SOLUTION WEEK 4

**Hands on 1**

**Create a Spring Web Project using Maven**   
  
Follow steps below to create a project: 

1. Go to <https://start.spring.io/>
2. Change Group as “com.cognizant”
3. Change Artifact Id as “spring-learn”
4. Select Spring Boot DevTools and Spring Web
5. Create and download the project as zip
6. Extract the zip in root folder to Eclipse Workspace
7. Build the project using ‘mvn clean package -Dhttp.proxyHost=proxy.cognizant.com -Dhttp.proxyPort=6050 -Dhttps.proxyHost=proxy.cognizant.com -Dhttps.proxyPort=6050 -Dhttp.proxyUser=123456’ command in command line
8. Import the project in Eclipse "File > Import > Maven > Existing Maven Projects > Click Browse and select extracted folder > Finish"
9. Include logs to verify if main() method of SpringLearnApplication.
10. Run the SpringLearnApplication class.

SME to walk through the following aspects related to the project created:

1. src/main/java - Folder with application code
2. src/main/resources - Folder for application configuration
3. src/test/java - Folder with code for testing the application
4. SpringLearnApplication.java - Walkthrough the main() method.
5. Purpose of @SpringBootApplication annotation
6. pom.xml
   1. Walkthrough all the configuration defined in XML file
   2. Open 'Dependency Hierarchy' and show the dependency tree.

**CODE**

package com.cognizant.spring\_learn;

import org.springframework.boot.SpringApplication;

import org.springframework.boot.autoconfigure.SpringBootApplication;

@SpringBootApplication

public class SpringLearnApplication {

    public static void main(String[] args) {

        SpringApplication.run(SpringLearnApplication.class, args);

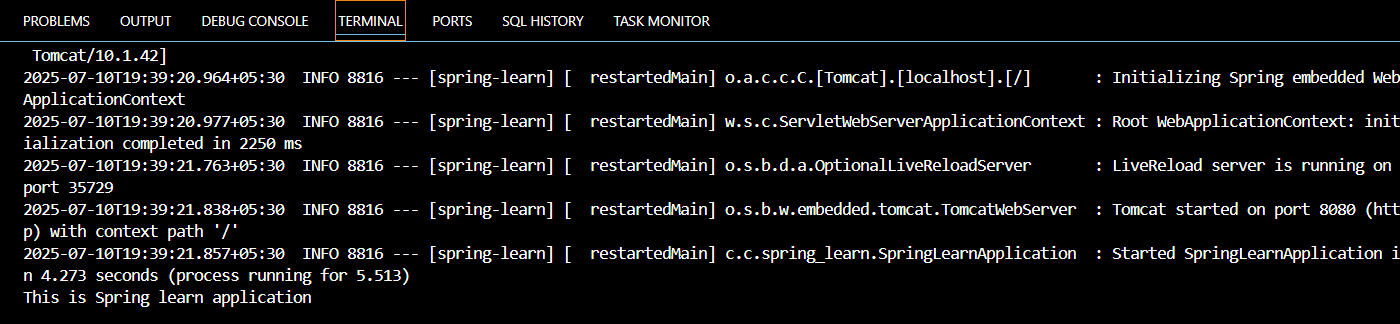
        System.out.println("This is Spring learn application");

    }

}

spring.application.name=spring-learn

**OUTPUT**

****

**Spring Core – Load Country from Spring Configuration XML**   
  
An airlines website is going to support booking on four countries. There will be a drop down on the home page of this website to select the respective country. It is also important to store the two-character ISO code of each country. 

|  |  |
| --- | --- |
| **Code** | **Name** |
| US | United States |
| DE | Germany |
| IN | India |
| JP | Japan |

Above data has to be stored in spring configuration file. Write a program to read this configuration file and display the details.  
  
Steps to implement

* Pick any one of your choice country to configure in Spring XML configuration named country.xml.
* Create a bean tag in spring configuration for country and set the property and values

    <bean id="country" class="com.cognizant.springlearn.Country">

        <property name="code" value="IN" />

        <property name="name" value="India" />

    </bean>

* Create Country class with following aspects:
  + Instance variables for code and name
  + Implement empty parameter constructor with inclusion of debug log within the constructor with log message as “Inside Country Constructor.”
  + Generate getters and setters with inclusion of debug with relevant message within each setter and getter method.
  + Generate toString() method
* Create a method displayCountry() in SpringLearnApplication.java, which will read the country bean from spring configuration file and display the country details. ClassPathXmlApplicationContext, ApplicationContext and context.getBean(“beanId”, Country.class). Refer sample code for displayCountry() method below.

ApplicationContext context = new ClassPathXmlApplicationContext("country.xml");

Country country = (Country) context.getBean("country", Country.class);

LOGGER.debug("Country : {}", country.toString());

* Invoke displayCountry() method in main() method of SpringLearnApplication.java.
* Execute main() method and check the logs to find out which constructors and methods were invoked.

