

Creating Microservices for account and loan

In this hands on exercises, we will create two microservices for a bank. One microservice for handling accounts and one for handling loans.

Each microservice will be a specific independent Spring RESTful Webservice maven project having it's own pom.xml. The only difference is that, instead of having both account and loan as a single application, it is split into two different applications. These webservices will be a simple service without any backend connectivity.

Follow steps below to implement the two microservices:

Account Microservice

- Create folder with employee id in D: drive
- Create folder named 'microservices' in the new folder created in previous step. This folder will contain all the sample projects that we will create for learning microservices.
- Open <https://start.spring.io/> in browser
- Enter form field values as specified below:
 - Group: com.cognizant
 - Artifact: account
- Select the following modules
 - Developer Tools > Spring Boot DevTools
 - Web > Spring Web
- Click generate and download the zip file
- Extract 'account' folder from the zip and place this folder in the 'microservices' folder created earlier
- Open command prompt in account folder and build using mvn clean package command
- Import this project in Eclipse and implement a controller method for getting account details based on account number. Refer specification below:
 - Method: GET
 - Endpoint: /accounts/{number}
 - Sample Response. Just a dummy response without any backend connectivity.

```
{ number: "00987987973432", type: "savings", balance: 234343 }
```

- Launch by running the application class and test the service in browser

Loan Microservice

- Follow similar steps specified for Account Microservice and implement a service API to get loan account details
 - Method: GET
 - Endpoint: /loans/{number}
 - Sample Response. Just a dummy response without any backend connectivity.

```
{ number: "H00987987972342", type: "car", loan: 400000, emi: 3258, tenure: 18 }
```

- Launching this application by having account service already running
- This launch will fail with error that the bind address is already in use
- The reason is that each one of the service is launched with default port number as 8080. Account service is already using this port and it is not available for loan service.
- Include "server.port" property with value 8081 and try launching the application
- Test the service with 8081 port

Now we have two microservices running on different ports.

NOTE: The console window of Eclipse will have both the service console running. To switch between different consoles use the monitor icon within the console view.

Solution

AccountApplication.java

```
package com.cognizant.account;
import org.springframework.boot.SpringApplication;
import org.springframework.boot.autoconfigure.SpringBootApplication;
@SpringBootApplication
public class AccountApplication {
    public static void main(String[] args) {
        SpringApplication.run(AccountApplication.class, args);
    }
}
```

AccountController.java

```
package com.cognizant.account.controller;
import java.util.Map;
import org.springframework.web.bind.annotation.GetMapping;
import org.springframework.web.bind.annotation.PathVariable;
import org.springframework.web.bind.annotation.RequestMapping;
import org.springframework.web.bind.annotation.RestController;
@RestController
@RequestMapping("/accounts")
public class AccountController {
    @GetMapping("/{number}")
    public Map <String, Object> getAccount(@PathVariable String number) {
        return Map.of("number", number,
            "type", "current",
            "balance" , 500000);
    }
}
```

LoanApplication.java

```
package com.cognizant.loan;
import org.springframework.boot.SpringApplication;
import org.springframework.boot.autoconfigure.SpringBootApplication;
@SpringBootApplication
public class LoanApplication {
    public static void main(String[] args) {
        SpringApplication.run(LoanApplication.class, args);
    }
}
```

LoanController.java

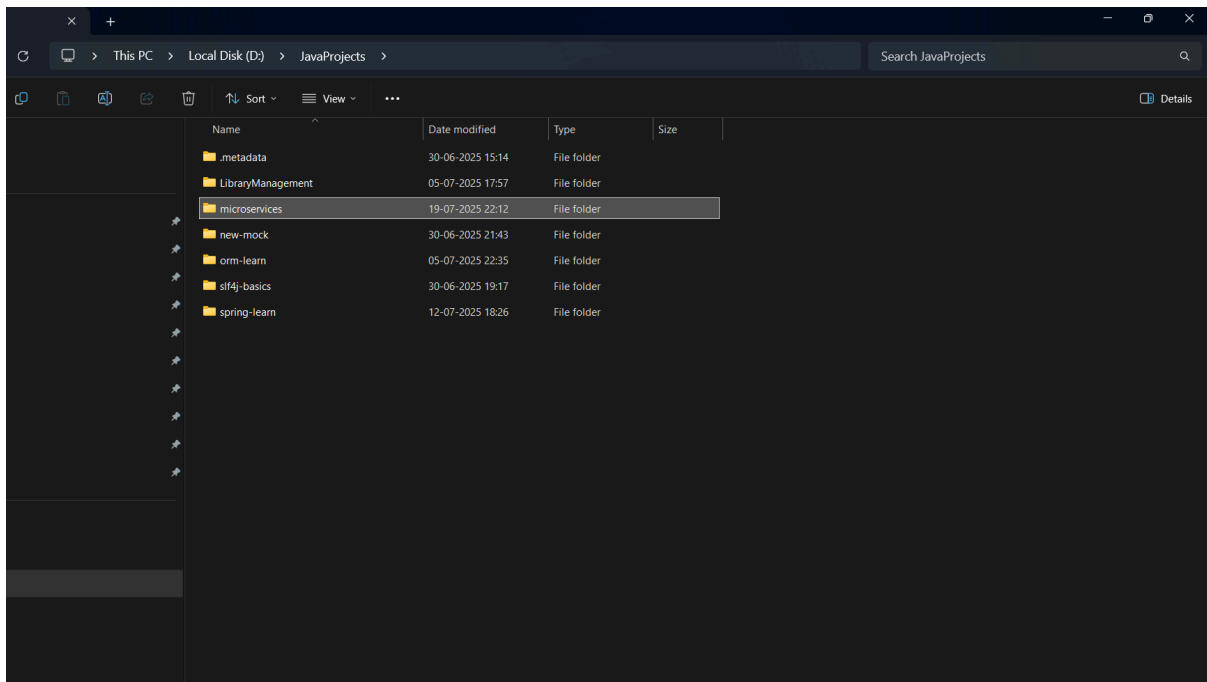
```
package com.cognizant.loan.controller;
import java.util.Map;
import org.springframework.web.bind.annotation.GetMapping;
import org.springframework.web.bind.annotation.PathVariable;
import org.springframework.web.bind.annotation.RequestMapping;
import org.springframework.web.bind.annotation.RestController;
@RestController
@RequestMapping("/loans")
public class LoanController {
    @GetMapping("/{number}")
    public Map <String, Object> getLoan(@PathVariable String number) {
        return Map.of("number", number, "type", "car", "loan", 4000000,
            "emi" , 3258, "tenure", 18);
    }
}
```

