Week 4 Hands-On Exercise

Skill: Spring REST using Spring Boot3

1.Create a Spring Web Project Using Maven

Scenario:

In this scenario, I created a simple Spring Boot application that exposes a basic REST endpoint.
The goal was to make sure that when the application is run and the URL http://localhost:9091/hello is accessed in a browser, it returns a plain text message

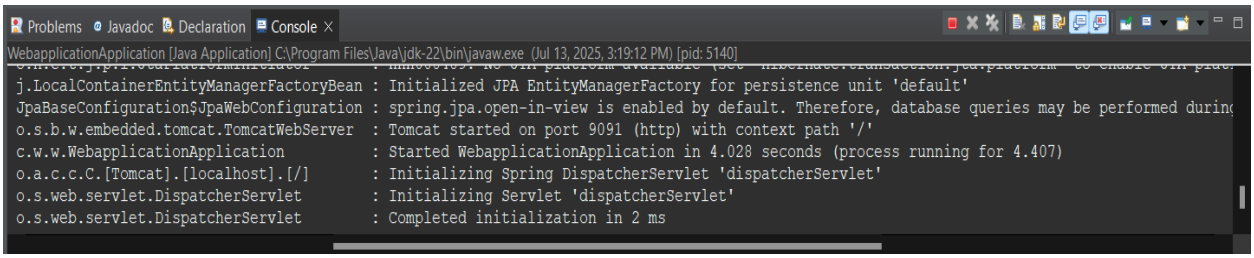
"Hello World from Spring Boot!".

Code:

HelloController.java

```
package com.webrest.webapplication;


import org.springframework.web.bind.annotation.GetMapping;

import org.springframework.web.bind.annotation.RestController;


@RestController

public class HelloController {


    @GetMapping("/hello")

    public String sayHello() {

        return "Hello World from Spring Boot!";

    }

}
```

Output:



Hello World from Spring Boot!

2.Spring Core – Load Country Spring Configuration XML

Scenario:

To develop a Spring Boot REST application to manage student data.
In this task it is required to expose a **GET endpoint** that returns the details of a student in **JSON format** when a user accesses the root URL (/).

Objective:

- Create a model class Student with fields: id, name, and department.
- Create a controller class that maps to /.
- The controller must return a Student object as a JSON response.

Code:

student.java:

```
package com.webrest.webapplication;


public class Student {

    private int id;

    private String name;

    private String department;
```

```
    public Student(int id, String name, String department) {
        this.id = id;
        this.name = name;
        this.department = department;
    }

    public int getId() { return id; }
    public String getName() { return name; }
    public String getDepartment() { return department; }
}
```

StudentController.java:

```
package com.webrest.webapplication;

import org.springframework.web.bind.annotation.GetMapping;
import org.springframework.web.bind.annotation.RestController;

@RestController
public class StudentController {

    @GetMapping("/student")
    public Student getStudent() {
        return new Student(135, "Shakthi", "ECE");
    }
}
```

Output:

```
package com.webrest.webapplication;

import org.springframework.web.bind.annotation.GetMapping;
import org.springframework.web.bind.annotation.RestController;

@RestController
public class StudentController {

    @GetMapping("/student")
    public Student getStudent() {
        return new Student(135, "Shakthi", "ECE");
    }
}
```

```
Problems  Javadoc  Declaration  Console
WebapplicationApplication [Java Application]  [pid: 15976]
] j.LocalContainerEntityManagerFactoryBean : Initialized JPA EntityManagerFactory for persistence unit 'default'
] JpaBaseConfiguration$JpaWebConfiguration : spring.jpa.open-in-view is enabled by default. Therefore, database queries may be performed duri
] o.s.b.w.embedded.tomcat.TomcatWebServer  : Tomcat started on port 9094 (http) with context path '/'
] c.w.w.WebapplicationApplication          : Started WebapplicationApplication in 3.837 seconds (process running for 4.157)
] o.a.c.c.C.[Tomcat].[localhost].[/]       : Initializing Spring DispatcherServlet 'dispatcherServlet'
] o.s.web.servlet.DispatcherServlet        : Initializing Servlet 'dispatcherServlet'
] o.s.web.servlet.DispatcherServlet        : Completed initialization in 2 ms
```

```
localhost:9094/student
localhost:9094/student
Pretty-print
{"id":135,"name":"Shakthi","department":"ECE"}
```

3.Hello World RESTful Web Service

Scenario:

To build a student management system. We want to send student data using POST method and save in memory and return the same as confirmation.