SME to provide more detailing about the following aspects:

* bean tag, id attribute, class attribute, property tag, name attribute, value attribute
* ApplicationContext, ClassPathXmlApplicationContext
* What exactly happens when context.getBean() is invoked

**CODE**

package com.cognizant.spring\_learn;

import org.slf4j.Logger;

import org.slf4j.LoggerFactory;

import org.springframework.context.ApplicationContext;

import org.springframework.context.support.ClassPathXmlApplicationContext;

import com.cognizant.spring\_learn.model.country;

public class SpringLearnApplication {

    private static final Logger LOGGER = LoggerFactory.getLogger(SpringLearnApplication.class);

    public static void main(String[] args) {

        displayCountry();

    }

    public static void displayCountry() {

        LOGGER.debug("Inside displayCountry()");

        ApplicationContext context = new ClassPathXmlApplicationContext("country.xml");

        country country = (country) context.getBean("in", country.class);

        LOGGER.debug("Country : {}", country.toString());

    }

}

package com.cognizant.spring\_learn.model;

public class country {

    private String code;

    private String name;

    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;

    }

    @Override

    public String toString() {

        return "Country [code=" + code + ", name=" + name + "]";

    }

}

<?xml version="1.0" encoding="UTF-8"?>

<beans xmlns="http://www.springframework.org/schema/beans"

       xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"

       xsi:schemaLocation="

         http://www.springframework.org/schema/beans

         http://www.springframework.org/schema/beans/spring-beans.xsd">

    <bean id="in" class="com.cognizant.spring\_learn.model.country">

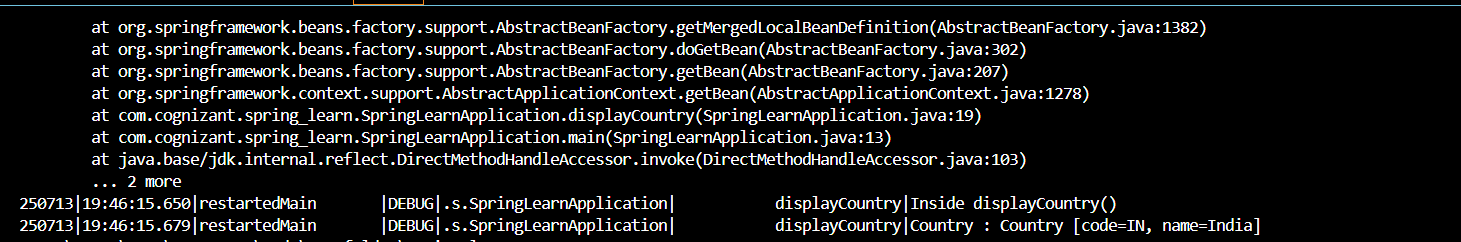
        <property name="code" value="IN"/>

        <property name="name" value="India"/>

    </bean>

</beans>

**OUTPUT**



**Hello World RESTful Web Service**   
  
Write a REST service in the spring learn application created earlier, that returns the text "Hello World!!" using Spring Web Framework. Refer details below:  
  
**Method:** GET  
**URL:** /hello  
**Controller:** com.cognizant.spring-learn.controller.HelloController  
**Method Signature:** public String sayHello()  
**Method Implementation:** return hard coded string "Hello World!!"  
**Sample Request**: http://localhost:8083/hello  
**Sample Response:** Hello World!!   
  
**IMPORTANT NOTE**: Don't forget to include start and end log in the sayHello() method.  
  
Try the URL http://localhost:8083/hello in both chrome browser and postman.  
  
SME to explain the following aspects:

* In network tab of developer tools show the HTTP header details received
* In postman click on "Headers" tab to view the HTTP header details received

**CODE**

package com.cognizant.spring\_learn;

import org.springframework.boot.SpringApplication;

import org.springframework.boot.autoconfigure.SpringBootApplication;

@SpringBootApplication

public class SpringLearnApplication {

  public static void main(String[] args) {

        SpringApplication.run(SpringLearnApplication.class, args);

    }

}

package com.cognizant.spring\_learn.controller;

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";

    }

}

package com.cognizant.spring\_learn.aspect;

import org.aspectj.lang.annotation.After;

import org.aspectj.lang.annotation.Aspect;

import org.aspectj.lang.annotation.Before;

import org.slf4j.Logger;

import org.slf4j.LoggerFactory;

import org.springframework.stereotype.Component;

@Aspect

@Component

public class HelloAspect {

    private final Logger LOGGER = LoggerFactory.getLogger(HelloAspect.class);

    @Before("execution(String com.cognizant.springlearn.controller.HelloController.sayHello())")

    public void beforeHelloLogger() {

        LOGGER.info("Before sayHello() Method");

    }

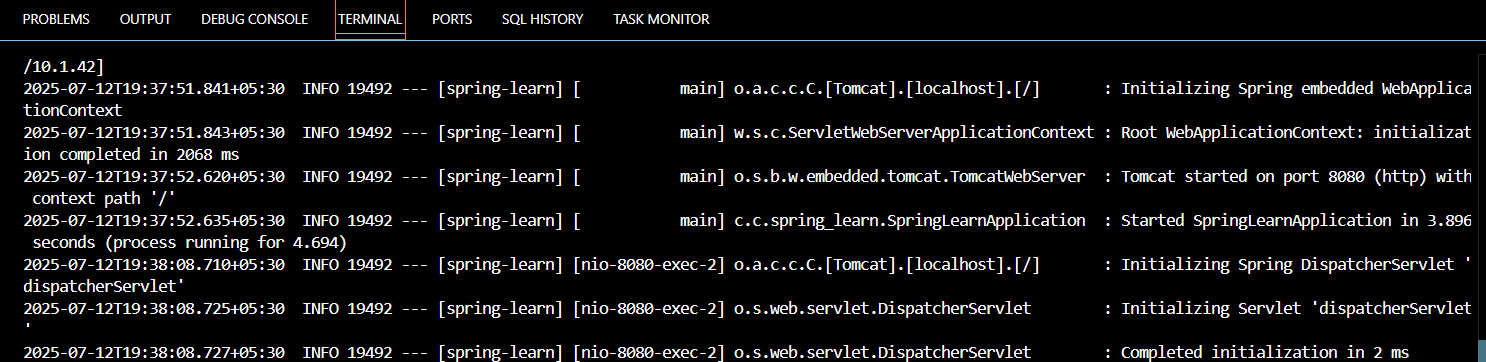
    @After("execution(String com.cognizant.springlearn.controller.HelloController.sayHello())")

