What is DBMS?

- A software which manages and facilitates access to the data
- If offers an organized way to store, retrieve and manage data efficiently.

Database Models:

- Relational Model:
- Data is organized into tables(relations) consisting of rows and columns
- Columns -> Also called as attributes or fields
- Rows -> Also called as tuples or records
- It is the most widely used model.

Database Technologies:

1. Files

- Storing and retrieving files is tedious and less efficient
- Poor security, difficulty in sharing

2. Database

- Faster and more efficient way to store and manipulate data.
- Enables data sharing and security
- If follows ACID properties.

ACID Properties

1. Atomicity(All or Nothing)

- Ensures that the transaction is either completely executed or completely rolled back if any part fails.

Example:

Suppose we transfer 10k from Account A -> Account B

The Transaction involves

1. Deduction of 10k from account A
2. Adding 10k to Account B

If the system crashes after deduction from account A but before adding to Account , the transaction should roll back to maintain the consistency.

2.Consistency(Valid data before and after the transaction)

Ensures the database remains in a valid state before and after transaction.

Ex:

A university database maintains a constraint that total students should not exceed 200.

If a new student is added/admitted then the system checks the constraint before insertion.

3. Isolation(Transaction should be executed Independently)

It ensures that a concurrent transaction do not interfere with each other.

Ex:

Two customers book ticket which is only one remaining, at the same time

Without isolation both will get the same ticket, causing the inconsistency

Using isolation levels like SERIALIZABLE prevents this issue With this only one transaction will succeed results in data consistency.

4. Durability(Changes are permanent)
   It ensures that once a transaction is commited, it remains permanent, even after the system failure.

   Ex:
   After transferring money between accounts, if the system crashes, the transaction should not be lost

SQL DataTypes:

String DataTypes:

1. VARCHAR(size) – a variable-length string. Maximum size needs to be specified.
   Ex. -> Username VARCHAR(50);
   It can store upto 50 characters only

2. CHAR(SIZE) – A fixed length string. Pads with spaces if the input is shorter than specified size.
   Ex. -> Code CHAR(10);
   It always stores exactly 10 characters.

3. TEXT
4. BINARY(SIZE)
5. BLOB(Binary Large Objects) (Ex. Images, audios)
6. MEDIUMTEXT
7. LONGTEXT

2,. Numeric Datatype

1. BIT(SIZE) : stores the binary data. BIT(1) can store a value of 0 or 1.
2. INT(SIZE): Integer numbers.The size specifies the display width.
   Ex.:Balance INT(10);
3. BIGINT: for storing larger integer values
4. FLOAT(SIZE,d): Approximate numeric values. Size is the total number of digits, d is the number of digits after decimal
   Ex. Value FLOAT(5,2);
5. DOUBLE(size,d): similar to float but stores larger values
6. DECIMAL
7. BOOLEAN

3,. Date and Time Datatypes:

Date: Stores the date in YYYY-MM-DD format.
Ex.: EventDate DATE;

DATETIME: Stores the date and time in YYYY-MM-DD HH:MM:SS format

TIME: stores time in HH:MM:SS format

1. DDL(Data Definition Language)

CREATE, ALTER, DROP, TRUNCATE

These commands are used to define or modify the database structures.

- CREATE: Used to create a table or a database
  Ex. CREATE table Students(ID INT, Name VARCHAR(50));

- ALTER: To modify the existing table
  Ex. ALTER table Students ADD Age INT;

- Truncate: Deletes all the records from table but keeps the table structure.
  Ex. TRUNCATE Table Students;

- DROP: Deletes a table or a database.
  Ex. DROP TABLE Students;

2. DQL (Data Query Language)

   SELECT: Retrieves data from a database.
   Ex. SELECT * from Students;

3. DML(Data Manipulation Language)

   To manipulate data use DML

- INSERT: adds a new record
  Ex.: INSERT INTO Employees(Name, Age) VALUES (‘Krishna’, 24);

- UPDATE: Modifies the existing data
  Ex. UPDATE Employees SET AGE=28 where Name = ‘Krishna’;

- DELETE: Remove the records
  Ex. Delete from employees where age < 25;

4. DCL(Data Control Language)
   Commands to control the access
   GRANT*
   REVOKE*

5. TCL(Transaction Control Protocol)
   - COMMIT
   - ROLLBACK
   - SAVEPOINT

CONSTRAINTS:

1. NOT NULL
   It ensures that a column cannot have a null value.

   EX:
   Create Table Employee(
   ID INT NOT NULL,
   Name VARCHAR(50) NOT NULL
)

2. Primary Key
   It uniquely identifies the row in a table.
   Ex:
   CREATE Table departments(
   DEPTID INT PRIMARY KEY,
   DEPTNAME VARCHAR(45)
)

3. Foreign Key
   It references the primary key in another table.

Ex.

```
CREATE TABLE Employees (
EMPID INT PRIMARY KEY,
DEPTID INT,
FOREIGN KEY (DEPTID) REFERENCES
Departments(DEPTID)
);
```

4. CHECK
   To enforce a condition on column values

   Ex.

   ```
   Create Table Products (
   PRODUCTID INT PRIMARY KEY,
   PRICE DECIMAL(10,2) CHECK(Price > 0)
   );
   ```

5. DEFAULT
   Assigns a default value to a column
   Ex.:

   ```
   Create Table Orders(
   OrderId INT Primary Key,
   ORDERDATE DATE DEFAULT CURRENT_DATE
   );
   ```

- Creating our first database

  ➔CREATE DATABASE FLYNAUT;

DROP DATABASE FLYNAUT; //To delete database

- Go inside Flynaut Database

  ➔Use Flynaut;

- Creating the table

```
CREATE TABLE EMP(
EMPNO INT(4) NOT NULL PRIMARY KEY,
ENAME VARCHAR(20),
JOB VARCHAR(20),
MGR INT(4),
HIREDATE DATE,
SAL DECIMAL(7,2),
COMM DECIMAL(7,2),
DEPTNO INT(4)
);
```

- To check table creation -> SHOW TABLES;
- To see the description of table -> desc emp;
- Insert value -> in agenda txt file

WHERE clause: