**Lab 8**

**Database Design**

**Part A. Transform the following logical ERDs into relational schemas and clearly show PK(s) and FK(s).**

**1.**



Employee

|  |  |
| --- | --- |
| EmpID | EmpName |

Billing

|  |  |  |
| --- | --- | --- |
| BillingID | EmpID | ProjectID |

Project

|  |  |
| --- | --- |
| ProjectID | ProjectTitle |

2.



**Person**

|  |  |  |
| --- | --- | --- |
| SSN | Name | Phone |

**Owner**

|  |  |  |  |
| --- | --- | --- | --- |
| SSN | SpouseName | Profession | Spouseprofession |

**Buyer**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| SSN | Address | Minprice | Bedrms | bthrms | Maxprice | AgentID |

**Home**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| HomeID | Street | City | State | Zip | Nobedrms | Nobath | Sqft | Ownoccupied | Commission | Salesprice | AgentID | SSN |

**Agent**

|  |  |  |  |
| --- | --- | --- | --- |
| AgentID | Agentname | Phone | OfficeID |

**Office**

|  |  |  |  |
| --- | --- | --- | --- |
| OfficeID | Address | ManagerName | Phone |

**Part B. Normalization (NOTE: the goal is to achieve tables whose entire PK determines all non-key columns)**

For the following problems:

a) Based on the *given* primary key or functional dependency, is the relation in 1NF, 2NF, or 3NF? Why?

b) Normalize the relation **successively** into 3NF, if it is not already in 3NF.

**EMPLOYEE**

**Fall**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| EmpNo | EmpName | EmpAdd | DeptNo | DeptName | DeptLoc | HealthPlanNo | HealthPlanDesc |

**Transitive Transitive**

**EMP**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| EmpNo | EmpName | EmpAdd | DeptNo | DeptName | ~~DeptLoc~~ | HealthPlanNo | ~~HealthPlanDesc~~ |

**DEPT**

|  |  |  |
| --- | --- | --- |
| DeptNo | DeptName | DeptLoc |

**HEALTH**

|  |  |
| --- | --- |
| HealthPlanNo | HealthPlanDesc |

EMPLOYEE

**Full**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Emp\_ID** | Name | Dept\_Name | Salary | Course\_Title | Date\_completed |

**Partial**

The functional dependencies are:

Emp\_ID 🡪 Name, Dept\_Name, Salary

(Emp\_ID, Course\_Title) 🡪 Date\_Completed

**EMP**

|  |  |  |  |
| --- | --- | --- | --- |
| Emp\_ID | Name | Dept\_Name | Salary |

**COURSE**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Emp\_ID | ~~Name~~ | ~~Dept\_Name~~ | ~~Salary~~ | Course\_Title | Date\_completed |

**EMPLOYEE**

|  |  |
| --- | --- |
| Course\_Title | Date\_completed |

**3.**

**SALESPERSON** (SalespersonNo, ProdNo, SalespersonName, Commission, DeptNo, MgrName, ProdName, UnitPrice, Qty)

Assume that a salesperson can sell multiple products and a product can be sold by zero or one or more salespersons.  The functional dependencies are:

SalespersonNo 🡪 SalespersonName, Commission, DeptNo, ManagerName

ProductNo 🡪 ProductName, UnitPrice

SalespersonNo, ProductNo 🡪 Qty

DeptNo 🡪 ManagerName

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| SalespersonNo | ProdNo | SalespersonName | Commission | DeptNo | MgrName | ProdName | UnitPrice | Qty |

**SALES**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| SalespersonNo | ProdNo | ~~SalespersonName~~ | ~~Commission~~ | ~~DeptNo~~ | ~~MgrName~~ | ~~ProdName~~ | ~~UnitPrice~~ | Qty |

**SALESPERSON**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| SalespersonNo | SalespersonName | Commission | DeptNo | MgrName | ProdName | UnitPrice | Qty |

**PRODUCT**

|  |  |  |
| --- | --- | --- |
| ProdNo | ProdName | UnitPrice |

**DEPARTMENT**

|  |  |
| --- | --- |
| DeptNo | MgrName |