



ALBUKHARY INTERNATIONAL UNIVERSITY

SCHOOL OF COMPUTING AND INFORMATICS

CCC2133 : Database Management System Semester I, Academic Session: 2023/2024

Final Report

Group Number : 10

Lecturer's Name : Profesor Madya Dr. Zurinahni Binti Zainol and Dr.Basheer Riskhan

Project Title : Database Management System for Secondhand Bookstore

Names	Matric No	Email Address	Role
Sumaiya Woomay Sarathee	AIU22102271	woomay.sarathee@student.aiu.edu.my	Leader
Thinley Yeshey Choden	AIU22102188	thinley.choden@student.aiu.edu.my	Member
Dema Yuden	AIU22102234	dema.yuden@student.aiu.edu.my	Member
Tamanna Kassim	AIU22102092	tamanna.kassim@student.aiu.edu.my	Member

Date of Submission : 09th February, 2024

Table of Content

1.0 Introduction	1
1.1 Description of the Organization	1
1.2 Description of the current system and its problems	1
1.3 Motivation	2
1.4 How will the system benefit the organization?	2
1.5 Inventory Management Database for Secondhand Bookstore Modules	3
1.5.1 Customer Module	3
1.5.2 Employee Module	3
1.5.3 Inventory Module	3
1.5.4 Sales Module	4
2.0 User Requirements and Business Rules	4
2.1 Customer Module	4
2.2 Employee Module	5
2.3. Inventory Module	5
2.4 Sales Module	6
2.5 Cross-module User Requirement and Business Rules	6
3.0 Entity Relationship Modeling	7
3.1 Customer Module	8
3.2 Employee Module	10
3.3 Inventory Module	12
3.4 Sales Module	14
4.0 Normalization	17
4.1 Customer module	17
4.2 Employee module	18
4.3 Inventory module	18
4.4 Sales module	19
5.0 Data Dictionary	21
5.1 Customer module	21
5.2 Employee module	23
5.3 Inventory module	26
5.4 Sales module	28
6.0 Data Implementation	31
7.0 Front-End System Design and Implementation	38
8.0 Project Problems and Pitfalls	46
9.0 Conclusion/Recommendations/Future Works	47
10.0 References	48

1.0 Introduction

1.1 Description of the Organization

ReadCycle: Sharing books for many years to come.

ReadCycle is a haven for book lovers. Based in Malaysia, this company was established in early 2010 as an enterprise focused on selling books. Just like its name suggests, the company aims to tackle and address the Sustainable Development Goal Number 4 (Quality Education) and Number 12 (Responsible Production and Consumption). ReadCycle is a medium enterprise selling old books so that quality second hand books purchased from various suppliers can be refurbished and sold at an affordable rate.

1.2 Description of the current system and its problems

The current data management structure of ReadCycle bookstore has already established a centralized database to integrate its data and records. However their system is of an older version that needs to be updated with an advanced database management system.

The users of the book include system administrators such as system admin, system cataloger, company owners, cashiers as well as its customers who would consist of book lovers.

Drawbacks of existing system

When it comes to querying and retrieving data for specific management needs, the system does not meet the criteria of an efficient database management system.

ReadCycle's central database lacks easy cataloging of book details for which employees find it very time consuming to arrange the records.

Tracking purchases and issues regarding smooth customer transactions is another area that needs to be looked into.

Security issues associated with online payments and personal information create a deterrent.

Ineffective search and filtering options make it difficult for customers to efficiently find specific books.

Insufficient details about a book's edition and publication date hinder informed purchasing decisions.

The restrictive nature of payment options adds an additional layer of inconvenience for customers, contributing to an overall suboptimal user experience.

1.3 Motivation

In a world where newness is celebrated, there's something special about owning a book with a history. Second-hand books offer readers an opportunity to connect with literature in a unique way. They can come with margin notes or dog-eared pages, adding character and charm that simply can't be found in a new book.

But choosing second-hand books isn't just about aesthetics. It's also an eco-friendly and cost-effective option. By buying second hand books or pre-loved books as we like to call them, you're contributing to reducing waste and minimizing your carbon footprint. It's a small yet significant step towards sustainable living. Furthermore, second-hand books are an affordable option for book lovers on a budget. You can get your hands on classic titles or bestsellers without breaking the bank.

With the availability of online marketplaces like ReadCycle, finding and buying second-hand books has never been easier.

1.4 How will the system benefit the organization?

Our inventory management database system is meticulously designed to cater to the specific needs outlined by established business rules, ensuring a robust structure that incorporates essential attributes and entities. It boasts a streamlined transaction tracking system for informed decision-making.

The database system prioritizes optimized query and retrieval functionalities, enhancing overall efficiency. Security is paramount, and we've implemented advanced features to control access meticulously.

With a commitment to user satisfaction, our system offers a user-friendly search interface equipped with robust filtering capabilities. It provides comprehensive book details, ensuring a seamless and comprehensive inventory management experience for all users.

1.5 Inventory Management Database for Secondhand Bookstore Modules

The ReadCycle database system has **4 modules** namely; customer module, employee module, inventory modules and sales module:

1.5.1 Customer Module

This module allows users to create accounts, and log in securely. It incorporates essential features such as registration forms, password hashing, and user profile management. Basic customer information such as name, surname, email and password are stored in this module. Upon account creation, users are directed to the homepage where a search function enables them to efficiently find the books of their interest by implementing keyword searches, advanced filters (genre), and sorting options. Subsequently, users can add items to their shopping cart, review their selections, and proceed to checkout. Features like adding/removing items from the cart, calculating totals, applying discounts or coupons are included. Customers can opt for self-pick-up or delivery for which they will be charged based on location. The final step involves selecting a payment method, including cash on delivery or self pick up.

1.5.2 Employee Module

The employee module will serve as a comprehensive system to handle staff-related data and operational access. It aims to capture vital employee information, including name, surname, email; and safe login credentials for system access. This module also saves the employee's certification description and allows employees to manipulate the data based on an employee type. For instance, a book cataloguer can see and add books, whereas an admin can update user's information as well as delete a user from the system. Admin can also alter the order status of customers and is responsible for providing customer service.

1.5.3 Inventory Module

The inventory module for the ReadCycle bookstore is to manage and organize the book inventory as it would have the following entities;. The genre entity which will provide information on the various categories where each book belongs. The book information entity will give us detailed information about each book in the inventory. their titles, authors, the description of the books and their pictures. It will also provide the information of whether the book is in stock or out of stock. Overall the inventory module provides the information about the books.

1.5.4 Sales Module

The Sales module will include details that keep track of the order details of ReadCycle and give insight on its sales trend. Sales reports will help identify popular genres, giving us an overall look into customer preferences, maximizing our inventory optimization and directing focused marketing initiatives. It also includes invoice details and loyalties rewards on every sale that is being made.

These will guide ReadCycle in making strategic decisions built on informed data interpretation, thus optimizing overall performance of the business.

2.0 User Requirements and Business Rules

2.1 Customer Module

Table 1: User Requirements and Business Rules of Customer Module

User Requirements	Business Rules
1.1 Each customer is allowed to create one unique profile with a unique username, a secure password, and accurate personal details. Users must log in securely with their valid credentials (username and password) to access the system.	1.1. One customer can have one account. Each account belongs to one person only.
1.2. Customers can add their preferred books in their shopping cart. They cannot proceed to checkout with an empty shopping cart.	1.2. A customer can have one or many books in their shopping cart and each book can be present in the shopping cart of many customers (based on availability).
1.3. System allows the customers to place many orders.	1.3. Customers can have zero or many orders. Each order is associated with a customer.
1.4. Customers can check out multiple books at once in one order.	1.4. Each order can have many books. Each book can show up in many orders.

1.5. Customers are encouraged to share their valuable feedback and suggestions to enhance their user experience.	1.5. Each customer can leave multiple messages and each message can be left by one customer only.
1.6. Customers can expect to receive their orders within 1-7 working days and the delivery destination must be a location accessible by either standard delivery or sea shipping.	1.6. Customers can choose a single location for their delivery address. The same location can be selected by zero or many customers as their preferred delivery address.
1.7. Customers opting for self-pickup can do so within 3 days from the date of purchase and choose their preferred time anywhere between 9:00 AM to 7:00PM.	1.7. Customers can choose only one pick-up time per purchase. Each pick-up time can be chosen by zero or many customers per purchase.

2.2 Employee Module

Table 2: User Requirements and Business Rules of Employee Module

User Requirement	Business Rules
2.1. Employees must be able to process orders placed by customers.	2.1. An employee can process zero to many orders. An order can be processed by one employee.
2.2. Employees must be able to access the system securely.	2.2. Employees must possess a single account. An account is dedicated to a single employee.
2.3. Employees must be able to record books brought in for sale.	2.3. An employee can record zero to many books. A book should be recorded by a single employee.

2.3. Inventory Module

Table 3: User Requirements and Business Rules of Inventory Module

User Requirements	Business Rules
3.1. The books can be grouped into different genres.	3.2. A genre can have multiple books under it. A book should belong to a single genre.

genres such as fiction, non-fiction, biography, history, novels, science fiction, politics, etc. All the books must fall under one genre.	book can only belong to one genre.
3.2. The cataloguer can view the status of books like how many of a particular book there is. The status can be “In stock” or “out of stock”	3.3. A book can only contain one and only one status. A status can have zero or many books under it.

2.4 Sales Module

Table 4: User Requirements and Business Rules of Sales Module

User requirement	Business rules
4.1. A customer can add books to order and make payment. This will be calculated and recorded to confirm order.	4.1. A customer can purchase one or many books. A book can be purchased by only one customer.
4.2. Sales records can be accessed by the employee in charge to obtain information such as daily sales and the best selling genres of books.	4.2. An employee can handle multiple orders. One record of information cannot be handled by multiple employees.
4.4. Loyalty programs will track customer purchases and provide rewards based on amount spent, that can be used in their next purchase.	4.4. Loyalty points and order have a 1:M relation. Every customer order can redeem only 1 loyalty point and vice versa.

