Spring Boot

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TECHNOLOGY

Getting Started with Spring Boot

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Learning Objectives

By the end of this lesson, you will be able to:

- Analyze the features of Spring Boot
- Comprehend advantages of using Spring Boot
- Classify the differences between Spring and Spring Boot
- Analyze Spring architecture
- Comprehend steps to create a Spring Boot project

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A Day in the Life of a Full Stack Developer

You have been hired as a developer in an organization and assigned a project where you need to facilitate a configuration that runs both simple and web-based applications.

You decide to use Spring Boot as it gives the RAD (Rapid Application Development) feature to the Spring framework. The idea is to employ convention over the configuration software design paradigm that helps to decrease the developer's efforts.

To do so, you need to explore more about Spring Boot, the architecture of Spring Boot, and how to create a Spring Boot project.

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Spring Boot: Overview

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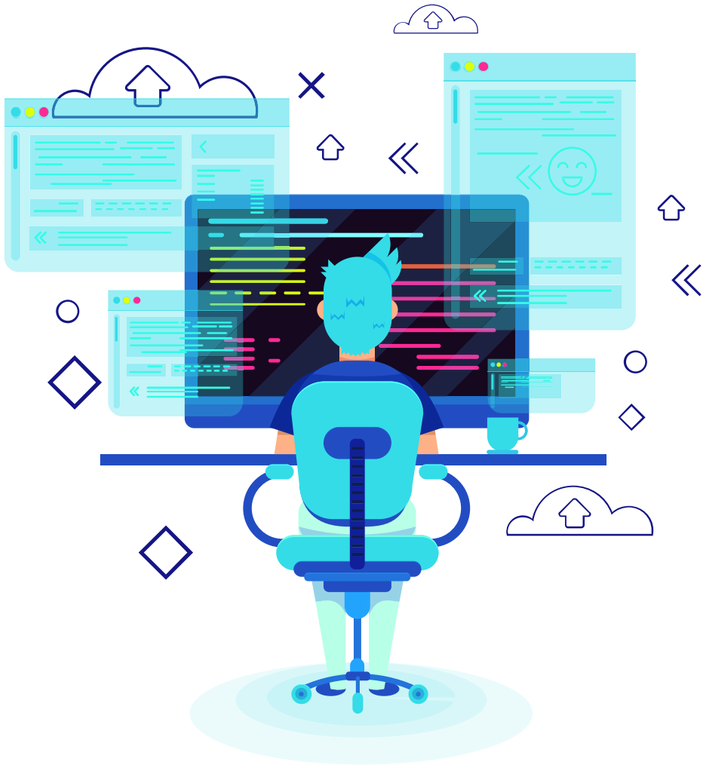
Spring Boot: Overview

It refers to a project built on top of the Spring framework.



It facilitates easy and fast configuration and helps run simple and web-based applications.

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Spring Boot: Overview

It is a part of the Spring module that gives the RAD (Rapid Application Development) feature to the spring framework.

It creates a standalone Spring-based application.

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Spring Boot: Overview

It is a combination of the Spring framework and the embedded servers.

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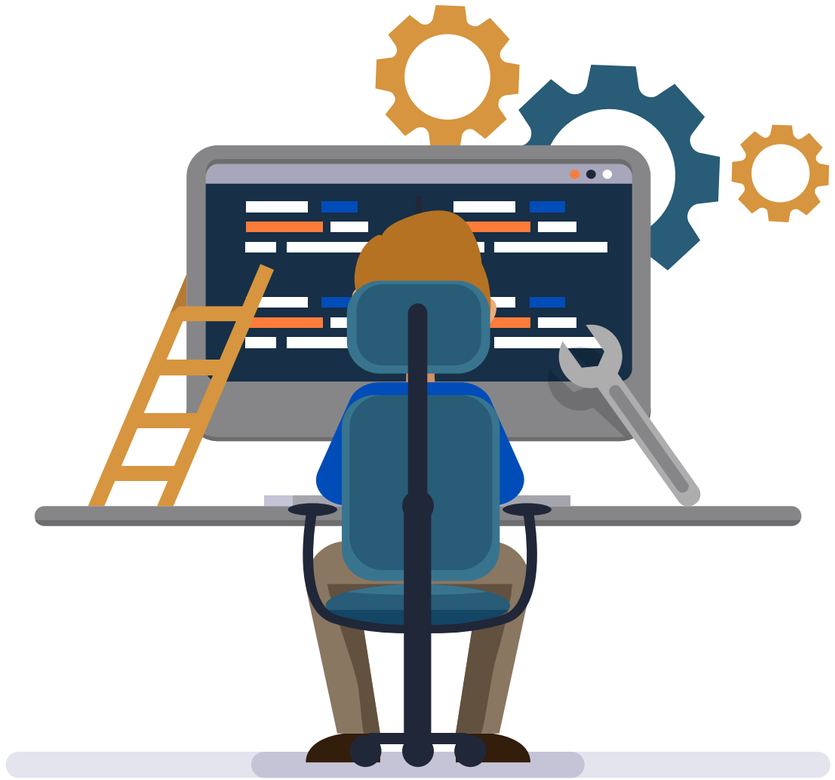
Spring Boot: Overview

It employs convention over the configuration software design paradigm that helps decrease a developer's efforts.



It employs the Spring STS IDE or Spring initializr to develop Spring Boot Java applications.

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Spring Boot: Uses

It is widely used as it:

- Provides production-ready features
- Provides opinionated ‘starter’ POMs to simplify the maven configuration
- Provides CLI tools used for testing and developing and offers plug-ins

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Spring Boot: Uses

It is widely used because it:

- Uses the dependency injection approach that helps to simplify integration
- Helps to decrease the cost and the development time of the application
- Possesses powerful database transaction management capabilities

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Spring Boot: Uses

It helps to build applications addressing modern business needs.

It is designed to simplify the process of building and deploying web applications.

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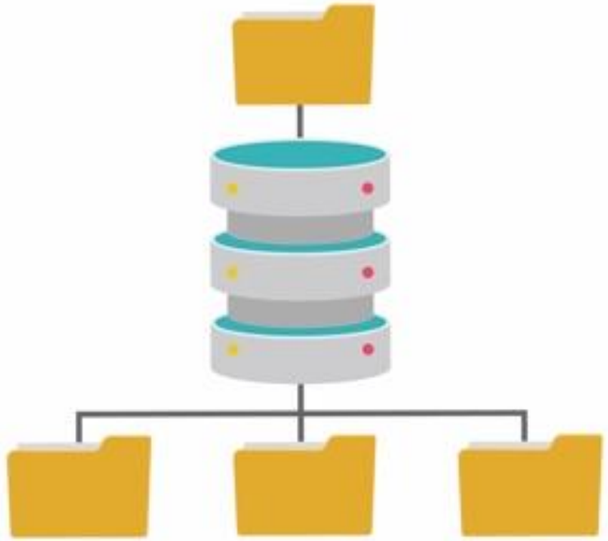
Spring Boot: Components

- Spring data
- Spring batch
- Spring security
- Spring social
- Spring integration

Provides easy data access from the relational and NoSQL databases



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Spring Boot: Components

Spring data

Spring batch

Spring security

Spring social

Spring integration

Provides powerful batch processing

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Spring Boot: Components

Spring data

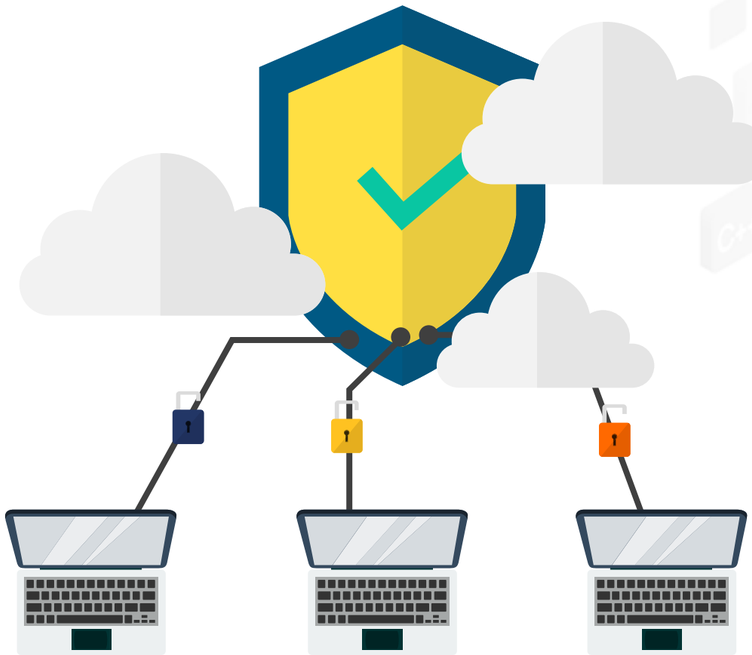
Spring batch

Spring security

Spring social

Spring integration

Provides a security framework that gives robust security to applications



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Spring Boot: Components

Spring data

Spring batch

Spring security

Spring social

Spring integration

Supports integration with social networking, like LinkedIn and others

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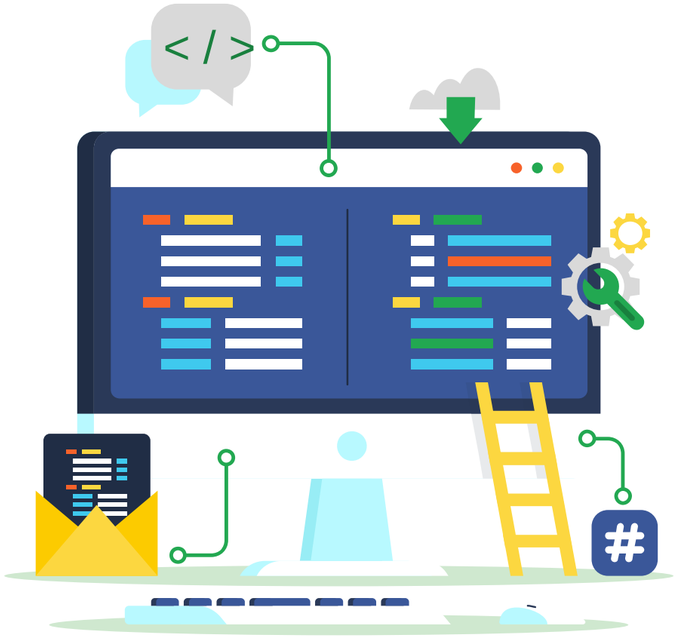
Spring Boot: Components

- Spring data
- Spring batch
- Spring security
- Spring social
- **Spring integration**

Allows integration with other enterprise applications using lightweight messaging and declarative adapters



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Spring Boot: Advantages

Below are a few advantages of Spring Boot. It:

01 Provides an opinionated development approach

02 Avoids defining more annotation configuration

03 Helps reduce the number of import statements that need to be written

04 Avoids the XML configuration

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Features of Spring Boot

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Features of Spring Boot

1. Web development
2. Spring applications
3. Application events and listeners
4. Admin support
5. Externalized configuration

