

# A Java Microservices project using Spring Boot– Hands-on guide

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# Detailed Steps:

This document contains the detailed steps with screenshots, to setup a Java Microservices project using Spring Boot:

## Target Audience:

All, who has the knowledge of Java.

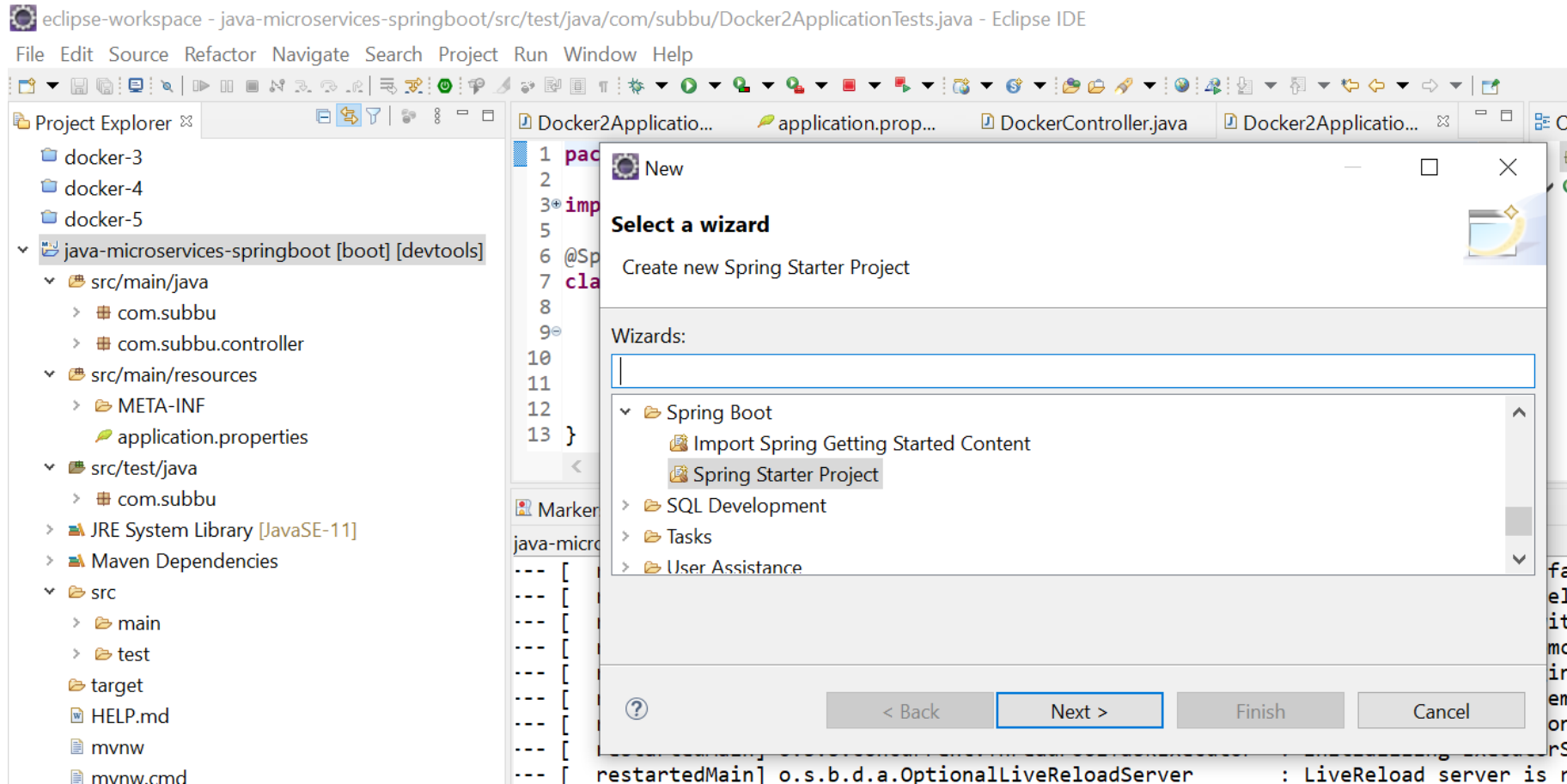
## Artifacts needed:

1. JDK11
2. Eclipse – IDE
3. Internet

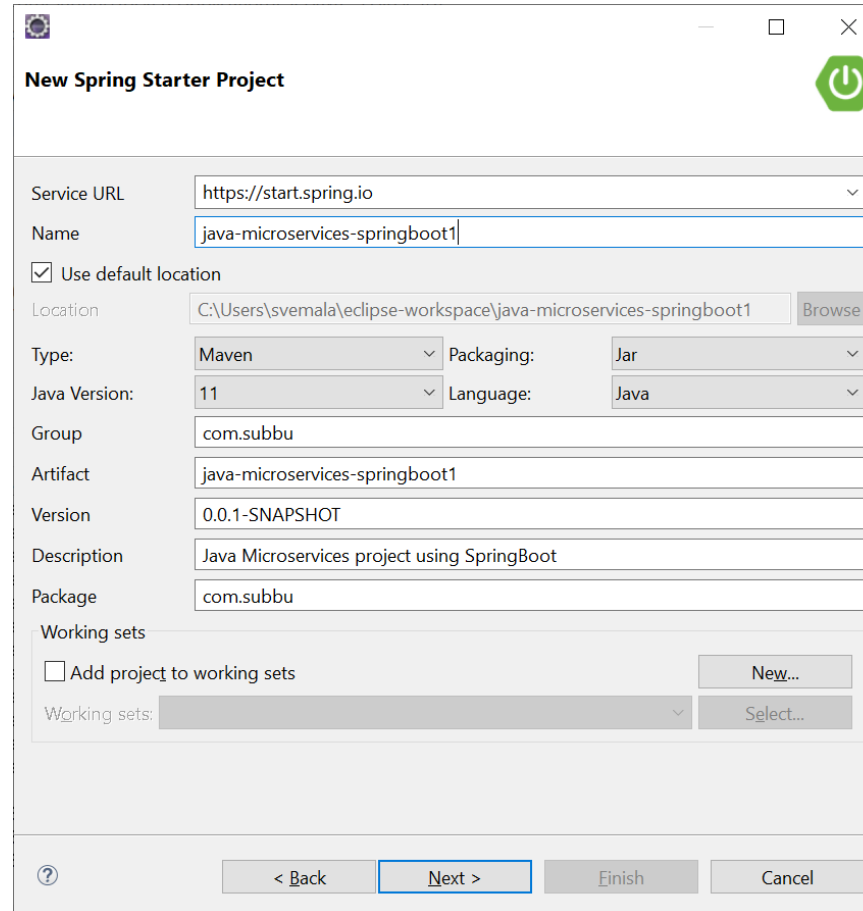
## Implementation Steps:

1. Create a Spring Starter Project.
2. Add the necessary Classes and dependencies in the pom.xml
3. Run as Spring Boot App on the Eclipse.
4. Check for the output both on the Console and the Browser.

