



Linux 系统运维之 MySQL DBA

UNIXHOT 运维社区

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修订历史记录

日期	版本	说明
2009-08-01	V1.0	创建本文原始版本以网页形式发布
2010-07-26	V1.1	PDF 网络发布

第 1 章 MySQL 概述

1.1 MySQL 简介

MySQL 是最流行的开放源码 SQL 数据库管理系统，它是由 MySQL AB 公司开发、发布并支持的。它的插入式存储引擎可以让使用者根据实际应用使用不同的存储。

1.2 MySQL 相关链接

MySQL 官方网站: <http://www.mysql.com/>

MySQL 社区版本下载地址: <http://www.mysql.com/downloads/mysql/>

MySQL 中文文档: <http://dev.mysql.com/doc/refman/5.1/zh/index.html>

第 2 章 MySQL 源码安装

2.1 解压并编译安装

下载地址: <http://dev.mysql.com/downloads/mysql/5.1.html>

```
[root@MySQL-Master src]# tar zxvf mysql-5.1.45.tar.gz
```

```
[root@MySQL-Master src]# cd mysql-5.1.45
```

```
[root@MySQL-Master mysql-5.1.45]# ./configure --prefix=/usr/local/mysql \
```

```
--localstatedir=/data/mysql --enable-asm \
```

```
--with-client-ldflags=-all-static --with-mysqld-ldflags=-all-static \
```

```
--with-pthread --enable-static --with-big-tables --without-ndb-debug \
```

```
--with-charset=utf8 --with-extra-charsets=all \
```

```
--without-debug --enable-thread-safe-client --enable-local-infile --with-plugins=max
```

```
[root@MySQL-Master mysql-5.1.45]# make && make install
```

2.2 安装参数介绍

```
--prefix=/usr/local/mysql    //主程序安装目录
```

```
--localstatedir=/data/mysql //库文件存放目录
--with-client-ldflags=-all-static --with-mysqld-ldflags=-all-static//静态编译安装 mysql 客户端和服务端
--with-pthread //采用线程
--with-big-tables //对大表的支持
--with-charset=utf8 //默认字符集为 utf8
--with-extra-charsets=all //安装所有字符集
--without-debug //去掉 debug 模式
--enable-thread-safe-client //以线程方式编译客户端
--with-plugins=max //添加对 innodb 及 partition 的支持
--enable-local-infile //对 load data 的支持
```

2.3 创建用户和组

```
[root@MySQL-Master mysql-5.1.45]# groupadd mysql
[root@MySQL-Master mysql-5.1.45]# useradd -s /sbin/nologin -M -g mysql mysql
```

2.4 安装数据库

```
[root@MySQL-Master mysql-5.1.45]# cd /usr/local/mysql/
[root@MySQL-Master mysql]# mkdir -p /unixhot/mysql
[root@MySQL-Master mysql]# bin/mysql_install_db --basedir=/usr/local/mysql/ --datadir=/data/mysql/
--user=mysql
```

2.5 相应权限的修改

```
[root@MySQL-Master mysql]# chown -R root:mysql /usr/local/mysql/
[root@MySQL-Master mysql]# chown -R mysql:mysql /data/mysql/
```

2.6 配置文件

```
[root@MySQL-Master mysql]# cp /usr/local/mysql/share/mysql/my-medium.cnf /etc/my.cnf
[root@MySQL-Master mysql]# cp /usr/local/mysql/share/mysql/mysql.server /etc/init.d/mysqld
[root@MySQL-Master mysql]# chmod 755 /etc/init.d/mysqld
[root@MySQL-Master mysql]# chkconfig --add mysqld
```

```
[root@MySQL-Master mysql]# vim /root/.bash_profile
PATH=$PATH:$HOME/bin:/usr/local/mysql/bin
[root@MySQL-Master mysql]# source /root/.bash_profile
```

2.7 启动数据库并初始化密码。

```
[root@MySQL-Master mysql]# service mysqld start
Starting MySQL [ OK ]
[root@MySQL-Master mysql]# mysqladmin -u root password unixhot //设置成自己的密码
```

第 3 章 MySQL Replication

3.1 MySQL Replication 概述

MySQL Replication 俗称 MySQL AB 复制,主要是通过把主服务器上的二进制日志通过网络传到从服务器上,MySQL 会自己把二进制日志转换成相关的 DDL, DML, DCL 等语句!但这种复制不同于 MySQL 簇,它是单向异步的。目前 MySQL 复制在企业应用率非常高,已经成为系统工程师必备的技能。

具体的原理请参考 MySQL 官方文档: <http://dev.mysql.com/doc/refman/5.1/zh/index.html>

3.2 安装 MySQL 数据库同 Master 端

实验环境:

实验环境是沿用第三章实验基础上的:

主机名	IP 地址	作用
MySQL-Master	192.168.140.128	MySQL 主库服务器
MySQL-Slave	192.168.140.129	MySQL 从库服务器

3.3 在 MySQL Master 上的配置

3.3.1 创建 Replication 用户

```
mysql> GRANT REPLICATION SLAVE, reload, super ON *.* TO slave@192.168.140.129 IDENTIFIED BY 'unixhot';
```

