A quick guide on

Understanding SQL

Day 1 of #10DaysOfSQL

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But first, you need to understand

THE BASICS

Let’s start with databases

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1: DATABASES

A database is a collection of RELATED information

ANY collection of related information

- Phonebook
- Shopping List
- To do list
- LinkedIn User Base
- Your 5 favorite food

Database can be stored in different ways

- On Paper
- This PowerPoint
- Comments section
- On a computer
- Ledgers

2: DATABASE APPLICATIONS

Databases can be very large, and databases touch all aspects of our lives

Banking: transactions

Airlines: reservations, schedules

Universities: registration, grades

Sales: customers, products, purchases

Online retailers: order tracking, customized recommendations

Manufacturing: production, inventory, orders, supply chain

Human resources: employee records, salaries, tax deductions

3: WHAT IS DBMS?

DBMS is Database Management System (DUH!)

A Database Management System is a software system that allows access to data contained in a database.

It is not an actual database

The objective of the DBMS is to provide a convenient and effective method of defining, storing, and retrieving the information contained in the database.

- Makes it easy to manage large amounts of information
- Handles security
- Backup
- Access management
- Import/Export data

4: C.R.U.D

CREATE. READ. UPDATE. DELETE

- A good DBMS should have all these functionalities:
- The ability to create records / columns
- The ability to read what's already there in the database
- The ability to update the existing information
- The ability to delete existing information

5: TYPES OF DATABASES (Traditional)

Relational Databases (SQL) and Non-Relational Databases (NoSQL)

Relational Databases (SQL)

- Data is stored in one or more tables
- Each table has columns and a row
- A unique key identifies each row

Non-Relational Databases (NoSQL)

- Data is not stored in tables
- It can be stored in:
  - Key-value stores
  - Documents (JSON, XML etc.)
  - Graphs

6: Relational Databases

A relational database stores and organizes data into tables linked together based on common columns.

What is the relation here? What is common between both the tables?

Yes, it's Department ID. That's the 'relation.'

Employees Table

EmployeeID	Name	DepartmentID
1	John	1
2	Sara	2
3	Bob	3
4	Charlie	4
5	Alice	NULL

Department Table

DepartmentID	DepartmentName
1	HR
2	Sales
3	IT
6	Finance

Relational Database Management System (RDBMS)

Used to create and maintain a relational database

Some examples of RDBMS and vendors:

- MySQL
- Oracle
- PostgreSQL
- Microsoft SQL Server (MSS)

8: SQL

SQL (structured query language) is a standardized language for interacting with RDBMS

But what is a Query?

- A Google search is a query
- Query are requests made to the DBMS for specific information
- As a database's structure becomes more complex, it becomes more difficult to get the specific pieces of information we want.

SQL is used to:

- Perform C.R.U.D operations, as well as other administrative tasks such as security, backup and access management
- Create and manage databases
- Design and create database tables
- SQL code (syntax) used on one RDMBS is not always directly portable to another RDBMS without modifications – slight changes are required

9: Types of SQL

A hybrid language with 4 different types of language combined into one

1. DQL

- Data Query Language
- Used to query (request) the database for information
- Get information that is already there
- SELECT Statements

2. DDL

- Data Definition Language
- Used for defining database schemas
- CREATE, ALTER, DROP, TRUNCATE, RENAME

10: Types of SQL (continued)

A hybrid language with 4 different types of language combined into one

3. DCL

- Data Control Language
- Used for controlling access to the data in the database
- User access and permission management
- GRANT, REVOKE

4. DML

- Data Manipulation Language
- Used for inserting, updating, and deleting data from the database
- INSERT, DELETE, UPDATE

11: Common Data Types

A data type specifies the kind of data that can be stored in a column

Some examples:

- **INT** – Whole Numbers
- **DECIMAL(M,N) / FLOAT** – Decimal Numbers
- **VARCHAR(32)** – String of text of length 32
- **BLOB** – Binary Large Objects, Stores large data
- **DATE** – 'YYYY-MM-DD'
- **TIMESTAMP** – 'YYYY'MM'DD HH:MM:SS' used for recording different events, transactions, continuous values etc.

11: Where is data really stored?

Data is logically stored in rows and columns in a table – but where is it physically stored?

In SQL databases, data is physically stored in fixed-size storage units called data pages, often a few kilobytes.

These pages are organized in a file system managed by the database system.

There are typically two main types of data pages:

Data Pages (lead nodes): These contain the actual data of the tables, like the rows and columns of information (data).

Index Pages (root and intermediate nodes): These are used to speed up searches; they store index information that points to the actual data pages.

RECAP

- Database is any collection of related information
- Computers are great for storing databases
- Database Management System (DBMS) makes it easy to create, maintain, and secure a database
- DBMS allow you to perform C.R.U.D. operations and other administrative tasks
- Two types of Databases: Relational vs Non-Relational
- Relation Databases use RDBMS, and RDBMS use SQL to store data in tables with rows and columns
- Non-Relational data is stored using other data structures like JSON, graphs, key-value stores etc.
- SQL data is physically stored in storage units called Data Pages

In next episode, we will
discuss:

Basic SQL Queries with Examples
Order of Query Execution
Best practices

Stay tuned