

Name: Dikshya Kafle

Student Number: 2018380039

## **Experiment 1**

Create and manage database and table

### **Goal**

1. Familiar with command line and GUI connection method in MySQL.
2. Master SQL statement to create database and table.
3. Master the update and deletion methods of database and tables.
4. Master the basic methods of backup and restore database.
5. Understand the logical structure and physical structure of MySQL database.

### **Content**

1. Use GUI to connect the DBMS
2. Use command line to connect the DBMS
3. Create, backup, drop and restore database and tables through GUI.

#### ● **Database and table**

Database name: SPJ\_MNG, four tables in the database: S, P, J, SPJ

S (SNO, SNAME, STATUS, CITY)

P (PNO, PNAME, COLOR, WEIGHT)

J (JNO, JNAME, CITY)

SPJ (SNO, PNO, JNO, QTY)

The supplier table S is composed of supplier code (SNO), supplier name (SNAME), supplier status (STATUS) and supplier city (CITY).

Part list P consists of part code (PNO), part name (PNAME), color (COLOR) and weight (WEIGHT).

Project table J consists of project code (JNO), project name (JNAME) and project city (CITY).

The supply situation table SPJ is composed of supplier code (SNO), part code (PNO), project code (JNO) and supply quantity (QTY). It indicates that the quantity of a certain part supplied by a supplier to an project is QTY.

### **S Table**

MySQL Workbench

Navigator

SCHEMAS

Filter objects

spj\_mng

Tables

j

p

s

spj

Views

Stored Procedures

Functions

sys

Tables

Administration

Schemas

Information

Table: s

Columns:

SNO varchar(45) PK

SNAME varchar(45)

STATUS varchar(45)

CITY varchar(45)

Query 1 Administration - Data Export new\_schema - Schema spj\_mng.s s - Table

Limit to 1000 rows

```

1 • SELECT * FROM spj_mng.s;
2 • INSERT INTO `s` (SNO,SNAME,STATUS,CITY) VALUES ('SN1','精益','20','天津');
3 • INSERT INTO `s` (SNO,SNAME,STATUS,CITY) VALUES ('SN2','盛锡','10','北京');
4 • INSERT INTO `s` (SNO,SNAME,STATUS,CITY) VALUES ('SN3','东方红','30','北京');
5 • INSERT INTO `s` (SNO,SNAME,STATUS,CITY) VALUES ('SN4','丰鑫盛','20','天津');
6 • INSERT INTO `s` (SNO,SNAME,STATUS,CITY) VALUES ('SN5','为民','30','上海');
7

```

Result Grid

SNO	SNAME	STATUS	CITY
SN1	精益	20	天津
SN2	精益	10	北京
SN3	精益	30	北京
SN4	精益	20	天津
SN5	精益	30	上海

Apply

## J Table

Navigator

SCHEMAS

Filter objects

spj\_mng

Tables

j

Columns

Indexes

Foreign Keys

Triggers

p

Columns

Indexes

Foreign Keys

Administration

Schemas

Information

Table: j

Columns:

JNO varchar(45) PK

JNAME varchar(45)

CITY varchar(45)

new\_table - Table j s j - Table j - Table j - Table j - Table j

Limit to 1000 rows

```

1 • SELECT * FROM spj_mng.j;
2 • INSERT INTO `j` (JNO,JNAME,CITY) VALUES ('J1','Rising','Guangzhou');
3 • INSERT INTO `j` (JNO,JNAME,CITY) VALUES ('J2','Powercity','Beijing');
4 • INSERT INTO `j` (JNO,JNAME,CITY) VALUES ('J3','Bechange','Hangzhou');
5 • INSERT INTO `j` (JNO,JNAME,CITY) VALUES ('J4','Wetogether','Shanghai');
6 • INSERT INTO `j` (JNO,JNAME,CITY) VALUES ('J5','Yesforchange','Shenzhen');
7 • INSERT INTO `j` (JNO,JNAME,CITY) VALUES ('J6','gotthis','Xian');

```

Result Grid

JNO	JNAME	CITY
J1	Rising	Guangzhou
J2	Powercity	Beijing
J3	Bechange	Hangzhou
J4	Wetogether	Shanghai
J5	Yesforchange	Shenzhen
J6	gotthis	Xian

Apply

Revert

## P Table

Result Grid

PNO	PNAME	COLOR	WEIGHT
P1	螺母	red	12
P2	螺栓	green	17
P3	螺丝刀	blue	14
P4	螺丝刀	red	14
P5	凸轮	blue	40
P6	齿轮	red	30
NULL	NULL	NULL	NULL

Output

Action Output

#	Time	Action	Message
1	08:30:14	SELECT * FROM spj_mng.p LIMIT 0, 1000	6 row(s) returned

## SPJ Table

MySQL Workbench

Mysql@127.0.0.1:3306 x

File Edit View Query Database Server Tools Scripting Help

Navigator

Schemas

Filter objects

Triggers

spj

Views

Stored Procedures

Functions

sys

Tables

Views

Stored Procedures

Functions

Administration Schemas

Information

Table: spj

Columns:

SNO varchar(100)

PNO varchar(100)

JNO varchar(100)

QTY int

Result Grid

Filter Rows:

