

Problem 1

Design

Definition statement

To do list

Users can add new tasks to the list by entering a title, description, and due date. The tasks are displayed in a list view, showing the title, description, due date, and completion status of each task. Users can mark tasks as complete or delete tasks from the list.

The application allows users to toggle between displaying all tasks or only incomplete tasks. Users can easily filter the task list to focus on the tasks that are yet to be completed.

When a task is selected from the task list, its details, including the title, description, due date, and completion status, are displayed in a separate section. Users can view the details of each task and mark tasks as complete if they are finished.

Some of the constraints when developing this program will be trying to implement the date and time and producing the dropdown which will be time consuming to create without issues occurring. Another constraint will also be data structuring and how I am going to store the to do lists data. I will be storing the data using an empty list to store tasks.

Complexity in the program should be efficient enough with no addition involved, but could require some filtering within the program for the tasks like the completed task and incomplete task function. It should be efficient by execution standards as it is only a small program and I will try to aim towards simple code and I will try not to include irrelevant code blocks in the program.

Key Features:

- Add Task - Users can add new tasks to the list by entering a title, description, and due date.
- Mark as Complete - Users can mark tasks as complete, indicating that they have been finished.
- Delete Task - Users can delete tasks from the list if they are no longer needed.
- Task Filtering - Users can toggle between displaying all tasks or only incomplete tasks.
- Task Details - The application provides a task details section that displays the title, description, due date, and completion status of the selected task.

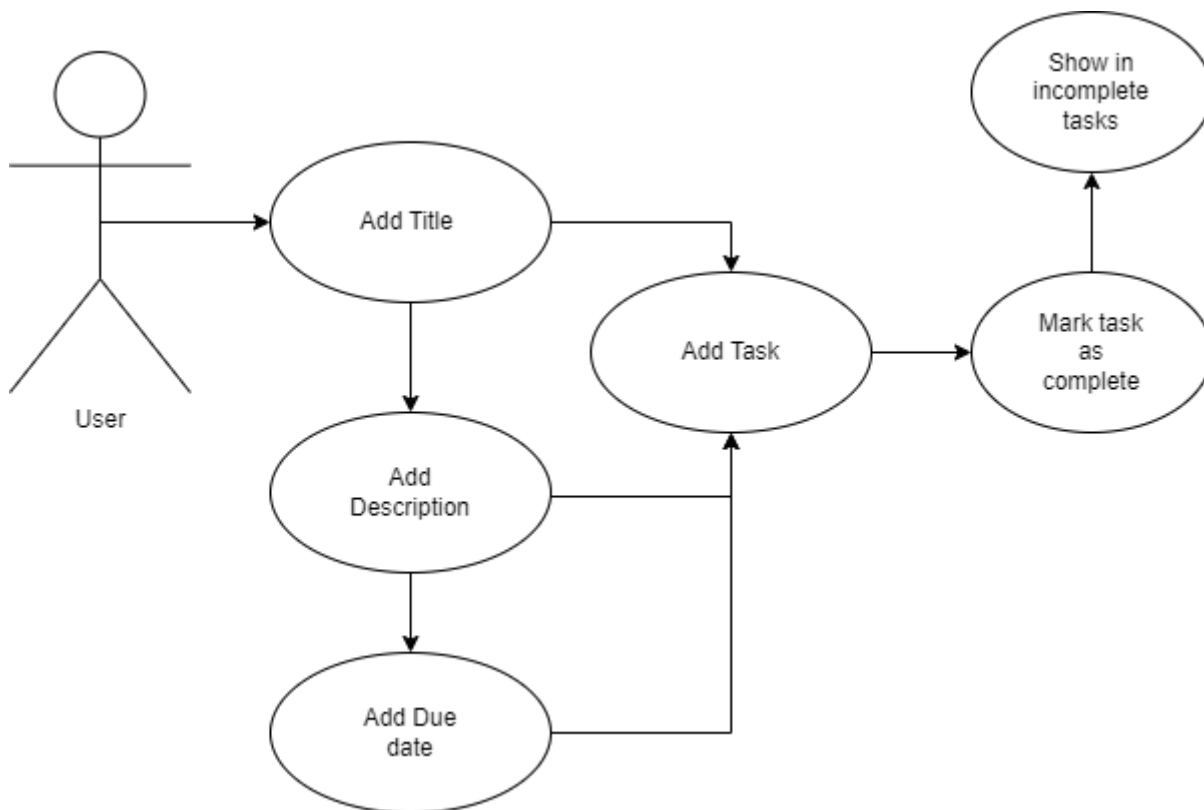
Data dictionary

In my program I will include some data structures for various variables that i will implement in my program code. The data structures I will include are: TaskItem Class: - Represents a single task item in the to-do list and represents additional details or description of the given task or tasks. List: - A collection that stores the task items and all task items that are added by the user are stored in this list.

