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DATA DEFINITION LANGUAGE COMMANDS

EX NO: 01
DATE:

AIM

To study the various DDL commands and implement them on the database.

COMMANDS

```
SQL> create table stud (sname varchar2(30), sid varchar2(10), sage number(2), sarea
varchar2(20));

Table created.

SQL> desc stud;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 SNAME                                               VARCHAR2(30)
 SID                                                VARCHAR2(10)
 SAGE                                               NUMBER(2)
 SAREA                                              VARCHAR2(20)

SQL>alter table stud modify ( sage number(10));

Table altered.


SQL> alter table stud add ( sdept varchar2(20));

Table altered.

SQL> desc stud;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 SNAME                                               VARCHAR2(30)
 SID                                                VARCHAR2(10)
 SAGE                                               NUMBER(10)
 SAREA                                              VARCHAR2(20)
 SDEPT                                              VARCHAR2(20)

SQL> alter table stud drop ( sdept varchar2(20));

Table altered.
```

```
SQL> desc studs;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 SNAME                                               VARCHAR2(30)
 SID                                                VARCHAR2(10)
 SAGE                                               NUMBER(10)
 SAREA                                              VARCHAR2(20)

SQL> truncate table studs;

Table truncated.

SQL> desc studs;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 SNAME                                               VARCHAR2(30)
 SID                                                VARCHAR2(10)
 SAGE                                               NUMBER(10)
 SAREA                                              VARCHAR2(20)
 SDEPT                                              VARCHAR2(20)

SQL> drop table studs;

Table dropped.
```

RESULT

Thus the DDL commands were implemented and the output was verified.

DATA MANIPULATION LANGUAGE COMMANDS

EX NO:02
DATE:

AIM

To study the various categories of DML commands such as logical operations, aggregate functions, string functions, numeric functions, date functions, conversion functions and group functions, set operations, join operations and nested queries..

DESCRIPTION

THE ORACLE TABLE – DUAL

Dual is a small oracle table which consists of only one row and one column and contains the value X in that column.

INSERT

This command is used to insert values into the table.

SELECT

This command is used to display the contents of the table or those of a particular column.

RENAME

This command renames the name of the table.

ARITHMETIC OPERATIONS

Various operations such as addition, multiplication, subtraction and division can be performed using the numbers available in the table.

DISTINCT

This keyword is used along with select keyword to display unique values from the specified column. It avoids duplicates during display.

ORDER BY CLAUSE

The order by clause arranges the contents of the table in ascending order (by default) or in descending order (if specified explicitly) according to the specified column.

CONCATENATION OPERATOR

This combines information from two or more columns in a sentence according to the format specified.

LOGICAL OPERATORS

- AND : The oracle engine will process all rows in a table and displays the result only when all of the conditions specified using the AND operator are specified.
- OR : The oracle engine will process all rows in a table and displays the result only when any of the conditions specified using the OR operators are satisfied.
- NOT : The oracle engine will process all rows in a table and displays the result only when none of the conditions specified using the NOT operator are specified.
- BETWEEN : In order to select data that is within a range of values, the between operator is used. (AND should be included)

PATTERN MATCH

- LIKE PREDICATE : The use of like predicate is that it allows the comparison of one string value with another string value, which is not identical. This is achieved by using wildcard characters which are % and _. The purpose of % is that it matches any string and _ matches any single character.

- IN AND NOT IN PREDICATE : The arithmetic operator = compares a single value to another single value. In case a value needs to be compared to a list of values then the in predicate is used.The not in predicate is the opposite of the in predicate. This will select all the rows whose values do not match all of the values in the list.

NUMERIC FUNCTIONS

- ABS: It returns the absolute value of 'n'.
- POWER: It returns m raised to nth power. n must be an integer else an error is returned.
- ROUND: It returns n rounded to m places right of the decimal point. If m is omitted, n is rounded to zero places. m must be an integer.
- SQRT: It returns square root of n. n should be greater than zero.

STRING FUNCTIONS

- LOWER: It returns char with letters in lower case.
- INITCAP: It returns char with the first letter in upper case.
- UPPER: It returns char with all letters forced to upper case.
- SUBSTR: It returns a portion of char beginning at character m, exceeding up to n characters. If n is omitted result is written up to the end character. The 1st position of char is one.
- LENGTH: It returns the length of char
- LTRIM: It removes characters from the left of char with initial characters removed up to the 1st character not in set.
- RTRIM: It returns char with final characters removed after the last character not in the set. Set is optional. It defaults to spaces.
- LPAD: It returns char1, left padded to length n with the sequence of characters in char2. char2 defaults to blanks.
- RPAD: It returns char1, right padded to length n with the characters in char2, replicated as many times as necessary. If char2 is omitted, it is padded with blanks.

AGGREGATE FUNCTIONS

- AVG (N): It returns average value of n ignoring null values.
- MIN (EXPR): It returns minimum value of the expression.
- COUNT (EXPR): It returns the number of rows where expression is not null.
- COUNT (*): It returns the number of rows in the table including the duplicates and those with null values.
- MAX (EXPR): It returns maximum value of the expression.
- SUM(N): It returns sum of values of n.

CONVERSION FUCTIONS

- TO_NUMBER(CHAR): It converts the char value containing a number to a value of number data type.
- TO_CHAR(N,FMT): It converts a value of number data type to a value of char data type, using the optional format string. It accepts a number n and a numeric format fmt in which the number has to appear. If fmt is omitted, n is converted to a char value exactly long enough to hold significant digits.

- TO_CHAR(DATE, FMT): It converts a value of data type to char value. It accepts a date as well as the format in which the date has to appear. Fmt must be a date format. If fmt is omitted, date is the default date format.

DATE FUNCTIONS

- SYSDATE : The sysdate is a pseudo column that contains the current date and time. It requires no arguments when selected from the table dual and returns the current date.
- ADD_MONTHS(D,N): It returns date after adding the number of months specified with the function.
- LAST_DAY(D): It returns the last date of the month specified with the function
- MONTHS_BETWEEN(D1,D2): It returns number of months between D1 and D2.
- NEXT_DAY(DATE, CHAR): It returns the date of the first week day named by char . char must be a day of the week.

GROUP BY CLAUSE

The group by clause is another section of the select statement. This optional class tells oracle to group rows based on distinct values that exists for specified columns.

HAVING CLAUSE

The having clause can be used in conjunction with the group by clause. Having imposes a condition on the group by clause, which further filters the groups created by the group by clause.

SET OPERATIONS

- UNION CLAUSE: Multiple queries can be put together and their output combined using the union clause. The union clause merges the output of two or more queries into a single set of rows and columns.
- INTERSECT CLAUSE: Multiple queries can be put together and their output can be combined using the intersect clause. The intersect clause outputs only rows produced by both the queries intersected. The output in an intersect clause will include only those rows that are retrieved by both the queries.

JOIN OPERATIONS

- INNER JOIN/ NATURAL JOIN/ JOIN: It is a binary operation that allows us to combine certain selections and a Cartesian product into one operation.
- OUTER JOIN: It is an extension of join operation to deal with missing information.

Left Outer Join: It takes tuples in the left relation that did not match with any tuple in the right relation, pads the tuples with null values for all other attributes from the right relation and adds them to the result of the natural join.

Right Outer Join: It takes tuples in the right relation that did not match with any tuple in the left relation, pads the tuples with null values for all other attributes from the left relation and adds them to the result of the natural join.

Full Outer Join: It combines tuples from both the left and the right relation and pads the tuples with null values for the missing attributes and them to the result of the natural join.

COMMANDS

CREATION OF TABLE

```
SQL>create table stud (sname varchar2(30), sid varchar2(10), sage number(10), sarea varchar2(20), sdept varchar2(20));

Table created.
```

INSERTION OF VALUES INTO THE TABLE

```
SQL> insert into stud values ('ashwin',101,19,'anna nagar','aeronautical');

1 row created.

SQL> insert into stud values ('bhavesh',102,18,'nungambakkam','marine');

1 row created.

SQL> insert into stud values ('pruthvik',103,20,'anna nagar','aerospace');

1 row created.

SQL> insert into stud values ('charith',104,20,'kilpauk','mechanical');
1 row created.

SQL> select * from stud;
SNAME                          SID        SAGE  SAREA                SDEPT
------------------------------ ---------- --------- -------------------- --------------------
ashwin                         101           19  anna nagar           aeronautical
bhavesh                        102           18  nungambakkam         marine
pruthvik                       103           20  anna nagar           aerospace
charith                        104           20  kilpauk              mechanical
```

RENAMING THE TABLE 'STUD'

```
SQL> rename stud to studs;

Table renamed.
```

ARITHMETIC OPERATION

```
SQL> select sname, sid+100 "stid" from studs;

SNAME                               stid
------------------------------ ---------
ashwin                               201
bhavesh                              202
pruthvik                             203
```

```
charith                          204
```

CONCATENATION OPERATOR

```
SQL> select sname || ' is a ' || sdept || ' engineer. ' AS  "PROFESSION" from studs;

PROFESSION
-------------------------------------------------------------------
ashwin is a aeronautical engineer.
bhavesh is a marine engineer.
pruthvik is a aerospace engineer.
charith is a mechanical engineer.
```

DISPLAY ONLY DISTINCT VALUES

```
SQL> select distinct sarea from studs;

SAREA
--------------------
anna nagar
kilpauk
nungambakkam
```

USING THE WHERE CLAUSE

```
SQL> select sname,sage from studs where sage<=19;

SNAME                         SAGE
------------------------------ ---------
ashwin                         19
bhavesh                        18
```

BETWEEN OPERATOR

```
SQL> select sname,sarea, sid from studs where sid between 102 and 104;

SNAME                         SAREA              SID
------------------------------ -------------------- ----------
bhavesh                       nungambakkam         102
pruthvik                      anna nagar           103
charith                       kilpauk              104
```

IN PREDICATE

```
SQL> select sname,sarea , sid from studs where sid in(102,104);

SNAME                         SAREA              SID
------------------------------ -------------------- ----------
bhavesh                       nungambakkam         102
charith                       kilpauk              104
```

PATTERN MATCHING

```
SQL> select sname, sarea from studs where sarea like '%g%';

SNAME                       SAREA
------------------------------ --------------------
ashwin                     anna nagar
bhavesh                    nungambakkam
pruthvik                    anna nagar
```

LOGICAL AND OPERATOR

```
SQL> select sname ,sid from studs where sid>102 and sarea='anna nagar';

SNAME                        SID
------------------------------ ----------
pruthvik                      103
```

LOGICAL OR OPERATOR

```
SQL> select sname ,sid from studs where sid>102 or sarea='anna nagar';

SNAME                       SID
------------------------------ ----------
ashwin                       101
pruthvik                     103
charith                      104
```

NOT IN PREDICATE

```
SQL> select sname, sid from studs where sid not in(102,104);

SNAME                       SID
------------------------------ ----------
ashwin                     101
pruthvik                    103
```

UPDATING THE TABLE

```
SQL> alter table studs add ( spocket varchar2(20) );

Table altered.

SQL> update studs set spocket=750 where sid=101;

1 row updated.

SQL> update studs set spocket=500 where sid=102;

1 row updated.

SQL> update studs set spocket=250 where sid=103;
```

```
1 row updated.

SQL> update studs set spocket=100 where sid=104;

1 row updated.

SQL> select * from studs;


SNAME                      SID        SAGE  SAREA              SDEPT
---------------------------- ---------- --------- ------------------- --------------------
SPOCKET
--------------------


ashwin               101          19    anna nagar             aeronautical
750
bhavesh              102          18   nungambakkam        marine
500
pruthvik              103          20   anna nagar             aerospace
250
charith              104          20   kilpauk                mechanical
100
```

AGGREGATE FUNCTIONS

```
SQL> select avg( spocket ) result from studs;

  RESULT
---------
   400

SQL>  select min(spocket) result  from studs;

RESULT
--------------------
100

SQL> select count(spocket) result from studs;

  RESULT
---------
      4

SQL> select count(*) result from studs;

  RESULT
```

```
---------
        4

SQL> select count(spocket) result from studs where sarea='anna nagar';

   RESULT
---------
        2
SQL> select max(spocket) result from studs;

RESULT
--------------------
750

SQL> select sum(spocket) result from studs;

   RESULT
---------
     1600
```

NUMERIC FUNCTIONS

```
SQL> select abs(-20) result from dual;

   RESULT
---------
       20

SQL> select power (2,10) result from dual;

   RESULT
---------
     1024

SQL> select round(15.359,2) result from dual;

   RESULT
---------
    15.36

SQL> select sqrt (36) result from dual;

   RESULT
---------
        6
```

STRING FUNCTIONS

```
SQL> select lower('ORACLE') result from dual;

RESULT
------
oracle

SQL> select upper('oracle') result from dual;

RESULT
------
ORACLE

SQL> select initcap('Oracle') result from dual;

RESULT
------
Oracle
SQL> select substr('oracle' ,2 ,5) result from dual;

RESULT
-----
racle

SQL> select lpad('oracle',10,'#') result from dual;

RESULT
----------
####oracle

SQL> select rpad ('oracle',10,'^') result from dual;

RESULT
----------
oracle^^^^
```

CONVERSION FUNCTIONS

```
SQL> update studs set sage=to_number(substr(118,2,3));

4 rows updated.

SQL> select * from studs;

SNAME                          SID        SAGE SAREA              SDEPT
------------------------------ ---------- --------- ------------------- --------------------
```

```
SPOCKET
--------------------
ashwin                  101            18 anna nagar         aeronautical
750
bhavesh                 102            18 nungambakkam        marine
500
pruthvik                103            18 anna nagar         aerospace
250
charith                 104            18 kilpauk            mechanical
100

SQL> select to_char( 17145, '099,999')  result from dual;

RESULT
--------
 017,145

SQL> select to_char(sysdate,'dd-mon-yyyy')  result from dual;

RESULT
-----------
16-jul-2008
```

DATE FUNCTIONS

```
SQL> select sysdate from dual;

SYSDATE
---------
16-JUL-08

SQL> select  sysdate,add_months(sysdate,4) result from dual;

SYSDATE   RESULT
---------  ---------
16-JUL-08 16-NOV-08

SQL> select sysdate, last_day(sysdate) result from dual;

SYSDATE   RESULT
---------  ---------
16-JUL-08 31-JUL-08

SQL> select  sysdate, next_day(sysdate,'sunday') result from dual;

SYSDATE   RESULT
---------  ---------
```

```
16-JUL-08   20-JUL-08

SQL> select months_between('09-aug-91','11-mar-90') result from dual;

   RESULT
    ---------
 16.935484
```

GROUP BY CLAUSE

```
SQL> select sarea, sum(spocket) result from studs group by sarea;

SAREA                    RESULT
--------------------     ------------
anna nagar                  1000
nungambakkam                 500
kilpauk                     100
```

HAVING CLAUSE

```
SQL> select sarea, sum(spocket) result from studs group by sarea having spocket<600;

SAREA                    RESULT
--------------------     ------------
nungambakkam                 500
kilpauk                     100
```

DELETION

```
SQL> delete from studs where sid=101;

1 row deleted.

SQL> select * from studs;

SNAME                      SID        SAGE  SAREA              SDEPT
------------------------------ ---------- --------- -------------------- --------------------
SPOCKET
-------------------
bhavesh                    102           18 nungambakkam        marine
500
pruthvik                   103           20  anna nagar          aerospace
250
charith                 104           20   kilpauk             mechanical
100
```

CREATING TABLES FOR DOING SET OPERATIONS

TO CREATE PRODUCT TABLE

```
SQL> create table product(prodname varchar2(30), prodno varchar2(10));
```

```
Table created.

SQL> insert into product values('table',10001);

1 row created.

SQL> insert into product values('chair',10010);

1 row created.

SQL> insert into product values('desk',10110);

1 row created.

SQL> insert into product values('cot',11110);

1 row created.

SQL> insert into product values('sofa',10010);

1 row created.

SQL>

SQL> insert into product values('tvstand',11010);

1 row created.

SQL> select * from product;

PRODNAME                           PRODNO
------------------------------ ----------
table                               10001
chair                               10010
desk                                10110
cot                                 11110
sofa                                10010
tvstand                             11010
```

TO CREATE SALE TABLE

```
SQL> create table sale(prodname varchar2(30),orderno number(10),prodno
varchar2(10));

Table created.
```

```
SQL>  insert into sale values('table',801,10001);

1 row created.

SQL> insert into sale values('chair',805,10010);

1 row created.

SQL> insert into sale values('desk',809,10110);

1 row created.

SQL> insert into sale values('cot',813,11110);

1 row created.

SQL> insert into sale values('sofa',817,10010);

1 row created.

SQL> select * from sale;

PRODNAME                        ORDERNO   PRODNO
------------------------------  ---------  ----------
table                            801        10001
chair                            805        10010
desk                             809        10110
cot                              813        11110
sofa                             817        10010
```

