

# DBMS / SQL (Modern Database Management System)



**Know Program**

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# 1. Introduction to Database & SQL

## 1.1) SQL

- There are numerous versions of SQL. The original version was developed at IBMS San Jose Research Laboratory.
- This language, originally called sequel was implemented as part of the “System-R” Project in the early 1970’s.
- The sequel language has evolved and its name has changed to SQL (Structured Query Language)
- In 1986, the American National Standards (ANSI) Published an SQL Standard.
- IBM has published its own ‘Corporate’ SQL Standard, the Systems Application Architecture Database Interface (SAA-SQL).
- SQL has Clearly Established Itself as the Standard Relational database Language.
- SQL allows users to access data in relational database management system, such as Oracle, Informix, Sybase, Access etc.
- SQL allows users to manipulate and define the data in a database.
- SQL is an ANSI Standard computer Language.
- SQL is more than a Query tool, although that was its original purpose and retrieving data is still one of its most important functions.
- SQL is used to content all of the functions of DBMS, Which Provides for its Users, including.

### Terminologies used in DBMS

- **Data Definition Language (DDL):-** In DDL User define the structure and organization of the stored data and relationships among the stored data items.
- **Data Retrieval Language:-** An Application Program to retrieve stored data from the database and use it.
- **Data Manipulation Language (DML):-** DML allows a user or an application program to update the database by adding new data, removing old data, and modifying previously stored data.
- **Data Control Languages (DCL):-** DCL Can be used to restrict a user’s ability to retrieve, add and modify data, protecting stored data against unauthorized access.
- **Data Sharing:-** It is used to Co-ordinate data sharing by Concurrent Users, Ensuring that they do not interface with one another.
- **Data Integrity:-** It defines integrity Constraints in the database, protecting it from corruption due to inconsistent updates or system failures.

## Role of SQL in a Database Architecture

1. An SQL-based relational database application involves a user-interface, a set of tables in the database and a relational database Management system (RDBMS) with an SQL Capability.
2. Within the RDBMS, SQL will be used to create the tables, translate user requests maintain the data dictionary and system catalog update and maintain the tables, Establish, Security and Carry out Backup and recovery procedures.
3. A relational DBMS (RDBMS) is a data Management System that implements a relational data model, one where data are stored in a collection of tables, and the data relationships are represented by common values, not links.

### *The original purposes of the SQL Standard are as follows*

- To specify the syntax and semantics of SQL data definition and manipulation languages.
- To define the data structures and basic operations for designing, accessing, maintaining, controlling and protecting an SQL database.
- To provide a vehicle for portability of database definition and application modules between conforming DBMS.
- To specify both minimal and complete standards, which permit different degrees of adoption in products.
- To provide an initial standard, to include specifications for handling such topics as referential integrity, transaction management, user-defined function, join operators and character sets.

