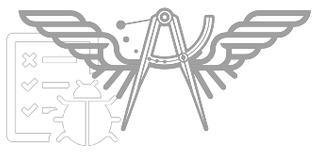
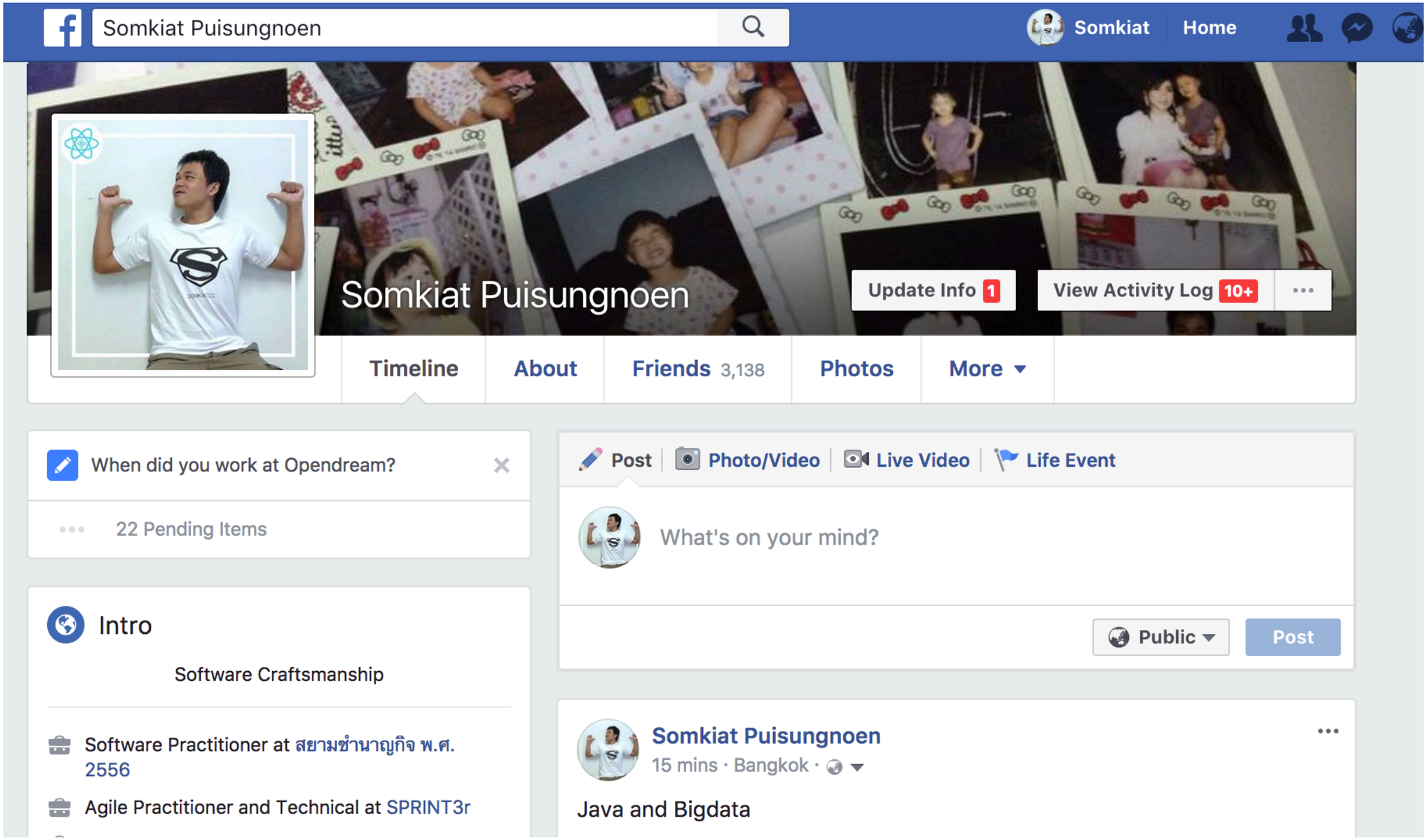
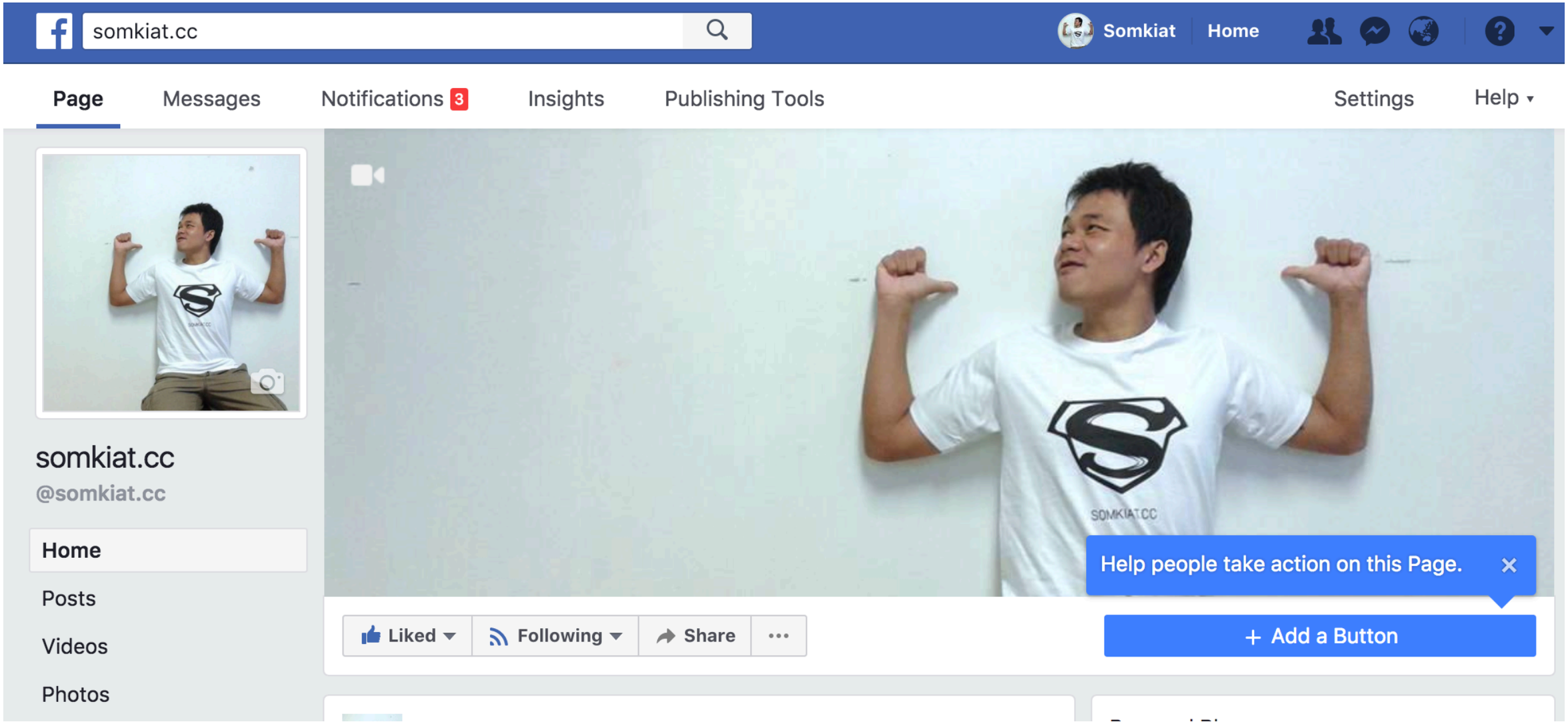
สยามชำนาญกิจ
SIAM CHAMNAN KIT

