CentOS 6.5 MySQL 5.6 MHA高可用测试笔记V2.0

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# 环境描述

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| --- | --- | --- | --- | --- |
| 主机名 | 操作系统 | IP地址 | 角色 | 数据库 |
| Manager | CentOS6.5 | 192.168.9.101 | Mha管理节点 |  |
| Master | CentOS6.5 | 192.168.9.102:3306 | Mha主节点 | MySQL5.6.22 |
| Slave | CentOS6.5 | 192.168.9.103:3306 | Mha备节点 | MySQL5.6.22 |
| Slave2 | CentOS6.5 | 192.168.9.104:3306 | Mha备节点 | MySQL5.6.22 |
|  |  | 192.168.9.120 | VIP |  |

主从复制相关用户：

|  |  |
| --- | --- |
| 用户名 | 口令 |
| mha | 123456 |
| myrpl | 123456 |

# 二、测试场景

五种场景：

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| --- | --- |
| 序号 | 测试场景 |
| 1 | 主库宕机,mha是否会正常切换 |
| 2 | gtid一致时，切换 |
| 3 | gtid不一致时切换-->演示  从库执行 create database mha1; |
| 4 | 不小心在主库执行了reset master，怎么办? |
| 5 | 如果切换前，数据不一致，切换后报 1062 ，如何补齐数据 ?  **提示：**  /home/mysql/mysql3502/bin/mysqldump --defaults-file=/home/mysql/mysql3502/etc/root.cnf --set-gtid-purged=OFF \  --single-transaction sop\_admin  > sop\_admin.sql    start slave until SQL\_BEFORE\_GTIDS ='5c580bf9-0161-4e14-943b-751a3a09508b:376093077'; |

# 三、在线切换流程

3.1 切换前的准备工作

检查从库GTID是否和主库一致，一致，不必修改。不一致，修改为和主库一致。

（1）查看当前数据库的uuid

show global variables like 'server\_uuid';

| server\_uuid | b92a2499-f44a-11e7-912d-005056a36ca7 |

（2）查看当前主库GTID：  
show master status\G

Executed\_Gtid\_Set: 2cb7f07d-[f448-11e7-911d-005056a30c6f:1-8](http://f448-11e7-911d-005056a30c6f:1-8/),  
[b92a2499-f44a-11e7-912d-005056a36ca7:1-5](http://b92a2499-f44a-11e7-912d-005056a36ca7:1-5/)

（3）检查从库GTID:  
show slave status \G

Executed\_Gtid\_Set: 2cb7f07d-[f448-11e7-911d-005056a30c6f:1-9](http://f448-11e7-911d-005056a30c6f:1-9/),  
[b92a2499-f44a-11e7-912d-005056a36ca7:1-5](http://b92a2499-f44a-11e7-912d-005056a36ca7:1-5/)

（4）比对从库除主库GTID行外，其他项是否一致，如不一致，修改为一致  
譬如上例 修改 (...0c6f:1-9) 为 (...0c6f:1-8)  
具体操作如下(从库执行，主库不执行任何操作):

stop slave;  
reset master;

SET GLOBAL gtid\_purged="2cb7f07d-[f448-11e7-911d-005056a30c6f:1-8](http://f448-11e7-911d-005056a30c6f:1-8/),  
[b92a2499-f44a-11e7-912d-005056a36ca7:1-5](http://b92a2499-f44a-11e7-912d-005056a36ca7:1-5/)";

CHANGE MASTER TO MASTER\_HOST='10.143.225.81', MASTER\_PORT=3308, MASTER\_AUTO\_POSITION=1;  
start slave;  
show slave status\G

3.2 在线切换VIP

（1）检查当前同步是否正常  
（2）停止mha-helper  
（3）在线切换  
（4）启动mha-helper

# supervisorctl status

# sh /home/dba/mha/bin/check\_rpl.sh 3308 wxytest2

# supervisorctl stop [mha:mha\_wxytest2\_3308](http://mhamha_wxytest2_3308/)

# sh /home/dba/mha/bin/switch\_over.sh 3308 wxytest2

# supervisorctl start [mha:mha\_wxytest2\_3308](http://mhamha_wxytest2_3308/)

# 四、测试日志

4.1 主库宕机,mha是否会正常切换(故障转移)

### 4.1.1 过程描述

（1）实验环境

|  |  |
| --- | --- |
| 主库 | 192.168.9.102 |
| 从库 | 192.168.9.103，192.168.9.104 |
| VIP | 192.168.9.120（在主库上） |

（2）实验步骤

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| --- | --- | --- |
| 序号 | 操作节点 | 操作内容描述 |
| 1 | 主库：192.168.9.102 | 模拟主库执行进行大量事务。  kill -9 杀掉主库mysql进程,模拟主库异常终止。 |
| 2 | 主库：192.168.9.102/master  从库：192.168.9.103/slave  192.168.9.104/slave2 | 查看mha是否进行了故转移操作，当前主库应该是192.168.9.103，当前从库：192.168.9.104。原主库：192.168.9.102，已移出mha集群中。 |
| 3 | 失败主库：192.168.9.102 | 从mysql错误日志中查找失败前最新的GTID  重建主从关系，跳过失败主库已执行过的GTID  启动从库线程 |

### 4.1.2 操作步骤

步骤一：登陆主库，查看当前主库信息

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| --- |
| su - mysql  mysql3306  #查看当前主库的UUID值  mysql> show global variables like 'server\_uuid';  +---------------+--------------------------------------+  | Variable\_name | Value |  +---------------+--------------------------------------+  | server\_uuid | 92f6e6cb-f84f-11e7-ab62-000c291dadaa |  +---------------+--------------------------------------+  1 row in set (0.00 sec)  #查看当前主库的GTID  mysql> show master status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  File: mysql\_bin.000003  Position: 191  Binlog\_Do\_DB:  Binlog\_Ignore\_DB:  Executed\_Gtid\_Set: 92f6e6cb-f84f-11e7-ab62-000c291dadaa:1-21  1 row in set (0.00 sec)  # 关闭主库，模拟主库异常【操作序号：005】  /opt/mysql56/bin/mysqladmin --socket=/data/mysql3308/data/mysql.sock --port=3308 shutdown  # 启动关闭的主库,查看状态，依然是主库【操作序号：007】  su - mysql  /opt/mysql56/bin/mysqld --defaults-file=/data/mysql3308/conf/my.cnf &  mysql> show master status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  File: mysql-bin.000010  Position: 231  Binlog\_Do\_DB:  Binlog\_Ignore\_DB:  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-8,  b92a2499-f44a-11e7-912d-005056a36ca7:1-5  1 row in set (0.00 sec)  #此这种情况下，需要修复失败的主库，可以通过离线，或在线方式重新失败的主库。 |

步骤二：登陆从库slave查看从库信息

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| --- |
| #登陆从库10.143.225.81查看当前数据库的UUID  /opt/mysql56/bin/mysql -uroot --socket=/data/mysql3308/data/mysql.sock --port=3308  mysql> show global variables like 'server\_uuid';  +---------------+--------------------------------------+  | Variable\_name | Value |  +---------------+--------------------------------------+  | server\_uuid | b92a2499-f44a-11e7-912d-005056a36ca7 |  +---------------+--------------------------------------+  1 row in set (0.00 sec) |

### （2）登陆从库操作

|  |
| --- |
| #查看当前数据库的UUID【操作序号：003】  /opt/mysql56/bin/mysql -uroot --socket=/data/mysql3308/data/mysql.sock --port=3308  mysql> show global variables like 'server\_uuid';  +---------------+--------------------------------------+  | Variable\_name | Value |  +---------------+--------------------------------------+  | server\_uuid | b92a2499-f44a-11e7-912d-005056a36ca7 |  +---------------+--------------------------------------+  1 row in set (0.00 sec)  #检查从库GTID: 【操作序号：004】  show slave status \G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Slave\_IO\_State: Waiting for master to send event  Master\_Host: 10.143.225.81  Master\_User: myrpl  Master\_Port: 3308  Connect\_Retry: 60  Master\_Log\_File: mysql-bin.000009  Read\_Master\_Log\_Pos: 231  Relay\_Log\_File: mha-master-relay-bin.000006  Relay\_Log\_Pos: 361  Relay\_Master\_Log\_File: mysql-bin.000009  Slave\_IO\_Running: Yes  Slave\_SQL\_Running: Yes  Replicate\_Do\_DB:  Replicate\_Ignore\_DB:  Replicate\_Do\_Table:  Replicate\_Ignore\_Table:  Replicate\_Wild\_Do\_Table:  Replicate\_Wild\_Ignore\_Table:  Last\_Errno: 0  Last\_Error:  Skip\_Counter: 0  Exec\_Master\_Log\_Pos: 231  Relay\_Log\_Space: 617  Until\_Condition: None  Until\_Log\_File:  Until\_Log\_Pos: 0  Master\_SSL\_Allowed: No  Master\_SSL\_CA\_File:  Master\_SSL\_CA\_Path:  Master\_SSL\_Cert:  Master\_SSL\_Cipher:  Master\_SSL\_Key:  Seconds\_Behind\_Master: 0  Master\_SSL\_Verify\_Server\_Cert: No  Last\_IO\_Errno: 0  Last\_IO\_Error:  Last\_SQL\_Errno: 0  Last\_SQL\_Error:  Replicate\_Ignore\_Server\_Ids:  Master\_Server\_Id: 81  Master\_UUID: b92a2499-f44a-11e7-912d-005056a36ca7  Master\_Info\_File: mysql.slave\_master\_info  SQL\_Delay: 0  SQL\_Remaining\_Delay: NULL  Slave\_SQL\_Running\_State: Slave has read all relay log; waiting for the slave I/O thread to update it  Master\_Retry\_Count: 86400  Master\_Bind:  Last\_IO\_Error\_Timestamp:  Last\_SQL\_Error\_Timestamp:  Master\_SSL\_Crl:  Master\_SSL\_Crlpath:  Retrieved\_Gtid\_Set:  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-8,  b92a2499-f44a-11e7-912d-005056a36ca7:1-5  Auto\_Position: 1  1 row in set (0.00 sec)  # 查看MySQL主从是否正常切换，现在的从库变为主库【操作序号：005】  mysql> show master status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  File: mysql-bin.000003  Position: 231  Binlog\_Do\_DB:  Binlog\_Ignore\_DB:  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-8,  b92a2499-f44a-11e7-912d-005056a36ca7:1-5  1 row in set (0.00 sec)  #检查VIP已成功飘移到新主库了  root@mha-master ~]# ip addr  1: lo: <LOOPBACK,UP,LOWER\_UP> mtu 16436 qdisc noqueue state UNKNOWN  link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00  inet 127.0.0.1/8 scope host lo  inet6 ::1/128 scope host  valid\_lft forever preferred\_lft forever  2: eth0: <BROADCAST,MULTICAST,UP,LOWER\_UP> mtu 1500 qdisc pfifo\_fast state UP qlen 1000  link/ether 00:50:56:a3:0c:6f brd ff:ff:ff:ff:ff:ff  inet 10.143.225.80/24 brd 10.143.225.255 scope global eth0  inet 10.143.225.90/24 scope global secondary eth0  inet6 fe80::250:56ff:fea3:c6f/64 scope link |

