S Harshini-185001058

ASSIGNMENT : DATABASE DESIGN USING NORMAL FORMS

COMPANY(empid, name, address, bdate, sex, salary, dno, dname, mgr_id, pno, pname, pdno, hrs)

fd1: empid -> name, address, bdate, sex, salary, dno

fd2: dno -> dname, mgr_id

fd3: pno -> pname, pdno where pdno is the department controlling the project.

fd4: empid, pno -> hrs

{empid, pno} is the super key.

{ empid, pno }+ -> empid, name, address, bdate, sex, salary, dno, dname, mgr_id, pno, pname, pdno, hrs

and

{empid}+ ->name, address, bdate, sex, salary, dno , dname, mgr_id (since dno -> dname, mgr_id)

{pno}+ -> pname, pdno (fd3)

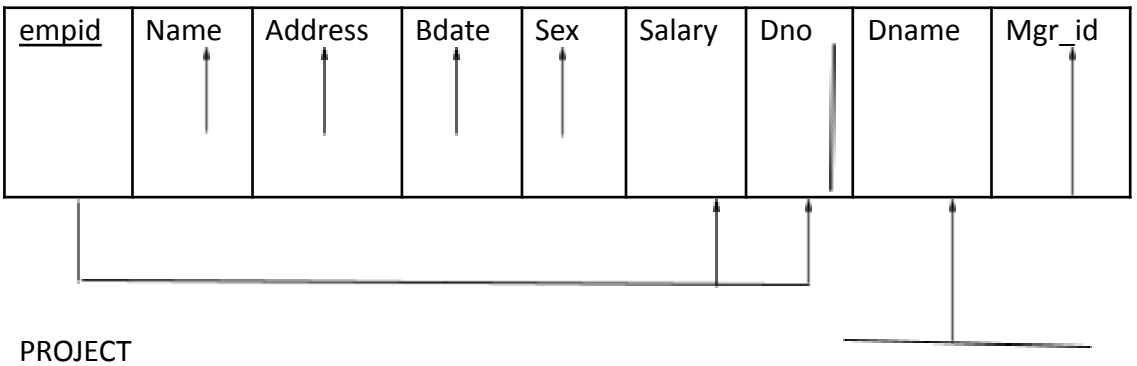
{empid}+ and (pno}+ separately does not include all the attributes of company.

Therefore {empid, pno} is the super key.

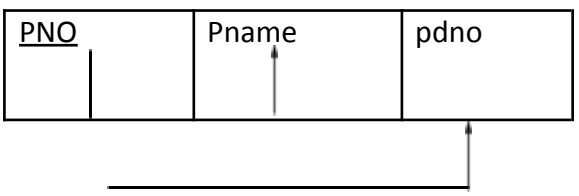
Decomposing the Company relation into various Normal forms we get:

