Date :

"PRACTICAL - 01"

AIM :

Study of open source Relational database : MYSQL / Oracle and design and develop SQL DDL statements which demonstrates the use of SQL objects such as table.

OBJECTIVE :

Study of MYSQL open source database.

PRE-REQUISITE :

Basic database concept.

THEORY :

- What is DBMS?
  Database Management System is a collection of interrelated data and set of program to access data.

- How DBMS works ?
  It is an asortment of program and application used to manage the database. Various users extract and manipulated data for different business and personal requirement. It might be used by an administrator who limits access to users.

- DBMS types :

[1] Heirarchical database
[2] Network database
[3] Relational database
[4] NOSQL database
[5] Object - oriented database.

- RDBMS :

A RDBMS is a type of database management system that stores data in a row - based table structure. A RDBMS is a program used to create, update and manage relational database. Some of most well known RDBMS include MYSQL, oracle database.

- MYSQL :

It is a powerful open - source database management system that is widely used for storing and organizing choice for web applications, business data and other type of data.

- Characteristics of MYSQL :

1] Relational DBMS
2] It is secure
3] It is scalable
4] client / server architecture
5] speed.

- Advantages of MYSQL :

1] open - source
2] Data security
3] Higher efficiency
4] scalability on demand
5] 24 X 7 server uptime.

- DDL command line in SQL :

[1] CREATE :

It is a DDL command used to create database, tables, triggers and other database objects.

[2] DROP :

It is used to delete / remove the database object from SQL database. We can remove the entire table.

[3] ALTER :

Command ALTER changes or modifies the existing structure of database and changes the schema of database.

[4] TRUNCATE :

It is used to delete the data inside a table but not table itself. It deletes and removes all records from the table.

[5] RENAME :

It is used to change the name of database table.

- MYSQL view :

A view is a database object that has no value. Its contents are based on base table. It contains rows and columns similar to real table. In MYSQL the view is virtual table created by query joining one or more tables. It is operated similarly to base tables but does not contain any data of its own.

Syntax -

```
1. CREATE VIEW view_name AS
2. SELECT column
3. FROM tables
4. [WHERE CONDITIONS ] ;
```

Example -

```
CREATE VIEW trainer AS
SELECT course_name , trainer
FROM course ;
```

- Index in MYSQL :

An index is data structure that allows us to add indexes in table. It enables you to improve the faster retrieval of records on database table. It creates an entry for each value of indexed columns. We use it to quickly find the record without searching each values of indexed column.

MYSQL CREATE INDEX statement -

```
mysql > CREATE TABLE t_index (
1. col1 INT PRIMARY KEY ,
2. col2 INT NOT NULL ,
3. col3 INT NOT NULL ,
4. col VARCHAR (20) ,
5. INDEX (col2 , col3 )
6. ) ;
```

If we want to add index in table, we will use CREATE INDEX statements as follows :

1. mysql > CREATE INDEX ind_1 ON t_index (col);

CONCLUSION :

In this practical we learned about all basic concepts of DBMS, its advantages and also learned about database software [MYSQL software], characteristics, advantages, applications and DDL commands for database creation.

P(3)	V(4)	A(3)	TOTAL	SIGN

Date :

"PRACTICAL - 02"

AIM :

Design atleast 10 SQL queries for suitable database application using SQL DML statements : Insert , select , update , delete with operators , functions and set operator , all type of joins , sub - query and view.

OBJECTIVE :

Study of MYSQL open source database to study DML queries . To study set operators.

THEORY :

- [1] DML -

Data manipulation capabilities of DML allows one to retrieve contents of database . DML can be used for the following operations :

1. Insert 2. Update 3. Delete . 4. select

[1.1.] INSERT :

To insert data into MYSQL table , we need to use SQL INSERT into commands . We can insert data into MYSQL table using MYSQL > prompt.

1] Specify all column names :
INSERT INTO table_name (col 1 , col 2 ....) VALUES
(val 1 , val 2 , ...) ;

2] Specify column :
INSERT INTO table_name (col1 , col 2 ....) VALUES
(val 1 , val 2 ...) ;

[1.2.] UPDATE :
There may be a requirement where existing in a data of MYSQL table need to be modified . We can do so by : SQL UPDATE .

1] To update all rows :
UPDATE table_name SET attribute = value ;

2] To update specific row :
UPDATE table_name SET attribute = value
WHERE search_condition ;

[1.3.] DELETE :
If we want to delete a record from any MYSQL table then we can use SQL command DELETE FROM .

1] To delete all rows :
DELETE FROM table_name ;

2] To delete specific rows :
DELETE FROM table_name
WHERE search_condition ;

[1.4] SELECT :

The SQL SELECT command is used to fetch data from MYSQL database.

