**EXPERIMENT NO. 2**

AIM :   Design an Entity- Relationship (ER) Model / Extended Entity- Relationship (EER) Model

THEORY :

E-R Model:E-R Model is used to model the logical view of the system from data perspective which consists of these components: In Database Management Systems, ER modelling helps to figure out the set of entities, attributes of each entitiy, and the relationship that is shared between entities. In other words it helps us to explain the logical structure of databases.

Example ERD
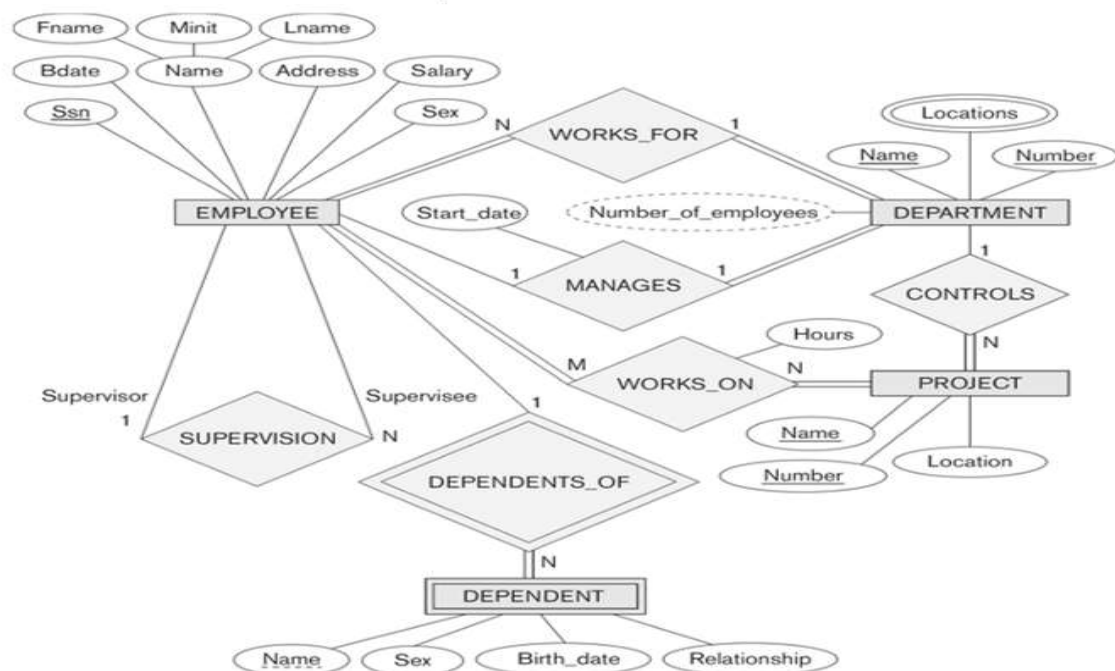
Step 1:   Figure out all the regular/strong entity from the diagram and then create a corresponding

relation(table) that includes all the simple attributes.
* Choose one of the attributes as a primary key. If composite, the simple attributes together form the primary key.
* For the given ER-Diagram we have *Employee, Department and Project* as strong/regular entity, as they are enclosed in single rectangle.
* So, we create respective relations that is depicted in the figure below.

EMPLOYEE

Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary

DEPARTMENT

Dname	Dnumber

PROJECT

Pname	Pnumber	Plocation

Step 2: Figure out the weak entity types from the diagram and create a corresponding relation(table) that includes all its simple attributes.

- Add as foreign key all of the primary key attributes in the entity corresponding to the owner entity.
- The primary key is a combination of all the primary key attributes from the owner and the primary key
   of the weak entity.
- For the given ER-Diagram we have *Dependent* as a weak entity, as it is enclosed in a double rectangle
   that is indicative of an entity being weak.

EMPLOYEE

Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary

DEPARTMENT

Dname	Dnumber

PROJECT

Pname	Pnumber	Plocation

DEPENDENT

Essn	Dependent_name	Sex	Bdate	Relationship

Step 3: Now we need to figure out the entities from ER diagram for which there exists a 1-to-1 relationship.

- The entities for which there exists a 1-to-1 relationship, choose one relation(table) as S, the other as T.
- Better if S has total participation (reduces the number of NULL values).
- Then we need to add to S all the simple attributes of the relationship if there exists any.
- After that, we add as a foreign key in S the primary key attributes of T.
- For the given ER-Diagram there exists a 1-to-1 relationship between Employee and Department entity.
- Here Department has total participation therefore consider it as relation S and Employee as relation T.
- The 1-to-1 mapping between Employee and Department is depicted in the figure below.
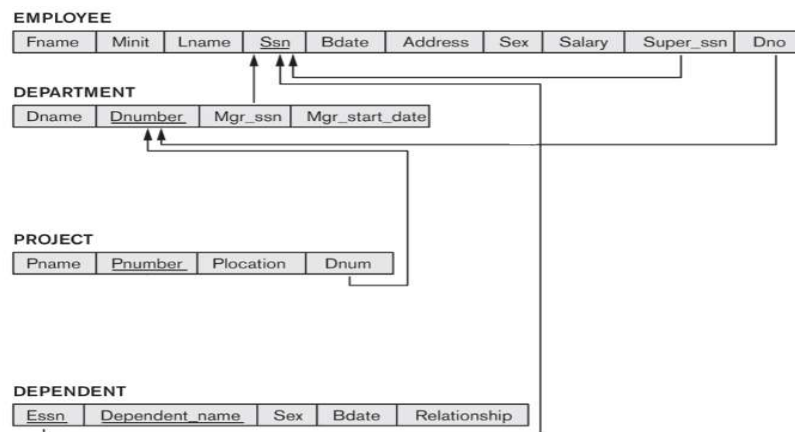
EMPLOYEE

Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary

DEPARTMENT

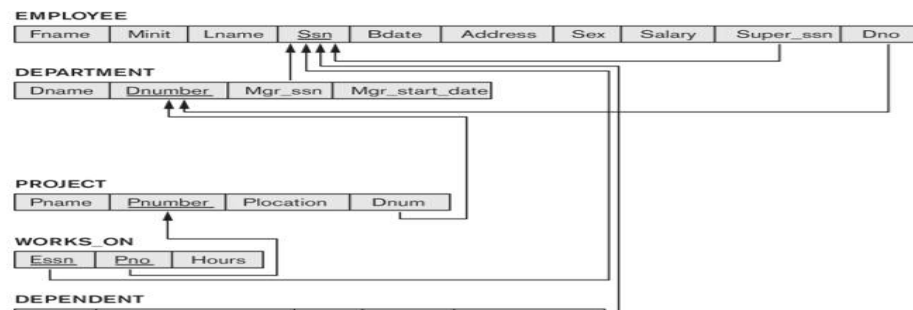| Dname	Dnumber	Mgr_ssn	Mgr_start_date

Step 4: Now we need to figure out the entities from ER diagram for which there exists a 1-to-N relationship.

- The entities for which there exists a 1-to-N relationship, choose a relation as S as the type at N-side of
    relationship and other as T.
- Then we add as a foreign key to S all of the primary key attributes of T.
- In the given ER diagram there are two 1-to-N relationships that exists between *Employee-Department* and *Employee-Dependent* entity.
- The 1-to-N mapping between *Employee-Department* and *Employee-Dependent* is depicted in the figure
    below.

EMPLOYEE

Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary	Super_ssn	Dno

DEPARTMENT

Dname	Dnumber	Mgr_ssn	Mgr_start_date

PROJECT

Pname	Pnumber	Plocation	Dnum

DEPENDENT

Essn	Dependent_name	Sex	Bdate	Relationship

Step 5: Now we need to figure out the entities from ER diagram for which there exists an M-to-N relationship.

- Create a new relation(table) S.
- The primary keys of relations(tables) between which M-to-N relationship exists, are added to the new
    relation S created, that acts as a foreign key.
- Then we,add any simple attributes of the M-to-N relationship to S.
- For the given ER-Diagram there exists M-to-N relationship between *Employee* and *Project* entity.
- The new table *Works_On* is created for mapping the relationship between Employee and Project relation(table).

EMPLOYEE

Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary	Super_ssn	Dno

DEPARTMENT

Dname	Dnumber	Mgr_ssn	Mgr_start_date

PROJECT

Pname	Pnumber	Plocation	Dnum

WORKS_ON

Essn	Pno	Hours

DEPENDENT

Step 6: Now identify the relations(tables) that contain multi-valued attributes.

- Then we need to create a new relation S
- In the new relation S we add as foreign keys the primary keys of the corresponding relation.
- Then we add the multi-valued attribute to S; the combination of all attributes in S forms the primary key.
- For the given ER-Diagram there exists a multi-valued attribute (*Locations*) in Department relation(table).
- So, we create a new relation called *Dept_Locations*. To this new relation we add the primary key of *Department* Table that is *D_Number* and the multi-valued attribute *Locations.*

EMPLOYEE

Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary	Super_ssn	Dno

DEPARTMENT

Dname	Dnumber	Mgr_ssn	Mgr_start_date

DEPT_LOCATIONS

Dnumber	Dlocation

PROJECT

Pname	Pnumber	Plocation	Dnum

WORKS_ON

Essn	Pno	Hours

DEPENDENT

Essn	Dependent_name	Sex	Bdate	Relationship
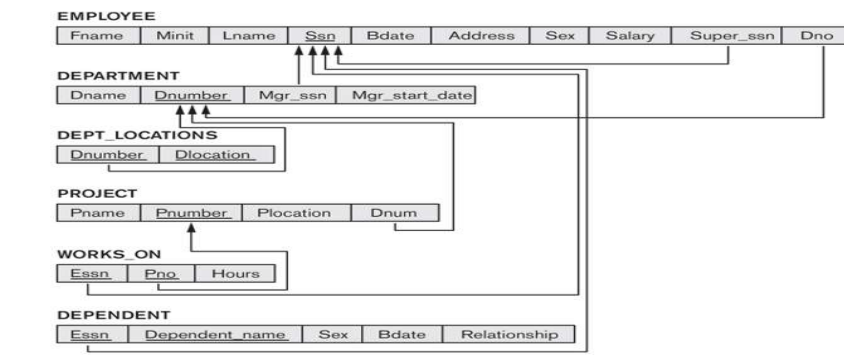
Conclusion : Hence , we have studied mapping of ER-Diagram to its Relational Schema.