MySQL RDBMS

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Agenda / Syllabus

- ✓ DBMS vs RDBMS
- ✓ MySQL: Introduction, Installation, …
- ✓ SQL
  - ✓ CREATE TABLE, MySQL data types
  - ✓ SELECT with LIMIT, ORDER, WHERE, GROUP BY, HAVING
  - ✓ INSERT, UPDATE, DELETE
  - ✓ Joins, Sub-queries
  - ✓ Transaction & Locking
  - ✓ GRANT & REVOKE
- ✓ MySQL programming (PSM)
  - ✓ Stored procedure
  - ✓ Cursors
  - ✓ Functions
  - ✓ Triggers

DBT module

Syllabus: RDBMS (MySQL)
+ NoSQL (Mongo)

Evaluation

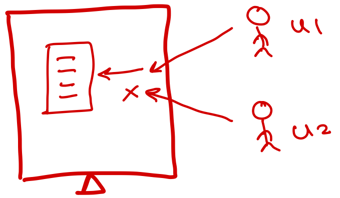
- ✓ Theory - 40 → CCEE (course end) - MCQ.
- ✓ Lab - 40 → Proctored Lab exam → Queries MySQL programs
  + Lab assignments
  end of module
- ✓ Internals - 20 → MCQ exam

Interview preparations

- * Interview questions
- * Rapid fire
- * Hot Seat

DBMS - Database Management System

- Any enterprise application need to manage data.
- In early days of software development, programmers store data into files and does operation on it. However data is highly application specific.
- Even today many software manage their data in custom formats e.g. Tally, Address book, etc.
- As data management became more common, DBMS systems were developed to handle the data. This enabled developers to focus on the business logic e.g. FoxPro, DBase, Excel, etc.
- At least CRUD (Create, Retrieve, Update and Delete) operations are supported by all databases.
- Traditional databases are file based, less secure, single-user, non-distributed, manage less amount of data (MB), complicated relation management, file-locking and need number of lines of code to use in applications.



RDBMS → Relational DBMS → CRUD

- RDBMS is relational DBMS.
- It organizes data into Tables, rows and columns. The tables are related to each other.
- RDBMS follow table structure, more secure, multi-user, server-client architecture, server side processing, clustering support, manage huge data (TB), built-in relational capabilities, table-locking or row-locking and can be easily integrated with applications.
- e.g. DB2, Oracle, MS-SQL, MySQL, MS-Access, SQLite, ... Derby → single user RDBMS.

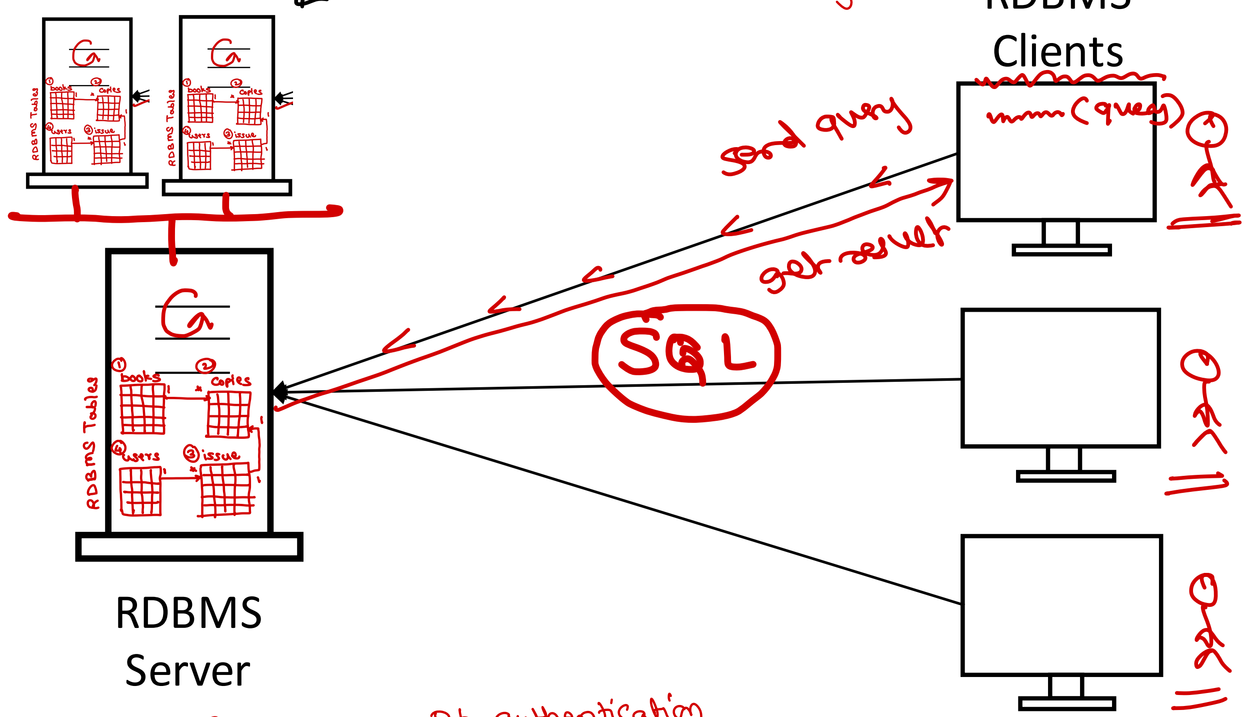
  mainframe · enterprize applns · Open Source db.

- RDBMS design is based on Codd's rules developed at IBM (in 1970). → Mathematician → 1 + 12 = 13 rules → based on set theory

  to develop RDBMS

Informix
Cybase
Postgre-SQL
⋮

duster : set of Servers connected in network for dedicated job.



