TTS 11.0 COOKBOOK

(NSD RDBMS1 DAY04)

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NSD RDBM1 DAY04

1. 案例 1： 用户授权

- **问题**

- 允许 192.168.4.0/24 网段主机使用 root 连接数据库服务器，对所有库和所有表有完全权限、密码为 123qqq...A

- 添加用户 dba007，对所有库和所有表有完全权限、且有授权权限，密码为 123qqq...A 客户端为网络中的所有主机。

- 撤销 root 从本机访问权限，然后恢复。

- 允许任意主机使用 webuser 用户连接数据库服务器，仅对 webdb 库有完全权限，密码为 123qqq...A

- 撤销 webuser 的权限，使其仅有查询记录权限

- **步骤**

实现此案例需要按照如下步骤进行。

步骤一：用户授权

1）允许 root 从 192.168.4.0/24 访问，对所有库表有完全权限，密码为 123qqq...A

授权之前，从 192.168.4.0/24 网段的客户机访问时，将会被拒绝：

```
[root@host120 ~]# mysql -u root -p -h 192.168.4.10
Enter password:                                    //输入正确的密码
ERROR 2003 (HY000): Host '192.168.4.120' is not allowed to connect to this MySQL server
```

授权操作，此处可设置与从 localhost 访问时不同的密码：

```
mysql> GRANT all ON *.* TO root@'192.168.4.%' IDENTIFIED BY 'tarena';
Query OK, 0 rows affected (0.00 sec)
```

再次从 192.168.4.0/24 网段的客户机访问时，输入正确的密码后可登入：

```
[root@host120 ~]# mysql -u root -p -h 192.168.4.10
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 20
Server version: 5.7.17 MySQL Community Server (GPL)

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```

```
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mysql>
```

从网络登入后，测试新建一个库、查看所有库：

```
mysql> CREATE DATABASE rootdb;                    //创建新库 rootdb
Query OK, 1 row affected (0.06 sec)

mysql> SHOW DATABASES;
+--------------------+
| Database           |
+--------------------+
| information_schema |
| home               |
| mysql              |
| performance_schema |
| rootdb             |                          //新建的 rootdb 库
| sys                |
| userdb             |
+--------------------+
7 rows in set (0.01 sec)
```

2）在 Mysql 服务器上建立一个管理账号 dba007，对所有库完全控制，并赋予其授权的权限新建账号并授权：

```
mysql> GRANT all ON *.* TO dba007@localhost
    -> IDENTIFIED BY '123qqq…A '
    -> WITH GRANT OPTION;
Query OK, 0 rows affected (0.00 sec)
```

查看 dba007 的权限：

```
mysql> SHOW GRANTS FOR dba007@localhost;
+-----------------------------------------------------------------------+
| Grants for dba007@localhost                                           |
+-----------------------------------------------------------------------+
| GRANT ALL PRIVILEGES ON *.* TO 'dba007'@'localhost' WITH GRANT OPTION |
+-----------------------------------------------------------------------+
1 row in set (0.00 sec)
```

3）撤销 root 从本机访问的权限，然后恢复

注意：如果没有事先建立其他管理账号，请不要轻易撤销 root 用户的本地访问权限，否则恢复起来会比较困难，甚至不得不重装数据库。

撤销 root 对数据库的操作权限：

```
mysql> REVOKE all ON *.* FROM root@localhost;
Query OK, 0 rows affected (0.00 sec)
mysql> SHOW GRANTS FOR root@localhost;
+-----------------------------------------------------------+
| Grants for root@localhost                                 |
+-----------------------------------------------------------+
| GRANT USAGE ON *.* TO 'root'@'localhost' WITH GRANT OPTION  |
| GRANT PROXY ON ''@'' TO 'root'@'localhost' WITH GRANT OPTION |
+-----------------------------------------------------------+
2 rows in set (0.00 sec)
```

验证撤销后的权限效果：

```
mysql> exit                                          //退出当前 MySQL 连接
Bye
[root@dbsvr1 ~]# mysql -u root -p                    //重新以 root 从本地登入
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 6
Server version: 5.6.15 MySQL Community Server (GPL)