application.properties

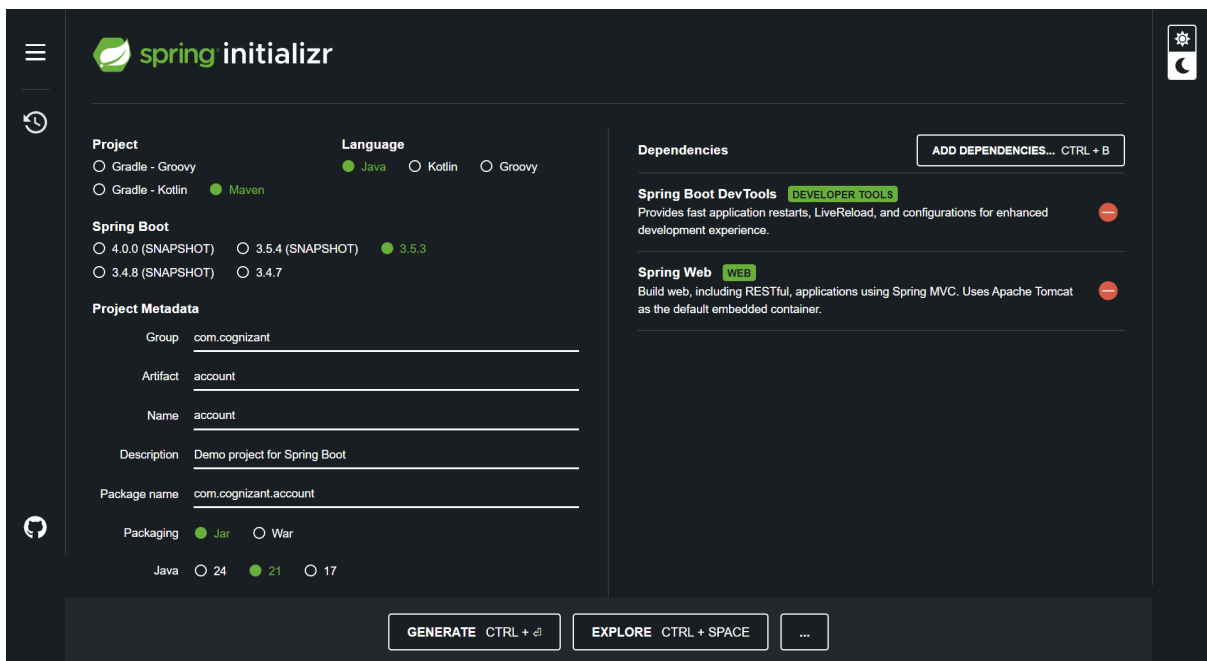
```
spring.application.name=loan
server.port = 8081
```

