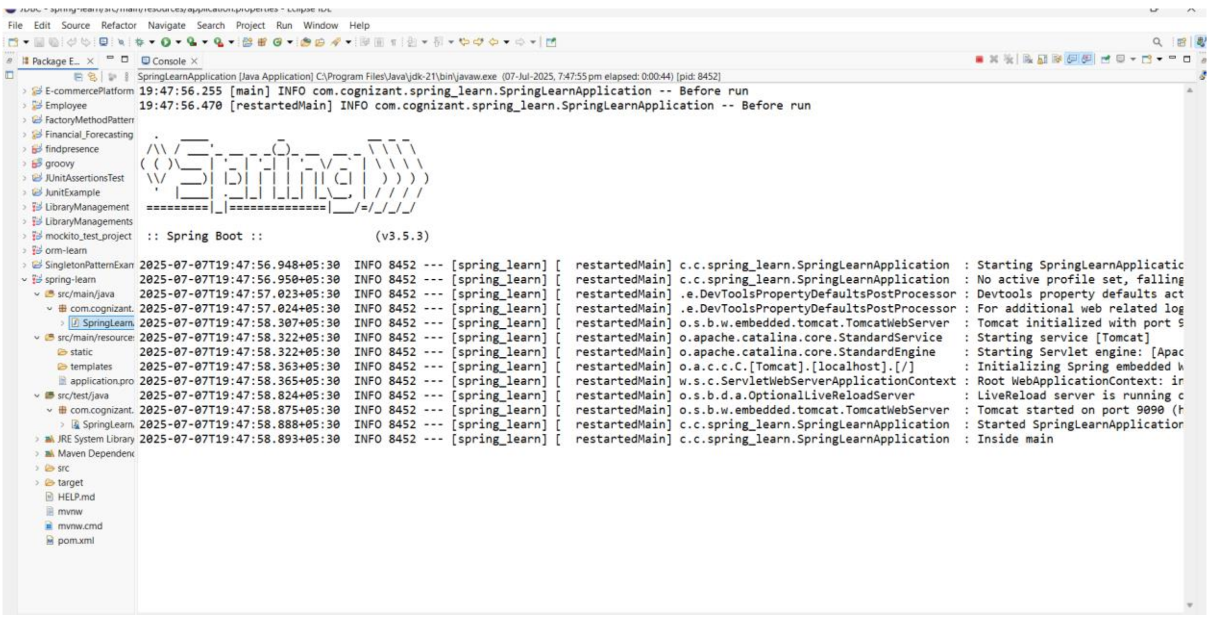
WEEK 4

Spring REST using Spring Boot 3

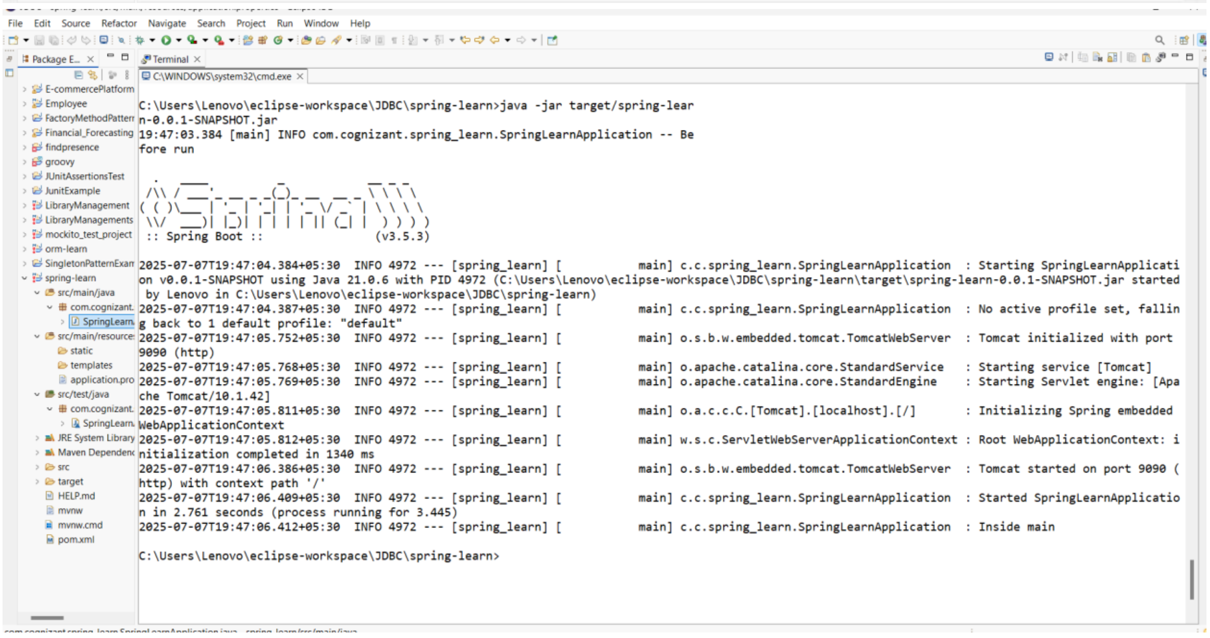
Hands on 1:

