

***DEPARTMENT OF COMPUTER SCIENCE AND
ENGINEERING***

LAB MANUAL

Academic Year: 2015-16 ODD SEMESTER

Programme (UG/PG) : UG
Semester : V
Course Code : CS1037
Course Title : DATABASE MANAGEMENT SYSTEM LAB

Prepared By

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**FACULTY OF ENGINEERING AND TECHNOLOGY
SRM UNIVERSITY**

**(Under section 3 of UGC Act, 1956)
SRM Nagar, Kattankulathur- 603203
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LIST OF EXPERIMENTS& SCHEDULE

Course Code: CS1037

Course Title: Database Management System Laboratory

Exp. No.	Title	Week No.
1	Data Definition Language (DDL) commands in RDBMS	1
2	Data Manipulation Language (DML) and Data Control Language (DCL)	2,3,4,5,
3	High level language extensions with cursors	6
4	High level language extension with Triggers	7
5	Procedures and Functions	8
6	Embedded SQL	9
7	Database design using E-R model and Normalization	10
8	Design and implementation of payroll processing system	11,12
9	Design and implementation of Banking system	11,12
10	Design and implementation of Library Information System	11,12
11	Design and implementation of Student Information System	11,12
12	Automatic Backup of Files and Recovery of Files	13

Course Coordinator

HoD

HARDWARE AND SOFTWARE REQUIREMENTS

HARDWARE REQUIREMENTS:

INTEL PENTIUM 915 GV

80GB HDD

512MB DDR

SOFTWARE REQUIREMENTS:

ORACLE 8i,9i.

MY SQL,

DB2.

Internal Assessment Mark Split Up

Observation :20 Marks

Attendance :5 Marks

Mini Project with the Report
(Max. 8 Pages & 3 Students per Batch) : 20 Marks

Model Exam :15 Marks

TOTAL MARKS : 60 Marks

AIM:

To create a DDL to perform creation of table, alter, modify and drop column.

DDL COMMANDS

1. The Create Table Command: - it defines each column of the table uniquely. Each column has minimum of three attributes, a name, data type and size.

Syntax:

Create table <table name> (<col1> <datatype>(<size>), <col2> <datatype>(<size>));

Ex:create table emp(empno number(4) primary key, ename char(10));

2. Modifying the structure of tables.

a) Add new columns

Syntax:

Alter table <tablename> add(<new col><datatype>(<size>), <new col><datatype>(<size>));

Ex:alter table emp add(sal number(7,2));

3. Dropping a column from a table.

Syntax:

Alter table <tablename> drop column <col>;

Ex:alter table emp drop column sal;

4. Modifying existing columns.

Syntax:

Alter table <tablename> modify(<col><newdatatype>(<newsize>));

Ex:alter table emp modify(ename varchar2(15));

5. Renaming the tables

Syntax:

Rename <oldtable> to <new table>;

Ex:rename emp to emp1;

6. truncating the tables.

Syntax:

Truncate table <tablename>;

Ex:trunc table emp1;

7. Destroying tables.

Syntax:

Drop table <tablename>;

Ex:drop table emp;

CREATION OF TABLE:

SYNTAX:

create table<tablename>(column1 datatype,column2 datatype...);

EXAMPLE:

SQL>create table std(sno number(5),sname varchar(20),age number(5),sdo date,sm1 number(4,2),sm2 number(4,2),sm3 number(4,4));

Table created.

SQL>insert into std values(101,'AAA',16,'03-jul-88',80,90,98);

1 row created.

SQL>insert into std values(102,'BBB',18,'04-aug-89',88,98,90);

1 row created.

OUTPUT:

Select * from std;

SNO	SNAME	AGE	SDOB	SM1	SM2	SM3
101	AAA	16	03-jul-88	80	90	98
102	BBB	18	04-aug-89	88	98	90

ALTER TABLE WITH ADD:

SQL>create table student(id number(5),name varchar(10),game varchar(20));

Table created.

SQL>insert into student values(1,'mercy','cricket');

1 row created.

SYNTAX:

alter table<tablename>add(col1 datatype,col2 datatype..);

EXAMPLE:

SQL>alter table student add(age number(4));

SQL>insert into student values(2,'sharmi','tennis',19);

OUTPUT:

ALTER: select * from student;

ID NAME GAME

1 Mercy Cricket

ADD: select * from student;

ID NAME GAME AGE

1 Mercy cricket

2 Sharmi Tennis 19

ALTER TABLE WITH MODIFY:**SYNTAX:**

Alter table<tablename>modify(col1 datatype,col2 datatype..);

EXAMPLE:

SQL>alter table student modify(id number(6),game varchar(25));

OUTPUT:

MODIFY

desc student;

NAME NULL? TYPE

Id Number(6)

Name Varchar(20)

Game Varchar(25)

Age Number(4)

DROP:

SYNTAX: drop table<tablename>;

EXAMPLE:

SQL>drop table student;

SQL>Table dropped.

TRUNCATE TABLE

SYNTAX: TRUNCATE TABLE <TABLE NAME>;

Example: Truncate table stud;

DESC

Example: desc emp;

Name Null? Type

EmpNo NOT NULL number(5)

EName VarChar(15)

Job NOT NULL Char(10)

DeptNo NOT NULL number(3)

PHONE_NO number (10)

CONSTRAINTS:

Create table tablename (column_name1 data_ type constraints, column_name2 data_ type constraints ...)

Example:

Create table Emp (EmpNo number(5), EName VarChar(15), Job Char(10) constraint un unique, DeptNo number(3) CONSTRAINT FKey2 REFERENCES DEPT(DeptNo));

Create table stud (sname varchar2(20) not null, rollno number(10) not null,dob date not null);

DOMAIN INTEGRITY

Example: Create table cust(custid number(6) not null, name char(10));

Alter table cust modify (name not null);

CHECK CONSTRAINT

Example: Create table student (regno number (6), mark number (3) constraint b check (mark >=0 and mark <=100)); Alter table student add constraint b2 check (length(regno)<=4));

ENTITY INTEGRITY

a) Unique key constraint

Example: Create table cust(custid number(6) constraint unique, name char(10)); Alter table cust add(constraint c unique(custid));

b) Primary Key Constraint

Example: Create table stud(regno number(6) constraint primary key, name char(20));

Queries:

Q1. Create a table called EMP with the following structure.

Name Type

EMPNO NUMBER(6)

ENAME VARCHAR2(20)

JOB VARCHAR2(10)

DEPTNO NUMBER(3)

SAL NUMBER(7,2)

Allow NULL for all columns except ename and job.

Solution:

1. Understand create table syntax.
2. Use the create table syntax to create the said tables.
3. Create primary key constraint for each table as understand from logical table structure.

Ans:

SQL> create table emp(empno number(6),ename varchar2(20)not null,job varchar2(10) not null, deptno number(3),sal number(7,2));

Table created.

Q2: Add a column experience to the emp table.
experience numeric null allowed.

Solution:

1. Learn alter table syntax.
2. Define the new column and its data type.
3. Use the alter table syntax.

Ans: SQL> alter table emp add(experience number(2));
Table altered.

Q3: Modify the column width of the job field of emp table.

Solution:

1. Use the alter table syntax.
2. Modify the column width and its data type.

Ans: SQL> alter table emp modify(job varchar2(12));
Table altered.

SQL> alter table emp modify(job varchar(13));
Table altered.

Q4: Create dept table with the following structure.

Name Type

DEPTNO NUMBER(2)
DNAME VARCHAR2(10)
LOC VARCHAR2(10)
Deptno as the primarykey

Solution:

1. Understand create table syntax.
2. Decide the name of the table.
3. Decide the name of each column and its data type.
4. Use the create table syntax to create the said tables.
5. Create primary key constraint for each table as understand from logical table structure.

Ans:

SQL> create table dept(deptno number(2) primary key,dname varchar2(10),loc
varchar2(10));
Table created.

Q5: create the emp1 table with ename and empno, add constraints to check the empno value while entering (i.e) empno > 100.

Solution:

1. Learn alter table syntax.
2. Define the new constraint [columns name type]
3. Use the alter table syntax for adding constraints.

Ans:

SQL> create table emp1(ename varchar2(10),empno number(6) constraint
check(empno>100));
Table created.

Q6: drop a column experience to the emp table.

Solution:

1. Learn alter table syntax. Use the alter table syntax to drop the column.

Ans:

SQL> alter table emp drop column experience; Table altered.

Q7: Truncate the emp table and drop the dept table

Solution:

1. Learn drop, truncate table syntax.

Ans: SQL> truncate table emp; Table truncated.

QUESTIONS

1. Define DDL
2. What are constraints?
3. Categories of SQL Command.
4. Difference between truncate and drop.
5. Define primary and referential integrity.

RESULT:

Thus the DDL commands have been executed successfully.

AIM;

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

DML COMMANDS

DML commands are the most frequently used SQL commands and is used to query and manipulate the existing database objects. Some of the commands are Insert, Select, Update, Delete.

Insert Command This is used to add one or more rows to a table. The values are separated by commas and the data types char and date are enclosed in apostrophes. The values must be entered in the same order as they are defined.

Select Commands It is used to retrieve information from the table. It is generally referred to as querying the table. We can either display all columns in a table or only specify column from the table.

Update Command It is used to alter the column values in a table. A single column may be updated or more than one column could be updated.

Delete command After inserting row in a table we can also delete them if required. The delete command consists of a from clause followed by an optional where clause.

Q1: Insert a single record into dept table.

Ans: SQL> insert into dept values (1,'IT','Tholudur');

1 row created.

Q2: Insert more than a record into emp table using a single insert command.

Ans: SQL> insert into emp values(&empno,'&ename','&job',&deptno,&sal);

Enter value for empno: 1

Enter value for ename: Mathi

Enter value for job: AP

Enter value for deptno: 1

Enter value for sal: 10000

old 1: insert into emp values(&empno,'&ename','&job',&deptno,&sal)

new 1: insert into emp values(1,'Mathi','AP',1,10000)

1 row created.

SQL> / Enter value for empno: 2

Enter value for ename: Arjun

Enter value for job: ASP

Enter value for deptno: 2

Enter value for sal: 12000

old 1: insert into emp values(&empno,'&ename','&job',&deptno,&sal)

new 1: insert into emp values(2,'Arjun','ASP',2,12000)

1 row created.

SQL> / Enter value for empno: 3

Enter value for ename: Gungan

Enter value for job: ASP

Enter value for deptno: 1

Enter value for sal: 12000

old 1: insert into emp values(&empno,'&ename','&job',&deptno,&sal)

new 1: insert into emp values(3,'Gungan','ASP',1,12000)

1 row created.

Q3: Update the emp table to set the salary of all employees to Rs15000/- who are working as ASP

Ans: SQL> select * from emp;

EMPNO ENAME JOB DEPTNO SAL

1 Mathi AP 1 10000

2 Arjun ASP 2 12000

3 Gungan ASP 1 12000

SQL> update emp set sal=15000 where job='ASP'; 2 rows updated.

SQL> select * from emp;

EMPNO ENAME JOB DEPTNO SAL

1 Mathi AP 1 10000

2 Arjun ASP 2 15000

3 Gungan ASP 1 15000

Q4: Create a pseudo table employee with the same structure as the table emp and insert rows into the table using select clauses.

Ans: SQL> create table employee as select * from emp;

Table created.

SQL> desc employee;

Name Null? Type

EMPNO NUMBER(6)

ENAME NOT NULL VARCHAR2(20)

JOB NOT NULL VARCHAR2(13)

DEPTNO NUMBER(3)

SAL NUMBER(7,2)

Q5: select employee name, job from the emp table

Ans: SQL> select ename, job from emp;

ENAME JOB

Mathi AP

Arjun ASP

Gungan ASP

Karthik Prof

Akalya AP

suresh lect

6 rows selected.

Q6: Delete only those who are working as lecturer

Ans: SQL> select * from emp;

EMPNO ENAME JOB DEPTNO SAL

1 Mathi AP 1 10000
2 Arjun ASP 2 15000
3 Gungan ASP 1 15000
4 Karthik Prof 2 30000
5 Akalya AP 1 10000
6 suresh lect 1 8000
6 rows selected.

SQL> delete from emp where job='lect';

1 row deleted.

SQL> select * from emp;

EMPNO ENAME JOB DEPTNO SAL

- -----
1 Mathi AP 1 10000
2 Arjun ASP 2 15000
3 Gungan ASP 1 15000
4 Karthik Prof 2 30000
5 Akalya AP 1 10000

Q7: List the records in the emp table orderby salary in ascending order.

Ans: SQL> select * from emp order by sal;

EMPNO ENAME JOB DEPTNO SAL

1 Mathi AP 1 10000
5 Akalya AP 1 10000
2 Arjun ASP 2 15000
3 Gungan ASP 1 15000
4 Karthik Prof 2 30000

Q8: List the records in the emp table orderby salary in descending order.

Ans: SQL> select * from emp order by sal desc;

EMPNO ENAME JOB DEPTNO SAL

4 Karthik Prof 2 30000
2 Arjun ASP 2 15000
3 Gungan ASP 1 15000
1 Mathi AP 1 10000
5 Akalya AP 1 10000

Q9: Display only those employees whose deptno is 30.

Solution: Use SELECT FROM WHERE syntax.

Ans: SQL> select * from emp where deptno=1;

EMPNO ENAME JOB DEPTNO SAL

1 Mathi AP 1 10000

3 Gagan ASP 1 15000

5 Akalya AP 1 10000

Q10: Display deptno from the table employee avoiding the duplicated values.

Solution:

1. Use SELECT FROM syntax.

2. Select should include distinct clause for the deptno.

Ans: SQL> select distinct deptno from emp;

DEPTNO

1

2

IMPLEMENTATION OF DATA AND BUILT IN FUNCTIONS IN SQL

CHARACTER/STRING FUNCTION:

SQL> select upper('welcome') from dual;

WELCOME

SQL> select upper('hai') from dual;

HAI

SQL> select lower('HAI') from dual;

LOW

hai

SQL> select initcap('hello world') from dual;

INITCAP('Hello

Hello World

SQL> select ltrim(' hai') from dual;

LTR

hai

SQL> select rtrim('hai ')from dual;

RTR

hai

SQL> select rtrim(' hai ')from dual;

RTRIM('

hai

SQL> select concat('SRM',' university')from dual;

SRM university

SQL> select length('SRM')from dual;

LENGTH('SRM')

12

SQL> select replace('SRM university', 'SRM','Anna')from dual;

Anna university

SQL> select substr('SRM', 7,6)from dual;

SUBSTR

lingam

```
SQL> select rpad('hai',3,'*')from dual;
```

```
RPAD('
```

```
-----
```

```
hai***
```

```
SQL> select lpad('hai',3,'*')from dual;
```

```
LPAD('
```

```
-----
```

```
***hai
```

```
SQL> select replace('Dany','y','ie')from dual;
```

```
REPLACE
```

```
-----
```

```
Danie
```

```
SQL> select translate('cold','ld','ol')from dual;
```

```
TRANSL
```

```
-----
```

```
cool
```

DATE & TIME FUNCTION

SQL> select sysdate from dual;

SYSDATE

07-APR-10

SQL> select round(sysdate)from dual;

ROUND(SYS

07-APR-10

SQL> select add_months(sysdate,3)from dual;

ADD_MONTH

07-JUL-10

SQL> select last_day(sysdate)from dual;

LAST_DAY(

30-APR-10

SQL> select sysdate+20 from dual;

SYSDATE+2

27-APR-10

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

NEXT_DAY(

13-APR-10

NUMERIC FUNCTION

SQL> select round(15.6789)from dual;

ROUND(15.6789)

16

SQL> select ceil(23.20)from dual;

CEIL(23.20)

24

SQL> select floor(34.56)from dual;

FLOOR(34.56)

34

SQL> select trunc(15.56743)from dual;

TRUNC(15.56743)

15

SQL> select sign(-345)from dual;

SIGN(-345)

-1

SQL> select abs(-70)from dual;

ABS(-70)

70

MATH FUNCTION:

SQL> select abs(45) from dual;

ABS(45)

45

SQL> select power(10,12) from dual;

POWER(10,12)

1.000E+12

SQL> select mod(11,5) from dual;

MOD(11,5)

1

SQL> select exp(10) from dual;

EXP(10)

22026.466

SQL> select sqrt(225) from dual;

SQRT(225)

15

NESTED QUERIES AND JOIN QUERIES

Q1: Display all employee names and salary whose salary is greater than minimum salary of the company and job title starts with _M'.

