**ACROPOLIS INSITITUE OF TECHNOLOGY AND RESEARCH, INDORE**



**Subject : Database Management System (DBMS) – CY405**

**{ To study DBMS and RDBMS,**

**Introduction of SQL and**

**Different data types used in SQL }**

**Submitted By : Submitted To :**

**Aarti Pawar (0827CY221001) Mrs. Nidhi Nigam Ma’am**

**Index**

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| **1** | **To study DBMS and RDBMS, its characteristic comparisons and study of popular DB software** | **11/03/24** | **18/03/24** |  |
| **2** | **Introduction SQL-SQL lite and installation.** | **01/04/24** |  |  |
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**What is Database Management System ?**

Database Management Systems (DBMS) are software systems used to store, retrieve, and run queries on data. A DBMS serves as an interface between an end-user and a database, allowing users to create, read, update, and delete data in the database.

DBMS manage the data, the database engine, and the database schema, allowing for data to be manipulated or extracted by users and other programs. This helps provide data security, data integrity, concurrency, and uniform data administration procedures.

DBMS optimizes the organization of data by following a database schema design technique called normalization, which splits a large table into smaller tables when any of its attributes have redundancy in values. DBMS offer many benefits over traditional file systems, including flexibility and a more complex backup system.

**Types of Database Management System :**



### Distributed database management system

A distributed DBMS is a set of logically interrelated databases distributed over a network that is managed by a centralized database application. This type of DBMS synchronizes data periodically and ensures that any change to data is universally updated in the database.

### Hierarchical database management system

Hierarchical databases organize model data in a tree-like structure. Data storage is either a top-down or bottom-up format and is represented using a parent-child relationship.

### Network database management system

The network database model addresses the need for more complex relationships by allowing each child to have multiple parents. Entities are organized in a graph that can be accessed through several paths.

### Relational database management system

Relational database management systems (RDBMS) are the most popular data model because of its user-friendly interface. It is based on normalizing data in the rows and columns of the tables. This is a viable option when you need a data storage system that is scalable, flexible, and able to manage lots of information.

### Object-oriented database management system

Object-oriented models store data in objects instead of rows and columns. It is based on object-oriented programming (OOP) that allows objects to have members such as fields, properties, and methods.

## Graph Databases

Graph Databases are NoSQL databases and use a graph structure for semantic queries. The data is stored as nodes, edges, and properties. In a graph database, a Node represents an entity or instance. A node is equivalent to a record in a relational database system. An Edge in a graph database represents a relationship that connects nodes. Properties are additional information added to the nodes.

## NoSQL Databases

NoSQL databases do not use SQL as their primary data access language. A graph database, network database, object database, and document databases are common NoSQL databases

### What is MySQL?

### MySQL is an Oracle-backed open source [relational database](https://www.techtarget.com/searchdatamanagement/definition/relational-database) management system ([RDBMS](https://www.techtarget.com/searchdatamanagement/definition/RDBMS-relational-database-management-system)) based on Structured Query Language ([SQL](https://searchsqlserver.techtarget.com/definition/SQL)). MySQL runs on virtually all platforms, including [Linux](https://www.techtarget.com/searchdatacenter/definition/Linux-operating-system), [UNIX](https://www.techtarget.com/searchdatacenter/definition/Unix) and [Windows](https://www.techtarget.com/searchwindowsserver/definition/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 a database system used on the web**
* **MySQL is a database system that runs on a server**
* **MySQL is ideal for both small and large applications**
* **MySQL is very fast, reliable, and easy to use**
* **MySQL uses standard SQL**
* **MySQL compiles on a number of platforms**
* **MySQL is free to download and use**
* **MySQL is developed, distributed, and supported by Oracle Corporation**

### Advantages of MySQL

#### **· Free and Open Source**

Being free and open-source makes MySQL the first choice for startups and developers. MySQL is free so it makes it perfect for startups and medium-sized enterprises that prefer cost-cutting. MySQL provides almost all the features desired in any database server, so application consistency and performance is not compromised.

#### **· Large Community for Support**

Although MySQL is open source, it does not mean you are left all with yourself. A huge community online is always at your disposal for looking up solutions or finding the best way to do things.

#### **· High Performance, Scalability, Flexibility**

MySQL is considered one of the fastest databases available. Moreover, it also provides multi-threading to achieve more optimized performance. With the support of embedded applications, MySQL is suitable for varying use cases.