Create a Spring Web Project using Maven

Output snapshot:

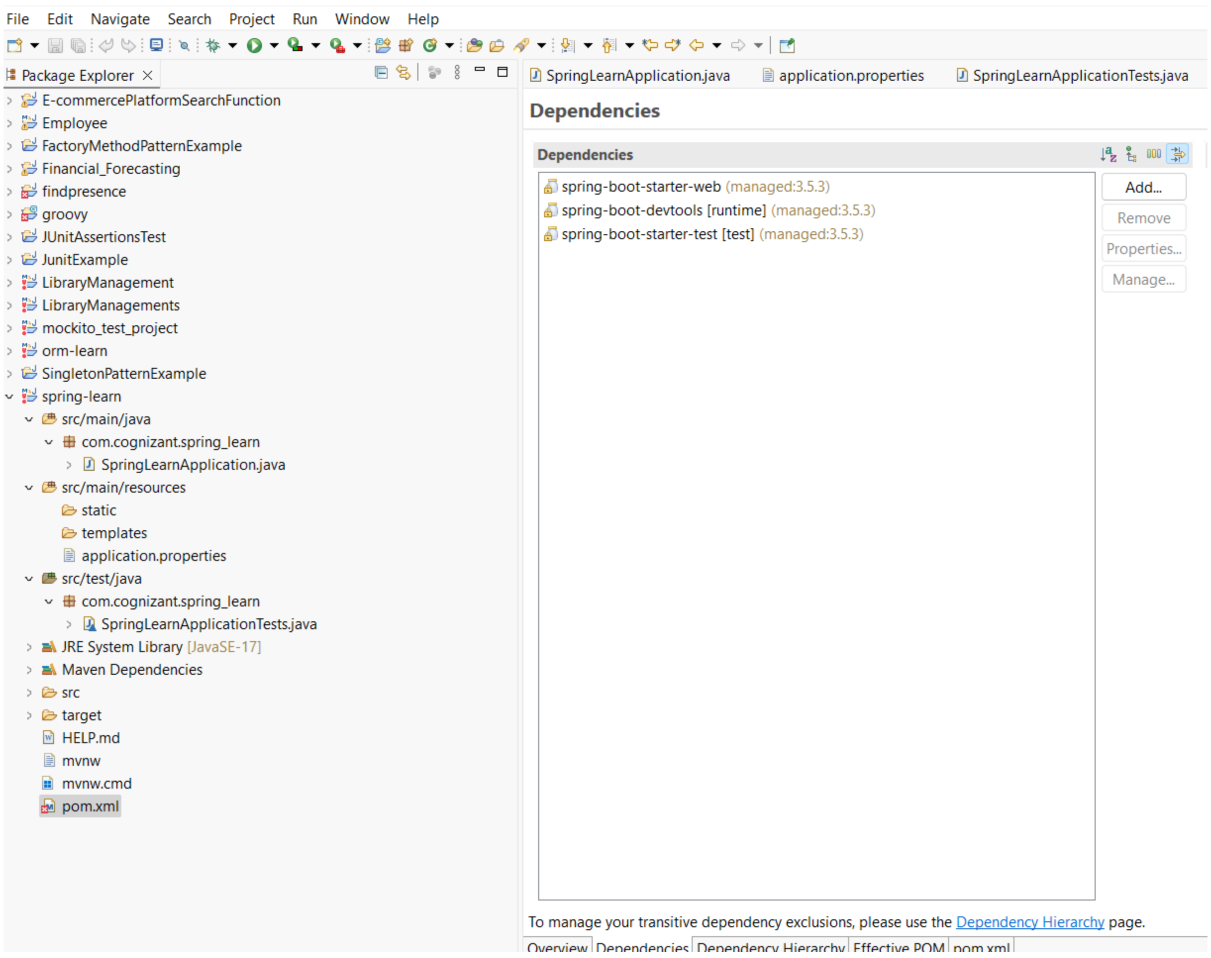


```
SpringLearnApplication [Java Application] C:\Program Files\Java\jdk-21\bin\javaw.exe (07-Jul-2025, 7:47:55 pm elapsed: 0:00:44) [pid: 8452]
19:47:56.255 [main] INFO com.cognizant.spring_learn.SpringLearnApplication -- Before run
19:47:56.470 [restartedMain] INFO com.cognizant.spring_learn.SpringLearnApplication -- Before run

  .   ____          _            __ _ _
 /\\ / ___'_ __ _ _(_)_ __  __ _ \ \ \ \
( ( )\___ | '_ | '_| | '_ \/ _` | \ \ \ \
 \\/  ___)| |_)| | | | | || (_| |  ) ) ) )
  '  |____| .__|_| |_|_| |_\__, | / / / /
 =========|_|==============|___/=/_/_/_/

 :: Spring Boot ::                (v3.5.3)

2025-07-07T19:47:56.948+05:30  INFO 8452 --- [spring_learn] [  restartedMain] c.c.spring_learn.SpringLearnApplication  : Starting SpringLearnApplicatic
2025-07-07T19:47:56.950+05:30  INFO 8452 --- [spring_learn] [  restartedMain] c.c.spring_learn.SpringLearnApplication  : No active profile set, falling
2025-07-07T19:47:57.023+05:30  INFO 8452 --- [spring_learn] [  restartedMain] .e.DevToolsPropertyDefaultsPostProcessor : Devtools property defaults act
2025-07-07T19:47:57.024+05:30  INFO 8452 --- [spring_learn] [  restartedMain] .e.DevToolsPropertyDefaultsPostProcessor : For additional web related log
2025-07-07T19:47:58.307+05:30  INFO 8452 --- [spring_learn] [  restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer  : Tomcat initialized with port 9
2025-07-07T19:47:58.322+05:30  INFO 8452 --- [spring_learn] [  restartedMain] o.apache.catalina.core.StandardService   : Starting service [Tomcat]
2025-07-07T19:47:58.322+05:30  INFO 8452 --- [spring_learn] [  restartedMain] o.apache.catalina.core.StandardEngine    : Starting Servlet engine: [Apac
2025-07-07T19:47:58.363+05:30  INFO 8452 --- [spring_learn] [  restartedMain] o.a.c.c.C.[Tomcat].[localhost].[/]       : Initializing Spring embedded W
2025-07-07T19:47:58.365+05:30  INFO 8452 --- [spring_learn] [  restartedMain] w.s.c.ServletWebServerApplicationContext : Root WebApplicationContext: in
2025-07-07T19:47:58.824+05:30  INFO 8452 --- [spring_learn] [  restartedMain] o.s.b.d.a.OptionalLiveReloadServer       : LiveReload server is running c
2025-07-07T19:47:58.875+05:30  INFO 8452 --- [spring_learn] [  restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer  : Tomcat started on port 9090 (h
2025-07-07T19:47:58.888+05:30  INFO 8452 --- [spring_learn] [  restartedMain] c.c.spring_learn.SpringLearnApplication  : Started SpringLearnApplicatior