Solution:

1. Use select from clause.
2. Use like operator to match job and in select clause to get the result.

Ans: SQL> select ename,sal from emp where sal>(select min(sal) from emp where job like 'A%');

ENAME SAL

Arjun 12000

Gugan 20000

Karthik 15000

Q2: Issue a query to find all the employees who work in the same job as Arjun.

Ans: SQL> select * from emp;

EMPNO ENAME JOB DEPTNO SAL

1 Mathi AP 1 10000

2 Arjun ASP 2 12000

3 Gugan ASP 2 20000

4 Karthik AP 1 15000

SQL> select ename from emp where job=(select job from emp where ename='Arjun');
ENAME

Arjun

Gugan

SET OPERATORS

QUERIES:

Q1: Display all the dept numbers available with the dept and emp tables avoiding duplicates.

Solution:

1. Use select from clause.
2. Use union select clause to get the result.

Ans: SQL> select deptno from emp union select deptno from dept;

DEPTNO

1
2
12
30
40

Q2: Display all the dept numbers available with the dept and emp tables.

Solution:

1. Use select from clause.
2. Use union all in select clause to get the result.

Ans: SQL> select deptno from emp union all select deptno from dept;

DEPTNO

1
2
2
1

12

1

2

30

40

9 rows selected.

Q3: Display all the dept numbers available in emp and not in dept tables and vice versa.

Solution:

1. Use select from clause.

2. Use minus in select clause to get the result.

Ans: SQL> select deptno from emp minus select deptno from dept;

DEPTNO

12

SQL> select deptno from dept minus select deptno from emp;

DEPTNO

30

40

VIEWS

Q1: The organization wants to display only the details of the employees those who are ASP.

Solution:

1. Create a view on emp table named managers

2. Use select from clause to do horizontal portioning

Ans: SQL> create view empview as select * from emp where job='ASP';

View created.

SQL> select * from empview;

EMPNO ENAME JOB DEPTNO SAL

2 Arjun ASP 2 12000 3 Gugan ASP 2 20000

Q2: The organization wants to display only the details like empno, empname, deptno, deptname of the employees. (Vertical portioning)

Solution: 1. Create a view on emp table named general

2. Use select from clause to do vertical partitioning

Ans: SQL> create view empview1 as select ename,sal from emp;

View created.

Q3: Display all the views generated.

Ans: SQL> select * from tab;

TNAME TABTYPE CLUSTERID

DEPT TABLE

EMP TABLE

EMPVIEW VIEW

EMPVIEW1 VIEW

Q4: Execute the DML commands on the view created.

Ans: SQL> select * from empview;

EMPNO ENAME JOB DEPTNO SAL

2 Arjun ASP 2 12000

3 Gugan ASP 2 20000

Q5: Drop a view.

Ans: SQL> drop view empview1;

View dropped.

Q3: Issue a query to display information about employees who earn more than any employee in dept 1. Ans: SQL> select * from emp where sal>(select max(sal) from emp where empno=1);

EMPNO ENAME JOB DEPTNO SAL

2 Arjun ASP 2 12000

3 Gagan ASP 2 20000

4 Karthik AP 1 15000

JOINS Tables used

SQL> select * from emp;

EMPNO ENAME JOB DEPTNO SAL

1 Mathi AP 1 10000

2 Arjun ASP 2 12000

3 Gagan ASP 2 20000

4 Karthik AP 1 15000

SQL> select * from dept;

DEPTNO DNAME LOC

1 ACCOUNTING NEW YORK

2 RESEARCH DALLAS

30 SALES CHICAGO

40 OPERATIONS BOSTON

EQUI-JOIN

Q4: Display the employee details, departments that the departments are same in both the emp and dept. Solution: 1. Use select from clause.

2. Use equi join in select clause to get the result.

Ans: SQL> select * from emp,dept where emp.deptno=dept.deptno;

EMPNO ENAME JOB DEPTNO SAL DEPTNO DNAME LOC

1 Mathi AP 1 10000 1 ACCOUNTING NEW YORK

2 Arjun ASP 2 12000 2 RESEARCH DALLAS

3 Gagan ASP 2 20000 2 RESEARCH DALLAS

4 Karthik AP 1 15000 1

ACCOUNTING NEW YORK

NON-EQUIJOIN

Q5: Display the employee details, departments that the departments are not same in both the emp and dept. Solution: 1. Use select from clause. 2. Use non equi join in select clause to get the result.

Ans: SQL> select * from emp,dept where emp.deptno!=dept.deptno;
EMPNO ENAME JOB DEPTNO SAL DEPTNO DNAME LOC

2 Arjun ASP 2 12000 1 ACCOUNTING NEW YORK
3 Gagan ASP 2 20000 1 ACCOUNTING NEW YORK
1 Mathi AP 1 10000 2 RESEARCH DALLAS
EMPNO ENAME JOB DEPTNO SAL DEPTNO DNAME LOC

4 Karthik AP 1 15000 2 RESEARCH DALLAS
1 Mathi AP 1 10000 30 SALES CHICAGO
2 Arjun ASP 2 12000 30 SALES CHICAGO
EMPNO ENAME JOB DEPTNO SAL DEPTNO DNAME LOC

3 Gagan ASP 2 20000 30 SALES CHICAGO
4 Karthik AP 1 15000 30 SALES CHICAGO
1 Mathi AP 1 10000 40 OPERATIONS BOSTON
EMPNO ENAME JOB DEPTNO SAL DEPTNO DNAME LOC

2 Arjun ASP 2 12000 40 OPERATIONS BOSTON
3 Gagan ASP 2 20000 40 OPERATIONS BOSTON
4 Karthik AP 1 15000 40 OPERATIONS BOSTON
12 rows selected.

LEFTOUT-JOIN Tables used SQL> select * from stud1;
Regno Name Mark2 Mark3 Result

101 john 89 80 pass
102 Raja 70 80 pass
103 Sharin 70 90 pass
104 sam 90 95 pass
SQL> select * from stud2;
NAME GRA

john s raj s sam a sharin a

Q6: Display the Student name and grade by implementing a left outer join.

Ans: SQL> select stud1.name,grade from stud1 left outer join stud2 on
stud1.name=stud2.name; Name Gra

john s raj
s sam a sharin a smith null RIGHTOUTER-JOIN

Q7: Display the Student name, register no, and result by implementing a right outer join.

Ans: SQL> select stud1.name, regno, result from stud1 right outer join stud2 on stud1.name = stud2.name; Name Regno Result

john 101 pass

raj 102 pass

sam 103 pass

sharin 104 pass

Rollno Name Mark1 Mark2 Total

1 sindu 90 95 185

2 arul 90 90 180

FULL OUTER-JOIN

Q8: Display the Student name register no by implementing a full outer join.

Ans: SQL> select stud1.name, regno from stud1 full outer join stud2 on (stud1.name=stud2.name); Name Regno

john 101

raj 102 sam

103 sharin 104

SELFJOIN

Q9: Write a query to display their employee names

Ans: SQL> select distinct ename from emp x, dept y where x.deptno=y.deptno; ENAME

Arjun

Gugan

Karthik

Mathi

Q10: Display the details of those who draw the salary greater than the average salary.

Ans: SQL> select distinct * from emp x where x.sal >= (select avg(sal) from emp); EMPNO ENAME JOB DEPTNO SAL

3 Gugan ASP 2 20000

4 Karthik AP 1 15000

11 kavitha designer 12 17000

DCL COMMANDS

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

TCL COMMAND

COMMIT: command is used to save the Records.

ROLL BACK: command is used to undo the Records.

SAVE POINT command is used to undo the Records in a particular transaction.

Queries:

Tables Used: 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);

Q1: Develop a query to grant all privileges of employees table into departments table

Ans: SQL> Grant all on employees to departments;

Grant succeeded.

Q2: Develop a query to grant some privileges of employees table into departments table

Ans: SQL> Grant select, update , insert on departments to departments with grant option;
Grant succeeded.

Q3: Develop a query to revoke all privileges of employees table from departments table

Ans: SQL> Revoke all on employees from departments; Revoke succeeded.

Q4: Develop a query to revoke some privileges of employees table from departments table

Ans: SQL> Revoke select, update , insert on departments from departments;

Revoke succeeded.

Q5: Write a query to implement the save point

Ans: SQL> SAVEPOINT S1;

Savepoint created.

SQL> select * from emp;

EMPNO ENAME JOB DEPTNO SAL

1 Mathi AP 1 10000

2 Arjun ASP 2 15000

3 Gungan ASP 1 15000

4 Karthik Prof 2 30000

SQL> INSERT INTO EMP VALUES(5,'Akalya','AP',1,10000); 1 row created.

SQL> select * from emp;

EMPNO ENAME JOB DEPTNO SAL

1 Mathi AP 1 10000

2 Arjun ASP 2 15000

3 Gungan ASP 1 15000

4 Karthik Prof 2 30000

5 Akalya AP 1 10000

Q6: Write a query to implement the rollback

Ans: SQL> rollback s1; SQL> select * from emp;

EMPNO ENAME JOB DEPTNO SAL

1 Mathi AP 1 10000

2 Arjun ASP 2 15000

3 Gungan ASP 1 15000

4 Karthik Prof 2 30000

Q6: Write a query to implement the commit

Ans: SQL> COMMIT;

Commit complete.

RESULT

Thus the DML, DCL,TCL commands was performed successfully and executed.

EX.NO:3 IMPLEMENTATION OF CURSORS

CURSOR PROGRAM FOR ELECTRICITY BILL CALCULATION:

```
SQL> create table bill(name varchar2(10), address varchar2(20), city varchar2(20), unit
number(10));
```

Table created.

```
SQL> insert into bill values('&name','&address','&city','&unit');
```

Enter value for name: yuva

Enter value for address: srivi

Enter value for city: srivilliputur

Enter value for unit: 100

```
old 1: insert into bill values('&name','&address','&city','&unit')
```

```
new 1: insert into bill values('yuva','srivi','srivilliputur','100')
```

1 row created.

```
SQL> /
```

Enter value for name: nithya

Enter value for address: Lakshmi nagar

Enter value for city: sivakasi

Enter value for unit: 200

```
old 1: insert into bill values('&name','&address','&city','&unit')
```

```
new 1: insert into bill values('nithya','Lakshmi nagar','sivakasi','200')
```

1 row created.

```
SQL> /
```

Enter value for name: maya

Enter value for address: housing board

Enter value for city: sivakasi

Enter value for unit: 300

old 1: insert into bill values('&name','&address','&city','&unit')

new 1: insert into bill values('maya','housing board','sivakasi','300')

1 row created.

SQL> /

Enter value for name: jeeva

Enter value for address: RRR nagar

Enter value for city: sivaganagai

Enter value for unit: 400

old 1: insert into bill values('&name','&address','&city','&unit')

new 1: insert into bill values('jeeva','RRR nagar','sivaganagai','400')

1 row created.

SQL> select * from bill;

NAME	ADDRESS	CITY	UNIT
yuva	srivi	srivilliputur	100
nithya	Lakshmi nagar	sivakasi	200
maya	housing board	sivakasi	300
jeeva	RRR nagar	sivaganagai	400

SQL> declare

```
2 cursor c is select * from bill;
3 b bill %ROWTYPE;
4 begin
5 open c;
6 dbms_output.put_line('Name Address city Unit Amount');
7 loop
8 fetch c into b;
9 if(c % notfound) then
10 exit;
11 else
12 if(b.unit<=100) then
13 dbms_output.put_line(b.name||' '||b.address||' '||b.city||' '||b.unit||' '||b.uni
t*1);
14 elsif(b.unit>100 and b.unit<=200) then
15 dbms_output.put_line(b.name||' '||b.address||' '||b.city||' '||b.unit||' '||b.
unit*2);
16 elsif(b.unit>200 and b.unit<=300) then
17 dbms_output.put_line(b.name||' '||b.address||' '||b.city||' '||b.unit||' '||b.
unit*3);
18 elsif(b.unit>300 and b.unit<=400) then
19 dbms_output.put_line(b.name||' '||b.address||' '||b.city||' '||b.unit||' '||b.unit*
4);
20 else
21 dbms_output.put_line(b.name||' '||b.address||' '||b.city||' '||b.unit||' '||b.unit*
5);
22 end if;
```

```
23 end if;
24 end loop;
25 close c;
26 end;
27 /
```

Name	Address	city	Unit	Amount
yuva	srivi	srivilliputur	100	100
nithya	Lakshmi nagar	sivakasi	200	400
maya	housing board	sivakasi	300	900
jeeva	RRR nagar	sivaganagai	400	1600

PL/SQL procedure successfully completed.

PROGRAM FOR STUDENT GRADE CALCULATION

```
SQL> create table std(name varchar(10), rollno number(3),mark1 number(3), mark2
number(3), mark3 nu
mber(3));
```

Table created.

```
SQL> insert into std values('&name','&rollno','&mark1','&mark2','&mark3');
```

Enter value for name: gowri

Enter value for rollno: 101

Enter value for mark1: 78

Enter value for mark2: 89

Enter value for mark3: 99

```
old 1: insert into std values('&name','&rollno','&mark1','&mark2','&mark3')
```

```
new 1: insert into std values('gowri','101','78','89','99')
```

1 row created.

```
SQL> /
```

Enter value for name: prem

Enter value for rollno: 102

Enter value for mark1: 88

Enter value for mark2: 99

Enter value for mark3: 90

```
old 1: insert into std values('&name','&rollno','&mark1','&mark2','&mark3')
```

```
new 1: insert into std values('prem','102','88','99','90')
```

1 row created.

SQL> /

Enter value for name: ravathi

Enter value for rollno: 103

Enter value for mark1: 67

Enter value for mark2: 89

Enter value for mark3: 99

old 1: insert into std values('&name','&rollno','&mark1','&mark2','&mark3')

new 1: insert into std values('ravathi','103','67','89','99')

1 row created.

SQL> /

Enter value for name: arun

Enter value for rollno: 104

Enter value for mark1: 56

Enter value for mark2: 66

Enter value for mark3: 77

old 1: insert into std values('&name','&rollno','&mark1','&mark2','&mark3')

new 1: insert into std values('arun','104','56','66','77')

1 row created.

SQL> set serveroutput on;

```

SQL> declare

2 tot number;

3 average number;

4 cursor c is select * from std;

5 s std %ROWTYPE;

6 begin

7 open c;

8 dbms_output.put_line('Name Rollno Mark1 Mark2 Mark3 Total Average
Grade');

9 loop

10 fetch c into s;

11 tot:=s.mark1+s.mark2+s.mark3;

12 average:=floor(tot/3);

13 if(c % notfound)then

14 exit;

15 else

16 if(s.mark1<50 or s.mark2<50 or s.mark3<50)then

17 dbms_output.put_line(s.name||' '||s.rollno||' '||s.mark1||' '||s.mark2||' '||s.mark3||
' '||tot||' '||average||' '||'F');

18 elsif(average>=90 and average<=100)then

19 dbms_output.put_line(s.name||' '||s.rollno||' '||s.mark1||' '||s.mark2||' '||s.mark3||
' '||tot||' '||average||' '||'S');

20 elsif(average>=80 and average<90)then

21 dbms_output.put_line(s.name||' '||s.rollno||' '||s.mark1||' '||s.mark2||' '||s.mark3||
' '||tot||' '||average||' '||'A+');

22 elsif(average>=70 and average<80)then

23 dbms_output.put_line(s.name||' '||s.rollno||' '||s.mark1||' '||s.mark2||' '||s.mark3||

```



```

' '||tot||' '||average||' '||B');

24 elsif(average>=60 and average<70)then

25 dbms_output.put_line(s.name||' '||s.rollno||' '||s.mark1||' '||s.mark2||' '||s.mark3||

' '||tot||' '||average||' '||C');

26 else

27 dbms_output.put_line(s.name||' '||s.rollno||' '||s.mark1||' '||s.mark2||' '||s.mark3||

' '||tot||' '||average||' '||D');

28 end if;

29 end if;

30 end loop;

31 close c;

32 end;

33 /

```

Name	Rollno	Mark1	Mark2	Mark3	Total	Average	Grade
gowri	101	78	89	99	266	88	A+
prem	102	88	99	90	277	92	S
ravathi	103	67	89	99	255	85	A+
arun	104	56	66	77	199	66	C

PL/SQL procedure successfully completed.

RESULT:

Thus the program to implement cursors was executed and output was verified successfully.