Export: Wrap Cell Content: A

SNO	PNO	JNO	QTY
S1	P1	J1	200
S1	P1	J3	100
S1	P1	J4	700
S1	P2	J2	100
S2	P3	J1	400
S2	P3	J2	200
S2	P3	J4	500
S2	P3	J5	400

spj 4 x

Output

Action Output

#	Time	Action	Message
83	08:17:57	INSERT INTO `spj` (SNO,PNO,JNO,QTY) VALUES ('S4','P6','J3','100');	1 row(s) affected
84	08:17:57	INSERT INTO `spj` (SNO,PNO,JNO,QTY) VALUES ('S4','P6','J4','300');	1 row(s) affected
85	08:17:57	INSERT INTO `spj` (SNO,PNO,JNO,QTY) VALUES ('S5','P2','J4','100');	1 row(s) affected
86	08:17:57	INSERT INTO `spj` (SNO,PNO,JNO,QTY) VALUES ('S5','P3','J1','200');	1 row(s) affected
87	08:17:57	INSERT INTO `spj` (SNO,PNO,JNO,QTY) VALUES ('S5','P6','J2','200');	1 row(s) affected
88	08:17:57	INSERT INTO `spj` (SNO,PNO,JNO,QTY) VALUES ('S5','P6','J4','500');	1 row(s) affected

Object Info Session

**Restore the database SPJ MNG with the file you have backed up in previous step**

## Export Database

MySQL Workbench

Mysql@127.0.0.1:3306 x

File Edit View Query Database Server Tools Scripting Help

Navigator

MANAGEMENT

Server Status

Client Connections

Users and Privileges

Status and System Variables

Data Export

Data Import/Restore

INSTANCE

Startup / Shutdown

Server Logs

Outlines File

Administration Schemas

Information

Table: spj

Columns:

SNO varchar(100)

PNO varchar(100)

JNO varchar(100)

QTY int

Data Export

Object Selection Export Progress

Export Completed

Status:

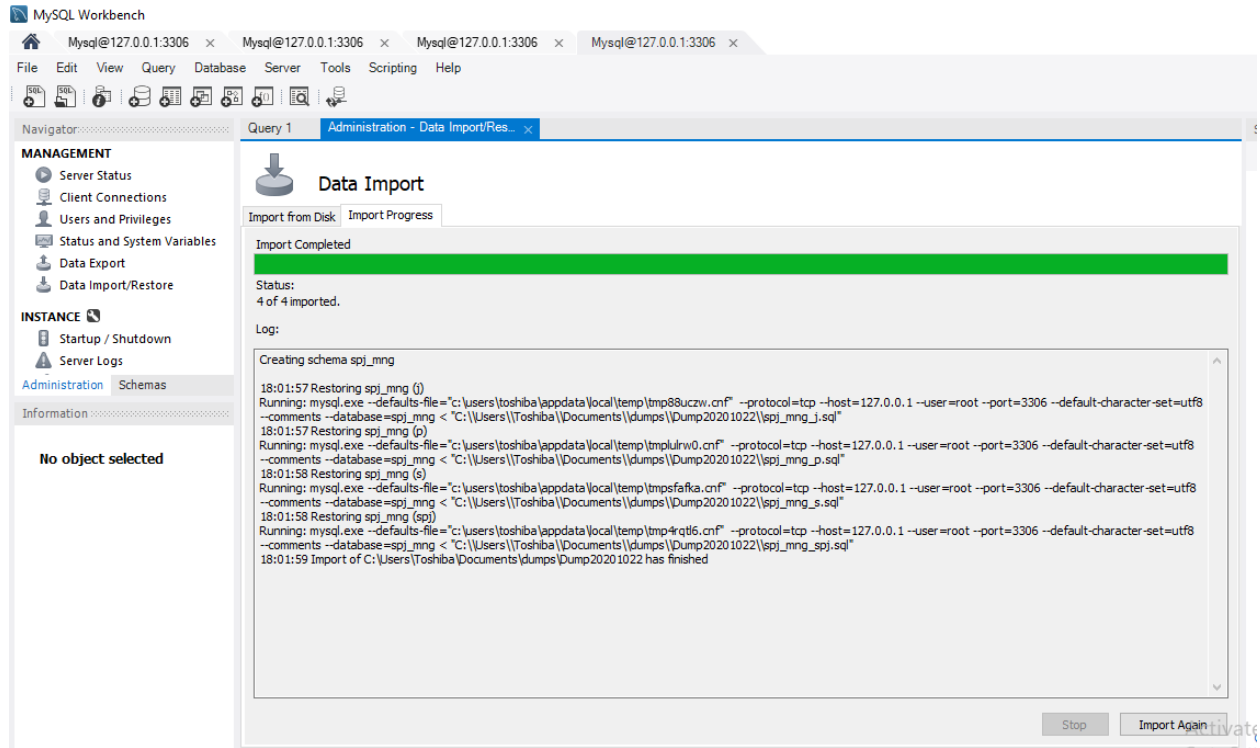
4 of 4 exported.

Log:

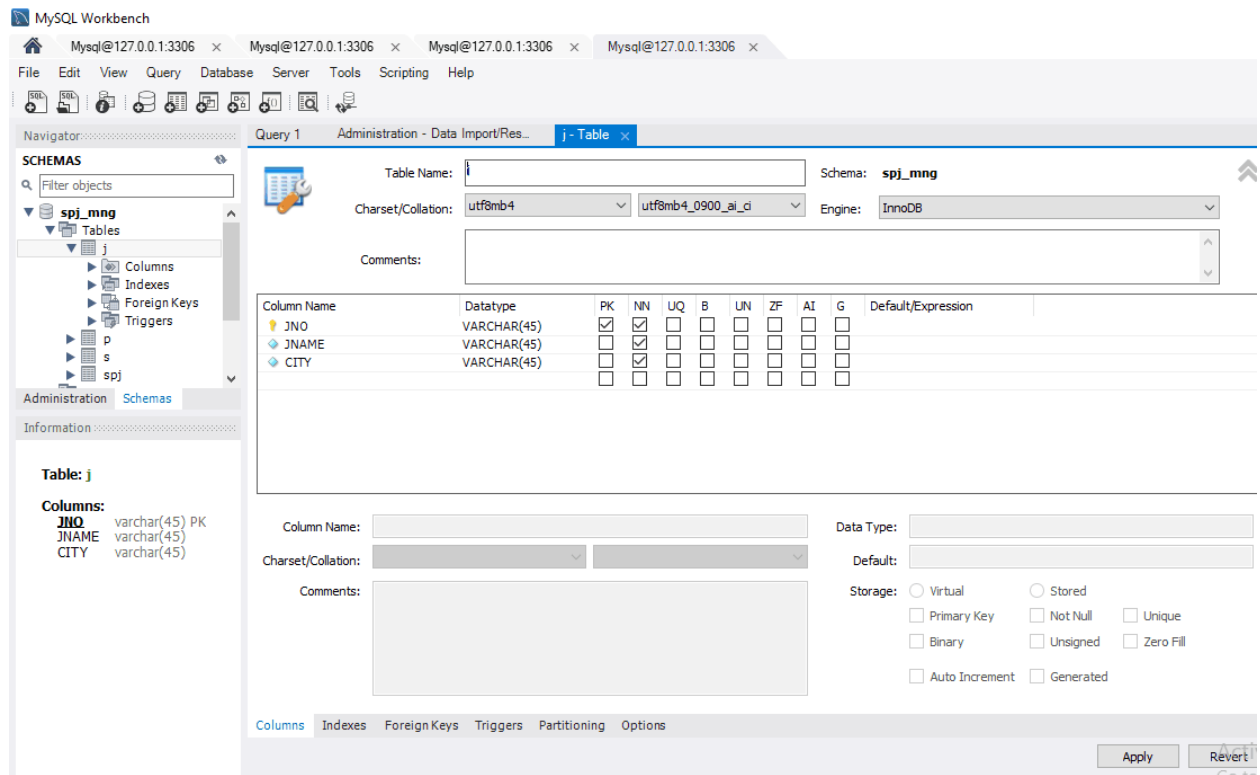
```

09:21:51 Dumping spj_mng (p)
Running: mysqldump.exe --defaults-file="c:\users\toshiba\appdata\local\temp\lmpz2p06.cnf" --user=root --host=127.0.0.1 --protocol=tcp --port=3306 --default-character-set=utf8 --skip-triggers "spj_mng"."p"
09:21:51 Dumping spj_mng (s)
Running: mysqldump.exe --defaults-file="c:\users\toshiba\appdata\local\temp\lmpz4k73.cnf" --user=root --host=127.0.0.1 --protocol=tcp --port=3306 --default-character-set=utf8 --skip-triggers "spj_mng"."s"
09:21:52 Dumping spj_mng (i)
Running: mysqldump.exe --defaults-file="c:\users\toshiba\appdata\local\temp\lmpzffngw.cnf" --user=root --host=127.0.0.1 --protocol=tcp --port=3306 --default-character-set=utf8 --skip-triggers "spj_mng"."i"
09:21:52 Dumping spj_mng (spj)
Running: mysqldump.exe --defaults-file="c:\users\toshiba\appdata\local\temp\lmpk3eb8.cnf" --user=root --host=127.0.0.1 --protocol=tcp --port=3306 --default-character-set=utf8 --skip-triggers "spj_mng"."spj"
09:21:52 Export of C:\Users\toshiba\Documents\lumps\Dump20201022 has finished
  
```

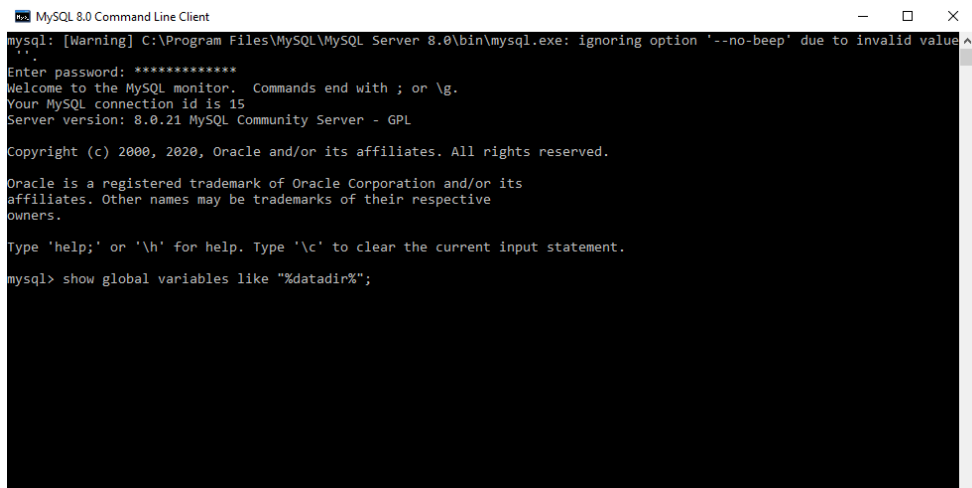
## Import Database:



## Imported Tables:



## Restore the database SPJ\_MNG with the file have been backed up before



```
MySQL 8.0 Command Line Client
mysql: [Warning] C:\Program Files\MySQL\MySQL Server 8.0\bin\mysql.exe: ignoring option '--no-beep' due to invalid value
Enter password: *****
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 15
Server version: 8.0.21 MySQL Community Server - GPL

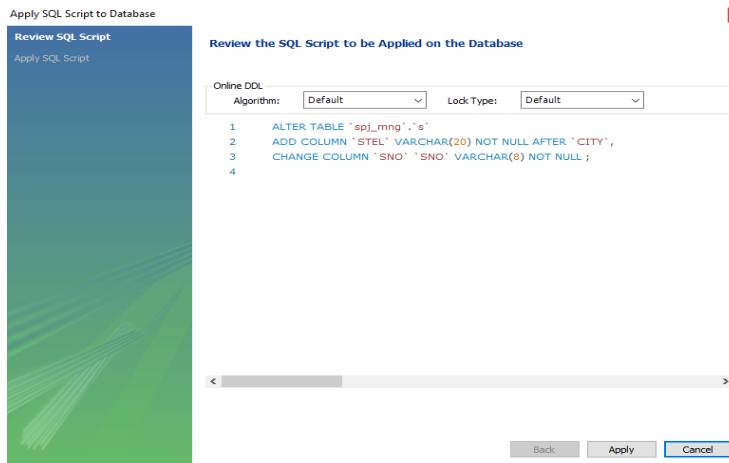
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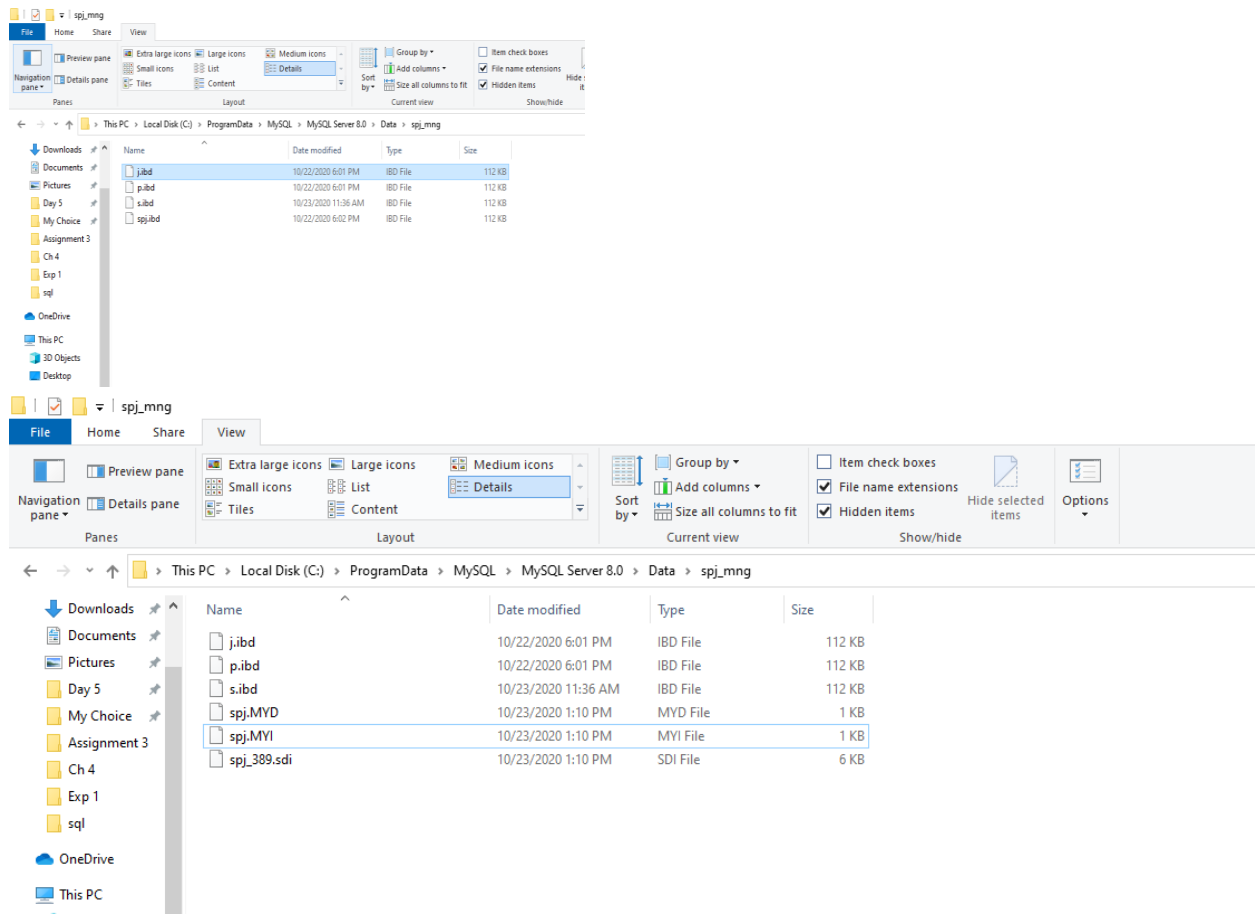
Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> show global variables like "%datadir%";
```

## Updated table S, Add an attribute of contact phone number STEL, the data type is string , and modify the maximum string length allowed by SNO in table S:



Understand the physical storage files of MySQL, and check the data files under the local MySQL service installation directory (such as the default installation directory: C: \programdata \ MySQL\ MySQL server 8.0\ data). Try to create tables according to different storage engines of InnoDB and MyISAM, observe and explain the differences of physical storage files.



## Create, backup, drop and restore database and table using MySQL command line:

```

MySQL 8.0 Command Line Client
mysql: [Warning] C:\Program Files\MySQL\MySQL Server 8.0\bin\mysql.exe: ignoring option '--no-beep' due to invalid value
Enter password: *****
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 15
Server version: 8.0.21 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 global variables like "%datadir%";

```

- Database and tables

Database name: university

Tables:

(primary key: red color foreign key: yellow)

Classroom: building, room\_number, capacity

Department: dept\_name, building, budget

Course: course\_id, title, dept\_name, credits

Instructor: ID, name, dept\_name, salary

Section: course\_id, sec\_id, semester, year, building, room\_number, time\_slot\_id

