ASSIGNMENT 1 FRONT SHEET

Qualification	BTEC Level 5 HND Diploma in Business		
Unit number and title	**Unit 30: Application Development**		
Submission date		**Date Received 1st submission**	
Re-submission Date		**Date Received 2nd submission**	
Student Name	Nguyen Doan Minh Hieu	**Student ID**	GCD210003
Class	GCD1102	**Assessor name**	Pham Thanh Son

Student declaration

I certify that the assignment submission is entirely my own work and I fully understand the consequences of plagiarism. I understand that making a false declaration is a form of malpractice.

	Student's signature	Hieu

Grading grid

P1	P2	P3	M1	M2	D1
✅	✅	✅			

☐ **Summative Feedback:** ☐ **Resubmission Feedback:**

2.1

Grade:	Assessor Signature:	Date:

Internal Verifier's Comments:

Signature & Date:

Software Requirements Specification

for

FPTBook

Version 1.1

Prepared by

Group Name: HHT

Nguyen Doan Minh Hieu	**GCD210003**	**Hieundmgcd210003@fpt.edu.vn**
Do Trong Thinh	**GCD210397**	**Thinhdtgcd210397@fpt.edu.vn**
Le Thanh Nhat Hung	**GCD210409**	**Hungltngcd210409@fpt.edu.vn**

Instructor: *Pham Thanh Son*

Course: Application Development

Date: 1-12-2023

Table of Contents

Revisions

Version	Primary Author(s)	Description of Version	Date Completed
1.1	Nguyen Doan Minh Hieu	Information about the revision. This table does not need to be filled in whenever a document is touched, only when the version is being upgraded.	02/04/2023

I. Introduction (P1)

1. Document Purpose

FPTBook is a web-based software program designed to help book store patrons and owners manage their sales and purchases of books. It will streamline and expedite the process of choosing, ordering, and buying books for patrons as well as administer user and product databases for owners. The development team, which consists of the requirements team, requirements analyst, design team, and additional personnel of the creating organization, is also included in the intended audience.

2. Product Scope

The owner wants to make an interface that looks like an online store so that she may sell books. This program, which can access the store's website, will be installed in stores. Following the commercial release of the FPTBook software, a methodical approach to arranging book sales at the shop will be adopted. For that reason, we will only allow you to do the following online activities: search for products, register, log in, update your account, and make purchases. In addition to managing potential client groups, book sales management (book title, book kind, bookshelf, etc.), account modifications, registration, member login, and other functions (such promoting policy groups), store employees can also utilize it for these purposes. The aim is to enhance the store's earnings by augmenting the virtual sales via the website.

3. Intended Audience and Document Overview

This document is the original user manual for anyone who intends to use the FPT training system directly, including developers, project managers, testers, and users. The user handbook also contains information on the hardware and software. Before examining, revising, updating, or adding new needs to the current system, developers should read this document and update the requirements. Using the illustrations and specifications included in the paper, users of this application can ascertain whether the program complies with all requirements and whether the web designer has executed them all. In the case that they are unclear, they can also refer to the user manual for more details. The ultimate product is tested to make sure it meets the project's initial requirements.

4. Definitions, Acronyms and Abbreviations

The following table provides definitions of acronyms and abbreviations to help the reader read the content more clearly:

No.	Acronyms and Abbreviations	Explanation
1	ASP.NET	Active Server Pages Network
2	UML	Unified Modelling Language
3	UI	User Interface
4	UX	User Experience
5	MVC	Model-View-Controller
6	ERD	Entity Relationship Diagram

5. References and Acknowledgments

References

back4app. (2023, 2 12). *back4app*. Retrieved from back4app: https://blog.back4app.com/front-end-programming-languages/

back4app. (2023, 2 12). *back4app*. Retrieved from back4app: https://blog.back4app.com/backend-frameworks/

guru99. (2023, 2 12). *guru99*. Retrieved from guru99: https://www.guru99.com/best-operating-systems.html

hackr. (2023, 2 12). *hackr*. Retrieved from hackr: https://hackr.io/blog/best-css-frameworks

lucidchart. (2023). *lucidchart*. Retrieved from lucidchart: https://www.lucidchart.com/pages/

uxdesigninstitute. (2023, 2 12). *uxdesigninstitute*. Retrieved from uxdesigninstitute:https://www.uxdesigninstitute.com/blog/user-interface-ui-design-tools/

webhostingcat. (2023, 2 12). *webhostingcat*. Retrieved from webhostingcat: https://webhostingcat.com/pros-and-cons/bluehost-pros-and-cons/

II.   Overall Description (P1)

1. Product Overview

The desire to purchase goods without having to travel far to look for them and make their selections is a result of the expanding market and economy. FPTBook is a sales technology solution that helps to streamline and reduce the expense of purchasing retail books in this particular field. This brand-new system will replace the existing FPTBook system, which is used to manage bookstores today. Information management is made simpler for users by the system's user-friendly interface. The HR department uses it, as do administrators, store owners, and customers. Shopping carts, orders, accounts, search, categories, store owners, and customers will all be managed by FPT Company through its web application.
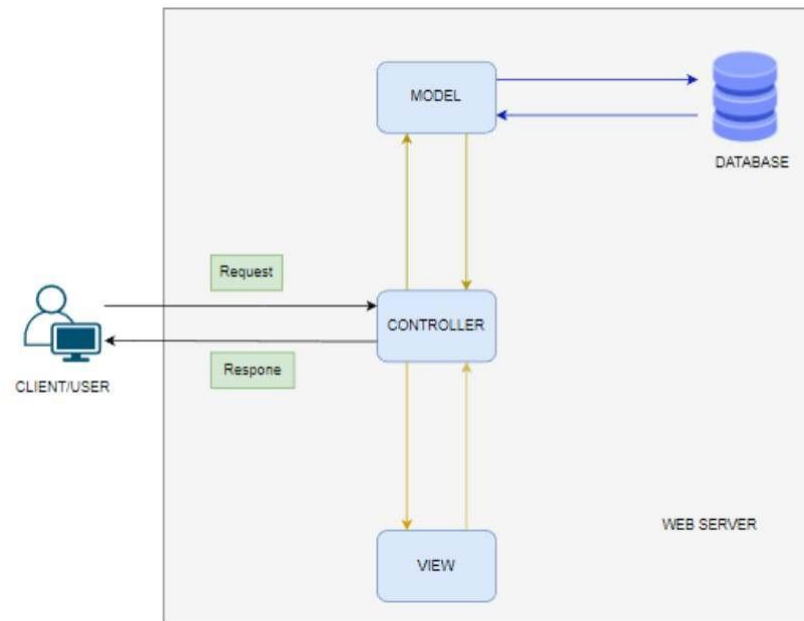
Figure 1: Product Overview

2. Product Functionality

The article lists functions in this section arranged according to the role of the user. Four different categories of users have different functions that are summarized in this section:

- **Guest:** The user had this role can not sign in.
- **Admin:** The user had this role can sign in and sign out of the system, manage users, manage store owners, and categories.

- **Store Owner:** The user had this role can sign in and sign out of the system, manage books, categories, and users.
- **User:** The user had this role can sign up, sign in, and sign out of the system, manage the cart, manage the account, browse the book, and search the book.

III.   **Specific Requirements (P1)**

1. **Functional Requirements**

These are some functional requirements of the website:

❖ **Guest**
➢ Register: This feature allow user to create an account.
➢ Show book: This feature allow user to view a specific book.
- Search book by title: use to find books with specific titles and categories related to the search term.

❖ **User**
➢ Login/ Logout
➢ Register: This feature allow user to create an account.
➢ Show book: This feature allow user to view a specific book.
- Add to cart: use to add the product to cart.
- Search book by title: use to search for a specific book that have the title and category relate to the keyword.
➢ Manage Profile: This feature allow user to manage their profile.
- View profile: use to view user profile.
- Update profile: use to update new information.
➢ Manage Cart: This feature allow user to manage their cart.
- Update cart: use to update new information of the cart as change the amount of product.
- Show cart: use to view user cart.
- Delete cart: use to delete product out of the cart.

❖ **Store owner**

➢ Login/ Logout.

➢ Manage Category: This feature allow store owner to manage the category which is make request to add new category.

➢ Manage Book: This feature allow store owner to manage book.

- Add book: use to add new book.
- Update book: use to update new information of an available book.
- Delete book: use to delete an available book.
- Search book: use to search a specific book.
- Show book: use to view book's information.

➢ Manage Order: This feature allow store owner to manage order records.

- View order records: use to view the order record.

❖ **Admin**

➢ Login/ Logout.

➢ Manage User: This feature allow admin to manage user account.

- Update password account: use to update a specific password for a user account.
- Show Account User: use to view all the information of all available user account.

➢ Manage Store Owner: This feature allow admin to manage store owner account.

- Update password account: use to update a specific password for a store owner account.
- Add Account Owner: use to create a new store owner account.
- Show Account owner: use to view all the information of all available store owner account.

➢ Manage Category: This feature allow admin to manage category.

- Reject category request: use to reject a request to create a new category made from store owner.
- Approve category request: use to approve a request to create a new category made from store owner.

2. Use Case Model

Guest
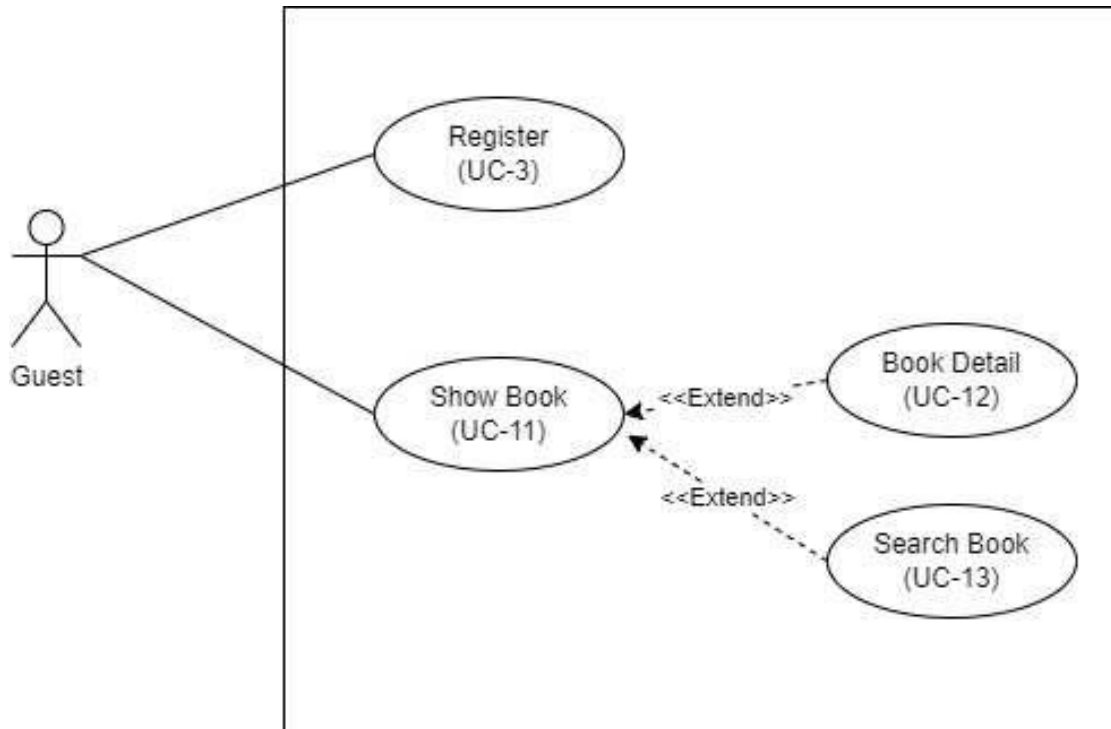
Figure 2: Use-case Guest

Use Case Name: Register	ID: UC-3	Priority: High
Actor: Guest		
Description: This use case shows how guest can Register new account.		
Trigger: Guest want to register new account. Type: External		
Pre-Condition: 1. A network connection has been made by the guest device. 2. The website is now operational.		
Normal Course: 1. Guest access to the system. 2. Select the registration method.		
Alternative Flow: N/A		
Post-Condition:		

| 1. The information that guests must provide will appear one at a time, and they must complete it all. |
| 2. Upon successful completion of the sign-up process, a notification will appear. |
| **Exception:**
 Exception 1: The user entered the incorrect format or nothing at all.
 • The message "Please enter the right format" will appear as a warning. |

Use Case Name: Show Book	**ID: UC-11**	**Priority:** High
Actor: Guest		
Description: This guest case illustrates the three main options available to guests.		
Trigger: Guest wish to use and access one of the three main options. **Type:** External		

Pre-Condition:
    3. A network connection has been made by the guest device.
    4. The website is now operational.		

Normal Course: 3. The "View book" is shown.		
Alternative Flow: N/A		
Post-Condition: N/A		
Exception: N/A		

Use Case Name: Book Detail	ID: UC-12	Priority: High
Actor: Guest		
Description: This use case shows how guest can show book detail		
Trigger: Guest want to show book detail **Type:** External		
Pre-Condition: 5. A network connection has been made by the guest device. 6. The website is now operational.		
Normal Course: 4. The "Show book" is shown. 5. Choose option "Book Detail"		
Alternative Flow: N/A		
Post-Condition: N/A		
Exception: N/A		

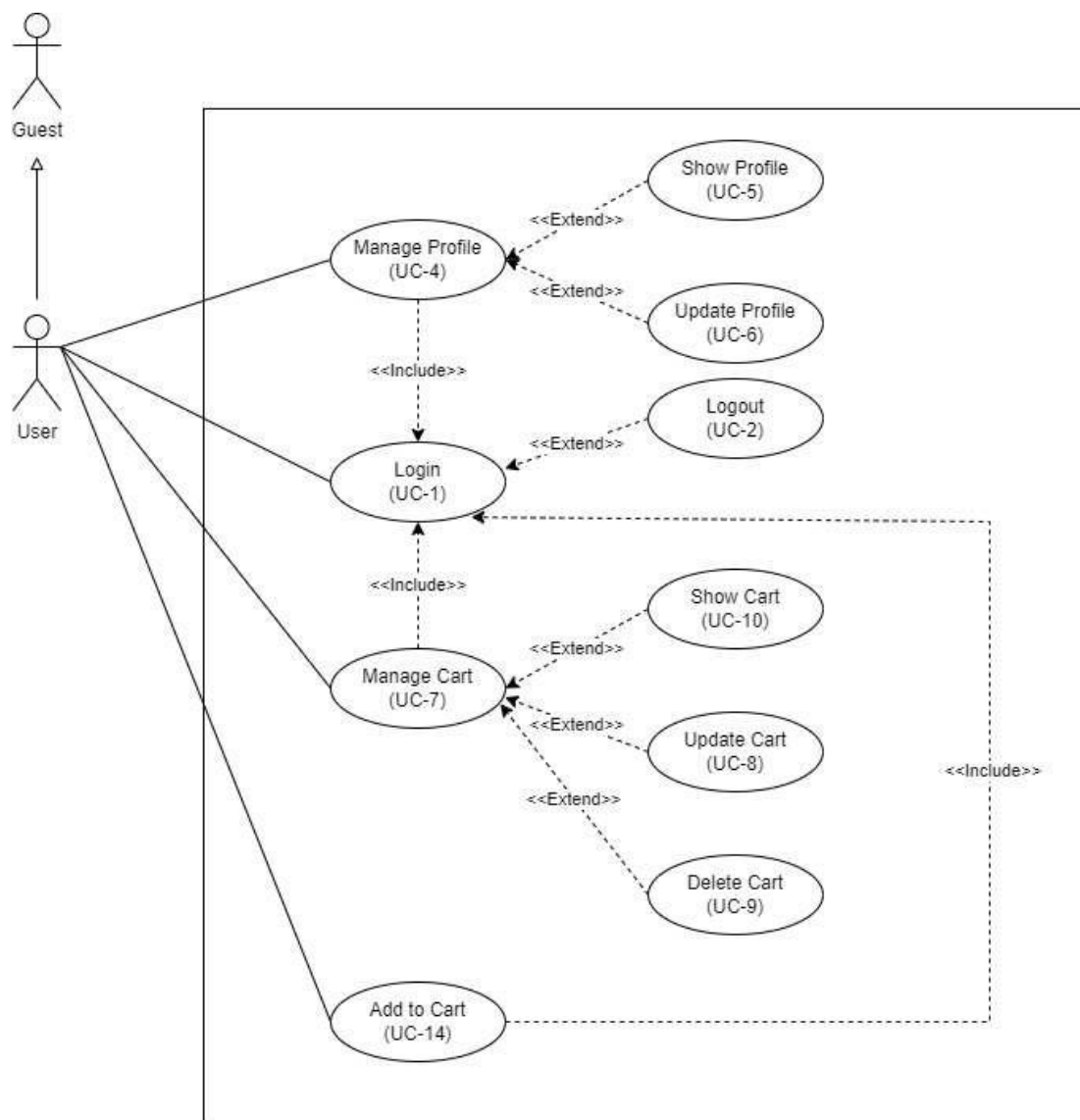| Use Case Name: Search Book	ID: UC-13	Priority: High
Actor: Guest		
Description: This use case shows how guest can do a book search by category and title.		
Trigger: Guest wish to do book searches by category and title. **Type:** External		
Pre-Condition: 6. A network connection has been made by the guest device. 7. The website is now operational.		
Normal Course: 7. The "Show book" is shown. 8. Choose option "Search book". 9. Enter book title or category to search.		
Alternative Flow: N/A		
Post-Condition: 3. The information that guests must provide will appear one at a time, and they must complete it all. 4. The book that appears will have a title and category related to the entered keyword.		
Exception: **Exception 1:** The user input nothing. • The message " Please input the title or category of the book to search " will appear as a warning.		