TRIGGER FOR DISPLAYING GRADE OF THE STUDENT

```
SQL> create table stdn(rollno number(3),name varchar(2),m1 number(3),m2 number(3),m3  
number(3),tot num
```

```
ber(3),avrg number(3),result varchar(10));
```

Table created.

```
SQL> create or replace trigger t1 before insert on stdn
```

```
2 for each row
```

```
3 begin
```

```
4 :new.tot:=:new.m1+:new.m2+:new.m3;
```

```
5 :new.avrg:=:new.tot/3;
```

```
6 if(:new.m1>=50 and :new.m2>=50 and :new.m3>=50) then
```

```
7 :new.result:='pass';
```

```
8 else
```

```
9 :new.result:='Fail';
```

```
10 end if;
```

```
11 end;
```

```
12 /
```

Trigger created.

```
SQL> insert into stdn values(101,'SM',67,89,99,"","");
```

1 row created.

```
SQL> select * from stdn;
```

ROLLNO	NA	M1	M2	M3	TOT	AVRG	RESULT
--------	----	----	----	----	-----	------	--------

101	SM	67	89	99	255	85	pass
-----	----	----	----	----	-----	----	------

PROGRAM TO INDICATE INVALID CONDITION USING TRIGGER

```
SQL> create table emp (name varchar(10),empno number(3),age number(3));
```

Table created.

```
SQL>
```

```
1 create or replace trigger t2 before insert on emp
2 for each row
3 when(new.age>100)
4 begin
5 RAISE_APPLICATION_ERROR(-20998,'INVALID ERROR');
6* end;
```

```
SQL> /
```

Trigger created.

```
SQL> insert into emp values('nithya',101,24);
```

1 row created.

```
SQL> insert into emp values('nithya',101,103);
```

```
insert into emp values('nithya',101,103)
```

*

ERROR at line 1:

ORA-20998: INVALID ERROR

ORA-06512: at "SCOTT.T2", line 2

ORA-04088: error during execution of trigger 'SCOTT.T2'

RESULT:

Thus triggers were implemented successfully.

PROCEDURE TO INSERT NUMBER

SQL> create table emp1(id number(3),First_name varchar2(20));

Table created.

SQL> insert into emp1 values(101,'Nithya');

1 row created.

SQL> insert into emp1 values(102,'Maya');

1 row created.

SQL> select * from emp1;

ID FIRST_NAME

101 Nithya

102 Maya

SQL> set serveroutput on;

SQL> create or replace

2 procedure insert_num(p_num number)is

```
3 begin
4 insert into emp1(id,First_name) values(p_num,user);
5 end insert_num;
6 /
```

Procedure created.

```
SQL> exec insert_num(3);
```

PL/SQL procedure successfully completed.

```
SQL> select * from emp1;
```

	ID	FIRST_NAME
101		Nithya
102		Maya
103		SCOTT

FUNCTION TO FIND FACTORIAL

SQL> create or replace function fact(n number)

2 return number is

3 i number(10);

4 f number:=1;

5 begin

6 for i in 1..N loop

7 f:=f*i;

8 end loop;

9 return f;

10 end;

11 /

Function created.

SQL> select fact(2) from dual;

FACT(2)

2

RESULT:

Thus procedures and functions were implemented successfully.

PL/SQL PROGRAM FOR BONUS CALCULATION

SQL> set serveroutput on;

SQL> declare

2 salary number;

3 bonus number;

4 begin

5 salary:=&sa;

6 if salary>5000 then

7 bonus:=salary*0.5;

8 else

9 bonus:=0;

10 end if;

11 dbms_output.put_line(bonus);

12 end;

13 /

Enter value for sa: 10000

old 5: salary:=&sa;

new 5: salary:=10000;

5000

PL/SQL procedure successfully completed.

PROGRAM FOR ARMSTRONG NUMBER

SQL> set serveroutput on;

SQL> declare

2 a number;

3 b number;

4 i number;

5 begin

6 i:=#

7 a:=i;

8 b:=0;

9 while a>0

10 loop

11 b:=b+power(mod(a,10),3);

12 a:=trunc(a/10);

13 end loop;

14 if b=i then

15 dbms_output.put_line(i||'IS AN ARMSTRONG NUMBER');

16 else

17 dbms_output.put_line(i||'IS NOT AN ARMSTRONG NUMBER');

18 end if;

19 end;

20 /

Enter value for num: 123

old 6: i:=#

new 6: i:=123;

123 IS NOT AN ARMSTRONG NUMBER

PL/SQL procedure successfully completed.

SQL> /

Enter value for num: 407

old 6: i:=#

new 6: i:=407;

407 IS AN ARMSTRONG NUMBER

PL/SQL procedure successfully completed.

PROGRAM FOR MULTIPLICATION TABLE:

SQL> set serveroutput on;

SQL> declare

2 a number;

3 b number;

4 i number;

5 n number;

6 s number;

7 begin

8 a:=&ulimit;

9 b:=&llimit;

10 n:=&n;

11 for i in a..b loop

12 s:=i*n;

13 dbms_output.put_line(i||'*'||n||'='||s);

14 end loop;

15 end;

16 /

Enter value for ulimit: 1

old 8: a:=&ulimit;

new 8: a:=1;

Enter value for llimit: 10

old 9: b:=&llimit;

new 9: b:=10;

Enter value for n: 5

old 10: n:=&n;

new 10: n:=5;

1*5=5

2*5=10

3*5=15

4*5=20

5*5=25

6*5=30

7*5=35

8*5=40

9*5=45

10*5=50

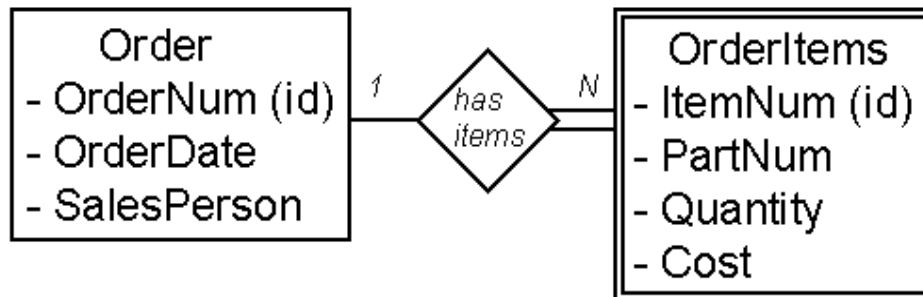
PL/SQL procedure successfully completed.

RESULT:

Thus Embedded SQL was executed successfully.

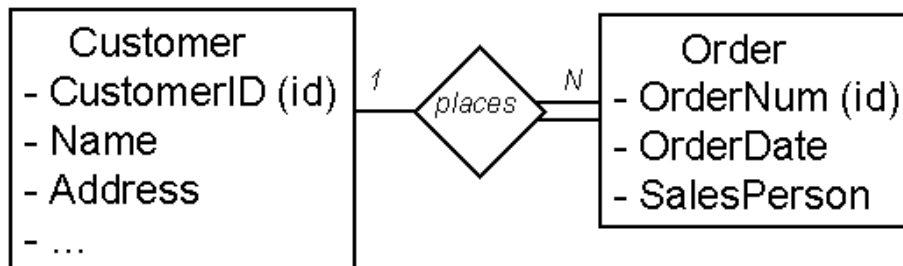
ER diagram:

Chen Notation



- **ORDER** (OrderNum (key), OrderDate, SalesPerson)
- **ORDERITEMS** (OrderNum (key)(fk) , ItemNum (key), PartNum, Quantity, Cost)
- In the above example, in the ORDERITEMS Relation: OrderNum is the *Foreign Key* and OrderNum plus ItemNum is the *Composite Key*.

Chen Notation



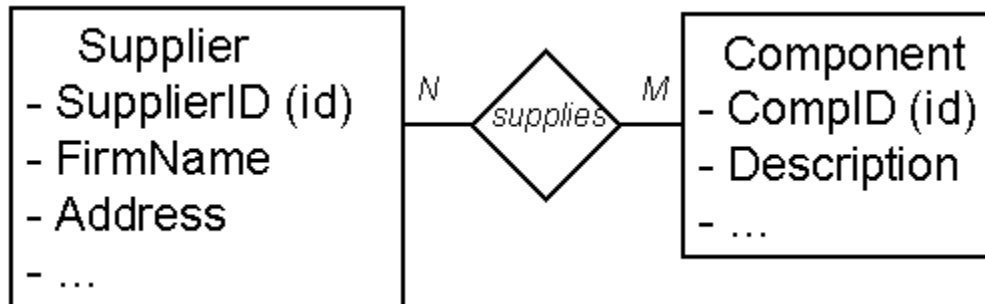
In the ORDER Relation: OrderNum is the *Key*.

Representing Relationships

- **1:1 Relationships.** The key of one relation is stored in the second relation. Look at example queries to determine which key is queried most often.
- **1:N Relationships.**
Parent - Relation on the "1" side.
Child - Relation on the "Many" side.
- Represent each Entity as a relation.
 Copy the key of the parent into the child relation.
- **CUSTOMER** (CustomerID (key), Name, Address, ...)
ORDER (OrderNum (key), OrderDate, SalesPerson, CustomerID (fk))

- **M:N Relationships.** Many to Many relationships can not be directly implemented in relations.
- Solution: Introduce a third *Intersection relation* and copy keys from original two relations.

Chen Notation



- SUPPLIER (SupplierID (key), FirmName, Address, ...)
- COMPONENT (CompID (key), Description, ...)
- SUPPLIER_COMPONENT (SupplierID (key), CompID (key))
- Note that this can also be shown in the ER diagram. Also, look for potential added attributes in the intersection relation.

RESULT:

Thus the ER Database design using E-R model and Normalization was implemented successfully.

**EX NO: 8 DATABASE DESIGN AND IMPLEMENTATION PAY ROLL
PROCESSING**

STEPS:

1. Create a database for payroll processing which request the using SQL
2. Establish ODBC connection
3. In the administrator tools open data source ODBC
4. Click add button and select oracle in ORA home 90, click finish
5. A window will appear given the data source home as oracle and select TNS source name as lion and give the used id as SWTT
6. ADODC CONTROL FOR SALARY FORM:-
7. The above procedure must be follow except the table , A select the table as salary
8. Write appropriate Program in form each from created in VB from each from created in VB form project.

SQL>create table emp(eno number primary key,enamr varchar(20),age number,addr varchar(20),DOB date,phno number(10));
Table created.

SQL>create table salary(eno number,edesig varchar(10),basic number,da number,hra number,pf number,mc number,met number,foreign key(eno) references emp);
Table created.

TRIGGER to calculate DA,HRA,PF,MC

SQL> create or replace trigger employ

2 after insert on salary

3 declare

4 cursor cur is select eno,basic from salary;

5 begin

6 for cur1 in cur loop

7 update salary set

8 hra=basic*0.1,da=basic*0.07,pf=basic*0.05,mc=basic*0.03 where hra=0; 9 end loop;

10 end;

11 / Trigger created.

PROGRAM FOR FORM 1

```
Private Sub emp_Click() Form
2.Show End
Sub Private
Sub exit_Click()
Unload Me
End Sub Private
Sub salary_Click()
Form3.Show
End Sub
```

PROGRAM FOR FORM 2

```
Private Sub add_Click()
Adodc1.Recordset.AddNew MsgBox "Record added"
```

```
End Sub Private
Sub clear_Click()
Text1.Text = ""
Text2.Text = ""
Text3.Text = ""
Text4.Text = ""
Text5.Text = ""
Text6.Text = ""
End Sub Private Sub delte_Click()
Adodc1.Recordset.Delete MsgBox "Record Deleted"
If Adodc1.Recordset.EOF = True
Then Adodc1.Recordset.MovePrevious
End If
End
Sub Private Sub exit_Click()
Unload Me
End Sub
Private Sub main_Click()
Form1.Show
End Sub
Private Sub modify_Click()
Adodc1.Recordset.Update
End Sub
```

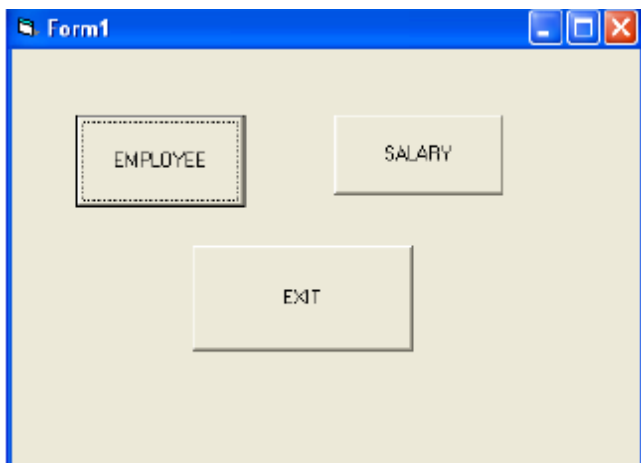
PROGRAM FOR FORM 3

```
Private Sub add_Click()
Adodc1.Recordset.AddNew MsgBox "Record added"
End Sub
Private Sub
clear_Click()
Text1.Text = ""
```

```

Text2.Text = ""
Text3.Text = ""
Text4.Text = ""
Text5.Text = ""
Text6.Text = ""
End Sub
Private Sub delte_Click()
Adodc1.Recordset.Delete MsgBox "Record Deleted"
If Adodc1.Recordset.EOF = True
Then Adodc1.Recordset.MovePrevious
End If
End Sub
Private Sub exit_Click()
Unload Me
End Sub
Private Sub main_Click()
Form1.Show
End Sub
Private Sub
modify_Click()
Adodc1.Recordset.Update
End Sub
Output:

```



Form2

Emp No	1
Emp Name	Rose
Age	20
Address	Trichy
D.O.B	3/12/198
Ph.No	98145789

Adcdc1

ADD MODIFY DELETE CLEAR

MAIN EXIT

Form3

EMP.ID	2	HRA	850
DESIGNATION	SELECT	PF	425
BASIC	8500	MC	255
DA	585	NET SALARY	10625

Adcdc1

ADD CALCULATE EXIT

RESULT:

Thus payroll system was designed and implemented successfully.

DETAILS OF THE STEP

- 1.Create the DB for banking system source request the using SQL
- 2.Establishing ODBC connection
- 3.Click add button and select oracle in ORA home 90 click finished
- 4.A window will appear give the data source name as oracle and give the user id as scott
- 5.Now click the test connection a window will appear with server and user name give user as scott and password tiger Click ok
- 6.VISUAL BASIC APPLICATION:-
 - ☐ Create standard exe project in to and design ms from in request format
 - ☐ To add ADODC project select component and check ms ADO data control click ok
 - ☐ Now the control is added in the tool book
 - ☐ Create standard exe project in to and design ms from in request format
- 7ADODC CONTEOL FOR ACCOUNT FROM:- Click customs and property window and window will appear and select ODBC data source name as oracle and click apply as the some window.

CREATE A TABLE IN ORACLE

SQL>create table account(cname varchar(20),accno number(10),balance number);

Table Created

SQL> insert into account values('&cname',&accno,&balance);

Enter value for cname: Mathi

Enter value for accno: 1234

Enter value for balance: 10000

old 1: insert into account values('&cname',&accno,&balance)

new 1: insert into emp values('Mathi',1234,10000) 1 row created.