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Features of Spring Boot

6. Properties files
7. YAML support
8. Typesafe configuration
9. Logging
10. Security

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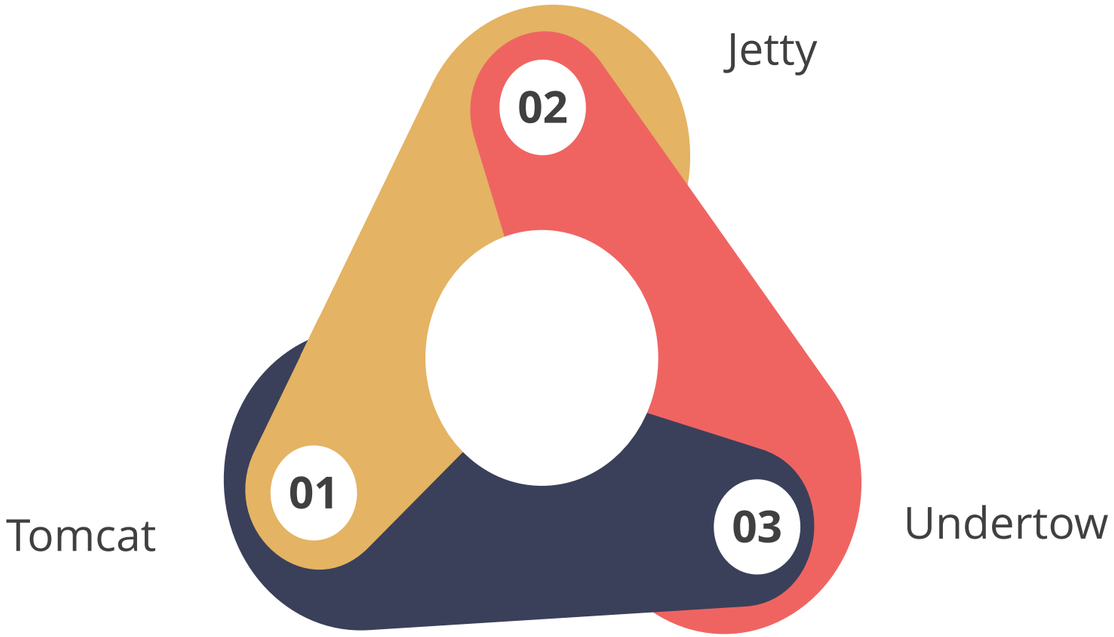
Web Development

The Spring Boot Starter Web module enables an application to start and run easily and quickly.

It creates self-contained HTTP applications that employ embedded servers like:



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Spring Applications

It provides a convenient way to bootstrap the Spring application.

The application can be called using the static run() method.

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Spring Applications

Syntax:

```
public static void main (String[] args)
{
StringApplication.run(ClassName.class,args
)
}
```

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Application Events and Listeners

01

Employs the events to handle a lot of tasks

02

Allows one to create the factories file that helps in adding listeners

03

Referred to by using the Application Listener key

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Application Events and Listeners

It helps to create the factories file in the META-INF folder like the META-INF or Spring factories.

These factory files serve as a kind of configuration file, which Spring Boot can use to automatically discover and configure various components of your application.

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Admin Support

Admin support is the assistance provided by a system administrator in maintaining and managing an application or software.

It provides the facility to enable admin-related features for the applications.

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Admin Support

It is used to access and manage the applications remotely.

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Admin Support

Enable it in the Spring Boot application using the spring.application.admin.enabled property

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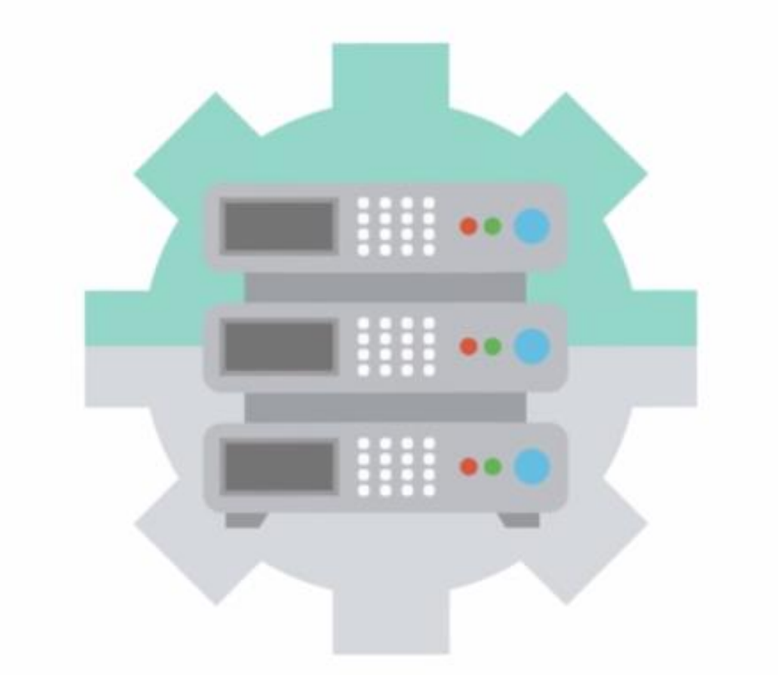
Externalized Configuration

The properties file assists in configuring and organizing the application's properties.



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Properties Files

The rich set of application properties that can be used in the properties file within the project

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YAML Support

YAML support in Spring boot are:

It provides an easier way to specify the hierarchical configuration

It is a superset of the JSON

It is an alternative of the properties file

It is automatically supported by the Spring application class

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Typesafe Configuration

Below are the features of Spring Boot as a typesafe configuration. It:

- Can govern and validate the configuration of the application
- Requires application configuration to be typesafe
- Can be used as annotations provided by this library

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Logging

Employs common logging for all the internal logging

Note

If no customization is needed, don’t change logging dependencies.

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Security

Spring boot applications are Spring-based web applications.

They are secure by default with the basic authentication on all the HTTP endpoints.

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Security

It offers a rich set of endpoints to develop the secure Spring Boot application.

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Spring vs. Spring Boot

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Spring vs. Spring Boot

Spring and Spring Boot are popular Java application development frameworks.

Spring	Spring Boot
It is used to build applications.	It is used to develop rest APIs.
It requires more coding and configurations.	It requires less coding and configurations.
It simplifies the development of Java EE and makes it easier to create web applications.	It shortens the code length and provides the easiest way to develop web applications.

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Spring vs. Spring Boot

Spring and Spring Boot are popular Java application development frameworks.

Spring	Spring Boot
The primary feature of the Spring framework is dependency injection.	The primary feature of Spring Boot is auto-configuration. It automatically configures the classes based on the requirements.
Developers manually define the dependencies for the Spring project in pom.xml.	The pom.xml file that comes with it automatically handles the download of dependency JARs according to Spring Boot requirements.
The server should be set up explicitly to test the project.	It offers embedded servers such as Jetty and Tomcat.

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Spring Boot Architecture

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Spring Boot Architecture

Four main layers in the Spring Boot include:

Data access layer
Includes the create, retrieve, update, and delete CRUD operation

Presentation layer
Consists of the views like the frontend part

Service layer
Consists of the service classes and uses services provided by the data access layers

Integration layer
Consists of different web services

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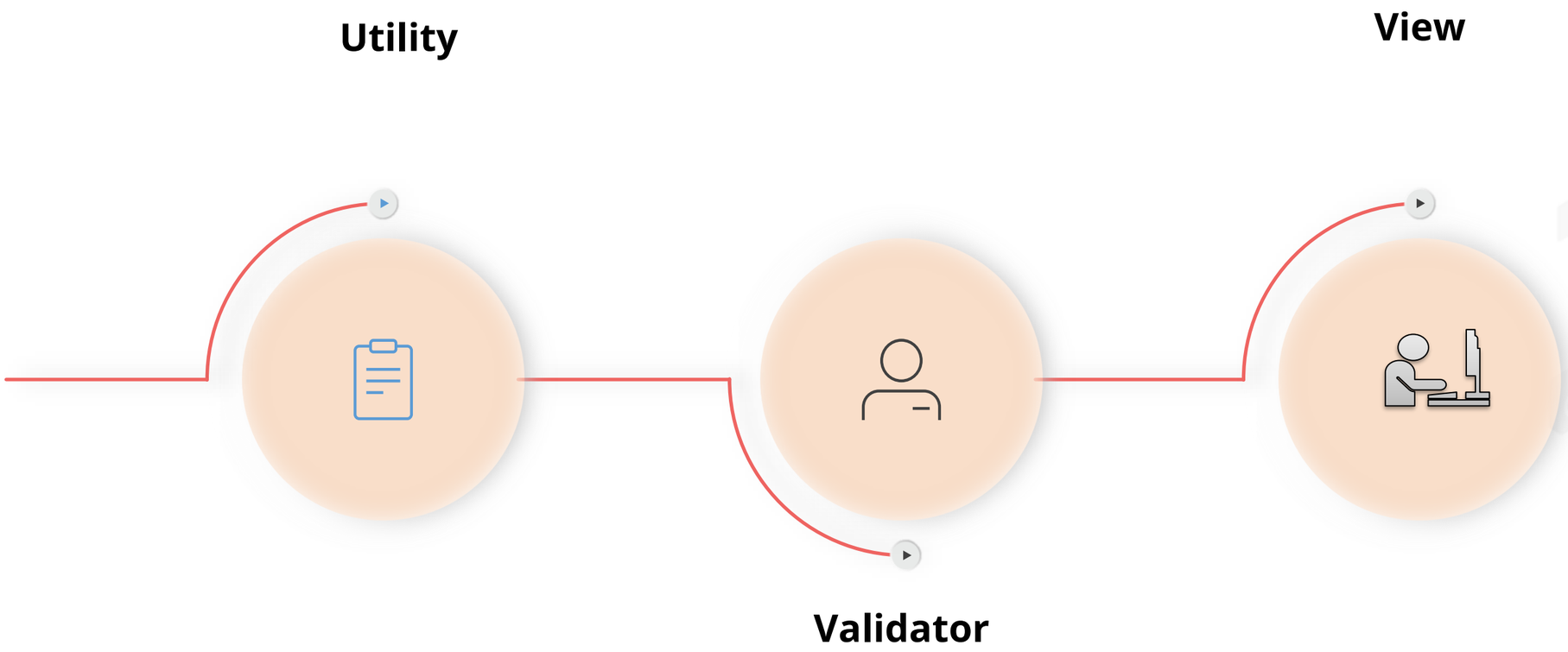
Spring Boot Architecture

In addition to these layers, there are:



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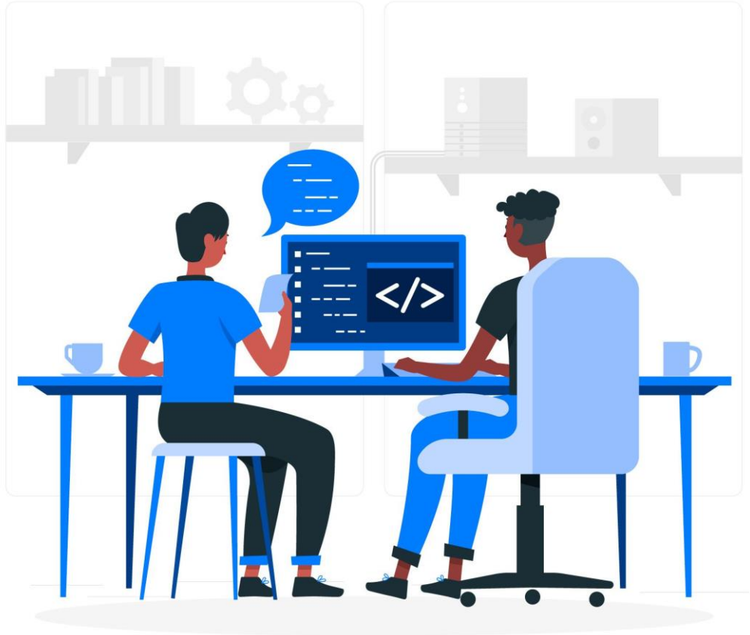
Spring Boot Architecture

Classes implement the interfaces that provide the necessary methods for successful execution of logic and accurate data.



