

Assignment #1

Installation and Setup (Connect MySQL with Python)

KAIST

CS360

Table of Contents

- ◆ MySQL
- ◆ MySQL Connector/Python
- ◆ Installation and Setup

MySQL



MySQL

- ◆ MySQL is the most popular open-source relation database management system (RDBMS).
- ◆ MySQL uses the standard database query language SQL which is very fast, flexible, and easy to use.
- ◆ It can be used on Unix, Linux, Mac and Windows.

MySQL Commands

◆ SELECT

- Select the desired data in the table
- Usage : **SELECT** Column1, Column2
[**FROM** Table]
[**GROUP BY** Column3]
[**ORDER BY** Column4 [**ASC** | **DESC**]]
[**LIMIT** offset]

| SQL>SELECT ID,Name FROM Student | | | |
|---------------------------------|----------|-------|-----|
| ID | Name | Major | Age |
| 1 | Kevin | CS | 20 |
| 2 | Jennifer | EE | 22 |
| 3 | Justin | EE | 19 |
| 4 | Larry | CS | 24 |
| 5 | | | |



| ID | Name |
|----|----------|
| 1 | Kevin |
| 2 | Jennifer |
| 3 | Justin |
| 4 | Larry |

MySQL Commands (cont'd)

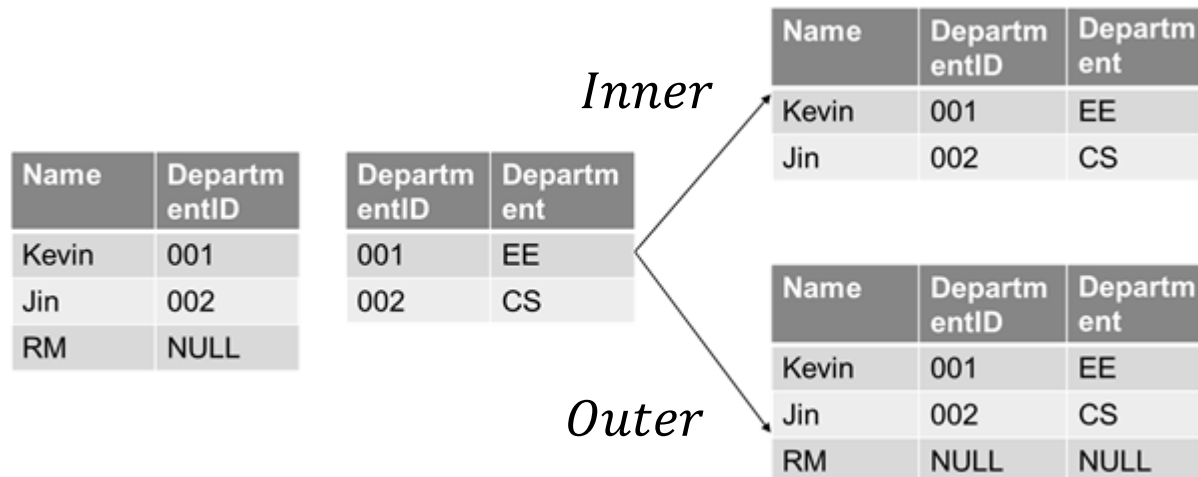
◆ SELECT

- **HAVING** condition
- **GROUP BY** column
- **COUNT** column
- **CONCAT** (column1, ..., column N)
- **ORDER BY** column
- **IN / NOT IN** offset
- **AS**

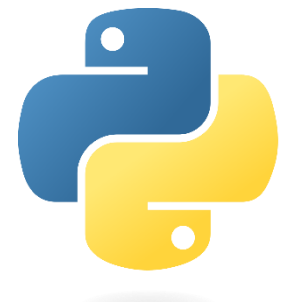
MySQL Commands (cont'd)

◆ JOIN

- (INNER) JOIN : omit the row that NULL is involved
- [LEFT | Right] OUTER JOIN : not omit the row that NULL is involved
- NATURAL JOIN : not need ON (default : inner)



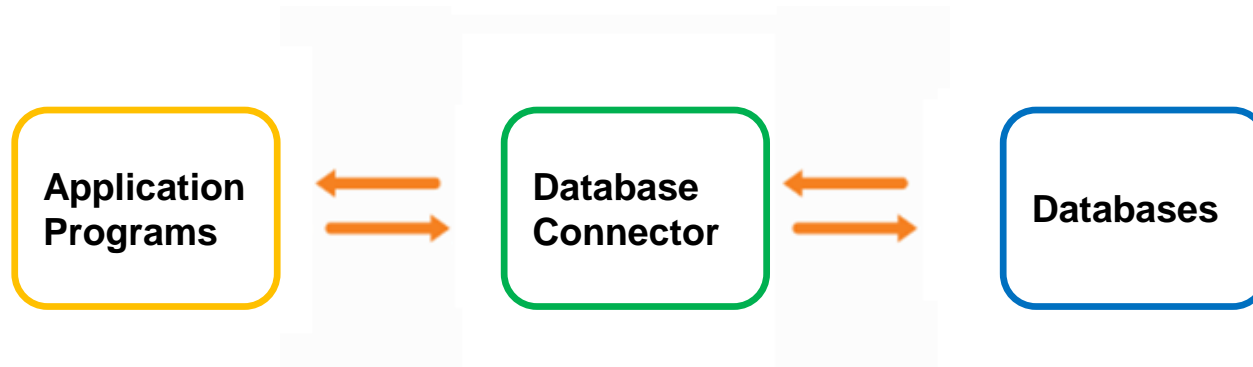
MySQL Connector/Python



MySQL Connector/Python

◆ Connector

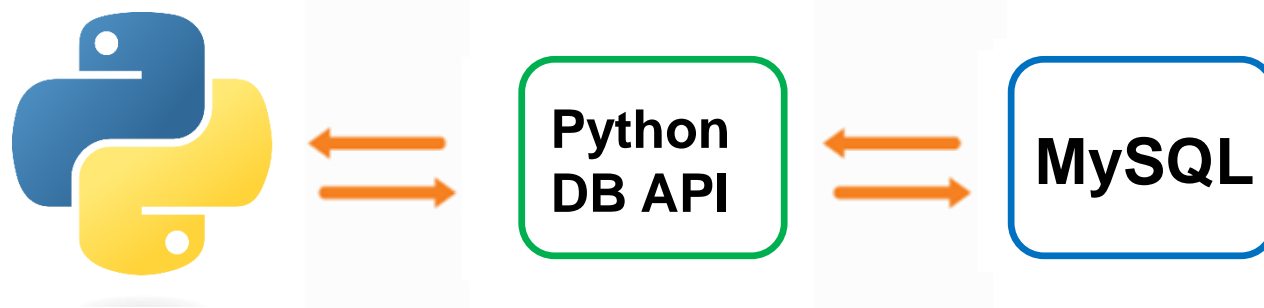
- enables programming languages (e.g., java, python, ..) to utilize RDBMS
- JDBC (Java↔MySQL), Psycopg2 (Python↔PostgreSQL), ...



