EUREKA – Service Discovery with Spring Boot

Introduction

Service Discovery is one of the key tenets of a microservice-based architecture. Trying to hand-configure each client or some form of convention can be difficult to do and can be brittle. Eureka is the Netflix Service Discovery Server and Client. The server can be configured and deployed to be highly available, with each server replicating state about the registered services to the others.

Let us consider a situation, we have producer and consumer micro service. There is one end point in consumer service which pulls information from producer service. It means one microservice calls another microservice. In this case, we can not hard code or mention the REST end point details because deployment of service may change the end point details. In this situation, service discovery comes into picture.

Let us consider an example, we have **Producer** and **Consumer** microservice. To achieve Service Discovery, we have used here Netflix Eureka.

Eureka Server

Maven Configuration (pom.xml)

```
<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>

      <groupId>eureka-server</groupId>
      <artifactId>eureka-server</artifactId>
      <version>0.0.1-SNAPSHOT</version>
      <packaging>jar</packaging>

      <name>eureka-server</name>
      <url>http://maven.apache.org</url>
      <parent>
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-starter-parent</artifactId>
            <version>2.0.0.RELEASE</version>
      </parent>

      <properties>
            <project.build.sourceEncoding>UTF-8</project.build.sourceEncoding>
      </properties>
```

```
	<dependencies>
		<dependency>
			<groupId>org.springframework.cloud</groupId>
			<artifactId>spring-cloud-starter-netflix-eureka-server</artifactId>
		</dependency>
		<dependency>
			<groupId>junit</groupId>
			<artifactId>junit</artifactId>
			<scope>test</scope>
		</dependency>
	</dependencies>

	<dependencyManagement>
		<dependencies>
			<dependency>
				<groupId>org.springframework.cloud</groupId>
				<artifactId>spring-cloud-dependencies</artifactId>
				<version>Finchley.RELEASE</version>
				<type>pom</type>
				<scope>import</scope>
			</dependency>
		</dependencies>
	</dependencyManagement>

	<build>
		<plugins>
			<plugin>
				<groupId>org.apache.maven.plugins</groupId>
				<artifactId>maven-compiler-plugin</artifactId>
				<configuration>
					<source>1.8</source>
					<target>1.8</target>
				</configuration>
			</plugin>
			<plugin>
				<groupId>org.springframework.boot</groupId>
				<artifactId>spring-boot-maven-plugin</artifactId>
			</plugin>
		</plugins>
	</build>
</project>
```

Spring Boot Application Layer

EurekaServerApplication.java

```java
package com.ddlab.rnd.eureka;
import org.springframework.boot.SpringApplication;
import org.springframework.boot.autoconfigure.SpringBootApplication;
import org.springframework.cloud.netflix.eureka.server.EnableEurekaServer;

@SpringBootApplication
@EnableEurekaServer
public class EurekaServerApplication {

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

Spring Boot Eureka Configuration

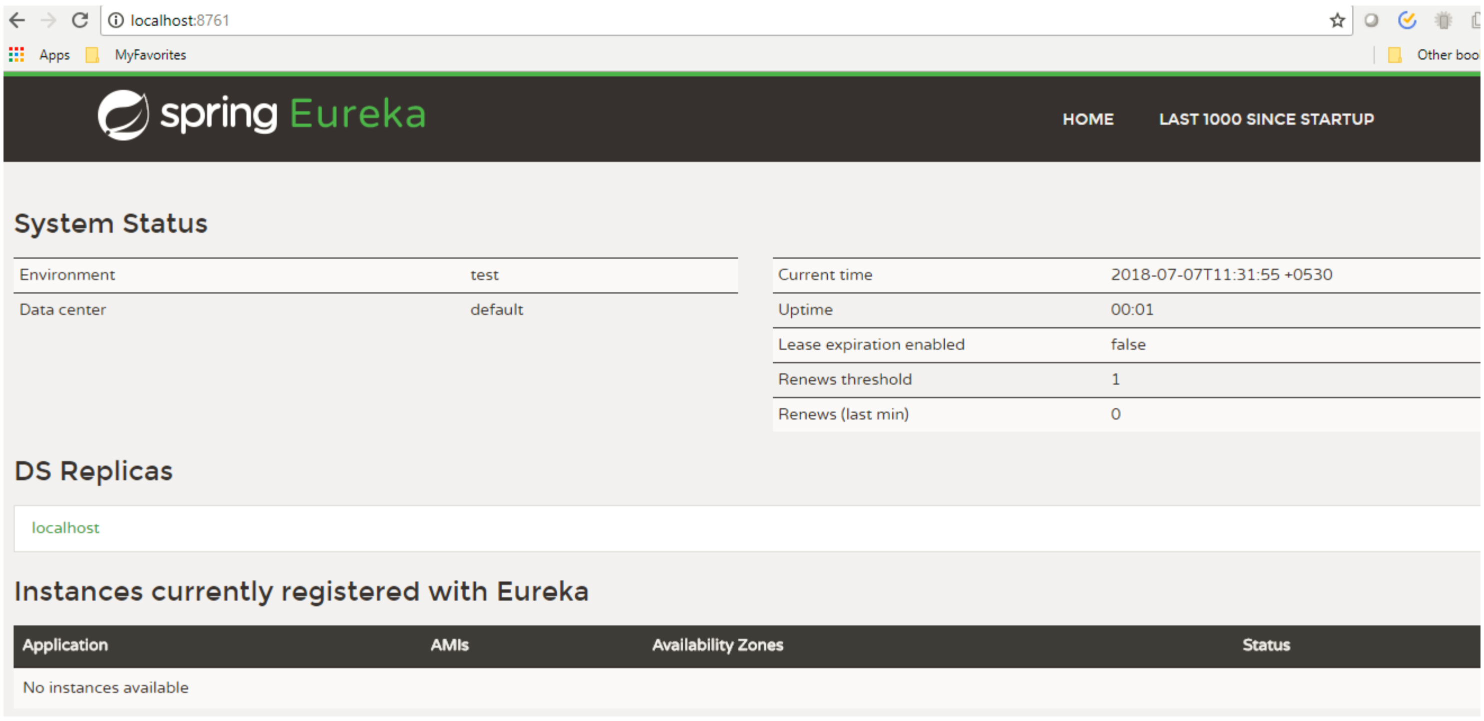
application.properties

