Kafka集群搭建测试

Zookeeper安装方式有三种，单机模式和集群模式以及伪集群模式。Kafka安装包里面已经包含了Zookeeper，可以使用Kafka自带的Zookeeper而不用重新下载。

- 单节点集群：Zookeeper只运行在一台服务器上，适合测试环境；
- 伪集群模式：就是在一台物理机上运行多个Zookeeper 实例；
- 集群模式：Zookeeper运行于一个集群上，适合生产环境，这个计算机集群被称为一个“集合体”（ensemble）

1.单节点集群

1.1 如何将Kafka组成一个集群?

Kafka运行依赖于ZooKeeper，首先我们安装并启动Zooker。点击查看安装教程

1. 启动Zookeeper

```
[root@localhost apache-zookeeper-3.6.0-bin]# bin/zkServer.sh start conf/zoo_sample.cfg
ZooKeeper JMX enabled by default
Using config: conf/zoo_sample.cfg
Starting zookeeper ... STARTED
[root@localhost apache-zookeeper-3.6.0-bin]#
```

2. 再次查看是否启动成功

> 控制台输入 jps命令

```
[root@localhost apache-zookeeper-3.6.0-bin]# jps
3157 QuorumPeerMain
3293 Jps
[root@localhost apache-zookeeper-3.6.0-bin]#
```

此时可以看到Zookeeper的进程已经有了

3. 查看Zookeeper中的Broker列表

> 1. 先进入zookeeper客户端
>
> bin/zkCli.sh

> 2. 查看Zookeeper中列表
>
> ls /

```
WatchedEvent state:SyncConnected type:None path:null
[zk: localhost:2181(CONNECTED) 0] ls /
[admin, brokers, cluster, config, consumers, controller_epoch, isr_change_notification, latest_producer_
id_block, log_dir_event_notification, zookeeper]
[zk: localhost:2181(CONNECTED) 1]
```

> 3. 显示集群中的Broker列表
>
> ls /brokers/ids

```
WATCHER::

WatchedEvent state:SyncConnected type:None path:null
[zk: localhost:2181(CONNECTED) 0] ls /
[admin, brokers, cluster, config, consumers, controller_epoch, isr_change_notification, latest_producer_
id_block, log_dir_event_notification, zookeeper]
[zk: localhost:2181(CONNECTED) 1] ls /brokers/ids
[]
[zk: localhost:2181(CONNECTED) 2]
```

此时可以看到列表为空，没有任何一台broker

4.修改Kafka的server.properties配置文件，将kafka注册到Zookeeper中

修改broker.id为105

```
############################# Server Basics #############################

# The id of the broker. This must be set to a unique integer for each broker.
broker.id=105
```

修改Zookeeper连接地址

```
############################# Zookeeper #############################

# Zookeeper connection string (see zookeeper docs for details).
# This is a comma separated host:port pairs, each corresponding to a zk
# server. e.g. "127.0.0.1:3000,127.0.0.1:3001,127.0.0.1:3002".
# You can also append an optional chroot string to the urls to specify the
# root directory for all kafka znodes.
zookeeper.connect=172.18.40.107:2181

# Timeout in ms for connecting to zookeeper
zookeeper.connection.timeout.ms=6000
```

5.保存修改后的配置文件并启动

其余两台Broker依次配置并启动

成功启动如图所示：

172.18.40.105

```
Purgatory$ExpiredOperationReaper)
[2020-04-16 04:19:01,252] INFO [ExpirationReaper-105-Rebalance]: Starting (kafka.server.DelayedOperation
Purgatory$ExpiredOperationReaper)
[2020-04-16 04:19:01,261] INFO [GroupCoordinator 105]: Starting up. (kafka.coordinator.group.GroupCoordi
nator)
[2020-04-16 04:19:01,262] INFO [GroupCoordinator 105]: Startup complete. (kafka.coordinator.group.GroupC
oordinator)
[2020-04-16 04:19:01,263] INFO [GroupMetadataManager brokerId=105] Removed 0 expired offsets in 1 millis
econds. (kafka.coordinator.group.GroupMetadataManager)
[2020-04-16 04:19:01,274] INFO [ProducerId Manager 105]: Acquired new producerId block (brokerId:105,blo
ckStartProducerId:1000,blockEndProducerId:1999) by writing to Zk with path version 2 (kafka.coordinator.
transaction.ProducerIdManager)
[2020-04-16 04:19:01,298] INFO [TransactionCoordinator id=105] Starting up. (kafka.coordinator.transacti
on.TransactionCoordinator)
[2020-04-16 04:19:01,299] INFO [TransactionCoordinator id=105] Startup complete. (kafka.coordinator.tran
saction.TransactionCoordinator)
[2020-04-16 04:19:01,299] INFO [Transaction Marker Channel Manager 105]: Starting (kafka.coordinator.tra
nsaction.TransactionMarkerChannelManager)
[2020-04-16 04:19:01,326] INFO [/config/changes-event-process-thread]: Starting (kafka.common.ZkNodeChan
geNotificationListener$ChangeEventProcessThread)
[2020-04-16 04:19:01,335] INFO [SocketServer brokerId=105] Started data-plane processors for 1 acceptors
 (kafka.network.SocketServer)
[2020-04-16 04:19:01,337] INFO Kafka version: 2.2.0 (org.apache.kafka.common.utils.AppInfoParser)
[2020-04-16 04:19:01,337] INFO Kafka commitId: 05fcfde8f69b0349 (org.apache.kafka.common.utils.AppInfoPa
rser)
[2020-04-16 04:19:01,338] INFO [KafkaServer id=105] started (kafka.server.KafkaServer)
```

