Hands on 1

Create a Spring Web Project using Maven

Follow steps below to create a project:

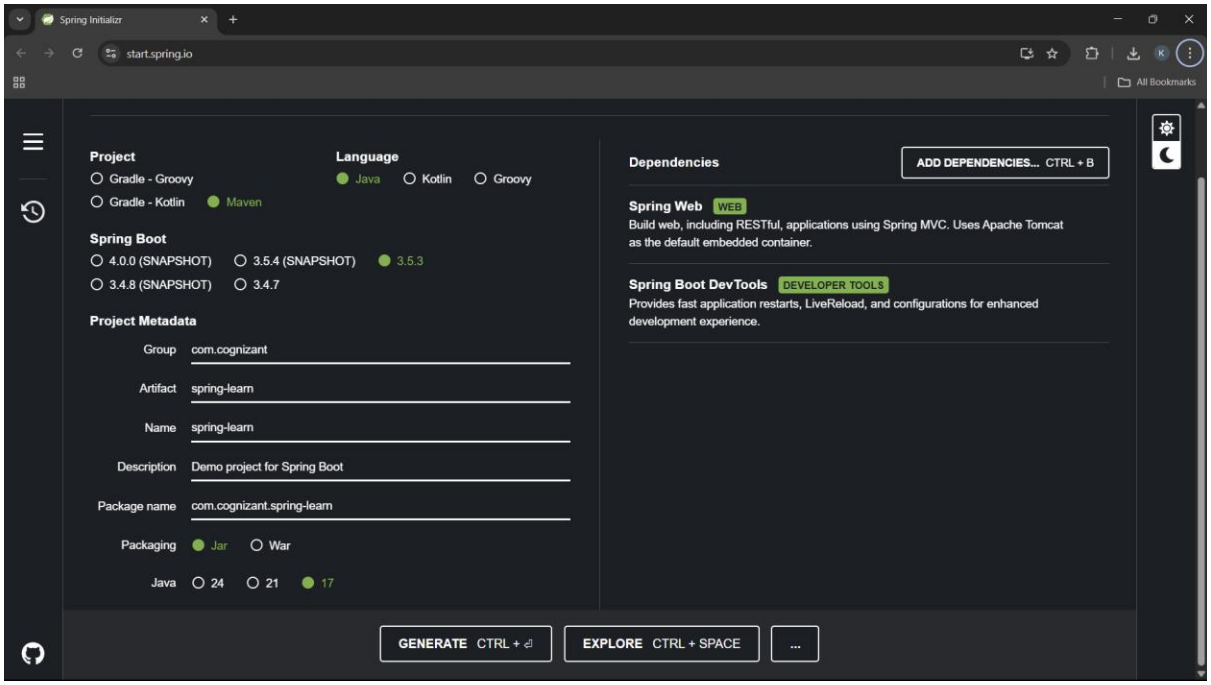
1. Go to https://start.spring.io/
2. Change Group as “com.cognizant”
3. Change Artifact Id as “spring-learn”
4. Select Spring Boot DevTools and Spring Web
5. Create and download the project as zip
6. Extract the zip in root folder to Eclipse Workspace
7. Build the project using ‘mvn clean package -Dhttp.proxyHost=proxy.cognizant.com -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.

Solution

Spring Initializer :



Project
○ Gradle - Groovy
○ Gradle - Kotlin ● Maven

Language
● Java ○ Kotlin ○ Groovy

Spring Boot
○ 4.0.0 (SNAPSHOT) ○ 3.5.4 (SNAPSHOT) ● 3.5.3
○ 3.4.8 (SNAPSHOT) ○ 3.4.7

Project Metadata

Group com.cognizant

Artifact spring-learn

Name spring-learn

Description Demo project for Spring Boot

Package name com.cognizant.spring-learn

Packaging ● Jar ○ War

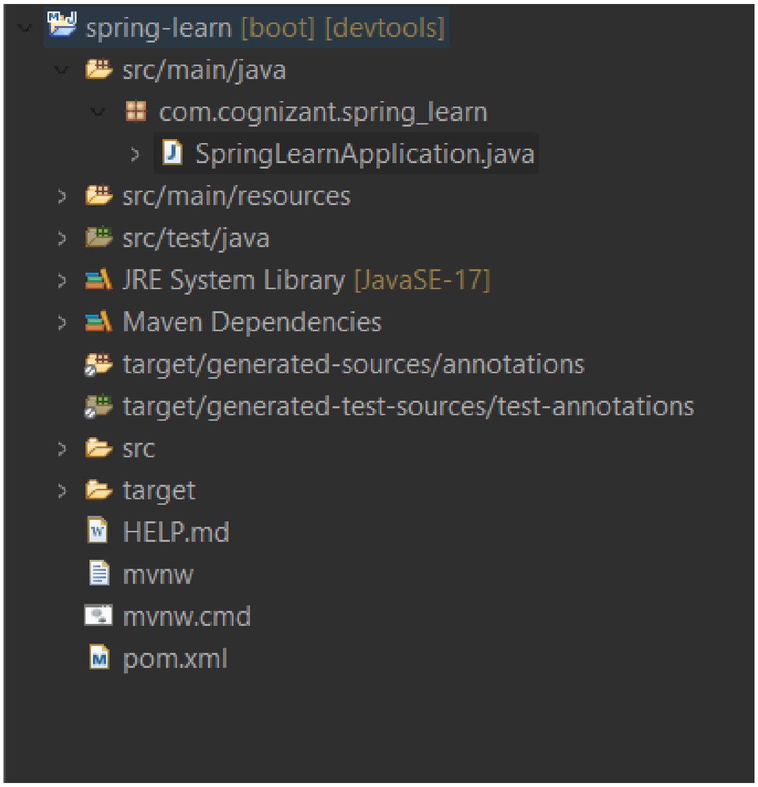
Java ○ 24 ○ 21 ● 17

Dependencies

Spring Web WEB
Build web, including RESTful, applications using Spring MVC. Uses Apache Tomcat as the default embedded container.

Spring Boot DevTools DEVELOPER TOOLS
Provides fast application restarts, LiveReload, and configurations for enhanced development experience.

Imported Project after extraction :



```
spring-learn [boot] [devtools]
  src/main/java
    com.cognizant.spring_learn
      SpringLearnApplication.java
  src/main/resources
  src/test/java
  JRE System Library [JavaSE-17]
  Maven Dependencies
  target/generated-sources/annotations
  target/generated-test-sources/test-annotations
  src
  target
  HELP.md
  mvnw
  mvnw.cmd
  pom.xml
```

Main Application :

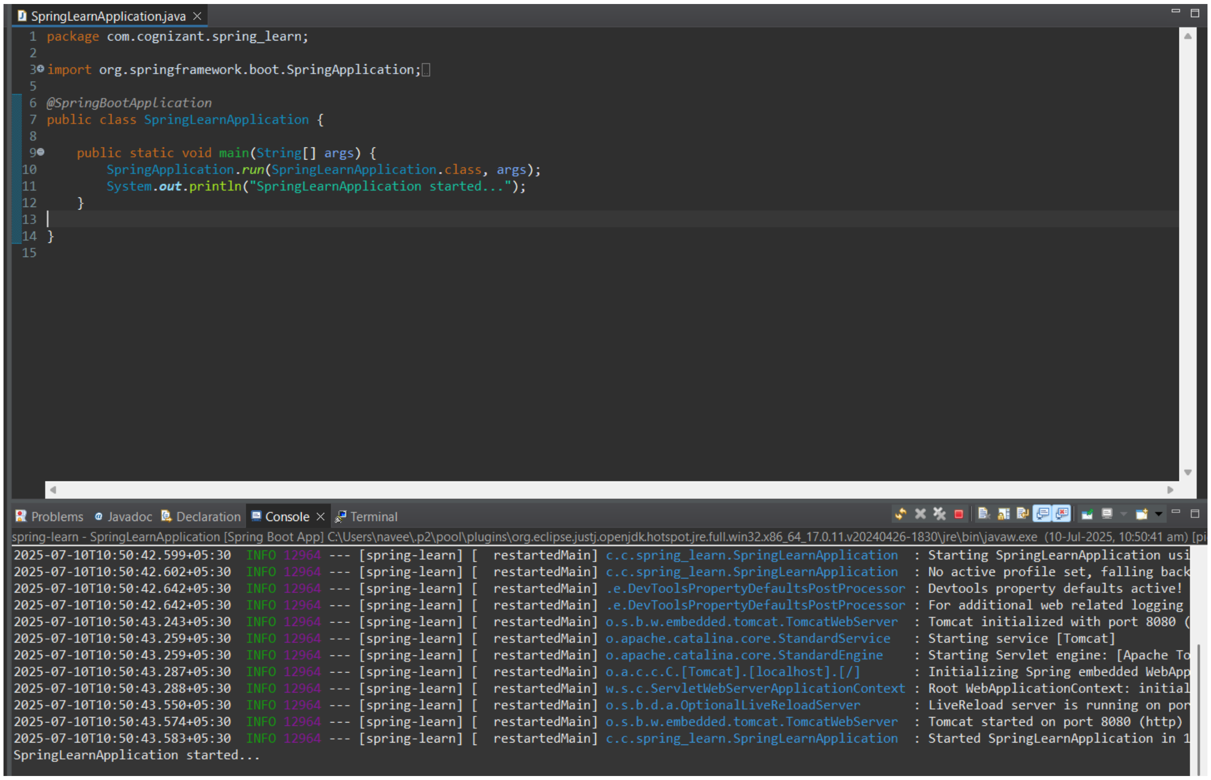
```
package com.cognizant.spring_learn;

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("SpringLearnApplication started...");
	}

}
```

Pom.xml –

```
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
	xsi:schemaLocation="http://maven.apache.org/POM/4.0.0
https://maven.apache.org/xsd/maven-4.0.0.xsd">
	<modelVersion>4.0.0</modelVersion>
	<parent>
		<groupId>org.springframework.boot</groupId>
		<artifactId>spring-boot-starter-parent</artifactId>
		<version>3.5.3</version>
		<relativePath/> <!-- lookup parent from repository -->
	</parent>
	<groupId>com.cognizant</groupId>
	<artifactId>spring-learn</artifactId>
	<version>0.0.1-SNAPSHOT</version>
	<name>spring-learn</name>
	<description>Demo project for Spring Boot</description>
	<url/>
	<licenses>
		<license/>
	</licenses>
	<developers>
		<developer/>
	</developers>
	<scm>
		<connection/>
		<developerConnection/>
		<tag/>
		<url/>
	</scm>
	<properties>
		<java.version>17</java.version>
	</properties>
```

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

        <dependency>
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-devtools</artifactId>
            <scope>runtime</scope>
            <optional>true</optional>
        </dependency>
        <dependency>
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-starter-test</artifactId>
            <scope>test</scope>
        </dependency>
    </dependencies>

