花了3天总结的RabbitMQ实用技巧，有点东西！

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来自专辑

mall学习教程（参考篇）

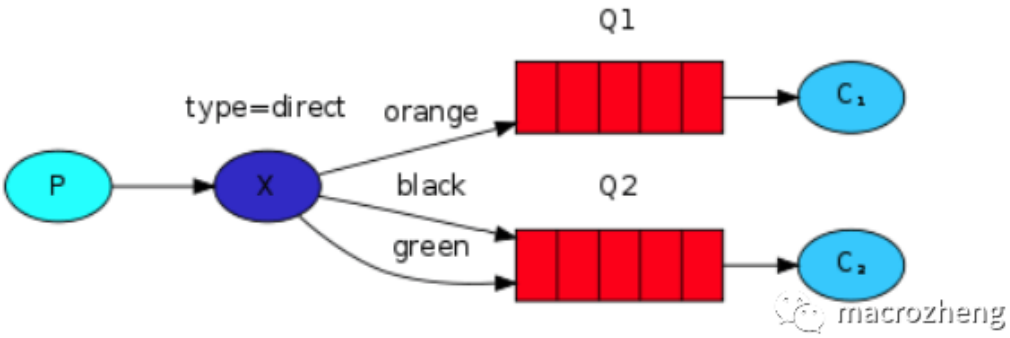
> 以前看过的关于RabbitMQ核心消息模式的文章都是基于Java API的，最近看了下官方文档，发现这些核心消息模式都可以通过Spring AMQP来实现。于是总结了下RabbitMQ的实用技巧，包括RabbitMQ在Windows和Linux下的安装、5种核心消息模式的Spring AMQP实现，相信对于想要学习和回顾RabbitMQ的朋友都会有所帮助。

简介

RabbitMQ是最受欢迎的开源消息中间件之一，在全球范围内被广泛应用。RabbitMQ是轻量级且易于部署的，能支持多种消息协议。RabbitMQ可以部署在分布式系统中，以满足大规模、高可用的要求。

相关概念

我们先来了解下RabbitMQ中的相关概念，这里以5种消息模式中的`路由模式`为例。



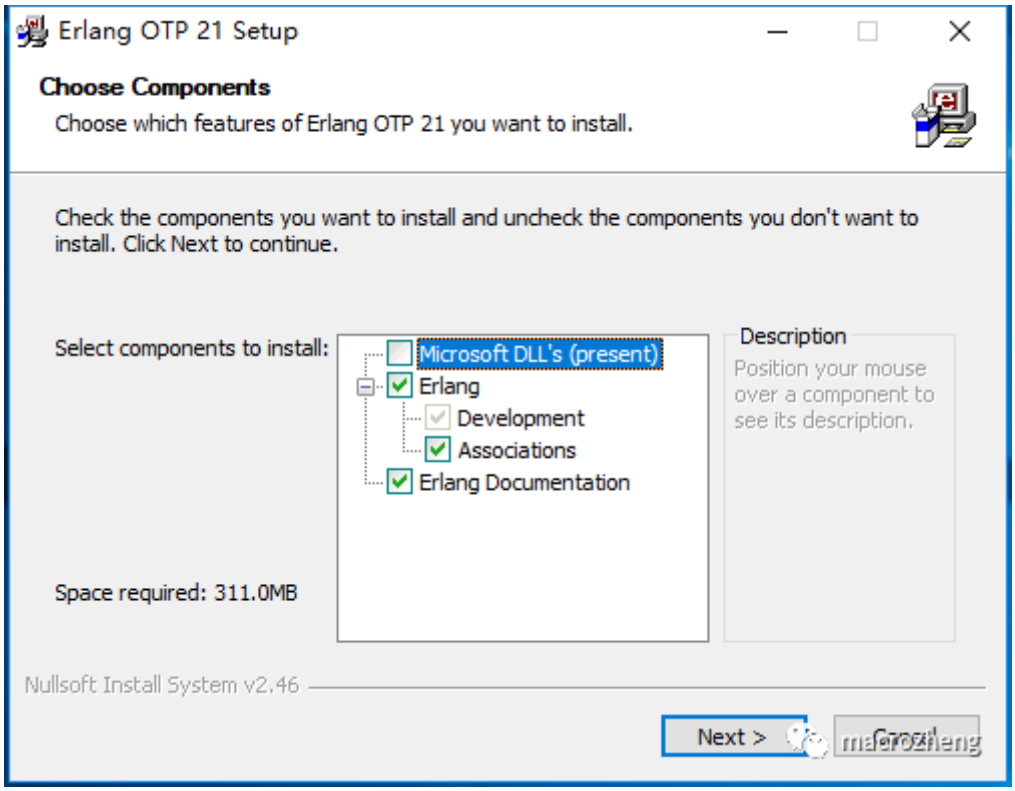
标志	中文名	英文名	描述
P	生产者	Producer	消息的发送者，可以将消息发送到交换机
C	消费者	Consumer	消息的接收者，从队列中获取消息并进行消费
X	交换机	Exchange	接收生产者发送的消息，并根据路由键发送给指定队列
Q	队列	Queue	存储从交换机发来的消息
type	交换机类型	type	不同类型的交换机转发消息方式不同
fanout	发布/订阅模式	fanout	广播消息给所有绑定交换机的队列
direct	路由模式	direct	根据路由键发送消息
topic	通配符模式	topic	根据路由键的匹配规则发送消息

安装及配置

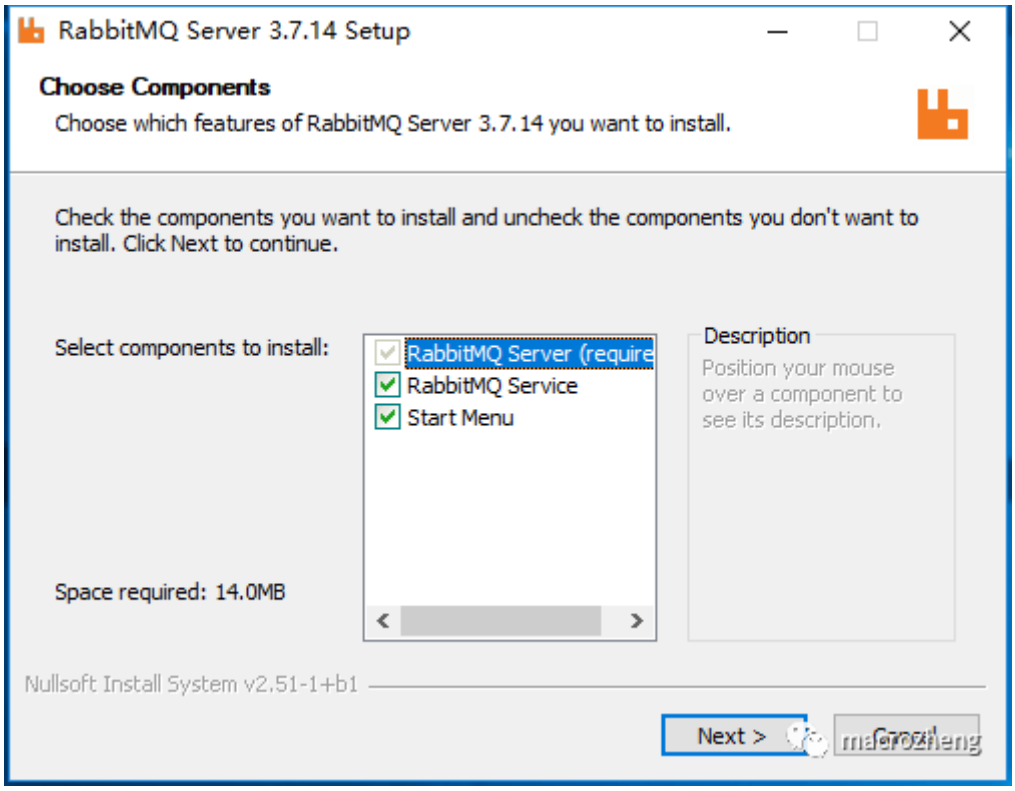
> 接下来我们介绍下RabbitMQ的安装和配置，提供Windows和Linux两种安装方式。

