**In this lab, you will learn how to:**

1. **Produce the 3NF Relations from each user view into one set of 3NF Relations for the application.**

**2. You will accomplish this by writing the UNF for each of 2 user views.**

**3. Normalize each set of relations to 3NF.**

**4. Merge attributes onto one relation where the PKs of two relations are identical.**

**5. Simplify Primary Keys. Ensure that the entire PK of multi-part PK’s is required. If not, remove the part of the PK that is not required and add it to the non-key attribute list for that relation.**

**6. Merge all relations with the identical Primary Key.**

**7. Eliminate any new Transitive Dependencies.**

**8. Mark ALL Foreign Keys.**

***Produce a Final 3NF Solution based on the two user views given below:***

**Good News Grocers**

**User View 1 - Price Update List**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Department** | **Product**  **Code** | **Aisle**  **Number** | **Price** | **Unit of Measure** | **Supplier Number** |
|  |  |  |  |  |  |
| Pr - Produce | 4081 | 1 | 0.35 | Lb | 32 |
| Pr - Produce | 4027 | 1 | 0.90 | Ea | 32 |
| Pr - Produce | 4108 | 1 | 1.99 | Lb | 21 |
| Pr - Produce | 4851 | 1 | 2.00 | Ea | 32 |
|  |  |  |  |  |  |
| Bu - Butcher | 331100 | 5 | 1.50 | Lb | 08 |
| Bu - Butcher | 331105 | 5 | 2.40 | Lb | 08 |
| Bu - Butcher | 332110 | 5 | 5.00 | Lb | 08 |
|  |  |  |  |  |  |
| Fr - Freezer | 411100 | 6 | 1.00 | Ea | 10 |
| Fr - Freezer | 521101 | 6 | 1.00 | Ea | 10 |
| Fr - Freezer | 866503 | 6 | 5.00 | Ea | 45 |
| Fr - Freezer | 866504 | 6 | 5.00 | Ea | 45 |

This report is used by the department managers to update the prices that are displayed in the grocery store for these products. Start with the UNF as given here:

**UNF:** [ Dept#, Department, (ProdCode, Aisle, Price, Unit, SuppNum ) ]  
  
  
  
**UNF:** Department [ Dept#, Department, (ProdCode, Aisle, Price, Unit, SuppNum ) ]

1NF: Department [ Dept#, ProdCode, Department, Aisle, Price, Unit, SuppNum ]

2NF: Department [ Dept#, Department, Aisle, SuppNum ]

Product [ ProdCode, Price, Unit, Dept#(FK) ]

Department\_Product [ Dept#, ProdCode, ]

3NF: Department [ Dept#, Department, Aisle, SuppNum(FK) ]

Product [ ProdCode, Price, Unit, Dept# ]

Department\_Product [ Dept#(FK), ProdCode(FK), ]

Supplier [ SuppNum ]

Simplify the concatenated PK. You can do this because the ProductCode determines the Department. ProductCode will be a one-part PK and DepartmentCode and Department will be attributes on the PRODUCT table.

**Good News Grocers**

# **User View 2: Product Cost Report**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Supplier** | **Product** | **Cost** | **Markup** | **Price** | **Dept**  **Code** |
| 21 – Very Veggie | 4108 – tomatoes, plum | 1.89 | 5% | 1.99 | PR |
| 32 – Fab Fruits | 4081 – bananas |  |  |  |  |
| 32 – Fab Fruits | 4027 – grapefruit | 0.45 | 100% | 0.90 | PR |
| 32 – Fab Fruits | 4851 – celery | 1.00 | 100% | 2.00 | PR |
| 08 – Meats R Us | 331100 – chicken wings | 0.50 | 300% | 1.50 | BU |
| 08 – Meats R Us | 331105 – lean ground beef | 0.60 | 400% | 2.40 | BU |
| 08 – Meats R Us | 332110 – boneless chicken breasts | 2.50 | 100% | 5.00 | BU |
| 10 – Jerry’s Juice | 411100 – orange juice | 0.25 | 400% | 1.00 | FR |
| 10 – Jerry’s Juice | 521101 – apple juice | 0.25 | 400% | 1.00 | FR |
| 45 – Icey Creams | 866503 – vanilla ice cream | 2.50 | 100% | 5.00 | FR |
| 45 – Icey Creams | 866504 – chocolate ice cream | 2.50 | 100% | 5.00 | FR |