Output Screenshots

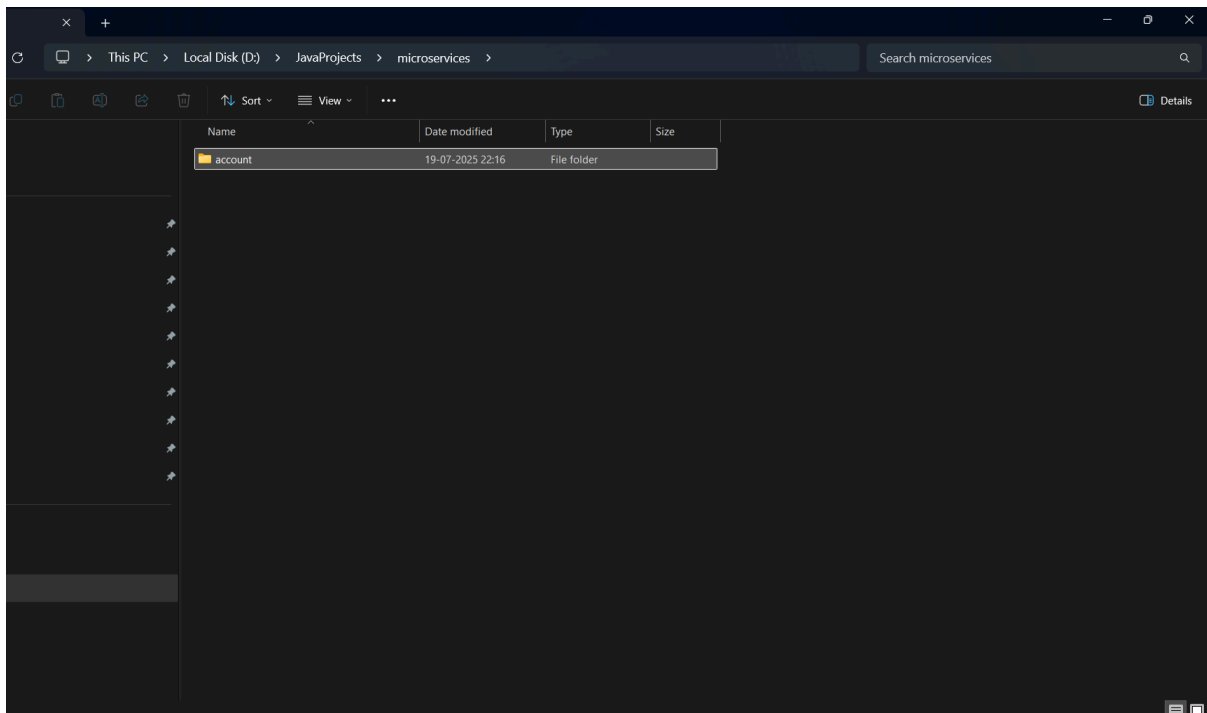
Creating a `microservices` folder



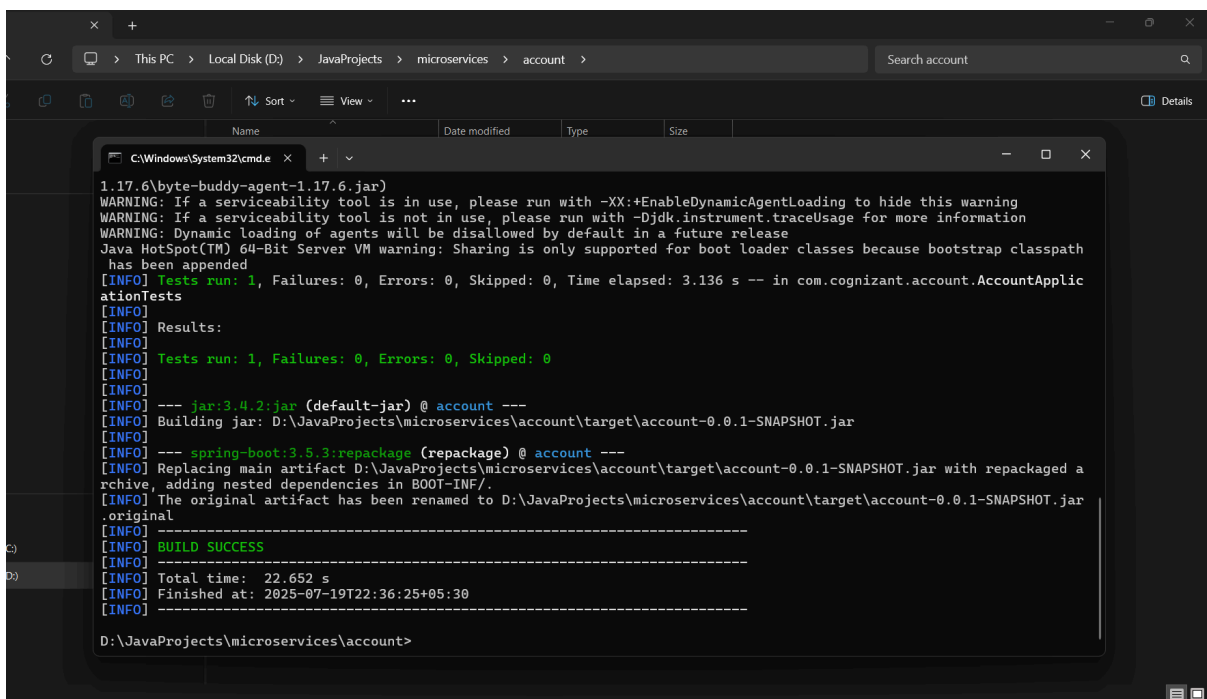
Spring Initializr Configs



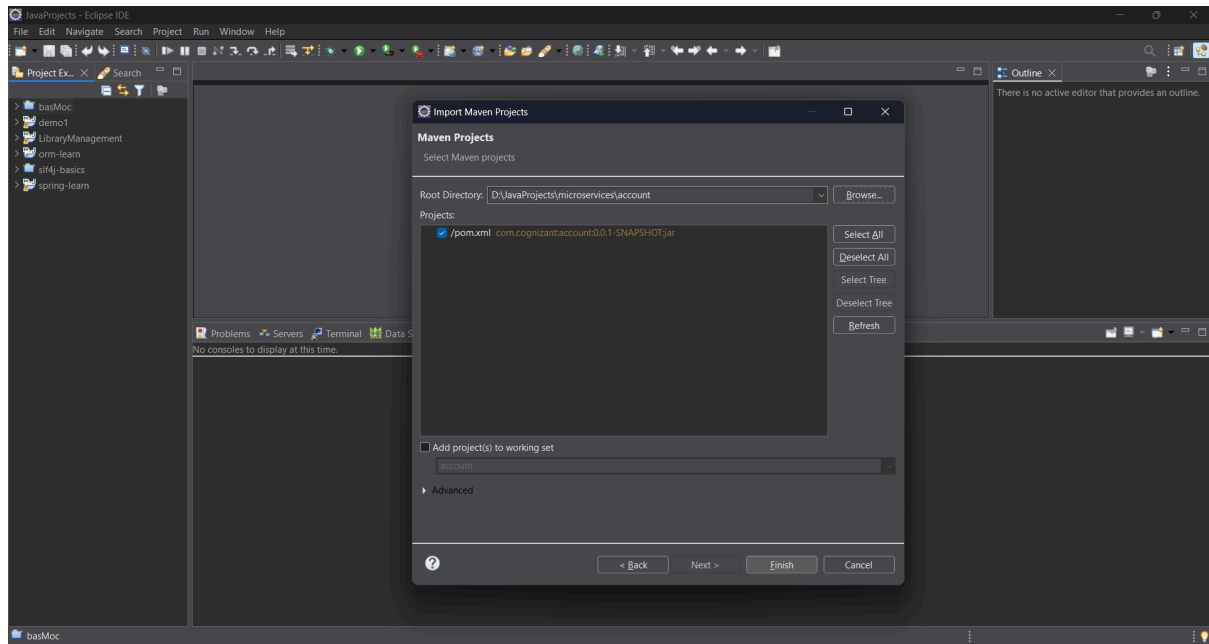
Extracted the zip `account` folder into `microservices`