Teaches: ID, course\_id, sec\_id, semester, year

Student: ID, name, dept\_name, tot\_cred

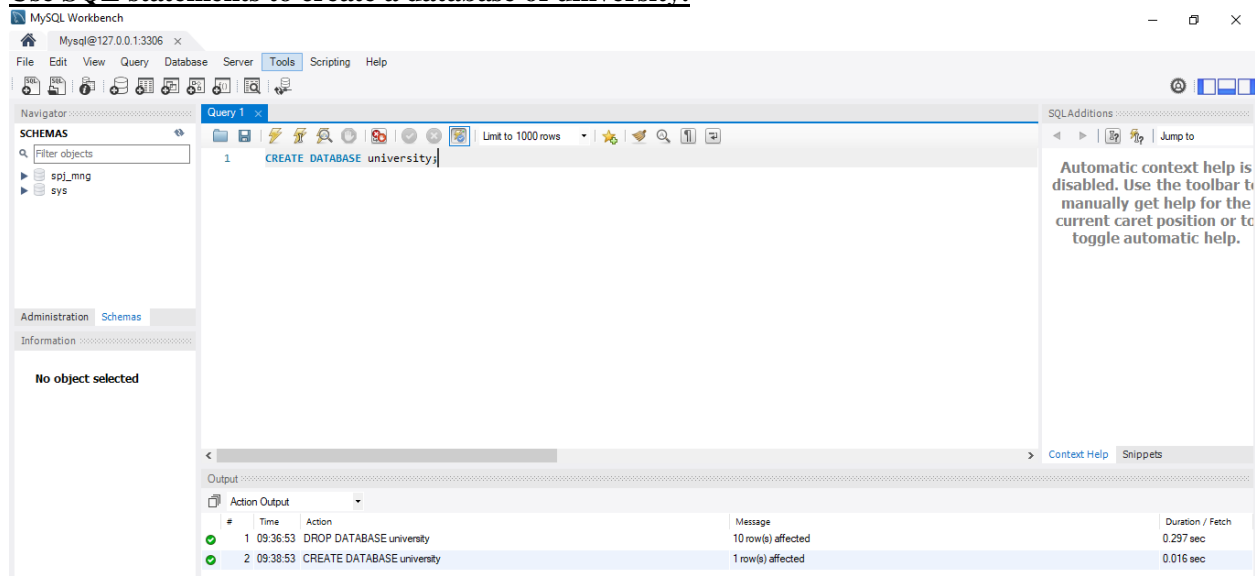
Takes: ID, course\_id, sec\_id, semester, year, grade

Advisor: s\_ID, i\_ID (s\_ID references student (ID), i\_ID references instructor (ID))

Time\_slot: time\_slot\_id, day, start\_hr, start\_min, end\_hr, end\_min

Prereq: course\_id, prereq\_id

### Use SQL statements to create a database of university.



### Use SQL to create 3 tables: student, course, takes, define the data type and primary key, ignore the other constraints, add some tuples if you like.

#### Course Table Created:

MySQL Workbench

mysql@127.0.0.1:3306 x

File Edit View Query Database Server Tools Scripting Help

Navigator

SCHEMAS

Filter objects

university

Tables

advisor

classroom

course

department

Columns

Indexes

Foreign Keys

Triggers

Administration Schemas

Information

Table: course

Columns:

course\_id varchar(8) PK

title varchar(50)

dept\_name varchar(20)

credits decimal(2,0)

Result Grid

Filter Rows:

Edit: Export/Imports: Wrap Cell Content: IA

course_id	title	dept_name	credits
Bio-101	Intro to Bio	Biology	4
CS-101	Intro to Comp.Sci	Computer Science	4
FIN-201	Investment Banking	Finance	4
HIS-351	World History	History	3
MU-199	Music Video Production	Music	3
FIN-201	Investment Banking	Finance	4

course 3 x

Output

## Student Table Created:

MySQL Workbench

mysql@127.0.0.1:3306 x

File Edit View Query Database Server Tools Scripting Help

Navigator

SCHEMAS

Filter objects

prereq

section

student

Columns

Indexes

Foreign Keys

Triggers

takes

teaches

Administration Schemas

Information

Table: student

Columns:

id varchar(5) PK

name varchar(20)

dept\_name varchar(20)

tot\_cred decimal(3,0)

Result Grid

Filter Rows:

Edit: Export/Imports: Wrap Cell Content: IA

id	name	dept_name	tot_cred
00122	Zhang	Com. Sci.	56
00125	Zhang	Com. Sci.	110
00128	Zhang	Com. Sci.	102
03128	Zhang	Com. Sci.	46
12345	Shankar	Com. Sci.	32
19991	Zhang	Com. Sci.	80
00128	Zhang	Com. Sci.	110

student 4 x

Output

Action Output

#	Time	Action	Message	D
37	19:04:46	INSERT INTO university.student (id,name,dept_name,tot_cred) VALUES ('00122','Zhang','Com. Sci.', 102);	1 row(s) affected	0
38	19:04:46	INSERT INTO university.student (id,name,dept_name,tot_cred) VALUES ('03128','Zhang','Com. Sci.', 46);	1 row(s) affected	0
39	19:35:03	INSERT INTO university.student (id,name,dept_name,tot_cred) VALUES ('00128','Zhang','Com. Sci.', 110);	Error Code: 1062. Duplicate entry '00128' for key 'student.PRIMARY'	0
40	19:35:13	SELECT * FROM university.student LIMIT 0, 1000	6 row(s) returned	0
41	19:35:13	INSERT INTO university.student (id,name,dept_name,tot_cred) VALUES ('00128','Zhang','Com. Sci.', 110);	Error Code: 1062. Duplicate entry '00128' for key 'student.PRIMARY'	0
42	20:01:33	SELECT * FROM university.student LIMIT 0, 1000	6 row(s) returned	0

