

Homework 02 : Normalization

CS 355 Database Systems
Habib University
Fall 2023

1 Instructions

- The deadline for submitting this Homework is 5th October 2023, 11:59 PM.
- This homework must be submitted online via CANVAS.
- You are required to submit a **single pdf** which contains images of both scenarios.
- This homework will be done in pairs. Please ensure that both the members have joined the same team on Canvas. **If your team does not correspond with your group name on Canvas, then your submission will not be graded.**
- The pdf file should be named HW_02_team_XX.pdf where XX will be replaced with your respective team number on Canvas.
- *Files that don't follow the appropriate naming convention will not be graded.*

1.1 Marking scheme

This Homework will be marked out of 100.

- 40 Marks are for Scenario 1
- 60 Marks are for Scenario 2

1.2 Submission Guidelines

- Models can be developed in DB Designer or any Database Diagram tool that can generate a schema.

- **No handwritten submissions will be accepted**
- If you make any assumptions regarding the scenario, clearly state them in your pdf document. **Your assumptions should not contradict the actual scenario.**

1.3 Late submission policy

Refer to the course syllabus for the late submission policy.

1.4 Use of AI

Taking help from any AI-based tools such as ChatGPT is strictly prohibited and will be considered plagiarism.

1.5 Viva

Course staff may call any student for Viva to provide explanation for their submission.

2 Objective

This assignment enables students to analyze real-world business scenarios, identify data to be stored and build a normalized relational model. The assignment also assess their understanding of different stages of normalization.

3 Exercise

In Q1, you have to convert the given table into 3NF using normalization while also showing any intermediate steps. You also have to create its ERD in 3NF. In Q2, you have to create an ERD in 3NF for the given business domain. The following information should be included in each data model diagram:

- Entities
- Attributes
- Primary & Foreign keys
- Relationships & Cardinalities(You can add a note which specifies the cardinality of each relationship)

Models can be developed in DB Designer or any Database Diagram tool which can generate a schema.**No hand written submissions will be accepted.**If you take any assumption regarding the scenario, clearly state them in your pdf document. **Your assumptions should not contradict the actual scenario.**

Question 01 - Online Book Store

Imagine designing a database for an online bookstore to store information about available books. Each book can have one or more authors, belongs to a specific genre, and is available in various formats (e.g., hardcover, paperback, eBook). Each format may have a different price for each book, and each book is published by a city-based publisher.

Title	Authors	Genre	Format (Price)	Year	ISBN	Publisher	Publisher City
Umrao Jaan Ada	Mirza Hadi Ruswa	Fiction	Hardcover (15.99) Paperback (12.99) eBook (9.99)	1899	978-0-316-76948-4	Urdu Bazar Press	Lahore
Pinjar	Amrita Pritam	Fiction	Hardcover (12.99) Paperback (10.99)	1950	978-0-06-112008-4	Punjabi Book Depot	Amritsar
Bazm-e-Anees	Mir Anis	Poetry	Hardcover (14.95) eBook (11.99)	1921	978-0-7432-7356-5	Maktaba-e-Anis	Lucknow
Hajj: Journey of a Lifetime	Ibn Battuta	Travel	Paperback (9.99) eBook (6.99)	1411	978-0-452-28423-4	Darussalam Publishers	Riyadh
Kulliyat-e-Iqbal	Allama Iqbal	Poetry	Hardcover (10.49) Paperback (7.49) eBook (5.99)	1931	978-0-261-10225-7	Iqbal Academy Pakistan	Lahore
Devdas	Sharatchandra Chattopadhyay	Fiction	Hardcover (11.25) eBook (8.99)	1917	978-0-307-27584-4	Ananda Publishers	Kolkata
Parineeta	Sarat Chandra Chattopadhyay	Fiction	Hardcover (13.75) Paperback (10.99) eBook (7.99)	1914	978-0-385-12167-5	Rupa Publications	Kolkata
Heer Waris Shah	Waris Shah	Poetry	Hardcover (8.99) eBook (6.99)	1831	978-0-14-026886-7	Maktaba-e-Kashmir	Lahore
Toba Tek Singh	Saadat Hasan Manto, Ismat Chughtai	Fiction	Paperback (6.49) eBook (4.99)	1955	978-1-59308-016-3	Ferozsons Publishers	Lahore
Train to Pakistan	Khushwant Singh	Fiction	Hardcover (11.99) Paperback (9.99) eBook (7.99)	1956	978-0-143-31429-9	Ferozsons Publishers	Lahore
Devdas	Sarat Chandra Chattopadhyay	Fiction	Hardcover (14.99) eBook (11.99)	1917	978-1-2 34-56789-0	Urdu Bazar Press	Lahore

Question 02 - Burger o' Clock

You are required to make a database model for the online ordering of Burger o' clock. The particulars of the system are as follows:

- Customers can order from a variety of categories, such as new arrivals, wings, fries, and so on. Each food item has its own category.

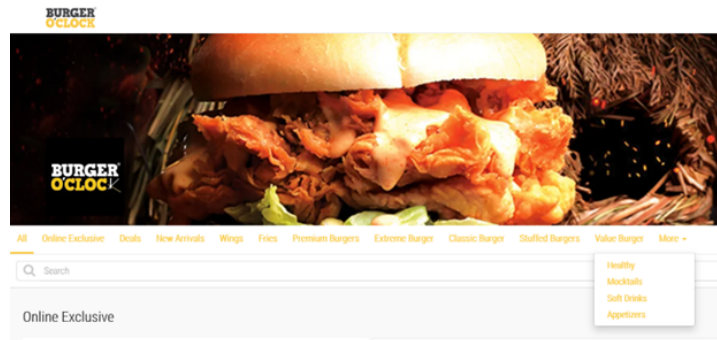


Figure 1: Customers can choose multiple categories

- There is a description for each food item. Furthermore, when a customer places an order, they can specify the quantity as well as any special instructions. Moreover, each item may include customizability like deals. These are considered add-ons and may or may not have a price.