# File – New – Spring Starter Project - Create



# Provide the necessary details for the Spring starter project:



The screenshot shows the 'New Spring Starter Project' dialog box in the Eclipse IDE. The dialog is titled 'New Spring Starter Project' and features a green power button icon in the top right corner. It contains several input fields and checkboxes for configuring a new project. The 'Service URL' is set to 'https://start.spring.io'. The 'Name' field contains 'java-microservices-springboot1'. The 'Use default location' checkbox is checked. The 'Location' field shows the default path 'C:\Users\svemala\eclipse-workspace\java-microservices-springboot1' with a 'Browse' button. The 'Type' is 'Maven', 'Packaging' is 'Jar', 'Java Version' is '11', and 'Language' is 'Java'. The 'Group' is 'com.subbu', 'Artifact' is 'java-microservices-springboot1', 'Version' is '0.0.1-SNAPSHOT', 'Description' is 'Java Microservices project using SpringBoot', and 'Package' is 'com.subbu'. At the bottom, there is a 'Working sets' section with an unchecked checkbox 'Add project to working sets', a 'New...' button, and a 'Working sets:' dropdown menu with a 'Select...' button. The bottom of the dialog has navigation buttons: '< Back', 'Next >', 'Finish', and 'Cancel'.

**New Spring Starter Project**

Service URL:

Name:

☒ Use default location

Location:

Type:  Packaging:

Java Version:  Language:

Group:

Artifact:

Version:

Description:

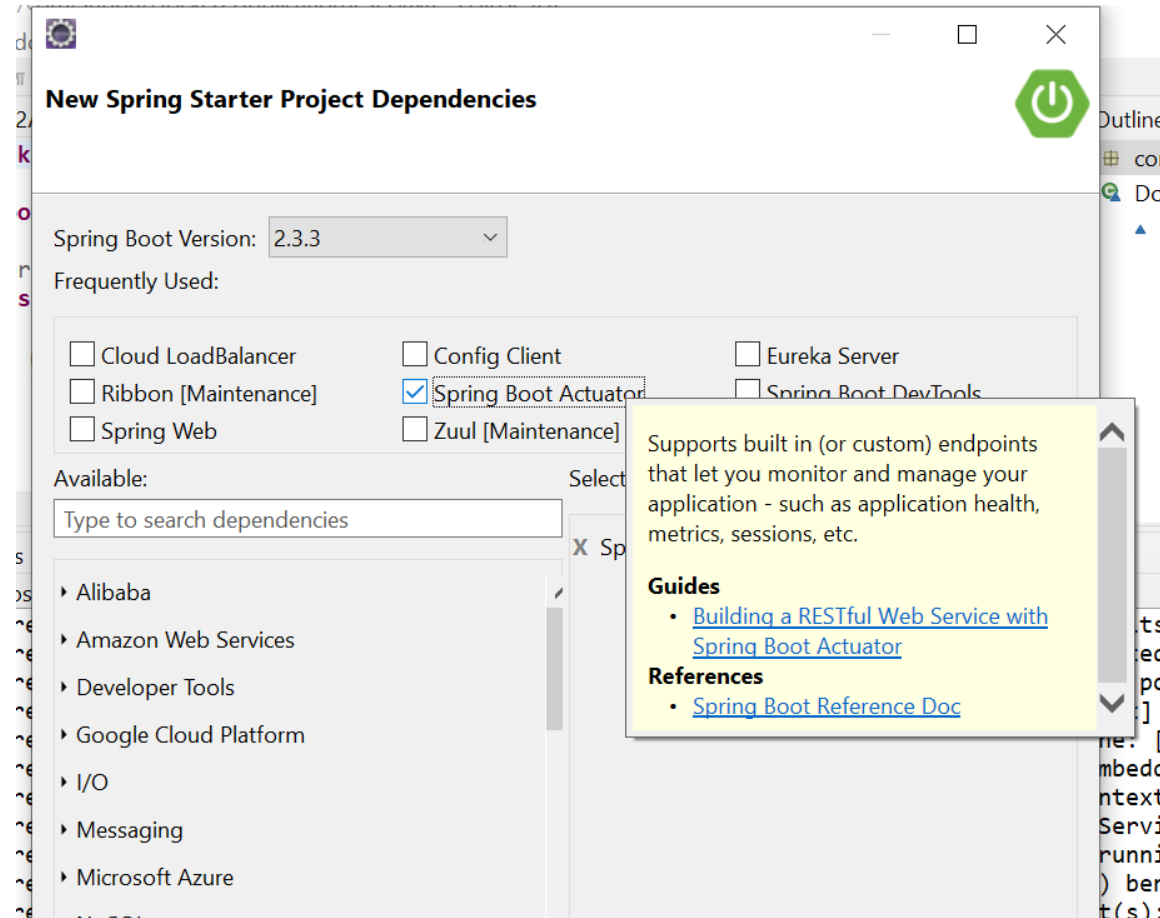
Package:

Working sets

☐ Add project to working sets

Working sets:

# Choose the dependencies - Actuator:



# Choose the dependencies - DevTools:

**New Spring Starter Project Dependencies**

Spring Boot Version: 2.3.3

Frequently Used:

- ☐ Cloud LoadBalancer
- ☐ Ribbon [Maintenance]
- ☐ Spring Web
- ☐ Config Client
- ☒ Spring Boot Actuator
- ☐ Zuul [Maintenance]
- ☒ Spring Boot DevTools
- ☐ Eureka Server

Available:

Type to search dependencies

- Alibaba
- Amazon Web Services
- Developer Tools
- Google Cloud Platform
- I/O
- Messaging

Selected:

- X Spring Boot DevTools
- X Spring Boot Actuator

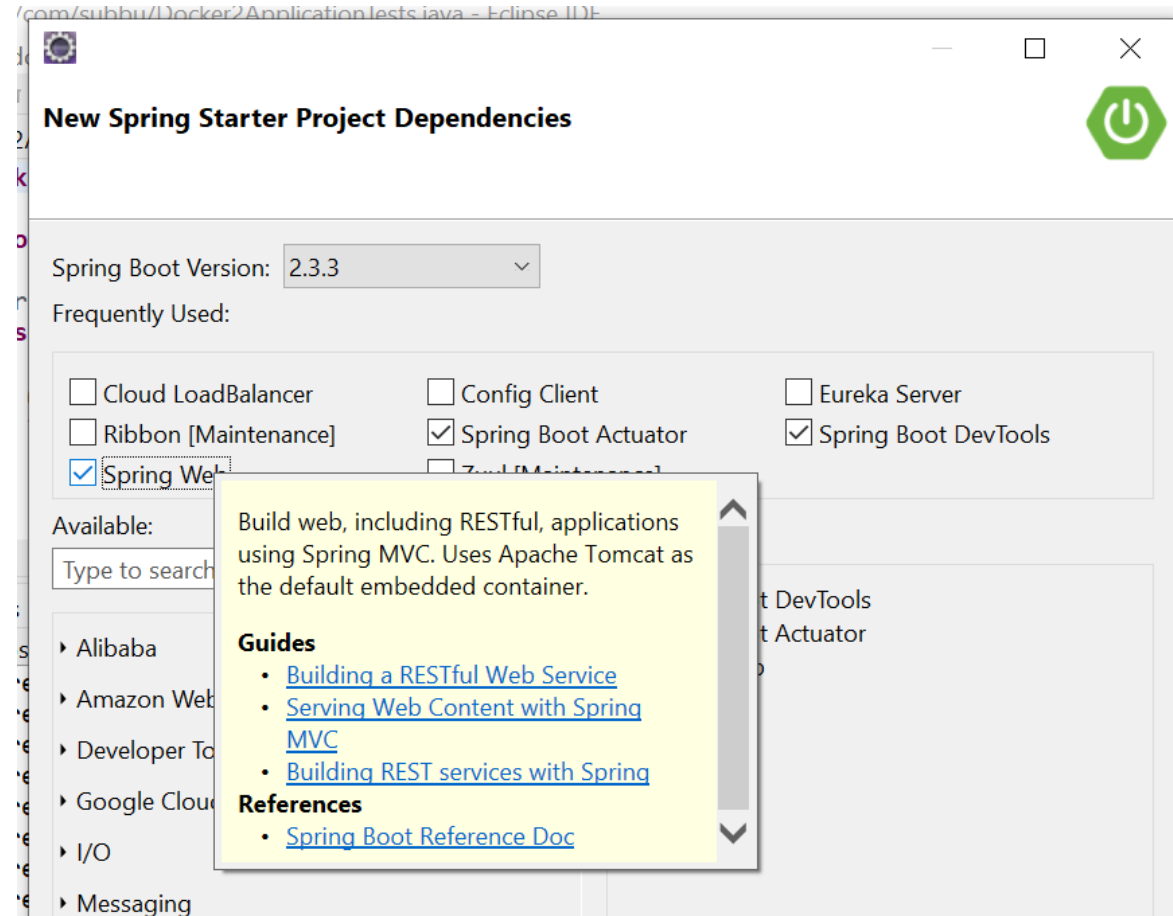
Provides fast application restarts, LiveReload, and configurations for enhanced development experience.

**References**

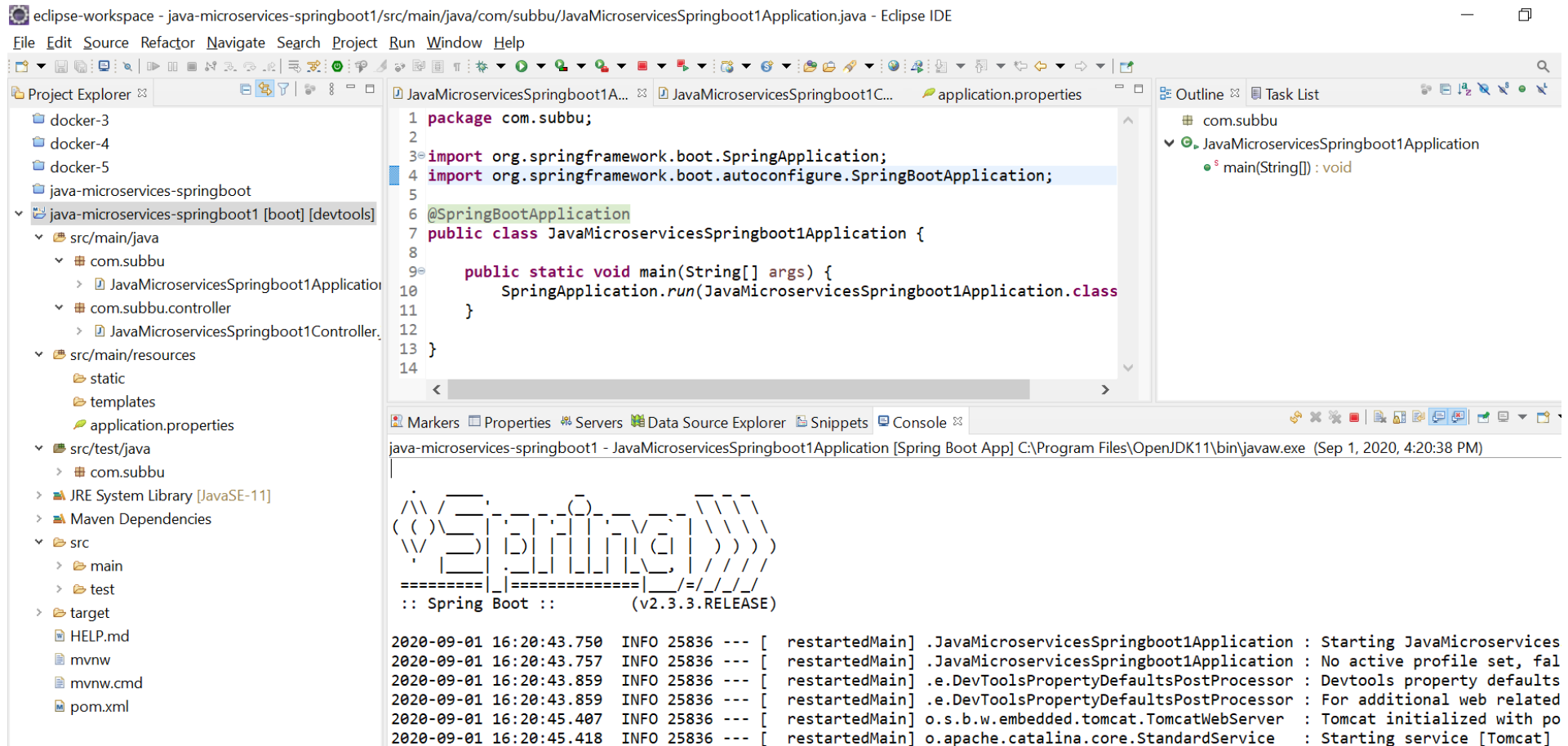
- [Spring Boot Reference Doc](#)