2.5 Cross-module User Requirement and Business Rules

Table 5: User Requirements and Business Rules of Cross-module

User Requirements	Business Rules
5.1. Employees assist customers ensuring a seamless journey from first contact until	5.1. A customer can be assisted by one employee. An employee can service zero or many customers.

transaction completion.	
5.2. One employee can update the customer's order details from pending to completed.	5.2. One employee can update customers' order status and one order status is updated by only one employee.
5.3. Employees can respond to messages sent by the customers.	5.3. One employee answers one or many messages and one message is answered by one employee only.
Employees to be able to manage books information	An employee can add one to many books at a time. A book can be added only by the book cataloguer employee

3.0 Entity Relationship Modeling

All the entity relationship diagrams are drawn with **Crow's foot notation**.

3.1 Customer Module

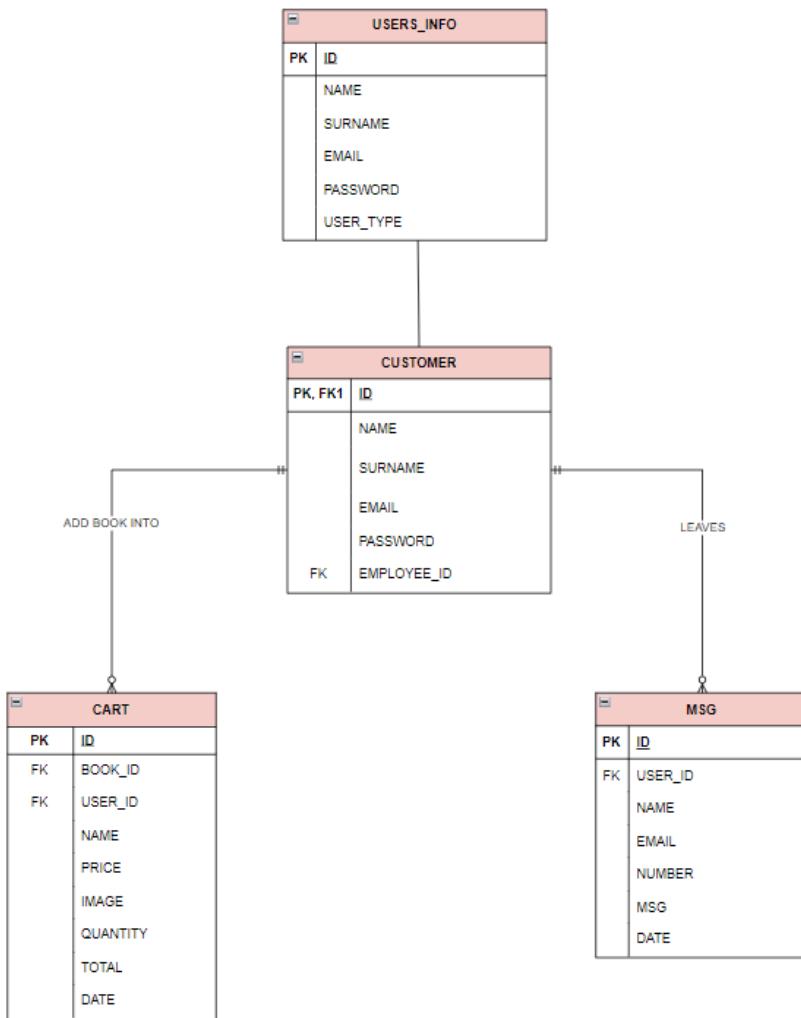


Figure 1:ERD Diagram for Customer Module

Explanation:

Customer module contains 4 entities consisting of supertype entity, USERS_INFO and its subtype entity, CUSTOMER. Other two modules are CART and Msg.

Relationships:

CUSTOMER entity and CART entity have one-to-many relationship. It represents a strong relationship between the two entities, with the CART entity being a weak entity as its existence is dependent on the CUSTOMER entity.

CUSTOMER entity and MSG entity have one-to-many relationship. It represents a strong relationship between the two entities, with the MSG entity being a weak entity as its existence is dependent on the CUSTOMER entity.

Key Constraints:

USERS_INFO entity has 2 subtypes namely CUSTOMER and EMPLOYEE.

The primary key of CUSTOMER entity is ID and it inherits foreign key EMPLOYEE_ID from EMPLOYEE entity.

MSG entity has a primary key called MESSAGE_ID. It is a weak entity as it inherits foreign keys namely USER_ID from CUSTOMER entity.

The primary key of the CART entity is CART_ID and it has USER_ID and BOOK_ID as its foreign key inherited from USER and BOOK_INFO entities respectively. It is a weak entity as it inherits two foreign keys from USER and BOOK_INFO entity.

Clarification:

In CUSTOMER entity, ID is a primary key which is a unique ID after they are registered into the system. Additionally, NAME is their username that customers create in order to sign in into the application. The other attributes are EMAIL and PASSWORD. They represent the customer's email and password.

In the MSG entity, some attributes include NAME (name of the customer who sent the message), EMAIL (customers' email), NUMBER (customers phone number), MESSAGE (textual comments or feedback from the customers) and DATE (date the message was sent).

In the CART entity, attributes include NAME (title of the book), PRICE (price in RM), IMAGE (cover page of the book), QUANTITY (represents how many copies of each book are in the shopping cart), TOTAL (total price) and DATE (date the book was added in the shopping cart).

3.2 Employee Module

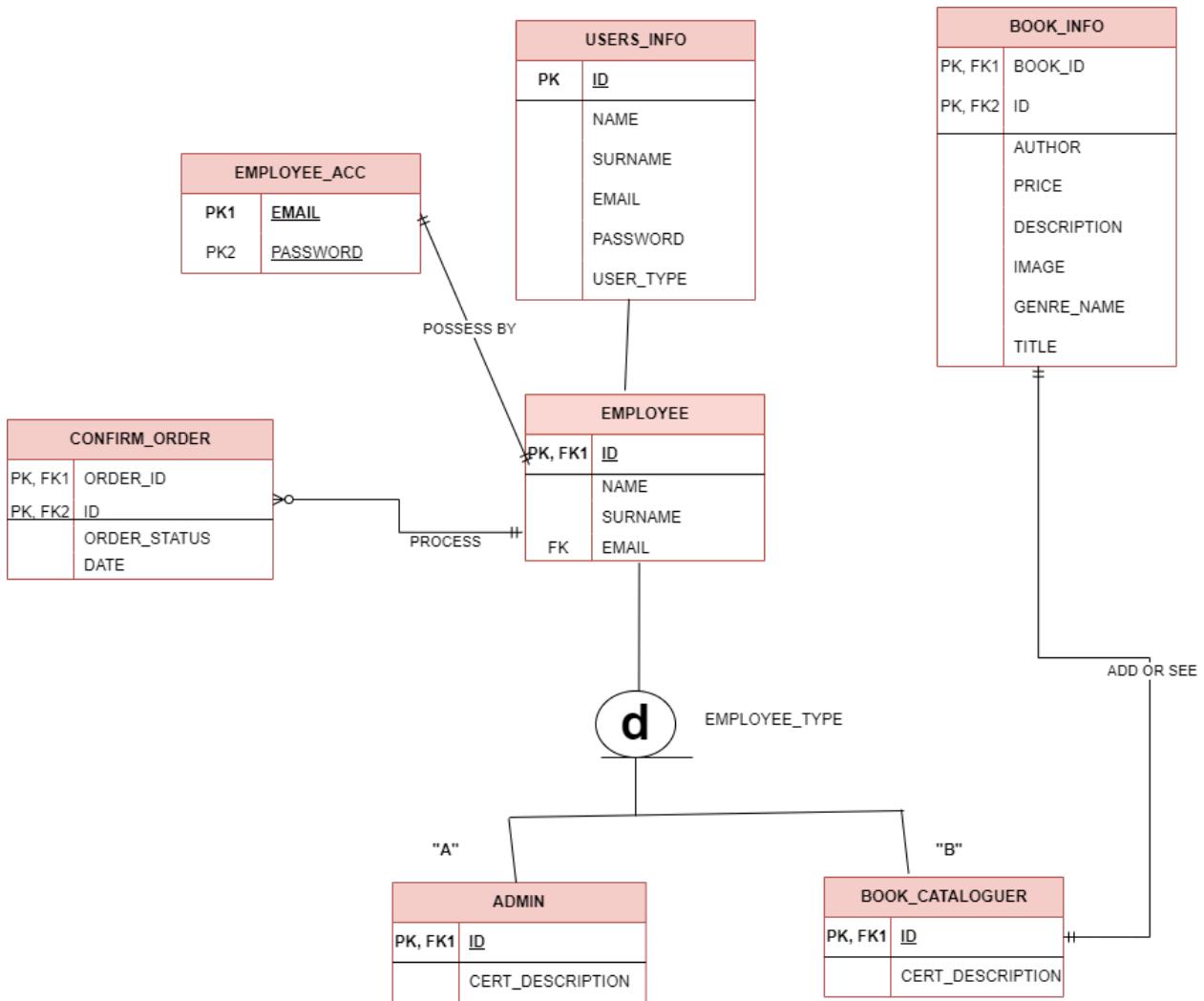


Figure 2: ERD Diagram for Employee Module

Explanation:

Employee module contains 7 entities, consists of supertype entity, USER_INFO and its subtype entity EMPLOYEE which has a further 2 subtypes namely BOOK_CATALOGUER and ADMIN as well as other entities like CONFIRM_ORDER, EMPLOYEE_ACC and BOOK_INFO

Relationships:

The USER_INFO entity has EMPLOYEE as a subtype.

EMPLOYEE entity and EMPLOYEE_ACC have a one-to-one relationship (refer to business rule 2.2) which is a weak relationship as primary keys of EMPLOYEE_ACC entity do not consist of the primary key of EMPLOYEE entity.

EMPLOYEE and CONFIRM_ORDER has a one to many relationship (refer to business rule 2.1). There is a strong relationship as primary keys of the CONFIRM_ORDER entity contain a primary key (ID) from the EMPLOYEE entity.

BOOK_CATALOGUER and BOOK_INFO have a one to many relationship (refer to business rule 2.3). There is a strong relationship as primary keys of the BOOK_INFO entity contain a primary key (ID) from the BOOK_CATALOGUER entity.

EMPLOYEE entity has 2 subtypes namely BOOK_CATALOGUER and ADMIN They all inherit relationships of EMPLOYEE entities.

Key Constraints:

USER_INFO is a strong entity as its primary key uniquely identifies each row and it is existence independent. USER_INFO has EMPLOYEE as a subtype.

EMPLOYEE entity contains EMAIL from EMPLOYEE_ACC entity as foreign key. EMPLOYEE_ACC entity also is a strong entity whose existence does not depend on any entity. EMAIL is the primary key of the EMPLOYEE_ACC entity. PASSWORD is another primary key of EMPLOYEE_ACC.