MySQL Connector/Python

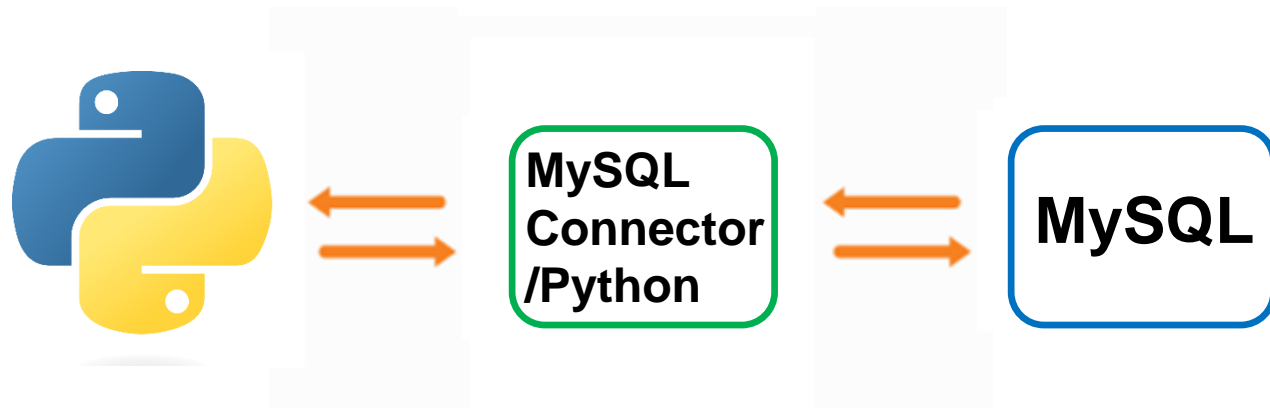
◆ Python DB API 2.0

- Python communicates with databases using Python DB APIs (e.g., mysql-connector, psycopg2, pymysql, ...)
- Main objects in Python DB API
 - » Connection : A socket with a mysql server
 - » Cursor : Object to interact with databases.



MySQL Connector/Python

- ◆ MySQL Connector/Python
 - MySQL officially provides its connector for python developers.
(<https://dev.mysql.com/doc/connector-python/en/>)



Connection

◆ Connect to database

- Using [mysql.connector.connect](#)

```
import mysql.connector
con = mysql.connector.connect(host=[hostname], user=[username],
                             password=[pw], db=[dbName], charset='utf8')
```

- host : Address of mysql server
- port : Port number of mysql server
- user : Mysql ID
- password : Password of the mysql ID
- db : Name of database you want to connect
- charset : How to encode your database

Connection

- ◆ Reflect changes to database
 - Using `Connection.commit`

```
con.commit()
```

- ◆ Disconnect to database
 - Using `Connection.close`

```
con.close()
```

Cursor

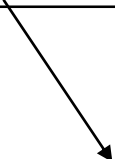
◆ Statement

- makes a simple sql query then execute it with cursor

```
cur = con.cursor()
N = input()
query = "SELECT * FROM STUDENT WHERE name='" + N + "'"
cur.execute(query)
```

- vulnerable to malicious inputs! (SQL Injection)

```
cur = con.cursor()
N = input()                # Kim Minjae' or 'Y'='Y
query = "SELECT * FROM STUDENT WHERE name='" + N + "'"
cur.execute(query)
```



```
SELECT * FROM STUDENT WHERE name='Kim Minjae' or 'Y'='Y'
=> Always True
```

Cursor


◆ PreparedStatement

- binds variables then makes a sentence into a query

```
cur = con.cursor(prepared=True)
N = input()
query = "SELECT * FROM STUDENT WHERE NAME=%s"
cur.execute(query,N)
```

- robust to SQL Injection

```
cur = con.cursor(prepared=True)
N = input()                # Kim Minjae' or 'Y'='Y
query = "SELECT * FROM STUDENT WHERE NAME=%s"
cur.execute(query,N)
```



```
SELECT * FROM STUDENT WHERE name="'Kim Minjae' or 'Y'='Y'"
```

Cursor

◆ Fetch operations

- Derive results from queries
 - » fetchone() : Get the first result
 - » fetchall() : Get the tuple of all results
 - » fetchmany(size=None) : Get the tuple of multiple results.

```
results = cur.fetchall()
print(results[0]) # 20200003
Print(results[1]) # 20190001
```


Example of MySQL-Connector code

```
import mysql.connector # Connect to the database
db = mysql.connector.connect(host='localhost', user='user', password='passwd', database='db', charset='utf8')
cursor = db.cursor(prepared=True)
sql = "INSERT INTO users (email, name) VALUES (%s, %s)"
cursor.execute(sql, ('cs360@kaist.ac.kr', 'TA'))
db.commit()

sql = "SELECT id, name FROM users WHERE email=%s"
cursor.execute(sql, ('cs360@kaist.ac.kr',))
result = cursor.fetchone()
print(result)
```

Installation

1. MySQL
2. Run MySQL on VSCODE
3. Anaconda
4. MySQL Connector/Python



MySQL

◆ Installation

- 1) <https://dev.mysql.com/downloads/mysql/>
- 2) Select your OS and Download
 - MSI Installers (for Windows)
 - Mac

The image displays two screenshots of the MySQL Community Downloads page. The left screenshot shows the 'MySQL Community Downloads' page with the 'MySQL Installer for Windows' section highlighted. A red box is drawn around the 'Go to Download Page' button. The right screenshot shows the 'MySQL Installer 8.0.26' page with the 'Download' button for the 'Windows (x86, 32-bit), MSI Installer' highlighted. Both screenshots show the 'General Availability (GA) Releases' tab selected.

