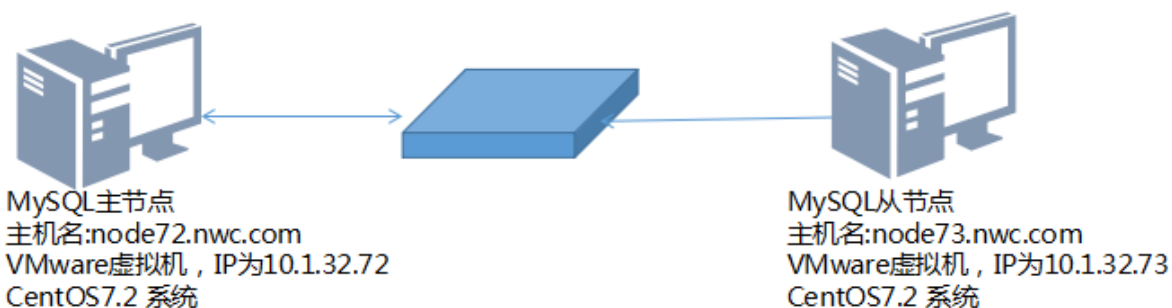# Mariadb数据库复制系列(三)：半同步复制

实验三：半同步复制的实现

> 默认情况下，主从复制的结构中，主从节点之间复制操作是异步的，这样就有可能造成主从节点之间数据不一致的情况发生，所谓版同步复制就是指在一主多从的场景中，我们设定主节点与其中一个或多个从节点(一般是一个)的数据复制是同步进行的，从而保证了该从节点和主节点之间的数据的一致性。故当主节点发生故障时，就可以基于其他方式将该从节点提升为主节点，提高可用性。

1、实验环境

设定node72节点和node73节点之间的数据复制是基于同步方式进行

确保节点间时间同步

2、在两个节点上安装mariadb-server服务程序包

```
[root@node72 ~]# yum install -y mariadb-server
已加载插件: fastestmirror, langpacks        在node72上安装mariadb-server
Repodata is over 2 weeks old. Install yum-cron? Or run: yum makecache fast
BASE                                              | 3.6 kB  00:00:00
EPEL                                              | 4.3 kB  00:00:00
Determining fastest mirrors
正在解决依赖关系
--> 正在检查事务
---> 软件包 mariadb-server.x86_64.1.5.5.44-2.el7.centos 将被 安装
--> 正在处理依赖关系 mariadb(x86-64) = 1:5.5.44-2.el7.centos，它被软件包 1:mariadb-server-5.5.44-2.
el7.centos.x86_64 需要
--> 正在处理依赖关系 perl-DBI，它被软件包 1:mariadb-server-5.5.44-2.el7.centos.x86_64 需要
--> 正在处理依赖关系 perl-DBD-MySQL，它被软件包 1:mariadb-server-5.5.44-2.el7.centos.x86_64 需要
--> 正在处理依赖关系 perl(Data::Dumper)，它被软件包 1:mariadb-server-5.5.44-2.el7.centos.x86_64 需
要
--> 正在处理依赖关系 perl(DBI)，它被软件包 1:mariadb-server-5.5.44-2.el7.centos.x86_64 需要
--> 正在检查事务
---> 软件包 mariadb.x86_64.1.5.5.44-2.el7.centos 将被 安装
---> 软件包 perl-DBD-MySQL.x86_64.0.4.023-5.el7 将被 安装
[root@node73 ~]# yum install -y mariadb-server
Loaded plugins: fastestmirror                 在node73上安装mariadb-server
BASE                                              | 3.6 kB  00:00:00
EPEL                                              | 4.3 kB  00:00:00
Loading mirror speeds from cached hostfile
Resolving Dependencies
--> Running transaction check
---> Package mariadb-server.x86_64 1:5.5.44-2.el7.centos will be installed
--> Processing Dependency: mariadb(x86-64) = 1:5.5.44-2.el7.centos for package: 1:mariadb-server-5.
5.44-2.el7.centos.x86_64
--> Processing Dependency: perl-DBI for package: 1:mariadb-server-5.5.44-2.el7.centos.x86_64
--> Processing Dependency: perl-DBD-MySQL for package: 1:mariadb-server-5.5.44-2.el7.centos.x86_64
--> Processing Dependency: perl(Data::Dumper) for package: 1:mariadb-server-5.5.44-2.el7.centos.x86
_64
--> Processing Dependency: perl(DBI) for package: 1:mariadb-server-5.5.44-2.el7.centos.x86_64
--> Processing Dependency: libaio.so.1(LIBAIO_0.4)(64bit) for package: 1:mariadb-server-5.5.44-2.el
7.centos.x86_64
```

