Experiment Title-1: Introduction To DBMS, RDBMS, ORACLE, Basic SQL Commands

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Semester: 3 **Date of Performance:**
Subject Name:DBMS lab **Subject Code:** *CSP 221*

1. Aim/Overview of the practical: Introduction To DBMS, RDBMS, ORACLE, Basic SQL Commands

2. Task to be done: Explain in Detail, DBMS, RDBMS,ORACLE and differentiate between them. Also elaborate basic SQL Commands

3. Apparatus (For applied/experimental sciences/materials based labs): NIL
4. Algorithm/Flowchart (For programming based labs)**:NIL**
5. Theme/Interests definition (For creative domains)**:NIL**
6. Steps for experiment/practical:NIL
7. Observations/Discussions (For applied/experimental sciences/materials based labs**):**

DBMS stands for Database Management System. It is a software for storing and retrieving users' data while considering appropriate security measures. It consists of a group of programs which manipulate the database. The DBMS accepts the request for data from an application and instructs the operating system to provide the specific data. In large systems, a DBMS helps users and other third-party software to store and retrieve data.

DBMS allows users to create their own databases as per their requirement. The term “DBMS” includes the user of the database and other application programs. It provides an interface between the data and the software application.

- **What is the need of DBMS?**

A **D**ata **B**ase **M**anagement **S**ystem is a system software for easy, efficient and reliable data processing and management. It can be used for:

- Creation of a database.
- Retrieval of information from the database.
- Updating the database.
- Managing a database.

It provides us with the many functionalities and is more advantageous than the traditional file system in many ways listed below:

1) Processing Queries and Object Management:
In traditional file systems, we cannot store data in the form of objects. In practical-world applications, data is stored in objects and not files. So in a file system, some application software maps the data stored in files to objects so that can be used further.
We can directly store data in the form of objects in a database management system. Application level code needs to be written to handle, store and scan through the data in a file system whereas a DBMS gives us the ability to query the database.

2) Controlling redundancy and inconsistency:
Redundancy refers to repeated instances of the same data. A database system provides redundancy control whereas in a file system, same data may be stored multiple times. For example, if a student is studying two different educational programs in the same college, say ,Engineering and History, then his information such as the phone number and address may be stored multiple times, once in Engineering dept and the other in History dept. Therefore, it increases time taken to access and store data. This may also lead to inconsistent data states in both places. A DBMS uses **data normalization** to avoid redundancy and duplicates.

3) Efficient memory management and indexing:
DBMS makes complex memory management easy to handle. In file systems, files are indexed in place of objects so query operations require entire file scans whereas in a DBMS , object indexing takes place efficiently through database schema based on any attribute of the data or a data-property. This helps in fast retrieval of data based on the indexed attribute.

4) Concurrency control and transaction management:
Several applications allow user to simultaneously access data. This may lead to inconsistency in data in case files are used. Consider two withdrawal transactions X and Y in which an amount of 100 and 200 is withdrawn from an account A initially containing 1000. Now since these transactions are taking place simultaneously, different transactions may update the account differently. X reads 1000, debits 100, updates the account A to 900, whereas Y also reads 1000, debits 200, updates A to 800. In both cases account A has wrong information. This results in data inconsistency. A DBMS provides mechanisms to deal with this kind of data inconsistency

while allowing users to access data concurrently. A DBMS implements ACID(atomicity, durability, isolation,consistency) properties to ensure efficient transaction management without data corruption.

5) Access Control and ease in accessing data:

A DBMS can grant access to various users and determine which part and how much of the data can they access from the database thus removing redundancy. Otherwise in file system, separate files have to be created for each user containing the amount of data that they can access. Moreover, if a user has to extract specific data, then he needs a code/application to process that task in case of file system, e.g. Suppose a manager needs a list of all employees having salary greater than X. Then we need to write business logic for the same in case data is stored in files. In case of DBMS, it provides easy access of data through queries, (e.g., **SELECT** queries) and whole logic need not be rewritten. Users can specify exactly what they want to extract out of the data.

6) Integrity constraints: Data stored in databases must satisfy integrity constraints. For example, Consider a database schema consisting of the various educational programs offered by a university such as(B.Tech/M.Tech/B.Sc/M.Sc/BCA/MCA) etc. Then we have a schema of students enrolled in these programs. A DBMS ensures that it is only out of one of the programs offered schema , that the student is enrolled in, i.e. Not anything out of the blue. Hence, database integrity is preserved

Purpose of Database Systems

Purpose of Database Management Systems

Organizations use large amounts of data. A **database management system** (DBMS) is a software tool that makes it possible to organize data in a database.

