# GitLab-CI/CD

# 1. Implement a Sample GitLab Pipeline with Artifacts

# YAML script stages: - build - test - deploy # build stage build-job: stage: build script: - echo "Building application" - mkdir build - echo "This is a build artifact file" > build/test.txt - echo "Build completed" artifacts: paths: - build/ # test stage test-job: stage: test script: - echo "Running test stage" - cat build/test.txt || echo "artifact not found!!!" - echo "Test passed successfully" # deploy stage deploy-job:

stage: deploy

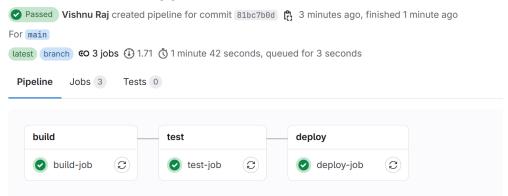
script:

- echo "Deploying application"
- echo "Content:"
- cat build/test.txt
- echo "Deploy completed"

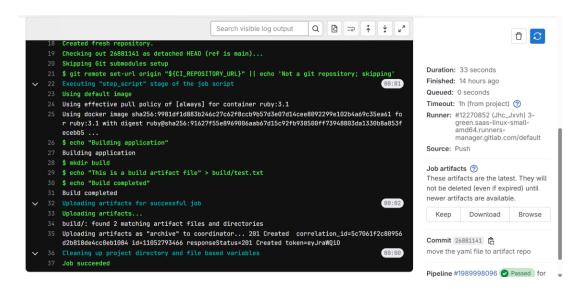
# **Output**

# GitLab build pipleline

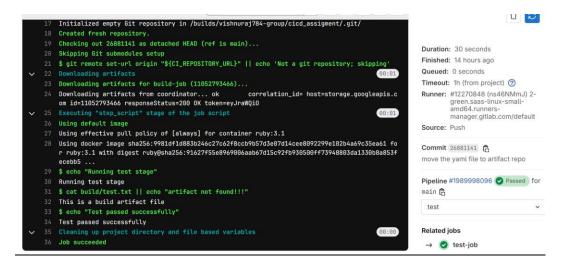
# create a artifact application



#### build stage



## test stage



# deploy stage



# 2. Implement Maven Build Job in GitLab CI/CD

#### YAML script

#yaml file for java application

stages:

- build
- deploy

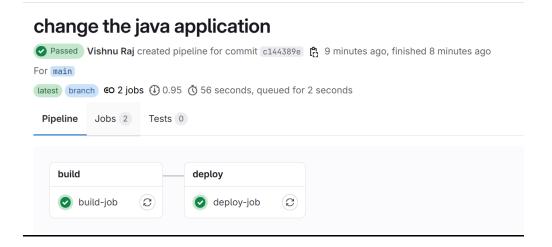
#docker image

image: maven:latest

```
#build job stage
build-job:
 stage: build
 script:
  - echo "Building the application"
  - mvn clean package
  - echo "Build stage completed"
 artifacts:
  paths:
   - target/
#deploy job stage
deploy-job:
 stage: deploy
 script:
  - echo "Deploy stage in-progress"
  - Is target
  - java -cp target/sum-app-1.0-SNAPSHOT.jar com.example.App 5 7
  - echo "Completed the application"
```

# **Output**

# GitLab build pipleline



# build stage



# deploy stage



# 3. Implement a Sample GitLab Pipeline with environment

#### YAML script

#### stages:

- build
- test
- deploy

#build job

build-job:

```
stage: build
 script:
  - echo "Compiling code stage"
  - echo "Build stage successfully"
#test job
test-job:
 stage: test
 script:
  - echo "Running tests stage"
  - echo "Test stage successfully"
# deploy stage for version/1.1.0
deploy-job:
 stage: deploy
 script:
  - echo "Deploying application stage"
  - echo "application deployed by $first_name"
  - echo "Deploy successfully"
 environment:
 name: staging
 only:
  - version/1.1.0
# deploy stage for production
deploy-prod:
 stage: deploy
 script:
  - echo "Deploying application stage"
  - echo "application deployed by $second_name"
  - echo "Deploy successfully"
```

environment:

name: production

only:

