INTRODUCTION TO DATABASE SYSTEMS

Week 1 – Lesson 1

LEARNING OUTCOME

- Understand Database Concepts,

- Understand Common DBMS

- Appreciate the role and advantages of DBMS

- Discuss Legacy Database Models

CONCEPTS OF DATABASE SYSTEMS

a) Data

Definition:- Are raw facts which facts have not yet been processed to reveal their meaning.

Example you can have daily sales in an excel worksheet but this may not provide details.

Information is the result of processing raw data to reveal its meaning.

Summary of Key Points:-

- Data constitute the building blocks of information.

- Information is produced by processing data.

- Information is used to reveal the meaning of data.

- Accurate, relevant, and timely information is the key to good decision making.

- Good decision making is the key to organizational success.

CONCEPTS OF DATABASE SYSTEMS CONTD'

Data management is a discipline that focuses on the proper generation, storage, and retrieval of data.

Data management is a core activity for any business, government agency and organization.

Efficient data management typically requires the use of a computer system which is a

Database.

A database is a shared, integrated computer structure that stores a collection of:-

❖**End-user data**, that is, raw facts of interest to the end user

❖**Metadata** or data about data, through which the end-user data are integrated and managed

DATABASE MODEL

A *database model* determines the logical structure of a database and determines in which manner data can be stored, organized and manipulated on a fundamental basis.

Before the databases were designed, the only way to store data was are in *file storage* and this increased complexity in extracting data

To solve such problems, database management systems (DBMSs) were developed which provides a standard and reliable way to access and update data.

A database management system (DBMS) is a collection of programs that manages the database structure and controls access to the data stored in the database.

POPULAR DATABASE MANAGEMENT SYSTEMS

- MySQL is a free, open source relational database management system (RDBMS)

- MariaDB is a community-developed, free and open source relational database management system.

- Microsoft SQL Server is a commercial relational database management system.

- Oracle DBMS is a commercial, multi-model database management system.

- PostgreSQL is a free, open source relational database management system (RDBMS).

- MongoDB is an open source, NoSQL, document-oriented database management system.

- SQLite is a public domain database engine that belongs to the embedded, relational database management systems family.

- IBM DB2 is a database management product developed by IBM, formerly known as DB2 for Linux, UNIX and Windows.

# CHARACTERISTICS AND APPLICATIONS OF DBMS

- ACID Properties - DBMS follows the concepts of Atomicity, Consistency, Isolation, and Durability (normally abbreviated as ACID). These concepts are applied on transactions, which manipulate data in a database.

- Multiuser and Concurrent Access - DBMS supports multi-user environment and allows them to access and manipulate data concurrently.

- Multiple views - DBMS offers multiple views for different users. A user who is in the Sales department will have a different view of database than a person working in the Production department.

- Security - multiple views require security to ensure users are can not access data of other users and departments. DBMS offers methods to apply these security mechanisms

ROLE AND ADVANTAGES OF THE DBMS

FIGURE 1.2 The DBMS manages the interaction between the end user and the database

