

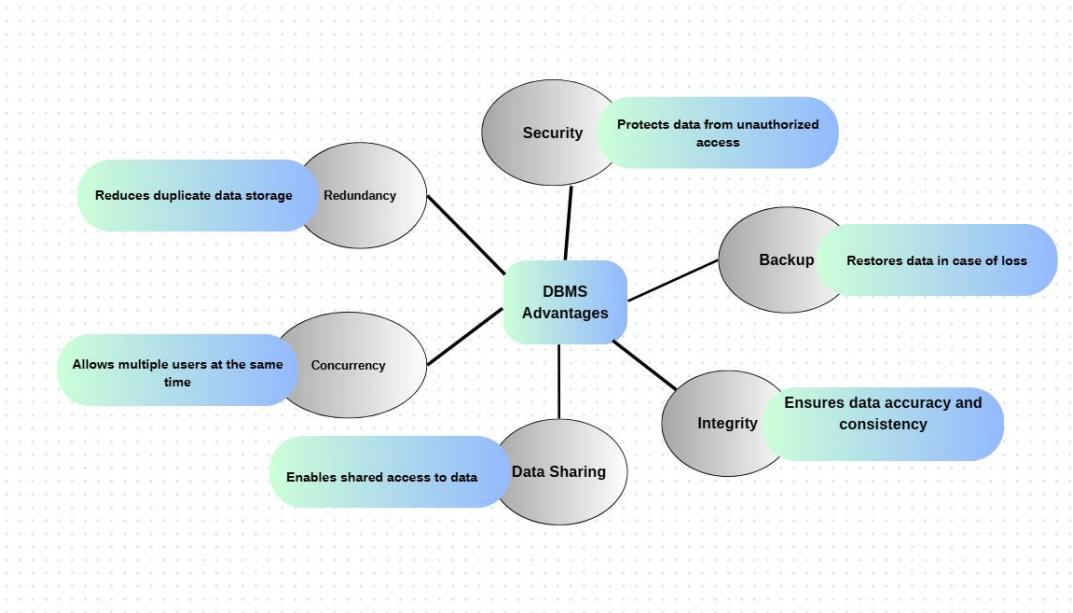
## Task 1

### Database Search and Reporting

#### 1. Comparison Assignment: Flat File Systems vs. Relational Databases

Aspect	Flat File Systems	Relational Databases
<b>Structure</b>	Data is stored in a single file, usually in text or CSV format, with no clear separation between different data types.	Data is stored in multiple tables, where each table represents a specific entity and is organized into rows and columns.
<b>Data Redundancy</b>	High data redundancy, as the same information may be repeated multiple times within the file.	Low data redundancy, as data is stored once and referenced using keys.
<b>Relationships</b>	Does not support relationships between data elements.	Supports relationships between tables using primary keys and foreign keys.
<b>Example Usage</b>	Simple applications, small datasets, temporary data storage, or early-stage systems.	Banking systems, library systems, enterprise applications, and systems that require structured and reliable data storage.
<b>Drawbacks</b>	Difficult to manage and update, high data duplication, poor scalability, and higher risk of data inconsistency.	More complex to design and maintain, requires knowledge of SQL and database management concepts.

## 2. DBMS Advantages – Mind Map



## 3. Roles in a Database System and What They Do in a Database Project

### **System Analyst:**

Analyzes business requirements, understands user needs, and defines what the database system should do. Acts as a bridge between users and the technical team.

### **Database Designer:**

Designs the structure of the database, including tables, relationships, keys, and constraints, to ensure data is organized efficiently.

### **Database Developer:**

Implements the database design by creating tables, writing SQL queries, stored procedures, and ensuring data operations work correctly.

### **Database Administrator (DBA):**

Manages and maintains the database system, handles security, backups, performance tuning, and ensures data availability and reliability.

### **Application Developer:**

Develops applications that interact with the database, writes code to retrieve, insert, update, and delete data using the database.

### **BI (Business Intelligence) Developer:**

Analyzes data and creates reports, dashboards, and visualizations to help organizations make informed business decisions.

#### 4. Types of Databases

- Relational vs. Non-Relational Databases

##### Relational Databases

- Data is stored in **tables (rows & columns)**
- Uses **SQL**
- Supports relationships using keys

**Example:** MySQL, Oracle, SQL Server

##### Use Case:

- Banking systems
- Library systems
- Any system with structured and related data

##### Non-Relational Databases (NoSQL)

- Data stored in documents, key-value, or columns
- Flexible structure
- Handles large and unstructured data

##### Examples:

- MongoDB – document-based database
- Cassandra – column-based database

##### Use Case:

- Social media applications
  - Big data and real-time systems
  - Applications with rapidly changing data
- Centralized vs. Distributed vs. Cloud Databases

##### Centralized Databases

- Database stored in **one central location**
- All users access the same server

##### Use Case:

- Small organizations
- University systems
- Single-office applications

**Example:** University systems

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- **Distributed Databases**

Distributed Databases

- Data is stored across **multiple locations or servers**
- Improves availability and fault tolerance

**Use Case:**

- Large enterprises
- Banking systems with multiple branches
- Global applications

**Example:** Enterprise systems

- **Cloud Databases**

- Database hosted on **cloud platforms**
- Scalable and accessible over the internet

**Use Case:**

- Web applications
- Mobile applications
- Startups and modern systems

**Example:** Web & mobile apps

## 5. Cloud Storage and Databases

- **What is Cloud Storage and how does it support database functionality?**

Cloud Storage refers to storing data on remote servers that are accessible through the internet instead of local machines or physical servers.

In database systems, cloud storage is used to store the actual database files and data. It supports database functionality by providing reliable storage, automatic backups, and easy data recovery. This allows databases to be accessed from different locations while keeping the data secure and available.

In simple terms, cloud storage acts as the place where database data is saved, while the database system manages and organizes that data.

- **Advantages of using cloud-based databases**

Using cloud-based databases provides several advantages, including:

- **Scalability:** Storage and resources can be increased or decreased easily based on system needs.
- **Automatic Backup:** Data is backed up automatically, reducing the risk of data loss.
- **High Availability:** Databases remain accessible even if a server fails.
- **Cost Efficiency:** No need to buy or maintain physical servers; users pay only for what they use.
- **Remote Access:** Databases can be accessed from anywhere through the internet.

Examples of cloud-based databases include Azure SQL, Amazon RDS, and Google Cloud Spanner.

- **Disadvantages or challenges of cloud-based databases**

Despite their advantages, cloud-based databases also have some challenges:

- **Internet Dependency:** Accessing the database requires a stable internet connection.
- **Security and Privacy Concerns:** Data is stored on third-party servers, which requires strong security measures.
- **Cost Over Time:** High usage can increase costs in the long term.
- **Limited Control:** Users have less control over hardware and infrastructure compared to on-premises databases.