lated logging consider  
th port(s): 9080 (http  
cat]  
ne: [Apache Tomcat/9.0  
mbedded WebApplication  
ntext: initialization  
Service 'applicationTa

# Choose the dependencies – Spring Web:



# Project is created on the Eclipse:



eclipse-workspace - java-microservices-springboot1/src/main/java/com/subbu/JavaMicroservicesSpringboot1Application.java - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

Project Explorer

- docker-3
- docker-4
- docker-5
- java-microservices-springboot
  - java-microservices-springboot1 [boot] [devtools]
    - src/main/java
      - com.subbu
        - JavaMicroservicesSpringboot1Application
      - com.subbu.controller
        - JavaMicroservicesSpringboot1Controller
    - src/main/resources
      - static
      - templates
      - application.properties
    - src/test/java
      - com.subbu
    - JRE System Library [JavaSE-11]
    - Maven Dependencies
    - src
      - main
      - test
    - target
    - HELP.md
    - mvnw
    - mvnw.cmd
    - pom.xml

JavaMicroservicesSpringboot1A... JavaMicroservicesSpringboot1C... application.properties

```
1 package com.subbu;
2
3 import org.springframework.boot.SpringApplication;
4 import org.springframework.boot.autoconfigure.SpringBootApplication;
5
6 @SpringBootApplication
7 public class JavaMicroservicesSpringboot1Application {
8
9     public static void main(String[] args) {
10         SpringApplication.run(JavaMicroservicesSpringboot1Application.class, args);
11     }
12 }
13
14
```

Outline Task List

- com.subbu
  - JavaMicroservicesSpringboot1Application
    - main(String[]) : void

Markers Properties Servers Data Source Explorer Snippets Console

java-microservices-springboot1 - JavaMicroservicesSpringboot1Application [Spring Boot App] C:\Program Files\OpenJDK11\bin\javaw.exe (Sep 1, 2020, 4:20:38 PM)

```

  ____ _
 / ___ \| | | |
/ /   \| |_| |
\ \   /| | | |
 \___/\_| |_| |
      |_|_|_|_|

:: Spring Boot :: (v2.3.3.RELEASE)

2020-09-01 16:20:43.750 INFO 25836 --- [ restartedMain] .JavaMicroservicesSpringboot1Application : Starting JavaMicroservices
2020-09-01 16:20:43.757 INFO 25836 --- [ restartedMain] .JavaMicroservicesSpringboot1Application : No active profile set, fal
2020-09-01 16:20:43.859 INFO 25836 --- [ restartedMain] .e.DevToolsPropertyDefaultsPostProcessor : Devtools property defaults
2020-09-01 16:20:43.859 INFO 25836 --- [ restartedMain] .e.DevToolsPropertyDefaultsPostProcessor : For additional web related
2020-09-01 16:20:45.407 INFO 25836 --- [ restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomcat initialized with po
2020-09-01 16:20:45.418 INFO 25836 --- [ restartedMain] o.apache.catalina.core.StandardService : Starting service [Tomcat]
```



# Create Controller with GetMapping and RestController:

eclipse-workspace - java-microservices-springboot1/src/main/java/com/subbu/controller/JavaMicroservicesSpringboot1Controller.java - Eclipse IDE

File Edit Source Refactor Navigate Search Project Run Window Help

Project Explorer

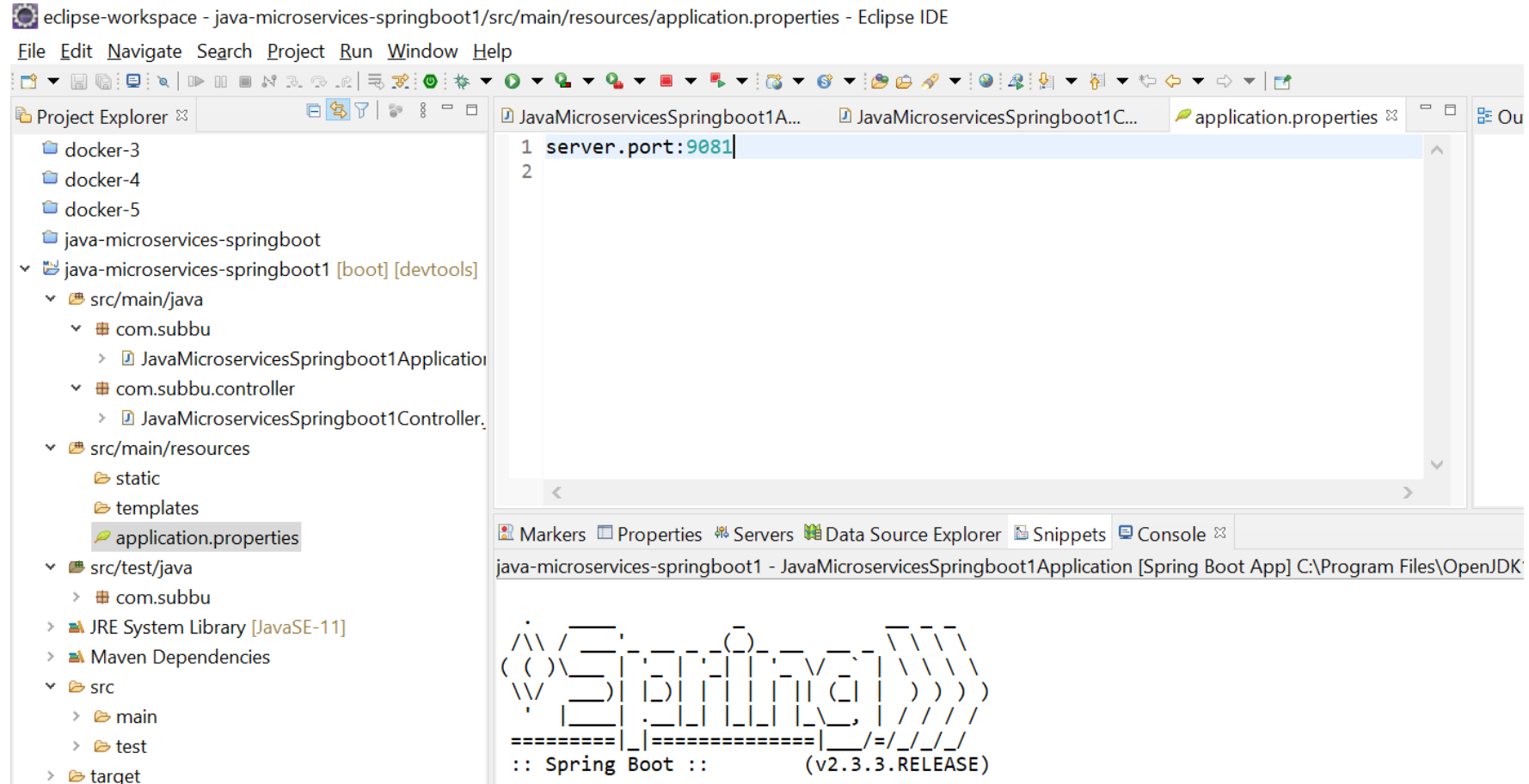
- docker-3
- docker-4
- docker-5
- java-microservices-springboot
  - java-microservices-springboot1 [boot] [devtools]
    - src/main/java
      - com.subbu
        - JavaMicroservicesSpringboot1Application
        - com.subbu.controller
          - JavaMicroservicesSpringboot1Controller
      - src/main/resources
        - static
        - templates
        - application.properties
      - src/test/java
        - com.subbu

```
1 package com.subbu.controller;
2
3 import org.springframework.web.bind.annotation.GetMapping;
4 import org.springframework.web.bind.annotation.RestController;
5
6 @RestController
7 public class JavaMicroservicesSpringboot1Controller {
8
9     @GetMapping("/message")
10    public String getMessage() {
11        return "Welcome to Subbu - message - call through the REST API";
12    }
13 }
14
```

