Online Library Management System

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INTRODUCTION

- Systems are created to solve problems. One can think of the systems approach as an organized way of dealing with a problem. In this dynamic world, the subject System Analysis and Design (SAD), mainly deals with the software development activities.

- Our project is a request Books using the Internet while you are in your place. You can open the browser and then go to the site and through it you place your order and then it reaches you, thus achieving the greatest benefit to the customer, which is to obtain his order without going to the library and also for the owner of the library to make the largest profit.

Project Objectives

The main aim of this project is to provide an easy to handle and automated Library Management System and build an application program to reduce the manual work.

This project was defined and implemented using diagrams to facilitate the understanding of the project and its requirements , such as:

- Context Diagram
- Data Flow Diagram
- Use Case Diagram
- Activity Diagram
- Sequence Diagram
- Class Diagram

Requirements Collection

- We use an **Internet Archive** it is an American digital library and a non-profit library of millions of free books and more.

- Search about the implementation of Library Management System.

- Use of Modern System Analysis and Design Book and Lectures & Labs slides

Function Requirements

- **Functional Requirement**

Staff do the following functions :

➢ Log in

➢ Add/Update/Delete books

➢ Update Inventory

➢ Check details of books sold

➢ Update book Info

Student does the following functions :

➢ Log in

➢ Search about books

➢ Buy books

Student does the following functions :

➢ Prepare management reports

- **Non-Functional Requirement**

➢ Performance

 The system would be able to perform desire tasks in reasonable unit of time.

➢ Reliability

The system does its work with more accuracy like user registration to the system , user validation and authorization , book search and issue operation , and updating the database.

➢ Accessibility

➢ Maintainability

Process Modeling

- Context Diagram
- Data Flow Diagram

Context Diagram

A context diagram is a top level (also known as Level 0) data flow diagram. It only contains one process node (process 0) that generalizes the function of the entire system in relationship to external entities. Only one process symbol, and no data stores shown on the context diagram.

There are 3 external entities with the system:

1) **Student** : Register into Online Library or Log in to Library and search in it.

2) **Staff** : Check inventory of books, Add/Update/Delete books, add new book info and Check details of books sold.

3) **Manager** : receive Management reports

Context Diagram
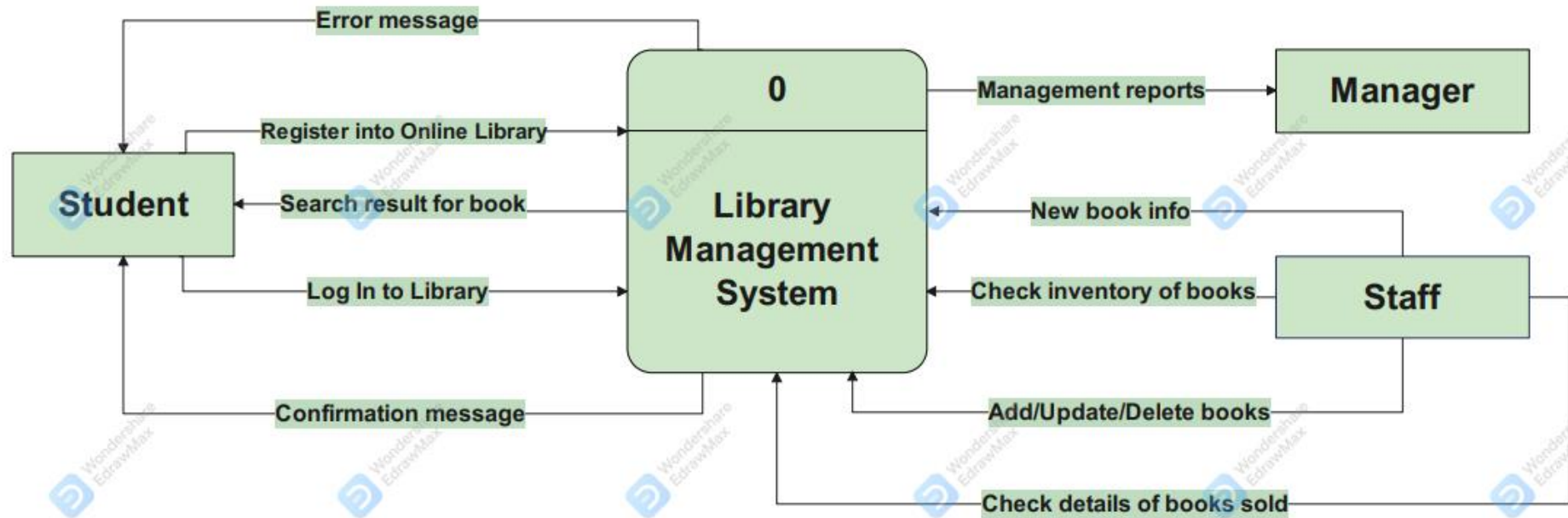
Data Flow Diagram

• Data Flow Diagram (DFD) is used to represent the information gathered as part of requirements determination divided into levels.

1. **level 0**

- Student will sign up in the website and store information in student info data store or log in in the website and checking information from student info data store .

- When he enters the website, he has 2 options, the first option is to scroll and second option is to search. when he chooses any book, the book will be displayed.
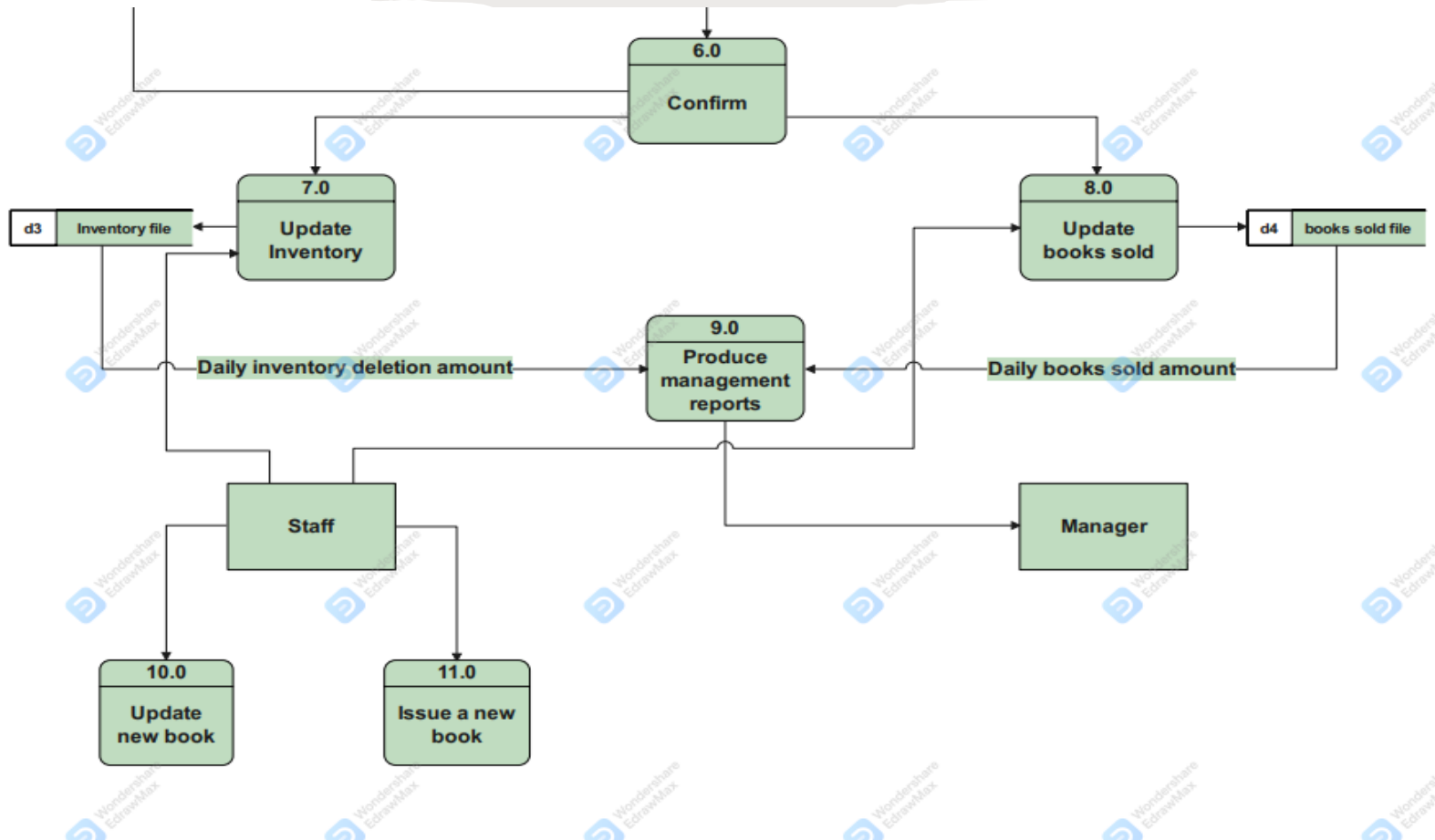
Data Flow Diagram (cont.)

- - Admin will:

- 1- update books sold and store it in books sold file data store

- 2 - update inventory and store it in inventory file.

- 3- update book info

- 4- issue a new book

- - Daily books sold amount and daily inventory deletion amount will store in produce management reports process to search it when we need.

- - The produce management reports will go to the manager.

