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GOA UNIVERSITY

GOA BUSINESS SCHOOL

MCA (MASTER OF COMPUTER APPLICATION)

INTERNSHIP REPORT AT

ZAPCOM SOLUTIONS PRIVATE LIMITED

Professor: Ramdas N Karmali

Reporting Manager: Digvijay Solanki

Mentor: Rushikesh Arlekar

Student's Name: Fatima Jafari

Roll Number: 2069

Date: 16/6/2023

INTERNSHIP REPORT

Fatima Jafari

2069

ZapCom Solutions Pvt. Ltd.

Goa University

REPORT OF INTERNSHIP DONE AT ZAPCOM SOLUTIONS PVT. LTD

Completed By:

Fatima Jafari

2069

For the partial fulfillment of

MCA Degree for Semester VI /V

Discipline of Computer Science and Technology,

Goa Business School,

Goa University

At

Zapcom Solution Pvt. Ltd.

9th Floor, Gamma Tower, Sigma Soft Tech Park,

Whitefield, Bangalore – 560066, India

UNDER THE GUIDANCE OF

Mr. Digvijay Solanki

(Lead Software Engineer, Zapcom)

&

Mr. Rushikesh Arlekar

(Associate Software Engineer, Zapcom)

~ || ~

zapcom.

1st June 2023

TO WHOMSOEVER IT MAY CONCERN

This is to inform you that **Ms. Fatima Jafari,** student of Master of Computer Applications (MCA) of Goa University, Goa, is currently undergoing her final semester project (Semester VI/V) at our company, **Zapcom Solutions Pvt. Ltd** from 4th January, 2023.

During her tenure she has met the expectations of her team lead/mentor/guide and found to be regular and sincere.

This letter is being issued on her request to be submitted with the project report at Goa University.

The final internship completion letter will be provided on completing her internship.

For Zapcom Solutions Pvt. Ltd.

Zapcom Solutions Pvt. Ltd. INDIA

Srinivas Reddy Kothakota
Chief Operating Officer

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105 Decker Court, Ste. 810 Irving,
TX 75062.
Ph: (972)441-2081

GOA UNIVERSITY

GOA BUSINESS SCHOOL

Certificate of Evaluation

This is certifying that Ms. **Fatima Jafari** successfully completed her internship at Zapcom Solutions Private Limited, Bangalore, India in partial fulfilment for the award of the degree in Master of Computer Application.

Examiner 1

Examiner 2

[Kiran Kulkarni]

Place: Goa University
Date: 16th June 2023

Dean, Goa Business School

Acknowledgement

This Internship in Zapcom has been a great opportunity for learning and professional development for me. I am grateful for having the chance of completing 6 months' internship and meet so many wonderful people and professionals who led me though this internship period.

I would like to thank Mr. Kishore Pallamreddy (CEO, Zapcom) for giving me the opportunity to do my MCA final semester internship at Zapcom and for providing professional and certificate courses like Udemy and LinkedIn.

I am using this opportunity to express my deepest gratitude and special thanks to Mr. Digvijay Solanki (Lead Software Engineer, Zapcom) for being a great manager and giving me all the necessary guidance and support. I am deeply grateful to Mr. Rushikesh Arlekar (Associate Software Engineer, Zapcom) for being an amazing mentor and spite of being extraordinarily busy with his duties, took time out to listen, guide and keep me on the correct path to carry out my project.

I would like to thank Ms Savitha Cariappa (COS-Marketing Head & Business Ops, Zapcom), Mr. Rangaswamy Sarla (Sr Java Developer, Zapcom), Mr. Subramanian Arumugan (Delivery Manager, Zapcom) and the rest of the HR team who helped us settle in and made us feel of family at Zapcom.

I would like to thank Goa Business School, Goa University, for giving me the opportunity to carry out my internship and acquire real-world industrial experience. I thank Mr. Hanumant Harichandra (Professor, MCA, Goa Business School, Goa University), Mr. Ramdas Karmali (Professor, MCA, Goa Business School, Goa University) and all the faculty of MCA, Goa University for the constant encouragement and support during this internship.

I am always thankful to my parents. Without their understanding, encouragement, support and praying, it would be impossible for me to successfully complete my studies and I would not have been able to come this far.

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Fatima Jafari

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1 Introduction

This internship report describes the tasks carried out during 5 months, full time internship period by Miss. Fatima Jafari which commenced on 4th January 2023 at Zapcom Solutions Pvt. Ltd, Bangalore in accordance with the curriculum of the VI semester Industrial Training of the MCA program, Goa University, Goa, India.

In the chapters that will follow, I will talk about the company and elaborate on the projects and tasks I worked on, a brief information about the projects, the modules I worked on. I will also provide information on the technologies studied and tools used during the internship, and my experience with the Zapcom company during the internship.

Figure 1: Internship at Zapcom Solutions Pvt. Ltd, Bangalore

2 Company Profile

Zapcom Group is a global Product Engineering and Technology Services company that designs and develops custom software solutions, enabling partners to achieve their business goals.

They are globally specialized in building scalable platforms for Travel, Hospitality, Fin-Tech and Retail. Zapcom Group is a high performing team with competency in disruptive innovative ideas and emerging technologies.

They are headquartered in California with offices in Dublin-California, Dallas Texas, Bangalore, Hyderabad - India and San Jose-Costa Rica. Zapcom has a strong management team with experience in Technology consulting, Product engineering and Custom solution development services. Zapcom is strategically placed to help clients deliver better products, services and business processes through Disruptive Technologies, Insights and Processes.

Zapcom has successfully delivered many projects in Agile and Scrum methodologies. The Company has helped its customers to adapt and further improve their delivery efficiency. Zapcom helps its customers to achieve performance targets.

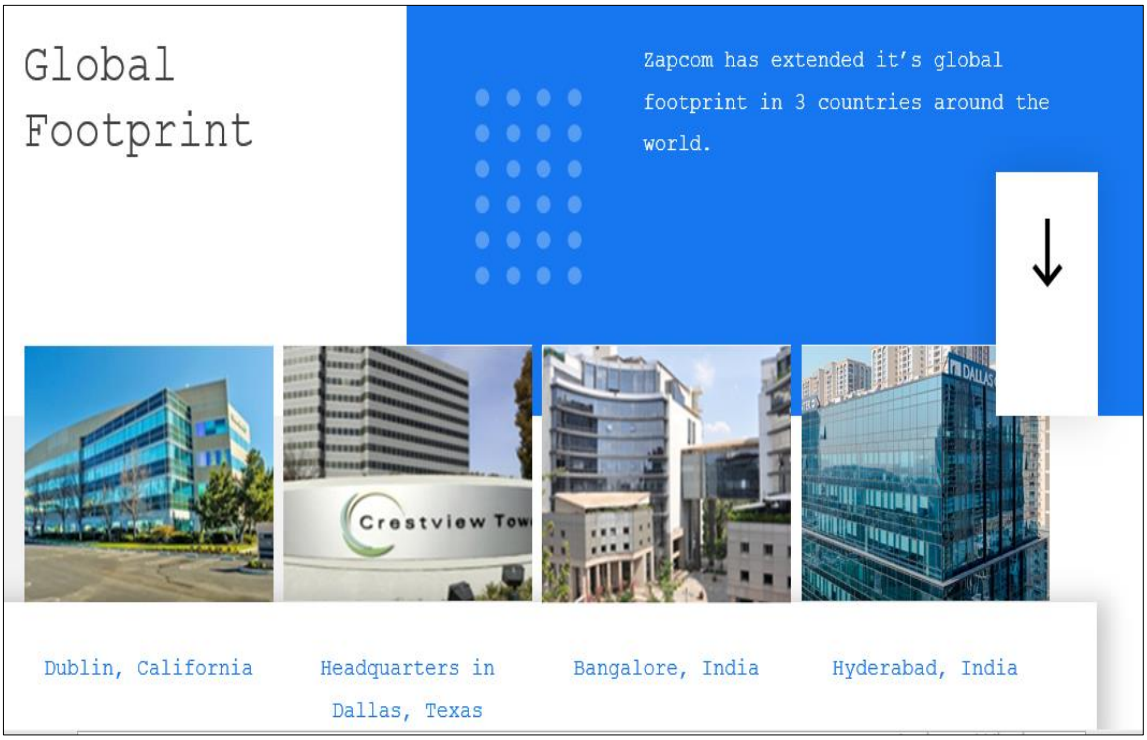


Figure 2: Zapcom Global Footprint

3 POC-Project Description

I have selected the student management system for my POC-Project. In this project I have implemented some of the advanced JAVA topics and functionality that I have learned during my Internship. This project has three main tables (Course, Grade, Student) and one junction table for creating many to many relationships between course and student for enrolling the students to courses. In order to give marks to students in the specific course I used one to many relationships to link the tables and unique contrast to prevent duplication of records. For developing this project, I use MYSQL for Storing records and Java with spring boot rest API for developing the project.

The project has the following Entities:

- Student
- Course
- Course_Student
- Grade

The project contains the following functionality:

- Register Students & courses
- Enroll Students to courses
- Add and Display grades of the students
- Prevent Storing Duplicate records
- Error handling

The following technologies and functionalities are implemented:

- CRUD Operation
- Relationships (1:M, M:1 & M:M)
- Custom Query with Query Annotation
- Spring Boot Logging
- Cashing (Redis: is a powerful tool for storing and processing data in memory)
- Flyway – SQL & Java-based Migrations
- Unit Test Using Mockito and Junit
- OpenApi specification
- Documenting, and testing RESTful API: shttps://inspector.swagger.io/
- Dockerfile
- Docker-Compose file

3.1 Student Management System

A student management system project is a web-based platform that allows, Courses, schools and universities to take student data online for improved management, transparency, communications, and scheduling. The system generates and uses a large amount of data. This data must be communicated appropriately to students, faculty, and parents. A student management system helps educational institutions to store, manage, and distribute this information.

Student management system provides many benefits to educational institutions, mostly stemming from centralized data management and accessibility. Teachers can more easily input, manage, and access student data. Parental guardians get better visibility into how their student is performing in classes. State-level compliance and other regulatory requirements are also much easier to fulfill.

By developing this application, I want use my skills to take part in facilitating and developing the education management system process.