Data element	tasks	showIncomplete Only	Tasks	PropertyChanged	Title	Description	DueDate
Description	Represents a list of tasks	Indicates whether only incomplete tasks should be shown.	A property representing the filtered list of tasks based on showIncompleteOnly value	Event raised when a property value changes	Represents the title of a task	Represents the description of a task	Represents the due date of the task
Data type	List<Tasks>	Bool	List<Tasks>	PropertyChangedEventHandler	String	String	DateTime
Usage	Used to store and retrieve tasks	Determines the filtering of tasks based on completion status	Used to bind tasks to the UI	Used to notify property changes in the MainWindow	Used to set and retrieve the task title.	Used to set and retrieve the task description	Used to set and retrieve the task due date
Example Values	[Task1, Task2, Task3...]	true, false	[Task1, Task2, Task3...]	None	Task1, Task2, ...	Description1, description2, ...	DateTime.Now, DateTime.Parse ("2023-06-30")
Data owner	MainWindow	MainWindow	MainWindow	MainWindow	Task	Task	

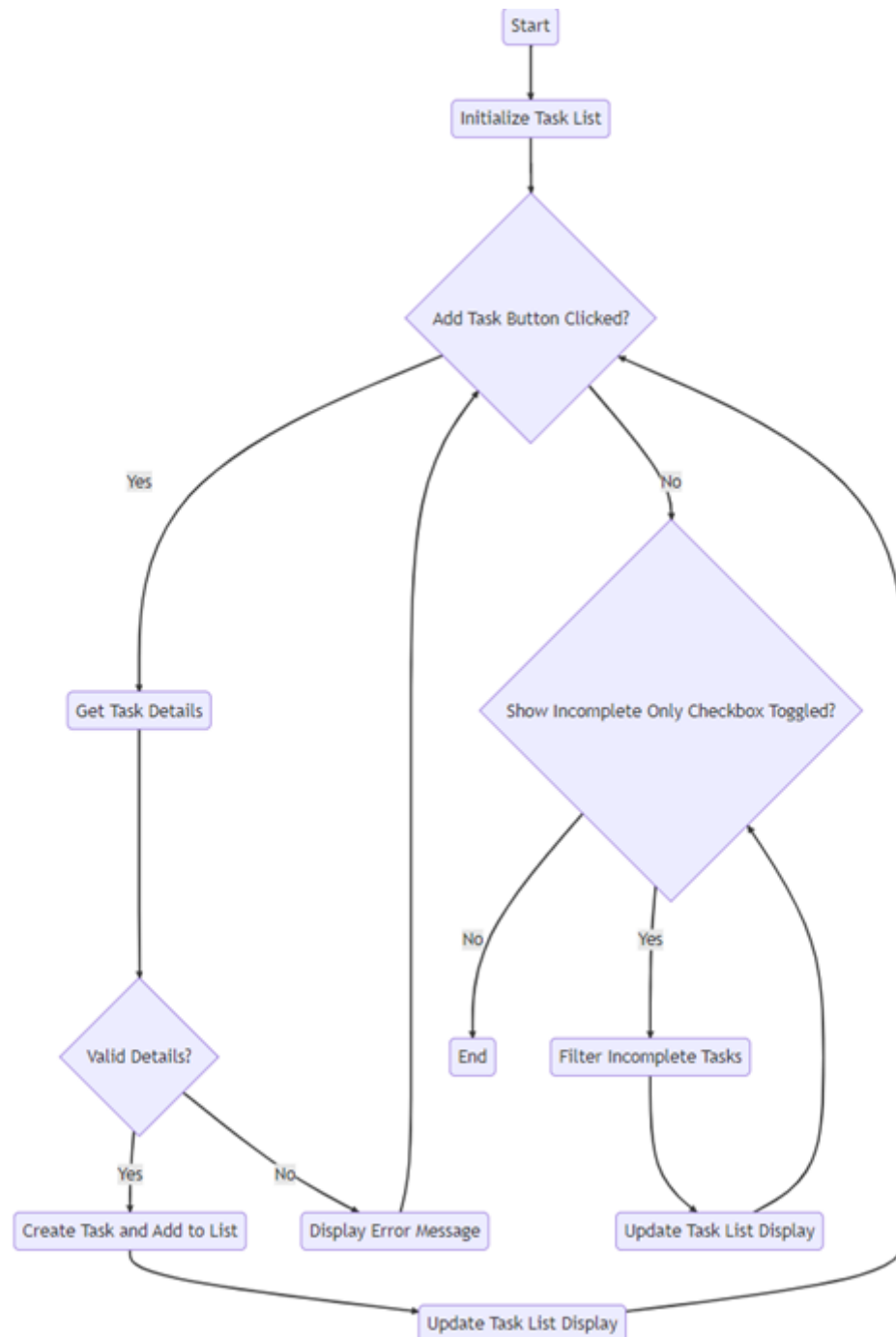
Use case diagram

I have developed a use case diagram describing how the program will function when a user is operating it.



