

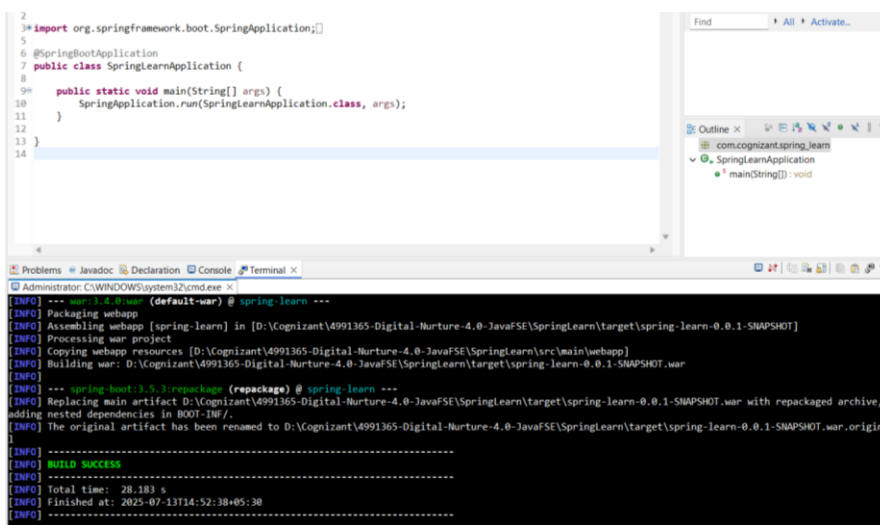
WEEK 4

spring-rest-handson, JWT-handson

Spring-rest-handson:

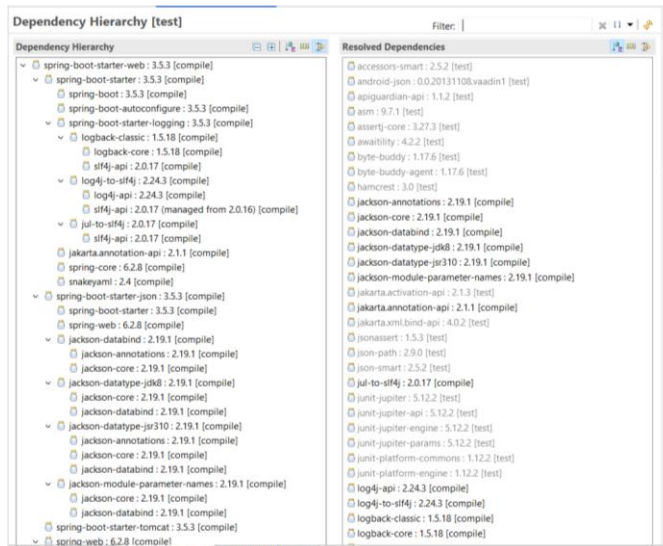
1. Create a Spring Web Project using Maven:

Create a SpringLearn Application and build it:



```
2
3import org.springframework.boot.SpringApplication;
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6@SpringBootApplication
7public class SpringLearnApplication {
8
9    public static void main(String[] args) {
10        SpringApplication.run(SpringLearnApplication.class, args);
11    }
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2625
2626
2627
2628
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2632
2633
2634
2635
```

Dependency Hierarchy:



Output:

```

3 import org.slf4j.Logger;
4 import org.slf4j.LoggerFactory;
5 import org.springframework.boot.SpringApplication;
6 import org.springframework.boot.autoconfigure.SpringBootApplication;
7
8 @SpringBootApplication
9 public class SpringLearnApplication {
10
11     private static final Logger LOGGER = LoggerFactory.getLogger(SpringLearnApplication.class);
12
13     public static void main(String[] args) {
14         SpringApplication.run(SpringLearnApplication.class, args);
15         LOGGER.info("Inside main()");
16     }
17 }
18