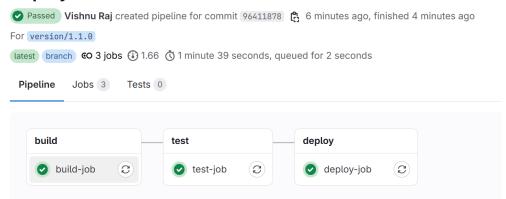
- main

# Output

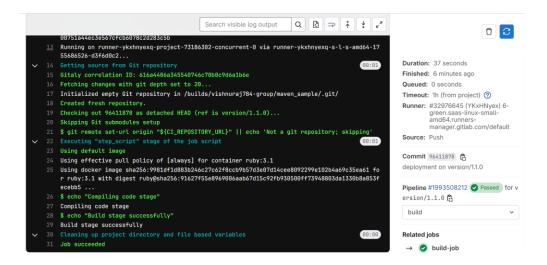
# GitLab pipleline

This pipleline is run on version/1.1.0

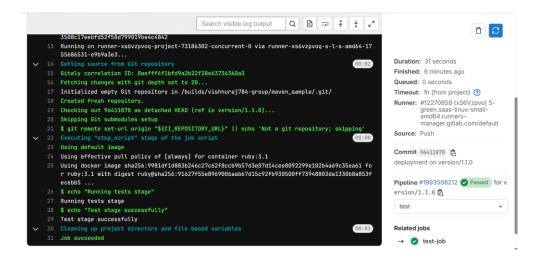
# deployment on version/1.1.0



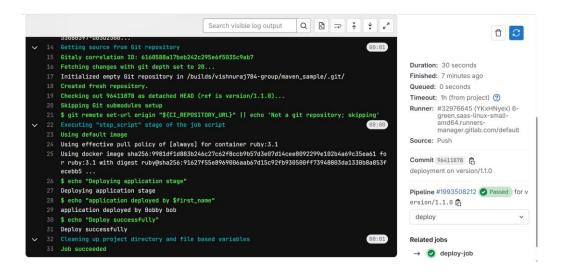
# **Build stage**



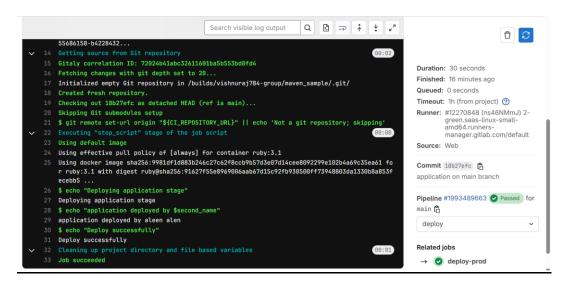
#### Test stage



#### Deploy stage on staging environment



# Deploy stage on production environment



# 4. Implement a Sample GitLab Pipeline with extends

# YAML script #yaml file for extends stages: - build - test - deploy #template for all job .job-template: image: maven:latest before\_script: - echo "Preparing environment..." #build job build-job: stage: build extends: .job-template script: - echo "Building stage" - mkdir build - echo "This application is build for extends file" > build/app.txt artifacts: paths: - build/ #test job test-job: stage: test

extends: .job-template

script:

- echo "Testing stage"
- echo "Running test"
- cat build/app.txt
- echo "All test passed!"

#deploy job

deploy-job:

stage: deploy

extends: .job-template

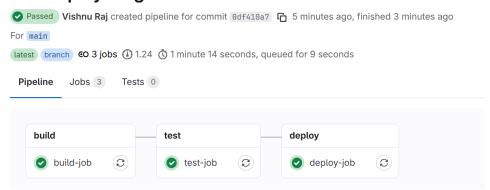
script:

- echo "Deploying stage"
- echo "Deployment completed"