2NF

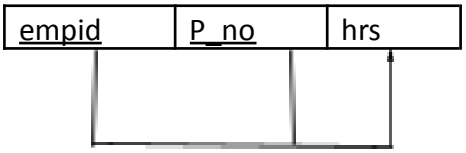
EMPLOYEE



PROJECT

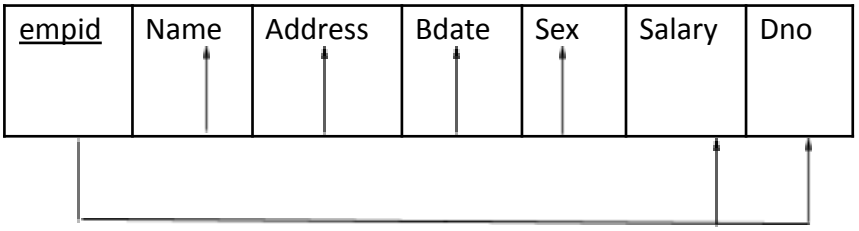


WORKS-ON

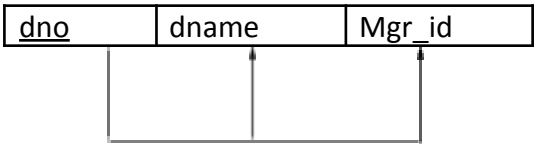


3NF

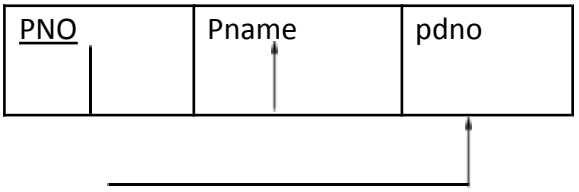
EMPLOYEE



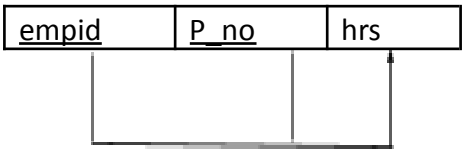
DEPARTMENT



PROJECT



WORKS-ON



a. **LOSSLESS JOIN DECOMPOSITION**

Joining the decomposed tables results in 16 tuples which is the company relation and hence the decomposition is correct.

Spool file of the execution is given below.

b. PRESERVATION OF FD

The decomposed table employee is fd1,
Department is fd2, project is fd3 and works_on is fd4.

Hence functional dependencies are also preserved in the decomposition.

LOSSLESS JOIN DECOMPOSITION SQL CODE

```
SQL> @ C:\Users\Harshini\Desktop\dbex\9.sql
SQL>
SQL> DROP TABLE works_on ;

Table dropped.

SQL> DROP TABLE project ;

Table dropped.

SQL> DROP TABLE employ ;

Table dropped.

SQL> DROP TABLE department ;

Table dropped.

SQL>
SQL> CREATE TABLE department (
  2         dname      varchar2(15),
  3    dno      number(4) constraint pkd primary key,
  4    mgrid      varchar(15));

Table created.

SQL>
SQL> CREATE TABLE employ(
  2    name    char(9),
```

```
  3   empid   varchar2(15) constraint pkid primary key,
  4   bdate    date,
  5   address varchar2(30),
  6   sex      char,
  7   salary   number(10),
  8   dno      number(4) constraint refdno references department(dno));

Table created.

SQL>
SQL> CREATE TABLE project (
  2   pname  varchar2(15),
  3   pno    number(4) constraint pkproj primary key,
  4   pdno   number(4) constraint fkp references department(dno));

Table created.

SQL>
SQL>
SQL> CREATE TABLE works_on (
  2   empid   varchar2(15),
  3   pno    number(4),
  4   hrs  number(4,1),
  5   constraint pkworks primary key (empid,pno),
  6   constraint fkon foreign key (empid) references employ(empid),
  7   constraint fkon1 foreign key (pno) references project(pno));

Table created.

SQL>  insert into department values('Research', 5, '333445555');

1 row created.

SQL>  insert into department values('Administration', 4, '987654321');

1 row created.

SQL>  insert into department values('Headquarters', 1, '888665555');

1 row created.
```

```
SQL>
SQL>  insert into employ values('John','123456789','09-jan-1965','731
fondren','m',30000,5);

1 row created.

SQL>  insert into employ values('Franklin','333445555','08-dec-1955','638
voss','m',40000,5);

1 row created.

SQL>  insert into employ values('Alicia','999887777','19-jan-1968','3321
castle','f',25000,4);

1 row created.

SQL>  insert into employ values('Jennifer','987654321','20-jun-1941','291
berry','f',43000,4);

1 row created.

SQL>  insert into employ values('Ramesh','666884444','15-sep-1962','975 fire
oak','m',38000,5);

1 row created.

SQL>  insert into employ values('Joyce','453453453','31-jul-1972','5631
rice','f',25000,5);

1 row created.

SQL>  insert into employ values('Ahmad','987987987','29-mar-1969','980
dallas','m',25000,4);

1 row created.

SQL>  insert into employ values('James','888665555','10-nov-1937','450
stone','m',55000,1);
```

```
1 row created.

SQL>
SQL>
SQL> insert into project values ('ProductX', 1,5);

1 row created.

SQL> insert into project values ('ProductY', 2,5);

1 row created.

SQL> insert into project values ('ProductZ', 3,5);

1 row created.

SQL> insert into project values ('Computerization', 10,4);

1 row created.

SQL> insert into project values ('Reorganization', 20,1);

1 row created.

SQL> insert into project values ('Newbenefits', 30,4);

1 row created.

SQL>
SQL> insert into works_on values ('123456789', 1,  32.5);

1 row created.

SQL> insert into works_on values ('123456789', 2,  7.5);

1 row created.

SQL> insert into works_on values ('666884444', 3,  40.0);

1 row created.
```

```
SQL> insert into works_on values ('453453453', 1,  20.0);

1 row created.

SQL> insert into works_on values ('453453453', 2,  20.0);

1 row created.

SQL> insert into works_on values ('333445555', 2,  10.0);

1 row created.

SQL> insert into works_on values ('333445555', 3,  10.0);

1 row created.

SQL> insert into works_on values ('333445555', 10, 10.0);

1 row created.

SQL> insert into works_on values ('333445555', 20, 10.0);

1 row created.

SQL> insert into works_on values ('999887777', 30, 30.0);

1 row created.

SQL> insert into works_on values ('999887777', 10, 10.0);

1 row created.

SQL> insert into works_on values ('987987987', 10, 35.0);

1 row created.

SQL> insert into works_on values ('987987987', 30, 5.0);

1 row created.
```