```

Problems Javadoc Declaration Console Terminal

```

SpringLearn - SpringLearnApplication [Spring Boot App] [D:\JESD\ eclipse-jee-2024-06-R-win32-x86_64\1\ eclipse\plugins\org.eclipse.jee.openjdk.hotspot.jre.full.win32.x86_64.21.0.5.v20241023-1957\jre\bin\java
Default: private: -uuiidns
2025-07-13T15:04:19.595+05:30 INFO 10644 --- [webk4] [ restartedMain] .e.DevToolsPropertyDefaultsPostProcessor : DevTools property defaults active! Set
'spring.devtools.add-properties' to 'false' to disable
2025-07-13T15:04:19.595+05:30 INFO 10644 --- [webk4] [ restartedMain] .e.DevToolsPropertyDefaultsPostProcessor : For additional web related logging
consider setting the 'logging.level.web' property to 'DEBUG'
2025-07-13T15:04:20.518+05:30 INFO 10644 --- [webk4] [ restartedMain] o.s.b.w.embedded.tomcat.TomcatEngineServer : Tomcat initialized with port 8080 (http)
2025-07-13T15:04:20.518+05:30 INFO 10644 --- [webk4] [ restartedMain] o.apache.catalina.core.StandardService : Starting service [Tomcat]
2025-07-13T15:04:20.535+05:30 INFO 10644 --- [webk4] [ restartedMain] o.apache.catalina.core.StandardEngine : Starting Servlet engine: [Apache
Tomcat/10.1.42]
2025-07-13T15:04:20.581+05:30 INFO 10644 --- [webk4] [ restartedMain] o.a.c.c.C.[Tomcat].[localhost].[/] : Initializing Spring embedded
WebApplicationContext
2025-07-13T15:04:20.582+05:30 INFO 10644 --- [webk4] [ restartedMain] w.s.c.ServletWebServerApplicationContext : Root WebApplicationContext:
initialization completed in 986 ms
2025-07-13T15:04:20.893+05:30 INFO 10644 --- [webk4] [ restartedMain] o.s.b.d.a.OptionalLiveReloadServer : LiveReload server is running on port
35729
2025-07-13T15:04:20.930+05:30 INFO 10644 --- [webk4] [ restartedMain] o.s.b.w.embedded.tomcat.TomcatEngineServer : Tomcat started on port 8080 (http) with
context path '/'
2025-07-13T15:04:20.941+05:30 INFO 10644 --- [webk4] [ restartedMain] c.c.spring_learn.SpringLearnApplication : Started SpringLearnApplication in 1.839
seconds (process running for 2.667)
2025-07-13T15:04:20.945+05:30 INFO 10644 --- [webk4] [ restartedMain] c.c.spring_learn.SpringLearnApplication : Inside main()

```

2. Spring Core – Load Country from Spring Configuration XML:

Create Country.java in src/main/java :

```
package com.cognizant.spring_learn;
```

```
import org.slf4j.Logger;
```

```
import org.slf4j.LoggerFactory;
```

```
public class Country {
```

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

```
    private String code;
```

```
    private String name;
```

```
    public Country() {
```

```
        LOGGER.debug("Inside Country Constructor.");
```

```
    }
```

```
    public String getCode() {
```

```
        LOGGER.debug("Inside getCode()");
```

```
        return code;
```

```
    }
```

```
    public void setCode(String code) {
```

```
        LOGGER.debug("Inside setCode()");
```

```
        this.code = code;
```

```
    }
```

```
public String getName() {  
    LOGGER.debug("Inside getName()");  
    return name;  
}
```

```
public void setName(String name) {  
    LOGGER.debug("Inside setName()");  
    this.name = name;  
}
```

@Override

```
public String toString() {  
    return "Country{" +  
        "code=" + code + "\" +  
        ", name=" + name + "\" +  
        "}";  
}  
}
```

Create a Country.xml in src/main/resources:

```
<?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="country" class="com.cognizant.springlearn.Country">  
        <property name="code" value="IN"/>  
    </bean>  
</beans>
```