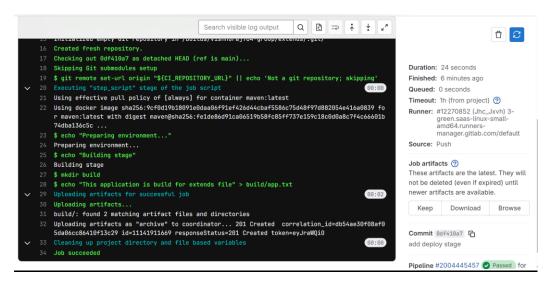
# **Output**

# GitLab main branch

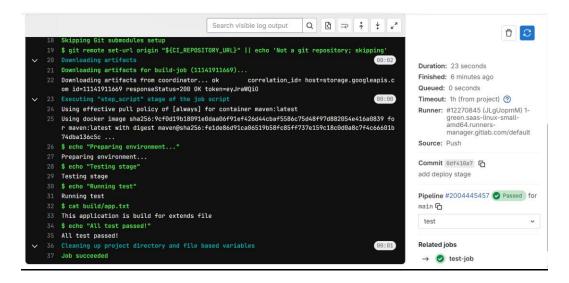
# add deploy stage



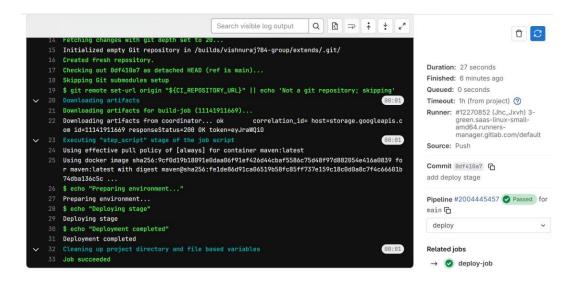
# build stage



#### test stage



#### deploy stage



# 5. <u>Maven Build Lifecycle Assignment: Validate, Test, Install, Publish, and</u> Deploy

# Set up a Local Maven Build

- Clone or create a simple Maven-based Java project (pom.xml must be present).
  - o To create a new project:

- o This will generate a project with a pom.xml.
- Run the **validate** phase to ensure the project is correctly configured.

mvn validate

#### **Run Tests**

• Execute unit tests using the mvn test command.

mvn test

Ensure the tests pass successfully

```
TERMINAL PORTS
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire-junit3/3.2.5/surefire-jun
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/surefire-junit3/3.2.5/surefire-juni
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/common-junit3/3.2.5/common-junit3-
3.2.5.jar
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/common-java5/3.2.5/common-java5-3.
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/common-java5/3.2.5/common-java5-3.2
.5.jar (18 kB at 516 kB/s)
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/surefire/common-junit3/3.2.5/common-junit3-3
.2.5.jar (12 kB at 243 kB/s)
[INFO] Running com.example.AppTest
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.015 s -- in com.example.AppTest
[INFO]
[INFO] Results:
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0
[INFO] BUILD SUCCESS
[INFO]
[INFO] Total time: 10.206 s
[INFO] Finished at: 2025-08-26T16:56:25+05:30
Vishnu Raj@LAPTOP-KSAOBH37 MINGW64 ~/devops/cicdmaven-1 (main)
```

# **Install the Build Locally**

• Use mvn install to install the built package into the local Maven repository

mvn install

### Publish the Build to an Artifact Repository (Optional)

 Configure GitLab Package Registry or Apache Nexus or JFrog Artifactory as a Maven repository.

In your pom.xml, add a <distributionManagement> section:

```
<id>id>internal-releases</id>
<username>your-username</username>
<password>your-password</password>
</server>
<id>id>internal-snapshots</id>
<username>your-username</username>
<password>your-password</password>
</server>
</server>
</server>
```

Use mvn deploy to publish the artifact to the repository.

mvn deploy

```
TERMINAL
[INFO] --- compiler:3.13.0:testCompile (default-testCompile) @ sum-app ---
[INFO] Nothing to compile - all classes are up to date.
      --- surefire:3.2.5:test (default-test) @ sum-app ---
[INFO] Using auto detected provider org.apache.maven.surefire.junit.JUnit3Provider
[INFO] TESTS
[INFO] -----
[INFO] Running com.example.AppTest
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.018 s -- in com.example.AppTest
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO]
[INFO] --- jar:3.4.1:jar (default-jar) @ sum-app ---
```

# **Deploy the Application**

Package the application (mvn package).

mvn package

```
[INFO] --- resources:3.3.1:testResources (default-testResources) @ sum-app ---
[WARNING] Using platform encoding (UTF-8 actually) to copy filtered resources, i.e. build is platform dependent!
[INFO] skip non existing resourceDirectory C:\Users\Vishnu Raj\devops\cicdmaven-1\src\test\resources
[INFO]
[INFO] --- compiler:3.13.0:testCompile (default-testCompile) @ sum-app ---
[INFO] Nothing to compile - all classes are up to date.
[INFO] --- surefire:3.2.5:test (default-test) @ sum-app ---
[INFO] Using auto detected provider org.apache.maven.surefire.junit.JUnit3Provider
[INFO]
[INFO] TESTS
[INFO] ---
[INFO] Running com.example.AppTest
[INFO] <mark>Tests run: 1, Fai</mark>lures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.016 s -- in com.example.<mark>AppTest</mark>
[INFO] Results:
[INFO]
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO]
[INFO] --- jar:3.4.1:jar (default-jar) @ sum-app ---
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] Total time: 1.578 s
[INFO] Finished at: 2025-08-26T18:11:19+05:30
```