1] To select all rows :

```
SELECT * FROM table_name ;
```

2] To select values for specific columns :

```
SELECT col1, col2 FROM table_name ;
```

3] To select distinct values :

```
SELECT DISTINCT col_name FROM table_name ;
```

4] To select rows with search condition :

```
SELECT * FROM table_name WHERE search_condition ;
```

[2] OPERATORS AND SET OPERATORS :

What is SQL operator ?

The operators are symbol that are used to perform operations with values. These operators are used with SQL clause such as SELECT, WHERE, ON etc.

Types of operators :

a] Arithmetic operators -

A comparison operator is a mathematical symbol used to compare two values.

Sr.	operators	Description	Query	Output
1	+	Addition	6+2	8
2	-	Subtraction	6-8	4
3	*	Multiplication	6*2	12
4	/	Division	6/2	3

- SET operators in SQL

Operators	Meaning	Expression	Value
>	is greater	6>4	True
>=	greater than equal	7>=6	True
<	is less than	9<8	True
<=	less than equal	5<=5	True
==	is equal to	3==3	True
!=	not equal to	3!=3	False

- Types of joins

1] SQL Joins -

Syntax :

```
SELECT
column_from_both_tables
FROM
table 1
JOIN
table 2
```

Customer_id	first_name
1	John
2	Robert
3	David
4	John
5	Betty

order_id	amount	customer
1	200	10
2	500	3
3	300	6
4	800	5
5	150	8

customer_id	first_name	amount
3	David	500
5	Betty	800

ON table 1 , column 1
table 2 , column 2

Example :

```
SELECT customers , customer_id , customer first_name ,
orders . item
FROM
Customers
JOIN
Orders
```

Types of SQL Joins –
INNER Join , LEFT Join , RIGHT Join , FULL OUTER Join

– VIEW :

Views in SQL are considered as virtual table . A view also contains rows and columns . To create view we can select the fields from one or more tables.

• Advantages of view –

1] Complexity :
Views help to reduce complexity different views can be created on same base table.

2] Security :
It increase the security by excluding the sensitive information from view.

3] Query simplicity :
It helps to simplify commands from user . A view can draw data from several tables and present it.

4] Consistency :
A view can present a consistent, unchanged image of structure of database. Views can be used to rename the columns without affecting table.

5] Storage capacity :
Views take very little space to store the data.

- Disadvantage of view –
We cannot insert if the base table has many not null column that do not appear in view. You can not INSERT or UPDATE if any of the column INSERT reference in the group function or column defined by expression.

CONCLUSION :
We have successfully studied different operators, DML statements, joins and view in SQL.

P(3)	V(4)	A(3)	TOTAL	SIGN

"PRACTICAL - 04"

AIM :

Write a PL/SQL block to create cursor to copy the contents of one table into another. Avoid redundancy.

PROBLEM STATEMENT :

Cursor : [All types : Implicit, Explicit, Cursor FOR loop, Parameterized cursor]. Write a PL/SQL block of code using using parameterized cursor that will merge the data available in the newly created table N-RollCall with the data available in the table O-RollCall. If the data in the first table already exist in the second table then the data should be skipped.

OBJECTIVE :

1. To learn and understand PL/SQL in Oracle
2. To learn and understand cursors.

HARDWARE REQUIREMENTS :

- Any CPU with Pentium Processor or similar, 256 MB
- RAM or more, 1 GB Hard disk or more.

SOFTWARE REQUIREMENTS :

Windows 7 operating system, Oracle 11g, SQL Developer

THEORY :

Oracle creates a memory area known as the context area for processing an SQL statement which contains all the information needed for processing the statement ; for example : the number of rows processed, etc.

A cursor pointer to this context area. PL/SQL controls the context area through a cursor. A cursor holds the rows [one or more] returned by an SQL statement. The set of rows the cursor holds is reffered to as the active set.

Implicit cursors :

Implicit cursors are automatically created by Oracle whenever an SQL statement is executed when there is no explicit cursor for the statement. Programmers cannot control the implicit cursors and the information in it.

whenever a DML statement [INSERT, UPDATE, DELETE] is issued, an implicit cursor is associate with this statement. For INSERT operations, the cursor holds the data that needs to be inserted. For UPDATE and DELETE operations, the cursor identifies the rows that would be affected.

SQL cursor has attributes such as %FOUND, %ISOPEN, %NOTFOUND and %ROWCOUNT. The SQL cursor has additional attributes %BULK_ROWCOUNT and %BULK_EXCEPTIONS.

Date :

Sr.	Attribute and Description
1.	%FOUND Returns TRUE if an INSERT, UPDATE or DELETE affect one or more rows of a SELECT INTO statement.
2.	%NOTFOUND The logical opposite of %FOUND. Returns TRUE if an INSERT, UPDATE, DELETE statement affect no rows.
3.	%ISOPEN Always returns FALSE for implicit cursors, because Oracle closes the SQL cursor automatically after executing its associated SQL statement.
4.	%ROWCOUNT Returns the number of rows affected by INSERT, UPDATE and DELETE.

