

Problem Statement

- Create a freestyle project with the name QA_UNIT_TEST in Jenkins that is driven from job DEVELOPER_CODE_REVIEW and performs unit testing

Take a screenshot of the console output showing a successful build of unit testing
- Create a freestyle project with the name QA_METRICS_CHECK in Jenkins to check the test cases.

Make sure the **Cobertura** plugin is installed in Jenkins

Take a screenshot of the metrics from the dashboard of the project.
- Create a freestyle project with the name QA_PACKAGE in Jenkins to create an executable jar/war file.

Take a screenshot of the target folder created in the workspace.
- Create a pipeline named SAMPLE_COMPILE_VIEW with **Build Pipeline View** option, select DEVELOPER_COMPILE project under layout section, and run the pipeline to check the console output

Take a screenshot of the pipeline dashboard showing the status of the projects
- The pipelines can also be extended to running web tests and load tests. Explain how you would do the same using Jenkins?

Solution:

SAMPLE_COMPILE_VIEW [Pipeline View]

```
(Start DEVELOPER_COMPILE [1]  
> DEVELOPER_CODE_REVIEW[2]  
> QA_UNIT_TEST[3]  
> QA_METRICS_CHECK[4]  
> QA_PACKAGE[5] End)
```

Note: Using JaCoCo Code Coverage tool on behalf of Cobertura.
As Cobertura is deprecated and not supported with Java 11.

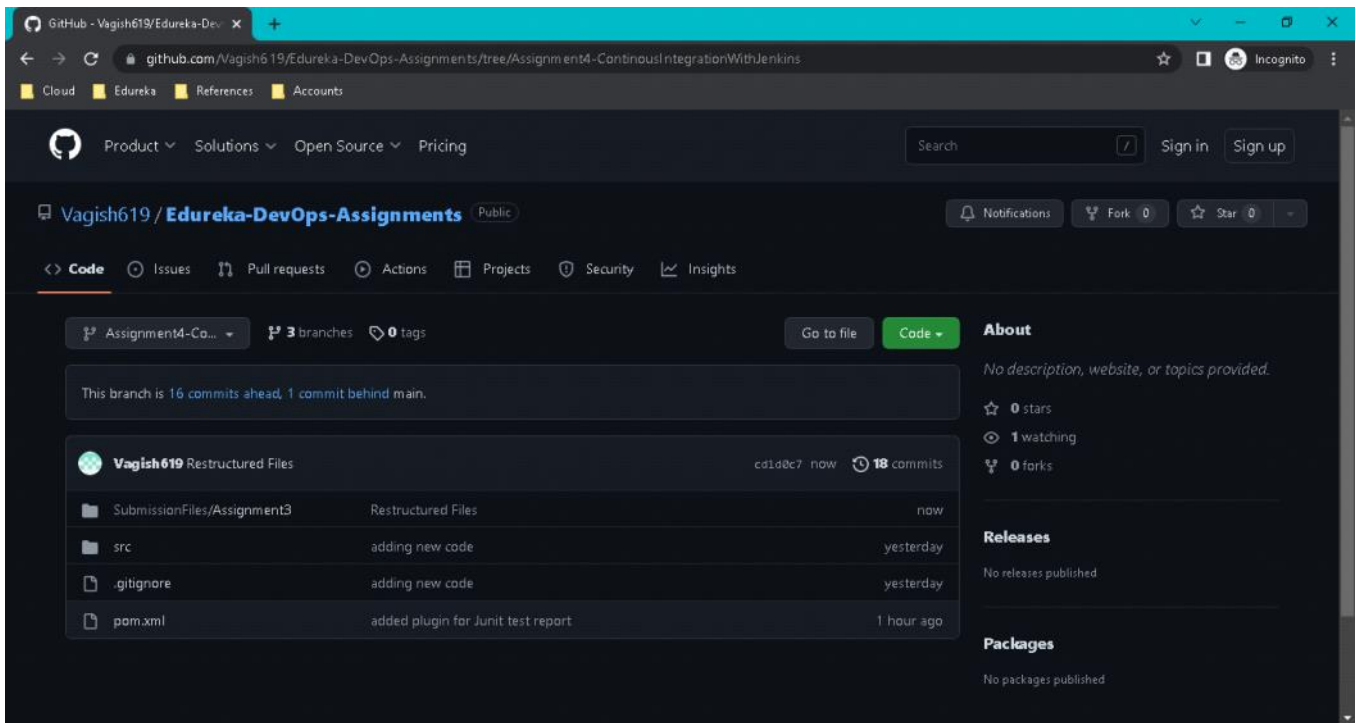
GIT Repo Used:

<https://github.com/Vagish619/Edureka-DevOps-Assignments.git>

Branch Name:

Assignment4-ContinuousIntegrationWithJenkins

GIT Repository Screenshot:



POM.xml

- Dependencies:
 - junit
- Plugins:
 - Unit Testing Code Coverage:
 - jacoco-maven-plugin
 - Code Review:
 - maven-pmd-plugin
 - maven-checkstyle-plugin
 - Reporting:
 - maven-site-plugin
 - maven-project-info-reports-plugin
 - maven-surefire-report-plugin

Jenkins Configuration:

1. Creating Job: DEVELOPER_COMPILE
 - a. Job Configuration Screenshot

1)

The screenshot shows the Jenkins configuration page for a job named 'DEVELOPER_COMPILE'. The left sidebar contains a 'Configure' menu with options: General, Source Code Management (selected), Build Triggers, Build Environment, Pre Steps, Build, Post Steps, Build Settings, and Post-build Actions. The main content area is titled 'Configure' and shows the 'Source Code Management' configuration. It includes a 'Repository URL' field with the value 'https://github.com/Vagish619/Eduka-DevOps-Assignments.git', a 'Credentials' dropdown menu set to '- none -', an 'Add' button, an 'Advanced' dropdown, an 'Add Repository' button, a 'Branches to build' section with a 'Branch Specifier (blank for \'any\')' field containing '*/Assignment4-ContinuousIntegrationWithJenkins', and 'Save' and 'Apply' buttons at the bottom.

2)

The screenshot shows the Jenkins configuration page for the same job 'DEVELOPER_COMPILE', but with the 'Pre Steps' tab selected in the left sidebar. The main content area is titled 'Configure' and shows the 'Pre Steps' configuration. It includes an 'Add pre-build step' button, a 'Build' section with a 'Root POM' field containing 'pom.xml', a 'Goals and options' field containing 'clean install', an 'Advanced' dropdown, a 'Post Steps' section, and 'Save' and 'Apply' buttons at the bottom.

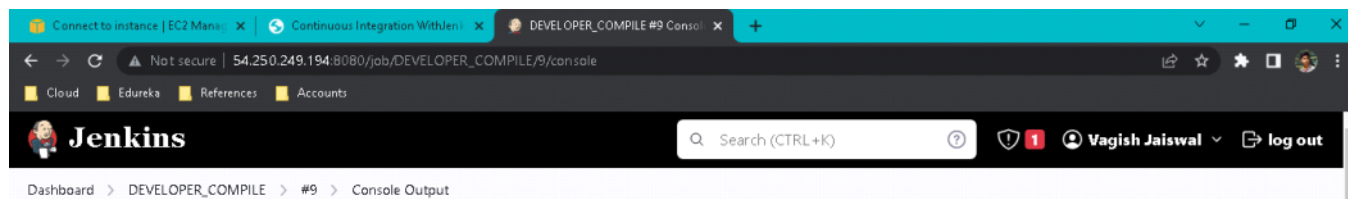
3)

The screenshot shows the Jenkins configuration page for a job named 'DEVELOPER_COMPILE'. The left sidebar contains a 'Configure' menu with options: General, Source Code Management, Build Triggers, Build Environment, Pre Steps, Build, Post Steps, and Build Settings. The 'Post-build Actions' section is selected. The main content area shows the 'Build other projects' configuration. Under 'Projects to build', 'DEVELOPER_CODE_REVIEW' is entered. The 'Trigger only if build is stable' option is selected. There are buttons for 'Save' and 'Apply' at the bottom. The footer shows 'REST API' and 'Jenkins 2.387.1'.

b. Job Build Result Screenshot

1)

The screenshot shows the Jenkins job build result page for 'Maven project DEVELOPER_COMPILE'. The left sidebar contains a 'Status' menu with options: Changes, Workspace, Build Now, Configure, Delete Maven project, Modules, and Rename. The 'Build History' section is selected, showing a list of builds. The main content area shows the job details, including a 'Latest Test Result' (no failures), 'Downstream Projects' (DEVELOPER_CODE_REVIEW), and 'Permalinks' (Last build (#9), 24 min ago; Last stable build (#9), 24 min ago; Last successful build (#9), 24 min ago; Last failed build (#3), 2 hr 2 min ago). A 'Test Result Trend' chart is also visible, showing a green line for 'Passed' and a red line for 'Failed'.