User

Figure 3: Use-case User

Use Case Name: Login (User)	**ID: UC-1**	**Priority:** High
Actor: User		
Description: This use case demonstrates how a user can login into the system.		
Trigger: User wishes to login into to the system. **Type:** External		
Pre-Condition: 1. Accounts users have already been created. 2. The user's accounts are approved. 3. There is a network connection established by the user's device. 4. The website is up and running right now.		
Normal Course: 1. User access to the system. 2. Choose to login into the system. 3. User enters user account information and clicks Login. 4. Upon successful authentication, the system provides the user with access.		
Alternative Flow: N/A		
Post-Condition: 1. The information that users must provide will appear one at a time, and they must complete it all. 2. Upon successful completion of the sign-in process, a notification will be displayed.		
Exception: **Exception 1:** The user entered the incorrect format or nothing at all. • The message "Please enter the right format" will appear as a warning.		

Use Case Name: Manage Profile	**ID: UC-4**	**Priority:** High
Actor: User		
Description: This use case demonstrates the user's access to two main options.		
Trigger: The user wishes to utilize and gain access to one of the two main options. **Type:** External		
Pre-Condition: 5. Accounts users have already been created. 6. The user's accounts are approved. 7. There is a network connection established by the user's device. 8. The website is up and running right now.		
Normal Course: 5. "Manage profile" is displayed.		
Alternative Flow: N/A		

Post-Condition:

3. The option "Show profile" and "Update profile" will show.

Exception: N/A

Use Case Name: Show Profile	ID: UC-5	Priority: High

Actor: User

Description: The user can view their profile as demonstrated by this use case.

Trigger: The user wishes to view their profile.
Type: External

Pre-Condition:

9. Accounts users have already been created.
10. The user's accounts are approved.
11. There is a network connection established by the user's device.
12. The website is up and running right now.

Normal Course:

6. "Manage profile" is displayed.
7. Select the "View profile" option.

Alternative Flow: N/A

Post-Condition:

4. All data for a specific user's profile will be displayed.

Exception: N/A

Use Case Name: Update Profile	ID: UC-6	Priority: High

Actor: User

Description: The user can update their profile as demonstrated by this use case.

Trigger: The user wishes to update their profile.
Type: External

Pre-Condition:

13. Accounts users have already been created.
14. The user's accounts are approved.
15. There is a network connection established by the user's device.
16. The website is up and running right now.

Normal Course:

8. "Manage profile" is displayed.

9. Select the "Update profile" option.		
10. Enter new information to update.		

Alternative Flow: N/A

Post-Condition:
5. The information that users must provide will appear one at a time, and they must complete it all.
6. Upon successful completion of the profile update process, a notification will be displayed.

Exception:
Exception 1: The user entered the incorrect format or nothing at all.
- The message "Please enter the right format" will appear as a warning.

Use Case Name: Manage cart	**ID: UC-7**	**Priority:** High
Actor: User		
Description: This use case demonstrates the user's access to two main options.		
Trigger: The user wishes to utilize and gain access to one of the two main options. **Type:** External		
Pre-Condition: 17. Accounts users have already been created. 18. The user's accounts are approved. 19. There is a network connection established by the user's device. 20. The website is up and running right now.		
Normal Course: 11. "Manage cart" is displayed.		
Alternative Flow: N/A		
Post-Condition: 7. The option "Show cart", "Delete cart" and "Update cart" will show.		
Exception: N/A		

Use Case Name: Update cart	ID: UC-8	Priority: High
Actor: User		
Description: The user can update their cart as demonstrated by this use case.		
Trigger: The user wishes to update their cart. **Type:** External		
Pre-Condition: 21. Accounts users have already been created. 22. The user's accounts are approved. 23. There is a network connection established by the user's device. 24. The website is up and running right now.		
Normal Course: 12. "Manage cart" is displayed. 13. Select the "Manage cart" option. 14. Select the "Update cart" option. 15. Select the cart to be updated.		
Alternative Flow: N/A		
Post-Condition: 8. Upon successful completion of the cart update process, a notification will be displayed.		
Exception: **Exception 1:** The user did not choose any carts to be updated. • The message "Please select a specific cart to update" will appear as a warning. **Exception 2:** The store owner entered the incorrect format or nothing at all. • The message "Please enter the right format" will appear as a warning.		

Use Case Name: Delete cart	ID: UC-9	Priority: High
Actor: User		
Description: The user can delete their cart as demonstrated by this use case.		
Trigger: The user wishes to delete their cart. **Type:** External		
Pre-Condition: 25. Accounts users have already been created. 26. The user's accounts are approved. 27. There is a network connection established by the user's device. 28. The website is up and running right now.		
Normal Course: 16. "Manage cart" is displayed. 17. Select the "Manage cart" option.		

| 18. Select the "Delete cart" option. |
| 19. Select cart to delete. |
| **Alternative Flow:** N/A |
| **Post-Condition:** |
| 9. Upon successful completion of the cart delete process, a notification will be displayed. |
| **Exception:** |
| **Exception 1:** The user did not choose any carts to be deleted. |
| • The message "Please select a specific cart to delete" will appear as a warning. |

Use Case Name: Show cart	**ID: UC-10**	**Priority:** High
Actor: User		
Description: The user can view their cart as demonstrated by this use case.		
Trigger: The user wishes to view their cart. **Type:** External		
Pre-Condition: 29. Accounts users have already been created. 30. The user's accounts are approved. 31. There is a network connection established by the user's device. 32. The website is up and running right now.		
Normal Course: 20. "Manage cart" is displayed.		
Alternative Flow: N/A		
Post-Condition: N/A		
Exception: N/A		

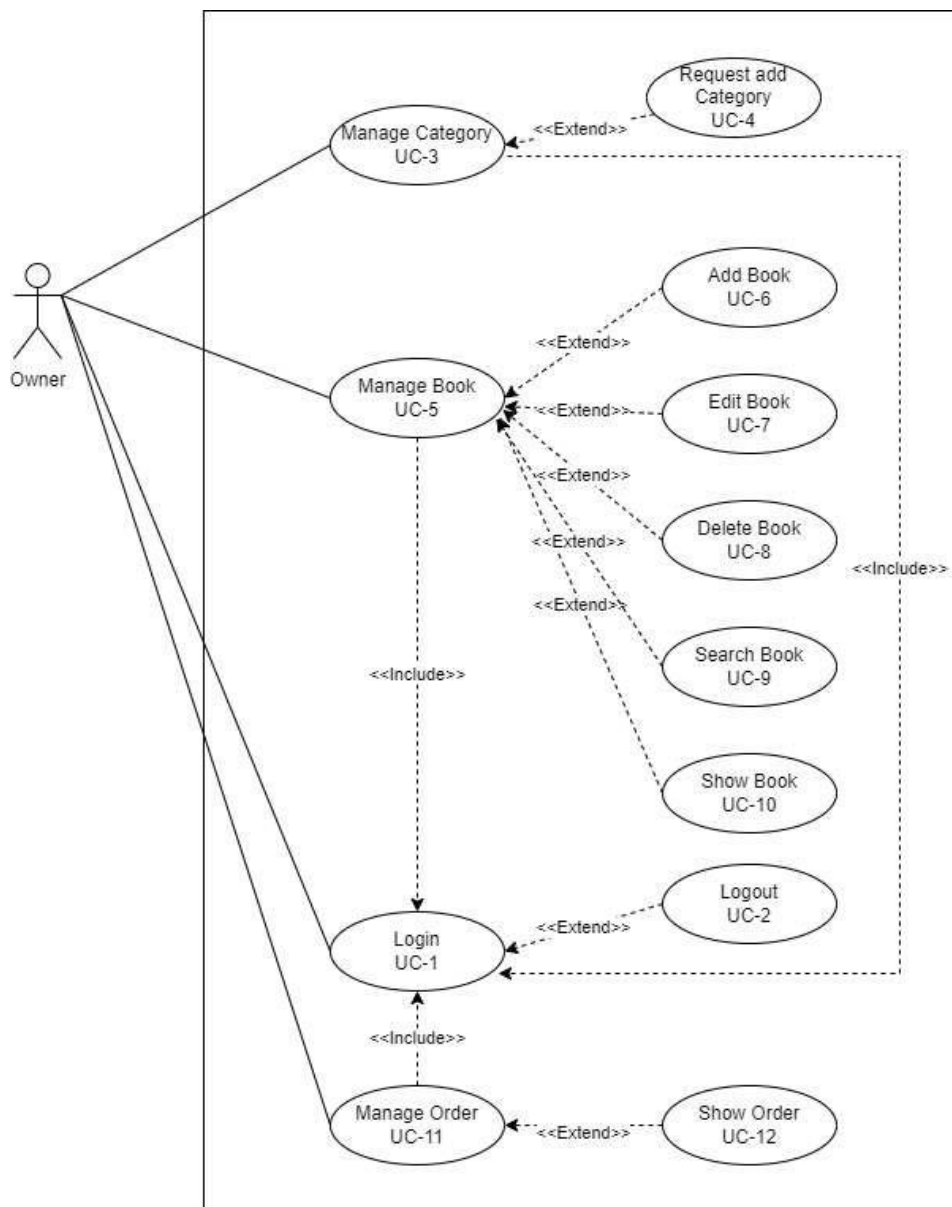| **Use Case Name:** Add to cart	**ID: UC-14**	**Priority:** High
Actor: User		
Description: The user can add to cart as demonstrated by this use case.		
Trigger: The user wishes to add to cart. **Type:** External		

Pre-Condition:
     33. Accounts users have already been created.
     34. The user's accounts are approved.
     35. There is a network connection established by the user's device.
     36. The website is up and running right now.		

Normal Course:
     21. "View book" is displayed.
     22. Select the "Add to cart" option.		

Alternative Flow: N/A		
Post-Condition: 10. Upon successful completion of the add to cart process, a notification will be displayed.		
Exception: N/A		

Store Owner

Figure 4: Use-case Store Owner

Use Case Name: Login (Store Owner)	ID: UC-1	Priority: High
Actor: Store Owner		
Description: This use case demonstrates how a store owner can login into the system.		
Trigger: Store Owner wishes to login into to the system. **Type:** External		
Pre-Condition: 1. Accounts store owner have already been created. 2. The store owner accounts are approved. 3. There is a network connection established by the user's device. 4. The website is up and running right now.		
Normal Course: 1. Owner access to the system. 2. Choose to Store sign in into the system. 3. Store owner enters store owner account information and clicks Login. 4. Upon successful authentication, the system provides the store owner with access.		
Alternative Flow: N/A		
Post-Condition: 1. The information that store owner must provide will appear one at a time, and they must complete it all. 2. Upon successful completion of the sign-in process, a notification will be displayed.		
Exception: **Exception 1:** The store owner entered the incorrect format or nothing at all. • The message "Please enter the right format" will appear as a warning.		

Use Case Name: Logout (Store Owner)	ID: UC-2	Priority: High
Actor: Store Owner		
Description: This use case demonstrates how a store owner can logout of the system.		
Trigger: Store Owner wishes to logout of to the system. **Type:** External		
Pre-Condition: 5. Accounts store owner have already been created. 6. The store owner accounts are approved. 7. There is a network connection established by the user's device. 8. The website is up and running right now.		
Normal Course: 5. The store owner has already logged into the system. 6. Select "Logout" to exit the system.		

Alternative Flow: N/A
Post-Condition: N/A
Exception: N/A

Use Case Name: Manage Category (Store Owner)	**ID: UC-3**	**Priority:** High
Actor: Store Owner		
Description: This use case demonstrates the store owner access to one main options.		
Trigger: The owner of the store wants to have access to and use the main option. **Type:** External		

Pre-Condition:
   9. Accounts store owner have already been created.
  10. The store owner accounts are approved.
  11. There is a network connection established by the user's device.
  12. The website is up and running right now.		

Normal Course: 7. "Manage Category" is displayed.		
Alternative Flow: N/A		
Post-Condition: 3. The option "Request add category" will show.		
Exception: N/A		

Use Case Name: Request add category	**ID: UC-4**	**Priority:** High
Actor: Store Owner		
Description: This use case demonstrates how a store owner can request add category.		
Trigger: Store Owner wishes to request add category. **Type:** External		

Pre-Condition:
  13. Accounts store owner have already been created.
  14. The store owner accounts are approved.
  15. There is a network connection established by the user's device.
  16. The website is up and running right now.		

Normal Course: 8. "Manage Category" is displayed.		

9.	Select the "Request add category" option.		

Alternative Flow: N/A

Post-Condition:
4. The information that store owner must provide will appear one at a time, and they must complete it all.
5. Upon successful completion of the request add category process, a notification will be displayed.

Exception: N/A

Use Case Name: Manage Book	**ID:** UC-5	**Priority:** High
Actor: Store Owner		
Description: This use case demonstrates the store owner access to five main options.		
Trigger: The user wishes to utilize and gain access to one of the five main options. **Type:** External		
Pre-Condition: 17. Accounts store owner have already been created. 18. The store owner accounts are approved. 19. There is a network connection established by the user's device. 20. The website is up and running right now.		
Normal Course: 10. "Manage Book" is displayed.		
Alternative Flow: N/A		
Post-Condition: 6. The option "Add book", "Update book", "Show book", "Search book", and "Delete book" will show.		
Exception: N/A		

Use Case Name: Add Book	ID: UC-6	Priority: High
Actor: Store Owner		
Description: This use case demonstrates how a store owner can add a new book.		
Trigger: Store Owner wishes to add a new book into the system. **Type:** External		

Pre-Condition:
     21. Accounts store owner have already been created.
     22. The store owner accounts are approved.
     23. There is a network connection established by the user's device.
     24. The website is up and running right now.		

Normal Course:
     11. "Manage Book" is displayed.
     12. Select the "Manage Book" option.
     13. Select the "Add Book" option.		

Alternative Flow: N/A		

Post-Condition:
     7. The information that store owner must provide will appear one at a time, and they must complete it all.
     8. Upon successful completion of the add book process, a notification will be displayed.		

Exception: N/A		

Use Case Name: Edit Book	ID: UC-7	Priority: High
Actor: Store Owner		
Description: This use case demonstrates how a store owner can update a book.		
Trigger: Store Owner wishes to update a book available in the system. **Type:** External		

Pre-Condition:
     25. Accounts store owner have already been created.
     26. The store owner accounts are approved.
     27. There is a network connection established by the user's device.
     28. The website is up and running right now.		

Normal Course:
     14. "Manage Book" is displayed.
     15. Select the "Manage Book" option.
     16. Select the "Update Book" option.		

Alternative Flow: N/A		

Post-Condition:
9. The information that store owner must provide will appear one at a time, and they must complete it all.
10. Upon successful completion of the update book process, a notification will be displayed.

Exception:
Exception 1: The user did not choose any book to be updated.
- The message "Please select a specific book to update" will appear as a warning.

Exception 2: The store owner entered the incorrect format or nothing at all.
- The message "Please enter the right format" will appear as a warning.

