

# Lab 10 – Normalization 2

## (2NF, 3NF)

### 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:

***You only need to submit the final part of this lab, Your name and student ID MUST be in the WORD 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 if 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 if 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 (FINDING 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 [ (PK CustNo, CustName, RepNo, RepName), OrderNo, OrderDate ]

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**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 [ PK CustNo, CustName, RepNo, RepName ]  
Cust\_Order [PK OrderNo, OrderDate, FK CustNo ]

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 [ PK CustNo, CustName, RepNo, RepName ]  
Cust\_Order [PK OrderNo, OrderDate, FK CustNo ]

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

Identify the key attributes. \_\_\_\_\_

Identify the non-key attributes. \_\_\_\_\_

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

Which non-key attributes are determined by only one of the PK attributes?  
\_\_\_\_\_.

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,

ORDER [ OrderNo

CUSTORDER [ CustNo, OrderNo,

1NF: Customer [ CK CustNo, CustName, RepNo, RepName ]  
Cust\_Order [CK OrderNo, OrderDate, FK CustNo ]

2NF:

Customer [ CustNo, CustName, RepNo, RepName ]

CustOrder [ CustNo, OrderNo ]

Order [ OrderNo, Orderdate ]

## Part B (FINDING 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 \_\_\_\_\_

Non-key attributes: \_\_\_\_\_

**CustOrder relation** Key attributes \_\_\_\_\_

Non-key attributes \_\_\_\_\_

**Order relation**      **Key attributes** \_\_\_\_\_

Non-key attributes: \_\_\_\_\_

**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? \_\_\_\_\_

If you answered yes, you are right. Fill in the blanks:

\_\_\_\_\_ is determined by \_\_\_\_\_

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 [ \_\_\_\_\_ ]

3NF:

ORDER [ OrderNo, Orderdate ]

REP [ ]

3NF: Customer [ PK **CustNo**, CustName, FK RepNo ]  
 Cust\_Order [ PK **OrderNo**, OrderDate, FK CustNo ]  
 Reps [ PK **RepNo**, RepName ]

## 2NF:

Customer [ CustNo, CustName, RepNo, RepName ]

CustOrder [ CustNo, OrderNo ]

Order [ OrderNo, Orderdate ]

**Lab 10 Submission from this page:**

**Submit a Word document of the following 3 questions.**

**Question 1**

**For the following User View, determine the 1, 2 and 3NF The UNF relation has been provided.**

**Premiere Corporation****Order Detail Report**

Order Number	Order Date	Cust Number	Cust Last Name	Part Number	Part Desc	Qty 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** [PK OrderNo, Orderdate, CustNo, CustLname, (PartNo, PartDesc, QtyOrd, Price)]



**1NF:**

**2NF:**

**3NF:**

## Question 2

**For the following User View, determine the UNF, 1, 2 and 3NF**

**Movie rental report**

FULL NAMES	PHYSICAL ADDRESS	MOVIES RENTED	SALUTATION
Janet Jones	First Street Plot No 4	Pirates of the Caribbean, Clash of the Titans	Ms.
Robert Phil	3 <sup>rd</sup> Street 34	Forgetting Sarah Marshal, Daddy's Little Girls	Mr.
Robert Phil	5 <sup>th</sup> Avenue	Clash of the Titans	Mr.

**UNF:**

**1NF:**

**2NF:**

**3NF:**