    <build>
        <plugins>
            <plugin>
                <groupId>org.springframework.boot</groupId>
                <artifactId>spring-boot-maven-plugin</artifactId>
            </plugin>
        </plugins>
    </build>

</project>
```

Output :



```java
package com.cognizant.spring_learn;

import org.springframework.boot.SpringApplication;

@SpringBootApplication
public class SpringLearnApplication {

    public static void main(String[] args) {
        SpringApplication.run(SpringLearnApplication.class, args);
        System.out.println("SpringLearnApplication started...");
    }

}

```

```
spring-learn - SpringLearnApplication [Spring Boot App] C:\Users\navee\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.11.v20240426-1830\jre\bin\javaw.exe  (10-Jul-2025, 10:50:41 am) [pi
2025-07-10T10:50:42.599+05:30  INFO 12964 --- [spring-learn] [  restartedMain] c.c.spring_learn.SpringLearnApplication   : Starting SpringLearnApplication usi
2025-07-10T10:50:42.602+05:30  INFO 12964 --- [spring-learn] [  restartedMain] c.c.spring_learn.SpringLearnApplication   : No active profile set, falling back
2025-07-10T10:50:42.642+05:30  INFO 12964 --- [spring-learn] [  restartedMain] .e.DevToolsPropertyDefaultsPostProcessor : Devtools property defaults active!
2025-07-10T10:50:42.642+05:30  INFO 12964 --- [spring-learn] [  restartedMain] .e.DevToolsPropertyDefaultsPostProcessor : For additional web related logging
2025-07-10T10:50:43.243+05:30  INFO 12964 --- [spring-learn] [  restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer  : Tomcat initialized with port 8080 (
2025-07-10T10:50:43.259+05:30  INFO 12964 --- [spring-learn] [  restartedMain] o.apache.catalina.core.StandardService   : Starting service [Tomcat]
2025-07-10T10:50:43.259+05:30  INFO 12964 --- [spring-learn] [  restartedMain] o.apache.catalina.core.StandardEngine    : Starting Servlet engine: [Apache To
2025-07-10T10:50:43.287+05:30  INFO 12964 --- [spring-learn] [  restartedMain] o.a.c.c.C.[Tomcat].[localhost].[/]       : Initializing Spring embedded WebApp
2025-07-10T10:50:43.288+05:30  INFO 12964 --- [spring-learn] [  restartedMain] w.s.c.ServletWebServerApplicationContext : Root WebApplicationContext: initial
2025-07-10T10:50:43.550+05:30  INFO 12964 --- [spring-learn] [  restartedMain] o.s.b.d.a.OptionalLiveReloadServer       : LiveReload server is running on por
2025-07-10T10:50:43.574+05:30  INFO 12964 --- [spring-learn] [  restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer  : Tomcat started on port 8080 (http)
2025-07-10T10:50:43.583+05:30  INFO 12964 --- [spring-learn] [  restartedMain] c.c.spring_learn.SpringLearnApplication   : Started SpringLearnApplication in 1
SpringLearnApplication started...
```

SME :

1. src/main/java - Folder with application code

Answer - This directory contains all the **main Java source files** of the application. This is the core folder where we write the business logic, controllers, services, and other application classes.

2. src/main/resources - Folder for application configuration

Answer - This is where we keep all configuration and static resource files. These resources are automatically picked up by Spring Boot at runtime. Ex. Application.properties.

3. src/test/java - Folder with code for testing the application

Answer - Contains unit and integration test cases written using JUnit or Spring Boot Test. It mirrors the structure of src/main/java so each class can have a corresponding test class. Example: CountryTest.java would test the Country.java class.

4. SpringLearnApplication.java - Walkthrough the main() method.

Answer - This class contains the main() method which is the entry point of the application.

Code –

```
@SpringBootApplication
public class SpringlearnApplication {
    public static void main(String[] args) {
        SpringApplication.run(SpringlearnApplication.class, args);
    }
}
```

Inside main():

- SpringApplication.run(...) bootstraps the Spring Boot application.
- It automatically scans all classes in the package and subpackages to register beans and components.

5. Purpose of @SpringBootApplication annotation

Answer - This is a composite annotation that includes:

- @Configuration: Allows the class to define beans using @Bean methods.
- @EnableAutoConfiguration: Automatically configures Spring components based on dependencies on the classpath.
- @ComponentScan: Scans for components like @RestController, @Service, @Component in the current package and subpackages.

This annotation is essential to enable Spring Boot's auto-configuration and component scanning features.

6. pom.xml

1. Walkthrough all the configuration defined in XML file

Answer –

Parent Tag –

```
<parent>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-starter-parent</artifactId>
    <version>3.5.3</version>
</parent>
```

- Inherits Spring Boot's default dependency versions, plugin configuration, and dependency management.
- Ensures compatibility with Spring Boot 3.5.3 and simplifies version control for dependencies.

Project Coordinates –

```
<groupId>com.cognizant</groupId>
<artifactId>spring-learn</artifactId>
```

```
    <version>0.0.1-SNAPSHOT</version>
```

These values uniquely identify your project in a Maven repository.

- groupId: Organization or company name
- artifactId: Project or module name
- version: Current version of the project (SNAPSHOT indicates development version)

Java Version –

```
<properties>
    <java.version>17</java.version>
</properties>
```

- Specifies that the project should be compiled with **Java 17**.
- Used by Spring Boot to generate correct bytecode and avoid compatibility issues.

Dependencies Section –

This section tells Maven what libraries your project depends on.

a) Spring Boot Web Starter

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

Brings in everything required for building a RESTful web application:

- Spring MVC, Tomcat (embedded), Jackson (for JSON), logging, etc.

b) Spring Boot DevTools

```
<dependency>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-devtools</artifactId>
    <scope>runtime</scope>
    <optional>true</optional>
</dependency>
```

- Adds auto-restart and hot-reloading support.
- Makes development faster by automatically restarting the app when files are changed.

c) Spring Boot Starter Test

```
<dependency>
```

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

Provides libraries like:

- **JUnit 5** for writing unit tests
- **Mockito** for mocking
- **Spring Test** for integration testing

Build Section – Plugin –

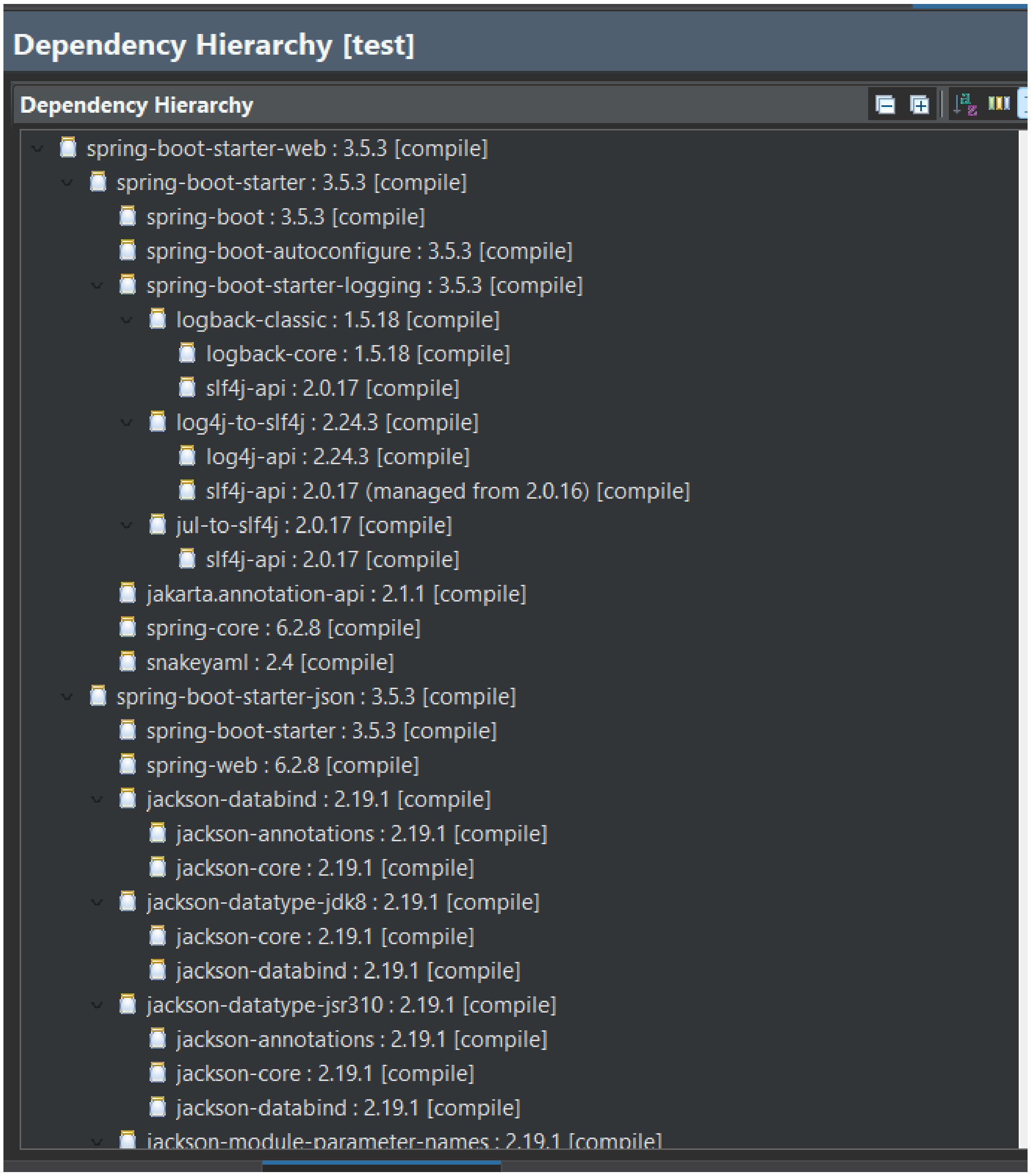
```
<build>
    <plugins>
        <plugin>
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-maven-plugin</artifactId>
        </plugin>
    </plugins>
</build>
```

Allows you to **build and run** the application using:

- mvn spring-boot:run
- mvn package (generates an executable .jar)

Embeds the application server (Tomcat) into the JAR, so no external server is needed.

Open 'Dependency Hierarchy' and show the dependency tree.



