Basic Implement Rate Limmiter on Springboot 2.0.6

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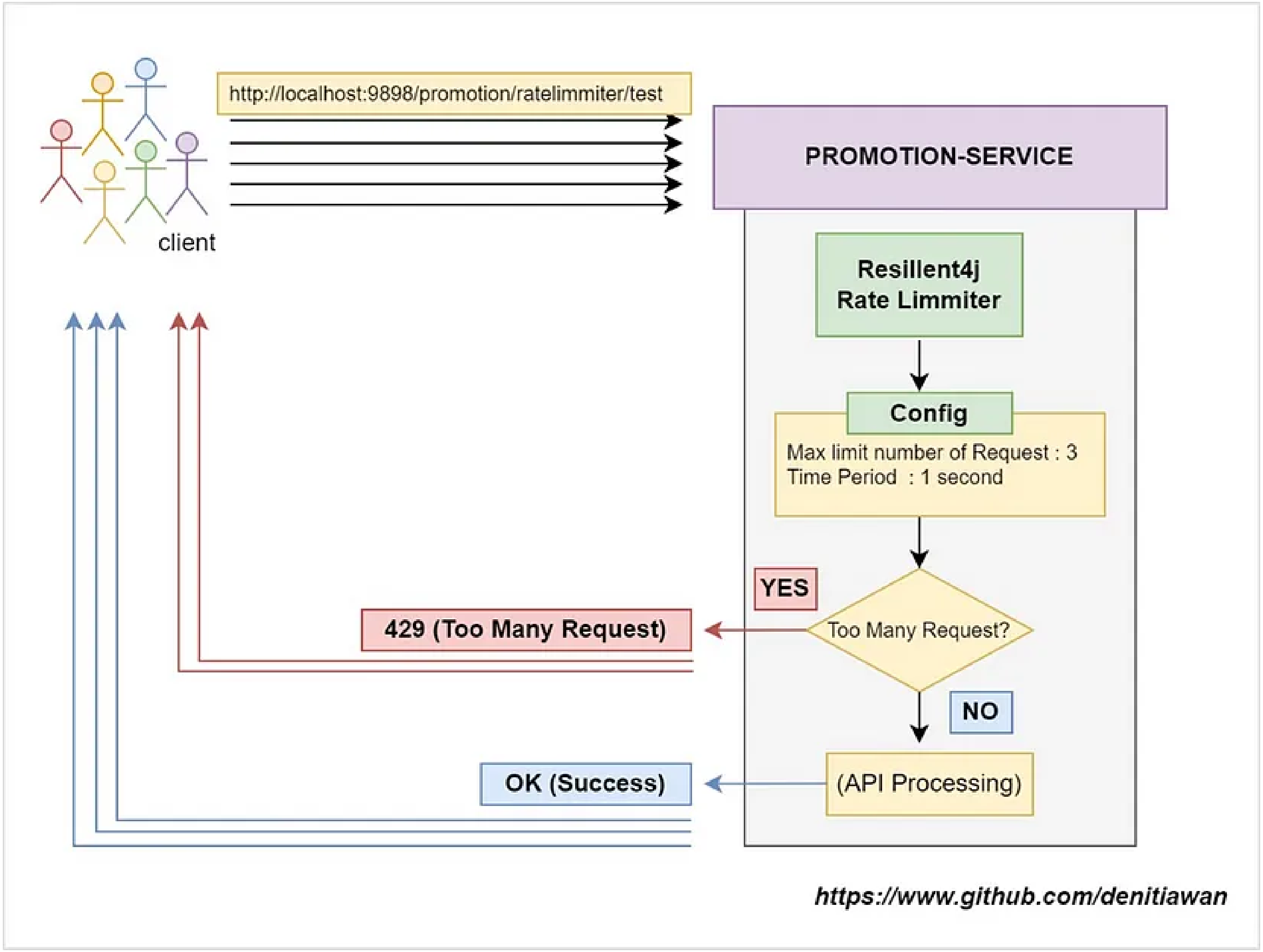
http://localhost:9898/promotion/ratelimmiter/test
client
PROMOTION-SERVICE
Resillent4j Rate Limmiter
Config
Max limit number of Request : 3
Time Period : 1 second
YES
Too Many Request?
429 (Too Many Request)
NO
(API Processing)
OK (Success)
https://www.github.com/denitiawan

