

Tableau與資料庫實務應用

大數據分析

- R/Python/Julia/SQL 程式設計與應用
(R/Python/Julia/SQL Programming and Application)
- 資料視覺化 (Data Visualization)
- 機器學習 (Machine Learning)
- 統計品管 (Statistical Quality Control)
- 最佳化 (Optimization)



李明昌博士

alan9956@gmail.com

<http://rwepa.blogspot.com/>

個人簡介 <http://rwepa.blogspot.com/>

- 姓名：李明昌 (ALAN LEE)
- 現職：中華R軟體學會 常務理事
臺灣資料科學與商業應用協會 常務理事
- 學歷：中原大學 工業與系統工程所 博士
- 經歷：
 - 育達科技大學 資訊管理系(所) 專任助理教授
 - 佛光大學 兼任教師
 - 國立台北商業大學 兼任教師
 - 東吳大學 兼任教師
 - 崇友實業 行銷企劃專員
 - 國航船務代理股份有限公司 海運市場運籌管理員
- 大專院校、資策會、工業技術研究院、國家發展委員會、中央氣象局、公平交易委員會、各縣市政府與日本名古屋產業大學等公民營單位演講達300餘場，2900小時以上。
- 連絡資訊：alan9956@gmail.com



- iPAS 巨量資料分析師 證照推廣
- iPAS 營運智慧分析師 證照推廣

大綱

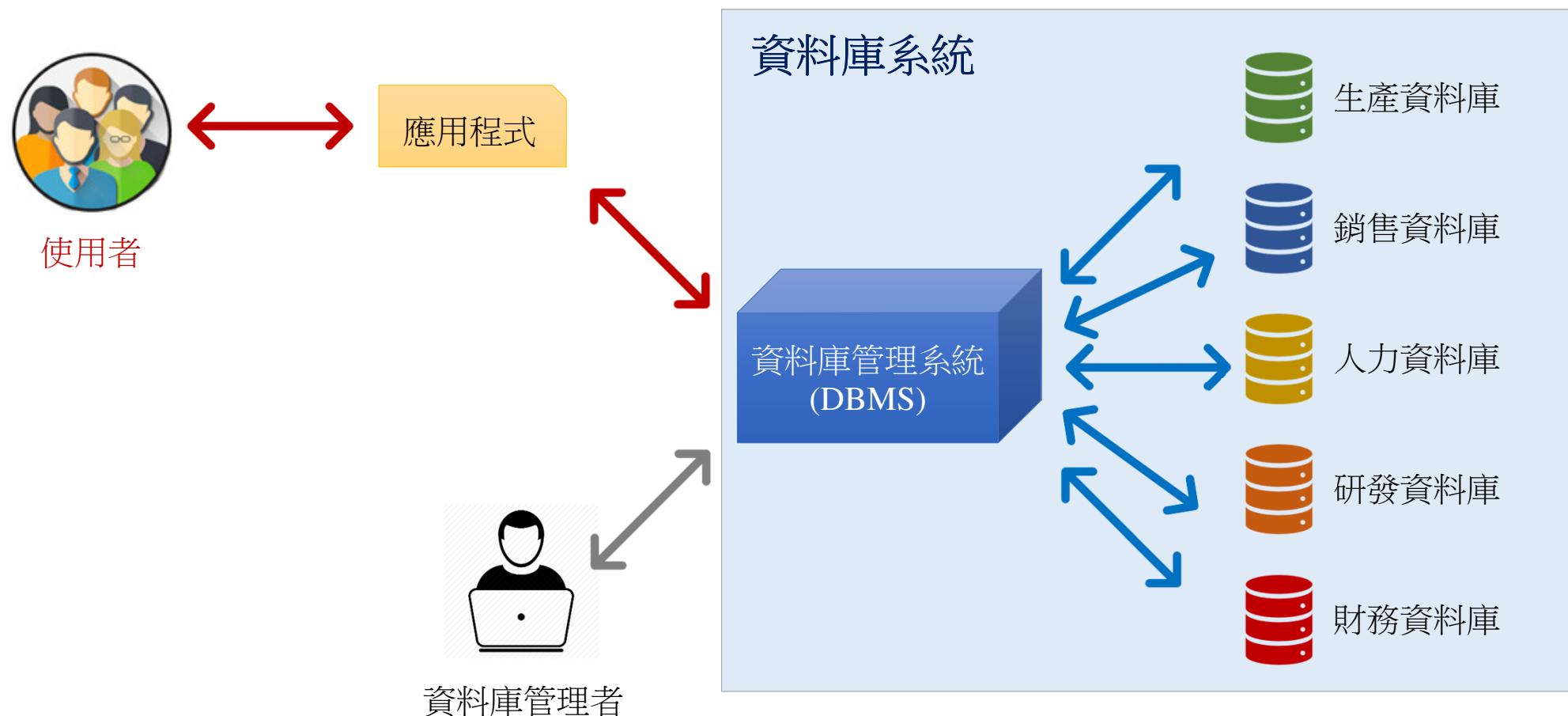
1. MySQL下載與安裝
2. MySQL Shell與MySQL Workbench簡介
3. Tableau與MySQL資料庫整合應用

1. MySQL下載與安裝



資料庫簡介

資料庫系統架構



資料庫管理系統的基本功能

- 資料定義

- 充份定義並管理各種類型的資料項目。

- 資料處理

- 提供使用者對資料庫的存取能力, 包括新增、修改、查詢、與刪除等基本功能。

- 資料安全

- 應該具備設定使用者帳戶、密碼、及權限的功能。

- 資料備份

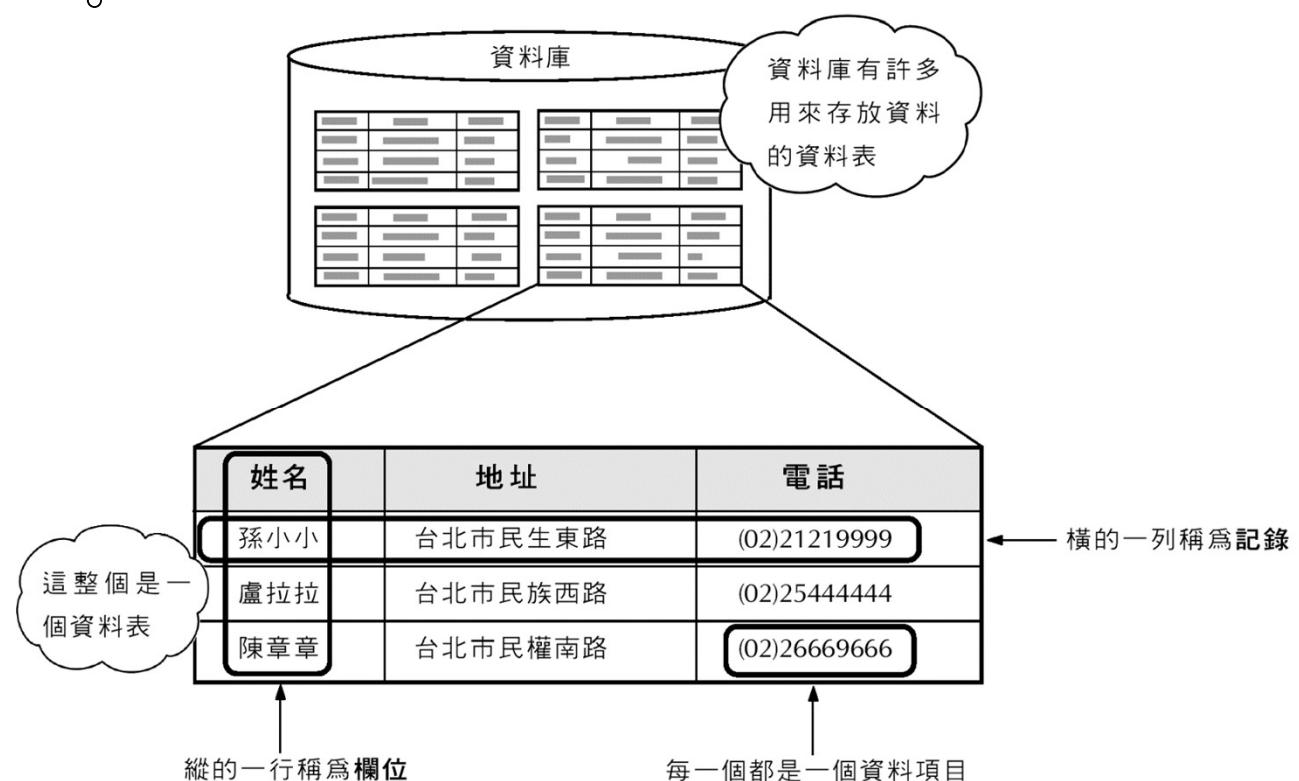
- 可以還原到備份資料時的狀況。

資料庫的類型

- 階層式資料庫 (Hierarchical Database)
- 網狀式資料庫 (Network Database)
- 關聯式資料庫 (Relational Database) → 使用 MySQL 資料庫
- 物件導向式資料庫 (Object-Oriented Database)
- NoSQL Database: <https://zh.wikipedia.org/wiki/NoSQL>

關聯式資料庫 (Relational Database)

使用二維的矩陣來儲存資料，而儲存在欄、列裡的資料必會有“關聯”。



關聯式資料庫 (Relational Database)

姓名	地址	電話
孫小小	台北市民生東路	(02)21219999
盧拉拉	台北市民族西路	(02)25444444
陳章章	台北市民權東路	(02)26669666

關聯式資料庫 (Relational Database)

訂單序號	日期	客戶編號	是否付款
1	2012/7/1	6	1
2	2012/7/1	3	1
3	2012/7/3	2	0

訂單資料表

客戶編號	客戶名稱	聯絡人	性別	地址
1	十全書店	陳圓圓	女	台北市
2	大發書店	陳季暄	女	台北市
3	好看書店	趙飛燕	女	台中市

客戶資料表

經由客戶編號欄的關聯，可知道
訂單序號 2 的客戶為好看書店

結構化查詢語言 SQL

```
USE 訂單資料庫  
CREATE TABLE 客戶資料表  
(  
    客戶編號 int,  
    聯絡人 char(10),  
    送貨地點 varchar(50)  
)
```

← 使用此資料庫
← 建立名稱為**客戶資料表**的資料表

指定資料表中的欄
位名稱及資料型別

客戶編號	聯絡人	送貨地點

資料庫系統的使用者

- 資料庫設計者 (Database Designer)
 - 依據使用者的需求設計適當的格式來存放資料。
- 資料庫管理者 (Database Administrator, DBA)
 - 要維護資料庫的有效運作, 並監督、記錄資料庫的操作狀況。
- 應用程式設計者 (Application Designer)
 - 負責撰寫存取資料庫的用戶端應用程式。
- 一般使用者 (End user)
 - 要學會用戶端的應用程式。

MySQL 下載

MySQL 下載與安裝

- Google → MySQL Community Download



MySQL 下載與安裝 (續)

- <https://dev.mysql.com/downloads/mysql/>

The screenshot shows the MySQL Community Server 8.0.31 download page. At the top, there are tabs for "General Availability (GA) Releases" and "Archives". A dropdown menu labeled "Select Operating System" is set to "Microsoft Windows". On the left, under "Recommended Download:", there is a red box around the "MySQL Installer for Windows" section. This section features an image of the Windows Start menu and the text "All MySQL Products. For All Windows Platforms. In One Package.". Below it, a link says "Windows (x86, 32 & 64-bit), MySQL Installer MSI" and a "Go to Download Page >" button. On the right, a tooltip says "Looking for versions?" and points to a dropdown menu titled "Select Operating System:". This dropdown is expanded, showing options like Microsoft Windows, Ubuntu Linux, Debian Linux, SUSE Linux Enterprise Server, Red Hat Enterprise Linux / Oracle Linux, Fedora, Linux - Generic, Oracle Solaris, macOS, and Source Code. The "Microsoft Windows" option is highlighted with a red box and a blue selection bar, with a mouse cursor hovering over it.

MySQL Community Downloads

The screenshot shows the MySQL Community Downloads page. At the top, there are three tabs: "General Availability (GA) Releases" (highlighted in orange), "Archives", and a help icon. Below the tabs, the text "MySQL Installer 8.0.31" is displayed, with a yellow callout bubble containing the Chinese text "最新版 8.0.31". To the right of this, a link says "Looking for previous GA versions?". A dropdown menu shows "Microsoft Windows" selected. The main content area lists two MSI installers:

Installer Type	Version	File Size	Action
Windows (x86, 32-bit), MSI Installer (mysql-installer-web-community-8.0.31.0.msi)	8.0.31	5.5M	Download
Windows (x86, 32-bit), MSI Installer (mysql-installer-community-8.0.31.0.msi)	8.0.31	431.7M	Download

A red arrow points from the text "最新版 8.0.31" to the "Download" button for the larger file.

MySQL 下載與安裝 (續)

⬇ MySQL Community Downloads

Login Now or Sign Up for a free account.

An Oracle Web Account provides you with the following advantages:

- Fast access to MySQL software downloads
- Download technical White Papers and Presentations
- Post messages in the MySQL Discussion Forums
- Report and track bugs in the MySQL bug system

[Login »](#)

using my Oracle Web account

[Sign Up »](#)

for an Oracle Web account

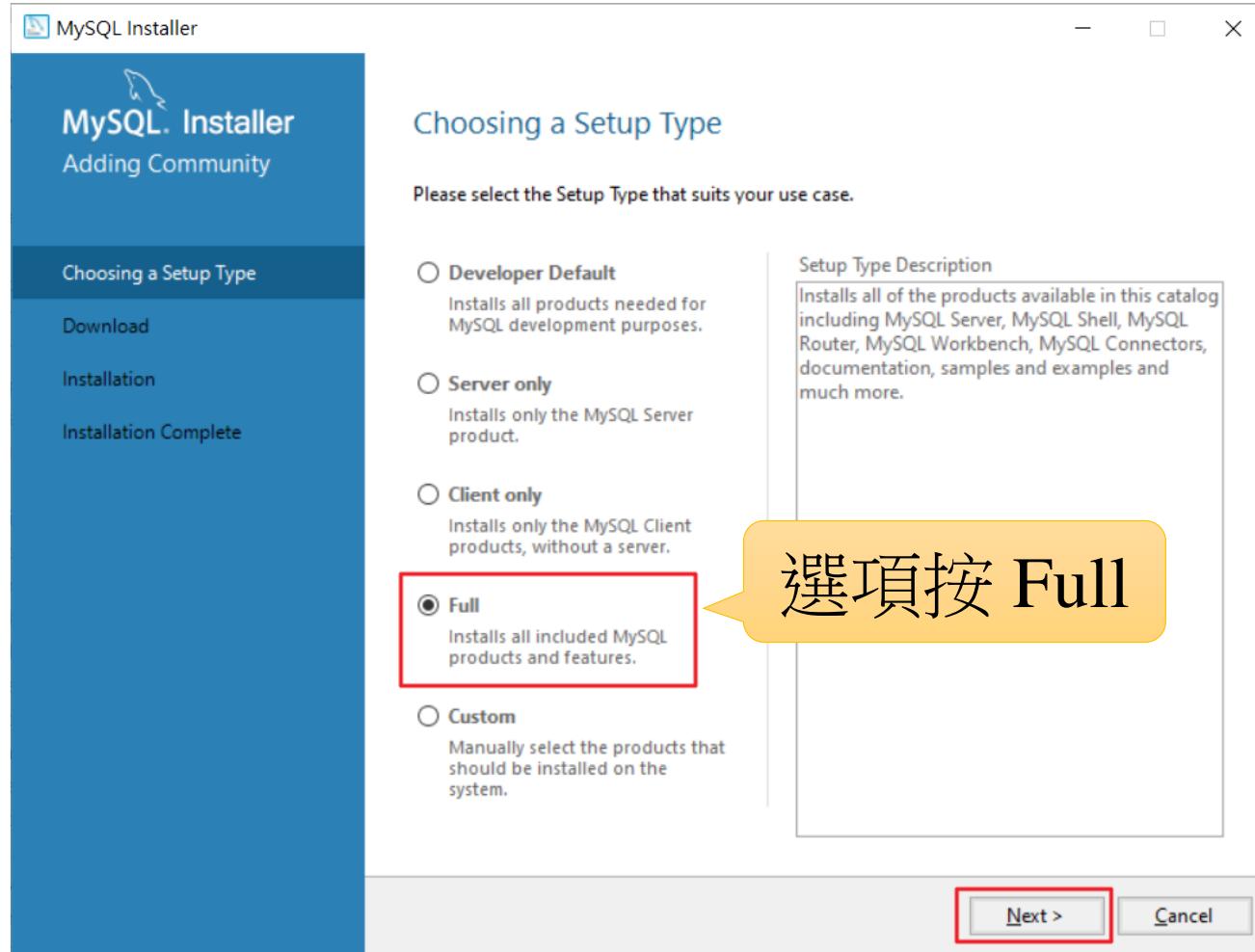
MySQL.com is using Oracle SSO for authentication. If you already have an Oracle Web account, click the Login link. Otherwise, you can signup for a free account by clicking the Sign Up link and following the instructions.

[No thanks, just start my download.](#)