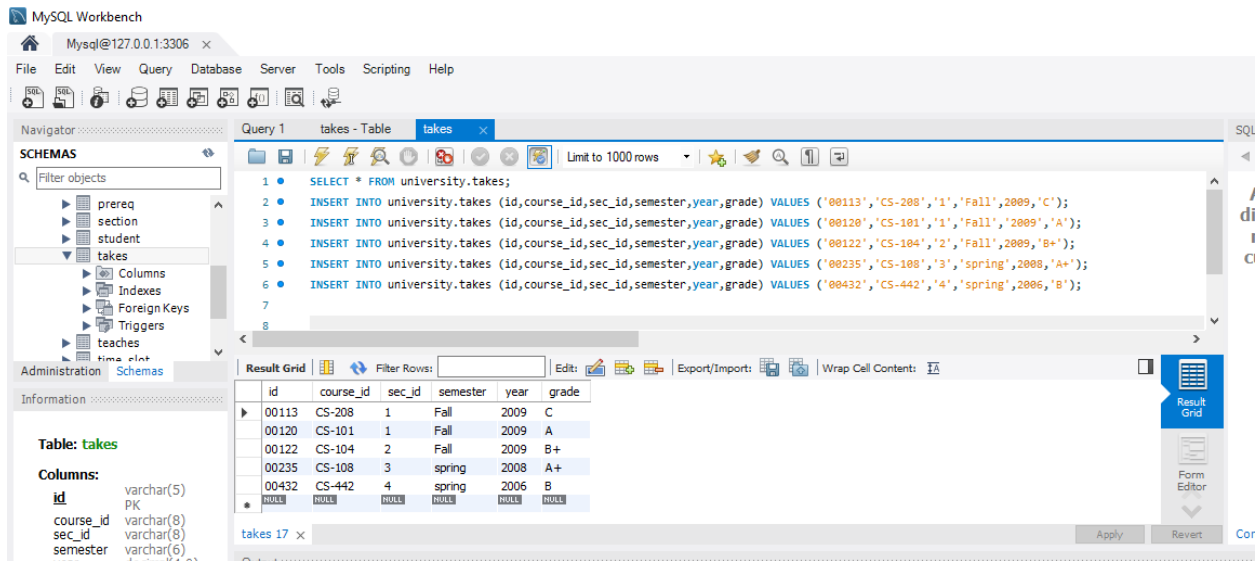
Object Info Session

Automatic (disabled). Use manually go current care toggle aut

Activate Windows Go to Settings to activate

## Takes Table Created:





## Backup the database of university.

Command Prompt

```
C:\>cd program files
The system cannot find the path specified.

C:\>cd Program Files

C:\Program Files>cd MySQL

C:\Program Files\MySQL>cd MySQL Server
The system cannot find the path specified.

C:\Program Files\MySQL>cd MySQL Server 8.0

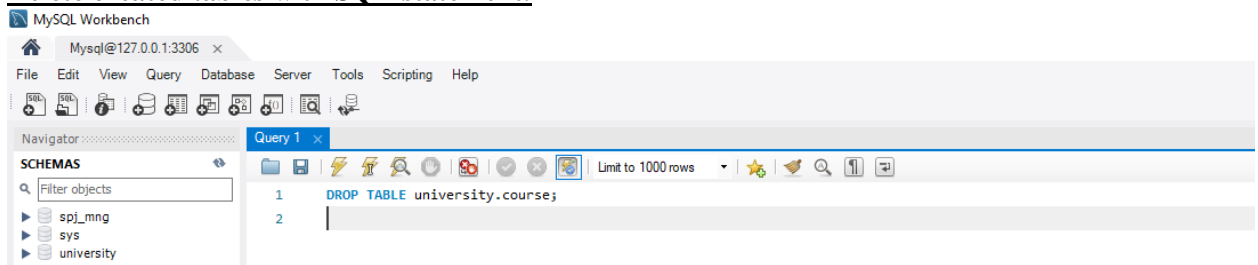
C:\Program Files\MySQL\MySQL Server 8.0>cd bin

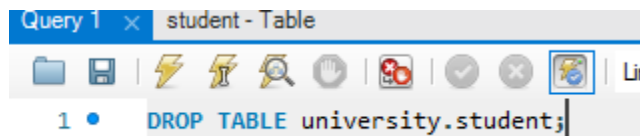
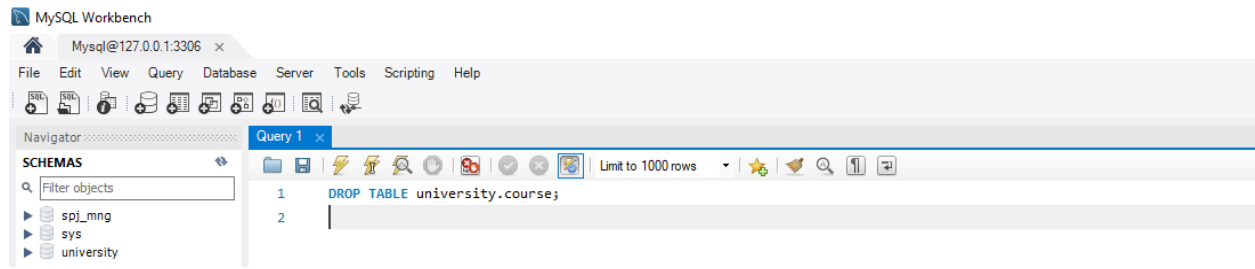
C:\Program Files\MySQL\MySQL Server 8.0\bin>
C:\Program Files\MySQL\MySQL Server 8.0\bin>mysqldump -h localhost -u root -p university> d:\university.sql
Enter password: *****

C:\Program Files\MySQL\MySQL Server 8.0\bin>mysqldump -h localhost -u root -p --no-data --databases university> d:\s2.sql
Enter password: *****

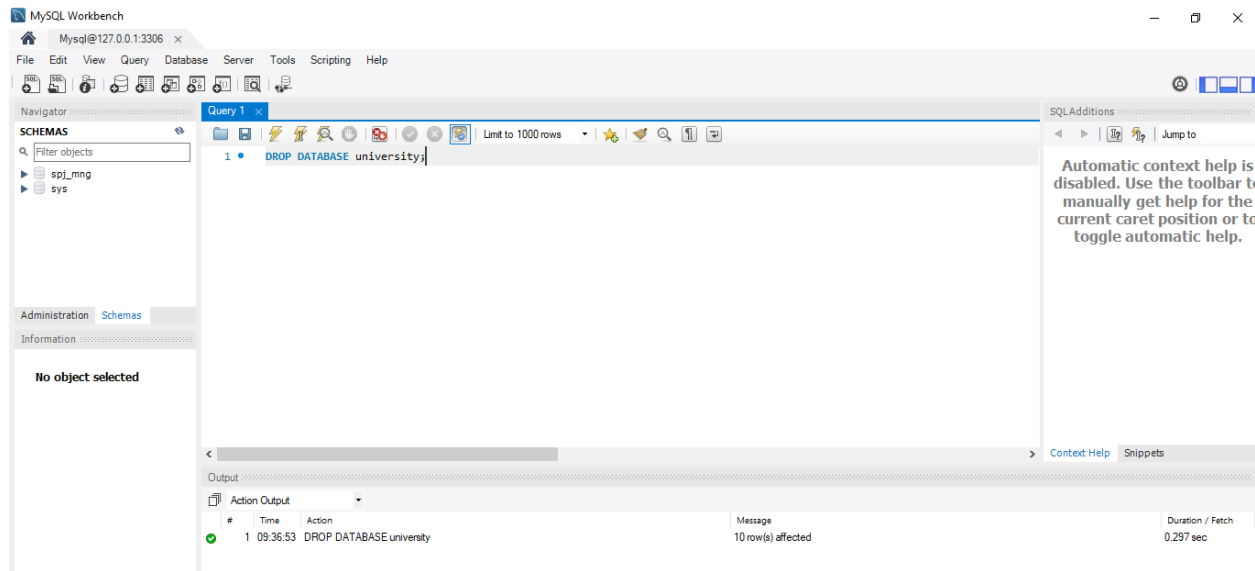
C:\Program Files\MySQL\MySQL Server 8.0\bin>
```

