Getting Familiar with Databases

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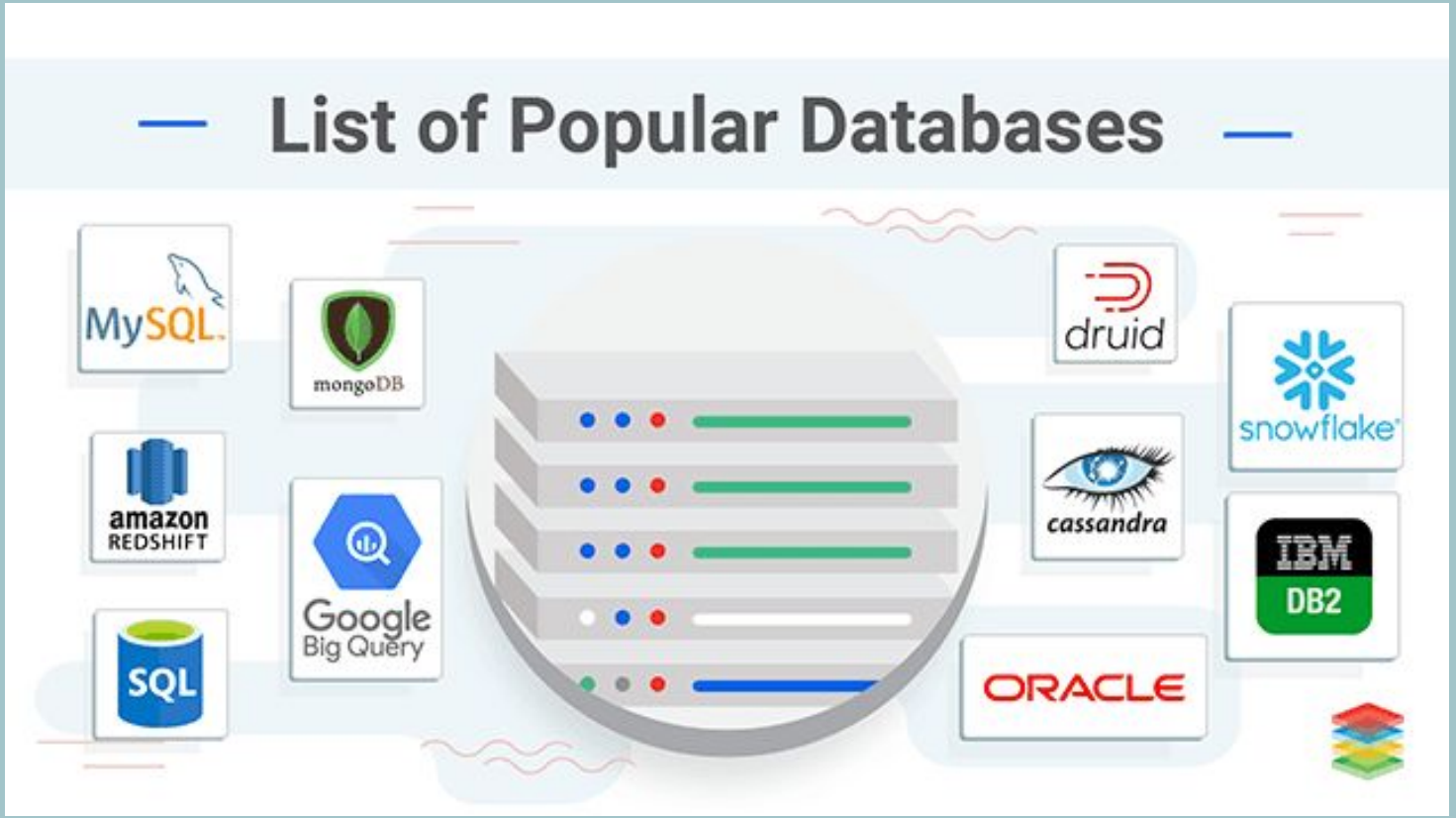
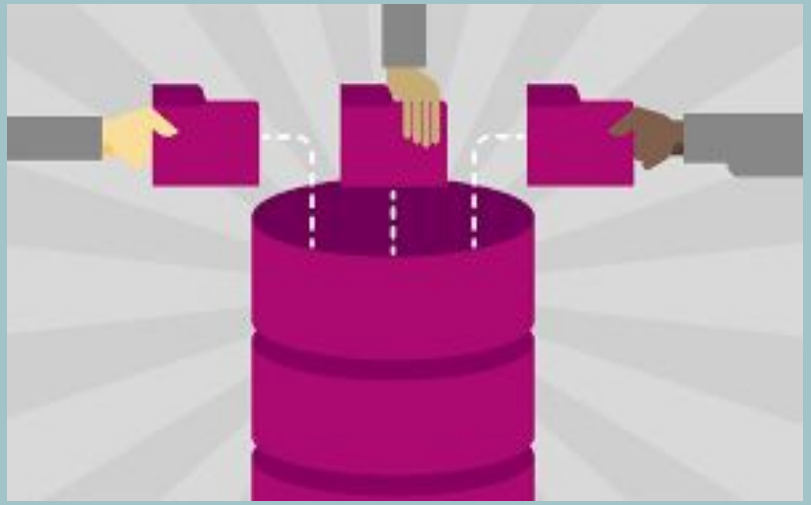