Use Case Name: Delete Book	**ID: UC-8**	**Priority:** High
Actor: Store Owner		

Description: This use case demonstrates how a store owner can delete a book.

Trigger: Store Owner wishes to delete a book out of the system.
Type: External

Pre-Condition:
29. Accounts store owner have already been created.
30. The store owner accounts are approved.
31. There is a network connection established by the user's device.
32. The website is up and running right now.

Normal Course:
17. "Manage Book" is displayed.
18. Select the "Manage Book" option.
19. Select the "Delete Book" option.

Alternative Flow: N/A

Post-Condition:
11. Upon successful completion of the delete book process, a notification will be displayed.

Exception:
Exception 1: The user did not choose any book to be deleted.
- The message "Please select a specific book to delete" will appear as a warning.

Exception 2: The store owner entered the incorrect format or nothing at all.
- The message "Please enter the right format" will appear as a warning.

Use Case Name: Search Book	**ID: UC-9**	**Priority:** High
Actor: Store Owner		
Description: This use case demonstrates how a store owner can search book.		
Trigger: Store Owner wishes to search book. **Type:** External		
Pre-Condition: 33. Accounts store owner have already been created. 34. The store owner accounts are approved. 35. There is a network connection established by the user's device. 36. The website is up and running right now.		
Normal Course: 20. "Manage Book" is displayed. 21. Select the "Search book" option. 22. Enter book to search.		
Alternative Flow: N/A		
Post-Condition: 12. The information that store owner must provide will appear one at a time, and they must complete it all. 13. The book whose title and details are related to the entered keyword will appear.		
Exception: **Exception 1:** The store owner input nothing. • The message "Please input the title or detail of the book to search" will appear as a warning.		

Use Case Name: Show Book	**ID: UC-10**	**Priority:** High
Actor: Store Owner		
Description: This use case demonstrates how a store owner can view books.		
Trigger: Store Owner wishes to view books. **Type:** External		
Pre-Condition: 37. Accounts store owner have already been created. 38. The store owner accounts are approved. 39. There is a network connection established by the user's device. 40. The website is up and running right now.		
Normal Course: 23. "View Book" is displayed.		
Alternative Flow: N/A		

| **Post-Condition:** |
| 14. The books will appear as a list with their details. |
| **Exception:** N/A |

Use Case Name: Manage Order	**ID: UC-11**	**Priority:** High
Actor: Store Owner		
Description: This use case demonstrates the store owner access to three main options.		
Trigger: The user wishes to utilize and gain access to one of the three main options. **Type:** External		
Pre-Condition: 41. Accounts store owner have already been created. 42. The store owner accounts are approved. 43. There is a network connection established by the user's device. 44. The website is up and running right now.		
Normal Course: 24. " Manage Order Records " is displayed.		
Alternative Flow: N/A		
Post-Condition: 15. The option "Show Order" will show.		
Exception: N/A		

Use Case Name: Show Order	**ID: UC-12**	**Priority:** High
Actor: Store Owner		
Description: This use case demonstrates how a store owner can view order records.		
Trigger: Store Owner wishes to view order records. **Type:** External		
Pre-Condition: 45. Accounts store owner have already been created. 46. The store owner accounts are approved. 47. There is a network connection established by the user's device. 48. The website is up and running right now.		
Normal Course: 25. "Manage Order" is displayed. 26. Select the "Show Order" option.		

Alternative Flow: N/A
Post-Condition: 16. A list of all order records is displayed.
Exception: N/A

Admin

Figure 5: Use-case Admin

Use Case Name: Manage User	ID: UC-3	Priority: High
Actor: Admin		
Description: This use case demonstrates the administrator access to two main options.		
Trigger: The admin wishes to utilize and gain access to one of the two main options. Type: External		

Pre-Condition:
   1. Accounts administrator have already been created.
   2. The administrator accounts are approved.
   3. There is a network connection established by the user's device.
   4. The website is up and running right now.		

Normal Course: 1. " Manage User " is displayed.		
Alternative Flow: N/A		
Post-Condition: 1. The option "Show Account User" and "Update password account" will show.		
Exception: N/A		

Use Case Name: Update password account	ID: UC-7	Priority: High
Actor: Admin		
Description: This use case demonstrates how an administrator can update the new password for users.		
Trigger: Admin wishes to update the new password for users. Type: External		

Pre-Condition:
   5. Accounts administrator have already been created.
   6. The administrator accounts are approved.
   7. There is a network connection established by the user's device.
   8. The website is up and running right now.		

Normal Course:
   2. "Manage User" is displayed.
   3. Select the "Update password account" option.
   4. Choose a specific user to update their password.		

Alternative Flow: N/A		

Post-Condition:
   2. The information that administrator must provide will appear one at a time, and they must complete it all.
   3. Upon successful completion of the change password process, a notification will be displayed.		

Exception:		

Exception 1: The administrator did not choose any account to be updated.
- The message "Please select a specific account to update" will appear as a warning.

Exception 2: The administrator entered the incorrect format or nothing at all.

The message "Please enter the right format" will appear as a warning.

Use Case Name: Show Account User	ID: UC-8	Priority: High
Actor: Admin		
Description: This use case demonstrates how an administrator can view account information for all users.		
Trigger: Admin wishes to view account information for all users. **Type:** External		

Pre-Condition:
   9. Accounts administrator have already been created.
  10. The administrator accounts are approved.
  11. There is a network connection established by the user's device.
  12. The website is up and running right now.		

Normal Course:
   5. "Manage User" is displayed.
   6. Select the "Show Account User" option.		

Alternative Flow: N/A		
Post-Condition: 4. A list of each user's account details will be displayed.		
Exception: N/A		

Use Case Name: Manage Store Owner	ID: UC-4	Priority: High
Actor: Admin		
Description: This use case demonstrates the administrator access to three main options.		
Trigger: The admin wishes to utilize and gain access to one of the three main options. **Type:** External		

Pre-Condition:
  13. Accounts administrator have already been created.
  14. The administrator accounts are approved.
  15. There is a network connection established by the user's device.
  16. The website is up and running right now.		

Normal Course:		

7.	" Manage Store Owner " is displayed.

Alternative Flow: N/A

Post-Condition:

  5. The option "Add account owners", "Show account owners" and "Update password account" will show.

Exception: N/A

Use Case Name: Update password account (Manage Store Owner)	**ID: UC-5**	**Priority:** High

Actor: Admin

Description: This use case demonstrates how an administrator can update the new password for store owners.

Trigger: Admin wishes to update the new password for store owners.
Type: External

Pre-Condition:

  17. Accounts administrator have already been created.
  18. The administrator accounts are approved.
  19. There is a network connection established by the user's device.
  20. The website is up and running right now.

Normal Course:

  8. "Manage Store Owner" is displayed.
  9. Select the "Update password account" option.
  10. Choose a specific store owners to update their password.

Alternative Flow: N/A

Post-Condition:

  6. The information that administrator must provide will appear one at a time, and they must complete it all.
  7. Upon successful completion of the change password process, a notification will be displayed.

Exception:

Exception 1: The administrator did not choose any account to be updated.

  • The message "Please select a specific account to update" will appear as a warning.

Exception 2: The administrator entered the incorrect format or nothing at all.

The message "Please enter the right format" will appear as a warning.

Use Case Name: Add account Owner	ID: UC-6	Priority: High
Actor: Admin		
Description: This use case demonstrates how an administrator can create new account for store owners.		
Trigger: Admin wishes to create new account for store owners. **Type:** External		

Pre-Condition:
    21. Accounts administrator have already been created.
    22. The administrator accounts are approved.
    23. There is a network connection established by the user's device.
    24. The website is up and running right now.		

Normal Course:
    11. "Manage Store Owner" is displayed.
    12. Select the "Add account Owner" option.
    13. Select to create a new store owner account.		

Alternative Flow: N/A		

Post-Condition:
    8. The information that administrator must provide will appear one at a time, and they must complete it all.
    9. Upon successful completion of the create account process, a notification will be displayed.		

Exception: N/A		

Use Case Name: Show Account Owner	ID: UC-7	Priority: High
Actor: Admin		
Description: This use case demonstrates how an administrator can view account information for all store owners.		
Trigger: Admin wishes to view account information for all store owners. **Type:** External		

Pre-Condition:
    25. Accounts administrator have already been created.
    26. The administrator accounts are approved.
    27. There is a network connection established by the user's device.
    28. The website is up and running right now.		

Normal Course:
    14. "Manage Store Owner" is displayed.
    15. Select the "Show Account Store Owner" option.		

Alternative Flow: N/A		
Post-Condition: 10. A list of each store owners account details will be displayed.		
Exception: N/A		

Use Case Name: Manage Category	ID: UC-10	Priority: High
Actor: Admin		
Description: This use case demonstrates the administrator access to two main options.		
Trigger: The admin wishes to utilize and gain access to one of the two main options. **Type:** External		

Pre-Condition:
     29. Accounts administrator have already been created.
     30. The administrator accounts are approved.
     31. There is a network connection established by the user's device.
     32. The website is up and running right now.		

Normal Course: 16. " Manage Category " is displayed.		
Alternative Flow: N/A		
Post-Condition: 11. The option "Approve category" and "Reject category" will show.		
Exception: N/A		

Use Case Name: Approve category	ID: UC-12	Priority: High
Actor: Admin		
Description: This use case demonstrates how an administrator can approve category request.		
Trigger: Admin wishes to approve category request. **Type:** External		

Pre-Condition:
     33. Accounts administrator have already been created.
     34. The administrator accounts are approved.
     35. There is a network connection established by the user's device.
     36. The website is up and running right now.		

Normal Course:
     17. "Manage Category" is displayed.
     18. Select the "Approve category" option.		

Alternative Flow: N/A		

Post-Condition:
     12. The information that administrator must provide will appear one at a time, and they must complete it all.
     13. Upon successful completion of the approve category request process, a notification will be displayed.		

Exception: N/A		

Use Case Name: Reject category	**ID: UC-11**	**Priority:** High
Actor: Admin		
Description: This use case demonstrates how an administrator can reject category request.		
Trigger: Admin wishes to reject category request. **Type:** External		
Pre-Condition: 37. Accounts administrator have already been created. 38. The administrator accounts are approved. 39. There is a network connection established by the user's device. 40. The website is up and running right now.		
Normal Course: 19. "Manage Category" is displayed. 20. Select the "Reject category" option.		
Alternative Flow: N/A		
Post-Condition: 14. The information that administrator must provide will appear one at a time, and they must complete it all. 15. Upon successful completion of the approve reject request process, a notification will be displayed.		
Exception: N/A		

Use Case Name: Login	**ID: UC-1**	**Priority:** High
Actor: Admin		
Description: This use case demonstrates how an administrator can login into the system.		
Trigger: Admin wishes to login into to the system. **Type:** External		
Pre-Condition: 41. Accounts administrator have already been created. 42. The administrator accounts are approved. 43. There is a network connection established by the user's device. 44. The website is up and running right now.		
Normal Course: 21. Admin access to the system. 22. Choose to login into the system. 23. Admin enters admin account information and clicks Login. 24. Upon successful authentication, the system provides the administrator with access.		
Alternative Flow: N/A		

Post-Condition:

17. The information that administrator must provide will appear one at a time, and they must complete it all.
18. Upon successful completion of the sign-in process, a notification will be displayed.

Exception:

Exception 1: The administrator entered the incorrect format or nothing at all.

- The message "Please enter the right format" will appear as a warning.

Use Case Name: Logout	ID: UC-9	Priority: High
Actor: Admin		
Description: This use case demonstrates how an administrator can logout of the system.		
Trigger: Admin wishes to logout of to the system. **Type:** External		
Pre-Condition: 45. Accounts administrator have already been created. 46. The administrator accounts are approved. 47. There is a network connection established by the user's device. 48. The website is up and running right now.		
Normal Course: 25. The administrator has already logged into the system. 26. Select "Logout" to exit the system.		
Alternative Flow: N/A		
Post-Condition: N/A		
Exception: N/A		