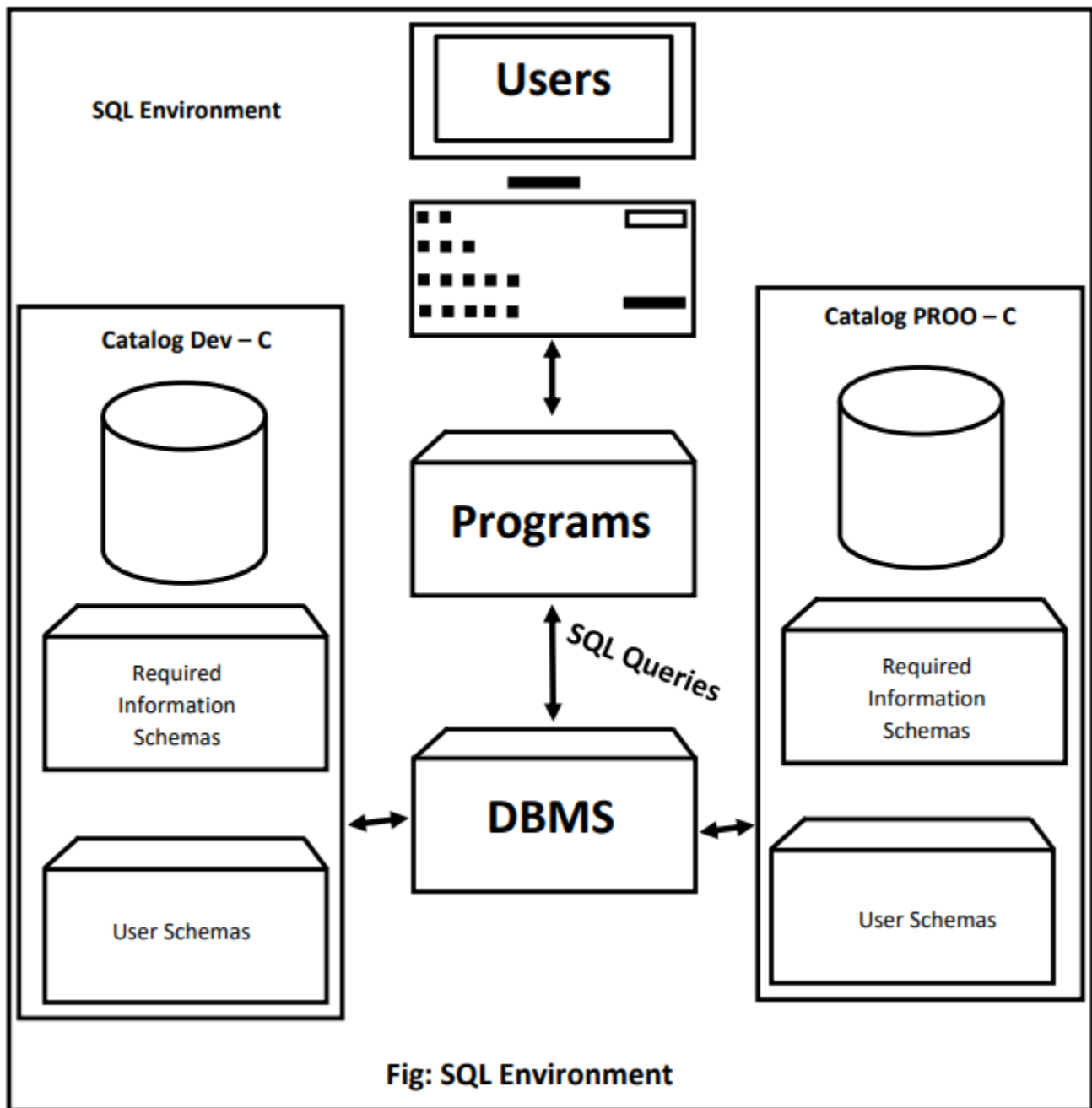
## 1.2) Benefits of SQL

1. **Reduced Training Costs:-** Training an organization can concentrate on one language. A large labor pool of is professionals trained in a common language reduces retaining when hiring new employees.
2. **Productivity:-** Is professionals can learn SQL thoroughly and became proficient with it from continued use and since they are familiar with the language in which programs are written, programmers can more quickly maintain existing programs.
3. **Application Portability:-** Applications can be moved from machine to machine when each machine uses SQL. Further, it is economical for the computer software industry to develop off – the – shelf application software when there is a standard language.
4. **Application Longevity:-** A Standard language tends to remain so far long time; hence there will be little pressure to require old applications. Rather, applications will simply be updated as the standard language is enhanced or new versions of DBMD are introduces.
5. **Reduced dependence on a single vendor:-** When a non-proprietary language is used, it is easier to use different vendors for the DBMS training and educational services, application software and consulting assistance.

6. **Cross – System Communication:-** Different DBMS and application program can more easily communicate and cooperate in managing data and processing user programs.