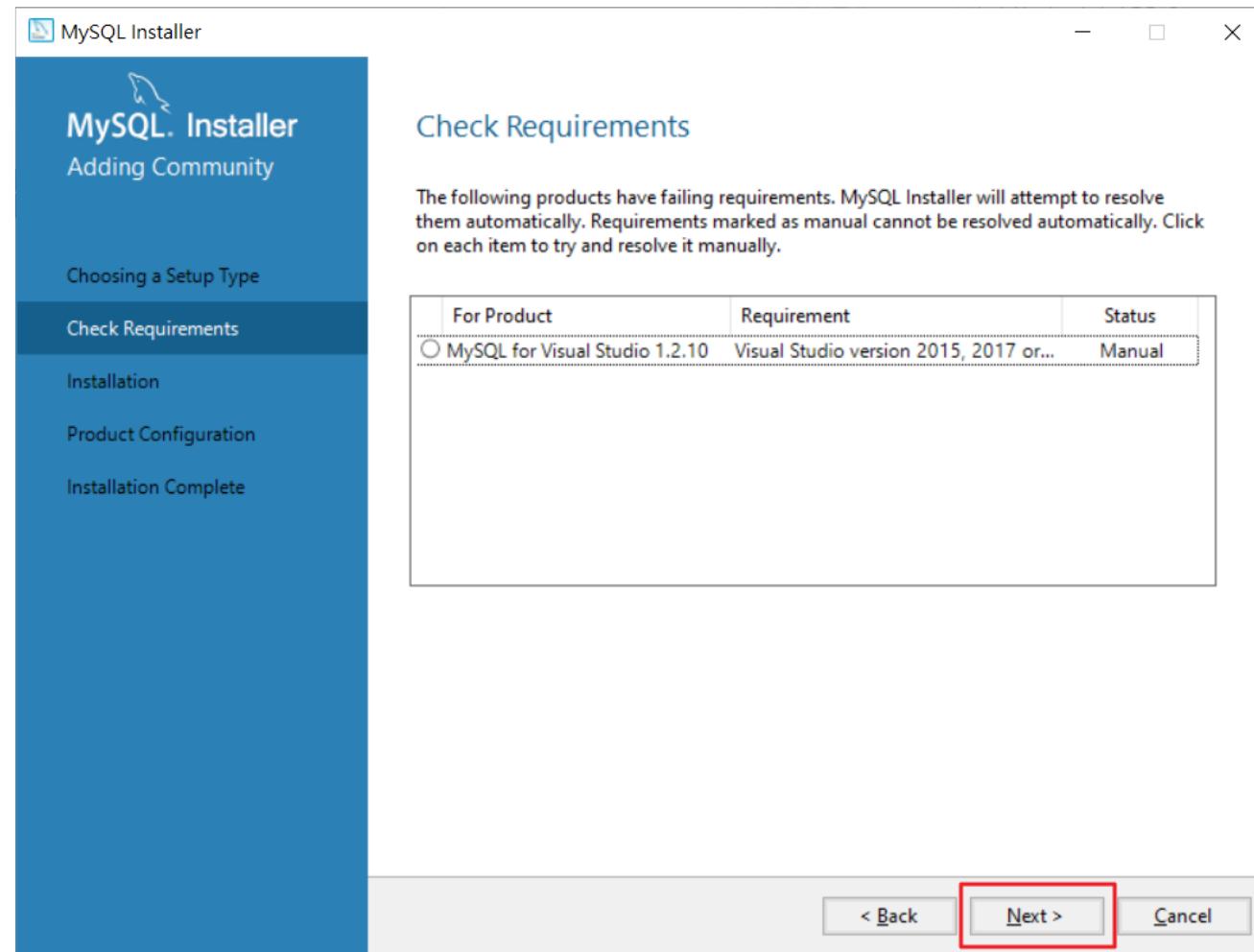
mysql-installer-community-8.0.31.0.msi

MySQL 安裝

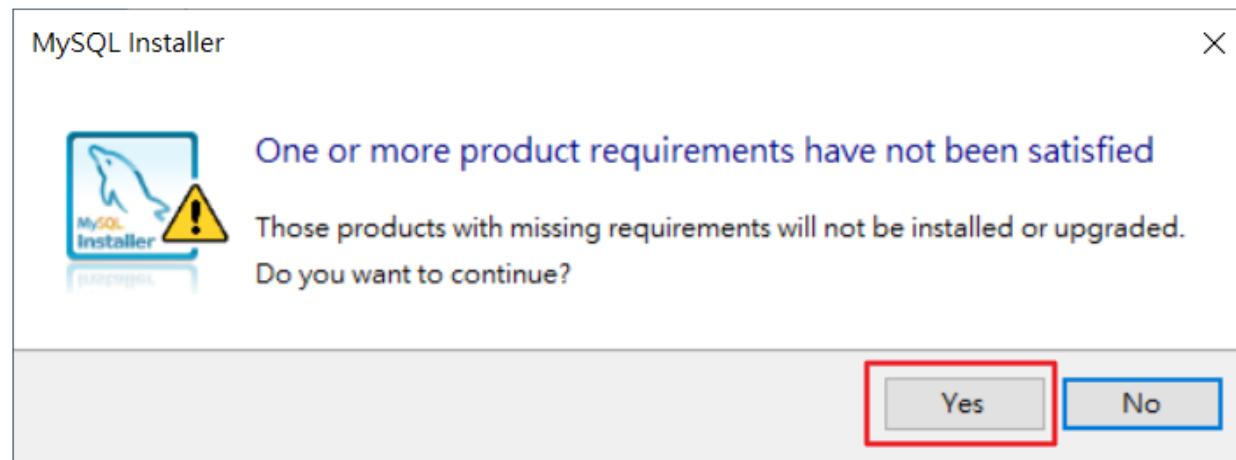
Choosing a Setup Type



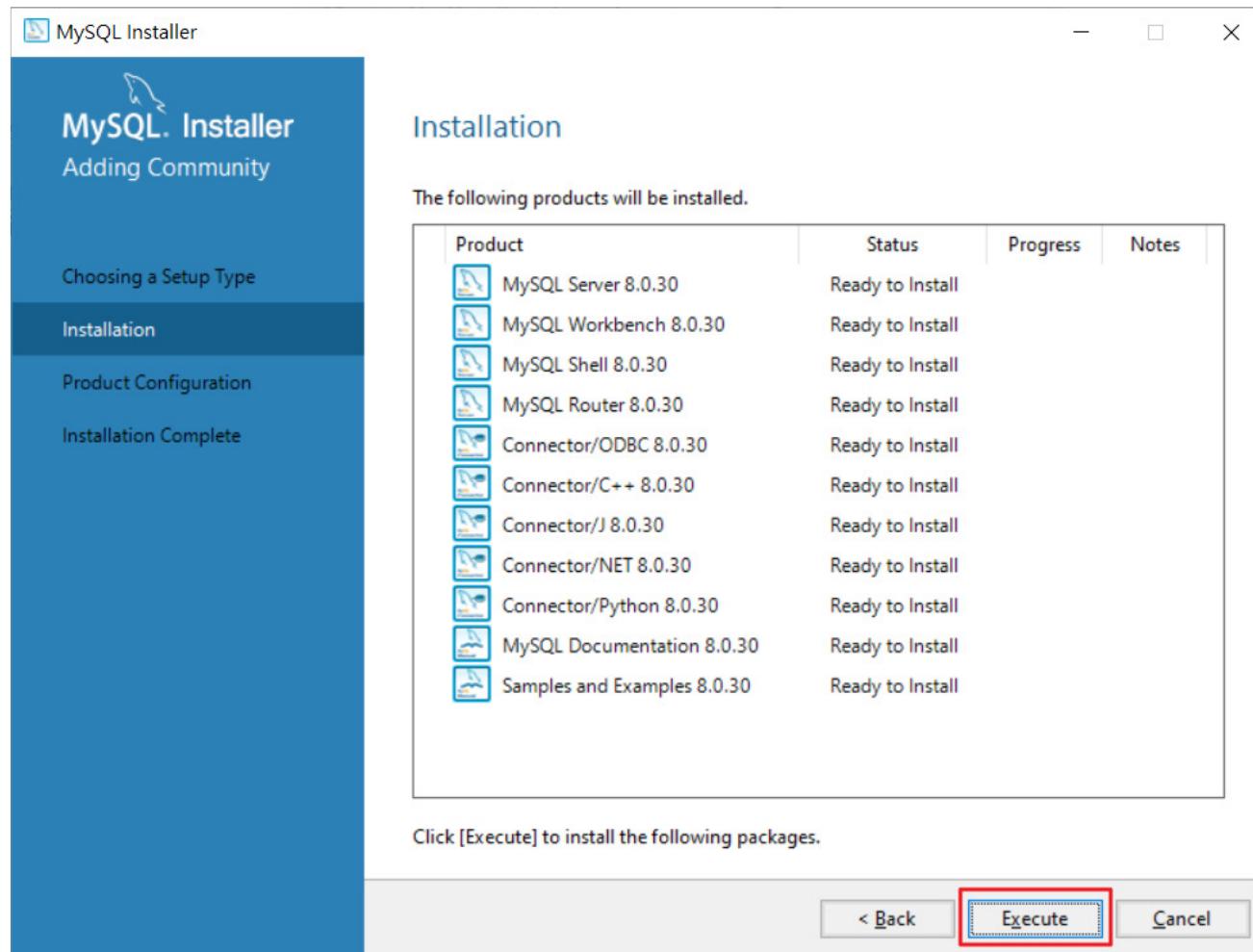
Check Requirements



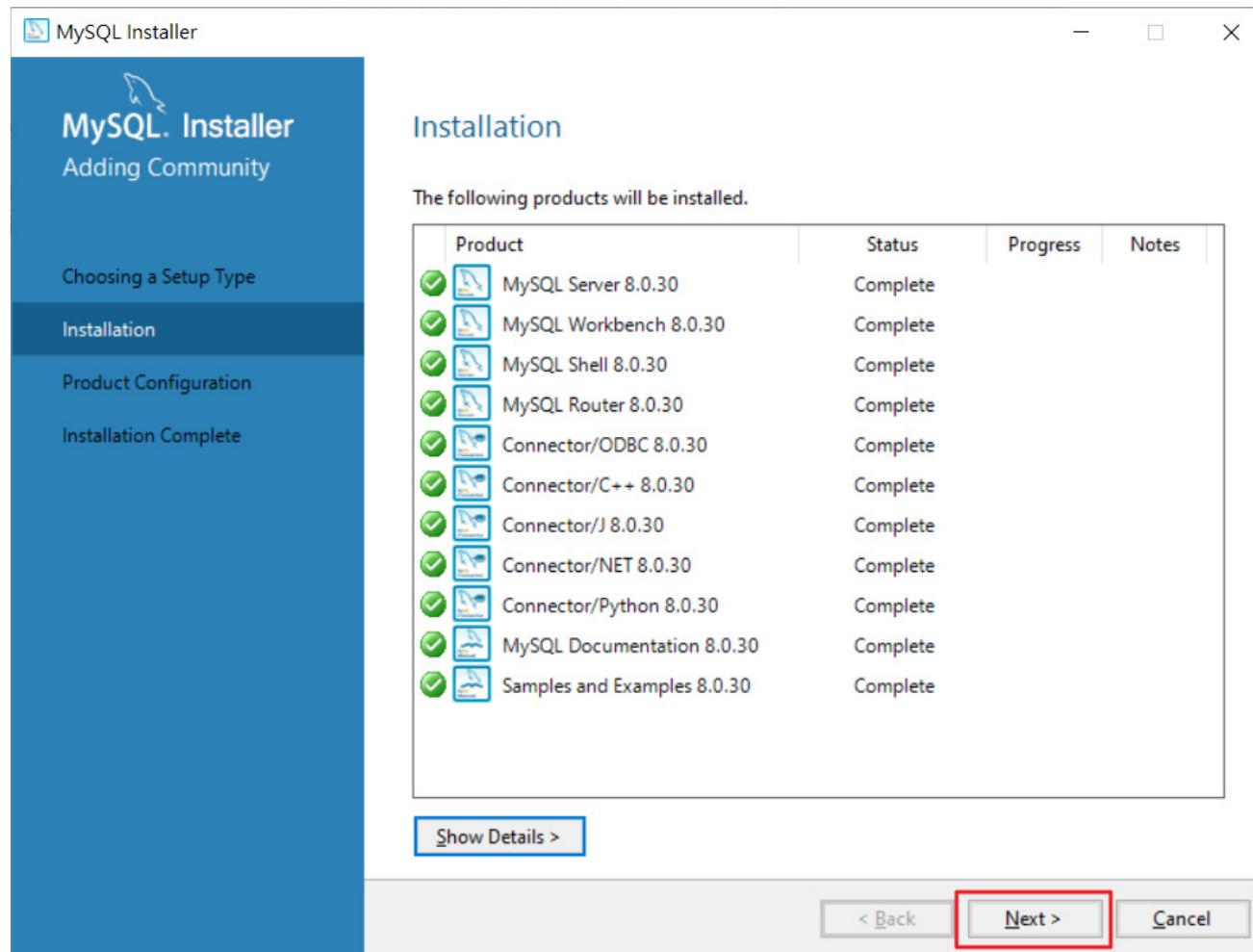
MySQL Installer



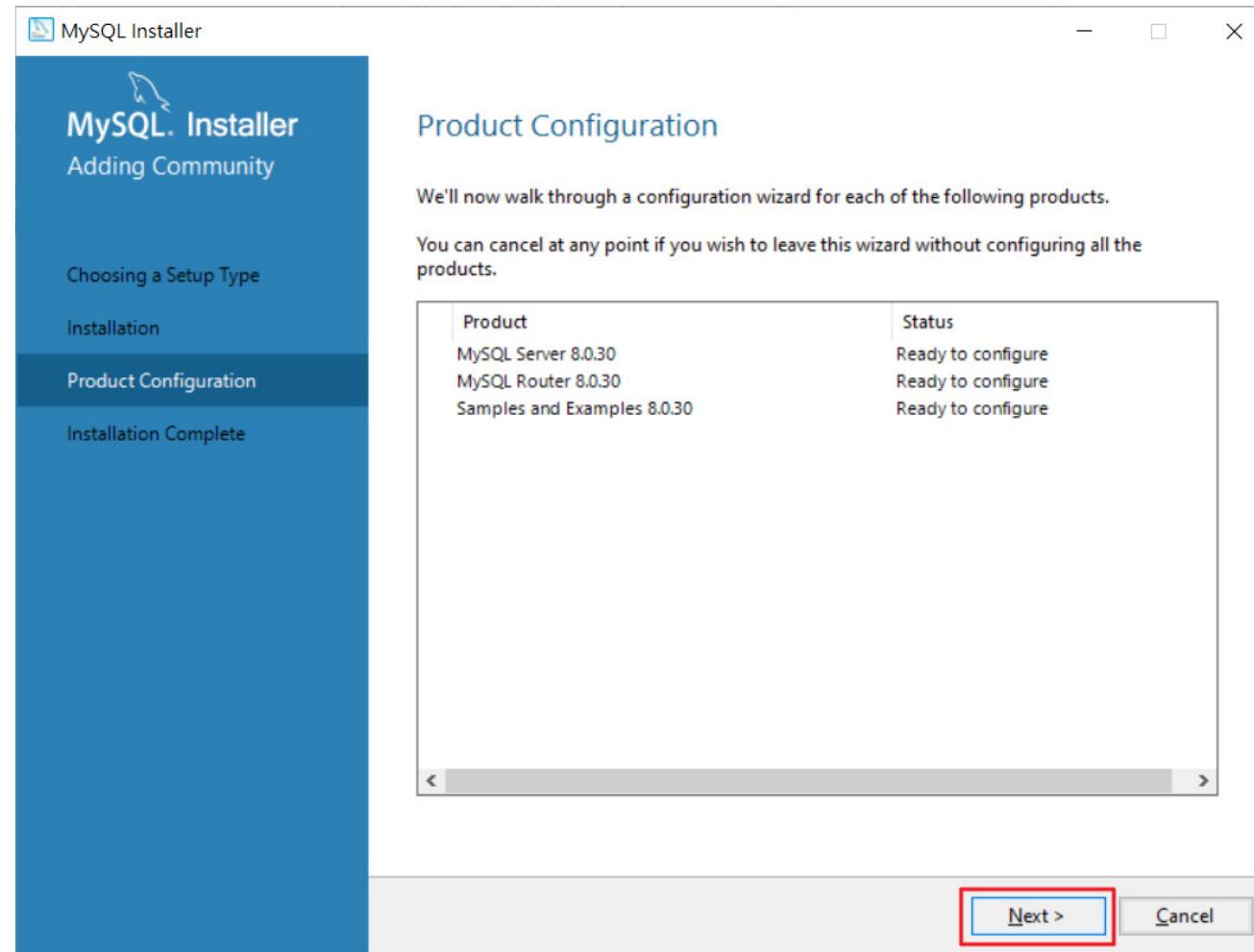
Installation



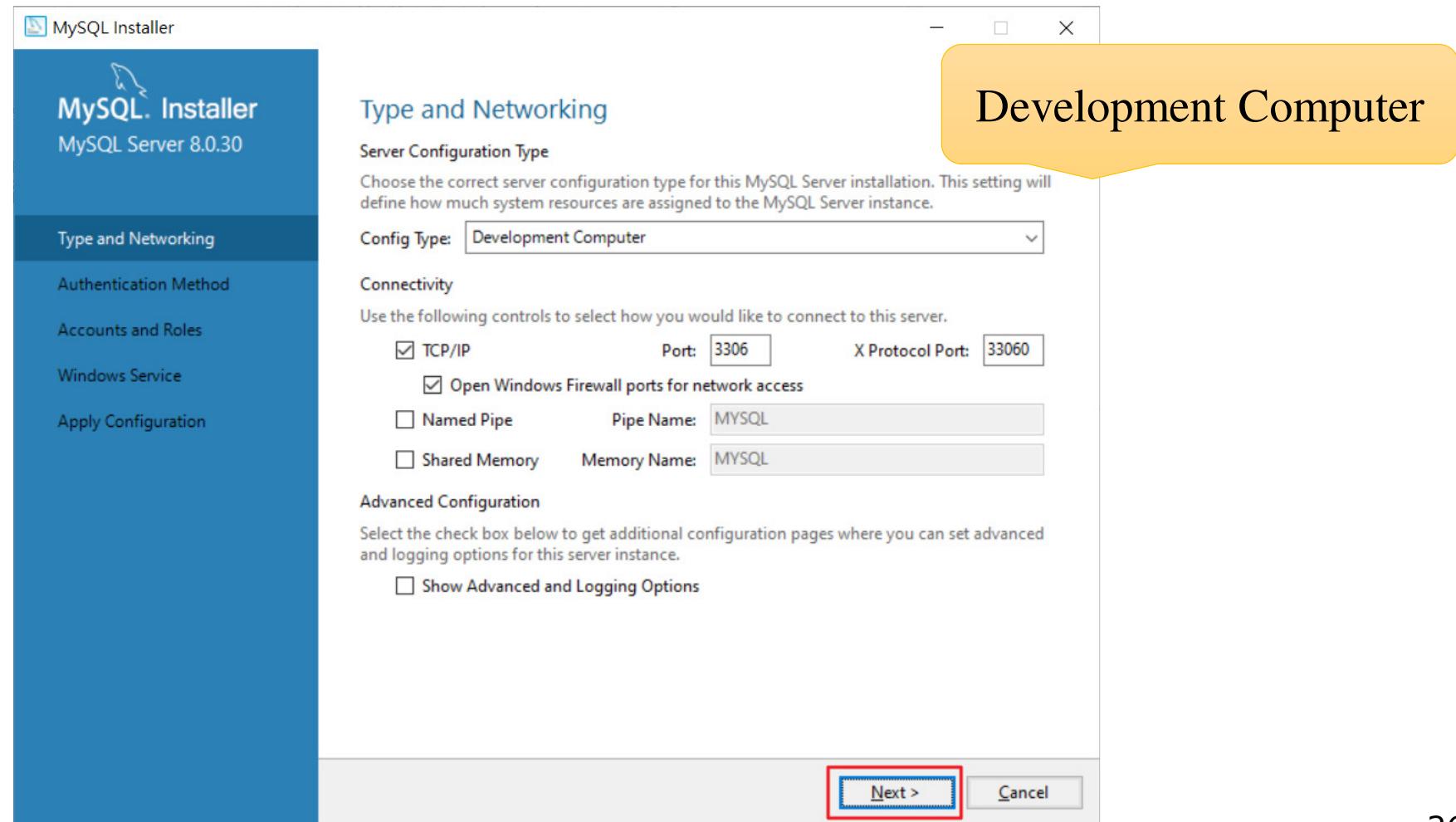
Installation



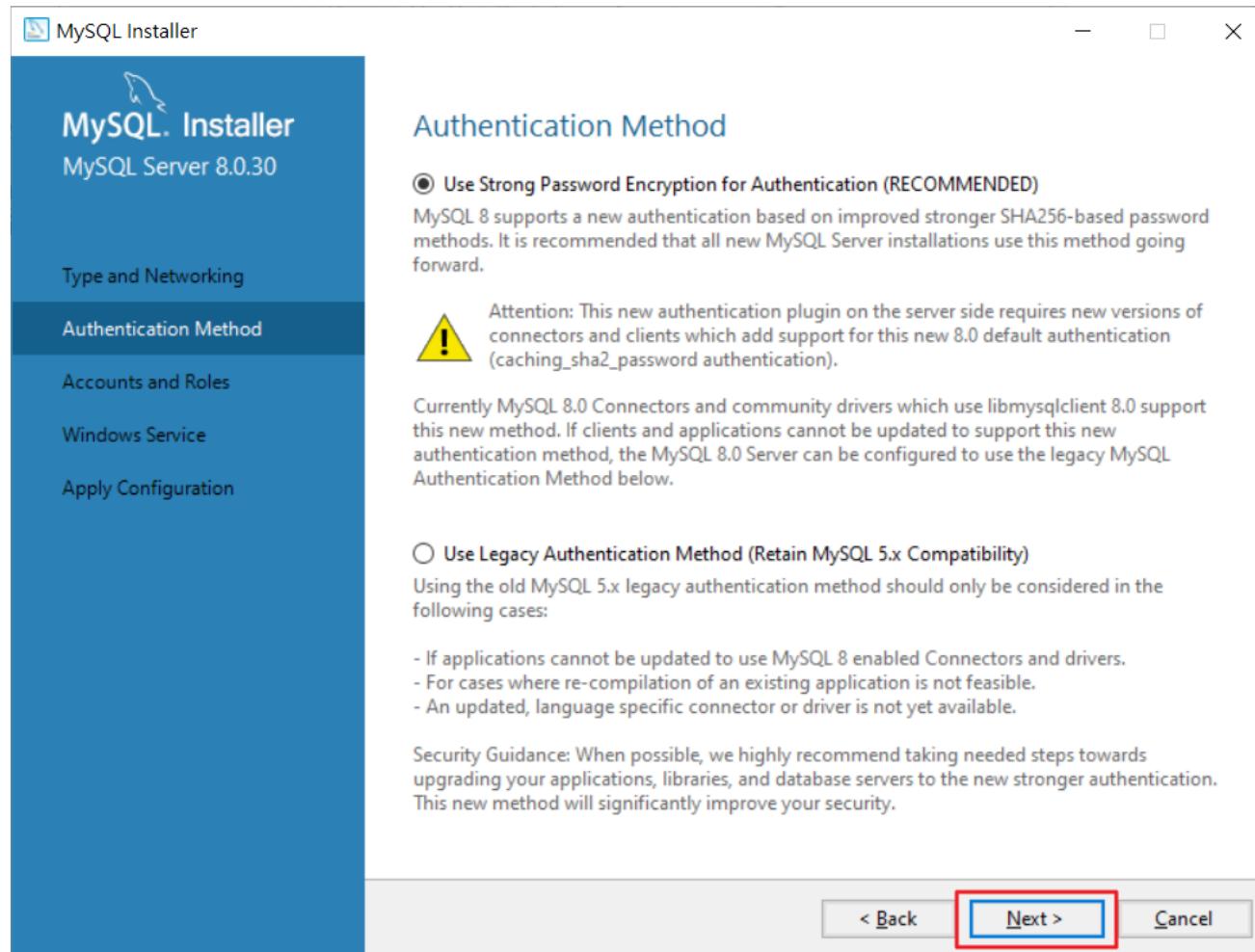
