
PIXIE

**Interactive Book Reader with Augmented reality
content**
Software Architecture Document
**For PID 20 : Interactive Book Reader with Augmented
realty content**

Version 1.0

Prepared by - Group 14

MADUSHA E.P.C. 200368L
MENDIS D.V.N 200392E
MENUKA L.D.S. 200394L

**Department of Computer Science and Engineering
University of Moratuwa**

10/08/2023

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

Contribution

Member	Description
Madusha E.P.C - 200368L	Functional Requirements 1-8 Architectural Representation Architectural Goals and Constraints
Mendis D.V.N - 200392E	Functional Requirements 8-16 Architectural Representation Architectural Goals and Constraints
Menuka L.D.S - 200394L	Functional Requirements 16-23 Architectural Representation Architectural Goals and Constraints Deployment View Implementation view Data View

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

Revision History

Date	Version	Description	Author
04/08/2023	1.0	Initial version of SAD	MADUSHA E.P.C. 200368L MENDIS D.V.N 200392E MENUKA L.D.S. 200394L

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

Table of Contents

1. Introduction	1
1.1 Purpose	7
1.2 Scope	7
1.3 Definitions, Acronyms, and Abbreviations	7
1.4 References	8
1.5 Overview	8
2. Architectural Representation	8
3. Architectural Goals and Constraints	9
4. Use-Case View	13
4.1 Use-Case Realizations	14
4.1.1 Create User account	14
4.1.2 Login to system	15
4.1.3 Edit user account details	15
4.1.4 Logout	16
4.1.5 Apply for publisher rights	17
4.1.6 Assign publisher rights	18
4.1.7 Publish an Ebook	19
4.1.8 Edit E-book's details	19
4.1.9 Remove a published E-book from the platform (Publisher)	20
4.1.10 Review the content of E-books	21
4.1.11 Remove published books from the platform (Admin)	22
4.1.12 Add books to personal library	23
4.1.13 Remove books from user's library	24
4.1.14 Highlight Selected Text	25
4.1.15 Access Digital Dictionary	25
4.1.16 Add a book to favourites	26
4.1.17 View Saved Definitions	27
4.1.18 Buy a subscription	28
4.1.19 Search the catalog of books	28
4.1.20 Visualize AR content	29
4.1.21 Read E-books	30
4.1.22 Bookmark pages	31
4.1.23 Add comments to highlighted sections	31
5. Logical View	33
5.1 Overview	33

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

5.2 Architecturally Significant Design Packages	35
Class diagram description	35
6. Process View	36
6.1 Activity Diagram	36
6.1.1 Create a user Account	36
6.1.2 Login to system	37
6.1.3 Edit user account details	37
6.1.4 Logout	39
6.1.5 Apply for publisher rights	40
6.1.6 Assign publisher rights	41
6.1.7 Publish an E-Book	42
6.1.8 Edit E-Book's details	43
6.1.9 Remove published E-Book from the platform (Publisher)	44
6.1.10 Review the content of E-Books	44
6.1.11 Remove published E-Books from the platform (Admin)	46
6.1.12 Add books to personal library	47
6.1.13 Remove books from user's library	48
6.1.14 Highlight selected texts	49
6.1.15 Access digital dictionary	50
6.1.16 Add a book to favorites	51
6.1.17 View saved definitions	52
6.1.18 Buy a subscription	53
6.1.19 Search the catalog of books	54
6.1.20 Visualize AR content	55
6.1.21 Read E-Books	56
6.1.22 Bookmark pages	57
6.1.23 Add comments to highlighted sections	58
6.2 Sequence Diagram	59
6.2.1 Create a user account	59
6.2.2 Login to system	60
6.2.3 Edit user account details	61
6.2.4 Logout	62
6.2.5 Apply for publisher rights	63
6.2.6 Assign publisher rights	64
6.2.7 Publish an E-Book	65
6.2.8 Edit E-Book's details	66
6.2.9 Remove published E-Book from the platform (Publisher)	67
6.2.10 Review the content of E-Books	68

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.2.11 Remove published E-Books from the platform (Admin)	69
6.2.12 Add books to personal library	70
6.2.13 Remove books from user's library	71
6.2.14 Highlight selected texts	72
6.2.15 Access digital dictionary	73
6.2.16 Add a book to favourites	74
6.2.17 View saved definitions	75
6.2.18 Buy a subscription	76
6.2.19 Search the catalog of books	77
6.2.20 Visualize AR content	78
6.2.21 Read E-Books	79
6.2.22 Bookmark pages	80
6.2.23 Add comments to highlighted sections	81
6. Deployment View	82
7. Implementation View	83
7.1 Overview	83
7.2 Layers	83
8. Data View (optional)	87
9. Size and Performance	87
10. Quality	88

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

Software Architecture Document

1. Introduction

Our proposed project is an Interactive Book Reader with Augmented Reality Content that mainly focuses on children's books with ages between 3-10 years. What we are aiming to do is give a new experience to kids learning interactively through a mobile app. This app will incorporate AR visualizations into children's books, making reading a more engaging and enjoyable experience for children. With this project, we hope to inspire young readers to fall in love with reading and learning while having fun. We believe that this technology will revolutionize the way children read and learn, and we are excited to be a part of this movement. Our goal is to create an immersive experience that encourages curiosity and creativity, and we can't wait to see the impact this app will have on young minds.

1.1 Purpose

The purpose of the Software Architecture Document (SAD) is to provide a comprehensive description of the software architecture for our proposed project - an interactive Book Reader with Augmented Reality Content for children aged 3-10 years. The SAD will be used to communicate the architectural design to the development team, stakeholders, and users. Our goal is to make learning interesting and engaging for children by incorporating AR visualizations into children's books. This will help parents to engage with their children more, providing them with an opportunity to spend quality time together and guide their learning. The SAD will be a living document that will be updated as the project progresses. It will be reviewed and approved by the stakeholders before the development phase begins, ensuring that the final product meets the requirements. By creating an app that provides an immersive experience, we hope to inspire young readers to fall in love with reading and learning while having fun.

1.2 Scope

The proposed project is mainly aimed at children and involves the development of an interactive Book Reader with Augmented Reality Content. The mobile app will have E-book reading capabilities, with AR content visualization and text-to-speech feature to enhance the AR experience. In addition to this, the app will be able to read other digital formats. It will also have a dictionary for complex words to improve vocabulary, comment and highlight functions for user annotations, and bookmarking pages for easy navigation and revisiting. The web app will have features to add AR content for publishers and allow users to purchase them in a marketplace. Guest users will be able to use the app to read books with AR content and digital books. They will also be able to purchase books from the marketplace in the web app. Administrators will have the ability to add new books and give publisher rights to the publishers. Publishers will have the ability to publish books to the marketplace.

1.3 Definitions, Acronyms, and Abbreviations

SAD - Software Architecture Document

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

DB - Database

1.4 References

- [1] Augmented Reality in Books. [Online] Retrieved from <https://blog.kotobee.com/augmented-reality-in-books/> [Accessed on 16/7/2023]
- [2] ARBIBOOK. [Online] Retrieved from <https://www.arbobook.com/?lang=en> [Accessed on 16/7/2023]
- [3] How Publishers Are Using Augmented Reality to Bring Stories to Life. [Online] Retrieved from <https://econsultancy.com/how-publishers-are-using-augmented-reality-to-bring-stories-to-life/> [Accessed on 16/7/2023]
- [5] Unity. [Online] Retrieved from <https://unity.com> [Accessed on 16/7/2023]
- [6] Vuforia Developer Portal. [Online] Retrieved from <https://developer.vuforia.com> [Accessed on 16/7/2023]
- [7] How to Build AR App. [Online] Retrieved from <https://program-ace.com/blog/how-to-build-ar-app/> [Accessed on 16/7/2023]
- [8] Kids Bookful: Kids' Books & Games Book Library for Kids. [Online] Retrieved from <https://apps.apple.com/us/app/bookful-kids-books-games/id1428323777> [Accessed on 31/7/2023]
- [9] Design Tools used to complete this Software Architecture Document.

- LucidChart
- drawio

1.5 Overview

This subsection provides an overview of the proposed project, which involves the development of an interactive Book Reader with Augmented Reality Content aimed at children. The mobile app will have E-book reading capabilities, with AR content visualization and text-to-speech feature to enhance the AR experience. In addition to this, the app will be able to read other digital formats. The web app will have features to add AR content for publishers and allow users to purchase them in a marketplace. The rest of the SRS contains detailed requirements and specifications for the app, including user requirements, functional requirements, and non-functional requirements. The document is organized in a logical and structured manner to facilitate understanding and implementation of the proposed project.

2. Architectural Representation

The architecture of the system will be described in the 4+1 architecture view model. This comprehensive approach provides multiple perspectives to understand the system's design and behavior, ensuring a well-rounded representation of its complexity and interactions.

1. Logical View: This view focuses on the fundamental structure of the system's components and their interactions. It defines the main building blocks, such as modules, components, and classes, and illustrates how they collaborate to achieve the system's objectives. The logical view aids in grasping the core functionality and organization of the software.

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

2. Process View: The process view offers insights into the system's runtime behavior and dynamic interactions. It showcases the flow of data, control, and communication among components during execution. This view is crucial for understanding concurrency, performance bottlenecks, and the overall system behavior in real-world scenarios.

3. Implementation View: The implementation view caters to the perspective of software developers. It presents the software's structure from a coding and development standpoint, highlighting source code organization, development tools, and version control. This view assists developers in efficiently collaborating, maintaining, and evolving the software.

4. Deployment View: The deployment view emphasizes the deployment and distribution of software components across hardware resources. It provides insights into the system's architecture in terms of servers, machines, and devices where the software runs. This view helps in addressing concerns related to scalability, reliability, and system administration.

5. Data View: The data view focuses on the organization and management of data within the system. It defines the structure of the database, data storage mechanisms, and data flow between components. This view is vital for understanding how data is captured, processed, stored, and accessed within the software.

6. Use Case View: The use case view complements the other views by presenting the system's functionality from a user's perspective. It captures various use cases or scenarios that users encounter while interacting with the software. This view ensures that the architecture aligns with user needs and expectations.

3. Architectural Goals and Constraints

3.1 Architecture Goals

In defining the architecture of the system, several key goals have been identified to guide the design process. These architecture goals cover the software principles and objectives that the architecture seeks to fulfill. They serve as a compass for making design decisions and ensuring that the resulting system aligns with the desired outcomes. The following architecture goals have been established:

1. Scalability: The architecture aims to support both current and future growth demands, ensuring that the system can effectively handle increased user load, data volume, and computational requirements. The team has considered the scalability of the system when choosing the technologies associated with the system.

2. Modularity and Maintainability: A modular architecture is to be developed with separation of the architecture into layers and components. The goal is to reduce coupling between those layers and components. This promotes ease of maintenance, as individual components can be developed, tested, and updated independently, without affecting the entire system.

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

3. Flexibility and Extensibility: The architecture will be designed to accommodate changes and enhancements without requiring significant rework. This extensibility is crucial to swiftly adapt to evolving user needs, business requirements, and technological advancements.

4. Performance Optimization: Performance considerations will be integral to the architecture, aiming to minimize response times, latency, and resource utilization. The chosen design patterns and technologies will be tailored to deliver optimal performance under various conditions.

5. Security and Privacy: The architecture will prioritize robust security measures to safeguard sensitive data, prevent unauthorized access, and mitigate potential vulnerabilities.

6. Interoperability: The architecture will facilitate seamless integration with external systems, APIs, and services. As the system incorporates third party AR models and engines, the architecture will be developed to enable interoperability with these technologies.

7. Usability and User Experience: User-centric design principles will guide the architecture to ensure an intuitive and engaging user experience. This involves designing components and interactions that align with user expectations and needs. Separation of the UI into components would help to improve the user experience without compromising other components of the application.

8. Cost Efficiency: The architecture will balance performance and functionality with cost considerations. Optimal resource utilization and technology choices will be made to achieve a cost-effective solution without compromising quality.

9. Adherence to Standards: The architecture will adhere to relevant industry standards, coding conventions, and design patterns. This fosters consistency, facilitates collaboration among developers, and eases the integration of third-party components.

3.2 Architecture constraints

The architecture of our system operates within certain constraints, which are influenced by the technologies and tools selected for its development. These constraints outline the specific parameters and limitations that shape the design and implementation of the system. The following architecture constraints have been identified:

1. Technology Stack: Our system is built using React for the front-end, Node.js for the back-end, and MongoDB for the database. These technologies were chosen based on their suitability for building

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

responsive user interfaces, scalable server-side logic, and efficient data storage and retrieval. React native which is a framework based on React, is used for mobile app.

2. Component-Based Front-End: React is employed as the front-end framework, enforcing a component-based architecture. This constraint guides the development of modular UI components, enabling reusability, maintainability, and a consistent user experience.

3. Asynchronous and Event-Driven: Node.js facilitates asynchronous, event-driven programming. This constraint influences the design of the back-end components, enabling efficient handling of concurrent requests and real-time interactions.

4. NoSQL Database: MongoDB serves as the database management system. This constraint shapes the data modeling approach and influences how data is stored, queried, and indexed.

5. RESTful API: The back-end will expose a RESTful API to communicate with the front-end and external services. This constraint enforces adherence to REST principles, guiding the design of endpoints, HTTP methods, and data exchange formats.

6. Web-Based User Interface: React's focus on web applications influences the system's user interface, requiring compatibility with modern web browsers and responsive design practices.

7. Schemaless Database Design: MongoDB's schema less nature impacts the approach to data modeling and database design. This constraint allows for flexibility in adapting to changing data requirements.

These architecture constraints provide a framework within which the system's design and development take place. They ensure coherence among technology choices, guide design decisions, and shape the overall structure of the system, aligning with the strengths and capabilities of the selected technologies.

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

4. Use-Case View



Figure 4.1 - Use case diagram of the system

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

4.1 Use-Case Realizations

4.1.1 Create User account

Use case name	Create account
Actor	Reader / Publisher
Description	User can register and create a new user account.
Preconditions	The chosen username must not already be associated with an existing account.
Main flow	<ol style="list-style-type: none"> 1) User accesses the registration page either through the PIXIE web application or mobile application. 2) System displays the registration form. 3) User provides the required information, such as username, email, password and type of the account (Reader/Publisher). 4) System validates the entered information and checks for any existing accounts with the same username. 5) If all the provided details are valid, system creates a new user account. 6) System generates a confirmation message indicating successful registration
Successful end/post condition	User account is created successfully and the user can log into the system using the registered credentials.
Fail end/post condition	If any issues arise during the validation process, system displays an error message indicating user to correct those issues before proceeding.
Extensions	N/A

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

4.1.2 Login to system

Use case name	Log in
Actor	Reader / Publisher
Description	User can log system using the registered credentials.
Preconditions	<ul style="list-style-type: none"> 1) User should possess a registered user account. 2) User should not be currently logged in
Main flow	<ul style="list-style-type: none"> 1) User accesses the login form either through the PIXIE web application or mobile application. 2) User enters their username and corresponding password in the relevant fields of the form. 3) System verifies the provided credentials against the registered user account details. 4) If the verification is successful, system checks the type of account the user possess (Reader / Publisher). 5) System grants access to the user based on their role.
Successful end/post condition	User successfully logs in and gain access to the features and functionalities of the system based on their role.
Fail end/post condition	If the login credentials are incorrect, system displays an error message. User can re-enter the accurate information.
Extensions	N/A

4.1.3 Edit user account details

Use case name	Edit user profile
Actor	Reader / Publisher
Description	User can edit their account details

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

Preconditions	User must be logged into the system.
Main flow	<ol style="list-style-type: none"> 1) User accesses their profile through the application's interface (Web app/ mobile app). 2) System displays the account details including username, password, contact information and other relevant information. 3) User selects the edit option provided by the system. 4) System presents a form allowing the user to modify the account detail. 5) User makes the desired changes and submits the form. 6) The system validates the changes and updates the user's account details accordingly.
Successful end/post condition	Updated account details are displayed in the user profile.
Fail end/post condition	If any issue occurs while the user is accessing the edit mode, the system displays an error message
Extensions	N/A

4.1.4 Logout

Use case name	Logout
Actor	Reader / Publisher
Description	User can logout from the system.
Preconditions	User must be logged into the system.
Main flow	<ol style="list-style-type: none"> 1) User selects the “Logout” option provided by the system. 2) System displays a confirmation box asking the user to confirm their intention to log out. 3) User confirm their choice by clicking the relevant option. 4) System terminates the user's session and clears their session data. 5) System redirects the user to the application's login page.

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

Successful end/post condition	User successfully logs out of the system.
Fail end/post condition	If any technical issues arise during the logout process, the system displays an error message
Extensions	N/A

4.1.5 Apply for publisher rights

Use case name	Apply for publisher rights
Actor	Publisher
Description	Publisher must apply for publisher rights before publishing their content on the platform.
Preconditions	1) User must be logged into the system as a registered publisher. 2) User should not already possess publisher rights.
Main flow	1) User navigates to the option related to applying for publisher rights. 2) System provides a form for the user to provide necessary details such as their intended content, publishing experience, and other relevant information. 3) User provides the required information and submits the form. 4) System records the application for admin review. 5) System displays the status of publisher rights application as "Pending" in the user profile.
Successful end/post condition	Publisher's application is successfully submitted for review.
Fail end/post condition	If there are any issues with the application process, the system displays an error message.
Extensions	N/A

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

4.1.6 Assign publisher rights

Use case name	Assign publisher rights
Actor	Admin
Description	System's admin can assign publisher rights to registered publishers who have applied for them.
Preconditions	Admin must be logged into the system with the administrative privileges.
Main flow	<ol style="list-style-type: none"> 1) Admin selects the option to check pending publisher applications in the administrative dashboard. 2) System displays a list of pending applications. 3) Admin selects a specific application to review in detail. 4) System provides access to the application's details along with the applicant's information. 5) Admin reviews the application to determine its validity and suitability. 6) If the application meets the criteria, admin approves the application. 7) If not system send a message saying your rights denied. 8) The system updates the user's profile to grant them publisher rights.
Successful end/post condition	The user gains access to publish their content on the platform.
Fail end/post condition	System updates the publisher rights application status in the user profile as "Rejected". User cannot publish their content on the platform.
Extensions	If there are no pending applications, the admin is informed that there are no applications to review.

