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**Data Manipulation Language (DML):**

* A data manipulation language (DML) is a family of computer languages including commands permitting users to manipulate data in a database.
* This manipulation involves inserting data into database tables, retrieving existing data, deleting data from existing tables and modifying existing data.
* DML is mostly incorporated in SQL databases.
* The functional capability of DML is organized in manipulation commands like SELECT, UPDATE, INSERT INTO and DELETE FROM.
* SELECT: This command is used to retrieve rows from a table.
* UPDATE: This command modifies data of one or more records.
* INSERT: This command adds one or more records to a database table.
* DELETE: This command removes one or more records from a table.

**Data Control Language (DCL):**

* A data control language (DCL) is a syntax similar to a computer [programming language](https://en.wikipedia.org/wiki/Programming_language) used to control access to data stored in a database.
* In particular, it is a component of [Structured Query Language](https://en.wikipedia.org/wiki/Structured_Query_Language) (SQL).
* Data Control Language is one of the logical group in SQL Commands.
* Examples of DCL commands include:

[GRANT](https://en.wikipedia.org/wiki/Grant_(SQL)) to allow specified users to perform specified tasks.

[REVOKE](https://en.wikipedia.org/wiki/Revoke_(SQL)) to remove the user accessibility to database object.

* DCL commands are used for access control and permission management for users in the database.
* This command is related to the security issues.

**Transaction Control Language (TCL):**

* Transaction Control Language commands are used to manage transactions in the database.
* These are used to manage the changes made by DML-statements.
* TCL allows the statements to be grouped together into logical transactions.
* TCL commands are as follows:  
  1. COMMIT  
  2. SAVEPOINT  
  3. ROLLBACK  
  4. SET TRANSACTION
* **COMMIT command** saves all the work done.
* **SAVEPOINT command** is used for saving all the current point in the processing of a transaction.
* **ROLLBACK** command restores database to original since the last **COMMIT**.
* **SET TRANSACTION** is used for placing a name on a transaction.

**Metadata:**

* **Metadata represents data about data.**
* **Metadata enriches the data with information that makes it easier to find, use and manage.**
* It helps to organize, find and understand data.
* Another way to think of metadata is as a short explanation or summary of what the data is.
* A simple example of metadata for a document might include a collection of information like the author, file size, the date the document was created, and keywords to describe the document.
* Metadata for a music file might include the artist's name, the album, and the year it was released.

**Data Models:**

* A data model refers to the logical inter-relationships and data flow between different data elements involved in the information world.
* Data models facilitate communication business and technical development by accurately representing the requirements of the information system and by designing the responses needed for those requirements.
* Data models help represent what data is required and what format is to be used for different business processes.
* A data model can be concrete or abstract.
* It has the following main components:

Data types

Data items

Data sources

Event sources

Links

* Information stored in data models is of great significance for businesses because it dictates the relationships between database tables, foreign keys and the events involved.
* The three basic styles of data model are:

Conceptual data models

Physical data models

Logical data models

**ENTITIES:**

* An entity is any singular, identifiable and separate object.
* It refers to individuals, organizations, systems, bits of data or even distinct system components that are considered significant in and of themselves.
* The term is used in a number of programming languages/concepts, database management, systems design.
* The following are examples of the use of an entity in different contexts:
* General computing: Refers to users, components and organizations.
* Database system: Refers to individual things, including people, concepts or objects with data that is first stored in a database management system (DBMS) and has attributes and relationships to other entities.
* Open Systems Interconnection model (OSI model): Refers to discrete system components that use different protocols to communicate with each other.
* Object-oriented programming (OOP): Synonymous with objects.

