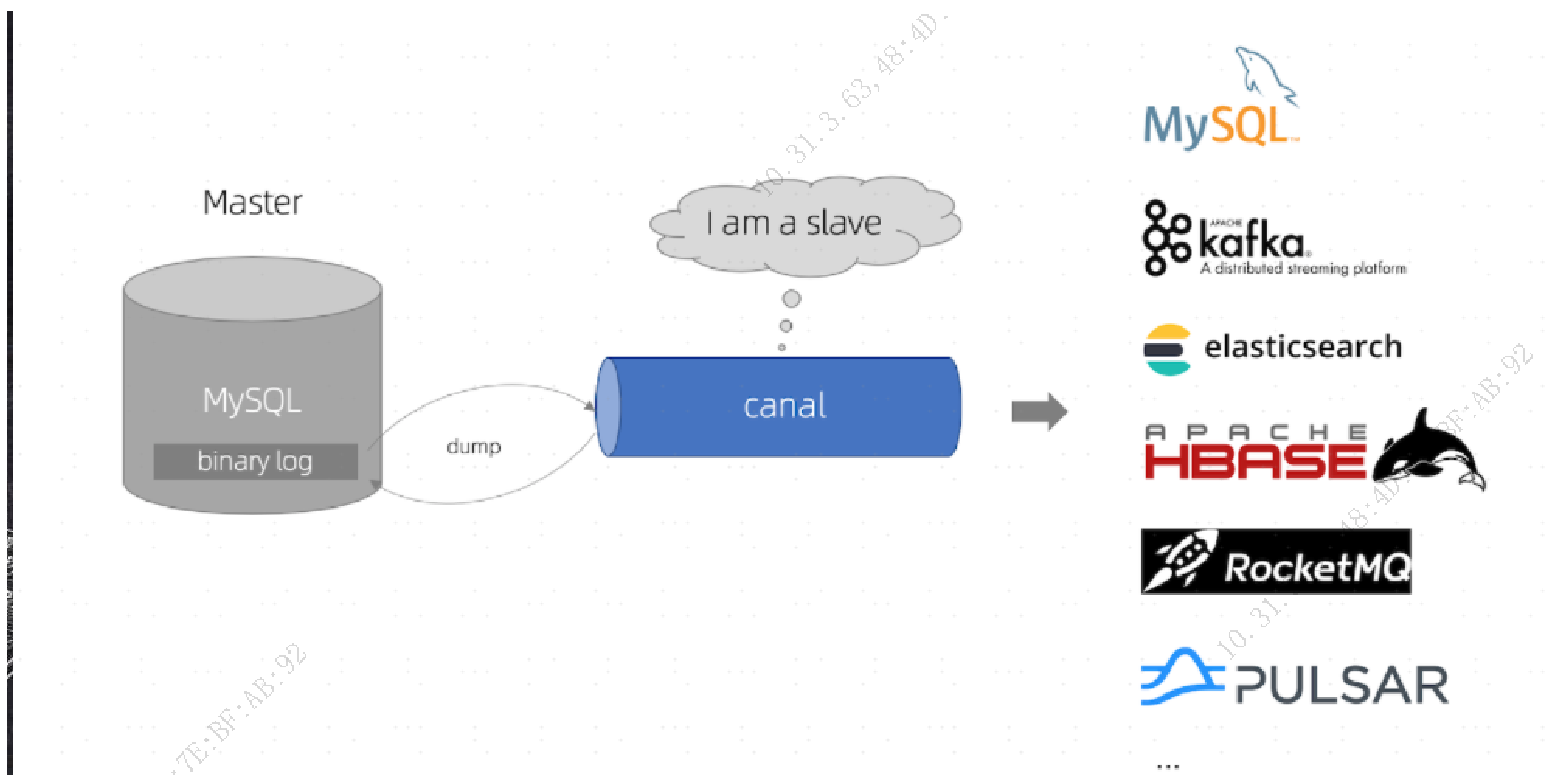
Canal

一、简介

```
1.Canal，译意为水道/管道/沟渠，阿里开源的框架，主要用途是基于 MySQL 数据库增量日志解析，提供增量数据订阅和消费。
2.Canal的工作原理就是把自己伪装成MySQL slave，模拟MySQL slave的交互协议向MySQL Mater发送 dump协议，
  MySQL master收到canal发送过来的dump请求，开始推送binary log给Canal，然后Canal解析binary log，再发送到存储目的地，比如MySQL，Kafka，Elastic Search等等。
```



二、准备MySQL

```
//支持版本 5.1.x , 5.5.x , 5.6.x , 5.7.x , 8.0.x
1.创建挂载目录
mkdir -vp /home/docker/mysql/{conf,data,logs}

2.挂载并启动容器
docker run --name mysql \
-e TZ=Asia/Shanghai \
-e MYSQL_ROOT_PASSWORD=root \
-v /home/docker/mysql/data:/var/lib/mysql \
-v /home/docker/mysql/conf:/etc/mysql/mysql.conf.d \
-v /home/docker/mysql/logs:/logs \
-p 3306:3306 \
-p 33060:33060 \
--privileged=true \
--restart=always \
-d mysql:5.7.21 \
--character-set-server=utf8mb4 \
--collation-server=utf8mb4_general_ci

3.配置mysqld.cnf
touch /home/docker/mysql/conf/mysqld.cnf
//写入配置
cat > /home/docker/mysql/conf/mysqld.cnf << EOF
[mysqld]
log-bin=mysql-bin
binlog-format=row
server_id=3306
log_timestamps=SYSTEM
default-time-zone='+8:00'
EOF
//重启容器生效
docker restart mysql;

4.创建一个用户并授权
docker exec -it mysql bash
> mysql -uroot -proot;
//如果执行报已经存在该用户 drop user canal@'%'; flush privileges;
> create user canal identified by 'canal';
> grant SELECT, REPLICATION SLAVE, REPLICATION CLIENT on *.* to 'canal'@'%';
> flush privileges;

5.检查状态
//是否为ON，为OFF重启容器
> show variables like 'log_bin';
//查看binlog，记录这两个参数 mysql-bin.000001 | 154
> show master status;

```

三、搭建 Canal 服务端

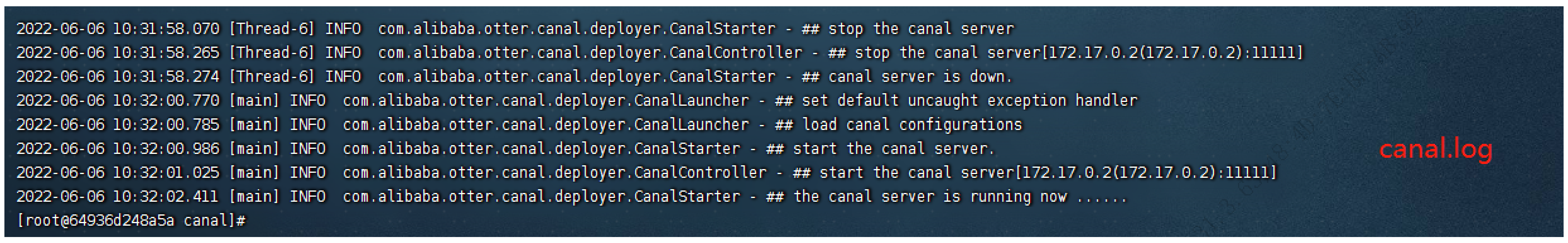
数据库初始化脚本

create_canal_admi....sql
3.91KB

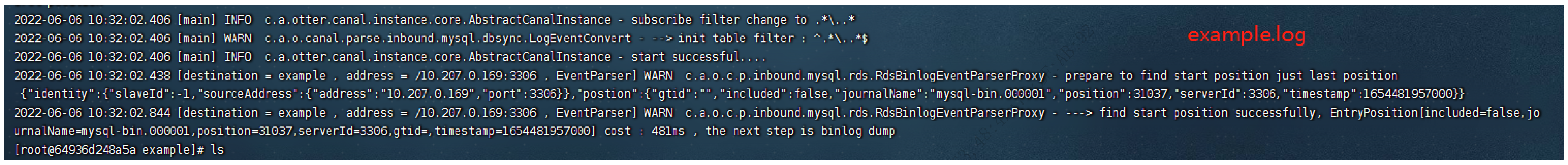
```
//创建网桥，避免容器ip变化
docker network create --subnet=172.172.0.0/24 docker-canal
```

```
//docker network ls    查看
//docker network rm docker-canal  删除
```

```
/**
 * 配置说明：/home/admin/canal-server/conf/example/instance.properties
 * example 为实例名称，一个canal服务可以对应多个实例
 * 在Mysql中使用 select password('123456') 生成密码密文 *6BB4837EB74329105EE4568DDA7DC67ED2CA2AD9
 * 参数说明如下：
 */
# 指定外部数据库地址
canal.instance.master.address=10.207.0.169:3306
# binlog日志名称(可省略)
canal.instance.master.journal.name=mysql-bin.000001
# mysql主库链接时起始的binlog偏移量(可省略)
canal.instance.master.position=154
# 在MySQL服务器授权的账号密码
canal.instance.dbUsername=root
canal.instance.dbPassword=root
# 字符集
canal.instance.connectionCharset = UTF-8
canal.instance.enableDruid=false
# 监听所有表，也可以写具体的表名用逗号隔开
canal.instance.filter.regex=.*\\..*
# 数据解析表的黑名单，多个表用逗号隔开
canal.instance.filter.black.regex=mysql\\.slave_.*
# MQ绑定的路由key名称
canal.mq.topic=canal_key

/**
 * 配置说明：/home/admin/canal-server/conf/canal.properties
 * 参数说明如下：
 */
# canal配置
canal.ip = 绑定本机不然随机选取一个本地IP
canal.register.ip = zk地址
canal.port = 服务端口，默认11111
canal.metrics.pull.port = 11112
# canal-admin页面管理配置
canal.admin.manager = 10.207.0.167:8089
canal.admin.port = 11110
canal.admin.user = admin
canal.admin.passwd = 6BB4837EB74329105EE4568DDA7DC67ED2CA2AD9
canal.admin.register.auto = true
canal.admin.register.cluster = 集群名称
canal.admin.register.name = server名称
canal.destinations = example     指定实例名称，可在/conf目录下新建其他实例目录
canal.serverMode = rabbitMQ      指定连接类型：tcp(代码监听)，kafka，rocketMQ，rabbitMQ，pulsarMQ
rabbitmq.host = 10.207.0.164     MQ地址
rabbitmq.virtual.host = /SFJC    虚拟主机
rabbitmq.exchange =  canal.exchange   交换机名称
rabbitmq.username = guest
rabbitmq.password = guest
rabbitmq.deliveryMode = 2        投递模式，2-持久化

--------------------------------------------------------------------------------------------------------------------
1.启动服务并复制挂载文件
docker run --name canal-server -p 11111:11111 -d canal/canal-server
mkdir -vp /home/docker/canal/server/{conf/example,logs}
//docker exec -it canal-server bash
docker cp canal-server:/home/admin/canal-server/conf/canal.properties /home/docker/canal/server/conf/
docker cp canal-server:/home/admin/canal-server/conf/example/instance.properties /home/docker/canal/server/conf/example/

2.修改配置文件
【canal.properties】
canal.serverMode = rabbitMQ
rabbitmq.host = 10.207.0.164
rabbitmq.virtual.host = /SFJC
rabbitmq.exchange = canal.exchange
rabbitmq.username = guest
rabbitmq.password = guest
rabbitmq.deliveryMode = 2

【instance.properties】
canal.instance.master.address=10.207.0.169:3306
canal.instance.dbUsername=root
canal.instance.dbPassword=root
canal.mq.topic=canal.key

3.登录rabbitMQ并设置
> http://10.207.0.164:15672/
> 新增虚拟主机 /SFJC   新增队列 canal.queue  新增交换机 canal.exchange
> 绑定队列与交换机  路由键为 canal.key

4.移除容器，重新挂载启动
docker stop canal-server;docker rm canal-server
docker run --name canal-server \
-p 11111:11111 \
-p 11110:11110 \
-p 11112:11112 \
-p 9100:9100 \
-v /home/docker/canal/server/conf/canal.properties:/home/admin/canal-server/conf/canal.properties \
-v /home/docker/canal/server/conf/example/instance.properties:/home/admin/canal-server/conf/example/instance.properties \
-v /home/docker/canal/server/logs/:/home/admin/canal-server/logs/ \
--privileged=true \
--restart=always \
--net docker-canal --ip 172.172.0.2 \
-d canal/canal-server
```

