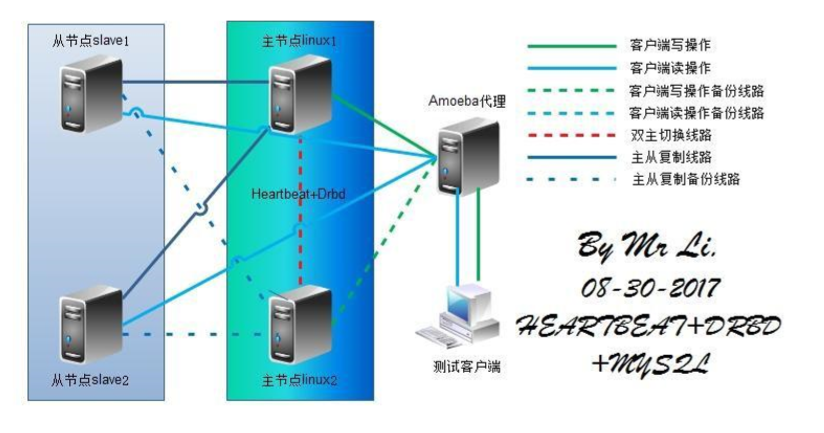
第三十九章-项目：Keepalived+DRBD+mysql+amoeba双主双从高可用集群

一、项目实验拓扑图；



二、项目重点；

**DRBD的概述：**Distributed Replicated Block Device是一个用软件实现的、无共享的、服务器之间镜像块设备内容的存储复制解决方案。其核心功能通过Linux的内核实现，比文件系统更加靠近操作系统内核及IO栈，drbd 共有两部分组成：内核模块和用户空间的管理工具；

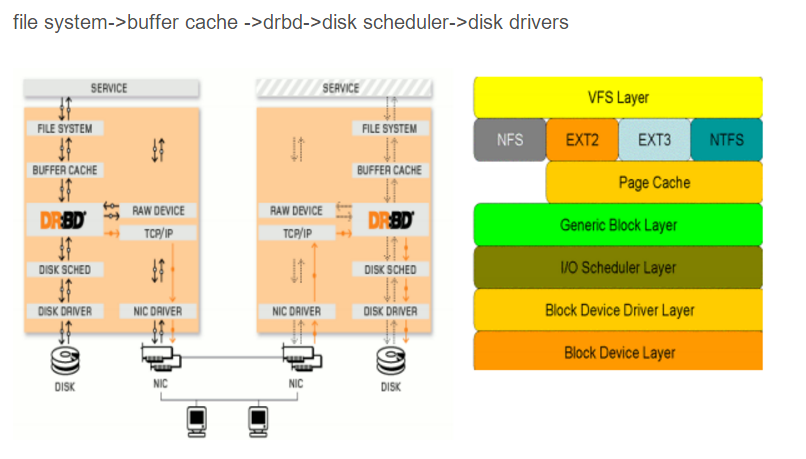
DRBD是由内核模块和相关脚本而构成，用以构建高可用性的集群。其实现方式是通过网络来镜像整个设备。可以把它看作是一种网络RAID。它允许用户在远程机器上建立一个本地块设备的实时镜像；

**DRBD的角色：**

主：在主 DRBD 设备中可以进行不受限制的读和写的操作，他可用来创建和挂载文件系统、初始化或者是直接 I/O 的快设备；

备：接收所有来自对等节点的更新，不能被应用也不能被读写访问。主要目的是保持缓冲及数据一致性。人工干预和管理程序的自动聚类算法都可以改变资源的角色。资源可以由被变换为主，以及主到备；

**DRBD原理图：**



**DRBD的特点：**

实时性：当某个应用程序完成对数据的修改时，复制功能立即发生；

透明性：应用程序的数据存储在镜像块设备上是独立透明的，他们的数据在两个节点上都保存一份，因此，无论哪一台服务器宕机，都不会影响应用程序读取数据的操作，所以说是透明的；

**DRBD的同步方式：**

同步镜像：表示当应用程序提交本地的写操作后，数据后会同步写到两个节点上去；

异步镜像：表示当应用程序提交写操作后，只有当本地的节点上完成写操作后，另一个节点才可以完成写操作；

**DRBD的工作模式：**

单主模式：任何资源在任何特定的时间，集群中只存在一个主节点。 正是因为这样在集群中，只能有一个节点可以随时操作数据，这种模式可用在任何的文件系统上（ EXT3、 EXT4、 XFS等等）；

双主模式：在双主模式下（drbd8.0后支持），任何资源在任何特定的时间，集群中都存在两个主节点。犹豫双方数据存在并发的可能性，这种模式需要一个共享的集群文件系统，利用分布式的锁机制进行管理，如 GFS 和OCFS2。部署双主模式时， DRBD 是负载均衡的集群，这就需要从两个并发的主节点中选取一个首选的访问数据。这种模式默认是禁用的，如果要是用的话必须在配置文件中进行声明；