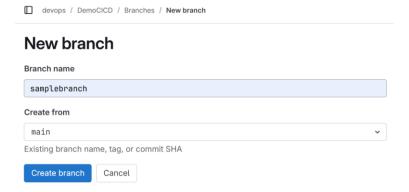
 Deploy the generated JAR/WAR file to a local or remote application server (Tomcat, WildFly, etc.).

mvn deploy

# 6. Implement Protected Branches in GitLab

**Create a new branch** (e.g., main or release or master) that you want to protect.

- Go to Code → Branches.
- Click New branch.
- Enter a branch name (e.g., main, master, or release).
- Select the source branch (commonly develop or an existing stable branch).
- Click Create branch.



**Navigate to Repository Settings** in GitLab and configure the selected branch as a protected branch.

- Navigate to:
  - Project → Settings → Repository.
  - o Expand the **Protected branches** section.
- In the dropdown, select **Protected branches** and click on **Add protected branch** (main, master, or release).
- Select your new branch (main, master, or release).
- Click Protect.

Set restrictions on who can push, merge, and force-push to the protected branch.

- Select **Protected branches** and click on **Add protected branch** (main, master, or release).
- Allowed to merge  $\rightarrow$  Choose roles (e.g., *Maintainers only*).
- Allowed to push and merge → Restrict to *No one* or *Maintainers only* (to enforce merge requests).
- Allowed to force push  $\rightarrow$  Leave disabled (to prevent history rewriting).
- Require approval from code owners  $\rightarrow$  Enable if CODEOWNERS file is used.
- Click **Protect**.

**Test the protection rules** by attempting actions with different user roles and permissions.

- As a Developer:
  - $\circ$  Try pushing directly  $\rightarrow$  should be **blocked**.
  - $\circ$  Try merging an MR  $\rightarrow$  may be blocked depending on settings.
- As a Maintainer:
  - $\circ$  Try merging an MR → should be **allowed**.
  - o Try force-pushing → should be **blocked** unless explicitly allowed.
- As a Guest/Reporter:
  - Should not be able to push/merge at all.

# 7. Implement Protected Variables in GitLab

# **Navigate to CI/CD Settings**

- 1. Open your GitLab project.
- 2. Go to Settings → CI/CD → Variables.
- 3. Click **Expand** next to Variables.
- 4. Click Add Variable.
- 5. Check Protected and Masked
- 6. Enter **Key** and **Value**
- 7. Click Save Variable.



# YAML script

stages:

- test

- deploy

test\_protected:

stage: test

script:

- echo "Running tests..."
- echo "admin\_name is not accessible here for unprotected branches."

deploy:

stage: deploy

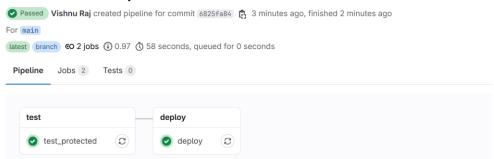
script:

- echo "Deploying with secret token:\$admin\_name"

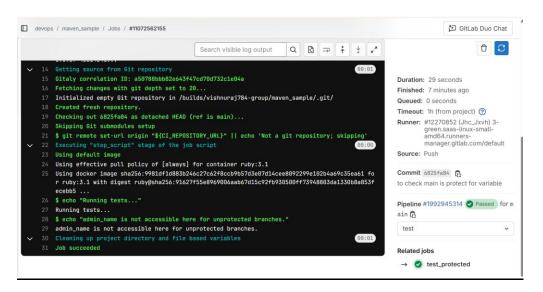
# **Output**

#### GitLab build pipleline

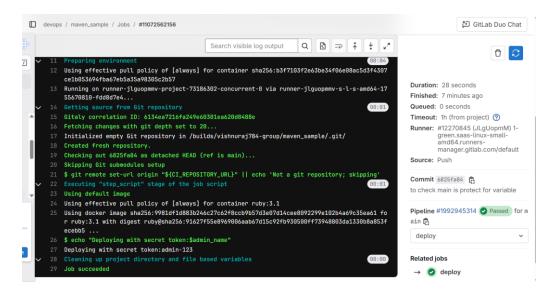
# to check main is protect for variable



#### test stage



#### deploy stage



# 8. Implement a Sample GitLab Pipeline with rules

# yAML script stages: - build - test build-job: stage: build script: - echo "Building the project..." rules: - if: '\$CI\_COMMIT\_BRANCH == "main"' test-job: stage: test script: - echo "Running tests..."