Data Flow Diagram (cont.)
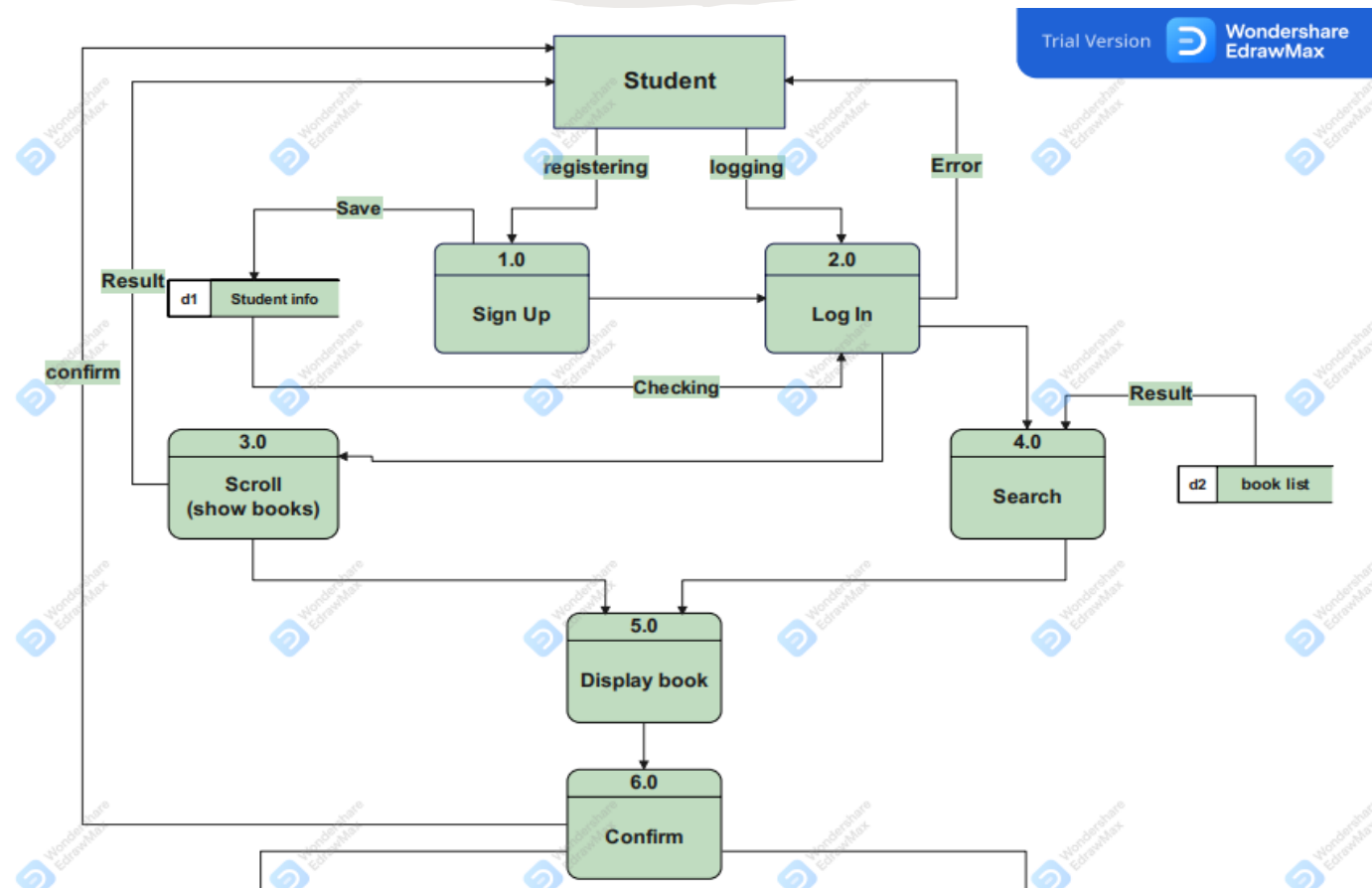
Data Flow Diagram (cont.)

Data Flow Diagram (cont.)

2. **level 1**: is inside process number 9

- The daily inventory deletion amounts and the daily sold book amounts will be processed in the (access book sold process) to give us inventory data and books sold data.

- The inventory data and books sold data will be processed in the (aggregate books sold process) to give us aggregated data.

- The aggregated data will be processed in the (prepare management reports process) to give us management reports.

Data Flow Diagram (cont.)
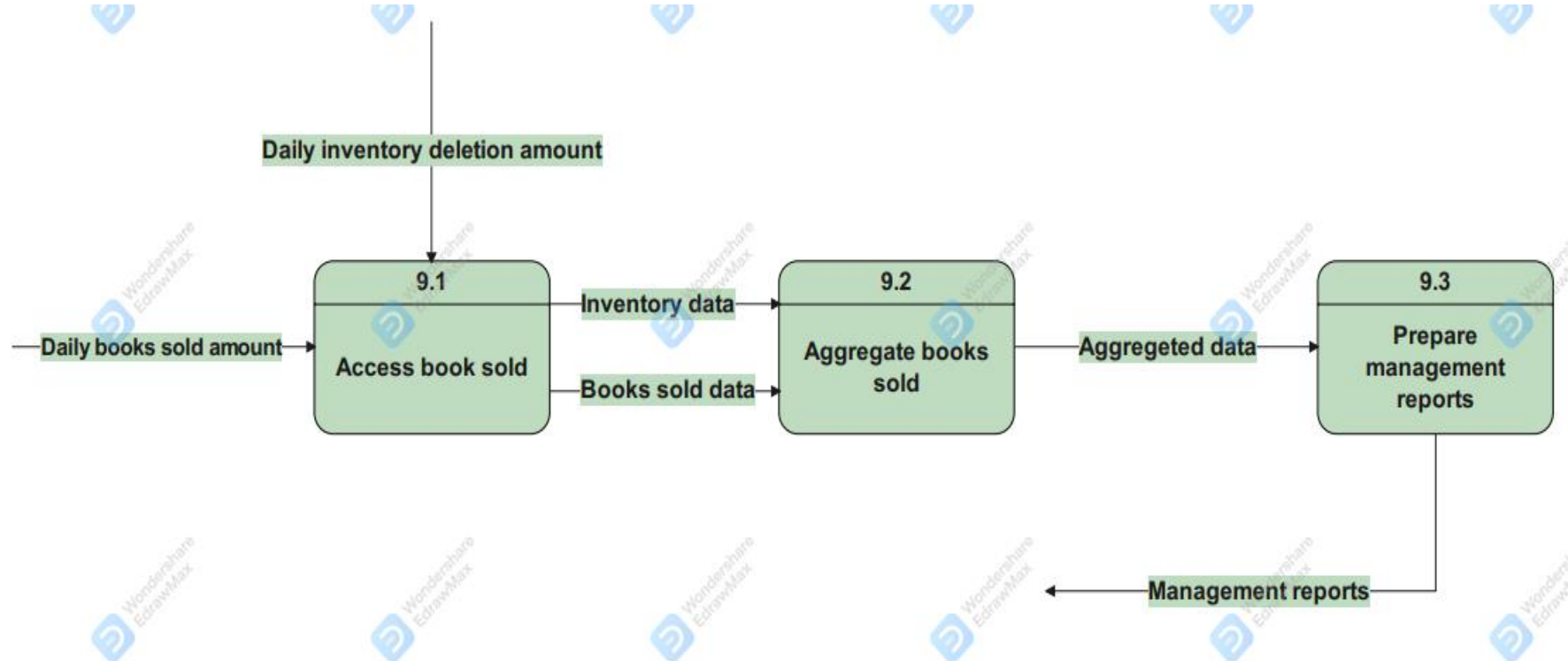
Use Case Model

- Use Case Diagram
- Analysis of Use Case

Use Case Diagram

- Represent system functionality from the user's perspective and describe who will use the system and in what ways the user expects to interact with the system and represent the interactions between use cases and actors.

- There are two main components of use Case diagrams are :
  1. Actor
  2. Use Case