Flowchart

I have created a mermaid flowchart to help plan my program to make it easier to write when I am implementing my code.



Pseudocode

This is the pseudocode I have produced to represent how I am going to structure my C# code. I have included how I am going to add tasks, complete tasks and show the incomplete tasks in the program and planned how I am going to structure each class in the program.

```
class Task {  
    string Title  
    string Description
```

```
        DateTime DueDate
    }

    List<Task> tasks

    function AddTask() {
        string title = ReadInput("Enter task title")
        string description = ReadInput("Enter task description")
        DateTime dueDate = ReadDateInput("Enter task due date")

        if (title is empty or dueDate is not provided) {
            ShowErrorMessage("Please enter a title and due date.")
            return
        }

        Task newTask = new Task()
        newTask.Title = title
        newTask.Description = description
        newTask.DueDate = dueDate
        newTask.Completed = false

        tasks.Add(newTask)

        UpdateTaskListDisplay()
    }

    function UpdateTaskListDisplay() {
```

```
    for each task in tasks {  
        if (showIncompleteOnly and task.Completed) {  
            continue  
        }  
    }  
}  
  
function CompleteTask(task) {  
    task.Completed = true  
    UpdateTaskListDisplay()  
}  
  
function ToggleShowIncompleteOnly() {  
    UpdateTaskListDisplay()  
}  
  
function Main() {  
  
    while (true) {  
  
        if (AddTaskButtonClicked) {  
            AddTask()  
        }  
  
        if (CompleteTaskButtonClicked) {  
            CompleteTask(selectedTask)  
        }  
    }  
}
```

```

    }

    if (ShowIncompleteOnlyCheckboxToggled) {

        ToggleShowIncompleteOnly()

    }

}

}

```

UI designs

I have used a software called figma to come up with two UI designs that I will chose to implement in my final program.

Task name

Add task

Description

Select date

dropdown

Task Name	Description	Complete	Due date
e.g task	lorem	yes	12/12

Incomplete tasks

Design 1 I thought looked nice with the task name and description vertically aligned with one another however, I don't like the spacing on the right hand side too much but to counter that I could make the form

Task name		Description		Select date		Add Task	
Title	Description	Due date	Completed	Actions			
<div>Show incomplected <input checked="" type="checkbox"/></div>							

Design review

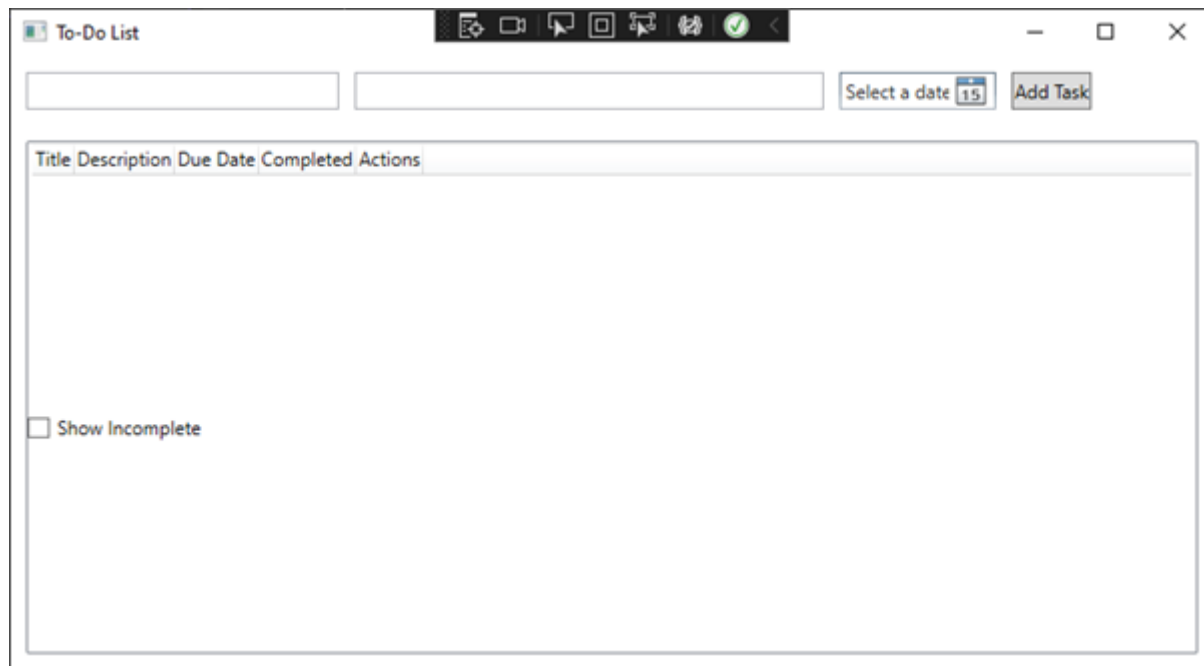
7 / 23

peer had to say about my design, I have decided to take his advice and implement labels next to the text boxes to indicate which ones which.