2025-07-07T19:47:58.893+05:30  INFO 8452 --- [spring_learn] [  restartedMain] c.c.spring_learn.SpringLearnApplication  : Inside main
```



```
C:\Users\Lenovo\eclipse-workspace\JDBC\spring-learn>java -jar target/spring-lear
n-0.0.1-SNAPSHOT.jar
19:47:03.384 [main] INFO com.cognizant.spring_learn.SpringLearnApplication -- Be
fore run

  .   ____          _            __ _ _
 /\\ / ___'_ __ _ _(_)_ __  __ _ \ \ \ \
( ( )\___ | '_ | '_| | '_ \/ _` | \ \ \ \
 \\/  ___)| |_)| | | | | || (_| |  ) ) ) )
 :: Spring Boot ::                (v3.5.3)

2025-07-07T19:47:04.384+05:30  INFO 4972 --- [spring_learn] [           main] c.c.spring_learn.SpringLearnApplication  : Starting SpringLearnApplicati
on v0.0.1-SNAPSHOT using Java 21.0.6 with PID 4972 (C:\Users\Lenovo\eclipse-workspace\JDBC\spring-learn\target\spring-learn-0.0.1-SNAPSHOT.jar started
 by Lenovo in C:\Users\Lenovo\eclipse-workspace\JDBC\spring-learn)
2025-07-07T19:47:04.387+05:30  INFO 4972 --- [spring_learn] [           main] c.c.spring_learn.SpringLearnApplication  : No active profile set, fallin
g back to 1 default profile: "default"
2025-07-07T19:47:05.752+05:30  INFO 4972 --- [spring_learn] [           main] o.s.b.w.embedded.tomcat.TomcatWebServer  : Tomcat initialized with port
9090 (http)
2025-07-07T19:47:05.768+05:30  INFO 4972 --- [spring_learn] [           main] o.apache.catalina.core.StandardService   : Starting service [Tomcat]
2025-07-07T19:47:05.769+05:30  INFO 4972 --- [spring_learn] [           main] o.apache.catalina.core.StandardEngine    : Starting Servlet engine: [Apa
che Tomcat/10.1.42]
2025-07-07T19:47:05.811+05:30  INFO 4972 --- [spring_learn] [           main] o.a.c.c.C.[Tomcat].[localhost].[/]       : Initializing Spring embedded
WebApplicationContext
2025-07-07T19:47:05.812+05:30  INFO 4972 --- [spring_learn] [           main] w.s.c.ServletWebServerApplicationContext : Root WebApplicationContext: i
nitialization completed in 1340 ms
2025-07-07T19:47:06.386+05:30  INFO 4972 --- [spring_learn] [           main] o.s.b.w.embedded.tomcat.TomcatWebServer  : Tomcat started on port 9090 (
http) with context path '/'
2025-07-07T19:47:06.409+05:30  INFO 4972 --- [spring_learn] [           main] c.c.spring_learn.SpringLearnApplication  : Started SpringLearnApplicatio
n in 2.761 seconds (process running for 3.445)
2025-07-07T19:47:06.412+05:30  INFO 4972 --- [spring_learn] [           main] c.c.spring_learn.SpringLearnApplication  : Inside main

C:\Users\Lenovo\eclipse-workspace\JDBC\spring-learn>
```