### （3）修复失败主库

|  |
| --- |
| #在失败主库上操作(10.143.225.81)：建立主从复制关系  reset slave;  reset master;  change master to  master\_host='10.143.225.80',  master\_port=3308,  master\_user='myrpl',  master\_password=' MzQxYjU5NzNlMTk3',  master\_auto\_position=1;  SET GLOBAL gtid\_purged='2cb7f07d-f448-11e7-911d-005056a30c6f:1-8';  start slave;  出错：  Last\_IO\_Error: Got fatal error 1236 from master when reading data from binary log: 'The slave is connecting using CHANGE MASTER TO MASTER\_AUTO\_POSITION = 1, but the master has purged binary logs containing GTIDs that the slave requires.' |
| 解决：需要跳过主库查询出来的所有GTID  stop slave;  reset slave;  reset master;  SET GLOBAL gtid\_purged='2cb7f07d-f448-11e7-911d-005056a30c6f:1-8,b92a2499-f44a-11e7-912d-005056a36ca7:1-5';  change master to  master\_host='10.143.225.80',  master\_port=3308,  master\_user='myrpl',  master\_password='MzQxYjU5NzNlMTk3',  master\_auto\_position=1;  start slave;  mysql> show slave status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Slave\_IO\_State: Waiting for master to send event  Master\_Host: 10.143.225.80  Master\_User: myrpl  Master\_Port: 3308  Connect\_Retry: 60  Master\_Log\_File: mysql-bin.000003  Read\_Master\_Log\_Pos: 231  Relay\_Log\_File: mha-slave-relay-bin.000002  Relay\_Log\_Pos: 361  Relay\_Master\_Log\_File: mysql-bin.000003  Slave\_IO\_Running: Yes  Slave\_SQL\_Running: Yes  Replicate\_Do\_DB:  Replicate\_Ignore\_DB:  Replicate\_Do\_Table:  Replicate\_Ignore\_Table:  Replicate\_Wild\_Do\_Table:  Replicate\_Wild\_Ignore\_Table:  Last\_Errno: 0  Last\_Error:  Skip\_Counter: 0  Exec\_Master\_Log\_Pos: 231  Relay\_Log\_Space: 569  Until\_Condition: None  Until\_Log\_File:  Until\_Log\_Pos: 0  Master\_SSL\_Allowed: No  Master\_SSL\_CA\_File:  Master\_SSL\_CA\_Path:  Master\_SSL\_Cert:  Master\_SSL\_Cipher:  Master\_SSL\_Key:  Seconds\_Behind\_Master: 0  Master\_SSL\_Verify\_Server\_Cert: No  Last\_IO\_Errno: 0  Last\_IO\_Error:  Last\_SQL\_Errno: 0  Last\_SQL\_Error:  Replicate\_Ignore\_Server\_Ids:  Master\_Server\_Id: 1  Master\_UUID: 2cb7f07d-f448-11e7-911d-005056a30c6f  Master\_Info\_File: mysql.slave\_master\_info  SQL\_Delay: 0  SQL\_Remaining\_Delay: NULL  Slave\_SQL\_Running\_State: Slave has read all relay log; waiting for the slave I/O thread to update it  Master\_Retry\_Count: 86400  Master\_Bind:  Last\_IO\_Error\_Timestamp:  Last\_SQL\_Error\_Timestamp:  Master\_SSL\_Crl:  Master\_SSL\_Crlpath:  Retrieved\_Gtid\_Set:  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-8,  b92a2499-f44a-11e7-912d-005056a36ca7:1-5  Auto\_Position: 1  1 row in set (0.00 sec)  #在新主库上操作(10.143.225.80)：建立测试表test.xs;  mysql> create table xs(xh int);  Query OK, 0 rows affected (0.05 sec)  mysql> insert into xs(xh) values(1);  Query OK, 1 row affected (0.00 sec)  #在失败主库上操作(10.143.225.81)：查询数据是否同步过来  mysql> select\* from test.xs;  +------+  | xh |  +------+  | 1 |  +------+  1 row in set (0.00 sec)  #查看失败主库上操作(10.143.225.81)上线程状态  mysql> show slave status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Slave\_IO\_State: Waiting for master to send event  Master\_Host: 10.143.225.80  Master\_User: myrpl  Master\_Port: 3308  Connect\_Retry: 60  Master\_Log\_File: mysql-bin.000003  Read\_Master\_Log\_Pos: 664  Relay\_Log\_File: mha-slave-relay-bin.000002  Relay\_Log\_Pos: 794  Relay\_Master\_Log\_File: mysql-bin.000003  Slave\_IO\_Running: Yes  Slave\_SQL\_Running: Yes  Replicate\_Do\_DB:  Replicate\_Ignore\_DB:  Replicate\_Do\_Table:  Replicate\_Ignore\_Table:  Replicate\_Wild\_Do\_Table:  Replicate\_Wild\_Ignore\_Table:  Last\_Errno: 0  Last\_Error:  Skip\_Counter: 0  Exec\_Master\_Log\_Pos: 664  Relay\_Log\_Space: 1002  Until\_Condition: None  Until\_Log\_File:  Until\_Log\_Pos: 0  Master\_SSL\_Allowed: No  Master\_SSL\_CA\_File:  Master\_SSL\_CA\_Path:  Master\_SSL\_Cert:  Master\_SSL\_Cipher:  Master\_SSL\_Key:  Seconds\_Behind\_Master: 0  Master\_SSL\_Verify\_Server\_Cert: No  Last\_IO\_Errno: 0  Last\_IO\_Error:  Last\_SQL\_Errno: 0  Last\_SQL\_Error:  Replicate\_Ignore\_Server\_Ids:  Master\_Server\_Id: 1  Master\_UUID: 2cb7f07d-f448-11e7-911d-005056a30c6f  Master\_Info\_File: mysql.slave\_master\_info  SQL\_Delay: 0  SQL\_Remaining\_Delay: NULL  Slave\_SQL\_Running\_State: Slave has read all relay log; waiting for the slave I/O thread to update it  Master\_Retry\_Count: 86400  Master\_Bind:  Last\_IO\_Error\_Timestamp:  Last\_SQL\_Error\_Timestamp:  Master\_SSL\_Crl:  Master\_SSL\_Crlpath:  Retrieved\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:9-10  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-10,  b92a2499-f44a-11e7-912d-005056a36ca7:1-5  Auto\_Position: 1  1 row in set (0.00 sec) |

4.2 主库从库GTID一致时正常切换

### （1）登陆主库操作

当前主库：10.143.225.80

当前从库：10.143.225.81

|  |
| --- |
| #查看主库GTID  mysql> show master status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  File: mysql-bin.000003  Position: 664  Binlog\_Do\_DB:  Binlog\_Ignore\_DB:  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-10,  b92a2499-f44a-11e7-912d-005056a36ca7:1-5  1 row in set (0.00 sec)  #查看从库GTID  mysql> show slave status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Slave\_IO\_State: Waiting for master to send event  Master\_Host: 10.143.225.80  Master\_User: myrpl  Master\_Port: 3308  Connect\_Retry: 60  Master\_Log\_File: mysql-bin.000003  Read\_Master\_Log\_Pos: 664  Relay\_Log\_File: mha-slave-relay-bin.000002  Relay\_Log\_Pos: 794  Relay\_Master\_Log\_File: mysql-bin.000003  Slave\_IO\_Running: Yes  Slave\_SQL\_Running: Yes  Replicate\_Do\_DB:  Replicate\_Ignore\_DB:  Replicate\_Do\_Table:  Replicate\_Ignore\_Table:  Replicate\_Wild\_Do\_Table:  Replicate\_Wild\_Ignore\_Table:  Last\_Errno: 0  Last\_Error:  Skip\_Counter: 0  Exec\_Master\_Log\_Pos: 664  Relay\_Log\_Space: 1002  Until\_Condition: None  Until\_Log\_File:  Until\_Log\_Pos: 0  Master\_SSL\_Allowed: No  Master\_SSL\_CA\_File:  Master\_SSL\_CA\_Path:  Master\_SSL\_Cert:  Master\_SSL\_Cipher:  Master\_SSL\_Key:  Seconds\_Behind\_Master: 0  Master\_SSL\_Verify\_Server\_Cert: No  Last\_IO\_Errno: 0  Last\_IO\_Error:  Last\_SQL\_Errno: 0  Last\_SQL\_Error:  Replicate\_Ignore\_Server\_Ids:  Master\_Server\_Id: 1  Master\_UUID: 2cb7f07d-f448-11e7-911d-005056a30c6f  Master\_Info\_File: mysql.slave\_master\_info  SQL\_Delay: 0  SQL\_Remaining\_Delay: NULL  Slave\_SQL\_Running\_State: Slave has read all relay log; waiting for the slave I/O thread to update it  Master\_Retry\_Count: 86400  Master\_Bind:  Last\_IO\_Error\_Timestamp:  Last\_SQL\_Error\_Timestamp:  Master\_SSL\_Crl:  Master\_SSL\_Crlpath:  Retrieved\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:9-10  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-10,  b92a2499-f44a-11e7-912d-005056a36ca7:1-5  Auto\_Position: 1 |

