

A Java Microservices project using Spring Boot deployment on Docker – 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, generate jar and deploy it on Docker:

Target Audience:

All, with knowledge of Java or coding and Containerization.

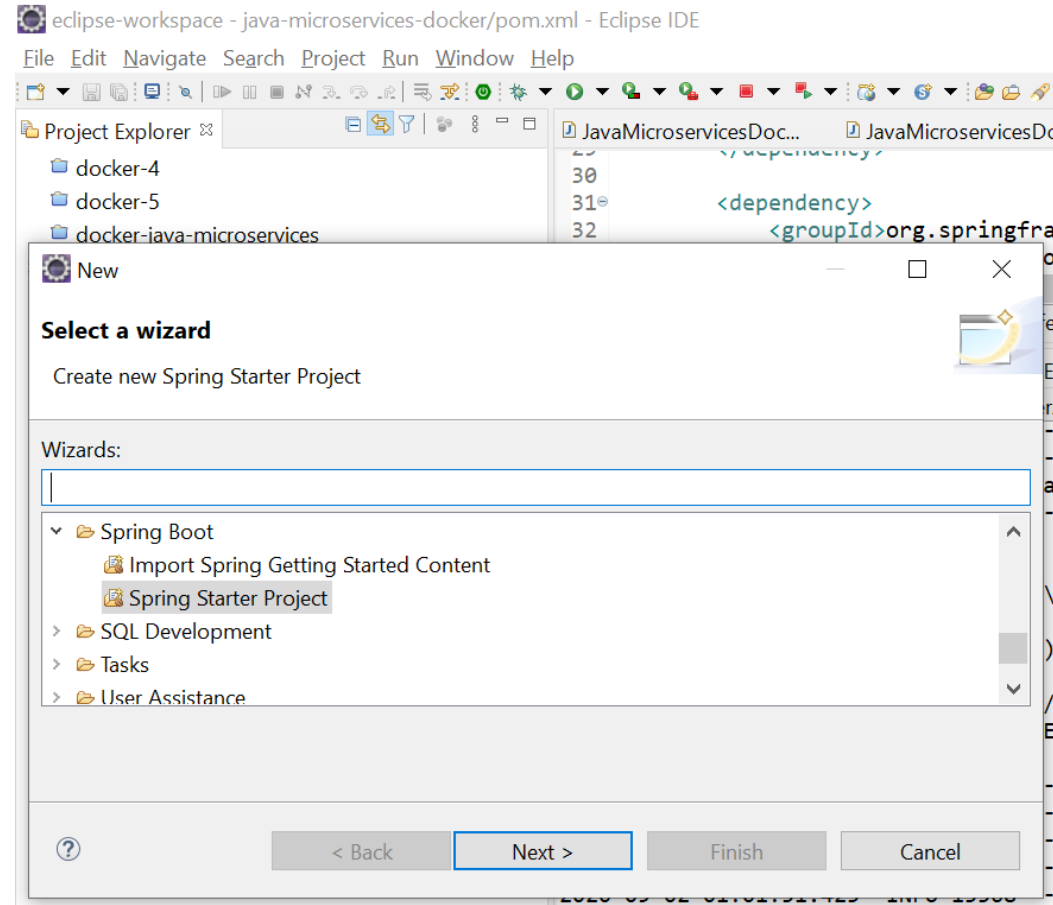
Artifacts needed:

1. JDK11
2. Eclipse – IDE
3. Docker
4. Internet

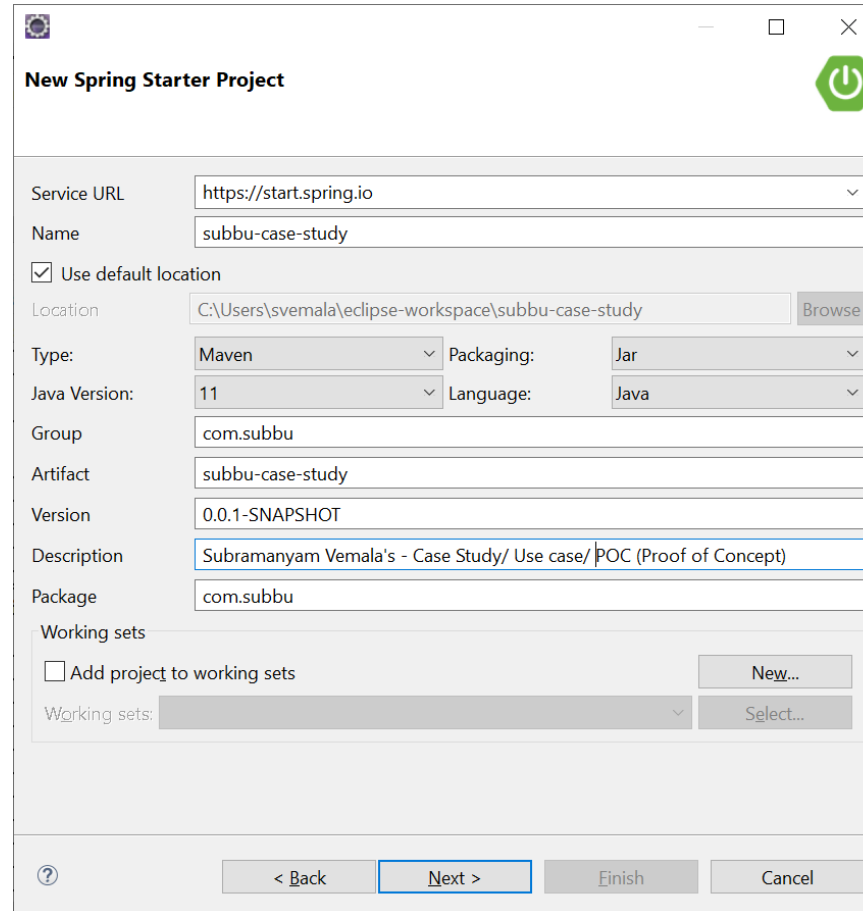
Implementation Steps:

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. Check for the output both on the Console and the Browser.
4. Create the jar in the target folder, through maven install.
5. Create Dockerfile.
6. Use Build command to create the Docker image.
7. Run the command to deploy the Docker image.
8. Check the expected output on the Browser.

File – New – Spring Starter Project - Create



Provide the project details:



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' is 'subbu-case-study'. The 'Use default location' checkbox is checked, and the 'Location' is 'C:\Users\svemala\eclipse-workspace\subbu-case-study'. The 'Type' is 'Maven', 'Packaging' is 'Jar', 'Java Version' is '11', and 'Language' is 'Java'. The 'Group' is 'com.subbu', 'Artifact' is 'subbu-case-study', 'Version' is '0.0.1-SNAPSHOT', 'Description' is 'Subramanyam Vemala's - Case Study/ Use case/ POC (Proof of Concept)', and 'Package' is 'com.subbu'. There is a 'Working sets' section with an unchecked checkbox 'Add project to working sets' and a 'Working sets' dropdown menu. At the bottom, there are four buttons: '< Back', 'Next >', 'Finish', and 'Cancel'. The 'Next >' button is highlighted with a blue border.

New Spring Starter Project

Service URL:

Name:

☒ Use default location

Location:

Type: Packaging:

Java Version: Language:

Group:

Artifact:

Version:

Description:

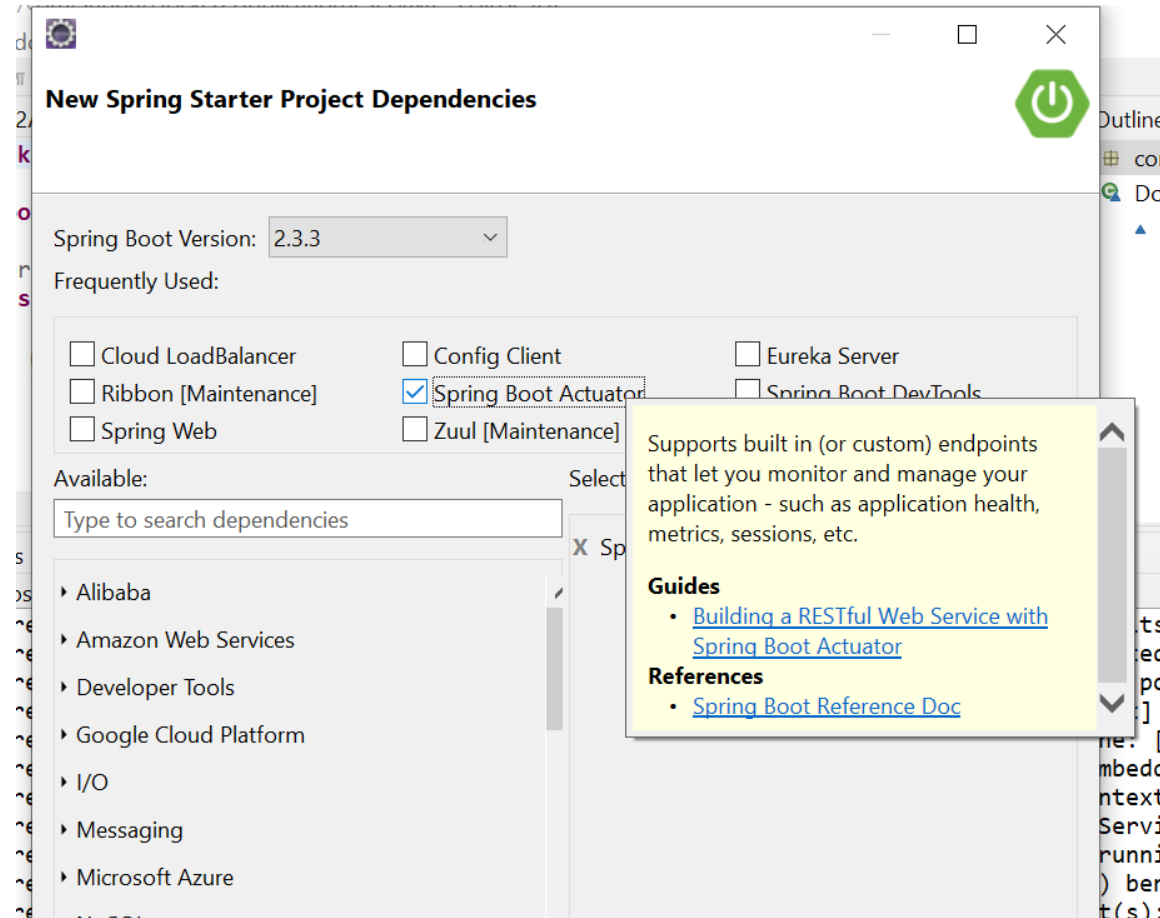
Package:

