MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Final Year Internship Report

on

JAVA SPRING FRAMEWORK

Submitted By:

KAPIL KUMAR TANTUWAY

0901CS181049

Faculty Mentor:

DR. RAJNI RANJAN SINGH MAKWANA

Assistant Professor

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE

GWALIOR - 474005 (MP) est. 1957

MAY-JUNE 2022

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A final year internship report submitted in partial fulfillment of the requirement for the degree of

BACHELOR OF TECHNOLOGY

in

COMPUTER SCIENCE AND ENGINEERING

Submitted by:

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Internship Faculty Mentor:

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Submitted to:

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GWALIOR - 474005 (MP) est. 1957

MAY-JUNE 2022

Reference: Persistent/Academic Intern/1439901/0.2

Internship Offer Letter
Confidential

Jan 07, 2022

Mr Kapil Kumar Tantuway
Maniyar Chawraha Bypass road, Shivpuri
Shivpuri 473551

Dear Kapil,

Subject:**Your engagement as an Academic Intern with Persistent**

With reference to your application for industrial training with us, and the subsequent selection process, we are pleased to inform you that you have been selected as **an Academic Intern** at grade **0.2** with Persistent Systems (Company). This offer is made to you as part of your Academic Curriculum.

The duration and start date of the internship will be communicated to you in due course of time separately.

During the internship period you will be paid a consolidated monthly stipend of Rs. 10,000 per month. You will also be eligible for benefits such as free lunch, snacks, tea and coffee during your internship period.

All terms and conditions in this document, read with any other document specifically referred herein and incorporated hereto by such reference, collectively shall constitute the entire understanding between the Academic Intern and the Company.

Company does not assure you or commit (a) any extension of this internship beyond the period stipulated under this letter and/or offer you employment with Company and/or absorb you as an employee of the Company in future. Unless otherwise specifically agreed in writing by Company, there shall be no employee-employer relationship between you and Company.

1. Working days
Normal working days for Company are Monday through Friday. Company observes Sunday as a compulsory weekly off and Saturday as the other weekly off day. The normal working hours are forty five hours per week.

2. Holidays and Leaves
You will not be eligible for any leave or compensatory off during internship period.

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CERTIFICATE

This is certified that **Kapil Kumar Tantuway** (0901CS181049) has submitted the Internship report titled **Java Spring Framework** of the work he has done under the mentorship of **Dr. Rajni Ranjan Singh Makwana**, in partial fulfilment of the requirement for the award of degree of Bachelor of Technology in Computer Science and Engineering from Madhav Institute of Technology and Science, Gwalior.

27/05/22

Dr. Rajni Ranjan Singh Makwana
Faculty Mentor
Assistant Professor
Computer Science and Engineering

27/05/22

Dr. Manish Dixit
Professor and Head,
Computer Science and Engineering

Dr. Manish Dixit
Professor & HOD
Department of CSE
M.I.T.S. Gwalior

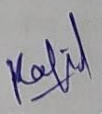
MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DECLARATION

I hereby declare that the work being presented in this Internship report, for the partial fulfilment of requirement for the award of the degree of Bachelor of Technology in CSE at Madhav Institute of Technology & Science, Gwalior is an authenticated and original record of my work under the mentorship of **Dr. Rajni Ranjan Singh Makwana**, **Assistant Professor**, Department of CSE.

I declare that I have not submitted the matter embodied in this report for the award of any degree or diploma anywhere else.



Kapil Kumar Tantuway
0901CS181049
IV Year,
Computer Science and Engineering

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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ACKNOWLEDGEMENT

The full semester internship has proved to be pivotal to my career. I am thankful to my institute, **Madhav Institute of Technology and Science** to allow me to continue my disciplinary/interdisciplinary internship as a curriculum requirement, under the provisions of the Flexible Curriculum Scheme (based on the AICTE Model Curriculum 2018), approved by the Academic Council of the institute. I extend my gratitude to the Director of the institute, **Dr. R. K. Pandit** and Dean Academics, **Dr. Manjaree Pandit** for this.

I would sincerely like to thank my department, **Department of Computer Science and Engineering, for allowing** me to explore this internship. I humbly thank **Dr. Manish Dixit**, Professor and Head, Department of Computer Science and Engineering, for his continued support during the course of this engagement, which eased the process and formalities involved.

I am sincerely thankful to my faculty mentors. I am grateful to the guidance of **Dr. Rajni Ranjan Singh Makwana**, Assistant Professor, Department of Computer Science and Engineering, for his continued support and close mentoring throughout the internship. I am also very thankful to the faculty and staff of the department.

Kapil Kumar Tantuway
0901CS181049
IV Year,
Computer Science and Engineering

ABSTRACT

This report outlines the responsibilities of an intern at Persistent Systems. I worked as an academic intern in Persistent Systems. I was put through intensive training during the course of my internship. Interns were given exposure to and trained in technologies in the IT market. Various tools and technologies used in industry learnt like java 8 framework like spring jdbc etc.