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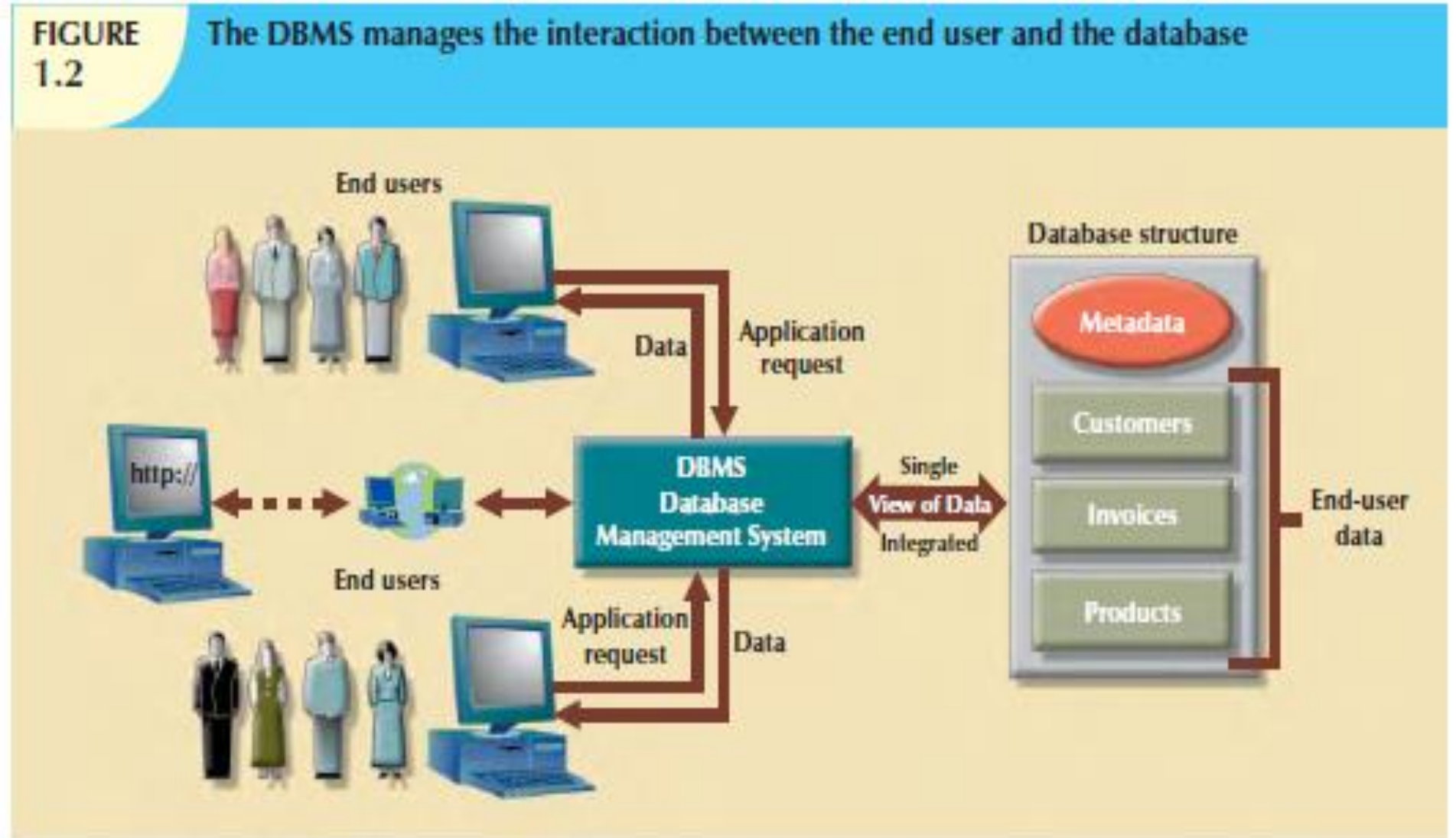
ADVANTAGES OF A DBMS

- Improved data sharing: - The DBMS enables the data in the database to be shared among multiple applications or users.

- Concurrent Access and Crash Recovery: - A DBMS enables concurrent accesses to the data. Further, the DBMS protects users from the effects of system failures.

- Data Administration:-When several users share the data, centralizing the administration of data can offer significant improvements.

- Minimized data inconsistency: - Data inconsistency exists when different versions of the same data appear in different places. This is greatly reduced in a properly designed database.

- Efficient Data Access: - A DBMS utilizes a variety of sophisticated techniques to store and retrieve data efficiently.

- Reduced Application Development Time: - Clearly, the DBMS supports important functions that are common to many applications accessing data in the DBMS.

ADVANTAGES OF A DBMS CONTD'

- **Data Integrity and Security:** - If data is always accessed through the DBMS, the DBMS can enforce integrity constraints.

- **Data quality:** - is a comprehensive approach to promoting the accuracy, validity, and timeliness of the data.

- **Improved decision making:** - Better-managed data and improved data access make it possible to generate quality information, on which better decisions are based. The quality of the information generated depends on the quality of the underlying data.

- **Increased end-user productivity:** - The availability of data, combined with the tools that transform data into usable information, empowers end users to make quick, informed decisions that can make the difference between success and failure in the global economy.

- **Data Independence:** - Application programs should not expose the details of data representation and storage, The DBMS provides an abstract view of the data that hides such details.

LEGACY DATABASE MODELS

- Legacy database refers to a database that has been in use for many years and therefore unsuitable for modern apps and environments. Examples include databases based on flat files and mostly reside on old servers.

- But just because a database is legacy does not mean it is obsolete. There are many applications that use it and need it to be operational.

- Example a business that has been using computing since the 1960s or 1970s, this typically means that there are old database applications still in use.

- The presence of legacy databases presents several challenges to an organization, depending on the need to access and integrate the older data.

- Businesses that need legacy data integrated with more recent data have to convert the data for storage in the current database

CHALLENGES OF LEGACY DATABASE MODELS

- The data model is not properly documented with diagrams or data dictionaries.

- The database presents design and/or data quality problems.

- It depends on old infrastructure and, possibly, one without vendor support.

- Any changes to its structure represent a great risk of loosing data for the applications that use it.

- Difficulty in upgrading or updating the applications that use them

- Legacy systems may not receive security patching updates, leaving them vulnerable to intrusions that disrupt the system's performance

- Legacy systems have compatibility issues