MySQL Community Downloads

MySQL Community Server

General Availability (GA) Releases Archives

MySQL Community Server 8.0.26

Select Operating System:
Microsoft Windows

Looking for previous GA versions?

Recommended Download:

MySQL Installer for Windows

All MySQL Products. For All Windows Platforms. In One Package.

Windows (x86, 32 & 64-bit), MySQL Installer MSI

Go to Download Page

Other Downloads:

| Operating System | Version | Size | Download |
|------------------------------------|---------|--------|----------|
| Windows (x86, 64-bit), ZIP Archive | 8.0.26 | 258.2M | Download |
| Windows (x86, 64-bit), ZIP Archive | 8.0.26 | 502.2M | Download |
| Debug Binaries & Test Suite | 8.0.26 | 502.2M | Download |

We suggest that you use the MD5 checksums and GnuPG signatures to verify the integrity of the packages you download.

MySQL Installer 8.0.26

Select Operating System:
Microsoft Windows

Looking for previous GA versions?

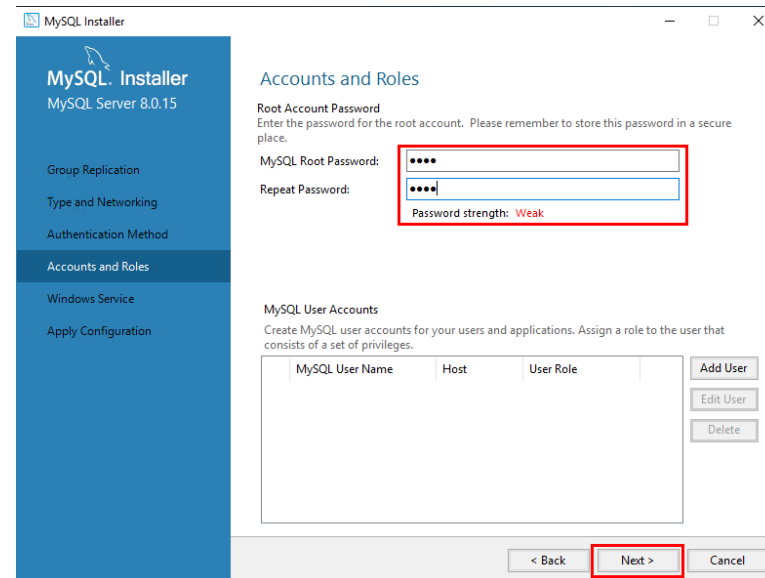
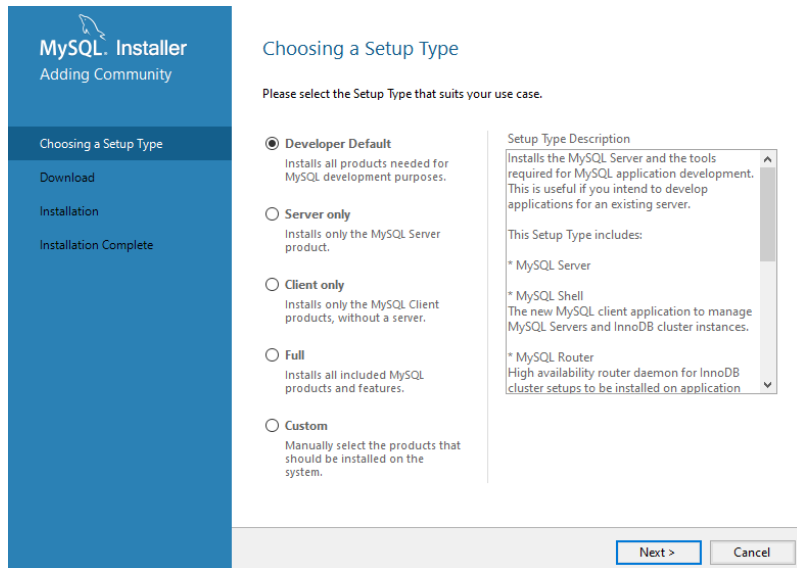
| Operating System | Version | Size | Download |
|--------------------------------------|---------|--------|----------|
| Windows (x86, 32-bit), MSI Installer | 8.0.26 | 2.4M | Download |
| Windows (x86, 32-bit), MSI Installer | 8.0.26 | 450.7M | Download |

We suggest that you use the MD5 checksums and GnuPG signatures to verify the integrity of the packages you download.

MySQL

◆ Installation (For windows)

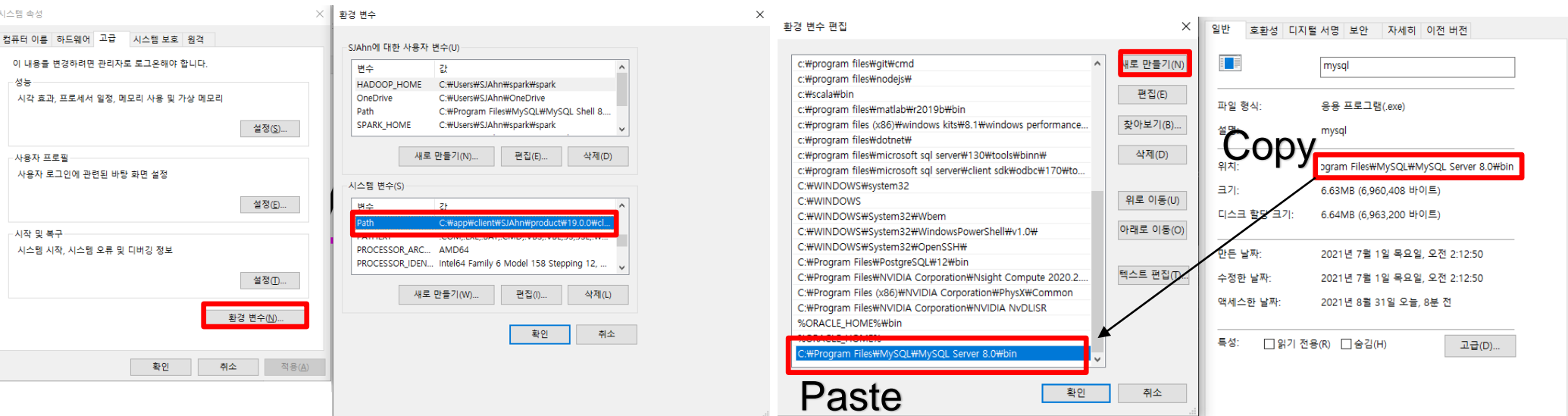
- 3) Run *MySQL Installer.exe*
- 4) Install 'Developer Default' type



