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Database Systems

Database System Design and Development for MentalPoIr eBooks Store

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Table of Contents

Introduction **4**

Part 1 : Database Design Toward Conceptual and Logical Models **4**

Task 1.A : System Requirements 4

Task 1.A.1 : Gantt Chart 4

Task 1.A.2 : Use-Case Diagram 5

Task 1.B: Database Design 7

Task 1.B.1 : Normalization 7

Task 1.B.1.1 : ONF 7

Task 1.B.1.2: 1NF 8

Task 1.B.1.3 : 2NF 8

Task 1.B.1.4: 3NF 9

Task 1.B.2 :ER Diagram 13

Task 1.B.3 : Data Dictionary 15

Part 2 : Database Implementation **22**

Task 2.A.1 : Physical implementation of database 23

Task 2.A.2 : Data Manipulation 30

Task 2.B : SQL Queries 30

Task 2.C : Reflection 38

References **39**

Appendices **40**

Appendix A. Presentation Slides and/or Video Ib Link – URL 40

Appendix B. Agreement of Participation 40

Appendix C. Meeting Minutes ..... **Error! Bookmark not defined.**

List of Figures

Figure 1 : Use case diagram for eBook store 6
Figure 2 : ER Diagram for eBook store 15

List of Tables

Table 1 : Level 0NF 7
Table 2 : Level 0NF (Cont.) 7
Table 3 : Level 1NF 8
Table 4: Level 1NF (Cont.) 8
Table 5 : Level 2NF Orders table 8
Table 6 : Level 2NF Book table 8
Table 7 : Level 2NF Customer table 9
Table 8 : Level 2NF Item table 9
Table 9 : Level 3NF Order type table 9
Table 10 : Level 3NF Customer table 10
Table 11 : Level 3NF Orders table 10
Table 12 : Level 3NF Item table 10
Table 13 : Level 3NF Payment table 10
Table 14 : Level 3NF Branch table 11
Table 15 : Level 3NF Publisher table 11
Table 16 : Level 3NF Genre table 11
Table 17 : Level 3NF Book table 11
Table 18 : Level 3NF Branch_Book table 12
Table 19 : Level 3NF Author table 12
Table 20 : Level 3NF Book_Author table 12
Table 21 : Level 3NF Book_Borrow table 13
Table 22 : Level 3NF Book_Reserve table 13
Table 23 : Level 3NF Book_Review table 13
Table 24: Data Dictionary of Order_Type Table 16
Table 25: Data Dictionary of Customer Table 16
Table 26: Data Dictionary of Orders Table 17
Table 27: Data Dictionary of Item Table 17
Table 28: Data Dictionary of Payment Table 18
Table 29: Data Dictionary of Branch Table 18
Table 30: Data Dictionary of Publisher Table 18
Table 31: Data Dictionary of Genre Table 19
Table 32: Data Dictionary of Book Table 19
Table 33: Data Dictionary of Branch_Book Table 19
Table 34: Data Dictionary of Author Table 20
Table 35: Data Dictionary of Book_Author Table 20
Table 36: Data Dictionary of Book_Borrow Table 21
Table 37: Data Dictionary of Book_Reserve Table 21
Table 38: Data Dictionary of Book_Review Table 22

Introduction

This project aims to replace MentalPoIr's outdated file system with a new, efficient relational database system for their eBooks Store. The design phase will involve creating an ERD and Use Case diagram to understand system requirements. The implementation phase will involve translating these diagrams into SQL code. The goal is to create a modern, user-friendly management system that meets MentalPoIr's unique needs and supports their business goals. (Atlassian, 2022)

Part 1: Database Design Toward Conceptual and Logical Models

Task 1.A: System Requirements

MentalPoIr eBook store is the name of our case study. With its headquarters in London, MentalPoIr is an eBook and bookstore that was launched in 2005. (HO). Books are sold and rented by MentalPoIr to a variety of customers. Has locations in the UK's three largest cities: Glasgow, Manchester, and Birmingham (GB). The company's management have now made the decision to modernise its internet presence to boost profit and brand recognition on a worldwide scale.

Information on books, authors, publishers, clients, orders, payments, and branch information must be kept up to date. Each location of MentalPoIr has thousands of copies of books in over 20 categories. A book may fall into more than one category and be in more than one subject, but it may also be written by several different authors. Customers are permitted to purchase or borrow any number of books in a single transaction, depending on the book price and any exclusive offers. Only one account may purchase one or more books from the sale, and only one payment card may be used to pay for those books.

Task 1.A.1: Gantt Chart

The Gannt chart consist of 3 parts, the first part I will be creating Gannt chart for the whole project, Use case diagram, Normalization and ERD (Entity Relationship Diagram) Diagram of the data. In Part 2 I should Develop SQL queries and explain all the queries mentioned in the question and then I should draft the report reflection. In the final part I should document the report then create overall layout and then at final I should do the oral presentation. (Atlassian, 2022)

