1. Primary Key

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

fd2: dno -> dname, mgr\_id

fd3: pno -> pname, pdno.

fd4: empid, pno -> hrs

{empid,pno}+ -> R

Therefore {empid,pno} is the primary key.

2. Normalise

1NF

EMPLOYEE

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Empid | Pno | Name | Address | Bdate | Sex | Salary | Dno | Dname | Mgr\_id | Pname | Pdno | Hrs |

FD2

FD1

FD3

FD4

2NF

EMPLOYEE

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Empid | Name | Address | Bdate | Sex | Salary | Dno | Dname | Mgr\_id |

FD2

FD1

WORKS\_ON

|  |  |  |
| --- | --- | --- |
| Empid | Pno | Hrs |

FD4

PROJECT

|  |  |  |
| --- | --- | --- |
| Pno | Pname | Pdno |

FD3

3NF

EMPLOYEE

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Empid | Name | Address | Bdate | Sex | Salary | Dno |

FD1

WORKS\_ON

|  |  |  |
| --- | --- | --- |
| Empid | Pno | Hrs |

FD4

PROJECT

|  |  |  |
| --- | --- | --- |
| Pno | Pname | Pdno |

FD3

DEPARTMENT

|  |  |  |
| --- | --- | --- |
| Dnp | Dname | Mgr\_id |

FD2

3.Proof

Spool file

Preservation of fd

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

fd2: dno -> dname, mgr\_id

fd3: pno -> pname, pdno.

fd4: empid, pno -> hrs

All fd remain intact

4.ER Diagram

COURSE

Offered as

DEPARTMENT

SECTION

Offers

Completed

(1,M)

STUDENT

Assigned to

(1,1)

(0,M)

(0,M)

(0,M)

(1,1)

(1,M)

5.ER – Relational Mapping

STUDENT

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sid | Fname | Lname | Address | Phone | Major | Dob | Sex | Degree | Dept | Minor |

DEPARTMENT

|  |  |  |  |
| --- | --- | --- | --- |
| Dname | Dcode | Dphone | Collegem |

COMPLETED

|  |  |  |
| --- | --- | --- |
| Sid | SecID | Grade |

COURSE

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| CoName | CCode | Level | Credits | Cdesc | Dcode |

SECTION

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| SecID | SecNo | Sem | Year | CRoom | CCode |