HW1 Report

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MYSQL

如何建立 MySQL database

1. 打開CMD，移動路徑到 `C:\Program Files\MySQL\MySQL Server 8.0\bin`
2. 輸入指令 `mysql --user=root --password` ，並輸入密碼登入，登入成功後會看到提示文字變成 `mysql>` ，代表進入操作資料庫的模式
3. 輸入指令 `CREATE DATABASE db_name;` ，其中 `db_name` 為database的名稱
4. 以下為此過程的截圖

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

C:\Program Files\MySQL\MySQL Server 8.0\bin>mysql --user=root --password
Enter password: ************
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 22
Server version: 8.0.25 MySQL Community Server - GPL

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owners.

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

mysql> CREATE DATABASE db_hw1
    -> ;
Query OK, 1 row affected (0.01 sec)
```

如何建立 MySQL table

1. 輸入 `use db_name;` ，來使用 `db_name` 這個datebase

2. 建立table的語法為

   `CREATE TABLE 資料表名 (欄位1 資料型態, 欄位2 資料型態, ......);`

   下方指令可用來設定一個名為 `Product` 的資料庫，指定其有四個欄位分別為 `pNo, pName, unitPrice, category` ，後面的 `varchar` 和 `int` 為欄位的data type `varchar(n)` 為一個長度為 n 字串， `int` 為整數，而在 `pNo` 後方的 `PRIMARY KEY` 則表示將 `pNo` 設為primary key

```
CREATE TABLE `Product` (
  `pNo` varchar(7) PRIMARY KEY,
  `pName` varchar(50),
  `unitPrice` int,
  `category` varchar(50));
```

3. 將資料插入table的語法為

```
INSERT INTO 資料表(欄位1,欄位2,......)
VALUES(值1,值2,......),(值1,值2,......), ........;
```

下方指令可用來將資料存入table(已存入第一筆資料為例)，Product 為table名稱，後方的括號依序為其欄位名稱，VALUES 後接的是要存入資料的值

```
INSERT INTO Product (pNo, pNamem, unitPrice, category)
VALUES('b30999', '資料庫理論與實務', 500, 'Book');
```

也可以一次存入多筆資料

```
INSERT INTO Product (pNo, pNamem, unitPrice, category)
VALUES('b30999', '資料庫理論與實務', 500, 'Book'),
('d11222', '任賢齊專輯三', 300, 'CD');
```

4. 以下為此過程的截圖

```
mysql> CREATE TABLE `Product` (
    -> `pNo` varchar(7) PRIMARY KEY,
    -> `pName` varchar(50),`unitPrice` int,
    -> `category` varchar(50));
Query OK, 0 rows affected (0.06 sec)

mysql> INSERT INTO Product (pNo, pName, unitPrice, category)VALUES ('b30999', '資料庫理論與實務', 500, 'Book');
Query OK, 1 row affected (0.02 sec)

mysql> INSERT INTO Product (pNo, pName, unitPrice, category)
    -> VALUES ('d11222', '任賢齊專輯三', 300, 'CD');
Query OK, 1 row affected (0.01 sec)

mysql> INSERT INTO Product (pNo, pName, unitPrice, category)
    -> VALUES ('b20666', 'OLAP進階', 500, 'Book');
Query OK, 1 row affected (0.01 sec)

mysql> INSERT INTO Product (pNo, pName, unitPrice, category)
    -> VALUES ('b10234', '管理資訊系統概論', 600, 'Book');
Query OK, 1 row affected (0.01 sec)

mysql> INSERT INTO Product (pNo, pName, unitPrice, category)
    -> VALUES ('b40555', '系統分析理論與實務', 550, 'Book');
Query OK, 1 row affected (0.01 sec)

mysql> INSERT INTO Product (pNo, pName, unitPrice, category)
    -> VALUES ('d20777', '蔡依林專輯二', 350, 'CD');
Query OK, 1 row affected (0.01 sec)