Use Case Diagram
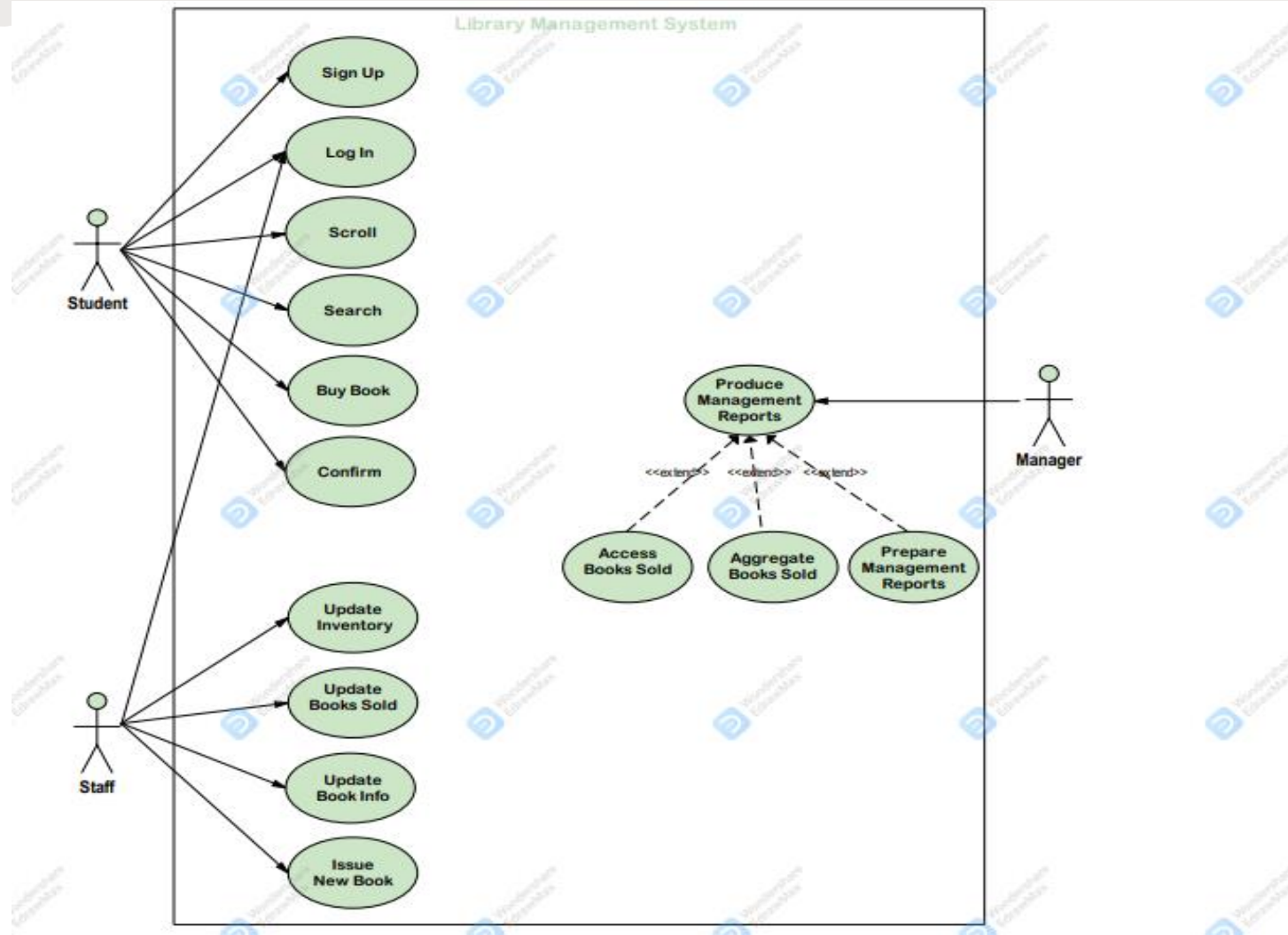
Analysis of Use Case

- It is necessary to have more specific details to build the system.

- These details are known as the analysis of use case.

- The analysis of use case will describe the flow of events.

- The analysis is needed as a document to describe in detail what the user of the system will do and what the system itself will do.

Analysis of Use Case (Sign Up)

Use case Analysis

Use case Name:	Sing Up	
Actor(s):	Student	
Description:	This use case describes the process of a student registering to Library website.	
Typical Course of Events:	**Actor Action**	**System Response**
	Step 1: This use case is initiated when a student registers and creates a user account into Library website to be processed. **Step 4:** The student will receive an email that has a token after entering his email address or number. **Step 5:** The student can use one of the following two methods to notify the system of the token. 1. Copy and paste the token into field on the Token Entry page and click on the Submit button. 2. Click on the link in the email.	**Step 2:** The system asks student to provide his email address or number. **Step 3:** The system will sent an email to student that has a token . **Step 6:** The system will then ask student to create a Password. **Step 7:** The system will ask student to provide a security word.

	Step 8: The Student will create a Password and provide a security word to continue registering. **Step 10:** This use case concludes when the student has registered to the library and has an valid account.	**Step 9:** Lastly, System will sent a welcome email confirming student's Username , which cannot be changed.
Alternate Courses:	**Step 4:** If the student has not receive notification of an email that has a token , Click on "Resend again" that appear in the end of the Token Entry page . **Step 8:** If the Password that created by student is weak or not valid , send a notification to the student requesting the student to submit a strong or valid Password and a message with the characters that should the student use it to Password.	
Precondition:	Registering can only be done by opening Library website.	
Post condition:	The system displays confirming student's Username , which cannot be changed and Lastly the student already has an valid account.	
Assumption:	None at this time.	

Analysis of Use Case (Log In)

Use case Name:	Log In	
Actor(s):	**Student**	
Description:	This use case allows student to login in into the system to read any book he wants. To login to the system , all students have to enter their username and password. Then the system will display the student's home page.	
Typical Course of Events:	**Actor Action**	**System Response**
	Step 1: This use case is initiated when a student enters his username and Password in the allowed fields and clicks on the Log In button or press the Enter key on keyboard.	**Step2:** The system will take student to the homepage where he can choose or search about books he wants.
Alternate Courses:	**Step 1:** If the student enters the wrong username or forgets password , Click on "Forgotten your Login ?". Then he will be taken to the page that asks about his Security word for help him to login. **Step 2:** If the home page does not load, send a notification that there is an error and show this message "You cannot reach the current page because you are not connected to the Internet".	
Precondition:	User has to have a valid account	
Post condition:	The system displays the relevant homepage	
Assumption:	None at this time.	

Analysis of Use Case (Scroll)

Use case Name:	Scroll (Show books)	
Actor(s):	Student	
Description:	This use case allows student to scroll down and up in homepage for searching about books he wants.	
Typical Course of Events:	**Actor Action**	**System Response**
	Step 1: This use case is initiated after the student log in into the library, then some of available and suggested books be displayed. **Step 3:** The student can scroll with using the mouse. With a mouse, he can move the scroll bar by clicking the scroll arrow at either end of the scroll bars .He may also click on an empty portion of the scroll bar, or click-and-drag the scroll box.	**Step 2:** The system provides more than method to make the student able to scroll down and up in a homepage for searching or having an idea about suggested books such as mouse , touchpad or keyboard.
Alternate Courses:	**Step 3:** If the student do not has a mouse or his mouse is damaged , Scroll with keyboard or touchpad. With a keyboard, he can use the up or down arrow keys to scroll a few lines at a time. The Page Up and Page Down keys or the spacebar scroll down one page at a time. With a touchpad , It allows the student to move a cursor with their finger. It can be used in place of an external mouse.	

Precondition:	User has to login into Library system.
Post condition:	Some of available and suggested books be displayed at the Library.
Assumption:	None at this time.

Analysis of Use Case (Search)

Use case Name:	Search	
Actor(s):	Student	
Description:	This use case enables student to use search engines to refine search results and access to required books. Search are commands that help student filter and refine search engine results.	
Typical Course of Events:	**Actor Action**	**System Response**
	Step 1: This use case is initiated after the student log in into the library, then student uses the search box above at the Library homepage. He types the title or topic he is looking for into the search box.	**Step 2:** The system will display all of the available results to the student.
	Step 3: The student will look at the results and get the section and call number of the book, if it's there and choose the relevant one to get the book he needs.	**Step 4:** The system will display the relevant book after the student choses it.
Alternate Courses:	**Step 3:** If the student is not sure that this is the book , Make sure the author(s) match the book he is looking for, since different books might have the same title. **Step 4:** If the student cannot find the book in all search results , Send a notification with this message " The book isn't currently available ".	

Precondition:	User has to login into Library system and want to search about particular book.

Post condition:	The student obtains the book he is looking for and make a purchase decision.
Assumption:	None at this time.

Analysis of Use Case (Buy Book)

Use case Name:	**Buy book**	
Actor(s):	**Student**	
Description:	This use case is the end of the series of steps that a user will take to make a purchasing decision. The user decides to purchase after seeking to ensure that the choice he made was correct.	
Typical Course of Events:	**Actor Action**	**System Response**
	Step 1: The student after selecting the book that wants to buy he will click on "Buy" button.	**Step 2:** The system will appear the invoice showing the name and price of the book purchased.
	Step 3: The student clicks to finish the purchase after obtaining the invoice and then he clicks on "Checkout".	**Step 4:** The system takes student to a secure page for him to enter his address and specify the method of payment and mail.
	Step 5: The student will enter his address and specify the method of payment and mail.	
Alternate Courses:	**Step 5:** If the student wants to modify the address, e-mail, or any of the required items, he shall provide the addresses of the books to be added via e-mail with an indication of the order number or make a new order with only the books to be added.	

Precondition:	User ensures that the choice he made is correct to start purchasing.
Post condition:	User confirm the purchase by pressing the "Confirm" button.

Assumption:	None at this time.

Analysis of Use Case (Confirm)

Use case Name:	**Confirm**	
Actor(s):	**Student**	
Description:	This use case is done after the user has ended entering shipping information, selecting the payment method, and type of postage, to confirm and dispatch the order.	
Typical Course of Events:	**Actor Action**	**System Response**
	Step 1: The student clicks on "Click here to submit the order" , after completing entering shipping information, selecting the payment method, and type of postage. **Step 3:** The student will receive a confirmation message , and this is the end of the purchase process.	**Step 2:** The system sends a confirmation message bearing the order number to the student's e-mail address as soon as the system receives the order.
Alternate Courses:	**Step 2:** If the student do not receive a confirmation message , Click on resend again.	
Precondition:	Checkout at which books are paid for.	
Post condition:	After confirming the purchase, go to the stores and update the data	
Assumption:	None at this time.	

