



**DEPARTMENT OF COMPUTING AND INFORMATION SYSTEMS
SCHOOL OF ENGINEERING AND TECHNOLOGY**

PROGRAMMING PROJECT FOR:

**Bachelor of Software Engineering (Hons);
BSc (Hons) Information Technology;
BSc (Hons) in Computer Science;
BSc (Hons) Information Technology (Computer Networking and Security);
BSC (HONS) Data Analytics;
BSc (Hons) Business Studies;**

ACADEMIC SESSION: SEPTEMBER 2023

CSC1024: PROGRAMMING PRINCIPLES

DEADLINE: 11th December 2023 (Monday), before 6.00 PM.

GROUP NAME : Jolibee

INSTRUCTIONS TO CANDIDATES

- This programming project will contribute **50%** to your final grade.
- This programming project is a final examination.
- This programming project is a **GROUP** assignment.

IMPORTANT

The University requires students to adhere to submission deadlines for any form of assessment. Penalties are applied in relation to unauthorized late submission of work.

- | |
|--|
| <ul style="list-style-type: none">• Coursework submitted after the deadline but within 1 week will be accepted for a maximum mark of 40%.• Work handed in following the extension of 1 week after the original deadline will be regarded as a non-submission and marked ZERO. |
|--|

Student's Declaration:

(Name)	(ID)	(Signature)
We 1) DARRANCE BEH HENG SHEK	23094907	<i>dbeh</i>
2) DERON HO WEN HARN	21087879	<i>Deron</i>
3) IZZAT ZULQARNAIN BIN IZAIDDIN	23096829	<i>Izzat</i>
4) LEE MING HUI ISAAC	22057301	<i>leeminghuiisaac</i>
5) TAN HO CHEN	22073647	<i>chen</i>

received the assignment and read the comments.

Academic Honesty Acknowledgement

"We (names stated above) verify that this paper contains entirely my own work. I have not consulted with any outside person or materials other than what was specified (an interviewee, for example) in the assignment or the syllabus requirements. Further, I have not copied or inadvertently copied ideas, sentences, or paragraphs from another student. I realize the penalties (*refer to the student handbook*) for any kind of copying or collaboration on any assignment."

- 1) *dBeh*, 9 DECEMBER 2023
- 2) *Deron*, 9 DECEMBER 2023
- 3) *Izzat*, 9 DECEMBER 2023
- 4) *leeminghuiisaac*, 9 DECEMBER 2023
- 5) *chen*, 9 DECEMBER 2023

.....
(Student's Signature and Date)

Chapter 1: Introduction

1.1 Background of our Assignment

This assignment was created as per the requirements for the subject CSC1024 - Programming Principles under the guidance of subject lecturer Dr. Yong Yoke Leng.

The background of the assignment is to develop a personal book management system using Python.

1.2 Problem Statement

This assignment aims to aid users in curating their own personal book collection via Python.

Our assignment aids in providing users with a Create, Read, Update and Delete (CRUD) interface to help users add new books, view all their books in their collection, update book details in their collection as well as remove books in their collection.

1.3 Methodology

The program is developed using Python and utilizes the use of text files to act as the database of our program. In order to improve workflow and productivity, our team utilized GitHub to streamline workflow and collaboration. The project repository can be accessed via

visiting the GitHub repository: <https://github.com/darrancebeh/CSC1024-Assignment>. Most documentation of project progress can be viewed in the repository README.md.

The team is named Jolibee and is composed of Darrance Beh Heng Shek, Deron Ho Wen Harn, Izzat Zulqarnain Bin Izaiddin, Tan Ho Chen and Lee Ming Hui Isaac. Darrance is the project leader and project manager, being responsible for ensuring the smoothness of project development as well as overseeing the progress of the assignment.

1.4 Objectives of the Study

The objectives of the study is to allow us to:

1. Allow team members to have a better understanding using Python.
2. Help user(s) manage their book collection.
3. Promote teamwork and team management.

1.5 Task Distribution Table

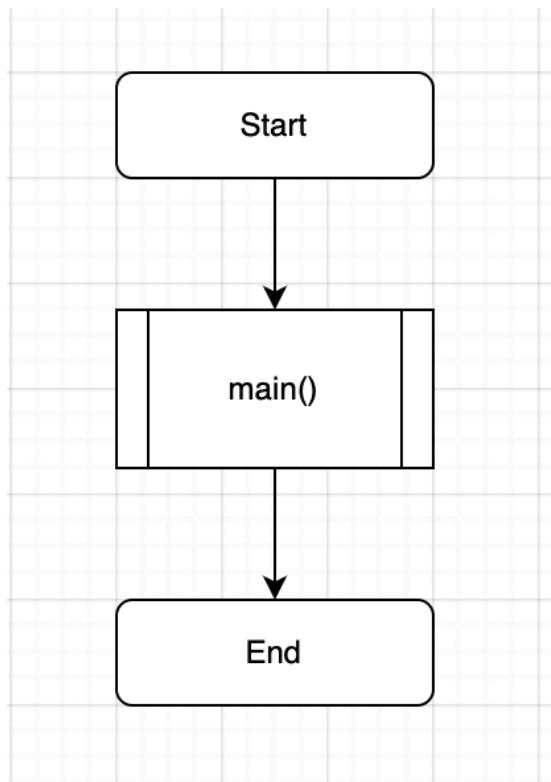
Name	Student ID	Role	Responsibilities	Code Contribution
DARRANCE BEH HENG SHEK	23094907	Team Lead and Manager	<ul style="list-style-type: none"> - Oversee the entire progress of the assignment - Ensure project development is able to be carried out smoothly - Give constructive feedback to group mates regarding their work - Ensure project deadline is met - Write the report and draw flowcharts for responsible functions 	<ul style="list-style-type: none"> - update_book_interface() - main_user_interface() - update_book() - user_error_redirect() - get_books() - check_author_multiple_book() - exit_program() - delete_book() - input_to_isbn() - isbn_to_details() - main_user_interface()
DERON HO WEN HARN	21087879	Member	<ul style="list-style-type: none"> - Write the report and draw flowcharts for responsible functions - Check for errors and bugs within report and code 	<ul style="list-style-type: none"> - display_books() - sort_books()
IZZAT ZULQARNAIN BIN IZAIDDIN	23096829	Member	<ul style="list-style-type: none"> - Write the report and draw flowcharts for responsible functions 	<ul style="list-style-type: none"> - search_book()

LEE MING HUI ISAAC	22057301	Member	- Write the report and draw flowcharts for responsible functions	- add_book() - add_book_interface()
TAN HO CHEN	22073647	Member	- Write the report and draw flowcharts for responsible functions	- delete_book() - delete_book_interface()