**Relationships:**

* A relationship, in the context of databases, is a situation that exists between two relational database tables when one table has a foreign key that references the primary key of the other table.
* Relationships allow relational databases to split and store data in different tables, while linking disparate data items.
* The fundamental feature that differentiates relational databases from other database types (e.g., flat-files) is the ability to define relationships.
* Three types of relationship exist among entities. These are:

One-to-one

One-to-many

Many-to-many

* A one-to-one (1:1) relationship is when at most one instance of a entity A is associated with one instance of entity B.
* A one-to-many (1:M) relationships is when for one instance of entity A, there are zero, one, or many instances of entity B, but for one instance of entity B, there is only one instance of entity A.
* A many-to-many (M:M) relationship, sometimes called non-specific, is when for one instance of entity A, there are zero, one, or many instances of entity B and for one instance of entity B there are zero, one, or many instances of entity A.

**Relational Database:**

* A relational database is a type of database that stores and provides access to data points that are related to one another.
* Relational [databases](https://www.oracle.com/in/database/what-is-database/) are based on the relational model, an intuitive, straightforward way of representing data in tables.
* In a relational database, each row in the table is a record with a unique ID called the key.
* The columns of the table hold attributes of the data, and each record usually has a value for each attribute, making it easy to establish the relationships among data points.
* Relational databases are used to track inventories, process ecommerce transactions, manage huge amounts of mission-critical customer information, and much more.
* A relational database can be considered for any information need in which data points relate to each other and must be managed in a secure, rules-based, consistent way.
* Today, the advantages of the relational model continue to make it the most widely accepted model for databases.

**Database Management Systems:**

* A database management system (DBMS) is a software package designed to define, manipulate, retrieve and manage data in a database.
* A DBMS generally manipulates the data itself, the data format, field names, record structure and file structure.
* Database management systems are set up on specific data handling concepts, as the practice of administrating a database evolves.
* The earliest types of database management systems consisted mainly of hierarchy and network models.

The **hierarchy model** is one where each node or component has a child/parent relationship with one other node or component.

In the **network model**, the difference is that a single component can have multiple relationships – think of this as a single node being able to “multicast” connections.

* Other types of DBMS models include a graph database model, where graph models are used for semantic queries, and an entity-relational model.
* Some of the newest types of DBMS can be used where a data center may have a wide disparity of differently formatted or relatively unformatted or “raw” data to work with, where records are not normalized in the conventional way.

**Enhanced Entity-Relationship (EER) Model:**

* The enhanced entity–relationship (EER) model (or **extended entity–relationship** model) in computer science is a high-level or [conceptual](https://en.wikipedia.org/wiki/Conceptual_schema) data model incorporating extensions to the original entity–relationship (ER) model, used in the design of [databases](https://en.wikipedia.org/wiki/Database).
* The EER model includes all of the concepts introduced by the ER model.
* It includes the concepts of a [subclass](https://en.wikipedia.org/wiki/Subclass_(computer_science)) and [superclass](https://en.wikipedia.org/wiki/Superclass_(computer_science)), along with the concepts of [specialization](https://en.wikipedia.org/wiki/Inheritance_(computer_science)#Specialization) and [generalization](https://en.wikipedia.org/wiki/Generalization).
* it introduces the concept of a [union](https://en.wikipedia.org/wiki/Union_(computer_science)) type or category, which is used to represent a collection of objects that is the union of objects of different [entity](https://en.wiktionary.org/wiki/entity) types.
* EER model also includes EER diagrams that are conceptual models that accurately represent the requirements of complex databases.
* EER creates a design more accurate to database schemas.

**Normalization:**

* **Normalization** is a database design technique that reduces data redundancy and eliminates undesirable characteristics like Insertion, Update and Deletion Anomalies.
* Normalization rules divides larger tables into smaller tables and links them using relationships.
* The purpose of Normalization in SQL is to eliminate redundant (repetitive) data and ensure data is stored logically.
* The following slideshow describes the three normal forms.

First Normal form

Second Normal form

Third Normal form

* In the first normal form, information items have been put into their own columns.
* The second normal form introduces a unique value that describes each row, and only that row. Typically the unique identifier has nothing to do with the data in the table, it is usually a counter.
* In third normal form, the information within each table is not duplicated, and the tables are tied together by the Item name.