Analysis of Use Case (Log In)

Use case Name:	Log In	
Actor(s):	Staff	
Description:	This use case allows staff to login in into the system and access a range of additional functionality. Logging in to Library System does give staff access to full-text items and information about library account, renew borrowed materials, and place holds.	
Typical Course of Events:	**Actor Action**	**System Response**
	Step 1: This use case is initiated when staff select login option and Enter their library card number and the password and click Login.	**Step 2:** The system will take staff to the homepage where they can access information about library account, renew borrowed materials, and place holds, update new books, etc.
Alternate Courses:	**Step 1:** If staff have forgotten their account password, They can obtain it from their Library Card or Click on "Forgotten your Password" and reset it online .	
Precondition:	User must be staff of the Library and has Library Card which includes "User ID" and "Password".	
Post condition:	The system displays the relevant homepage where staff can access additional functionality that user does not access to it.	
Assumption:	None at this time.	

Analysis of Use Case (Update Inventory)

Use case Name:	**Update Inventory**	
Actor(s):	**Staff**	
Description:	This use case describes staff organize the library database and edit and make changes the details of inventory of books, by add , update , delete them in some cases.	
Typical Course of Events:	**Actor Action**	**System Response**
	Step 1: In the Library menu, employee does 1. select Books and services. 2. Select the Inventory file. 3. Select the checkboxes next to the inventory books he wants to delete. 4. Click Delete. 5. Click Delete to confirm.	**Step 2:** Once employee has deleted an book, The system no longer displays it in the inventory file. He won't be able to select this item when He is adding or editing a transaction, quote or purchase order. **Step 3:** The system removes the data for the deleted book and refresh the inventory of Library.
Alternate Courses:	**Step 1:** If employee cannot delete one of books , Send a notification with this message " You can't delete this book because It's been used on an approved invoice or approved bill ".	
Precondition:	There are some books in inventory for update inventory and calculate daily inventory deletion.	
Post condition:	Daily inventory deletion amount reports.	
Assumption:	None at this time.	

Analysis of Use Case (Update Book Sold)

Use case Name:	**Update book sold**	
Actor(s):	**Staff**	
Description:	This use case describes staff update the library data when books sold , it is vital that the book is removed from Library online inventory.	
Typical Course of Events:	**Actor Action**	**System Response**
	Step 1: In the Library menu, employee does 1. Select Books and services. 2. Select the books sold file. **Step 3:** The employee updates the books sold file by mark the books as "Sold" or removes them from the inventory file.	**Step 2:** The system takes employee to the books sold file and displays all the amounts of sold books daily. **Step 4:** The system displays available books at the Library and the books which not available with a sign "Sold".
Alternate Courses:	**Step 3:** If employee does not removes books sold , Failure to do so can result in the books being inadvertently relisted for sale. **Step 4:** If a student attempts to buy a previously sold book, Reject the order.	

Precondition:	The purchase was made by the user and there are sales already made.
Post condition:	Reports of books sold daily.

Assumption:	None at this time.

Analysis of Use Case (Update Book Info)

Use case Name:	**Update book Info**	
Actor(s):	**Staff**	
Description:	This use case explains that the book editing process requires several steps, and the process can be tailored to best suit what works for book depend on whether the book is not ordered or sold.	
Typical Course of Events:	**Actor Action**	**System Response**
	Step 1: In the Library menu, employee does 1. Select Books and services. 2. Select the book which want to modify on it. 3. Click anywhere on the line of the book which edit. 4. Click Edit book. **Step 3:** Lastly employee makes changes or additions to any part of the book, or modifies book info or author info , then clicks Save.	**Step 2:** The system navigates employee to the book's or author's page for making an adjustment to it. **Step 4:** After modifying is done , The system sends this notification " You've made an adjustment to it ".
Alternate Courses:	**Step 4:** If the system does not receive any modifications , Send a notification " There is not any adjustment done".	

Precondition:	Set editing goals , Break it up to edit , Set next steps for modifying your book.
Post condition:	It is essential to keep your online data up-to-date and update your inventory management system to reflect the sale , so as not to result in disappointed buyers.
Assumption:	None at this time.

Analysis of Use Case (Issue New Book)

Use case Name:	**Issue new book**	
Actor(s):	**Staff**	
Description:	This use case allows staff to add new books into Library. Adding books to Library is relatively simple.	
Typical Course of Events:	**Actor Action**	**System Response**
	Step 1: Employee does from Library dashboard 1. Click on the "Add books" tab and choose books which wants to add.	**Step 2:** The left-hand column allows him to search for books to add.
	Step 3: He can search on the right-hand column.	**Step 4:** Then the right-hand column shows search results, as well as the books he has already added.
Alternate Courses:	**Step 3:** If employee does not search on the right-hand column , in the Google-style search box He can search by: title, author for addition.	
Precondition:	Search for a source by language or country. Entering all book information manually.	
Post condition:	Include the author's last name and the book title.	
Assumption:	None at this time.	

Analysis of Use Case
(Produce Management Reports)

| Use case Name:	**Produce Management Reports**	
Actor(s):	**Manager**	
Description:	Management Reports allows Manager to create a set of reports in a PDF format package which includes a professional looking reporting package complete with cover page, table of contents, preliminary pages, reports and end notes and book ID, Title, Author, Price, Quantity, Quantity Limit, Book Language, and Number of Images. This use case **extends** another three use cases **First** : Access books sold by knowing daily books sold amount. **Second** : Aggregate books sold by accessing to inventory data and books sold data. **Third** : Prepare management reports by aggregating data to produce the management reports at the end.	
Typical Course of Events:	**Actor Action**	**System Response**
	Step 1: Manager does gathers the data collected and does : 　1. Click Reports in the navigation bar. 　2. Click the Management Reports tab. **Step 3:** The next step in the process is setting goals and creating a budget for Library and access and aggregate books sold. **Step 4:** Determining what type of management reporting	**Step 2:** The system opens the management report. **Step 5:** The system displays management reports to the manager after its

|	Library needs and preparing it for producing.	termination in a PDF.
Alternate Courses:	**Step 1:** If Manager is new to Management Reports, try editing the pre-made templates on Online and edit with his requirements. **Step 2:** If student try to write reports , Send a notification "You do not have permission".	
Precondition:	Making sure the management reports that are created serve a purpose for Library is vitally important to avoid wasted time and money. Data from different departments of the Library is collected.	
Post condition:	Manager can save the customized template of management reports to use time and time again. Use the report to compare inventory records.	
Assumption:	None at this time.	

Activity Diagram

- An Activity Diagram is used to describe the sequential flow of activities of a use case (flow of functionality) in a system.

- A type of behavioral diagram that describes the course of the application from its starting point to its end, and the activities and processes it goes through in a sequence.

- An Activity Diagram is a flowchart showing the flow of activities through the system.

- The activity diagram is similar to state diagram because activities are state of doing something.

- The activity diagram is a special kind of state chart diagram.

- An activity is a task that is performed during the workflow.