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

4.1.7 Publish an Ebook

Use case name	Publish an E-book
Actor	Publisher
Description	Publishers can publish their content on the platform.
Preconditions	1) User must be logged into the system as a registered publisher. 2) User should not already possess publisher rights.
Main flow	1) Publisher selects the option in the dashboard to publish a new E-book. 2) System displays the publish form to provide information about the e-book including title, description, cover image, and content file. 3) Publisher enters the required details and submits the form, 4) System validates the provided information and the uploaded content file for its compatibility. 5) If the validation is successful, the system processes the information and files and creates a new e-book entry and send it to admin review. 6) The new e-book becomes available for readers to discover.
Successful end/post condition	The e-book is successfully published on the platform
Fail end/post condition	If any required information is incomplete, system displays an error message indicating publisher to correct those issues before proceeding.
Extensions	N/A

4.1.8 Edit E-book's details

Use case name	Edit E-book's details
Actor	Publisher
Description	Publisher can edit the details their own published e-books on the platform.

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

Preconditions	1) User must be logged into the system as a registered publisher. 2) User must have their own published e-books on the platform.
Main flow	<ol style="list-style-type: none"> 1) Publisher accesses their user account through the web application's interface. 2) System displays a list of the publisher's currently published e-books along with their user account details. 3) Publisher selects the e-book they wish to edit. 4) System presents the publisher with options to edit the e-book's details. 5) Publisher selects the "Edit Details" option. 6) System displays a form with current details of the selected e-book, including title, description, cover image, and other relevant information. 7) Publisher makes the necessary changes to the e-book's details and submits the form. 8) System updates the e-book's details accordingly. 9) The updated details of the e-book are displayed in the platform's catalog.
Successful end/post condition	The details of the selected e-book are successfully updated.
Fail end/post condition	If any changes made are incomplete, system displays an error message indicating publisher to correct those issues before proceeding.
Extensions	N/A

4.1.9 Remove a published E-book from the platform (Publisher)

Use case name	Remove a published E-book
Actor	Publisher
Description	Publisher can remove their own published e-books from the platform.
Preconditions	<ol style="list-style-type: none"> 1) User must be logged into the system as a registered publisher. 2) User must have their own published e-books on the platform.

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

Main flow	<ol style="list-style-type: none"> 1) Publisher accesses their user account through the web application's interface. 2) System displays a list of the publisher's currently published e-books along with their user account details. 3) Publisher selects the e-book they wish to remove. 4) System presents the publisher with options to remove the selected e-book from the platform. 5) Publisher selects the "Remove" option. 6) System displays a confirmation box for the user to confirm their intent to remove the E-book. 7) Publisher clicks on the confirm option. 8) System removes the selected e-book from the platform's catalog.
Successful end/post condition	The selected e-book is successfully removed from the platform's catalog and is no longer accessible to readers.
Fail end/post condition	N/A
Extensions	N/A

4.1.10 Review the content of E-books

Use case name	Review the content of E-books
Actor	Admin
Description	System's admin can review the content of published e-books on the platform.
Preconditions	Admin must be logged into the system with the administrative privileges.

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

Main flow	<ol style="list-style-type: none"> 1) Admin selects the option to review content in the administrative dashboard. 2) The system displays a list of newly added E-books which have not yet been reviewed. 3) Admin selects an e-book they wish to review. 4) System presents the e-book's content in a preview mode. 5) The admin reviews the content checking for any inappropriate material or other issues. 6) If the content meets the platform's standards, admin updates the book's status as reviewed. 7) If there are any issues with the book's content, the admin removes the e-book from the platform. (See 4.1.11)
Successful end/post condition	Admin successfully reviews the content of the selected e-book and takes appropriate actions.
Fail end/post condition	N/A
Extensions	N/A

4.1.11 Remove published books from the platform (Admin)

Use case name	Remove published books from the platform
Actor	Admin
Description	System's admin can remove a published E-book from the platform due to violations of system standards.
Preconditions	Admin must be logged into the system with the administrative privileges.

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

Main flow	<ol style="list-style-type: none"> 1) The system presents the list of e-books currently in the platform. 2) Admin searches for the name of the book they wish to remove. 3) System presents all the matching results. 4) Admin selects the specific e-book they want to remove. 5) System presents the admin with options to remove the selected-book. 6) Admin selects the "Remove" option. 7) System displays a confirmation box for the admin to confirm their intent to remove the E-book. 8) Admin clicks on the confirm option. 9) System removes the selected e-book from the platform's catalog.
Successful end/post condition	Admin successfully removes the selected e-book making it inaccessible to users.
Fail end/post condition	N/A
Extensions	N/A

4.1.12 Add books to personal library

Use case name	Add books to personal library
Actor	Reader
Description	Readers can add e-books to their personal library for easy access and reading.
Preconditions	The reader must be logged into the system with a valid user account.
Main flow	<ol style="list-style-type: none"> 1) Reader navigates to the desired e-book on the platform. 2) The system displays detailed information about the E-book including its title, author, and cover image. 3) The reader selects the option to add the e-book to their library. 4) The system adds the selected e-book to the reader's personal library.
Successful end/post condition	User can access the selected E-book from their personal library.

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

Fail end/post condition	N/A
Extensions	N/A

4.1.13 Remove books from user's library

Use case name	Remove books from personal library
Actor	Reader
Description	Readers can remove e-books from their personal library.
Preconditions	<ul style="list-style-type: none"> 1) Reader must be logged into the system with a valid user account. 2) Reader must have at least one e-book in their personal library.
Main flow	<ul style="list-style-type: none"> 1) Reader accesses their personal library using either the web application or the mobile application. 2) System displays the list of e-books in the reader's library. 3) Reader selects the e-book they wish to remove. 4) System displays a confirmation box for the reader to confirm their intent to remove the E-book. 5) Reader confirms the removal. 6) System removes the selected e-book from the reader's library and updates the library view.
Successful end/post condition	Selected e-book is successfully removed from the reader's personal library the book no longer appears in their library list.
Fail end/post condition	N/A
Extensions	N/A

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

4.1.14 Highlight Selected Text

Use case name	Highlight Selected Text
Actor	Reader
Description	Users(Readers) can highlight specific sections of text in an eBook for their convenience and for reviews.
Preconditions	1) User must be logged into the system as a registered reader.. 2)User must be reading an E-book.
Main flow	1) Reader selects and highlights a portion of text within the eBook. 2) System immediately highlights the selected content by the reader.
Successful end/post condition	The reader successfully highlights selected text within the eBook.
Fail end/post condition	If the system is unable to highlight the text selected by the reader immediately,it displays an error message.
Extensions	Reader can remove highlights if needed.

4.1.15 Access Digital Dictionary

Use case name	Access Digital Dictionary
Actor	Reader
Description	Users can access a digital dictionary to find the definitions of unknown words that they encounter while reading.
Preconditions	1) Reader must be logged into the system with a valid user account. 2) Reader must be reading an E-book.

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

Main flow	<ol style="list-style-type: none"> 1) Reader encounters an unknown word while reading an E-book. 2) Reader selects the unknown word by tapping on it. 3) System presents a menu with an option to find the meaning of the selected word. 4) Reader chooses the option. 5) System does a quick search for the word's definition within the integrated digital dictionary. 6) System displays the definition in an overlay on the screen and provides an option for the reader to save the definition for future reference. 7) User saves the definition, if desired.
Successful end/post condition	Reader successfully finds the meaning of the unknown word.
Fail end/post condition	If any issues related to the functionality of digital dictionary arise, the system displays an error message to notify users about the problem.
Extensions	N/A

4.1.16 Add a book to favourites

Use case name	Add a book to favourites
Actor	Reader
Description	Readers can add books to their list of favourite books for quick access.
Preconditions	<ol style="list-style-type: none"> 1) Reader must be logged into the system with a valid user account. 2) Reader must have at least one book in their library.

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

Main flow	<ol style="list-style-type: none"> 1) Reader navigates to their library where their books are listed. 2) Reader selects the book he want to add to favourites. 3) System shows an option to “Add to Favourites” 4) Reader chooses the option. 5) System adds the selected book to the readers’s list of favourite books. 6) A confirmation message is sent by system to the reader.
Successful end/post condition	Reader can see his selected book in favourites list.
Fail end/post condition	Reader can not see his previously added books in the favourite list.
Extensions	Reader can remove books in the favourite list

4.1.17 View Saved Definitions

Use case name	View Saved Definitions
Actor	Reader
Description	Readers can access and review previously saved word definitions.
Preconditions	Reader must be logged into the system with a valid user account.
Main flow	<p>Reader navigates to the “View Saved Definitions” option in the mobile application.</p> <p>System displays a list of previously saved words along with their definitions.</p> <p>Reader refers the saved definitions.</p>
Successful end/post condition	Reader successfully views the previously saved word definitions.
Fail end/post condition	N/A
Extensions	If there are no saved definitions, the system displays a message indicating that there are no saved definitions available.

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

4.1.18 Buy a subscription

Use case name	Buy a subscription
Actor	Reader
Description	User should purchase a subscription plan to access the E-books on the platform.
Preconditions	The reader must be logged into the system with a valid user account.
Main flow	<ol style="list-style-type: none"> 1) Reader navigates to the subscription section in the web application. 2) The system presents a list of available subscription plans along with their details. 3) The reader selects the desired subscription plan. 4) System displays the available payment options. 5) Reader selects a payment option and enters the payment details. 6) System processes the payment and activates the selected subscription plan for the reader.
Successful end/post condition	The reader successfully purchases a subscription plan and granted with the access to any of the E-books available on the platform.
Fail end/post condition	If any problem occurs during the payment process, the system displays an error message and the reader's account remains unchanged.
Extensions	N/A

4.1.19 Search the catalog of books

Use case name	Search the catalog of books
Actor	Reader
Description	Users can search for specific books within the platform's catalog.
Preconditions	Reader must be logged into the system with a valid user account.

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

Main flow	<ol style="list-style-type: none"> 1) Reader accesses the search bar within the application. 2) User enters title or author's name or keywords related to the book they want to find. 3) The system processes the search query and displays a list of search results that matches with the input. 4) User clicks on a specific book to view its detailed information.
Successful end/post condition	User is presented with a list of relevant search results.
Fail end/post condition	If the search query doesn't produce any results, system displays a message notifying user that no matching books were found in the catalog.
Extensions	N/A

4.1.20 Visualize AR content

Use case name	Visualize AR content
Actor	Reader
Description	Readers can experience Augmented Reality (AR) content embedded within the books that offer AR features.
Preconditions	<ol style="list-style-type: none"> 1) Reader must be logged into the system with a valid user account. 2) User must have purchased a subscription plan. 3) User must have a compatible device capable of AR interactions.

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

Main flow	<ol style="list-style-type: none"> 1) Reader selects a book with AR features from their personal library in the PIXIE mobile app. 2) System detects the book with AR content and displays an AR activation option. 3) Reader taps on the AR activation option. 4) System activates the device's camera and prompts the reader to scan the AR trigger in the book. 5) Reader aligns the camera with the trigger to initiate AR content visualization. 6) System generates 3D animations and interactive elements related to the book's content. 7) Reader interacts with the AR content by tapping, moving the device, and exploring various angles.
Successful end/post condition	Reader successfully visualizes and interacts with AR content embedded within the book.
Fail end/post condition	If the AR activation is unsuccessful, the system displays an error message indicating the issue.
Extensions	N/A

4.1.21 Read E-books

Use case name	Read E-books
Actor	Reader
Description	Readers can access and read E-books available in the platform.
Preconditions	<ol style="list-style-type: none"> 1) Reader must be logged into the system with a valid user account. 2) User must have purchased a subscription plan.
Main flow	<ol style="list-style-type: none"> 1) User navigates to their personal library using the PIXIE mobile application. 2) User selects a specific E-book they wish to read. 3) System displays the content of the eBook on the screen. 4) User scrolls through the eBook's pages and read the content.

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

Successful end/post condition	User successfully reads the selected eBook.
Fail end/post condition	If any issues arise during the loading of an E-book, the system displays relevant error messages to the user, informing them about the problem.
Extensions	N/A

4.1.22 Bookmark pages

Use case name	Bookmark pages
Actor	Reader
Description	Users can bookmark specific pages in an eBook for later reference.
Preconditions	1) Reader must be logged into the system with a valid user account. 2) Reader must be reading an eBook.
Main flow	1) Reader navigates to the page they want to bookmark while reading an eBook. 2) Reader selects the bookmark option. 3) System adds the current page to the reader's list of bookmarks. 4) Reader receives a confirmation message indicating successful bookmarking.
Successful end/post condition	Reader successfully bookmarks the current page for future reference.
Fail end/post condition	Reader can not see previously added bookmarks to pages.
Extensions	N/A

4.1.23 Add comments to highlighted sections

Use case name	Add comments to highlighted sections.
Actor	Reader
Description	Reader can add comments to sections of text that they have highlighted while reading an eBook.

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

Preconditions	<ol style="list-style-type: none"> 1) Reader must be logged into the system with a valid user account. 2) Reader must have previously highlighted a section of text.
Main flow	<ol style="list-style-type: none"> 1) Reader selects a section of highlighted text. 2) Reader taps on the highlighted text to open a comment box. 3) System presents a comment box where the reader can enter their comment. 4) Reader enters their comment and submits it. 5) System associates the comment with the highlighted section of text.
Successful end/post condition	Reader's comment is successfully added to the highlighted section of text.
Fail end/post condition	N/A
Extensions	N/A

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

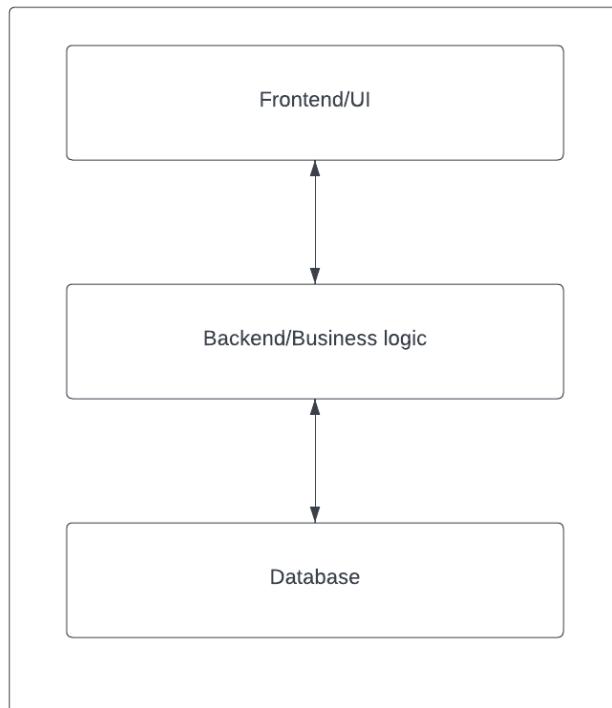
5. Logical View

5.1 Overview

The system is composed of the user interface, application logic and database access modules. The user interface module is further subdivided into the graphical user interface module and the voice interface module.

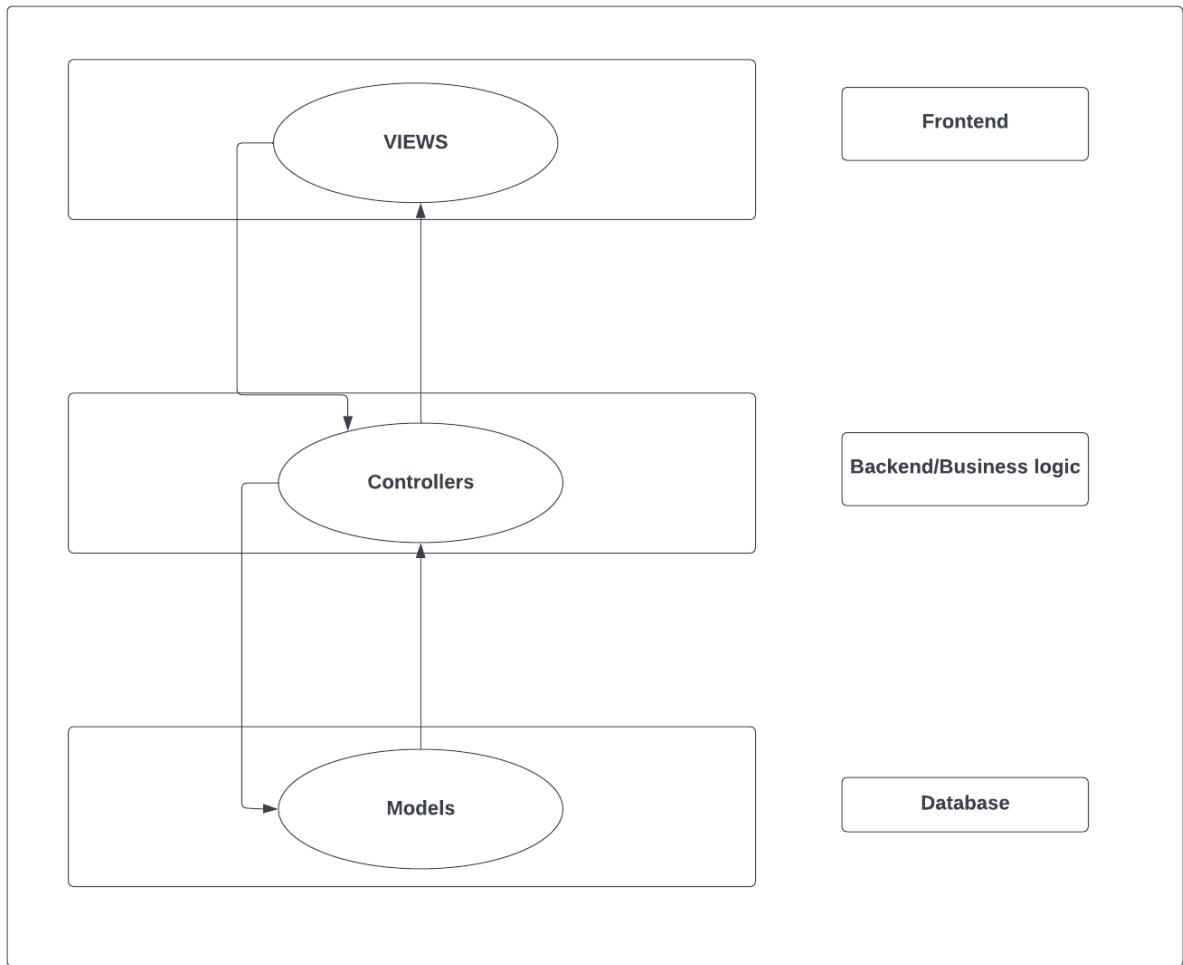
Architecture at large

Both the web app and the mobile app are based on a 3 layer architecture.



