Using MySQL database in the department
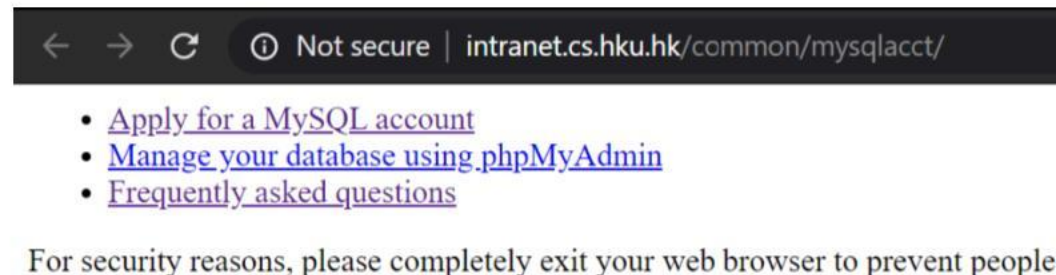
COMP3278B 2020

Objectives

- To enable access to MySQL database in the department.
- To understand the different access method to the MySQL server in the department.

Apply for a MySQL database account

- Before you can start using the MySQL database in the department, you must apply for an account through the link below.

https://intranet.cs.hku.hk/common/mysqlacct/

- Your account will be available within a few days.

For security reasons, please completely exit your web browser to prevent people v

Accessing database

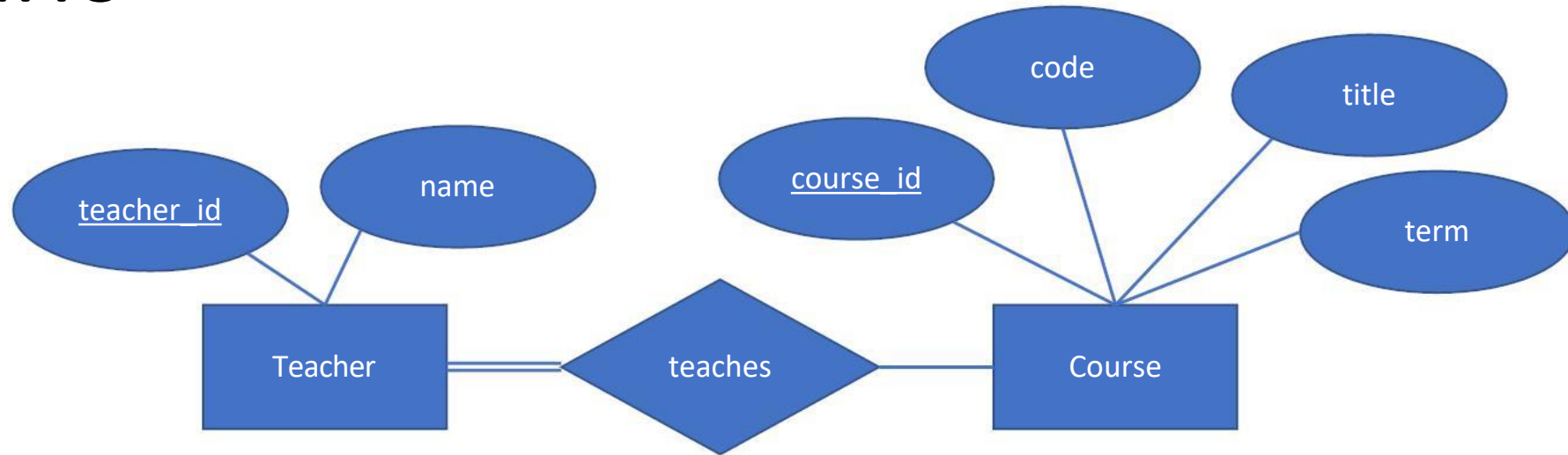There are two suggested ways to access the database.