**DRBD的同步协议：**

协议 A：本地完成写入，且数据包已在发送队列中,则认为写入完成。在一个节点发生故障时，可能发生数据丢失，常用与物理上分开的节点；

协议 B：本地完成写入，并收到远程主机的收到数据确认后,则认为写入完成。在两个节点同时发生故障时，可能发生数据丢失。因为在数据传输过程中，数据未必能提交到磁盘；

协议 C：本地完成写入，并收到远程主机的写入确认后,则认为写入完成，没有任何数据丢失，因此这是最常用的模式；

三、项目环境；

|  |  |  |  |
| --- | --- | --- | --- |
| 系统类型 | IP地址 | 主机名 | 所需软件 |
| Centos 7.4 1708 64bit | 192.168.100.101 | master1 | mysql-5.6.36.tar.gz  drbd84-utils  kmod-drbd84 drbd84-utils-sysvinit  ntp |
| Centos 7.4 1708 64bit | 192.168.100.102 | master2 | mysql-5.6.36.tar.gz  drbd84-utils  kmod-drbd84 drbd84-utils-sysvinit  ntpdate |
| Centos 7.4 1708 64bit | 192.168.100.103 | slave1 | mysql-5.6.36.tar.gz  ntpdate |
| Centos 7.4 1708 64bit | 192.168.100.104 | slave2 | mysql-5.6.36.tar.gz  ntpdate |
| Centos 7.4 1708 64bit | 192.168.100.105 | amoeba | amoeba-mysql-binary-2.2.0.tar.gz jdk-6u14-linux-x64.bin |
| Centos 7.4 1708 64bit | 192.168.100.106 | client | mysql |

四、项目实验步骤；

* 部署master1节点的ntp服务以及域名解析；
* 配置master2、slave1、slave2节点同步ntp时间及域名解析（在此只列举master2单台主机配置）；
* 分别在master1、master2、slave1、slave2节点上安装mysql服务（在此只列举master1单台主机配置）；
* 分别在master1、master2节点上drbd服务（在此只列举master1单台主机配置）；
* 配置优化master1、master2节点的drbd服务（在此只列举master1单台主机配置）；
* 在master1、master2两个节点准备drbd的磁盘（在此只列举master1单台主机配置）；
* 在master1主节点上进行初始化drbd的块设备并且进行测试挂载；
* 在master2从节点上测试挂载drbd块设备；
* 配置 master1节点的mysql服务数据文件的存放位置为 drbd 块设备的挂载点；
* 使用master2节点测试查看mysql中数据；
* 安装master1、master2节点的keepalived服务；
* 配置master1节点上master主节点；
* 配置master 2节点上backup从节点；
* 配置master1节点keepalived服务切换DRBD块设备；
* 配置master1、master2节点上的主从复制；
* 配置slave1节点的主从复制；
* 配置slave2节点的主从复制；
* 验证master1节点、slave1节点、slave2节点的主从复制；
* 安装amoeba数据库代理程序；
* 配置master1节点授权amoeba节点连接数据库集群；
* 修改amoeba节点的配置文件并启动测试；
* 客户端访问测试主从复制；
* 客户端访问测试读写分离；
* 关闭master1节点，测试双主热备情况；
* **部署master1节点的ntp服务以及域名解析；**

[root@master1 ~]# cat <<END >>/etc/hosts

192.168.100.101 master1

192.168.100.102 master2

192.168.100.103 slave1

192.168.100.104 slave2

END

[root@master1 ~]# yum -y install ntp

[root@master1 ~]# sed -i '/^server/s/^/#/g' /etc/ntp.conf

[root@master1 ~]# cat <<END >>/etc/ntp.conf

server 127.127.1.0

fudge 127.127.1.0 stratum 8

END

[root@master1 ~]# systemctl start ntpd

[root@master1 ~]# systemctl enable ntpd

Created symlink from /etc/systemd/system/multi-user.target.wants/ntpd.service to /usr/lib/systemd/system/ntpd.service.

* **配置master2、slave1、slave2节点同步ntp时间及域名解析（在此只列举master2单台主机配置）；**

[root@master2 ~]# cat <<END >>/etc/hosts

192.168.100.101 master1

192.168.100.102 master2

192.168.100.103 slave1

192.168.100.104 slave2

END

[root@master2 ~]# yum -y install ntpdate

[root@master2 ~]# /usr/sbin/ntpdate 192.168.100.101

ech 9 Aug 18:04:38 ntpdate[1106]: adjust time server 192.168.100.101 offset 0.299673 sec

[root@master2 ~]# echo "/usr/sbin/ntpdate 192.168.100.101">>/etc/rc.local

[root@master2 ~]# chmod +x /etc/rc.local

* **分别在master1、master2、slave1、slave2节点上安装mysql服务（在此只列举master1单台主机配置）；**

[root@master1 ~]# yum -y install ncurses cmake

[root@master1 ~]# mount /dev/cdrom /mnt/

mount: /dev/sr0 写保护，将以只读方式挂载

[root@master1 ~]# rpm -ivh /mnt/Packages/ncurses-devel-5.9-13.20130511.el7.x86\_64.rpm --nodeps