2)

- Status
- Changes
- Console Output**
- View as plain text
- Edit Build Information
- Delete build '#9'
- Timings
- Git Build Data
- Test Result
- Redeploy Artifacts
- See Fingerprints

Console Output

```

Started by user Vagish Jaiswal
Running as SYSTEM
Building remotely on node1 in workspace /home/ubuntu/workspace/DEVELOPER_COMPILE
Selected Git installation does not exist. Using Default
The recommended git tool is: NONE
No credentials specified
> git rev-parse --resolve-git-dir /home/ubuntu/workspace/DEVELOPER_COMPILE/.git # timeout=10
Fetching changes from the remote Git repository
> git config remote.origin.url https://github.com/Vagish619/Eduka-DevOps-Assignments.git # timeout=10
Fetching upstream changes from https://github.com/Vagish619/Eduka-DevOps-Assignments.git
> git --version # timeout=10
> git --version # 'git version 2.34.1'
> git fetch --tags --force --progress -- https://github.com/Vagish619/Eduka-DevOps-Assignments.git
+refs/heads/*:refs/remotes/origin/* # timeout=10
> git rev-parse refs/remotes/origin/Assignment4-ContinuousIntegrationWithJenkins^{commit} # timeout=10
Checking out Revision fdb57253f91b44024914656a57ddf65132e0d10a (refs/remotes/origin/Assignment4-ContinuousIntegrationWithJenkins)
> git config core.sparsecheckout # timeout=10
> git checkout -f fdb57253f91b44024914656a57ddf65132e0d10a # timeout=10

```

3)

Dashboard > DEVELOPER_COMPILE > #9 > Console Output

```

[INFO] WEB-INF/web.xml already added, skipping
[INFO] --- maven-install-plugin:2.4:install (default-install) @ SimpleTomcatWebApp ---
[INFO] Installing /home/ubuntu/workspace/DEVELOPER_COMPILE/target/SimpleTomcatWebApp.war to
/root/.m2/repository/com/vagish/app/SimpleTomcatWebApp/1.0-SNAPSHOT/SimpleTomcatWebApp-1.0-SNAPSHOT.war
[INFO] Installing /home/ubuntu/workspace/DEVELOPER_COMPILE/pom.xml to /root/.m2/repository/com/vagish/app/SimpleTomcatWebApp/1.0-SNAPSHOT/SimpleTomcatWebApp-1.0-SNAPSHOT.pom
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 23.660 s
[INFO] Finished at: 2023-03-11T20:39:19Z
[INFO] -----
[JENKINS] Archiving /home/ubuntu/workspace/DEVELOPER_COMPILE/pom.xml to com.vagish.app/SimpleTomcatWebApp/1.0-SNAPSHOT/SimpleTomcatWebApp-1.0-SNAPSHOT.pom
[JENKINS] Archiving /home/ubuntu/workspace/DEVELOPER_COMPILE/target/SimpleTomcatWebApp.war to
com.vagish.app/SimpleTomcatWebApp/1.0-SNAPSHOT/SimpleTomcatWebApp-1.0-SNAPSHOT.war
channel stopped
Triggering a new build of DEVELOPER_CODE_REVIEW
Finished: SUCCESS

```

REST API Jenkins 2.387.1

2. Creating Job: DEVELOPER_CODE_REVIEW

-> Used PMD & Check Style Code review plugin

a. Job Configuration Screenshot

DEVELOPER_CODE_REVIEW Conf. x +

Not secure | 54.250.249.194:8080/job/DEVELOPER_CODE_REVIEW/configure

Cloud Edureka References Accounts

Jenkins

Search (CTRL+K) Vagish Jaiswal log out

Dashboard > DEVELOPER_CODE_REVIEW > Configuration

Configure

- General
- Source Code Management
- Build Triggers
- Build Environment
- Build Steps
- Post-build Actions

General

Enabled

Description

This is to do PMD & Check Style Code Review of code downloaded and compiled by DEVELOPER_COMPILE job

[Plain text] Preview

☐ Commit agent's Docker container ?

☐ Run the build inside Docker containers

☐ Define a Docker template

☐ Discard old builds ?

Save Apply

1)

DEVELOPER_CODE_REVIEW Conf. x +

Not secure | 54.250.249.194:8080/job/DEVELOPER_CODE_REVIEW/configure

Cloud Edureka References Accounts

Jenkins

Search (CTRL+K) Vagish Jaiswal log out

Dashboard > DEVELOPER_CODE_REVIEW > Configuration

Configure

- General
- Source Code Management
- Build Triggers
- Build Environment
- Build Steps
- Post-build Actions

Record compiler warnings and static analysis results

Static Analysis Tools

Tool ?

PMD

Report File Pattern ?

Fileset 'includes' syntax specifying the files to scan for issues. If you leave this field empty then the default file pattern '**/pmd.xml' will be used.

☐ Skip symbolic links when searching for files ?

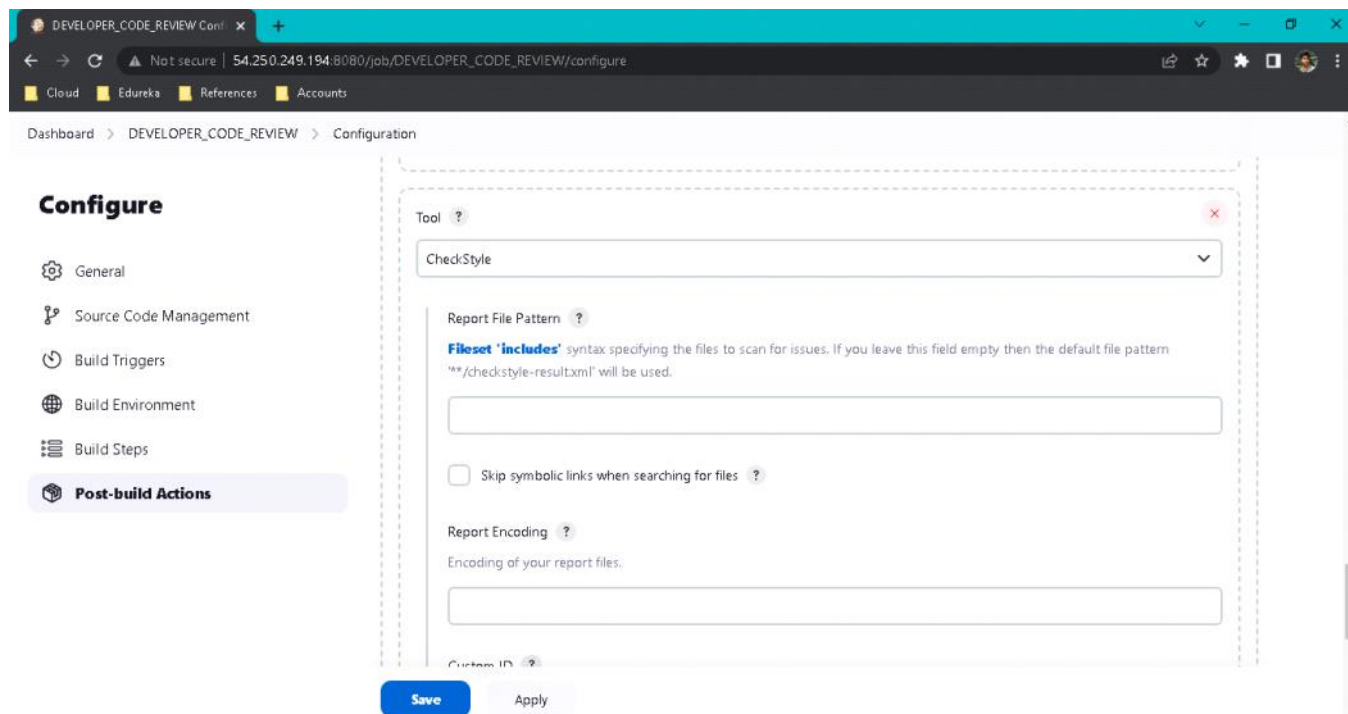
Report Encoding ?