Code:

Student.java:

```
package com.webapp.webapplication.model;


public class Student {
    private int id;
    private String name;
    private String department;

    // Constructors
    public Student() {}

    public Student(int id, String name, String department) {
        this.id = id;
        this.name = name;
        this.department = department;
    }

    // Getters and Setters
    public int getId() {
        return id;
    }

    public void setId(int id) {
        this.id = id;
    }
```

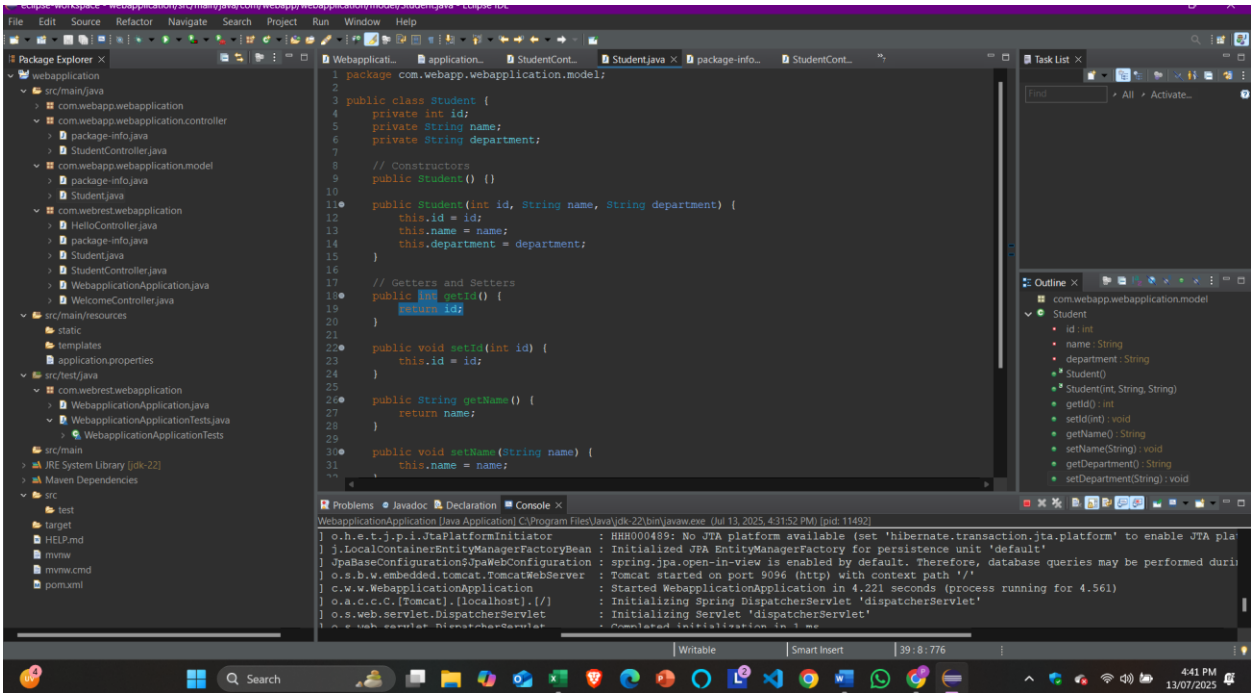
```
    public String getName() {
        return name;
    }

    public void setName(String name) {
        this.name = name;
    }

    public String getDepartment() {
        return department;
    }

    public void setDepartment(String department) {
        this.department = department;
    }
}
```

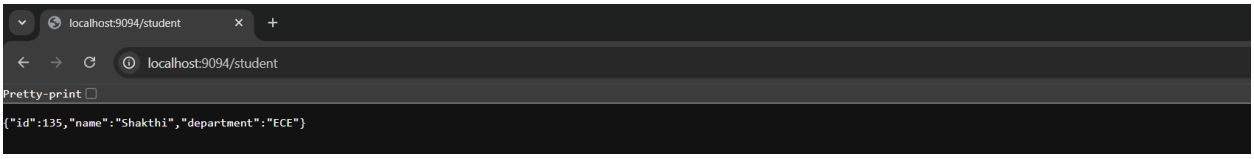
StudentController.java

```
package com.webapp.webapplication.controller;

import org.springframework.web.bind.annotation.*;
import com.webapp.webapplication.model.Student;

@RestController
public class StudentController {

    @PostMapping("/student")
```

```
    public Student addStudent(@RequestBody Student student) {
        return student;
    }
}
```

Output:





4. REST – Country Web Service

Scenario:

To build a RESTful web service that returns **details of a country** using a GET request.