172.18.40.106

```
Purgatory$ExpiredOperationReaper)
[2020-04-16 04:19:00,649] INFO [GroupCoordinator 106]: Starting up. (kafka.coordinator.group.GroupCoordi
nator)
[2020-04-16 04:19:00,650] INFO [GroupCoordinator 106]: Startup complete. (kafka.coordinator.group.GroupC
oordinator)
[2020-04-16 04:19:00,651] INFO [GroupMetadataManager brokerId=106] Removed 0 expired offsets in 2 millis
econds. (kafka.coordinator.group.GroupMetadataManager)
[2020-04-16 04:19:00,662] INFO [ProducerId Manager 106]: Acquired new producerId block (brokerId:106,blo
ckStartProducerId:2000,blockEndProducerId:2999) by writing to Zk with path version 3 (kafka.coordinator.
transaction.ProducerIdManager)
[2020-04-16 04:19:00,677] INFO [TransactionCoordinator id=106] Starting up. (kafka.coordinator.transacti
on.TransactionCoordinator)
[2020-04-16 04:19:00,678] INFO [TransactionCoordinator id=106] Startup complete. (kafka.coordinator.tran
saction.TransactionCoordinator)
[2020-04-16 04:19:00,678] INFO [Transaction Marker Channel Manager 106]: Starting (kafka.coordinator.tra
nsaction.TransactionMarkerChannelManager)
[2020-04-16 04:19:00,703] INFO [/config/changes-event-process-thread]: Starting (kafka.common.ZkNodeChan
geNotificationListener$ChangeEventProcessThread)
[2020-04-16 04:19:00,713] INFO [SocketServer brokerId=106] Started data-plane processors for 1 acceptors
 (kafka.network.SocketServer)
[2020-04-16 04:19:00,716] INFO Kafka version: 2.2.0 (org.apache.kafka.common.utils.AppInfoParser)
[2020-04-16 04:19:00,716] INFO Kafka commitId: 05fcfde8f69b0349 (org.apache.kafka.common.utils.AppInfoPa
rser)
[2020-04-16 04:19:00,717] INFO [KafkaServer id=106] started (kafka.server.KafkaServer)
```

172.18.40.108

```
nator)
[2020-04-16 04:19:00,655] INFO Successfully created /controller_epoch with initial epoch 0 (kafka.zk.Kaf
kaZkClient)
[2020-04-16 04:19:00,655] INFO [GroupCoordinator 108]: Startup complete. (kafka.coordinator.group.GroupC
oordinator)
[2020-04-16 04:19:00,657] INFO [GroupMetadataManager brokerId=108] Removed 0 expired offsets in 2 millis
econds. (kafka.coordinator.group.GroupMetadataManager)
[2020-04-16 04:19:00,670] INFO [ProducerId Manager 108]: Acquired new producerId block (brokerId:108,blo
ckStartProducerId:0,blockEndProducerId:999) by writing to Zk with path version 1 (kafka.coordinator.tran
saction.ProducerIdManager)
[2020-04-16 04:19:00,690] INFO [TransactionCoordinator id=108] Starting up. (kafka.coordinator.transacti
on.TransactionCoordinator)
[2020-04-16 04:19:00,691] INFO [Transaction Marker Channel Manager 108]: Starting (kafka.coordinator.tra
nsaction.TransactionMarkerChannelManager)
[2020-04-16 04:19:00,691] INFO [TransactionCoordinator id=108] Startup complete. (kafka.coordinator.tran
saction.TransactionCoordinator)
[2020-04-16 04:19:00,716] INFO [/config/changes-event-process-thread]: Starting (kafka.common.ZkNodeChan
geNotificationListener$ChangeEventProcessThread)
[2020-04-16 04:19:00,737] INFO [SocketServer brokerId=108] Started data-plane processors for 1 acceptors
 (kafka.network.SocketServer)
[2020-04-16 04:19:00,744] INFO Kafka version: 2.2.0 (org.apache.kafka.common.utils.AppInfoParser)
[2020-04-16 04:19:00,744] INFO Kafka commitId: 05fcfde8f69b0349 (org.apache.kafka.common.utils.AppInfoPa
rser)
[2020-04-16 04:19:00,745] INFO [KafkaServer id=108] started (kafka.server.KafkaServer)
```