Encoding of your report files.

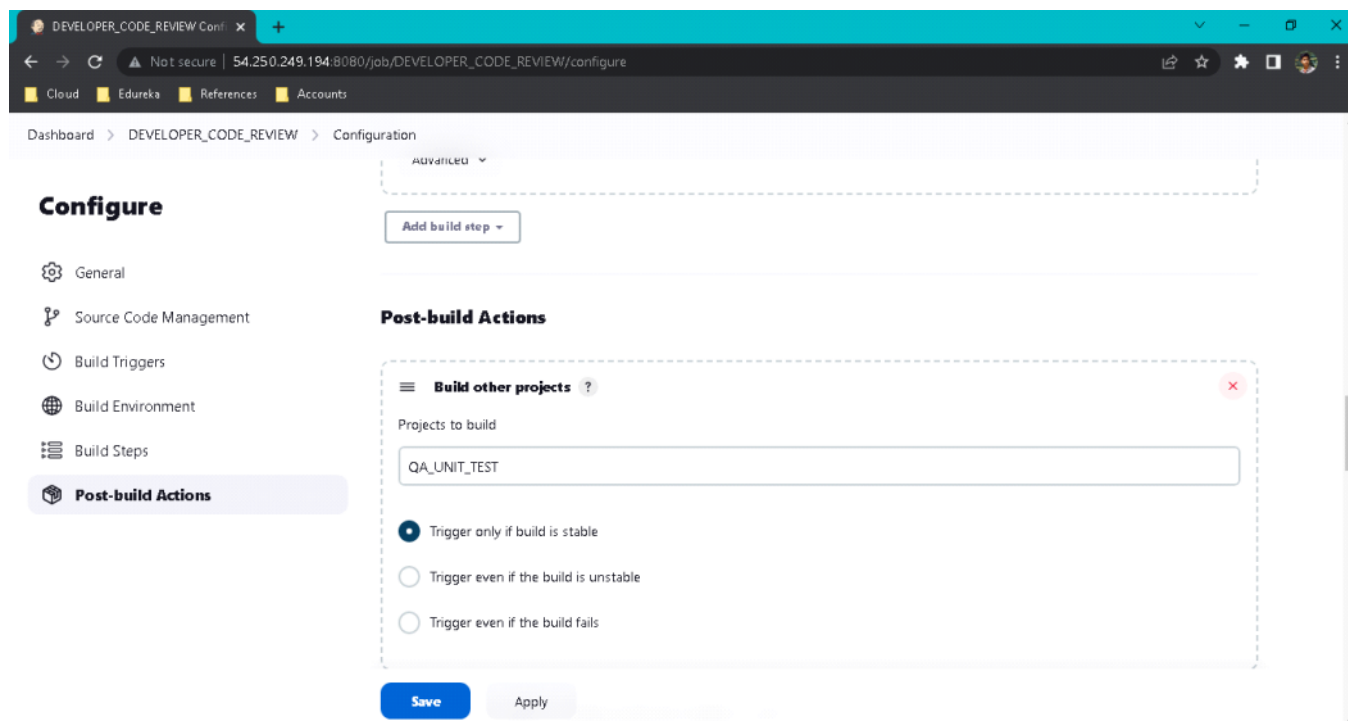
Save Apply

2)

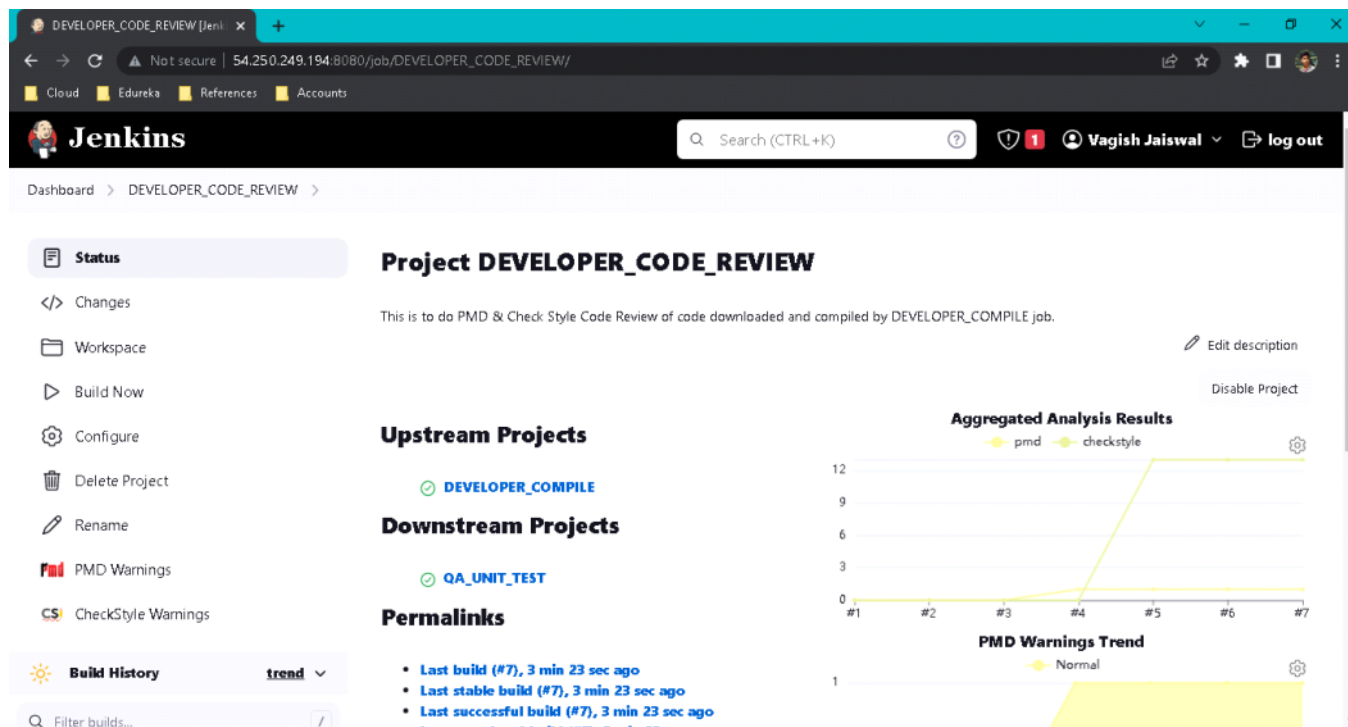
3)



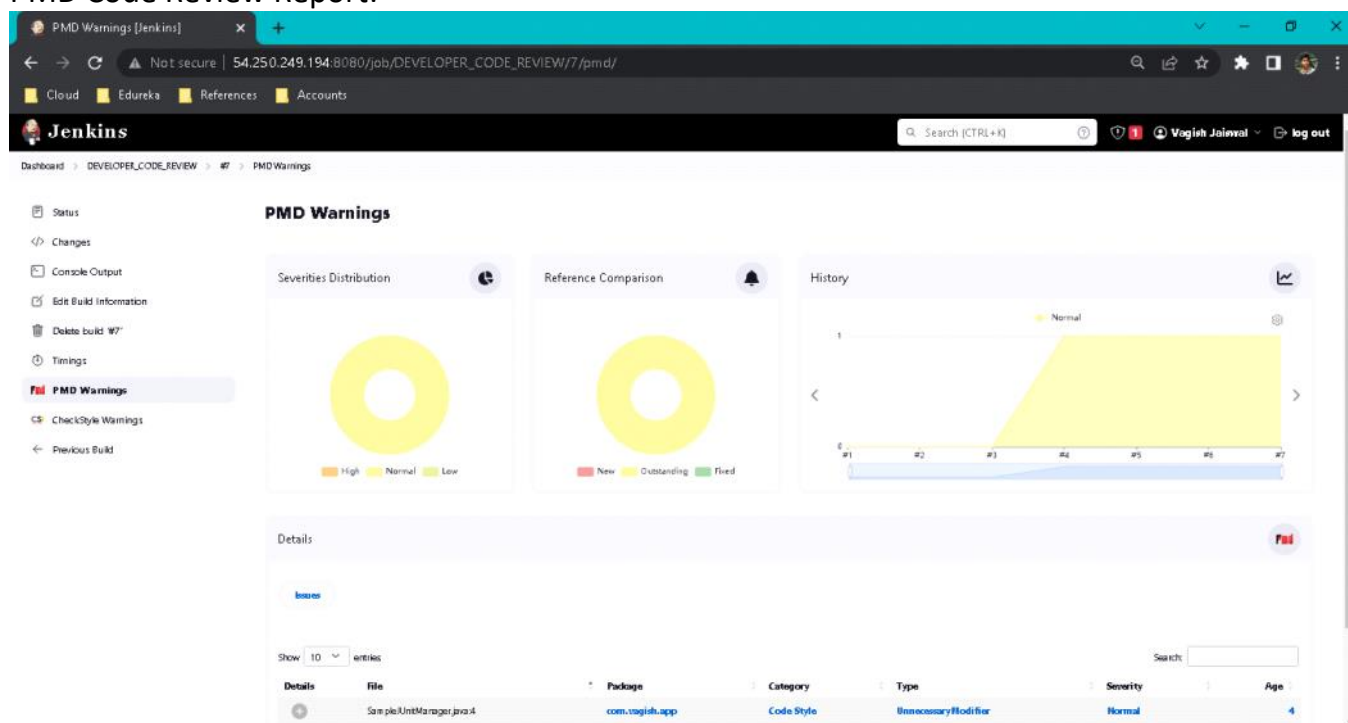
4)