- **Web interface**
  - Simple to use
  - UI that allows you to work with the database without using MySQL
  - Not developed by MySQl, may not be available in some system

- **MySQL client**
  - Need to use SSH to connect to the department server
  - Bundled with MySQL database, always available to use

Scenario

- Teacher (<u>teacher_id</u>, name)
- Course (<u>course_id</u>, code, title, term)
- teaches (<u>teacher_id</u>, <u>course_id</u>)
  - teacher_id REFERENCES Teacher(teacher_id),
  - course_id REFERENCES Course(course_id)

In this tutorial, we are going to create the tables through the web interface, then insert data through the MySQL client.

phpMyAdmin

- Web interface for the MySQL database in the department is accessible at the following URL.

 https://i.cs.hku.hk/phpmyadmin/

- The web interface runs the application phpMyAdmin, a very common choice of web interface for MySQL.
  - Username: your CS login
  - Password: the password you choose when you apply for a database account

Choose a database

- Once logged in, you will see a database with your CS login name.
  - This is the only database you can use.
  - **information_schema** is a database that provide meta information of the database system, we will not use it.
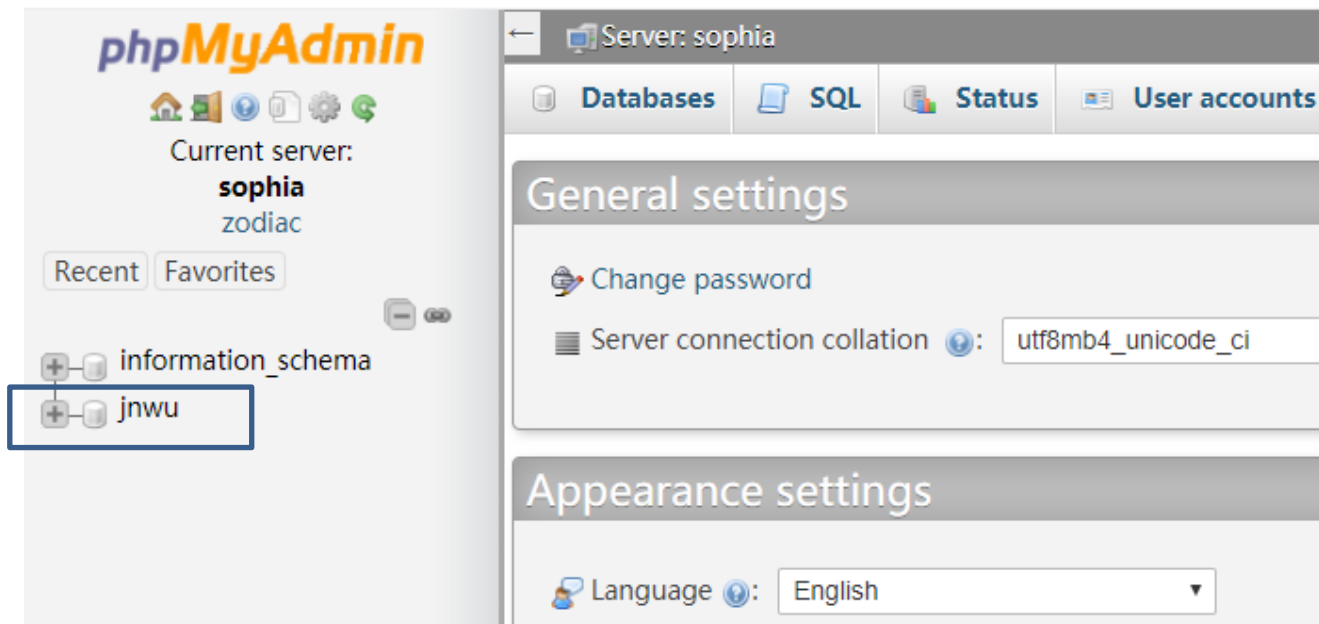
Create table - Teacher

Field	Type	Options
teacher_id	INT	not null
name	VARCHAR(100)	not null

Teacher
Table name: Teacher
Primary key: teacher_id

Check result

Browse | Structure | SQL | Search | Insert | E

Table structure | Relation view

#	Name	Type	Collation	Attributes	Null	Default
1	teacher_id 🔑	int(11)			No	None
2	name	varchar(100)	utf8_unicode_ci		No	None

Check all   With selected: Browse Change Dr

Print   Propose table structure   Track table   Move colu

Add [1] column(s) [after name ▼] Go

+ Indexes

Indexes ⓘ

Action	Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
Edit ⊖ Drop	PRIMARY	BTREE	Yes	No	teacher_id	0	A	No	

Create an index on [1] columns Go

Check that columns are created with the correct name and type

Check NULL options

Check Primary key

Foreign keys could be added here

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Create table - exercise

- As you can see, you can simply create a table by specifying the columns, data type, and other options.

- Now try to create the Course table using the same flow.