Implementation

Firstly, I will create a C# WPF application and I will start to implement the design I have chosen to implement for the user interface. For my program I am going to base the UI on design 2 and I will start to implement the xaml code into my program.

Here is the XAML code which produces the following design when the program is ran:



```
<Grid>
    <Grid.RowDefinitions>
        <RowDefinition Height="Auto"/>
        <RowDefinition Height="*" />
    </Grid.RowDefinitions>

    <StackPanel Orientation="Horizontal" Margin="10">

        <TextBox x:Name="txtTitle" Width="200" Margin="0 0 10 0" />

        <TextBox x:Name="txtDescription" Width="300" Margin="0 0 10 0" />

        <DatePicker x:Name="dpDueDate" Width="100" Margin="0 0 10 0" />

        <Button Content="Add Task" Click="AddTask_Click" />

    </StackPanel>

    <ListView x:Name="lstTasks" Grid.Row="1" Margin="10" ItemsSource="{Binding
```



```

Tasks}"/>

        <ListView.View>

            <GridView>

                <GridViewColumn Header="Title" DisplayMemberBinding="{Binding
Title}"/>

                <GridViewColumn Header="Description" DisplayMemberBinding="
{Binding Description}"/>

                <GridViewColumn Header="Due Date" DisplayMemberBinding="
{Binding DueDate}"/>

                <GridViewColumn Header="Completed" DisplayMemberBinding="
{Binding Completed}"/>

                <GridViewColumn Header="Actions">

                    <GridViewColumn.CellTemplate>

                        <DataTemplate>

                            <Button Content="Complete"
Click="CompleteTask_Click"/>

                        </DataTemplate>

                    </GridViewColumn.CellTemplate>

                </GridViewColumn>

            </GridView>

        </ListView.View>

    </ListView>

    <CheckBox x:Name="chkShowIncomplete" Grid.Row="1" Margin="10,186,10,10"
Content="Show Incomplete" Checked="ShowIncomplete_Checked"
Unchecked="ShowIncomplete_Unchecked"/>

</Grid>
</Window>

```

I have used a grid based layout to organize the UI elements in rows and columns. I have also included two rows defined using Grid.RowDefinitions, one with Auto height for the input section and the other with * height for the task list section. In the input section (The stackpanel) I have used a horizontal StackPanel which is used to group input elements for adding new tasks. I have used textBoxes for the task title and description, a DatePicker for the due date, and a Button to add the task. I have implemented a ListView control is used to display the list of tasks. The ListView uses a GridView to define the columns for displaying task properties (Title, Description, Due Date, Completed). The ListView also uses a GridView to define the columns for

displaying task properties (Title, Description, Due Date, Completed). I have implemented a CheckBox control to provide the task list which is to toggle the display of incomplete tasks. I have included an event handler for the Checked and Unchecked events ("ShowIncomplete_Checked" and "ShowIncomplete_Unchecked").

Now that the UI design is implemented, I will start implementing the code in the .cs file.

This is the finished and completed code:

```
using System;

using System.Collections.Generic;

using System.ComponentModel;

using System.Windows;

using System.Windows.Controls;

namespace ToDoList

{

    public partial class MainWindow : Window, INotifyPropertyChanged

    {

        private List<Task> tasks;

        private bool showIncompleteOnly;

        public List<Task> Tasks

        {

            get

            {

                if (showIncompleteOnly)

                {

                    return tasks.FindAll(task => !task.Completed);

                }

                else

                {

                    return tasks;

                }

            }

        }

    }

}
```

```
    }

}

private void CompleteTask_Click(object sender, RoutedEventArgs e)

{
    Button button = (Button)sender;

    Task task = button.DataContext as Task;

    if (task != null)
    {
        task.Completed = true;

        PropertyChanged?.Invoke(this, new
PropertyChangedEventArgs("Tasks"));
    }
}

public event PropertyChangedEventHandler PropertyChanged;

public MainWindow()
{
    InitializeComponent();

    tasks = new List<Task>();

    showIncompleteOnly = false;

    DataContext = this;
}

private void AddTask_Click(object sender, RoutedEventArgs e)

{
```

```
        string title = txtTitle.Text;

        string description = txtDescription.Text;

        DateTime? dueDate = dpDueDate.SelectedDate;

        if (!string.IsNullOrEmpty(title) && dueDate.HasValue)
        {
            Task newTask = new Task(title, description, dueDate.Value);

            tasks.Add(newTask);

            PropertyChanged?.Invoke(this, new
PropertyChangeEventArgs("Tasks"));

            ResetInputs();
        }
        else
        {
            MessageBox.Show("Please enter title and due date.");
        }
    }

    private void ResetInputs()
    {
        txtTitle.Text = string.Empty;

        txtDescription.Text = string.Empty;

        dpDueDate.SelectedDate = null;
    }

    private void ShowIncomplete_Checked(object sender, RoutedEventArgs e)
    {
        showIncompleteOnly = true;
    }
```

```
        PropertyChanged?.Invoke(this, new PropertyChangedEventArgs("Tasks"));
    }

    private void ShowIncomplete_Unchecked(object sender, RoutedEventArgs e)
    {
        showIncompleteOnly = false;
        PropertyChanged?.Invoke(this, new PropertyChangedEventArgs("Tasks"));
    }
}

public class Task
{
    public string Title { get; set; }
    public string Description { get; set; }
    public DateTime DueDate { get; set; }
    public bool Completed { get; set; }

    public Task(string title, string description, DateTime dueDate)
    {
        Title = title;
        Description = description;
        DueDate = dueDate;
        Completed = false;
    }
}
}
```