Activity Diagram

- Activity Diagram of staff
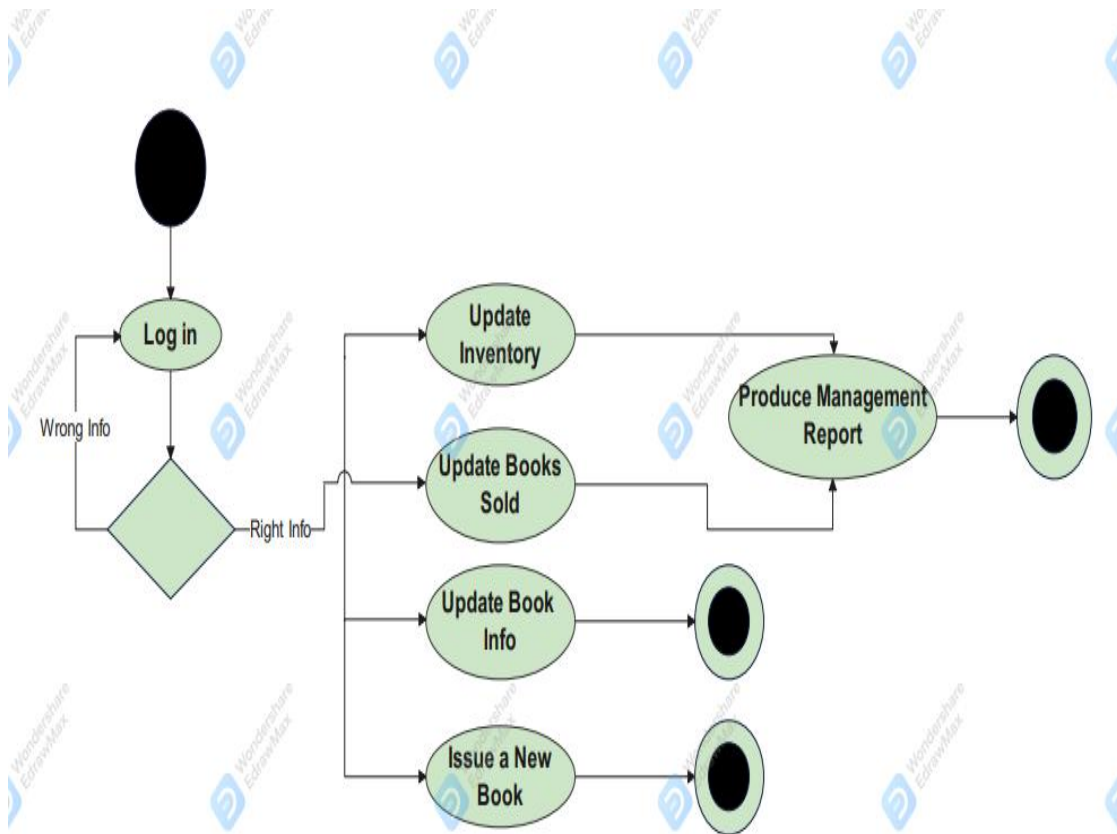
- Activity Diagram of student
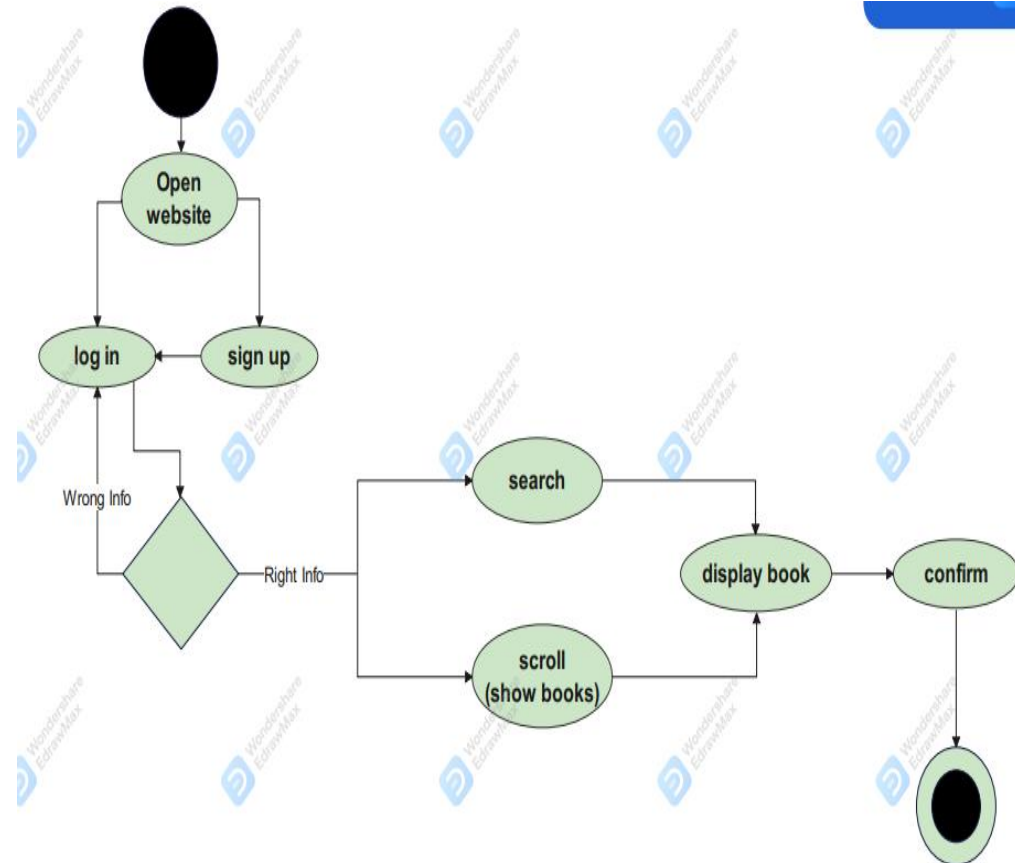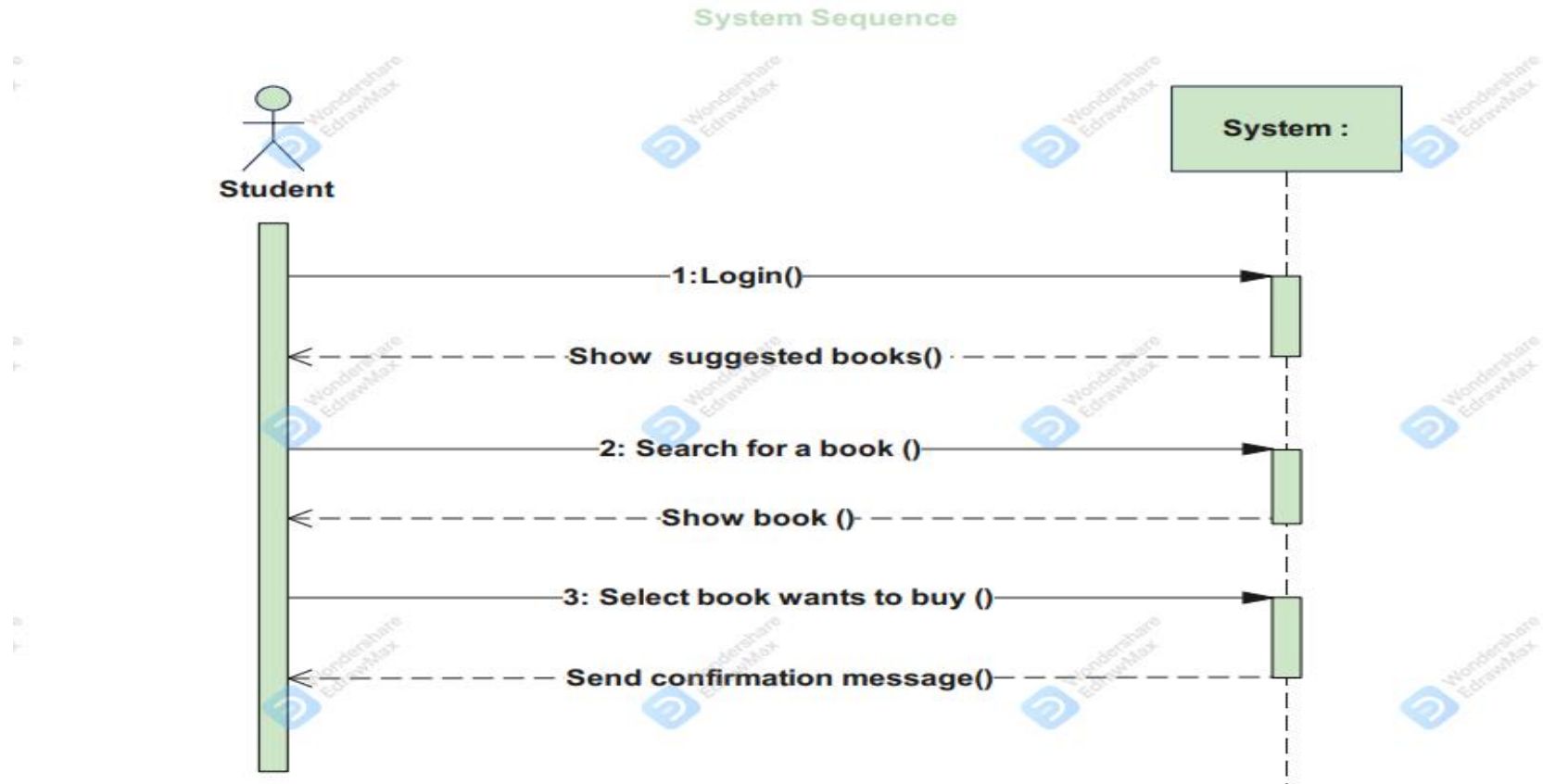
System Sequence

A system sequence diagram is a sequence diagram that displays, for a given use case scenario, the events generated by external actors, their order, and the possible events between systems.

System sequence diagrams are visual summaries of individual use cases.

Steps of System Sequence

- Student opens website and Log in to Library.
- System displays homepage where student will show suggested books.
- Student will search for a book.
- System displays all of the available results of book.
- Student selects the book he wants to buy.
- System sends confirmation message.

System Sequence Diagram

Sequence Diagram

• A sequence diagram simply depicts interaction between objects in a sequential order i.e. the order in which these interactions take place.

• Sequence diagrams describe how and in what order the objects in a system function.

• A sequence diagram is a behavior diagram that represents the interaction between objects over a specific period of time. In other words, it represents the sequence of messages flowing from one object to another.

Steps of Sequence Diagram to login

- If the student has an account ,he will enter his username and password .

- The system will validate user name and password .

- The system will send login successful message .

- If the student doesn't have an account ,he will create a new account.

- The system will check the information and save it .

- The system will send a welcome email confirming to student .

