A.Y. 2020-2021
Class: SE-ITA/B, Semester: III

Subject: **Structured Query Lab**

Experiment – 7: Implement Procedures and Cursors on the chosen system.

1. **Aim:** To Implement Procedures and Cursors on the chosen system.
2. **Objective:**
   - After performing the experiment, the students will be able to formulate and use procedures to manipulate database and retrieve data
   - Use cursors on the database

3. **Outcome:** L303.4: To Write queries in SQL to retrieve any type of information from a database.

4. **Prerequisite:** Understanding of Procedures and Cursors with terminologies along with sample syntax.

5. **Requirements:** PC, Oracle 11g/SQL Server 2008 R2, Microsoft Word, Internet, MySQL

6. **Pre-Experiment Exercise:**
   Brief Theory :(To be hand written)
   1. Explain what are Procedures.
   2. What are cursors?
   3. Types of cursors and their attributes.

7. **Laboratory Exercise**
   A. Procedure:
   i) Open SQL server 2008 using below login credentials:
   Username: sa, Password: Lab301a
   ii) Use existing database created by you or
   iii) Construct your own database
   iv) Construct tables for any two to three entities from your chosen case study v) Insert at least 8 to 10 records for each tables

   PROCEDURES(Follow Additional attached file) for reference

```
CURSORS:
Declare
Cursor c1 is select ename from emp where deptno=10; Z c1%type;
Begin
Open c1;
Fetch c1 into z; While(c1%found) loop Dbms_output.put_line(z.ename); End  loop;
Close c1;
End;
```

   vi)Write/Print output for each query

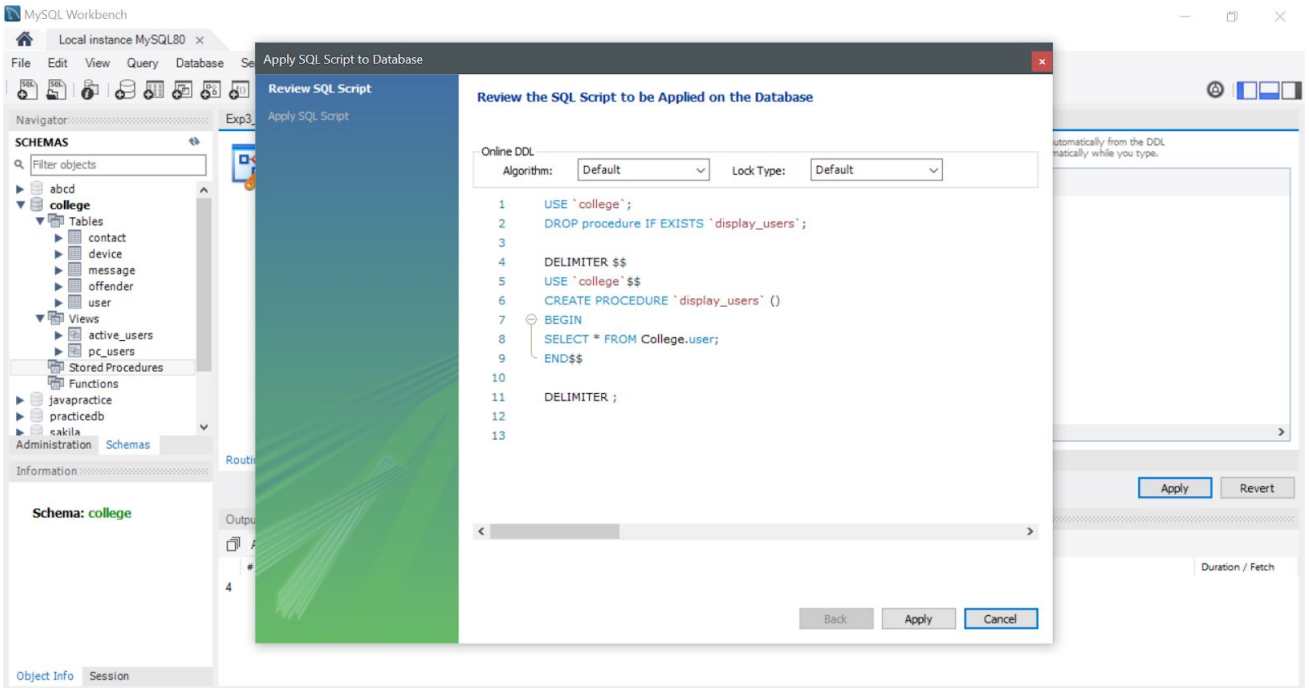
B. **Result/Observation/Program code:** Attach all queries executed code with proper output