mysql> INSERT INTO Product (pNo, pName, unitPrice, category)
    -> VALUES ('v10888', '哈利波特：混血王子的背叛', 450, 'DVD');
Query OK, 1 row affected (0.01 sec)

mysql> INSERT INTO Product (pNo, pName, unitPrice, category)
    -> VALUES ('d03333', '5566專輯', 450, 'CD');
Query OK, 1 row affected (0.01 sec)

mysql> INSERT INTO Product (pNo, pName, unitPrice, category)
    -> VALUES ('b51111', '電子商務理論與實務', 700, 'Book');
Query OK, 1 row affected (0.01 sec)

mysql> INSERT INTO Product (pNo, pName, unitPrice, category)
    -> VALUES ('v00111', '英雄', 400, 'DVD');
Query OK, 1 row affected (0.01 sec)
```

```
mysql> CREATE TABLE `Record` (
    -> `tNo` varchar(6),
    -> `pNo` varchar(7),
    -> `amount` int,
    -> `salePrice` int);
Query OK, 0 rows affected (0.03 sec)

mysql>
mysql> INSERT INTO Record (tNo, pNo, amount, salePrice)
    -> VALUES ('91100', 'b30999', 1, 450),
    -> ('90111', 'v10888', 3, 1350),
    -> ('92555', 'b10234', 5, 3000),
    -> ('92555', 'b40555', 10, 5000),
    -> ('91888', 'b40555', 3, 1650),
    -> ('91888', 'd03333', 2, 850),
    -> ('92666', 'd11222', 1, 300),
    -> ('92666', 'd20777', 1, 350),
    -> ('92666', 'v00111', 2, 800),
    -> ('92333', 'b51111', 1, 700);
Query OK, 10 rows affected (0.02 sec)
Records: 10  Duplicates: 0  Warnings: 0
```

顯示各table的完整內容/每筆資料

輸入指令來檢查目前table的資料

```
SELECT * FROM db_name.table_name;
```

product:

```
mysql> SELECT * FROM db_hw1.product;
+--------+-----------------------------------+-----------+----------+
| pNo    | pName                             | unitPrice | category |
+--------+-----------------------------------+-----------+----------+
| b10234 | 管理資訊系統概論                    |       600 | Book     |
| b20666 | OLAP進階                          |       500 | Book     |
| b30999 | 資料庫理論與實務                    |       500 | Book     |
| b40555 | 系統分析理論與實務                  |       550 | Book     |
| b51111 | 電子商務理論與實務                  |       700 | Book     |
| d03333 | 5566專輯                          |       450 | CD       |
| d11222 | 任賢齊專輯三                        |       300 | CD       |
| d20777 | 蔡依林專輯二                        |       350 | CD       |
| v00111 | 英雄                              |       400 | DVD      |
| v10888 | 哈利波特：混血王子的背叛             |       450 | DVD      |
+--------+-----------------------------------+-----------+----------+
10 rows in set (0.01 sec)
```

record:

```
mysql> SELECT * FROM db_hw1.Record;
+-------+--------+--------+-----------+
| tNo   | pNo    | amount | salePrice |
+-------+--------+--------+-----------+
| 91100 | b30999 |      1 |       450 |
| 90111 | v10888 |      3 |      1350 |
| 92555 | b10234 |      5 |      3000 |
| 92555 | b40555 |     10 |      5000 |
| 91888 | b40555 |      3 |      1650 |
| 91888 | d03333 |      2 |       850 |
| 92666 | d11222 |      1 |       300 |
| 92666 | d20777 |      1 |       350 |
| 92666 | v00111 |      2 |       800 |
| 92333 | b51111 |      1 |       700 |
+-------+--------+--------+-----------+
10 rows in set (0.00 sec)
```

MySQL查詢結果的完整截圖

查詢1：找出定價400元以下所有CD。列出商品名稱、定價。

