

# SQL PROGRAMMING

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# DATABASE

- The database is a shared collection of logically related data in a systematic manner, which is stored to meet the requirements of different users of an organization that can easily be accessed, managed and updated.
- It is actually a place where related piece of information is stored and various operations can be performed on it.



# DATABASE MANAGEMENT SYSTEM

- A Database Management System (DBMS) is system software that allows users to efficiently define, create, maintain and share databases.
- Defining a database involves specifying the data types, structures and constraints of the data to be stored in the database.



# DATABASE MANAGEMENT SYSTEM

- **DBMS allows users the following tasks:**
  - **Data Definition**
  - **Data Updation**
  - **Data Retrieval**
  - **User Administration**



# ADVANTAGES OF DBMS

- **Controls database redundancy**
- **Data sharing**
- **Easily Maintenance**
- **Reduce time**
- **Backup**
- **multiple user interface**



# TYPES OF DBMS



# WHAT IS SQL?

- SQL (Structured Query Language) is a computer language aimed to store, manipulate, and retrieve data stored in relational databases.
- IBM implemented the language, originally called Sequel, as part of the System R project in the early 1970s..
- The first commercial relational database was released by Relational Software later becoming oracle.



# WHAT IS SQL?


- SQL is the standard language for Relational Database System.
- All the Relational Database Management Systems (RDMS) like **MySQL**, **MS Access**, **Oracle**, Sybase, Informix, Postgres and **SQL Server** use SQL as their standard database language.





# WHY SQL?

SQL is widely popular because it offers the following advantages:

- Allows users to access data in the relational database management systems.
  - Allows users to describe the data.
  - Allows users to define the data in a database and manipulate that data.
  - Allows to embed within other languages using SQL modules, libraries & pre-compilers.
  - Allows users to create and drop databases and tables.
  - Allows users to create view, stored procedure, functions in a database.
  - Allows users to set permissions on tables, procedures and views.
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# HISTORY OF SQL

- 1970 – Dr. Edgar F. "Ted" Codd of IBM is known as the father of relational databases. He described a relational model for databases
- 1974 – Structured Query Language appeared.
- 1978 – IBM worked to develop Codd's ideas and released a product named System/R.
- 1986 – IBM developed the first prototype of relational database and standardized by ANSI. The first relational database was released by Relational Software which later came to be known as Oracle.