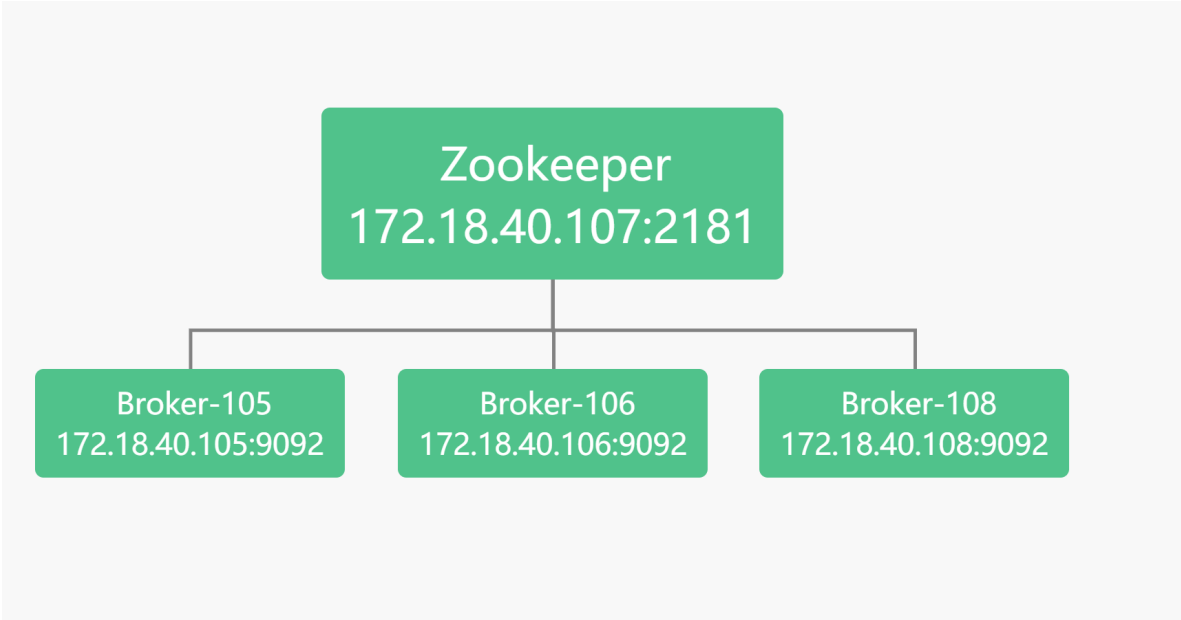
6. 查看Zookeeper中的Broker列表

> ls /brokers/ids

```
WatchedEvent state:SyncConnected type:None path:null
[zk: localhost:2181(CONNECTING) 0] ls /
[zookeeper]
[zk: localhost:2181(CONNECTED) 1] ls /brokers/ids
[105, 106, 108]
[zk: localhost:2181(CONNECTED) 2]
```