Inside the 3 layer architecture a MVC architecture pattern is used

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

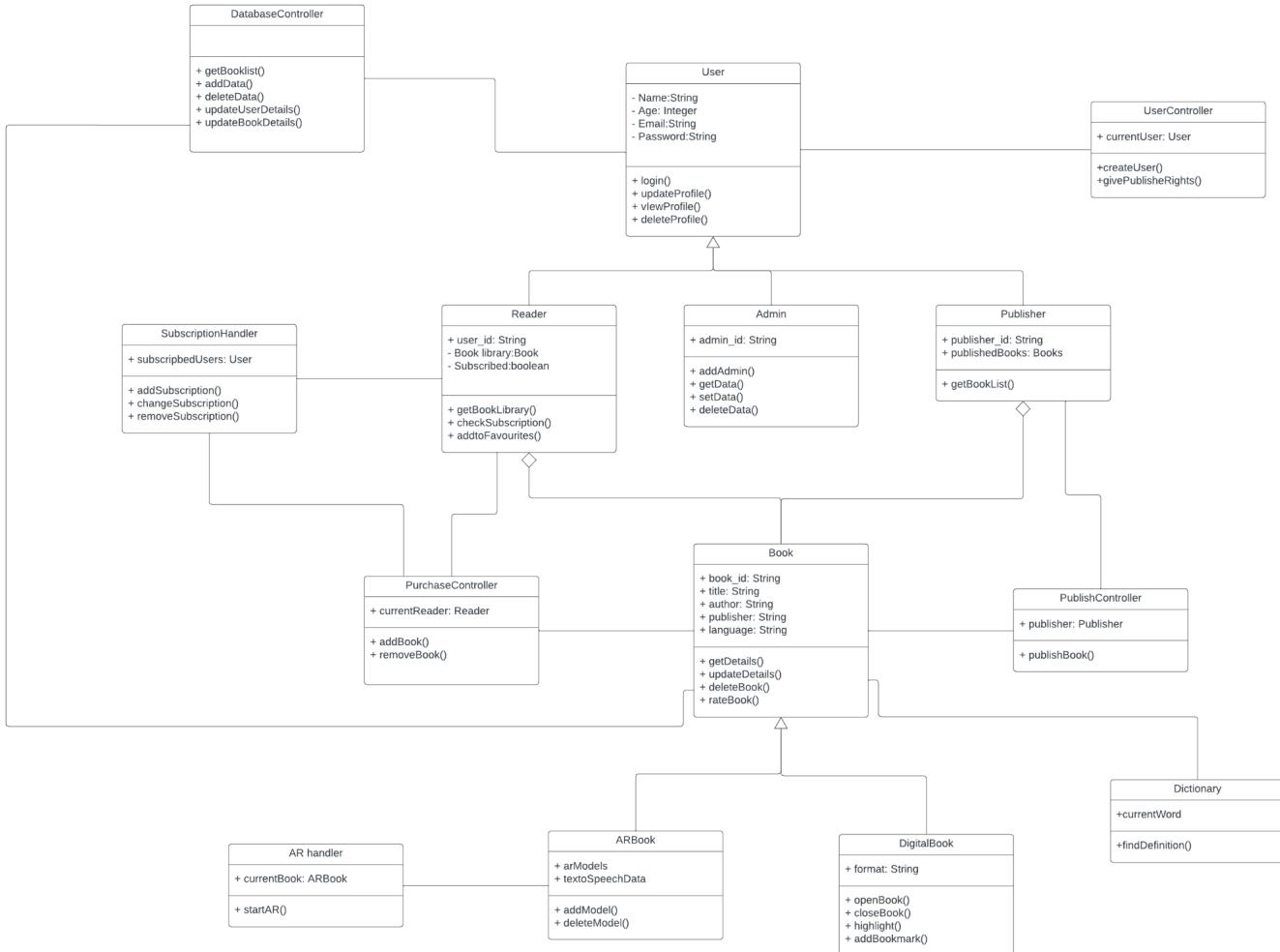


PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

5.2 Architecturally Significant Design Packages

Class Diagram

Class diagram description

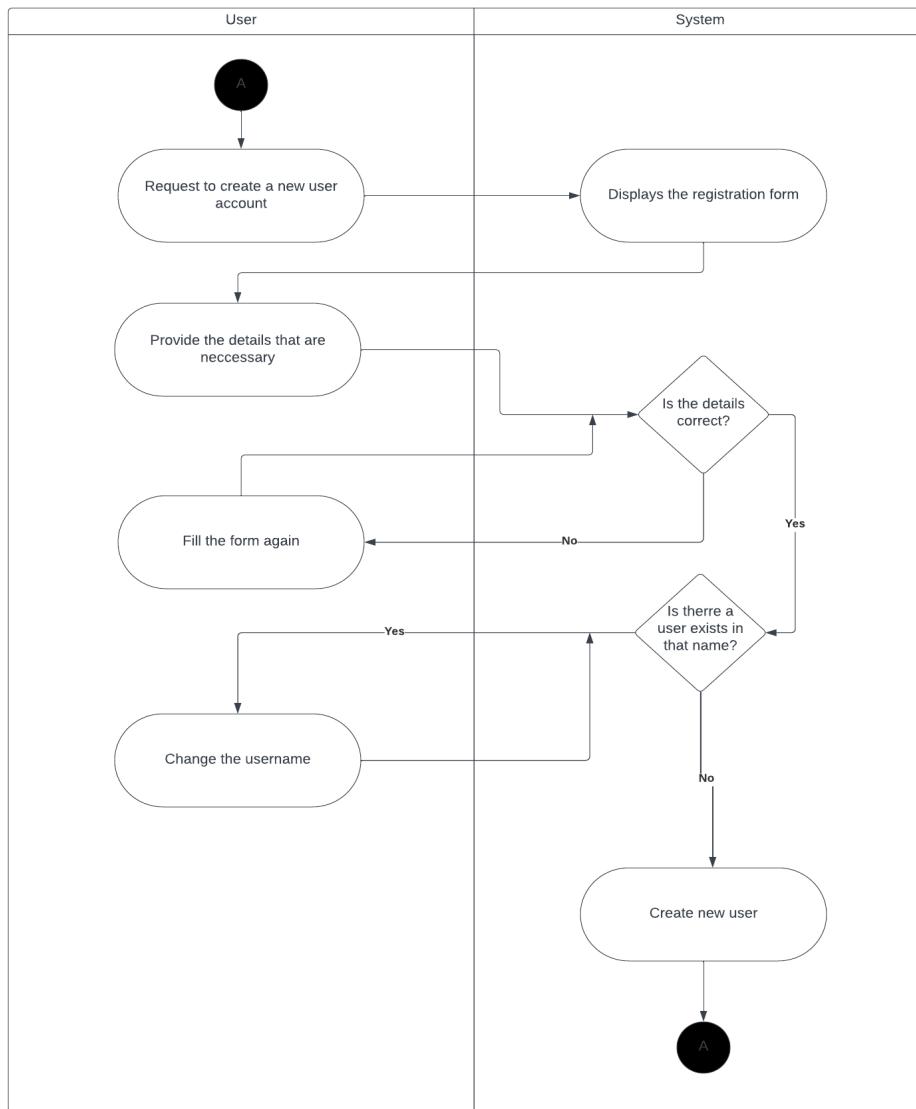


PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6. Process View

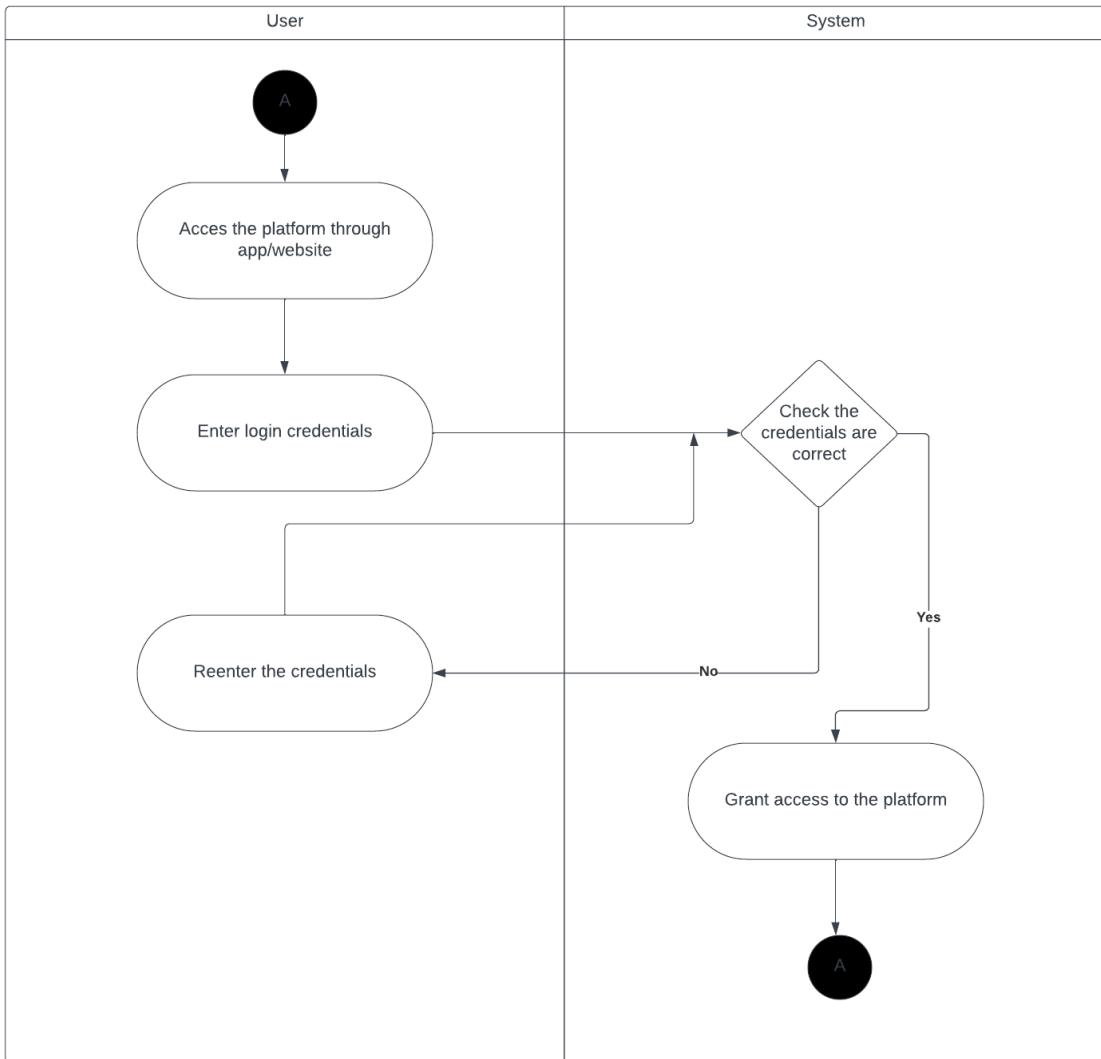
6.1 Activity Diagram

6.1.1 Create a user Account



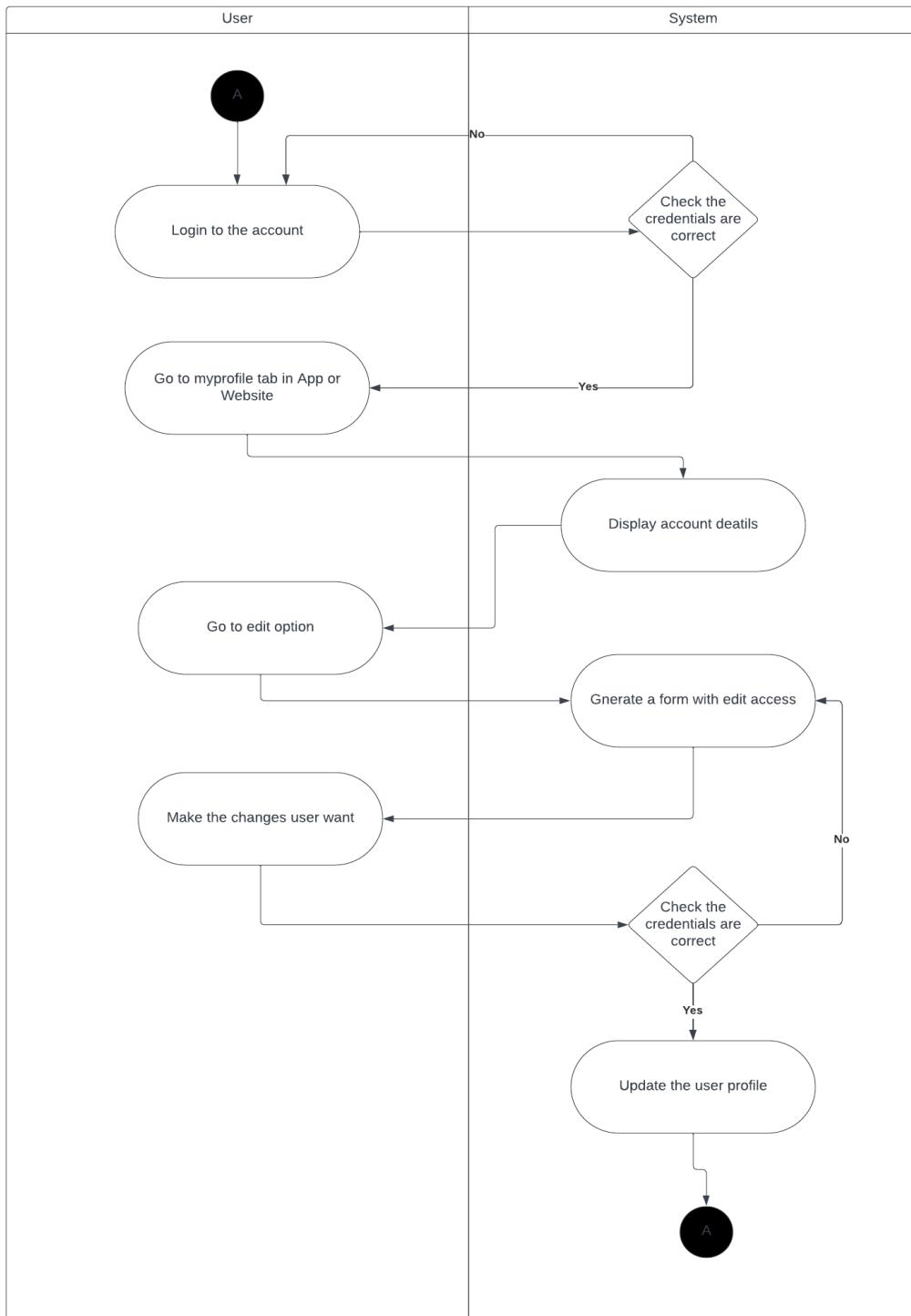
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.1.2 Login to system