CONFIRM_ORDER is a weak entity as it depends on the existence of the other entities. CONFIRM_ORDER inherits ID from EMPLOYEE entity as primary key. Another primary key for the CONFIRM_ORDER is ORDER_ID.

BOOK_INFO entity inherits ID from BOOK_CATALOGUER subtype as primary key and foreign key. BOOK_INFO entity is considered a weak entity as its primary keys are totally derived from other entities in the relationship.

EMPLOYEE entity has two disjoint entity subtypes in which an entity supertype occurrence can be a member of only one of the subtypes and EMPLOYEE_TYPE is the subtype discriminator. The ADMIN and BOOK_CATALOGUER subtype has CERT_DESCRIPTION as a unique attribute.

Clarification:

In the USER_INFO entity, a unique ID is generated after a user, which in this case is an employee; is registered into the system. Attributes involved are NAME, SURNAME, EMAIL, PASSWORD AND USER_TYPE.

ID is the primary key which uniquely identifies each row. Attributes involved in an EMPLOYEE entity to store information are NAME, SURNAME and EMAIL.

EMPLOYEE_ACC entity has PASSWORD which is created by each employee used to login into their own account together with their EMAIL.

ORDER_STATUS in CONFIRM_ORDER is used to state whether an order made by a customer is complete or still pending. DATE attribute is used to represent the date when the order status was altered. ID and ORDER_ID are the primary keys used to identify each order.

NAME, AUTHOR, PRICE, DESCRIPTION, IMAGE, GENRE_NAME and TITLE are attributes written by a book cataloguer in the BOOK_INFO entity. BOOK_ID and ID are the primary keys used to identify each book.

3.3 Inventory Module

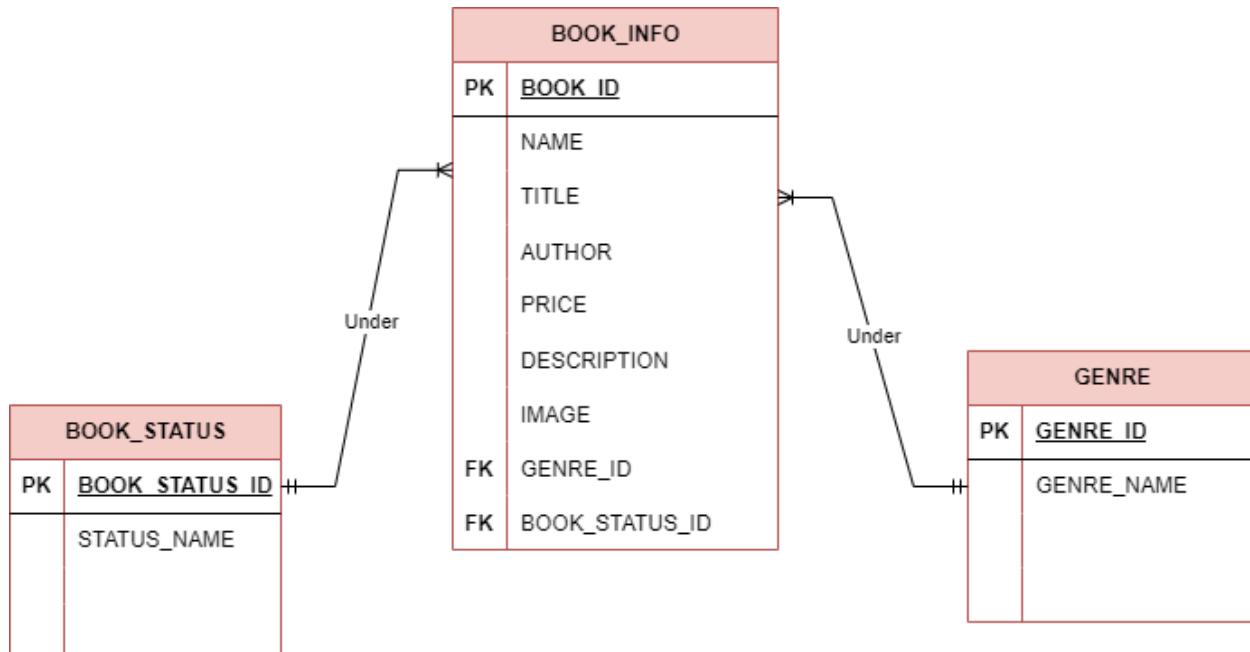


Figure 3: ERD Diagram for Inventory Module

Explanation:

The inventory module has 3 entities namely the BOOK_INFO, GENRE, and BOOK STATUS.

Relationships:

The BOOK and GENRE entity have a one-to-many relationship. The BOOK entity has a one-to-many relationship with the BOOK_STATUS entity.

Key Constraints:

The primary key of the book entity is Book_ID, it contains 1 foreign key which is GENRE_NAME from the GENRE table. The book entity is a strong entity. The GENRE entity has the Genre_ID as the primary key. It is also a strong entity.

In BOOK_STATUS, the BOOK_STATUS_ID is the ID of the BOOK_STATUS. It is also a strong entity.

Clarification:

In the BOOK entity, the BOOK_ID is a unique ID generated when a book is first recorded into the system. The other attributes which are the NAME, TITLE, PRICE, QUANTITY_IN_STOCK are used to provide more information about the book like the book title, author, price and the quantity of that book available.

In GENRE entity, the GENRE_ID is a unique ID that is generated when a genre is recorded into the system. It has only one attribute which is the GENRE_NAME to categorize the books into different genres, such as fiction, non fiction and so on.

The BOOK_STATUS_ID is the ID of the BOOK_STATUS, and the attribute name STATUS_NAME is to show whether the book is “in stock” or “out of stock”.

3.4 Sales Module

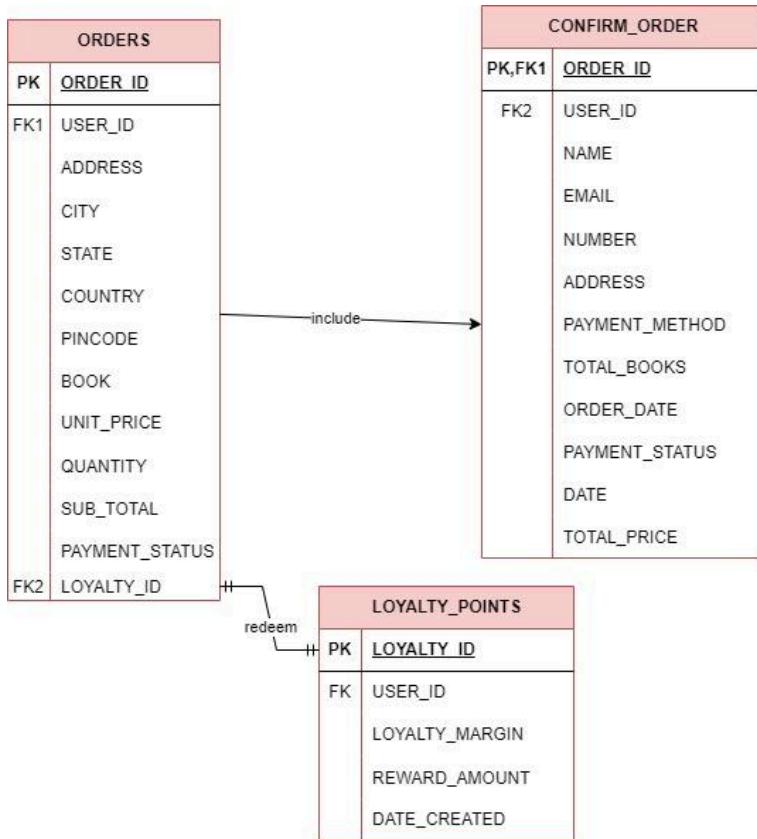


Figure 4: ERD Diagram for Sales Module

Explanation:

Sales module contains 3 entities, namely ORDER, CONFIRM_ORDER AND LOYALTY_POINTS.

Relationships:

The LOYALTY_POINTS AND ORDER entity has a one-to-many relationship with a strong relationship as the LOYALTY_POINTS entity cannot exist on its own.

ORDER and CONFIRM_ORDER entities have foreign key USER_ID to refer to the USER_INFO table.

The CONFIRM_ORDER entity is a weak entity as it is existence dependent on the ORDER entity and cannot exist without it. However, it depicts a strong relationship between the two entities.

Key Constraints:

The primary key of the ORDER entity is ID and the foreign key is USER_ID and LOYALTY_ID. USER_ID refers to the USER_INFO entity and LOYALTY_ID refers to the LOYALTY_POINTS entity.

The CONFIRM_ORDER entity has a primary key named ORDER_ID and its foreign keys consist of USER_ID from USER_INFO entity.

The LOYALTY_POINTS entity has a primary key named LOYALTY_ID.

Clarifications:

In the ORDER entity, ID is a unique attribute given each time a purchase is made by a customer. The other attributes are USER_ID which references the USER_INFO entity, ADDRESS, CITY, STATE, COUNTRY and PINCODE which stores the customer shipping details. BOOK, UNIT_PRICE, QUANTITY, SUB_TOTAL and PAYMENT_STATUS to show the order details. LOYALTY_ID which references the LOYALTY_POINTS entity .

In the CONFIRM_ORDER entity, the ORDER_ID is a unique attribute when an order is confirmed. USER_ID which references the USER_INFO entity. The other attributes are NAME, EMAIL, NUMBER, ADDRESS, PAYMENT_METHOD, TOTAL_BOOKS, ORDER_DATE, PAYMENT_STATUS, DATE and TOTAL_PRICE.

In the LOYALTY_POINTS entity, LOYALTY_ID is the type of loyalty that can be redeemed. USER_ID will note the customer's purchase details. LOYALTY_MARGIN is the range of purchase to be made by a customer to redeem a particular loyalty type. REWARD_AMOUNT is the maximum discount that a customer can get. DATE_CREATED is the date when the offer was entered into the system.