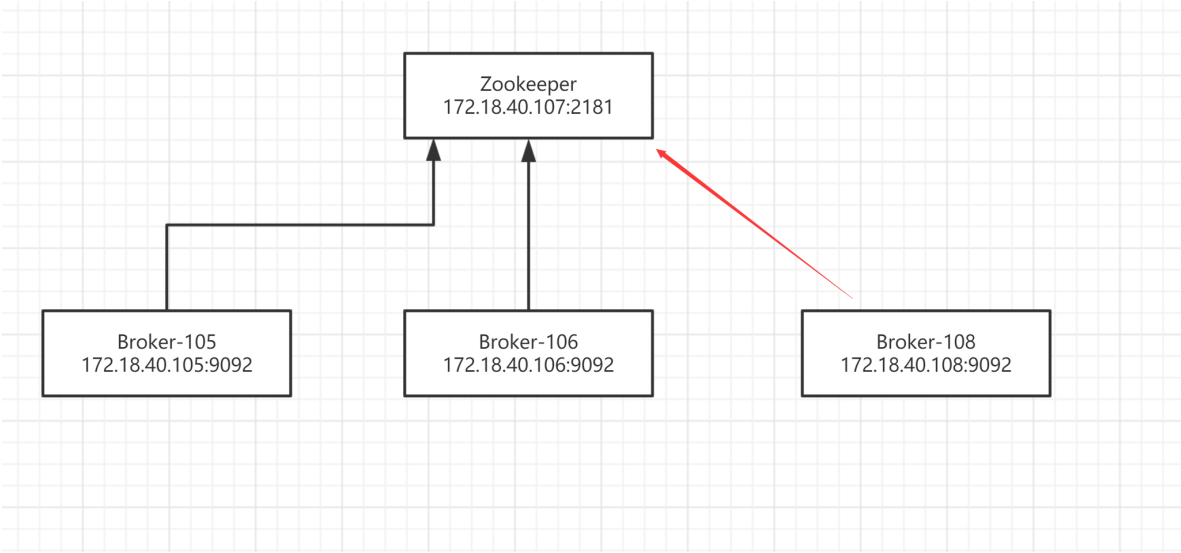
此时我们发现，zookeeper中已经有了我们3台kafka broker的id

拓扑图如图所示



1.2 kafka集群如何在线扩容?

现在有两个Broker集群，我想在线重新添加一台Broker怎么办?



1. 查看Zookeeper中Broker列表

> ls /brokers/ids

```
[zk: localhost:2181(CONNECTED) 2] ls /brokers/ids
[105, 106]
[zk: localhost:2181(CONNECTED) 3]
```

此时Zookeeper中只有2台Broker

2. 修改新添加Kafka的server.properties配置文件，将kafka注册到Zookeeper中

> 修改broker.id为108

```
############################# Server Basics #############################

# The id of the broker. This must be set to a unique integer for each broker.
broker.id=108
```

3. 修改Zookeeper连接地址

> zookeeper.connect=172.18.40.107:2181

```
############################# Zookeeper #############################

# Zookeeper connection string (see zookeeper docs for details).
# This is a comma separated host:port pairs, each corresponding to a zk
# server. e.g. "127.0.0.1:3000,127.0.0.1:3001,127.0.0.1:3002".
# You can also append an optional chroot string to the urls to specify the
# root directory for all kafka znodes.
zookeeper.connect=172.18.40.107:2181

# Timeout in ms for connecting to zookeeper
zookeeper.connection.timeout.ms=6000
```

4. 保存修改后的配置文件并启动

```
Purgatory$ExpiredOperationReaper)
[2020-04-16 04:48:04,278] INFO [ExpirationReaper-108-Rebalance]: Starting (kafka.server.DelayedOperation
Purgatory$ExpiredOperationReaper)
[2020-04-16 04:48:04,288] INFO [GroupCoordinator 108]: Starting up. (kafka.coordinator.group.GroupCoordi
nator)
[2020-04-16 04:48:04,288] INFO [GroupCoordinator 108]: Startup complete. (kafka.coordinator.group.GroupC
oordinator)
[2020-04-16 04:48:04,290] INFO [GroupMetadataManager brokerId=108] Removed 0 expired offsets in 2 millis
econds. (kafka.coordinator.group.GroupMetadataManager)
[2020-04-16 04:48:04,298] INFO [ProducerId Manager 108]: Acquired new producerId block (brokerId:108,blo
ckStartProducerId:5000,blockEndProducerId:5999) by writing to Zk with path version 6 (kafka.coordinator.
transaction.ProducerIdManager)
[2020-04-16 04:48:04,311] INFO [TransactionCoordinator id=108] Starting up. (kafka.coordinator.transacti
on.TransactionCoordinator)
[2020-04-16 04:48:04,311] INFO [Transaction Marker Channel Manager 108]: Starting (kafka.coordinator.tra
nsaction.TransactionMarkerChannelManager)
[2020-04-16 04:48:04,312] INFO [TransactionCoordinator id=108] Startup complete. (kafka.coordinator.tran
saction.TransactionCoordinator)
[2020-04-16 04:48:04,333] INFO [/config/changes-event-process-thread]: Starting (kafka.common.ZkNodeChan
geNotificationListener$ChangeEventProcessThread)
[2020-04-16 04:48:04,342] INFO [SocketServer brokerId=108] Started data-plane processors for 1 acceptors
 (kafka.network.SocketServer)
[2020-04-16 04:48:04,345] INFO Kafka version: 2.2.0 (org.apache.kafka.common.utils.AppInfoParser)
[2020-04-16 04:48:04,346] INFO Kafka commitId: 05fcfde8f69b0349 (org.apache.kafka.common.utils.AppInfoPa
rser)
[2020-04-16 04:48:04,346] INFO [KafkaServer id=108] started (kafka.server.KafkaServer)
```