```
#spring.application.name=eureka
#server.servlet.context-path=/eureka
#server.port=8090
server.error.whitelabel.enabled=false

server.port=8761

#You comment below two lines, you will see Eureka server as a client and
#It will be displayed as UNKNOWN
#The below the correct configuration

eureka.client.register-with-eureka=false
eureka.client.fetch-registry=false
#
#logging.level.com.netflix.eureka=OFF
#logging.level.com.netflix.discovery=OFF
```

How to Use

If you start the Spring boot application with Eureka in port 8761, you will see the following screen shot.

The URL for the browser : **http://localhost:8761/**



System Status

Environment	test
Data center	default

Current time	2018-07-07T11:31:55 +0530
Uptime	00:01
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			

You can see that No instances are available.

Producer Microservice

Maven Configuration (pom.xml)

```
<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>
      <groupId>producer</groupId>
      <artifactId>producer</artifactId>
      <version>0.0.1-SNAPSHOT</version>
      <packaging>jar</packaging>
      <name>producer</name>
      <url>http://maven.apache.org</url>
      <parent>
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-starter-parent</artifactId>
            <version>2.0.0.RELEASE</version>
      </parent>
      <properties>
            <project.build.sourceEncoding>UTF-8</project.build.sourceEncoding>
      </properties>

      <dependencies>
            <dependency>
                  <groupId>org.springframework.boot</groupId>
                  <artifactId>spring-boot-starter-web</artifactId>
            </dependency>
            <dependency>
                  <groupId>org.projectlombok</groupId>
                  <artifactId>lombok</artifactId>
                  <scope>provided</scope>
            </dependency>
            <dependency>
                  <groupId>junit</groupId>
                  <artifactId>junit</artifactId>
                  <scope>test</scope>
            </dependency>
            <dependency> <!-- For Eureka -->
                  <groupId>org.springframework.cloud</groupId>
                  <artifactId>spring-cloud-starter-netflix-eureka-client</artifactId>
            </dependency>
      </dependencies>
      <dependencyManagement> <!-- For Eureka -->
            <dependencies>
                  <dependency>
                        <groupId>org.springframework.cloud</groupId>
                        <artifactId>spring-cloud-dependencies</artifactId>
                        <version>Finchley.RELEASE</version>
                        <type>pom</type>
                        <scope>import</scope>
                  </dependency>
            </dependencies>
      </dependencyManagement>
```

