Week - 5
Microservices

<u>Mandatory Hands-on</u>

<u>Creating Microservices for account and loan</u>

i. <u>For Account</u>

```java
package com.cognizant.account;

import org.springframework.web.bind.annotation.*;

@RestController
@RequestMapping("/accounts")
public class AccountController {

    @GetMapping("/{number}")
    public Account getAccountByNumber(@PathVariable String number) {
        return new Account(number, "Savings", 927642);
    }

    static class Account {
        private String number;
        private String type;
        private double balance;

        public Account(String number, String type, double balance) {
            this.number = number;
            this.type = type;
            this.balance = balance;
        }

        public String getNumber() { return number; }
        public void setNumber(String number) { this.number = number; }

        public String getType() { return type; }
        public void setType(String type) { this.type = type; }

        public double getBalance() { return balance; }
```

```
        public void setBalance(double balance) { this.balance
= balance; }
    }
}
```

```
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);
    }

}
```
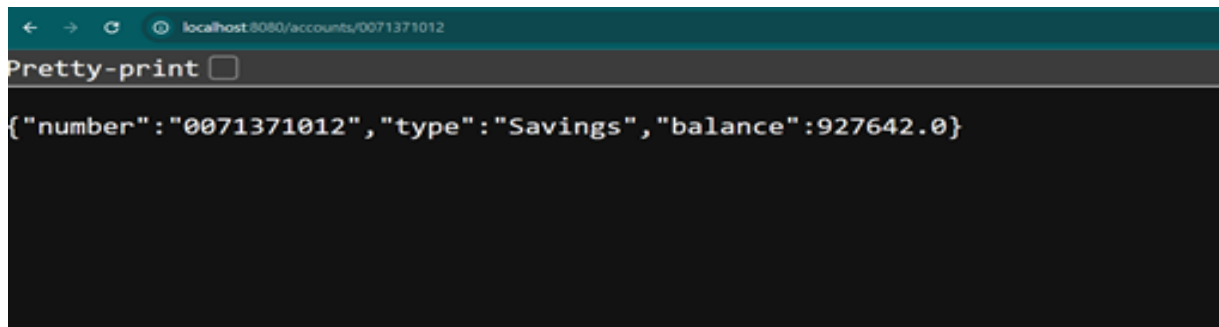
Console:

Output:

{"number":"0071371012","type":"Savings","balance":927642.0}

ii. For loan

```java
package com.cognizant.loan;

import org.springframework.web.bind.annotation.*;

@RestController
@RequestMapping("/loans")
public class LoanController {

    @GetMapping("/{loanNumber}")
    public Loan getLoanDetails(@PathVariable String
loanNumber) {
        return new Loan(loanNumber, "Personal", 280000, 7.5);
    }

    static class Loan {
        private String loanNumber;
        private String type;
        private double amount;
        private double interestRate;

        public Loan(String loanNumber, String type, double
amount, double interestRate) {
            this.loanNumber = loanNumber;
            this.type = type;
            this.amount = amount;
            this.interestRate = interestRate;
        }

        public String getLoanNumber() { return loanNumber; }
        public void setLoanNumber(String loanNumber)
{ this.loanNumber = loanNumber; }

        public String getType() { return type; }
```
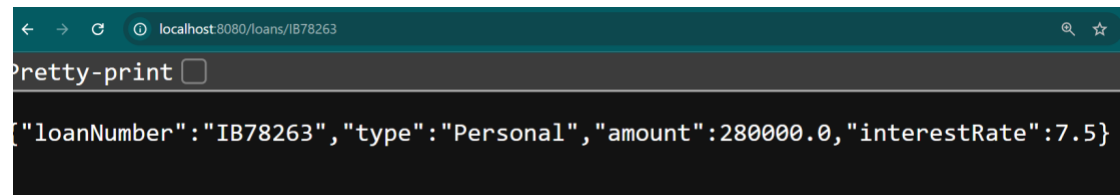
```java
        public void setType(String type) { this.type = type; }

        public double getAmount() { return amount; }
        public void setAmount(double amount) { this.amount =
amount; }

        public double getInterestRate() { return
interestRate; }
        public void setInterestRate(double interestRate)
{ this.interestRate = interestRate; }
    }
}
```

```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);
    }

}
```

```
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 :: Spring Boot ::                (v3.5.3)

2025-07-19T12:55:27.429+05:30  INFO 6964 --- [loan]
[  restartedMain] com.cognizant.loan.LoanApplication     :
Starting LoanApplication using Java 21.0.7 with PID 6964
(D:\7282\microservices\loan\target\classes started by admin in
D:\7282\microservices\loan)
2025-07-19T12:55:27.435+05:30  INFO 6964 --- [loan]
[  restartedMain] com.cognizant.loan.LoanApplication     :
```

```
No active profile set, falling back to 1 default profile:
"default"
2025-07-19T12:55:27.541+05:30  INFO 6964 --- [loan]
[  restartedMain] .e.DevToolsPropertyDefaultsPostProcessor :
Devtools property defaults active! Set 'spring.devtools.add-
properties' to 'false' to disable
2025-07-19T12:55:27.542+05:30  INFO 6964 --- [loan]
[  restartedMain] .e.DevToolsPropertyDefaultsPostProcessor :
For additional web related logging consider setting the
'logging.level.web' property to 'DEBUG'
2025-07-19T12:55:29.172+05:30  INFO 6964 --- [loan]
[  restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer  :
Tomcat initialized with port 8080 (http)
2025-07-19T12:55:29.196+05:30  INFO 6964 --- [loan]
[  restartedMain] o.apache.catalina.core.StandardService   :
Starting service [Tomcat]
2025-07-19T12:55:29.197+05:30  INFO 6964 --- [loan]
[  restartedMain] o.apache.catalina.core.StandardEngine     :
Starting Servlet engine: [Apache Tomcat/10.1.42]
2025-07-19T12:55:29.247+05:30  INFO 6964 --- [loan]
[  restartedMain] o.a.c.c.C.[Tomcat].[localhost].[/]        :
Initializing Spring embedded WebApplicationContext
2025-07-19T12:55:29.250+05:30  INFO 6964 --- [loan]
[  restartedMain] w.s.c.ServletWebServerApplicationContext :
Root WebApplicationContext: initialization completed in 1703
ms
2025-07-19T12:55:29.781+05:30  INFO 6964 --- [loan]
[  restartedMain] o.s.b.d.a.OptionalLiveReloadServer        :
LiveReload server is running on port 35729
2025-07-19T12:55:29.834+05:30  INFO 6964 --- [loan]
[  restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer  :
Tomcat started on port 8080 (http) with context path '/'
2025-07-19T12:55:29.847+05:30  INFO 6964 --- [loan]
[  restartedMain] com.cognizant.loan.LoanApplication        :
Started LoanApplication in 3.082 seconds (process running for
3.789)
2025-07-19T12:56:02.053+05:30  INFO 6964 --- [loan] [nio-8080-
exec-1] o.a.c.c.C.[Tomcat].[localhost].[/]        :
Initializing Spring DispatcherServlet 'dispatcherServlet'
2025-07-19T12:56:02.053+05:30  INFO 6964 --- [loan] [nio-8080-
exec-1] o.s.web.servlet.DispatcherServlet         :
Initializing Servlet 'dispatcherServlet'
2025-07-19T12:56:02.055+05:30  INFO 6964 --- [loan] [nio-8080-
exec-1] o.s.web.servlet.DispatcherServlet         : Completed
initialization in 2 ms
```