Dependency Hierarchy

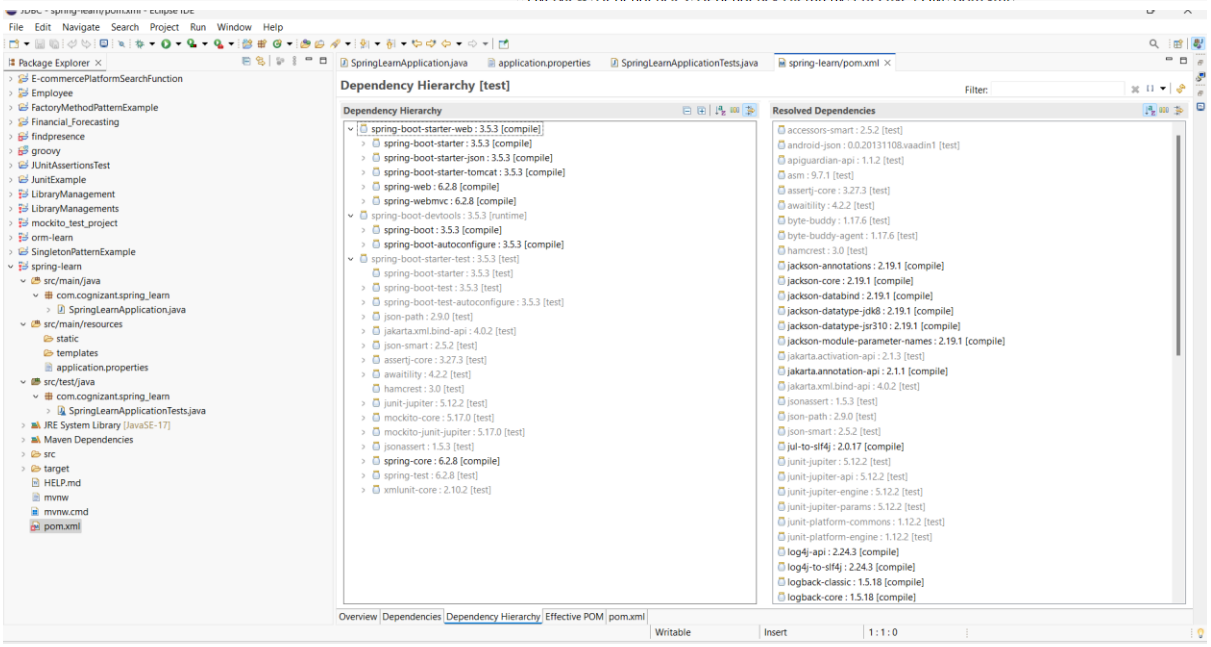


```
Package Explorer
> E-commercePlatformSearchFunction
> Employee
> FactoryMethodPatternExample
> Financial_Forecasting
> findpresence
> groovy
> JUnitAssertionsTest
> JunitExample
> LibraryManagement
> LibraryManagements
> mockito_test_project
> orm-learn
> SingletonPatternExample
v spring-learn
  v src/main/java
    v com.cognizant.spring_learn
      > SpringLearnApplication.java
  v src/main/resources
      static
      templates
      application.properties
  v src/test/java
    v com.cognizant.spring_learn
      > SpringLearnApplicationTests.java
  > JRE System Library [JavaSE-17]
  > Maven Dependencies
  > src
  > target
    HELP.md
    mvnw
    mvnw.cmd
    pom.xml
```

Dependencies

```
spring-boot-starter-web (managed:3.5.3)
spring-boot-devtools [runtime] (managed:3.5.3)
spring-boot-starter-test [test] (managed:3.5.3)
```

To manage your transitive dependency exclusions, please use the Dependency Hierarchy page.

