数据库第八次上机

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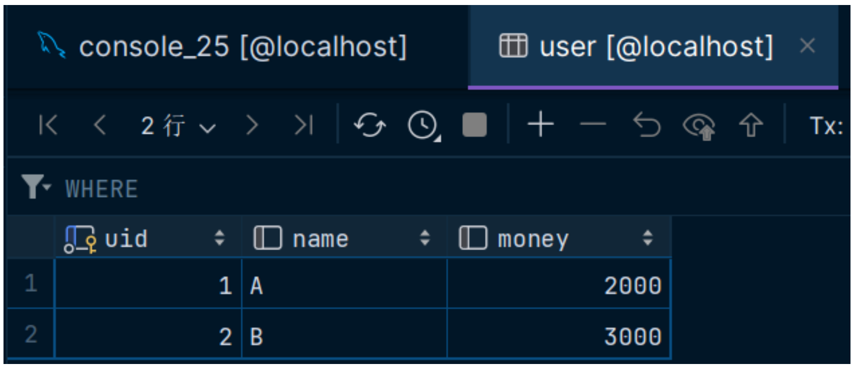
TASK 1：逻辑备份

1. 建表

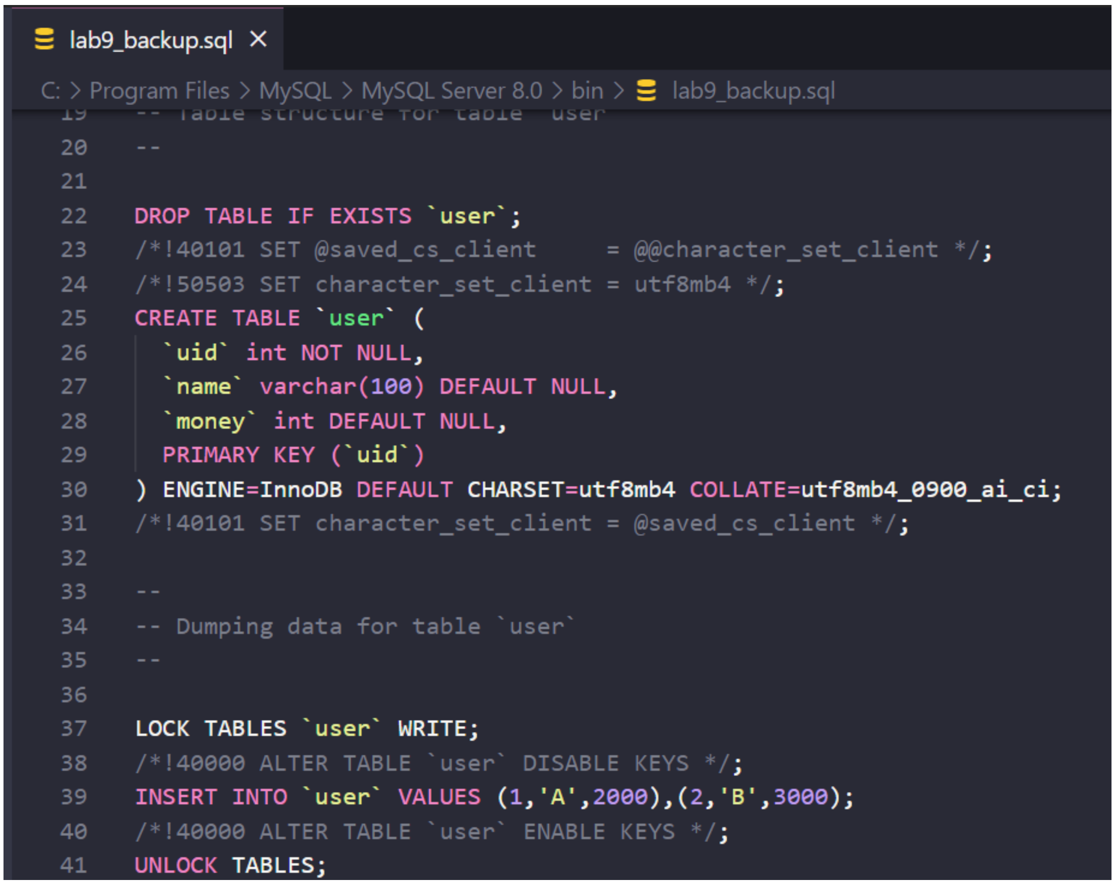
```sql
create database lab9;
create table user(
    uid int primary key,
    name varchar(100),
    money int
);
insert into user values(1, 'A', 2000), (2, 'B', 3000);
```



