

## 使用 ZRM 备份 Mysql 数据库

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V0.1	2010 年 11 月	彭勇华	<a href="mailto:peng_yh@hotmail.com">peng_yh@hotmail.com</a>

## 目 录

1. ZRM 简介 .....	2
2. 测试环境 .....	2
3. 安装 ZRM .....	3
4. 配置 ZRM .....	3
4.1. 修改 ZRM 配置文件 .....	3
4.2. 添加 Mysql 备份用户 .....	4
5. 备份 .....	5
5.1. 执行备份 .....	5
5.2. 查看备份状态 .....	7
5.3. 验证备份 .....	8
5.4. 定时备份 .....	8
6. 还原 .....	8
7. ZRM 日志 .....	11

# 1. ZRM 简介

ZRM 是 Zmanda 公司出品的 Mysql 备份与还原工具。ZRM 是一套用 Perl 写的工具集，不难使用，设计的很合理，充分考虑了备份与还原的各个细节。它的报告工具也做得十分出色。

ZRM 主要功能包括：

- ✓ 支持完整备份和增量备份
- ✓ 支持逻辑备份和裸备份
- ✓ 支持多种存储引擎
- ✓ 支持远程备份
- ✓ 备份时可选择压缩和加密
- ✓ 还原操作简单

ZRM 包括商业版和社区版。商业版要付费，它的最主要好处是有一套基于 WEB 的管理系统，可以通过 WEB 界面定制备份策略，监视备份状态。不过如果用户熟悉 Unix/Linux 命令行操作，使用社区版 ZRM 也足够了。

# 2. 测试环境

操作系统：Slackware Linux 12.1.0

内核版本：2.6.24.5-smp

Mysql 版本：5.1.51

Mysql 存储引擎：InnoDB

Mysql 数据库名是 pyh，共有 4 个表：

```
mysql> show tables;
+-----+
| Tables_in_pyh |
+-----+
| myt1          |
| myt2          |
| myt3          |
| myt4          |
+-----+
4 rows in set (0.00 sec)

mysql> select count(*) from myt2;
+-----+
| count(*) |
```

```
+-----+
| 150000 |
+-----+
1 row in set (0.01 sec)
```

## 3. 安装 ZRM

首先到这个页面下载 ZRM 的最新版（目前是 2.2）:

<http://www.zmanda.com/download-zrm.php>

根据操作系统来选择相应版本。Debian/Ubuntu 可以选择 .deb 版本，然后用 `dpkg` 命令安装。Redhat/OpenSuse 可以选择 .rpm 版本，并用 `rpm` 命令安装。我的是 Slackware 系统，选择源代码下载，并且运行 `installpkg` 命令进行安装。

由于 ZRM 都是 Perl 写的，因此没有编译过程，文件安装在如下几个目录：

/etc 下的三个子目录：

logrotate.d/ mysql-zrm/ xinetd.d/

配置文件、日志轮转等。

/usr 下的三个子目录：

bin/ lib/ share/

ZRM 的可执行命令、库文件、帮助文件。

/var 下的两个子目录：

lib/ log/

主要是 ZRM 的日志文件。

请注意：ZRM 运行必须有 XML::Parser、DBI、DBD::mysql 三个 Perl 库。大多数 Linux 发行版默认安装了这些库，如果没有则请从 CPAN 安装它们。

## 4. 配置 ZRM

### 4.1. 修改 ZRM 配置文件

ZRM 是按项目来执行备份计划的。所以每个备份任务，必须指定一个项目名。所谓项目名，就是在 `/etc/mysql-zrm` 创建一个子目录，并使用这个子目录的名字。

`/etc/mysql-zrm/mysql-zrm.conf` 是配置文件模板。先在 `/etc/mysql-zrm` 下创建一个子目录作为

项目名，如 `dailybackup`，然后把模板拷贝到该子目录下。

```
cd /etc/mysql-zrm
mkdir dailybackup
cp mysql-zrm.conf dailybackup/
```

然后进入 `dailybackup` 目录，修改 `mysql-zrm.conf`。  
这个文件自身的注释写得相当完善，可自行阅读。  
`grep` 一下可以看到主要改动如下几个地方：

```
# grep -v ^# mysql-zrm.conf |grep -v ^$
backup-level=0
backup-mode=logical
destination=/data/mysqlbackup
retention-policy=10D
compress=1
databases=pyh
user="backup-user"
password="pass123"
socket=/tmp/mysql.sock
verbose=1
```