Output:

{"loanNumber":"IB78263","type":"Personal","amount":280000.0,"interestRate":7.5}

Additional Hands-on

Create Eureka Discovery Server and register microservices

```java
package com.cognizant.eureka_discovery_server;

import org.springframework.boot.SpringApplication;
import org.springframework.boot.autoconfigure.SpringBootApplication;
import org.springframework.cloud.netflix.eureka.server.EnableEurekaServer;

@EnableEurekaServer
@SpringBootApplication
public class EurekaDiscoveryServerApplication {
    public static void main(String[] args) {

SpringApplication.run(EurekaDiscoveryServerApplication.class, args);
    }
}
```

```properties
spring.application.name=eureka-discovery-server
server.port=8761
eureka.client.register-with-eureka=false
eureka.client.fetch-registry=false
logging.level.com.netflix.eureka=OFF
logging.level.com.netflix.discovery=OFF
```

Console:

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

```
2025-07-19T17:32:20.808+05:30  INFO 28820 --- [eureka-
discovery-server] [           main]
c.c.e.EurekaDiscoveryServerApplication   : Starting
EurekaDiscoveryServerApplication using Java 21.0.7 with PID
28820 (D:\7282\microservices\eureka-discovery-
server\target\classes started by admin in
D:\7282\microservices\eureka-discovery-server)
2025-07-19T17:32:20.817+05:30  INFO 28820 --- [eureka-
discovery-server] [           main]
c.c.e.EurekaDiscoveryServerApplication   : No active profile
set, falling back to 1 default profile: "default"
2025-07-19T17:32:23.198+05:30  INFO 28820 --- [eureka-
discovery-server] [           main]
o.s.cloud.context.scope.GenericScope      : BeanFactory
id=d4b5e39c-8d2d-3834-94f8-dc636db86bcb
2025-07-19T17:32:23.894+05:30  INFO 28820 --- [eureka-
discovery-server] [           main]
o.s.b.w.embedded.tomcat.TomcatWebServer  : Tomcat initialized
with port 8761 (http)
2025-07-19T17:32:23.924+05:30  INFO 28820 --- [eureka-
discovery-server] [           main]
o.apache.catalina.core.StandardService   : Starting service
[Tomcat]
2025-07-19T17:32:23.924+05:30  INFO 28820 --- [eureka-
discovery-server] [           main]
o.apache.catalina.core.StandardEngine    : Starting Servlet
engine: [Apache Tomcat/10.1.42]
2025-07-19T17:32:24.055+05:30  INFO 28820 --- [eureka-
discovery-server] [           main]
o.a.c.c.C.[Tomcat].[localhost].[/]        : Initializing Spring
embedded WebApplicationContext
2025-07-19T17:32:24.057+05:30  INFO 28820 --- [eureka-
discovery-server] [           main]
w.s.c.ServletWebServerApplicationContext : Root
WebApplicationContext: initialization completed in 3097 ms
2025-07-19T17:32:26.572+05:30  INFO 28820 --- [eureka-
discovery-server] [           main]
o.s.v.b.OptionalValidatorFactoryBean      : Failed to set up a
Bean Validation provider:
jakarta.validation.NoProviderFoundException: Unable to create
a Configuration, because no Jakarta Bean Validation provider
could be found. Add a provider like Hibernate Validator (RI)
to your classpath.
2025-07-19T17:32:28.015+05:30  WARN 28820 --- [eureka-
discovery-server] [           main]
iguration$LoadBalancerCaffeineWarnLogger : Spring Cloud
LoadBalancer is currently working with the default cache.
While this cache implementation is useful for development and
tests, it's recommended to use Caffeine cache in
```

```
production.You can switch to using Caffeine cache, by adding
it and org.springframework.cache.caffeine.CaffeineCacheManager
to the classpath.
2025-07-19T17:32:28.064+05:30  INFO 28820 --- [eureka-
discovery-server] [           main]
o.s.c.n.eureka.InstanceInfoFactory       : Setting initial
instance status as: STARTING
2025-07-19T17:32:28.594+05:30  INFO 28820 --- [eureka-
discovery-server] [           main]
o.s.b.a.e.web.EndpointLinksResolver      : Exposing 1 endpoint
beneath base path '/actuator'
2025-07-19T17:32:28.744+05:30  INFO 28820 --- [eureka-
discovery-server] [           main]
o.s.c.n.e.s.EurekaServiceRegistry        : Registering
application EUREKA-DISCOVERY-SERVER with eureka with status UP
2025-07-19T17:32:28.770+05:30  INFO 28820 --- [eureka-
discovery-server] [       Thread-9]
o.s.c.n.e.server.EurekaServerBootstrap   : isAws returned
false
2025-07-19T17:32:28.771+05:30  INFO 28820 --- [eureka-
discovery-server] [       Thread-9]
o.s.c.n.e.server.EurekaServerBootstrap   : Initialized server
context
2025-07-19T17:32:28.783+05:30  INFO 28820 --- [eureka-
discovery-server] [       Thread-9]
e.s.EurekaServerInitializerConfiguration : Started Eureka
Server
2025-07-19T17:32:28.818+05:30  INFO 28820 --- [eureka-
discovery-server] [           main]
o.s.b.w.embedded.tomcat.TomcatWebServer  : Tomcat started on
port 8761 (http) with context path '/'
2025-07-19T17:32:28.820+05:30  INFO 28820 --- [eureka-
discovery-server]
[           main] .s.c.n.e.s.EurekaAutoServiceRegistration :
Updating port to 8761
2025-07-19T17:32:28.879+05:30  INFO 28820 --- [eureka-
discovery-server] [           main]
c.c.e.EurekaDiscoveryServerApplication   : Started
EurekaDiscoveryServerApplication in 9.161 seconds (process
running for 10.53)
2025-07-19T17:32:40.788+05:30  INFO 28820 --- [eureka-
discovery-server] [nio-8761-exec-6]
o.a.c.c.C.[Tomcat].[localhost].[/]       : Initializing Spring
DispatcherServlet 'dispatcherServlet'
2025-07-19T17:32:40.788+05:30  INFO 28820 --- [eureka-
discovery-server] [nio-8761-exec-6]
o.s.web.servlet.DispatcherServlet        : Initializing
Servlet 'dispatcherServlet'
```

```
2025-07-19T17:32:40.790+05:30  INFO 28820 --- [eureka-
discovery-server] [nio-8761-exec-6]
o.s.web.servlet.DispatcherServlet        : Completed
initialization in 2 ms
```