MySQL

◆ Installation (For windows)

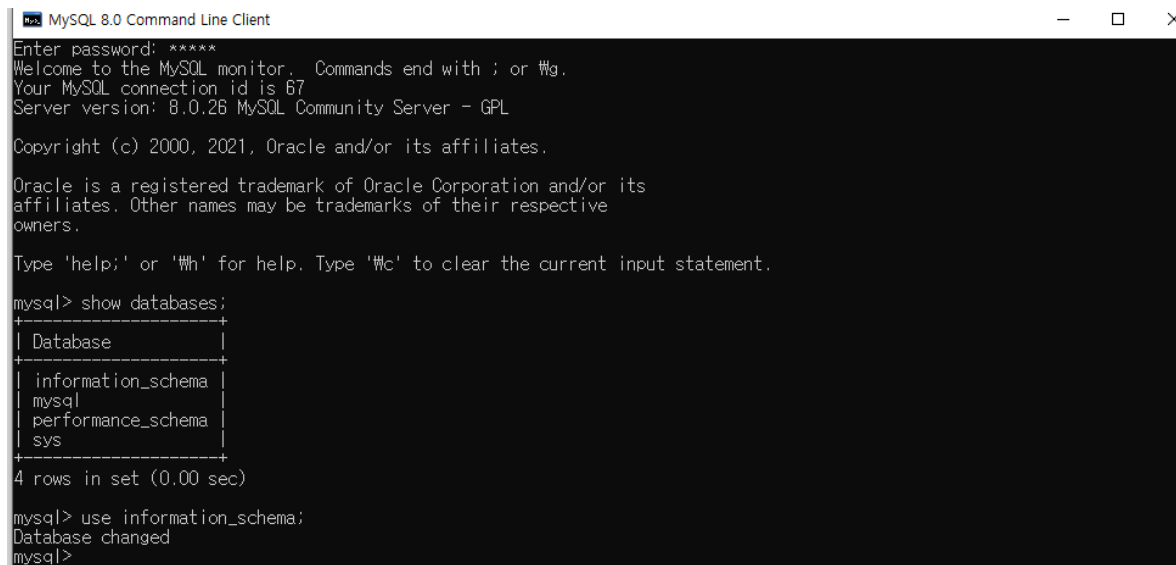
5) Set System environment variable



MySQL

◆ Run MySQL (For windows)

- Run MySQL command line
- Enter password
- Access to databases



```
MySQL 8.0 Command Line Client
Enter password: *****
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 67
Server version: 8.0.26 MySQL Community Server - GPL

Copyright (c) 2000, 2021, Oracle and/or its affiliates.

Oracle is a registered trademark of Oracle Corporation and/or its
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> show databases;
+-----+
| Database                |
+-----+
| information_schema       |
| mysql                    |
| performance_schema       |
| sys                      |
+-----+
4 rows in set (0.00 sec)

mysql> use information_schema;
Database changed
mysql>
```

MySQL

◆ Installation (For mac)

- Select OS version depend on your device

MySQL Community Downloads

MySQL Community Server

General Availability (GA) Releases Archives

MySQL Community Server 8.0.26

Select Operating System: [Looking for previous GA versions?](#)

macOS

Select OS Version:

macOS 11 (ARM, 64-bit)

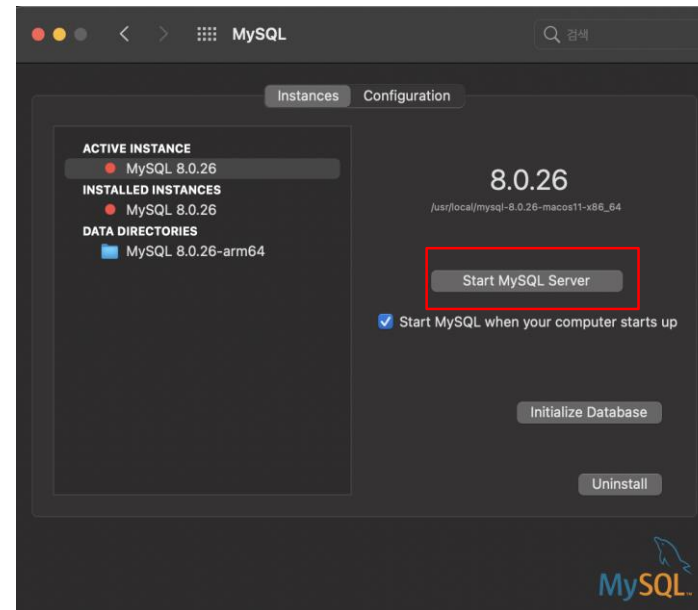
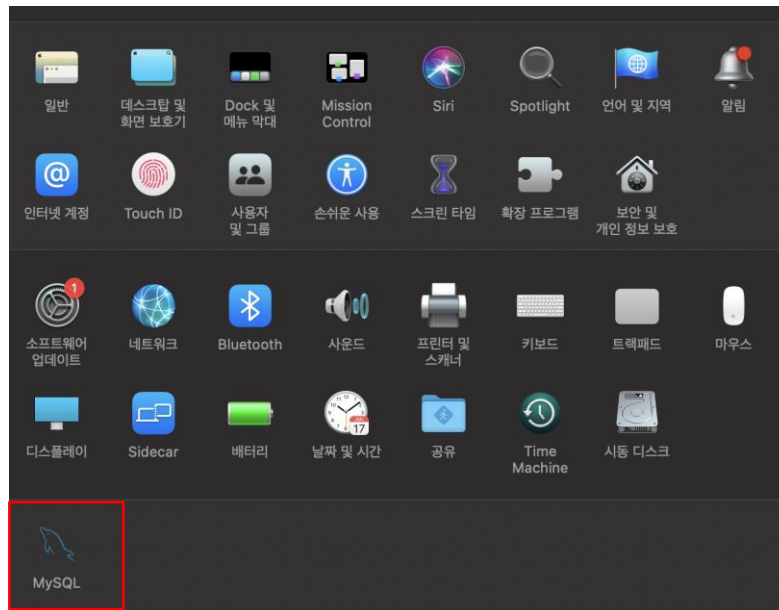
! Packages for Big Sur (11) on x86 are compatible with Catalina (10.15)