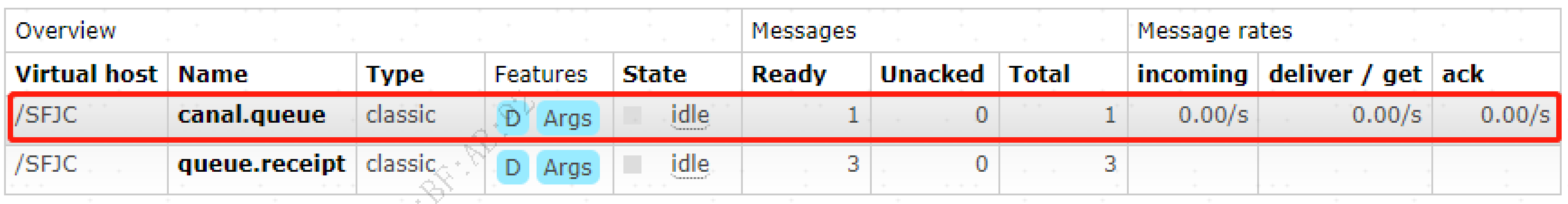


```
2022-06-06 10:31:58.070 [Thread-6] INFO  com.alibaba.otter.canal.deployer.CanalStarter - ## stop the canal server
2022-06-06 10:31:58.265 [Thread-6] INFO  com.alibaba.otter.canal.deployer.CanalController - ## stop the canal server[172.17.0.2(172.17.0.2):11111]
2022-06-06 10:31:58.274 [Thread-6] INFO  com.alibaba.otter.canal.deployer.CanalStarter - ## canal server is down.
2022-06-06 10:32:00.770 [main] INFO  com.alibaba.otter.canal.deployer.CanalLauncher - ## set default uncaught exception handler
2022-06-06 10:32:00.785 [main] INFO  com.alibaba.otter.canal.deployer.CanalLauncher - ## load canal configurations
2022-06-06 10:32:00.986 [main] INFO  com.alibaba.otter.canal.deployer.CanalStarter - ## start the canal server.
2022-06-06 10:32:01.025 [main] INFO  com.alibaba.otter.canal.deployer.CanalController - ## start the canal server[172.17.0.2(172.17.0.2):11111]
2022-06-06 10:32:02.411 [main] INFO  com.alibaba.otter.canal.deployer.CanalStarter - ## the canal server is running now ......
[root@64936d248a5a canal]#
```

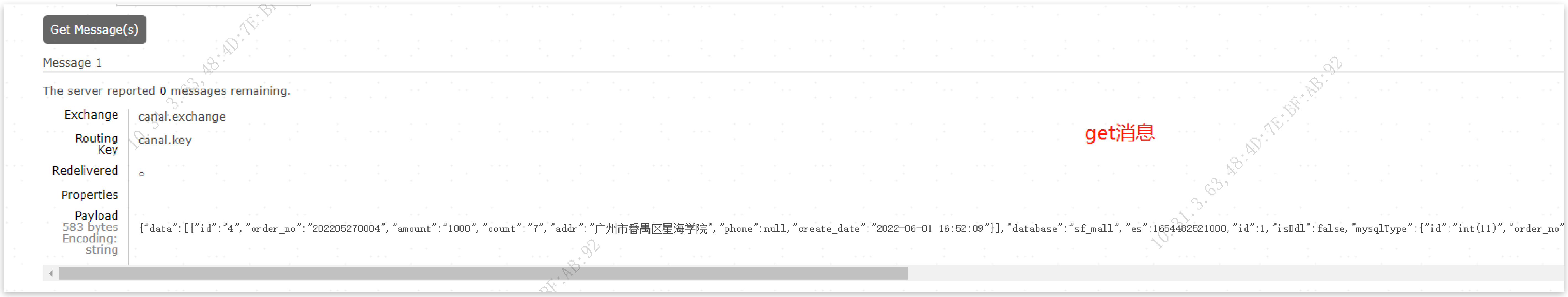


```
2022-06-06 10:32:02.406 [main] INFO  c.a.otter.canal.instance.core.AbstractCanalInstance - subscribe filter change to .*\..*
2022-06-06 10:32:02.406 [main] WARN  c.a.o.canal.parse.inbound.mysql.dbsync.LogEventConvert - --> init table filter : ^.*\..*$
2022-06-06 10:32:02.406 [main] INFO  c.a.otter.canal.instance.core.AbstractCanalInstance - start successful....
2022-06-06 10:32:02.438 [destination = example , address = /10.207.0.169:3306 , EventParser] WARN  c.a.o.c.p.inbound.mysql.rds.RdsBinlogEventParserProxy - prepare to find start position just last position
 {"identity":{"slaveId":-1,"sourceAddress":{"address":"10.207.0.169","port":3306}},"postion":{"gtid":"","included":false,"journalName":"mysql-bin.000001","position":31037,"serverId":3306,"timestamp":1654481957000}}
2022-06-06 10:32:02.844 [destination = example , address = /10.207.0.169:3306 , EventParser] WARN  c.a.o.c.p.inbound.mysql.rds.RdsBinlogEventParserProxy - ---> find start position successfully, EntryPosition[included=false,jo
urnalName=mysql-bin.000001,position=31037,serverId=3306,gtid=,timestamp=1654481957000] cost : 481ms , the next step is binlog dump
[root@64936d248a5a example]# ls
```

```
5.数据库修改一条数据
> update t_order set count = 7 where order_no = '202205270004';
```



Overview					Messages			Message rates		
Virtual host	Name	Type	Features	State	Ready	Unacked	Total	incoming	deliver / get	ack
/SFJC	canal.queue	classic	D Args	idle	1	0	1	0.00/s	0.00/s	0.00/s
/SFJC	queue.receipt	classic	D Args	idle	3	0	3			

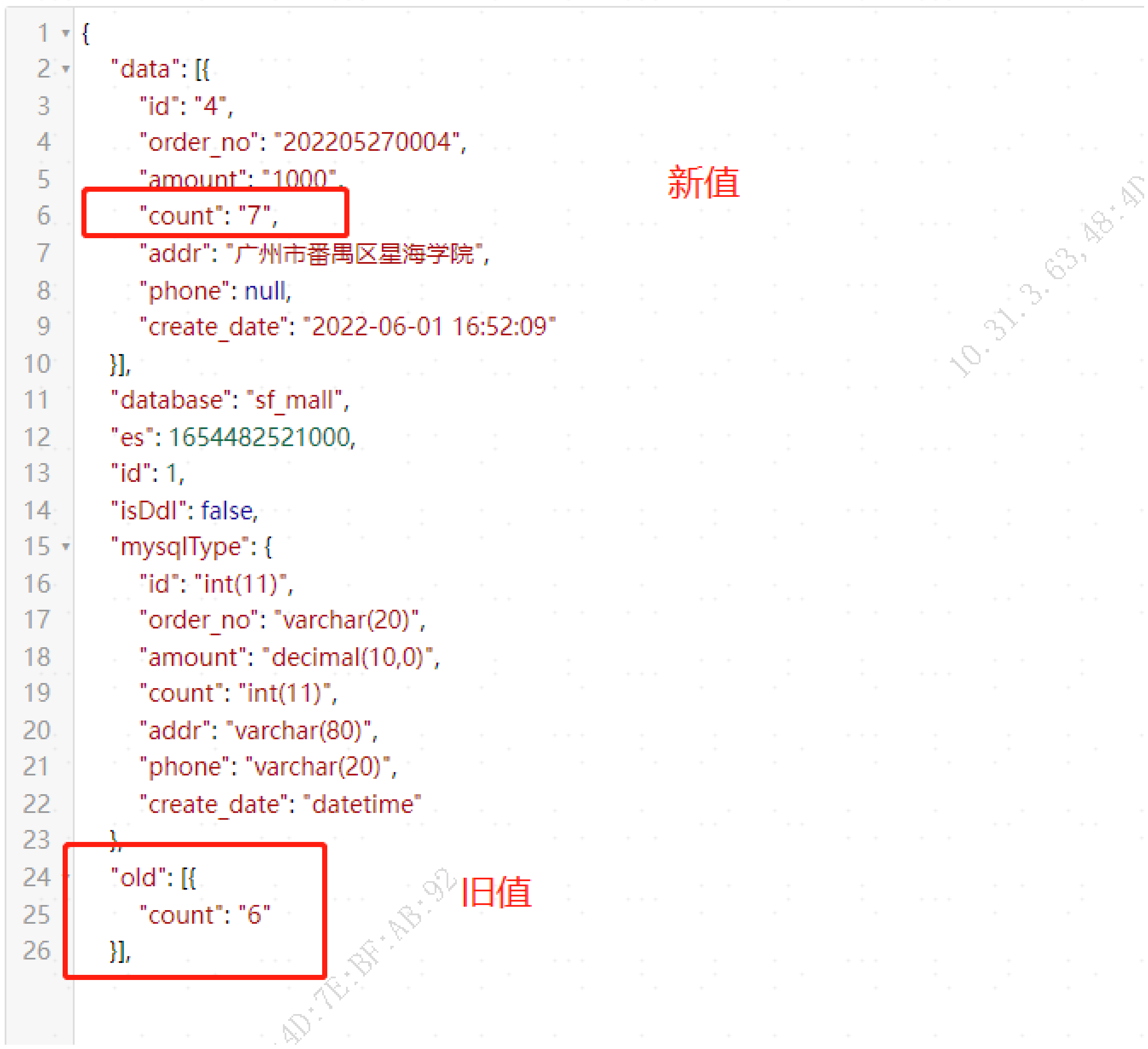


Message 1

The server reported 0 messages remaining.