### （2）进行正常主从切换操作

|  |
| --- |
| #查看mha进程状态  # supervisorctl status  linuxdash:linuxdash\_8081 STOPPED Not started  mha:mha\_wxytest2\_3308 FATAL Exited too quickly (process log may have details)  #启动mha进程  [root@test-ylzhao-124 mha\_conf]# supervisorctl start mha:mha\_wxytest2\_3308  mha:mha\_wxytest2\_3308: started  #再次查看状态  [root@test-ylzhao-124 mha\_conf]# supervisorctl status  linuxdash:linuxdash\_8081 STOPPED Not started  mha:mha\_wxytest2\_3308 RUNNING pid 16872, uptime 0:00:17  #检查当前同步是否正常  [root@test-ylzhao-124 mha\_conf]# sh /home/dba/mha/bin/check\_rpl.sh 3308 wxytest2  Tue Jan 16 17:45:40 2018 - [info] Reading default configuration from /etc/masterha\_default.cnf..  Tue Jan 16 17:45:40 2018 - [info] Reading application default configuration from /home/dba/mha/manager/3308\_wxytest2/etc/mhamanager3308\_wxytest2.conf..  Tue Jan 16 17:45:40 2018 - [info] Reading server configuration from /home/dba/mha/manager/3308\_wxytest2/etc/mhamanager3308\_wxytest2.conf..  Tue Jan 16 17:45:40 2018 - [info] MHA::MasterMonitor version 0.57.  Tue Jan 16 17:45:41 2018 - [info] GTID failover mode = 1  Tue Jan 16 17:45:41 2018 - [info] Dead Servers:  Tue Jan 16 17:45:41 2018 - [info] Alive Servers:  Tue Jan 16 17:45:41 2018 - [info] 10.143.225.80(10.143.225.80:3308)  Tue Jan 16 17:45:41 2018 - [info] 10.143.225.81(10.143.225.81:3308)  Tue Jan 16 17:45:41 2018 - [info] Alive Slaves:  Tue Jan 16 17:45:41 2018 - [info] 10.143.225.81(10.143.225.81:3308) Version=5.6.23-log (oldest major version between slaves) log-bin:enabled  Tue Jan 16 17:45:41 2018 - [info] GTID ON  Tue Jan 16 17:45:41 2018 - [info] Replicating from 10.143.225.80(10.143.225.80:3308)  Tue Jan 16 17:45:41 2018 - [info] Current Alive Master: 10.143.225.80(10.143.225.80:3308)  Tue Jan 16 17:45:41 2018 - [info] Checking slave configurations..  Tue Jan 16 17:45:41 2018 - [info] read\_only=1 is not set on slave 10.143.225.81(10.143.225.81:3308).  Tue Jan 16 17:45:41 2018 - [info] Checking replication filtering settings..  Tue Jan 16 17:45:41 2018 - [info] binlog\_do\_db= , binlog\_ignore\_db=  Tue Jan 16 17:45:41 2018 - [info] Replication filtering check ok.  Tue Jan 16 17:45:41 2018 - [info] GTID (with auto-pos) is supported. Skipping all SSH and Node package checking.  Tue Jan 16 17:45:41 2018 - [info] Checking SSH publickey authentication settings on the current master..  Tue Jan 16 17:45:42 2018 - [info] HealthCheck: SSH to 10.143.225.80 is reachable.  Tue Jan 16 17:45:42 2018 - [info]  10.143.225.80(10.143.225.80:3308) (current master)  +--10.143.225.81(10.143.225.81:3308)  Tue Jan 16 17:45:42 2018 - [info] Checking replication health on 10.143.225.81..  Tue Jan 16 17:45:42 2018 - [info] ok.  Tue Jan 16 17:45:42 2018 - [info] Checking master\_ip\_failover\_script status:  Tue Jan 16 17:45:42 2018 - [info] /usr/bin/master\_ip\_hard\_failover\_helper --test\_config\_path=/home/dba/mha/helper/3308\_wxytest2 --command=status --ssh\_user=root --orig\_master\_host=10.143.225.80 --orig\_master\_ip=10.143.225.80 --orig\_master\_port=3308  Reading config file: /home/dba/mha/helper/3308\_wxytest2/mhahelper3308\_wxytest2.conf  Checking the vip using the 'metal' provider on the original master '10.143.225.80'  Connecting to 'root'@'10.143.225.80'  Executing command on '10.143.225.80': /sbin/ip addr show dev eth0  Tue Jan 16 17:45:43 2018 - [info] OK.  Tue Jan 16 17:45:43 2018 - [warning] shutdown\_script is not defined.  Tue Jan 16 17:45:43 2018 - [info] Got exit code 0 (Not master dead).  MySQL Replication Health is OK.  #停止mha-helper  [root@test-ylzhao-124 mha\_conf]# supervisorctl stop mha:mha\_wxytest2\_3308  mha:mha\_wxytest2\_3308: stopped  #在线切换  [root@test-ylzhao-124 bin]# sh /home/dba/mha/bin/switch\_over.sh 3308 wxytest2  Tue Jan 16 17:47:33 2018 - [info] MHA::MasterRotate version 0.57.  Tue Jan 16 17:47:33 2018 - [info] Starting online master switch..  Tue Jan 16 17:47:33 2018 - [info]  Tue Jan 16 17:47:33 2018 - [info] \* Phase 1: Configuration Check Phase..  Tue Jan 16 17:47:33 2018 - [info]  Tue Jan 16 17:47:33 2018 - [info] Reading default configuration from /etc/masterha\_default.cnf..  Tue Jan 16 17:47:33 2018 - [info] Reading application default configuration from /home/dba/mha/manager/3308\_wxytest2/etc/mhamanager3308\_wxytest2.conf..  Tue Jan 16 17:47:33 2018 - [info] Reading server configuration from /home/dba/mha/manager/3308\_wxytest2/etc/mhamanager3308\_wxytest2.conf..  Tue Jan 16 17:47:34 2018 - [info] GTID failover mode = 1  Tue Jan 16 17:47:34 2018 - [info] Current Alive Master: 10.143.225.80(10.143.225.80:3308)  Tue Jan 16 17:47:34 2018 - [info] Alive Slaves:  Tue Jan 16 17:47:34 2018 - [info] 10.143.225.81(10.143.225.81:3308) Version=5.6.23-log (oldest major version between slaves) log-bin:enabled  Tue Jan 16 17:47:34 2018 - [info] GTID ON  Tue Jan 16 17:47:34 2018 - [info] Replicating from 10.143.225.80(10.143.225.80:3308)  Tue Jan 16 17:47:34 2018 - [info] Executing FLUSH NO\_WRITE\_TO\_BINLOG TABLES. This may take long time..  Tue Jan 16 17:47:34 2018 - [info] ok.  Tue Jan 16 17:47:34 2018 - [info] Checking MHA is not monitoring or doing failover..  Tue Jan 16 17:47:34 2018 - [info] Checking replication health on 10.143.225.81..  Tue Jan 16 17:47:34 2018 - [info] ok.  Tue Jan 16 17:47:34 2018 - [info] Searching new master from slaves..  Tue Jan 16 17:47:34 2018 - [info] Candidate masters from the configuration file:  Tue Jan 16 17:47:34 2018 - [info] Non-candidate masters:  Tue Jan 16 17:47:34 2018 - [info]  From:  10.143.225.80(10.143.225.80:3308) (current master)  +--10.143.225.81(10.143.225.81:3308)  To:  10.143.225.81(10.143.225.81:3308) (new master)  +--10.143.225.80(10.143.225.80:3308)  Tue Jan 16 17:47:34 2018 - [info] Checking whether 10.143.225.81(10.143.225.81:3308) is ok for the new master..  Tue Jan 16 17:47:34 2018 - [info] ok.  Tue Jan 16 17:47:34 2018 - [info] 10.143.225.80(10.143.225.80:3308): SHOW SLAVE STATUS returned empty result. To check replication filtering rules, temporarily executing CHANGE MASTER to a dummy host.  Tue Jan 16 17:47:34 2018 - [info] 10.143.225.80(10.143.225.80:3308): Resetting slave pointing to the dummy host.  Tue Jan 16 17:47:34 2018 - [info] \*\* Phase 1: Configuration Check Phase completed.  Tue Jan 16 17:47:34 2018 - [info]  Tue Jan 16 17:47:34 2018 - [info] \* Phase 2: Rejecting updates Phase..  Tue Jan 16 17:47:34 2018 - [info]  Tue Jan 16 17:47:34 2018 - [info] Executing master ip online change script to disable write on the current master:  Tue Jan 16 17:47:34 2018 - [info] /usr/bin/master\_ip\_online\_failover\_helper --test\_config\_path=/home/dba/mha/helper/3308\_wxytest2 --command=stop --orig\_master\_host=10.143.225.80 --orig\_master\_ip=10.143.225.80 --orig\_master\_port=3308 --orig\_master\_user='mha' --new\_master\_host=10.143.225.81 --new\_master\_ip=10.143.225.81 --new\_master\_port=3308 --new\_master\_user='mha' --orig\_master\_ssh\_user=root --new\_master\_ssh\_user=root --orig\_master\_is\_new\_slave --orig\_master\_password=xxx --new\_master\_password=xxx  Reading config file: /home/dba/mha/helper/3308\_wxytest2/mhahelper3308\_wxytest2.conf  Connecting to mysql on the original master '10.143.225.80'  Removing the vip using the 'metal' provider from the original master '10.143.225.80'  Connecting to 'root'@'10.143.225.80'  Executing command on '10.143.225.80': /sbin/ip addr delete 10.143.225.90/24 dev eth0  Setting read\_only to '1' on the original master '10.143.225.80'  Waiting 5 seconds for application threads to disconnect from the MySQL server '10.143.225.80'  Terminating all application threads connected to the MySQL server '10.143.225.80'  Terminating thread Id => 1, User => event\_scheduler, Host => localhost  Error 1094: Unknown thread id: 1  Terminating thread Id => 83, User => root, Host => localhost  Disconnecting from mysql on the original master '10.143.225.80'  Tue Jan 16 17:47:41 2018 - [info] ok.  Tue Jan 16 17:47:41 2018 - [info] Locking all tables on the orig master to reject updates from everybody (including root):  Tue Jan 16 17:47:41 2018 - [info] Executing FLUSH TABLES WITH READ LOCK..  Tue Jan 16 17:47:41 2018 - [info] ok.  Tue Jan 16 17:47:41 2018 - [info] Orig master binlog:pos is mysql-bin.000003:664.  Tue Jan 16 17:47:41 2018 - [info] Waiting to execute all relay logs on 10.143.225.81(10.143.225.81:3308)..  Tue Jan 16 17:47:41 2018 - [info] master\_pos\_wait(mysql-bin.000003:664) completed on 10.143.225.81(10.143.225.81:3308). Executed 0 events.  Tue Jan 16 17:47:41 2018 - [info] done.  Tue Jan 16 17:47:41 2018 - [info] Getting new master's binlog name and position..  Tue Jan 16 17:47:41 2018 - [info] mysql-bin.000002:655  Tue Jan 16 17:47:41 2018 - [info] All other slaves should start replication from here. Statement should be: CHANGE MASTER TO MASTER\_HOST='10.143.225.81', MASTER\_PORT=3308, MASTER\_AUTO\_POSITION=1, MASTER\_USER='myrpl', MASTER\_PASSWORD='xxx';  Tue Jan 16 17:47:41 2018 - [info] Executing master ip online change script to allow write on the new master:  Tue Jan 16 17:47:41 2018 - [info] /usr/bin/master\_ip\_online\_failover\_helper --test\_config\_path=/home/dba/mha/helper/3308\_wxytest2 --command=start --orig\_master\_host=10.143.225.80 --orig\_master\_ip=10.143.225.80 --orig\_master\_port=3308 --orig\_master\_user='mha' --new\_master\_host=10.143.225.81 --new\_master\_ip=10.143.225.81 --new\_master\_port=3308 --new\_master\_user='mha' --orig\_master\_ssh\_user=root --new\_master\_ssh\_user=root --orig\_master\_is\_new\_slave --orig\_master\_password=xxx --new\_master\_password=xxx  Reading config file: /home/dba/mha/helper/3308\_wxytest2/mhahelper3308\_wxytest2.conf  Connecting to mysql on the new master '10.143.225.81'  Setting read\_only to '0' on the new master '10.143.225.81'  Adding the vip using the 'metal' provider to the new master '10.143.225.81'  Connecting to 'root'@'10.143.225.81'  Executing command on '10.143.225.81': /sbin/ip addr add 10.143.225.90/24 dev eth0  Executing command on '10.143.225.81': /usr/sbin/arping -q -c 3 -A -I eth0 10.143.225.90  Disconnecting from mysql on the new master '10.143.225.81'  Tue Jan 16 17:47:45 2018 - [info] ok.  Tue Jan 16 17:47:45 2018 - [info]  Tue Jan 16 17:47:45 2018 - [info] \* Switching slaves in parallel..  Tue Jan 16 17:47:45 2018 - [info]  Tue Jan 16 17:47:45 2018 - [info] Unlocking all tables on the orig master:  Tue Jan 16 17:47:45 2018 - [info] Executing UNLOCK TABLES..  Tue Jan 16 17:47:45 2018 - [info] ok.  Tue Jan 16 17:47:45 2018 - [info] Starting orig master as a new slave..  Tue Jan 16 17:47:45 2018 - [info] Resetting slave 10.143.225.80(10.143.225.80:3308) and starting replication from the new master 10.143.225.81(10.143.225.81:3308)..  Tue Jan 16 17:47:45 2018 - [info] Executed CHANGE MASTER.  Tue Jan 16 17:47:45 2018 - [info] Slave started.  Tue Jan 16 17:47:45 2018 - [info] All new slave servers switched successfully.  Tue Jan 16 17:47:45 2018 - [info]  Tue Jan 16 17:47:45 2018 - [info] \* Phase 5: New master cleanup phase..  Tue Jan 16 17:47:45 2018 - [info]  Tue Jan 16 17:47:45 2018 - [info] 10.143.225.81: Resetting slave info succeeded.  Tue Jan 16 17:47:45 2018 - [info] Switching master to 10.143.225.81(10.143.225.81:3308) completed successfully.  #启动mha-helper  [root@test-ylzhao-124 bin]# supervisorctl start mha:mha\_wxytest2\_3308  mha:mha\_wxytest2\_3308: started  [root@test-ylzhao-124 bin]# ps -ef | grep supervisor  root 14140 1 0 Jan09 ? 00:01:38 /usr/bin/python /usr/bin/supervisord -c /etc/supervisord.conf  root 17191 16642 0 17:49 pts/0 00:00:00 grep supervisor  [root@test-ylzhao-124 bin]# supervisorctl status  linuxdash:linuxdash\_8081 STOPPED Not started  mha:mha\_wxytest2\_3308 RUNNING pid 17172, uptime 0:00:18 |

