

Database Foundations for Business Analytics: Homework #2

Q.1:

A.

ANSWER. The first table violates the first normal form rule as multiple values are present in the Dependent column (Multiple dependents, their first and last names and also their relationship) and also Employee Name can be split as Employee First Name and Employee Last Name, all of this violates the need to maintain atomicity as a part of 1NF.

B.

ANSWER. Once we apply the First Normal Form Rule, we will be splitting the columns EmployeeName into Employee First Name & Employee Last Name and also the Dependent Column into Dependent First Name, Dependent Last Name and Relationship. Doing this will help us to attain atomicity across the table.

The table after **applying the first normal form** the Employee Steven King has 2 dependents, we will have 2 separate rows for each dependent to maintain atomicity.

Employee Code	Employee First Name	Employee Last Name	Phone_Number	HireDate	Salary	JobTitle	Dependent First Name	Dependent Last Name	Relationship
1	Steven	King	972.123.4567	03/04/21	54000	Accountant	Amaly	King	Wife
1	Steven	King	972.123.4567	03/04/21	54000	Accountant	John	King	Son
2	Neena	Kochhar	415.342.4566	11/04/17	59000	Accountant	Adam	Kochhar	Husband
3	Alexander	Hunold	416.985.0933	6/18/2022	83000	Finance Manager	Lillian	Hunold	Wife
4	Allen	Baige	020.3899.8732	8/16/2019	59000	Human Resources Representative	Sam	Baige	Son
5	Mary	Swan	65.4303.9900	2/15/2015	82000	Human Resources Manager	Angela	Swan	Daughter

When we apply the second normal form, we will be creating the Employee Table, JobTitle Table, Dependent Table and Relationship Table to satisfy the “No Partial Dependency” rule which is a part of the second normal form.

Employee Table								
Employee Code	Employee First Name	Employee Last Name	Phone_Number	HireDate	Salary	Job Code	Dependent Code	Relationship Code
1	Steven	King	972.123.4567	03/04/21	54000	1	1	1
1	Steven	King	972.123.4567	03/04/21	54000	1	2	2
2	Neena	Kochhar	415.342.4566	11/04/17	59000	1	3	3
3	Alexander	Hunold	416.985.0933	6/18/2022	83000	2	4	1
4	Allen	Baige	020.3899.8732	8/16/2019	59000	3	5	2
5	Mary	Swan	65.4303.9900	2/15/2015	82000	4	6	4

JobTitle Table	
Job Code	JobTitle
1	Accountant
2	Finance Manager
3	Human Resources Representative
4	Human Resources Manager

Dependent Table		
Dependent Code	Dependent First Name	Dependent Last Name
1	Amaly	King
2	John	King
3	Adam	Kochhar
4	Lillian	Hunold
5	Sam	Baige
6	Angela	Swan

Relationship Table	
Relationship Code	Relationship
1	Wife
2	Son
3	Husband
4	Daughter

Q.2:

1. First Normal Form (1NF):

ANSWER. After applying the first normal form we will be able to add the following columns – Employee First Name, Employee Last Name & split the Location address into Location Address and Zip Code.

Doing this will help us to attain atomicity across the table.

Employee Code	Employee First Name	Employee Last Name	Phone Number	HireDate	Salary	JobTitle	MinSalary	MaxSalary	DepartmentName	CountryCode	Country	Region	Location address	ZIP Code
1	Steven	King	972.123.4567	03/04/21	54000	Accountant	45000	64000	Accounting	US	United States of America	Americas	2014 Jabberwocky Rd, Southlake, TX.	76092
2	Neena	Kochhar	415.342.4566	11/04/17	59000	Accountant	45000	64000	Accounting	US	United States of America	Americas	2011 Interiors Blvd, San Francisco, California	99236
3	Alexander	Hunold	416.985.0933	6/18/2022	83000	Finance Manager	75000	98000	Finance Manager	CAN	Canada	Americas	978 ARGYLE ST N, Toronto	N5 8J3
4	Allen	Bajaj	020 3899 8732	8/16/2019	59000	Human Resources Representative	55000	85000	Human Resources	UK	United Kingdom	Europe	8204 Arthur St, London	N/A
5	Mary	Swan	65.4303.9900	2/15/2015	82000	Human Resources Manager	55000	85000	Human Resources	SG	Singapore	Asia	101 Marlow Street, Clife Parkview	59020

2. Second Normal Form (2NF):

- Department, Country, and Region are not dependent on each employee. Multiple employees can belong to these entities.
- Create new entities for department, Country, Region, and location

ANSWER.

To satisfy the second normal form, first we make sure the first normal form is satisfied and from Q1 we know that by adding columns for Employee Name and Location address we have maintained atomicity.

Now to ensure removal of partial dependency, we will create new entities which are not fully dependent on the primary key. Hence, we create Employee table which contains data directly in relation to the employee. Next, we create Jobtitle table which has data related to the Jobtitle and Department table with its respective Department Codes and the same is followed for the Country table and Region table. We create another entity for Location Address with its data split between Zip Code and the Location Address.

Now after creating all the entities, we can link the different entities to the main Employee table by mentioning the code of each table in the Employee table and once we do that we have achieved Second Normalization Form or 2NF.

DATABASE FOUNDATIONS FOR BUSINESS ANALYTICS – BUAN 6320 – SEC504 – 27519

HOMEWORK #2 – FIRST NORMAL FORM & SECOND NORMAL FORM

Employee Table											
Employee Code	Employee First Name	Employee Last Name	Phone_Number	HireDate	Salary	Location address	Department Code	Country ID	JobTitle Code	Region Code	Location Code
1	Steven	King	972.123.4567	03/04/21	54000	2014 Jabberwocky Rd, Southlake, TX.	1	1	1	1	1
2	Neena	Kochhar	415.342.4566	11/04/17	59000	2011 Interiors Blvd, San Francisco, California.	1	1	1	1	2
3	Alexander	Hunold	416.985.0933	6/18/2022	83000	978 ARGYLE ST N, Toronto	2	2	2	2	3
4	Allen	Baige	020.3899.8732	8/16/2019	59000	8204 Arthur St, London	3	3	3	3	4
5	Mary	Swan	65.4303.9900	2/15/2015	82000	101 Marlow Street, Clife Parkview	3	4	4	3	5

Department Table	
Department Code	DepartmentName
1	Accounting
2	Finance Manager
3	Human Resources

Country		
Country ID	Country Code	Country
1	US	United States of America
2	CAN	Canada
3	UK	United Kingdom
4	SG	Singapore

JobTitle Table			
JobTitle Code	JobTitle	MinSalary	MaxSalary
1	Accountant	45000	64000
2	Finance Manager	75000	98000
3	Human Resources Representative	55000	85000
4	Human Resources Manager	55000	85000

Region	
Region Code	Region
1	Americas
2	Europe
3	Asia

Location Table	
Location Code	ZIP Code
1	76092
2	99236
3	NS B3J
4	NULL
5	59020