	uid	name	money
1	1	A	2000
2	2	B	3000

2. 使用mysqldump工具备份数据库

```
C:\Program Files\MySQL\MySQL Server 8.0\bin>mysqldump -uroot -p lab9 user > lab9_backup.sql
Enter password: ********
```


lab9_backup.sql

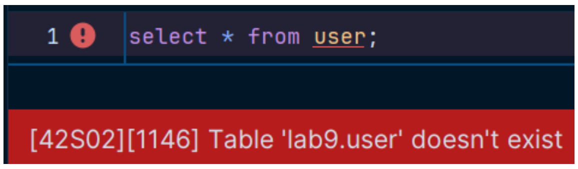
C: > Program Files > MySQL > MySQL Server 8.0 > bin > lab9_backup.sql

```sql
-- Table structure for table `user`
--

DROP TABLE IF EXISTS `user`;
/*!40101 SET @saved_cs_client     = @@character_set_client */;
/*!50503 SET character_set_client = utf8mb4 */;
CREATE TABLE `user` (
  `uid` int NOT NULL,
  `name` varchar(100) DEFAULT NULL,
  `money` int DEFAULT NULL,
  PRIMARY KEY (`uid`)
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_0900_ai_ci;
/*!40101 SET character_set_client = @saved_cs_client */;

--
-- Dumping data for table `user`
--

LOCK TABLES `user` WRITE;
/*!40000 ALTER TABLE `user` DISABLE KEYS */;
INSERT INTO `user` VALUES (1,'A',2000),(2,'B',3000);
/*!40000 ALTER TABLE `user` ENABLE KEYS */;
UNLOCK TABLES;
```

3. 删除该表

```sql
drop table user;
```

恢复前：



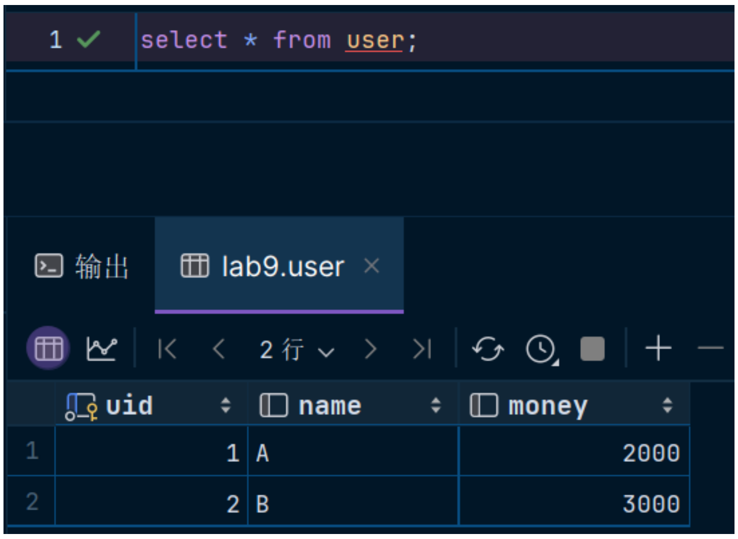
```
select * from user;
```

```
[42S02][1146] Table 'lab9.user' doesn't exist
```

4. 恢复数据库

```
C:\Program Files\MySQL\MySQL Server 8.0\bin>mysql -uroot -p lab9 < lab9_backup.sql
Enter password: ********
```

