mysql 主从复制与 lvs+keepalived 实现负载高可用

环境

主机 A：192.168.5.171

主机 B：192.168.5.172

W-VIP：192.168.5.173　（负责写入）

R-VIP：192.168.5.174　（负责读取）

Client：任意，只要能访问以上三个 IP 即可

设计思路

1、服务器 A 和 B，通过 mysql 的 slave 进程同步数据。

2、通过 keepalived 启用两个虚 IP：W-VIP/R-VIP，一个负责写入，一个负责读取，实现读写分离。

3、A 和 B 都存在时，W-VIP 下将请求转发至主机 A，R-VIP 将请求转发给 A 和 B，实现负载均衡。

4、当主机 A 异常时，B 接管服务，W-VIP/R-VIP 此时漂到了主机 B 上，此时这两个虚 IP 下都是主机 B，实现高可用

5、当主机 B 异常时，R-VIP 会将 B 踢出，其他不变

具体实现后的效果

正常状态

Prot LocalAddress:Port Scheduler Flags

  -> RemoteAddress:Port　　　　　　　Forward Weight ActiveConn InActConn

TCP　**192.168.5.173:3306** wrr persistent 60

  -> 192.168.5.171:3306　　　　　　　Local　3　　　0　　　　　　0

TCP　**192.168.5.174:3306** wrr persistent 60

  -> 192.168.5.172:3306　　　　　　　Route　3　　　0　　　　　　0

  -> 192.168.5.171:3306　　　　　　　Local　1　　　0　　　　　　0

A 故障后，B 的状态

Prot LocalAddress:Port Scheduler Flags

  -> RemoteAddress:Port　　　　　　　Forward Weight ActiveConn InActConn

TCP　**192.168.5.173:3306** wrr persistent 60

  -> 192.168.5.172:3306　　　　　　　Local　3　　　0　　　　　　0

TCP　**192.168.5.174:3306** wrr persistent 60

  -> 192.168.5.172:3306　　　　　　　Local　3　　　0　　　　　　0

一、　安装

1、mysql　可以根据需要进行安装，此处省略

2、lvs+keepalived 的安装

关联 lvs 与 keepalived 的 ipvs 所需的内核信息

ln -s /usr/src/kernels/2.6.18-194.el5-x86_64/ /usr/src/linux

安装 lvs
tar -zxvf ipvsadm-1.24.tar.gz
cd tar -zxvf ipvsadm-1.24
make
make install

验证
ipvsadm -v
返回 ipvsadm v1.24 2005/12/10 (compiled with popt and IPVS v1.2.1)说明安装成功

安装 keepalived
tar –zxvf keepalived-1.1.20.tar.gz
cd keepalived-1.1.20
./configure --prefix=/usr/local/keepalived/
make
make install
ln -s /usr/local/keepalived/etc/keepalived /etc/
ln -s /usr/local/keepalived/etc/rc.d/init.d/keepalived /etc/rc.d/init.d/
ln -s /usr/local/keepalived/etc/sysconfig/keepalived /etc/sysconfig/
ln -s /usr/local/keepalived/bin/genhash /bin/
ln -s /usr/local/keepalived/sbin/keepalived /sbin/

configure 时注意 Use IPVS Framework、IPVS sync daemon support 、Use VRRP Framework 要返回 yes，否则无法关联 ipvs 功能

二、 配置 **mysql** 的主从

Master 的配置
vi /etc/my.cnf

添加如下内容：
server-id = 1　　##master ID
binlog-do-db = ppl　##允许同步的库
binlog-ignore-db = mysql　##忽略同步的库，也就是不能同步的库

##配置文件中还需开启 log-bin，例如 log-bin = mysql-bin

mysql –uroot –p
以下内容在 mysql 中执行
mysql> grant replication slave on *.* to 'slave'@'%' identified by '123456';
mysql>create database ppl;
mysql>flush logs;

mysql>show master status;

mysql>use ppl;

mysql> create table test(name char);

返回一表格如下，记住 File 的内容，等下 slave 的配置中要用到

```
mysql> show master status;
+-------------------+----------+--------------+------------------+
| File              | Position | Binlog_Do_DB | Binlog_Ignore_DB |
+-------------------+----------+--------------+------------------+
| mysql-bin.000007  |      106 | ppl          | mysql            |
+-------------------+----------+--------------+------------------+
1 row in set (0.00 sec)
```

