TP N°6 :

Résilience des microservices avec Spring Cloud : Hystrix

1. Prérequis

- JDK.17
- Connexion internet

2. Objectifs

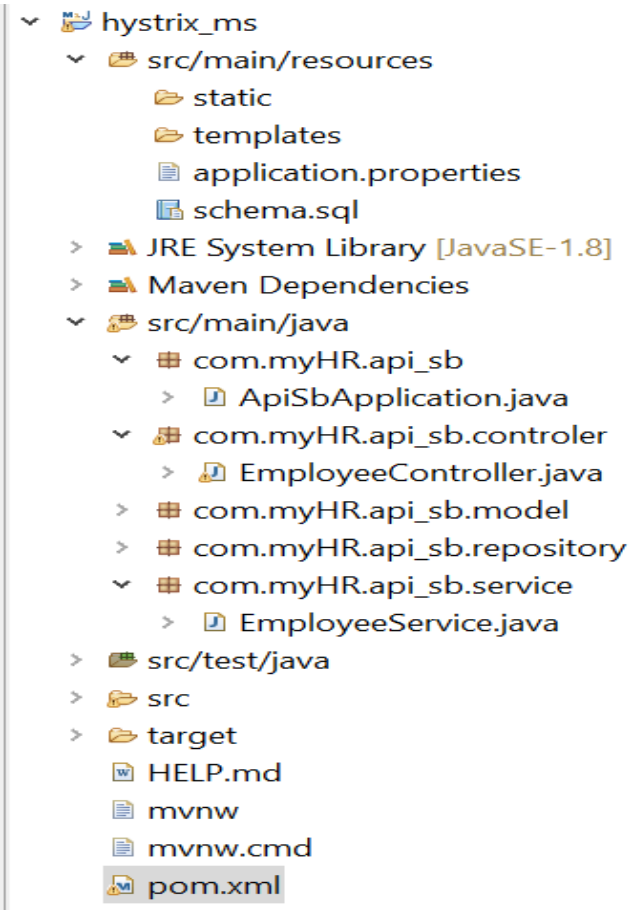
1. Mise en œuvre du framework Hystrix :
    a. @EnableCircuitBreaker
    b. HystrixCommand
2. Design pattern Fallback processing : fallbackMethod
3. Exploitation du tableau de bord de Hystrix : @EnableHystrixDashboard

3. Use case à étudier

En se basant sur le TP 2 : Communication entre les micorservices pour la gestion des employés: WebApp frontal et API back end, on va simuler que la partie back end déclenche un timeout et vérifier que le mécanisme de Hystrix a pu détecter le problème de timeout et va rediriger le traitement vers une solution de contournement en se basant sur le Design pattern Fallback Processing.

Pour arriver à cet objectif, on va simuler un timeout au niveau du Contrôleur Employee.