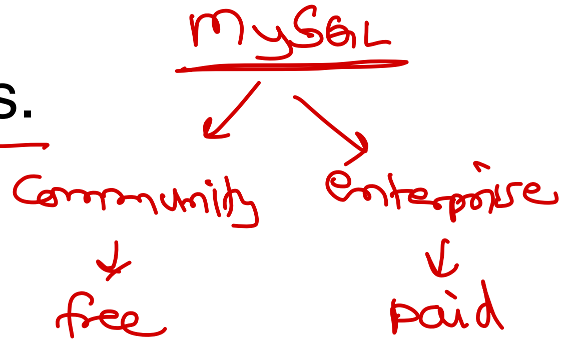
Secure: OS security, Db authentication, Schema security, Table security, operations restrictions.

SQL - Structured Query Language.

- Clients send SQL queries to RDBMS server and operations are performed accordingly. on server and response is sent to the client.
- Originally it was named as RQBE (Relational Query By Example).
- SQL is ANSI standardised in 1987 and then revised multiple times adding new features. Recent revision in 2016.
- SQL is case insensitive. except table & database/schema name on UNIX/Linux platform for MySQL db.
- There are five major categories:
  - DDL: Data Definition Language e.g. CREATE, ALTER, DROP, RENAME.
  - DML: Data Manipulation Language e.g. INSERT, UPDATE, DELETE.
  - DQL: Data Query Language e.g. SELECT.
  - DCL: Data Control Language e.g. CREATE USER, GRANT, REVOKE.
  - TCL: Transaction Control Language e.g. SAVEPOINT, COMMIT, ROLLBACK.
- Table & column names allows alphabets, digits & few special symbols. $ #
- If name contains special symbols then it should be back-quotes.
- e.g. Tbl1, `T1#`, `T2$` etc. Names can be max 30 chars long.

MySQL

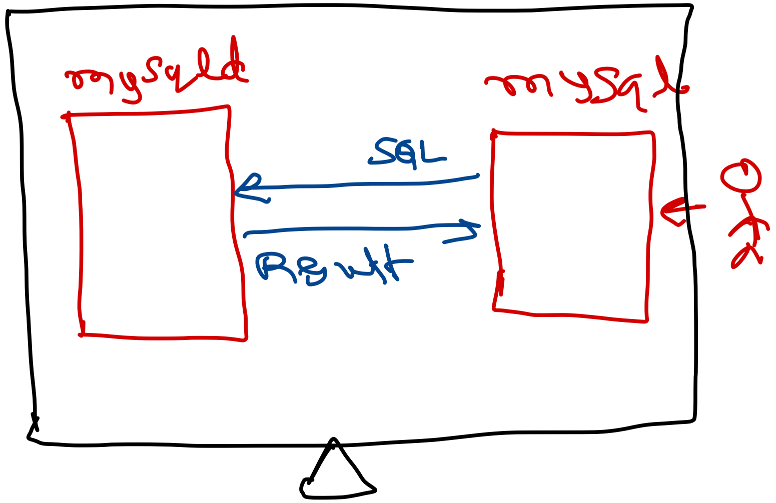
- Developed by Michael Widenius in 1995. It is named after his daughter name Myia.
- Sun Microsystems acquired MySQL in 2008.
- Oracle acquired Sun Microsystem in 2010.
- MySQL is free and open-source database under GPL. However some enterprise modules are close sourced and available only under commercial version of MySQL.
- MariaDB is completely open-source clone of MySQL.
- MySQL support multiple database storage and processing engines.
- MySQL versions:
  - < 5.5: MyISAM storage engine
  - 5.5: InnoDb storage engine
  - 5.6: SQL Query optimizer improved, memcached style NoSQL
  - 5.7: Windowing functions, JSON data type added for flexible schema
  - 8.0: CTE, NoSQL document store.
- MySQL is database of year 2019 (in database engine ranking).



MySQL installation on Ubuntu/Linux

(Linux)

- terminal> sudo apt-get install mysql-community-server mysql-community-client
- This installs MySQL server (mysqld) and MySQL client (mysql).
- MySQL Server (mysqld)
  - Run as background process. (no gui)
  - Implemented in C/C++.
  - Process SQL queries and generate results.
  - By default run on port 3306. (network socket = ip addr + port)
  - Controlled via systemctl. (Linux)
    - terminal> sudo systemctl start|stop|status|enable|disable mysql



- MySQL client (mysql)
  - Command line interface
  - Send SQL queries to server and display its results.
  - terminal> mysql –u root -p → password = manager
    admin user
- Additional MySQL clients
  - MySQL workbench ✓ (desktop based)
  - PHPMyAdmin ✓ (web based) →

Getting started

- root login can be used to perform CRUD as well as admin operations.
- It is recommended to create users for performing non-admin tasks.
  - mysql> CREATE DATABASE db;
  - mysql> SHOW DATABASES;
  - mysql> CREATE USER dbuser@localhost IDENTIFIED BY 'dbpass';
  - mysql> SELECT user, host FROM mysql.user;
  - mysql> GRANT ALL PRIVILEGES ON db.* TO dbuser@localhost;
  - mysql> FLUSH PRIVILEGES;
  - mysql> EXIT;
- terminal> mysql –u dbuser –pdbpass
  - mysql> SHOW DATABASES;
  - mysql> SELECT USER(), DATABASE();
  - mysql> USE db;
  - mysql> SHOW TABLES;
  - mysql> CREATE TABLE student(id INT, name VARCHAR(20), marks DOUBLE);
  - mysql> INSERT INTO student VALUES(1, 'Abc', 89.5);
  - mysql> SELECT * FROM student;

Thank you!

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