Slave 的配置

vi /etc/my.cnf

添加如下内容：

server-id = 2   ##slave ID

master-host = 192.168.5.171   ##指定 master 的地址

master-user = slave   ##同步所用的账号

master-password = 123456   ##同步所用的密码

master-port = 3306   ##master 上 mysql 的端口

replicate-do-db = ppl   ##要同步的库名

replicate-ignore-db = mysql   ##忽略的库名

slave-skip-errors = 1062   ##当同步异常时，那些错误跳过，本例为 1062 错误

#log-slave-updates   ##同步的同时，也记录自己的 binlog 日志，如果还有台 slave 是通过这台机器进行同步，那需要增加此项，

#skip-slave-start   ##启动时不自动开启 slave 进程

#read-only   ##将库设为只读模式，只能从 master 同步，不能直接写入（避免自增键值冲突）

mysql –uroot –p

以下内容在 mysql 中执行

mysql>create database ppl;

mysql>change master to master_log_file='mysql-bin.000007',master_log=106;

mysql>slave start;

mysql>show slave status \G

在返回值中查看，如果 slave_IO_Runing 与 slave_SQL_Runing 的值都为 Yes 说明同步成功

```
        Slave_IO_Running: Yes
       Slave_SQL_Running: Yes
         Replicate_Do_DB: ppl
```

三、   通过 lvs+keepalived 实现负载与热备，并实现读写分离

Master 上的配置

vi /etc/keepalived/keepalived.conf

```
! Configuration File for keepalived

global_defs {
    router_id MySQL-HA
}

vrrp_instance VI_1 {
    state BACKUP
    interface eth0
    virtual_router_id 90
    priority 100
    advert_int 1
    notify_master "/usr/local/mysql/bin/remove_slave.sh"
    nopreempt
    authentication {
        auth_type PASS
        auth_pass ppl.com
    }
    virtual_ipaddress {
        192.168.5.173 label eth0:1
        192.168.5.174 label eth0:2
    }
}

virtual_server 192.168.5.173 3306 {
    delay_loop 2
    lb_algo wrr
    lb_kind DR
    persistence_timeout 60
    protocol TCP
    real_server 192.168.5.171 3306 {
    weight 3
    notify_down /usr/local/mysql/bin/mysql.sh
    TCP_CHECK {
            connect_timeout 10
            nb_get_retry 3
            delay_before_retry 3
        connect_port 3306
        }
    }
}
```

```
virtual_server 192.168.5.174 3306 {
      delay_loop 2
      lb_algo wrr
      lb_kind DR
      persistence_timeout 60
      protocol TCP
      real_server 192.168.5.171 3306 {
      weight 1
      notify_down /usr/local/mysql/bin/mysql.sh
      TCP_CHECK {
                connect_timeout 10
                nb_get_retry 3
                delay_before_retry 3
            connect_port 3306
            }
      }
      real_server 192.168.5.172 3306 {
      weight 3
      TCP_CHECK {
                connect_timeout 10
                nb_get_retry 3
                delay_before_retry 3
            connect_port 3306
            }
      }
}
```

vi /usr/local/mysql/bin/remove_slave.sh

```
#!/bin/bash
user=root
password=123456
log=/root/mysqllog/remove_slave.log
#--------------------------------------------------------------------------------
echo "`date`" >> $log
/usr/bin/mysql  -u$user  -p$password  -e "set  global  read_only=OFF;reset  master;stop
slave;change master to master_host='localhost';" >> $log
/bin/sed -i 's#read-only#\#read-only#' /etc/my.cnf
```

chomd 755 /usr/local/mysql/bin/remove_slave.sh

vi /usr/local/mysql/bin/mysql.sh

```
#!/bin/bash
/etc/init.d/keepalived stop
```