4. Adaptation du microservice « Employee » pour bénéficier de Hystrix




```xml
<?xml version="1.0" encoding="UTF-8"?>
<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>
	<parent>
		<groupId>org.springframework.boot</groupId>
		<artifactId>spring-boot-starter-parent</artifactId>
		<version>2.0.5.RELEASE</version>
		<relativePath /> <!-- lookup parent from repository -->
	</parent>
	<groupId>com.myHR</groupId>
	<artifactId>api_sb</artifactId>
	<version>0.0.1-SNAPSHOT</version>
	<name>api_sb</name>
	<description>API with Spring Boot</description>
	<properties>
		<java.version>1.8</java.version>
		<spring-cloud.version>Finchley.RELEASE</spring-cloud.version>
	</properties>

	<dependencies>
		<dependency>
			<groupId>org.springframework.boot</groupId>
			<artifactId>spring-boot-starter-web</artifactId>
```

```
		</dependency>
		<dependency>
			<groupId>org.springframework.boot</groupId>
			<artifactId>spring-boot-starter-data-jpa</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-hystrix-dashboard</artifactId>
	<version>1.4.7.RELEASE</version>
</dependency>

<dependency>
	<groupId>org.springframework.boot</groupId>
	<artifactId>spring-boot-starter-actuator</artifactId>
	<version>2.2.6.RELEASE</version>
</dependency>

		<dependency>
			<groupId>com.h2database</groupId>
			<artifactId>h2</artifactId>
			<scope>runtime</scope>
		</dependency>
		<dependency>
			<groupId>org.projectlombok</groupId>
			<artifactId>lombok</artifactId>
			<optional>true</optional>
		</dependency>
	</dependencies>
	<dependencyManagement>
		<dependencies>
			<dependency>
				<groupId>org.springframework.cloud</groupId>
				<artifactId>spring-cloud-dependencies</artifactId>
				<version>${spring-cloud.version}</version>
				<type>pom</type>
				<scope>import</scope>
			</dependency>
		</dependencies>
	</dependencyManagement>
<build><plugins><plugin><groupId>org.springframework.boot</groupId><artifactId>spring-
boot-maven-plugin</artifactId></plugin></plugins></build></project>
```

```
#Global configuration
spring.application.name=Api_sbHystrix
#Tomcat configuration
server.port=9000
#Log level configuration
logging.level.root=ERROR
logging.level.com.myHR=INFO
logging.level.org.springframework.boot.autoconfigure.h2=INFO
logging.level.org.springframework.boot.web.embedded.tomcat=INFO
#H2 Configuration
spring.jpa.show-sql=true
```

```
spring.h2.console.enabled=true
spring.datasource.url=jdbc:h2:mem:mytestdb

# Hystrix dashboard management
management.endpoints.web.exposure.include=hystrix.stream
```

```
package com.myHR.api_sb.controler;

import java.util.Optional;

import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.web.bind.annotation.DeleteMapping;
import org.springframework.web.bind.annotation.GetMapping;
import org.springframework.web.bind.annotation.PathVariable;
import org.springframework.web.bind.annotation.PostMapping;
import org.springframework.web.bind.annotation.PutMapping;
import org.springframework.web.bind.annotation.RequestBody;
import org.springframework.web.bind.annotation.RestController;
import com.myHR.api_sb.model.Employee;
import com.myHR.api_sb.service.EmployeeService;

import org.springframework.cloud.client.circuitbreaker.EnableCircuitBreaker;
import org.springframework.context.annotation.Configuration;

import com.netflix.hystrix.contrib.javanica.annotation.HystrixCommand;
import com.netflix.hystrix.contrib.javanica.annotation.HystrixProperty;
import
org.springframework.cloud.netflix.hystrix.dashboard.EnableHystrixDashboard;

@EnableCircuitBreaker
@Configuration
@EnableHystrixDashboard
@RestController
public class EmployeeController {
    @Autowired
    private EmployeeService employeeService;

    @GetMapping("/myMessage")

    @HystrixCommand(fallbackMethod = "myHistrixbuildFallbackMessage",
            commandProperties ={@HystrixProperty(name =
"execution.isolation.thread.timeoutInMilliseconds", value = "1000")},
            threadPoolKey = "messageThreadPool")

    public String getMessage() throws InterruptedException {
      System.out.println("Message from EmployeeController.getMessage():
```

```
Begin To sleep for 3 scondes ");
      Thread.sleep(3000);
      return "Message from EmployeeController.getMessage(): End from sleep for 3
scondes ";
      }

     private String myHistrixbuildFallbackMessage() {
      return "Message from myHistrixbuildFallbackMessage() : Hystrix
Fallback message ( after timeout : 1 second )";
      }

    @GetMapping("/employees")
    public Iterable<Employee> getEmployees() {
        return employeeService.getEmployees();
    }

      @DeleteMapping("/employee/{id}")
      public void deleteEmployee(@PathVariable("id") final Long id) {
            employeeService.deleteEmployee(id);
      }

      @PostMapping("/employee")
      public Employee createEmployee(@RequestBody Employee employee) {
            return employeeService.saveEmployee(employee);
      }


      @GetMapping("/employee/{id}")
      public Employee getEmployee(@PathVariable("id") final Long id) {
            Optional<Employee> employee = employeeService.getEmployee(id);
            if(employee.isPresent()) {
                  return employee.get();
            } else {
                  return null;
            }
      }
      @PutMapping("/employee/{id}")
      public Employee updateEmployee(@PathVariable("id") final Long id, @RequestBody
Employee employee) {
            Optional<Employee> e = employeeService.getEmployee(id);
            if(e.isPresent()) {
                  Employee currentEmployee = e.get();

                  String firstName = employee.getFirstName();
                  if(firstName != null) {
                        currentEmployee.setFirstName(firstName);
                  }
                  String lastName = employee.getLastName();
                  if(lastName != null) {
                        currentEmployee.setLastName(lastName);;
                  }
                  String mail = employee.getMail();
                  if(mail != null) {
                        currentEmployee.setMail(mail);
                  }
                  String password = employee.getPassword();
                  if(password != null) {
```

```
                        currentEmployee.setPassword(password);;
                    }
                    employeeService.saveEmployee(currentEmployee);
                    return currentEmployee;
                } else {
                    return null;
                }
        }
}
```

