《数据库系统原理》实验报告（3）				
题目： 数据库安全性				
学号		姓名		日期	2024.4.8
实验环境：				

实验步骤及结果截图：

1. 建立数据库 Major，在 Major 数据库中创建表 Players

表名：Players		
字段	**类型**	**约束**
Sno	Varchar(10)	Primary Key
Sname	Varchar(20)	Unique
Ssex	Varchar(1)	
Sage	SmallInt	
Steam	Varchar(20)	

```
obclient [(none)]> create database major;
Query OK, 1 row affected (0.014 sec)

obclient [(none)]> use major;
Database changed
obclient [major]> create table players(
    -> sno varchar(10),
    -> sname varchar(20),
    -> ssex varchar(1),
    -> sage smallint,
    -> steam varchar(20),
    -> primary key(sno),
    -> unique(sname)
    -> );
Query OK, 0 rows affected (0.062 sec)
```

```
obclient [major]> desc players;
+-------+-------------+------+-----+---------+-------+
| Field | Type        | Null | Key | Default | Extra |
+-------+-------------+------+-----+---------+-------+
| sno   | varchar(10) | NO   | PRI | NULL    |       |
| sname | varchar(20) | YES  | UNI | NULL    |       |
| ssex  | varchar(1)  | YES  |     | NULL    |       |
| sage  | smallint(6) | YES  |     | NULL    |       |
| steam | varchar(20) | YES  |     | NULL    |       |
+-------+-------------+------+-----+---------+-------+
5 rows in set (0.007 sec)
```

2. 向 Players 表中插入两个元组：
   ('200215121' ,'NiKo' ,'M' ,27 ,'G2')
   ('200215122' ,'m0NESY' ,'M' ,18 ,'G2')

```
obclient [major]> insert into players values('200215121' ,'NiKo' ,'M' ,27 ,'G2');
Query OK, 1 row affected (0.003 sec)

obclient [major]> insert into players values('200215122' ,'m0NESY' ,'M' ,18 ,'G2');
Query OK, 1 row affected (0.002 sec)

obclient [major]> select * from players;
+-----------+--------+------+------+-------+
| sno       | sname  | ssex | sage | steam |
+-----------+--------+------+------+-------+
| 200215121 | NiKo   | M    |   27 | G2    |
| 200215122 | m0NESY | M    |   18 | G2    |
+-----------+--------+------+------+-------+
2 rows in set (0.002 sec)
```

3. 建立用户 Valve，授予用户 Valve 以系统特权，包括 create table、create user、alter user 和 drop user 等，并赋予其再授权的能力

```
obclient [major]> create user value@'%' identified by '123';
Query OK, 0 rows affected (0.028 sec)
```

在用户创建中，**value** 是用户名，**@**后面是指定的主机，使用 **'%'** 来代表任何主机，用户就能够从任何地方连接到服务器，**identified by** 后面是密码，在登录该用户时需要输入密码

```
obclient [major]> grant create on major to 'value' with grant option;
Query OK, 0 rows affected (0.025 sec)
```

通过查询手册，可知权限 **create table** 需要用'create'指令来授予（手册相关内容见下图）

- CREATE

  Enables use of statements that create new databases and tables.

CREATE	Create_priv	Databases, tables, or indexes

Create 的 context 是 database,tables or indexes，所以 on major

```
obclient [major]> grant create user on *.* to 'value' with grant option;
Query OK, 0 rows affected (0.021 sec)
```

通过查询手册，可知 create user , alter user , drop user 三个权限都是同一个 'create user' 指令来授予
（手册相关内容见下图）

- CREATE USER

  Enables use of the ALTER USER, CREATE ROLE, CREATE USER, DROP ROLE, DROP USER, RENAME USER, and REVOKE ALL PRIVILEGES statements.