5. 查看Zookeeper中的Broker列表

> ls /brokers/ids

```
[zk: localhost:2181(CONNECTED) 2] ls /brokers/ids
[105, 106]
[zk: localhost:2181(CONNECTED) 3] ls /brokers/ids
[105, 106, 108]
[zk: localhost:2181(CONNECTED) 4]
```

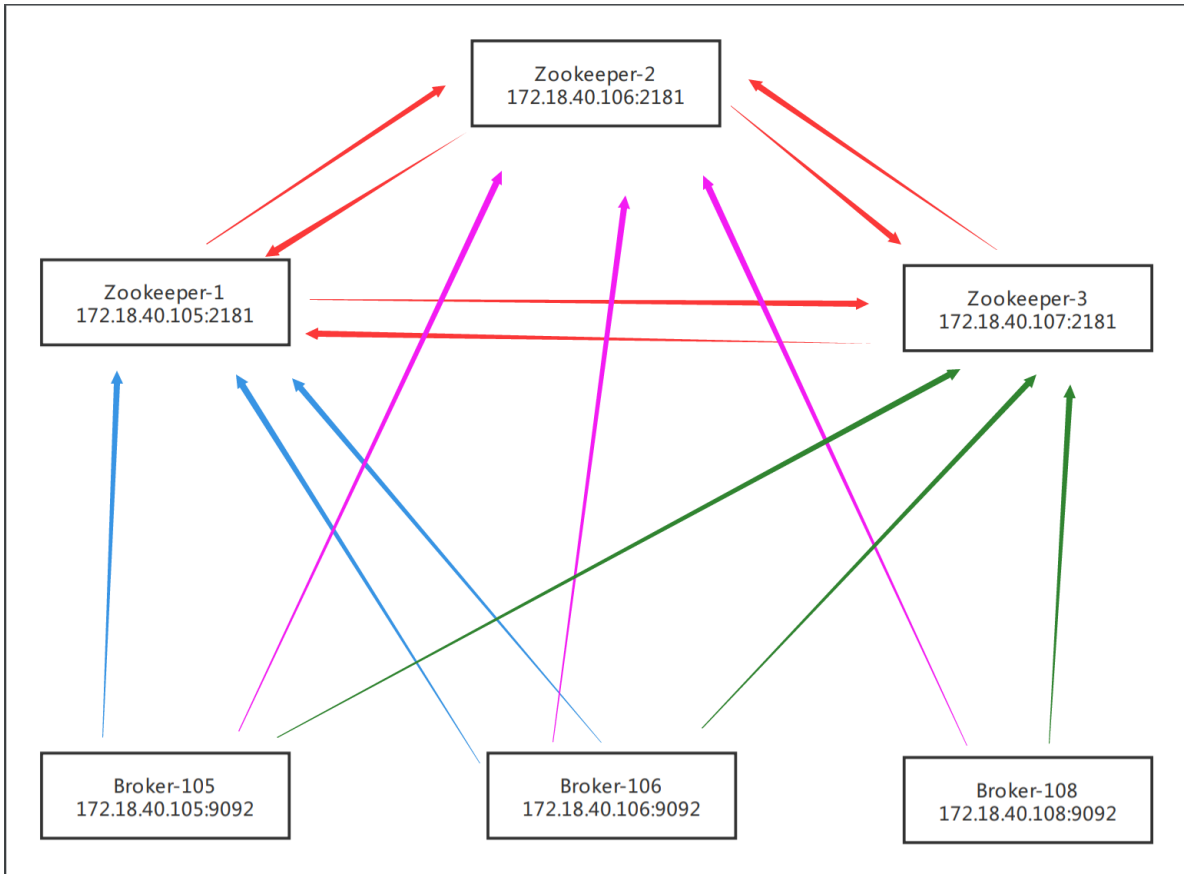
此时新添加的Broker id为108的已经成功注册到Zookeeper中

2.多节点集群

Zookeeper集群原则上需要2n+1个实例才能保证集群有效性，所以集群规模至少是3台。

多节点集群模式：Zookeeper运行于一个集群上，适合生产环境，这个计算机集群被称为一个“集合体”（ensemble）

拓扑图如下：



将3台Broker分别注册到3台不同的zookeeper中

将3台Zookeeper相互注册

2.1 如何将Kafka和Zookeeper组成多节点集群?