## Delete created tables with SQL statement.





### Delete created database with SQL statement.



### Restore the database with the backed up files you've got in the operation of previous step:

Command Prompt

```
C:\>cd program files
The system cannot find the path specified.

C:\>cd Program Files

C:\Program Files>cd MySQL

C:\Program Files\MySQL>cd MySQL Server
The system cannot find the path specified.







C:\Program Files\MySQL>cd MySQL Server 8.0

C:\Program Files\MySQL\MySQL Server 8.0>cd bin

C:\Program Files\MySQL\MySQL Server 8.0\bin>
C:\Program Files\MySQL\MySQL Server 8.0\bin>mysqldump -h localhost -u root -p university> d:\university.sql
Enter password: *****

C:\Program Files\MySQL\MySQL Server 8.0\bin>mysqldump -h localhost -u root -p --no-data --databases university> d:\s2.sql
Enter password: *****

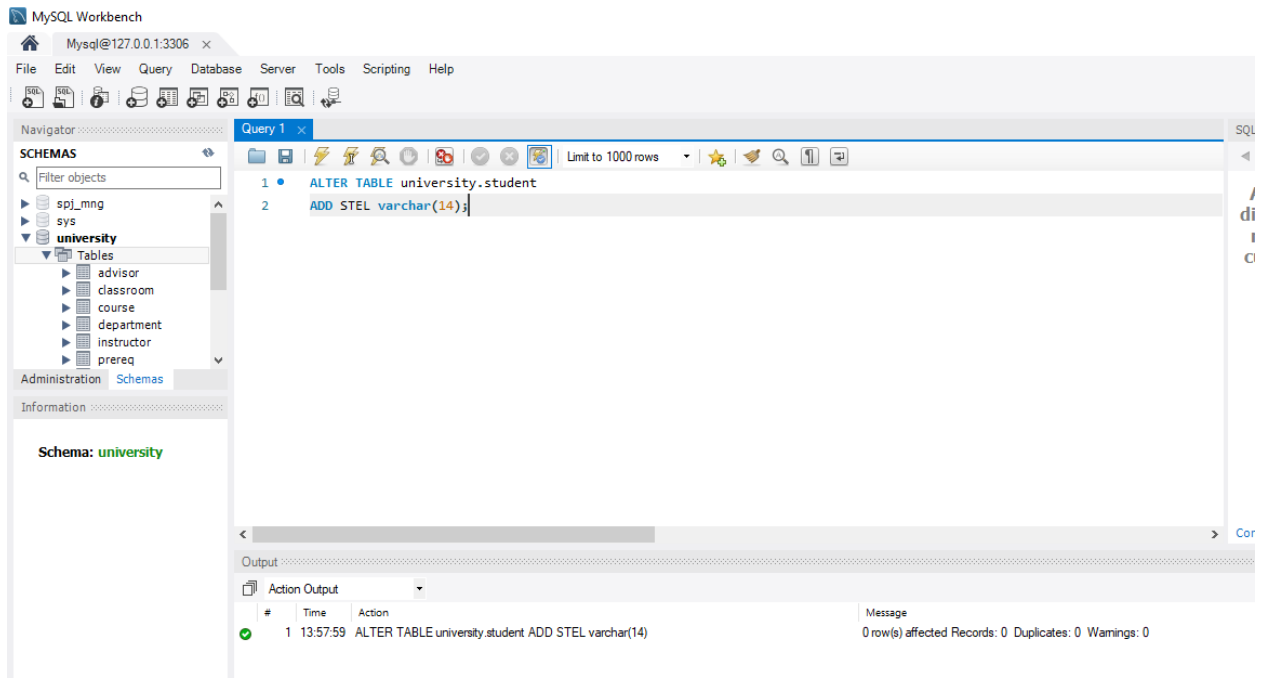
C:\Program Files\MySQL\MySQL Server 8.0\bin>
```