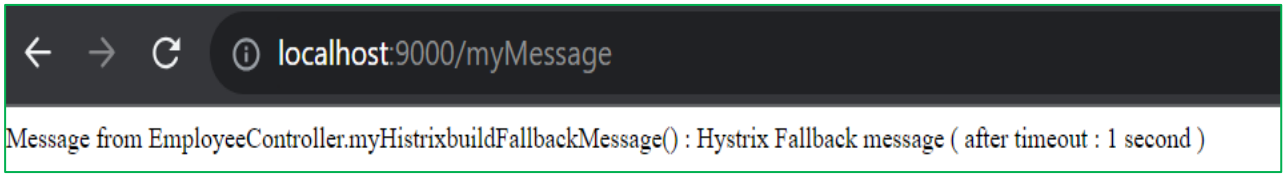
- Résultat d'appel sans activation du Timeout:

```
Au niveau de la console:

Message from EmployeeController.getMessage(): Begin To
sleep for 3 scondes
```

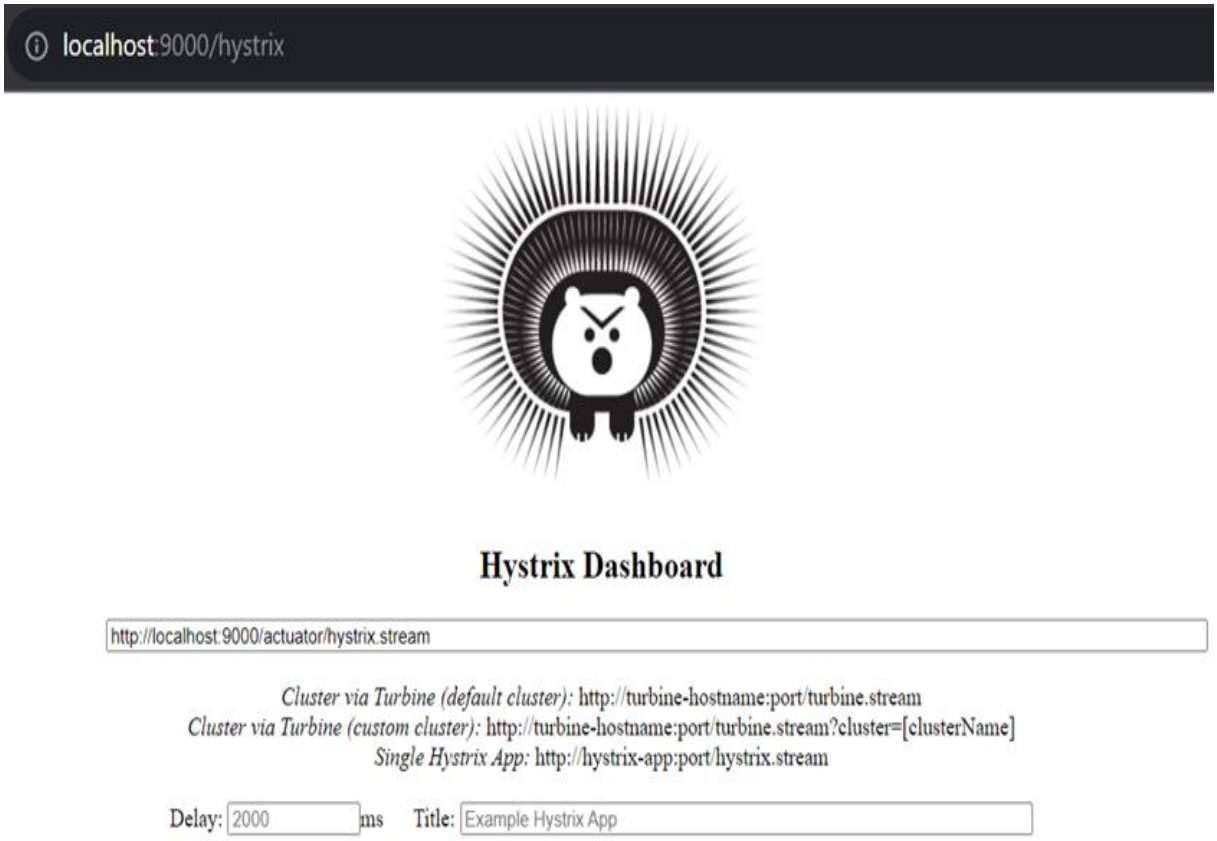
- Résultat d'appel avec activation du Timeout : Hystrix prend le contrôle après 1 seconde définit dans :

