Al-Mustaqbal University
College of Sciences
Cyber Security Department

جامـــــعة المـــــستـقبـل
AL MUSTAQBAL UNIVERSITY

كلية العلوم
قســـم الامن السيبراني

Lecture: (1)

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Lecturer: Asst. Lecturer Qusai AL-Durrah

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Data are raw facts. The word raw indicates that the facts have not yet been processed to reveal their meaning.

Information Is the result of processing raw data to reveal its meaning

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.

Metadata provide a description of the data characteristics and the set of Relationships that link the data found within the DB.

Database management system DBMS:

It a collection of programs that manages the DB structure and controls access to the data stored in the database.

Role and advantages of the DBMS

1. improved data sharing.
2. Improved data security.
3. better data integration.
4. minimized data inconsistency.
5. improved data access.
6. improved decision making.
7. Increased end-user productivity.

Types of DB:

- **according to number of users:**

1-Single user desktop database, single user on desktop computer. 2-

Multiuser database supports multiple users.

-Workgroup DB: small number of users

-Enterprise DB: more than so

- **Location classifies the DB**

1- Centralized DB: single site

2- Distributed DB: Data distributed across several different sites

Database Design

Refers to the activities that focus on the design of the DB structure that will be used to store and manage end-user data.

Database System

Refers to an organization of components that define and regulate the collection, storage, management from general management point of view, the DB system is composed of:

- Hardware
- Software
- Procedures
- Data
- People:

1. system administrators: database systems operations.
2. DB administrators: manage the DBMS and ensure the DB is functioning properly.
3. DB designers.
4. System analysts and programmers: design and implement the application programs.
5. End users

DBMS Functions

A DBMS performs several important functions that guarantee the integrity and consistency of the data in the DB.

1. **Data dictionary management**

The DBMS stores definitions of the data elements and their relationship in data dictionary.

2. **Data storage management**

The DBMS creates and manages the complex structures required for data storage, thus relieving you from the difficult task of defining and programming the physical data characteristics.

3. **Data transformation and presentation**

The DBMS transforms entered data to conform to required data structures

4. **Security management**

The DBMS creates security system that enforces user security and data privacy

5. **Multiuser access control**

   To provide data integrity and data consistency

6. **Backup and recovery management**

   To ensure data safety and integrity

7. **Data integrity management**

   Enforces integrity rules, thus minimizing data redundancy and maximizing data consistency

8. **DB access languages and application programming interfaces**
9. **DB communication interfaces**

   Current-generation DBMS accept end-user requests via multiple, different network environments

Disadvantages of DB systems:

1. Increased costs.
2. Management complexity.
3. Maintaining currency.
4. Vendor dependence.
5. Frequent upgrade/replacement cycles.

Concept of Database

To store and manage data efficiently in the database let us understand some key terms:

1. Database Schema: It is a design of the database. Or we can say that it is a skeleton of the database that is used to represent the structure, types of data will be stored in the rows and columns, constraints, relationships between the tables.
2. Data Constraints: In a database, sometimes we put some restrictions on the table that what type of data can be stored in one or more columns of the table, it can be done by using constraints. Constraints are defined while we are creating a table.
3. Database instance: In a database, a database instance is used to define the complete database environment and its components. Or we can say that it is a set of memory structures and background processes that are used to access the database files.
4. Query: In a database, a query is used to access data from the database. So users have to write queries to retrieve or manipulate data from the database.
5. Data manipulation: In a database, we can easily manipulate data using the three main operations that is Insertion, Deletion, and updation.
6. Data Engine: It is an underlying component that is used to create and manage various database queries.