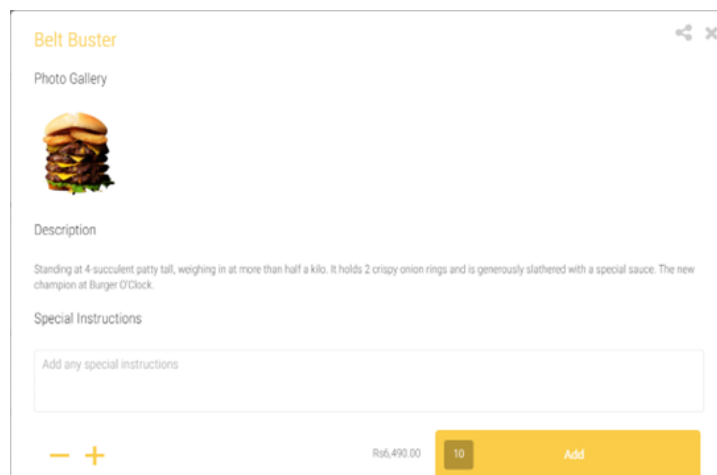


Figure 2: Item Description

- Deals, for example, provide the customer certain options, such as selecting a drink and a burger from a variety of options.

Classic Burger (Choose one)

☐ Beef Cheese

☐ Beef Vegi

☐ Chick'n'Crisp

☒ Grilled Chicken

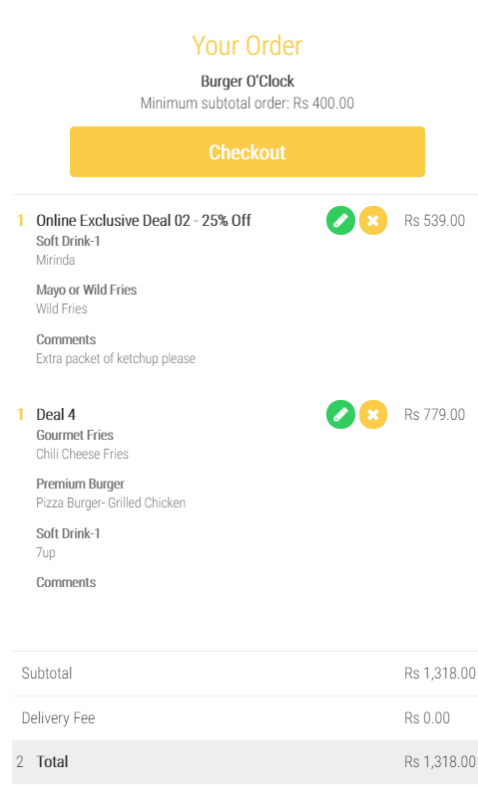
Soft Drink-1 (Choose one)

☐ Pepsi

☒ 7up

Figure 3: Deals

- Once a customer is ready to check out, they can view the details of all the items in their shopping cart and then move to the checkout page.



Your Order
Burger O'Clock
Minimum subtotal order: Rs 400.00

Checkout





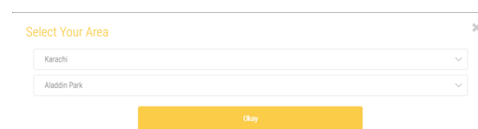
1	Online Exclusive Deal 02 - 25% Off	 	Rs 539.00
	Soft Drink-1 Mirinda		
	Mayo or Wild Fries Wild Fries		
	Comments Extra packet of ketchup please		
1	Deal 4	 	Rs 779.00
	Gourmet Fries Chili Cheese Fries		
	Premium Burger Pizza Burger- Grilled Chicken		
	Soft Drink-1 7up		
	Comments		
Subtotal			Rs 1,318.00
Delivery Fee			Rs 0.00
2	Total		Rs 1,318.00

Figure 4: Shopping Cart

- Customers must also choose the delivery area. There are some areas where delivery is not possible.



Select Your Area

Karachi

Aladdin Park

Okay

Figure 5: Delivery Area

- When the customer proceeds to the checkout page, they will be required to provide their information (Name, Email Address, Phone Number, Address to Deliver, Special Instructions). A customer may also create an account, log in, and save this information in their account to avoid having to enter it again with different orders. They can also use a discount coupon. In addition to, coupons have a set discount percentage and an expiration date.

The image shows a checkout form with the following sections:

- User details:** A vertical stack of input fields for Name, Email, Mobile Phone, Full Address, and Any Special Instructions, for example: "Don't ring the bell". Below these is a field for a Discount coupon with an orange Apply button.
- Delivery time:** A section with the label "Delivery time" and the selected option "ASAP".
- Payment method:** A section with the label "Payment method" and a radio button selected for "Cash".

Figure 6: Checkout

You make the following assumptions when make a ERD for this scenario

- Coupons are merely percentage discounts.
- Customers may only have soft drinks in the deal and cannot upgrade to mock-tails for a little extra.
- Deals are special types of items.

4 Rubric

1NF is correct	15%
2NF is correct	30%
3NF is correct	35%
Functional dependencies and transitive dependencies correctly identified	20%

Table 1: Rubric for Question 01

Entities correctly identified	20%
All Attributes mentioned	15%
Relationships drawn and resolved correctly	20%
Correct Cardinalities	10%
PK, FK identified and FK is placed in appropriate Entity table	10%
ERD is 3ND	25%

Table 2: Rubric for Question 02