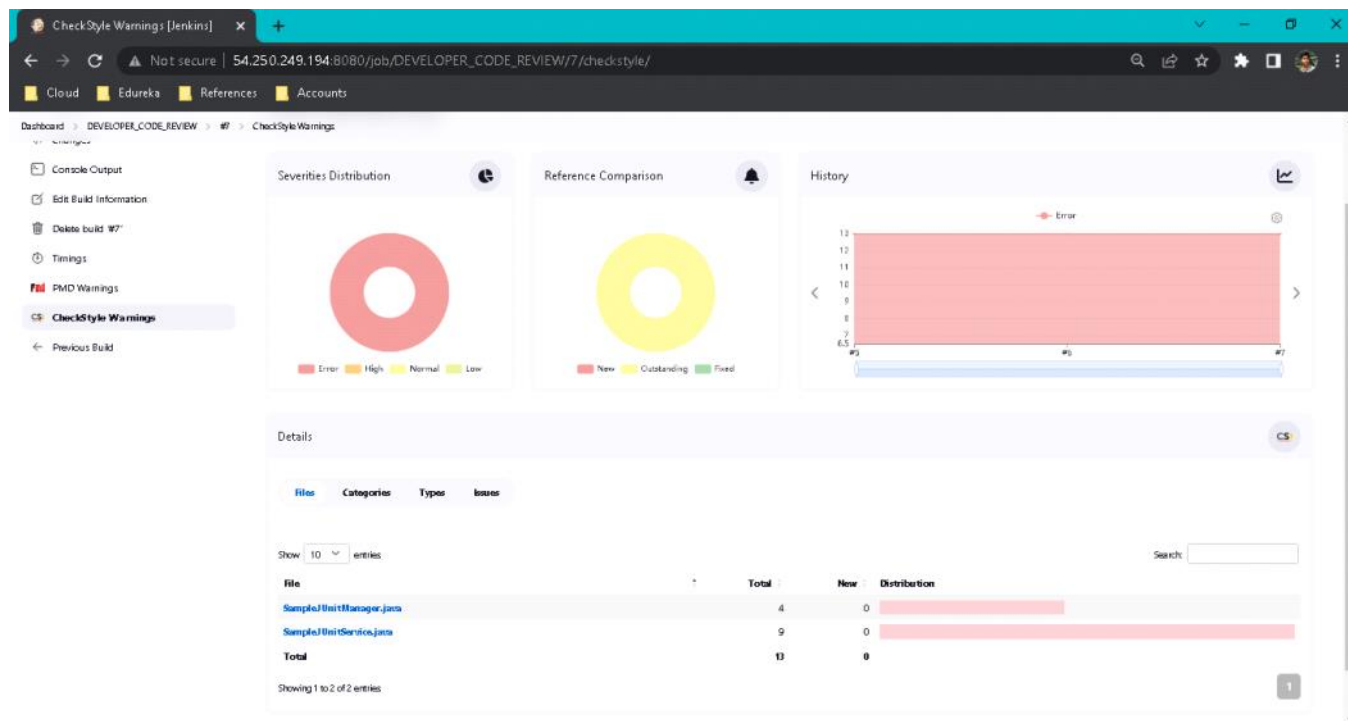
b. DEVELOPER_CODE_REVIEW Build Result Screenshot



2) PMD Code Review Report:



4) CHECK STYLE Code Review Report:



3. Creating Job: QA_UNIT_TEST -> Used Junit for Unit Testing

a. Job Configuration Screenshot

Configure

- General
- Source Code Management
- Build Triggers
- Build Environment
- Build Steps
- Post-build Actions

General Enabled

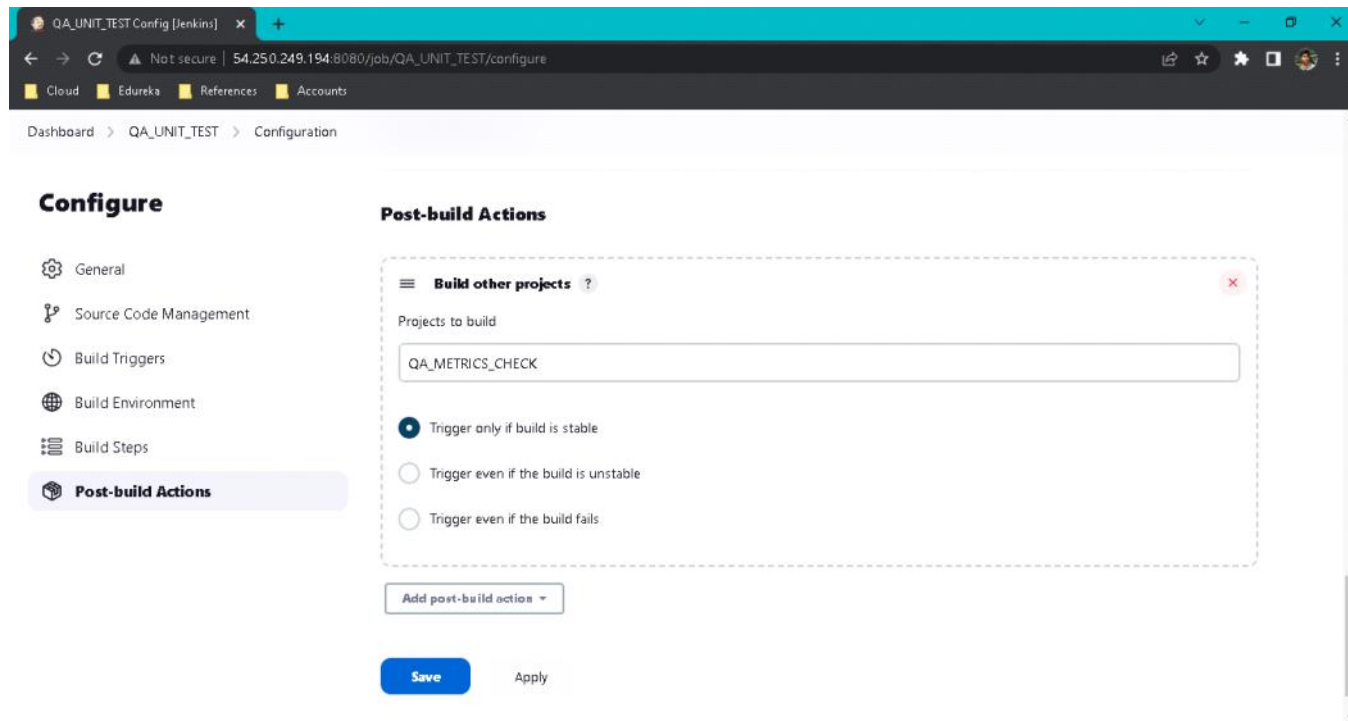
Description: This is to run JUnit Test Cases to perform Unit Testing on the code downloaded by DEVELOPER_COMPILE pipeline

[Plain text] Preview

- ☐ Commit agent's Docker container ?
- ☐ Run the build inside Docker containers
- ☐ Define a Docker template
- ☐ Discard old builds ?