Sequence Diagram of login
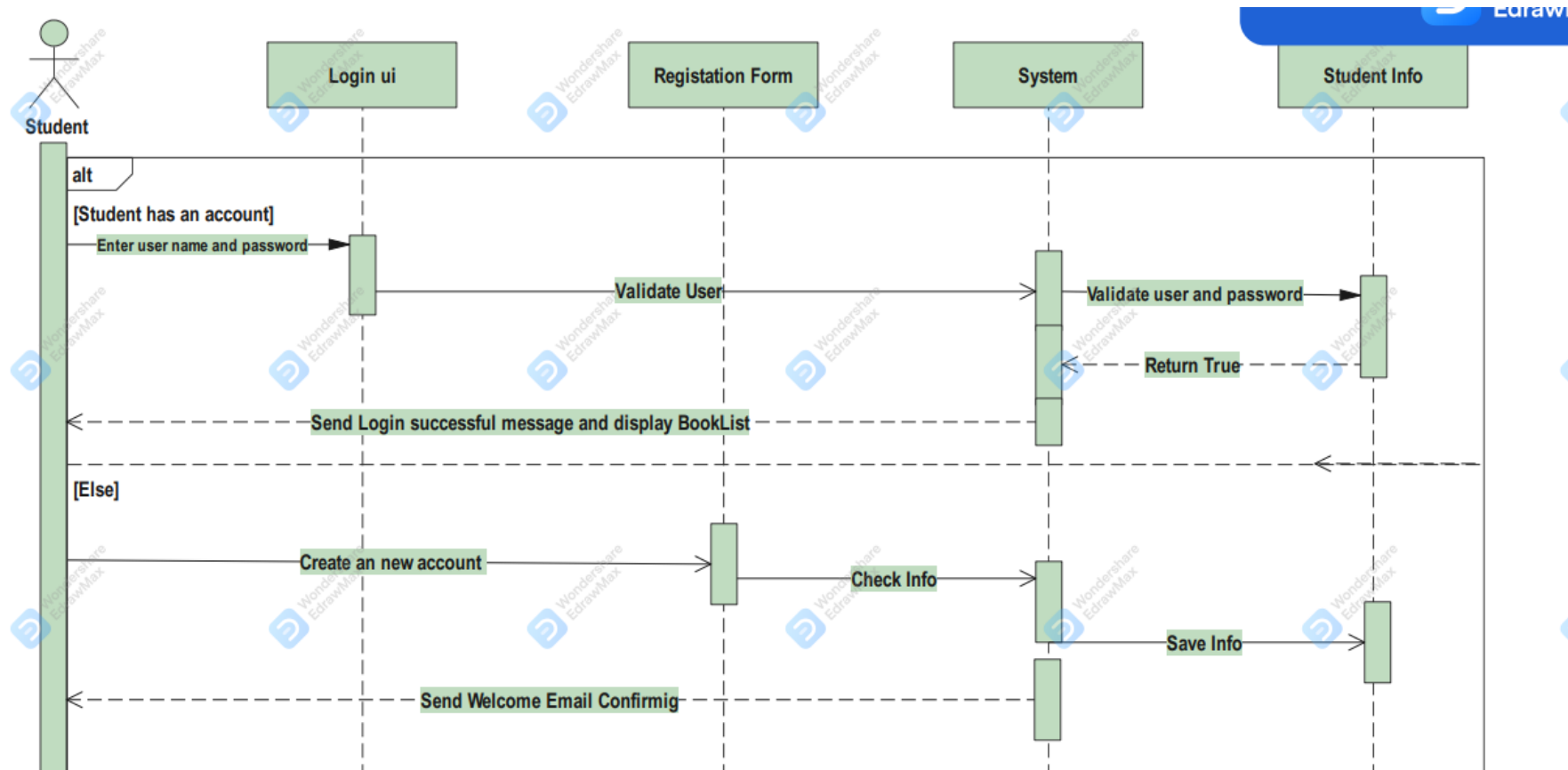
Steps of Sequence Diagram of search

- The student will enter the book name that wants to search.

- The system will validate book name .

- If the book is available , the system will display all of the available results .

- If the book isn't available ,the system will send a message that the book isn't currently available .

Sequence Diagram of search
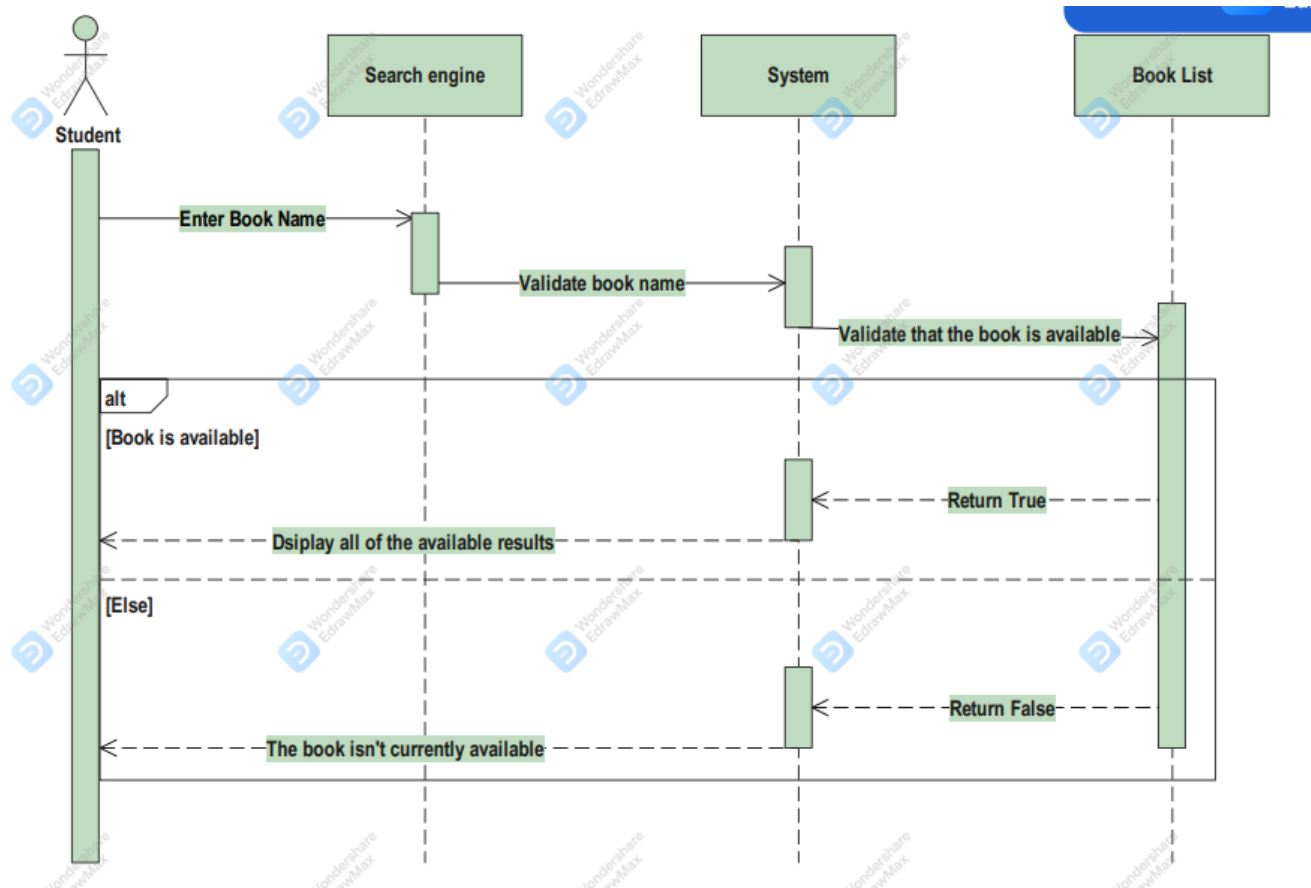
Steps of Sequence Diagram of Buy book

- The student will select the book that wants to buy .
- The system will show the invoice that show the book name and price.
- The student will confirm to buy .
- The system will take student to secure page and ask for the student address and the method of payment .
- The student will enter his address and the method of payment .
- The system will send a confirm message to student .

Sequence Diagram of Buy book
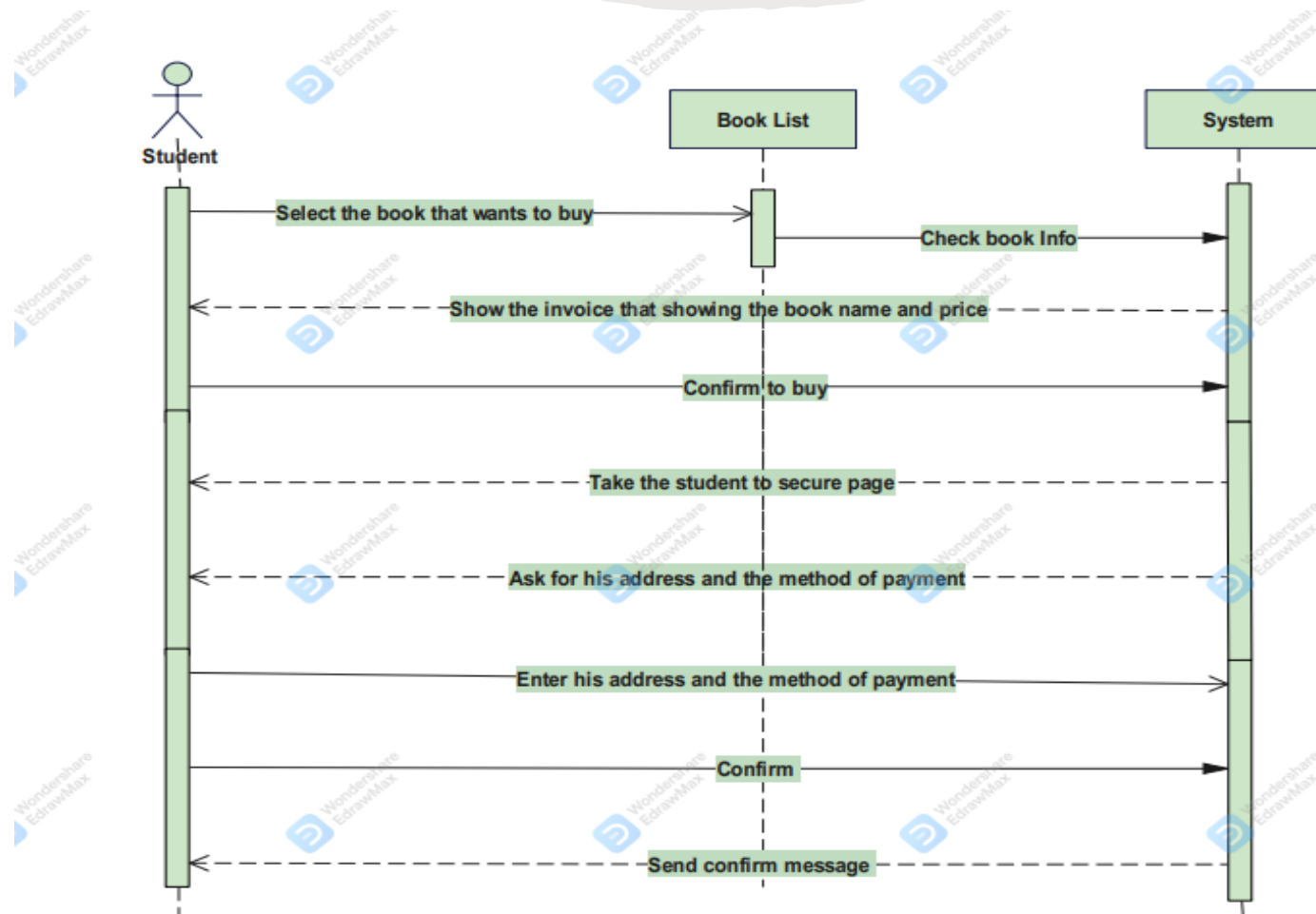
Steps of Sequence Diagram of Inventory

