MySQL - RDBMS

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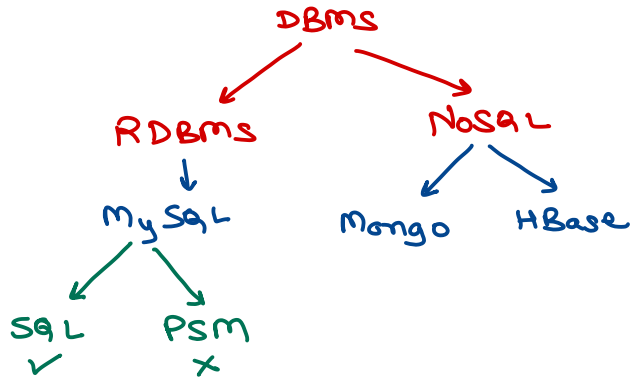
Agenda

- 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



Evaluation :

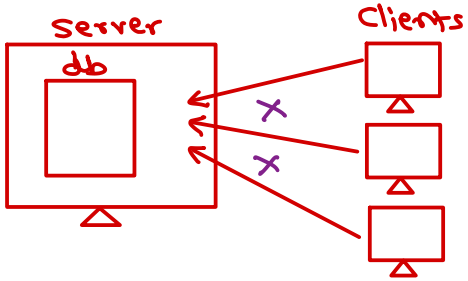
1. Theory - 40 (MCQ) - CCEE
2. Lab - 40
   - SQL queries - MySQL
   - Mongo queries
3. Internal - 20