3. Wirefram

❖ **Guest**
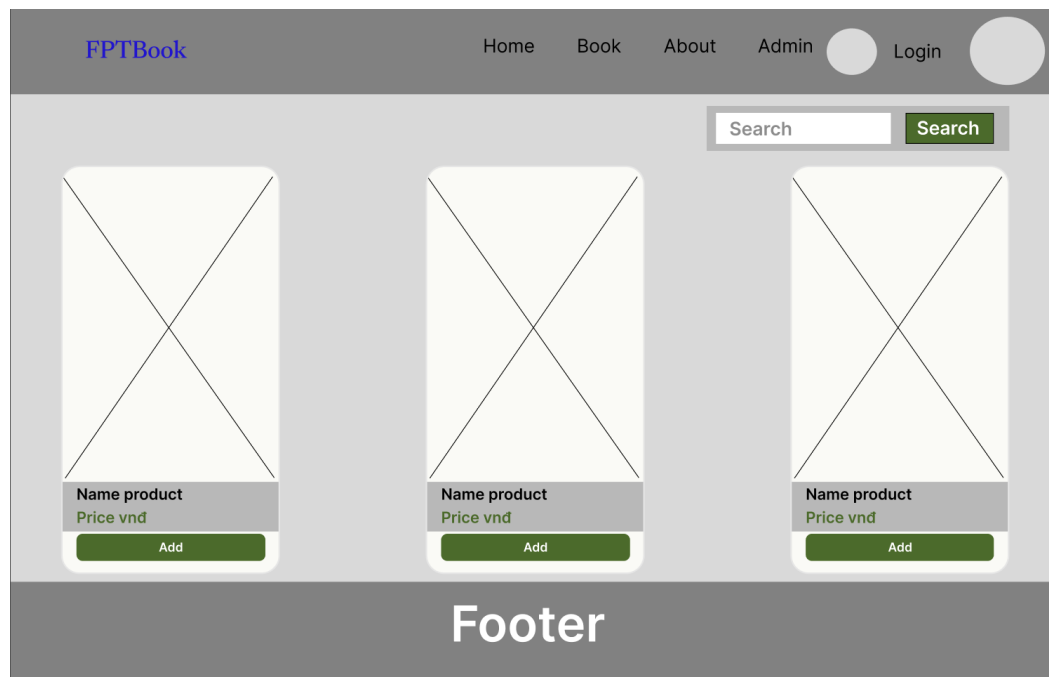
Figure 6: Guest Home Page

Figure 7: Guest Register Page
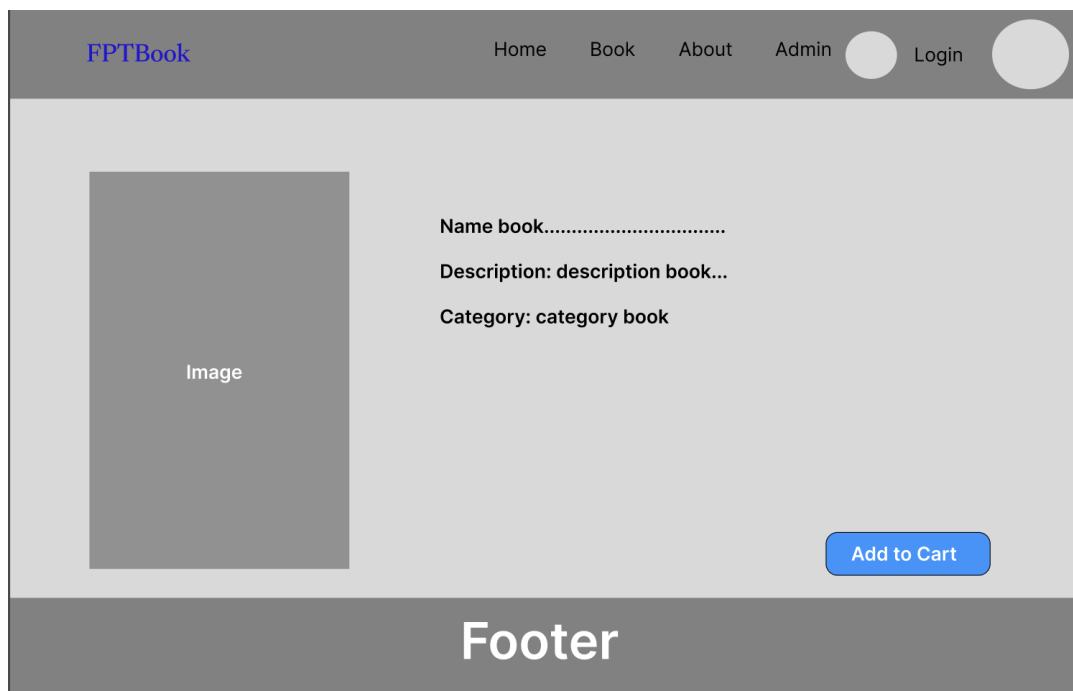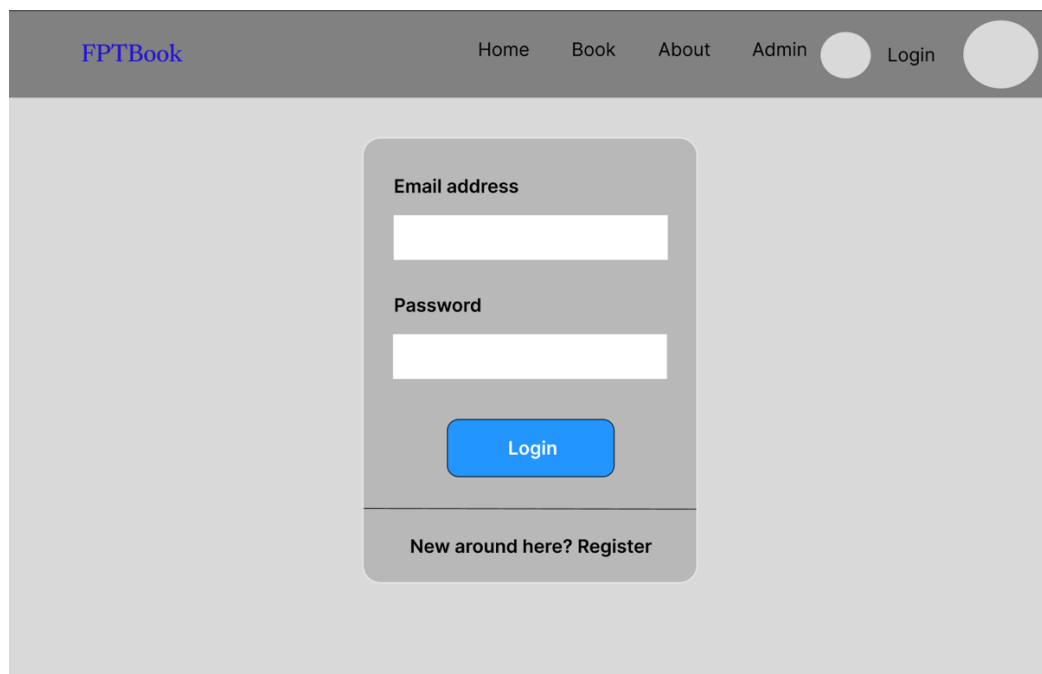
Figure 8: Guest Book Detail Page
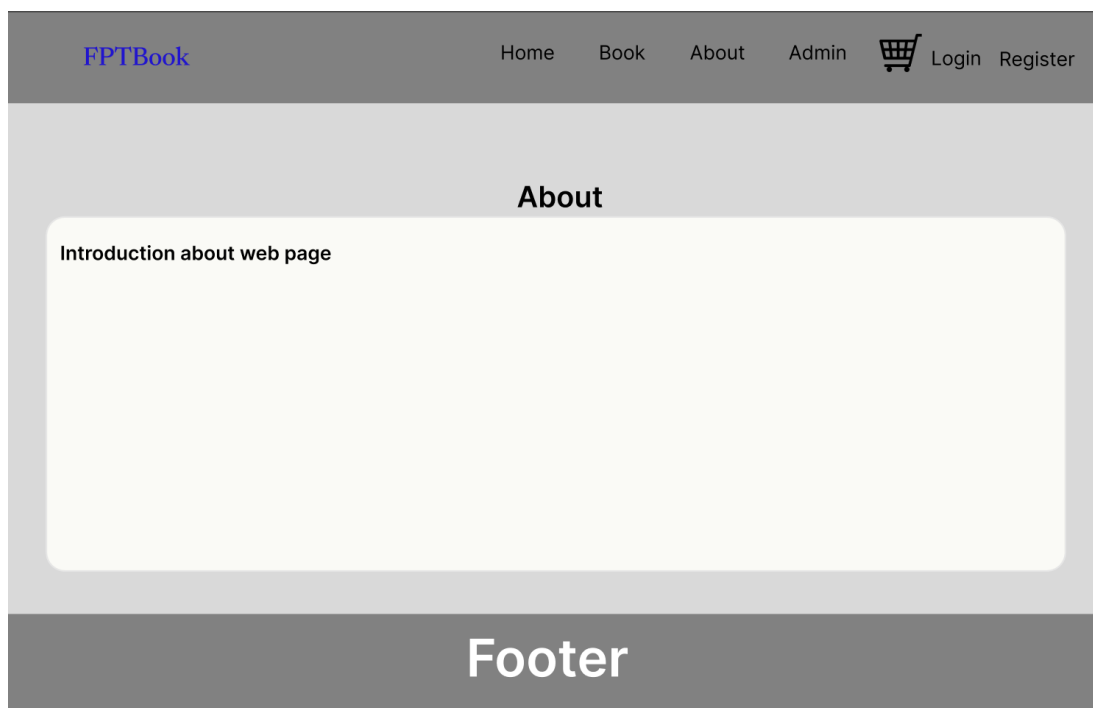
Figure 9: Guest About Page
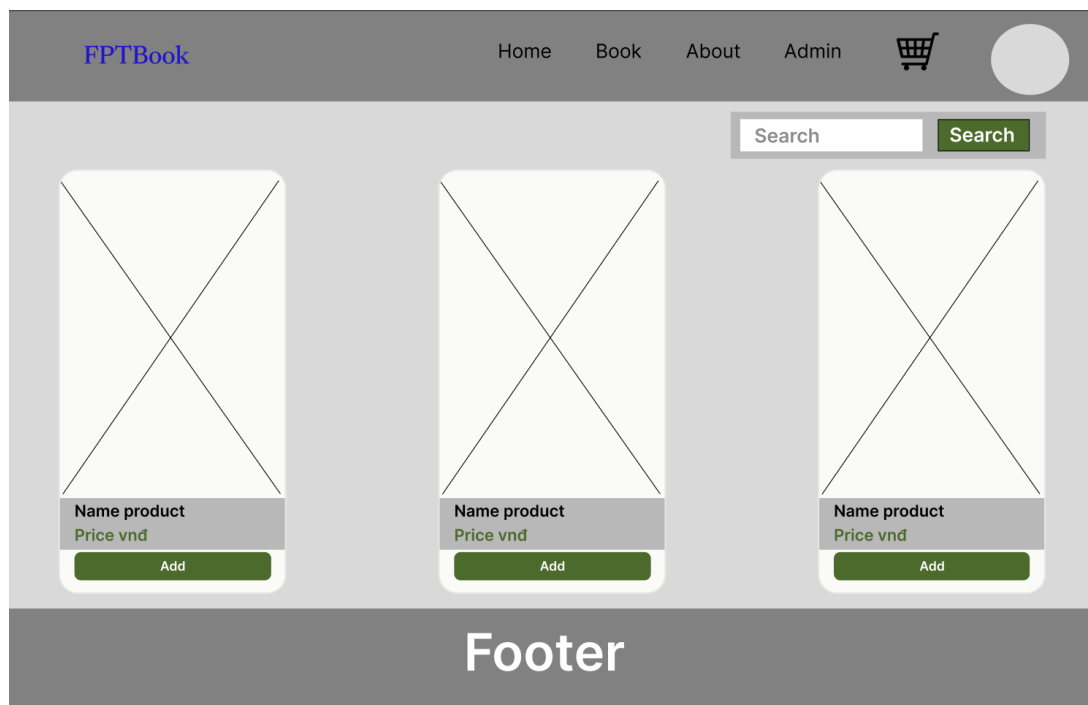
❖ **User**

Figure 10: User Login Page

Figure 11: User Home Page

Figure 12: User Book Page
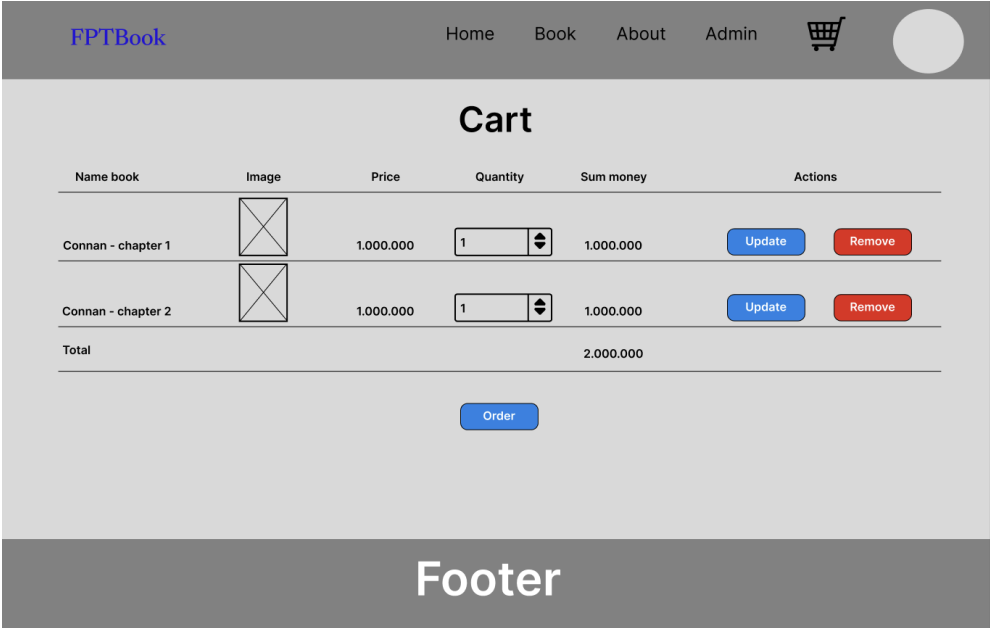
Figure 13: User Cart Page