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

```
</beans>
```

Change SpringLearnApplication code:

```
package com.cognizant.spring_learn;
```

```
import org.slf4j.Logger;
```

```
import org.slf4j.LoggerFactory;
```

```
import org.springframework.boot.SpringApplication;
```

```
import org.springframework.boot.autoconfigure.SpringBootApplication;
```

```
import org.springframework.context.ApplicationContext;
```

```
import org.springframework.context.annotation.ImportResource;
```

```
@SpringBootApplication
```

```
@ImportResource("classpath:country.xml") // load the XML bean into Spring Boot
context
```

```
public class SpringLearnApplication {
```

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

```
    public static void main(String[] args) {
```

```
        LOGGER.info("START");
```

```
        ApplicationContext context = SpringApplication.run(SpringLearnApplication.class,
args);
```

```
displayCountry(context);
```

```
LOGGER.info("END");
```

```
}
```

```
public static void displayCountry(ApplicationContext context) {
```

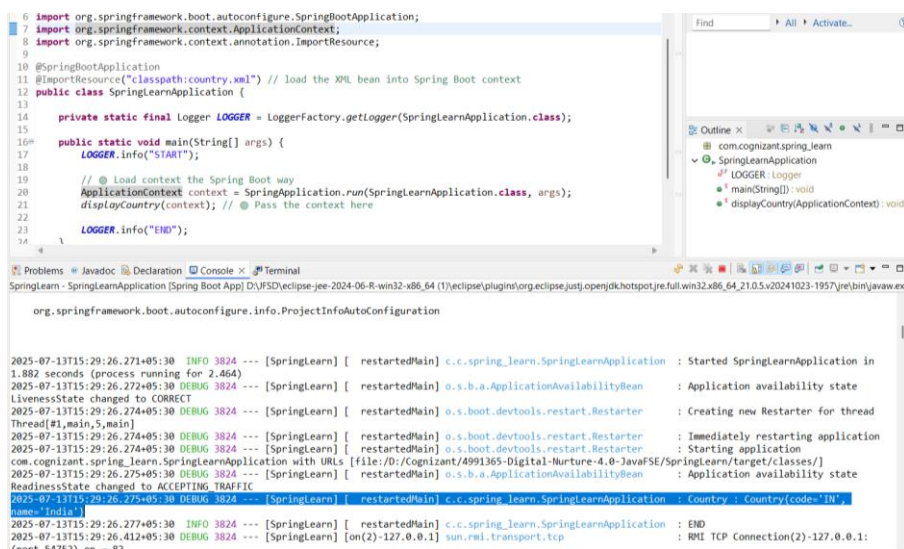
```
Country country = context.getBean("country", Country.class);
```

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

```
}
```

```
}
```

Output:



The screenshot shows an IDE with a Java file named `SpringLearnApplication.java`. The code is a Spring Boot application that loads an XML bean and displays its details. The console output shows the application starting, loading the bean, and displaying its details.

```
6 import org.springframework.boot.autoconfigure.SpringBootApplication;
7 import org.springframework.context.ApplicationContext;
8 import org.springframework.context.annotation.ImportResource;
9
10 @SpringBootApplication
11 @ImportResource("classpath:country.xml") // load the XML bean into Spring Boot context
12 public class SpringLearnApplication {
13
14     private static final Logger LOGGER = LoggerFactory.getLogger(SpringLearnApplication.class);
15
16     public static void main(String[] args) {
17         LOGGER.info("START");
18
19         // @ Load context the Spring Boot way
20         ApplicationContext context = SpringApplication.run(SpringLearnApplication.class, args);
21         displayCountry(context); // @ Pass the context here
22
23         LOGGER.info("END");
24     }
25 }
```