| | | | |
|---|--------|--------|-----------------|
| DMG Archive | 8.0.26 | 413.8M | Download |
| <small>(mysql-8.0.26-macos11-arm64.dmg) MD5: f052981e6c26e124d85784d55fccc0ca Signature</small> | | | |

MySQL

◆ Installation (For mac)

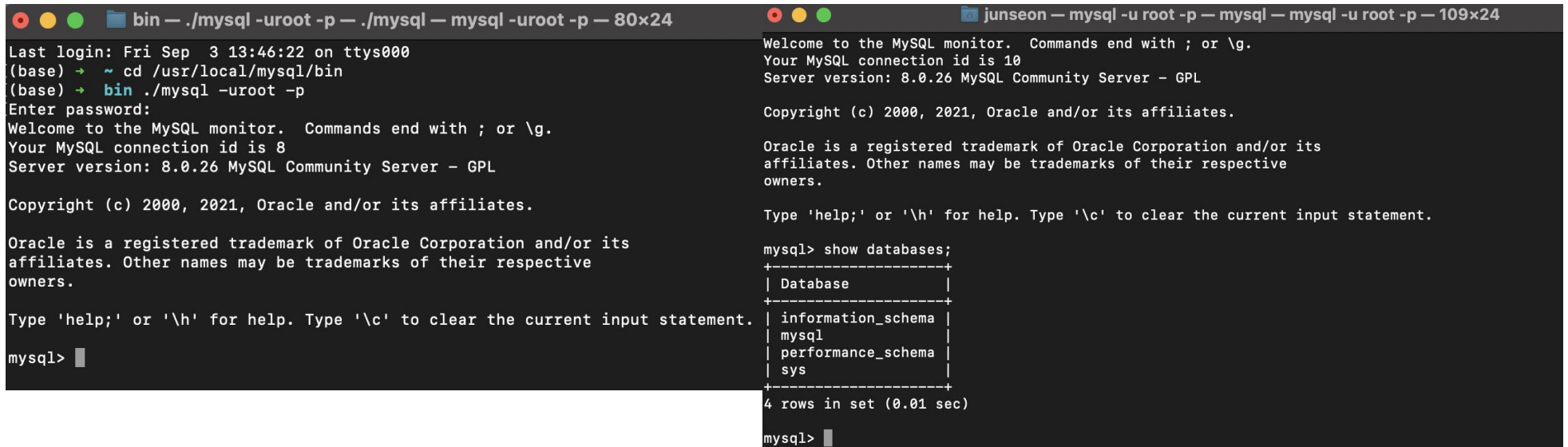
- Run `mysql-8.0.26-macos11-arm64.pkg(x86_64.pkg)`
- Go to system preferences => Click MySQL
- Click 'Start MySQL Server'



MySQL

◆ Run MySQL (For mac)

- Change the directory : `>> cd /usr/local/mysql/bin`
- To start MySQL : `>> ./mysql -uroot -p`



```
bin — ./mysql -uroot -p — ./mysql — mysql -uroot -p — 80x24
Last login: Fri Sep  3 13:46:22 on ttys000
(base) → ~ cd /usr/local/mysql/bin
(base) → bin ./mysql -uroot -p
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 8
Server version: 8.0.26 MySQL Community Server - GPL

Copyright (c) 2000, 2021, Oracle and/or its affiliates.

Oracle is a registered trademark of Oracle Corporation and/or its
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>
```

```
junseon — mysql -u root -p — mysql — mysql -u root -p — 109x24
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 10
Server version: 8.0.26 MySQL Community Server - GPL

Copyright (c) 2000, 2021, Oracle and/or its affiliates.

Oracle is a registered trademark of Oracle Corporation and/or its
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> show databases;
+-----+
| Database |
+-----+
| information_schema |
| mysql |
| performance_schema |
| sys |
+-----+
4 rows in set (0.01 sec)

mysql>
```

MySQL

◆ MySQL configuration (For mac)