3.5 Combined ERD - ReadCycle Database

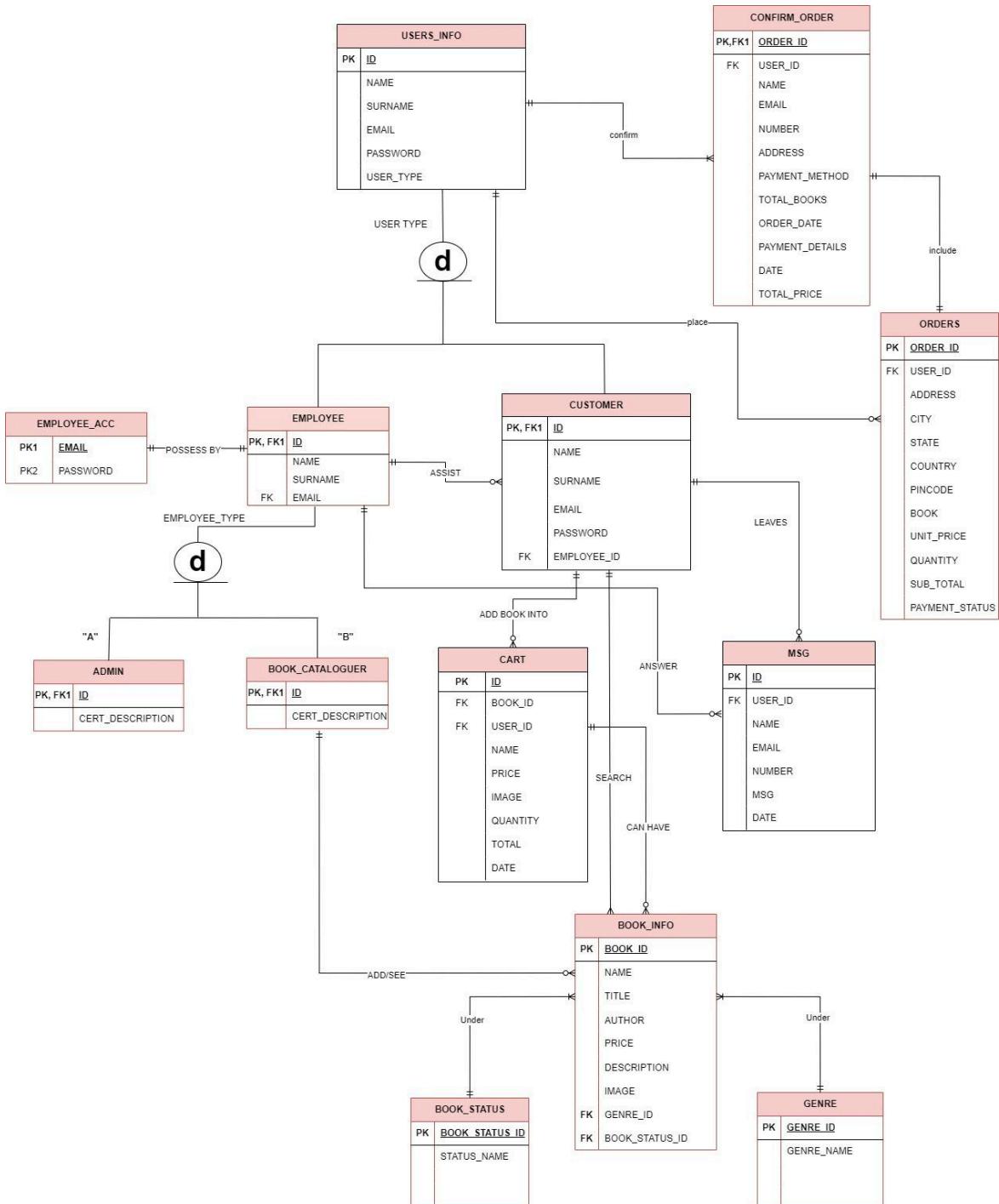


Figure 5: ERD Diagram for the entire ReadCycle Bookstore database

Explanation:

This ERD is a combination of all the four modules. This ERD contains 13 entities and 16 relationships in total. After the combination of all four modules, there are 3 relationships that overlap with each module.

Relationships:

The relationship between CUSTOMER and EMPLOYEE (business rule 5.1.) is a one-to-many relationship which is a weak relationship. The CUSTOMER entity is a strong entity.

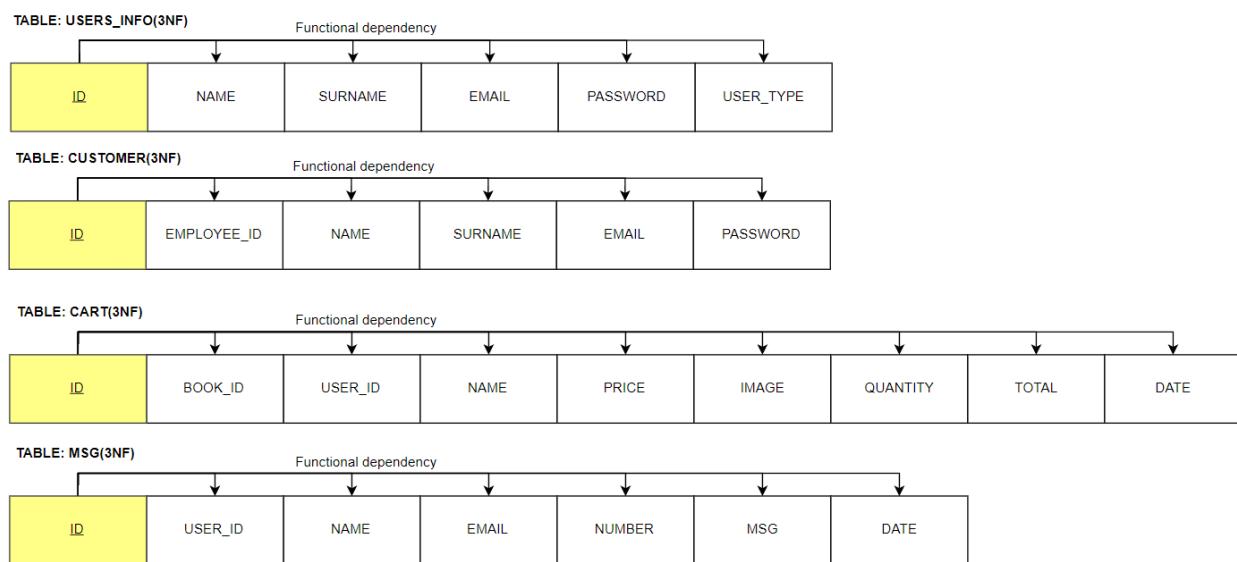
The relationship between EMPLOYEE and ORDERS (business rule 5.2) is a weak relationship. Primary key of ORDER does not contain the primary key component of the EMPLOYEE_ID.

The relationship between EMPLOYEE and MSG (business rule 5.3) is a weak relationship. The primary key of the MSG entity does not contain the EMPLOYEE_ID as its primary key.

4.0 Normalization

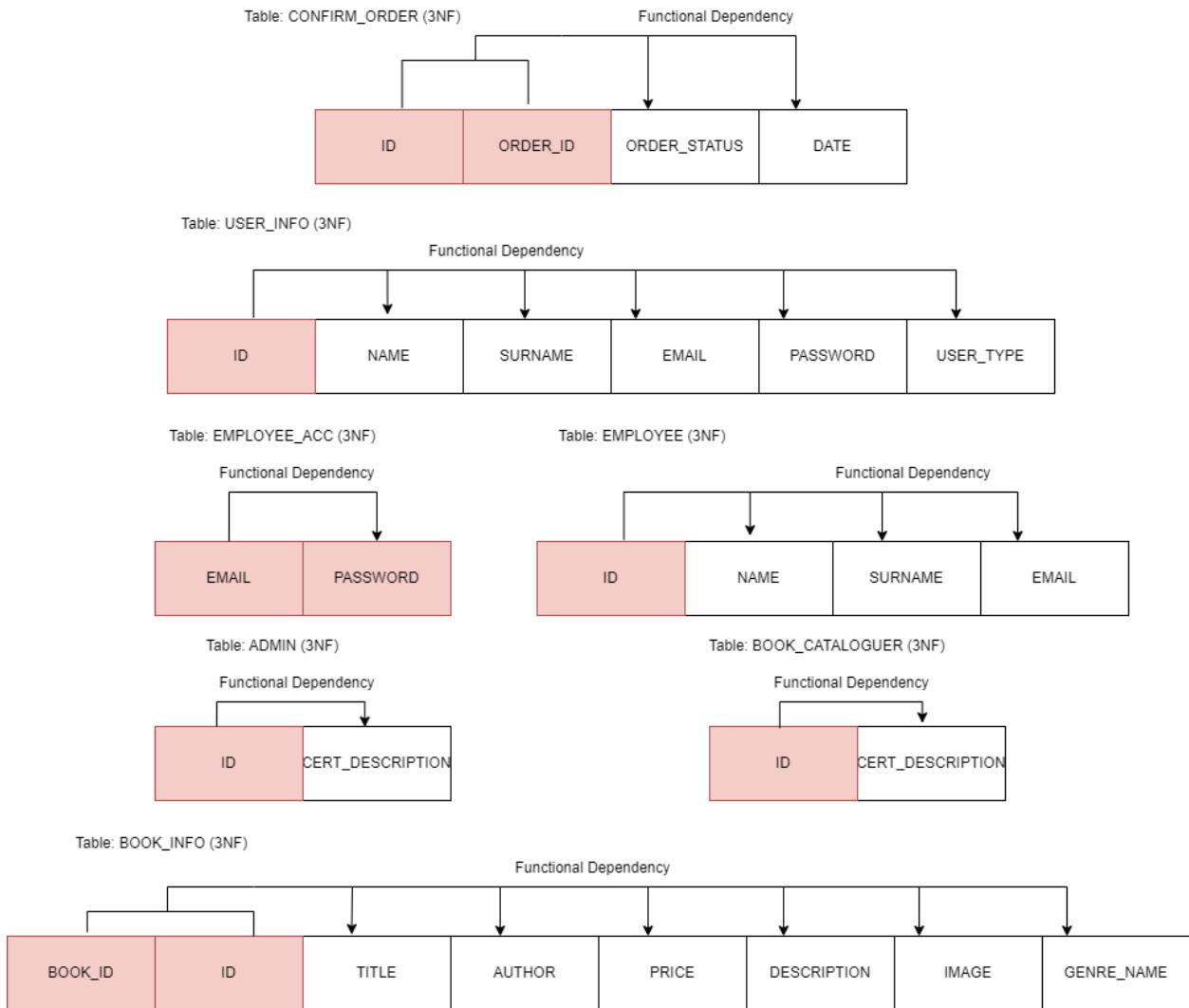
4.1 Customer module

All the four entities of the customer module are in 3NF since there are no partial and transitive dependencies. The following shows the dependency diagrams of the tables.