```
spring-boot-starter-web : 3.5.3 [compile]
  spring-boot-starter : 3.5.3 [compile]
    spring-boot : 3.5.3 [compile]
    spring-boot-autoconfigure : 3.5.3 [compile]
    spring-boot-starter-logging : 3.5.3 [compile]
      logback-classic : 1.5.18 [compile]
        logback-core : 1.5.18 [compile]
        slf4j-api : 2.0.17 [compile]
      log4j-to-slf4j : 2.24.3 [compile]
        log4j-api : 2.24.3 [compile]
        slf4j-api : 2.0.17 (managed from 2.0.16) [compile]
      jul-to-slf4j : 2.0.17 [compile]
        slf4j-api : 2.0.17 [compile]
    jakarta.annotation-api : 2.1.1 [compile]
    spring-core : 6.2.8 [compile]
    snakeyaml : 2.4 [compile]
  spring-boot-starter-json : 3.5.3 [compile]
    spring-boot-starter : 3.5.3 [compile]
    spring-web : 6.2.8 [compile]
    jackson-databind : 2.19.1 [compile]
      jackson-annotations : 2.19.1 [compile]
      jackson-core : 2.19.1 [compile]
    jackson-datatype-jdk8 : 2.19.1 [compile]
      jackson-core : 2.19.1 [compile]
      jackson-databind : 2.19.1 [compile]
    jackson-datatype-jsr310 : 2.19.1 [compile]
      jackson-annotations : 2.19.1 [compile]
      jackson-core : 2.19.1 [compile]
      jackson-databind : 2.19.1 [compile]
    jackson-module-parameter-names : 2.19.1 [compile]
```

Hands on 2

Spring Core – Load SimpleDateFormat from Spring Configuration XML

SimpleDateFormat with the pattern ‘dd/MM/yyyy’ is created in multiple places of an application. To avoid creation of SimpleDateFormat in multiple places, define a bean in Spring XML Configuration file and retrieve the date.

Follow steps below to implement:

- Create spring configuration file date-format.xml in src/main/resources folder of 'spring-learn' project
- Open https://docs.spring.io/spring-framework/docs/current/spring-framework-reference/core.html#beans-factory-metadata
- Copy the XML defined in the section of previous step URL and paste it into date-format.xml
- Define bean tag in the XML with for date format. Refer code below.

```
<?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
        https://www.springframework.org/schema/beans/spring-beans.xsd">

    <bean id="dateFormat" class="java.text.SimpleDateFormat">
        <constructor-arg value="dd/MM/yyyy" />
    </bean>

</beans>
```

- Create new method displayDate() in SpringLearnApplication.java
- In displayDate() method create the ApplicationContext. Refer code below:

```
ApplicationContext context = new ClassPathXmlApplicationContext("date-format.xml");
```

- Get the dateFormat using getBean() method. Refer code below.

```
SimpleDateFormat format = context.getBean("dateFormat", SimpleDateFormat.class);
```

- Using the format variable try to parse string '31/12/2018' to Date class and display the result using System.out.println.
- Run the application as 'Java Application' and check the result in console log output.

Troubleshooting Tips

If the tomcat port has a conflict and the server is not starting include the below property in application.properties file in src/main/resources folder.

Solution:

Code :

Country.java :

```
package com.cognizant.springlearn;

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 + "]";
    }
}
```

Country.xml :

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

</beans>
```

Logback.xml :

```
<configuration>
    <appender name="STDOUT" class="ch.qos.logback.core.ConsoleAppender">
        <encoder>
            <pattern>%d{HH:mm:ss.SSS} [%thread] %-5level %logger{36} -
%msg%n</pattern>
        </encoder>
    </appender>

    <root level="debug">
        <appender-ref ref="STDOUT"/>
    </root>
</configuration>
```

SpringlearnApplication.java :

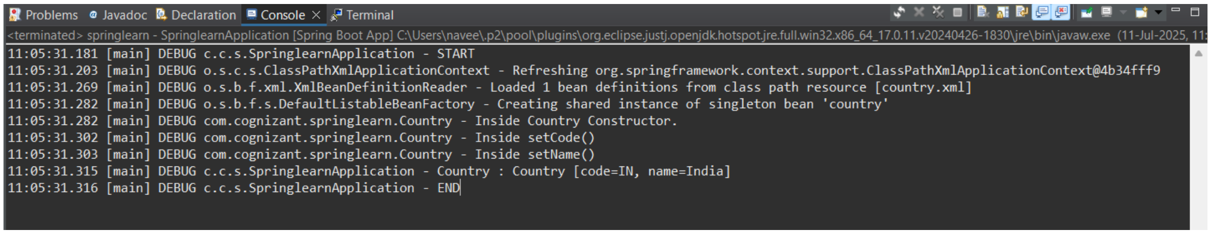
```
package com.cognizant.springlearn;

import org.slf4j.Logger;
import org.slf4j.LoggerFactory;
import org.springframework.context.ApplicationContext;
import org.springframework.context.support.ClassPathXmlApplicationContext;

public class SpringlearnApplication {
    private static final Logger LOGGER = 
LoggerFactory.getLogger(SpringlearnApplication.class);

    public static void main(String[] args) {
        LOGGER.debug("START");
        displayCountry();
        LOGGER.debug("END");
    }

    public static void displayCountry() {
        ApplicationContext context = new 
ClassPathXmlApplicationContext("country.xml");
        Country country = (Country) context.getBean("country", Country.class);
        LOGGER.debug("Country : {}", country.toString());
    }
}
```

Pom.xml :

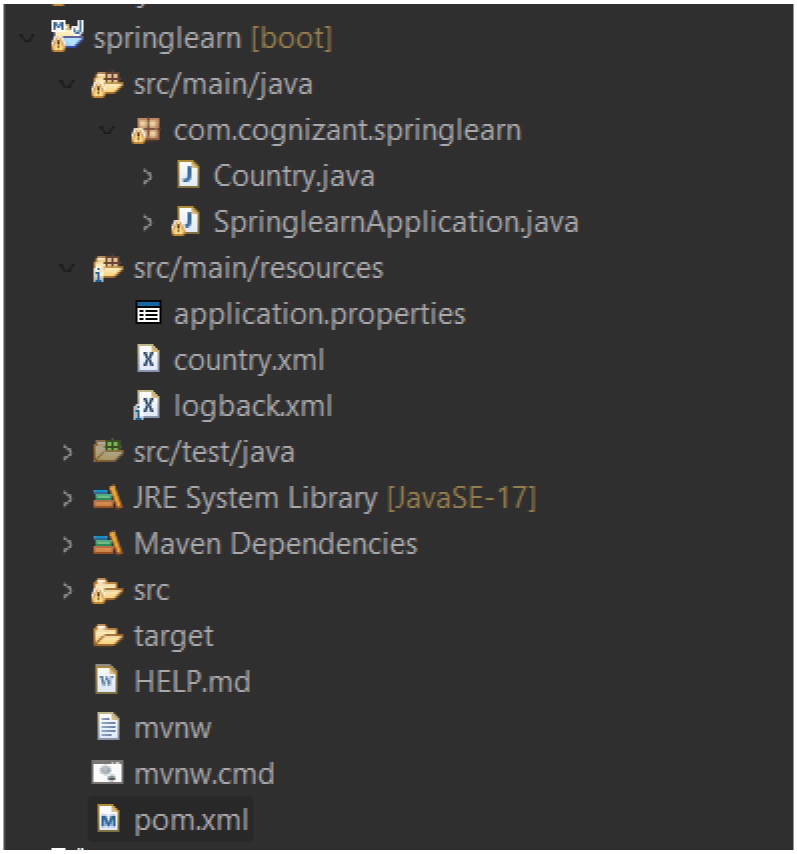
```
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0" 
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
	xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 
https://maven.apache.org/xsd/maven-4.0.0.xsd">
	<modelVersion>4.0.0</modelVersion>
	<parent>
		<groupId>org.springframework.boot</groupId>
		<artifactId>spring-boot-starter-parent</artifactId>
		<version>3.5.3</version>
		<relativePath/> <!-- lookup parent from repository -->
	</parent>
	<groupId>com.cognizant</groupId>
	<artifactId>springlearn</artifactId>
	<version>0.0.1-SNAPSHOT</version>
	<name>springlearn</name>
	<description>Demo project for Spring Boot</description>
	<url/>
	<licenses>
		<license/>
	</licenses>
	<developers>
		<developer/>
	</developers>
	<scm>
		<connection/>
		<developerConnection/>
		<tag/>
		<url/>
	</scm>
	<properties>
		<java.version>17</java.version>
	</properties>
	<dependencies>
		    <!-- Spring Core -->
```

```
    <dependency>
        <groupId>org.springframework</groupId>
        <artifactId>spring-context</artifactId>
    </dependency>

    <!-- SLF4J + Logback for logging -->
    <dependency>
        <groupId>ch.qos.logback</groupId>
        <artifactId>logback-classic</artifactId>
    </dependency>
             <dependency>
                   <groupId>org.springframework.boot</groupId>
                   <artifactId>spring-boot-starter</artifactId>
             </dependency>

             <dependency>
                   <groupId>org.springframework.boot</groupId>
                   <artifactId>spring-boot-starter-test</artifactId>
                   <scope>test</scope>
             </dependency>
      </dependencies>

      <build>
             <plugins>
                   <plugin>
                          <groupId>org.springframework.boot</groupId>
                          <artifactId>spring-boot-maven-plugin</artifactId>
                   </plugin>
             </plugins>
      </build>

</project>
```

Output : (Screenshots)



```
<terminated> springlearn - SpringlearnApplication [Spring Boot App] C:\Users\navee\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.11.v20240426-1830\jre\bin\javaw.exe  (11-Jul-2025, 11:
11:05:31.181 [main] DEBUG c.c.s.SpringlearnApplication - START
11:05:31.203 [main] DEBUG o.s.c.s.ClassPathXmlApplicationContext - Refreshing org.springframework.context.support.ClassPathXmlApplicationContext@4b34fff9
11:05:31.269 [main] DEBUG o.s.b.f.xml.XmlBeanDefinitionReader - Loaded 1 bean definitions from class path resource [country.xml]
11:05:31.282 [main] DEBUG o.s.b.f.s.DefaultListableBeanFactory - Creating shared instance of singleton bean 'country'
11:05:31.282 [main] DEBUG com.cognizant.springlearn.Country - Inside Country Constructor.
11:05:31.302 [main] DEBUG com.cognizant.springlearn.Country - Inside setCode()
11:05:31.303 [main] DEBUG com.cognizant.springlearn.Country - Inside setName()
11:05:31.315 [main] DEBUG c.c.s.SpringlearnApplication - Country : Country [code=IN, name=India]
11:05:31.316 [main] DEBUG c.c.s.SpringlearnApplication - END
```



```
springlearn [boot]
  src/main/java
    com.cognizant.springlearn
      Country.java
      SpringlearnApplication.java
  src/main/resources
    application.properties
    country.xml
    logback.xml
  src/test/java
  JRE System Library [JavaSE-17]
  Maven Dependencies
  src
  target
  HELP.md
  mvnw
  mvnw.cmd
  pom.xml
```

SME :

- **bean tag, id attribute, class attribute, property tag, name attribute, value attribute**

Answer - The <bean> tag is used in Spring XML configuration to define a bean (an object) that will be managed by the Spring IoC (Inversion of Control) container.

Attributes:

- **id:** A unique identifier for the bean. You use this ID to retrieve the bean from the Spring container.
- **class:** Fully qualified name of the class that the Spring container will instantiate.