SET OPERATIONS

```
SQL> select prodname from product where prodno=10010 union select prodname from
sale where prodno=10010;

PRODNAME
------------------------------
chair
sofa

SQL> select prodname from product where prodno=11110 intersect select prodname
from sale where prodno=11110;

PRODNAME
------------------------------
cot
```

CREATING TABLES FOR DOING JOIN AND NESTED QUERY OPERATIONS

TO CREATE SSTUD1 TABLE

```
SQL> create table sstud1 ( sname varchar2(20) , place varchar2(20));

Table created.

SQL> insert into sstud1 values ( 'prajan','chennai');

1 row created.

SQL> insert into sstud1 values ( 'anand','chennai');

1 row created.

SQL> insert into sstud1 values ( 'kumar','chennai');

1 row created.

SQL> insert into sstud1 values ( 'ravi','chennai');

1 row created.

SQL> select * from sstud1;

SNAME                PLACE
-------------------- --------------------
prajan               chennai
anand                chennai
kumar                chennai
ravi                 chennai
```

TO CREATE SSTUD2 TABLE

```
SQL> create table sstud2 ( sname varchar2(20), dept varchar2(10), marks number(10));

Table created.

SQL> insert into sstud2 values ('prajan','cse',700);

1 row created.

SQL> insert into sstud2 values ('anand','it',650);

1 row created.

SQL> insert into sstud2 values ('vasu','cse',680);

1 row created.
```

```
SQL> insert into sstud2 values ('ravi','it',600);

1 row created.

SQL> select * from sstud2;

SNAME                DEPT          MARKS
-------------------- ---------- ---------
prajan                cse           700
anand                 it            650
vasu                  cse           680
ravi                  it            600
```

JOIN OPERATIONS

```
SQL> select sstud1.sname, dept from sstud1 inner join sstud2 on ( sstud1.sname=
sstud2.sname);

SNAME                DEPT
-------------------- ----------
anand                 it
prajan                cse
ravi                  it

SQL> select sstud1.sname, dept from sstud1 join sstud2 on ( sstud1.sname=
sstud2.sname);

SNAME                DEPT
-------------------- ----------
anand                 it
prajan                cse
ravi                  it

SQL> select sstud1.sname, dept from sstud1 left outer join sstud2 on ( sstud1.sname=
sstud2.sname);

SNAME                DEPT
-------------------- ----------
prajan                cse
anand                 it
ravi                  it
kumar

SQL> select sstud1.sname, dept from sstud1 right outer join sstud2 on ( sstud1.sname=
sstud2.sname)
```

```
SNAME                DEPT
-------------------- ----------
prajan               cse
anand                 it
ravi                 it
                    cse
```

```
SQL> select sstud1.sname, dept from sstud1 full outer join sstud2 on ( sstud1.sname=
sstud2.sname);
```

```
SNAME                DEPT
-------------------- ----------
prajan               cse
anand                 it
ravi                 it
kumar
                     cse
```

NESTED QUERIES

```
SQL> select sname from sstud1 where sstud1.sname in ( select sstud2.sname from
  2  sstud2 );

SNAME
--------------------
anand
prajan
ravi
```

```
SQL> select sname from sstud1 where sstud1.sname not in ( select sstud2.sname from
sstud2 );

SNAME
--------------------
kumar
```

```
SQL> select sname from sstud2 where marks > some(select marks from sstud2
  2  where dept='cse');

SNAME
--------------------
prajan
```

```
SQL>  select sname from sstud2 where marks >= some (select marks from sstud2
  2  where dept='cse' );

SNAME
--------------------
prajan
vasu

SQL> select sname from sstud2 where marks > any ( select marks from sstud2 where
dept='cse' );

SNAME
--------------------
prajan

SQL> select sname from sstud2 where marks >= any ( select marks from sstud2
  2  where dept='cse' );

SNAME
--------------------
prajan
vasu

SQL> select sname from sstud2 where marks > all ( select marks from sstud2 where
dept='cse' );

no rows selected

SQL> select sname from sstud2 where marks < all ( select marks from sstud2 where
dept='cse' );

SNAME
--------------------
anand
ravi

SQL> select sname from sstud1 where exists ( select sstud2.sname from sstud2
  2  where sstud1.sname=sstud2.sname );

SNAME
--------------------
prajan
anand
ravi

SQL> select sname from sstud1 where not exists ( select sstud2.sname from
  2  sstud2 where sstud1.sname=sstud2.sname );

SNAME
--------------------
kumar
```

RESULT

Thus all the DML commands were executed and the output was verified.

INTEGRITY CONSTRAINTS

EX NO: 03
DATE:

AIM

To study the various constraints available in the SQL query language.

DOMAIN INTEGRITY CONSTRAINTS

NOT NULL CONSTRAINT

```
SQL> create table empl (ename varchar2(30) not null, eid varchar2(20) not null);

Table created.

SQL> insert into empl values ('abcde',11);

1 row created.

SQL> insert into empl values ('fghij',12);

1 row created.

SQL> insert into empl values ('klmno',null);
insert into empl values ('klmno',null)
*
ERROR at line 1:
ORA-01400: cannot insert NULL into ("ITA"."EMPL"."EID")


SQL> select * from empl;

ENAME                          EID
------------------------------ --------------------
abcde                          11
fghij                          12
```

CHECK AS A COLUMN CONSTRAINT

```
SQL> create table depts ( dname varchar2(30) not null, did number(20) not null check
(did<10000));

Table created.

SQL> insert into depts values ('sales ',9876);

1 row created.
```

```
SQL> insert into depts values ('marketing',5432);

1 row created.

SQL> insert into depts values ('accounts',789645);
insert into depts values ('accounts',789645)
*
ERROR at line 1:
ORA-02290: check constraint (ITA.SYS_C003179) violated


SQL> select * from depts;

DNAME                          DID
------------------------------ ---------
sales                          9876
marketing                      5432
```

CHECK AS A TABLE CONSTRAINT

```
SQL> create table airports (aname varchar2(30) not null , aid number(20) not null, acity
varchar2(30) check( acity in ('chennai','hyderabad','bangalore')));

Table created.

SQL> insert into airports values( 'abcde', 100,'chennai');

1 row created.

SQL> insert into airports values( 'fghij', 101,'hyderabad');

1 row created.

SQL> insert into airports values( 'klmno', 102,'bangalore');

1 row created.

SQL> insert into airports values( 'pqrst', 103,'mumbai');
insert into airports values( 'pqrst', 103,'mumbai')
*
ERROR at line 1:
ORA-02290: check constraint (ITA.SYS_C003187) violated


SQL> select * from airports;
```

```
ANAME                          AID ACITY
------------------------------ --------- ------------------------------
abcde                          100     chennai
fghij                          101     hyderabad
klmno                          102     bangalore
```

ENTITY INTEGRITY CONSTRAINTS

UNIQUE AS A COLUMN CONSTRAINT

```
SQL> create table book (bname varchar2(30) not null, bid number(20) not null unique);

Table created.

SQL> insert into book values ('fairy tales',1000);

1 row created.

SQL> insert into book values ('bedtime stories',1001);

1 row created.

SQL> insert into book values ('comics',1001);
insert into book values ('comics',1001)
*
ERROR at line 1:
ORA-00001: unique constraint (ITA.SYS_C003130) violated


SQL> select * from book;

BNAME                          BID
------------------------------ ---------
fairy tales                    1000
bedtime stories                1001
```

UNIQUE AS A TABLE CONSTRAINT

```
SQL> create table orders( oname varchar2(30) not null , oid number(20) not null ,
unique(oname,oid));

Table created.

SQL> insert into orders values ('chair', 2005);
```

```
1 row created.

SQL> insert into orders values ('table',2006);

1 row created.


SQL> insert into orders values ('chair',2007);

1 row created.

SQL> insert into orders values ('chair', 2005);
insert into orders values ('chair', 2005)
*
ERROR at line 1:
ORA-00001: unique constraint (ITA.SYS_C003152) violated

SQL> select * from orders;

ONAME                          OID
------------------------------ ---------
chair                          2005
table                          2006
chair                          2007
```

PRIMARY KEY AS A COLUMN CONSTRAINT

```
SQL> create table custo ( cname varchar2(30) not null , cid number(20) not null
primary key);

Table created.

SQL> insert into custo values ( 'jones', 506);

1 row created.

SQL> insert into custo values ('hayden',508);

1 row created.

SQL> insert into custo values ('ricky',506);
insert into custo values ('ricky',506)
*
ERROR at line 1:
ORA-00001: unique constraint (ITA.SYS_C003165) violated
```

```
SQL> select * from custo;

CNAME                          CID
------------------------------ ---------
jones                          506
hayden                         508
```

PRIMARY KEY AS A TABLE CONSTRAINT

```
SQL> create table branches( bname varchar2(30) not null , bid number(20) not null ,
primary key(bname,bid));

Table created.

SQL> insert into branches values ('anna nagar', 1005);

1 row created.

SQL> insert into branches values ('adyar',1006);

1 row created.

SQL> insert into branches values ('anna nagar',1007);

1 row created.

SQL> insert into branches values ('anna nagar', 1005);
insert into branches values ('anna nagar', 1005)
*
ERROR at line 1:
ORA-00001: unique constraint (ITA.SYS_C003173) violated


SQL> select * from branches;


BNAME                          BID
------------------------------ ---------
anna nagar                          1005
adyar                               1006
anna nagar                          1007
```

<u>REFERENTIAL INTEGRITY CONSTRAINTS</u>

TO CREATE ‘DEPTS’ TABLE

```
SQL> create table depts(city varchar2(20), dno number(5) primary key);
Table created.
SQL> insert into depts values('chennai', 11);
1 row created.
SQL> insert into depts values('hyderabad', 22);
1 row created.
```

TO CREATE ‘SEMP’ TABLE

```
SQL> create table semp(ename varchar2(20), dno number(5) references depts(dno));

Table created.
SQL> insert into semp values('x', 11);
1 row created.
SQL> insert into semp values('y', 22);
1 row created.
SQL> insert into semp values('z', 33);
insert into semp values('z', 33)
*
ERROR at line 1:
ORA-00001: referential integrity constraint (ITA.SYS_C003273) violated


SQL> select * from semp;
ENAME                DNO
-------------------- ---------
x                    11
y                    22
```

ALTER TABLE

```
SQL> alter table semp add(eddress varchar2(20));
Table altered.
SQL> update semp set eddress='10 gandhi road' where dno=11;
1 row updated.
SQL> update semp set eddress='12 m.g. road' where dno=22;
1 row updated.

SQL> select * from semp;
ENAME                DNO    EDDRESS
-------------------- --------- --------------------
x                      11       10 gandhi road
y                      22       12 m.g. road

SQL> select city, ename from depts, s2emp where depts.dno = s2emp.dno;
CITY              ENAME
-------------------- --------------------
chennai           x
```

```
hyderabad          y
```

RESULT

Thus the various constraints were implemented and the tables were created using the respecting constraints. Hence the output was verified.

VIEWS

EX NO: 4
DATE:

AIM

To create views for the table and perform operations on it.

DEFINITION

A view is an object that gives the user the logical view of data from the underlying table.
Any relation that is not part of the logical model but is made visible to the user as a virtual relation is called a view. They are generally used to avoid duplication of data.

Views are created for the following reasons,

- Data simplicity
- To provide data security
- Structural simplicity (because view contains only limited number of rows and columns)

TYPES OF VIEWS

- Updatable views – Allow data manipulation
- Read only views – Do not allow data manipulation

TO CREATE THE TABLE 'FVIEWS'

```
SQL> create table fviews( name varchar2(20),no number(5), sal number(5), dno
number(5));

Table created.

SQL> insert into fviews values('xxx',1,19000,11);

1 row created.

SQL> insert into fviews values('aaa',2,19000,12);

1 row created.

SQL> insert into fviews values('yyy',3,40000,13);

1 row created.

SQL> select * from fviews;
```

```
NAME                        NO      SAL       DNO
-------------------- --------- --------- ---------
xxx                      1     19000       11
aaa                      2     19000       12
yyy                      3     40000       13
```

TO CREATE THE TABLE 'DVIEWS'

```
SQL> create table dviews( dno number(5), dname varchar2(20));

Table created.

SQL> insert into dviews values(11,'x');

1 row created.

SQL> insert into dviews values(12,'y');

1 row created.

SQL> select * from dviews;

      DNO DNAME
--------- --------------------
       11 x
       12 y
```

CREATING THE VIEW 'SVIEW' ON 'FVIEWS' TABLE

```
SQL> create view sview as select name,no,sal,dno from fviews where dno=11;

View created.

SQL> select * from sview;

NAME                        NO      SAL       DNO
--------------------   ---------     ---------    ---------
xxx                          1        19000       11
```

UPDATES MADE ON THE VIEW ARE REFLECTED ONLY ON THE TABLE WHEN THE STRUTURE OF THE TABLE AND THE VIEW ARE NOT SIMILAR -- PROOF

```
SQL> insert into sview values ('zzz',4,20000,14);
```

```
1 row created.

SQL> select * from fviews;

NAME                 NO      SAL      DNO
-------------------- ---------      ---------    ---------
xxx                   1         19000       11
aaa                   2          19000       12
yyy                   3          40000       13
zzz                   4          20000       14
```

UPDATES MADE ON THE VIEW ARE REFLECTED ON BOTH THE VIEW AND THE TABLE WHEN THE STRUTURE OF THE TABLE AND THE VIEW ARE SIMILAR – PROOF

CREATING A VIEW 'IVIEW' FOR THE TABLE 'FVIEWS'

```
SQL> create view iview as select * from fviews;

View created.

SQL> select * from iview;

NAME                 NO      SAL      DNO
-------------------- --------- --------- ---------
xxx                   1    19000       11
aaa                   2    19000       12
yyy                    3     40000       13
zzz                   4    20000       14
```

PERFORMING UPDATE OPERATION

```
SQL> insert into iview values ('bbb',5,30000,15);

1 row created.

SQL> select * from iview;

NAME                 NO      SAL      DNO
-------------------- --------- --------- ---------
xxx                   1    19000       11
bbb                    5     30000       15

SQL> select * from fviews;
```

```
NAME                         NO       SAL       DNO
-------------------- --------- --------- ---------
xxx                         1     19000        11
aaa                         2     19000        12
yyy                         3     40000        13
zzz                         4     20000        14
bbb                         5     30000        15
```

CREATE A NEW VIEW 'SSVIEW' AND DROP THE VIEW

```
SQL> create view ssview( cusname,id) as select name, no from fviews where dno=12;

View created.

SQL> select * from ssview;

CUSNAME                      ID
-------------------- ---------
aaa                          2

SQL> drop view ssview;

View dropped.
```

TO CREATE A VIEW 'COMBO' USING BOTH THE TABLES 'FVIEWS' AND 'DVIEWS'

```
SQL> create view combo as select name,no,sal,dviews.dno,dname from fviews,dviews
where fviews.dno=dviews.dno;

View created.

SQL> select * from combo;
NAME                         NO       SAL       DNO DNAME
-------------------- --------- --------- --------- --------------------
xxx                          1     19000        11 x
aaa                          2     19000        12 y
```

TO PERFORM MANIPULATIONS ON THIS VIEW

```
SQL> insert into combo values('ccc',12,1000,13,'x');
insert into combo values('ccc',12,1000,13,'x')
*

ERROR at line 1:
ORA-01779: cannot modify a column which maps to a non key-preserved table
```

This shows that when a view is created from two different tables no manipulations can be performed using that view and the above error is displayed.

RESULT

Thus views were created, various operations were performed and the outputs were verified.

DATACONTROL LANGUAGE COMMANDS

EX NO: 5
DATE:

AIM

To study the various data language commands (DCL) and implement them on the database.

DESCRIPTION

The DCL language is used for controlling the access to the table and hence securing the database. This language is used to provide certain priveleges to a particular user. Priveleges are rights to be allocated. The privilege commands are namely,

- Grant
- Revoke

The various privileges that can be granted or revoked are,

- Select
- Insert
- Delete
- Update
- References
- Execute
- All

GRANT COMMAND**:** It is used to create users and grant access to the database. It requires database administrator (DBA) privilege, except that a user can change their password. A user can grant access to their database objects to other users.

REVOKE COMMAND**:** Using this command , the DBA can revoke the granted database privileges from the user.

SYNTAX

GRANT COMMAND

Grant < database_priv [database_priv…..] > to <user_name> identified by <password> [,<password…..];

Grant <object_priv> | All on <object> to <user | public> [With Grant Option];

REVOKE COMMAND

Revoke <database_priv> from <user [, user] >;

Revoke <object_priv> on <object> from < user | public >;

<database_priv> -- Specifies the system level priveleges to be granted to the users or roles. This includes create / alter / delete any object of the system.
<object_priv> -- Specifies the actions such as alter / delete / insert / references / execute / select / update for tables.
<all> -- Indicates all the priveleges.
[With Grant Option] – Allows the recipient user to give further grants on the objects.
The priveleges can be granted to different users by specifying their names or to all users by using the "Public" option.