Field	Type	Options
course_id	INT	not null
code	VARCHAR(10)	not null
title	VARCHAR(200)	not null
term	CHAR(1)	not null

Course
Table name: Course
Primary key: course_id

Create table (SQL)

- Alternatively, we can use the SQL tab to input SQL directly.
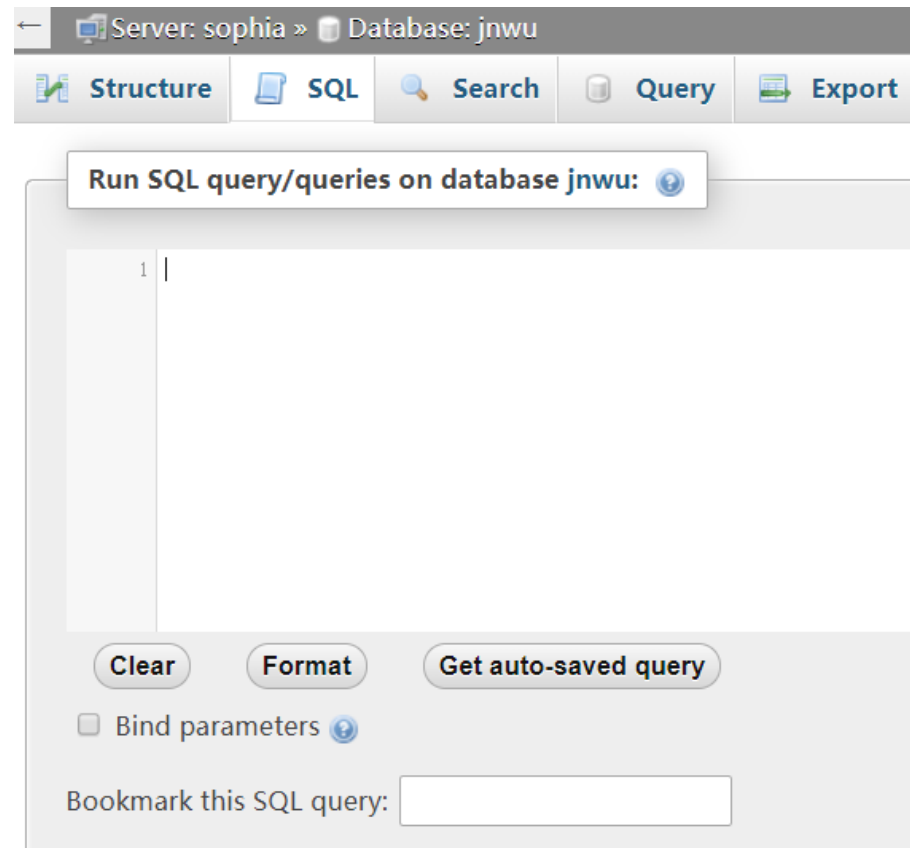
What is the corresponding SQL that creates this table?

Field	Type	Options
teacher_id	int	Not null
course_id	varchar(10)	Not null

teaches

Table name: teaches
Primary key: teacher_id, course_id
Foreign key:
    teacher_id → Teacher.teacher_id,
    course_id → Course.cours_id

Create table - teaches

Field	Type	Options
teacher_id	int	Not null
course_id	varchar(10)	Not null

teaches

Table name: teaches

Primary key: teacher_id, course_id

Foreign key:

    teacher_id → Teacher.teacher_id,

    course_id → Course.cours_id

Structure   **SQL**   **Search**   **Query**   ▼ **More**

Run SQL query/queries on database jnwu: ⓘ

```
1  CREATE TABLE teaches (
2    teacher_id INT NOT NULL,
3    course_id INT NOT NULL,
4    PRIMARY KEY(teacher_id, course_id),
5    FOREIGN KEY(teacher_id) REFERENCES Teacher(teacher_id),
6    FOREIGN KEY(course_id) REFERENCES Course(course_id)
7  );
8
```

[Clear] [Format] [Get auto-saved query]

☐ Bind parameters ⓘ

Bookmark this SQL query: [_____]

[Delimiter [;]] ☑ Show this query here again [Go]

☐ Retain query box

☐ Rollback when finished ☑ Enable foreign key checks

```
CREATE TABLE teaches (
   teacher_id INT NOT NULL,
   course_id INT NOT NULL,
   PRIMARY KEY(teacher_id, course_id),
   FOREIGN KEY(teacher_id) REFERENCES Teacher(teacher_id),
   FOREIGN KEY(course_id) REFERENCES Course(course_id)
);
```

✔ MySQL returned an empty result set (i.e. zero rows). (Query took 0.0071 seconds.)