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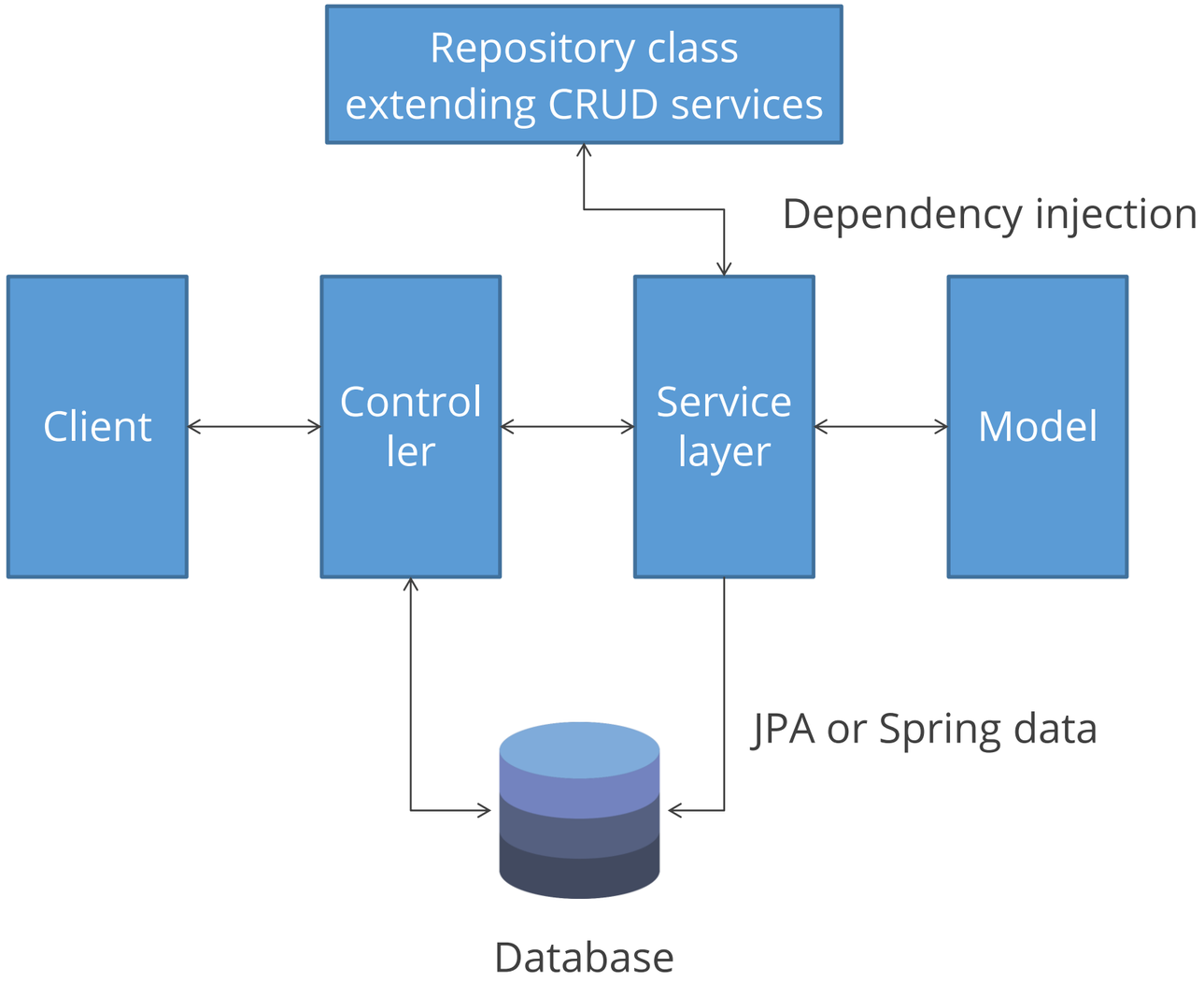
Spring Boot Flow Architecture

Spring Boot uses all the features or modules of the Spring, like Spring Data, Spring MVC, and more.



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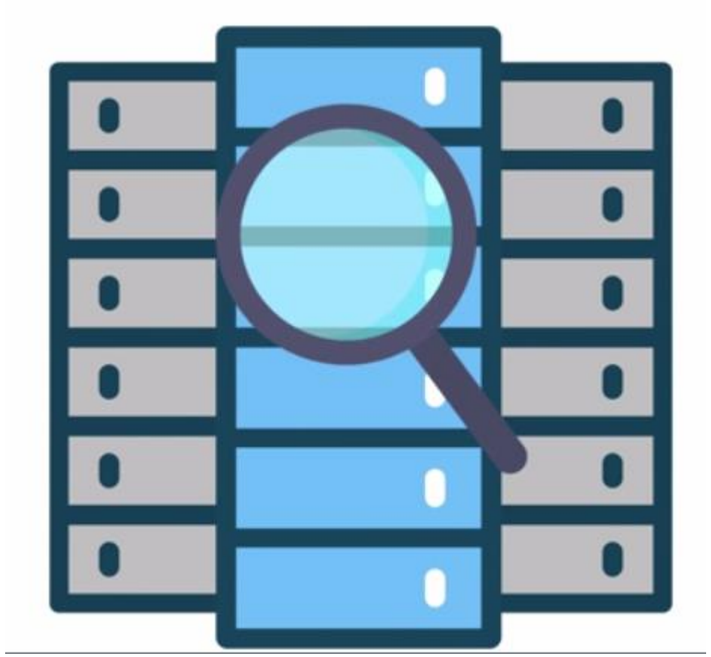
Spring Boot Flow Architecture

The data access layer contains a repository class that implements CRUD operation.



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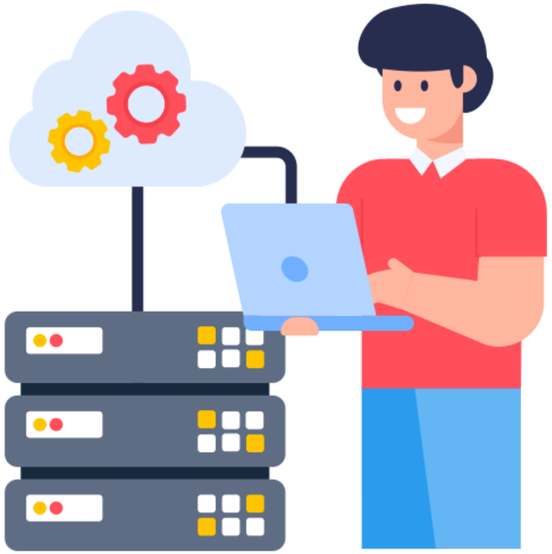
Spring Boot Flow Architecture

In the service layer, JPA maps data from the database and performs business logic.



If there are no errors, the JSP page is returned in the response.

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Spring Boot Flow Architecture

The client makes the HTTPS request (PUT or GET) that goes to the controller mapped with that route.

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Creating Spring Boot Project

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Creating Spring Boot Project

Boot projects can be created using the Spring initializer in start.spring.io.

In this method, the Spring initializer provides different options to choose from:

- Build tools
- Programming languages
- Spring Boot
- Other dependencies

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Creating Spring Boot Project

A Spring initialization helps speed up the process and does most of the groundwork.

Note

Go to start.spring.io and add the required Spring Boot starter dependencies

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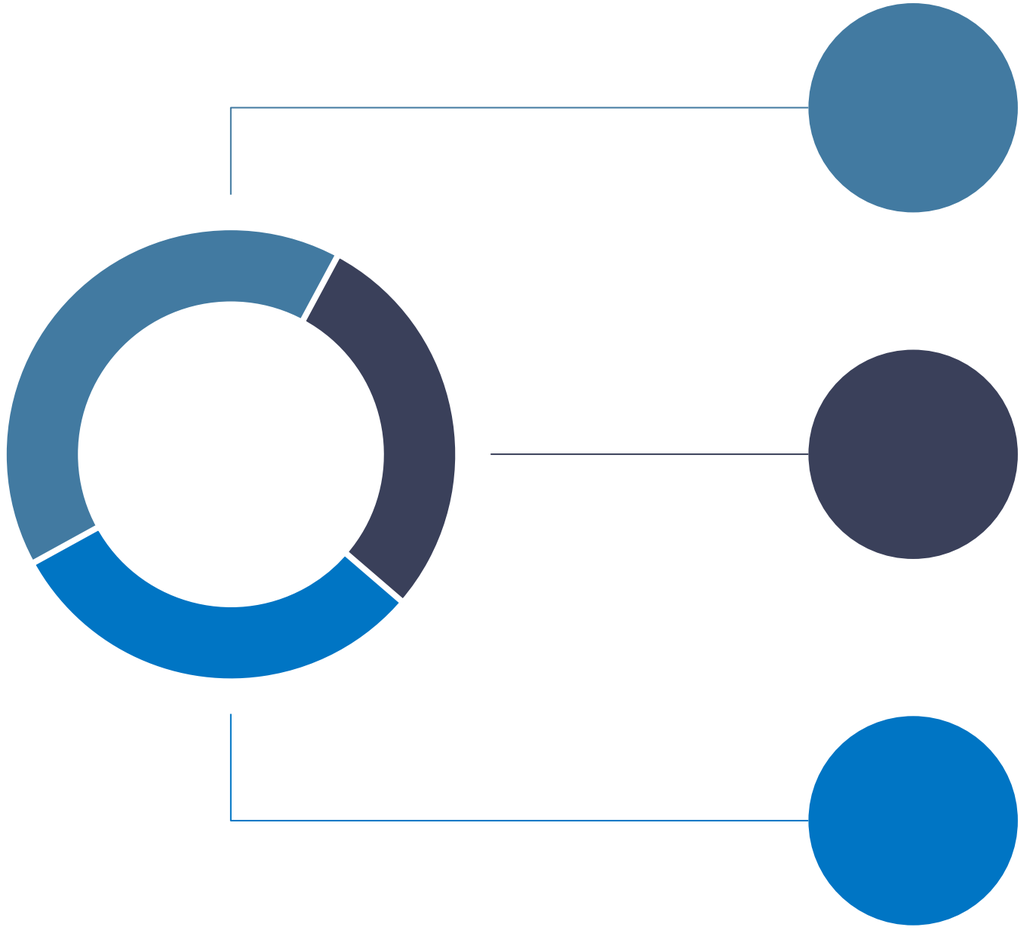
Creating Spring Boot Project

The Spring initializr performs these steps:



- Creates the build file with all the required dependencies and plugins
- Takes care of the versions
- Creates the project structure

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Creating Spring Boot Project

Step 1: Start implementing and performing customizations to the build file or the project setup

