SQL入門

Calvin Lin
2015/11/26

課程檔案下載

- https://goo.gl/z7K5dw

SQL基礎介紹

- 全名：Structured Query Language
- Relational Database Management System(RDBMS)的標準語言
- 常見的幾種RDBMS：
    - MySQL
    - SQLite
    - MS SQL-Server(使用Transact-SQL)

SQL基礎介紹

- RDBMS架構：
  - Server（伺服器）
    - Database（資料庫）
      - Table（資料表）
        - Column（欄位）
- 關鍵字: Case Insensitive

安裝MySQL

- Windows:
  - http://dev.mysql.com/downloads/windows/installer/
- Mac & Linux:
  - http://dev.mysql.com/downloads/mysql/

GUI

- MySQL Workbench:
    - https://dev.mysql.com/downloads/workbench/
- Sequel Pro(Only For Mac):
    - http://www.sequelpro.com/

Sample Table(midterm_exam)

Name	Subject	Score
Amy	Math	60
Amy	English	85
Amy	Chinese	90
Amy	Science	80
Amy	Social_Science	70
Ben	Math	100
Ben	English	65
Ben	Chinese	75
Ben	Science	60
Ben	Social_Science	100
Calvin	Math	60
Calvin	English	20
Calvin	Chinese	95
Calvin	Science	80
Calvin	Social_Science	60
David	Math	75
David	English	95
David	Chinese	80
David	Science	90
David	Social_Science	60

CREATE DATABASE

- 顯示現有資料庫：
  - SHOW DATABASES;
- 創造資料庫：
  - CREATE DATABASE testDB;

CREATE TABLE

- 指定使用資料庫：
  ```
  USE testDB;
  ```
- 顯示現有資料表：
  ```
  SHOW TABLES;
  ```
- 創造資料表：
  ```
  CREATE TABLE midterm_exam (Name VARCHAR(255), Subject
  VARCHAR(255), Score VARCHAR(255));
  ```
- 複製資料表：
  ```
  CREATE TABLE midterm_exam_copy SELECT * FROM midterm_exam;
  ```

DATA TYPEs

- INT
- FLOAT
- VARCHAR
- DATE
- 改變Data Type：

  -
    ```
    ALTER TABLE midterm_exam MODIFY Score INT(11);
    ```

INSERT

- 新增資料：
  - INSERT INTO midterm_exam (Name, Subject, Score) VALUES (‘Amy’, ‘Math’, 30);
  - INSERT INTO midterm_exam (Name, Subject) VALUES (‘Ben’, ‘Math’);

UPDATE

- 修改符合條件的資料：
  - UPDATE midterm_exam SET Score=90 WHERE Name=‘Ben’ AND Subject=‘Math’;
- 修改所有資料：
  - UPDATE midterm_exam SET Score=0;
  - UPDATE midterm_exam SET Score=0 WHERE 1=1;

DELETE

- 刪除符合條件的資料：
  - DELETE FROM midterm_exam WHERE Name=‘Amy’ AND Subject=‘Math’;
- 刪除所有資料：
  - DELETE FROM midterm_exam;
  - DELETE FROM midterm_exam WHERE 1=1;

LOAD DATA