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LIST OF ABBREVIATIONS

Abbreviation	Description
OOP	Object Oriented Programming
SQL	Structured Query language
RDBMS	Relational Database Management System
DDL	Data Definition Language
DML	Data Manipulation Language
DCL	Data Control Language
TCL	Transaction Control Language
API	Application programming interface
JDBC	Java Database Connectivity
ODBC	Open Database Connectivity
POM	Project Object Model
POJO	Plain Old Java Object
ORM	Object relational model
MVC	Model view controller

Chapter 1 : Internship Overview

1.1 Introduction

Interns were put through training and were divided in various batches according to technology assigned to them. I was put in a Java batch which involved learning and implementing Java and its features, I was trained in various frameworks, tools and technologies. Interns are supposed to use the company's platform for learning. The platform included the courses and their respective assessments to assess the concepts, and complete the mini projects that are unfinished to get a clear understanding of technology. We were put through power skills training.

1.2 Objectives and Scopes

Internships are generally thought of to be reserved for college students looking to gain experience in a particular field. However, a wide array of people can benefit from Training Internships in order to receive real world experience and develop their skills.

An objective for this position should emphasize the skills you already possess in the area and your interest in learning more.

Internship helps build a firm base for interns to start a career in the IT industry as a professional.

1.3 Internship Features

Internship gave a proper understanding of what is to be expected from a working professional in Industry.
One of the features of internship is its emphasis on communication skills, as they play a very crucial role in a workplace.

Interns are expected to learn and apply the technology and build a firm understanding.

Complete the assigned courses as per the schedule.

Interns are required to go through the assessments of modules/courses they have completed.

1.4 Feasibility

This full time internship followed work from home, as the company has not started calling their employees to the office. If one has a good internet connection one could complete the internship without trouble.

1.5 System Requirement

This internship involved handling data in a relational database, using api calls and a mix of front end technologies so system requirements should be appropriate to run these tasks.
The system used during internship is Windows 10.
Softwares used were Eclipse, Visual Studio Code, Spring Tool Suite, Node,js.
Hardware requirement: 10 GB free disk space, intel core i-5.

Chapter 2: Tools and Technology used

2.1. Technology:

2.1.1. SQL:

RDBMS:

A relational database is a type of database that stores and provides access to data points that are related to one another. Relational databases are based on the relational model, an intuitive, straightforward way of representing data in tables. In a relational database, each row in the table is a record with a unique ID called the key. The columns of the table hold attributes of the data, and each record usually has a value for each attribute, making it easy to establish the relationships among data points.

Four crucial properties define relational database transactions: atomicity, consistency, isolation, and durability—typically referred to as ACID.

Structured Query Language:

SQL is Structured Query Language, which is a computer language for storing, manipulating and retrieving data stored in a relational database.

SQL is the standard language for Relational Database Systems. All the Relational Database Management Systems (RDMS) like MySQL, MS Access, Oracle, Sybase, Informix, Postgres and SQL Server use SQL as their standard database language.

Based upon relational algebra and tuple relational calculus, SQL consists of many types of statements:

1. DDL
2. DML
3. DCL
4. TCL

2.1.2. Git:

1.1. Control System:

This basically means that Git is a content tracker. So Git can be used to store content — it is mostly used to store code due to the other features it provides.

1.2. Version Control System:

The code which is stored in Git keeps changing as more code is added. Also, many developers can add code in parallel. So the Version Control System helps in handling this by maintaining a history of what changes have happened.

1.3. Distributed Version Control System:

Git has a remote repository which is stored in a server and a local repository which is stored in the computer of each developer. This means that the code is not just stored in a central server, but the full copy of the code is present in all the developers' computers. Git is a Distributed Version Control System since the code is present in every developer's computer.

2.1.3. Core 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.

Features:

Stream API.
Lambda Expressions.
Functional Interfaces.
Reflection API.

2.2.4. JDBC :

JDBC stands for Java Database Connectivity. JDBC is a Java API to connect and execute the query with the database. It is a part of JavaSE (Java Standard Edition). JDBC API uses JDBC drivers to connect with the database. There are four types of JDBC drivers:

1. JDBC-ODBC Bridge Driver,

2. Native Driver,
3. Network Protocol Driver, and
4. Thin Driver

2.1.5. JUnit :

JUnit is a unit testing framework for the Java programming language. JUnit has been important in the development of test-driven development, and is one of a family of unit testing frameworks which is collectively known as xUnit that originated with SUnit.

JUnit is linked as a JAR at compile-time. The latest version of the framework, JUnit 5, resides under package org.junit.jupiter. Previous versions JUnit 4 and JUnit 3 were under packages org.junit and junit.framework, respectively.

2.1.6. Maven :

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

Maven's Objectives :

- Making the build process easy
- Providing a uniform build system
- Providing quality project information
- Encouraging better development practices

2.1.7. Spring :

Spring Framework is a Java platform that provides comprehensive infrastructure support for developing Java applications. Spring handles the infrastructure so you can focus on your application.

Spring enables you to build applications from “plain old Java objects” (POJOs) and to apply enterprise services non-invasively to POJOs. This capability applies to the Java SE programming model and to full and partial Java EE.

At a macro-level, we can consider the Spring framework a collection of sub frameworks such as Spring Web Flow, Spring MVC, and Spring ORM. In addition to Java, Spring also supports Kotlin and Groovy.

The Spring framework is also the base that powers all the other Spring-based projects, such as:

- Spring Boot
- Spring Cloud
- Spring GraphQL

Core Features of Spring Framework:

1. **IoC (Inversion of Control) Container :**

IoC container is one of the core features of Spring that provides a streamlined way to configure and manage Java objects. This container is responsible for managing the lifecycle of a defined Java object, significantly increasing the configurability of a Spring-based application.