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]
- ☐ Eureka Server
- ☒ Spring Boot DevTools

Available:

Type to search dependencies

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

Selected:

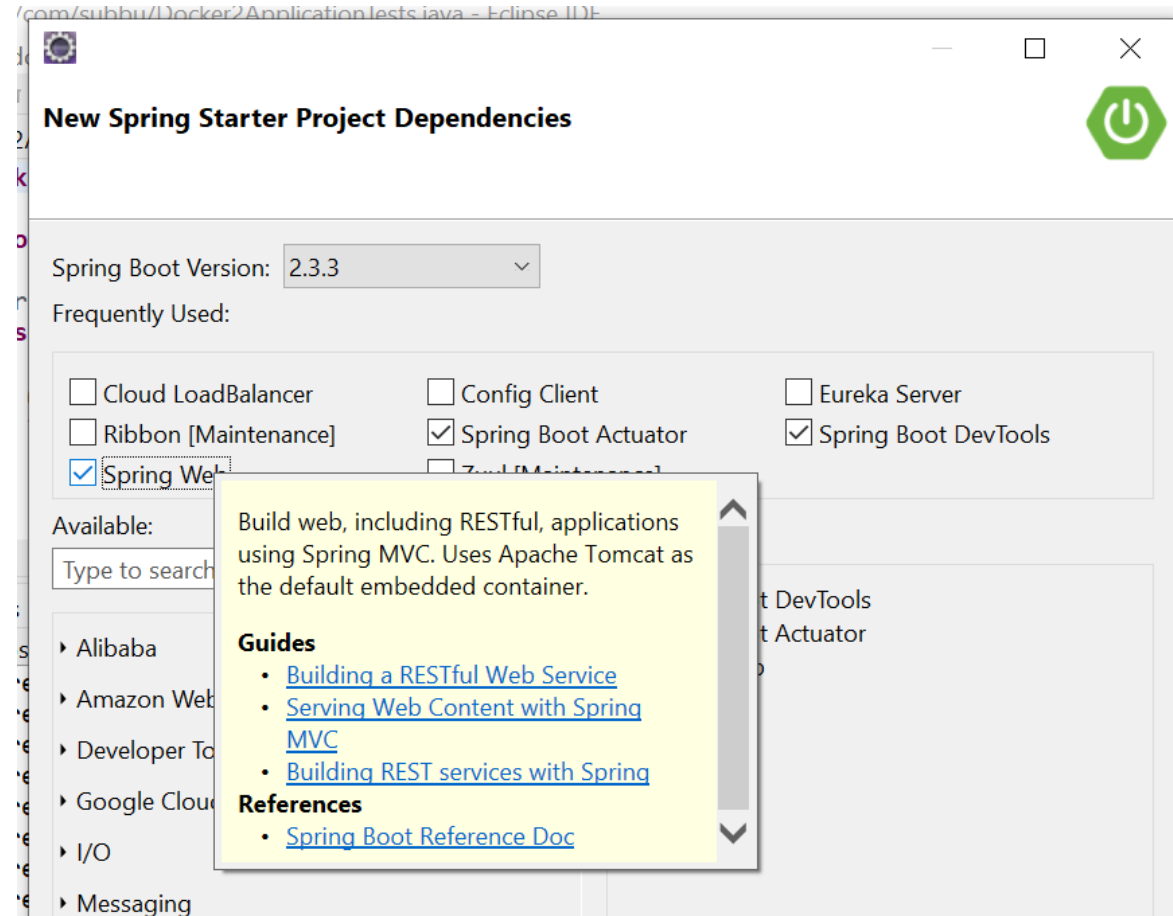
- X Spring Boot DevTools
- X Spring Boot Actuator

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

References

- [Spring Boot Reference Doc](#)

Choose the dependencies – Spring Web:



Project is created (subbu-case-study):

The screenshot shows the Eclipse IDE interface. The top toolbar contains various icons for file operations and development tools. The left sidebar displays the Project Explorer with a tree view of the project structure. The main editor window shows the SubbuCaseStudyController.java file with the following code:

```
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 SubbuCaseStudyController {
8
9     @GetMapping("/message")
10    public String getMessage() {
11        return "Welcome to Subramanyam Vemala - message - call through the REST API";
12    }
13 }
14
```