恢复后如下图，可见恢复操作成功。



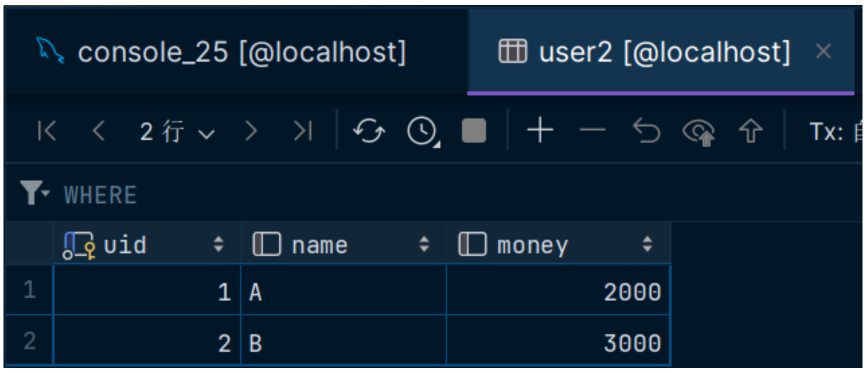
```
select * from user;
```

	uid	name	money
1	1	A	2000
2	2	B	3000

TASK2：增量备份

1. 建表

```sql
create table user2(
    uid int primary key,
    name varchar(100),
    money int
);
insert into user2 values(1, 'A', 2000), (2, 'B', 3000);
```

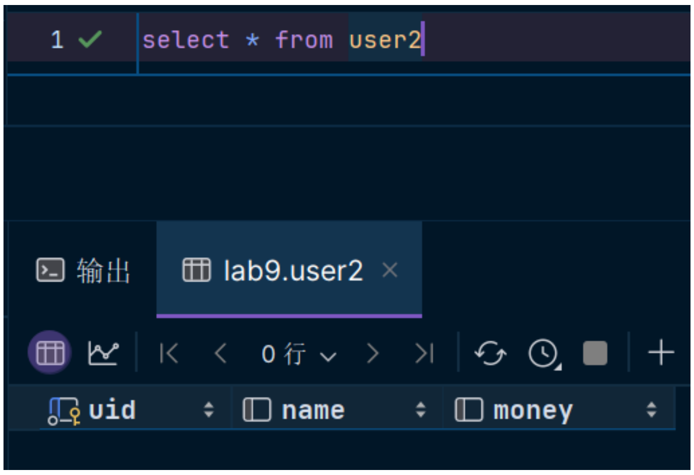


	uid	name	money
1	1	A	2000
2	2	B	3000

2&3. 删除A用户、删除B用户

```sql
delete from user2 where name = 'A';
delete from user2 where name = 'B';
```