IoC uses the dependency injection or dependency lookup patterns to provide the object reference during runtime. The container consists of assembler code that is required for configuration management.

2. Aspect-oriented programing :

AOP aims to provide more modularity to the cross-cutting concerns, which are functions that span across the application, such as:

- Logging
- Caching
- Transaction management
- Authentication, etc

Moreover, AOP complements object-oriented programming by providing a different way to structure the program, where OOP modularity is based on classes.

In AOP, the main unit of modularity is an aspect. This enables users to use AOP to create custom aspects and declarative enterprise services. The IoC container does not depend on AOP, offering further freedom for developers to select their preferred programming method.

3. Data access framework :

Database communication issues are one of the common issues developers face when developing applications. Spring simplifies the database communication process by providing direct support for popular data access frameworks in Java, such as JDBC, Hibernate, Java Persistence API (JPA), etc.

4. Spring MVC framework :

The Spring MVC enables developers to create applications using the popular MVC pattern. It is a request-based framework that allows developers to easily create customized MVC implementations that exactly suit their needs.

5. Spring web service:

This Spring Web Service component provides a streamlined way to create and manage web service endpoints in the application. It offers a layered approach that can be managed using XML and can be used to provide mapping for web requests to a specific object.

2.1.8 Spring Boot:

Spring Boot is an open source Java-based framework used to create a micro Service. It is developed by Pivotal Team and is used to build stand-alone and production ready spring applications.

2.1.9. HTML :

HTML (HyperText Markup Language) is the most basic building block of the Web. It defines the meaning and structure of web content. Other technologies besides HTML are generally used to describe a web page's appearance/presentation (CSS) or functionality/behavior (JavaScript).

2.1.10. CSS :

Cascading Style Sheets (CSS) is a stylesheet language used to describe the presentation of a document written in HTML or XML (including XML dialects such as SVG, MathML or XHTML). CSS describes how elements should be rendered on screen, on paper, in speech, or on other media.
CSS is among the core languages of the open web and is standardized across Web browsers according to W3C specifications. Previously, development of various parts of CSS specification was done synchronously, which allowed versioning of the latest recommendations.

2.1.11. JavaScript :

JavaScript (JS) is a lightweight, interpreted, or just-in-time compiled programming language with first-class functions. While it is most well-known as the scripting language for Web pages, many non-browser environments also use it, such as Node.js, Apache CouchDB and Adobe Acrobat. JavaScript is a prototype-based, multi-paradigm, single-threaded, dynamic language, supporting object-oriented, imperative, and declarative (e.g. functional programming) styles.