3、确保两个节点上安装生成的mysql的插件目录下有semisync_master.so 和semisync_slave.so共享库文件

```
[root@node72 ~]# rpm -ql mariadb-server|grep "semi"
/usr/lib64/mysql/plugin/semisync_master.so         确保安装的mysql服务端程序包有同步复制的插件
/usr/lib64/mysql/plugin/semisync_slave.so
[root@node72 ~]#
[root@node73 ~]#
[root@node73 ~]# rpm -ql mariadb-server|grep "semi"
/usr/lib64/mysql/plugin/semisync_master.so
/usr/lib64/mysql/plugin/semisync_slave.so
[root@node73 ~]#
```

4、配置两个节点之间的主从关系

```
[root@node72 ~]# vim /etc/my.cnf          编辑node72的服务配置文件，让其满足主从结构中主节点的配置要求

[mysqld]
datadir=/var/lib/mysql
socket=/var/lib/mysql/mysql.sock
# Disabling symbolic-links is recommended to prevent assorted security risks
symbolic-links=0
# Settings user and group are ignored when systemd is used.
# If you need to run mysqld under a different user or group,
# customize your systemd unit file for mariadb according to the
# instructions in http://fedoraproject.org/wiki/Systemd
skip_name_resolve=ON    禁用名称解析
innodb_file_per_table=ON    innodb存储引擎的表，每表一个单独的表空间
server_id=1    设定该节点的全局唯一serverid
log_bin=node72binlog    启用主节点的二进制日志功能

[mysqld_safe]
log-error=/var/log/mariadb/mariadb.log
pid-file=/var/run/mariadb/mariadb.pid


#
# include all files from the config directory
[root@node73 ~]# vim /etc/my.cnf

[mysqld]                          配置node73的mysql服务配置文件，让其满足从节点的配置要求
datadir=/var/lib/mysql
socket=/var/lib/mysql/mysql.sock
# Disabling symbolic-links is recommended to prevent assorted security risks
symbolic-links=0
# Settings user and group are ignored when systemd is used.
# If you need to run mysqld under a different user or group,
# customize your systemd unit file for mariadb according to the
# instructions in http://fedoraproject.org/wiki/Systemd
skip_name_resolve=ON
innodb_file_per_table=ON
server_id=2    设定全局唯一server id
relay_log=node73relaylog    启动中继日志功能
read_only=ON    限定从服务器只读属性

[mysqld_safe]
log-error=/var/log/mariadb/mariadb.log
pid-file=/var/run/mariadb/mariadb.pid

[root@node72 ~]# systemctl start mariadb    node72主节点上启动mariadb服务
[root@node72 ~]# ss -tnl
State       Recv-Q Send-Q    Local Address:Port              Peer Address:Port
LISTEN      0      50                *:3306                          *:*
LISTEN      0      128               *:22                            *:*
LISTEN      0      100       127.0.0.1:25                            *:*
LISTEN      0      128              :::22                           :::*
LISTEN      0      100             ::1:25                           :::*
[root@node72 ~]# mysql
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 2
Server version: 5.5.44-MariaDB-log MariaDB Server

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Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> GRANT REPLICATION SLAVE,REPLICATION CLIENT ON *.* TO 'node72user'@'10.1.32.73' ID
ENTIFIED BY '111111';
Query OK, 0 rows affected (0.00 sec)
                              连接到mysql，授权一个具有复制权限的用户，只允许该用户在10.1.32.73也就是从节
```

```
MariaDB [(none)]> FLUSH PRIVILEGES;                点上登录
Query OK, 0 rows affected (0.01 sec)

MariaDB [(none)]>

