Birla Institute of Technology and Science, Pilani

INTRODUCTION TO DEVOPS

Assignment – Part A

Group No - 3

Topic: DevOps Project

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2		
3		
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5		

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Part – A (Project Description)

Project Title: Shopping Website with Microservices Architecture

Project Description:

A Shopping Website with Microservices Architecture with the backend on Java Spring Boot and Frontend in Angular. The objective of our project was to learn about microservices architecture and various design patterns such as circuit breaker, DTOs (Data Transfer Objects) etc. used in making one. How communication between microservices takes place and how to handle a situation in which a service is down.

Features of our webapp:

1. Core Services
    a. Product Service: Responsible for product catalog.
    b. Order Service: Responsible for placing orders, and discounts.
    c. Payment Service: Responsible for processing payments.
2. Supporting Services
    a. Gateway/Load Balancer/Reverse Proxy: For routing client-requests.
    b. Service Registry: Services status and profiling.
3. Frontend Service
    a. Angular WebApp: For to view and buy the products.

Technologies used:

1. Frontend: Angular, Typescript, HTML, CSS
2. Backend: Java, Spring Boot
3. Testing: JUnits, Selenium

Tools Used:

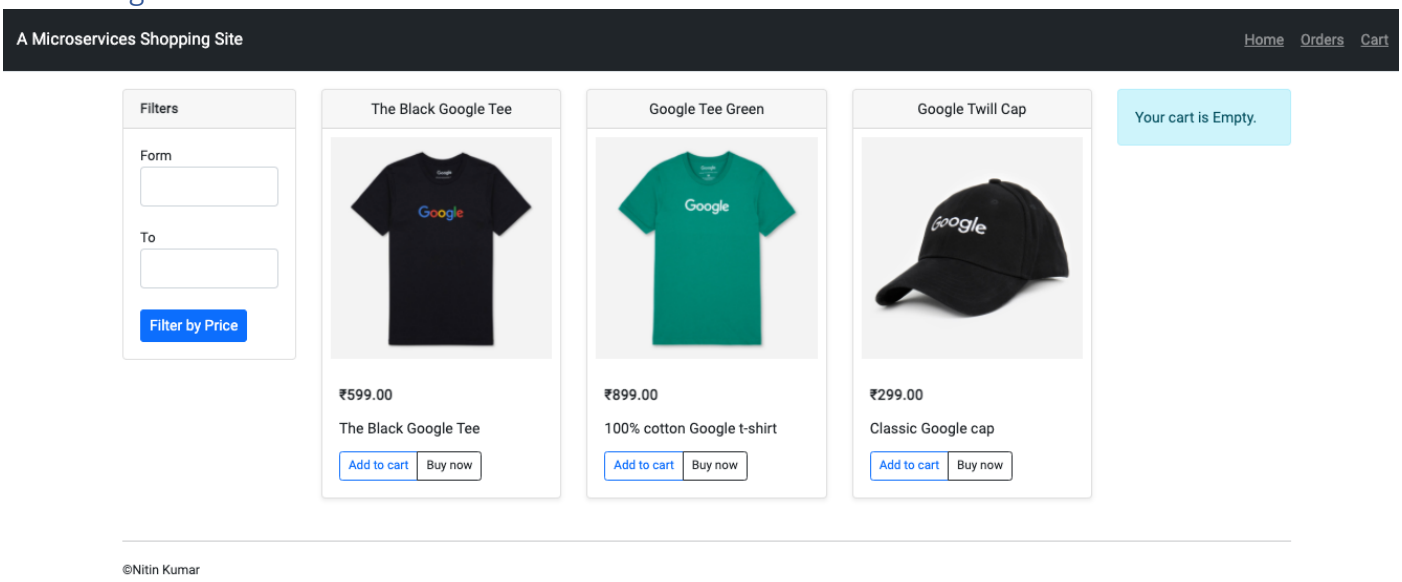
1. GitHub
2. Maven
3. SonarQube
4. Selenium

IDEs:

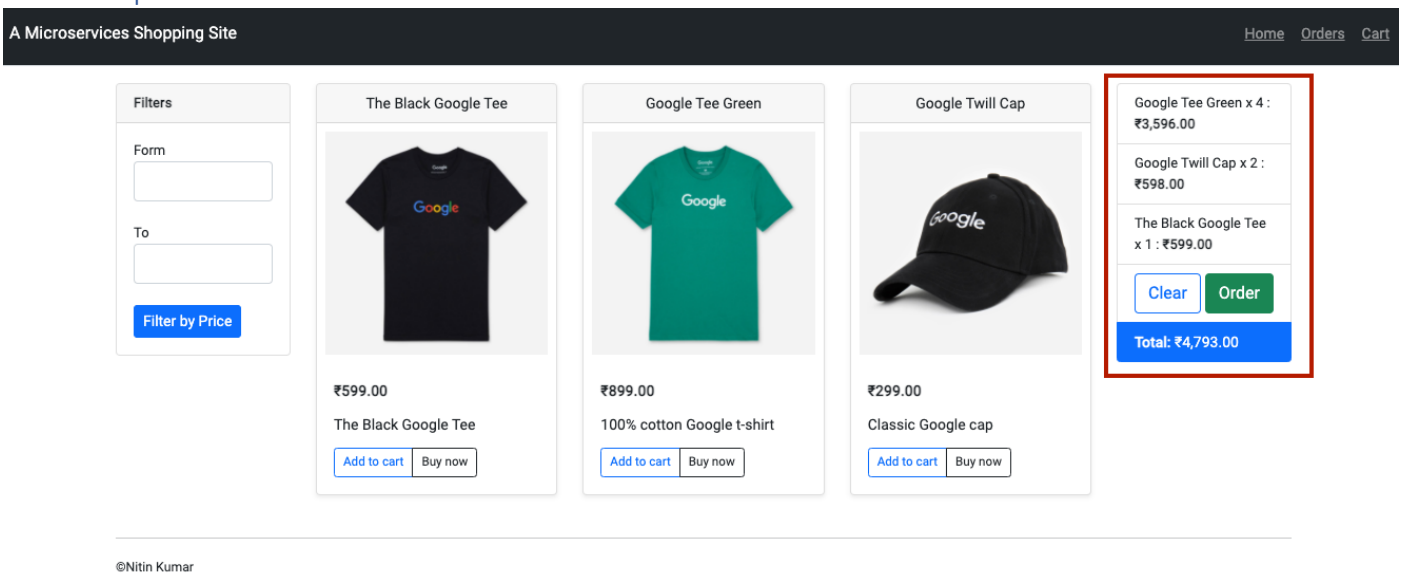
1. IntelliJ
2. VS Code

Project Demo

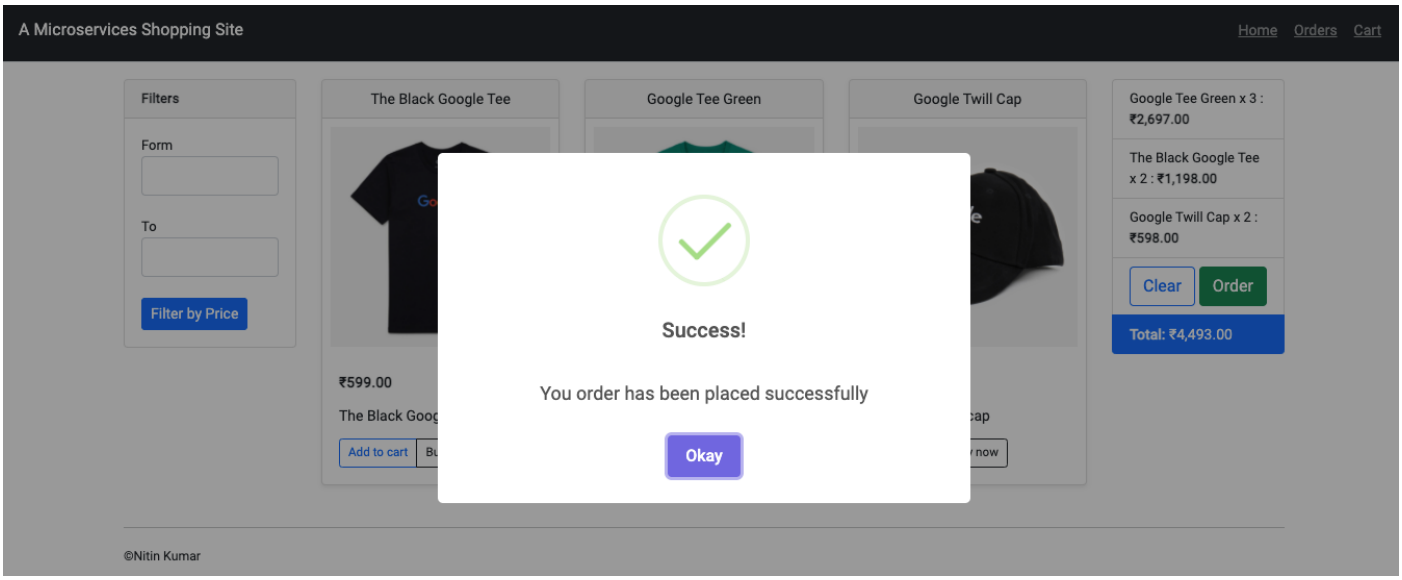
Home Page:



Cart Component:



Order Confirmation:

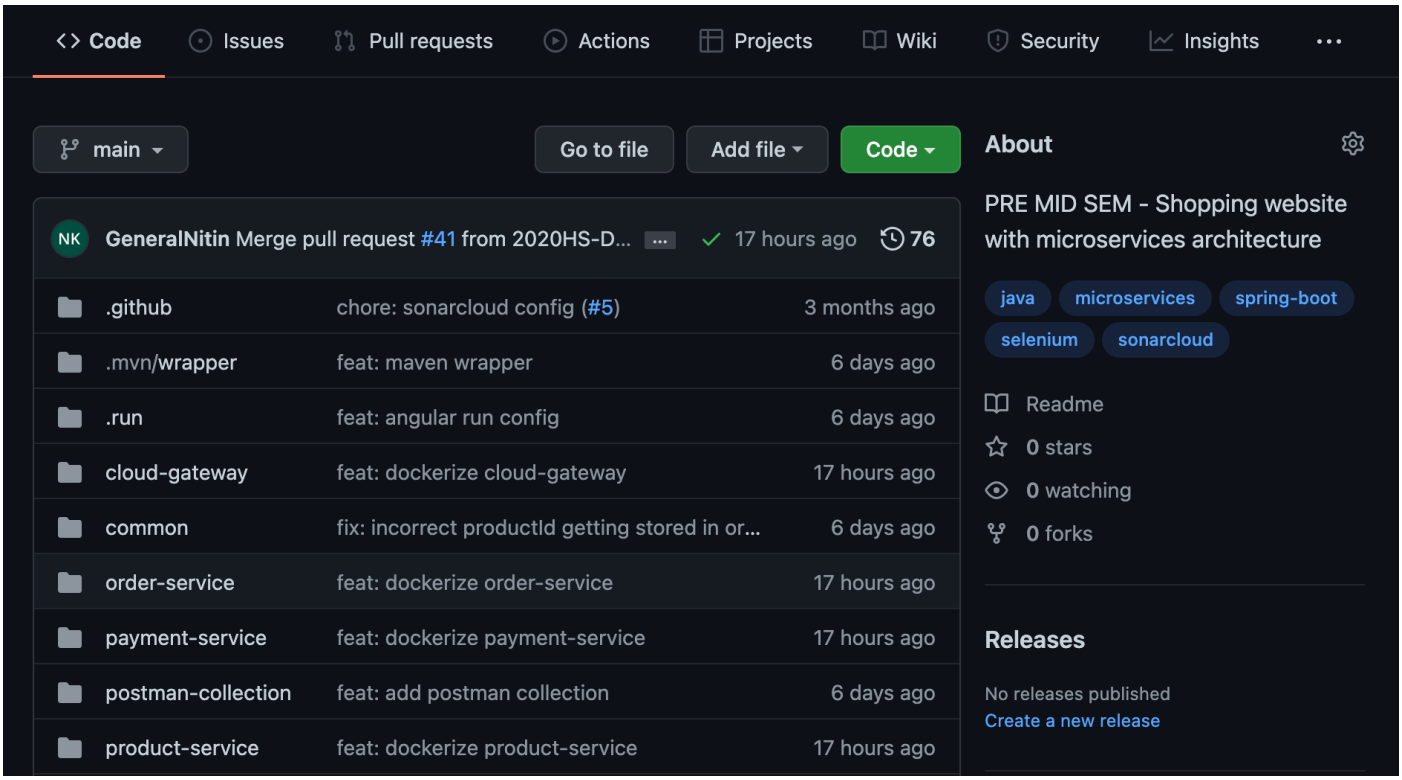


Part – B (DevOps Tools and Practices)

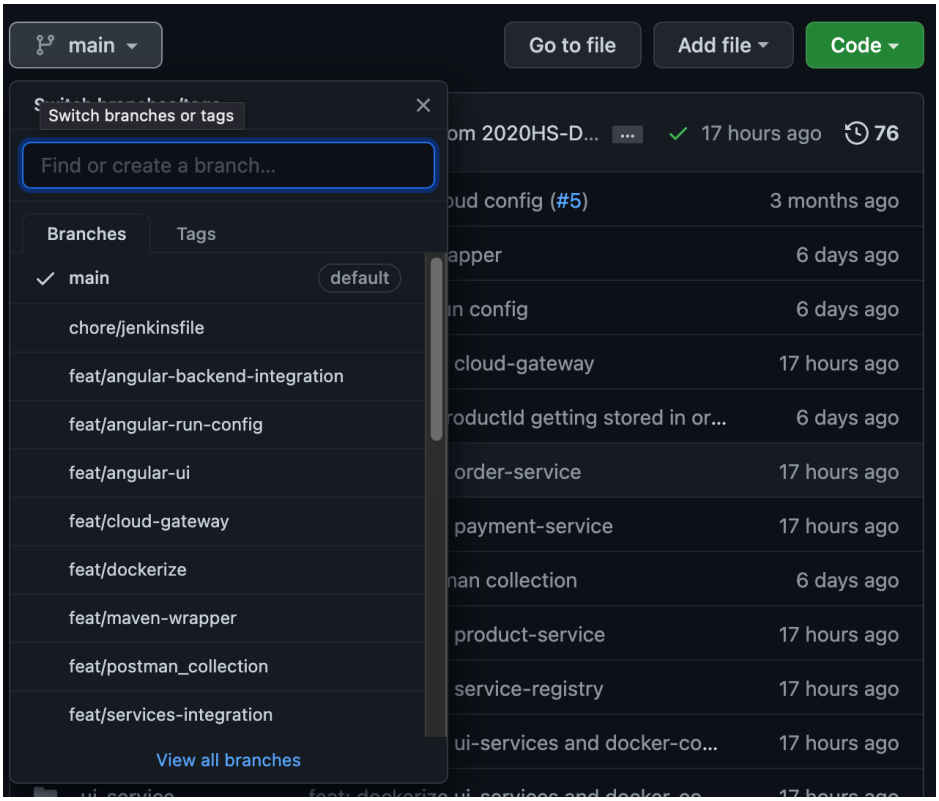
Source Code Management:

1. Git and GitHub
2. Workflow: Feature Branch Workflow

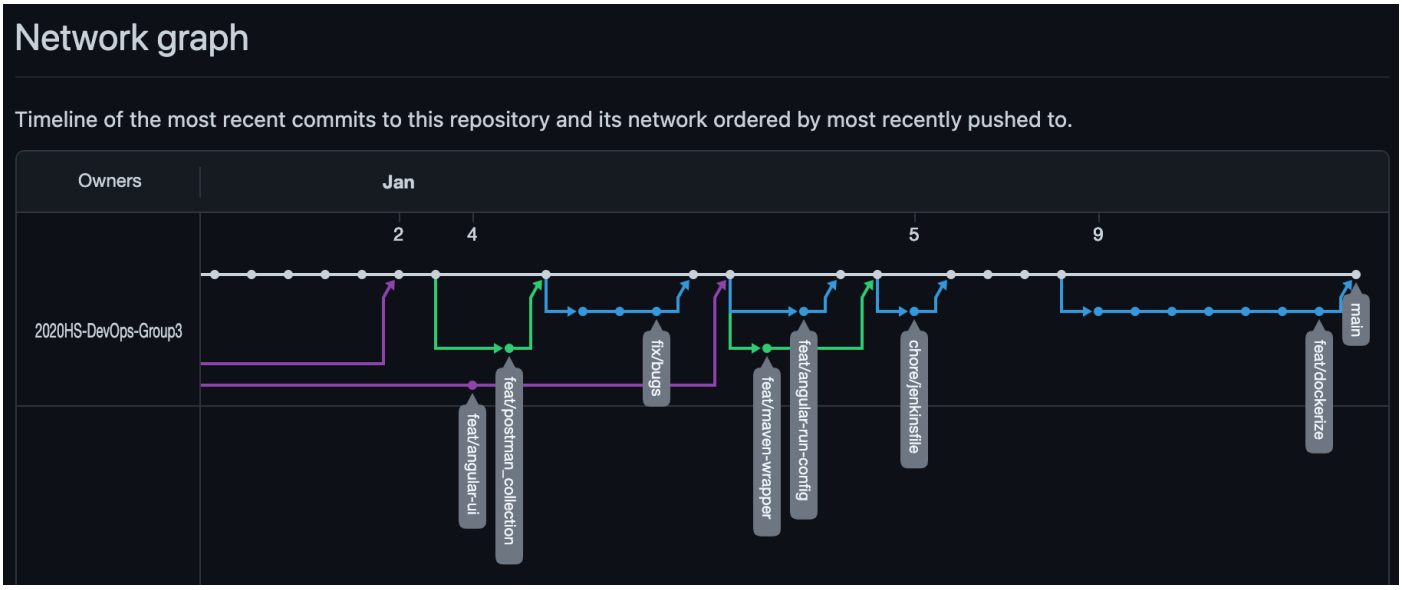
Repository Link: https://github.com/2020HS-DevOps-Group3/Shop-Microservices



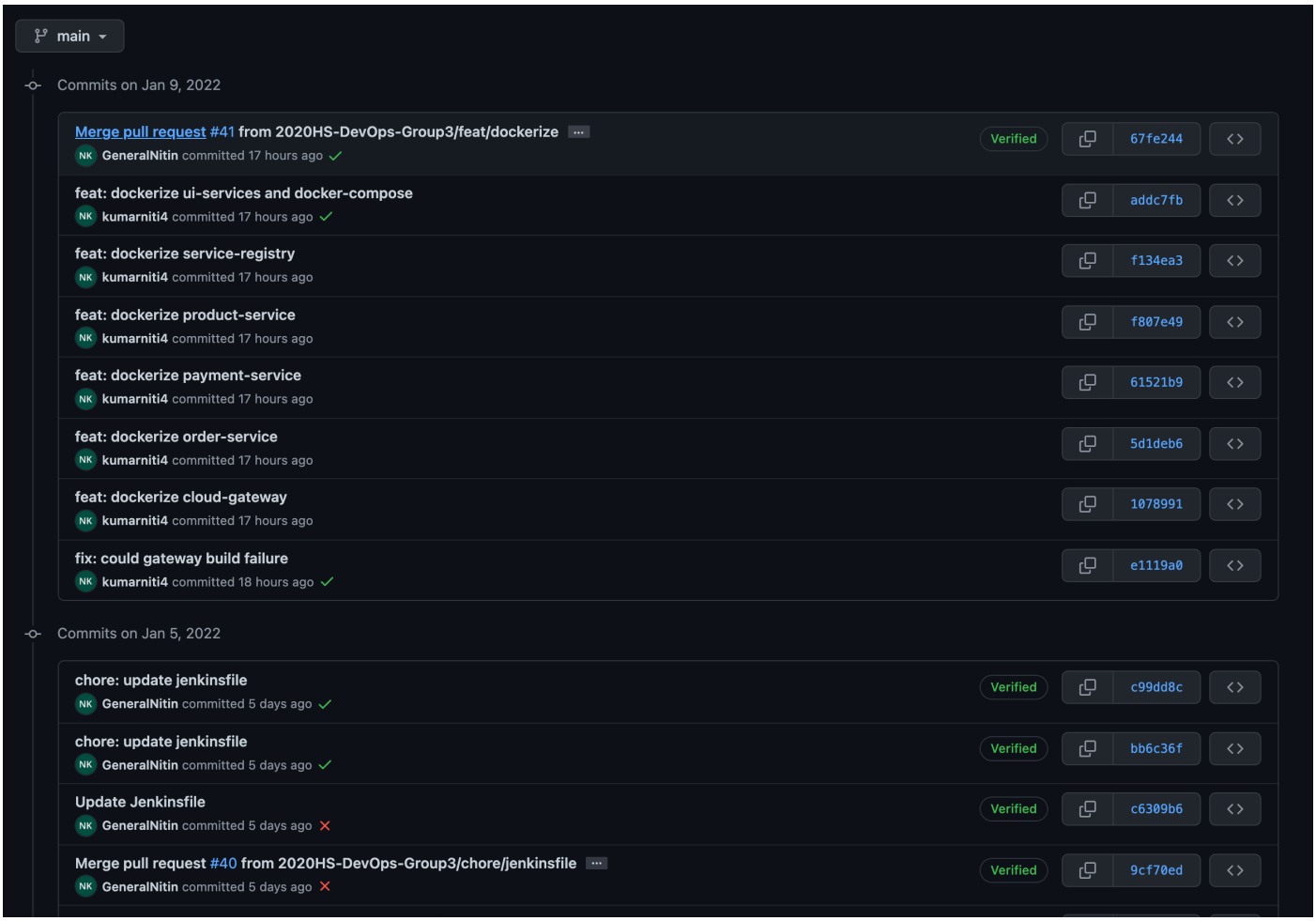
Branches:



Workflow:



Commits:



Build Management with Maven

Maven use cases in the project.

1. Used Maven as the Build tool for the project
2. Maven helped us in making our build artifacts and managing dependencies.

Parent Pom.XML:

```xml
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
         xmlns="http://maven.apache.org/POM/4.0.0"
         xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-4.0.0.xsd">
    <modelVersion>4.0.0</modelVersion>

    <parent>
        <artifactId>spring-boot-starter-parent</artifactId>
        <groupId>org.springframework.boot</groupId>
        <version>2.5.5</version>
        <relativePath/>
    </parent>

    <groupId>org.devops</groupId>
    <artifactId>DevOps-Project</artifactId>
    <version>1.0-SNAPSHOT</version>
    <name>DevOps Project</name>
    <description>DevOps Assignment Project</description>
    <packaging>pom</packaging>

    <properties>
        <java.version>11</java.version>
        <maven.compiler.source>11</maven.compiler.source>
        <maven.compiler.target>11</maven.compiler.target>
        <sonar.organization>2020hs-devops-group3</sonar.organization>
        <sonar.host.url>https://sonarcloud.io</sonar.host.url>
    </properties>

    <modules>
        <module>order-service</module>
        <module>payment-service</module>
        <module>service-registry</module>
        <module>product-service</module>
        <module>cloud-gateway</module>
        <module>common</module>
    </modules>
    <dependencies>
        <dependency>
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-starter-data-jpa</artifactId>
        </dependency>
        <dependency>
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-starter-web</artifactId>
        </dependency>
        <dependency>
            <groupId>org.springframework.boot</groupId>
```

```
            <artifactId>spring-boot-starter-validation</artifactId>
        </dependency>
        <dependency>
            <groupId>org.modelmapper</groupId>
            <artifactId>modelmapper</artifactId>
            <version>2.4.5</version>
        </dependency>
        <dependency>
            <groupId>com.google.guava</groupId>
            <artifactId>guava</artifactId>
            <version>31.0.1-jre</version>
        </dependency>
        <dependency>
            <groupId>com.h2database</groupId>
            <artifactId>h2</artifactId>
            <scope>runtime</scope>
        </dependency>
        <dependency>
            <groupId>org.projectlombok</groupId>
            <artifactId>lombok</artifactId>
            <optional>true</optional>
        </dependency>
        <dependency>
            <groupId>org.junit.jupiter</groupId>
            <artifactId>junit-jupiter</artifactId>
            <version>5.8.2</version>
            <scope>test</scope>
        </dependency>
        <dependency>
            <groupId>org.mockito</groupId>
            <artifactId>mockito-all</artifactId>
            <version>1.10.19</version>
            <scope>test</scope>
        </dependency>
        <dependency>
            <groupId>org.mockito</groupId>
            <artifactId>mockito-junit-jupiter</artifactId>
            <version>4.2.0</version>
            <scope>test</scope>
        </dependency>
        <dependency>
            <groupId>org.assertj</groupId>
            <artifactId>assertj-core</artifactId>
            <version>3.21.0</version>
            <scope>test</scope>
        </dependency>
    </dependencies>
</project>
```

Build Tasks with Maven:

Compilation using Maven (mvn complie):

```
[INFO] Copying 1 resource
[INFO] Copying 0 resource
[INFO]
[INFO] --- maven-compiler-plugin:3.8.1:compile (default-compile) @ cloud-gateway ---
[INFO] Nothing to compile - all classes are up to date
[INFO] ------------------------------------------------------------------------
[INFO] Reactor Summary:
[INFO]
[INFO] DevOps Project 1.0-SNAPSHOT ..... SUCCESS [  0.002 s]
[INFO] common 0.0.1-SNAPSHOT ..... SUCCESS [  1.327 s]
[INFO] order-service 0.0.1-SNAPSHOT ..... SUCCESS [  1.116 s]
[INFO] payment-service 0.0.1-SNAPSHOT ..... SUCCESS [  0.186 s]
[INFO] service-registry 0.0.1-SNAPSHOT ..... SUCCESS [  0.147 s]
[INFO] product-service 0.0.1-SNAPSHOT ..... SUCCESS [  0.109 s]
[INFO] cloud-gateway 0.0.1-SNAPSHOT ..... SUCCESS [  0.455 s]
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  3.690 s
[INFO] Finished at: 2022-01-10T16:28:30+05:30
[INFO] ------------------------------------------------------------------------
I514807@C02FQ8NQMD6M DevOps-Project %
```