CREATE TABLE teaches (teacher_id INT NOT NULL, course_id INT NOT NULL, PRIMARY KEY(teacher_id, course_id), FOREIGN KEY(teacher_id) REFERENCES Teacher(teacher_id), FOREIGN KEY(course_id) REFERENCES Course(course_id))

[Edit inline] [Edit] [Create PHP code]

Insert data

- Let's insert for our own course. First, we insert a Teacher record.

More insert

- Similar for Course…
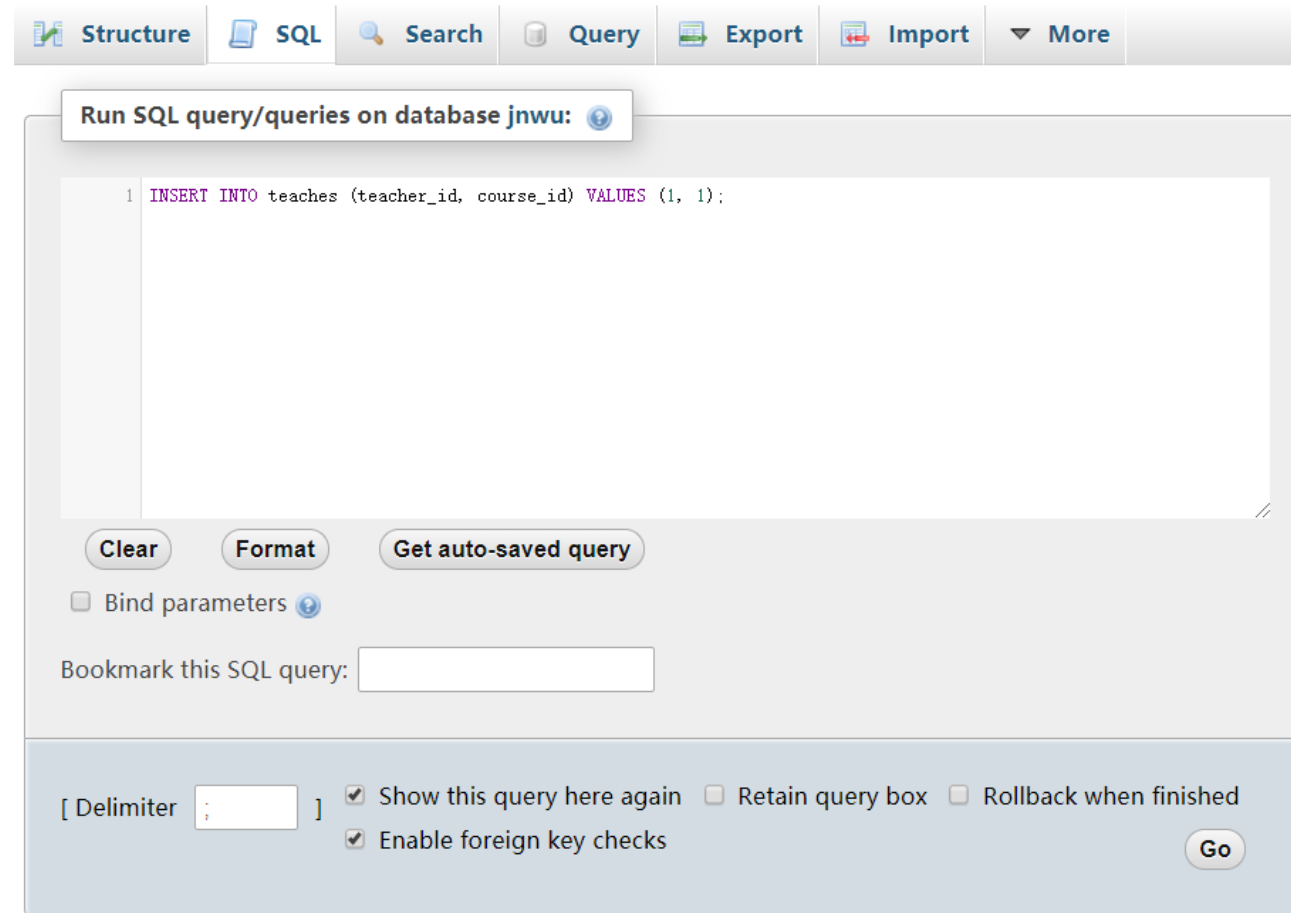
Insert by SQL

- Of course, you can simply use SQL to insert.