Figure 14: User Profile Page

❖ **Store Owner**

Figure 15: Owner Manage Category

Figure 16: Owner Manage Book

Figure 17: Owner Manage Order

Figure 18: Owner Add Book

Figure 19: Owner Edit Book

❖ **Admin**

Figure 20: Admin Manage User

Figure 21: Admin Edit User

Figure 22: Admin Manage Category

Figure 23: Admin Manage Owner

Figure 24: Admin Edit Owner

4. Wireflow

❖ **Guest**
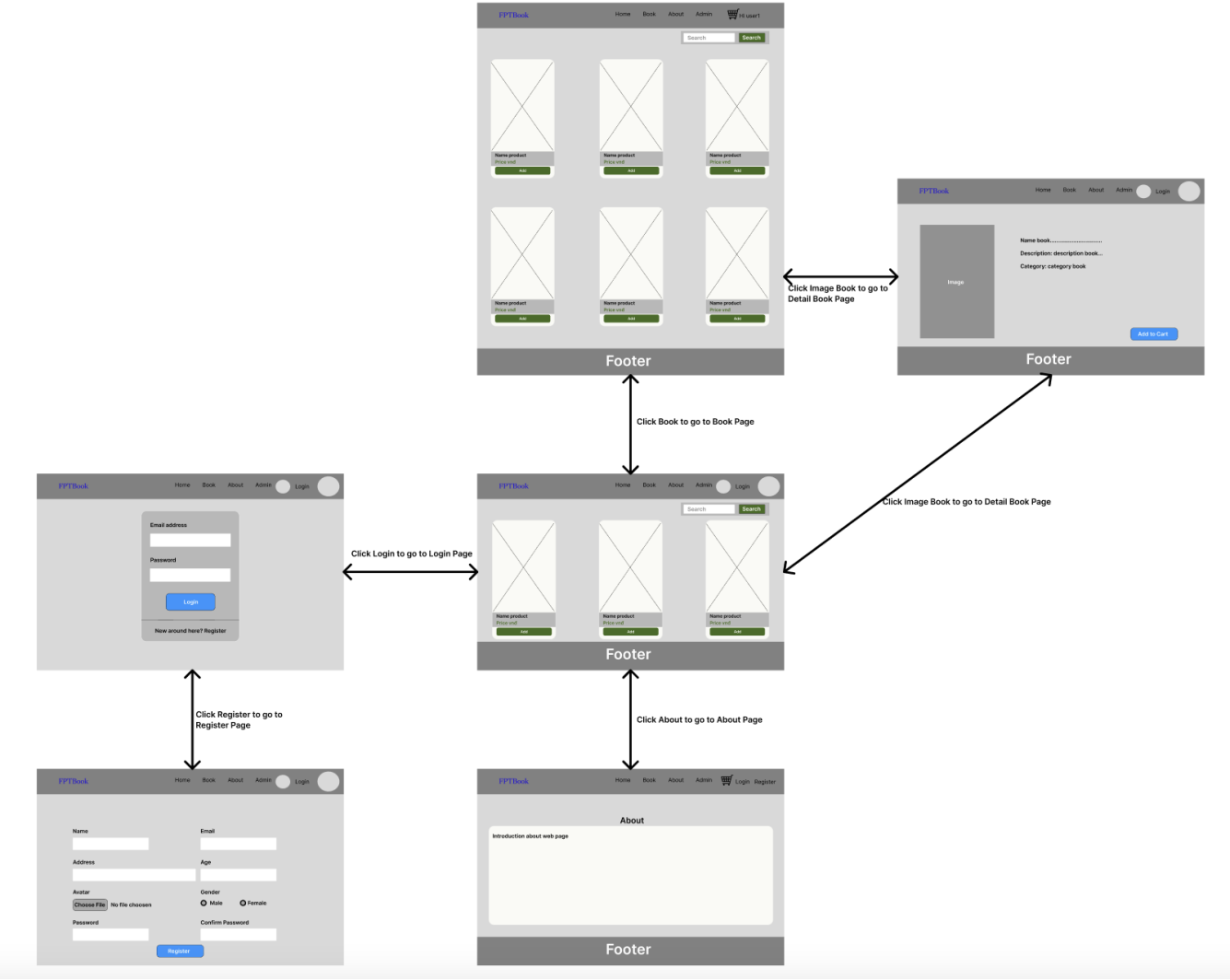
Figure 25: Wireflow Guest

❖ **User**
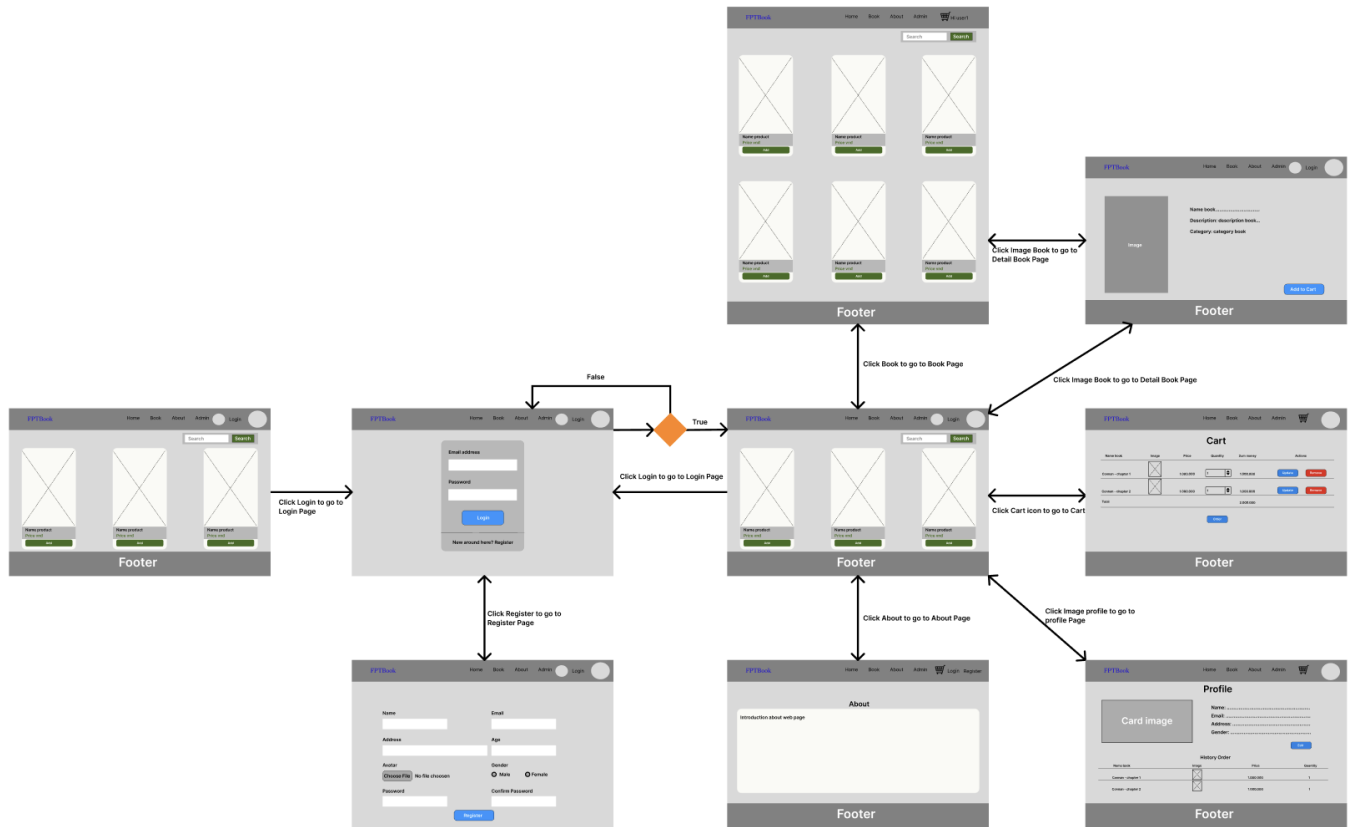
Figure 26: Wireflow User

❖ **Owner**

Figure 27: Wireflow Owner

❖ **Admin**

Figure 28: Wireflow Admin

IV. Risk Assessment (P2)

1. Risk Assessment

N AME	Nguyen Doan Minh Hieu	OBJECTIVE	

REF / ID	PRE-MITIGATION				DEPARTMENT / LOCATION	MITIGATIONS / WARNINGS / REMEDIES	POST-MITIGATION			
	RISK	RISK SEVERITY	RISK LIKELIHOOD	RISK LEVEL			RISK SEVERITY	RISK LIKELIHOOD	RISK LEVEL	ACCEPTABLE TO PROCEED?
1	Member quitting the project	TOLERABLE	POSSIBLE	**HIGH**	Team member	The project should be divided into several smaller modules so that any team members who are leaving cannot leak information or seriously harm the project.	ACCEPTABLE	IMPROBABLE	**LOW**	**YES**
2	Too few members	UNDESIRABLE	POSSIBLE	**HIGH**	Occurs during the software development process.	Recruiting new members or everyone else will take turns	ACCEPTABLE	IMPROBABLE	**LOW**	**YES**

						to do the lack of staff.				
3	Members are ill or have health issues.	TOLERABLE	POSSIBLE	**HIGH**	Team member	If data disappears, the team could suffer significant losses, but GitHub can help with that. The risk is substantial, though, because it happens regularly.	ACCEPTABLE	POSSIBLE	**LOW**	**YES**
4	Violating the law	INTOLERABLE	POSSIBLE	**EXTREME**	Government, Project Manager	Hire a lawyer to look into any potential legal issues with this project and to make any necessary adjustments.	TOLERABLE	IMPROBABLE	**MEDIUM**	**YES**

5	Natural disaster	INTOLERABLE	POSSIBLE	EXTREME	Natural	Daily backups and safe storage of hardware devices	UNDESIRABLE	POSSIBLE	EXTREME	YES

V.   Technologies Evaluation (P3)
1. Design Tools
❖ Tools to design UML

Software engineering is one field where UML (Unified Modeling Language) diagrams are very helpful. Our capacity to assess and visualize systems is enhanced by it. As they say, "a picture is worth a thousand words," which is why it works so well.It's simpler to explain to clients when you use pictures. Software engineers use UML diagrams to represent and record projects both before and after they are finished. This UML diagram often saves a great deal of time, so be aware of that.

Additionally, we have the best UML modeling tools at our disposal to help us create UML diagrams, including:

- **Draw.io**

Draw.io is an open-source software for creating flowcharts and diagrams that was designed with contemporary business obligations and sensibilities in mind. You can design with a range of tools and features that are freely available for use on various platforms and browsers. You can get right to work and achieve genuine results without hesitation with the help of this straightforward program. No matter your level of technical expertise, the user-friendly interface of draw.io makes it easy to organize and manipulate your data into a more readable format. Use the drag-and-drop feature to quickly create more flowcharts and diagrams, or create shapes and links right in your browser. You can even use the Scratchpad to save some for later. For quick builds, Draw.io provides an abundance of shapes and templates. Additionally, functionality is not compromised. You can easily track changes and share your work by importing and exporting multiple file types, including.xml and image formats. It functions both offline and on mobile devices. Regardless of where or how you work, you are safe because the service doesn't store any of your data or claim any of your creations. Draw.io is completely free, as are its offline versions and plugins for cloud storage. Depending on how many people will be using the program, you can also choose to subscribe to its Confluence and Jira services for more functionality. Draw.io is an excellent, free one-stop diagramming solution that can be used in a variety of industries. (JGraph, 2023)

Figure 29: Draw.io

Advantages	Disadvantages
− It is an entirely free piece of software. − It processes along pretty quickly. − The characteristics are attractive. − There are no minimal requirements for using it. − Permit you to share your designs. − There are multiple templates available.	− It has a dull user interface that is unappealing to look at. − It's confusing how the shapes and components are arranged. − It lacks advanced features. − After extended use, the desktop version of Draw.io occasionally experiences glitches. − Exporting designs is a little challenging. − It occasionally operates slowly. − Files saved on Google Drive and OneDrive are the only ones that can be shared. − Files cannot be exported to Word.

- **Lucidchart**

Users can create charts and diagrams with the Lucidchart program. It offers group diagram design as a framework. It's an excellent web tool and service. To access it, all you have to do is sign up once. Using it is simple. It includes all the shapes needed to construct any type of UML diagram. There are also basic templates included for every diagram. We can make any diagram with ease thanks to these templates. Additionally, it aids in the planning of business events. For tasks like data visualization and diagramming, it will therefore be very beneficial. A risk-free trial period is employed. Users on the free trial are limited to a limited selection of frames and shapes. For free users, a diagram may only have 60 shapes total. Business browsers are not supported. This tool is useful for project management and design in addition to creating UML diagrams.

Figure 30: Lucidchart

Advantages	Disadvantages
− User-friendly layout − Features and integrations across platforms − Enables a variety of diagram types − Community and support documentation − Collaborate and share in teams.	− Limited free version − Requires internet connection − Expensive for high-end features − Possibly sluggish when utilizing big diagrams − Security and privacy

❖ **Tools to design User Interface**

Designing a digital product's user interface (UI) is all about how it looks. Together with the components you use to interact with the interface, such as buttons, scrollbars, and swipe gestures, it includes every color, font, and image you see on the screen.

Developing a positive user experience requires excellent UI design. It follows that having a few trustworthy UI design tools in your toolkit is essential for any type of digital designer.

• **Figma**

Figma is a well-known graphic design and user interface (UI) program created by Figma, Inc. With the help of this cloud-based tool, teams can collaborate virtually to efficiently and flexibly create, edit, and share designs. Figma facilitates not just the design of user interfaces but also the entire workflow from concept to finished product.

Figma's cross-platform functionality, which can be accessed from any web browser without the need to install software, is one of its best features. Team members can now collaborate more easily, especially if they are geographically separated. To create dynamic user experiences, Figma offers a plethora of effective tools and features, such as interoperability between components, sharing of templates, and annotations.

Figure 31: Figma

Key Features:

- **Cloud-Based Collaboration:** Figma is a cloud-based platform that facilitates real-time team collaboration. It is simple for teams, designers, and stakeholders to collaborate easily when multiple users can work on the same design at once.
- **Cross-Platform Accessibility:** Platform independence is achieved by Figma's browser-based accessibility. In order to increase flexibility and user-friendliness, users can access their designs from any internet-connected device.
- **Vector Editing:** Designers can precisely create and manipulate shapes, paths, and text with Figma's powerful vector editing tools. Creating user interfaces and graphics of the highest caliber requires this.
- **Prototyping and Interaction:** Prototyping interactive designs is supported by Figma. A more dynamic depiction of the finished product can be achieved by designers by connecting various frames and components to mimic user interactions, transitions, and animations.
- **Component-Based Design**: Component-based design is encouraged by Figma. It is easier to maintain and update designs when designers use reusable components and styles, which guarantee consistency across various screens.
- **Auto Layout:** One feature that aids in the creation of responsive designs is Auto Layout. It makes it easier to design layouts for various screen sizes by enabling elements inside frames to automatically adjust in response to content changes.

Advantages	Disadvantages
− Real-Time Collaboration − Cross-Platform Accessibility − Auto Layout and Responsive Design − Prototyping and User Testing − Component-Based Design − Vector Editing	− Internet Dependency − Limited Offline Access − Performance with Large Files − Free Plan Limitations

❖ **Conclude which tools will be used for the design of the application**

I choose to design all of my diagrams with Figma for this assignment 1. Though it's not the greatest overall, Figma is the best flowchart and diagramming tool that is totally free. I find it easier to create diagrams and other visualizations with this application than with vector tools. Figma provides robust real-time collaboration features that let multiple users work on a diagram at once. Thus, it facilitates my ability to work with my group.

2. Front-end technology
❖ Front-end Programming Language

The interface through which users carry out important tasks on a website or software application is called the front end. Different sections and functionalities are available to users who visit an app or browser.

All websites and applications have programming on their front end that allows users to access specific features. A backend, in contrast, performs essential background tasks and data processing that are necessary for the operation of the program.

The following languages are used in the development of the front end:

- **HLML**

The programming language known as HTML, which stands for Hypertext Markup Language, is used to create electronic documents that are displayed on websites. There are numerous hyperlinks and links to other pages on every single page.

HTML is the language that has been used to create every single webpage on the Internet. It is necessary for browsers to learn how to load different elements and display texts.

Figure 32: HTML

Features:

− The programming language HTML has a low learning curve and is very user-friendly.
− The language is also platform-independent.
− A web page can easily include audio, video, and image content thanks to HTML.
− Hypertext content can also be added to text segments using this language.
− Compared to other languages, HTML is much simpler and is a markup language.

Advantages	Disadvantages
• HTML is one of the easiest programming languages to learn, according to most developers. It is also simple to use. HTML is taught in most development courses, and many developers learn it before any other language. Because HTML uses simple tags and case sensitivity is not an issue, it is an easy language to learn. • Developers do not need to purchase any software in order to begin working with HTML as it is a free language. To access key features of the language, users do not need to work with any external plugins or software. For this reason, HTML is used by a large number of businesses worldwide to meet their website design needs. Whole websites can be constructed entirely in HTML. • HTML provides cross-browser compatibility; the majority of popular browsers support HTML. There is therefore no need to worry about browser compatibility if a website is written in HTML. It is possible to optimize HTML websites for the various browsers in which they can be loaded.	• Not Sufficient for Dynamic Pages – Many of the features that users of contemporary websites enjoy cannot be supported by using only basic HTML. Adding dynamic content to web pages using HTML may be challenging for developers. They must pick up additional languages like ASP, PHP, or JavaScript. • Limited for Displaying Content - HTML is also not the best option for presenting displayed content in an eye-catching manner. The majority of developers are aware of this restriction. In order to improve the visual appeal of HTML page content, they must rely on CSS, or Cascading Style Sheets. In certain situations, web designers and developers must create and manage two separate file sets.

- **CSS**

A programming language called CSS is used to specify the layout and style of documents that are made available to users. In general, a document is a text file structure that uses one or more markup languages, like the widely used HTML and others like XML or SVG.

A document can be made usable for audiences by using CSS. This is especially important for browsers like Chrome, Firefox, and Edge that are designed to visually present documents on screens, printers, and projectors.

Figure 33: CSS

Features:

- Selectors - CSS selectors give users the ability to choose and manage various elements on a webpage. For the purpose of matching attributes and attribute values, they can be referred to as structural components. It is possible for new selectors to style URL-targeted elements by targeting pseudo-classes. A checked pseudo-class is also included in selectors for styling checked elements, such as checkboxes and radio buttons.
- Text effects and layout - CSS3 can be used to modify text justification, change the amount of whitespace in a document, and change the way words are hyphenated.
- First-letter and first-line pseudo-classes – CSS has properties to help with character spacing adjustments to improve the visual effect and paragraph start drop caps.

Advantages	Disadvantages
• CSS saves time because it only requires one sheet of code to be written and can be applied to multiple HTML pages. Every HTML element has a style that can be defined, and depending on the needs, a user can apply it to several web pages. • Simple maintenance: Users can easily make global changes to modify the style of CSS code. Every web page updates automatically as soon as changes are made. • Shifting web standards: more people are using CSS instead of HTML attributes, which are becoming less common. In order to guarantee compatibility with upcoming browser releases, it is advised that developers use it throughout HTML pages.	• Cross-browser issues: Modifying the CSS on a webpage can be a simple task for developers. After the modifications are made, though, it is necessary to guarantee CSS compatibility so that the user can verify that the changes are displayed consistently across all browsers. It's crucial to check across browsers because CSS behaves differently in each one. • Confusion resulting from multiple levels – The CSS programming language comprises multiple levels, which can be intimidating for certain developers. These consist of the slightly different specifications for CSS, CSS 2, and CSS 3.

❖ **JavaScript Library/ Framework**

• **ReactJs**

- Facebook created the programming language React to enable developers to quickly and innovatively create web user interfaces.

- As of right now, it's one of the most popular JavaScript libraries for building web front ends and a fantastic choice for full stack development.

- For the purpose of creating visual user interfaces and rendering data for browsers, the programming language React is appropriate. With React, developing front-end websites is simple. The main benefits and features of this technology are listed below.
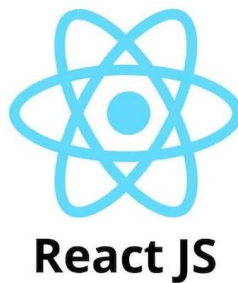
Figure 34: ReactJs

Features

- JSX – JSX is among the syntax extensions of JavaScript. It is used to describe how a user interface looks when combined with React Native. With the help of this extension, users can write HTML structures that coexist with JavaScript code in the same file.
- Virtual DOM - React uses what is known as VDOM, or virtual DOM, to store a lighter version of DOM in memory. Because screen drawing is not required for VDOM, users can adjust it more quickly than they can with DOM.

Advantages	Disadvantages
- Because there is a wealth of documentation, online training materials, and tutorials, React is a very simple language to learn and use. In a short amount of time, developers with a working knowledge of JavaScript can quickly grasp React. - React programming language offers several advantages, one of which is Virtual DOM. Developers can optimize an application's structure to achieve optimal performance when it is focused on user interactions and receives frequent data updates.	- Dynamic technology - ReactJS is a well-liked option for developers, but it's always evolving. It sets a higher standard for developers who must invest time and energy in learning new modifications. - Poor documentation - With every update, React documentation and tools undergo frequent updates, which can be difficult for certain developers to stay up to date. If the most recent documentation for a particular tool is unavailable, it can be challenging to stay current and cause problems for development.

- **VueJs**

Vue is a user interface framework designed to provide maximum adaptability, setting it apart from most monolithic frameworks.

Aside from being readily integrated with other project libraries already in place, the primary Vue library is easy to use and concentrates on a view layer.

Figure 35: VueJs

Features

- Virtual DOM - Vue.js makes use of virtual DOM, which is essentially a JavaScript data structure that copies the main DOM component and responds to any changes made to it. The evolution and modifications of JavaScript data structures can be compared to the original data structures. The final changes that users can view are applied to the real DOM.
- Two-Way data binding - The MVVM architecture of VueJS provides two-way binding. Using the QRR facilitates the editing or assignment of HTML value attributes in order to speed up HTML blocks. Two-way communication is a feature of VueJS that makes sure that any changes made to the UI are reflected onto it.