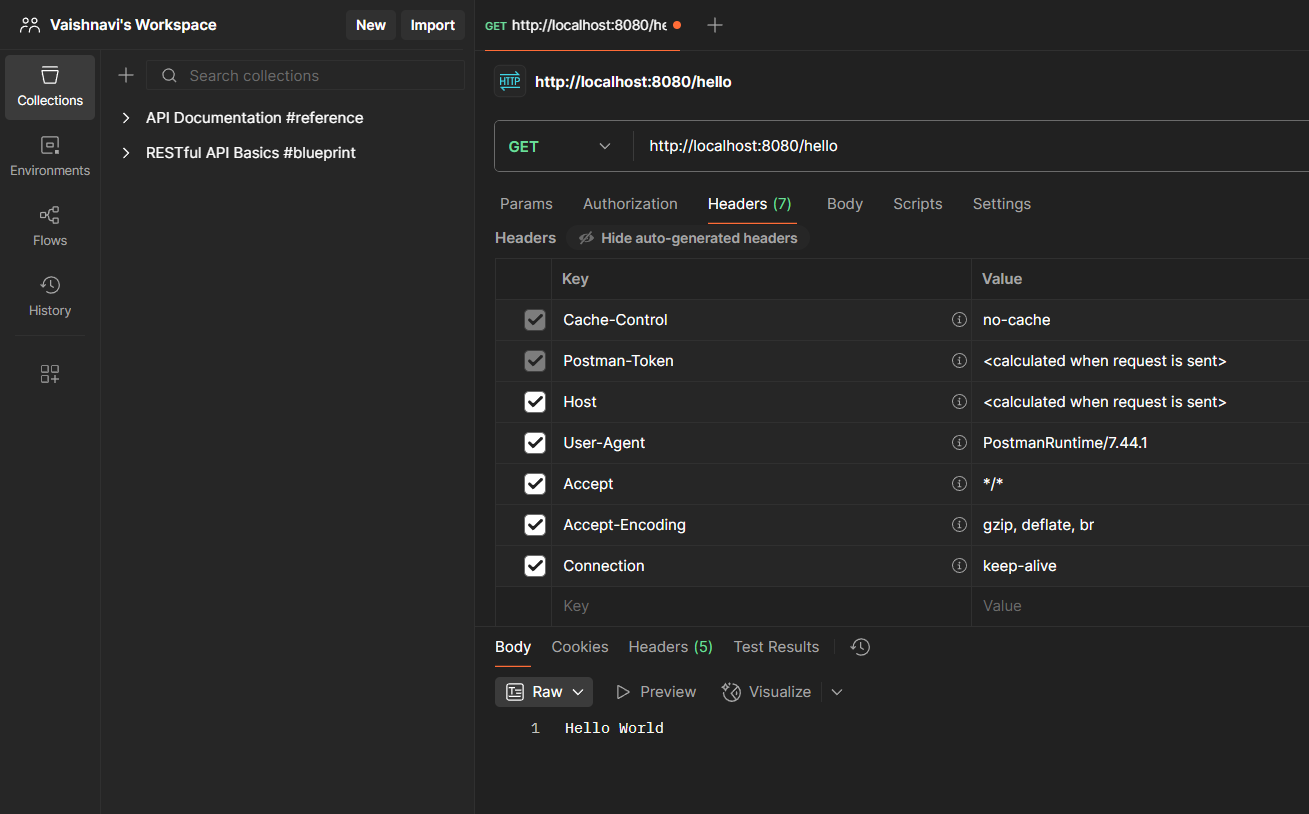
    public void afterHelloLogger() {

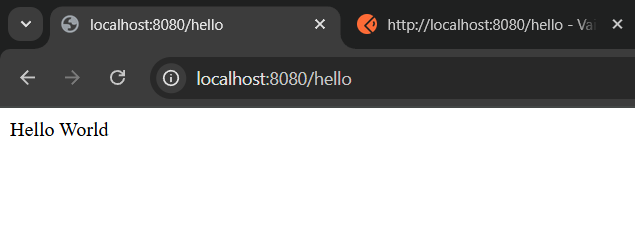
        LOGGER.info("After sayHello() Method");

    }

}

**OUTPUT**





**REST - Country Web Service**   
  
Write a REST service that returns India country details in the earlier created spring learn application.  
  