4.2 Employee module

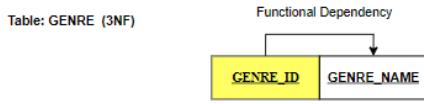
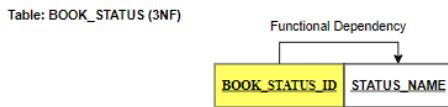
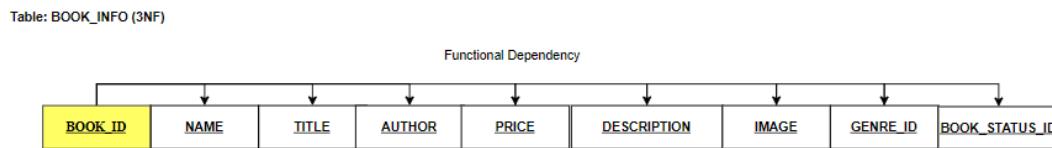
All seven tables are in 3NF which do not contain partial dependency and transitive dependency. Below shows the dependency diagrams of the tables. NOTE: All attributes in table EMPLOYEE_ACC which are ID and PASSWORD are primary keys.



4.3 Inventory module

In the inventory module, the BOOK, GENRE, GENRE_BOOK, SUPPLIER, BOOK_SUPPLIER and BOOK_STATUS tables are already in 3NF because they have no partial or transitive dependencies. The BOOK module however is in 2NF because it has transitive dependency. The entities in the yellow block are the primary keys.

NOTE: All attributes in the GENRE_BOOK (GENRE_ID, BOOK_ID) and BOOK_SUPPLIER (BOOK_ID, SUPPLIER_ID) tables are primary keys.



4.4 Sales module

All the three entities of the sales module are in 3NF since there are no partial and transitive dependencies. The following shows the dependency diagrams of the tables.

TABLE: ORDERS (3NF)

Functional dependency						
ORDER_ID	USER_ID	ADDRESS	CITY	STATE	COUNTRY	PINCODE

BOOK	UNIT_PRICE	QUANTITY	SUB_TOTAL	SUB_TOTAL	PAYMENT_STATUS	LOYALTY_ID
------	------------	----------	-----------	-----------	----------------	------------

TABLE: CONFIRM_ORDER (3NF)

Functional dependency						
ORDER_ID	USER_ID	NAME	EMAIL	NUMBER	ADDRESS	PAYMENT_METHOD

TOTAL_BOOKS	ORDER_DATE	PAYMENT_STATUS	DATE	TOTAL_PRICE
-------------	------------	----------------	------	-------------

TABLE: LOYALTY_POINTS(3NF)

Functional dependency				
LOYALTY_ID	USER_ID	LOYALTY_MARGIN	REWARD_AMOUNT	DATE_CREATED

5.0 Data Dictionary

5.1 Customer module

Table Name	Attribute Name	Contents	Data Type	Format	Nullable	PK or FK	Reference Table
USERS_INFO	ID	Customer & Employee id	INT(100)	1	No	PK	
	NAME	Users name	VARCHAR R(20)	Samantha	No		
	SURNAME	Users surname	VARCHAR R(20)	John	No		
	EMAIL	Users email	VARCHAR R(20)	samantha@gmail.com	No		
	PASSWORD	Users password	VARCHAR R(20)	samantha123	No		
	USER_TYPE	Customer or Employee	VARCHAR R(20)	Customer or Employee	No		
CUSTOMER	ID	Customer's account id	INT(100)	1	No	PK	
	EMPLOYEE_ID	Employee's id	INT(100)	1	No	FK	EMPLOYEE
	NAME	Customer's	VARCHAR	Jennie	No		

		name	R(20)				
	SURNAME	Customer's surname	VARCHA R(20)	Kim	No		
	EMAIL	Customer's email	VARCHA R(20)	kimjennie@gmail.com	No		
	PASSWORD	Customer's password	VARCHA R(20)	jennie123	No		
CART	ID	Customer's id	INT(100)	1	No	PK	
	BOOK_ID	Book's id	INT(20)	1	No	FK	BOOK
	USER_ID	Total quantity added in cart	INT(100)	1	NO	FK	USERS_INFO
	NAME	Title of the book	VARCHA R(50)	Last Blood	NO		
	PRICE	Price of book	INT(20)	RM 20	NO		
	IMAGE	Cover image of book	VARCHA R(25)		NO		
	QUANTITY	Amount of book in shopping cart	INT(25)	1	NO		
	TOTAL	Total price	DOUBLE(10,2)	RM 100	NO		
	DATE	Date book was added in shopping cart	DATE	YYYY-MM-DD	NO		

MSG	ID	MESSAGE ID	INT(100)	1	No	PK	
	USER_ID	User's id	INT(100)	1	No	FK	USERS_INFO
	NAME	Customer's name	VARCHAR(20)	Kim Jennie	No		
	EMAIL	Customer's email	VARCHAR(20)	jennie@gmail.com	No		
	NUMBER	Customer's phone number	INT(20)	+60117 384737 3	No		
	MSG	Textual comment or feedback from the customers	TEXT	feedback	No		
	DATE	Date the message was sent	DATE	dd-mm-yyyy	No		

5.2 Employee module

Table Name	Attribute Name	Contents	Data Type	Format	Null able	PK or FK	Reference Table

EMPLOYEE	ID	Employee's id	INT(100)	51	No	PK	
	NAME	Employee's first name	VARCHAR(20)	Sam	No		
	SURNAME	Employee's last name	VARCHAR(20)	Smith	No		
	EMAIL	Employee's email	VARCHAR(20)	sam@gmail.com	No		

EMPLOYEE_ACC	EMAIL	Employee's email	VARCHAR(20)	sam@gmail.com	No	PK	
	PASSWORD	Password created by employee to login	VARCHAR(20)	Pasta123&	No		
USER_INFO	ID	Employee's id	INT(100)	51	No	PK	
	NAME	Employee's first name	VARCHAR(20)	Sam	No		
	SURNAME	Employee's last name	VARCHAR(20)	Smith	No		
	EMAIL	Employee's email	VARCHAR(20)	sam@gmail.com	No	PK	

	PASSWORD	Password created by employee to login	VARCHAR(20)	Pasta123&	No		
	USER_TYPE	State the user type	VARCHAR(20)	Admin	N O		
CONFIRM_ORDER	ID	Employee's id	INT(100)	51	No	PK FK	EMPL LOYEE
	ORDER_ID	Salary's id for each salary given	VARCHAR(4)	1001	No	PK FK	ORDER
	ORDER_STATUS	State the status of the order	VARCHAR(100)	Pending	No		
	DATE	State the date when the order status was change	VARCHAR(20)	01/02/2024	N O		

BOOK_CATALOGUE	ID	Employee's id	INT(100)	51	No	PK, FK	EMPLOYEE
	CERT_DESCRIPIN	Description of the certification	VARC HAR (150)		No		
ADMIN	ID	Employee's id	INT(100)	51	No	PK, FK	EMPLOYEE

	CERT_DESCRIPTION	Description of the certification	VARC HAR(150)		No		
BOOK_INFO	BOOK_ID	Book's id	INT(100)	72	No	PK	
	ID	Book cataloguer id	INT(100)	72	No	PK	
	AUTHOR	The author of the books	VARCHAR 2(100)	Hillary Mantel	N O		
	PRICE	The price of the books	DECIMAL(10,0)	35	N O		
	DESCRIPTION	Description of the book	text		n o		
	IMAGE	Picture of the books	VARCHAR (10)		n o		
	GENRE_NAME	State genre of book	VARCHAR (50)	knowledg e	n o		
	TITLE	State the title of the book	VARCHAR (20)	Wolf hall	n o		

5.3 Inventory module

Table name	Attribute name	Contents	Data Type	Format	Nullable	PK or FK	Reference Table

BOOK	BOOK_ID	Id for the books	INT(100)	1	NO	PK	
	TITLE	The title of the books	VARCH AR2(255)	Wolf hall	NO		
	AUTHOR	The author of the books	VARCH AR2(100)	Hillary Mantel	NO		
	PRICE	The price of the books	DECIM AL(10,0)	35	NO		
	DESCRIPTION	Synopsis of the books	text	This story centers around...	NO		
	IMAGE	Picture of the books	VARCH AR(10)	picture			
	BOOK_STATUS_ID	Id of book status	DECIM AL(1,0)	1	NO	FK	BOOK_STATUS
GENRE	GENRE_ID	The Id of the genre of books	VARCH AR(5)	A3	NO	PK	
	GENRE_NAME	Name of genres	VARCH AR(50)	Adventur e	NO		
BOOK_STATUS	BOOK_STATUS_ID	Id for status of the books	DECIM AL(1,0)	1	NO	PK	

STATUS_NAME	Description of the status of books	CHAR(15)	In stock	NO		
-------------	------------------------------------	----------	----------	----	--	--

5.4 Sales module

Table Name	Attribute Name	Contents	Data Type	Format	Null able	PK or FK	Reference Table
ORDER S	ORDER_ID	Id number of order placed	INT (225)	1001	No	PK	
	USER_ID	Id number of customer	INT (100)	0001	No	FK	USER_INFO
	ADDRESS	Address of customer	VARCHAR(50)	150.50.	No		
	CITY	City of customer	VARCHAR (100)	01	No		
	STATE	State of the customer	VARCHAR (50)	YYYYMM-DDHH24:MI:SS	No		
	COUNTRY	Country of the customer	VARCHAR (50)	1	No		
	PINCODE	Pincode of the	INT(6)	001	No		

		customer account					
	BOOK	Book purchased	VARCHAR(50)	A3	No		
	UNIT_PRICE	Price of each book	DOUBLE(10,2)		No		
	QUANTITY	Number of books purchased	INT(10)		No		
	SUB_TOTAL	Total sum of cost	DOUBLE(10,2)		No		
	PAYMENT_STATUS	Whether book is available or not	VARCHAR(100)		No		
	LOYALTY_ID	Loyalty points id if applicable to customer	VARCHAR(20)		No	FK	LOYALTY_POINTS
CONFIRM_ORDER	ORDER_ID	Id number of order placed	INT(100)	1	No	PK	
	USER_ID	Id number of customer	INT (100)	YYYYMM-DDHH24:MI:SS	No	FK	USER_INFO
	NAME	Name of customer	VARCHAR (50)	YYYYMM-DD	No		