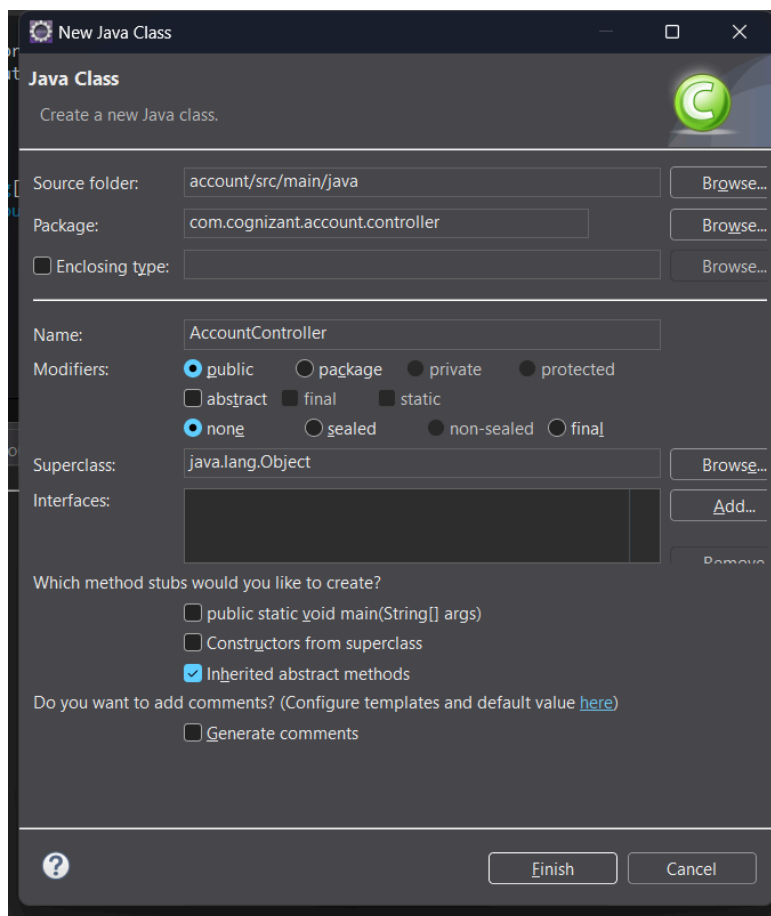
Successful Maven Build of Project



Importing Project into Eclipse



Create the `AccountController.java` class



Running the AccountApplication.java

```
Problems Servers Terminal Data Source Explorer Properties Console X JUnit
AccountApplication [Java Application] D:\downloads\ eclipse-jee-2025-06-R-win32-x86_64\eclipse\plugins\org.eclipse.justi.openjdk.hotspot.jre.full.win32.x86_64.21.0.7\jre\bin\javaw.exe (19-Jul-2025, 11:33:23 pm elapsed: 0:01:03)

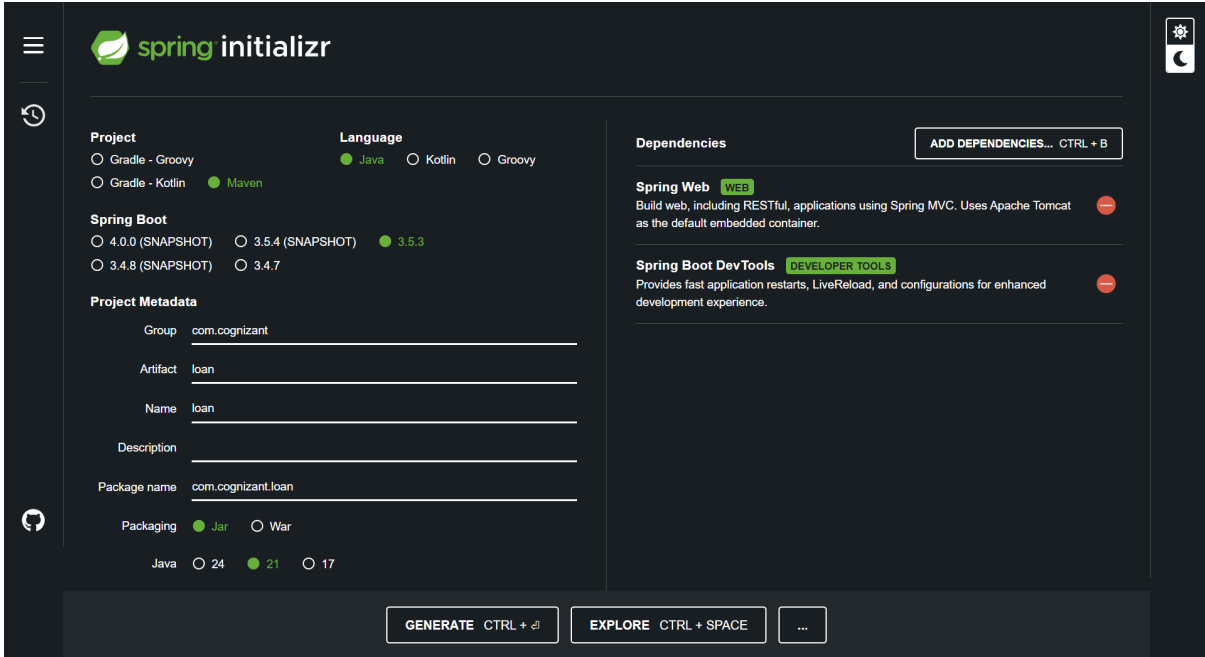
:: Spring Boot :: (v3.5.3)

2025-07-19T23:33:58.005+05:30 INFO 4000 --- [account] [ restartedMain] c.cognizant.account.AccountApplication : Starting AccountApplication using Java 21.0.7 with PID 4000 (D
2025-07-19T23:33:58.187+05:30 INFO 4000 --- [account] [ restartedMain] c.cognizant.account.AccountApplication : No active profile set, falling back to 1 default profile: "def
2025-07-19T23:33:58.188+05:30 INFO 4000 --- [account] [ restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomcat initialized with port 8080 (http)
2025-07-19T23:33:58.189+05:30 INFO 4000 --- [account] [ restartedMain] o.apache.catalina.core.StandardService : Starting service [Tomcat]
2025-07-19T23:33:58.202+05:30 INFO 4000 --- [account] [ restartedMain] o.apache.catalina.core.StandardEngine : Starting Servlet engine: [Apache Tomcat/10.1.42]
2025-07-19T23:33:58.202+05:30 INFO 4000 --- [account] [ restartedMain] o.a.c.c.C.[Tomcat].[localhost].[/] : Initializing Spring embedded WebApplicationContext
2025-07-19T23:33:58.202+05:30 INFO 4000 --- [account] [ restartedMain] w.s.c.ServletWebServerApplicationContext : Root WebApplicationContext: initialization completed in 193 ms
2025-07-19T23:33:58.282+05:30 INFO 4000 --- [account] [ restartedMain] o.s.b.d.a.OptionalLiveReloadServer : LiveReload server is running on port 35729
2025-07-19T23:33:58.294+05:30 INFO 4000 --- [account] [ restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomcat started on port 8080 (http) with context path '/'
2025-07-19T23:33:58.297+05:30 INFO 4000 --- [account] [ restartedMain] c.cognizant.account.AccountApplication : Started AccountApplication in 0.316 seconds (process running f
2025-07-19T23:33:58.300+05:30 INFO 4000 --- [account] [ restartedMain] .ConditionEvaluationDeltaLoggingListener : Condition evaluation unchanged
2025-07-19T23:34:07.218+05:30 INFO 4000 --- [account] [nio-8080-exec-1] o.a.c.c.C.[Tomcat].[localhost].[/] : Initializing Spring DispatcherServlet 'dispatcherServlet'
2025-07-19T23:34:07.218+05:30 INFO 4000 --- [account] [nio-8080-exec-1] o.s.web.servlet.DispatcherServlet : Initializing Servlet 'dispatcherServlet'
2025-07-19T23:34:07.218+05:30 INFO 4000 --- [account] [nio-8080-exec-1] o.s.web.servlet.DispatcherServlet : Completed initialization in 0 ms
```

Sending GET request at <http://localhost:8080/accounts/00987987973432>

```
localhost:8080/accounts/00987987973432
http://localhost:8080/accounts/00987987973432
SSSA IMPHE ids techres spring mockito weekly PLANNER left domains in cse - Go... trailmix skillwallet Goals 2025 - AFFINE vm Blind 75 Must Do Le... 2025 Big-O Algorithm Co...
Pretty-print
{
  "number": "00987987973432",
  "balance": 500000,
  "type": "current"
}
```


Creating for loan microservice



The Spring Initializr interface shows the configuration for a new project. The 'Project' section includes options for 'Gradle - Groovy', 'Gradle - Kotlin', and 'Maven' (selected). The 'Language' section includes 'Java' (selected), 'Kotlin', and 'Groovy'. The 'Spring Boot' section includes versions '4.0.0 (SNAPSHOT)', '3.5.4 (SNAPSHOT)', '3.5.3' (selected), and '3.4.8 (SNAPSHOT)', '3.4.7'. The 'Project Metadata' section includes fields for 'Group' (com.cognizant), 'Artifact' (loan), 'Name' (loan), 'Description', and 'Package name' (com.cognizant.loan). The 'Packaging' section includes 'Jar' (selected) and 'War'. The 'Java' section includes versions '24', '21' (selected), and '17'. The 'Dependencies' section includes 'Spring Web' (WEB) and 'Spring Boot DevTools' (DEVELOPER TOOLS). Buttons at the bottom include 'GENERATE CTRL + G', 'EXPLORE CTRL + SPACE', and a menu button '...'.