Localhost:8761

System Status			
Environment	test	Current time	2025-07-19T17:32:40 +0530
Data center	default	Uptime	00:00
		Lease expiration enabled	false
		Renews threshold	1
		Renews (last min)	0

DS Replicas

localhost

Instances currently registered with Eureka

Application	AMIs	Availability Zones	Status
No instances available			

General Info

Name	Value
total-avail-memory	88mb
num-of-cpus	8
current-memory-usage	68mb (77%)
server-uptime	00:00
registered-replicas	http://localhost:8761/eureka/
unavailable-replicas	http://localhost:8761/eureka/,
available-replicas	

Instance Info

Name	Value
ipAddr	192.168.137.1
status	UP

I) For account

```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);
    }

}
```

```java
package com.cognizant.account;

import org.springframework.web.bind.annotation.*;
import java.util.*;

@RestController
@RequestMapping("/accounts")
```

```java
public class AccountController {

    @GetMapping("/{number}")
    public Map<String,Object> getAccount(@PathVariable String
number){
        return Map.of(
                    "number", number,
                    "type", "savings","balance" , 28173);
    }
}
```

Upon running eureka-discovery-server

System Status

Environment	test	Current time	2025-07-19T17:32:40 +0530
Data center	default	Uptime	00:00
		Lease expiration enabled	false
		Renews threshold	1
		Renews (last min)	0

DS Replicas

localhost

Instances currently registered with Eureka

Application	AMIs	Availability Zones	Status
No instances available			

General Info

Name	Value
total-avail-memory	88mb
num-of-cpus	8
current-memory-usage	68mb (77%)
server-uptime	00:00
registered-replicas	http://localhost:8761/eureka/
unavailable-replicas	http://localhost:8761/eureka/,
available-replicas	