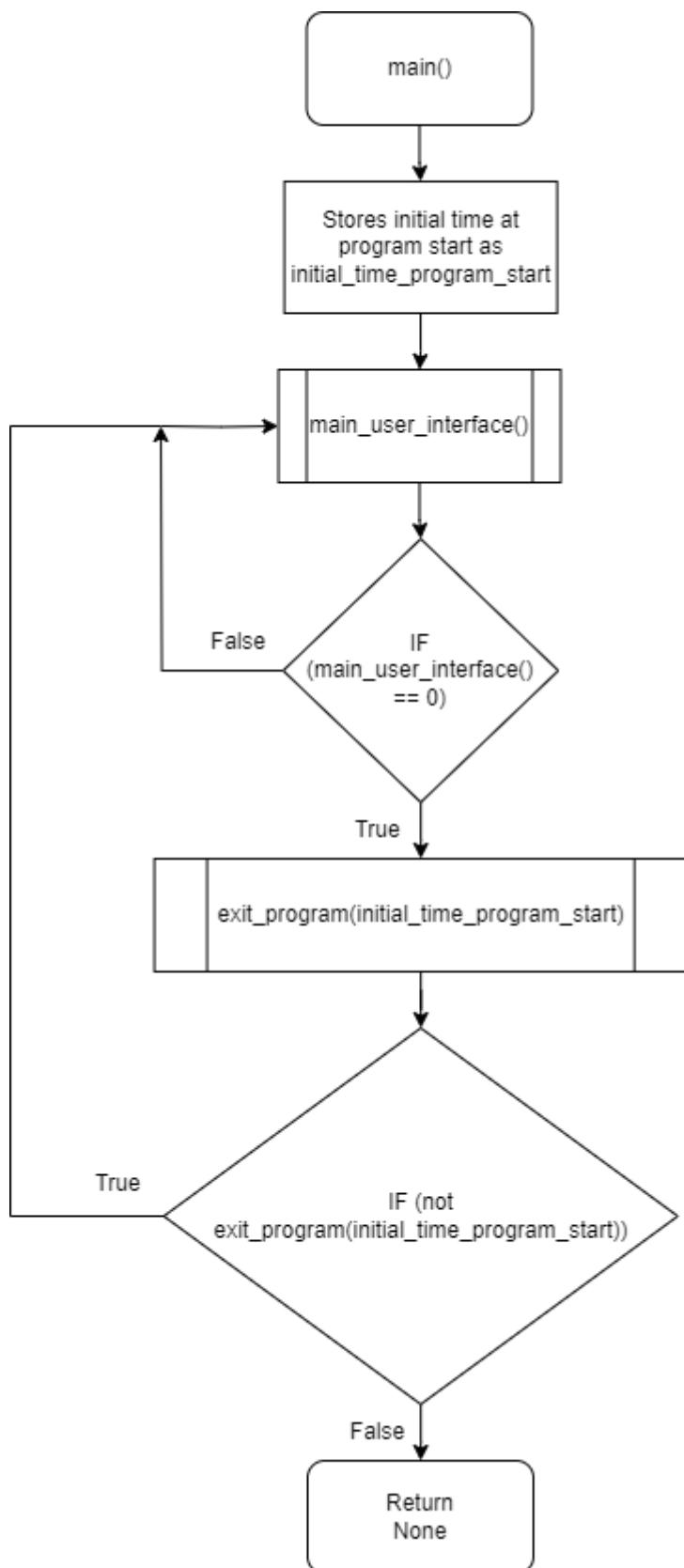
Chapter 2: Design and Implementation

2.1 Program Flowcharts

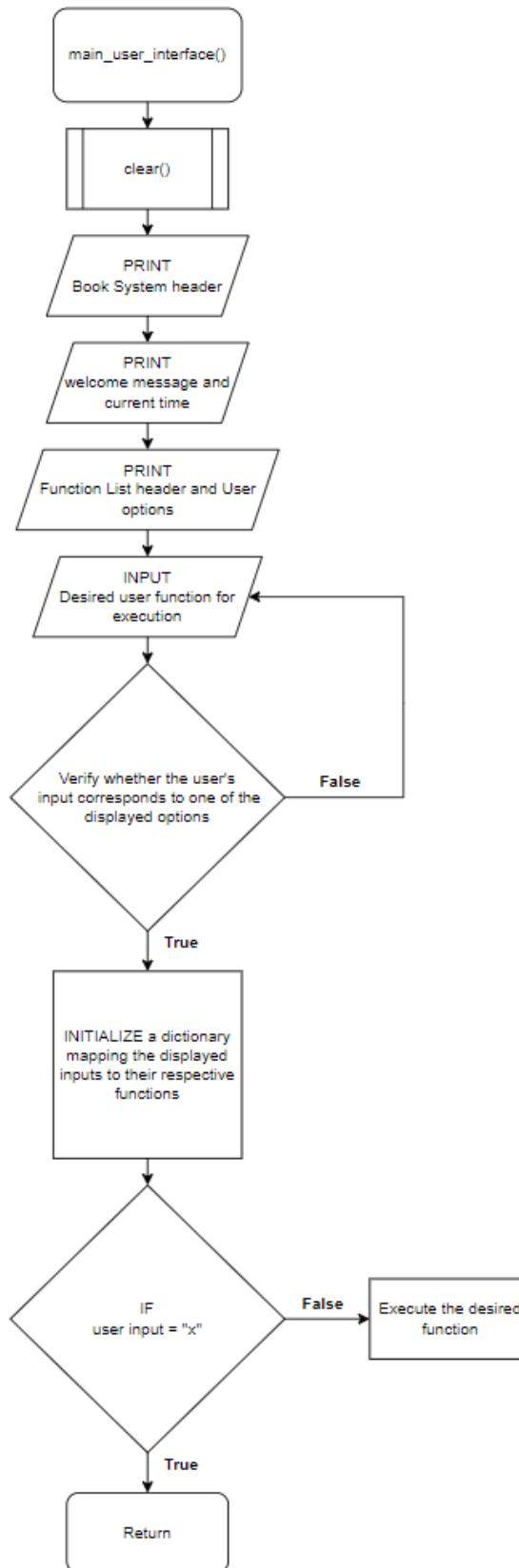
Program Start and End



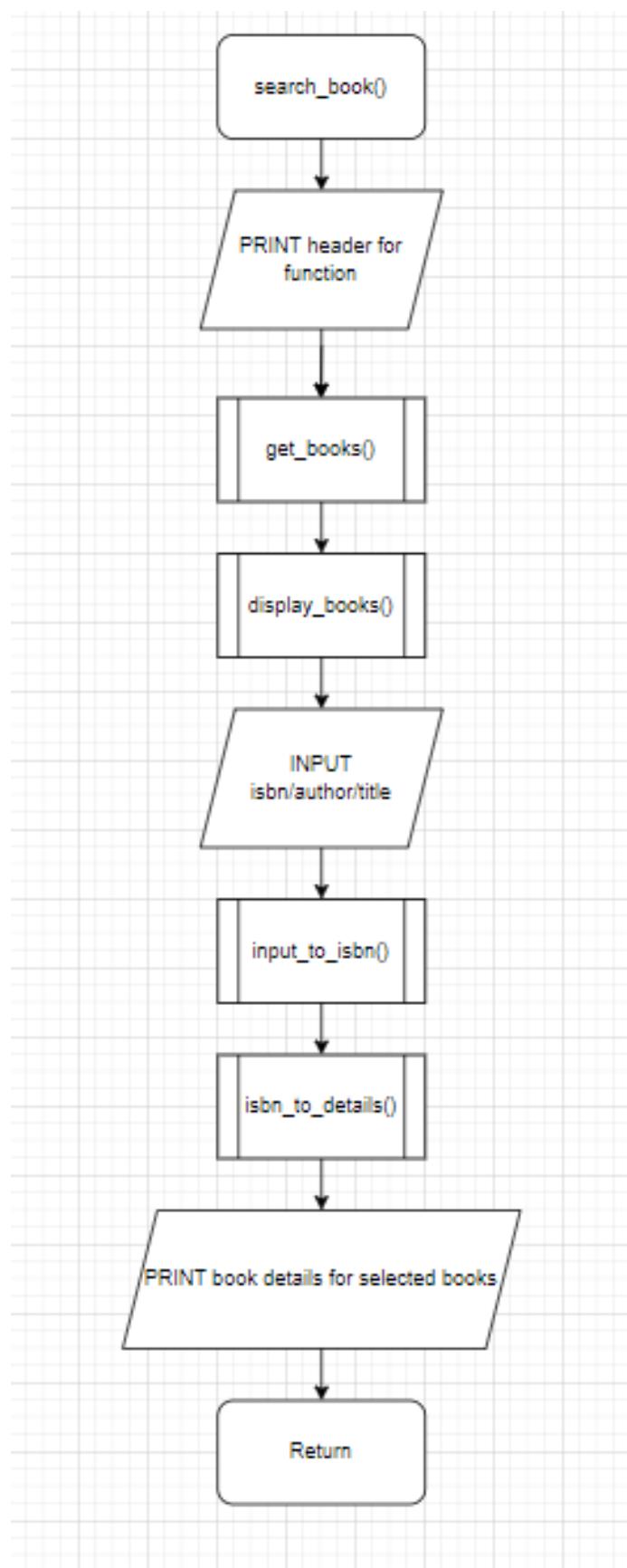
main() Function



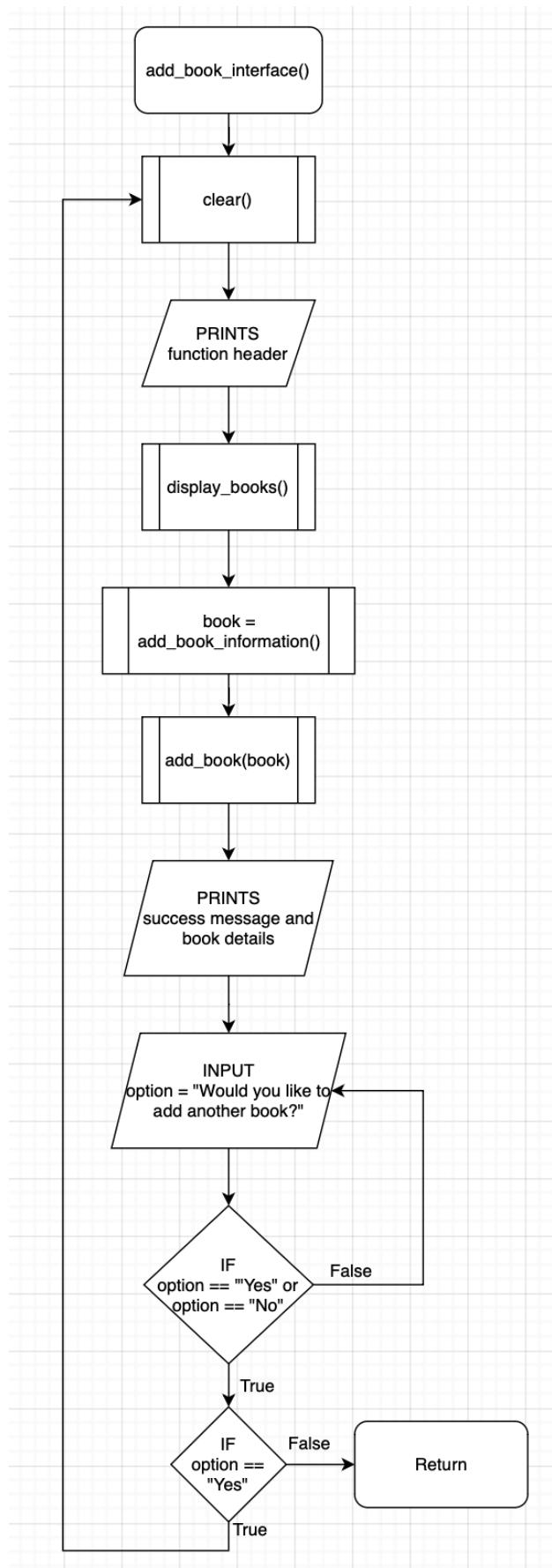
main_user_interface() Function



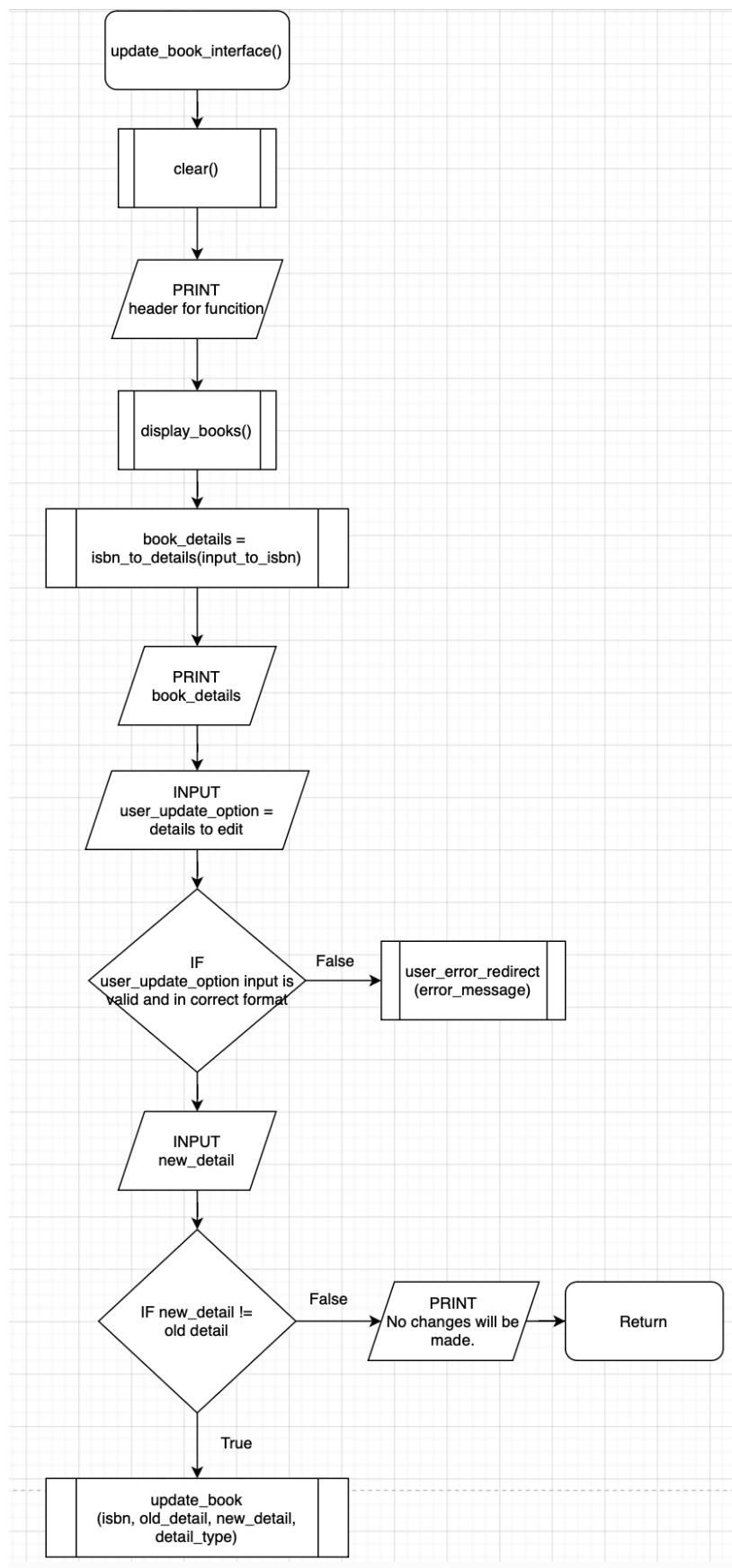
search_books() Function



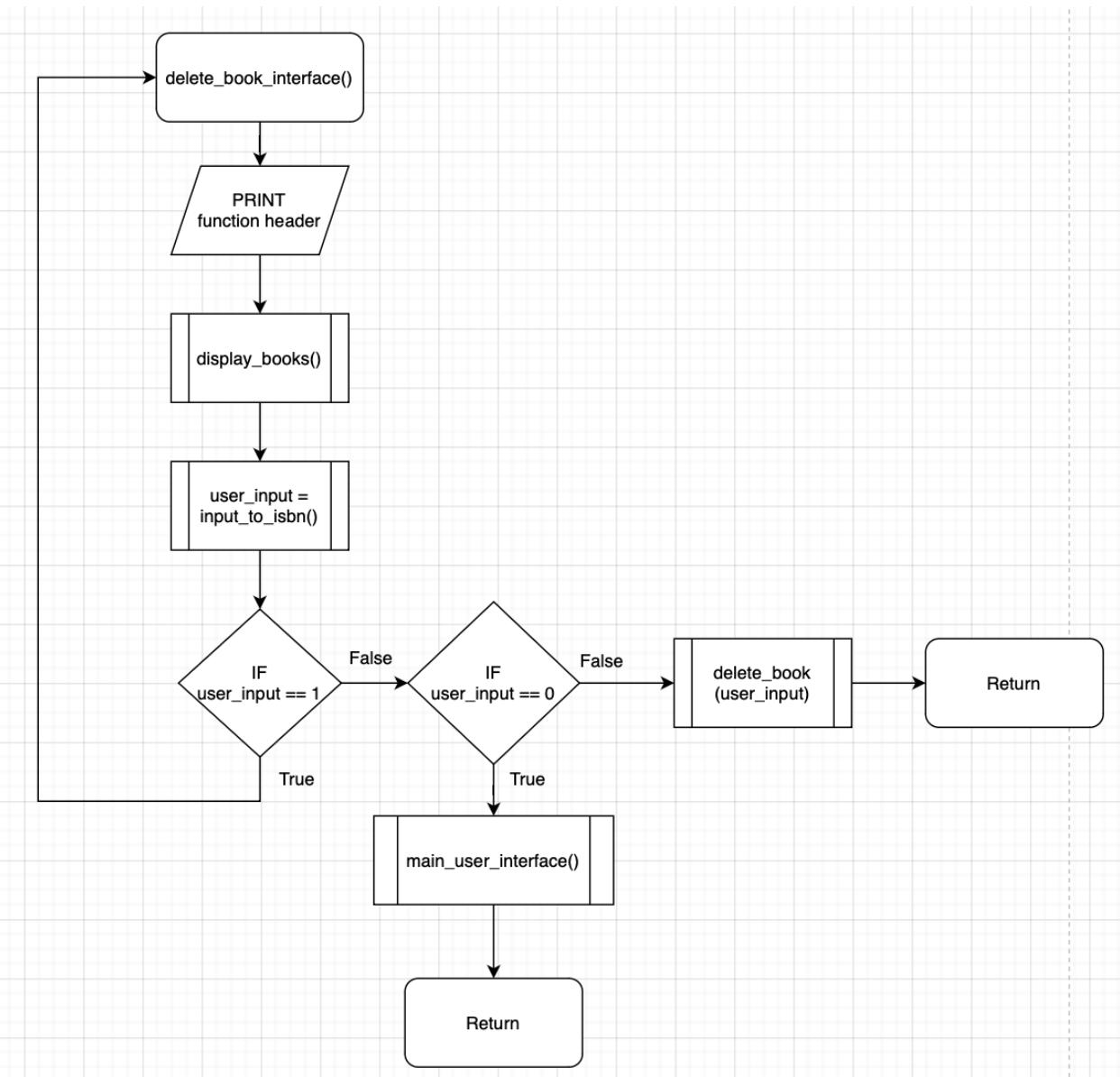
add_book_interface() Function



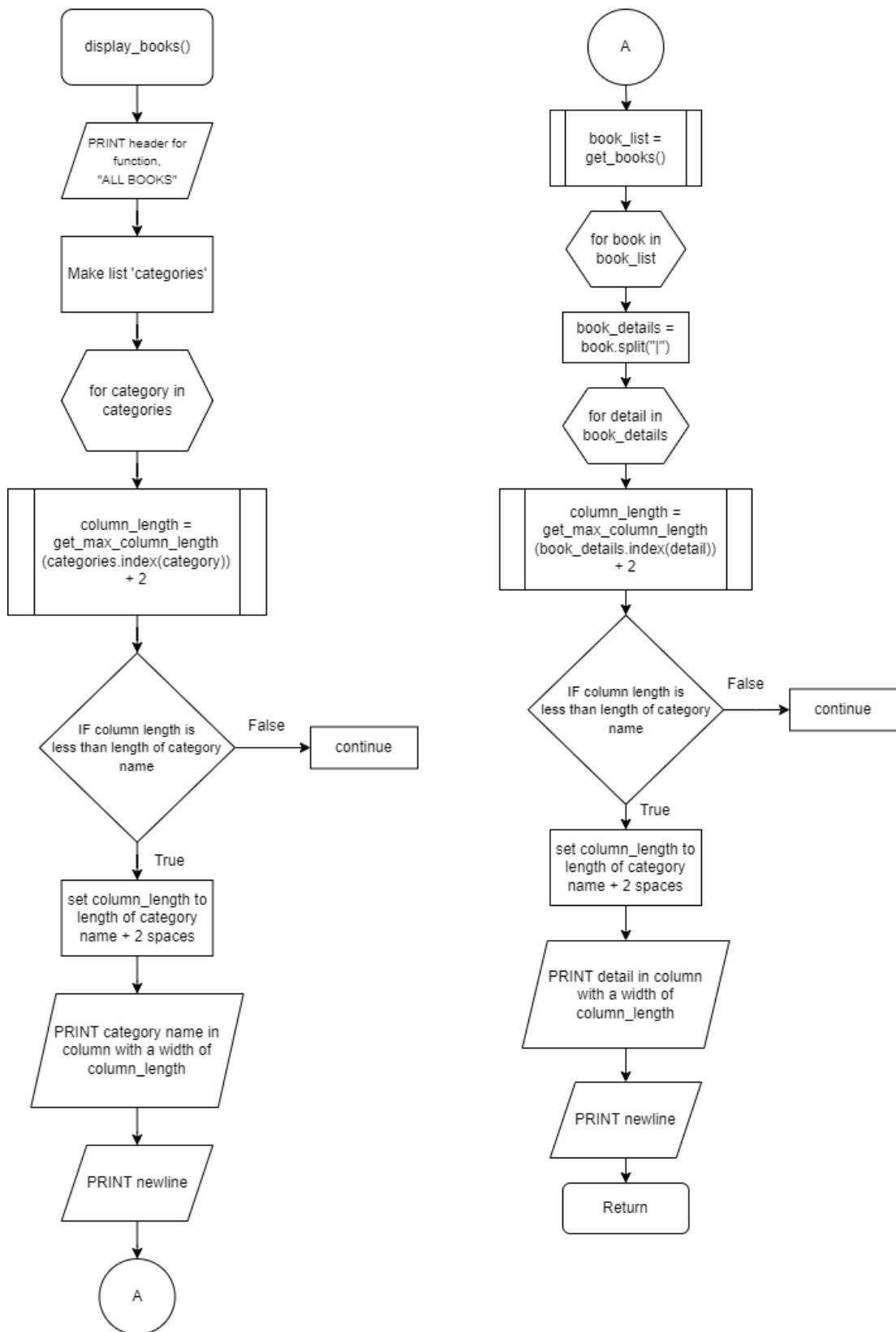
update_book_interface() Function



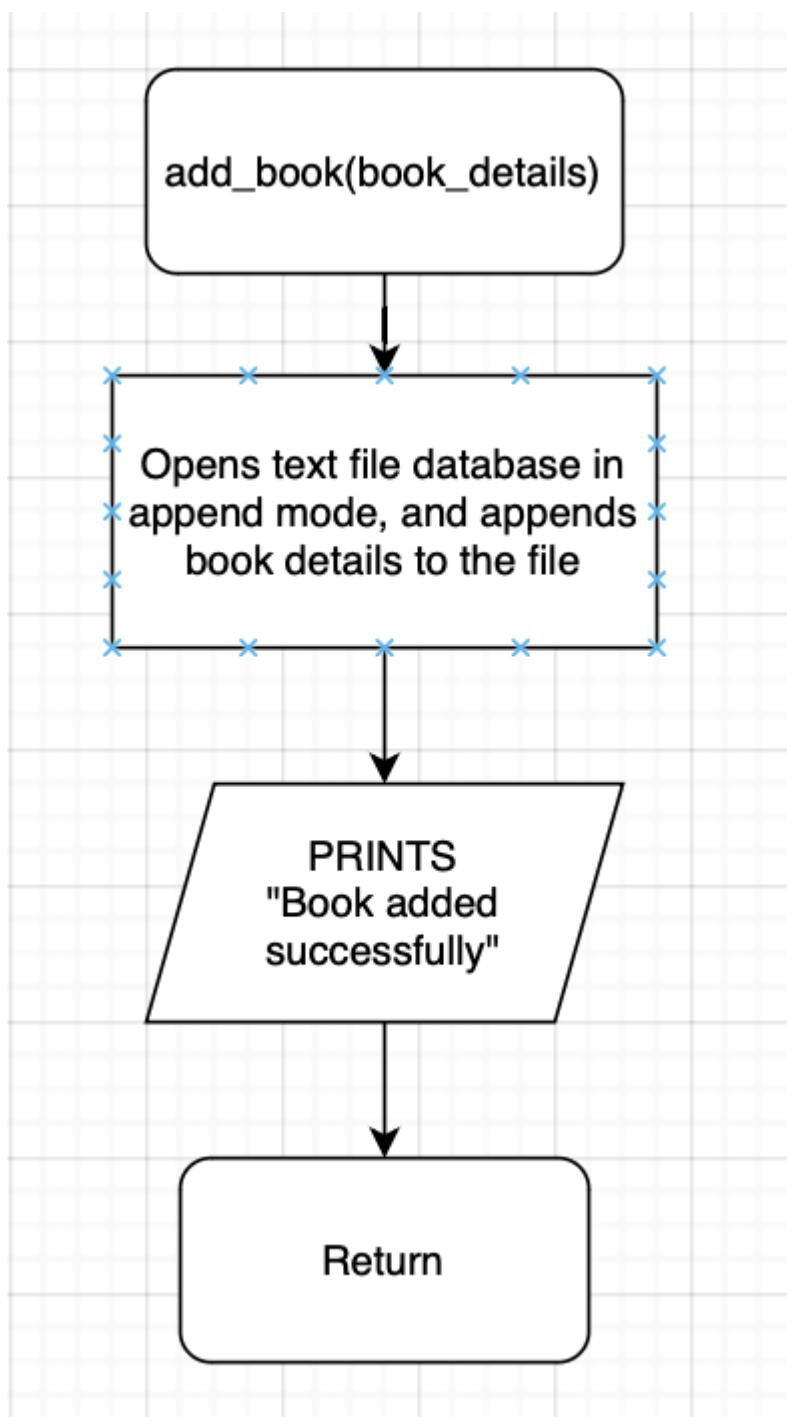
delete_book_interface() Function



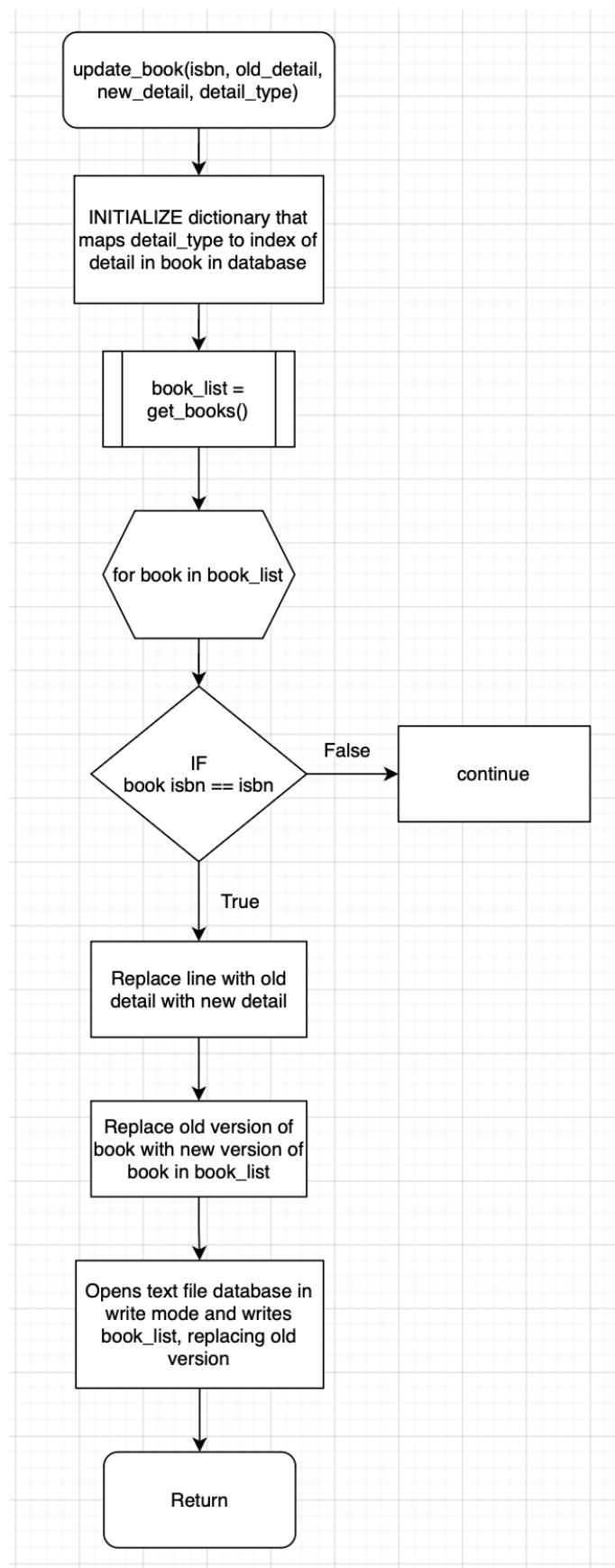
display_books() Function



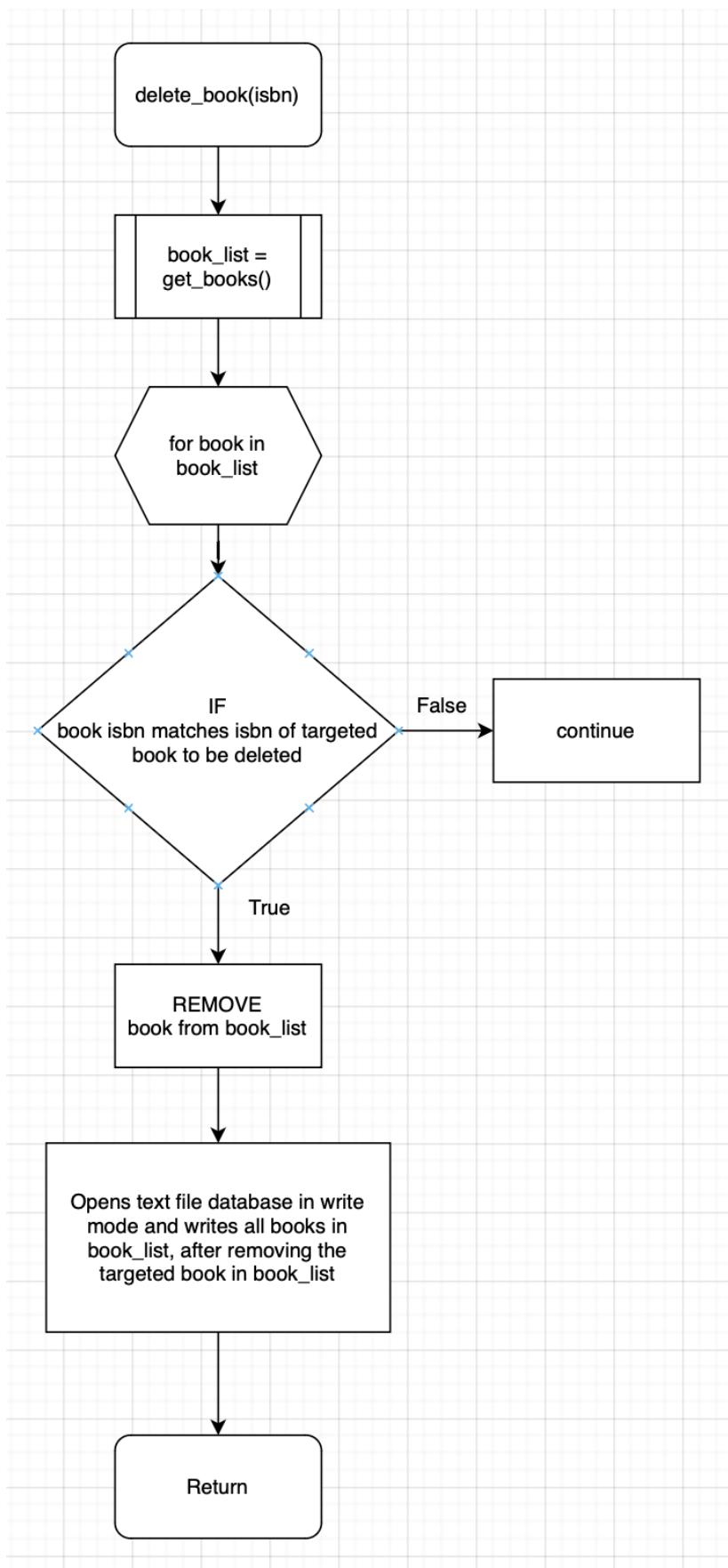
add_book(book) Function



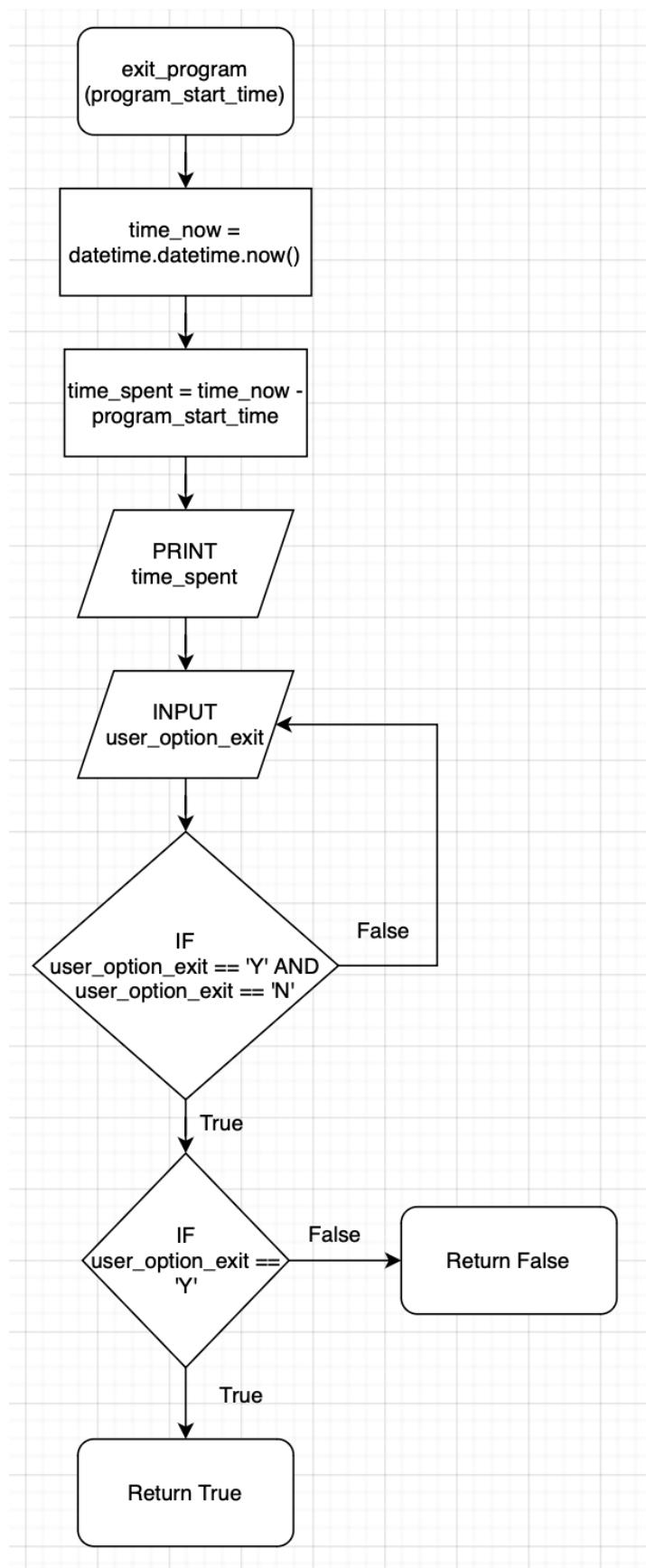
`update_book(isbn, old_detail, new_detail, detail_type)` Function