```
mysql> SELECT Product.pName, Product.unitPrice
    -> FROM Product
    -> WHERE (((Product.category) = 'CD') AND ((Product.unitPrice) <= 400))
    -> ORDER BY unitPrice;
+------------------+-----------+
| pName            | unitPrice |
+------------------+-----------+
| 任賢齊專輯三     |       300 |
| 蔡依林專輯二     |       350 |
+------------------+-----------+
2 rows in set (0.00 sec)
```

查詢2：找出所有定價比所有書籍都高的商品。

```
mysql> SELECT Product.pNo, Product.pName
    -> FROM Product
    -> WHERE Product.unitPrice >
    -> ALL (SELECT Product.unitPrice
    -> FROM Product
    -> WHERE Product.category = 'BOOK');
Empty set (0.01 sec)
```

查詢3：找出最優惠的交易記錄。列出交易編號、該筆交易得到的優惠金額。

```
mysql> SELECT TBL1.tNo, TBL1.discount
    -> FROM (SELECT Record.tNo,
    -> SUM(Product.unitPrice -
    -> Record.salePrice / Record.amount) AS discount
    -> FROM Product, Record
    -> WHERE Product.pNo = Record.pNo
    -> GROUP BY Record.tNo) TBL1
    -> WHERE TBL1.discount = (SELECT MAX(TBL2.discount)
    -> FROM (SELECT Record.tNo,
    -> SUM(Product.unitPrice -
    -> Record.salePrice /
    -> Record.amount) AS discount
    -> FROM Product, Record
    -> WHERE Product.pNo = Record.pNo
    -> GROUP BY Record.tNo) TBL2 );
+-------+----------+
| tNo   | discount |
+-------+----------+
| 91100 |  50.0000 |
| 92555 |  50.0000 |
+-------+----------+
2 rows in set (0.01 sec)
```

MongoDB

如何建立 MongoDB database

1. 在CMD輸入 `mongo` ，進入mongoDB的操作模式
2. 輸入 `use db_name` ，選擇使用的database名稱，若db_name不存在則會新增一個database

3. 使用指令 `show dbs` 檢查是否成功新增(若database還沒有任何操作，則指令 `show dbs` 出現的結果將不會有該database，可在有insert之後查看是否有新增database)
4. 以下為此過程的截圖

```
C:\Users\user>mongo
MongoDB shell version v5.0.6
connecting to: mongodb://127.0.0.1:27017/?compressors=disabled&gssapiServiceName=mongodb
Implicit session: session { "id" : UUID("21e4515c-6365-4bc8-a1ac-01ede7fbead7") }
MongoDB server version: 5.0.6
================
Warning: the "mongo" shell has been superseded by "mongosh",
which delivers improved usability and compatibility.The "mongo" shell has been deprecated and
will be removed in
an upcoming release.
For installation instructions, see
https://docs.mongodb.com/mongodb-shell/install/
================
---
The server generated these startup warnings when booting:
        2022-03-01T21:59:23.571+08:00: Access control is not enabled for the database. Read an
d write access to data and configuration is unrestricted
---
> use db_hw1
switched to db db_hw1
> show dbs
admin   0.000GB
config  0.000GB
local   0.000GB
test    0.000GB
try     0.000GB
```

如何建立 MongoDB table

在mongoDB中insert會進一個table有兩種情況:若table已存在，insert會直接將資料放入table中；若table不存在，insert則會新增一個table在database中，之後再insert資料進table中。

insert 一筆資料

```
db.table_name.insertOne( {欄位1: 值1, 欄位二: 值2, ...} )
```

insert 多筆資料

```
db.table_name.insertMany([
    {欄位1: 值1, 欄位二: 值2, ...},
    {欄位1: 值1, 欄位二: 值2, ...}, ...
])
```

Product