Project

☐ Gradle - Groovy ☐ Gradle - Kotlin ☒ Maven

Language

☒ Java ☐ Kotlin ☐ Groovy

Spring Boot

☐ 4.0.0 (SNAPSHOT) ☐ 3.5.4 (SNAPSHOT) ☒ 3.5.3 ☐ 3.4.8 (SNAPSHOT) ☐ 3.4.7

Project Metadata

Group

Artifact

Name

Description

Package name

Packaging

☒ Jar ☐ War

Java

☐ 24 ☒ 21 ☐ 17

Dependencies

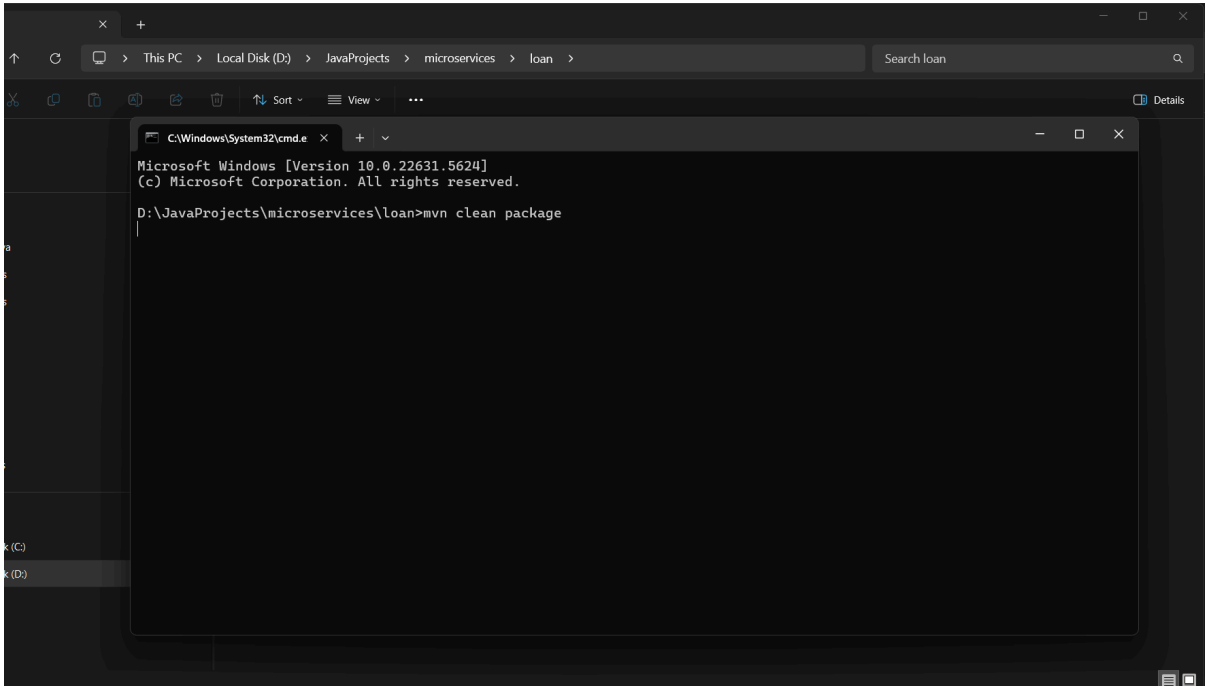
Spring Web WEB Build web, including RESTful, applications using Spring MVC. Uses Apache Tomcat as the default embedded container. ☐

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

ADD DEPENDENCIES... CTRL + B

GENERATE CTRL + G **EXPLORE CTRL + SPACE** ...

