

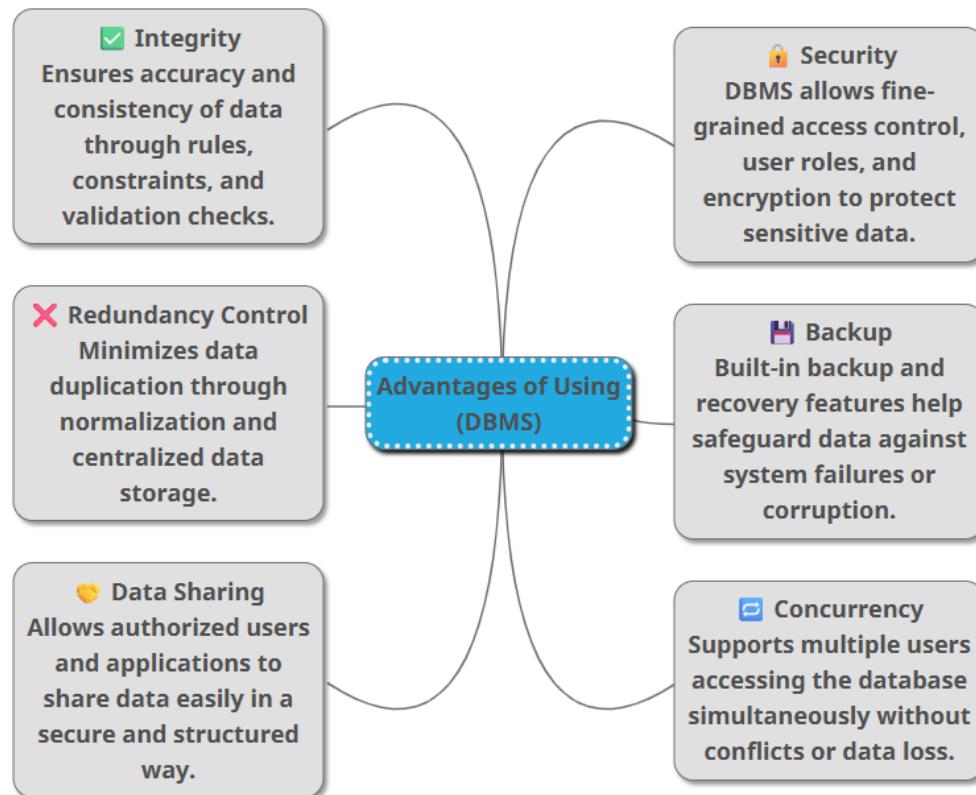
Task 1

Database Search and Reporting

1. Flat File Systems vs. Relational Databases: A Comparative Analysis

Feature	Flat File System	Relational Database System (RDBMS)
Structure	Simple files like CSV or TXT storing data in rows; no strict schema.	Organized into tables with defined schemas (columns, types).
Data Redundancy	High; duplicate data often exists across files.	Low; uses normalization and keys to avoid repetition.
Relationships	No inherent relationships; managed manually.	Built-in support via foreign keys and joins.
Example Usage	Log files, simple configuration storage, small applications.	Enterprise applications, banking systems, inventory management.
Drawbacks	Difficult to scale, search, and maintain; lacks integrity constraints.	More complex setup and requires database management skills.

2. Advantages of Using a Database Management System (DBMS)



Task 1

Database Search and Reporting

3. Roles in a Database System

System Analyst

- Acts as a bridge between business needs and technical solutions.
- Gathers and analyses user requirements to design the overall system flow.
- Ensures the database system aligns with business processes and goals.

Database Designer

- Designs the logical and physical structure of the database (schema, tables, relationships).
- Defines data types, keys, and constraints to ensure data integrity and performance.
- Works closely with analysts and developers to create a scalable and efficient model.

Database Developer

- Implements the database design using SQL and development tools.
- Writes queries, stored procedures, functions, and triggers.
- Optimizes database performance through indexing and efficient query writing.

Database Administrator

- Manages the database environment, including installation, configuration, and upgrades.
- Monitors performance, ensures security, and handles backup and recovery.
- Grants user access and ensures availability and reliability of the database.

Application Developer

- Builds applications that interact with the database (web, desktop, or mobile).
- Uses APIs and query languages to connect frontend interfaces with backend databases.
- Ensures smooth user experience while retrieving, inserting, or updating data.

BI (Business Intelligence) Developer

- Transforms raw data into actionable insights through dashboards and reports.
- Develops data models and uses tools like Power BI, Tableau, or SQL Server Reporting Services.
- Works with stakeholders to support decision-making using visual analytics.