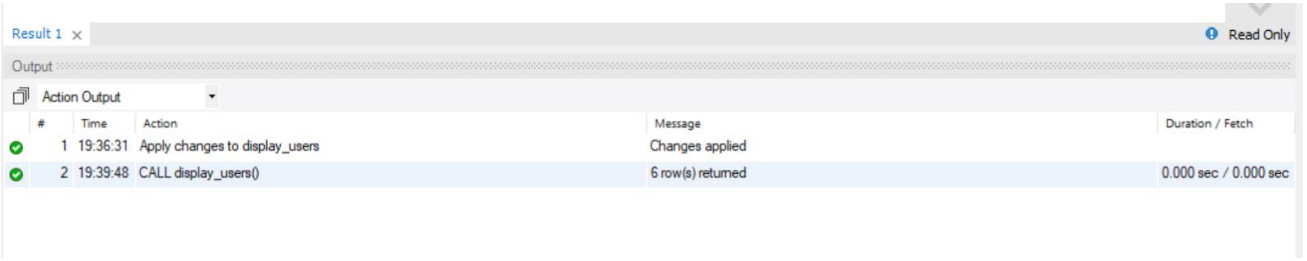
```
CREATE DEFINER=`root`@`localhost` PROCEDURE `display_users`()
BEGIN
SELECT * FROM College.user;
END

CALL display_users();

CREATE DEFINER=`root`@`localhost` PROCEDURE `device_cursor`()
BEGIN
DECLARE a VARCHAR(20);
DECLARE b VARCHAR(15);
DECLARE c1 cursor for SELECT device_id, device_type FROM device;
OPEN c1;
FETCH c1 INTO a,b;
SELECT a,b;
CLOSE c1;
END

CALL display_users();
```





MySQL 8.0 Command Line Client

```
mysql> use College;
Database changed
mysql> select * from device;
+-----------+----------------+---------+
| device_id | device_type    | user_id |
+-----------+----------------+---------+
| AXA1234   | Mobile-Android | user_1  |
| BAS1245   | PC-Windows     | user_1  |
| LSQ6432   | PC-MacOS       | user_5  |
| M63A43B   | Mobile-IOS     | user_2  |
| MCB2345   | PC-Ubuntu      | user_4  |
| WCL1454   | PC-Windows     | user_3  |
| XMP3464   | Mobile-iPadOS  | user_2  |
+-----------+----------------+---------+
7 rows in set (0.01 sec)

mysql> delimiter //
mysql> create procedure device_cursor()
    -> begin
    -> declare a varchar(20);
    -> declare b varchar(15);
    -> declare c1 cursor for select device_id, device_type from device;
    -> open c1;
    -> fetch c1 into a,b;
    -> select a,b;
    -> close c1;
    -> end; //
Query OK, 0 rows affected (0.03 sec)

mysql> delimiter ;
mysql> call device_cursor();
+---------+----------------+
| a       | b              |
+---------+----------------+
| AXA1234 | Mobile-Android |
+---------+----------------+
1 row in set (0.01 sec)

Query OK, 0 rows affected (0.02 sec)
```

8. Post Experimental Exercise

A. Questions:

1. What are the steps in using an explicit cursor?
2. What are the differences between procedures and cursors in SQL?

B. Conclusion:

1. Write what was performed in the experiment
2. Mention a few applications of what was studied.
3. Write the significance of the studied topic

C. References:

[1] Elmasri and Navathe, “Fundamentals of Database Systems”, 5th Edition, PEARSON Education.

[2] Korth, Silberchatz, Sudarshan, “Database System Concepts”, 6th Edition, McGraw – Hill

[3] https://www.w3schools.com/sql/sql_default.asp

Page No :
Date :

Yash Mahajan SE IT B 04

6 Pre-Experiment Exercise :-

Brief Theory :-

Q.1 Explain what are procedures.