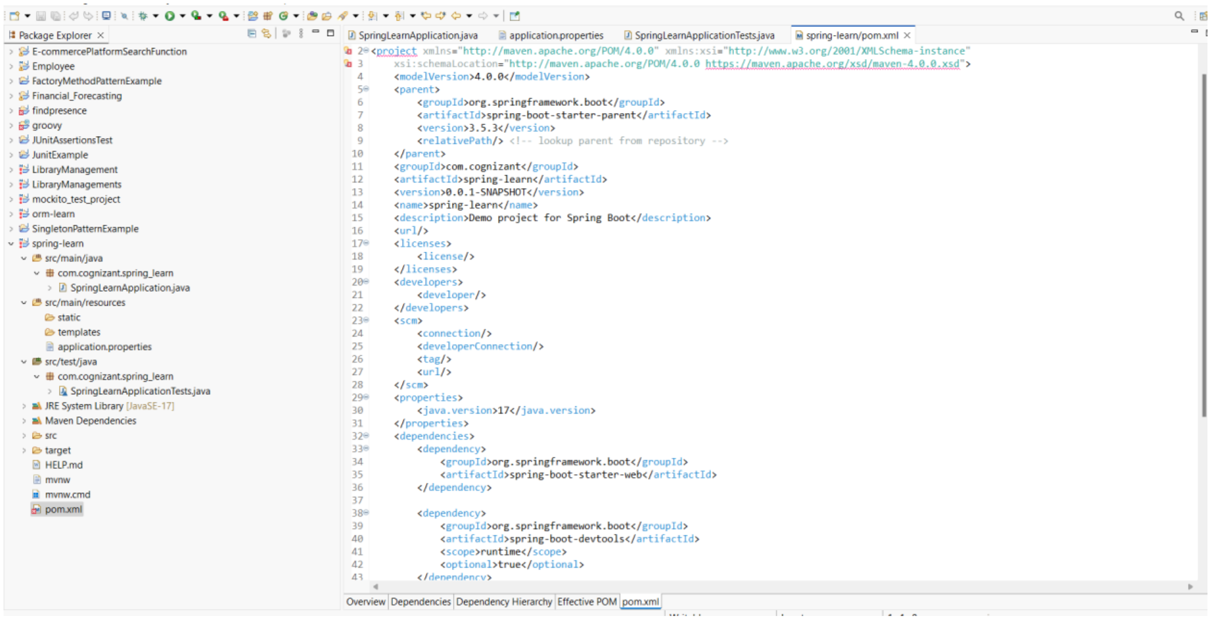


Dependency Hierarchy [test]

```
Dependency Hierarchy
v spring-boot-starter-web : 3.5.3 [compile]
    > spring-boot-starter : 3.5.3 [compile]
    > spring-boot-starter-json : 3.5.3 [compile]
    > spring-boot-starter-tomcat : 3.5.3 [compile]
    > spring-web : 6.2.8 [compile]
    > spring-webmvc : 6.2.8 [compile]
v spring-boot-devtools : 3.5.3 [runtime]
    > spring-boot : 3.5.3 [compile]
    > spring-boot-autoconfigure : 3.5.3 [compile]
v spring-boot-starter-test : 3.5.3 [test]
      spring-boot-starter : 3.5.3 [test]
    > spring-boot-test : 3.5.3 [test]
    > spring-boot-test-autoconfigure : 3.5.3 [test]
    > json-path : 2.9.0 [test]
    > jakarta.xml.bind-api : 4.0.2 [test]
    > json-smart : 2.5.2 [test]
    > assertj-core : 3.27.3 [test]
    > awaitility : 4.2.2 [test]
      hamcrest : 3.0 [test]
    > junit-jupiter : 5.12.2 [test]
    > mockito-core : 5.17.0 [test]
    > mockito-junit-jupiter : 5.17.0 [test]
    > jsonassert : 1.5.3 [test]
    > spring-core : 6.2.8 [compile]
    > spring-test : 6.2.8 [test]
    > xmlunit-core : 2.10.2 [test]
```

```
Resolved Dependencies
accessors-smart : 2.5.2 [test]
android-json : 0.0.20131108.vaadin1 [test]
apiguardian-api : 1.1.2 [test]
asm : 9.7.1 [test]
assertj-core : 3.27.3 [test]
awaitility : 4.2.2 [test]
byte-buddy : 1.17.6 [test]
byte-buddy-agent : 1.17.6 [test]
hamcrest : 3.0 [test]
jackson-annotations : 2.19.1 [compile]
jackson-core : 2.19.1 [compile]
jackson-databind : 2.19.1 [compile]
jackson-datatype-jdk8 : 2.19.1 [compile]
jackson-datatype-jsr310 : 2.19.1 [compile]
jackson-module-parameter-names : 2.19.1 [compile]
jakarta.activation-api : 2.1.3 [test]
jakarta.annotation-api : 2.1.1 [compile]
jakarta.xml.bind-api : 4.0.2 [test]
jsonassert : 1.5.3 [test]
json-path : 2.9.0 [test]
json-smart : 2.5.2 [test]
jul-to-slf4j : 2.0.17 [compile]
junit-jupiter : 5.12.2 [test]
junit-jupiter-api : 5.12.2 [test]
junit-jupiter-engine : 5.12.2 [test]
junit-jupiter-params : 5.12.2 [test]
junit-platform-commons : 1.12.2 [test]
junit-platform-engine : 1.12.2 [test]
log4j-api : 2.24.3 [compile]
log4j-to-slf4j : 2.24.3 [compile]
logback-classic : 1.5.18 [compile]
logback-core : 1.5.18 [compile]
```