This report is used by the grocery store manager to determine the final selling price of his products. Start with the UNF given: Note that we did not keep the Price because it can be calculated from Cost and Markup.

**UNF**: [ SuppCode, Supplier, (ProdCode, Product, Cost, Markup, DeptCode ) ]

**UNF**: Supplier [ SuppCode, Supplier, (ProdCode, Product, Cost, Markup, DeptCode ) ]

1NF: Supplier [ SuppCode, ProdCode, Supplier, Product, Cost, Markup, DeptCode ]

2NF: Supplier [ SuppCode, Supplier, Markup ]

Product [ ProdCode, Product, Cost, DeptCode ]

Supplier\_Product [ SuppCode, ProdCode ]

3NF Supplier [ SuppCode, Supplier, Markup ]

Product [ ProdCode, Product, Cost, DeptCode(FK) ]

Supplier\_Product [ SuppCode(FK), ProdCode(FK) ]

Department [DeptCode ]

Simplify the concatenated PK. You can do this because the ProductCode determines the Supplier. So ProductCode will be a one-part PK and SuppCode and Supplier will be attributes on the PRODUCT table

*Copy the 3NF relations from User View 1here:*

1A Department [ Dept#, Department, Aisle, SuppNum(FK) ]

1B Product [ ProdCode, Price, Unit, Dept# ]

1C Department\_Product [ Dept#(FK), ProdCode(FK), ]

1D Supplier [ SuppNum ]

*Copy the 3NF relations from User View 2 here:*

2A Supplier [ SuppCode, Supplier, Markup ]

2B Product [ ProdCode, Product, Cost, DeptCode(FK) ]

2C Supplier\_Product [ SuppCode(FK), ProdCode(FK) ]

2D Department [ DeptCode ]

*Merge the two sets of relations by combining the attributes of relations that have identical PK’s.*

1A, 2D Department [ DeptCode, Department, Aisle, SuppNum(FK) ]

1B, 2B Product [ ProdCode, Product, Cost, Unit, DeptCode(FK) ]

1D, 2A Supplier [ SuppNum, Supplier, Markup ]

*Finally, remove any new transitive dependencies.*

*Mark all Foreign Keys:*

SuppNum, DeptCode

*Write your final answer:*

Department [ DeptCode, Department, Aisle, SuppNum(FK) ]

Product [ ProdCode, Product, Cost, Unit, DeptCode(FK) ]

Supplier [ SuppNum, Supplier, Markup ]

Department\_Product [ DeptCode(FK), ProdCode(FK) ]

Supplier\_Product [ SuppCode(FK), ProdCode(FK) ]

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*Produce the final merged 3NF relations for the following two user views:*

**User View #1**

**HEALTH HISTORY REPORT**

PET ID PET NAME PET TYPE PET AGE OWNER VISIT DATE PROCEDURE DOCTOR

246 ROVER DOG 12 SAM COOK JAN 13/2013 01 – DOG RABIES VACCINATION T.CANINE

07 - DE-WORMING

25 – DOG ANNUAL CHECKUP

341 MORRIS CAT 4 SAM COOK AUG 13/2012 02 – CAT RABIES VACCINATION T.CANINE

JAN 13/2013 02 – CAT RABIES VACCINATION J.KATZ

MAR 10/2013 10 - EXAMINE and TREAT WOUND R.BYRD

05 – CAT HEART WORM TEST J.KATZ

342 SPOT DOG 2 TERRY KIM JAN 13/2013 08 - TETANUS VACCINATION R. BYRD

25 – DOG ANNUAL CHECKUP

MAR 10/2013 06 – DOG HEART WORM TEST

519 TWEEDY BIRD 2 TERRY KIM FEB 26/2013 27 - ANNUAL CHECK UP J.KATZ

12 - EYE WASH

Start with this UNF:

**UNF: [** PetID, PetName, PetType, PetAge, Ownerid, Owner, ( Visit Date, (Proc#, Procedure, DocId, Doctor) ) ]

**UNF:** Pet [ PetID, PetName, PetType, PetAge, Ownerid, Owner, ( Visit Date, (Proc#, Procedure, DocId, Doctor) ) ]

**1NF:** Pet [ PetID, Visit Date, Proc#, PetName, PetType, PetAge, Ownerid, Owner, Procedure, DocId, Doctor ]

**2NF:** Pet [ PetID, PetName, PetType, PetAge, Ownerid, Owner ]

Procedure [ Proc#, Procedure ]

Pet\_Visit [ PetID, Visit Date, Proc#, DocId, Doctor ]

**3NF:** Pet [ PetID, PetName, PetType, PetAge, Ownerid(FK) ]

Owner [ Ownerid, Owner ]

Procedure [ Proc#, Procedure ]

Pet\_Visit [ PetID(FK), Visit Date, Proc#(FK), DocId(FK) ]

Doctor [ DocId, Doctor ]

**User View 2**

**INVOICE**

HILLTOP ANIMAL HOSPITAL DATE: JAN 13/2013

INVOICE # 987

MR. RICHARD COOK

123 THIS STREET

MY CITY, ONTARIO

Z5Z 6G6

PET DOCTOR# PROCEDURE AMOUNT

ROVER 12 DOG RABIES VACCINATION 30.00

DE-WORMING 59.00

DOG ANNUAL CHECKUP 45.00

MORRIS 23 CAT RABIES VACCINATION 24.00

TOTAL 158.00

TAX (13%) 20.54

AMOUNT OWING 178.54

UNF: Invoice [ Invoice#, InvDate, CustDetail, ( PetId, PetName, DoctorId, Doctor, ( Proc#, Procedure, Amount ) ) ]

1NF: Invoice [ Invoice#, PetId, Proc#, InvDate, CustDetail, PetName, DoctorId, Doctor, Procedure, Amount ]

2NF: Invoice [ Invoice#, InvDate, CustDetail ]

Pet [ PetId, PetName ]

Procedure [ Proc#, Procedure ]

Invoice\_Pet [ Invoice#, PetId, DoctorId, Doctor ]

Invoice\_Procedure [ Invoice#, PetId, Proc#, Amount ]

3NF: Invoice [ Invoice#, InvDate, Cust#(FK) ]

Customer [ Cust#, CustName, Street, City, Province, PostalCode ]

Pet [ PetId, PetName ]

Procedure [ Proc#, Procedure ]

Invoice\_Pet [ Invoice#, PetId, DoctorId(FK) ]

Doctor [ DoctorId, Doctor ]

Invoice\_Pet\_Procedure [ Invoice#(FK), PetId(FK), Proc#(FK), Amount ]

*Now using the relations from both the user views, produce a final set of 3NF relations.*

Customer [ Cust#, CustName, Street, City, Province, PostalCode ]

Doctor [ DoctorId, Doctor ]

Invoice [ Invoice#, InvDate, Cust#(FK) ]

Invoice\_Pet [ Invoice#, PetId, DoctorId(FK) ]

Invoice\_Pet\_Procedure [ Invoice#(FK), PetId(FK), Proc#(FK), Amount ]

Pet [ PetID, PetName, PetType, PetAge, Cust#(FK) ]

Procedure [ Proc#, Procedure ]