 CS semester 1.rar	10/10/2020 5:04 AM	WinRAR archive	1,613,412 KB
 CS semester 2.zip	1/25/2020 5:07 PM	WinRAR ZIP archive	663,952 KB
 s2.sql	10/24/2020 9:24 AM	SQL Text File	9 KB
 Summer2020.zip	9/6/2020 8:52 AM	WinRAR ZIP archive	73,698 KB
 university.sql	10/24/2020 9:23 AM	SQL Text File	12 KB
 web class.zip	1/25/2020 5:19 PM	WinRAR ZIP archive	7,359,881 KB

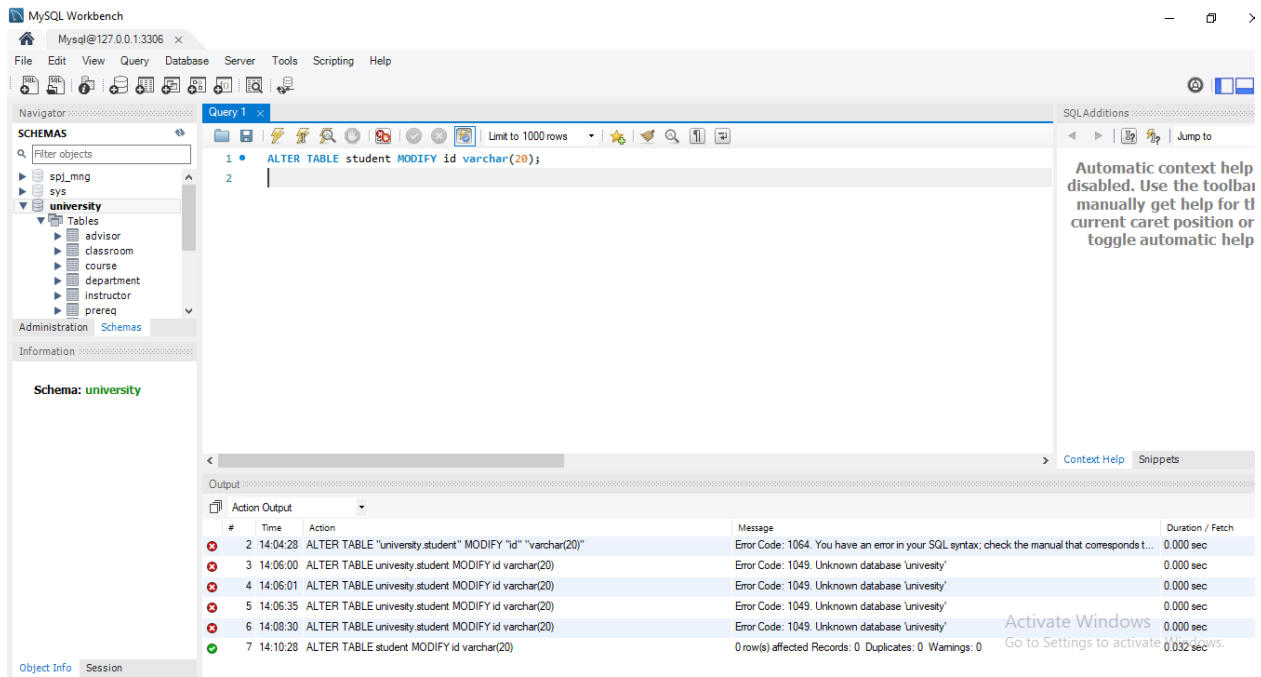
```
C:\Program Files\MySQL\MySQL Server 8.0\bin>mysql -h localhost -u root -p university< d:\university.sql
Enter password: *****

C:\Program Files\MySQL\MySQL Server 8.0\bin>
C:\Program Files\MySQL\MySQL Server 8.0\bin>
```

**Use SQL statement to add a new column STEL to store phone number into the table of student**



## Modify max length of the attribute id:



Check the SQL scripts that define the database or table in the SQL file generated by [mysqldump](#), and compare the similarities and differences between the automatically generated scripts and the SQL statements written by yourself.

### SQL statement to create student table by me:

```
1 • CREATE TABLE university.student(  
2     id varchar(5) NOT NULL PRIMARY KEY,  
3     name varchar(20) NOT NULL,  
4     dept_name varchar(20) NOT NULL,  
5     tot_cred NUMERIC(3,0) NOT NULL,  
6     FOREIGN KEY (dept_name)  
7     REFERENCES university.department (dept_name)  
8 );
```

### Auto generated SQL statement for creating student table:

```
1 • CREATE TABLE `student` (  
2     `id` varchar(20) NOT NULL,  
3     `name` varchar(20) NOT NULL,  
4     `dept_name` varchar(20) NOT NULL,  
5     `tot_cred` decimal(3,0) NOT NULL,  
6     `STEL` varchar(14) DEFAULT NULL,  
7     PRIMARY KEY (`id`)  
8 ) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_0900_ai_ci;  
9
```

### Comparison of my script vs. the generated script by the system

- My script only lists the tables and creates attributes and their relation with each other. The generated script consists of more relationships that we are abstract to the users (like null or not null) with more description like Engine, CHARSET, COLLATE. It also has more complex codes difficult to understand on our level.

### Problem:

Simple minor errors while creating tables caused a lot of hassle. It took a lot of time in creating table. Had some syntax error and it took a little bit of time figure it out. Had problem in using command prompt forgot add the directory file while backing up and restoring the database university.

**Solution:**

To solve these problems I looked for information in internet. In order to understand some questions and procedure I also asked the teacher to help me solve them. And provided instructions helped to solve some of my errors during the experiment.

**Summary:**

From this experiment I have learned SQL statement to create database and table. I have learned how to update and delete methods of database and table. Have become familiar with command line and GUI connection method in MySQL. Similarly, have mastered the basic methods of backup and restore database and understood the logical structure and physical structure of MySQL database.