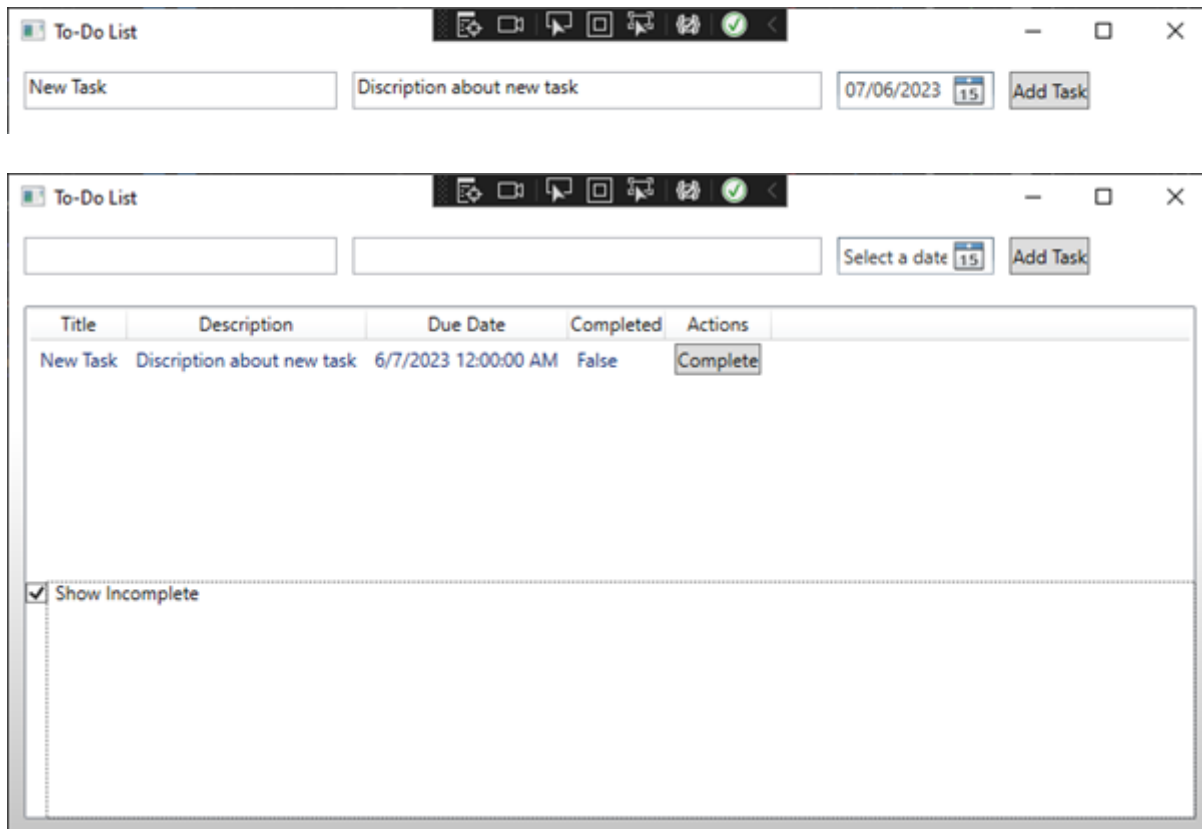
The MainWindow class inherits from the window class which is located in the XAML file. It also implements the INotifyPropertyChanged interface for data binding support. The private fields tasks which is List and the showIncompleteOnly boolean is used for managing the task list and the display filter. The program defines the public property Tasks and returns the filtered list of tasks based on the showIncompleteOnly flag. The program uses the FindAll() method to filter the list of tasks. The program also defines the event handler CompleteTask_Click for marking a task as completed. It then sets the Completed property of the task to true and raises the PropertyChanged event to update the task list display. I have implemented the PropertyChanged event and make it to set the tasks property to filter flag changes. The MainWindow constructor was implemented to initialize the tasks list and to set the showIncompleteOnly flag to false. The AddTask_Click event handler handles the click event of the Add task button. The Add task button retrieves the input values title, description and due date from the text boxes and date picker. The AddTask_Click event handler also creates a new task object with the provided values and adds it to the tasks list. The event handler also raises the PropertyChanged event to update the task list display and to reset the input fields. I have implemented a message box if the title or due date is not entered as the description is optional. I have implemented a ResetInputs method to clear the text in the title and description text boxes for the next input and the method also resets the date picker. The ShowIncomplete_Checked event handler handles the checked events of the Show incomplete only checkbox and it sets the showIncompleteOnly flag to true and raises the PropertyChanged event to update the task list display. The final event handler is the ShowIncomplete_Unchecked event handler, which handles the unchecked event of the Show complete only checkbox and sets the showIncompleteOnly flag to false and raises the PropertyChanged event to update the task list display. The task class at the end of the program represents a single task with properties for the title, description, due date and the completion status. Overall, my program provides the correct functionality for adding the tasks, tracking the tasks by marking them as completed and filtering the different tasks based on if they are completed or not.