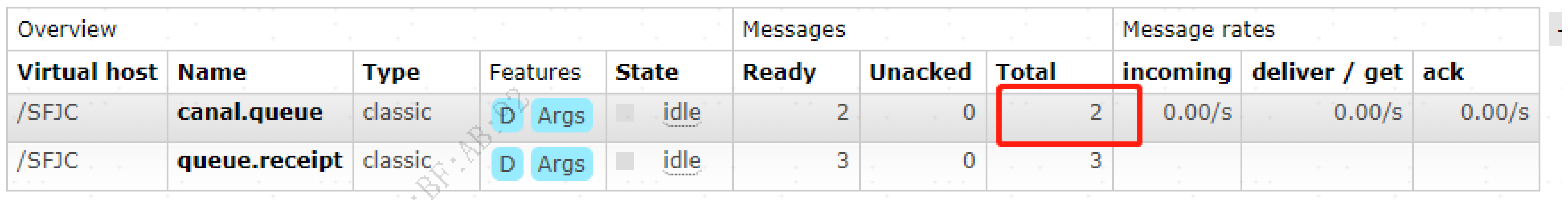
Exchange	canal.exchange
Routing Key	canal.key
Redelivered	○
Properties	
Payload 583 bytes Encoding: string	{"data":[{"id":"4","order_no":"202205270004","amount":"1000","count":"7","addr":"广州市番禺区星海学院","phone":null,"create_date":"2022-06-01 16:52:09"}],"database":"sf_mall","es":1654482521000,"id":1,"isDdl":false,"mysqlType":{"id":"int(11)","order_no"

格式化校验



```
{
    "data": [{
        "id": "4",
        "order_no": "202205270004",
        "amount": "1000",
        "count": "7",
        "addr": "广州市番禺区星海学院",
        "phone": null,
        "create_date": "2022-06-01 16:52:09"
    }],
    "database": "sf_mall",
    "es": 1654482521000,
    "id": 1,
    "isDdl": false,
    "mysqlType": {
        "id": "int(11)",
        "order_no": "varchar(20)",
        "amount": "decimal(10,0)",
        "count": "int(11)",
        "addr": "varchar(80)",
        "phone": "varchar(20)",
        "create_date": "datetime"
    },
    "old": [{
        "count": "6"
    }],
```

```
6.再修改一条数据
> update t_order set count = 5 where order_no = '202205270004';
```

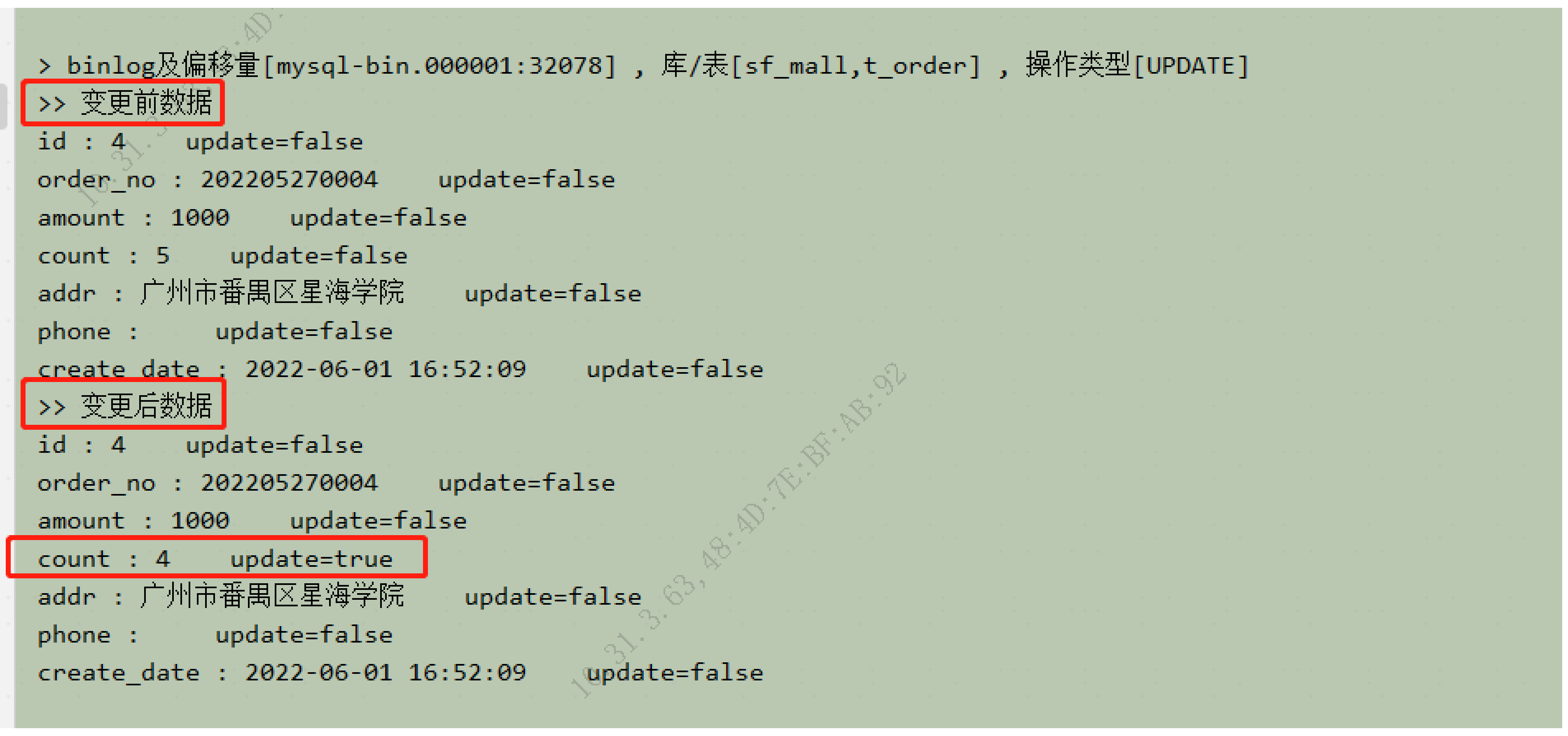


Overview					Messages			Message rates		
Virtual host	Name	Type	Features	State	Ready	Unacked	Total	incoming	deliver / get	ack
/SFJC	canal.queue	classic	D Args	idle	2	0	2	0.00/s	0.00/s	0.00/s
/SFJC	queue.receipt	classic	D Args	idle	3	0	3			

四、客户端连接

```
1.依赖
<!-- canal -->
<dependency>
```

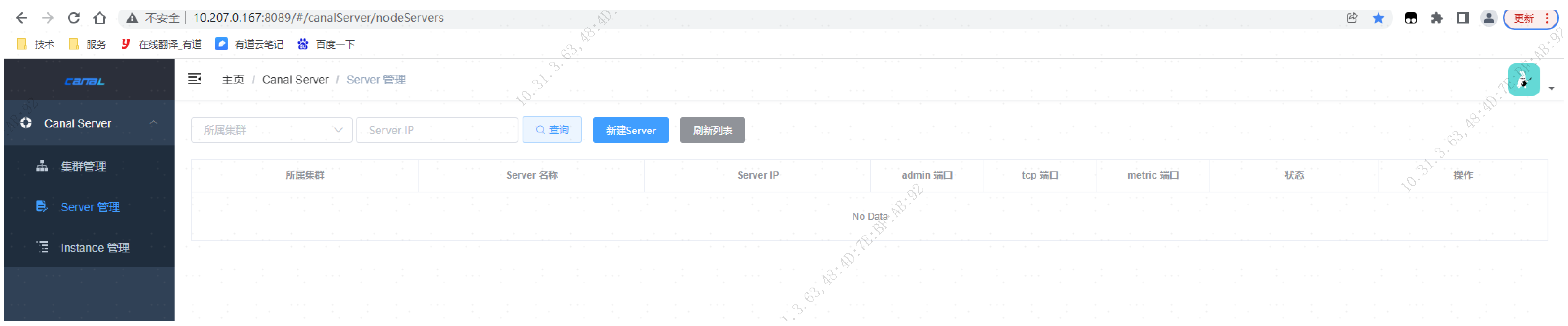
```
    <groupId>com.alibaba.otter</groupId>
    <artifactId>canal.client</artifactId>
    <version>1.1.4</version>
</dependency

2.工具类
import com.alibaba.otter.canal.client.CanalConnector;
import com.alibaba.otter.canal.client.CanalConnectors;
import com.alibaba.otter.canal.protocol.CanalEntry;
import com.alibaba.otter.canal.protocol.Message;
import org.springframework.beans.factory.InitializingBean;
import org.springframework.stereotype.Component;

import java.net.InetSocketAddress;
import java.util.List;

import static com.alibaba.otter.canal.protocol.CanalEntry.*;

/**
 * canal 拦截 mysql binlog
 */
@Component
public class CannalClient implements InitializingBean {

    private final static int BATCH_SIZE = 1000;

    @Override
    public void afterPropertiesSet() throws Exception {
        // 创建链接
        CanalConnector connector = CanalConnectors.newSingleConnector(new InetSocketAddress("10.207.0.167", 11111), "example", "canal", "canal");
        try {
            //打开连接
            connector.connect();
            //订阅数据库表,全部表
            connector.subscribe(".*\\..*");
            //回滚到未进行ack的地方，下次fetch的时候，可以从最后一个没有ack的地方开始拿
            connector.rollback();
            while (true) {
                // 获取指定数量的数据
                Message message = connector.getWithoutAck(BATCH_SIZE);

                //获取批量ID
                long batchId = message.getId();
                //获取批量的数量
                int size = message.getEntries().size();
                //如果没有数据
                if (batchId == -1 || size == 0) {
                    try {
                        //线程休眠2秒
                        Thread.sleep(2000);
                    } catch (InterruptedException e) {
                        e.printStackTrace();
                    }
                } else {
                    //如果有数据,处理数据
                    printEntry(message.getEntries());
                }
                //进行 batch id 的确认。确认之后，小于等于此 batchId 的 Message 都会被确认。
                connector.ack(batchId);
            }
        } catch (Exception e) {
            e.printStackTrace();
        } finally {
            connector.disconnect();
        }
    }

    /**
     * 打印canal server解析binlog获得的实体类信息
     */
    private static void printEntry(List<Entry> entrys) {
        for (Entry entry : entrys) {
            if (entry.getEntryType() == EntryType.TRANSACTIONBEGIN || entry.getEntryType() == EntryType.TRANSACTIONEND) {
                //开启/关闭事务的实体类型，跳过
                continue;
            }
            //RowChange对象，包含了一行数据变化的所有特征
            //比如isDdl 是否是ddl变更操作 sql 具体的ddl sql beforeColumns afterColumns 变更前后的数据字段等等
            RowChange rowChage;
            try {
                rowChage = RowChange.parseFrom(entry.getStoreValue());
            } catch (Exception e) {
                throw new RuntimeException("ERROR ## parser of eromanga-event has an error , data:" + entry.toString(), e);
            }
            //获取操作类型：insert/update/delete类型
            EventType eventType = rowChage.getEventType();
            //打印Header信息
            System.out.println();
            System.out.println(String.format("> binlog及偏移量[%s:%s] , 库/表[%s,%s] , 操作类型[%s]",
                    entry.getHeader().getLogfileName(), entry.getHeader().getLogfileOffset(),
                    entry.getHeader().getSchemaName(), entry.getHeader().getTableName(),
                    eventType));
            //判断是否是DDL语句
            if (rowChage.getIsDdl()) {
                System.out.println("> DDL sql: " + rowChage.getSql());
            }
            //获取RowChange对象里的每一行数据，打印出来
            for (CanalEntry.RowData rowData : rowChage.getRowDatasList()) {
                //删除语句
                if (eventType == EventType.DELETE) {
                    printColumn(rowData.getBeforeColumnsList());
                } else if (eventType == EventType.INSERT) {
                    printColumn(rowData.getAfterColumnsList());
                } else {
                    //变更前的数据
                    System.out.println(">> 变更前数据");
                    printColumn(rowData.getBeforeColumnsList());
                    //变更后的数据
                    System.out.println(">> 变更后数据");
                    printColumn(rowData.getAfterColumnsList());
                }
            }
        }
    }

    private static void printColumn(List<Column> columns) {
        for (Column column : columns) {
            System.out.println(column.getName() + " : " + column.getValue() + "    update=" + column.getUpdated());
        }
    }
}

3.测试
//将 canal.properties 中的 canal.serverMode = rabbitMQ 改为 canal.serverMode = tcp 后重启服务，不然代码层面监听会报异常
> update t_order set count = 4 where order_no = '202205270004';

```



```
> binlog及偏移量[mysql-bin.000001:32078] , 库/表[sf_mall,t_order] , 操作类型[UPDATE]
>> 变更前数据
id : 4    update=false
order_no : 202205270004    update=false
amount : 1000    update=false
count : 5    update=false
addr : 广州市番禺区星海学院    update=false
phone :     update=false
create_date : 2022-06-01 16:52:09    update=false
>> 变更后数据
id : 4    update=false
order_no : 202205270004    update=false
amount : 1000    update=false
count : 4    update=true
addr : 广州市番禺区星海学院    update=false
phone :     update=false
create_date : 2022-06-01 16:52:09    update=false
```

