Netflix Ribbon with Spring Boot

Introduction

Ribbon is a client side IPC library that is battle-tested in cloud. The library includes the Netflix client side load balancers and clients for middle tier services.

Ribbon provides the following features:

- Multiple and pluggable load balancing rules
- Integration with service discovery
- Built-in failure resiliency
- Cloud enabled
- Clients integrated with load balancers
- Archaius configuration driven client factory

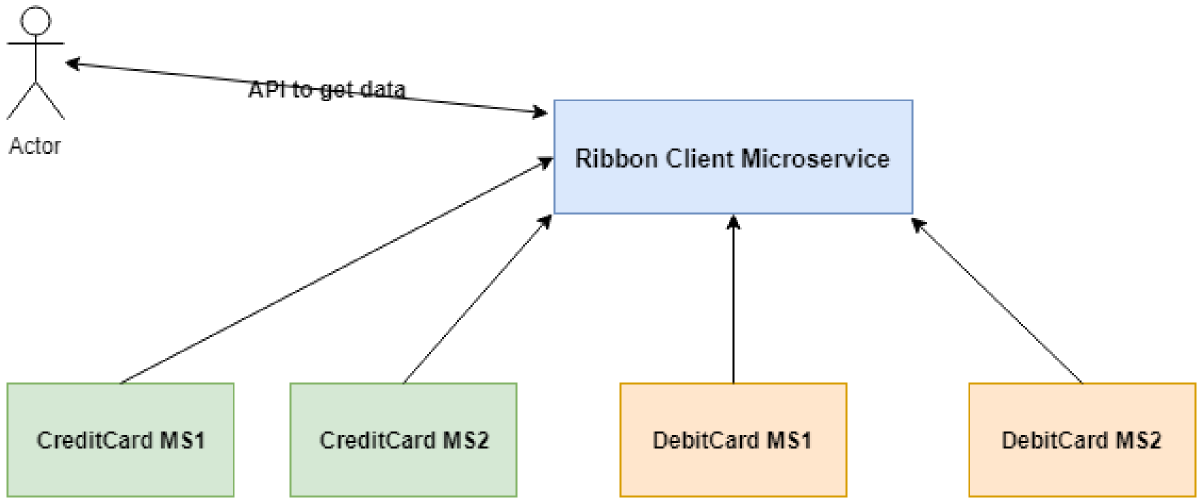
There are three sub projects:

- ribbon-core: includes load balancer and client interface definitions, common load balancer implementations, integration of client with load balancers and client factory.
- ribbon-eureka: includes load balancer implementations based on Eureka client, which is the library for service registration and discovery.
- ribbon-httpclient: includes the JSR-311 based implementation of REST client integrated with load balancers.

Ribbon is a client-side load balancer that gives you a lot of control over the behavior of HTTP and TCP clients. A central concept in Ribbon is that of the named client. Each load balancer is part of an ensemble of components that work together to contact a remote server on demand, and the ensemble has a name that you give it as an application developer (for example, by using the @FeignClient annotation). On demand, Spring Cloud creates a new ensemble as an ApplicationContext for each named client by using RibbonClientConfiguration. This contains (amongst other things) an ILoadBalancer, a RestClient, and a ServerListFilter.

Before moving into the code structure, let us consider an example.

There is a microservice for debit card and for credit card. Now we want to run both the micro services in different ports. There is another micro service called card services which can access both debit and credit card micro services. In this case, there may be multiple instances of credit and debit card micro service, when we access through card service api, it will use Netflix Ribbon load balancer api to access the micro services so that it can easily handle fault tolerance. The diagram is given below.