[root@master1 ~]# ls

mysql-5.6.36.tar.gz

[root@master1 ~]# tar zxvf mysql-5.6.36.tar.gz -C /usr/src/

[root@master1 ~]# cd /usr/src/mysql-5.6.36/

[root@master2 mysql-5.6.36]# cmake -DCMAKE\_INSTALL\_PREFIX=/usr/local/mysql -DDEFAULT\_CHARSET=utf8 -DDEFAULT\_COLLATION=utf8\_general\_ci -DWITH\_INNOBASE\_STORAGE\_ENGINE=1 -DWITH\_ARCHIVE\_STORAGE\_ENGINE=1 -DWITH\_BLACKHOLE\_STORAGE\_ENGINE=1 -DENABLE\_DOWNLOADS=1

[root@master1 mysql-5.6.36]# make

[root@master1 mysql-5.6.36]# make install

[root@master1 mysql-5.6.36]# cd

[root@master1 ~]# cp /usr/src/mysql-5.6.36/support-files/mysql.server /etc/init.d/

[root@master1 ~]# chmod +x /etc/init.d/mysql.server

[root@master1 ~]# cat <<END >>/usr/lib/systemd/system/mysqld.service

[Unit]

Description=mysqldapi

After=network.target

[Service]

Type=forking

PIDFile=/usr/local/mysql/logs/mysqld.pid

ExecStart=/etc/init.d/mysql.server start

ExecReload=/etc/init.d/mysql.server restart

ExecStop=/etc/init.d/mysql.server stop

PrivateTmp=Flase

[Install]

WantedBy=multi-user.target

END

[root@master1 ~]# echo "export PATH=$PATH:/usr/local/mysql/bin/" >>/etc/profile

[root@master1 ~]# source /etc/profile

[root@master1 ~]# groupadd mysql

[root@master1 ~]# useradd -g mysql mysql

[root@master1 ~]# cat <<END >/etc/my.cnf

[mysqld]

basedir = /usr/local/mysql

datadir = /usr/local/mysql/data

port = 3306

sql\_mode=NO\_ENGINE\_SUBSTITUTION,STRICT\_TRANS\_TABLES

character\_set\_server=utf8

init\_connect='SET NAMES utf8'

log-error=/usr/local/mysql/logs/mysqld.log

pid-file=/usr/local/mysql/logs/mysqld.pid

skip-name-resolve

END

[root@master1 ~]# mkdir /usr/local/mysql/logs

[root@master1 ~]# chown mysql:mysql /usr/local/mysql/ -R

[root@master1 ~]# /usr/local/mysql/scripts/mysql\_install\_db --user=mysql --basedir=/usr/local/mysql --datadir=/usr/local/mysql/data

[root@master1 ~]# systemctl start mysqld

[root@master1 ~]# systemctl enable mysqld

Created symlink from /etc/systemd/system/multi-user.target.wants/mysqld.service to /usr/lib/systemd/system/mysqld.service.

[root@master1 ~]# netstat -utpln |grep 3306

tcp 0 0 0.0.0.0:3306 0.0.0.0:\* LISTEN 31481/mysqld

[root@master1 ~]# mysqladmin -uroot password 123123

Warning: Using a password on the command line interface can be insecure.

[root@master1 ~]# mysql -uroot -p123123

mysql> show databases;

+--------------------+

| Database |

+--------------------+

| information\_schema |

| mysql |

| performance\_schema |

| test |

+--------------------+

mysql> exit

* **分别在master1、master2节点上drbd服务（在此只列举master1单台主机配置）；**

[root@master1 ~]# wget -O /etc/yum.repos.d/CentOS-Base.repo http://mirrors.aliyun.com/repo/Centos-7.repo

[root@master1 ~]# yum -y install epel-release

[root@master1 ~]# yum -y install perl-TimeDate kernel-devel kernel-headers flex resource-agents

[root@master1 ~]# rpm -ivh http://www.elrepo.org/elrepo-release-7.0-2.el7.elrepo.noarch.rpm

[root@master1 ~]# yum install -y drbd84-utils kmod-drbd84 drbd84-utils-sysvinit

* **配置优化master1、master2节点的drbd服务（在此只列举master1单台主机配置）；**

[root@master1 ~]# cp /usr/lib/modules/3.10.0-862.el7.x86\_64/extra/drbd84/drbd.ko /lib/modules/$(uname -r)/kernel/lib

[root@master1 ~]# depmod

[root@master1 ~]# cat /etc/drbd.conf

# You can find an example in /usr/share/doc/drbd.../drbd.conf.example

include "drbd.d/global\_common.conf";

include "drbd.d/\*.res";

[root@master1 ~]# cp /etc/drbd.d/global\_common.conf{,-$(date +%s)}

[root@master1 ~]# ls /etc/drbd.d/

global\_common.conf global\_common.conf-1533828130

[root@master1 ~]# vi /etc/drbd.d/global\_common.conf

global {

usage-count yes;

}

common {

startup {

wfc-timeout 120;

degr-wfc-timeout 120;

}

options {

# cpu-mask on-no-data-accessible

}

disk {

on-io-error detach;