五、Admin管理界面

```
//登录密码不能少于6位，故改为123456   如果指定了数据库，以数据库里的canal_user表为准
//在Mysql中使用 select password('123456') 生成密码密文 *6BB4837EB74329105EE4568DDA7DC67ED2CA2AD9
1.启动服务并复制挂载文件
docker run --name=canal-admin -p 8089:8089 -d canal/canal-admin
mkdir -vp /home/docker/canal/admin/{conf,logs}
//docker exec -it canal-admin bash
docker cp canal-admin:/home/admin/canal-admin/conf/application.yml /home/docker/canal/admin/conf/

2.配置
【application.yml】
server:
  port: 8089  # docker启动需要单独指定，否则不生效
spring:
  jackson:
    date-format: yyyy-MM-dd HH:mm:ss
    time-zone: GMT+8

spring.datasource:
  address: 10.207.0.169:3306
  database: canal_manager
  username: root
  password: root
  driver-class-name: com.mysql.jdbc.Driver
  url: jdbc:mysql://${spring.datasource.address}/${spring.datasource.database}?useUnicode=true&characterEncoding=UTF-8&useSSL=false
  hikari:
    maximum-pool-size: 30
    minimum-idle: 1

canal:
  adminUser: admin
  adminPasswd: 123456

3.移除旧容器
docker stop canal-admin ; docker rm canal-admin

4.重新挂载启动
docker run --name=canal-admin \
-p 8089:8089 \
-e server.port=8089 \
-v /home/docker/canal/admin/conf/application.yml:/home/admin/canal-admin/conf/application.yml \
-v /home/docker/canal/admin/logs/:/home/admin/canal-admin/logs/ \
--privileged=true \
--restart=always \
--net docker-canal --ip 172.172.0.4 \
-d canal/canal-admin

5.访问admin
http://10.207.0.167:8089       // admin/123456 登录
```

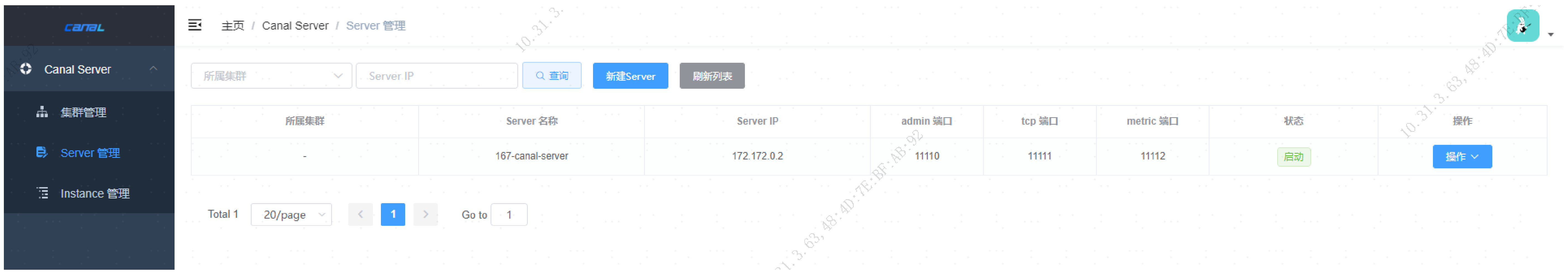

不安全 | 10.207.0.167:8089/#/canalServer/nodeServers

主页 / Canal Server / Server 管理

所属集群	Server 名称	Server IP	admin 端口	tcp 端口	metric 端口	状态	操作
No Data							

```
6.server关联admin
> vi /home/docker/canal/server/conf/canal.properties
canal.admin.register.auto = true
canal.admin.register.cluster =
canal.admin.register.name = 167-canal-server

> docker restart canal-server
```

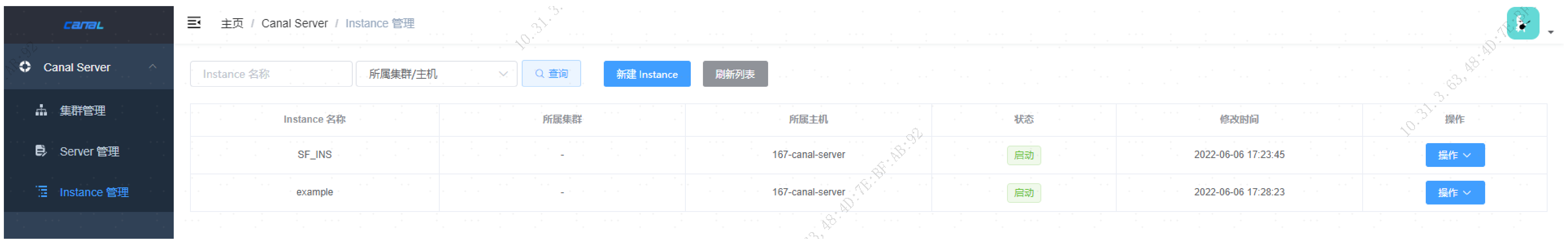
server自动注入进来


主页 / Canal Server / Server 管理

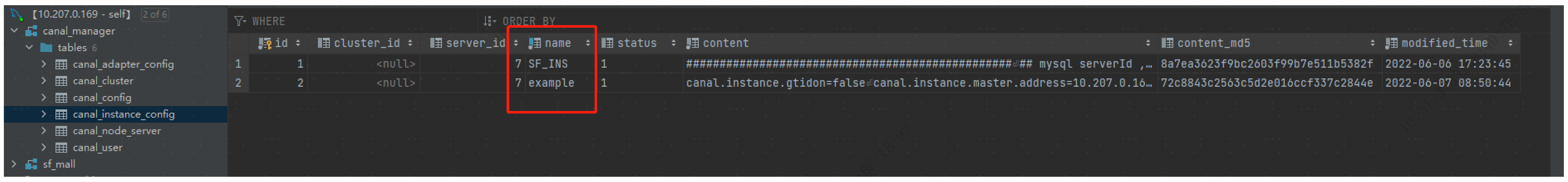
所属集群	Server 名称	Server IP	admin 端口	tcp 端口	metric 端口	状态	操作
-	167-canal-server	172.172.0.2	11110	11111	11112	启动	操作

Total 1 20/page 1 Go to 1

添加实例，一个默认，一个新增

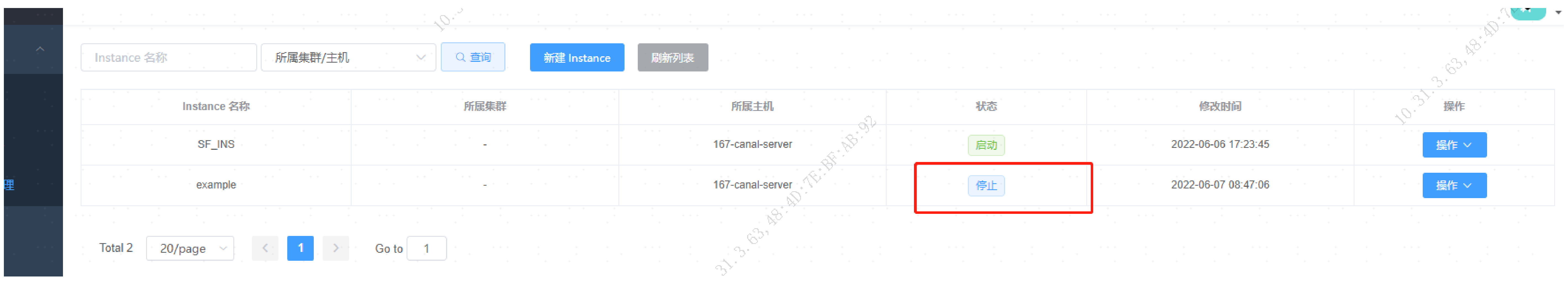

主页 / Canal Server / Instance 管理

Instance 名称	所属集群	所属主机	状态	修改时间	操作
SF_INS	-	167-canal-server	启动	2022-06-06 17:23:45	操作
example	-	167-canal-server	启动	2022-06-06 17:28:23	操作


[10.207.0.169 - self] 2 of 6
canal_manager
tables 6
canal_adapter_config
canal_cluster
canal_config
canal_instance_config
canal_node_server
canal_user
sf_mall

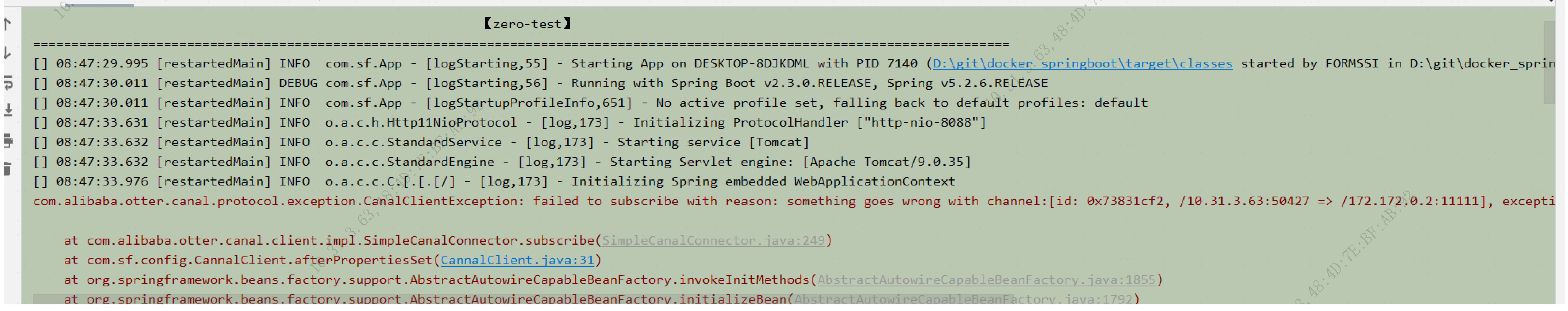
```
    id  cluster_id  server_id  name     status  content                                                            content_md5                       modified_time
1   1   <null>      7          SF_INS   1       ################################################### mysql serverId ,…  8a7ea3623f9bc2603f99b7e511b5382f  2022-06-06 17:23:45
2   2   <null>      7          example  1       canal.instance.gtidon=false canal.instance.master.address=10.207.0.16…  72c8843c2563c5d2e016ccf337c2844e  2022-06-07 08:50:44
```