Debit Card 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>debitcard</groupId>
 <artifactId>debitcard</artifactId>
 <version>0.0.1-SNAPSHOT</version>
 <packaging>jar</packaging>
 <name>debitcard</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>junit</groupId>
   <artifactId>junit</artifactId>
   <scope>test</scope>
  </dependency>
 </dependencies>
 <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 Layer

DebitCardBootApplication.java

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

@SpringBootApplication
public class DebitCardBootApplication {
  public static void main(String[] args) {
    SpringApplication.run(DebitCardBootApplication.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 {

}
```

Resource/Controller layer

```java
package com.ddlab.boot.controller;
import org.springframework.beans.factory.annotation.Value;
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.RequestMapping;
import org.springframework.web.bind.annotation.RestController;

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

  @Value("${server.port}")
  String port;

  @GetMapping(path = "/name", produces = MediaType.TEXT_PLAIN_VALUE)
  public ResponseEntity<String> getDebitCardName() {
    return new ResponseEntity<String>("HDFC Debit Card service running in " + port,
HttpStatus.OK);
  }
}
```

Spring Boot Configuration

application.properties

```
spring.application.name=dc
server.servlet.context-path=/dc
server.port=8081
#server.port=8082
server.error.whitelabel.enabled=false
```

The same code is for CreditCard Microservice. The application.properties for CreditCard service is given below.

application.properties for creditcard microservice

```
spring.application.name=cc
server.servlet.context-path=/cc
server.port=8091
#server.port=8092
server.error.whitelabel.enabled=false
```

Card Service Ribbon Client 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>cardserviceRibbon</groupId>
 <artifactId>cardserviceRibbon</artifactId>
 <version>0.0.1-SNAPSHOT</version>
 <packaging>jar</packaging>

 <name>cardserviceRibbon</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.springframework.cloud</groupId>
   <artifactId>spring-cloud-starter-netflix-ribbon</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 Layer

CardServiceBootApplication.java

```
package com.ddlab.rnd.boot;
import org.springframework.boot.SpringApplication;
import org.springframework.boot.autoconfigure.SpringBootApplication;
import org.springframework.cloud.netflix.ribbon.RibbonClient;
import com.ddlab.rnd.config.Configuration;

@SpringBootApplication
@RibbonClient(name = "justANameToIgnore", configuration = Configuration.class)
public class CardServiceBootApplication {

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

}
```

Ribbon Configuration Layer

Configuration.java

```java
package com.ddlab.rnd.config;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.context.annotation.Bean;
import com.netflix.client.config.IClientConfig;
import com.netflix.loadbalancer.AvailabilityFilteringRule;
import com.netflix.loadbalancer.IPing;
import com.netflix.loadbalancer.IRule;
import com.netflix.loadbalancer.PingUrl;

public class Configuration {
  @Autowired IClientConfig ribbonClientConfig;

  @Bean
  public IPing ribbonPing(IClientConfig config) {
    return new PingUrl();
  }

  @Bean
  public IRule ribbonRule(IClientConfig config) {
    return new AvailabilityFilteringRule();
  }
}
```

Controller layer

CardServiceController.java

```java
package com.ddlab.boot.controller;
import java.net.URI;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.cloud.client.ServiceInstance;
import org.springframework.cloud.client.loadbalancer.LoadBalanced;
import org.springframework.cloud.client.loadbalancer.LoadBalancerClient;
import org.springframework.context.annotation.Bean;
import org.springframework.http.MediaType;
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.RestTemplate;

@RestController
@RequestMapping("/cards")
@CrossOrigin
public class CardServiceController {

  @LoadBalanced
  @Bean
  RestTemplate restTemplate() {
    return new RestTemplate();
  }

  @Autowired RestTemplate restTemplate;

  @GetMapping(path = "/dcard/name", produces = MediaType.TEXT_PLAIN_VALUE)
  public String getDebitCardName() {
    return this.restTemplate.getForObject("http://debitcard/dc/home/name",
String.class);
  }

  @GetMapping(path = "/ccard/name", produces = MediaType.TEXT_PLAIN_VALUE)
  public String getCreditCardName() {
    return this.restTemplate.getForObject("http://creditcard/cc/home/name",
String.class);
  }

  @Autowired private LoadBalancerClient loadBalancer;

  @GetMapping(path = "/info", produces = MediaType.TEXT_PLAIN_VALUE)
  public String doStuff() {
    ServiceInstance instance = loadBalancer.choose("creditcard");
    URI storesUri =
        URI.create(String.format("http://%s:%s", instance.getHost(),
instance.getPort()));
    return storesUri.toString();
  }
}
```

Ribbon Client Microservice Configuration

Application.yml

