# MySQL
## Intermediate Web Programming (CIS 245)

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# Lesson's Outline

1. **Structured Query Language (SQL)**
   - SQL History
   - SQL Syntax

2. **MySQL Installation**
   - Installing MariaDB on Ubuntu
   - Installing MariaDB on CentOS

3. **Using MySQL**
   - Managing Users
   - Checking Databases & Users
   - SQL Data Definition Language (DDL)
   - SQL Data Manipulation Language (DML)

4. **Using PHP with MySQL**

## Database

- ❑ *Structured* collection of *data*

- ❑ *Organized* based on a *database model*

- ❑ Provide *easy storage* and *retrieval* of data

- ❑ An *electronic filing system*

## Database Model

✎ *Database Model* specifies

  ☐ *Data container*
  ☐ *Data storage* and *retrieval*

✎ *Database Model*s

  ☐ *Flat File*
  ☐ *Network*
  ☐ *Hierarchical*
  ☐ *Relational*

## Relational Database Model

✎ *Data is stored in different tables (relations)*

✎ *Table consists of*
  ❑ *Records (rows, tuples)*
  ❑ *fields (columns, attributes)*

✎ *Relationships are defined to link tables:*

  ① *one-to-one*
  ② *one-to-many*
  ③ *many-to-many*

## DBMS

✎ *Software that manages database functions*

- [ ] *Storage*
- [ ] *Retrieval*
- [ ] *Insertion*
- [ ] *Modification*
- [ ] *Deletion*

## DBMS

✎ *Two main DBMSs*

☐ *MySQL*                          ☐ *Microsoft SQL*

✎ SQL is a database computer language designed for managing data in

   ✔ relational database management systems (RDBMS)

✎ SQL stands for Structured Query Language

## SQL History

✎ In June 1970 Edgar Frank Codd published the paper

✔ A Relational Model of Data for Large Shared Data Banks

✔ *in* *in the Association of Computer Machinery (ACM) journal*

# SQL History

✎ SQL was originally developed

✔ at IBM by

   ✏ Donald D.
     Chamberlin

   ✏ Raymond F.
     Boyce

✔ in early 1970s to implement Edgar Frank Codd's relational model

✎ In June 1979 Relational Software Inc.(Oracle) introduced the

✔ the first SQL commercial software

## MySQL/MariaDB History

✎ MySQL was developed by

    ✔ Michael Widenius & David Axmark in 1994

✎ MySQL was written in C & C++

✎ MariaDB was developed by

    ✔ Michael Widenius in 2010

✎ MariaDB is a Drop-in replacement of MySQL

# SQL Statements

✎ *SQL is declarative language*

   ✔ specifies *WHAT* not *HOW*

✎ *SQL basic database operations are CRUD*

   ① *Create*         ③ *Update*

   ② *Retrieve*     ④ *Delete*

## SQL Statements

✎ *SQL* `keywords` *are case insensitive*

✎ *Two types of SQL statements*

① `Data Definition Language (DDL)`
`statements`

   ✔ *used to define the database schema*

② `Data Manipulation Language (DML)`
`statements called queries`

   ✔ *used to manage data*

# SQL Statements

✎ Data Definition Language (DDL) statements

   ① CREATE             ③ DROP

   ② ALTER

✎ Data Manipulation Language (DML) statements

   ① SELECT           ③ UPDATE

   ② INSERT           ④ DELETE

# MariaDB Installation

## Installing MariaDB on Ubuntu Server

☐ Update Ubuntu distribution & packages

```
sudo apt update
```

☐ Install MariaDB with the latest packages

```
sudo apt install mariadb-server
```

☐ Secure MariaDB

```
sudo mysql_secure_installation
```

# MariaDB Installation

## Starting MariaDB Server on Ubuntu Server

❏ To start MariaDB service

```
sudo systemctl start mariadb
```

❏ To automatically start MariaDB service at boot

```
sudo systemctl enable mariadb
```

# MariaDB Installation

## Installing MariaDBon CentOS Server

☐ Update CentOS distribution & packages

```
yum update
```

☐ Install MariaDB with the latest packages

```
sudo yum install mariadb-server
```

☐ Secure MariaDB

```
sudo mysql_secure_installation
```

# MariaDB Installation

## Starting MariaDB Server on CentOS

❑ To start MariaDB service

```
sudo systemctl start mariadb
```

❑ To automatically start MariaDB service at boot

```
sudo systemctl enable mariadb
```

# Using MySQL Server

## Login to MySQL Server

☐ To login to MySQL server as root

```
mysql -u root -p
#OR
[root@centos-ufv ~]# mysql -p
```

☐ To list all MySQL prompt commands

```
help
# OR
\h
# OR
\?
```

# Class Activity

✎ *Using appropriate MySQL prompt command*

① *Change MySQL prompt to* **MySQL»**

② *Get MySQL server status information*

Chinese Proverb

Tell Me & I Forget,
Teach Me & I Remember,
Involve Me & I Learn

# Using MySQL Server

## Managing Database Users

☐ To add a Database user

```
CREATE USER 'webmaster'@'localhost' IDENTIFIED BY '
    connect';
```

☐ Grant all privileges to a user except the GRANT privilege on all databases

```
GRANT ALL ON *.* TO 'webmaster'@'localhost';
```