3.3.2 修改 MySQL 配置文件。

```
[root@MySQL-Master ~]# vim /etc/my.cnf
```

```
server-id=1 #1..设置 server id
```

```
log-bin=mysql-binlog #打开二进制日志，最好放在不同的硬盘上，减小 IO 消耗
```

```
expire_logs_day=10 #设置二进制日志保存日期
```

```
max_binlog_size=500M #设置每个 binlog 文件的大小
```

修改完后重启数据库：[root@MySQL-Master ~]# /etc/init.d/mysqld restart

注意：mysql-5.1.45.tar.gz 版本默认开启了 log-bin 选项，并且 server-id 默认为 1。

3.3.3 获得 Master DB 的相关信息

```
mysql> show master status;
```

```
+-----+-----+-----+-----+
| File           | Position | Binlog_Do_DB | Binlog_Ignore_DB |
+-----+-----+-----+-----+
| mysql-bin.000003 |      106 |              |                  |
+-----+-----+-----+-----+
```

1 row in set (0.00 sec)

注意：供 Slave DB 连接时使用。

3.3.4 备份 Master DB 数据到 Slave DB

备份的方法有很多，可以直接复制数据文件，也可以使用 mysqldump，在这里不再详述。

3.4 在 MySQL Slave 上的配置。

3.4.1 修改 MySQL 配置文件

```
[root@MySQL-Slave ~]# vim /etc/my.cnf
```

```
server-id=2    #配置多个从服务器时依次设置 id 号
```

```
slave-skip-errors=all  #mysql 复制可能出现主服务器上可以运行的语句，从服务器不能够运行，所以我们在 my.cnf 加一句 slave-skip-errors=all 意思是忽略所有的 sql 语句错误！
```

```
relay-log=mysql-relay-bin #该文件用于存放 Slave 端的 I/O 线程从 Master 端读取的二进制文件信息
```

关闭 binlog 主要考虑到我们使用 Master 的 binlog 进行增量备份，这里就不需要了。

```
#log-bin=mysql-bin
```

```
#binlog_format=mixed
```

修改完后重启数据库：[root@MySQL-Slave ~]# /etc/init.d/mysqld restart

3.4.2 在 Slave 服务器授权。

```
mysql> CHANGE MASTER TO
```

```
-> MASTER_HOST='192.168.140.128',
```

```
-> MASTER_USER='slave',
```

```
-> MASTER_PASSWORD='unixhot',
```

```
-> MASTER_LOG_FILE='mysql-bin.000003',
```

```
-> MASTER_LOG_POS=106;
```

```
Query OK, 0 rows affected (0.04 sec)
```

参数说明：

MASTER_HOST: Master 主机名（或者 IP 地址）

MASTER_USER: Slave 连接 Master 主机的用户名

MASTER_PASSWORD: Slave 连接 Master 的用户密码

MASTER_LOG_FILE: 开始复制的日志文件名称

MASTER_LOG_POS: 开始复制的日志文件位置，也就是 Log Position。

3.4.3 启动 Slave DB

```
mysql> START SLAVE;
```

```
Query OK, 0 rows affected (0.00 sec)
```

3.5 测试复制是否成功。

可以在 Master DB 创建一个数据库，或者表，到 Slave DB 上看，如果配置成功就可以成功同步的。

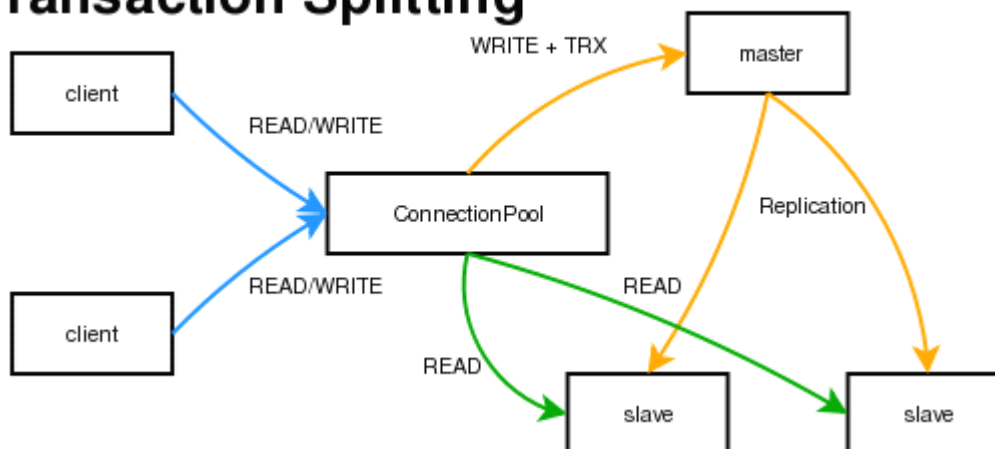
第 4 章 MySQL Proxy

4.1 MySQL 读写分离简介

MySQL-Proxy,是处在你的 MySQL 数据库客户和服务端之间的程序，它还支持嵌入性脚本语言 Lua。这个代理可以用来分析、监控和变换（transform）通信数据。

MySQL Proxy 最强大的一项功能是实现“读 写分离（Read/Write Splitting）”。基本的原理是让主数据库处理事务性查询，而从数据库处理 SELECT 查询。数据库复制被用来把事务性查询导致的变更同步到集群中的从数据库。