关闭example实例



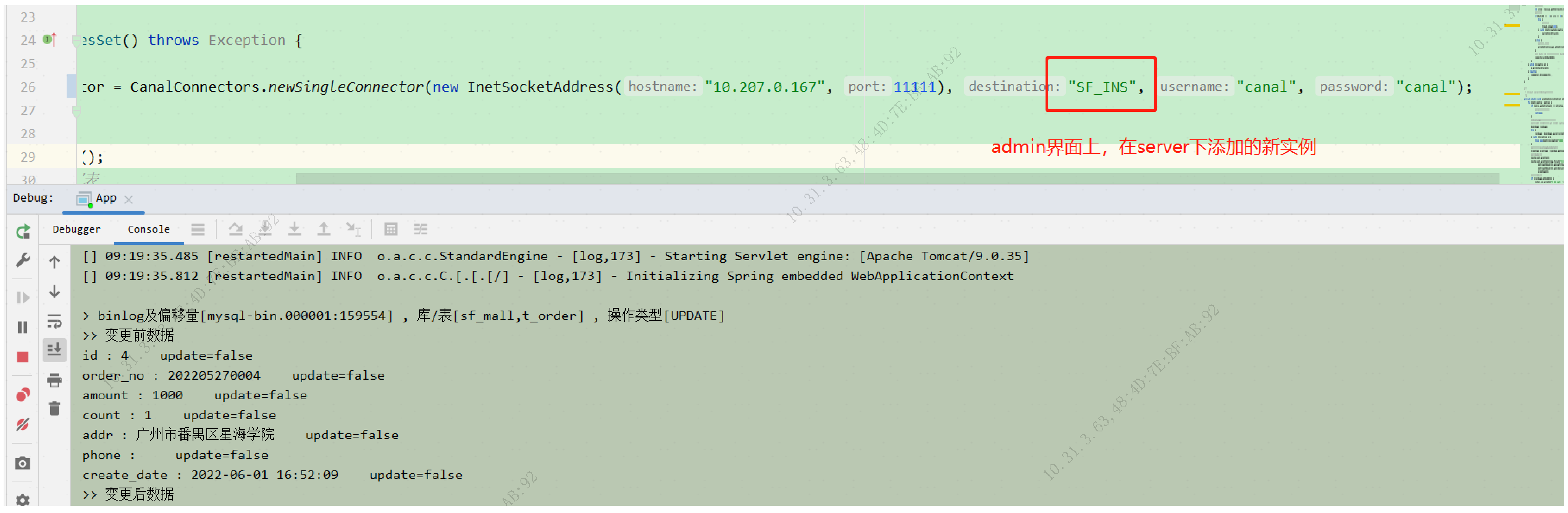
Instance 名称	所属集群	所属主机	状态	修改时间	操作
SF_INS	-	167-canal-server	启动	2022-06-06 17:23:45	操作
example	-	167-canal-server	停止	2022-06-07 08:47:06	操作

Total 2 20/page 1 Go to 1



```
                                                                    【zero-test】
============================================================================================================
[] 08:47:29.995 [restartedMain] INFO  com.sf.App - [logStarting,55] - Starting App on DESKTOP-8DJKDML with PID 7140 (D:\git\docker springboot\target\classes started by FORMSSI in D:\git\docker_sprin
[] 08:47:30.011 [restartedMain] DEBUG com.sf.App - [logStarting,56] - Running with Spring Boot v2.3.0.RELEASE, Spring v5.2.6.RELEASE
[] 08:47:30.011 [restartedMain] INFO  com.sf.App - [logStartupProfileInfo,651] - No active profile set, falling back to default profiles: default
[] 08:47:33.631 [restartedMain] INFO  o.a.c.h.Http11NioProtocol - [log,173] - Initializing ProtocolHandler ["http-nio-8088"]
[] 08:47:33.632 [restartedMain] INFO  o.a.c.c.StandardService - [log,173] - Starting service [Tomcat]
[] 08:47:33.632 [restartedMain] INFO  o.a.c.c.StandardEngine - [log,173] - Starting Servlet engine: [Apache Tomcat/9.0.35]
[] 08:47:33.976 [restartedMain] INFO  o.a.c.c.C.[.[.[/] - [log,173] - Initializing Spring embedded WebApplicationContext
com.alibaba.otter.canal.protocol.exception.CanalClientException: failed to subscribe with reason: something goes wrong with channel:[id: 0x73831cf2, /10.31.3.63:50427 => /172.172.0.2:11111], excepti

    at com.alibaba.otter.canal.client.impl.SimpleCanalConnector.subscribe(SimpleCanalConnector.java:249)
    at com.sf.config.CannalClient.afterPropertiesSet(CannalClient.java:31)
    at org.springframework.beans.factory.support.AbstractAutowireCapableBeanFactory.invokeInitMethods(AbstractAutowireCapableBeanFactory.java:1855)
    at org.springframework.beans.factory.support.AbstractAutowireCapableBeanFactory.initializeBean(AbstractAutowireCapableBeanFactory.java:1792)
```

监听新增的SF_INS实例

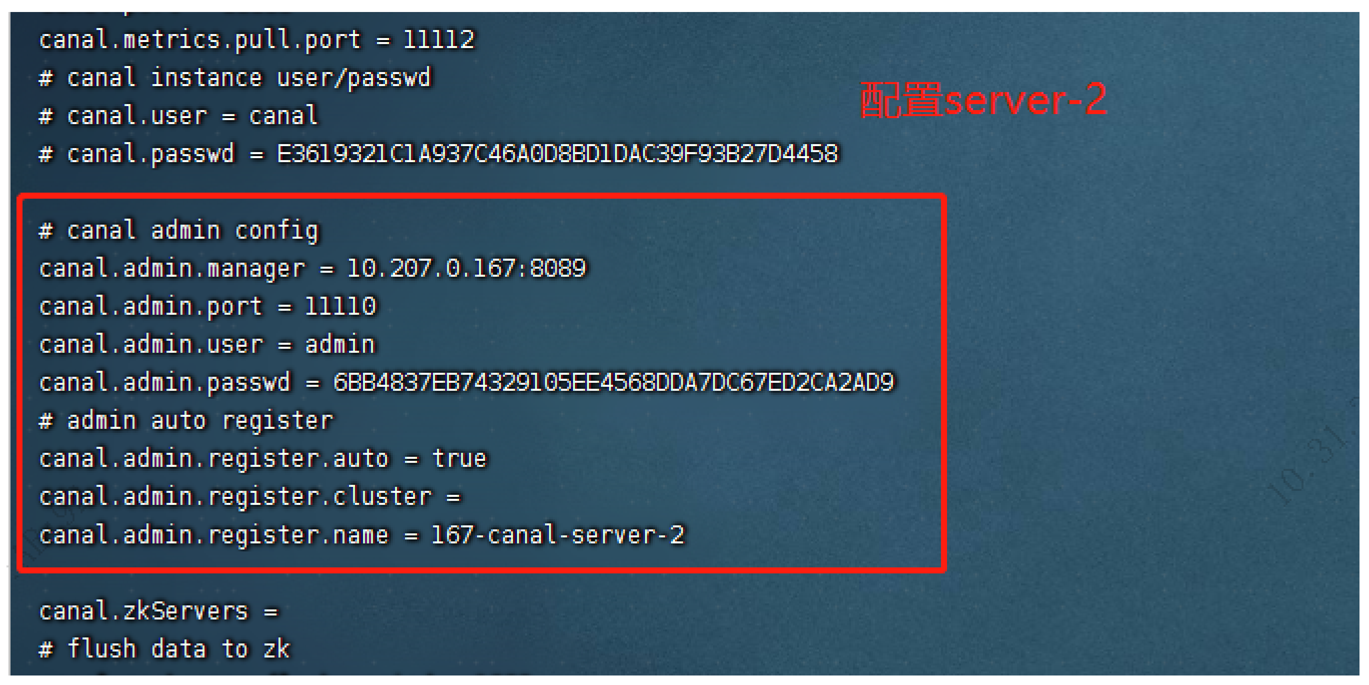


```
:esSet() throws Exception {

:or = CanalConnectors.newSingleConnector(new InetSocketAddress( hostname: "10.207.0.167",  port: 11111),  destination: "SF_INS",  username: "canal",  password: "canal");


:);
```

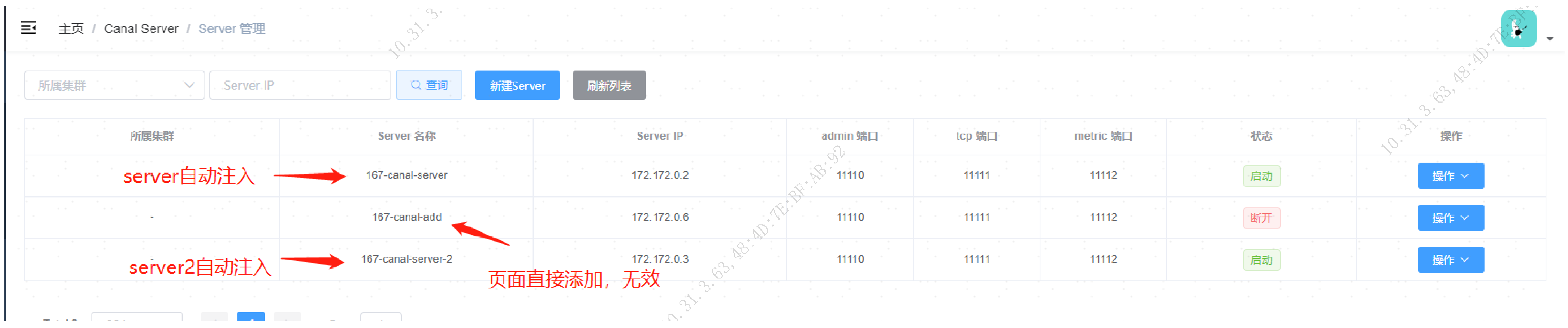
```
[] 09:19:35.485 [restartedMain] INFO  o.a.c.c.StandardEngine - [log,173] - Starting Servlet engine: [Apache Tomcat/9.0.35]
[] 09:19:35.812 [restartedMain] INFO  o.a.c.c.C.[.[.[/] - [log,173] - Initializing Spring embedded WebApplicationContext

> binlog及偏移量[mysql-bin.000001:159554] , 库/表[sf_mall,t_order] , 操作类型[UPDATE]
>> 变更前数据
id : 4     update=false
order_no : 202205270004     update=false
amount : 1000     update=false
count : 1     update=false
addr : 广州市番禺区星海学院     update=false
phone :      update=false
create_date : 2022-06-01 16:52:09     update=false
>> 变更后数据
```

六、多server容器

```
1.新增server-2容器
docker run --name canal-server-2 -p 10011:11111 --net docker-canal --ip 172.172.0.3 -d canal/canal-server
//docker stop canal-server-2 ; docker rm canal-server-2
//docker exec -it canal-server-2 bash
//cd /home/admin/canal-server/conf
//docker restart canal-server-2
```

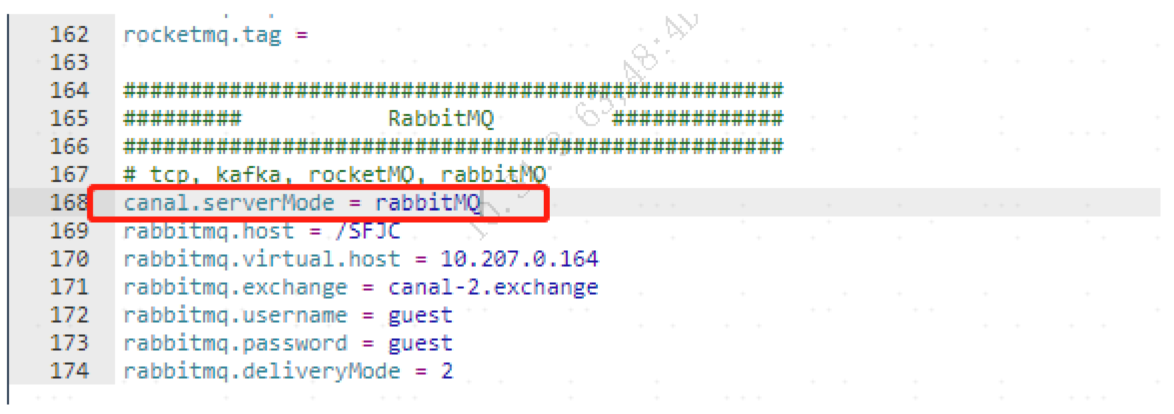


```
canal.metrics.pull.port = 11112
# canal instance user/passwd
# canal.user = canal
# canal.passwd = E3619321C1A937C46A0D8BD1DAC39F93B27D4458

# canal admin config
canal.admin.manager = 10.207.0.167:8089
canal.admin.port = 11110
canal.admin.user = admin
canal.admin.passwd = 6BB4837EB74329105EE4568DDA7DC67ED2CA2AD9
# admin auto register
canal.admin.register.auto = true
canal.admin.register.cluster =
canal.admin.register.name = 167-canal-server-2

canal.zkServers =
# flush data to zk
```

