Problem 2

Introduction:
The College Library needs to implement a new index system for all its books. The objective is to automatically read book details from a stored CSV file, generate a unique index reference for each book, and write the indexed book details to a new CSV file.

Requirements:\

- Read book details (title, author, publisher, publication date) from a CSV file.
- Generate a unique index reference for each book.
- Write the indexed book details to a new CSV file.

Design

Class Descriptions

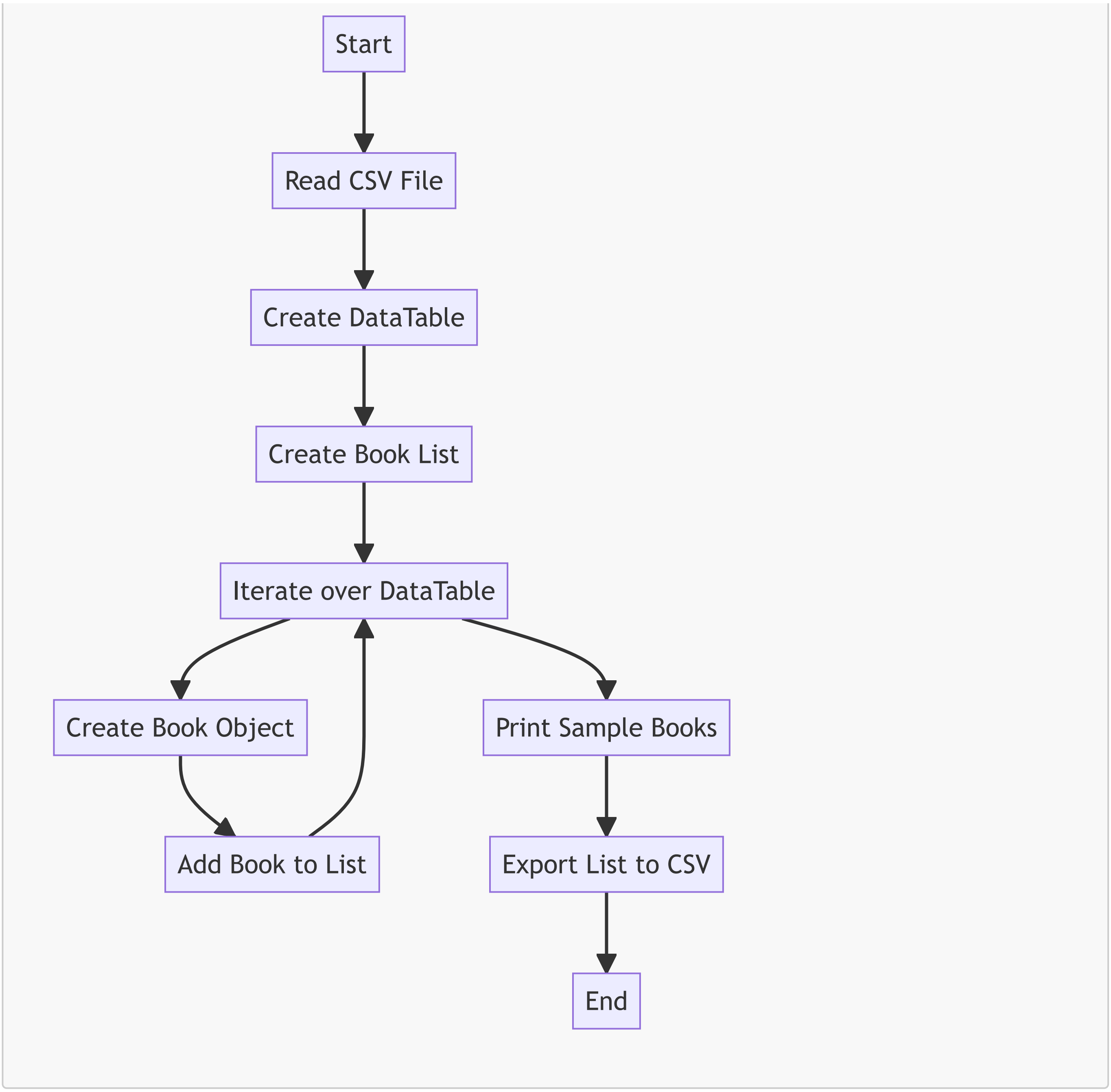
Program Class:
Description: The main class responsible for managing the book indexing process. Methods:
Main(): The entry point of the program. Reads the book details from a CSV file, creates Book objects, and exports the indexed book details to a new CSV file.
ExportToCSV(List books, string csvFilePath): Exports the list of Book objects to a CSV file.