Country.java

package com.webapp.webapplication.model;

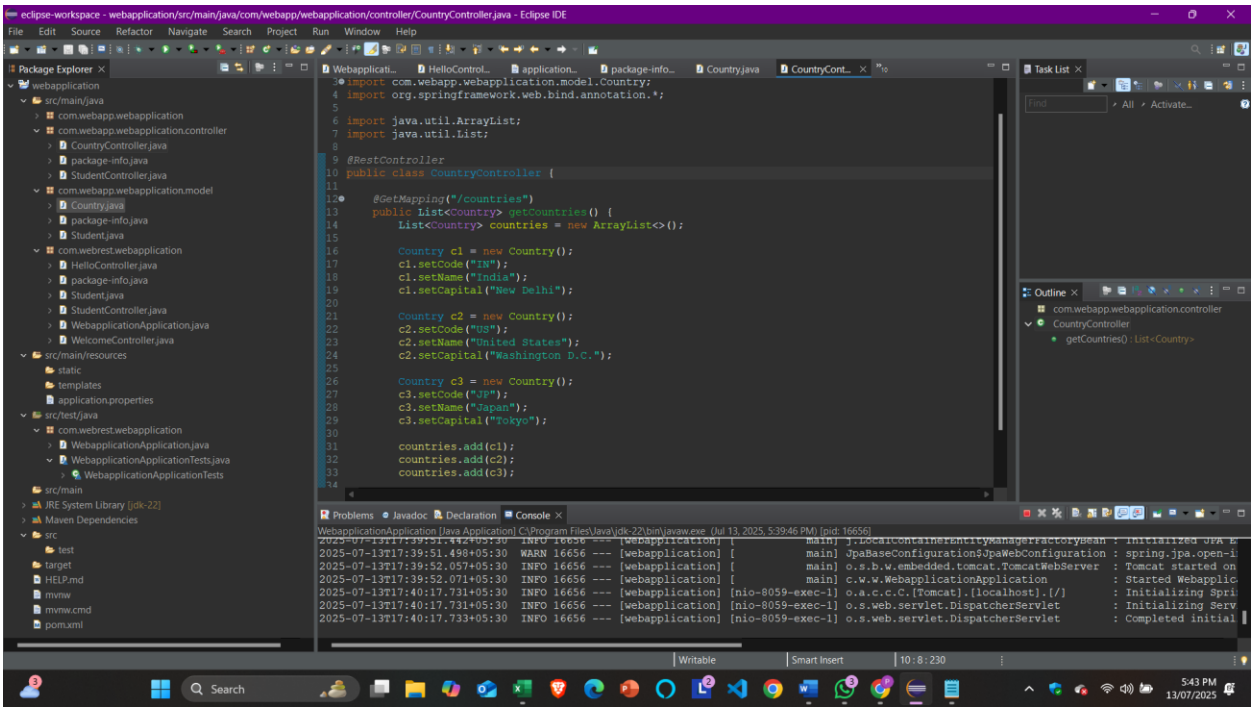
```
public class Country {
    private String code;
    private String name;
    private String capital;

    public Country() {}

    public Country(String code, String name, String capital) {
        this.code = code;
        this.name = name;
        this.capital = capital;
    }

    public String getCode() {
        return code;
    }

    public String getName() {
        return name;
    }

    public String getCapital() {
        return capital;
    }

    public void setCode(String code) {
        this.code = code;
```