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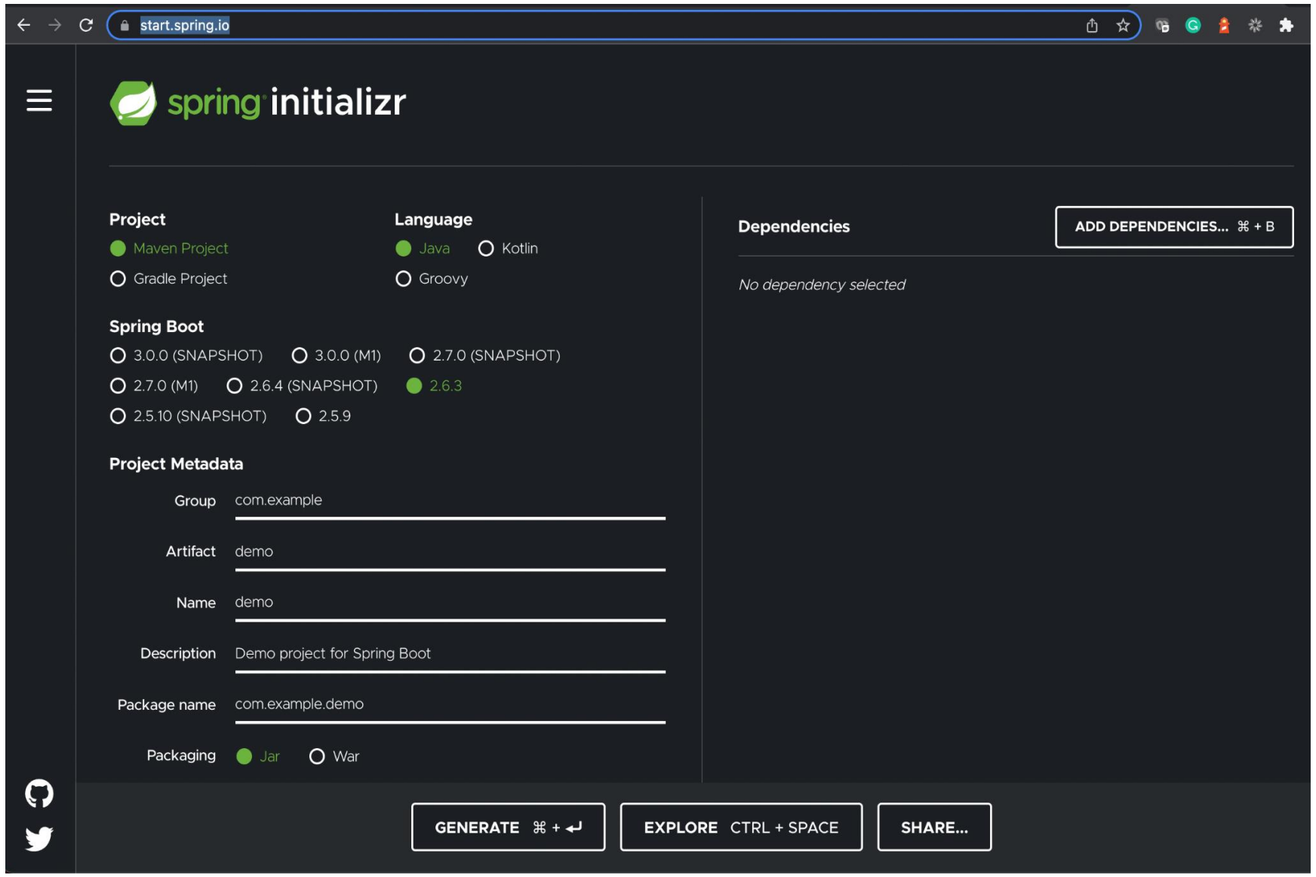
Creating Spring Boot Project

Step 2: Go to the spring initializer website https://start.spring.io/



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Creating Spring Boot Project

Step 3: Select the programming language and the Spring Boot version needed

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Creating Spring Boot Project

Step 4: Click on Add Dependencies. A popup list of dependencies will appear

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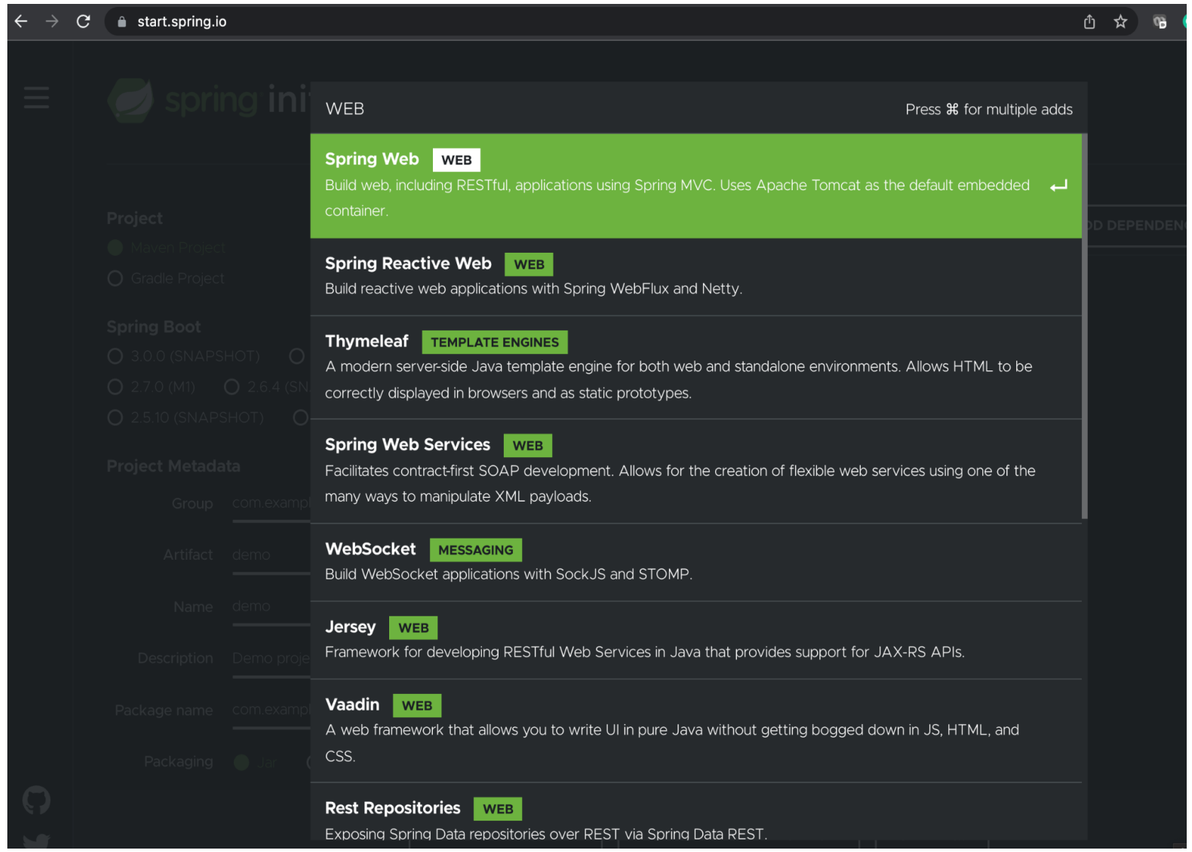
Creating Spring Boot Project

Step 5: Search for the dependencies as shown



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Creating Spring Boot Project

Step 6: Search for the REST and the first dependency which appears in Spring web

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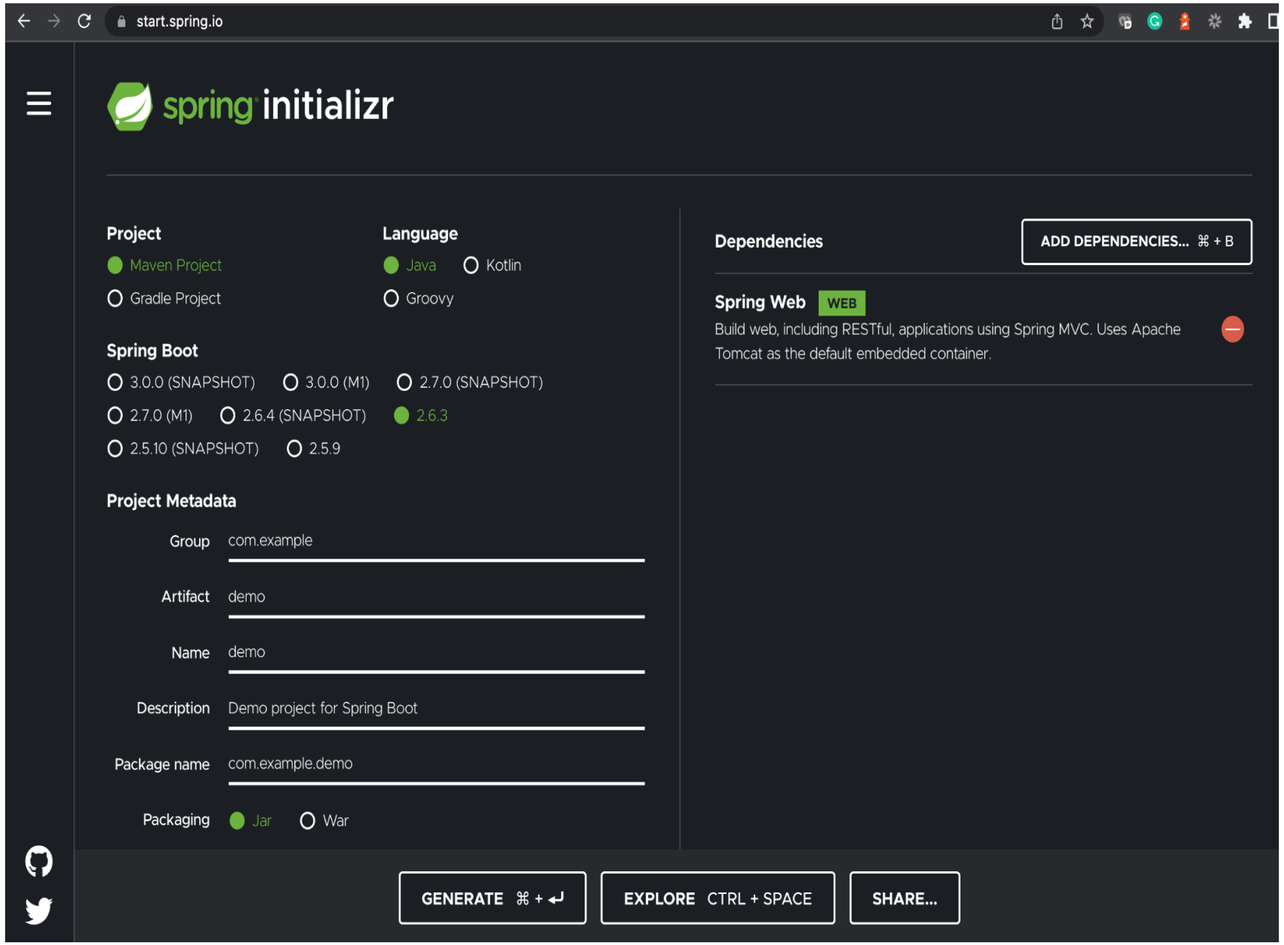
Creating Spring Boot Project