3.2 Student Management System Implementation

The project is implemented using Java with Spring Boot Rest API. The project Structure is as follows:

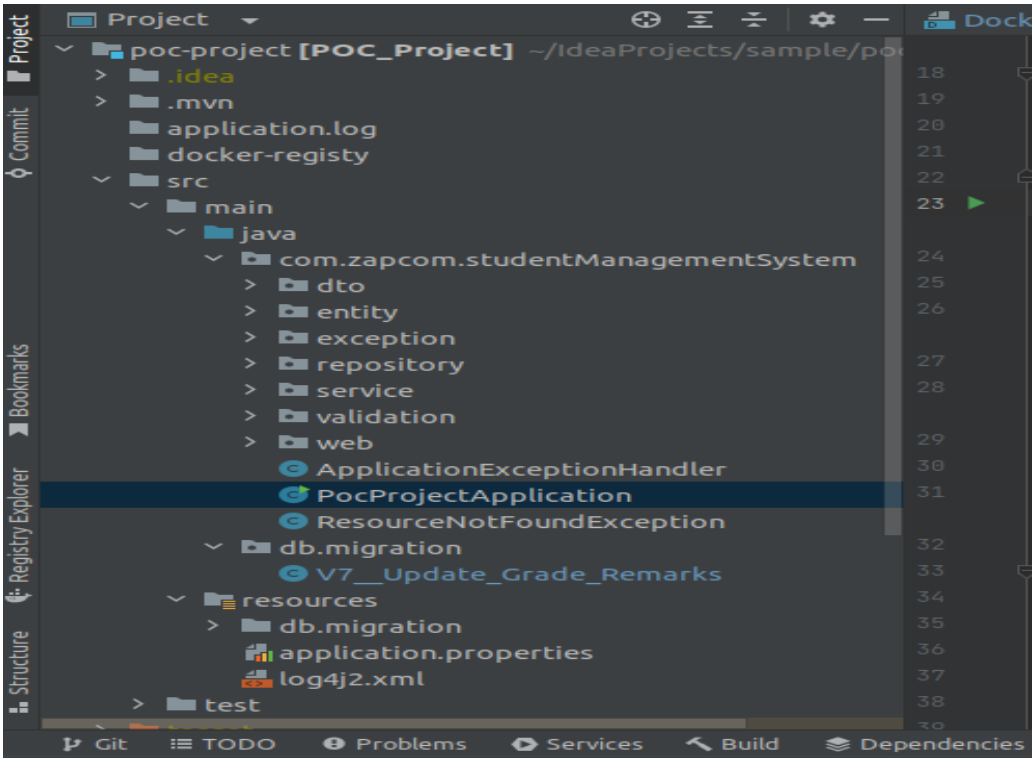


Figure 3: Project Structure

3.2.1 CRUD Operation

CRUD stands for Create, Read/Retrieve, Update and Delete and these are the four basic operations that we perform on persistence storage. CRUD is data-oriented and the standardized use of HTTP methods. HTTP has a few methods which work as CRUD operations and do note they are very vital from a developmental point perspective in programming that also does helps us relate better web development and also aids us while dealing with databases. So, standard CRUD Operations are as follows:

POST: Creates a new resource

GET: Reads/Retrieve a resource

PUT: Updates an existing resource

DELETE: Deletes a resource

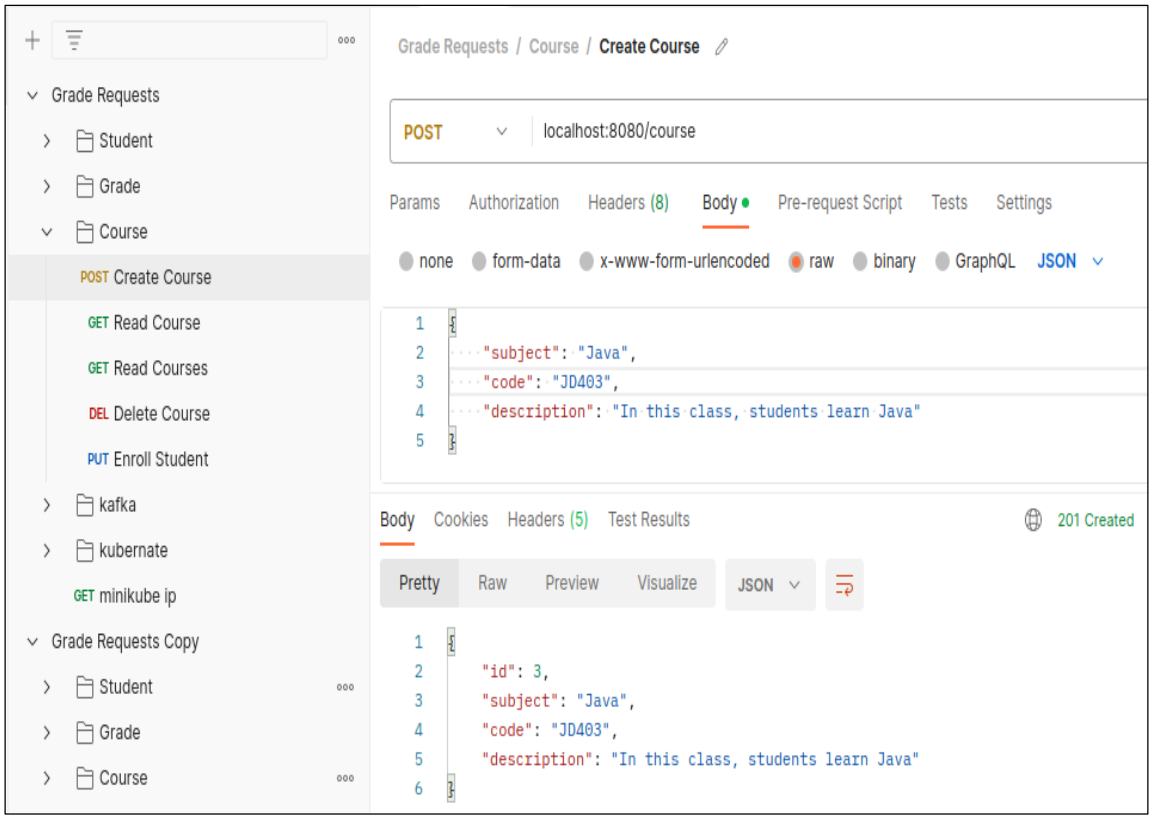


Figure 4: CRUD Operation

3.2.2 Relationships

Relationships between tables tell you how much of the data from a **foreign key** field can be seen in the related **primary key** column and vice versa.

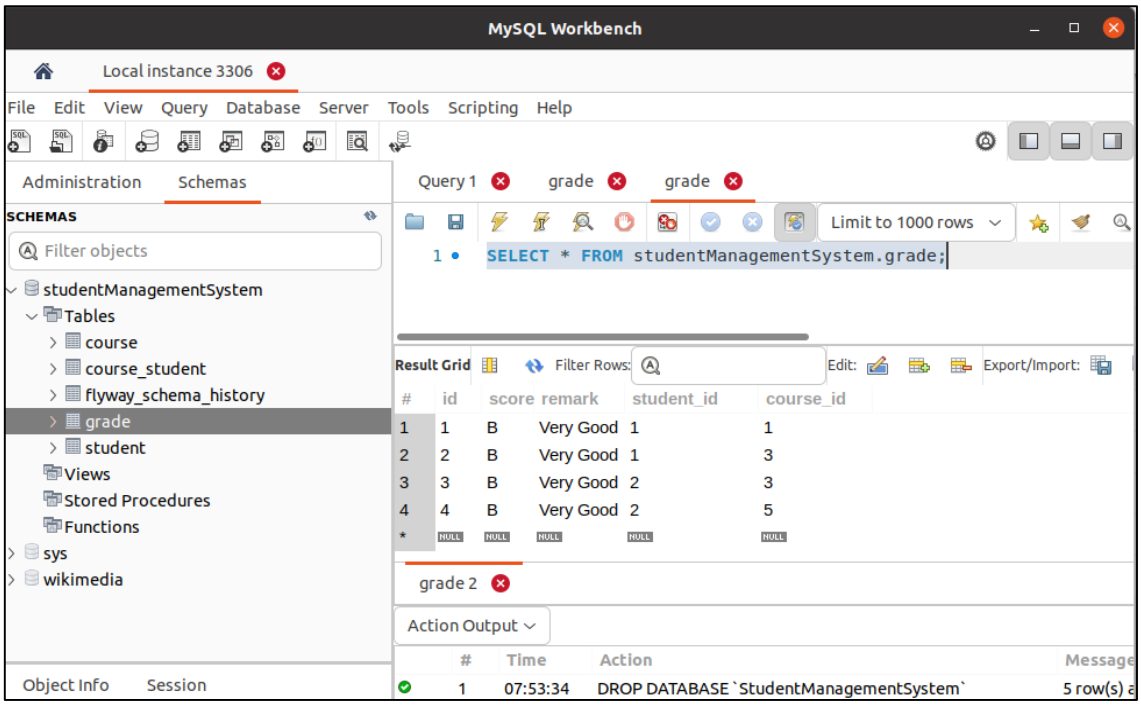


Figure 5: Relationships between Grade, Student and Course Tables

3.2.3 Custom Query with Query Annotation

Sometime case arises, where we need a custom query to fulfil one test case. We can use @Query annotation to specify a query within a repository

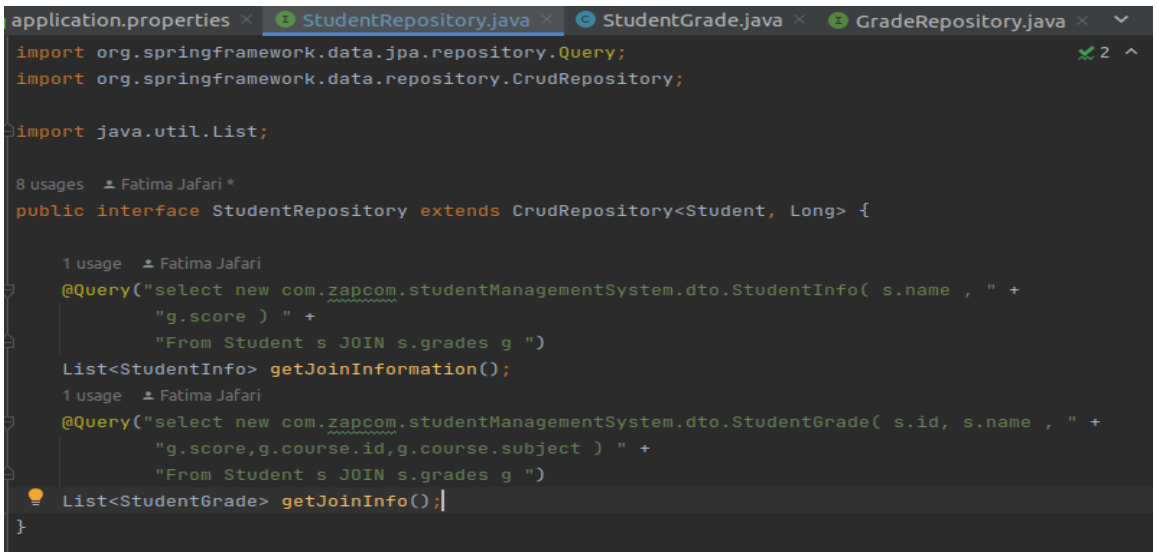


Figure 6: Custom Query with Query Annotation

3.2.4 Spring Boot Logging

Spring Boot uses Apache Commons logging for all internal logging. Spring Boot's default configurations provides a support for the use of Java Util Logging, Log4j2, and Logback. Using these, we can configure the console logging as well as file logging.

