CP5804 Assignment #2

Note: This is an individual assignment. While it is expected that students will discuss their ideas with one another, students need to be aware of their responsibilities in ensuring that they do not deliberately or inadvertently plagiarize the work of others.

Assignment 2 – Normalization

Due date: 8:00 PM (AEST) End of Week 4, 5 April 2020

Assessment Weight: 15%

Rationale

This assignment has been designed to assess students' ability to define different normal forms and apply correct conversions to higher normal form (3NF) from the lower normal form. It also assesses students' ability to understand how normalization is used in the database design process.

This assignment addresses the following learning objectives for this subject:

- Students are able to apply the techniques of normalization

Requirements

You are given two normalization tasks for this assignment.

The first task is exactly in the same format of the exercise task you completed through Exercise 3~6 provided at the end of Topic 2 of Week 3. An example data stored in one single table is given and you are required to identify the current normal form of the data. If the current form is not 3NF, you are required further to transform the current non-3NF into 3NF. With the final 3NF tables, you are also required to draw an ERD corresponding to your normalization results.

The second task requires you to apply further considerations to treat properly some complicated matters like managing multi-value-attributes etc.

For further details about requirements, follow instructions provided in each task.

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Normalization Task #1 – weight 5%

A real-estate company manages a number of rental properties in Smithfield area and kept historical/current records about all rental properties under their management and corresponding details about each rental contract – including customer details, property details, owner details, contract periods and weekly rent. The table below shows some sample records the company keeps.

Use this table of records to answer the following questions 1), 2), 3), and 4).

Customer_ No	Property _No	Customer_ Name	Property _Address	Rent _Start	Rent _Finish	Property _Rent ($)	Owner _No	Owner_Name
CR85	PG16	James Matt	5 Novar Dr. Smithfield	1/Dec/08		450	CO99	Janie Edwards
CR56	PG4	Aline Stewart	6 Lawrence St. Smithfield	1/Nov/07		375	CO99	Janie Edwards
CR76	PG16	John Kay	5 Novar Dr. Smithfield	1/Sep/07	1/Sep/08	450	CO93	Tony Shaw
CR56	PG16	Aline Stewart	5 Novar Dr. Smithfield	1/Sep/06	10/Aug/07	450	CO93	Tony Shaw
CR56	PG4	Aline Stewart	6 Lawrence St. Smithfield	1/Dec/05	10/June/06	350	CO40	Tina Murphy
CR76	PG16	John Kay	5 Novar Dr. Smithfield	1/Dec/05	31/Aug/06	420	CO93	Tony Shaw
CR56	PG36	Aline Stewart	2 Manor Rd. Smithfield	10/Oct/04	15/Nov/05	375	CO93	Tony Shaw
CR76	PG4	John Kay	6 Lawrence St. Smithfield	1/July/04	31/Nov/05	325	CO40	Tina Murphy
CR56	PG4	Aline Stewart	6 Lawrence St. Smithfield	1/Sep/02	10/June/04	325		

1) Fill in the following diagram to draw the dependency diagram of the relation presented in the table above. Identify the primary key(s), draw all dependencies and label them properly (e.g. partial, transitive).

Customer No	Property No	Customer Name	Property Address	Rent Start	Rent Finish	Property Rent	Owner No	Owner Name

2) What normal form is the relation currently in? State the reasons for your answer.

3) Normalize the table to third normal form (3NF) and draw the dependency diagrams of the 3NF tables.

4) Using the results in Q13, draw an entity relationship diagram (ERD). You need to use Crow's foot notation. Your diagram should show all relevant attributes including primary and foreign keys. Indicate all connectivities, cardinalities and optionalities.

   (You may need to set up optionalities by your own assumptions. List all assumptions you made and every assumption should be correctly corresponded with your ERD. Also note that you should not make up your own assumptions if not needed – for example, mandatory optionalities caused by strong relationships does not require you to make your own assumption for the decision for the optionality)

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Normalization Task #2 – weight 10%

The table structure shown in the table below contains many unsatisfactory components and characteristics. For example, there are several multivalued attributes, naming conventions are violated, and some attributes are not atomic.