```
> db.Product.insertMany([
...        {
...             pNo: 'b30999',  pName: '資料庫理論與實務',
...             unitPrice: 500, category: 'Book'
...        },{
...             pNo: 'd11222', pName: '任賢齊專輯三',
...             unitPrice: 300, category: 'CD'
...        },{
...             pNo: 'b20666', pName: 'OLAP進階',
...             unitPrice: 500, category: 'Book'
...        },{
...             pNo: 'b10234', pName: '管理資訊系統概論',
...             unitPrice: 600,category: 'Book'
...        },{
...             pNo: 'b40555', pName: '系統分析理論與實務',
...             unitPrice: 550, category: 'Book'
...        },{
...             pNo: 'd20777', pName: '蔡依林專輯二',
...             unitPrice: 350, category: 'CD'
...        },{
...             pNo: 'v10888', pName: '哈利波特：混血王子的背叛',
...             unitPrice: 450, category: 'DVD'
...        },{
...             pNo: 'd03333', pName: '5566專輯',
...             unitPrice: 450, category: 'CD'
...        },{
...             pNo: 'b51111', pName: '電子商務理論與實務',
...             unitPrice: 700, category: 'Book'
...        },{
...             pNo: 'v00111', pName: '英雄',
...             unitPrice: 400, category: 'DVD'
...        }])
{
        "acknowledged" : true,
        "insertedIds" : [
                ObjectId("621e3cba1ceed44cd268c6c6"),
                ObjectId("621e3cba1ceed44cd268c6c7"),
                ObjectId("621e3cba1ceed44cd268c6c8"),
                ObjectId("621e3cba1ceed44cd268c6c9"),
                ObjectId("621e3cba1ceed44cd268c6ca"),
                ObjectId("621e3cba1ceed44cd268c6cb"),
                ObjectId("621e3cba1ceed44cd268c6cc"),
                ObjectId("621e3cba1ceed44cd268c6cd"),
                ObjectId("621e3cba1ceed44cd268c6ce"),
                ObjectId("621e3cba1ceed44cd268c6cf")
        ]
}
```

Record

```
> db.Record.insertMany([
...        {
...             tNo: '91100', pNo: 'b30999',
...             amount: 1, salePrice: 450
...        },{
...             tNo: '90111', pNo: 'v10888',
...             amount: 3, salePrice: 1350
...        },{
...             tNo: '92555', pNo: 'b10234',
...             amount: 5, salePrice: 3000
...        },{
...             tNo: '92555', pNo: 'b40555',
...             amount: 10, salePrice: 5000
...        },{
...             tNo: '91888', pNo: 'b40555',
...             amount: 3, salePrice: 1650
...        },{
...             tNo: '91888', pNo: 'd03333',
...             amount: 2, salePrice: 850
...        },{
...             tNo: '92666', pNo: 'd11222',
...             amount: 1, salePrice: 300
...        },{
...             tNo: '92666', pNo: 'd20777',
...             amount: 1, salePrice: 350
...        },{
...             tNo: '92666', pNo: 'v00111',
...             amount: 2, salePrice: 800
...        },{
...             tNo: '92333', pNo: 'b51111',
...             amount: 1, salePrice: 700
...        }
... ])
{
        "acknowledged" : true,
        "insertedIds" : [
                ObjectId("621e3d511ceed44cd268c6d0"),
                ObjectId("621e3d511ceed44cd268c6d1"),
                ObjectId("621e3d511ceed44cd268c6d2"),
                ObjectId("621e3d511ceed44cd268c6d3"),
                ObjectId("621e3d511ceed44cd268c6d4"),
                ObjectId("621e3d511ceed44cd268c6d5"),
                ObjectId("621e3d511ceed44cd268c6d6"),
                ObjectId("621e3d511ceed44cd268c6d7"),
                ObjectId("621e3d511ceed44cd268c6d8"),
                ObjectId("621e3d511ceed44cd268c6d9")
        ]
}
```

table的完整內容

查看database裡的table