上述配置说明如下：

`backup-level=0` 执行完整备份  
`backup-mode=logical` 执行逻辑备份  
`destination=/data/mysqlbackup` 备份数据的位置  
`retention-policy=10D` 备份数据保留在磁盘的周期（10D 表示 10 天）  
`compress=1` 使用压缩  
`databases=pyh` 备份数据库的名字  
`user="backup-user"` 执行备份的用户名  
`password="pass123"` 执行备份的密码  
`socket=/tmp/mysql.sock` Socket 文件位置，这个与 `my.cnf` 里对应  
`verbose=1` 备份时输出详细说明

## 4.2. 添加 Mysql 备份用户

登录 Mysql shell，运行如下语句：

```
mysql> grant all on pyh.* to 'backup-user'@'localhost' identified by 'pass123';
Query OK, 0 rows affected (0.11 sec)

mysql> flush privileges;
Query OK, 0 rows affected (0.00 sec)
```

表示授权 backup-user 这个用户可以从本机对 pyh 数据库进行备份。

## 5. 备份

### 5.1. 执行备份

如下操作，都以 root 进行。

执行备份的命令很简单，一次执行过程及输出结果如下：

```
# mysql-zrm-backup --backup-set dailybackup

backup:INFO: ZRM for MySQL Community Edition - version 2.2.0
dailybackup:backup:INFO: START OF BACKUP
dailybackup:backup:INFO: PHASE START: Initialization
dailybackup:backup:INFO: The quick backup-type is supported only for snapshot backups.
Setting backup-type to 'regular'
dailybackup:backup:INFO:      ZRM      Temporary      configuration      file      =
/etc/mysql-zrm/dailybackup/tmpaBLUU.conf
dailybackup:backup:INFO: {
dailybackup:backup:INFO:      verbose=1
dailybackup:backup:INFO:      retention-policy=10D
dailybackup:backup:INFO:      backup-level=0
dailybackup:backup:INFO:      destination=/data/mysqlbackup
dailybackup:backup:INFO:      databases=pyh
dailybackup:backup:INFO:      socket=/tmp/mysql.sock
dailybackup:backup:INFO:      mail-policy=always
dailybackup:backup:INFO:      backup-mode=logical
dailybackup:backup:INFO:      password=*****
dailybackup:backup:INFO:      backup-type=regular
dailybackup:backup:INFO:      compress=
dailybackup:backup:INFO:      user=backup-user
dailybackup:backup:INFO: }
dailybackup:backup:INFO: Getting mysql variables
dailybackup:backup:INFO:      mysqladmin      --user="backup-user"      --password="*****"
--socket="/tmp/mysql.sock" variables
dailybackup:backup:INFO: datadir is /usr/local/mysql/data/
dailybackup:backup:INFO: mysql_version is 5.1.51-log
dailybackup:backup:INFO:      InnoDB      data      file      are      /usr/local/mysql/data/ibdata1
/usr/local/mysql/data/ibdata2 /usr/local/mysql/data/ibdata3
dailybackup:backup:INFO: InnoDB log dir is /usr/local/mysql/data/
dailybackup:backup:INFO: backup set being used is dailybackup
```

```

dailybackup:backup:INFO: backup-set=dailybackup
dailybackup:backup:INFO: backup-date=20101104163233
dailybackup:backup:INFO: mysql-server-os=Linux/Unix
dailybackup:backup:INFO: backup-type=regular
dailybackup:backup:INFO: host=localhost
dailybackup:backup:INFO: backup-date-epoch=1288859553
dailybackup:backup:INFO: retention-policy=10D
dailybackup:backup:INFO: mysql-zrm-version=ZRM for MySQL Community Edition - version
2.2.0
dailybackup:backup:INFO: mysql-version=5.1.51-log
dailybackup:backup:INFO: backup-directory=/data/mysqlbackup/dailybackup/20101104163233
dailybackup:backup:INFO: backup-level=0
dailybackup:backup:INFO: backup-mode=logical
dailybackup:backup:INFO: PHASE END: Initialization
dailybackup:backup:INFO: PHASE START: Running pre backup plugin
dailybackup:backup:INFO: Executing pre-backup-plugin
dailybackup:backup:INFO: PHASE END: Running pre backup plugin
dailybackup:backup:INFO: PHASE START: Flushing logs
dailybackup:backup:INFO: Flushing the logs
dailybackup:backup:INFO:      mysqladmin      --user="backup-user"      --password="*****"
--socket="/tmp/mysql.sock" flush-logs
dailybackup:backup:INFO: Getting master logname using command mysql --user="backup-user"
--password="*****" --socket="/tmp/mysql.sock" -e "show master status"
dailybackup:backup:INFO: PHASE END: Flushing logs
dailybackup:backup:INFO: PHASE START: Creating logical backup
dailybackup:backup:INFO: Command used for logical backup is mysqldump --opt
--extended-insert      --create-options      --default-character-set=utf8      --single-transaction
--user="backup-user" --password="*****" --socket="/tmp/mysql.sock" --databases pyh >
"/data/mysqlbackup/dailybackup/20101104163233/backup.sql"
dailybackup:backup:INFO: Logical backup done for the following database(s)
      pyh
dailybackup:backup:INFO: logical-databases=pyh
dailybackup:backup:INFO: PHASE END: Creating logical backup
dailybackup:backup:INFO: PHASE START: Calculating backup size & checksums
dailybackup:backup:INFO: next-binlog=mysql-bin.000036
dailybackup:backup:INFO: last-backup=/data/mysqlbackup/dailybackup/20101104150431
dailybackup:backup:INFO: backup-size=8.98 MB
dailybackup:backup:INFO: PHASE END: Calculating backup size & checksums
dailybackup:backup:INFO: PHASE START: Compression/Encryption
dailybackup:backup:INFO: Compressing backup
dailybackup:backup:INFO: Command used is 'tar      --same-owner      -cpsC
"/data/mysqlbackup/dailybackup/20101104163233"      --exclude=backup-data      --exclude=index
--exclude=zrm_checksum      --exclude=backup-sql      . 2>/tmp/bZPQWcrJU5      | gzip
2>/tmp/CPrekLdvok      >      "/data/mysqlbackup/dailybackup/20101104163233/backup-data"