EXAMPLES

Consider the following tables namely "DEPARTMENTS" and "EMPLOYEES"
Their schemas are as follows ,
Departments (dept _no , dept_ name , dept_location);
Employees (emp_id , emp_name , emp_salary);

```
SQL> Grant all on employees to abcde;

Grant succeeded.

SQL> Grant select , update , insert on departments to abcde with grant option;

Grant succeeded.

SQL> Revoke all on employees from abcde;

Revoke succeeded.

SQL> Revoke select , update , insert on departments from abcde;

Revoke succeeded.
```

RESULT

Thus all the commands were executed and their outputs were verified.

TRANSACTION CONTROL LANGUAGE

EX NO: 6
DATE:

AIM

To study the various TCL commands namely commit, rollback and savepoint.

DESCRIPTION

COMMIT: This command saves all the transactions to the database since the last commit or rollback command.
ROLLBACK: This command is used to undo the transactions that have not been already saved to the database.It can be used to undo transactions since the last commit or rollback command.
SAVEPOINT: This command is a point in transaction that you can roll the transaction back to without rolling back the entire transmission.

CREATE THE TABLE 'ITYR'

```
SQL> create table ityr(ename varchar(15),eid number(5),salary number(5));

Table created.
```

PROGRAM

```
SQL> set serveroutput on;
SQL> declare
  2  t number(6);
  3  n number(6);
  4  s number(6);
  5  begin
  6  insert into ityr values('a',100,19000);
  7  insert into ityr values('b',102,1000);
  8  s:=&s;
  9  n:=&n;
 10  savepoint a;
 11  update ityr set salary=salary+2000 where eid=s;
 12  update ityr set salary=salary+1500 where eid=n;
 13  select sum(salary) into t from ityr;
 14  if(t>20000)
 15  then
 16   rollback to a;
 17  else
 18  dbms_output.put_line('no updation');
 19  end if;
 20  end ;
 21  /
Enter value for s: 100
old   8: s:=&s;
new   8: s:=100;
Enter value for n: 102
old   9: n:=&n;
new   9: n:=102;

PL/SQL procedure successfully completed.
```

DISPLAYING THE UPDATED TABLE

```
SQL> select * from ityr;

ENAME                  EID     SALARY
--------------- ---------- ----------
a                      100      19000
b                      102       1000
```

RESULT

Thus the various commands were executed and the output was verified.

PROCEDURAL LANGUAGE/ STRUCTURAL QUERY LANGUAGE

EX NO: 7
DATE:

AIM

To implement various programs using PL/SQL language.

PROGRAMS

TO DISPLAY HELLO MESSAGE

```
SQL> set serveroutput on;
SQL> declare
  2  a varchar2(20);
  3  begin
  4  a:='Hello';
  5  dbms_output.put_line(a);
  6  end;
  7  /
Hello

PL/SQL procedure successfully completed.
```

TO INPUT A VALUE FROM THE USER AND DISPLAY IT

```
SQL> set serveroutput on;
SQL> declare
  2  a varchar2(20);
  3  begin
  4  a:=&a;
  5  dbms_output.put_line(a);
  6  end;
  7  /
Enter value for a: 5
old   4: a:=&a;
new   4: a:=5;
5

PL/SQL procedure successfully completed.
```

GREATEST OF TWO NUMBERS

```
SQL> set serveroutput on;
SQL> declare
  2  a number(7);
  3  b number(7);
  4  begin
  5  a:=&a;
  6  b:=&b;
  7  if(a>b) then
  8  dbms_output.put_line (' The grerater of the two is'|| a);
  9  else
 10  dbms_output.put_line (' The grerater of the two is'|| b);
 11  end if;
 12  end;
 13  /
Enter value for a: 5
old   5: a:=&a;
new   5: a:=5;
Enter value for b: 9
old   6: b:=&b;
new   6: b:=9;
The grerater of the two is9

PL/SQL procedure successfully completed.
```

GREATEST OF THREE NUMBERS

```
SQL> set serveroutput on;
SQL> declare
  2  a number(7);
  3  b number(7);
  4  c number(7);
  5  begin
  6  a:=&a;
  7  b:=&b;
  8  c:=&c;
  9  if(a>b and a>c) then
 10  dbms_output.put_line (' The greatest of the three is ' || a);
 11  else if (b>c) then
 12  dbms_output.put_line (' The greatest of the three is ' || b);
 13  else
 14  dbms_output.put_line (' The greatest of the three is ' || c);
 15  end if;
 16  end if;
 17  end;
 18  /
Enter value for a: 5
old   6: a:=&a;
new   6: a:=5;
Enter value for b: 7
```

```
old   7: b:=&b;
new   7: b:=7;
Enter value for c: 1
old   8: c:=&c;
new   8: c:=1;
The greatest of the three is 7

PL/SQL procedure successfully completed.
```

PRINT NUMBERS FROM 1 TO 5 USING SIMPLE LOOP

```
SQL> set serveroutput on;
SQL> declare
  2  a number:=1;
  3  begin
  4  loop
  5  dbms_output.put_line (a);
  6  a:=a+1;
  7  exit when a>5;
  8  end loop;
  9  end;
 10  /
1
2
3
4
5

PL/SQL procedure successfully completed.
```

PRINT NUMBERS FROM 1 TO 4 USING WHILE LOOP

```
SQL> set serveroutput on;
SQL> declare
  2  a number:=1;
  3  begin
  4  while(a<5)
  5  loop
  6  dbms_output.put_line (a);
  7  a:=a+1;
  8  end loop;
  9  end;
 10  /
1
2
3
4
```

```
PL/SQL procedure successfully completed.
```

PRINT NUMBERS FROM 1 TO 5 USING FOR LOOP

```
SQL> set serveroutput on;
SQL> declare
  2  a number:=1;
  3  begin
  4  for a in 1..5
  5  loop
  6  dbms_output.put_line (a);
  7  end loop;
  8  end;
  9  /
1
2
3
4
5

PL/SQL procedure successfully completed.
```

PRINT NUMBERS FROM 1 TO 5 IN REVERSE ORDER USING FOR LOOP

```
SQL> set serveroutput on;
SQL> declare
  2  a number:=1;
  3  begin
  4  for a in reverse 1..5
  5  loop
  6  dbms_output.put_line (a);
  7  end loop;
  8  end;
  9  /
5
4
3
2
1

PL/SQL procedure successfully completed.
```

TO CALCULATE AREA OF CIRCLE

```
SQL> set serveroutput on;
SQL> declare
  2  pi constant number(4,2):=3.14;
  3  a number(20);
  4  r number(20);
  5  begin
  6  r:=&r;
  7  a:= pi* power(r,2);
  8  dbms_output.put_line (' The area of circle is ' || a);
  9  end;
 10  /
Enter value for r: 2
old   6: r:=&r;
new   6: r:=2;
The area of circle is 13

PL/SQL procedure successfully completed.
```

TO CREATE SACCOUNT TABLE

```
SQL> create table saccount  ( accno number(5), name varchar2(20), bal number(10));

Table created.

SQL> insert into saccount values ( 1,'mala',20000);

1 row created.

SQL> insert into saccount values (2,'kala',30000);

1 row created.

SQL> select * from saccount;

    ACCNO NAME                        BAL
--------- -------------------- ---------
        1 mala                     20000
        2 kala                     30000

SQL> set serveroutput on;
SQL> declare
  2  a_bal number(7);
  3  a_no varchar2(20);
  4  debit number(7):=2000;
  5  minamt number(7):=500;
  6  begin
  7  a_no:=&a_no;
  8  select bal into a_bal from saccount where accno= a_no;
  9  a_bal:= a_bal-debit;
 10  if (a_bal > minamt) then
 11  update  saccount  set bal=bal-debit where accno=a_no;
 12  end if;
 13  end;
 14
 15  /
Enter value for a_no: 1
old   7: a_no:=&a_no;
new   7: a_no:=1;

PL/SQL procedure successfully completed.
```

```
SQL> select * from saccount;

  ACCNO NAME                    BAL
--------- ------------------- ---------
        1 mala                18000
        2 kala                30000
```

TO CREATE TABLE SROUTES

```
SQL> create table sroutes ( rno number(5), origin varchar2(20), destination
varchar2(20), fare numbe
r(10), distance number(10));

Table created.

SQL> insert into sroutes values ( 2, 'chennai', 'dindugal', 400,230);

1 row created.

SQL> insert into sroutes values ( 3, 'chennai', 'madurai', 250,300);

1 row created.

SQL> insert into sroutes values ( 6, 'thanjavur', 'palani', 350,370);

1 row created.

SQL> select * from sroutes;

      RNO ORIGIN              DESTINATION              FARE  DISTANCE
--------- ------------------- ------------------- --------- ---------
        2 chennai             dindugal                  400       230
        3 chennai             madurai                   250       300
        6 thanjavur           palani                   350       370


SQL> set serveroutput on;
SQL> declare
  2  route sroutes.rno % type;
  3  fares sroutes.fare % type;
  4  dist sroutes.distance % type;
  5  begin
  6  route:=&route;
  7  select fare, distance into fares , dist from sroutes where rno=route;
  8  if (dist < 250) then
  9  update sroutes set fare=300 where rno=route;
 10  else if dist between 250 and 370 then
 11  update sroutes set fare=400 where rno=route;
 12  else if (dist > 400) then
 13  dbms_output.put_line('Sorry');
 14  end if;
 15  end if;
 16  end if;
 17  end;
 18  /
Enter value for route: 3
old   6: route:=&route;
new   6: route:=3;

PL/SQL procedure successfully completed.

SQL> select * from sroutes;

      RNO ORIGIN              DESTINATION               FARE  DISTANCE
--------- ------------------- ------------------- --------- ---------
        2 chennai             dindugal                  400       230
        3 chennai             madurai                   400       300
        6 thanjavur           palani                   350       370
```

TO CREATE SCA LCULATE TABLE

```
SQL> create table scalculate ( radius number(3), area number(5,2));

Table created.

SQL> desc scalculate;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 RADIUS                                             NUMBER(3)
 AREA                                               NUMBER(5,2)
```

```
SQL> set serveroutput on;
SQL> declare
  2  pi constant number(4,2):=3.14;
  3  area number(5,2);
  4  radius number(3);
  5  begin
  6  radius:=3;
  7  while (radius <=7)
  8  loop
  9  area:= pi* power(radius,2);
 10  insert into scalculate values (radius,area);
 11  radius:=radius+1;
 12  end loop;
 13  end;
 14  /

PL/SQL procedure successfully completed.

SQL> select * from scalculate;

   RADIUS      AREA
--------- ---------
        3     28.26
        4     50.24
        5      78.5
        6    113.04
        7    153.86
```

TO CALCULATE FACTORIAL OF A GIVEN NUMBER

```
SQL> set serveroutput on;
SQL> declare
  2  f number(4):=1;
  3  i number(4);
  4  begin
  5  i:=&i;
  6  while(i>=1)
  7  loop
  8  f:=f*i;
  9  i:=i-1;
 10  end loop;
 11  dbms_output.put_line('The value is ' || f);
 12  end;
 13  /
Enter value for i: 5
old   5: i:=&i;
```

```
new   5: i:=5;
The value is 120

PL/SQL procedure successfully completed.
```

RESULT

Thus the various programs were implemented and their output was verified.

TRIGGERS

EX NO: 8
DATE:

AIM

To study and implement the concept of triggers.

DEFINITION

A trigger is a statement that is executed automatically by the system as a side effect of a modification to the database. The parts of a trigger are,

- **Trigger statement**: Specifies the DML statements and fires the trigger body. It also specifies the table to which the trigger is associated.
- **Trigger body or trigger action**: It is a PL/SQL block that is executed when the triggering statement is used.
- **Trigger restriction**: Restrictions on the trigger can be achieved

The different uses of triggers are as follows,

- To generate data automatically
- To enforce complex integrity constraints
- To customize complex securing authorizations
- To maintain the replicate table
- To audit data modifications

TYPES OF TRIGGERS

The various types of triggers are as follows,

- **Before**: It fires the trigger before executing the trigger statement.
- **After**: It fires the trigger after executing the trigger statement.
- **For each row**: It specifies that the trigger fires once per row.
- **For each statement**: This is the default trigger that is invoked. It specifies that the trigger fires once per statement.

VARIABLES USED IN TRIGGERS

- :new
- :old

These two variables retain the new and old values of the column updated in the database. The values in these variables can be used in the database triggers for data manipulation

SYNTAX

```
 create or replace trigger triggername [before/after] {DML statements}
 on [tablename] [for each row/statement]
 begin
 ------------------------
 ------------------------
 ------------------------
exception
end;
```

USER DEFINED ERROR MESSAGE

The package "raise_application_error" is used to issue the user defined error messages
Syntax: raise_application_error(error number,'error message');
The error number can lie between -20000 and -20999.
The error message should be a character string.

TO CREATE THE TABLE 'ITEMPLS'

```
SQL> create table itempls (ename varchar2(10), eid number(5), salary number(10));

Table created.

SQL> insert into itempls values('xxx',11,10000);

1 row created.

SQL> insert into itempls values('yyy',12,10500);

1 row created.

SQL> insert into itempls values('zzz',13,15500);

1 row created.

SQL> select * from itempls;

ENAME           EID    SALARY
---------- --------- ---------
xxx              11     10000
yyy              12     10500
zzz              13     15500
```

TO CREATE A SIMPLE TRIGGER THAT DOES NOT ALLOW INSERT UPDATE AND DELETE OPERATIONS ON THE TABLE

```
SQL> create trigger ittrigg before insert or update or delete on itempls for each row
  2  begin
  3  raise_application_error(-20010,'You cannot do manipulation');
  4  end;
  5
  6  /

Trigger created.

SQL> insert into itempls values('aaa',14,34000);
insert into itempls values('aaa',14,34000)
            *
ERROR at line 1:
ORA-20010: You cannot do manipulation
ORA-06512: at "STUDENT.ITTRIGG", line 2
ORA-04088: error during execution of trigger 'STUDENT.ITTRIGG'

SQL> delete from itempls where ename='xxx';
delete from itempls where ename='xxx'
            *
ERROR at line 1:
ORA-20010: You cannot do manipulation
ORA-06512: at "STUDENT.ITTRIGG", line 2
ORA-04088: error during execution of trigger 'STUDENT.ITTRIGG'

SQL> update itempls set eid=15 where ename='yyy';
update itempls set eid=15 where ename='yyy'
       *
ERROR at line 1:
ORA-20010: You cannot do manipulation
ORA-06512: at "STUDENT.ITTRIGG", line 2
ORA-04088: error during execution of trigger 'STUDENT.ITTRIGG'
```

TO DROP THE CREATED TRIGGER

```
SQL> drop trigger ittrigg;

Trigger dropped.
```

TO CREATE A TRIGGER THAT RAISES AN USER DEFINED ERROR MESSAGE AND DOES NOT ALLOW UPDATION AND INSERTION

```
SQL> create trigger ittriggs before insert or update of salary on itempls for each row
```

```
declare
triggsal itempls.salary%type;
begin
select salary into triggsal from itempls where eid=12;
if(:new.salary>triggsal or :new.salary<triggsal) then
raise_application_error(-20100,'Salary has not been changed');
end if;
end;
/

Trigger created.


SQL> insert into itempls values ('bbb',16,45000);
insert into itempls values ('bbb',16,45000)
            *
ERROR at line 1:
ORA-04098: trigger 'STUDENT.ITTRIGGS' is invalid and failed re-validation


SQL> update itempls set eid=18 where ename='zzz';
update itempls set eid=18 where ename='zzz'
       *
ERROR at line 1:
ORA-04298: trigger 'STUDENT.ITTRIGGS' is invalid and failed re-validation
```

<u>RESULT</u>

Thus the triggers were created , executed and their respective outputs were verified.

GOTO AND EXCEPTIONS

EX NO: 9
DATE:

AIM

To perform goto and exception handling mechanisms.

GOTO COMMAND

PURPOSE

The GOTO statement changes the flow of control within a PL/SQL block. The entry point into such a block of code is marked using the tags. This statement makes use of the
<<user defined name>> to jump into the block of code for execution.

SYNTAX

GOTO <code block name> <<user defined name>>

CREATING THE TABLES 'SPRODUCTMASTERS' AND 'SOLDPRICES'

```
SQL> create table sproductmasters( pno varchar2(10), sellprice number(10));

Table created.

SQL> insert into sproductmasters values('p1',3200);

1 row created.

SQL> insert into sproductmasters values('p2',4000);

1 row created.

SQL> insert into sproductmasters values('p3',6000);

1 row created.

SQL> select * from sproductmasters;

PNO        SELLPRICE
---------- ---------
p1            3200
p2            4000
p3            6000

SQL> create table soldprices( pno varchar2(10), datechange varchar2(20),soldprices
number(10));

Table created.
```

OPERATION TO BE PERFORMED

If the price of a product is less than 4000 then change to 4000. The price change is to be recorded on the old price table along with the product number and the date on which the price was last changed using PL/SQL.