- To set the configuration >> mysql_secure_installation
- You should press “No” to “Disallow root login remotely?”, others are no matter

```
((base) → ~ mysql_secure_installation

Securing the MySQL server deployment.

Enter password for user root:
The 'validate_password' component is installed on the server.
The subsequent steps will run with the existing configuration
of the component.
Using existing password for root.

Estimated strength of the password: 25
Change the password for root ? ((Press y|Y for Yes, any other key for No) : n

... skipping.
By default, a MySQL installation has an anonymous user,
allowing anyone to log into MySQL without having to have
a user account created for them. This is intended only for
testing, and to make the installation go a bit smoother.
You should remove them before moving into a production
environment.

Disallow root login remotely? (Press y|Y for Yes, any other key for No) : no

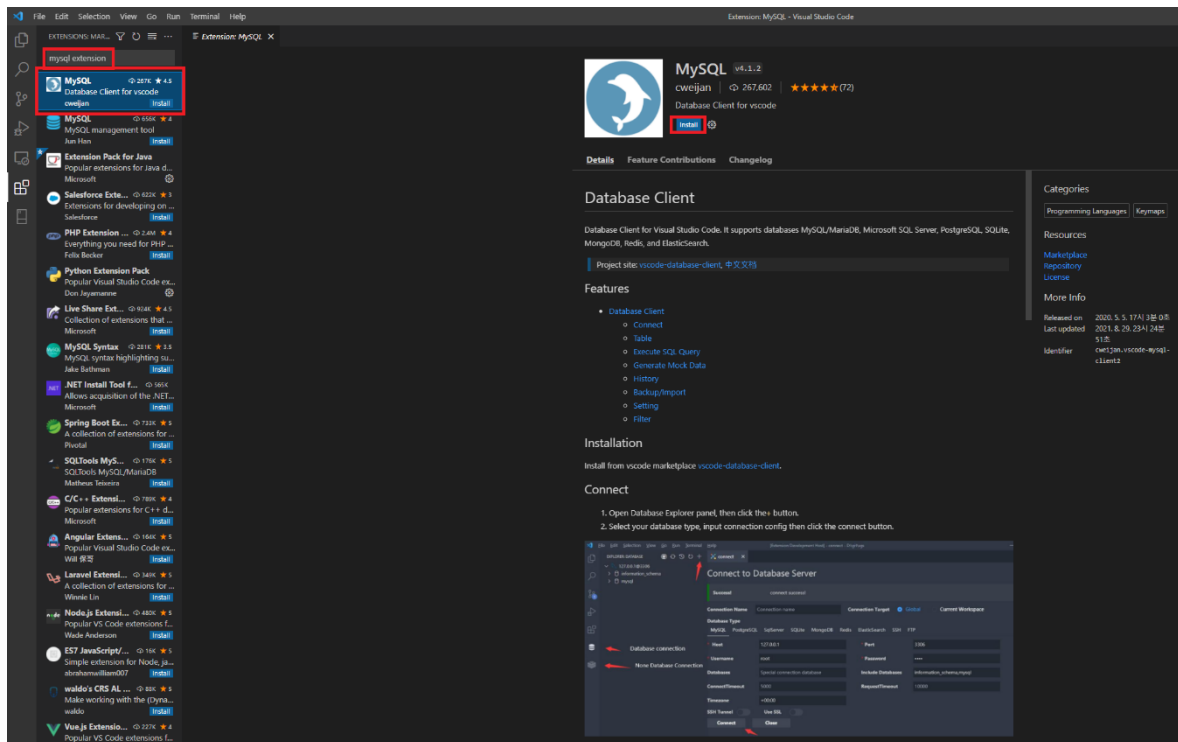
... skipping.
By default, MySQL comes with a database named 'test' that
anyone can access. This is also intended only for testing,
and should be removed before moving into a production
environment.

Remove test database and access to it? (Press y|Y for Yes, any other key for No) : no

... skipping.
Reloading the privilege tables will ensure that all changes
made so far will take effect immediately.
```

Run MySQL on VSCode

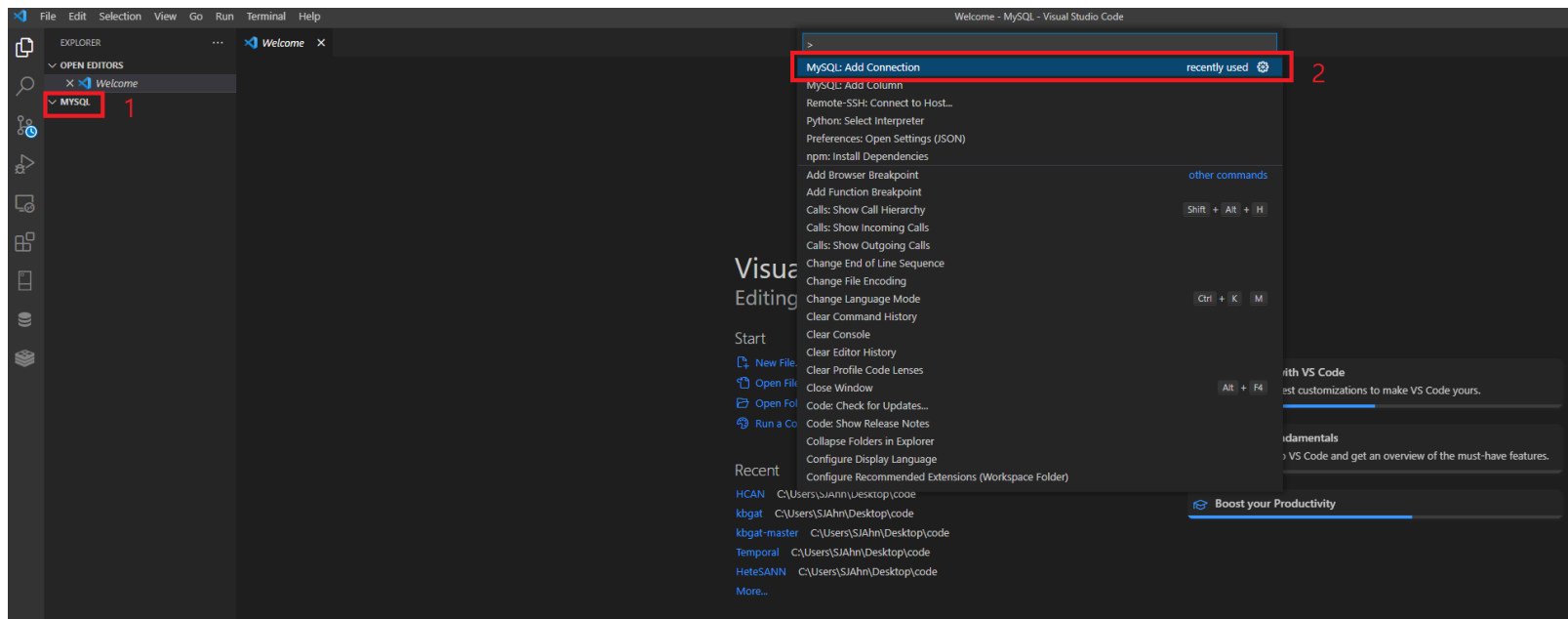
◆ Install MySQL extension on VSCode



Run MySQL on VSCode

◆ Connect to Database Server

- Go to command palette (Ctrl + Shift + P)
- Find 'MySQL : Add Connection'



Run MySQL on VSCode

◆ Connect to Database Server

Connect to Database Server

Success! connect success!