Windows下的安装

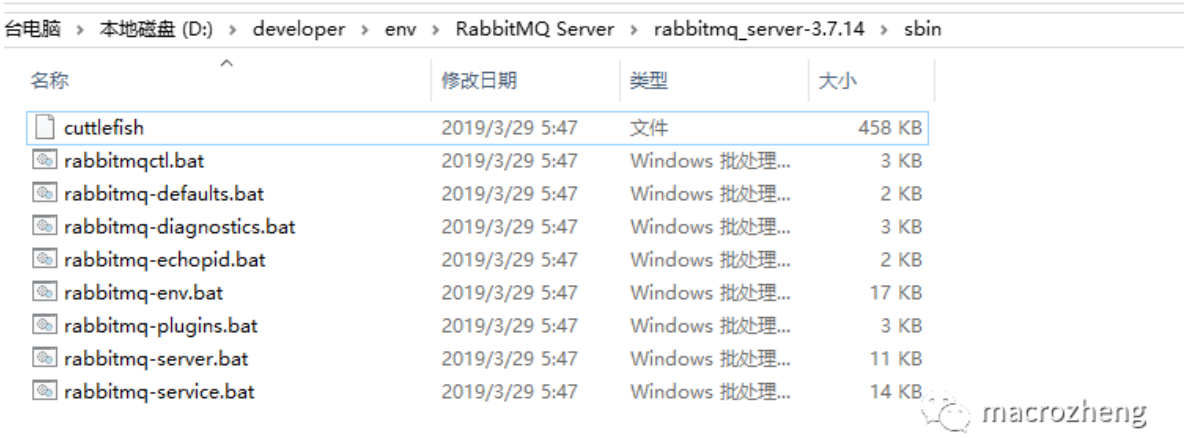
- 安装Erlang，下载地址：http://erlang.org/download/otp_win64_21.3.exe



- 安装RabbitMQ，下载地址：https://dl.bintray.com/rabbitmq/all/rabbitmq-server/3.7.14/rabbitmq-server-3.7.14.exe

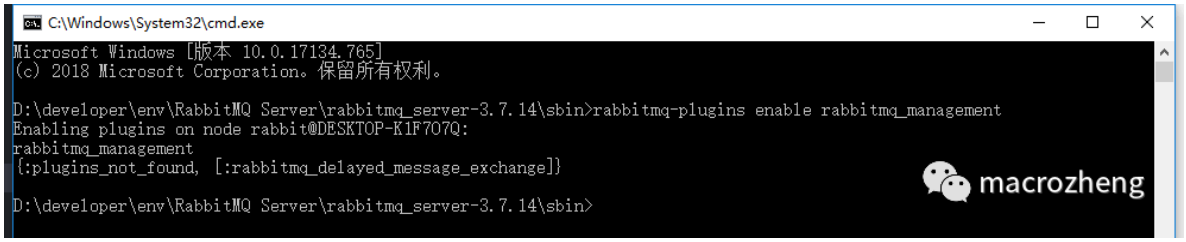


- 安装完成后，进入RabbitMQ安装目录下的sbin目录；



- 在地址栏输入cmd并回车启动命令行，然后输入以下命令启动管理功能。

```
rabbitmq-plugins enable rabbitmq_management
```



Linux下的安装

- 下载`rabbitmq 3.7.15`的Docker镜像；

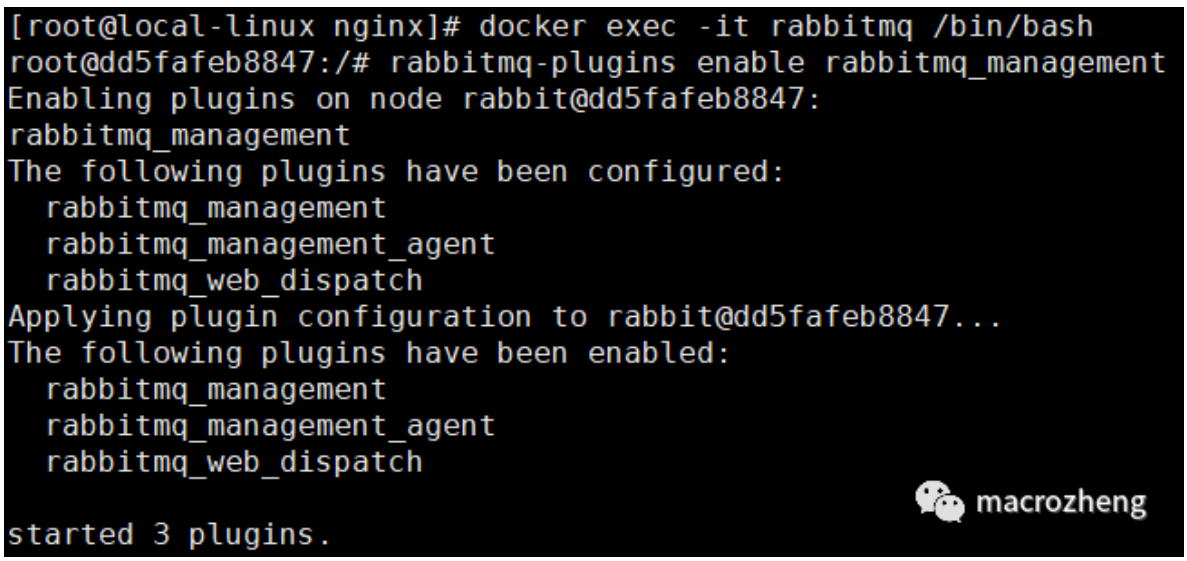
```
docker pull rabbitmq:3.7.15
```

- 使用Docker命令启动服务；

```
docker run -p 5672:5672 -p 15672:15672 --name rabbitmq \-d rabbitmq:3.7.15
```

- 进入容器并开启管理功能；

```
docker exec -it rabbitmq /bin/bashrabbitmq-plugins enable rabbitmq_management
```

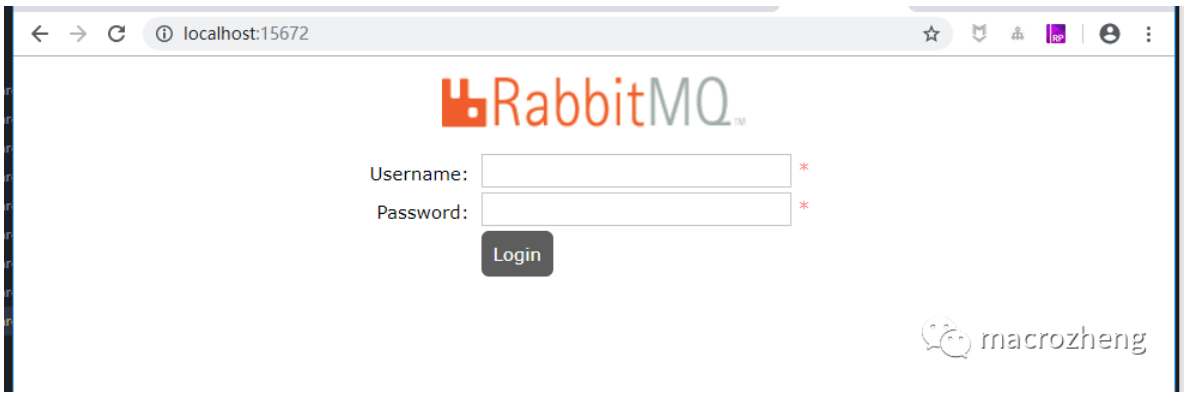


- 开启防火墙便于外网访问。

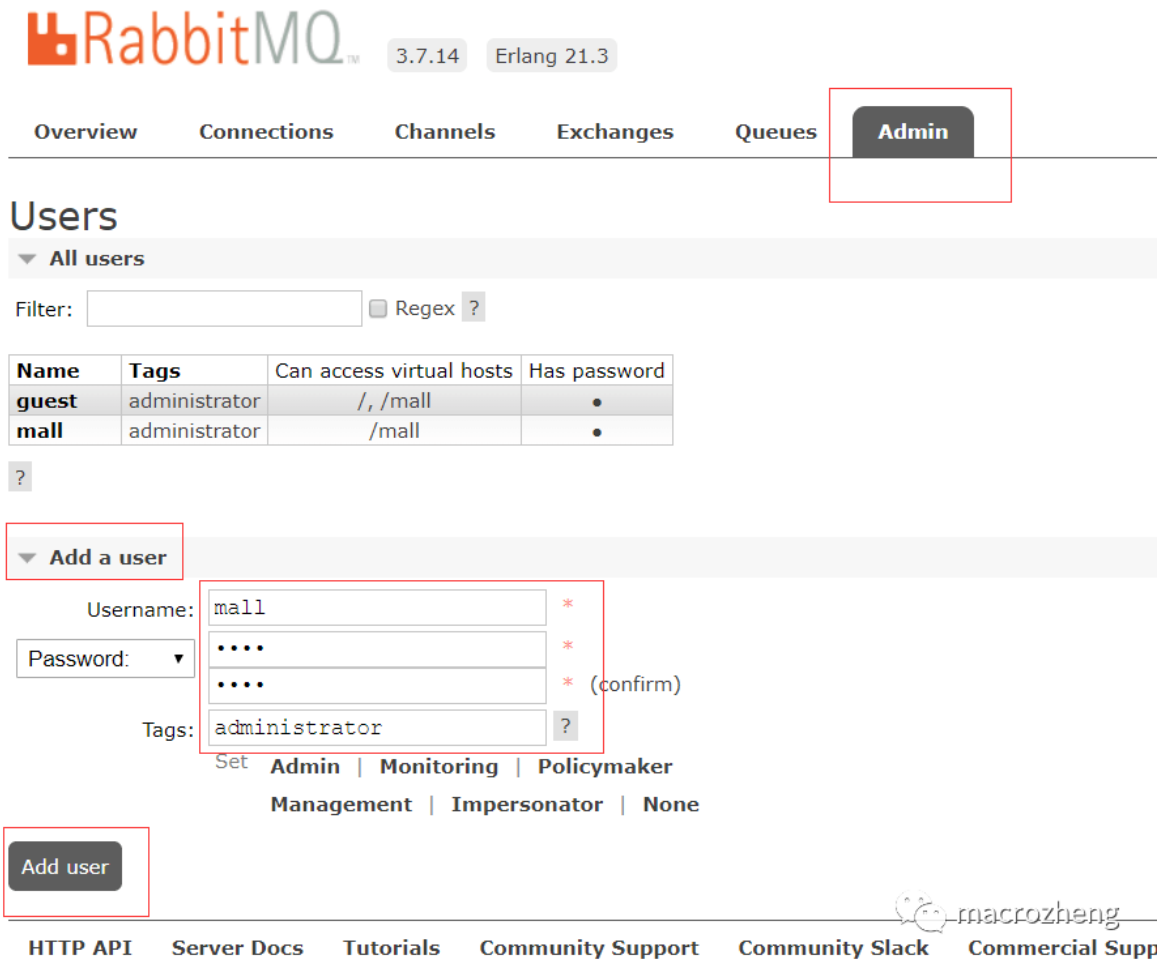
```
firewall-cmd --zone=public --add-port=15672/tcp --permanentfirewall-cmd --
zone=public --add-port=5672/tcp --permanentfirewall-cmd --reload
```

