# CHAPTER 3

# SOFTWARE ENVIRONMENT

### Database Management System (DBMS)

DBMS is a collection of programs that enables users to create and maintain a database The DBMS is a general-purpose software system that facilitates the processes of defining, constructing, manipulating and sharing databases among various users and applications.

A Relational **database** is a database that has a collection of tables of data items, all of which is formally described and organized according to the relational model. Data in a single table represents a relation, from which the name of the database type comes. In typical solutions, tables may have additionally defined relationships with each other. In the relational model, each table schema must identify a column or group of columns, called the primary key, to uniquely identify each row. A relationship can then be established between each row in the table and a row in another table by creating a foreign key, a column or group of columns in one table that points to the primary key of another table.

### Characteristics of Database Management Systems

* Ad Self-describing nature.
* Keeps a tight control on data redundancy.
* Enforces user defined rules to ensure that integrity of table data.
* Provides insulation between Programs and data, Data abstraction.
* Supports multiple views of the data.
* Helps sharing of data and Multi-user transaction processing.

### Advantages of using the DBMS approach

* Controlling the redundancy.
* Restricting unauthorized access.
* Providing persistent storage for program objects.
* Providing storage structures for efficient query processing.

**3.2 MYSQL**

MySQL is an Oracle-backed open source relational database management system (RDBMS) based on Structured Query Language (SQL). MySQL runs on virtually all platforms, including Linux, UNIX and Windows. Although it can be used in a wide range of applications, MySQL is most often associated with web applications and online publishing.

MySQL is an important component of an open source enterprise stack called LAMP. LAMP is a web development platform that uses Linux as the operating system, Apache as the web server. MySQL has the relational database management system and PHP as the object-oriented scripting language. (Sometimes Perl or Python is used instead of PHP.)

Originally conceived by the Swedish company MySQL AB, MySQL was acquired by Sun Microsystems in 2008 and then by Oracle when it bought Sun in 2010. Developers can use MySQL under the GNU General Public License (GPL), but enterprises must obtain a commercial license from Oracle.

Today, MySQL is the RDBMS behind many of the top websites in the world and countless corporate and consumer-facing web-based applications, including Facebook, Twitter and YouTube.

SQL uses the terms table, row, and column for relation, tuple, and attribute, respectively. The SQL commands for data definition are CREATE, ALTER and DROP.

#### **CREATE**

This command is used to create table or view by giving it a name and specifying its attributes and constraints. The attributes are specified first, and each attribute is given a name, a data type to specify its domain values, and any attribute constraints such as NOT NULL.

SYNTAX: CREATE TABLE <TNAME> (ATR1 TYP1 CONST1, ATR2 TYP2 CONST,…)

#### **ALTER**

The definition of a base table can be altered by ALTER command which is a Schema Evolution command. The possible ALTER TABLE include adding or dropping a column (attribute), changing a column definition, and adding or dropping table constraints.

Example: ALTER TABLE STUDENT ADD NAME VARCHAR (12)

#### **DROP**

If a whole schema is not needed any more, the DROP SCHEMA command can be used. There are two drip behaviour options: CASCADE and RESTRICT.

CASCADE option is used to remove the database schema and all its tables, domains and other elements.

If the RESTRICT option is chosen in place of CASCADE, the schema is dropped only it has no elements in it; otherwise, the DROP command will not be executed.

SYNTAX: DROP TABLE STUDENT CASCADE

### 3.2.1 Statements in SQL

Following are the important statements used in SQL.

* SELECT - Used to retrieve the information from the relation.
* INSERT - Used to insert the new values to the relation.
* DELETE - Used to delete one or more existing tuples from the relation.
* UPDATE - Used to update already existing values in the relation.

### Aggregate Functions in SQL

Following aggregate functions are provided by the SQL.

* COUNT - Returns number of tuples.
* SUM - Returns sum of entries in a column.
* MAX - Returns Maximum value from an entire column.
* MIN - Returns Minimum value from an entire column.
* AVG - Returns Average of all the entries in a column.

### Constraints in SQL

Following constraints are provided by the SQL.

* NOT NULL - Column should contain some value.
* PRIMARY KEY - Should not allow duplicate and null values to a column.
* UNIQUE - Each value of a column should be unique.

**3.3 PHP**

**PHP: Hypertext Pre-processor** (or simply **PHP**) is a general-purpose programming language originally designed for web development. It was originally created by [Rasmus Lerdorf](https://en.wikipedia.org/wiki/Rasmus_Lerdorf)  in 1994 the PHP reference implementation is now produced by The PHP Group.

PHP code may be executed with a command line interface (CLI), embedded into HTML code, or used in combination with various web template systems, web content management systems, and web frameworks. PHP code is usually processed by a PHP interpreter implemented as a module in a web server or as a Common Gateway Interface (CGI) executable.

The web server outputs the results of the interpreted and executed PHP code, which may be any type of data, such as generated HTML code or binary image data. PHP can be used for many programming tasks outside of the web context, such as standalone graphical applications and robotic drone control.

The standard PHP interpreter, powered by the Zend Engine, is free software released under the PHP License. PHP has been widely ported and can be deployed on most web servers on almost every operating system and platform, free of charge.

The PHP language evolved without a written formal specification or standard until 2014, with the original implementation acting as the de facto standard which other implementations aimed to follow. Since 2014, work has gone on to create a formal PHP specification.

* PHP can generate dynamic page content
* PHP can create, open, read, write, delete, and close files on the server
* PHP can collect form data
* PHP can send and receive cookies
* PHP can add, delete, modify data in your database
* PHP can be used to control user-access
* PHP can encrypt data

PHP is a server side scripting language that is embedded in HTML. It is used to manage dynamic content, databases, session tracking, even build entire e-commerce sites. It is integrated with a number of popular databases, including MySQL, PostgreSQL, Oracle, Sybase, Informix, and Microsoft SQL Server.

PHP supports a large number of major protocols such as POP3, IMAP, and LDAP. PHP4 added support for Java and distributed object architectures (COM and CORBA), making n-tier development a possibility for the first time.

* PHP is forgiving: PHP language tries to be as forgiving as possible.
* PHP Syntax is C-Like.