Feature	Flat File Systems	Relational Databases
Structure	Data stored in plain text or spreadsheets	Data stored in tables with rows and columns
Data Redundancy	High: Repetitive data entries	Low: Normalization reduces redundancy
Relationships	No support for relationships	Strong support using primary and foreign keys
Example Usage	CSV files, Excel sheets, log files	MySQL, PostgreSQL, Oracle DB
Drawbacks	Poor scalability, difficult to query or maintain	Complex setup, requires database knowledge

DBMS Advantages – Mind Map

Central Topic: DBMS Advantages

- 🔐 **Security** – Controls access and privileges
- ✅ **Integrity** – Ensures data accuracy and consistency
- 💾 **Backup** – Automatic and scheduled backups
- ♻️ **Redundancy** – Eliminates unnecessary duplicates
- 🔄 **Concurrency** – Allows multiple users to access data simultaneously
- 👥 **Data Sharing** – Facilitates access across teams

👨‍💼 3. Roles in a Database System

• System Analyst

Analyzes business requirements and determines what data is needed. Acts as a bridge between stakeholders and the technical team.

• Database Designer

Designs the schema, tables, and relationships ensuring data normalization and efficiency.

• Database Developer

Implements the design, writes SQL queries, triggers, stored procedures, and supports integration with applications.

• Database Administrator (DBA)

Maintains the database system: tuning, security, user roles, backups, and recovery.

• Application Developer

Builds the front-end/backend application that interacts with the database.

• BI (Business Intelligence) Developer

Creates dashboards, reports, and performs data analysis using data from the database to support decision-making.

🔍 4. Types of Databases

◇ Relational vs. Non-Relational Databases

Aspect	Relational (RDBMS)	Non-Relational (NoSQL)
Structure	Tables with rows and columns	Documents, key-value pairs, graphs, wide-column
Schema	Fixed schema	Flexible schema
Examples	MySQL, PostgreSQL, Oracle	MongoDB (Document), Cassandra (Wide-column)
Best for	Structured data, transactions	Unstructured/semi-structured, big data

◇ Centralized vs. Distributed vs. Cloud Databases

Type	Description	Use Case Example
Centralized	Single location server, easier to control and manage	Small enterprise with local operations
Distributed	Data is stored across multiple locations or servers	Global company with data centers worldwide
Cloud	Hosted on cloud platforms, scalable and managed	Startups using AWS RDS, Google Cloud Spanner

☁️ 5. Cloud Storage and Databases

What is Cloud Storage?

Cloud storage is an online space where data is stored on remote servers accessed via the internet. Databases hosted in the cloud use this storage to manage their data.

How it Supports Database Functionality

Cloud storage enables:

- Elastic scaling
- Real-time backups
- Multi-region accessibility
- Disaster recovery

☑ Advantages of Cloud-Based Databases

- Scalability and flexibility
- High availability
- Automatic updates and backups
- Pay-as-you-go pricing models

❌ Disadvantages / Challenges

- Data privacy concerns
- Vendor lock-in
- Network latency or downtime risks
- Compliance complexity (GDPR, HIPAA, etc.)