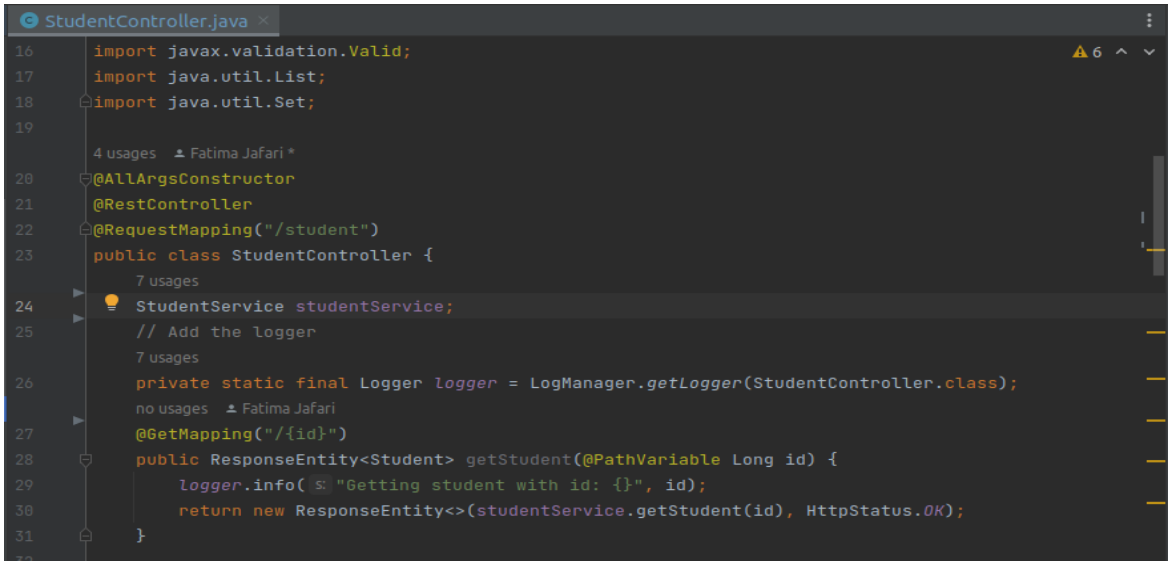


Figure 7: Spring Boot Logging Implementation

3.2.5 Cashing

Redis, which stands for Remote Dictionary Server, is a fast, open-source, in-memory, key-value data store.

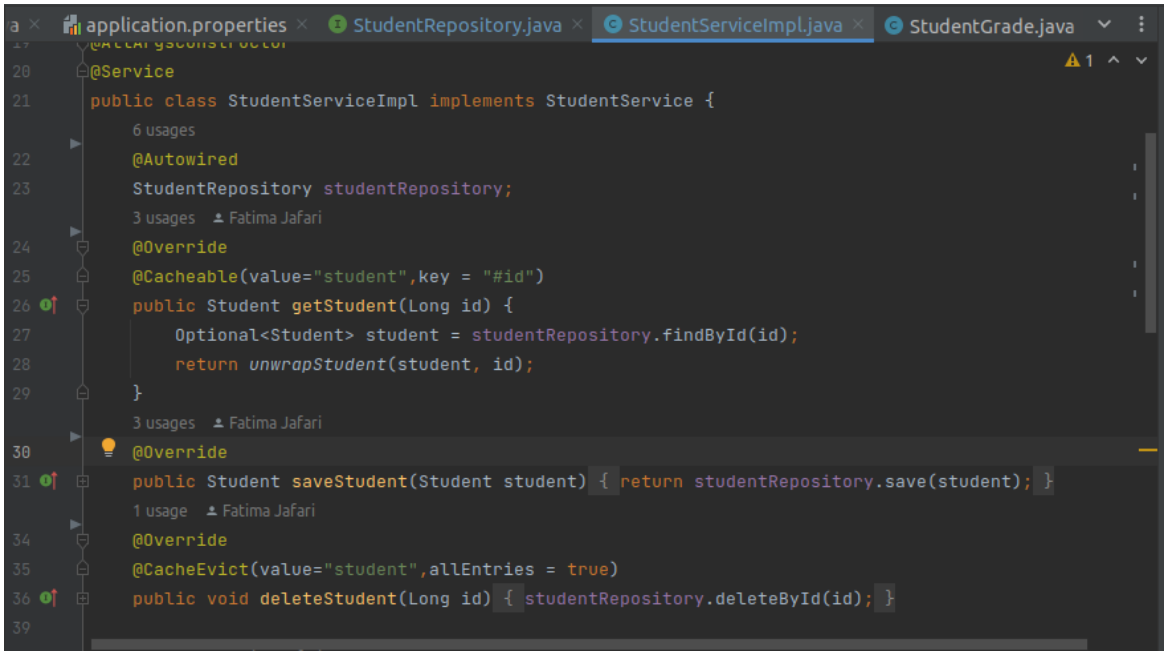


Figure 8: Cashing

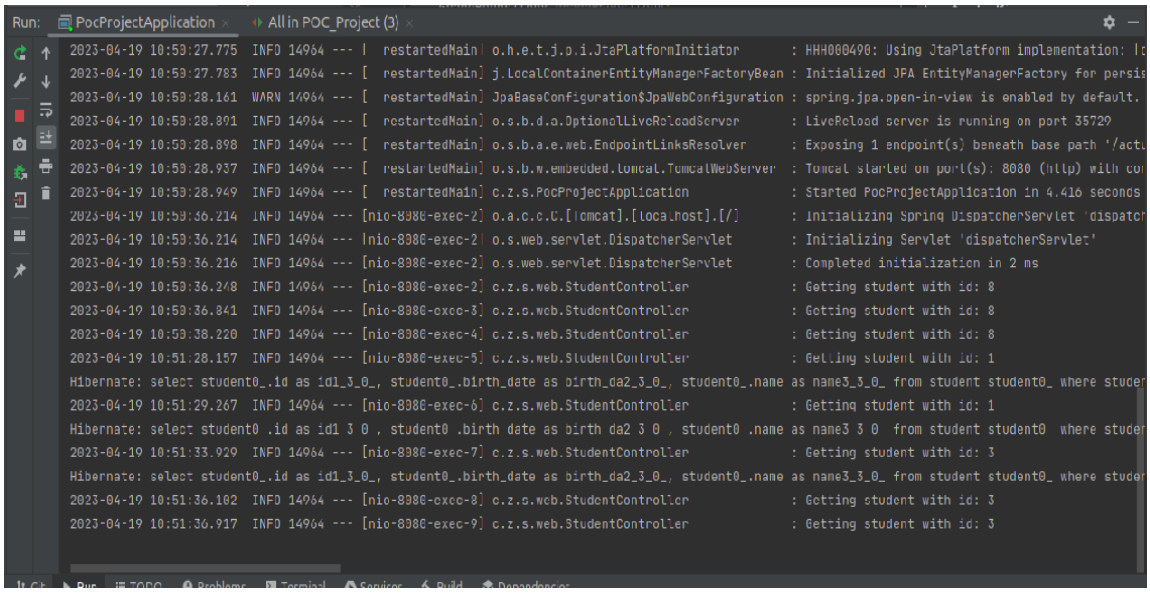
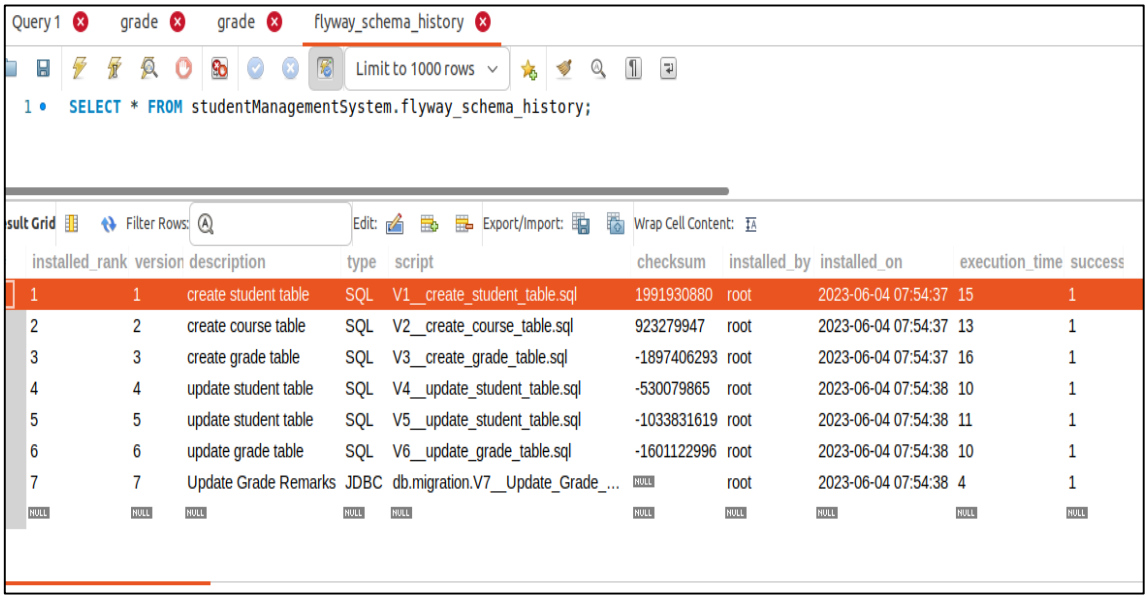


Figure 9: Cashing & Logging

3.2.6 Flyway – SQL &Java Based

Flyway is an open-source database migration tool that helps developers manage and automate the evolution of their database schema. It provides a simple and effective way to version control and apply database changes using SQL scripts. Flyway supports a wide range of databases, including Oracle, MySQL, PostgreSQL, SQL Server, and more.



installed_rank	version	description	type	script	checksum	installed_by	installed_on	execution_time	success
1	1	create student table	SQL	V1__create_student_table.sql	1991930880	root	2023-06-04 07:54:37	15	1
2	2	create course table	SQL	V2__create_course_table.sql	923279947	root	2023-06-04 07:54:37	13	1
3	3	create grade table	SQL	V3__create_grade_table.sql	-1897406293	root	2023-06-04 07:54:37	16	1
4	4	update student table	SQL	V4__update_student_table.sql	-530079865	root	2023-06-04 07:54:38	10	1
5	5	update student table	SQL	V5__update_student_table.sql	-1033831619	root	2023-06-04 07:54:38	11	1
6	6	update grade table	SQL	V6__update_grade_table.sql	-1601122996	root	2023-06-04 07:54:38	10	1
7	7	Update Grade Remarks	JDBC	db.migration.V7__Update_Grade_...	NULL	root	2023-06-04 07:54:38	4	1
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Figure 10: Flyway – SQL &Java Based

3.2.7 Unit Test Using Mockito and Junit

Unit testing is a software testing technique that focuses on verifying the individual components, or units, of a software system. The goal of unit testing is to ensure that each unit functions correctly in isolation before integrating them into the larger system.

