ASSIGNMENT # 4

DATABASE SYSTEM

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Section F

11th December 2020

TASK (a) Why the given table Branch Manager is not in 3NF? Give the reason.

Solution:- Before we delve into details of third form, we will point out functional dependency on the given table.

branchNo	branch Address	telNo	mgr staff no	name
BD01	8 Jefferson Way, Portland--	503-555-3618	S1500	Tom Daniels
BD02	City Centre Plaza, ---	206-555-6756	SOO1O	Mary Martinez
BOO3	14-8th Avenue, ---	212-371-3000	SO145	Art Peters
BDO4	16-14th Avenue, ---	206-555-3131	S2256	Sally Stern

NOTE:- column A is said to be functionally dependent on column B if changing the value of A may require a change in the value of B.

Here mgr staff no column is dependent on name and also tel No column. This is because if we change branch manager (mgr staffno) then we have to change name. For eg for some reason a new branch manager is appointed for branch "BOO1" then with mgrstaffno we have to change name.

This is not desirable since someone who is updating the database may remember to change mgr number or name but not the other values may be he forgets. This can cause inconsistency in the database.

And since table is not in 2NF as 2 attributes combinely making PK.

Also non key attribute telno relates with branch address.

TASK (b) + (c) - Describe and illustrate the process of normalizing the data show in Branch Manager table
- Identify the primary & secondary keys in each step (Normal forms)

FIRST NORMAL FORM (1NF)

The first normal form says that each cell of a table should contain exactly one value.

here in the given table.

primary key :- branch No (unique and related to and mgr staffNO.   branch name)

foreign key :- There is no foreign key as there is currently only one table and no others to be related

The table is already in 1NF.

SECOND NORMAL FORM (2NF)

For a table to be in second normal form, the following two conditions are to be met

1. The table should be in the first normal form.
2. The primary key of the table should compose of exactly 1 column.

The given table violates 2NF form.

we have 2 primary keys

branch No which relates with branch Address.
and mgr staffNo that tells name.

Therefore Branch Manager table/relation violates 2NF in normalization and considered a bad db design.

To remove Partial dependency and violation on 2NF we decompose the given table.

branchNO	branch address	mgrstaffno

PK: branchNO
FK: mgrstaffno
tel no.

mgrstaffno	name

PK: mgrstaffno
FK: none.

THIRD NORMAL FORM (3NF)

1- Should be in 2NF & 1NF
2- no two columns to be functionally dependent.
3- no non-key attribute must define each other

In above 2NF form tele no and branhid can define each other hence violates 3NF. we decompose the relation to make in 3NF

↗PK   ↗FK   ↗FK

branchno	branchaddress	mgrstaff no.

brauhadder	tellno.

PK: branch addery
FK: none

mgrstaffno	name.

PK: mgrstaffno
FK: none

BOYCE-CODD NORMAL FORM (BCNF)

Boyce-codd Normal form is a stronger generalization of 3NF. A table is in BCNF if no trivial functional dependency and we hae candidate keys on left side.

The previous form in 3NF is also in BCNF because each dependency has candidate key on which all attributes depend.

FOURTH NORMAL FORM (4NF)

A table is said to be in fourth normal form if there is no two or more, independent and multivalued data describing the relevant entity.

Since we hae no multivalued attribute hence relations are in 4NF.

FIFTH NORMAL FORM (5NF)

A table is in fifth normal form if
- It is in fourth normal form
- It can't be subdivided into any smaller tables without loosing some form of info.

No further division can't be done.

Final DB schema:

brauchno.	brauhadden	mgr staffno

PK: branchno.

FK: branch adden, mgrstaffno

branchaddes	tellno.

PK: branchaddes

mgrstaffno	name

PK: mgrstaffno.