}

net {

protocol C;

}

}

[root@master1 ~]# vi /etc/drbd.d/r0.res

resource r0 {

on master1 {

device /dev/drbd0;

disk /dev/sdb1;

address 192.168.100.101:7788;

meta-disk internal;

}

on master2 {

device /dev/drbd0;

disk /dev/sdb1;

address 192.168.100.102:7788;

meta-disk internal;

}

}

* **在master1、master2两个节点准备drbd的磁盘（在此只列举master1单台主机配置）；**

[root@master1 ~]# fdisk /dev/sdb

n--p--1--回车--回车--p--w

[root@master1 ~]# yum -y install parted

[root@master1 ~]# partprobe /dev/sdb

[root@master1 ~]# partprobe /dev/sdb1

[root@master1 ~]# dd if=/dev/zero of=/dev/sdb1 bs=1M count=1

记录了1+0 的读入

记录了1+0 的写出

1048576字节(1.0 MB)已复制，0.00917599 秒，114 MB/秒

[root@master1 ~]# drbdadm create-md r0 ##创建drbd磁盘，注意master1和master2的主机名必须更改，不然导致报错

you are the 1649th user to install this version

initializing activity log

initializing bitmap (640 KB) to all zero

Writing meta data...

New drbd meta data block successfully created.

[root@master1 ~]# /etc/init.d/drbd start ##如若出现无法加载drbd模块，重启主机可以解决

...

To abort waiting enter 'yes' [ 12]: yes

...

[root@master1 ~]# netstat -anpt |grep 7788 ##当master1单个节点服务启动的状态

tcp 0 0 192.168.100.101:7788 0.0.0.0:\* LISTEN -

[root@master2 ~]# netstat -anpt |grep 7788 ##当master1和master2两个节点服务同时启动的状态

tcp 0 0 192.168.100.102:7788 192.168.100.101:56853 ESTABLISHED -

tcp 0 0 192.168.100.102:34126 192.168.100.101:7788 ESTABLISHED -

* **在master1主节点上进行初始化drbd的块设备并且进行测试挂载；**

[root@master1 ~]# drbdadm -- --overwrite-data-of-peer primary r0

[root@master1 ~]# cat /proc/drbd ##等待其初始化完成

version: 8.4.11-1 (api:1/proto:86-101)

GIT-hash: 66145a308421e9c124ec391a7848ac20203bb03c build by mockbuild@, 2018-04-26 12:10:42

0: cs:SyncSource ro:Primary/Secondary ds:UpToDate/Inconsistent C r-----

ns:301636 nr:0 dw:0 dr:303740 al:8 bm:0 lo:0 pe:0 ua:0 ap:0 ep:1 wo:f oos:20668184

[>....................] sync'ed: 1.5% (20180/20476)M

finish: 0:23:53 speed: 14,408 (10,772) K/sec

[root@master1 ~]# mkfs -t xfs /dev/drbd0

meta-data=/dev/drbd0 isize=512 agcount=4, agsize=1310614 blks

= sectsz=512 attr=2, projid32bit=1

= crc=1 finobt=0, sparse=0

data = bsize=4096 blocks=5242455, imaxpct=25

= sunit=0 swidth=0 blks

naming =version 2 bsize=4096 ascii-ci=0 ftype=1

log =internal log bsize=4096 blocks=2560, version=2

= sectsz=512 sunit=0 blks, lazy-count=1

realtime =none extsz=4096 blocks=0, rtextents=0

[root@master1 ~]# mkdir /mysqldata

[root@master1 ~]# mount /dev/drbd0 /mysqldata/

[root@master1 ~]# mount |tail -1

/dev/drbd0 on /mysqldata type xfs (rw,relatime,attr2,inode64,noquota)

[root@master1 ~]# echo "ceshi" >>/mysqldata/ceshi.txt

[root@master1 ~]# cat /mysqldata/ceshi.txt

ceshi

[root@master1 ~]# umount /mysqldata/

[root@master1 ~]# drbdadm secondary r0

* **在master2从节点上测试挂载drbd块设备；**

[root@master2 ~]# drbdadm primary r0

[root@master2 ~]# mkdir /mysqldata

[root@master2 ~]# mount /dev/drbd0 /mysqldata/

[root@master2 ~]# mount |tail -1

/dev/drbd0 on /mysqldata type xfs (rw,relatime,attr2,inode64,noquota)

[root@master2 ~]# cat /mysqldata/ceshi.txt

ceshi

[root@master2 ~]# umount /mysqldata/

[root@master2 ~]# drbdadm secondary r0

* **配置 master1节点的mysql服务数据文件的存放位置为 drbd 块设备的挂载点；**

[root@master1 ~]# drbdadm primary r0

[root@master1 ~]# mount /dev/drbd0 /mysqldata/

[root@master1 ~]# ls /mysqldata/

ceshi.txt

[root@master1 ~]# sed -i 's/\/usr\/local\/mysql\/data/\/mysqldata\/mysql/g' /etc/my.cnf

[root@master1 ~]# grep mysqldata /etc/my.cnf

datadir = /mysqldata/mysql

[root@master1 ~]# chown -R mysql:mysql /mysqldata/

[root@master1 ~]# systemctl stop mysqld

[root@master1 ~]# /usr/local/mysql/scripts/mysql\_install\_db --user=mysql --basedir=/usr/local/mysql --datadir=/mysqldata/mysql

[root@master1 ~]# systemctl start mysqld

[root@master1 ~]# ls /mysqldata/mysql/

auto.cnf ibdata1 ib\_logfile0 ib\_logfile1 mysql performance\_schema test

[root@master1 ~]# mysqladmin -uroot password 123123

Warning: Using a password on the command line interface can be insecure.