Testing using Maven (mvn test):

```
[INFO] ------------------------------------------------------------------------
[INFO] Reactor Summary:
[INFO]
[INFO] DevOps Project 1.0-SNAPSHOT ..... SUCCESS [  0.002 s]
[INFO] common 0.0.1-SNAPSHOT ..... SUCCESS [  1.428 s]
[INFO] order-service 0.0.1-SNAPSHOT ..... SUCCESS [ 25.387 s]
[INFO] payment-service 0.0.1-SNAPSHOT ..... SUCCESS [ 16.691 s]
[INFO] service-registry 0.0.1-SNAPSHOT ..... SUCCESS [  9.995 s]
[INFO] product-service 0.0.1-SNAPSHOT ..... SUCCESS [ 13.303 s]
[INFO] cloud-gateway 0.0.1-SNAPSHOT ..... SUCCESS [  0.631 s]
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  01:07 min
[INFO] Finished at: 2022-01-10T16:31:14+05:30
[INFO] ------------------------------------------------------------------------
I514807@C02FQ8NQMD6M DevOps-Project %
```

Packaging using Maven (mvn package):

```
[INFO] --- maven-jar-plugin:3.2.0:jar (default-jar) @ cloud-gateway ---
[INFO]
[INFO] --- spring-boot-maven-plugin:2.5.5:repackage (repackage) @ cloud-gateway ---
[INFO] Replacing main artifact with repackaged archive
[INFO] ------------------------------------------------------------------------
[INFO] Reactor Summary:
[INFO]
[INFO] DevOps Project 1.0-SNAPSHOT ..... SUCCESS [  0.003 s]
[INFO] common 0.0.1-SNAPSHOT ..... SUCCESS [  1.658 s]
[INFO] order-service 0.0.1-SNAPSHOT ..... SUCCESS [ 24.134 s]
[INFO] payment-service 0.0.1-SNAPSHOT ..... SUCCESS [ 13.334 s]
[INFO] service-registry 0.0.1-SNAPSHOT ..... SUCCESS [  9.819 s]
[INFO] product-service 0.0.1-SNAPSHOT ..... SUCCESS [ 13.351 s]
[INFO] cloud-gateway 0.0.1-SNAPSHOT ..... SUCCESS [  0.679 s]
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  01:03 min
[INFO] Finished at: 2022-01-10T16:33:52+05:30
[INFO] ------------------------------------------------------------------------
I514807@C02FQ8NQMD6M DevOps-Project %
```

Installing in local .m2 repository using Maven (mvn install):

```
[INFO] --- maven-install-plugin:2.5.2:install (default-install) @ cloud-gateway ---
[INFO] Installing /Users/I514807/LocalDiskC/BITS/DevOps/Assignment/DevOps-Project/cloud-gateway/target/c
gateway/0.0.1-SNAPSHOT/cloud-gateway-0.0.1-SNAPSHOT.jar
[INFO] Installing /Users/I514807/LocalDiskC/BITS/DevOps/Assignment/DevOps-Project/cloud-gateway/pom.xml
eway-0.0.1-SNAPSHOT.pom
[INFO] ------------------------------------------------------------------------
[INFO] Reactor Summary:
[INFO]
[INFO] DevOps Project 1.0-SNAPSHOT ........................ SUCCESS [ 13.333 s]
[INFO] common 0.0.1-SNAPSHOT .............................. SUCCESS [  1.499 s]
[INFO] order-service 0.0.1-SNAPSHOT ....................... SUCCESS [ 24.799 s]
[INFO] payment-service 0.0.1-SNAPSHOT ..................... SUCCESS [ 15.104 s]
[INFO] service-registry 0.0.1-SNAPSHOT .................... SUCCESS [ 10.723 s]
[INFO] product-service 0.0.1-SNAPSHOT ..................... SUCCESS [ 14.674 s]
[INFO] cloud-gateway 0.0.1-SNAPSHOT ....................... SUCCESS [  1.210 s]
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  01:21 min
[INFO] Finished at: 2022-01-10T16:36:48+05:30
[INFO] ------------------------------------------------------------------------
I514807@C02FQ8NQMD6M DevOps-Project %
```

Clean up using Maven (mvn clean):

```
[INFO] ----------------------< org.devops:cloud-gateway >----------------------
[INFO] Building cloud-gateway 0.0.1-SNAPSHOT                              [7/7]
[INFO] --------------------------------[ jar ]---------------------------------
[INFO]
[INFO] --- maven-clean-plugin:3.1.0:clean (default-clean) @ cloud-gateway ---
[INFO] Deleting /Users/I514807/LocalDiskC/BITS/DevOps/Assignment/DevOps-Project/cloud-gateway/target
[INFO] ------------------------------------------------------------------------
[INFO] Reactor Summary:
[INFO]
[INFO] DevOps Project 1.0-SNAPSHOT ........................ SUCCESS [  0.255 s]
[INFO] common 0.0.1-SNAPSHOT .............................. SUCCESS [  0.055 s]
[INFO] order-service 0.0.1-SNAPSHOT ....................... SUCCESS [  0.160 s]
[INFO] payment-service 0.0.1-SNAPSHOT ..................... SUCCESS [  0.096 s]
[INFO] service-registry 0.0.1-SNAPSHOT .................... SUCCESS [  0.056 s]
[INFO] product-service 0.0.1-SNAPSHOT ..................... SUCCESS [  0.093 s]
[INFO] cloud-gateway 0.0.1-SNAPSHOT ....................... SUCCESS [  0.041 s]
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  1.190 s
[INFO] Finished at: 2022-01-10T16:38:20+05:30
[INFO] ------------------------------------------------------------------------
I514807@C02FQ8NQMD6M DevOps-Project %
```