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

This tells Spring to create an object of Country class and name it as "country" within the container.

The <property> tag is used to inject values into the bean's fields (using setter injection).

Attributes:

- **name**: Name of the Java property (must match the setter method in the class).

- **value**: Literal value to be set for that property.

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

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

This will invoke the setCode("IN") and setName("India") methods of the Country class when the bean is initialized.

- **ApplicationContext, ClassPathXmlApplicationContext**

Answer –

- ApplicationContext is the central interface for accessing Spring’s IoC container.
- ClassPathXmlApplicationContext is a concrete implementation that loads the Spring configuration from an XML file in the classpath**.**

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

This line creates and initializes the Spring container by reading the country.xml file.

- **What exactly happens when context.getBean() is invoked**

Answer –

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

Here’s what happens:

1. Spring looks up the bean with ID "country" in the XML config.
2. It finds the class name com.cognizant.springlearn.Country.
3. It creates an instance of that class (using the default constructor).
4. It injects the properties using the setters (setCode(), setName()).
5. The fully initialized bean is returned.

This is the essence of Dependency Injection in Spring.

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

Solution:

Code –

HelloController.java :

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

import org.slf4j.Logger;
import org.slf4j.LoggerFactory;
import org.springframework.web.bind.annotation.GetMapping;
import org.springframework.web.bind.annotation.RestController;

@RestController
public class HelloController {
	private static final Logger LOGGER = 
LoggerFactory.getLogger(HelloController.class);

	@GetMapping("/hello")
```

```
    public String sayHello() {
        LOGGER.debug("START");
        String msg = "Hello World!";
        LOGGER.debug("END");
        return msg;
    }

}
```

```
SpringlearnApplication.java \u2013
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("SpringLearnApplication started...");
    }

}
```

Application.properties :

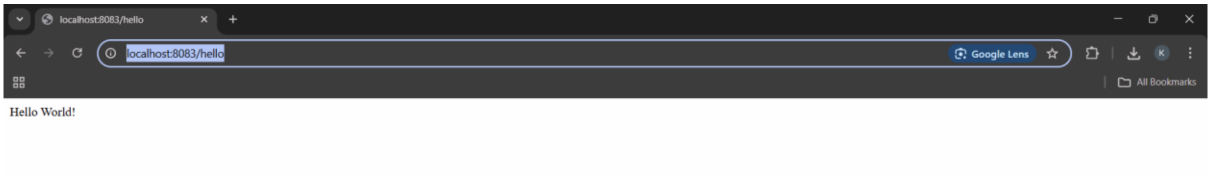
spring.application.name=spring-learn

server.port=8083

pom.xml :

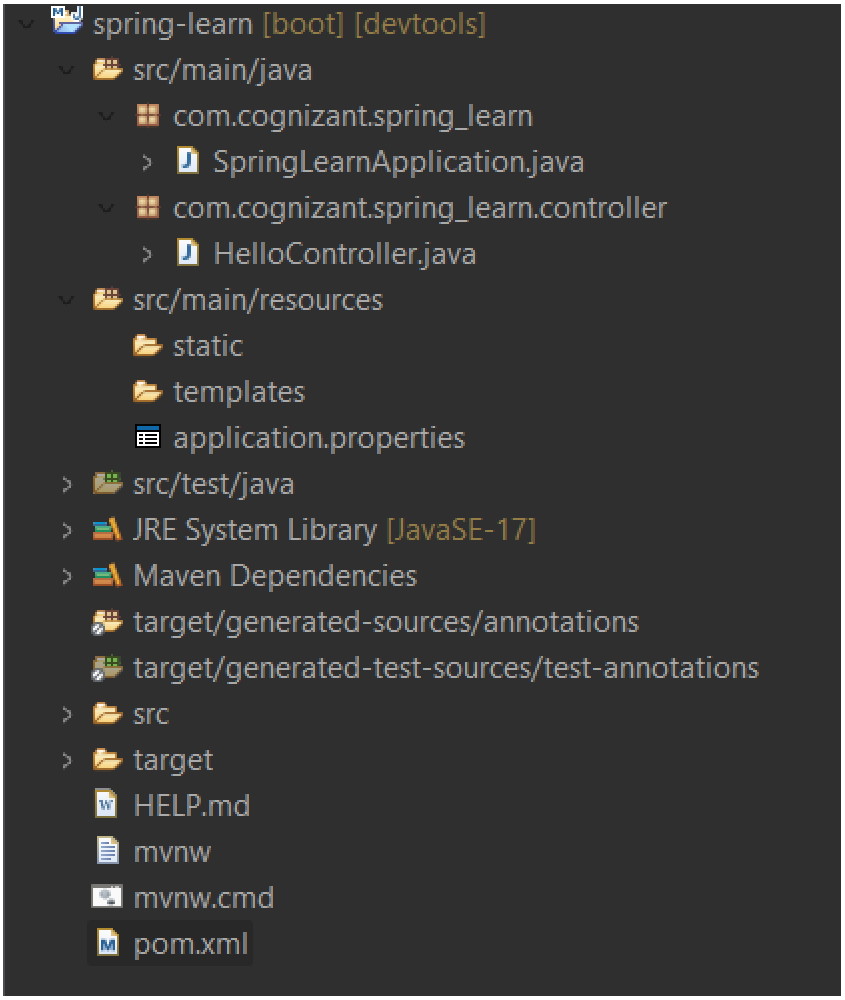
```
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://maven.apache.org/POM/4.0.0
https://maven.apache.org/xsd/maven-4.0.0.xsd">
    <modelVersion>4.0.0</modelVersion>
    <parent>
        <groupId>org.springframework.boot</groupId>
        <artifactId>spring-boot-starter-parent</artifactId>
        <version>3.5.3</version>
        <relativePath/> <!-- lookup parent from repository -->
    </parent>
    <groupId>com.cognizant</groupId>
    <artifactId>spring-learn</artifactId>
    <version>0.0.1-SNAPSHOT</version>
    <name>spring-learn</name>
    <description>Demo project for Spring Boot</description>
    <url/>
    <licenses>
        <license/>
    </licenses>
    <developers>
        <developer/>
    </developers>
    <scm>
        <connection/>
        <developerConnection/>
        <tag/>
        <url/>
    </scm>
    <properties>
        <java.version>17</java.version>
    </properties>
    <dependencies>
        <dependency>
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-starter-web</artifactId>
        </dependency>

        <dependency>
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-devtools</artifactId>
            <scope>runtime</scope>
            <optional>true</optional>
        </dependency>
        <dependency>
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-starter-test</artifactId>
            <scope>test</scope>
        </dependency>
    </dependencies>

    <build>
        <plugins>
            <plugin>
                <groupId>org.springframework.boot</groupId>
                <artifactId>spring-boot-maven-plugin</artifactId>
            </plugin>
        </plugins>
    </build>

</project>
```

Output – (Screenshots)



localhost:8083/hello

Hello World!