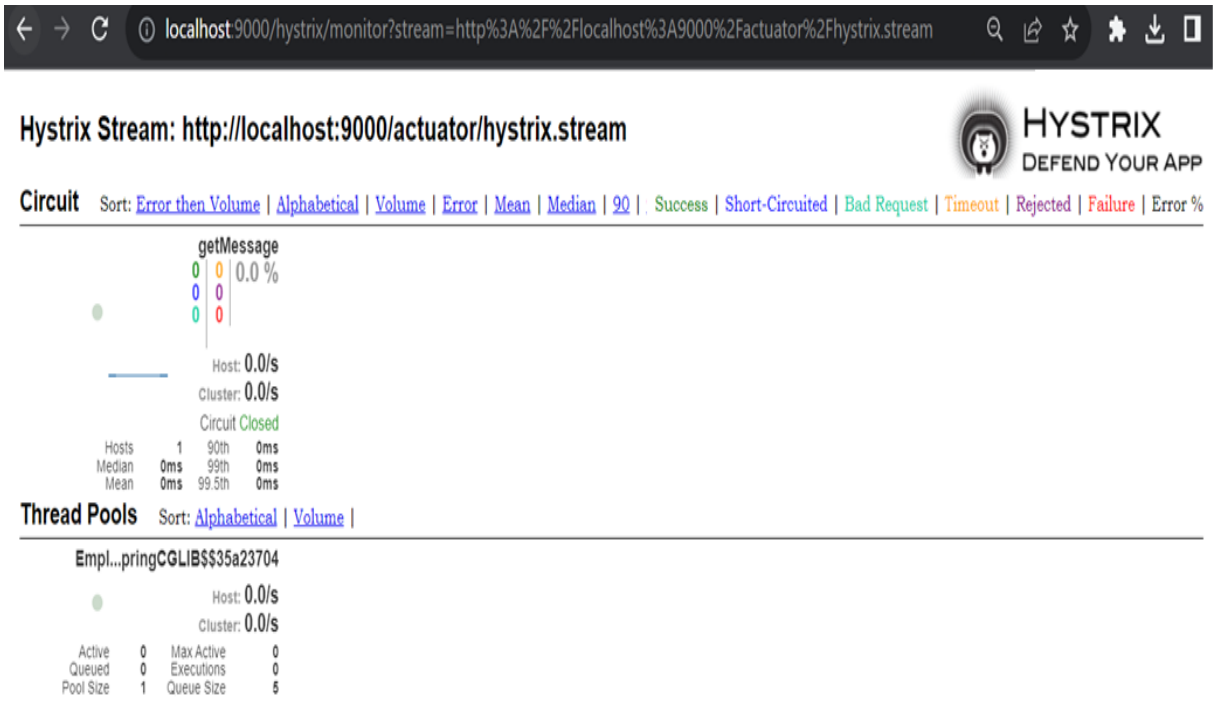
```
commandProperties ={@HystrixProperty(name =
"execution.isolation.thread.timeoutInMilliseconds",
value = "1000")
```



5. Exploitation du Dashbord de Hystrix

- Accès au dashbord Hystrix : http://localhost:9000/hystrix
- Dans le stream du dashbord entrer : http://localhost:9000/actuator/hystrix.stream





- Appel au microservice : http://localhost:9000/myMessage