The console output shows the application starting, loading the bean, and displaying its details:

```
org.springframework.boot.autoconfigure.info.ProjectInfoAutoConfiguration
2025-07-13T15:29:26.271+05:30 INFO 3824 --- [SpringLearn] [ restartedMain] c.c.spring_learn.SpringLearnApplication : Started SpringLearnApplication in
1.882 seconds (process running for 2.464)
2025-07-13T15:29:26.272+05:30 DEBUG 3824 --- [SpringLearn] [ restartedMain] o.s.b.o.ApplicationAvailabilityBean : Application availability state
livenessState changed to CORRECT
2025-07-13T15:29:26.274+05:30 DEBUG 3824 --- [SpringLearn] [ restartedMain] o.s.boot.devtools.restart.Restarter : Creating new Restarter for thread
Thread[#1,main,5,main]
2025-07-13T15:29:26.274+05:30 DEBUG 3824 --- [SpringLearn] [ restartedMain] o.s.boot.devtools.restart.Restarter : Immediately restarting application
2025-07-13T15:29:26.274+05:30 DEBUG 3824 --- [SpringLearn] [ restartedMain] o.s.boot.devtools.restart.Restarter : Starting application
com.cognizant.spring_learn.SpringLearnApplication with URLs [file:/D:/Cognizant/4991365-Digital-Nurture-4.0-JavaSE/SpringLearn/target/classes/]
2025-07-13T15:29:26.275+05:30 DEBUG 3824 --- [SpringLearn] [ restartedMain] o.s.b.o.ApplicationAvailabilityBean : Application availability state
ReadinessState changed to ACCEPTING_TRAFFIC
2025-07-13T15:29:26.275+05:30 DEBUG 3824 --- [SpringLearn] [ restartedMain] c.c.spring_learn.SpringLearnApplication : Country : Country{codes="IN",
name="India"}
2025-07-13T15:29:26.277+05:30 INFO 3824 --- [SpringLearn] [ restartedMain] c.c.spring_learn.SpringLearnApplication : END
2025-07-13T15:29:26.412+05:30 DEBUG 3824 --- [SpringLearn] [ on(2)-127.0.0.1] sun.rmi.transport.tcp : RMI TCP Connection(2)-127.0.0.1:
(Conn: 547623, no. = 87)
```

3. Hello World RESTful Web Service:

Create a com.cognizant.spring_learn.controller package

Create a HelloController.java :

```
package com.cognizant.spring_learn.controller;
```

```
import org.slf4j.Logger;
```

```
import org.slf4j.LoggerFactory;
```

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

```
@RestController
```

```
public class HelloController {
```

```
    private static final Logger LOGGER =
```

```
    LoggerFactory.getLogger(HelloController.class);
```

```
    @GetMapping("/hello")
```

```
    public String sayHello() {
```

```
        LOGGER.info("START - sayHello()");
```

```
        LOGGER.info("END - sayHello()");
```

```
        return "Hello World!!";
```

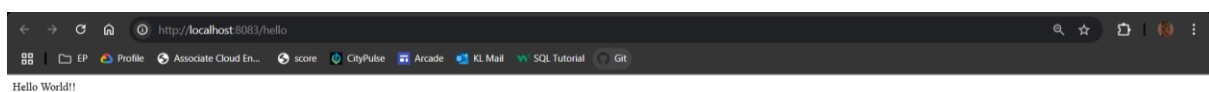
```
    }
```

```
}
```

Change port to 8083 in application.properties using :

```
server.port=8083
```

Output:



4. REST - Country Web Service:

Create CountryController.java:

```
package com.cognizant.spring_learn.controller;

import com.cognizant.spring_learn.Country;
import org.slf4j.Logger;
import org.slf4j.LoggerFactory;
import org.springframework.beans.factory.annotation.*;
import org.springframework.context.ApplicationContext;
import org.springframework.web.bind.annotation.*;

@RestController

public class CountryController {

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

    @Autowired

    private ApplicationContext context;

    @RequestMapping("/country")

    public Country getCountryIndia() {

        LOGGER.info("START - getCountryIndia()");

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

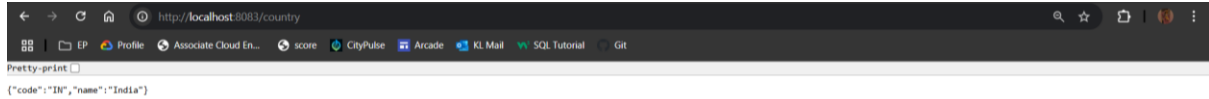
        LOGGER.info("END - getCountryIndia()");

        return country;

    }

}
```