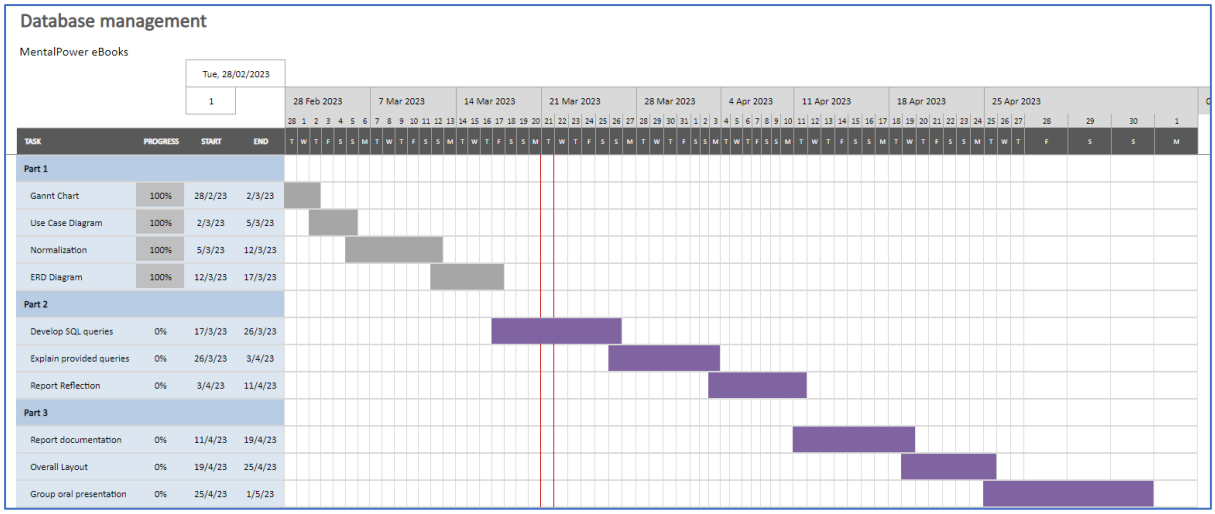

Figure 1 : Gantt Chart

Task 1.A.2: Use-Case Diagram

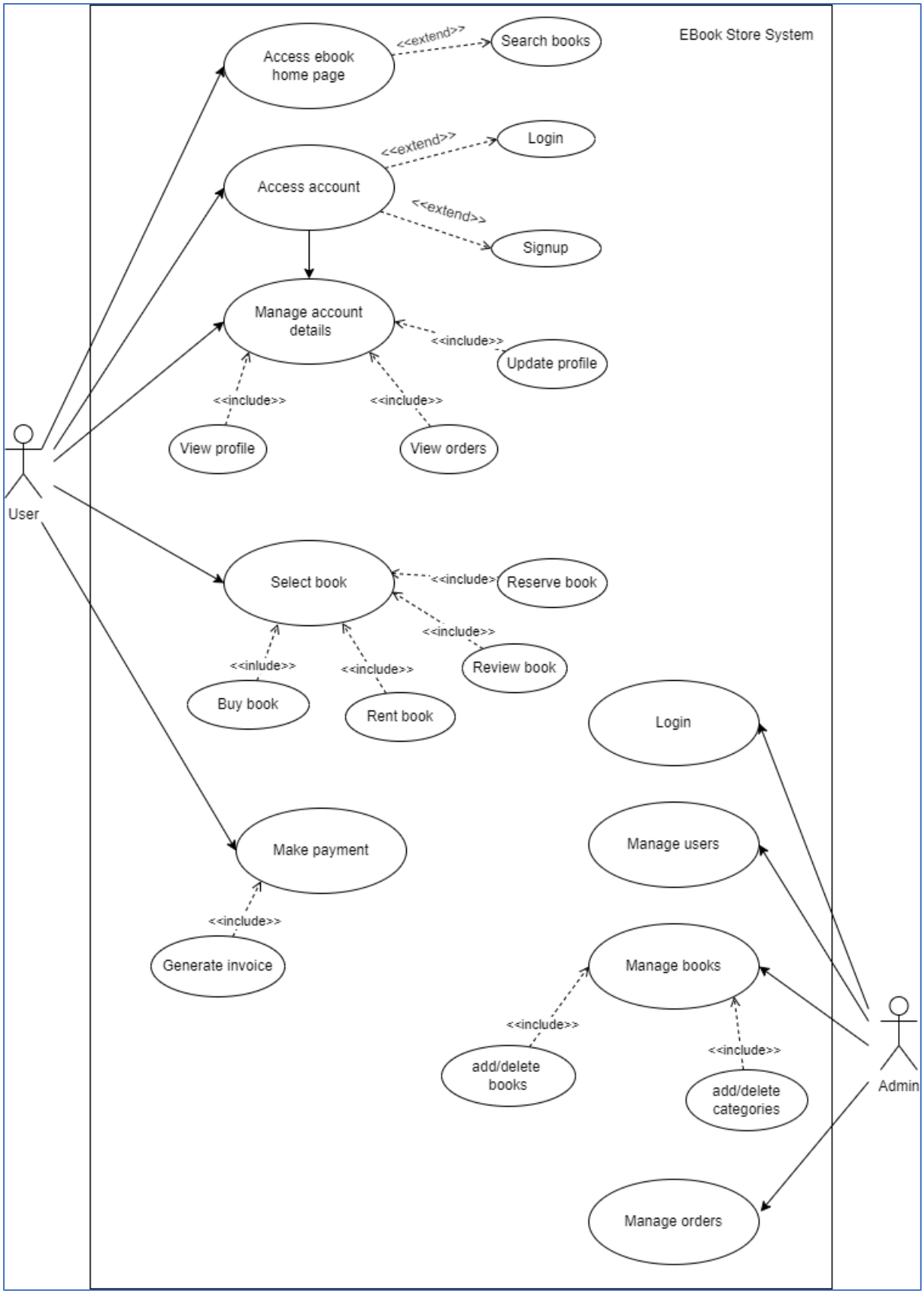

Figure 2 : Use case diagram for eBook store

In the above figure, it depicts an eBook store system's functionalities and requirements. It can be explained as: The system has two actor, User and Admin. The User access eBook home page and searches for books. If the User is new, they need to signup otherwise login to access the account. When the User is logged in, they can view or update the profile, view orders etc. A user can buy, rent, reserve or review a book. Also, they will get an invoice for any payments made. The admin, when logged in can manage users. They can add/delete books and categories, and manager orders etc. (Lee, 2022)

Task 1.B: Database Design

Task 1.B.1: Normalization

To eliminate data redundancy and increase data integrity, a relational database is structured according to several so-called normal forms. This process is known as database normalisation or database normalisation. Here in eBook system, I are performing 1N,2NF and 3NF onto the 0NF to structure the database. (w3schools, 2021)

Task 1.B.1.1: ONF

In 0NF the data is yet to be normalized. Here the customer, book and order data are not normalized. There is repetition among the data. And there is no unique column to identify a record. Below two images are the continuation of a single 0NF table. (Thomas M.Connolly & Carolyn E.Begg, 2023)

Order Date	Total Amount	Method of Payment	Delivery Status	Book Serial No	Book Title	Author	Publisher	Genre	Book Price	Copies in Stock
12/01/2022	£13	Card	Delivered	231-6-56-7896-4	Critical Thinking	Tom Chatfield	SAGE Publications	Education	*£13*	*56*
06/06/2022	£23.26	Card	Delivered	741-6-56-7896-7	Idea of a Univerity	John Henry Cardinal	University of Notr	History	£23.26	26
08/09/2022	£42.29	Card	Delivered	564-9-56-7896-6	Organization and Administration in Higher Education	Kristina 'KP' Powers	SAGE Publications	History	£42.29	*46*
03/06/2022	£26	Cash	Delivered	231-6-56-7896-4	Critical Thinking	Tom Chatfield	SAGE Publications	Education	*£13*	*54*
02/02/2022	£5	Card	Borrowed	231-6-56-7896-4	Critical Thinking	Tom Chatfield	SAGE Publications	Education	*£13*	*54*

Table 1 : Level 0NF

Branch	Customer Na	Customer Address	Customer Email	Customer Phone	Purchased Quantity	Borrow/Sale	Borrow start date	Borrow End Rate	Borrow Status	Fine
London	John	30 Lathom Road, Lo	john@gmail.com	1245789878	1	Sale				
London	John	30 Lathom Road, Lo	john@gmail.com	1245789878	1	Sale				
Manchester	Charlotte	89 chester Road, Ma	charlotte@gmail.co	5678968621	1	Sale				
London	Smith	120 Tilbury, London	smith@gmail.com	3654128975	2	Sale				
London	Smith	121 Tilbury, London	smith@gmail.com	3654128975		Borrow	02/02/2022	02/03/2022	Returned	0

Table 2 : Level 0NF (Cont.)

Task 1.B.1.2: 1NF

According to 1NF every row should have a unique id to identify the record. Here in eBook system, Order_Id is added as a unique column.(Thomas M.Connolly & Carolyn E.Begg, 2023)

Order_Id	Order Date	Total Amount	Method of Payment	Delivery Status	Book Serial No	Book Title	Author	Publisher	Genre	Book Price	Copies in Stock
OD_001	12/01/2022	£13	Card	Delivered	231-6-56-7896-4	Critical Thinking	Tom Chatfield	SAGE Publications	Education	*£13*	*56*
OD_002	06/06/2022	£23.26	Card	Delivered	741-6-56-7896-7	Idea of a Univerity	John Henry Cardinal Newman; Martin J. S	University of Notre Dame Pre	History	£23.26	26
OD_003	08/09/2022	£42.29	Card	Delivered	564-9-56-7896-6	Organization and Administ	Kristina 'KP' Powers (ed.); Patrick J. Schlo	SAGE Publications	History	£42.29	*46*
OD_004	03/06/2022	£26	Cash	Delivered	231-6-56-7896-4	Critical Thinking	Tom Chatfield	SAGE Publications	Education	*£13*	*54*
OD_005	02/02/2022	£5	Card	Borrowed	231-6-56-7896-4	Critical Thinking	Tom Chatfield	SAGE Publications	Education	*£13*	*54*

Table 3 : Level 1NF

Branch	Customer Name	Customer Address	Customer Email	Customer Phone	Purchased Quantity	Borrow/Sale	Borrow start date	Borrow End Da	Borrow Status	Fine
London	John	30 Lathom Road, Londc	john@gmail.com	1245789878	1	Sale				
London	John	30 Lathom Road, Londc	john@gmail.com	1245789878	1	Sale				
Manchester	Charlotte	89 chester Road, Manc	charlotte@gmail.	5678968621	1	Sale				
London	Smith	120 Tilbury, London	smith@gmail.con	3654128975	2	Sale				
London	Smith	121 Tilbury, London	smith@gmail.con	3654128975		Borrow	02/02/2022	02/03/2022	Returned	0

Table 4: Level 1NF (Cont.)

Task 1.B.1.3: 2NF

Rules for 2NF is 1NF is folloId and every attribute in an entity should be dependent only on primary key. Here 1NF table is breakdown into four tables such as Order, Book, Customer, and Item.

Order_Id	Order Date	Total Amount	Method of Payment	Delivery Status	Customer_Id
OD_001	12/01/2022	£13	Card	Delivered	1
OD_002	06/06/2022	£23.26	Card	Delivered	1
OD_003	08/09/2022	£42.29	Card	Delivered	2
OD_004	03/06/2022	£26	Cash	Delivered	3
OD_005	02/02/2022	£5	Card	Borrowed	3

Table 5 : Level 2NF Orders table

The order table in 2NF shown above contains details related to the orders placed by the customers. It has attributes such as order date, amount, status etc. It has Order_ID as primary key.

Book_Id	Book Serial No	Book Title	Author	Publisher	Genre	Book Price	In stock	Branch_Id
BK_001	231-6-56-7896	Critical Thinking	Tom Chatfield	SAGE Publications	Education	*£13*	*54*	1
BK_002	741-6-56-7896	Idea of a Univeri	John Henry Cardinal	University of Notre	History	£23.26	*26*	1
BK_003	564-9-56-7896	Organization and	Kristina 'KP' Powers (	SAGE Publications	History	£42.29	*46*	2

Table 6 : Level 2NF Book table

In book table in 2NF shown above stores data related to the available books in store. It has attributes like book serial number, title, author, publisher, genre etc... Book_Id acts as the primary key in this table.

Customer_Id	Customer Nam	Customer Addres	Customer Email	Customer Phone
1	John	30 Lathom Road,	john@gmail.com	1245789878
2	Charlotte	89 chester Road,	charlotte@gmail.cor	5678968621
3	Smith	120 Tilbury, Lond	smith@gmail.com	3654128975

Table 7 : Level 2NF Customer table

In customer table in 2NF as shown above stores information related to the customers such as customer name, address, email, phone. Here primary key is Customer_Id.

Item_Id	Order_Id	Purchased Quant	Price	Book_Id	Order Type	Borrow start date	Borrow End Date	Borrow Status	Fine
IT_001	OD_001	1	£13	BK_001	Sale				
IT_002	OD_002	1	£23.26	BK_002	Sale				
IT_003	OD_003	1	£42.29	BK_003	Sale				
IT_004	OD_004	2	£26	BK_001	Sale				
IT_005	OD_005	1	£5	BK_001	Borrow	02/02/2022	02/03/2022	Returned	0

Table 8 : Level 2NF Item table

The item table in 2NF shown above holds data related to the orders. A single order can have many items. Its attributes are order id, price, book id, order type etc.