CSVreader Class:
Description: A helper class responsible for reading the book details from a CSV file and converting them into a DataTable.
Methods:
GetDataTableFromCSVFile(string csvFilePath): Reads the CSV file and returns a DataTable containing the book details.

Book Class:
Description: Represents a book and its associated details.
Properties:
Cat: The unique index reference of the book.
Name: The name of the book.
Title: The title of the book.
PublishedIn: The publication location of the book.
Publisher: The publisher of the book.
Date: The publication date of the book.

Constructors:
Book(string name, string title, string publishedIn, string publisher, string date): Initializes a new instance of the Book class with the provided book details. Generates the Cat value based on the provided data.

Flowchart



Flowchart Description:

- The program starts.
- It reads the CSV file containing data.
- The data is converted into a DataTable object.
- A list called "books" is created to store Book objects.
- The program iterates over each row in the DataTable.
- For each row, a Book object is created using the row values.
- The Book object is added to the "books" list.
- The program continues to the next row until all rows are processed.
- After the loop, it prints the details of three sample books.
- Finally, the list of books is exported to a CSV file.
- The program ends.

This flowchart provides a clear visual representation of the main steps involved in the program, including reading the CSV file, processing the data, and performing necessary operations on the Book objects.

Test

Test

Test number	Purpose of test	How the test is done.	Test data	Expected result	Actual result	Comments
1	To Test that the Unique numbers are generated.	Console.log of the generated numbers	Problem 2 Data	Random numbers	random hash number are generated	it worked
2	To test edge case: Empty book details	Provide a CSV file with empty book details and validate the result	CSV file with empty book details	Proper handling of empty values	Skipped empty book details during processing	Make sure the empty values are handled correctly
3	To test edge case: Large CSV file	Use a large CSV file with a significant number of book records	Large CSV file	Large CSV file	Large CSV file processed without any performance issues	Ensure the system can handle large datasets
4	test the output to the csv file	open the new csv file	Problem 2 Data	data in new csv file with hash numbers	new data is correctly there	it worked to the requirements

Evaluation

Design Documentation:

The design documentation provides a clear and concise overview of the problem statement, objectives, and technologies used.

The class descriptions provide a comprehensive understanding of the program's structure and logic.

The flowchart visually represents the program's flow and logic, making it easier to understand the process from start to finish.

The test plan outlines various test scenarios, including testing the generation of unique index numbers, handling edge cases, and validating the exported data. It helps ensure the correctness and robustness of the implementation.

Code Implementation:

The code is encapsulated within the LibarySystem namespace, providing proper organization and preventing naming conflicts.

The code follows a modular approach with separate classes for different functionalities. The Program class handles the main logic, the CSVreader class provides CSV file handling functionality, and the Book class represents a book with its properties and methods.

The code includes exception handling to catch and handle any potential errors that may occur during file reading or other operations.

The CSVreader class effectively reads a CSV file and converts it into a DataTable. The Program class uses this functionality to process the book details.

The Book class encapsulates the book details and generates a unique Cat value based on the provided data using a SHA256 hash function. The class also overrides the ToString() method to provide a readable representation of a book's details.

The ExportToCSV() method in the Program class successfully exports the list of books to a new CSV file, ensuring the correct formatting of the data.

Overall Assessment:

The provided design documentation and code implementation showcase a well-structured and efficient solution for the College Library Book Index System. The code demonstrates good programming practices, such as modularity, exception handling, and proper encapsulation. The design effectively meets the stated requirements and provides the necessary functionality for reading, indexing, and exporting book details. Overall, The design and implementation meets the requirements and provides a structured solution for implementing the College Library Book Index System. The design and implementation incorporates the necessary classes, methods, and properties to read book details, generate unique index references, and export the indexed book details to a new CSV file.