```
spring-learn [boot] [devtools]
  src/main/java
    com.cognizant.spring_learn
      SpringLearnApplication.java
    com.cognizant.spring_learn.controller
      HelloController.java
  src/main/resources
    static
    templates
    application.properties
  src/test/java
  JRE System Library [JavaSE-17]
  Maven Dependencies
  target/generated-sources/annotations
  target/generated-test-sources/test-annotations
  src
  target
  HELP.md
  mvnw
  mvnw.cmd
  pom.xml
```

SME :

In network tab of developer tools show the HTTP header details received

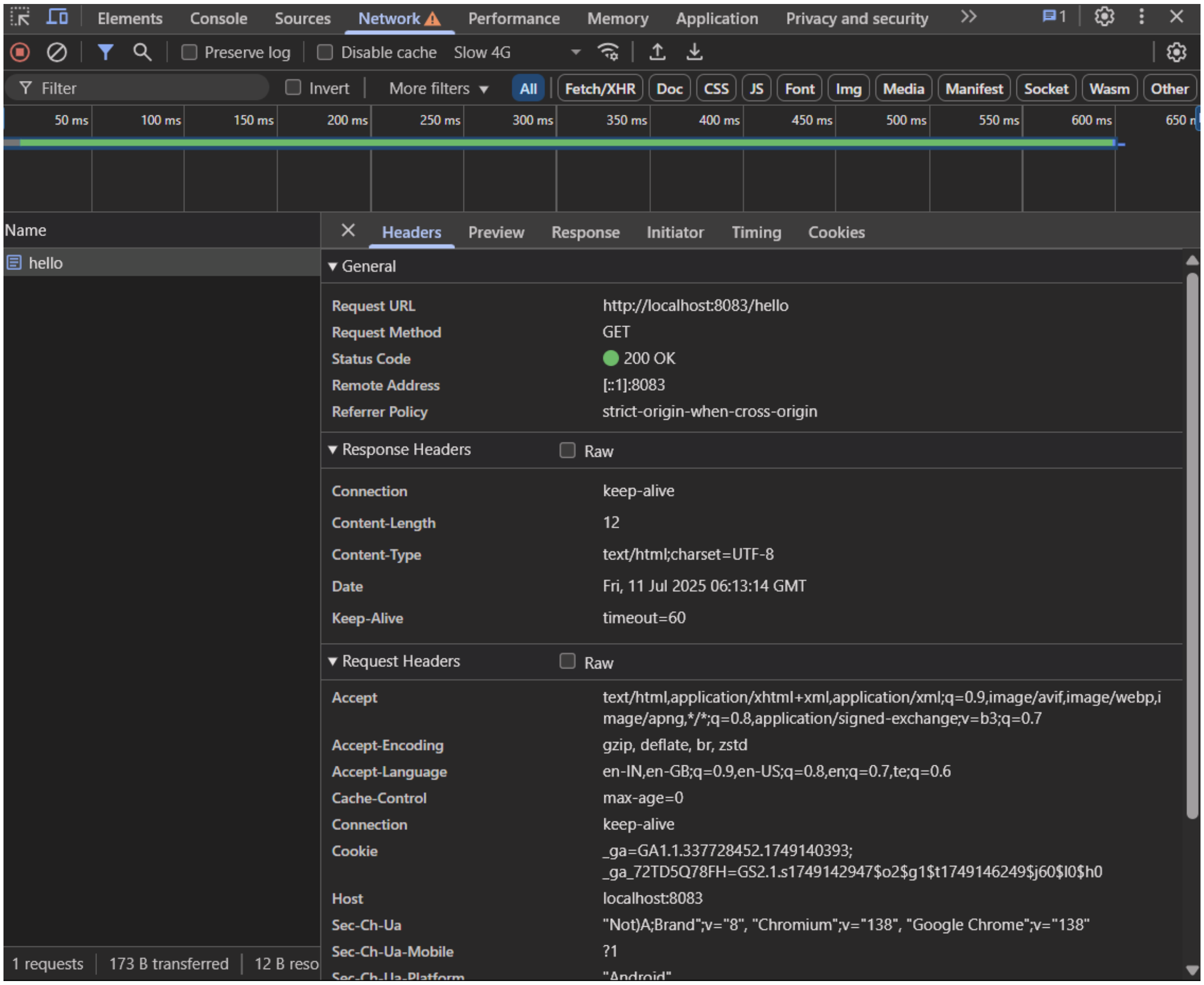
When you open http://localhost:8083/hello in Chrome:

1. Open **Dev Tools** → Go to the **Network** tab
2. Refresh the page (F5) → Click on the /hello request

Headers You'll See (under "Response Headers" and "General"):

HTTP headers give **metadata** about the request and response:

- They tell clients **how to interpret** the response
- Help with **debugging, caching, and security**
- Provide insights on server behavior and content type



▼ General

Request URL	http://localhost:8083/hello
Request Method	GET
Status Code	● 200 OK
Remote Address	[::1]:8083
Referrer Policy	strict-origin-when-cross-origin

▼ Response Headers □ Raw

Connection	keep-alive
Content-Length	12
Content-Type	text/html;charset=UTF-8
Date	Fri, 11 Jul 2025 06:13:14 GMT
Keep-Alive	timeout=60

▼ Request Headers □ Raw

Accept	text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,image/apng,*/*;q=0.8,application/signed-exchange;v=b3;q=0.7
Accept-Encoding	gzip, deflate, br, zstd
Accept-Language	en-IN,en-GB;q=0.9,en-US;q=0.8,en;q=0.7,te;q=0.6
Cache-Control	max-age=0
Connection	keep-alive

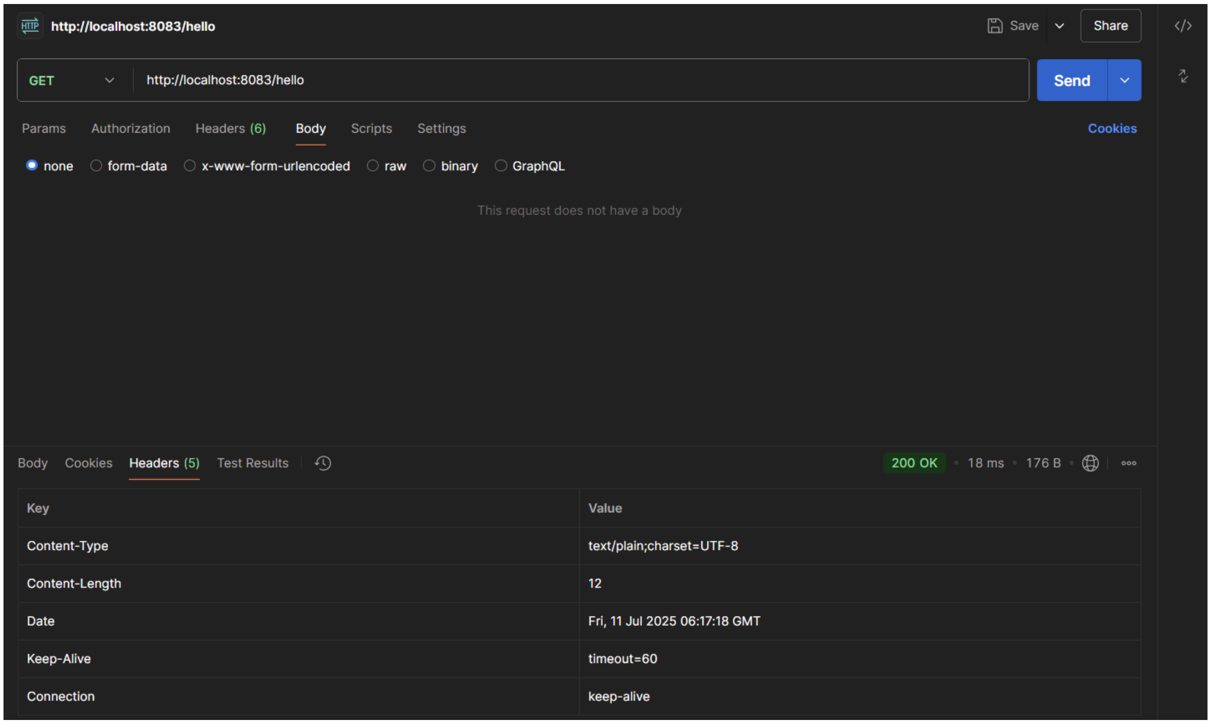
Cookie	_ga=GA1.1.337728452.1749140393;
	_ga_72TD5Q78FH=GS2.1.s1749142947$o2$g1$t1749146249$j60$l0$h0

Host	localhost:8083
Sec-Ch-Ua	"Not)A;Brand";v="8", "Chromium";v="138", "Google Chrome";v="138"
Sec-Ch-Ua-Mobile	?1
Sec-Ch-Ua-Platform	"Android"

In postman click on "Headers" tab to view the HTTP header details received

When you send a GET request to http://localhost:8083/hello in **Postman**:

1. Click **"Send"**
2. Go to the **"Headers" tab** under the response section



GET http://localhost:8083/hello

Body: ● none ○ form-data ○ x-www-form-urlencoded ○ raw ○ binary ○ GraphQL

This request does not have a body

200 OK • 18 ms • 176 B

Key	Value
Content-Type	text/plain;charset=UTF-8
Content-Length	12
Date	Fri, 11 Jul 2025 06:17:18 GMT
Keep-Alive	timeout=60
Connection	keep-alive

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

Solution :

Code –

CountryController.java :

```
package com.cognizant.springlearn.controller;

import org.slf4j.Logger;
import org.slf4j.LoggerFactory;
import org.springframework.context.ApplicationContext;
import org.springframework.context.support.ClassPathXmlApplicationContext;
import org.springframework.web.bind.annotation.RequestMapping;
import org.springframework.web.bind.annotation.RequestMethod;
import org.springframework.web.bind.annotation.RestController;
import com.cognizant.springlearn.Country;

@RestController
public class CountryController {

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

    @RequestMapping(value = "/country", method = RequestMethod.GET)
    public Country getCountryIndia() {
        LOGGER.debug("Start - getCountryIndia()");
        ApplicationContext context = new
ClassPathXmlApplicationContext("country.xml");
        Country country = context.getBean("country", Country.class);
        LOGGER.debug("Country: {}", country);
        return country;
    }
}
```

SpringlearnApplication.java :

```
package com.cognizant.springlearn;

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);
    }
}
```

Country.java :

```
package com.cognizant.springlearn;

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 + "]";
    }
}
```

Country.xml :

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

</beans>
```

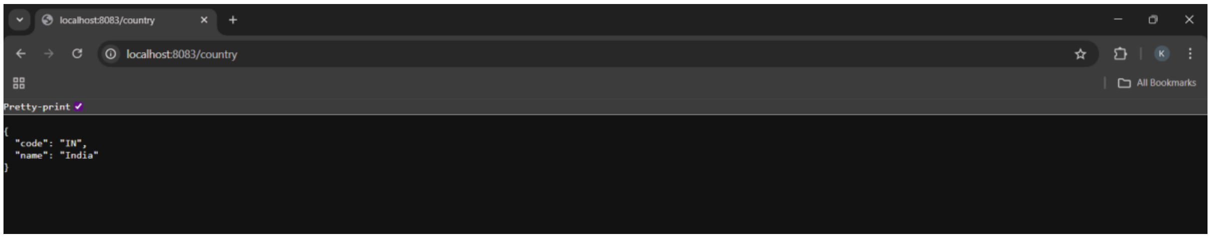
Logback.xml :

```
<configuration>
    <appender name="STDOUT" class="ch.qos.logback.core.ConsoleAppender">
        <encoder>
            <pattern>%d{HH:mm:ss.SSS} [%thread] %-5level %logger{36} - %msg%n</pattern>
        </encoder>
    </appender>

    <root level="debug">
        <appender-ref ref="STDOUT"/>
    </root>
</configuration>
```

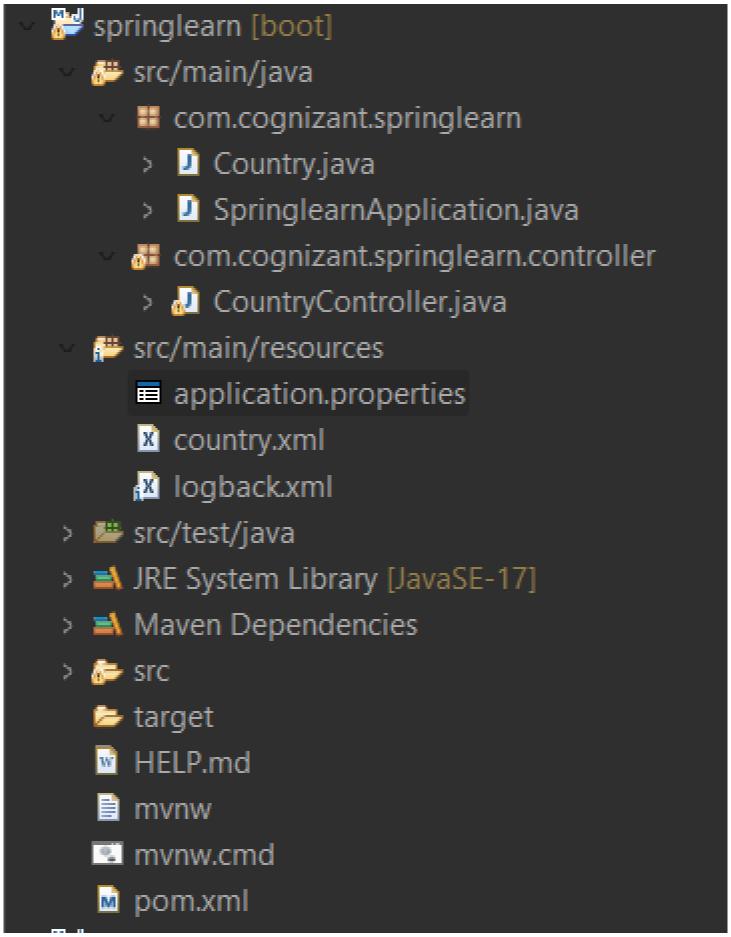
Application.properties :

```
spring.application.name=springlearn
server.port=8083
```

Output – (Screenshots)



```
{
  "code": "IN",
  "name": "India"
}
```



```
springlearn [boot]
  src/main/java
    com.cognizant.springlearn
      Country.java
      SpringlearnApplication.java
    com.cognizant.springlearn.controller
      CountryController.java
  src/main/resources
    application.properties
    country.xml
    logback.xml
  src/test/java
  JRE System Library [JavaSE-17]
  Maven Dependencies
  src
  target
  HELP.md
  mvnw
  mvnw.cmd
  pom.xml
```

SME :

- **What happens in the controller method?**

Answer - When the user hits the URL http://localhost:8083/country, the following happens:

Lifecycle:

1. Spring Boot handles the incoming HTTP GET request to /country.
2. It matches the request to this controller method:

   ```
   @RequestMapping(value = "/country", method = RequestMethod.GET)

   public Country getCountryIndia() { ... }
   ```

3. The Country bean (either autowired or loaded from XML) is returned from the method.
4. Spring uses **HttpMessageConverter** (Jackson by default) to convert the Country object into **JSON**.
5. The JSON is sent back in the **HTTP Response Body**.