```
	<build>
		<plugins>
			<plugin>
				<groupId>org.apache.maven.plugins</groupId>
				<artifactId>maven-compiler-plugin</artifactId>
				<configuration>
					<source>1.8</source>
					<target>1.8</target>
				</configuration>
			</plugin>
			<plugin>
				<groupId>org.springframework.boot</groupId>
				<artifactId>spring-boot-maven-plugin</artifactId>
			</plugin>
		</plugins>
	</build>
</project>
```

Spring Boot Application Layer

ProducerBootApplication.java

```
package com.ddlab.rnd.boot;
import org.springframework.boot.SpringApplication;
import org.springframework.boot.autoconfigure.SpringBootApplication;
import org.springframework.cloud.client.discovery.EnableDiscoveryClient;

@SpringBootApplication
@EnableDiscoveryClient
public class ProducerBootApplication {
  public static void main(String[] args) {
	SpringApplication.run(ProducerBootApplication.class, args);
  }
}
```

BootConfig.java

```
package com.ddlab.rnd.boot;
import org.springframework.context.annotation.ComponentScan;
import org.springframework.context.annotation.Configuration;

@ComponentScan(basePackages= {"com.ddlab.rnd.*","com.ddlab.boot.*"})
@Configuration
public class BootConfig {

}
```

Controller Layer

ProducerController.java

```
package com.ddlab.boot.controller;
import java.util.Arrays;
import java.util.List;
import org.springframework.http.HttpStatus;
import org.springframework.http.MediaType;
import org.springframework.http.ResponseEntity;
import org.springframework.web.bind.annotation.CrossOrigin;
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("/home")
@CrossOrigin
public class ProducerController {

  @GetMapping(path = "/item/{id}", produces = MediaType.TEXT_PLAIN_VALUE)
  public ResponseEntity<String> getItemsById(@PathVariable("id") String id) {
    List<String> soapList = Arrays.asList("Lux soap", "Rexona Soap", "Patanjali 
Soap");
    return new ResponseEntity<String>(soapList.toString(), HttpStatus.OK);
  }
}
```

Spring Boot and Eureka Configuration

application.properties

```
spring.application.name=producer
server.servlet.context-path=/producer
server.port=8081
server.error.whitelabel.enabled=false

#Eureka Configuration
eureka.client.serviceUrl.defaultZone=http://localhost:8761/eureka
```

bootstrap.properties

```
spring.application.name=producer
```

Consumer Microservice

Maven Configuration (pom.xml)

```xml
<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>
      <groupId>consumer</groupId>
      <artifactId>consumer</artifactId>
      <version>0.0.1-SNAPSHOT</version>
      <packaging>jar</packaging>
      <name>consumer</name>
      <url>http://maven.apache.org</url>
      <parent>
            <groupId>org.springframework.boot</groupId>
            <artifactId>spring-boot-starter-parent</artifactId>
            <version>2.0.0.RELEASE</version>
      </parent>
      <properties>
            <project.build.sourceEncoding>UTF-8</project.build.sourceEncoding>
      </properties>
      <dependencies>
            <dependency>
                  <groupId>org.springframework.boot</groupId>
                  <artifactId>spring-boot-starter-web</artifactId>
            </dependency>
            <dependency>
                  <groupId>org.projectlombok</groupId>
                  <artifactId>lombok</artifactId>
                  <scope>provided</scope>
            </dependency>
            <dependency>
                  <groupId>junit</groupId>
                  <artifactId>junit</artifactId>
                  <scope>test</scope>
            </dependency>
            <dependency>
                  <groupId>org.springframework.cloud</groupId>
                  <artifactId>spring-cloud-starter-netflix-eureka-client</artifactId>
            </dependency>
      </dependencies>
      <dependencyManagement>
            <dependencies>
                  <dependency>
                        <groupId>org.springframework.cloud</groupId>
                        <artifactId>spring-cloud-dependencies</artifactId>
                        <version>Finchley.RELEASE</version>
                        <type>pom</type>
                        <scope>import</scope>
                  </dependency>
            </dependencies>
      </dependencyManagement>
```

```xml
     <build>
          <plugins>
               <plugin>
                    <groupId>org.apache.maven.plugins</groupId>
                    <artifactId>maven-compiler-plugin</artifactId>
                    <configuration>
                         <source>1.8</source>
                         <target>1.8</target>
                    </configuration>
               </plugin>
               <plugin>
                    <groupId>org.springframework.boot</groupId>
                    <artifactId>spring-boot-maven-plugin</artifactId>
               </plugin>
          </plugins>
     </build>
</project>
```

Spring Boot Application Layer

ConsumerBootApplication.java

```java
package com.ddlab.rnd.boot;
import org.springframework.boot.SpringApplication;
import org.springframework.boot.autoconfigure.SpringBootApplication;