[root@master1 ~]# mysql -uroot -p123123

mysql> exit

[root@master1 ~]# systemctl stop mysqld

[root@master1 ~]# umount /mysqldata/

[root@master1 ~]# drbdadm secondary r0

* **使用master2节点测试查看mysql中数据；**

[root@master2 ~]# drbdadm primary r0

[root@master2 ~]# mount /dev/drbd0 /mysqldata/

[root@master2 ~]# sed -i 's/\/usr\/local\/mysql\/data/\/mysqldata\/mysql/g' /etc/my.cnf

[root@master2 ~]# grep mysqldata /etc/my.cnf

datadir = /mysqldata/mysql

[root@master2 ~]# chown -R mysql:mysql /mysqldata/

[root@master2 ~]# systemctl restart mysqld

[root@master2 ~]# mysql -uroot -p123123

mysql> exit

[root@master2 ~]# systemctl stop mysqld

[root@master2 ~]# umount /mysqldata/

[root@master2 ~]# drbdadm secondary r0

[root@master1 ~]# drbdadm primary r0

[root@master1 ~]# mount /dev/drbd0 /mysqldata/

[root@master1 ~]# systemctl start mysqld

* **安装master1、master2节点的keepalived服务；**

[root@master1 ~]# yum -y install kernel-devel openssl-devel popt-devel

[root@master1 ~]# tar -zxvf keepalived-1.2.13.tar.gz -C /usr/src/

[root@master1 ~]# cd /usr/src/keepalived-1.2.13/

[root@master1 keepalived-1.2.13]# ./configure --prefix=/usr/local/keepalived

[root@master1 keepalived-1.2.13]# make &&make install

[root@master1 keepalived-1.2.13]# cd

[root@master1 ~]# mkdir -p /etc/keepalived ##程序的主配置目录

[root@master1 ~]# cp /usr/local/keepalived/etc/keepalived/keepalived.conf /etc/keepalived/ ##复制主配置文件

[root@master1 ~]# cp /usr/local/keepalived/etc/sysconfig/keepalived /etc/sysconfig/ ##复制启动时需要加载的配置文件

[root@master1 ~]# cp /usr/local/keepalived/etc/rc.d/init.d/keepalived /etc/init.d/ ##复制服务的控制脚本

[root@master1 ~]# cp /usr/local/keepalived/sbin/keepalived /usr/sbin/ ##复制keepalived的命令

[root@master1 ~]# chmod 755 /etc/init.d/keepalived ##为控制脚本指定权限

* **配置master1节点上master主节点；**

[root@master1 ~]# vi /etc/keepalived/keepalived.conf

global\_defs {

router\_id HA\_TEST\_R1 ##本服务器的名称，若环境中有多个keepalived时，此名称不能一致

}

vrrp\_instance VI\_1 { ##定义VRRP热备实例，每一个keep组都不同

state MASTER ##MASTER表示主服务器

interface eth0 ##承载VIP地址的物理接口

virtual\_router\_id 1 ##虚拟路由器的ID号，每一个keep组都不同

priority 100 ##优先级，数值越大优先级越高

advert\_int 1 ##通告检查间隔秒数（心跳频率）

authentication { ##认证信息

auth\_type PASS ##认证类型

auth\_pass 123456 ##密码字串

}

virtual\_ipaddress {

192.168.100.95 ##指定漂移地址（VIP）

}

}

:wq

[root@master1 ~]# /etc/init.d/keepalived start

Starting keepalived (via systemctl): [ 确定 ]

[root@master1 ~]# ip a |grep 192.168.100.95

inet 192.168.100.95/32 scope global eth0

* **配置master 2节点上backup从节点；**

[root@master2 ~]# vi /etc/keepalived/keepalived.conf

global\_defs {

router\_id HA\_TEST\_R2 ##本服务器的名称

}

vrrp\_instance VI\_1 {

state BACKUP ##BACKUP表示从服务器

interface eth0

virtual\_router\_id 1

priority 99 ##优先级，低于主服务器

advert\_int 1

authentication {

auth\_type PASS

auth\_pass 123456

}

virtual\_ipaddress {

192.168.100.95

}

}

:wq

[root@master2 ~]# /etc/init.d/keepalived start

Starting keepalived (via systemctl): [ 确定 ]

