



Database Search and Reporting

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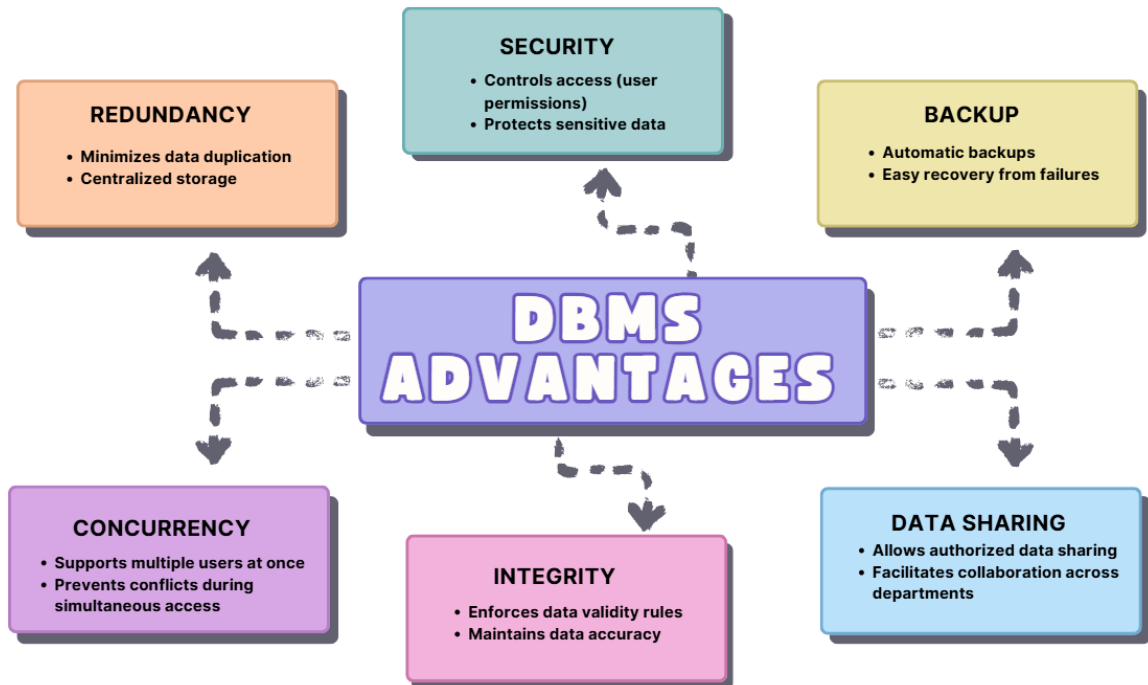
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1. Flat File Systems vs. Relational Databases

| Criteria | Flat File Systems | Relational Databases |
|------------------------|--|---|
| STRUCTURE | Simple text files, no schema | Tables with defined schema |
| DATA REDUNDANCY | High duplication, hard to maintain consistency | Low redundancy, normalization used |
| RELATIONSHIPS | No built-in relationship support | Supports complex relationships via keys |
| EXAMPLE USAGE | Small apps, logs, configs, spreadsheets | ERP, banking, e-commerce, large systems |
| DRAWBACKS | Hard to scale/manage, low accuracy | Complex setup, requires DBMS, higher cost |

2. DBMS Advantages



3. Roles in a Database System

ROLES IN A DATABASE SYSTEM

| Role | Main Responsibilities |
|--------------------------------------|--|
| System Analyst | Collects business needs, analyzes systems, defines requirements, and communicates between business and IT. |
| Database Designer | Plans database structure, defines tables & relationships, ensures data integrity and scalability |
| Database Developer | Builds and modifies database objects, writes SQL, optimizes queries, and supports development teams. |
| Database Administrator (DBA) | Manages database systems, handles security, backups, performance, and disaster recovery. |
| Application Developer | Creates software that connects to the database, manages data flow, and ensures application functionality. |
| BI (Business Intelligence) Developer | Builds reports, dashboards, and analytics; handles data extraction, transformation, and loading (ETL). |

4. Types of Databases

- **Relational databases** store data in structured tables with SQL support and relationships between tables for example: (MySQL, Oracle, PostgreSQL, SQL Server). They are ideal for systems like banking, ERP, CRM, inventory, and financial applications.
- **Non-relational databases** store data in flexible, often schema-less formats like documents or columns for example: (MongoDB, Cassandra). They are used in IoT, big data, real-time analytics, content management, and social media platforms.
- **Centralized databases** store all data in one location, making management simple but creating a single point of failure. They are used in small organizations for HR or accounting.

- **Distributed databases** store data across multiple locations, improving availability and performance. They fit large enterprises, global apps, and telecom systems (e.g. Google Spanner, Cassandra).
- **Cloud databases** are hosted online, offering scalability, flexibility, and easy access. Common for SaaS, e-commerce, startups, and scalable business apps (e.g. Amazon RDS, Azure SQL, Google BigQuery).

5. Cloud Storage and Databases

- **Cloud storage** is an online service that stores data on remote servers, accessible via the internet. It allows organizations to store files, backups, and large datasets without managing physical hardware.
- **Cloud storage** handles unstructured data (files, objects), cloud databases manage structured data with advanced features like querying, indexing, and relationships.

How Cloud Storage Supports Databases:

- Provides scalable and reliable storage for database backups and data files.
- Ensures high availability and disaster recovery.
- Supports data replication across multiple regions.
- Allows integration with cloud-based databases for seamless data management.

Proc and cons of cloud-based databases:

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Advantages of Cloud-Based Databases

- **SCALABILITY:** EASILY SCALE UP OR DOWN BASED ON DEMAND.
- **HIGH AVAILABILITY:** BUILT-IN REDUNDANCY AND FAILOVER OPTIONS.
- **COST EFFICIENCY:** PAY-AS-YOU-GO PRICING REDUCES UPFRONT COSTS.
- **AUTOMATIC MAINTENANCE:** PROVIDERS HANDLE UPDATES, PATCHES, AND BACKUPS.
- **GLOBAL ACCESS:** ACCESSIBLE FROM ANYWHERE WITH INTERNET CONNECTIVITY.
- **DISASTER RECOVERY:** BUILT-IN BACKUP AND RECOVERY OPTIONS.

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Disadvantages of Cloud-Based Databases

- **SECURITY CONCERNS:** SENSITIVE DATA HOSTED OFF-PREMISES REQUIRES STRONG SECURITY MEASURES.
- **LATENCY:** NETWORK DELAYS MAY AFFECT PERFORMANCE IN SOME REGIONS.
- **COMPLIANCE:** MUST MEET LEGAL AND REGULATORY DATA PROTECTION STANDARDS.
- **LIMITED CONTROL:** LESS DIRECT CONTROL OVER HARDWARE AND CONFIGURATIONS.
- **VENDOR LOCK-IN:** DEPENDENCY ON ONE PROVIDER MAY COMPLICATE MIGRATION LATER.