```
spring:
  application:
    name: Ribbon-Client

debitcard:
  ribbon:
    eureka:
      enabled: false
    listOfServers: localhost:8081,localhost:8082
    ServerListRefreshInterval: 1000


creditcard:
  ribbon:
    eureka:
      enabled: false
    listOfServers: localhost:8091,localhost:8092
    ServerListRefreshInterval: 1000


server:
  port: 8090
```

How to Use

1. Start Debit Card Micro service in both 8081 and 8082 ports.
2. Start CreditCard Micro service in both 8091 and 8092 ports.
3. Start Ribbon Client Micro service CardServiceRibbon in port 8090 port.

Use the following URLS in browser.

For Debit Card

http://localhost:8081/dc/home/name

http://localhost:8082/dc/home/name

For Credit Card

http://localhost:8091/cc/home/name

http://localhost:8092/cc/home/name

For Card Service Ribbon

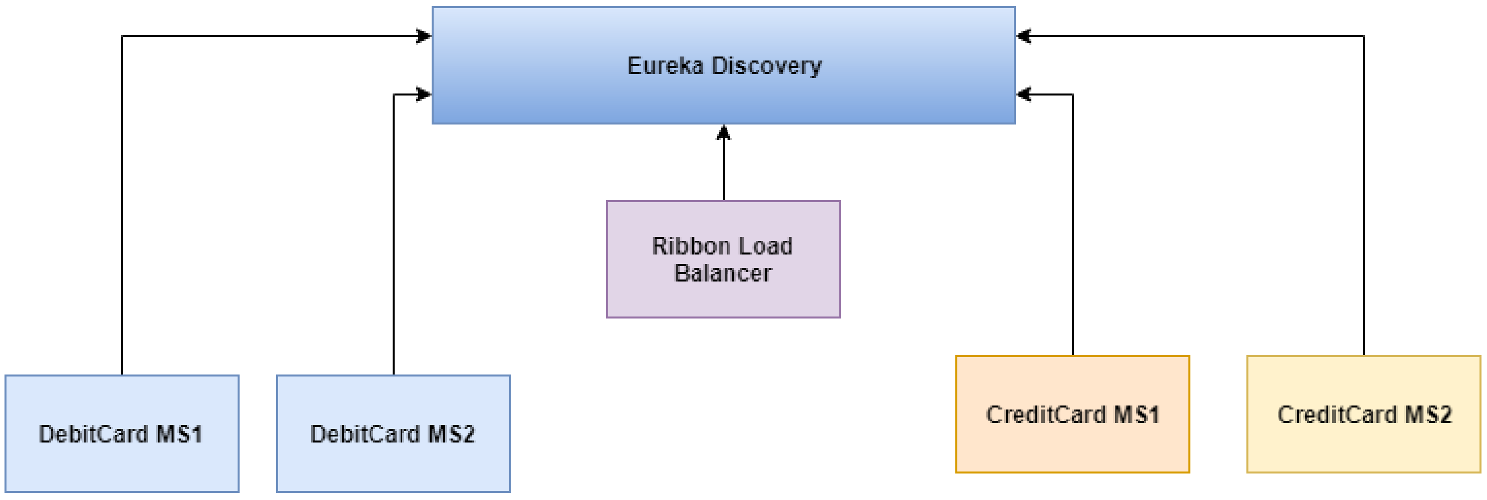
http://localhost:8090/cards/dcard/name

http://localhost:8090/cards/ccard/name

http://localhost:8090/cards/info

Introduction

In this case micro services become more complex. We use both Eureka as discovery client and Ribbon as client side load balancer. Let us consider the same example with Eureka and Ribbon. The diagram is given below.



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
```

Eureka configuration is bit straight forward.