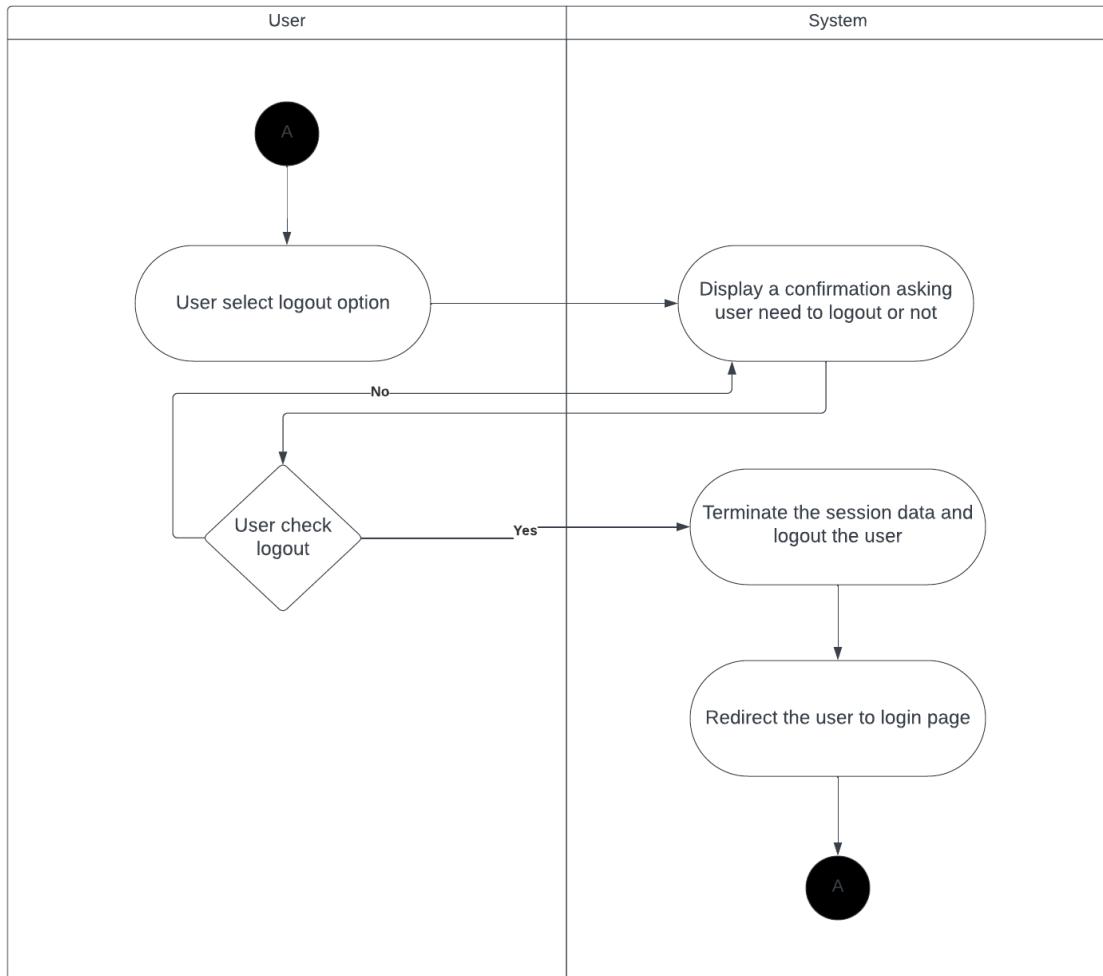
6.1.3 Edit user account details

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	



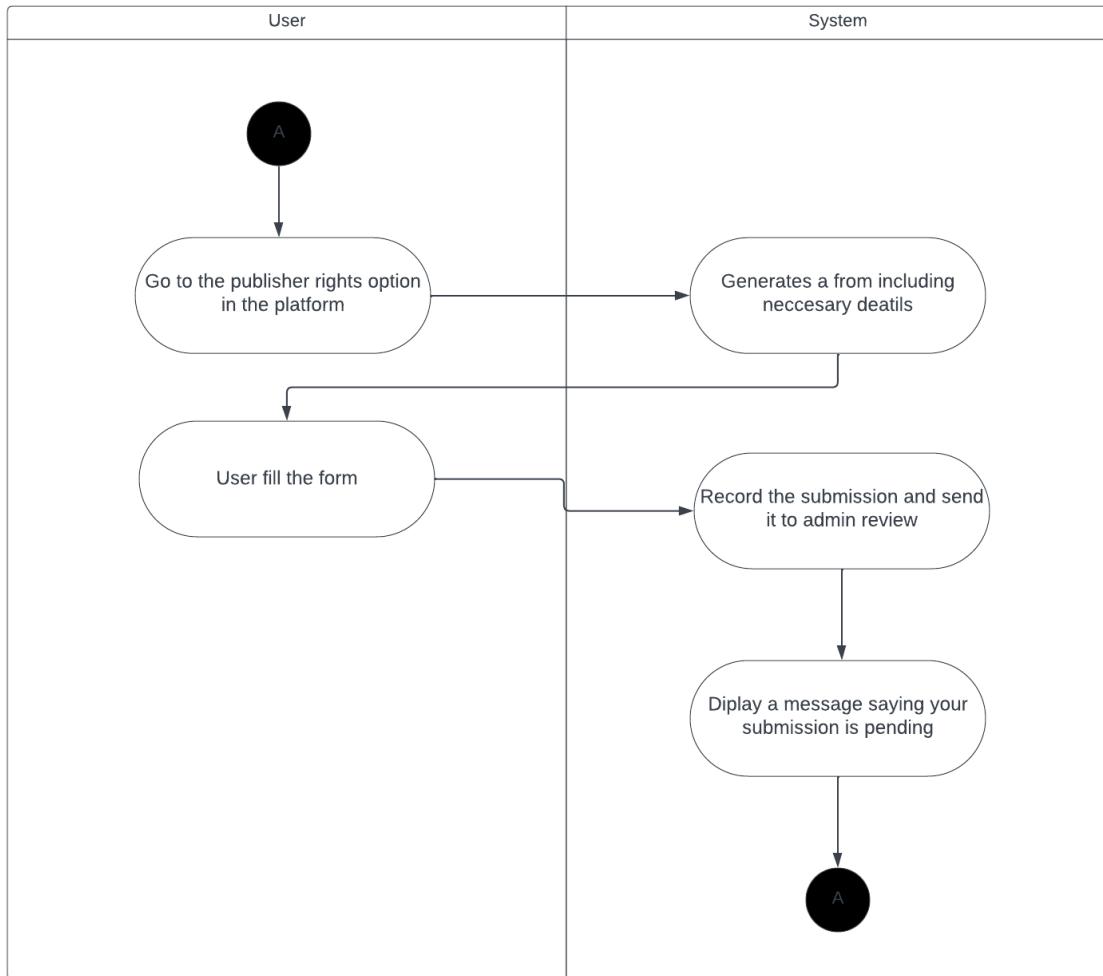
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.1.4 Logout



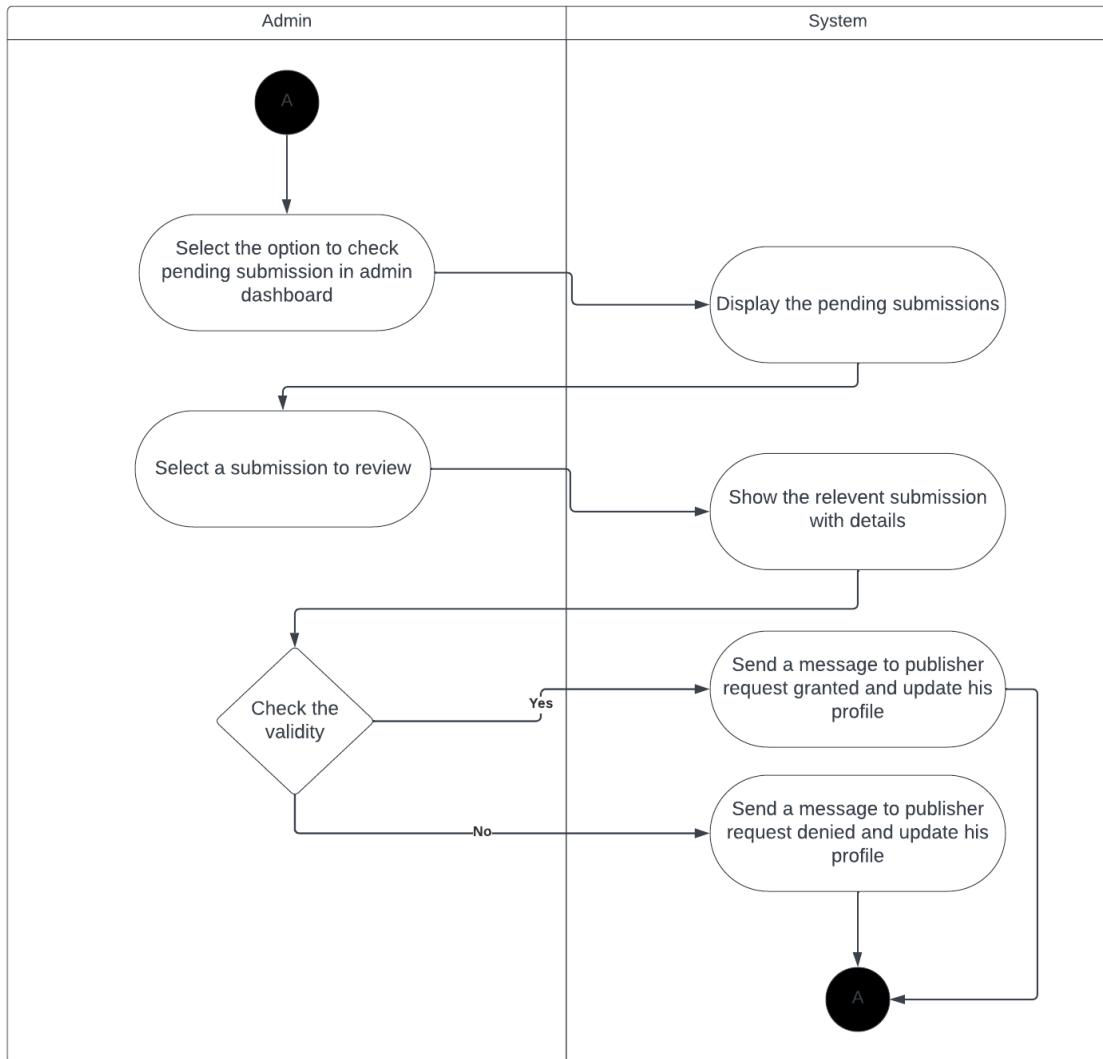
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.1.5 Apply for publisher rights



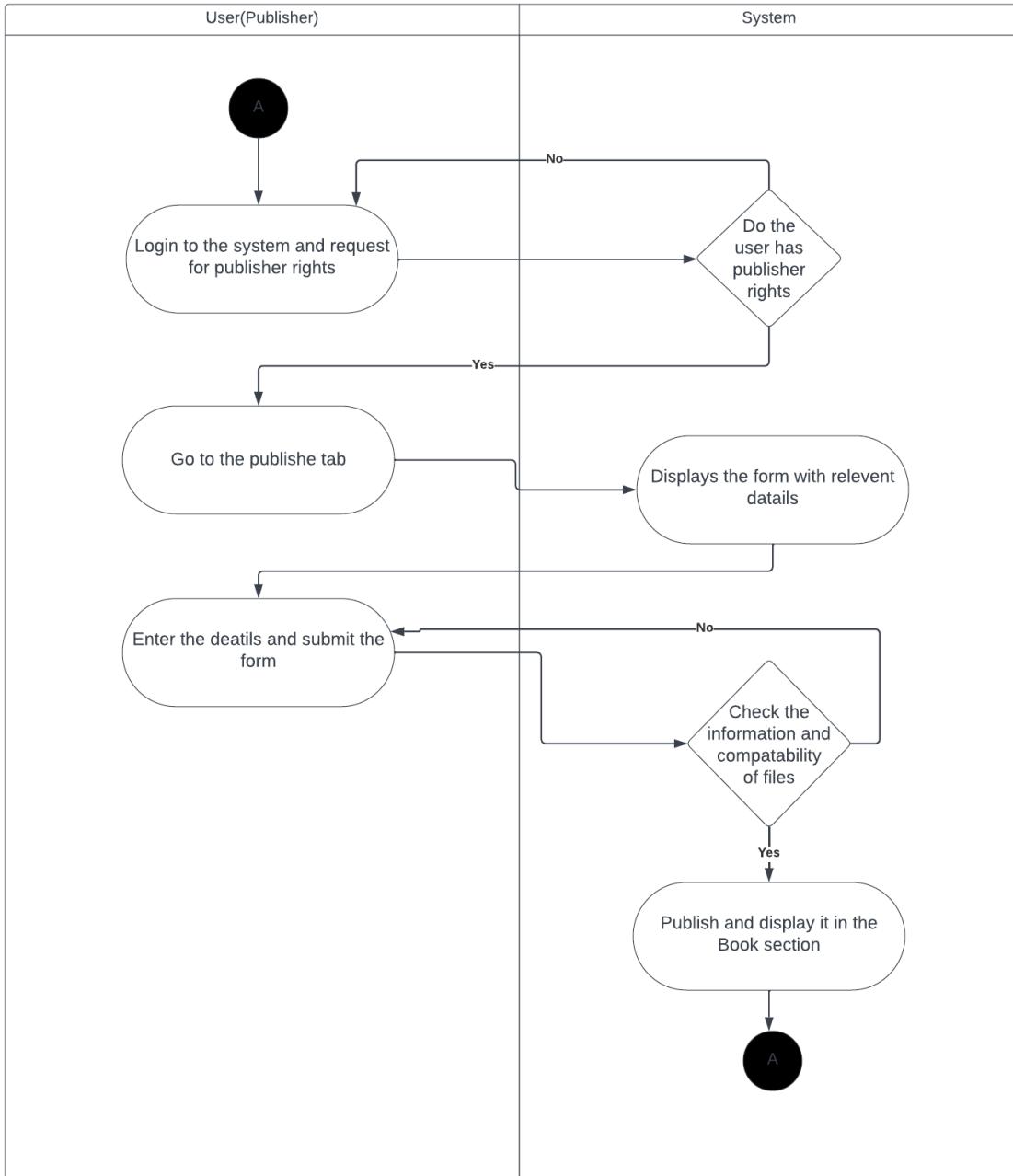
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.1.6 Assign publisher rights



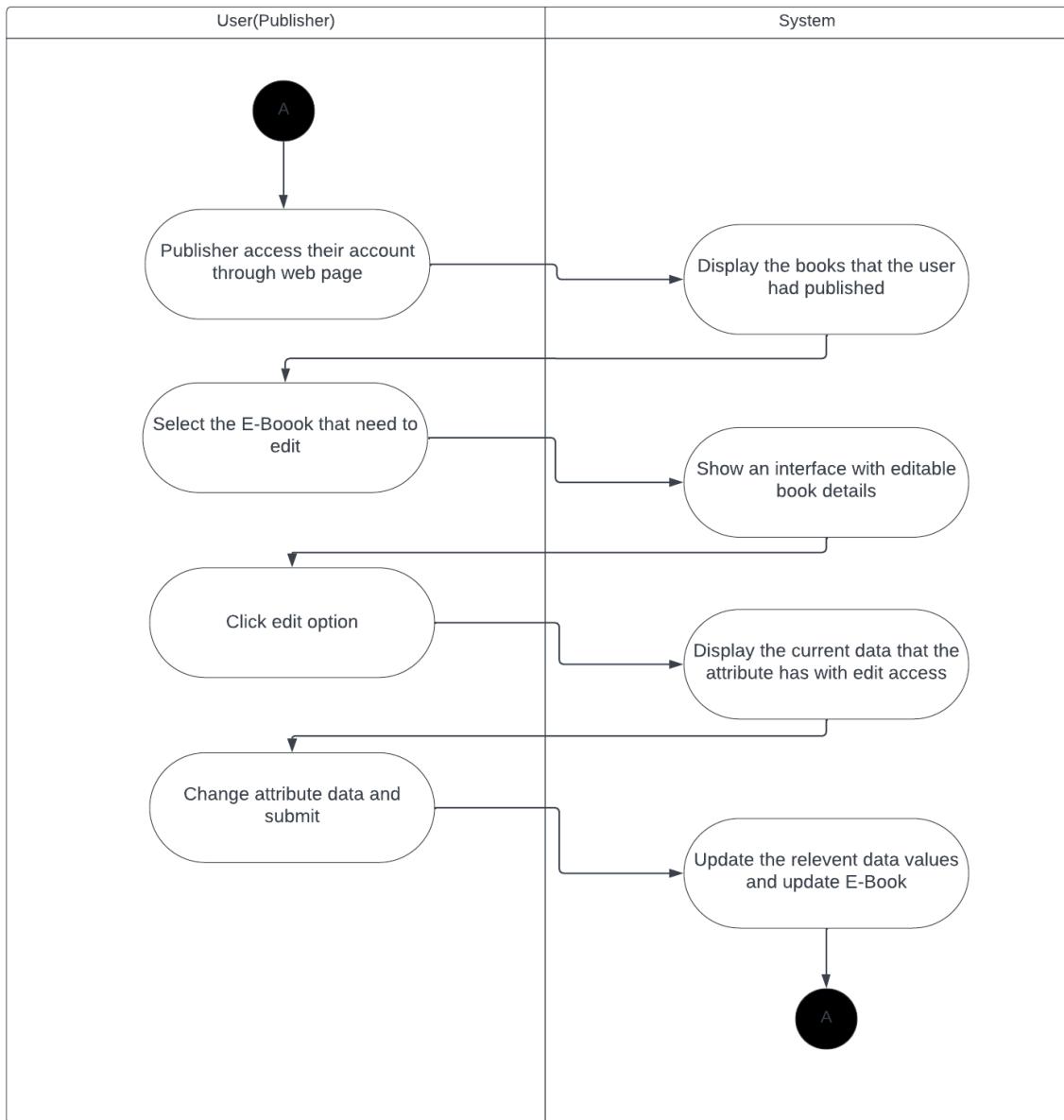
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.1.7 Publish an E-Book