Advantages	Disadvantages
- Flexibility - Vue.js is renowned for providing users with a high degree of flexibility. With virtual nodes in HTML files, pure JavaScript, and JavaScript, developers can create their own templates. This makes Vue.js a simple-to-use choice for developers who work with JavaScript frameworks like React.js and Angular.js. - Two-way communication - The MVVM architecture of Vue js makes handling HTML blocks simple and allows for two-way communication. That's one area where it and Angular.js are very similar. Often known as two-way data binding, it	- Language barriers - The development process may be hampered by some of Vue.js's language-related limitations. This app has a preference for the Chinese language over other languages, which can be explained by its Chinese-American heritage. The issue stems from the fact that Chinese is not widely spoken. It is therefore evident that developers are hindered by the framework's Chinese language. - Over-flexibility - For many developers, Vue.js's flexibility is a curse that can lead to problems that need to be solved with community assistance. There may be

<table>
<tr>
<td>means that modifications made to the user interface (UI) will also affect the data and vice versa.

- Excellent tooling - The most recent version of the Vue 3.x CLI is rated as one of the greatest JavaScript Framework tools, and Vue.js is widely recognized as one of the best options for tools. With built-in features like Linting, Routing, CSS Pre-processors, State Store, Routing, PWA, TypeScript, and Unit Testing, developers can get started on new projects right away.</td>
<td>situations where Vue.js's great flexibility causes users to make more mistakes and unneeded complications.</td>
</tr>
</table>

❖ **CSS Framework**

The.css files contain all of the CSS components. The styling elements grow in number in tandem with the number of web pages, which eventually causes your CSS file to get large. Furthermore, there are already a few distinct CSS types. As more people collaborate on a project, it gets harder to keep track of who modified what styles, which leads to randomness in the code. But what is a CSS framework?

CSS frameworks are ready-to-use CSS style sheets or libraries that come with pre-coded web designs. They relieve web developers by reducing the amount of work that comes with writing code. Various frameworks, each with their own special features, are helpful for varying project requirements. (hackr, 2023)

The following are a few popular CSS frameworks:

• **Bootstrap**

One of the most widely used CSS frameworks worldwide, Bootstrap gained notoriety right away thanks to its responsive design. Additionally, it was the first framework to prioritize mobile devices. It is not necessary to have a different design for mobile viewing when using Bootstrap. All you have to do is add the required classes, and the website will adjust to fit the device's screen size. With the introduction of the grid in Bootstrap, the amount of code that developers had to write was drastically reduced.

Figure 36: Bootstrap

Key Features:

- All browser compatibility eliminates the need for browser-specific code, enabling quick prototyping.
- The most widely supported CSS framework in terms of usage.
- Integrated elements such as badges, forms, cards, buttons, and navigation, etc.
- Excellent custom CDN-equipped JavaScript components.
- Version 4.5 is more responsive and includes more pre-set layouts. It is free to use.
- User-friendly.

Advantages	Disadvanttages
- Reduced Cross-Browser Issues - A standardized framework with support for the majority of browsers and fixes for CSS compatibility - Lightweight and customizable - Responsive structures and styles - Several JavaScript plugins that make use of the jQuery - Excellent documentation and community assistance - Numerous high-quality, free templates, WordPress themes, and plugins - Excellent grid system	- If the design tends to deviate from the standard Bootstrap design, a lot of style overrides or rewriting files will be needed, which can result in a lot of time spent designing and coding the website. - If you don't do a lot of customization, all the websites will have the same design, so you will need to go above and beyond when creating them. - Styles are verbose and can produce a large amount of unnecessary HTML output.

	- Because JavaScript is linked to jQuery and is one of the most widely used libraries, most plugins go unutilized. - HTML not in compliance.

- **Foundation**

Foundation, one of the most complex and sophisticated UI frameworks, makes it possible to create websites quickly. Foundation is fully responsive and takes a mobile-first stance, much like Bootstrap. It works great for large-scale web applications that require a lot of styling. Foundation is adaptable, versatile, and logical. Additionally, there are good community support and more than 2,000 contributors on GitHub.
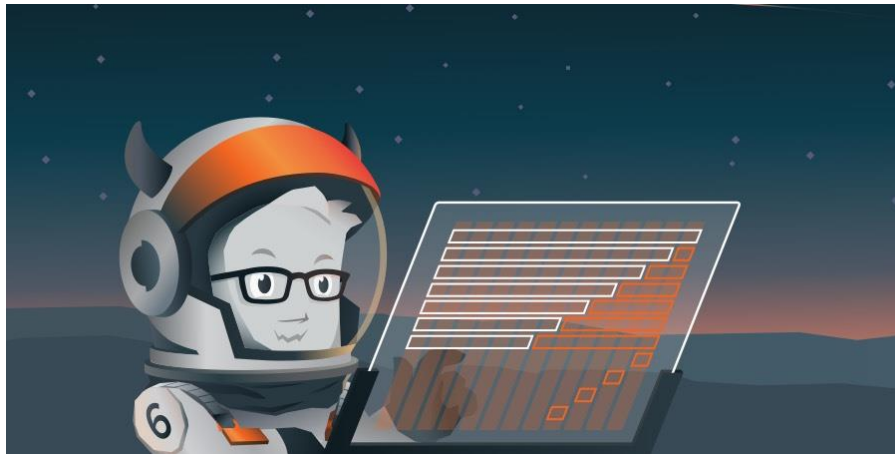
Figure 37: Foundation

Key Features:

- Easy to use
- A front-end framework that is more than just a CSS framework, and packed with helpful tools.
- Includes a CLI (command-line interface) for assembling Foundation sources into CSS for use in HTML markup.
- Although ZURB developed it initially, volunteers now handle its upkeep.
- Modular, extensible, and flexible.
- Offers a wide range of customizable, modular JavaScript plugins and components, including tooltips, alerts, carousels, dropdown menus, placeholders, cookies, and more.

- Adaptable navigation patterns that increase productivity by reducing the number of lines of code.

Advantages	Disadvantages
- Without using other websites similar to Foundation, you can alter your website using the Foundation. Without even requiring much modification, the CSS design outside the box is more akin to a graphic design that looks fantastic right away. - With minimal CSS saturation in the HTML, the fundamental CSS look and feel has been incorporated. - Flexible grids - Widgets - Additional services	- The community support for Twitter Bootstrap is superior to Foundation because of Bootstrap's widespread popularity. - Learning how to use Foundation may take some time for beginners. - Lack of broader support, such as quality control websites and forums to solve problems. - Problem solving and QA sites don't have much support.

❖ **Conclude which Front-end technologies will be used for the development**

I use the following front-end technologies in my assignment:

- **HTML:** I choose HTML because it is widely used, compatible with all browsers, simple to learn and use, and comes pre-installed in every window, saving me money on additional software.
- **CSS:** I go with CSS because it's easy to maintain, saves time, makes pages load faster, has better styling than HTML, and works with a variety of devices.
- **Bootstrap:** I choose Bootstrap because Bootstrap stems from its ease of setup, responsiveness, immense versatility, high user-centricity, excellent support, cross-browser compatibility, widespread usage, and sufficient documentation and updates.

3. **Back-end technology**
   ❖ **Back-end Programming Language**

Backend programming and automation in Windows environments are best done with the C# programming language. A.NET language like C# is just one of many, but programmers accustomed to languages like Java or C++ prefer it because of its C-style syntax. There are a few benefits and drawbacks to consider if you choose to use C# to develop your infrastructure. (Lysis, 2023)

Figure 38: C#

Advantages

- Because C# has so many advantages, most Windows development projects use it as their primary language.
- First, it has good Windows integration. To run a C# program in your Windows environment, no additional configurations are required. C# programs are simple to deploy across a network, regardless of their format—web, Windows services, or desktop applications. Your C# program deployment should go smoothly from development to production as long as the target server or workstation supports.NET.
- Next, hiring more C# developers is simple, whether they are needed on a contract or full-time basis. One of the common languages that programmers learn is C#, in case your business expands and you require more developers. Additionally, its syntax is very similar to that of Java, so you can typically find a developer who is proficient in both Java (for backend services programming) and C# (for mobile programming).
- Microsoft has made it simple for a team of developers to collaborate on a single project. Visual Studio comes with built-in code merge and change control tools. Microsoft provides Enterprise options for large development teams and Team Foundation Server versions of its software.
- Lastly, since C# is a compiled language, binary code is kept on a server that is accessible to the public. The source code is not always accessible to hackers who compromise your server. The hacker can obtain database passwords by accessing source code through other widely used languages like PHP. When using C#, the hacker can't see the important parts of your software until he has "cracked," or decompiled, it.

Disadvantages

- Although C# is an excellent language for enterprise applications, it is not without its drawbacks.
- One "pro" that was mentioned in the previous section was compiling the code. While it is a benefit, there are drawbacks to code compilation as well. Working with it is much more challenging because every time you make a small change, your code needs to be compiled. Should a single character be altered within your code, the entire application needs to be recompiled and re-deployed. This frequently results in new bugs if a small change isn't properly tested.
- The application must be running on a Windows server because C# is a component of the.NET framework. Put differently, for any.NET application to run, it requires a Windows platform. Because Linux servers are significantly less expensive, a lot of startup businesses use them. To run a.NET application, Windows hosting is required.
- After a few operating system updates, Microsoft stops supporting older.NET frameworks. For example,.NET 2.0 applications are the only ones that can run on older Windows 2000 servers. Although it might seem foolish to have an outdated operating system installed, a lot of enterprise organizations continue to use older operating systems due to the various issues that an upgrade can cause with the platform. Development takes longer and costs more when significant changes to server architecture need to be tested and approved before being implemented.
- The simplest to integrate with is.NET if your company uses Windows workstations and servers. Web applications or Windows Services can be automated with C#. It's advantageous for scalability as a business grows and works well in Windows environments. C# has many advantages over disadvantages that can be overcome with the appropriate network configuration.

❖ **Operating System**
• **Windows**

Ideal for Gaming, Personal Use, Browsing, and Apps.

For laptops and personal computers, Microsoft's Windows operating system is among the best choices. Many computer systems have Windows OS preinstalled. The system utilities, productivity, unity, functionality, support, and system utilities make it the best operating system for laptops and desktop computers.

You can easily alter this operating system to suit your needs. Numerous well-known operating system features in Windows OS help to enhance security, effectiveness, and privacy. All things considered, even non-techies can easily operate Windows. It is inexpensive, quick, safe, and accessible.

Figure 39: Windows

Features:

- You can navigate your computer and different applications with the assistance of the Cortana digital assistant.
- The Edge browser, which is rapidly gaining traction, is included with Windows.
- You can efficiently switch between multiple workspaces with Task View.
- Windows offers an easy-to-use interface that you can pick up quickly.
- Two user interfaces are available: one for touchscreen devices (Tablet Mode) and another for keyboard and mouse.
- You can quickly access the programs on your computer by using the Windows start menu.
- By compressing system files, it lessens the amount of storage space you need.
- Your device is secure thanks to Windows Hello's multi-factor authentication technology.

Advantages	Disadvantages
- Antivirus software is included to keep you safe from malware. - With Focus Assist, you can disable notifications while working.	- The software Windows is closed-source. - The license agreements for this operating system are pricey.

| - Windows will provide updates and product support for newly released hardware.
 - Windows is renowned for its high performance and quick startup.
 - Applications for Windows and Android are supported by Windows OS. | |

- **Linux**

Ideal for browsing, gaming, downloading, and running apps.

Based on Linus Torvalds's Linux kernel, Linux is a well-known open source operating system. Linux is the go-to operating system for embedded devices, server systems, and cloud computing due to its flexibility and extensibility. It is also the operating system of choice for personal computers.

While maintaining stability and security, the user and developer communities collaborate to provide versions and variants with distinctive user interfaces. Linux is a symbol of international cooperation in the IT community and maintains a significant position in the industry thanks to its robust package management system, strong network support, and wide range of compatibility. community behind open source software.
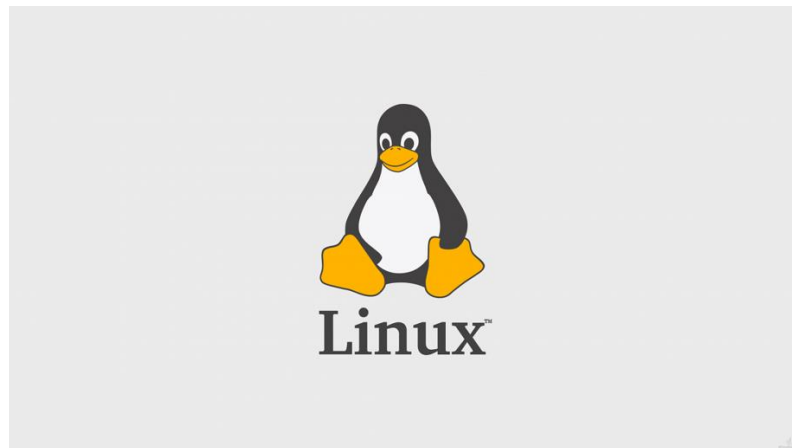
Figure 40: Linux

Features:

- Free and Open-Source
- Extremely Flexible
- Lightweight Infrastructure

- Graphical User Interface (GUI)
- End-to-end encryption
- Portable Environment
- Shell/ Command-line Interface
- Customized keyboard.
- Frequent New Updates
- Hierarchical File System
- Multi-user and Multi-programming

Advantages	Disadvantages
- Open-source nature: Linux is freely available for anyone to modify and distribute, thanks to its open-source software. This promotes creativity, a cooperative development community, and customization to meet specific needs. - Stability and Reliability: Servers and other critical systems are often run on Linux due to its well-known stability and dependability. It tends to have fewer crashes, freezes, and performance problems than other operating systems because of its Unix-like design principles. - Security: Due in large part to its open-source nature, Linux has a solid security record. Due to its community-driven nature, vulnerabilities are promptly found and fixed by a vibrant developer community. Furthermore, possible security breaches are limited by its strong permissions system and user-based access control. - Hardware Compatibility: Linux is adaptable and appropriate for a variety of devices and architectures because it supports a large range of hardware. Furthermore, a large number of device drivers are frequently included in Linux distributions, which removes the need for manual driver installations.	- Learning Curve: Because of its distinct software ecosystem and command-line interface, Linux might have a more difficult learning curve than other operating systems. To fully grasp and control the Linux environment, novice users might need to put in some time and effort. - Software and Game Compatibility: Although Linux offers a large catalogue of applications, it might not have as much choice as other operating systems, especially in terms of proprietary or business-specific applications. Furthermore, Linux users may not have access to some well-known games, which restricts their options. - Technical Support: Compared to other operating systems, Linux systems may not receive as much professional technical support, despite having a thriving community and a wealth of online resources. It might be necessary for businesses to use internal knowledge or to invest in specialized support. - Fragmentation: There are several Linux distributions, or "distros," with different features, development priorities, and user bases. For users, especially those switching from other operating systems, this fragmentation may cause confusion and compatibility problems.

- Flexibility and Customization: Linux provides a great deal of flexibility and customization, enabling users to personalize their operating system to suit their needs. Users can customize their computing environment by choosing from a variety of desktop environments and software options.	- Lack of Standardization: Compared to other operating systems, Linux is less standardized because of its open-source architecture and varied ecosystem. This may lead to differences in system configurations, software installation techniques, and user experiences, which may cause compatibility issues.

❖ **Web Server**
- **Apache**

Worldwide, Apache or the Apache HTTP Server is used by the majority of web servers.

Using extensions and modules, Apache Web Server is incredibly quick, safe, and adaptable to a variety of settings. On Linux and Windows web servers, Apache functions flawlessly. The Apache Software Foundation is the organization behind its development and upkeep. A software that runs on a server is what the Apache HTTP Server is, not a physical server.

Because Apache is an open-source program, anyone can view and work with the source code without cost.

Due to its open-source nature, Apache has gained a lot of popularity among developers who have created and customized modules to add particular features and enhance its core capabilities.

Apache began contributing to the internet's development in 1995. Although web servers are an essential component of websites, front-end users rarely deal directly with web server-related issues.

Figure 41: Apache

Advantages	Disadvantages
- Anyone can obtain Apache for free as it is an open-source project. - Code that is customizable can be changed to meet needs - Possibility of including extra modules and features to enhance functionality - Extremely dependable and outstanding performance - It is simple to install Apache. - Quick documentation of modifications - Able to operate on all operating system - Actively updated and cared for by a community - Extremely adaptable web server - Excellent documentation that is both comprehensive and useful	- The ability to change the configuration opened the door to many threats because tampering with the code allowed insecure gates to open. - Once more, the customization results in additional errors and bugs. Debugging requires a lot of time and resources. - It is essential to implement a strict updating policy on a regular basis. - Identifying and turning off undesirable modules and services - Performance problems on websites with a lot of traffic.

