

# Final Project

- Normalization report -

PROG2111

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## Phase 3: Normalization

### Original Data (Unnormalized Form)

OrderID	CustomerInfo	BookInfo	PublishInfo	OrderDate	TotalPrice
1001	D Beckham, C001, david@gmail.com,	FreeKickMaster: B001: 2 : ISBN 978-1-4028-9462-6 : Sports	FIFABook: P001, MyLifeBook: P002	11/30/2025	54.97
	7 ManU st, Madrid, ON, M7U R7D, 777-777-2323	Last Dance: B004: 1 : ISBN 978-0-545-01022-1 : Autobiography			
1002	C Ronaldo, C002, CR7@gmail.com,	How To Be Winner: B002: 1 : ISBN 978-1-59327-584-6 : Autobiography	MyLifeBook: P002	11/29/2025	29.99
	7 Real st, Porto, ON, R7D P7G, 777-777-7777				
1003	D Beckham, C001, david@gmail.com, 7 ManU st, Madrid, ON, M7U R7D, 777-777-2323	Become a Rich: B005: 1 : ISBN 978-0-306-40615-7 : Investment	FIFABook: P001	11/28/2025	34.99
1004	L Messi, C003, Goat@gmail.com, 9 Nukamp, Barcia, ON, B9N A9H, 999-999-9999	G.O.A.T!: B003: 1 : ISBN 978-1-250-03095-7 : Autobiography	AnimalBook: P003	11/27/2025	54.48
		Last Dance: B004: 2 : ISBN 978-1-118-02212-8 : Autobiography	MyLifeBook: P002		

### Issues and Redundancy

- **Multiple Values in One Cell:** The CustomerInfo column has name, ID, email, and address all together. We cannot search for just a name or email.
- **Repeating Groups:** The BookInfo column has multiple books separated by commas. It is hard to know how many books were sold.
- **Redundancy:** The same customer information (D Beckham) is repeated in rows 1001 and 1003.

**First Normal Form(1NF)****Do:**

- **Split Information:** We separated CustomerInfo into CustomerID, CustomerName, Email, Address, and Phone. We did the same for BookInfo
- **Removed Repeating Groups:** For Order 1001 (which has 2 books), we created two separate rows. Now, each row has only one book.

-Order

Order ID	Customer ID	Customer Name	Customer Email	CustomerAddress	Customer Phone	OrderDate	Book ID	BookTitle	BookISBN	Category	Qty	UnitPrice	Publisher ID	Publisher Name	Total Price
1001	C001	D Beckham	david@gmail.com	7 ManU st, Madrid, ON, M7U R7D	777-777-2323	11/30/2025	B001	FreeKickMaster	978-1-4028-9462-6	Sports	2	20	P001	FIFABook	54.97
1001	C001	D Beckham	david@gmail.com	7 ManU st, Madrid, ON, M7U R7D	777-777-2323	11/30/2025	B004	Last Dance	978-0-545-01022-1	Autobiography	1	14.97	P002	MyLifeBook	54.97
1002	C002	C Ronaldo	CR7@gmail.com	7 Real st, Porto, ON, R7D P7G	777-777-7777	11/29/2025	B002	How To Be Winner	978-1-59327-584-6	Autobiography	1	29.99	P002	MyLifeBook	29.99
1003	C001	D Beckham	david@gmail.com	7 ManU st, Madrid, ON, M7U R7D	777-777-2323	11/28/2025	B005	Become a Rich	978-0-306-40615-7	Investment	1	34.99	P001	FIFABook	34.99
1004	C003	L Messi	Goat@gmail.com	9 Nukamp, Barcia, ON, B9N A9H	999-999-9999	11/27/2025	B003	G.O.A.T!	978-1-250-03095-7	Autobiography	1	24.5	P003	AnimalBook	54.48
1004	C003	L Messi	Goat@gmail.com	9 Nukamp, Barcia, ON, B9N A9H	999-999-9999	11/27/2025	B004	Last Dance	978-1-118-02212-8	Autobiography	2	14.99	P002	MyLifeBook	54.48

## Second Normal Form(2NF)

**Problem:** The Primary Key is (OrderID, BookID).

- CustomerName depends only on OrderID. It has nothing to do with BookID. This is a partial dependency.
- BookTitle depends only on BookID. It has nothing to do with OrderID.

**Solution:** We split the table into three parts:

- Orders Table: Keeps information about the order (Customer, Date) → depends on OrderID.
- Books Table: Keeps information about the book (Title, Category, Publisher) → depends on BookID.
- OrderDetails Table: Keeps Qty because quantity depends on both Order and Book.