- **How the bean is converted into JSON reponse?**

Answer - Spring Boot uses Jackson (a JSON library) which is included automatically via:

```
<dependency>

  <groupId>org.springframework.boot</groupId>

  <artifactId>spring-boot-starter-web</artifactId>

</dependency>
```

Behind the scenes:

- @RestController tells Spring to skip view rendering and instead return **data** (usually as JSON).
- Jackson looks at your Country class (using getters) and serializes it into JSON.
- For example: Country country = new Country("IN", "India");

  is converted to:

  ```
  {

   "code": "IN",

   "name": "India"

  }
  ```

  This happens automatically because of **Spring's HttpMessageConverter chain**.

- **In network tab of developer tools show the HTTP header details received**

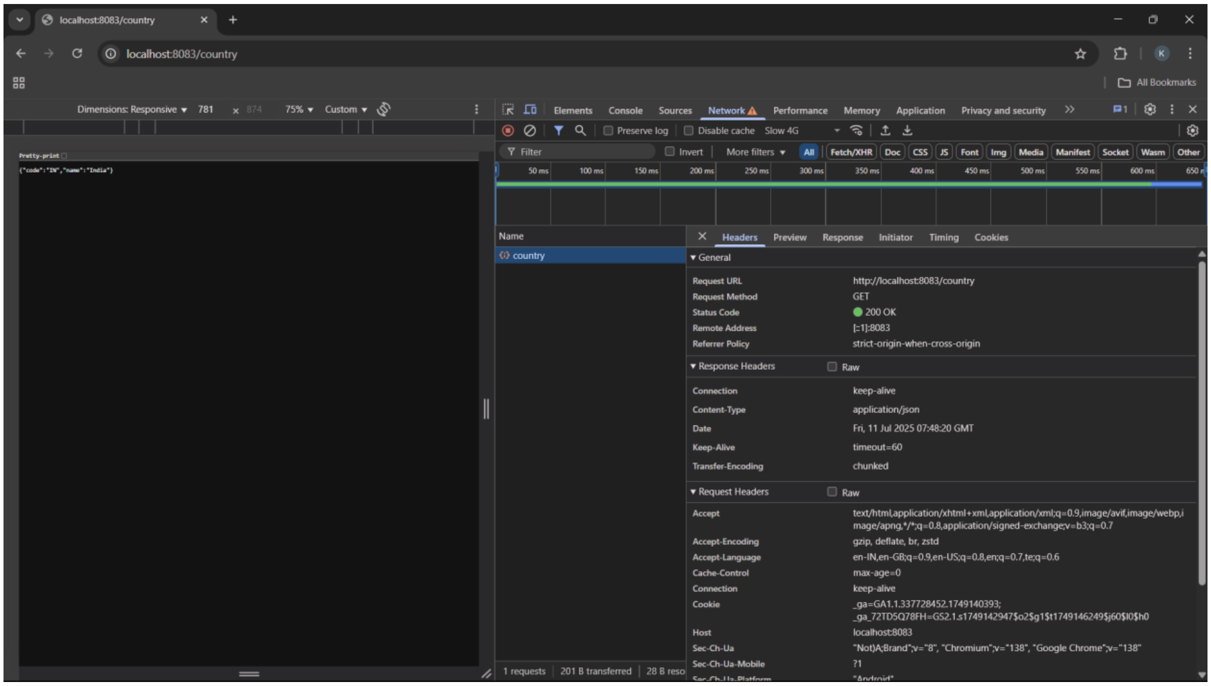
Answer - You can inspect the response headers using:

Steps (in Chrome):

1. Right-click > Inspect → Open Developer Tools.
2. Go to the Network tab.
3. Hit your endpoint in browser: http://localhost:8083/country
4. Click on the network request (usually labeled country).
5. View the Headers tab:
   - Request Headers: Info sent from browser (like User-Agent, Accept).
   - Response Headers: Info sent from your Spring Boot app, such as:

     Content-Type: application/json

     Content-Length: 34



Pretty-print □

```
{"code":"IN","name":"India"}
```

```
▾ General
Request URL          http://localhost:8083/country
Request Method       GET
Status Code          ● 200 OK
Remote Address       [::1]:8083
Referrer Policy      strict-origin-when-cross-origin
▾ Response Headers   □ Raw
Connection           keep-alive
Content-Type         application/json
Date                 Fri, 11 Jul 2025 07:48:20 GMT
Keep-Alive           timeout=60
Transfer-Encoding    chunked
▾ Request Headers    □ Raw
Accept               text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,i
                     mage/apng,*/*;q=0.8,application/signed-exchange;v=b3;q=0.7
Accept-Encoding      gzip, deflate, br, zstd
Accept-Language      en-IN,en-GB;q=0.9,en-US;q=0.8,en;q=0.7,te;q=0.6
Cache-Control        max-age=0
Connection           keep-alive
Cookie               _ga=GA1.1.337728452.1749140393;
                     _ga_72TD5Q78FH=GS2.1.s1749142947$o2$g1$t1749146249$j60$l0$h0
Host                 localhost:8083
Sec-Ch-Ua            "Not)A;Brand";v="8", "Chromium";v="138", "Google Chrome";v="138"
Sec-Ch-Ua-Mobile     ?1
Sec-Ch-Ua-Platform   "Android"
```

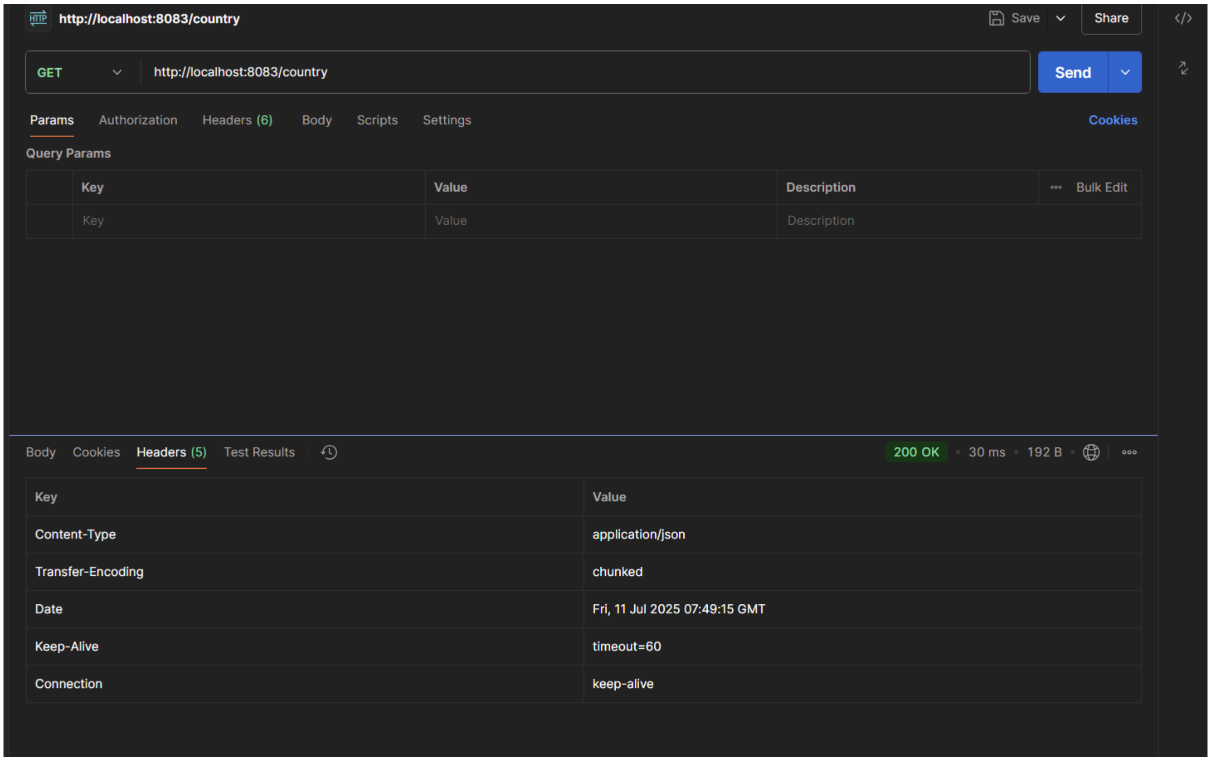
- **In postman click on "Headers" tab to view the HTTP header details received**

Answer –

Steps:

1. Open Postman.
2. Send a GET request to: http://localhost:8083/country
3. Go to the Headers tab (right next to "Body" and "Cookies").
4. You'll see:
   - Content-Type: application/json (returned from Spring)
   - Content-Length
   - Date
   - Server: Apache Tomcat

These headers confirm that the response is valid JSON, sent over HTTP correctly.



GET http://localhost:8083/country

Key	Value	Description
Key	Value	Description

Key	Value
Content-Type	application/json
Transfer-Encoding	chunked
Date	Fri, 11 Jul 2025 07:49:15 GMT
Keep-Alive	timeout=60
Connection	keep-alive

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"
}
```

Solution:

Code :

CountryController.java :

```
package com.cognizant.springlearn.controller;

import java.util.List;

import com.cognizant.springlearn.Country;
import org.slf4j.Logger;
import org.slf4j.LoggerFactory;
import org.springframework.beans.factory.annotation.Autowired;
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(value = "/country", method = RequestMethod.GET)
    public Country getCountryIndia() {
        LOGGER.debug("Start - getCountryIndia()");
        Country country = context.getBean("country", Country.class);
        LOGGER.debug("Country: {}", country);
        return country;
    }

    @GetMapping("/countries/{code}")
    public Country getCountry(@PathVariable String code) {
        LOGGER.debug("Start - getCountry() for code: {}", code);
        List<Country> countries = (List<Country>) context.getBean("countryList");

        return countries.stream()
                .filter(c -> c.getCode().equalsIgnoreCase(code))
                .findFirst()
                .orElse(null);
    }
}
```

SpringlearnApplication.java :

```
package com.cognizant.springlearn;

import org.springframework.boot.SpringApplication;
import org.springframework.boot.autoconfigure.SpringBootApplication;
import org.springframework.context.annotation.ImportResource;

@SpringBootApplication
@ImportResource("classpath:country.xml")
public class SpringlearnApplication {

    public static void main(String[] args) {
        SpringApplication.run(SpringlearnApplication.class, args);
    }
}
```

Country.java :

```java
package com.cognizant.springlearn;