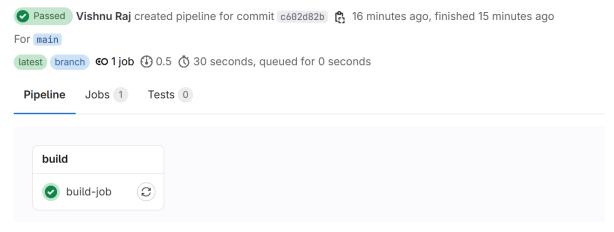
# **Output**

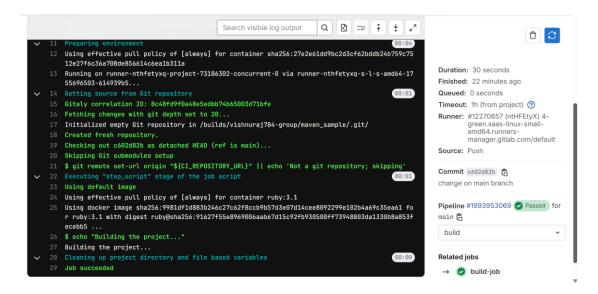
rules:

# GitLab main branch

# change on main branch

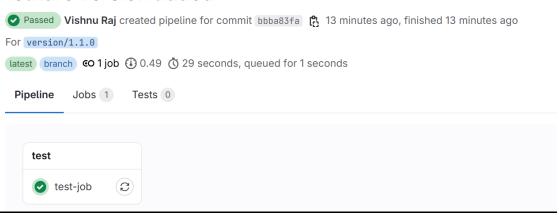
- if: '\$CI\_COMMIT\_BRANCH == "version/1.1.0"

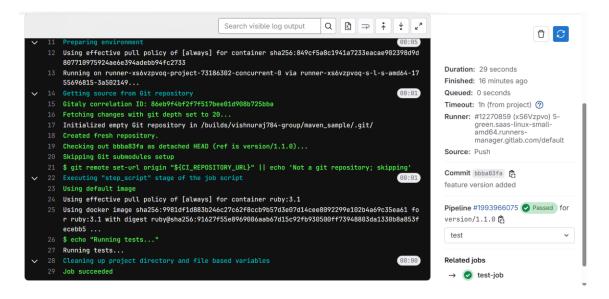




# GitLab sub branch

# feature version added





# 9. Setting Up Shell and Docker Executors

# **Shell Executor Runner**

• Register Runner:

gitlab-runner register

- Your project/group's **Settings > CI/CD > Runners > Create project runner**.
- Fill the Tags and Runner description > Create runner

Copy and paste the command into your command line to register the runner

• To check Runner is now active:

gitlab-runner list

Step 2: create a .gitlab-ci.yml

stages:

- test

test-job:

stage:

tags:

- runner-shell

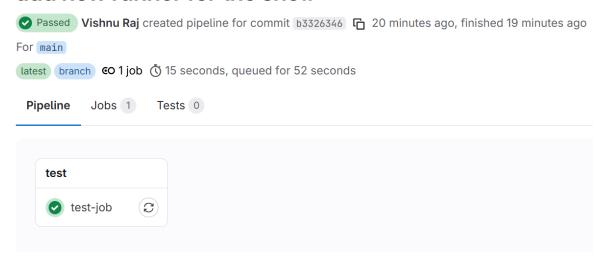
script:

- echo "Running on shell executor"
- whoami
- pwd

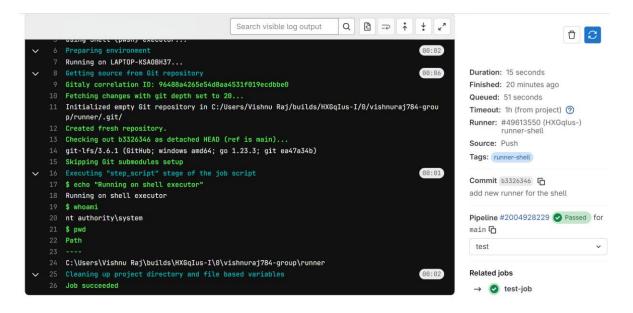
# Step 3: Output of the simple shell script job

