




Database Management Systems

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AC 1.1 analyse the key issues and application of databases within organisational environments

- ▶ Why do businesses need data?
- ▶ Why do they need concurrency?
- ▶ Why do they need security?
- ▶ Why do they need recovery and backup?
- ▶ Why do they need scalability
- ▶ Why do they need audit trails
- ▶ Why do they need analytics

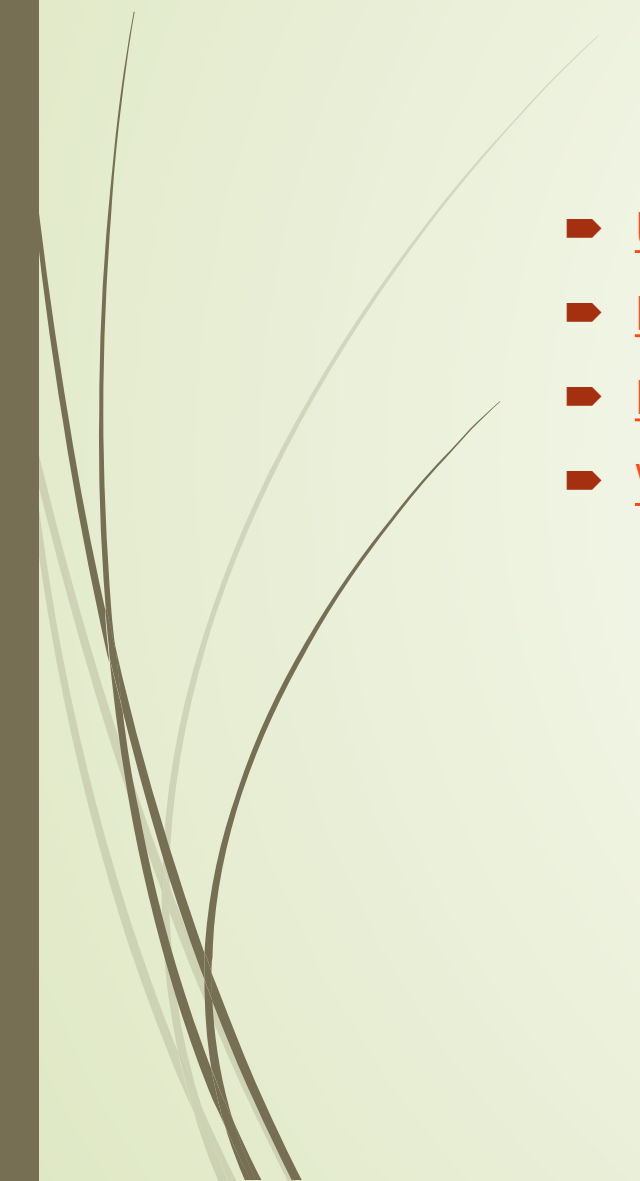


Why keep data?