A stored procedure is named as PL/SQL block that can take arguements and procedure some output once it has been called. Procedures are just text objects and do not store any data.
Procedures provide access to data and returns data sets, just like views. In SQL server stored procedures perform operations in the database and can return a status value to an application or a batch calling procedure.

General syntax of procedure is.

```
CREATE PROCEDURE procedure_name
([{[IN | OUT | INOUT] [parameter_name]
  datatype [AS LOCATOR] [RESULT]})

[RETURNS datatype [AS LOCATOR]
LANGUAGE
BEGIN
Codeblock
END.
```

Yash Mahajan SE IT B 04

Eg:-

```
CREATE PROCEDURE selectAll ()
begin
    SELECT * FROM Customers ;
end ;
```

2. What are Cursors?

Cursor is a temporary memory management work station. It is allocated by Database server at the time of performing DML operations on table by user. Cursors are used to store database tables. There are 2 types of cursors. Implicit Cursors and Explicit Cursors.

3. Types of cursors and their attributes :-

There are two type of cursors :-

1) Implicit cursor.

whenever DML operations such as INSERT, UPDATE and DELETE are processed in the database, implicit cursors are generated automatically and used by the framework. These type of cursors are used for internal processing and can't be used or offered from other code area. Implicit cursors in SQL just hold the affected rows by operations and can only refer to the most recent cursor.

Page No :
Date :

Yash Mahajan SE IT B 04

Explicit Cursors :-

This type of cursor is generated whenever data is processed by a user through SQL block. Generally, the use of the SELECT query triggers the creation of an explicit cursor and can hold more than one row but the process just one at a time. This type of Cursor is used to hold the records present in a column. This allows the programmers to create a named context area for executing their DML operations for better control.

Attributes of cursor :-

Attribute	Description
%Found	It will return True in case an INSERT, UPDATE, or DELETE statement affects one or more rows or a SELECT INTO statement returns one or more rows. In other cases, it will returns false.
%NOTFOUND	It ~~is~~ will return false in case an INSERT, UPDATE or DELETE statements affects one or more rows or a SELECT INTO statement returns one or more rows. In other cases it will return true.

Attitude

Yash Mahajan SE IT B04

%ISOPEN	This attributes will always return false for implicit SQL cursors as they are automatically closed immediately after the associated SQL statement is executed.
%ROWCOUNT	It returns the total number of affected rows by an insert, update, delete statement, or the rows returned by a SELECT INTO STATEMENT.

Yash Mahajan SE IT B 04

8. Post Experiment

A. Questions :-

1. What are the steps in using an explicit cursor?

Following are the steps in using a cursor :-

1. Declare.

```
Declare CursorName Cursor
For selectStatement ;
```

This will specify the name of the cursor and the SELECT statement will define the result.

2. Open

```
Open cursorName;
```

This will open and populate the cursor by executing it.

3. Fetch

```
Fetch next from cursor INTO variableList;
```

This will retrieve a row from the cursor and store it in one or more variables.

Yash M Mahajan SE IT B 04

4. Close
Close cursorName;
This step will help you in closing the cursor after the operations have been completed.

5. Deallocate
Deallocate cursorName;
This step will help in deallocating the cursor and freeing up the memory space.

2. What are the differences between procedures and cursors in SQL?
- A function or procedure is set of instructions to perform some operations.
Stored procedure is set of SQL statements that are precompiled and execute a bulk of statements.
A cursor is an array that can store the result of a select query
Cursors are executed row by row
They can be a part of a dynamic query or be a part of a procedure.

Page No :
Date :

Yash Mahajan SE IT B 64

B) Conclusion :-

In this experiment we have studied and implemented cursors and stored procedures on our database. These help us to avoid executing long queries repetatively.

A database cursor is an object that enables us to traverse over the rows of a result set and process individual result. whereas a stored procedure is a piece of code saved in our database that can be used repetatively instead of having to enter entire query.

If a particular operation needs to be performed over and over many times we can just call a procedure that is predefined to execute the same operations thus saving time. Cursors in SQL form an integral part of any database which basically helps a user in traversing a database without much hassle.