Microservices workshop

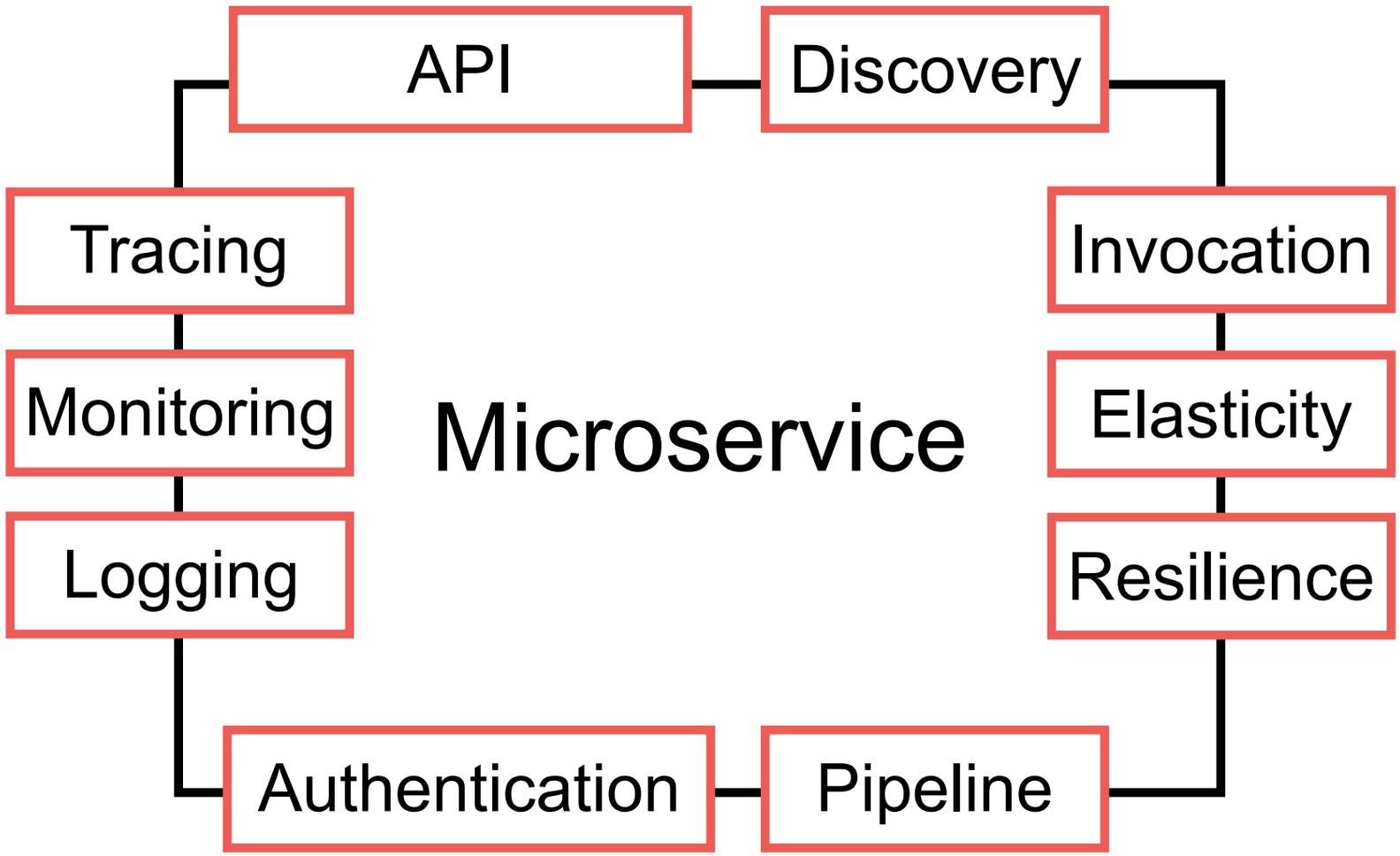






Workshop :: Develop service

Properties of Microservice

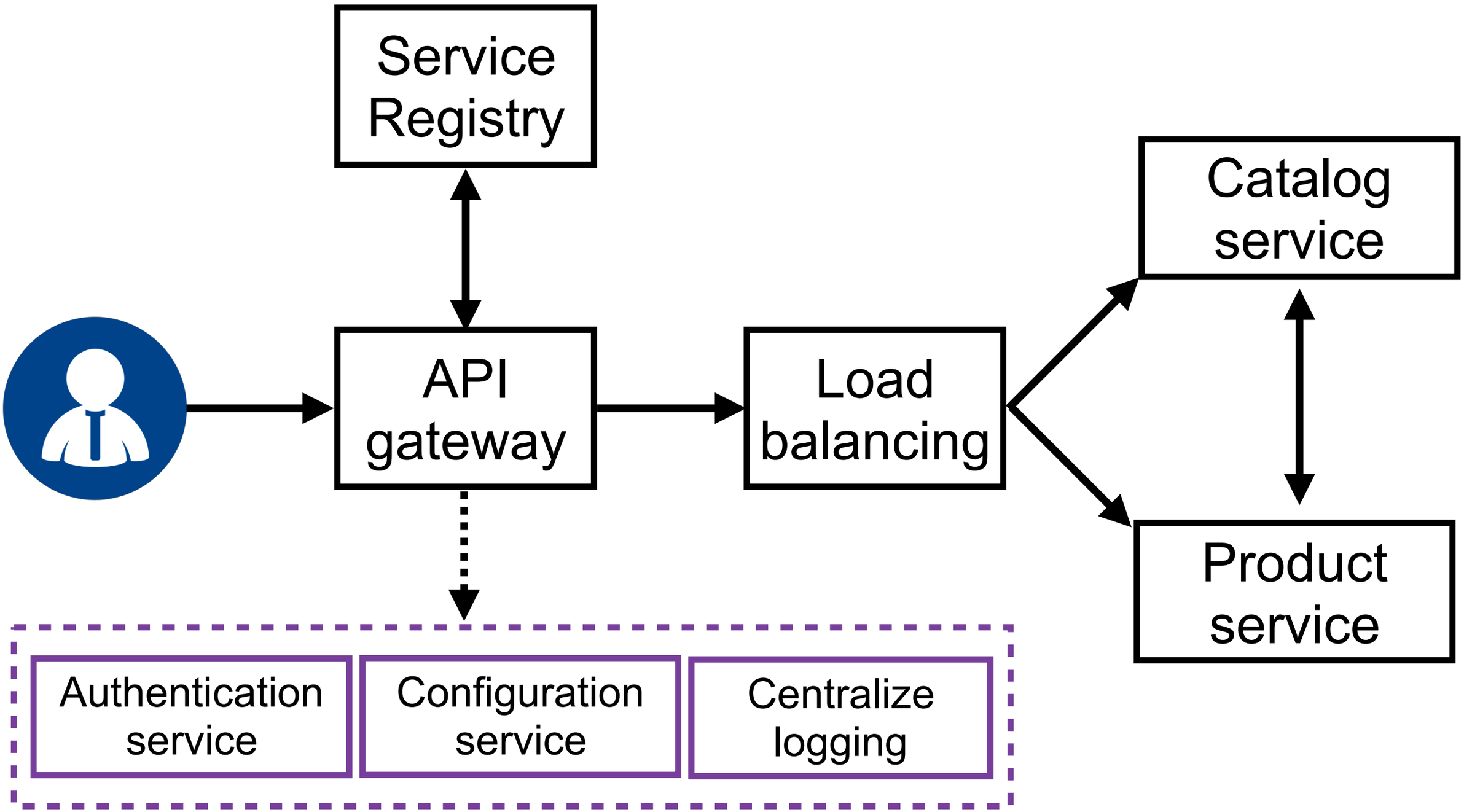


https://github.com/up1/workshop-microservice-with-java

Communication between services

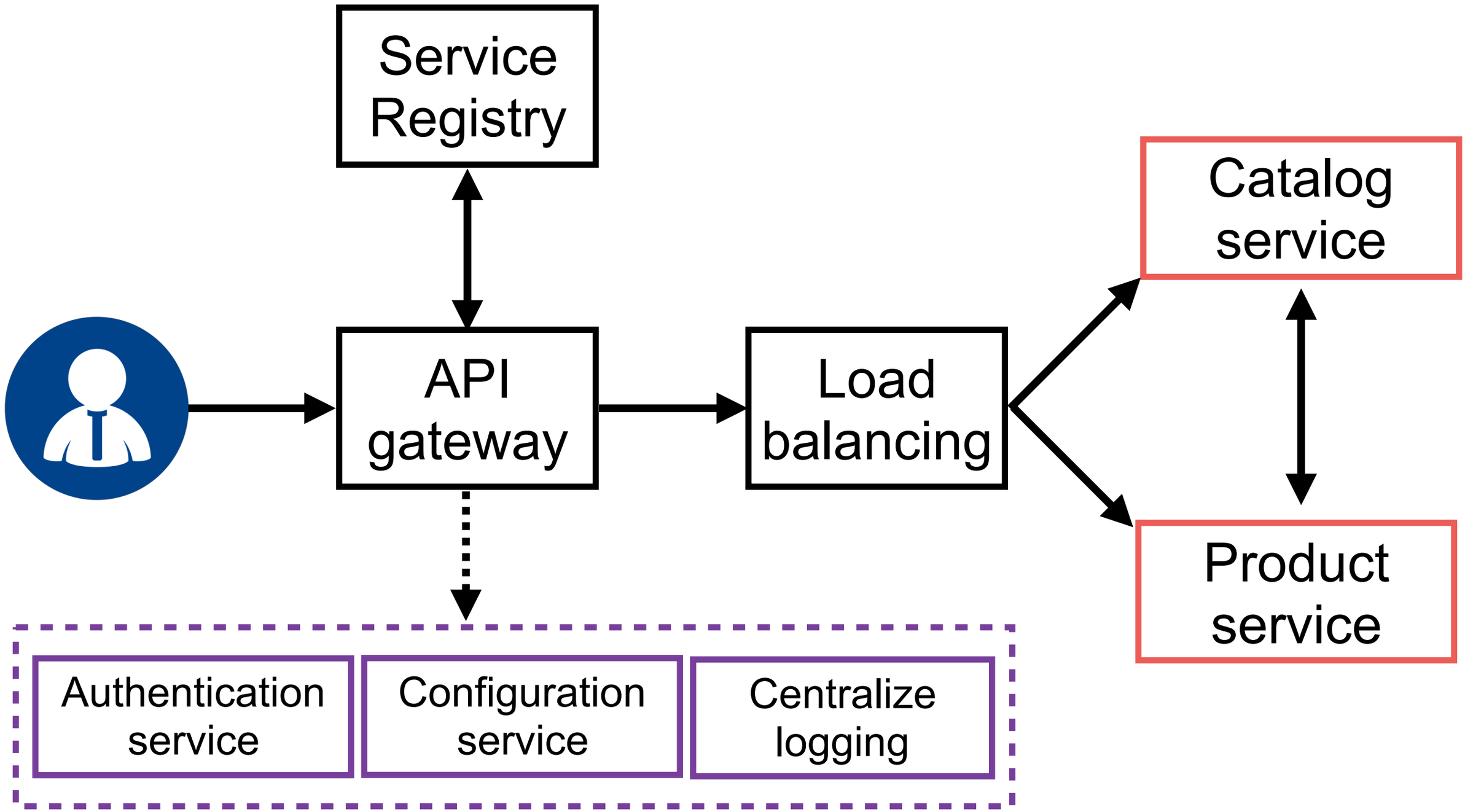
Synchronous communication

Goals

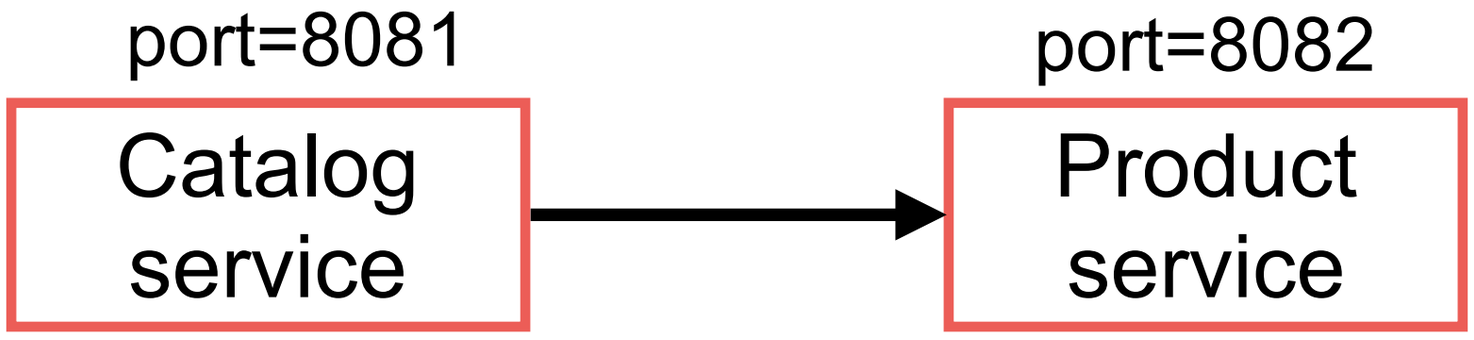


Step 1
Point-to-Point communication

Goals



Point-to-Point communication



Point-to-Point communication

$git clone https://github.com/up1/workshop-microservice-with-java.git -b **step01**