访问及配置

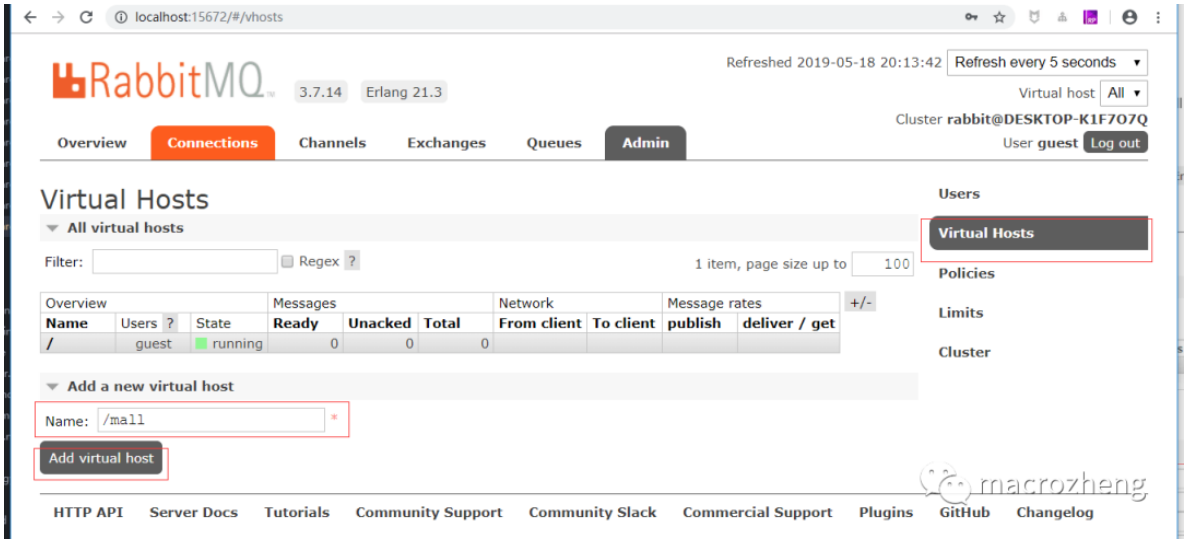
- 访问RabbitMQ管理页面地址，查看是否安装成功（Linux下使用服务器IP访问即可）：http://localhost:15672/



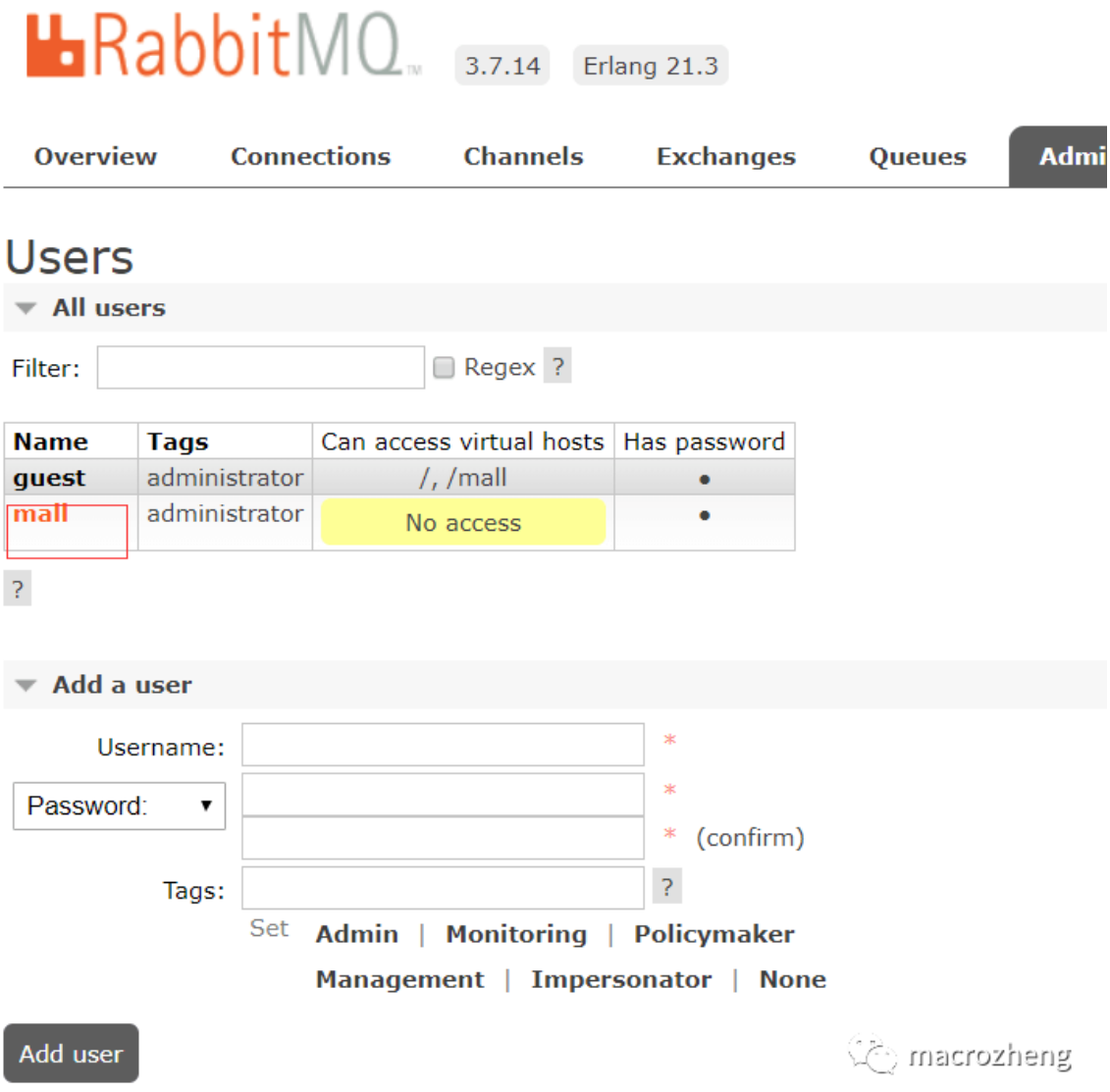
- 输入账号密码并登录，这里使用默认账号密码登录：guest guest
- 创建帐号并设置其角色为管理员：mall mall