```
LOAD DATA LOCAL INFILE ‘[your_file_path]’
INTO TABLE midterm_exam
FIELDS TERMINATED BY ‘,'
ENCLOSED BY ‘"'
LINES TERMINATED BY ‘\n'
IGNORE 1 ROWS;
```

SELECT

- 選出所有資料：
  - SELECT * FROM midterm_exam;
- 選出特定欄位資料：
  - SELECT Name, Score FROM midterm_exam;
- 選出前5筆資料：
  - SELECT * FROM midterm_exam LIMIT 5; //MySQL
  - SELECT TOP 5 * FROM midterm_exam; //MSSQL

SELECT

- 計算考卷總數：
  - SELECT COUNT(*) FROM midterm_exam;
- 計算考生總數：
  - SELECT COUNT(DISTINCT Name) FROM midterm_exam;
- 計算所有考卷平均分數：
  - SELECT AVG(Score) AS avg_score FROM midterm_exam;
- 計算個人總分：
  - SELECT Name, SUM(Score) AS sum_score FROM midterm_exam GROUP BY Name;

SELECT

- 計算科目平均分數並由平均分數低到高排序
    - SELECT Subject, AVG(Score) AS avg_score FROM midterm_exam GROUP BY Subject ORDER BY avg_score;
- 選出滿分或不及格的考卷並由分數高到低排序：
    - SELECT * FROM midterm_exam WHERE Score = 100 OR Score < 60 ORDER BY Score DESC;
    - SELECT * FROM midterm_exam WHERE Score NOT BETWEEN 60 AND 99 ORDER BY Score DESC;

PRIMARY KEY

- 中文：主鍵
- 每張資料表只能有一個Primary Key
- Primary Key可以由多個欄位組成
- 同一張資料表內，Primary Key的值不能重複亦不能有NULL

PRIMARY KEY

- 設定Primary Key：
  - ALTER TABLE midterm_exam ADD PRIMARY KEY(Name); //會失敗，因為Name有重複值。
  - ALTER TABLE midterm_exam ADD CONSTRAINT pk_midterm_exam PRIMARY KEY(Name, Subject);
- 刪除Primary Key
  - ALTER TABLE midterm_exam DROP PRIMARY KEY; //MySQL
  - ALTER TABLE midterm_exam DROP CONSTRAINT pk_midterm_exam; //MSSQL

INDEX

- 中文：索引
- 每張資料表可以有多個INDEX
- INDEX可以由多個欄位組成
- INDEX的值可以重複也可以有NULL

INDEX

- 創造INDEX：
  - CREATE INDEX name_index ON midterm_exam (Name);
  - CREATE INDEX name_and_subject_index ON midterm_exam (Name, Subject);
- 刪除INDEX：
  - ALTER TABLE midterm_exam DROP INDEX name_and_subject_index; //MySQL
  - DROP INDEX midterm_exam.name_and_subject_index; //MSSQL

UNIQUE

- 每張表可以有多個UNIQUE
- UNIQUE可以由多個欄位組成
- 同一張資料表內，UNIQUE的值不能重複但可以有NULL

INDEX的優缺點

- 優點：
  - 加快SELECT速度（O(n) -> O(log n)）
- 缺點：
  - 創造INDEX費時、減慢INSERT及DELETE速度
- 原理：
  - 每個INDEX都代表一個Binary Tree

Sample Table(final_exam)

Name	Subject	Score
Amy	Math	30
Ben	Math	90
Calvin	Math	80
David	Math	100
Amy	English	90
David	English	100
Calvin	English	40
Ben	English	80
Amy	Chinese	80
David	Chinese	70
Calvin	Chinese	100
Ben	Chinese	50
Amy	Science	100
David	Science	60
Calvin	Science	90
Ben	Science	80
Amy	Social_Science	70
David	Social_Science	20
Calvin	Social_Science	60
Ben	Social_Science	100

JOIN

- 合併兩張資料表：

  -
    ```
    SELECT m.Name, m.Subject, m.Score AS
    Midterm_Score, f.Score AS Final_Score FROM
    midterm_exam AS m INNER JOIN final_exam AS f
    ON m.Name=f.Name AND m.Subject=f.Subject;
    ```
- INNER JOIN / LEFT JOIN / RIGHT JOIN

FOREIGN KEY

- 中文：外鍵
- ALTER TABLE midterm_exam ADD CONSTRAINT fk_Name FOREIGN KEY (Name) REFERENCES students(Name) ON DELETE CASCADE ON UPDATE RESTRICT;
- ALTER TABLE midterm_exam DROP FOREIGN KEY fk_Name;

其他範例

- SELECT * FROM students WHERE Name LIKE ‘A%’;
- SELECT CONCAT(Name, ‘_EX’) AS New_Name FROM students;
- SELECT * FROM students WHERE Best_Subject IS NOT NULL;
- SELECT Name, DATEDIFF(NOW(), Birthday) FROM students;

其他學習資源

- Code School:
  - https://www.codeschool.com/courses/try-sql
- codecademy:
  - https://www.codecademy.com/en/courses/learn-sql
- w3school:
  - http://www.w3schools.com/sql/default.asp