MariaDB [(none)]> SHOW BINARY LOGS;
+---------------------+------------+
| Log_name            | File_size  |
+---------------------+------------+
| node72binlog.000001 |      30358 |
| node72binlog.000002 |    1038814 |
| node72binlog.000003 |        496 |
+---------------------+------------+
3 rows in set (0.00 sec)

MariaDB [(none)]> SHOW MASTER STATUS;   查看主节点上二进制日志当前所处的位置
+---------------------+----------+--------------+------------------+
| File                | Position | Binlog_Do_DB | Binlog_Ignore_DB |
+---------------------+----------+--------------+------------------+
| node72binlog.000003 |      496 |              |                  |
+---------------------+----------+--------------+------------------+
1 row in set (0.00 sec)

MariaDB [(none)]>
```

```
[root@node73 ~]# systemctl start mariadb         启动从节点的服务
[root@node73 ~]# ss -tnl
State          Recv-Q Send-Q     Local Address:Port              Peer Address:Port
LISTEN         0      50                *:3306                         *:*
LISTEN         0      128               *:22                           *:*
LISTEN         0      100         127.0.0.1:25                         *:*
LISTEN         0      128              :::22                          :::*
LISTEN         0      100             ::1:25                          :::*
[root@node73 ~]# mysql
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 2
Server version: 5.5.44-MariaDB MariaDB Server

Copyright (c) 2000, 2015, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> CHANGE MASTER TO MASTER_HOST='10.1.32.72',MASTER_USER='node72user',MASTER_PASSWOR
D='111111',MASTER_LOG_FILE='node72binlog.000003',MASTER_LOG_POS=496;
Query OK, 0 rows affected (0.02 sec)
                                           设定从节点从主节点复制时的属性信息

MariaDB [(none)]> START SLAVE;    启动复制线程
Query OK, 0 rows affected (0.00 sec)

MariaDB [(none)]> SHOW SLAVE STATUS\G    查看从节点的状态信息
*************************** 1. row ***************************
               Slave_IO_State: Waiting for master to send event
                  Master_Host: 10.1.32.72
                  Master_User: node72user
                  Master_Port: 3306
                Connect_Retry: 60
              Master_Log_File: node72binlog.000003
          Read_Master_Log_Pos: 496
               Relay_Log_File: node73relaylog.000002
                Relay_Log_Pos: 532
        Relay_Master_Log_File: node72binlog.000003
             Slave_IO_Running: Yes      复制线程连接正常
            Slave_SQL_Running: Yes
```

```
● 17.2系统-node72                            ● 17.2系统-node73

MariaDB [(none)]>                           MariaDB [(none)]> SHOW DATABASES;
MariaDB [(none)]>                           +--------------------+
MariaDB [(none)]> CREATE DATABASE mydb;     | Database           |
Query OK, 1 row affected (0.00 sec)         +--------------------+     测试主从复制是否成功
                                            | information_schema |
MariaDB [(none)]> use mydb;                 | mydb               |
Database changed                            | mysql              |
```