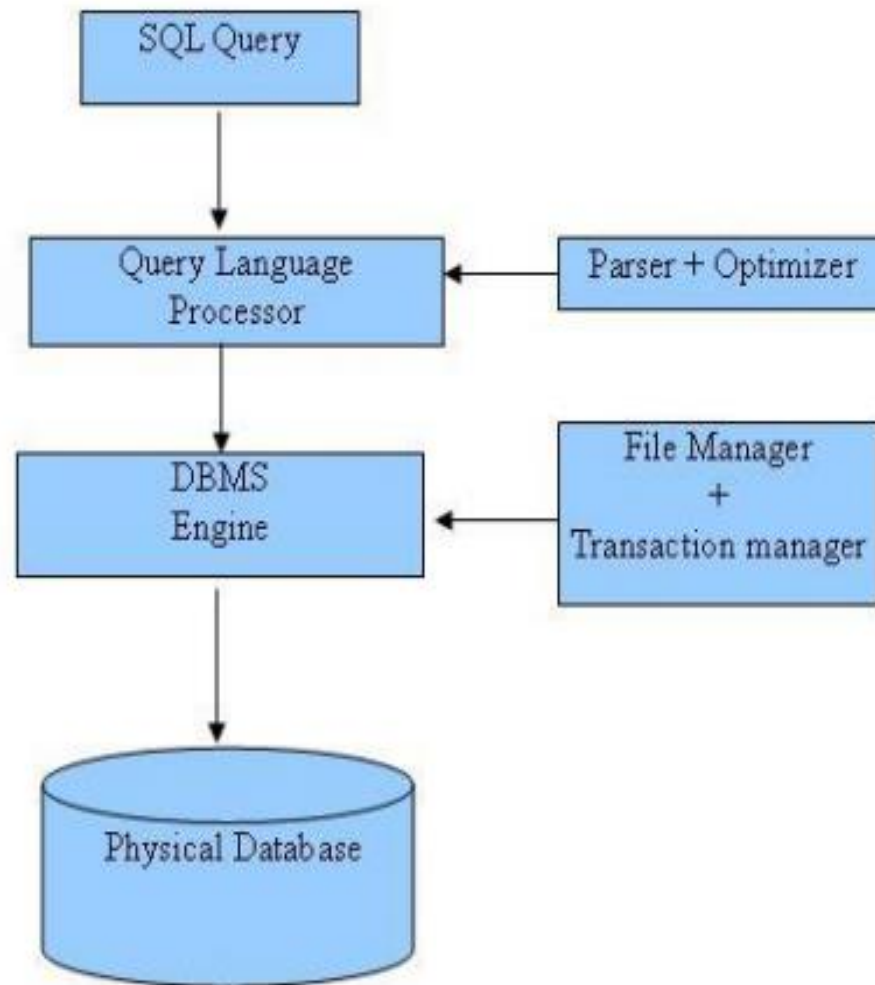
# SQL PROCESS

- When you are executing an SQL command for any RDBMS, the system determines the best way to carry out your request and SQL engine figures out how to interpret the task.
- There are various components included in this process.
  - Query Dispatcher
  - Optimization Engines
  - Classic Query Engine
  - SQL Query Engine, etc.



# SQL PROCESS

Following is a simple diagram showing the SQL Architecture:



# SQL – RDBMS CONCEPTS

- RDBMS stands for Relational Database Management System.
- It is the basis for SQL, and for all modern database systems like MS SQL Server, IBM DB2, Oracle, MySQL, and Microsoft Access.
- It is a database management system (DBMS) that is based on the relational model



# WHAT IS A TABLE?

- The data in an RDBMS is stored in database objects which are called as tables.
- This table is basically a collection of related data entries and it consists of numerous columns and rows.



## EXAMPLE OF A CUSTOMERS TABLE

ID	NAME	AGE	ADDRESS	SALARY
1	Ramesh	32	Ahmadabad	20000.00
2	Khilan	25	Kota	15000.00
3	Kaushik	23	Delhi	20000.00
4	Chaitali	25	Mumbai	65000.00
5	Hardik	27	Bhopal	85000.00
6	Rahul	22	Pune	45000.00
7	Muffy	24	Indore	10000.00

# WHAT IS A FIELD?

- Every table is broken up into smaller entities called fields.
- The fields in the CUSTOMERS table consist of ID, NAME, AGE, ADDRESS and SALARY.
- A field is a column in a table that is designed to maintain specific information about every record in the table.





# WHAT IS A RECORD OR A ROW?

- A record is also called as a row of data is each individual entry that exists in a table.
- For example, there are 7 records in the above CUSTOMERS table.
- Following is a single row of data or record in the CUSTOMERS table:

ID	NAME	AGE	ADDRESS	SALARY
1	Ramesh	32	Ahmadabad	20000.00



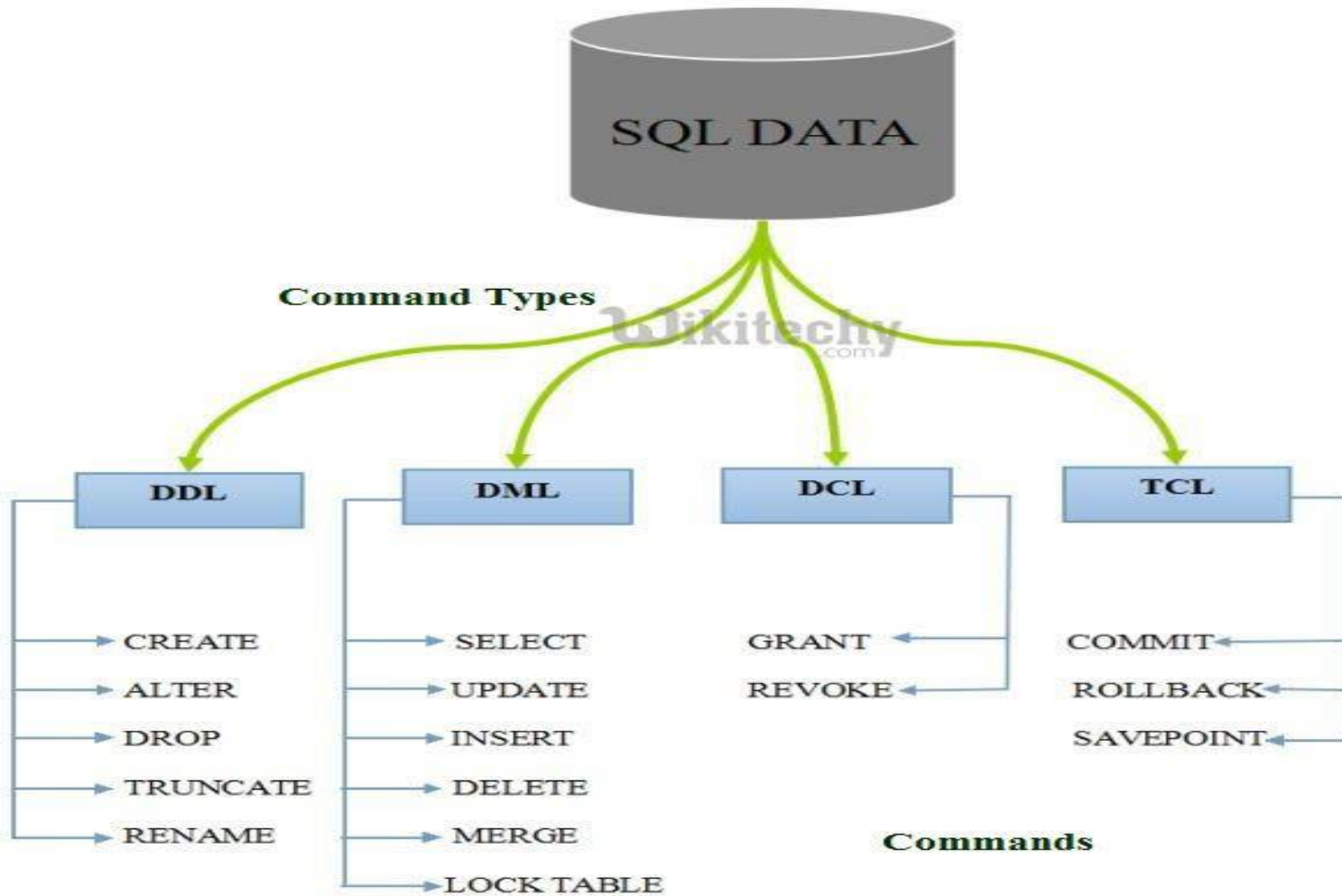
# WHAT IS A COLUMN?

- A column is a vertical entity in a table that contains all information associated with a specific field in a table.
- For example, a column in the CUSTOMERS table is ADDRESS, which represents location description and would be as shown below:

NAME
Ramesh
Khilan
Kaushik
Chaitali
Hardik
Rahul
Muffy



# SQL COMMANDS



# DDL - DATA DEFINITION LANGUAGE

- DDL consists of the SQL commands that can be used to define the database schema.
- Deals with descriptions of the database schema
- Used to create and modify the structure of database objects in the database.

Command	Description
CREATE	Creates a new table, a view of a table, or other object in the database.
ALTER	Modifies an existing database object, such as a table.
DROP	Deletes an entire table, a view of a table or other objects in the database.

# SQL | CREATE

- There are two CREATE statements available in SQL:
  - CREATE DATABASE
  - CREATE TABLE
- **CREATE DATABASE**
  - A **Database** is defined as a structured set of data.
  - The **CREATE DATABASE** statement is used to create a new database in SQL.
- **Syntax:**  
**CREATE DATABASE database\_name;**
- **Example Query:**  
**CREATE DATABASE my\_database;**



# SQL | CREATE

## ○ CREATE TABLE

- The CREATE TABLE statement is used to create a table in SQL
- While creating tables we have to provide all the information to SQL about the names of the columns, type of data to be stored in columns, size of the data etc.