Save Apply

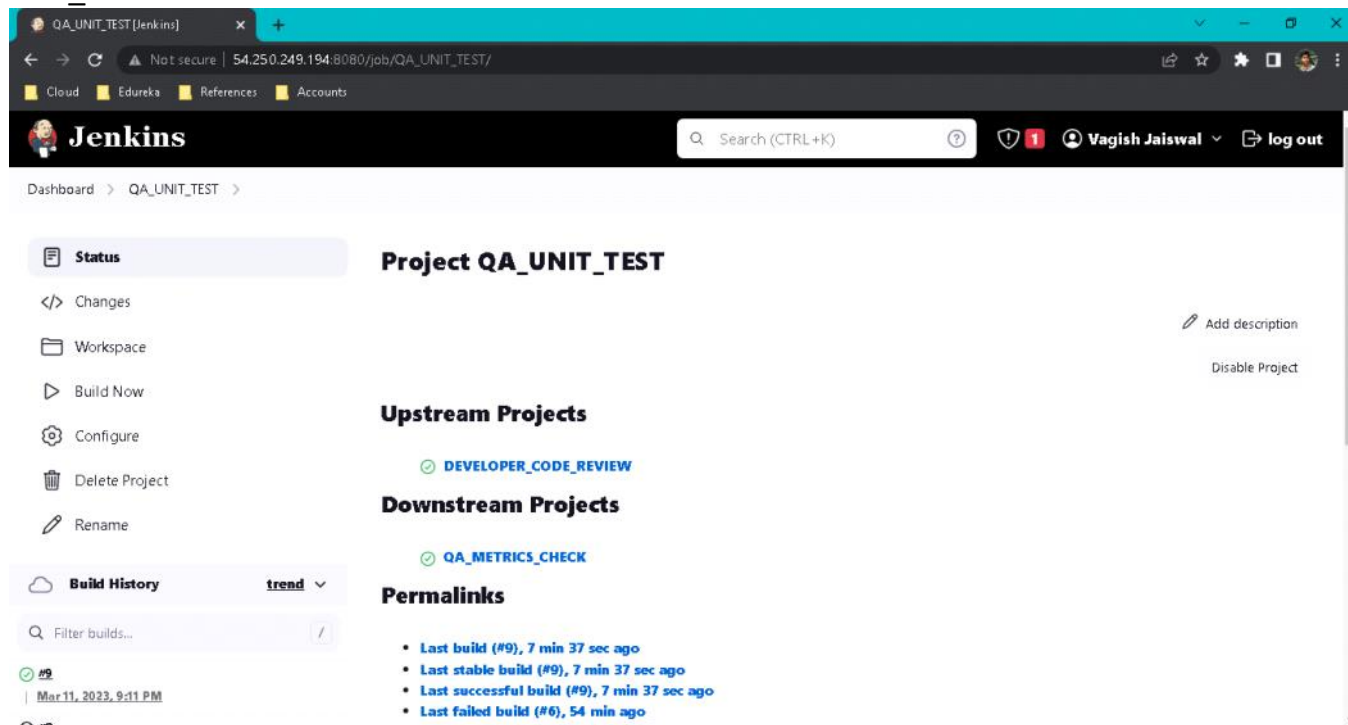
2)



3)

b. QA_UNIT_TEST Result Screenshot

1)



QA_UNIT_TEST #9 [Jenkins]

Not secure | 54.250.249.194:8080/job/QA_UNIT_TEST/9/

Cloud Edureka References Accounts

Jenkins Search (CTRL+K) Vagish Jaiswal log out

Dashboard > QA_UNIT_TEST > #9

Status

</> Changes

Console Output

Edit Build Information

Delete build '#9'

Timings

Previous Build

Build #9 (Mar 11, 2023, 9:11:59 PM)

Keep this build forever

Add description Started 7 min 10 sec ago Took **20 sec** on **node1**

No changes.

Started by upstream project **DEVELOPER_CODE_REVIEW** build number **7** originally caused by:

- Started by upstream project **DEVELOPER_COMPILE** build number **10** originally caused by:
 - Started by user **Vagish Jaiswal**

This run spent:

- 5.7 sec waiting
- 20 sec build duration
- 26 sec total from scheduled to completion.

2)

4. Creating Job: QA_METRICS

-> Used JaCoCo Code Coverage tool for generating code coverage metrics from Junit Testing done by QA_UNIT_TEST job.

a. Job Configuration Screenshot

QA_METRICS_CHECK Config [Jenkins]

Not secure | 54.250.249.194:8080/job/QA_METRICS_CHECK/configure

Cloud Edureka References Accounts

Jenkins Search (CTRL+K) Vagish Jaiswal log out

Dashboard > QA_METRICS_CHECK > Configuration

Configure

General

Enabled

Description

To generate JaCoCo Code Coverage Report as metrics from Junit Testing done by QA_UNIT_TEST job.

[Plain text] Preview

☐ Commit agent's Docker container ?

☐ Run the build inside Docker containers

☐ Define a Docker template

☐ Discard old builds ?

Save Apply

1)

2)

The screenshot shows the 'Record JaCoCo coverage report' configuration step. The left sidebar lists the configuration sections: General, Source Code Management, Build Triggers, Build Environment, Build Steps, and Post-build Actions (which is highlighted). The main area contains the following fields:

- Path to exec files (e.g.: **/target/**.exec, **/jacoco.exec):**
- Inclusions (e.g.: **/*.class):**
- Exclusions (e.g.: **/*Test*.class):**
- Path to class directories (e.g.: **/target/classDir, **/classes):**
- Path to source directories (e.g.: **/mySourceFiles):**
- Inclusions (e.g.: **/*.java, **/*.groovy, **/*.gs):**
- Exclusions (e.g.: generated/**/*java):**
- ☐ Disable display of source files for coverage
- ☐ Change build status according to the defined thresholds

Buttons at the bottom: **Save** and **Apply**.

3)

The screenshot shows the 'Build other projects' configuration step. The left sidebar is the same as in the previous screenshot. The main area contains the following fields:

- Projects to build:**
- ☒ Trigger only if build is stable
- ☐ Trigger even if the build is unstable
- ☐ Trigger even if the build fails

Buttons at the bottom: **Save** and **Apply**.

b. QA_METRICS Job Build Result Screenshot

1)

Project QA_METRICS_CHECK

To generate JaCoCo Code Coverage Report as metrics from Junit Testing done by QA_UNIT_TEST job.

Upstream Projects

- QA_UNIT_TEST

Downstream Projects

- QA_PACKAGE

Permalinks

- Last build (#2), 9 min 58 sec ago
- Last stable build (#2), 9 min 58 sec ago
- Last successful build (#2), 9 min 58 sec ago

Code Coverage Trend

Enlarge

Build History trend

Filter builds...

#2

2)