### （3）切换后主从库检查

当前主库：10.143.225.81

当前从库：10.143.225.80

|  |
| --- |
| #登陆主库操作  mysql> show master status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  File: mysql-bin.000002  Position: 655  Binlog\_Do\_DB:  Binlog\_Ignore\_DB:  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-10,  b92a2499-f44a-11e7-912d-005056a36ca7:1-5  1 row in set (0.00 sec)  #查看VIP是否在主库上  root@mha-slave ~]# ip addr  1: lo: <LOOPBACK,UP,LOWER\_UP> mtu 16436 qdisc noqueue state UNKNOWN  link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00  inet 127.0.0.1/8 scope host lo  inet6 ::1/128 scope host  valid\_lft forever preferred\_lft forever  2: eth0: <BROADCAST,MULTICAST,UP,LOWER\_UP> mtu 1500 qdisc pfifo\_fast state UP qlen 1000  link/ether 00:50:56:a3:6c:a7 brd ff:ff:ff:ff:ff:ff  inet 10.143.225.81/24 brd 10.143.225.255 scope global eth0  inet 10.143.225.90/24 scope global secondary eth0  inet6 fe80::250:56ff:fea3:6ca7/64 scope link  valid\_lft forever preferred\_lft forever  #查看从库状态  mysql> show slave status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Slave\_IO\_State: Waiting for master to send event  Master\_Host: 10.143.225.81  Master\_User: myrpl  Master\_Port: 3308  Connect\_Retry: 60  Master\_Log\_File: mysql-bin.000002  Read\_Master\_Log\_Pos: 655  Relay\_Log\_File: mha-master-relay-bin.000002  Relay\_Log\_Pos: 408  Relay\_Master\_Log\_File: mysql-bin.000002  Slave\_IO\_Running: Yes  Slave\_SQL\_Running: Yes  Replicate\_Do\_DB:  Replicate\_Ignore\_DB:  Replicate\_Do\_Table:  Replicate\_Ignore\_Table:  Replicate\_Wild\_Do\_Table:  Replicate\_Wild\_Ignore\_Table:  Last\_Errno: 0  Last\_Error:  Skip\_Counter: 0  Exec\_Master\_Log\_Pos: 655  Relay\_Log\_Space: 617  Until\_Condition: None  Until\_Log\_File:  Until\_Log\_Pos: 0  Master\_SSL\_Allowed: No  Master\_SSL\_CA\_File:  Master\_SSL\_CA\_Path:  Master\_SSL\_Cert:  Master\_SSL\_Cipher:  Master\_SSL\_Key:  Seconds\_Behind\_Master: 0  Master\_SSL\_Verify\_Server\_Cert: No  Last\_IO\_Errno: 0  Last\_IO\_Error:  Last\_SQL\_Errno: 0  Last\_SQL\_Error:  Replicate\_Ignore\_Server\_Ids:  Master\_Server\_Id: 81  Master\_UUID: b92a2499-f44a-11e7-912d-005056a36ca7  Master\_Info\_File: mysql.slave\_master\_info  SQL\_Delay: 0  SQL\_Remaining\_Delay: NULL  Slave\_SQL\_Running\_State: Slave has read all relay log; waiting for the slave I/O thread to update it  Master\_Retry\_Count: 86400  Master\_Bind:  Last\_IO\_Error\_Timestamp:  Last\_SQL\_Error\_Timestamp:  Master\_SSL\_Crl:  Master\_SSL\_Crlpath:  Retrieved\_Gtid\_Set:  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-10,  b92a2499-f44a-11e7-912d-005056a36ca7:1-5  Auto\_Position: 1  1 row in set (0.00 sec)  #主从同步验证  #10.143.225.81上操作  mysql> insert into test.xs(xh) values(2);  Query OK, 1 row affected (0.01 sec)  #10.143.225.80上操作  mysql> select \* from test.xs;  +------+  | xh |  +------+  | 1 |  | 2 |  +------+  2 rows in set (0.00 sec) |

### （4）总结

**实验现状：**

主库：10.143.225.80

从库：10.143.225.81

VIP : 在主库上

**实验过程**：

（1）在manager节点查看supervisor进程状态。

（2）检查当前主从同步状态是否正常

（3）停止mha-helper

（4）在线切换

（5）启动mha-helper

**切换后：**

主库：10.143.225.81

从库：10.143.225.80

VIP : 在主库上

4.3 主库从库GTID不一致时切换

### （1）登陆从库操作

当前主库：10.143.225.81

当前从库：10.143.225.80

|  |
| --- |
| #从库上创建了一个数据库  mysql> create database test2;  Query OK, 1 row affected (0.01 sec)  mysql> show slave status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Slave\_IO\_State: Waiting for master to send event  Master\_Host: 10.143.225.81  Master\_User: myrpl  Master\_Port: 3308  Connect\_Retry: 60  Master\_Log\_File: mysql-bin.000002  Read\_Master\_Log\_Pos: 944  Relay\_Log\_File: mha-master-relay-bin.000002  Relay\_Log\_Pos: 697  Relay\_Master\_Log\_File: mysql-bin.000002  Slave\_IO\_Running: Yes  Slave\_SQL\_Running: Yes  Replicate\_Do\_DB:  Replicate\_Ignore\_DB:  Replicate\_Do\_Table:  Replicate\_Ignore\_Table:  Replicate\_Wild\_Do\_Table:  Replicate\_Wild\_Ignore\_Table:  Last\_Errno: 0  Last\_Error:  Skip\_Counter: 0  Exec\_Master\_Log\_Pos: 944  Relay\_Log\_Space: 906  Until\_Condition: None  Until\_Log\_File:  Until\_Log\_Pos: 0  Master\_SSL\_Allowed: No  Master\_SSL\_CA\_File:  Master\_SSL\_CA\_Path:  Master\_SSL\_Cert:  Master\_SSL\_Cipher:  Master\_SSL\_Key:  Seconds\_Behind\_Master: 0  Master\_SSL\_Verify\_Server\_Cert: No  Last\_IO\_Errno: 0  Last\_IO\_Error:  Last\_SQL\_Errno: 0  Last\_SQL\_Error:  Replicate\_Ignore\_Server\_Ids:  Master\_Server\_Id: 81  Master\_UUID: b92a2499-f44a-11e7-912d-005056a36ca7  Master\_Info\_File: mysql.slave\_master\_info  SQL\_Delay: 0  SQL\_Remaining\_Delay: NULL  Slave\_SQL\_Running\_State: Slave has read all relay log; waiting for the slave I/O thread to update it  Master\_Retry\_Count: 86400  Master\_Bind:  Last\_IO\_Error\_Timestamp:  Last\_SQL\_Error\_Timestamp:  Master\_SSL\_Crl:  Master\_SSL\_Crlpath:  Retrieved\_Gtid\_Set: b92a2499-f44a-11e7-912d-005056a36ca7:6  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-11,  b92a2499-f44a-11e7-912d-005056a36ca7:1-6  Auto\_Position: 1  1 row in set (0.00 sec) |

### （2）登陆主库操作

当前主库：10.143.225.81

当前从库：10.143.225.80

|  |
| --- |
| #查看主库当前GTID  mysql> show master status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  File: mysql-bin.000002  Position: 1233  Binlog\_Do\_DB:  Binlog\_Ignore\_DB:  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-10,  b92a2499-f44a-11e7-912d-005056a36ca7:1-7  1 row in set (0.00 sec)  #当前从库的本机GTID比主库大 |

