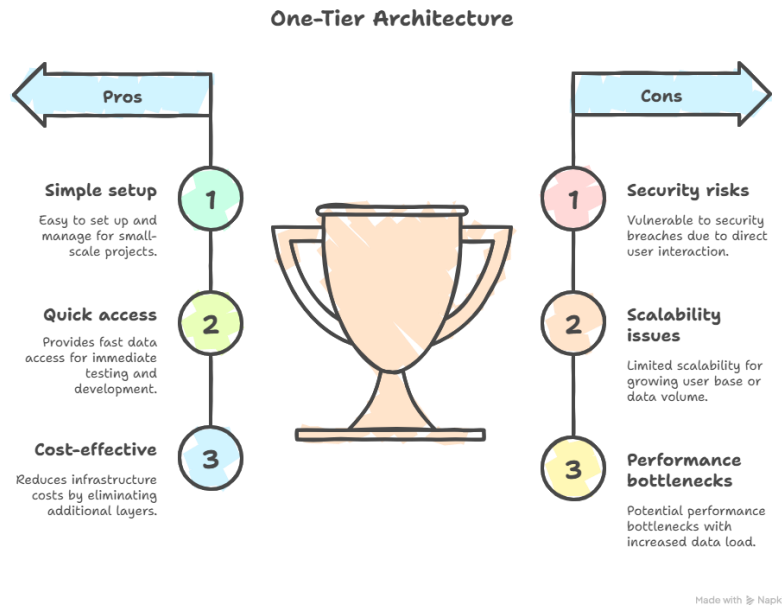


Database Management System (DBMS) Architecture

The architecture of a Database Management System (DBMS) describes how the system is structured and how its components interact to store, retrieve, and manage data efficiently. There are generally three types of DBMS architectures:

1. One-Tier Architecture

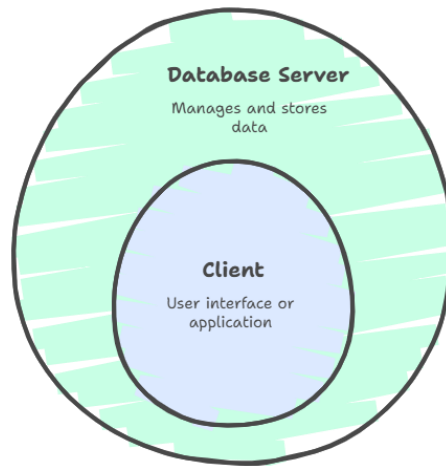
- The user directly interacts with the DBMS.
- Mostly used for development and testing purposes.
- Example: Using MS Access or SQLite locally.



2. Two-Tier Architecture

- Tier 1: Client (Application/User Interface)
- Tier 2: Database Server (DBMS)
- The client sends SQL queries to the DBMS server and receives the results.
- Example: Client-server applications using JDBC or ODBC.

Two-Tier Architecture

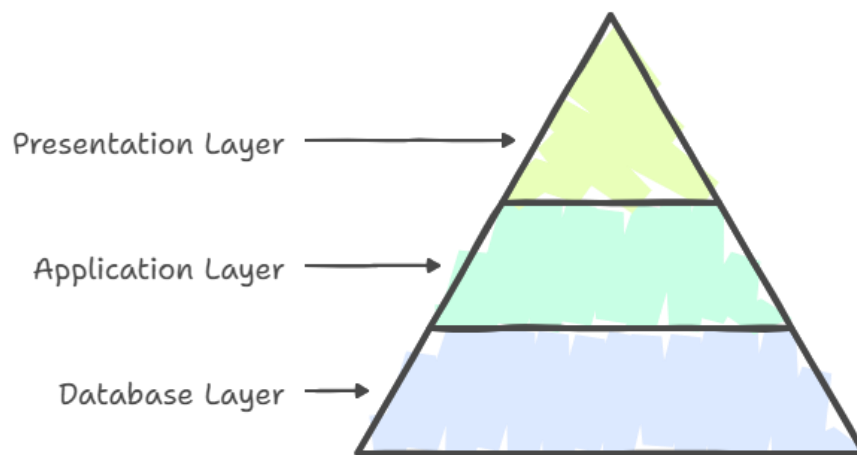


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3. Three-Tier Architecture (Most common)

- Tier 1: Presentation Layer (Client): UI or application interface.
- Tier 2: Application Layer (Server): Business logic, APIs, validation.
- Tier 3: Database Layer (DBMS Server): Handles data storage, query processing, and transactions.
- This architecture enhances scalability, security, and maintainability.

Three-Tier Architecture Pyramid



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Main Components of a DBMS

Component	Function
DBMS Engine	Core services like storing, retrieving, and updating data
Query Processor	Parses and executes SQL queries
Storage Manager	Manages data on disk including indexing and file organization
Transaction Manager	Ensures ACID properties and concurrency control
Buffer Manager	Caches data in memory for faster access
Metadata Catalog	Stores schema definitions and constraints