Product service

List all products
Run on port 8082

$mvnw clean package

$java -jar target/product.jar

Product service

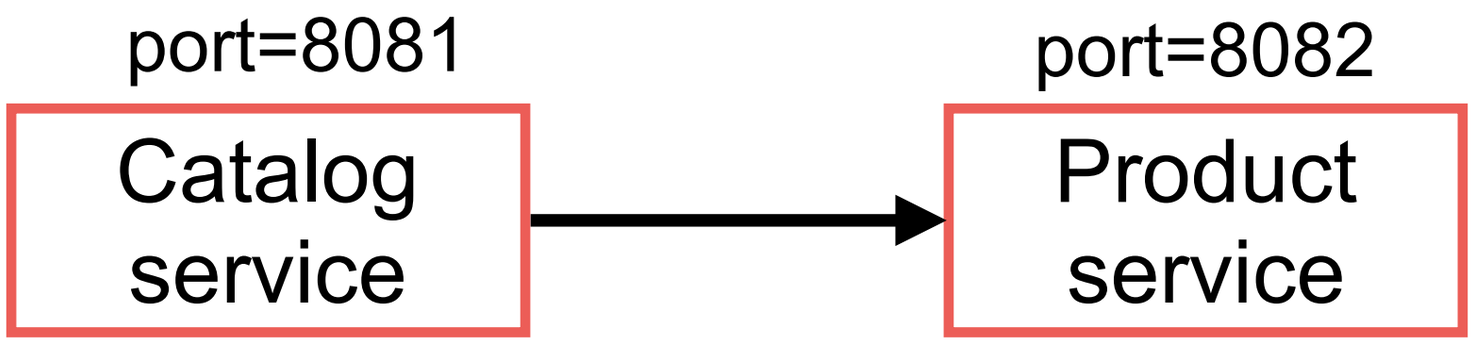
GET /products

localhost:8082/products


```
[
  - {
        id: 1,
        name: "Product 1",
        description: "Description 1",
        imageUrl: "URL of product 1"
    },
  - {
        id: 2,
        name: "Product 2",
        description: "Description 2",
        imageUrl: "URL of product 2"
    },
  - {
        id: 3,
        name: "Product 3",
        description: "Description 3",
        imageUrl: "URL of product 3"
    }
]
```


Catalog service

List of product by category
Run on port 8081



$mvnw clean package
$java -jar target/product.jar

Catalog service

GET /catalog/1

localhost:8081/catalog/1


```
{
    id: 1,
  - products: [
      - {
            id: 1,
            name: "Product 1",
            description: "Description 1",
            imageUrl: "URL of product 1"
        },
      - {
            id: 2,
            name: "Product 2",
            description: "Description 2",
            imageUrl: "URL of product 2"
        },
      - {
            id: 3,
            name: "Product 3",
            description: "Description 3",
            imageUrl: "URL of product 3"
        }
    ]
}
```


Catalog service

Open file CatalogController.java

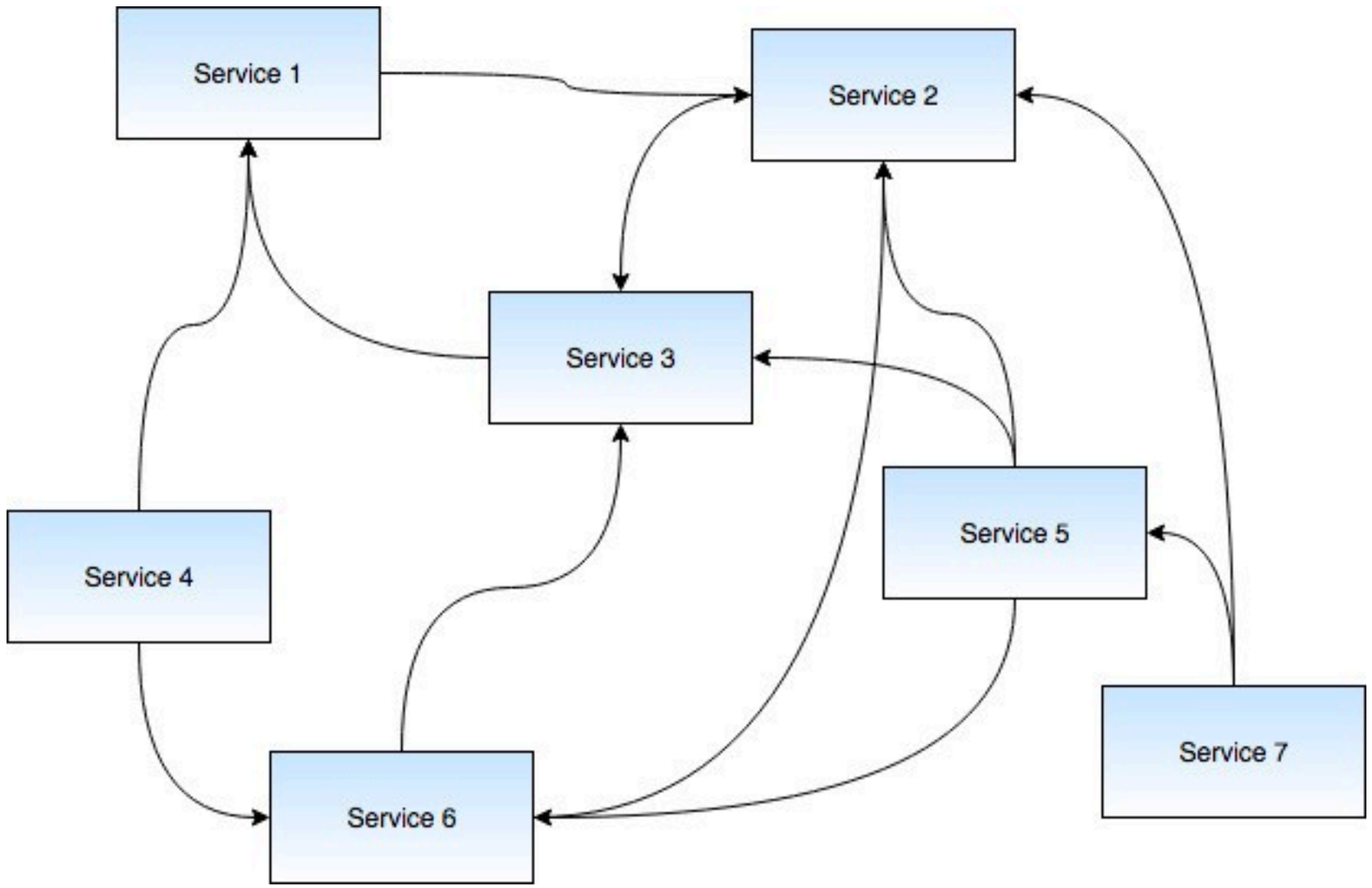
```
@GetMapping("/catalog/{id}")
public Catalog getCatalog(@PathVariable int id) {
    Catalog catalog = new Catalog();
    catalog.setId(id);
    // Get all products from product service
    List<Object> products
            = restTemplate.getForObject("http://localhost:8082/products",
                                        List.class);
    catalog.setProducts(products);
    return catalog;
}
```

Hard code url of service !!

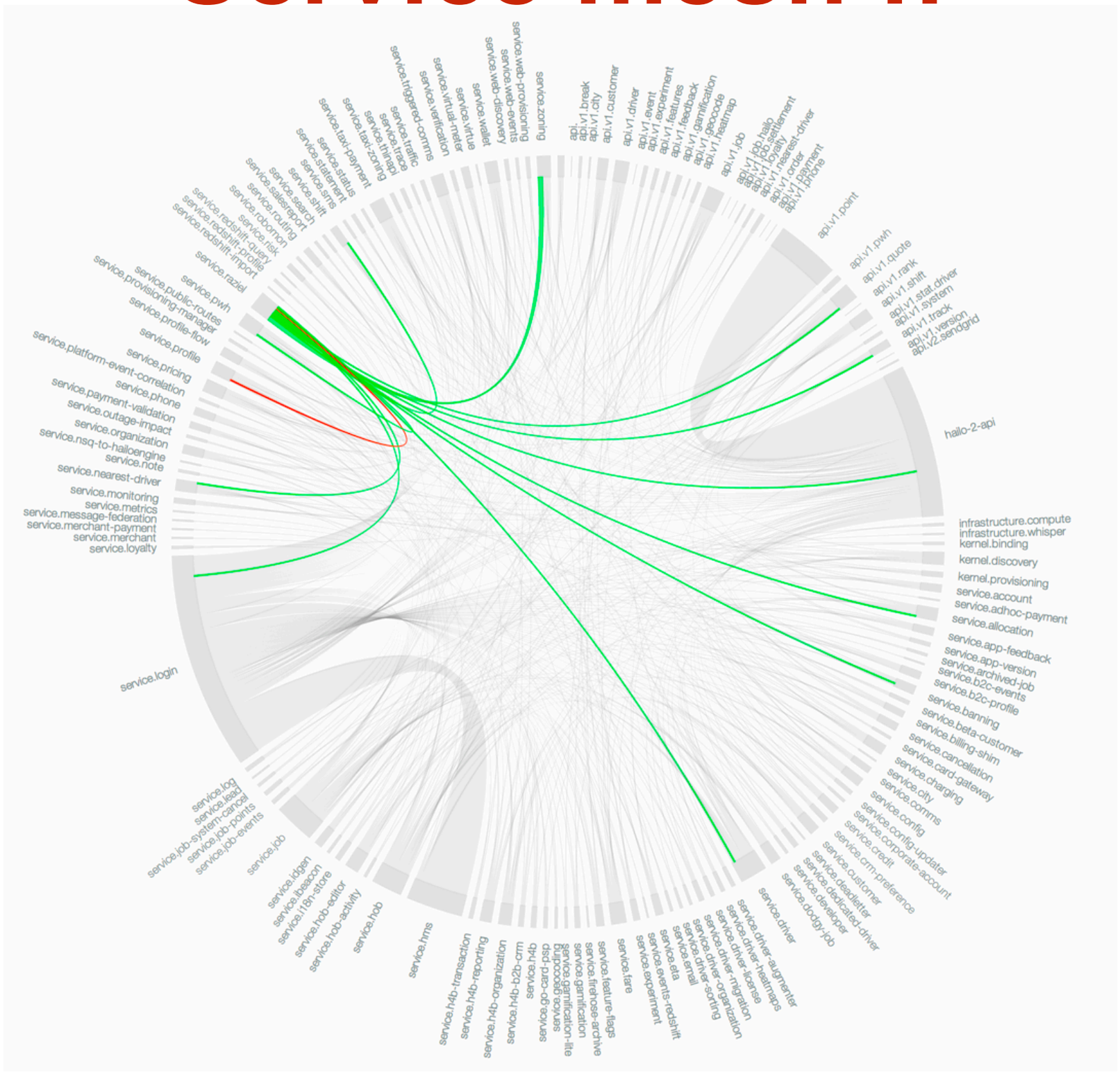
Change url !!