PROGRAM

```
declare
sellingprice number(10,2);
begin
select sellprice into sellingprice from sproductmasters where pno='p1';
if sellingprice < 4000
then
goto add_old_price;
else
dbms_output.put_line(' Current price is '|| sellingprice);
end if;
<<add_old_price>>
update sproductmasters set sellprice = 4000 where pno='p1';
insert into soldprices values('p1',sysdate,sellingprice);
dbms_output.put_line(' The new price of p1 is 4000 ');
end;
/
```

PROGRAM OUTPUT

```
The new price of p1 is 4000

PL/SQL procedure successfully completed.
```

DISPLAYING THE CONTENTS OF 'SOLDPRICES' TABLE

```
SQL> select * from soldprices;

PNO      DATECHANGE           SOLDPRICES
---------- ------------------- ----------
p1       27-AUG-08               3200
```

<u>EXCEPTIONS</u>

Exceptions are error handling mechanisms. They are of 2 types,

- Pre – defined exceptions
- User – defined exceptions

TO CREATE THE TABLE 'SSITEMS' ON WHICH THE EXCEPTION HANDLING MECHANISMS ARE GOING TO BE PERFORMED

```
SQL> create table ssitems( id number(10), quantity number(10), actualprice
number(10));

Table created.

SQL> insert into ssitems values(100,5,5000);

1 row created.

SQL> insert into ssitems values(101,6,9000);

1 row created.

SQL> insert into ssitems values(102,4,4000);

1 row created.

SQL> insert into ssitems values(103,2,2000);

1 row created.

SQL> select * from ssitems;

     ID  QUANTITY  ACTUALPRICE
---------   ---------          -----------
     100       5               5000
     101       6               9000
     102       4              4000
     103       2              2000
```

<u>PRE – DEFINED EXCEPTIONS</u>

SYNTAX

```
begin
sequence of statements;
exception
when < exception name > then
sequence of statements;
end;
```

EXAMPLE USING PL/SQL

```
SQL> set serveroutput on;
SQL> declare
```

```
  2  price ssitems.actualprice % type;
  3  begin
  4  select actualprice into price from ssitems where quantity=10;
  5  exception
  6  when no_data_found then
  7  dbms_output.put_line ('ssitems missing');
  8  end;
  9  /
ssitems missing

PL/SQL procedure successfully completed.
```

DISPLAYING THE UPDATED TABLE

```
SQL> select * from ssitems;

       ID  QUANTITY  ACTUALPRICE
---------   ---------          -----------
      100        5                 5000
      101        6                 9000
      102        4                4000
      103        2                2000
```

USER DEFINED EXCEPTONS

SYNTAX

```
 declare
 < exception name > exception;
 begin
 sequence of statements;
 raise < exception name >;
 exception
 when < exception name > then
 sequence of statements;
 end;
```

EXAMPLE USING PL/SQL

```
SQL> set serveroutput on;
SQL> declare
  2  zero_price exception;
  3  price number(8,2);
  4  begin
  5  select actualprice into price from ssitems where id=103;
  6  if price=0 or price is null then
  7  raise zero_price;
```

```
end if;
exception
when zero_price then
dbms_output.put_line('Failed zero price');
end;
/

PL/SQL procedure successfully completed.
```

DISPLAYING THE UPDATED TABLE

```
SQL> select * from ssitems;

       ID  QUANTITY ACTUALPRICE
---------  ---------  -----------
      100        5          5000
      101        6          9000
      102        4          4000
      103        2          2000
```

RESULT

Thus the goto statement and exceptions were executed and their respective outputs were verified.

CURSORS

EX NO: 10
DATE:

AIM

To write PL/SQL blocks that implement the concept of for the 3 types of cursors namely,

- Cursor for loop
- Explicit cursor
- Implicit cursor

TO CREATE THE TABLE 'SSEMPP'

```
SQL> create table ssempp( eid number(10), ename varchar2(20), job varchar2(20), sal
number (10),dnonumber(5));

Table created.

SQL> insert into ssempp values(1,'nala','lecturer',34000,11);

1 row created.

SQL> insert into ssempp values(2,'kala',' seniorlecturer',20000,12);

1 row created.

SQL> insert into ssempp values(5,'ajay','lecturer',30000,11);

1 row created.

SQL> insert into ssempp values(6,'vijay','lecturer',18000,11);

1 row created.

SQL> insert into ssempp values(3,'nila','professor',60000,12);

1 row created.

SQL> select * from ssempp;

   EID   ENAME              JOB                 SAL      DNO
--------- ------------------- -------------------  ---------  ---------
       1    nala              lecturer             34000      11
       2    kala             seniorlecturer        20000       12
       5    ajay             lecturer             30000      11
       6   vijay            lecturer              18000      11
```

```
      3     nila                professor             60000        12
```

TO WRITE A PL/SQL BLOCK TO DISPLAY THE EMPOYEE ID AND EMPLOYEE NAME USING CURSOR FOR LOOP

```
SQL> set serveroutput on;
SQL> declare
  2  begin
  3  for emy in (select eid,ename from ssempp)
  4  loop
  5  dbms_output.put_line('Employee id and employee name  are '|| emy.eid ‘and’||
emy.ename);
  6  end loop;
  7  end;
  8  /
Employee id and employee name are 1 and nala
Employee id and employee name are 2 and kala
Employee id and employee name are 5 and ajay
Employee id and employee name are 6 and vijay
Employee id and employee name are 3 and nila

PL/SQL procedure successfully completed.
```

TO WRITE A PL/SQL BLOCK TO UPDATE THE SALARY OF ALL EMPLOYEES WHERE DEPARTMENT NO IS 11 BY 5000 USING CURSOR FOR LOOP AND TO DISPLAY THE UPDATED TABLE

```
SQL> set serveroutput on;
SQL> declare
  2  cursor cem is select eid,ename,sal,dno from ssempp where dno=11;
  3  begin
  4  --open cem;
  5  for rem in cem
  6  loop
  7  update ssempp set sal=rem.sal+5000 where eid=rem.eid;
  8  end loop;
  9  --close cem;
 10  end;
 11  /

PL/SQL procedure successfully completed.

SQL> select * from ssempp;

      EID     ENAME              JOB               SAL       DNO
---------    -------------------- -------------------- --------- ---------
```

```
      1     nala               lecturer          39000       11
      2     kala            seniorlecturer       20000       12
      5     ajay              lecturer         35000       11
      6   vijay               lecturer          23000       11
      3   nila               professor          60000       12
```

TO WRITE A PL/SQL BLOCK TO DISPLAY THE EMPLOYEE ID AND EMPLOYEE NAME WHERE DEPARTMENT NUMBER IS 11 USING EXPLICIT CURSORS

```
  1  declare
  2  cursor cenl is select eid,sal from ssempp where dno=11;
  3  ecode ssempp.eid%type;
  4  esal empp.sal%type;
  5  begin
  6  open cenl;
  7  loop
  8  fetch cenl into ecode,esal;
  9  exit when cenl%notfound;
 10  dbms_output.put_line(' Employee code and employee salary are' || ecode ‘and’||
esal);
 11  end loop;
 12  close cenl;
 13* end;
SQL> /
Employee code and employee salary are 1 and 39000
Employee code and employee salary are 5 and 35000
Employee code and employee salary are 6 and 23000

PL/SQL procedure successfully completed.
```

TO WRITE A PL/SQL BLOCK TO UPDATE THE SALARY BY 5000 WHERE THE JOB IS LECTURER , TO CHECK IF UPDATES ARE MADE USING IMPLICIT CURSORS AND TO DISPLAY THE UPDATED TABLE

```
SQL> declare
  2  county number;
  3  begin
  4  update ssempp set sal=sal+10000 where job='lecturer';
  5  county:= sql%rowcount;
  6  if county > 0 then
  7  dbms_output.put_line('The number of rows are '|| county);
  8  end if;
  9  if sql %found then
 10  dbms_output.put_line('Employee record modification successful');
 11  else if sql%notfound then
 12  dbms_output.put_line('Employee record is not found');
 13  end if;
 14  end if;
 15  end;
 16  /
The number of rows are 3

Employee record modification successful

PL/SQL procedure successfully completed.

SQL> select * from ssempp;

     EID   ENAME              JOB                    SAL       DNO
--------- -------------------- -------------------- ---------        ---------
       1       nala              lecturer             44000       11
       2       kala              seniorlecturer        20000       12
       5       ajay              lecturer             40000       11
       6       vijay             lecturer             28000       11
       3       nila             professor             60000       12
```

RESULT

Thus the various operations were performed on the table using cursors and the output was verified.

PROCEDURES AND FUNCTIONS

EX NO: 11
DATE:

AIM

To write PL/SQL programs that execute the concept of functions and procedures.

DEFINITION

A procedure or function is a logically grouped set of SQL and PL/SQL statements that perform a specific task. They are essentially sub-programs. Procedures and functions are made up of,

- Declarative part
- Executable part
- Optional exception handling part

These procedures and functions do not show the errors.

KEYWORDS AND THEIR PURPOSES

REPLACE: It recreates the procedure if it already exists.
PROCEDURE: It is the name of the procedure to be created.
ARGUMENT: It is the name of the argument to the procedure. Paranthesis can be omitted if no arguments are present.
IN: Specifies that a value for the argument must be specified when calling the procedure ie. used to pass values to a sub-program. This is the default parameter.
OUT: Specifies that the procedure passes a value for this argument back to it's calling environment after execution ie. used to return values to a caller of the sub-program.
INOUT: Specifies that a value for the argument must be specified when calling the procedure and that procedure passes a value for this argument back to it's calling environment after execution.
RETURN: It is the datatype of the function's return value because every function must return a value, this clause is required.

PROCEDURES – SYNTAX

```
 create or replace procedure <procedure name> (argument {in,out,inout} datatype )
{is,as}
 variable declaration;
 constant declaration;
 begin
 PL/SQL subprogram body;
 exception
 exception PL/SQL block;
 end;
```

FUNCTIONS – SYNTAX

```
 create or replace function <function name> (argument in datatype,……) return
datatype {is,as}
 variable declaration;
 constant declaration;
 begin
 PL/SQL subprogram body;
 exception
 exception PL/SQL block;
 end;
```

CREATING THE TABLE 'ITITEMS' AND DISPLAYING THE CONTENTS

```
SQL> create table ititems(itemid number(3), actualprice number(5), ordid number(4),
prodid number(4));

Table created.

SQL> insert into ititems values(101, 2000, 500, 201);

1 row created.

SQL> insert into ititems values(102, 3000, 1600, 202);

1 row created.

SQL> insert into ititems values(103, 4000, 600, 202);

1 row created.

SQL> select * from ititems;

ITEMID  ACTUALPRICE     ORDID   PRODID
---------    -----------         --------    ---------
     101        2000                500       201
     102        3000              1600       202
     103        4000                600       202
```

PROGRAM FOR GENERAL PROCEDURE – SELECTED RECORD'S PRICE IS INCREMENTED BY 500 , EXECUTING THE PROCEDURE CREATED AND DISPLAYING THE UPDATED TABLE

```
SQL> create procedure itsum(identity number, total number) is price number;
  2  null_price exception;
  3  begin
  4  select actualprice into price from ititems where itemid=identity;
  5  if price is null then
  6  raise null_price;
  7  else
  8  update ititems set actualprice=actualprice+total where itemid=identity;
  9  end if;
 10  exception
 11  when null_price then
 12  dbms_output.put_line('price is null');
 13  end;
 14  /

Procedure created.

SQL> exec itsum(101, 500);

PL/SQL procedure successfully completed.

SQL> select * from ititems;

 ITEMID   ACTUALPRICE     ORDID    PRODID
---------  -----------  ---------  ---------
      101         2500        500        201
      102         3000       1600        202
      103         4000        600        202
```

PROCEDURE FOR ‘IN’ PARAMETER – CREATION, EXECUTION

```
SQL> set serveroutput on;
SQL> create procedure yyy (a IN number) is price number;
  2  begin
  3  select actualprice into price from ititems where itemid=a;
  4  dbms_output.put_line('Actual price is ' || price);
  5  if price is null then
  6  dbms_output.put_line('price is null');
  7  end if;
  8  end;
  9  /

Procedure created.

SQL> exec yyy(103);
Actual price is 4000

PL/SQL procedure successfully completed.
```

PROCEDURE FOR ‘OUT’ PARAMETER – CREATION, EXECUTION

```
SQL> set serveroutput on;
SQL> create procedure zzz (a in number, b out number) is identity number;
  2  begin
  3  select ordid into identity from ititems where itemid=a;
  4  if identity<1000 then
  5   b:=100;
  6  end if;
  7  end;
  8  /

Procedure created.

SQL> declare
  2  a number;
  3  b number;
  4  begin
  5  zzz(101,b);
  6  dbms_output.put_line('The value of b is '|| b);
  7  end;
  8  /
The value of b is 100

PL/SQL procedure successfully completed.
```

PROCEDURE FOR ‘INOUT’ PARAMETER – CREATION, EXECUTION

```
SQL> create procedure itit ( a in out number) is
  2  begin
  3  a:=a+1;
  4  end;
  5  /

Procedure created.

SQL> declare
  2  a number:=7;
  3  begin
  4  itit(a);
  5  dbms_output.put_line(‘The updated value is ‘||a);
  6  end;
  7  /

The updated value is 8
```

PL/SQL procedure successfully completed.

CREATE THE TABLE 'ITTRAIN' TO BE USED FOR FUNCTIONS

```
SQL>create table ittrain ( tno number(10), tfare number(10));

Table created.

SQL>insert into ittrain values (1001, 550);

1 row created.

SQL>insert into ittrain values (1002, 600);

1 row created.

SQL>select * from ittrain;

    TNO      TFARE
  ---------  ------------
   1001       550
   1002       600
```

PROGRAM FOR FUNCTION AND IT'S EXECUTION

```
SQL> create function aaa (trainnumber number) return number is
  2  trainfunction ittrain.tfare % type;
  3  begin
  4  select tfare into trainfunction from ittrain where tno=trainnumber;
  5  return(trainfunction);
  6  end;
  7  /
Function created.

SQL> set serveroutput on;
SQL> declare
  2  total number;
  3  begin
  4  total:=aaa (1001);
  5  dbms_output.put_line('Train fare is Rs. '||total);
  6  end;
  7  /
Train fare is Rs.550

PL/SQL procedure successfully completed.
```

FACTORIAL OF A NUMBER USING FUNCTION — PROGRAM AND EXECUTION

```
 SQL>  create function itfact (a number) return number is
  2   fact number:=1;
  3   b number;
  4   begin
  5   b:=a;
  6   while b>0
  7   loop
  8   fact:=fact*b;
  9   b:=b-1;
 10    end loop;
 11  return(fact);
 12  end;
 13  /

Function created.

 SQL> set serveroutput on;
SQL> declare
  2  a number:=7;
  3  f number(10);
  4  begin
  5  f:=itfact(a);
  6  dbms_output.put_line(‘The factorial of the given number is’||f);
  7 end;
  8  /

The factorial of the given number is 5040

PL/SQL procedure successfully completed.
```

RESULT

Thus the PL/SQL programs were executed and their respective outputs were verified.

EMBEDDED SQL

EX NO: 12
DATE:

AIM:

To execute the embedded SQL program in JAVA.

CODE:

```
import java.sql.*;
class emb
{
public static void main(String args[]) throws Exception
{
Class.forName("sun.jdbc.odbc.JdbcOdbcDriver");
String  s="insert into table1 values ("+args[0]+")";
Connection con = DriverManager.getConnection("jdbc:odbc:aarthi");
Statement st=con.createStatement();
int i =st.executeUpdate(s);
if(i>0)
System.out.println("Data Inserted" +i);
else
System.out.println("Data not inserted");
con.close();
}
}
```

OUTPUT:

Table before insertion:

Table1

Id

```
D:\Java\jdk1.5.0\bin>javac embedded1.java
D:\Java\jdk1.5.0\bin>java embedded1 1001
Data Inserted1

D:\Java\jdk1.5.0\bin>java embedded1 1002
Data Inserted1

D:\Java\jdk1.5.0\bin>java embedded1 1003
Data Inserted1

D:\Java\jdk1.5.0\bin>java embedded1 1004
Data Inserted1

D:\Java\jdk1.5.0\bin>
```

Table after insertion:

Table1

Id
1001
1001
1002
1003
1004

<u>RESULT:</u>

Thus the embedded SQL application is implemented successfully.

Application Development using appropriate Front End and Back End Tools

EX NO: 13
DATE:
AIM:

To develop a JAVA application for employee information system.