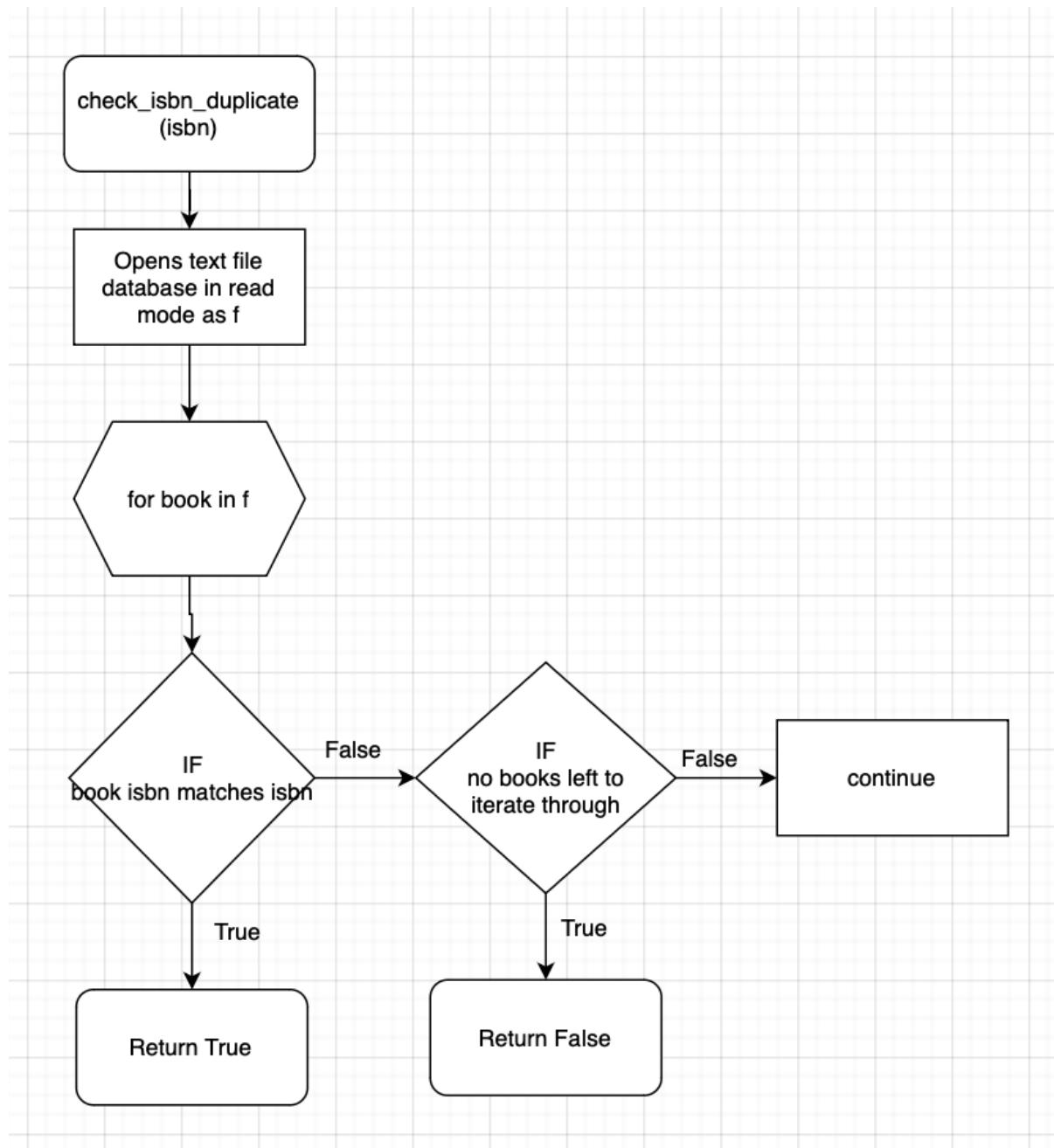
delete_book(isbn) Function



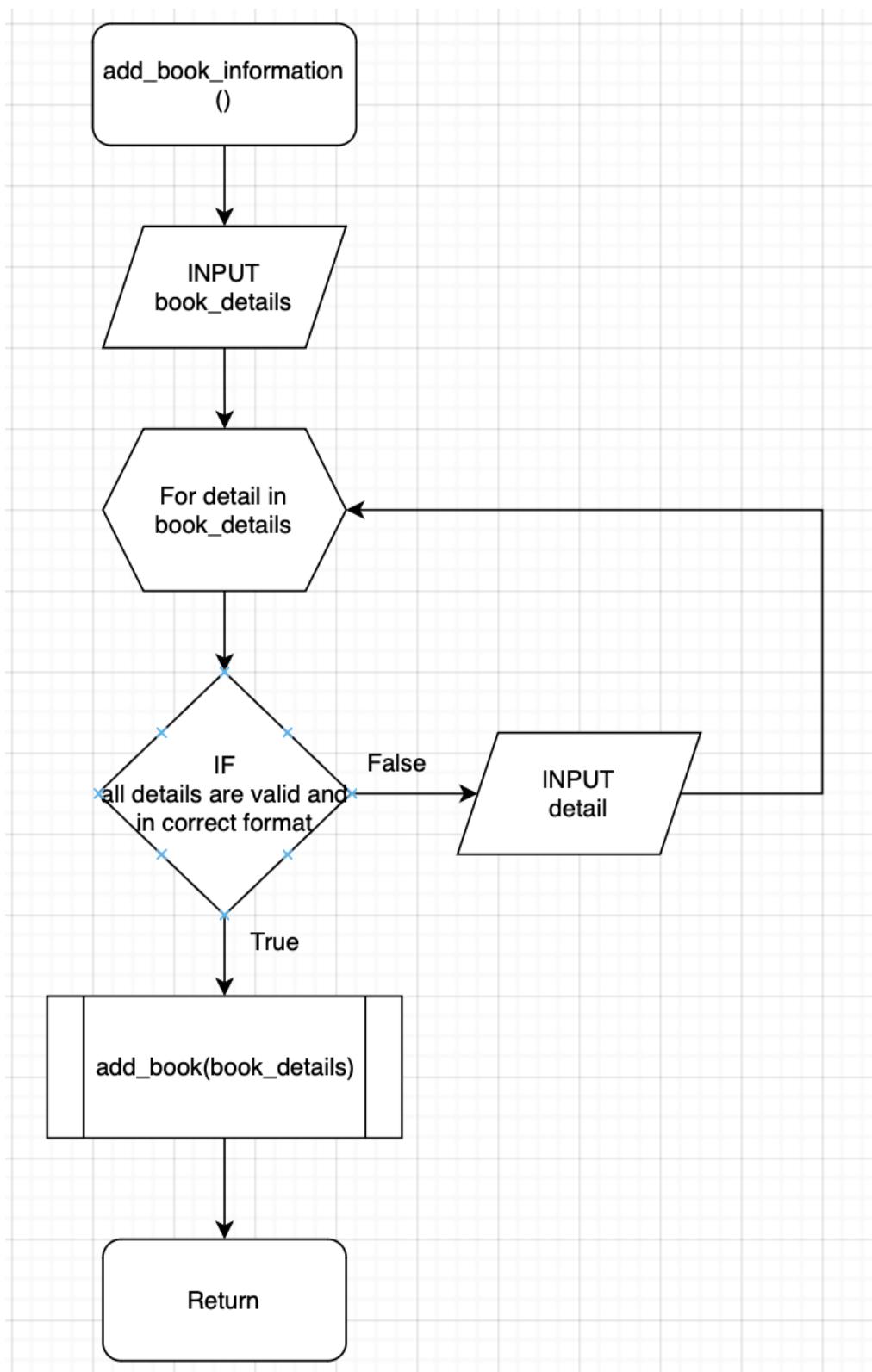
`exit_program(program_start_time)` Function



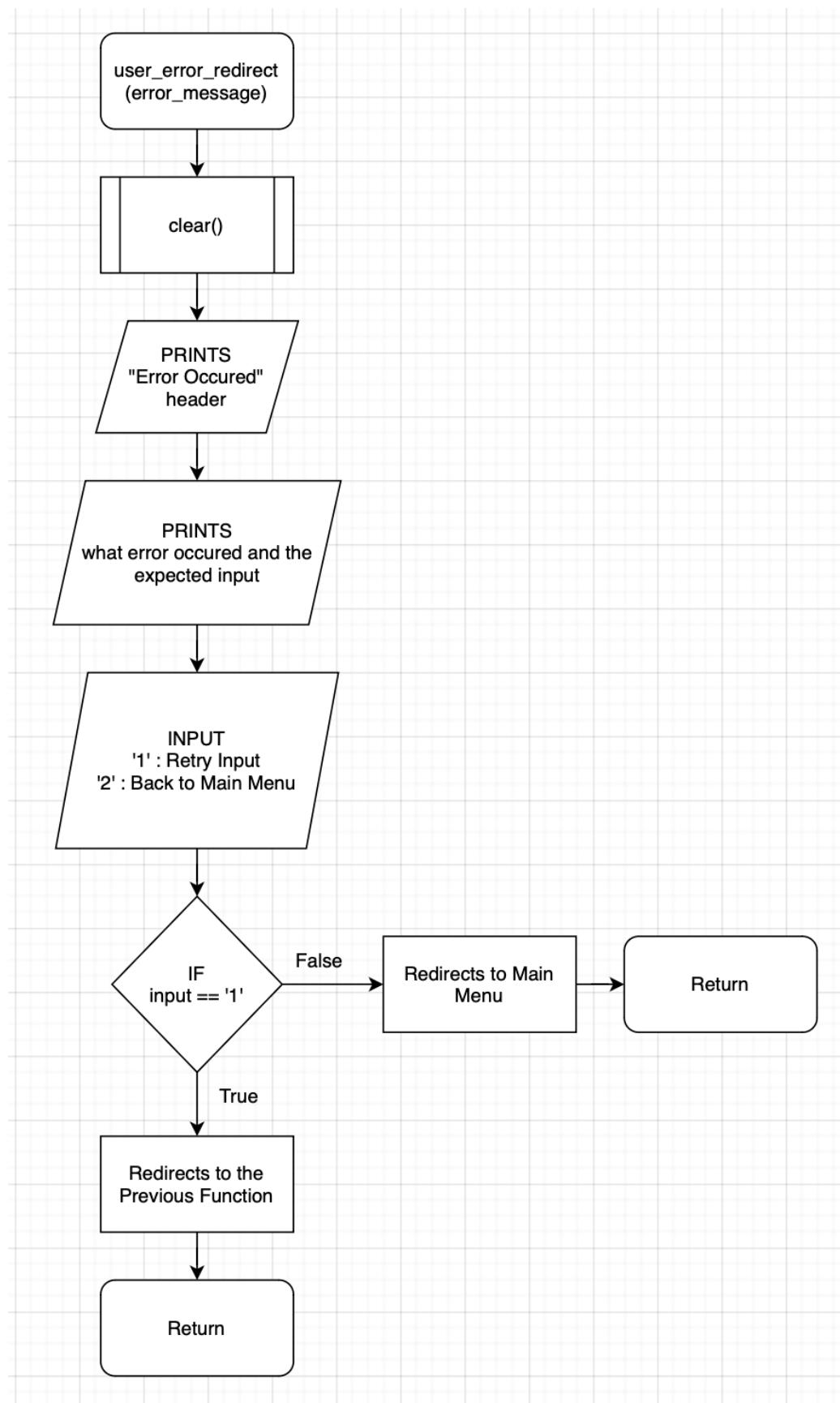
check_isbn_duplicate(isbn) Function



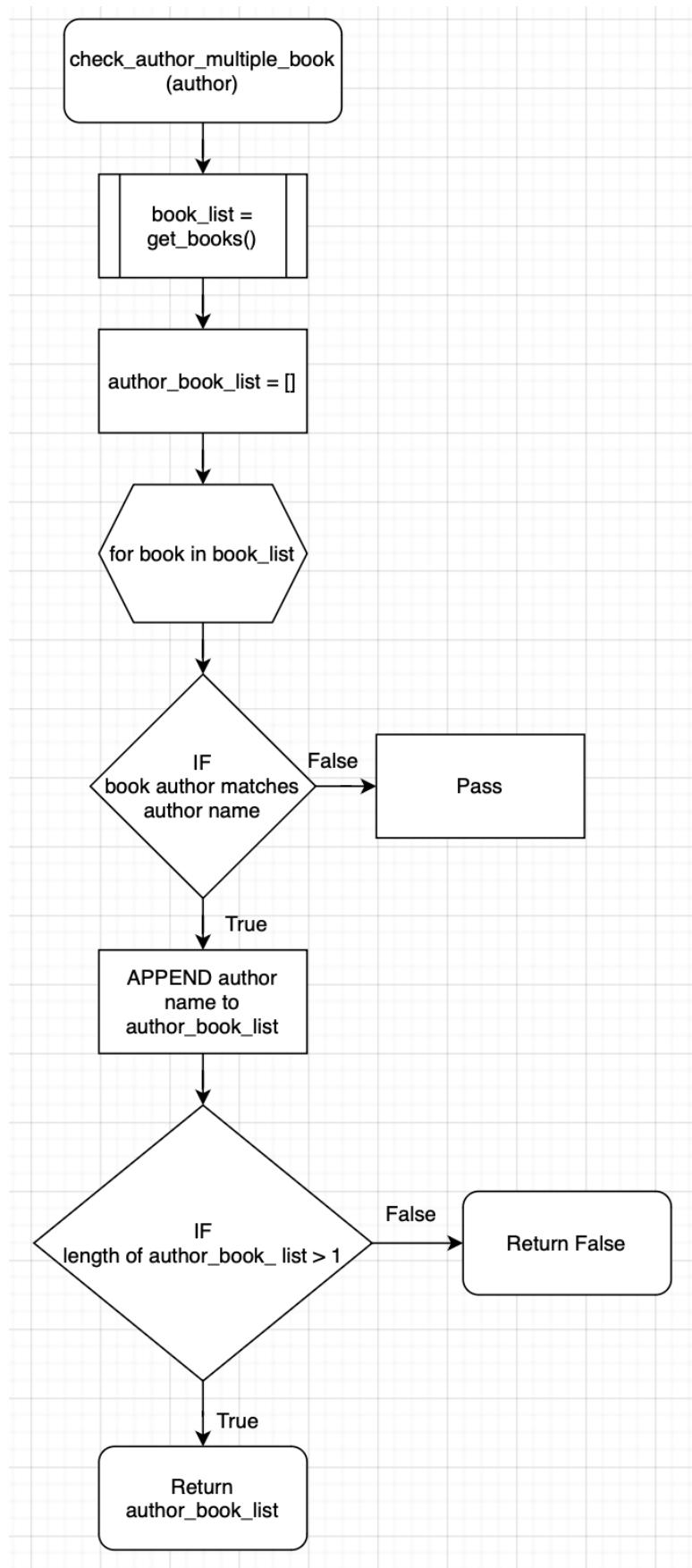
add_book_information() Function



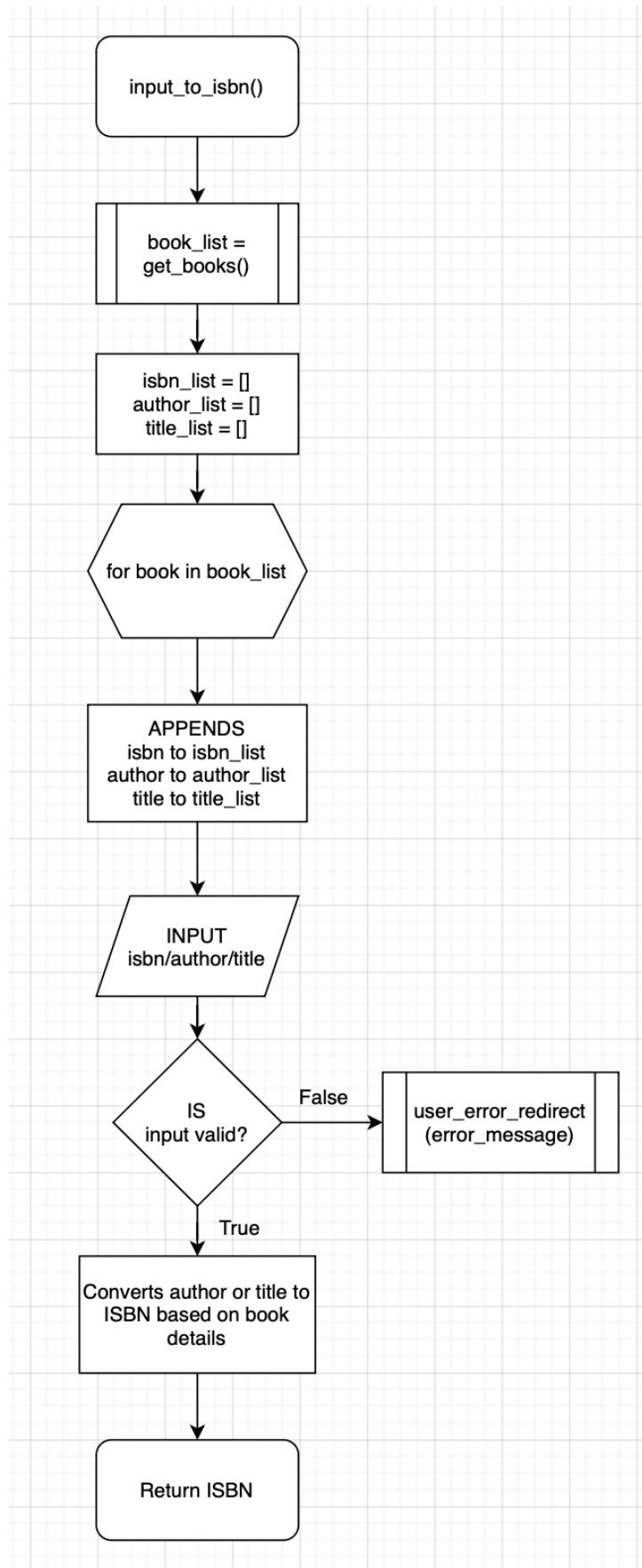
`user_error_redirect(error_message)` Function



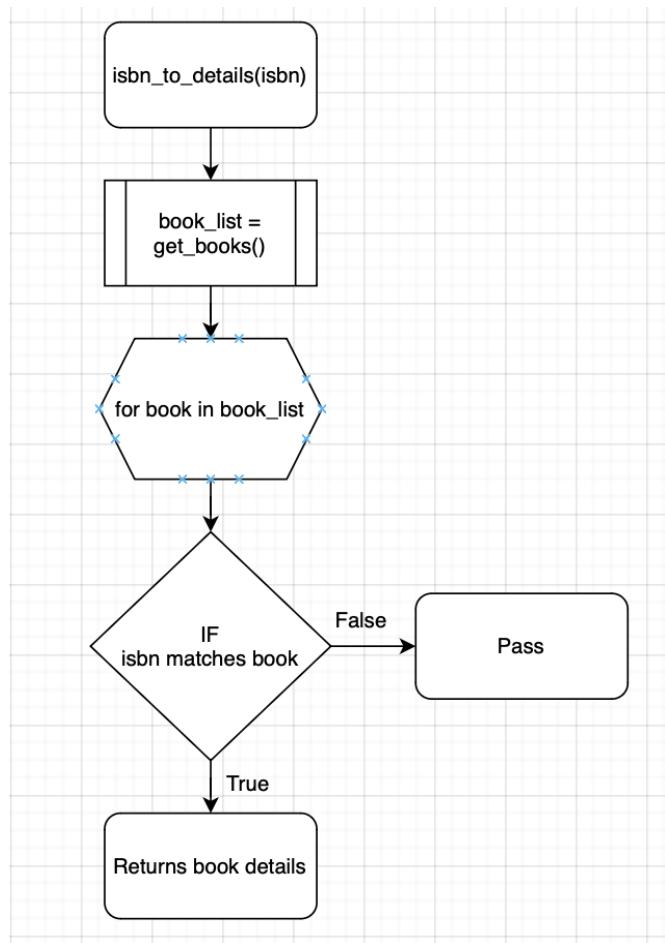
check_author_multiple_book(author) Function



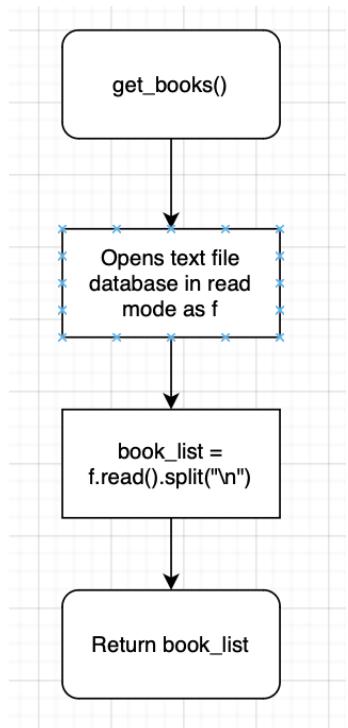
input_to_isbn() Function



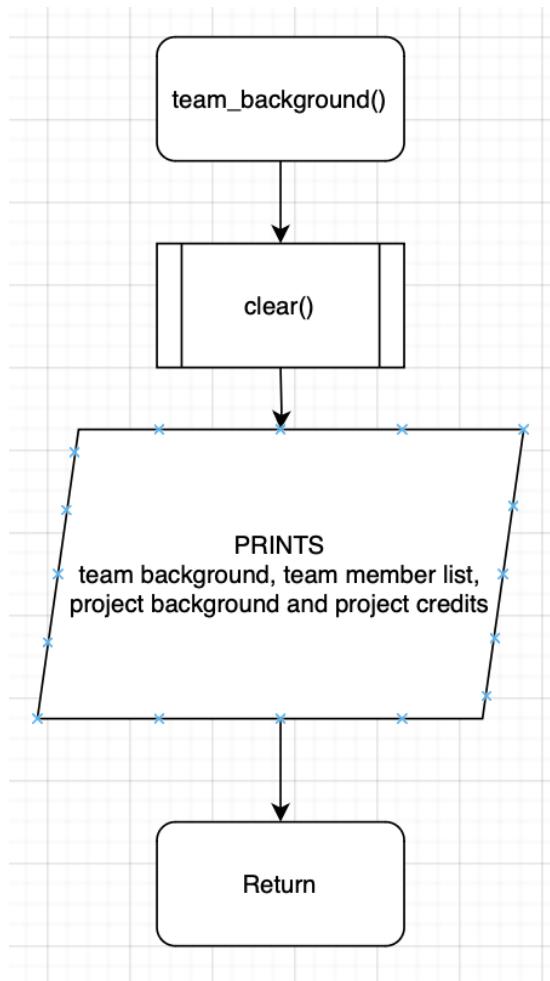
isbn_to_details(isbn) Function



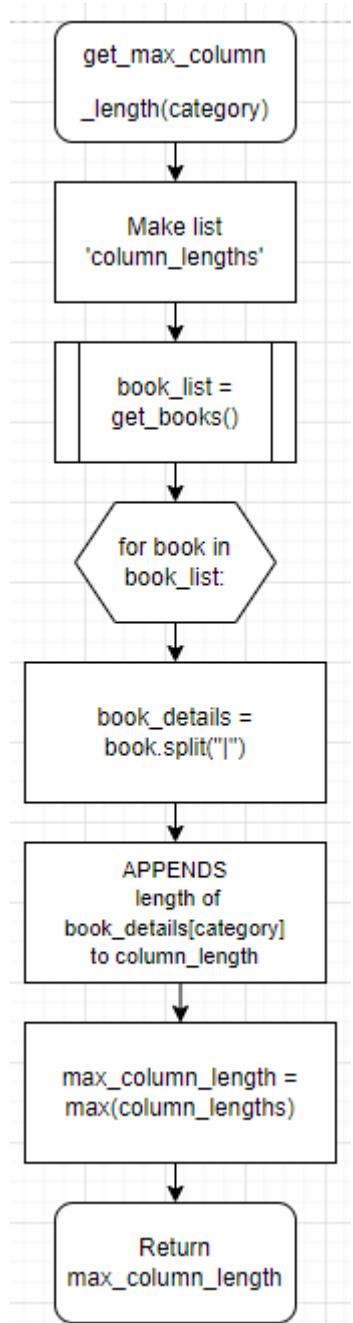
get_books() Function



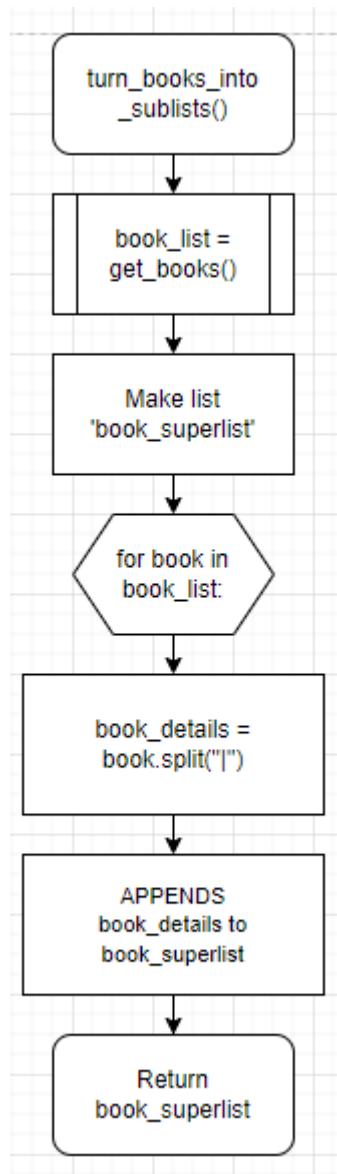
team_background() Function



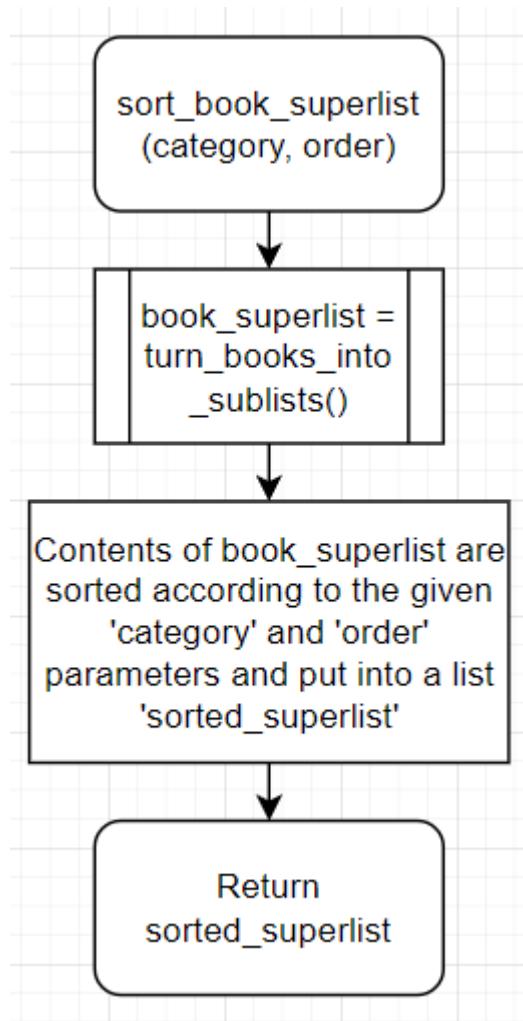
get_max_column_length(category) Function