Instance Info

Name	Value
ipAddr	192.168.137.1
status	UP

Secondly, upon running account

```
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 :: Spring Boot ::                (v3.5.3)

2025-07-20T19:51:34.803+05:30  INFO 31996 --- [account]
[  restartedMain] c.cognizant.account.AccountApplication    :
Starting AccountApplication using Java 21.0.7 with PID 31996
(D:\7282\microservices\account\target\classes started by admin
in D:\7282\microservices\account)
2025-07-20T19:51:34.806+05:30  INFO 31996 --- [account]
[  restartedMain] c.cognizant.account.AccountApplication    :
No active profile set, falling back to 1 default profile:
"default"
2025-07-20T19:51:34.914+05:30  INFO 31996 --- [account]
[  restartedMain] .e.DevToolsPropertyDefaultsPostProcessor :
```

```
Devtools property defaults active! Set 'spring.devtools.add-
properties' to 'false' to disable
2025-07-20T19:51:34.915+05:30  INFO 31996 --- [account]
[  restartedMain] .e.DevToolsPropertyDefaultsPostProcessor :
For additional web related logging consider setting the
'logging.level.web' property to 'DEBUG'
2025-07-20T19:51:36.634+05:30  INFO 31996 --- [account]
[  restartedMain] o.s.cloud.context.scope.GenericScope    :
BeanFactory id=f2cea789-6c08-3c31-b460-448982ab026a
2025-07-20T19:51:37.280+05:30  INFO 31996 --- [account]
[  restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer  :
Tomcat initialized with port 8080 (http)
2025-07-20T19:51:37.299+05:30  INFO 31996 --- [account]
[  restartedMain] o.apache.catalina.core.StandardService   :
Starting service [Tomcat]
2025-07-20T19:51:37.300+05:30  INFO 31996 --- [account]
[  restartedMain] o.apache.catalina.core.StandardEngine    :
Starting Servlet engine: [Apache Tomcat/10.1.42]
2025-07-20T19:51:37.374+05:30  INFO 31996 --- [account]
[  restartedMain] o.a.c.c.C.[Tomcat].[localhost].[/]        :
Initializing Spring embedded WebApplicationContext
2025-07-20T19:51:37.376+05:30  INFO 31996 --- [account]
[  restartedMain] w.s.c.ServletWebServerApplicationContext :
Root WebApplicationContext: initialization completed in 2459
ms
2025-07-20T19:51:38.442+05:30  INFO 31996 --- [account]
[  restartedMain] o.s.b.d.a.OptionalLiveReloadServer       :
LiveReload server is running on port 35729
2025-07-20T19:51:38.578+05:30  INFO 31996 --- [account]
[  restartedMain] DiscoveryClientOptionalArgsConfiguration :
Eureka HTTP Client uses RestTemplate.
2025-07-20T19:51:38.677+05:30  WARN 31996 --- [account]
[  restartedMain] iguration$LoadBalancerCaffeineWarnLogger :
Spring Cloud LoadBalancer is currently working with the
default cache. While this cache implementation is useful for
development and tests, it's recommended to use Caffeine cache
in production.You can switch to using Caffeine cache, by
adding it and
org.springframework.cache.caffeine.CaffeineCacheManager to the
classpath.
2025-07-20T19:51:38.726+05:30  INFO 31996 --- [account]
[  restartedMain] o.s.c.n.eureka.InstanceInfoFactory       :
Setting initial instance status as: STARTING
2025-07-20T19:51:38.783+05:30  INFO 31996 --- [account]
[  restartedMain] com.netflix.discovery.DiscoveryClient    :
Initializing Eureka in region us-east-1
2025-07-20T19:51:38.800+05:30  INFO 31996 --- [account]
[  restartedMain] c.n.d.s.r.aws.ConfigClusterResolver      :
Resolving eureka endpoints via configuration
```

```
2025-07-20T19:51:38.825+05:30  INFO 31996 --- [account]
[  restartedMain] com.netflix.discovery.DiscoveryClient     :
Disable delta property : false
2025-07-20T19:51:38.825+05:30  INFO 31996 --- [account]
[  restartedMain] com.netflix.discovery.DiscoveryClient     :
Single vip registry refresh property : null
2025-07-20T19:51:38.825+05:30  INFO 31996 --- [account]
[  restartedMain] com.netflix.discovery.DiscoveryClient     :
Force full registry fetch : false
2025-07-20T19:51:38.825+05:30  INFO 31996 --- [account]
[  restartedMain] com.netflix.discovery.DiscoveryClient     :
Application is null : false
2025-07-20T19:51:38.826+05:30  INFO 31996 --- [account]
[  restartedMain] com.netflix.discovery.DiscoveryClient     :
Registered Applications size is zero : true
2025-07-20T19:51:38.826+05:30  INFO 31996 --- [account]
[  restartedMain] com.netflix.discovery.DiscoveryClient     :
Application version is -1: true
2025-07-20T19:51:38.826+05:30  INFO 31996 --- [account]
[  restartedMain] com.netflix.discovery.DiscoveryClient     :
Getting all instance registry info from the eureka server
2025-07-20T19:51:39.724+05:30  INFO 31996 --- [account]
[  restartedMain] com.netflix.discovery.DiscoveryClient     :
The response status is 200
2025-07-20T19:51:39.726+05:30  INFO 31996 --- [account]
[  restartedMain] com.netflix.discovery.DiscoveryClient     :
Starting heartbeat executor: renew interval is: 30
2025-07-20T19:51:39.728+05:30  INFO 31996 --- [account]
[  restartedMain] c.n.discovery.InstanceInfoReplicator      :
InstanceInfoReplicator onDemand update allowed rate per min is
4
2025-07-20T19:51:39.733+05:30  INFO 31996 --- [account]
[  restartedMain] com.netflix.discovery.DiscoveryClient     :
Discovery Client initialized at timestamp 1753021299730 with
initial instances count: 0
2025-07-20T19:51:39.739+05:30  INFO 31996 --- [account]
[  restartedMain] o.s.c.n.e.s.EurekaServiceRegistry         :
Registering application ACCOUNT with eureka with status UP
2025-07-20T19:51:39.740+05:30  INFO 31996 --- [account]
[  restartedMain] com.netflix.discovery.DiscoveryClient     :
Saw local status change event StatusChangeEvent
[timestamp=1753021299740, current=UP, previous=STARTING]
2025-07-20T19:51:39.743+05:30  INFO 31996 --- [account]
[foReplicator-%d] com.netflix.discovery.DiscoveryClient     :
DiscoveryClient_ACCOUNT/DESKTOP-KQJ5G19:account:8080:
registering service...
2025-07-20T19:51:39.794+05:30  INFO 31996 --- [account]
[  restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer   :
Tomcat started on port 8080 (http) with context path '/'
```

```
2025-07-20T19:51:39.797+05:30  INFO 31996 --- [account]
[  restartedMain] .s.c.n.e.s.EurekaAutoServiceRegistration :
Updating port to 8080
2025-07-20T19:51:39.822+05:30  INFO 31996 --- [account]
[  restartedMain] c.cognizant.account.AccountApplication   :
Started AccountApplication in 5.851 seconds (process running
for 7.029)
2025-07-20T19:51:39.997+05:30  INFO 31996 --- [account]
[foReplicator-%d] com.netflix.discovery.DiscoveryClient    :
DiscoveryClient_ACCOUNT/DESKTOP-KQJ5G19:account:8080 -
registration status: 204
2025-07-20T19:52:09.742+05:30  INFO 31996 --- [account]
[reshExecutor-%d] com.netflix.discovery.DiscoveryClient    :
Disable delta property : false
2025-07-20T19:52:09.743+05:30  INFO 31996 --- [account]
[reshExecutor-%d] com.netflix.discovery.DiscoveryClient    :
Single vip registry refresh property : null
2025-07-20T19:52:09.743+05:30  INFO 31996 --- [account]
[reshExecutor-%d] com.netflix.discovery.DiscoveryClient    :
Force full registry fetch : false
2025-07-20T19:52:09.743+05:30  INFO 31996 --- [account]
[reshExecutor-%d] com.netflix.discovery.DiscoveryClient    :
Application is null : false
2025-07-20T19:52:09.744+05:30  INFO 31996 --- [account]
[reshExecutor-%d] com.netflix.discovery.DiscoveryClient    :
Registered Applications size is zero : true
2025-07-20T19:52:09.744+05:30  INFO 31996 --- [account]
[reshExecutor-%d] com.netflix.discovery.DiscoveryClient    :
Application version is -1: false
2025-07-20T19:52:09.745+05:30  INFO 31996 --- [account]
[reshExecutor-%d] com.netflix.discovery.DiscoveryClient    :
Getting all instance registry info from the eureka server
2025-07-20T19:52:09.856+05:30  INFO 31996 --- [account]
[reshExecutor-%d] com.netflix.discovery.DiscoveryClient    :
The response status is 200
```

