PROGRAMMING161

Milestone 1

ABOUT MILESTONE 1

This project involves designing and planning a customer loyalty system for a magical bookstore. The goal is to allow customers to register, rent books, and receive discounts and rewards based on their loyalty and book rental history.

Group Members

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DATA STRUCTURES USING LISTS

The following data structure (List) is used to store customer and book information:

```
List<string> customerNames = new List<string> ();
List<int> registrationYears = new List<int> ();
List<int> customerBookTotals = new List<int> (); // total books each customer has rented
List<double> MoneySpent = new List<double> ();

List<string> bookCatalog = new List<string> (); // stores all available books
List<string> rentedBooks = new List<string> (); // e.g., "Children’s Books", "Romance"

List<string> rentalHistory = new List<string> ();
```

2. IPO Table

2.1 Customer Registration

Input	**Process**	**Output**
Full name registration year	Prompt full name Get full name Prompt Registration year Get registration year Set Books Rented = 0 Set Total spent = 0	Customer Added Message: “{name} + “” + has been successfully added!”

CUSTOMER PSEUDOCODE

```
START
Name = “”, Surname = “”, FullName = “”, Registration Year = 0, Books Rented = 0, TotalSpent = 0.
Display “Enter your name”
Name = Get Value
Display “Enter your surname”
Surname = Get Value
FullName = Name + “” + Surname
Display “Enter Registration Year”
Year = Get Value
Display “How many books have you rented?”
BooksRented = Get Value
```

```
Display "Enter total amount spent"

TotalSpent = Get Value

Display FullName + " " + "Has been successfully Added!"

END
```

BOOKS TO RENT

Input	**Process**	**Output**
Customer Full Name Book title Number of books to rent Choice of book (by category)	Prompt customer name Get customer name Prompt Books to rent Get books to rent If (customer != Found) Display: Not Found! Display: Availability of books User choice of a book Add book(s) price Total of books rented Calculate discount Apply discount to total Display(receipt): Book title(s) Price before discount Price after discount Number of free rentals (if qualified)	Receipt Book Title(s) Price before discount Price after discount Total Discount and reward information

3. BOOKS TO RENT PSEUDOCODE

```
START
CustomerName = “ “, CustomerName = "", BookTitle = "", BookQuantity = 0, BookPrice = 0,
TotalPrice = 0, Discount = 0, FinalPrice = 0

Display "Enter customer full name:"
CustomerName = get value

Display "Enter book Title (Movie names):"
Title = get value

Display "Enter how many books to rent:"
BookQuantity = get value

TotalPrice = BookQuantity * BookPrice
Display "Enter discount percentage (e.g., enter 10 for 10%):"
Discount = GET VALUE

Finalprice = totalprice - (totalprice * Discount / 100)
Display "Customer must pay: " + finalprice + " Galleons"

Add bookcategory + " x" + bookquantity TO rentalhistory list
Update customer’s booksrented and galleonsspent in lists

 Display "Books rented successfully."
END
```

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Track total rentals and apply the correct discount

INPUT	PROCESSING	OUTPUT
Customer Name Registration year Number of books to rent Book Price	Prompt Customer Name Get Customer Name Prompt Registration Year Get Registration Year Prompt Number of books to rent Get Number of Books to rent Prompt Book price Get Book Price Current Year – Registration year = Years Registered Add new rental, counting to the existing total Determine discount Based on years registered Book price x Quantity = discount Apply discount to total	Total Books Rented Discount Percentage Updated total Price + Discount

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PSEUDOCODE

```
START

  CustomerName = “”, RegistrationYear = 0, YearsRegistered = 0, Discount = 0, BooksRentedBefore = 0, NewBooksRented = 0, BookPrice = 0, TotalBeforeDiscount = 0, FinalPrice = 0

  Display "Enter customer full name:"
  CustomerName = get value

  Find RegistrationYear and BooksRentedBefore from list using CustomerName

  Display "Enter number of books rented currently:"
  NewBooksRented = get value

  Display "Enter price per book:"
  BookPrice = get value

  TotalBeforeDiscount = NewBooksRented * BookPrice

  YearsRegistered = 2025 - RegistrationYear

  IF YearsRegistered >= 15 THEN
    Discount = 35%
  ELSE IF YearsRegistered >= 10 THEN
    Discount = 20%
  ELSE IF YearsRegistered >= 5 THEN
    Discount = 10%
  ELSE
    Discount = 5%
  END IF

  FinalPrice = TotalBeforeDiscount - (TotalBeforeDiscount * Discount / 100)
  UPDATE booksRented list with: BooksRentedBefore + NewBooksRented
  UPDATE galleonsSpent list with:  FinalPrice


  Display "Books rented: " + NewBooksRented
  Display "Total before discount: " + TotalBeforeDiscount
  Display "Discount: " + Discount + "%"
  Display "Final price: " + FinalPrice
END
```

