

1. Introduction

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What is a DataBase ?

In a nutshell, it's any collection of related information.

Database Management Systems (DBMS)

A special software program that helps users create and maintain a database.

C.R.U.D(Create, Read/Retrive , Update, Delete)

Relational Databases(SQL)	Non Relational Databases(noSQL/ not just sql)
Organize data into one or more tables.	Organize data is anything but a traditional table/
Each table has columns and rows.	Key-Value stores.
A unique key identifies each row.	Documents (JSON, XML. etc)
	Graphs, flexible tables.

Example of a Non-Relational Database (Key-Value Store)

Key	Value
1	{"FirstName": "John", "LastName": "Doe", "Department": "Engineering"}
2	{"FirstName": "Jane", "LastName": "Smith", "Department": "Marketing"}
3	{"FirstName": "Bob", "LastName": "Johnson", "Department": "Sales"}
4	{"FirstName": "Alice", "LastName": "Williams", "Department": "HR"}

Overview of Database Queries

- **Definition:** Database queries are requests for data or information from a database, often written in a query language such as SQL.

- **Types of Queries:**

- **Select Query:** Retrieves specific data from one or more tables.
- **Insert Query:** Adds new data into a table.
- **Update Query:** Modifies existing data in a table.
- **Delete Query:** Removes data from a table.

- **Syntax of SQL Queries:**

- **SELECT:** Used to fetch data from a database.

```
SELECT column1, column2 FROM table_name WHERE condition;
```

- **INSERT INTO:** Used to insert new data into a table.

```
INSERT INTO table_name (column1, column2) VALUES (value1, value2);
```

- **UPDATE:** Used to update existing data within a table.

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

- **DELETE FROM:** Used to delete records from a table.

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

- **Joins:** Combines rows from two or more tables based on a related column.

- **INNER JOIN:** Returns records with matching values in both tables.
- **LEFT JOIN:** Returns all records from the left table and matched records from the right table.
- **RIGHT JOIN:** Returns all records from the right table and matched records from the left table.

- **FULL JOIN:** Returns records when there is a match in one of the tables.
- **Aggregate Functions:** Performs calculations on a set of values and returns a single value.
 - **COUNT():** Returns the number of rows that match the criteria.
 - **SUM():** Returns the total sum of a numeric column.
 - **AVG():** Returns the average value of a numeric column.
 - **MIN():** Returns the smallest value in a column.
 - **MAX():** Returns the largest value in a column.
- **Subqueries:** A query nested inside another query, used to perform more complex queries.
- **Indexes:** Special lookup tables that the database search engine can use to speed up data retrieval.
- **Transactions:** A sequence of one or more SQL statements treated as a single unit of work, ensuring data integrity.
- **Stored Procedures and Functions:** Predefined SQL code that can be saved and reused, allowing for modular and efficient database operations.