Schedule

1. 3 hrs lecture + lab
2. 1 hr lab

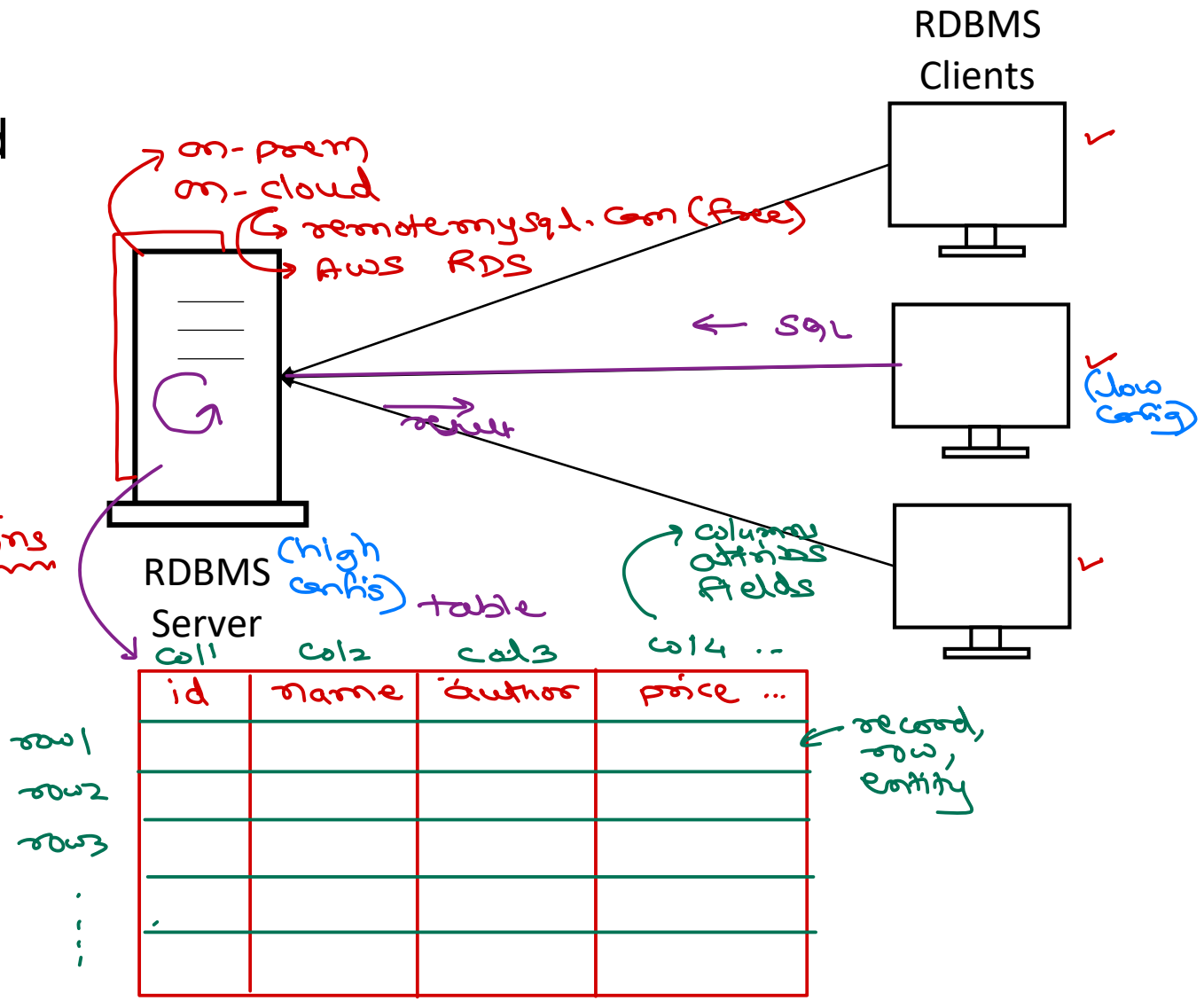
DBMS

- 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

- 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, …
- RDBMS design is based on Codd's rules developed at IBM (in 1970).



SQL - Structured Query Language.

ANSI → SQL - 1987, C - 1989, C++ -

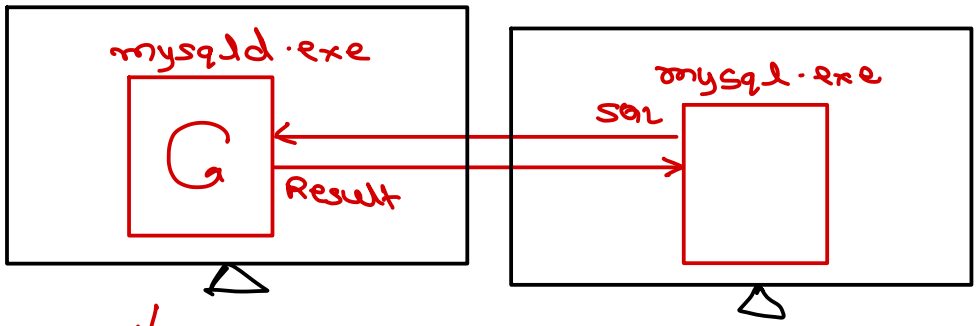
- Clients send SQL queries to RDBMS server and operations are performed accordingly.
- Originally it was named as RQBE (Relational Query By Example).
- SQL is ANSI standardised in 1987 and then revised multiple times adding new features. Recent revision in 2016.
- SQL is case insensitive. → SQL keywords, functions. Table/db names are case sensitive on Linux.
- 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~~ min 30 chars long.

MySQL (Oracle)

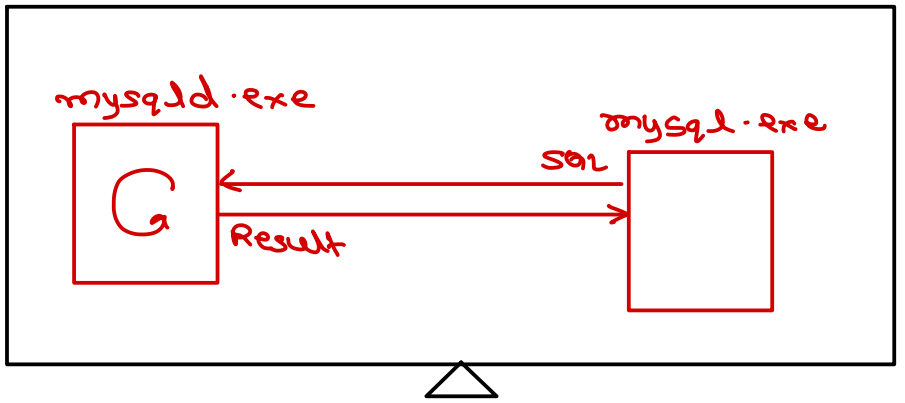
- Developed by Michael Widenius in 1995. It is named after his daughter name Myia.
- Sun Microsystems acquired MySQL in 2008.
- Oracle acquired Sun Microsystem in 2010.
- MySQL is free and open-source database under GPL. However some enterprise modules are close sourced and available only under commercial version of MySQL.
- MariaDB is completely open-source clone of MySQL. → limited features
- MySQL support multiple database storage and processing engines.
- MySQL versions: MyISAM, InnoDb, CSV, NDB, Memory, ...
  - < 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

- terminal> sudo apt-get install mysql-community-server mysql-community-client
- This installs MySQL server (mysqld) and MySQL client (mysql).
- MySQL Server (mysqld) - daemon
  - Run as background process. (service)
  - Implemented in C/C++.
  - Process SQL queries and generate results.
  - By default run on port 3306.
  - Controlled via systemctl.
    - 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
- Additional MySQL clients
  - MySQL workbench
  - PHPMyAdmin



Thank you!

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