### 1.3) SQL Environment

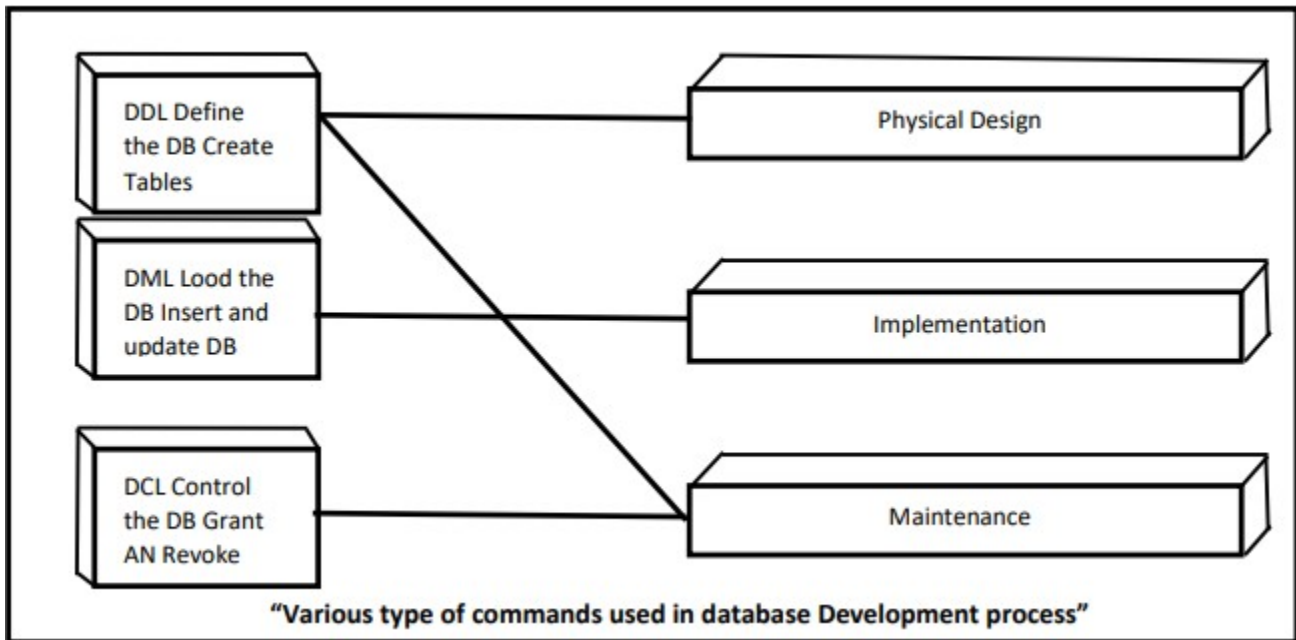
- The figure below is a simplified schematic of an SQL environment:-



- An SQL Environment includes an instance of an SQL database Management System along with the databases accessible by that DBMS and the users and programs that may use that DBMS to access the databases.
- Each database is contained in a catalog, which describes any object that is a part of the database, regardless of which are created that object.
- The term Schema is not clearly defined in the standard it may be taken in general to contain description of the objects, such as the base tables, views, constraints and so on.
- If more than one user has created objects in the database, combining information about all users' schemas will yield information for the entire database.
- Each catalog must contain an information schema, which contains descriptions of all schemas in the catalog, table's views, attributes, privileges, constraints and domains.
- The information contained in the catalog is maintained by the DBMS as a result of the SQL commands issued by the users and does not require conscious action by the user to build it.
- Users can browse the catalog contents by using SQL select statements.

## The SQL Language has Several Parts

1. **Data Definition Language (DDL):** The SQL DDL Provides commands for defining relation schemes, deleting relations, creating indices and modifying relation scheme.
2. **Data Manipulation Language (DML):**
  - The SQL DML includes a Query language based both the relational algebra and the tuple relational calculus.
  - It includes Commands to insert, delete and modify tuples in the database.
3. **Data Control Language (DCL):** These commands help the DBA to control the database and include commands to grant or revoke privileges to access the database or particular objects within the database and to store or remove transactions that would effect the database.
4. **Embedded data manipulation languages:** - The embedded from of SQL is designed for use within general-purpose programming language such as P</a, COBOL, PASCAL, FORTRAN and C.
5. **View Definition:** - The SQL DDL includes commands for defining views.
6. **Authorization:** - The SQL DDL includes commands for specifying access rights to relation and views.
7. **Integrity:** -
  - The original system-R sequel language includes commands for specifying complex integrity constraints.
  - Newer versions of SQL, including the ANSI Standard, Provide only a limited from of integrity checking.
8. **Transaction Context:** SQL includes commands for specifying the beginning and ending of transactions. Several implementations including IBM (SAA-SQL), allows explicit toking of data for concurrency context.



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