[root@master2~]# ip a |grep 192.168.100.95

* **配置master1节点keepalived服务切换DRBD块设备；**

[root@master1 ~]# yum -y install expect

[root@master1 ~]# vi /etc/keepalived/drbd.sh

#!/bin/bash

while true;do

VIP=$(ip a |grep 192.168.100.95 |wc -l)

if [ $VIP -eq 0 ];then

/etc/init.d/keepalived start

sleep 2

VIP=$(ip a |grep 192.168.100.95 |wc -l)

if [ $VIP -eq 0 ];then

systemctl stop mysqld

sleep 2

fi

fi

MYSQLD=$(ps aux |grep mysqld |grep -v grep |wc -l)

if [ $MYSQLD -eq 0 ];then

/etc/init.d/keepalived stop

echo "mysql stats is down on $(date +%F-%T)" >>/var/log/mysqld.stats

sleep 2

umount /mysqldata

sleep 2

drbdadm secondary r0

/etc/keepalived/expect.sh 192.168.100.102 root pwd@123 "drbdadm primary r0 && mount /dev/drbd0 /mysqldata && systemctl start mysqld"

echo "mysql is already switched master2 on $(date +%F-%T)" >>/var/log/mysqld.stats

fi

done

[root@master1 ~]# vi /etc/keepalived/expect.sh

#!/usr/bin/expect

set ip [lindex $argv 0]

set user [lindex $argv 1]

set password [lindex $argv 2]

set com [lindex $argv 3]

set timeout 10

spawn ssh $user@$ip $com

expect {

"\*yes/no" { send "yes\r"; exp\_continue}

"\*password:" { send "$password\r" }

}

interact

[root@master1 ~]# chmod +x /etc/keepalived/drbd.sh

[root@master1 ~]# chmod +x /etc/keepalived/expect.sh

[root@master1 ~]# /etc/keepalived/drbd.sh &

[root@master1 ~]# jobs -l

[1]+ 4349 running /etc/keepalived/drbd.sh

* **配置master1、master2节点上的主从复制；**

[root@master1 ~]# cat <<END >>/etc/my.cnf

server-id=1

log-bin=mysql-bin

log-slave-updates=true

END

[root@master1 ~]# systemctl restart mysqld

[root@master1 ~]# mysql -uroot -p123123

mysql> grant replication slave on \*.\* to 'myslave'@'192.168.100.%' identified by '123123';

Query OK, 0 rows affected (0.00 sec)

mysql> flush privileges;

Query OK, 0 rows affected (0.00 sec)

mysql> show master status;

+------------------+----------+--------------+------------------+-------------------+

| File | Position | Binlog\_Do\_DB | Binlog\_Ignore\_DB | Executed\_Gtid\_Set |

+------------------+----------+--------------+------------------+-------------------+

| mysql-bin.000001 | 412 | | | |

+------------------+----------+--------------+------------------+-------------------+

mysql> exit

[root@master2 ~]# cat <<END >>/etc/my.cnf

server-id=1

log-bin=mysql-bin

log-slave-updates=true

END

* **配置slave1节点的主从复制；**

[root@slave1 ~]# cat <<END >>/etc/my.cnf

server-id=2

relay-log=relay-log-bin

relay-log-index=slave-relay-bin.index

END

[root@slave1 ~]# systemctl restart mysqld

[root@slave1 ~]# mysql -uroot -p123123

mysql> change master to master\_host='192.168.100.95',master\_user='myslave',master\_password='123123',master\_log\_file='mysql-bin.000001',master\_log\_pos=412;

Query OK, 0 rows affected, 2 warnings (0.01 sec)

mysql> start slave;

Query OK, 0 rows affected (0.00 sec)

mysql> show slave status\G;

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Slave\_IO\_State: Waiting for master to send event

Master\_Host: 192.168.100.95

Master\_User: myslave

Master\_Port: 3306

Connect\_Retry: 60

Master\_Log\_File: mysql-bin.000001

Read\_Master\_Log\_Pos: 412

Relay\_Log\_File: relay-log-bin.000002

Relay\_Log\_Pos: 283

Relay\_Master\_Log\_File: mysql-bin.000001

Slave\_IO\_Running: Yes

Slave\_SQL\_Running: Yes

mysql> exit

* **配置slave2节点的主从复制；**

[root@slave2 ~]# cat <<END >>/etc/my.cnf

server-id=3

relay-log=relay-log-bin

relay-log-index=slave-relay-bin.index

END

[root@slave2 ~]# systemctl restart mysqld

[root@slave2 ~]# mysql -uroot -p123123

mysql> change master to master\_host='192.168.100.95',master\_user='myslave',master\_password='123123',master\_log\_file='mysql-bin.000001',master\_log\_pos=412;

Query OK, 0 rows affected, 2 warnings (0.02 sec)

mysql> start slave;

Query OK, 0 rows affected (0.00 sec)

mysql> show slave status\G;

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1. row \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Slave\_IO\_State: Waiting for master to send event