List of Popular Databases
MySQL
mongoDB
druid
snowflake
amazon
REDSHIFT
cassandra
IBM
DB2
Google
Big Query
SQL
ORACLE

How do you define a Database?

- A database is a collection of bits of data that is organized into files, which are called tables. Tables are a logical way of accessing, managing, and updating data.
- In a database, data can also appear in other formats, such as figures, graphics, images, and audio-video recordings.



- **Database Types:**
  - Relational databases
  - Non-relational databases

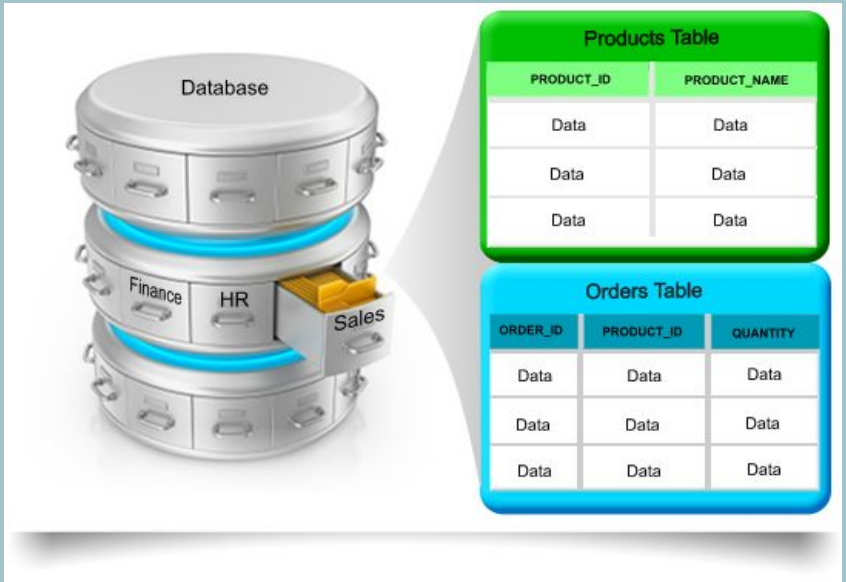
What’s the difference?

Relational (SQL)

- Structured query language
- Rigid schema
- Run transactional or analytical queries
- Used primarily in relational databases
- Easily update, delete, or add to existing DBs
- Uses vertical scaling, which means changing the resources (CPU,RAM), inside the computer or virtual machine (WM) to fit the needs of the database

Use cases

- Traditional application, enterprise resource planning (ERP), customer relationship management (CRM), ecommerce