Chapter 3 : Preliminary design

3.1. Spring Applications

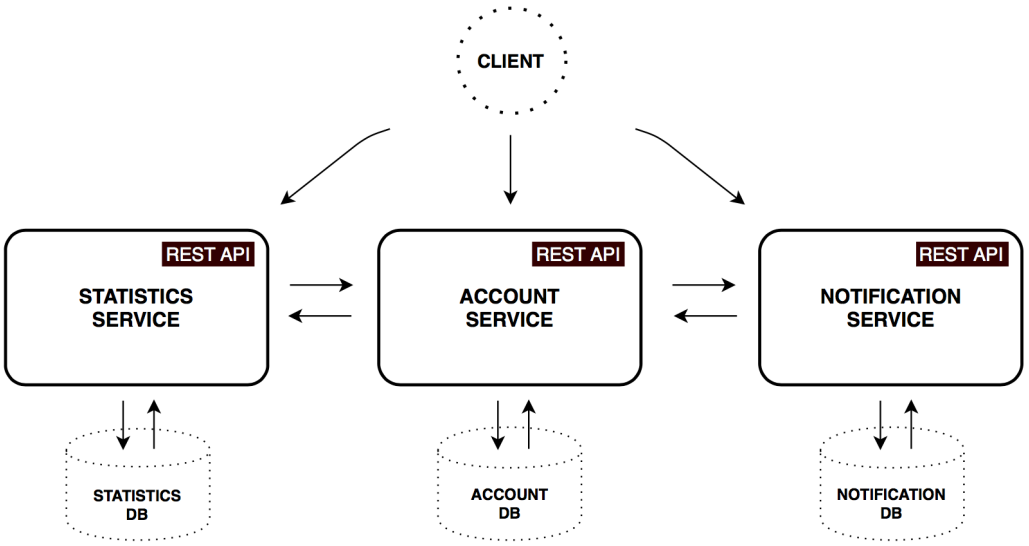

Fig 3.1 :- RestAPI

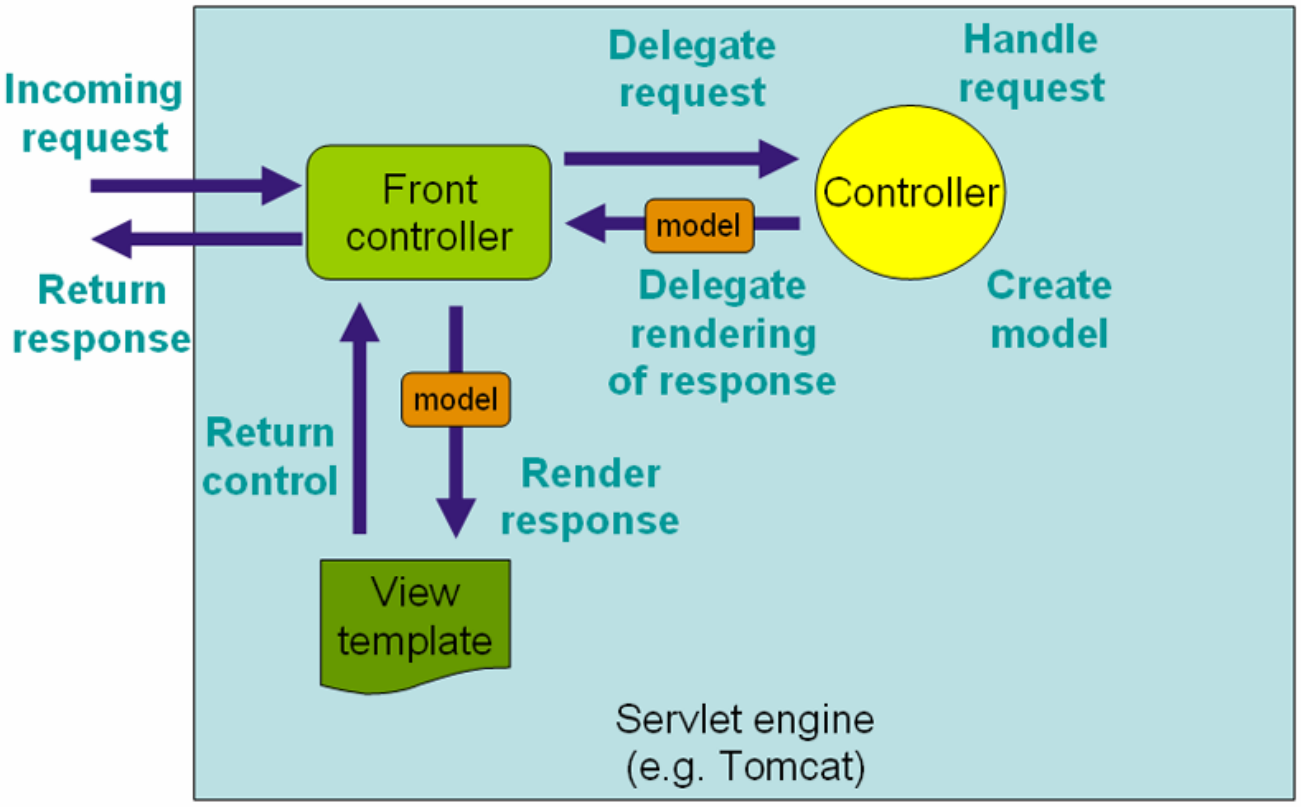

Fig 3.2 :- Dispatcher Servlet

Chapter 4 : Final Analysis and Design

4.1. Results :

4.1.1. Spring data binding in MVC

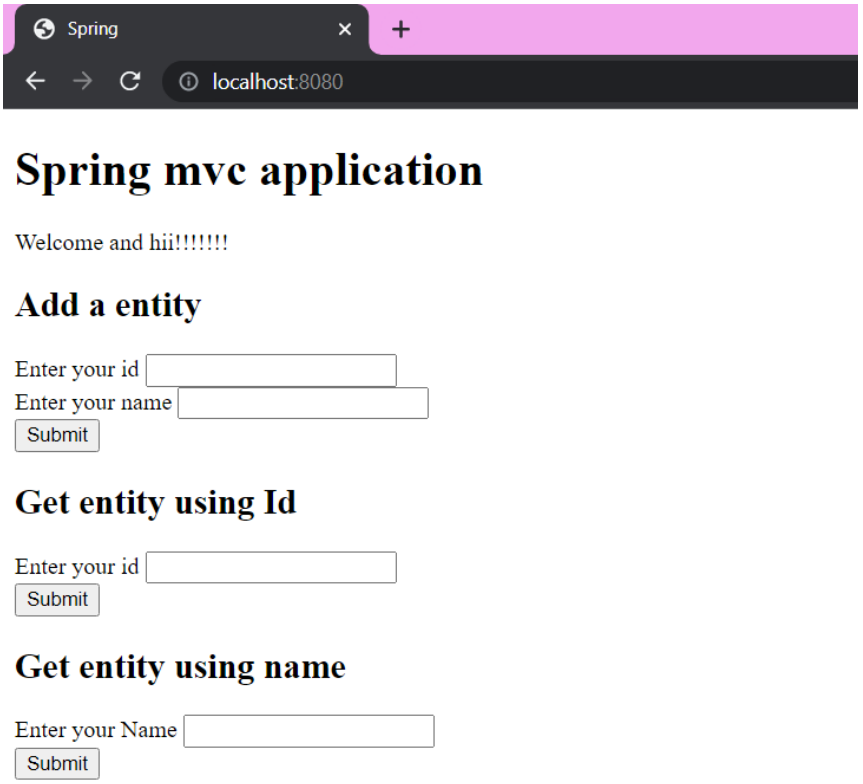

Fig 4.1 :- View

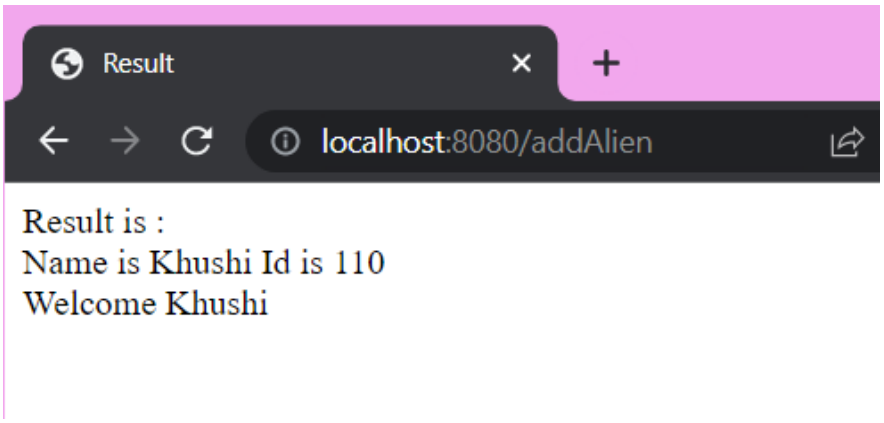

Fig 4.2 :- Entity added

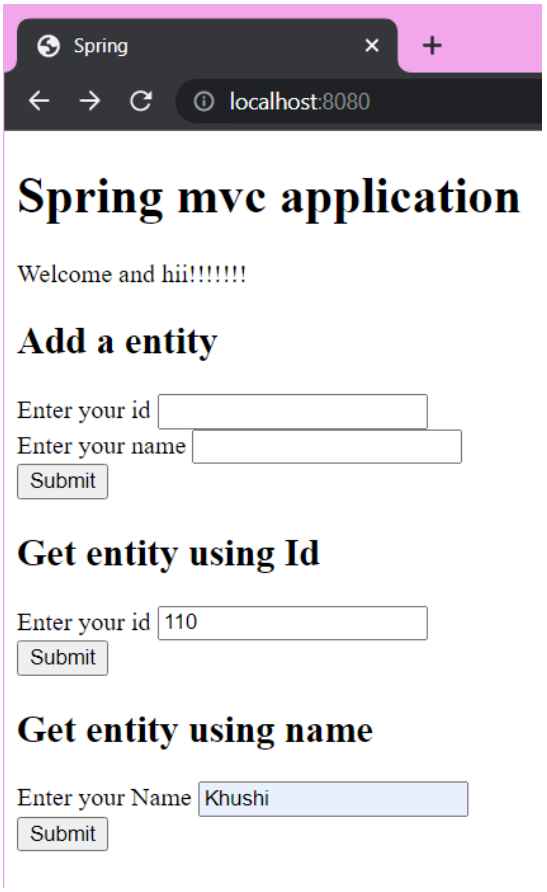

Fig 4.3 :- Retrieving object from database

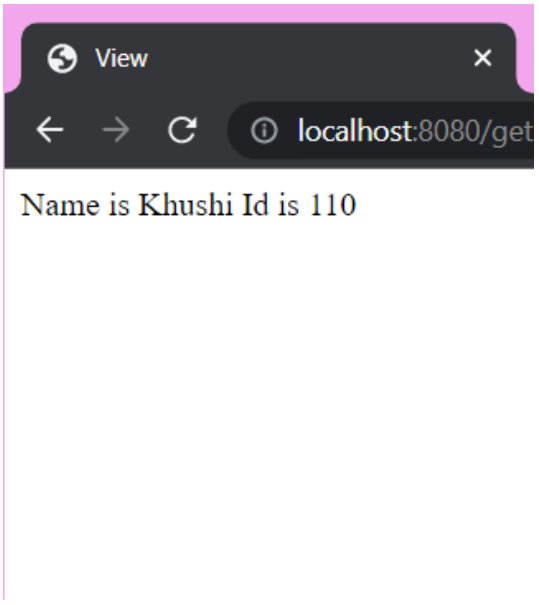

Fig 4.4 :- Object retrieved

4.1.2 RestAPI using Spring Boot

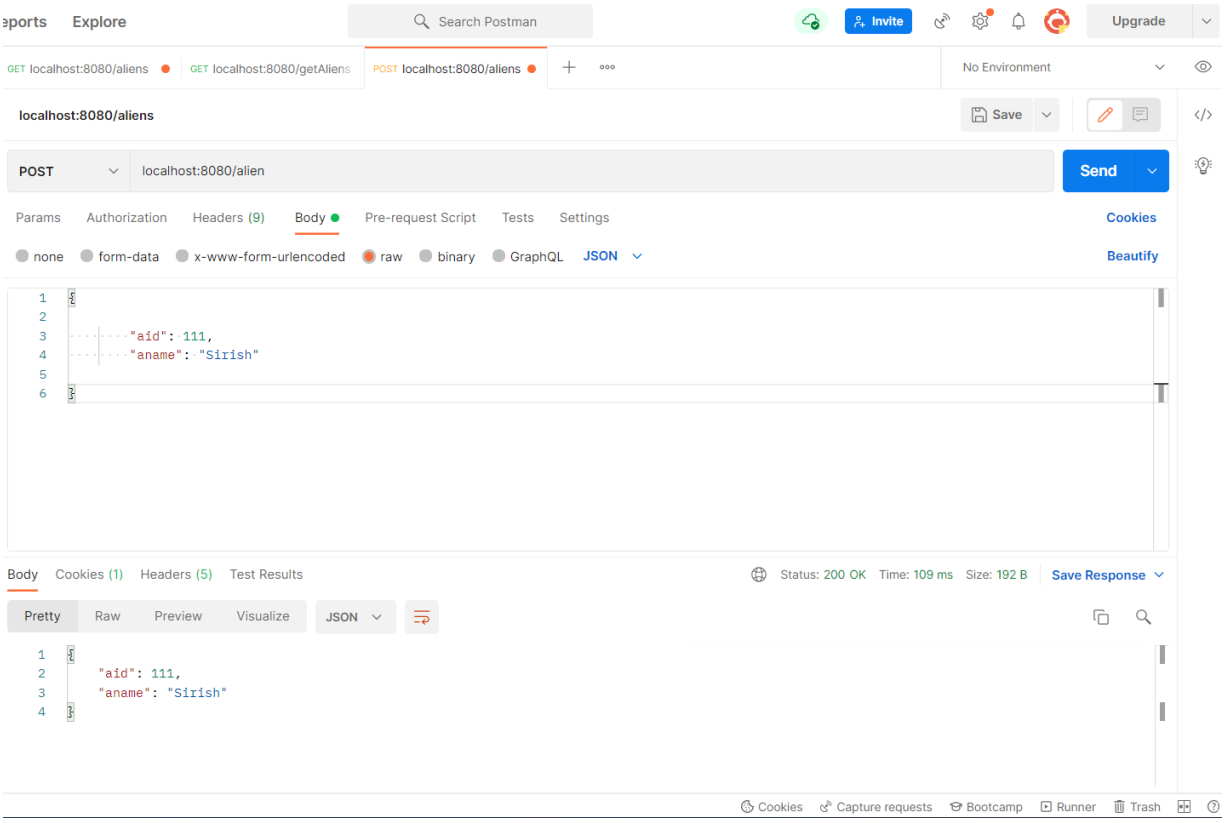

Fig 4.5 :- Using Post method to send data

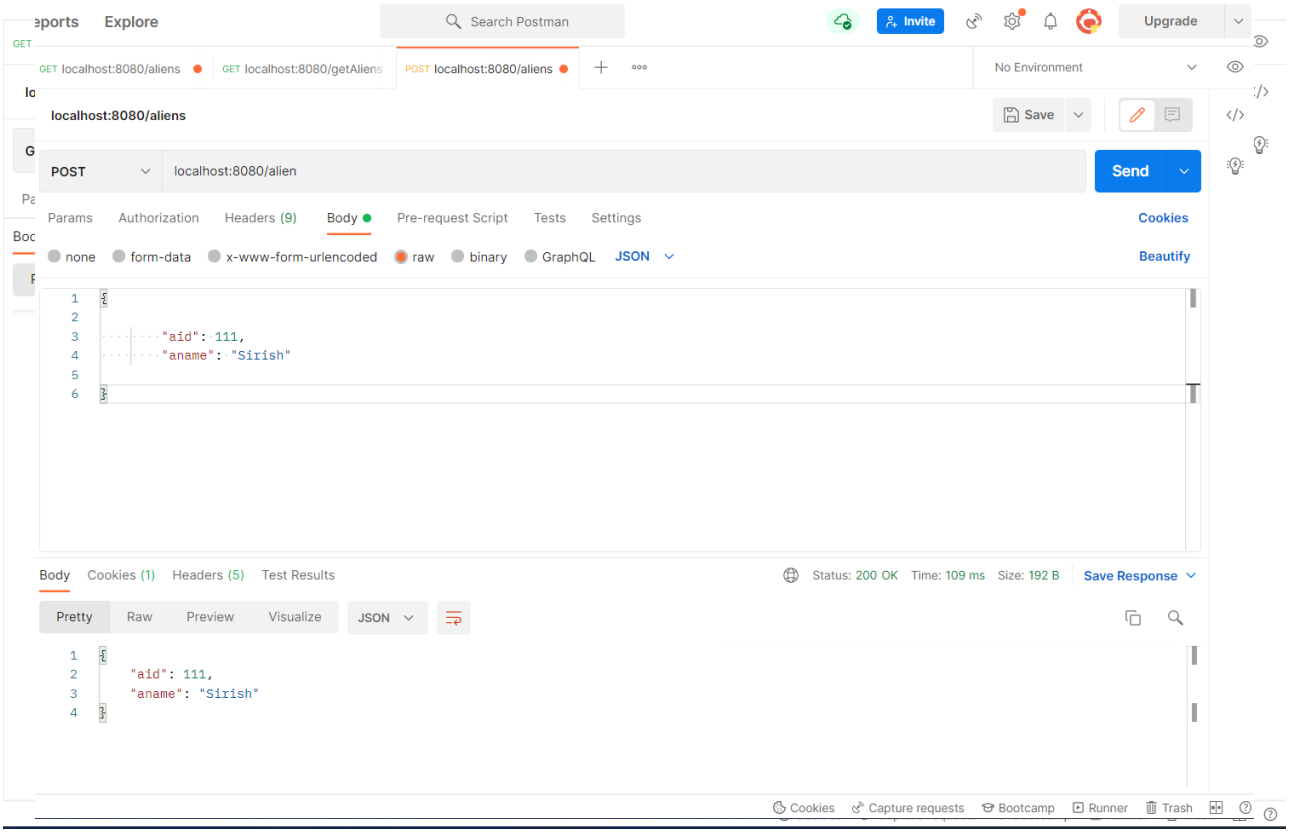

Fig 4.6 :- Using Get method to fetch data

4.1.3. Spring Security

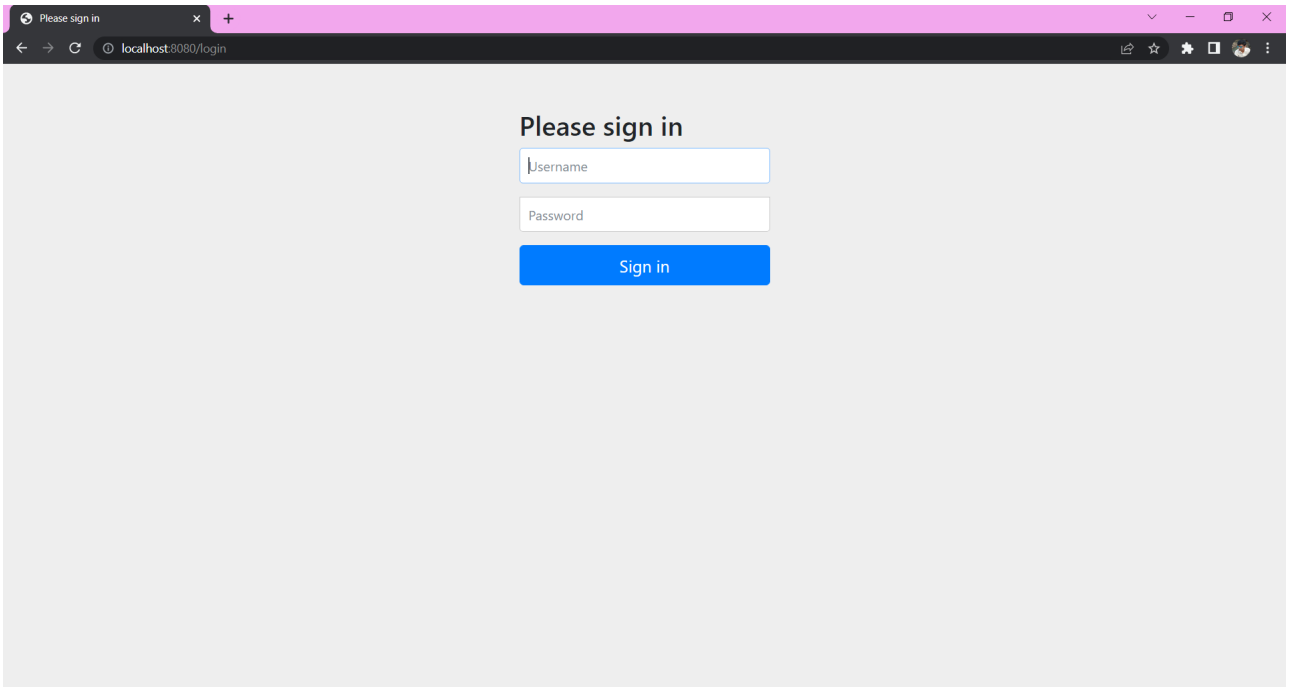