Explicit cursor

An explicit cursor should be defined in the declaration section of the SQL/PL block. It is created on a SELECT statement which returns more than one row.

The syntax for creating and explicit cursor is -
CURSOR cursor_name IS select_statement ;

- Declaring the cursor
Declaring the cursor defines the cursor with a name and the associated SELECT statement.
For example -
CURSOR c_customers IS
SELECT id, name, address FROM customers ;

- Opening the cursor
opening the cursor allocates the memory for the cursor and makes it ready for fetching the rows returned by the SQL statement. For example to open the above defined cursor -
OPEN c_customers ;

- Fetching the cursor
We will fetch rows from the above opened cursors as follows -
FETCH c_customers INTO c_id, c_name, c_addr ;

- Closing the cursor
To close the above opened cursor - CLOSE c_customers ;

CONCLUSION :
Thus we have successfully implemented PL/SQL block to retrieve fine for issued library book by reading borrower information from the database.

[3]	[3]	[4]	TOTAL	SIGN

 Date :

"PRACTICAL NO. 5"

AIM :

To study and implement PL/SQL programming along with Procedures and Functions.

PROBLEM STATEMENT :

PL/SQL Stored Procedure and stored function
Write a stored procedure namely proc_grade for categorization. If marks scored <= 1500 and marks >= 990 then student will be placed in distinction. If marks scored are between 989 and 900 category is first class, 899 and 825 is higher second class. Write PL/SQL block for using procedure created with above requirement.

HARDWARE REQUIREMENTS :

- Any CPU with Pentium Processor or similar, 256 MB.
- RAM or more, 1 GB hard disk or more.

SOFTWARE REQUIREMENTS :

- Windows 7 operating system, Oracle 11g, SQL developer.

THEORY :

PL/SQL [Procedural Language / Structured Query Language]
It is oracle corporation's proprietary procedural extension to the SQL database language, used in oracle database.

Some other database management systems offer similar extension to the oracle database. PL/SQL syntax strongly resembles that of Ada and just like some Ada compilers of the 1980's, the PL/SQL runtime system uses Diana as intermediate representation.

- Basic code structure in PL/SQL

```
DECLARE
TYPE / item / FUNCTION / PROCEDURE declarations
BEGIN
Statements
EXCEPTION
EXCEPTION handlers
END;
```

The DECLARE and EXCEPTIONS sections are optional.

- Simple example :

```
DECLARE
number1 int ;
number2 int := 17 ; -- value default
text1 varchar(12) := 'Hello World' ;
BEGIN
SELECT street_number
INTO number1
FROM address
WHERE name = 'Xyz' ;
END ;
```

FUNCTIONS :
Functions in PL/SQL are a collection of SQL and PL/SQL statements that perform a task and sould return a value to the calling environment.

SYNTAX :
CREATE FUNCTION < function_name > RETURN return_type
< IS/AS >
BEGIN
[declaration block]
< PL/SQL block WITH RETURN statement >
EXCEPTION
END ;

PROCEDURES
Procedures are the same as functions , in that they are also used to perform some task with the difference being that procedures cannot be used in a SQL statement and they can have multiple out parameters they do not return a value.

SYNTAX :
CREATE PROCEDURE < procedure_name >
BEGIN
[declaration block]

<PL/SQL block statements>
[EXCEPTION
EXCEPTION block]
END;

CONCLUSION :
Thus we successfully implemented procedures and functions in PL/SQL.

[3]	[4]	[3]	TOTAL	SIGN

"PRACTICAL NO. 6"

AIM :

Write a PL/SQL block to create trigger on library table to keep track of updation and deletion of records.

PROBLEM STATEMENT :

Database triggers on library table. The system should keep track of the records that are being updated or deleted. The old value of updated or deleted records should be added in Library_Audit table.

OBJECTIVE :

1. To learn and understand PL/SQL in Oracle.
2. To learn and understand triggers.

HARDWARE REQUIREMENTS :

- Any CPU with Pentium Processors or similar, 256 MB
- RAM or more, 1 GB Hard disk or more.

SOFTWARE REQUIREMENTS :

Windows 7 operating system, Oracle 11g, SQL developer

THEORY :

Triggers are stored programs, which are automatically executed or fired when some event occur. Triggers are,

in fact, written to be executed in response to any of the following events -
- A Database manipulation [DML] statement
- A Database definition [DDL] statement
- A Database operation [SERVERERROR, LOGON, LOGOFF]

Triggers can be defined on the table, view, schema or database with which the event is associated.