**URL**: /country  
**Controller**: com.cognizant.spring-learn.controller.CountryController  
**Method Annotation**: @RequestMapping  
**Method Name**: getCountryIndia()  
**Method Implementation**: Load India bean from spring xml configuration and return  
**Sample Request**: http://localhost:8083/country  
**Sample Response**:

{

  "code": "IN",

  "name": "India"

}

SME to explain the following aspects:

* What happens in the controller method?
* How the bean is converted into JSON reponse?
* In network tab of developer tools show the HTTP header details received
* In postman click on "Headers" tab to view the HTTP header details received

CODE

package com.cognizant.spring\_learn;

import org.springframework.boot.SpringApplication;

import org.springframework.boot.autoconfigure.SpringBootApplication;

@SpringBootApplication

public class SpringLearnApplication {

    public static void main(String[] args) {

        SpringApplication.run(SpringLearnApplication.class, args);

    }

}

package com.cognizant.spring\_learn.controller;

import com.cognizant.spring\_learn.aspect.Country;

import org.springframework.context.support.ClassPathXmlApplicationContext;

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

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

@RestController

public class CountryController {

    @GetMapping("/country")

    public Country getCountryIndia() {

        return new ClassPathXmlApplicationContext("country.xml").getBean("india", Country.class);

    }

}

package com.cognizant.spring\_learn.aspect;

public class Country {

    private String code;

    private String name;

    public Country(String code, String name) {

        this.code = code;

        this.name = name;

    }

    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;

    }

}

<?xml version="1.0" encoding="UTF-8"?>

<beans xmlns="http://www.springframework.org/schema/beans"

       xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"

       xsi:schemaLocation="

        http://www.springframework.org/schema/beans http://www.springframework.org/schema/beans/spring-beans.xsd">

    <bean id="india" class="com.cognizant.spring\_learn.aspect.Country">

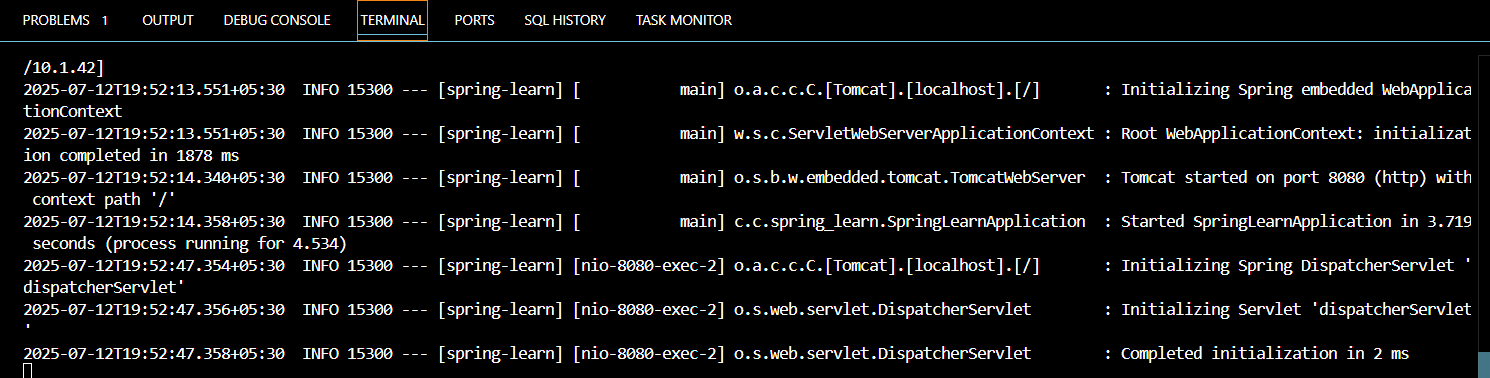
        <constructor-arg name="code" value="IN" />

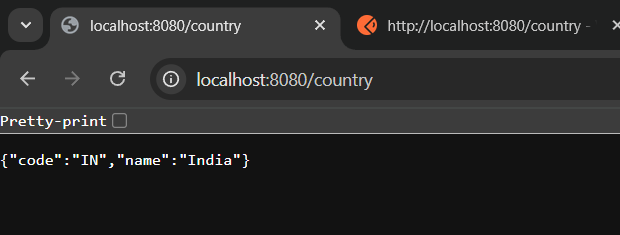
        <constructor-arg name="name" value="India" />