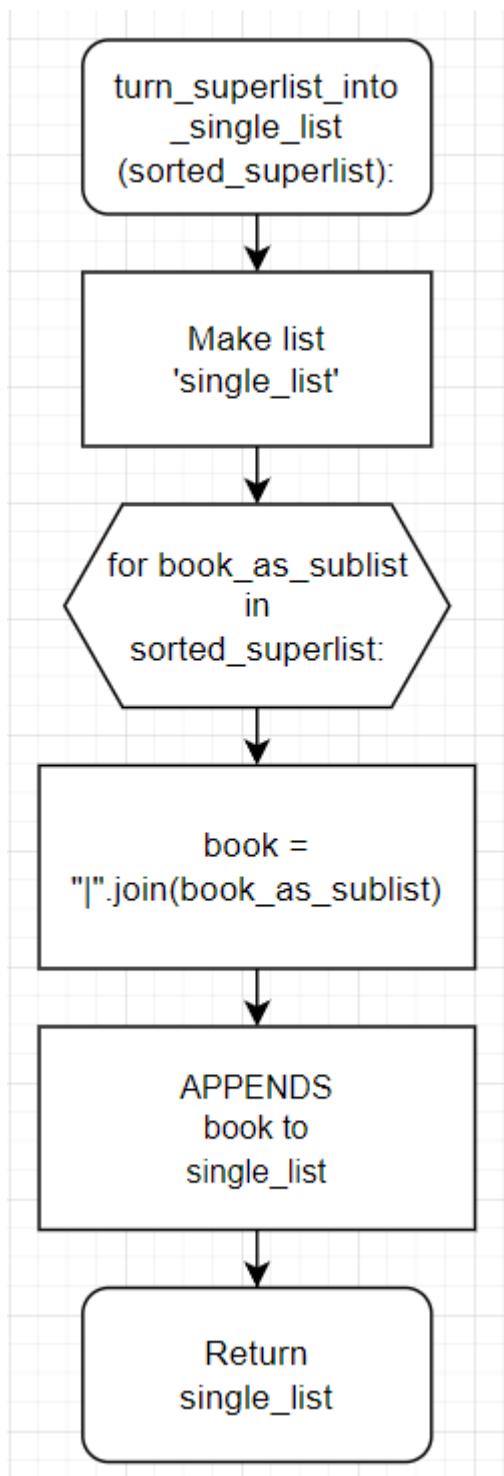
`turn_books_into_sublists()` Function



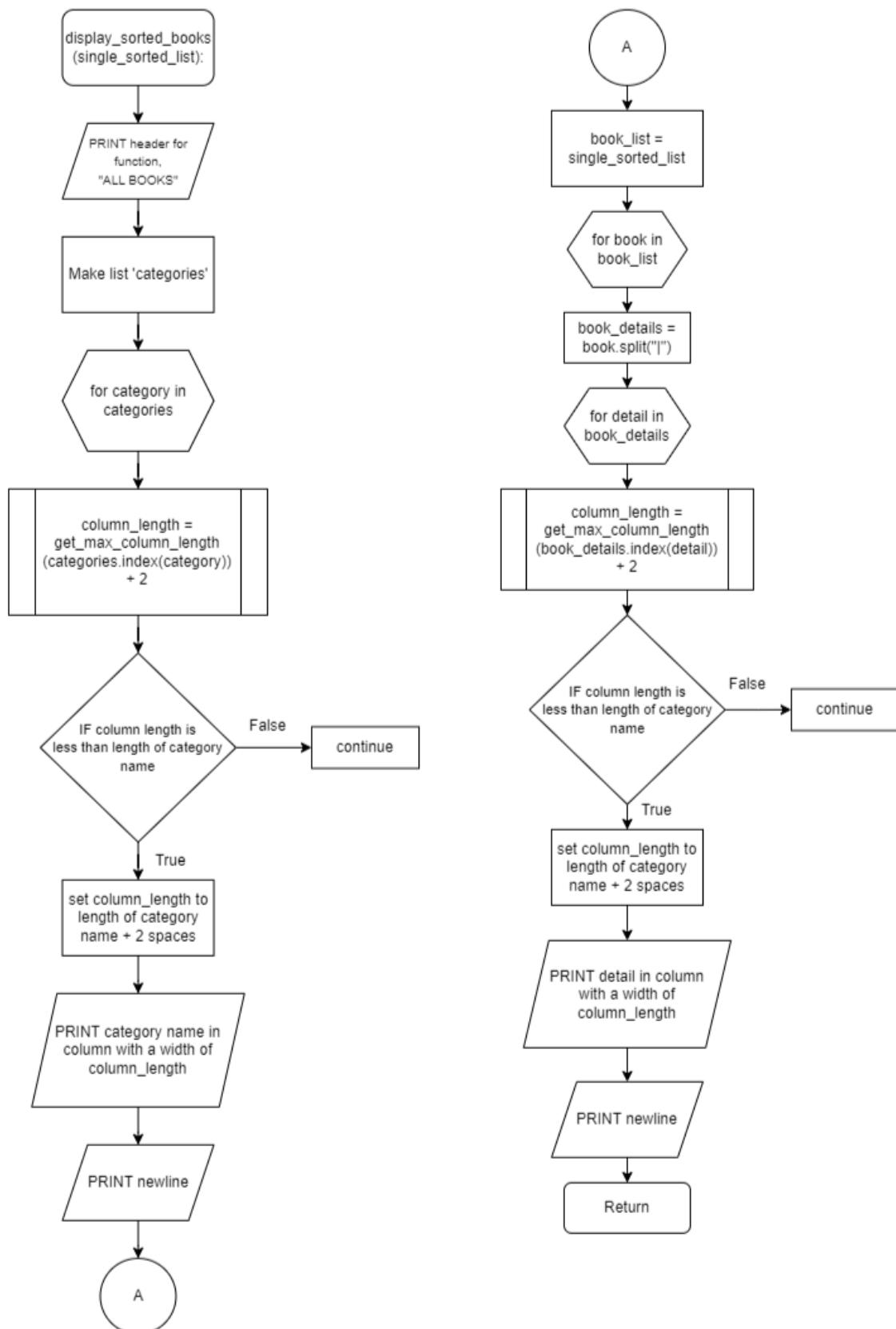
`sort_book_superlist(category, order)` Function



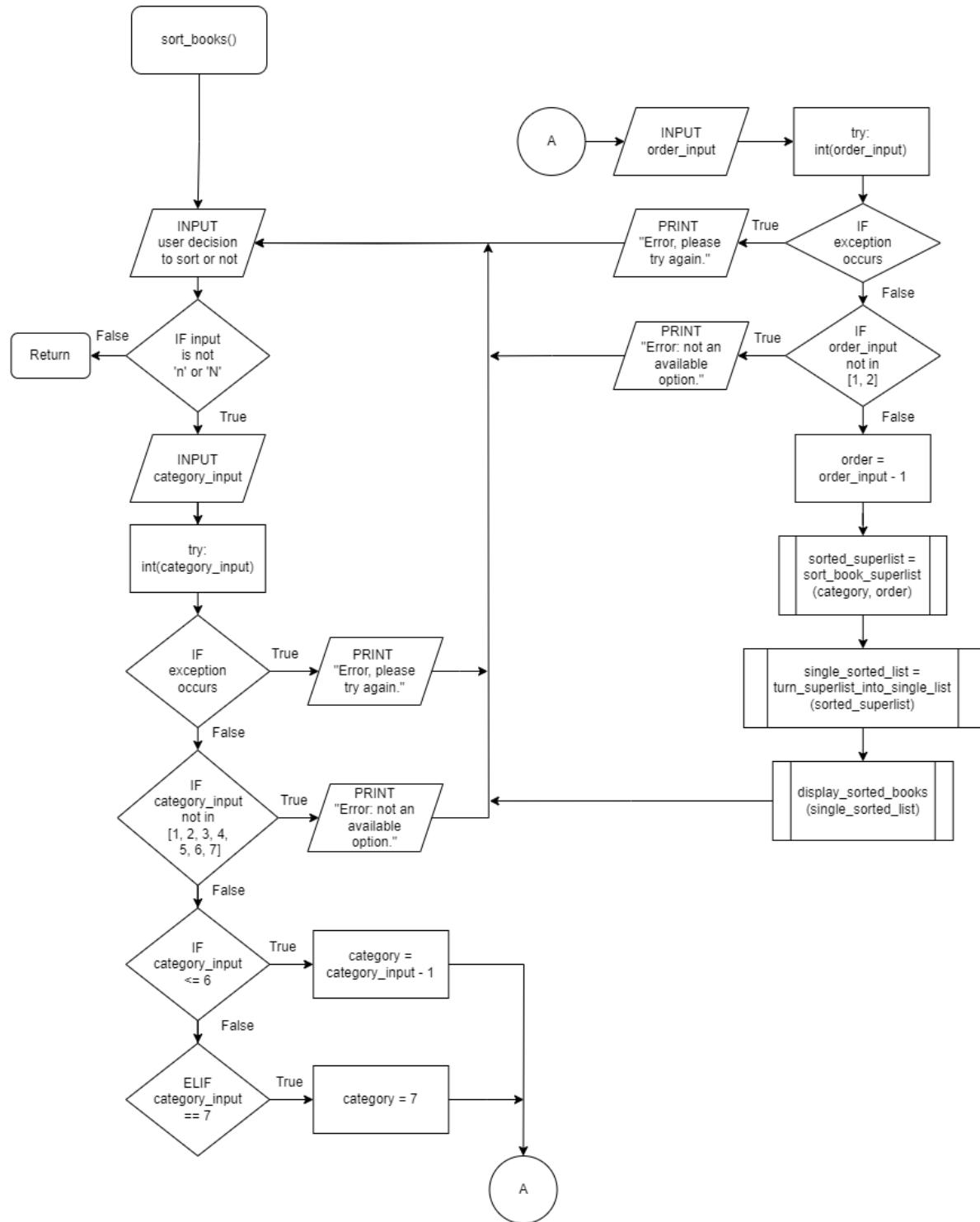
```
turn_superlist_into_single_list(sorted_superlist):
```



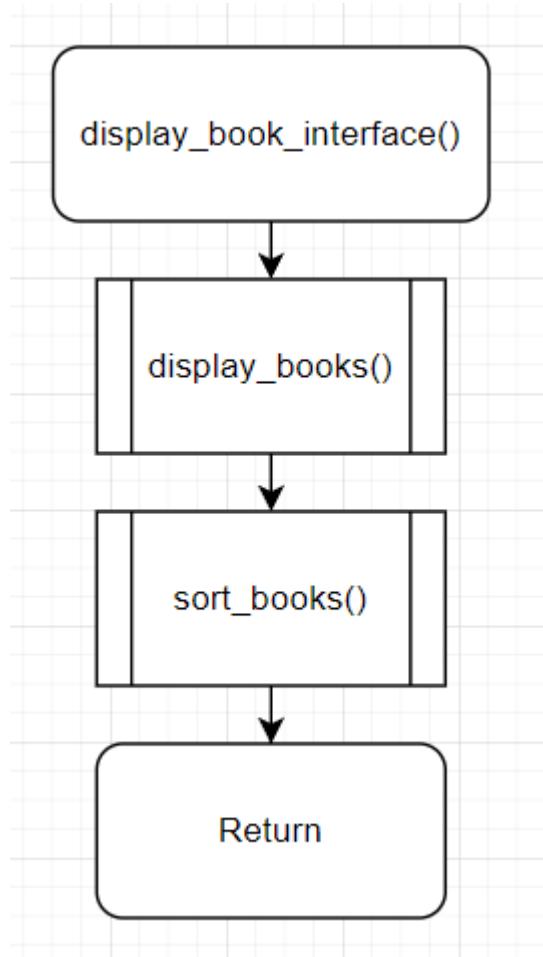
display_sorted_books(single_sorted_list):



sort_books() Function



`display_book_interface()`



2.2 Functional Requirements

2.2.1 Overview

A personal book development system allows a user to manage their books stored in a database. In our program, the database used to store user book data is named “books_23094907.txt”. The main runnable program in our project is named “python_23094907.py”.

In our assignment guideline, we were tasked to create a program that meets the following functional requirements: Add Book Record(s), Delete Book Record(s), Update/Edit Book Record(s), Display, Search for Book(s), and Exit.

2.2.2 Functional Requirement - Create, Read, Update and Delete

In order to allow users to manage their book curation. CRUD functions were implemented to allow users to add, update, delete and display books in their collection.

This chapter aims to discuss individual CRUD functions and how they were implemented into the program.

No	Functional Requirement	Description	Responsible Member
F1.1	Update/Edit Book Record(s) update_book(old_detail, new_detail, detail_type)	- Updates and edits specific book records based on user input in the book updating interface.	Darrance Beh Heng Shek
F1.2	Exit exit_program()	- Exit the program smoothly. - Displays the total time the user has spent using the program. - Double-confirms with user whether they want to exit the program.	Darrance Beh Heng Shek
F1.3	Add Book Record(s) add_book(book)	- Adds books into the existing books_23094907.txt	Lee Ming Hui Isaac
F1.4	Delete Book Record(s) delete_book(book)	- Delete books from the database "books_23094907.txt"	Tan Ho Chen
F1.5	Search for Book(s) search_books()	- Allows the user to locate their desired book. - Displays the details of the searched book.	Izzat Zulqarnain Bin Izaiddin
F1.6	Display Book Record(s) display_books()	- Displays all book record(s) listed in 'books_23094907.txt' - Gives the user the option to sort the books according to various orders.	Deron Ho Wen Harn

2.2.3 Functional Requirement Explanation and Sample

This chapter will be discussing the intricacies of the code in the functional requirements. Detailed descriptions and screenshots of sample outputs will be given to aid in understanding.

2.2.3.1 Functional Requirement 1 - Update/Edit Book Record(s)

The update_book(isbn, old_detail, new_detail, detail_type) function is called to allow users to update/edit their book record(s).

Do note that this function is purely FUNCTIONAL and does not display any contents to the user nor prompts the user to input anything. Thus, sample output only displays the before and after results in the text file.

The function takes in 4 variables: isbn, old_detail, new_detail and detail_type.

- isbn refers to the isbn of the book to be edited, it is used as an identifier.
- old_detail refers to the detail that the user wishes to edit.
- new_detail refers to the new detail that the user wishes to replace the old detail with.
- detail_type refers to the type of detail the user wishes to edit. (e.g., isbn, author, title, publisher, etc...)

These variables are obtained in update_book_interface() where the user inputs the required variables.

This function is only called within update_book_interface().

```
book_list = get_books()
```

In the function, the function calls the `get_books()` function which returns all books stored in the database and returns a list of the data.

```
detail_to_index_identifier = {
    "isbn": 0,
    "author": 1,
    "title": 2,
    "publisher": 3,
    "genre": 4,
    "yop": 5,
    "dop": 6,
    "status": 7
}
```

We integrated a dictionary that translates the `detail_type` string variable into an integer, which refers to the index of the detail the user wishes to edit.

```
for book in book_list:
    book_details = book.split("|")
        if (book_details[detail_to_index_identifier[detail_type]] == old_detail):
            book_details[detail_to_index_identifier[detail_type]] = new_detail
    book_list[book_list.index(book)] = "|".join(book_details)
```

This for loop splits every book entry into details into a new list. In this new list, every list item's 0 index refers to the isbn, index 1 refers to author, index 2 refers to the title, index 3 refers to publisher, index 4 to genre, 5 to year of publication, 6 to date of purchase and 7 to status.

In the for loop, we identify the line with the old detail that the user wants to edit, and we replace it with a new line with the new updated details. After that, we join the details, separated by a “|” to conform to the format of our database.

```
with open("books_23094907.txt", "w") as f:  
    f.write("\n".join(book_list))
```

Finally, we open the text file in write mode, and write the new updated version of the book into the text file, separating every new book with a newline.

Sample result:

Sample 1:

```
13 9781945631849|Lucy Score|Things We Never Got Over|That's What She Said Publishing|Contemporary|2022|13/01/2022|to-read
```

Original Book Entry 13 Before Editing

```
13 9781945631849|Lucy Score|Things We Never Got Over|That's What She Said Publishing|Contemporary|2022|13/01/2022|completed
```

Updated Book Entry 13 After Calling the Function `update_book("9781945631849", "to-read", "completed", "status")`

In the updated sample, note that the status (last index, last column) changed from “to-read” to “completed”

Sample 2:

```
18 9780356519500|Rachel Gillig|Two Twisted Crowns|Orbit|Fantasy|2023|19/10/2023|wishlist
```

Original Book Entry 18

```
18 9780356519500|Rachel Gillig|Two Straight Crowns|Orbit|Fantasy|2023|19/10/2023|wishlist
```

Updated Book Entry 18 After Calling the Function `update_book("9780356519500", "Two Twisted Crowns", "Two Straight Crowns", "title")`

In the updated sample, note that the book title (index 2, third column), changed from “Two Twisted Crowns” to “Two Straight Crowns”.

2.2.3.2 Functional Requirement 2 - Exit Program

The `exit_program(program_start_time)` function is called to allow users to smoothly exit the program with an interactive and fun experience.

The function takes in 1 variable: `program_start_time`.

- `program_start_time` is obtained with the help of the `datetime` module and the variable is initiated at program start and refers to the time the user starts up the program.

```
time_now = datetime.datetime.now().strftime("%Y-%m-%d %H:%M:%S")

time_spent = datetime.datetime.strptime(
    time_now,
    "%Y-%m-%d %H:%M:%S") - -
    datetime.datetime.strptime(program_start_time, "%Y-%m-%d %H:%M:%S")

# displays time in xx Hours xx Minutes xx Seconds format
hours, minutes, seconds = str(time_spent).split(":")
print(f"You Spent {hours} Hours {minutes} Minutes {
    seconds} Seconds using This Program.")
```

- With the `program_start_time`, we are able to calculate the amount of time the user spent using the program.
- We display the amount of time the user spent using our program to improve interactivity and immersion.
- We display the time format in the form of: HH hours MM minutes SS seconds.

```
user_option_exit = input("Are You Sure You Want To Exit? (Y/N) :
") .upper()
```

After we display the time spent, we prompt the user to input whether they really want to exit the program, prompting the user clearly to input either Y (Yes) or N (No).

- If the user inputs Y, we exit the program smoothly by using the exit() function.
- If the user inputs N, which means the user wants to continue using the program, we redirect the user back to the main menu by calling the main() function which refreshes our master function.

Sample Result:

Sample 1:

```
You Spent 0 Hours 00 Minutes 04 Seconds using This Program.  
Are You Sure You Want To Exit? (Y/N): y  
  
Exiting Program...  
Press Any Key To Exit.█
```

- Sample output when the user has used the program for only 4 seconds.
- Exits the program when the user inputs 'y'.

Sample 2:

```
You Spent 0 Hours 01 Minutes 22 Seconds using This Program.  
Are You Sure You Want To Exit? (Y/N): n  
  
Returning To Main Menu...  
Press Any Key To Continue.█
```

- Sample output when the user has used the program for only 22 seconds.
- Returns the user to the main menu when the user inputs 'n'.

2.2.3.3 Functional Requirement 3 - Add Book Record(s)

- The `check_isbn_duplicate(isbn)` function is called to check for existing ISBNs within `books_23094907.txt` in read mode for similarities.
- The `add_book_information()` function is called to collect and validate information about a book the user enters. Within it, many details need to be collected, such as the ISBN, author's name, book's title, publisher's name, genre, publishing year, purchase date, and book's status.
- Firstly, the program prompts the user to input the book's ISBN. The program will check whether the ISBN is a digit and has a length of 13 digits; if unsuccessful, an error message will be shown and prompt the user to try again. If successful, the program will check for existing ISBNs using the previously mentioned `check_isbn_duplicate(isbn)` function. If similarities are detected, an error message is displayed stating that a duplicate is found, which will ask the user again for the ISBN. If there are no errors, the program breaks the loop and moves on to the next detail.

```
Please enter the following information:  
ISBN number: abcdefghijklm  
Error. ISBN number must be 13 digits long and contain only digits. Please try again.  
ISBN number: 
```

(The above sample output shows that alphabetical letters are not accepted. It prompts the user to try again.)

```
ISBN number: 9781785785719  
Error. A book with this ISBN already exists.  
ISBN number: 
```

(The above sample output shows an existing book with an identical ISBN. Also prompts the user to try again.)

- Then, the program asks for the user to input the author's name. The program checks whether the input is in alphabetical characters. If not, it will output an error statement stating the reason and ask the user to try again. (Note: Due to naming conventions in

different cultures, umlauts, diphthongs and ligatures are accepted.) If the author's name is accepted, the program breaks the loop and proceeds with the next detail.

```
Author's name: J4ME5 TR4PP  
Error. Author's name must only contain alphabetical characters. Please try again.  
Author's name: █
```

(The above sample output indicates that numbers are not permitted. Requests the user to try again.)

```
Author's name: Tõre Ørjäsäter  
Book's title: █
```

(The above sample output accepts the input, which breaks the loop and moves on to the next demand.)

