

Normalisation

Exercise 01

Consider a Real Estate system which maintains property rental details:

A property has an owner and is rented to a customer. A customer can rent more than one property but not simultaneously. A customer never rents the same property twice.

Such a relation might contain the following attributes:

CustNo, Cname
PropNo, Paddr
RentStart, RentFinish, Rent
OwnerNo, Owner

Show the data as a set of normalised (3NF) relations

Solution

UNF

Customer_Rentals(Cno, Cname, PropNo, PAddr, RentStart, RentFinish, Rent, OwnerNo, Owner).

1NF

Identify and remove any repeating groups in the table.

ie. Any attributes with multiple values for a single value of the nominated key (non-atomic values)

Place the repeating data along **with the original primary key** in a new relation.

Give this relation a meaningful name.

Identify a primary key for the new relation.

Repeating group =

(PropNo, PAddr, RentStart, RentFinish, Rent, OwnerNo, Owner)

Removing these attributes to a new relation gives:

Cust_Rentals(Cno, PropNo, Paddr, RentStart, RentFinish, Rent, OwnerNo, Owner)

Pick a suitable primary key for the relation.

Customers(Cno, Cname)

Cust_Rentals(Cno, PropNo, Paddr,
RentStart, RentFinish, Rent, OwnerNo, Owner)

2NF

Based on concept of Full Functional dependency.

Refers only to those relations with a **composite** primary key.

Cust_Rentals(Cno, PropNo, Paddr,
RentStart, RentFinish, Rent, OwnerNo, Owner)

Cno, PropNo → RentStart, RentFinish

PropNo → Paddr, Rent, OwnerNo, Owner
All of these are *partially* dependent on the PK.

Remove the dependent attributes to a new relation, with the determining attribute as the PK.

Identify the partial dependencies and remove them to new relations.

Customers(Cno, Cname)

Cust_Rentals(Cno, PropNo, RentStart,
RentFinish)

PropOwners(PropNo, Paddr, Rent, OwnerNo,
Owner)

3NF

Identify & remove any transitive dependencies.

In the relation **PropOwners**

OwnerNo → Owner

PropNo → OwnerNo

OR

PropNo → OwnerNo → Owner

Owner is transitively dependent on the PK, **PropNo**.

Remove the pair of transitively dependent attributes to a new relation.

The determining attribute in the pair of non-key attributes becomes the PK of the new relation.

Customers(Cno, Cname)

Cust_Rentals(Cno, PropNo, RentStart, RentFinish)

PropOwners(PropNo, Paddr, Rent, OwnerNo)

Owners(OwnerNo, Owner)