Master\_Host: 192.168.100.95

Master\_User: myslave

Master\_Port: 3306

Connect\_Retry: 60

Master\_Log\_File: mysql-bin.000001

Read\_Master\_Log\_Pos: 412

Relay\_Log\_File: relay-log-bin.000002

Relay\_Log\_Pos: 283

Relay\_Master\_Log\_File: mysql-bin.000001

Slave\_IO\_Running: Yes

Slave\_SQL\_Running: Yes

mysql> exit

* **验证master1节点、slave1节点、slave2节点的主从复制；**

[root@master1 ~]# mysql -uroot -p123123

mysql> create database linuxfan1;

Query OK, 1 row affected (0.00 sec)

mysql> show databases;

+--------------------+

| Database |

+--------------------+

| information\_schema |

| linuxfan |

| linuxfan1 |

| mysql |

| performance\_schema |

| test |

+--------------------+

6 rows in set (0.00 sec)

mysql> exit

[root@slave1 ~]# mysql -uroot -p123123

mysql> show databases;

+--------------------+

| Database |

+--------------------+

| information\_schema |

| linuxfan |

| linuxfan1 |

| mysql |

| performance\_schema |

| test |

+--------------------+

6 rows in set (0.00 sec)

mysql> exit

[root@slave2 ~]# mysql -uroot -p123123

mysql> show databases;

+--------------------+

| Database |

+--------------------+

| information\_schema |

| linuxfan |

| linuxfan1 |

| mysql |

| performance\_schema |

| test |

+--------------------+

6 rows in set (0.00 sec)

mysql> exit

* **安装amoeba数据库代理程序；**

[root@amoeba ~]# ls

amoeba-mysql-binary-2.2.0.tar.gz jdk-6u14-linux-x64.bin

[root@amoeba ~]# chmod +x jdk-6u14-linux-x64.bin

[root@amoeba ~]# ./jdk-6u14-linux-x64.bin

[root@amoeba ~]# mv jdk1.6.0\_14/ /usr/local/jdk1.6

[root@amoeba ~]# vi /etc/profile

export JAVA\_HOME=/usr/local/jdk1.6

export CLASSPATH=$CLASSPATH:$JAVA\_HOME/lib:$JAVA\_HOME/jre/lib

export PATH=$JAVA\_HOME/lib:$JAVA\_HOME/jre/bin/:$PATH:$HOME/bin

export AMOEBA\_HOME=/usr/local/amoeba

export PATH=$PATH:$AMOEBA\_HOME

:wq

[root@amoeba ~]# source /etc/profile

[root@amoeba ~]# java --version

Unrecognized option: --version

Could not create the Java virtual machine.

[root@amoeba ~]# java -version

java version "1.6.0\_14"

Java(TM) SE Runtime Environment (build 1.6.0\_14-b08)

Java HotSpot(TM) 64-Bit Server VM (build 14.0-b16, mixed mode)

* **配置master1节点授权amoeba节点连接数据库集群；**

[root@master1 ~]# mysql -uroot -p123123

mysql> grant all on \*.\* to 'amoeba'@'192.168.100.%' identified by '123123';

Query OK, 0 rows affected (0.01 sec)

mysql> flush privileges;

Query OK, 0 rows affected (0.00 sec)

mysql> exit

* **修改amoeba节点的配置文件并启动测试；**

[root@amoeba ~]# mkdir /usr/local/amoeba

[root@amoeba ~]# tar zxvf amoeba-mysql-binary-2.2.0.tar.gz -C /usr/local/amoeba/

[root@amoeba ~]# chmod -R 755 /usr/local/amoeba/

[root@amoeba ~]# vi /usr/local/amoeba/conf/amoeba.xml

30 <property name="user">admin</property>

31

32 <property name="password">admin</property>

115 <property name="defaultPool">master</property>

116

117

118 <property name="writePool">master</property>

119 <property name="readPool">slaves</property>

:wq

[root@amoeba ~]# vi /usr/local/amoeba/conf/dbServers.xml

19 <!-- mysql port -->

20 <property name="port">3306</property>

21

22 <!-- mysql schema -->

23 <property name="schema">test</property>

24

25 <!-- mysql user -->

26 <property name="user">amoeba</property>

27

28 <!-- mysql password -->

29 <property name="password">123123</property>

45 <dbServer name="master" parent="abstractServer">

46 <factoryConfig>

47 <!-- mysql ip -->

48 <property name="ipAddress">192.168.100.95</property>

49 </factoryConfig>

50 </dbServer>

51

52 <dbServer name="slave1" parent="abstractServer">

53 <factoryConfig>

54 <!-- mysql ip -->

55 <property name="ipAddress">192.168.100.103</property>

56 </factoryConfig>

57 </dbServer>

58

59 <dbServer name="slave2" parent="abstractServer">

60 <factoryConfig>

61 <!-- mysql ip -->

62 <property name="ipAddress">192.168.100.104</property>

63 </factoryConfig>

64 </dbServer>

66 <dbServer name="slaves" virtual="true">

67 <poolConfig class="com.meidusa.amoeba.server.MultipleServerPool">

68 <!-- Load balancing strategy: 1=ROUNDROBIN , 2=WEIGHTBASED , 3=HA-->

69 <property name="loadbalance">1</property>

70

71 <!-- Separated by commas,such as: server1,server2,server1 -->

72 <property name="poolNames">slave1,slave2</property>

73 </poolConfig>

74 </dbServer>

:wq

[root@amoeba ~]# /usr/local/amoeba/bin/amoeba start &

[1] 1237

* **客户端访问测试主从复制；**

[root@client ~]# yum -y install mysql

[root@client ~]# mysql -uadmin -padmin -h192.168.100.105 -P 8066

MySQL [(none)]> show databases;