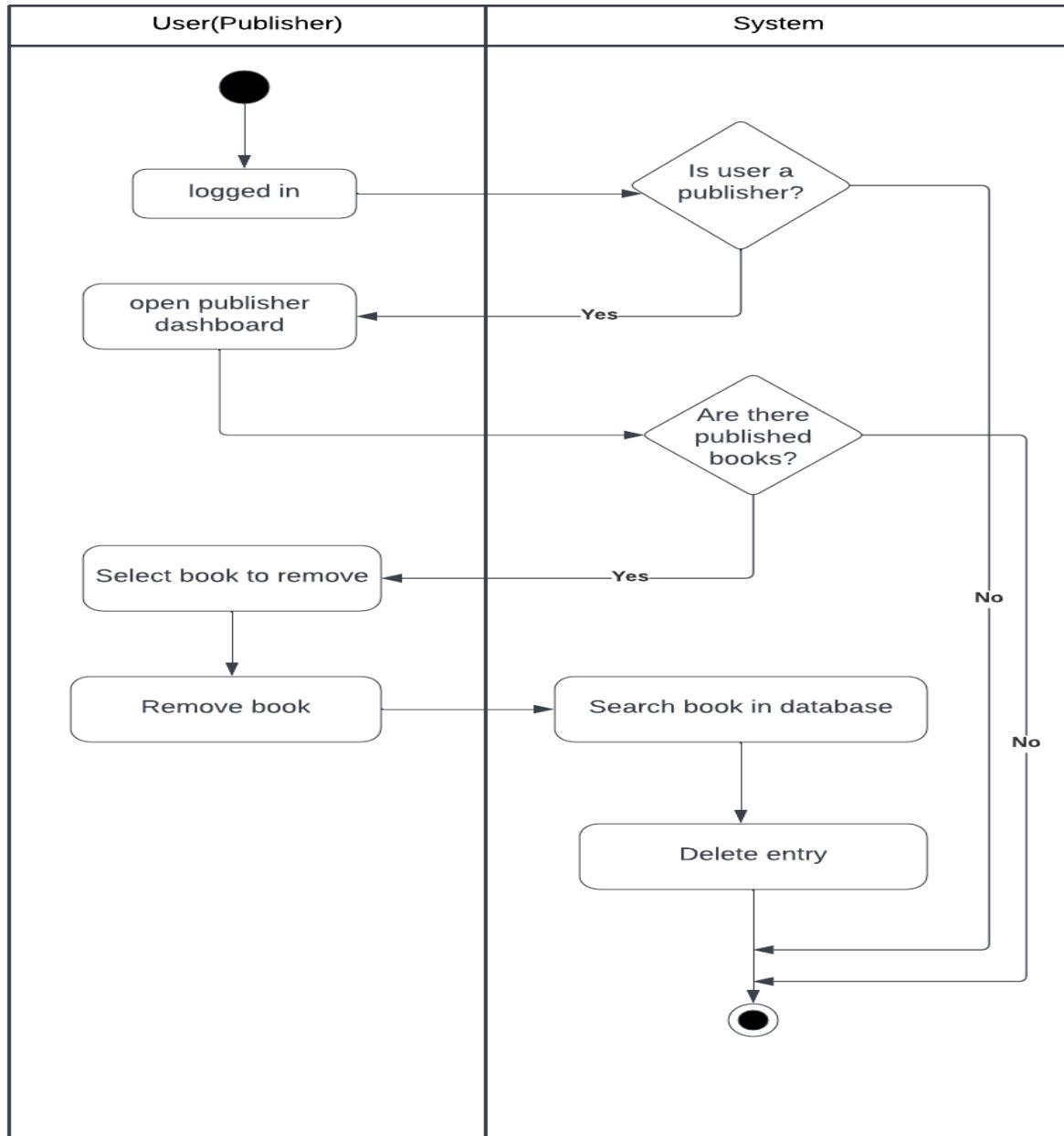
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.1.8 Edit E-Book's details



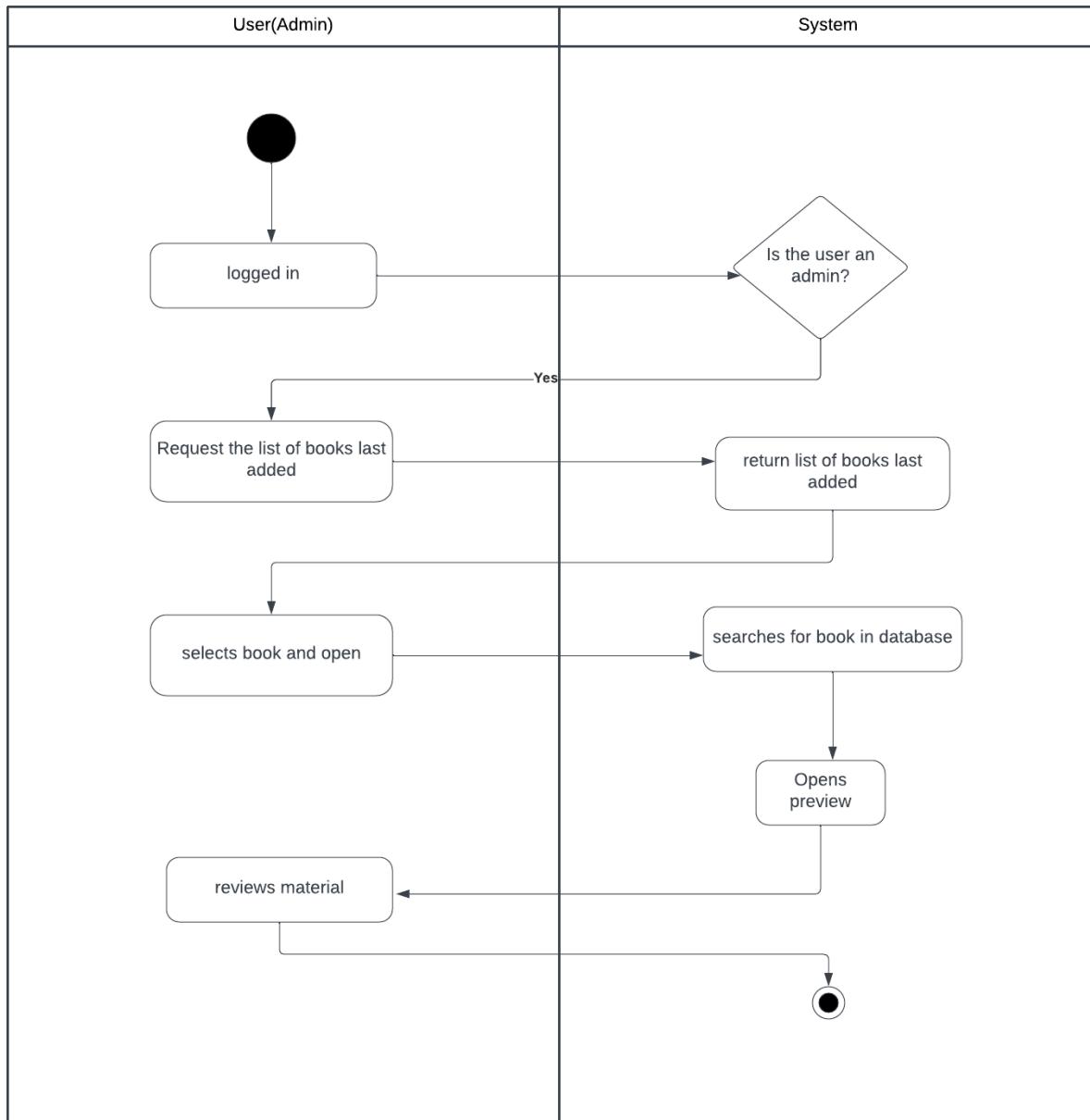
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.1.9 Remove published E-Book from the platform (Publisher)



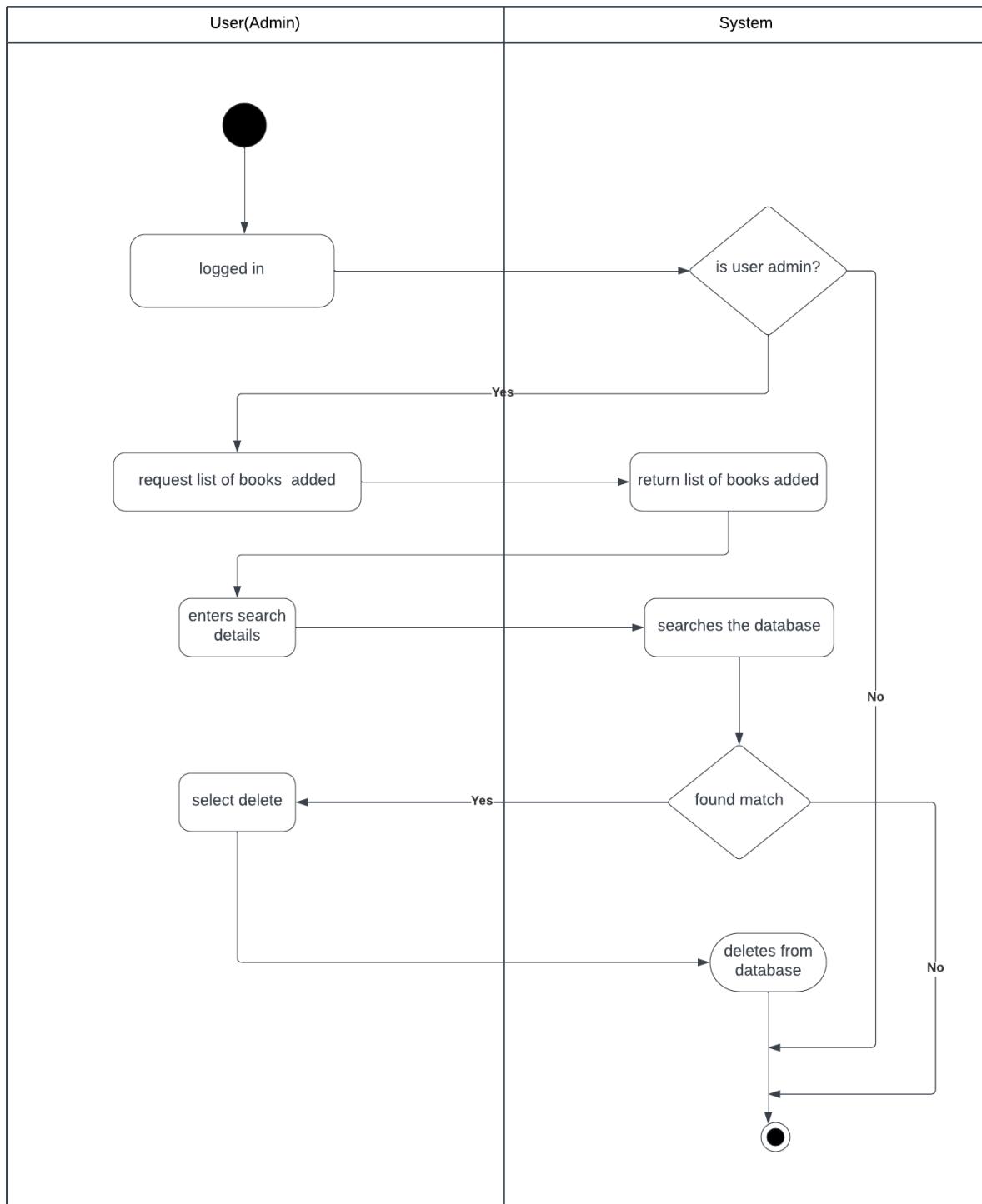
6.1.10 Review the content of E-Books

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	



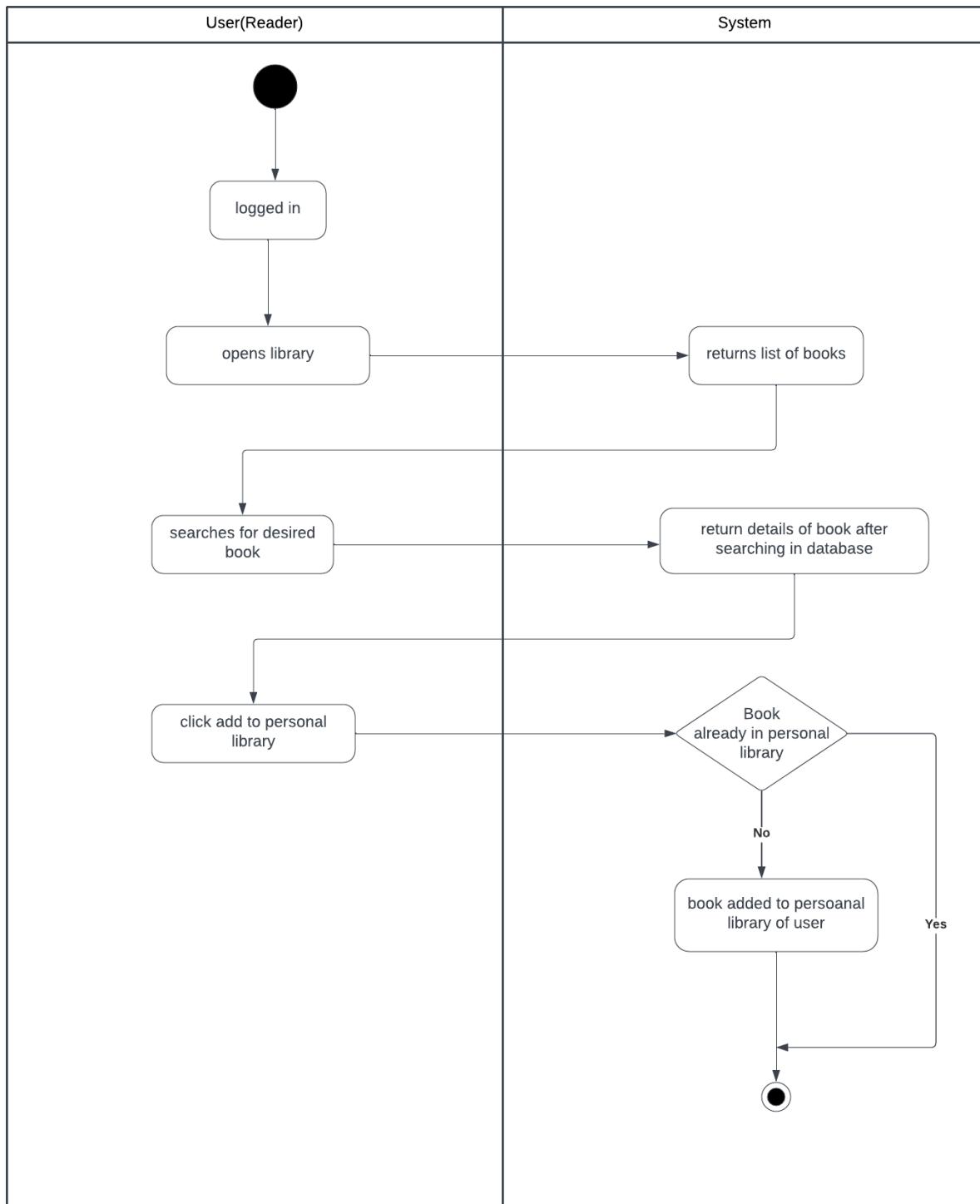
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.1.11 Remove published E-Books from the platform (Admin)



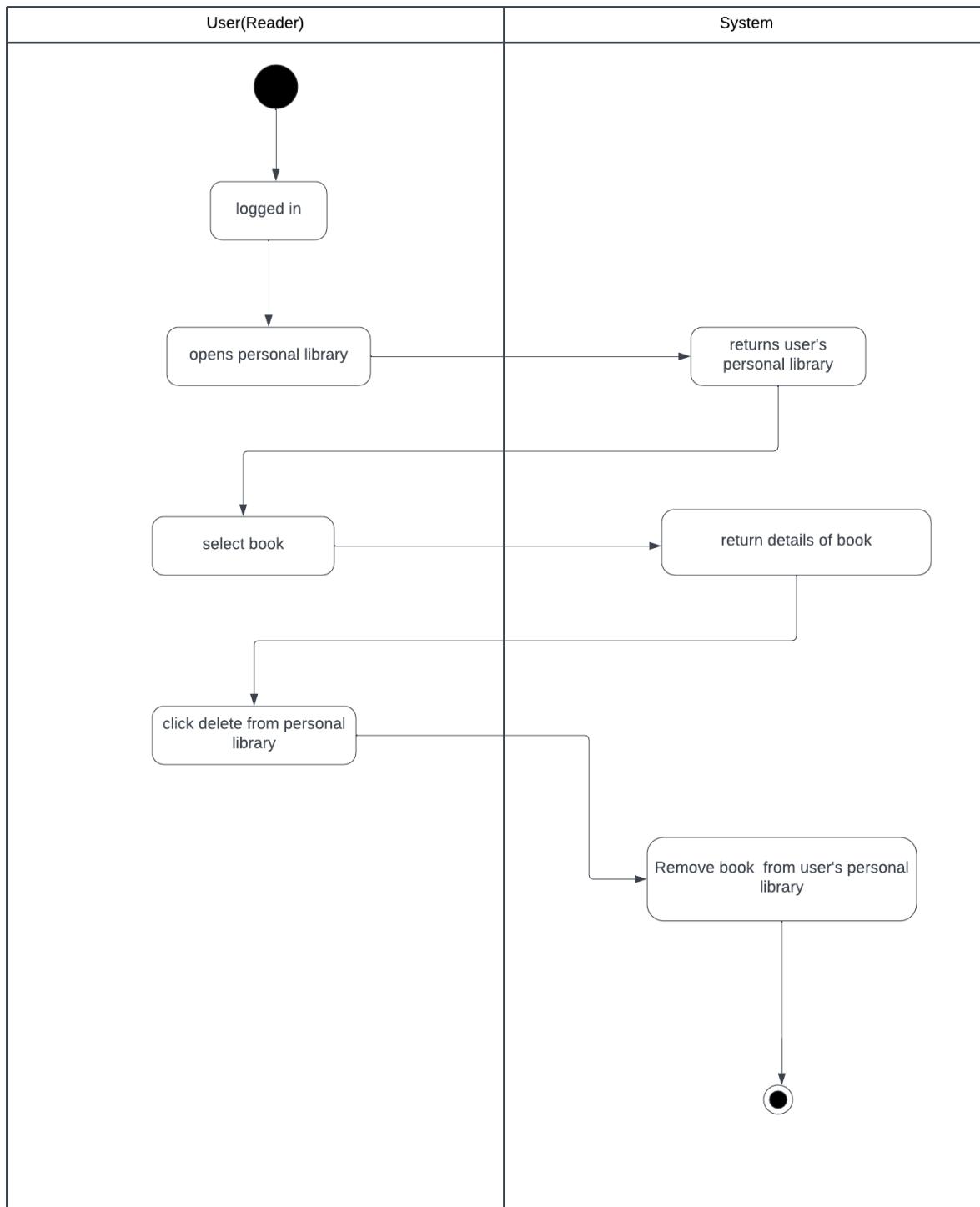
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.1.12 Add books to personal library