Transaction Splitting



4.2 MySQL 环境部署

实验环境：

实验环境是沿用第三章实验基础上的：

主机名	IP 地址	作用
MySQL-Master	192.168.140.128	MySQL 主库服务器
MySQL-Slave	192.168.140.129	MySQL 从库服务器
MySQL-Proxy	192.168.140.130	MySQL 代理服务器

4.2.1 部署安装环境

```

[root@MySQL-Proxy ~]# rpm -q libevent glib2 pkgconfig libtool mysql-devel
[root@MySQL-Proxy ~]# cd /usr/local/src
[root@MySQL-Proxy src]# wget http://www.lua.org/ftp/lua-5.1.4.tar.gz
[root@MySQL-Proxy src]#
wget http://gd.tuwien.ac.at/db/mysql/Downloads/MySQL-Proxy/mysql-proxy-0.6.0.tar.gz
[root@MySQL-Proxy src]# wget http://www.monkey.org/~provos/libevent-1.4.13-stable.tar.gz
  
```

4.2.2 安装 lua

```

[root@MySQL-Proxy src]# tar zxvf lua-5.1.4.tar.gz
[root@MySQL-Proxy src]# cd lua-5.1.4
[root@MySQL-Proxy lua-5.1.4]# vi Makefile
  
```

修改:

```
INSTALL_TOP= /usr/local/lua
```

```
[root@MySQL-Proxy lua-5.1.4]# make && make linux && make install
```

```
[root@MySQL-Proxy lua-5.1.4]# export LUA_CFLAGS="-I/usr/local/lua/include"
```

```
LUA_LIBS="-L/usr/local/lua/lib -llua -ldl" LDFLAGS="-L/usr/local/libevent/lib -lm"
```

```
[root@MySQL-Proxy lua-5.1.4]# export CPPFLAGS="-I/usr/local/libevent/include"
```

```
[root@MySQL-Proxy lua-5.1.4]# export CFLAGS="-I/usr/local/libevent/include"
```

4.2.3 安装 libevent

```
[root@MySQL-Proxy src]# tar zxvf libevent-1.4.13-stable.tar.gz
```

```
[root@MySQL-Proxy src]# cd libevent-1.4.13-stable
```

```
[root@MySQL-Proxy libevent-1.4.13-stable]# ./configure --prefix=/usr/local/libevent
```

```
[root@MySQL-Proxy libevent-1.4.13-stable]# make && make install
```

4.2.4 安装 MySQL

```
[root@MySQL-Proxy src]# tar zxvf mysql-5.1.47.tar.gz
```

```
[root@MySQL-Proxy src]# cd mysql-5.1.47
```

```
[root@MySQL-Proxy mysql-5.1.47]# ./configure --prefix=/usr/local/mysql --without-server
```

4.2.5 设置环境变量

```
[root@MySQL-Proxy src]# export LUA_CFLAGS="-I/usr/local/lua/include"
```

```
LUA_LIBS="-L/usr/local/lua/lib -llua -ldl" LDFLAGS="-L/usr/local/libevent/lib -lm"
```

```
[root@MySQL-Proxy src]# export CPPFLAGS="-I/usr/local/libevent/include"
```

```
[root@MySQL-Proxy src]# export CFLAGS="-I/usr/local/libevent/include"
```

4.2.6 安装 MySQL-Proxy

注意: 如果你安装更高版本的 mysql-proxy 需要升级你的 glib。

```
[root@MySQL-Proxy src]# tar zxvf mysql-proxy-0.6.0.tar.gz
```

```
[root@MySQL-Proxy src]# cd mysql-proxy-0.6.0
```

```
[root@MySQL-Proxy mysql-proxy-0.6.0]# ./configure --prefix=/usr/local/mysql-proxy
```

```
--with-mysql=/usr/local/mysql --with-lua
```

```
[root@MySQL-Proxy mysql-proxy-0.6.0]# make && make install
```

4.3 MySQL-Proxy 的配置

```
[root@MySQL-Proxy ~]# /usr/local/mysql-proxy/sbin/mysql-proxy --help-all
```

Usage:

```
mysql-proxy [OPTION...] - MySQL Proxy
```

Help Options:

```
-?, --help
--help-all
--help-admin
--help-proxy
```

admin module

```
--admin-address=<host:port> #管理主机监听地址和端口，默认是 4041
```

proxy-module

```
-proxy-address=<host:port> #代理主机监听地址和端口，默认是 4040
```

```
--proxy-read-only-backend-addresses=<host:port> #只读连接时，代理服务器的监听地址及端口。
```

默认 4042

```
--proxy-backend-addresses=<host:port> #连接后端真实服务器时的地址及监听端口，默认是 3306
```

```
--proxy-skip-profiling
```

```
--proxy-fix-bug-25371
```

```
--proxy-lua-script=<file> 连接真实服务器的地址及监听端口，默认是 3306
```

```
--no-proxy
```

Application Options:

```
-V, --version
```

```
--daemon
```

```
--pid-file=<file>
```