- **IIS**

Windows Communication Foundation (WCF), PHP, ASP.NET, FTP services, and IIS are all integrated into the unified web platform known as IIS Web Server. Its automatic application isolation, default sandbox configuration, and smaller server footprint allow you to host your websites and services with the highest level of security.

To improve your website's speed, it also comes with improved compression and dynamic caching. The modular platform also allows developers to add new modules to expand its capabilities.

Figure 42: Microsoft IIS

Advantages of IIS

- Integration with Windows: Because of its close integration with Windows, IIS is an easy option for businesses that use Windows Server environments.
- Graphical User Interface (GUI): IIS offers a graphical configuration and management interface that is easy to use, enabling users with different levels of technical proficiency to utilize it.
- Microsoft's.NET framework is well-supported by IIS, which makes it a good choice for hosting and operating ASP.NET applications.
- Windows Authentication: Integrating IIS with pre-existing Windows user accounts is simple because it supports a number of authentication techniques, including Windows authentication.
- Scalability: IIS is suitable for hosting websites and applications with high traffic because it is scalable and can manage many concurrent connections.
- Performance Monitoring and Logging: Administrators can track and evaluate server performance thanks to IIS's powerful performance monitoring and logging features.
- Security features: To improve the security of hosted applications, IIS has built-in security features like IP address restriction, request filtering, and SSL/TLS support.
- Modern Features and.NET Core: Newer iterations of IIS support.NET Core applications and come equipped with contemporary features that follow industry standards and best practices.

Disadvantages of IIS

- Platform Dependency: IIS can only be used on Windows servers because it was created expressly for Windows environments. This may pose a drawback for institutions that favor or depend on alternative operating systems.
- License Cost: Because IIS is not open source, using it may incur license fees, which may be a concern for businesses on a tight budget.
- Less Community and Third-Party Support: IIS might have a smaller community and fewer third-party modules or extensions available than open-source alternatives like Apache.
- Limited Cross-Platform Compatibility: IIS's deployment options in heterogeneous environments are limited by its difficult portability to non-Windows platforms.
- Resource Consumption: Compared to lightweight web servers, IIS may occasionally be thought to use more system resources, which could have an effect on server performance.
- Learning Curve: Using IIS and its particular configuration may require some getting used to for administrators and developers who are accustomed to working in non-Windows environments.

- Updates with Windows Updates: IIS updates are frequently linked to Windows updates, which implies that IIS updates could necessitate a system reboot and possibly result in downtime.
- Historical Security Concerns: As a result of IIS's previous security mishaps, enterprises must continue to exercise caution and implement security best practices to reduce risks.

❖ **Database**
- **MySQL**

With its basic Structured Query Language (SQL) commands, MySQL is a Database Management System (DBMS) that is frequently used to create websites and applications. Free Software (free software) and Shareware (proprietary software with restricted use) are the two license types available for MySQL, an open-source database management system.

Since its 1995 release, MySQL has been known for its excellent dependability and reputation. Additionally, it is very simple to use because the data is organized in rows and columns that illustrate the relationships between different table fields, and the MySQL-owned database schema is predetermined based on specific conditions and guidelines. This program allows users to define, work with, manage, and query data using Standard Query Language (SQL).

Figure 43: MySQL

Advantages	Disadvantages
- Open Source: MySQL is freely available and its source code is accessible to users as it is an open-source program. Collaboration, openness, and community-driven development are encouraged as a result. - Scalability: MySQL is capable of handling both large-scale enterprise databases and small-scale applications due to its scalability. Through the use of technologies like replication and MySQL Cluster, it supports horizontal scaling. - Cross-Platform Compatibility: MySQL works on Windows, Linux, macOS, and Unix, among other operating systems. The flexibility of deployment across various environments is made possible by this cross-platform support. - High Performance: MySQL is built with speed and efficiency in mind, providing fast and effective data storage and retrieval. To improve performance, it has a range of indexing choices, caching strategies, and optimization techniques. - Easy to Use: MySQL is renowned for being simple to install and configure. It offers graphical user interfaces (GUIs) similar to MySQL Workbench as well as an easy-to-use command-line interface.	- Performance Restrictions: MySQL might not perform as well as some other database systems in some situations, particularly when dealing with very large databases or complicated queries. Extremely high read and write loads may cause it to struggle. - Absence of Features in Older Versions: Upgraded MySQL versions may come with additional advanced features and optimizations not found in older versions. It is advisable to update to the most recent version; however, this may not be possible on all systems. - Restricted Support for Document-Oriented Data: MySQL is a relational database at its core, so it might not be as capable of managing hierarchical or document-oriented data as certain NoSQL databases. - Limited Support for Large-Scale Data Warehousing: When it comes to large-scale data warehousing and analytics applications, MySQL may not be the best option when compared to specialized databases made just for these uses. - Limitations of Storage Engines: Although MySQL supports a variety of storage engines, not all of them are created equal. For instance, the MyISAM storage engine is less appropriate in some situations because it does not support transactions or foreign keys.

- **Microsoft SQL Server**

For one of the best database software platforms available, Microsoft provides outstanding on-premises and cloud tool support. Both Windows and Linux are compatible with it well. JSON, SQL, and geographical data are all supported by the multi-model database MS SQL.

Though it has experienced substantial modifications and updates over time, it is not as sophisticated or inventive as other well-known databases available on the market today.

Figure 44: SQL Server

Advantages	Disadvantages
- Boosts data security: When combined with a Microsoft SQL Server database management service, one of Microsoft SQL Server's main objectives is to protect your database. Using a table structure to link functions and data pieces is made possible by this program, which helps to keep your data secure. Information about customers and other sensitive data must be stored in databases with integrity and security. - Easy configuration: Installing and configuring Microsoft SQL Server is a simple process, in contrast to other database management tools. Updates for the program are fully automated, and no special tools are needed during installation. Without having to go through any difficult steps, you can also install additional components to customize the program for your company. Thus, Microsoft SQL Server is the best option if you're looking for an intuitive database management system. - Optimized data storage: You don't require an additional data storage from the same Microsoft SQL Server database	- Cost: Microsoft SQL Server is available for free use. However, later versions of the program will cost you a lot more if you want more sophisticated databased applications and features. - Limited compatibility: You might have to spend a lot of money on Microsoft software if your business uses little to no Microsoft infrastructure. You will be able to use Microsoft SQL Server on your platform with these extra commitments, even though they may increase costs for your company. - Hardware limitations: Advanced technology is needed for the latest iterations of Microsoft SQL Server to function. Purchasing new hardware might be necessary if your current setup isn't compatible with Microsoft SQL Server. Moreover, you'll need to increase the amount of hard drive space if your business needs a bigger database.

if you're using a different device. This reduces the need for maintenance and troubleshooting and allows you to handle data efficiently and rapidly. This could allow you to save time and concentrate on other aspects of your company. - Assistance with data recovery: Data can be damaged during a power outage or server shutdown, which presents a big problem for businesses that keep few or no backups. With its data recovery and restoration features, Microsoft SQL Server lowers the risk of data loss. You will therefore feel more at ease knowing that, no matter what happens to your server, your data is safeguarded by log files, cache, and regular backups.	

❖ **Hosting**
- **Firebase**

Firebase, Google's platform for web and mobile development, helps entrepreneurs build, improve, and expand their app portfolios. The platform provides several features that make the process of developing new products much simpler. It is suitable for building MVP since it takes less time and effort from developers to actually produce it.

Real-time database, storage, archiving, and machine learning toolkit are among the services that are available and ready to use. Infrastructure also provides analytics, incident reporting, and cloud messaging as free services. Services are hosted in the cloud.

Figure 45: Firebase

Advantages	Disadvantages
- Database Options: Databases like Firestore and Realtime can be used to create a product. Both of these cloud-hosted NoSQL databases are adaptable and scalable. - Free for novices: The majority of the platform's services are provided without charge, and the need to select a subscription plan only arises when a particular quantity of database memory is utilized. This will be useful for beginners who want to see if the platform is a good fit for their product but don't want to pay for all of the services at once. - Community: Firebase provides extensive technical documentation to enhance user accessibility and make the provided services easier to use. You may find all the information you need with regard to integrations, accessibility, and supported technologies. Furthermore, roughly 1.5 million apps use Firebase globally.	- Data storage is inconvenient: It's not always a good idea to use a real-time database as your primary storage. The limited ability to query is the main problem. You cannot query multiple keys at once or use the service to filter your data. For this reason, the entire database is a JSON file, as opposed to the storage format that SQL uses. Additionally, this format does not offer the option for data modeling. - Limited data migration: Using a BaaS platform as your app backend means that all of your data is hosted on Firebase, which is a big issue because you don't store the data yourself. Up until it provides tools that make moving user data easy, Firebase will severely restrict data migration.

- **AWS**

AWS is one of the most popular virtual web hosting providers in most businesses these days. Storage service, which was launched by Amazon in 2002, provides a cloud-based storage solution. Owing to its ability to surmount various obstacles that conventional web hosting services face, Amazon is a preferred choice for leading companies across the globe. Creating, developing, and managing a website can be done more affordably, securely, and with ease with AWS.

Figure 46: AWS

Advantages	Disadvantages
- Scalability: In light of traditional web hosting services' incapacity to keep up with the surge in website traffic, scaling and modifying website performance can be difficult. But AWS can quickly expand its bandwidth in the event that it detects a spike in website traffic because it is highly scalable. You may scale back or up the bandwidth, depending on the amount of traffic. - Being economical: Businesses opt to utilize hosting services that reduce overall costs, which has made AWS a highly sought-after choice in the current market due to its affordable price and range of useful features. Unlike other providers, AWS only charges for the services you really use. There is no initial contract tying you to the service. - Speed: Considering that traditional hosting companies do not throttle website traffic in the same manner as AWS, it is clear that AWS will provide services that won't impair the operation of your website. Nobody has the time to wait around for a slow website in today's high-tech world. Therefore, if you want to improve the functionality of your website, you should go with AWS.	- Potential issues could be: There are certain common cloud computing problems that Amazon Web Services might run into when you migrate to the cloud. As an illustration, consider downtime, restricted control, and backup defense. - Resource limit: AWS imposes default resource limits that differ depending on the region. Among these resources are pictures, audio files, and snapshots. There is a maximum number of instances that can be launched per region. - Efficiency: Hardware-level changes made to your application might not give it the best possible use and performance.

- **Google Cloud**

A cloud computing platform called Google Cloud Platform (GCP) helps companies and organizations to create, launch, and manage their own websites, apps, and services that function similarly to those of Google.

Google VPS is a virtual server service that is hosted on the Google Cloud Platform. This service is offered by VPS Google, commonly referred to as Virtual Machine (VM). In order to satisfy the needs of a physical server with features similar to a private server, a virtual server known as a virtual private server was developed.

Both businesses and individuals use Google VPS because of its excellent management tools, security features, and first-rate storage. It can be used as a platform developer, game server, and host for multiple services on websites.

Figure 47: Google Cloud

Advantages	Disadvantages
- Strict storage and data statistics. - Simplifies interaction. - Made for business solutions that are cloud-based. - Quick development.	- The migration from Google Cloud may be difficult if the model uses proprietary platforms as a service. - Comparatively fewer international data centers than their rivals. - Geographical restrictions might not always be able to provide the best results.

❖ **Frameworks**
• **Django**

One of the most popular open-source backend frameworks for Python is called Django. The model view controller (MVC) pattern is adhered to.

Among the simplest backend frameworks is Django, which can be used to create complex and feature-rich database-driven websites. Django is regarded as one of the top frameworks for backend web development.

Better pluggability, less coding, more reusability, and quicker development are made possible by this back end framework. It supports the creation, reading, updating, and deleting of operations using an

optional admin interface, and it runs all Django operations in Python. Numerous well-known websites, including Disqus, Mozilla, and The Washington Times, use Django. (back4app, 2023)

Figure 48: Django

Advantages	Disadvantages
- Fast framework - The Django framework was designed to help developers expedite the entire development process from beginning to end. It is user-friendly and has a low learning curve. For websites, it is regarded as a basic backend. - Rich in features - Django offers a plethora of tools to assist users in handling certain typical web development tasks. Among many other things, it assists with tasks like content management, sitemaps, user authentication, and much more. - Optimal security - Django is a safe framework that aids users in avoiding malicious activities such as clickjacking, SQL injection, cross-site scripting, and request forgery. Users can safely store and manage passwords and accounts thanks to the user authentication system it offers. - High scalability - Users of Django can expect a high degree of scalability. Because it can easily meet their high operational demands, a large number of the most popular websites in the world rely on it.	- Not Suitable for Small Projects: Django is a backend framework that some developers feel is too complex for smaller projects due to its high coding requirements. More processing time and bandwidth are also required. - Another drawback of using the Django framework is its lack of conventions. For developers, a lack of conventions leads to a number of issues, such as low comfort levels, contrasting components, and a slow rate of development. - Monolithic Framework: The Django framework's monolithic design gives development teams less control over the workflow. Similarly, developers must script more codes due to fewer dependencies.

- Versatile framework - The Django framework is suitable for creating a broad range of application kinds. Social networking apps, content management systems, and computer platforms are a few of these. High scalability - Users of Django can expect a high degree of scalability. Because it can easily meet their high operational demands, a large number of the most popular websites in the world rely on it. - Versatile framework - The Django framework is suitable for creating a broad range of application kinds. Social networking apps, content management systems, and computer platforms are a few of these.	

- **.NET**

ASP.NET Core, a new version of the ASP.NET Framework released by Microsoft, can be downloaded as open source code from GitHub. Developers use ASP.NET Core to create programs, websites, and web services. It is compatible with many browsers, including Windows, Mac, and Linux, and runs on the MVC platform.

ASP.NET Core optimizes the development foundation for apps that are deployed in the cloud or run locally. ASP.NET Core uses modular components to reduce development costs and resource consumption. ASP.NET Core is also open source, following a trend that other contemporary programming languages try to follow.

Figure 49: ASP.NET Core

Advantages	Disadvantages
- Object Oriented: One of the best things about.NET is that it is based on object-oriented programming (OOP). To allow programmers to work on each piece separately, the software is divided into small parts here. Upon finishing one element, they can proceed to the subsequent one. When everything is finished, the smaller components can be combined and handled more deftly. - Visual Studio IDE: The integrated development environment facilitates the process of writing and testing applications by offering the necessary software. Programs for various platforms, including Android and iOS, are created, tested, and published using the Microsoft Integrated Development Environment (Visual Studio). - Cross-platform design: This design crosses platforms. Programs can run on Windows, Linux, and OS X thanks to.NET Core's cross-platform compatibility. Your code will run on any compatible operating system. Businesses can now access a variety of.NET ecosystem platforms thanks to this. - Numerous application types are supported by.NET: you can use it to create applications for games, mobile devices, the Internet of Things, and artificial intelligence. Enterprises have realized the immense potential of AI, big data, and machine learning. Big Data and AI have the potential to improve almost every aspect of daily life, making things easier.	- Limited Audience-Relationship Support: Object-Oriented programming is used in.NET, as was previously mentioned. The Entity Framework facilitates the development of.NET object-oriented applications. Entity acts as a bridge between object-oriented SQL and the.NET database. Some developers claim that Entity Framework lacks the necessary flexibility and does not support all database designs. - Memory leak:.NET is one of the most frequently criticized platforms for memory-related issues and memory leaks. Memory leaks affect all technologies. Even though.NET has a garbage collector for resource management, engineers still need to put in extra effort in this area.

❖ **Conclude which Back-end technologies will be used for the development**

I use the following back-end technologies in my assignment:

For this project, C# and JavaScript were selected for a purpose. Due to their ease of comprehension and easily accessible study materials, they can be utilized extensively in website development

Most people choose to use Microsoft Window, which is a similar operating system. I chose this system because of that.

My usage of Microsoft Windows means that IIS is also supported on this OS. To host the project on IIS is a decision I make.

SQL Server has become very useful in web programming because it is a component of the Windows operating system.

My choice is ASP.NET. This well-known web development tool is useful for creating dynamic websites for mobile and desktop platforms. Microsoft created it to let programmers make dynamic services, apps, and webpages.