5、在主节点上安装专用于主节点的半同步插件，启用主节点的半同步复制功能

```
MariaDB [(none)]> INSTALL PLUGIN rpl_semi_sync_master SONAME 'semisync_master.so';
Query OK, 0 rows affected (0.00 sec)    在主节点上装载主节点专用的半同步插件，指明插件名称和插件的
                                        SONAME（共享库文件的名称）
MariaDB [(none)]> SHOW PLUGINS;   查看当前mysql服务器装载的插件列表
+-------------------------------+----------+--------------------+------------------------+---------+
| Name                          | Status   | Type               | Library                | License |
+-------------------------------+----------+--------------------+------------------------+---------+
| binlog                        | ACTIVE   | STORAGE ENGINE     | NULL                   | GPL     |
| mysql_native_password         | ACTIVE   | AUTHENTICATION     | NULL                   | GPL     |
| mysql_old_password            | ACTIVE   | AUTHENTICATION     | NULL                   | GPL     |
| MRG_MYISAM                    | ACTIVE   | STORAGE ENGINE     | NULL                   | GPL     |
| MEMORY                        | ACTIVE   | STORAGE ENGINE     | NULL                   | GPL     |
| MyISAM                        | ACTIVE   | STORAGE ENGINE     | NULL                   | GPL     |
| CSV                           | ACTIVE   | STORAGE ENGINE     | NULL                   | GPL     |
| PERFORMANCE_SCHEMA            | ACTIVE   | STORAGE ENGINE     | NULL                   | GPL     |
| ARCHIVE                       | ACTIVE   | STORAGE ENGINE     | NULL                   | GPL     |
| InnoDB                        | ACTIVE   | STORAGE ENGINE     | NULL                   | GPL     |
| INNODB_RSEG                   | ACTIVE   | INFORMATION SCHEMA | NULL                   | GPL     |
| INNODB_UNDO_LOGS              | ACTIVE   | INFORMATION SCHEMA | NULL                   | GPL     |
| INNODB_TRX                    | ACTIVE   | INFORMATION SCHEMA | NULL                   | GPL     |
| INNODB_LOCKS                  | ACTIVE   | INFORMATION SCHEMA | NULL                   | GPL     |
| INNODB_LOCK_WAITS             | ACTIVE   | INFORMATION SCHEMA | NULL                   | GPL     |
| INNODB_CMP                    | ACTIVE   | INFORMATION SCHEMA | NULL                   | GPL     |
| INNODB_CMP_RESET              | ACTIVE   | INFORMATION SCHEMA | NULL                   | GPL     |
| INNODB_CMPMEM                 | ACTIVE   | INFORMATION SCHEMA | NULL                   | GPL     |
| INNODB_CMPMEM_RESET           | ACTIVE   | INFORMATION SCHEMA | NULL                   | GPL     |
| INNODB_SYS_TABLES             | ACTIVE   | INFORMATION SCHEMA | NULL                   | GPL     |
| INNODB_SYS_TABLESTATS         | ACTIVE   | INFORMATION SCHEMA | NULL                   | GPL     |
| INNODB_SYS_INDEXES            | ACTIVE   | INFORMATION SCHEMA | NULL                   | GPL     |
| INNODB_SYS_COLUMNS            | ACTIVE   | INFORMATION SCHEMA | NULL                   | GPL     |
| INNODB_SYS_FIELDS             | ACTIVE   | INFORMATION SCHEMA | NULL                   | GPL     |