Introduction

On this article, i want to share about ***how to implement Rate Limmiter on Springboot 2.0.6-RELEASE.*** that version was release since 2018.

and for the java version is 1.8

so let’s to implement the **Rate Limmiter** on springboot project.

Overviews

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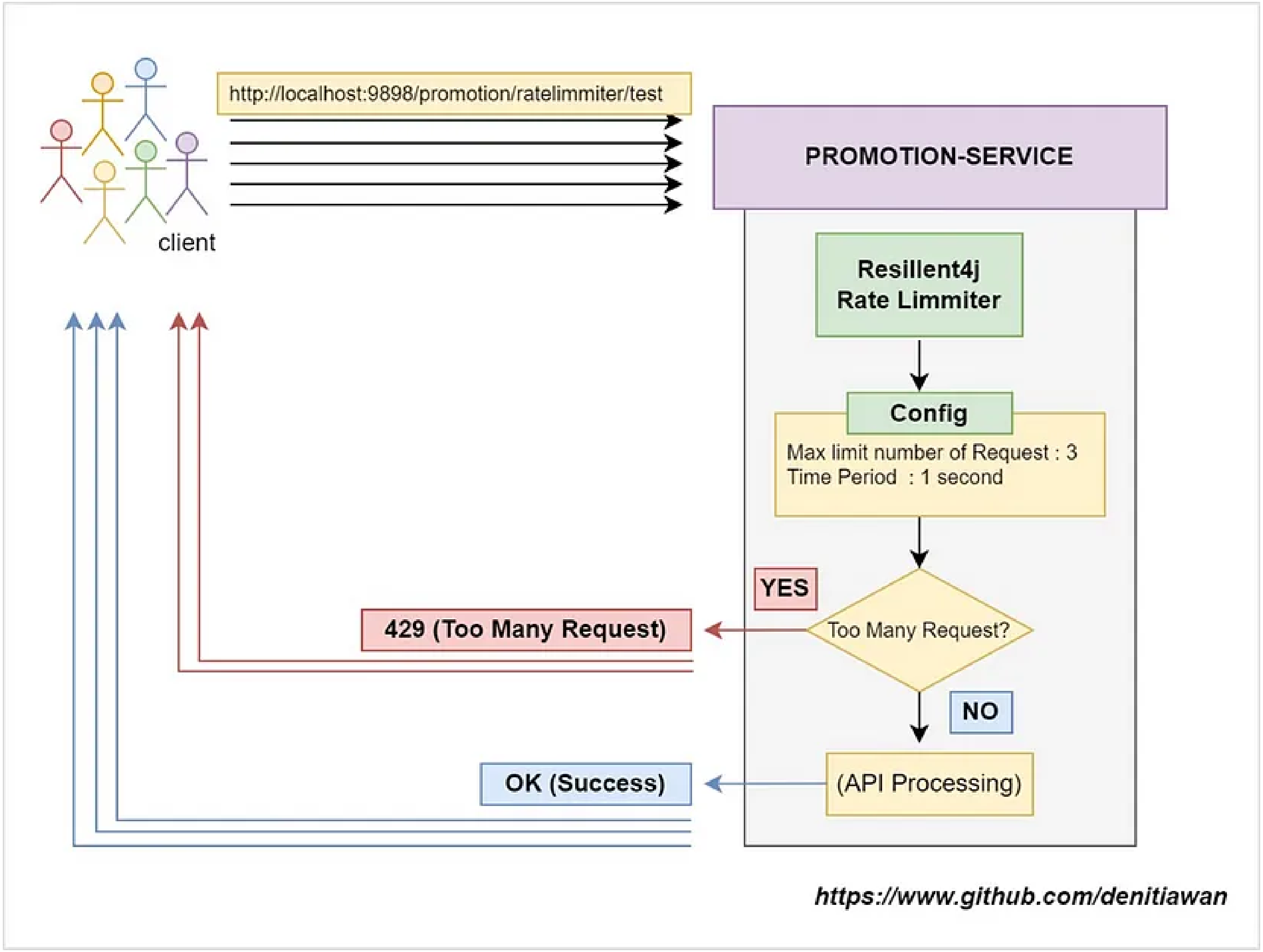
Diagram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NO
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OK (Success)
https://www.github.com/denitiawan