4.4 MySQL Proxy 启动

4.4.1 命令行启动

```
[root@MySQL-Proxy ~]# /usr/local/mysql-proxy/sbin/mysql-proxy \
```

```
> --proxy-read-only-backend-addresses=192.168.140.129:3306 \
```

```
> --proxy-backend-addresses=192.168.140.128:3306 \
```

```
> --proxy-lua-script=/usr/local/mysql-proxy/share/mysql-proxy/rw-splitting.lua &
```

检测是否开始监听:

```
[root@MySQL-Proxy ~]# netstat -ntlp | grep mysql
```

```
tcp        0      0 0.0.0.0:4040          0.0.0.0:*            LISTEN      28739/mysql-proxy
tcp        0      0 0.0.0.0:4041          0.0.0.0:*            LISTEN      28739/mysql-proxy
```

4.4.2 脚本启动

```
[root@MySQL-Proxy ~]# vi /etc/init.d/mysql-proxy
#!/bin/bash
PRODIR=/usr/local/mysql-proxy
LUA_PATH=$PRODIR/share/mysql-proxy

start(){
$PRODIR/sbin/mysql-proxy          --proxy-read-only-backend-addresses=192.168.140.129:3306
--proxy-backend-addresses=192.168.140.128:3306      --proxy-lua-script=$LUA_PATH/rw-splitting.lua
>>$PRODIR/mysql-proxy.log &
}

stop(){
kill $(pidof mysql-proxy)
if [ $? -ne 0 ];then
    kill -9 $(pidof mysql-proxy)
fi
}

case "$1" in
    start)
        start
        ;;
    stop)
        stop
        ;;
    restart)
        stop
        start
        ;;
    *)
        echo $"Usage: $0 {start|stop|restart}"
Esac
[root@MySQL-Proxy ~]# chmod +x /etc/init.d/mysql-proxy
[root@MySQL-Proxy ~]# /etc/init.d/mysql-proxy start
```

4.5 MySQL Proxy 测试

4.5.1 测试环境部署

在 MySQL-Master 上创建测试数据库和用户。

```
mysql> create database unixhot;
```

```
mysql> GRANT ALL PRIVILEGES ON unixhot.* to proxytest@%' identified by 'unixhot';
```

4.5.2 连接测试

```
[root@MySQL-Proxy ~]# mysql -h 192.168.140.130 -P 4040 -u proxytest -p
```

输入密码即可登录。

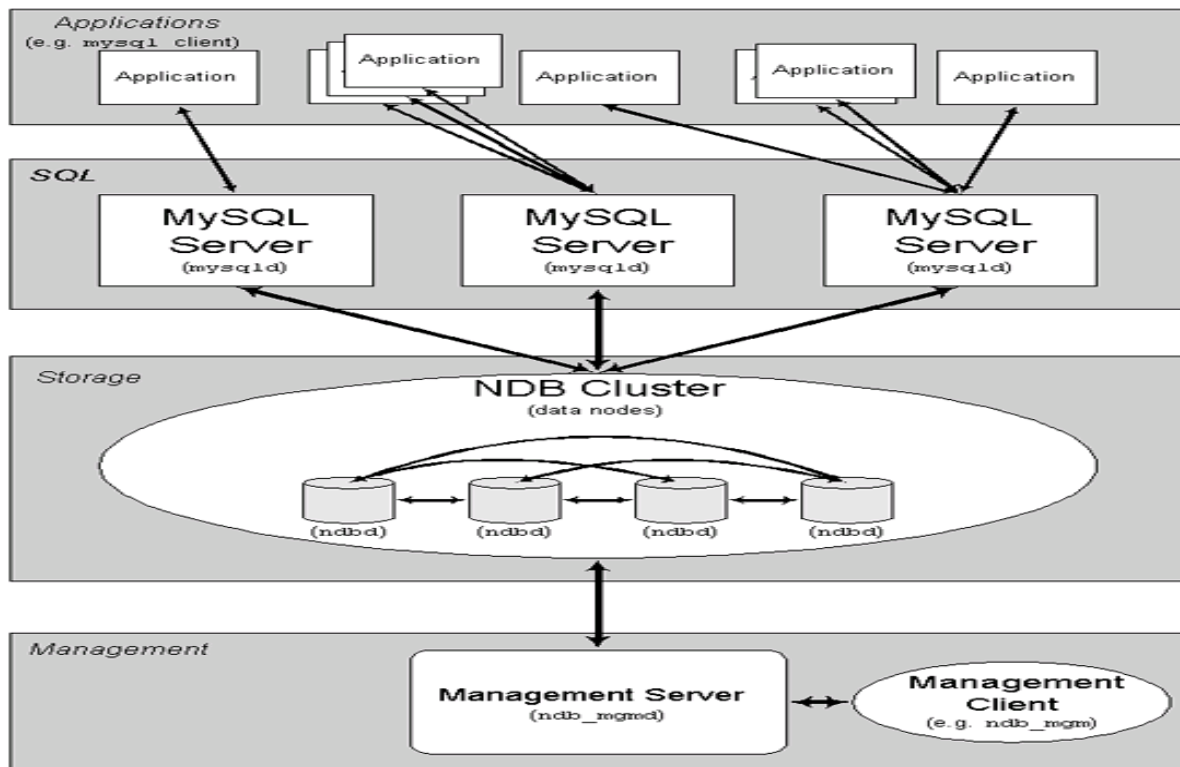
注意：在这里只做简单测试，具体请根据具体应用进行测试。由于目前 MySQL Proxy 技术还不够成熟，如果想在生产环境部署，请慎用。