| INNODB_SYS_FOREIGN            | ACTIVE   | INFORMATION SCHEMA | NULL                   | GPL     |
| INNODB_SYS_FOREIGN_COLS       | ACTIVE   | INFORMATION SCHEMA | NULL                   | GPL     |
| INNODB_SYS_STATS              | ACTIVE   | INFORMATION SCHEMA | NULL                   | GPL     |
| INNODB_TABLE_STATS            | ACTIVE   | INFORMATION SCHEMA | NULL                   | GPL     |
| INNODB_INDEX_STATS            | ACTIVE   | INFORMATION SCHEMA | NULL                   | GPL     |
| INNODB_BUFFER_POOL_PAGES      | ACTIVE   | INFORMATION SCHEMA | NULL                   | GPL     |
| INNODB_BUFFER_POOL_PAGES_INDEX| ACTIVE   | INFORMATION SCHEMA | NULL                   | GPL     |
| INNODB_BUFFER_POOL_PAGES_BLOB | ACTIVE   | INFORMATION SCHEMA | NULL                   | GPL     |
| XTRADB_ADMIN_COMMAND          | ACTIVE   | INFORMATION SCHEMA | NULL                   | GPL     |
| INNODB_CHANGED_PAGES          | ACTIVE   | INFORMATION SCHEMA | NULL                   | GPL     |
| INNODB_BUFFER_PAGE            | ACTIVE   | INFORMATION SCHEMA | NULL                   | GPL     |
| INNODB_BUFFER_PAGE_LRU        | ACTIVE   | INFORMATION SCHEMA | NULL                   | GPL     |
| INNODB_BUFFER_POOL_STATS      | ACTIVE   | INFORMATION SCHEMA | NULL                   | GPL     |
| FEDERATED                     | ACTIVE   | STORAGE ENGINE     | NULL                   | GPL     |
| BLACKHOLE                     | ACTIVE   | STORAGE ENGINE     | NULL                   | GPL     |
| Aria                          | ACTIVE   | STORAGE ENGINE     | NULL                   | GPL     |
| FEEDBACK      发现半同步复制插件已 | DISABLED | INFORMATION SCHEMA | NULL                   | GPL     |
| partition       装载成功         | ACTIVE   | STORAGE ENGINE     | NULL                   | GPL     |
| rpl_semi_sync_master          | ACTIVE   | REPLICATION        | semisync_master.so     | GPL     |
+-------------------------------+----------+--------------------+------------------------+---------+
43 rows in set (0.00 sec)
MariaDB [(none)]> SHOW GLOBAL VARIABLES LIKE '%semi%';    装载半同步复制插件后，新增了一些服务器变量，用于定义
                                                          半同步复制时的工作属性
+-----------------------------------+-------+
| Variable_name                     | Value |
+-----------------------------------+-------+
| rpl_semi_sync_master_enabled      | OFF   |  用于定义是否启用主节点的半同步复制功能
| rpl_semi_sync_master_timeout      | 10000 |
| rpl_semi_sync_master_trace_level  | 32    |
| rpl_semi_sync_master_wait_no_slave| ON    |
+-----------------------------------+-------+
4 rows in set (0.00 sec)                        用于定义半同步复制时，主节点与从节点直接的同步复制的超时时
                                                间，在此时间内，无法建立同步复制连接请求，主从复制将自动降级
                                                为异步复制
MariaDB [(none)]> SET GLOBAL rpl_semi_sync_master_enabled=ON;
```

```
Query OK, 0 rows affected (0.00 sec)   启动主节点的半同步复制功能

MariaDB [(none)]>
```