Description

- Client do 5 requests at the same times to one api
- backend will automatically check the **Rate Limmiter Config** is requested got the **Too Many Request status**

- Backend is only accept & process the requested who not got the **Too Many Requests status**

Pom.xml

We need add defendencies on **“pom.xml”** class, and then refresh the pom, for download the new librarries

```
<!--
 Release 2.x will be using Java 11
 Release 1.x is still using Java 8
 -->
  <dependency>
      <groupId>io.github.resilience4j</groupId>
      <artifactId>resilience4j-spring-boot2</artifactId>
      <version>1.3.1</version>
  </dependency>
```

Application.yml

Wee need add some config script for enable the **”Rate Limmiter”** .

- application.yml

```yaml
# ratelimmiter config
management:
  endpoints:
    web:
      exposure:
        include: "*"

  health:
    ratelimiters:
      enabled: true
```

RateLimmiterConfig.java

RateLimmiterConfig.java is an class for handling the rate limiter configuration. On this class we can setting

- **Limmit for periode**

This is for define specifies the maximum number of requests allowed within a specific time period. For example, if you set it to 10, it means that only 10 requests are allowed within that period.

- **Limmit refresh period**

This is for defines the duration of the time period mentioned above. It determines how frequently the rate limit will be reset. For instance, if you set it to 1 second, the rate limit will be reset every second, allowing the specified number of requests again.

- **Time out duration**

This is for define the timeout duration for requests. If a request exceeds this duration, it will be considered as taking too long and might trigger fallback behavior or an exception. Setting it to 3s means request will fail after three seconds if it did't get a chance to execute.

- **Rate limmiter registry name**

This is for define the **"rate limiter name"** for mapping to rest controller class, the registry name can be global (one name for many endpoints) or (one name for one endpoint)

```
package com.deni.promotion.ratelimmiter;

import io.github.resilience4j.ratelimiter.RateLimiter;
import io.github.resilience4j.ratelimiter.RateLimiterConfig;
import io.github.resilience4j.ratelimiter.RateLimiterRegistry;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.context.annotation.Bean;
import org.springframework.context.annotation.Configuration;

import java.time.Duration;
import java.time.temporal.ChronoUnit;


@Configuration
public class RateLimmiterConfig {
    @Autowired
    private RateLimiterRegistry rateLimiterRegistry;

    @Bean
    public RateLimiter globalRateLimiter() {
        RateLimiterConfig customConfig = RateLimiterConfig.custom()
                .limitForPeriod(10)
                .limitRefreshPeriod(Duration.of(1, ChronoUnit.SECONDS))
                .timeoutDuration(Duration.of(1, ChronoUnit.SECONDS))

                .build();

        return rateLimiterRegistry.rateLimiter("globalRateLimiter", customConfig
    }

}
```

Rate Limmiter Annotation

- name

Parameter **“name”** is for define Initial name for spesifiec api who want implement the **“rate limmiter”**

The **”globalRateLimmiter”** in this case, already created & define by “RateLimmiterConfig.java”

```
    @RateLimiter(name = "globalRateLimiter")
```

- **fallback**

Parameter **“fallback”** is for define an callback function, callback function will trigger when the rest api got httpstatus is (429 : Too Many Request), the (429) is default httpstatus from httpservlet and ratelimmiter exception handling

```
  @RateLimiter(fallbackMethod = "fallbackTest")
```