Markers Properties Servers Data Source Explorer Snippets Console

java-microservices-springboot1 - JavaMicroservicesSpringboot1Application [Spring Boot App] C:\Program Files\Open

# A Microservices project structure on Eclipse:



# View of JRE System Library:

The screenshot displays the Eclipse IDE interface with the following components:

- Project Explorer:** Shows the 'JRE System Library [JavaSE-11]' expanded, listing various Java standard library packages such as `java.base`, `java.compiler`, `java.datatransfer`, `java.desktop`, `java.instrument`, `java.logging`, `java.management`, `java.management.rmi`, `java.naming`, `java.net.http`, `java.prefs`, `java.rmi`, `java.scripting`, `java.se`, `java.security.jgss`, `java.security.sasl`, `java.sql`, `java.sql.rowset`, `java.transaction.xa`, `java.xml`, `java.xml.crypto`, `jdk.accessibility`, `jdk.attach`, `jdk.compiler`, `jdk.dynalink`, `jdk.httpserver`, and `jdk.internal.ed`.
- Editor:** Displays the source code of `JavaMicroservicesSpringboot1Controller.java`. The code includes package declarations, imports for `GetMapping` and `RestController`, an `@RestController` annotation, and a `getMessage()` method that returns a REST API response.
- Outline:** Shows the class structure with `com.subbu.controller` and `JavaMicroservicesSpringboot1Controller`, highlighting the `getMessage() : String` method.
- Console:** Shows the application output, including the Spring Boot logo and version information (v2.3.3.RELEASE), followed by log messages from the `restartedMain` thread indicating the startup of `JavaMicroservicesSpringboot1Application` and the initialization of the Tomcat web server.

# View of Maven Dependencies:

The screenshot displays the Eclipse IDE interface with the following components:

- Project Explorer:** Shows the project structure with 'Maven Dependencies' expanded, listing various JARs such as spring-boot-starter-actuator-2.3.3.RELEASE.jar, logback-classic-1.2.3.jar, and jackson-databind-2.11.2.jar.
- Editor:** Displays the source code of `JavaMicroservicesSpringboot1Application.java`. The code includes imports for `SpringApplication` and `SpringBootApplication`, and a `main` method that runs the application.
- Outline:** Shows the class structure with `com.subbu` and `JavaMicroservicesSpringboot1Application`.
- Console:** Displays the output of the application, including the Spring Boot logo and logs indicating the application is starting successfully.

```
1 package com.subbu;
2
3 import org.springframework.boot.SpringApplication;
4 import org.springframework.boot.autoconfigure.SpringBootApplication;
5
6 @SpringBootApplication
7 public class JavaMicroservicesSpringboot1Application {
8
9     public static void main(String[] args) {
10         SpringApplication.run(JavaMicroservicesSpringboot1Application.class, args);
11     }
12 }
13 }
```