Step 7: Choose a dependency and click on it to include it in the project



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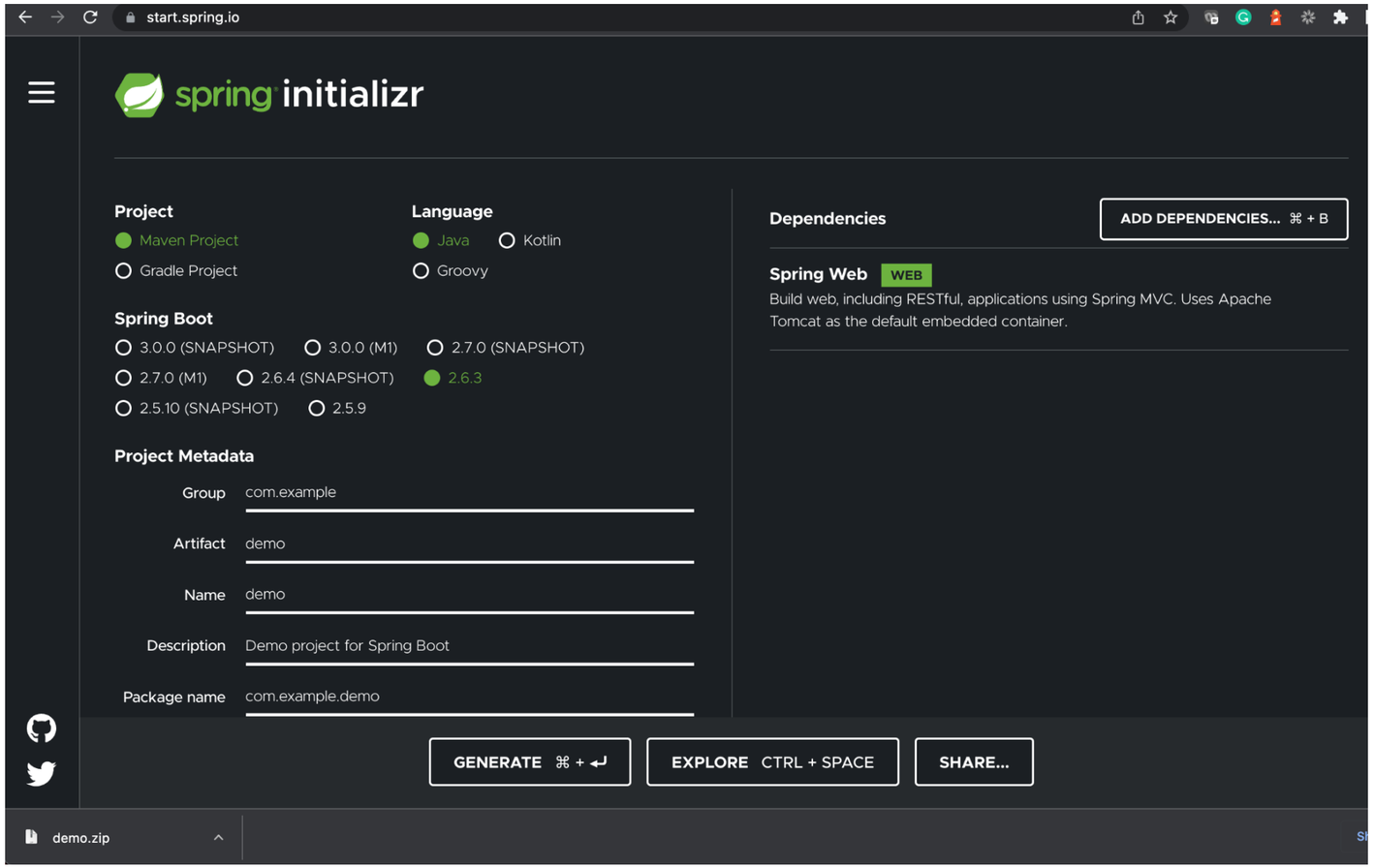
Creating Spring Boot Project

Step 8: Generate a button to download the zip file, which will be named demo.zip



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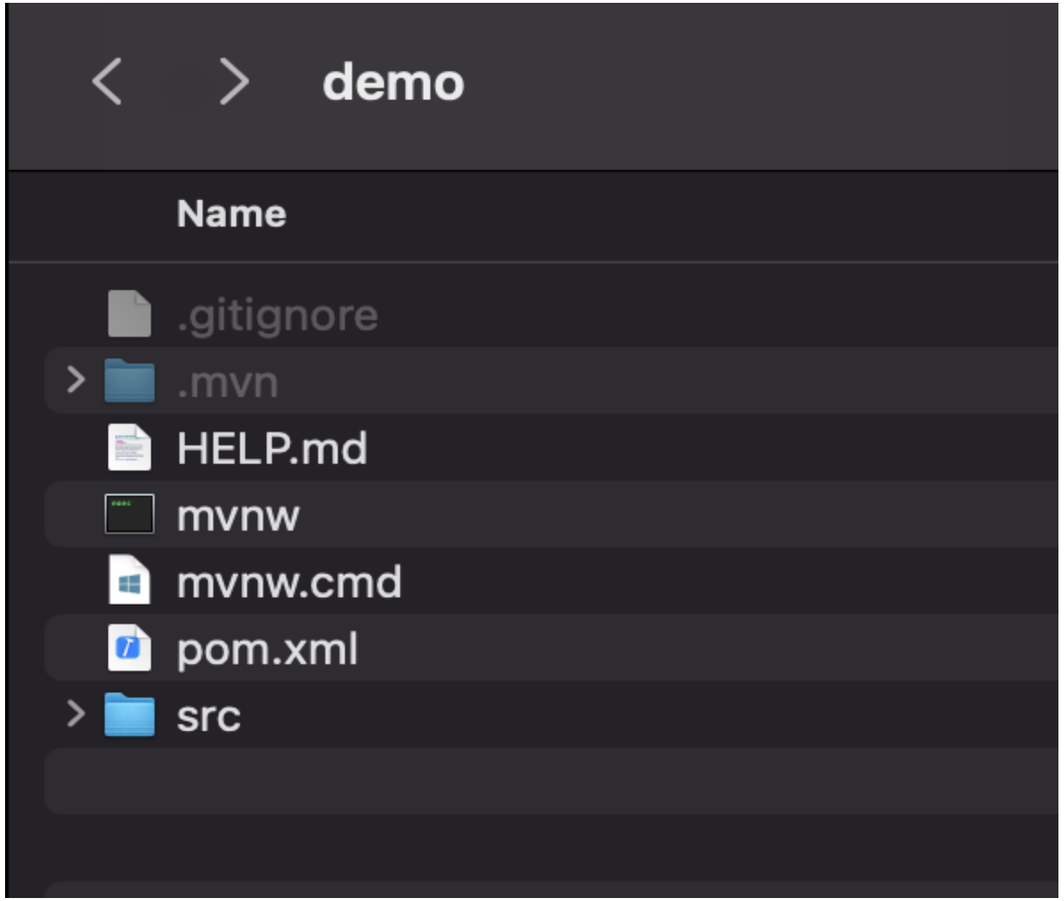
Creating Spring Boot Project

The file contains these files as shown



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Creating Spring Boot Project

The Maven project has its dependencies in the pom.xml file

```
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>2.6.3</version>
       <relativePath/> <!-- lookup parent from repository -->
   </parent>
   <groupId>com.example</groupId>
   <artifactId>demo</artifactId>
   <version>0.0.1-SNAPSHOT</version>
   <name>demo</name>
   <description>Demo project for Spring Boot</description>
   <properties>
```

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Creating Spring Boot Project

```
<java.version>11</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-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>
```

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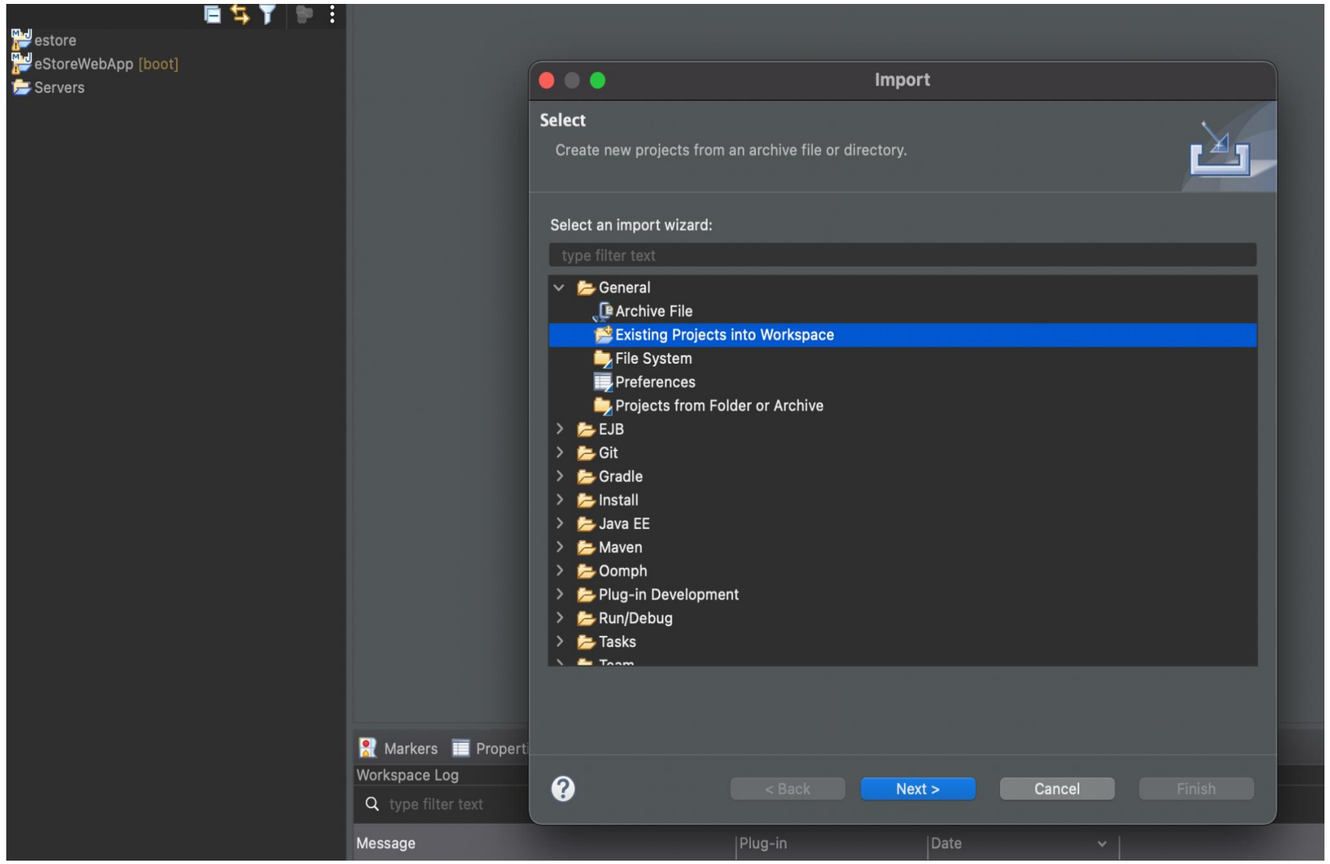
Creating Spring Boot Project

The build file includes the spring-boot-starter-test dependency along with the starter dependencies that were previously selected.



