**Lab Exercise 4**

This week we are looking at how to convert unnormalized data to 1st, 2nd or 3rd normalized form. Work in small groups of 2 or 3 to complete the following tasks:

**Task 1 (you have approximately 20 minutes to complete this task)**

1. Examine the table shown below.

| *branchNo* | *branchAddress* | *telNos* |
| --- | --- | --- |
| B001 | 8 Jefferson Way, Portland, OR 97201 | 503-555-3618,  503-555-2727,  503-555-6534 |
| B002 | City Center Plaza, Seattle, WA 98122 | 206-555-6756,  206-555-8836 |
| B003 | 14 - 8th Avenue, New York, NY 10012 | 212-371-3000 |
| B004 | 16 - 14th Avenue, Seattle, WA 98128 | 206-555-3131,  206-555-4112 |

1. Why is this table not in 1NF?

There are still repeating groups present in the table.

1. Describe and illustrate the process of normalising the data shown in this table to third normal form (3NF).

0NF:  
Attributes identified for the table below which is Branch are branchNo, branchAddress and telNos, they are all put into a table.

BRANCH(branchNo{PK}, branchAddress, (telNos)\* )  
  
1NF:

Repeating group, telNos, is found and is removed from the main relation, a second relation for telephone is created with branchNo  
BRANCH(branchNo{PK}, branchAddress)

TELEPHONE(branchNo{PPK}, telId{PPK}, telNos )

2NF:

Partial relationships for each components of branchAddress with the main relation Branch are found, they are separated into a new relation, Address with branchAddress acting as an ID.

BRANCH(branchNo{PK}, branchAddress{FK})  
ADDRESS(branchAddress{PK}, unit, street, town, country, postcode)

TELEPHONE(branchNo{PPK}, telId{PPK}, telNos )

3NF:

The tables have no transitive relationships to be removed, therefore 3NF results are same as 2NF

BRANCH(branchNo{PK}, branchAddress{FK})  
ADDRESS(branchAddress{PK}, unit, street, town, country, postcode)

TELEPHONE(branchNo{PPK}, telId{PPK}, telNos )

1. Identify the primary, alternate and foreign keys in your 3NF relations.

**PRIMARY KEYS:**

branchNo,branchAddress

**FOREIGN KEYS:**

branchAddress

**PARTIAL PRIMARY KEYS:**

branchNo, telId

**Task 2 (you have approximately 20 minutes to complete this task)**

The purpose of this form shown below is to record the medication given to a particular patient at the Wellmeadows Hospital. Examine the data shown on the form. Discuss how the data shown on this form could be represented in tables.



The possible entities that is included in this form are the form itself, the patient and their ward, medical record of the patient and the drugs that are recorded inside it since they all have their own distinct and related data. Therefore, using normalization, we can represent them into relations by building it starting from 0NF:

In 0NF, all data that are present in the medication form are merged together into one relation, possible repeating groups are emphasized using brackets:

MedicationForm(patientNo{PK}, fullName, bedNo, wardNo, wardName, (drugNo, drugName, drugDesc, drugDosage, methodOfAdmin, unitPerDay, startDate, finishDate)\* )

Then, in 1NF, the data in the repeating group is separated into a new relation. The relation is called MedicalRecord since it contains the attributes that are related to this entity. Then, patientNo is also added into the new relation as a partial primary key for tracking purposes:  
MedicationForm(patientNo{PK}, fullName, bedNo, wardNo, wardName)

MedicalRecord(patientNo{PPK}, drugNo{PPK}, drugName, drugDesc, drugDosage, methodOfAdmin, unitPerDay, startDate, finishDate)

After that, in 2NF, partial relationships such as the relationship of drug information to the medical record are removed from all relations and separated into another new relation. This is done to the Drug relation and drugNo is assigned as its primary key:

MedicationForm(patientNo{PK}, fullName, bedNo, wardNo, wardName)

MedicalRecord(patientNo{PPK}, drugNo{PPK}, startDate, finishDate)

Drug(drugNo{PK} ,drugName, drugDesc, drugDosage, methodOfAdmin, unitPerDay)

Finally, in 3NF, transitive relationship like the ward information is removed from the main relation and separated into a new relation:

MedicationForm(patientNo{PK}, fullName, wardNo)

Ward(wardNo{PK}, bedNo, wardName)

MedicalRecord(patientNo{PPK}, drugNo{PPK}, startDate, finishDate)

Drug(drugNo{PK} ,drugName, drugDesc, drugDosage, methodOfAdmin, unitPerDay)