Console Output:

```

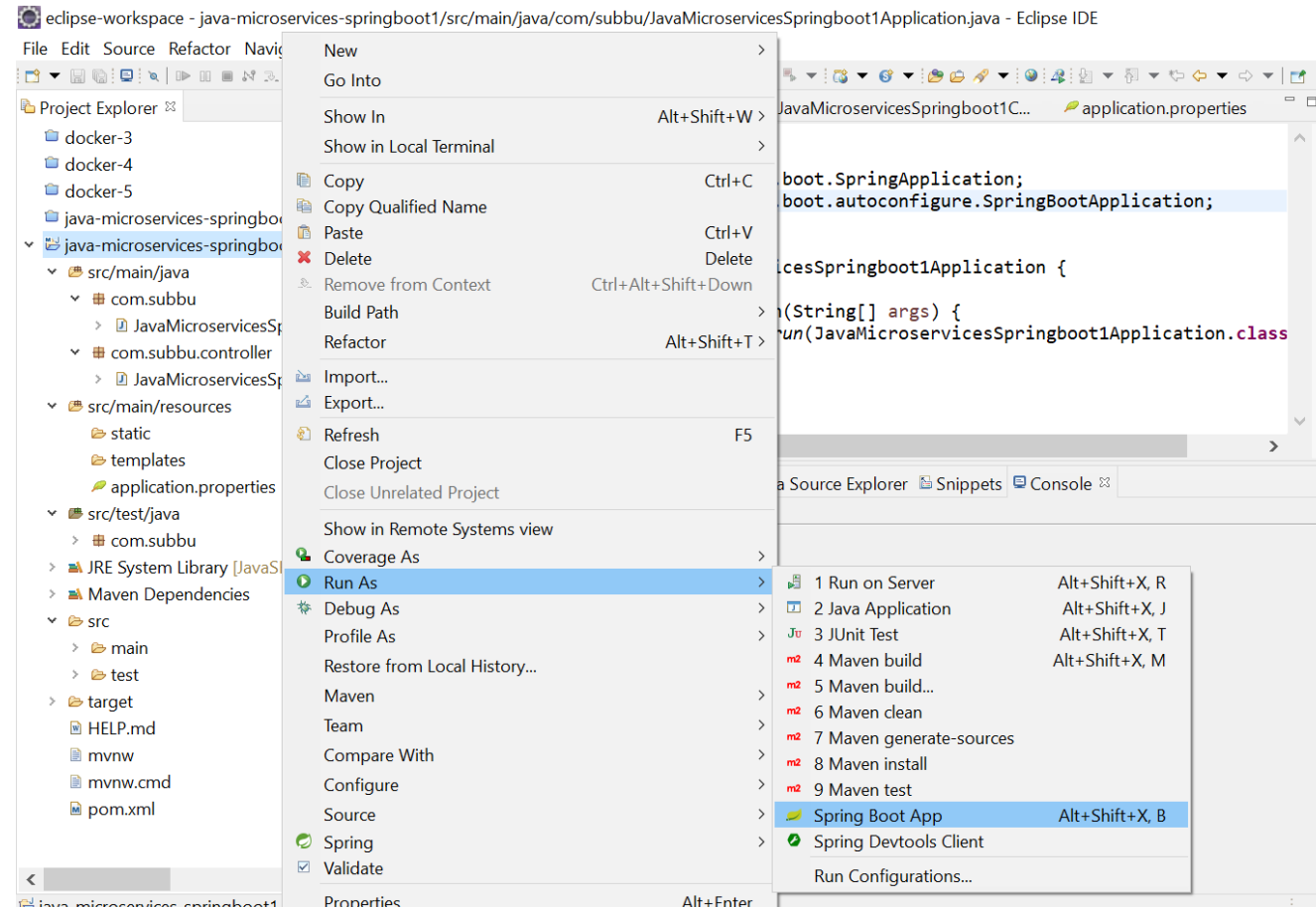
  ____ _
 / ___ \| | | |
| |___ \| |_| |
 \___ \|____|_|_|
  Spring Boot :: (v2.3.3.RELEASE)

2020-09-01 16:20:43.750 INFO 25836 --- [ restartedMain] .JavaMicroservicesSpringboot1Application : Starting JavaMicroservicesSpringboot1Application
2020-09-01 16:20:43.757 INFO 25836 --- [ restartedMain] .JavaMicroservicesSpringboot1Application : No active profile set, falling back to default profiles: []
2020-09-01 16:20:43.859 INFO 25836 --- [ restartedMain] .e.DevToolsPropertyDefaultsPostProcessor : Devtools property defaults are active. For additional logging see https://docs.spring.io/spring-boot/docs/2.3.3.RELEASE/reference/html/#tool-devtools
2020-09-01 16:20:43.859 INFO 25836 --- [ restartedMain] .e.DevToolsPropertyDefaultsPostProcessor : For additional web related logging see https://docs.spring.io/spring-boot/docs/2.3.3.RELEASE/reference/html/#tool-devtools-web
2020-09-01 16:20:45.407 INFO 25836 --- [ restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomcat initialized with port(s): 8080
2020-09-01 16:20:45.418 INFO 25836 --- [ restartedMain] o.apache.catalina.core.StandardService : Starting service [Tomcat]
2020-09-01 16:20:45.419 INFO 25836 --- [ restartedMain] org.apache.catalina.core.StandardEngine : Starting Servlet engine: [Apache/2.4.18.0 (Ubuntu)]
```

# pom.xml – Deployment descriptor

```
eclipse-workspace - java-microservices-springboot1/pom.xml - Eclipse IDE
File Edit Source Navigate Search Project Run Window Help
JavaMicroservicesSpringboot1Application.java JavaMicroservicesSpringboot1Controller.java application.properties java-microservices-springboot1/pom.xml
1 <?xml version="1.0" encoding="UTF-8"?>
2 <project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
3   xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/xsd/maven-4.0.0.xsd">
4   <modelVersion>4.0.0</modelVersion>
5   <parent>
6     <groupId>org.springframework.boot</groupId>
7     <artifactId>spring-boot-starter-parent</artifactId>
8     <version>2.3.3.RELEASE</version>
9     <relativePath/> <!-- lookup parent from repository -->
10  </parent>
11  <groupId>com.subbu</groupId>
12  <artifactId>java-microservices-springboot1</artifactId>
13  <version>0.0.1-SNAPSHOT</version>
14  <name>java-microservices-springboot1</name>
15  <description>Java Microservices project using SpringBoot</description>
16
17  <properties>
18    <java.version>11</java.version>
19  </properties>
20
21  <dependencies>
22    <dependency>
23      <groupId>org.springframework.boot</groupId>
24      <artifactId>spring-boot-starter-actuator</artifactId>
25    </dependency>
26    <dependency>
27      <groupId>org.springframework.boot</groupId>
28      <artifactId>spring-boot-starter-web</artifactId>
29    </dependency>
30
31    <dependency>
32      <groupId>org.springframework.boot</groupId>
```

# Project – Run as Spring Boot App:



# Successfully deployed with tomcat started on port 9081:

The screenshot displays the Eclipse IDE interface. The top toolbar includes standard development tools. The left sidebar shows the Project Explorer with a tree view of the project structure: `docker-3`, `docker-4`, `docker-5`, `java-microservices-springboot`, and `java-microservices-springboot1` (selected). The `java-microservices-springboot1` project is expanded, showing `src/main/java` with `com.subbu` and `com.subbu.controller` packages. The `com.subbu` package contains `JavaMicroservicesSpringboot1Application` and `JavaMicroservicesSpringboot1Controller`. The `com.subbu.controller` package contains `JavaMicroservicesSpringboot1Controller`. The `JavaMicroservicesSpringboot1Application` class is open in the editor, showing the following code:

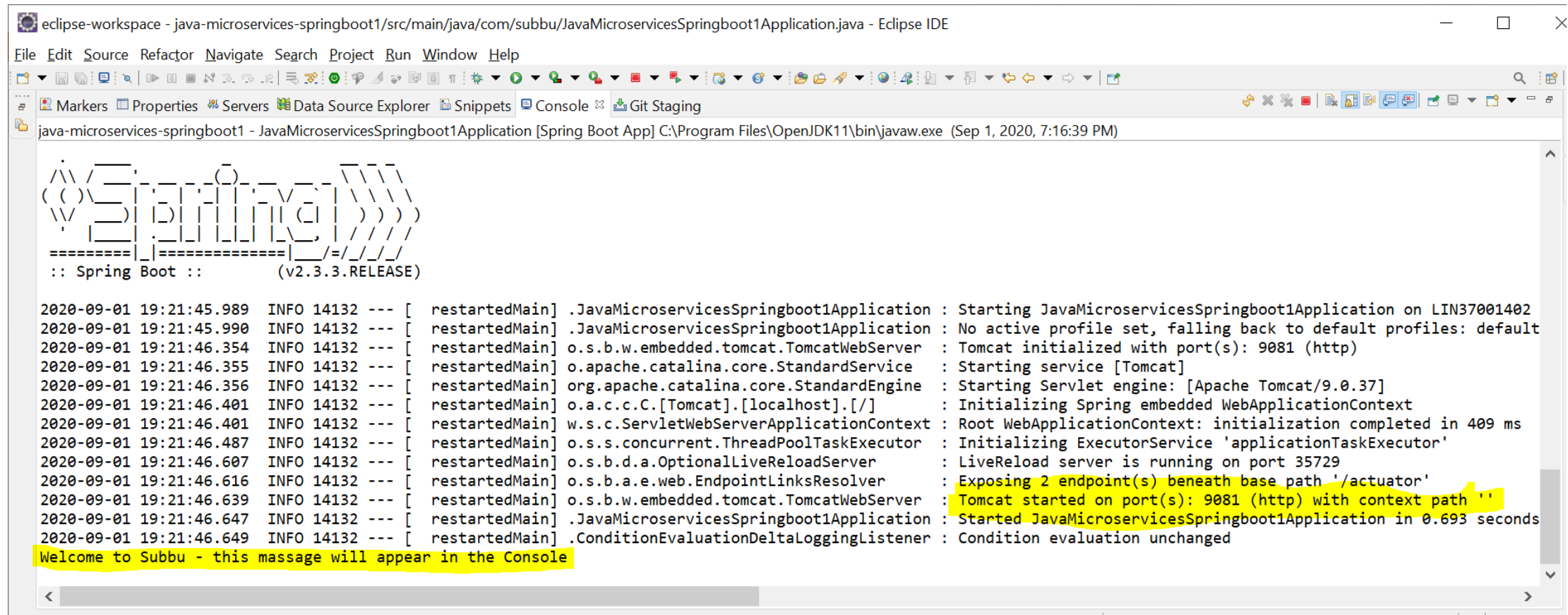
```
1 package com.subbu;
2
3 import org.springframework.boot.SpringApplication;
4
5 @SpringBootApplication
6 public class JavaMicroservicesSpringboot1Application {
7
8     public static void main(String[] args) {
9         SpringApplication.run(JavaMicroservicesSpringboot1Application.class, args);
10
11         System.out.println("Welcome to Subbu - this message will appear in the Console");
12     }
13 }
14
15 }
```

The right sidebar shows the Outline view with the `com.subbu` package and `JavaMicroservicesSpringboot1Application` class. The `main(String[]) : void` method is listed. The bottom pane shows the Console view with the following output:

```
java-microservices-springboot1 - JavaMicroservicesSpringboot1Application [Spring Boot App] C:\Program Files\OpenJDK11\bin\javaw.exe (Sep 1, 2020, 7:16:39 PM)
2020-09-01 19:21:45.989 INFO 14132 --- [ restartedMain] .JavaMicroservicesSpringboot1Application : Starting JavaMicroservicesSpringboot1Application
2020-09-01 19:21:45.990 INFO 14132 --- [ restartedMain] .JavaMicroservicesSpringboot1Application : No active profile set, falling back to default profile: 'default'
2020-09-01 19:21:46.354 INFO 14132 --- [ restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomcat initialized with port(s): 9081
2020-09-01 19:21:46.355 INFO 14132 --- [ restartedMain] o.apache.catalina.core.StandardService : Starting service [Tomcat]
2020-09-01 19:21:46.356 INFO 14132 --- [ restartedMain] org.apache.catalina.core.StandardEngine : Starting Servlet engine: [Apache/2.4.18.0 (Ubuntu)]
2020-09-01 19:21:46.401 INFO 14132 --- [ restartedMain] o.a.c.c.C.[Tomcat].[localhost].[/] : Initializing Spring embedded web application
2020-09-01 19:21:46.401 INFO 14132 --- [ restartedMain] w.s.c.ServletWebServerApplicationContext : Root WebApplicationContext: initialization completed
2020-09-01 19:21:46.487 INFO 14132 --- [ restartedMain] o.s.s.concurrent.ThreadPoolTaskExecutor : Initializing ExecutorService 'defaultTaskExecutor'
2020-09-01 19:21:46.607 INFO 14132 --- [ restartedMain] o.s.b.d.a.OptionalLiveReloadServer : LiveReload server is running on port 35729
2020-09-01 19:21:46.616 INFO 14132 --- [ restartedMain] o.s.b.a.e.web.EndpointLinksResolver : Exposing 2 endpoint(s) beneath context path
2020-09-01 19:21:46.639 INFO 14132 --- [ restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomcat started on port(s): 9081
2020-09-01 19:21:46.647 INFO 14132 --- [ restartedMain] .JavaMicroservicesSpringboot1Application : Started JavaMicroservicesSpringboot1Application
2020-09-01 19:21:46.649 INFO 14132 --- [ restartedMain] .ConditionEvaluationDeltaLoggingListener : Condition evaluation unchanged
Welcome to Subbu - this message will appear in the Console
```