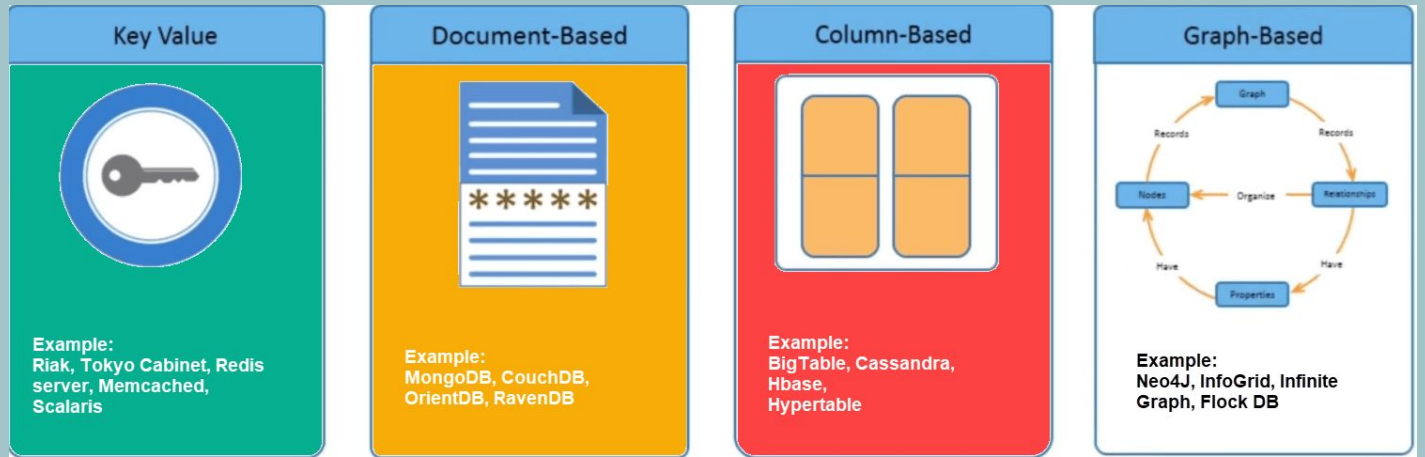


Non-relational (NoSQL)

- Not only SQL
- Not a rigid schema
- Uses different types of data models, such as graph, document, key-value
- Alternative to traditional relational DB
- Used for large data stores in cloud and web applications
- Uses horizontal scaling, which means adding more computers, servers, and more