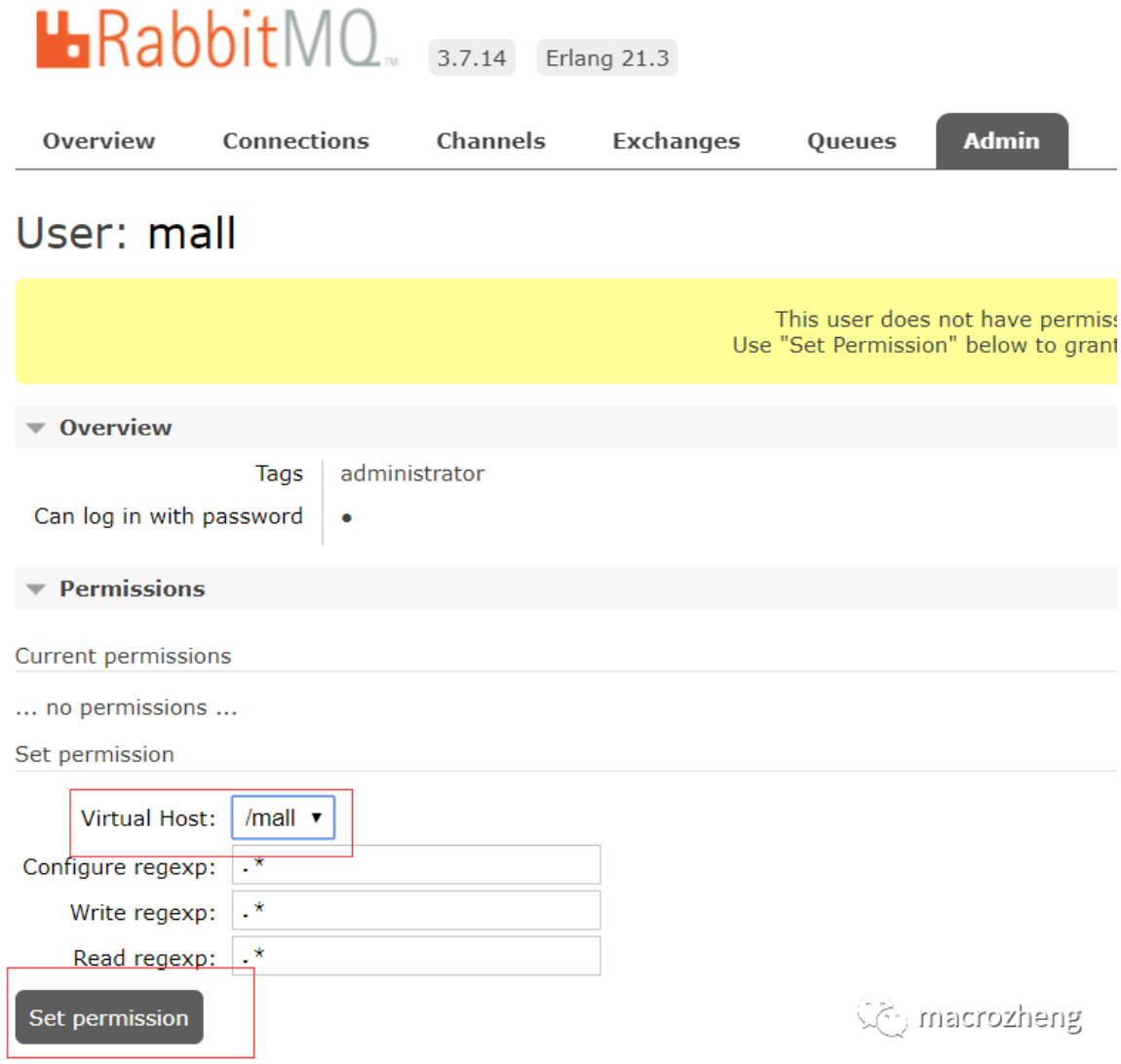
- 创建一个新的虚拟host为：/mall



- 点击mall用户进入用户配置页面；



- 给mall用户配置该虚拟host的权限；



- 至此，RabbitMQ的配置完成。

5种消息模式

> 这5种消息模式是构建基于RabbitMQ的消息应用的基础，一定要牢牢掌握它们。学过RabbitMQ的朋友应该了解过这些消息模式的Java实现，这里我们使用Spring AMQP的形式来实现它们。

简单模式

> 简单模式是最简单的消息模式，它包含一个生产者、一个消费者和一个队列。生产者向队列里发送消息，消费者从队列中获取消息并消费。

模式示意图

Spring AMQP实现

- 首先需要在`pom.xml`中添加Spring AMQP的相关依赖；

```
<!--Spring AMQP依赖-->
<dependency>
    <groupId>org.springframework.boot</groupId>
    <artifactId>spring-boot-starter-amqp</artifactId>
</dependency>
```

- 然后修改`application.yml`，添加RabbitMQ的相关配置；

```
spring:
  rabbitmq:
    host: localhost
    port: 5672
    virtual-host: /mall
    username: mall
    password: mall
    publisher-confirms: true #消息发送到交换器确认
    publisher-returns: true #消息发送到队列确认
```

- 添加`简单模式`相关Java配置，创建一个名为`simple.hello`的队列、一个生产者和一个消费者；

```
/** *
Created by macro on 2020/5/19.
*/
@Configuration
public class SimpleRabbitConfig {
    @Bean public Queue hello() {
        return new Queue("simple.hello");
    }
    @Bean public SimpleSender simpleSender(){
        return new SimpleSender();
    }
    @Bean public SimpleReceiver simpleReceiver(){
        return new SimpleReceiver();
    }
}
```

- 生产者通过`send方法`向队列`simple.hello`中发送消息；

```
/** * Created by macro on 2020/5/19. */public class SimpleSender { private
static final Logger LOGGER = LoggerFactory.getLogger(SimpleSender.class);
@Autowired private RabbitTemplate template; private static final String
queueName="simple.hello"; public void send() {  String message = "Hello World!";
this.template.convertAndSend(queueName, message);  LOGGER.info(" [x] Sent '{}'",
message); }}
```

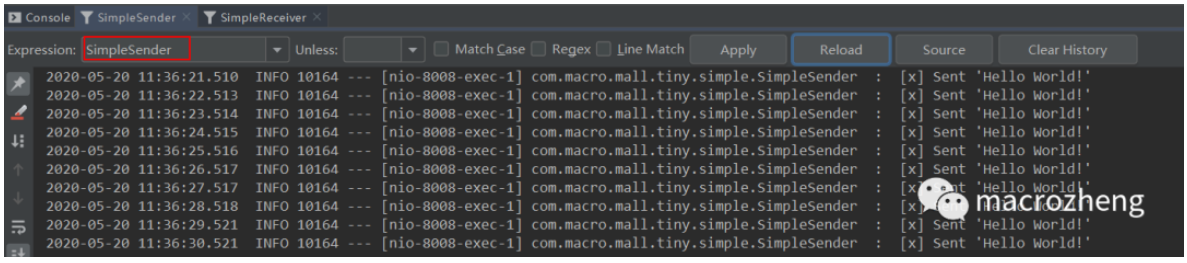
- 消费者从队列`simple.hello`中获取消息；

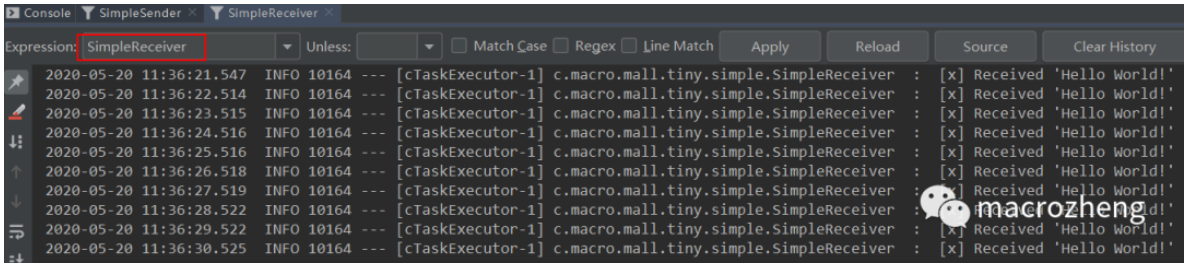
```
/** *
Created by macro on 2020/5/19.
*/
@RabbitListener(queues = "simple.hello")
public class SimpleReceiver {
    private static final Logger LOGGER =
LoggerFactory.getLogger(SimpleReceiver.class);    @RabbitHandler
    public void receive(String in) {
        LOGGER.info(" [x] Received '{}'", in);
    }
}
```

- 在controller中添加测试接口，调用该接口开始发送消息；

```
/** *
Created by macro on 2020/5/19.
*/
@Api(tags = "RabbitController", description = "RabbitMQ功能测试")
@Controller@RequestMapping("/rabbit")
public class RabbitController {
    @Autowired
    private SimpleSender simpleSender;
    @ApiOperation("简单模式")
    @RequestMapping(value = "/simple", method = RequestMethod.GET)
    @ResponseBody
    public CommonResult simpleTest() {
        for(int i=0;i<10;i++){
            simpleSender.send();
            ThreadUtil.sleep(1000);
        }
        return CommonResult.success(null);
    }
}
```