JaCoCo Coverage Report

Download jacoco.exec binary coverage file

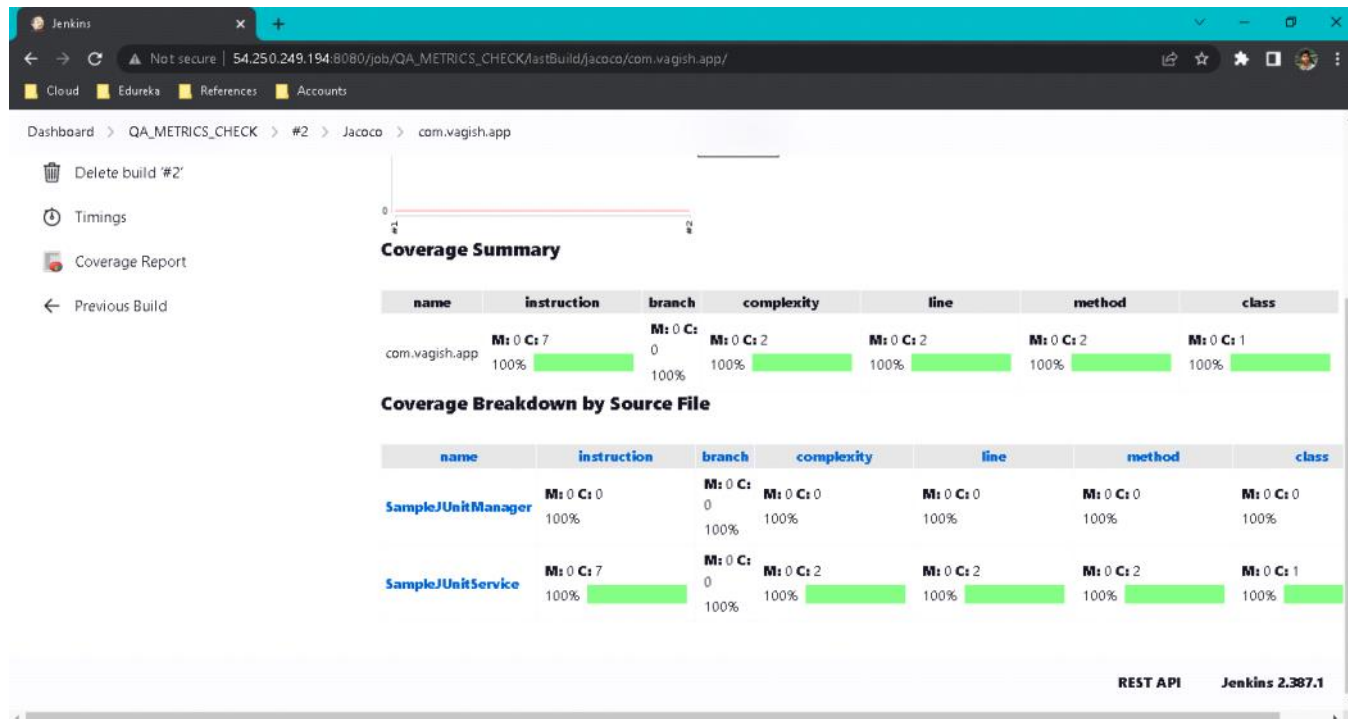
Overall Coverage Summary

name	instruction	branch	complexity	line	method	class
all	100%	100%	100%	100%	100%	100%
classes	M: 0 C: 7	M: 0 C: 0	M: 0 C: 2	M: 0 C: 2	M: 0 C: 2	M: 0 C: 1

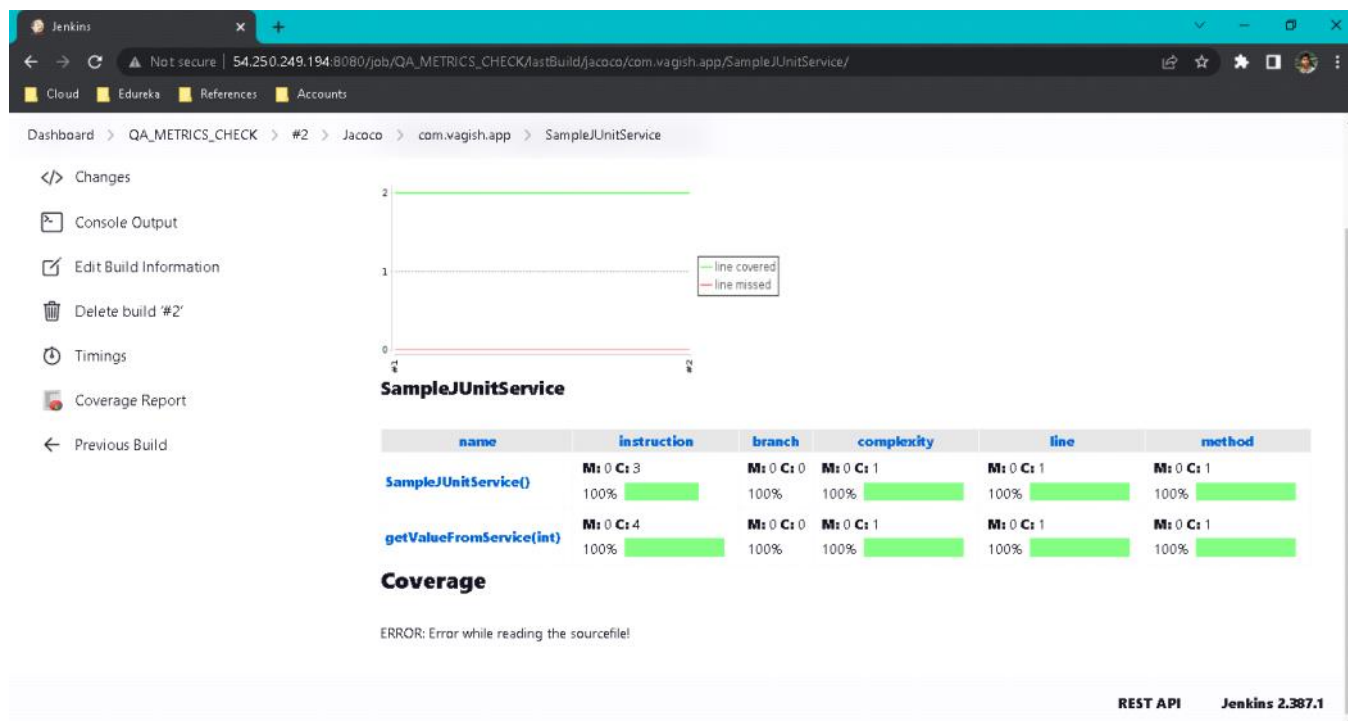
Coverage Breakdown by Package

name	instruction	branch	complexity	line	method	class
com.vagish.app	M: 0 C: 7 100%	M: 0 C: 0 100%	M: 0 C: 2 100%	M: 0 C: 2 100%	M: 0 C: 2 100%	M: 0 C: 1 100%

3)



4)



5. Creating Job: QA_PACKAGE

a. Job Configuration Screenshot

QA_PACKAGE Config [Jenkins] x +

Not secure | 54.250.249.194:8080/job/QA_PACKAGE/configure

Cloud Edureka References Accounts

Jenkins Search (CTRL+K) Vagish Jaiswal log out

Dashboard > QA_PACKAGE > Configuration

Configure

General

Enabled

General

- Source Code Management
- Build Triggers
- Build Environment
- Build Steps
- Post-build Actions

Description

This to package the distributable WAR from the code downloaded by DEVELOPER_COMPILE job from the SCM GIT

[Plain text] [Preview](#)

- ☐ Commit agent's Docker container ?
- ☐ Run the build inside Docker containers
- ☐ Define a Docker template
- ☐ Discard old builds ?

[Save](#) [Apply](#)

b. QA_PACKAGE JOB Build Result Screenshot

QA_PACKAGE #2 Console [Jenkins] x +

Not secure | 54.250.249.194:8080/job/QA_PACKAGE/2/console

Cloud Edureka References Accounts

Dashboard > QA_PACKAGE > #2 > Console Output

Status

Changes

Console Output

View as plain text

Edit Build Information

Delete build '#2'