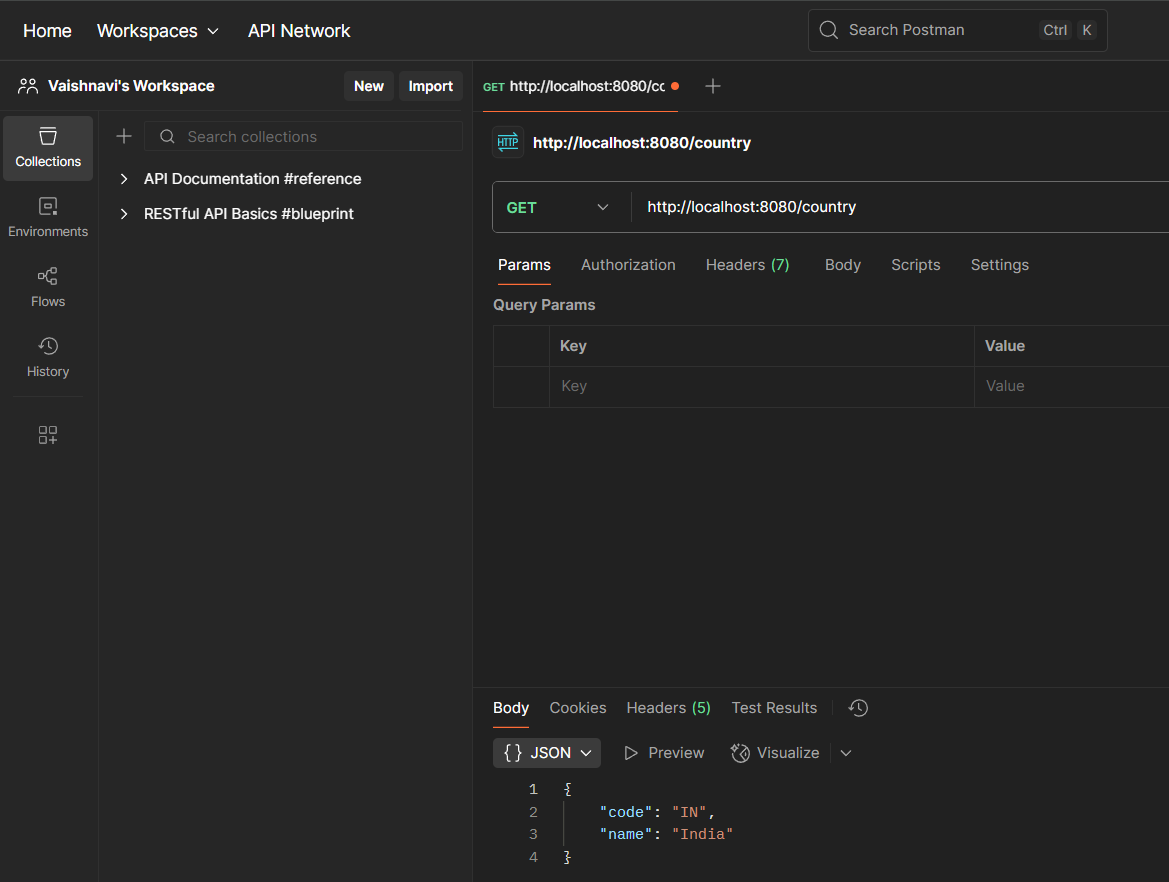
    </bean>

</beans>

Output







**REST - Get country based on country code**   
  
Write a REST service that returns a specific country based on country code. The country code should be case insensitive.  
  
**Controller**: com.cognizant.spring-learn.controller.CountryController  
**Method Annotation:** @GetMapping("/countries/{code}")  
**Method Name**: getCountry(String code)  
**Method Implemetation**: Invoke countryService.getCountry(code)   
**Service Method:**com.cognizant.spring-learn.service.CountryService.getCountry(String code)  
  
**Service Method Implementation**:

* Get the country code using @PathVariable
* Get country list from country.xml
* Iterate through the country list
* Make a case insensitive matching of country code and return the country.
* Lambda expression can also be used instead of iterating the country list

**Sample Request**: http://localhost:8083/country/in  
  
**Sample Response**:

{

  "code": "IN",

  "name": "India"

}

**CODE**

package com.cognizant.spring\_learn;

import org.springframework.boot.SpringApplication;

import org.springframework.boot.autoconfigure.ImportAutoConfiguration;

import org.springframework.boot.autoconfigure.SpringBootApplication;

import org.springframework.context.ApplicationContext;

import org.springframework.context.annotation.ImportResource;

import org.springframework.context.support.ClassPathXmlApplicationContext;

@SpringBootApplication

@ImportResource("classpath:country.xml")

public class SpringLearnApplication {

    public static void main(String[] args) {

        SpringApplication.run(SpringLearnApplication.class, args);

    }

}

package com.cognizant.spring\_learn.service;

import com.cognizant.spring\_learn.aspect.Country;

import com.cognizant.spring\_learn.repository.CountryRepository;

import org.springframework.beans.factory.annotation.Autowired;

public class counservice {

    private CountryRepository countryRepository;

    public counservice(@Autowired CountryRepository countryRepository) {

        this.countryRepository = countryRepository;

    }

    public Country getCountryByCode(String code) {

        return countryRepository.findByCode(code);

    }

}

package com.cognizant.spring\_learn.repository;

import com.cognizant.spring\_learn.aspect.Country;

import org.springframework.beans.factory.annotation.Autowired;

import java.util.ArrayList;

import java.util.List;

public class CountryRepository {

    private List<Country> countries;

    public CountryRepository( @Autowired List<Country> countries) {

        this.countries = new ArrayList<>(countries);

    }

    public Country findByCode(String code) {

        for(int i=0;i<countries.size();i++)

            if(countries.get(i).getCode().equalsIgnoreCase(code))

                return countries.get(i);

        return new Country();

    }

}

package com.cognizant.spring\_learn.controller;

import com.cognizant.spring\_learn.aspect.Country;

import com.cognizant.spring\_learn.service.counservice;

import org.springframework.beans.factory.annotation.Autowired;

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

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

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

@RestController

public class CountryController {

    private counservice countryService;

    public CountryController(@Autowired counservice countryService) {

        this.countryService = countryService;

    }

    @GetMapping("/country/{code}")

    public Country getCountryByCode(@PathVariable String code) {

        return countryService.getCountryByCode(code);