## ○ Syntax:

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



# SQL | CREATE

- **Example Query:**

This query will create a table named Students with three columns, ROLL\_NO, NAME and SUBJECT.

```
CREATE TABLE Students  
( ROLL_NO int(3),  
  NAME varchar(20),  
  SUBJECT varchar(20));
```



# SQL | DROP

- DROP is used to delete a whole database or just a table.
- It destroys the objects like an existing database, table, index, or view.
- **Syntax:**

**DROP object object\_name**

- **Examples:**

**DROP TABLE table\_name;**

**DROP DATABASE database\_name;**





# SQL | TRUNCATE

- The TRUNCATE TABLE command deletes the data inside a table, but not the table itself.

- **Syntax:**

**TRUNCATE TABLE table\_name;**

- **Examples:**

**TRUNCATE TABLE Student;**



# SQL | ALTER

- ALTER TABLE is used to add, delete/drop or modify columns in the existing table.
- It is also used to add and drop various constraints on the existing table.



# ALTER TABLE – ADD

- ADD is used to add columns into the existing table. Sometimes we may require to add additional information
- **Syntax:**

```
ALTER TABLE table_name ADD  
( Columnname_1 datatype,  
  Columnname_2 datatype,      ...  
  Columnname_n datatype );
```



# ALTER TABLE – ADD

- Queries Sample Table: Student

ROLL_NO	NAME
1	Ram
2	Abhi
3	Rahul
4	Tanu



# ALTER TABLE – ADD

- **QUERY:**To ADD 2 columns AGE and COURSE to table Student.

```
ALTER TABLE Student ADD  
(AGE int(3),  
COURSE varchar(40));
```

**OUTPUT:**

ROLL_NO	NAME	AGE	COURSE
1	Ram		
2	Abhi		
3	Rahul		
4	Tanu		



# ALTER TABLE – DROP

- DROP COLUMN is used to drop column in a table. Deleting the unwanted columns from the table.
- **Syntax:**

**ALTER TABLE table\_name**

**DROP COLUMN column\_name;**



# ALTER TABLE – DROP

- DROP column COURSE in table Student.

**ALTER TABLE Student  
DROP COLUMN COURSE;**

**OUTPUT:**

ROLL_NO	NAME	AGE
1	Ram	
2	Abhi	
3	Rahul	
4	Tanu	



# ALTER TABLE-MODIFY

- It is used to modify the existing columns in a table. Multiple columns can also be modified at once.  
*\*Syntax may vary slightly in different databases.*
- **Syntax(Oracle,MySQL,MariaDB):**

**ALTER TABLE table\_name**

**MODIFY column\_name column\_type;**

- **Syntax(SQL Server):**

**ALTER TABLE table\_name**

**ALTER COLUMN column\_name  
column\_type;**





# ALTER TABLE-MODIFY

- **Example Query:**

```
ALTER TABLE Student  
MODIFY COURSE varchar(20);
```

- After running the above query maximum size of Course Column is reduced to 20 from 40.



# SQL | ALTER (RENAME)

- we can use **ALTER TABLE** to rename the name of table.  
*\*Syntax may vary in different databases.*

- **Syntax(Oracle,MySQL,MariaDB):**

**ALTER TABLE table\_name  
RENAME TO new\_table\_name;**

- Columns can be also be given new name with the use of **ALTER TABLE**.

**Syntax(Oracle):**

**ALTER TABLE table\_name  
RENAME COLUMN old\_name TO new\_name;**

- **Syntax(MySQL,MariaDB):**

**ALTER TABLE table\_name  
CHANGE COLUMN old\_name TO new\_name;**



# SQL | ALTER (RENAME)

- **QUERY:**

- Change the name of column NAME to FIRST\_NAME in table Student.

**ALTER TABLE Student**

**RENAME COLUMN NAME TO FIRST\_NAME;**

- **OUTPUT:**

ROLL_NO	FIRST_NAME	AGE
1	Ram	20
2	Abhi	23
3	Rahul	21
4	Tanu	23



# SQL | ALTER (RENAME)

- **QUERY:**
- Change the name of the table Student to Student\_Details

**ALTER TABLE Student RENAME TO  
Student\_Details;**

## **OUTPUT:**

Student\_Details

ROLL_NO	FIRST_NAME	AGE
1	Ram	20
2	Abhi	23
3	Rahul	21
4	Tanu	23

