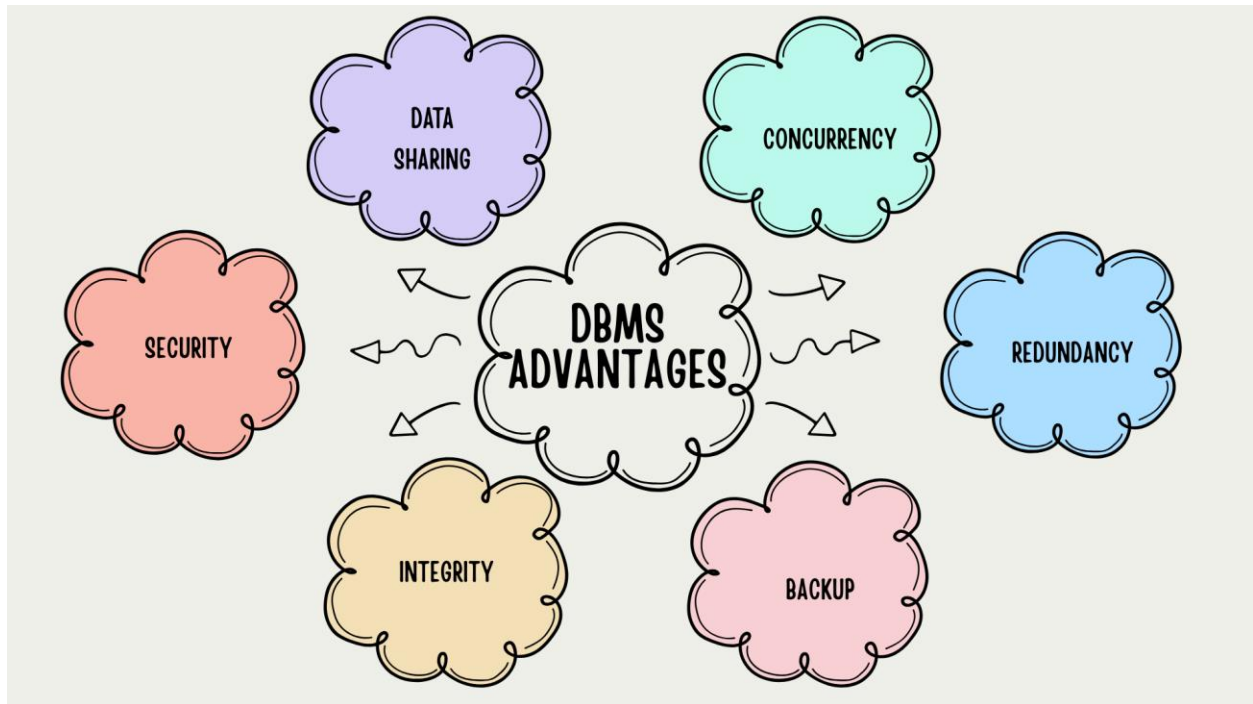


# Database Course Documentation

## 1. Flat File Systems vs. Relational Databases

Feature	Flat File System	Relational Database
Structure	Data is saved in just one table or file	Data is stored in multiple related tables
Redundancy	High – same data can be repeated many times	Low – uses normalization to avoid repetition
Relationships	No direct relationships between data	Tables are connected with primary and foreign keys
Example Usage	Logs, simple Excel files	Banking, inventory systems, websites
Drawbacks	Hard to search, no strict rules	More complex to set up and maintain

## 2. DBMS Advantages – Mind Map



### Description of Key Advantages:

- **Security** – Controls who can see or change data, keeps it safe.
- **Integrity** – Makes sure the data is correct and consistent.
- **Backup** – Helps recover data if something goes wrong.
- **Redundancy** – Removes duplicated information.
- **Concurrency** – Many people can use the database at the same time.
- **Data Sharing** – Multiple users can access the same data together.

### **3. Roles in a Database System**

#### **1. System Analyst**

- Understands what the users need.
- Collects requirements and talks to the technical team.
- Make sure the final database system helps users.

#### **2. Database Designer**

- Plans how the database is structured (tables, keys, rules).
- Uses normalization to reduce repeated data.
- Creates ER diagrams.

#### **3. Database Developer**

- Write SQL code to query and update data.
- Build logic to interact with the database.
- Works closely with designers and app developers.

#### **4. Database Administrator (DBA)**

- Keeps the database running smoothly.
- Handles backups, recovery, and security.
- Monitors' performance and access.

#### **5. Application Developer**

- Creates software (web or mobile) that connects to the database.
- Builds the interface users see.
- Uses APIs or query languages to interact with data.

#### **6. Business Intelligence (BI) Developer**

- Look at large amounts of data to find useful insights.

- Builds dashboards and reports.
- Uses tools like Power BI, Tableau, and SQL.

#### 4. Types of Databases

##### A. Relational vs. Non-Relational

Type	Description	Examples	Best For
Relational	Uses tables with rows and columns; uses SQL	MySQL, PostgreSQL, Oracle	Structured data and transactions
Non-Relational	Uses key-value, document, or graph formats; more flexible, no fixed schema	MongoDB, Redis, Cassandra	Big data and flexible data structures

##### B. Centralized vs. Distributed vs. Cloud

Type	Description	Use Case Example
Centralized	Everything stored in one location/server	Small office or school database
Distributed	Data is saved in different servers across many locations	Big platforms like Google, Netflix
Cloud Database	Hosted online by services like AWS, Azure, or Google Cloud	Scalable apps and online businesses

##### C. Examples of Use Case

- **Relational** – Banking, schools, shopping websites
- **Non-Relational** – social media, chat apps, real-time tracking
- **Distributed** – Big global apps with many users
- **Cloud** – Startups or companies that want fast setup and scaling

## 5. Cloud Storage and Databases

### What is Cloud Storage?

Cloud storage means saving data online, so it can be accessed from anywhere with internet. It helps databases by:

- Storing backups and snapshots
- Saving large structured or unstructured data
- Allowing people in different places to use the same data

### Advantages of Cloud Databases

Advantage	Description
Scalability	Easy to handle more users or data automatically
Accessibility	Access the data from anywhere at any time
Managed Services	Cloud providers take care of security, updates, and backups
Cost-Effective	Pay only for what you use, no need to buy full servers

### Examples:

- Amazon RDS
- Microsoft Azure SQL
- Google Cloud Spanner

## Disadvantages of Cloud Databases

Disadvantage	Description
Latency	It might be slower if the server is far away
Security Risks	Data is online and might be targeted by hackers
Vendor Lock-In	It is difficult to switch providers later
Ongoing Costs	You must keep paying regularly, especially if usage is high