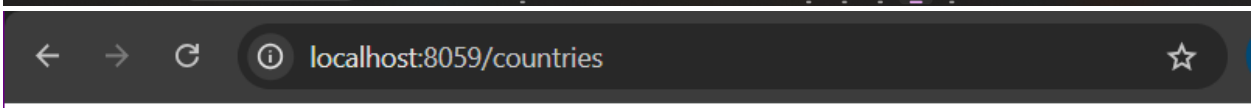
```
    }

    public void setName(String name) {
        this.name = name;
    }

    public void setCapital(String capital) {
        this.capital = capital;
    }
}
```

CountryController.java

```
package com.webapp.webapplication.controller;

import org.springframework.web.bind.annotation.*;
import com.webapp.webapplication.model.Country;

@RestController
public class CountryController {

    @GetMapping("/country")
    public Country getCountry() {
        return new Country("IN", "India", "New Delhi");
    }
}
```

Output:






```
[
  {
    "code": "IN",
    "name": "India",
    "capital": "New Delhi"
  },
  {
    "code": "US",
    "name": "United States",
    "capital": "Washington D.C."
  },
  {
    "code": "JP",
    "name": "Japan",
    "capital": "Tokyo"
  }
]
```


5.REST – Get country based on country code

Scenario:

To build a RESTful web service that returns **country information** based on a given country **code**. For example, if you send /country/IN, it should return data for **India**.

Code:

CountryController.java

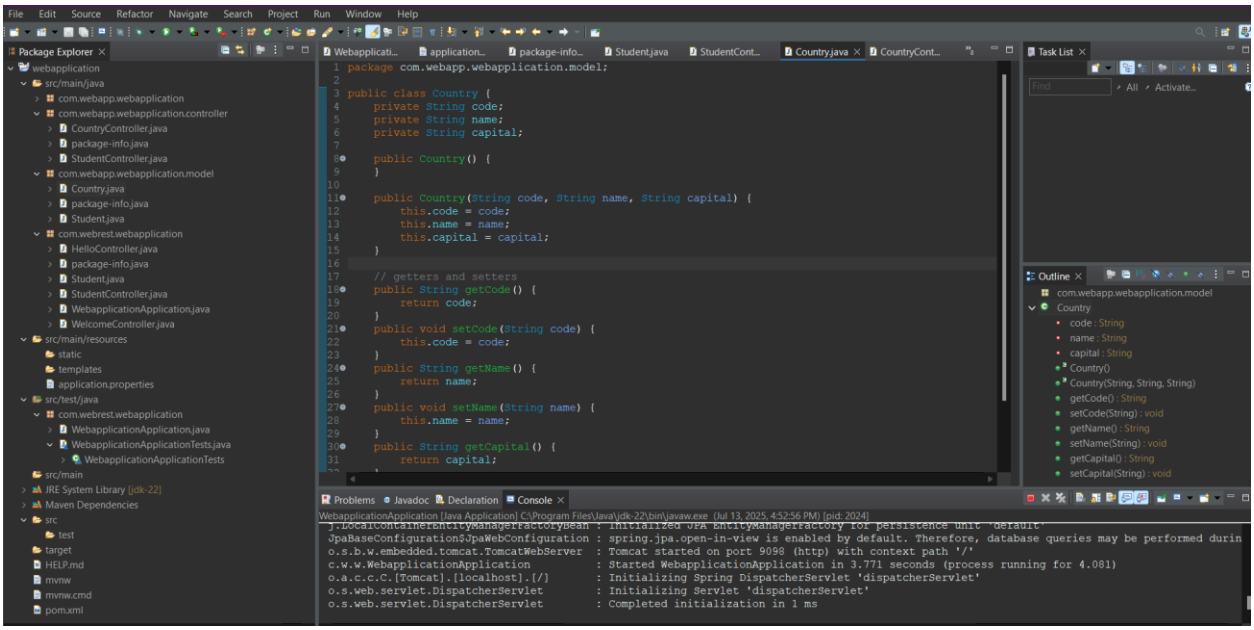
```
package com.webapp.webapplication.controller;

import org.springframework.web.bind.annotation.*;
import com.webapp.webapplication.model.Country;

@RestController
public class CountryController {

    @GetMapping("/country/{code}")
    public Country getCountry(@PathVariable String code) {
        if (code.equalsIgnoreCase("IN")) {
            return new Country("IN", "India", "New Delhi");
        } else if (code.equalsIgnoreCase("US")) {
            return new Country("US", "United States", "Washington, D.C.");
        } else {
            return new Country("UNKNOWN", "Unknown Country", "Unknown Capital");
        }
    }
}
```