Award free rentals and magical bonuses

INPUT	PROCESSING	OUTPUT
Customer Name Books rented total Registration Year	Prompt Customer Name Get Customer Name Prompt Books rented total Get Books rented total Prompt Registration Year Get Registration year Year registered = 2025 – Registration Year If both rentals and years meet reward level: Assign bronze/Silver/Gold bonus	Bonus Book (if qualified) Message: “Congratulations, you have earned a bonus”

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PSEUDOCODE

```
START

CustomerName = “”, BooksRented = 0, RegistrationYear = 0, FreeRentals = 0, BonusReward = “”

Display "Enter customer name:"

CustomerName = get value

YearsRegistered = 2025 – RegistrationYear

//Free Rentals Check

IF BooksRented >= 75 THEN

    FreeRentals = 8

  ELSE IF BooksRented >= 50 THEN

    FreeRentals = 4

  ELSE IF BooksRented >= 25 THEN

    FreeRentals = 2

  ELSE IF BooksRented >= 10 THEN

    FreeRentals = 1

  ELSE

    FreeRentals = 0

  END IF

//Check for Bonus

IF YearsRegistered >= 15 AND BooksRented >= 75 THEN

    BonusReward = "5 Bronze, 2 Silver, 1 Gold Tier Book"

  ELSE IF YearsRegistered >= 10 AND BooksRented >= 50 THEN

    BonusReward = "3 Bronze, 1 Silver Tier Book"

  ELSE IF YearsRegistered >= 5 AND BooksRented >= 25 THEN

    BonusReward = "1 Bronze Tier Book"

  ELSE

    BonusReward = "No bonus"

  END IF

Display "You qualify for " + FreeRentals + " free rentals"

Display "Bonus: " + BonusReward

END
```

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RECEIPT

INPUT	**PROCESSING**	**OUTPUT**
Customer Name Book Categories Book Quantity and Price Discount in % Free Rentals, bonus Rewards	Prompt Rented Book List Calculate Total Price before discount Total Price + Discount = Final Price Show bonus magical books tier(if qualified)	Receipt Books rented Total before and after discount Free rentals info Bonus books earned

PSEUDOCODE

```
START

CustomerName = “”, BookTitles = “”, BookCategory = “”, BookQuantity = 0, BookPrice = 0,
TotalBeforeDiscount = 0, Discount = 0, FinalPrice = 0, FreeRentals = 0, BonusReward = “”

Display "Enter customer name:"

CustomerName = get value

TotalBeforeDiscount = BookQuantity * BookPrice

FinalPrice = TotalBeforeDiscount - (TotalBeforeDiscount * Discount / 100)

Display "Rental Receipt for: " + CustomerName

  Display "Books Rented: " + BookTitles

  Display "Price Before Discount: " + TotalBeforeDiscount + " Galleons"

  Display "Discount Applied: " + Discount + "%"

  Display "Price After Discount: " + FinalPrice + " Galleons"

  Display "Free Rentals Awarded: " + FreeRentals

  Display "Bonus Magical Books Earned: " + BonusReward

END
```