@SpringBootApplication
public class ConsumerBootApplication {
  public static void main(String[] args) {
    SpringApplication.run(ConsumerBootApplication.class, args);
  }
}
```

BootConfig.java

```java
package com.ddlab.rnd.boot;
import org.springframework.context.annotation.ComponentScan;
import org.springframework.context.annotation.Configuration;

@ComponentScan(basePackages = {"com.ddlab.rnd.*", "com.ddlab.boot.*"})
@Configuration
public class BootConfig {}
```

Controller Layer

ConsumerController.java

```java
package com.ddlab.boot.controller;
import java.io.IOException;
import java.util.List;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.cloud.client.ServiceInstance;
import org.springframework.cloud.client.discovery.DiscoveryClient;
import org.springframework.http.HttpEntity;
import org.springframework.http.HttpHeaders;
import org.springframework.http.HttpMethod;
import org.springframework.http.MediaType;
import org.springframework.http.ResponseEntity;
import org.springframework.web.bind.annotation.CrossOrigin;
import org.springframework.web.bind.annotation.GetMapping;
import org.springframework.web.bind.annotation.RequestMapping;
import org.springframework.web.bind.annotation.RestController;
import org.springframework.web.client.RestClientException;
import org.springframework.web.client.RestTemplate;

@RestController
@RequestMapping("/home")
@CrossOrigin
public class ConsumerController {

  @GetMapping(path = "/item/{id}", produces = MediaType.TEXT_PLAIN_VALUE)
  public ResponseEntity<String> getItemsById() throws RestClientException, IOException {
    String baseUrl = "http://localhost:8081/producer/home/item/11";
    RestTemplate restTemplate = new RestTemplate();
    ResponseEntity<String> response = null;
    try {
      response = restTemplate.exchange(baseUrl, HttpMethod.GET, getHeaders(),
String.class);
    } catch (Exception ex) {
      System.out.println(ex);
    }
    System.out.println(response.getBody());
    return response;
  }

  private static HttpEntity<?> getHeaders() throws IOException {
    HttpHeaders headers = new HttpHeaders();
    headers.set("Accept", MediaType.TEXT_PLAIN_VALUE);
    return new HttpEntity<>(headers);
  }
  @Autowired private DiscoveryClient discoveryClient;

  @GetMapping(path = "/items/{id}", produces = MediaType.TEXT_PLAIN_VALUE)
  public ResponseEntity<String> getNewItemsById() throws RestClientException, IOException {
    System.out.println("discoveryClient----------->" + discoveryClient);
    discoveryClient.getServices().forEach(System.out::println);
    List<ServiceInstance> instances = discoveryClient.getInstances("producer");
    System.out.println("instances----------->" + instances);
    ServiceInstance serviceInstance = instances.get(0);
    System.out.println("serviceInstance----------->" + serviceInstance);
    String baseUrl = serviceInstance.getUri().toString();
    System.out.println("baseUrl----------->" + baseUrl);
    baseUrl = baseUrl + "/producer/home/item/11";
    System.out.println("baseUrl----------->" + baseUrl);
    RestTemplate restTemplate = new RestTemplate();
    ResponseEntity<String> response = null;
    try {
      response = restTemplate.exchange(baseUrl, HttpMethod.GET, getHeaders(),
String.class);
    } catch (Exception ex) {
      System.out.println(ex);
    }
    System.out.println(response.getBody());

    return response;
  }
}
```

Spring Eureka Configuration

application.properties

```
spring.application.name=consumer
server.servlet.context-path=/consumer
server.port=8082
server.error.whitelabel.enabled=false

#Eureka Configuration
eureka.client.serviceUrl.defaultZone=http://localhost:8761/eureka
```

bootstrap.properties