1. 修改Kafka的server.properties配置文件，将kafka注册到Zookeeper-1和Zookeeper-2中

多节点之间用逗号隔开

```
############################# Zookeeper #############################

# Zookeeper connection string (see zookeeper docs for details).
# This is a comma separated host:port pairs, each corresponding to a zk
# server. e.g. "127.0.0.1:3000,127.0.0.1:3001,127.0.0.1:3002".
# You can also append an optional chroot string to the urls to specify the
# root directory for all kafka znodes.
zookeeper.connect=172.18.40.105:2181,172.18.40.106:2181,172.18.40.107:2181

# Timeout in ms for connecting to zookeeper
zookeeper.connection.timeout.ms=6000
```

2. 修改Zookeeper中配置信息，将3台Zookeeper相互注册，zoo_sample.cfg 这个文件是官方给我们的zookeeper的样板文件，给他复制一份命名为zoo.cfg，zoo.cfg是官方指定的文件命名规则。

> 1. cd conf
> 2. cp zoo_sample.cfg zoo.cfg
> 3. vim zoo.cfg

```
server.1=172.18.40.105:2888:3888
server.2=172.18.40.106:2888:3888
server.3=172.18.40.107:2888:3888
#server.1 这个1是服务器的标识也可以是其他的数字， 表示这个是第几号服务器，用来标识服务器，这个标识要写到快照目录下面myid文件里
#172.18.40.105为集群里的IP地址，第一个端口是master和slave之间的通信端口，默认是2888，第二个端口是leader选举的端口，集群刚启动的时候选举或者leader挂掉之后进行新的选举的端口默认是3888
```

3. 三台服务器上分别创建myid文件

```
#server1（172.18.40.105）
1. cd /tmp/zookeeper
2. touch myid
3. echo "1">>myid

#server2（172.18.40.106）
1. cd /tmp/zookeeper
2. touch myid
3. echo "2">>myid

#server3（172.18.40.107）
1. cd /tmp/zookeeper
2. touch myid
3. echo "3">>myid
```

每台机器的myid里面的值对应server.后面的数字

4. 配置zookeeper的环境变量

> vim /etc/profile
>
> 在配置文件中添加如下配置
>
> #Zookeeper_Home
> export ZOOKEEPER_HOME=/developer/apache-zookeeper-3.6.0-bin
> export PATH=$PATH:$ZOOKEEPER_HOME/bin:$JAVA_HOME/bin
>
> 刷新配置
>
> source /etc/profile

5. 依次启动3台zookeeper集群

> bin/zkServer.sh start conf/zoo.cfg

6. 分别查看Zookeeper状态

> bin/zkServer.sh status

```
[root@localhost apache-zookeeper-3.6.0-bin]# bin/zkServer.sh status
ZooKeeper JMX enabled by default
Using config: /developer/apache-zookeeper-3.6.0-bin/bin/../conf/zoo.cfg
Client port found: 2181. Client address: localhost.
Mode: follower
[root@localhost apache-zookeeper-3.6.0-bin]#
```

此时172.18.40.105节点成为 follower

发送键盘输入的所有会话。

```
[root@localhost apache-zookeeper-3.6.0-bin]# bin/zkServer.sh status
ZooKeeper JMX enabled by default
Using config: /developer/apache-zookeeper-3.6.0-bin/bin/../conf/zoo.cfg
Client port found: 2181. Client address: localhost.
Mode: follower
[root@localhost apache-zookeeper-3.6.0-bin]#
```

172.18.40.106节点成为 follower

发送键盘输入的所有会话。

```
[root@localhost apache-zookeeper-3.6.0-bin]# bin/zkServer.sh status
ZooKeeper JMX enabled by default
Using config: /developer/apache-zookeeper-3.6.0-bin/bin/../conf/zoo.cfg
Client port found: 2181. Client address: localhost.
Mode: leader
[root@localhost apache-zookeeper-3.6.0-bin]#
```

172.18.40.107节点选举成为leader

> zk集群一般只有一个leader，多个follower，主一般是相应客户端的读写请求，而从主同步数据，当主挂掉之后就会从follower里投票选举一个leader出来。

6. 修改Kafka配置信息

> cd config
>
> vim server.properties
>
> 修改zookeeper连接地址为之前搭建好的zookeeper集群地址
>
> zookeeper.connect=172.18.40.105:2181,172.18.40.106:2181,172.18.40.107:2181

```
############################# Zookeeper #############################

# Zookeeper connection string (see zookeeper docs for details).
# This is a comma separated host:port pairs, each corresponding to a zk
# server. e.g. "127.0.0.1:3000,127.0.0.1:3001,127.0.0.1:3002".
# You can also append an optional chroot string to the urls to specify the
# root directory for all kafka znodes.
zookeeper.connect=172.18.40.105:2181,172.18.40.106:2181,172.18.40.107:2181

# Timeout in ms for connecting to zookeeper
zookeeper.connection.timeout.ms=6000
```