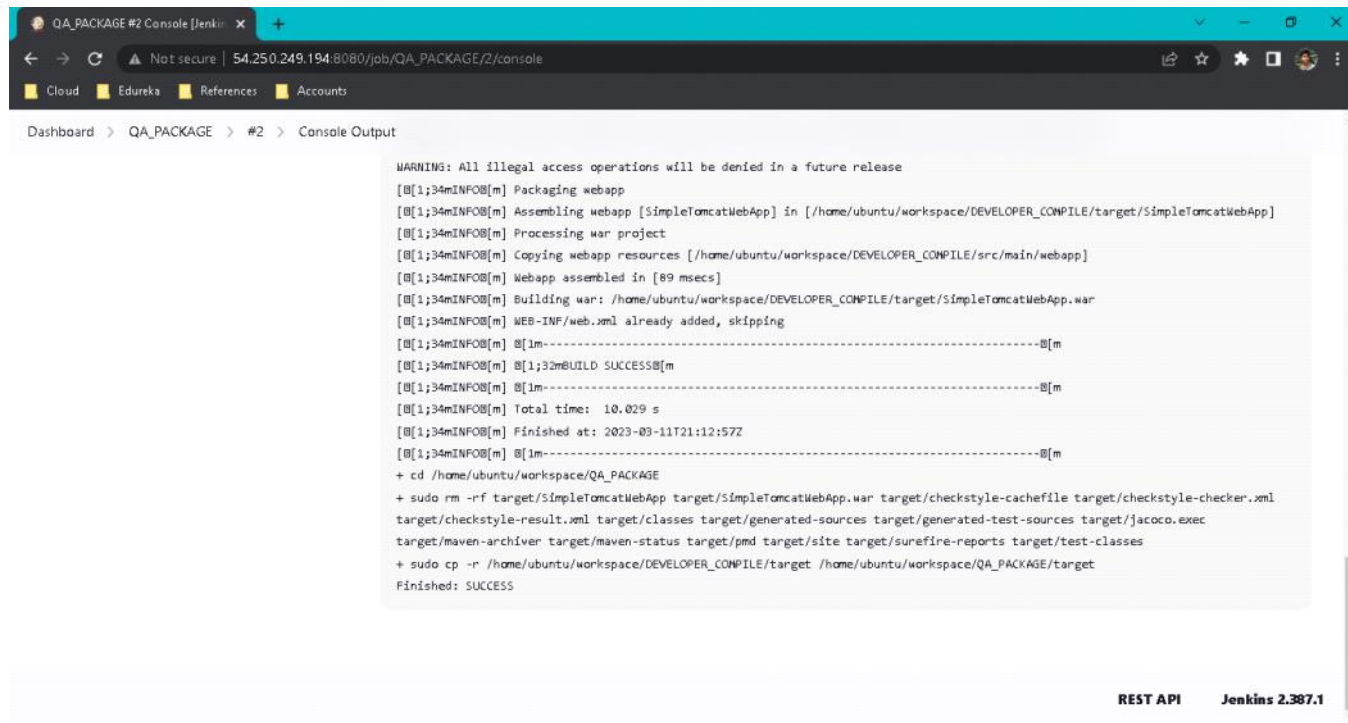
Timings

Previous Build

Console Output

```
Started by upstream project "QA_METRICS_CHECK" build number 2
originally caused by:
  Started by upstream project "QA_UNIT_TEST1" build number 9
originally caused by:
  Started by upstream project "DEVELOPER_CODE_REVIEW" build number 7
originally caused by:
  Started by upstream project "DEVELOPER_COMPILE" build number 10
originally caused by:
  Started by user Vagish Jaiswal
Running as SYSTEM
Building remotely on node1 in workspace /home/ubuntu/workspace/QA_PACKAGE
[QA_PACKAGE] $ /bin/sh -xe /tmp/jenkins16622799804906380807.sh
+ cd /home/ubuntu/workspace/DEVELOPER_COMPILE
+ mvn package
[01:34mINFO@] Scanning for projects...
[01:34mINFO@]
[01:34mINFO@] @1m-----< @0:36mcom.vagish.app:SimpleTomcatWebApp@0:1m >-----@m
[01:34mINFO@] @1mBuilding SimpleTomcatWebApp Maven Webapp 1.0-SNAPSHOT@m
[01:34mINFO@] @1m-----[ war ]-----@m
[01:34mINFO@]
[01:34mINFO@] @1m--- @0:32maven-pmd-plugin:3.13.0:pmd@m @1m(default)@m @ @36mSimpleTomcatWebApp@0:1m ---@m
[01:33mWARNING@] Unable to locate Source XRef to link to - DISABLED
```

2)



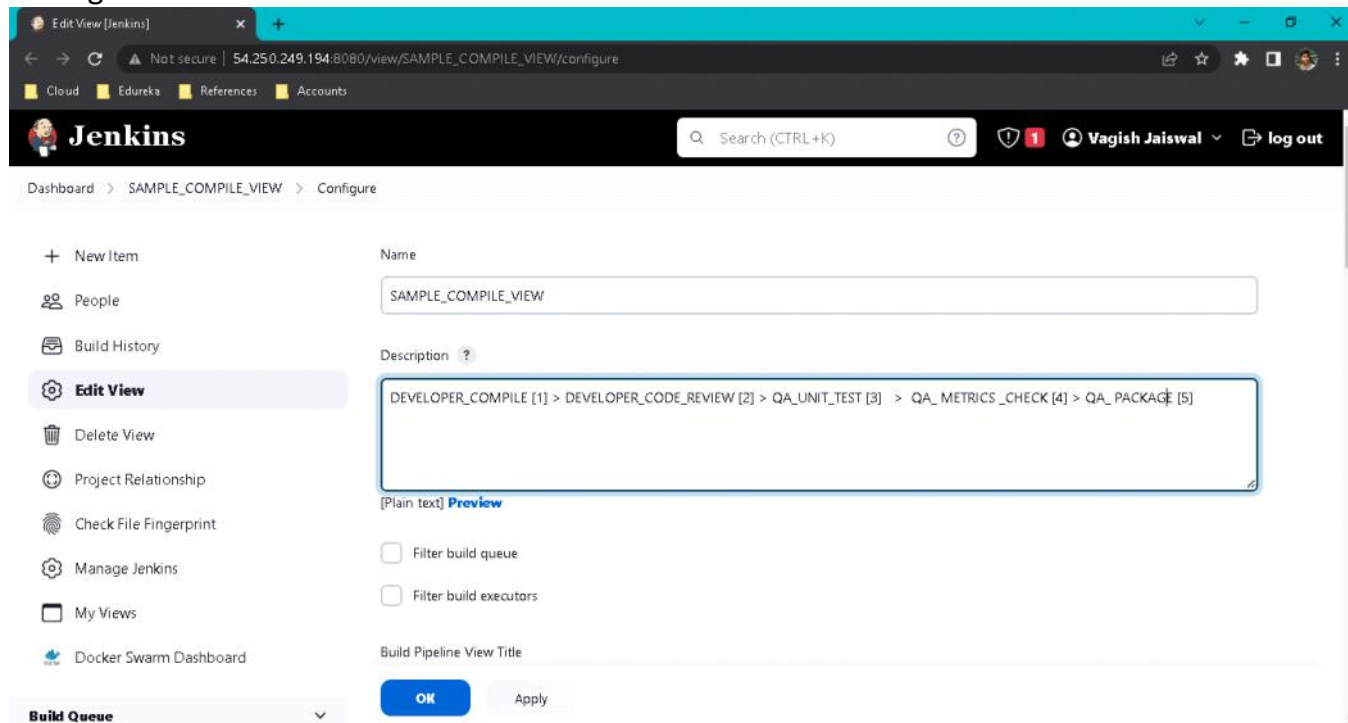
```
WARNING: All illegal access operations will be denied in a future release
[01:34mINFO[m] Packaging webapp
[01:34mINFO[m] Assembling webapp [SimpleTomcatWebApp] in [/home/ubuntu/workspace/DEVELOPER_COMPILE/target/SimpleTomcatWebApp]
[01:34mINFO[m] Processing war project
[01:34mINFO[m] Copying webapp resources [/home/ubuntu/workspace/DEVELOPER_COMPILE/src/main/webapp]
[01:34mINFO[m] Webapp assembled in [89 msecs]
[01:34mINFO[m] Building war: /home/ubuntu/workspace/DEVELOPER_COMPILE/target/SimpleTomcatWebApp.war
[01:34mINFO[m] WEB-INF/web.xml already added, skipping
[01:34mINFO[m] @1m-----@[m
[01:34mINFO[m] @1;32mBUILD SUCCESS[m
[01:34mINFO[m] @1m-----@[m
[01:34mINFO[m] Total time: 10.029 s
[01:34mINFO[m] Finished at: 2023-03-11T21:12:57Z
[01:34mINFO[m] @1m-----@[m
+ cd /home/ubuntu/workspace/QA_PACKAGE
+ sudo rm -rf target/SimpleTomcatWebApp target/SimpleTomcatWebApp.war target/checkstyle-cachefile target/checkstyle-checker.xml
target/checkstyle-result.xml target/classes target/generated-sources target/generated-test-sources target/jacoco.exec
target/maven-archiver target/maven-status target/pmd target/site target/surefire-reports target/test-classes
+ sudo cp -r /home/ubuntu/workspace/DEVELOPER_COMPILE/target /home/ubuntu/workspace/QA_PACKAGE/target
Finished: SUCCESS
```

REST API Jenkins 2.387.1

6. Pipeline View: SAMPLE_COMPILE_VIEW

a. View Configuration Screenshot

1)