SOURCE CODE FOR FORM1

Private Sub ACCOUNT_Click()

Form2.Show

End Sub

Private Sub

EXIT_Click()

Unload Me

End Sub

Private Sub

TRANSACTION_Click()

Form3.Show

```

End Sub
SOURCE CODE FOR FORM 2
Private Sub CLEAR_Click()
Text1.Text = ""
Text2.Text = ""
Text3.Text = ""
End Sub
Private Sub
DELETE_Click()
Adodc1.Recordset.DELETE MsgBox "record deleted"
Adodc1.Recordset.MoveNext If Adodc1.Recordset.EOF = True Then
Adodc1.Recordset.MovePrevious
End If
End Sub
Private Sub EXIT_Click()
Unload Me
End Sub
Private Sub
HOME_Click()
Form1.Show
End Sub
Private Sub
INSERT_Click() Adodc1.Recordset.AddNew
End Sub
Private Sub
TRANSACTION_Click()
Form3.Show
End Sub
Private Sub UPDATE_Click() Adodc1.Recordset.UPDATE MsgBox "record updated
successfully"
End Sub
SOURCE CODE FOR FORM 3
Private Sub ACCOUNT_Click()
Form2.Show
End Sub
Private Sub CLEAR_Click()
Text1.Text = ""
Text2.Text = ""
End Sub
Private Sub
DEPOSIT_Click()
Dim s As String s = InputBox("enter the amount to be deposited")
Text2.Text = Val(Text2.Text) + Val(s) A = Text2.Text MsgBox "CURRENT BALANCE IS
Rs" + Str(A) Adodc1.Recordset.Save Adodc1.Recordset.UPDATE

```

```

End Sub
Private Sub
EXIT_Click()
Unload Me
End Sub
Private Sub
HOME_Click()
Form1.Show End
Sub Private Sub
WITHDRAW_Click()
Dim s As String s = InputBox("enter the amount to be deleted")
Text2.Text = Val(Text2.Text) - Val(s) A = Text2.Text MsgBox "current balance is Rs" +
Str(A)
Adodc1.Recordset.Save
Adodc1.Recordset.UPDATE
End Sub

```

Form1: BANK MANAGEMENT DETAILS

Buttons: ACCOUNT details, TRANSACTION, EXIT

Form2

NAME: malathi

ACCNO: 116

BALANCE: 10900

Buttons: INSERT, UPDATE, DELETE

Recordset: Adodc1

Buttons: HOME, TRANSACTION, EXIT, CLEAR

Form3

Aceno: 112

balance: 20000

DEPOSIT WITHDRAW CLEAR

ACCOUNT HOME EXIT

Adodc1

Project1

enter the amount to be deposited

OK Cancel

200

Project1

CURRENT BALANCE IS Rs 20200

OK

Result:

Thus the banking system was designed and implemented successfully.

STEPS:

1. Create a database for library which request the using SQL
2. Establish ODBC connection
3. In the administrator tools open data source ODBC
4. Click add button and select oracle in ORA home 90, click finish
5. A window will appear given the data source home as oracle and select TNS source name as lion and give the used id as SWTT
6. ADODC CONTROL FOR library FORM:-
7. The above procedure must be follow except the table , A select the table as library
8. Write appropriate Program in form each from created in VB from each from created in VB form project.

Relational Database Schema							
Status	code	description					
Media	media_id	code					
Book	ISBN	title	author	year	dewey	price	
BookMedia	media_id	ISBN					
Customer	ID	name	addr	DOB	phone	username	password
Card	num	fines	ID				
Checkout	media_id	num	since	until			
Location	name	addr	phone				
Hold	media_id	num	name	until	queue		
Stored_In	media_id	name					
Librarian	eid	ID	Pay	name	since		
Video	title	year	director	rating	price		
VideoMedia	media_id	title	year				

```
CREATE TABLE Status ( code INTEGER, description CHAR(30), PRIMARY KEY
(code) );
```

```
CREATE TABLE Media( media_id INTEGER, code INTEGER, PRIMARY KEY
(media_id),
```

```
FOREIGN KEY (code) REFERENCES Status );
```

```
CREATE TABLE Book(ISBNCHAR(14), title CHAR(128), author CHAR(64),
year INTEGER, dewey INTEGER, price REAL, PRIMARY KEY (ISBN) );
```

```
CREATE TABLE BookMedia( media_id INTEGER, ISBN CHAR(14), PRIMARY
KEY (media_id),
```

```
FOREIGN KEY (media_id) REFERENCES Media,
```

```
FOREIGN KEY (ISBN) REFERENCES Book);
```

```
CREATE TABLE Customer( ID INTEGER, name CHAR(64), addr CHAR(256),
DOB CHAR(10),
```

```
phone CHAR(30), username CHAR(16), password CHAR(32), PRIMARY KEY
(ID),
```

```
UNIQUE (username) );
```

```
CREATE TABLE Card( num INTEGER, fines REAL, ID INTEGER, PRIMARY
KEY (num),
```

```
FOREIGN KEY (ID) REFERENCES Customer );
```

```
CREATE TABLE Checkout( media_id INTEGER, num INTEGER, since CHAR(10),
until CHAR(10), PRIMARY KEY (media_id),
```

```
FOREIGN KEY (media_id) REFERENCES Media,
```

```
FOREIGN KEY (num) REFERENCES Card );
```

```
CREATE TABLE Location( name CHAR(64), addr CHAR(256), phone CHAR(30),
PRIMARY KEY (name) );
```

```
CREATE TABLE Hold( media_id INTEGER, num INTEGER, name CHAR(64),
until CHAR(10),
```

```
queue INTEGER, PRIMARY KEY (media_id, num),
```

```
FOREIGN KEY (name) REFERENCES Location,
```

```

FOREIGN KEY (num) REFERENCES Card,

FOREIGN KEY (media_id) REFERENCES Media );

CREATE TABLE Stored_In( media_id INTEGER, name char(64), PRIMARY KEY
(media_id),

FOREIGN KEY (media_id) REFERENCES Media ON DELETE CASCADE,

FOREIGN KEY (name) REFERENCES Location );

CREATE TABLE Librarian( eid INTEGER, ID INTEGER NOT NULL, Pay REAL,
Loc_name CHAR(64) NOT NULL, PRIMARY KEY (eid),

FOREIGN KEY (ID) REFERENCES Customer ON DELETE CASCADE,

FOREIGN KEY (Loc_name) REFERENCES Location(name) );

CREATE TABLE Video( title CHAR(128), year INTEGER, director CHAR(64),
rating REAL, price REAL, PRIMARY KEY (title, year) );

CREATE TABLE VideoMedia( media_id INTEGER, title CHAR(128), year
INTEGER,

PRIMARY KEY (media_id), FOREIGN KEY (media_id) REFERENCES Media,

FOREIGN KEY (title, year) REFERENCES Video );

INSERT INTO Customer(ID, name, addr, DOB, phone, username, password)
VALUES

(60201, 'Jason L. Gray', '2087 Timberbrook Lane, Gypsum, CO 81637',
'09/09/1958', '970-273-9237', 'jlgray', 'password1');

INSERT INTO Customer(ID, name, addr, DOB, phone, username, password)
VALUES

(89682, 'Mary L. Prieto', '1465 Marion Drive, Tampa, FL 33602',
'11/20/1961', '813-487-4873', 'mlprieto', 'password2');

INSERT INTO Customer(ID, name, addr, DOB, phone, username, password)
VALUES

(64937, 'Roger Hurst', '974 Bingamon Branch Rd, Bensenville, IL 60106',
'08/22/1973', '847-221-4986', 'rhurst', 'password3');

```



```
INSERT INTO Customer(ID, name, addr, DOB, phone, username, password)
VALUES
```

```
(31430, 'Warren V. Woodson', '3022 Lords Way, Parsons, TN 38363',
'03/07/1945', '731-845-0077', 'wvwoodson', 'password4');
```

```
INSERT INTO Customer(ID, name, addr, DOB, phone, username, password)
VALUES
```

```
(79916, 'Steven Jensen', '93 Sunny Glen Ln, Garfield Heights, OH 44125',
'12/14/1968', '216-789-6442', 'sjensen', 'password5');
```

```
INSERT INTO Customer(ID, name, addr, DOB, phone, username, password)
VALUES
```

```
(93265, 'David Bain', '4356 Pooh Bear Lane, Travelers Rest, SC 29690',
'08/10/1947', '864-610-9558', 'dbain', 'password6');
```

```
INSERT INTO Customer(ID, name, addr, DOB, phone, username, password)
VALUES
```

```
(58359, 'Ruth P. Alber', '3842 Willow Oaks Lane, Lafayette, LA 70507',
'02/18/1976', '337-316-3161', 'rpalber', 'password7');
```

```
INSERT INTO Customer(ID, name, addr, DOB, phone, username, password)
VALUES
```

```
(88564, 'Sally J. Schilling', '1894 Wines Lane, Houston, TX 77002',
'07/02/1954', '832-366-9035', 'sjschilling', 'password8');
```

```
INSERT INTO Customer(ID, name, addr, DOB, phone, username, password)
VALUES
```

```
(57054, 'John M. Byler', '279 Raver Croft Drive, La Follette, TN 37766',
'11/27/1954', '423-592-8630', 'jmbyler', 'password9');
```

```
INSERT INTO Customer(ID, name, addr, DOB, phone, username, password)
VALUES
```

```
(49312, 'Kevin Spruell', '1124 Broadcast Drive, Beltsville, VA 20705',
'03/04/1984', '703-953-1216', 'kspruell', 'password10');
```

```
INSERT INTO Card(num, fines, ID) VALUES ( 5767052, 0.0, 60201);
```

```
INSERT INTO Card(num, fines, ID) VALUES ( 5532681, 0.0, 60201);
```

```

INSERT INTO Card(num, fines, ID) VALUES ( 2197620, 10.0, 89682);
INSERT INTO Card(num, fines, ID) VALUES ( 9780749, 0.0, 64937);
INSERT INTO Card(num, fines, ID) VALUES ( 1521412, 0.0, 31430);
INSERT INTO Card(num, fines, ID) VALUES ( 3920486, 0.0, 79916);
INSERT INTO Card(num, fines, ID) VALUES ( 2323953, 0.0, 93265);
INSERT INTO Card(num, fines, ID) VALUES ( 4387969, 0.0, 58359);
INSERT INTO Card(num, fines, ID) VALUES ( 4444172, 0.0, 88564);
INSERT INTO Card(num, fines, ID) VALUES ( 2645634, 0.0, 57054);
INSERT INTO Card(num, fines, ID) VALUES ( 3688632, 0.0, 49312);
INSERT INTO Location(name, addr, phone) VALUES ('Texas Branch',
'4832 Deercove Drive, Dallas, TX 75208', '214-948-7102');
INSERT INTO Location(name, addr, phone) VALUES ('Illinois Branch',
'2888 Oak Avenue, Des Plaines, IL 60016', '847-953-8130');
INSERT INTO Location(name, addr, phone) VALUES ('Louisiana Branch',
'2063 Washburn Street, Baton Rouge, LA 70802', '225-346-0068');
INSERT INTO Status(code, description) VALUES (1, 'Available');
INSERT INTO Status(code, description) VALUES (2, 'In Transit');
INSERT INTO Status(code, description) VALUES (3, 'Checked Out');
INSERT INTO Status(code, description) VALUES (4, 'On Hold');
INSERT INTO Media( media_id, code) VALUES (8733, 1);
INSERT INTO Media( media_id, code) VALUES (9982, 1);
INSERT INTO Media( media_id, code) VALUES (3725, 1);
INSERT INTO Media( media_id, code) VALUES (2150, 1);
INSERT INTO Media( media_id, code) VALUES (4188, 1);
INSERT INTO Media( media_id, code) VALUES (5271, 2);
INSERT INTO Media( media_id, code) VALUES (2220, 3);
INSERT INTO Media( media_id, code) VALUES (7757, 1);

```

```

INSERT INTO Media( media_id, code) VALUES (4589, 1);
INSERT INTO Media( media_id, code) VALUES (5748, 1);
INSERT INTO Media( media_id, code) VALUES (1734, 1);
INSERT INTO Media( media_id, code) VALUES (5725, 1);
INSERT INTO Media( media_id, code) VALUES (1716, 4);
INSERT INTO Media( media_id, code) VALUES (8388, 1);
INSERT INTO Media( media_id, code) VALUES (8714, 1);
INSERT INTO Book(ISBN, title, author, year, dewey, price) VALUES
('978-0743289412', 'Lisey"s Story', 'Stephen King',
2006, 813, 10.0);
INSERT INTO Book(ISBN, title, author, year, dewey, price) VALUES
('978-1596912366', 'Restless: A Novel', 'William Boyd',
2006, 813, 10.0);
INSERT INTO Book(ISBN, title, author, year, dewey, price) VALUES
('978-0312351588', 'Beachglass', 'Wendy Blackburn',
2006, 813, 10.0);
INSERT INTO Book(ISBN, title, author, year, dewey, price) VALUES
('978-0156031561', 'The Places In Between', 'Rory Stewart',
2006, 910, 10.0);
INSERT INTO Book(ISBN, title, author, year, dewey, price) VALUES
('978-0060583002', 'The Last Season', 'Eric Blehm',
2006, 902, 10.0);
INSERT INTO Book(ISBN, title, author, year, dewey, price) VALUES
('978-0316740401', 'Case Histories: A Novel', 'Kate Atkinson',
2006, 813, 10.0);
INSERT INTO Book(ISBN, title, author, year, dewey, price) VALUES
('978-0316013949', 'Step on a Crack', 'James Patterson, et al.',

```

```

2007, 813, 10.0);

INSERT INTO Book(ISBN, title, author, year, dewey, price) VALUES
('978-0374105235', 'Long Way Gone: Memoirs of a Boy Soldier',
'Tshmael Beah', 2007, 916, 10.0);

INSERT INTO Book(ISBN, title, author, year, dewey, price) VALUES
('978-0385340229', 'Sisters', 'Danielle Steel', 2006, 813, 10.0);

INSERT INTO BookMedia(media_id, ISBN) VALUES (8733, '978-0743289412');
INSERT INTO BookMedia(media_id, ISBN) VALUES (9982, '978-1596912366');
INSERT INTO BookMedia(media_id, ISBN) VALUES (3725, '978-1596912366');
INSERT INTO BookMedia(media_id, ISBN) VALUES (2150, '978-0312351588');
INSERT INTO BookMedia(media_id, ISBN) VALUES (4188, '978-0156031561');
INSERT INTO BookMedia(media_id, ISBN) VALUES (5271, '978-0060583002');
INSERT INTO BookMedia(media_id, ISBN) VALUES (2220, '978-0316740401');
INSERT INTO BookMedia(media_id, ISBN) VALUES (7757, '978-0316013949');
INSERT INTO BookMedia(media_id, ISBN) VALUES (4589, '978-0374105235');
INSERT INTO BookMedia(media_id, ISBN) VALUES (5748, '978-0385340229');

INSERT INTO Checkout(media_id, num, since, until) VALUES
(2220, 9780749, '02/15/2007', '03/15/2007');

INSERT INTO Video(title, year, director, rating, price) VALUES
('Terminator 2: Judgment Day', 1991, 'James Cameron', 8.3, 20.0);

INSERT INTO Video(title, year, director, rating, price) VALUES
('Raiders of the Lost Ark', 1981, 'Steven Spielberg', 8.7, 20.0);

INSERT INTO Video(title, year, director, rating, price) VALUES
('Aliens', 1986, 'James Cameron', 8.3, 20.0);

INSERT INTO Video(title, year, director, rating, price) VALUES
('Die Hard', 1988, 'John McTiernan', 8.0, 20.0);

INSERT INTO VideoMedia(media_id, title, year) VALUES

```

```

( 1734, 'Terminator 2: Judgment Day', 1991);

INSERT INTO VideoMedia(media_id, title, year) VALUES

( 5725, 'Raiders of the Lost Ark', 1981);

INSERT INTO VideoMedia(media_id, title, year) VALUES

( 1716, 'Aliens', 1986);

INSERT INTO VideoMedia(media_id, title, year) VALUES

( 8388, 'Aliens', 1986);

INSERT INTO VideoMedia(media_id, title, year) VALUES

( 8714, 'Die Hard', 1988);

INSERT INTO Hold(media_id, num, name, until, queue) VALUES

(1716, 4444172, 'Texas Branch', '02/20/2008', 1);

INSERT INTO Librarian(eid, ID, pay, Loc_name) Values

(2591051, 88564, 30000.00, 'Texas Branch');

INSERT INTO Librarian(eid, ID, pay, Loc_name) Values

(6190164, 64937, 30000.00, 'Illinois Branch');

INSERT INTO Librarian(eid, ID, pay, Loc_name) Values

(1810386, 58359, 30000.00, 'Louisiana Branch');

INSERT INTO Stored_In(media_id, name) VALUES(8733, 'Texas Branch');

INSERT INTO Stored_In(media_id, name) VALUES(9982, 'Texas Branch');

INSERT INTO Stored_In(media_id, name) VALUES(1716, 'Texas Branch');

INSERT INTO Stored_In(media_id, name) VALUES(1734, 'Texas Branch');

INSERT INTO Stored_In(media_id, name) VALUES(4589, 'Texas Branch');

INSERT INTO Stored_In(media_id, name) VALUES(4188, 'Illinois Branch');

INSERT INTO Stored_In(media_id, name) VALUES(5271, 'Illinois Branch');

INSERT INTO Stored_In(media_id, name) VALUES(3725, 'Illinois Branch');

INSERT INTO Stored_In(media_id, name) VALUES(8388, 'Illinois Branch');

INSERT INTO Stored_In(media_id, name) VALUES(5748, 'Illinois Branch');