第 5 章 MySQL Cluster

5.1 MySQL Cluster 简介

请参考官方文档：<http://dev.mysql.com/doc/refman/5.1/zh/ndbcluster.html>

下面是官方的 MySQL Cluster 的基本架构图：



5.2 MySQL Cluster 环境搭建

搭建 MySQL Cluster 至少需要三个节点，一个管理节点来实现管理功能，一个 SQL 节点主机来实现 MySQL server 功能，一个 ndb 节点主机实现 NDB Cluster 的功能。

5.2.1 实验环境

主机名	IP 地址	作用
MySQL-SQL-Node1	192.168.140.128	SQL 节点服务器
MySQL-Data-Node1	192.168.140.129	Data 节点服务器
MySQL-MGM-Node	192.168.140.130	管理节点服务器

注意：如果你的实验环境是根据本文的设置，为了对 MySQL Cluster 的配置不冲突，请整理前面的实验环境，如下：

```
[root@MySQL-Proxy ~]# /etc/init.d/mysql-proxy stop
[root@MySQL-Slave ~]# /etc/init.d/mysqld stop
[root@MySQL-Master ~]# /etc/init.d/mysqld stop
```

5.2.2 部署安装环境

```
[root@MySQL-SQL-Node1 src]# wget
http://ftp.jaist.ac.jp/pub/mysql/Downloads/MySQL-Cluster-7.1/mysql-cluster-gpl-7.1.3.tar.gz
[root@MySQL-SQL-Node1 src]# chmod +x mysql-cluster-gpl-7.1.3.tar.gz
[root@MySQL-SQL-Node1 src]# scp mysql-cluster-gpl-7.1.3.tar.gz 192.168.140.129:/usr/local/src
[root@MySQL-SQL-Node1 src]# scp mysql-cluster-gpl-7.1.3.tar.gz 192.168.140.130:/usr/local/src
```

5.2.3 部署管理(MGM)节点

1> 安装 MGM 节点

```
[root@MySQL-MGM-Node ~]# cd /usr/local/src
[root@MySQL-MGM-Node src]# tar zxvf mysql-cluster-gpl-7.1.3.tar.gz
[root@MySQL-MGM-Node src]# cd mysql-cluster-gpl-7.1.3
[root@MySQL-MGM-Node mysql-cluster-gpl-7.1.3]# ./configure --prefix=/usr/local/mysqlcluster \
--with-charset=utf8 --with-collation=utf8_general_ci \
```

```
--with-client-ldflags=-all-static -with-mysqld-ldflags=-all-static \  
--enable-asm --with-extra-charsets=complex \  
--enable-thread-safe-client --with-big-tables --with-readline \  
--with-ssl --with-embedded-server --enable-local-infile \  
--with-unix-socket-path=/usr/local/mysqlcluster/tmp/mysql.sock \  
--sysconfdir=/usr/local/mysqlcluster/etc --without-debug \  
--with-mysqld-user=mysql --with-plugins=max  
[root@MySQL-MGM-Node mysql-cluster-gpl-7.1.3]# make && make install
```

2> 配置 MGM 节点

```
[root@MySQL-MGM-Node ~]# cd /usr/local/mysqlcluster/  
[root@MySQL-MGM-Node mysqlcluster]# mkdir mysql-cluster  
[root@MySQL-MGM-Node mysqlcluster]# vi mysql-cluster/config.ini  
[NDBD DEFAULT]  
NoOfReplicas= 1  
DataMemory=50M  
IndexMemory=10M  
  
[NDB_MGMD]  
id=1  
HostName=192.168.140.130  
DataDir=/usr/local/mysqlcluster/mysql-cluster  
  
[NDBD]  
id=2  
HostName=192.168.140.129  
DataDir=/usr/local/mysqlcluster/ndbdata  
  
[MYSQLD]  
id=3  
HostName=192.168.140.128
```

3> 启动 MGM 节点

```
[root@MySQL-MGM-Node mysqlcluster]# libexec/ndb_mgmd -f  
/usr/local/mysqlcluster/mysql-cluster/config.ini
```

5.2.4 部署 NDBD 节点

1> 安装 NDBD 节点

```
[root@MySQL-Data-Node1 ~]# cd /usr/local/src
[root@MySQL-Data-Node1 src]# tar zxvf mysql-cluster-gpl-7.1.3.tar.gz
[root@MySQL-Data-Node1 src]# cd mysql-cluster-gpl-7.1.3
[root@MySQL-Data-Node1 mysql-cluster-gpl-7.1.3]# ./configure --prefix=/usr/local/mysqlcluster \
--with-charset=utf8 --with-collation=utf8_general_ci \
--with-client-ldflags=-all-static -with-mysqld-ldflags=-all-static \
--enable-asm --with-extra-charsets=complex \
--enable-thread-safe-client --with-big-tables --with-readline \
--with-ssl --with-embedded-server --enable-local-infile \
--with-unix-socket-path=/usr/local/mysqlcluster/tmp/mysql.sock \
--sysconfdir=/usr/local/mysqlcluster/etc --without-debug \
--with-mysqld-user=mysql --with-plugins=max
[root@MySQL-Data-Node1 mysql-cluster-gpl-7.1.3]# make && make install
```