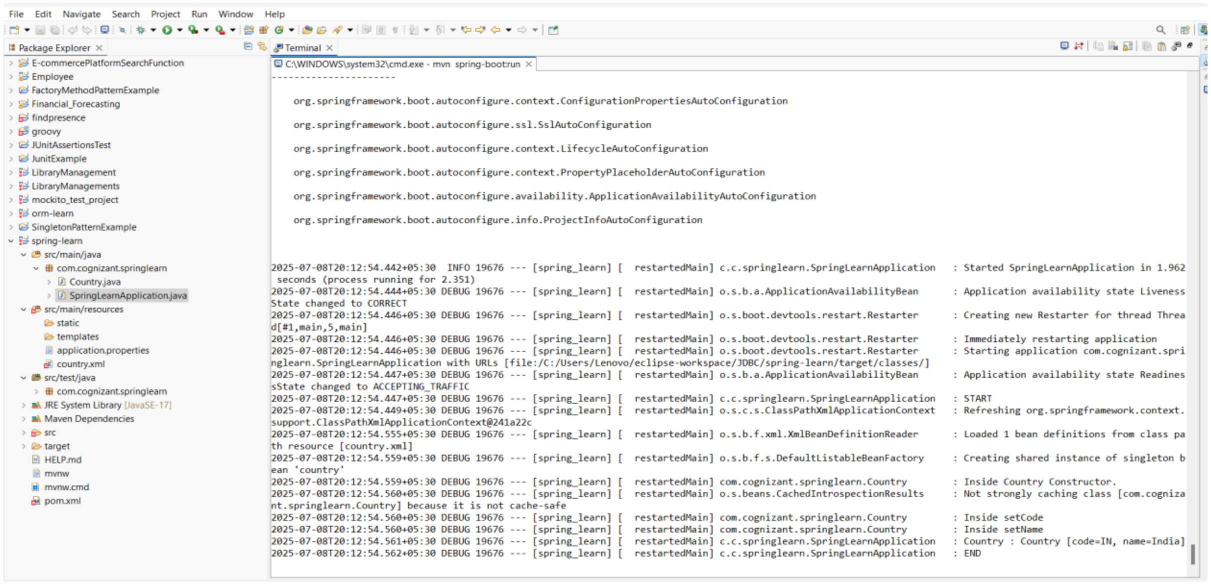
Configuration in pom.xml:



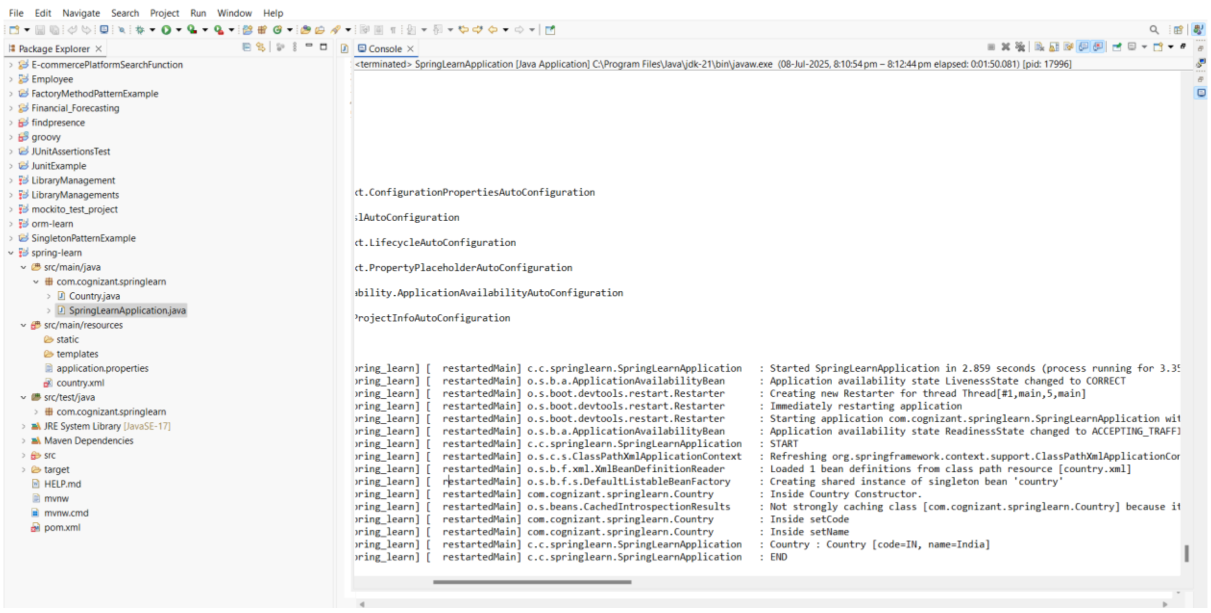
```xml
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 https://maven.apache.org/xsd/maven-4.0.0.xsd">
    <modelVersion>4.0.0</modelVersion>
    <parent>
        <groupId>org.springframework.boot</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>
```