				HH24:M I:S S			
EMAIL	Email of the customer	VARCHA R(50)	1001	No			
NUMBER	Contact number of the customer	VARCHA R(500)	MACC1 234	No			
ADDRESS	Address of the customer	VARCHA R(20)		No			
PAYMENT_M EHTOD	Payment method chosen by customer	VARCHA R(500)		No			
TOTAL_BOO KS	Total number of books purchased	VARCHA R(500)		No			
ORDER_DAT E	Date of order placed	VARCHA R(100)		No			
PAYMENT_S TATUS	Details of payment info	VARCHA R(100)		No			
DATE	Date of order	VARCHA R(20)		No			

		confirmed					
	TOTAL_PRICE	Total sum of cost	DOUBLE(10,2)		No		
LOYALTY_POINTS	LOYALTY_ID	Loyalty points id	VARCHAR (20)	01	No	PK	
	USER_ID	Id number of customer	INT (100)	001	Yes	FK	USER_INFO
	LOYALTY_MARGIN	Range of loyalty placed	VARCHAR (20)	25<x<50	No		
	REWARD_AMOUNT	Maximum discount amount	DECIMAL (5,2)	10	Yes		
	DATE_CREATED	Date of creation	VARCHAR (20)	YYYYMM-DD	Yes		

6.0 Data Implementation

6.1 Customer module

```
CREATE TABLE `users_info` (
  `Id` int(100) NOT NULL,
  `name` varchar(20) NOT NULL,
  `surname` varchar(20) NOT NULL,
  `email` varchar(20) NOT NULL,
  `password` varchar(20) NOT NULL,
  `user_type` varchar(20) NOT NULL DEFAULT 'user'
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4;
```

```

CREATE TABLE `customer` (
  `ID` int(100) NOT NULL,
  `NAME` varchar(20) NOT NULL,
  `SURNAME` varchar(20) NOT NULL,
  `EMAIL` varchar(20) NOT NULL,
  `PASSWORD` varchar(20) NOT NULL,
  `EMPLOYEE_ID` int(100) DEFAULT NULL
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_general_ci;
/

CREATE TABLE `cart` (
  `id` int(100) NOT NULL,
  `book_id` int(20) NOT NULL,
  `user_id` int(100) NOT NULL,
  `name` varchar(50) NOT NULL,
  `price` int(20) NOT NULL,
  `image` varchar(25) NOT NULL,
  `quantity` int(25) NOT NULL,
  `total` double(10,2) NOT NULL,
  `date` datetime NOT NULL DEFAULT current_timestamp()
);
/

CREATE TABLE `msg` (
  `id` int(100) NOT NULL,
  `user_id` int(100) NOT NULL,
  `name` varchar(20) NOT NULL,
  `email` varchar(20) NOT NULL,
  `number` int(20) NOT NULL,
  `msg` text NOT NULL,
  `date` datetime NOT NULL DEFAULT current_timestamp()
);
/

```

6.2 Employee module

```
CREATE TABLE `users_info` (
  `Id` int(100) NOT NULL,
  `name` varchar(20) NOT NULL,
  `surname` varchar(20) NOT NULL,
  `email` varchar(20) NOT NULL,
  `password` varchar(20) NOT NULL,
  `user_type` varchar(20) NOT NULL DEFAULT 'user'
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_general_ci;
```

/

```
CREATE TABLE ``employee`` (
  `Id` int(100) NOT NULL,
  `name` varchar(20) NOT NULL,
  `surname` varchar(20) NOT NULL,
  `email` varchar(20) NOT NULL
```

);

/

```
CREATE TABLE ``employee_acc`` (
  `email` varchar(20) NOT NULL,
  `password` varchar(20) NOT NULL
);
```

/

```

CREATE TABLE ``admin`` (
    `Id` int(100) NOT NULL,
    ``cert_description`` varchar(150) NOT NULL
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_general_ci;

/
CREATE TABLE ``book_cataloguer`` (
    `Id` int(100) NOT NULL,
    ``cert_description`` varchar(150) NOT NULL
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4 COLLATE=utf8mb4_general_ci;

```

6.3 Inventory module

```

CREATE TABLE `book_info` (
    `book_id` int(100) NOT NULL,
    `Id` int(100) NOT NULL,
    `name` varchar(20) NOT NULL,
    `title` varchar(20) NOT NULL,
    `price` decimal(10,0) NOT NULL,
    `genre_name` varchar(50) NOT NULL,
    `description` text NOT NULL,
    `image` varchar(10) NOT NULL

```

```
) ;

/
CREATE TABLE `book_status` (
    `BOOK_STATUS_ID` decimal(1,0) NOT NULL,
    `STATUS_NAME` char(15) NOT NULL
);
/
CREATE TABLE `genre` (
    `GENRE_ID` varchar(5) NOT NULL,
    `GENRE_NAME` varchar(50) NOT NULL
);
/
ALTER TABLE `book_info`
    ADD PRIMARY KEY (`BOOK_ID`),
    ADD KEY `GENRE_ID`(`GENRE_NAME`),
;
ALTER TABLE `book_status`
    ADD PRIMARY KEY (`BOOK_STATUS_ID`);
/
```

```
/ALTER TABLE `genre`  
ADD PRIMARY KEY (`GENRE_ID`);  
  
/  
  
/  
  
ALTER TABLE `book_info`  
ADD CONSTRAINT `book_ibfk_1` FOREIGN KEY (`GENRE_ID`) REFERENCES `genre`  
(`GENRE_ID`),  
ADD CONSTRAINT `book_ibfk_2` FOREIGN KEY (`GENRE_ID`) REFERENCES `genre`  
(`GENRE_ID`),  
ADD CONSTRAINT `book_ibfk_3` FOREIGN KEY (`GENRE_ID`) REFERENCES `genre`  
(`GENRE_ID`),/
```

6.4 Sales module

```
CREATE TABLE `confirm_order` (  
    `order_id` int(100) NOT NULL,  
    `user_id` int(100) NOT NULL,  
    `name` varchar(50) NOT NULL,  
    `email` varchar(50) NOT NULL,  
    `number` int(12) NOT NULL,  
    `address` varchar(500) NOT NULL,  
    `payment_method` varchar(20) NOT NULL,
```

```
`total_books` varchar(500) NOT NULL,  
 `order_date` varchar(100) NOT NULL,  
 `payment_status` varchar(100) NOT NULL DEFAULT 'pending',  
 `date` varchar(20) NOT NULL,  
 `total_price` double(10,2) NOT NULL  
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4;
```

```
CREATE TABLE `orders` (  
 `id` int(225) NOT NULL,  
 `user_id` int(100) NOT NULL,  
 `address` varchar(50) NOT NULL,  
 `city` varchar(100) NOT NULL,  
 `state` varchar(50) NOT NULL,  
 `country` varchar(50) NOT NULL,  
 `pincode` int(6) NOT NULL,  
 `book` varchar(50) NOT NULL,  
 `unit_price` double(10,2) NOT NULL,  
 `quantity` int(10) NOT NULL,  
 `sub_total` double(10,2) NOT NULL,  
 `payment_status` varchar(100) NOT NULL DEFAULT 'pending'  
) ENGINE=InnoDB DEFAULT CHARSET=utf8mb4;
```

7.0 Front-End System Design and Implementation

Employee and Customer registration page

Employees can register based on employee type.