Output:



5. REST - Get country based on country code:

Update country.xml with a list of countries:

```
<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="country" class="com.cognizant.spring_learn.Country">
    <property name="code" value="IN"/>
    <property name="name" value="India"/>
  </bean>
```

```
<bean id="countryList" class="java.util.ArrayList">
  <constructor-arg>
    <list>
      <bean class="com.cognizant.spring_learn.Country">
        <property name="code" value="IN"/>
        <property name="name" value="India"/>
      </bean>
      <bean class="com.cognizant.spring_learn.Country">
        <property name="code" value="US"/>
        <property name="name" value="United States"/>
      </bean>
      <bean class="com.cognizant.spring_learn.Country">
        <property name="code" value="DE"/>
        <property name="name" value="Germany"/>
      </bean>
      <bean class="com.cognizant.spring_learn.Country">
        <property name="code" value="JP"/>
        <property name="name" value="Japan"/>
      </bean>
    </list>
  </constructor-arg>
</bean>
```

```
</beans>
```

Create a CountryService in a service package:

```
package com.cognizant.spring_learn.service;
```

```
import com.cognizant.spring_learn.Country;
```

```
import org.slf4j.Logger;
```

```
import org.slf4j.LoggerFactory;

import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.context.ApplicationContext;
import org.springframework.stereotype.Service;
```

```
import java.util.List;
```

```
@Service
```

```
public class CountryService {
```

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

```
@Autowired
```

```
private ApplicationContext context;
```

```
public Country getCountry(String code) {
```

```
    LOGGER.info("START - getCountry()");
```

```
    List<Country> countryList = (List<Country>) context.getBean("countryList");
```

```
    // Lambda-based search (case-insensitive)
```

```
    Country match = countryList.stream()
```

```
        .filter(c -> c.getCode().equalsIgnoreCase(code))
```

```
        .findFirst()
```

```
        .orElse(null);
```

```
    LOGGER.info("END - getCountry()");
```

```
    return match;
```

```
}
```

```
}
```

Update CountryController to get Country by Country Code:

```
package com.cognizant.spring_learn.controller;

import com.cognizant.spring_learn.Country;
import com.cognizant.spring_learn.service.CountryService;
import org.slf4j.Logger;
import org.slf4j.LoggerFactory;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.web.bind.annotation.*;

@RestController

public class CountryController {

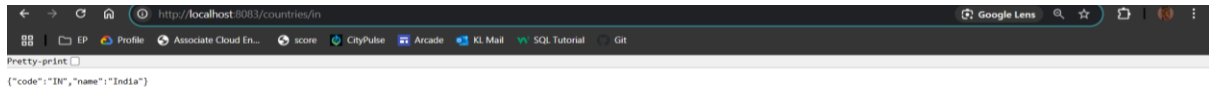
    private static final Logger LOGGER =
LoggerFactory.getLogger(CountryController.class);

    @Autowired

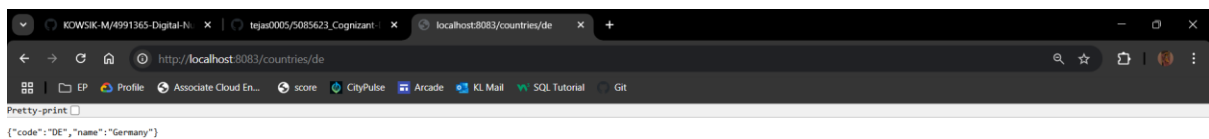
    private CountryService countryService;

    @GetMapping("/countries/{code}")
    public Country getCountry(@PathVariable String code) {
        LOGGER.info("START - getCountry()");
        Country country = countryService.getCountry(code);
        LOGGER.info("END - getCountry()");
        return country;
    }
}
```