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

mysql> CREATE DATABASE newdb2014;                    //尝试新建库失败
ERROR 1044 (42000): Access denied for user 'root'@'localhost' to database 'newdb2014'
mysql> DROP DATABASE rootdb;                         //尝试删除库失败
ERROR 1044 (42000): Access denied for user 'root'@'localhost' to database 'rootdb'
```

尝试以当前的 root 用户恢复权限，也会失败（无权更新授权表）：

```
mysql> GRANT all ON *.* TO root@localhost IDENTIFIED BY '1234567';
ERROR 1045 (28000): Access denied for user 'root'@'localhost' (using password: YES)
```

怎么办呢?

退出当前 MySQL 连接，以上一步添加的管理账号 dba007 登入：

```
mysql> exit                                          //退出当前 MySQL 连接
Bye
[root@dbsvr1 ~]# mysql -u dba007 -p                  //以另一个管理账号登入
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 24
Server version: 5.7.17 MySQL Community Server (GPL)

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

由管理账号 dba007 重新为 root 添加本地访问权限：

```
mysql> GRANT all ON *.* TO root@localhost IDENTIFIED BY '1234567';
Query OK, 0 rows affected (0.00 sec)
mysql> SHOW GRANTS FOR root@localhost;               //查看恢复结果
+-----------------------------------------------------------------------+
| Grants for root@localhost                                             |
+-----------------------------------------------------------------------+
| GRANT ALL PRIVILEGES ON *.* TO 'root'@'localhost' WITH GRANT OPTION |
| GRANT PROXY ON ''@'' TO 'root'@'localhost' WITH GRANT OPTION        |
+-----------------------------------------------------------------------+
2 rows in set (0.00 sec)
```

退出，再重新以 root 登入，测试一下看看，权限又恢复了吧：

```
mysql> exit                                          //退出当前 MySQL 连接
Bye
[root@dbsvr1 ~]# mysql -u root -p                    //重新以 root 登入
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 25
Server version: 5.7.17 MySQL Community Server (GPL)

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

mysql> CREATE DATABASE newdb2014;                    //成功创建新库
Query OK, 1 row affected (0.00 sec)
```

4）允许 webuser 从任意客户机登录，只对 webdb 库有完全权限，密码为 123qqq…A

添加授权：

```
mysql> GRANT all ON webdb.* TO webuser@'%' IDENTIFIED BY '888888';
Query OK, 0 rows affected (0.00 sec)
```

查看授权结果：

```
mysql> SHOW GRANTS FOR webuser@'%';
+-----------------------------------------------------+
| Grants for webuser@%                                |
+-----------------------------------------------------+
| GRANT USAGE ON *.* TO 'webuser'@'%'                 |
| GRANT ALL PRIVILEGES ON `webdb`.* TO 'webuser'@'%' |
+-----------------------------------------------------+
2 rows in set (0.00 sec)
```

5）撤销 webuser 的完全权限，改为查询权限

撤销所有权限：

```
mysql> REVOKE all ON webdb.* FROM webuser@'%';
Query OK, 0 rows affected (0.00 sec)
```

只赋予查询权限：

```
mysql> GRANT select ON webdb.* TO webuser@'%';
Query OK, 0 rows affected (0.00 sec)
```

确认授权更改结果：

```
mysql> SHOW GRANTS FOR webuser@'%';
+-----------------------------------------+
| Grants for webuser@%                    |
+-----------------------------------------+
| GRANT USAGE ON *.* TO 'webuser'@'%'     |
| GRANT SELECT ON `webdb`.* TO 'webuser'@'%' |
+-----------------------------------------+
2 rows in set (0.00 sec)
```

2. 案例 2：root 密码

- **问题**

具体要求如下：

- 恢复管理员 root 密码　123qqq...A
- 重置管理员 root 密码　A...qqq321

- **步骤**

实现此案例需要按照如下步骤进行。

步骤一：恢复管理员 root 密码

1）首先停止已运行的 MySQL 服务程序

```
[root@dbsvr1 ~]# systemctl  stop mysqld.service          //停止服务
[root@dbsvr1 ~]# systemctl  status mysqld.service        //确认状态
mysqld.service - MySQL Server
   Loaded: loaded (/usr/lib/systemd/system/mysqld.service; enabled)
   Active: inactive (dead) since 五 2017-04-07 23:01:38 CST; 21s ago
     Docs: man:mysqld(8)
           http://dev.mysql.com/doc/refman/en/using-systemd.html
  Process:          20260          ExecStart=/usr/sbin/mysqld          --daemonize
--pid-file=/var/run/mysqld/mysqld.pid $MYSQLD_OPTS (code=exited, status=0/SUCCESS)
  Process:    20238    ExecStartPre=/usr/bin/mysqld_pre_systemd    (code=exited,
status=0/SUCCESS)
 Main PID: 20262 (code=exited, status=0/SUCCESS)
```