Many services !!

Many services !!

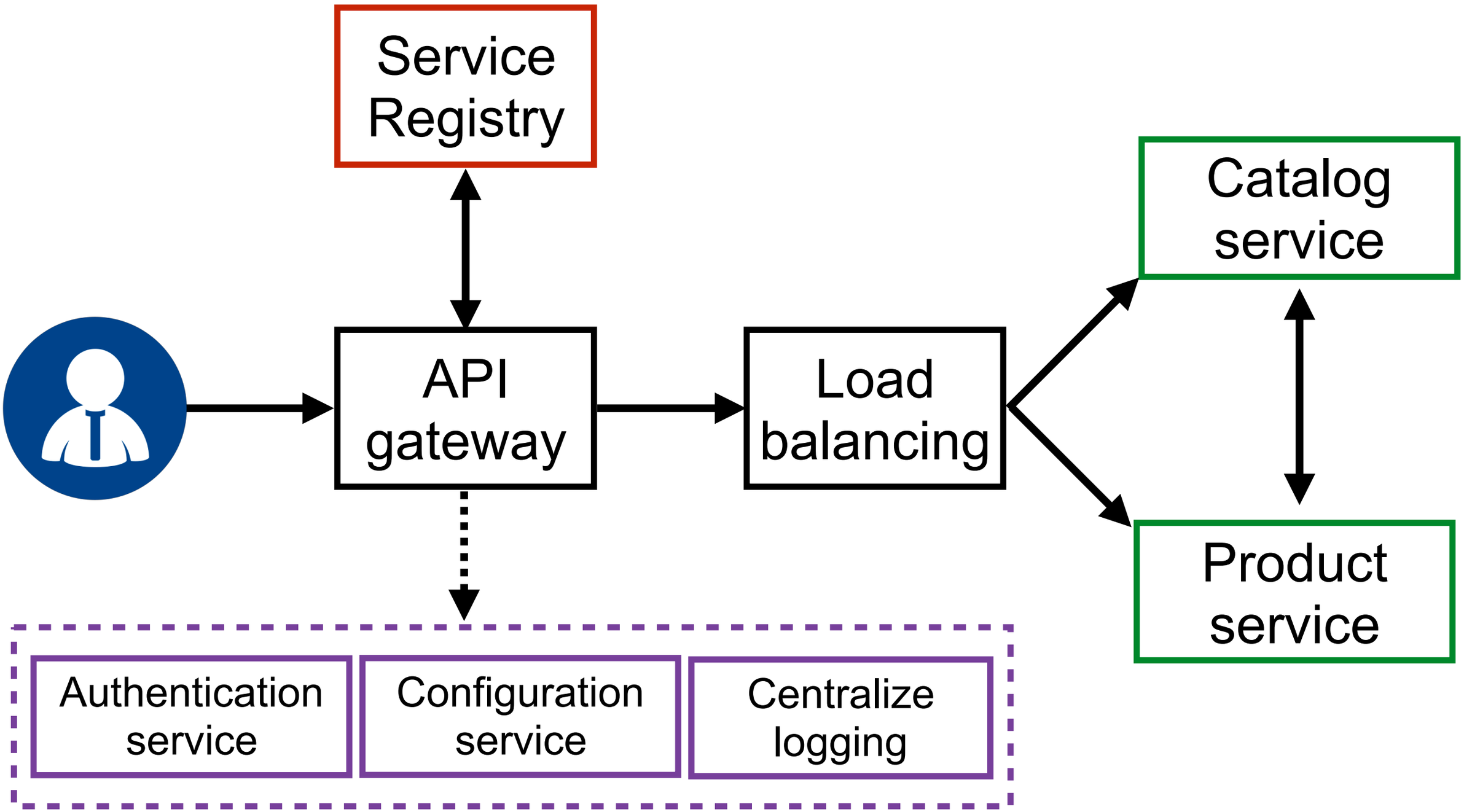


Service mesh !!