CREATE USER	Create_user_priv	Server administration

Create user 的 context 是 server administration，所以 on *.*，意思是所有数据库的所有表都适用

4. 删除 Valve 的 create user、alter user 和 drop user 的系统特权

```
obclient [major]> revoke create user on *.* from 'value';
Query OK, 0 rows affected (0.019 sec)
```

5. 在 Valve 用户下尝试查询 Players（注意使用 Major.Players）

```
obclient [(none)]> quit
Bye
sh-4.4# obclient -uvalue@sys -h127.1 -P2881 -p
Enter password:
Welcome to the OceanBase.  Commands end with ; or \g.
Your OceanBase connection id is 3221556066
Server version: OceanBase_CE 4.2.2.0 (r1000010012024022719-c984fe7cb7a4cef85a40323a0d073f0

Copyright (c) 2000, 2018, OceanBase and/or its affiliates. All rights reserved.

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

obclient [(none)]> select * from major.players;
ERROR 1142 (42000): SELECT command denied to user 'value'@'%' for table 'players'
```

关键在于如何进入 value 用户。
quit 退出系统用户 root 的登录，把用户名 root 改成 value，并通过-p 指令输入此前设定的 value 用户的密码，就可以登录 value 用户了。
登录后在不进入任何数据库的情况下直接查询，注意查询 players 表需要写名所属数据库，major.players
因为此前并未授予用户 value 对表 players 的查询特权，故结果为查询失败。

6. 授予用户 Valve 对表 Players 的查询、插入、修改等对象特权，并赋予其再授权的能力

```
obclient [major]> quit
Bye
sh-4.4# obclient -uroot@sys -h127.1 -P2881
Welcome to the OceanBase.  Commands end with ; or \g.
Your OceanBase connection id is 3221586700
Server version: OceanBase_CE 4.2.2.0 (r100010012024022719-c984fe7cb7a4cef85a40323a0d0

Copyright (c) 2000, 2018, OceanBase and/or its affiliates. All rights reserved.

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

obclient [(none)]> use major;
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
obclient [major]> grant select on players to 'value' with grant option;
Query OK, 0 rows affected (0.016 sec)

obclient [major]> grant insert on players to 'value' with grant option;
Query OK, 0 rows affected (0.019 sec)

 obclient [major]> grant update on players to 'value' with grant option;
 Query OK, 0 rows affected (0.015 sec)
```

需要注意是授权时需要退出 value 用户转回 root 用户，系统用户才具有授权的权力，并且登回 major 数据库，进行授权。

7. 在 Valve 用户下查询 Players（注意使用 Major.Players）

同理，登出系统用户，登入 value 用户，进行查询。授权后的 value 此时查询成功了。

```
obclient [major]> quit
Bye
sh-4.4# obclient -uvalue@sys -h127.1 -P2881 -p
Enter password:
Welcome to the OceanBase.  Commands end with ; or \g.
Your OceanBase connection id is 3221592999
Server version: OceanBase_CE 4.2.2.0 (r100010012024022719-c984fe7cb7a4cef85a40323a0d073f0c9b7b

Copyright (c) 2000, 2018, OceanBase and/or its affiliates. All rights reserved.

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

obclient [(none)]> select * from major.players;
+-----------+--------+------+------+-------+
| sno       | sname  | ssex | sage | steam |
+-----------+--------+------+------+-------+
| 200215121 | NiKo   | M    |   27 | G2    |
| 200215122 | m0NESY | M    |   18 | G2    |
+-----------+--------+------+------+-------+
2 rows in set (0.001 sec)
```

8. 在 Valve 用户下再插入一个元组的数据('200215123' ,'ZywOo' ,'M' ,23 ,'Vit')，并在 Valve 用户下查询（注意使用 Major.Players）

```
obclient [(none)]> insert into major.players values('200215123' ,'ZywOo' ,'M' ,23 ,'Vit')
Query OK, 1 row affected (0.003 sec)

obclient [(none)]> select * from major.players;
+-----------+--------+------+------+-------+
| sno       | sname  | ssex | sage | steam |
+-----------+--------+------+------+-------+
| 200215121 | NiKo   | M    |   27 | G2    |
| 200215122 | m0NESY | M    |   18 | G2    |
| 200215123 | ZywOo  | M    |   23 | Vit   |
+-----------+--------+------+------+-------+
3 rows in set (0.000 sec)
```