2）然后跳过授权表启动 MySQL 服务程序

这一步主要利用 mysqld 的 --skip-grant-tables 选项

修改 my.cnf 配置，添加 skip_grant_tables=1 启动设置：

```
[root@dbsvr1 ~]# vim /etc/my.cnf
[mysqld]
skip_grant_tables
.. ..
[root@dbsvr1 ~]# systemctl  start mysqld.service

[root@dbsvr1 ~]# service mysql status
mysqld.service - MySQL Server
   Loaded: loaded (/usr/lib/systemd/system/mysqld.service; enabled)
   Active: active (running) since 五 2017-04-07 23:40:20 CST; 40s ago
     Docs: man:mysqld(8)
           http://dev.mysql.com/doc/refman/en/using-systemd.html
  Process:          11698          ExecStart=/usr/sbin/mysqld          --daemonize
--pid-file=/var/run/mysqld/mysqld.pid $MYSQLD_OPTS (code=exited, status=0/SUCCESS)
  Process:    11676    ExecStartPre=/usr/bin/mysqld_pre_systemd    (code=exited,
status=0/SUCCESS)
 Main PID: 11701 (mysqld)
   CGroup: /system.slice/mysqld.service
           └─11701 /usr/sbin/mysqld          --daemonize
--pid-file=/var/run/mysqld/mysqld.p...
```

3）使用 mysql 命令连接到 MySQL 服务，重设 root 的密码

由于前一步启动的 MySQL 服务跳过了授权表，所以可以 root 从本机直接登录

```
[root@dbsvr1 ~]# mysql  //直接回车即可

Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 4
Server version: 5.7.17 MySQL Community Server (GPL)

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mysql>
```

进入 mysql> 环境后，通过修改 mysql 库中 user 表的相关记录，重设 root 用户从本机登录的密码：

```
mysql> UPDATE mysql.user SET authentication_string=PASSWORD('123qqq…A')
    -> WHERE user='root' AND host='localhost';              //重设 root 的密码
Query OK, 1 row affected, 1 warning (0.00 sec)
Rows matched: 1  Changed: 1  Warnings: 1
mysql> FLUSH PRIVILEGES;                                    //刷新授权表
Query OK, 0 rows affected (0.01 sec)
mysql> exit                                                 //退出 mysql> 环境
Bye
```

通过执行“FLUSH PRIVILEGES;”可使授权表立即生效，对于正常运行的 MySQL 服务，也可以用上述方法来修改密码，不用重启服务。本例中因为是恢复密码，最好重启 MySQL 服务程序，所以上述“FLUSH PRIVILEGES;”操作可跳过。

4）重新以正常方式启动 MySQL 服务程序，验证新密码

如果前面是修改/etc/my.cnf 配置的方法来跳过授权表，则重置 root 密码后，应去除相应的设置以恢复正常：

```
[root@dbsvr1 ~]# vim /etc/my.cnf
[mysqld]
#skip_grant_tables=1                                //注释掉或删除此行
.. ..
```

按正常方式，通过 mysql 脚本重启服务即可：

```
[root@dbsvr1 ~]# systemctl  restart mysqld.service
```

验证无密码登录时，将会被拒绝：

```
[root@dbsvr1 ~]# mysql -u root
Enter password:                          //没有跳过授权表回车会报错
ERROR 1045 (28000): Access denied for user 'root'@'localhost' (using password: NO)
```

只有提供重置后的新密码，才能成功登入：

```
[root@dbsvr1 ~]# mysql -uroot -p123qqq…A
```

```
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 4
Server version: 5.7.17 MySQL Community Server (GPL)

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

mysql>
```