- Next, the program requests the user to input the book's title. Since there are no special requirements for this information, the user can input anything and the program will accept it.

```
Book's title: The Art of War 2  
Publisher's name: █
```

(The above sample output shows that both alphabets and numbers are accepted in the book's title.)

- Moving on, the program prompts the user to input the book's genre. Just like the author's name, the program will check and only accept alphabetical characters. If not, the program will output an error statement requesting the user to try again. This will repeat until an alphabetical character-only genre is received in which the program will break the loop and proceed to the next detail.

```
Genre of the book: Strategy 101  
Error. Genre must only contain alphabetical characters. Please try again.  
Genre of the book: █
```

(This sample output shows that numbers within the genre are not accepted. As such, the user must retry.)

```
Genre of the book: Strategy
Publishing year: █
```

(This sample output shows that only alphabetical characters are accepted. The loop breaks and proceeds to the next detail.)

- Afterwards, the program asks the user to enter the book's publishing year. The program will check whether the publishing year is a 4-digit number and does not exceed the current year, as that is not possible to obtain a published book dated in the future. If the input year exceeds the current year, an error message will be displayed and asking the user to try again. Until the user enters an appropriate year, the loop will continue.

```
Publishing year: 20230
Error. Publishing year must be a 4-digit positive integer and not in the future. Please try again.
Publishing year: █
```

(The above sample input shows that a 5-digit number produces an error and prompts the user to give a different input.)

```
Publishing year: 2025
Error. Publishing year must be a 4-digit positive integer and not in the future. Please try again.
Publishing year: █
```

(The above sample input shows that the input is ahead of the current year. As such, an error is presented and the user is required to try again.)

```
Publishing year: 2016
Date purchased in the format DD/MM/YYYY: █
```

(The above sample input is accepted by the program as the book is published before the current year. Therefore, the program moves on to the next prompt.)

- Subsequently, the program will request the user to input the book's date of purchase. The program will verify whether the input format is in DD/MM/YYYY and has a maximum of 10 numbers (including "/"). At the same time, the program will ensure that the date of purchase is after the publishing date. If not, the program shows an

error message informing the problem and loops back for the user to try again.

```
Date purchased in the format DD/MM/YYYY: AA/BB/CCCC  
Error. The date format is incorrect. Please try again.  
Date purchased in the format DD/MM/YYYY: █
```

(The above sample input is rejected by the program as only numbers are permitted.)

The program outputs an error statement and tells the user to try again.)

```
Date purchased in the format DD/MM/YYYY: 12/3/23  
Error. The date must be exactly 10 characters long in the format DD/MM/YYYY. Please try again.  
Date purchased in the format DD/MM/YYYY: █
```

(The above sample input is also rejected, as it did not adhere to the format. As a result, the user must try again.)

```
Date purchased in the format DD/MM/YYYY: 12/01/2015  
Error. The purchase date must be after the publishing year. Please try again.  
Date purchased in the format DD/MM/YYYY: █
```

(The above sample is also rejected, as the purchase date is before the publishing date. The program informs the user to try again.)

```
Date purchased in the format DD/MM/YYYY: 12/03/2017  
Please input the book's status:  
[1] - wishlist  
[2] - to-read  
[3] - reading  
[4] - completed  
  
Book's status (enter a number from 1 to 4): █
```

(The above sample is accepted, as the purchase date is after the publishing date.)

The program breaks the loops and continues to the final detail demand.)

- Lastly, the program will demand the user to enter a single digit number from 1 to 4 to make a selection towards the book's status. If anything other than the numbers 1 to 4 has been selected, the program will output an error message stating invalid status and demand the user to try again.

```
Book's status (enter a number from 1 to 4): a
Error. Invalid status. Please try again.
Please input the book's status:
[1] - wishlist
[2] - to-read
[3] - reading
[4] - completed

Book's status (enter a number from 1 to 4): █
```

(The above sample input is not accepted, as the input is not a number but an alphabet. Hence, “invalid status” is shown to the user to retry.)

```
Book's status (enter a number from 1 to 4): 5
Error. Invalid status. Please try again.
Please input the book's status:
[1] - wishlist
[2] - to-read
[3] - reading
[4] - completed

Book's status (enter a number from 1 to 4): █
```

(The above sample input is also not accepted, as the number is out of range. Henceforth, “invalid status” is shown to the user to retry.)

- When the add_book_information() function ends, each book's details (values) will be returned.
 - The add_book(book) function writes the book's details into books_23094907.txt storing book information in a specific format, which is:
- isbn|author|title|publisher|genre|published_year|date_purchased_str|status.

Sample results:

```
9781785785719|Yasha Levine|Surveillance Valley|Icon Books|Politics|2019|02/01/2020|completed
9780241976630|John Maeda|How to Speak Machine|Portfolio UK|Artificial Intelligence|2019|02/01/2020|completed
9781119055808|Andre De Vries|R For Dummies|John Wiley|Programming|2015|12/08/2016|completed
9780062018205|Dan Ariely|Predictably Irrational|Harper Collins|Psychology|2010|03/06/2019|read
9780008327613|John Walsh|The Globalist|Harper Collins|Biography & Autobiography|2019|11/05/2021|to-read
9780525538349|John Doerr|Measure What Matters|Penguin LCC|Management|2018|21/09/2022|to-read
9780807092156|Viktor Frankl|Man's Search for Meaning|Random House|Philosophy|2019|30/08/2021|to-read
9780735222359|Amor Towles|The Lincoln Highway|Viking|Fiction|2021|5/10/2021|to-read
9780778311010|Sarah Penner|The Lost Apothecary|Park Row|Fiction|2021|02/03/2021|to-read
9780593318485|Joan Didion|Let Me Tell You What I Mean|Knopf|Essays|2021|26/01/2021|to-read
9780593320624|Maggie O'Farrell|The Marriage Portrait|Knopf|Fiction|2022|05/12/2022|to-read
9781542025607|Colleen Hoover|Reminders of Him|Montlake|Romance|2022|18/01/2022|to-read
9781945631849|Lucy Score|Things We Never Got Over|That's What She Said|Contemporary|2022|13/01/2022|to-read
9781668026038|Hannah Grace|icebreaker|Atria|Romance|2022|07/02/2023|to-read
9780063052734|Danya Kukafka|Notes on an Execution|William Morrow|Thriller|2022|25/01/2022|to-read
9780765376459|V.E. Schwab|A Darker Shade of Magic|Tor|Fantasy|2015|24/05/2015|to-read
9780063211506|ava reid|A Study in Drowning|HarperTeen|Fantasy|2023|19/09/2023|wishlist
9780356519500|Rachel Gillig|Two Twisted Crowns|Orbit|Fantasy|2023|19/10/2023|wishlist
9781250851208|Stephanie Garber|A Curse for True Love|Flatiron|Fantasy|2023|24/10/2023|wishlist
9780316312486|Rachel Gillig|one dark window|Orbit|Fantasy|2022|27/09/2022|to-read
9781250857439|Rebecca Ross|Divine Rivals|Wednesday Books|Fantasy|2023|04/04/2023|wishlist
9781232857439|Rebecca Ross|Divine Lovers|Wednesday Books|Fantasy|2022|05/07/2023|to-read|
```

(The image above shows books_23094907.txt before any books are added)

Sample 1:

```
9781785785719|Yasha Levine|Surveillance Valley|Icon Books|Politics|2019|02/01/2020|completed
9780241976630|John Maeda|How to Speak Machine|Portfolio UK|Artificial Intelligence|2019|02/01/2020|completed
9781119055808|Andre De Vries|R For Dummies|John Wiley|Programming|2015|12/08/2016|completed
9780062018205|Dan Ariely|Predictably Irrational|Harper Collins|Psychology|2010|03/06/2019|read
9780008327613|John Walsh|The Globalist|Harper Collins|Biography & Autobiography|2019|11/05/2021|to-read
9780525538349|John Doerr|Measure What Matters|Penguin LCC|Management|2018|21/09/2022|to-read
9780807092156|Viktor Frankl|Man's Search for Meaning|Random House|Philosophy|2019|30/08/2021|to-read
9780735222359|Amor Towles|The Lincoln Highway|Viking|Fiction|2021|5/10/2021|to-read
9780778311010|Sarah Penner|The Lost Apothecary|Park Row|Fiction|2021|02/03/2021|to-read
9780593318485|Joan Didion|Let Me Tell You What I Mean|Knopf|Essays|2021|26/01/2021|to-read
9780593320624|Maggie O'Farrell|The Marriage Portrait|Knopf|Fiction|2022|05/12/2022|to-read
9781542025607|Colleen Hoover|Reminders of Him|Montlake|Romance|2022|18/01/2022|to-read
9781945631849|Lucy Score|Things We Never Got Over|That's What She Said|Contemporary|2022|13/01/2022|to-read
9781668026038|Hannah Grace|icebreaker|Atria|Romance|2022|07/02/2023|to-read
9780063052734|Danya Kukafka|Notes on an Execution|William Morrow|Thriller|2022|25/01/2022|to-read
9780765376459|V.E. Schwab|A Darker Shade of Magic|Tor|Fantasy|2015|24/05/2015|to-read
9780063211506|ava reid|A Study in Drowning|HarperTeen|Fantasy|2023|19/09/2023|wishlist
9780356519500|Rachel Gillig|Two Twisted Crowns|Orbit|Fantasy|2023|19/10/2023|wishlist
9781250851208|Stephanie Garber|A Curse for True Love|Flatiron|Fantasy|2023|24/10/2023|wishlist
9780316312486|Rachel Gillig|one dark window|Orbit|Fantasy|2022|27/09/2022|to-read
9781250857439|Rebecca Ross|Divine Rivals|Wednesday Books|Fantasy|2023|04/04/2023|wishlist
9781232857439|Rebecca Ross|Divine Lovers|Wednesday Books|Fantasy|2022|05/07/2023|to-read
9781782744344|Sun Tzu|Art of War|Popular UK Pte Ltd|Strategy|2016|12/06/2020|completed|
```

(The image above shows books_23094907.txt after a book is added. The book added can be seen on the last line of books_23094907.txt, which is named "Art of War" with an ISBN of 9781782744344.)

Sample 2:

9781785785719	Yasha Levine	Surveillance Valley	Icon Books	Politics	2019 02/01/2020	completed
9780241976630	John Maeda	How to Speak Machine	Portfolio UK	Artificial Intelligence	2019 02/01/2020	completed
9781119055808	Andre De Vries	R For Dummies	John Wiley	Programming	2015 12/08/2016	completed
9780062018205	Dan Ariely	Predictably Irrational	Harper Collins	Psychology	2010 03/06/2019	read
9780008327613	John Walsh	The Globalist	Harper Collins	Biography & Autobiography	2019 11/05/2021	to-read
9780525538349	John Doerr	Measure What Matters	Penguin LCC	Management	2018 21/09/2022	to-read
9780807092156	Viktor Frankl	Man's Search for Meaning	Random House	Philosophy	2019 30/08/2021	to-read
9780735222359	Amor Towles	The Lincoln Highway	Viking	Fiction	2021 5/10/2021	to-read
9780778311010	Sarah Penner	The Lost Apothecary	Park Row	Fiction	2021 02/03/2021	to-read
9780593318485	Joan Didion	Let Me Tell You What I Mean	Knopf	Essays	2021 26/01/2021	to-read
9780593320624	Maggie O'Farrell	The Marriage Portrait	Knopf	Fiction	2022 05/12/2022	to-read
9781542025607	Colleen Hoover	Reminders of Him	Montlake	Romance	2022 18/01/2022	to-read
9781945631849	Lucy Score	Things We Never Got Over	That's What She Said	Contemporary	2022 13/01/2022	to-read
9781668026038	Hannah Grace	icebreaker	Atria	Romance	2022 07/02/2023	to-read
9780063052734	Danya Kukafka	Notes on an Execution	William Morrow	Thriller	2022 25/01/2022	to-read
9780765376459	V.E. Schwab	A Darker Shade of Magic	Tor	Fantasy	2015 24/05/2015	to-read
9780063211506	ava reid	A Study in Drowning	HarperTeen	Fantasy	2023 19/09/2023	wishlist
9780356519500	Rachel Gillig	Two Twisted Crowns	Orbit	Fantasy	2023 19/10/2023	wishlist
9781250851208	Stephanie Garber	A Curse for True Love	Flatiron	Fantasy	2023 24/10/2023	wishlist
9780316312486	Rachel Gillig	one dark window	Orbit	Fantasy	2022 27/09/2022	to-read
9781250857439	Rebecca Ross	Divine Rivals	Wednesday Books	Fantasy	2023 04/04/2023	wishlist
9781232857439	Rebecca Ross	Divine Lovers	Wednesday Books	Fantasy	2022 05/07/2023	to-read
9781782744344	Sun Tzu	Art of War	Popular UK Pte Ltd	Strategy	2016 12/06/2020	completed
9789814189736	Andrew Tanzer	ROBERT KUOK a memoir	Landmark Books Pte Ltd	Memoir	2017 05/09/2022	reading

(The image above shows the interface display after the second book has been added. As you can see, the second book is now in the last line, which carries the title of "ROBERT KUOK a memoir" written by Andrew Tanzer with an ISBN of 9789814189736.)

2.2.3.4 Functional Requirement 4 - Delete Book Record(s)

The delete_book(isbn) is called by the delete_book_interface() function (F2.10) and it takes an ISBN as an argument. It retrieves the current list of books using the get_books() function. It then iterates through the list, searching for a book with a matching ISBN. If a match is found, it removes that book from the list. The updated list is then written back to the file "books_23094907.txt" to reflect the deletion. After successfully deleting the book, it prints a message: "Book Deleted Successfully!"

Function Snapshots:

Snapshot 1:

```
Please Input Book ISBN / Author / Title:  
Stephanie Garber
```

```
Book Details:  
ISBN: 9781250851208  
Author: Stephanie Garber  
Title: A Curse for True Love  
Publisher: Flatiron  
Genre: Fantasy  
Year Published: 2023  
Date Purchased: 24/10/2023  
Status: wishlist
```

```
Are you sure you want to delete this book?  
[1] - Yes  
[2] - No  
1  
Book Deleted Successfully!
```

- Sample for when user input the author name “Stephanie Garber” which is present once in the database.
- The program will show the book details, then will ask the user “Are you sure you want to delete this book?”. “1” means Yes, “2” means no. In this case, “1” is the input. Therefore, “Book Deleted Successfully” is printed out.

Snapshot 2:

```
Please Input Book ISBN / Author / Title:  
one dark window
```

```
Book Details:  
ISBN: 9780316312486  
Author: Rachel Gillig  
Title: one dark window  
Publisher: Orbit  
Genre: Fantasy  
Year Published: 2022  
Date Purchased: 27/09/2022  
Status: to-read
```

```
Are you sure you want to delete this book?  
[1] - Yes  
[2] - No  
2  
Okay. The Book will not be Deleted.
```

- Sample for when the user has provided an input but does not want to delete the book.
- The program outputs “Okay. The Book will not be Deleted.” to let the user know that the book will not be deleted.

Sample Results:

```
books_23094907.txt
1 9781785785719|Yasha Levine|Surveillance Valley|Icon Books|Politics|2019|02/01/2020|completed
2 9780241976630|John Maeda|How to Speak Machine|Portfolio UK|Artificial Intelligence|2019|02/01/2020|to-read
3 9781119055808|Andre De Vries|R For Dummies|John Wiley|Programming|2015|12/08/2016|completed
4 9780062018205|Dan Ariely|Predictably Irrational|Harper Collins|Psychology|2010|03/06/2019|completed
5 9780008327613|John Walsh|The Globalist|Harper Collins|Biography & Autobiography|2019|11/05/2021|to-read
6 9780525538349|John Doerr|Measure What Matters|Penguin LCC|Management|2018|21/09/2022|to-read
7 9780807092156|Viktor Frankl|Man's Search for Meaning|Random House|Philosophy|2019|30/08/2021|to-read
8 9780735222359|Amor Towles|The Lincoln Highway|Viking|Fiction|2021|5/10/2021|to-read
9 9780778311010|Sarah Penner|The Lost Apothecary|Park Row|Fiction|2021|02/03/2021|to-read
10 9780593318485|Joan Didion|Let Me Tell You What I Mean|Knopf|Essays|2021|26/01/2021|to-read
11 9780593320624|Maggie O'Farrell|The Marriage Portrait|Knopf|Fiction|2022|05/12/2022|to-read
12 9781542025607|Colleen Hoover|Reminders of Him|Montlake|Romance|2022|18/01/2022|to-read
13 9781945631849|Lucy Score|Things We Never Got Over|That's What She Said|Contemporary|2022|13/01/2022|to-read
14 9781668026038|Hannah Grace|icebreaker|Atria|Romance|2022|07/02/2023|to-read
15 9780063052734|Danya Kukafka|Notes on an Execution|William Morrow|Thriller|2022|25/01/2022|to-read
16 9780765376459|V.E. Schwab|A Darker Shade of Magic|Tor|Fantasy|2015|24/05/2015|to-read
17 9780063211506|ava reid|A Study in Drowning|HarperTeen|Fantasy|2023|19/09/2023|wishlist
18 9780356519500|Rachel Gillig|Two Twisted Crowns|Orbit|Fantasy|2023|19/10/2023|wishlist
19 9781250851208|Stephanie Garber|A Curse for True Love|Flatiron|Fantasy|2023|24/10/2023|wishlist
20 9780316312486|Rachel Gillig|One Dark Window|Orbit|Fantasy|2022|27/09/2022|to-read
21 9781250857439|Rebecca Ross|Divine Rivals|Wednesday Books|Fantasy|2023|04/04/2023|wishlist
22 9781232857439|Rebecca Ross|Divine Lovers|Wednesday Books|Fantasy|2022|05/07/2023|to-read
```

Original Text File Before Deleting Books

Sample Result 1:

```
books_23094907.txt
1 9781785785719|Yasha Levine|Surveillance Valley|Icon Books|Politics|2019|02/01/2020|completed
2 9780241976630|John Maeda|How to Speak Machine|Portfolio UK|Artificial Intelligence|2019|02/01/2020|to-read
3 9781119055808|Andre De Vries|R For Dummies|John Wiley|Programming|2015|12/08/2016|completed
4 9780062018205|Dan Ariely|Predictably Irrational|Harper Collins|Psychology|2010|03/06/2019|completed
5 9780008327613|John Walsh|The Globalist|Harper Collins|Biography & Autobiography|2019|11/05/2021|to-read
6 9780525538349|John Doerr|Measure What Matters|Penguin LCC|Management|2018|21/09/2022|to-read
7 9780807092156|Viktor Frankl|Man's Search for Meaning|Random House|Philosophy|2019|30/08/2021|to-read
8 9780735222359|Amor Towles|The Lincoln Highway|Viking|Fiction|2021|5/10/2021|to-read
9 9780778311010|Sarah Penner|The Lost Apothecary|Park Row|Fiction|2021|02/03/2021|to-read
10 9780593318485|Joan Didion|Let Me Tell You What I Mean|Knopf|Essays|2021|26/01/2021|to-read
11 9780593320624|Maggie O'Farrell|The Marriage Portrait|Knopf|Fiction|2022|05/12/2022|to-read
12 9781542025607|Colleen Hoover|Reminders of Him|Montlake|Romance|2022|18/01/2022|to-read
13 9781945631849|Lucy Score|Things We Never Got Over|That's What She Said|Contemporary|2022|13/01/2022|to-read
14 9781668026038|Hannah Grace|icebreaker|Atria|Romance|2022|07/02/2023|to-read
15 9780063052734|Danya Kukafka|Notes on an Execution|William Morrow|Thriller|2022|25/01/2022|to-read
16 9780765376459|V.E. Schwab|A Darker Shade of Magic|Tor|Fantasy|2015|24/05/2015|to-read
17 9780063211506|ava reid|A Study in Drowning|HarperTeen|Fantasy|2023|19/09/2023|wishlist
18 9780356519500|Rachel Gillig|Two Twisted Crowns|Orbit|Fantasy|2023|19/10/2023|wishlist
19 9781250851208|Stephanie Garber|A Curse for True Love|Flatiron|Fantasy|2023|24/10/2023|wishlist
20 9780316312486|Rachel Gillig|One Dark Window|Orbit|Fantasy|2022|27/09/2022|to-read
21 9781250857439|Rebecca Ross|Divine Rivals|Wednesday Books|Fantasy|2023|04/04/2023|wishlist
22 9781232857439|Rebecca Ross|Divine Lovers|Wednesday Books|Fantasy|2022|05/07/2023|to-read
```

Text File after Deleting Book 22

Sample Result 2:

```
books_23094907.txt
1 9781785785719|Yasha Levine|Surveillance Valley|Icon Books|Politics|2019|02/01/2020|completed
2 9780241976630|John Maeda|How to Speak Machine|Portfolio UK|Artificial Intelligence|2019|02/01/2020|to-read
3 978119055808|Andre De Vries|R For Dummies|R For Dummies|John Wiley|Programming|2015|12/08/2016|completed
4 9780062018205|Dan Ariely|Predictably Irrational|Harper Collins|Psychology|2010|03/06/2019|completed
5 9780008327613|John Walsh|The Globalist|Harper Collins|Biography & Autobiography|2019|11/05/2021|to-read
6 9780525538349|John Doerr|Measure What Matters|Penguin LCC|Management|2018|21/09/2022|to-read
7 9780807092156|Viktor Frankl|Man's Search for Meaning|Random House|Philosophy|2019|30/08/2021|to-read
8 9780735222359|Amor Towles|The Lincoln Highway|Viking|Fiction|2021|5/10/2021|to-read
9 9780778311010|Sarah Penner|The Lost Apothecary|Park Row|Fiction|2021|02/03/2021|to-read
10 9780593318485|Joan Didion|Let Me Tell You What I Mean|Knopf|Essays|2021|26/01/2021|to-read
11 9780593320624|Maggie O'Farrell|The Marriage Portrait|Knopf|Fiction|2022|05/12/2022|to-read
12 9781542025607|Colleen Hoover|Reminders of Him|Montlake|Romance|2022|18/01/2022|to-read
13 9781945631849|Lucy Score|Things We Never Got Over|That's What She Said|Contemporary|2022|13/01/2022|to-read
14 9781668026038|Hannah Grace|icebreaker|Atria|Romance|2022|07/02/2023|to-read
15 9780063052734|Danya Kukafka|Notes on an Execution|William Morrow|Thriller|2022|25/01/2022|to-read
16 9780765376459|V.E. Schwab|A Darker Shade of Magic|Tor|Fantasy|2015|24/05/2015|to-read
17 9780063211506|ava reid|A Study in Drowning|HarperTeen|Fantasy|2023|19/09/2023|wishlist
18 9780356519500|Rachel Gillig|Two Twisted Crowns|Orbit|Fantasy|2023|19/10/2023|wishlist
19 9781250851208|Stephanie Garber|A Curse for True Love|Flatiron|Fantasy|2023|24/10/2023|wishlist
20 9780316312486|Rachel Gillig|one dark window|Orbit|Fantasy|2022|27/09/2022|to-read
```

Text File after Deleting Book 21

2.2.3.5 Functional Requirement 5 - Search for Book(s)

The `search_book()` function is called when the user wishes to search the book database for their desired book.