II) <u>For loan</u>

```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);
    }

}
```

Upon runing eureka-discover-server

Secondly, upon running loan-service

III) For greet-service

```
package com.cognizant.greet_service;

import org.springframework.web.bind.annotation.*;
import java.util.*;


@RestController
public class GreetController {
    @GetMapping("/greet")
    public String greet() {
        return "Hello World";
```

```
    }
}
```

```java
package com.cognizant.greet_service;

import org.springframework.boot.SpringApplication;
import org.springframework.boot.autoconfigure.SpringBootApplication;
import org.springframework.cloud.client.discovery.EnableDiscoveryClient;

@SpringBootApplication
@EnableDiscoveryClient
public class GreetServiceApplication {

    public static void main(String[] args) {
        SpringApplication.run(GreetServiceApplication.class, args);
    }

}
```

Console:

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

 :: Spring Boot ::                (v3.5.3)

2025-07-20T20:15:12.275+05:30  INFO 33236 --- [greet-service]
[  restartedMain] c.c.g.GreetServiceApplication            :
Starting GreetServiceApplication using Java 21.0.7 with PID
33236 (D:\7282\microservices\greet-service\target\classes
started by admin in D:\7282\microservices\greet-service)
2025-07-20T20:15:12.281+05:30  INFO 33236 --- [greet-service]
[  restartedMain] c.c.g.GreetServiceApplication            :
No active profile set, falling back to 1 default profile:
"default"
2025-07-20T20:15:12.394+05:30  INFO 33236 --- [greet-service]
[  restartedMain] .e.DevToolsPropertyDefaultsPostProcessor :
Devtools property defaults active! Set 'spring.devtools.add-
properties' to 'false' to disable
```

```
2025-07-20T20:15:12.394+05:30  INFO 33236 --- [greet-service]
[  restartedMain] .e.DevToolsPropertyDefaultsPostProcessor :
For additional web related logging consider setting the
'logging.level.web' property to 'DEBUG'
2025-07-20T20:15:13.920+05:30  INFO 33236 --- [greet-service]
[  restartedMain] o.s.cloud.context.scope.GenericScope     :
BeanFactory id=9536fd0b-8d58-3268-a2fb-285f9fa8febe
2025-07-20T20:15:14.611+05:30  INFO 33236 --- [greet-service]
[  restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer  :
Tomcat initialized with port 8083 (http)
2025-07-20T20:15:14.641+05:30  INFO 33236 --- [greet-service]
[  restartedMain] o.apache.catalina.core.StandardService    :
Starting service [Tomcat]
2025-07-20T20:15:14.641+05:30  INFO 33236 --- [greet-service]
[  restartedMain] o.apache.catalina.core.StandardEngine     :
Starting Servlet engine: [Apache Tomcat/10.1.42]
2025-07-20T20:15:14.718+05:30  INFO 33236 --- [greet-service]
[  restartedMain] o.a.c.c.C.[Tomcat].[localhost].[/]        :
Initializing Spring embedded WebApplicationContext
2025-07-20T20:15:14.720+05:30  INFO 33236 --- [greet-service]
[  restartedMain] w.s.c.ServletWebServerApplicationContext :
Root WebApplicationContext: initialization completed in 2324
ms
2025-07-20T20:15:15.820+05:30  INFO 33236 --- [greet-service]
[  restartedMain] o.s.b.d.a.OptionalLiveReloadServer        :
LiveReload server is running on port 35729
2025-07-20T20:15:15.955+05:30  INFO 33236 --- [greet-service]
[  restartedMain] DiscoveryClientOptionalArgsConfiguration :
Eureka HTTP Client uses RestTemplate.
2025-07-20T20:15:16.035+05:30  WARN 33236 --- [greet-service]
[  restartedMain] iguration$LoadBalancerCaffeineWarnLogger :
Spring Cloud LoadBalancer is currently working with the
default cache. While this cache implementation is useful for
development and tests, it's recommended to use Caffeine cache
in production.You can switch to using Caffeine cache, by
adding it and
org.springframework.cache.caffeine.CaffeineCacheManager to the
classpath.
2025-07-20T20:15:16.083+05:30  INFO 33236 --- [greet-service]
[  restartedMain] o.s.c.n.eureka.InstanceInfoFactory        :
Setting initial instance status as: STARTING
2025-07-20T20:15:16.135+05:30  INFO 33236 --- [greet-service]
[  restartedMain] com.netflix.discovery.DiscoveryClient     :
Initializing Eureka in region us-east-1
2025-07-20T20:15:16.144+05:30  INFO 33236 --- [greet-service]
[  restartedMain] c.n.d.s.r.aws.ConfigClusterResolver       :
Resolving eureka endpoints via configuration
```