6、在从节点上安装专用于从节点的半同步插件，启用从节点的半同步复制功能

```
MariaDB [(none)]> INSTALL PLUGIN rpl_semi_sync_slave SONAME 'semisync_slave.so';
Query OK, 0 rows affected (0.01 sec)
```
在从节点上，装载专用从节点的半同步复制插件的插件，指明插件名称和
SONAME，也就是插件对应的so文件的名称

```
MariaDB [(none)]> SHOW PLUGINS;
```
查看当前服务器装载的插件列表

Name	Status	Type	Library	License
binlog	ACTIVE	STORAGE ENGINE	NULL	GPL
mysql_native_password	ACTIVE	AUTHENTICATION	NULL	GPL
mysql_old_password	ACTIVE	AUTHENTICATION	NULL	GPL
MRG_MYISAM	ACTIVE	STORAGE ENGINE	NULL	GPL
MEMORY	ACTIVE	STORAGE ENGINE	NULL	GPL
MyISAM	ACTIVE	STORAGE ENGINE	NULL	GPL
CSV	ACTIVE	STORAGE ENGINE	NULL	GPL
PERFORMANCE_SCHEMA	ACTIVE	STORAGE ENGINE	NULL	GPL
ARCHIVE	ACTIVE	STORAGE ENGINE	NULL	GPL
InnoDB	ACTIVE	STORAGE ENGINE	NULL	GPL
INNODB_RSEG	ACTIVE	INFORMATION SCHEMA	NULL	GPL
INNODB_UNDO_LOGS	ACTIVE	INFORMATION SCHEMA	NULL	GPL
INNODB_TRX	ACTIVE	INFORMATION SCHEMA	NULL	GPL
INNODB_LOCKS	ACTIVE	INFORMATION SCHEMA	NULL	GPL
INNODB_LOCK_WAITS	ACTIVE	INFORMATION SCHEMA	NULL	GPL
INNODB_CMP	ACTIVE	INFORMATION SCHEMA	NULL	GPL
INNODB_CMP_RESET	ACTIVE	INFORMATION SCHEMA	NULL	GPL
INNODB_CMPMEM	ACTIVE	INFORMATION SCHEMA	NULL	GPL
INNODB_CHANGED_PAGES	ACTIVE	INFORMATION SCHEMA	NULL	GPL
INNODB_BUFFER_PAGE	ACTIVE	INFORMATION SCHEMA	NULL	GPL
INNODB_BUFFER_PAGE_LRU	ACTIVE	INFORMATION SCHEMA	NULL	GPL
INNODB_BUFFER_POOL_STATS	ACTIVE	INFORMATION SCHEMA	NULL	GPL
FEDERATED	ACTIVE	STORAGE ENGINE	NULL	GPL
BLACKHOLE	ACTIVE	STORAGE ENGINE	NULL	GPL
Aria	ACTIVE	STORAGE ENGINE	NULL	GPL
FEEDBACK	DISABLED	INFORMATION SCHEMA	NULL	GPL
partition	ACTIVE	STORAGE ENGINE	NULL	GPL
rpl_semi_sync_slave	ACTIVE	REPLICATION	semisync_slave.so	GPL

发现插件已经装载

```
43 rows in set (0.01 sec)

MariaDB [(none)]> SHOW GLOBAL VARIABLES LIKE '%semi%';
```
装载从节点的半同步插件后，引入了几个服务器变量，专
用于定义半同步复制时，从节点的工作属性

Variable_name	Value
rpl_semi_sync_slave_enabled	OFF
rpl_semi_sync_slave_trace_level	32

是否启用从节点的半同步复制功能

```
2 rows in set (0.00 sec)

MariaDB [(none)]> SET GLOBAL rpl_semi_sync_slave_enabled=ON;
Query OK, 0 rows affected (0.00 sec)
```
设定启用从节点的半同步复制功能

```
MariaDB [(none)]> STOP SLAVE;
Query OK, 0 rows affected (0.01 sec)

MariaDB [(none)]> START SLAVE;
Query OK, 0 rows affected (0.02 sec)
```
设定完从节点的半同步复制的工作属性，重启复制线程生效

```
MariaDB [(none)]>
MariaDB [(none)]>
```

7、验证同步复制是否配置成功

```
MariaDB [hellodb]> SHOW STATUS LIKE '%semi%';     在主节点上查看半同步复制的相关的状态信息
+--------------------------------------+-------+
| Variable_name                        | Value |
+--------------------------------------+-------+
| Rpl_semi_sync_master_clients         | 1     表示当前有一个半同步复制的而从节点
| Rpl_semi_sync_master_net_avg_wait_time | 1390  同步复制时，平均网络等待的时长，单位毫秒
| Rpl_semi_sync_master_net_wait_time   | 48658 同步复制时，网络等待的次数的总时长，单位毫秒
| Rpl_semi_sync_master_net_waits       | 35    同步复制时，网络等待的次数
| Rpl_semi_sync_master_no_times        | 0     |
| Rpl_semi_sync_master_no_tx           | 0     |
| Rpl_semi_sync_master_status          | ON    |
| Rpl_semi_sync_master_timefunc_failures | 0     |
| Rpl_semi_sync_master_tx_avg_wait_time | 1743  同步复制时，事务等待的平均时长，单位毫秒
| Rpl_semi_sync_master_tx_wait_time    | 61037 同步复制时，事务等待的次数的总时长，单位毫秒
| Rpl_semi_sync_master_tx_waits        | 35    同步复制时，事务等待的次数
| Rpl_semi_sync_master_wait_pos_backtraverse | 0     |
| Rpl_semi_sync_master_wait_sessions   | 0     |
| Rpl_semi_sync_master_yes_tx          | 35    |
+--------------------------------------+-------+
14 rows in set (0.01 sec)

MariaDB [hellodb]>
```