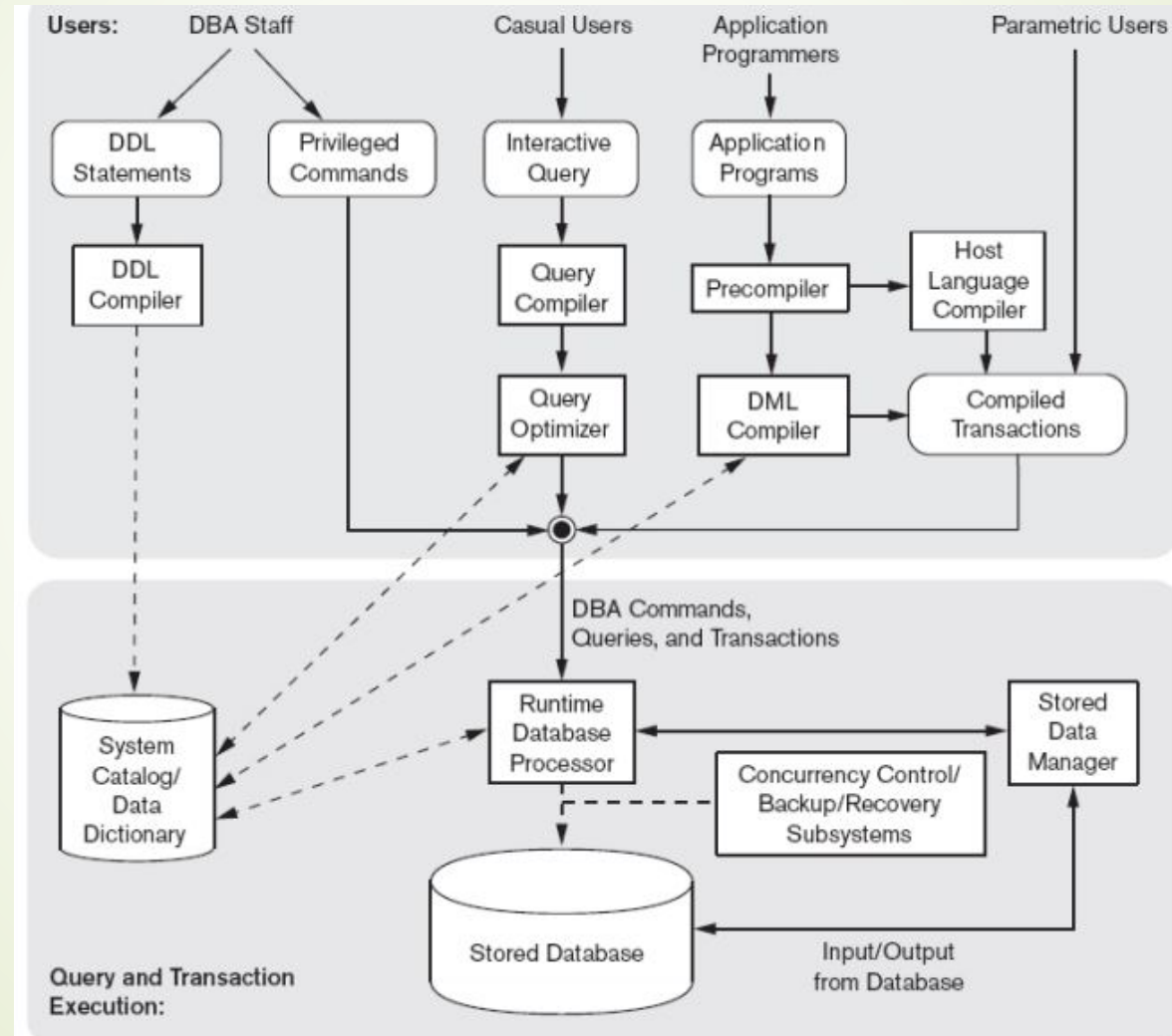
- ▶ Legal requirements -> Tax Assessment!
- ▶ Audited Accounts
- ▶ Customer complaints!
- ▶ Will we make a profit by the end of the year?
- ▶ Are our sales increasing or decreasing?
- ▶ Which items are most popular?
- ▶ How many sales did we loose due to poor stock keeping?



Big Data at Intel and Oracle

- ▶ [Using Data Science in Healthcare with Johnson & Johnson](#)
 - ▶ [Recruitment Methods Streamline Teacher Hiring](#)
 - ▶ [Entertainment Marketing](#)
 - ▶ [Wargaming.NET](#)
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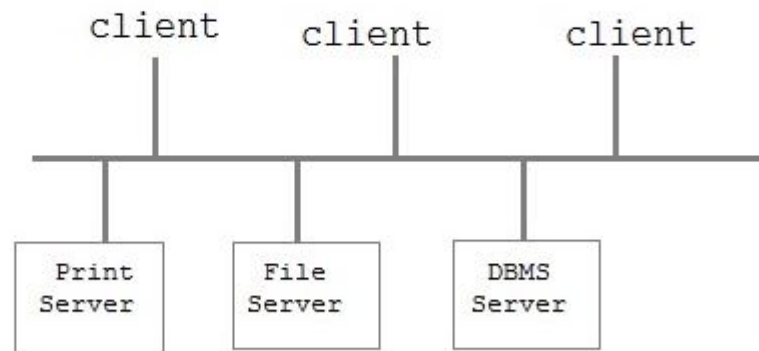
DBMS Architecture