Task 1.B.1.4: 3NF

If an entity is in the 2NF and none of its characteristics are transitively dependent on the entire primary key, it is said to be in the 3NF. So, after performing 3NF, 15 entities are made.

Order_Type_I	Order_Type
1	Buy
2	Borrow
3	Reserve

Table 9 : Level 3NF Order type table

The Order_Type entity store data related to the different order types. It has attributes like order type and order type id as primary key.

Customer_Id	Customer_Name	Customer_Address	Email	Phone
1	John	30 Lathom Road, London	john@gmail.com	1245789878
2	Charlotte	89 chester Road, Manchester	charlotte@gmail.com	5678968621
3	Smith	120 Tilbury, London	smith@gmail.com	3654128975
4	David	12 Colonial Road, Birmingham	david@gmail.com	5689893562
5	Mini	187 Minard Road, London	mini@gmail.com	4524198900
6	Sam	66 Torridon Road, Glasgow	sam@gmail.com	2345678901
7	Mickey	85 Brownhill Road, Glasgow	mickey@gmail.com	3456663434

Table 10 : Level 3NF Customer table

The Customer entity holds data related to customers. It has customer id as primary key. It contains attributes such as customer name, address, email, phone.

Order_Id	Order_Date	Status	Customer_Id	Order_Type_Id
OD_001	12/1/2022	Purchased	1	1
OD_002	6/6/2022	Purchased	1	1
OD_003	8/9/2022	Purchased	2	1
OD_004	3/6/2022	Purchased	3	1
OD_005	2/2/2022	Borrowed	3	2
OD_006	3/3/2023	Reserved	4	3

Table 11 : Level 3NF Orders table

The Order entity holds data related to the orders placed. It has attributes such as order date, status, customer, and order type. Primary key here is order id.

Item_Id	Order_Id	Quantity	Price	Book_Id
IT_001	OD_001	1	£13	BK_001
IT_002	OD_002	1	£23.26	BK_002
IT_003	OD_003	1	£42.29	BK_003
IT_004	OD_004	2	£26	BK_001
IT_005	OD_005	1	£5	BK_001

Table 12 : Level 3NF Item table

The Item entity contains data related to the orders. It has attributes such as order id, quantity, price, and book id. Item id is primary key.

Payment_Id	Payment_Date	Order_Id	Payment_Method	Amount
1	12/01/2022	OD_001	Card	£13
2	06/06/2022	OD_002	Card	£23.26
3	08/09/2022	OD_003	Card	£42.29
4	03/06/2022	OD_004	Cash	£26
5	02/02/2022	OD_005	Card	£5

Table 13 : Level 3NF Payment table

The payment entity contains data related to the payments done by the customers. It has attributes such as date, order id, payment method and amount. Payment id is primary key.

Branch_Id	City	Branch Address	Branch Manager
1	London	London NW, England	Agnes
2	Manchester	Manchester WA, England	Tom
3	Birmingham	Birmingham B1,England	Ria
4	Glasgow	Glasgow G1 ,England	Meenu

Table 14 : Level 3NF Branch table

The Branch entity stores data related to branches of the eBook stores. It has attributes such as city, branch address and branch manager. Branch id is primary key.

Publisher_Id	Publisher_Name
1	SAGE Publications
2	University of Notre Dame Press
3	WW Norton & Co
4	Pearson
5	TSO
6	Fourth Estate

Table 15 : Level 3NF Publisher table

The Publisher entity stores publisher details like publisher name. Publisher id is primary key.

Genre_Id	Genre_Name
1	Education
2	History
3	Science
4	Computer Science
5	Engineering
6	Information Technology

Table 16 : Level 3NF Genre table

The Genre entity stores diverse types of genres of book. Genre name is an attribute and primary key is Genre id.

Book_Id	Book_Serial_No	Book_Title	Publisher_Id	Genre_Id	Book_Price
BK_001	231-6-56-7896-4	Critical Thinking	1	1	*£13*
BK_002	741-6-56-7896-7	Idea of a Univerity	2	2	£23.26
BK_003	564-9-56-7896-6	Organization and Administratio	1	2	£42.29
BK_004	978-1-84-9768-6	When Brains Dream	3	3	£12.99
BK_005	912-9-66-5647-7	Digital Fundamentals	4	4	£77.99
BK_006	309-2-11-2908-4	Modern Operating Systems	4	5	£29.81

Table 17 : Level 3NF Book table

The Book entity stores book details and has attributes like book serial number, title, publisher id, genre id, price. Book id is primary key.

Branch_Book_Id	Book_Id	Branch_Id	In stock
1	BK_001	1	54
2	BK_002	1	26
3	BK_003	2	46
4	BK_004	1	27
5	BK_004	3	45

Table 18 : Level 3NF Branch_Book table

The Branch book entity is created to solve the many to many relations betIen the book and branch. Because a book may be in more than one branch and a branch can have more than one book. It contains attributes like book id, branch id and in stock. Branch book id is primary key.

Author_Id	Author_Name
1	Tom Chatfield
2	John Henry Cardinal Newman
3	Martin J. Svaglic
4	Kristina 'KP' Powers
5	Patrick J. Schloss
6	Antonio Zadra
7	Thomas L Floyd

Table 19 : Level 3NF Author table

The Author entity stores details of Authors of the books like name. Author id is primary key.

Book_Author_Id	Book_Id	Author_Id
1	BK_001	1
2	BK_002	2
3	BK_002	3
4	BK_003	4
5	BK_003	5

Table 20 : Level 3NF Book_Author table

The Book Author entity is made up to solve the many to many relations betIen the book and author. A book can have more than one Author also an Author can have more than one Book. It has attributes like book id and author id. Primary key is book author id.

Book_Borrow_Id	Order_Id	Borrow_start_date	Borrow_End_Date	Borrow_Status	Fine
1	OD_005	2/2/2022	2/3/2022	Returned	0
2	OD_017	1/3/2023	15/3/2023	Returned	0
3	OD_018	6/8/2022	5/9/2022	Returned	0
4	OD_019	12/4/2022	30/4/2022	Returned	0
5	OD_033	11/7/2022	10/8/2022	Returned	0
6	OD_034	14/06/2023	13/07/2023	Returned	0

Table 21 : Level 3NF Book_Borrow table

The Book Borrow entity store details of borrowing a book. It has attributes like order id, start date, end date, status and fine. Book Borrow id is primary key.

Book_Reserve_Id	Order_Id	Reserve_Date
1	OD_006	3/3/2023
2	OD_020	11/3/2023
3	OD_021	15/3/2023
4	OD_022	18/3/2023
5	OD_036	4/12/2022
6	OD_037	13/09/2023

Table 22 : Level 3NF Book_Reserve table

The Book Reserve entity stores details of reserving a book. It has attributes like order id and reserve date. The primary key is Book Reserve id.

Book_Review_Id	Book_Id	Customer_Id	Rating	Comments	Date
1	BK_001	1	3 star	Good	12/10/2022

Table 23 : Level 3NF Book_Review table

The Book Review entity holds details of reviews of all the books made by the customers. It has attributes like book id, customer id, rating, comments, and date.