- 运行后结果如下，可以发现生产者往队列中发送消息，消费者从队列中获取消息并消费。

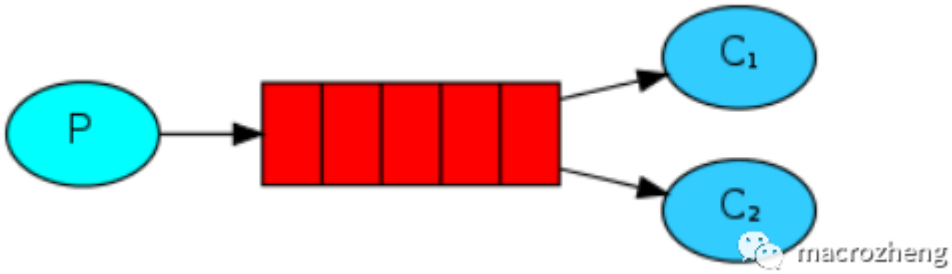




工作模式

> 工作模式是指向多个互相竞争的消费者发送消息的模式，它包含一个生产者、两个消费者和一个队列。两个消费者同时绑定到一个队列上去，当消费者获取消息处理耗时任务时，空闲的消费者从队列中获取并消费消息。

模式示意图



Spring AMQP实现

- 添加`工作模式`相关Java配置，创建一个名为`work.hello`的队列、一个生产者和两个消费者；

```
/** *
Created by macro on 2020/5/19.
*/
@Configuration
public class WorkRabbitConfig {
    @Bean
    public Queue workQueue() {
        return new Queue("work.hello");
    }
    @Bean
    public WorkReceiver workReceiver1() {
        return new WorkReceiver(1);
    }
    @Bean
    public WorkReceiver workReceiver2() {
        return new WorkReceiver(2);
    }
    @Bean
    public WorkSender workSender() {
        return new WorkSender();
    }
}
```

- 生产者通过`send方法`向队列`work.hello`中发送消息，消息中包含一定数量的`.`号；

```
/** *
Created by macro on 2020/5/19.
*/
public class WorkSender {
    private static final Logger LOGGER =
LoggerFactory.getLogger(WorkSender.class);          @Autowired
    private RabbitTemplate template;
    private static final String queueName = "work.hello";
    public void send(int index) {
        StringBuilder builder = new StringBuilder("Hello");
        int limitIndex = index % 3+1;
        for (int i = 0; i < limitIndex; i++) {
            builder.append('.');
        }
        builder.append(index+1);
        String message = builder.toString();
```

```
        template.convertAndSend(queueName, message);
        LOGGER.info(" [x] Sent '{}'", message);
    }
}
```

- 两个消费者从队列`work.hello`中获取消息，名称分别为`instance 1`和`instance 2`，消息中包含`.`号越多，耗时越长；

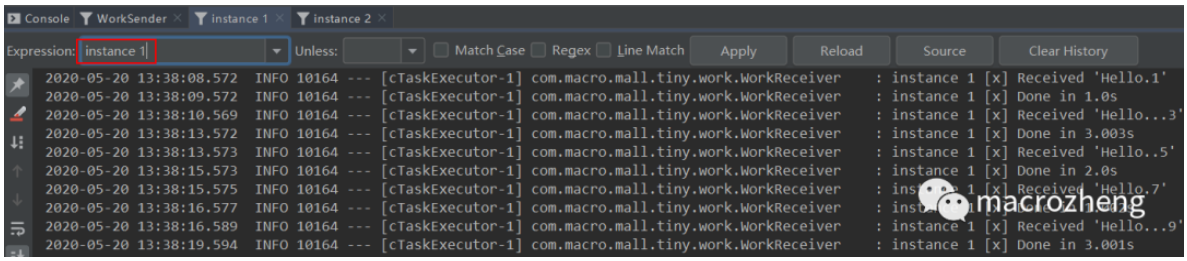
```
/** *
Created by macro on 2020/5/19.
*/
@RabbitListener(queues = "work.hello")
public class WorkReceiver {
    private static final Logger LOGGER =
LoggerFactory.getLogger(WorkReceiver.class);        private final int instance;

    public WorkReceiver(int i) {
        this.instance = i;
    }
    @RabbitHandler
    public void receive(String in) {
        StopWatch watch = new StopWatch();
        watch.start();
        LOGGER.info("instance {} [x] Received '{}'", this.instance, in);
doWork(in);
        watch.stop();
        LOGGER.info("instance {} [x] Done in {}s", this.instance,
watch.getTotalTimeSeconds());
    }

    private void doWork(String in) {
        for (char ch : in.toCharArray()) {
            if (ch == '.') {
                ThreadUtil.sleep(1000);
            }
        }
    }
}
```

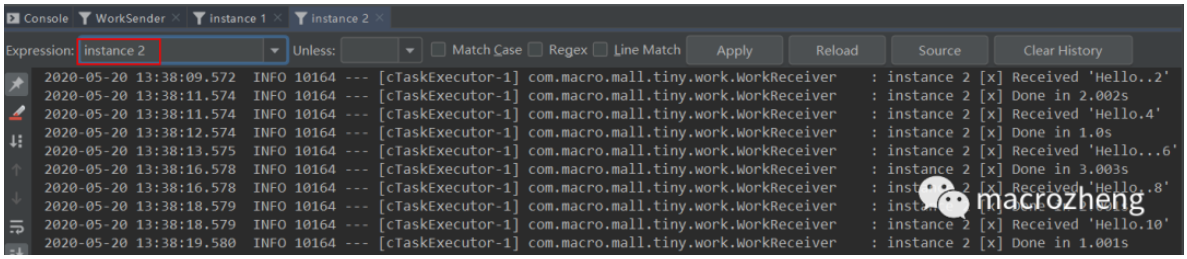
- 在controller中添加测试接口，调用该接口开始发送消息；

```
/** *
Created by macro on 2020/5/19.
*/
@Api(tags = "RabbitController", description = "RabbitMQ功能测试")
@Controller@RequestMapping("/rabbit")
public class RabbitController {
    @Autowired
    private WorkSender workSender;
    @ApiOperation("工作模式")
    @RequestMapping(value = "/work", method = RequestMethod.GET)
    @ResponseBody
    public CommonResult workTest() {
        for(int i=0;i<10;i++){
            workSender.send(i);
            ThreadUtil.sleep(1000);
```

```
        }
        return CommonResult.success(null);
    }
}
```

- 运行后结果如下，可以发现生产者往队列中发送包含不同数量`.`号的消息，`instance 1`和`instance 2`消费者互相竞争，分别消费了一部分消息。

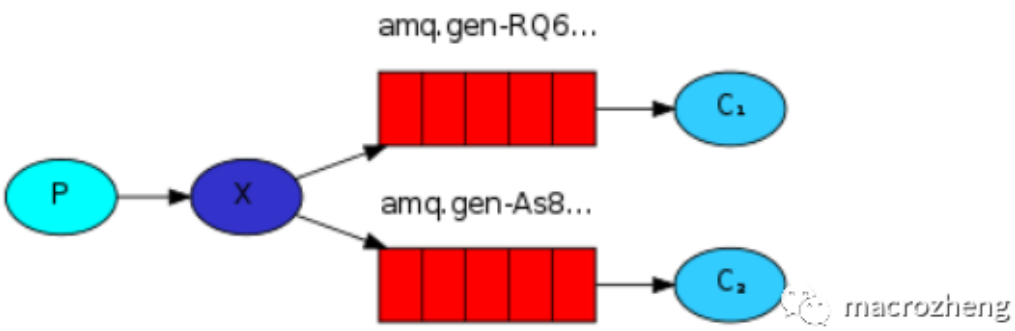




发布/订阅模式

> 发布/订阅模式是指同时向多个消费者发送消息的模式（类似广播的形式），它包含一个生产者、两个消费者、两个队列和一个交换机。两个消费者同时绑定到不同的队列上去，两个队列绑定到交换机上去，生产者通过发送消息到交换机，所有消费者接收并消费消息。

模式示意图



Spring AMQP实现

- 添加`发布/订阅模式`相关Java配置，创建一个名为`exchange.fanout`的交换机、一个生产者、两个消费者和两个匿名队列，将两个匿名队列都绑定到交换机；

```
/** *
```

```
Created by macro on 2020/5/19.
*/
@Configuration
public class FanoutRabbitConfig {
    @Bean
    public FanoutExchange fanout() {
        return new FanoutExchange("exchange.fanout");
    }
    @Bean
    public Queue fanoutQueue1() {
        return new AnonymousQueue();
    }
    @Bean
    public Queue fanoutQueue2() {
        return new AnonymousQueue();
    }
    @Bean
    public Binding fanoutBinding1(FanoutExchange fanout, Queue fanoutQueue1) {
                return BindingBuilder.bind(fanoutQueue1).to(fanout);
                                                                    }

    @Bean
    public Binding fanoutBinding2(FanoutExchange fanout, Queue fanoutQueue2) {
                return BindingBuilder.bind(fanoutQueue2).to(fanout);
                                                                    }

    @Bean
    public FanoutReceiver fanoutReceiver() {
        return new FanoutReceiver();
    }
    @Bean
    public FanoutSender fanoutSender() {
        return new FanoutSender();
    }
}
```