- example

```
package com.deni.promotion.ratelimmiter;

import com.deni.common.model.response.Response;
import io.github.resilience4j.ratelimiter.RequestNotPermitted;
import io.github.resilience4j.ratelimiter.annotation.RateLimiter;
import lombok.extern.slf4j.Slf4j;
import org.springframework.http.HttpStatus;
import org.springframework.http.ResponseEntity;
import org.springframework.web.bind.annotation.RequestMapping;
import org.springframework.web.bind.annotation.RequestMethod;
import org.springframework.web.bind.annotation.RestController;

import static com.deni.common.model.response.rest.ResponseHelper.error;

/**
 * @author https://www.github.com/denitiawan
 */
@Slf4j
@RestController
@RequestMapping("/ratelimmiter")
public class RateLimmiterTestController {

    final String url = "http://localhost:9999/promotion/ratelilmmiter/test";

    @RequestMapping(value = "/test", method = {RequestMethod.GET})
    @RateLimiter(name = "globalRateLimiter", fallbackMethod = "fallbackTest")
    public ResponseEntity<Response> test() {
        Response response = error(String.valueOf(HttpStatus.OK.value()), HttpSta
        return ResponseEntity.status(HttpStatus.OK).body(response);
    }


    public ResponseEntity<Response> fallbackTest(RequestNotPermitted exception)
        Response response = error(String.valueOf(HttpStatus.TOO_MANY_REQUESTS.va
        return ResponseEntity.status(HttpStatus.TOO_MANY_REQUESTS).body(response
        }

    }
```

Unitest

We can test the **rate limmiter, when the request got the maximum request,** likes what we already define on “RateLimmiterConfig.java” class.

See the example code below, for testing the rate limiter exception handling.