Test Plan

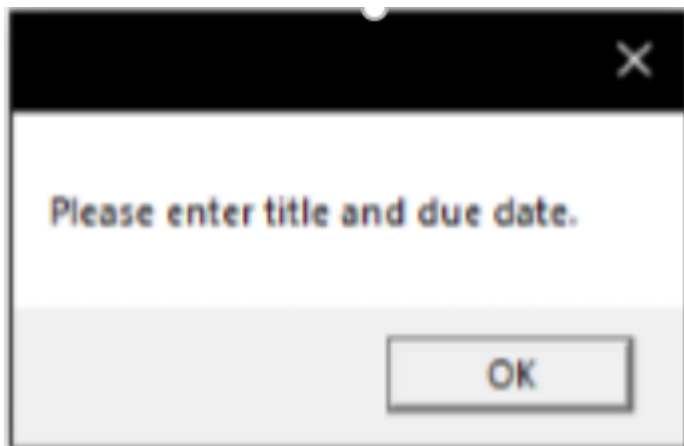
This is my test plan for my to do list. Firstly I am going to test the program to see if it can add a task successfully. To test that I will enter valid values for title, description, and due date. I will then click the add task button, which should appear in the task list below. I will then test adding a task with a missing title or a missing due date. I will test this by entering a valid description and an invalid title or due date. I will then click the add task button which should verify that a message box is displayed indicating the missing title or due date. After them tests become successful, I will test completing a task. To test this feature, I will click the complete button on a task in the task list. By hitting the complete button, the task list should verify that the task is complete. To test the filtering of incomplete tasks I will test the show incomplete only checkbox to verify that when checked, only incomplete tasks are listed in the checkbox. This should also verify that the completed tasks are not shown. The final test I will run is clearing the show incomplete only filter. To test that feature I will uncheck the show incomplete only checkbox which should clear the filters back to normal and show the incomplete tasks only.

Testing

Following my test plan, I am now going to be testing my program based on its functionality and useability. The first aspect I will test within my program is adding my task successfully. The first image is me filling in the fields for the task otherwise the program will throw an error, which I will test next. The second image shows the task being added as an incomplete task and the task will be shown when the incomplete box is ticked.



If I select add task without filling in either the title or description fields the program will throw an error.



Final review

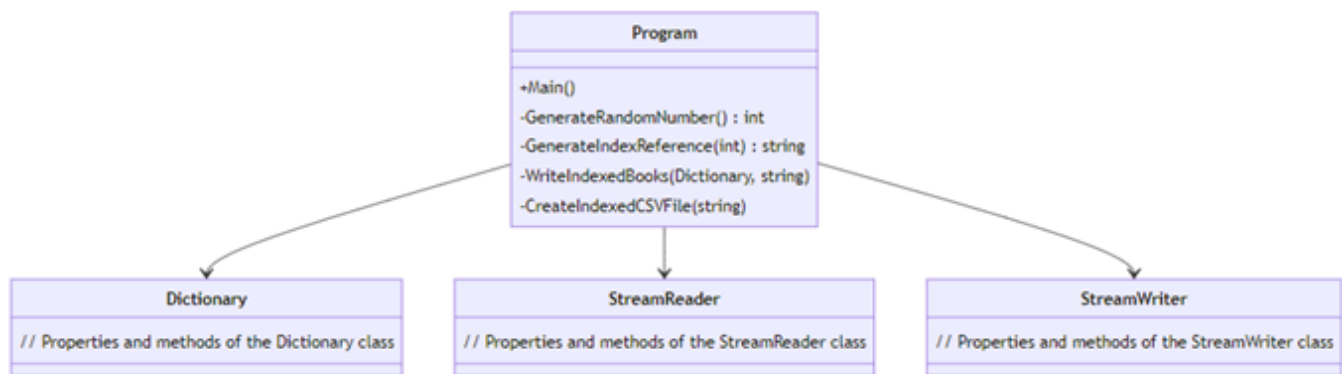
In my WPF application I feel like I have included good namespace organization in my code. This helps improve my codes readability and maintainability. The style and formatting of the code I have created is well-formatted, however I could enhance the code clarity by using braces for single line if statements and using PascalCasting for method names. An implementation that I should consider using next time in my code is better validation. Currently a message box is being displayed when the title and due dates are not provided. Next time in a future build I could consider using WPF validation mechanisms, such as DataAnnotations or implementing IDataErrorInfo in the Task class, to provide visual feedback to the user directly within the UI. The code I have created appears to be simple and straightforward and I have formatted the code to be easily followed and understood. It follows a clean structure, making it accessible to beginners and anyone familiar with C# and WPF. The error handling in my code is good with a validation check to ensure that the user enters a title and due date before adding a task. Displaying a MessageBox to alert the user is a suitable approach for