步骤二：重置管理员 root 密码

正常的前提是：已知当前 MySQL 管理用户（root）的密码。

1）方法 1，在 Shell 命令行下设置

使用 mysqladmin 管理工具，需要验证旧的密码。比如，以下操作将会把 root 的密码设置为 1234567：

```
[root@dbsvr1 ~]# mysqladmin -uroot -p password 'A…qqq321'
Enter password:                                    //验证原来的密码
mysqladmin: [Warning] Using a password on the command line interface can be insecure.
Warning: Since password will be sent to server in plain text, use ssl connection to
ensure password safety.                            //提示明文修改不安全，并不是报错
[root@dbsvr1 ~]# mysql -uroot -pA…qqq321  //使用修改后的密码登录
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 4
Server version: 5.7.17 MySQL Community Server (GPL)

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

mysql>
```

步骤三：修改管理员 root 密码的其他方法

1）方法 1，以 root 登入 mysql> 后，使用 SET PASSWORD 指令设置

这个与新安装 MySQL-server 后首次修改密码时要求的方式相同，平时也可以用：

```
mysql> SET PASSWORD FOR root@localhost=PASSWORD('1234567');
Query OK, 0 rows affected, 1 warning (0.00 sec)
```

2）方法 2，以 root 登入 mysql> 后，使用 GRANT 授权工具设置

这个是最常见的用户授权方式（下一节会做更多授权的练习）：

```
mysql> GRANT all ON *.* TO root@localhost IDENTIFIED BY '1234567';
Query OK, 0 rows affected, 1 warning (0.00 sec)
```

3）方法 3，以 root 登入 mysql> 后，使用 UPDATE 更新相应的表记录

这种方法与恢复密码时的操作相同：

```
mysql> UPDATE mysql.user SET authentication_string=PASSWORD('1234567')
    -> WHERE user='root' AND host='localhost';          //重设 root 的密码
Query OK, 0 rows affected, 1 warning (0.00 sec)
Rows matched: 1  Changed: 0  Warnings: 1
mysql> FLUSH PRIVILEGES;                                //刷新授权表
Query OK, 0 rows affected (0.00 sec)
```

在上述方法中，需要特别注意：***当 MySQL 服务程序以 skip-grant-tables 选项启动时，如果未执行“FLUSH PRIVILEGES;”操作，是无法通过 SET PASSWORD 或者 GRANT 方式来设置密码的。***比如，验证这两种方式时，都会看到 ERROR 1290 的出错提示：

```
mysql> SET PASSWORD FOR root@localhost=PASSWORD('1234567');
ERROR 1290 (HY000): The MySQL server is running with the --skip-grant-tables option
so it cannot execute this statement

mysql> GRANT all ON *.* TO root@localhost IDENTIFIED BY '1234567';
ERROR 1290 (HY000): The MySQL server is running with the --skip-grant-tables option
so it cannot execute this statement
```

3. 案例 3：数据备份与恢复

- **问题**

具体要求如下：

- 练习 mysqldump 命令的使用
- 使用 mysql 命令恢复删除的数据

- **步骤**

实现此案例需要按照如下步骤进行。

步骤一：练习 mysqldump 命令的使用

1）备份 MySQL 服务器上的所有库

将所有的库备份为 mysql-all.sql 文件：

```
[root@dbsvr1 ~]# mysqldump -u root -p --all-databases > /root/alldb.sql
Enter password:                                         //验证口令
[root@dbsvr1 mysql]# file /root/alldb.sql               //确认备份文件类型
/root/alldb.sql: UTF-8 Unicode English text, with very long lines
```

查看备份文件 alldb.sql 的部分内容：

```
[root@dbsvr1 ~]# grep -vE '^/|^-|^$' /root/alldb.sql | head -15
CREATE DATABASE /*!32312 IF NOT EXISTS*/ `home` /*!40100 DEFAULT CHARACTER SET latin1
*/;
USE `home`;
DROP TABLE IF EXISTS `biao01`;
CREATE TABLE `biao01` (
  `id` int(2) NOT NULL,
  `name` varchar(8) DEFAULT NULL
```

```
) ENGINE=InnoDB DEFAULT CHARSET=latin1;
LOCK TABLES `biao01` WRITE;
UNLOCK TABLES;
DROP TABLE IF EXISTS `biao02`;
CREATE TABLE `biao02` (
  `id` int(4) NOT NULL,
  `name` varchar(8) DEFAULT NULL,
  PRIMARY KEY (`id`)
) ENGINE=InnoDB DEFAULT CHARSET=latin1;
.. ..
```