Exercise – Insert data

- Insert the necessary data for one more course listed in the department website.
  - https://www.cs.hku.hk/programmes/course-offered

Year 3 - Core			
COMP3230A	Principles of Operating Systems (CS)	1	Dr. Tam Anthony
COMP3230B	Principles of Operating Systems (CE, BBAIS, 2nd Major)	1	Prof. Wang C L
COMP3234	Computer and Communication Networks	2	Dr. Wu C
COMP3250A	Design and Analysis of Algorithms	2	Dr. Huang Z.Y.
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COMP3278A	Intro. to Database Management Systems (CS)	1	Dr. Lam Ka Man Carmen
COMP3278B	Intro. to Database Management Systems (BBAIS, CE, CDA, Dec Analytics, EEE, Minor, 2nd Major)	2	Dr. Luo Ping

Final words on phpMyAdmin

- You can explore how to insert data into the tables using phpMyAdmin, it is straight forward.

- When using SQL, make sure you have selected your own database, otherwise it will complain that you have not selected a database.

- Try not to rely too much on the web interface. It is essential to learn how to use the client if you are going to develop applications that uses database in the future.

Accessing MySQL client – SSH connection

- Recall how you can SSH to the department server. You could check the FAQ below.
  - https://intranet.cs.hku.hk/csintranet/contents/technical/howto/ssh.jsp
  - Instead of using server **academy11**, you should use **workbench4**
- In brief:
  - First SSH to **gatekeeper.cs.hku.hk**, then SSH to **workbench4**.
  - Alternatively you can use CSVPN, then you only need to SSH to **workbench4.cs.hku.hk**

SSH connection demo 1

SSH is available in PowerShell in Windows 10 and any terminal in Linux/MacOS.

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\Users\kevin> ssh yklam2@gatekeeper.cs.hku.hk
The authenticity of host 'gatekeeper.cs.hku.hk (147.8.179.11)' can't be established.
ECDSA key fingerprint is SHA256:YjTJqh3reNV5lFH35YrC/e4GwzZ6uIWEhJAjR1n14RC
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'gatekeeper.cs.hku.hk,147.8.179.11' (ECDSA) to the list of known hosts.
yklam2@gatekeeper.cs.hku.hk's password:

---------------------------------------------------------------
******************* gatekeeper *******************************
You may also ssh to gatekeeper2.cs.hku.hk from the Internet
---------------------------------------------------------------
You may also use CSVPN to access computing facilities of the CS department.
See https://intranet.cs.hku.hk/csintranet/contents/technical/howto/csvpn
---------------------------------------------------------------
yklam2@gatekeeper:~$
```

ssh *cs_login*@gatekeeper.cs.hku.hk
(replace cs_login with your own login)

This will appear when you connect the first time, answer "**yes**"

Enter your CS login password when you see this. NOTHING will be shown when you type, just press enter after typing your password

You are now logged into gatekeeper.cs.hku.hk
Continue in the next page

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SSH connection demo 1 (cont'd)

```
jnwu@gatekeeper:~$ ssh workbench4
Failed to add the host to the list of known hosts (/home/restricted/.ssh/known_hosts).
jnwu@workbench4's password:
Welcome to Ubuntu 18.04.5 LTS (GNU/Linux 4 15.0-130-generic

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

  System information as of Sun Jan 17 20:39:15 HKT 2021

  System load:     1.19       Processes:           24
  Usage of /home:  unknown    Users logged in:      0
  Memory usage:    0%         IP address for eth0: 147.8.179.84
  Swap usage:      0%
```

ssh cs_login@workbench4.cs.hku.hk
(cs_login and .cs.hku.hk could be omitted here)

Enter your CS login password again