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 + "]";
    }
}
```

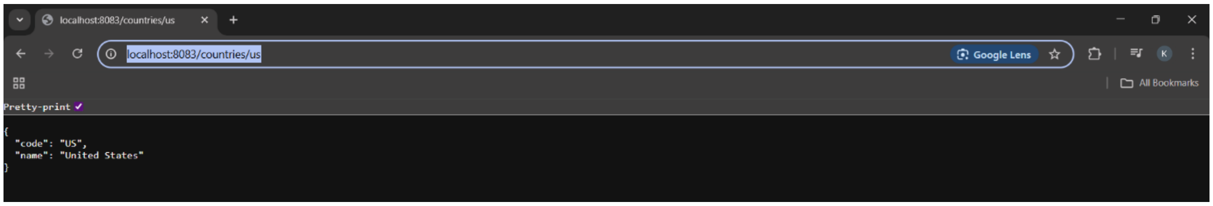
Country.xml :

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

</beans>
```

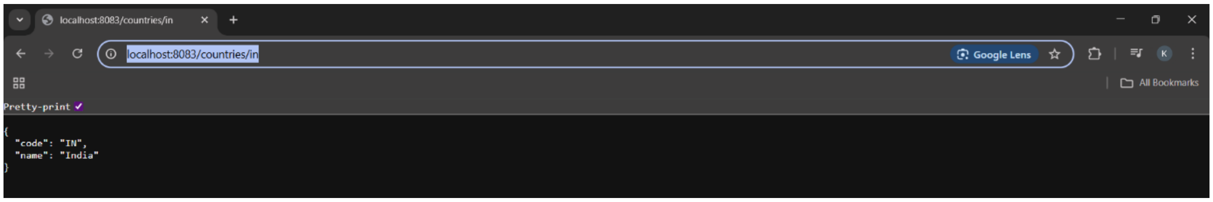
Logback.xml :

```
<configuration>
    <appender name="STDOUT" class="ch.qos.logback.core.ConsoleAppender">
        <encoder>
            <pattern>%d{HH:mm:ss.SSS} [%thread] %-5level %logger{36} -
%msg%n</pattern>
        </encoder>
    </appender>

    <root level="debug">
        <appender-ref ref="STDOUT"/>
    </root>
</configuration>
```

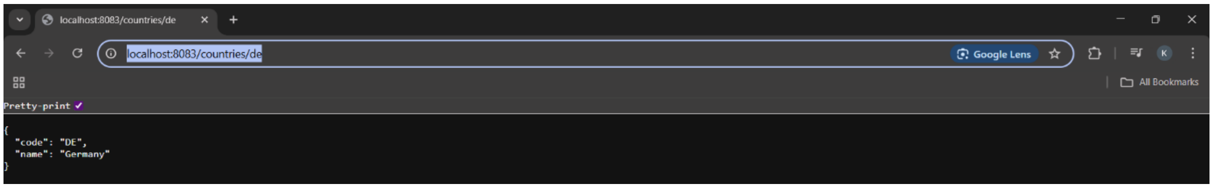
Output – (Screenshots)



```
{
  "code": "US",
  "name": "United States"
}
```



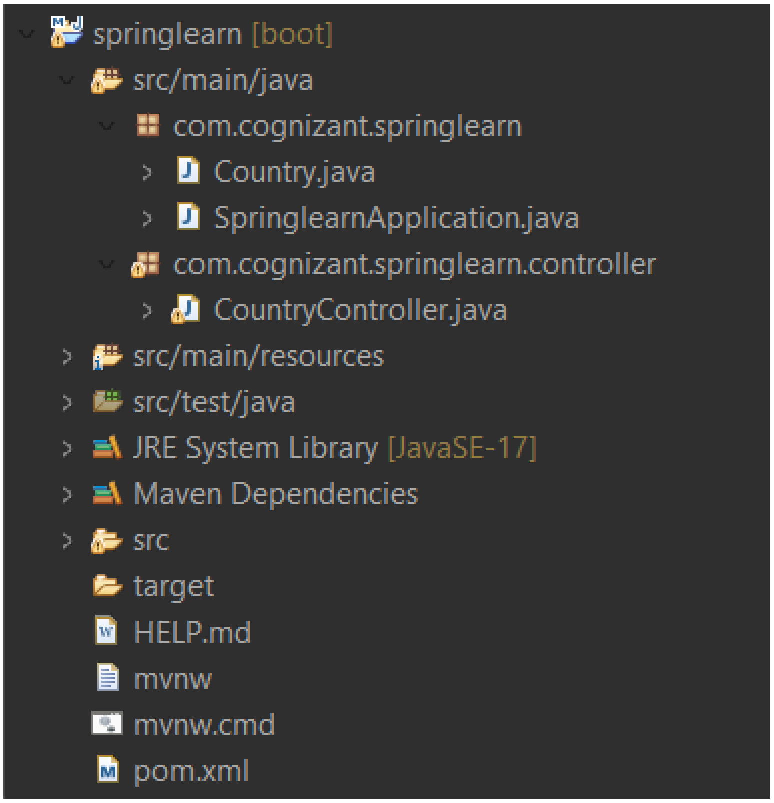
```
{
  "code": "IN",
  "name": "India"
}
```



localhost:8083/countries/de

Pretty-print ☑

```
{
  "code": "DE",
  "name": "Germany"
}
```



```
springlearn [boot]
  src/main/java
    com.cognizant.springlearn
      Country.java
      SpringlearnApplication.java
    com.cognizant.springlearn.controller
      CountryController.java
  src/main/resources
  src/test/java
  JRE System Library [JavaSE-17]
  Maven Dependencies
  src
  target
  HELP.md
  mvnw
  mvnw.cmd
  pom.xml
```

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.eyJzdWIiOiJ1c2VyIiwiaWF0IjoxNTcwMzc5NDc0LCJleHAiOjE1Nz
AzODA2NzR9.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.

Solution:

1. Create authentication controller and configure it in SecurityConfig

Code –

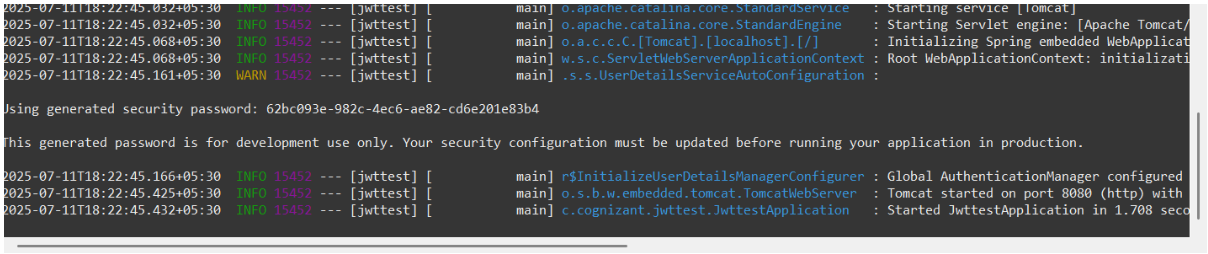
AuthController.java :

```
package com.cognizant.jwttest.controller;

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

@RestController
public class AuthController {

    @PostMapping("/authenticate")
    public String authenticate() {
        return "Authentication endpoint hit";
    }
}
```

SecurityConfig.java :

```
package com.cognizant.jwttest.config;

import org.springframework.context.annotation.Bean;
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 securityFilterChain(HttpSecurity http) throws 
Exception {
        http.csrf().disable()
            .authorizeHttpRequests()
                .requestMatchers("/authenticate").permitAll()  // Allow this endpoint
                .anyRequest().authenticated()                 // Secure all others
            .and()
            .httpBasic(); // Enable basic auth for username/password

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

Output –



```
2025-07-11T18:22:45.032+05:30  INFO 15452 --- [jwttest] [           main] o.apache.catalina.core.StandardService   : Starting service [Tomcat]
2025-07-11T18:22:45.032+05:30  INFO 15452 --- [jwttest] [           main] o.apache.catalina.core.StandardEngine    : Starting Servlet engine: [Apache Tomcat/
2025-07-11T18:22:45.068+05:30  INFO 15452 --- [jwttest] [           main] o.a.c.c.C.[Tomcat].[localhost].[/]       : Initializing Spring embedded WebApplicat
2025-07-11T18:22:45.068+05:30  INFO 15452 --- [jwttest] [           main] w.s.c.ServletWebServerApplicationContext : Root WebApplicationContext: initializati
2025-07-11T18:22:45.161+05:30  WARN 15452 --- [jwttest] [           main] .s.s.UserDetailsServiceAutoConfiguration : 

Using generated security password: 62bc093e-982c-4ec6-ae82-cd6e201e83b4

This generated password is for development use only. Your security configuration must be updated before running your application in production.

2025-07-11T18:22:45.166+05:30  INFO 15452 --- [jwttest] [           main] r$InitializeUserDetailsManagerConfigurer : Global AuthenticationManager configured
2025-07-11T18:22:45.425+05:30  INFO 15452 --- [jwttest] [           main] o.s.b.w.embedded.tomcat.TomcatWebServer  : Tomcat started on port 8080 (http) with
2025-07-11T18:22:45.432+05:30  INFO 15452 --- [jwttest] [           main] c.cognizant.jwttest.JwttestApplication   : Started JwttestApplication in 1.708 seco
```

2. Read Authorization header and decode the username and password

Code –

AuthController.java –

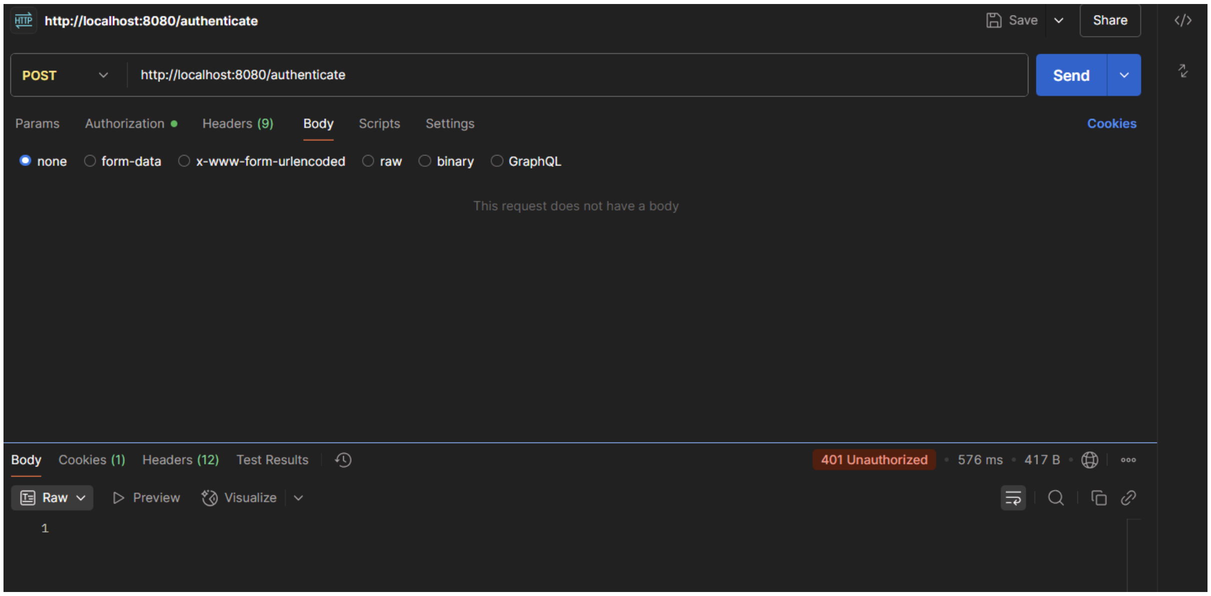
```
package com.cognizant.jwttest.controller;

import org.springframework.http.HttpStatus;
import org.springframework.http.ResponseEntity;
import org.springframework.web.bind.annotation.*;

import java.nio.charset.StandardCharsets;
import java.util.Base64;
```

```
@RestController
public class AuthController {

    @PostMapping("/authenticate")
    public ResponseEntity<?> authenticate(@RequestHeader("Authorization") String
authHeader) {
        if (authHeader == null || !authHeader.startsWith("Basic ")) {
            return ResponseEntity.status(HttpStatus.UNAUTHORIZED).body("Missing or
invalid Authorization header");
        }