Task 1.B.2: ER Diagram

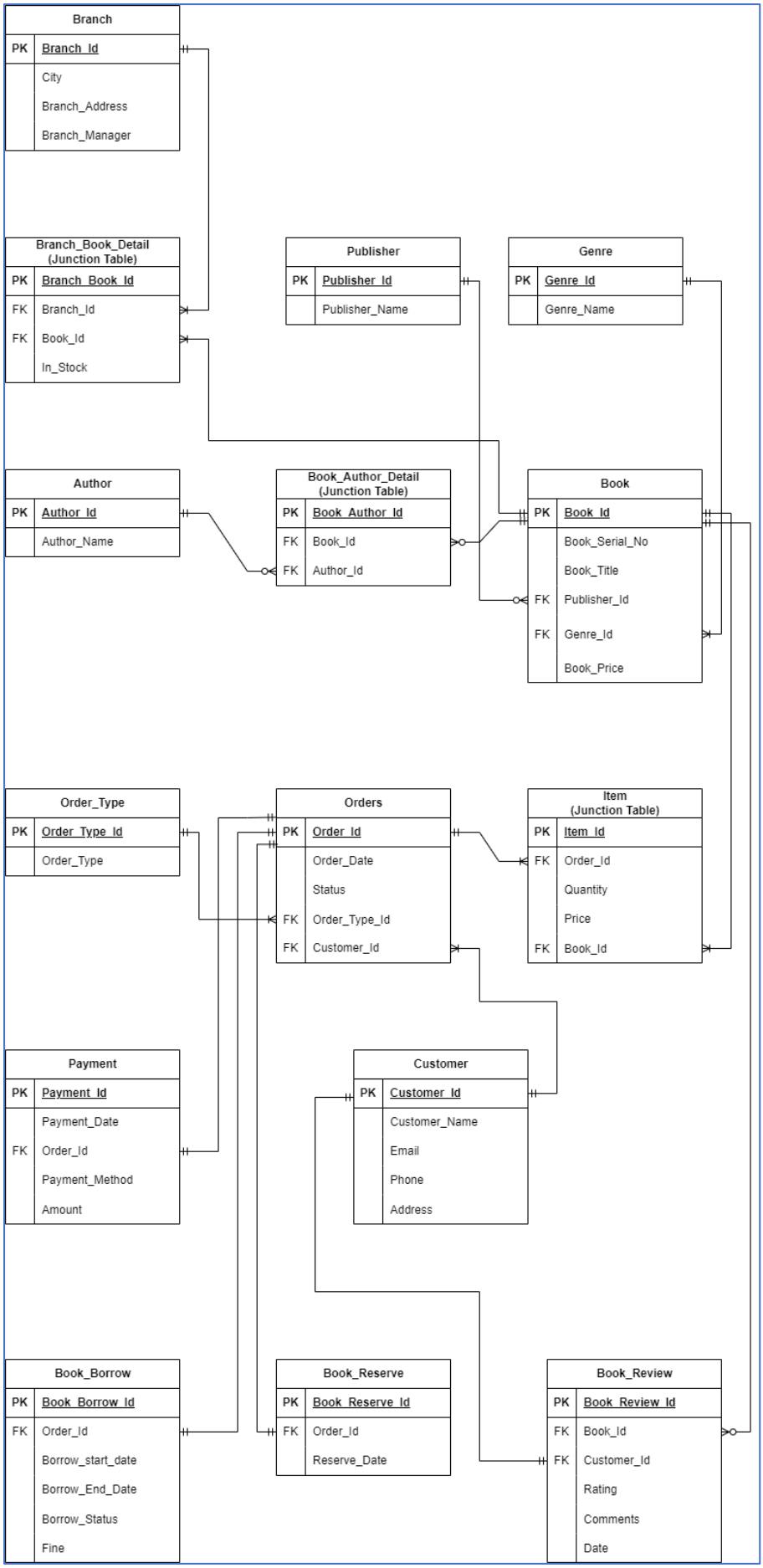

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Figure 3 : ER Diagram for eBook store

In the above figure, depicts an ER diagram for eBook store system. It shows different entities and their attributes needed in this system and how they are related to each other. Based on this design I must build the database for our system. An ER diagram will be helpful for a database engineer to identify the tables needed for the system and design it accordingly. In this ER diagram it contains 15 entities including junction tables. (Draw.io., 2022)

Below are the entities:

1. **Book:**
   This entity holds book details which contain attributes like book title, serial number, price etc.
2. **Author:**
   Author entity stores data regarding authors like name of author and information.
3. **Book_Author_Detail (Junction Table):**
   This entity is a junction table, which holds mapping of book and author.
4. **Publisher:**
   Publisher entity contains information of publishers of book.
5. **Genre:**
   Genre entity holds different type of genre of books.
6. **Branch:**
   The branch entity stores details of all branches of stores.
7. **Branch_Book_Detail (Junction Table):**
   This entity is a junction table which maps betIen the branch and book entities.
8. **Orders:**
   The Order entity stores details of all orders placed by the customers.
9. **Item (Junction Table):**
   This is also a junction table. An order can have more than one items.
10. **Order_Type:**
    The Order Type entity stores diverse types of orders.
11. **Customer:**
    The customer entity stores details of customers.
12. **Payment:**
    The Payment entity hold data related to the payment done by customers.
13. **Book_Borrow:**
    The Book Borrow entity holds data related to borrowing a book.
14. **Book_Reserve:**
    The Book Reserve entity holds data related to reserving a book.
15. **Book_Review:**
    The Book Review entity contains reviews made by the customers about books.

Task 1.B.3: Data Dictionary

A database's structure, content, and relationships are all described in a data dictionary. In general, it serves as a thorough reference manual for the data included in a database, outlining each data element's description, meaning, data type, permitted values, links to other data elements, and any other pertinent information. For database administrators, programmers, and users who need to work with the database, it is a crucial tool. (Tutorialspoint, 2023) (Foster, 2014)

Order Type

Order_Type			
Column	**Data Type**	**Property**	**Example**
Order_Type_Id	int	Identity, Primary key	1
Order_Type	varchar(20)		Borrow

Table 24: Data Dictionary of Order_Type Table

The Order_Type table (Table 24) contains attributes such as Order_Type_Id, Order_type and its data type are int and varchar, respectively.

Customer

Customer			
Column	**Data Type**	**Property**	**Example**
Customer_Id	int	Identity, Primary key	1
Customer_Name	varchar(50)		John
Cust_Address	nvarchar(100)		30 Lathom Road, London
Email	nvarchar(100)		john@gmail.com
Phone	nvarchar(50)		1245789878

Table 25: Data Dictionary of Customer Table

The Customer table (Table 25) contains attributes such as Customer_Id, Customer_Name, Cust_Address, Email, Phone, and their data types are int, varchar and nvarchar respectively.

Orders

Orders			
Column	**Data Type**	**Property**	**Example**
Order_Id	int	Identity, Primary key	1
Order_Date	date		12/1/2022
Status	varchar(20)		Delivered
Customer_Id	int	Foreign Key (Customer_Id) REFERNCES Customer(Customer_Id)	1
Order_Type_Id	int	Foreign Key (Order_Type_Id) REFERNCES Order_Type(Order_Type_Id)	1

Table 26: Data Dictionary of Orders Table

The Orders table (Table 26) has attributes such as Order_Id, Order_Date, Status, Customer_Id, Order_Type_Id and their data types are int, date, varchar, int, respectively.

Item

Item			
Column	**Data Type**	**Property**	**Example**
Item_Id	int	Identity, Primary key	1
Order_Id	int	Foreign Key (Order_Id) REFERNCES Order(Order_Id)	1
Quantity	int		2
Price	float		£23
Book_Id	int	Foreign Key (Book_Id) REFERNCES Book(Book_Id)	1

Table 27: Data Dictionary of Item Table

The item table (Table 27) has attributes such as Item_Id, Order_Id, Quantity, Price, Book_Id and data types are int, float, int, respectively.

Payment

Payment			
Column	**Data Type**	**Property**	**Example**
Payment_Id	int	Identity, Primary key	1
Payment_Date	date		12/1/2022
Order_Id	int	Foreign Key (Order_Id) REFERNCES Order(Order_Id)	1
Payment_Method	varchar(20)		Card
Amount	float		£23

Table 28: Data Dictionary of Payment Table

The Payment table (Table 28) contains attributes such as Payment_Id, Payment_Date, Order_Id, Payment_Method, Amount and its attributes are int, date, int, varchar, float, respectively.

Branch

Branch			
Column	**Data Type**	**Property**	**Example**
Branch_Id	int	Identity, Primary key	1
City	varchar(50)		London
Branch_Address	nvarchar(200)		London NW, England
Branch_Manager	varchar(100)		Agnes

Table 29: Data Dictionary of Branch Table

The Branch table (Table 29) contains attributes such as Branch_Id, City, Branch_Address, Branch_Manager and its data types are int, varchar, nvarchar, varchar, respectively.

Publisher

Publisher			
Column	**Data Type**	**Property**	**Example**
Publisher_Id	int	Identity, Primary key	1
Publisher_Name	varchar(100)		SAGE Publications

Table 30: Data Dictionary of Publisher Table

The Publisher table (Table 30) contains attributes such as Publisher_Id, Publisher_Name and its data types are int, varchar, nvarchar respectively.

Genre

Genre			
Column	**Data Type**	**Property**	**Example**
Genre_Id	int	Identity, Primary key	1
Genre_Name	nvarchar(100)		Education

Table 31: Data Dictionary of Genre Table

The Genre table (Table 31) contains attributes such as Genre_Id, Genre_Name and its data types are int, nvarchar respectively.

Book

Book			
Column	**Data Type**	**Property**	**Example**
Book_Id	int	Identity, Primary key	1
Book_Serial_No	nvarchar(100)		231-6-56-7896-4
Book_Title	nvarchar(100)		Critical Thinking
Publisher_Id	int	Foreign Key (Publisher_Id) REFERNCES Publisher(Publisher_Id)	1
Genre_Id	int	Foreign Key (Genre_Id) REFERNCES Genre(Genre_Id)	1
Book_Price	float		*£13*

Table 32: Data Dictionary of Book Table

The Book table (Table 32) contains attributes such as Book_Id, Book_Serial_No, Book_title, Publisher_Id, Genre_Id, Book_Price and its data types are int, nvarchar, int, float, respectively.

Branch_Book

Branch_Book			
Column	**Data Type**	**Property**	**Example**
Branch_Book_Id	int	Identity, Primary key	1
Book_Id	int	Foreign Key (Book_Id) REFERNCES Book(Book_Id)	1
Branch_Id	int	Foreign Key (Branch_Id) REFERNCES Branch(Branch_Id)	1
InStock	int		25

Table 33: Data Dictionary of Branch_Book Table

The Branch_Book table (Table 33) contains attributes such as Branch_book_Id, Book_Id, Branch_Id, InStock and its data types are int, respectively.

Author

Author			
Column	**Data Type**	**Property**	**Example**
Author_Id	int	Identity, Primary key	1
Author_Name	varchar(100)		Tom Chatfield

Table 34: Data Dictionary of Author Table

The Author table (Table 34) contains attributes Author_Id, Author_Name and its data types are int, varchar, nvarchar respectively.