Mockito is an open-source testing framework used for unit testing of Java applications. It plays a vital role in developing testable applications. Mockito is used to mock interfaces so that a dummy functionality can be added to a mock interface that can be used in Unit Testing. Mockito can also be used with other testing frameworks like **JUnit**. **JUnit** framework is a Java framework that is also used for testing.

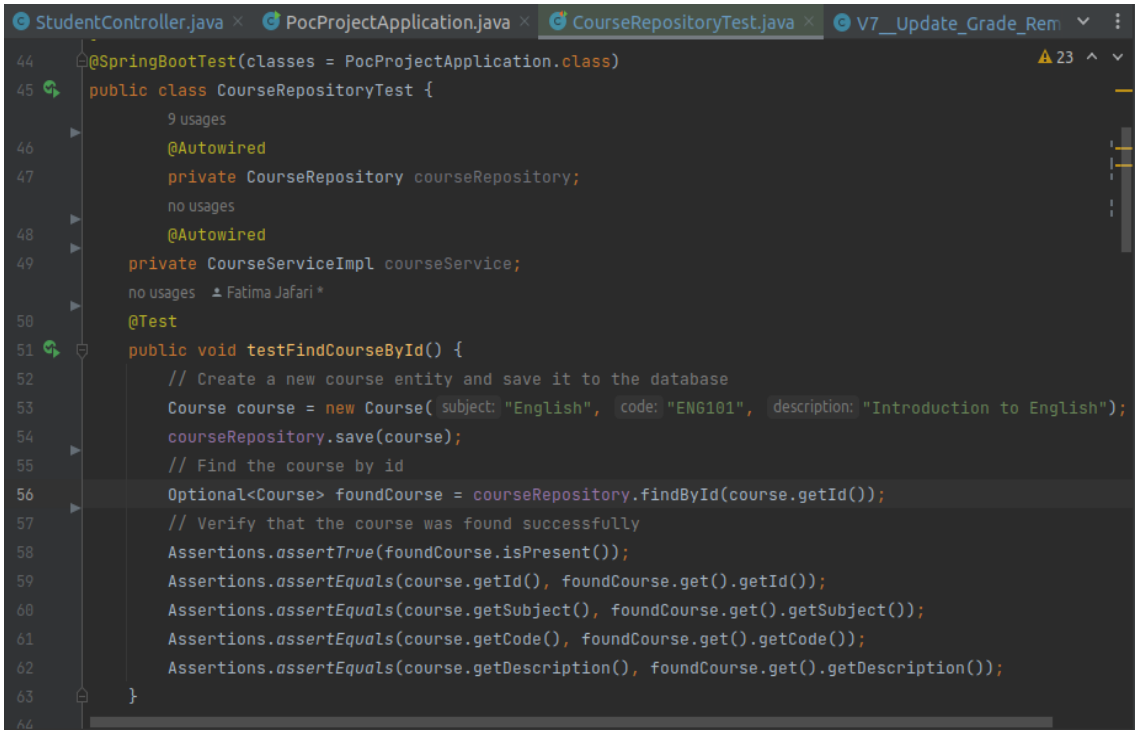


Figure 11: Unit Test for CourseRepository

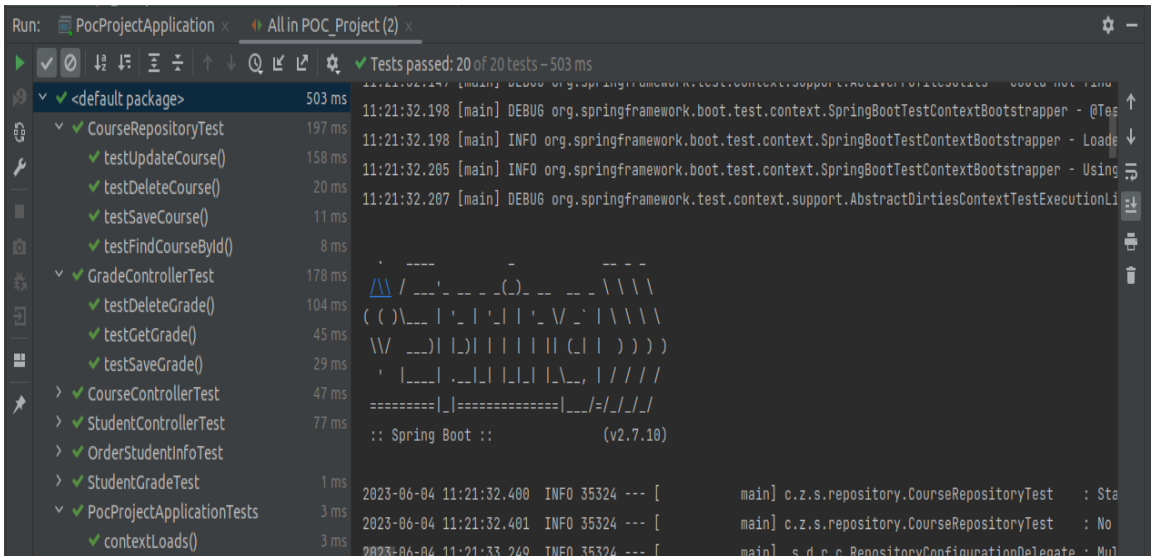


Figure 12: Unit Tests

3.2.8 OpenApi specification

The OpenAPI Specification (formerly known as Swagger) is an open standard that defines a language-agnostic interface for RESTful APIs. It provides a structured way to describe, document, and visualize the functionalities of an API, making it easier for developers to understand and consume the API.

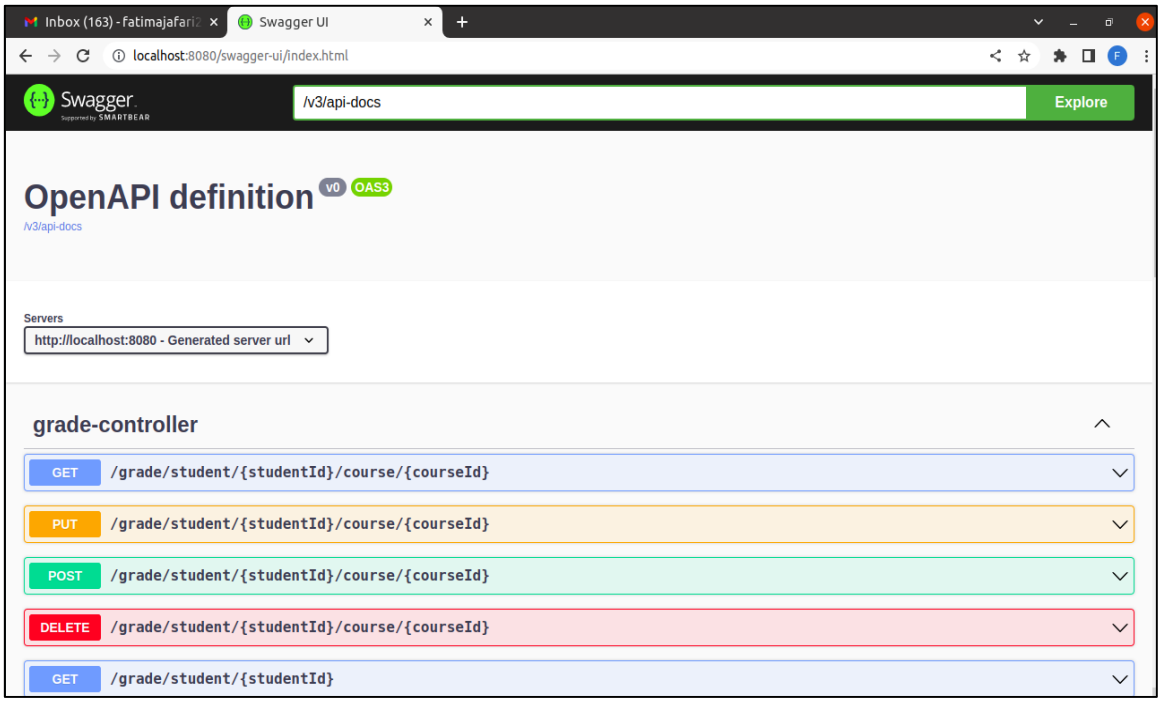


Figure 13: OpenApi specification

3.2.9 Dockerfile

A Dockerfile is a text file that contains a set of instructions for building a Docker image. It provides a way to automate the creation of container images with all the dependencies and configurations required for running an application.

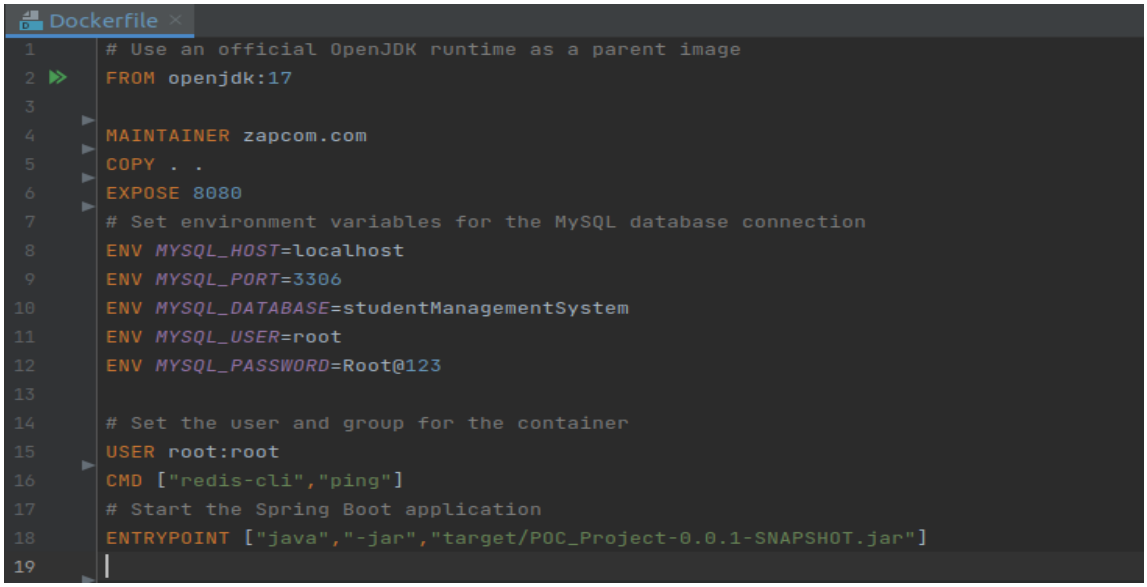


Figure 14: Dockerfile

3.2.10 Docker-Compose

Docker Compose is a tool that simplifies the management and orchestration of multi-container Docker applications. It allows you to define and run multiple Docker containers as a single application, making it easier to set up complex environments and manage their dependencies.