Hands on 4

Spring Core – Load Country from Spring Configuration XML



```
---------------------

    org.springframework.boot.autoconfigure.context.ConfigurationPropertiesAutoConfiguration

    org.springframework.boot.autoconfigure.ssl.SslAutoConfiguration

    org.springframework.boot.autoconfigure.context.LifecycleAutoConfiguration

    org.springframework.boot.autoconfigure.context.PropertyPlaceholderAutoConfiguration

    org.springframework.boot.autoconfigure.availability.ApplicationAvailabilityAutoConfiguration

    org.springframework.boot.autoconfigure.info.ProjectInfoAutoConfiguration



2025-07-08T20:12:54.442+05:30  INFO 19676 --- [spring_learn] [  restartedMain] c.c.springlearn.SpringLearnApplication   : Started SpringLearnApplication in 1.962
 seconds (process running for 2.351)
2025-07-08T20:12:54.444+05:30 DEBUG 19676 --- [spring_learn] [  restartedMain] o.s.b.a.ApplicationAvailabilityBean      : Application availability state Liveness
State changed to CORRECT
2025-07-08T20:12:54.446+05:30 DEBUG 19676 --- [spring_learn] [  restartedMain] o.s.boot.devtools.restart.Restarter      : Creating new Restarter for thread Threa
d[#1,main,5,main]
2025-07-08T20:12:54.446+05:30 DEBUG 19676 --- [spring_learn] [  restartedMain] o.s.boot.devtools.restart.Restarter      : Immediately restarting application
2025-07-08T20:12:54.446+05:30 DEBUG 19676 --- [spring_learn] [  restartedMain] o.s.boot.devtools.restart.Restarter      : Starting application com.cognizant.spri
nglearn.SpringLearnApplication with URLs [file:/C:/Users/Lenovo/eclipse-workspace/JDBC/spring-learn/target/classes/]
2025-07-08T20:12:54.447+05:30 DEBUG 19676 --- [spring_learn] [  restartedMain] o.s.b.a.ApplicationAvailabilityBean      : Application availability state Readines
sState changed to ACCEPTING_TRAFFIC
2025-07-08T20:12:54.447+05:30 DEBUG 19676 --- [spring_learn] [  restartedMain] c.c.springlearn.SpringLearnApplication   : START
2025-07-08T20:12:54.449+05:30 DEBUG 19676 --- [spring_learn] [  restartedMain] o.s.c.s.ClassPathXmlApplicationContext   : Refreshing org.springframework.context.
support.ClassPathXmlApplicationContext@241a22c
2025-07-08T20:12:54.555+05:30 DEBUG 19676 --- [spring_learn] [  restartedMain] o.s.b.f.xml.XmlBeanDefinitionReader      : Loaded 1 bean definitions from class pa
th resource [country.xml]
2025-07-08T20:12:54.559+05:30 DEBUG 19676 --- [spring_learn] [  restartedMain] o.s.b.f.s.DefaultListableBeanFactory     : Creating shared instance of singleton b
ean 'country'
2025-07-08T20:12:54.559+05:30 DEBUG 19676 --- [spring_learn] [  restartedMain] com.cognizant.springlearn.Country        : Inside Country Constructor.
2025-07-08T20:12:54.560+05:30 DEBUG 19676 --- [spring_learn] [  restartedMain] o.s.beans.CachedIntrospectionResults     : Not strongly caching class [com.cogniza
nt.springlearn.Country] because it is not cache-safe
2025-07-08T20:12:54.560+05:30 DEBUG 19676 --- [spring_learn] [  restartedMain] com.cognizant.springlearn.Country        : Inside setCode
2025-07-08T20:12:54.560+05:30 DEBUG 19676 --- [spring_learn] [  restartedMain] com.cognizant.springlearn.Country        : Inside setName
2025-07-08T20:12:54.561+05:30 DEBUG 19676 --- [spring_learn] [  restartedMain] c.c.springlearn.SpringLearnApplication   : Country : Country [code=IN, name=India]
2025-07-08T20:12:54.562+05:30 DEBUG 19676 --- [spring_learn] [  restartedMain] c.c.springlearn.SpringLearnApplication   : END
```



```
<terminated> SpringLearnApplication [Java Application] C:\Program Files\Java\jdk-21\bin\javaw.exe  (08-Jul-2025, 8:10:54 pm – 8:12:44 pm elapsed: 0:01:50.081) [pid: 17996]

ct.ConfigurationPropertiesAutoConfiguration

slAutoConfiguration

ct.LifecycleAutoConfiguration

ct.PropertyPlaceholderAutoConfiguration

ability.ApplicationAvailabilityAutoConfiguration

ProjectInfoAutoConfiguration


pring_learn] [  restartedMain] c.c.springlearn.SpringLearnApplication   : Started SpringLearnApplication in 2.859 seconds (process running for 3.35
pring_learn] [  restartedMain] o.s.b.a.ApplicationAvailabilityBean      : Application availability state LivenessState changed to CORRECT
pring_learn] [  restartedMain] o.s.boot.devtools.restart.Restarter      : Creating new Restarter for thread Thread[#1,main,5,main]
pring_learn] [  restartedMain] o.s.boot.devtools.restart.Restarter      : Immediately restarting application
pring_learn] [  restartedMain] o.s.boot.devtools.restart.Restarter      : Starting application com.cognizant.springlearn.SpringLearnApplication wit
pring_learn] [  restartedMain] o.s.b.a.ApplicationAvailabilityBean      : Application availability state ReadinessState changed to ACCEPTING_TRAFFI
pring_learn] [  restartedMain] c.c.springlearn.SpringLearnApplication   : START
pring_learn] [  restartedMain] o.s.c.s.ClassPathXmlApplicationContext   : Refreshing org.springframework.context.support.ClassPathXmlApplicationCon
pring_learn] [  restartedMain] o.s.b.f.xml.XmlBeanDefinitionReader      : Loaded 1 bean definitions from class path resource [country.xml]
pring_learn] [  restartedMain] o.s.b.f.s.DefaultListableBeanFactory     : Creating shared instance of singleton bean 'country'
pring_learn] [  restartedMain] com.cognizant.springlearn.Country        : Inside Country Constructor.
pring_learn] [  restartedMain] o.s.beans.CachedIntrospectionResults     : Not strongly caching class [com.cognizant.springlearn.Country] because it
pring_learn] [  restartedMain] com.cognizant.springlearn.Country        : Inside setCode
pring_learn] [  restartedMain] com.cognizant.springlearn.Country        : Inside setName
pring_learn] [  restartedMain] c.c.springlearn.SpringLearnApplication   : Country : Country [code=IN, name=India]
pring_learn] [  restartedMain] c.c.springlearn.SpringLearnApplication   : END
```