The test case of Rate limiter exception handling

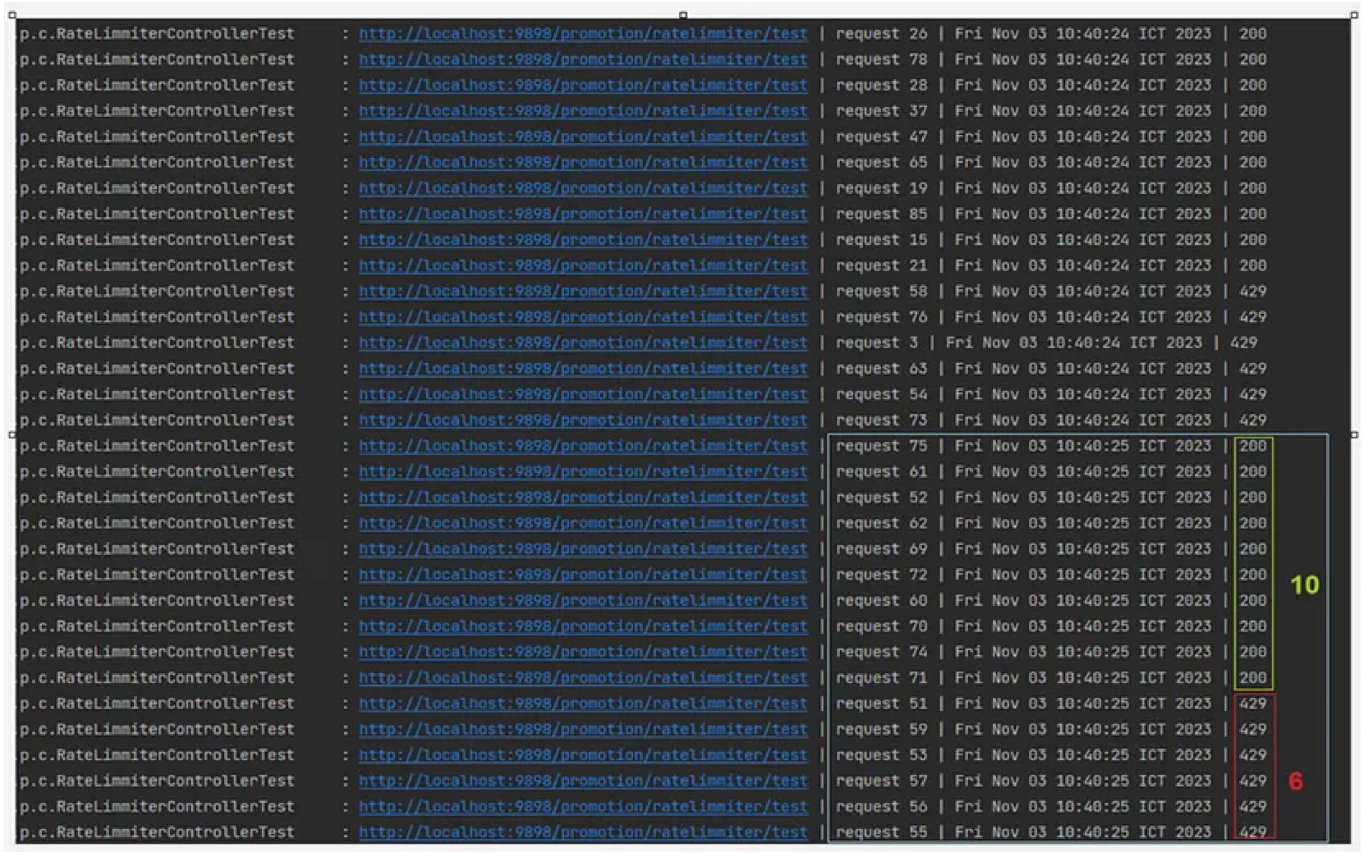
- Max Number of request = 10
- Time periode in second = 1
- Given number of request = 100
- Expected result = Too Many Request

```
    package com.deni.promotion.controller;
```

```java
import com.deni.promotion.gt.GTTestApp;
import com.deni.promotion.config.DataSourceTestConfig;
import lombok.extern.slf4j.Slf4j;
import org.junit.Assert;
import org.junit.Test;
import org.junit.runner.RunWith;
import org.springframework.boot.test.autoconfigure.jdbc.AutoConfigureTestDatabas
import org.springframework.boot.test.context.SpringBootTest;
import org.springframework.boot.test.web.client.TestRestTemplate;
import org.springframework.http.HttpStatus;
import org.springframework.http.MediaType;
import org.springframework.http.RequestEntity;
import org.springframework.http.ResponseEntity;
import org.springframework.test.annotation.DirtiesContext;
import org.springframework.test.context.junit4.SpringRunner;
import org.springframework.transaction.annotation.Transactional;
import org.springframework.web.client.RestTemplate;

import java.net.URI;
import java.util.Date;
import java.util.HashMap;
import java.util.Map;
import java.util.stream.IntStream;


/**
 * @author https://www.github.com/denitiawan
 */
@Transactional
@RunWith(SpringRunner.class)
@SpringBootTest(classes = {
        GTTestApp.class,
        DataSourceTestConfig.class
}, webEnvironment = SpringBootTest.WebEnvironment.DEFINED_PORT)
@AutoConfigureTestDatabase(replace = AutoConfigureTestDatabase.Replace.NONE)
@DirtiesContext(classMode = DirtiesContext.ClassMode.AFTER_EACH_TEST_METHOD)
@Slf4j
```

```
public class RateLimmiterControllerTest {

    private RestTemplate restTemplate = new TestRestTemplate().getRestTemplate()


    /**
     * max number of request = 1
     * times periode in second = 1
     * given number of request = 1
     * expected = ok
     */
    @Test
    public void TEST_REQUEST_OK() {
        String uri = "http://localhost:9898/promotion/ratelimmiter/test";
        RequestEntity<Void> request = RequestEntity
                .get(URI.create(uri))
                .accept(MediaType.APPLICATION_JSON).build();

        ResponseEntity<String> response = restTemplate.exchange(request, String.
        Assert.assertEquals(HttpStatus.OK, response.getStatusCode());
    }


    /**
     * max number of request = 10
     * times periode in second = 1
     * given number of request = 100
     * expected = too many request
     */
    @Test
    public void TEST_TOO_MANY_REQUEST() {

        Map<Integer, Integer> responseCount = new HashMap<>();


        /**
         .rangeClosed(startInclusive, endInclusive)
         */
        IntStream.rangeClosed(1, 100)
                .parallel()
                .forEach(i -> {
                    String uri = "http://localhost:9898/promotion/ratelimmiter/t
                    RequestEntity<Void> request = RequestEntity
                            .get(URI.create(uri))
                            .accept(MediaType.APPLICATION_JSON).build();

                    ResponseEntity<String> response = restTemplate.exchange(requ

                    // masukan : http status, counter
                    responseCount.put(response.getStatusCodeValue(), i + 1);
                    log.info(uri + " | request " + i + " | " + new Date().toStri
                });

        // chek response had too many request (got rate limmiter)
        boolean expected = responseCount.containsKey(HttpStatus.TOO_MANY_REQUEST
        Assert.assertTrue(expected);

    }


}
```