#### **· Platform Independency**

MySQL is platform-independent. So, if your application is running on Linux Server or Windows Server or any other operating systems (UNIX, OS/2), MySQL has you covered.

### Disadvantages of MySQL

#### **· Stability issues**

MySQL suffers from stability issues and tends to corrupt under certain use cases. While this complaint is not made in general, general complaints have been made about the corruption of data when auditing or making transactions.

#### **· Poor Performance in High Loads**

While MySQL is best for many use cases, for large enterprises having millions of records and transactions, MySQL is not suitable. The reason being for such high volumes MySQL does not provide adequate support for reading/write operations. For such scenarios, Oracle or SQL Server gains their share.

**Difference Between DBMS and RDBMS**

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| **DBMS** | **RDBMS** |
| Data is stored in a database management system (DBMS) as a file | Tables are used to store information |
| Data is stored in a database management system (DBMS) in either a navigational or hierarchical format | RDBMS employs a tabular format, with column names as headers and associated data as rows |
| Only a single user is supported by the DBMS | It may be used by numerous people |
| The data in a typical database may not be stored according to the ACID model  This can lead to database discrepancies | Relational databases are more difficult to create, but they are more consistent and organised  They follow the rules of ACID (Atomicity, Consistency, Isolation, Durability) |
| It is an application that is used to manage databases over computer networks as well as the system hard drives | The database systems are used to keep track of the relationships between the tables |
| Software and hardware requirements are minimal | Higher hardware and software requirements are required |
| The integrity constraints are not supported by DBMS  At the file level, the integrity constraints are not imposed | At the schema level, RDBMS provides integrity restrictions  Values outside of a certain range cannot be stored in the RDBMS column |
| Normalization is not supported by DBMS. | A relational database management system (RDBMS) can be normalised. |
| Distributed databases are not supported by DBMS | Distributed databases are supported by RBMS |
| The DBMS system is mostly used to manage tiny amounts of data | The RDBMS database is built to manage a vast volume of data |
| Dbms only meet seven of Dr E.F. Codd’s rules | Dbms meet 8 to 10 of Dr E.F. Codd’s rules |
| Client-server architecture is not supported by DBMS | Client-server architecture is supported by RDBMS |
| For complicated and vast amounts of data, data retrieval takes longer | Because of its relational methodology, data retrieval is quick |
| In this architecture, data redundancy is common | Data redundancy is not possible using keys and indexes |
| There is no correlation between the data | Data is kept in the form of tables that are linked together via foreign keys |
| There is no sense of safety | Multiple security levels are available. At the OS, command, and object levels, log files are produced |
| Individual data items must be accessed | SQL queries make it simple to retrieve data  At the same time, many data items can be accessed |
| A file system, XML, the Windows Registry, and other DBMS are examples | MySQL, Oracle, SQL Server, and other RDBMS are examples |

**Introduction to SQL**

## **What is SQL?**

Structured query language (SQL) is a programming language for storing and processing information in a relational database. A relational database stores information in tabular form, with rows and columns representing different data attributes and the various relationships between the data values. You can use SQL statements to store, update, remove, search, and retrieve information from the database. You can also use SQL to maintain and optimize database performance.

## **Why is SQL important?**

Structured query language (SQL) is a popular query language that is frequently used in all types of applications. Data analysts and developers learn and use SQL because it integrates well with different programming languages. For example, they can embed SQL queries with the Java programming language to build high-performing data processing applications with major SQL database systems such as Oracle or MS SQL Server. SQL is also fairly easy to learn as it uses common English keywords in its statements.

**What Is SQLite?**

SQLite is an embedded, server-less relational database management system. It is an in-memory open-source library with zero configuration and does not require any installation. Also, it is very convenient as it’s less than 500kb in size, which is significantly lesser than other database management systems.

**Why Use SQLite?**

* SQLite is an open-source software. The software does not require any license after installation.
* SQLite is serverless as it doesn't need a different server process or system to operate.
* SQLite facilitates you to work on multiple databases on the same session simultaneously, thus making it flexible.
* SQLite is a cross-platform DBMS that can run on all platforms, including macOS, Windows, etc.
* SQLite doesn't require any configuration. It needs no setup or administration.

**When to Use SQLite?**

* SQLite is used to develop embedded software for devices like televisions, cell phones, cameras, etc.
* It can manage low to medium-traffic HTTP requests.
* SQLite can change files into smaller size archives with lesser metadata.
* SQLite is used as a temporary dataset to get processed with some data within an application.
* Beginners use SQLite for learning and training purposes, as it requires no installation and configuration.