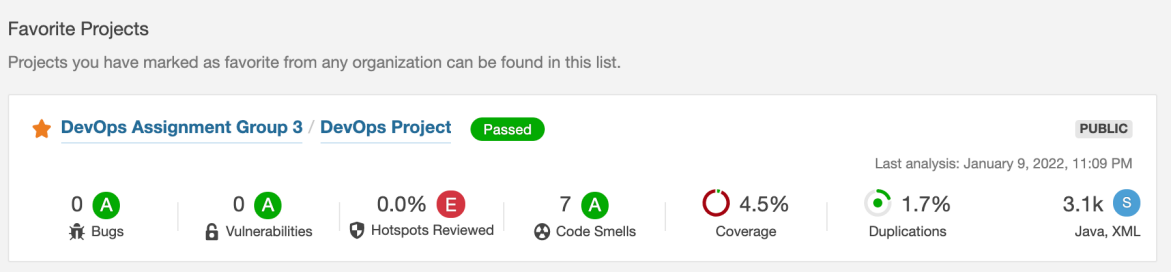
Code Quality Management using SonarQube

SonarQube is an open-source platform for continuous inspection of code quality to perform automatic reviews with static analysis of code to detect bugs, code smells, and security vulnerabilities on many programming languages.

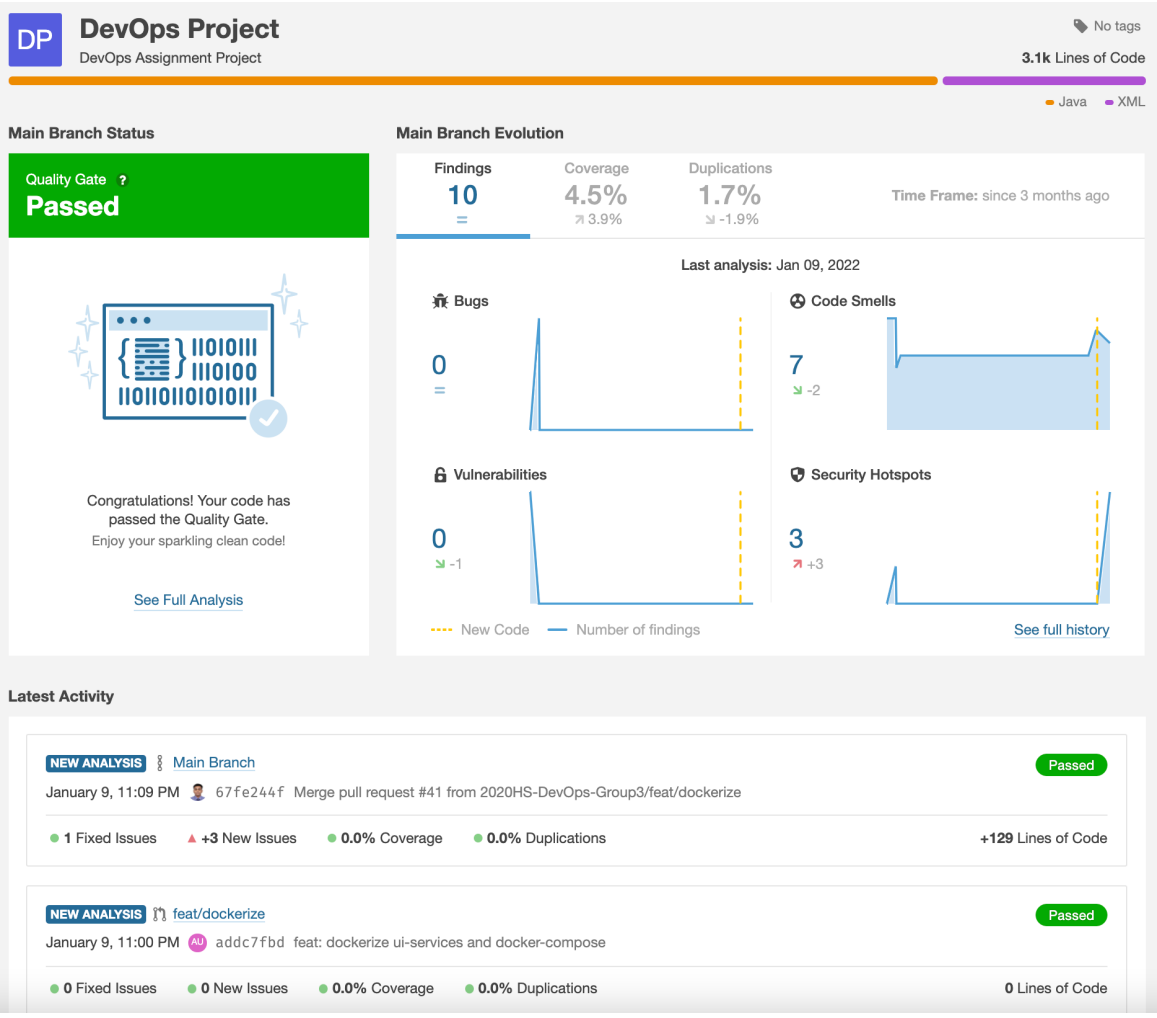
We configured and integrated SonarQube with our project, using the free cloud offering of SonarQube called SonarCloud.