Here the result after run the unitest



```
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 26 | Fri Nov 03 10:40:24 ICT 2023 | 200
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 78 | Fri Nov 03 10:40:24 ICT 2023 | 200
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 28 | Fri Nov 03 10:40:24 ICT 2023 | 200
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 37 | Fri Nov 03 10:40:24 ICT 2023 | 200
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 47 | Fri Nov 03 10:40:24 ICT 2023 | 200
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 65 | Fri Nov 03 10:40:24 ICT 2023 | 200
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 19 | Fri Nov 03 10:40:24 ICT 2023 | 200
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 85 | Fri Nov 03 10:40:24 ICT 2023 | 200
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 15 | Fri Nov 03 10:40:24 ICT 2023 | 200
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 21 | Fri Nov 03 10:40:24 ICT 2023 | 200
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 58 | Fri Nov 03 10:40:24 ICT 2023 | 429
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 76 | Fri Nov 03 10:40:24 ICT 2023 | 429
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 3 | Fri Nov 03 10:40:24 ICT 2023 | 429
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 63 | Fri Nov 03 10:40:24 ICT 2023 | 429
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 54 | Fri Nov 03 10:40:24 ICT 2023 | 429
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 73 | Fri Nov 03 10:40:24 ICT 2023 | 429
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 75 | Fri Nov 03 10:40:25 ICT 2023 | 200
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 61 | Fri Nov 03 10:40:25 ICT 2023 | 200
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 52 | Fri Nov 03 10:40:25 ICT 2023 | 200
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 62 | Fri Nov 03 10:40:25 ICT 2023 | 200
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 69 | Fri Nov 03 10:40:25 ICT 2023 | 200
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 72 | Fri Nov 03 10:40:25 ICT 2023 | 200
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 60 | Fri Nov 03 10:40:25 ICT 2023 | 200
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 70 | Fri Nov 03 10:40:25 ICT 2023 | 200
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 74 | Fri Nov 03 10:40:25 ICT 2023 | 200
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 71 | Fri Nov 03 10:40:25 ICT 2023 | 200
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 51 | Fri Nov 03 10:40:25 ICT 2023 | 429
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 59 | Fri Nov 03 10:40:25 ICT 2023 | 429
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 53 | Fri Nov 03 10:40:25 ICT 2023 | 429
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 57 | Fri Nov 03 10:40:25 ICT 2023 | 429
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 56 | Fri Nov 03 10:40:25 ICT 2023 | 429
p.c.RateLimmiterControllerTest     : http://localhost:9898/promotion/ratelimmiter/test | request 55 | Fri Nov 03 10:40:25 ICT 2023 | 429
```

Description

- The 100 request hit with parallel mechanism
- See the blue box we focused on what happened on every 1 second on server
- On Fri Nov 03 10:40:25, got 16 request per 1 second
- But just 10 request is OK (200)

- And 6 request is Too Many Request (429)

So we can see the Rate limiter handling its work on api http://localhost:9999/promotion/ratelimmiter/test" .