- The staff will login to the system .
- The staff will enter the system and update books sold file and the system will save the files in the inventory file .
- The staff will enter the system and update books info and the system will save the files in the inventory file .
- The staff will enter the system and add new books and the system will save the files in the inventory file .
- The staff will enter the system and update inventory and the system will save the files in the inventory file .
- The staff will check details .
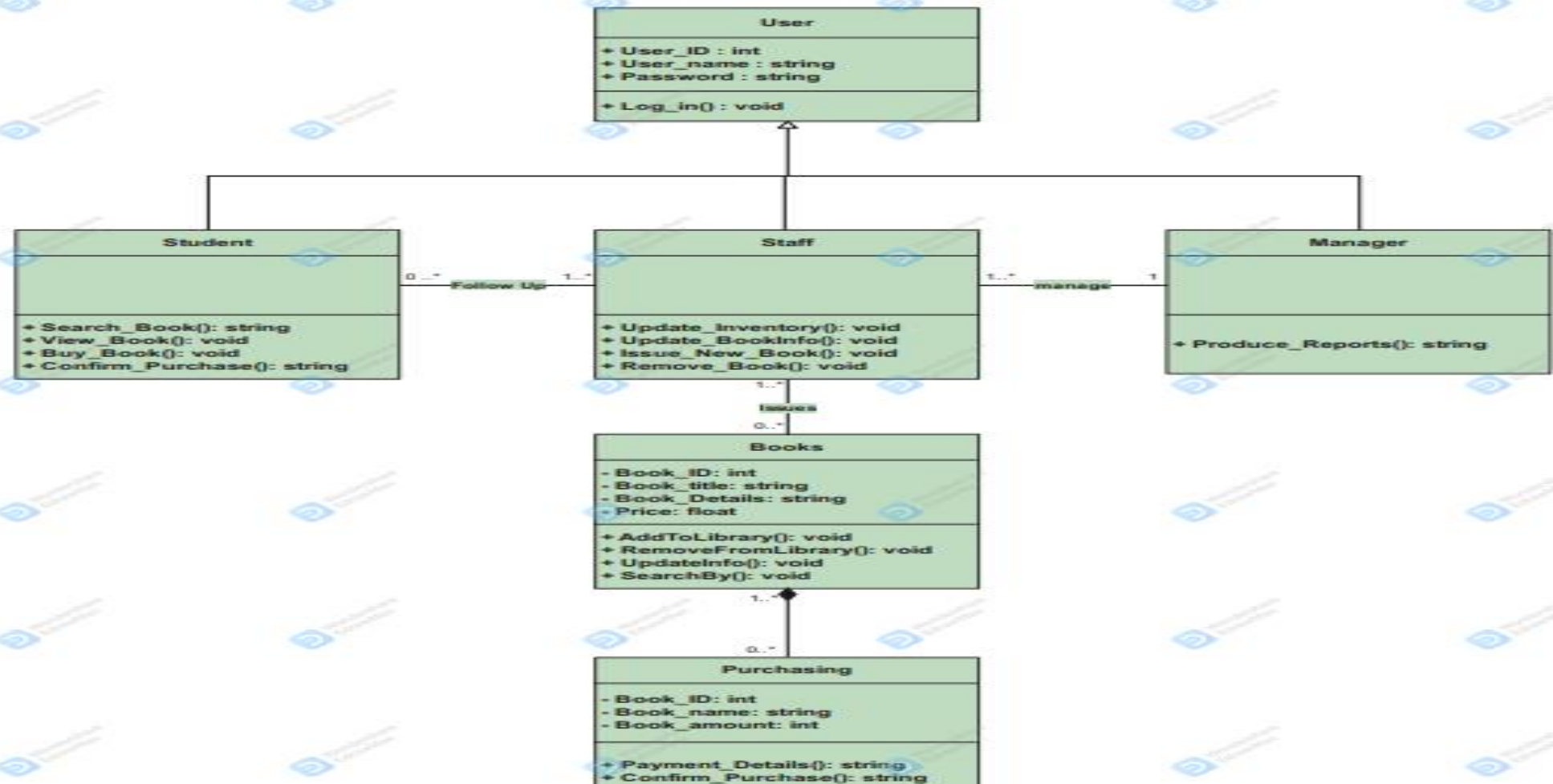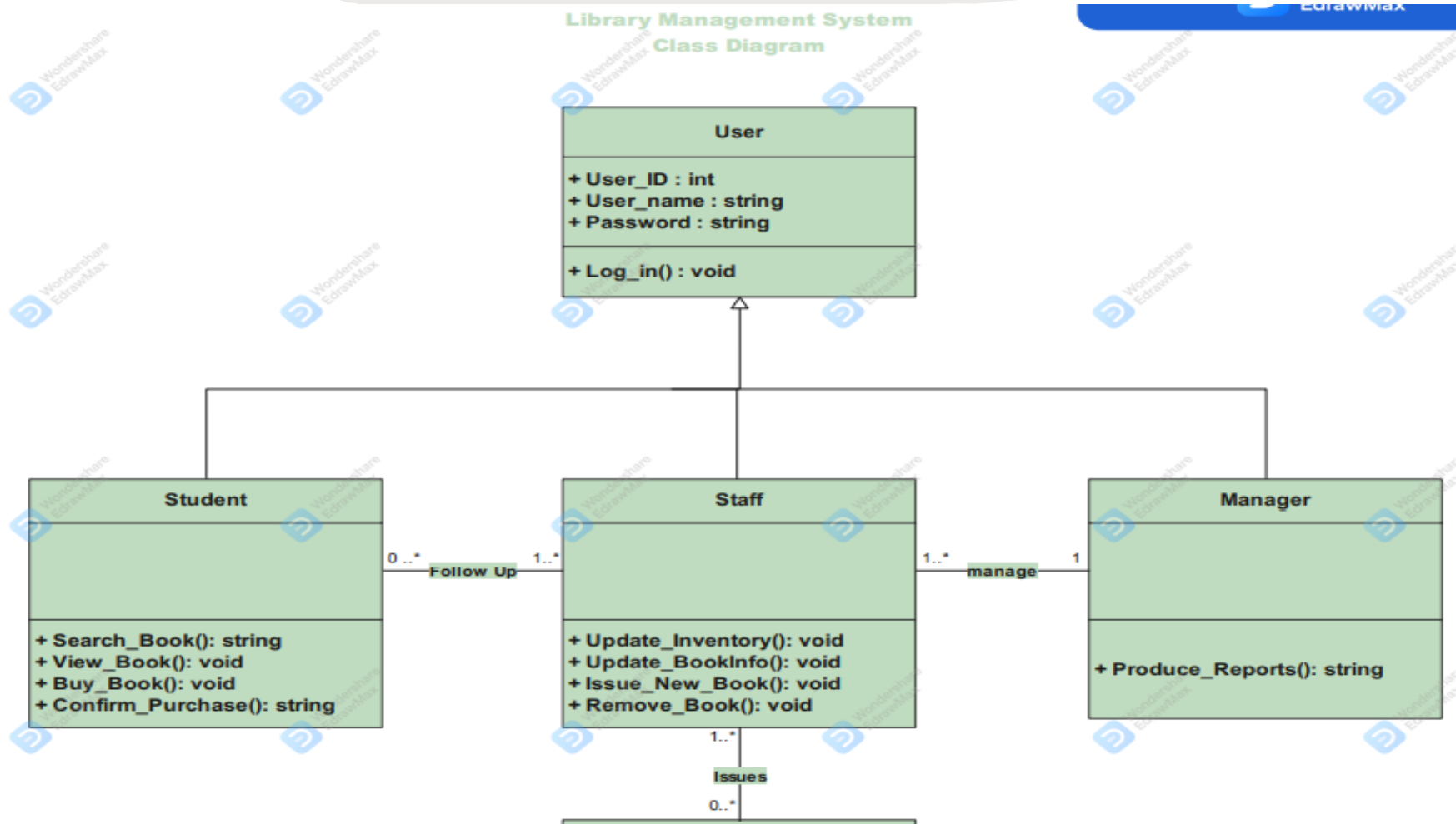- Finally The system will confirm.