    }

}

package com.cognizant.spring\_learn.aspect;

import lombok.\*;

@Getter @Setter

@NoArgsConstructor @AllArgsConstructor

@ToString

public class Country {

    private String code;

    private String name;

}

<?xml version="1.0" encoding="UTF-8"?>

<beans xmlns="http://www.springframework.org/schema/beans"

       xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"

       xsi:schemaLocation="

        http://www.springframework.org/schema/beans http://www.springframework.org/schema/beans/spring-beans.xsd">

     <bean id="countryRepo" class="com.cognizant.spring\_learn.repository.CountryRepository">

        <constructor-arg>

            <list>

                <bean class="com.cognizant.spring\_learn.aspect.Country">

                    <constructor-arg name="code" value="IN" />

                    <constructor-arg name="name" value="India" />

                </bean>

                <bean class="com.cognizant.spring\_learn.aspect.Country">

                    <constructor-arg name="code" value="US" />

                    <constructor-arg name="name" value="United States" />

                </bean>

                <bean class="com.cognizant.spring\_learn.aspect.Country">

                    <constructor-arg name="code" value="JP" />

                    <constructor-arg name="name" value="Japan" />

                </bean>

                <bean class="com.cognizant.spring\_learn.aspect.Country">

                    <constructor-arg name="code" value="DE" />

                    <constructor-arg name="name" value="Germany" />

                </bean>

            </list>

        </constructor-arg>

    </bean>

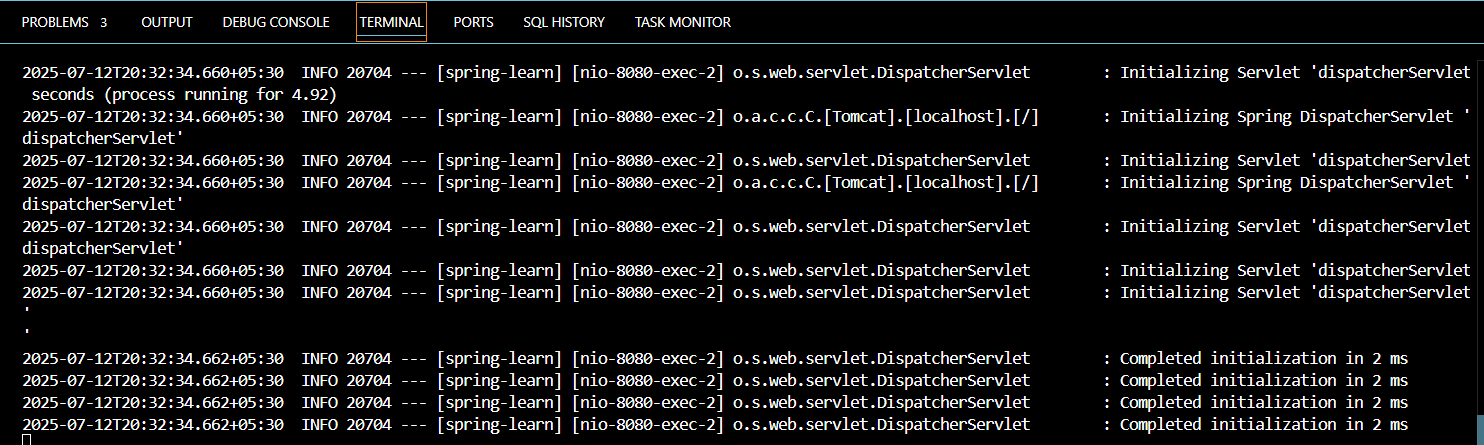
    <bean id="countryService" class="com.cognizant.spring\_learn.service.counservice">

