

Database Course Documentation

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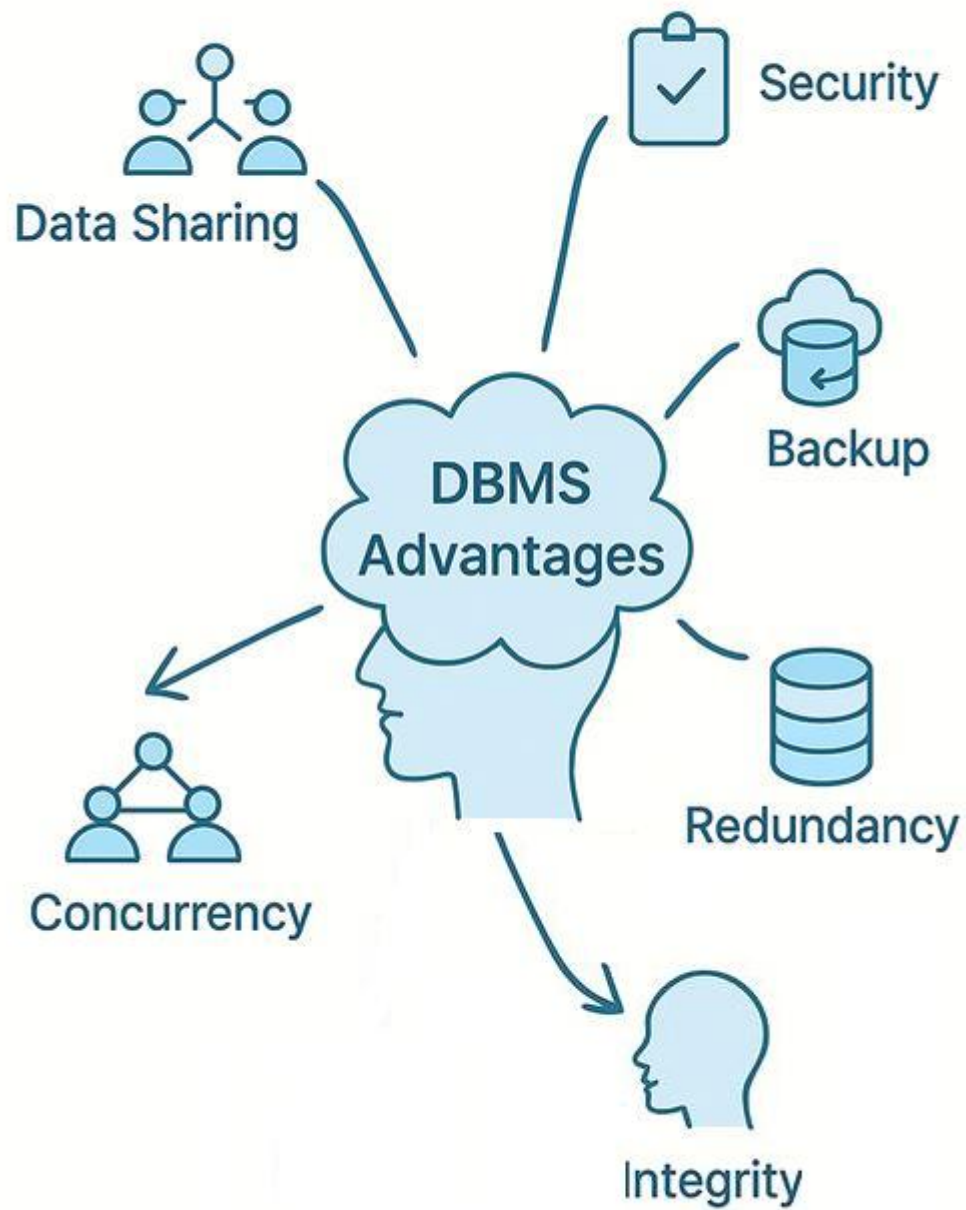
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1. Flat File Systems vs. Relational Databases

Feature	Flat File System	Relational Database
Structure	Stores all data in one single file or table (like a spreadsheet)	Stores data in many connected tables (like multiple spreadsheets working together)
Data Redundancy	High – same data might be repeated many times	Low – data is stored once and linked across tables using keys
Relationships	No relationships between data	Tables are connected using primary keys and foreign keys
Example Usage	- CSV files- Text files- Simple school list	- Student management systems- Online shopping apps- Hospital databases
Drawbacks	- Not good for big or complex data- Hard to update or search	- More difficult to set up- Needs database software like MySQL, PostgreSQL

2. DBMS Advantages – Mind Map



3. Roles in a Database System:

3.1. System Analyst:

The system analyst is the person who talks to the people using the system to figure out what they need. They gather all the information about what the database should do and then explain it to the tech team.

3.2. Database Designer:

This person plans how the database will be built. They decide what tables and fields are needed, how the data should be connected, and make sure everything is organized properly.

3.3. Database Developer:

The developer takes the designer's plan and builds the database. They write the SQL code to create the tables, write queries, and make the database work well with the applications.

3.4. Database Administrator (DBA):

The DBA takes care of the database after it's made. They install it, keep it running smoothly, back up the data so nothing is lost, and keep it safe from unauthorized users.

3.5. Application Developer:

This person builds the apps that people use to interact with the database. For example, they write the code for a website or mobile app that shows or updates the data.

3.6. Business Intelligence (BI) Developer:

BI developers use the data from the database to help businesses make decisions. They create reports, dashboards, and analyze data so companies can understand trends and improve.

4. Types of Databases:

Type	What it Means	Examples	Used In
Relational	Stores data in tables (like Excel). Uses SQL to manage it.	MySQL, Oracle	Banks, schools, online shops
Non-Relational	Stores data in other ways (like documents or lists), not in tables.	MongoDB, Cassandra	Social media, chat apps, big data
Centralized	All data is in one place (one computer or server).	Local software	Small offices, computer labs
Distributed	Data is saved in many places but works like one system.	Cassandra, Google Spanner	Big companies in different locations
Cloud	Data is saved on the internet (cloud), so you can use it from anywhere.	Google Cloud, Amazon RDS	Websites, mobile apps, growing online businesses

5. Cloud Storage and Databases:

5.1. What is Cloud Storage?

Cloud storage is a way to save data on the internet using services like **Google Drive, Dropbox, or Amazon S3** instead of your local computer. The data is stored on remote servers managed by big companies (like Google or Amazon) and you can access it anytime from anywhere.

5.2. How does it support databases?

Cloud storage supports databases by:

- Hosting the **data files** and backups of databases.
- Making it easier to **scale up** (add more space or power) when needed.
- Providing **fast access** and **automatic backups** for safety.
- Allowing databases like **Azure SQL, Amazon RDS, or Google Cloud Spanner** to run fully in the cloud — meaning you don't need to manage physical servers.

5.3. Advantages of Cloud-Based Databases:

Advantage	Explanation
Scalable	You can easily increase storage or speed as your app or data grows.
Accessible	You can use your database from anywhere with an internet connection.
Secure (Managed)	Cloud providers often include built-in security, updates, and backups.
Cost-efficient	You pay only for what you use (no need to buy expensive hardware).
Automatic updates	No need to install updates manually — the cloud service handles it.

5.4. Disadvantages / Challenges of Cloud Databases:

Disadvantage	Explanation
Needs internet	You must have internet access to access your data.
Security risks	If not configured properly, data might be exposed to risks.
Latency (delay)	Accessing cloud data can be slower than local databases in some cases.
Vendor lock-in	It can be hard to move your database to another provider later.

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