```

```

INSERT INTO Stored_In(media_id, name) VALUES(2150, 'Louisiana Branch');
INSERT INTO Stored_In(media_id, name) VALUES(8714, 'Louisiana Branch');
INSERT INTO Stored_In(media_id, name) VALUES(7757, 'Louisiana Branch');
INSERT INTO Stored_In(media_id, name) VALUES(5725, 'Louisiana Branch');

```

```

SELECT C.ID, C.name, C.addr, C.DOB, C.phone, C.username,
nvl((SELECT 'Librarian'
FROM Librarian L
WHERE L.ID = C.ID), 'Customer') AS role
FROM Customer C
WHERE C.username = <user input> AND C.password = <user input>;

/* Book search for customers */

SELECT B.ISBN, B.title, B.author, B.year,
(SELECT COUNT(*)
FROM BookMedia BM
WHERE BM.ISBN = B.ISBN AND BM.code = 1) AS num_available
FROM Book B
WHERE B.title LIKE '%<user input>%' AND B.author LIKE '%<user input>%' AND
B.year <= <user input> AND B.year >= <user input>;

/* Find all copies of a book (used for placing holds or viewing detailed
information). */

SELECT BM.media_id, S.description,
nvl((SELECT SI.name
FROM Stored_In SI
WHERE SI.media_id = BM.media_id), 'none') AS name
FROM BookMedia BM, Media M, Status S

```

```

WHERE BM.ISBN = <user input> AND M.media_id = BM.media_id AND S.code =
M.code;

/* Video search for customers */

SELECT V.title, V.year, V.director, V.rating
(SELECT COUNT(*)
FROM VideoMedia VM
WHERE VM.ID = V.ID AND VM.code = 1) AS num_available
FROM Video V
WHERE V.title LIKE '%<user input>%' AND V.year <= <user input> AND V.year <= <user
input>
AND V.director LIKE '%<user input>%' AND V.rating >= <user input>;

/* Find all copies of a video (used for placing holds or viewing detailed
information). */

SELECT VM.media_id, S.description,
nvl((SELECT SI.name
FROM Stored_In SI
WHERE SI.media_id = VM.media_id), 'none') AS name
FROM VideoMedia VM, Media M, Status S
WHERE VM.title = <user input> AND VM.year = <user input> AND
M.media_id = VM.media_id AND S.code = M.code;

/* Find the status of a given media item */

SELECT S.description
FROM Status S, Media M
WHERE S.code = M.code AND M.media_id = <user input>;

/* Create a new Hold */

INSERT INTO Hold(media_id, num, name, until, queue) VALUES
(<user input>, <user input>, <user input>, <user input>,
nvl((SELECT MAX(H.queue)

```

```

FROM Hold H

WHERE H.media_id = <user input>), 0) + 1 );

/* Cancel Hold, Step 1: Remove the entry from hold */

DELETE FROM Hold

WHERE media_id = <user input> AND num = <user input>

/* Cancel Hold, Step 2: Update queue for this item */

UPDATE Hold

SET queue = queue-1

WHERE media_id = <user input> AND queue > <user input>;

/* Functions needed to view information about a customer */

/* View the customer's card(s) */

SELECT CR.num, CR.fines

FROM Card CR

WHERE CR.ID = <user input>;

/* View media checked out on a given card */

SELECT B.title, B.author, B.year, BM.media_id, CO.since, CO.until

FROM Checkout CO, BookMedia BM, Book B

WHERE CO.num = <user input> AND CO.media_id = BM.media_id AND B.ISBN =
BM.ISBN

UNION

SELECT V.title, V.director, V.year, VM.media_id, CO.since, CO.until

FROM Checkout CO, VideoMedia VM, Book B

WHERE CO.num = <user input> AND CO.media_id = VM.media_id AND

VM.title = V.title AND VM.year = V.year;

/* View media currently on hold for a given card */

SELECT B.title, B.author, B.year, BM.media_id, H.until, H.queue, SI.name

FROM Hold H, BookMedia BM, Book B, Stored_In SI

```



```

WHERE H.num = <user input> AND H.media_id = BM.media_id AND B.ISBN =
BM.ISBN

AND SI.media_id = H.media_id

UNION

SELECT V.title, V.director, V.year, VM.media_id, H.until, H.queue, SI.name
FROM Hold H, VideoMedia VM, Book B, Stored_In SI
WHERE H.num = <user input> AND H.media_id = VM.media_id AND
VM.title = V.title AND VM.year = V.year AND SI.media_id = H.media_id;

/* View the total amount of fines the customer has to pay */

SELECT SUM(CR.fines)

FROM Card CR

WHERE CR.ID = <user input>;

/* *\

Functions reserved for librarians

\* */

/* Add new customer */

INSERT INTO Customer(ID, name, addr, DOB, phone, username, password) VALUES
(<user input>, <user input>, <user input>, <user input>, <user input>,
<user input>, <user input>, );

/* Find a customer */

SELECT C.ID, C.name, C.addr, C.DOB, C.phone, C.username,
nvl((SELECT 'Librarian'

FROM Librarian L

WHERE L.ID = C.ID), 'Customer') AS role

FROM Customer C

WHERE C.username = <user input> AND C.name LIKE '%<user input>%';

/* Add new card and assign it to a customer */

```

```

INSERT INTO Card(num, fines, ID) VALUES ( <user input>, 0, <user input>);

/* Create an entry in Checkout */

INSERT INTO Checkout(media_id, num, since, until) VALUES

(<user input>, <user input>, <user input>, <user input>);

/* Remove the entry for Stored_In */

DELETE FROM Stored_In

WHERE media_id = <user input>;

/* Change the status code of the media */

UPDATE Media

SET code = <user input>

WHERE media_id = <user input>;

/* Remove the entry from Checkout */

DELETE FROM Checkout

WHERE media_id = <user input>;

/* Create the entry in Stored_In */

INSERT INTO Stored_In(media_id, name) VALUES (<user input>, <user input>);

/* Find the next Hold entry for a given media */

SELECT H.num, H.name, H.until

FROM Hold H

WHERE H.queue = 1 AND H.media_id = <user input>;

/* Change the Stored_In entry to the target library branch */

UPDATE Stored_In

SET name = <user input>

WHERE media_id = <user input>;

/* Find the customer that should be notified about book arrival */

SELECT C.name, C.phone, CR.num

FROM Customer C, Card CR, Hold H

```

```
WHERE H.queue = 1 AND H.name = <user input> AND H.media_id = <user input> AND  
CR.num = H.num AND C.ID = CR.ID;
```

```
/* Add a new entry into the Book table */
```

```
INSERT INTO Book(ISBN, title, author, year, dewey, price) VALUES  
(<user input>, <user input>, <user input>, <user input>, <user input>,  
<user input>);
```

```
/* Add a new entry into the Video table */
```

```
INSERT INTO Video(title, year, director, rating, price) VALUES  
(<user input>, <user input>, <user input>, <user input>, <user input>);
```

```
/* Add a new Media object */
```

```
INSERT INTO Media( media_id, code) VALUES (<user input>, 1);
```

```
/* Add a new BookMedia object */
```

```
INSERT INTO BookMedia(media_id, ISBN) VALUES (<user input>, <user input>);
```

```
/* Add a new VideoMedia object */
```

```
INSERT INTO VideoMedia(media_id, title, year) VALUES  
(<user input>, <user input>, <user input>);
```

```
/* Remove an entry from the BookMedia table */
```

```
DELETE FROM BookMedia  
WHERE media_id = <user input>;
```

```
/* Remove an entry from the VideoMedia table */
```

```
DELETE FROM VideoMedia  
WHERE media_id = <user input>;
```

```
/* Remove an entry from the Media table */
```

```
DELETE FROM Media  
WHERE media_id = <user input>;
```

```
/* Remove an entry from the Book table */
```

```
DELETE FROM Book
```

WHERE ISBN = <user input>;

/* Remove an entry from the Video table */

DELETE FROM Video

WHERE title = <user input> AND year = <user input>;

/* Update the customer's fines */

UPDATE Card

SET fines = <user input>

WHERE num = <user input>

The screenshot shows a Windows-style application window titled "MDIForm1 - [BOOKS]". The menu bar includes "Books Entry", "User Entry", "Issues of Books", and "Exit". The main area has a light blue background with the word "Books" in a large, red, serif font. Below the title, there are labels for various book attributes: "Book No.", "ISBN No.", "Subject", "Name Of The Book", "Author", "Publisher", "Edition", "Copies", and "Cost". Each label is followed by a text input field. The fields contain the following values: "3", "2568956", "Mathematics", "Trigonometry", "Loni", "Moon Light", "2003", "5", and "150". At the bottom of the form, there are six buttons: "UPDATE", "DELETE", "ADD", "SEARCH", "REFRESH", and "EXIT".

The screenshot shows a Windows-style application window titled "MDIForm1 - [Form1]". The menu bar includes "Books Entry", "User Entry", "Issues of Books", and "Exit". The main area has a light blue background with the text "ISSUES OF BOOKS" in a large, red, serif font. Below the title, there are labels for issue-related attributes: "Book No.", "Student ID.", "Current No. of Copies Available", "Issue Date", and "Due date". Each label is followed by a text input field or a date picker. The fields contain the following values: "3", "2", "500", and two date pickers showing "13 JUN 2004" and "20 JUN 2004". At the bottom of the form, there are six buttons: "UPDATE", "DELETE", "ADD", "SEARCH", "REFRESH", and "EXIT".

STEPS:

1. Create a database for library which request the using SQL
2. Establish ODBC connection
3. In the administrator tools open data source ODBC
4. Click add button and select oracle in ORA home 90, click finish
5. A window will appear given the data source home as oracle and select TNS source name as lion and give the used id as SWTT
6. ADODC CONTROL FOR library FORM:-
7. The above procedure must be follow except the table , A select the table as library
8. Write appropriate Program in form each from created in VB from each from created in VB form project.

i.ADMINISTRATOR Table

This table holds the profile information of the application super users otherwise known as system

administrators. They have control of the software meaning that they can perform additional tasks that

other users cannot ordinarily perform. Every software of this nature has such users and this one is no

exception. The table contains the following columns; ADMIN_ID, TITLE, FRIST_NAME,

LAST_NAME, and DEPARMENT_ID. The column ADMIN_ID is the primary key column (primary

key disallows duplicate values and nulls in a column) every table should have a primary key column,

as this acts like table indexing.

ii. ALL_COURCES Table

This table keeps the courses offered by students in different departments in the school. The table

contains the following columns; COURCE_ID, COURCE_TITLE, and COURCE_CODE. The

COURCE_ID is the primary key column.

iii. APP_USER_A Table

This table contains application login details for application administrators. The table columns are;

USRXNAME, PASSWD and ADMIN_ID. The column ADMIN_ID is the primary key column.

iv. APP_USER_L Table

This table contains application login details for application lecturers. The table columns are;

USRXNAME, PASSWD and LECTURER_ID. The column LECTURER_ID is the primary key

column.

v. APP_USER_S Table

This table contains application login details for application students. The table columns are;

USRXNAME, PASSWD and MATRIG_NO. The column MATRIG_NO is the primary key column.

vi. DEPARTMENTS Table

This table holds information about the schools departments. The table contains the following columns;

DEPARTMENT_ID and DEPARTMENT_NAME. The column DEPARTMENT_ID is the primary

key column.

vii. GRADES Table

This is more like the main table in the database as all other tables relate to this table directly or in

some other way. This table holds students examination records. The table contains the following

columns; GRADES_ID, SESSION1, REG_NUMBER, DEPARTMENT_ID, LEVEL1, MATRIG_NO, FRIST_NAME, LAST_NAME, COURCE_CODE, GRADE, CREDIT_UNIT, SCORE, LECTURER_ID and GRADE_POINT. The column GRADES_ID is the primary key column.

viii. LECTURERS Table

This table holds the profile information of the application lecturers. The table contains the following

columns; LECTURER_ID, TITLE, FRIST_NAME, LAST_NAME, and DEPARMENT_ID. The column LECTUTER_ID is the primary key column.

ix. REG_TABLE Table

This table contains student's registration details i.e. if a student is registered for the semester this table

is used to store that information. The table contains the following columns; REG_ID, REG_NUMBER, MATRIG_NO, FRIST_NAME, LAST_NAME, LEVEL1, DEPARTMENT_ID and SESSION1. The column REG_ID is the primary key column.


x. STUDENTS Table

This table holds the profile information of the application students. The table contains the following

columns; MATRIG_NO, TITLE, FRIST_NAME, LAST_NAME, and DEPARMENT_ID. The column MATRIG_NO is the primary key column.

Oracle Application Server Forms Services

WELCOME



Demo University
Knowledge is power.

Welcome to Demo University's Exam Officer.
Kindly click the check box if you are a student.
Leave unchecked if not and continue.


☐ Student

Record: 1/1

Window

ORACLE

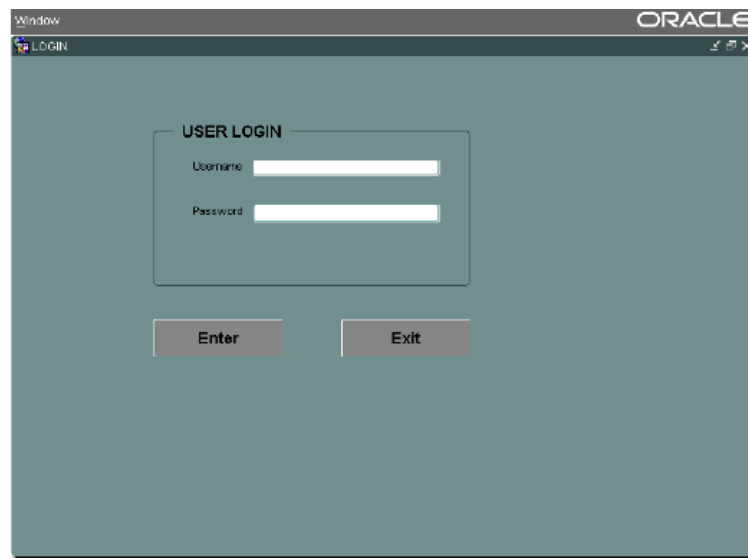
ADMINISTRATION



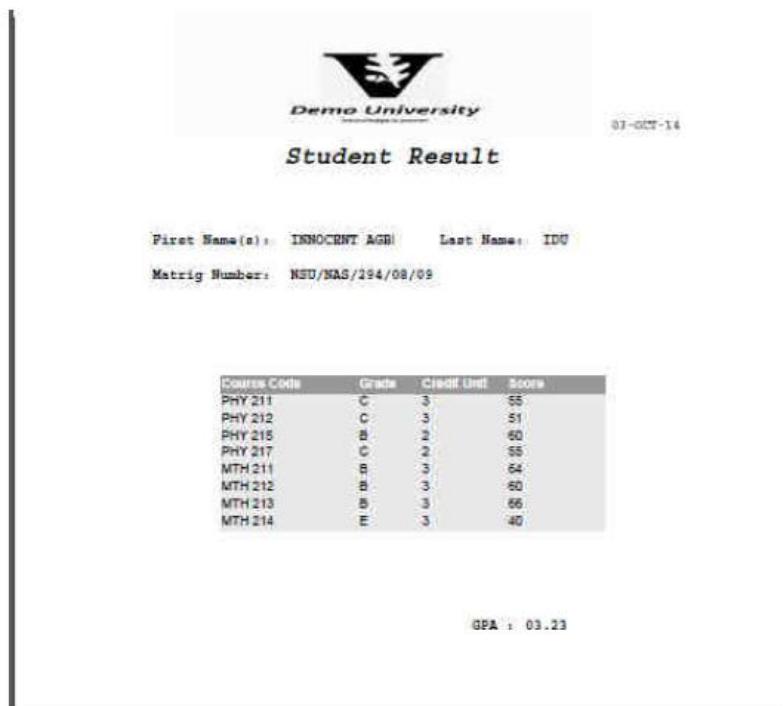
Demo University
Knowledge is power.

Kindly click the check box if you wish to sign in as an Administrator, leave unchecked if you wish to sign in as a Lecturer.

☐ Administrator



A screenshot of an Oracle database user login window. The window has a title bar with 'Window' and 'ORACLE' on the right. Below the title bar is a 'LOGIN' button. The main area is a dark teal color. In the center, there is a 'USER LOGIN' section with two input fields: 'Username' and 'Password'. Below these fields are two buttons: 'Enter' and 'Exit'.