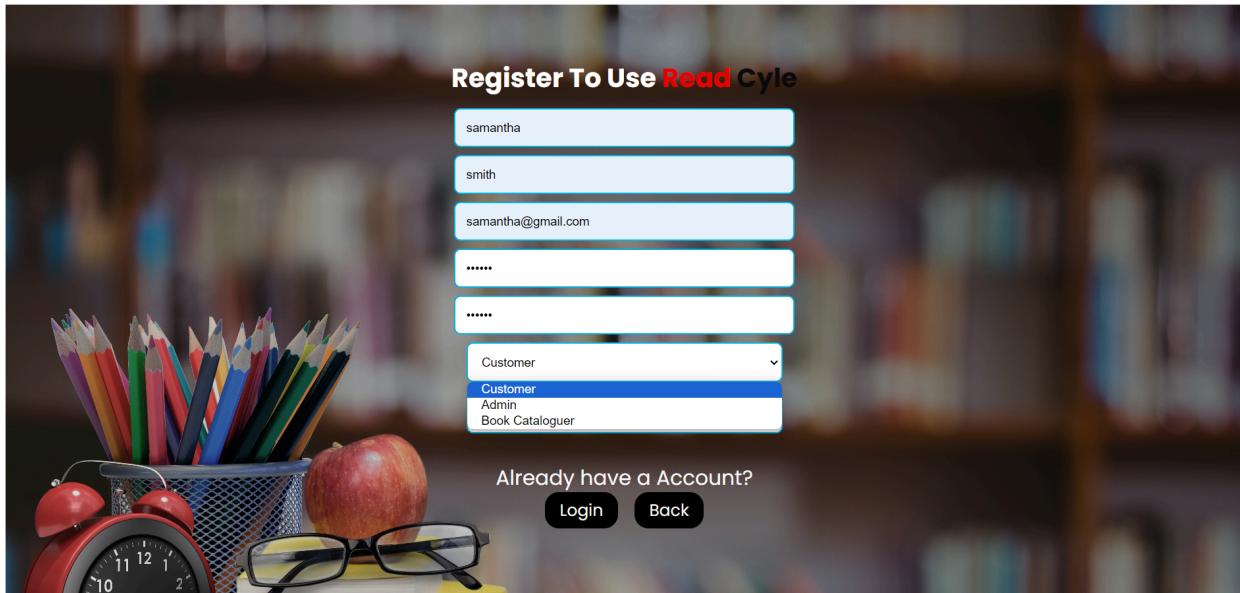


Figure 1: Sign Up Page

Employee and Customer login page

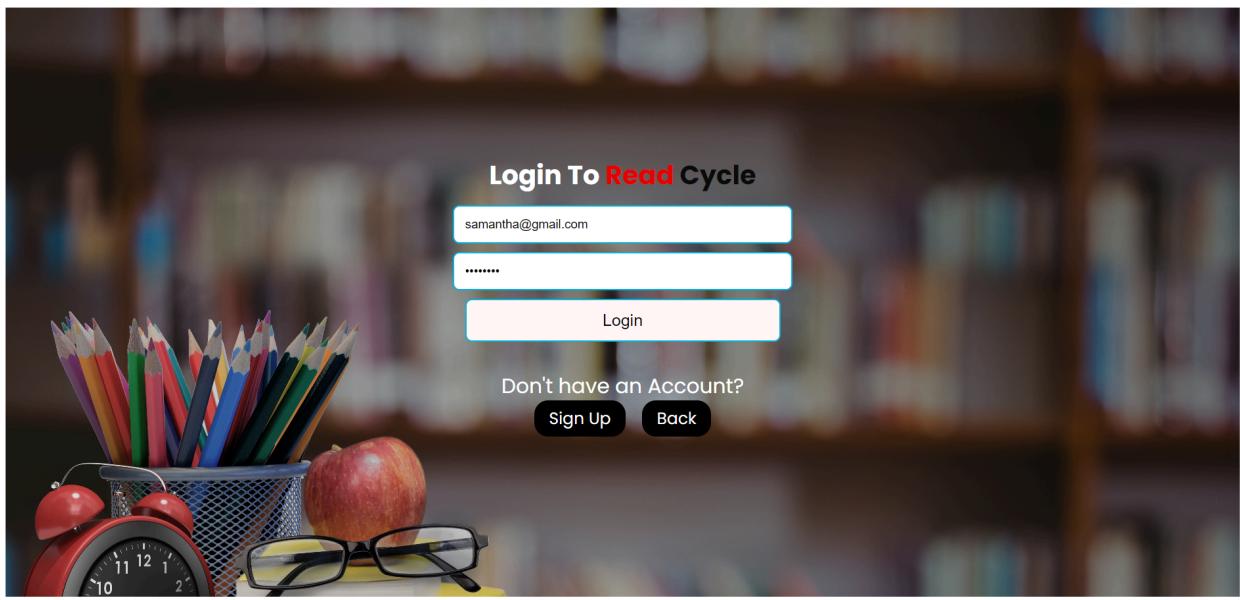


Figure 2: Login Page

Customer Dashboard

The customer home page shows the newly arrived books and books under three genres namely adventure, knowledge and magical. In addition, the customer can navigate through the page and contact our bookstore as well as view the shopping cart and orders placed.

The screenshot shows the customer dashboard with a header "Read Cycle" and navigation links for Home, Contact US, Cart, and Orders. A search bar and user profile "Hello, samantha samantha@gmail.com" are also present. The main content area features a "New Arrived" section with four book cards:

- Last Blood** by Alexandra Gregg, Price: RM 50/-, Know More
- Batman Knight**, Price: RM 17/-, Know More
- Sunrise**, Price: RM 80/-, Know More
- Seventh Sun** by Lani Forbes, Price: RM 56/-, Know More

Figure 3: Customer Home Page

Customers can search books and for any new unavailable book, a message would be printed on the page.

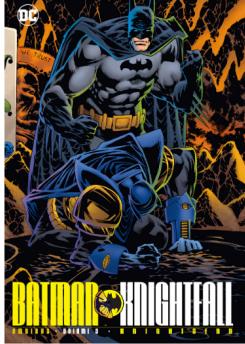
The screenshot shows the searching page with a search bar containing "search products...". The search results for "THE SEA GIRL" are displayed, showing one result:

Search Result for "THE SEA GIRL":

The Sea Gave Back by Adrienne Young
Author: Adrienne Young
Name: The Sea Girl
Price: ₦ 33/-
Know More

Figure 4: Searching Page

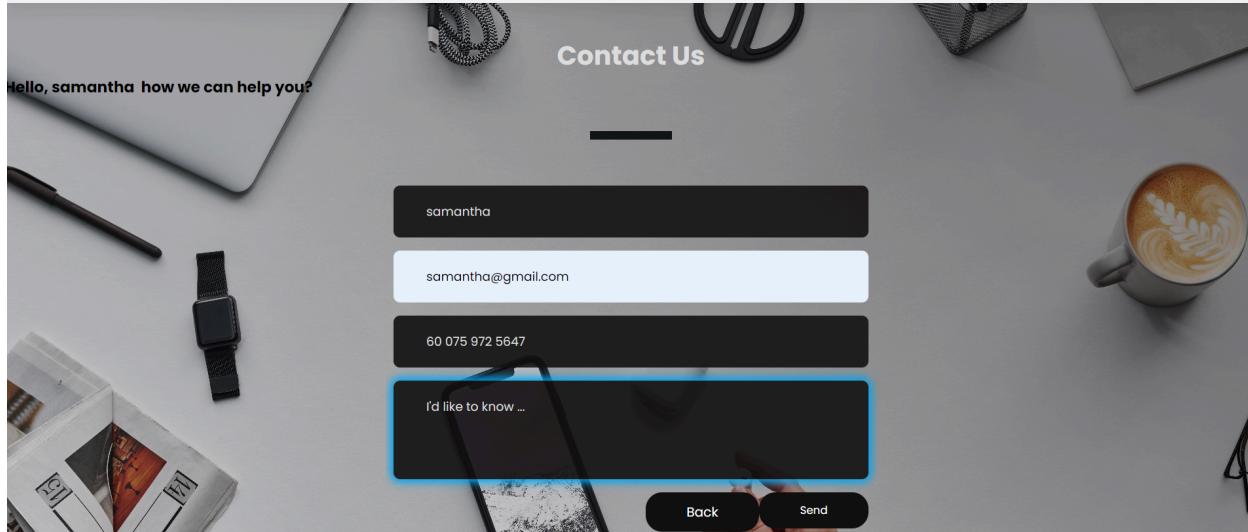
The customer can select a particular book and is directed to the book entails page where one can add the book to cart as well as modify the quantity.



A screenshot of a web page showing a book titled "Batman Knight". The book cover features Batman in a dynamic pose against a colorful, abstract background. The title "BATMAN KNIGHTFALL" is visible at the bottom. To the right of the book image, the author is listed as "DC", the name is "Name: Batman Knight", the price is "Price: RM 17/-", and a quantity input field shows "1". Below these details is a "Add To Cart" button with a shopping cart icon. A section titled "Book Details" contains a brief description: "This collection of adorable stories for children show us how the Asuras tried to defeat the Devas, and how the gods ultimately won over. These stories will entertain, educate and provide healthy enjoyment to the readers."

Figure 5: Book Details Page

Customers can contact employees through the Contact Us Page and send any queries they have.



A screenshot of a web page titled "Contact Us". The page has a clean, modern design with a light gray background featuring a desk setup with a laptop, a watch, and a coffee cup. The title "Contact Us" is centered above a form. The form fields include a recipient name "samantha", an email address "samantha@gmail.com", and a phone number "60 075 972 5647". Below these fields is a message input box containing the placeholder text "I'd like to know ...". At the bottom of the form are two buttons: "Back" and "Send".

Figure 6: Contact Us Page

Customers can view books that are in the cart alongside with the quantity and total price. Customers can either continue shopping or proceed to check out.

Image	Name	price	Quantity	Total (RM)
	Love Boat	45	1	45
	Atomic Habits	69	2	138
				RM 183/-
		Total		
			Proceed To Checkout	Continue Shopping

Quick Links

- Home
- Genre ▾
- About Us

Account

- Profile
- Cart
- Order History
- LogOut

Contact

- Contact Form
- +60 5324851596
- contact@ReadCycle.com
- Address: Kuala Lumpur 05200

Figure 8: Cart Page

If a customer wishes to proceed to check out, he is directed to the Checkout Page.

Place Your Order Here
Just One Step away from getting your books

Billing Address

Full Name: Samantha Smith

Email: samantha@gmail.com

Number: +91987456123

Address: Jalan Tun Razak, 03400, Alor Setar, Kedah

City:

Books In Cart

Love Boat	(RM 45/- x 1)
Atomic Habits	(RM 69/- x 2)
Grand total :	RM 183/-

Payment

Payment Method : Cash on delivery

Figure 9: Cart Page

The screenshot shows a form for entering shipping details. It includes fields for State ('Kedah'), Country ('Malaysia'), Pincode ('03400'), and a checkbox for 'Shipping address same as billing'. A blue 'Continue to checkout' button is at the bottom.

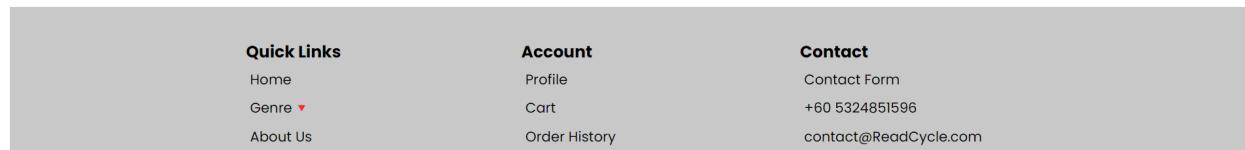


Figure 7: Checkout Page

After placing an order, customers can track the order status on the Order History Page.

The screenshot shows the 'PLACED ORDERS' section. It displays the following order details:

- Order Date : 08-Feb-2024
- Order Id : # 33
- Name : Samantha Smith
- Mobile Number : 60
- Email Id : samantha@gmail.com
- Address : Jalan Tun Razak, 03400, Alor Setar, Kedah, Alor Setar, Kedah, Malaysia - 03400
- Payment Method : cash on delivery
- Your orders : Love Boat #90,(1) Atomic Habits #72,(2)
- Total price : ₹ 183.00/-
- Payment status : pending
- [Print Receipt](#)

At the bottom, there are links for Quick Links, Account, and Contact.

Figure 8: Order History Page

Employee Dashboard

The employee home page displays the option such as 'Add Books', viewing the orders status as well as modifying the users. The page allows the admin to respond to the user's queries.