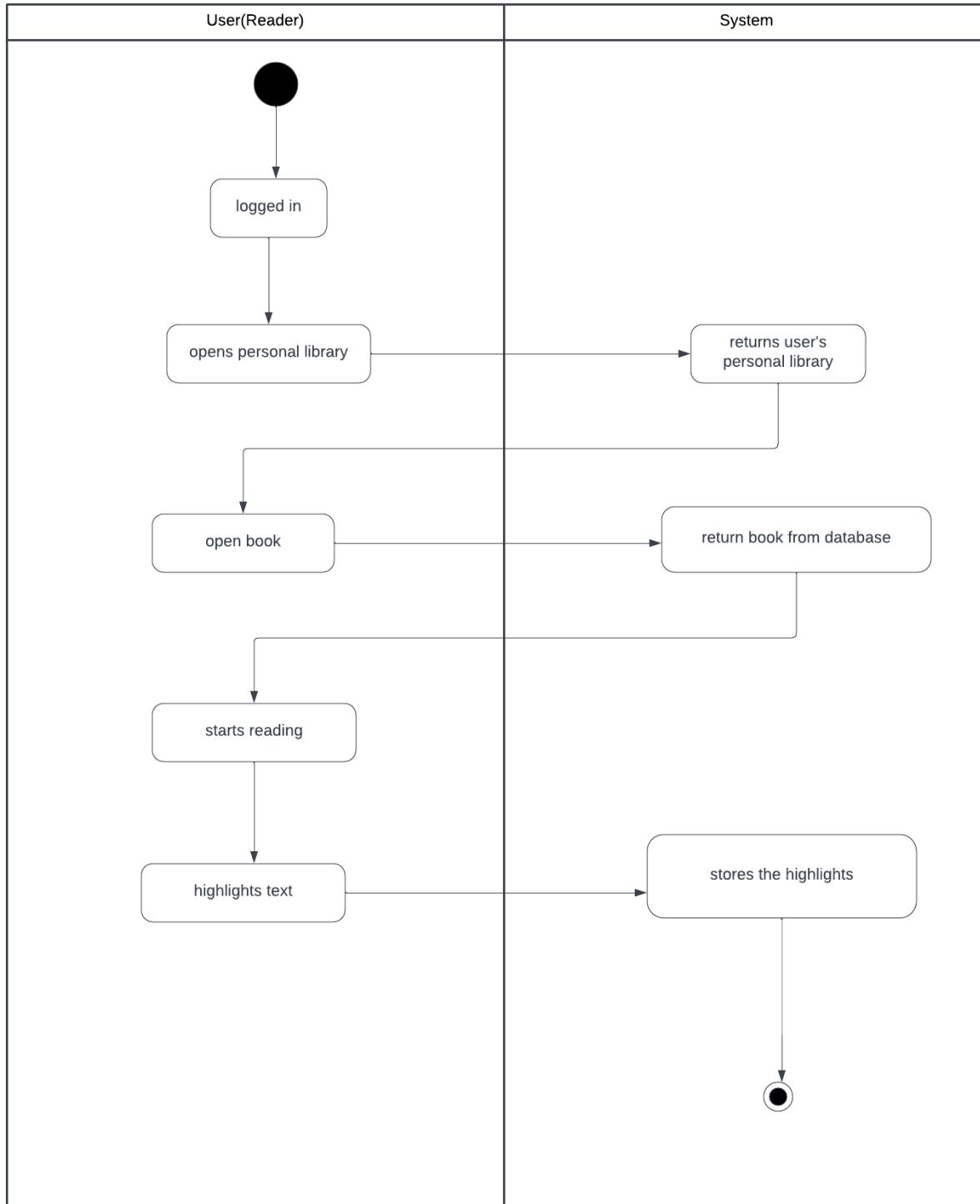
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.1.13 Remove books from user's library



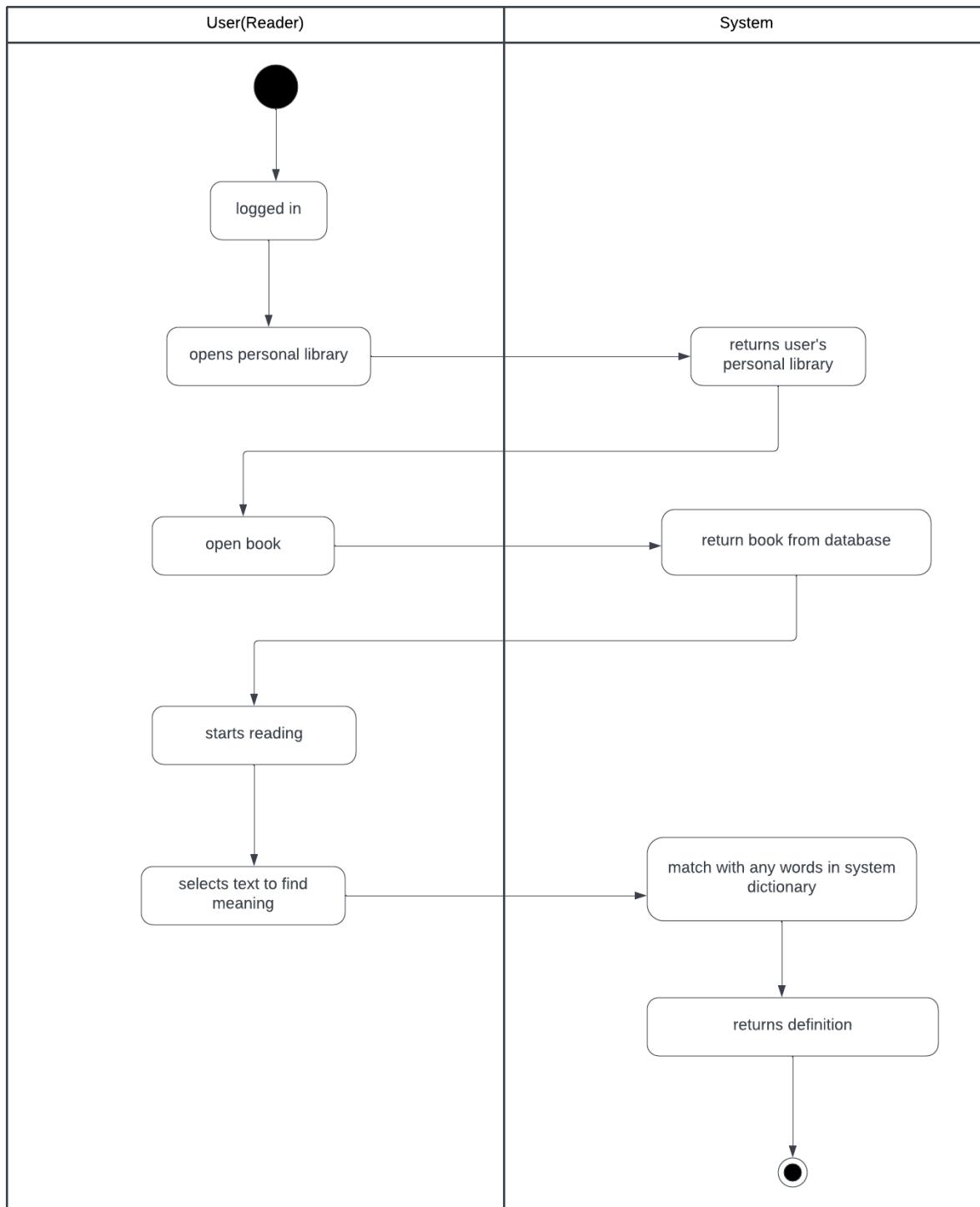
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.1.14 Highlight selected texts



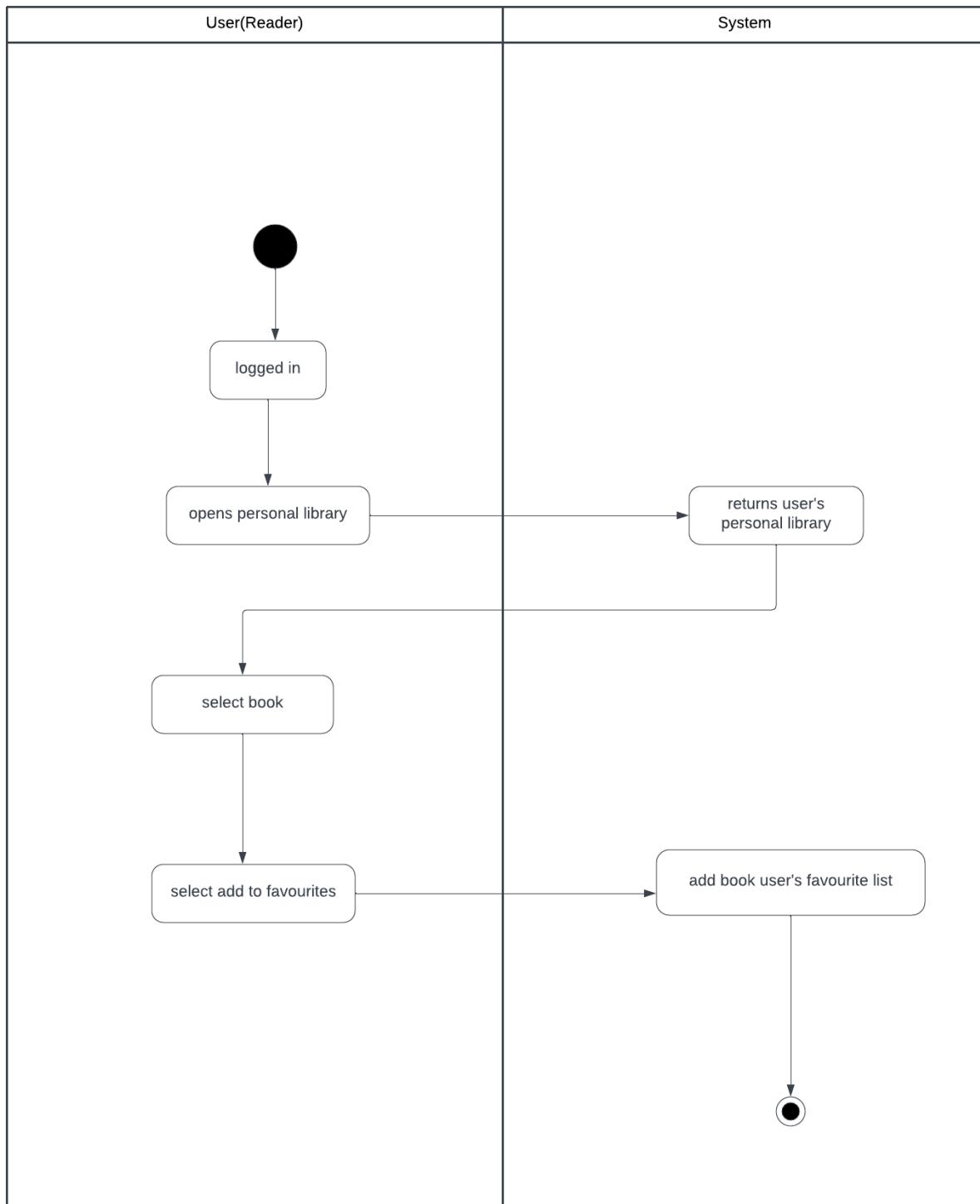
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.1.15 Access digital dictionary



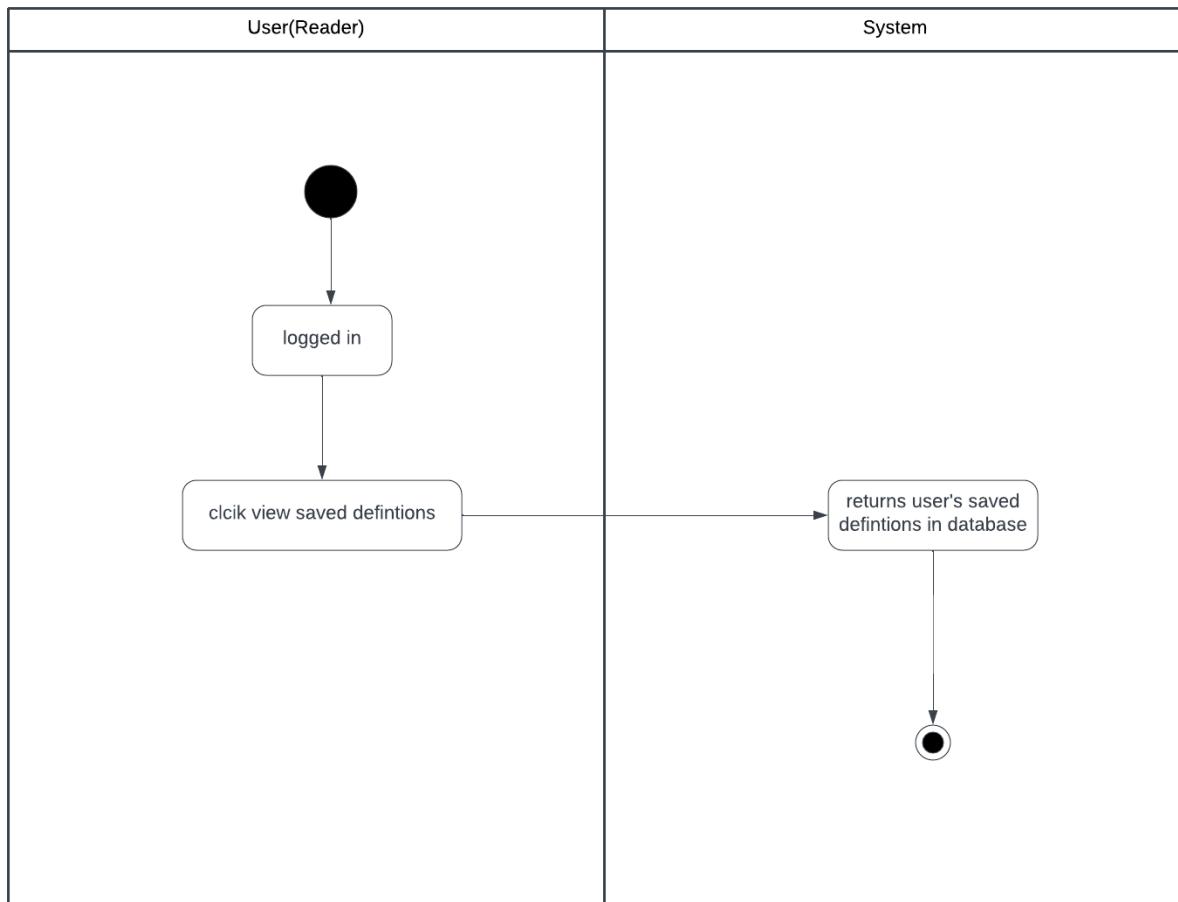
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.1.16 Add a book to favorites



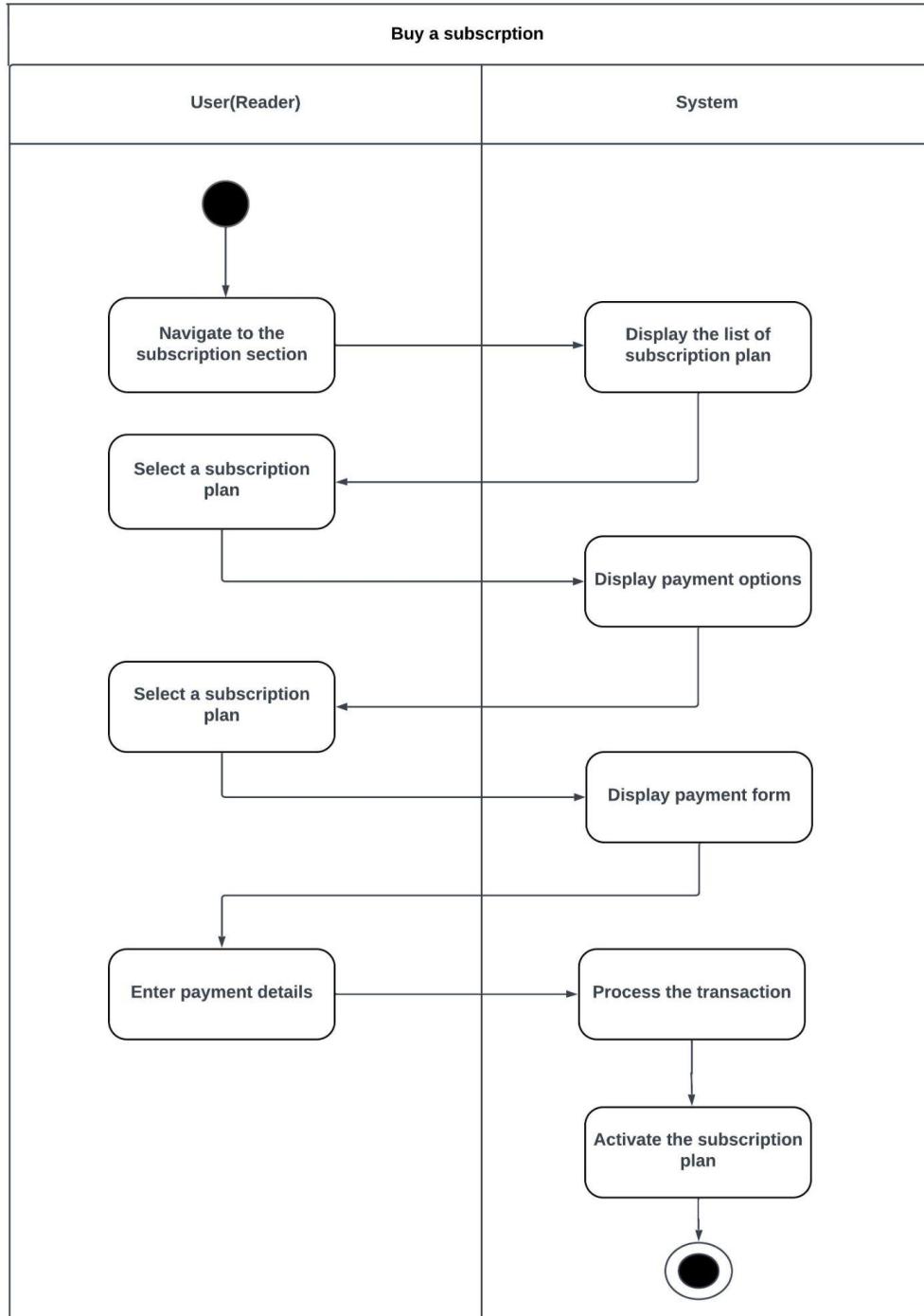
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.1.17 View saved definitions