Output:



```
http://localhost:8083/countries/in
Pretty-print
{"code":"IN","name":"India"}
```



```
http://localhost:8083/countries/de
Pretty-print
{"code":"DE","name":"Germany"}
```

JWT-handson:

6. Create authentication service that returns JWT:

Add Spring Security dependency:

<dependency>

```
        <groupId>org.springframework.boot</groupId>
        <artifactId>spring-boot-starter-security</artifactId>
    </dependency>
```

Create AuthenticationController.java:

```
package com.cognizant.spring_learn.controller;
```

```
import org.slf4j.Logger;
```

```
import org.slf4j.LoggerFactory;
```

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

```
import java.util.HashMap;
```

```
import java.util.Map;
```

```
@RestController
```

```
public class AuthenticationController {
```

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

```
    @GetMapping("/authenticate")
```

```
    public Map<String, String> authenticate(@RequestHeader("Authorization") String
    authHeader) {
```

```
        LOGGER.info("START - authenticate()");
```

```
        LOGGER.debug("Authorization Header: {}", authHeader);
```

```
        Map<String, String> map = new HashMap<>();
```

```
        map.put("token", ""); // JWT will be filled in later
```

```
        LOGGER.info("END - authenticate()");
```

```
        return map;
    }
}
```

Create a **com.cognizant.spring_learn.config** and in that **SecurityConfig.java**:

```
package com.cognizant.spring_learn.config;
```

```
import org.springframework.context.annotation.Configuration;
import org.springframework.security.config.annotation.web.builders.HttpSecurity;
import org.springframework.security.web.SecurityFilterChain;
import org.springframework.context.annotation.Bean;
```

```
@Configuration
```

```
public class SecurityConfig {
```

```
    @Bean
```

```
    public SecurityFilterChain filterChain(HttpSecurity http) throws Exception {
```

```
        http.csrf(csrf -> csrf.disable())
```

```
        _____ .authorizeHttpRequests(authz -> authz
```

```
        _____ .requestMatchers("/countries").hasRole("USER")
```

```
        _____ .requestMatchers("/authenticate").hasAnyRole("USER", "ADMIN")
```

```
        _____ .anyRequest().authenticated()
```

```
        _____ )
```

```
        _____ .httpBasic();
```

```
        return http.build();
```

```
    }
```

```
}
```