- 生产者通过`send方法`向交换机`exchange.fanout`中发送消息，消息中包含一定数量的`.`号；

```
/** *
Created by macro on 2020/5/19.
*/
public class FanoutSender {
    private static final Logger LOGGER =
LoggerFactory.getLogger(FanoutSender.class);         @Autowired
    private RabbitTemplate template;
    private static final String exchangeName = "exchange.fanout";
    public void send(int index) {
        StringBuilder builder = new StringBuilder("Hello");
        int limitIndex = index % 3 + 1;
        for (int i = 0; i < limitIndex; i++) {
            builder.append('.');
        }
        builder.append(index + 1);
        String message = builder.toString();
        template.convertAndSend(exchangeName, "", message);
        LOGGER.info(" [x] Sent '{}'", message);
    }
```

```
}
```

- 消费者从绑定的匿名队列中获取消息，消息中包含`.`号越多，耗时越长，由于该消费者可以从两个队列中获取并消费消息，可以看做两个消费者，名称分别为`instance 1`和`instance 2`；

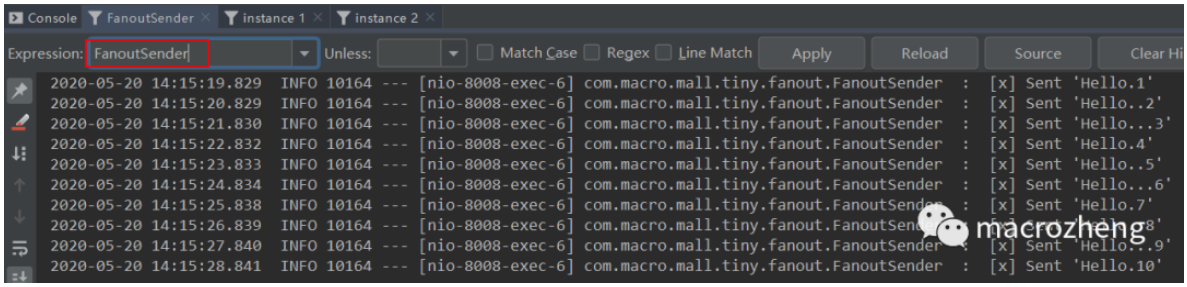
```
/** *
Created by macro on 2020/5/19.
*/
public class FanoutReceiver {
    private static final Logger LOGGER =
LoggerFactory.getLogger(FanoutReceiver.class);        @RabbitListener(queues =
"#{fanoutQueue1.name}")
    public void receive1(String in) {
        receive(in, 1);
    }
    @RabbitListener(queues = "#{fanoutQueue2.name}")
    public void receive2(String in) {
        receive(in, 2);
    }
    private void receive(String in, int receiver) {
        StopWatch watch = new StopWatch();
        watch.start();
        LOGGER.info("instance {} [x] Received '{}'", receiver, in);
        doWork(in);
        watch.stop();
        LOGGER.info("instance {} [x] Done in {}s", receiver,
watch.getTotalTimeSeconds());
    }
    private void doWork(String in) {
        for (char ch : in.toCharArray()) {
            if (ch == '.') {
                ThreadUtil.sleep(1000);
            }
        }
    }
}
```

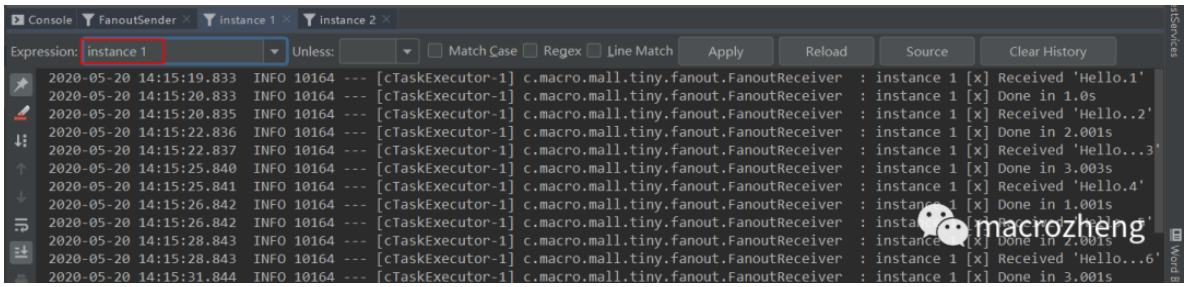
- 在controller中添加测试接口，调用该接口开始发送消息；

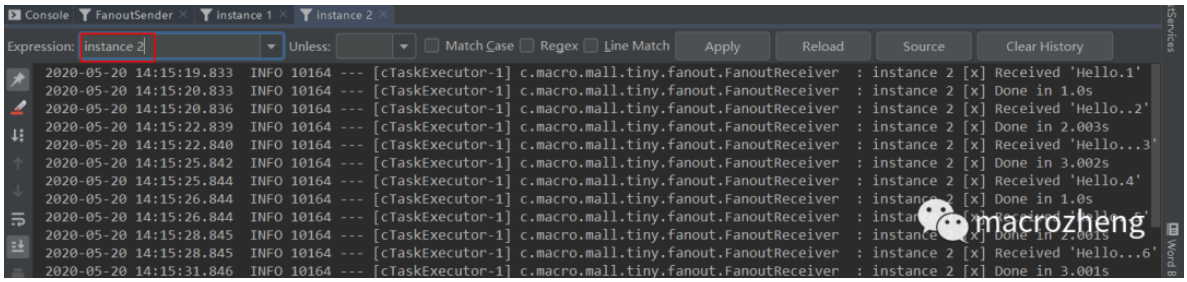
```
/** *
Created by macro on 2020/5/19.
*/
@Api(tags = "RabbitController", description = "RabbitMQ功能测试")
@Controller@RequestMapping("/rabbit")
public class RabbitController {
    @Autowired
    private FanoutSender fanoutSender;
    @ApiOperation("发布/订阅模式")
    @RequestMapping(value = "/fanout", method = RequestMethod.GET)
    @ResponseBody
    public CommonResult fanoutTest() {
        for(int i=0;i<10;i++){
            fanoutSender.send(i);
            ThreadUtil.sleep(1000);
        }
        return CommonResult.success(null);
```

```
    }
}
```

- 运行后结果如下，可以发现生产者往队列中发送包含不同数量`.`号的消息，`instance 1`和`instance 2`同时获取并消费了消息。



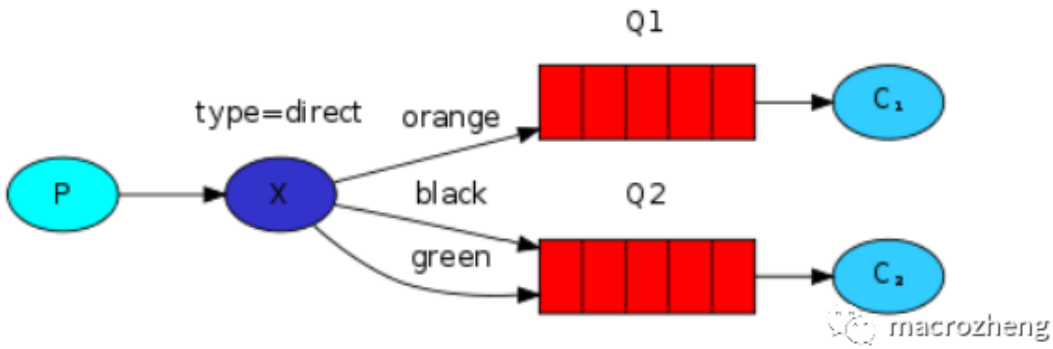




路由模式

> 路由模式是可以根据`路由键`选择性给多个消费者发送消息的模式，它包含一个生产者、两个消费者、两个队列和一个交换机。两个消费者同时绑定到不同的队列上去，两个队列通过`路由键`绑定到交换机上去，生产者发送消息到交换机，交换机通过`路由键`转发到不同队列，队列绑定的消费者接收并消费消息。

模式示意图



Spring AMQP实现

- 添加`路由模式`相关Java配置，创建一个名为`exchange.direct`的交换机、一个生产者、两个消费者和两个匿名队列，队列通过`路由键`都绑定到交换机，`队列1`的路由键为`orange`和`black`，`队列`