注意：若数据库都使用 MyISAM 存储引擎，可以采用冷备份的方式，直接复制对应的数据库目录即可；恢复时重新复制回来就行。

2）只备份指定的某一个库

将 userdb 库备份为 userdb.sql 文件：

```
[root@dbsvr1 ~]# mysqldump -u root -p userdb > userdb.sql
Enter password:                                    //验证口令
```

查看备份文件 userdb.sql 的部分内容：

```
[root@dbsvr1 ~]# grep -vE '^/|^-|^$' /root/userdb.sql
DROP TABLE IF EXISTS `stu_info`;
CREATE TABLE `stu_info` (
  `name` varchar(12) NOT NULL,
  `gender` enum('boy','girl') DEFAULT 'boy',
  `age` int(3) NOT NULL
) ENGINE=InnoDB DEFAULT CHARSET=latin1;
LOCK TABLES `stu_info` WRITE;
.. ..
```

3）同时备份指定的多个库

同时备份 mysql、userdb 库，保存为 mysql+userdb.sql 文件：

```
[root@dbsvr1 ~]# mysqldump -u root -p -B mysql  userdb > mysql+test+userdb.sql
Enter password:                                    //验证口令
```

查看备份文件 userdb.sql 的部分内容：

```
[root@dbsvr1 ~]# grep '^CREATE DATA' /root/mysql+userdb.sql
CREATE DATABASE /*!32312 IF NOT EXISTS*/ `mysql` /*!40100 DEFAULT CHARACTER SET latin1
*/;
CREATE DATABASE /*!32312 IF NOT EXISTS*/ `userdb` /*!40100 DEFAULT CHARACTER SET
latin1 */;
```

步骤二： 使用 mysql 命令恢复删除的数据

以恢复 userdb 库为例，可参考下列操作。通常不建议直接覆盖旧库，而是采用建立新库并导入逻辑备份的方式执行恢复，待新库正常后即可废弃或删除旧库。

1）创建名为 userdb2 的新库

```
mysql> CREATE DATABASE userdb2;
Query OK, 1 row affected (0.00 sec)
```

2）导入备份文件，在新库中重建表及数据

```
[root@dbsvr1 ~]# mysql -u root -p userdb2 < /root/userdb.sql
Enter password:                                    //验证口令
```

3）确认新库正常，启用新库

```
mysql> USE userdb2;                                    //切换到新库
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
mysql> SELECT sn,username,uid,gid,homedir       //查询数据，确认可用
    -> FROM userlist LIMIT 10;
+----+----------+-----+-----+-----------------+
| sn | username | uid | gid | homedir         |
+----+----------+-----+-----+-----------------+
|  1 | root     |   0 |   0 | /root           |
|  2 | bin      |   1 |   1 | /bin            |
|  3 | daemon   |   2 |   2 | /sbin           |
|  4 | adm      |   3 |   4 | /var/adm        |
|  5 | lp       |   4 |   7 | /var/spool/lpd  |
|  6 | sync     |   5 |   0 | /sbin           |
|  7 | shutdown |   6 |   0 | /sbin           |
|  8 | halt     |   7 |   0 | /sbin           |
|  9 | mail     |   8 |  12 | /var/spool/mail |
| 10 | operator |  11 |   0 | /root           |
+----+----------+-----+-----+-----------------+
10 rows in set (0.00 sec)
```

4）废弃或删除旧库

```
mysql> DROP DATABASE userdb;
Query OK, 2 rows affected (0.09 sec)
```

4. 案例 4：binlog 日志

- **问题**

启用 binlog 日志，具体要求如下：

- 启用 binlog 日志，把日志文件存放到系统的/mylog 目录下，日志文件为 db50
- 手动创建 3 个新的日志文件
- 删除编号 3 之前的日志文件