USING MySQL:

ALGORITHM:

Step 1: Start.
Step 2: Import required packages.
Step 3: Invoke the database driver and create a connection to the database.
Step 4: Display the list of all operations and get the user's choice.
Step 5: If the choice is 1, display the whole contents of the table.
Step 6: If the choice is 2, get the required data from the user and add a new recordto the database.
Step 7: If the choice is 3, get the eid of the required employee and delete the record from the table.
Step 8: If the choice is 4, ask the user as to which column must be updated.
Step 8i: If the choice is 1, list the options for salary updation and get the user's choice.
Step 8ii: If the choice is 1, get the increment amount and increment the salaryof all the employees.
Step 8iii: If the choice is 2, get the eid and the new salary of the employee and update the salary.
Step 8iv: If the choice 2, get the new bonus for all the employees and update itin the database.
Step 8v: If the choice is 3, get the eid and the new role of the employee and update it in the database.
Step 9: If the choice is 5, display the total count of employees in the database.
Step 10: If the choice is 6, get the eid of the employee, calculate the pay including the bonus and print it.
Step 11: Repeat steps 4-10, if the user wants to continue.
Step 12: Close the connection to the database.
Step 13: End.

PROGRAM:

a) For accessing table in MySQL:
Table Creation:

```
create table employee_db(
eid int,
ename varchar(20),
salary int,
bonus int,
role varchar(20));
```

JDBC Program:

```
import java.sql.*;
import java.util.Scanner;
public class EmployeeDB
{
	public void display(Statement stmt)
	{
		try
		{
			String q="select * from employee_db";
			ResultSet r=stmt.executeQuery(q);
			int i=0;
			if(r.next()==false)
			{
```

```
                System.out.println("The table is empty.");
                return;
            }
            do
            {
                System.out.println("Row "+(++i)+" : ");
                System.out.println("EID        : "+r.getString("EID"));
                System.out.println("ENAME : "+r.getString("ENAME"));
                System.out.println("SALARY : "+r.getString("SALARY"));
                System.out.println("BONUS : "+r.getString("BONUS"));
                System.out.println("ROLE     : "+r.getString("ROLE"));
                System.out.println();
            }while(r.next());
        }
        catch(Exception e)
        {
            System.out.println(e);
        }
    }
    public void add(Statement stmt,Scanner s)
    {
        try
        {
            System.out.println("Enter EID : ");int
            eid=s.nextInt();
            s.nextLine(); System.out.println("Enter
            ENAME : "); String ename=s.nextLine();
            System.out.println("Enter SALARY : ");
            int salary=s.nextInt();
            s.nextLine(); System.out.println("Enter
            BONUS% : ");int bonus=s.nextInt();
            s.nextLine(); System.out.println("Enter
            ROLE : ");String role=s.nextLine();
            String q=String.format("insert into employee_db values(%d,'%s',%d,
%d,'%s')",eid,ename,salary,bonus,role);
            int status=stmt.executeUpdate(q);
            if(status==1)
                System.out.println("1 row created.");
             else
                System.out.println("Couldn't create the row!");
        }
        catch(Exception e)
        {
                System.out.println(e);
        }
}
public void delete(Statement stmt,Scanner s)
{
        try
        {
                System.out.println("Enter the EID of the record to be deleted : ");

                int eid=s.nextInt();
                s.nextLine();
                String q=String.format("delete from employee_db where eid=%d",eid);
                int status=stmt.executeUpdate(q);
                if(status==1)
                        System.out.println("1 row deleted.");
                 else
                        System.out.println("Couldn't delete the row!");
        }
```

```
            catch(Exception e)
            {
                  System.out.println(e);
            }
public void update(Statement stmt,Scanner s)
      {
            try
            {
                  String q; int
                  status;
                  System.out.println("Select the column to be updated : ");
                  System.out.println("1. SALARY");
                  System.out.println("2. BONUS");
                  System.out.println("3. ROLE");
                  System.out.println("Enter your choice : ");int
                  ch=s.nextInt();
                  s.nextLine();
                  if(ch==1)
                  {
                        System.out.println("SALARY UPDATE MENU");
                         System.out.println("1. Increment salary for everyone");
                        System.out.println("2. Update a new salary for an employee");
                        System.out.println("Enter your choice : ");
                        int c=s.nextInt();
                        s.nextLine();
                        if(c==1)
                        {
                              System.out.println("Enter the increment amount : ");
                              int incr=s.nextInt();
                              s.nextLine();
                              q=String.format("update employee_db set salary=salary+%d",
 incr);
                              status=stmt.executeUpdate(q);
                              if(status==1)
                                    System.out.println("1 row updated");
                              else if(status>1)
                                    System.out.println(status+" rows updated.");
                               else
                                    System.out.println("Couldn't update!");
                        }
```

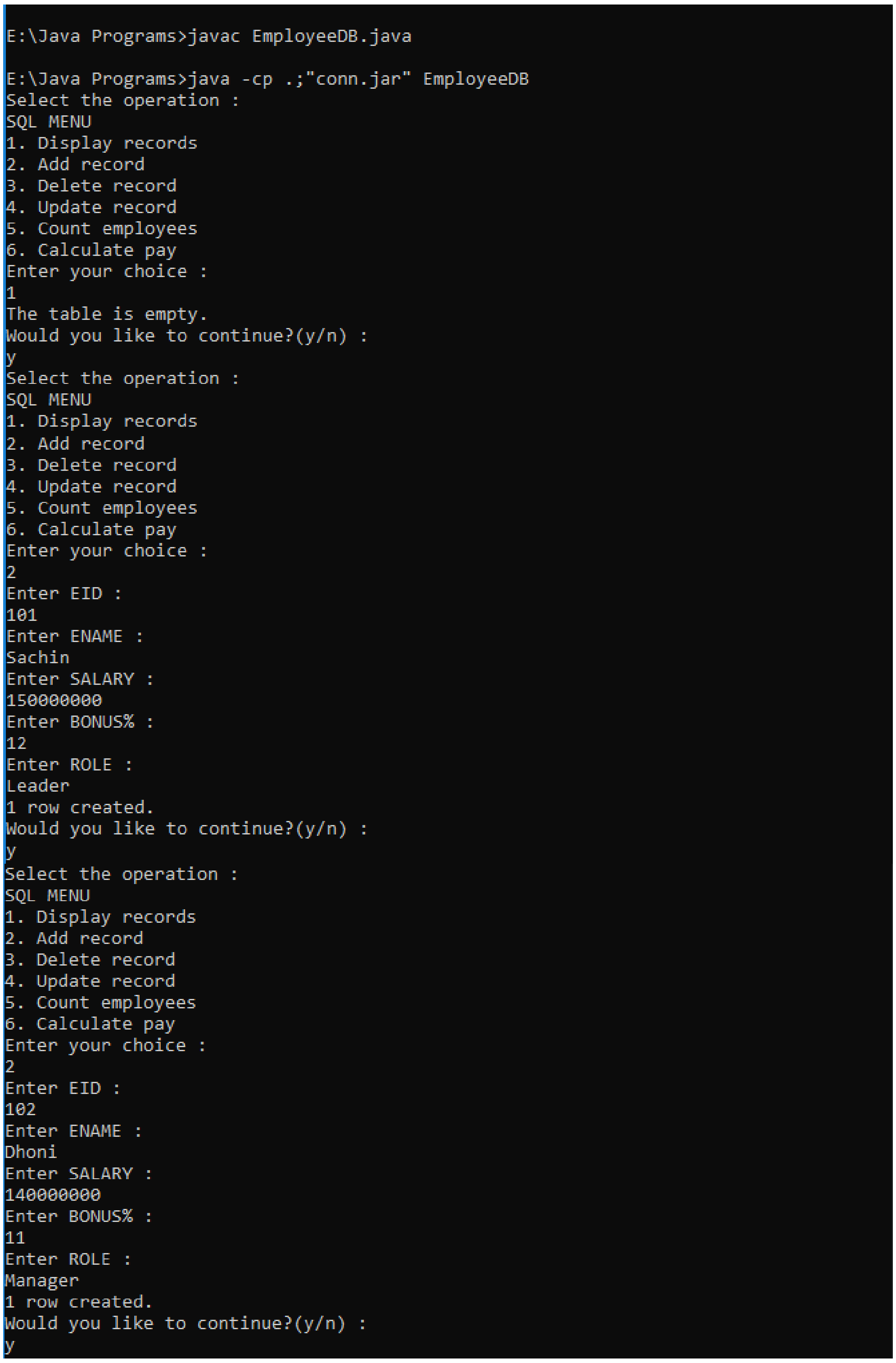
```
                    else if(c==2)
                    {
                       System.out.println("Enter the EID of the employee : ");
                       int eid=s.nextInt();
                       s.nextLine();
                       System.out.println("Enter the new salary : ");
                       int sal=s.nextInt();
                       s.nextLine();
                       q=String.format("update employee_db set SALARY=%d where
                       EID = %d”,sal,eid);
                       status=stmt.executeUpdate(q);
                       if(status!=0)
                                 System.out.println("1 row updated ");
                       else
                                 System.out.println("Couldn’t update! ");
}
else
          System.out.println("Invalid Command!");
                    }
                    else if(ch==2)
                    {
                          System.out.println("Enter the new bonus for all employees : ");
                          int b=s.nextInt();
                          s.nextLine();
                          q=String.format("update employee_db set bonus=%d",b);
                          status=stmt.executeUpdate(q);
                          if(status==1)
                                System.out.println("1 row updated.");
                          else if(status>1)
                                System.out.println(status+" rows updated.");
                          else
                                System.out.println("Couldn't update!");
                    }
                    else if(ch==3)
                    {
                             System.out.println("Enter the EID of the employee : ");
                             int eid=s.nextInt();
                             s.nextLine();
                             System.out.println("Enter the new ROLE : ");
                             String role=s.nextLine();
                             q=String.format("update employee_db set role='%s' where
                    eid=%d",role,id);
                    status=stmt.executeUpdate(q);
                    if(status!=0)
                        System.out.println(status+" row updated");
                    else
                        System.out.println("Couldn't update!");
                }
                else
                    System.out.println("Invalid Command!");

        catch(Exception e)
        {
            System.out.println(e);
        }
}
public void count(Statement stmt)
{
try

{
        String q="select count(*) from employee_db";
        ResultSet r=stmt.executeQuery(q);
        r.next();
        System.out.println("No. of employee in the database :
"+r.getString("COUNT(*)"));
}
catch(Exception e)
{
        System.out.println(e);
}
}
public void pay(Statement stmt,Scanner s)
{
 try
{
        System.out.println("Enter the EID of the employee : ");
         int eid=s.nextInt();
        s.nextLine();
        String q=String.format("select salary,bonus from employee_db where
eid=%d",eid);
        ResultSet r=stmt.executeQuery(q); r.next();
        int sal=r.getInt("SALARY"); int bon=r.getInt("BONUS"); double
pay=(1+(bon/100.0))*sal;
        System.out.println("Employee's pay : "+pay);
}
catch(Exception e)
{
        System.out.println(e);
}
}
public static void main(String[] args)
{
        Scanner s=new Scanner(System.in); try
{
Class.forName("com.mysql.cj.jdbc.Driver");
Connection
con=DriverManager.getConnection("jdbc:mysql://localhost:3306/db","root","root");
char c;
do
{
        System.out.println("Select the operation : ");
        System.out.println("SQL MENU");
        System.out.println("1. Display records");
        System.out.println("2. Add record");
         System.out.println("3. Delete record");
        System.out.println("4. Update record");
        System.out.println("5. Count employees");
        System.out.println("6. Calculate pay");
        System.out.println("Enter your choice : ");
        int ch=s.nextInt();
        s.nextLine();
        EmployeeDB e=new EmployeeDB();
        Statement stmt=con.createStatement();
        switch(ch)
        {
        case 1:         e.display(stmt);
                break;
        case 2:         e.add(stmt,s);
                break;
        case 3:         e.delete(stmt,s);
                break;
        case 4:         e.update(stmt,s);
                break;
        case 5:         e.count(stmt);
                break;
        case 6:         e.pay(stmt,s);
                break;
        default:System.out.println("Invalid Command!");
        }
System.out.println("Would you like to continue?(y/n) : ");
c=s.nextLine().charAt(0);
}while(c=='y'||c=='Y');
con.close();
```

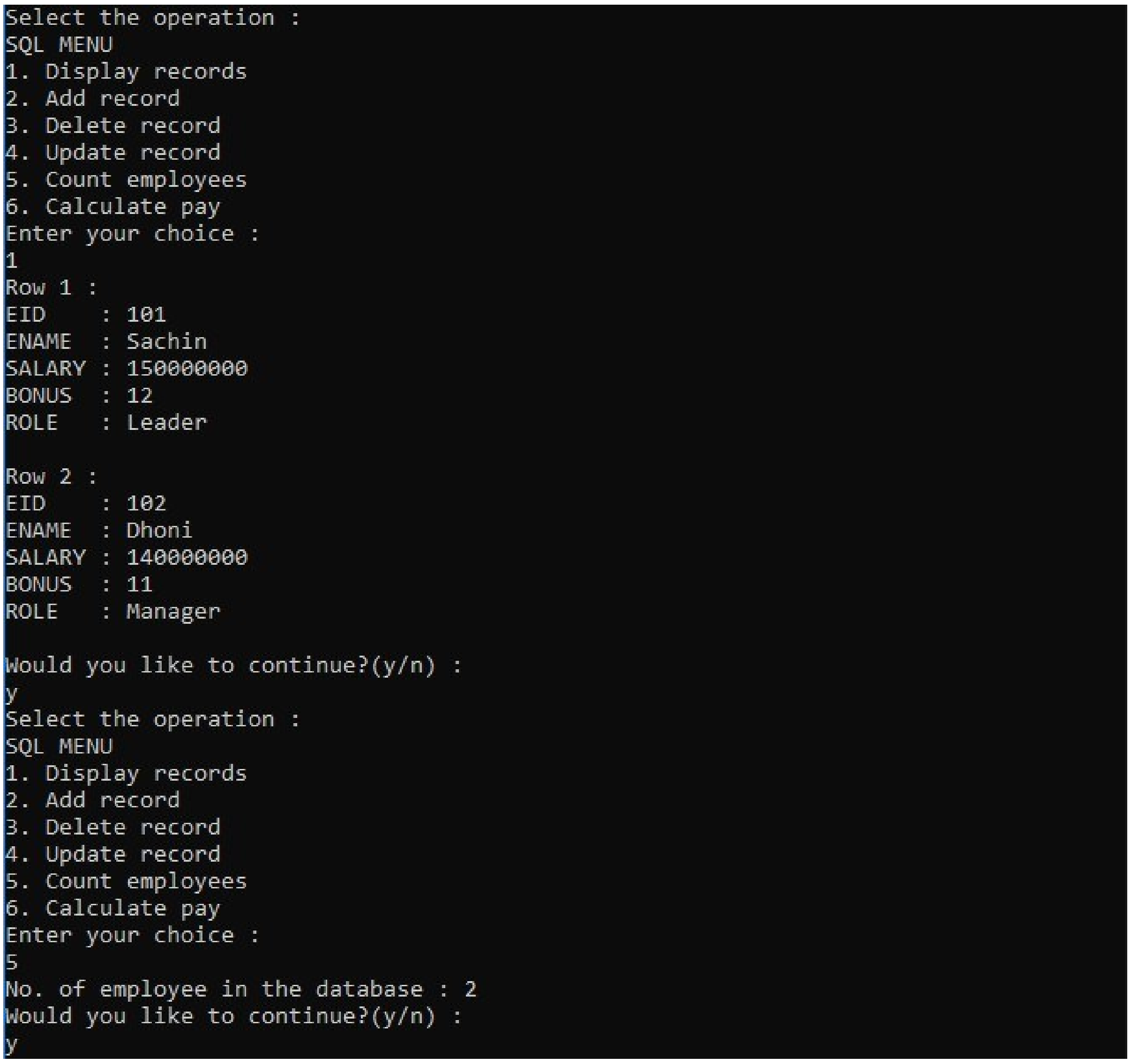
```
}
catch(Exception e)
{
        System.out.println(e);
}
s.close();
}
}
```

OUTPUT:



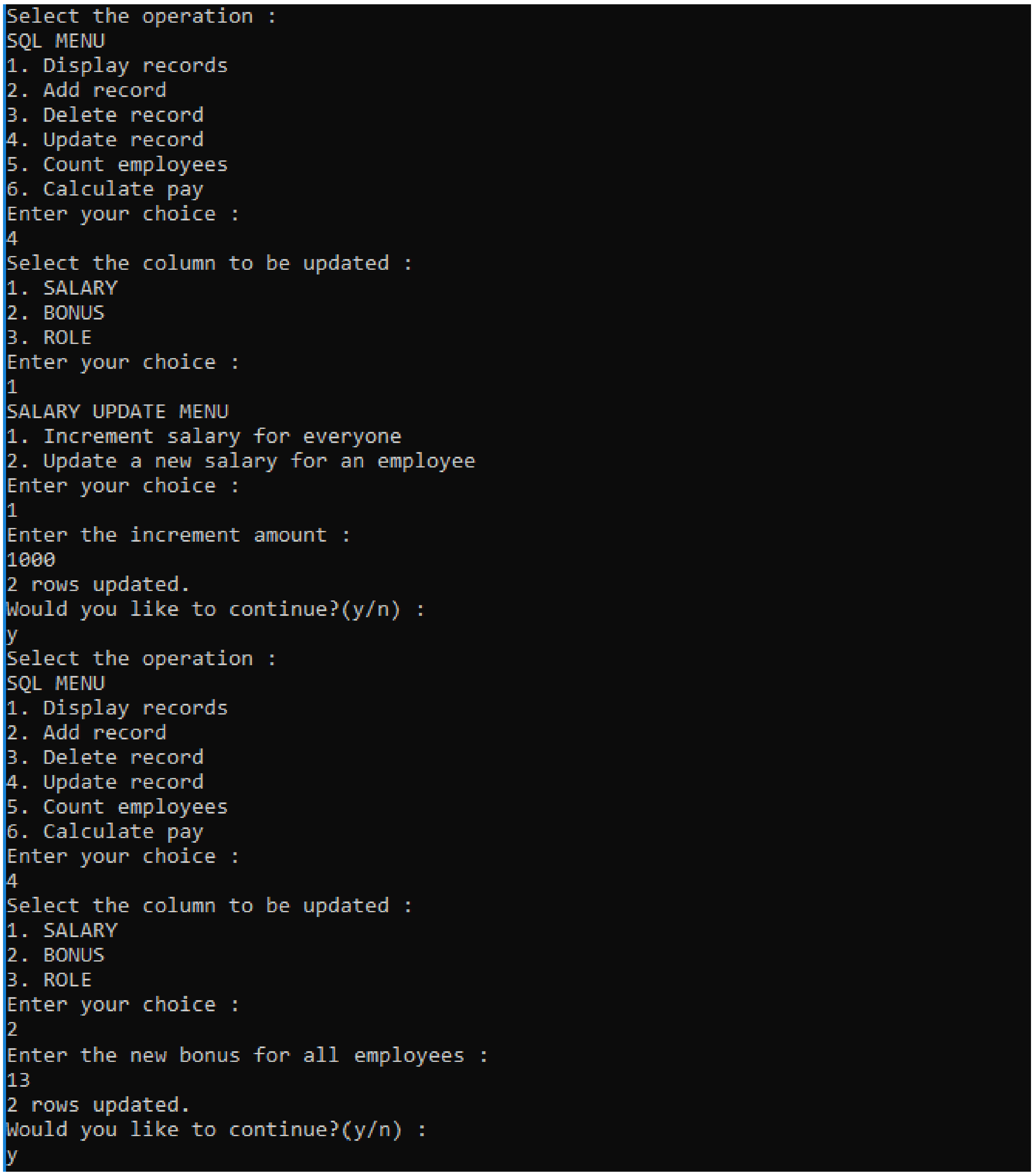
```
E:\Java Programs>javac EmployeeDB.java

E:\Java Programs>java -cp .;"conn.jar" EmployeeDB
Select the operation :
SQL MENU
1. Display records
2. Add record
3. Delete record
4. Update record
5. Count employees
6. Calculate pay
Enter your choice :
1
The table is empty.
Would you like to continue?(y/n) :
y
Select the operation :
SQL MENU
1. Display records
2. Add record
3. Delete record
4. Update record
5. Count employees
6. Calculate pay
Enter your choice :
2
Enter EID :
101
Enter ENAME :
Sachin
Enter SALARY :
150000000
Enter BONUS% :
12
Enter ROLE :
Leader
1 row created.
Would you like to continue?(y/n) :
y
Select the operation :
SQL MENU
1. Display records
2. Add record
3. Delete record
4. Update record
5. Count employees
6. Calculate pay
Enter your choice :
2
Enter EID :
102
Enter ENAME :
Dhoni
Enter SALARY :
140000000
Enter BONUS% :
11
Enter ROLE :
Manager
1 row created.
Would you like to continue?(y/n) :
y
```

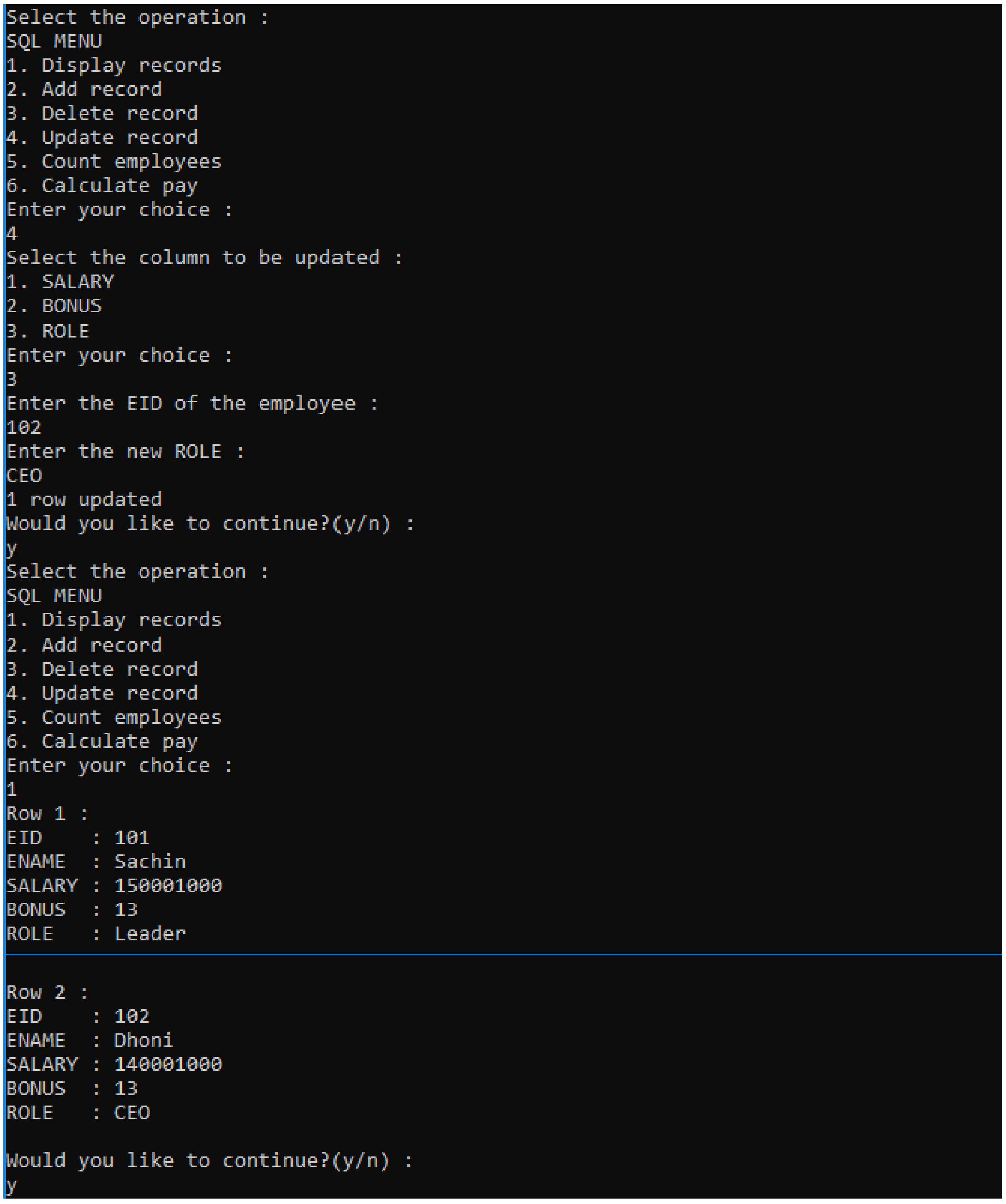

```
Select the operation :
SQL MENU
1. Display records
2. Add record
3. Delete record
4. Update record
5. Count employees
6. Calculate pay
Enter your choice :
1
Row 1 :
EID    : 101
ENAME  : Sachin
SALARY : 150000000
BONUS  : 12
ROLE   : Leader

Row 2 :
EID    : 102
ENAME  : Dhoni
SALARY : 140000000
BONUS  : 11
ROLE   : Manager

Would you like to continue?(y/n) :
y
Select the operation :
SQL MENU
1. Display records
2. Add record
3. Delete record
4. Update record
5. Count employees
6. Calculate pay
Enter your choice :
5
No. of employee in the database : 2
Would you like to continue?(y/n) :
y
```



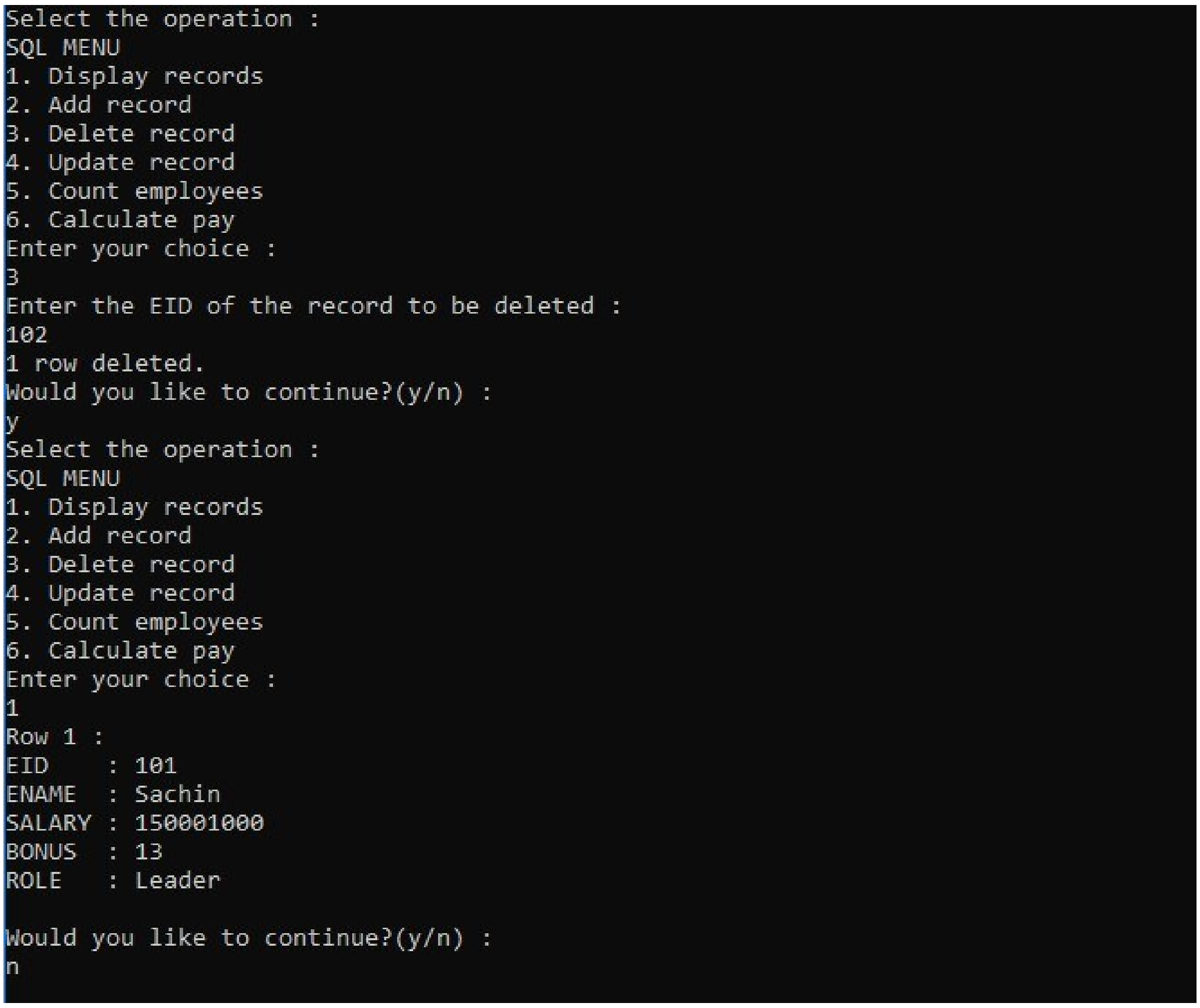
```
Select the operation :
SQL MENU
1. Display records
2. Add record
3. Delete record
4. Update record
5. Count employees
6. Calculate pay
Enter your choice :
4
Select the column to be updated :
1. SALARY
2. BONUS
3. ROLE
Enter your choice :
1
SALARY UPDATE MENU
1. Increment salary for everyone
2. Update a new salary for an employee
Enter your choice :
1
Enter the increment amount :
1000
2 rows updated.
Would you like to continue?(y/n) :
y
Select the operation :
SQL MENU
1. Display records
2. Add record
3. Delete record
4. Update record
5. Count employees
6. Calculate pay
Enter your choice :
4
Select the column to be updated :
1. SALARY
2. BONUS
3. ROLE
Enter your choice :
2
Enter the new bonus for all employees :
13
2 rows updated.
Would you like to continue?(y/n) :
y
```



```
Select the operation :
SQL MENU
1. Display records
2. Add record
3. Delete record
4. Update record
5. Count employees
6. Calculate pay
Enter your choice :
4
Select the column to be updated :
1. SALARY
2. BONUS
3. ROLE
Enter your choice :
3
Enter the EID of the employee :
102
Enter the new ROLE :
CEO
1 row updated
Would you like to continue?(y/n) :
y
Select the operation :
SQL MENU
1. Display records
2. Add record
3. Delete record
4. Update record
5. Count employees
6. Calculate pay
Enter your choice :
1
Row 1 :
EID    : 101
ENAME  : Sachin
SALARY : 150001000
BONUS  : 13
ROLE   : Leader

Row 2 :
EID    : 102
ENAME  : Dhoni
SALARY : 140001000
BONUS  : 13
ROLE   : CEO

Would you like to continue?(y/n) :
y
```



```
Select the operation :
SQL MENU
1. Display records
2. Add record
3. Delete record
4. Update record
5. Count employees
6. Calculate pay
Enter your choice :
3
Enter the EID of the record to be deleted :
102
1 row deleted.
Would you like to continue?(y/n) :
y
Select the operation :
SQL MENU
1. Display records
2. Add record
3. Delete record
4. Update record
5. Count employees
6. Calculate pay
Enter your choice :
1
Row 1 :
EID    : 101
ENAME  : Sachin
SALARY : 150001000
BONUS  : 13
ROLE   : Leader

Would you like to continue?(y/n) :
n
```

RESULT:

The JAVA application for employee information system was implemented and executed successfully.

Distributed Data Base for BOOK STORE

EX NO: 14

DATE:

AIM:

To implement distributed database for bookstore

Queries

Create database site1;

Query OK 1 row affected

Use site1;

Database changed

Create table books (isbn ibt, author varchar (10), topic varchar (100), totalstock int, price int);

Table created

Insert into books values (1001,'tanenbum','database systems',20,200.01);

1 row created

Insert into books values (1002,'sudarshan','advance database systems',30,500.01);

1 row created

Insert into books values (1003,'korth','concepts of database systems',40,600.01);

1 row created

Insert into books values (1004,'navathe','fundamentals of database systems',50,650.01);

1 row created

Insert into books values (1005,'cannolly','database systems:practicals',350,350.01);

1 row created

Insert into books values (1006,'begg','database approach',50,100.01);

1 row created

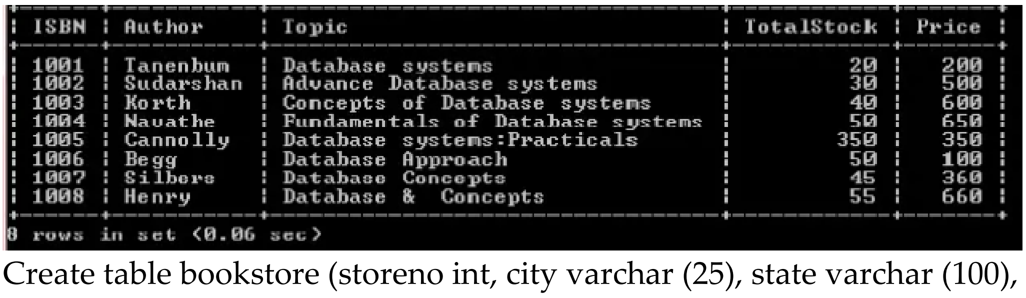
Insert into books values (1007,'silbers','database cocepts',45,360);

1 row created

Insert into books values (1008,'henry','database & concepts',55,660);

1 row created

Select * from books



```
+------+-----------+----------------------------------+------------+-------+
| ISBN | Author    | Topic                            | TotalStock | Price |
+------+-----------+----------------------------------+------------+-------+
| 1001 | Tanenbum  | Database systems                 |         20 |   200 |
| 1002 | Sudarshan | Advance Database systems         |         30 |   500 |
| 1003 | Korth     | Concepts of Database systems     |         40 |   600 |
| 1004 | Navathe   | Fundamentals of Database systems |         50 |   650 |
| 1005 | Cannolly  | Database systems:Practicals      |        350 |   350 |
| 1006 | Begg      | Database Approach                |         50 |   100 |
| 1007 | Silbers   | Database Concepts                |         45 |   360 |
| 1008 | Henry     | Database & Concepts              |         55 |   660 |
+------+-----------+----------------------------------+------------+-------+
8 rows in set (0.06 sec)
```