Sample EMPLOYEE Records

Attribute Name	Sample Value	Sample Value	Sample Value	Sample Value
EMP_NUM	1003	1018	1019	1023
EMP_LNAME	Willaker	Smith	McGuire	McGuire
EMP_EDUCATION	BBA, MBA	BBA		BS, MS, Ph.D.
JOB_CLASS	SLS	SLS	JNT	DBA
EMP_DEPENDENTS	Gerald (spouse), Mary (daughter), John (son)		JoAnne (spouse)	George (spouse) Jill (daughter)
DEPT_CODE	MKTG	MKTG	SVC	INFS
DEPT_NAME	Marketing	Marketing	General Service	Info. Systems
DEPT_MANAGER	Jill H. Martin	Jill H. Martin	Hank B. Jones	Carlos G Ortez
EMP_TITLE	Sales Agent	Sales Agent	Janitor	DB Admin
EMP_DOB	23-Dec-1968	28-Mar-1979	18-May-1982	20-Jul-1959
EMP_HIRE_DATE	14-Oct-1997	15-Jan-2006	21-Apr-2003	15-Jul-1999
EMP_TRAINING	L1, L2		L1	L1, L3, L8, L15
EMP_BASE_SALARY	$38,255.00	$30,500.00	$19.750.00	$127,900.00
EMP_COMMISSION_RATE	0.015	0.010		

1) Given the structure shown in the table Sample EMPLOYEE Records, draw its dependency diagram. Label all transitive and/or partial dependencies.

2) Draw the dependency diagrams that are in 3NF. (*Hint*: You might have to create a few new attributes. Also make sure that the new dependency diagrams contain attributes that meet proper design criteria; that is, make sure there are no multivalued attributes, that the naming conventions are met, and so on.)

3) Draw the Crow's Foot ERD. (Use your preferred software tool to draw ERD)

Submission

- You need to submit a single document file (MS Word or PDF format) to LearnJCU. The document should include all answers and ERDs.
- Timestamp shown on LearnJCU assignment submission will be used to determine if the assignment is late or not. Refer to the subject guide for the policy for late submission.

Assignment 2 Marking Criteria (Task #1)

Criterion	Description	Mark
Dependency Diagram	Define appropriate PK by identifying dependencies from PK to other attributes correctly	1
	Correctly identify partial dependencies or transitive dependencies if necessary	1
Understanding the initial normal form	Correctly identify what normal form the relation currently is	0.5
	Correctly state the reason for the answer	0.5
Normalization process (up to 3NF)	Normalize the given relation table to a number of 3NFs and draw the dependency diagrams of 3NF tables correctly	4
Transforming the completed 3NF to ERD	Transform and present tables correctly	3
	Set PKs and FKs correctly	2
	Set relationships between tables correctly (connectivities, cardinalities and optionalities)	2
	State reasonable assumptions correctly corresponding to optionalities presented in the ERD	1
	TOTAL	**15**

Assignment 2 Marking Criteria (Task #2)

Criterion	Description	Mark
Dependency Diagram	Define appropriate PK by identifying dependencies from PK to other attributes correctly	1
	Correctly identify partial dependencies or transitive dependencies if necessary	1
Normalization process (up to 3NF)	Normalize the given relation table to a number of 3NFs and draw the dependency diagrams of 3NF tables correctly	8
	All multi-values attributes are correctly identified and appropriately treated by creating a separate 3NF for each attribute.	4
Transforming the completed 3NF to ERD	Transform and present tables correctly	6
	Set PKs and FKs correctly	4
	Set relationships between tables correctly (connectivities, cardinalities and optionalities)	4
	State reasonable assumptions correctly corresponding to optionalities presented in the ERD	2
	TOTAL	**30**

Your Assignment 2 marks (out of 15) = (Task #1 (___) + Task #2 (___)) / 3