### （3）登陆从库操作

当前主库：10.143.225.81

当前从库：10.143.225.80

|  |
| --- |
| #获取从库GTID （比主库显示的GTID之后的二进制日志  /opt/mysql56/bin/mysqlbinlog --no-defaults --base64-output=decode-rows -v -v mysql-bin.000003 --start-position=996  说明：查看从库期间都做了什么操作，如果只是像这个例子只创建了一个新库，那么处理起来比较简单，过程如下  #1.先停止从库线  mysql> stop slave;  #2.执行上一步查询到的语句的回滚操作，本例是删除在从库创建的数据库test2  mysql> drop database test2;  #3.重新设置从库GTID与主库一致  reset master;  SET GLOBAL gtid\_purged='2cb7f07d-f448-11e7-911d-005056a30c6f:1-10,b92a2499-f44a-11e7-912d-005056a36ca7:1-7';  #4.启动从库线程  start slave;  #5查询从库状态  mysql> start slave;  Query OK, 0 rows affected (0.01 sec)  mysql> show slave status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Slave\_IO\_State: Waiting for master to send event  Master\_Host: 10.143.225.81  Master\_User: myrpl  Master\_Port: 3308  Connect\_Retry: 60  Master\_Log\_File: mysql-bin.000002  Read\_Master\_Log\_Pos: 1233  Relay\_Log\_File: mha-master-relay-bin.000003  Relay\_Log\_Pos: 448  Relay\_Master\_Log\_File: mysql-bin.000002  Slave\_IO\_Running: Yes  Slave\_SQL\_Running: Yes  Replicate\_Do\_DB:  Replicate\_Ignore\_DB:  Replicate\_Do\_Table:  Replicate\_Ignore\_Table:  Replicate\_Wild\_Do\_Table:  Replicate\_Wild\_Ignore\_Table:  Last\_Errno: 0  Last\_Error:  Skip\_Counter: 0  Exec\_Master\_Log\_Pos: 1233  Relay\_Log\_Space: 1492  Until\_Condition: None  Until\_Log\_File:  Until\_Log\_Pos: 0  Master\_SSL\_Allowed: No  Master\_SSL\_CA\_File:  Master\_SSL\_CA\_Path:  Master\_SSL\_Cert:  Master\_SSL\_Cipher:  Master\_SSL\_Key:  Seconds\_Behind\_Master: 0  Master\_SSL\_Verify\_Server\_Cert: No  Last\_IO\_Errno: 0  Last\_IO\_Error:  Last\_SQL\_Errno: 0  Last\_SQL\_Error:  Replicate\_Ignore\_Server\_Ids:  Master\_Server\_Id: 81  Master\_UUID: b92a2499-f44a-11e7-912d-005056a36ca7  Master\_Info\_File: mysql.slave\_master\_info  SQL\_Delay: 0  SQL\_Remaining\_Delay: NULL  Slave\_SQL\_Running\_State: Slave has read all relay log; waiting for the slave I/O thread to update it  Master\_Retry\_Count: 86400  Master\_Bind:  Last\_IO\_Error\_Timestamp:  Last\_SQL\_Error\_Timestamp:  Master\_SSL\_Crl:  Master\_SSL\_Crlpath:  Retrieved\_Gtid\_Set: b92a2499-f44a-11e7-912d-005056a36ca7:6-7  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-10,  b92a2499-f44a-11e7-912d-005056a36ca7:1-7  Auto\_Position: 1  1 row in set (0.00 sec) |

此时，从库的GTID与主库的GTID一致了。

### （4）修复从库后测试

|  |
| --- |
| #主库操作:  mysql> insert into xs(xh) values(4);  Query OK, 1 row affected (0.01 sec)  mysql> show master status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  File: mysql-bin.000002  Position: 1521  Binlog\_Do\_DB:  Binlog\_Ignore\_DB:  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-10,  b92a2499-f44a-11e7-912d-005056a36ca7:1-8  1 row in set (0.00 sec)  #从库操作：  mysql> select \* from test.xs;  +------+  | xh |  +------+  | 1 |  | 2 |  | 3 |  | 4 |  +------+  4 rows in set (0.00 sec)  mysql> show slave status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Slave\_IO\_State: Waiting for master to send event  Master\_Host: 10.143.225.81  Master\_User: myrpl  Master\_Port: 3308  Connect\_Retry: 60  Master\_Log\_File: mysql-bin.000002  Read\_Master\_Log\_Pos: 1521  Relay\_Log\_File: mha-master-relay-bin.000003  Relay\_Log\_Pos: 736  Relay\_Master\_Log\_File: mysql-bin.000002  Slave\_IO\_Running: Yes  Slave\_SQL\_Running: Yes  Replicate\_Do\_DB:  Replicate\_Ignore\_DB:  Replicate\_Do\_Table:  Replicate\_Ignore\_Table:  Replicate\_Wild\_Do\_Table:  Replicate\_Wild\_Ignore\_Table:  Last\_Errno: 0  Last\_Error:  Skip\_Counter: 0  Exec\_Master\_Log\_Pos: 1521  Relay\_Log\_Space: 1780  Until\_Condition: None  Until\_Log\_File:  Until\_Log\_Pos: 0  Master\_SSL\_Allowed: No  Master\_SSL\_CA\_File:  Master\_SSL\_CA\_Path:  Master\_SSL\_Cert:  Master\_SSL\_Cipher:  Master\_SSL\_Key:  Seconds\_Behind\_Master: 0  Master\_SSL\_Verify\_Server\_Cert: No  Last\_IO\_Errno: 0  Last\_IO\_Error:  Last\_SQL\_Errno: 0  Last\_SQL\_Error:  Replicate\_Ignore\_Server\_Ids:  Master\_Server\_Id: 81  Master\_UUID: b92a2499-f44a-11e7-912d-005056a36ca7  Master\_Info\_File: mysql.slave\_master\_info  SQL\_Delay: 0  SQL\_Remaining\_Delay: NULL  Slave\_SQL\_Running\_State: Slave has read all relay log; waiting for the slave I/O thread to update it  Master\_Retry\_Count: 86400  Master\_Bind:  Last\_IO\_Error\_Timestamp:  Last\_SQL\_Error\_Timestamp:  Master\_SSL\_Crl:  Master\_SSL\_Crlpath:  Retrieved\_Gtid\_Set: b92a2499-f44a-11e7-912d-005056a36ca7:6-8  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-10,  b92a2499-f44a-11e7-912d-005056a36ca7:1-8  Auto\_Position: 1  1 row in set (0.00 sec) |

### （5）总结

**实验现状：**

主库：10.143.225.81

从库：10.143.225.80

VIP : 在主库上

**实验过程**：

（1）slave上创建一数据库，导致从库GTID比主库大

（2）在从库查询二进制日志找出从库在主库记录的从库已执行GTID之后执行了哪些操作。如果语句简单，可以写出相应的回滚语句。

（3）停止从库I/O,SQL线程,在从库上执行回滚操作。

（4）重置从库上的GTID与主库保持一致。

（5）启动从库线程。

（6）测试主从环境是否一致。

4.4 不小心在主库上执行了reset master?