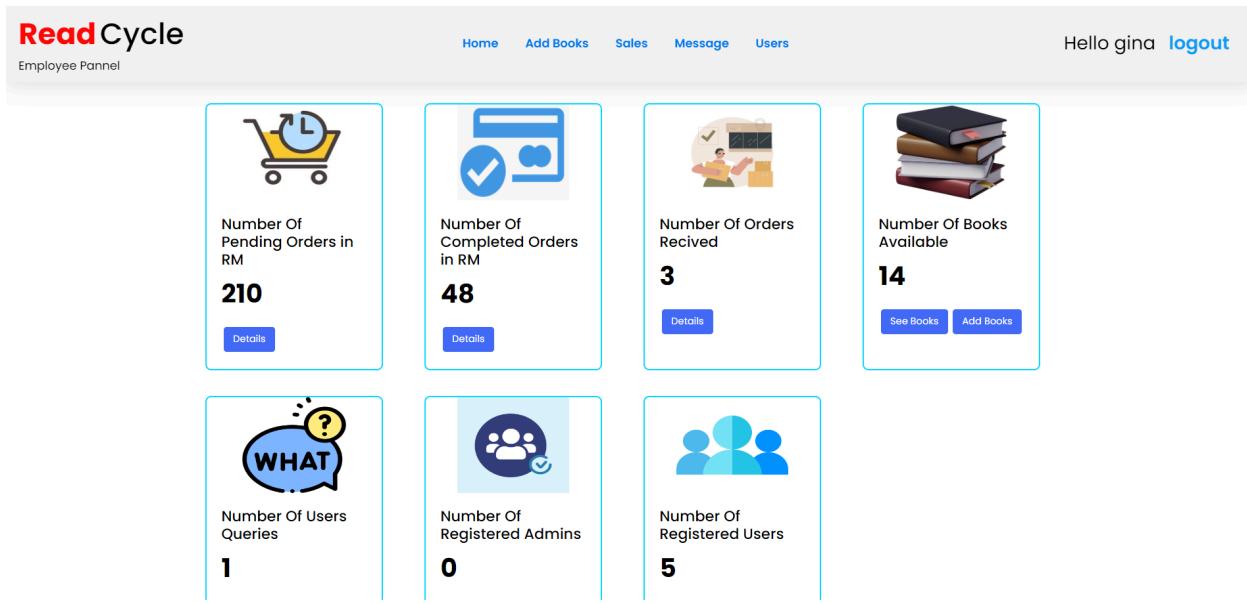


Figure 9: Admin Home Page

Placed Order Page

The employee can view the order pace by customers and can manipulate the order status.

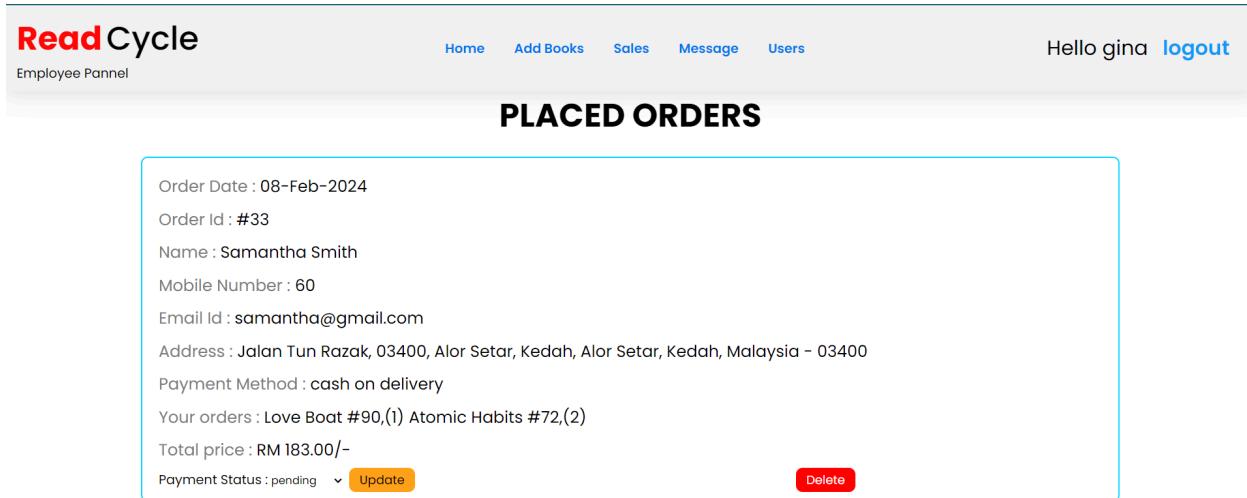


Figure 10: Place Order Page

Add Book Page

This page allows the book cataloguer to add a specific book.

ReadCycle

Admin Panel

[See All Books](#)

[Home](#) [Add Books](#) [Orders](#) [Message](#) [Users](#)

Hello sam [logout](#)

Add Books To ReadCycle

Enter book Name

Enter Author name

enter product price

Adventure

Enter book description

No file chosen

Figure 11: Add Book Page

Books Update Page

Book cataloguer can update information regarding books.

ReadCycle

Employee Panel

[Add More Books](#)

[Home](#) [Add Books](#) [Sales](#) [Message](#) [Users](#)

Hello gina [logout](#)



Last Blood

Alexander G

Adventure ▾

The political struggle in the ancient city of Hastinapur is esca

50

Figure 12: Book Update Page

Message Box page

This page allows employees to view queries of customers.

The screenshot shows a web application titled "Read Cycle" with a "Employee Panel" header. The navigation menu includes Home, Add Books, Sales, Message, and Users. On the right, it says "Hello gina" and has a "logout" link. The main content area displays a single message entry in a blue-bordered box:

Message ID: 10
Name: Sam
Email ID: Sam@Gmail.Com
Number: 2147483647
Message: i want to ...
Date: 2024-02-09 01:37:25
Delete

Figure 13: Book Update Page

Users Details Page

Admin can delete or update the user's info. It applies to both employees and customers.

The screenshot shows a web application titled "Read Cycle" with a "Employee Panel" header. The navigation menu includes Home, Add Books, Sales, Message, and Users. On the right, it says "Hello gina" and has a "logout" link. The main content area displays five user entries in separate blue-bordered boxes:

User ID: 72 Name: Sam Smith Email ID: Sam@Gmail.Com Password: sam User type: User Update Delete	User ID: 74 Name: Walee Maghoo Email ID: Walee@Gmail.Com Password: walee User type: Admin Update Delete	User ID: 75 Name: Samantha Smith Email ID: Samantha@Gmail.Com Password: samantha User type: User Update Delete
User ID: 78 Name: Awra Tan Email ID: Tan@Gmail.Com Password: tan User type: Admin Update Delete	User ID: 79 Name: Gina Guini Email ID: Gina@Gmail.Com Password: gina User type: Admin Update Delete	

Figure 14: Users Details Page

User Update Page

From User entails Page, admin is directed to User Update Page if he wants to update user information.

The screenshot shows a user update interface for the 'Read Cycle' application. At the top, there's a navigation bar with links for Home, Add Books, Sales, Message, and Users. On the right, it says 'Hello gina' and has a 'logout' link. Below the navigation, there are two sections for 'User type: Admin' with 'Update Delete' buttons. The main area displays a list of users:

- sam
- smith
- sam@gmail.com
- ...
- User

At the bottom, there are 'Update' and 'Cancel' buttons.

Figure 15: User Update Page

8.0 Project Problems and Pitfalls

Creating a website for the first time can present various challenges. It's not uncommon for teams with basic programming knowledge to encounter hurdles during the development process. Lacking experience made us doubt what we were conveying into our report and it did take quite an amount of time to complete the website. One significant issue faced by our team was the difficulty in connecting the four modules. This task can be intricate, especially for beginners, as it involves ensuring seamless communication between different parts of the application.

Furthermore, the decision to simplify coherency between coding and the database led to adjustments in the database structure. For example, not including all entities in the employee module might have been a trade-off to streamline the development process, but it could potentially have implications on the overall functionality and completeness of the system.

The challenges extended to the unexpected shutdowns of the XAMPP application, disrupting the workflow and causing some team members to redo their module databases in order for the website to be workable. Moreover it was our first time using this application and we faced a lot of problems but through the tutorial session, we learnt how to navigate through the app. We also had to add some attributes during the implementation in the tables due to our oversight during the design process.

Justification

Our project underwent numerous changes and iterations. The objectives were revised multiple times to meet our current needs and capabilities, and the business rules had to be frequently reviewed. Our entity-relationship (ER) diagram also went through several changes. Initially starting with 4 modules and 31 entities, we eventually streamlined it down to just 13 tables by the end. This allowed us to implement a database system that is usable and integrated with the frontend.

The main reason for reducing the number of entities was primarily due to the discovery that the source code we were integrating for the frontend was not compatible with our database. With little to no knowledge and expertise on the frontend development side, we made the decision to adjust our database and its entities. This involved releasing the ones that weren't functioning properly and integrating other tables to ensure the SQL database could be successfully imported into PHPMyAdmin and integrated with the frontend code. This resolution addressed our frontend implementation issues despite encountering many hurdles along the way.

9.0 Conclusion/Recommendations/Future Works

Conclusion

In conclusion, crafting a robust database system proves to be a formidable task, demanding both time and expertise. Our endeavor resulted in the development of an online second-hand bookstore, enabling customers to effortlessly explore a vast array of books, place orders, and have their selections swiftly confirmed and readied for delivery or self pickup.

We have acquired extensive knowledge throughout our journey, particularly in constructing our database with MySQL and PHP using CSS. Through this process, we gained expertise in crafting Entity-Relationship Diagrams (ERDs) and distinguishing between strong and weak entities, as well as defining relationships among them. Additionally, we diligently normalized our tables to ensure they adhere to the Third Normal Form (3NF). Despite encountering various challenges along the way, our team's collaboration and support proved instrumental in overcoming obstacles. By assisting one another every step of the way, we ensured that our deliverables met the requirements outlined by our lecturer.

Future Works

For future work, we aim to refine our system further and enhance its functionalities. Currently, our system only supports cash payments upon delivery. In future implementations, we plan to incorporate more

secure payment options such as credit cards, debit cards, e-wallets, and PayPal. Additionally, we intend to implement a loyalty points system for customers to earn discounts during the checkout process.

Furthermore, we plan to establish records on the suppliers of our books to maintain better inventory management for each book that enters ReadCycle. We will also enhance the inventory management system for the book cataloguer, allowing them to manually add and delete genres and update the status of books as either in stock or out of stock.

10.0 References

Northwind Traders — Student Project | by Aly S. (2019, May 7). Medium. Retrieved December 20, 2023, from <https://medium.com/@sardina.aleigha/northwind-traders-student-project-8f683e78cc38>

YouTube Channel: KodifyMe