+--------------------+

| Database |

+--------------------+

| information\_schema |

| linuxfan |

| linuxfan1 |

| mysql |

| performance\_schema |

| test |

+--------------------+

MySQL [(none)]> create database linuxfan2;

Query OK, 1 row affected (0.01 sec)

MySQL [(none)]> show databases;

+--------------------+

| Database |

+--------------------+

| information\_schema |

| linuxfan |

| linuxfan1 |

| linuxfan2 |

| mysql |

| performance\_schema |

| test |

+--------------------+

MySQL [(none)]> use linuxfan2;

Database changed

MySQL [linuxfan]> create table t1(id int,name varchar(8));

Query OK, 0 rows affected (0.02 sec)

MySQL [linuxfan]> insert into t1 values(1,'tom');

Query OK, 1 row affected (0.01 sec)

MySQL [linuxfan]> select \* from t1;

+------+------+

| id | name |

+------+------+

| 1 | tom |

+------+------+

MySQL [(none)]> exit

[root@master1 ~]# mysql -uroot -p123123

mysql> show databases;

+--------------------+

| Database |

+--------------------+

| information\_schema |

| linuxfan |

| linuxfan1 |

| linuxfan2 |

| mysql |

| performance\_schema |

| test |

+--------------------+

mysql> exit

[root@slave1 ~]# mysql -uroot -p123123

mysql> show databases;

+--------------------+

| Database |

+--------------------+

| information\_schema |

| linuxfan |

| linuxfan1 |

| linuxfan2 |

| mysql |

| performance\_schema |

| test |

+--------------------+

mysql> exit

[root@slave2 ~]# mysql -uroot -p123123

mysql> show databases;

+--------------------+

| Database |

+--------------------+

| information\_schema |

| linuxfan |

| linuxfan1 |

| linuxfan2 |

| mysql |

| performance\_schema |

| test |

+--------------------+

mysql> exit

* **客户端访问测试读写分离；**

[root@slave1 ~]# mysql -uroot -p123123

mysql> stop slave;

Query OK, 0 rows affected (0.00 sec)

mysql> use linuxfan2;

Database changed

mysql> insert into t1 values(2,'jack');

Query OK, 1 row affected (0.00 sec)

mysql> select \* from t1;

+------+------+

| id | name |

+------+------+

| 1 | tom |

| 2 | jack |

+------+------+

mysql> exit

[root@slave2 ~]# mysql -uroot -p123123

mysql> stop slave;

Query OK, 0 rows affected (0.01 sec)

mysql> use linuxfan2;

Database changed

mysql> insert into t1 values(3,'marry');

Query OK, 1 row affected (0.00 sec)

mysql> select \* from t1;

+------+-------+

| id | name |

+------+-------+

| 1 | tom |

| 3 | marry |

+------+-------+

mysql> exit

[root@client ~]# mysql -uadmin -padmin -h192.168.100.105 -P 8066

MySQL [(none)]> use linuxfan2;

Database changed

MySQL [linuxfan2]> insert into t1 values(4,'kali');

Query OK, 1 row affected (0.01 sec)

MySQL [linuxfan2]> select \* from t1;

+------+------+

| id | name |

+------+------+

| 1 | tom |

| 2 | jack |

+------+------+

MySQL [linuxfan2]> select \* from t1;

+------+-------+

| id | name |

+------+-------+

| 1 | tom |

| 3 | marry |

+------+-------+

MySQL [linuxfan2]> exit

* **关闭master1节点，测试双主热备情况；**

[root@master1 ~]# /etc/keepalived/drbd.sh &

[1] 51212

[root@master1 ~]# systemctl stop mysqld

[root@master1 ~]# Stopping keepalived (via systemctl): [ 确定 ]

spawn ssh root@192.168.100.102 drbdadm primary r0 && mount /dev/drbd0 /mysqldata && systemctl start mysqld

...

[root@master2 ~]# ip a|grep 192.168.100.95

inet 192.168.100.95/32 scope global eth0

[root@master2 ~]# ls /mysqldata/

ceshi.txt mysql

[root@master2 ~]# netstat -utpln |grep 3306

tcp 0 0 0.0.0.0:3306 0.0.0.0:\* LISTEN 8037/mysqld

[root@client ~]# mysql -uadmin -padmin -h192.168.100.105 -P 8066

MySQL [(none)]> show databases;

+--------------------+

| Database |

+--------------------+

| information\_schema |

| linuxfan |

| linuxfan1 |

| linuxfan2 |

| mysql |

| performance\_schema |

| test |

+--------------------+

MySQL [(none)]> exit