```
Last login: Sat Jan 16 22:16:28 2021 from 147.8.179.11
jnwu@workbench4:~$
```

Now you are connected!

SSH connection demo2

PuTTY is another choice of SSH client, which is available in Windows.
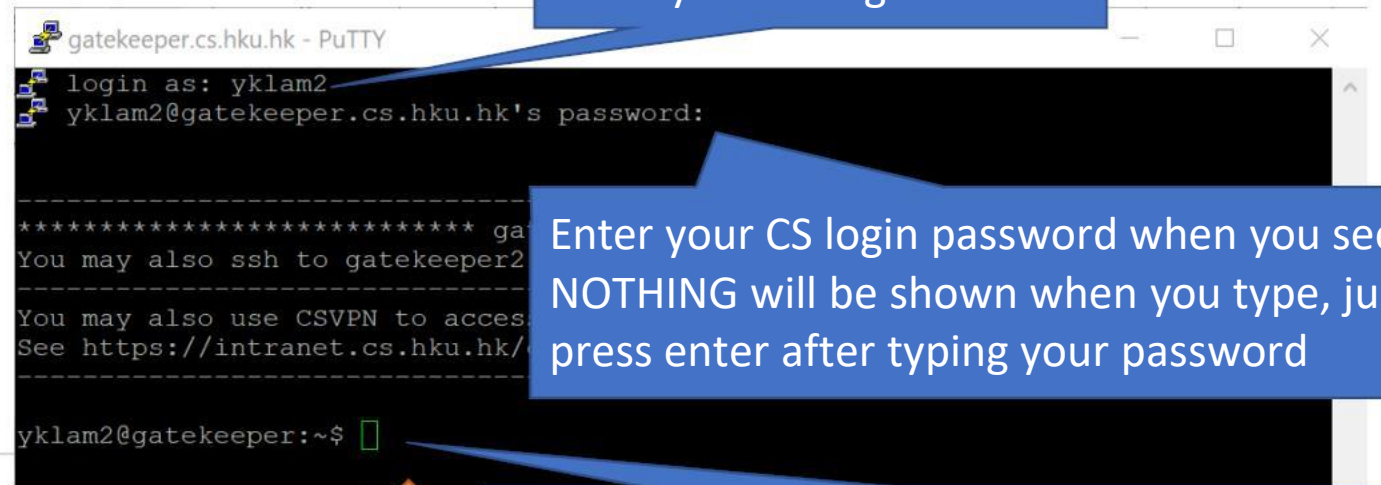Also possible to install in Linux and MacOS.

Enter your CS login name

gatekeeper.cs.hku.hk

Enter your CS login password when you see this. NOTHING will be shown when you type, just press enter after typing your password

At this point onwards, you can SSH to **workbench4** as in the second part of demo 1.

This will appear when you connect the first time, click "**yes**"
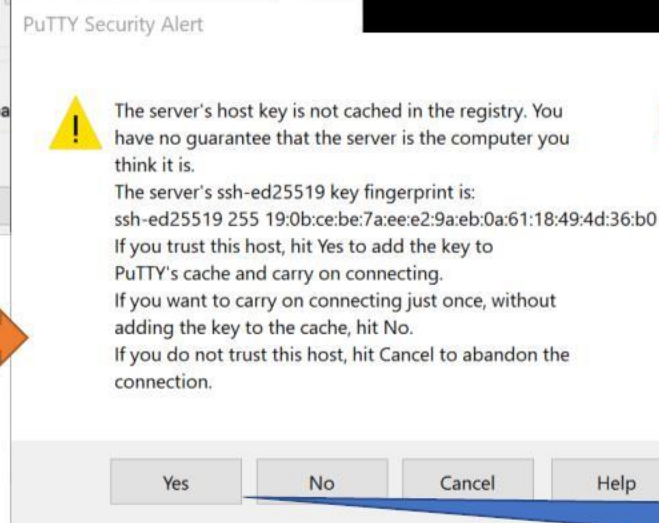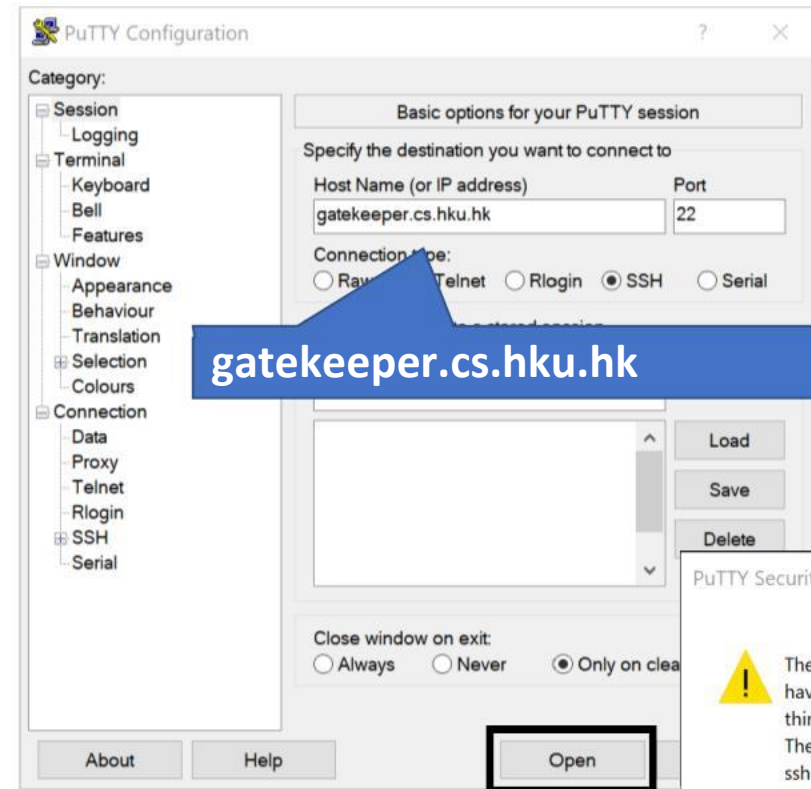
Using the MySQL client

- Once you have logged into **workbench4**, you can start the MySQL client with the following command.

<div style="background-color:#E8842D; padding:10px;">

mysql -h sophia -u *cs_login* -p

</div>

- **-h** specify the host to connect to. **sophia** is the server hosting the MySQL database.
- **-u** specify the user name used to login.
  - Replace *cs_login* with your own CS login
- **-p** specify that we want to provide a password.

- When you are asked for a password, enter your MySQL password.

- To exit from the client, use command "quit"

MySQL client - login

Start MySQL Client

Enter password
Again, NOTHING will be shown
when you type your password

You are now inside the client