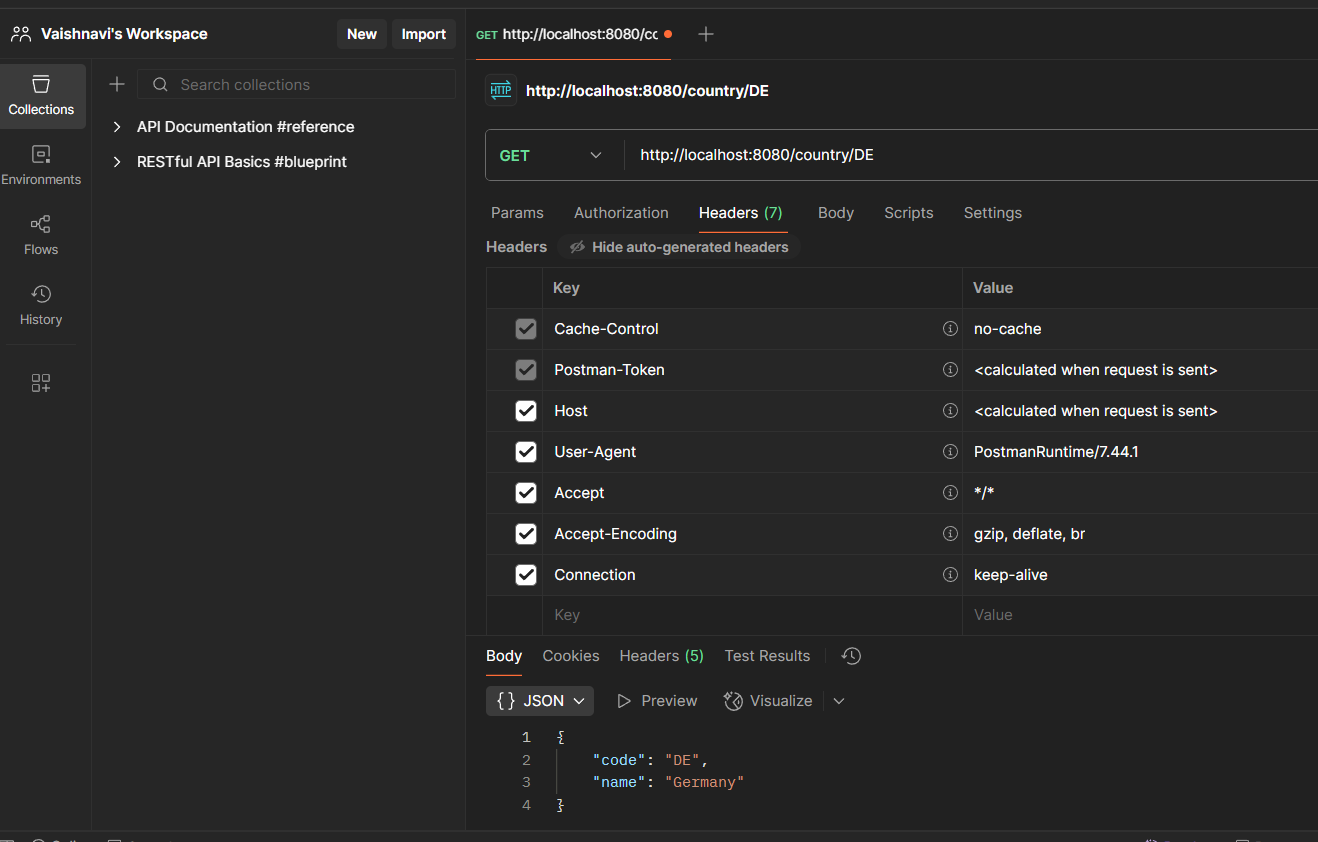
        <constructor-arg name="countryRepository" ref="countryRepo" />

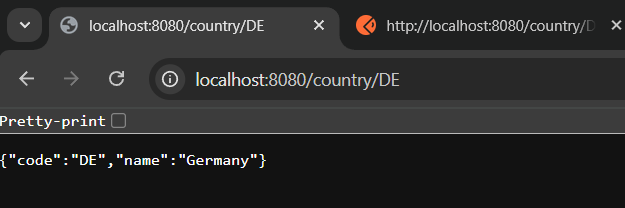
    </bean>

</beans>

OUTPUT







**Create authentication service that returns JWT**   
  
As part of first step of JWT process, the user credentials needs to be sent to authentication service request that generates and returns the JWT.  
  
Ideally when the below curl command is executed that calls the new authentication service, the token should be responded. Kindly note that the credentials are passed using -u option.  
  
**Request**

curl -s -u user:pwd http://localhost:8090/authenticate

**Response**

{"token":"eyJhbGciOiJIUzI1NiJ9.eyJzdWIiOiJ1c2VyIiwiaWF0IjoxNTcwMzc5NDc0LCJleHAiOjE1NzAzODA2NzR9.t3LRvlCV-hwKfoqZYlaVQqEUiBloWcWn0ft3tgv0dL0"}

This can be incorporated as three major steps:

* Create authentication controller and configure it in SecurityConfig
* Read Authorization header and decode the username and password
* Generate token based on the user retrieved in the previous step

Let incorporate the above as separate hands on exercises.

CODE

package com.cognizant.spring\_learn;

import org.springframework.boot.SpringApplication;

import org.springframework.boot.autoconfigure.SpringBootApplication;

@SpringBootApplication

public class SpringLearnApplication {

    public static void main(String[] args) {

        SpringApplication.run(SpringLearnApplication.class, args);

    }

}

package com.cognizant.spring\_learn.service;

import io.jsonwebtoken.Jwts;

import io.jsonwebtoken.SignatureAlgorithm;

import io.jsonwebtoken.security.Keys;

import org.springframework.stereotype.Component;

import java.security.Key;

import java.util.Date;

@Component

public class JwtUtil {

    private final Key secretKey = Keys.secretKeyFor(SignatureAlgorithm.HS256);

    public String generateToken(String username) {

        long now = System.currentTimeMillis();

        return Jwts.builder()

                .setSubject(username)

                .setIssuedAt(new Date(now))

                .setExpiration(new Date(now + 1000 \* 60 \* 10))

                .signWith(secretKey)

                .compact();

    }

}

import org.springframework.context.annotation.Configuration;

import org.springframework.security.config.annotation.web.builders.HttpSecurity;

import org.springframework.security.web.SecurityFilterChain;

@Configuration

public class SecurityConfig {

    @Bean

    public SecurityFilterChain filterChain(HttpSecurity http) throws Exception {

        http

                .csrf(csrf -> csrf.disable())

                .authorizeHttpRequests(auth -> auth

                        .requestMatchers("/authenticate").permitAll()

                        .anyRequest().authenticated()

                );

        return http.build();

    }

}

package com.cognizant.spring\_learn.controller;

import com.cognizant.spring\_learn.service.JwtUtil;

import jakarta.servlet.http.HttpServletRequest;

import org.springframework.http.ResponseEntity;

import org.springframework.web.bind.annotation.\*;

import java.util.Base64;

