Database Environment

ANSI-SPARC

Three-level architecture – External, conceptual, and internal level

1. External level – The users’ view of the database. This level describes that part of the database that is relevant to each user.
2. Conceptual level- provides the mapping and the desired independence between the external and internal levels. The community view of the database. This level describes what data is stored in the database and the relationships among the data.
3. Internal level- The physical representation of the database on the computer. This level describes how the data is stored in the database.

Database scheme (three) – overall description of the database

1. Multiple external schemas (also called subschemas) that correspond to different views of the data
2. Conceptual schema – describes all the entities, attributes, and relationships together with integrity constraints
3. Internal schema – complete description of the internal model that contains the definitions of stored records, the methods of representation, the data fields, and the indexes and storage structures used.

Conceptual/internal mapping – enables the DBMS to find the actual record or combination of records in physical storage.

External/conceptual mapping – enables the DBMS to map names in the user’s view to the relevant part of the conceptual schema

Logical data independence – the immunity of the external schemes to changes in the conceptual schema

Physical data independence­ – the immunity of the conceptual schema to changes in the internal schemas

Data Definition Language (DDL) - A language that allows the DBA or user to describe and name the entities, attributes, and relationships required for the application, together with any associated integrity and security constraints. The DDL is used to define a schema or to modify an existing one. It cannot be used to manipulate data.

* Metadata - data that describes the objects in the database and makes it easier for those objects to be accessed or manipulated

Data Manipulation Language (DML) - A language that provides a set of operations to support the basic data manipulation operations on the data held in the database. (CRUD operation)

* Insertion of new data into the database
* Modification of data stored in the database
* Retrieval of data contained in the database
* Deletion of data from the database
* Query language – data retrieval

Procedural DML – A language that allows the user to tell the system what data is needed and exactly how to retrieve the data

Nonprocedural DML – A language that allows the user to state what data is needed rather than how it is to be retrieved

Fourth-Generation Language (4GLs) –

* -presentation languages, such as query languages and report generators;
* -specialty languages, such as spreadsheets and database languages;
* -application generators that define, insert, update, and retrieve data from the database to build applications;
* -very high-level languages that are used to generate application code.
* SQL and QBE, mentioned previously, are examples of 4GLs.

Data model - An integrated collection of concepts for describing and manipulating data, relationships between data, and constraints on the data in an organization.

1. Structural part – consists of a set of rules according to which databases can be constructed
2. Manipulative part – defines the types of operations that are allowed on the data
3. Set of integrity constraints – ensures that the data is accurate