Product Configuration



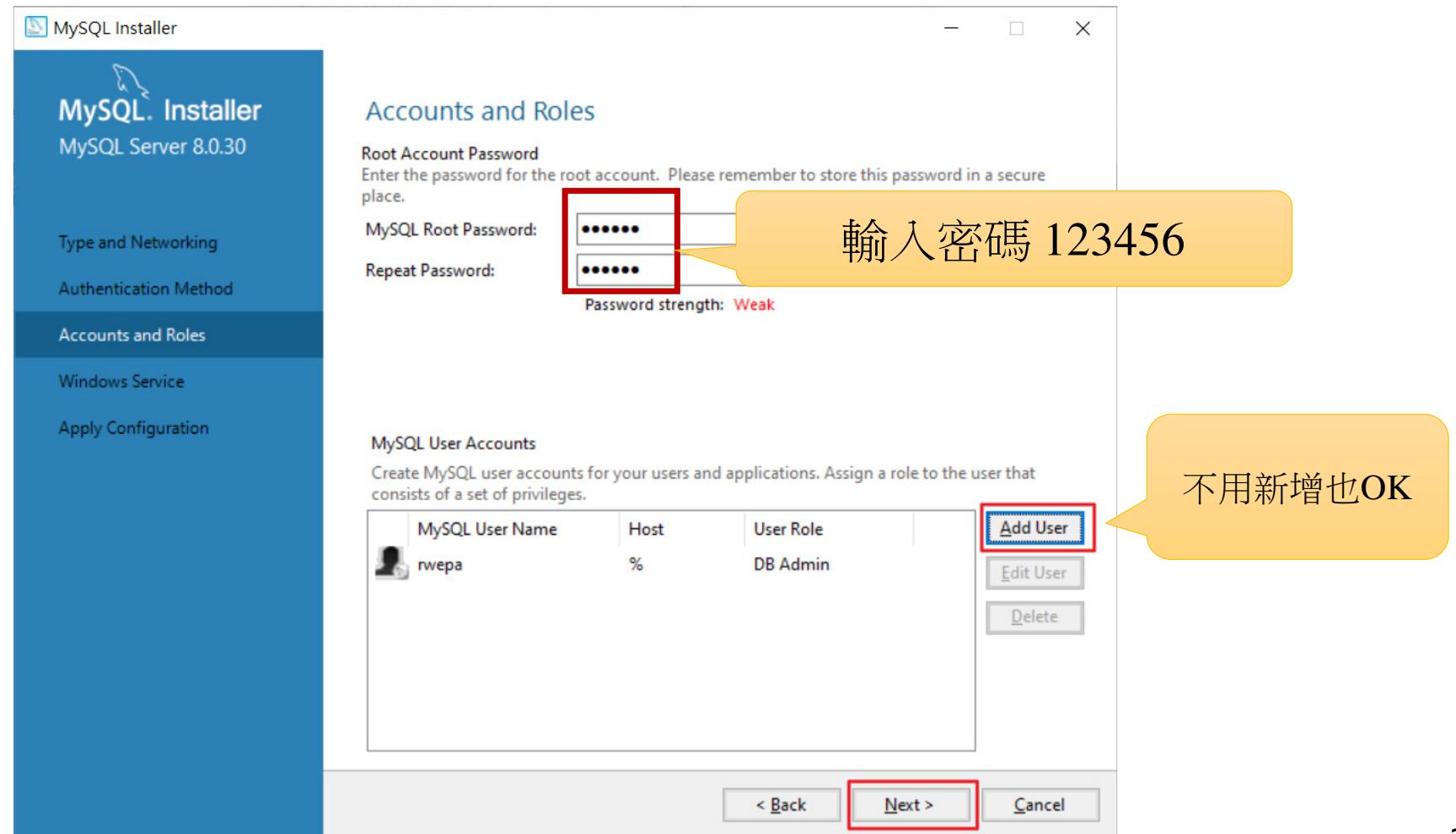
Type and Networking



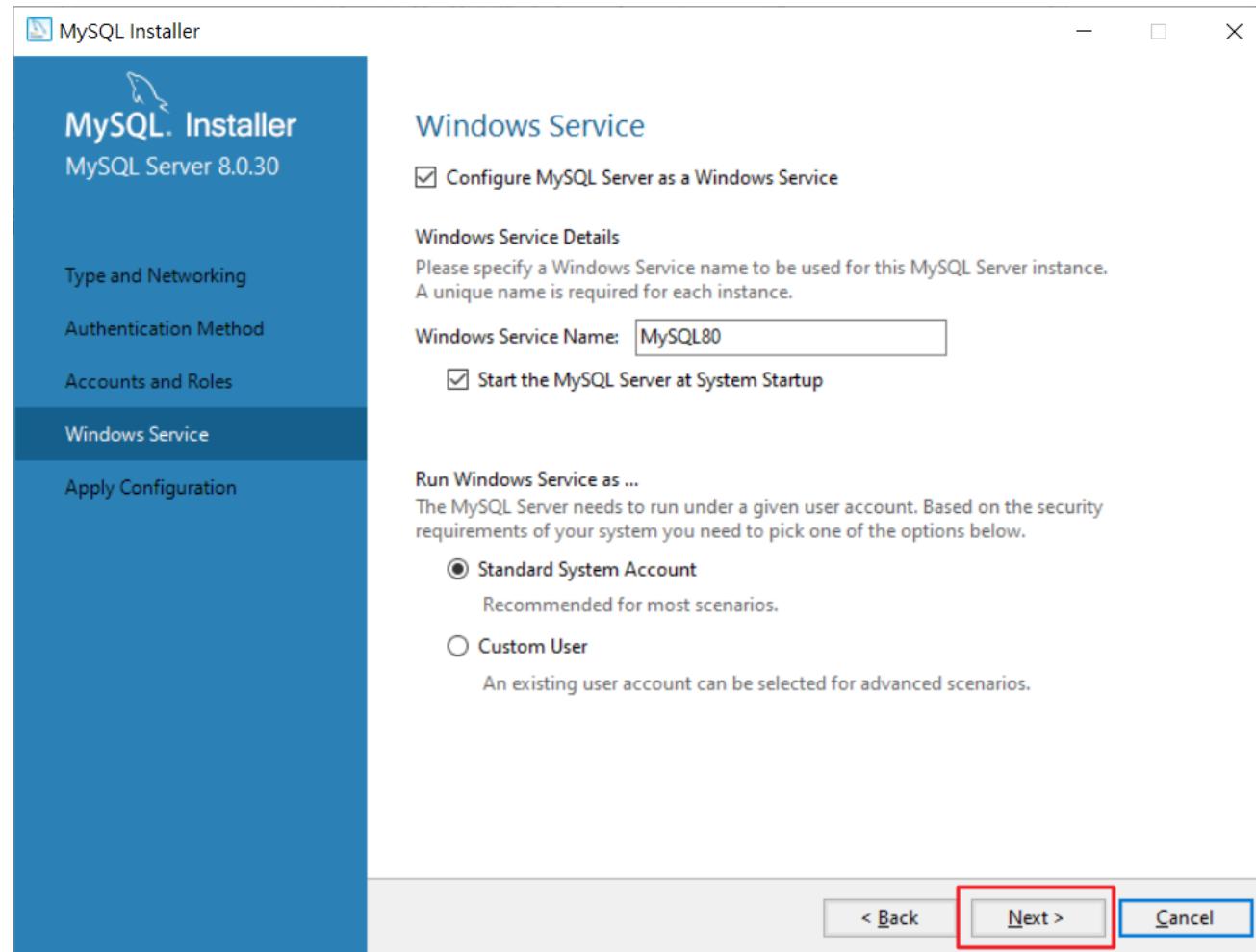
Authentication Method



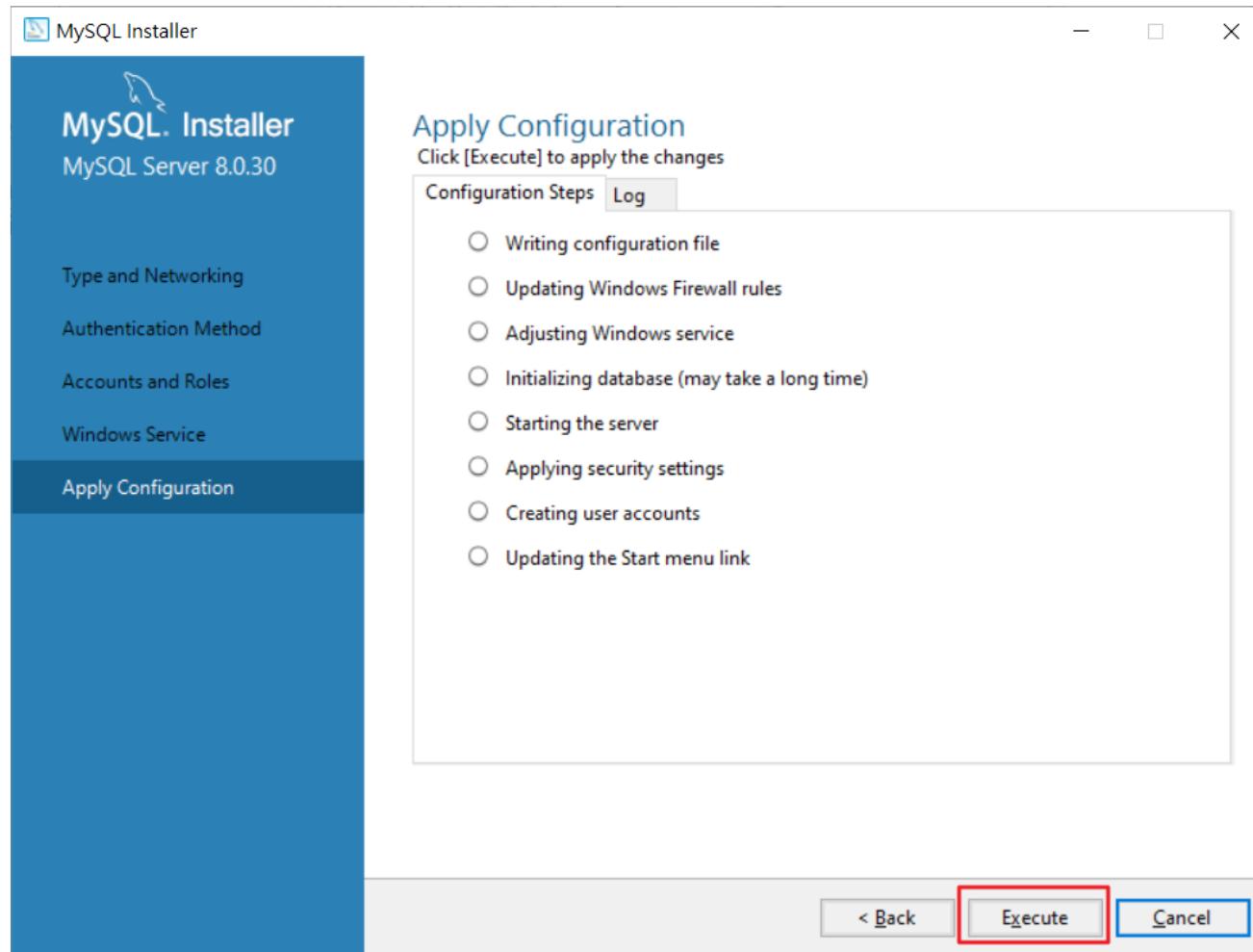
Accounts and Roles



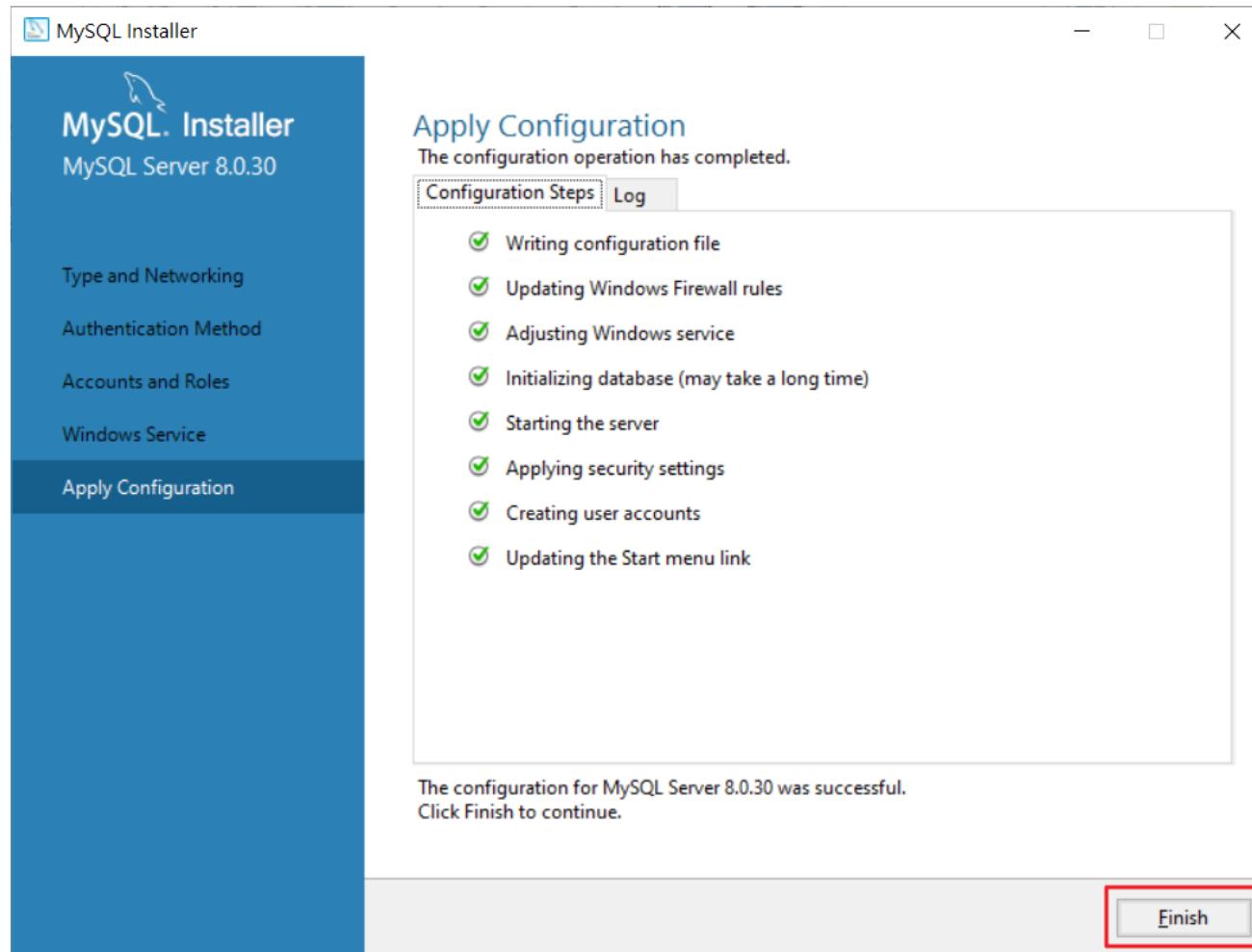
Windows Service



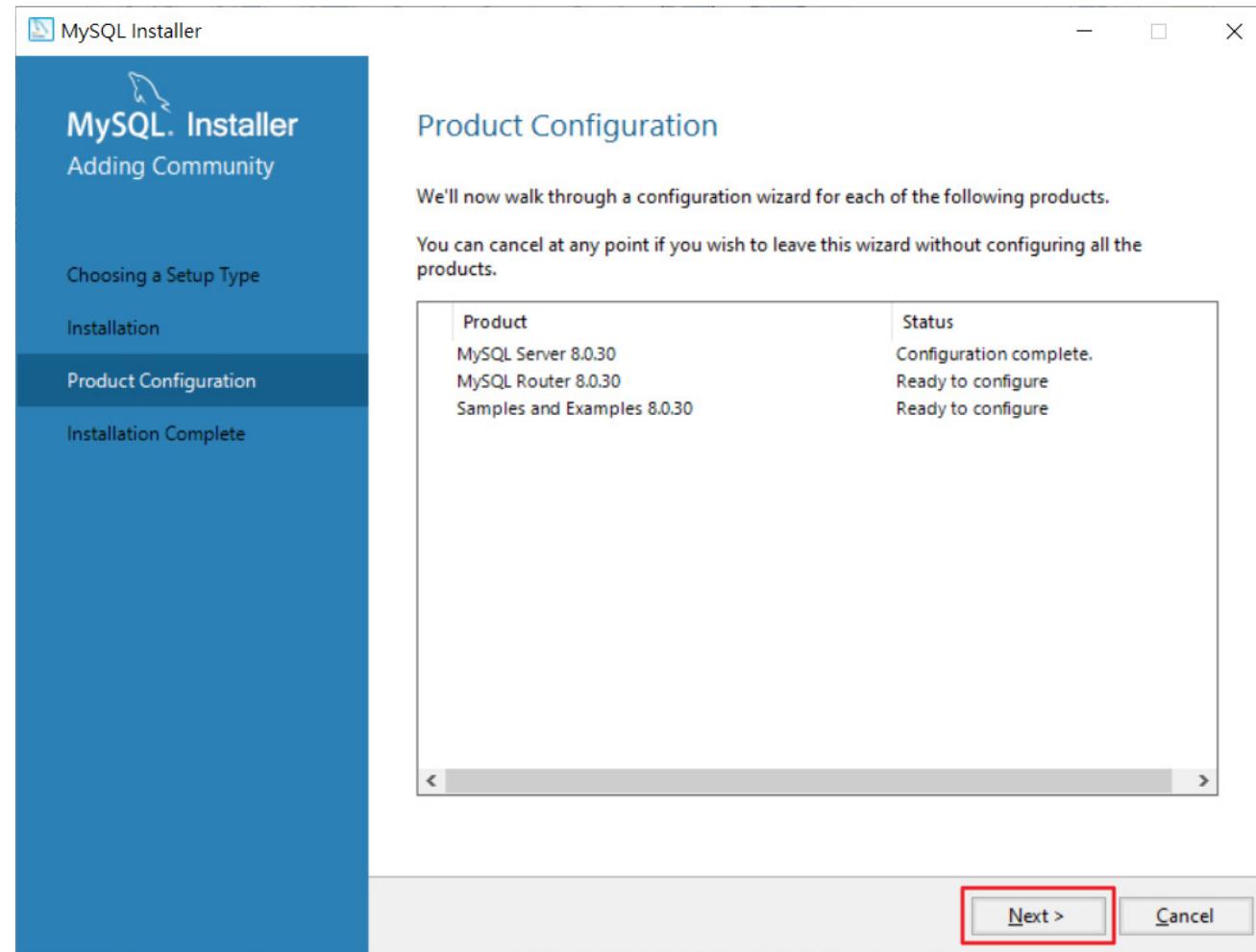
Apply Configuration



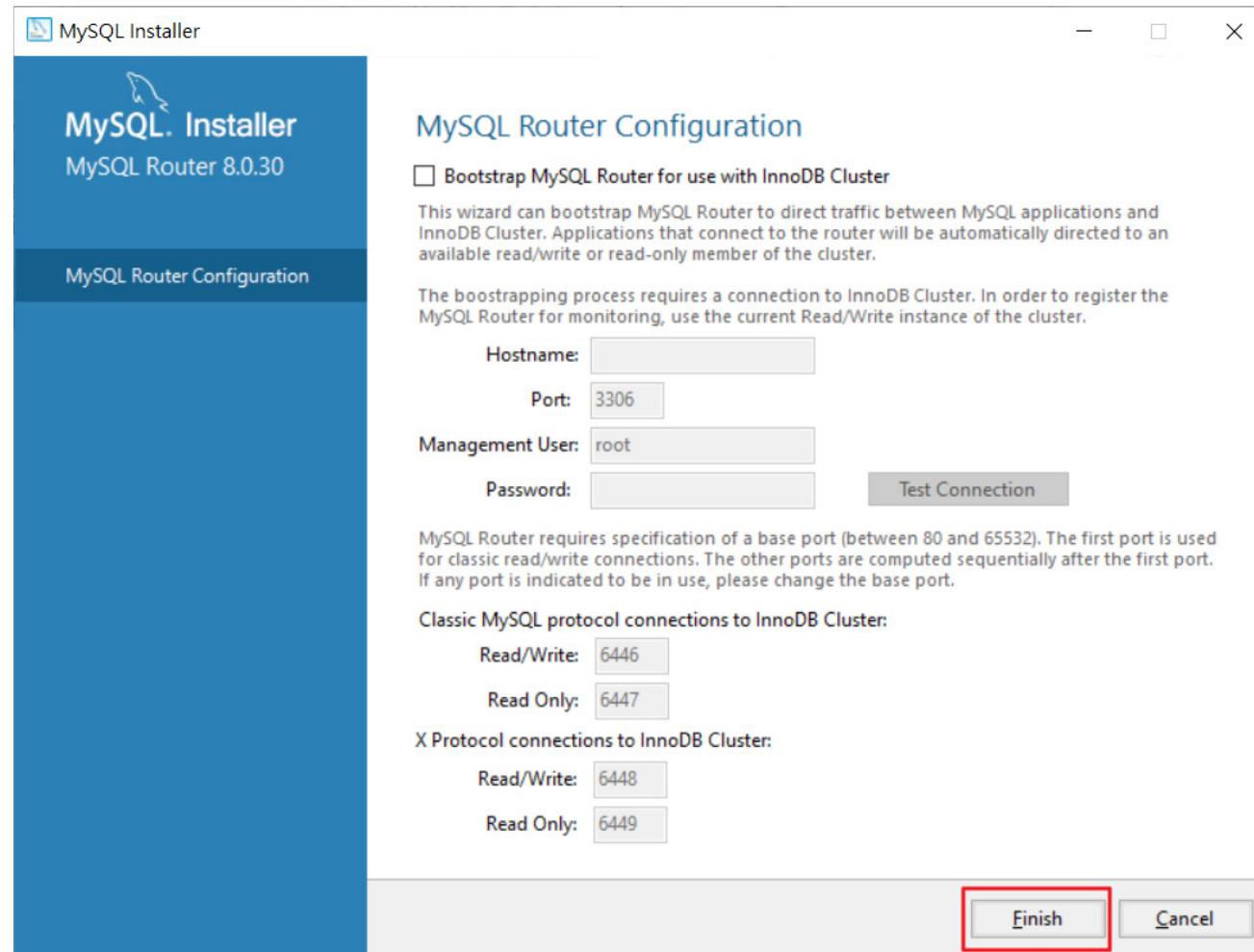
Apply Configuration (Finish)