Step 2
Using service registry

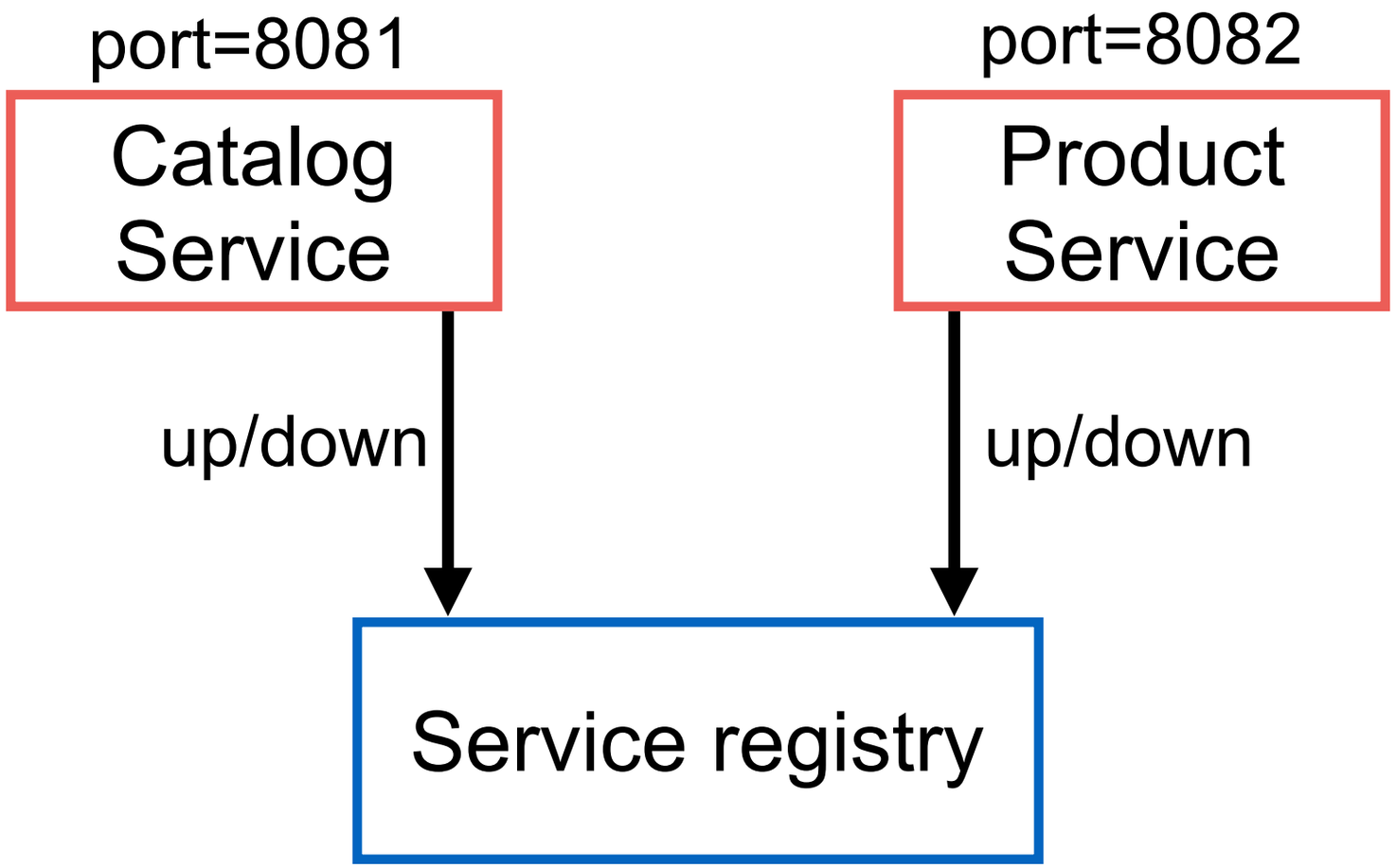
Goals



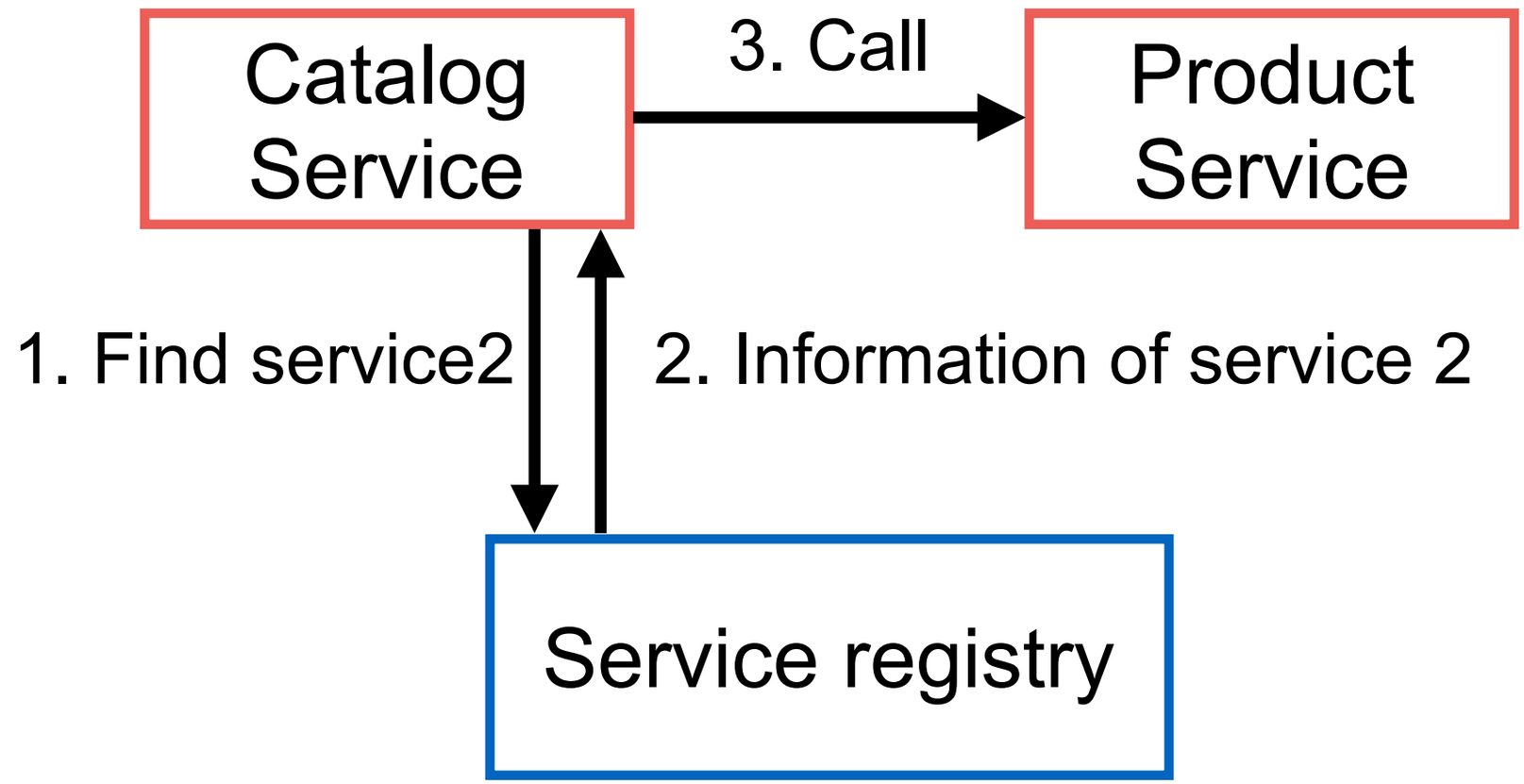
Service Registry

Database to keep data of services
How to register services ?
How to discover services ?

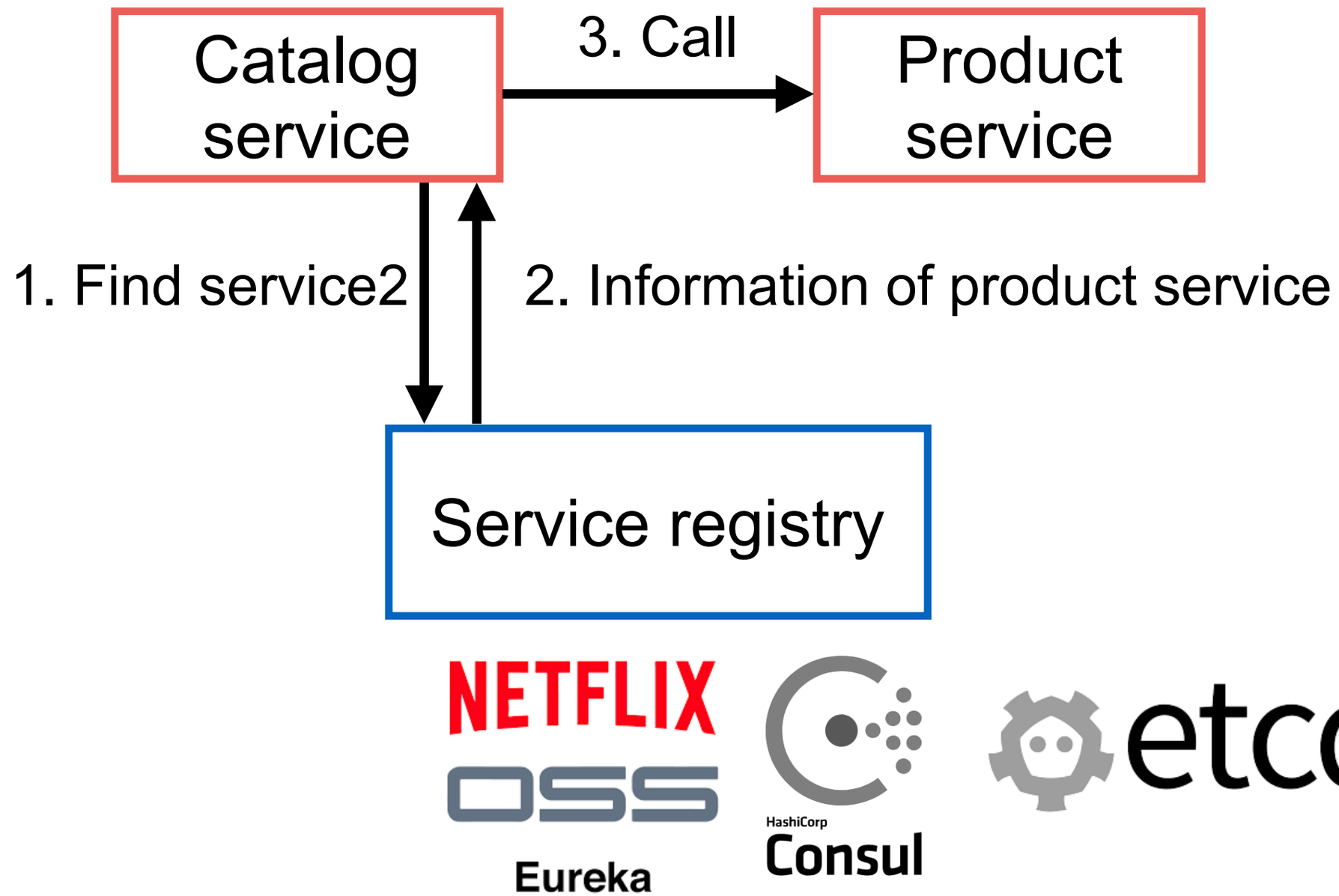
1. Service register



2. Service Discovery



Our project



Service Registry

$git clone https://github.com/up1/workshop-microservice-with-java.git -b **step02**

Step

1. Create service registry with Eureka
2. Register product service to registry
3. Register catalog service to registry
4. Catalog service call product service

1. Create service registry

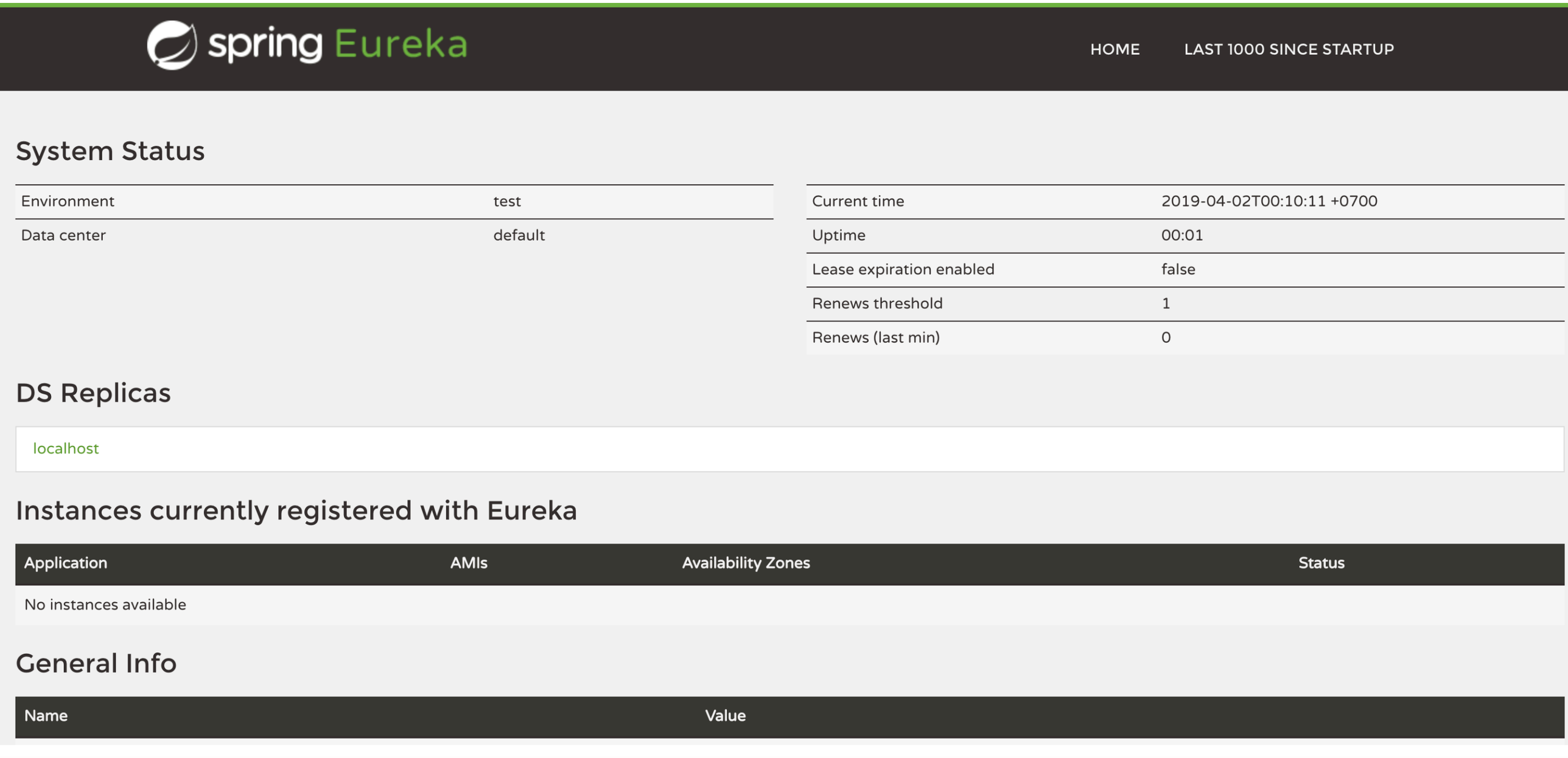
Project name = eureka-server
Default port = 8761

$mvnw clean package

$java -jar target/eureka-server.jar

Eureka server

http://locahost:8761



2. Register product service

Add Eureka client library to service
See detail in file **pom.xml**

```
<dependency>
    <groupId>org.springframework.cloud</groupId>
    <artifactId>spring-cloud-starter-netflix-eureka-client</artifactId>
</dependency>
<dependency>
    <groupId>org.springframework.cloud</groupId>
    <artifactId>spring-cloud-starter-sleuth</artifactId>
</dependency>
<dependency>
    <groupId>org.springframework.data</groupId>
    <artifactId>spring-data-rest-hal-browser</artifactId>
</dependency>
```

2. Register product service

Add url of Eureka server

See detail in file **application.properties**

```
spring.application.name=product-service
server.port=8082

eureka.client.service-url.default-zone=http://localhost:8761/eureka
```

2. Register product service

Add Eureka client to service
See detail in file **ProductApplication.java**

```
@SpringBootApplication
@EnableEurekaClient
public class ProductApplication {

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

}
```