恢复前：



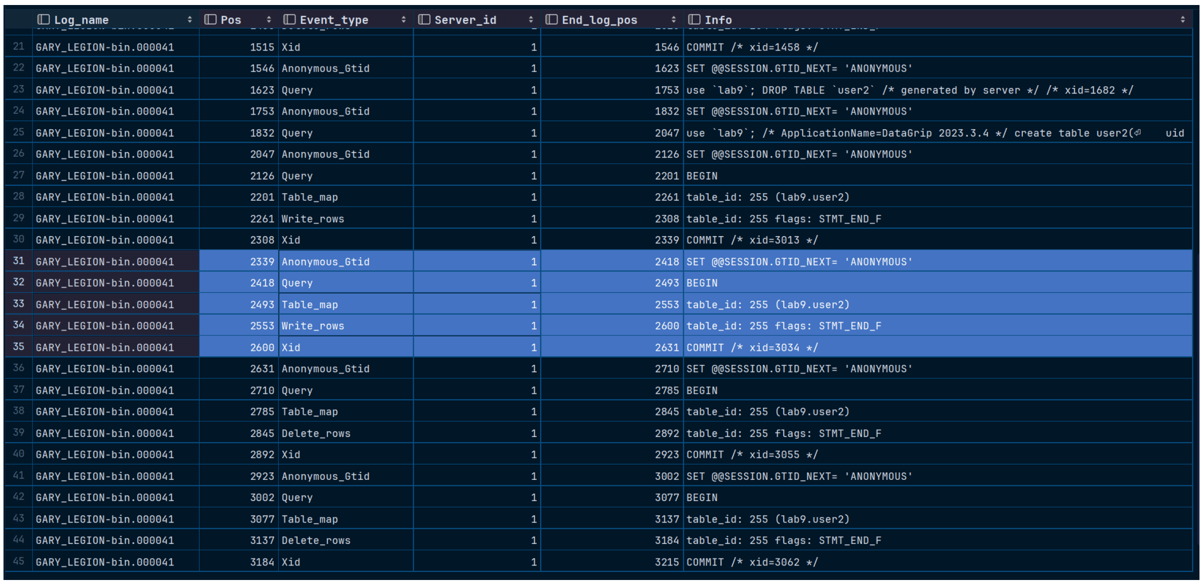
```
select * from user2
```

uid	name	money

4. 使用日志通过位置恢复B用户

查询日志：日志文件名为`GARY_LEGION-bin.000041"`。

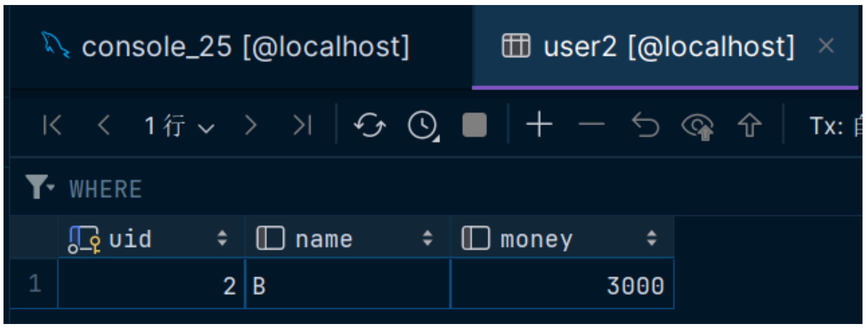
高亮部分为插入B用户的操作。start-position=2339，stop-position=2631



	Log_name	Pos	Event_type	Server_id	End_log_pos	Info
21	GARY_LEGION-bin.000041	1515	Xid	1	1546	COMMIT /* xid=1458 */
22	GARY_LEGION-bin.000041	1546	Anonymous_Gtid	1	1623	SET @@SESSION.GTID_NEXT= 'ANONYMOUS'
23	GARY_LEGION-bin.000041	1623	Query	1	1753	use \`lab9\`; DROP TABLE \`user2\` /* generated by server */ /* xid=1682 */
24	GARY_LEGION-bin.000041	1753	Anonymous_Gtid	1	1832	SET @@SESSION.GTID_NEXT= 'ANONYMOUS'
25	GARY_LEGION-bin.000041	1832	Query	1	2047	use \`lab9\`; /* ApplicationName=DataGrip 2023.3.4 */ create table user2(⏎ uid
26	GARY_LEGION-bin.000041	2047	Anonymous_Gtid	1	2126	SET @@SESSION.GTID_NEXT= 'ANONYMOUS'
27	GARY_LEGION-bin.000041	2126	Query	1	2201	BEGIN
28	GARY_LEGION-bin.000041	2201	Table_map	1	2261	table_id: 255 (lab9.user2)
29	GARY_LEGION-bin.000041	2261	Write_rows	1	2308	table_id: 255 flags: STMT_END_F
30	GARY_LEGION-bin.000041	2308	Xid	1	2339	COMMIT /* xid=3013 */
31	GARY_LEGION-bin.000041	2339	Anonymous_Gtid	1	2418	SET @@SESSION.GTID_NEXT= 'ANONYMOUS'
32	GARY_LEGION-bin.000041	2418	Query	1	2493	BEGIN
33	GARY_LEGION-bin.000041	2493	Table_map	1	2553	table_id: 255 (lab9.user2)
34	GARY_LEGION-bin.000041	2553	Write_rows	1	2600	table_id: 255 flags: STMT_END_F
35	GARY_LEGION-bin.000041	2600	Xid	1	2631	COMMIT /* xid=3034 */
36	GARY_LEGION-bin.000041	2631	Anonymous_Gtid	1	2710	SET @@SESSION.GTID_NEXT= 'ANONYMOUS'
37	GARY_LEGION-bin.000041	2710	Query	1	2785	BEGIN
38	GARY_LEGION-bin.000041	2785	Table_map	1	2845	table_id: 255 (lab9.user2)
39	GARY_LEGION-bin.000041	2845	Delete_rows	1	2892	table_id: 255 flags: STMT_END_F
40	GARY_LEGION-bin.000041	2892	Xid	1	2923	COMMIT /* xid=3055 */
41	GARY_LEGION-bin.000041	2923	Anonymous_Gtid	1	3002	SET @@SESSION.GTID_NEXT= 'ANONYMOUS'
42	GARY_LEGION-bin.000041	3002	Query	1	3077	BEGIN
43	GARY_LEGION-bin.000041	3077	Table_map	1	3137	table_id: 255 (lab9.user2)
44	GARY_LEGION-bin.000041	3137	Delete_rows	1	3184	table_id: 255 flags: STMT_END_F
45	GARY_LEGION-bin.000041	3184	Xid	1	3215	COMMIT /* xid=3062 */

```
C:\Program Files\MySQL\MySQL Server 8.0\bin>
mysqlbinlog  --no-defaults --start-position=2339 --stop-position=2631 "C:\ProgramData\MySQL\MySQL Server 8.0\Data\GARY_LEGION-bin.000041" | mysql -uroot -p
Enter password: ********
```