DebitCard 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>debitcard</groupId>
 <artifactId>debitcard</artifactId>
 <version>0.0.1-SNAPSHOT</version>
 <packaging>jar</packaging>
 <name>debitcard</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>
  <!-- For Eureka -->
  <dependency>
   <groupId>org.springframework.cloud</groupId>
   <artifactId>spring-cloud-starter-netflix-eureka-client</artifactId>
  </dependency>

  <dependency>
   <groupId>junit</groupId>
   <artifactId>junit</artifactId>
   <scope>test</scope>
  </dependency>
 </dependencies>

 <!-- For Eureka -->
 <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 Layer

DebitCardBootApplication.java

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

@SpringBootApplication
public class DebitCardBootApplication {
  public static void main(String[] args) {
    SpringApplication.run(DebitCardBootApplication.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 {

}
```

Resource/Controller layer

```java
package com.ddlab.boot.controller;
import org.springframework.beans.factory.annotation.Value;
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.RequestMapping;
import org.springframework.web.bind.annotation.RestController;

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

  @Value("${server.port}")
  String port;

  @GetMapping(path = "/name", produces = MediaType.TEXT_PLAIN_VALUE)
  public ResponseEntity<String> getDebitCardName() {
    return new ResponseEntity<String>("HDFC Debit Card service running in " + port,
HttpStatus.OK);
  }
}
```

Spring Boot Configuration for Eureka

application.properties

```
spring.application.name=dc
server.servlet.context-path=/dc
#server.port=8081
server.port=8082
server.error.whitelabel.enabled=false

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

bootstrap.properties

spring.application.name=dc

The source code for CreditCard microservice is same. However, I provide below the configuration details for better understanding.

Spring Boot Configuration for Eureka for CreditCard

application.properties

```
spring.application.name=cc
server.servlet.context-path=/cc
#server.port=8091
server.port=8092
server.error.whitelabel.enabled=false

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

bootstrap.properties

```
spring.application.name=cc
```

Card Service Ribbon Client 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>cardserviceRibbon</groupId>
 <artifactId>cardserviceRibbon</artifactId>
 <version>0.0.1-SNAPSHOT</version>
 <packaging>jar</packaging>
 <name>cardserviceRibbon</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.springframework.cloud</groupId>
   <artifactId>spring-cloud-starter-netflix-eureka-client</artifactId>
  </dependency>
  <dependency>
   <groupId>org.springframework.cloud</groupId>
   <artifactId>spring-cloud-starter-netflix-ribbon</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 Layer

CardServiceBootApplication.java

```
package com.ddlab.rnd.boot;
import org.springframework.boot.SpringApplication;
import org.springframework.boot.autoconfigure.SpringBootApplication;
import org.springframework.cloud.netflix.ribbon.RibbonClient;
import com.ddlab.rnd.config.Configuration;

@SpringBootApplication
@RibbonClient(name = "justANameToIgnore", configuration = Configuration.class)
public class CardServiceBootApplication {

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

}
```

Ribbon Configuration Layer

Configuration.java

```
package com.ddlab.rnd.config;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.context.annotation.Bean;
import com.netflix.client.config.IClientConfig;
import com.netflix.loadbalancer.AvailabilityFilteringRule;
import com.netflix.loadbalancer.IPing;
import com.netflix.loadbalancer.IRule;
import com.netflix.loadbalancer.PingUrl;

public class Configuration {
  @Autowired IClientConfig ribbonClientConfig;

  @Bean
  public IPing ribbonPing(IClientConfig config) {
    return new PingUrl();
  }

  @Bean
  public IRule ribbonRule(IClientConfig config) {
    return new AvailabilityFilteringRule();
  }
}
```

Controller layer

CardServiceController.java

```
package com.ddlab.boot.controller;
import java.net.URI;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.cloud.client.ServiceInstance;
import org.springframework.cloud.client.loadbalancer.LoadBalanced;
import org.springframework.cloud.client.loadbalancer.LoadBalancerClient;
import org.springframework.context.annotation.Bean;
import org.springframework.http.MediaType;
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.RestTemplate;

@RestController
@RequestMapping("/cards")
@CrossOrigin
public class CardServiceController {

  @LoadBalanced
  @Bean
  RestTemplate restTemplate() {
    return new RestTemplate();
  }

  @Autowired RestTemplate restTemplate;

  @GetMapping(path = "/dcard/name", produces = MediaType.TEXT_PLAIN_VALUE)
  public String getDebitCardName() {
    return this.restTemplate.getForObject("http://debitcard/dc/home/name",
String.class);
  }

  @GetMapping(path = "/ccard/name", produces = MediaType.TEXT_PLAIN_VALUE)
  public String getCreditCardName() {
    return this.restTemplate.getForObject("http://creditcard/cc/home/name",
String.class);
  }