Link: https://sonarcloud.io/project/overview?id=2020HS-DevOps-Group3_DevOps-Project

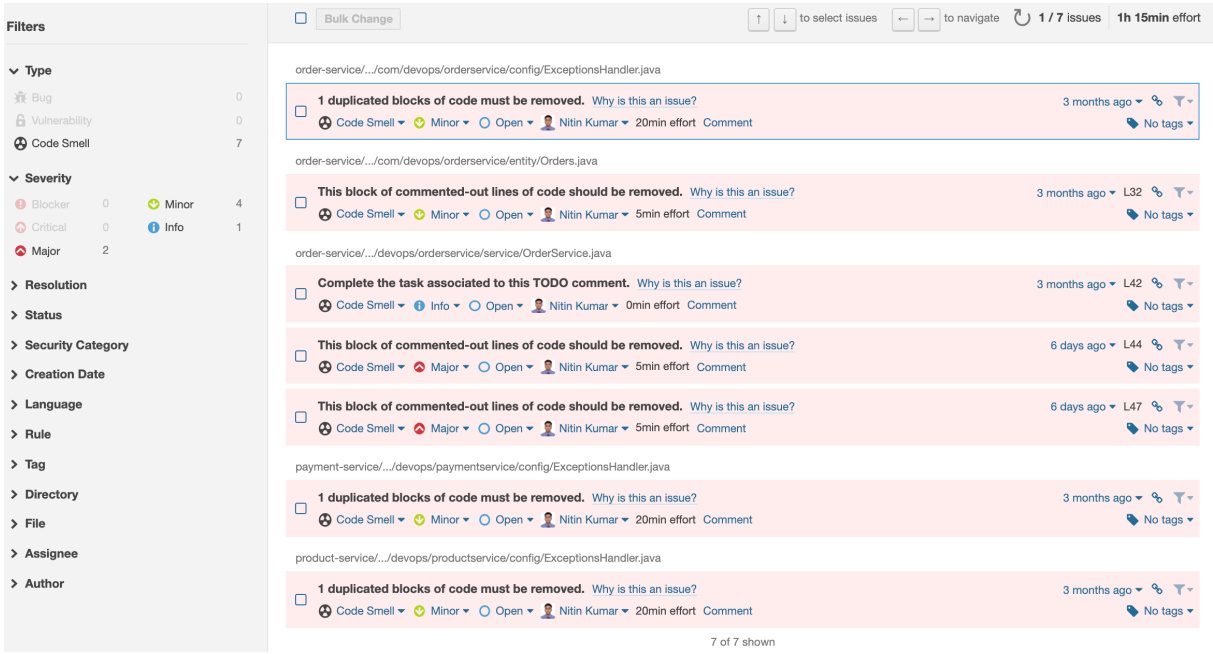
Project Status:



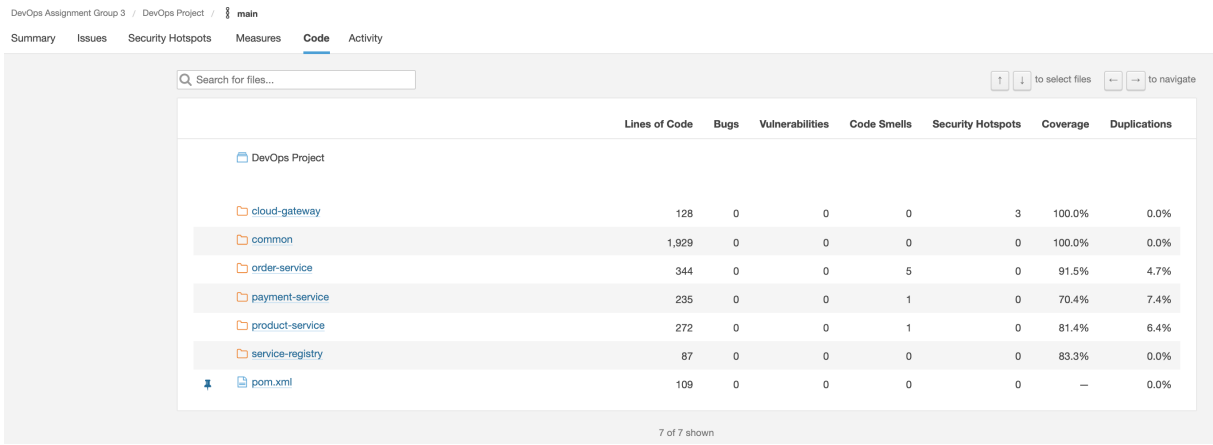
SonarCloud Home Page:



Code Smells:



Coverage:



Automation Testing with Selenium

Selenium is an open-source project with wide range of tools and libraries with a aim to support web browser automation. Selenium provides a tool for writing functional tests without the need to learn a test scripting language.

Repository Link: https://github.com/2020HS-DevOps-Group3/SeleniumTests

Test Results:

```
PASSED: launchSite
        Launches the site
PASSED: validateLoginData
        Enters valid login data

===============================================
    Default test
    Tests run: 2, Failures: 0, Skips: 0
===============================================


===============================================
Default suite
Total tests run: 2, Passes: 2, Failures: 0, Skips: 0
===============================================
```