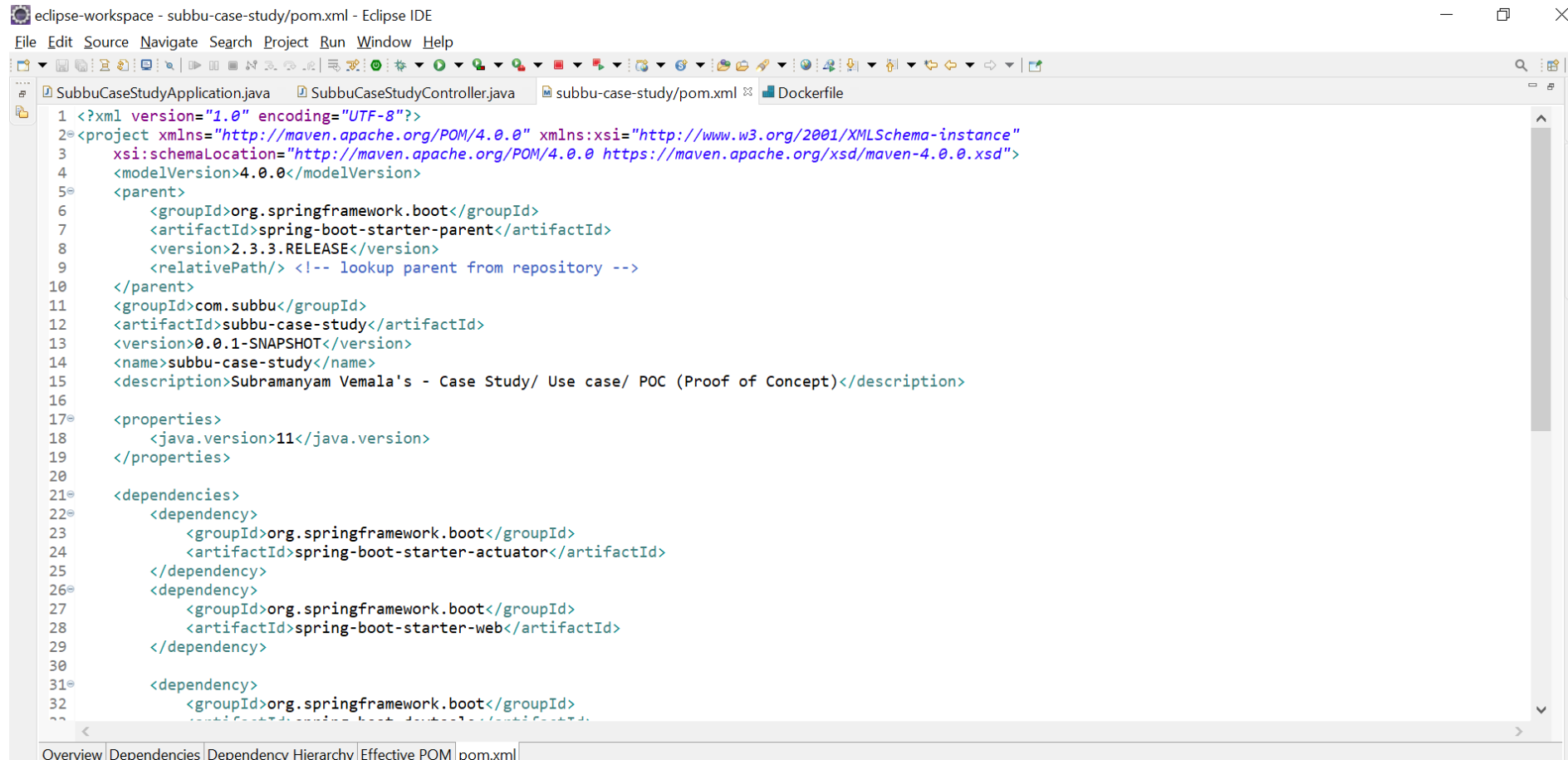
The right sidebar shows the Outline view. The bottom panel displays the Console view with the following output:

```
subbu-case-study - SubbuCaseStudyApplication [Spring Boot App] C:\Program Files\OpenJDK11\bin\javaw.exe (Sep 2, 2020, 10:16:51 AM)

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

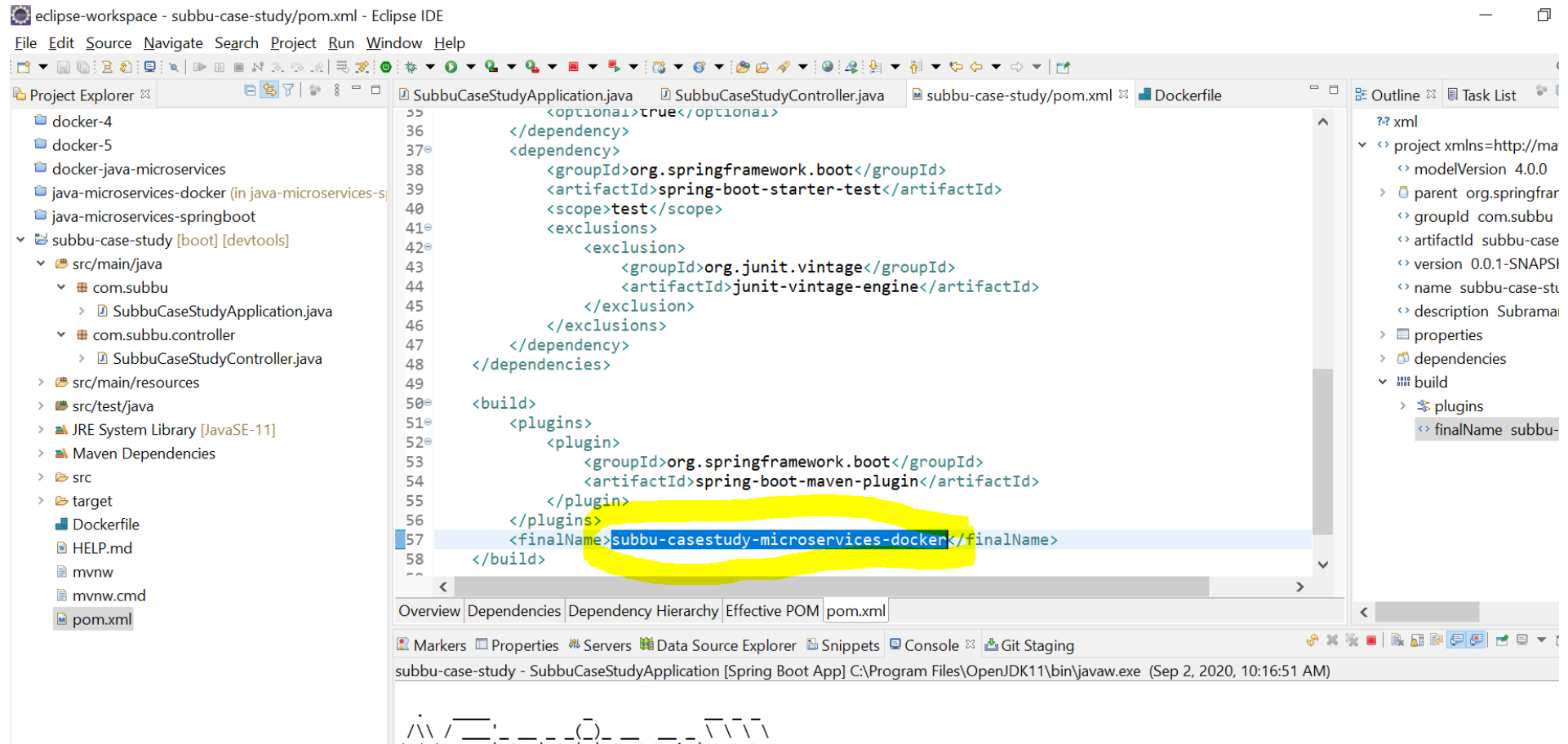
2020-09-02 10:16:54.991 INFO 24088 --- [ restartedMain] com.subbu.SubbuCaseStudyApplication : Starting
2020-09-02 10:16:55.003 INFO 24088 --- [ restartedMain] com.subbu.SubbuCaseStudyApplication : No activ
```


pom.xml – Deployment descriptor



```
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>subbu-case-study</artifactId>
13    <version>0.0.1-SNAPSHOT</version>
14    <name>subbu-case-study</name>
15    <description>Subramanyam Vemala's - Case Study/ Use case/ POC (Proof of Concept)</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>
```

Give the jar name in the pom.xml:



Create Controller with GetMapping and RestController:

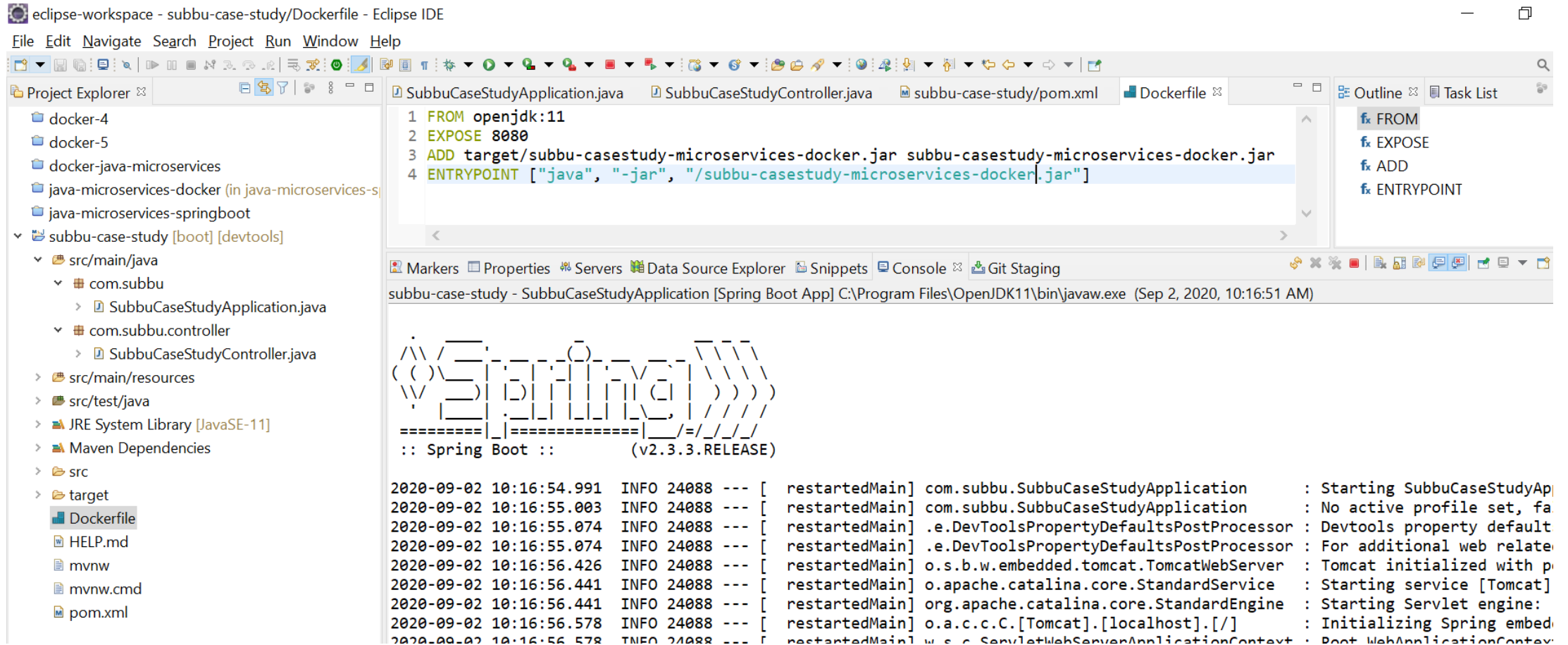
The screenshot displays the Eclipse IDE interface for a project named 'subbu-case-study'. The Project Explorer on the left shows the project structure, including the 'com.subbu.controller' package. The main editor window shows the code for 'SubbuCaseStudyController.java'. The code defines a REST controller with a single endpoint '/message' that returns a welcome message. The Console window at the bottom shows the application's startup logs, including the message 'Welcome to Subbu - this message will appear in the Console'.

```
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 SubbuCaseStudyController {
8
9     @GetMapping("/message")
10    public String getMessage() {
11        return "Welcome to Subramanyam Vemala - message - call through the REST API";
12    }
13 }
14
```

subbu-case-study - SubbuCaseStudyApplication [Spring Boot App] C:\Program Files\OpenJDK11\bin\javaw.exe (Sep 2, 2020, 10:16:51 AM)

```
2020-09-02 10:58:06.048 INFO 24088 --- [ restartedMain] w.s.c.ServletWebServerApplicationContext : Root WebApplicationContext: initializing...
2020-09-02 10:58:06.194 INFO 24088 --- [ restartedMain] o.s.s.concurrent.ThreadPoolTaskExecutor : Initializing ExecutorService 'application'
2020-09-02 10:58:06.369 INFO 24088 --- [ restartedMain] o.s.b.d.a.OptionalLiveReloadServer : LiveReload server is running on port 34567
2020-09-02 10:58:06.374 INFO 24088 --- [ restartedMain] o.s.b.a.e.web.EndpointLinksResolver : Exposing 2 endpoint(s) beneath base path 'http://localhost:8080/'
2020-09-02 10:58:06.402 INFO 24088 --- [ restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomcat started on port(s): 8080 (http)
2020-09-02 10:58:06.412 INFO 24088 --- [ restartedMain] com.subbu.SubbuCaseStudyApplication : Started SubbuCaseStudyApplication in 1.581 seconds
2020-09-02 10:58:06.415 INFO 24088 --- [ restartedMain] .ConditionEvaluationDeltaLoggingListener : Condition evaluation unchanged
Welcome to Subbu - this message will appear in the Console
2020-09-02 10:58:22.581 INFO 24088 --- [ Thread-33] o.s.s.concurrent.ThreadPoolTaskExecutor : Shutting down ExecutorService 'application'
```