A screenshot of a 'Student Result' page for 'Demo University'. The page features the university's logo at the top center, the date '01-OCT-14' on the top right, and the title 'Student Result' in a stylized font. Below the title, the student's details are listed: 'First Name(s): INNOCENT AGBI', 'Last Name: IDU', and 'Matric Number: NSU/NAS/294/08/09'. A table displays the student's course results, and the GPA is shown at the bottom right.

Course Code	Grade	Credit Unit	Score
PHY 211	C	3	55
PHY 212	C	3	51
PHY 215	B	2	60
PHY 217	C	2	55
MTH 211	B	3	64
MTH 212	B	3	60
MTH 213	B	3	66
MTH 214	E	3	40

GPA : 03.23

RESULT:

Thus the student information system was designed and implemented successfully.

AIM:

To study about automatic backup of files and recovery.

INTRODUCTION:

Because data is the heart of the enterprise, it's crucial to protect it. And to protect organization's data, one need to implement a data backup and recovery plan. Backing up files can protect against accidental loss of user data, database corruption, hardware failures, and even natural disasters. It's our job as an administrator to make sure that backups are performed and that backup tapes are stored in a secure location.

Creating a Backup and Recovery Plan

Data backup is an insurance plan. Important files are accidentally deleted all the time. Mission-critical data can become corrupt. Natural disasters can leave office in ruin. With a solid backup and recovery plan, one can recover from any of these.

Figuring Out a Backup Plan

It takes time to create and implement a backup and recovery plan. We'll need to figure out what data needs to be backed up, how often the data should be backed up, and more. To help we create a plan, consider the following:

- How important is the data on systems? The importance of data can go a long way in helping to determine if one need to back it up—as well as when and how it should be backed up. For critical data, such as a database, one'll want to have redundant backup sets that extend back for several backup periods. For less important data, such as daily user files, we won't need such an elaborate backup plan, but 'll need to back up the data regularly and ensure that the data can be recovered easily.
- What type of information does the data contain? Data that doesn't seem important to we may be very important to someone else. Thus, the type of information the data contains can help we determine if we need to back up the data—as well as when and how the data should be backed up.
- How often does the data change? The frequency of change can affect our decision on how often the data should be backed up. For example, data that changes daily should be backed up daily.
- How quickly do we need to recover the data? Time is an important factor in creating a backup plan. For critical systems, we may need to get back online swiftly. To do this, we may need to alter our backup plan.
- Do we have the equipment to perform backups? We must have backup hardware to perform backups. To perform timely backups, we may need several backup devices and

several sets of backup media. Backup hardware includes tape drives, optical drives, and removable disk drives. Generally, tape drives are less expensive but slower than other types of drives.

- Who will be responsible for the backup and recovery plan? Ideally, someone should be a primary contact for the organization's backup and recovery plan. This person may also be responsible for performing the actual backup and recovery of data.
- What is the best time to schedule backups? Scheduling backups when system use is as low as possible will speed the backup process. However, we can't always schedule backups for off-peak hours. So we'll need to carefully plan when key system data is backed up.
- Do we need to store backups off-site? Storing copies of backup tapes off-site is essential to recovering our systems in the case of a natural disaster. In our off-site storage location, we should also include copies of the software we may need to install to reestablish operational systems.

The Basic Types of Backup

There are many techniques for backing up files. The techniques use will depend on the type of data we're backing up, how convenient we want the recovery process to be, and more.

If we view the properties of a file or directory in Windows Explorer, we'll note an attribute called Archive. This attribute often is used to determine whether a file or directory should be backed up. If the attribute is on, the file or directory may need to be backed up. The basic types of backups we can perform include

- **Normal/full backups** All files that have been selected are backed up, regardless of the setting of the archive attribute. When a file is backed up, the archive attribute is cleared. If the file is later modified, this attribute is set, which indicates that the file needs to be backed up.
- **Copy backups** All files that have been selected are backed up, regardless of the setting of the archive attribute. Unlike a normal backup, the archive attribute on files isn't modified. This allows us to perform other types of backups on the files at a later date.
- **Differential backups** Designed to create backup copies of files that have changed since the last normal backup. The presence of the archive attribute indicates that the file has been modified and only files with this attribute are backed up. However, the archive attribute on files isn't modified. This allows to perform other types of backups on the files at a later date.
- **Incremental backups** Designed to create backups of files that have changed since the most recent normal or incremental backup. The presence of the archive attribute indicates that the file has been modified and only files with this attribute are backed up. When a file is backed up, the archive attribute is cleared. If the file is later modified, this attribute is set, which indicates that the file needs to be backed up.
- **Daily backups** Designed to back up files using the modification date on the file itself. If a file has been modified on the same day as the backup, the file will be backed up. This technique doesn't change the archive attributes of files.

In we backup plan we'll probably want to perform full backups on a weekly basis and supplement this with daily, differential, or incremental backups. We may also want to create an extended backup set for monthly and quarterly backups that includes additional files that aren't being backed up regularly.

Tip We'll often find that weeks or months can go by before anyone notices that a file or data source is missing. This doesn't mean the file isn't important. Although some types of data aren't used often, they're still needed. So don't forget that we may also want to create extra sets of backups for monthly or quarterly periods, or both, to ensure that we can recover historical data over time.

Differential and Incremental Backups

The difference between differential and incremental backups is extremely important. To understand the distinction between them. As it shows, with differential backups we back up all the files that have changed since the last full backup (which means that the size of the differential backup grows over time). With incremental backups, we only back up files that have changed since the most recent full or incremental backup (which means the size of the incremental backup is usually much smaller than a full backup).

Once we determine what data we're going to back up and how often, we can select backup devices and media that support these choices. These are covered in the next section.

Selecting Backup Devices and Media

Many tools are available for backing up data. Some are fast and expensive. Others are slow but very reliable. The backup solution that's right for our organization depends on many factors, including

- **Capacity** The amount of data that we need to back up on a routine basis. Can the backup hardware support the required load given our time and resource constraints?
- **Reliability** The reliability of the backup hardware and media. Can we afford to sacrifice reliability to meet budget or time needs?
- **Extensibility** The extensibility of the backup solution. Will this solution meet our needs as the organization grows?
- **Speed** The speed with which data can be backed up and recovered. Can we afford to sacrifice speed to reduce costs?
- **Cost** The cost of the backup solution. Does it fit into our budget?

Common Backup Solutions

Capacity, reliability, extensibility, speed, and cost are the issues driving our backup plan. If we understand how these issues affect our organization, we'll be on track to select an appropriate backup solution. Some of the most commonly used backup solutions include

- **Tape drives** Tape drives are the most common backup devices. Tape drives use magnetic tape cartridges to store data. Magnetic tapes are relatively inexpensive but aren't highly reliable. Tapes can break or stretch. They can also lose information over time. The average capacity of tape cartridges ranges from 100 MB to 2 GB. Compared with other backup solutions, tape drives are fairly slow. Still, the selling point is the low cost.
- **Digital audio tape (DAT) drives** DAT drives are quickly replacing standard tape drives as the preferred backup devices. DAT drives use 4 mm and 8 mm tapes to store data. DAT drives and tapes are more expensive than standard tape drives and tapes, but they offer more speed and capacity. DAT drives that use 4 mm tapes can typically record over 30 MB per minute and have capacities of up to 16 GB. DAT drives that use 8 mm tapes can typically record more than 10 MB per minute and have capacities of up to 36 GB (with compression).
- **Auto-loader tape systems** Auto-loader tape systems use a magazine of tapes to create extended backup volumes capable of meeting the high-capacity needs of the enterprise. With an auto-loader system, tapes within the magazine are automatically changed as needed during the backup or recovery process. Most auto-loader tape systems use DAT tapes. The typical system uses magazines with between 4 and 12 tapes. The main drawback to these systems is the high cost.
- **Magnetic optical drives** Magnetic optical drives combine magnetic tape technology with optical lasers to create a more reliable backup solution than DAT. Magnetic optical drives use 3.5-inch and 5.25-inch disks that look similar to floppies but are much thicker. Typically, magnetic optical disks have capacities of between 1 GB and 4 GB.
- **Tape jukeboxes** Tape jukeboxes are similar to auto-loader tape systems. Jukeboxes use magnetic optical disks rather than DAT tapes to offer high-capacity solutions. These systems load and unload disks stored internally for backup and recovery operations. Their key drawback is the high cost.
- **Removable disks** Removable disks, such as Iomega Jaz, are increasingly being used as backup devices. Removable disks offer good speed and ease of use for a single drive or single system backup. However, the disk drives and the removable disks tend to be more expensive than standard tape or DAT drive solutions.
- **Disk drives** Disk drives provide the fastest way to back up and restore files. With disk drives, you can often accomplish in minutes what takes a tape drive hours. So when business needs mandate a speedy recovery, nothing beats a disk drive. The drawbacks to disk drives, however, are relatively high costs and less extensibility.

Before we can use a backup device, we must install it. When we install backup devices other than standard tape and DAT drives, we need to tell the operating system about the controller card and drivers that the backup device uses. For detailed information on installing devices and drivers, see the section of Chapter 2 entitled "Managing Hardware Devices and Drivers."

Buying and Using Tapes

Selecting a backup device is an important step toward implementing a backup and recovery plan. But we also need to purchase the tapes or disks, or both, that will allow us to implement our plan. The number of tapes we need depends on how much data we'll be backing up, how often we'll be backing up the data, and how long we'll need to keep additional data sets.

The typical way to use backup tapes is to set up a rotation schedule whereby we rotate through two or more sets of tapes. The idea is that we can increase tape longevity by reducing tape usage and at the same time reduce the number of tapes we need to ensure that we have historic data on hand when necessary.

One of the most common tape rotation schedules is the 10-tape rotation. With this rotation schedule, we use 10 tapes divided into two sets of 5 (one for each weekday). As shown in Table 14-2, the first set of tapes is used one week and the second set of tapes is used the next week. On Fridays, full backups are scheduled. On Mondays through Thursdays, incremental backups are scheduled. If we add a third set of tapes, we can rotate one of the tape sets to an off-site storage location on a weekly basis.

Tip The 10-tape rotation schedule is designed for the 9 to 5 workers of the world. If we're in a 24 x 7 environment, we'll definitely want extra tapes for Saturday and Sunday. In this case, use a 14-tape rotation with two sets of 7 tapes. On Sundays, schedule full backups. On Mondays through Saturdays, schedule incremental backups.

RESULT:

Thus the study of automatic backup of files was performed successfully.

EXERCISE NO-1(a)

INSERTION SORT

AIM: To arrange the numbers in ascending order using insertion sort.

Algorithm:

- 1) Repeat step 2 to 5 for K=1 to n-1
- 2) Set temp=arr[k]
- 3) Set j=k-1
- 4) Repeat while temp <=arr[j] && j>=0
Set arr[j+1]=arr[j]
Set j=j-1
- 5) Set arr[j+1] = temp
- 6) Exit

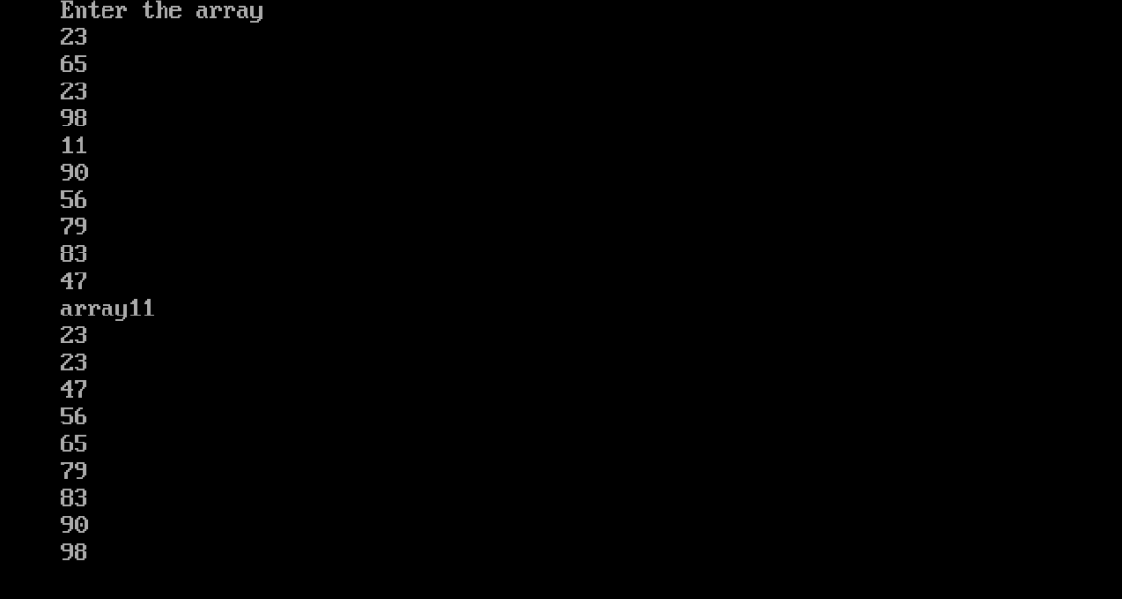
Program:

```
#include<stdio.h>
#include<conio.h>
void insertion_sort(int a[]);
void main()
{
    int arr[10], i;
    printf("Enter the elements of the array");
    for(i=0; i<10; i++)
    {
        scanf("%d", &arr[i]);
    }
    insertion_sort(arr);
    getch();
}

void insertion_sort(int a[])
{
    int k, j, temp, n;
    n=10;
    for(k=1; k<=(n-1); k++)
    {
        temp=a[k];
        j=k-1;
        while(temp<=a[j] && j>=0)
        {
            a[j+1]=a[j];
            j=j-1;
        }
        a[j+1]=temp;
    }
}
```

```
}  
printf("sorted array is:");  
for(k=0;k<10;k++)  
{ printf("%d\n",a[k]);  
}
```

Output :



```
Enter the array  
23  
65  
23  
98  
11  
90  
56  
79  
83  
47  
array11  
23  
23  
47  
56  
65  
79  
83  
90  
98
```

RESULT :

The elements were successfully arranged in ascending order using insertion sort

EXERCISE NO-1(b)**SELECTION SORT**

AIM: To arrange the numbers in ascending order using selection sort.

Algorithm:

- 1) Repeat step 2 and 3 for K=1 to n-1
- 2) Call smallest (arr ,k,n,pos)
- 3) Swap a[k] with arr[pos]
- 4) Exit

Smallest(arr,k,n,pos)

- 1) Set small = arr[k]
- 2) Set pos=k
- 3) Repeat for j=k+1 to n-1
 If small>arr[j]
 Set pos=j
 [end of if]
 [end of loop]
- 4) Exit

Program:


```
#include<stdio.h>
#include<conio.h>
int smallest(intarr[],intk,int n)
{
    intsmall,j,pos;
    small=arr[k];
    pos=k;
    for(j=k+1;j<n;j++)
    {
        if(small>arr[j])
        {
            small=arr[j];
            pos=j;}}
    returnpos;
}
void main()
{
    inti,arr[6],k,c,temp;
    clrscr();
    printf("Enter 6 numbers: ");
    for(i=0;i<6;i++)
```

```

{
scanf("%d",&arr[i]);
}
for(i=0;i<6;i++)
{
c=smallest(arr,i,6);
temp=arr[i];
arr[i]=arr[c];
arr[c]=temp;
}
for(i=0;i<6;i++)
{
printf("%d ",arr[i]);}
getch();
}

```

Output :



```

Enter the array67
55
12
90
80
54
35
62
111
56
array12
35
54
55
56
62
67
80
90
111
-

```

RESULT :

The elements were successfully arranged in ascending order using selection sort.

EXERCISE NO-2

MERGE SORT

AIM: To sort the given elements using Merge sort.