#### GitLab main branch

# add new runner for the shell



# test stage



# **Docker Executor Runner**

# Step 1: Configure a Shell Executor Runner

Register Runner:

gitlab-runner register

- Your project/group's **Settings > CI/CD > Runners > Create project runner**.
- Fill the Tags and Runner description > Create runner

Copy and paste the command into your command line to register the runner

 To check Runner is now active: gitlab-runner list

Step 2: Ensure the runner is registered with a specific Docker image

# create a .gitlab-ci.yml

stages:

- test

docker-job:

stage: test

tags:

- sample\_docker

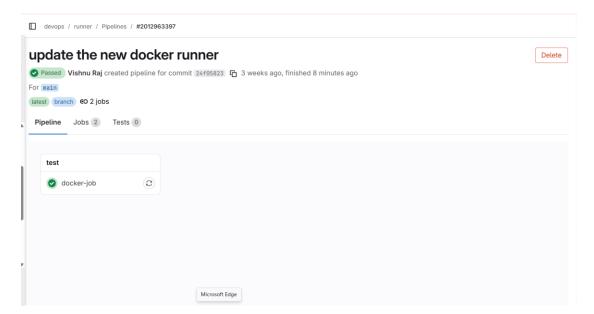
image: docker:latest

script:

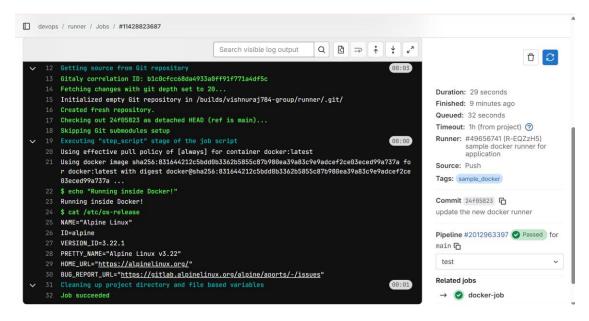
- echo "Running inside Docker!"
- cat /etc/os-release

Step 3: Output of the simple shell script job

# GitLab main branch



## test stage



# 10. Implement a Sample GitLab Pipeline

# YAML script

#stages of the pipleline

stages:

- build

- test

- deploy

#global variables

variables:

APP NAME: "MySampleApp"

DEV\_NAME: "Demo Name"

#build job stage

build-job:

stage: build

tags:

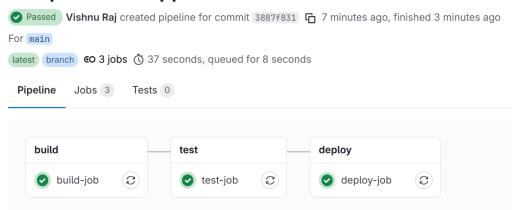
```
- simple-runner
 script:
  - echo "Starting build stage for $APP_NAME"
  - echo "Compiling source code..."
  - echo "Build stage completed..."
#test job stage
test-job:
 stage: test
 tags:
  - simple-runner
 script:
  - echo "Starting test stage for $APP_NAME"
  - echo "Executing unit test"
  - echo "All test successfully completed"
#deploy job stage
deploy-job:
 stage: deploy
 tags:
  - simple-runner
 script:
 - echo "Start deploying application $APP_NAME"
  - echo "#APP_NAME is deployed by $DEV_NAME"
```

- echo "Deploy stage completed"

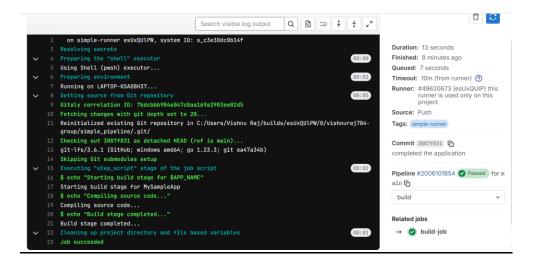
# **Output**

# GitLab main branch

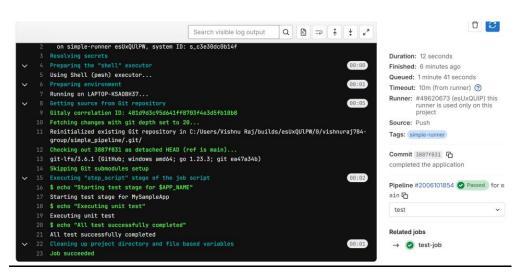
# completed the application



# build stage



#### test stage



# deploy stage