```
2025-07-20T20:15:16.176+05:30  INFO 33236 --- [greet-service]
[  restartedMain] com.netflix.discovery.DiscoveryClient    :
Disable delta property : false
2025-07-20T20:15:16.177+05:30  INFO 33236 --- [greet-service]
[  restartedMain] com.netflix.discovery.DiscoveryClient    :
Single vip registry refresh property : null
2025-07-20T20:15:16.177+05:30  INFO 33236 --- [greet-service]
[  restartedMain] com.netflix.discovery.DiscoveryClient    :
Force full registry fetch : false
2025-07-20T20:15:16.177+05:30  INFO 33236 --- [greet-service]
[  restartedMain] com.netflix.discovery.DiscoveryClient    :
Application is null : false
2025-07-20T20:15:16.177+05:30  INFO 33236 --- [greet-service]
[  restartedMain] com.netflix.discovery.DiscoveryClient    :
Registered Applications size is zero : true
2025-07-20T20:15:16.177+05:30  INFO 33236 --- [greet-service]
[  restartedMain] com.netflix.discovery.DiscoveryClient    :
Application version is -1: true
2025-07-20T20:15:16.178+05:30  INFO 33236 --- [greet-service]
[  restartedMain] com.netflix.discovery.DiscoveryClient    :
Getting all instance registry info from the eureka server
2025-07-20T20:15:16.913+05:30  INFO 33236 --- [greet-service]
[  restartedMain] com.netflix.discovery.DiscoveryClient    :
The response status is 200
2025-07-20T20:15:16.917+05:30  INFO 33236 --- [greet-service]
[  restartedMain] com.netflix.discovery.DiscoveryClient    :
Starting heartbeat executor: renew interval is: 30
2025-07-20T20:15:16.926+05:30  INFO 33236 --- [greet-service]
[  restartedMain] c.n.discovery.InstanceInfoReplicator     :
InstanceInfoReplicator onDemand update allowed rate per min is
4
2025-07-20T20:15:16.929+05:30  INFO 33236 --- [greet-service]
[  restartedMain] com.netflix.discovery.DiscoveryClient    :
Discovery Client initialized at timestamp 1753022716928 with
initial instances count: 1
2025-07-20T20:15:16.934+05:30  INFO 33236 --- [greet-service]
[  restartedMain] o.s.c.n.e.s.EurekaServiceRegistry        :
Registering application GREET-SERVICE with eureka with status
UP
2025-07-20T20:15:16.935+05:30  INFO 33236 --- [greet-service]
[  restartedMain] com.netflix.discovery.DiscoveryClient    :
Saw local status change event StatusChangeEvent
[timestamp=1753022716935, current=UP, previous=STARTING]
2025-07-20T20:15:16.938+05:30  INFO 33236 --- [greet-service]
[foReplicator-%d] com.netflix.discovery.DiscoveryClient    :
DiscoveryClient_GREET-SERVICE/DESKTOP-KQJ5G19:greet-
service:8083: registering service...
```

```
2025-07-20T20:15:16.993+05:30  INFO 33236 --- [greet-service]
[  restartedMain] o.s.b.w.embedded.tomcat.TomcatWebServer   :
Tomcat started on port 8083 (http) with context path '/'
2025-07-20T20:15:16.995+05:30  INFO 33236 --- [greet-service]
[  restartedMain] .s.c.n.e.s.EurekaAutoServiceRegistration :
Updating port to 8083
2025-07-20T20:15:17.019+05:30  INFO 33236 --- [greet-service]
[  restartedMain] c.c.g.GreetServiceApplication            :
Started GreetServiceApplication in 5.498 seconds (process
running for 6.682)
2025-07-20T20:15:17.040+05:30  INFO 33236 --- [greet-service]
[foReplicator-%d] com.netflix.discovery.DiscoveryClient    :
DiscoveryClient_GREET-SERVICE/DESKTOP-KQJ5G19:greet-
service:8083 - registration status: 204
```

IV) For api-gateway

```java
package com.cognizant.api_gateway;

import org.springframework.boot.SpringApplication;
import
org.springframework.boot.autoconfigure.SpringBootApplication;

@SpringBootApplication
public class ApiGatewayApplication {

    public static void main(String[] args) {
        SpringApplication.run(ApiGatewayApplication.class,
args);
    }

}
```

```java
package com.cognizant.api_gateway;

import org.slf4j.Logger;
import org.slf4j.LoggerFactory;
import org.springframework.cloud.gateway.filter.GlobalFilter;
import
org.springframework.cloud.gateway.filter.GatewayFilterChain;
import org.springframework.core.Ordered;
import org.springframework.core.annotation.Order;
import org.springframework.stereotype.Component;
import org.springframework.web.server.ServerWebExchange;
import reactor.core.publisher.Mono;



@Component
```

```java
public class LogFilter implements GlobalFilter, Ordered {

    private static final Logger logger =
LoggerFactory.getLogger(LogFilter.class);

    @Override
    public Mono<Void> filter(ServerWebExchange exchange,
GatewayFilterChain chain) {
        logger.info("Request Path: {}",
exchange.getRequest().getPath());
        return chain.filter(exchange);
    }