Extract to location and build maven project

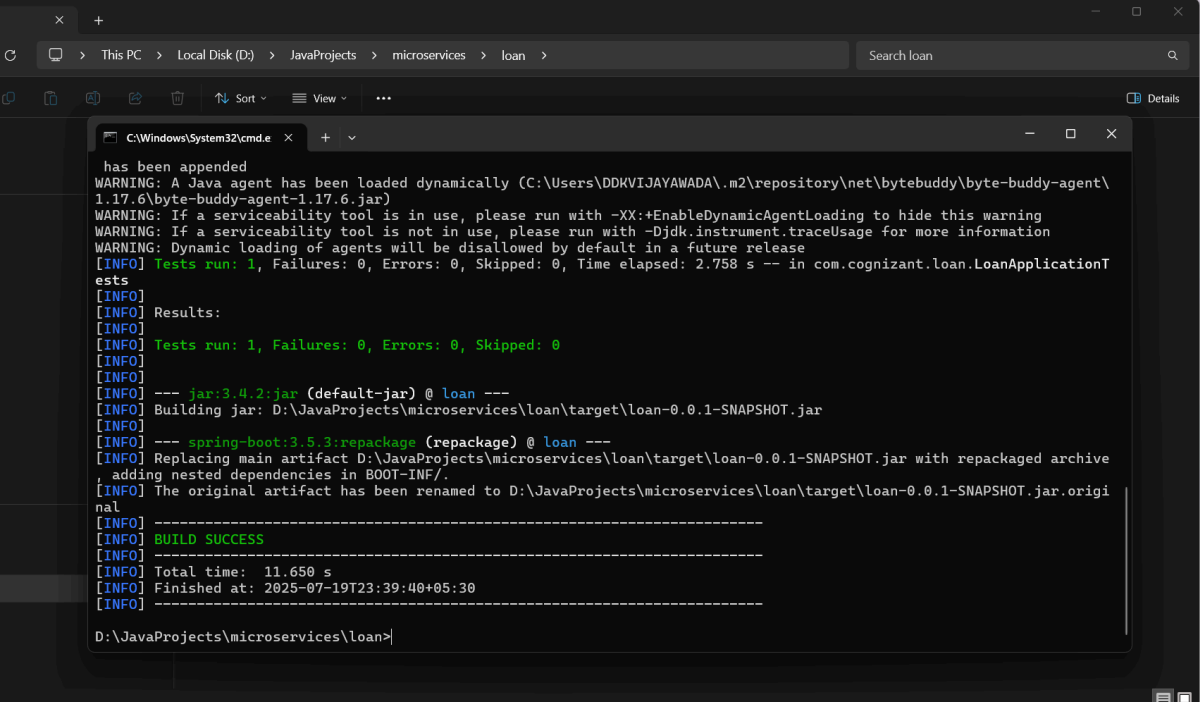


The terminal window shows the execution of the Maven command 'mvn clean package' in the directory 'D:\JavaProjects\microservices\loan'.

```
C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.22631.5624]
(c) Microsoft Corporation. All rights reserved.

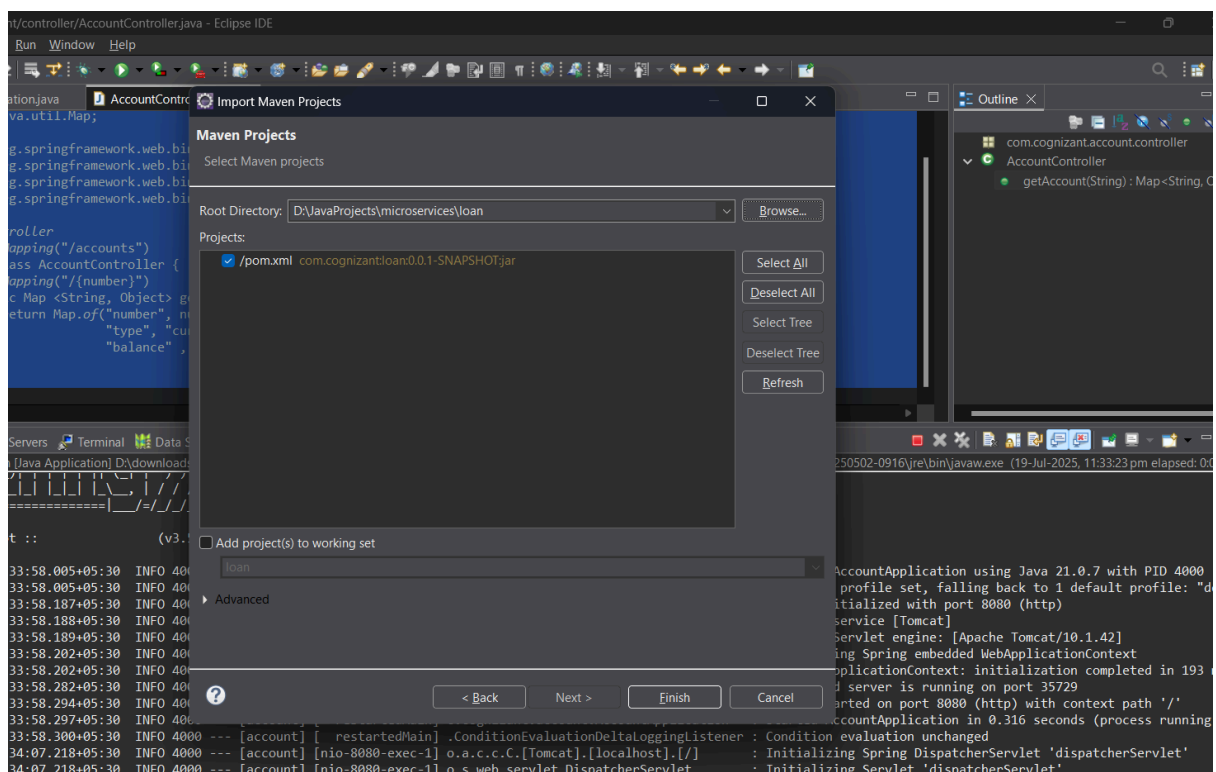
D:\JavaProjects\microservices\loan>mvn clean package
```

Maven project successfully built

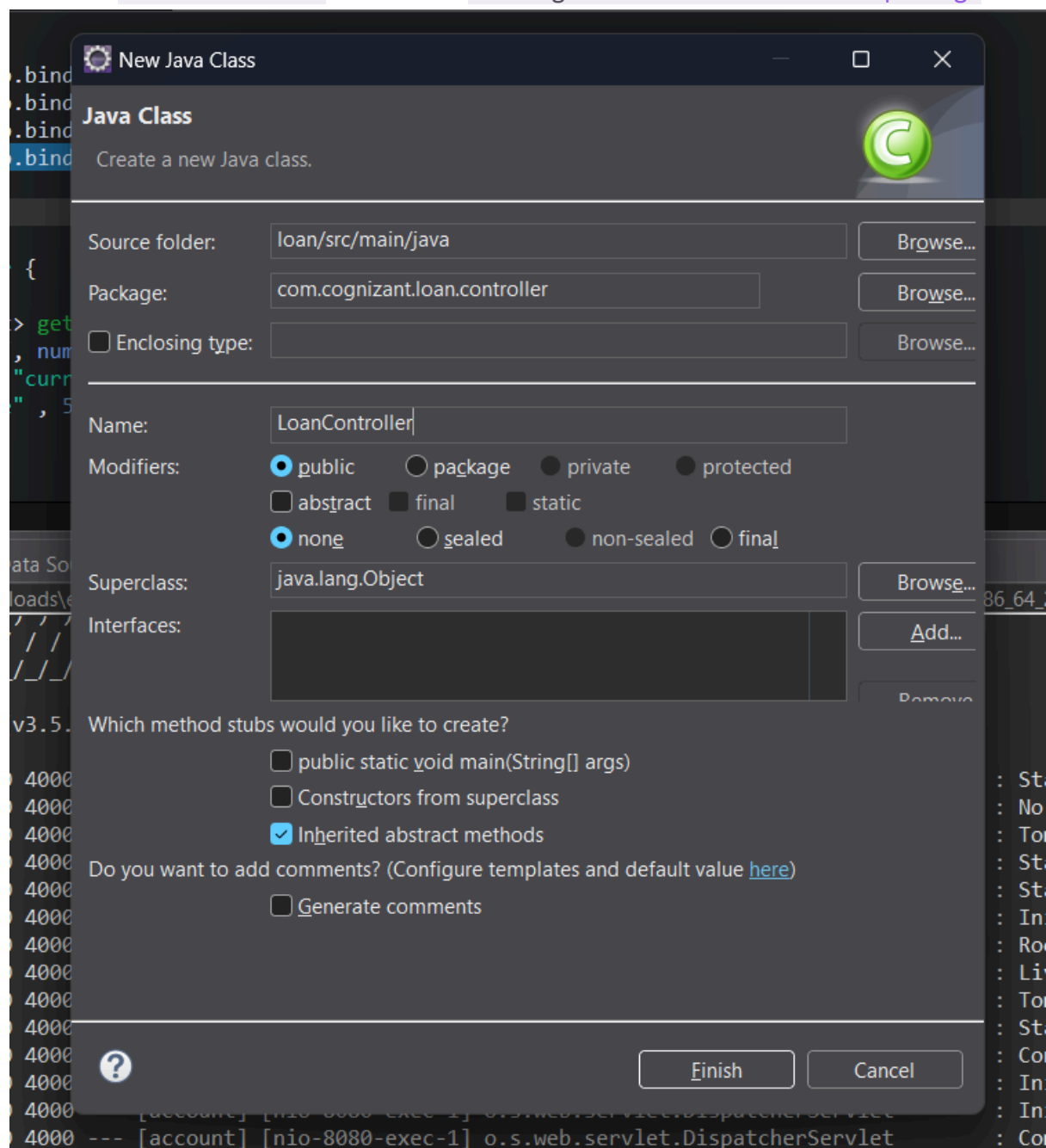


```
C:\Windows\System32\cmd.exe
has been appended
WARNING: A Java agent has been loaded dynamically (C:\Users\DDKVIJAYAWADA\.m2\repository\net\bytebuddy\byte-buddy-agent\1.17.6\byte-buddy-agent-1.17.6.jar)
WARNING: If a serviceability tool is in use, please run with -XX:+EnableDynamicAgentLoading to hide this warning
WARNING: If a serviceability tool is not in use, please run with -Djdk.instrument.traceUsage for more information
WARNING: Dynamic loading of agents will be disallowed by default in a future release
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 2.758 s -- in com.cognizant.loan.LoanApplicationTests
[INFO] Results:
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0
[INFO] --- jar:3.4.2:jar (default-jar) @ loan ---
[INFO] Building jar: D:\JavaProjects\microservices\loan\target\loan-0.0.1-SNAPSHOT.jar
[INFO] --- spring-boot:3.5.3:repackage (repackage) @ loan ---
[INFO] Replacing main artifact D:\JavaProjects\microservices\loan\target\loan-0.0.1-SNAPSHOT.jar with repackaged archive, adding nested dependencies in BOOT-INF/.
[INFO] The original artifact has been renamed to D:\JavaProjects\microservices\loan\target\loan-0.0.1-SNAPSHOT.jar.original
[INFO] BUILD SUCCESS
[INFO] Total time: 11.650 s
[INFO] Finished at: 2025-07-19T23:39:40+05:30
[INFO]
```