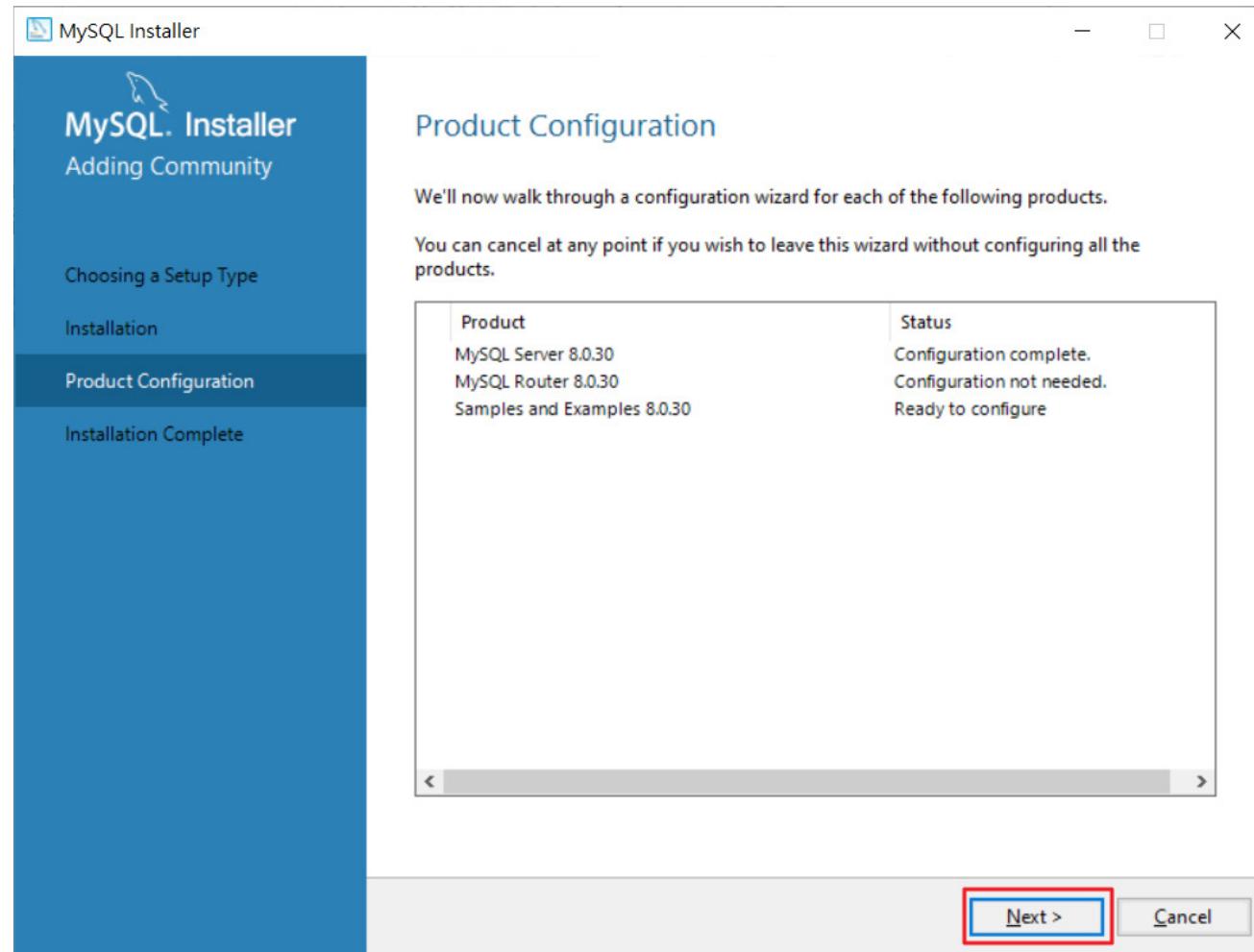
Product Configuration



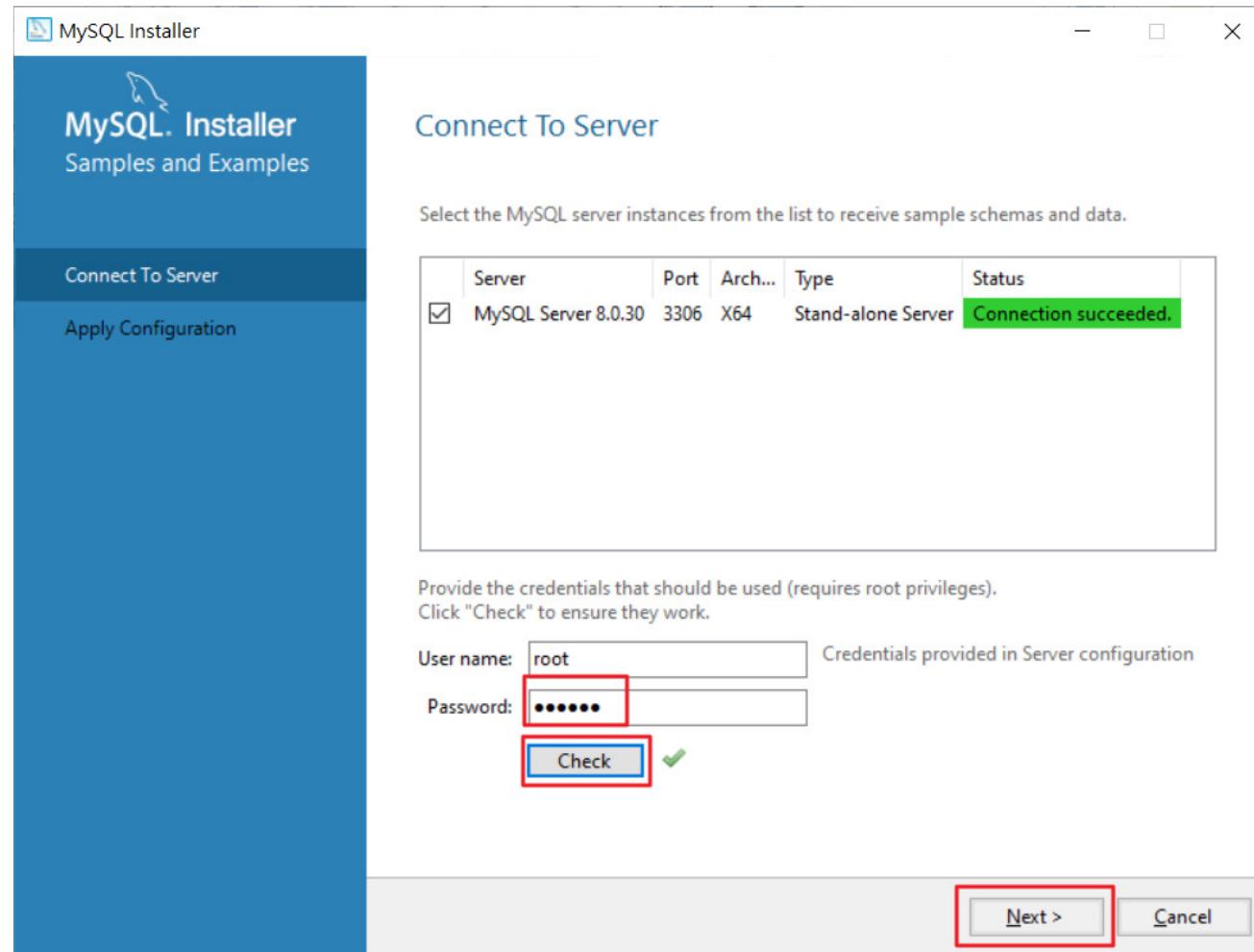
MySQL Router Configuration



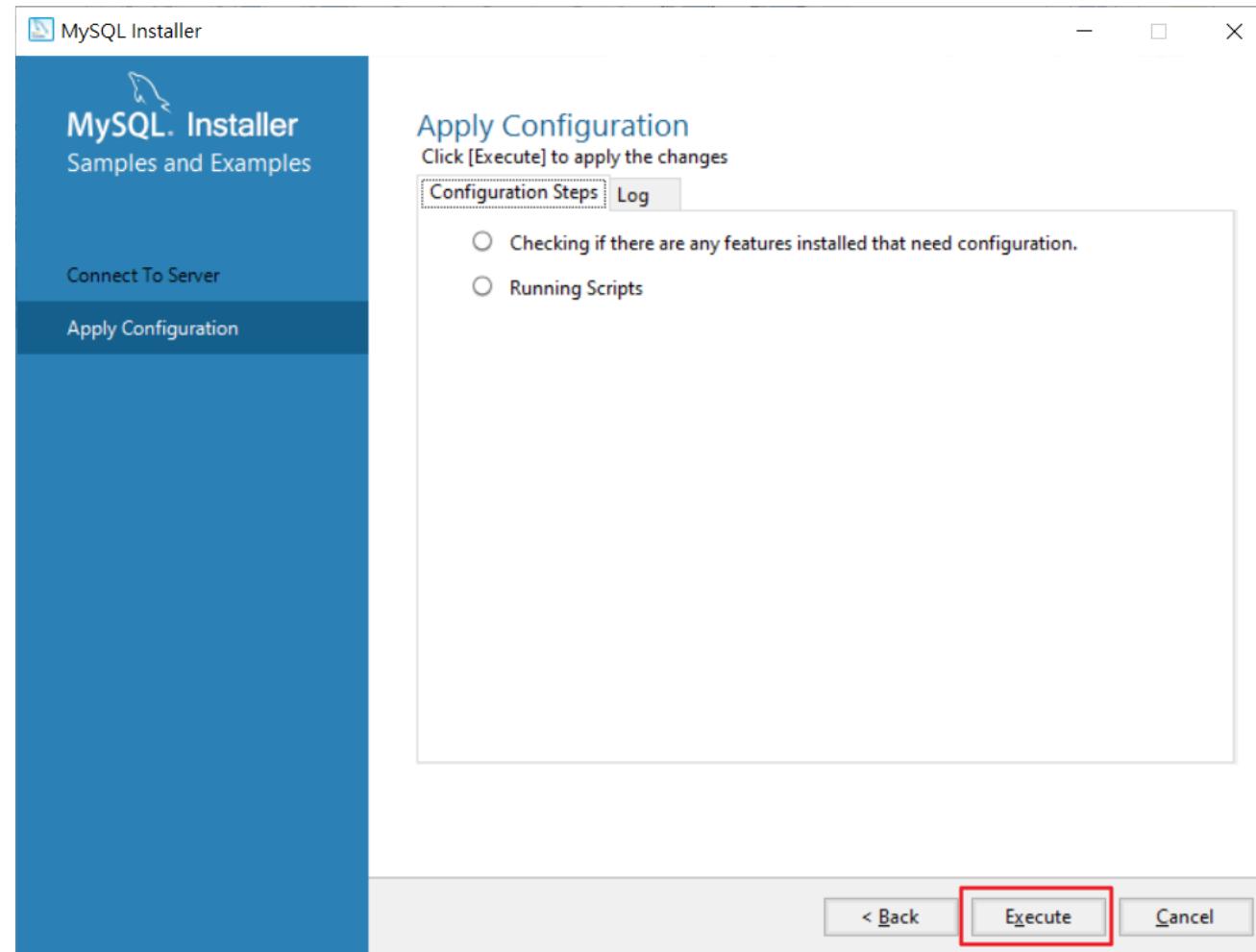
Product Configuration



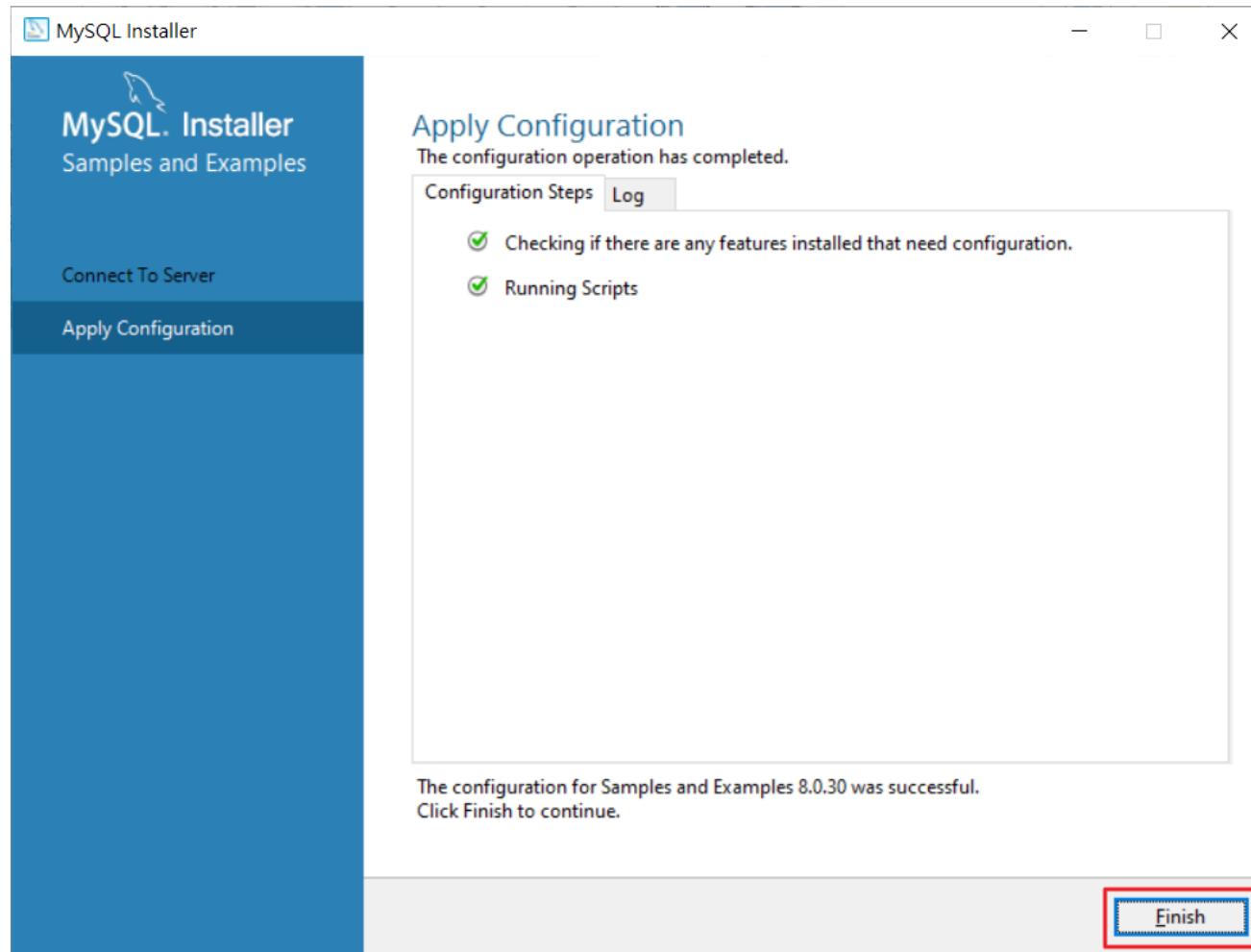
Connect To Server



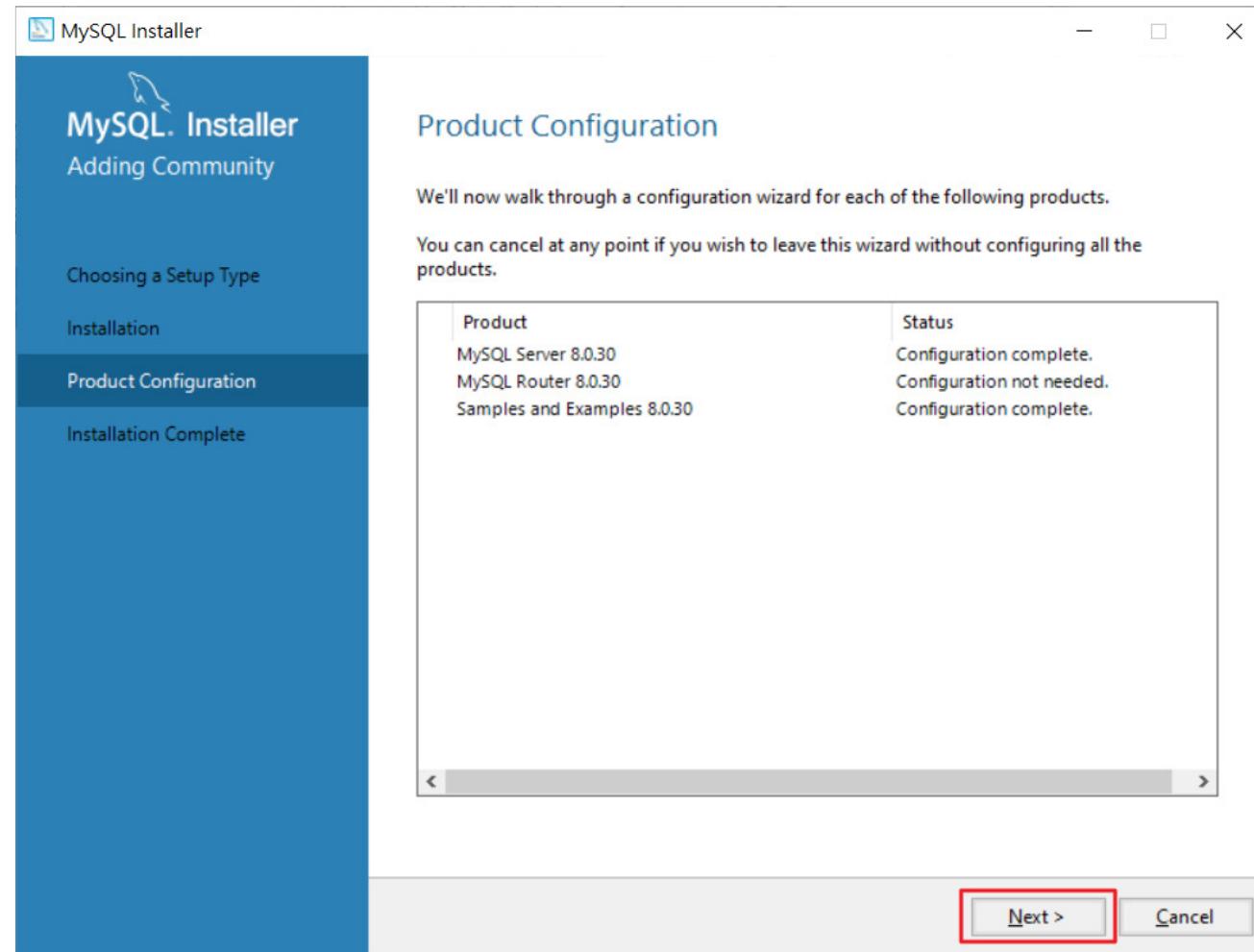
Apply Configuration



Apply Configuration (Finish)



Product Configuration



Installation Complete

MySQL Installer
Adding Community

Choosing a Setup Type
Installation
Product Configuration
Installation Complete

Installation Complete
The installation procedure has been completed.

