Lab 10 – Normalization 2

(2NF, 3NF)

Group 11

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Objective:

Students will learn:

- To continue the **normalization** of user views from **1NF** to **2NF and 3NF**
- How to identify and remove **partial dependencies**
- How to identify and remove **transitive dependencies**

Submission:

Save your lab file as a PDF file. You need to submit a single PDF named as `DBS211_L10_Group_Number` ***file for this lab.***

Your name and student ID MUST be in the PDF file or you will receive a mark of zero.

Definitions:

Definition**:** A relation is in 1NF if it contains no multi-valued dependencies (also known as repeating groups).

Definition**:** A relation is in 2NF it is in 1NF and it contains no Partial Dependencies.

Definition: A Partial Dependency occurs when a non-key attribute(s) is dependent on (or is determined by) a part of a composite primary key.

Definition**:** A relation is in 3NF it is in 2NF and it contains no Transitive Dependencies.

Definition**:** A Transitive Dependency occurs when a non-key attribute (s) is dependent on (or is determined by) another non-key attribute.

Instructions:

Part A (Second Normal Form (2NF))

Note: A relation that has only a simple primary key cannot have any partial dependencies!

1. Examine the following report:

Premiere Corporation
Customer Orders

Customer Number	Name	Order Number	Order Date	Sales Rep	Rep Last Name
124	Sally Adams	12489	2016-09-02	03	Jones
		12500	2016-09-05		
256	Ann Samuels	12495	2016-09-04	06	Smith
311	Don Charles	12491	2016-09-02	12	Diaz
315	Tom Daniels	12494	2016-09-04	06	Smith
522	Mary Nelson	12498	2016-09-05	12	Diaz
		12504	2016-09-05		

Step 1:
Create the UNF relation by creating a relation composed of all the attributes found in the User View. Don't forget to underline the primary key and place brackets around any multi-valued dependencies (also known as repeating groups) you may find.

UNF:

UNF: Customer [**CustNo**, CustName, RepNo, RepName, (OrderNo, OrderDate)]

Step 2:
Create the 1NF relations by resolving the multi-valued dependencies (also known as repeating groups):

1NF

Now you are ready to create the 2NF relations by resolving the partial dependencies from the 1NF relations.

Your 1NF solution should look something like this:

1NF: Customer [**CustNo**, CustName, RepNo, RepName]
Cust_Order [**CustNo, OrderNo**, OrderDate]

Note: if you did not get a similar solution, please talk to your instructor about it now! It is very important to get the correct UNF and 1NF relations.

Step 3:
The process for taking a relation from 1NF to 2NF involves resolving the partial dependencies. We see that from our definition of 2NF (page 1) a partial Dependency is when a non-key attribute is determined by a part of the primary key. We also read in the note (page 1) that we cannot have partial dependencies when there is a one-part Primary Key).

1NF: Customer [**CustNo**, CustName, RepNo, RepName]
Cust_Order [**CustNo**, **OrderNo**, OrderDate]

Now examine the Cust_Order relation. Does it have a composite primary key (a key made up of more than 1 field) ? ___Yes________

Identify the key attributes.________CustNo, OrderNo_____________________

Identify the non-key attributes. _______OrderDate___________________

Are any of the non-key attributes determined by ONE of the key attributes?
____No_________________

Which non-key attributes are determined by only one of the PK attributes?
_____None from Cust_Order________________________________.

We must create new relations for the partial dependencies.

Write the 3 possible PK's:

[CustNo ,
[OrderNo ,
[CustNo, OrderNo ,

Place all non-key attributes on the appropriate table (hint: choose the table with the least parts.

2NF:
CUSTOMER [CustNo, CustName, RepNo, RepName]

ORDER [OrderNo, OrderDate]
CUSTORDER [CustNo, OrderNo]

1NF: Customer [**CustNo**, CustName, RepNo, RepName]
Cust_Order [**CustNo, OrderNo**, OrderDate]

2NF: CUSTOMER [CustNo, CustName, RepNo, RepName]
ORDER [OrderNo, OrderDate]
CUSTORDER [CustNo, OrderNo]

Part B (Third Normal Form (3NF))

We now have a set of 2NF relations from our User View. Your 2NF solution should look something like this:

2NF:
Customer [CustNo, CustName, RepNo, RepName]
CustOrder [CustNo, OrderNo]
Order [OrderNo, Orderdate]

If you did not correctly identify the order relation, please ask your instructor about this process now!