Create a **MyUserDetailsConfig**:

```
package com.cognizant.spring_learn.config;

import org.springframework.context.annotation.Bean;
import org.springframework.context.annotation.Configuration;
import org.springframework.security.core.userdetails.*;
import org.springframework.security.provisioning.InMemoryUserDetailsManager;
import org.springframework.security.crypto.bcrypt.BCryptPasswordEncoder;
import org.springframework.security.crypto.password.PasswordEncoder;

@Configuration

public class MyUserDetailsConfig {

    @Bean

    public InMemoryUserDetailsManager userDetailsService(PasswordEncoder
passwordEncoder) {

        UserDetails user = User.builder()

            .username("user")

            .password(passwordEncoder.encode("pwd"))

            .roles("USER")

            .build();

        UserDetails admin = User.builder()

            .username("admin")

            .password(passwordEncoder.encode("admin"))

            .roles("ADMIN")

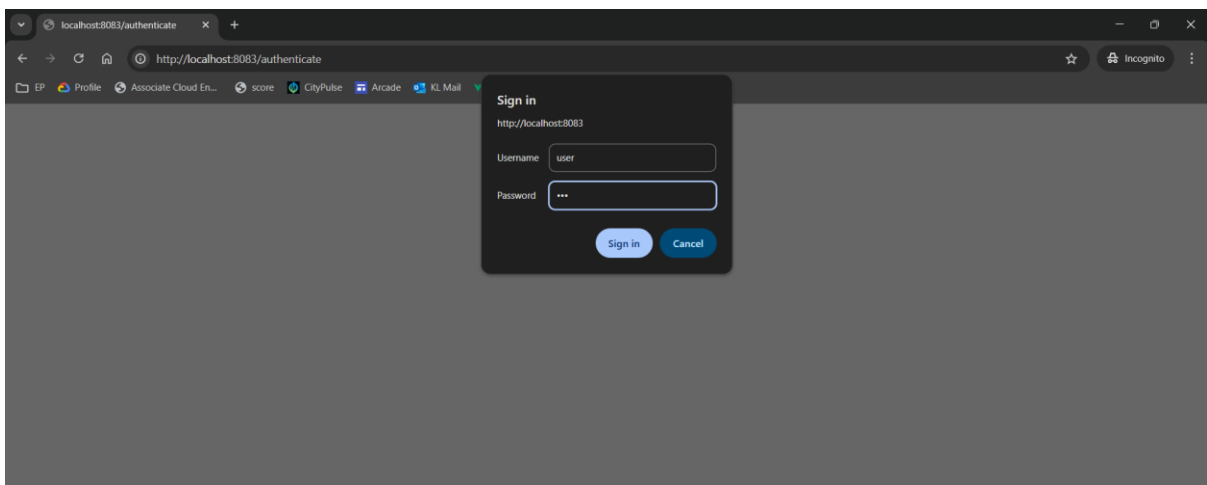
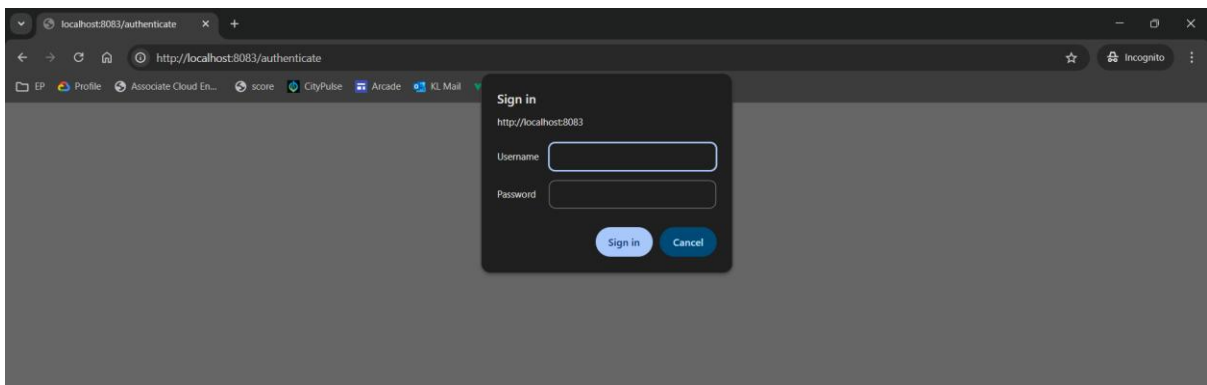
            .build();

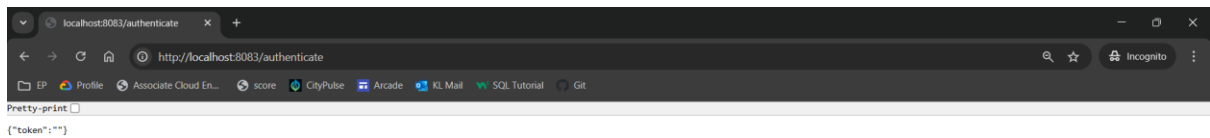
        return new InMemoryUserDetailsManager(user, admin);
    }
}
```


@Bean

```
public PasswordEncoder passwordEncoder() {  
    return new BCryptPasswordEncoder();  
}  
}
```

Output:





Pretty-print ☐

```
{"token":""}
```