```
show collections
```

查看table內容

```
db.table_name.find()
```



```
> show collections
Product
Record
> db.Product.find()
{ "_id" : ObjectId("621e3cba1ceed44cd268c6c6"), "pNo" : "b30999", "pName" : "資料庫理論與實務", "unitPrice" : 500, "category" : "Book" }
{ "_id" : ObjectId("621e3cba1ceed44cd268c6c7"), "pNo" : "d11222", "pName" : "任賢齊專輯三", "unitPrice" : 300, "category" : "CD" }
{ "_id" : ObjectId("621e3cba1ceed44cd268c6c8"), "pNo" : "b20666", "pName" : "OLAP進階", "unitPrice" : 500, "category" : "Book" }
{ "_id" : ObjectId("621e3cba1ceed44cd268c6c9"), "pNo" : "b10234", "pName" : "管理資訊系統概論", "unitPrice" : 600, "category" : "Book" }
{ "_id" : ObjectId("621e3cba1ceed44cd268c6ca"), "pNo" : "b40555", "pName" : "系統分析理論與實務", "unitPrice" : 550, "category" : "Book" }
{ "_id" : ObjectId("621e3cba1ceed44cd268c6cb"), "pNo" : "d20777", "pName" : "蔡依林專輯二", "unitPrice" : 350, "category" : "CD" }
{ "_id" : ObjectId("621e3cba1ceed44cd268c6cc"), "pNo" : "v10888", "pName" : "哈利波特：混血王子的背叛", "unitPrice" : 450, "category" : "DVD" }
{ "_id" : ObjectId("621e3cba1ceed44cd268c6cd"), "pNo" : "d03333", "pName" : "5566專輯", "unitPrice" : 450, "category" : "CD" }
{ "_id" : ObjectId("621e3cba1ceed44cd268c6ce"), "pNo" : "b51111", "pName" : "電子商務理論與實務", "unitPrice" : 700, "category" : "Book" }
{ "_id" : ObjectId("621e3cba1ceed44cd268c6cf"), "pNo" : "v00111", "pName" : "英雄", "unitPrice" : 400, "category" : "DVD" }
> db.Record.find()
{ "_id" : ObjectId("621e3d511ceed44cd268c6d0"), "tNo" : "91100", "pNo" : "b30999", "amount" : 1, "salePrice" : 450 }
{ "_id" : ObjectId("621e3d511ceed44cd268c6d1"), "tNo" : "90111", "pNo" : "v10888", "amount" : 3, "salePrice" : 1350 }
{ "_id" : ObjectId("621e3d511ceed44cd268c6d2"), "tNo" : "92555", "pNo" : "b10234", "amount" : 5, "salePrice" : 3000 }
{ "_id" : ObjectId("621e3d511ceed44cd268c6d3"), "tNo" : "92555", "pNo" : "b40555", "amount" : 10, "salePrice" : 5000 }
{ "_id" : ObjectId("621e3d511ceed44cd268c6d4"), "tNo" : "91888", "pNo" : "b40555", "amount" : 3, "salePrice" : 1650 }
{ "_id" : ObjectId("621e3d511ceed44cd268c6d5"), "tNo" : "91888", "pNo" : "d03333", "amount" : 2, "salePrice" : 850 }
{ "_id" : ObjectId("621e3d511ceed44cd268c6d6"), "tNo" : "92666", "pNo" : "d11222", "amount" : 1, "salePrice" : 300 }
{ "_id" : ObjectId("621e3d511ceed44cd268c6d7"), "tNo" : "92666", "pNo" : "d20777", "amount" : 1, "salePrice" : 350 }
{ "_id" : ObjectId("621e3d511ceed44cd268c6d8"), "tNo" : "92666", "pNo" : "v00111", "amount" : 2, "salePrice" : 800 }
{ "_id" : ObjectId("621e3d511ceed44cd268c6d9"), "tNo" : "92333", "pNo" : "b51111", "amount" : 1, "salePrice" : 700 }
```

MongoDB查詢結果

查詢1：找出定價400元以下所有CD。列出商品名稱、定價。