☐ Grant all privileges to a user on all databases

```
GRANT ALL ON *.* TO 'webmaster'@'localhost' WITH GRANT
    OPTION;
```

## Managing Database Users

❒ Grant all privileges to a user except the GRANT privilege on login database

```
GRANT ALL ON login.* TO 'webmaster'@'localhost';
```

❒ Grant all privileges to a user on login database

```
GRANT ALL ON login.* TO 'webmaster'@'localhost' WITH
    GRANT OPTION;
```

# Using MySQL Server

## Checking Databases & Users

❐ To list all databases you have access to

```
SHOW DATABASES;
```

❐ To switch to a specific database

```
USE mysql;
```

❐ To list all tables in the currently selected database

```
SHOW TABLES;
```

❐ To list the currently logged in user

```
SELECT user();
```

# Using MySQL Server

## Checking Databases & Users

□ To list all hosts and users

```sql
SELECT HOST,USER FROM user;
```

□ To list all permissions in the currently selected database

```sql
SHOW GRANTS;
```

□ To list MySQL version

```sql
SELECT version();
```

# Using MySQL Server

## Data Definition Language (DDL)

❑ To create a database with a name login

```
CREATE DATABASE login;
```

❑ To delete a database with a name login

```
DROP DATABASE login;
```

## Data Definition Language (DDL)

❐ To create a table with a name FactLog in a
   database with a name star

```
USE star;
CREATE TABLE IF NOT EXISTS FactLog
(
  logID INT(10) NOT NULL AUTO_INCREMENT,
  hostID INT(10) NOT NULL REFERENCES DimHost(id),
  timeID INT(10) NOT NULL REFERENCES DimTime(id),
  hostID INT(10) NOT NULL REFERENCES DimHost(id),
  requestMethodID INT(10) NOT NULL REFERENCES
      DimRequestMethod(id),
  statusID INT(10) NOT NULL REFERENCES statusHost(id),
  agentID INT(10) NOT NULL REFERENCES DimAgent(id),
  size SMALLINT UNSIGNED
)
```

# Using MySQL Server

## Data Definition Language (DDL)

❐ To delete all data of a table with a name users
in a database with a name login

```
TRUNCATE users;
# OR
TRUNCATE login.users;
```

# Using MySQL Server

## Data Definition Language (DDL)

☐ To delete a column with a name active in a table with a name users

```
ALTER TABLE DROP active
```

☐ To change a column name from passwd to password

```
ALTER TABLE CHANGE passwd password VARCH(256)
```

# Using MySQL Server

## Data Manipulation Language (DML)

❑ To select all data of user with a
john.smith@ufv.ca email

```sql
SELECT * FROM users WHERE email='john.smith@ufv.ca';
```

❑ To insert a record into an existing table with a
name users

```sql
INSERT INTO users (firstName,lastName,email,password)
VALUES('John','Smith','john.smith@ufv.ca',password('
    guess'));
```

## Data Manipulation Language (DML)

❑ To update a `password` of user with a `john.smith@ufv.ca` email

```
UPDATE users SET password=password('Hard')
       WHERE email='john.smith@ufv.ca';
```

❑ To delete a `recored` of user with a `john.smith@ufv.ca` email

```
DELETE FROM users WHERE email='john.smith@ufv.ca';
```

## Running a SQL Script

❏ To run a SQL script with a name setting.sql

```
CREATE DATABASE IF NOT EXISTS documents;
USE documents;
CREATE TABLE IF NOT EXISTS uploads
( id INT(10) NOT NULL AUTO_INCREMENT PRIMARY KEY,
  name VARCHAR(25) NOT NULL,
  dateUploaded TIMESTAMP DEFAULT CURRENT_TIMESTAMP
)
```

❏ Use the following command

```
mysql -u root -p < setting.sql
```

# Using PHP with MySQL

## Storing Registered Users in MySQL Server

### Registration Form

**Firstname**

Type your firstname

**Lastname**

Type your lastname

**Username**

Type your username

**Email address**

Type your email

**Confirm email address**

Confirm your email

## Storing Registered Users in MySQL Server

❑ Connect to your MySQL database

```php
<?php
  $firstname=$lastname=$username=$email=$password='';
  $host='localhost';
  $user='webmaster';
  $password='connect';
  $database='login';
  $connect = new mysqli($host,$user,$password,$database);
  .
  .
?>
```

## Storing Registered Users in MySQL Server

❏ Get registration data, sanitize it, then insert
it into MySQL database

```php
<?php
.
.
if(isset($_POST['submit'])){
    $firstname=validate($_POST['firstname']);
    $lastname=validate($_POST['lastname']);
    $username=validate($_POST['username']);
    $email=validate($_POST['email']);;
    $password=validate($_POST['password']);
    $password=password_hash('password',PASSWORD_DEFAULT);
  $insert ="INSERT INTO users (firstname,lastname,username,
     email,password)
          VALUES('$firstname','$lastname','$username','$
             email','$password')";

}
```

# Using MySQL Server

## Storing Registered Users in MySQL Server

```php
function validate($data) {
 $data = trim($data);
  $data = stripslashes($data);
  $data = htmlspecialchars($data, ENT_QUOTES | ENT_HTML5, '
    UTF-8');
  $data =mysqli_escape_string($connect,$data);
  return $data;
}
```