当前环境：

当前主库：10.143.225.81

当前从库：10.143.225.80

解决思路：

（1）记录下从库的GTID相关信息，包括已在主库执行的GTID集合

（2）由于主库执行了reset master操作，主库的二进制文件及二进制索引被删除，但主库数据依然是最新的。

（3）在主库上设置read\_only=on,禁止事务发生。

（4）在主库上设置已执行过的GTID集合，GTID集合来源于上面从库查询结果。

（5）停止从库线程。

（6）从库删除主从配置信息。

（7）启动从库线程。

（8）查检主从复制状态。通过一个测试表测试一下主从同步是否正常。

（9）主库设置read\_only=off。

### （1）登陆从库操作

提醒：从库先备份binlog文件，同时对数据库也做一个完整备份后再进行操作。

|  |
| --- |
| #停止从库线程（step 4）  mysql> stop slave;  Query OK, 0 rows affected (0.01 sec)  #查询从库，记录下从库的GTID信息状态（step 5）  mysql> show slave status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Slave\_IO\_State: Waiting for master to send event  Master\_Host: 10.143.225.81  Master\_User: myrpl  Master\_Port: 3308  Connect\_Retry: 60  Master\_Log\_File: mysql-bin.000002  Read\_Master\_Log\_Pos: 1521  Relay\_Log\_File: mha-master-relay-bin.000003  Relay\_Log\_Pos: 736  Relay\_Master\_Log\_File: mysql-bin.000002  Slave\_IO\_Running: Yes  Slave\_SQL\_Running: Yes  Replicate\_Do\_DB:  Replicate\_Ignore\_DB:  Replicate\_Do\_Table:  Replicate\_Ignore\_Table:  Replicate\_Wild\_Do\_Table:  Replicate\_Wild\_Ignore\_Table:  Last\_Errno: 0  Last\_Error:  Skip\_Counter: 0  Exec\_Master\_Log\_Pos: 1521  Relay\_Log\_Space: 1780  Until\_Condition: None  Until\_Log\_File:  Until\_Log\_Pos: 0  Master\_SSL\_Allowed: No  Master\_SSL\_CA\_File:  Master\_SSL\_CA\_Path:  Master\_SSL\_Cert:  Master\_SSL\_Cipher:  Master\_SSL\_Key:  Seconds\_Behind\_Master: 0  Master\_SSL\_Verify\_Server\_Cert: No  Last\_IO\_Errno: 0  Last\_IO\_Error:  Last\_SQL\_Errno: 0  Last\_SQL\_Error:  Replicate\_Ignore\_Server\_Ids:  Master\_Server\_Id: 81  Master\_UUID: b92a2499-f44a-11e7-912d-005056a36ca7  Master\_Info\_File: mysql.slave\_master\_info  SQL\_Delay: 0  SQL\_Remaining\_Delay: NULL  Slave\_SQL\_Running\_State: Slave has read all relay log; waiting for the slave I/O thread to update it  Master\_Retry\_Count: 86400  Master\_Bind:  Last\_IO\_Error\_Timestamp:  Last\_SQL\_Error\_Timestamp:  Master\_SSL\_Crl:  Master\_SSL\_Crlpath:  Retrieved\_Gtid\_Set: b92a2499-f44a-11e7-912d-005056a36ca7:6-8  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-10,  b92a2499-f44a-11e7-912d-005056a36ca7:1-8  Auto\_Position: 1  1 row in set (0.00 sec)  #在从库清除主从配置信息（step 8）  mysql> reset slave;  Query OK, 0 rows affected (0.01 sec)  #查看从库主从状态信息 （step 9）  mysql> show slave status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Slave\_IO\_State:  Master\_Host: 10.143.225.81  Master\_User: myrpl  Master\_Port: 3308  Connect\_Retry: 60  Master\_Log\_File:  Read\_Master\_Log\_Pos: 4  Relay\_Log\_File: mha-master-relay-bin.000001  Relay\_Log\_Pos: 4  Relay\_Master\_Log\_File:  Slave\_IO\_Running: No  Slave\_SQL\_Running: No  Replicate\_Do\_DB:  Replicate\_Ignore\_DB:  Replicate\_Do\_Table:  Replicate\_Ignore\_Table:  Replicate\_Wild\_Do\_Table:  Replicate\_Wild\_Ignore\_Table:  Last\_Errno: 0  Last\_Error:  Skip\_Counter: 0  Exec\_Master\_Log\_Pos: 0  Relay\_Log\_Space: 174  Until\_Condition: None  Until\_Log\_File:  Until\_Log\_Pos: 0  Master\_SSL\_Allowed: No  Master\_SSL\_CA\_File:  Master\_SSL\_CA\_Path:  Master\_SSL\_Cert:  Master\_SSL\_Cipher:  Master\_SSL\_Key:  Seconds\_Behind\_Master: NULL  Master\_SSL\_Verify\_Server\_Cert: No  Last\_IO\_Errno: 0  Last\_IO\_Error:  Last\_SQL\_Errno: 0  Last\_SQL\_Error:  Replicate\_Ignore\_Server\_Ids:  Master\_Server\_Id: 81  Master\_UUID: b92a2499-f44a-11e7-912d-005056a36ca7  Master\_Info\_File: mysql.slave\_master\_info  SQL\_Delay: 0  SQL\_Remaining\_Delay: NULL  Slave\_SQL\_Running\_State:  Master\_Retry\_Count: 86400  Master\_Bind:  Last\_IO\_Error\_Timestamp:  Last\_SQL\_Error\_Timestamp:  Master\_SSL\_Crl:  Master\_SSL\_Crlpath:  Retrieved\_Gtid\_Set:  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-10,  b92a2499-f44a-11e7-912d-005056a36ca7:1-8  Auto\_Position: 1  1 row in set (0.00 sec)  #启动从库线程（step 10）  mysql> show slave status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Slave\_IO\_State: Waiting for master to send event  Master\_Host: 10.143.225.81  Master\_User: myrpl  Master\_Port: 3308  Connect\_Retry: 60  Master\_Log\_File: mysql-bin.000002  Read\_Master\_Log\_Pos: 231  Relay\_Log\_File: mha-master-relay-bin.000003  Relay\_Log\_Pos: 361  Relay\_Master\_Log\_File: mysql-bin.000002  Slave\_IO\_Running: Yes  Slave\_SQL\_Running: Yes  Replicate\_Do\_DB:  Replicate\_Ignore\_DB:  Replicate\_Do\_Table:  Replicate\_Ignore\_Table:  Replicate\_Wild\_Do\_Table:  Replicate\_Wild\_Ignore\_Table:  Last\_Errno: 0  Last\_Error:  Skip\_Counter: 0  Exec\_Master\_Log\_Pos: 231  Relay\_Log\_Space: 570  Until\_Condition: None  Until\_Log\_File:  Until\_Log\_Pos: 0  Master\_SSL\_Allowed: No  Master\_SSL\_CA\_File:  Master\_SSL\_CA\_Path:  Master\_SSL\_Cert:  Master\_SSL\_Cipher:  Master\_SSL\_Key:  Seconds\_Behind\_Master: 0  Master\_SSL\_Verify\_Server\_Cert: No  Last\_IO\_Errno: 0  Last\_IO\_Error:  Last\_SQL\_Errno: 0  Last\_SQL\_Error:  Replicate\_Ignore\_Server\_Ids:  Master\_Server\_Id: 81  Master\_UUID: b92a2499-f44a-11e7-912d-005056a36ca7  Master\_Info\_File: mysql.slave\_master\_info  SQL\_Delay: 0  SQL\_Remaining\_Delay: NULL  Slave\_SQL\_Running\_State: Slave has read all relay log; waiting for the slave I/O thread to update it  Master\_Retry\_Count: 86400  Master\_Bind:  Last\_IO\_Error\_Timestamp:  Last\_SQL\_Error\_Timestamp:  Master\_SSL\_Crl:  Master\_SSL\_Crlpath:  Retrieved\_Gtid\_Set:  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-10,  b92a2499-f44a-11e7-912d-005056a36ca7:1-8  Auto\_Position: 1  1 row in set (0.00 sec) |

### （2）登陆主库操作

|  |
| --- |
| #在主库上执行reset master操作（step 1）  mysql> reset master;  Query OK, 0 rows affected (0.02 sec)  #在主库上设置read-only=on，禁止事务发生（step 2）  mysql> set @@global.read\_only=on;  Query OK, 0 rows affected (0.00 sec)  #查询主库的状态，主库的二进制信息被清空（step 3）  mysql> show master status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  File: mysql-bin.000001  Position: 151  Binlog\_Do\_DB:  Binlog\_Ignore\_DB:  Executed\_Gtid\_Set:  1 row in set (0.00 sec)  #设置主库的grid\_purged为从库查询出来的已执行过的GTID集合（step 6）  mysql> SET GLOBAL gtid\_purged='2cb7f07d-f448-11e7-911d-005056a30c6f:1-10, b92a2499-f44a-11e7-912d-005056a36ca7:1-8';  Query OK, 0 rows affected (0.01 sec)  #再次查询主库GTID情况（step 7）  mysql> show master status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  File: mysql-bin.000002  Position: 231  Binlog\_Do\_DB:  Binlog\_Ignore\_DB:  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-10,  b92a2499-f44a-11e7-912d-005056a36ca7:1-8  1 row in set (0.00 sec)  #在主库上设置read-only=off，允许事务操作（step 11）  mysql> set @@global.read\_only=off;  Query OK, 0 rows affected (0.00 sec) |

### （3）修复从库后测试

当前环境：

当前主库：10.143.225.81

当前从库：10.143.225.80

|  |
| --- |
| #主库操作：  mysql> insert into test.xs(xh) values(5),(6);  Query OK, 2 rows affected (0.00 sec)  Records: 2 Duplicates: 0 Warnings: 0  #主库检查已执行GTID集合  mysql> show master status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  File: mysql-bin.000002  Position: 529  Binlog\_Do\_DB:  Binlog\_Ignore\_DB:  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-10,  b92a2499-f44a-11e7-912d-005056a36ca7:1-9  1 row in set (0.00 sec)  #从库操作  mysql> select \* from test.xs;  +------+  | xh |  +------+  | 1 |  | 2 |  | 3 |  | 4 |  | 5 |  | 6 |  +------+  6 rows in set (0.00 sec)  #检查从库已执行GTID集合  mysql> show slave status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Slave\_IO\_State: Waiting for master to send event  Master\_Host: 10.143.225.81  Master\_User: myrpl  Master\_Port: 3308  Connect\_Retry: 60  Master\_Log\_File: mysql-bin.000002  Read\_Master\_Log\_Pos: 529  Relay\_Log\_File: mha-master-relay-bin.000003  Relay\_Log\_Pos: 659  Relay\_Master\_Log\_File: mysql-bin.000002  Slave\_IO\_Running: Yes  Slave\_SQL\_Running: Yes  Replicate\_Do\_DB:  Replicate\_Ignore\_DB:  Replicate\_Do\_Table:  Replicate\_Ignore\_Table:  Replicate\_Wild\_Do\_Table:  Replicate\_Wild\_Ignore\_Table:  Last\_Errno: 0  Last\_Error:  Skip\_Counter: 0  Exec\_Master\_Log\_Pos: 529  Relay\_Log\_Space: 868  Until\_Condition: None  Until\_Log\_File:  Until\_Log\_Pos: 0  Master\_SSL\_Allowed: No  Master\_SSL\_CA\_File:  Master\_SSL\_CA\_Path:  Master\_SSL\_Cert:  Master\_SSL\_Cipher:  Master\_SSL\_Key:  Seconds\_Behind\_Master: 0  Master\_SSL\_Verify\_Server\_Cert: No  Last\_IO\_Errno: 0  Last\_IO\_Error:  Last\_SQL\_Errno: 0  Last\_SQL\_Error:  Replicate\_Ignore\_Server\_Ids:  Master\_Server\_Id: 81  Master\_UUID: b92a2499-f44a-11e7-912d-005056a36ca7  Master\_Info\_File: mysql.slave\_master\_info  SQL\_Delay: 0  SQL\_Remaining\_Delay: NULL  Slave\_SQL\_Running\_State: Slave has read all relay log; waiting for the slave I/O thread to update it  Master\_Retry\_Count: 86400  Master\_Bind:  Last\_IO\_Error\_Timestamp:  Last\_SQL\_Error\_Timestamp:  Master\_SSL\_Crl:  Master\_SSL\_Crlpath:  Retrieved\_Gtid\_Set: b92a2499-f44a-11e7-912d-005056a36ca7:9  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-10,  b92a2499-f44a-11e7-912d-005056a36ca7:1-9  Auto\_Position: 1  1 row in set (0.00 sec) |

4.5 如果切换前，数据不一致，切换后报 1062 ，如何补齐数据 ?