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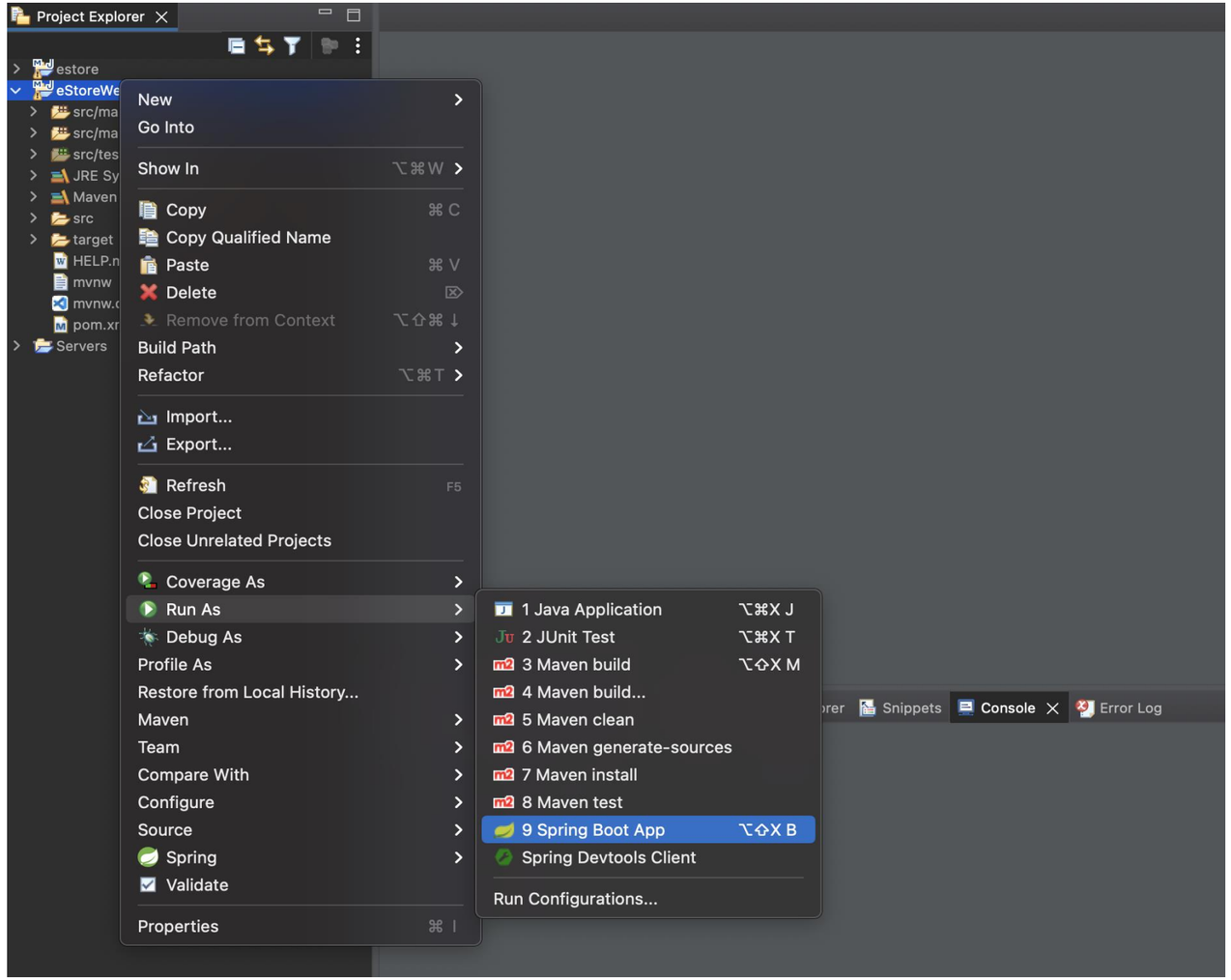
Creating Spring Boot Project

Step 9: Run the application in the Spring Boot App as shown:



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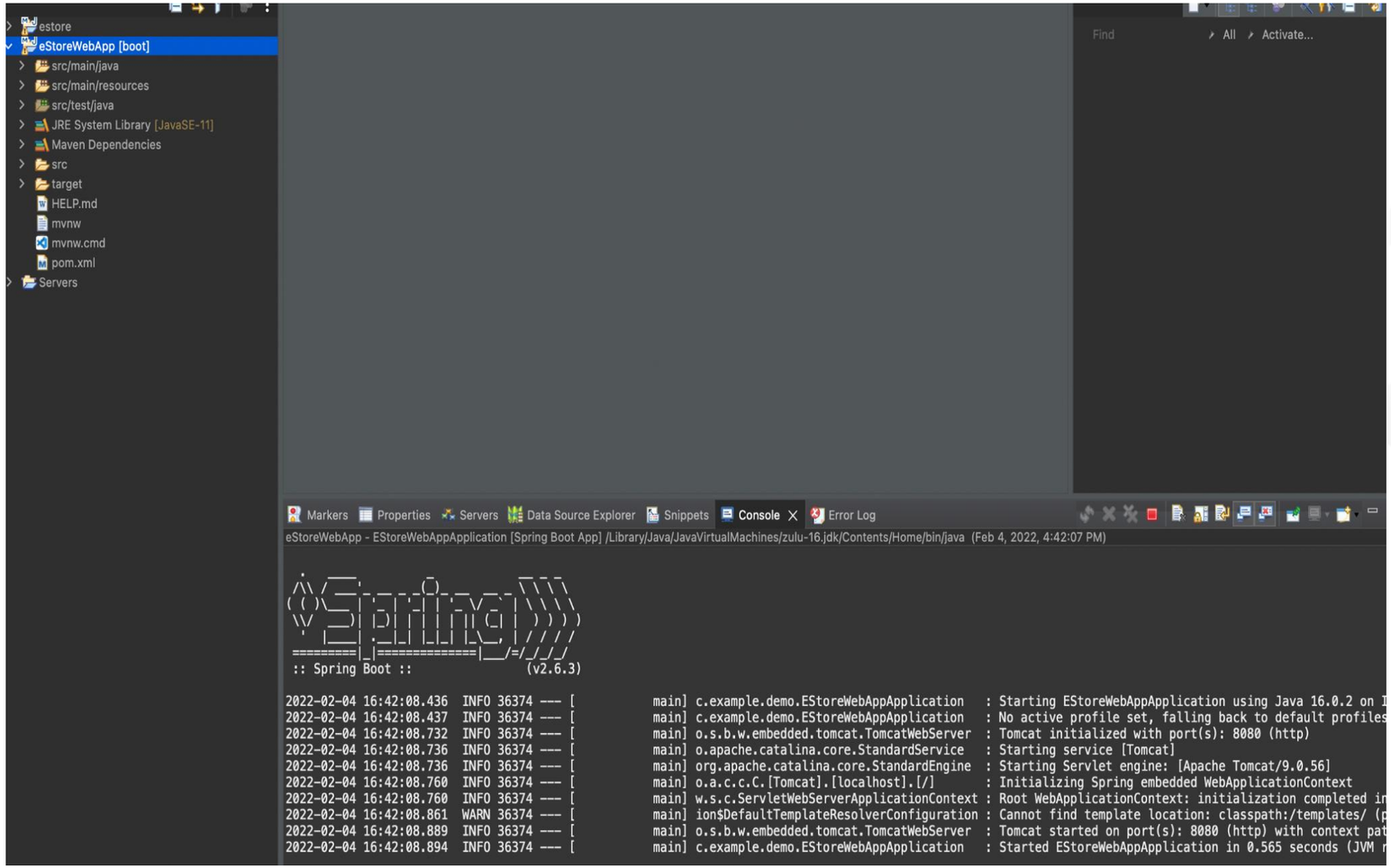
Creating Spring Boot Project

Step 10: In the console, one can see the output App Started Log



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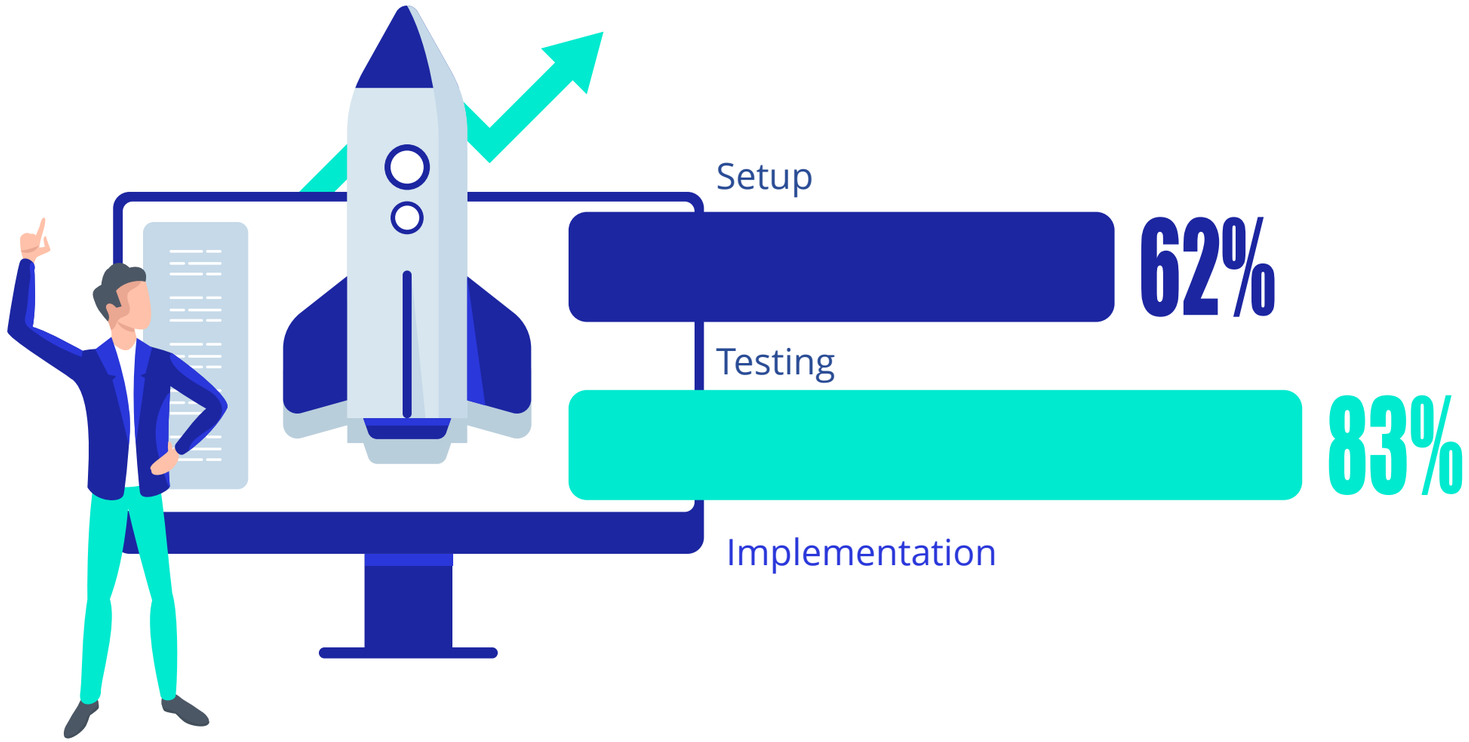
Creating Spring Boot Project

Step 11: Once the project setup is complete, proceed with testing and implementing the application.