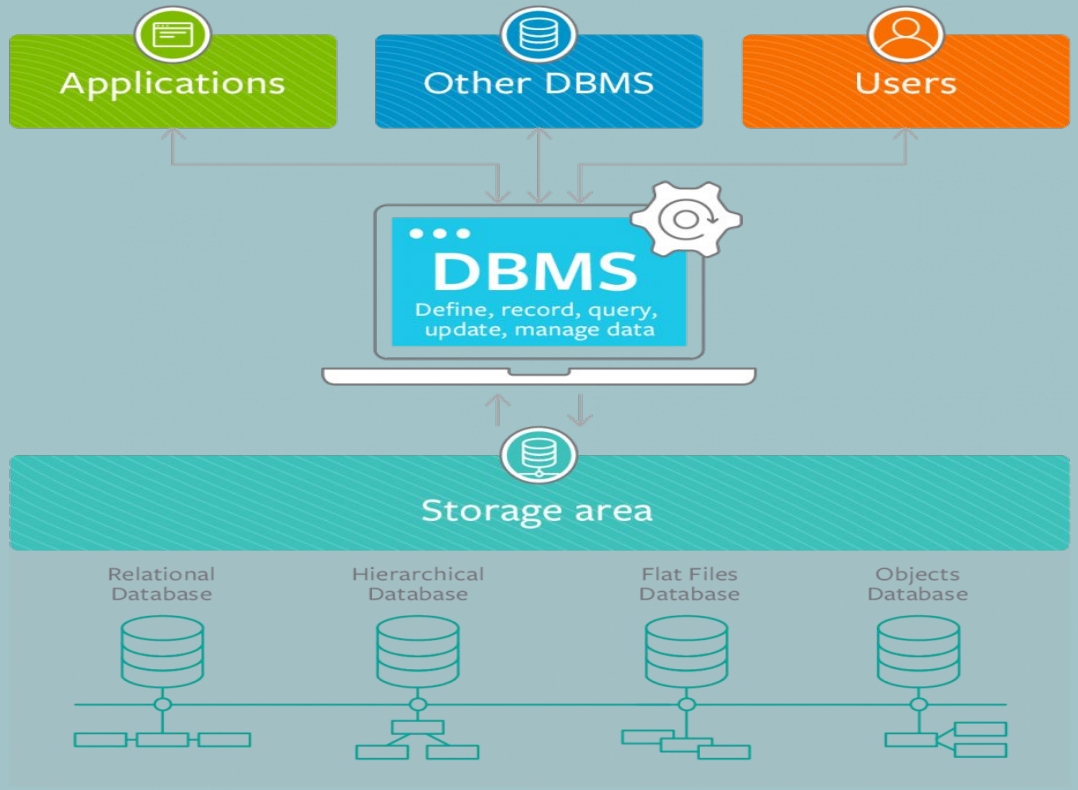
Use cases

- High traffic web applications, ecommerce systems, gaming applications



Database Management System (DBMS)

You manage stored data with a database management system (DBMS).



Managing Databases

Create database Sample

- The **CREATE DATABASE** statement
- **Sample - usersDB;**

Rename a database:

- The **ALTER** statement
- **ALTER DATABASE** *Sample* **MODIFY** *name = usersDB*

Delete or dropping:

- The **DROP DATABASE** statement
- DROP DATABASE SampleDB

Drop database Sample1

Managing Tables

Create table tblEmployee

- The **CREATE TABLE** statement is used to create a new table in a database.
- **CREATE TABLE** tblEMployee (

  EmployeeID int not null Primary Key,

  Fname nvarchar (50) not null,

  Name nvarchar (50) not null,

  GenderID int

  );

Managing Tables(cont'd)

The ALTER TABLE statement is used to add, delete, or modify tables.

Rename a table:

- **ALTER TABLE** tblStudent **RENAME TO** tblGraduate

Change the column within a table:

- **ALTER TABLE Modify Column**

  ALTER TABLE tblStudent
  a add Email nvarchar(100);

Alter table tblStudent:

- To delete a column in the table tblStudent, use the following syntax:
- ALTER TABLE tblStudent
  DROP Email;

Order of Execution

1. FROM	tblLearner
2. ON	tblLearner.genderID = tblGender.ID
3. JOIN	inner/left/right
4. WHERE	jobTitle = ‘cloud engineer’
5. GROUP BY	group by States
6. WITH CUBE OR WITH ROLLUP	group by rollup (States)
7. HAVING	sum(salary) > 100000
8. SELECT	ID, Fname, Lname or *
9. DISTINCT	unique records with one column or combined column
10. ORDER BY	Fname desc
11. TOP	top 5, 10, or by %

Data Integrity

What does the term data integrity mean?

The term data integrity refers to the correctness and completeness of the data in a database. To preserve the consistency and correctness of its data, a RDBMS imposes constraints.

TYPES OF DATA INTEGRITY		EXAMPLES:
• Required data	→	not allowed to have missing data or NULL
• Entity integrity	→	primary key must contain unique value in each row
• Foreign key	→	has to be one of the value contained in the table it points to
• Validity checking	→	set of values permitted for column
• Consistency	→	updates to one table can corresponding change in linked tables
• Referential integrity	→	primary key in parent table links to foreign key in child table
• Business rules	→	quantity in a column must be above a set amount

Example:

Foreign constraint

ALTER TABLE tblPerson **ADD CONSTRAINT FK**_tblPerson_genderID

Foreign key (genderID) references tblGender(ID)

Default constraint

ALTER TABLE tblPerson A**DD CONSTRAINT DF**_tblPerson_GenderID **DEFAULT** 3 **FOR** genderID

SQL SELECT with Order By, Insert, Update and Delete Command

- SQL **INSERT** statement is used to add rows to a table. Insert can be used in several ways:
  - To insert a single complete row, OR insert a single partial row
- SQL **UPDATE** is used to update data in a row or set of rows specified in the filter condition.
  - Update tblLearner set ageRange = ‘20-30’ where ID = 1
- SQL **DELETE** is used to delete a row or set of rows specified in the filter condition.
  - Delete from tblPerson where ID = 4