```

```

2>/tmp/6oqt9E0NNr'
dailybackup:backup:INFO: compress=
dailybackup:backup:INFO: backup-size-compressed=5.64 MB
dailybackup:backup:INFO: Removing all of the uncompressed/unencrypted data
dailybackup:backup:INFO: PHASE END: Compression/Encryption
dailybackup:backup:INFO: read-locks-time=00:00:02
dailybackup:backup:INFO: flush-logs-time=00:00:00
dailybackup:backup:INFO: compress-encrypt-time=00:00:42
dailybackup:backup:INFO: backup-time=00:00:06
dailybackup:backup:INFO: backup-status=Backup succeeded
dailybackup:backup:INFO: Backup succeeded
dailybackup:backup:INFO: PHASE START: Running post backup plugin
dailybackup:backup:INFO: Executing post-backup-plugin
dailybackup:backup:INFO: PHASE END: Running post backup plugin
dailybackup:backup:INFO: PHASE START: Cleanup
dailybackup:backup:INFO: PHASE END: Cleanup
dailybackup:backup:INFO: END OF BACKUP

```

执行 `mysql-zrm-backup` 这个命令，`--backup-set` 后面跟项目名字。

备份的数据文件位于 `/data/mysqlbackup/dailybackup` 目录里。在这个目录下，还根据备份时间创建了一些子目录，每个子目录里保存当次的备份数据。

## 5.2. 查看备份状态

```

# mysql-zrm-reporter --where backup-set=dailybackup --show backup-status-info

REPORT TYPE : backup-status-info

      backup_set  backup_date                backup_level  backup_status
backup_type      comment
-----
regular         dailybackup  Thu 04 Nov 2010 04:32:33    0  Backup succeeded
                ----
                PM CST
regular         dailybackup  Thu 04 Nov 2010 03:04:31    0  Backup succeeded
                ----
                PM CST
regular         dailybackup  Thu 04 Nov 2010 03:03:04    0  Backup succeeded
                ----
                PM CST

```

上述输出表示执行了三次备份，分别记录了备份时间、备份级别、备份状态、备份类型。



还可以用 `mysql-zrm-reporter --where backup-set=dailybackup --show backup-performance-info` 这个命令查看性能状态，输出备份文件大小、备份执行时间等。

## 5.3. 验证备份

```
# mysql-zrm --action verify-backup --backup-set dailybackup
verify-backup:INFO: ZRM for MySQL Community Edition - version 2.2.0
dailybackup:verify-backup:INFO: Verification successful
```

这个命令用来验证数据备份是否正确完整。

## 5.4. 定时备份

执行如下命令：

```
# mysql-zrm-scheduler --add --interval daily --start 01:00 --backup-level 0 --backup-set
dailybackup
```

表示每天凌晨一点开始，对 `dailybackup` 项目执行一次完整备份。

执行完后运行 `crontab -e` 可看到自动添加了两条定时任务：

```
0 1 * * * /usr/bin/zrm-pre-scheduler --action backup --backup-set dailybackup --backup-level 0
--interval daily
0 4 * * * /usr/bin/mysql-zrm --action purge
```