```
> db.Product.aggregate([
... {
... "$match": {"category": "CD", "unitPrice": {"$lt": 400}}
... },
... {
... "$project": {"_id": 0, "pName": 1, "unitPrice": 1}
... },
... {
... "$sort": {"unitPrice": 1}
... }
... ])
{ "pName" : "任賢齊專輯三", "unitPrice" : 300 }
{ "pName" : "蔡依林專輯二", "unitPrice" : 350 }
>
```

查詢2：找出所有定價比所有書籍都高的商品。

```
> var topPriceOfBooks = db.Product.find({"category": "Book"},
... {"unitPrice": 1, "_id": 0}).sort({ "unitPrice": -1
... }).limit(1).toArray().map(function(u){return u.unitPrice;})[0]
> db.Product.aggregate([
...     {
... "$match": {"unitPrice": {"$gt": topPriceOfBooks}}
...     },
...     {
... "$project": {"_id": 0, "pNo": 1, "pName": 1}
...     }
... ])
>
```

查詢3：找出最優惠的交易記錄。列出交易編號、該筆交易得到的優惠金額。

```
> db.Record.aggregate([
... {$lookup:
... {
... from:"Product",
... localField:"pNo",
... foreignField:"pNo",
... as:"Product"
... }
... },
... {$unwind:"$Product"},
... {
... "$group":{
... "_id": "$tNo",
... "tNo": {"$first": "$tNo"},
... "discount": {"$sum": {"$subtract": ["$Product.unitPrice", {"$divide": ["$salePrice", "$amount"]}]}}}
... },
... {$project:
... {
... "_id":0
... }
... },
... {$sort:{"discount":-1}},
... {$out:"temp"}
... ])
> var x = db.temp.find().sort({"discount":-1}).limit(1).toArray().map(function(u){return u.discount;})[0]
> db.temp.find(
... {
... "discount":x
... },
... {
... "_id":0
... }
... )
{ "tNo" : "91100", "discount" : 50 }
{ "tNo" : "92555", "discount" : 50 }
>
```

狀況排解

中文字產生'?'

```
mysql> SELECT * FROM my_db.product;
+--------+---------------+-----------+----------+
| pNo    | pName         | unitPrice | category |
+--------+---------------+-----------+----------+
| b10234 | ????????      |       600 | Book     |
| b20666 | OLAP??        |       500 | Book     |
| b30999 | ????????      |       500 | Book     |
| b40555 | ?????????     |       550 | Book     |
| b51111 | ?????????     |       700 | Book     |
| d03333 | 5566??        |       450 | CD       |
| d11222 | ??????        |       300 | CD       |
| d20777 | ??????        |       350 | CD       |
| v00111 | ??            |       400 | DVD      |
| v00112 | ?             |       400 | DVD      |
| v10888 | ???????????   |       450 | DVD      |
+--------+---------------+-----------+----------+
11 rows in set (0.00 sec)
```

解決:

在CMD輸入指令，將CMD輸入時的中文編碼從 `Big5` 改成 `utf-8`

```
chcp 65001
```

Reference

mysql語法-1 (https://www.cynet.com.tw/learning/MySql/Page04.htm)

mysql語法-2 (https://www.mysql.tw/2015/05/select-sql.html)

環境變數設定 (https://www.architectryan.com/2018/03/17/add-to-the-path-on-windows-10/)

mongodb-1 (https://docs.mongodb.com/manual/reference/method/db.collection.insertMany/)

mongodb-2 (https://zh-tw.coderbridge.com/series/800ffff9f7524d35ac6ecc51fffda4b9/posts/fccb25a652444dfda38629965eac7c7d)

mongodb-3 (http://dog0416.blogspot.com/2015/08/databasemongodb-1-crud-operation-1.html)

mongodb-4 (https://docs.mongodb.com/manual/reference/method/db.dropDatabase/)