Select Statement

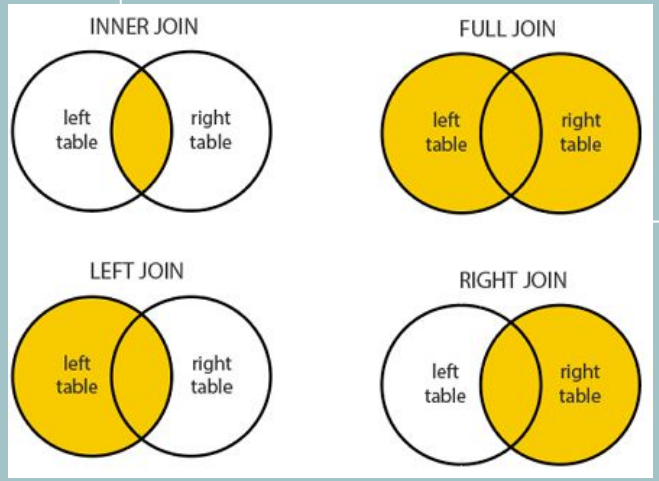
- SQL **SELECT** statement is used to retrieve data from table. For example, to retrieve data from the table given below, following SQL select statements are used:
- In SQL, the **WHERE** clause enables you to apply a filter.
  - “**SELECT * FROM** tblLearner **WHERE** condition; “
- The **WHERE** clause specifies which record(s) should be SELECTED FROM.
- SQL **Alias** name is used to give a alias name to a column or a calculated field. This is used with an aggregate function. In some situations, the aliases make your SQL statements simpler to write and easier to read.
  - **SELECT** jobTitle, sum(salary) as TtlSal **FROM** tblLearner

GROUP BY and Aggregate Functions

- **GROUP BY** is used to group identical rows in a column together
  - Placed **after WHERE** and **before ORDER BY** in a statement
- Often used with aggregate functions to sort the data in a meaningful way
- Example: Say there's a table called **tblLearner** and we're grouping by the column **Salary**
  - **Count ()** - Returns the total number of non-null values
  - **Sum () -** Returns the sum of all non-null values
  - **Avg () -** Returns sum() / count ()
  - **Min () -** Minimum non-null value
  - **Max ()** - Maximum non-null value

Id	Name	Salary
1	A	20
2	B	30
3	C	40

Joins



- A **join** combines rows from two or more tables by merging them through a common column
- **INNER JOIN**
  - Returns records that have matching values in both tables
- **FULL JOIN**
  - Returns all records when there is a match in left or right table records
- **LEFT JOIN**
  - Returns all records from left table, and any that match with the right table
- **RIGHT JOIN**
  - Returns all records from right table, and any that match with the left table

Syntax for Joins

```
SELECT                  Fname, Lname, Salary, Gender,Dept
FROM                    tblLearner
INNER/LEFT/RIGHT JOIN   tblDept
ON                      tblLearner.deptID=tblDept.ID;
```

Transactions

- Transactions are a group of tasks performed as a single execution
- The following commands are used to control transactions:
  - **BEGIN** - Indicates start point of transaction
  - **SET** - Places name on transaction
  - **COMMIT** - To save the changes
  - **ROLLBACK** - Reverses changes in case of an error; failsafe
  - **SAVEPOINT** - Creates points within the transaction to roll back to
  - **RELEASE SAVEPOINT** - Remove a savepoint

```
Create Procedure spHardWorks
As
Begin
        Begin try
                Begin transaction
                        Update tblLearner  set Salary  = '1000000'
                        Where  ID = 1

                        Update tblLearner set Salary = '1M'
                        Where Lname like '[H%]'

                        Update tblLearner set Salary = '1M'
                        Where Fname like '[S%]' and GenderID = 1
                Commit Transaction
        End Try
        Begin Catch
                Rollback Transaction
                Print 'Transaction Rolled Back'
        End Catch
```

Thank you for your time, hope this helps!