2> 配置 NDBD 节点

```
[root@MySQL-Data-Node1 ~]# cd /usr/local/mysqlcluster/
[root@MySQL-Data-Node1 mysqlcluster]# mkdir etc ndbdata
[root@MySQL-Data-Node1 mysqlcluster]# vi etc/my.cnf
[mysqld]
basedir=/usr/local/mysqlcluster/
datadir=/usr/local/mysqlcluster/var
user=mysql
port=3306
socket=/usr/local/mysql/tmp/mysql.sock
ndbcluster
ndb-connectstring=192.168.140.130
[mysql_cluster]
ndb-connectstring=192.168.140.130
```

3> 启动 NDBD 节点

```
[root@MySQL-Data-Node1 mysqlcluster]# libexec/ndbd --initial
```

注意：

第一次启动需要加--initial 参数进行初始化工作，在以后的启动中，千万不要加该参数，因为 ndbd 程序会清除之前建立的所有用于恢复的数据文件和日志文件。

5.2.5 部署 SQL 节点

1> 安装 SQL 节点

```
[root@MySQL-SQL-Node1 ~]# cd /usr/local/src/
[root@MySQL-SQL-Node1 src]# tar zxvf mysql-cluster-gpl-7.1.3.tar.gz
[root@MySQL-SQL-Node1 src]# cd mysql-cluster-gpl-7.1.3
[root@MySQL-SQL-Node1 mysql-cluster-gpl-7.1.3]# ./configure --prefix=/usr/local/mysqlcluster \
--with-charset=utf8 --with-collation=utf8_general_ci \
--with-client-ldflags=-all-static -with-mysqld-ldflags=-all-static \
--enable-asm --with-extra-charsets=complex \
--enable-thread-safe-client --with-big-tables --with-readline \
--with-ssl --with-embedded-server --enable-local-infile \
--with-unix-socket-path=/usr/local/mysqlcluster/tmp/mysql.sock \
--sysconfdir=/usr/local/mysqlcluster/etc --without-debug \
--with-mysqld-user=mysql --with-plugins=max
[root@MySQL-Data-Node1 mysql-cluster-gpl-7.1.3]# make && make install
```

2> 配置 SQL 节点

```
[root@MySQL-SQL-Node1 ~]# cd /usr/local/mysqlcluster/
[root@MySQL-SQL-Node1 mysqlcluster]# mkdir etc
[root@MySQL-SQL-Node1 mysqlcluster]# chown -R root:mysql .
[root@MySQL-SQL-Node1 mysqlcluster]# bin/mysql_install_db --user=mysql
[root@MySQL-SQL-Node1 mysqlcluster]# vi etc/my.cnf
[mysqld]
basedir=/usr/local/mysqlcluster/
datadir=/usr/local/mysqlcluster/var
user=mysql
port=3306
socket=/usr/local/mysql/tmpcluster/mysql.sock
ndbcluster
ndb-connectstring=192.168.140.130
[mysql_cluster]
ndb-connectstring=192.168.140.130
```

3> 启动 SQL 节点

```
[root@MySQL-SQL-Node1 mysqlcluster]# bin/mysqld_safe --user=mysql &
```

5.3 MySQL Cluster 测试

在管理节点上测试:

```
[root@MySQL-MGM-Node ~]# cd /usr/local/mysqlcluster/
[root@MySQL-MGM-Node mysqlcluster]# bin/ndb_mgm
-- NDB Cluster -- Management Client --
ndb_mgm> show
Connected to Management Server at: localhost:1186
Cluster Configuration
-----
[ndbd(NDB)] 1 node(s)
id=2 @192.168.140.129 (mysql-5.1.44 ndb-7.1.3, Nodegroup: 0, Master)

[ndb_mgmd(MGM)] 1 node(s)
id=1 @192.168.140.130 (mysql-5.1.44 ndb-7.1.3)

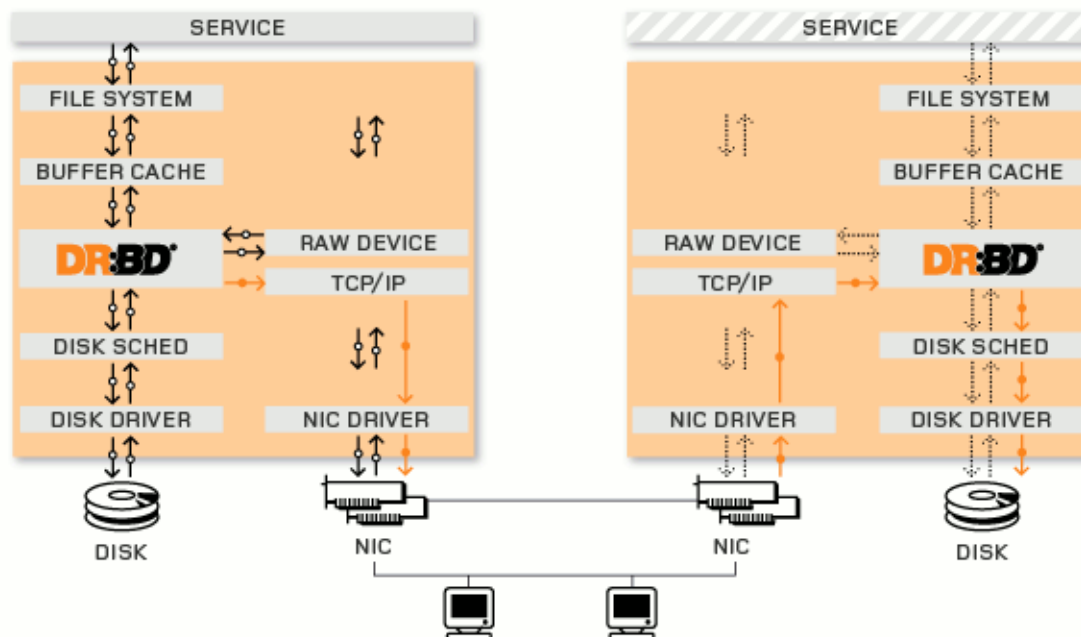
[mysqld(API)] 1 node(s)
id=3 @192.168.140.128 (mysql-5.1.44 ndb-7.1.3)
```