Country.java

```
package com.webapp.webapplication.model;

public class Country {
    private String code;
```

```
    private String name;
    private String capital;

    public Country() {}

    public Country(String code, String name, String capital) {
        this.code = code;
        this.name = name;
        this.capital = capital;
    }

    // Getters and Setters
    public String getCode() { return code; }
    public void setCode(String code) { this.code = code; }

    public String getName() { return name; }
    public void setName(String name) { this.name = name; }

    public String getCapital() { return capital; }
    public void setCapital(String capital) { this.capital = capital; }
}
```

Output:



6.JWT – Handson

Scenario:

> **Registration** (POST /auth/register):
User sends username & password → password gets **encrypted**, then stored in the database.

> **Login** (POST /auth/login):
User credentials are verified → if valid, server sends back a **JWT token**

Code:

JWT Utility.java

```
package com.webapp.webapplication.security;

import io.jsonwebtoken.Jwts;
import io.jsonwebtoken.SignatureAlgorithm;
import org.springframework.stereotype.Component;

import java.util.Date;

@Component
public class JwtUtil {

    private String secret = "mySecretKey";

    public String generateToken(String username) {
        return Jwts.builder()
                .setSubject(username)
                .setIssuedAt(new Date(System.currentTimeMillis()))
                .setExpiration(new Date(System.currentTimeMillis() + 1000 * 60 * 60)) // 1 hour
                .signWith(SignatureAlgorithm.HS256, secret)
                .compact();
    }
}
```

AuthRequest.java

```
package com.webapp.webapplication.model;
```

```
public class AuthRequest {
    private String username;
    private String password;

    // Getters and Setters
    public String getUsername() {
        return username;
    }
    public void setUsername(String username) {
        this.username = username;
    }
    public String getPassword() {
        return password;
    }
    public void setPassword(String password) {
        this.password = password;
    }
}
```

AuthController.java

```
package com.webapp.webapplication.controller;

import com.webapp.webapplication.model.AuthRequest;
import com.webapp.webapplication.model.User;
import com.webapp.webapplication.repository.UserRepository;
import com.webapp.webapplication.security.JwtUtil;
import org.springframework.beans.factory.annotation.Autowired;
```

```
import org.springframework.security.crypto.password.PasswordEncoder;
import org.springframework.web.bind.annotation.*;

@RestController
@RequestMapping("/auth")
public class AuthController {

    @Autowired
    private UserRepository userRepo;

    @Autowired
    private PasswordEncoder passwordEncoder;

    @Autowired
    private JwtUtil jwtUtil;

    @PostMapping("/register")
    public String register(@RequestBody User user) {
        user.setPassword(passwordEncoder.encode(user.getPassword()));
        userRepo.save(user);
        return "User registered";
    }

    @PostMapping("/login")
    public String login(@RequestBody AuthRequest authRequest) {
        User user = userRepo.findByUsername(authRequest.getUsername())
                .orElseThrow(() -> new RuntimeException("User not found"));
```

```
        if (passwordEncoder.matches(authRequest.getPassword(), user.getPassword())) {
            return jwtUtil.generateToken(user.getUsername());
        } else {
            throw new RuntimeException("Invalid credentials");
        }
    }
}
```

User.java

```
package com.webapp.webapplication.model;

import jakarta.persistence.*;
import lombok.*;
import org.springframework.security.core.GrantedAuthority;
import org.springframework.security.core.userdetails.UserDetails;
import java.util.Collection;
import java.util.Collections;

@Entity
@Data
@NoArgsConstructor
@AllArgsConstructor
public class User implements UserDetails {

    @Id
    @GeneratedValue(strategy = GenerationType.IDENTITY)
    private Long id;
```

```
    private String username;
    private String password;

    @Override
    public Collection<? extends GrantedAuthority> getAuthorities() {
        return Collections.emptyList(); // No roles for now
    }

    @Override public boolean isAccountNonExpired() { return true; }
    @Override public boolean isAccountNonLocked() { return true; }
    @Override public boolean isCredentialsNonExpired() { return true; }
    @Override public boolean isEnabled() { return true; }
}
```