2. Register product service

Build and run service

$mvnw clean package
$java -jar target/product.jar

```
ication   : Started ProductApplication in 6.429 seconds (JVM running for 6.878)
2019-04-02 00:20:08.084  INFO [product-service,,,] 28662 --- [nfoReplicator-0] com.netflix.discovery.Disco
Client    : DiscoveryClient_PRODUCT-SERVICE/192.168.1.107:product-service:8082 - registration status: 204
```

Eureka server

http://locahost:8761

Instances currently registered with Eureka

Application	AMIs	Availability Zones	Status
PRODUCT-SERVICE	n/a (1)	(1)	UP (1) - 192.168.1.107:product-service:8082

3. Register catalog service

Add Eureka client library to service
See detail in file **pom.xml**

```
<dependency>
    <groupId>org.springframework.cloud</groupId>
    <artifactId>spring-cloud-starter-netflix-eureka-client</artifactId>
</dependency>
<dependency>
    <groupId>org.springframework.cloud</groupId>
    <artifactId>spring-cloud-starter-sleuth</artifactId>
</dependency>
<dependency>
    <groupId>org.springframework.data</groupId>
    <artifactId>spring-data-rest-hal-browser</artifactId>
</dependency>
```

3. Register catalog service

Add url of Eureka server

See detail in file **application.properties**

```
spring.application.name=catalog-service
server.port=8081

eureka.client.service-url.default-zone=http://localhost:8761/eureka
```

3. Register catalog service

Add Eureka client to service

See detail in file **CatalogApplication.java**

```
@SpringBootApplication
@EnableEurekaClient
public class CatalogApplication {

    public static void main(String[] args)

}
```

3. Register catalog service

Build and run service

$mvnw clean package
$java -jar target/catalog.jar

Eureka server

http://locahost:8761

Instances currently registered with Eureka

Application	AMIs	Availability Zones	Status
CATALOG-SERVICE	n/a (1)	(1)	UP (1) - 192.168.1.107:catalog-service:8081
PRODUCT-SERVICE	n/a (1)	(1)	UP (1) - 192.168.1.107:product-service:8082

4. Call product service

Call product service from **catalog service**
See detail in file **CatalogController.java**

```
@GetMapping("/catalog/{id}")
public Catalog getCatalog(@PathVariable int id) {
    Catalog catalog = new Catalog();
    catalog.setId(id);

    // Get all products from product service
    List<Object> products
            = restTemplate.getForObject("http://product-service/products",
                                        List.class);
    catalog.setProducts(products);

    return catalog;
}
```

Using service name
from Service Registry

Catalog service

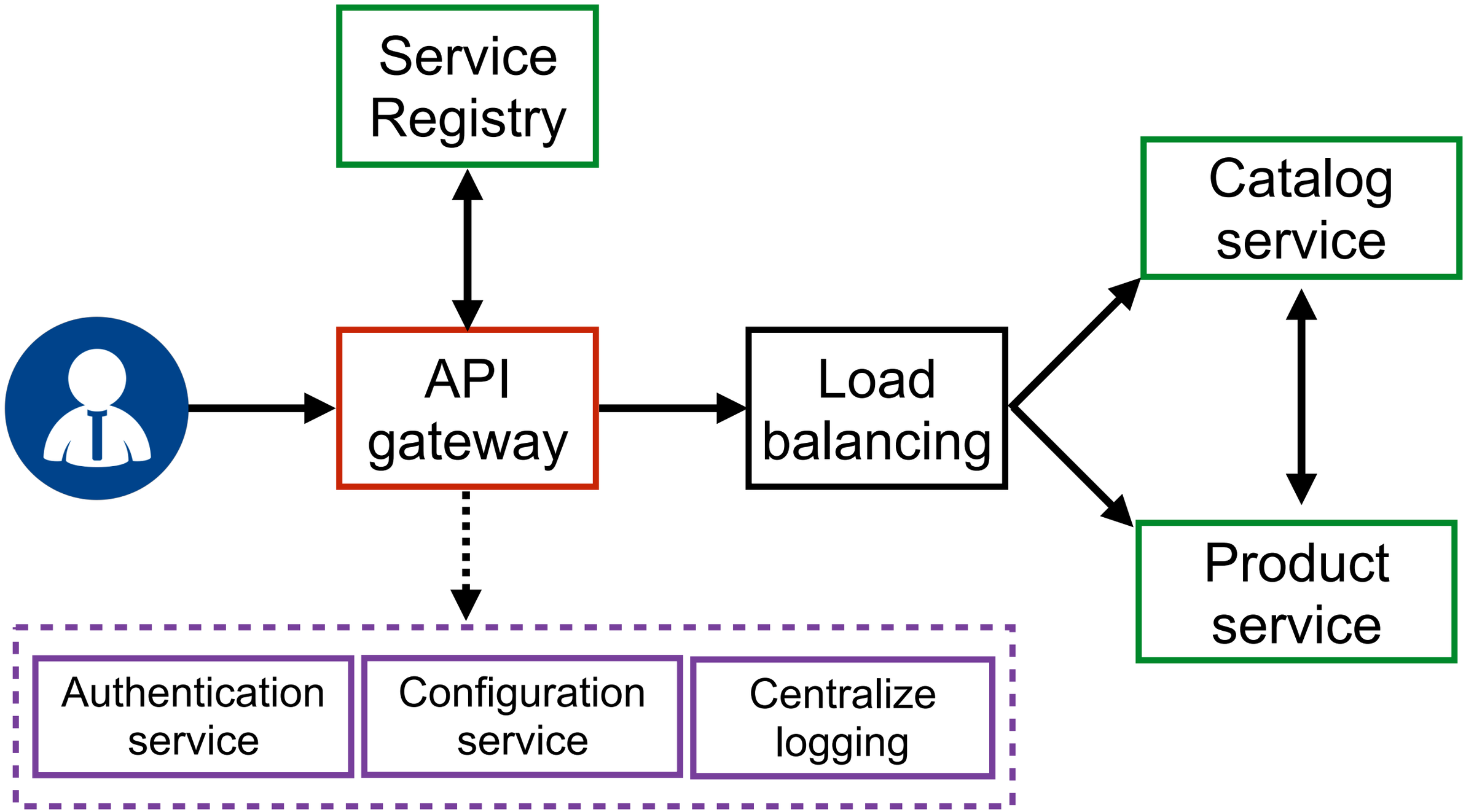
GET /catalog/1

localhost:8081/catalog/1

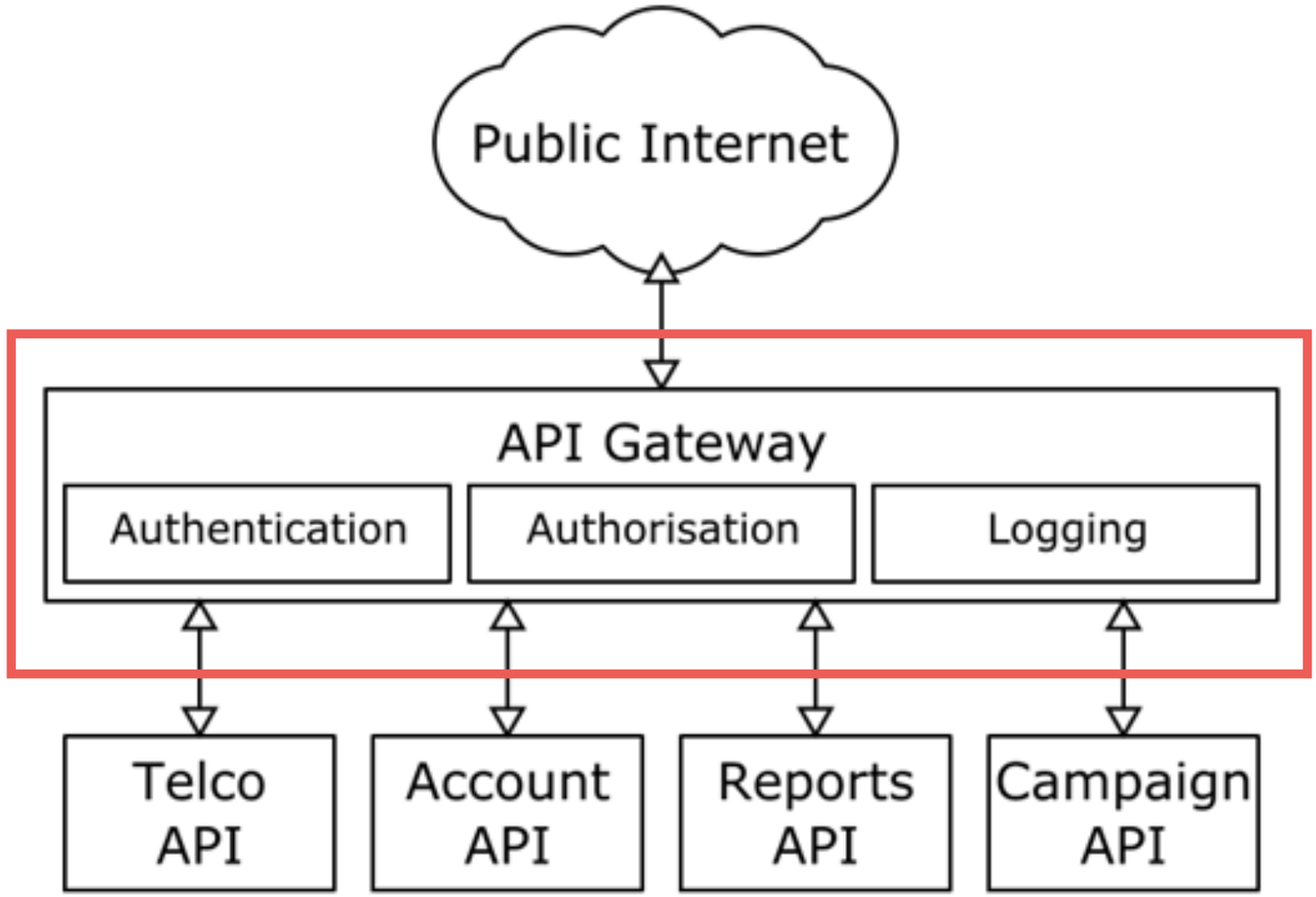

```
{
    id: 1,
  - products: [
      - {
            id: 1,
            name: "Product 1",
            description: "Description 1",
            imageUrl: "URL of product 1"
        },
      - {
            id: 2,
            name: "Product 2",
            description: "Description 2",
            imageUrl: "URL of product 2"
        },
      - {
            id: 3,
            name: "Product 3",
            description: "Description 3",
            imageUrl: "URL of product 3"
        }
    ]
}
```


