**What we will learn:**

1. To continue the **normalization** of user views from **1NF** to **2NF and 3NF**

2. How to identify and remove **partial dependencies**

3. How to identify and remove **transitive dependencies**

**Part A: Second Normal Form (2NF)**

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.

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 Name Order Order Sales Rep**

**Number Number Date Rep Last Name**

**No**

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

\*\*\*\*\*\*\*\* End of report \*\*\*\*\*\*\*\*

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: CUSTOMER [CustNo, Name, SalesRep, RepName, (OrderNo, OrderDate)]

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

1NF: CUSTOMER [CustNo, OrderNo, Name, SalesRep, RepName, OrderDate]

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, OrderNo, OrderDate, CustName, RepNo, RepName]

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, OrderNo, OrderDate, CustName, RepNo, RepName]

Now examine the CustOrder 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, CustName, RepNo, RepName

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

Which non-key attributes are determined by only one of the PK

attributes?

CustName → CustNo

OrderDate → OrderNo

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, SalesRepNo, 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.

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.

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,

Non-key attributes: CustName, RepNo, RepName

**CustOrder relation** Key attributes CustNo, OrderNo

Non-key attributes None

**Order relation** Key attributes OrderNo

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? Yes

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, 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, RepName]

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**Lab 9 Submission:**

**1. 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 Order Cust Cust Part Part Qty Quoted**

**Number Date Number Last Number Desc Ordered Price**

**Name**

12489 2016-09-02 124 Adams AX12 Iron 11 14.95

12491 2016-09-02 311 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

\*\*\*\*\*\* \*\*\*\*\*\*\*\* End of report \*\*\*\*\*\*\*\*

**UNF:** Order

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

**1NF:** Order

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

**2NF:** Order [OrderNo, OrderDate, CustNo, CustLname]

Part [PartNo, PartDesc, QtyOrd, Price]

Order\_Part [OrderNo, PartNo]

**3NF:** Order [OrderNo, OrderDate, CustNo(FK)]

Part [PartNo, PartDesc, QtyOrd, Price]

Order\_Part [OrderNo(FK), PartNo(FK)]

Customer [CustNo, CustLname]