Book_Author

Book_Author			
Column	**Data Type**	**Property**	**Example**
Book_Author_Id	int	Identity, Primary key	1
Book_Id	int	Foreign Key (Book_Id) REFERNCES Book(Book_Id)	1
Author_Id	int	Foreign Key (Author_Id) REFERNCES Author(Author_Id)	1

Table 35: Data Dictionary of Book_Author Table

The Book_Author table (Table 35) contains attributes such as Book_Author_Id, Book_Id, Author_Id and its data types includes int, respectively.

Book_Borrow

Book_Borrow			
Column	**Data Type**	**Property**	**Example**
Book_Borrow_Id	int	Identity, Primary key	1
Order_Id	int	Foreign Key (Order_Id) REFERNCES Order(Order_Id)	
Borrow_Start_Date	date		2/2/2022
Borrow_End_Date	date		2/3/2022
Borrow_Status	varchar(50)		Returned
Fine	float		0

Table 36: Data Dictionary of Book_Borrow Table

The Book_Borrow table (Table 36) contains attributes such as Book_Borrow_Id, Order_Id, Borrow_Start_date, Borrow_End_Date, Borrow_Status, Fine and its data types are int, date, varchar, respectively.

Book_Reserve

Book_Reserve			
Column	**Data Type**	**Property**	**Example**
Book_Reserve_Id	int	Identity, Primary key	1
Order_Id	int	Foreign Key (Order_Id) REFERNCES Order(Order_Id)	1
Reserve_Date	date		5/5/2022

Table 37: Data Dictionary of Book_Reserve Table

The Book_Reserve table (Table 37) contains attributes such as Book_Reserve_Id, Order_Id, Reserve_Date and its data types are int, date, respectively.

Book_Review

Book_Review			
Column	**Data Type**	**Property**	**Example**
Book_Review_Id	int	Identity, Primary key	1
Book_Id	int	Foreign Key (Book_Id) REFERNCES Book(Book_Id)	1
Customer_Id	int	Foreign Key (Customer_Id) REFERNCES Customer(Customer_Id)	1
Rating	nvarchar(100)		3 star
Comments	nvarchar(300)		Good
Review_Date	date		6/7/2022

Table 38: Data Dictionary of Book_Review Table

The Book_Review table (Table 38) contains attributes such as Book_Review_Id, Book_Id, Customer_Id, Rating, Comments, Review_date and its data types are int, nvarchar, date, respectively.

Part 2: Database Implementation

Next step is to implement the database from the above findings. Here I are using Microsoft SQL Server Management Studio Version 18 to implement the database. This IDE is more flexible in creating tables and managing databases. (TechTarget, 2022) (Thomas, 2023)

Task 2.A.1: Physical implementation of database

The stages in physical implementation of database are to consider the final ER diagram of the system. The tables are created using DDL (Data Definition Language) commands. The attributes and the integrity constraints of the appropriate entities must be mentioned in this table's creation. (LearnSQL.com, 2022)

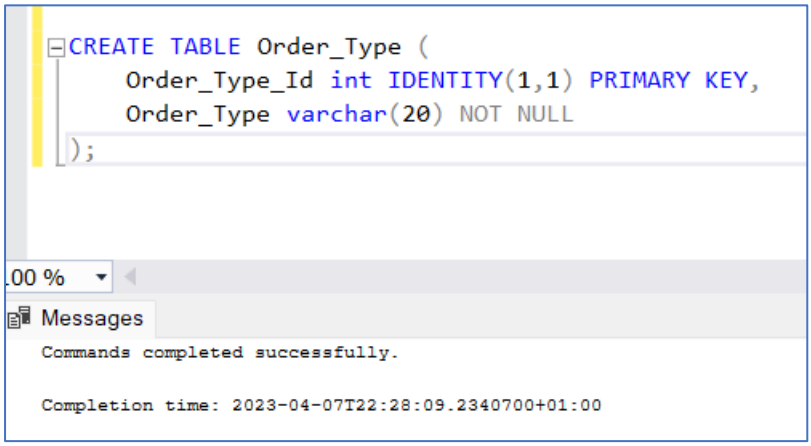

Figure 4: Table creation of Order_Type table

In the above figure Order_Type table is created, and its attributes and integrity constraints are mentioned.

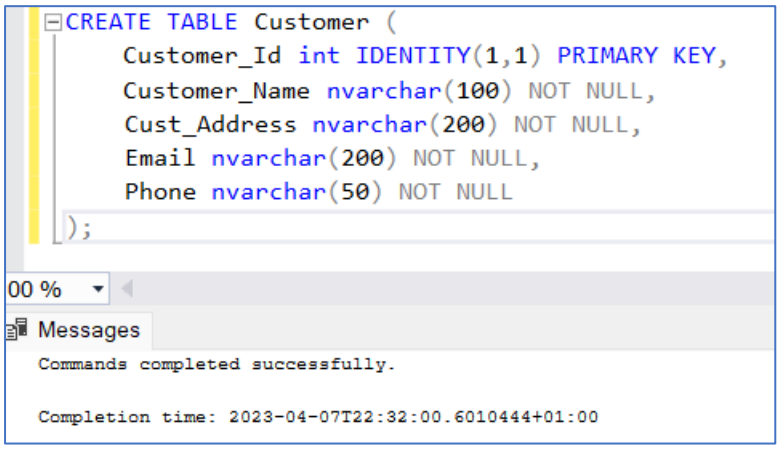

Figure 5: Table creation of Customer table

In the above figure Customer table is created and its attributes and integrity constraints are mentioned. Customer_Id is the set as primary key and set as identity.

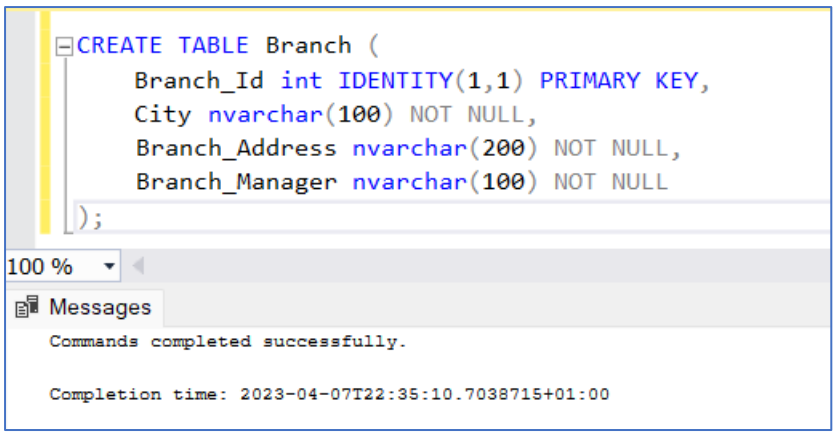

Figure 6: Table creation of Branch table

In the above figure Branch table is created and its attributes and integrity constraints are mentioned. Branch_Id is the set as primary key and set as identity.

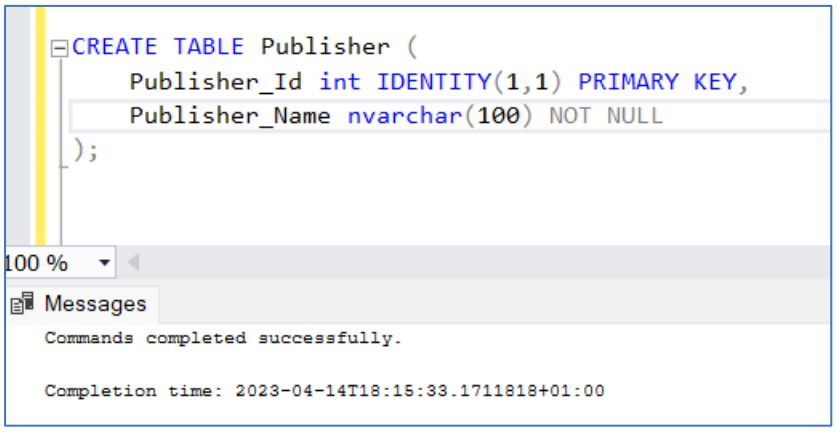

Figure 7: Table creation of Publisher table

In the above figure Publisher table is created and its attributes and integrity constraints are mentioned. Publisher_Id is the set as primary key and set as identity.

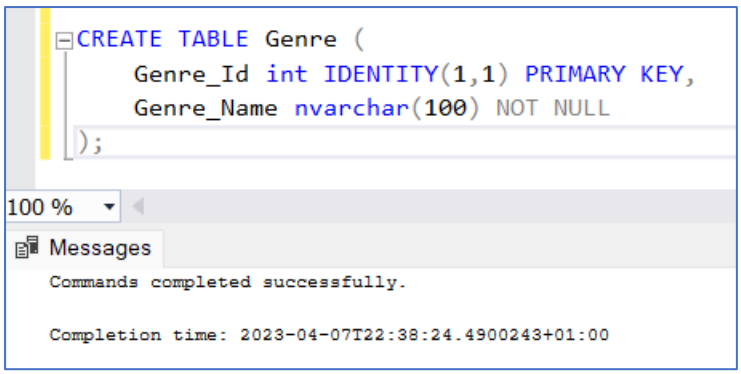

Figure 8: Table creation of Genre table

In the above figure Genre table is created and its attributes and integrity constraints are mentioned. Genre_Id is the set as primary key and set as identity.