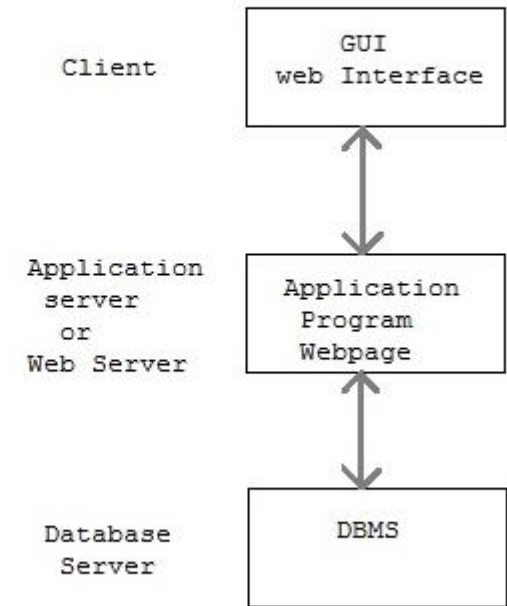
Client/Server Architecture

ODBC (Open Database Connectivity) Drivers

Two-tier Client / Server Architecture

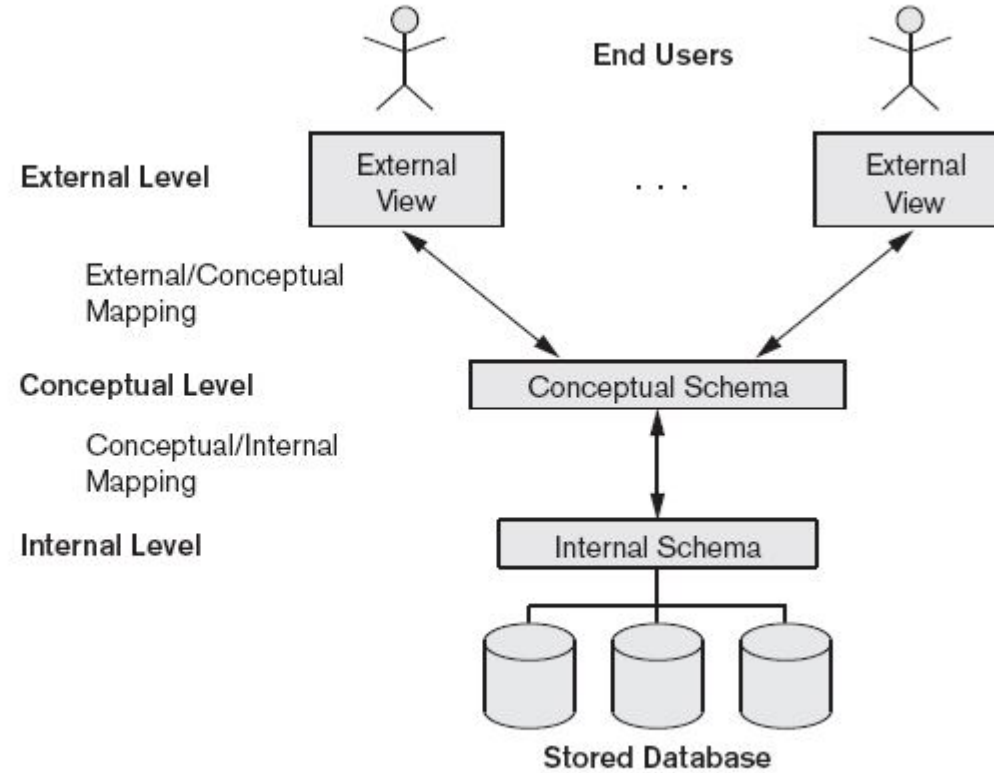



Three-tier Client / Server Architecture



Schemas

Figure 2.2
The three-schema architecture.






AC 1.2 critically evaluate the features and advantages of database management systems

- ▶ What is a DBMS?
 - ▶ Contains a database
 - ▶ Manages multi-user access to the database through queries and tools
 - ▶ Contains tools to maintain the structure of the database
 - ▶ Contains Analytical tools
 - ▶ Contains Reporting tools



What is an RDBMS

- ▶ Entities and attributes
 - ▶ Primary Keys, Foreign Keys and relationships
 - ▶ Uses SQL for queries (SELECT, CREATE, DELETE UPDATE)
 - ▶ Contains schemas (ERDs)
 - ▶ Manages the database (access rights, backup, clusters)
 - ▶ Can interface with other languages (C#, Java)
 - ▶ ACID transactional Atomicity, Consistency, Isolation and Durability
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Data Anomalies

- ▶ The same identifier (Owner ID) can appear in multiple rows.
- ▶ You cannot retrieve a unique owner record with the identifier
- ▶ Entities may not have an ID (what is the unique identifier for a sandwich?).
- ▶ Details are repeated – DATA REDUNDANCY, wasting space and time.
- ▶ Data can be INCONSISTENT as it is stored more than once
- ▶ Multiple records have to be updated. This is an AMENDMENT ANOMALY
- ▶ Multiple records have to be deleted. This is a DELETION ANOMALY
- ▶ More than one record may need to be added. This is an ADDITION ANOMALY
- ▶ Data may not be ATOMIC.



Leading DBMS Software

SQL Databases

- MS SQL Server
- Oracle
- DB2
- MySQL
- MS Access

NoSQL Databases

- MongoDB
- Oracle NoSQL
- MS DocumentDB



Comparing DBMS Software

- ▶ Platforms
- ▶ Languages
- ▶ Size Limits
- ▶ Performance
- ▶ Security
- ▶ Concurrency
- ▶ Data Mining
- ▶ Multiple Cores
- ▶ In-Memory
- ▶ Replication
- ▶ Clouds
- ▶ Recovery
- ▶ Backup
- ▶ Data Warehousing