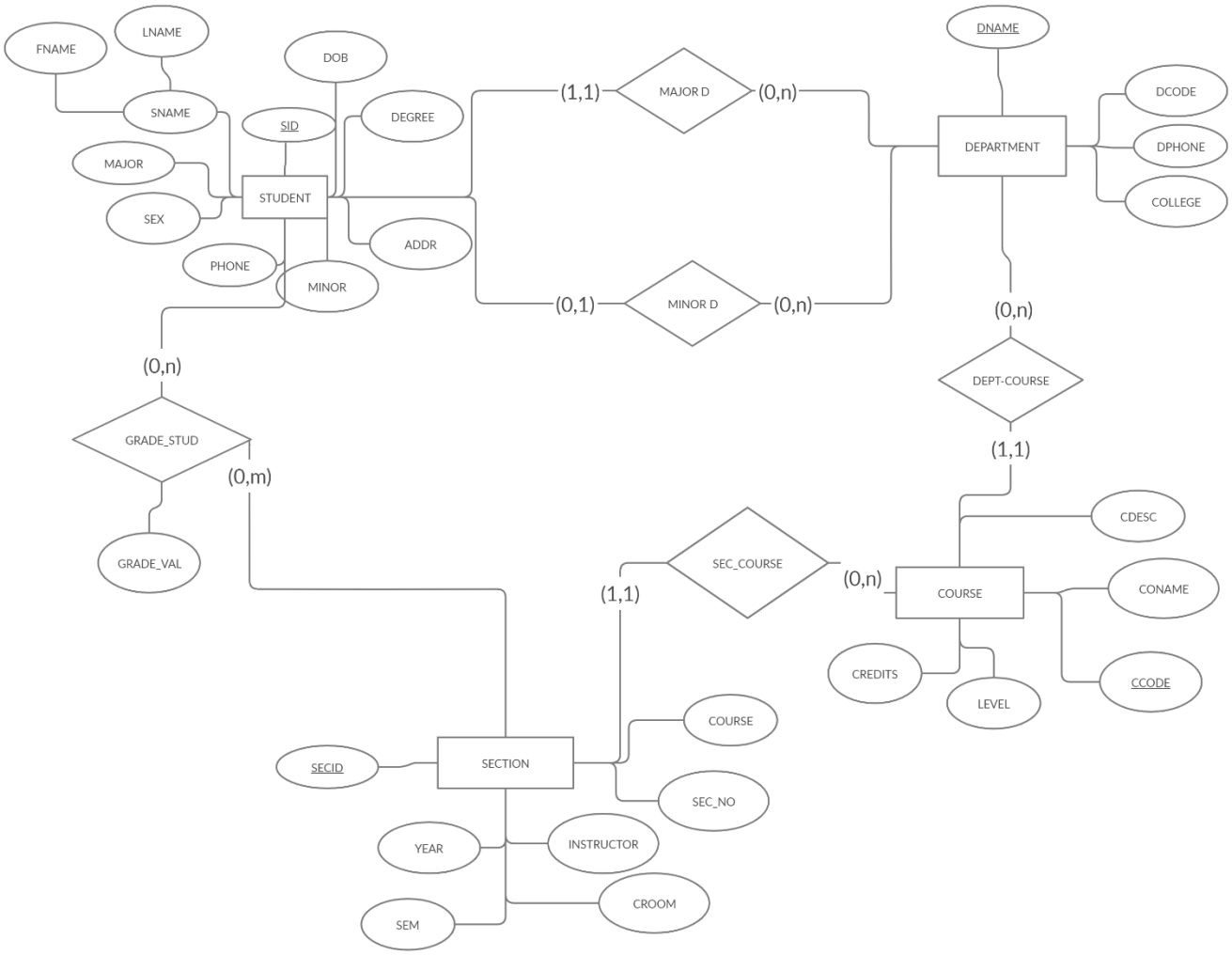
```
SQL> insert into works_on values ('987654321', 30, 20.0);

1 row created.

SQL> insert into works_on values ('987654321', 20, 15.0);

1 row created.

SQL> insert into works_on values ('888665555', 20, null);

1 row created.

SQL>
SQL> select
e.name,e.empid,e.bdate,e.address,e.sex,e.salary,e.dno,d.dname,d.mgrid,w.pn
o,p.pname,p.pdno,w.hrs from
  2    employ e,department d,project p,works_on w where
  3    e.dno=d.dno and e.empid=w.empid and w.pno=p.pno;

NAME      EMPID          BDATE     ADDRESS                    S     SALARY       DNO DNAME          MGRID
PNO PNAME               PDNO       HRS
--------- --------------- --------- ------------------------------ - ---------- ---------- --------------- ---------- ----------
--------------- ---------- ----------
Joyce     453453453       31-JUL-72 5631 rice                  f      25000         5 Research       333445555
1 ProductX              5         20
John      123456789       09-JAN-65 731 fondren                  m      30000         5 Research       333445555
1 ProductX              5       32.5
Franklin  333445555       08-DEC-55 638 voss                     m      40000         5 Research       333445555
2 ProductY              5         10
Joyce     453453453       31-JUL-72 5631 rice                  f      25000         5 Research       333445555
2 ProductY              5         20
John      123456789       09-JAN-65 731 fondren                  m      30000         5 Research       333445555
2 ProductY              5        7.5
Franklin  333445555       08-DEC-55 638 voss                     m      40000         5 Research       333445555
3 ProductZ              5         10
Ramesh    666884444       15-SEP-62 975 fire oak                 m      38000         5 Research
333445555               3 ProductZ              5         40
Ahmad     987987987       29-MAR-69 980 dallas                   m      25000         4 Administration