Connection Name: test Connection Target: ☒ Global ☐ Current Workspace

Database Type: MySQL PostgreSQL SqlServer SQLite MongoDB Redis ElasticSearch SSH FTP

* Host: 127.0.0.1 * Port: 3306

* Username: root * Password:

Databases: Special connection database Include Databases: Example: mysql,information_schema

ConnectTimeout: 5000 RequestTimeout: 10000

Timezone: +00:00

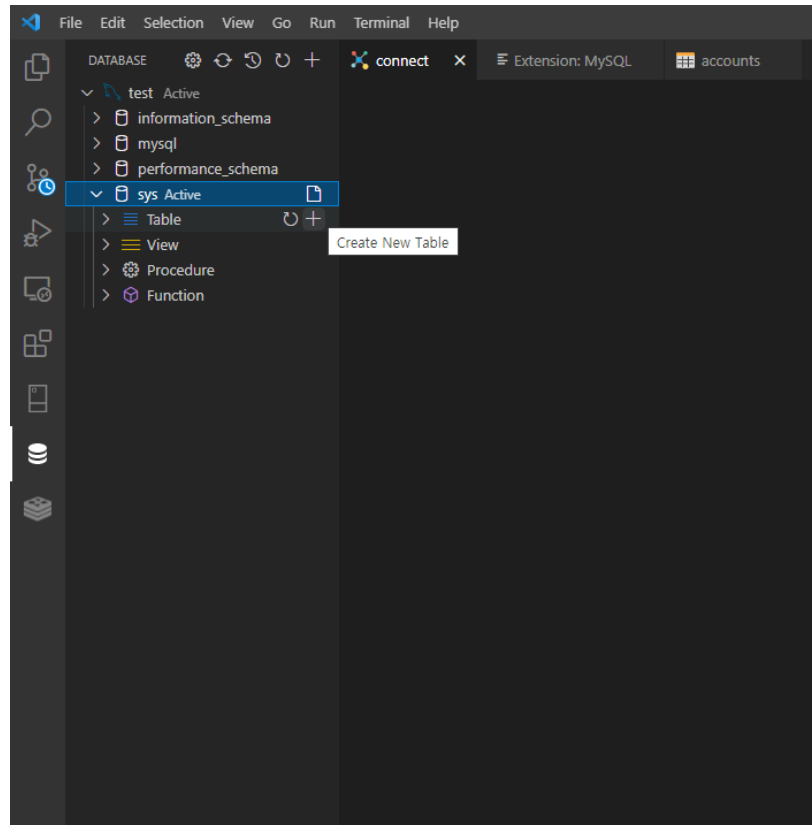
SSH Tunnel: ☐ Use SSL: ☐

Connect Close

Password you set in p.20

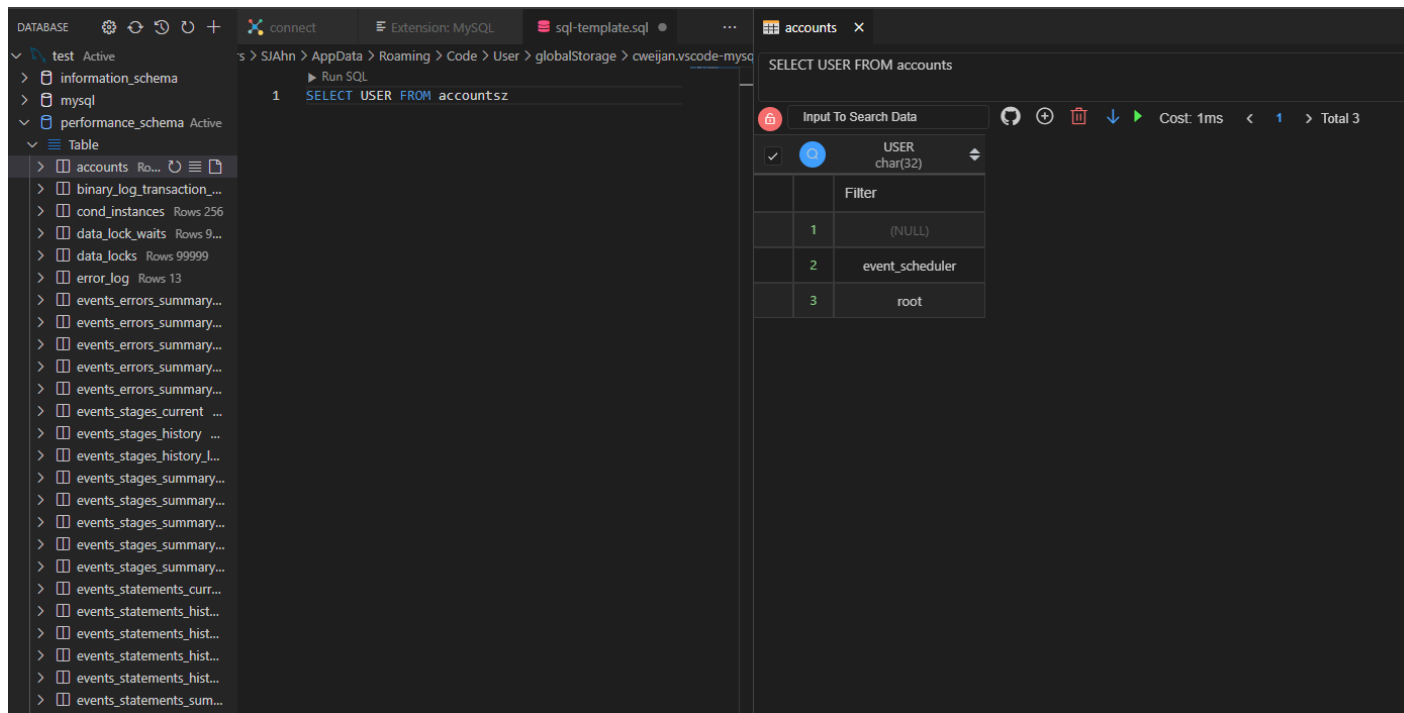
Run MySQL on VSCode

- ◆ **Create** a sql file.