Start MySQL Workbench after setup
 Start MySQL Shell after setup

The MySQL Shell is an advanced MySQL client application that can be used to work with single MySQL Server instances. Further, it can be used to create and manage InnoDB Cluster, an integrated solution for high availability and scalability of MySQL databases, without requiring advanced MySQL expertise.

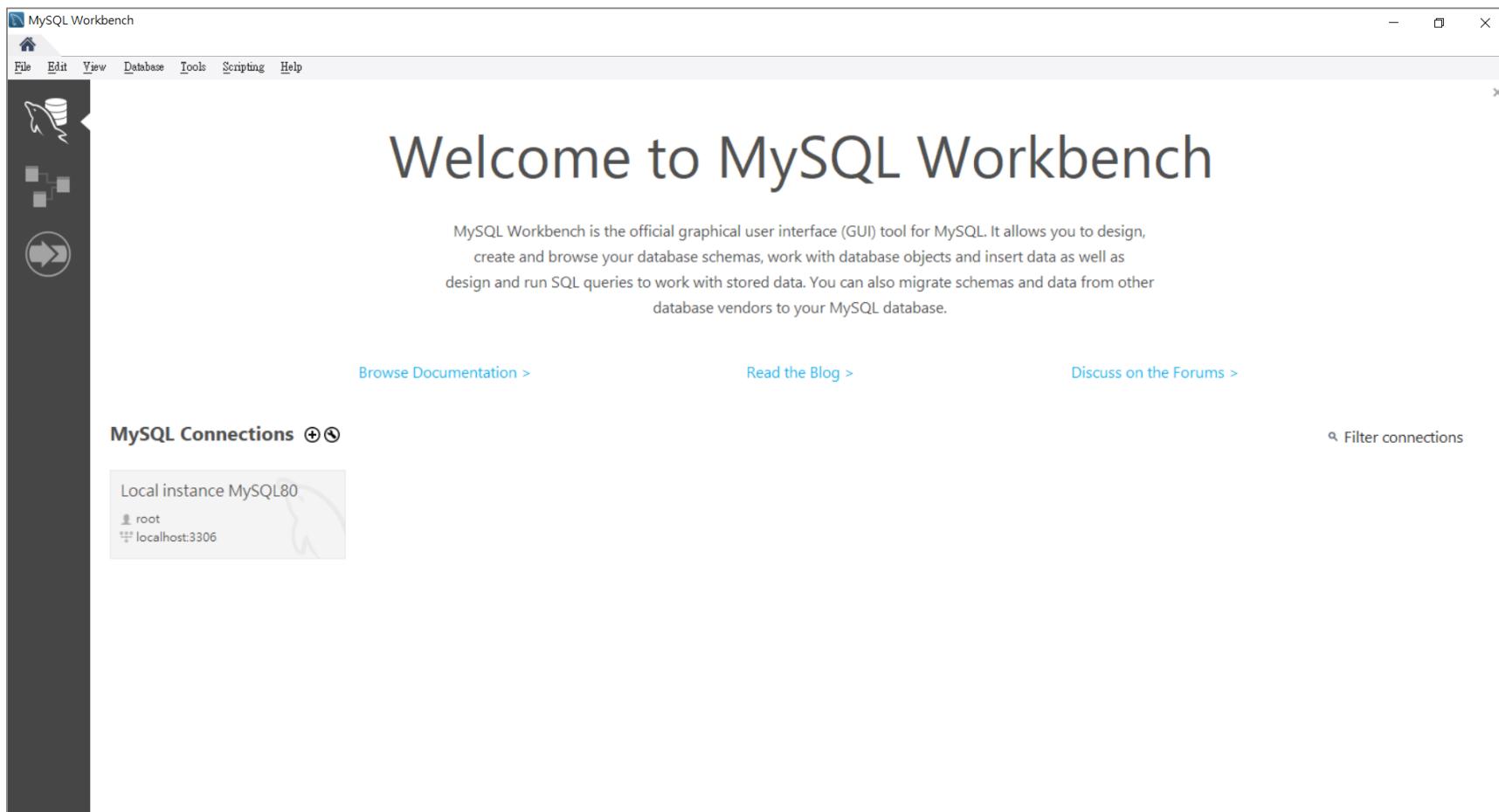
MySQL Shell
Client App
MySQL Router
InnoDB Cluster

Refer to the following links for documentation, tutorials and examples on MySQL Shell:
[MySQL Shell Documentation](#) [Setting up a Real World Cluster Blog](#)
[The All New MySQL InnoDB ReplicaSet Blog](#) [Changing Cluster Options Live Blog](#)

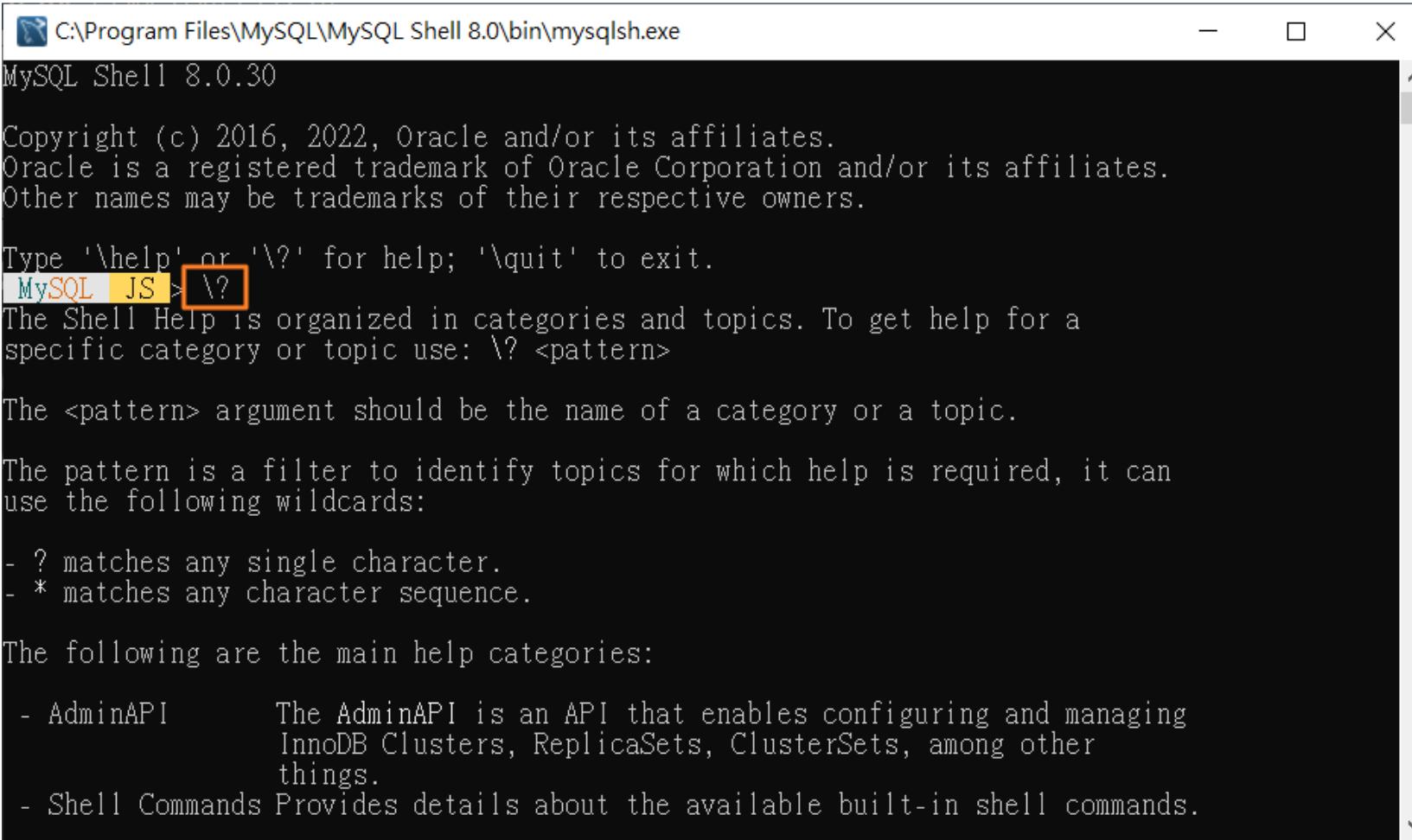
Finish

完成後開啟
1. MySQL Workbench
2. MySQL Shell

開啟畫面 - MySQL Workbench



開啟畫面-MySQL Shell



C:\Program Files\MySQL\MySQL Shell 8.0\bin\mysqlsh.exe

MySQL Shell 8.0.30

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Type '\help' or '\?' for help; '\quit' to exit.

MySQL JS > \?

The Shell Help is organized in categories and topics. To get help for a specific category or topic use: \? <pattern>

The <pattern> argument should be the name of a category or a topic.

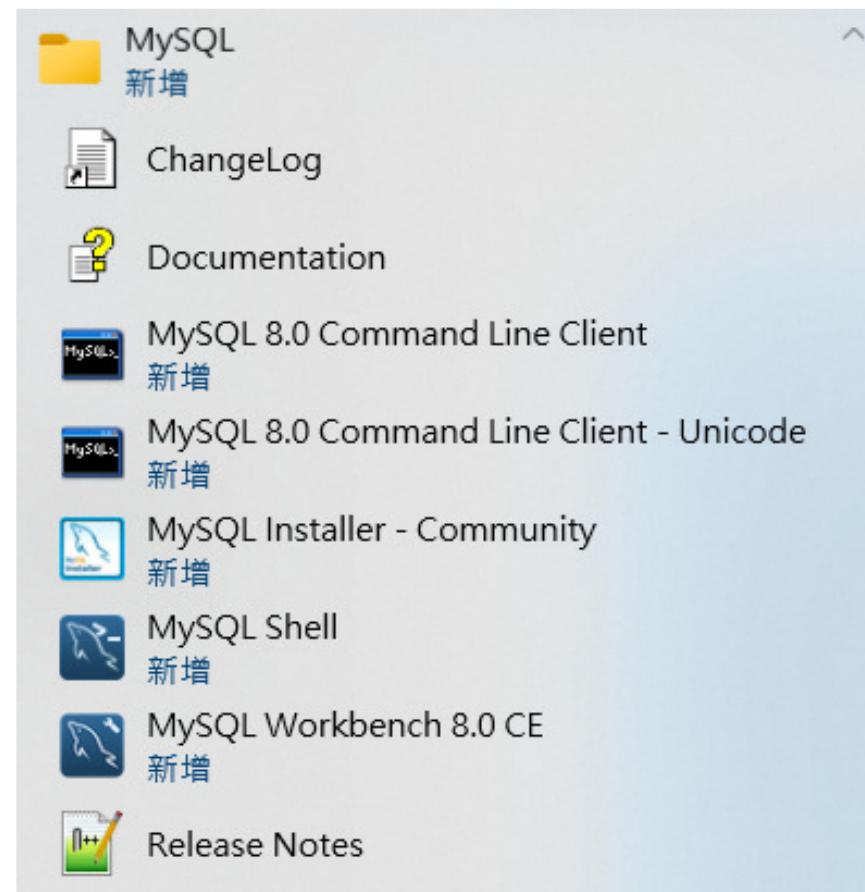
The pattern is a filter to identify topics for which help is required, it can use the following wildcards:

- ? matches any single character.
- * matches any character sequence.

The following are the main help categories:

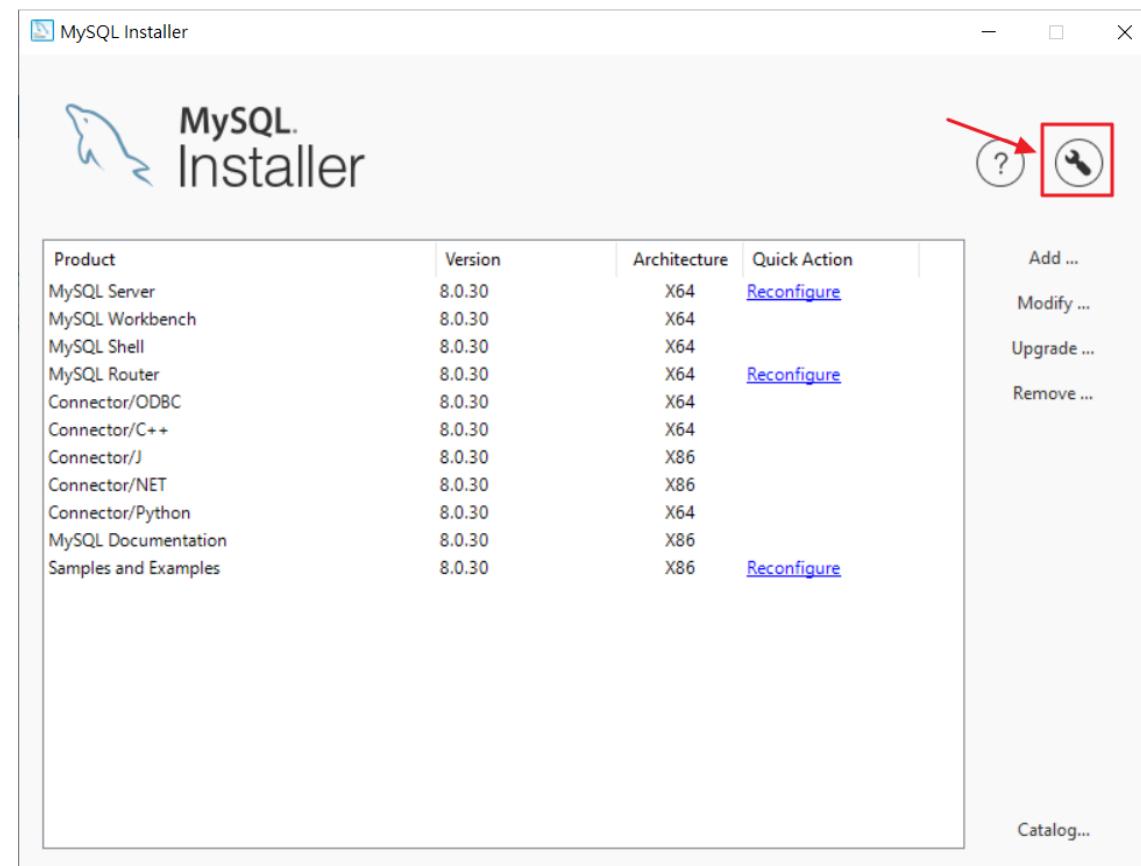
- AdminAPI The AdminAPI is an API that enables configuring and managing InnoDB Clusters, ReplicaSets, ClusterSets, among other things.
- Shell Commands Provides details about the available built-in shell commands.

程式集 \ MySQL



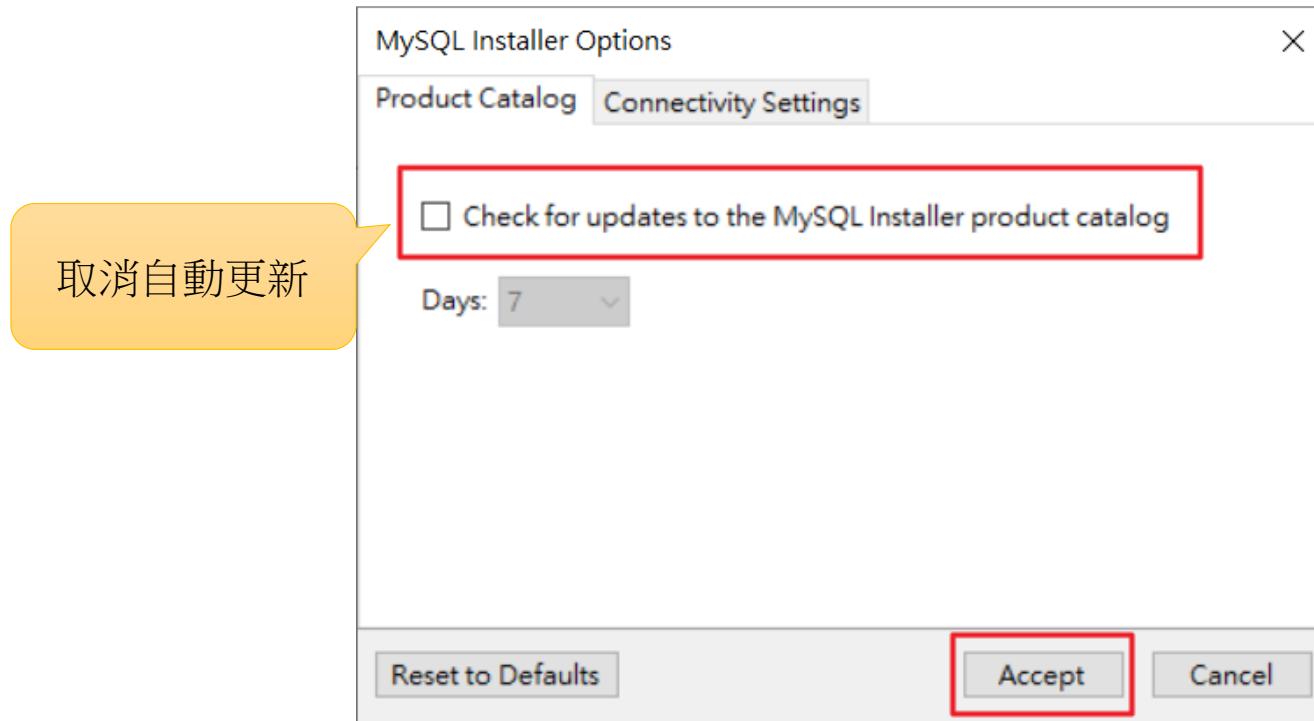
MySQL Installer – Community

- MySQL Installer - Community 提供更新/升級功能



元件修改

MySQL Installer Options – 取消自動更新



2. MySQL Shell與MySQL Workbench簡介



MySQL Shell

- MySQL Shell 簡介
- MySQL Shell 啟動
- MySQL Shell 指令
- MySQL Shell – SQL 範例

MySQL Shell 簡介

- MySQL Shell是MySQL的進階客戶端和程式碼編輯器
- X DevAPI 支援關聯式資料與 schema-less 的文件資料
 - <https://dev.mysql.com/doc/x-devapi-userguide/en/>
- 執行 JavaScript, Python, SQL 等程式
- 8.0.18以後版本採用 Python 3 為主
- 支援互動式編碼執行 Interactive Code Execution
- 支援批次執行 Batch Code Execution
- 可自行定義報表與延伸功能

參考: <https://dev.mysql.com/doc/mysql-shell/8.0/en/>

MySQL Shell 啟動

- 方法1 程式集 \ MSQL \ MySQL Shell
- 方法2 命令提示字元輸入 **mysqlsh**



The screenshot shows a Windows command prompt window. The title bar says '選取 命令提示字元'. The window content is as follows:

```
Microsoft Windows [版本 10.0.19042.746]
(c) 2020 Microsoft Corporation。著作權所有，並保留一切權利。
C:\Users\88697>mysqlsh
MySQL Shell 8.0.22

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Other names may be trademarks of their respective owners.

Type '\help' or '\?' for help; '\quit' to exit.
MySQL JS > \quit
Bye!

C:\Users\88697>
```

MySQL Shell 指令 (1/4)

中文功能	Command	Alias/Shortcut	Description
線上說明	\help	\h or \?	Print help about MySQL Shell, or search the online help.
離開	\quit	\q or \exit	Exit MySQL Shell.
切換至多行模式	\		In SQL mode, begin multiple-line mode. Code is cached and executed when an empty line is entered.
系統狀態	\status	\s	Show the current MySQL Shell status.
切換至 JavaScript	\js		Switch execution mode to JavaScript.
切換至 Python	\py		Switch execution mode to Python.
切換至 SQL	\sql		Switch execution mode to SQL.