        // Decode Base64 credentials
        String base64Credentials = authHeader.substring("Basic ".length());
        byte[] decodedBytes = Base64.getDecoder().decode(base64Credentials);
        String decodedCredentials = new String(decodedBytes, StandardCharsets.UTF_8);

        // Split into username and password
        String[] values = decodedCredentials.split(":", 2);
        if (values.length != 2) {
            return ResponseEntity.status(HttpStatus.BAD_REQUEST).body("Invalid
credentials format");
        }

        String username = values[0];
        String password = values[1];

        // TEMP: Print to verify
        return ResponseEntity.ok("Username: " + username + ", Password: " +
password);
    }
}
```

SecurityConfig.java :

```
package com.cognizant.jwttest.config;

import org.springframework.context.annotation.Bean;
import org.springframework.context.annotation.Configuration;
import org.springframework.security.config.Customizer;
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()
            )
            .httpBasic(Customizer.withDefaults()); // Enables Basic Auth
        return http.build();
    }
}
```

Output –



POST http://localhost:8080/authenticate

Body: ● none

This request does not have a body

401 Unauthorized · 576 ms · 417 B

```
1
```

3. Generate token based on the user retrieved in the previous step

Code –

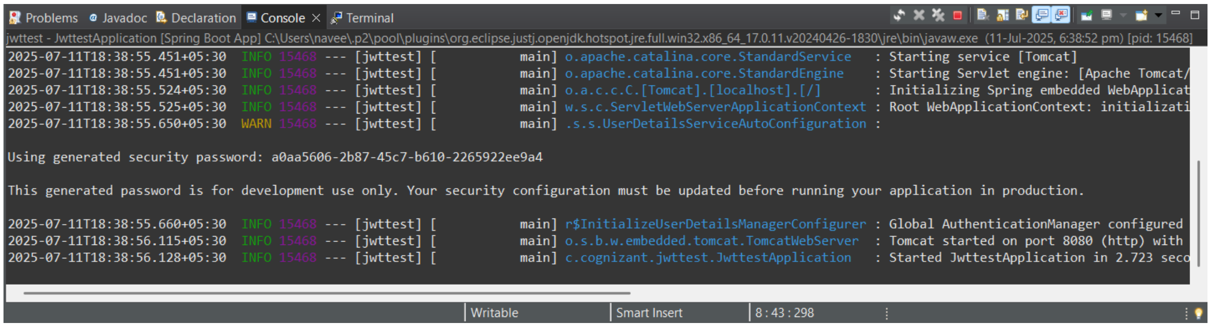
JwtUtil.java :

```
package com.cognizant.jwttest.util;

import java.util.Date;
import org.springframework.stereotype.Component;
import io.jsonwebtoken.Jwts;
import io.jsonwebtoken.SignatureAlgorithm;

@Component
public class JwtUtil {

    private final String SECRET_KEY = "secret123"; // In real apps, use env vars

    public String generateToken(String username) {
        long nowMillis = System.currentTimeMillis();
        long expMillis = nowMillis + 1000 * 60 * 10; // 10 mins expiry

        return Jwts.builder()
                .setSubject(username)
                .setIssuedAt(new Date(nowMillis))
                .setExpiration(new Date(expMillis))
                .signWith(SignatureAlgorithm.HS256, SECRET_KEY.getBytes())
                .compact();
    }
}
```

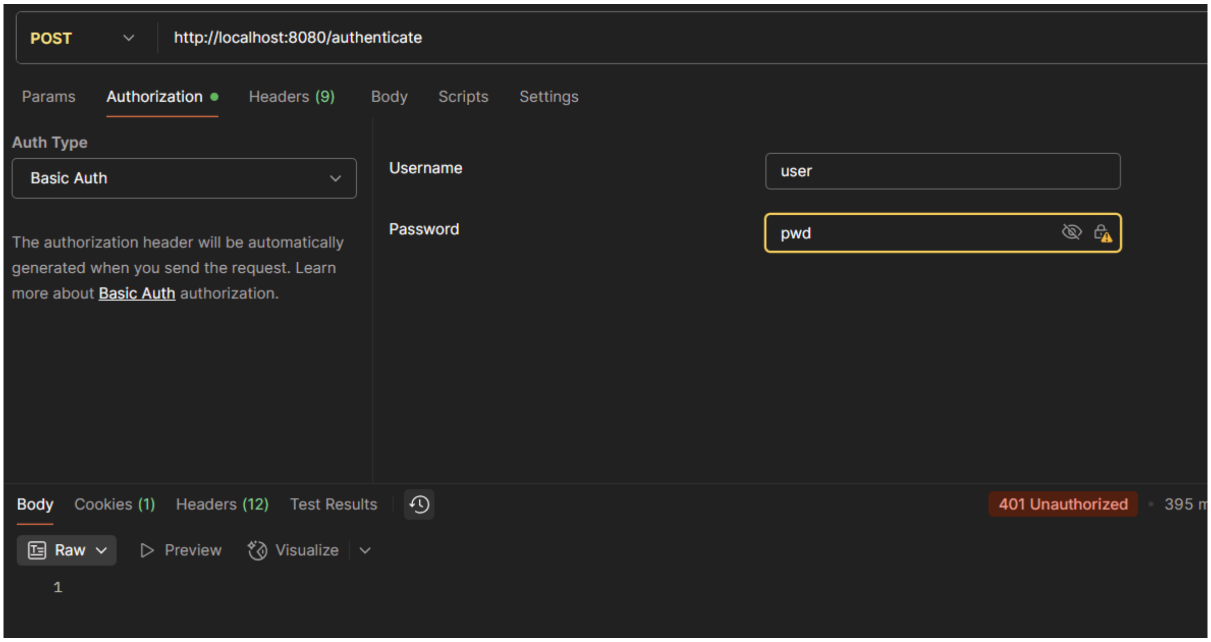
AuthController.java :

```
package com.cognizant.jwttest.controller;

import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.http.HttpStatus;
import org.springframework.http.ResponseEntity;
import org.springframework.web.bind.annotation.*;

import com.cognizant.jwttest.util.JwtUtil;

import java.nio.charset.StandardCharsets;
import java.util.Base64;
import java.util.HashMap;
import java.util.Map;

@RestController
public class AuthController {

    @Autowired
    private JwtUtil jwtUtil;

    @PostMapping("/authenticate")
    public ResponseEntity<?> authenticate(@RequestHeader("Authorization") String
authHeader) {
        if (authHeader == null || !authHeader.startsWith("Basic ")) {
            return ResponseEntity.status(HttpStatus.UNAUTHORIZED).body("Missing or
invalid Authorization header");
        }

        String base64Credentials = authHeader.substring("Basic ".length());
        byte[] decodedBytes = Base64.getDecoder().decode(base64Credentials);
        String decodedCredentials = new String(decodedBytes, StandardCharsets.UTF_8);

        String[] values = decodedCredentials.split(":", 2);
        if (values.length != 2) {
            return ResponseEntity.status(HttpStatus.BAD_REQUEST).body("Invalid
credentials format");
        }

        String username = values[0];
        String password = values[1];

        // Hardcoded check \u2014 later replace with DB or user service
        if ("user".equals(username) && "pwd".equals(password)) {
            String token = jwtUtil.generateToken(username);
            Map<String, String> response = new HashMap<>();
            response.put("token", token);
            return ResponseEntity.ok(response);
        } else {
            return ResponseEntity.status(HttpStatus.UNAUTHORIZED).body("Invalid
username or password");
        }
    }
}
```

Output :



```
jwttest - JwttestApplication [Spring Boot App] C:\Users\navee\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.11.v20240426-1830\jre\bin\javaw.exe  (11-Jul-2025, 6:38:52 pm) [pid: 15468]
2025-07-11T18:38:55.451+05:30  INFO 15468 --- [jwttest] [           main] o.apache.catalina.core.StandardService   : Starting service [Tomcat]
2025-07-11T18:38:55.451+05:30  INFO 15468 --- [jwttest] [           main] o.apache.catalina.core.StandardEngine    : Starting Servlet engine: [Apache Tomcat/
2025-07-11T18:38:55.524+05:30  INFO 15468 --- [jwttest] [           main] o.a.c.c.C.[Tomcat].[localhost].[/]       : Initializing Spring embedded WebApplicat
2025-07-11T18:38:55.525+05:30  INFO 15468 --- [jwttest] [           main] w.s.c.ServletWebServerApplicationContext : Root WebApplicationContext: initializati
2025-07-11T18:38:55.650+05:30  WARN 15468 --- [jwttest] [           main] .s.s.UserDetailsServiceAutoConfiguration :

Using generated security password: a0aa5606-2b87-45c7-b610-2265922ee9a4

This generated password is for development use only. Your security configuration must be updated before running your application in production.

2025-07-11T18:38:55.660+05:30  INFO 15468 --- [jwttest] [           main] r$InitializeUserDetailsManagerConfigurer : Global AuthenticationManager configured
2025-07-11T18:38:56.115+05:30  INFO 15468 --- [jwttest] [           main] o.s.b.w.embedded.tomcat.TomcatWebServer  : Tomcat started on port 8080 (http) with
2025-07-11T18:38:56.128+05:30  INFO 15468 --- [jwttest] [           main] c.cognizant.jwttest.JwttestApplication   : Started JwttestApplication in 2.723 seco
```



POST http://localhost:8080/authenticate

Auth Type: Basic Auth

The authorization header will be automatically generated when you send the request. Learn more about Basic Auth authorization.

Username: user

Password: pwd

401 Unauthorized • 395 m

```
1
```