



جامعة المستقبل
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قسم الانظمة الطبية الذكية المرحلة الثانية

Fifth Lecture

Subject: Database Systems

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Lecture 5: Database Systems

Lecture Title: Database Languages, Database Abstraction

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Database Languages

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Data Definition Language (DDL)

DDL is the short name for Data Definition Language, which deals with database schemas and descriptions, of how the data should reside in the database.

- **CREATE:** to create a database and its objects like (table, index, views, store procedure, function, and triggers)
- **ALTER:** alters the structure of the existing database
- **DROP:** delete objects from the database
- **TRUNCATE:** remove all records from a table, including all spaces allocated for the records are removed
- **COMMENT:** add comments to the data dictionary
- **RENAME:** rename an object



Data Manipulation Language (DML)

DML is the short name for Data Manipulation Language which deals with data manipulation and includes most common SQL statements such SELECT, INSERT, UPDATE, DELETE, etc., and it is used to store, modify, retrieve, delete and update data in a database. Data query language (DQL) is the subset of “Data Manipulation Language”. The most common command of DQL is SELECT statement. SELECT statement help on retrieving the data from the table without changing anything in the table.

- **SELECT:** retrieve data from a database
- **INSERT:** insert data into a table
- **UPDATE:** updates existing data within a table
- **DELETE:** Delete all records from a database table
- **MERGE:** UPSERT operation (insert or update)
- **CALL:** call a PL/SQL or Java subprogram
- **EXPLAIN PLAN:** interpretation of the data access path
- **LOCK TABLE:** concurrency Control

Data Control Language (DCL)

DCL is short for Data Control Language which acts as an access specifier to the database (basically to grant and revoke permissions to users in the database

- **GRANT:** grant permissions to the user for running DML (SELECT, INSERT, DELETE,...) commands on the table
- **REVOKE:** revoke permissions to the user for running DML (SELECT, INSERT, DELETE,...) command on the specified table



Transactional Control Language (TCL)

TCL is short for Transactional Control Language which acts as a manager for all types of transactional data and all transactions. Some of the commands of TCL are:

- **Roll Back:** Used to cancel or Undo changes made in the database
- **Commit:** It is used to apply or save changes in the database
- **Save Point:** It is used to save the data on the temporary basis in the database

Data Query Language (DQL)

Data query language (DQL) is the subset of “Data Manipulation Language”. The most common command of DQL is the SELECT statement. SELECT statement helps us in retrieving the data from the table without changing anything or modifying the table. DQL is very important for retrieval of essential data from a database.

Database Abstraction

A major purpose of a database is to provide the user with only as much information as is required of them. This means that the system does not disclose all the details of the data, rather it hides some details of how the data is stored and maintained. The complexity of databases is hidden from them which, if necessary, are ordered through multiple levels of abstraction to facilitate their interaction with the system. The different levels of the database are implemented through three layers:

Internal Level (Physical Level): The lowest level of abstraction, the internal level, is closest to physical storage. It describes how the data is stored concretely on the storage medium.

Conceptual Level: This level of abstraction describes what data is concretely stored in the database. It also describes the relationships that exist between the data. At this level, databases are described logically in terms of simple data structures. Users at this level are not concerned with how these logical data structures will be implemented at the physical level.



External Level (View Level): It is the level closest to users and is related to the way the data is viewed by individual users.

Since a database can be viewed through three levels of abstraction, any change at one level can affect plans at other levels. As databases continue to grow, there may be frequent changes to it at times. This should not lead to redesign and re-implementation of the database. In such a context the concept of data independence proves beneficial.