Create Dockerfile:



JRE System Library:

The screenshot shows the Eclipse IDE interface. On the left, the Project Explorer displays the JRE System Library [JavaSE-11] with a list of system libraries. The main editor shows a Dockerfile with the following content:

```
1 FROM openjdk:11
2 EXPOSE 8080
3 ADD target/subbu-casestudy-microservices-docker.jar subbu-casestudy-microser
4 ENTRYPOINT ["java", "-jar", "/subbu-casestudy-microservices-docker.jar"]
```

On the right, the Outline view shows the structure of the Dockerfile with the following items:

- FROM
- EXPOSE
- ADD
- ENTRYPOINT

At the bottom, the Console view shows the output of the application startup:

```
subbu-case-study - SubbuCaseStudyApplication [Spring Boot App] C:\Program Files\OpenJDK11\bin\javaw.exe (Sep 2, 2020, 10:16:51 AM)

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

2020-09-02 10:16:54.991 INFO 24088 --- [ restartedMain] com.subbu.SubbuCaseStudyApplication : Start
2020-09-02 10:16:55.003 INFO 24088 --- [ restartedMain] com.subbu.SubbuCaseStudyApplication : No ac
2020-09-02 10:16:55.074 INFO 24088 --- [ restartedMain] .e.DevToolsPropertyDefaultsPostProcessor : Devto
2020-09-02 10:16:55.074 INFO 24088 --- [ restartedMain] .e.DevToolsPropertyDefaultsPostProcessor : For a
2020-09-02 10:16:56.426 INFO 24088 --- [ restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomca
2020-09-02 10:16:56.441 INFO 24088 --- [ restartedMain] o.apache.catalina.core.StandardService : Start
2020-09-02 10:16:56.441 INFO 24088 --- [ restartedMain] org.apache.catalina.core.StandardEngine : Start
2020-09-02 10:16:56.578 INFO 24088 --- [ restartedMain] o.a.c.c.C.[Tomcat].[localhost].[/] : Initi
2020-09-02 10:16:56.578 INFO 24088 --- [ restartedMain] w.s.c.ServletWebServerApplicationContext : Root
2020-09-02 10:16:56.909 INFO 24088 --- [ restartedMain] o.s.s.concurrent.ThreadPoolTaskExecutor : LiveR
2020-09-02 10:16:57.260 INFO 24088 --- [ restartedMain] o.s.b.d.a.OptionalLiveReloadServer : LiveR
2020-09-02 10:16:57.269 INFO 24088 --- [ restartedMain] o.s.b.a.e.web.EndpointLinksResolver : Expos
2020-09-02 10:16:57.344 INFO 24088 --- [ restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomca
```


Maven Dependencies:

eclipse-workspace - subbu-case-study/Dockerfile - Eclipse IDE

File Edit Navigate Search Project Run Window Help

Project Explorer

- JRE System Library [JavaSE-11]
- Maven Dependencies
 - spring-boot-starter-actuator-2.3.3.RELEASE.jar - C:\Users\svemala\.m2\rep
 - spring-boot-starter-2.3.3.RELEASE.jar - C:\Users\svemala\.m2\repository\o
 - spring-boot-starter-logging-2.3.3.RELEASE.jar - C:\Users\svemala\.m2\rep
 - logback-classic-1.2.3.jar - C:\Users\svemala\.m2\repository\ch\qos\logbac
 - logback-core-1.2.3.jar - C:\Users\svemala\.m2\repository\ch\qos\logback
 - log4j-to-slf4j-2.13.3.jar - C:\Users\svemala\.m2\repository\org\apache\log
 - log4j-api-2.13.3.jar - C:\Users\svemala\.m2\repository\org\apache\logging
 - jul-to-slf4j-1.7.30.jar - C:\Users\svemala\.m2\repository\org\slf4j\jul-to-slf
 - jakarta.annotation-api-1.3.5.jar - C:\Users\svemala\.m2\repository\jakarta\
 - snakeyaml-1.26.jar - C:\Users\svemala\.m2\repository\org\yaml\snakeyam
 - spring-boot-actuator-autoconfigure-2.3.3.RELEASE.jar - C:\Users\svemala\
 - spring-boot-actuator-2.3.3.RELEASE.jar - C:\Users\svemala\.m2\repository
 - jackson-databind-2.11.2.jar - C:\Users\svemala\.m2\repository\com\fast
 - jackson-annotations-2.11.2.jar - C:\Users\svemala\.m2\repository\com\fas
 - jackson-core-2.11.2.jar - C:\Users\svemala\.m2\repository\com\fast
 - jackson-datatype-jsr310-2.11.2.jar - C:\Users\svemala\.m2\repository\com
 - micrometer-core-1.5.4.jar - C:\Users\svemala\.m2\repository\io\micromete
 - HdrHistogram-2.1.12.jar - C:\Users\svemala\.m2\repository\org\hdrhistog
 - LatencyUtils-2.0.3.jar - C:\Users\svemala\.m2\repository\org\latencyutils\L
 - spring-boot-starter-web-2.3.3.RELEASE.jar - C:\Users\svemala\.m2\reposit
 - spring-boot-starter-json-2.3.3.RELEASE.jar - C:\Users\svemala\.m2\reposit
 - jackson-datatype-jdk8-2.11.2.jar - C:\Users\svemala\.m2\repository\com\fa
 - jackson-module-parameter-names-2.11.2.jar - C:\Users\svemala\.m2\repo
 - spring-boot-starter-tomcat-2.3.3.RELEASE.jar - C:\Users\svemala\.m2\repc
 - tomcat-embed-core-9.0.37.jar - C:\Users\svemala\.m2\repository\org\apa

SubbuCaseStudyApplic... SubbuCaseStudyContr... subbu-case-study/po... Dockerfile

```
1 FROM openjdk:11
2 EXPOSE 8080
3 ADD target/subbu-casestudy-microservices-docker.jar subbu-casestudy-microser
4 ENTRYPOINT ["java", "-jar", "/subbu-casestudy-microservices-docker.jar"]
```

