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 scaleability
- 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](#)

- https://www-ssl.intel.com/content/www/uk/en/analytics/overview.html?cid=sem43700017218340581&intel_term=analytics+for+big+data&gclid=Cj0KEQiAuonGBRCaotXoycysvlMBEiQAcxV0nJ9C8ASu_xZ1UPNt7WbIWxH2fBygiVZgEAKFPrljshcaAk8I8P8HAQ&gclsrc=aw.ds
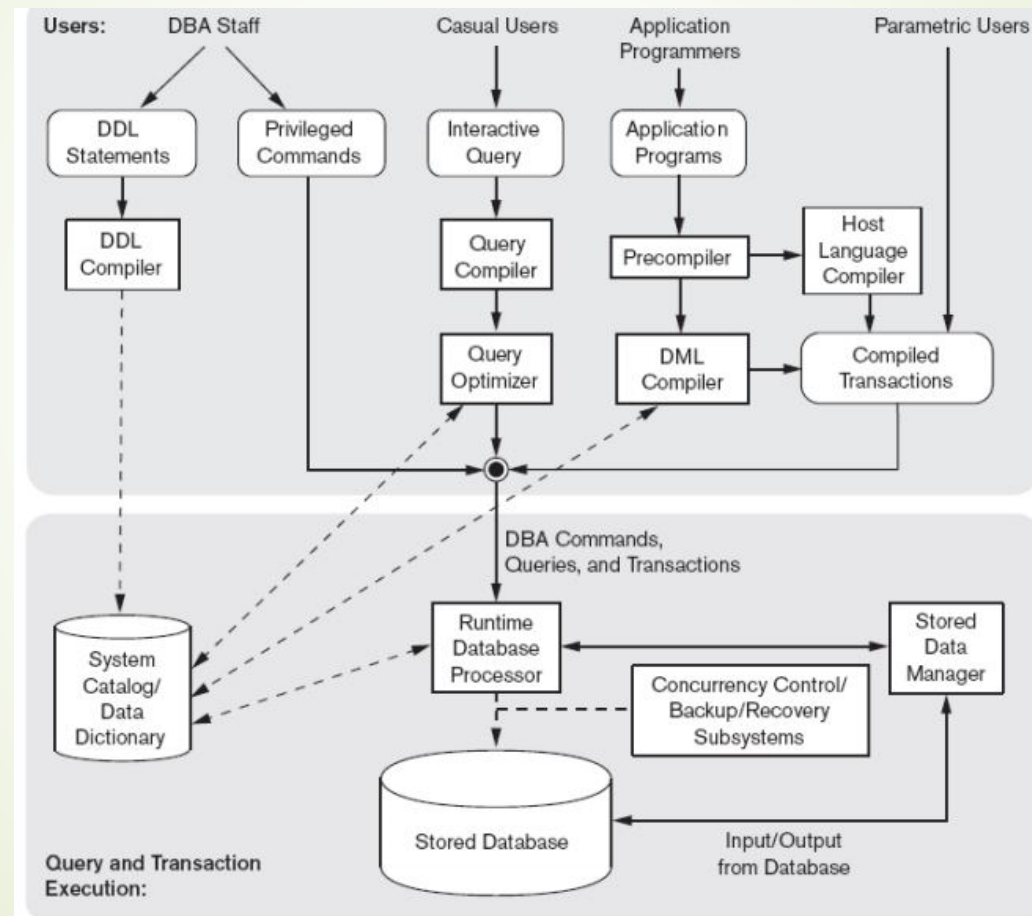
- [Recruitment Methods Streamline Teacher Hiring](#)

- https://www-ssl.intel.com/content/www/uk/en/big-data/teachermatch.html

Big Data - Continued

- [Entertainment Marketing](#)
- https://www-ssl.intel.com/content/www/uk/en/big-data/caesars-entertainment.html
- Wargaming.NET
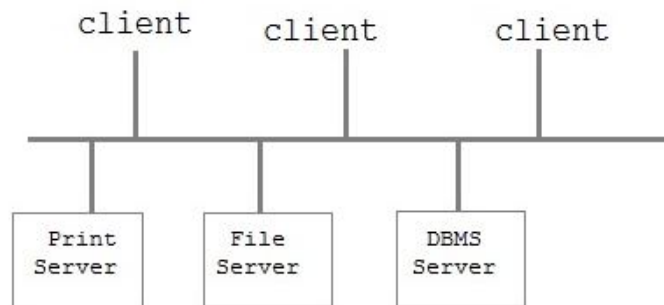- https://www.oracle.com/uk/big-data/index.html?bcid=4250083428001