**场景一**：主库少，从库多

主库某会话禁用binlog后进行了delete操作，这部分数据没有同步至从库，而从库又没有在会话级关闭binlog进行同样的操作，导致主从数据不一致，可能导致违返唯一约束或两边相同操作影响记录数不一样等问题。

解决思路：

这种情况，如果主库中基于会话的操作确实不希望记录到binlog中，那么在从库会话级关闭binlog后，也进行相同的操作，使主从库数据保持一致即可。这种情况下只有在主库特定操作某张表数据时才会发生，所以只要保持表数据两张一致就可以，不需要进行其它操作。

**场景二**：主库多，从库少

主库某会话禁用binlog后进行了insert操作，这部分数据不会同步至从库，而从库又没有在会话级关闭binlog进行同样的操作，导致主从数据不一致，可能导致主库进行删除操作，从库没找到数据的情况。

解决思路：

这种情况，如果主库中基于会话的操作确实不希望记录到binlog中，那么在从库会话级关闭binlog后，也进行相同的insert操作，使主从库数据保持一致即可。可在主库导出相关表insert语句，再在从库上关闭binlog后执行相同insert操作，使主库从库上该表数据保持一致。

**场景三：**主库多，从库少

从库通过root账号账号删除过数据或修改过数据，导致从库数据与主库不一致。

本例中模拟从库通过root账号删除数据库test中xs表所有数据。造成主从数据不一致的情况。

解决思路：

（1）从库通过root账号删除某一张表中数据，造成主从数据不一致。

（2）此刻，主库已执行的GTID与从库是一样的，从库自身的已执行GTID集合比主库大。

（3）将主库某schema下的某张表数据导出（在mysqldump数据时，应该如warning提示加上参数--set-gtid-purged=OFF，主库中导出数据时不含GTID相关信息，以便数据在导入从库时从库中的已执行GTID中的主库部分值不发生变化）。

（4）在从库导入数据后，启动从库线程，如果从库状态有问题，需要根据情况进行处理，以下的例子中从库中test.xs表中只有一列，且没有主键，所以造成从库数据重复，因此在从库中基于会话关闭二进制后，删除重复数据后，主从数据一致。

**场景三操作过程：**

当前环境：

当前主库：10.143.225.81

当前从库：10.143.225.80

### （1）登陆从库操作

说明：操作前检查主从环境是否一致，记录下两边的状态信息，本例中的状态信息同4.4中最后部分

|  |
| --- |
| #从库通过root用户不小心，删除了test数据库中的xs表(step 1)  mysql> drop table test.xs;  Query OK, 0 rows affected (0.01 sec)  #操作后查看从库的状态信息，从库自身的GTID集合增加至11(step 2)  mysql> show slave status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Slave\_IO\_State: Waiting for master to send event  Master\_Host: 10.143.225.81  Master\_User: myrpl  Master\_Port: 3308  Connect\_Retry: 60  Master\_Log\_File: mysql-bin.000002  Read\_Master\_Log\_Pos: 529  Relay\_Log\_File: mha-master-relay-bin.000003  Relay\_Log\_Pos: 659  Relay\_Master\_Log\_File: mysql-bin.000002  Slave\_IO\_Running: Yes  Slave\_SQL\_Running: Yes  Replicate\_Do\_DB:  Replicate\_Ignore\_DB:  Replicate\_Do\_Table:  Replicate\_Ignore\_Table:  Replicate\_Wild\_Do\_Table:  Replicate\_Wild\_Ignore\_Table:  Last\_Errno: 0  Last\_Error:  Skip\_Counter: 0  Exec\_Master\_Log\_Pos: 529  Relay\_Log\_Space: 868  Until\_Condition: None  Until\_Log\_File:  Until\_Log\_Pos: 0  Master\_SSL\_Allowed: No  Master\_SSL\_CA\_File:  Master\_SSL\_CA\_Path:  Master\_SSL\_Cert:  Master\_SSL\_Cipher:  Master\_SSL\_Key:  Seconds\_Behind\_Master: 0  Master\_SSL\_Verify\_Server\_Cert: No  Last\_IO\_Errno: 0  Last\_IO\_Error:  Last\_SQL\_Errno: 0  Last\_SQL\_Error:  Replicate\_Ignore\_Server\_Ids:  Master\_Server\_Id: 81  Master\_UUID: b92a2499-f44a-11e7-912d-005056a36ca7  Master\_Info\_File: mysql.slave\_master\_info  SQL\_Delay: 0  SQL\_Remaining\_Delay: NULL  Slave\_SQL\_Running\_State: Slave has read all relay log; waiting for the slave I/O thread to update it  Master\_Retry\_Count: 86400  Master\_Bind:  Last\_IO\_Error\_Timestamp:  Last\_SQL\_Error\_Timestamp:  Master\_SSL\_Crl:  Master\_SSL\_Crlpath:  Retrieved\_Gtid\_Set: b92a2499-f44a-11e7-912d-005056a36ca7:9  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-11,  b92a2499-f44a-11e7-912d-005056a36ca7:1-9  Auto\_Position: 1  1 row in set (0.00 sec)  #查看从库同步状态(step 10)  ysql> show slave status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Slave\_IO\_State: Waiting for master to send event  Master\_Host: 10.143.225.81  Master\_User: myrpl  Master\_Port: 3308  Connect\_Retry: 60  Master\_Log\_File: mysql-bin.000002  Read\_Master\_Log\_Pos: 822  Relay\_Log\_File: mha-master-relay-bin.000003  Relay\_Log\_Pos: 659  Relay\_Master\_Log\_File: mysql-bin.000002  Slave\_IO\_Running: Yes  Slave\_SQL\_Running: No  Replicate\_Do\_DB:  Replicate\_Ignore\_DB:  Replicate\_Do\_Table:  Replicate\_Ignore\_Table:  Replicate\_Wild\_Do\_Table:  Replicate\_Wild\_Ignore\_Table:  Last\_Errno: 1146  Last\_Error: Error executing row event: 'Table 'test.xs' doesn't exist'  Skip\_Counter: 0  Exec\_Master\_Log\_Pos: 529  Relay\_Log\_Space: 1161  Until\_Condition: None  Until\_Log\_File:  Until\_Log\_Pos: 0  Master\_SSL\_Allowed: No  Master\_SSL\_CA\_File:  Master\_SSL\_CA\_Path:  Master\_SSL\_Cert:  Master\_SSL\_Cipher:  Master\_SSL\_Key:  Seconds\_Behind\_Master: NULL  Master\_SSL\_Verify\_Server\_Cert: No  Last\_IO\_Errno: 0  Last\_IO\_Error:  Last\_SQL\_Errno: 1146  Last\_SQL\_Error: Error executing row event: 'Table 'test.xs' doesn't exist'  Replicate\_Ignore\_Server\_Ids:  Master\_Server\_Id: 81  Master\_UUID: b92a2499-f44a-11e7-912d-005056a36ca7  Master\_Info\_File: mysql.slave\_master\_info  SQL\_Delay: 0  SQL\_Remaining\_Delay: NULL  Slave\_SQL\_Running\_State:  Master\_Retry\_Count: 86400  Master\_Bind:  Last\_IO\_Error\_Timestamp:  Last\_SQL\_Error\_Timestamp: 180117 11:19:16  Master\_SSL\_Crl:  Master\_SSL\_Crlpath:  Retrieved\_Gtid\_Set: b92a2499-f44a-11e7-912d-005056a36ca7:9-10  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-11,  b92a2499-f44a-11e7-912d-005056a36ca7:1-9  Auto\_Position: 1  1 row in set (0.00 sec)  #停止从库复制线程(step 11)  mysql> stop slave;  Query OK, 0 rows affected (0.01 sec)  #将主库导出的/home/mysql/xs\_20180117.sql文件导入到从库(step 12)  mysql> source /home/mysql/xs\_20180117.sql  #启动从库线程  mysql> start slave;  Query OK, 0 rows affected (0.00 sec)  #查询从库xs表数据，因xs表上没有设置主键，所以主库上第10个事务在从库上执行了，造成从库有一条数据重复。  mysql> select \* from test.xs;  +------+  | xh |  +------+  | 1 |  | 2 |  | 3 |  | 4 |  | 5 |  | 6 |  | 7 |  | 8 |  | 8 |  +------+  9 rows in set (0.00 sec)  #检查从复制状态，GTID与主库一致  mysql> show slave status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Slave\_IO\_State: Waiting for master to send event  Master\_Host: 10.143.225.81  Master\_User: myrpl  Master\_Port: 3308  Connect\_Retry: 60  Master\_Log\_File: mysql-bin.000002  Read\_Master\_Log\_Pos: 822  Relay\_Log\_File: mha-master-relay-bin.000004  Relay\_Log\_Pos: 448  Relay\_Master\_Log\_File: mysql-bin.000002  Slave\_IO\_Running: Yes  Slave\_SQL\_Running: Yes  Replicate\_Do\_DB:  Replicate\_Ignore\_DB:  Replicate\_Do\_Table:  Replicate\_Ignore\_Table:  Replicate\_Wild\_Do\_Table:  Replicate\_Wild\_Ignore\_Table:  Last\_Errno: 0  Last\_Error:  Skip\_Counter: 0  Exec\_Master\_Log\_Pos: 822  Relay\_Log\_Space: 1458  Until\_Condition: None  Until\_Log\_File:  Until\_Log\_Pos: 0  Master\_SSL\_Allowed: No  Master\_SSL\_CA\_File:  Master\_SSL\_CA\_Path:  Master\_SSL\_Cert:  Master\_SSL\_Cipher:  Master\_SSL\_Key:  Seconds\_Behind\_Master: 0  Master\_SSL\_Verify\_Server\_Cert: No  Last\_IO\_Errno: 0  Last\_IO\_Error:  Last\_SQL\_Errno: 0  Last\_SQL\_Error:  Replicate\_Ignore\_Server\_Ids:  Master\_Server\_Id: 81  Master\_UUID: b92a2499-f44a-11e7-912d-005056a36ca7  Master\_Info\_File: mysql.slave\_master\_info  SQL\_Delay: 0  SQL\_Remaining\_Delay: NULL  Slave\_SQL\_Running\_State: Slave has read all relay log; waiting for the slave I/O thread to update it  Master\_Retry\_Count: 86400  Master\_Bind:  Last\_IO\_Error\_Timestamp:  Last\_SQL\_Error\_Timestamp:  Master\_SSL\_Crl:  Master\_SSL\_Crlpath:  Retrieved\_Gtid\_Set: b92a2499-f44a-11e7-912d-005056a36ca7:9-10  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-16,  b92a2499-f44a-11e7-912d-005056a36ca7:1-10  Auto\_Position: 1  1 row in set (0.00 sec)  #删除从库重复的数据,因xs表没有主键，所以删除重复数据麻烦些  mysql> set session sql\_log\_bin=off;  Query OK, 0 rows affected (0.00 sec)  mysql> create table xs\_tmp as select distinct xh from xs;  Query OK, 8 rows affected (0.01 sec)  Records: 8 Duplicates: 0 Warnings: 0  mysql> desc xs\_tmp;  +-------+---------+------+-----+---------+-------+  | Field | Type | Null | Key | Default | Extra |  +-------+---------+------+-----+---------+-------+  | xh | int(11) | YES | | NULL | |  +-------+---------+------+-----+---------+-------+  1 row in set (0.00 sec)  mysql> delete from xs;  Query OK, 9 rows affected (0.01 sec)  mysql> insert into xs select \* from xs\_tmp;  Query OK, 8 rows affected (0.00 sec)  Records: 8 Duplicates: 0 Warnings: 0  mysql> select \* from xs;  +------+  | xh |  +------+  | 1 |  | 2 |  | 3 |  | 4 |  | 5 |  | 6 |  | 7 |  | 8 |  +------+  8 rows in set (0.00 sec)  mysql> drop table xs\_tmp;  Query OK, 0 rows affected (0.02 sec)  mysql> set session sql\_log\_bin=on;  Query OK, 0 rows affected (0.00 sec) |