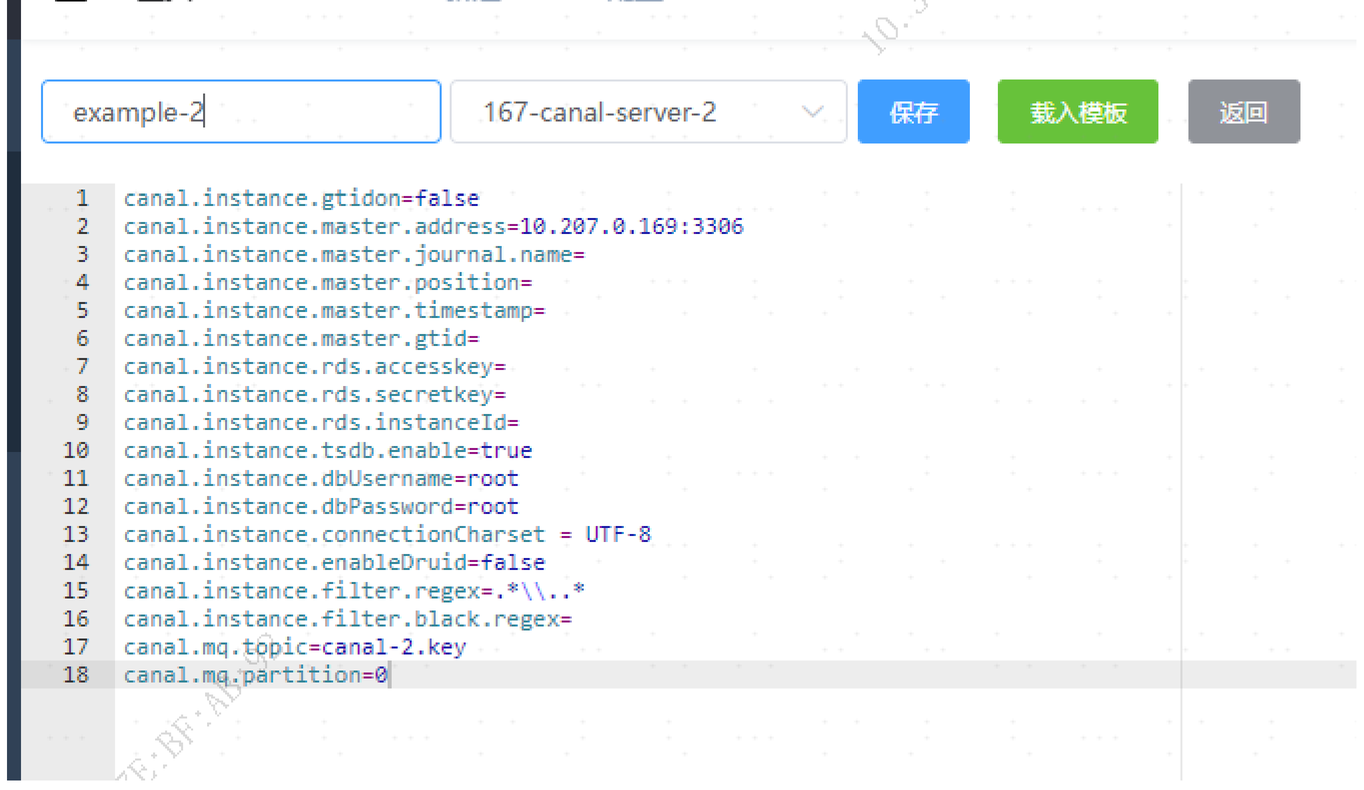


所属集群	Server 名称	Server IP	admin 端口	tcp 端口	metric 端口	状态	操作
	167-canal-server	172.172.0.2	11110	11111	11112	启动	操作
-	167-canal-add	172.172.0.6	11110	11111	11112	断开	操作
	167-canal-server-2	172.172.0.3	11110	11111	11112	启动	操作

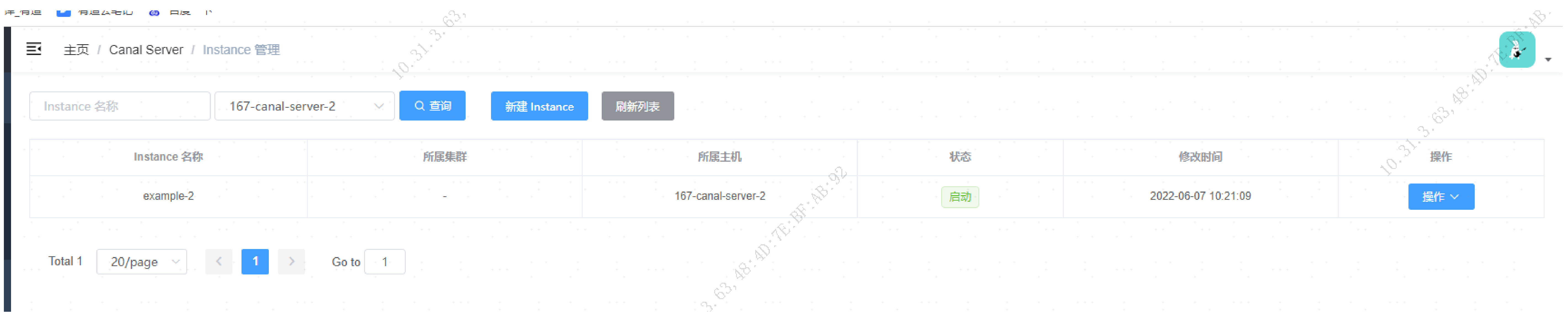
```
2.登录rabbitMQ并设置
> 在虚拟主机/SFJC下  新增队列 canal-2.queue  新增交换机 canal-2.exchange
> 绑定队列与交换机  路由键为 canal-2.key

3.在admin管理界面配置server及实例，添加MQ信息
```



```
rocketmq.tag =

##################################################
#########               RabbitMQ     #############
##################################################
# tcp, kafka, rocketMQ, rabbitMQ
canal.serverMode = rabbitMQ
rabbitmq.host = /SFJC
rabbitmq.virtual.host = 10.207.0.164
rabbitmq.exchange = canal-2.exchange
rabbitmq.username = guest
rabbitmq.password = guest
rabbitmq.deliveryMode = 2
```

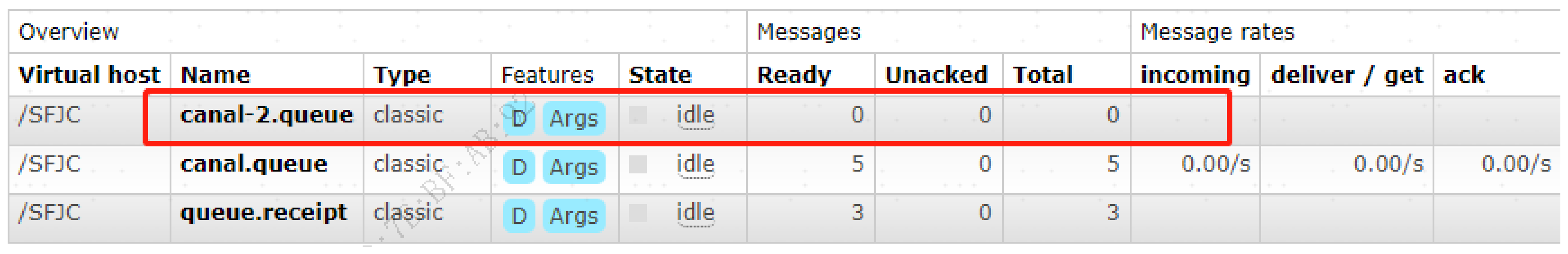


```
canal.instance.gtidon=false
canal.instance.master.address=10.207.0.169:3306
canal.instance.master.journal.name=
canal.instance.master.position=
canal.instance.master.timestamp=
canal.instance.master.gtid=
canal.instance.rds.accesskey=
canal.instance.rds.secretkey=
canal.instance.rds.instanceId=
canal.instance.tsdb.enable=true
canal.instance.dbUsername=root
canal.instance.dbPassword=root
canal.instance.connectionCharset = UTF-8
canal.instance.enableDruid=false
canal.instance.filter.regex=.*\\..*
canal.instance.filter.black.regex=
canal.mq.topic=canal-2.key
canal.mq.partition=0
```

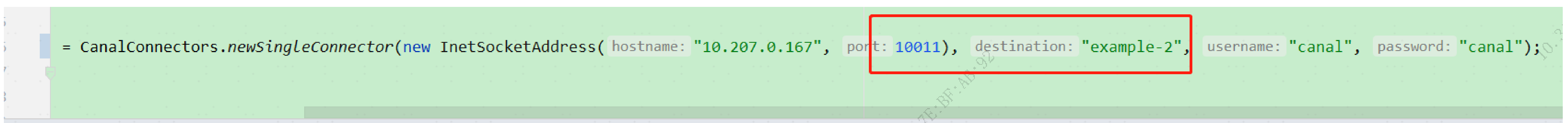


Instance 名称	所属集群	所属主机	状态	修改时间	操作
example-2	-	167-canal-server-2	启动	2022-06-07 10:21:09	操作

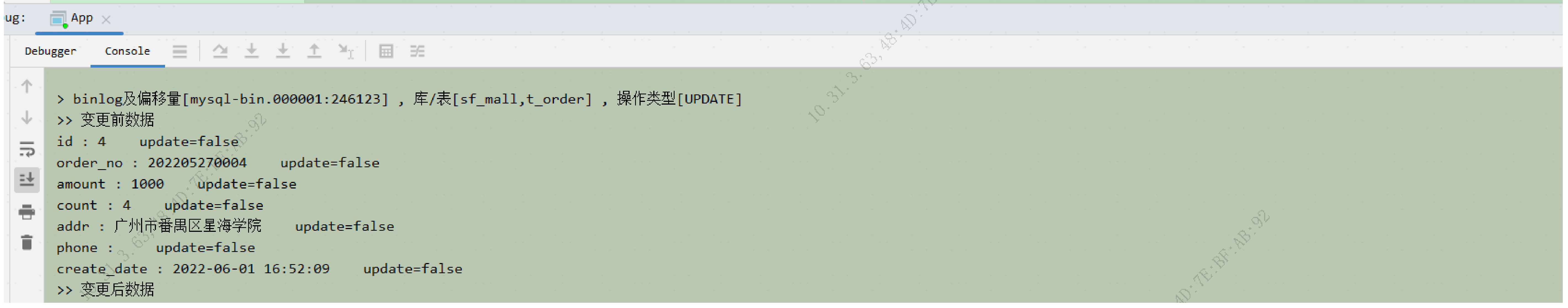
admin配置server似乎没生效，还是tcp模式



Overview					Messages			Message rates		
Virtual host	Name	Type	Features	State	Ready	Unacked	Total	incoming	deliver / get	ack
/SFJC	canal-2.queue	classic	D Args	idle	0	0	0			
/SFJC	canal.queue	classic	D Args	idle	5	0	5	0.00/s	0.00/s	0.00/s
/SFJC	queue.receipt	classic	D Args	idle	3	0	3			

