

Web Design and Programming (0107558)

Internet Programming (0107571)¹

Introduction to SQL

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¹Michael Mendez. *The Missing Link: An Introduction to Web Development and Programming*. Open SUNY Textbooks 2014.

Introduction to SQL

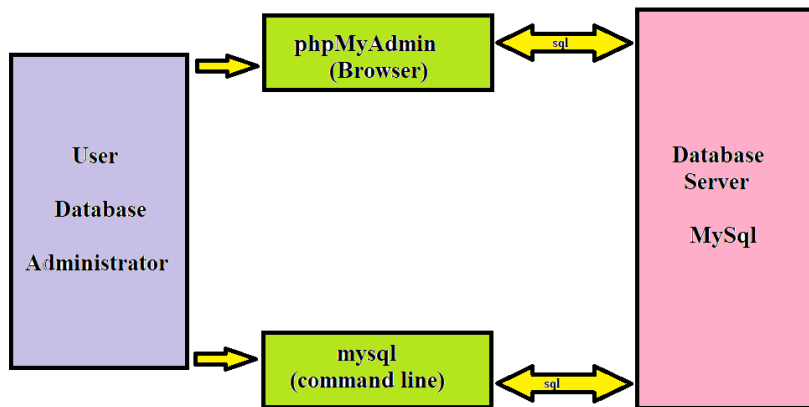
Database design

- ▶ A database is an organized collection of data, generally stored and accessed electronically from a computer system.
- ▶ Computer scientists may classify database-management systems according to the database models that they support.
 - ▶ Relational databases became dominant in the 1980s. These model data as rows and columns in a series of tables, and the vast majority use SQL for writing and querying data.
 - ▶ Non-relational databases became popular in the 2000s, referred to as NoSQL because they use different query languages.

Introduction to SQL

SQL basics

- ▶ SQL: Structured Query Language.
- ▶ Used for managing data held in a relational database management system.



Introduction to SQL

SQL basics - Command line

- ▶ Open cmd.
- ▶ `CD c : \mamp\bin\mysql\bin`
- ▶ Run: `mysql.exe -u root -p`
- ▶ Enter the password "root"
- ▶ `show databases;` (show what databases are in the system).
- ▶ **CREATE DATABASE people;** Create a new database with a name of people.
- ▶ `USE people;`
- ▶ Delete a table: **DROP TABLE users;**

Introduction to SQL

SQL basics - CREATE table

- ▶ Syntax:

```
CREATE TABLE table_name (  
    column1 datatype,  
    column2 datatype,  
    column3 datatype,  
    ....  
);
```

- ▶ Example:

```
CREATE TABLE users(  
    name VARCHAR(128),  
    email VARCHAR(128)  
);
```

- ▶ DESCRIBE users;. Show the users table.
- ▶ INSERT INTO users (name,email) VALUES ('Naeem','na@gmail.com');.

Introduction to SQL

SQL basics - DELETE

- ▶ Syntax:

```
DELETE FROM table_name WHERE condition;
```

- ▶ Example:

```
DELETE FROM users WHERE email='omar@yahoo.com';
```

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SQL basics - UPDATE

- ▶ Syntax:

```
UPDATE table_name  
SET column1 = value1, column2 = value2, ...  
WHERE condition;
```

- ▶ Example:

```
UPDATE users  
SET name='Ali98'  
WHERE email='ali@gmail.com';
```

Introduction to SQL

SQL basics - SELECT

- ▶ Syntax:

```
SELECT column1, column2, ...  
FROM table_name;
```

- ▶ Examples:

```
1) SELECT *  
FROM users WHERE email='naeemodat@gmail.com';  
2) SELECT *  
FROM users ORDER BY email;  
3) SELECT *  
FROM users WHERE name LIKE '%e%';
```


Introduction to SQL

SQL basics - Data Types

- ▶ Each column in a database table is required to have a name and a data type.
- ▶ String data types:
 - ▶ CHAR(n): Fixed width character string up to 255 characters.
 - ▶ VARCHAR(n): Variable width character string up to 65535 characters.
 - ▶ TEXT(n): Holds a string with a maximum length of 65,535 bytes.
 - ▶ TINYTEXT: Holds a string with a maximum length of 255 characters.
 - ▶ MEDIUMTEXT: Holds a string with a maximum length of 16,777,215 characters.
 - ▶ LONGTEXT: Holds a string with a maximum length of 4,294,967,295 characters.

Introduction to SQL

SQL basics - Data Types

- ▶ Binary types (rarely used, store small images) :
 - ▶ BYTE(n): Stores binary byte strings up to 255 byte.
 - ▶ VARBINARY(n): Stores binary byte strings up to 65535 bytes.

Introduction to SQL

SQL basics - Data Types

- ▶ BLOB (Binary Large Objects) types (movies, pdf, images,...):
 - ▶ TINYBLOB: Max length is 255 bytes.
 - ▶ BLOB(n): Holds up to 65,535 bytes of data.
 - ▶ MEDIUMBLOB: Holds up to 16,777,215 bytes of data.
 - ▶ LONGBLOB: Holds up to 4,294,967,295 bytes of data.

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SQL basics - Data Types

- ▶ Integer types (n specifies the maximum display width which is 255):
 - ▶ TINYINT(n): (-128, 127), (0, 255).
 - ▶ SMALLINT(n): (-32768, 32767), (0, 64K).
 - ▶ MEDIUMINT(n): (-8M, 8M), (0, 16M).
 - ▶ INT(n): (-2G, 2G), (0, 4G).
 - ▶ BIGINT(n): (-10^{19} , 10^{19}), (0, 10^{20}).
- ▶ Float types:
 - ▶ FLOAT(p): A floating point number (p is the precision up to 64), default is 64 if p is not specified.
 - ▶ DOUBLE(size, d): The total number of digits is specified in size. The number of digits after the decimal point is specified in the d parameter.

Introduction to SQL

SQL basics - Data Types

- ▶ Date types:
 - ▶ DATE: (YYYY-MM-DD). Range is from '1000-01-01' to '9999-12-31'
 - ▶ DATETIME(fsp) A date and time combination. (YYYY-MM-DD hh:mm:ss). Range is from '1000-01-01 00:00:00' to '9999-12-31 23:59:59'.
 - ▶ TIMESTAMP(fsp): The number of seconds since the Unix epoch ('1970-01-01 00:00:00' UTC). (YYYY-MM-DD hh:mm:ss). Range is from '1970-01-01 00:00:01' UTC to '2038-01-09 03:14:07' UTC.
 - ▶ TIME(fsp): Time. (hh:mm:ss).
 - ▶ YEAR: (1901, 2155), and 0000.
 - ▶ fsp: Fractional seconds precision (0,6). 0 (no fraction) to 6 digits are after the period.

Introduction to SQL

SQL basics - Auto Increment, Index, Primary Key, and Foreign key

- ▶ Auto-Increment allows a unique number to be generated automatically when a new record is inserted into a table.
- ▶ The PRIMARY KEY uniquely identifies each record in a table. A table can have only ONE primary key. Can consist of single or multiple columns (fields).
- ▶ A FOREIGN KEY is a key used to link two tables together. It is a field (or collection of fields) in one table that refers to the PRIMARY KEY in another table.
- ▶ Indexes are used to retrieve data from the database more quickly than otherwise.
- ▶ Example:

```
CREATE TABLE users(  
    user_id INT UNSIGNED NOT NULL AUTO_INCREMENT,  
    name VARCHAR(128),  
    email VARCHAR(128),  
    PRIMARY KEY(user_id),  
    INDEX(email)  
);
```