The standard acronym for database management system is **DBMS**, so you will often see this instead of the full name. The ultimate purpose of a database management system is to store and transform data into information to support making decisions.

A DBMS consists of the following three elements:

1. The **physical database**: the collection of files that contain the data
2. The **database engine**: the software that makes it possible to access and modify the contents of the database
3. The **database scheme**: the specification of the logical structure of the data stored in the database

- **RDBMS stands for relational database management system. A relational model can be represented as a table of rows and columns. A relational database has following major components:**

1. Table

2. Record or Tuple

3. Field or Column name or Attribute

4. Domain

5. Keys

1. Table:A table is a collection of data represented in rows and columns. Each table has a name in database. For example, the following table "STUDENT" stores the information of students in database.

Table: STUDENT

Id	Name	City	Age
1	Vishal	Mohali	20
2	Rishi	Chandigarth	21

2. Record or Tuple

Each row of a table is known as record. It is also known as tuple

Key plays an important role in relational database; it is used for identifying unique rows from table. It also establishes relationship among tables.

Types of keys in DBMS

Primary Key – A primary is a column or set of columns in a table that uniquely identifies tuples (rows) in that table.

Super Key – A super key is a set of one of more columns (attributes) to uniquely identify rows in a table.

Candidate Key – A super key with no redundant attribute is known as candidate key

Alternate Key – Out of all candidate keys, only one gets selected as primary key, remaining keys are known as alternate or secondary keys.

Composite Key – A key that consists of more than one attribute to uniquely identify rows (also known as records & tuples) in a table is called composite key.

Foreign Key – Foreign keys are the columns of a table that points to the primary key of another table. They act as a cross-reference between tables.

- **ORACLE**

An Oracle database is a collection of data treated as a unit. The purpose of a database is to store and retrieve related information. A database server is the key to solving the problems of information management. In general, a server reliably manages a large amount of data in a multiuser environment so that many users can concurrently access the same data. All this is accomplished while delivering high performance. A database server also prevents unauthorized access and provides efficient solutions for failure recovery.

Oracle Database is the first database designed for enterprise grid computing, the most flexible and cost effective way to manage information and applications. Enterprise grid computing creates large pools of industry-standard, modular storage and servers. With this architecture, each new system can be rapidly provisioned from the pool of components. There is no need for peak workloads, because capacity can be easily added or reallocated from the resource pools as needed.

- **What is SQL?**

1. SQL stands for Structured Query Language, which is a standardised language for interacting with RDBMS (Relational Database Management System). Some of the popular relational database example are: MySQL, Oracle, mariaDB, postgreSQL etc.

2. SQL is used to perform C.R.U.D (Create, Retrieve, Update & Delete) operations on relational databases.

3. SQL can also perform administrative tasks on database such as database security, backup, user management etc.

4. We can create databases and tables inside database using SQL.

- **Types of command in Structured Query Language(SQL)**

1 DQL (Data Query Language)

DQL is used to fetch the information from the database which is already stored there.

2 DDL (Data Definition Language)

DDL is used to define table schemas.

3 DCL (Data Control Language)

DCL is used for user & permission management. It controls the access to the database.

4 DML (Data Manipulation Language)

DML is used for inserting, updating and deleting data from the database.

- **Difference:**

DBMS	RDBMS	ORACLE
DBMS has to provide some uniform methods to access the stored information.	RDBMS system supports a tabular structure of the data and a relationship between them to access the stored information.	Oracle Database is the first database designed for enterprise grid computing, the most flexible and cost effective way to manage information and applications.
DBMS does not support distributed database.	RDBMS supports distribute database.	ORACLE is a platform where we can create database. We can do definition, manipulation as well as control the records of a particular database.
DBMS is meant to be for small organization and deal with small data. As it supports single user.	RDBMS is designed to handle large amount of data as it supports multiple users.	Oracle can store large amount of data and can supports multi users.
Example: Xml etc.	Example; MySQL, SQL Server, Oracle etc.	Oracle is a popular and widely used example of RDBMS.

8. Percentage error (if any or applicable):NIL

9. Calculations/ Chemical Reactions / Theorems /Formulas used etc :NIL

10. Result/Output/Writing Summary:NIL

11. Graphs (If any): Image/Soft copy of graph paper to be attached here:NIL

Learning outcomes (What I have learnt):

1. Learned about the DBMS and RDBMS.
2. Learned how to use these SQL commands on Oracle.
3. Learned how to create the records on database.
4. Learned how to create the records on database.

Evaluation Grid (To be created as per the SOP and Assessment guidelines by the faculty):

Sr. No.	Parameters	Marks Obtained	Maximum Marks
1.			
2.			
3.			