Dashboard > SAMPLE_COMPILE_VIEW > Configure

Jenkins Search (CTRL+K) Vagish Jaiswal log out

+ New Item

People

Build History

Edit View

Delete View

Project Relationship

Check File Fingerprint

Manage Jenkins

My Views

Docker Swarm Dashboard

Name: SAMPLE_COMPILE_VIEW

Description: DEVELOPER_COMPILE [1] > DEVELOPER_CODE_REVIEW [2] > QA_UNIT_TEST [3] > QA_METRICS_CHECK [4] > QA_PACKAGE [5]

[Plain text] Preview

☐ Filter build queue

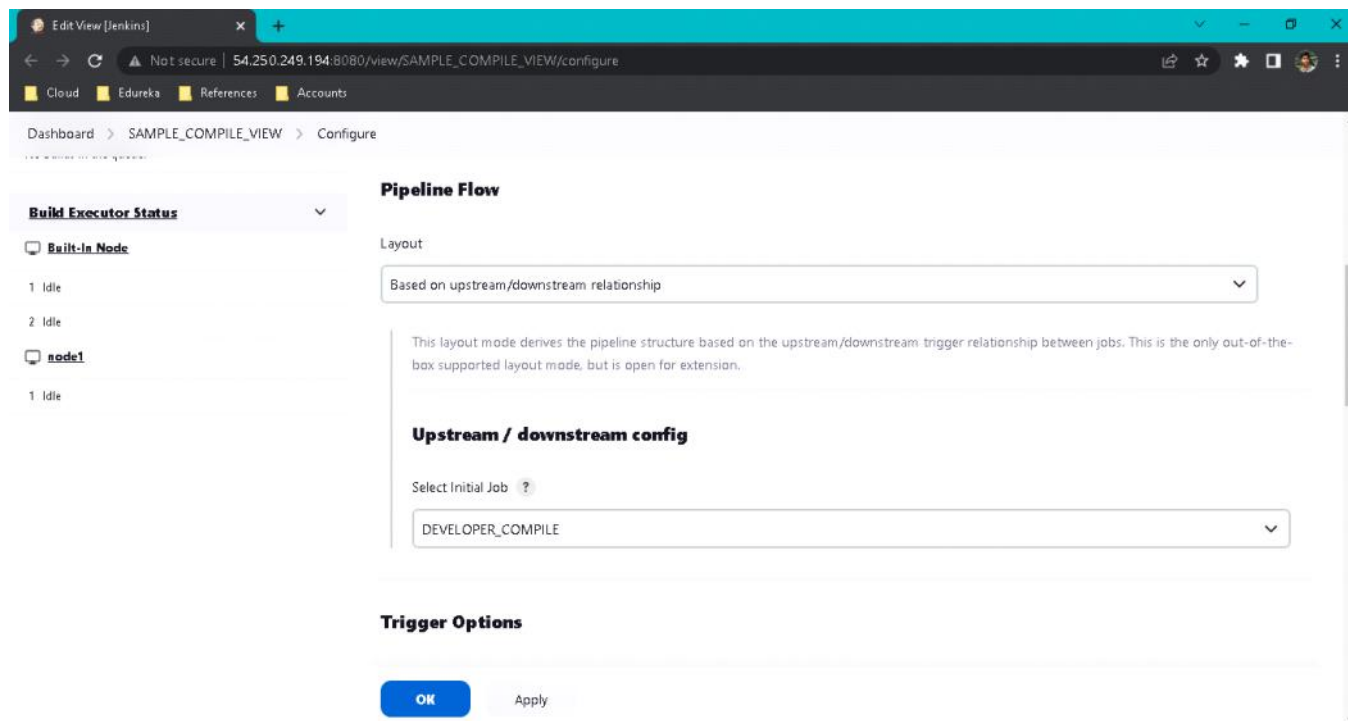
☐ Filter build executors

Build Pipeline View Title

OK Apply

Build Queue

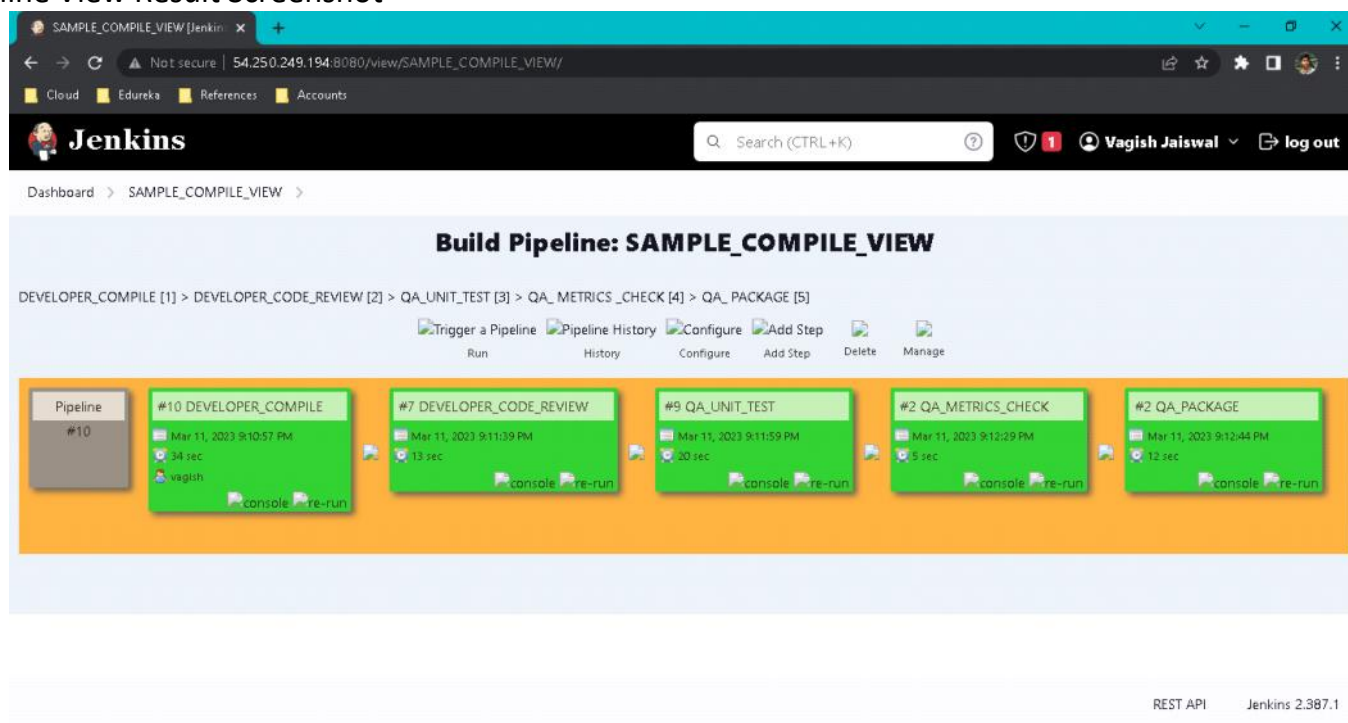
2)



The screenshot shows the Jenkins 'Configure' page for a pipeline named 'SAMPLE_COMPILE_VIEW'. The left sidebar shows the 'Build Executor Status' with two nodes: 'Built-In Node' (2 idle) and 'node1' (1 idle). The main content area is titled 'Pipeline Flow' and includes a 'Layout' dropdown set to 'Based on upstream/downstream relationship'. Below this is an 'Upstream / downstream config' section with a 'Select Initial Job' dropdown set to 'DEVELOPER_COMPILE'. At the bottom, there are 'OK' and 'Apply' buttons.

b. Pipeline View Result Screenshot

1)



The screenshot shows the Jenkins 'Build Pipeline: SAMPLE_COMPILE_VIEW' view. The top navigation bar includes the Jenkins logo, a search bar, and user information for 'Vagish Jaiswal'. The main content area displays a sequence of pipeline steps: 'DEVELOPER_COMPILE [1]' (34 sec), 'DEVELOPER_CODE_REVIEW [2]' (13 sec), 'QA_UNIT_TEST [3]' (20 sec), 'QA_METRICS_CHECK [4]' (5 sec), and 'QA_PACKAGE [5]' (12 sec). Each step is represented by a green box with a status icon, a timestamp, and a duration. Below the steps, there are links for 'Trigger a Pipeline', 'Pipeline History', 'Configure', 'Add Step', 'Delete', and 'Manage'. The bottom right corner shows 'REST API' and 'Jenkins 2.387.1'.