- Orders

OrderID	Customer ID	Customer Name	Customer Email	CustomerAddress	Customer Phone	OrderDate	Total Price
1001	C001	D Beckham	<a href="mailto:david@gmail.com">david@gmail.com</a>	7 ManU st, Madrid, ON, M7U R7D	777-777-2323	11/30/2025	54.97
1002	C002	C Ronaldo	<a href="mailto:CR7@gmail.com">CR7@gmail.com</a>	7 Real st, Porto, ON, R7D P7G	777-777-7777	11/29/2025	29.99
1003	C001	D Beckham	<a href="mailto:david@gmail.com">david@gmail.com</a>	7 ManU st, Madrid, ON, M7U R7D	777-777-2323	11/28/2025	34.99
1004	C003	L Messi	<a href="mailto:Goat@gmail.com">Goat@gmail.com</a>	9 Nukamp, Barcia, ON, B9N A9H	999-999-9999	11/27/2025	54.48

- Books

BookID	BookTitle	BookISBN	UnitPrice	Category	PublisherID	PublisherName
B001	FreeKickMaster	978-1-4028-9462-6	20	Sports	P001	FIFABook
B002	How To Be Winner	978-1-59327-584-6	29.99	Autobiography	P002	MyLifeBook
B003	G.O.A.T!	978-1-250-03095-7	24.5	Autobiography	P003	AnimalBook
B004	Last Dance	978-0-545-01022-1	14.97	Autobiography	P002	MyLifeBook
B005	Become a Rich	978-0-306-40615-7	34.99	Investment	P001	FIFABook

## - OrderDetails

OrderID	BookID	Qty
1001	B001	2
1001	B004	1
1002	B002	1
1003	B005	1
1004	B003	1
1004	B004	2

**Third Normal Form(3NF)****Problem:**

- In the Orders table, CustomerName depends on CustomerID, not OrderID. (OrderID → CustomerID → CustomerName). This is a transitive dependency.
- In the Books table, PublisherName depends on PublisherID, and Category (name) is repeated text.

**Solution:** We moved these dependent columns to their own tables.

- Created a Customer Table. Now Orders only keeps CustomerID.
- Created a Publisher Table. Now Books only keeps PublisherID.
- Created a Category Table. Now Books only keeps CategoryID.

## - Customer

CustomerID (PK)	CustomerName	CustomerEmail	CustomerAddress	CustomerPhone
C001	D Beckham	<a href="mailto:david@gmail.com">david@gmail.com</a>	7 ManU st, Madrid, ON, M7U R7D	777-777-2323
C002	C Ronaldo	<a href="mailto:CR7@gmail.com">CR7@gmail.com</a>	7 Real st, Porto, ON, R7D P7G	777-777-7777
C003	L Messi	<a href="mailto:Goat@gmail.com">Goat@gmail.com</a>	9 Nukamp, Barcia, ON, B9N A9H	999-999-9999

- Book

<b>BookID (PK)</b>	<b>BookTitle</b>	<b>BookISBN</b>	<b>BookPrice</b>	<b>BookStock</b>	<b>PublisherID (FK)</b>	<b>CategoryID (FK)</b>
B001	FreeKickMaster	978-1-4028-9462-6	20	15	P001	CAT001
B002	How To Be Winner	978-1-59327-584-6	29.99	8	P002	CAT002
B003	G.O.A.T!	978-1-250-03095-7	24.5	12	P003	CAT002
B004	Last Dance	978-0-545-01022-1	14.97	20	P002	CAT002
B005	Become a Rich	978-0-306-40615-7	34.99	10	P001	CAT003

- Order

<b>OrderID (PK)</b>	<b>OrderDate</b>	<b>TotalAmount</b>	<b>CustomerID (FK)</b>
1001	11/30/2025	54.97	C001
1002	11/29/2025	29.99	C002
1003	11/28/2025	34.99	C001
1004	11/27/2025	54.48	C003

- OrderDetail

<b>OrderDetailID (PK)</b>	<b>OrderID (FK)</b>	<b>BookID (FK)</b>	<b>Qty</b>	<b>UnitPrice</b>
1	1001	B001	2	20
2	1001	B004	1	14.97
3	1002	B002	1	29.99
4	1003	B005	1	34.99
5	1004	B003	1	24.5
6	1004	B004	2	14.99

- Publisher

<b>PublisherID (PK)</b>	<b>PublisherName</b>
P001	FIFABook
P002	MyLifeBook
P003	AnimalBook

- Category

<b>CategoryID (PK)</b>	<b>CategoryName</b>
CAT001	Sports
CAT002	Autobiography
CAT003	Investment



## Phase 4: DDL statement