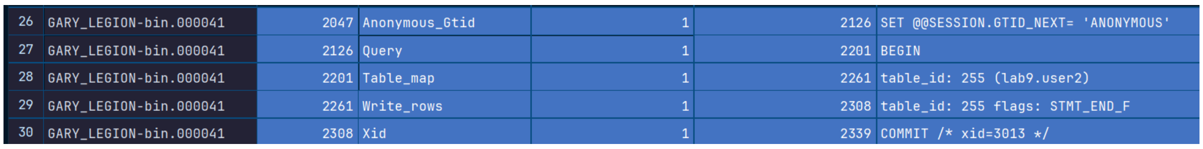
由下图可看出，B用户被成功恢复。



	uid	name	money
1	2	B	3000

5. 使用日志通过时间恢复A用户

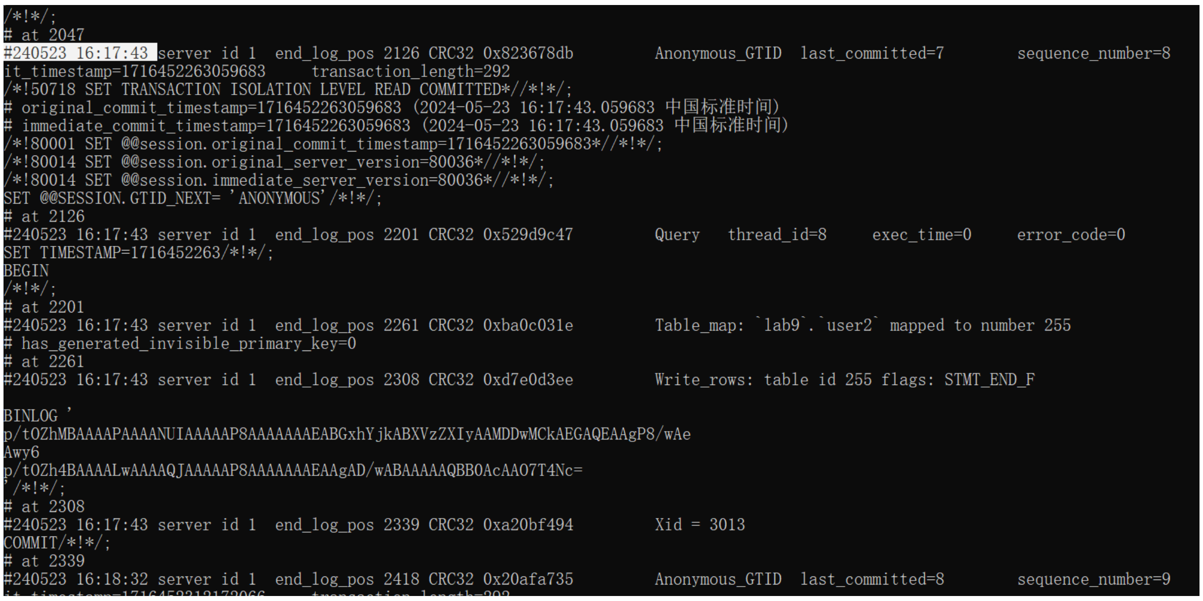
如图为通过`show binlog events`语句查询到的插入A用户的日志。start-position=2047， stop-position=2339



26	GARY_LEGION-bin.000041	2047	Anonymous_Gtid	1	2126	SET @@SESSION.GTID_NEXT= 'ANONYMOUS'
27	GARY_LEGION-bin.000041	2126	Query	1	2201	BEGIN
28	GARY_LEGION-bin.000041	2201	Table_map	1	2261	table_id: 255 (lab9.user2)
29	GARY_LEGION-bin.000041	2261	Write_rows	1	2308	table_id: 255 flags: STMT_END_F
30	GARY_LEGION-bin.000041	2308	Xid	1	2339	COMMIT /* xid=3013 */

cmd命令行执行语句：

```
mysqlbinlog --no-defaults "C:\ProgramData\MySQL\MySQL Server 8.0\Data\GARY_LEGION-bin.000041"
```