```
jnwu@workbench4:~$ mysql -h sophia -u jnwu -p
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 8856
Server version: 5.7.32-0ubuntu0.18.04.1 (Ubuntu)

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affiliates. Other names may be trademarks of their respective
owners.

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

mysql>
```

MySQL client – check and use database

- Once you have logged into a client, you have to select a database to work on.

```
mysql> SHOW DATABASES;
+--------------------+
| Database           |
+--------------------+
| information_schema |
| jnwu               |
+--------------------+
2 rows in set (0.02 sec)

mysql> USE jnwu
Reading table information for completion of table a
You can turn off this feature to get a quicker start

Database changed
mysql>
```

SHOW DATABASES;

This SQL list all available databases

USE *database_name*

This command specify that you want to use the specific database, in this case, you should replace database_name with your own CS login

MySQL client – check tables

- We can take a look at the available tables in the database

```
mysql> SHOW TABLES;
+---------------+
| Tables_in_jnwu |
+---------------+
| Course        |
| Teacher       |
| teaches       |
+---------------+
3 rows in set (0.00 sec)

mysql> DESCRIBE Teacher;
+-----------+--------------+------+-----+---------+-------+
| Field     | Type         | Null | Key | Default | Extra |
+-----------+--------------+------+-----+---------+-------+
| teacher_id | int(11)     | NO   | PRI | NULL    |       |
| name      | varchar(100) | NO   |     | NULL    |       |
+-----------+--------------+------+-----+---------+-------+
2 rows in set (0.00 sec)
```

SHOW TABLES;

This SQL list all available tables in the current database

DESCRIBE *table_name*;

This SQL show the columns in the specific table.

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MySQL client – check data

- Now we can start using SQL to query the database.

```
mysql> SELECT * FROM Teacher;
+------------+-------------+
| teacher_id | name        |
+------------+-------------+
|          1 | Dr. Luo Ping |
+------------+-------------+
1 row in set (0.00 sec)

mysql> SELECT * FROM Course;
+-----------+----------+----------------------------------------+------+
| course_id | code     | title                                  | term |
+-----------+----------+----------------------------------------+------+
|         1 | COMP3278B | Intro. to Database Management Systems | 2    |
+-----------+----------+----------------------------------------+------+
1 row in set (0.00 sec)

mysql> SELECT * FROM teaches;
+------------+-----------+
| teacher_id | course_id |
+------------+-----------+
|          1 |         1 |
+------------+-----------+
1 row in set (0.00 sec)
```

Exercise – Insert data in MySQL client

- Insert the necessary data for one more course listed in the department website.
  - https://www.cs.hku.hk/programmes/course-offered

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