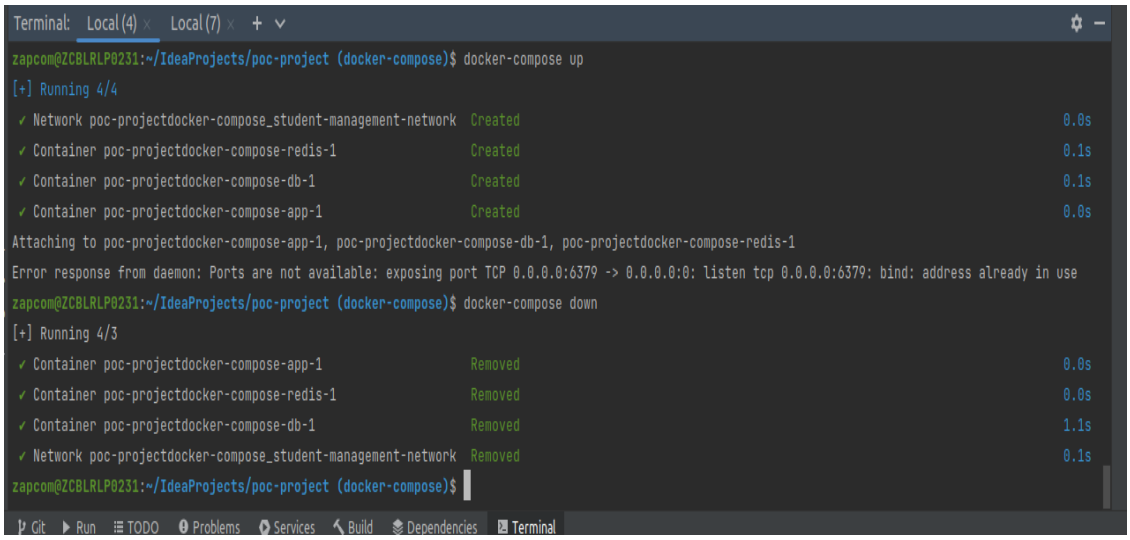


Figure 15: Docker-Compose

4 Tools & Technologies Used:

- Backend : Java with Spring Boot
- Java IDE : IntelliJ, Eclipse
- Project Management Tool: Maven
- Database: MySQL
- API platform: Postman
- DevOps software: Gitlab
- Software Platform: Docker
- Tool for documenting API: Swagger
- Database Migration Tool: Flyway
- Software Platform: Kafka

4.1 Java

Java is a **programming language** and a **platform**. Java is a high level, robust, object-oriented and secure programming language. Java was developed by Sun Microsystems (which is now the subsidiary of Oracle) in the year 1995. James Gosling is known as the father of Java. Before Java, its name was Oak. Since Oak was already a registered company, so James Gosling and his team changed the name from Oak to Java.

Platform: Any hardware or software environment in which a program runs, is known as a platform. Since Java has a runtime environment (JRE) and API, it is called a platform.

4.2 Spring Boot

Spring Boot is a project that is built on the top of the Spring Framework. It provides an easier and faster way to set up, configure, and run both simple and web-based applications.

It is a Spring module that provides the **RAD (*Rapid Application Development*)** feature to the Spring Framework. It is used to create a stand-alone Spring-based application that you can just run because it needs minimal Spring configuration.

In short, Spring Boot is the combination of **Spring Framework** and **Embedded Servers**. In Spring Boot, there is no requirement for XML configuration (deployment descriptor). It uses convention over configuration software design paradigm that means it decreases the effort of the developer. We can use Spring **STS IDE** or **Spring Initializr** to develop Spring Boot Java applications.

The reasons we use Spring Boot Framework:

- The dependency injection approach is used in Spring Boot.
- It contains powerful database transaction management capabilities.
- It simplifies integration with other Java frameworks like JPA/Hibernate ORM, Struts, etc.
- It reduces the cost and development time of the application.

4.2.1 Advantages of Spring Boot

- It creates stand-alone Spring applications that can be started using Java -jar.
- It tests web applications easily with the help of different Embedded HTTP servers such as Tomcat, Jetty, etc. We don't need to deploy WAR files.
- It provides opinionated 'starter' POMs to simplify our Maven configuration.
- It provides production-ready features such as metrics, health checks, and externalized configuration.
- There is no requirement for XML configuration.
- It offers a CLI tool for developing and testing the Spring Boot application.
- It offers the number of plug-ins.
- It also minimizes writing multiple boilerplate codes (the code that has to be included in many places with little or no alteration), XML configuration, and annotations.
- It increases productivity and reduces development time.

4.2.2 Limitations of Spring Boot

Spring Boot can use dependencies that are not going to be used in the application. These dependencies increase the size of the application.

4.2.3 Goals of Spring Boot

The main goal of Spring Boot is to reduce **development, unit test,** and **integration test** time.

- Provides Opinionated Development approach
- Avoids defining more Annotation Configuration
- Avoids writing lots of import statements
- Avoids XML Configuration.

By providing or avoiding the above points, Spring Boot Framework reduces **Development time, Developer Effort,** and **increases productivity**.

4.2.4 Spring Boot Features

- Web Development
- Spring Application
- Application events and listeners
- Admin features
- Externalized Configuration
- Properties Files
- YAML Support
- Type-safe Configuration
- Logging
- Security

4.2.5 Spring Boot Architecture

Spring Boot is a module of the Spring Framework. It is used to create stand-alone, production-grade Spring Based Applications with minimum efforts. It is developed on top of the core Spring Framework.

Spring Boot follows a layered architecture in which each layer communicates with the layer directly below or above (hierarchical structure) it. Before understanding the **Spring Boot Architecture**, we must know the different layers and classes present in it. There are **four** layers in Spring Boot are as follows:

- Presentation Layer
- Business Layer
- Persistence Layer
- Database Layer

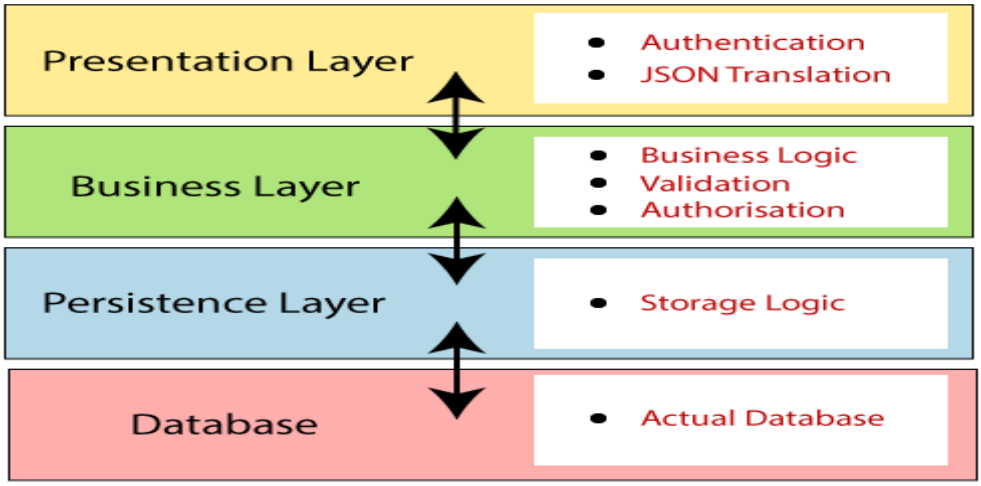


Figure 16: Spring Boot Layers

Presentation Layer: The presentation layer handles the HTTP requests, translates the JSON parameter to object, and authenticates the request and transfers it to the business layer. In short, it consists of **views** i.e., frontend part.

Business Layer: The business layer handles all the **business logic**. It consists of service classes and uses services provided by data access layers. It also performs **authorization** and **validation**.

Persistence Layer: The persistence layer contains all the **storage logic** and translates business objects from and to database rows.

Database Layer: In the database layer, **CRUD** (create, retrieve, update, delete) operations are performed.

4.2.6 Spring Boot Flow Architecture

- Now we have validator classes, view classes, and utility classes.
- Spring Boot uses all the modules of Spring-like Spring MVC, Spring Data, etc. The architecture of Spring Boot is the same as the architecture of Spring MVC, except one thing: there is no need for **DAO** and **DAOImpl** classes in Spring boot.
- Creates a data access layer and performs CRUD operation.
- The client makes the HTTP requests (PUT or GET).
- The request goes to the controller, and the controller maps that request and handles it. After that, it calls the service logic if required.
- In the service layer, all the business logic performs. It performs the logic on the data that is mapped to JPA with model classes.
- A JSP page is returned to the user if no error occurred.

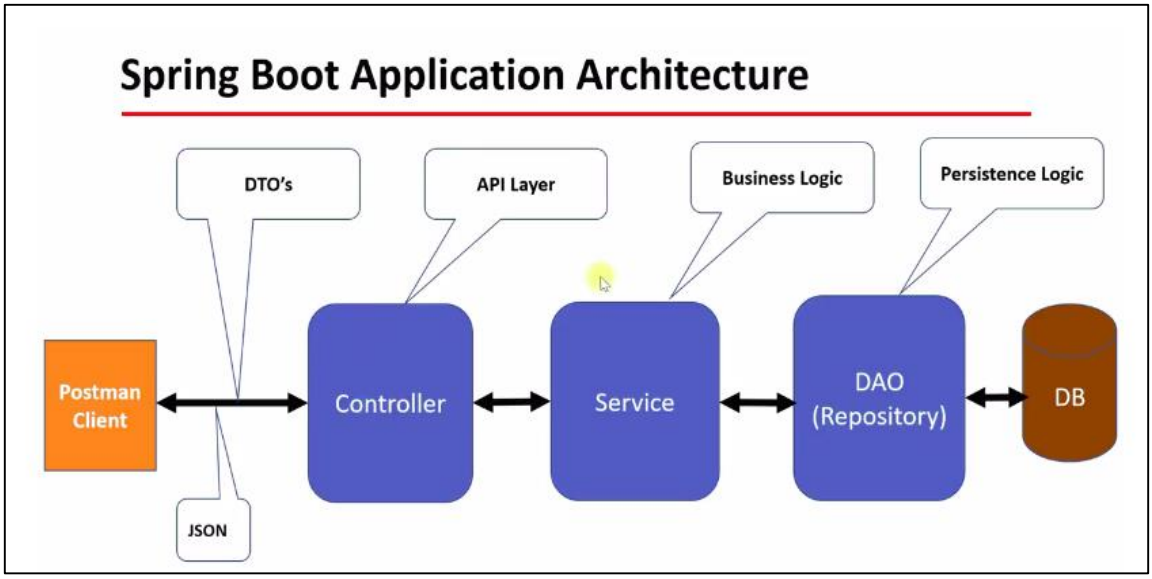


Figure 17: Spring Boot Application Architecture

4.3 IntelliJ IDEA

IntelliJ IDEA is an Integrated Development Environment (IDE) for JVM languages designed to maximize developer productivity. It does the routine and repetitive tasks for you by providing clever code completion, static code analysis, and refactoring, and lets you focus on the bright side of software development, making it not only productive but also an enjoyable experience.