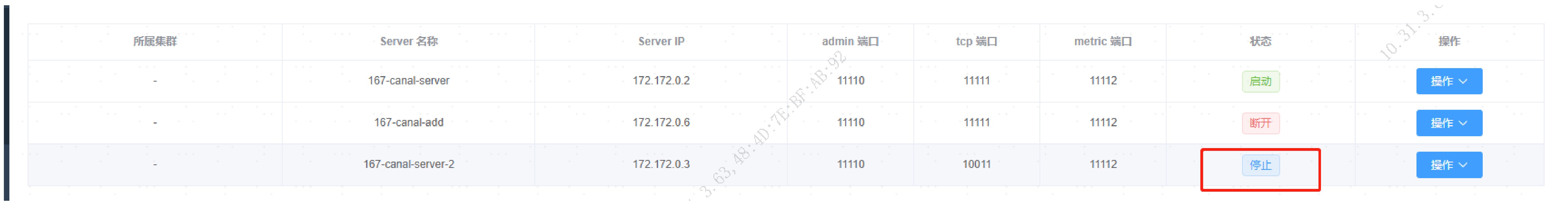


```
= CanalConnectors.newSingleConnector(new InetSocketAddress( hostname: "10.207.0.167",  port: 10011),  destination: "example-2",  username: "canal",  password: "canal");
```

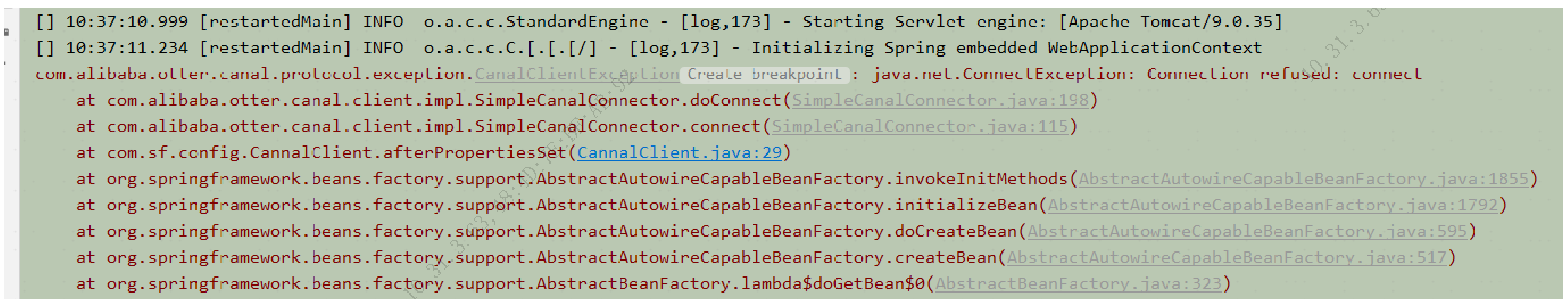


```
> binlog及偏移量[mysql-bin.000001:246123] , 库/表[sf_mall,t_order] , 操作类型[UPDATE]
>> 变更前数据
id : 4    update=false
order_no : 202205270004    update=false
amount : 1000    update=false
count : 4    update=false
addr : 广州市番禺区星海学院    update=false
phone :    update=false
create_date : 2022-06-01 16:52:09    update=false
>> 变更后数据
```

启动暂停ok

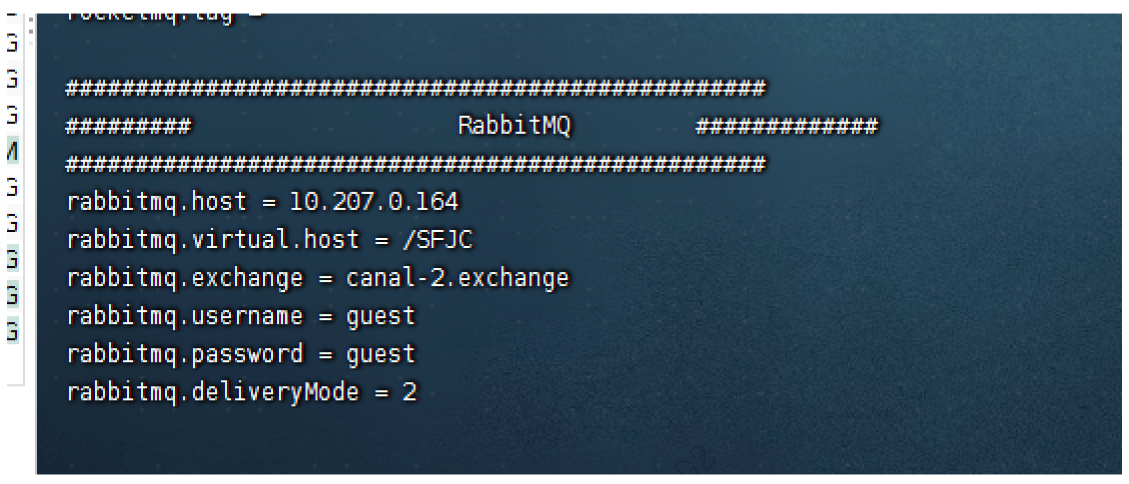


所属集群	Server 名称	Server IP	admin 端口	tcp 端口	metric 端口	状态	操作
-	167-canal-server	172.172.0.2	11110	11111	11112	启动	操作
-	167-canal-add	172.172.0.6	11110	11111	11112	断开	操作
-	167-canal-server-2	172.172.0.3	11110	10011	11112	停止	操作

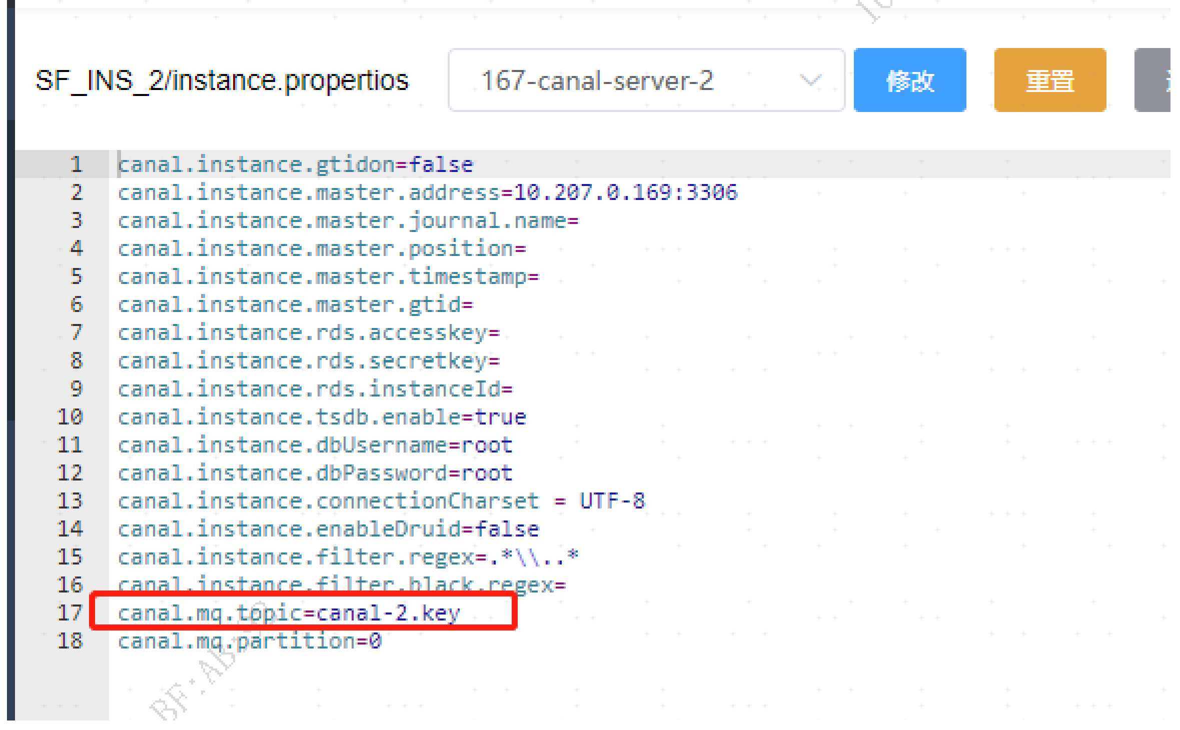


```
[] 10:37:10.999 [restartedMain] INFO  o.a.c.c.StandardEngine - [log,173] - Starting Servlet engine: [Apache Tomcat/9.0.35]
[] 10:37:11.234 [restartedMain] INFO  o.a.c.c.C.[.[.[/] - [log,173] - Initializing Spring embedded WebApplicationContext
com.alibaba.otter.canal.protocol.exception.CanalClientException Create breakpoint : java.net.ConnectException: Connection refused: connect
	at com.alibaba.otter.canal.client.impl.SimpleCanalConnector.doConnect(SimpleCanalConnector.java:198)
	at com.alibaba.otter.canal.client.impl.SimpleCanalConnector.connect(SimpleCanalConnector.java:115)
	at com.sf.config.CannalClient.afterPropertiesSet(CannalClient.java:29)
	at org.springframework.beans.factory.support.AbstractAutowireCapableBeanFactory.invokeInitMethods(AbstractAutowireCapableBeanFactory.java:1855)
	at org.springframework.beans.factory.support.AbstractAutowireCapableBeanFactory.initializeBean(AbstractAutowireCapableBeanFactory.java:1792)
	at org.springframework.beans.factory.support.AbstractAutowireCapableBeanFactory.doCreateBean(AbstractAutowireCapableBeanFactory.java:595)
	at org.springframework.beans.factory.support.AbstractAutowireCapableBeanFactory.createBean(AbstractAutowireCapableBeanFactory.java:517)
	at org.springframework.beans.factory.support.AbstractBeanFactory.lambda$doGetBean$0(AbstractBeanFactory.java:323)
```

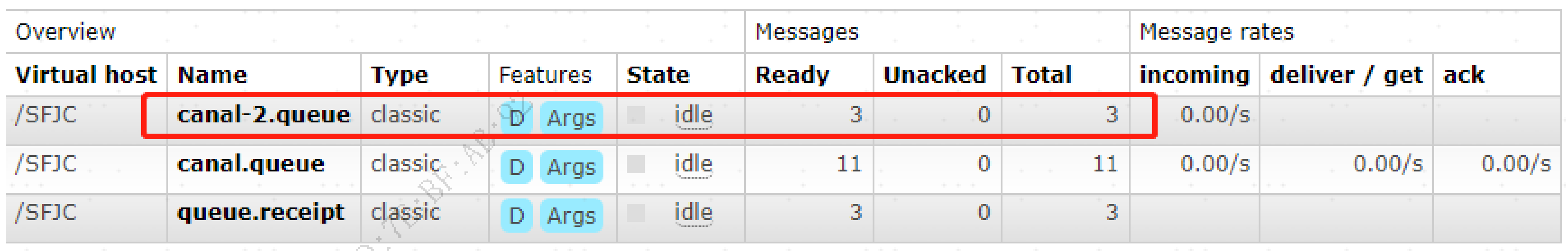
既然admin上修改canal.properties没用，那就去server容器改吧，然后在admin添加一个实例 SF_INS_2