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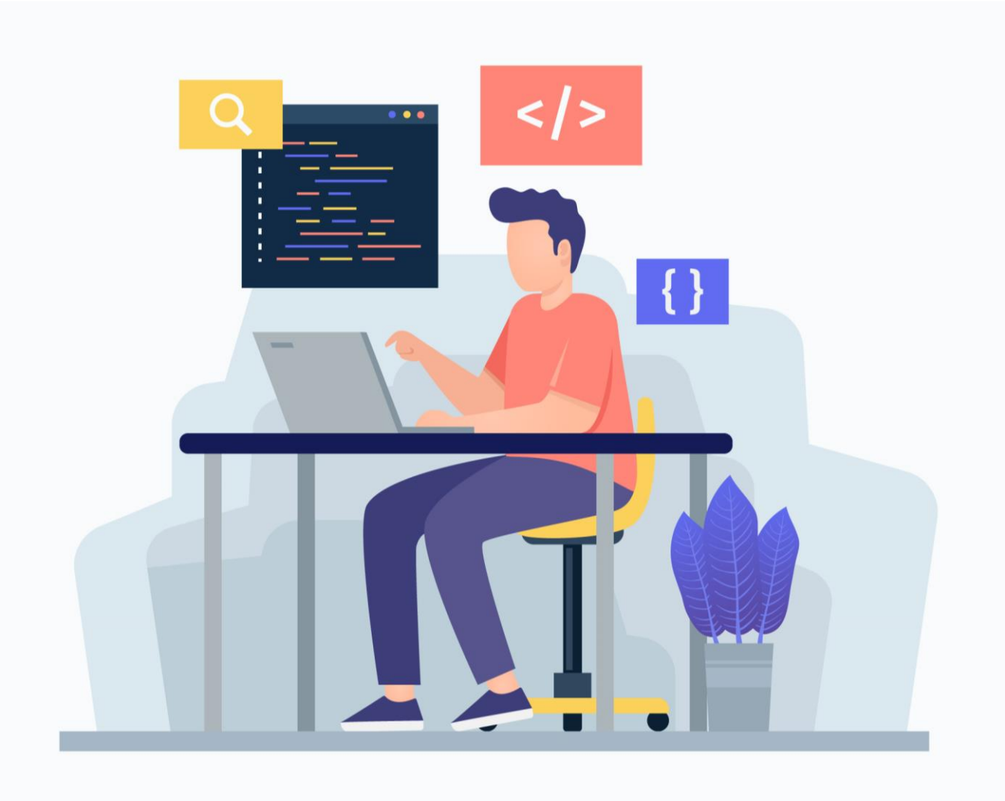
Creating Spring Boot Project

Step 12: One can create the Spring Boot project using the Spring initializer plugin in Eclipse EE



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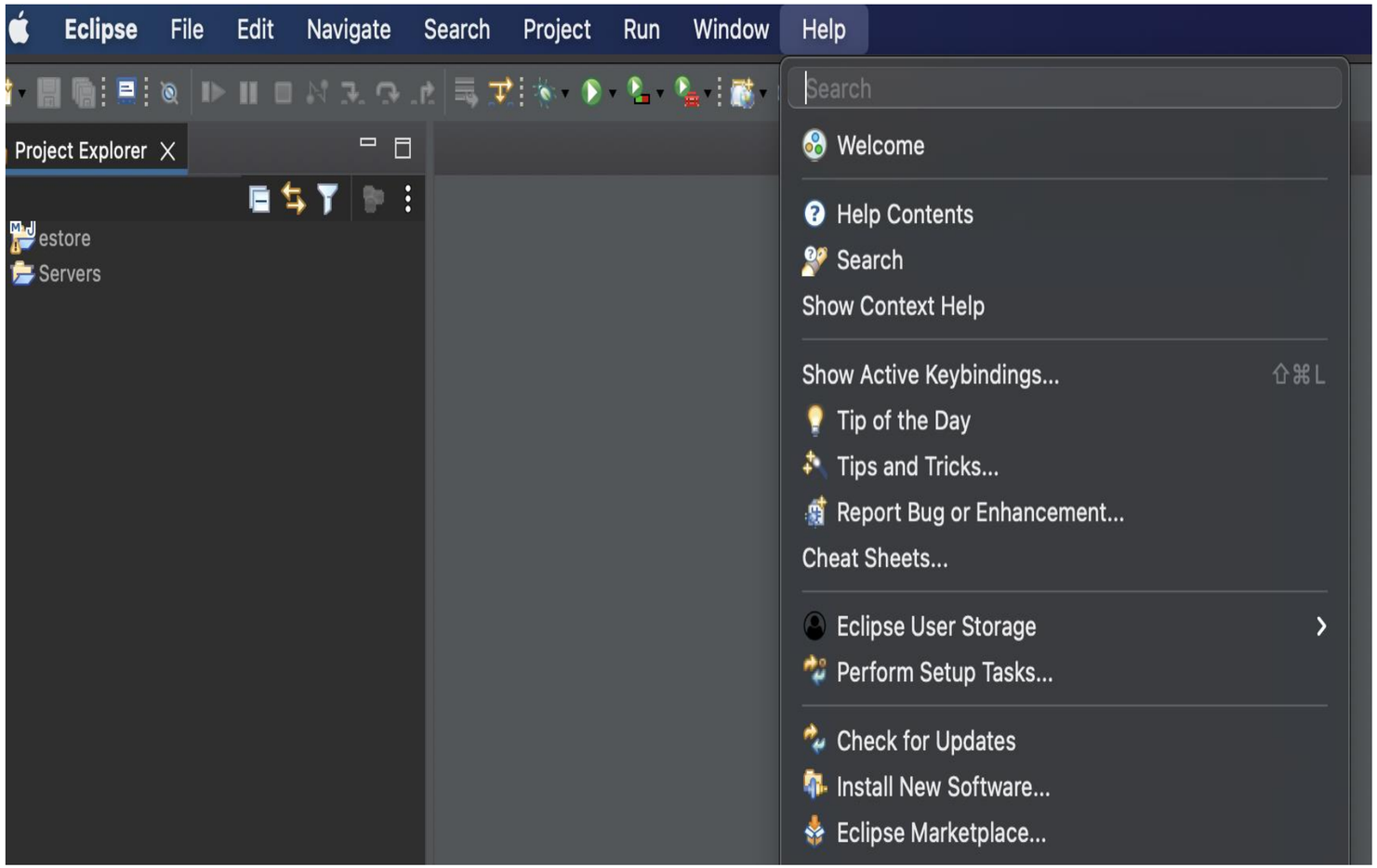
Creating Spring Boot Project

Step 13: Install Spring Initializer Plugin in Eclipse



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Creating Spring Boot Project

Step 14: Go to Eclipse Marketplace

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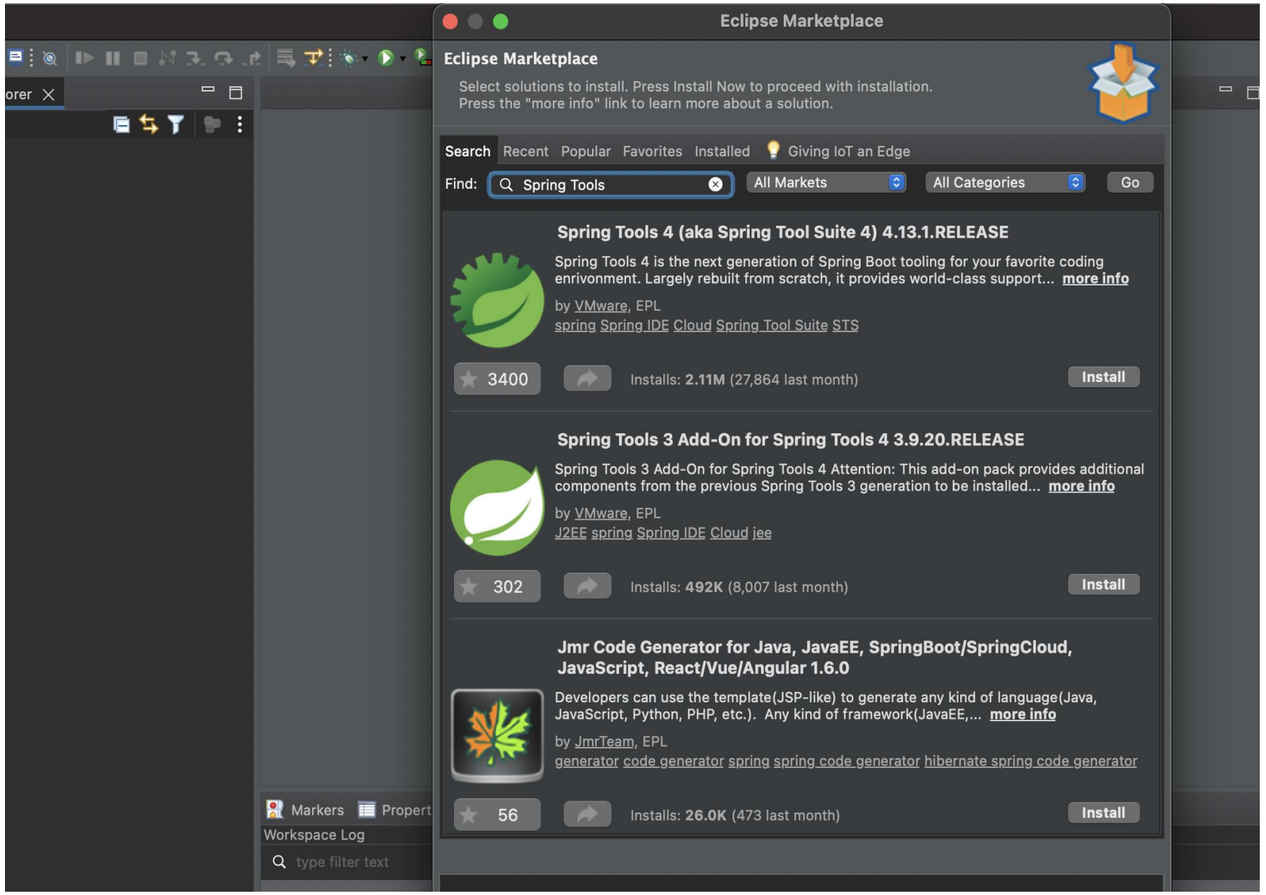
Creating Spring Boot Project

Step 15: Search For Spring Boot



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Creating Spring Boot Project

Step 16: Click Install and proceed to finish in the continuation of the installation wizard steps

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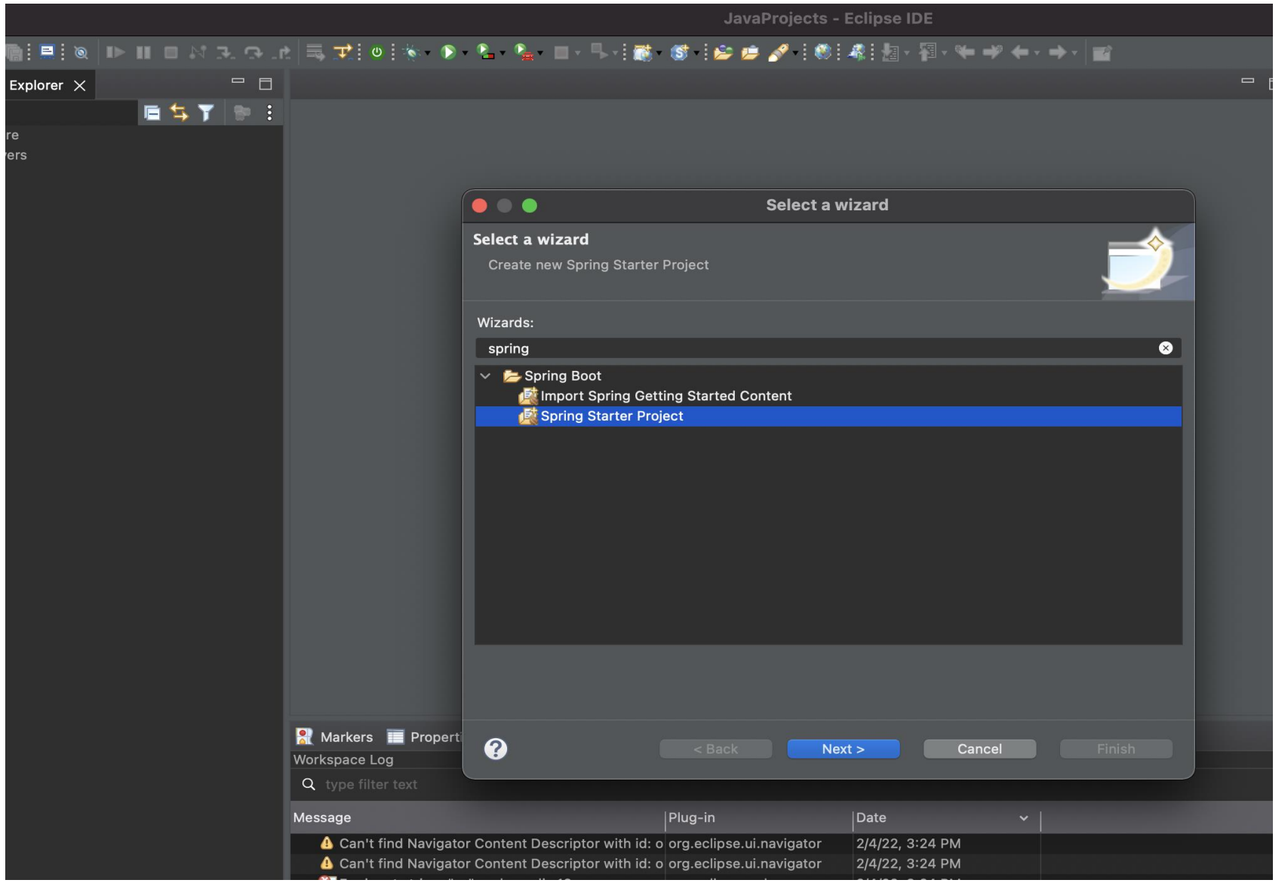
Creating Spring Boot Project