2 的路由键为 green 和 black；

```
/** *
Created by macro on 2020/5/19.
*/
@Configuration
public class DirectRabbitConfig {
    @Bean
    public DirectExchange direct() {
        return new DirectExchange("exchange.direct");
    }
    @Bean
    public Queue directQueue1() {
        return new AnonymousQueue();
    }
    @Bean
    public Queue directQueue2() {
        return new AnonymousQueue();
    }
    @Bean
    public Binding directBinding1a(DirectExchange direct, Queue directQueue1) {
                return
BindingBuilder.bind(directQueue1).to(direct).with("orange");
                                                                                }

    @Bean
    public Binding directBinding1b(DirectExchange direct, Queue directQueue1) {
                return
BindingBuilder.bind(directQueue1).to(direct).with("black");
                                                                                }

    @Bean
    public Binding directBinding2a(DirectExchange direct, Queue directQueue2) {
                return
BindingBuilder.bind(directQueue2).to(direct).with("green");
                                                                                }

    @Bean
    public Binding directBinding2b(DirectExchange direct, Queue directQueue2) {
                return
BindingBuilder.bind(directQueue2).to(direct).with("black");
                                                                                }

    @Bean
    public DirectReceiver receiver() {
        return new DirectReceiver();
    }
    @Bean
    public DirectSender directSender() {
        return new DirectSender();
    }
}
```

- 生产者通过 send方法 向交换机 exchange.direct 中发送消息，发送时使用不同的 路由键，根据 路由键 会被转发到不同的队列；

```
/** *
Created by macro on 2020/5/19.
*/
public class DirectSender {
    @Autowired
    private RabbitTemplate template;
    private static final
        String exchangeName = "exchange.direct";
    private final String[] keys = {"orange", "black", "green"};
    private static final Logger LOGGER =
LoggerFactory.getLogger(DirectSender.class);       public void send(int index) {

        StringBuilder builder = new StringBuilder("Hello to ");
        int limitIndex = index % 3;
        String key = keys[limitIndex];
        builder.append(key).append(' ');
        builder.append(index+1);
        String message = builder.toString();
        template.convertAndSend(exchangeName, key, message);
        LOGGER.info(" [x] Sent '{}'", message);
    }
}
```

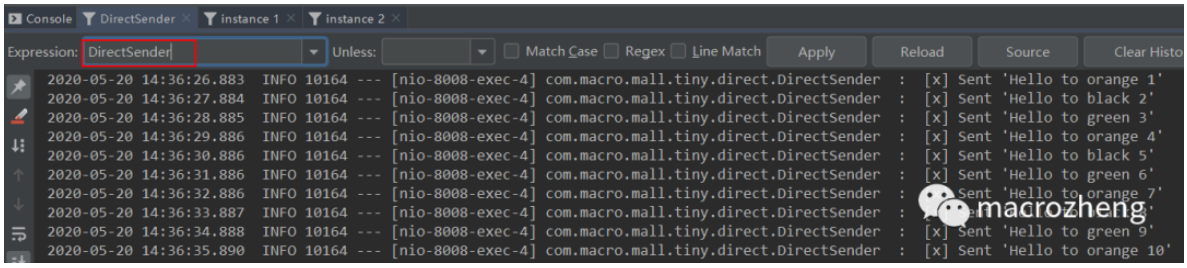
- 消费者从自己绑定的匿名队列中获取消息，由于该消费者可以从两个队列中获取并消费消息，可以看做两个消费者，名称分别为`instance 1`和`instance 2`；

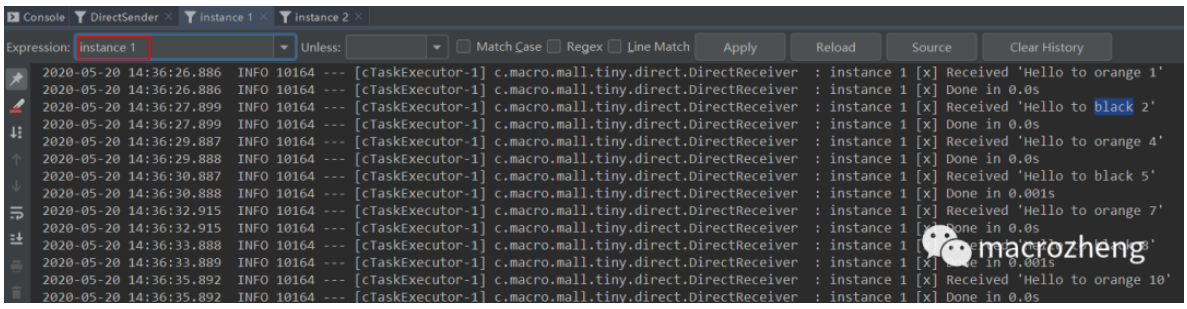
```
/** *
Created by macro on 2020/5/19.
*/
public class DirectReceiver {
    private static final Logger LOGGER =
LoggerFactory.getLogger(DirectReceiver.class);        @RabbitListener(queues =
"#{directQueue1.name}")
    public void receive1(String in){
        receive(in, 1);
    }
    @RabbitListener(queues = "#{directQueue2.name}")
    public void receive2(String in){
        receive(in, 2);
    }
    private void receive(String in, int receiver){
        StopWatch watch = new StopWatch();
        watch.start();
        LOGGER.info("instance {} [x] Received '{}'", receiver, in);
        doWork(in);
        watch.stop();
        LOGGER.info("instance {} [x] Done in {}s", receiver,
watch.getTotalTimeSeconds());
    }
    private void doWork(String in){
        for (char ch : in.toCharArray()) {
            if (ch == '.') {
                ThreadUtil.sleep(1000);
            }
        }
    }
}
```

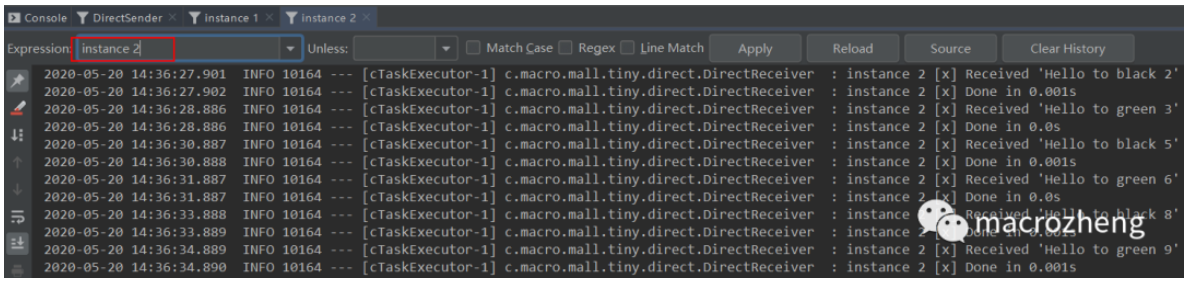
- 在controller中添加测试接口，调用该接口开始发送消息；

```
/** *
Created by macro on 2020/5/19.
*/
@Api(tags = "RabbitController", description = "RabbitMQ功能测试")
@Controller@RequestMapping("/rabbit")
public class RabbitController {
    @Autowired
    private DirectSender directSender;
    @ApiOperation("路由模式")
    @RequestMapping(value = "/direct", method = RequestMethod.GET)
    @ResponseBody
    public CommonResult directTest() {
        for(int i=0;i<10;i++){
            directSender.send(i);
            ThreadUtil.sleep(1000);
        }
        return CommonResult.success(null);
    }
}
```

- 运行后结果如下，可以发现生产者往队列中发送包含不同`路由键`的消息，`instance 1`获取到了`orange`和`black`消息，`instance 2`获取到了`green`和`black`消息。







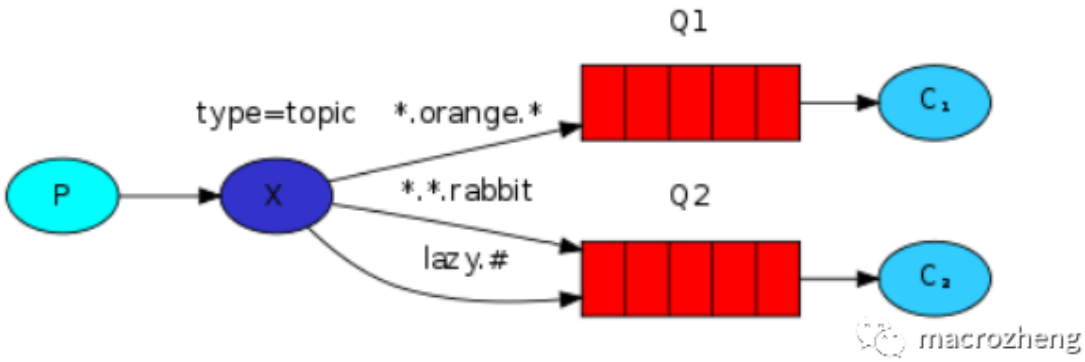
通配符模式

> 通配符模式是可以根据`路由键匹配规则`选择性给多个消费者发送消息的模式，它包含一个生产者、两个消费者、两个队列和一个交换机。两个消费者同时绑定到不同的队列上去，两个队列通过`路由键匹配规则`绑定到交换机上去，生产者发送消息到交换机，交换机通过`路由键匹配规则`转发到不同队列，队列绑定的消费者接收并消费消息。