UserRepository.java

```
package com.webapp.webapplication.repository;

import com.webapp.webapplication.model.User;
import org.springframework.data.jpa.repository.JpaRepository;
import java.util.Optional;

public interface UserRepository extends JpaRepository<User, Long> {
    Optional<User> findByUsername(String username);
}
```

Security Configuration.java

```
package com.webapp.webapplication.security;
```

```
import org.springframework.context.annotation.Bean;
import org.springframework.context.annotation.Configuration;
import org.springframework.security.authentication.AuthenticationManager;
import org.springframework.security.authentication.dao.DaoAuthenticationProvider;
import
org.springframework.security.config.annotation.authentication.configuration.AuthenticationConf
iguration;
import org.springframework.security.config.annotation.web.configuration.EnableWebSecurity;
import org.springframework.security.crypto.bcrypt.BCryptPasswordEncoder;
import org.springframework.security.crypto.password.PasswordEncoder;
import org.springframework.security.core.userdetails.UserDetailsService;

@Configuration
@EnableWebSecurity
public class SecurityConfig {

    @Bean
    public PasswordEncoder passwordEncoder() {
        return new BCryptPasswordEncoder();
    }

    @Bean
    public UserDetailsService userDetailsService() {
        return username -> null; // Optional if not using full Spring Security
    }

    @Bean
```

```
    public AuthenticationManager authManager(AuthenticationConfiguration config) throws
Exception {

        return config.getAuthenticationManager();

    }

}
```

Output:

```java
package com.webapp.webapplication.model;

import jakarta.persistence.*;

@Entity
public class User implements UserDetails {

    @Id
    @GeneratedValue(strategy = GenerationType.IDENTITY)
    private Long id;

    private String username;
    private String password;

    // ☑ Constructors
    public User() {}

    public User(Long id, String username, String password) {
        this.id = id;
        this.username = username;
        this.password = password;
    }

    // ☑ Getters and Setters
    public Long getId() {
        return id;
    }

    public void setId(Long id) {
        this.id = id;
```

```
Outline
com.webapp.webapplication.model
User
  id : Long
  username : String
  password : String
  User()
  User(Long, String, String)
  getId() : Long
  setId(Long) : void
  getUsername() : String
  setUsername(String) : void
  getPassword() : String
```

```java
        this.password = password;
    }

    // ☑ UserDetails required methods
    @Override
    public Collection<? extends GrantedAuthority> getAuthorities() {
        return Collections.emptyList(); // No roles for now
    }

    @Override
    public boolean isAccountNonExpired() {
        return true;
    }

    @Override
    public boolean isAccountNonLocked() {
        return true;
    }

    @Override
    public boolean isCredentialsNonExpired() {
        return true;
    }

    @Override
    public boolean isEnabled() {
        return true;
    }
}
```

```
Outline
  User(Long, String, String)
  getId() : Long
  setId(Long) : void
  getUsername() : String
  setUsername(String) : void
  getPassword() : String
  setPassword(String) : void
  getAuthorities() : Collection<? extends
  isAccountNonExpired() : boolean
  isAccountNonLocked() : boolean
  isCredentialsNonExpired() : boolean
  isEnabled() : boolean
```

```
WebapplicationApplication [Java Application] C:\Program Files\Java\jdk-22\bin\javaw.exe  (Jul 13, 2025, 5:36:06 PM) [pid: 20088]
  main] j.LocalContainerEntityManagerFactoryBean : Initialized JPA EntityManagerFactory for persistence unit 'default'
  main] JpaBaseConfiguration$JpaWebConfiguration : spring.jpa.open-in-view is enabled by default. Therefore, database queries may be performed
  main] o.s.b.w.embedded.tomcat.TomcatWebServer  : Tomcat started on port 8058 (http) with context path '/'
  main] c.w.w.WebapplicationApplication          : Started WebapplicationApplication in 4.86 seconds (process running for 5.229)
xec-1] o.a.c.c.C.[Tomcat].[localhost].[/]       : Initializing Spring DispatcherServlet 'dispatcherServlet'
xec-1] o.s.web.servlet.DispatcherServlet        : Initializing Servlet 'dispatcherServlet'
xec-1] o.s.web.servlet.DispatcherServlet        : Completed initialization in 1 ms
```

When JWT Token Missed:

```
401 Unauthorized
```