7. 依次修改其余几台配置

> bin/kafka-server-start.sh config/server.properties

8. 查看Zookeeper中的Broker列表

> 先进入zookeeper客户端
>
> bin/zkCli.sh
>
> 查看Zookeeper中的Broker列表
>
> ls /brokers/ids

```
WatchedEvent state:SyncConnected type:None path:null
[zk: localhost:2181(CONNECTED) 0] ls /brokers/ids
[105, 106, 108]
[zk: localhost:2181(CONNECTED) 1]
```

此时可以发现Zookeeper节点中已经有了我们注册进去的三个broker集群，依次查看其余两台zookeeper集群，查看Broker列表，可以发现三个broker集群也成功注册进去。

2.2 在多节点集群模式中，kafka集群如何在线扩容?

1. 修改新加入服务器的kafka配置文件

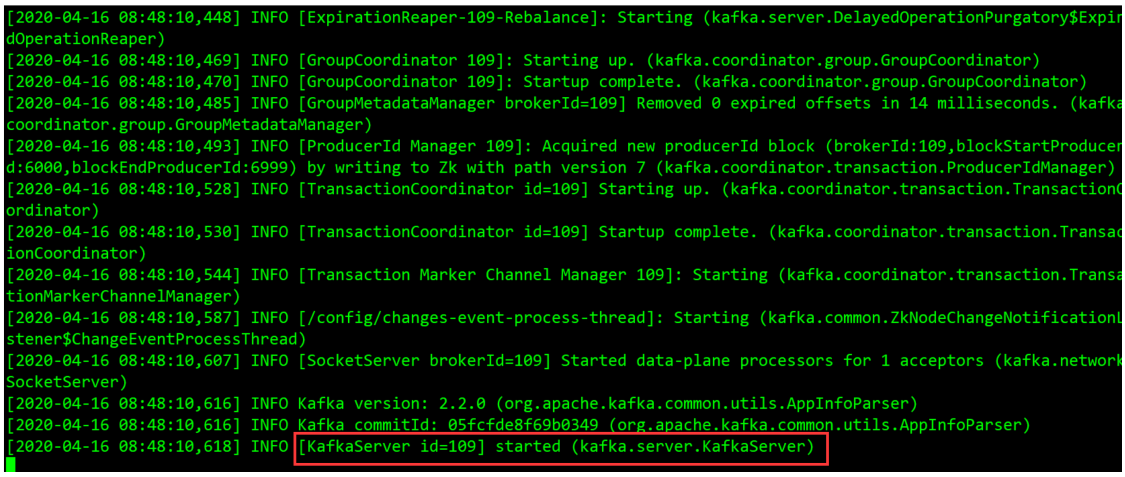
> cd config
>
> vim vim server.properties
>
> 修改kafka的broker id 命名为109
>
> broker.id=109

```
############################# Server Basics #############################

# The id of the broker. This must be set to a unique integer for each broker.
broker.id=109
```

> 修改kafka的zookeeper节点连接地址
>
> zookeeper.connect=172.18.40.105:2181,172.18.40.106:2181,172.18.40.107:2181

```
############################# Zookeeper #############################

# Zookeeper connection string (see zookeeper docs for details).
# This is a comma separated host:port pairs, each corresponding to a zk
# server. e.g. "127.0.0.1:3000,127.0.0.1:3001,127.0.0.1:3002".
# You can also append an optional chroot string to the urls to specify the
# root directory for all kafka znodes.
zookeeper.connect=172.18.40.105:2181,172.18.40.106:2181,172.18.40.107:2181
```

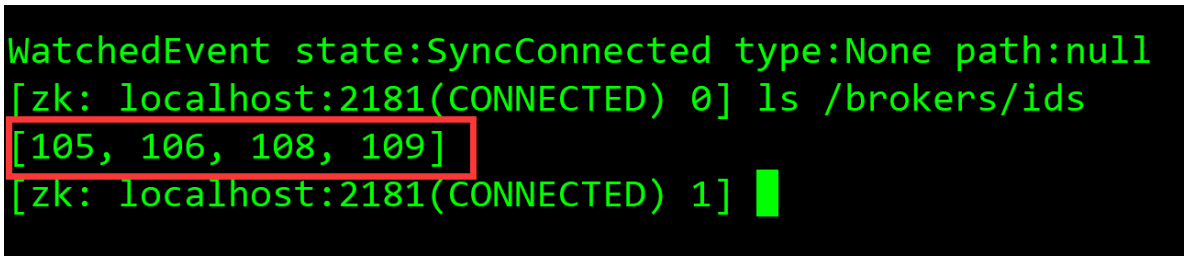
> 启动kafka
>
> bin/kafka-server-start.sh config/server.properties