1. bean tag, id, class, property, name, value

- The <bean> tag in the XML file tells Spring to create and manage an object of a specific Java class.
- The id attribute gives a unique name to this bean so that it can be fetched later from the Spring container.
- The class attribute tells Spring which Java class to instantiate.
- The <property> tag is used to set values in the object after it is created.

- The name attribute inside <property> tells Spring which setter method to call. For example, name="code" means Spring will call setCode(...).
- The value attribute provides the actual value to be passed into the setter method.

Example in country.xml:

```
<bean id="countryIndia" class="com.cognizant.springlearn.Country">
   <property name="code" value="IN"/>
   <property name="name" value="India"/>
</bean>
```

This means Spring will do:

- new Country()
- call setCode("IN")
- call setName("India")

2. ApplicationContext and ClassPathXmlApplicationContext

- ApplicationContext is the main interface for Spring's IoC container. It reads the configuration, creates and manages all the beans, wires dependencies, and manages their lifecycle.
- ClassPathXmlApplicationContext is a specific type of ApplicationContext that reads the bean configuration from an XML file located in the classpath (like src/main/resources).

For example:

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

This tells Spring to load country.xml from the classpath, parse all the <bean> definitions, create the objects, and keep them ready to be used.

s

3. What happens when context.getBean() is called

When you write:

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

this is what happens:

- Spring looks up the bean with id "countryIndia" in the container.
- If it is already created (because default is singleton scope), it returns the existing object.
- If not yet created, Spring creates it by calling the constructor, sets all the properties by calling the setters, and then returns it.
- The returned object is a fully initialized Java object ready to use.