```
spring.application.name=consumer
```

How to use

Start the Eureka server, start Producer and Consumer Service.

Use the following URLs in browser, you will get responses.

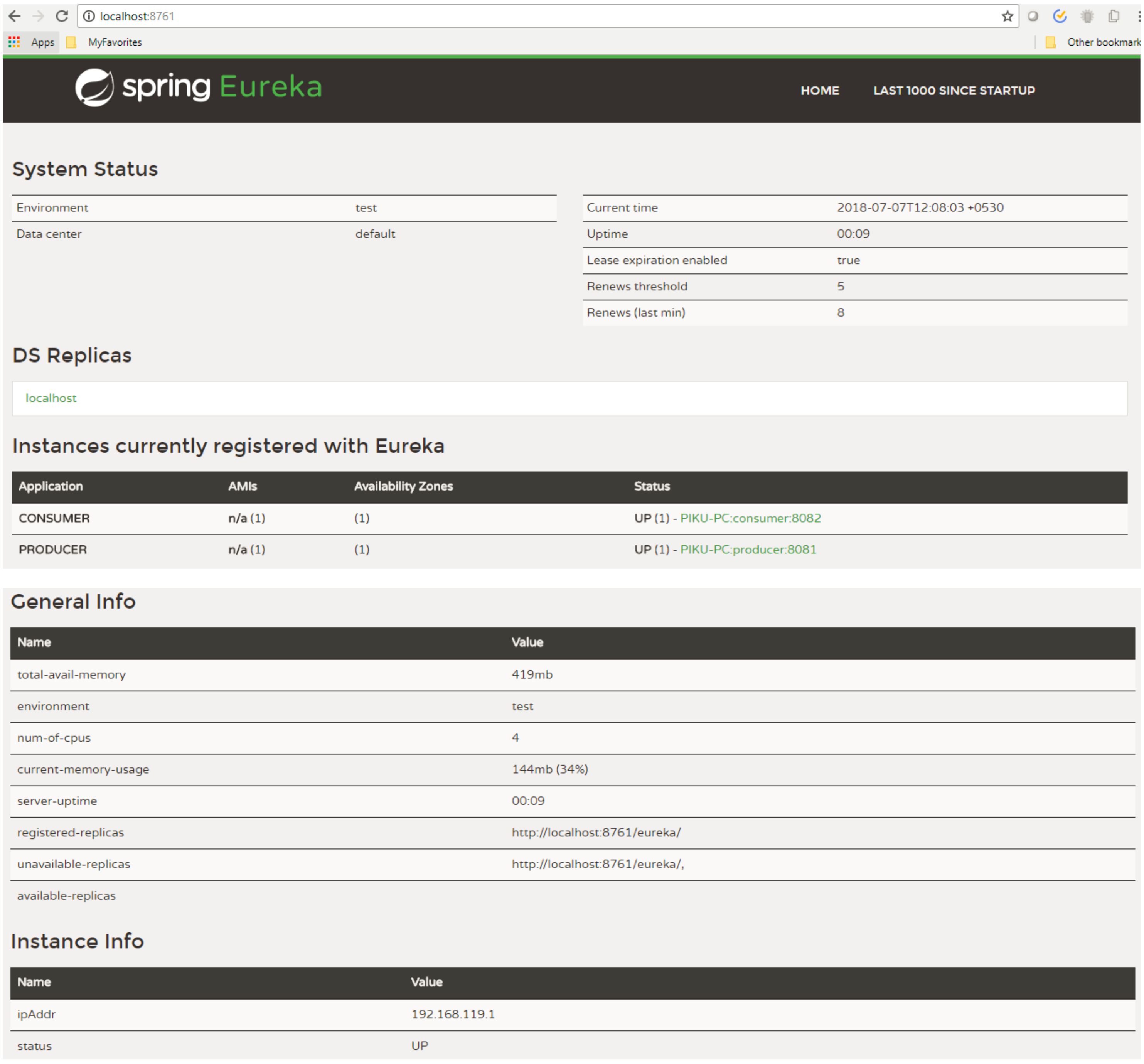
http://localhost:8761/ (For Eureka Server)

http://localhost:8081/producer/home/item/11 (To access producer micro service)

http://localhost:8082/consumer/home/item/11 (To access consumer micro service)

http://localhost:8082/consumer/home/items/11 (Consumer service call Producer through Eureka)

After accessing Eureka Server, you will see the following screenshot.



System Status

Environment	test
Data center	default

Current time	2018-07-07T12:08:03 +0530
Uptime	00:09
Lease expiration enabled	true
Renews threshold	5
Renews (last min)	8

DS Replicas

localhost

Instances currently registered with Eureka

Application	AMIs	Availability Zones	Status
CONSUMER	n/a (1)	(1)	UP (1) - PIKU-PC:consumer:8082
PRODUCER	n/a (1)	(1)	UP (1) - PIKU-PC:producer:8081

General Info

Name	Value
total-avail-memory	419mb
environment	test
num-of-cpus	4
current-memory-usage	144mb (34%)
server-uptime	00:09
registered-replicas	http://localhost:8761/eureka/
unavailable-replicas	http://localhost:8761/eureka/,
available-replicas	

Instance Info

Name	Value
ipAddr	192.168.119.1
status	UP