4.4 Eclipse

Eclipse is an integrated development environment (IDE) for Java and other programming languages like C, C++, PHP, and Ruby etc. Development environment provided by Eclipse includes the Eclipse Java development tools (JDT) for Java, Eclipse CDT for C/C++, and Eclipse PDT for PHP, among others.

4.5 Maven

Apache Maven is a project management software, and we can say it is a comprehension tool. It is based on the concept of the project object model (POM), Maven can manage a project's build, reporting, and documentation from a central piece of information.

Apache Maven is a build tool, and it does the task just like Ant, which is again an extraordinary build Tool. This is a software project management tool that gives a new concept of the project object model (POM). Maven allows the developer to automate the handling of the creation of the original folder format, performing the assortment and testing and the packaging and deployment of the final output. It cuts down the considerable number of steps in the base process, and it makes it just one-step process to do a build.

Maven simplifies and standardizes the project build process. It handles team collaboration, compilation, distribution, documentation, and separate tasks seamlessly. Maven increases reusability, and it also takes care of most of the build-related tasks. It helps in many steps such as adding jars to the project library and building reports.

4.6 MySQL

MySQL, the most popular Open Source SQL database management system, is developed, distributed, and supported by Oracle Corporation.

MySQL is a database management system:

A database is a structured collection of data. It may be anything from a simple shopping list to a picture gallery or the vast amounts of information in a corporate network. To add, access, and process data stored in a computer database, you need a database management system such as MySQL Server. Since computers are very good at handling large amounts of data, database management systems play a central role in computing, as standalone utilities, or as parts of other applications.

MySQL databases are relational:

A relational database stores data in separate tables rather than putting all the data in one big storeroom. The database structures are organized into physical files optimized for speed. The logical model, with objects such as databases, tables, views, rows, and columns, offers a flexible programming environment. You set up rules governing the relationships between different data fields, such as one-to-one, one-to-many, unique, required or optional, and "pointers" between different tables. The database enforces these rules, so that with a well-designed database, your application never sees inconsistent, duplicate, orphan, out-of-date, or missing data.

4.7 Postman

Postman is an API platform for building and using APIs. Postman simplifies each step of the API lifecycle and streamlines collaboration so you can create better APIs faster.

4.7.1 API platform

An API platform is a software system with integrated tools and processes that allow teams to effectively build, manage, publish, and consume APIs. An API platform helps API producers manage the entire API lifecycle from design to production while engaging directly with API consumers. API platforms complement and enhance existing workflows through integrations with source code management tools, CI/CD pipelines, cloud infrastructure, and APM solutions, and they also enable leaders to create and implement API governance and security strategies that foster collaboration, promote consistency, and reduce risk.

4.8 GitLab

GitLab is a web-based Git repository that provides free open and private repositories, issue-following capabilities, and wikis. It is a complete DevOps platform that enables professionals to perform all the tasks in a project—from project planning and source code management to monitoring and security. Additionally, it allows teams to collaborate and build better software.

GitLab helps teams reduce product lifecycles and increase productivity, which in turn creates value for customers. The application doesn't require users to manage authorizations for each tool. If permissions are set once, then everyone in the organization has access to every component.

Customers can opt for the paid version of GitLab if they want to access more functionalities.

4.8.1 GitLab Advantages

The main benefit of using GitLab is that it allows all the team members to collaborate in every phase of the project. GitLab offers tracking from planning to creation to help developers automate the entire DevOps lifecycle and achieve the best possible results. More and more developers have started to use GitLab because of its wide assortment of features and brick blocks of code availability.

4.9 Docker

Docker is a software platform that allows you to build, test, and deploy applications quickly. Docker packages software into standardized units called containers that have everything the software needs to run including libraries, system tools, code, and runtime. Using Docker, you can quickly deploy and scale applications into any environment and know your code will run.

4.9.1 Docker Container

A container is a standard unit of software that packages up code and all its dependencies so the application runs quickly and reliably from one computing environment to another. A Docker container image is a lightweight, standalone, executable package of software that includes everything needed to run an application: code, runtime, system tools, system libraries and settings.

Container images become containers at runtime and in the case of Docker containers – images become containers when they run on Docker Engine. Available for both Linux and Windows-based applications, containerized software will always run the same, regardless of the infrastructure. Containers isolate software from its environment and ensure that it works uniformly despite differences for instance between development and staging.

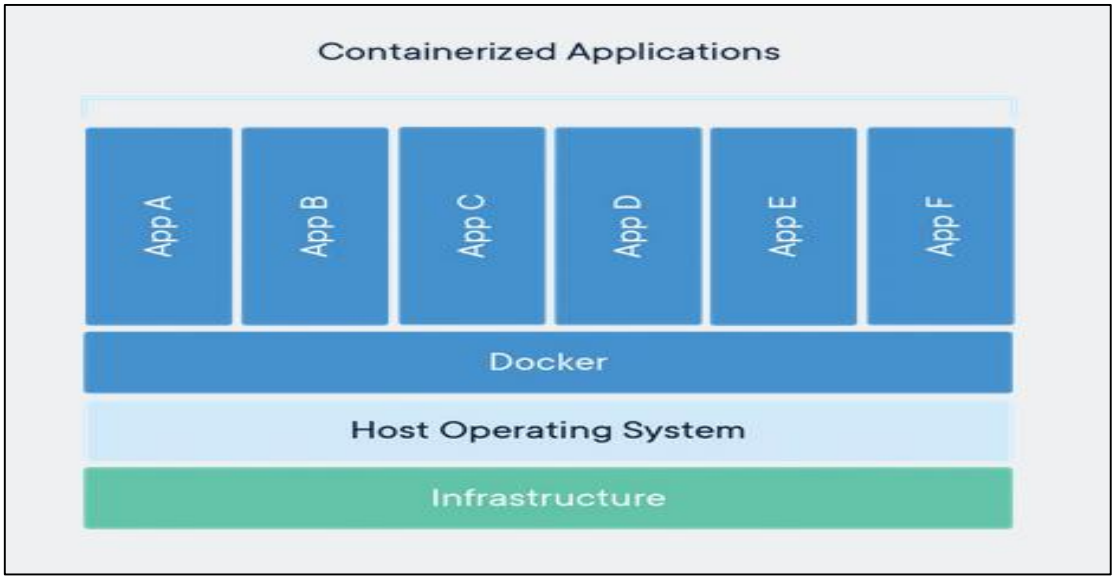


Figure 18: Containerized Applications

4.9.2 Docker Registry

A **Docker registry** is a storage and distribution system for named Docker images. The same image might have multiple different versions, identified by their tags. A Docker registry is organized into **Docker repositories,** where a repository holds all the versions of a specific image. The registry allows Docker users to pull images locally, as well as push new images to the registry (given adequate access permissions when applicable).

By default, the Docker engine interacts with **Docker Hub.** Docker's public registry instance. However, it is possible to run on premise the open-source Docker registry/distribution, as well as a commercially supported version called **Docker Trusted Registry.** There are other public registries available online. **Docker Hub** is a hosted repository service provided by Docker for finding and sharing container images with your team.

4.10 Kubernetes

Kubernetes (also known as k8s or "kube"), is an open-source system for automating deployment, scaling, and management of containerized applications. It groups containers that make up an application into logical units for easy management and discovery. Kubernetes builds upon 15 years of experience of running production workloads at Google, combined with best-of-breed ideas and practices from the community.

4.10.1 Kubernetes clusters

Kubernetes clusters can span hosts across on premise, public, private, or hybrid clouds. You can cluster together groups of hosts running Linux containers, and Kubernetes helps you easily and efficiently manage those clusters. For this reason, Kubernetes is an ideal platform for hosting cloud-native applications that require rapid scaling, like real-time data streaming through Apache Kafka.

4.11 Swagger

Swagger is one of the popular tools used for generating an interactive documentation. It generates an interactive API for the users so that they can understand about the API more quickly. Swagger provides an editor for the Open API Specification files.

Auto generated documentation

Tools such as Swagger takes the OAS files and generate the HTML documentation from it so that it can be updated on the web. As long as the OAS file is kept up to date then the documentation is likely to be more accurate rather than writing the documentation manually. It also allows you try out the requests from within the documentation so that it can help the developer for implementing the code.

4.12 Flyway

Flyway is an open-source database migration tool. Flyway is an open-source tool, licensed under Apache License 2.0, that helps you implement automated and version-based database migrations. It allows you to define the required update operations in an SQL script or as Java code. You can then run the migration from a command line client or automatically as part of your build process or integrated into your Java application.

The good thing about this process is that Flyway detects the required update operations and executes them. So, you don't need to know which SQL update statements need to be performed to update your current database. You and your co-workers just define the update operations to migrate the database from one version to the next. And Flyway detects the current version and performs the necessary update operations to get the database to the latest version.

Migrations can be written in SQL or Java (for advanced data transformations or dealing with LOBs). It has a Command-line client. If you are on the JVM, we recommend using the Java API for migrating the database on application startup. Alternatively, you can also use the Maven plugin or Gradle plugin and there are plugins available for Spring Boot.

4.13 Kafka

Apache Kafka is a distributed publish-subscribe messaging system and a robust queue that can handle a high volume of data and enables you to pass messages from one end-point to another. Kafka is suitable for both offline and online message consumption. Kafka messages are persisted on the disk and replicated within the cluster to prevent data loss. Kafka is built on top of the ZooKeeper synchronization service. It integrates very well with Apache Storm and Spark for real-time streaming data analysis.

5 Other Additional Task

PROBLEM STATEMENT: Create a Multi-module POC-Project using kafka with following functionality:

- Implemented Kafka producer (Ex: Wikimedia)
- Configure producer and create a topic
- Event handler implementation
- Run and test the producer
- Implemented kafka consumer database.
- Configure kafka Consumer in application.properties
- Kafka conumer implementation
- Configure Mysql database and to store producer (Ex: wikimedia) data

The above functionality implemented and the screenshots are as follows:

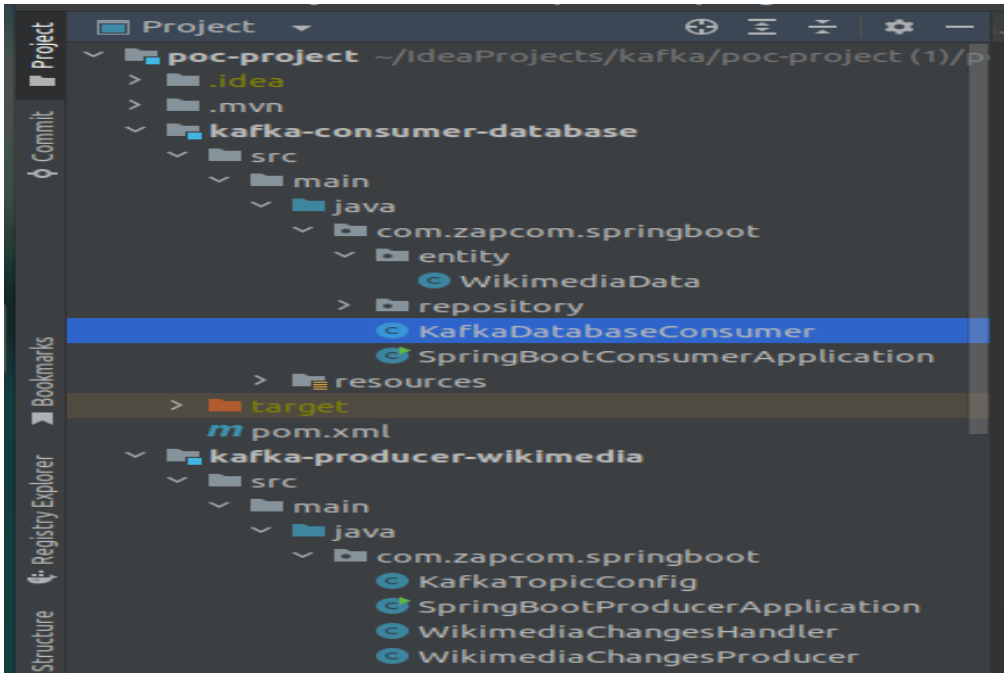


Figure 19: Kafka-POC-Project Structure

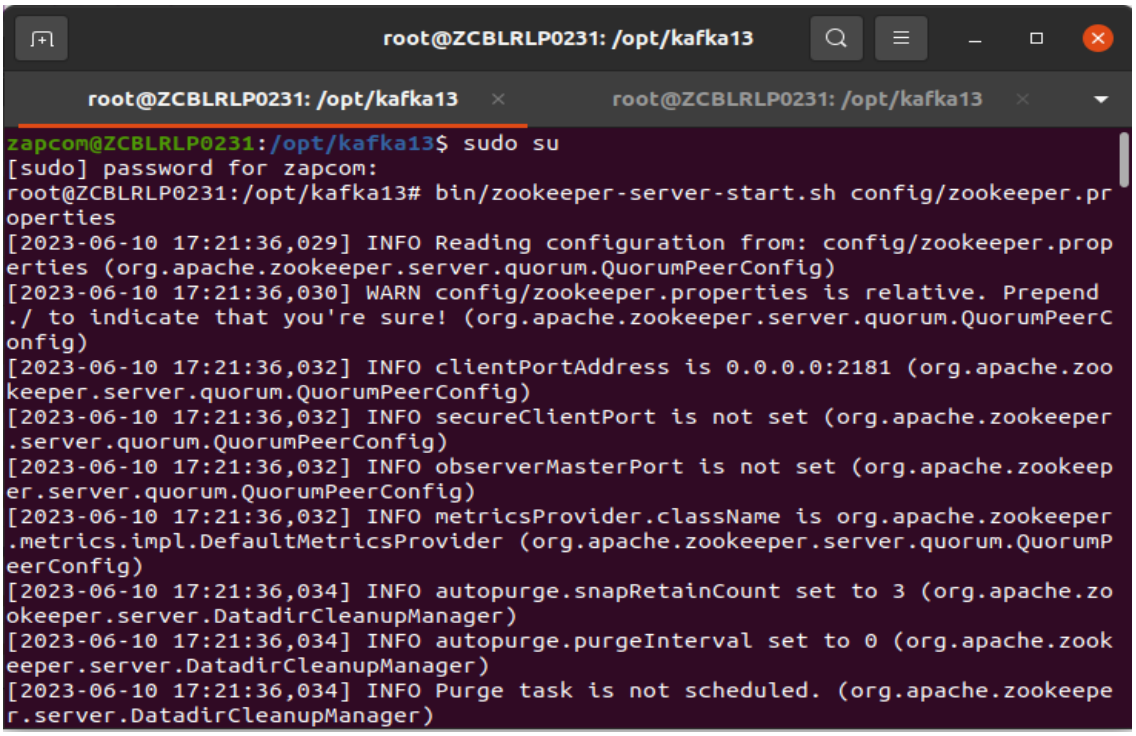


Figure 20: Start Zookeeper

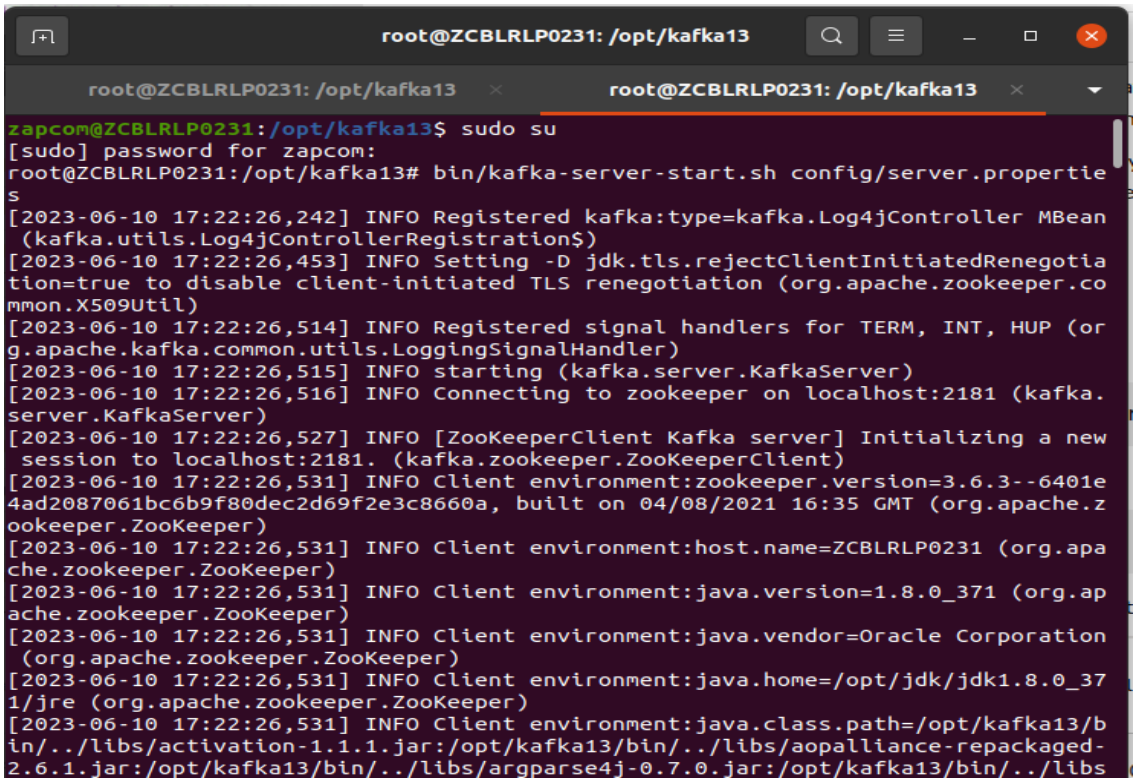


Figure 21: Start Kafka Server

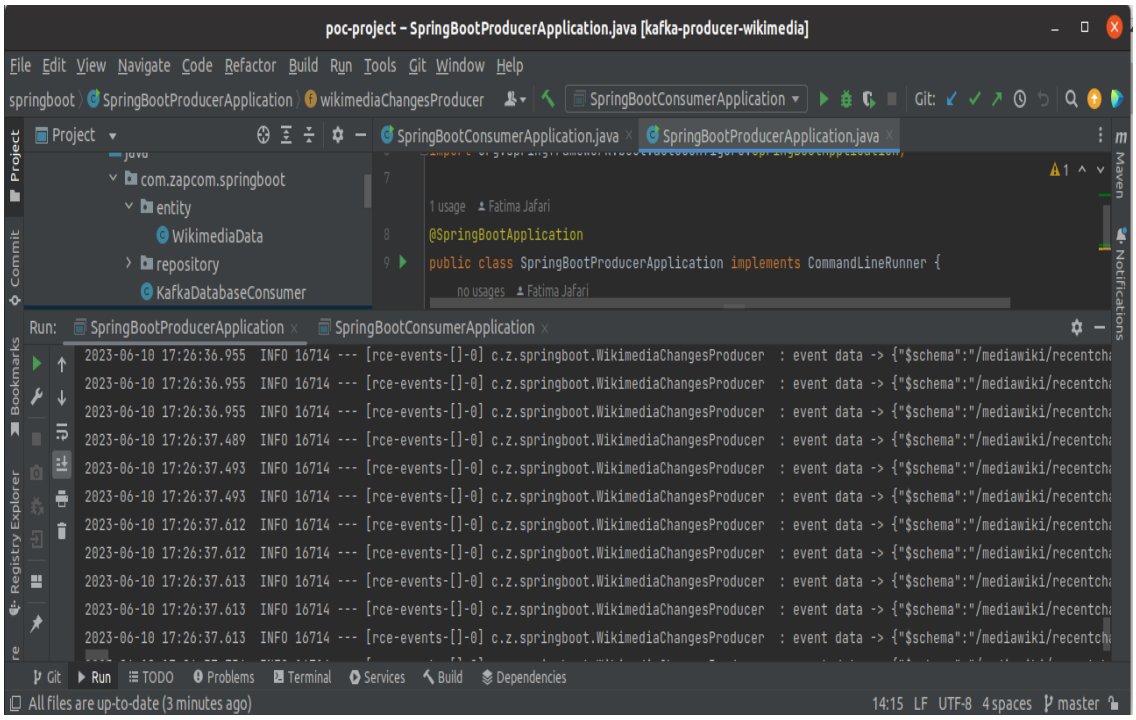


Figure 22: Spring Boot Producer Application

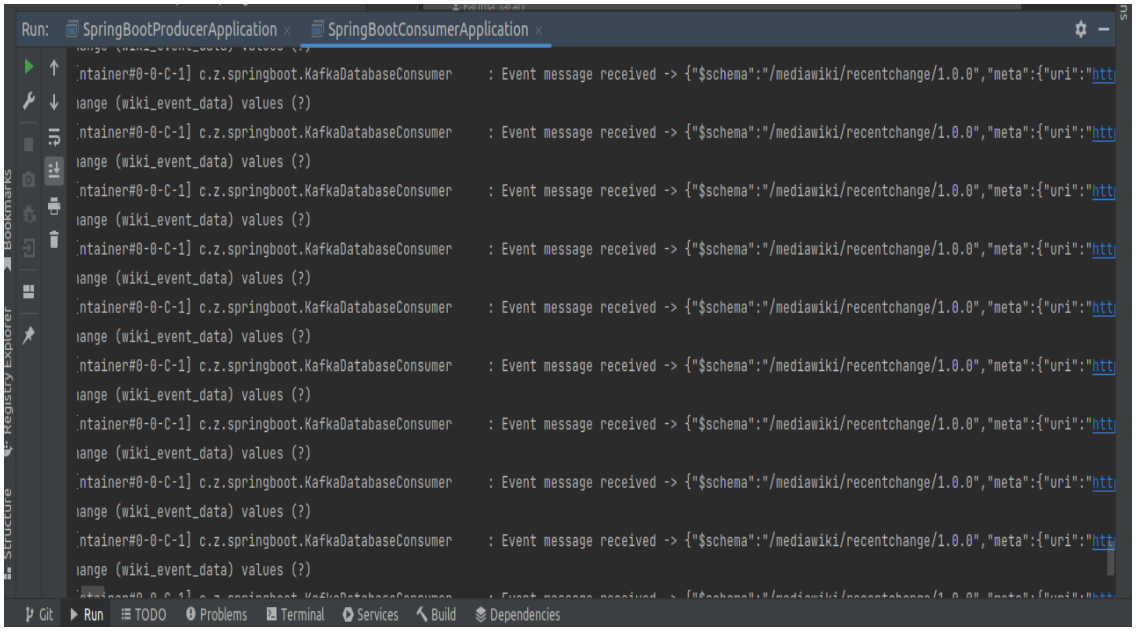


Figure 23: Spring Boot Consumer

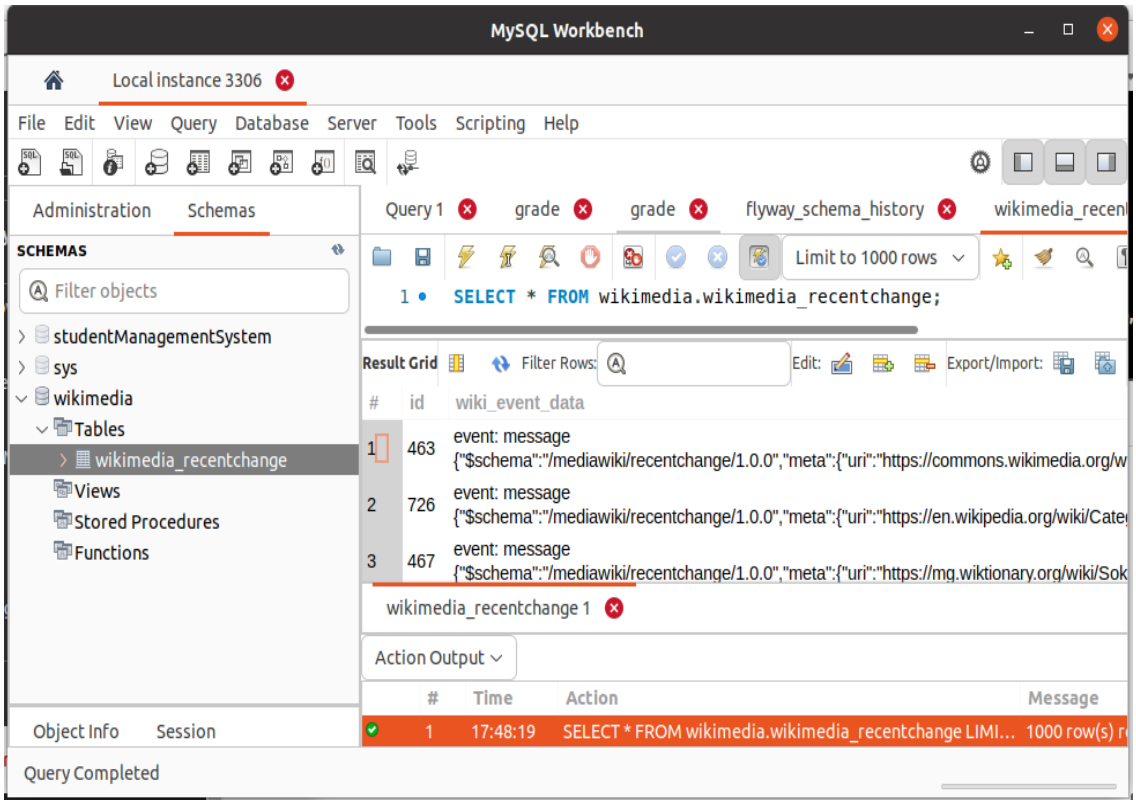


Figure 24: Wikimedia Data Stored in Table

6 Internship Timeline

6.1 January 2023

- 1st week
  - Registration and software Installation
  - Review JavaScript Fundamentals
- 2nd week
  - Advanced Java Topics & gone through Java8 streams
  - Introduction to Java Servlets and Servlets API's
  - Connect database and implemented CRUD operation example on servlet
  - SendRedirect () and Request Dispatcher
  - Static Vs NonStatic Flow in Java [variables,bloks and methods]
  - Servlet Example with Web.xml and Annotation [basic sample to understand flow]
  - session, cookies
  - init parameters,Config Parameters and Context parameters
  - Singleton Design Patterns, Factory Design Patterns and Strategy Design Patterns
- 3rd Week
  - SQL Injections
  - Spring IOC
  - Dependency Injection
  - Spring core
  - Spring bean life cycle
  - Spring Dependency Injection (xml and Annotation)
- 4th Week
  - Circular Dependencies in Spring
  - Spring MVC module and implementation
  - How many ways we can read the configuration information from properties file to our spring bean class

6.2 February 2023

- 1st Week
    - Junit 5 • Architecture, Annotation, Assertions, Exception testing, ... • Mockito
    - Implement student registration system
    - Implement elevator control system (Multithreading)
- 2nd Week
    - Learn GitLab
    - Pushed the codes in a GitLab repo
    - Implemented Program for Parking Lot
- 3rd Week
    - HackerRank (Problem Solving)
    - HackerRank Test
- 4th Week
    - POC_Project (Implement CRUD Operation)
    - Learn Postman

6.3 March 2023

- 1st Week
    - Spring Boot Security , security filter chain, user details service, basic authentication
- 2nd Week
    - Using Relationships between tables
    - Lombok and annotation based configuration
- 3rd Week
    - Dual Boot the system (Ubuntu installation)
    - Implement Many To Many Relationship
    - Spring boot Logging (Log4j2)
    - learning spring boot REST API
- 4th Week
    - Spring Data @Query with Joins
    - Database Migration with Flyway and Spring Boot
    - Create Gitlab Branches
    - Implement Caching

6.4 April 2023

- 1st Week
  - Flyway (Implementing Java-based Migrations)
  - Learning Unit Test writing for Spring Boot
- 2nd Week
  - Writing Unit Tests for Controller and Repository in Spring Boot .
  - OpenAPI Specification (Swagger Specification)
- 3rd Week
  - Java Microservices
  - Writing Yaml file
  - Dockerization of the REST API , (writing Docker file, creating docker image and container)
- 4th Week
  - Writing Docker-compose file
  - Creating of the **Kubernetes Manifest** to deploy container to local cluster such as kind

6.5 May 2023

- 1st Week
  - Learning Kubernetes, Run & Deploy spring boot Application to Kubernates
- 2nd Week
  - Use of Kafka
  - Apache Kafka Configuration, Start Zookeeper & Broker,
  - Apache Kafka - Basic Operations
  - Kafka with Spring Boot.
- 3rd Week
  - Learn modern HTML5, CSS3 and web design
- 4th Week
  - Learning JavaScript

6.6 June 2023

- 1st Week
    - Learning React Native
    - Move typescript instead of JS
    - Get API integration with pagination and infinite scroll
    - React Native Material UI
- 2nd Week
    - Learning React JS

7 Certifications and Training Completed Under Internship & Self Study

7.1 Udemy Courses

- Docker for Beginners. DevOps for Java Spring Boot Microservices. Get Hands-on with Docker.
- Learn Kubernetes in simple, easy and fun way with hands-on coding exercises. For beginners in DevOps.