Sequence Diagram of Inventory
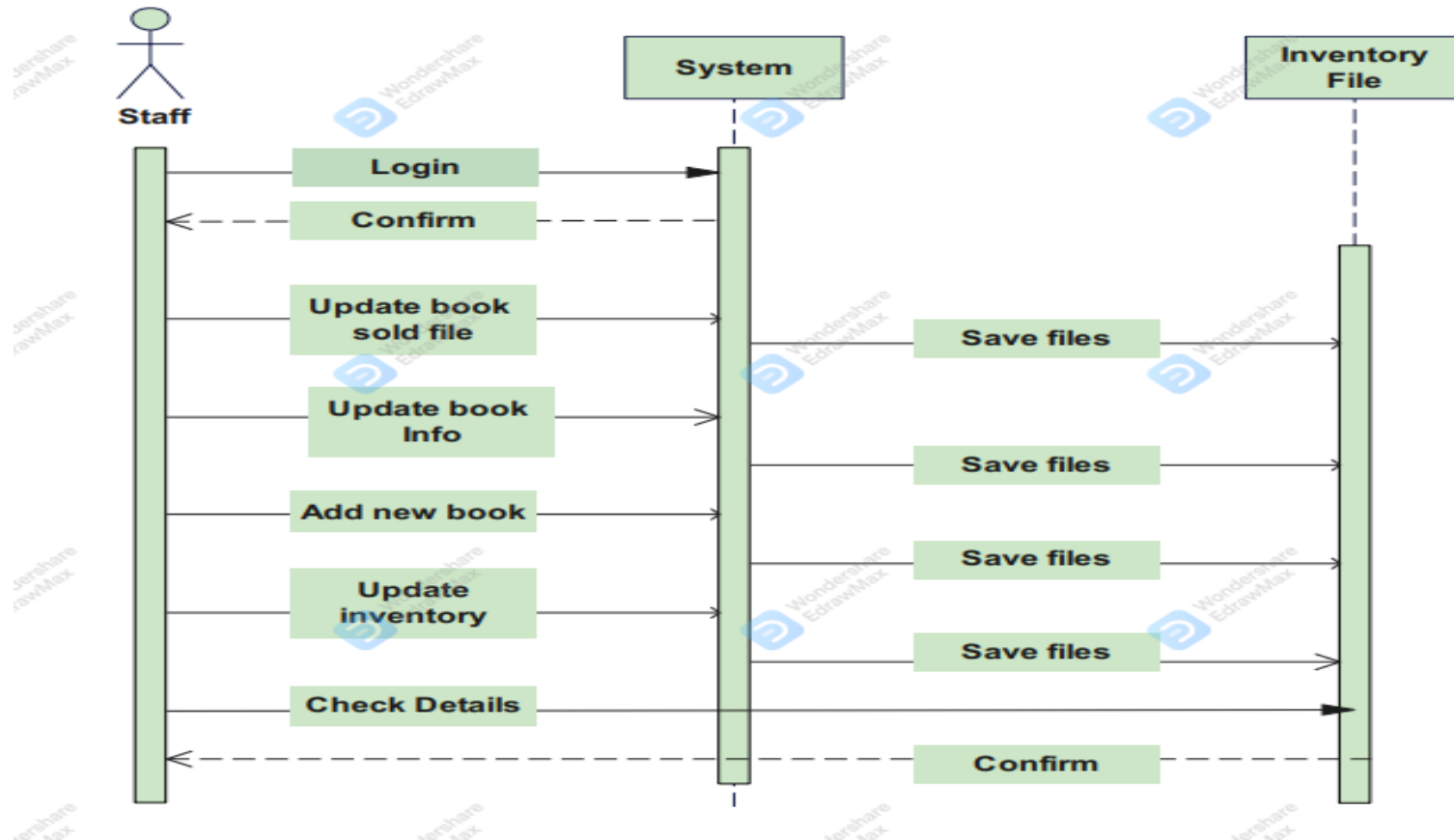
Class Diagram

Class diagrams are one of the most useful types of diagrams in UML as they clearly map out the structure of a particular system by modeling its classes, attributes, operations, and relationships between objects. With our UML diagramming software, creating these diagrams is not as overwhelming as it might appear. This guide will show you how to understand, plan, and create your own class diagrams
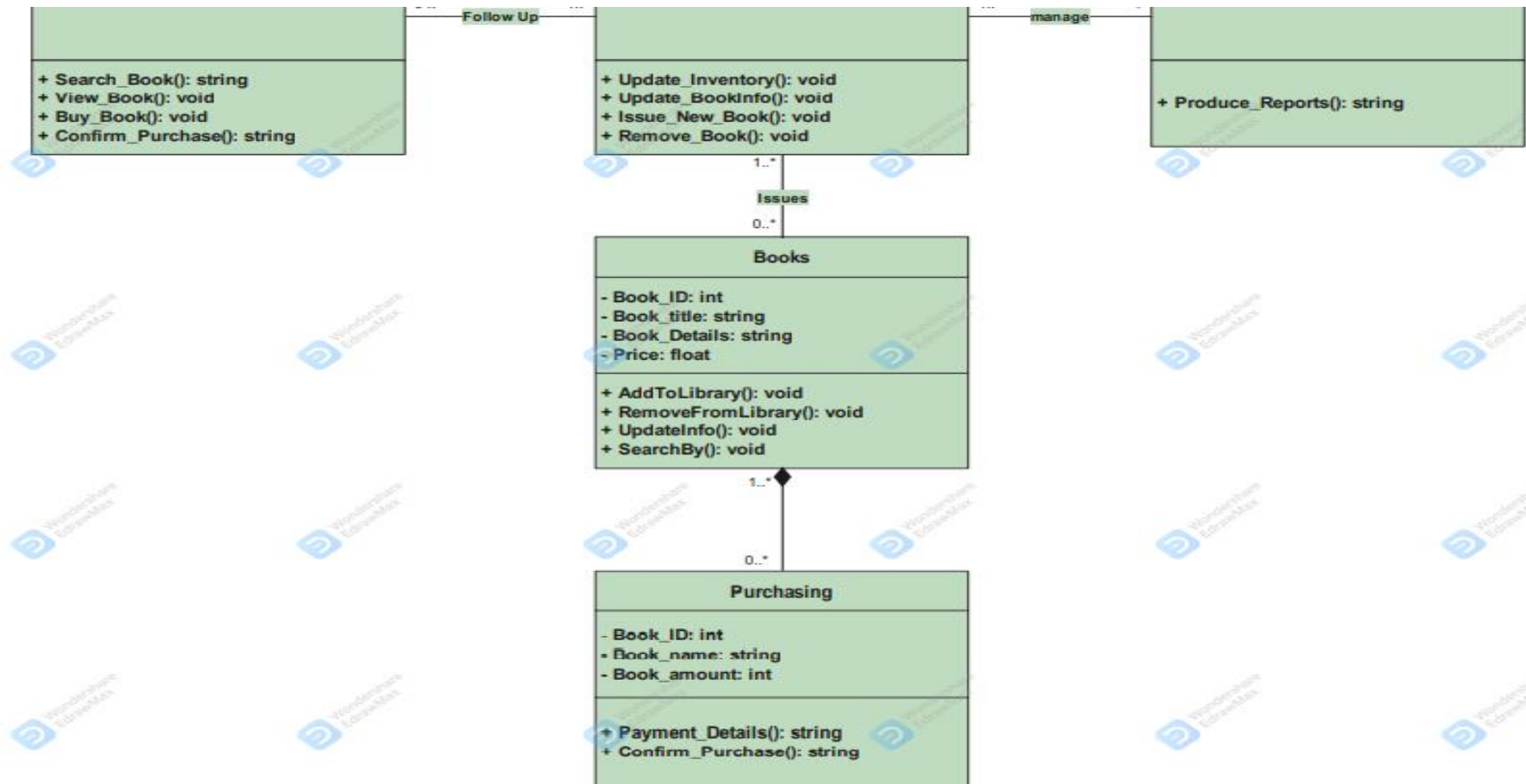
Class Diagram

Class Diagram

Library Management System
Class Diagram

User

+ User_ID : int
+ User_name : string
+ Password : string

+ Log_in() : void

Student

+ Search_Book(): string
+ View_Book(): void
+ Buy_Book(): void
+ Confirm_Purchase(): string

Staff

+ Update_Inventory(): void
+ Update_BookInfo(): void
+ Issue_New_Book(): void
+ Remove_Book(): void

Manager

+ Produce_Reports(): string

0 ..* Follow Up 1..*

1..* manage 1

1..*

Issues

0..*

Class Diagram

Summary

Online Library Management System

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  [Science fiction | Open Library](#)

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