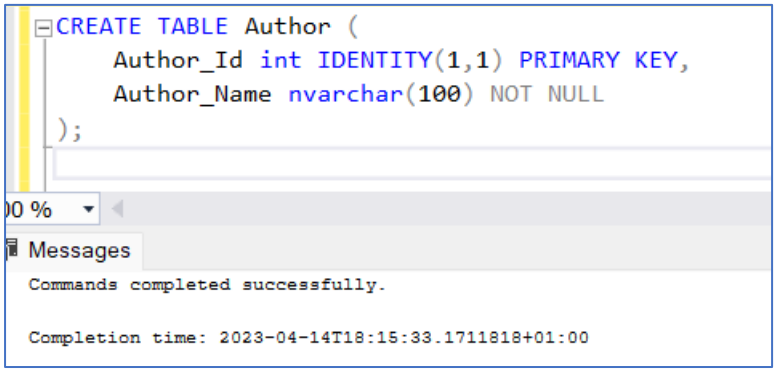

Figure 9: Table creation of Author table

In the above figure Author table is created and its attributes and integrity constraints are mentioned. Author_Id is the set as primary key and set as identity.

```
CREATE TABLE Orders (
    Order_Id int IDENTITY(1,1) PRIMARY KEY,
    Order_Date date NOT NULL,
    Status varchar(50) NOT NULL,
    Customer_Id int FOREIGN KEY REFERENCES Customer(Customer_Id),
    Order_Type_Id int FOREIGN KEY REFERENCES Order_Type(Order_Type_Id)
);
```

100 %

Messages

```
Commands completed successfully.

Completion time: 2023-04-14T18:14:37.5240099+01:00
```

Figure 10: Table creation of Orders table

In the above figure Orders table is created and its attributes and integrity constraints are mentioned. Order_Id is the set as primary key and set as identity. Customer_Id and Order_Type_Id are set as foreign keys referenced to appropriate tables.

```
CREATE TABLE Book (
    Book_Id int IDENTITY(1,1) PRIMARY KEY,
    Book_Serial_No nvarchar(100) NOT NULL,
    Book_Title nvarchar(100) NOT NULL,
    Publisher_Id int FOREIGN KEY REFERENCES Publisher(Publisher_Id),
    Genre_Id int FOREIGN KEY REFERENCES Genre(Genre_Id),
    Book_Price float NOT NULL,
);
```

00 %

Messages

```
Commands completed successfully.

Completion time: 2023-04-07T22:51:14.8600892+01:00
```

Figure 11: Table creation of Book table

In the above figure Book table is created and its attributes and integrity constraints are mentioned. Book_Id is the set as primary key and set as identity. Publisher_Id and Genre_Id is set as foreign keys referenced to appropriate tables.

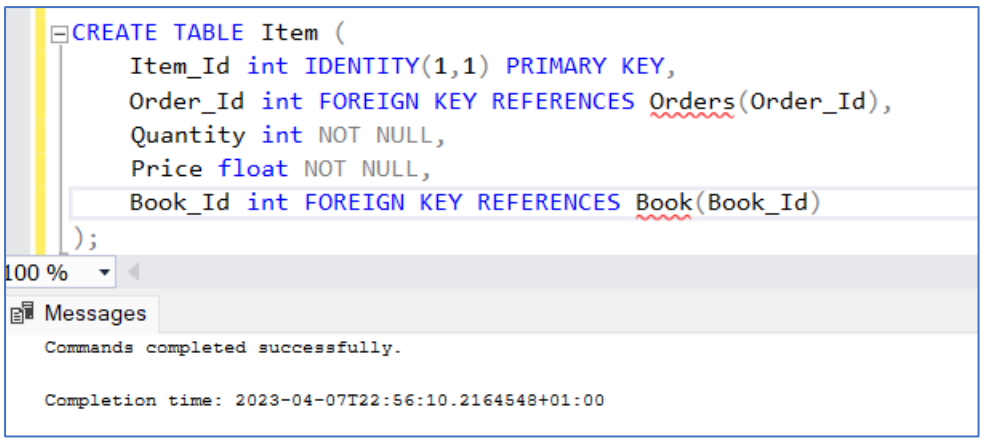

Figure 12: Table creation of Item Table

In the above figure Item table is created and its attributes and integrity constraints are mentioned. Item_Id is the set as primary key and set as identity. Book_Id and Order_Id are set as foreign keys referenced to appropriate tables.

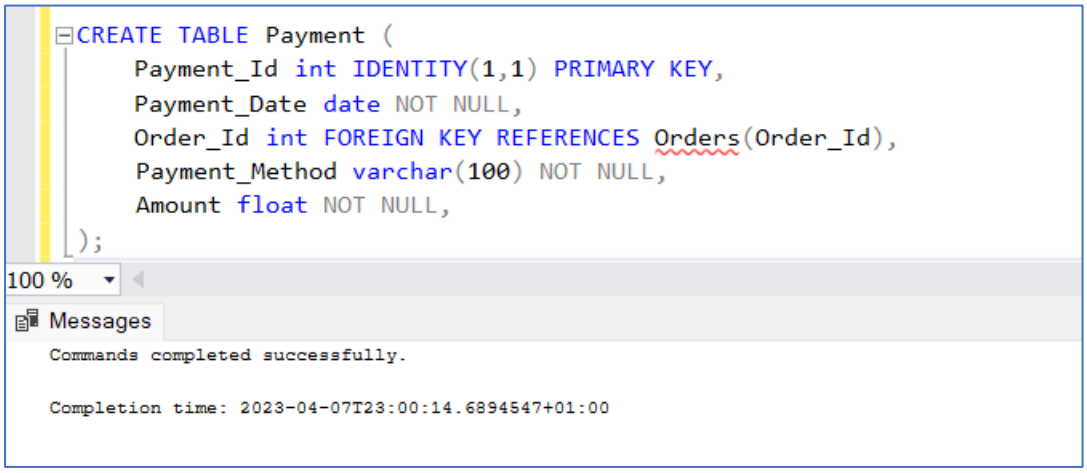

Figure 13: Table creation of Payment table

In the above figure Payment table is created and its attributes and integrity constraints are mentioned. Payment_Id is the set as primary key and set as identity. Order_Id is set as foreign key referenced to appropriate table.

```
CREATE TABLE Branch_Book (
    Branch_Book_Id int IDENTITY(1,1) PRIMARY KEY,
    Book_Id int FOREIGN KEY REFERENCES Book(Book_Id),
    Branch_Id int FOREIGN KEY REFERENCES Branch(Branch_Id),
    InStock int NOT NULL
);
```

100 %

Messages

```
Commands completed successfully.

Completion time: 2023-04-07T23:06:11.3419271+01:00
```

Figure 14: Table creation of Branch_Book table

In the above figure Branch_Book table is created, and its attributes and integrity constraints are mentioned. Branch_Book_Id is the set as primary key and set as identity. Book_Id and Branch_Id is set as foreign keys referenced to appropriate tables.

```
CREATE TABLE Book_Author (
    Book_Author_Id int IDENTITY(1,1) PRIMARY KEY,
    Book_Id int FOREIGN KEY REFERENCES Book(Book_Id),
    Author_Id int FOREIGN KEY REFERENCES Author(Author_Id)
);
```

100 %

Messages

```
Commands completed successfully.

Completion time: 2023-04-07T23:07:56.5079616+01:00
```

Figure 15: Table creation of Book_Author table

In the above figure Book_Author table is created, and its attributes and integrity constraints are mentioned. Book_Author_Id is the set as primary key and set as identity. Book_Id and Author_Id is set as foreign keys referenced to appropriate tables.

```
CREATE TABLE Book_Borrow (
    Book_Borrow_Id int IDENTITY(1,1) PRIMARY KEY,
    Order_Id int FOREIGN KEY REFERENCES Orders(Order_Id),
    Borrow_Start_Date date NOT NULL,
    Borrow_End_Date date NOT NULL,
    Borrow_Status varchar(20) NOT NULL,
    Fine float NOT NULL
);
```

100 %

Messages

```
Commands completed successfully.

Completion time: 2023-04-07T23:12:02.0779989+01:00
```

Figure 16: Table creation of Book_Borrow table

In the above figure Book_Borrow table is created and its attributes and integrity constraints are mentioned. Book_Borrow_Id is the set as primary key and set as identity. Order_Id is set as foreign key referenced to appropriate table.

```
CREATE TABLE Book_Reserve (
    Book_Reserve_Id int IDENTITY(1,1) PRIMARY KEY,
    Order_Id int FOREIGN KEY REFERENCES Orders(Order_Id),
    Reserve_Date date NOT NULL
);
```

100 %

Messages

```
Commands completed successfully.

Completion time: 2023-04-07T23:13:28.6664501+01:00
```

Figure 17: Table creation of Book_Reserve table

In the above figure Book_Reserve table is created, and its attributes and integrity constraints are mentioned. Book_Reserve_Id is the set as primary key and set as identity. Order_Id is set as foreign key referenced to appropriate table.

```
CREATE TABLE Book_Review (
    Book_Review_Id int IDENTITY(1,1) PRIMARY KEY,
    Book_Id int FOREIGN KEY REFERENCES Book(Book_Id),
    Customer_Id int FOREIGN KEY REFERENCES Customer(Customer_Id),
    Rating nvarchar(20) NOT NULL,
    Comments nvarchar(200) NOT NULL,
    Review_Date date NOT NULL
);
```

100 %

Messages

```
Commands completed successfully.

Completion time: 2023-04-07T23:17:03.7394693+01:00
```

Figure 18: Table creation of Book_Review table

In the above figure Book_Review table is created, and its attributes and integrity constraints are mentioned. Book_Review_Id is the set as primary key and set as identity. Customer_Id and Book_Id is set as foreign keys referenced to appropriate tables.