## 6. 还原

登录 Mysql 数据库，删除一个表：

```
mysql> drop table myt2;
Query OK, 0 rows affected (0.13 sec)

mysql> show tables;
+-----+
| Tables_in_pyh |
+-----+
| myt1          |
| myt3          |
| myt4          |
```

```
+-----+
3 rows in set (0.01 sec)
```

然后，使用 ZRM 恢复这个数据库。  
先运行如下命令查看可用的恢复信息：

```
# mysql-zrm-reporter --show restore-info --where backup-set=dailybackup

REPORT TYPE : restore-info

      backup_set  backup_date                backup_level  backup_directory
backup_status    comment
-----
dailybackup     Thu 04 Nov 2010 04:32:33    0
/data/mysqlbackup/dailybackup/2010110416 Backup succeeded    ---          3233
      PM CST
dailybackup     Thu 04 Nov 2010 03:04:31    0
/data/mysqlbackup/dailybackup/2010110415 Backup succeeded    ---          0431
      PM CST
dailybackup     Thu 04 Nov 2010 03:03:04    0
/data/mysqlbackup/dailybackup/2010110415 Backup succeeded    ---          0304
      PM CST
```

可以看到有三个文件可供选择进行恢复，每个都记录有备份时间和状态。我们选择中间这个进行恢复，执行如下命令：

```
# mysql-zrm-restore --backup-set dailybackup --source-directory
/data/mysqlbackup/dailybackup/20101104150431

restore:INFO: ZRM for MySQL Community Edition - version 2.2.0
dailybackup:restore:INFO: The quick backup-type is supported only for snapshot backups. Setting
backup-type to 'regular'
dailybackup:restore:INFO:      ZRM      Temporary      configuration      file      =
/etc/mysql-zrm/dailybackup/tmpo8fLX.conf
dailybackup:restore:INFO: {
dailybackup:restore:INFO:      verbose=1
dailybackup:restore:INFO:      retention-policy=10D
dailybackup:restore:INFO:      backup-level=0
dailybackup:restore:INFO:      destination=/data/mysqlbackup
dailybackup:restore:INFO:      databases=pyh
dailybackup:restore:INFO:
source-directory=/data/mysqlbackup/dailybackup/20101104150431
dailybackup:restore:INFO:      socket=/tmp/mysql.sock
```

```

dailybackup.restore:INFO:      mail-policy=always
dailybackup.restore:INFO:      backup-mode=logical
dailybackup.restore:INFO:      password=*****
dailybackup.restore:INFO:      backup-type=regular
dailybackup.restore:INFO:      compress=
dailybackup.restore:INFO:      user=backup-user
dailybackup.restore:INFO: }
dailybackup.restore:INFO: Getting mysql variables
dailybackup.restore:INFO:      mysqladmin      --user="backup-user"      --password="*****"
--socket="/tmp/mysql.sock" variables
dailybackup.restore:INFO: datadir is /usr/local/mysql/data/
dailybackup.restore:INFO: mysql_version is 5.1.51-log
dailybackup.restore:INFO:      InnoDB      data      file      are      /usr/local/mysql/data/ibdata1
/usr/local/mysql/data/ibdata2 /usr/local/mysql/data/ibdata3
dailybackup.restore:INFO: InnoDB log dir is /usr/local/mysql/data/
dailybackup.restore:INFO: Executing pre-restore-plugin
dailybackup.restore:INFO:      restoring      using      command      mysql      --user="backup-user"
--password="*****"      --socket="/tmp/mysql.sock"      -e      "set      character_set_client=utf8;set
character_set_connection=utf8;set character_set_database=utf8;set character_set_results=utf8;set
character_set_server=utf8;source /tmp/AQQQ8PnyEs;"
dailybackup.restore:INFO: Restored database(s) from logical backup:  pyh
dailybackup.restore:INFO: Executing post-restore-plugin
dailybackup.restore:INFO: Restore done in 7 seconds.

```

恢复完成，用了 7 秒。登录数据库验证一下：

```

mysql> show tables;
+-----+
| Tables_in_pyh |
+-----+
| myt1          |
| myt2          |
| myt3          |
| myt4          |
+-----+
4 rows in set (0.00 sec)

mysql> select count(*) from myt2;
+-----+
| count(*) |
+-----+
| 150000 |
+-----+
1 row in set (0.11 sec)

```

数据恢复成功。

## 7. ZRM 日志

日志文件都位于`/var/log/mysql-zrm`目录下，其中`/var/log/mysql-zrm/mysql-zrm.log`里记录了备份与还原操作的输出细节，需要重点留意。