Slave 上的配置

vi /etc/keepalived/keepalived.conf

```
! Configuration File for keepalived

global_defs {
    router_id MySQL-HA
}

vrrp_instance VI_1 {
    state BACKUP
    interface eth0
    virtual_router_id 90
    priority 99
    advert_int 1
    notify_master "/usr/local/mysql/bin/remove_slave.sh"
    authentication {
        auth_type PASS
        auth_pass ppl.com
    }
    virtual_ipaddress {
        192.168.5.173 label eth0:1
        192.168.5.174 label eth0:2
    }
}

virtual_server 192.168.5.173 3306 {
    delay_loop 2
    lb_algo wrr
    lb_kind DR
    persistence_timeout 60
    protocol TCP
    real_server 192.168.5.172 3306 {
        weight 3
    notify_down /usr/local/mysql/bin/mysql.sh
    TCP_CHECK {
            connect_timeout 10
            nb_get_retry 3
            delay_before_retry 3
        connect_port 3306
```

```
            }
        }
}

virtual_server 192.168.5.174 3306 {
        delay_loop 2
        lb_algo wrr
        lb_kind DR
        persistence_timeout 60
        protocol TCP
        real_server 192.168.5.172 3306 {
            weight 3
        notify_down /usr/local/mysql/bin/mysql.sh
        TCP_CHECK {
                connect_timeout 10
                nb_get_retry 3
                delay_before_retry 3
            connect_port 3306
            }
        }
#     real_server 192.168.5.172 3306 {
#         weight 3
#         TCP_CHECK {
#               connect_timeout 10
#               nb_get_retry 3
#               delay_before_retry 3
#               connect_port 3306
#         }
#     }
}
```

vi /usr/local/mysql/bin/remove_slave.sh

```
#!/bin/bash
user=root
password=123456
log=/root/mysqllog/remove_slave.log
#-------------------------------------------------------------------------------
echo "`date`" >> $log
/usr/bin/mysql  -u$user  -p$password  -e  "set  global  read_only=OFF;reset  master;stop
slave;change master to master_host='localhost';" >> $log
/bin/sed -i 's#read-only#\#read-only#' /etc/my.cnf
```

chomd 755 /usr/local/mysql/bin/remove_slave.sh

vi /usr/local/mysql/bin/mysql.sh

```
#!/bin/bash
/etc/init.d/keepalived stop
```

vi /usr/local/keepalived/bin/lvs-rs.sh

```
#!/bin/bash
WEB_VIP=192.168.5.174

. /etc/rc.d/init.d/functions

case "$1" in
start)
        ifconfig lo:0 $WEB_VIP netmask 255.255.255.255 broadcast $WEB_VIP
        /sbin/route add -host $WEB_VIP dev lo:0
        echo "1" >/proc/sys/net/ipv4/conf/lo/arp_ignore
        echo "2" >/proc/sys/net/ipv4/conf/lo/arp_announce
        echo "1" >/proc/sys/net/ipv4/conf/all/arp_ignore
        echo "2" >/proc/sys/net/ipv4/conf/all/arp_announce
        sysctl -p >/dev/null 2>&1
        echo "RealServer Start OK"

        ;;
stop)
        ifconfig lo:0 down
        route del $WEB_VIP >/dev/null 2>&1
        echo "0" >/proc/sys/net/ipv4/conf/lo/arp_ignore
        echo "0" >/proc/sys/net/ipv4/conf/lo/arp_announce
        echo "0" >/proc/sys/net/ipv4/conf/all/arp_ignore
        echo "0" >/proc/sys/net/ipv4/conf/all/arp_announce
        echo "RealServer Stoped"
        ;;
status)
         # Status of LVS-DR real server.
         islothere=`/sbin/ifconfig lo:0 | grep $WEB_VIP`
         isrothere=`netstat -rn | grep "lo:0" | grep $web_VIP`
         if [ ! "$islothere" -o ! "isrothere" ];then
             # Either the route or the lo:0 device
             # not found.
             echo "LVS-DR real server Stopped."
         else
             echo "LVS-DR Running."
```

```
        fi
;;
*)
        # Invalid entry.
        echo "$0: Usage: $0 {start|status|stop}"
        exit 1
;;
esac
exit 0
```

chmod 755 /usr/local/keepalived/bin/lvs-rs.sh
echo "/usr/local/keepalived/bin/lvs-rs.sh start" >>/etc/rc.local

vi /etc/my.cnf
将这两个参数前边的 # 去掉，重启 mysql
#skip-slave-start
#read-only
登陆 mysql，手动将 slave 进程启动
mysql>slave start;

先启动 master 上的 keepalived，正常后再启动 slave 上的。