- **步骤**

实现此案例需要按照如下步骤进行。

步骤一：启用 binlog 日志

1）修改配置文件，并重启服务。

```
[root@dbsvr1 ~]# vim  /etc/my.cnf
[mysqld]
 server_id=1  //指定 server_id
log-bin=/mylog/db50  //指定日志目录及名称
:wq
[root@dbsvr1 ~]# mkdir  /mylog   //创建目录
[root@dbsvr1 ~]# chmod  mysql  /mylog   //修改所有者
```

```
[root@dbsvr1 ~]# systemctl  restart mysqld.service  //重启服务
```

2）查看日志信息

```
[root@dbsvr1 ~]#
[root@localhost ~]# mysql -uroot -p123qqq...A //管理员登录
mysql: [Warning] Using a password on the command line interface can be insecure.
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 3
Server version: 5.7.17-log MySQL Community Server (GPL)

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owners.

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

mysql> show master status; //查看日志信息
+-------------+----------+--------------+------------------+-------------------+
| File        | Position | Binlog_Do_DB | Binlog_Ignore_DB | Executed_Gtid_Set |
+-------------+----------+--------------+------------------+-------------------+
| db50.000001 |      154 |              |                  |                   |
+-------------+----------+--------------+------------------+-------------------+
1 row in set (0.00 sec)

mysql>
```

3）手动创建 3 个新的日志文件

```
mysql>
mysql> flush logs;  //刷新日志
Query OK, 0 rows affected (0.14 sec)

mysql> flush logs; //刷新日志
Query OK, 0 rows affected (0.11 sec)

mysql> flush logs; //刷新日志
Query OK, 0 rows affected (0.12 sec)

mysql> system ls /mylog/  //查看日志文件
db50.000001  db50.000002  db50.000003  db50.000004  db50.index
mysql>
mysql> show master status; //查看日志信息
+-------------+----------+--------------+------------------+-------------------+
| File        | Position | Binlog_Do_DB | Binlog_Ignore_DB | Executed_Gtid_Set |
+-------------+----------+--------------+------------------+-------------------+
| db50.000004 |      154 |              |                  |                   |
+-------------+----------+--------------+------------------+-------------------+
1 row in set (0.00 sec)

mysql>
```

4）删除编号 3 之前的日志文件

```
 mysql>
```

```
mysql> purge  master  logs  to  "db50.000003"; //删除日志
Query OK, 0 rows affected (0.05 sec)

mysql> system ls /mylog/    //查看日志文件
db50.000003  db50.000004  db50.index
mysql>
mysql> system cat /mylog/db50.index //查看索引文件
/mylog/db50.000003
/mylog/db50.000004
mysql>
```

5. 案例 5：使用 binlog 日志恢复数据

- **问题**

利用 binlog 恢复库表，要求如下：

- 启用 binlog 日志
- 创建 db1 库 tb1 表，插入 3 条记录
- 删除 tb1 表中刚插入的 3 条记录
- 使用 mysqlbinlog 恢复删除的 3 条记录

- **步骤**

实现此案例需要按照如下步骤进行。

步骤一：启用 binlog 日志

1）调整/etc/my.cnf 配置，并重启服务

```
[root@dbsvr1 ~]# vim  /etc/my.cnf
[mysqld]
 server_id=1  //定义 server_id
 log-bin=mysql-bin  //定义日志名
 binlog_format=”mixed”     //定义日志格式
[root@dbsvr1 ~]# systemctl  restart mysqld.service //重启服务
```

2）确认 binlog 日志文件

新启用 binlog 后，每次启动 MySQl 服务都会新生成一份日志文件：

```
[root@dbsvr1 ~]# ls /var/lib/mysql/mysql-bin.*
/var/lib/mysql/mysql-bin.000001  /var/lib/mysql/mysql-bin.index
```

其中 mysql-bin.index 文件记录了当前保持的二进制文件列表：

```
[root@dbsvr1 ~]# cat /var/lib/mysql/mysql-bin.index
./mysql-bin.000001
```

重启 MySQL 服务程序，或者执行 SQL 操作“FLUSH LOGS;”，会生成一份新的日志：

```
[root@dbsvr1 ~]# ls /var/lib/mysql/mysql-bin.*
/var/lib/mysql/mysql-bin.000001  /var/lib/mysql/mysql-bin.index
```

```
/var/lib/mysql/mysql-bin.000002

[root@dbsvr1 ~]# cat /var/lib/mysql/mysql-bin.index
./mysql-bin.000001
./mysql-bin.000002
```