### （2）登陆主库操作

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| #查看主库GTID集合(step 3)  mysql> show master status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  File: mysql-bin.000002  Position: 529  Binlog\_Do\_DB:  Binlog\_Ignore\_DB:  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-10,  b92a2499-f44a-11e7-912d-005056a36ca7:1-9  1 row in set (0.00 sec)  #主库基于会话关闭binlog，同时向test.xs表中写入数据(step 4)  mysql> set session sql\_log\_bin=off;  Query OK, 0 rows affected (0.00 sec)  mysql> insert into test.xs(xh) values(7);  Query OK, 1 row affected (0.00 sec)  #查看主库GTID是否变化？(step 5)  mysql> show master status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  File: mysql-bin.000002  Position: 529  Binlog\_Do\_DB:  Binlog\_Ignore\_DB:  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-10,  b92a2499-f44a-11e7-912d-005056a36ca7:1-9  1 row in set (0.00 sec)  说明：GTID没有发生变化。  #查看主库进进制日志(step 6)  /opt/mysql56/bin/mysqlbinlog --no-defaults --base64-output=decode-rows -v -v mysql-bin.000002 --start-position=529  529  /\*!50530 SET @@SESSION.PSEUDO\_SLAVE\_MODE=1\*/;  /\*!40019 SET @@session.max\_insert\_delayed\_threads=0\*/;  /\*!50003 SET @OLD\_COMPLETION\_TYPE=@@COMPLETION\_TYPE,COMPLETION\_TYPE=0\*/;  DELIMITER /\*!\*/;  DELIMITER ;  # End of log file  ROLLBACK /\* added by mysqlbinlog \*/;  /\*!50003 SET COMPLETION\_TYPE=@OLD\_COMPLETION\_TYPE\*/;  /\*!50530 SET @@SESSION.PSEUDO\_SLAVE\_MODE=0\*/;  说明：binlog中没有记录上面的insert操作，因为刚才的操作从会话级别关闭了binlog日志写入功能。  #主库将会话级binlog开关打开(step 7)  mysql> set session sql\_log\_bin=on;  Query OK, 0 rows affected (0.00 sec)  mysql> insert into test.xs(xh) values(8);  Query OK, 1 row affected (0.00 sec)  #主库查看GTID及binlog日志(step 8)  mysql> show master status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  File: mysql-bin.000002  Position: 822  Binlog\_Do\_DB:  Binlog\_Ignore\_DB:  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-10,  b92a2499-f44a-11e7-912d-005056a36ca7:1-10  1 row in set (0.00 sec)    说明：打开binlog后，产生了一个事务，该事务写入binlog文件同时主库已执行GTID  集合增加到10了。  #主库导出test.xs表的数据(step 9)  /opt/mysql56/bin/mysqldump -uroot -p --socket=/data/mysql3308/data/mysql.sock --port=3308 --set-gtid-purged=OFF --single-transaction test xs >/home/mysql/xs\_20180117.sql    # 将主库导出的备份文件传至从库  # scp /home/mysql/xs\_20180117.sql root@10.143.225.80:/home/mysql  xs\_20180117.sql  说明：“--set-gtid-purged=OFF”参数作用在导出的SQL文件中去掉了GTID相关设置信息，以下是没有增加“--set-gtid-purged=OFF”参数时导出的文件，里面含有GTID相关设置。  /opt/mysql56/bin/mysqldump -uroot -p --socket=/data/mysql3308/data/mysql.sock --port=3308 --single-transaction test xs >/home/mysql/xs\_2018011\_2.sql |

### （3）主从环境验证

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| #主库状态：  mysql> show master status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  File: mysql-bin.000002  Position: 822  Binlog\_Do\_DB:  Binlog\_Ignore\_DB:  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-10,  b92a2499-f44a-11e7-912d-005056a36ca7:1-10  1 row in set (0.00 sec)  #从库状态：  mysql> show slave status\G  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Slave\_IO\_State: Waiting for master to send event  Master\_Host: 10.143.225.81  Master\_User: myrpl  Master\_Port: 3308  Connect\_Retry: 60  Master\_Log\_File: mysql-bin.000002  Read\_Master\_Log\_Pos: 822  Relay\_Log\_File: mha-master-relay-bin.000004  Relay\_Log\_Pos: 448  Relay\_Master\_Log\_File: mysql-bin.000002  Slave\_IO\_Running: Yes  Slave\_SQL\_Running: Yes  Replicate\_Do\_DB:  Replicate\_Ignore\_DB:  Replicate\_Do\_Table:  Replicate\_Ignore\_Table:  Replicate\_Wild\_Do\_Table:  Replicate\_Wild\_Ignore\_Table:  Last\_Errno: 0  Last\_Error:  Skip\_Counter: 0  Exec\_Master\_Log\_Pos: 822  Relay\_Log\_Space: 1458  Until\_Condition: None  Until\_Log\_File:  Until\_Log\_Pos: 0  Master\_SSL\_Allowed: No  Master\_SSL\_CA\_File:  Master\_SSL\_CA\_Path:  Master\_SSL\_Cert:  Master\_SSL\_Cipher:  Master\_SSL\_Key:  Seconds\_Behind\_Master: 0  Master\_SSL\_Verify\_Server\_Cert: No  Last\_IO\_Errno: 0  Last\_IO\_Error:  Last\_SQL\_Errno: 0  Last\_SQL\_Error:  Replicate\_Ignore\_Server\_Ids:  Master\_Server\_Id: 81  Master\_UUID: b92a2499-f44a-11e7-912d-005056a36ca7  Master\_Info\_File: mysql.slave\_master\_info  SQL\_Delay: 0  SQL\_Remaining\_Delay: NULL  Slave\_SQL\_Running\_State: Slave has read all relay log; waiting for the slave I/O thread to update it  Master\_Retry\_Count: 86400  Master\_Bind:  Last\_IO\_Error\_Timestamp:  Last\_SQL\_Error\_Timestamp:  Master\_SSL\_Crl:  Master\_SSL\_Crlpath:  Retrieved\_Gtid\_Set: b92a2499-f44a-11e7-912d-005056a36ca7:9-10  Executed\_Gtid\_Set: 2cb7f07d-f448-11e7-911d-005056a30c6f:1-16,  b92a2499-f44a-11e7-912d-005056a36ca7:1-10  Auto\_Position: 1  1 row in set (0.00 sec)  #主库操作：  mysql> insert into test.xs(xh) values(9);  Query OK, 1 row affected (0.00 sec)  mysql>  mysql> alter table xs add primary key(xh);  Query OK, 9 rows affected (0.03 sec)  Records: 9 Duplicates: 0 Warnings: 0  mysql> desc test.xs;  +-------+---------+------+-----+---------+-------+  | Field | Type | Null | Key | Default | Extra |  +-------+---------+------+-----+---------+-------+  | xh | int(11) | NO | PRI | 0 | |  +-------+---------+------+-----+---------+-------+  1 row in set (0.00 sec)  #从库操作：  mysql> desc test.xs;  +-------+---------+------+-----+---------+-------+  | Field | Type | Null | Key | Default | Extra |  +-------+---------+------+-----+---------+-------+  | xh | int(11) | NO | PRI | 0 | |  +-------+---------+------+-----+---------+-------+  1 row in set (0.00 sec)  mysql>  mysql> select \* from test.xs;  +----+  | xh |  +----+  | 1 |  | 2 |  | 3 |  | 4 |  | 5 |  | 6 |  | 7 |  | 8 |  | 9 |  +----+  9 rows in set (0.00 sec) |

# 五、测试中存在问题记录

五种场景：需要考虑生产环境主库GTID不断变化，不能改为只读

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| --- | --- | --- |
| 序号 | 测试场景 | 存在问题 |
| 1 | 主库宕机,mha是否会正常切换 | （1）主库异常关机，或服务异常停止  （2）故障转移成功后，需要确认失败主库的失败时的GTID信息，从失败主库的错误日志中查找。做实验验证。  （3）定位到失败时的GTID时，直接在失败主库上执行purge\_gtid 为主库出错前已执行过的GTID集合。  （4）重新建立主从关系 |
| 2 | gtid一致时，切换 | OK |
| 3 | gtid不一致时切换-->演示  从库执行 create database mha1; | （1）停止GTID不一致的从库，记下从库中已执行的GTID和从库自身的GTID集合。  （2）查看从库中自已GTID集合比主库中记录的从库的GTID集合多的一部分二进制日志，找出从库中执行的语句。  （3）根据分析从库中执行的语句来确定如何处理。比如从库如果只是新建了对象，那么打开一个会话，关闭二进制日志，再把新建的对象删除就可以了，然后在从库执行purge\_gtid为从库记录的主库已执行GTID和主库记录的从库执行过的GTID。（问题：从库以后切换为主库时，会报一个GTID已存在的错误，可以通过执行一个空事务的方法跳过即可）。  （4）如果从库不小心操作了已有的表中的数据，可能是增、删、改的操作。这种情况下，先是先分析从库在主库记录的GTID之后都执行了哪些操作。然后根据分析情况做处理。由于主库是在不断的读写中。如果从库操作的表主库没有事务，那么在从库开一个会话关闭二进制开关，执行从库中找到的日志中的逆操作，使得从库与主库数据保持一致。然后在从库执行purge\_gtid为从库记录的主库已执行GTID和主库记录的从库已执行GTID集合。（说明：当该从库切为主库时也会出现有部分GTID已存在的问题，也是通过空事务忽略即可）。 |
| 4 | 不小心在主库执行了reset master，怎么办? | （1）主库执行了reset master后二进制日志文件没了，但是事务在不断进行中。  （2）但是从库同步会失败，因为找不到二进制日志文件了。此时在从库进行如下操作：记录下从库报错时已执行的主库的GTID。然后  reset master后（重新配置主从？ 还是直接启动从线程？ 修改purge GTID后直接启动从库线程？ ）  （3）应该是reset slave后，重建主从关系。从库中已执行GTID从主库新产生的二进制日志文件中获取。 |
| 5 | 如果切换前，数据不一致，切换后报 1062 ，如何补齐数据 ?  **提示：**  /home/mysql/mysql3502/bin/mysqldump --defaults-file=/home/mysql/mysql3502/etc/root.cnf --set-gtid-purged=OFF \  --single-transaction sop\_admin  > sop\_admin.sql    start slave until SQL\_BEFORE\_GTIDS ='5c580bf9-0161-4e14-943b-751a3a09508b:376093077'; | （1）导使用出数据时不使用“set-gtid-purged=OFF”参数。  （2）记下导出文件时的GTID，然后手动去掉文件中的GTID。  （3）在从库在会话级关闭二进制日志开关，导入刚才的文件。  （4）打开二进制会话开关。  （5）停止从库  （6）reset master  （7）在从库purge GTID至刚才从库停止时主库已执行GTID和主库中记录的从库GTID。  （8）启动从库线程。 |