Step 3
API gateway

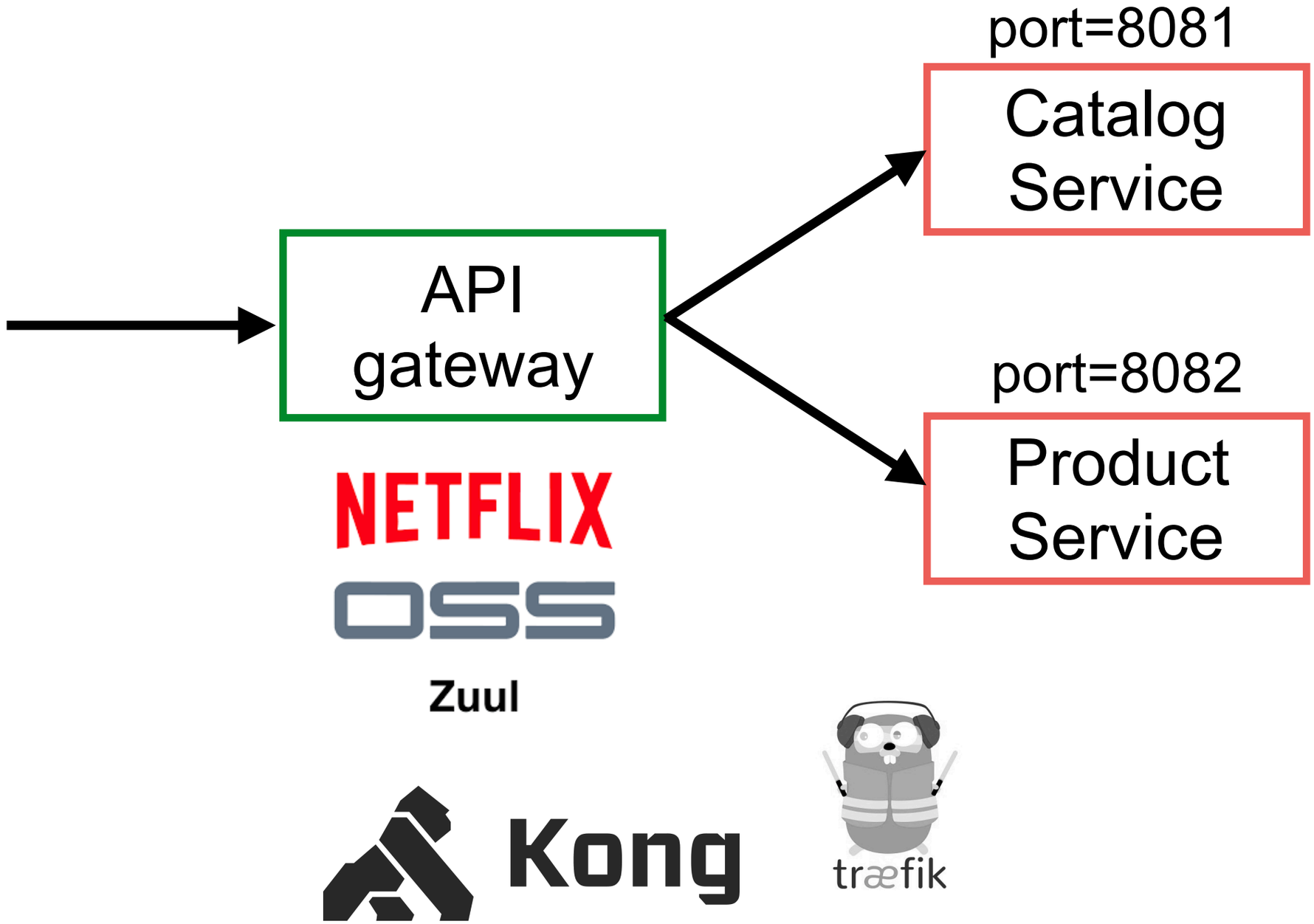
Goals



API gateway



API gateway



Service Registry

$git clone https://github.com/up1/workshop-microservice-with-java.git -b **step03**

Step

1. Create api gateway with Zuul
2. Register api gateway to registry
3. Configuration api gateway
4. Call service from api gateway

Create api gateway with Zuul

Project name = api-gateway
Default port = 8762

$mvnw clean package

$java -jar target/api-gateway.jar

Create api gateway with Zuul

Add Zuul library to service
See detail in file **pom.xml**

```
<dependency>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-starter-web</artifactId>
</dependency>
<dependency>
    <groupId>org.springframework.cloud</groupId>
    <artifactId>spring-cloud-starter-netflix-eureka-client</artifactId>
</dependency>
<dependency>
    <groupId>org.springframework.cloud</groupId>
    <artifactId>spring-cloud-starter-netflix-zuul</artifactId>
</dependency>
```

Create api gateway with Zuul

Enable Zuul server

See detail in file **ApiGatewayApplication.java**

```
@SpringBootApplication
@EnableEurekaClient
@EnableZuulProxy
public class ApiGatewayApplication {

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

}
```

Eureka server

http://locahost:8761

Instances currently registered with Eureka

Application	AMIs	Availability Zones	Status
API-GATEWAY	n/a (1)	(1)	UP (1) - 192.168.1.107:api-gateway:8762
CATALOG-SERVICE	n/a (1)	(1)	UP (1) - 192.168.1.107:catalog-service:8081
PRODUCT-SERVICE	n/a (1)	(1)	UP (1) - 192.168.1.107:product-service:8082

Create api gateway with Zuul

Add url of Eureka server

See detail in file **application.properties**

```
spring.application.name=api-gateway
server.port=8762
eureka.client.service-url.default-zone=http://localhost:8761/eureka/

# Config of Zuul
zuul.prefix=/api
zuul.ignored-services=*

# Map paths to services
zuul.routes.catalog-service.path=/catalogservice/**

management.endpoints.web.exposure.include=*
```