Below are the INSERT queries I used to populate tables:

insert into Order_Type values ('Buy');
insert into Order_Type values ('Borrow');
insert into Order_Type values ('Reserve');

	Order_Type_Id	Order_Type
1	1	Buy
2	2	Borrow
3	3	Reserve

Task 2.A.2: Data Manipulation

Next stage of implementation is to populate tables with data. For these I are using DML (Data Manipulation Language) queries. I are using INSERT query one of the commonly used DML query to insert data. DML commands are frequently used in software applications and database management systems because they are crucial for managing and maintaining data in a database (LearnSQL.com, 2022) (Thomas, 2023)

Task 2.B: SQL Queries

2.B.1: Show current prices of Database Systems books in all the Cities

```
insert into  Order_Type values ('Buy');

insert into  Order_Type values ('Borrow');

insert into  Order_Type values ('Reserve');
```

100 %

Messages

```
(1 row affected)

(1 row affected)

Completion time: 2023-04-07T23:19:49.5789482+01:00
```

```
insert into Customer values ('Mini',' 187 Minard Road, London', 'mini@gmail.com', 4524198900);

insert into Customer values ('Sam','66 Torridon Road, Glasgow', 'david@gmail.com',5689893562);

insert into Customer values ('Mickey','85 Brownhill Road, Glasgow',' mickey@gmail.com', 3456663434);

insert into Customer values ('Jack',' 115 Theore Road, Manchester',' jack@gmail.com ', 8756777898);

insert into Customer values ('Rosy','20 Somusundar road, London',' rosy@gmail.com ', 8978787866);

insert into Customer values ('Lucy', '90 Tommy Road, Glasgow' , ' Lucy@gmail.com', 9872314421);

insert into Customer values ('Soni','34 Downhill road, Birminghan',' soni@gmail.com ', 3245672233);

insert into Customer values (' Ayra','8 Duckman road, Manchester','ayra@gmail.com', 8977897899);
```

100 %

Messages

```
(1 row affected)

(1 row affected)

(1 row affected)

(1 row affected)
```

```
insert into Branch values ('London','London NW, England','Agnes');

insert into Branch values ('Manchester','Manchester WA, England','Tom');

insert into Branch values ('Birmingham','Birmingham B1,England','Ria');

insert into Branch values ('Glasgow','Glasgow G1 ,England','Meenu');
```

100 %

Messages

```
(1 row affected)

(1 row affected)

(1 row affected)

(1 row affected)

Completion time: 2023-04-07T23:36:53.2327248+01:00
```

```
insert into  Order_Type values ('Buy');
insert into  Order_Type values ('Borrow');
insert into  Order_Type values ('Reserve');

-------------------------------------------------
insert into Branch values ('London','London NW, England','Agnes');
insert into Branch values ('Manchester','Manchester WA, England','Tom');
insert into Branch values ('Birmingham','Birmingham B1,England','Ria');
insert into Branch values ('Glasgow','Glasgow G1 ,England','Meenu');
-----------------------------------------------

insert into Customer values ('John','30 Lathom Road London','john@gmail.com', '1245789878');
insert into Customer values ('Charlotte','89 chester Road, Manchester', 'charlotte@gmail.com', '5678968621');
insert into Customer values ('Smith','120 Tilbury, London', 'smith@gmail.com', '3654128975');
insert into Customer values ('David','12 Colonial Road, Birmingham', 'david@gmail.com', '5689893562');
insert into Customer values (' Mini',' 187 Minard Road, London', 'mini@gmail.com', '4524198900');
insert into Customer values ('Sam','66 Torridon Road, Glasgow', 'david@gmail.com','5689893562');
insert into Customer values ('Mickey','85 Brownhill Road, Glasgow',' mickey@gmail.com', '3456663434');
insert into Customer values ('Jack',' 115 Theore Road, Manchester',' jack@gmail.com ', '8756777898');
insert into Customer values ('Rosy','20 Somusundar road, London',' rosy@gmail.com ', '8978787866');
```

```
--1 Show current prices of Database Systems books in all the Cities

select b.book_title as Book,g.Genre_Name as Genre,b.book_price as CurrentPrices,br.City from Book b
join Genre g on b.Genre_Id =g.Genre_Id
join Branch_Book bb on bb.Book_Id=b.Book_Id
join Branch br on br.Branch_Id=bb.Branch_Id
where g.Genre_Name='Database Systems'
```

100 %

Results | Messages

	Book	Genre	CurrentPrices	City
1	Oracle Database 12c SQL	Database Systems	53	London
2	Beginning Database Design: From Novice to Profes...	Database Systems	35	London
3	Oracle Database Transactions and Locking Revealed	Database Systems	22	Birmingham
4	Database Systems: The Complete Book	Database Systems	67	Glasgow
5	Database Systems: A Practical Approach to Design, ...	Database Systems	57	Manchester
6	Database Reliability Engineering	Database Systems	34	Glasgow
7	Fundamentals of Database Management Systems	Database Systems	138	Manchester
8	Database Security	Database Systems	38	Birmingham

```
--2 Show the largest of price value from all subjects for London and Manchester

select max(b.book_price) as largest_price from Book b
inner join Branch_Book bb on bb.Book_Id=b.Book_Id
inner join Branch br on br.Branch_Id=bb.Branch_Id
where br.City='Manchester' or br.City ='London'
```

100 %

Results | Messages

	largest_price
1	138

```sql
--3 Show the minimum price for London books, from all subjects

select min(b.book_price) as Lowest_Price from Book b
inner join Branch_Book bb on bb.Book_Id=b.Book_Id
inner join Branch br on br.Branch_Id=bb.Branch_Id
where br.City ='London'
```

100 %

Results | Messages

	Lowest_Price
1	1.5

```sql
--4 Find the book with the maximum number of orders

select top 1 b.book_title as BookTitle, sum(i.Quantity) as MaxOrders from Orders o
join Item i on i.Order_Id=o.Order_Id
join Book b on b.Book_Id=i.Book_Id
group by i.Book_Id,b.book_title
order by MaxOrders desc
```

100 %

Results | Messages

	BookTitle	MaxOrders
1	Leadership	7

```sql
--5 Find the customer who borrowed the maximum number of books

select top 1 c.Customer_Name,o.Status,sum(i.Quantity) as Max_NoOf_borrows from Orders o
join Item i on i.Order_Id=o.Order_Id
join Book b on b.Book_Id=i.Book_Id
join Order_Type ot on ot.Order_Type_Id=o.Order_Type_Id
join Customer c on c.Customer_Id=o.Customer_Id
where ot.Order_Type='Borrow'
group by c.Customer_Name,o.Status
order by Max_NoOf_borrows desc
```

100 %

Results | Messages

	Customer_Name	Status	Max_NoOf_borrows
1	Soni	Borrowed	2

```sql
--6 Show all books with prices higher than average book prices in Birmingham


select b.Book_Title,b.Book_Price,br.City  from Book b
join Branch_Book bb on bb.Book_Id=b.Book_Id
join Branch br on br.Branch_Id=bb.Branch_Id
where b.Book_Price> (select AVG(b.book_price)  from Book b
join Branch_Book bb on bb.Book_Id=b.Book_Id
join Branch br on br.Branch_Id=bb.Branch_Id
where br.City='Birmingham')
```

100 %

Results | Messages

	Book_Title	Book_Price	City
1	Oracle Database 12c SQL	53	London
2	Organization and Administration in Higher Education	42.29	Manchester
3	Digital Fundamentals	77.99	Glasgow
4	Modern Operating Systems	29.81	Birmingham
5	Introduction to Robotics	44.99	Glasgow
6	Computer Security Fundamentals	48.67	Manchester
7	Project, Programme and Portfolio Governance (P3G)	50	London
8	Beginning Database Design: From Novice to Profes...	35	London
9	Oracle Database Transactions and Locking Revealed	22	Birmingham
10	Deep In The Forest	37	Glasgow

```sql
-- 8 Show the maximum price sold from all subjects, for all books

select b.book_title as BookTitle,p.amount as MaxPriceSold
from Orders o
join Item i on i.Order_Id=o.Order_Id and o.Order_Type_Id=1
join Book b on b.Book_Id=i.Book_Id
join Payment p on o.Order_Id=p.Order_Id
where p.Amount=(select max(p.amount)
from Orders o
join Item i on i.Order_Id=o.Order_Id and o.Order_Type_Id=1
join Book b on b.Book_Id=i.Book_Id
join Payment p on o.Order_Id=p.Order_Id
where o.Order_Type_Id=1 )
```