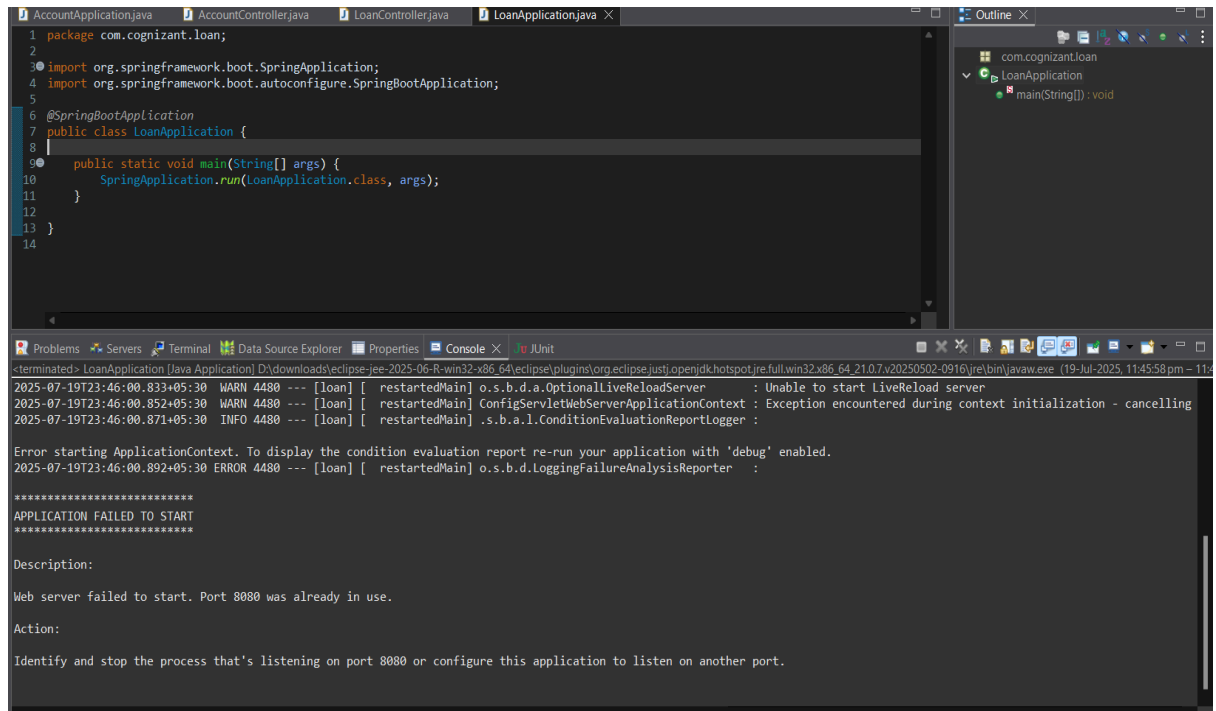
Import into Eclipse



Create a `LoanController` class in the `com.cognizant.loan.controller` package



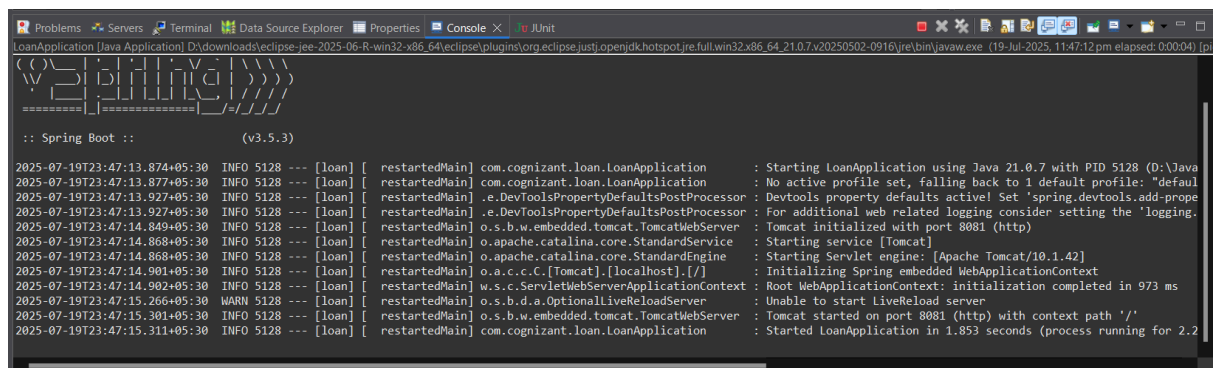
Port Conflict Error



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

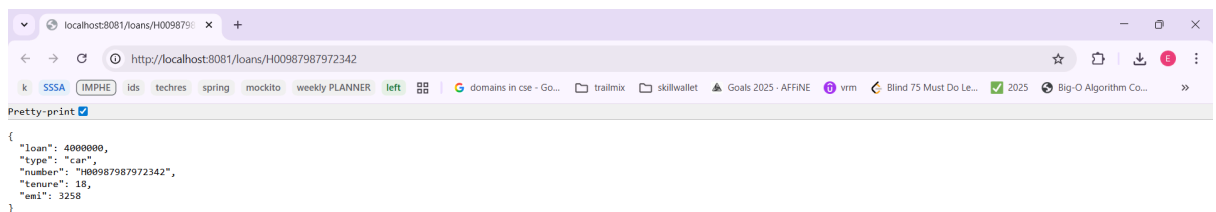
```
<terminated> LoanApplication [Java Application] D:\downloads\eclipse-jee-2025-06-R-win32-x86_64\eclipse\plugins\org.eclipse.justi.openjdk.hotspot.jre.full.win32.x86_64.21.0.7.v20250502-0916\jre\bin\javaw.exe (19-Jul-2025, 11:45:58 pm - 11:46:00:000)
2025-07-19T23:46:00.833+05:30 WARN 4480 --- [loan] [ restartedMain] o.s.b.d.a.OptionalLiveReloadServer : Unable to start liveReload server
2025-07-19T23:46:00.852+05:30 WARN 4480 --- [loan] [ restartedMain] ConfigServletWebServerApplicationContext : Exception encountered during context initialization - cancelling
2025-07-19T23:46:00.871+05:30 INFO 4480 --- [loan] [ restartedMain] .s.b.a.l.ConditionEvaluationReportLogger :
Error starting ApplicationContext. To display the condition evaluation report re-run your application with 'debug' enabled.
2025-07-19T23:46:00.892+05:30 ERROR 4480 --- [loan] [ restartedMain] o.s.b.d.LoggingFailureAnalysisReporter :
*****
APPLICATION FAILED TO START
*****
Description:
Web server failed to start. Port 8080 was already in use.
Action:
Identify and stop the process that's listening on port 8080 or configure this application to listen on another port.
```

Successfully running after error is resolved



```
LoanApplication [Java Application] D:\downloads\eclipse-jee-2025-06-R-win32-x86_64\eclipse\plugins\org.eclipse.justi.openjdk.hotspot.jre.full.win32.x86_64.21.0.7.v20250502-0916\jre\bin\javaw.exe (19-Jul-2025, 11:47:12 pm elapsed: 0:00:04.10)
:: Spring Boot ::
(v3.5.3)
2025-07-19T23:47:13.874+05:30 INFO 5128 --- [loan] [ restartedMain] com.cognizant.loan.LoanApplication : Starting LoanApplication using Java 21.0.7 with PID 5128 (D:\Java
2025-07-19T23:47:13.877+05:30 INFO 5128 --- [loan] [ restartedMain] com.cognizant.loan.LoanApplication : No active profile set, falling back to 1 default profile: "default"
2025-07-19T23:47:13.927+05:30 INFO 5128 --- [loan] [ restartedMain] .e.DevToolsPropertyDefaultsPostProcessor : Devtools property defaults active! Set 'spring.devtools.add-props
2025-07-19T23:47:13.927+05:30 INFO 5128 --- [loan] [ restartedMain] .e.DevToolsPropertyDefaultsPostProcessor : For additional web related logging consider setting the 'logging.
2025-07-19T23:47:14.849+05:30 INFO 5128 --- [loan] [ restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomcat initialized with port 8081 (http)
2025-07-19T23:47:14.868+05:30 INFO 5128 --- [loan] [ restartedMain] o.apache.catalina.core.StandardService : Starting service [Tomcat]
2025-07-19T23:47:14.868+05:30 INFO 5128 --- [loan] [ restartedMain] o.apache.catalina.core.StandardEngine : Starting Servlet engine: [Apache Tomcat/10.1.42]
2025-07-19T23:47:14.901+05:30 INFO 5128 --- [loan] [ restartedMain] o.a.c.c.C.[Tomcat].[localhost].[/] : Initializing Spring embedded WebApplicationContext
2025-07-19T23:47:14.902+05:30 INFO 5128 --- [loan] [ restartedMain] w.s.c.ServletWebServerApplicationContext : Root WebApplicationContext: initialization completed in 973 ms
2025-07-19T23:47:15.266+05:30 WARN 5128 --- [loan] [ restartedMain] o.s.b.d.a.OptionalLiveReloadServer : Unable to start liveReload server
2025-07-19T23:47:15.301+05:30 INFO 5128 --- [loan] [ restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer : Tomcat started on port 8081 (http) with context path '/'
2025-07-19T23:47:15.311+05:30 INFO 5128 --- [loan] [ restartedMain] com.cognizant.loan.LoanApplication : Started LoanApplication in 1.853 seconds (process running for 2.2
```

Successfully made API request



```
localhost:8081/loans/H00987987972342
http://localhost:8081/loans/H00987987972342
SSSA IMPHE ids teches spring mockito weekly PLANNER left domains in cse - Go... trailmix skillwallet Goals 2025 - AFFINE vrm Blind 75 Must Do Le... 2025 Big-O Algorithm Co...
Pretty-print
{
  "loan": 4000000,
  "type": "car",
  "number": "H00987987972342",
  "tenure": 18,
  "emi": 3258
}
```

Successful Account Service

localhost:8080/accounts/00987987973432

http://localhost:8080/accounts/00987987973432

SSSA IMPHE ids techres spring mockito weekly PLANNER left

Pretty-print ☒

```
{
  "number": "00987987973432",
  "balance": 500000,
  "type": "current"
}
```

Successful Loan Service

localhost:8081/loans/H00987987972342

http://localhost:8081/loans/H00987987972342

SSSA IMPHE ids techres spring mockito weekly PLANNER left

Pretty-print ☒

```
{
  "loan": 4000000,
  "type": "car",
  "number": "H00987987972342",
  "tenure": 18,
  "emi": 3258
}
```