- Spring 5: Learn Spring 5 Core, AOP, Spring MVC, Spring Security, Spring REST, Spring Boot 2, Thymeleaf, JPA & Hibernate
- Testing Java with JUnit 5 & Mockito
- Become a Java Web Developer: MVC, REST API, OpenAPI Documentation, Testing, Spring Data JPA (SQL), Spring Security (JWT)
- Learn & Develop Microservices with Java, Spring Boot, Spring Cloud, Docker, Kubernetes, Helm, Microservices Security
- Learn modern HTML5, CSS3 and web design by building a stunning website for your portfolio! Includes flexbox and CSS Grid
- The modern JavaScript course for everyone! Master JavaScript with projects, challenges and theory. Many courses in one!

7.2 LinkedIn courses

- HTML Essential Training
- Microservices Foundation
- Advance Spring: Effective Integration Testing with spring Boot
- Agile Foundation
- Spring Boot 2.0 Essential Training
- Apache Kafka Essential Training
- Learning Kubernates

7.3 Youtube Tutorials:

- Spring Boot + Apache Kafka Tutorial
- Servlet and JSP Tutorial for Beginners 2018 (Navin Reddy,Telusko)
- Spring Framework Tutorial |Full Course (Navin Reddy,Telusko)
- Spring MVC Tutorial | Full Course (Navin Reddy,Telusko)
- Database Migrations for Beginners | Flyway Tutorial (Redhwan Nacef)

7.4 Certificates

- **Certificate** of HackerRank Java Test
- **Certificate** of Advanced Spring: Effective Integration Testing with Spring Boot
- **Certificate** of Completion_Microservices Foundations
- **Certificate** of Apache Kafka Essential Training
- **Certificate** of Agile Foundation
- **Certificate** of Spring Boot 2.0 Essential Training
- **Certificate** of HTML Essential Training
- **Certificate** of Learning Kubernates

Figure 25: Certificate of HackerRank Test

Figure 26: Certificate of Effective Integration Testing with Spring Boot

Figure 27: Certificate of Microservices Foundation

Figure 28: Certificate of Apache Kafka Essential Training

Figure 29: Certificate of Agile Foundation

Figure 30: Certificate of HTML Essential Training

Figure 31: Certificate of Spring Boot 2.0 Essential Training

Figure 32: Certificate of Learning Kubernates

Figure 33: Certificate of Learning React Native

Figure 34: Certificate of Learning React.js

8 Overall Experience at Zapcom

During my internship experience with Zapcom, I was able to develop my communication and programming skills. It has been a wonderful and growing experience that has taught me a lot.

The work environment at Zapcom is friendly and motivational. I got the experience how the industry actually functions and how the project cycle works in real life. My colleagues were extremely helpful, supportive and approachable, that helped me to learn from them and feel comfortable working at Zapcom.

We encouraged to spend a fraction of our time on group activities and having fun to know each other and create valuable memories at Zapcom. Overall, my internship experience has been an extremely enriching and helpful. I am thankful for this great learning and working opportunity to gain valuable working experience.

9 References

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- https://www.youtube.com/watch?v=If1Lw4pLLEo
- JDBC Servlets and JSP - Java Web Development Fundamentals (udemy.com)
- Servlet Filter Tutorial Theory - YouTube
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- Learn Spring Boot Tutorial - javatpoint
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- The Complete Spring Boot Development Bootcamp (udemy.com)
- Solution: Write tests for a custom query (linkedin.com)
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- https://kubernetes.io/
- https://www.redhat.com/en/topics/containers/what-is-kubernetes

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- https://www.aquasec.com/cloud-native-academy/docker-container/docker-registry/
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- https://www.geeksforgeeks.org/unit-testing-in-spring-boot-project-using-mockito-and-junit/