# Console - Successfully deployed with tomcat started on port 9081:



The screenshot shows the Eclipse IDE interface with the console window open. The console displays the Spring Boot logo and a series of log messages indicating the successful deployment and startup of the application. The logs show the application starting on port 9081, initializing the Tomcat web server, and starting the Spring Boot application. The final message in the console is "Welcome to Subbu - this message will appear in the Console".

```
eclipse-workspace - java-microservices-springboot1/src/main/java/com/subbu/JavaMicroservicesSpringboot1Application.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Markers Properties Servers Data Source Explorer Snippets Console Git Staging
java-microservices-springboot1 - JavaMicroservicesSpringboot1Application [Spring Boot App] C:\Program Files\OpenJDK11\bin\javaw.exe (Sep 1, 2020, 7:16:39 PM)

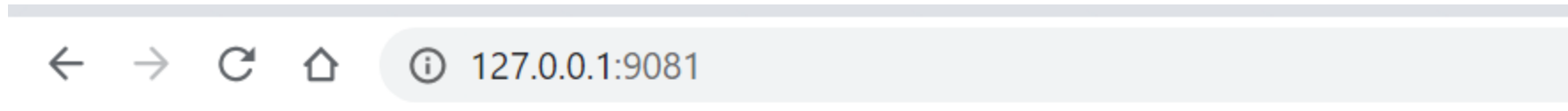
:: Spring Boot :: (v2.3.3.RELEASE)

2020-09-01 19:21:45.989 INFO 14132 --- [ restartedMain] .JavaMicroservicesSpringboot1Application : Starting JavaMicroservicesSpringboot1Application on LIN37001402
2020-09-01 19:21:45.990 INFO 14132 --- [ restartedMain] .JavaMicroservicesSpringboot1Application : No active profile set, falling back to default profiles: default
2020-09-01 19:21:46.354 INFO 14132 --- [ restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomcat initialized with port(s): 9081 (http)
2020-09-01 19:21:46.355 INFO 14132 --- [ restartedMain] o.apache.catalina.core.StandardService : Starting service [Tomcat]
2020-09-01 19:21:46.356 INFO 14132 --- [ restartedMain] org.apache.catalina.core.StandardEngine : Starting Servlet engine: [Apache Tomcat/9.0.37]
2020-09-01 19:21:46.401 INFO 14132 --- [ restartedMain] o.a.c.c.C.[Tomcat].[localhost].[/] : Initializing Spring embedded WebApplicationContext
2020-09-01 19:21:46.401 INFO 14132 --- [ restartedMain] w.s.c.ServletWebServerApplicationContext : Root WebApplicationContext: initialization completed in 409 ms
2020-09-01 19:21:46.487 INFO 14132 --- [ restartedMain] o.s.s.concurrent.ThreadPoolTaskExecutor : Initializing ExecutorService 'applicationTaskExecutor'
2020-09-01 19:21:46.607 INFO 14132 --- [ restartedMain] o.s.b.d.a.OptionalLiveReloadServer : LiveReload server is running on port 35729
2020-09-01 19:21:46.616 INFO 14132 --- [ restartedMain] o.s.b.a.e.web.EndpointLinksResolver : Exposing 2 endpoint(s) beneath base path '/actuator'
2020-09-01 19:21:46.639 INFO 14132 --- [ restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomcat started on port(s): 9081 (http) with context path ''
2020-09-01 19:21:46.647 INFO 14132 --- [ restartedMain] .JavaMicroservicesSpringboot1Application : Started JavaMicroservicesSpringboot1Application in 0.693 seconds
2020-09-01 19:21:46.649 INFO 14132 --- [ restartedMain] .ConditionEvaluationDeltaLoggingListener : Condition evaluation unchanged

Welcome to Subbu - this message will appear in the Console
```



# Browser output without GetMessage string:



## Whitelabel Error Page

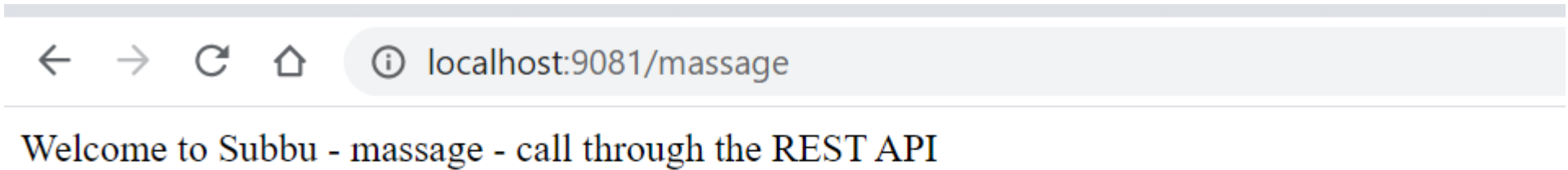
This application has no explicit mapping for /error, so you are seeing this as a fallback.

Tue Sep 01 17:22:24 IST 2020

There was an unexpected error (type=Not Found, status=404).

No message available

<http://localhost:9081/message> - output on  
Chrome by REST call:



<http://127.0.0.1:9081/message> - output on  
Chrome by REST call:



A screenshot of a web browser interface. The address bar at the top shows navigation icons (back, forward, refresh, home) and the URL '127.0.0.1:9081/message'. Below the address bar, the page content displays the text 'Welcome to Subbu - message - call through the REST API'.

← → ↻ 🏠 ⓘ 127.0.0.1:9081/message

Welcome to Subbu - message - call through the REST API

Kill the tasks if the port has been used by other services:

```
C:\Users\svemala>netstat -ano | findstr :9080
TCP    0.0.0.0:9080      0.0.0.0:0        LISTENING      31576
TCP    [::]:9080        [::]:0           LISTENING      31576

C:\Users\svemala>taskkill /PID 31576 /F
SUCCESS: The process with PID 31576 has been terminated.

C:\Users\svemala> 
```

Kill the tasks if the port has been used by other services:

```
C:\Users\svemala>netstat -ano | findstr :9080
```

TCP	0.0.0.0:9080	0.0.0.0:0	LISTENING	31576
TCP	:::9080	:::0	LISTENING	31576

```
C:\Users\svemala>taskkill /PID 31576 /F
```

```
SUCCESS: The process with PID 31576 has been terminated.
```

```
C:\Users\svemala>
```

# Appendix:

Download the code from public GitHub:

## 1. HTTPS:

<https://github.com/subbugh/java-microservices-springboot.git>

## 2. SSH:

<git@github.com:subbugh/java-microservices-springboot.git>

## 3. Code Zip file:



java-microservices-springboot-master.zip