a simple application like this. In conclusion, my code demonstrates a good understanding of WPF concepts and the basics of event handling and data binding.

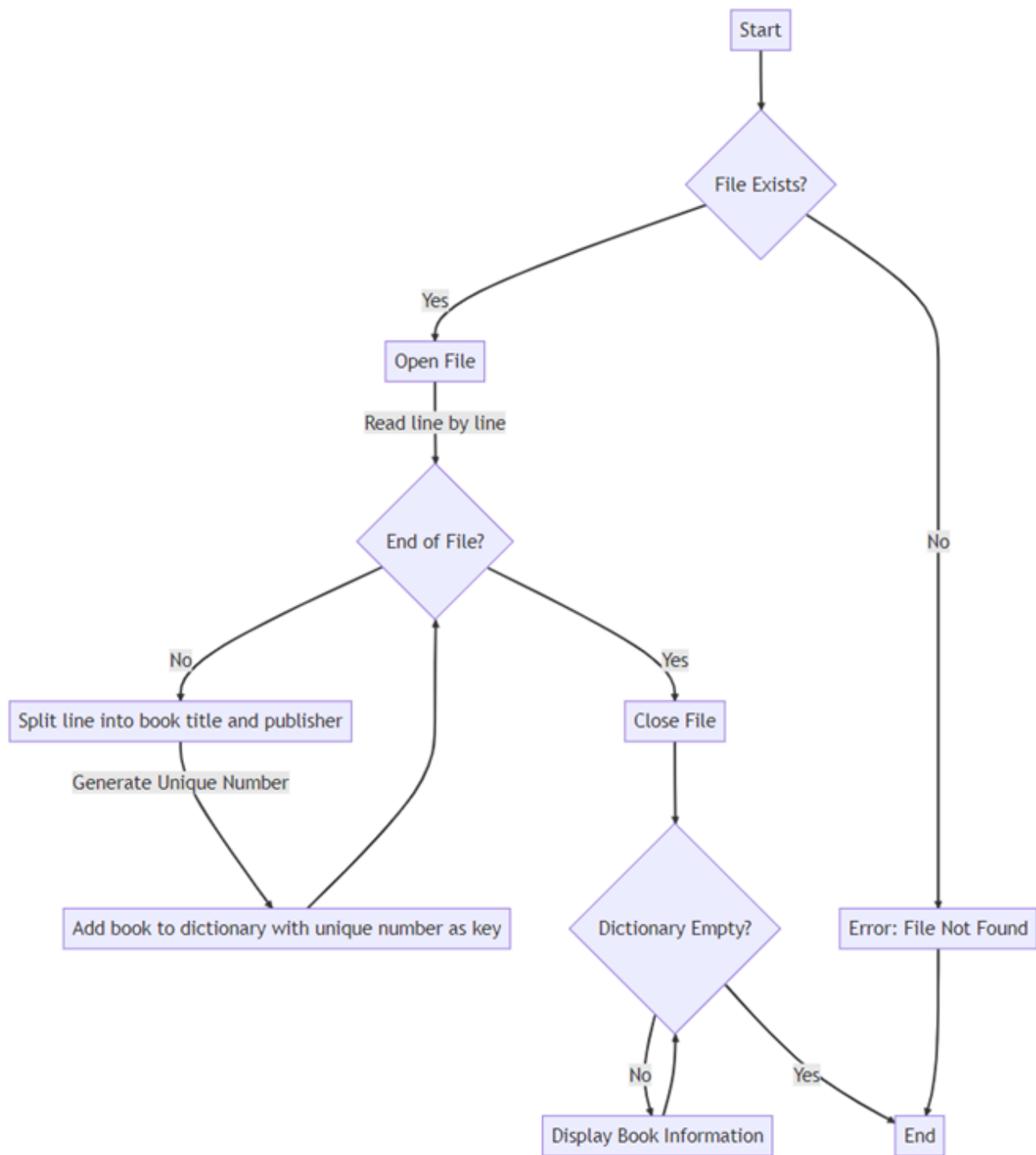
Problem 2

design

For the design of my program I am going to start with making a class diagram which will show me what classes, methods and objects I should be using in my program. As shown below I have produced a class diagram which has my main program with my main() class and my variable types like my strings and integers. The class diagram just gives me a small indication of what sort of structure I should use in the program.