100 %

Results | Messages

	BookTitle	MaxPriceSold
1	Fundamentals of Database Management Systems	414

```
Create TRIGGER [dbo].[AfterDELETETrigger_Orders] on [dbo].[Orders]
FOR DELETE
AS DECLARE @Order_Id INT,
           @Order_Date date,
       @Status varchar(50),
       @Customer_Id int,
       @Order_Type_Id int;

SELECT @Order_Id = del.Order_Id FROM DELETED del;
SELECT @Order_Date = del.Order_Date FROM DELETED del;
SELECT @Status = del.Status FROM DELETED del;
SELECT @Customer_Id = del.Customer_Id FROM DELETED del;
SELECT @Order_Type_Id = del.Order_Type_Id FROM DELETED del;

INSERT INTO [Orders_Delete_Record](
       Order_Id
      ,Order_Date
      ,Status
      ,Customer_Id
      ,Order_Type_Id)
VALUES (@Order_Id,
        @Order_Date,
    @Status,
    @Customer_Id,
    @Order_Type_Id);
PRINT ' Successfully Fired the AFTER DELETE Triggers in Orders table'
GO
```

```
-- 9 Create a trigger which places the orders, which have been deleted into an order table. This
--allows records to be maintained while improving query times for existing orders

Create TRIGGER [dbo].[AfterDELETETrigger_Orders] on [dbo].[Orders]
FOR DELETE
AS DECLARE @Order_Id INT,
           @Order_Date date,
       @Status varchar(50),
       @Customer_Id int,
       @Order_Type_Id int;

SELECT @Order_Id = del.Order_Id FROM DELETED del;
SELECT @Order_Date = del.Order_Date FROM DELETED del;
SELECT @Status = del.Status FROM DELETED del;
SELECT @Customer_Id = del.Customer_Id FROM DELETED del;
SELECT @Order_Type_Id = del.Order_Type_Id FROM DELETED del;

INSERT INTO [Orders_Delete_Record](
       Order_Id
      ,Order_Date
      ,Status
      ,Customer_Id
      ,Order_Type_Id)
VALUES (@Order_Id,
        @Order_Date,
    @Status,
    @Customer_Id,
    @Order_Type_Id);
PRINT ' Successfully Fired the AFTER DELETE Triggers in Orders table'
GO
```

```
--deleting a row from order table,
-- after delete a row should
--insert into orders_delete_record table,item_delete_record table and payment_delete_record table

delete from Orders where Order_Id=64
```

100 %

Messages

```
(1 row affected)
 Successfully Fired the AFTER DELETE Triggers in Payment table

(1 row affected)
 Successfully Fired the AFTER DELETE Triggers in Item table

(1 row affected)
 Successfully Fired the AFTER DELETE Triggers in Orders table

(1 row affected)

Completion time: 2023-04-21T20:15:37.8241705+01:00
```

```
/****** Script for SelectTopNRows command from SSMS  ******/
SELECT TOP (1000) [Payment_Id]
      ,[Payment_Date]
      ,[Order_Id]
      ,[Payment_Method]
      ,[Amount]
  FROM [MentalPowerEBookStoreDB].[dbo].[Payment_Delete_Record]
```

100 %

Results Messages

	Payment_Id	Payment_Date	Order_Id	Payment_Method	Amount
1	64	2023-02-10	64	Cash	11.76

```
SELECT TOP (1000) [Order_Id]
      ,[Order_Date]
      ,[Status]
      ,[Customer_Id]
      ,[Order_Type_Id]
  FROM [MentalPowerEBookStoreDB].[dbo].[Orders_Delete_Record]
```

100 %

Results Messages

	Order_Id	Order_Date	Status	Customer_Id	Order_Type_Id
1	64	2023-10-02	Purchased	52	1

```
SELECT TOP (1000) [Item_Id]
      ,[Order_Id]
      ,[Quantity]
      ,[Price]
      ,[Book_Id]
  FROM [MentalPowerEBookStoreDB].[dbo].[Item_Delete_Record]
```

100 %

Results Messages

	Item_Id	Order_Id	Quantity	Price	Book_Id
1	205	64	2	5.88	57

	book_title	City	book_price
1	1984	London	26.5
2	A Game of Thrones (A Song of Ice and Fire series)	London	38.75
3	Bridget Jones Diary	London	33.75
4	Crime and Punishment	London	34.82
5	Critical Thinking	London	38
6	Don Quixote	Manchester	37.05
7	Harry Potter series	Manchester	37.8
8	Les Miserables	Manchester	30
9	Moby-Dick	London	46.18
10	One Hundred Years of Solitude	Manchester	36.76
11	Organization and Administration in Higher Education	Manchester	67.29
12	The Adventures of Huckleberry Finn	London	31.99
13	The Adventures of Sherlock Holmes	Manchester	29
14	The Catcher in the Rye	Manchester	30
15	The Count of Monte Cristo	London	30.88
16	The Great Gatsby	London	30
17	The Scarlet Letter	London	30
18	The Time Travelers Wife	London	25
19	To Kill a Mockingbird	London	31.45
20	Advances in Taxation	Manchester	110

	book_title	City	book_price
1	1984	London	1.5
2	A Game of Thrones (A Song of Ice and Fire series)	London	13.75
3	Bridget Jones Diary	London	8.75
4	Crime and Punishment	London	9.82
5	Critical Thinking	London	13
6	Don Quixote	Manchester	12.05
7	Harry Potter series	Manchester	12.8
8	Les Miserables	Manchester	5
9	Moby-Dick	London	21.18
10	One Hundred Years of Solitude	Manchester	11.76
11	Organization and Administration in Higher Education	Manchester	42.29
12	The Adventures of Huckleberry Finn	London	6.99
13	The Adventures of Sherlock Holmes	Manchester	4
14	The Catcher in the Rye	Manchester	5
15	The Count of Monte Cristo	London	5.88
16	The Great Gatsby	London	5
17	The Scarlet Letter	London	5
18	The Time Travelers Wife	London	0
19	To Kill a Mockingbird	London	6.45
20	Advances in Taxation	Manchester	85

```sql
--7 Update the price for all books, for London and Manchester, for today, assuming they want
--to promote 25GBP per book

update Book set Book_Price=Book_Price-25
where Book_Id in (select b.book_id
from Book b
left join Branch_Book bb on bb.Book_Id=b.Book_Id
left join Branch br on br.Branch_Id=bb.Branch_Id
where  br.City='Manchester' or br.City ='London' );
```

100 %

Results | Messages

	book_title	City	book_price
1	1984	London	1.5
2	A Game of Thrones (A Song of Ice and Fire series)	London	13.75
3	Bridget Jones Diary	London	8.75
4	Crime and Punishment	London	9.82
5	Critical Thinking	London	13
6	Don Quixote	Manchester	12.05
7	Harry Potter series	Manchester	12.8
8	Les Miserables	Manchester	5
9	Moby-Dick	London	21.18
10	One Hundred Years of Solitude	Manchester	11.76
11	Organization and Administration in Higher Education	Manchester	42.29
12	The Adventures of Huckleberry Finn	London	6.99
13	The Adventures of Sherlock Holmes	Manchester	4
14	The Catcher in the Rye	Manchester	5
15	The Count of Monte Cristo	London	5.88
16	The Great Gatsby	London	5
17	The Scarlet Letter	London	5
18	The Time Travelers Wife	London	0
19	To Kill a Mockingbird	London	6.45
20	Advances in Taxation	Manchester	85

Task 2.C: Reflection

Conclusion:

In conclusion, setting up a database system for an e-book shop is crucial for effectively managing and organising the data in the store. Improved data integrity, quicker query response times, and better scalability for future development are just a few advantages that a Ill-designed database system may offer.

By creating a strong database schema, I can make sure that data is stored effectively, with little duplication, and can be promptly retrieved for user queries and searches. To further enhance query performance, I may further employ indexing and optimisation strategies. Finally, a successful database system is essential to the development and implementation of an e-bookstore.

Analysis:

An e-book shop is a Ibsite where customers can buy and download eBooks. Data concerning eBooks', authors, publishers, consumers, orders, and payments are all managed and organised by the store's database system, which is essential to its operation.

Overall, a successful database system for an e-book shop should strike a balance betIen the demands of scalability, data integrity, performance, security, and integration. I may create a database system that serves as a strong framework for the operation as Ill as the growth of the e-book shop by meticulously taking these aspects into account.

Future works:

Future works for the e-book store's database system include leveraging machine learning algorithms to automate various tasks, migrating the system to a cloud-based platform for increased scalability, and improving the user interface to provide a more intuitive and user-friendly experience. The database system could be further optimized by implementing advanced techniques such as data partitioning, data sharing, and query optimization.

By continually enhancing the system, the e-bookstore can provide a more personalized, efficient, and effective experience for both customers and administrators.

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Appendices

Appendix A. Presentation Slides and/or Video Ib Link – URL

Appendix B. Agreement of Participation