987654321              10 Computerization       4         35
Alicia    999887777       19-JAN-68 3321 castle                  f      25000         4 Administration  987654321
10 Computerization       4         10
Franklin  333445555       08-DEC-55 638 voss                     m      40000         5 Research       333445555
10 Computerization       4         10
James     888665555       10-NOV-37 450 stone                    m      55000         1 Headquarters
888665555              20 Reorganization        1
```

```
NAME      EMPID          BDATE     ADDRESS                    S     SALARY       DNO DNAME          MGRID
PNO PNAME               PDNO       HRS
--------- --------------- --------- ------------------------------ - ---------- ---------- --------------- ---------- ----------
--------------- ---------- ----------
Jennifer  987654321       20-JUN-41 291 berry                  f     43000         4 Administration
987654321             20 Reorganization          1         15
Franklin  333445555       08-DEC-55 638 voss                   m     40000         5 Research       333445555
20 Reorganization          1         10
Jennifer  987654321       20-JUN-41 291 berry                  f     43000         4 Administration
987654321             30 Newbenefits             4         20
Ahmad     987987987       29-MAR-69 980 dallas                 m     25000         4 Administration
987654321             30 Newbenefits             4         5
Alicia    999887777       19-JAN-68 3321 castle                f     25000         4 Administration  987654321
30 Newbenefits             4         30

16 rows selected.


SQL>
SQL> spool off;
```

ASSIGNMENT 9B: DATABASE DESIGN USING ER DIAGRAM

UNIVERSITY

ER DIAGRAM



ER RELATIONAL MAPPING

STUDENT

SID	FNAME	LNAME	DOB	DEGREE	ADDR	SEX	PHONE	MINOR	MAJOR

DEPARTMENT

DNAME	DCODE	DPHONE	COLLEGE

COURSE

CCODE	CONAME	CREDITS	LEVEL	CDESC	DNO

SECTION

SECID	SEC_NO	COURSE	YEAR	INSTRUCTOR	SEM	CROOM	COURSE_NO

GRADE_STUDENT

STUD_ID	SEC_ID	GRADE_VAL