Task 1

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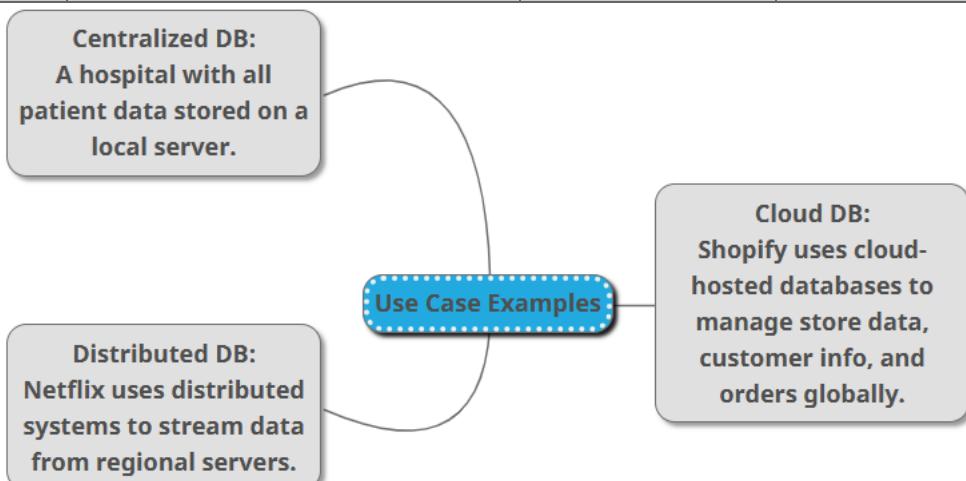
4. Types of Databases

Relational vs. Non-Relational Databases

Feature	Relational Database (RDBMS)	Non-Relational Database (NoSQL)
Structure	Tables with rows and columns (fixed schema).	Collections, key-value pairs, documents, graphs.
Schema	Rigid, predefined schema.	Flexible or schema-less.
Examples	MySQL, PostgreSQL, Oracle.	MongoDB, Cassandra, Redis, Neo4j.
Best For	Structured data, complex queries, transactions.	Unstructured or semi-structured data, scalability.
Use Case	Banking systems, HR applications.	IoT data, social media feeds, real-time analytics.

Centralized vs. Distributed vs. Cloud Databases

Type	Description	Example DBs	Use Case Example
Centralized	Data is stored and managed in a single location (one server).	MS Access, early Oracle setups	Small business tools, local inventory systems.
Distributed	Data is spread across multiple servers or locations, often synced.	Cassandra, Google Spanner	Global web apps, large-scale real-time systems.
Cloud	Hosted and managed by cloud providers; scalable, accessible via the internet.	Amazon RDS, Google Cloud SQL	SaaS apps, multi-user enterprise platforms.



Task 1

Database Search and Reporting

5. Cloud Storage and Databases

What is Cloud Storage & How It Supports Databases

Cloud Storage is an internet-based service that stores data on remote servers managed by cloud providers (like AWS, Azure, Google Cloud). It supports database functionality by:

- Providing **on-demand storage** for databases to scale as needed.
- Ensuring **high availability and data durability** across multiple regions.
- Enabling **backup, replication, and disaster recovery** automatically.

Cloud databases like **Azure SQL**, **Amazon RDS**, and **Google Cloud Spanner** are built on top of this infrastructure, offering managed services for running databases without handling physical hardware or software maintenance.

Cloud-Based Databases – Advantages & Disadvantages

Advantages	Disadvantages/Challenges
<input checked="" type="checkbox"/> Scalable – easy to increase storage and performance as needed.	<input checked="" type="checkbox"/> Ongoing subscription costs can be higher over time.
<input checked="" type="checkbox"/> Accessible from anywhere with internet connectivity.	<input checked="" type="checkbox"/> Dependent on reliable internet and provider uptime.
<input checked="" type="checkbox"/> Managed services reduce the need for in-house DB admin expertise.	<input checked="" type="checkbox"/> Limited control over backend configurations and tuning.
<input checked="" type="checkbox"/> Automated backups, updates, and security patches.	<input checked="" type="checkbox"/> Data privacy or regulatory concerns in certain industries.
<input checked="" type="checkbox"/> Supports high availability and global distribution.	<input checked="" type="checkbox"/> Potential vendor lock-in with specific cloud platforms.

This report provided a foundational overview of database systems, including comparisons between flat file and relational databases, the advantages of using DBMS, essential team roles, types of databases, and the relationship between cloud storage and databases. Understanding these concepts is crucial for building efficient, secure, and scalable data solutions in today's digital world.