特殊匹配符号

- `*`：只能匹配一个单词；
- `#`：可以匹配零个或多个单词。

模式示意图



Spring AMQP实现

- 添加`通配符模式`相关Java配置，创建一个名为`exchange.topic`的交换机、一个生产者、两个消费者和两个匿名队列，匹配`*.orange.*`和`*.*.rabbit`发送到`队列1`，匹配`lazy.#`发送到`队列2`；

```
/** *
Created by macro on 2020/5/19.
*/
@Configurationpublic class TopicRabbitConfig {
    @Bean
    public TopicExchange topic() {
        return new TopicExchange("exchange.topic");
    }
    @Bean
    public Queue topicQueue1() {
        return new AnonymousQueue();
    }
    @Bean
    public Queue topicQueue2() {
        return new AnonymousQueue();
    }
    @Bean
    public Binding topicBinding1a(TopicExchange topic, Queue topicQueue1) {

        return BindingBuilder.bind(topicQueue1).to(topic).with("*.orange.*");

    }
    @Bean
    public Binding topicBinding1b(TopicExchange topic, Queue topicQueue1) {

        return BindingBuilder.bind(topicQueue1).to(topic).with("*.*.rabbit");

    }
    @Bean
    public Binding topicBinding2a(TopicExchange topic, Queue topicQueue2) {
```

```
        return BindingBuilder.bind(topicQueue2).to(topic).with("lazy.#");
    }
    @Bean
    public TopicReceiver topicReceiver() {
        return new TopicReceiver();
    }
    @Bean
    public TopicSender topicSender() {
        return new TopicSender();
    }
}
```

- 生产者通过`send方法`向交换机`exchange.topic`中发送消息，消息中包含不同的`路由键`；

```
/** *
Created by macro on 2020/5/19.
*/
public class TopicSender {
    @Autowired
    private RabbitTemplate template;
    private static final String exchangeName = "exchange.topic";
    private static final Logger LOGGER =
LoggerFactory.getLogger(TopicSender.class);        private final String[] keys =
{"quick.orange.rabbit", "lazy.orange.elephant",
"quick.orange.fox",   "lazy.brown.fox", "lazy.pink.rabbit", "quick.brown.fox"};
    public void send(int index) {
        StringBuilder builder = new StringBuilder("Hello to ");
        int limitIndex = index%keys.length;
        String key = keys[limitIndex];
        builder.append(key).append(' ');
        builder.append(index+1);
        String message = builder.toString();
        template.convertAndSend(exchangeName, key, message);
        LOGGER.info(" [x] Sent '{}'",message);
        System.out.println(" [x] Sent '" + message + "'");
    }
}
```

- 消费者从自己绑定的匿名队列中获取消息，由于该消费者可以从两个队列中获取并消费消息，可以看做两个消费者，名称分别为`instance 1`和`instance 2`；

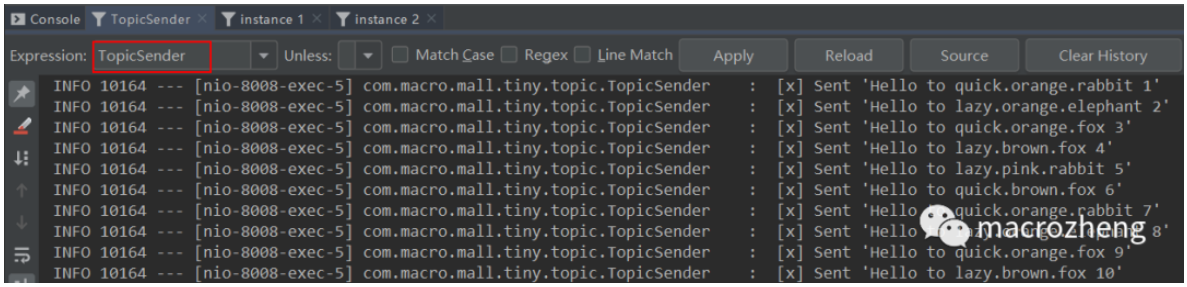
```
/** *
Created by macro on 2020/5/19.
*/
public class TopicReceiver {
    private static final Logger LOGGER =
LoggerFactory.getLogger(TopicReceiver.class);      @RabbitListener(queues = "#
{topicQueue1.name}")
    public void receive1(String in){
        receive(in, 1);
    }
    @RabbitListener(queues = "#{topicQueue2.name}")
    public void receive2(String in){
        receive(in, 2);
    }
    public void receive(String in, int receiver){
```

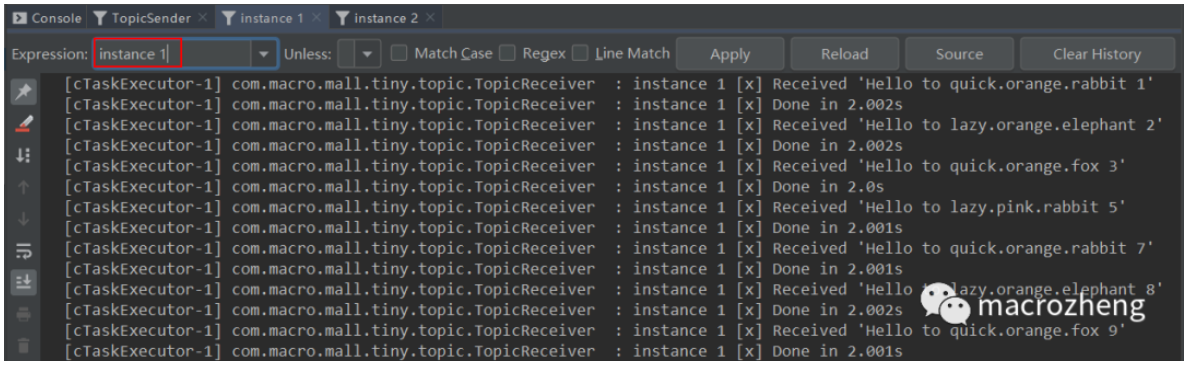
```
        StopWatch watch = new StopWatch();
        watch.start();
        LOGGER.info("instance {} [x] Received '{}'", receiver, in);
        doWork(in);
        watch.stop();
        LOGGER.info("instance {} [x] Done in {}s", receiver,
watch.getTotalTimeSeconds());
    }
    private void doWork(String in){
        for (char ch : in.toCharArray()) {
            if (ch == '.') {    ThreadUtil.sleep(1000);
                            }
        }
    }
}
```

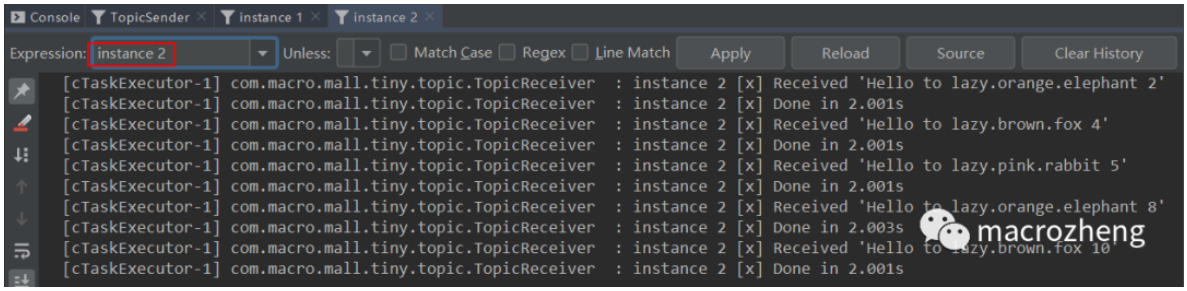
- 在controller中添加测试接口，调用该接口开始发送消息；

```
/** *
Created by macro on 2020/5/19.
*/
@Api(tags = "RabbitController", description = "RabbitMQ功能测试")
@Controller@RequestMapping("/rabbit")
public class RabbitController {
    @Autowired
    private TopicSender topicSender;
    @ApiOperation("通配符模式")
    @RequestMapping(value = "/topic", method = RequestMethod.GET)
    @ResponseBody
    public CommonResult topicTest() {
        for(int i=0;i<10;i++){
            topicSender.send(i);
            ThreadUtil.sleep(1000);
        }       return CommonResult.success(null);
    }
}
```

- 运行后结果如下，可以发现生产者往队列中发送包含不同`路由键`的消息，`instance 1`和`instance 2`分别获取到了匹配的消息。







参考资料

RabbitMQ Tutorials:https://www.rabbitmq.com/getstarted.html

项目源码地址

https://github.com/macrozheng/mall-learning/tree/master/mall-tiny-rabbit