This function utilizes the `get_book()` (refer to F2.5) function to retrieve the list of books and displays them using the `display_books()` (refer to F1.6) function.

The user is prompted to input an ISBN, author name, or book title using the `input_to_isbn()` (refer to F2.6) function. Subsequently, the function `isbn_to_details()` (refer to F2.7) is used to obtain detailed information about the book corresponding to the provided ISBN. The function concludes by presenting the retrieved details to the user in a user-friendly format.

Sample Result:

Sample 1:

```
-----  
Please Input Book ISBN / Author / Title:  
9780593320624  
Displaying Searched Book Details...  
  
Book Found: The Marriage Portrait by Maggie O'Farrell  
  
ISBN      : 9780593320624  
Author    : Maggie O'Farrell  
Title     : The Marriage Portrait  
Publisher : Knopf  
Genre     : Fiction  
Year of Publication : 2022  
Date of Purchase   : 05/12/2022  
Status: to-read
```

- Sample output when the user inputs an ISBN.
- Note that when conducting an ISBN search (refer to section **2.3.2.2** for a visual representation), users are required to input precisely 13 digits.

Sample 2:

```
-----  
Please Input Book ISBN / Author / Title:  
Rebecca Ross  
  
Multiple Books Found for Author Rebecca Ross.  
Please Select the Book to Update:  
  
[1] | 9781250857439 | Divine Rivals | Fantasy | wishlist  
[2] | 9781232857439 | Divine Lovers | Fantasy | to-read  
  
Please Input Book Number to Update: [1] - [2]  
2  
Displaying Searched Book Details...  
  
Book Found: Divine Lovers by Rebecca Ross  
  
ISBN      : 9781232857439  
Author    : Rebecca Ross  
Title     : Divine Lovers  
Publisher : Wednesday Books  
Genre     : Fantasy  
Year of Publication : 2022  
Date of Purchase   : 05/07/2023  
Status: to-read
```

- Sample output when the user inputs the author's name.

- Note that in this particular sample, the user was presented with multiple books and thus had the option to expand on the details of their desired book.

2.2.3.6 Functional Requirement 6 - Display Book Record(s)

The `display_books()` function is called to display all books in ‘books_23094907.txt’ to the user.

This function does not prompt for any inputs from the user and simply displays the contents of ‘books_23094907.txt’ in a more convenient and readable form by using the `get_books()` function in order to retrieve the list of books.

First, the header ‘All Books’ is printed. Next, a list ‘categories’ consisting of the categories of book details (ISBN, author, title, etc.) is created to allow each of them to be printed at the top of each column without having to edit the original ‘books_23094907.txt’ file.

```
categories = ["ISBN", "AUTHOR", "TITLE", "PUBLISHER",
              "GENRE", "YEAR PUBLISHED", "DATE PURCHASED", "STATUS"]
```

A for loop is then used to:

1. iterate through each element in the ‘categories’ list
2. find the length of the largest entry in that column (including book details) using the `get_max_column_length()` function and store it inside a variable ‘column_length’
3. check if the length of the largest entry is shorter than the length of the category name itself and change ‘column_length’ accordingly
4. print the category name in a space that is consistently-sized with book details that will be displayed later on

Next, a list ‘book_list’ is created, which retrieves and stores the information from ‘books_23094907.txt’ in the form of a list, with each book as an element in the list.

A for loop is utilized to split each book into a list consisting of its details, with each detail becoming an element in the list. A second for loop is utilized to:

1. iterate through each detail
2. find the length of the largest entry in that column using the get_max_column_length() function and store it inside a variable ‘column_length’
3. check if the length of the largest entry is shorter than the length of the category name itself and change ‘column_length’ accordingly
4. print the detail (eg: “Yasha Levine”) in a space that is consistently-sized throughout the whole column

The purpose of printing each detail/category according to the length of the largest entry in each column is to ensure that each column will be consistently-sized for every row, making the display clear and easily readable.

Printing without a consistent width:

ISBN	AUTHOR	TITLE	PUBLISHER	GENRE	YEAR PUBLISHED	DATE PURCHASED	STATUS
9781785785719	Yasha Levine	Surveillance Valley	Icon Books	Politics	2019	02/01/2020	completed
9780241976630	John Maeda	How to Speak Machine	Portfolio UK	Artificial Intelligence	2019	02/01/2020	completed
9781119055808	Andre De Vries	R For Dummies	John Wiley	Programming	2015	12/08/2016	completed

Printing with a consistent width:

ALL BOOKS

ISBN	AUTHOR	TITLE	PUBLISHER	GENRE	YEAR PUBLISHED	DATE PURCHASED	STATUS
9781785785719	Yasha Levine	Surveillance Valley	Icon Books	Politics	2019	02/01/2020	completed
9780241976630	John Maeda	How to Speak Machine	Portfolio UK	Artificial Intelligence	2019	02/01/2020	completed
9781119055808	Andre De Vries	R For Dummies	John Wiley	Programming	2015	12/08/2016	completed

Printing each detail like this is achieved by the use of string formatting, ie:

```
print(f" {detail: <{column_length}}", end="")
```

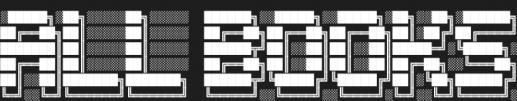
where:

- ‘detail’ represents the detail to be printed (eg: “Yasha Levine”)
- ‘<’ causes ‘detail’ to be left-aligned in the space
- ‘column_length’ represents the length of the space that ‘detail’ will be printed in
- ‘end=””’ prevents a newline from being printed after every detail

To enhance user experience, we also allow them the option to sort books using the `sort_books()` function (refer to F2.12).

Sample Results:

Result 1:



ISBN	AUTHOR	TITLE	PUBLISHER	GENRE	YEAR PUBLISHED	DATE PURCHASED	STATUS
9781785785719	Yasha Levine	Surveillance Valley	Icon Books	Politics	2019	02/01/2020	completed
9780241976630	John Maeda	How to Speak Machine	Portfolio UK	Artificial Intelligence	2019	02/01/2020	to-read
9781119055808	Andre De Vries	R For Dummies	John Wiley	Programming	2015	12/08/2016	completed
9780062018205	Dan Ariely	Predictably Irrational	Harper Collins	Psychology	2010	03/06/2019	completed
9780008327613	John Walsh	The Globalist	Harper Collins	Biography & Autobiography	2019	11/05/2021	to-read
9780525538349	John Doerr	Measure What Matters	Penguin LCC	Management	2018	21/09/2022	to-read
9780807092156	Viktor Frankl	Man's Search for Meaning	Random House	Philosophy	2019	30/08/2021	to-read
9780735222359	Amor Towles	The Lincoln Highway	Viking	Fiction	2021	5/10/2021	to-read
9780778311010	Sarah Penner	The Lost Apothecary	Park Row	Fiction	2021	02/03/2021	to-read
9780593318485	Joan Didion	Let Me Tell You What I Mean	Knopf	Essays	2021	26/01/2021	to-read
9780593320624	Maggie O'Farrell	The Marriage Portrait	Knopf	Fiction	2022	05/12/2022	to-read
9781542025607	Colleen Hoover	Reminders of Him	Montlake	Romance	2022	18/01/2022	to-read
9781945631849	Lucy Score	Things We Never Got Over	That's What She Said	Contemporary	2022	13/01/2022	to-read
9781668026038	Hannah Grace	icebreaker	Atria	Romance	2022	07/02/2023	to-read
9780063052734	Danya Kukafka	Notes on an Execution	William Morrow	Thriller	2022	25/01/2022	to-read
9780765376459	V.E. Schwab	A Darker Shade of Magic	Tor	Fantasy	2015	24/05/2015	to-read
9780063211506	ava reid	A Study in Drowning	HarperTeen	Fantasy	2023	19/09/2023	wishlist
9780356519500	Rachel Gillig	Two Twisted Crowns	Orbit	Fantasy	2023	19/10/2023	wishlist
9781250851208	Stephanie Garber	A Curse for True Love	Flatiron	Fantasy	2023	24/10/2023	wishlist
9780316312486	Rachel Gillig	one dark window	Orbit	Fantasy	2022	27/09/2022	to-read
9781250857439	Rebecca Ross	Divine Rivals	Wednesday Books	Fantasy	2023	04/04/2023	wishlist
9781232857439	Rebecca Ross	Divine Lovers	Wednesday Books	Fantasy	2022	05/07/2023	to-read

Sample result of what happens when display_book() function is called

Result 2:

Full Books							
ISBN	AUTHOR	TITLE	PUBLISHER	GENRE	YEAR PUBLISHED	DATE PURCHASED	STATUS
9780735222359	Amor Towles	The Lincoln Highway	Viking	Fiction	2021	5/10/2021	to-read
9781119055808	Andre De Vries	R For Dummies	John Wiley	Programming	2015	12/08/2016	completed
9780063211506	ava reid	A Study in Drowning	HarperTeen	Fantasy	2023	19/09/2023	wishlist
9781542025607	Colleen Hoover	Reminders of Him	Montlake	Romance	2022	18/01/2022	to-read
9780062018205	Dan Ariely	Predictably Irrational	Harper Collins	Psychology	2010	03/06/2019	completed
9780063052734	Danya Kukafka	Notes on an Execution	William Morrow	Thriller	2022	25/01/2022	to-read
9781668026038	Hannah Grace	icebreaker	Atria	Romance	2022	07/02/2023	to-read
9780593318485	Joan Didion	Let Me Tell You What I Mean	Knopf	Essays	2021	26/01/2021	to-read
9780525538349	John Doerr	Measure What Matters	Penguin LCC	Management	2018	21/09/2022	to-read
9780241976630	John Maeda	How to Speak Machine	Portfolio UK	Artificial Intelligence	2019	02/01/2020	to-read
9780008327613	John Walsh	The Globalist	Harper Collins	Biography & Autobiography	2019	11/05/2021	to-read
9781945631849	Lucy Score	Things We Never Got Over	That's What She Said	Contemporary	2022	13/01/2022	to-read
9780593320624	Maggie O'Farrell	The Marriage Portrait	Knopf	Fiction	2022	05/12/2022	to-read
9780356519500	Rachel Gillig	Two Twisted Crowns	Orbit	Fantasy	2023	19/10/2023	wishlist
9780316312486	Rachel Gillig	one dark window	Orbit	Fantasy	2022	27/09/2022	to-read
9781250857439	Rebecca Ross	Divine Rivals	Wednesday Books	Fantasy	2023	04/04/2023	wishlist
9781232857439	Rebecca Ross	Divine Lovers	Wednesday Books	Fantasy	2022	05/07/2023	to-read
9780778311010	Sarah Penner	The Lost Apothecary	Park Row	Fiction	2021	02/03/2021	to-read
9781250851208	Stephanie Garber	A Curse for True Love	Flatiron	Fantasy	2023	24/10/2023	wishlist
9780765376459	V.E. Schwab	A Darker Shade of Magic	Tor	Fantasy	2015	24/05/2015	to-read
97800807092156	Viktor Frankl	Man's Search for Meaning	Random House	Philosophy	2019	30/08/2021	to-read
9781785785719	Yasha Levine	Surveillance Valley	Icon Books	Politics	2019	02/01/2020	completed

Sort the display? (Enter N to decline and return to main menu, or anything else to accept)

Sample Result when the user decides to sort the author names alphabetically in ascending order (A -> Z)

2.3 Non-Functional Requirements

2.3.1 Overview

Non-Functional Requirements include auxiliary functions that are called multiple times in the function to help with recurring tasks and to avoid code clutter from copying and pasting the same code functions.

Non-Functional Requirements also include functions that cover the user interface and prompts user input, as well as error handling and data validation.

No	Sub-Requirement	Description	Responsible Member
F2.1	Main Menu Interface main_user_interface()	- The first user interface the user will see when first running the program. - Displays header of our program and prompts the user to input their desired function to carry out.	Darrance Beh Heng Shek
F2.2	Error Handling user_error_redirect(message)	- Displays an error message to the user when they entered the wrong input for the input prompt. - Indicates what error they committed and the expected input.	Darrance Beh Heng Shek
F2.3	User Interface for Book Update update_book_interface()	- User interface for users when they want to update book record(s). - Calls update_book(old_detail, new_detail, detail_type) function after data validation.	Darrance Beh Heng Shek
F2.4	Multiple Book, Same Author Checker check_author_multiple_book(author_name)	- Checks whether an author has multiple books. - Used for data validation. - Returns all author's books if the author has multiple books, else, returns False.	Darrance Beh Heng Shek
F2.5	Returns all Books in Database	- Returns all book information stored in the database in a list.	Darrance Beh Heng Shek

	get_books()		
F2.6	Prompts User Input and Converts it to Book ISBN input_to_isbn()	<ul style="list-style-type: none"> - Prompts user input for book ISBN/author/title. - Converts the input unanimously to the book's unique ISBN number. 	Darrance Beh Heng Shek
F2.7	Covers Given ISBN to Book Details isbn_to_details(isbn)	<ul style="list-style-type: none"> - Takes in an ISBN as a variable. - Converts a book's ISBN and returns the book's details. 	Darrance Beh Heng Shek
F2.8	Displays Background of Team Members and Project team_background()	<ul style="list-style-type: none"> - Displays and explains team background, team member list, project background and project credits. 	Darrance Beh Heng Shek
F2.9	Interface for adding book(s) add_book_interface()	<ul style="list-style-type: none"> - User interface for users to add book details. 	Lee Ming Hui Isaac
F2.10	Interface for deleting book(s) delete_book_interface()	<ul style="list-style-type: none"> - User interface for delete book and prompt user for book information for deleting book. 	Tan Ho Chen
F2.11	Finds length of longest item in column of book list get_max_column_length(category)	<ul style="list-style-type: none"> - Returns length of longest item in column of book list, according to the 'category' parameter, which denotes the index in a list of book details 	Deron Ho Wen Harn

F2.12	Sorts books according to selected category and order sort_books()	- Sorts display of books according to user-inputted selected category and order to sort by	Deron Ho Wen Harn
F2.13	Converts list consisting of elements into list consisting of sublists turn_books_into_sublists()	- Converts book list consisting of elements as books into book list consisting of sublists as books	Deron Ho Wen Harn
F2.14	Sorts list according to parameters 'category' and 'order' sort_book_superlist(category, order)	- Sorts list consisting of smaller sublists according to parameters 'category' and 'order'.	Deron Ho Wen Harn
F2.15	Converts list consisting of sublists into list consisting of elements turn_superlist_into_single_list(sorted_superlist)	- Converts book list consisting of sublists as books into book list consisting of elements as books	Deron Ho Wen Harn
F2.16	Displays a given list display_sorted_books(single_sorted_list)	- Functionally similar to display_books(), but takes a parameter to determine what information it displays	Deron Ho Wen Harn

2.3.2 Non-Functional Requirement Explanation and Sample

This sub-chapter will be discussing the intricacies of the code in the non-functional requirements.

Non-Functional Requirements are implemented to improve user experience, user friendliness as well as promote clean code.

Detailed descriptions and/or screenshots of sample outputs will be given to aid in understanding.

2.3.2.1 Non-Functional Requirement F2.1

Function F2.1 refers to the Main Menu Interface that the user will be introduced to when first running the program.

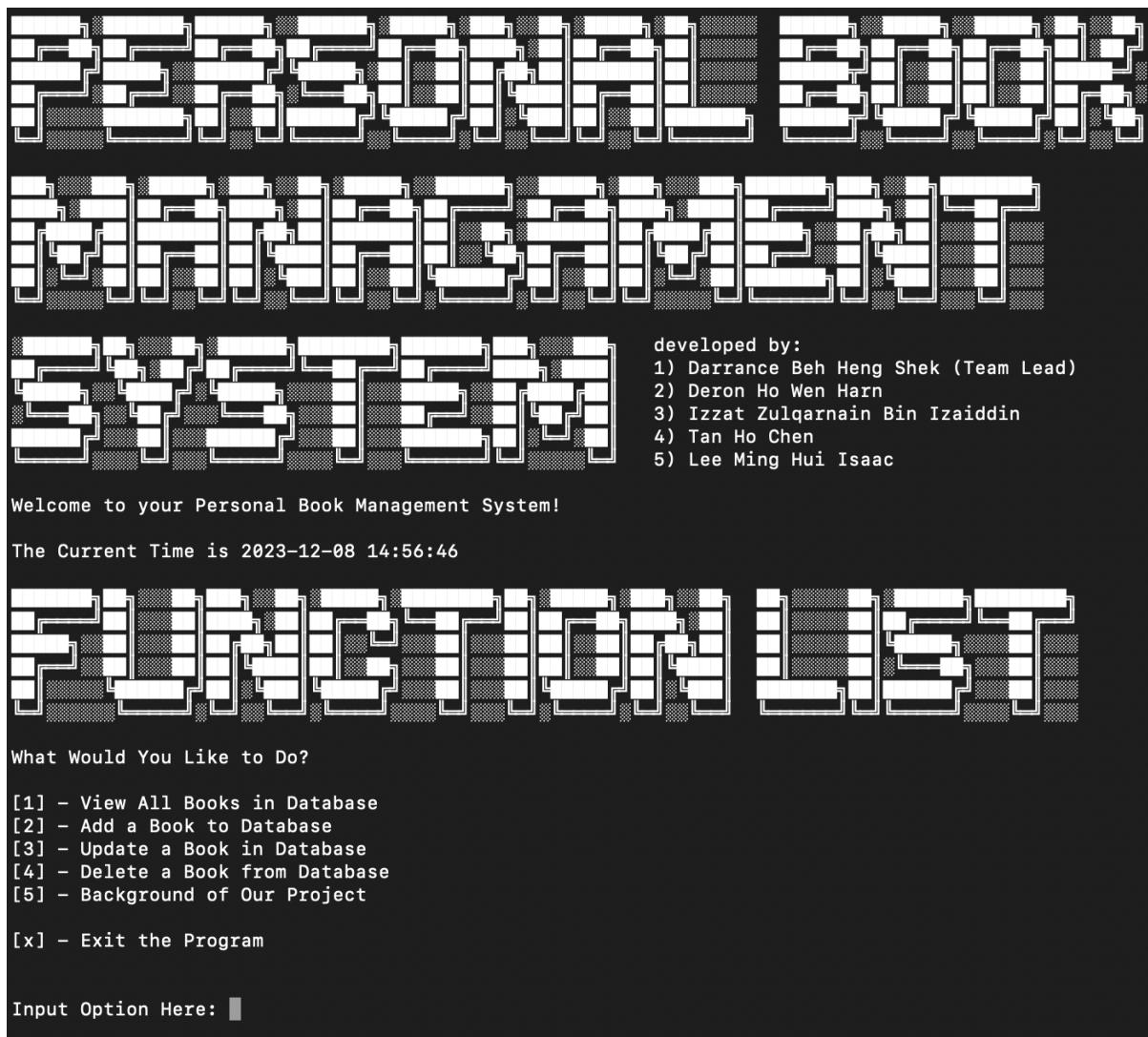


Image depicting how main_user_interface looks like on program run

This function comprises mainly verbose print functions to introduce the program, as well as list the names of the group members.

This function also displays a list of functions the user can carry out and prompts the user to input the option according to the list given.

When the user prompts a valid option, it will redirect the user to the specified function's interface.

```
option_to_function_identifier = {  
    "1": display_book_interface,  
    "2": add_book_interface,  
    "3": update_book_interface,  
    "4": delete_book_interface,  
    "5": team_background  
}  
  
if (user_input_function_option == 'x'):  
    return 0  
else:  
    option_to_function_identifier[user_input_function_option]()
```

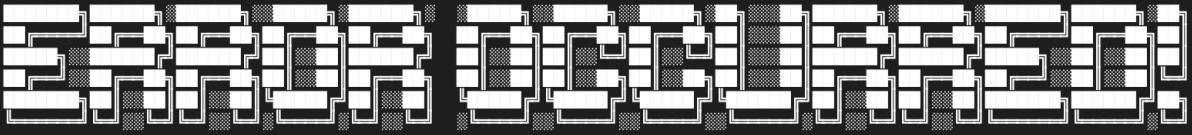
The program uses a dictionary to convert user input ('1', '2', '3', '4') to the specified callable function names.

If the user inputs 'x' to exit the program. The function returns 0 which terminates the function and redirects the user back to the main() function which will run the exit_program() function.

2.3.2.2 Non-Functional Requirement F2.2

Function F2.2 is called whenever the user inputs the wrong value or type from the expected input of the program.

Thus, this function is called to display an error message and indicate what type of error the user has committed.



```
Oh No! Looks Like You Inputted Something Wrong!
Error Encountered:
ERROR: ISBN Should Contain EXACTLY 13 digits. Your Input Had 7 digits.
Please Read Prompt Instructions Carefully and Try Again!

Retry Input?
[1] - Retry Input.
[2] - Back to Main Menu.
```

Example of error message when user inputs only 7 digits for ISBN input when ISBN should have 13 digits

After displaying the error, the program prompts the user to input whether they want to '1' - Retry the function, which recalls the previous function or '2' - Return to main menu, which redirects the user back to `main_user_interface()`.

2.3.2.3 Non-Functional Requirement F2.3

- F2.3 refers to the main user interface for updating books.
- This function is called when the user chooses to update/edit book record(s) in the main menu.
- This function prompts the user to input the desired book and book detail to update and prompts the user to input the new details the user wants to replace the old details with.
- This function calls the `update_book(old_detail, new_detail, detail_type)` function at the end with the inputs obtained from the function.