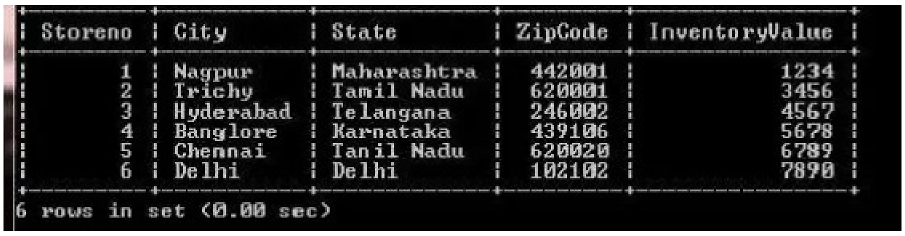
Create table bookstore (storeno int, city varchar (25), state varchar (100), zipcode int, inventory value int);

Table created

Insert into bookstore values(1,'nagpur','maharashtra',442001,1234);

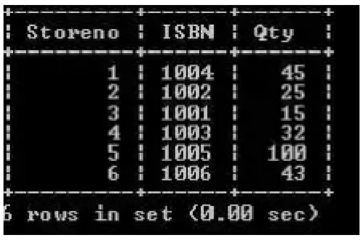
1 row created

Insert into bookstore values(2,’trichy’,’tamil nadu’,620001,3456);
 1 row created
Insert into bookstore values(3,’hyderabad,’telangana’,246002,4567);
 1 row created
Insert into bookstore values(4’banglore’,’karnataka’,439106,5678);
 1 row created
Insert into bookstore values(5,’chennai’,’tamil nadu’,620001,6789);
 1 row created
Insert into bookstore values(6,’delhi’,’delhi’,102102,7890);
 1 row created
Select * from bookstore



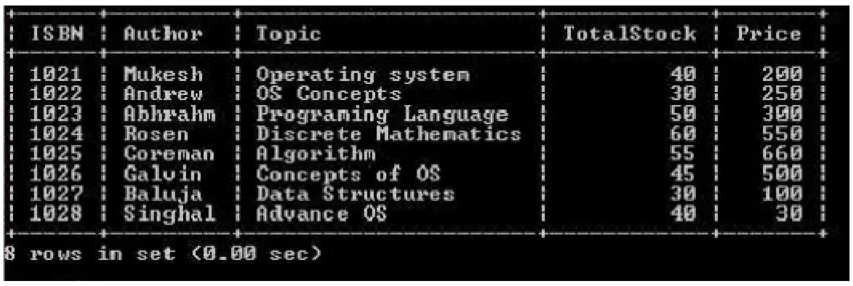
```
+---------+-----------+-------------+---------+----------------+
| Storeno | City      | State       | ZipCode | InventoryValue |
+---------+-----------+-------------+---------+----------------+
|       1 | Nagpur    | Maharashtra | 442001  |           1234 |
|       2 | Trichy    | Tamil Nadu  | 620001  |           3456 |
|       3 | Hyderabad | Telangana   | 246002  |           4567 |
|       4 | Banglore  | Karnataka   | 439106  |           5678 |
|       5 | Chennai   | Tanil Nadu  | 620020  |           6789 |
|       6 | Delhi     | Delhi       | 102102  |           7890 |
+---------+-----------+-------------+---------+----------------+
6 rows in set (0.00 sec)
```

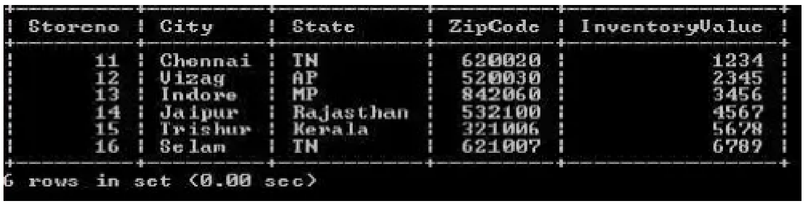
Create table stock (storeno int, isbn varchar (100), qty int);
Table created
Insert into stock values (1,1004,45);
1 row created
Insert into stock values (2,1002,25);
1 row created
Insert into stock values (3,1001,15);
1 row created
Insert into stock values (4,1003,32);
1 row created
Insert into stock values (5,1005,100);
1 row created
Insert into stock values (6,1006,43);
1 row created
Select * from stock



```
+---------+------+-----+
| Storeno | ISBN | Qty |
+---------+------+-----+
|       1 | 1004 |  45 |
|       2 | 1002 |  25 |
|       3 | 1001 |  15 |
|       4 | 1003 |  32 |
|       5 | 1005 | 100 |
|       6 | 1006 |  43 |
+---------+------+-----+
6 rows in set (0.00 sec)
```

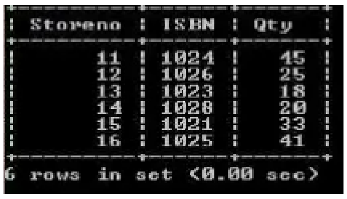
Create database site2;
Query OK 1 row affected
Use site2;
Database changed
Create table books (isbn ibt, author varchar (10), topic varchar (100), totalstock int, price int);

Table created
Insert into books values (1021,'mukesh','operating system',40,200);
1 row created
Insert into books values (1022,'andrew','os concepts',30,250);
1 row created
Insert into books values (1023,'abhrahm','programing language',50,300);
1 row created
Insert into books values (1024,'rosen','discrete mathematics',60,550);
1 row created
Insert into books values (1025,'coreman','algorith',55,660);
1 row created
Insert into books values (1026,'galvin','concepts of os',45,500);
1 row created
Insert into books values (1027,'baluja','data structures',30,100);
1 row created
Insert into books values (1028,'singhal','advance os',40,30);
1 row created
Select * from books

```
+------+---------+----------------------+------------+-------+
| ISBN | Author  | Topic                | TotalStock | Price |
+------+---------+----------------------+------------+-------+
| 1021 | Mukesh  | Operating system     |         40 |   200 |
| 1022 | Andrew  | OS Concepts          |         30 |   250 |
| 1023 | Abhrahm | Programing Language  |         50 |   300 |
| 1024 | Rosen   | Discrete Mathematics |         60 |   550 |
| 1025 | Coreman | Algorithm            |         55 |   660 |
| 1026 | Galvin  | Concepts of OS       |         45 |   500 |
| 1027 | Baluja  | Data Structures      |         30 |   100 |
| 1028 | Singhal | Advance OS           |         40 |    30 |
+------+---------+----------------------+------------+-------+
8 rows in set (0.00 sec)
```
Create table bookstore (storeno int, city varchar (25), state varchar (100), zipcode int, inventory value int);
Table created
Insert into bookstore values(11,'chennai','tn',620020,1234);
1 row created
Insert into bookstore values(12,'vizag','ap',520030,2345);
1 row created
Insert into bookstore values(13,'indore','mp',842060,3456);
1 row created
Insert into bookstore values(14,'jaipur','rajasthan',532100,4567);
1 row created
Insert into bookstore values(15,'trishur','kerla',321006,5678);
1 row created
Insert into bookstore values(16,'selam','tn',621007,6789);
1 row created
Select * from bookstore



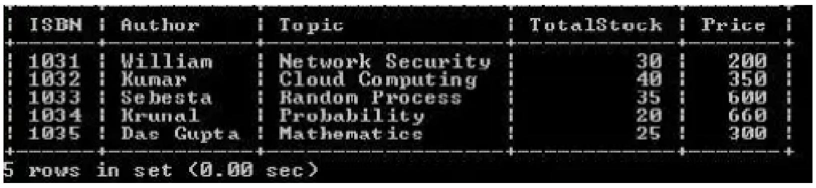
```
+---------+---------+-----------+---------+----------------+
| Storeno | City    | State     | ZipCode | InventoryValue |
+---------+---------+-----------+---------+----------------+
|      11 | Chennai | TN        | 620020  |           1234 |
|      12 | Vizag   | AP        | 520030  |           2345 |
|      13 | Indore  | MP        | 842060  |           3456 |
|      14 | Jaipur  | Rajasthan | 532100  |           4567 |
|      15 | Trishur | Kerala    | 321006  |           5678 |
|      16 | Selam   | TN        | 621007  |           6789 |
+---------+---------+-----------+---------+----------------+
6 rows in set (0.00 sec)
```

Create table stock (storeno int, isbn varchar (100), qty int);
Table created
Insert into stock values (11,1024,45);
1 row created
Insert into stock values (12,1026,25);
1 row created
Insert into stock values (13,1023,18);
1 row created
Insert into stock values (14,1028,20);
1 row created
Insert into stock values (15,1021,33);
1 row created
Insert into stock values (16,1025,41);
1 row created
Select * from stock



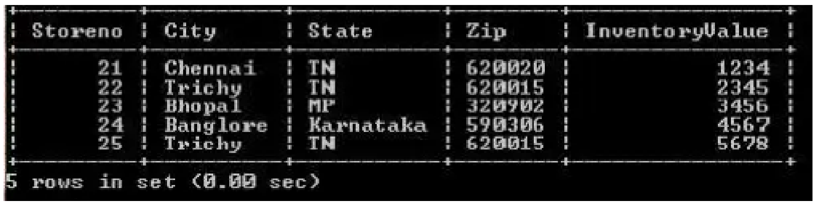
```
+---------+------+-----+
| Storeno | ISBN | Qty |
+---------+------+-----+
|      11 | 1024 |  45 |
|      12 | 1026 |  25 |
|      13 | 1023 |  18 |
|      14 | 1028 |  20 |
|      15 | 1021 |  33 |
|      16 | 1025 |  41 |
+---------+------+-----+
6 rows in set (0.00 sec)
```

Create database site3;
Query OK 1 row affected
Use site3;
Database changed
Create table books (isbn ibt, author varchar (10), topic varchar (100), totalstock int, price int);
Table created
Insert into books values (10031,'william','network security',30,200);
1 row created
Insert into books values (10032,'kumar','cloud computing',40,350);
1 row created
Insert into books values (10033,'sebesta','random process',35,600);
1 row created
Insert into books values (10034,'krunal','proability',20,660);
1 row created
Insert into books values (10035,'dac gupta','mathematics',25,3000);
1 row created
Select * from books



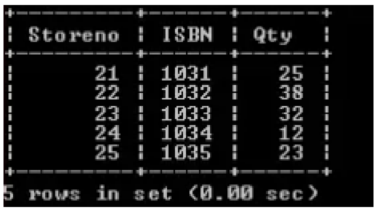
```
| ISBN | Author     | Topic             | TotalStock | Price |
+------+------------+-------------------+------------+-------+
| 1031 | William    | Network Security  |         30 |   200 |
| 1032 | Kumar      | Cloud Computing   |         40 |   350 |
| 1033 | Sebesta    | Random Process    |         35 |   600 |
| 1034 | Krunal     | Probability       |         20 |   660 |
| 1035 | Das Gupta  | Mathematics       |         25 |   300 |
+------+------------+-------------------+------------+-------+
5 rows in set (0.00 sec)
```

Create table bookstore (storeno int, city varchar (25), state varchar (100), zipcode int, inventory value int);
Table created
Insert into bookstore values(21,'chennai','tn',620020,1234);
 1 row created
Insert into bookstore values(22,'trichy','tn',620015,2345);
 1 row created
Insert into bookstore values(23,'bhopal','mp',320902,3456);
 1 row created
Insert into bookstore values(24,'banglore','karnataka',590306,4567);
 1 row created
Insert into bookstore values(25,'trichy','tn',620015,5678);
 1 row created
Select * from bookstore



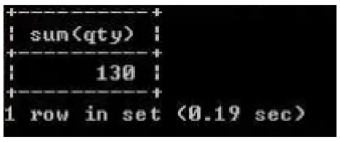
```
+---------+----------+-----------+--------+----------------+
| Storeno | City     | State     | Zip    | InventoryValue |
+---------+----------+-----------+--------+----------------+
|      21 | Chennai  | TN        | 620020 |           1234 |
|      22 | Trichy   | TN        | 620015 |           2345 |
|      23 | Bhopal   | MP        | 320902 |           3456 |
|      24 | Banglore | Karnataka | 590306 |           4567 |
|      25 | Trichy   | TN        | 620015 |           5678 |
+---------+----------+-----------+--------+----------------+
5 rows in set (0.00 sec)
```

Create table stock (storeno int, isbn varchar (100), qty int);
Table created
Insert into stock values (21,1031,25);
1 row created
Insert into stock values (22,1032,38);
1 row created
Insert into stock values (23,1033,32);
1 row created
Insert into stock values (24,1034,12);
1 row created
Insert into stock values (25,1035,23);
1 row created
Select * from stock



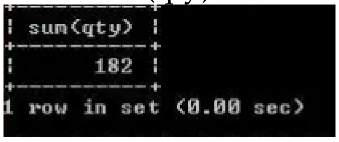
```
+---------+------+-----+
| Storeno | ISBN | Qty |
+---------+------+-----+
|      21 | 1031 |  25 |
|      22 | 1032 |  38 |
|      23 | 1033 |  32 |
|      24 | 1034 |  12 |
|      25 | 1035 |  23 |
+---------+------+-----+
5 rows in set (0.00 sec)
```

Use site3;'dtabase changed
Select sun(qty) from site3.stock;



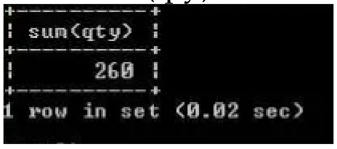
```
+----------+
| sum(qty) |
+----------+
|      130 |
+----------+
1 row in set (0.19 sec)
```

Select sun(qty) from site2.stock;



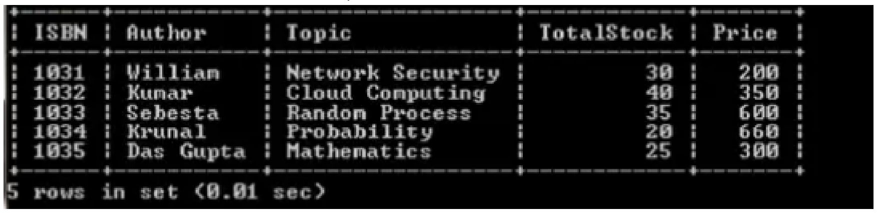
```
+----------+
| sum(qty) |
+----------+
|      182 |
+----------+
1 row in set (0.00 sec)
```

Select sun(qty) from site1.stock;



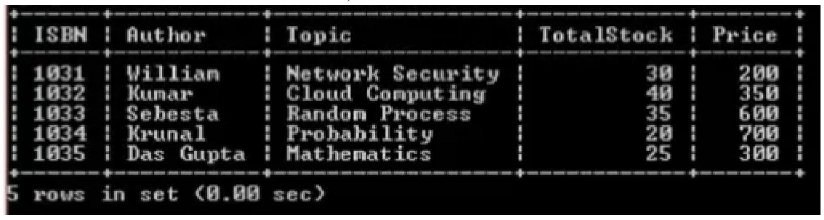
```
+----------+
| sum(qty) |
+----------+
|      260 |
+----------+
1 row in set (0.02 sec)
```

Use site1
Database changed
Select * from site3.books;



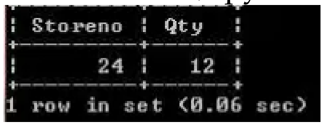
```
+------+-----------+------------------+------------+-------+
| ISBN | Author    | Topic            | TotalStock | Price |
+------+-----------+------------------+------------+-------+
| 1031 | William   | Network Security |         30 |   200 |
| 1032 | Kumar     | Cloud Computing  |         40 |   350 |
| 1033 | Sebesta   | Random Process   |         35 |   600 |
| 1034 | Krunal    | Probability      |         20 |   660 |
| 1035 | Das Gupta | Mathematics      |         25 |   300 |
+------+-----------+------------------+------------+-------+
5 rows in set (0.01 sec)
```

Update site3.books set price =700 where isbn= 1034;
1 row updated
Select * from site3.books;