MySQL Shell 指令 (2/4)

中文功能	Command	Alias/Shortcut	Description
連接至資料庫	\connect	\c	Connect to a MySQL instance.
重新連接至資料庫	\reconnect		Reconnect to the same MySQL instance.
中斷連線	\disconnect		Disconnect the global session.
設定資料庫綱要	\use	\u	Specify the schema to use.
執行腳本檔案	\source	\. or source (no backslash)	Execute a script file using the active language.

MySQL Shell 指令 (3/4)

中文功能	Command	Alias/Shortcut	Description
顯示警告訊息	\warnings	\W	Show any warnings generated by a statement.
不顯示警告訊息	\nowarnings	\w	Do not show any warnings generated by a statement.
歷史指令	\history		View and edit command line history.
手動更新	\rehash		Manually update the autocomplete name cache.
查詢與設定組態	\option		Query and change MySQL Shell configuration options.
顯示報表	\show		Run the specified report using the provided options and arguments.
監控報表	\watch		Run the specified report using the provided options and arguments, and refresh the results at regular intervals.

MySQL Shell 指令 (4/4)

中文功能	Command	Alias/Shortcut	Description
編輯	\edit	\e	Open a command in the default system editor then present it in MySQL Shell.
換頁設定	\pager	\P	Configure the pager which MySQL Shell uses to display text.
取消換頁	\nopager		Disable any pager which MySQL Shell was configured to use.
執行作業系統指令	\system	\!	Run the specified operating system command and display the results in MySQL Shell.

MySQL Shell – SQL 範例

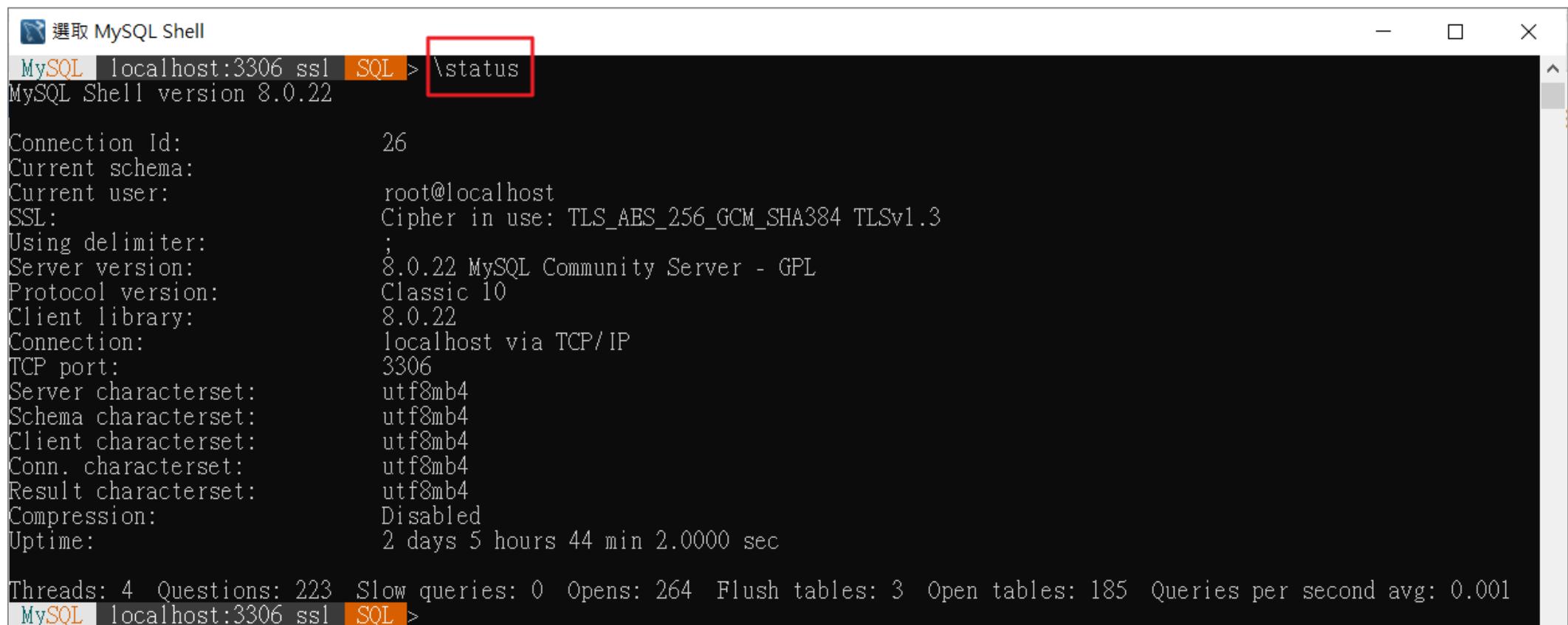
- \sql 切換至SQL模式
- \connect root@localhost:3306 連接資料庫

```
選取 MySQL Shell
MySQL Shell 8.0.22

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Other names may be trademarks of their respective owners.

Type '\help' or '\?' for help; '\quit' to exit.
MySQL JS > \sql
Switching to SQL mode... Commands end with ;
MySQL SQL > \connect root@localhost:3306
Creating a session to 'root@localhost:3306'
Fetching schema names for autocompletion... Press ^C to stop.
Your MySQL connection id is 26
Server version: 8.0.22 MySQL Community Server - GPL
No default schema selected; type \use <schema> to set one.
```

\status 資料庫狀態



The screenshot shows a terminal window titled "選取 MySQL Shell" with the command "\status" highlighted by a red box. The output displays various MySQL system variables and connection parameters.

```
MySQL [localhost:3306 ssl] SQL > \status
MySQL Shell version 8.0.22

Connection Id: 26
Current schema:
Current user: root@localhost
SSL: Cipher in use: TLS_AES_256_GCM_SHA384 TLSv1.3
Using delimiter:
Server version: 8.0.22 MySQL Community Server - GPL
Protocol version: 10
Client library: 8.0.22
Connection: localhost via TCP/IP
TCP port: 3306
Server characterset: utf8mb4
Schema characterset: utf8mb4
Client characterset: utf8mb4
Conn. characterset: utf8mb4
Result characterset: utf8mb4
Compression: Disabled
Uptime: 2 days 5 hours 44 min 2.0000 sec

Threads: 4 Questions: 223 Slow queries: 0 Opens: 264 Flush tables: 3 Open tables: 185 Queries per second avg: 0.001
MySQL [localhost:3306 ssl] SQL >
```

SHOW databases; 顯示資料庫

```
MySQL localhost:3306 ssl SQL > SHOW databases;  
+-----+  
| Database |  
+-----+  
| information_schema |  
| mysql |  
| performance_schema |  
| sakila |  
| sys |  
| world |  
+-----+  
6 rows in set (0.0015 sec)
```

包括 sakila, world 等資料庫

USE sakila; 使用資料庫

SELECT * FROM rental limit 6;

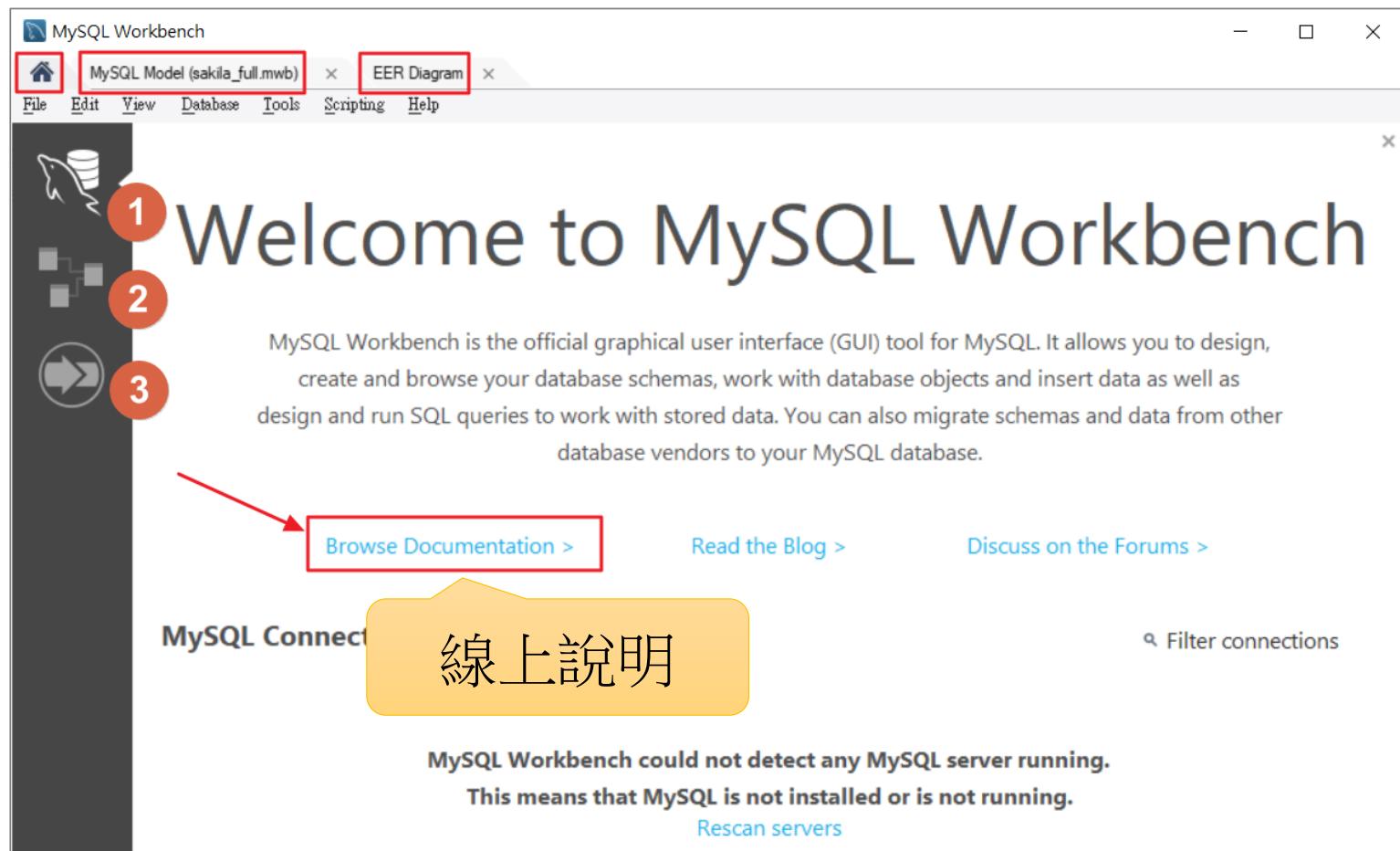
```
MySQL Shell
MySQL localhost:3306 ssl sakila SQL > USE sakila;
Default schema set to `sakila`.
Fetching table and column names from `sakila` for auto-completion... Press ^C to stop.
MySQL localhost:3306 ssl sakila SQL > SELECT * FROM rental limit 6;
+-----+-----+-----+-----+-----+-----+-----+
| rental_id | rental_date | inventory_id | customer_id | return_date | staff_id | last_update |
+-----+-----+-----+-----+-----+-----+-----+
| 1 | 2005-05-24 22:53:30 | 367 | 130 | 2005-05-26 22:04:30 | 1 | 2006-02-15 21:30:53 |
| 2 | 2005-05-24 22:54:33 | 1525 | 459 | 2005-05-28 19:40:33 | 1 | 2006-02-15 21:30:53 |
| 3 | 2005-05-24 23:03:39 | 1711 | 408 | 2005-06-01 22:12:39 | 1 | 2006-02-15 21:30:53 |
| 4 | 2005-05-24 23:04:41 | 2452 | 333 | 2005-06-03 01:43:41 | 2 | 2006-02-15 21:30:53 |
| 5 | 2005-05-24 23:05:21 | 2079 | 222 | 2005-06-02 04:33:21 | 1 | 2006-02-15 21:30:53 |
| 6 | 2005-05-24 23:08:07 | 2792 | 549 | 2005-05-27 01:32:07 | 1 | 2006-02-15 21:30:53 |
+-----+-----+-----+-----+-----+-----+-----+
6 rows in set (0.0007 sec)
MySQL localhost:3306 ssl sakila SQL > -
```

MySQL Workbench

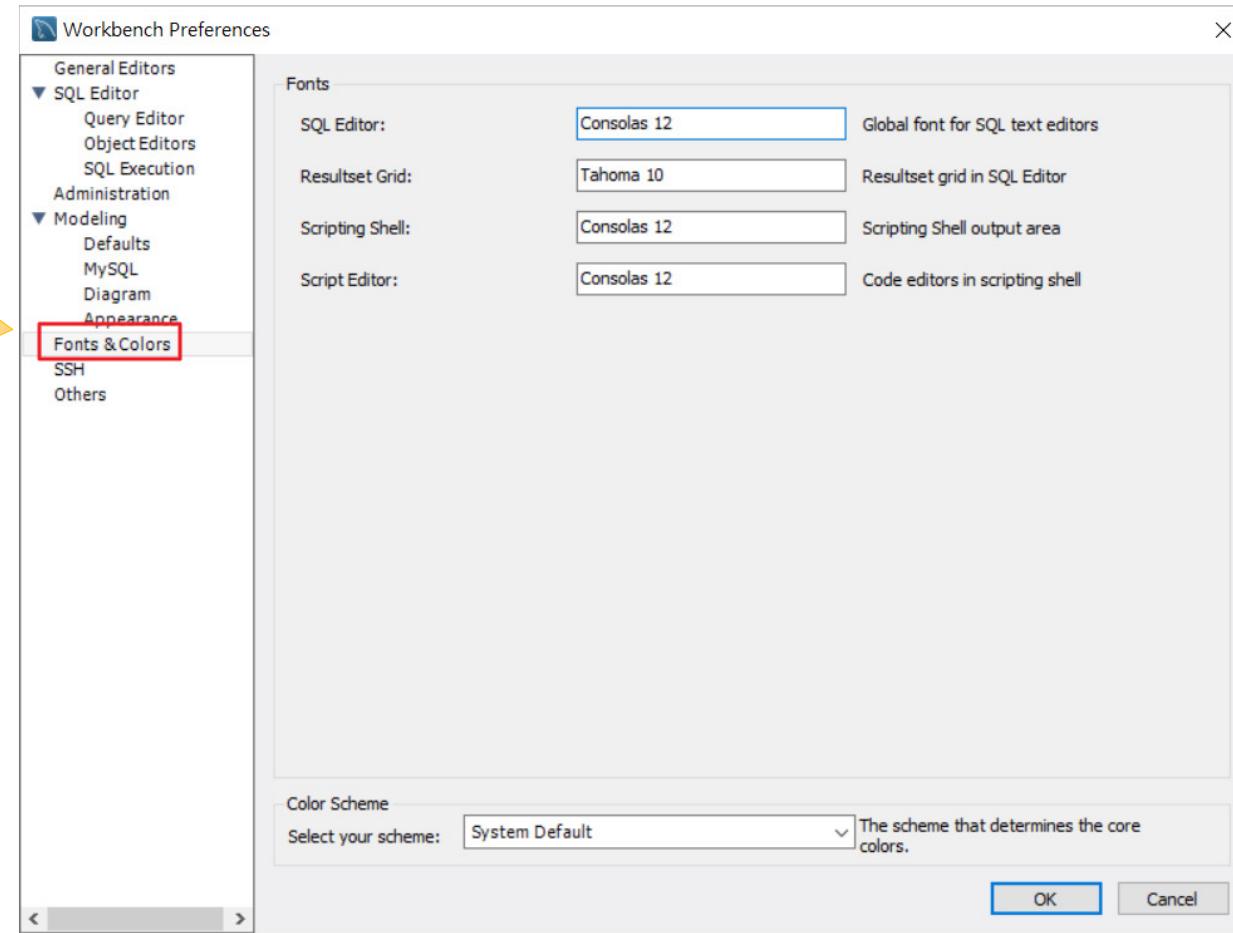
MySQL Workbench

首頁

1. SQL程式
2. EER Diagram
3. 線上說明



Edit \ Preferences \ Fonts & Colors



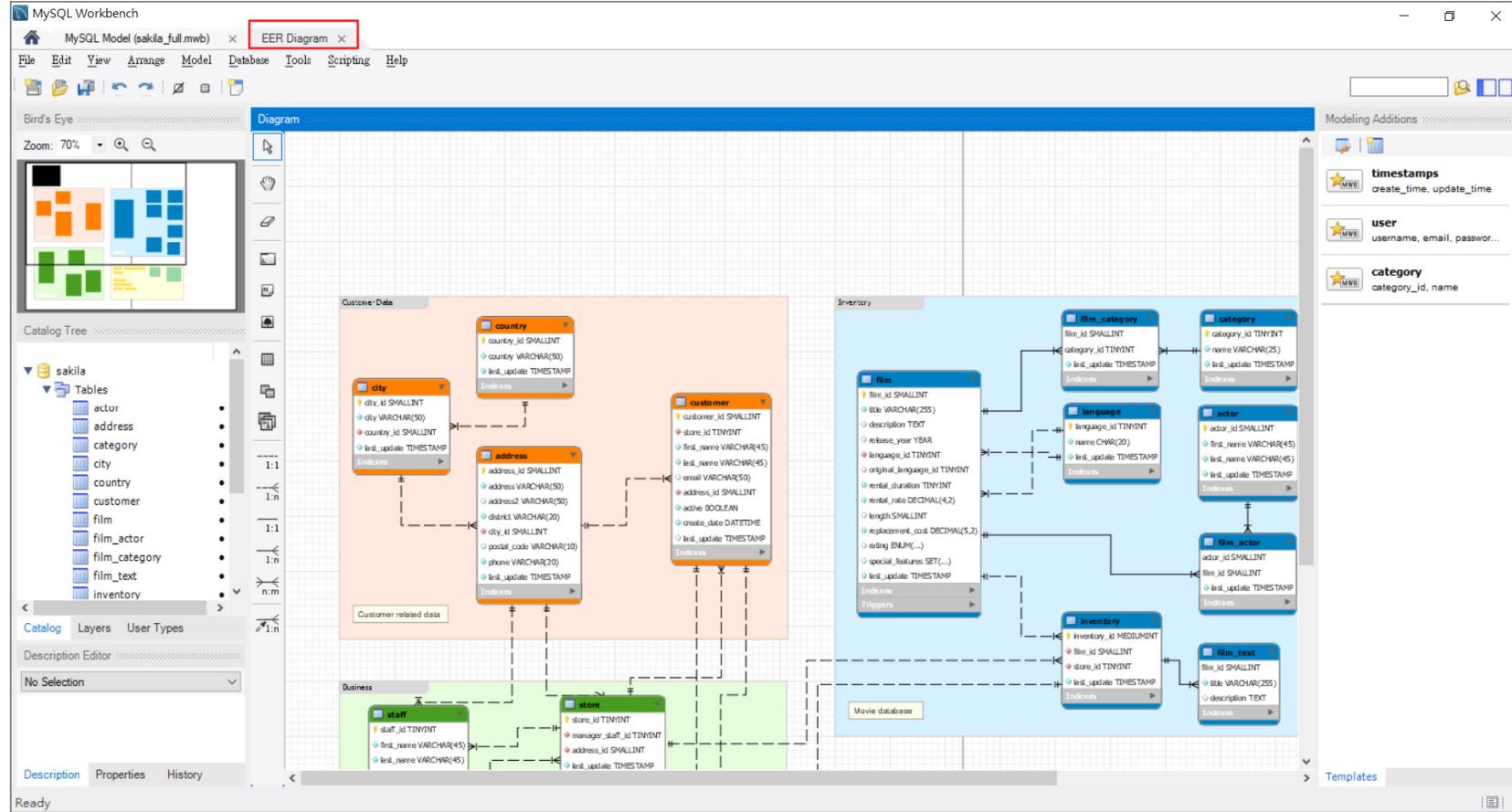
設定字型與顏色

歡迎視窗

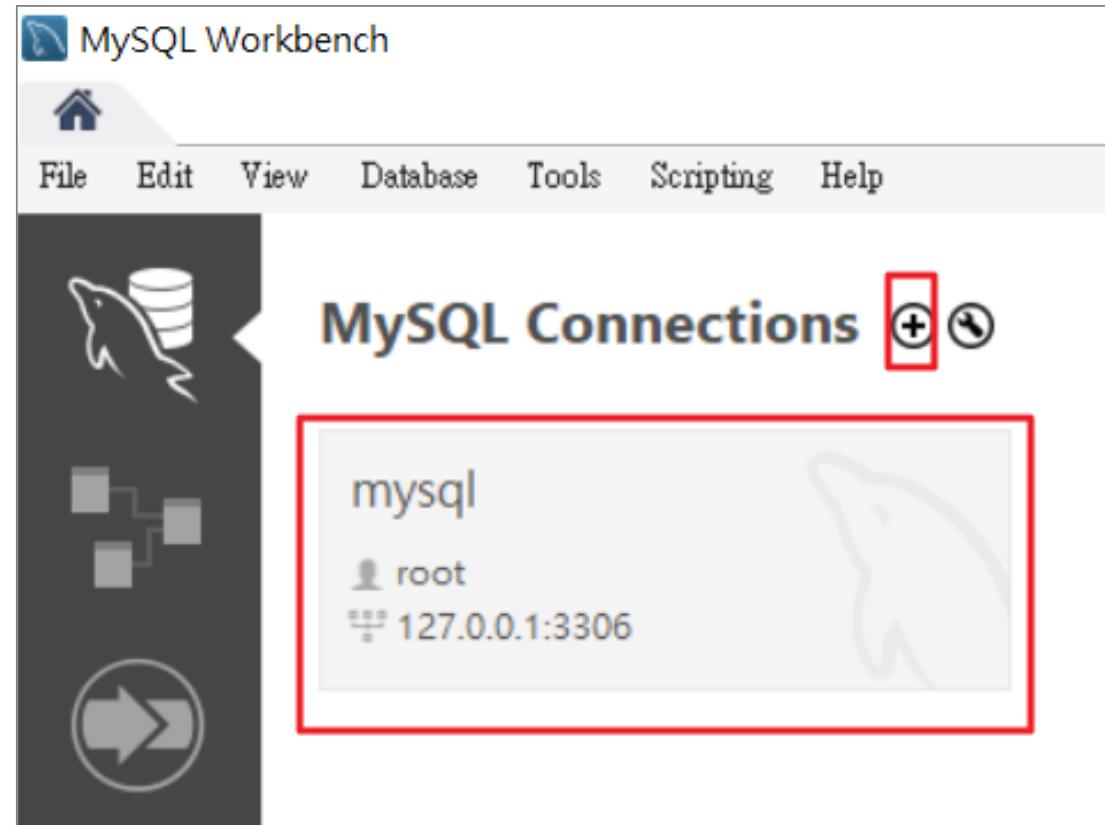
The screenshot shows the 'Workbench Preferences' dialog box. On the left, a sidebar lists various preference categories: General Editors, SQL Editor (Query Editor, Object Editors, SQL Execution), Administration, Modeling (Defaults, MySQL, Diagram, Appearance), Fonts & Colors, SSH, and Others. The 'Others' category is currently selected, indicated by a blue highlight. The main pane contains several configuration sections:

- Home Screen**: Contains a checkbox labeled "Show Welcome Message on Connections Screen" which is checked and highlighted with a red rectangle.
- Timeouts**: Contains a setting for "Migration Connection Timeout" set to 60, with a description: "Maximum time to wait before a connection is aborted."
- Others**: Contains a checkbox "Allow more than one instance of MySQL Workbench to run" which is unchecked.
- Logs**: Contains a "Log Level" dropdown set to "info" with a descriptive note: "Sets the 'chattiness' of logs. Choices further down the list produce more output than the ones that precede them."

Enhanced Entity-Relationship (EER) Diagrams 加強版實體關聯圖 (EER Diagram)

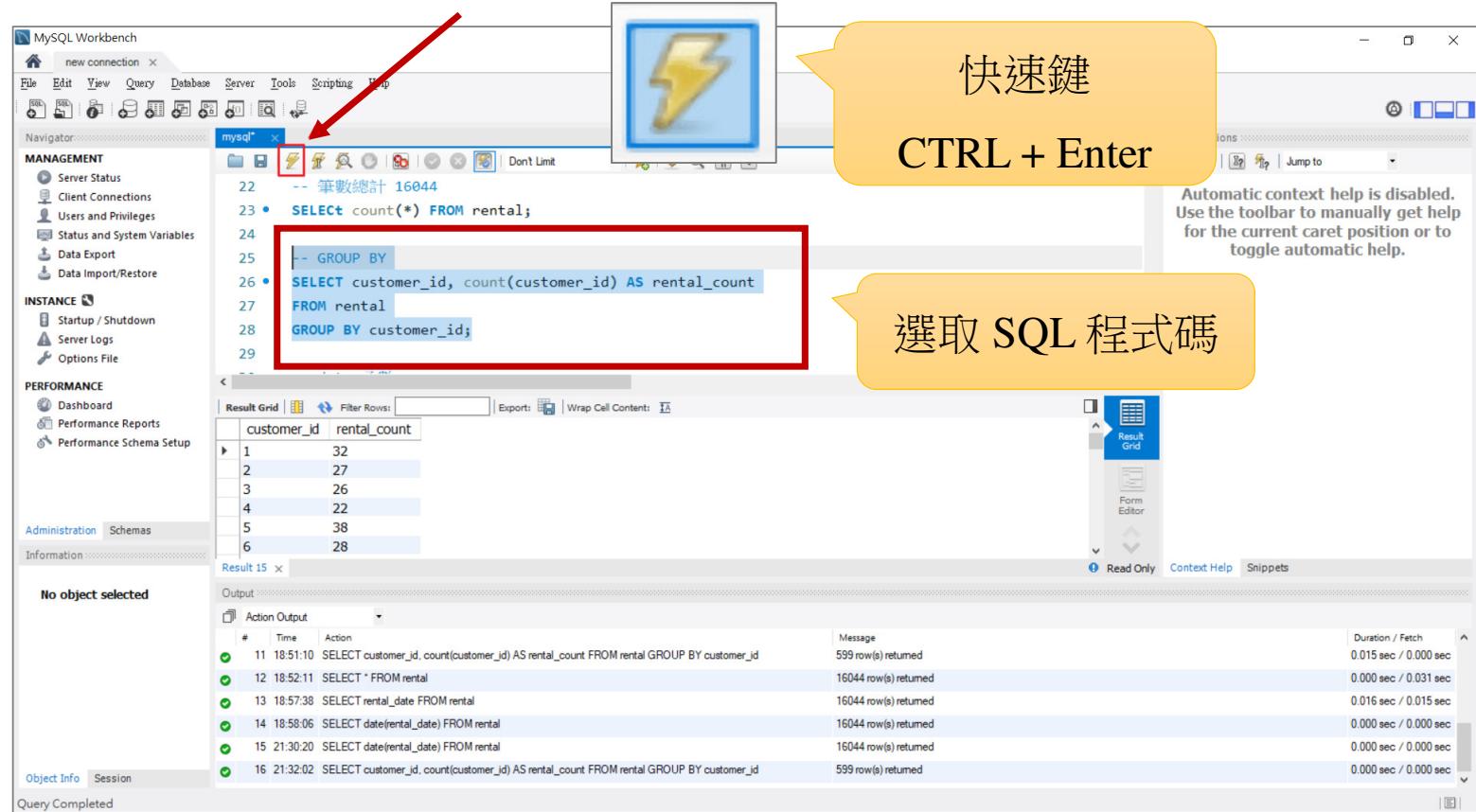


MySQL Connections (SQL程式)



MySQL 練習

Execute the selected portion of the script or everything, if there is no selection





SQL 常用語法

實作練習

```
-- 顯示資料庫版本, 今天日期
SELECT VERSION(), CURRENT_DATE;
-- 現在日期與時間
SELECT NOW();
-- 2的3次方, 與 Excel: =2^3 結果相同
SELECT power(2, 3);
-- 顯示所有資料庫
SHOW DATABASES;
-- 使用資料庫
USE sakila;
-- 目前使用資料庫
SELECT DATABASE();
-- 顯示使用中資料庫的所有資料表
SHOW TABLES;
-- 資料表綱要-- 欄位名稱, 資料型態, NULL值, 鍵, 預設值, 額外資訊(auto_increment自動編號)
DESCRIBE rental;
-- 查詢資料
SELECT * FROM rental;
-- 筆數總計
SELECT count(*) FROM rental;
-- GROUP BY, 類似 Excel 樞紐分析
SELECT customer_id, count(customer_id) AS rental_count FROM rental GROUP BY customer_id;
-- 選取 rental_date 欄位
SELECT rental_date FROM rental;
-- 使用 DATE 函數取出日期資料
SELECT DATE(rental_date) FROM rental;
```

建立資料庫與SQL語法

建立資料庫 CREATE DATABASE

方法1.

CREATE DATABASE IF NOT EXISTS 資料庫名稱

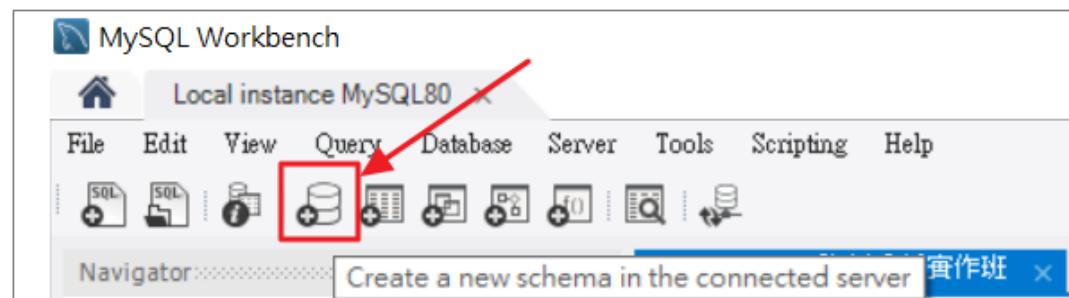
[CHARACTER SET 字元集名稱]

[COLLATE 定序名稱]

方法2.

MySQL Workbench 工具列

→ Create a new schema in the connected server



修改資料庫 ALTER DATABASE

方法1.

ALTER DATABASE 資料庫名稱

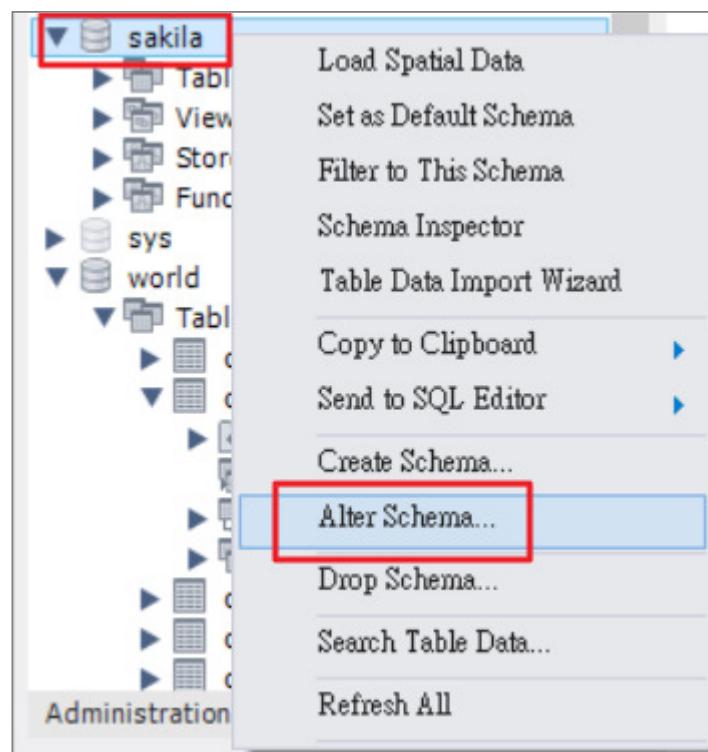
[CHARACTER SET 字元集名稱]

[COLLATE 定序名稱]

修改資料庫 – GUI介面

方法2.

資料庫 \ 右鍵 \ Alter Schema...



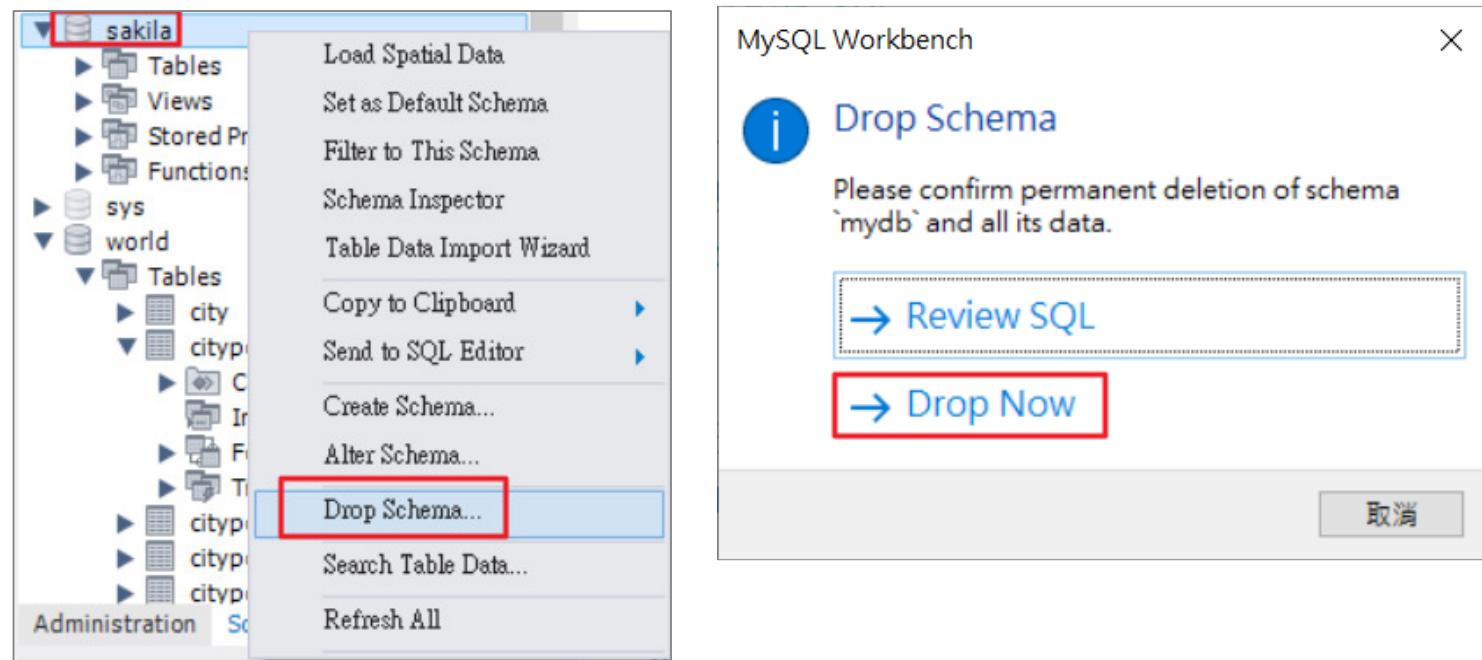
刪除資料庫 DROP DATABASE

方法1.

- DROP DATABASE IF EXISTS 資料庫名稱

方法2.

- 資料庫
 \ 右鍵
 \ DROP Schema...



SQL - 資料庫操作

-- 建立資料庫 CREATE DATABASE

CREATE DATABASE IF NOT EXISTS mydbtest;

【注意】結尾加上 ; 符號

-- 修改資料庫 ALTER DATABASE

ALTER DATABASE mydbtest

COLLATE utf8mb4_unicode_ci;

-- 刪除資料庫 DROP DATABASE

DROP DATABASE IF EXISTS mydbtest;

【注意】系統直接刪除資料庫，
不會有詢問視窗

所有資料庫名稱 SHOW DATABASES

```
83    -- 所有資料庫名稱
84 • SHOW DATABASES;
85 • SHOW SCHEMAS; -- same as above.
86
```

Result Grid | Filter Rows: Export: Wrap Cell Content:

	Database
▶	classicmodels
	information_schema
	mydb
	mysql
	performance_schema
	sakila
	sys
	world

系統資料庫的相關資訊

87 -- 系統資料庫的相關資訊

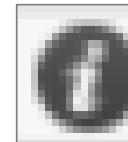
88 • **SELECT * FROM information_schema.SCHEMATA;**

Result Grid | Filter Rows: | Export: | Wrap Cell Content: |

	CATALOG_NAME	SCHEMA_NAME	DEFAULT_CHARACTER_SET_NAME	DEFAULT_COLLATION_NAME	SQL_PATH	DEFAULT_ENCRYPTION
▶	def	mysql	utf8mb4	utf8mb4_0900_ai_ci	NULL	NO
	def	information_schema	utf8mb3	utf8mb3_general_ci	NULL	NO
	def	performance_schema	utf8mb4	utf8mb4_0900_ai_ci	NULL	NO
	def	sys	utf8mb4	utf8mb4_0900_ai_ci	NULL	NO
	def	sakila	utf8mb4	utf8mb4_0900_ai_ci	NULL	NO
	def	world	utf8mb4	utf8mb4_0900_ai_ci	NULL	NO
	def	classicmodels	latin1	latin1_swedish_ci	NULL	NO
	def	mydb	utf8mb4	utf8mb4_0900_ai_ci	NULL	NO

資料庫詳細資訊

- Navigator \ 選取資料庫 \



Navigator

SCHEMAS

Filter objects

- classicmodels
- mydb
- sakila**
- sys
- world
 - Tables
 - Views
 - Stored Procedures
 - Functions

SQL,PYTHON 資料分析實作班 sakila

Info Tables Columns Indexes Triggers Views Stored Procedures Functions Grants Events

Local instance MySQL80

sakila

Schema Details

Default collation: **utf8mb4_0900_ai_ci**

Default characterset: **utf8mb4**

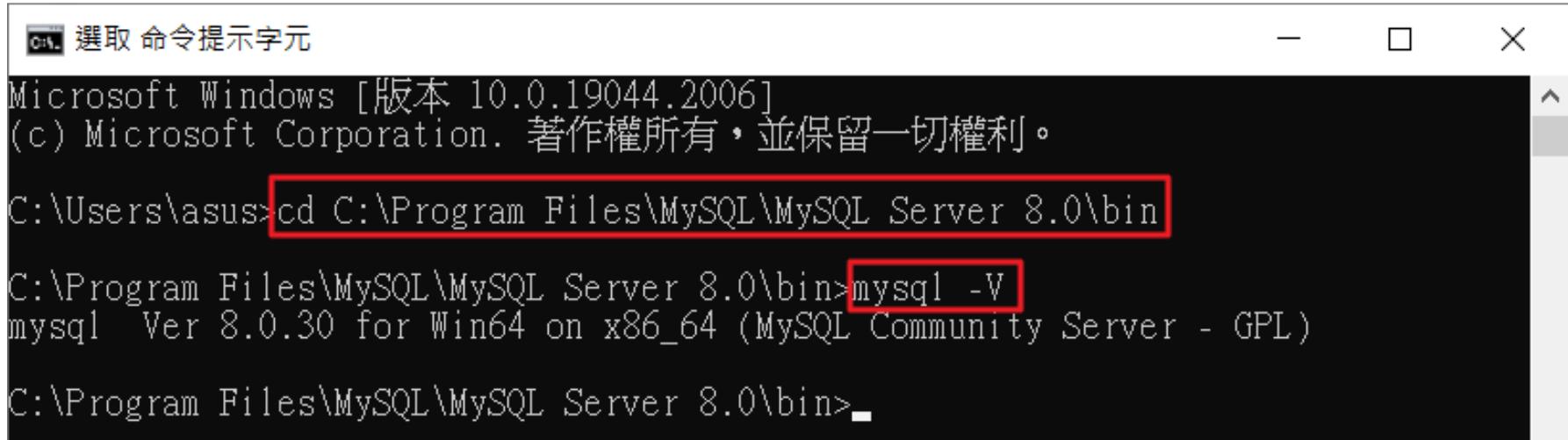
Table count: **23**

Database size (rough estimate): **6.5 MiB**

MySQL 資料庫引擎

資料庫版本-命令提示字元

- cd C:\Program Files\MySQL\MySQL Server 8.0\bin
- mysql -V



```
選取 命令提示字元
Microsoft Windows [版本 10.0.19044.2006]
(c) Microsoft Corporation. 著作權所有，並保留一切權利。
C:\Users\asus>cd C:\Program Files\MySQL\MySQL Server 8.0\bin
C:\Program Files\MySQL\MySQL Server 8.0\bin>mysql -V
mysql Ver 8.0.30 for Win64 on x86_64 (MySQL Community Server - GPL)
C:\Program Files\MySQL\MySQL Server 8.0\bin>
```

資料庫版本-SQL語法

- show variables like 'version';

The screenshot shows the MySQL Workbench interface with a query editor and a results grid.