BOOK UPDATING INTERFACE							
ALL BOOKS							
ISBN	AUTHOR	TITLE	PUBLISHER	GENRE	YEAR PUBLISHED	DATE PURCHASED	STATUS
9781785785719	Yasha Levine	Surveillance Valley	Icon Books	Politics	2019	02/01/2020	read
9780241976630	John Maeda	How to Speak Machine	Portfolio UK	Artificial Intelligence	2019	02/01/2020	to-read
9781119055808	Andre De Vries	R For Dummies	John Wiley	Programming	2015	12/08/2016	read
9780062018265	Dan Ariely	Predictably Irrational	Harper Collins	Psychology	2010	03/06/2019	read
978008327613	John Walsh	The Globalist	Harper Collins	Biography & Autobiography	2019	11/05/2021	to-read
9780525538349	John Doerr	Measure What Matters	Penguin LCC	Management	2018	21/09/2022	to-read
9780807092156	Viktor Frankl	Man's Search for Meaning	Random House	Philosophy	2019	30/08/2021	to-read
9780735222359	Amor Towles	The Lincoln Highway	Viking	Fiction	2021	5/10/2021	to-read
9780778311010	Sarah Penner	The Lost Apothecary	Park Row	Fiction	2021	02/03/2021	to-read
9780593318485	Joan Didion	Let Me Tell You What I Mean	Knopf	Essays	2021	26/01/2021	to-read
9780593320624	Maggie O'Farrell	The Marriage Portrait	Knopf	Fiction	2022	05/12/2022	to-read
9781542025607	Colleen Hoover	Reminders of Him	Montlake	Romance	2022	18/01/2022	to-read
9781945631849	Lucy Score	Things We Never Got Over	That's What She Said Publishing	Contemporary	2022	13/01/2022	to-read
9781668826038	Hannah Grace	Icebreaker	Atria	Romance	2022	07/02/2023	to-read
9780063052734	Danya Kukafka	Notes on an Execution	William Morrow	Thriller	2022	25/01/2022	to-read
9780765376459	V.E. Schwab	A Darker Shade of Magic	Tor	Fantasy	2015	24/05/2015	to-read
9780063211506	Ava Reid	A Study in Drowning	HarperTeen	Fantasy	2023	19/09/2023	wishlist
9780356519500	Rachel Gillig	Two Twisted Crowns	Orbit	Fantasy	2023	19/10/2023	wishlist
9781250851208	Stephanie Garber	A Curse for True Love	Flatiron	Fantasy	2023	24/10/2023	wishlist
9780316312486	Rachel Gillig	One Dark Window	Orbit	Fantasy	2022	27/09/2022	to-read
9781250857439	Rebecca Ross	Divine Rivals	Wednesday Books	Fantasy	2023	04/04/2023	wishlist
9781232857439	Rebecca Ross	Divine Lovers	Wednesday Books	Fantasy	2022	05/07/2023	to-read

All Books Have Been Displayed.

Sample of when the function is first run and what the user sees

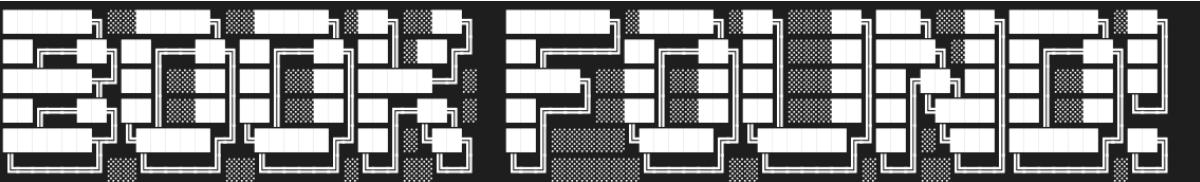
When the function is first run, the program displays a header for the interface, as well as calls the display_books() function which displays all books in the database in a neat manner.

To Edit an Item, Please Input the Item's 13-digit ISBN, Author OR Book Title.
Please Input Book ISBN / Author / Title:

Program prompts user to input book ISBN/Author>Title

The isbn_to_details(input_to_isbn()) composite function calls input_to_isbn() which converts user input into isbn and returns isbn, and uses the isbn to call the isbn_to_details(isbn)

function which converts the isbn to book details by finding it in the database. The functions are called to validate user input and returns the ISBN of the book, taking into account multiple books with the same author, and handles errors if user inputs an invalid input.



```
Congratulations! Your Input is Valid and A Book Has Been Found!

Book Found: One Dark Window by Rachel Gillig

Book Details:

ISBN: 9780316312486
Author: Rachel Gillig
Title: One Dark Window
Publisher: Orbit
Genre: Fantasy
Year of Publication: 2022
Date of Purchase: 27/09/2022
Status: to-read

What Details Would You Like to Update?

[1] - ISBN
[2] - Author
[3] - Title
[4] - Publisher
[5] - Genre
[6] - Year of Publication
[7] - Date of Purchase
[8] - Book Status
```

What users see when their input is valid; sample uses the input “one dark window” title

When the user's input is valid, the program displays the book details and prompts the user to input what details to edit/update.

What Details Would You Like to Update?

- [1] – ISBN
- [2] – Author
- [3] – Title
- [4] – Publisher
- [5] – Genre
- [6] – Year of Publication
- [7] – Date of Purchase
- [8] – Book Status

3

Current Title: One Dark Window

Please Input New Title:

Program displays previous detail when user wants to update the detail

When the user enters a valid option, the program displays the old detail and prompts the user to input new detail.

Error handling and data validation procedures are in place to ensure that users input digits for ISBN, alphabetical characters for author, etc..

The program also ensures that new edited details won't cause duplicate ISBN in the database.

Before calling the update_book function, the program displays to the user the details they wanted to change, and prompts the user to double confirm whether they want to edit the selected detail.

If the user agrees, the program proceeds below.

Else, the program will redirect the user to the main menu interface.

```
update_book(  
genre, new_genre, "genre")
```

Example of program calling update_book function when user wants to update “genre” detail

The program calls the update_book() function after validating user input.

```
Please Input New Title:  
one dark window  
  
Your Inputted Details are The Same as The Previous Details. Thus, No Changes Will Be Made.  
  
No Updates Will Be Made From Your Input.  
Would You Like to Try Again?  
  
[1] - Yes  
[2] - No  
  
|
```

Example when user input same details as old details, resulting in no changes made

When data validation fails, users will be notified that no changes will be made and be given the choice to retry the function ([1] - Yes) or return to the main menu ([2] - No).

2.3.2.4 Non-Functional Requirement F2.4

Function F2.4 is called to check whether an author has multiple books in the same database.

This is to validate input when the user enters the author name for the prompt “Enter ISBN/Author>Title: “ and the author has multiple books.

- If the author has multiple books, the function returns a list of all of the author’s books.
- If the author only has one book, the function returns False, indicating the author does not have multiple books.

```
Please Input Book ISBN / Author / Title:  
rebecca ross  
  
Multiple Books Found for Author Rebecca Ross.  
Please Select the Book to Update:  
  
[1] | 9781250857439 | Divine Rivals | Fantasy | wishlist  
[2] | 9781232857439 | Divine Lovers | Fantasy | to-read  
  
Please Input Book Number to Update: [1] - [2]
```

Example of function catching an author that has multiple books, author being “Rebecca Ross”

2.3.2.5 Non-Functional Requirement F2.5

Function F2.5 is called to get all books in the database and returns all book information in a list.

This function opens the text file database and reads the file line by line, splitting every new list item by every newline.

2.3.2.6 Non-Functional Requirement F2.6

Function F2.6 is called to prompt user input in the form of (ISBN/Author/Title) and converts the input to ISBN.

Even if the user inputs author name or book title, the function will convert it into the book’s unique ISBN number.

This function is useful for data validation as author and title can be duplicates in the database, but a book’s ISBN IS ALWAYS UNIQUE.

2.3.2.7 Non-Functional Requirement F2.7

Function F2.7 takes in a variable “isbn”, being a book’s ISBN and converts the ISBN to book details.

This function converts the ISBN to the book details by reading the text file database and matches the book to the given ISBN. Once a matching book is found, the function returns the book details in the form of a list.

2.3.2.8 Non-Functional Requirement F2.8

Function F2.8 is called when the user chooses to display team background in the main menu.

This function comprises print statements explaining the team background, team member list, project background and project credits explaining everyone’s individual roles in the assignment.2.5



Output of team_background() function

2.3.2.9 Non-Functional Requirement F2.9

- F2.9 refers to the main user interface (**add_book_interface**) for adding books.
- This function is called when the user chooses to add books to the main menu.
- This function calls **display_books()** to display all books stored within **books_23094907.txt**.
- This function calls **add_book_information()** to prompt the user to input the book's information, such as the ISBN, author's name, title, publisher's name, genre, publishing year, data purchased and the book's current status.

- If the user still wants to add a book to the system, the system returns to `add_book_interface()` for the user to view the current book list and add a new book.

Sample response 1

ISBN	AUTHOR	TITLE	PUBLISHER	GENRE	YEAR PUBLISHED	DATE PURCHASED	STATUS
9781785785719	Yasha Levine	Surveillance Valley	Icon Books	Politics	2019	02/01/2020	completed
9780241976630	John Maeda	How to Speak Machine	Portfolio UK	Artificial Intelligence	2019	02/01/2020	to-read
9781119055808	Andre De Vries	R For Dummies	John Wiley	Programming	2015	12/08/2016	completed
9780062018205	Dan Ariely	Predictably Irrational	Harper Collins	Psychology	2010	03/06/2019	completed
9780008327613	John Walsh	The Globalist	Harper Collins	Biography & Autobiography	2019	11/05/2021	to-read
9780525538349	John Doerr	Measure What Matters	Penguin LCC	Management	2018	21/09/2022	to-read
9780807092156	Viktor Frankl	Man's Search for Meaning	Random House	Philosophy	2019	30/08/2021	to-read
9780735222359	Amor Towles	The Lincoln Highway	Viking	Fiction	2021	5/10/2021	to-read

9780778311010	Sarah Penner	The Lost Apothecary	Park Row	Fiction	2021	02/03/2021	to-read
9780593318485	Joan Didion	Let Me Tell You What I Mean	Knopf	Essays	2021	26/01/2021	to-read
9780593320624	Maggie O'Farrell	The Marriage Portrait	Knopf	Fiction	2022	05/12/2022	to-read
9781542025607	Colleen Hoover	Reminders of Him	Montlake	Romance	2022	18/01/2022	to-read
9781945631849	Lucy Score	Things We Never Got Over	That's What She Said	Contemporary	2022	13/01/2022	to-read
9781668026038	Hannah Grace	icebreaker	Atria	Romance	2022	07/02/2023	to-read
9780063052734	Danya Kukafka	Notes on an Execution	William Morrow	Thriller	2022	25/01/2022	to-read
9780765376459	V.E. Schwab	A Darker Shade of Magic	Tor	Fantasy	2015	24/05/2015	to-read
9780063211506	ava reid	A Study in Drowning	HarperTeen	Fantasy	2023	19/09/2023	wishlist
9780356519500	Rachel Gillig	Two Twisted Crowns	Orbit	Fantasy	2023	19/10/2023	wishlist

9781250851208	Stephanie Garber	A Curse for True Love	Flatiron	Fantasy	2023	24/10/2023	wishlist
9780316312486	Rachel Gillig	one dark window	Orbit	Fantasy	2022	27/09/2022	to-read
9781250857439	Rebecca Ross	Divine Rivals	Wednesday Books	Fantasy	2023	04/04/2023	wishlist
9781232857439	Rebecca Ross	Divine Lovers	Wednesday Books	Fantasy	2022	05/07/2023	to-read
9781782744344	Sun Tzu	Art of War	Popular UK Pte Ltd	Strategy	2016	12/01/2017	completed
9789814189736	Andrew Tanzer	ROBERT KUOK a memoir	Landmark Books	Memoir	2017	23/06/2020	reading

All books have been displayed.

To add a book, please input the book's details.

Please enter the following information:
ISBN number:

(These two images are the main interface. As you can see, all books have been displayed with the program requesting the user to add a book by entering the ISBN.)

All books have been displayed.

To add a book, please input the book's details.

Please enter the following information:

ISBN number: 9781782744344

Author's name: Sun Tzu

Book's title: Art of War

Publisher's name: Popular UK Pte Ltd

Genre of the book: Strategy

Publishing year: 2016

Date purchased in the format DD/MM/YYYY: 12/01/2017

Please input the book's status:

[1] - wishlist

[2] - to-read

[3] - reading

[4] - completed

Book's status (enter a number from 1 to 4): 4

Please confirm the following details:

ISBN: 9781782744344

Author: Sun Tzu

Title: Art of War

Publisher: Popular UK Pte Ltd

Genre: Strategy

Year of Publication: 2016

Date of Purchase: 12/01/2017

Status: completed

Are you sure you want to add this book with the following details?

[1] - Yes

[2] - No

(The image above shows the output after entering all the necessary information. The program will seek confirmation on whether to add the book to books_23094907.txt.)

Are you sure you want to add this book with the following details?

- [1] - Yes
- [2] - No

1

Book added successfully!

Congratulations! Your Input is Valid and A Book Has Been Added!

Book Added: Art of War by Sun Tzu

Book Details:

ISBN: 9781782744344

Author: Sun Tzu

Title: Art of War

Publisher: Popular UK Pte Ltd

Genre: Strategy

Year of Publication: 2016

Date of Purchase: 12/01/2017

Status: completed

Would You Like to Add Another Book?

- [1] - Yes
- [2] - No



(The image above shows the next request on whether the user would like to add another book after the current one has been successfully added to books_23094907.txt.)

9780525538349	John Doerr	Measure What Matters	Penguin LCC	Management	2018	21/09/2022	to-read
9780807092156	Viktor Frankl	Man's Search for Meaning	Random House	Philosophy	2019	30/08/2021	to-read
9780735222359	Amor Towles	The Lincoln Highway	Viking	Fiction	2021	5/10/2021	to-read
9780778311010	Sarah Penner	The Lost Apothecary	Park Row	Fiction	2021	02/03/2021	to-read
9780593318485	Joan Didion	Let Me Tell You What I Mean	Knopf	Essays	2021	26/01/2021	to-read
9780593320624	Maggie O'Farrell	The Marriage Portrait	Knopf	Fiction	2022	05/12/2022	to-read
9781542025607	Colleen Hoover	Reminders of Him	Montlake	Romance	2022	18/01/2022	to-read
9781945631849	Lucy Score	Things We Never Got Over	That's What She Said	Contemporary	2022	13/01/2022	to-read
9781668026038	Hannah Grace	icebreaker	Atria	Romance	2022	07/02/2023	to-read
9780063052734	Danya Kukafka	Notes on an Execution	William Morrow	Thriller	2022	25/01/2022	to-read
9780765376459	V.E. Schwab	A Darker Shade of Magic	Tor	Fantasy	2015	24/05/2015	to-read
9780063211506	ava reid	A Study in Drowning	HarperTeen	Fantasy	2023	19/09/2023	wishlist
9780356519500	Rachel Gillig	Two Twisted Crowns	Orbit	Fantasy	2023	19/10/2023	wishlist
9781250851208	Stephanie Garber	A Curse for True Love	Flatiron	Fantasy	2023	24/10/2023	wishlist
9780316312486	Rachel Gillig	one dark window	Orbit	Fantasy	2022	27/09/2022	to-read
9781250857439	Rebecca Ross	Divine Rivals	Wednesday Books	Fantasy	2023	04/04/2023	wishlist
9781232857439	Rebecca Ross	Divine Lovers	Wednesday Books	Fantasy	2022	05/07/2023	to-read
9781782744344	Sun Tzu	Art of War	Popular UK Pte Ltd	Strategy	2016	12/01/2017	completed

All books have been displayed.

To add a book, please input the book's details.

Please enter the following information:

ISBN number:

(The image above shows that if 1 is selected (Yes), then the program will go back to the main interface for the user to enter the ISBN. Here, you can see the updated list where the book inserted (Art of War) is visible (last line).)

Sample response 2

All books have been displayed.

To add a book, please input the book's details.

Please enter the following information:

ISBN number: 9789814189736

Author's name: Andrew Tanzer

Book's title: ROBERT KUOK a memoir

Publisher's name: Landmark Books

Genre of the book: Memoir

Publishing year: 2017

Date purchased in the format DD/MM/YYYY: 21/06/2020

Please input the book's status:

[1] - wishlist

[2] - to-read

[3] - reading

[4] - completed

Book's status (enter a number from 1 to 4): 3

Please confirm the following details:

ISBN: 9789814189736

Author: Andrew Tanzer

Title: ROBERT KUOK a memoir

Publisher: Landmark Books

Genre: Memoir

Year of Publication: 2017

Date of Purchase: 21/06/2020

Status: reading

Are you sure you want to add this book with the following details?

[1] - Yes

[2] - No



(The image above shows the output after entering the details for the second desired book to be added. Just like the first book being added, the system will seek confirmation from the user as well.)

Please confirm the following details:

ISBN: 9789814189736
Author: Andrew Tanzer
Title: ROBERT KUOK a memoir
Publisher: Landmark Books
Genre: Memoir
Year of Publication: 2017
Date of Purchase: 21/06/2020
Status: reading

Are you sure you want to add this book with the following details?

- [1] - Yes
- [2] - No

2

Okay. The Book will not be Added.

Press Any Key to Return to Main Menu. █

(However, the image above shows a different scenario where the book will not be added. The program will prompt the user to press any key to return to the main menu.)

Sample response 3

Please confirm the following details:

ISBN: 9789814189736
Author: Andrew Tanzer
Title: ROBERT KUOK a memoir
Publisher: Landmark Books
Genre: Memoir
Year of Publication: 2017
Date of Purchase: 23/06/2020
Status: reading

Are you sure you want to add this book with the following details?

- [1] - Yes
- [2] - No

(The image above shows an identical scenario as **Sample response 2**. In this case, we will add the book to books_23094907.txt.)

Are you sure you want to add this book with the following details?
[1] - Yes
[2] - No

1
Book added successfully!

Congratulations! Your Input is Valid and A Book Has Been Added!

Book Added: ROBERT KUOK a memoir by Andrew Tanzer

Book Details:

ISBN: 9789814189736
Author: Andrew Tanzer
Title: ROBERT KUOK a memoir
Publisher: Landmark Books
Genre: Memoir
Year of Publication: 2017
Date of Purchase: 23/06/2020
Status: reading

Would You Like to Add Another Book?

[1] - Yes
[2] - No

(Next, the image above shows the successfully added book. It will also ask the user whether or not to add another book. In this case, we will select 2 (No).)

Congratulations! Your Input is Valid and A Book Has Been Added!

Book Added: ROBERT KUOK a memoir by Andrew Tanzer

Book Details:

ISBN: 9789814189736

Author: Andrew Tanzer

Title: ROBERT KUOK a memoir

Publisher: Landmark Books

Genre: Memoir

Year of Publication: 2017

Date of Purchase: 23/06/2020

Status: reading

Would You Like to Add Another Book?

[1] - Yes

[2] - No

2

(Finally, the image above shows the aftermath of selecting 2 (No). As you can see, it ends the program entirely.)

2.3.2.10 Non-Functional Requirement F2.10

- Function F2.10 serves as an interface for deleting a book from the database.
- This function is called when the user chooses to delete a book in the main menu.
- This function prompts the user to input the desired book or book details to delete and calls the delete_book() function.

It first clears the screen, then prints a stylized ASCII art title. After that, it calls the display_books() function to show the list of books, and finally, it calls the delete_book() function with the ISBN input from the user.

DELETE BOOK INTERFACE

ALL BOOKS

ISBN	AUTHOR	TITLE	PUBLISHER	GENRE	YEAR PUBLISHED	DATE PURCHASED	STATUS
9781785785719	Yasha Levine	Surveillance Valley	Icon Books	Politics	2019	02/01/2020	completed
9780241976630	John Maeda	How to Speak Machine	Portfolio UK	Artificial Intelligence	2019	02/01/2020	completed
9781119055808	Andre De Vries	R For Dummies	John Wiley	Programming	2015	12/08/2016	completed
9780062018205	Dan Ariely	Predictably Irrational	Harper Collins	Psychology	2010	03/06/2019	read
9780008327613	John Walsh	The Globalist	Harper Collins	Biography & Autobiography	2019	11/05/2021	to-read
9788525538349	John Doerr	Measure What Matters	Penguin LCC	Management	2018	21/09/2022	to-read
9788807092156	Viktor Frankl	Man's Search for Meaning	Random House	Philosophy	2019	30/08/2021	to-read
9788735222359	Amor Towles	The Lincoln Highway	Viking	Fiction	2021	5/10/2021	to-read
9780778311018	Sarah Penner	The Lost Apothecary	Park Row	Fiction	2021	02/03/2021	to-read
9780593318485	Joan Didion	Let Me Tell You What I Mean	Knopf	Essays	2021	26/01/2021	to-read
9780593320624	Maggie O'Farrell	The Marriage Portrait	Knopf	Fiction	2022	05/12/2022	to-read
9781542025607	Colleen Hoover	Reminders of Him	Montlake	Romance	2022	18/01/2022	to-read
9781945631849	Lucy Score	Things We Never Got Over	That's What She Said	Contemporary	2022	13/01/2022	to-read
9781668026038	Hannah Grace	icebreaker	Atria	Romance	2022	07/02/2023	to-read
9780063052734	Danya Kukafka	Notes on an Execution	William Morrow	Thriller	2022	25/01/2022	to-read
9780765376459	V.E. Schwab	A Darker Shade of Magic	Tor	Fantasy	2015	24/05/2015	to-read
9780063211506	ava reid	A Study in Drowning	HarperTeen	Fantasy	2023	19/09/2023	wishlist
9780356519500	Rachel Gillig	Two Twisted Crowns	Orbit	Fantasy	2023	19/10/2023	wishlist
9781250851208	Stephanie Garber	A Curse for True Love	Flatiron	Fantasy	2023	24/10/2023	wishlist
9780316312486	Rachel Gillig	one dark window	Orbit	Fantasy	2022	27/09/2022	to-read
9781250857439	Rebecca Ross	Divine Rivals	Wednesday Books	Fantasy	2023	04/04/2023	wishlist
9781232857439	Rebecca Ross	Divine Lovers	Wednesday Books	Fantasy	2022	05/07/2023	to-read

Please Input Book ISBN / Author / Title:

Sample of what the user sees when chosen the delete book function

When the user chooses the delete function, the program displays a header for the delete book interface, as well as calls the display_books() function to display all books in the database in a neat manner. Then the program prompts the user to input ISBN / Author / Title

```

13     def delete_book_interface():
14         clear()
15
16         print(r"""
17             . . .
18             . . .
19             . . .
20             . . .
21             . . .
22             . . .
23             . . .
24             . . .
25             . . .
26             . . .
27             . . .
28             . . .
29             . . .
30             . . .
31             ...
32         print("\n_____ \n")
33
34         display_books()
35
36         user_input = input_to_isbn()
37
38         if (user_input == 1):
39             delete_book_interface()
40         elif (user_input == 0):
41             return
42         else:
43             book_details = isbn_to_details(user_input)
44
45             # display targeted book details
46             print("\n_____ \n")
47             print("Book Details:")
48             print("ISBN: " + book_details[0])
49             print("Author: " + book_details[1])
50             print("Title: " + book_details[2])
51             print("Publisher: " + book_details[3])
52             print("Genre: " + book_details[4])
53             print("Year Published: " + book_details[5])
54             print("Date Purchased: " + book_details[6])
55             print("Status: " + book_details[7])
56             print("\n_____ \n")
57
58             ...
59             Double confirms with user to confirm whether they want to delete the selected book.
60             ...
61             user_option = input(
62                 "Are you sure you want to delete this book?\n[1] - Yes\n[2] - No\n")
63
64             # error handling
65             if (user_option not in ['1', '2']):
66                 print("Invalid Input!")
67                 user_option = input(
68                     "Are you sure you want to delete this book?\n[1] - Yes\n[2] - No\n")
69
70             # deletes book if user confirms, otherwise returns to main menu
71             if (user_option == "Y" or user_option == "1"):
72                 delete_book(user_input)
73             elif (user_option == "N" or user_option == "2"):
74                 print("Okay. The Book will not be Deleted.")
75                 input("Press Any Key to Return to Main Menu.")
76
77             return 0

```

When the program receives the input from the user (user_input), the input is processed using the input_to_isbn() function. If user_input is '1', it calls itself again, effectively restarting the delete book interface. If user input is '0', the function returns, exiting the delete book interface. Otherwise, it proceeds to call the isbn_to_details() function to retrieve details for the selected book then print the book's details. After that, the program asks the user to confirm whether they want to delete the selected book. The program will handle the invalid input and prompts the user again if necessary. if the input from the user is '1' or 'Y', it calls the delete_book() function with the ISBN. If the input is '2' or 'N', it prints "Okay. The Book will be Deleted." and prompt the user to press any key to return to the main menu.