flowchart



pseudocode

To plan for this problem I am going to produce some pseudocode which will allow me to logically think about how I am going to set out this program and what methods, classes and objects I need to use.

Here is the pseudocode I have produced.

```
CONSTANT FILENAME = "books.csv"
```

```
DECLARE dictionary books

PROCEDURE main()

    books = emptyDictionary

    OPEN FILENAME for reading

    IF FILENAME does not exist THEN

        DISPLAY "Error: File not found"

        EXIT program

    END IF

    READ line FROM FILENAME // Skip header row

    DECLARE randomNumberGenerator

    DECLARE set generatedNumbers

    generatedNumbers = emptySet

    WHILE NOT endOfFile(FILENAME) DO

        line = READ line FROM FILENAME

        publisher = SPLIT line BY delimiter // Extract publisher

        REPEAT

            randomNumber = generateRandomNumber()

        UNTIL NOT generatedNumbers CONTAINS randomNumber

        generatedNumbers.add(randomNumber)

        books.add(randomNumber, publisher)
```

```
END WHILE

CLOSE FILENAME

FOR EACH entry IN books DO
    PRINT entry.key, entry.value
END FOR EACH

END PROCEDURE

FUNCTION generateRandomNumber() : integer
    Generate a random number with multiple digits
    Implementation specific to the programming language
END FUNCTION
```

Review design

In my design I feel like the structure of the code is going to be well set out and simple to follow because I would like to create the program using functions and if and while statements. Using these in my design code makes making the implementation of the code better and faster to type up as well as it being easy to follow and understand. The class diagram is very helpful in identifying which classes I should use and how to structure them correctly.

implementation

This problem is a much bigger task and has taken some time to come up with some sort of solution for the problem. At the minute, the solution doesn't meet the current requirements but I will implement all the clients requirements once I have reviewed my code. This is the current program.

```
using System;
using System.Collections.Generic;
using System.IO;

class Program
```

```
{

    static void Main()

    {

        string filename = "books.csv";

        // Dictionary to store book number and publisher

        Dictionary<int, string> books = new Dictionary<int, string>();

        // Read the CSV file

        using (StreamReader reader = new StreamReader(filename))

        {

            reader.ReadLine(); // Skip the header

            int bookNumber = 1;

            // Extract the publisher

            string line;

            while ((line = reader.ReadLine()) != null)

            {

                string[] row = line.Split(',');

                string publisher = row[4];

                books.Add(bookNumber, publisher);

                bookNumber++;

            }

        }

        // Print the book number and publisher
```

```
        foreach (KeyValuePair<int, string> book in books)
        {
            Console.WriteLine("Book Number: {0}, Publisher: {1}", book.Key,
book.Value);
        }
    }
}
```

Below is my updated code, which I have replaced the integer book number which was not a unique number with a string type to support multiple and random digits. The HashSet named generatedNumbers is used to keep track of the generated numbers and ensure uniqueness. The GenerateRandomNumber function generates a random 4-digit number as a string.

```
using System;

using System.Collections.Generic;

using System.IO;

class Program
{
    static void Main()
    {
        string filename = "books.csv";

        // Dictionary to store book number and publisher
        Dictionary<string, string> books = new Dictionary<string, string>();

        // Read the CSV file

        using (StreamReader reader = new StreamReader(filename))
```

```
{

    reader.ReadLine();

    // Extract the publisher

    string line;

    Random random = new Random();

    HashSet<string> generatedNumbers = new HashSet<string>();

    while ((line = reader.ReadLine()) != null)
    {

        string[] row = line.Split(',');

        string publisher = row[3];

        string randomNumber;

        do

        {

            randomNumber = GenerateRandomNumber(random);

        }

        while (generatedNumbers.Contains(randomNumber));

        generatedNumbers.Add(randomNumber);

        books.Add(randomNumber, publisher);

    }

}

// Print the book number and publisher

foreach (KeyValuePair<string, string> book in books)

{
```

```
        Console.WriteLine("Book Number: {0}, Publisher: {1}", book.Key,
book.Value);

    }

}

static string GenerateRandomNumber(Random random)

{

    return random.Next(1000, 10000).ToString();

}

}
```