Algorithm:

Merge _Sort(arr,beg,end)

1) If beg < end then

Set mid =(beg + end)/2

Call Merge _Sort(arr,beg,mid)

Call Merge _Sort(arr,mid+1,end)

Call Merge _Sort(arr,beg,mid,end)

[end of if]

Merge (arr,beg,mid,end)

1) Initialise set i = beg ; j=mid+1 ; index =0

2) Repeat while (i<=mid) and (j<=end)

If arr[i]<arr[j],then

Set temp[index] = arr[i]

Set i=i+1

else

Set temp[index]=arr[j]

Set j=j+1

[End of if]

Set index =index +1

[End of loop]

Merge (arr,beg,mid,end)

3) [Copy the remaining elements of right sub array if any]

If i> mid then

Repeat while j <= end

Set index = index +1

[end of loop]

[copy the remaining elements of left sub. Array ,if any]

else

repeat while i<= mid

set temp[index]=arr[i]

set index = index + 1, sort i = i+1
[end of loop]

Program:

```
#include<stdio.h>
#include<conio.h>
int arr[10];
void merge_sort(int arr[], int beg, int end);
void merge(int a[], int beg, int mid, int end);
void main()
{
    inti;
    clrscr();
    printf("Enter the array");
    for(i=0; i<10; i++)
    {
        scanf("%d", &arr[i]);
    }
    merge_sort(arr, 0, 9);
    printf("array");
    for(i=0; i<10; i++)
    {
        printf("%d", &arr[i]);
    }
    getch();
}

void merge_sort(int arr[], int beg, int end)
{
    inti;
    if(beg<end)
    {
        int mid=(beg+end)/2;
        merge_sort(arr, beg, mid);
        merge_sort(arr, mid+1, end);
        merge(arr, beg, mid, end);
    }
}

void merge(int arr[], int beg, int mid, int end)
{
    inti, j, index, temp[10];
    i=beg;
    j=mid+1;
    index=beg;
    while(i<=mid && j<=end)
    {
        if(arr[i]<arr[j])
        {
            temp[index]=arr[i];
            i=i+1;
        }
    }
}
```

```

    }
else
    {temp[index]=arr[j];
    j=j+1;
    }
index=index+1;
}
if(i>mid)
{ while(j<=end)
{ temp[index]=arr[j];
index=index+1;
j=j+1;
}}
else
{ while(i<=mid)
{temp[index]=arr[i];
index=index+1;
i=i+1;
}}
for(i=beg;i<index;i++)
{ arr[i]=temp[i];
}
}

```

Output :

```

Enter the array99
88
77
66
55
44
33
22
11
1
array1
11
22
33
44
55
66
77
88
99

```

RESULT :

Hence the program for Sorting an array using merge sort was successfully executed.

EXERCISE NO-2(b)**QUICK SORT**

AIM: To sort the given elements using Quick sort.

Algorithm:

Quick _Sort(arr,beg,end)

1) If beg < end then

 Call partition(arr,beg,end,loc)

 Call Quick_Sort(arr,beg,mid+1)

 Call Quick_Sort(arr,loc+1,end)

[end of if]

2) end

partition (arr,beg,end,loc)

1) Initially set left = beg ,right =end

 Loc=beg,flag = 0

2) Repeat steps 3 to 6 while flag = 0

3) Repeat while arr[loc]<=arr[right] and loc!=right

 Set right = right -1

 [End of loop]

4) If loc == right then

 Set flag=1

 else if arr[loc]>arr[right]

 then

 swaparr[loc] with arr[right]

 setloc = right

 [END OF IF]

5) If flag =0 then

 Repeat while arr[loc]>=arr[left]

 andloc!=left

 set left = left + 1

 [END OF LOOP]

6) If loc== left then

 Set flag =1

 Else ifarr[loc]<arr[left] then

 Swap arr[loc] with arr[left]

 Set loc = left

[END OF IF]

[END OF LOOP]

7) end

Program:

```
#include<stdio.h>
#include<conio.h>
int part(int a[],intbeg,intend,intloc);
void quicksort(int a[],intbeg,int end);
int a[10];
void main()
{inti;
printf("enter the array");
for(i=0;i<10;i++)
{ scanf("%d",&a[i]);
}
quicksort(a,0,9);
printf("sorted");
for(i=0;i<10;i++)
{ printf("%d\n",a[i]);
}
getch();
}
void quicksort(int a[],intbeg,int end)
{ intloc=beg;
if(beg<end)
{if(loc==beg)
{loc= part(a,beg,end,loc);
}
quicksort(a,beg,loc-1);
quicksort(a,loc+1,end);
}}
int part(int a[],intbeg,intend,intloc)
{intleft,temp,right,flag,i;
left=beg;
right=end;
loc=beg;
flag=0;
while(flag==0)
{ while((a[loc]<=a[right]) &&loc!=right)
{ right=right-1;
}
if(loc==right)
```

```

    {   flag=1;
    }
else if(a[loc]>a[right])
    {   temp= a[loc];
a[loc]=a[right];
a[right]=temp;
loc=right;
    }
if(flag==0)
    {   while((a[loc]>=a[left]) &&loc!=left)
        {   left=left+1;
        }}
if(loc==left)
    {   flag=1;
    }
else if(a[loc]<a[left])
    {   temp=a[loc];
a[loc]=a[left];
a[left]=temp;
loc=left;
    }}
returnloc;
}

```

Output :

```

enter the array
76
45
34
9
23
76
45
99
11
23
sorted9
11
23
23
34
45
45
76
76
99

```

RESULT :

Hence the program for Sorting an array using quick sort was successfully executed.

EXERCISE NO-3

STACKS

AIM: To write a menu driven program to perform following operations on the stack-

(i)Push (ii)Pop (iii) Peek

Algorithm:

Push-

- 1) If top=MAX-1 then print "overflow"
- 2) Set top=top+1;
- 3) Set stack[top]=val;
- 4) end

Pop-

- 1) if top==NULL then print "underflow"
- 2) set val=stack[top]
- 3) set top=top-1;
- 4) end

Peep-

- 1) if top==NULL then print "empty stack"
go to step 3
- 2) return stack[top];
- 3) end

Program:

```
#include<stdio.h>
#include<conio.h>
int a[5];int max=4;int top=-1;
void pop();void push();
void peek(); void disp();
void main()
{ intj,k;
  charch;
  clrscr();
  do
  { printf("\n1push\n2)pop\n3)peek\n4)Display Stack") ;
    scanf("%d",&j) ;
    switch(j)
    {
      case 1: push();break;
      case 2: pop();break;
      case 3: peek();break;
      case 4: disp();break;
      default: printf("\ninvalid choice"); }
  }
```

```

printf("\nDo you want to continue? (y/n)");
scanf("%s",&ch);
}while(ch=='y');
getch(); }
void push()
{ intval;
if(top==max)
printf("\nstack overflow\n");
else
{ top++;
printf("\nEnter the element");
scanf("%d",&val);
a[top]=val;}}
void pop()
{ intval;
if(top==-1)
printf("\nstack underflow\n");
else
{ val=a[top];
top--;
printf("deleted element %d", val);
}}
void peek(int a[],int top)
{ if(top==-1)
printf("empty stack\n");
else
printf("%d",a[top]);
}
void disp()
{ printf("Elements of stack are\n");
for(k=0;k<=top;k++)
{
printf("%d",a[k]);
}}

```

Output :

```
Do you want to continue? (y/n)y

1)push
2)pop
3)peek
4)Display Stack1

Enter the element12

Do you want to continue? (y/n)y

1)push
2)pop
3)peek
4)Display Stack2
deleted element 12
Do you want to continue? (y/n)y

1)push
2)pop
3)peek
4)Display Stack3
54
Do you want to continue? (y/n)
```

RESULT :

Hence the program for implementing stack operations like push, pop and peek were successfully executed.

EXPERIMENT NO. 4

LIST USING ARRAYS

AIM: To perform list operations with the help of arrays using C programming

ALGORITHM

main()

1. Display the operation that can be performed
 2. Repeat step 3 and 4 until x!=7
 3. x← choice of user
 4. switch x
 - case 1: insertion(y,p)
 - case 2: deletion()
 - case 3: findpos()
 - case 4: index(y)
 - case 5: empty()
 - case 6: display()
- [end switch]
[[end do while]

insertion(int a, int b)

1. If end>9
 print overflow
2. Else
 For I from end +1 to b
 Arr(i+1)←Arr(i)

deletion(int a, int b)

1. For I in range a to end
 Arr(i)←Arr(i+1)
2. (end for)
3. end←end+1

findpos(int a)

1. if a>=0 and a<=end
 Print Arr(a)
2. Else
 Print position doesn't exist

Empty()

1. end← -1

display()

1. for i=0 to end
 Print Arr(i)

Program-

```
#include<stdio.h>
void insert();
void delete();
void makeempty();
void findpos();
void findele();
void disp();
int arr[100],size=0;
int main()
{
    int ch;
    do
    {
        printf("\n1.Insertion");
        printf("\n2.Deletion");
        printf("\n3.Make Empty");
        printf("\n4.Find element");
        printf("\n5.Find element pos");
        printf("\n6.Display");
        printf("\n7.Exit");
        printf("\nEnter choice:-");
        scanf("%d",&ch);
        switch(ch)
        {
            case 1: insert();
                    break;
            case 2: delete();
                    break;
            case 3: makeempty();
                    break;
            case 4: findpos();
                    break;
            case 5: findele();
                    break;
            case 6: disp();
                    break;
        }
    }while(ch<=6);
    return 0;
}

void insert()
```

```

{
    if(size==100)
    {
        printf("\nOverflow");
    }
    else
    {
        inti,no,pos;
        printf("\nEnter position :-");
        scanf("%d",&pos);
        if(pos<=size)
        {
            printf("Enter element:-");
            scanf("%d",&no);
            for(i=size;i>=pos;i--)
            {
                arr[i+1]=arr[i];
            }
            arr[pos]=no;
            ++size;
            printf("\nElement %d inserted\n",no);
        }
        else
        {
            printf("\nInvalid position");
        }
    }
}

void delete()
{
    intpos,i;
    if(size==0)
    {
        printf("Underflow\n");
    }
    else
    {
        printf("\nEnter position :-");
        scanf("%d",&pos);
        if(pos<=size)
        {
            for(i=pos;i<size;i++)
            {

```

```

        arr[i]=arr[i+1];
    }
    --size;
    printf("\nElement deleted");
}
else
{
    printf("\nInvalid position");
}
}
}

void makeempty()
{
    size=0;
    printf("\nArray Emptied");
}

void findpos()
{
    int pos;
    printf("\nEnter position :");
    scanf("%d",&pos);
    if(pos<=size)
    {
        printf("\nElement at position %d is : %d",pos,arr[pos]);
    }
    else
    {
        printf("\n Invalid Position");
    }
}

void finddele()
{
    int i,no,pos=-1;
    printf("Enter element : ");
    scanf("%d",&no);
    for(i=0;i<size;i++)
    {
        if(arr[i]==no)
        {
            pos=i;
            break;

```

```

        }
    }
    if(pos!=-1)
    {
        printf("\nElement %d found at %d position",no,pos);
    }
    else
    {
        printf("\nElement not found");
    }
}

void disp()
{
    inti;
    printf("\n List is :-\n");
    for(i=0;i<size;i++)
    {
        printf("%d\t",arr[i]);
    }
}

```


EXERCISE NO-5

QUEUES

AIM: To perform queue operations on the menu-

(i)Insert (ii)Delete (iii)Peek (iv)Display

Algorithm:

Insert-

- 1) If rear=MAX-1 then print "overflow"
- 2) If front== -1 and rear== -1 then set front=rear=0
Else
Set rear=rear+1;
- 3) Set queue[rear]num
- 4) end

Delete-

- 1) if front== -1 or front>rear then print "underflow"
else
set front=front+1;
setval=queue[front];
- 2) end
- 3)

Peek-

- 1) Print queue[front]
- 2) end

Program:

```
#include<stdio.h>
#include<conio.h>
int a[5]; int rear=-1;
int front=-1;int max=5;
void delete(); void insert();void peek();
void main()
{intj,k;
charch;
clrscr();
do{
printf("\n1)Insert\n2)Delete\n3)Peek\n4)Display Queue") ;
scanf("%d",&j) ;
switch(j)
{ case 1: insert();break;
case 2: delete();break;
case 3: peek();break;
case 4: printf("Elemnts of queue are\n");
for(k=front;k<=rear;k++)
```

```

        {      printf("\n%d",a[k]);
        }
        break;
default: printf("\ninvalid choice");
}
printf("\nDo you want to continue? (y/n)");
scanf("%s",&ch);
}while(ch=='y');
getch();
}
void peek()
{  printf("Peek element: %d",a[front]);
}

void insert()
{  intval;
printf("\nEnter the element");
scanf("%d",&val);
if(rear==max-1)
printf("\nQueue overflow\n");
if (front==-1 && rear==-1)
front=rear=0;
else
rear++;
a[rear]=val;  }
void pop()
{  intval;
if(front==-1||front>rear)
printf("\nQueue underflow \n");
else
{  front++;
val=a[front];
printf("Element Deleted");
}}

```

Output :

```
1)Insert
2)Delete
3)Peek
4)Display Queue4
Elemmts of queue are

8
Do you want to continue? (y/n)y

1)Insert
2)Delete
3)Peek
4)Display Queue2
Element Deleted
Do you want to continue? (y/n)y

1)Insert
2)Delete
3)Peek
4)Display Queue2

Queue underflow
Do you want to continue? (y/n)
```

RESULT :

Hence the program for queue operations was successfully executed.

EXERCISE NO-6

SINGLY LINKED LIST

AIM: To write program to create linked list and perform the following function

- a) Insertion
- b) Deletion
- c) Searching
- d) Display

Algorithm:

Insertion at beginning

- 1) Allocate memory for new node.
- 2) Set new_node → data = val
- 3) Set new_node → next = start
- 4) Set start = new_node
- 5) End.

Insertion at end

- 3) Set new_node → next = null
- 4) Set ptr = start
- 5) Set step 6 while
Ptr → next != NULL
- 6) Set ptr = ptr → next

[END OF LOOP]

- 7) Set ptr → next = new_node
- 8) Exit

Search

- 1) Initialise set ptr = start
- 2) Repeat step 3 while (ptr) != NULL
- 3) If val = ptr → data
Set pos = ptr
Goto step 5
- 4) Set pos = NULL(-1)
- 5) Exit

Delete

- 1) Set ptr = Start
- 2) Set start = start → next
- 3) Free ptr
- 4) exit

Program:

```
#include<stdio.h>
#include<conio.h>
#include<stdlib.h>
struct node
{   int data;
    struct node *next;
}*head,*var,*trav;

voidinsert_at_begning(int value)
{   var=(struct node *)malloc(sizeof (struct node));
    var->data=value;
    if(head==NULL)
        {   head=var;
            head->next=NULL;
        }
    else
        {   var->next=head;
            head=var;
        }
}

voidinsert_at_end(int value)
{   struct node *temp;
    temp=head;
    var=(struct node *)malloc(sizeof (struct node));
    var->data=value;
    if(head==NULL)
        {   head=var;
            head->next=NULL;
        }
    else
        {   while(temp->next!=NULL)
            {   temp=temp->next;
                }
            var->next=NULL;
            temp->next=var;
        }
}

voidinsert_at_middle(int value, intloc)
{   struct node *var2,*temp;
    var=(struct node *)malloc(sizeof (struct node));
    var->data=value;
    temp=head;
    if(head==NULL)
        {   head=var;
```

```

head->next=NULL;  }
else
{
    while(temp->data!=loc)
    {
        temp=temp->next;}
    var2=temp->next;
    temp->next=var;
    var->next=var2;
}
}
intdelete_from_middle(int value)
{
    struct node *temp,*var;
    temp=head;
    while(temp!=NULL)
    {
        if(temp->data == value)
        {
            if(temp==head)
            {
                head=temp->next;
                free(temp);
                return 0;
            }
            else
            {
                var->next=temp->next;
                free(temp);
                return 0;
            }
        }
        else
        {
            var=temp;
            temp=temp->next;
        }
    }
    printf("data deleted from list is %d",value);
    return 0;}
intdelete_from_end()
{
    struct node *temp;
    temp=head;
    while(temp->next != NULL)
    {
        var=temp;
        temp=temp->next;    }
    if(temp ==head)
    {
        head=temp->next;
        free(temp);
        return 0;    }
    printf("data deleted from list is %d",temp->data);
    var->next=NULL;
    free(temp);
    return 0;}
void display()

```

```

{   trav=head;
if(trav==NULL)
    {   printf("\nList is Empty");
    }
else
    {   printf("\nElements in the List: ");
        while(trav!=NULL)
            {printf(" -> %d ",trav->data);
             trav=trav->next;          }
        printf("\n");
    }
}

void search(int value)
{struct node *ptr;
for(ptr=head;ptr!=NULL;ptr=ptr->next)
{if(ptr->data==value)
{printf("Key found");
printf(ptr);
return;
}}
printf("\n %d not found",value);
}

void main()
{
inti=0;
head=NULL;
printf("\ninsertion at begning of linked list - 1");
printf("\ninsertion at the end of linked list - 2");
printf("\ninsertion at the middle where you want - 3");
printf("\ndeletion from the end of linked list - 4");
printf("\ndeletion of the data that you want - 5");
printf("\nSearch element - 6\n");
printf("\nExit-7");
while(1)
    {   printf("\nenter the choice of operation to perform on linked list");
        scanf("%d",&i);
        switch(i)
            {
                case 1:
                    {   int value;
                        printf("\nenter the value to be inserted");
                        scanf("%d",&value);
                        insert_at_begning(value);
                        display();
                        break;}
                case 2:

```

```

        {      int value;
printf("\nenter value to be inserted");
scanf("%d",&value);
insert_at_end(value);
display();
break;      }
case 3:
{      intvalue,loc;
printf("\nafter which data you want to insert the data");
scanf("%d",&loc);
printf("\nenter the value to be inserted");
scanf("%d",&value);
insert_at_middle(value,loc);
display();
break;}
case 4:
{delete_from_end();
display();
break;}
case 5:
{int value;
display();
printf("\nenter the data that you want to delete from the list shown above");
scanf("%d",&value);
delete_from_middle(value);
display();
break;}
case 6:
{  int value;
printf("\nEnter the number you want t search");
scanf("%d",&value);
search(value);
break;
case 7:
{exit(0);
}} }}

getch();
}

```


Output :

```
MENU
insertion at begning of linked list - 1
insertion at the end of linked list - 2
insertion at the middle where you want - 3
deletion from the end of linked list - 4
deletion of the data that you want - 5
Search element - 6

Exit-7
enter the choice of operation to perform on linked list1
enter the value to be inserted33
Elements in the List:  -> 33
enter the choice of operation to perform on linked list
```

RESULT :

The operations on a linked list are successfully performed

EXERCISE NO-7

DOUBLY LINKED LIST

AIM: To write program to create Doubly linked list and perform the following function

- a) Insert
- b) Delete
- c) Display
- d) search

Algorithm:

Insert

- 1) Allocate memory for new_node.
- 2) Set new_node→data = val
- 3) Set new_node→next = start
- 4) Set start = new_node
- 5) End.

