

DATABASE BASICS

Simple Notes for Beginners

1. What is a Database?

A **database** is an organized collection of data that can be stored, managed, searched, and updated easily. Examples include student records, employee information, bank accounts, hospital records, and online shopping data.

2. What is DBMS?

DBMS (Database Management System) is software used to create, store, organize, retrieve, and manage data in a database. Examples: MySQL, PostgreSQL, Oracle Database, Microsoft SQL Server, and SQLite.

3. What is a Table?

In a relational database, data is usually organized into **tables**. A table consists of rows and columns. For example, a Student table may contain Student_ID, Name, Class, and Marks.

4. Rows and Columns

A **row (record)** represents one complete item or entry. A **column (field)** represents one type of information. Example: In a Student table, one student's details form a row, while 'Name' is a column.

5. Primary Key

A **primary key** is a field that uniquely identifies each record in a table. It cannot contain duplicate values. Example: Student_ID can be the primary key of a Student table.

6. Foreign Key

A **foreign key** is a field that links one table to another. It usually refers to the primary key of another table. This helps maintain relationships between related data.

7. SQL

SQL (Structured Query Language) is used to communicate with relational databases. Common SQL commands include **SELECT**, **INSERT**, **UPDATE**, **DELETE**, **CREATE**, and **ALTER**.

8. Basic SQL Commands

SELECT – retrieves data.

INSERT – adds new data.

UPDATE – changes existing data.

DELETE – removes data.

CREATE – creates database objects such as tables.

ALTER – changes the structure of a table.

9. Example SQL

SELECT * FROM Students; retrieves all columns and records from the Students table.

INSERT INTO Students (Student_ID, Name) VALUES (101, 'Riya'); adds a new student record.

UPDATE Students SET Name = 'Riya Sharma' WHERE Student_ID = 101; updates a record.

DELETE FROM Students WHERE Student_ID = 101; deletes a specific record.

10. Database Relationships

Tables can be related in different ways:

One-to-One: One record is related to one record.

One-to-Many: One record can be related to many records.

Many-to-Many: Many records can be related to many records, usually through an additional linking table.

11. What is a Relational Database?

A **relational database** stores data in related tables. Relationships are commonly created using primary keys and foreign keys. This approach reduces unnecessary duplication and makes data easier to manage.

12. What is Normalization?

Normalization is the process of organizing database data to reduce unnecessary duplication and improve consistency. Common normal forms include 1NF, 2NF, and 3NF.

13. Database Advantages

- Organized storage of large amounts of data
- Fast searching and retrieval
- Easier data updating
- Better data consistency
- Access control and security
- Backup and recovery support
- Ability to handle multiple users and applications

14. Important Terms to Remember

Data: Raw facts and information.

Database: Organized collection of data.

DBMS: Software for managing databases.

Table: Data arranged in rows and columns.

Record: A single row in a table.

Field: A column/attribute in a table.

Primary Key: Uniquely identifies a record.

Foreign Key: Connects related tables.

SQL: Language used to work with relational databases.

15. Quick Revision

Database → Organized collection of data.

DBMS → Software that manages databases.

Table → Collection of related records.

Row → One record.

Column → One field/attribute.

Primary Key → Unique identifier.

Foreign Key → Link between tables.

SQL → Language used to manage relational data.

Study Tip: Learn the difference between a table, row, column, primary key, and foreign key first. These concepts form the foundation for understanding databases and SQL.