    @Override
    public int getOrder() {
        return -1;
    }
}
```

Console and Output:

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

 :: Spring Boot ::                (v3.5.3)

2025-07-20T20:37:07.581+05:30  INFO 18480 --- [api-gateway]
[          main] c.c.api_gateway.ApiGatewayApplication    :
Starting ApiGatewayApplication using Java 21.0.7 with PID
18480 (D:\7282\microservices\api-gateway\target\classes
started by admin in D:\7282\microservices\api-gateway)
2025-07-20T20:37:07.586+05:30  INFO 18480 --- [api-gateway]
[          main] c.c.api_gateway.ApiGatewayApplication    :
No active profile set, falling back to 1 default profile:
"default"
2025-07-20T20:37:09.531+05:30  INFO 18480 --- [api-gateway]
[          main] o.s.cloud.context.scope.GenericScope     :
BeanFactory id=8b518e1f-496e-339a-aef0-70114078920d
2025-07-20T20:37:09.654+05:30  WARN 18480 --- [api-gateway]
[          main] trationDelegate$BeanPostProcessorChecker :
Bean
'org.springframework.cloud.client.loadbalancer.reactive.LoadBa
lancerBeanPostProcessorAutoConfiguration' of type
[org.springframework.cloud.client.loadbalancer.reactive.LoadBa
```

```
lancerBeanPostProcessorAutoConfiguration] is not eligible for
getting processed by all BeanPostProcessors (for example: not
eligible for auto-proxying). The currently created
BeanPostProcessor
[loadBalancerWebClientBuilderBeanPostProcessor] is declared
through a non-static factory method on that class; consider
declaring it as static instead.
2025-07-20T20:37:09.656+05:30  WARN 18480 --- [api-gateway]
[           main] trationDelegate$BeanPostProcessorChecker :
Bean
'org.springframework.cloud.client.loadbalancer.reactive.LoadBa
lancerBeanPostProcessorAutoConfiguration$ReactorDeferringLoadB
alancerFilterConfig' of type
[org.springframework.cloud.client.loadbalancer.reactive.LoadBa
lancerBeanPostProcessorAutoConfiguration$ReactorDeferringLoadB
alancerFilterConfig] is not eligible for getting processed by
all BeanPostProcessors (for example: not eligible for auto-
proxying). Is this bean getting eagerly injected/applied to a
currently created BeanPostProcessor
[loadBalancerWebClientBuilderBeanPostProcessor]? Check the
corresponding BeanPostProcessor declaration and its
dependencies/advisors. If this bean does not have to be post-
processed, declare it with ROLE_INFRASTRUCTURE.
2025-07-20T20:37:09.660+05:30  WARN 18480 --- [api-gateway]
[           main] trationDelegate$BeanPostProcessorChecker :
Bean 'reactorDeferringLoadBalancerExchangeFilterFunction' of
type
[org.springframework.cloud.client.loadbalancer.reactive.Deferr
ingLoadBalancerExchangeFilterFunction] is not eligible for
getting processed by all BeanPostProcessors (for example: not
eligible for auto-proxying). Is this bean getting eagerly
injected/applied to a currently created BeanPostProcessor
[loadBalancerWebClientBuilderBeanPostProcessor]? Check the
corresponding BeanPostProcessor declaration and its
dependencies/advisors. If this bean does not have to be post-
processed, declare it with ROLE_INFRASTRUCTURE.
2025-07-20T20:37:11.237+05:30  INFO 18480 --- [api-gateway]
[           main] o.s.c.g.r.RouteDefinitionRouteLocator    :
Loaded RoutePredicateFactory [After]
2025-07-20T20:37:11.238+05:30  INFO 18480 --- [api-gateway]
[           main] o.s.c.g.r.RouteDefinitionRouteLocator    :
Loaded RoutePredicateFactory [Before]
2025-07-20T20:37:11.238+05:30  INFO 18480 --- [api-gateway]
[           main] o.s.c.g.r.RouteDefinitionRouteLocator    :
Loaded RoutePredicateFactory [Between]
2025-07-20T20:37:11.238+05:30  INFO 18480 --- [api-gateway]
[           main] o.s.c.g.r.RouteDefinitionRouteLocator    :
Loaded RoutePredicateFactory [Cookie]
```

```
2025-07-20T20:37:11.238+05:30  INFO 18480 --- [api-gateway]
[           main] o.s.c.g.r.RouteDefinitionRouteLocator    :
Loaded RoutePredicateFactory [Header]
2025-07-20T20:37:11.238+05:30  INFO 18480 --- [api-gateway]
[           main] o.s.c.g.r.RouteDefinitionRouteLocator    :
Loaded RoutePredicateFactory [Host]
2025-07-20T20:37:11.238+05:30  INFO 18480 --- [api-gateway]
[           main] o.s.c.g.r.RouteDefinitionRouteLocator    :
Loaded RoutePredicateFactory [Method]
2025-07-20T20:37:11.238+05:30  INFO 18480 --- [api-gateway]
[           main] o.s.c.g.r.RouteDefinitionRouteLocator    :
Loaded RoutePredicateFactory [Path]
2025-07-20T20:37:11.238+05:30  INFO 18480 --- [api-gateway]
[           main] o.s.c.g.r.RouteDefinitionRouteLocator    :
Loaded RoutePredicateFactory [Query]
2025-07-20T20:37:11.239+05:30  INFO 18480 --- [api-gateway]
[           main] o.s.c.g.r.RouteDefinitionRouteLocator    :
Loaded RoutePredicateFactory [ReadBody]
2025-07-20T20:37:11.239+05:30  INFO 18480 --- [api-gateway]
[           main] o.s.c.g.r.RouteDefinitionRouteLocator    :
Loaded RoutePredicateFactory [RemoteAddr]
2025-07-20T20:37:11.239+05:30  INFO 18480 --- [api-gateway]
[           main] o.s.c.g.r.RouteDefinitionRouteLocator    :
Loaded RoutePredicateFactory [XForwardedRemoteAddr]
2025-07-20T20:37:11.239+05:30  INFO 18480 --- [api-gateway]
[           main] o.s.c.g.r.RouteDefinitionRouteLocator    :
Loaded RoutePredicateFactory [Weight]
2025-07-20T20:37:11.239+05:30  INFO 18480 --- [api-gateway]
[           main] o.s.c.g.r.RouteDefinitionRouteLocator    :
Loaded RoutePredicateFactory [CloudFoundryRouteService]
2025-07-20T20:37:11.786+05:30  INFO 18480 --- [api-gateway]
[           main] DiscoveryClientOptionalArgsConfiguration :
Eureka HTTP Client uses RestTemplate.
2025-07-20T20:37:11.874+05:30  WARN 18480 --- [api-gateway]
[           main] iguration$LoadBalancerCaffeineWarnLogger :
Spring Cloud LoadBalancer is currently working with the
default cache. While this cache implementation is useful for
development and tests, it's recommended to use Caffeine cache
in production.You can switch to using Caffeine cache, by
adding it and
org.springframework.cache.caffeine.CaffeineCacheManager to the
classpath.
2025-07-20T20:37:11.935+05:30  INFO 18480 --- [api-gateway]
[           main] o.s.c.n.eureka.InstanceInfoFactory       :
Setting initial instance status as: STARTING
2025-07-20T20:37:12.215+05:30  INFO 18480 --- [api-gateway]
[           main] com.netflix.discovery.DiscoveryClient    :
Initializing Eureka in region us-east-1
```

```
2025-07-20T20:37:12.225+05:30  INFO 18480 --- [api-gateway]
[            main] c.n.d.s.r.aws.ConfigClusterResolver      :
Resolving eureka endpoints via configuration
2025-07-20T20:37:12.289+05:30  INFO 18480 --- [api-gateway]
[            main] com.netflix.discovery.DiscoveryClient     :
Disable delta property : false
2025-07-20T20:37:12.290+05:30  INFO 18480 --- [api-gateway]
[            main] com.netflix.discovery.DiscoveryClient     :
Single vip registry refresh property : null
2025-07-20T20:37:12.290+05:30  INFO 18480 --- [api-gateway]
[            main] com.netflix.discovery.DiscoveryClient     :
Force full registry fetch : false
2025-07-20T20:37:12.290+05:30  INFO 18480 --- [api-gateway]
[            main] com.netflix.discovery.DiscoveryClient     :
Application is null : false
2025-07-20T20:37:12.290+05:30  INFO 18480 --- [api-gateway]
[            main] com.netflix.discovery.DiscoveryClient     :
Registered Applications size is zero : true
2025-07-20T20:37:12.291+05:30  INFO 18480 --- [api-gateway]
[            main] com.netflix.discovery.DiscoveryClient     :
Application version is -1: true
2025-07-20T20:37:12.291+05:30  INFO 18480 --- [api-gateway]
[            main] com.netflix.discovery.DiscoveryClient     :
Getting all instance registry info from the eureka server
2025-07-20T20:37:13.186+05:30  INFO 18480 --- [api-gateway]
[            main] com.netflix.discovery.DiscoveryClient     :
The response status is 200
2025-07-20T20:37:13.191+05:30  INFO 18480 --- [api-gateway]
[            main] com.netflix.discovery.DiscoveryClient     :
Starting heartbeat executor: renew interval is: 30
2025-07-20T20:37:13.196+05:30  INFO 18480 --- [api-gateway]
[            main] c.n.discovery.InstanceInfoReplicator      :
InstanceInfoReplicator onDemand update allowed rate per min is
4
2025-07-20T20:37:13.209+05:30  INFO 18480 --- [api-gateway]
[            main] com.netflix.discovery.DiscoveryClient     :
Discovery Client initialized at timestamp 1753024033207 with
initial instances count: 1
2025-07-20T20:37:13.213+05:30  INFO 18480 --- [api-gateway]
[            main] o.s.c.n.e.s.EurekaServiceRegistry         :
Registering application API-GATEWAY with eureka with status UP
2025-07-20T20:37:13.215+05:30  INFO 18480 --- [api-gateway]
[            main] com.netflix.discovery.DiscoveryClient     :
Saw local status change event StatusChangeEvent
[timestamp=1753024033215, current=UP, previous=STARTING]
2025-07-20T20:37:13.218+05:30  INFO 18480 --- [api-gateway]
[nfoReplicator-0] com.netflix.discovery.DiscoveryClient     :
DiscoveryClient_API-GATEWAY/DESKTOP-KQJ5G19:api-gateway:9090:
registering service...
```

```
2025-07-20T20:37:13.336+05:30  INFO 18480 --- [api-gateway]
[nfoReplicator-0] com.netflix.discovery.DiscoveryClient    :
DiscoveryClient_API-GATEWAY/DESKTOP-KQJ5G19:api-gateway:9090 -
registration status: 204
2025-07-20T20:37:13.649+05:30  INFO 18480 --- [api-gateway]
[          main] o.s.b.web.embedded.netty.NettyWebServer  :
Netty started on port 9090 (http)
2025-07-20T20:37:13.652+05:30  INFO 18480 --- [api-gateway]
[          main] .s.c.n.e.s.EurekaAutoServiceRegistration :
Updating port to 9090
2025-07-20T20:37:13.686+05:30  INFO 18480 --- [api-gateway]
[          main] c.c.api_gateway.ApiGatewayApplication    :
Started ApiGatewayApplication in 6.926 seconds (process
running for 7.655)
2025-07-20T20:37:55.520+05:30  INFO 18480 --- [api-gateway]
[ctor-http-nio-2] com.cognizant.api_gateway.LogFilter      :
Request Path: /greet-service/greet
2025-07-20T22:14:15.350+05:30  INFO 18480 --- [api-gateway]
[trap-executor-0] c.n.d.s.r.aws.ConfigClusterResolver      :
Resolving eureka endpoints via configuration
```

← → C ⓘ localhost:8761

DS Replicas

localhost

Instances currently registered with Eureka

Application	AMIs	Availability Zones	Status
GREET-SERVICE	n/a (1)	(1)	UP (1) - 192.168.1.41:greet-service:8082

← → C ⓘ localhost:9090/greet-service/greet

Hello World

Microservice REST API Outputs
Account Service
http://localhost:8080/accounts/123456
```
{
  "number": "123456",
  "type": "savings",
  "balance": 234343
}
```

Loan Service

http://localhost:8081/loans/H98765

{
  "number": "H98765",
  "type": "car",
  "loan": 400000,
  "emi": 3258,
  "tenure": 18
}