DBMS Architecture

Client/Server Architecture

ODBC (Open Database Connectivity) Drivers

Two-tier Client / Server Architecture

client   client   client

| Print Server | File Server | DBMS Server |

Three-tier Client / Server Architecture

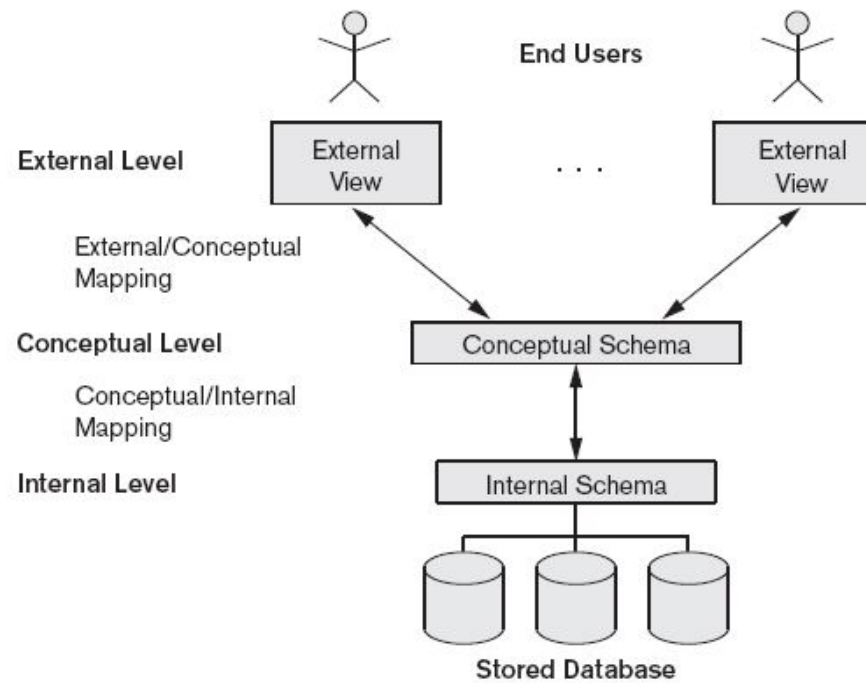| Client | GUI web Interface |
| Application server or Web Server | Application Program Webpage |
| Database Server | DBMS |
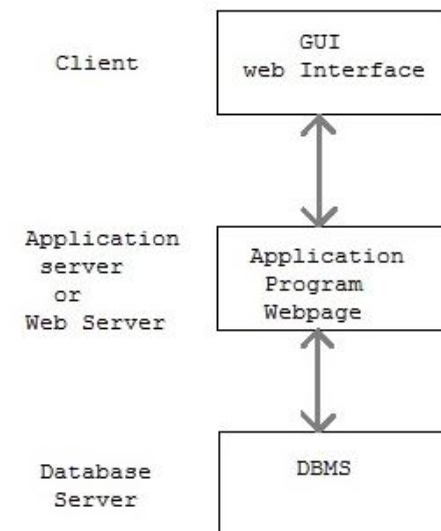
Schemas

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

What is wrong with flat files?

FullName	Contact Number	House Number	Post Code	Order No	Date Ordered	Date Delivered	Paid	Quantity	Description
Christopher Wood	0115 9838367	53 Blues Road	NG23 3WE	1	05-Sep-16	06-Sep-16	TRUE	2	Brie
Chris Wood	0115 9838367	54 Blues Road	NG23 3WE	1	05-Sep-16	06-Sep-16	TRUE	1	BLT
Gino Albine	0116 2623366	84 Brooks Close	LE12 7SS	2	06-Sep-16	07-Oct-16	TRUE	1	Cheddar Cheese
Gino Albine	0116 2623368	83 Brooks Close	LE12 7SS	2	06-Sep-16	07-Oct-16	TRUE	2	Chicken & Sweetcorn
Chris Wood	0115 9838367	53 Blues Road	NG23 3WS	3	06-Sep-16	07-Sep-16	TRUE	2	Brie
Christopher Wood	0115 9838367	53 Blues Road	NG23 3WE	3	06-Sep-16	07-Sep-16	TRUE	1	BLT
Gino Albin	0116 2623368	84 Brookes Close	LE12 7SS	4	08-Sep-16	09-Sep-16	TRUE	2	Chicken and Mayo
Gino Albin	0116 2623368	84 Brooks Close	LE12 7SH	4	08-Sep-16	09-Sep-16	TRUE	1	Goats Cheese Special

How many errors/inconsistancies are there?

Data Anomalies

- The same identifier (Owner ID) can appears 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