此时broker id为109的kafka已经成功启动

2. 查看Zookeeper中的Broker列表

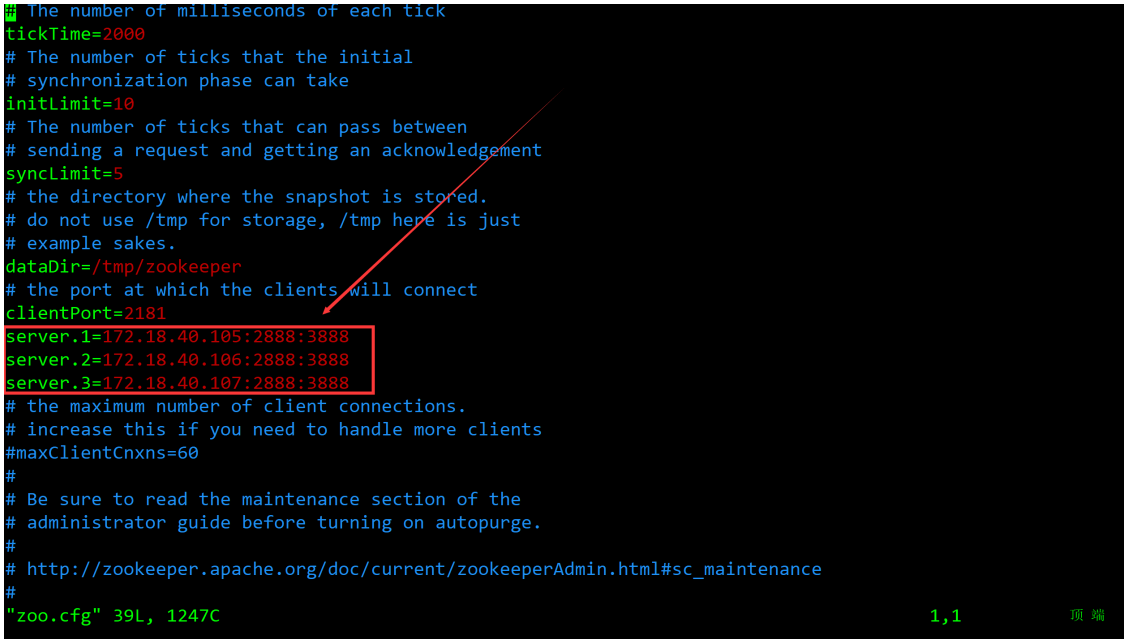
> 先进入zookeeper客户端
>
> bin/zkCli.sh
>
> 查看Zookeeper中的Broker列表
>
> ls /brokers/ids



此时我们新加入的brokers id为109的kafka已经成功注册到zookeeper集群中

2.3 在多节点集群模式中，如zookeeper集群如何在线扩容?

1. 首先stop我们的zookeeper集群
2. 按照2.1 如何将Kafka和Zookeeper组成多节点集群? 章节中，分别修改zookeeper集群中所有zookeeper中的zoo.cfg配置文件。将新添加的zookeeper连接地址添加进去



3. 在新的zookeeper下创建myid文件

> cd /tmp/zookeeper
>
> touch myid
>
> echo "4">>myid

4. 配置zookeeper的环境变量

> vim /etc/profile
>
> /mnt/d/Ubuntu/apache-zookeeper-3.5.5-bin
>
> 在配置文件中添加如下配置
>
> #Zookeeper_Home
>
> export PATH=$PATH:$JAVA_HOME/bin:$KE_HOME/bin
> export ZOOKEEPER_HOME=/developer/apache-zookeeper-3.6.0-bin
> export PATH=$PATH:$ZOOKEEPER_HOME/bin
>
> 刷新配置
>
> source /etc/profile

5. 保存退出，并依次启动全部zookeeper

> bin/zkServer.sh start conf/zoo.cfg

6. 修改Kafka配置文件

> 修改kafka的zookeeper节点连接地址
>
> zookeeper.connect=172.18.40.105:2181,172.18.40.106:2181,172.18.40.107:2181,新的zookeeper节点地址

7. 保存退出，并依次启动全部kafka集群

> bin/kafka-server-start.sh config/server.properties

8. 依次查看zookeeper中的broker列表

> 先进入zookeeper客户端
>
> bin/zkCli.sh
>
> 查看Zookeeper中的Broker列表

```
ls /brokers/ids
```

9. 查看新加入的zookeeper状态是否扩容成功

```
bin/zkServer.sh status
```