  @Autowired private LoadBalancerClient loadBalancer;

  @GetMapping(path = "/info", produces = MediaType.TEXT_PLAIN_VALUE)
  public String doStuff() {
    ServiceInstance instance = loadBalancer.choose("creditcard");
    URI storesUri =
        URI.create(String.format("http://%s:%s", instance.getHost(),
instance.getPort()));
    return storesUri.toString();
  }
}
```

EurekaRibbonCardController.java

```java
package com.ddlab.boot.controller;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.cloud.client.ServiceInstance;
import org.springframework.cloud.client.loadbalancer.LoadBalancerClient;
import org.springframework.http.MediaType;
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.RestTemplate;

@RestController
@RequestMapping("/eurocards")
@CrossOrigin
public class EurekaRibbonCardController {

  @Autowired private LoadBalancerClient loadBalancer;

  private String getDCLoadBalancerURL() {
    ServiceInstance dcInstance = loadBalancer.choose("DC");
    String dcURL = dcInstance.getUri().toString();
    System.out.println("Base URL : " + dcURL);
    dcURL = dcURL + "/dc/home/name";
    return dcURL;
  }

  private String getCCLoadBalancerURL() {
    ServiceInstance ccInstance = loadBalancer.choose("CC");
    String ccURL = ccInstance.getUri().toString();
    System.out.println("Base URL : " + ccURL);
    ccURL = ccURL + "/cc/home/name";
    return ccURL;
  }

  @GetMapping(path = "/eureka/ribbon/names", produces = MediaType.TEXT_PLAIN_VALUE)
  public String doStuff() {
    RestTemplate restTemplate = new RestTemplate();
    String response = null;
    StringBuilder allResponse = new StringBuilder();
    try {
      String dcURL = getDCLoadBalancerURL();
      response = restTemplate.getForObject(dcURL, String.class);
      allResponse.append("Debit Card Details \n").append(response).append("\n\n");
      String ccURL = getCCLoadBalancerURL();
      response = restTemplate.getForObject(ccURL, String.class);
      allResponse.append("Credit Card Details \n").append(response).append("\n\n");
    } catch (Exception ex) {
      System.out.println(ex);
    }
    System.out.println("Finally response ::: " + response);
    return allResponse.toString();
  }
}
```

Ribbon Client Microservice Configuration

Application.yml

```yaml
spring:
  application:
    name: Ribbon-Client

eureka:
  client:
    serviceUrl:
      defaultZone: http://localhost:8761/eureka/

debitcard:
  ribbon:
    eureka:
      enabled: false
    listOfServers: localhost:8081,localhost:8082
    ServerListRefreshInterval: 1000


creditcard:
  ribbon:
    eureka:
      enabled: false
    listOfServers: localhost:8091,localhost:8092
    ServerListRefreshInterval: 1000