Fig 4.7 :- Login page

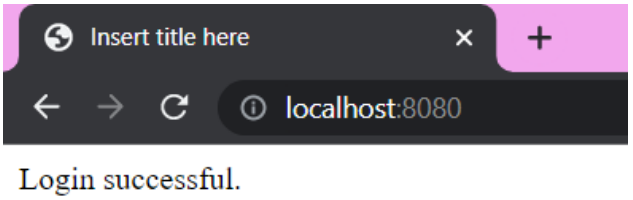

Fig 4.8 :- Login result

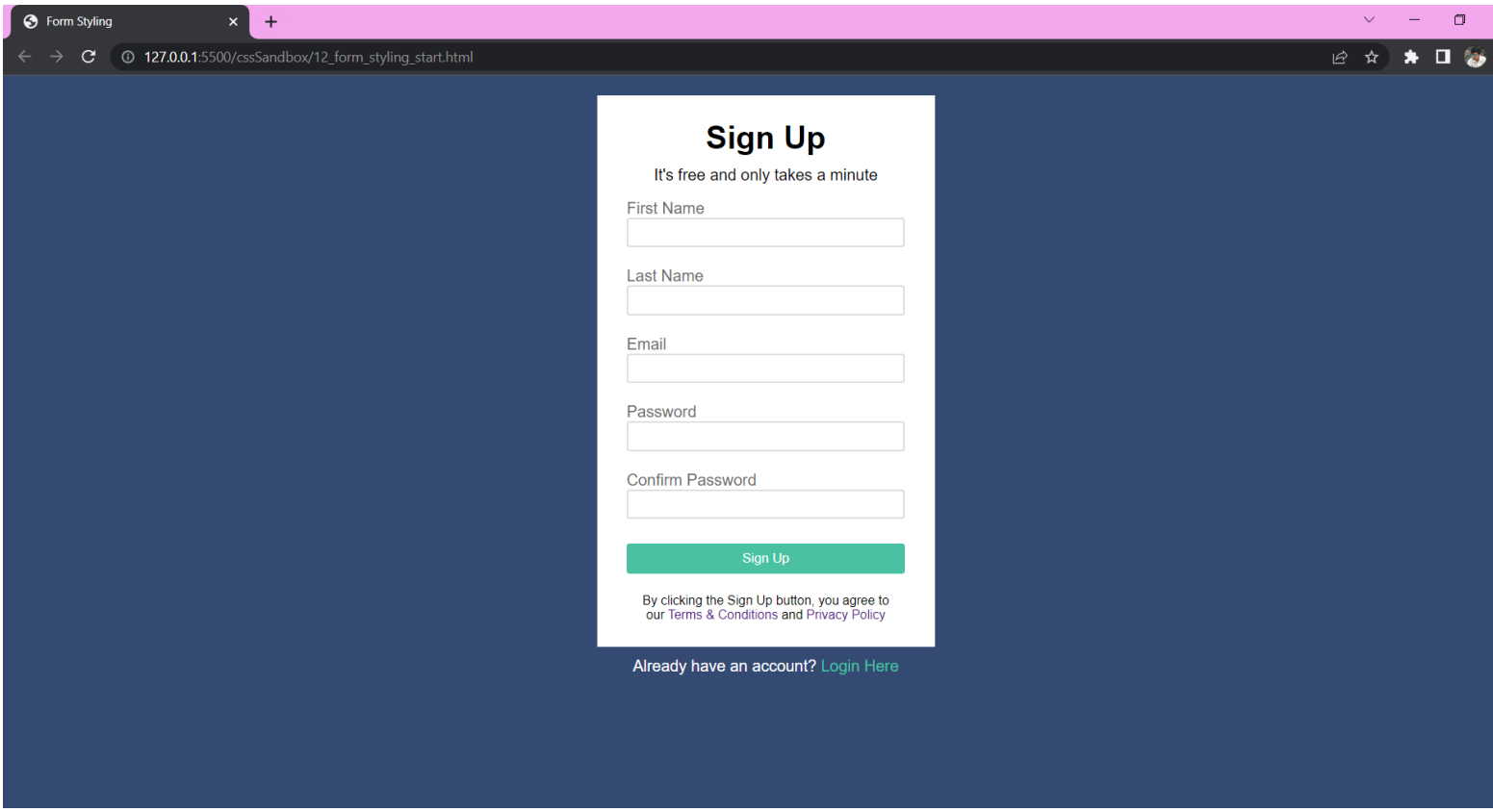

Fig 4.8 :- SignUp form

4.2. Applications :

4.2.1. SQL :

- Used Mysql Database Database for making spring applications.
- Used Mysql server dependency and jdbc type 4 driver to connect spring application and Mysql server.

4.2.2. Maven :

- Maven is used for building java projects.
- Managing dependencies in projects.
- Testing java projects using Junit and other testing frameworks.

4.2.3. Spring :

- Used for building enterprise Java applications.
- Provides security to Java applications.
- Building Java microservices.

4.2.4. HTML :

- It provides a means to create structured documents by denoting structural semantics.
- HTML allows images and objects to be embedded and can be used to create interactive forms.