Query Editor:

```
1 -- 資料庫版本 8.0.30
2 • show variables like 'version';
3
```

The second line of the query, "show variables like 'version';", is highlighted with a red box.

Results Grid:

	Variable_name	Value
▶	version	8.0.30

MySQL 資料庫引擎

- 儲存引擎 (Storage engine) 是MySQL用來儲存資料的技術，為了資料庫多樣化的應用，你可以在建立表格的時候，依照自己的需求指定一種儲存引擎，不同的儲存引擎會有不同的資料儲存方式與運作的特色。
 - MyISAM : MySQL 5.5 版本之前預設的儲存引擎，雖然它支援的功能並沒有像一般的資料庫那麼多(例如交易、transaction)；不過也因為它比較簡單，所以運作的效率相對也比較好。
 - InnoDB : MySQL 5.5 版本之後預設儲存引擎，提供交易(transaction)、紀錄鎖定(row-level locking) 與自動回復(auto-recovery)功能，沒有支援全文檢索(full-text search)。
 - MEMORY : 這是一個比較特殊的儲存引擎，它把資料儲存在紀憶體中，所以運作的效率是最快的；不過只要MySQL伺服器關閉後，儲存的資料就全部不見了。

MySQL 資料庫引擎 (續)

```
1 -- 顯示 MySQL 建立資料庫所使用引擎  
2 • show engines;  
3
```

Engine	Support	Comment	Transactions	XA	Savepoint
MEMORY	YES	Hash based, stored in memory, useful for temporary tables	NO	NO	NO
MRG_MYISAM	YES	Collection of identical MyISAM tables	NO	NO	NO
CSV	YES	CSV storage engine	NO	NO	NO
FEDERATED	NO	Federated MySQL storage engine	NULL	NULL	NULL
PERFORMANCE_SCHEMA	YES	Performance Schema	NO	NO	NO
MyISAM	YES	MyISAM storage engine	NO	NO	NO
InnoDB	DEFAULT	Supports transactions, row-level locking, and foreign keys	YES	YES	YES
BLACKHOLE	YES	/dev/null storage engine (anything you write to it disappears)	NO	NO	NO
ARCHIVE			NO	NO	NO

預設 InnoDB 資料庫引擎

資料庫字元集與定序

- 字元集 CHARACTER SET
- 定序：包括排序與規則 COLLATION

```
115 -- 資料庫字元集與定序
116
117 -- 使用 sakila 資料庫
118 • USE sakila;
119
120 -- 顯示所有的字元集
121 • SHOW CHARACTER SET;
122
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

	Charset	Description	Default collation	Maxlen
▶	armscii8	ARMSCII-8 Armenian	armscii8_general_ci	1
	ascii	US ASCII	ascii_general_ci	1
	big5	Big5 Traditional Chinese	big5_chinese_ci	2
	binary	Binary pseudo charset	binary	1
	cp1250	Windows Central European	cp1250_general_ci	1

資料型態

資料型態 (Data Types)

- <https://dev.mysql.com/doc/refman/8.0/en/data-types.html>

Chapter 11 Data Types

Table of Contents

- 11.1 Numeric Data Types
- 11.2 Date and Time Data Types
- 11.3 String Data Types
- 11.4 Spatial Data Types
- 11.5 The JSON Data Type
- 11.6 Data Type Default Values
- 11.7 Data Type Storage Requirements
- 11.8 Choosing the Right Type for a Column
- 11.9 Using Data Types from Other Database Engines

1. 數值(整數與小數點)
2. 日期,時間,時區
3. 字串
4. 地理資料
5. JSON

建立資料表

建立資料表 CREATE TABLE

CREATE TABLE [IF NOT EXISTS] 資料表名稱 (

欄位名稱1 資料型別1,

欄位名稱2 資料型別2,

...

SELECT 查詢結果

) ENGINE = InnoDB

CHARACTER SET = utf8

COLLATE = utf8_Unicode_ci

MySQL 預設

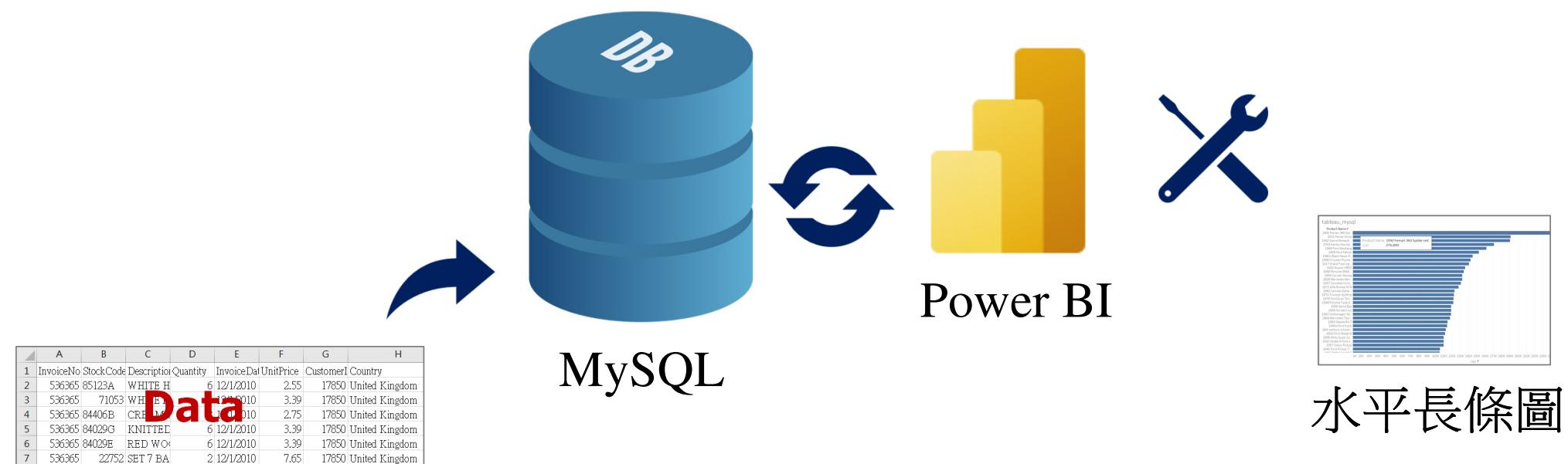
- CHARACTER SET : utf8mb4
- collations : utf8mb4_0900_ai_ci

欄位屬性

- NOT NULL | NULL
 - 如果沒有指定,預設值為 NULL
 - 指定為 NOT NULL, 新增或修改資料時,不能違反此規則。
- DEFAULT 預設值
 - 如果沒有指定預設值, 則MySQL 自動加入 **DEFAULT NULL**
 - 例: DEFAULT '台北市'
- UNIQUE KEY 唯一鍵
- PRIMARY KEY 主索引鍵

3. Tableau與資料庫整合應用

應用情境





步驟1 準備資料

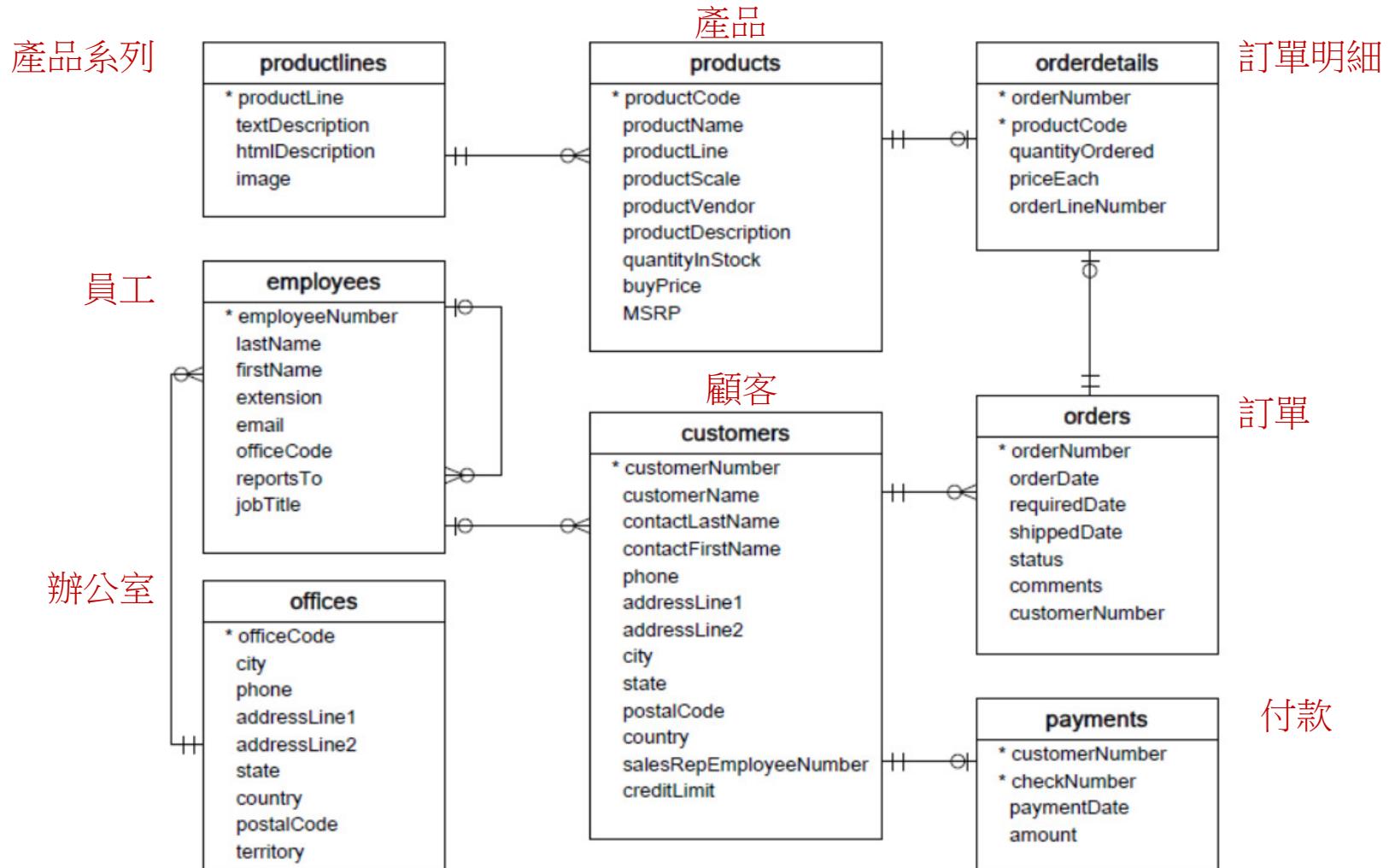
(classicmodels 範例資料庫)

下載 classicmodels 範例資料庫

- 下載 <https://www.mysqltutorial.org/wp-content/uploads/2018/03/mysqlsampledatabase.zip>
- mysqlsampledatabase.sql

```
mysqldatabase.sql
1 /* ****
2 ***** MySQL Sample Database classicmodels
3 ***** http://www.mysqltutorial.org
4 ***** *****
5 Name: MySQL Sample Database classicmodels
6 Link: http://www.mysqltutorial.org/mysql-sample-database.aspx
7 Version 3.1
8 + changed data type from DOUBLE to DECIMAL for amount columns
9 Version 3.0
10 + changed DATETIME to DATE for some columns
11 Version 2.0
12 + changed table type from MyISAM to InnoDB
13 + added foreign keys for all tables
14 ****
15 */
16
17 /*!40101 SET NAMES utf8 */;
18
19 /*!40101 SET SQL_MODE='';*/
20
21 /*!40014 SET @OLD_UNIQUE_CHECKS=@UNIQUE_CHECKS, UNIQUE_CHECKS=0 */;
22 /*!40014 SET @OLD_FOREIGN_KEY_CHECKS=@FOREIGN_KEY_CHECKS, FOREIGN_KEY_CHECKS=0 */;
23 /*!40101 SET @OLD_SQL_MODE=@SQL_MODE, SQL_MODE='NO_AUTO_VALUE_ON_ZERO' */;
24 /*!40111 SET @OLD_SQL_NOTES=@SQL_NOTES, SQL_NOTES=0 */;
25
26 CREATE DATABASE /*!32312 IF NOT EXISTS*/`classicmodels` /*!40100 DEFAULT CHARACTER SET latin1 */;
27
28 USE `classicmodels`;
29
30 /*Table structure for table `customers` */
31
32 DROP TABLE IF EXISTS `customers`;
33
34 CREATE TABLE `customers` (
35     `customerNumber` int(11) NOT NULL,
```

classicmodels 資料庫 - ERD



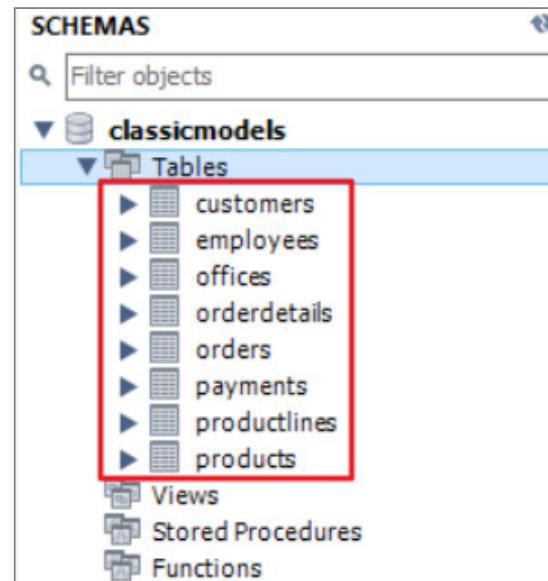


步驟2 準入MySQL



安裝方式

- 方法1 - MySQL Shell
 - source c:\temp\mysqlsampledatabase.sql
 - show databases;
- 方法2 – 【推薦此法】
 - MySQL Workbench 開啟 mysqlsampledatabase.sql
 - 執行所有 SQL



8個資料表

SQL-次數統計表

```
757    -- 次數統計表
758 •  SELECT country, count(*) as quantity
759   FROM customers
760   GROUP BY country
761   ORDER BY quantity DESC, country ASC; -- quantity 遞減排序, country 遞增排序
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

	country	quantity
▶	USA	36
	Germany	13
	France	12
	Spain	7
	Australia	5
	UK	5
	Italy	4
	New Zealand	4



步驟3 Power BI 連結 MySQL 資料庫

資料庫: classicmodels

資料表: [orderdetails], [products]

共通欄位: productCode

Tableau + MySQL

The screenshot shows the Tableau interface for connecting to MySQL. On the left, a sidebar lists various connection options. The 'MySQL' option is highlighted with an orange box. On the right, a detailed configuration dialog for MySQL is open, showing fields for host, port, database, user, and password, along with SSL settings and a login button.

Tableau sidebar (left):

- 檔案(F) 資料(D) 伺服器(S) 說明(H)
- 連線
- 搜尋資料
- Tableau Server
- 到檔案
- Microsoft Excel
- 文字檔
- JSON 檔案
- Microsoft Access
- PDF 檔案
- 空間檔案
- 統計檔案
- 更多...
- 到伺服器
- Oracle
- Amazon Redshift
- MySQL** (highlighted with an orange box)
- 其他資料庫 (ODBC)
- 更多...

MySQL connection dialog (right):

- MySQL tab (一般 tab highlighted with a red box, with a red arrow pointing to it from the sidebar).
- 伺服器: localhost (highlighted with a red box).
- 連接埠: 3306
- 資料庫: classicmodels (highlighted with a red box).
- 使用者名稱: root (highlighted with a red box).
- 密碼: (highlighted with a red box).
- 需要 SSL
- 登入

Tableau + MySQL – 連結完成

The screenshot shows the Tableau Data Source setup window. At the top, there's a menu bar with Chinese labels: 檔案(E) 資料(D) 伺服器(S) 視窗(N) 說明(H). Below the menu is a toolbar with icons for back, forward, refresh, and search. The main area is titled "连线" (Connection) with a "新增" (New) button. A connection to "localhost MySQL" is selected. On the left, there's a sidebar with sections for "資料庫" (Database) and "表" (Tables). The "資料庫" section has a dropdown menu where "classicmodels" is selected and highlighted with a red box. The "表" section lists several tables: customers, employees, offices, orderdetails, orders, payments, productlines, and products, all highlighted with a red box. Below these sections are buttons for "新自訂 SQL" (New Custom SQL), "新建聯集" (New Catalog), and "新資料表擴充功能" (New Table Extension Feature). At the bottom, there's a toolbar with buttons for "資料來源" (Data Source), "tableau_mysql", and other connection management options. To the right of the sidebar, there's a large empty workspace with a grid icon and the text "將表拖曳到此處" (Drag the table here). The bottom right corner of the workspace contains a small Tableau logo.



步驟4 Power BI視覺化

新增2個資料表 (orderdetails, products)

The screenshot shows the Tableau Data Source interface connected to a MySQL database on localhost. The interface displays the schema for the 'classicmodels' database, specifically the 'orderdetails' and 'products' tables. A red arrow points from the 'products' table in the schema view to the 'products' table in the results pane, highlighting the relationship between the two tables.

Schema View:

- 連線: localhost MySQL
- 資料庫: classicmodels
- 表: customers, employees, offices, orderdetails, orders, payments, productlines, products

Results View:

關係與聯結有何不同？深入瞭解

Abc products productCode (products)	Abc products Product Name	Abc products Product Line	Abc products Product Scale	Abc products Product Vendor
S10_1678	1969 Harley Davidson Ultima...	Motorcycles	1:10	Min Lin Diecast
S10_1949	1952 Alpine Renault 1300	Classic Cars	1:10	Classic Metal Creations
S10_2016	1996 Moto Guzzi 1100i	Motorcycles	1:10	Highway 66 Mini Classics
S10_4698	2003 Harley-Davidson Eagle ...	Motorcycles	1:10	Red Start Diecast
S10_4757	1972 Alfa Romeo GTA	Classic Cars	1:10	Motor City Art Classics
S10_4962	1962 LanciaA Delta 16V	Classic Cars	1:10	Second Gear Diecast
S12_1099	1968 Ford Mustang	Classic Cars	1:12	Autoart Studio Design
S12_1108	2001 Ferrari Enzo	Classic Cars	1:12	Second Gear Diecast
S12_1666	1958 Setra Bus	Trucks and Buses	1:12	Welly Diecast Productions
S12_2823	2002 Suzuki XREO	Motorcycles	1:12	Unimax Art Galleries
S12_3148	1969 Corvair Monza	Classic Cars	1:18	Welly Diecast Productions

建立產品銷貨小計長條圖

The screenshot shows the Tableau desktop interface with the following key elements:

- Top Bar:** Includes File, Data, Worksheet, Dashboard, Story, Analysis, Map, Format, Server, Window, Help.
- Left Shelf (Data Source: tableau_mysql):**
 - orderdetails:** Order Line Number, Order Number, Product Code, Price Each, Quantity Ordered, 小計 (Calculated Field).
 - products:** Product Description, Product Line, Product Name, Product Scale, Product Vendor, productCode (products), Buy Price, Msrp, Quantity In Stock, products (Calculated Field).
- Center View:** A horizontal bar chart titled "總和(小計)" (Sum) showing sales volume for various products. The Y-axis lists product names, and the X-axis shows sales volume in thousands (0K to 280K). A tooltip for the first bar indicates "Product Name: 1992 Ferrari 360 Spider red" and "小計: 276,840".
- Right Shelf (Calculated Field):** A floating window titled "小計" (Sum) contains the formula $[Quantity] * [Unit Price] * (1 - [Discount])$.
- Bottom Status Bar:** Shows 109 個標記 (110 列依據 1 標籤 總和(小計): 9,604,191).
- Bottom Left Callout:** A yellow callout with the text "右鍵" (Right-click) points to the context menu options: "建立計算欄位..." (Create Calculated Field...), "建立參數..." (Create Parameter...), and "建立資料夾(使用「按資料夾分組」)" (Create Folder (Use 'Group by Folder')).

參考資料

- RWEPA-
 - <http://rwepa.blogspot.com/>
- Tableau Youtube-
 - <https://www.youtube.com/user/tableausoftware>
- MySQL Tutorial-
 - <https://www.w3schools.com/MySQL/>
- 張益裕, MySQL新手入門超級手冊-第三版, 磐峰, 2022.
 - <https://wanderself.gitbooks.io/mysql-tutorial/content/chapter7.html>

謝謝您的聆聽

Q & A



李明昌

alan9956@gmail.com

<http://rwepa.blogspot.tw/>