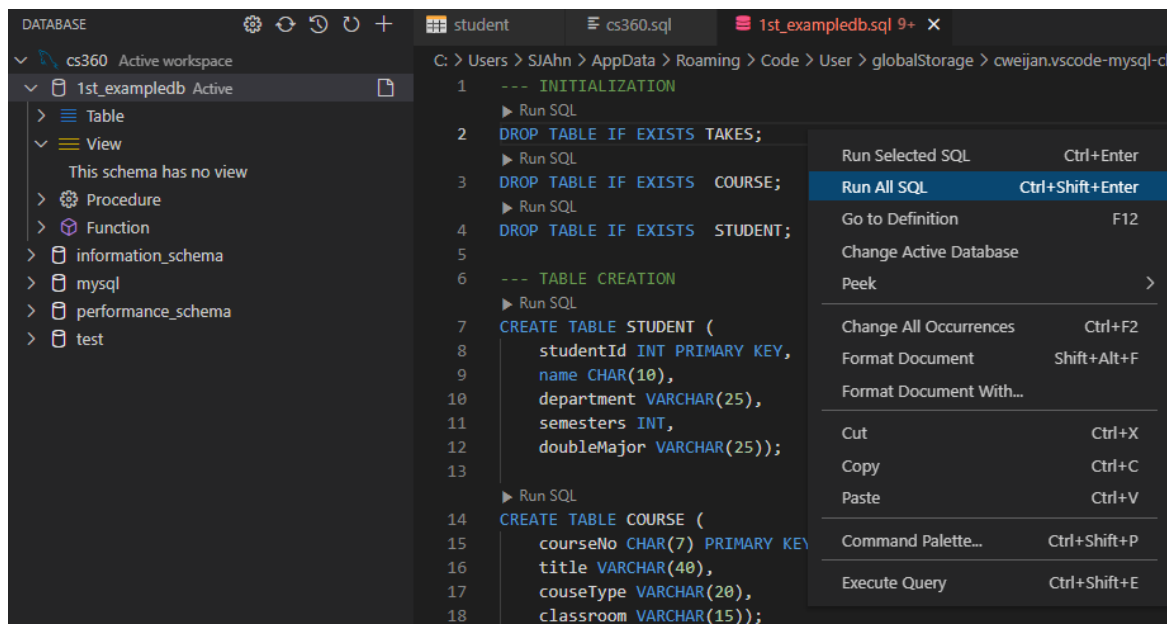
Run MySQL on VSCode

- ◆ **Use** the data in databases by using the sql file
 - You can run a sql command by pressing a 'F9' key.



Run MySQL on VSCode

- ◆ **Use** the data in databases by using the sql file
 - You can also run multiple commands at once.
(press a right button and a 'Run All SQL' command)



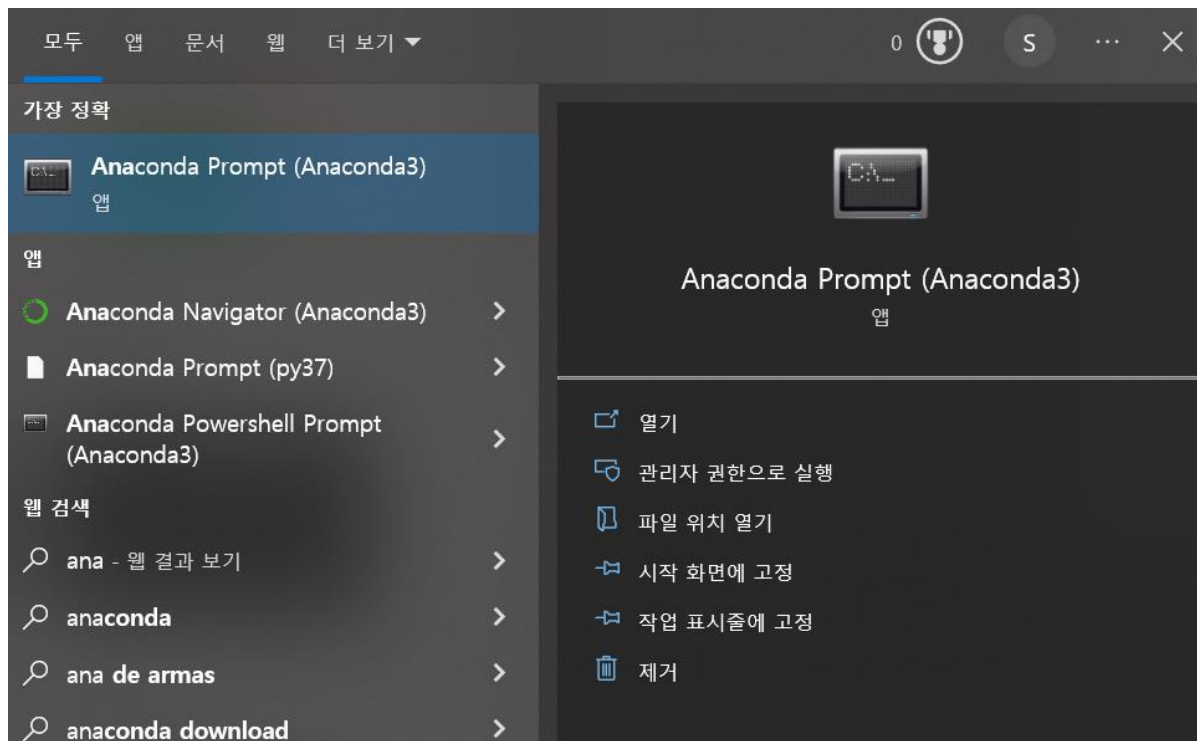
Anaconda

- ◆ Widely used open-source package for manage environment
- ◆ How to install Anaconda?
 - <https://docs.anaconda.com/anaconda/install/>
 - <https://www.anaconda.com/products/distribution>



Anaconda

1. Run anaconda prompt



Anaconda

2. Create an environment

- `conda create -n <envName> python=<version>`

```
Anaconda Prompt (Anaconda3) - conda create -n cs360 python=3.7

(base) C:\Users\SJAhn>conda create -n cs360 python=3.7
Collecting package metadata (current_repodata.json): done
Solving environment: done

==> WARNING: A newer version of conda exists. <==
  current version: 4.12.0
  latest version: 23.1.0

Please update conda by running

  $ conda update -n base -c defaults conda
```

MySQL Connector/Python

3. Activate the environment
 - activate <envName>
4. Download mysql-connector-python on the environment
 - conda install mysql-connector-python (or pip install mysql-connector-python)