4.2.5. CSS :

- Fast Page Loading: We don't need to mention the attributes of the HTML element every time if we use CSS.
- Easy Maintenance: To create a global alteration we need to alter the style. Every element will get automatically updated within all web pages.
- Superior HTML Styles: HTML contains few extended attribute's array than CSS, thus we can provide a much better view to our HTML page as compared to HTML attributes.

4.2.6. JavaScript :

- JavaScript allows developers to create a dynamic and interactive web page to interact with visitors and execute complex actions.
- JavaScript frameworks are used for developing and building robust web applications.
- Node.js allows developers to use JavaScript to create a web server.

4.3. Problems faced :

- While using git remote repository with simultaneous push and pull requests maintaining a proper commit history.
- Configuring MySQL server in spring application.
- Making a spring project in Spring MVC without spring boot, including conjuring various files like web.xml, pom.xml and writing bean configuration. Configuring dispatcher and view resolver.
- Understanding the concept of object oriented programming in JavaScript.
- Differentiating between function declaration, constructor function and Arrow functions in JavaScript.
- Understanding how closures work in JavaScript.

4.4. Limitations :

4.4.1 Spring Applications :

- **Complexity**: Working with Spring is more complex. It requires a lot of expertise.
- **Parallel Mechanism:** It provides multiple options to developers. These options create confusion to developers which feature to use and which to not and wrong decisions may lead to significant delays.
- **No Specific Guidelines:** It does not care about XSS or cross-site scripting. With this in mind, we need to figure out ways on how to stop hackers from infiltrating your application yourself.
- **High Learning Curve:** If you have not development experience in the field, it would be quite difficult to learn.
- **Lots of XML:** Developing a Spring application requires lots of XML.

Conclusion

Experienced how business problems are solved using technology. Implemented Spring framework to create java based applications. Most of the configuration in spring is made one time at project creation. Making applications using spring boot is full of learning and improve our debugging skills. Learnt how data is revised from the client side and processed on client and server side.

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