Sample result:

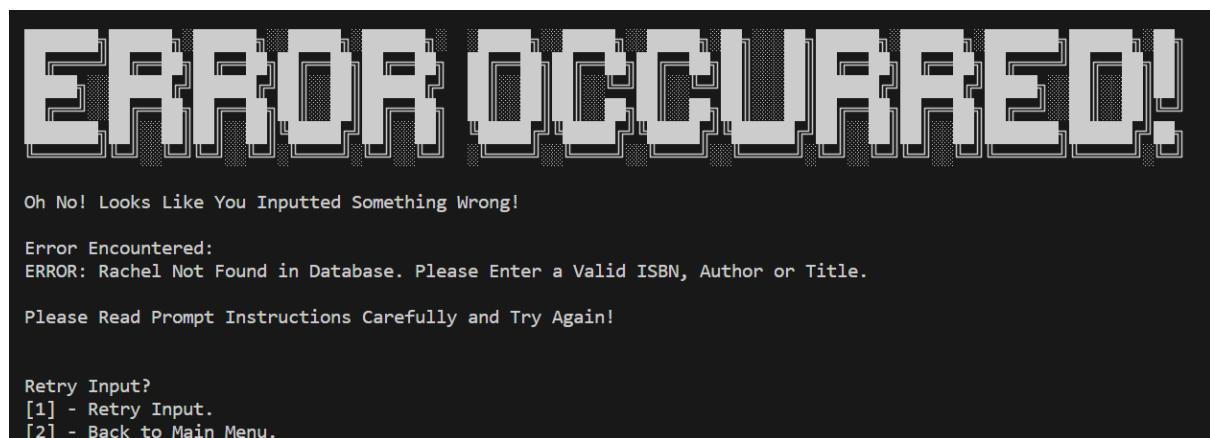
Sample 1:

```
Please Input Book ISBN / Author / Title:  
Rebecca Ross  
  
Multiple Books Found for Author Rebecca Ross.  
Please Select the Book to Update:  
  
[1] | 9781250857439 | Divine Rivals | Fantasy | wishlist  
[2] | 9781232857439 | Divine Lovers | Fantasy | to-read  
  
Please Input Book Number to Update: [1] - [2]  
1
```

- Sample for when user input is present more than once in the database.
- Program will ask the user to choose which book to delete.

Sample 2:

```
Please Input Book ISBN / Author / Title:  
Rachel
```



- Sample output when user inputs incompletely. In this case, the input is “Rachel”.
- The program shows “ERROR OCCURRED” when the user inputs incompletely. After that, The program asks the user if he/she wants to retry input. If the user inputs “1”, the program will retry input. If the user inputs “2”, the program will return to the Main Menu.

2.3.2.11 Non-Functional Requirement F2.11

Function F2.11 refers to the function `get_max_column_length(category)` which returns the length of the longest item(s) in a specified column of the book list, according to the ‘category’ parameter, which denotes the index in a list of book details.

This function does not display anything or prompt the user to input anything. Samples show the value that the function returns depending on the given parameter when the function is called.

First, an empty list ‘column_lengths’ is created to store all the lengths of the items in the column for later comparison.

A for loop is utilized to separate each book into a list ‘book_details’, in which each detail (eg: ISBN, author, etc.) is an element in the list. The actual parameter ‘category’ is used to select which element of ‘book_details’ is checked, using it as an index, ie:

```
book_details[category]
```

The length of this element is then appended to ‘column_lengths’.

After iterating through every book, a variable ‘max_column_length’ is created, storing the value of the largest length(s) in ‘column_lengths’.

This value is returned.

```
max_column_length = max(column_lengths)  
return max_column_length
```

Sample 1:

Code:

```
print("get_max_column_length(1) returns:", get_max_column_length(1))
```

Output:

```
get_max_column_length(1) returns: 16
```

- here, the parameter ‘1’ is used to refer to the element indexed ‘1’ in book_details, which would be the name of the author
- ie: `book_details[1]`
- this would mean that the length of the longest item(s) in the ‘AUTHOR’ column would be 16 characters long
- According to the section of the display shown below, the longest item is indeed 16 characters long (Maggie O’Farrell / Stephanie Garber)

```
AUTHOR  
Yasha Levine  
John Maeda  
Andre De Vries  
Dan Ariely  
John Walsh  
John Doerr  
Viktor Frankl  
Amor Towles  
Sarah Penner  
Joan Didion  
Maggie O'Farrell  
Colleen Hoover  
Lucy Score  
Hannah Grace  
Danya Kukafka  
V.E. Schwab  
ava reid  
Rachel Gillig  
Stephanie Garber  
Rachel Gillig  
Rebecca Ross  
Rebecca Ross
```

Sample 2:

Code:

```
print("get_max_column_length(4) returns:", get_max_column_length(4))
```

Output:

```
get_max_column_length(4) returns: 25
```

- here, the parameter '4' is used to refer to the element indexed '4' in book_details, which would be the genre

- ie: `book_details[4]`
- this would mean that the length of the longest item(s) in the 'GENRE' column would be 25 characters long
- According to the section of the display shown below, the longest item is indeed 25 characters long (Biography & Autobiography)

```
GENRE
Politics
Artificial Intelligence
Programming
Psychology
Biography & Autobiography
Management
Philosophy
Fiction
Fiction
Essays
Fiction
Romance
Contemporary
Romance
Thriller
Fantasy
Fantasy
Fantasy
Fantasy
Fantasy
Fantasy
Fantasy
```

2.3.2.12 Non-Functional Requirement F2.12

Function F2.12 refers to the function `sort_books()`, which displays the list of books in a sorted manner, according to user-selected category and order. It can be sorted according to ISBN, Author, Title, Publisher, Genre, Year Published, and Status. Sorting by Date Purchased was not included due to undesired output and time constraints.

Running the `sort_books()` function first starts a while loop, asking the user if they would like to sort the display or not.

Declining would result in the user being sent back to the main menu.

Accepting allows the function to continue on until the display is sorted as desired or an error is caught, where in both cases the function would return to the start of the while loop and once again prompt the user to sort the display or not.

After accepting, the function prompts the user for an input 'category_input'. A try-except-else is used to check if the input is an integer. If it isn't, an error message is displayed and the function loops back to its start.

```
Sort the display? (Enter N to decline and return to main menu, or anything else to accept)
y

Sort by:
ISBN [1]
Author [2]
Title [3]
Publisher [4]
Genre [5]
Year Published [6]
Status [7]
q
Error, please try again.

-----
Sort the display? (Enter N to decline and return to main menu, or anything else to accept)
```

If the input is an integer, an IF statement is used to determine if the input is an available option (from 1 to 7). If not, an error message is displayed and the function loops back to its start.

```
Sort the display? (Enter N to decline and return to main menu, or anything else to accept)
y

Sort by:
ISBN [1]
Author [2]
Title [3]
Publisher [4]
Genre [5]
Year Published [6]
Status [7]
0
Error: not an available option.
```

If the input is an integer and is an available option, an IF statement checks if it is less than or equal to 6. If so, the input value minus 1 is stored in a variable 'category'. Else, if the input value is equal to 7, the value '7' is stored in 'category'.

ie: 1→0, 2→1, 3→2, 4→3, 5→4, 6→5, 7→7

The purpose of doing this is to match the selected option with the element index used in `sort_book_superlist(category, order)` (refer to F2.14).

Next, the function prompts the user for another input 'order_input'. Another try-except-else is used in the same way as the one mentioned earlier to check if the input is an integer and print an error message if not.

```
Sort by:
ISBN [1]
Author [2]
Title [3]
Publisher [4]
Genre [5]
Year Published [6]
Status [7]
1

Ascending order (A→Z/0→9) [1]
Descending order (Z→A/9→0) [2]
0.01
Error, please try again.
```

If the input is an integer, an IF statement is used to determine if the input is an available option (1 or 2). If not, an error message is displayed and the function loops back to its start.

```
Ascending order (A→Z/0→9) [1]
Descending order (Z→A/9→0) [2]
3
Error: not an available option.
```

A variable ‘order’ is created, storing the value of ‘order_input’ minus 1.

ie: 1→0, 2→1

The purpose of doing this is to match the selected option with False and True values respectively, used in sort_book_superlist(category, order) (refer to F2.14).

A list ‘sorted_superlist’ is created and stores information from calling sort_book_superlist(category, order) (refer to F2.14). This is a list that has been sorted according to the user-selected options. However, it cannot be displayed using our later displaying function yet, as it is a list consisting of other sublists, instead of a list consisting of just elements.

Another list ‘single_sorted_list’ is created and stores information from calling turn_superlist_into_single_list(sorted_superlist) (refer to F2.15). This makes a sorted list comprising just elements, making it compatible with display_sorted_books(single_sorted_list) (refer to F2.16).

Finally, display_sorted_books(single_sorted_list) is called, displaying the sorted list of books.

Samples:

ALL BOOKS							
ISBN	AUTHOR	TITLE	PUBLISHER	GENRE	YEAR PUBLISHED	DATE PURCHASED	STATUS
9781250851208	Stephanie Garber	A Curse for True Love	Flatiron	Fantasy	2023	24/10/2023	wishlist
9780765376459	V.E. Schwab	A Darker Shade of Magic	Tor	Fantasy	2015	24/05/2015	to-read
9780063211506	ava reid	A Study in Drowning	HarperTeen	Fantasy	2023	19/09/2023	wishlist
9781232857439	Rebecca Ross	Divine Lovers	Wednesday Books	Fantasy	2022	05/07/2023	to-read
9781250857439	Rebecca Ross	Divine Rivals	Wednesday Books	Fantasy	2023	04/04/2023	wishlist
9780241976630	John Maeda	How to Speak Machine	Portfolio UK	Artificial Intelligence	2019	02/01/2020	completed
9781668026038	Hannah Grace	icebreaker	Atria	Romance	2022	07/02/2023	to-read
9780593318485	Joan Didion	Let Me Tell You What I Mean	Knopf	Essays	2021	26/01/2021	to-read
9780807092156	Viktor Frankl	Man's Search for Meaning	Random House	Philosophy	2019	30/08/2021	to-read
9780525538349	John Doerr	Measure What Matters	Penguin LCC	Management	2018	21/09/2022	to-read
9780063052734	Danya Kukafka	Notes on an Execution	William Morrow	Thriller	2022	25/01/2022	to-read
9780316312486	Rachel Gillig	one dark window	Orbit	Fantasy	2022	27/09/2022	to-read
9780062018205	Dan Ariely	Predictably Irrational	Harper Collins	Psychology	2010	03/06/2019	read
9781119055808	Andre De Vries	R For Dummies	John Wiley	Programming	2015	12/08/2016	completed
9781542025607	Colleen Hoover	Reminders of Him	Montlake	Romance	2022	18/01/2022	to-read
9781785785719	Yasha Levine	Surveillance Valley	Icon Books	Politics	2019	02/01/2020	completed
9780008327613	John Walsh	The Globalist	Harper Collins	Biography & Autobiography	2019	11/05/2021	to-read
9780735222359	Amor Towles	The Lincoln Highway	Viking	Fiction	2021	5/10/2021	to-read
9780778311010	Sarah Penner	The Lost Apothecary	Park Row	Fiction	2021	02/03/2021	to-read
9780593320624	Maggie O'Farrell	The Marriage Portrait	Knopf	Fiction	2022	05/12/2022	to-read
9781945631849	Lucy Score	Things We Never Got Over	That's What She Said	Contemporary	2022	13/01/2022	to-read
9780356519500	Rachel Gillig	Two Twisted Crowns	Orbit	Fantasy	2023	19/10/2023	wishlist

Sort the display? (Enter N to decline or anything else to accept)

- sample output image when book list is sorted by Title, in ascending order.

ALL BOOKS

ISBN	AUTHOR	TITLE	PUBLISHER	GENRE	YEAR PUBLISHED	DATE PURCHASED	STATUS
9780063211506	ava reid	A Study in Drowning	HarperTeen	Fantasy	2023	19/09/2023	wishlist
9780356519500	Rachel Gillig	Two Twisted Crowns	Orbit	Fantasy	2023	19/10/2023	wishlist
9781250851208	Stephanie Garber	A Curse for True Love	Flatiron	Fantasy	2023	24/10/2023	wishlist
9781250857439	Rebecca Ross	Divine Rivals	Wednesday Books	Fantasy	2023	04/04/2023	wishlist
9780593320624	Maggie O'Farrell	The Marriage Portrait	Knopf	Fiction	2022	05/12/2022	to-read
9781542025607	Colleen Hoover	Reminders of Him	Montlake	Romance	2022	18/01/2022	to-read
9781945631849	Lucy Score	Things We Never Got Over	That's What She Said	Contemporary	2022	13/01/2022	to-read
9781668026038	Hannah Grace	icebreaker	Atria	Romance	2022	07/02/2023	to-read
9780063052734	Danya Kukafka	Notes on an Execution	William Morrow	Thriller	2022	25/01/2022	to-read
9780316312486	Rachel Gillig	one dark window	Orbit	Fantasy	2022	27/09/2022	to-read
9781232857439	Rebecca Ross	Divine Lovers	Wednesday Books	Fantasy	2022	05/07/2023	to-read
9780735222359	Amor Towles	The Lincoln Highway	Viking	Fiction	2021	5/10/2021	to-read
9780778311010	Sarah Penner	The Lost Apothecary	Park Row	Fiction	2021	02/03/2021	to-read
9780593318485	Joan Didion	Let Me Tell You What I Mean	Knopf	Essays	2021	26/01/2021	to-read
9781785785719	Yasha Levine	Surveillance Valley	Icon Books	Politics	2019	02/01/2020	completed
9780241976630	John Maeda	How to Speak Machine	Portfolio UK	Artificial Intelligence	2019	02/01/2020	completed
9780008327613	John Walsh	The Globalist	Harper Collins	Biography & Autobiography	2019	11/05/2021	to-read
9780007092156	Viktor Frankl	Man's Search for Meaning	Random House	Philosophy	2019	30/08/2021	to-read
9780525538349	John Doerr	Measure What Matters	Penguin LCC	Management	2018	21/09/2022	to-read
9781119055808	Andre De Vries	R For Dummies	John Wiley	Programming	2015	12/08/2016	completed
97800765376459	V.E. Schwab	A Darker Shade of Magic	Tor	Fantasy	2015	24/05/2015	to-read
9780062018205	Dan Ariely	Predictably Irrational	Harper Collins	Psychology	2010	03/06/2019	read

Sort the display? (Enter N to decline or anything else to accept)

- sample output image when book list is sorted by Year Published, in descending order.

Due to the way in which the book list is sorted, sorting by Date Purchased would not display the desired output. This is because the function would merely sort it *according to the first digit it sees, followed by the second, and so on*. The function does not first convert it into a form that would allow for it to be sorted according to a date format as desired. A sample of the book list being sorted by Date Purchased is shown below.

ISBN	AUTHOR	TITLE	PUBLISHER	GENRE	YEAR PUBLISHED	DATE PURCHASED	STATUS
9781785785719	Yasha Levine	Surveillance Valley	Icon Books	Politics	2019	02/01/2020	completed
9780241976630	John Maeda	How to Speak Machine	Portfolio UK	Artificial Intelligence	2019	02/01/2020	completed
9780778311010	Sarah Penner	The Lost Apothecary	Park Row	Fiction	2021	02/03/2021	to-read
9780062018205	Dan Ariely	Predictably Irrational	Harper Collins	Psychology	2010	03/06/2019	read
9781250857439	Rebecca Ross	Divine Rivals	Wednesday Books	Fantasy	2023	04/04/2023	wishlist
9781232857439	Rebecca Ross	Divine Lovers	Wednesday Books	Fantasy	2022	05/07/2023	to-read
9780593320624	Maggie O'Farrell	The Marriage Portrait	Knopf	Fiction	2022	05/12/2022	to-read
9781668026038	Hannah Grace	icebreaker	Atria	Romance	2022	07/02/2023	to-read
9780008327613	John Walsh	The Globalist	Harper Collins	Biography & Autobiography	2019	11/05/2021	to-read
9781119055808	Andre De Vries	R For Dummies	John Wiley	Programming	2015	12/08/2016	completed
9781945631849	Lucy Score	Things We Never Got Over	That's What She Said	Contemporary	2022	13/01/2022	to-read
9781542025607	Colleen Hoover	Reminders of Him	Montlake	Romance	2022	18/01/2022	to-read
9780063211506	ava reid	A Study in Drowning	HarperTeen	Fantasy	2023	19/09/2023	wishlist
9780356519500	Rachel Gillig	Two Twisted Crowns	Orbit	Fantasy	2023	19/10/2023	wishlist
9780525538349	John Doerr	Measure What Matters	Penguin LCC	Management	2018	21/09/2022	to-read
9780765376459	V.E. Schwab	A Darker Shade of Magic	Tor	Fantasy	2015	24/05/2015	to-read
9781250851208	Stephanie Garber	A Curse for True Love	Flatiron	Fantasy	2023	24/10/2023	wishlist
9780063052734	Danya Kukafka	Notes on an Execution	William Morrow	Thriller	2022	25/01/2022	to-read
9780593318485	Joan Didion	Let Me Tell You What I Mean	Knopf	Essays	2021	26/01/2021	to-read
9780316312486	Rachel Gillig	one dark window	Orbit	Fantasy	2022	27/09/2022	to-read
978007092156	Viktor Frankl	Man's Search for Meaning	Random House	Philosophy	2019	30/08/2021	to-read
9780735222359	Amor Towles	The Lincoln Highway	Viking	Fiction	2021	5/10/2021	to-read

- sample output image when book list is sorted by Date Purchased, in ascending order.

This undesired output was avoided by omitting Date Purchased from the sorting options available to the user.

2.3.2.13 Non-Functional Requirement F2.13

Function F2.13 refers to the function `turn_books_into_sublists()`, which converts the book list consisting of elements as books into a book list consisting of sublists as books instead. This is done to convert it into a form that can be used in `sort_book_superlist(category, order)` (refer to F2.14) to sort with.

A list ‘book_list’ is created, which stores information from the text file ‘books_23094907.txt’ by using the `get_books()` function.

An empty list ‘book_superlist’ is created.

A for loop is used to separate each book into a list with their details as elements.

ie: "9781668026038|Hannah Grace|..."

turns into:

["9781668026038", "Hannah Grace", ...]

Each book, now as a list, is appended to ‘book_superlist’.

ie: []

turns into:

[["9781668026038", "Hannah Grace", ...]]

then:

[["9781668026038", "Hannah Grace", ...], ["9780063052734", "Danya Kukafka", ...]]

and so on.

```
for book in book_list:  
    book_details = book.split("|")  
  
    book_superlist.append(book_details)
```

Finally, ‘book_superlist’ is returned.

2.3.2.14 Non-Functional Requirement F2.14

Function F2.14 refers to the function `sort_book_superlist(category, order)`, which sorts a list consisting of smaller sublists according to given parameters ‘category’ and ‘order’.

A list ‘book_superlist’ is created, storing information from calling `turn_books_into_sublists()`.

This is a list of books that consists of sublists as books, instead of elements as books.

Another list ‘sorted_superlist’ is created, storing information running a `sorted()` function with:

- ‘book_superlist’ as the *iterable list*
- `lambda book: book[‘category’].lower()` as the *key*
- ‘order’ as a boolean to determine whether it will be sorted in ascending or descending order

```
sorted_superlist = sorted(  
    book_superlist,  
    key=lambda book: book[category].lower(),  
    reverse=order,  
)
```

Iterable:

‘book_superlist’ is the list to be sorted

key:

A lambda function is used as the key to determine what category to sort by.

For the argument ‘book’, `book[category].lower()` is the expression to be returned, with ‘category’ indicating the index for each book sublist.

eg: [0] would refer to the ‘ISBN’ element in each book sublist.

The `lower()` method is used to convert the expression to lowercase first before being returned. This is done to ensure that the function does not sort uppercase letters before lowercase, and makes it case-insensitive.

reverse:

In the function `sort_books()`, the actual arguments for ‘order’ will be either ‘0’ or ‘1’, which would be ‘False’ and ‘True’ in boolean form, respectively.

If ‘order’ == 0, then `reverse=False`, and the list will be sorted in ascending order.

If ‘order’ == 1, then `reverse=True`, and the list will be sorted in descending order.

‘sorted_superlist’ is then returned.

2.3.2.15 Non-Functional Requirement F2.15

Function F2.15 refers to the function `turn_superlist_into_single_list(sorted_superlist)`, which converts the book list consisting of sublists as books into a book list consisting of elements as books instead. This function is essentially the opposite of `turn_books_into_sublists()` (refer to F2.13). This is done to convert it into a form that can be used in `display_sorted_books(single_sorted_list)` (refer to F2.16).

An empty list ‘single_list’ is created.

A for loop is used to merge elements in each book sublist, transforming the sublist into one single element, with details separated with “|”.

ie: `["9781668026038", "Hannah Grace", ...]`

turns into:

`"9781668026038|Hannah Grace|..."`

Each book, now as an element, is appended to ‘single_list’.

ie: `[]`

turns into:

`["9781668026038|Hannah Grace|..."]`

then:

```
["9781668026038|Hannah Grace|...","9780063052734|Danya Kukafka|..."]
```

and so on.

```
for book_as_sublist in sorted_superlist:  
    book = "|".join(book_as_sublist)  
  
    single_list.append(book)
```

Finally, ‘single_list’ is returned. This ‘single_list’ is a list consisting of only elements as books, which would be sorted if used in conjunction with sort_book_superlist(category, order).

2.3.2.16 Non-Functional Requirement F2.16

Function F2.16 refers to the function display_sorted_books(single_sorted_list). This function is functionally similar to display_books(), except that it takes a parameter ‘single_sorted_list’, which determines what information it will display, instead of only being able to display the information obtained from calling get_books().

```
def display_sorted_books(single_sorted_list):  
  
    book_list = single_sorted_list
```

This function is meant to be used in conjunction with turn_superlist_into_single_list(sorted_superlist), which returns a sorted list consisting of only elements. By using the output of turn_superlist_into_single_list(sorted_superlist) as the ‘single_sorted_list’ parameter, this function will display the sorted list of books.