COMP2411 Fall 2023 Class Exercise 5 (Functional Dependencies and Normalization)

Student Name: _____

Student ID: _____

1. Consider the attribute set R = (A,B,C,D,E,G,H) and the FD set F={AB->C, AC->B, AD->E, B->D, BC->A, E->G}. For each of the following attributes sets, compute the closure of the set.

   (a) ABC (b) ABCD (c) ABCEG (d) DCEGH

   (a) R1=ABC
   FD = {AB->C, AC->B, BC->A}
   It is in BCNF since AB, AC & BC are candidate keys for R1.

   (b) R2=ABCD
   FD = {AB->C, AC->B, B->D, BC->A}
   keys are AB, BC, AC
   Since B->D and B is part of a key, and partial dependencies are not allowed by 2NF.
   It is only in 1NF.
   Decomposition into ABC & BD makes them BCNF

   (c) R3=ABCEG
   FD = {AB->C, AC->B, BC->A, E->G}
   keys are ABE, BCE, ACE
   Since E->G and E is part of a key. 1NF
   Decompose into ABC, ABE & EG makes them BCNF

   (d) R4=DCEGH
   FD={E->G}
   key is DCEH
   1NF
   Decompose into DCEH & EG to make them BCNF

Exercise 5 Fall 2023

2. A summary report of a superstore is shown below. Show step-by-step to normalize the data fields in the report into a set of 3NF tables.

Supplier	Product	Cost	Markup	Price	Dept Code
21 – Very Veggie	4108 – tomatoes, plum	1.89	5%	1.99	PR
32 – Fab Fruits	4081 – bananas	0.20	75%	0.35	PR
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

UNF:

supplier [supplier_id, supplier_name, (prod_code, prod_desc, cost, markup, dept_cd)]

1NF:

supplier [supplier_id, supplier_name]

supplier_product [supplier_id, prod_code, prod_desc, cost, markup, dept_cd]

2NF:

supplier [supplier_id, supplier_name]

supplier_product [supplier_id, prod_code]

product [prod_code, prod_desc, cost, markup, dept_cd]

note: if we were getting a product from more than 1 supplier, then the cost attribute would go into the supplier_product table.

Exercise 5 Fall 2023

3NF:

supplier [supplier_id, supplier_name]

product [prod_code, prod_desc, cost, markup, dept_cd, supplier_id (FK)]

note: examing the relationship between supplier and product, we discover that it is a 1:M, therefore we do not need the composite table, supplier_product. So, it is eliminated and the foreign key placed in the product table.