步骤二：利用 binlog 日志重做数据库操作

1）执行数据库表添加操作

创建 db1·库 tb1 表，表结构自定义：

```
mysql> CREATE DATABASE db1;
Query OK, 1 row affected (0.05 sec)

mysql> USE db1;
Database changed
mysql> CREATE TABLE tb1(
    -> id int(4) NOT NULL,name varchar(24)
    -> );
Query OK, 0 rows affected (0.28 sec)
```

插入 3 条表记录：

```
mysql> INSERT INTO tb1 VALUES
    -> (1,'Jack'),
    -> (2,'Kenthy'),
    -> (3,'Bob');
Query OK, 3 rows affected (0.12 sec)
Records: 3  Duplicates: 0  Warnings: 0
```

确认插入的表记录数据：

```
mysql> SELECT * FROM tb1;
+----+--------+
| id | name   |
+----+--------+
|  1 | Jack   |
|  2 | Kenthy |
|  3 | Bob    |
+----+--------+
3 rows in set (0.00 sec)
```

2）删除前一步添加的 3 条表记录

执行删除所有表记录操作：

```
mysql> DELETE FROM tb1;
Query OK, 3 rows affected (0.09  sec)
```

确认删除结果：

```
mysql> SELECT * FROM tb1;
Empty set (0.00 sec)
```

步骤三：通过 binlog 日志恢复表记录

binlog 会记录所有的数据库、表更改操作，所以可在必要的时候重新执行以前做过的一部分数据操作，但对于启用 binlog 之前已经存在的库、表数据将不适用。

根据上述“恢复被删除的 3 条表记录”的需求，应通过 mysqlbinlog 工具查看相关日志文件，找到删除这些表记录的时间点，只要恢复此前的 SQL 操作（主要是插入那 3 条记

