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Assignment # 2

Assumption: A client rents a given property only once and cannot rent more than one property at any one time. Rent finishing Date might be null.

The Unnormalized Table (ClientRental)

clientNo	cName	propertyNo	pAddress	rentStart	rentFinish	rent	ownerNo	oName
CR76	John Kay	PG4	6 Lawrence St, Glasgow	1-Jul-12	31-Aug-13	350	CO40	Tina Murphy
	John Kay	PG16	5 Novar Dr, Glasgow	1-Sep-13	1-Sep-14	450	CO93	Tony Shaw
CR56	Aline Stewart	PG4	6 Lawrence St, Glasgow	1-Sep-11	10-June-12	350	CO40	Tina Murphy
	Aline Stewart	PG36	5 Manor Rd, Glasgow	10-Oct-12	1-Dec-13	375	CO93	Tony Shaw
	Aline Stewart	PG16	5 Novar Dr, Glasgow	1-Nov-14	10-Aug-15	450	CO93	Tony Shaw

As we can see that the cells of column propertyNo, pAddress, rentStart, rentFinish, rent, ownerNo, oName have multiple values hence the above table is in unnormalized form.

1NF Table:

To convert this table into first normal form (i.e., 1NF), we have to remove these repeating groups from this table.

ClientRental

clientNo	cName	propertyNo	pAddress	rentStart	rentFinish	rent	ownerNo	oName
CR76	John Kay	PG4	6 Lawrence St, Glasgow	1-Jul-12	31-Aug-13	350	CO40	Tina Murphy
CR76	John Kay	PG16	5 Novar Dr, Glasgow	1-Sep-13	1-Sep-14	450	CO93	Tony Shaw

CR56	Aline Stewart	PG4	6 Lawrence St, Glasgow	1-Sep-11	10-June-12	350	CO40	Tina Murphy
CR56	Aline Stewart	PG36	5 Manor Rd, Glasgow	10-Oct-12	1-Dec-13	375	CO93	Tony Shaw
CR56	Aline Stewart	PG16	5 Novar Dr, Glasgow	1-Nov-14	10-Aug-15	450	CO93	Tony Shaw

The above table is in first normal form. In order to convert it into 2NF (Second Normal Form), we will first find the functional dependencies.

FUNCTIONAL DEPENDENCIES:

clientNo, propertyNo → cName, pAddress, rentStart, rentFinish, rent, oName, ownerNo (Primary Key)

clientNo, rentStart → cName, propertyNo, pAddress, rentFinish, rent, oName, ownerNo (Candidate Key)

propertyNo, rentStart → clientNo, cName, pAddress, rentFinish, rent, oName, ownerNo(Candidate Key)

clientNo →cName (Partial Dependency)

propertyNo → pAddress, rent, ownerNo, oName (Partial Dependency)

ownerNo → oName (Transitive Dependency)

2NF Tables:

To convert 1NF to 2NF, we have to remove the partial dependencies from the above table which will convert the above table into the following 3 tables:

ClientRental (**clientNo, propertyNo**, rentStart, rentFinish)

Client (**clientNo**, cName)

Property (**propertyNo**, pAddress, rent, ownerNo, oName)

ClientRental

clientNo	propertyNo	rentStart	rentFinish
CR76	PG4	1-Jul-12	31-Aug-13
CR76	PG16	1-Sep-13	1-Sep-14

CR56	PG4	1-Sep-11	10-June-12

CR56	PG36	10-Oct-12	1-Dec-13
CR56	PG16	1-Nov-14	10-Aug-15

Client

clientNo	**cName**
CR76	John Kay
CR56	Aline Stewart

Property

propertyNo	**pAddress**	**rent**	**ownerNo**	**oName**
PG4	6 Lawrence St, Glasgow	350	CO40	Tina Murphy
PG16	5 Novar Dr, Glasgow	450	CO93	Tony Shaw
PG36	5 Manor Rd, Glasgow	375	CO93	Tony Shaw

The above tables are in second normal form.

3NF Tables:

In order to convert above tables into 3NF, we have to remove transitive dependency.

ClientRental and Client Tables have no transitive dependency hence they are already in 3NF. But to convert Property Table into 3NF, we have to remove the transitive dependency of oName on ownerName. Removing this would break Property table into the following 2 tables:

Property (**propertyNo**, pAddress, rent, ownerNo)

Owner (**ownerNo**, oName)

Property

propertyNo	pAddress	rent	ownerNo
PG4	6 Lawrence St, Glasgow	350	CO40
PG16	5 Novar Dr, Glasgow	450	CO93
PG36	5 Manor Rd, Glasgow	375	CO93

Owner

ownerNo	oName
CO40	Tina Murphy
CO93	Tony Shaw

The above tables are now in third normal form.

BCNF

In order to convert 3NF to BCNF, we have such a dependency in which a non-prime attribute functionally determines a prime attribute.

In above tables, there is no such dependency hence the tables are already in Boyce-Codd normal form.