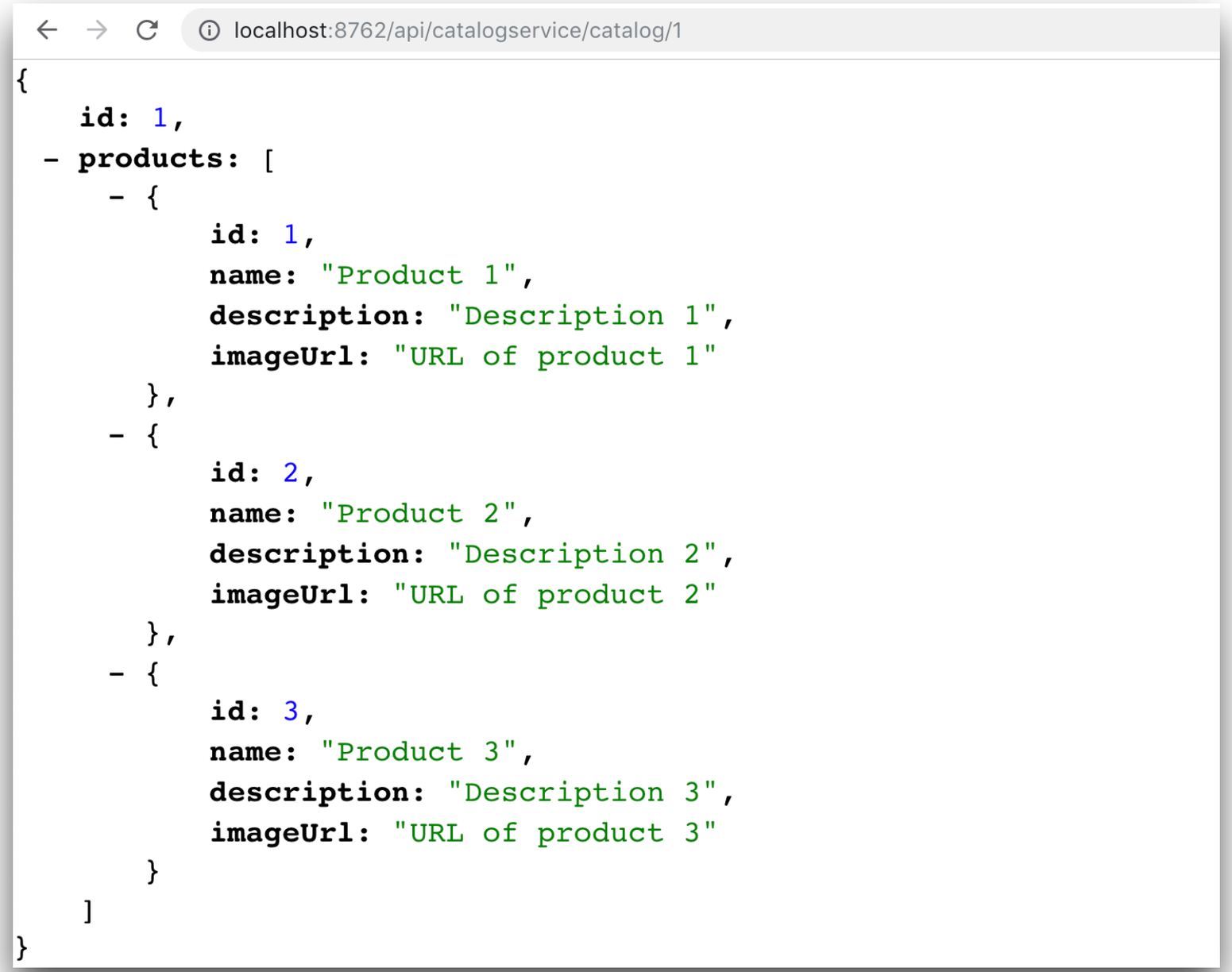
Check Route of API gateway

http://localhost:8762/actuator

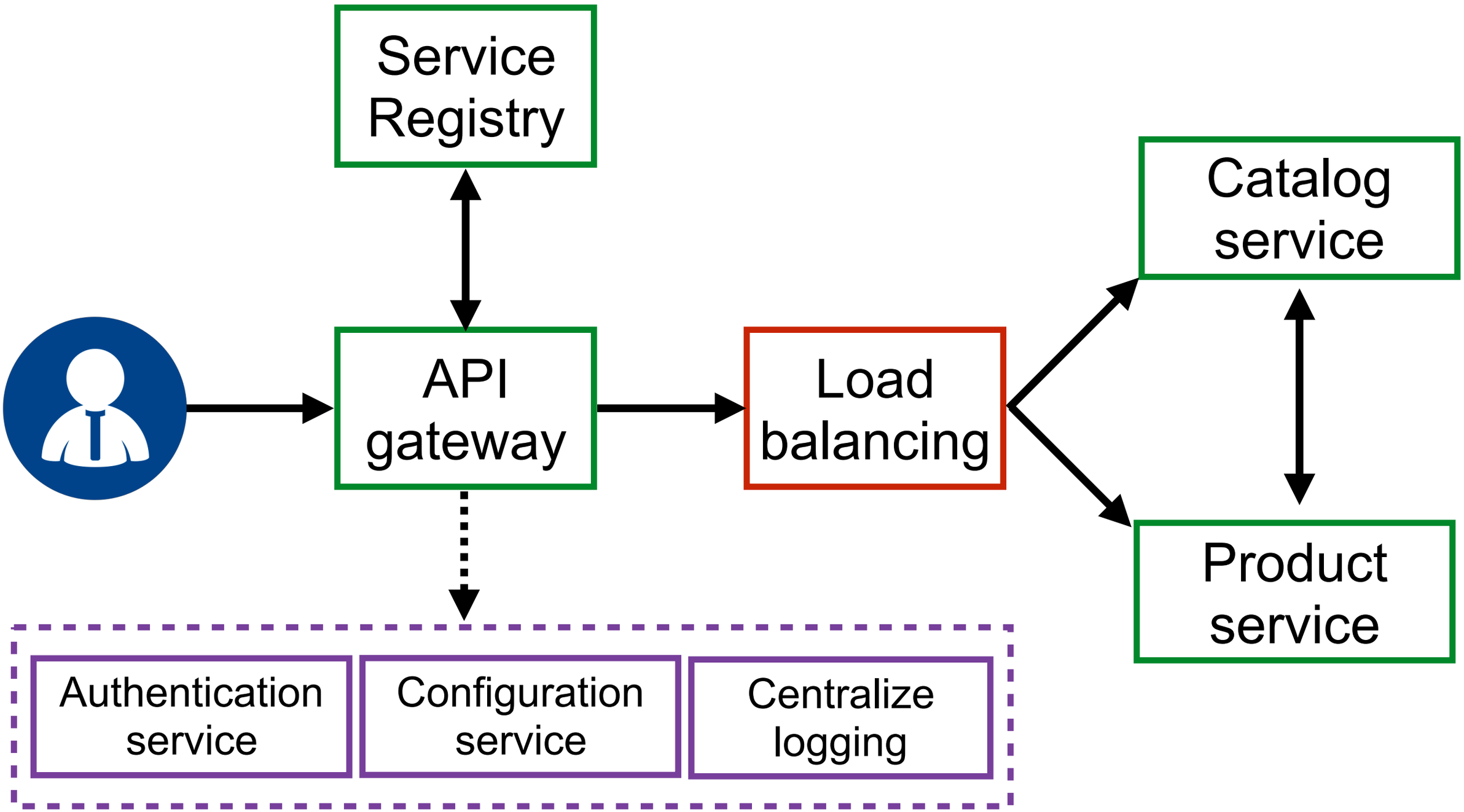
http://localhost:8762/actuator/routes

Call service from API gateway

http://localhost:8762/api/catalogservice/catalog/1

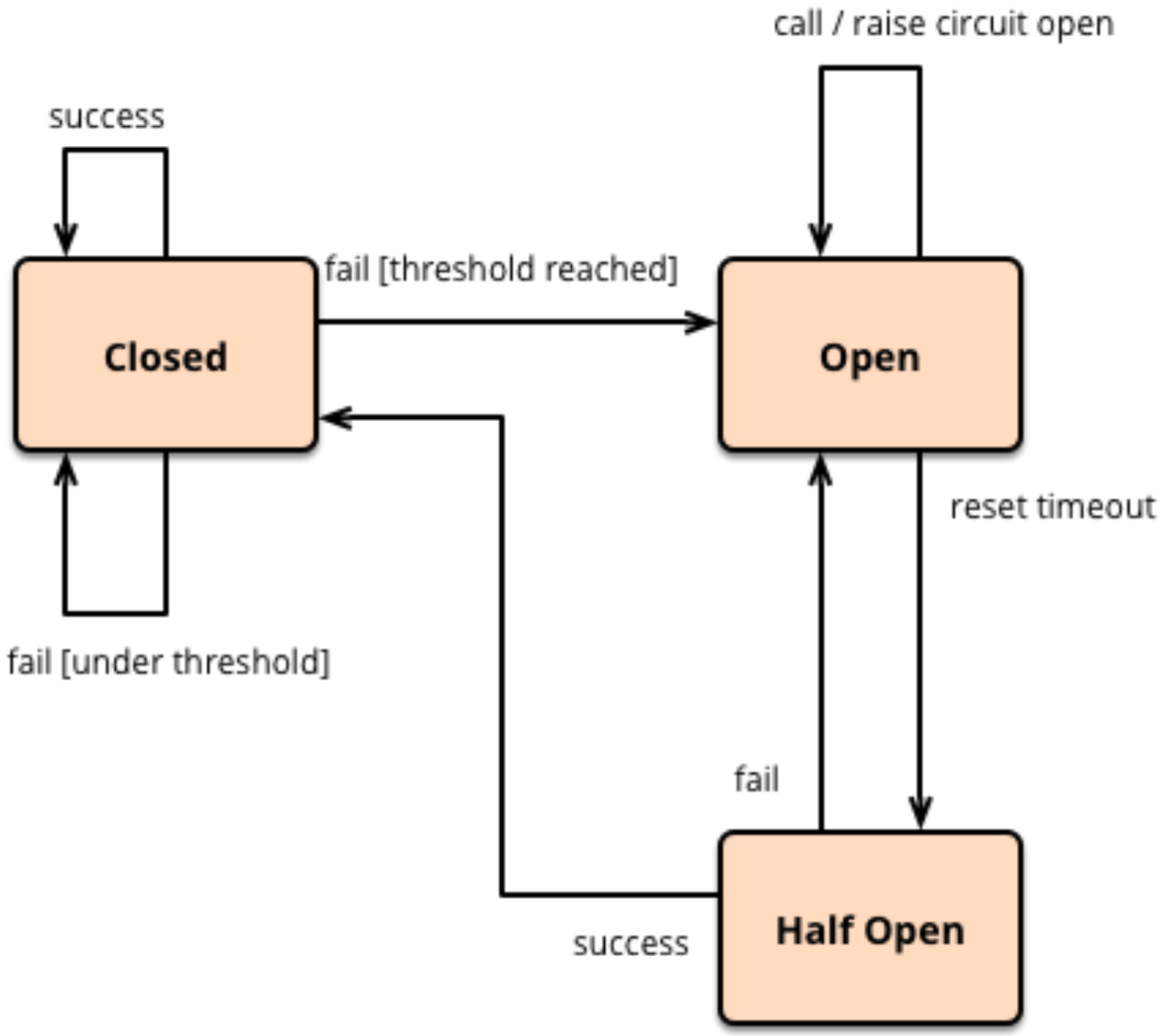


Goals

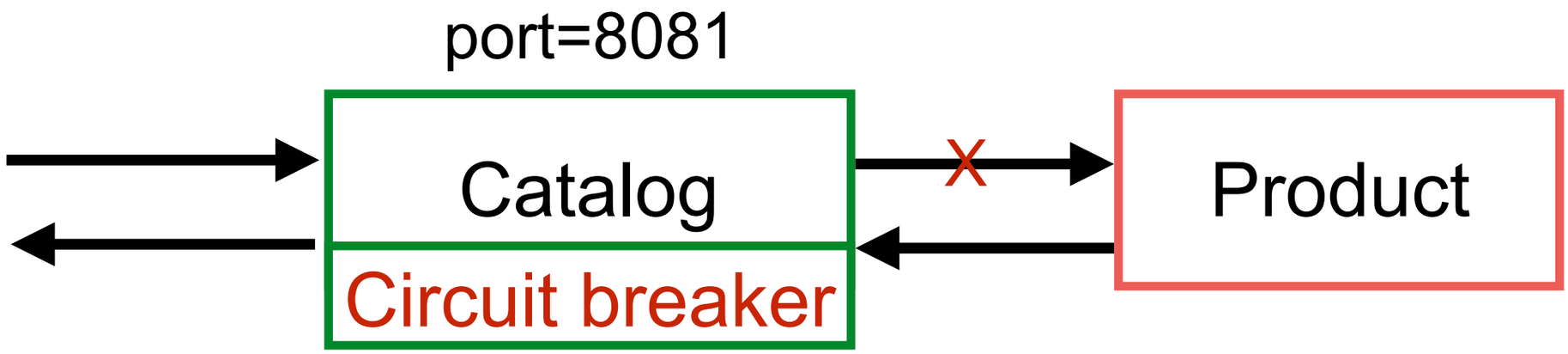


Step 4
Circuite Breaker

Circuit breaker



Circuit breaker



How to handling problem ?

??

Circuit breaker

$git clone https://github.com/up1/workshop-microservice-with-java.git -b **step04**

Step

1. Enable circuit breker in catalog service
2. Add hystrix library
3. Create fallback method for operation

Enable circuit breaker

See detail in file **CatalogApplication.java**

```
@SpringBootApplication
@EnableEurekaClient
@EnableCircuitBreaker
public class CatalogApplication {

    public static void main(String[] args) {
        SpringApplication.run(CatalogApplication.
    }

}
```

Add Hystrix library to service

See detail in file **pom.xml**

```
<dependency>
    <groupId>org.springframework.cloud</groupId>
    <artifactId>spring-cloud-starter-netflix-eureka-client</artifactId>
</dependency>
<dependency>
    <groupId>org.springframework.cloud</groupId>
    <artifactId>spring-cloud-starter-netflix-hystrix</artifactId>
</dependency>
<dependency>
    <groupId>org.springframework.cloud</groupId>
    <artifactId>spring-cloud-starter-sleuth</artifactId>
</dependency>
```

Create fallback method with Hystrix

Try to handle error with default value

See detail in file **CatalogController.java**

```
@HystrixCommand(fallbackMethod = "fallback")
@GetMapping("/catalog/{id}")
public Catalog getCatalog(@PathVariable int id)
{
    ...

}
```

```
public Catalog fallback(int catalogId, Throwable hystrixCommand) {
    Catalog catalog = new Catalog();
    catalog.setId(catalogId);
    return catalog;
}
```

Step 5
??