HIGH-LEVEL-FLOWCHART

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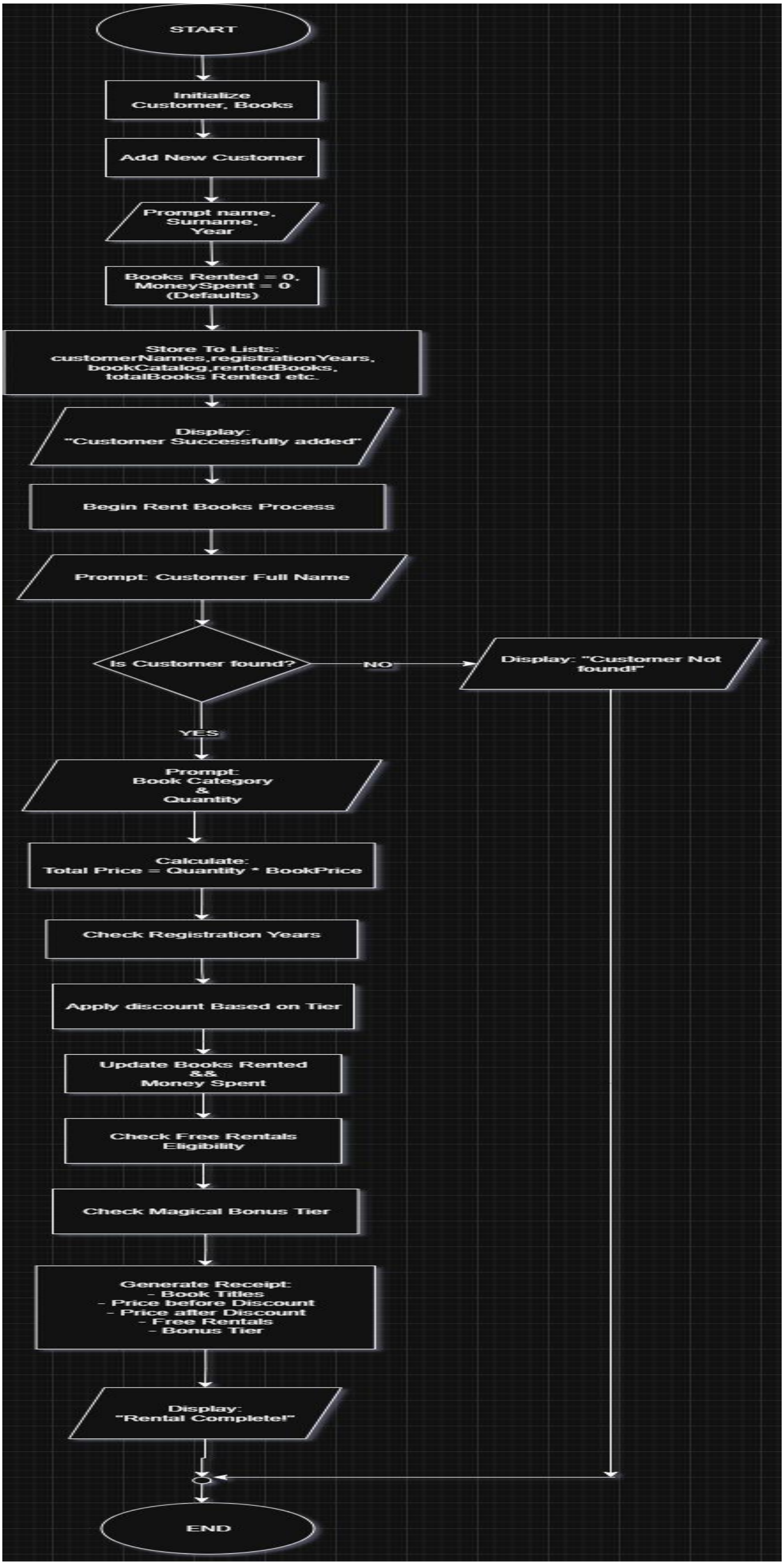
START
Initialize Customer, Books
Add New Customer
Prompt name, Surname, Year
Books Rented = 0, MoneySpent = 0 (Defaults)
Store To Lists: customerNames,registrationYears, bookCatalog,rentedBooks, totalBooks Rented etc.
Display: "Customer Successfully added"
Begin Rent Books Process
Prompt: Customer Full Name
Is Customer found?
NO
Display: "Customer Not found!"
YES
Prompt: Book Category & Quantity
Calculate: Total Price = Quantity * BookPrice
Check Registration Years
Apply discount Based on Tier
Update Books Rented && Money Spent
Check Free Rentals Eligibility
Check Magical Bonus Tier
Generate Receipt: - Book Titles - Price before Discount - Price after Discount - Free Rentals - Bonus Tier
Display: "Rental Complete!"
END

IMPLEMENTING ERROR-HANDLING

- "To simplify user input, we used Parse methods (e.g., int. Parse()), and applied IF statements to check logic, such as book existence or empty lists. This keeps input checking easy to read."

- Before allowing rentals, we also made sure that values like book titles were present in the catalogue using conditional statements, such as IF Statement. This keeps the software from doing anything that could confuse the user or result in mistakes.

How will the system be tested

1. **Approach to how the system will be tested**

   We will be testing the system manually to check all the main functions the system can do. This will mean that we are required to run the system, enter various inputs, check if the output is valid.

   What will be tested:

- Input correct data
- Values are close to the rule
- Invalid inputs

2. **The testing environment**

- Programming language used: C#
- Testing Tool: Console App
- Test Data: Books, rentals entered manually and sample customers

Testing types

Test Type	Purpose
Functionality	To ensure that each feature works
Calculation	To confirm that the correct discounts, coupons, and bonus rewards are added
Input Validation	To ensure that the system handles any missing or incorrect inputs accordingly
Reward Eligibility	To make sure that bonus rewards are only given to those who meet the required criteria
Receipt	To check that the receipt displays the correct information after a rental
Boundary	To test very close cases like exactly 10 rentals or exactly 15 years registered
Error Handling	To ensure that the system gives useful error indicators and does not crash

4. **<u>Testing the Data Preparation</u>**

We will prepare different example customers:

- Newly customers (from 0-4 years registered)
- Long- term customers (over 5 years registered)
- Customers with various rental counts (e.g., 5, 25, 75)

We will also prepare book data:

- Various book categories with fixed prices

5. **<u>Success Criteria</u>**

The system will be considered a success when:

- All features of the system work as expected
- All discounts and coupons are calculated accordingly
- The system knows how to handle incorrect input without giving out an error
- Receipts and rewards are displayed accordingly

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GROUP MEMBER'S CONTRIBUTIONS

Boitumelo Segole

- Define Data Structures,
- Pseudocode and IPO Tables

Charlton Macdonald

- High Level Flowchart of the system

Vhuwavho Raphala

- Award Magical Bonuses
- Implement Error Handling

Koena Seopa

- Calculate Discounts and Identify eligible coupons
- Plan on how the system will be tested