

Database Search and Reporting

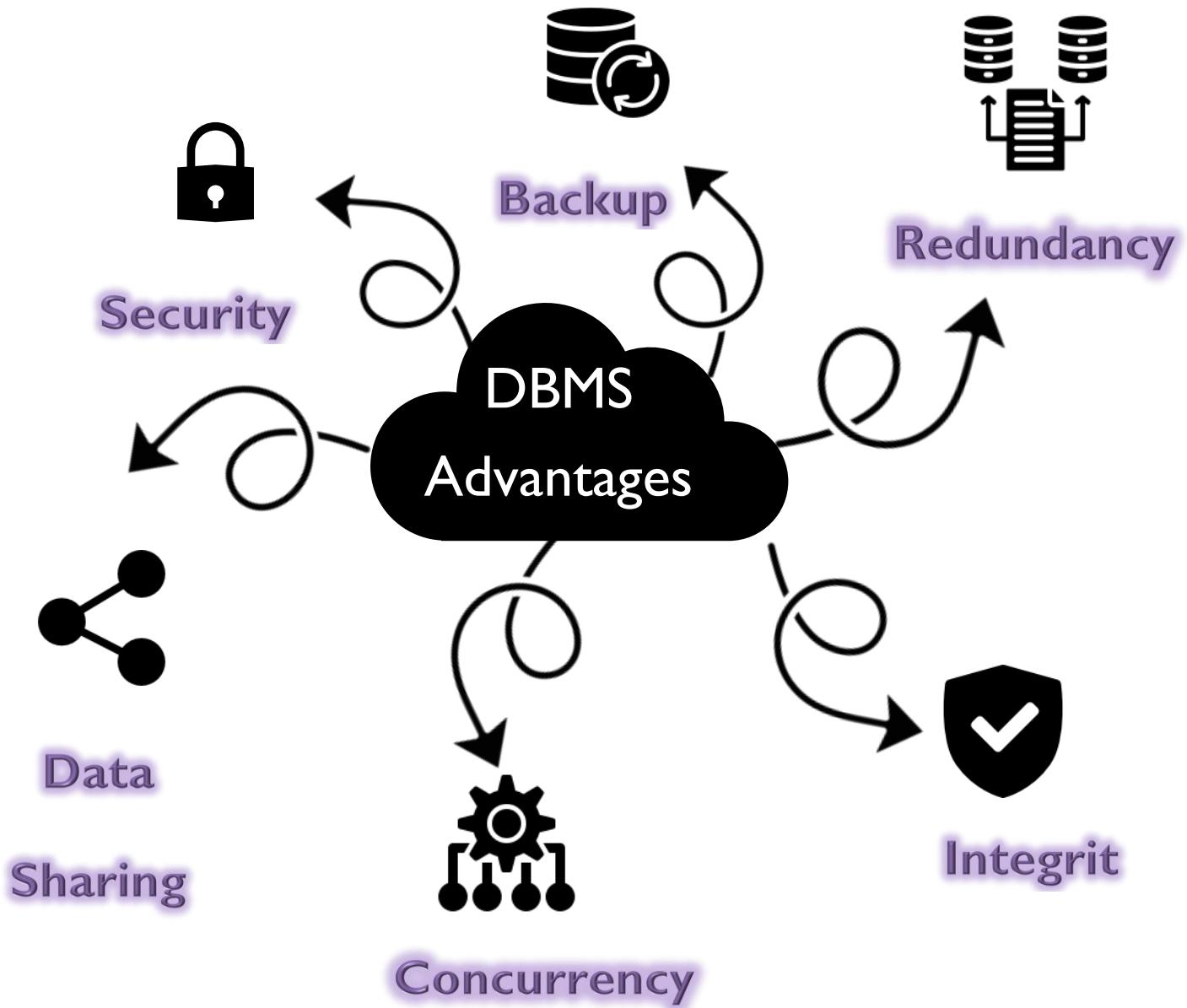


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1- Flat File Systems vs. Relational Databases

Feature	Flat File System	Relational Database
Structure	Data stored in plain text or CSV format. No schema or relationships.	Organized into tables with rows and columns, following a strict schema (ER model).
Data Redundancy	High redundancy as the same data may be repeated in different files.	Low redundancy due to normalization and relational structure.
Relationships	No direct relationships; any linkage must be handled manually.	Supports complex relationships via primary and foreign keys.
Example Usage	CSV files for contact lists, logs, config files.	Banking systems, e-commerce apps, HR databases.
Drawbacks	Difficult to maintain and scale; poor data integrity.	Requires setup and management; may have a learning curve.

2- DBMS Advantages – Mind Map



3- Roles in a Database System

System Analyst

'The Bridge Between Business & Technology'

Gathers user requirements, analyzing business processes, and translates them into technical specifications which to the development team.

Database Designer

'The Architect of the Data World'

Designs the database structure which consists of the tables, their relationships, and the constraints. To ensure data integrity and data modeling and efficiency, the Architect uses techniques like ERDs (Entity-Relationship Diagrams).

Database Developer

'The Builder of the Database Logic'

Implements the database schema using SQL, develops stored procedures and triggers, query optimization for security and performance, and defines views.

 **Database Administrator (DBA)*****'The Guardian of the Data'***

Secures the database, performs backups, tunes the database performance, and manages users and access rights. Also responsible for disaster recovery planning.

 **Application Developer*****'The Frontline Developer'***

Designs and develops applications that access the data which are kept in the database. Presents data using APIs, through front-end and back-end frameworks, and collects user input.

 **BI (Business Intelligence) Developer*****'BI Developer 'The Data Storyteller'***

Transforming relevant data into insightful information and designing the business processes dashboards, as well as data visualizations and reports with Power BI, Tableau, and SQL-based Data Marts.

4- Types of Databases

Relational vs. Non-Relational

Relational-Databases-RDBMS

- **Structure:** Information is categorized into system rows and columns in the tables itself.
- **Schema:** Uses a precise and fixed schema that is called SQL. (Structured Query Language)

Examples:

- MySQL – Most popular and open-source.
- PostgreSQL – More Advanced; object-relational features.
- **Best For:** Situations that need more consistency, advanced querying, transactions, and complexity like banking and ERP systems.
-  **Non-Relational-Databases --NoSQL**
- **Structure:** Flexible data models like:
 -  Key-Value (Example: Redis)
 -  Document (Example: MongoDB)
 -  Column (Example Cassandra)
 -  Graph (Example Neo4j)

- **Schema:** Schema-less or dynamically structured are more ideal for unstructured, semi-structured data.

Examples:

- **MongoDB** – Uses documents like JSON.
- **Cassandra** – Provides excellent availability and great scalability.
- **Best For:** Distributed applications, real time analytics, Internet of Things, and big data. Storing files online can be accessed from any location, referred to as remote storage.

5- Cloud Storage and Databases

Cloud Storage

Cloud storage refers to remote storage services accessed over the internet. It supports databases by providing scalable, accessible infrastructure.

Advantages of Cloud Databases

-  **Scalability:** allocating resources on demand.
-  **Cost Efficiency:** Cloud databases allow payment for only used resources.
-  **Managed Services:** Automatic procedures for updating, backing up, and maintenance.
-  **Accessibility:** Global access from anywhere.

Challenges

-  **Latency:** Possible delays in data retrieval.
-  **Privacy Risks:** Storing very sensitive information (data) on servers not managed in house.
-  **Vendor Lock-in:** Unfavorable migration from one application to another.

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