We are now ready to identify any transitive dependencies we may have.

Note: A relation that has no transitive dependencies is already in 3NF!

1. Examine each of the 2NF relations and determine the following:

Customer relation: Key attributes _______CustNo (PK)________________________

Non-key attributes: ________CustName, RepNo, RepName_____________________

CustOrder relation Key attributes ___CustNo (Part of Primary Key), OrderNo (Part of Primary Key)____________________________

Non-key attributes ___________NONE____________________

Order relation Key attributes __________OrderNo (PK)_____________________

Non-key attributes: ____OrderDate___________________________

Note: if a relation contains less than 2 non-key attributes, there cannot be any transitive dependencies. Therefore the CustOrder and Order relations cannot contain any transitive dependencies! Simply copy those relations to the 3NF solution.

Examine non-key attributes of the Customer relation. Do any of the non-key attributes determine any of the other non-key attributes? ___REP______
If you answered yes, you are right. Fill in the blanks:

___________RepName_____________ is determined by _____RepNo_________

2. We must create a new relation for the transitive dependency. We do this by moving the non-key attributes involved in the transitive dependency to a new relation. The primary key of the new relation will be the non-key attribute that determines the other non-key attributes involved in the transitive dependency.

Write the DBDL for the new relation:

REP [RepNo (PK), RepName]

3. The last step in resolving the transitive dependency is to maintain the link (or relationship) between the relation that contained the transitive dependency (Customer) and the new relation (Rep). We do this by placing a foreign key to the new relation (Rep) into the relation that contained the transitive dependency (Customer). The foreign key will be the primary key of the new relation. Don't forget to identify it with **(FK)**

Complete the 3NF solution**:**

3NF:

CUSTORDER [CustNo, OrderNo]
ORDER [OrderNo, Orderdate]
CUSTOMER [CustNo, CustName, RepNo (FK)] (fill in the foreign key)
REP [RepNo (PK), RepName]

3NF: Customer [**CustNo**, CustName, FK RepNo]
Cust_Order [**OrderNo**, OrderDate, FK CustNo]
Reps [**RepNo**, RepName]

Lab 9 Submission:

For the following User View, determine the 1, 2 and 3NF and hand in this page to your instructor. The UNF relation has been provided.

Premiere Corporation
Order Detail Report

Order Number	Order Date	Cust Number	Cust Last Name	Part Number	Part Desc	Qnty Ordered	Quoted Price
12489	2016-09-02 124	124	Adams	AX12	Iron	11	14.95
12491	2016-09-02 311	311	Charles	BT04	GasGrill	3	440.00
				BZ66	Washer	1	399.99
				CX11	MiniBlender	1	11.98
12494	2016-09-04	315	Daniels	CB03	Bike	4	279.96
12495	2016-09-04	256	Samuels	CX11	MiniBlender	2	23.96
12498	2016-09-05	522	Nelson	AZ52	Dartboard	2	12.96
				BA74	Basketbal	4	24.96
12500	2016-09-05	124	Adams	BT04	GasGrill	1	149.99
12504	2016-09-05	522	Nelson	CZ81	Treadmill	2	325.98

UNF:
Order [OrderNo, Orderdate, CustNo, CustLname, (PartNo, PartDesc, QtyOrd, Price)]

1NF:

Order [OrderNo, Orderdate, CustNo, CustLname, PartNo, PartDesc, QtyOrd, Price]

2NF:

ORDER [OrderNo (PK), OrderDate, CustNo (FK)]
CUSTOMER [CustNo (PK), CustLname]
PART [PartNo (PK), PartDesc]
ORDER_DETAIL [OrderNo (FK), PartNo (FK), QtyOrd, Price]

3NF:

ORDER [OrderNo (PK), OrderDate, CustNo (FK)]

CUSTOMER [CustNo (PK), CustLname]
PART [PartNo (PK), PartDesc]
ORDER_DETAIL [OrderNo (FK), PartNo (FK), QtyOrd, Price]