@RestController

public class AuthenticationController {

    private final JwtUtil jwtUtil;

    public AuthenticationController(JwtUtil jwtUtil) {

        this.jwtUtil = jwtUtil;

    }

    @GetMapping("/authenticate")

    public ResponseEntity<?> authenticate(HttpServletRequest request) {

        String authHeader = request.getHeader("Authorization");

        if (authHeader != null && authHeader.startsWith("Basic ")) {

            String base64Credentials = authHeader.substring("Basic ".length());

            String credentials = new String(Base64.getDecoder().decode(base64Credentials));

            String[] values = credentials.split(":", 2);

            String username = values[0];

            String password = values[1];

            if ("user".equals(username) && "pwd".equals(password)) {

                String token = jwtUtil.generateToken(username);

                return ResponseEntity.ok().body("{\"token\":\"" + token + "\"}");

            }

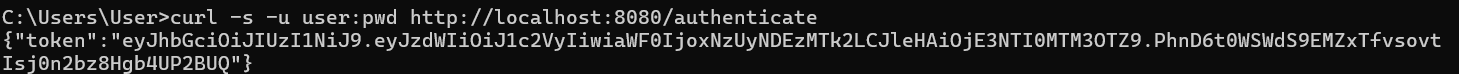
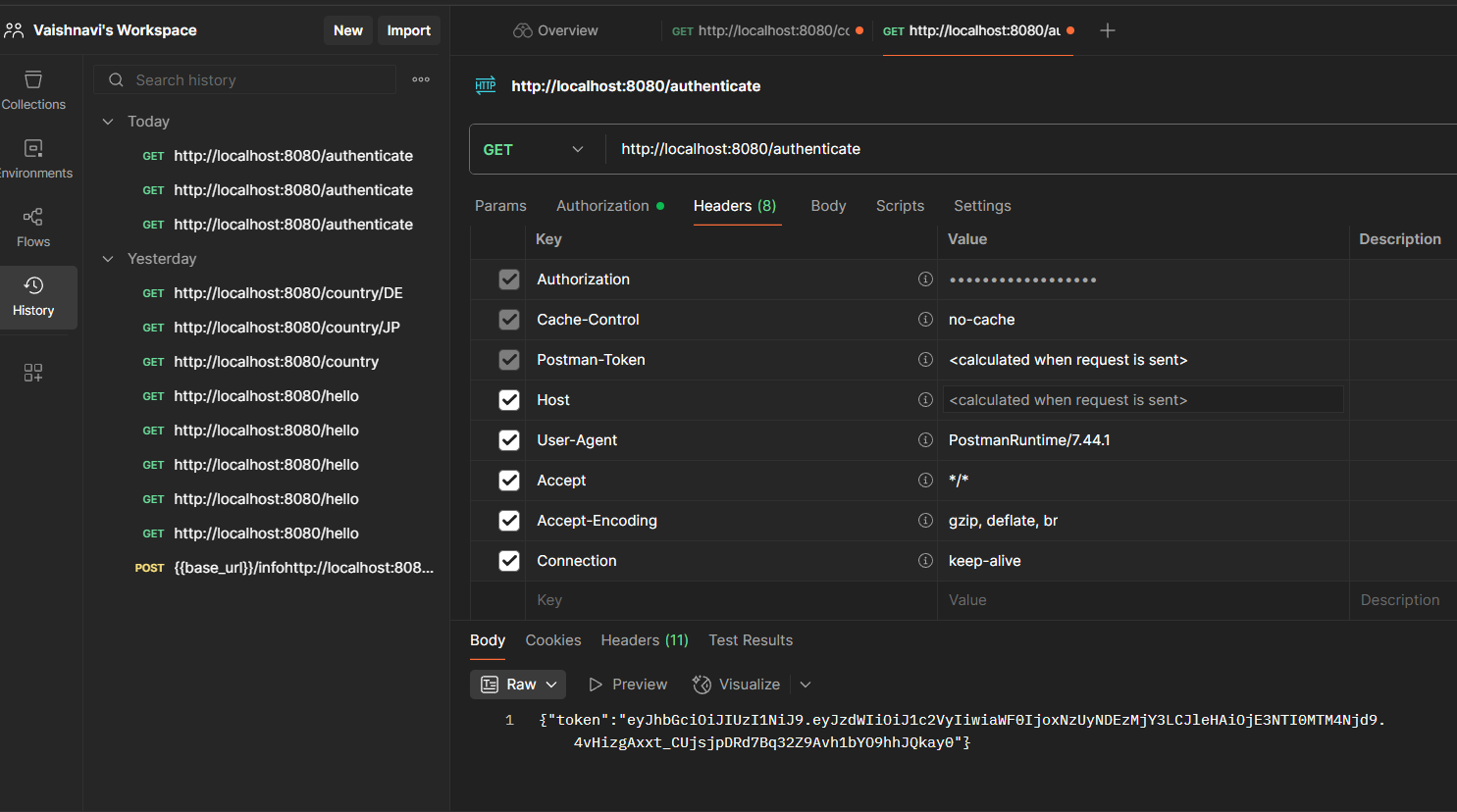
        }

        return ResponseEntity.status(401).body("Unauthorized");

    }

}

**OUTPUT**

****

