Relational Schema Design

Mapping EER diagrams to Relational Schema

1. An entity is represented as a relation. A relation is a table with the name as that of the entity and columns as that of the attributes of the entity.
2. When the attributes are composite we use the individual or atomic attributes.
   As an example, instead of the Name attribute we have separately used its composition - First_Name, Middle_Name, and Last_Name as separate columns.
3. For an attribute that can take multiple values, we created another relation which takes the primary key of the entity as its own primary key, and a column for the attributes. The primary key also acts as a foreign key to refer to the parent entity.
4. For an entity we define a primary key which uniquely identifies each record (row) in the table (Uniqueness Constraint).
5. For defining relations between tables, we use a foreign key which refers to a relation and is governed by the Referential Integrity Constraint.
   The referential constraints satisfy the following criteria:
   - The domain of attributes in the foreign key must be the same as the domain of the primary key of the referred relation.
   - The value of foreign key has the values that are in the primary key of the referred relation for some tuple. It can also have a NULL value.
6. For a weak entity type, we make the relation using all its attributes, but we also include the primary key of the owner entity. The primary key of the weak entity is a combination of primary key of the identifying entity and the weak entity key. The primary key of the owner entity also works as a foreign key which refers to the owner entity.
7. For subclasses we can use a variety of ways to represent them in the relational schema based on their disjoint constraints. For our design we have used the following methods.
   - We represented the super entity using the conventional method and for every subclass entity we use their attributes combined with the primary key of the superclass entity. This primary key of the super class acts as a primary key of the subclasses and also as a foreign key to refer to the superclass entity.
   - When we have total participation from the superclass, we created relations for each subclass where we included the attributes of the superclass and the attributes of the corresponding subclass. The primary key of each subclass is the primary key of the superclass.
   - When we have disjoint subclasses, we created a single relation which comprises super class and all the subclasses. We combine all the attributes of the super class and the subclasses and added a type attribute. The values of the type attribute is used to specify which subclass is being referred. The primary key of the super class is the primary key of the relation.
8. Representing relations: For a 1:1 and 1: N relationship we give the primary key of one relation to the other as a foreign key. Let’s say we have two entities A and B which have a 1:1 relation among them. We give the primary key of B to A as a foreign key also any attributes of the relation are given to the relation A. We give the keys and attributes to the relation which has total participation.

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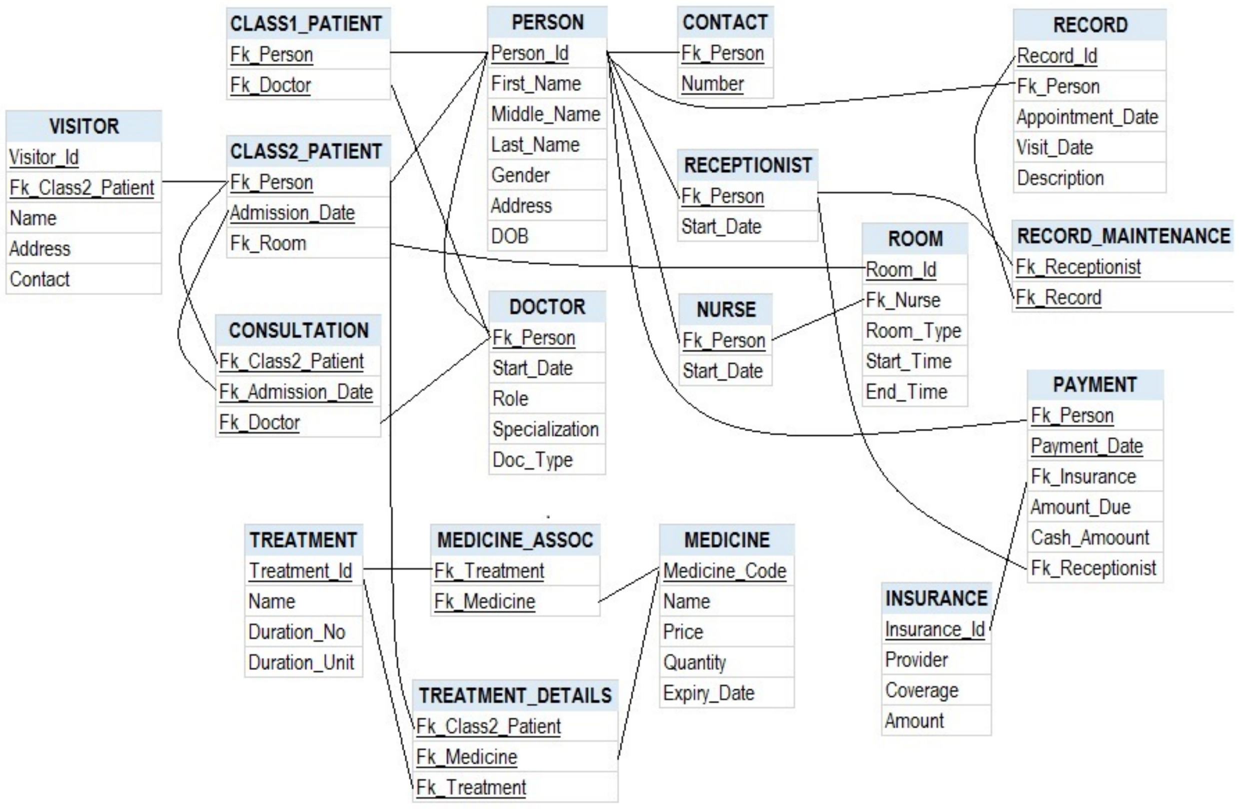
9. For M: N relations, we make a new table which has the primary keys from all the participating relations. The primary keys from all the relations combined act as the primary key of the new relation. These keys also act as foreign key to refer to their respective relations.
10. For a relation with degree > 2 we follow the same steps followed to represent the M: N relation.
11. When we have a union of two entities, we give the union entity a surrogate key along with its attributes in its table. We give this surrogate key to all the participating entities, this works as a foreign key for them. This process is required only when the entities whose union is made have no common attribute; otherwise, we can directly refer that common attribute.


CLASS1_PATIENT
Fk_Person
Fk_Doctor
PERSON
Person_Id
First_Name
Middle_Name
Last_Name
Gender
Address
DOB
CONTACT
Fk_Person
Number
RECORD
Record_Id
Fk_Person
Appointment_Date
Visit_Date
Description
VISITOR
Visitor_Id
Fk_Class2_Patient
Name
Address
Contact
CLASS2_PATIENT
Fk_Person
Admission_Date
Fk_Room
RECEPTIONIST
Fk_Person
Start_Date
ROOM
Room_Id
Fk_Nurse
Room_Type
Start_Time
End_Time
RECORD_MAINTENANCE
Fk_Receptionist
Fk_Record
CONSULTATION
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Fk_Admission_Date
Fk_Doctor
DOCTOR
Fk_Person
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Role
Specialization
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Provider
Coverage
Amount
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Fk_Medicine
Fk_Treatment