- Benefits of triggers -
  - Generating some derived column values automatically.
  - Enforcing referential integrity.
  - Event logging and storing information on table access
  - Auditing
  - Synchronous replication of tables.
  - Imposing security authorizations
  - Preventing invalid transactions.

- Types of PL/SQL triggers -

There are two types of triggers based on the which level it is triggered :-

1] Row level trigger - An event is triggered for each row updated, inserted or deleted.

2] Statement level trigger - An event is triggered for each SQL statement executed.

- CREATING TRIGGERS

The syntax for creating trigger is :

```
CREATE [OR REPLACE] TRIGGER trigger-name
{BEFORE | AFTER | INSTEAD OF }
{INSERT [OR] | UPDATE [OR] | DELETE }
[OF col_name]
ON table_name
[REFERENCING OLD AS o NEW AS n ]
[FOR EACH ROW]
WHEN (condition)
DECLARE
    Declaration - statements
BEGIN
    Executable - statements
EXCEPTION
    Exception - handling - statements
END ;
```

- Triggering a trigger

Let us perform some DML operations on CUSTOMERS table.
To create a new record in the table -

```
INSERT INTO CUSTOMERS (ID, NAME, AGE, ADDRESS, SALARY)
VALUES (7, 'Kriti', 22, 'HP', 75000);
```

When a record is created in the CUSTOMERS table, the above create trigger, display_salary_changes will be fired and it will display result.

- Trigger for library updation and deletion :

```
CREATE OR REPLACE TRIGGER BOOKS_AUDIT
BEFORE DELETE OR UPDATE ON library
REFERENCING OLD AS OLD AND NEW AS NEW
FOR EACH ROW
BEGIN
INSERT INTO library_audit
VALUES
( :old.id,
  :old.book,
  :old.author,
    sysdate );
END ;
```

CONCLUSION :

Thus we have successfully implemented trigger to keep track of update and delete operation performed on library table.

[3]	[4]	[3]	TOTAL	SIGN

"PRACTICAL NO. 7"

AIM :

Install and implement MongoDB and study CRUD operation.

PROBLEM STATEMENT :

Study of open source NOSQL Database : Mongo DB [Installation, basic CRUD operations, Execution]

OBJECTIVE :

1. To learn and understand NOSQL database.
2. To execute CRUD operations on MongoDB.

HARDWARE REQUIREMENTS :

- Any CPU with Pentium Processor or similar, 256 MB.
- RAM or more, 1GB Hard disk or more.

SOFTWARE REQUIREMENTS :

Ubuntu 14.04, MongoDB Packages

THEORY :

MongoDB is a free and open-source NoSQL document database used commonly in modern web application. MongoDB works on concept of collection and document.

Collection :
Collection is a group of MongoDB documents. It is the equivalent of an RDBMS table. A collection exists within a single database. Collection do not enforce a schema.

Document :
A document is a set of key-value pair. Documents have dynamic schema. Dynamic shema means that documents in the same collection don't need to have the same set of fields or structure.

CRUD operations :
CRUD operations create, read, update, delete documents. These operations are considered to be the four basic functionalities of a repository. CRUD operations can be mapped directly to database operations :-
- Create matches insert
- Read matches select
- Update matches update
- Delete matches delete.

- CREATE operation -
Create or insert operations add new documents to a collection. If the collection does not currently exist, insert operations will create the collection.
Syntax -
db.collection.insert()
<document or array of documents>,
{ writeConcern : <document>,
ordered : <boolean>
} }

Date :

- READ operations -

READ operations retrieves documents from a collection i.e. queries a collection for documents. MongoDB provides the following methods to read documents from a collection:

- db.collection.find()

The find() method with no parameters returns all documents from a collection and returns all fields for the documents.

For example - Returning all documents in bios collection.

- db.bios.find()

- UPDATE operations -

The update() method updates the values in the existing document.

Syntax -

>db.COLLECTION_NAME update (SELECTION_CRITERIA, UPDATED_DATA)

- DELETE operations -

The remove() method is used to remove a document from the collection. remove() method accepts two parameters. One is deletion criteria and second is justOne flag.

- deletion criteria - (optional) deletion criteria according to documents will be removed.
- justOne - (optional) if set to true or 1, then remove only one document.

syntax -
>db.COLLECTION_NAME.remove(DELETION_CRITERIA)

Remove only one -
If there are multiple records and you want to delete only the first record, then set justOne parameter in remove() method.
>db.COLLECTION_NAME.remove(DELETION_CRITERIA, 1)

Remove All documents -
If you don't specify deletion criteria then MongoDB will delete whole documents from the collection. This is equivalent of SQL's truncate command.

CONCLUSION :
We successfully learned to install and studied MongoDB and implemented CRUD operations.

[3]	[4]	[3]	TOTAL	SIGN