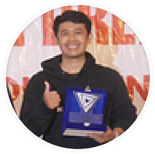
Conclusion

This article just **Basic how to implement RateLimmiter on sprinboot project.**

Thank you.

Happy Coding & Keep Learning 🚀

Spring Boot 2 Resilience4j Rate Limiter Rate Limiting



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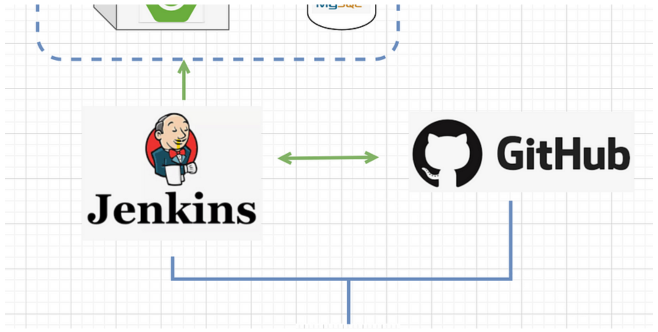

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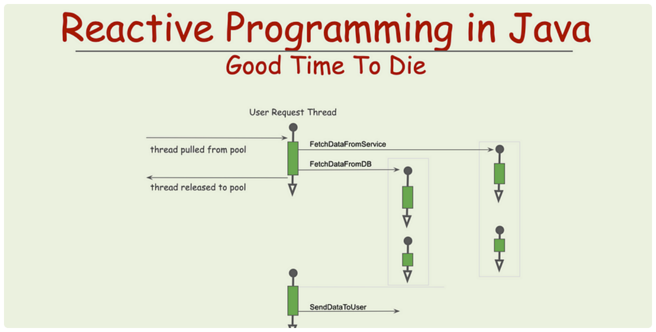

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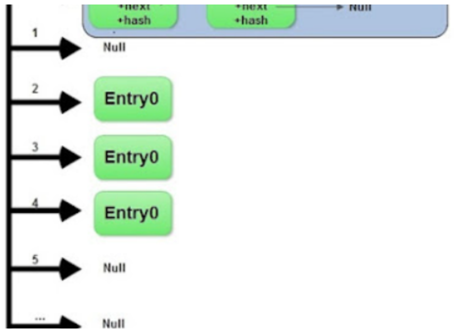

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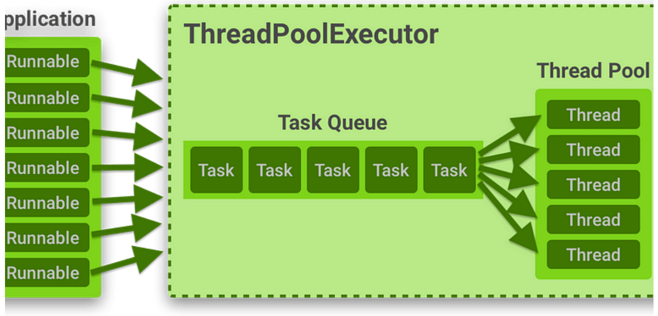

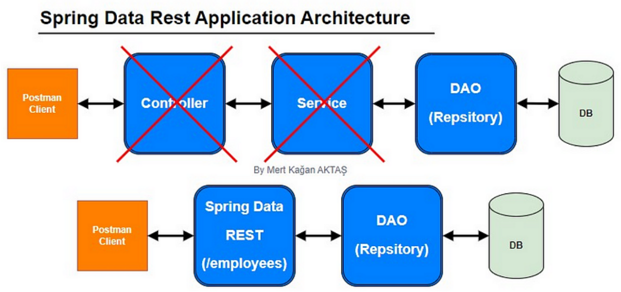

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