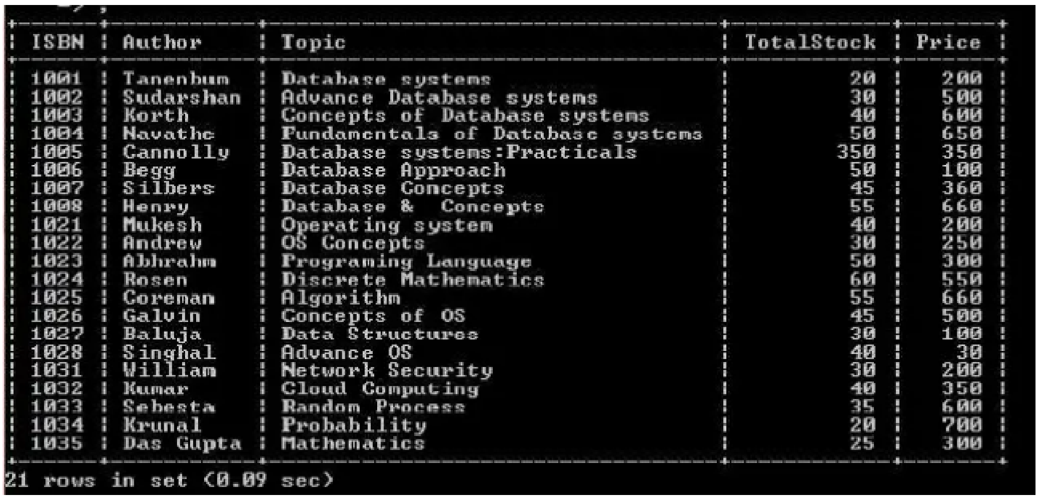
```
+------+-----------+------------------+------------+-------+
| ISBN | Author    | Topic            | TotalStock | Price |
+------+-----------+------------------+------------+-------+
| 1031 | William   | Network Security |         30 |   200 |
| 1032 | Kumar     | Cloud Computing  |         40 |   350 |
| 1033 | Sebesta   | Random Process   |         35 |   600 |
| 1034 | Krunal    | Probability      |         20 |   700 |
| 1035 | Das Gupta | Mathematics      |         25 |   300 |
+------+-----------+------------------+------------+-------+
5 rows in set (0.00 sec)
```

Use site2;
Database changed
Select storeno, qty fromsite3.stock where isbn=1034;



```
| Storeno | Qty  |
+---------+------+
|      24 |   12 |
+---------+------+
1 row in set (0.06 sec)
```

Use site2
Database changed
Select * from site1.books union select * from site2.books union Select * from site3.books

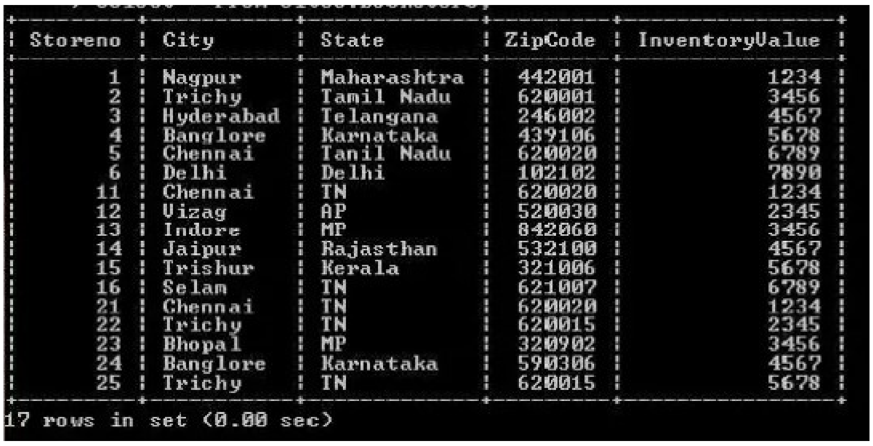


```
+------+------------+------------------------------------+------------+-------+
| ISBN | Author     | Topic                              | TotalStock | Price |
+------+------------+------------------------------------+------------+-------+
| 1001 | Tanenbum   | Database systems                   |         20 |   200 |
| 1002 | Sudarshan  | Advance Database systems           |         30 |   500 |
| 1003 | Korth      | Concepts of Database systems       |         40 |   600 |
| 1004 | Navathe    | Fundamentals of Database systems   |         50 |   650 |
| 1005 | Cannolly   | Database systems:Practicals        |        350 |   350 |
| 1006 | Begg       | Database Approach                  |         50 |   100 |
| 1007 | Silbers    | Database Concepts                  |         45 |   360 |
| 1008 | Henry      | Database &  Concepts               |         55 |   660 |
| 1021 | Mukesh     | Operating system                   |         40 |   200 |
| 1022 | Andrew     | OS Concepts                        |         30 |   250 |
| 1023 | Abhrahm    | Programing Language                |         50 |   300 |
| 1024 | Rosen      | Discrete Mathematics               |         60 |   550 |
| 1025 | Coreman    | Algorithm                          |         55 |   660 |
| 1026 | Galvin     | Concepts of OS                     |         45 |   500 |
| 1027 | Baluja     | Data Structures                    |         30 |   100 |
| 1028 | Singhal    | Advance OS                         |         40 |    30 |
| 1031 | William    | Network Security                   |         30 |   200 |
| 1032 | Kumar      | Cloud Computing                    |         40 |   350 |
| 1033 | Sebesta    | Random Process                     |         35 |   600 |
| 1034 | Krunal     | Probability                        |         20 |   700 |
| 1035 | Das Gupta  | Mathematics                        |         25 |   300 |
+------+------------+------------------------------------+------------+-------+
21 rows in set (0.09 sec)
```

Use site3

Database changed

Select * from site1.bookstore union select * from site2.bookstore union Select * from site3.bookstore



```
+---------+-----------+-------------+---------+----------------+
| Storeno | City      | State       | ZipCode | InventoryValue |
+---------+-----------+-------------+---------+----------------+
|       1 | Nagpur    | Maharashtra | 442001  |           1234 |
|       2 | Trichy    | Tamil Nadu  | 620001  |           3456 |
|       3 | Hyderabad | Telangana   | 246002  |           4567 |
|       4 | Banglore  | Karnataka   | 439106  |           5678 |
|       5 | Chennai   | Tanil Nadu  | 620020  |           6789 |
|       6 | Delhi     | Delhi       | 102102  |           7890 |
|      11 | Chennai   | TN          | 620020  |           1234 |
|      12 | Vizag     | AP          | 520030  |           2345 |
|      13 | Indore    | MP          | 842060  |           3456 |
|      14 | Jaipur    | Rajasthan   | 532100  |           4567 |
|      15 | Trishur   | Kerala      | 321006  |           5678 |
|      16 | Selam     | TN          | 621007  |           6789 |
|      21 | Chennai   | TN          | 620020  |           1234 |
|      22 | Trichy    | TN          | 620015  |           2345 |
|      23 | Bhopal    | MP          | 320902  |           3456 |
|      24 | Banglore  | Karnataka   | 590306  |           4567 |
|      25 | Trichy    | TN          | 620015  |           5678 |
+---------+-----------+-------------+---------+----------------+
17 rows in set (0.00 sec)
```

<u>RESULT</u>

Thus the distributed databases were implemented and the output was verified.

MONGODB CURD OPERATIONS

EX NO: 15

DATE:

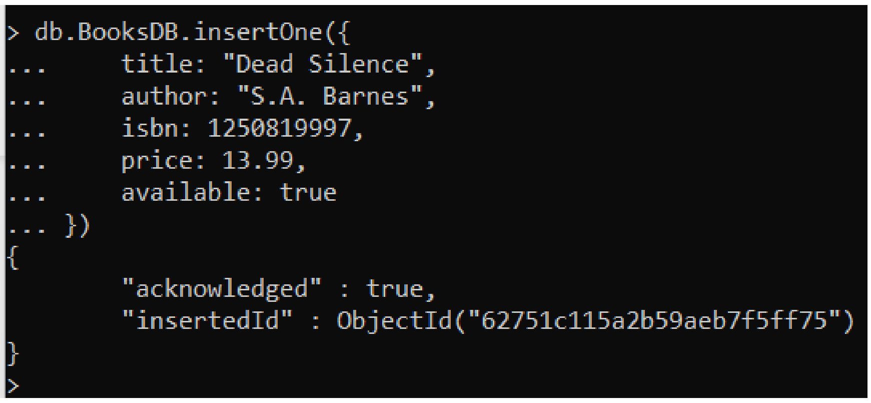
AIM:

To implement MongoDB curd operations

COMMANDS

- **Create/Insert Operations:**
  - **Insert One**

Db. BooksDb.insertOne({
Title: "Dead Silence",
Author's Barnes",
Isbn:1250819997,
Price:13.99,
Available: true
})

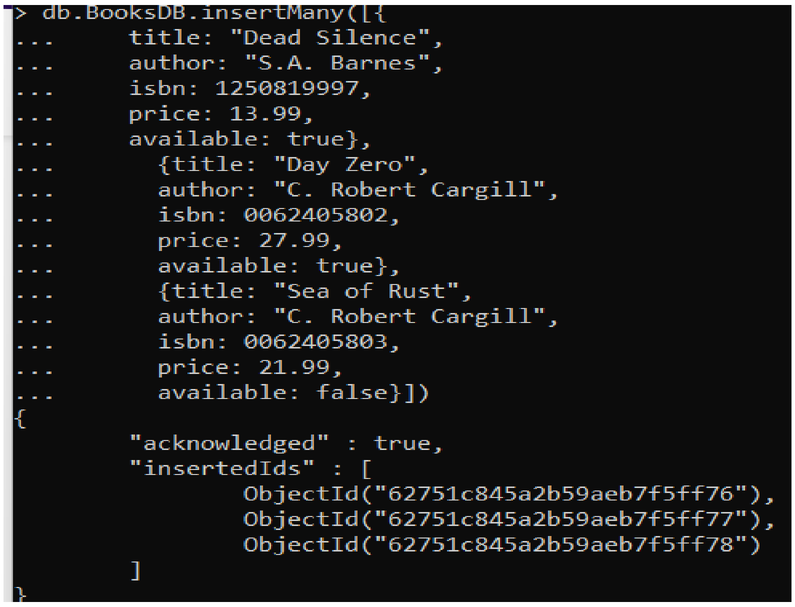


```
> db.BooksDB.insertOne({
...     title: "Dead Silence",
...     author: "S.A. Barnes",
...     isbn: 1250819997,
...     price: 13.99,
...     available: true
... })
{
        "acknowledged" : true,
        "insertedId" : ObjectId("62751c115a2b59aeb7f5ff75")
}
>
```

- **Insert Many**

Db. BooksDB.insertMany() ([{
Title: "Dead Silence"'
Author:" S.A. Barnes",
Isbn:1250819997,
Price:13.99,
Available: true},
{
Title: "Day Zero",
Author: "Robert Cargill",
Isbn:0062405802,
Price:27.99,
Available: true}
{
Title: "Sea of Rust",

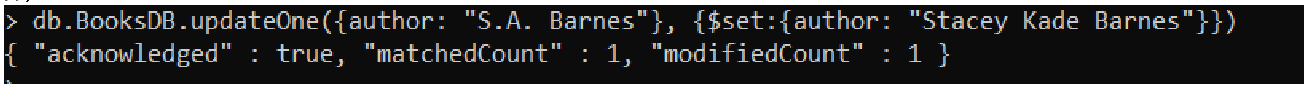
Author: “Robert Cargill”,
Isbn:0062405803,
Price:21.99,
Available: false
}])



```
> db.BooksDB.insertMany([{
...     title: "Dead Silence",
...     author: "S.A. Barnes",
...     isbn: 1250819997,
...     price: 13.99,
...     available: true},
...       {title: "Day Zero",
...       author: "C. Robert Cargill",
...       isbn: 0062405802,
...       price: 27.99,
...       available: true},
...       {title: "Sea of Rust",
...       author: "C. Robert Cargill",
...       isbn: 0062405803,
...       price: 21.99,
...       available: false}])
{
        "acknowledged" : true,
        "insertedIds" : [
                ObjectId("62751c845a2b59aeb7f5ff76"),
                ObjectId("62751c845a2b59aeb7f5ff77"),
                ObjectId("62751c845a2b59aeb7f5ff78")
        ]
}
```

- **Update Operations:**
- **Update One**

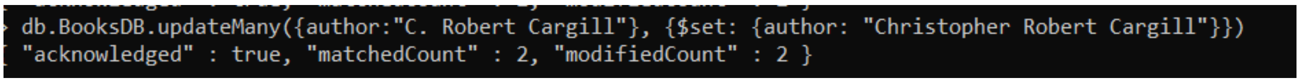
Db. BooksDB.updateOne
({
Author:” S.A. Barnes”),
{$set:” Stacey Kade Barnes”
}})



```
> db.BooksDB.updateOne({author: "S.A. Barnes"}, {$set:{author: "Stacey Kade Barnes"}})
{ "acknowledged" : true, "matchedCount" : 1, "modifiedCount" : 1 }
```

- **UpdateMany**

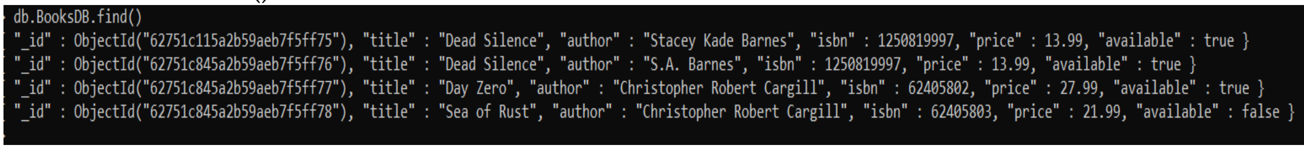
Db. BooksDB.updateMany({
Author:”C.Robert Cargill”),
{$set:{author:”Christopher Robert Cargill”
}})



```
> db.BooksDB.updateMany({author:"C. Robert Cargill"}, {$set: {author: "Christopher Robert Cargill"}})
{ "acknowledged" : true, "matchedCount" : 2, "modifiedCount" : 2 }
```

- **ReadOperations:**
- **Find**

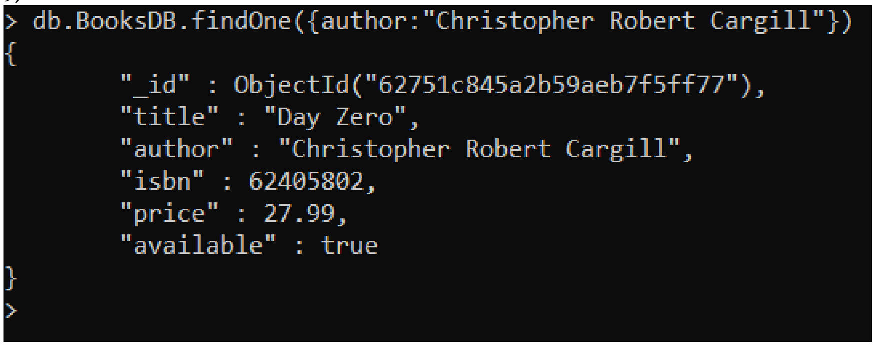
Db.BooksDB.find()



```
> db.BooksDB.find()
{ "_id" : ObjectId("62751c115a2b59aeb7f5ff75"), "title" : "Dead Silence", "author" : "Stacey Kade Barnes", "isbn" : 1250819997, "price" : 13.99, "available" : true }
{ "_id" : ObjectId("62751c845a2b59aeb7f5ff76"), "title" : "Dead Silence", "author" : "S.A. Barnes", "isbn" : 1250819997, "price" : 13.99, "available" : true }
{ "_id" : ObjectId("62751c845a2b59aeb7f5ff77"), "title" : "Day Zero", "author" : "Christopher Robert Cargill", "isbn" : 62405802, "price" : 27.99, "available" : true }
{ "_id" : ObjectId("62751c845a2b59aeb7f5ff78"), "title" : "Sea of Rust", "author" : "Christopher Robert Cargill", "isbn" : 62405803, "price" : 21.99, "available" : false }
```

- **FindOne**

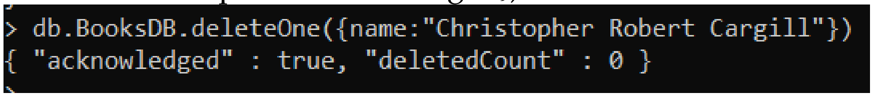
  Db.BooksDB.findOne({
  Author:"Christopher Robert Cargill"
  })



```
> db.BooksDB.findOne({author:"Christopher Robert Cargill"})
{
        "_id" : ObjectId("62751c845a2b59aeb7f5ff77"),
        "title" : "Day Zero",
        "author" : "Christopher Robert Cargill",
        "isbn" : 62405802,
        "price" : 27.99,
        "available" : true
}
>
```

- **Delete Operations:**
- **DeleteOne**

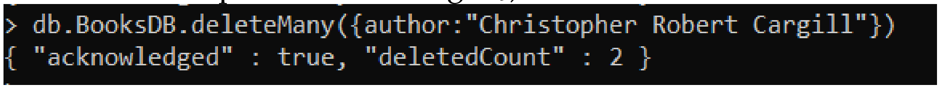
  Db.BooksDB.deleteOne({
  Name:"Christopher Robert Cargil"})



```
> db.BooksDB.deleteOne({name:"Christopher Robert Cargill"})
{ "acknowledged" : true, "deletedCount" : 0 }
```

- **DeleteMany**

  Db.BooksDB.deleteMany({
  Name:"Christopher Robert Cargil"})



```
> db.BooksDB.deleteMany({author:"Christopher Robert Cargill"})
{ "acknowledged" : true, "deletedCount" : 2 }
```

<u>RESULT</u>

Thus the MongoDB operations were implemented and the output was verified.