

AI Empowered Youth Program 2025-2026

Database Course Documentation

Comprehensive Report and Visual Summary

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Codeline Training Program
Sprint 4
June 2025



Introduction

This report is part of a foundational training exercise designed to build core competencies in database systems. It aims to provide a structured overview of essential database concepts, roles, and technologies commonly used in real-world information systems.

Throughout the report, we explore the differences between flat file systems and relational databases, highlight the key advantages of using a Database Management System (DBMS), and define the core roles involved in a database project. The document also compares various types of databases—including relational, non-relational, centralized, distributed, and cloud-based models—along with their practical use cases.

In addition, we analyze the relationship between cloud storage and modern database systems, focusing on platforms like Amazon RDS, Azure SQL, and Google Cloud Spanner.

This documentation is intended to serve as a reference for students, trainees, and early-career professionals learning about database design, management, and integration in modern IT environments. Visuals such as comparison tables, mind maps, and infographics are included to enhance clarity and retention.

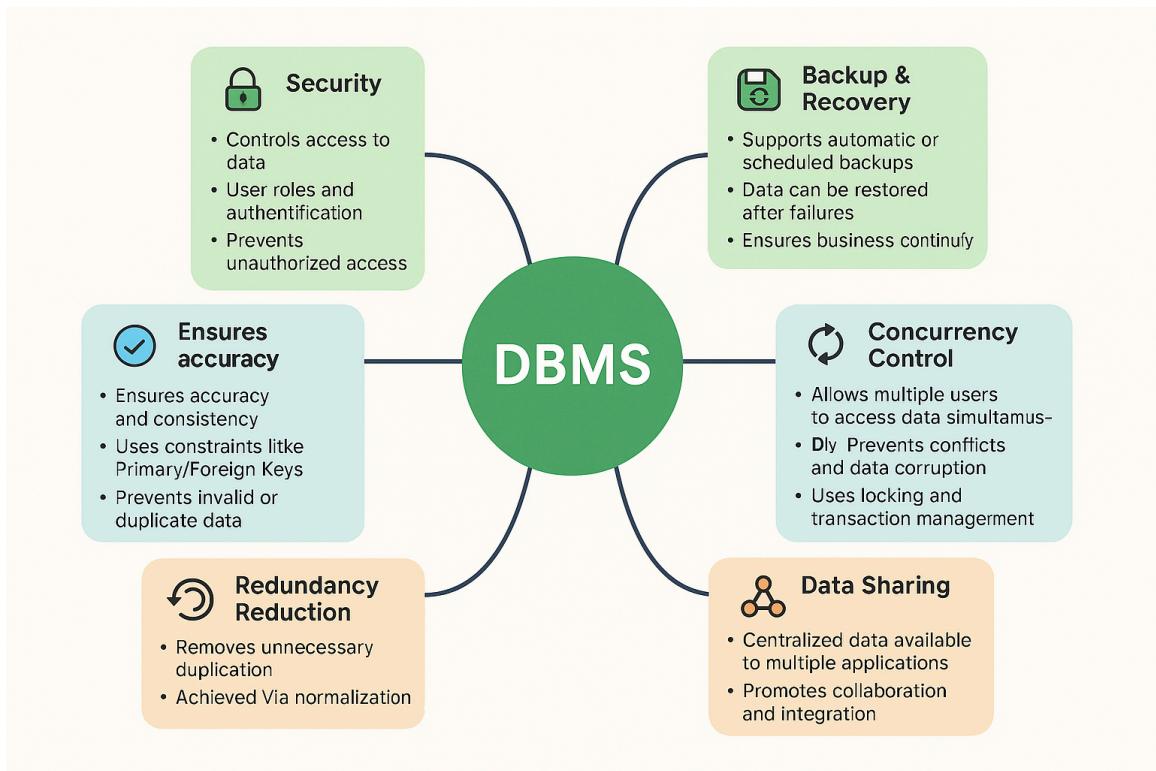
Flat File Systems vs Relational Databases

This mind map visualizes the key benefits of using a Database Management System (DBMS). It outlines how a DBMS improves data integrity, reduces redundancy, enforces security, enables multi-user access, and facilitates easier data backup and recovery. This diagram serves as a quick reference to understand why organizations prefer DBMS over manual or file-based storage.

Flat File Systems vs. Relational Databases		
	 Flat File Systems	 Relational Databases
Structure	Simple text files, no formal schema	Structured tables with rows, columns, and keys
Data Redundancy	High redundancy data often repeated	Low redundancy through normalization
Relationships	No inherent relationship between files	Supports 1:1, 1:n, n with foreign keys
Example Usage	CSV, Excel files for simple storage	Banking systems, inventory management, ERPs
Drawbacks	Difficult to maintain, prone to inconsistency	More complex setup, and higher learning curve

DBMS Advantages – Mind Map

This mind map visualizes the key benefits of using a Database Management System (DBMS). It outlines how a DBMS improves data integrity, reduces redundancy, enforces security, enables multi-user access, and facilitates easier data backup and recovery. This diagram serves as a quick reference to understand why organizations prefer DBMS over manual or file-based storage.



Roles in a Database System

This graphic introduces the primary roles in a database system, such as the database administrator (DBA), database designer, developer, and end-users. Each role contributes uniquely—from designing the schema to maintaining performance and ensuring data security. Understanding these roles is essential for successful collaboration in database projects.

Roles in a Database System	
	System Analyst Gathers business requirements and plans database features
	Database Developer Designs the data model and defines table relationships
	Database Developer (DBA) Writes queries, stored procedures and logic
	Application Developer Manages performance, access control, and backups
	BI Developer Extracts and visualizes data for business reporting

Types of Databases

This diagram compares different types of databases—relational, non-relational (NoSQL), centralized, distributed, and cloud databases. Each type has its own advantages and is suited for specific applications. This visual provides a simplified classification to help learners distinguish when and why to use each type.

Types of Databases		
Type	Description	Use Cases
 Relational	Structured tables with SQL	MySQL, PostgreSQL, Oracle
 One location/server	Flexible, often schema-less	
 Distributed	Data spread across multiple sites	Global systems high availability
 Cloud-Based	Hosted by cloud providers	Startups scalable web platforms

Cloud Storage and Databases

This final visual explains how cloud storage supports modern database systems. It shows the advantages (like scalability, global accessibility, and lower infrastructure costs) of cloud platforms such as Amazon RDS, Azure SQL, and Google Cloud Spanner. It also addresses some challenges, including security and vendor lock-in.