9. 删除 Valve 用户

仍是要注意登回系统用户，进入数据库，删除此前创建的用户 value。
为检验结果，删除后再次尝试登录 value 用户，此时显示失败，证明用户删除成功。

```
obclient [(none)]> quit
Bye
sh-4.4# obclient -uroot@sys -h127.1 -P2881
Welcome to the OceanBase.  Commands end with ; or \g.
Your OceanBase connection id is 3221601658
Server version: OceanBase_CE 4.2.2.0 (r100010012024022719-c984fe7cb7a4cef85a40323a0d073f0

Copyright (c) 2000, 2018, OceanBase and/or its affiliates. All rights reserved.

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

obclient [(none)]> use major;
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
obclient [major]> drop user value;
Query OK, 0 rows affected (0.031 sec)


obclient [major]> quit
Bye
sh-4.4# obclient -uvalue@sys -h127.1 -P2881 -p
Enter password:
ERROR 1045 (42000): Access denied for user 'value'@'xxx.xxx.xxx.xxx' (using password: YES)
```

出现的问题：

1.如何创建用户

2. SQL 权限设置相关语句

3.如何登录创建的 **value** 用户

4.权限的更改权

5.如何在新创建的用户中查询

解决方案：

1.

```
obclient [major]> create user value@'%' identified by '123';
Query OK, 0 rows affected (0.028 sec)
```

value 是用户名，**@**后面是指定的主机，使用 **'%'** 来代表任何主机，用户就能够从任何地方连接到服务器，**identified by** 后面是密码，在登录该用户时需要输入密码

2.通过查询 **mysql** 手册，可以找到需要的权限对应的指令

Table 8.2 Permissible Static Privileges for GRANT and REVOKE

Privilege	Grant Table Column	Context
ALL [PRIVILEGES]	Synonym for "all privileges"	Server administration
ALTER	Alter_priv	Tables
ALTER ROUTINE	Alter_routine_priv	Stored routines
CREATE	Create_priv	Databases, tables, or indexes
CREATE ROLE	Create_role_priv	Server administration
CREATE ROUTINE	Create_routine_priv	Stored routines
CREATE TABLESPACE	Create_tablespace_priv	Server administration
CREATE TEMPORARY TABLES	Create_tmp_table_priv	Tables

Static Privilege Descriptions

Static privileges are built in to the server, in contrast to dynamic privileges, which are defined at runtime. The following list describes each static privilege available in My

Particular SQL statements might have more specific privilege requirements than indicated here. If so, the description for the statement in question provides the details.

- ALL, ALL PRIVILEGES

  These privilege specifiers are shorthand for "all privileges available at a given privilege level" (except GRANT OPTION). For example, granting ALL at the global or tabl level grants all global privileges or all table-level privileges, respectively.

- ALTER

  Enables use of the ALTER TABLE statement to change the structure of tables. ALTER TABLE also requires the CREATE and INSERT privileges. Renaming a table requ ALTER and DROP on the old table, CREATE, and INSERT on the new table.

- ALTER ROUTINE

  Enables use of statements that alter or drop stored routines (stored procedures and functions). For routines that fall within the scope at which the privilege is grant and for which the user is not the user named as the routine , also enables access to routine properties other than the routine definition. DEFINER

- CREATE

  Enables use of statements that create new databases and tables.

- CREATE ROLE

3. quit 退出系统用户 **root** 的登录，把用户名 **root** 改成 **value**，并通过**-p** 指令输入此前设定的 **value** 用户的密码，就可以登录 **value** 用户了。

```
obclient [(none)]> quit
Bye
sh-4.4# obclient -uvalue@sys -h127.1 -P2881 -p
Enter password:
Welcome to the OceanBase.  Commands end with ; or \g.
Your OceanBase connection id is 3221556066
Server version: OceanBase_CE 4.2.2.0 (r100010012024022719-c984fe7cb7a4cef85a40323a0d073f0

Copyright (c) 2000, 2018, OceanBase and/or its affiliates. All rights reserved.

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

4.无论是给用户授权，删除用户的权限，还是创建和删除用户，都是系统用户才拥有的权力，都需要登录系统 **root** 用户才能 **grant**，在登入 **value** 用户时只能使用被授权的权限，不能更改权限。

5.直接查询即可，不需要进入数据库，只要在查询表格时表明其属于的数据库即可，例如**'major.players'**