.com/shukuchicoding/vdt\\_ansible.git](https://github.com/shukuchicoding/vdt_ansible.git)

```
ansible > roles > api > ! main.yml
1  ---
2  - name: Deploy API Service
3    hosts: api_servers
4    become: true
5    tasks:
6      - name: Pull API Service Docker image
7        docker_image:
8          name: "{{ api_image }}"
9          source: pull
10
11     - name: Run API Service container
12       docker_container:
13         name: my-api-service
14         image: "{{ api_image }}"
15         ports:
16           - "{{ api_port }}:8080"
17         state: started
18         restart_policy: always
```

Ảnh 24: API

```
ansible > roles > db > ! main.yml
1  ---
2  - name: Deploy DB Service
3    hosts: db_servers
4    become: true
5    tasks:
6      - name: Pull DB Service Docker image
7        docker_image:
8          name: "{{ db_image }}"
9          source: pull
10
11     - name: Run DB Service container
12       docker_container:
13         name: my-db-service
14         image: "{{ db_image }}"
15         ports:
16           - "{{ db_port }}:5432"
17       state: started
18       restart_policy: always
```

```

ansible > roles > web > ! main.yml
1   ---
2   - name: Deploy Web Service
3     hosts: web_servers
4     become: true
5     tasks:
6       - name: Pull Web Service Docker image
7         docker_image:
8           name: "{{ web_image }}"
9           source: pull
10
11      - name: Run Web Service container
12        docker_container:
13          name: my-web-service
14          image: "{{ web_image }}"
15          ports:
16            - "{{ web_port }}:80"
17          state: started
18          restart_policy: always

```

Ảnh 26: Web

Các biến được sử dụng để có thể thay đổi: web\_image, api\_image, db\_image.

Ở đây, web\_image = web, api\_image = api, db\_image = mongo:latest,

web\_port = 3000, api\_port = 5000, db\_port = 27017.

```

ansible > ≡ inventory.ini
1  [web_servers]
2  web1 ansible_host=192.168.1.10 web_port=3000 web_image=web:1.0.0
3  web2 ansible_host=192.168.1.11 web_port=3000 web_image=web:1.0.0
4
5  [api_servers]
6  api1 ansible_host=192.168.1.20 api_port=5000 api_image=api:1.0.0
7  api2 ansible_host=192.168.1.21 api_port=5000 api_image=api:1.0.0
8
9  [db_servers]
10 db1 ansible_host=192.168.1.30 db_port=27017 db_image=mongo:latest

```

Ảnh 27: Inventory

```

ansible > ! playbook.yml
1  ---
2  - name: Deploy Web Service
3    hosts: web_servers
4    become: true
5    roles:
6      - web
7
8  - name: Deploy API Service
9    hosts: api_servers
10   become: true
11   roles:
12     - api
13
14  - name: Deploy DB Service
15    hosts: db_servers
16    become: true
17    roles:
18      - db

```

Ảnh 28: Playbook