4. **Tools for source control management**
   • **GitHub**

Most effective for distributed version control across several teams.

Figure 50: GitHub

Features:

- Facilitates collaborate, code review, and code management for sizable development teams.
- Provides for bug tracking tool integration.
- Integrated support for permissions and access control.

Advantages	Disadvantages
- Supports mobile devices as well as Windows and Mac. - Facilitates deployment via the cloud. - Able to granularly manage several projects and permissions - Great support and documentation.	- Given that Github is a cloud-based platform, security for valuable intellectual property projects or codes may be a concern. - It can be time-consuming and laborious to review large pull requests

- **Git**

Ideal for teams that possess highly valuable intellectual software code or applications, such as those related to banking or defense.

Figure 51: Git

Features:

- Setup Git software on-site.
- Remote repository
- Speed and Performance
- Distributed version management

Advantages	Disadvantages
- Easy to learn. - Enables distributed versioning. - Setup on-premise is quick and safe. - Has no single point of failure because every Git pull creates a entire copy of the repository locally. - The integrity of the code is guaranteed because all files and commits are checksummed.	- Developers will have to rely on community support because it's free. - Managing on-premise setup can be difficult to manage, particularly when using CI tools or other integrations.

- **GitLab**

Ideal for use with Git-based tools such as version control, project management, CI/CD, etc. as an end-to-end project life cycle.

Figure 52: GitLab

Features:

- Git workflows, project management, and CI/CD integration are supported.
- It boasts 100,000 organizations & more than 30 million users.
- Single application for the entire DevOps life cycle.

Advantages	Disadvantages
- Version control is handled by using standard Git underneath. - Simple to use and learn. - Good support (depending on the pricing tiers).	- High pricing tags make it less viable for larger teams and organizations.

❖ **Tools to be used to manage**

Because it's so widely used, GitHub is the greatest way to manage code sources. Access to manage, edit, push, and download code sources is available to all project participants. herefore, this is a good project manager.

5. **Software Development Models**
   ❖ **SDLC Models**
   • **Waterfall model**

Out of all the SDLC methodologies, the waterfall model is the earliest and the simples. There are phases to the entire software development process, and each phase doesn't start until the one before it is finished. With its own project plan, each stage builds on the data from the one before it. Obtaining and evaluating requirements, system design, implementation, testing, deployment, and launch are the primary stages of the SDLC in this model. Due to its ease of planning and management, this type of model is frequently utilized in software development. Additionally, the procedures and results of each step are precisely laid out in the process's documentation.
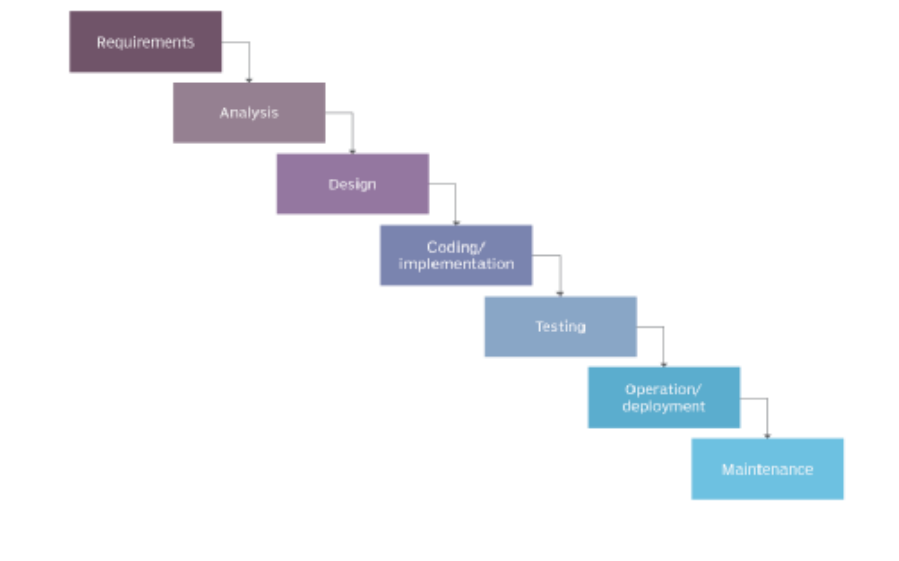
Figure 53: Waterfall model

Every project is individual, and the SDLC model that is selected must fit the different internal and external requirements. The waterfall model will work best in the following situations:

- The project specifications are clear, detailed, and unambiguous.
- Product definition stability
- The tech stack is not dynamic; rather, it is preset.
- There are abundant resources with the requisite knowledge at their disposal.
- The project is not long.

Advantages	Disadvantages
- There are no overlaps in the way that the processes are managed and finished. - Defining the essential points is simple. - It's easy to establish the task priorities. - Budgeting and scheduling for development is simple. - Works well for medium-sized or smaller projects with clear specifications	- Unsuitable model for intricate, protracted, and object-oriented projects - The product is integrated right at the conclusion of the process. - The group is unable to anticipate potential issues. - It is challenging to gauge each stage's progress. - It isn't appropriate for projects with flexible requirements. - Changing the scope mid-life may lead to issues. - High degree of uncertainty and risk.

- **Agile model**

This model of the software development life cycle is thought to be highly practical. The project is divided into short-term cycles, allowing for the prompt delivery of a working product. Every cycle concludes with a test of the product. The most popular substitute for the waterfall SDLC methodology is this one. It improves communication between various members of the development team because it is a cycle model. Additionally, it is heavily reliant on how the customer and development company communicate. The adaptive strategy, which does not necessitate extensive planning, is the foundation of the agile model. The procedure is modified by the developers in response to shifting product specifications.
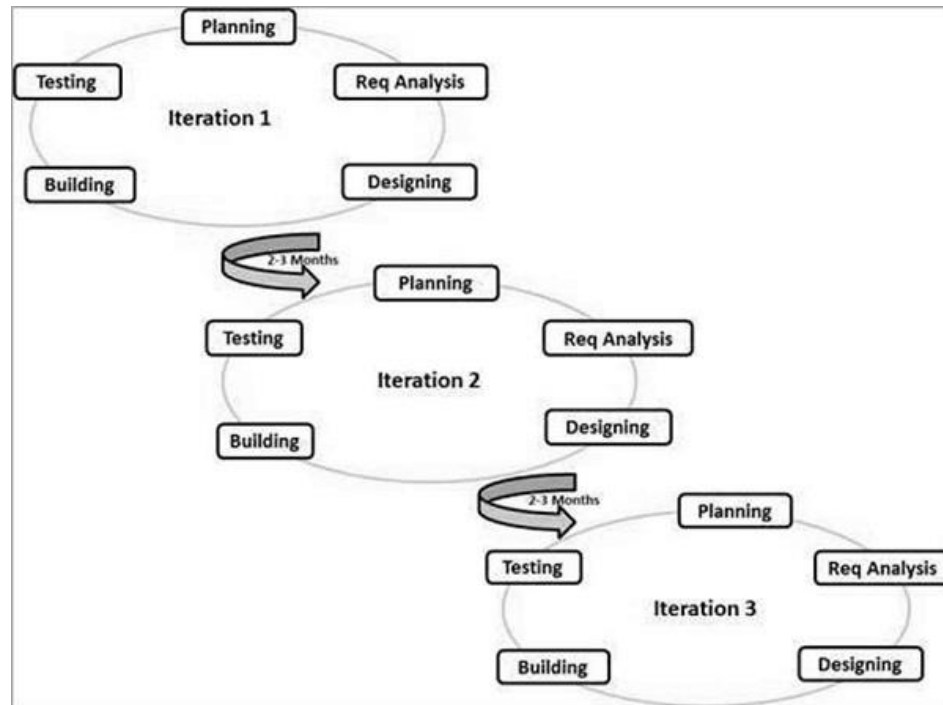
Figure 54: Agile model

Because of its adaptability and adjustability, the Agile model is becoming more and more popular. In these circumstances, it is appropriate to:

- It is necessary to put the changes into effect.
- The project specifications are not carefully considered.
- It is necessary to give risk management more consideration.
- Project calls for greater flexibility in terms of timing and actions.

Advantages	Disadvantages
- There is minimal time and expense involved in going back to the earlier phases. - Increases flexibility for the development team - They are brief and unambiguous iterations. - Risks are reduced because of the project's flexibility. - The initial working version of the product is promptly released. - Little need for resources	- It is difficult to calculate the final product cost. - It's possible that new adjustments won't work with the designed architecture. - A proficient and customer-oriented development team is essential. - There's a chance the finished product won't arrive by the deadline. - Heavily dependent on clients, who have the power to ruin the project.

| - Improves cross-training and teamwork | |

- V-Model

The testing (verification) and development (validation) phases of the V-shaped SDLC model run concurrently, with the testing phases matching specific development phases. This model is an expanded version of the waterfall model. Similar to a waterfall model, this one follows a set schedule, with each step starting only after the last is completed. This model calls for a hierarchical approach to testing, with specific deliverables at each stage. When errors are discovered early on, they are simple to find.
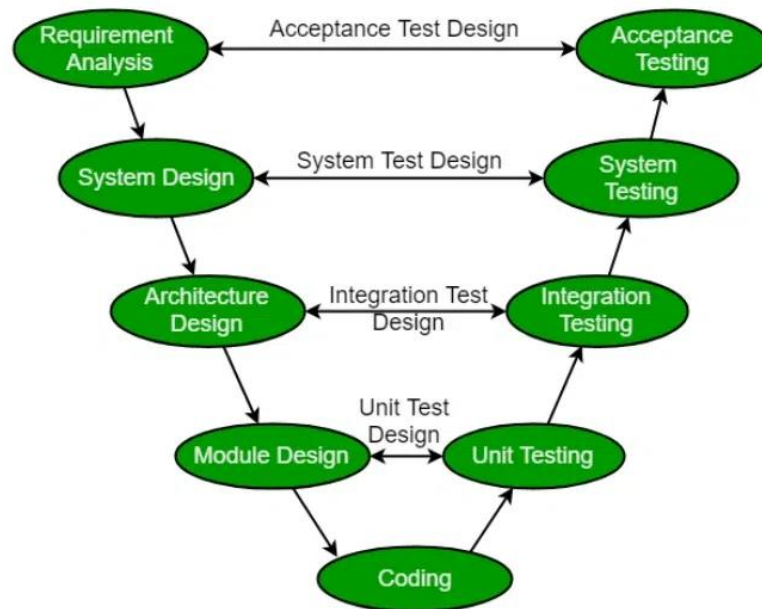
Figure 55: V-Model

When should I apply a V-shaped model?

This model increases the likelihood of producing a high-quality, error-free product by emphasizing the testing activities. The ideal choice is V models when:

- The project is not large, and all requirements are well-defined.
- There are competent software engineers available, particularly testers.
- The project requires thorough testing
- There are copious technical resources accessible.

Advantages	Disadvantages
- Since each step has clear results, managing it is simple. - Each phase is finished one by one. - Testing is done in the preliminary phases. - lucid and simple to use - It's easy to manage projects and keep track of outcomes.	- Not flexible - Comparatively big risks - It is not supported to iterate phases. - Simple and easy to use - Concurrent event handling is challenging.

❖ **Conclude which SDLC model will be used for the development with explanations**

I decided to use the waterfall model for my project because it has the benefit of allowing requirements to be determined well in advance of programming, allowing for minimal requirement changes as the project progresses. The three primary disadvantages are that the system recommended in the analysis phase takes time to complete and provide, testing is rarely addressed during the implementation phase, and programming cannot begin until the design is finalized. Deliverables are generally not very effective as a means of communication, so important requirements could get lost in piles of paperwork. If a critical need is overlooked by the project team, costly post-implementation programming might become necessary. Because so much time has elapsed between the system's conception and actual use, users may not recall what the system was meant to do. When implemented in today's fast-paced corporate environment, even a system that passed environmental requirements during the study phase may require extensive reworking. To finish this rewrite, you have to begin at the beginning and work your way through each step, making changes as you go.

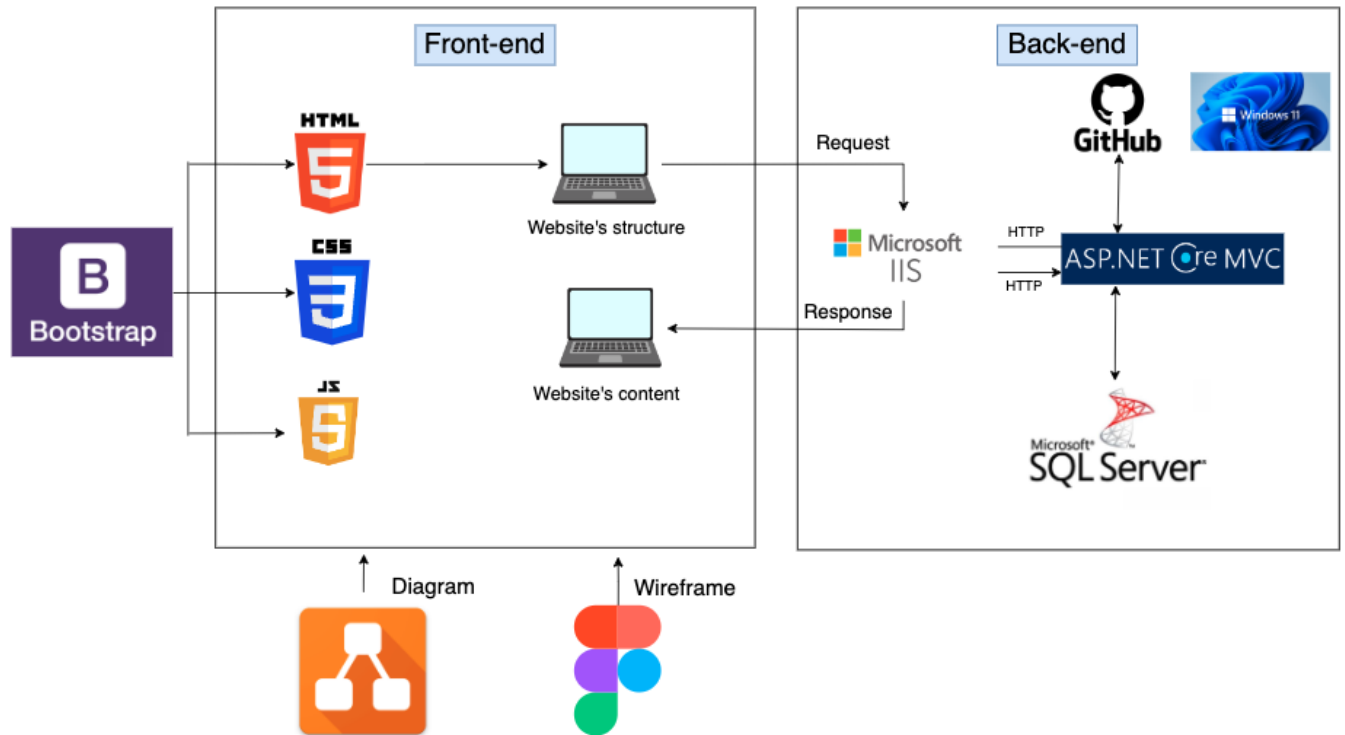**6. Illustrate all your findings on how to use these by drawing the overview**

Figure 56: Overview

References

Anon., 2023. *back4app.* [Online]
Available at: https://blog.back4app.com/front-end-programming- languages/
[Accessed 26 11 2023].

Anon., 2023. *back4app.* [Online]
Available at: https://blog.back4app.com/backend-frameworks/
[Accessed 26 11 2023].

Williams, L., 2023. *guru99.* [Online]
Available at: https://www.guru99.com/best-operating-systems.html
[Accessed 26 11 2023].

Semah, B., 2023. *hackr.io.* [Online]
Available at: https://hackr.io/blog/best-css-frameworks
[Accessed 26 11 2023].

Anon., 2023. *lucidchart.* [Online]
Available at: https://www.lucidchart.com/pages/
[Accessed 26 11 2023].

Stevens, E., 2023. *uxdesigninstitute.* [Online]
Available at: https://www.uxdesigninstitute.com/blog/user-interface-ui-design-tools/
[Accessed 26 11 2023].

Anon., 2023. *webhostingcat.* [Online]
Available at: https://webhostingcat.com/pros-and- cons/bluehost-pros-and-cons/
[Accessed 26 11 2023].

Index of comments