Search

- a) Initialise set ptr = start
- b) Repeat step 3 while (ptr)!=NULL
- c) If val = ptr→ data
Set pos = ptr
Goto step 5
- d) Set pos = NULL(-1)
- e) Exit

Delete

- 1) Set ptr = Start
- 2) Set start = start → next
- 3) Free ptr
- 4) exit

Program:

```
#include<stdio.h>
#include<stdlib.h>
typedef struct Node
{
    int data;
    struct Node *next;
    struct Node *prev;
```

```

}node;
void insert(node *pointer, int data)
{

while(pointer->next!=NULL)
{
pointer = pointer -> next;
}
pointer->next = (node *)malloc(sizeof(node));
(pointer->next)->prev = pointer;
pointer = pointer->next;
pointer->data = data;
pointer->next = NULL;
}
int find(node *pointer, int key)
{
pointer = pointer -> next;
while(pointer!=NULL)
{
if(pointer->data == key)
{
return 1;
}
pointer = pointer -> next;
}
return 0;
}
void delete(node *pointer, int data)
{
node *temp;
while(pointer->next!=NULL && (pointer->next)->data != data)
{
pointer = pointer -> next;
}
if(pointer->next==NULL)
{
printf("Element %d is not present in the list\n",data);
return;
}
temp = pointer -> next;
pointer->next = temp->next;
temp->prev = pointer;
free(temp);
return;
}

```

```

}
void print(node *pointer)
{
    if(pointer==NULL)
    {
        return;
    }
    printf("%d ",pointer->data);
    print(pointer->next);
}
void main()
{
    node *start,*temp;
    charch;
    intquery,data;
    clrscr();
    start = (node *)malloc(sizeof(node));
    temp = start;
    temp -> next = NULL;
    temp -> prev = NULL;
    printf("1. Insert\n");
    printf("2. Delete\n");
    printf("3. Print\n");
    printf("4. Find\n");

do
{
    printf("\nEnter choice");
        scanf("%d",&query);
        switch(query)
        {
            case 1:
                printf("\nEnter value to be inserted");
                scanf("%d",&data);
                insert(start,data);
                break;
            case 2:
                printf("\nEnter value to be deleted");
                scanf("%d",&data);
                delete(start,data);
                break;
            case 3:
                printf("\nThe list is ");
                printf("\n");

```

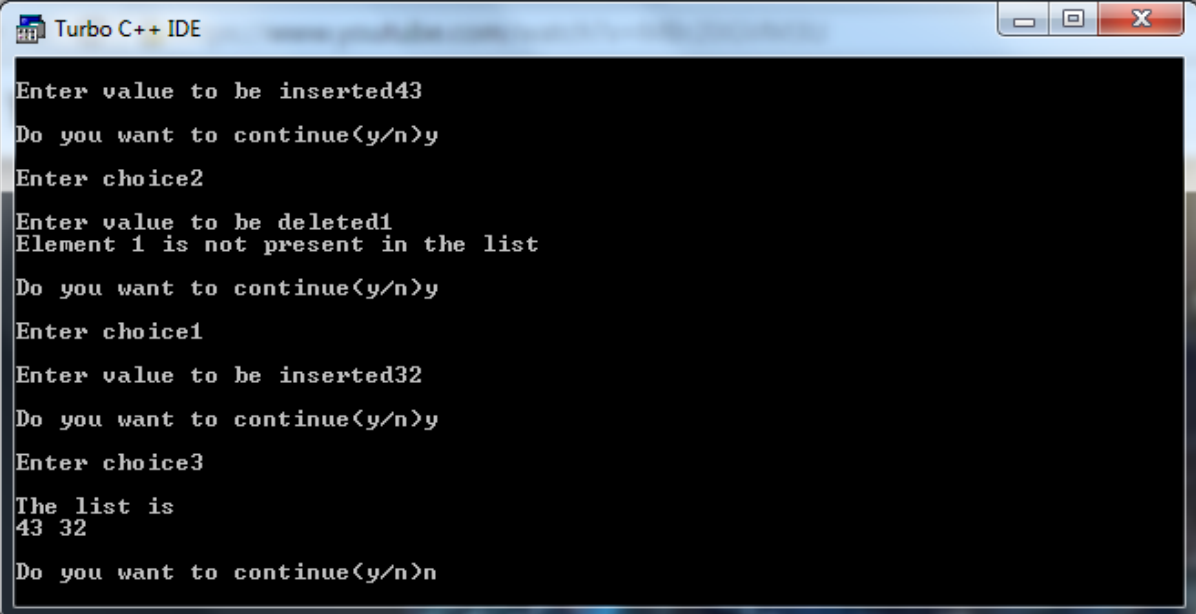
```

    print(start->next);
    printf("\n");
    break;
case 4:
    printf("\nEnter value to be searched");
    scanf("%d",&data);
    if(find(start,data))
    {
        printf("Element Found\n");
    }
    else
    {
        printf("Element Not Found\n");
    }
    break;
default:
    printf("\nWrong choice");
    break;
}
printf("\nDo you want to continue(y/n)");
scanf("%s",&ch);
}while(ch=='y');

```

getch();}

Output :



```

Turbo C++ IDE
Enter value to be inserted43
Do you want to continue(y/n)y
Enter choice2
Enter value to be deleted1
Element 1 is not present in the list
Do you want to continue(y/n)y
Enter choice1
Enter value to be inserted32
Do you want to continue(y/n)y
Enter choice3
The list is
43 32
Do you want to continue(y/n)n

```

RESULT :

The operations on a Doubly linked list are successfully performed

EXERCISE NO-8

TREE TRAVERSAL

AIM: To implement binary search tree traversal.

Algorithm:

preorder(node)

- 1) repeat step 2 to step 4 while tree!=NULL
- 2) write "TREE→data"
- 3) preorder(Tree→left)
- 4) Preorder(Tree→Right)
- 5) End

postorder(node)

- 1) repeat step 2 to step 4 while tree!=NULL
- 2) postorder(Tree→left)
- 3) Postorder(Tree→Right)
- 4) Write"TREE→data"
- 5) End

inorder(node)

- 1) repeat step 2 to step 4 while tree!=NULL
- 2) inorder(Tree→left)
- 3) write "TREE→data"
- 4) inorder(Tree→Right)
- 5) End

Program:

```
#include <stdio.h>
#include <conio.h>
#include <stdlib.h>

typedefstruct BST {
int data;
struct BST *lchild, *rchild;
} node;
void insert(node *, node *);
void inorder(node *);
void preorder(node *);
void postorder(node *);
node *search(node *, int, node **);

void main() {
int choice;
charans = 'N';
int key;
node *new_node, *root, *tmp, *parent;
node *get_node();
```

```

root = NULL;
clrscr();
printf("\nProgram For Binary Search Tree ");
do {
printf("\n--MENU--");
printf("\n1) Create binary search tree");
printf("\n2) Search");
printf("\n3) Recursive Traversals");
printf("\n4) Exit");
printf("\n Enter your choice :");
scanf("%d", &choice);
switch (choice) {
case 1:
do {
new_node = get_node();
printf("\nEnter the element ");
scanf("%d", &new_node->data);
if (root == NULL) /* Tree is not Created */
root = new_node;
else
insert(root, new_node);
printf("\nDo you want to enter more elements?(y/n)");
ans = getch();
} while (ans == 'y');
break;
case 2:
printf("\nEnter the element to be searched :");
scanf("%d", &key);
tmp = search(root, key, &parent);
printf("\nParent of the node %d is %d", tmp->data, parent->data);
break;
case 3:
if (root == NULL)
printf("Tree is not created");
else {
printf("\nTheInorder display -> ");
inorder(root);
printf("\nThePreorder display -> ");
preorder(root);
printf("\nThePostorder display -> ");
postorder(root);
}
break;
}
}

```

```

    } while (choice != 4);
}
node *get_node() {
node *temp;
temp = (node *) malloc(sizeof(node));
temp->lchild = NULL;
temp->rchild = NULL;
return temp;
}
void insert(node *root, node *new_node) {
if (new_node->data < root->data) {
if (root->lchild == NULL)
    root->lchild = new_node;
else
    insert(root->lchild, new_node);
}
if (new_node->data > root->data) {
if (root->rchild == NULL)
    root->rchild = new_node;
else
    insert(root->rchild, new_node);
}}
node *search(node *root, int key, node **parent) {
node *temp;
temp = root;
while (temp != NULL) {
if (temp->data == key) {
    printf("\nThe %d Element is Present", temp->data);
    return temp;
}
*parent = temp;
if (temp->data > key)
    temp = temp->lchild;
else
    temp = temp->rchild;
}
return NULL;
}
void inorder(node *temp) {
if (temp != NULL) {
inorder(temp->lchild);
printf("%d ", temp->data);
inorder(temp->rchild);
}}

```



```

void preorder(node *temp) {
    if (temp != NULL) {
        printf("%d ", temp->data);
        preorder(temp->lchild);
        preorder(temp->rchild);
    }
}

void postorder(node *temp) {
    if (temp != NULL) {
        postorder(temp->lchild);
        postorder(temp->rchild);
        printf("%d ", temp->data);
    }
}

```

OUTPUT :

```

DOS
DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip: 0, Program: TC
Do you want to enter more elements?(y/n)
Enter the element
25

Do you want to enter more elements?(y/n)
Enter the element
24

Do you want to enter more elements?(y/n)
--MENU--
1) Create binary search tree
2) Search
3) Recursive Traversals
4) Exit
Enter your choice :3

The Inorder display -> 23 24 25
The Preorder display -> 23 25 24
The Postorder display -> 24 25 23
--MENU--
1) Create binary search tree
2) Search
3) Recursive Traversals
4) Exit
Enter your choice :_

```

RESULT :

Hence the program for implementing binary search tree traversal was successfully executed.

EXERCISE NO-9

GRAPH TRAVERSAL

Aim: To implement breadth first search (bfs) and depth first search (dfs) in graphs using adjacency matrix.

Algorithm:

bfs(ints,int n)

- 1) list L = empty
- 2) tree T = empty
- 3) choose a starting vertex x
- 4) search(x)
- 5) while(L nonempty)
- 6) remove edge (s,n) from start of L
- 7) if n not yet visited
- add (s,n) to T
- search(n)

dfs(ints,int n)

- 1) list L = empty
- 2) tree T = empty
- 3) choose a starting vertex x
- 4) search(x)
- 5) while(L nonempty)
- 6) remove edge (s,n) from end of L
- 7) if n not yet visited
- add (s,n) to T
- search(n)

Program:

```
#include<stdio.h>
#include<conio.h>
int q[20],top=-1,front=-1,rear=-1,a[20][20],vis[20],stack[20];
int delete();
void add(int item);
void bfs(ints,int n);
void dfs(ints,int n);
void push(int item);
int pop();
void main()
{ int n,i,s,ch,j;
  char c,dummy;
  clrscr();
  printf("\n\n\t\t\tDFS and BFS implementation !");
  printf("\n\n\t\t\tEnter the Number of Nodes in Graph: ");
```

```

scanf("%d",&n);
for(i=1;i<=n;i++)
{
    for(j=1;j<=n;j++)
    {
        printf("\nEnter 1 if %d has a NODE with %d else 0 ",i,j);
        scanf("%d",&a[i][j]);
    }
    printf("\n\n\t\tTheAdjecency Matrix is: ");
    for(i=1;i<=n;i++)
    {
        for(j=1;j<=n;j++)
        {
            printf(" %d",a[i][j]);
        }
        printf("\n");
    }
    do
    {
        for(i=1;i<=n;i++)
        vis[i]=0;
        printf("\n\nMENU");
        printf("\n1) B.F.S (Breadth First Search)");
        printf("\n2) D.F.S (Depth First Search)");
        printf("\n\nEnter your choice: ");
        scanf("%d",&ch);
        printf("\nEnter source VERTEX:");
        scanf("%d",&s);
        switch(ch)
        {
            case 1:bfs(s,n);
            break;
            case 2:
            dfs(s,n);
            break;
        }
        printf("\n\nWould you like to continue ?\n\n Yes(Y) or No (N): ");
        scanf("%c",&dummy);
        scanf("%c",&c);
    }while((c=='y')||(c=='Y'));
}
void bfs(ints,int n)
{
    intp,i;
    add(s);
    vis[s]=1;
    p=delete();
    if(p!=0)
    printf(" %d",p);
    while(p!=0)
    {
        for(i=1;i<=n;i++)
        if((a[p][i]!=0)&&(vis[i]==0))
        {
            add(i);

```

```

vis[i]=1;
}
p=delete();
if(p!=0)
printf(" %d ",p);
}
for(i=1;i<=n;i++)
if(vis[i]==0)
bfs(i,n);
}
void add(int item)
{ if(rear==19)
printf("\n\nQUEUE is FULL: Error No Space!");
else
{ if(rear==-1)
{ q[++rear]=item;
front++;
}
else
q[++rear]=item;
}}
int delete()
{ int k;
if((front>rear)|| (front== -1))
return(0);
else
{ k=q[front++];
return(k);
}}
void dfs(ints,int n)
{ inti,k;
push(s);
vis[s]=1;
k=pop();
if(k!=0)
printf(" %d ",k);
while(k!=0)
{ for(i=1;i<=n;i++)
if((a[k][i]!=0)&&(vis[i]==0))
{ push(i);
vis[i]=1;
}
k=pop();
if(k!=0)

```

```

printf(" %d ",k);
}
for(i=1;i<=n;i++)
if(vis[i]==0)
dfs(i,n);
}
void push(int item)
{ if(top==19)
printf("\n\nStackoverflow.com");
else
stack[++top]=item;
}
int pop()
{ int k;
if(top==-1)
return(0);
else
{ k=stack[top--];
return(k);
}}

```

OUTPUT :

```

1) B.F.S (Breadth First Search)
2) D.F.S (Depth First Search)

Enter your choice: 2

Enter source VERTEX:1
1 2 3

Would you like to continue ?

Yes(Y) or No (N): y

MENU
1) B.F.S (Breadth First Search)
2) D.F.S (Depth First Search)

Enter your choice: 1

Enter source VERTEX:2
2 3 1

Would you like to continue ?

Yes(Y) or No (N): _

```

RESULT :

Hence the program for implementing breadth first search (bfs) and depth first search (dfs) in graphs using adjacency matrix was successfully executed.