录的操作）即可。

1）查看 mysql-bin.000002 日志内容

```
[root@dbsvr1 ~]# mysqlbinlog /var/lib/mysql/mysql-bin.000002
/*!50530 SET @@SESSION.PSEUDO_SLAVE_MODE=1*/;
/*!50003 SET @OLD_COMPLETION_TYPE=@@COMPLETION_TYPE,COMPLETION_TYPE=0*/;
DELIMITER /*!*/;
# at 4
#170412 12:05:32 server id 1  end_log_pos 123 CRC32 0x6d8c069c  Start: binlog v 4,
server v 5.7.17-log created 170412 12:05:32 at startup
# Warning: this binlog is either in use or was not closed properly.
ROLLBACK/*!*/;
BINLOG '
jKftWA8BAAAAdwAAAHsAAAABAAQANS43LjE3LWxvZwAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAACMp+1YEzgNAAgAEgAEBAQEEgAAXwAEGggAAAAICAgCAAAACgoKKioAEjQA
AZwGjG0=
'/*!*/;
# at 123
#170412 12:05:32 server id 1  end_log_pos 154 CRC32 0x17f50164  Previous-GTIDs
# [empty]
# at 154
#170412 12:05:59 server id 1  end_log_pos 219 CRC32 0x4ba5a976  Anonymous_GTID
last_committed=0       sequence_number=1
SET @@SESSION.GTID_NEXT= 'ANONYMOUS'/*!*/;
# at 219
#170412 12:05:59 server id 1  end_log_pos 310 CRC32 0x5b66ae13  Query   thread_id=3
exec_time=0     error_code=0
SET TIMESTAMP=1491969959/*!*/;
SET @@session.pseudo_thread_id=3/*!*/;
SET         @@session.foreign_key_checks=1,         @@session.sql_auto_is_null=0,
@@session.unique_checks=1, @@session.autocommit=1/*!*/;
SET @@session.sql_mode=1436549152/*!*/;
SET @@session.auto_increment_increment=1, @@session.auto_increment_offset=1/*!*/;
/*!\C utf8 *//*!*/;
SET
@@session.character_set_client=33,@@session.collation_connection=33,@@session.colla
tion_server=8/*!*/;
SET @@session.lc_time_names=0/*!*/;
SET @@session.collation_database=DEFAULT/*!*/;
CREATE DATABASE db1
/*!*/;
# at 310
#170412 12:06:23 server id 1  end_log_pos 375 CRC32 0x2967cc28  Anonymous_GTID
last_committed=1       sequence_number=2
SET @@SESSION.GTID_NEXT= 'ANONYMOUS'/*!*/;
# at 375
#170412 12:06:23 server id 1  end_log_pos 502 CRC32 0x5de09aae  Query   thread_id=3
exec_time=0     error_code=0
use `db1`/*!*/;
SET TIMESTAMP=1491969983/*!*/;
CREATE TABLE tb1(
id int(4) NOT NULL,name varchar(24)
)
/*!*/;
# at 502
#170412 12:06:55 server id 1  end_log_pos 567 CRC32 0x0b8cd418  Anonymous_GTID
last_committed=2       sequence_number=3
SET @@SESSION.GTID_NEXT= 'ANONYMOUS'/*!*/;
# at 567
#170412 12:06:55 server id 1  end_log_pos 644 CRC32 0x7e8f2fa0  Query   thread_id=3
exec_time=0     error_code=0
SET TIMESTAMP=1491970015/*!*/;
BEGIN
/*!*/;
```

```
    # at 644
    #170412 12:06:55 server id 1  end_log_pos 772 CRC32 0x4e3f728e  Query   thread_id=3
exec_time=0     error_code=0                          //插入表记录的起始时间点
    SET TIMESTAMP=1491970015/*!*/;
    INSERT INTO tb1 VALUES(1,'Jack'),(2,'Kenthy'), (3,'Bob')
    /*!*/;
    # at 772
    #170412 12:06:55 server id 1  end_log_pos 803 CRC32 0x6138b21f  Xid = 10
                                                      //确认事务的时间点
    COMMIT/*!*/;
    # at 803
    #170412 12:07:24 server id 1  end_log_pos 868 CRC32 0xbef3f472  Anonymous_GTID
last_committed=3        sequence_number=4
    SET @@SESSION.GTID_NEXT= 'ANONYMOUS'/*!*/;
    # at 868
    #170412 12:07:24 server id 1  end_log_pos 945 CRC32 0x5684e92c  Query   thread_id=3
exec_time=0     error_code=0
    SET TIMESTAMP=1491970044/*!*/;
    BEGIN
    /*!*/;
    # at 945
    #170412 12:07:24 server id 1  end_log_pos 1032 CRC32 0x4c1c75fc          Query
thread_id=3     exec_time=0     error_code=0          //删除表记录的时间点
    SET TIMESTAMP=1491970044/*!*/;
    DELETE FROM tb1
    /*!*/;
    # at 1032
    #170412 12:07:24 server id 1  end_log_pos 1063 CRC32 0xccf549b2        Xid = 12
    COMMIT/*!*/;
    SET @@SESSION.GTID_NEXT= 'AUTOMATIC' /* added by mysqlbinlog */ /*!*/;
    DELIMITER ;
    # End of log file
    /*!50003 SET COMPLETION_TYPE=@OLD_COMPLETION_TYPE*/;
    /*!50530 SET @@SESSION.PSEUDO_SLAVE_MODE=0*/;
```

2） 执行指定 Pos 节点范围内的 sql 命令恢复数据

根据上述日志分析，只要恢复从 2014.01.12 20:12:14 到 2014.01.12 20:13:50 之间的操作即可。可通过 mysqlbinlog 指定时间范围输出，结合管道交给 msyql 命令执行导入重做：

```
    [root@dbsvr1 ~]# mysqlbinlog \
       --start-datetime="2017-04-12 12:06:55" \
       --stop-datetime="2017-04-12 12:07:23" \
       /var/lib/mysql/mysql-bin.000002 | mysql -u root -p
    Enter password:                                   //验证口令
```

3）确认恢复结果

```
    mysql> SELECT * FROM db1.tb1;
    +----+--------+
    | id | name   |
    +----+--------+
    |  1 | Jack   |
    |  2 | Kenthy |
    |  3 | Bob    |
    +----+--------+
    3 rows in set (0.00 sec)
```