Step 17: To create a Spring project that utilizes Spring Initializr, access the File menu in Eclipse EE



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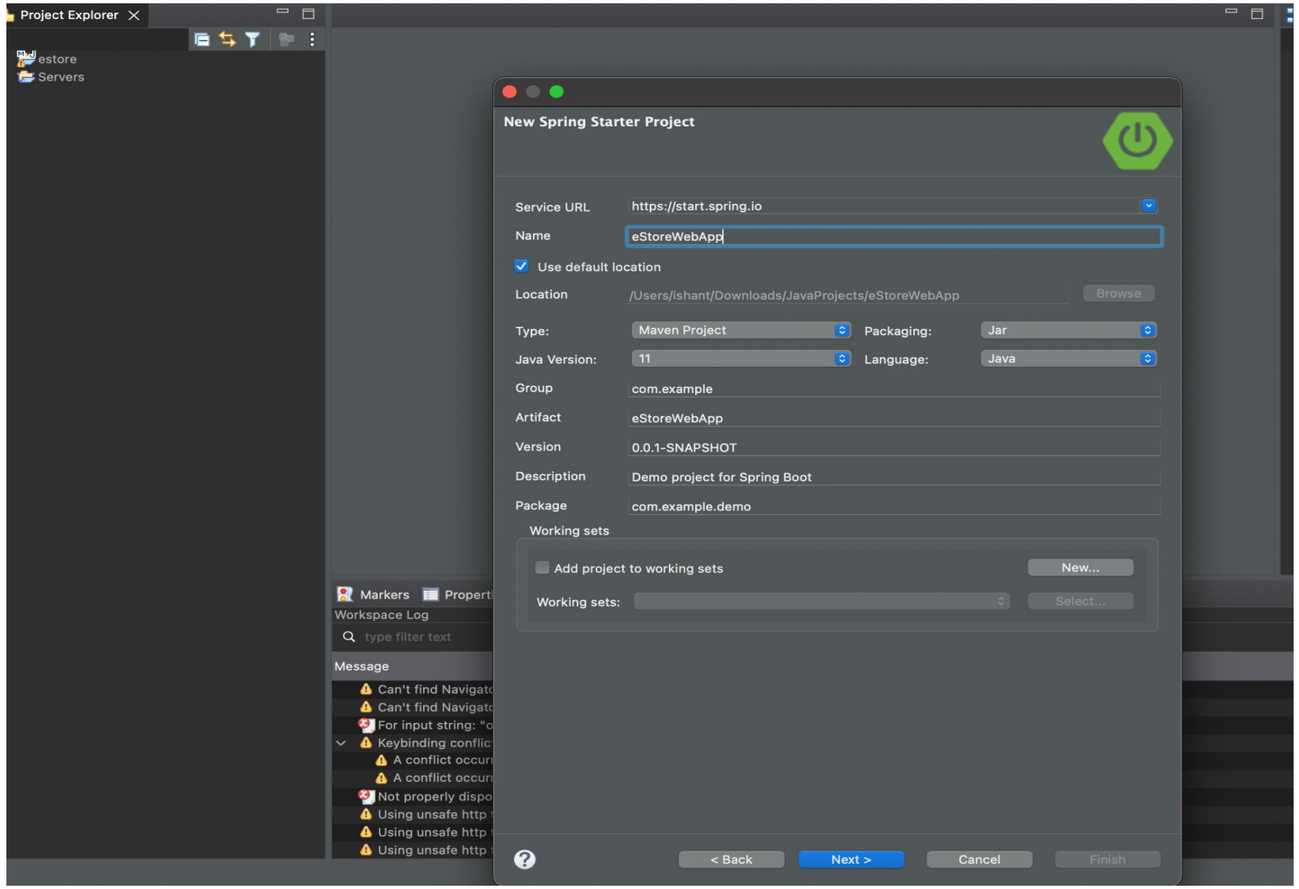
Creating Spring Boot Project

Step 18: Configure the project settings per the requirements



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Creating Spring Boot Project

Step 19: Choose Maven or Gradle as the build tool

Step 20: Select Java Version and jar as the packaging option

Step 21: Fill in the project details

Step 22: Select next to continue

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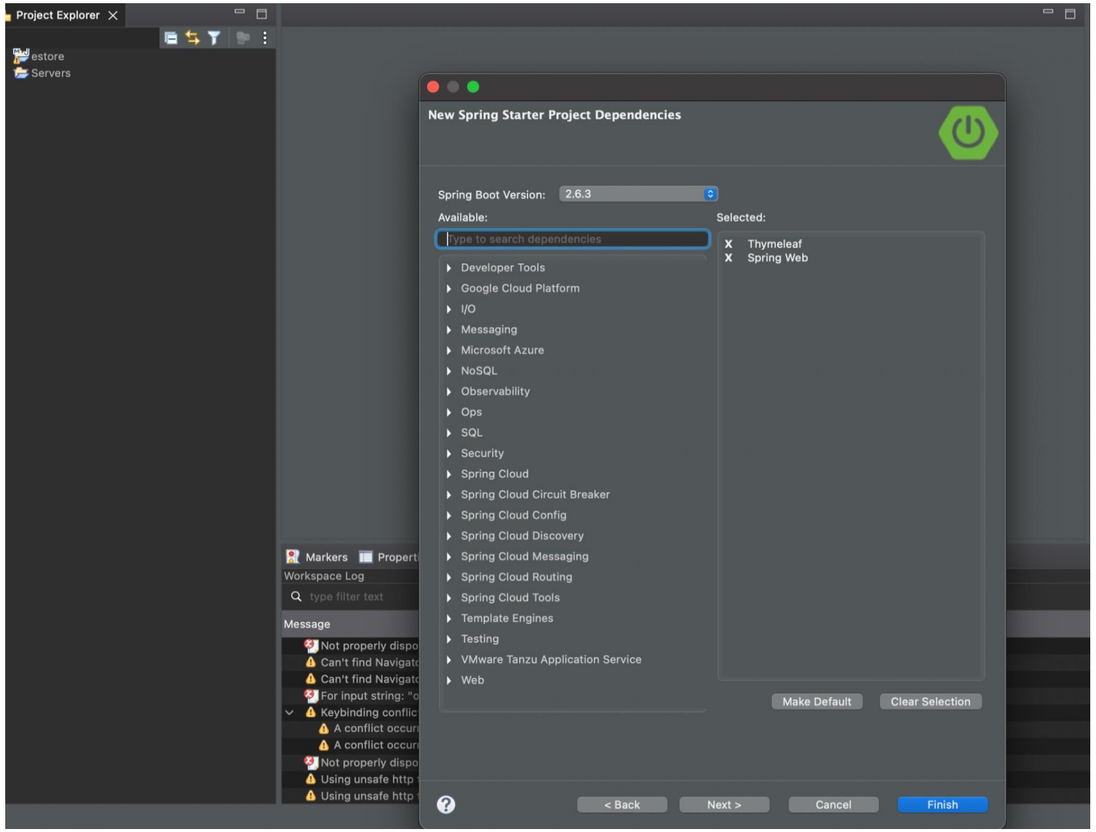
Creating Spring Boot Project

Step 23: Define the external dependencies of the Spring Boot application



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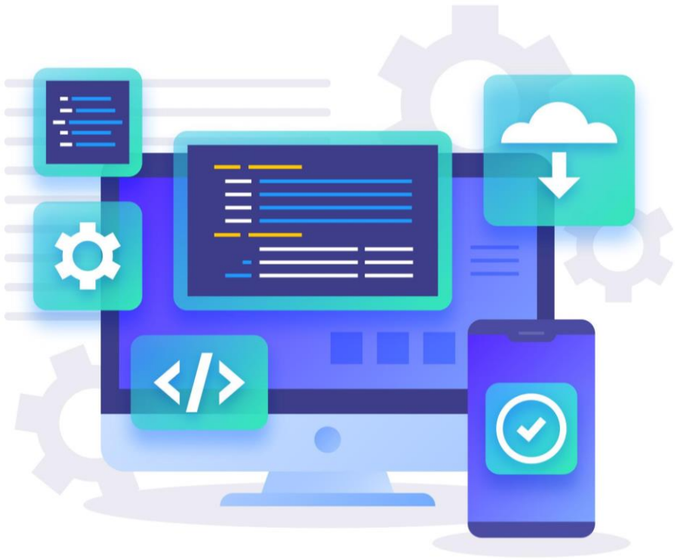
Creating Spring Boot Project

Step 24: Choose the Spring web dependency, which should be sufficient to build the simple RESTful web application



Select Next to continue

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Create Spring Boot Project with Spring Initializr

Problem Statement:

You have been asked to create a Spring Boot application using the Spring Initializer to view the application created.

ASSISTED PRACTICE

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Assisted Practice: Guidelines

Steps to be followed are:

1. Configuring the project from the Spring Initializer website
2. Extracting the downloaded project
3. Building and running the project

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Creating a Spring Boot Project in Eclipse

Problem Statement:

You have been asked to create a Spring Boot project in Eclipse IDE and to view the application created.

ASSISTED PRACTICE

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Assisted Practice: Guidelines

Steps to be followed are:

1. Installing the Spring Tool Suite plugin
2. Setting up a Spring Boot project in Eclipse IDE
3. Initializing the Spring Boot project

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Web MVC App in Spring Boot

Problem Statement:

You have been asked to create a spring web MVC application using the Spring Boot and run the created web application.

ASSISTED PRACTICE

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Assisted Practice: Guidelines

Steps to be followed are:

1. Creating a new Spring Boot project
2. Creating a view template and running the application

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Key Takeaways

- Spring Boot facilitates easy and fast configuration and helps run both simple- and web-based applications.
- The main goal of the Spring Boot is to reduce the development, unit test, and the integration test time.
- Spring Boot allows one to externalize configurations to enable working with the same application in different environments.
- Spring Boot projects can be created using the Spring initializer in start.spring.io.

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TECHNOLOGY

Thank You

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