Database Management Systems

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Course Content

1. Introduction and Overview of DBMS
2. Conceptual Database Design (ER Modeling)
3. Relational Model
4. Relational Algebra and Calculus
5. SQL
6. Schema Refinement and Normal Forms
7. Disk Storage
8. Hashing and Indexing
9. Transaction Management and Concurrency Control
10. Database Recovery

Books

1. R Ramakrishnan & J Gehrke, Database Management Systems, Mc Graw Hill, 3rd Ed., 2003.

2. Elmasri, Ramez, Shamkant B. Navathe, Fundamentals of Database Systems, Pearson Education, 5th Ed., 2007

3. Date C.J., An Introduction to Database Systems, Pearson, 8th Ed., 2006.

4. Korth H F and A Silberschatz, Database System Concepts, MGHISE, 3rd Ed., 1997.

Lecture Session-1
Introduction to DBMS

Content

- ❑ *Database Systems*
- ❑ *DBMS*
- ❑ *Database System environment*
- ❑ *Traditional file systems for storing data*
- ❑ *Advantages of DBMS over traditional file systems*

Introduction

Databases and Systems to manage them have become significant components of any present day business of any nature.

These databases help businesses to perform their day-to-day activities in an efficient and effective manner.

• Banking
• Travel ticket reservation
• Library catalog search

Here some program access the database.
Advances in technology have given raise to new concepts-
❑ Multimedia databases
❑ GIS
❑ Web data
❑ Data warehousing and mining

Data: Known fact that can be recorded and that has implicit meaning.

Ex. *Name*, *Tel_no*, *city* etc.

This data can be stored in a file on a computer.

Database: Is a collection of related data.

❖ It is a collection of logically related data.

❖ A database is designed, built and populated with data for a specific purpose.

DBMS

DBMS: Is a collection of programs that enables users to create and maintain databases in a convenient and effective manner.

DBMS is a software system that facilitates the following:

1.*Defining the database:* This includes defining the structures, data types, constraints, indexes etc.
        Database catalog/Data dictionary/ called as *Meta-data*

2.*Constructing the database:* This means storing data into the database structures and storing on some storage medium.

3.*Manipulating database for various applications:* This encompasses activities like – *querying* the database*, inserting* new records into the database, *updating* some data items, and *deleting* certain items from the database.
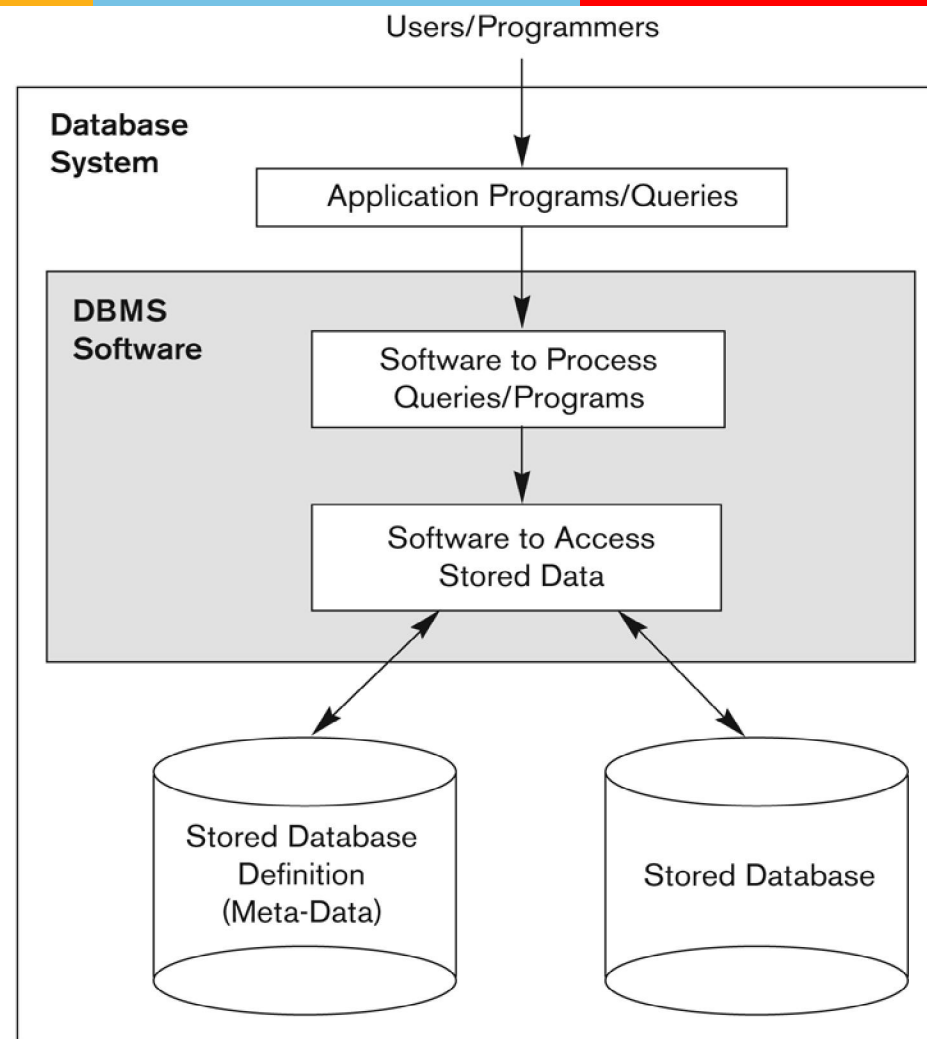
What is DBMS?
What is a Database System?

Figure 1.1
A simplified database system environment.

Traditional file systems for storing the data

If we take the example of savings bank enterprise, information about customers and savings accounts etc. need to be stored.

One way to keep the information on computers is to store in files provided by operating systems (OS).

Disadvantages of the above System
- ❖ Difficulty in accessing data (possible operations need to be hard-coded in   programs).
- ❖ Redundancy leading to inconsistency.
- ❖ Inconsistent changes made by concurrent users.
- ❖ No recovery on crash.
- ❖ The security provided by OS in the form of password is not sufficient.
- ❖ Data Integrity is not maintained.

Advantages of using DBMS

- ❑ Data independence
- ❑ Efficient data access
- ❑ Data integrity and security
- ❑ Data Administration
- ❑ Concurrent access and Crash recovery
- ❑ Reduced application development time

Disadvantages of DBMS

1. Extra cost due to SW, HW and training.
2. Not suitable or effective for certain applications (Real-time constraints; well-defined limited operations)
3. Data manipulation not supported by Query languages.

Summary

✓ *What is Data, Database, and DBMS*

✓ *Importance of DBMS*

✓ *Storing data in Traditional file systems*

✓ *Advantages of DBMS over traditional file systems*