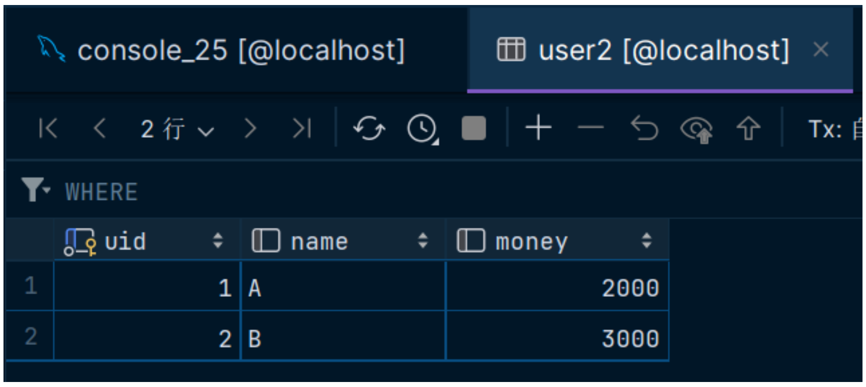
```
/*!*/;
# at 2047
#240523 16:17:43 server id 1  end_log_pos 2126 CRC32 0x823678db         Anonymous_GTID  last_committed=7        sequence_number=8
it_timestamp=1716452263059683     transaction_length=292
/*!50718 SET TRANSACTION ISOLATION LEVEL READ COMMITTED*//*!*/;
# original_commit_timestamp=1716452263059683 (2024-05-23 16:17:43.059683 中国标准时间)
# immediate_commit_timestamp=1716452263059683 (2024-05-23 16:17:43.059683 中国标准时间)
/*!80001 SET @@session.original_commit_timestamp=1716452263059683*//*!*/;
/*!80014 SET @@session.original_server_version=80036*//*!*/;
/*!80014 SET @@session.immediate_server_version=80036*//*!*/;
SET @@SESSION.GTID_NEXT= 'ANONYMOUS'/*!*/;
# at 2126
#240523 16:17:43 server id 1  end_log_pos 2201 CRC32 0x529d9c47         Query   thread_id=8     exec_time=0     error_code=0
SET TIMESTAMP=1716452263/*!*/;
BEGIN
/*!*/;
# at 2201
#240523 16:17:43 server id 1  end_log_pos 2261 CRC32 0xba0c031e         Table_map: `lab9`.`user2` mapped to number 255
# has_generated_invisible_primary_key=0
# at 2261
#240523 16:17:43 server id 1  end_log_pos 2308 CRC32 0xd7e0d3ee         Write_rows: table id 255 flags: STMT_END_F

BINLOG '
p/tOZhMBAAAAPAAAANUIAAAAAP8AAAAAAAAEABGxhYjkABXVzZXIyAAMDDwMCkAEGAQEAAgP8/wAe
Awy6
p/tOZh4BAAAALwAAAAQJAAAAAP8AAAAAAAAEAAgAD/wABAAAAAAQBB0AcAAO7T4Nc=
'/*!*/;
# at 2308
#240523 16:17:43 server id 1  end_log_pos 2339 CRC32 0xa20bf494         Xid = 3013
COMMIT/*!*/;
# at 2339
#240523 16:18:32 server id 1  end_log_pos 2418 CRC32 0x20afa735         Anonymous_GTID  last_committed=8        sequence_number=9
```

查询到2047~2339的时间戳为 2024-05-23 16:17:43 ~ 2024-05-23 16:18:32

进行恢复操作：

```
C:\Program Files\MySQL\MySQL Server 8.0\bin>
mysqlbinlog  --no-defaults  --start-datetime="2024-05-23 16:17:43" --stop-datetime="2024-05-23 16:18:32" "C:\ProgramData\MySQL\MySQL Server 8.0\Data\GARY_LEGION-bin.000041" | mysql -uroot -p
Enter password: ********
```

由下图可看出，A用户被成功恢复。



	uid	name	money
1	1	A	2000
2	2	B	3000