Outline Task List

- FROM
- EXPOSE
- ADD
- ENTRYPOINT

Markers Properties Servers Data Source Explorer Snippets Console Git Staging

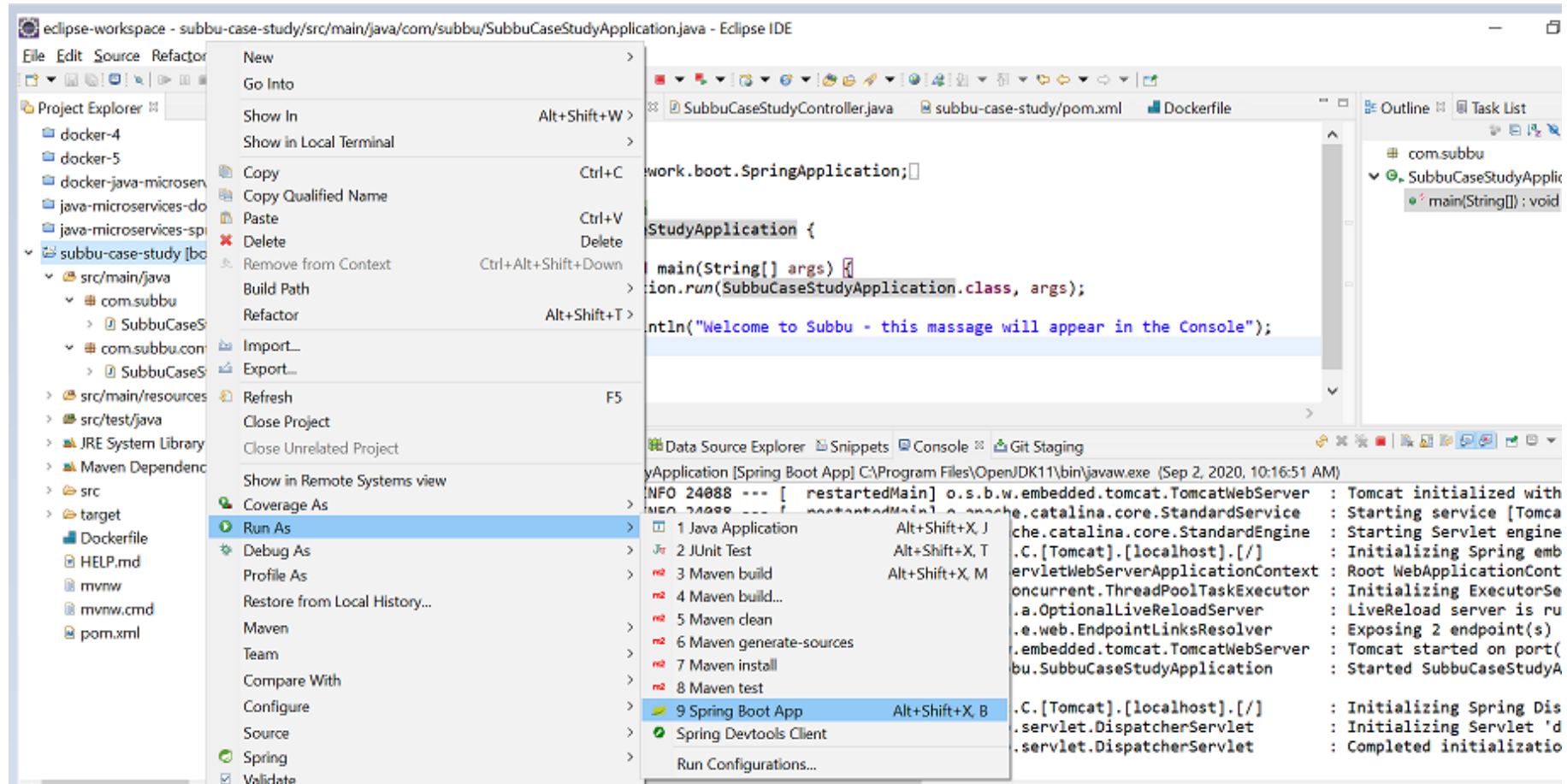
subbu-case-study - SubbuCaseStudyApplication [Spring Boot App] C:\Program Files\Open\DK11\bin\javaw.exe (Sep 2, 2020, 10:16:51 AM)

```

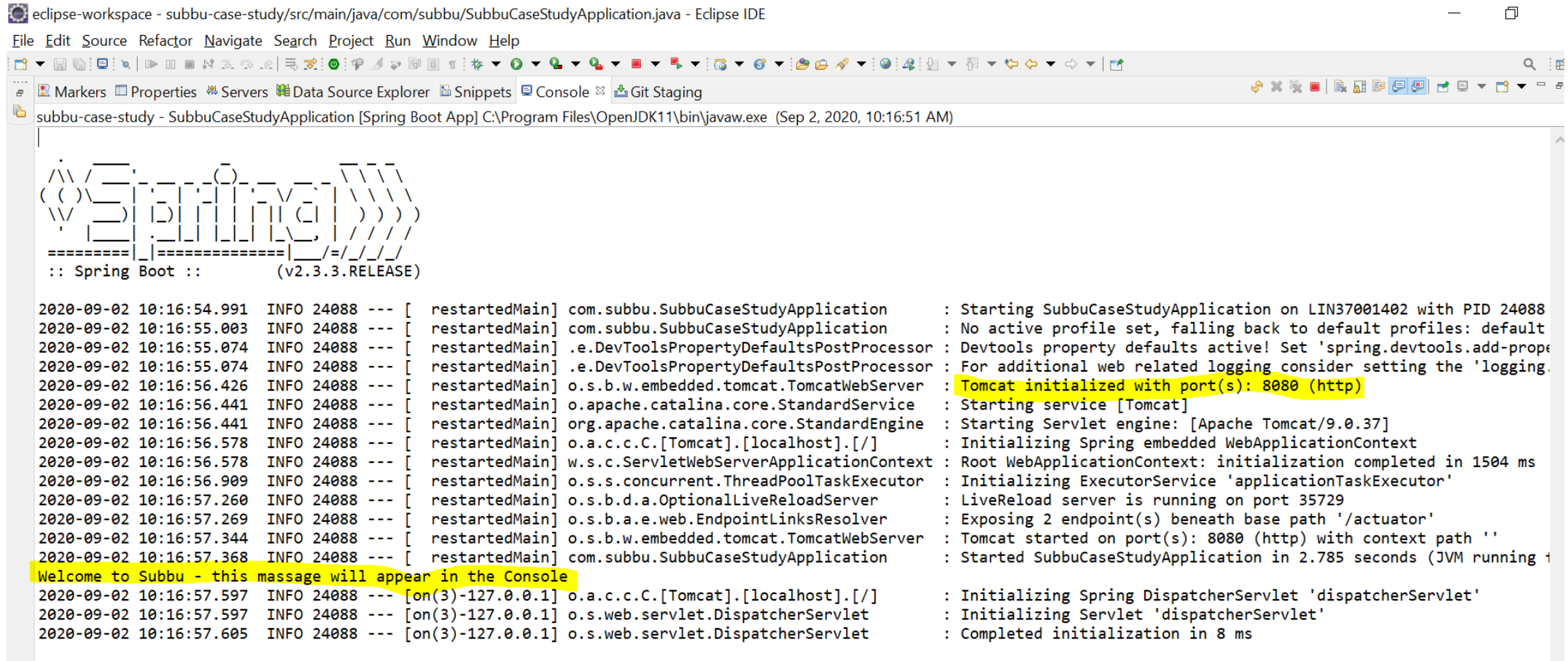
  ____ _
 / ___ \| | | |
/ /___ \| |_| |
 \___ \|  __/|_|_|_|
  =====|_|=====|_|_/___/___/
  :: Spring Boot ::      (v2.3.3.RELEASE)

2020-09-02 10:16:54.991 INFO 24088 --- [ restartedMain] com.subbu.SubbuCaseStudyApplication : Star
2020-09-02 10:16:55.003 INFO 24088 --- [ restartedMain] com.subbu.SubbuCaseStudyApplication : No a
2020-09-02 10:16:55.074 INFO 24088 --- [ restartedMain] .e.DevToolsPropertyDefaultsPostProcessor : Devt
2020-09-02 10:16:55.074 INFO 24088 --- [ restartedMain] .e.DevToolsPropertyDefaultsPostProcessor : For
2020-09-02 10:16:56.426 INFO 24088 --- [ restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomc
2020-09-02 10:16:56.441 INFO 24088 --- [ restartedMain] o.apache.catalina.core.StandardService : Star
2020-09-02 10:16:56.441 INFO 24088 --- [ restartedMain] org.apache.catalina.core.StandardEngine : Star
2020-09-02 10:16:56.578 INFO 24088 --- [ restartedMain] o.a.c.c.C.[Tomcat].[localhost].[/] : Init
2020-09-02 10:16:56.578 INFO 24088 --- [ restartedMain] w.s.c.ServletWebServerApplicationContext : Root
2020-09-02 10:16:56.909 INFO 24088 --- [ restartedMain] o.s.s.concurrent.ThreadPoolTaskExecutor : Init
2020-09-02 10:16:57.260 INFO 24088 --- [ restartedMain] o.s.b.d.a.OptionalLiveReloadServer : Live
2020-09-02 10:16:57.269 INFO 24088 --- [ restartedMain] o.s.b.a.e.web.EndpointLinksResolver : Expo
2020-09-02 10:16:57.344 INFO 24088 --- [ restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomc
```

Run as a Spring Boot App:



Tomcat started successfully and message can be seen on Console:



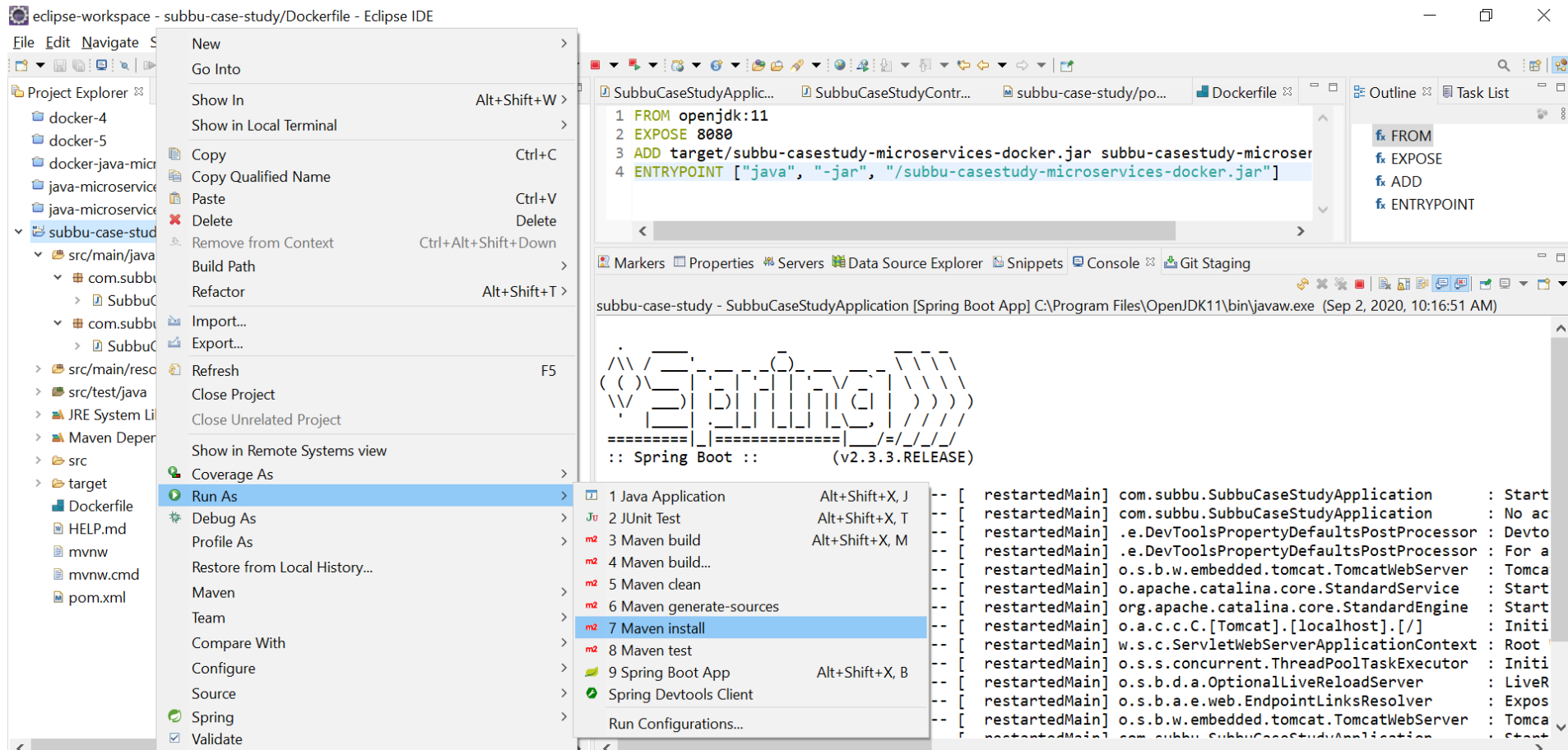
The screenshot shows the Eclipse IDE interface with the console window open. The console displays the output of a Java application running on a Spring Boot server. The application is 'SubbuCaseStudyApplication' and is running on a Tomcat web server. The logs show the application starting successfully on port 8080. A yellow highlight is placed over the message 'Welcome to Subbu - this message will appear in the Console' in the console output.

```
eclipse-workspace - subbu-case-study/src/main/java/com/subbu/SubbuCaseStudyApplication.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Markers Properties Servers Data Source Explorer Snippets Console Git Staging
subbu-case-study - SubbuCaseStudyApplication [Spring Boot App] C:\Program Files\OpenJDK11\bin\javaw.exe (Sep 2, 2020, 10:16:51 AM)

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

2020-09-02 10:16:54.991 INFO 24088 --- [ restartedMain] com.subbu.SubbuCaseStudyApplication : Starting SubbuCaseStudyApplication on LIN37001402 with PID 24088
2020-09-02 10:16:55.003 INFO 24088 --- [ restartedMain] com.subbu.SubbuCaseStudyApplication : No active profile set, falling back to default profiles: default
2020-09-02 10:16:55.074 INFO 24088 --- [ restartedMain] .e.DevToolsPropertyDefaultsPostProcessor : Devtools property defaults active! Set 'spring.devtools.add-prop
2020-09-02 10:16:55.074 INFO 24088 --- [ restartedMain] .e.DevToolsPropertyDefaultsPostProcessor : For additional web related logging consider setting the 'logging.
2020-09-02 10:16:56.426 INFO 24088 --- [ restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomcat initialized with port(s): 8080 (http)
2020-09-02 10:16:56.441 INFO 24088 --- [ restartedMain] o.apache.catalina.core.StandardService : Starting service [Tomcat]
2020-09-02 10:16:56.441 INFO 24088 --- [ restartedMain] org.apache.catalina.core.StandardEngine : Starting Servlet engine: [Apache Tomcat/9.0.37]
2020-09-02 10:16:56.578 INFO 24088 --- [ restartedMain] o.a.c.c.C.[Tomcat].[localhost].[/] : Initializing Spring embedded WebApplicationContext
2020-09-02 10:16:56.578 INFO 24088 --- [ restartedMain] w.s.c.ServletWebServerApplicationContext : Root WebApplicationContext: initialization completed in 1504 ms
2020-09-02 10:16:56.909 INFO 24088 --- [ restartedMain] o.s.s.concurrent.ThreadPoolTaskExecutor : Initializing ExecutorService 'applicationTaskExecutor'
2020-09-02 10:16:57.260 INFO 24088 --- [ restartedMain] o.s.b.d.a.OptionalLiveReloadServer : LiveReload server is running on port 35729
2020-09-02 10:16:57.269 INFO 24088 --- [ restartedMain] o.s.b.a.e.web.EndpointLinksResolver : Exposing 2 endpoint(s) beneath base path '/actuator'
2020-09-02 10:16:57.344 INFO 24088 --- [ restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomcat started on port(s): 8080 (http) with context path ''
2020-09-02 10:16:57.368 INFO 24088 --- [ restartedMain] com.subbu.SubbuCaseStudyApplication : Started SubbuCaseStudyApplication in 2.785 seconds (JVM running t
Welcome to Subbu - this message will appear in the Console
2020-09-02 10:16:57.597 INFO 24088 --- [on(3)-127.0.0.1] o.a.c.c.C.[Tomcat].[localhost].[/] : Initializing Spring DispatcherServlet 'dispatcherServlet'
2020-09-02 10:16:57.597 INFO 24088 --- [on(3)-127.0.0.1] o.s.web.servlet.DispatcherServlet : Initializing Servlet 'dispatcherServlet'
2020-09-02 10:16:57.605 INFO 24088 --- [on(3)-127.0.0.1] o.s.web.servlet.DispatcherServlet : Completed initialization in 8 ms
```


Run as Maven Install to create jar:



Jar is created in the Target folder:

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

- Project Explorer:** Displays the project structure for 'subbu-case-study'. The 'target' folder is expanded, showing 'subbu-casestudy-microservices-docker.jar' and 'subbu-casestudy-microservices-docker.jar.original'.
- Dockerfile Editor:** Shows the following content:

```
1 FROM openjdk:11
2 EXPOSE 8080
3 ADD target/subbu-casestudy-microservices-docker.jar subbu-casestudy-microservices-dc
4 ENTRYPOINT ["java", "-jar", "/subbu-casestudy-microservices-docker.jar"]
```
- Console:** Displays the output of running the application. It starts with a Java version message and then shows logs from the application startup:

```
g Boot :: (v2.3.3.RELEASE)

2 10:37:25.571 INFO 24088 --- [ restartedMain] com.subbu.SubbuCaseStudyApplication : Starting SubbuCaseStudyAp
2 10:37:25.571 INFO 24088 --- [ restartedMain] com.subbu.SubbuCaseStudyApplication : No active profile set, fa
2 10:37:25.907 INFO 24088 --- [ restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomcat initialized with p
2 10:37:25.908 INFO 24088 --- [ restartedMain] o.apache.catalina.core.StandardService : Starting service [Tomcat]
2 10:37:25.908 INFO 24088 --- [ restartedMain] org.apache.catalina.core.StandardEngine : Starting Servlet engine:
2 10:37:25.982 INFO 24088 --- [ restartedMain] o.a.c.c.C.[Tomcat].[localhost].[/] : Initializing Spring embed
2 10:37:25.982 INFO 24088 --- [ restartedMain] w.s.c.ServletWebServerApplicationContext : Root WebApplicationContext
2 10:37:26.067 INFO 24088 --- [ restartedMain] o.s.s.concurrent.ThreadPoolTaskExecutor : Initializing ExecutorServ
2 10:37:26.188 INFO 24088 --- [ restartedMain] o.s.b.d.a.OptionalLiveReloadServer : LiveReload server is runn
2 10:37:26.194 INFO 24088 --- [ restartedMain] o.s.b.a.e.web.EndpointLinksResolver : Exposing 2 endpoint(s) be
2 10:37:26.217 INFO 24088 --- [ restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomcat started on port(s)
2 10:37:26.227 INFO 24088 --- [ restartedMain] com.subbu.SubbuCaseStudyApplication : Started SubbuCaseStudyApp
2 10:37:26.229 INFO 24088 --- [ restartedMain] .ConditionEvaluationDeltaLoggingListener : Condition evaluation unch
o Subbu - this message will appear in the Console
```

<http://localhost:8080>



Whitelabel Error Page

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

Wed Sep 02 10:39:02 IST 2020

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

No message available

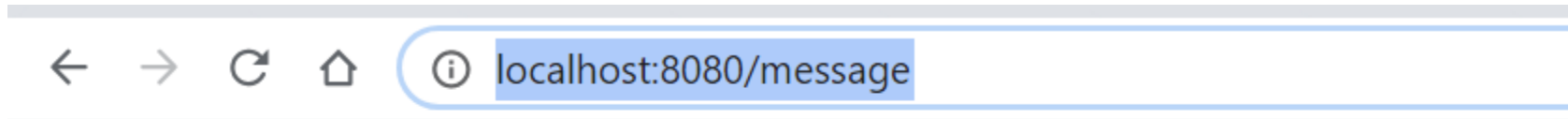
<http://127.0.0.1:8080/message>



← → ↻ 🏠 ⓘ 127.0.0.1:8080/message

Welcome to Subramanyam Vemala - message - call through the REST API

<http://localhost:8080/message>



Welcome to Subramanyam Vemala - message - call through the REST API

Launch Power Shell – goto the Dockerfile folder:

Windows PowerShell

```
PS C:\Users\svemala\eclipse-workspace> ls
```

Directory: C:\Users\svemala\eclipse-workspace

Mode	LastWriteTime	Length	Name
d-----	8/27/2020 7:12 PM		.metadata
d-----	8/31/2020 12:10 PM		docker-2
d-----	8/31/2020 5:35 PM		docker-4
d-----	8/31/2020 8:31 PM		docker-5
d-----	9/1/2020 2:46 PM		docker-java-microservices
d-----	9/1/2020 3:49 PM		java-microservices-springboot
d-----	9/1/2020 6:48 PM		java-microservices-springboot1
d-----	9/2/2020 10:10 AM		subbu-case-study

```
PS C:\Users\svemala\eclipse-workspace> cd subbu*
```

```
PS C:\Users\svemala\eclipse-workspace\subbu-case-study>
```

Build the Docker image using the Dockerfile using the command: `docker build -t <jar name> .`

```
Windows PowerShell
2b36e29a60da      k8s.gcr.io/pause:3.1   "/pause"         22 hours ago     Up 22 hours       k8s_POD_kube-apiserver-docker-desktop_kube-system_2966bdea77
1eade42b079889c75cf17e_0
46d11909a96a      k8s.gcr.io/pause:3.1   "/pause"         22 hours ago     Up 22 hours       k8s_POD_etcd-docker-desktop_kube-system_bc3eca0122540ccc59e9
59a7805e87e8_0
PS C:\Users\svemala\eclipse-workspace\subbu-case-study> docker build -t subbu-casestudy-microservices-docker.jar .
Sending build context to Docker daemon 18.58MB
Step 1/4 : FROM openjdk:11
--> 455ecea6f4f2
Step 2/4 : EXPOSE 8080
--> Using cache
--> 6ede0b7d669c
Step 3/4 : ADD target/subbu-casestudy-microservices-docker.jar subbu-casestudy-microservices-docker.jar
--> 106e8a60aac5
Step 4/4 : ENTRYPOINT ["java", "-jar", "/subbu-casestudy-microservices-docker.jar"]
--> Running in bfe927617ff1
Removing intermediate container bfe927617ff1
--> 54538fc8948d
Successfully built 54538fc8948d
Successfully tagged subbu-casestudy-microservices-docker.jar:latest
SECURITY WARNING: You are building a Docker image from Windows against a non-Windows Docker host. All files and directories added to build context will have '-rwxr-xr-x' permissions. It is
recommended to double check and reset permissions for sensitive files and directories.
PS C:\Users\svemala\eclipse-workspace\subbu-case-study>
```

Docker Image created: docker ps

```
Windows PowerShell
PS C:\Users\svemala\eclipse-workspace\subbu-case-study> docker ps
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
ba4431a5c2fa	subbu-casestudy-microservices-docker.jar	"java -jar /subbu-ca..."	2 hours ago	Up 2 hours	0.0.0.0:9091->8080/tcp	crazy_meninsky
ac9a3d272039	54538fc8948d	"java -jar /subbu-ca..."	2 hours ago	Up 2 hours	0.0.0.0:9090->8080/tcp	boring_heisenberg
867a94ed25e3	e704287ce753	"/storage-provisione..."	24 hours ago	Up 24 hours		k8s_storage-provisioner_storage-prov
isioner_kube-system_cf41569a-33ac-4693-be2a-1e673e45ebba_1						
96ea327e35eb	129151cdf35f	"/compose-controller..."	24 hours ago	Up 24 hours		k8s_compose_compose-78f95d4f8c-j41hk
_docker_e5bb9b12-338d-4f4e-99a0-973ece0f631d_0						
149fdc1a31b3	bf261d157914	"/coredns -conf /etc..."	24 hours ago	Up 24 hours		k8s_coredns_coredns-5644d7b6d9-zv6m4
_kube-system_48269134-3fbc-4a5c-8f10-f671e07917cd_0						
f205cecb47c7	bf261d157914	"/coredns -conf /etc..."	24 hours ago	Up 24 hours		k8s_coredns_coredns-5644d7b6d9-85fz6
_kube-system_8da76ca1-bc13-4a95-90ac-330cad6f6d20_0						
bbb644f85e92	989749268895	"/api-server --kubec..."	24 hours ago	Up 24 hours		k8s_compose_compose-api-6fffb89dc58-9
6w7k_docker_faed47b7-753f-4acf-a61f-b4e6976c97d3_0						
2521e3c928dd	79da37e5a3aa	"/kube-vpnkit-forwar..."	24 hours ago	Up 24 hours		k8s_vpnkit-controller_vpnkit-control
ler_kube-system_a9ab932e-b5df-4426-8ed5-478bf96302ba_0						
90c864b57709	k8s.gcr.io/pause:3.1	"/pause"	24 hours ago	Up 24 hours		k8s_POD_compose-78f95d4f8c-j41hk_doc
ker_e5bb9b12-338d-4f4e-99a0-973ece0f631d_0						
cb2cc7d18486	k8s.gcr.io/pause:3.1	"/pause"	24 hours ago	Up 24 hours		k8s_POD_compose-api-6fffb89dc58-96w7k
_docker_faed47b7-753f-4acf-a61f-b4e6976c97d3_0						
f7aeb917f72b	k8s.gcr.io/pause:3.1	"/pause"	24 hours ago	Up 24 hours		k8s_POD_coredns-5644d7b6d9-zv6m4_kub
e-system_48269134-3fbc-4a5c-8f10-f671e07917cd_0						
174ffbf30737	k8s.gcr.io/pause:3.1	"/pause"	24 hours ago	Up 24 hours		k8s_POD_coredns-5644d7b6d9-85fz6_kub
e-system_8da76ca1-bc13-4a95-90ac-330cad6f6d20_0						
c8cf83b6b5fc	0ee1b8a3ebe0	"/usr/local/bin/kube..."	24 hours ago	Up 24 hours		k8s_kube-proxy_kube-proxy-g4v94_kube
-system_69795b23-d199-4265-8998-a24f3aaf69b4_0						
7a7e9c6bc221	k8s.gcr.io/pause:3.1	"/pause"	24 hours ago	Up 24 hours		k8s_POD_vpnkit-controller_kube-syste
m_a9ab932e-b5df-4426-8ed5-478bf96302ba_0						
81982e6ea504	k8s.gcr.io/pause:3.1	"/pause"	24 hours ago	Up 24 hours		k8s_POD_storage-provisioner_kube-sys
tem_cf41569a-33ac-4693-be2a-1e673e45ebba_0						
62ef55945511	k8s.gcr.io/pause:3.1	"/pause"	24 hours ago	Up 24 hours		k8s_POD_kube-proxy-g4v94_kube-system
_69795b23-d199-4265-8998-a24f3aaf69b4_0						
41779161b3af	b2756210eeab	"etcd --advertise-cl..."	24 hours ago	Up 24 hours		k8s_etcd_etcd-docker-desktop_kube-sy
stem_bc3eca0122540ccc59e959a7805e87e8_0						
f55fe687dc20	b4d073a9efda	"kube-scheduler --au..."	24 hours ago	Up 24 hours		k8s_kube-scheduler_kube-scheduler-do
cker-desktop_kube-system_28dd1b1230fbe15350eb1b896ae9493d_0						
3cb0f87dd299	441835dd2301	"kube-controller-man..."	24 hours ago	Up 24 hours		k8s_kube-controller-manager_kube-con
troller-manager-docker-desktop_kube-system_9076958db0c2cc26f76def745bfc1928_0						
a50445846a88	fc838b21afbb	"kube-apiserver --ad..."	24 hours ago	Up 24 hours		k8s_kube-apiserver_kube-apiserver-do
cker-desktop_kube-system_2966bddea771eade42b079889c75cf17e_0						
ddd90d3dbad	k8s.gcr.io/pause:3.1	"/pause"	24 hours ago	Up 24 hours		k8s_POD_kube-scheduler-docker-deskto
p_kube-system_28dd1b1230fbe15350eb1b896ae9493d_0						

Run the Docker image using the command: `docker run -p <port number mapped to the exposed port>:<Exposed port> <jar name>`

```
PS C:\Users\svemala\eclipse-workspace\subbu-case-study> docker run -p 9091:8080 subbu-casestudy-microservices-docker.jar
```

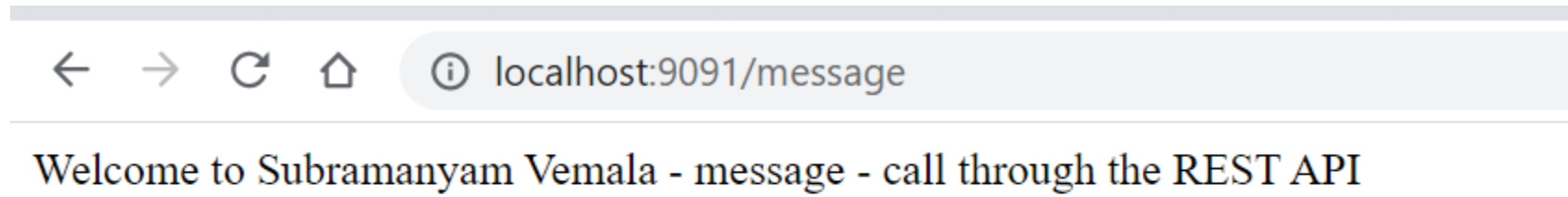
```