server:
  port: 8090
```

bootstrap.properties

```
spring.application.name=Ribbon-Client
```

How to use

1. Start Eureka Server in 8671 port.
2. Start Debit Card Micro service in both 8081 and 8082 ports.
3. Start CreditCard Micro service in both 8091 and 8092 ports.
4. Start Ribbon Client Micro service CardServiceRibbon in port 8090 port.

Access the following URLs.

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

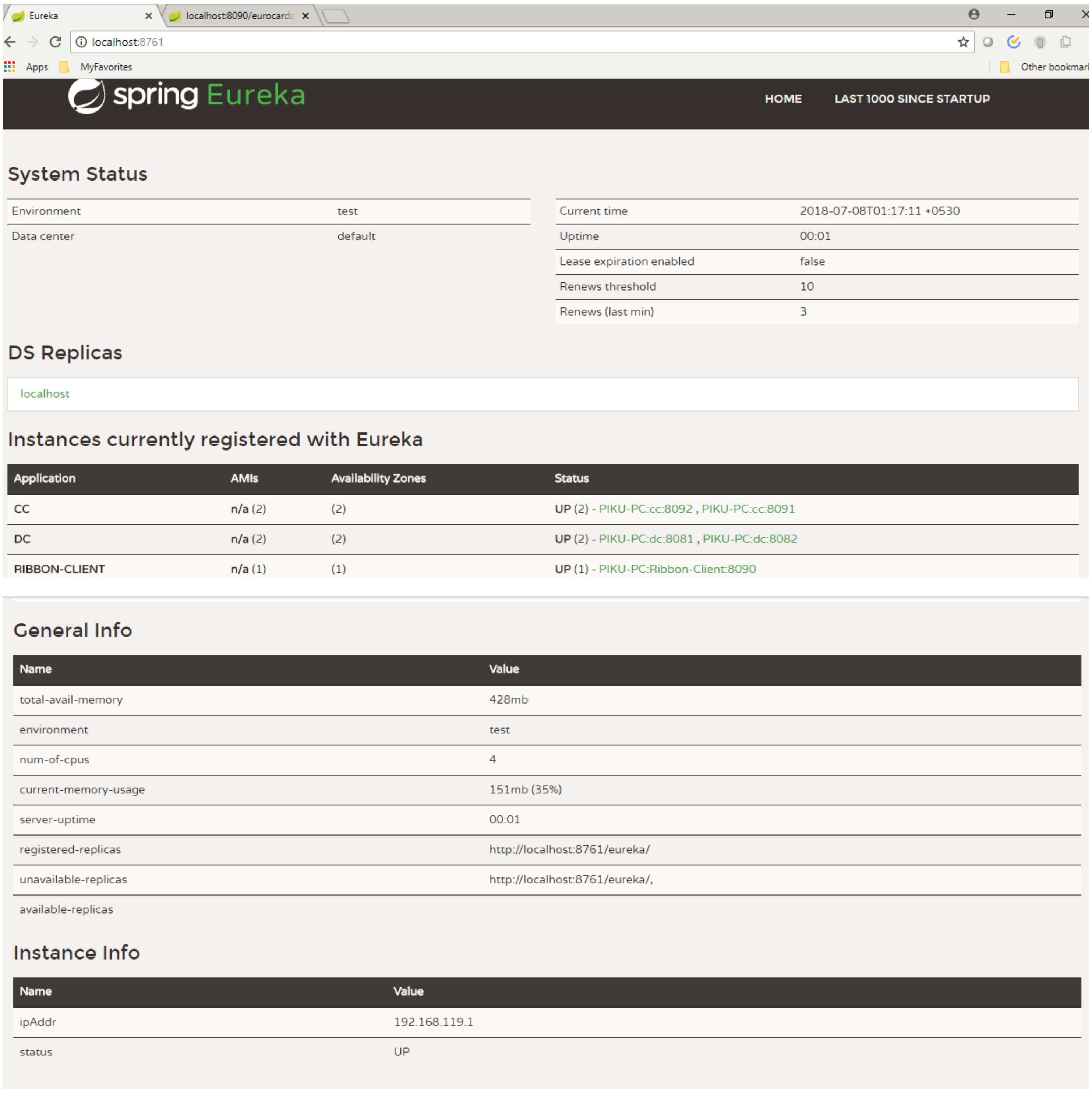
http://localhost:8090/eurocards/eureka/ribbon/names

Output

```
Debit Card Details
HDFC Debit Card service running in 8081

Credit Card Details
Standard Chatered Card service running in 8091
```

If you access the Eureka server(http://localhost:8761/), you find the following output as screenshot.



System Status

Environment	test
Data center	default

Current time	2018-07-08T01:17:11 +0530
Uptime	00:01
Lease expiration enabled	false
Renews threshold	10
Renews (last min)	3

DS Replicas

localhost

Instances currently registered with Eureka

Application	AMIs	Availability Zones	Status
CC	n/a (2)	(2)	UP (2) - PIKU-PC:cc:8092 , PIKU-PC:cc:8091
DC	n/a (2)	(2)	UP (2) - PIKU-PC:dc:8081 , PIKU-PC:dc:8082
RIBBON-CLIENT	n/a (1)	(1)	UP (1) - PIKU-PC:Ribbon-Client:8090

General Info

Name	Value
total-avail-memory	428mb
environment	test
num-of-cpus	4
current-memory-usage	151mb (35%)
server-uptime	00:01
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