第 6 章 使用 **Heartbeat** 和 **DRBD** 构建高可用 **MySQL**

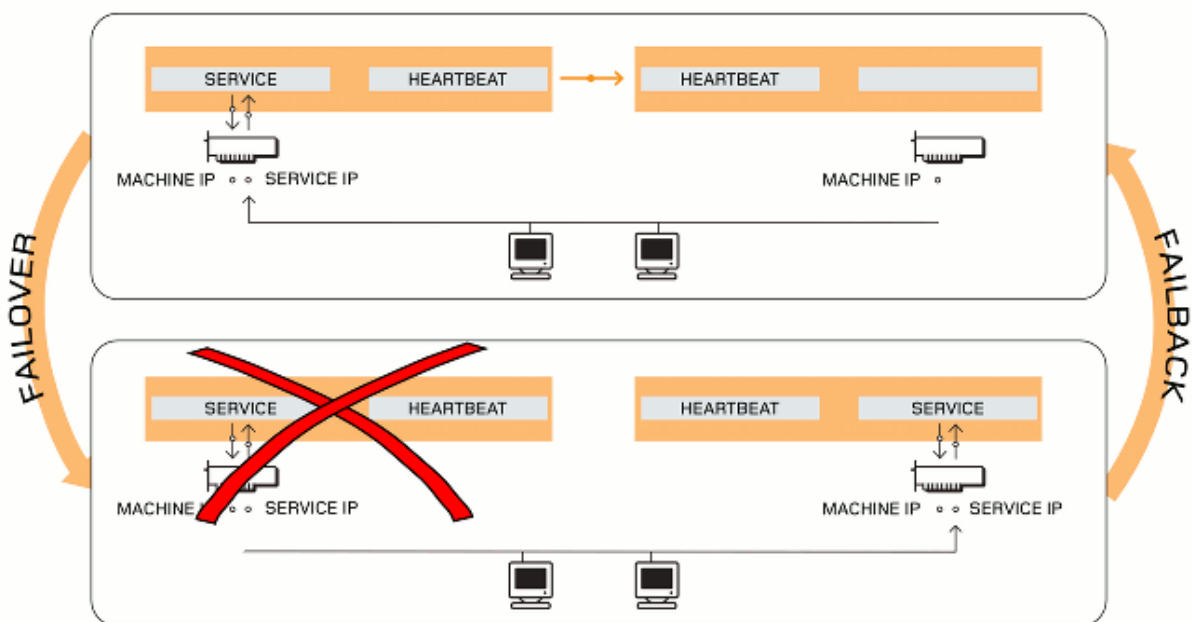
6.1 DRBD 介绍

DRBD(Distributed Replicated Block Device), DRBD 号称是 "网络 RAID", 开源软件, 由 LINBIT 公司开发。DRBD 分为两个部分, 内核中的驱动程序代码和用户空间的工具。Linux 2.6.33 之后的内核版本集成了 DRBD。

DRBD 实际上是一种块设备的实现, 主要被用于 Linux 平台下的高可用(HA)方案之中。他是有内核模块和相关程序而组成, 通过网络通信来同步镜像整个设备, 有点类似于一个网络 RAID 的功能。也就是说当你将数据写入本地的 DRBD 设备上的文件系统时, 数据会同时被发送到网络中的另外一台主机之上, 并以完全相同的形式记录在一个文件系统中 (实际上文件系统的创建也是由 DRBD 的同步来实现的)。本地节点 (主机) 与远程节点 (主机) 的数据可以保证实时的同步, 并保证 IO 的一致性。所以当本地节点的主机出现故障时, 远程节点的主机上还会保留有一份完全相同的数据, 可以继续使用, 以达到高可用的目的。