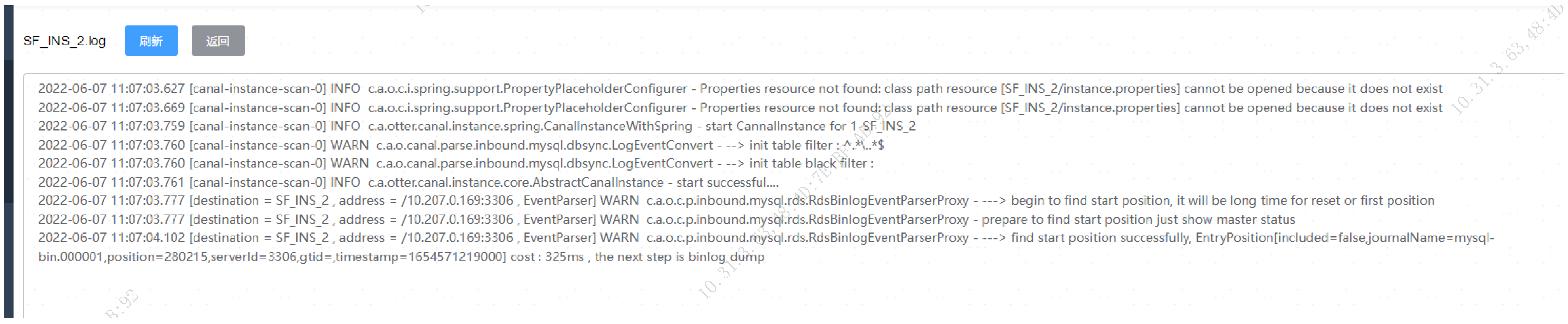
```
##################################################
#########                    RabbitMQ         #############
##################################################
rabbitmq.host = 10.207.0.164
rabbitmq.virtual.host = /SFJC
rabbitmq.exchange = canal-2.exchange
rabbitmq.username = guest
rabbitmq.password = guest
rabbitmq.deliveryMode = 2
```



```
canal.instance.gtidon=false
canal.instance.master.address=10.207.0.169:3306
canal.instance.master.journal.name=
canal.instance.master.position=
canal.instance.master.timestamp=
canal.instance.master.gtid=
canal.instance.rds.accesskey=
canal.instance.rds.secretkey=
canal.instance.rds.instanceId=
canal.instance.tsdb.enable=true
canal.instance.dbUsername=root
canal.instance.dbPassword=root
canal.instance.connectionCharset = UTF-8
canal.instance.enableDruid=false
canal.instance.filter.regex=.*\\..*
canal.instance.filter.black.regex=
canal.mq.topic=canal-2.key
canal.mq.partition=0
```

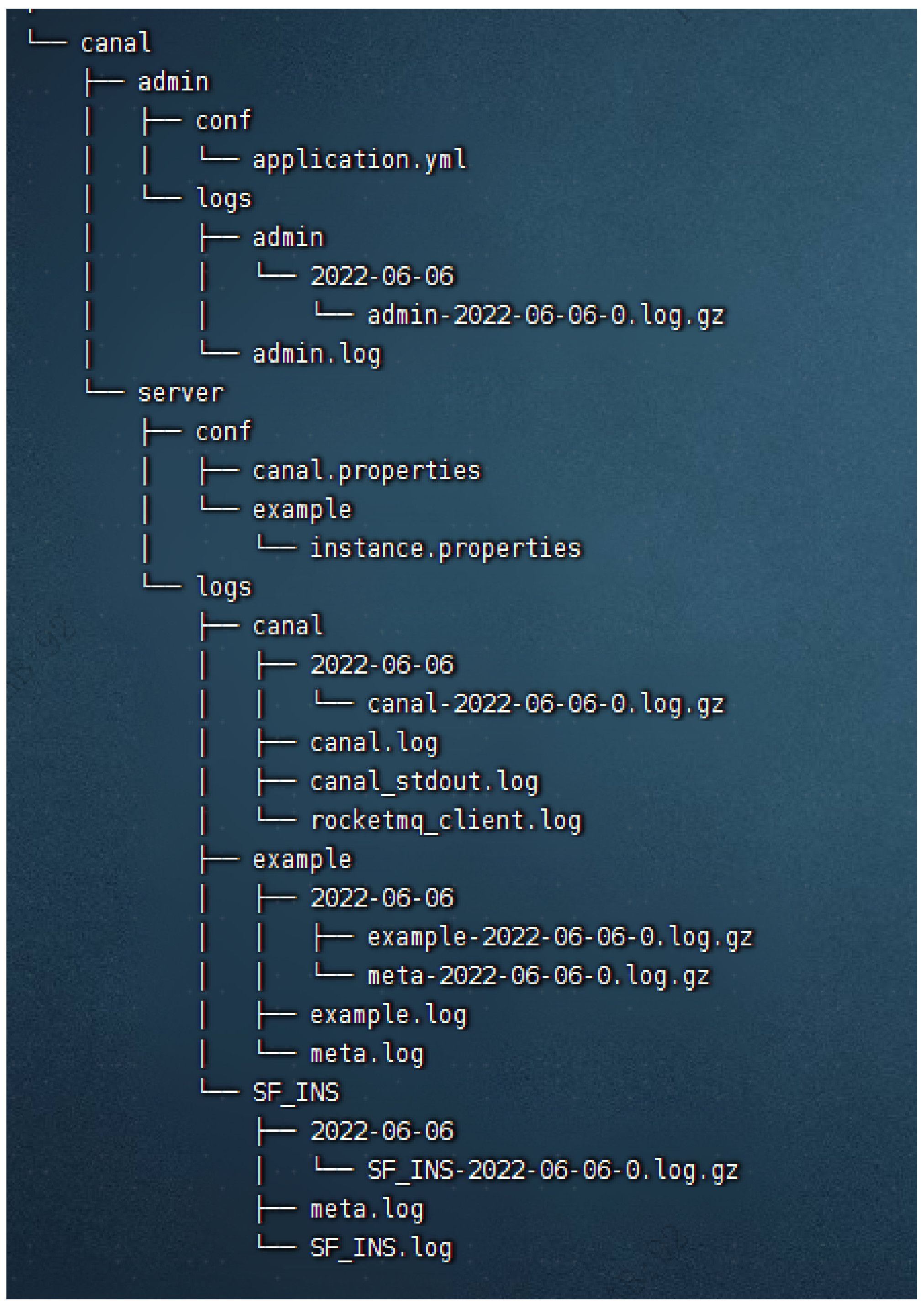


Overview					Messages			Message rates		
Virtual host	Name	Type	Features	State	Ready	Unacked	Total	incoming	deliver / get	ack
/SFJC	**canal-2.queue**	classic	D Args	idle	3	0	3	0.00/s		
/SFJC	**canal.queue**	classic	D Args	idle	11	0	11	0.00/s	0.00/s	0.00/s
/SFJC	**queue.receipt**	classic	D Args	idle	3	0	3			



```
2022-06-07 11:07:03.627 [canal-instance-scan-0] INFO  c.a.o.c.i.spring.support.PropertyPlaceholderConfigurer - Properties resource not found: class path resource [SF_INS_2/instance.properties] cannot be opened because it does not exist
2022-06-07 11:07:03.669 [canal-instance-scan-0] INFO  c.a.o.c.i.spring.support.PropertyPlaceholderConfigurer - Properties resource not found: class path resource [SF_INS_2/instance.properties] cannot be opened because it does not exist
2022-06-07 11:07:03.759 [canal-instance-scan-0] INFO  c.a.otter.canal.instance.spring.CanalInstanceWithSpring - start CannalInstance for 1-SF_INS_2
2022-06-07 11:07:03.760 [canal-instance-scan-0] WARN  c.a.o.canal.parse.inbound.mysql.dbsync.LogEventConvert - --> init table filter : ^.*\..*$
2022-06-07 11:07:03.760 [canal-instance-scan-0] WARN  c.a.o.canal.parse.inbound.mysql.dbsync.LogEventConvert - --> init table black filter :
2022-06-07 11:07:03.761 [canal-instance-scan-0] INFO  c.a.otter.canal.instance.core.AbstractCanalInstance - start successful....
2022-06-07 11:07:03.777 [destination = SF_INS_2 , address = /10.207.0.169:3306 , EventParser] WARN  c.a.o.c.p.inbound.mysql.rds.RdsBinlogEventParserProxy - ---> begin to find start position, it will be long time for reset or first position
2022-06-07 11:07:03.777 [destination = SF_INS_2 , address = /10.207.0.169:3306 , EventParser] WARN  c.a.o.c.p.inbound.mysql.rds.RdsBinlogEventParserProxy - prepare to find start position just show master status
2022-06-07 11:07:04.102 [destination = SF_INS_2 , address = /10.207.0.169:3306 , EventParser] WARN  c.a.o.c.p.inbound.mysql.rds.RdsBinlogEventParserProxy - ---> find start position successfully, EntryPosition[included=false,journalName=mysql-
bin.000001,position=280215,serverId=3306,gtid=,timestamp=1654571219000] cost : 325ms , the next step is binlog dump
```

七、Canal目录结构



```
└── canal
    ├── admin
    │   ├── conf
    │   │   └── application.yml
    │   └── logs
    │       ├── admin
    │       │   └── 2022-06-06
    │       │       └── admin-2022-06-06-0.log.gz
    │       └── admin.log
    └── server
        ├── conf
        │   ├── canal.properties
        │   └── example
        │       └── instance.properties
        └── logs
            ├── canal
            │   ├── 2022-06-06
            │   │   └── canal-2022-06-06-0.log.gz
            │   ├── canal.log
            │   ├── canal_stdout.log
            │   └── rocketmq_client.log
            ├── example
            │   ├── 2022-06-06
            │   │   ├── example-2022-06-06-0.log.gz
            │   │   └── meta-2022-06-06-0.log.gz
            │   ├── example.log
            │   └── meta.log
            └── SF_INS
                ├── 2022-06-06
                │   └── SF_INS-2022-06-06-0.log.gz
                ├── meta.log
                └── SF_INS.log
```

【最佳实践】

1. Server 可以单独启动，并配置实例

2. Server 配置 admin 相关参数，启动后自动注入到 admin 管理界面

3. Admin 新增 server 以及对自动注入的 server 修改配置都不会生效，新增实例配置没问题

4. Admin 查询 server 及实例状态、启动暂停都没问题

5. 如果对某个DB实例既要代码监听又要MQ监听，可以启动两个 server 在各自配置里指定 tcp 或 rabbitMQ 模式

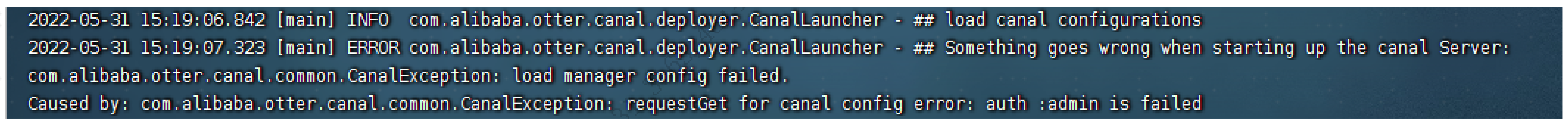
【异常】：

问题：canal容器启动失败，配置文件属于挂载外部文件，容器内没有权限读取

原因：centos7 安全子系统 Selinux 禁止了一些安全权限，导致进行挂载目录时出现这个错误

解决：可以在 docker run 命令中加入 --privileged=true 设置，给容器加上特定权限

问题：启动canal，报canal-admin密码错误



```
2022-05-31 15:19:06.842 [main] INFO  com.alibaba.otter.canal.deployer.CanalLauncher - ## load canal configurations
2022-05-31 15:19:07.323 [main] ERROR com.alibaba.otter.canal.deployer.CanalLauncher - ## Something goes wrong when starting up the canal Server:
com.alibaba.otter.canal.common.CanalException: load manager config failed.
Caused by: com.alibaba.otter.canal.common.CanalException: requestGet for canal config error: auth :admin is failed
```

原因：配置需要用 select password('xx') 生成的密文，123456 -> 6BB4837EB74329105EE4568DDA7DC67ED2CA2AD9

问题：com.alibaba.otter.canal.protocol.exception.CanalClientException: java.net.ConnectException: Connection refused: connect

原因：MQ的连接需要将 canal.properties 中的 canal.serverMode = rabbitMQ，如需代码监听 改为 canal.serverMode = tcp

问题：Caused by: java.net.BindException: Cannot assign requested address

原因：canal.ip = 10.207.0.167 绑定本机真实ip，由于docker默认网络类型为bridge，不特殊指定的话，容器内部分配的ip为172.17.0.x

解决：docker创建网桥，启动时固定容器ip，参考docker