ASSIGNMENT#6

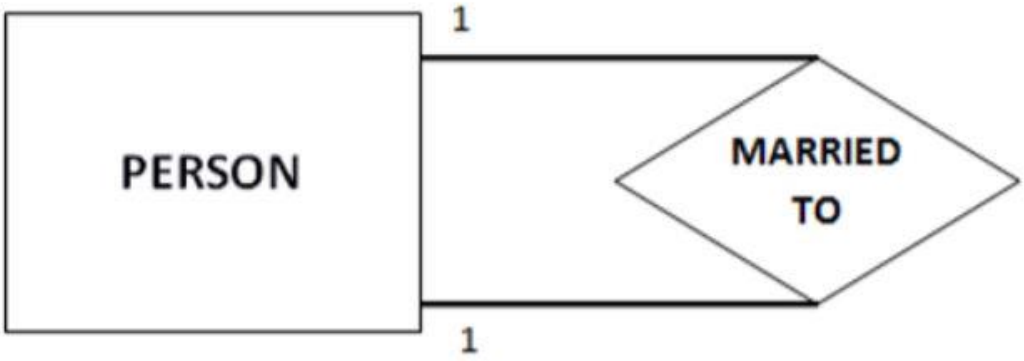
1.Describe the process for converting entities in each of the following relationships into relational database structures:

One-to-one binary relationship: Here one role group of one entity is mapped to one role group of another entity. In simple terms one instance of one entity is mapped with only one instance of another entity. In this type, the primary key of one entity must be available as foreign key in other entity.

One-to-many binary relationship: One role group of one entity is mapped with many role groups of second entity and one role group of second entity is mapped with one role group of first entity.

Many-to-many binary relationship: One role group of one entity is mapped with many role groups of second entity and one role group of second entity is mapped with many role groups of first entity. In these kinds of relationships, a third table is always associated that defines the relationship between the two entities.

One-to-one unary relationship: A One-to-One Unary Relationship is the association with the same entity between the same instances represented by same role group.

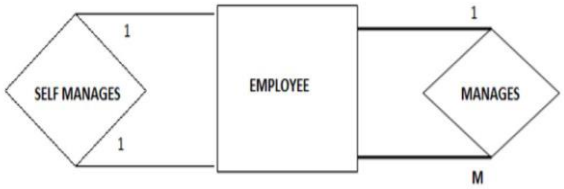


Above figure represents a set of married persons with the relationship MARRIED_TO. Each person is married to only one and only one person in the group.

In One-to-One Unary we have three cases available −

- Mandatory-Mandatory
- Optional-Optional
- Optional-Mandatory or Mandatory-Optional

One-to-many unary relationship: A One-to-Many Unary Relationship is the association with the same entity between the same instances represented by different role groups.



Consider the relationship between Managers and Employees. The two different Roles in this relationship are- Managers and Employees. Only few Employees take the role of Managers within an organization while everyone working for an organization is an Employee. One Manager manages multiple Employees, and each Manager is also an Employee.

Many-to-many unary relationship: Every entity occurrence can be related to many other occurrences. Likes different product relates with many similar or different services.

Ternary relationship: When there is a relationship between three different entities, it is a ternary relationship. Like a relationship between a doctor, patient where doctor prescribes a medicine. Here doctor, patient and medicine act as three related by the prescription of medicine.

2. Describe the data normalization process including its specific steps. Why is it referred to as a "decomposition process"?

a. First Normal Form: collect all the attributes of the database and select a combination of fields as the unique key.

b. Second Normal Form**:** decompose the attributes into tables so that in each table each non-key field is

dependent on the entire key of the table and not part of the key.

c. Third Normal Form: decompose any tables in which a non-key field defines another non-key field.

This is referred to as the decomposition process because all the attributes in the database are collected together as a group then divided up into relational tables.

3.Explain the following terms:

Functional dependency:

Functional dependency is a relationship that exits between two attributes. Functional dependency is represented as

A -> B

left side attribute is called determinant and right side is known as dependent.

It means that if there are two tupples in database that has same value for attribute A, then value of attribute B will also be same for those two tupples.

Determinant: In a database determinant is a type of attribute, which is used to determine the values assigned to other attributes located in the same row of table. In a functional dependency, left side attribute is called determinant.

4.What characterizes unnormalized data? Why is such data problematic?

Un-normalized data can have multi-valued attribute occurrences. Since one does not know how many values there might be per attribute occurrence it is impossible to know how much storage space to allocate for them.

If there are more than one such multi-valued attribute in a record it is impossible to know which value of one of the multi-valued attributes is associated with which value of the other multi-valued attribute.

5.What characterizes tables in first normal form? Why is such data problematic?

First Normal Form (1NF) stats that attribute values in a table should be atomic i.e. attribute is neither multi valued nor composite. So, every column in the table contains unique values and separate tables gets created for related data.

Drawback of 1NF is that it increases data redundancy within tables. Data redundancy occurs due to multiple copies of same data in multiple rows but as we converted database into first normal form, thus we can identify each row uniquely.

But still data redundancy is there, so to solve this problem we must further proceed with higher normalization concepts.

6.What is a partial functional dependency? What does the term "fully functionally dependent" mean?

Partial functional dependency as name stats columns is partially dependent on each other. It occurs when non-prime attribute depends on part of candidate key.

Fully functionally Dependency:

An attribute must depend on another attribute fully and not on its proper subset.

Consider B which is fully functionally depends on A and not on any proper subset of A.

for example a relation R (Course, Sid , Sname) where Course and Sid is key. So, name of a student i.e. Sname is fully dependent on Course and Sid. Here we cannot identify student name individually.

7.What is the rule for converting tables in first normal form to tables in second normal form?

Rule for converting tables in first normal form to second normal form:

1. A relation must be First Normal Form

2.A relation is in Second Normal Form if every non-prime attribute is not partially dependent on any part of candidate key or every non-prime attribute is fully functionally dependent on the prime attribute.

8.What is the definition of data in second normal form?

Second Normal Form: Data redundancy is there in First Normal Form, so to reduce it we use Second Normal Form.

Second Normal Form stated as follows-

A relation must be First Normal Form

A relation is in Second Normal Form if every non-prime attribute is not partially dependent on any part of candidate key or every non-prime attribute is fully functionally dependent on the prime attribute.

9.What is a transitive dependency? What is the rule for converting tables in second normal form to tables in third normal form?

A functional dependency is said to be transitive if it is indirectly formed by two functional dependencies.

For e.g.

X -> Z is a transitive dependency if the following three functional dependencies hold true:

- X->Y
- Y does not ->X
- Y->Z

There are two steps involved in database normalization third normal form. The first step is to make new tables to eliminate transitive dependencies. The second step is to reassign corresponding dependent attributes.

10.What is the definition of data in third normal form? What are the characteristics of data in third normal form?

Third Normal Form is an upgrade to Second Normal Form. When a table is in the Second Normal Form and has no transitive dependency, then it is in the Third Normal Form.

A table is in third normal form if:

- A table is in 2nd normal form.
- It contains only columns that are non-transitively dependent on the primary key