6.2 Heartbeat 介绍



6.3 部署前的准备工作

第一步：准备两台服务器，分别安装上 MySQL。

第二步：检查你的内核版本，如果是或高于 2.6.33 的话，就不需要安装了。

```
[root@MySQL-M ~]# uname -r
```

2.6.18-164.el5

第三步：准备 DRBD 使用的硬盘，我为两台服务器各加了一块硬盘。并分区，没有创建文件系统。

Device	Boot	Start	End	Blocks	Id	System
/dev/sdb1		1	261	2096451	83	Linux

第四步：IP 地址和主机名

主机名	IP 地址	作用
MySQL-node1	192.168.140.137	MySQL 主库服务器
MySQL-node2	192.168.140.139	MySQL 备库服务器

6.4 安装 DRBD

该小节所有内容需要在两个节点 MySQL-node1 和 MySQL-node2 分别执行。

6.4.1 下载软件包

```
[root@MySQL-node1 ~]# cd /usr/local/src
[root@MySQL-node1 src]# wget http://oss.linbit.com/drbd/8.3/drbd-8.3.7.tar.gz
[root@MySQL-node1 src]# tar zxvf drbd-8.3.7.tar.gz
[root@MySQL-node1 src]# cd drbd-8.3.7
```

6.4.2 编译为内核模块方式

```
[root@MySQL-node1 drbd-8.3.7]# ./configure --prefix=/usr/local/drbd \
> --sysconfdir=/etc --with-km
[root@MySQL-node1 drbd-8.3.7]# make
Module build was successful.(显示模块创建成功为正确)
[root@MySQL-node1 drbd-8.3.7]# make install
[root@MySQL-node1 ~]# whereis drbd
drbd: /etc/drbd.d /etc/drbd.conf /usr/local/drbd
```

6.4.3 载入 DRBD 模块到内核中

```
[root@MySQL-node1 ~]# modprobe drbd
[root@MySQL-node1 ~]# lsmod | grep drbd
drbd                272504  0
[root@MySQL-node1 ~]# echo "modprobe drbd" >> /etc/rc.local
```

6.4.4 DRBD 命令

安装成功后，会发现，系统增加了以下三个命令：

```
[root@MySQL-node1 ~]# ls /sbin/drbd*
/sbin/drbdadm  /sbin/drbdmeta  /sbin/drbdsetup
```

6.5 DRBD 配置

6.5.1 /etc/drbd.conf

```
[root@MySQL-M ~]# 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";
```

默认情况下，该文件包含了/etc/drbd.d 目录下的配置文件，下面是我修改好的 drbd.conf

```
[root@MySQL-M ~]# cat /etc/drbd.conf
include "drbd.d/global_common.conf";
resource r0 { #定义一个资源名字 r0
    on MySQL-node1 {
        device /dev/drbd1; #设置一个 DRBD device，编号是从 0 开始，主设备号 147。
        disk /dev/sdb1; #本地使用的 device
        address 192.168.140.137:7789; #网络设置，IP 地址加端口
        meta-disk internal;
    }
}
```

```
on MySQL-node2 {
    device /dev/drbd1;
    disk /dev/sdb1;
    address 192.168.140.139:7789;
    meta-disk internal;
}
}
```

6.5 初始化设置

6.5.1 创建 DRBD 元数据

```
[root@MySQL-node1 ~]# drbdadm create-md r0
```

Writing meta data...

initializing activity log

NOT initialized bitmap

New drbd meta data block successfully created.

success

```
[root@MySQL-node1 ~]# drbdadm attach r0
```

```
[root@MySQL-node1 ~]# drbdadm syncer r0
```

```
[root@MySQL-node1 ~]# drbdadm connect r0
```

设置为主节点:

```
[root@MySQL-node1 ~]# drbdadm -- --overwrite-data-of-peer primary r0
```

```
[root@MySQL-node1 ~]# mkfs.ext3 /dev/drbd1
```

```
[root@MySQL-node1 ~]# cat /proc/drbd
```

version: 8.3.7 (api:88/proto:86-91)

GIT-hash: ea9e28dbff98e331a62bcbcc63a6135808fe2917 build by root@MySQL-M, 2010-11-26

02:36:34

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

ns:75304 nr:0 dw:66388 dr:8952 al:25 bm:2 lo:0 pe:0 ua:0 ap:0 ep:1 wo:b oos:2024192

```
[>.....] sync'ed: 3.6% (2024192/2096348)K
```

```
finish: 1:52:27 speed: 256 (2,120) K/sec
```

```
[root@MySQL-node2 ~]# cat /proc/drbd
```

```
version: 8.3.7 (api:88/proto:86-91)
```

```
GIT-hash: ea9e28dbff98e331a62bcbcc63a6135808fe2917 build by root@MySQL-node2, 2010-11-27
```

```
01:50:08
```

```
1: cs:SyncTarget ro:Secondary/Primary ds:Inconsistent/UpToDate C r----
```

```
ns:0 nr:79880 dw:79880 dr:0 al:0 bm:2 lo:0 pe:0 ua:0 ap:0 ep:1 wo:b oos:2019616
```

```
[>.....] sync'ed: 3.8% (2019616/2096348)K
```

```
finish: 0:42:04 speed: 512 (1,868) K/sec
```

(未完待续)

实验答疑: <http://www.unixhot.com>

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