CSCI UA.0060 Spring 2025

Assignment 3 – Normalization

Deliverables

Upload a pdf with the answers to the questions below to the Github repository for this assignment.

Filenames should be FirstInitialLastName-Ass3.pdf. For example, John Smith's file would be JSmith-Ass3.pdf

Overall Requirements

This assignment will give you more practice on Normalization. There are three exercises. In each one, you must first show all the data in one table. This table might be in 1NF, 2NF or 3NF (unlikely!!) or might not be in a Normal Form at all.

For each exercise, make sure you show each step of the process, including both a graphical view of the data and the specific reasons why each piece of data changes from one step to the next. Don't just show what the table(s) look like at the end of the process.

In each iteration, make sure that fields that are part of a PK are shown in a bold underlined font. For the 3NF version, make sure that FKs are italicized (including FKs that are also part of a PK).

Specific Requirements

1. The following is a handwritten Parts Order Form for a local Supply company. You can assume that employees help any and all different customers, i.e. there is no special relationship between specific employees and customers. A cage code is the identifier of the cages (or shelves) that the inventory is stored in.

   The plan is to replace the manual processes at the company with an application and database.

   Answer the questions shown below:

Happy Supplies
Parts Warehouse

Customer Name:	*Jeff Peterson*	**Date:**	*7/1/2024*
Customer Number:	*HG54587*	**Time:**	*10:30am*
		Employee:	*D. Harrison*
Customer Type:	*Consumer*		

Part Number	Name	Type	Cage Code	Quantity Ordered	Unit Price
10654	Float Control	Plumbing	G413	4	12
10456	Modulator	Electrical	H433	3	7
10776	Hose Assembly	Plumbing	G413	7	9
10657	Float Assembly	Plumbing	G413	5	10

   a. State any assumptions that you make about the data and the attributes shown.

1. Each customer has a unique customer number.
2. Each customer can only order one parts order at a time.
3. Each employee can only work with one customer at a time.
4. Each employee has a different name.
5. Each customer can only be classified as one type at a time.

   b. Describe and illustrate the process of normalizing the attributes shown in this form.

This table is not on 1NF as there are attributes with multiple values.

To convert to 1NF:

customerName

customerNumber
customerType
date
time
employee
partNumber
name
type
cageCode
quantityOrdered
unitPrice

This table is now on 1NF as there are no repeating groups or multivalued attributes. However, it does have partial dependencies:

- customerName and customerType depending only on customerNumber
- name, type cageCode, unitPrice depending on partNumber

To convert to 2NF:

customer
customerNumber
customerName
customerType

order
customerNumber
date
time
employee
partNumber
quantityOrdered

part
partNumber
name
type
cageCode
unitPrice

Now the table is on 3NF as there are no transitive dependencies.

c. Identify the primary keys at each step of the normalization process and both the primary and foreign keys in your 3NF relations.
d. Ensure that the 3NF relations are named.

Please note that you should not add any additional fields when performing the normalization process, including surrogate keys.
The names of all the relations and attributes must conform to the class naming convention, including use of case and singularity.

1. The data shown below is used by the Panacea Mental Health Corporation to track its therapists. Therapists may work at a number of different branches, but they only see patients at one specific branch on any given day. A patient is given an appointment at a specific time and date at a particular branch with one therapist. Patients may have multiple appointments in any given day and with multiple different therapists.

staffNo	therapistName	patNo	patName	appointment		branchNo
				date	time	
S1011	Fred Smith	P100	Lily White	9/12/2022	10:00	M15
S1011	Fred Smith	P105	Jill Baker	9/12/2022	12:00	M15
S1024	Heidi Pierce	P108	Andy McKee	9/12/2022	10:00	Q10
S1024	Heidi Pierce	P108	Andy McKee	9/14/2022	14:00	Q10
S1032	Richard Levin	P105	Jill Baker	9/14/2022	16:30	M15
S1032	Richard Levin	P110	Jimmy Winter	9/15/2022	18:00	B13

a. State any assumptions you make about the data and the attributes shown in this table.

1. Patients can only meet with one therapist at a time.
2. Each appointment can only have one location, date, time, patient and therapist.
3. Therapists and patients can only have one numberID.

b. Describe and illustrate the process of normalizing the table to 3NF relations.
The table is not on 1NF as there is an attribute (appointment) with multiple values (date & time). To be in 1NF all attributes need to have a single value.

staffNo
therapistName
patNo
patName
appointment
branchNo

To convert the table to 1NF, we need to separate the appointment column into appointmentDate and appointmentTime

1NF:
staffNo
therapistName
patNo
patName
appointmentDate

appointmentTime
branchNo

Now the table is in 1NF but there are partial dependencies (therapistName only being dependent on staffNo and patName being only dependent on patNo)

To convert this table to 2NF:

patient
patNo
patName

therapist
staffNo
therapistName

appointment
patNo
staffNo
appointmentDate
appointmentTime
branchNo

These tables are in 3NF as there are no transitive dependencies

c. Identify the primary keys at each step of the normalization process and both the primary and foreign keys in your 3NF relations.

d. Ensure that the 3NF relations are named.

2. The Maid Better temp agency supplies help to Event Management companies within the New York area . Below is the data that the company uses to track employee hours against different contracts. The Employee Number (eNo) is unique for each member of staff. Each contract only applies to one event. There may be different contracts for an event depending upon different service needs.

eNo	contractNo	hours	eName	eventNo	eventLoc
1135	C1024	16	Smith J	H25	Queens
1057	C1024	24	Hocine D	H25	Queens
1068	C1025	28	White T	H4	Yonkers
1135	C1025	15	Smith J	H4	Yonkers
1135	C1026	10	Smith J	H25	Queens

a. State any assumptions you make about the data and the attributes shown in this table.
   1. Employees can only work at one event at the time.
   2. Each event can only have one location.

b. Describe and illustrate the process of normalizing the table to 3NF relations.
   The table initially is on 1NF, as there are no repeating groups.

   1NF table:
   eNo
   contractNo
   hours
   eName
   eventNo
   eventLoc

   To convert the table to 2NF, we must remove the partial dependencies that exist and make a single PK per table:

   - eName (only dependent on eNo)
   - eventNo (only dependent on contractNo)
   - eventLoc(dependent on eventNo, not even to the PK)

   2NF:

   employee

   eNo

   eName

event

eventNo

eventLoc

contract_event

contractNo

eventNo

contract_employee

contractNo

eNo

hours

The tables above in 2NF are also in 3NF as there are no transitive dependencies.

c. Identify the primary keys at each step of the normalization process and both the primary and foreign keys in your 3NF relations.

d. Ensure that the 3NF relations are named.

Grading Rubric

See Brightspace for Grading Rubric