      .\ / _.-'-. \_..-.\_..-\_\_\_\_\_
( ) \_-|_|_|_|_|_|_|_|_|_|_|_|_|_|
W   | |_|_|_|_|_|_|_|_|_|_|_|_|_|)
    | |_|_|_|_|_|_|_|_|_|_|_|_|_|)
=====|_|=====|_|_/=//_//_//_
:: Spring Boot ::                (v2.3.3.RELEASE)

```

```
2020-09-02 05:31:22.366 INFO 1 --- [main] com.subbu.SubbuCaseStudyApplication : Starting SubbuCaseStudyApplication v0.0.1-SNAPSHOT on ba4431a5c2fa with PID 1 (/subbu-cases
study-microservices-docker.jar started by root in /)
2020-09-02 05:31:22.377 INFO 1 --- [main] com.subbu.SubbuCaseStudyApplication : No active profile set, falling back to default profiles: default
2020-09-02 05:31:25.548 INFO 1 --- [main] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomcat initialized with port(s): 8080 (http)
2020-09-02 05:31:25.581 INFO 1 --- [main] o.apache.catalina.core.StandardService : Starting service [Tomcat]
2020-09-02 05:31:25.582 INFO 1 --- [main] org.apache.catalina.core.StandardEngine : Starting Servlet engine: [Apache Tomcat/9.0.37]
2020-09-02 05:31:25.720 INFO 1 --- [main] o.a.c.c.C.[Tomcat].[localhost].[/] : Initializing Spring embedded WebApplicationContext
2020-09-02 05:31:25.720 INFO 1 --- [main] w.s.c.ServletWebServerApplicationContext : Root WebApplicationContext: initialization completed in 3027 ms
2020-09-02 05:31:26.818 INFO 1 --- [main] o.s.s.concurrent.ThreadPoolTaskExecutor : Initializing ExecutorService 'applicationTaskExecutor'
2020-09-02 05:31:27.398 INFO 1 --- [main] o.s.b.a.e.web.EndpointLinksResolver : Exposing 2 endpoint(s) beneath base path '/actuator'
2020-09-02 05:31:27.485 INFO 1 --- [main] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomcat started on port(s): 8080 (http) with context path ''
2020-09-02 05:31:27.525 INFO 1 --- [main] com.subbu.SubbuCaseStudyApplication : Started SubbuCaseStudyApplication in 6.746 seconds (JVM running for 8.053)
Welcome to Subbu - this message will appear in the console
```

<http://localhost:9091/message>



<http://127.0.0.1:9091/message>

A screenshot of a web browser's address bar. It features navigation icons (back, forward, refresh, home) on the left, followed by an information icon and the URL '127.0.0.1:9091/message' in a light gray background.

← → ↻ 🏠 ⓘ 127.0.0.1:9091/message

Welcome to Subramanyam Vemala - message - call through the REST API

Stop the application:

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

- Project Explorer:** Displays the project structure for 'subbu-case-study'. The 'pom.xml' file is selected under the 'target' directory.
- Editor:** Shows the 'pom.xml' file content. The XML structure is as follows:

```
<?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 http://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>2.3.3.RELEASE</version>
    <relativePath/> <!-- lookup parent from repository -->
  </parent>
  <groupId>com.subbu</groupId>
  <artifactId>subbu-case-study</artifactId>
  <version>0.0.1-SNAPSHOT</version>
</project>
```
- Console:** Displays the output of the application. The output shows the application starting successfully on port 8080. The following lines are highlighted in yellow:

```
Tomcat started on port(s): 8080 (http) with context path ''
Started SubbuCaseStudyApplication in 3.15 seconds (JVM running for 5.473)
```

Application is stopped:

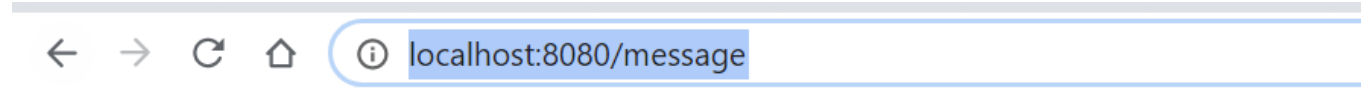
The screenshot shows the Eclipse IDE interface with the following components:

- Project Explorer:** Displays the project structure for 'subbu-case-study'. It includes folders for 'src/main/java', 'src/main/resources', 'src/test/java', 'JRE System Library [JavaSE-11]', 'Maven Dependencies', 'target/generated-sources/annotations', 'target/generated-test-sources/test-annotations', 'java-microservices-springboot-docker', 'src', and 'target'. A 'Dockerfile' is also visible.
- Code Editor:** Shows the 'pom.xml' file for 'subbu-case-study'. The XML content is as follows:

```
<?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 http://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>2.3.3.RELEASE</version>
    <relativePath/> <!-- lookup parent from repository -->
  </parent>
  <groupId>com.subbu</groupId>
  <artifactId>subbu-case-study</artifactId>
  <version>0.0.1-SNAPSHOT</version>
</project>
```
- Console:** Displays the output of the application. The log shows the application starting successfully, but then receiving a shutdown request. The final lines of the log are highlighted in yellow:

```
<terminated> subbu-case-study - SubbuCaseStudyApplication [Spring Boot App] C:\Program Files\OpenJDK11\bin\javaw.exe (Sep 3, 2020, 9:34:38 AM - 9:41:20 AM)
[main] org.apache.catalina.core.StandardEngine : Starting Servlet engine: [Apache Tomcat/9.0.37]
[main] o.a.c.c.C.[Tomcat].[localhost].[/] : Initializing Spring embedded WebApplicationContext
[main] w.s.c.ServletWebServerApplicationContext : Root WebApplicationContext: initialization completed in 1738 ms
[main] o.s.s.concurrent.ThreadPoolTaskExecutor : Initializing ExecutorService 'applicationTaskExecutor'
[main] o.s.b.d.a.OptionalLiveReloadServer : LiveReload server is running on port 35729
[main] o.s.b.a.e.web.EndpointLinksResolver : Exposing 2 endpoint(s) beneath base path '/actuator'
[main] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomcat started on port(s): 8080 (http) with context path ''
[main] com.subbu.SubbuCaseStudyApplication : Started SubbuCaseStudyApplication in 3.15 seconds (JVM running for 5.473)
[main] o.a.c.c.C.[Tomcat].[localhost].[/] : Initializing Spring DispatcherServlet 'dispatcherServlet'
[main] o.s.web.servlet.DispatcherServlet : Initializing Servlet 'dispatcherServlet'
[main] o.s.web.servlet.DispatcherServlet : Completed initialization in 8 ms
[main] inMXBeanRegistrar$SpringApplicationAdmin : Application shutdown requested.
[main] o.s.s.concurrent.ThreadPoolTaskExecutor : Shutting down ExecutorService 'applicationTaskExecutor'
```

Check for the output on the browser - Now no output, on the browser as the application is stopped:
<http://localhost:8080/message>



This site can't be reached

localhost refused to connect.

Try:

- Checking the connection
- [Checking the proxy and the firewall](#)

ERR_CONNECTION_REFUSED

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

```
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 - optional:

```
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>
```


C:\Users\svemala\eclipse-workspace\subbu-case-study

File Explorer window showing the directory `C:\Users\svemala\eclipse-workspace\subbu-case-study`.

The ribbon includes tabs: File, Home, Share, View. The ribbon buttons are organized into groups: Clipboard (Pin to Quick access, Copy, Paste, Cut, Copy path, Paste shortcut), Organize (Move to, Copy to, Delete, Rename), New (New item, Easy access, New folder), Open (Properties, Open, Edit, History), and Select (Select all, Select none, Invert selection).

The address bar shows the path: `This PC > System (C:) > Users > svemala > eclipse-workspace > subbu-case-study`.

The left sidebar shows Quick access and This PC. The main pane displays a list of files and folders:

Name	Date modified	Type	Size
.mvn	9/2/2020 9:59 AM	File folder	
.settings	9/2/2020 9:59 AM	File folder	
src	9/2/2020 9:59 AM	File folder	
target	9/2/2020 10:58 AM	File folder	
.classpath	9/2/2020 9:59 AM	CLASSPATH File	2 KB
.gitignore	9/2/2020 9:59 AM	Text Document	1 KB
.project	9/2/2020 9:59 AM	PROJECT File	1 KB
Dockerfile	9/2/2020 10:13 AM	File	1 KB
HELP.md	9/2/2020 9:59 AM	MD File	2 KB
mvnw	9/2/2020 9:59 AM	File	10 KB
mvnw.cmd	9/2/2020 9:59 AM	Windows Command ...	7 KB
pom.xml	9/2/2020 10:13 AM	XML Document	2 KB

Appendix:

Download the code from public GitHub:

1. HTTPS:

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

2. SSH:

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

3. Code Zip file:



java-microservices-springboot-docker-master.zip