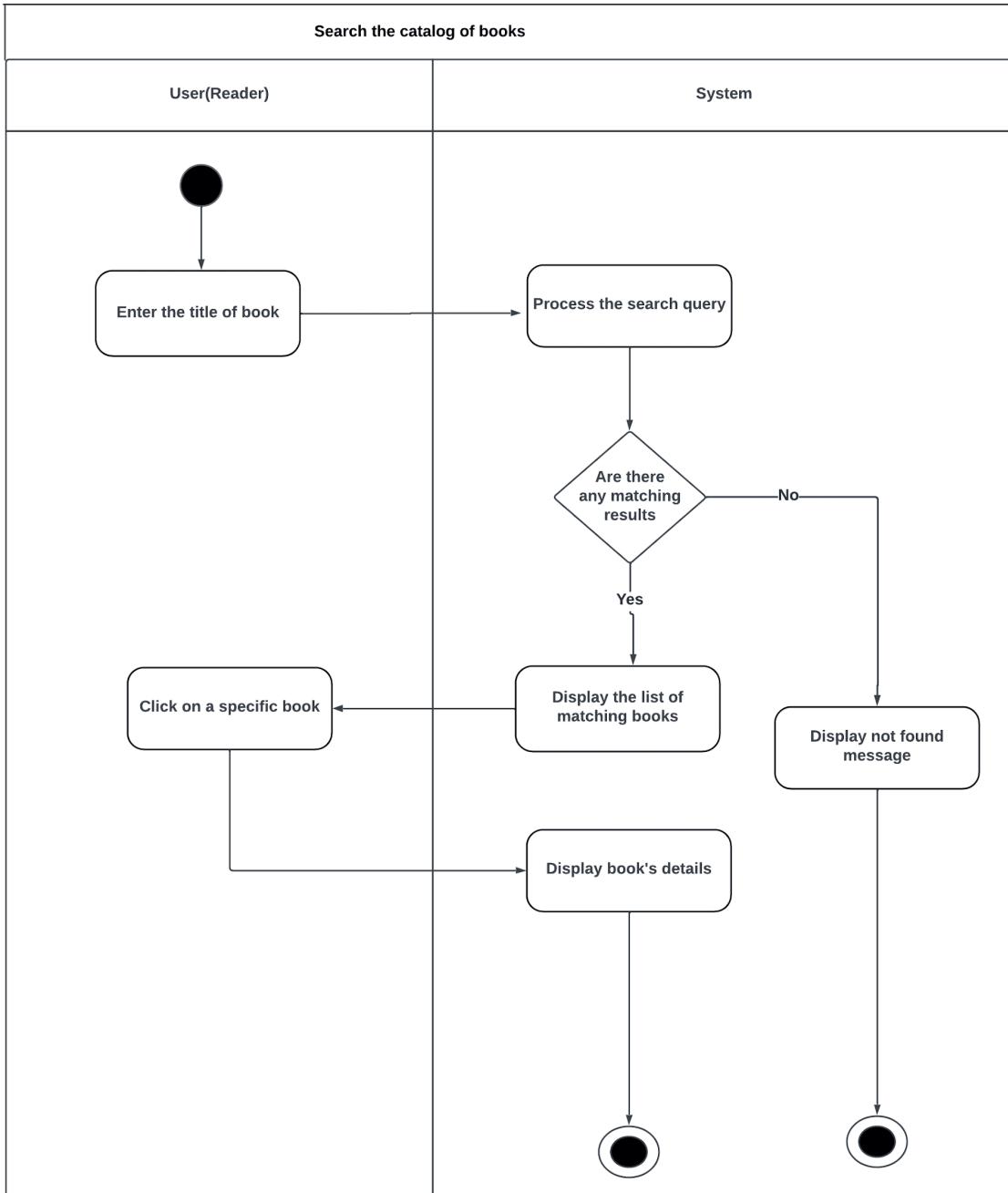
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.1.18 Buy a subscription



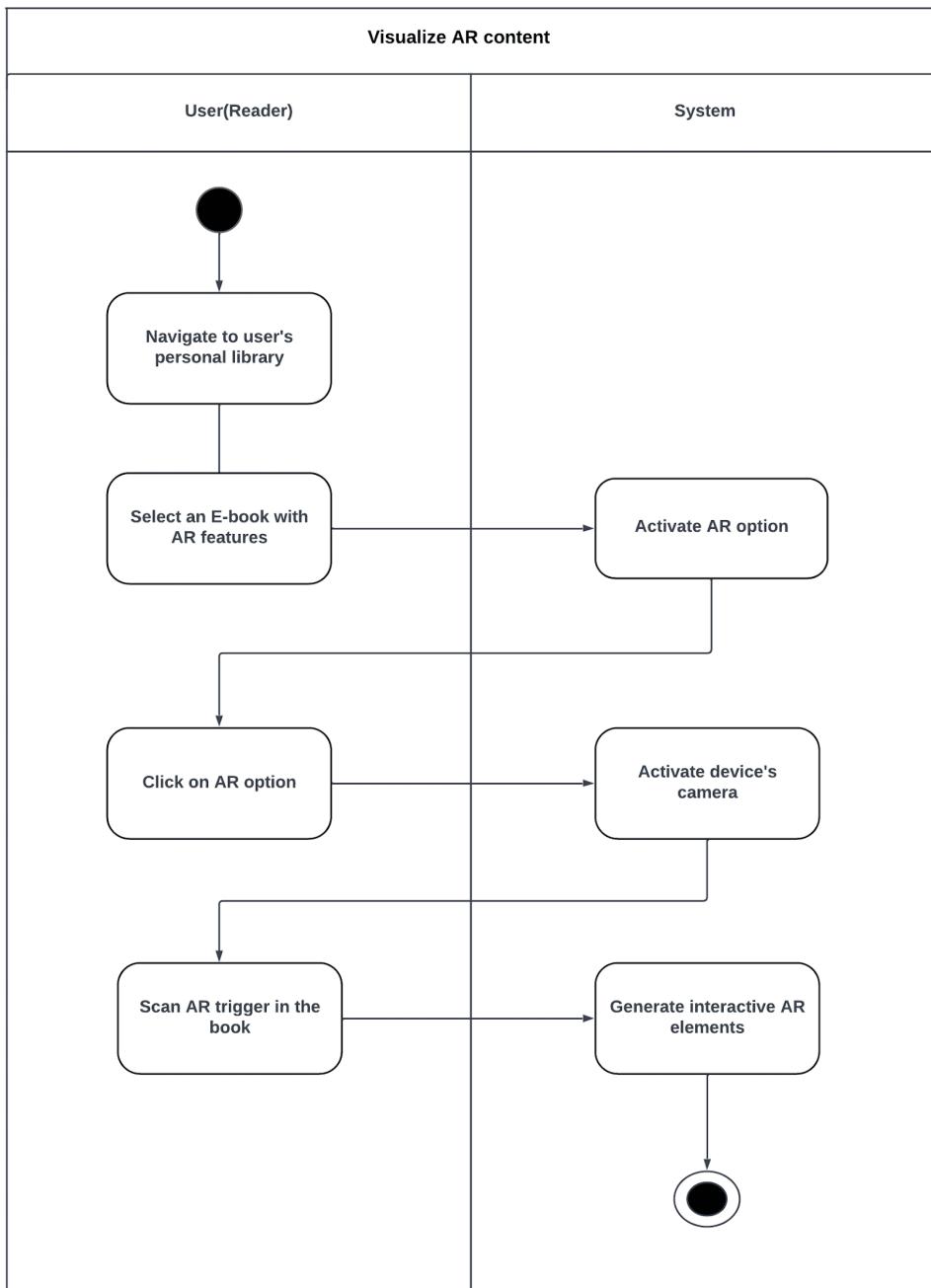
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.1.19 Search the catalog of books



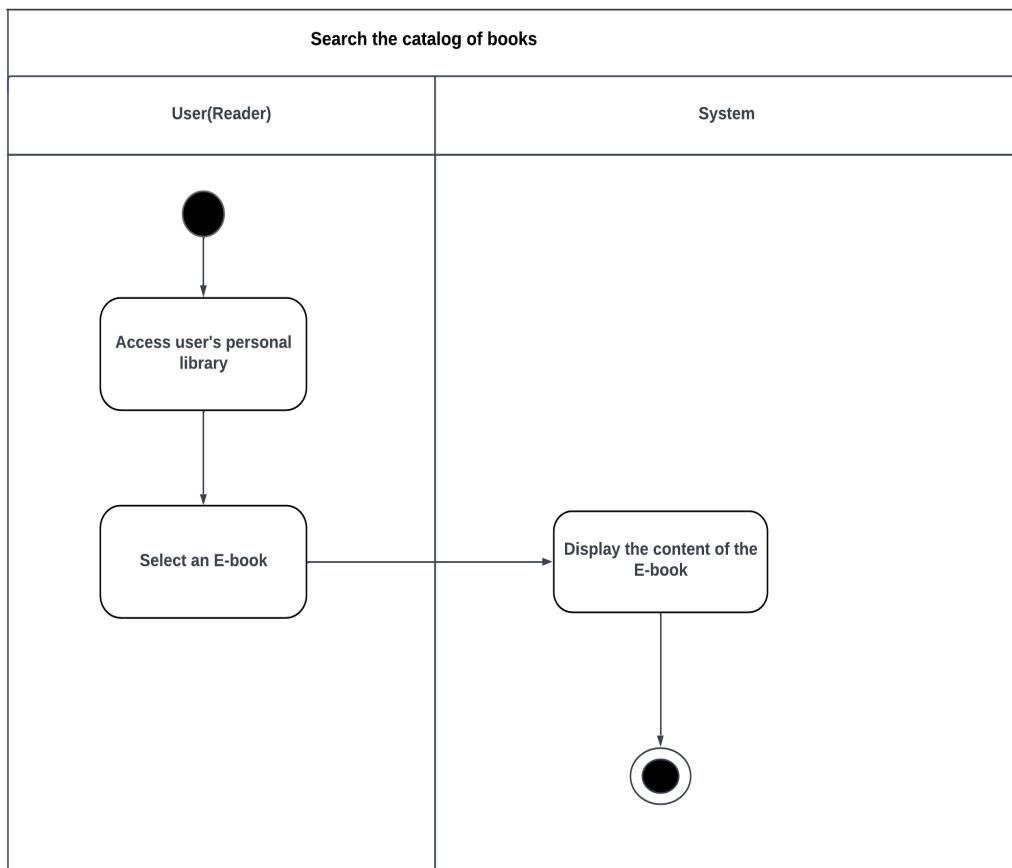
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.1.20 Visualize AR content



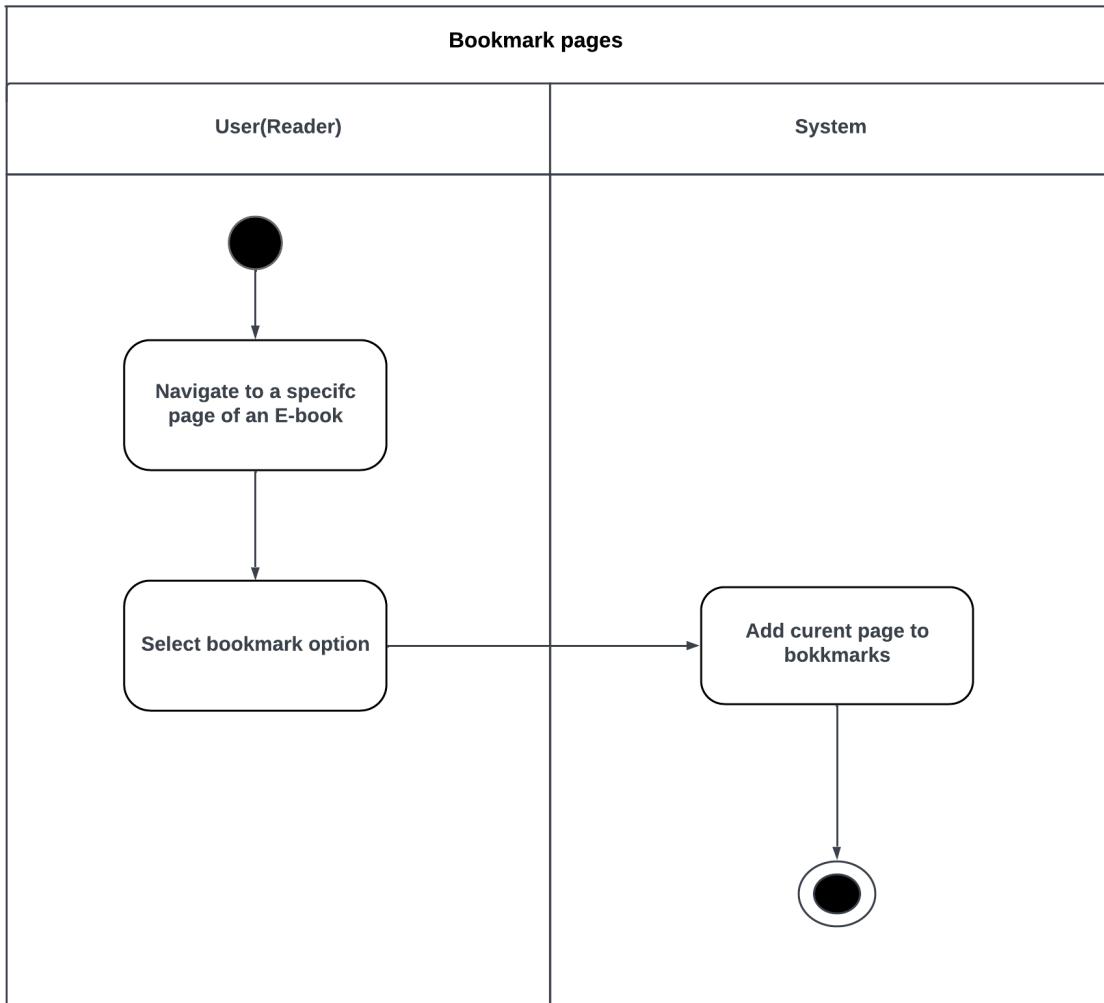
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.1.21 Read E-Books



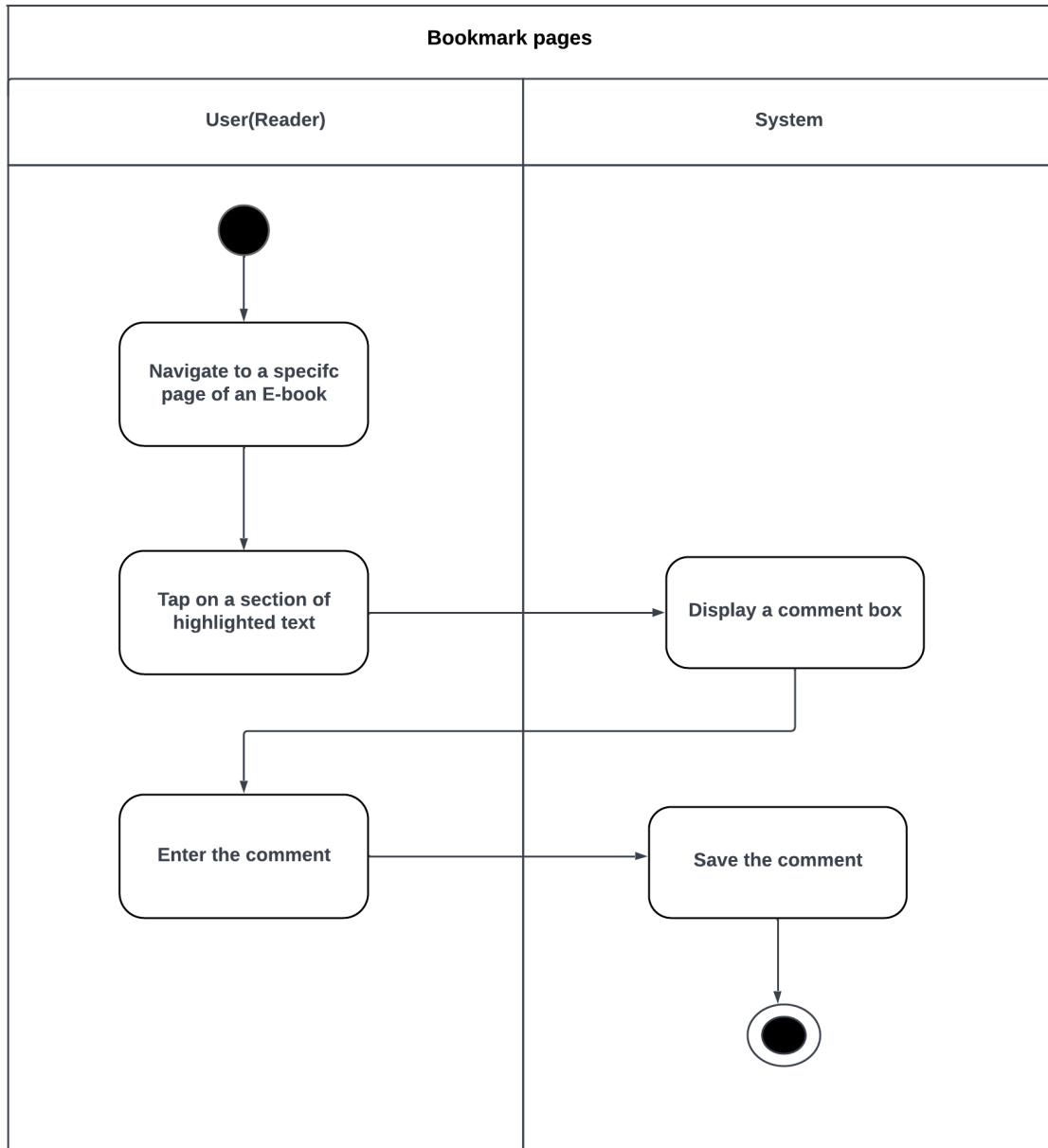
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.1.22 Bookmark pages



PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

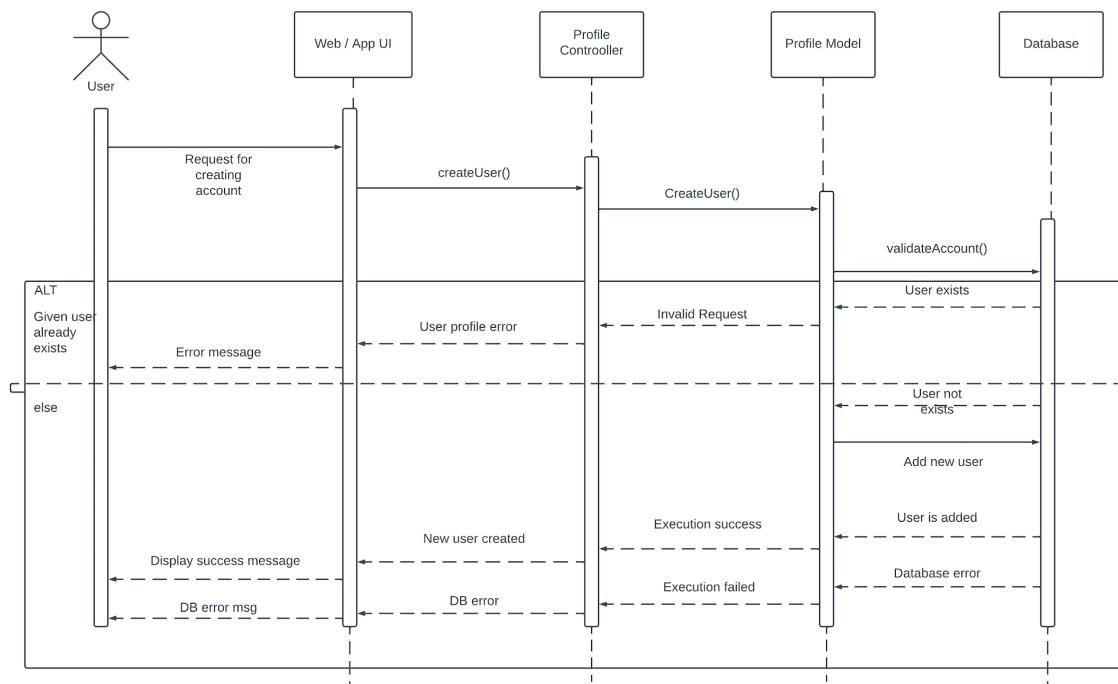
6.1.23 Add comments to highlighted sections



PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

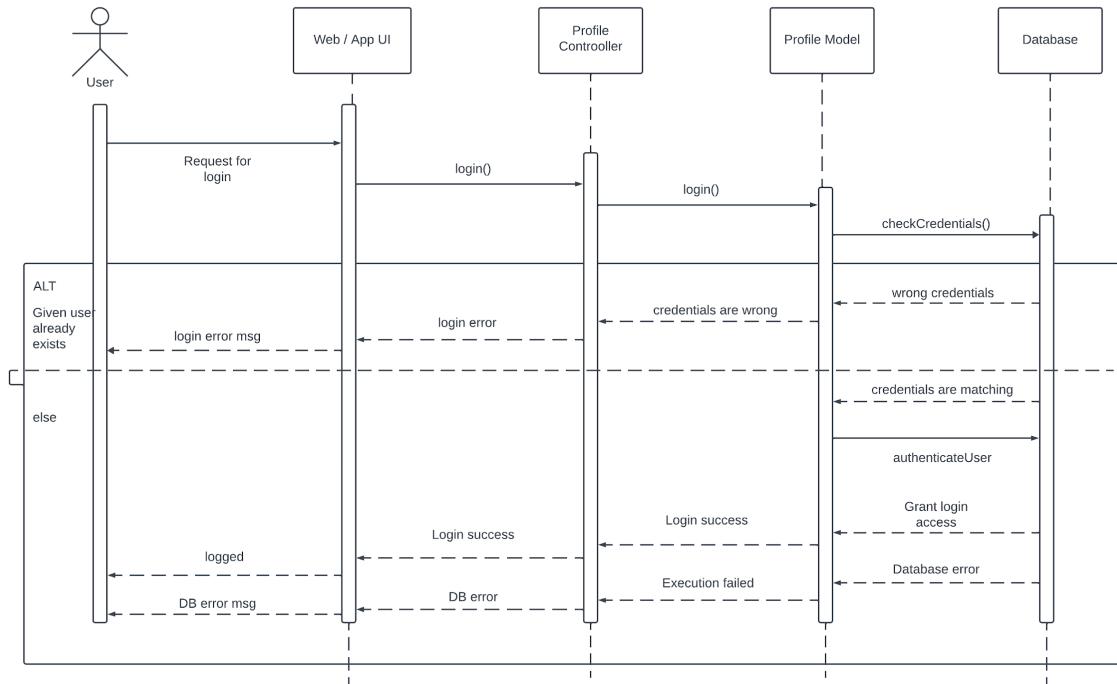
6.2 Sequence Diagram

6.2.1 Create a user account



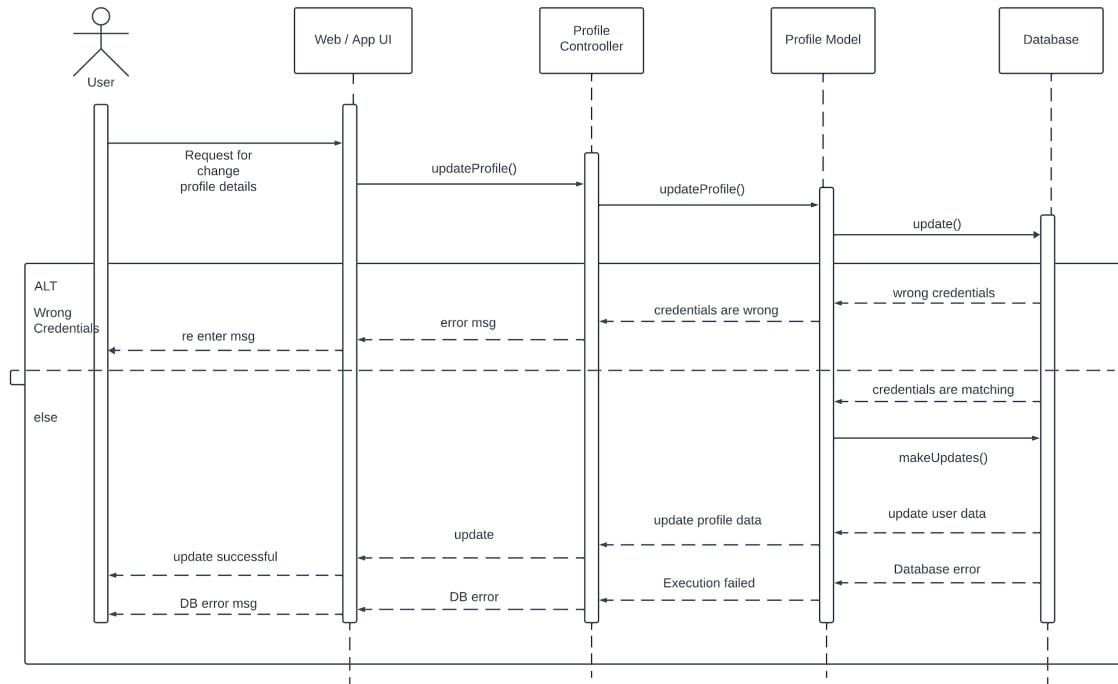
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.2.2 Login to system



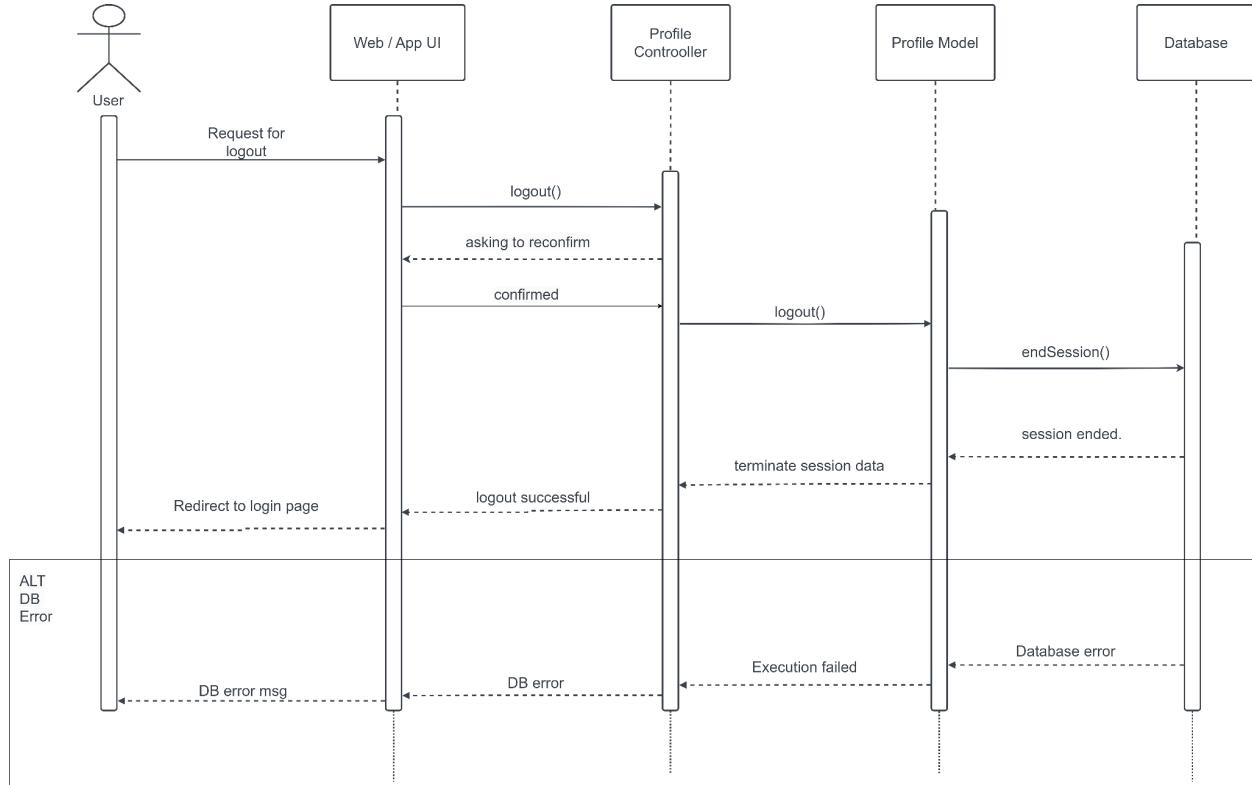
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.2.3 Edit user account details



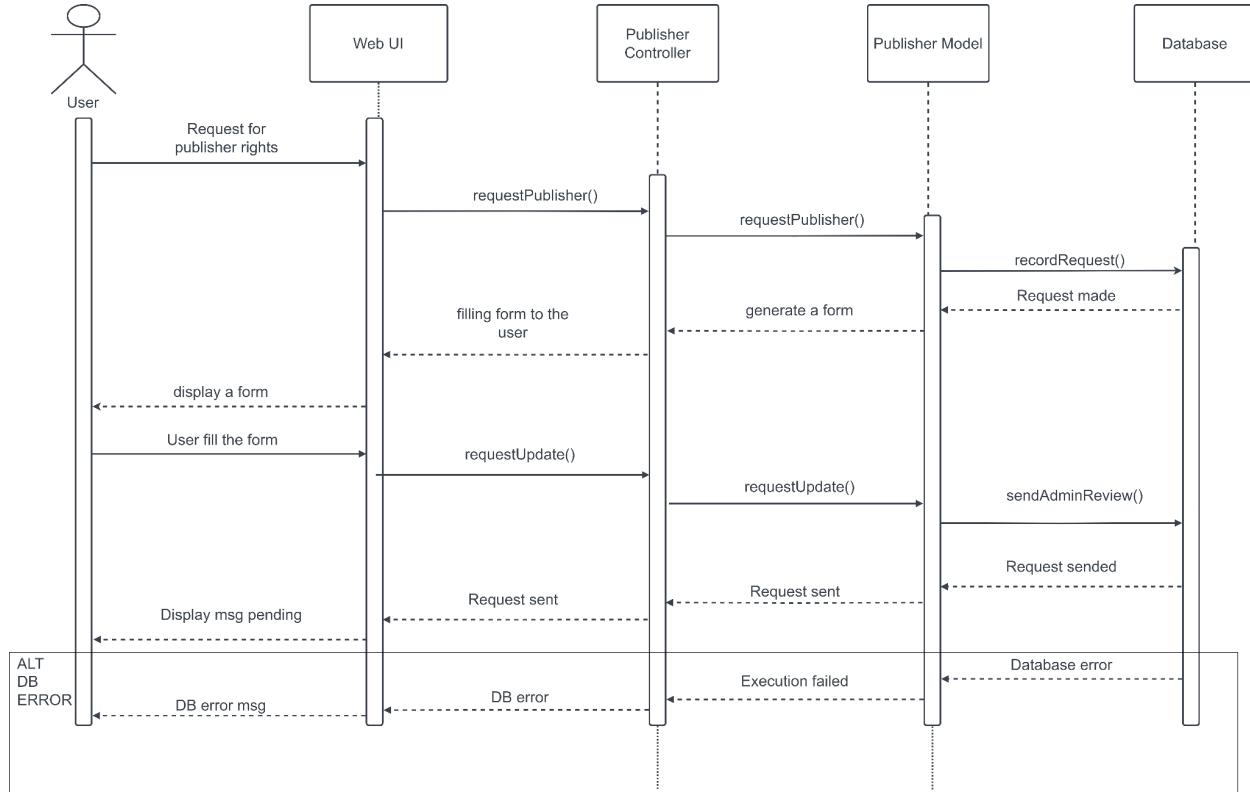
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.2.4 Logout



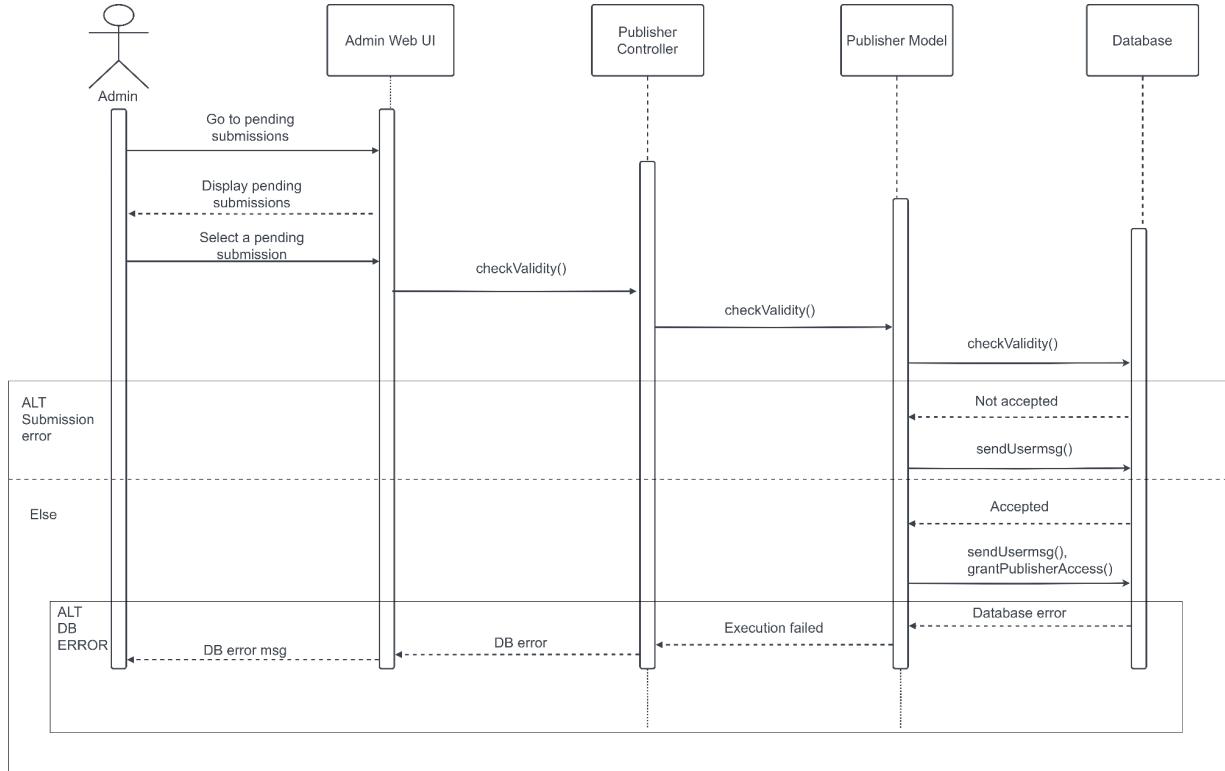
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.2.5 Apply for publisher rights



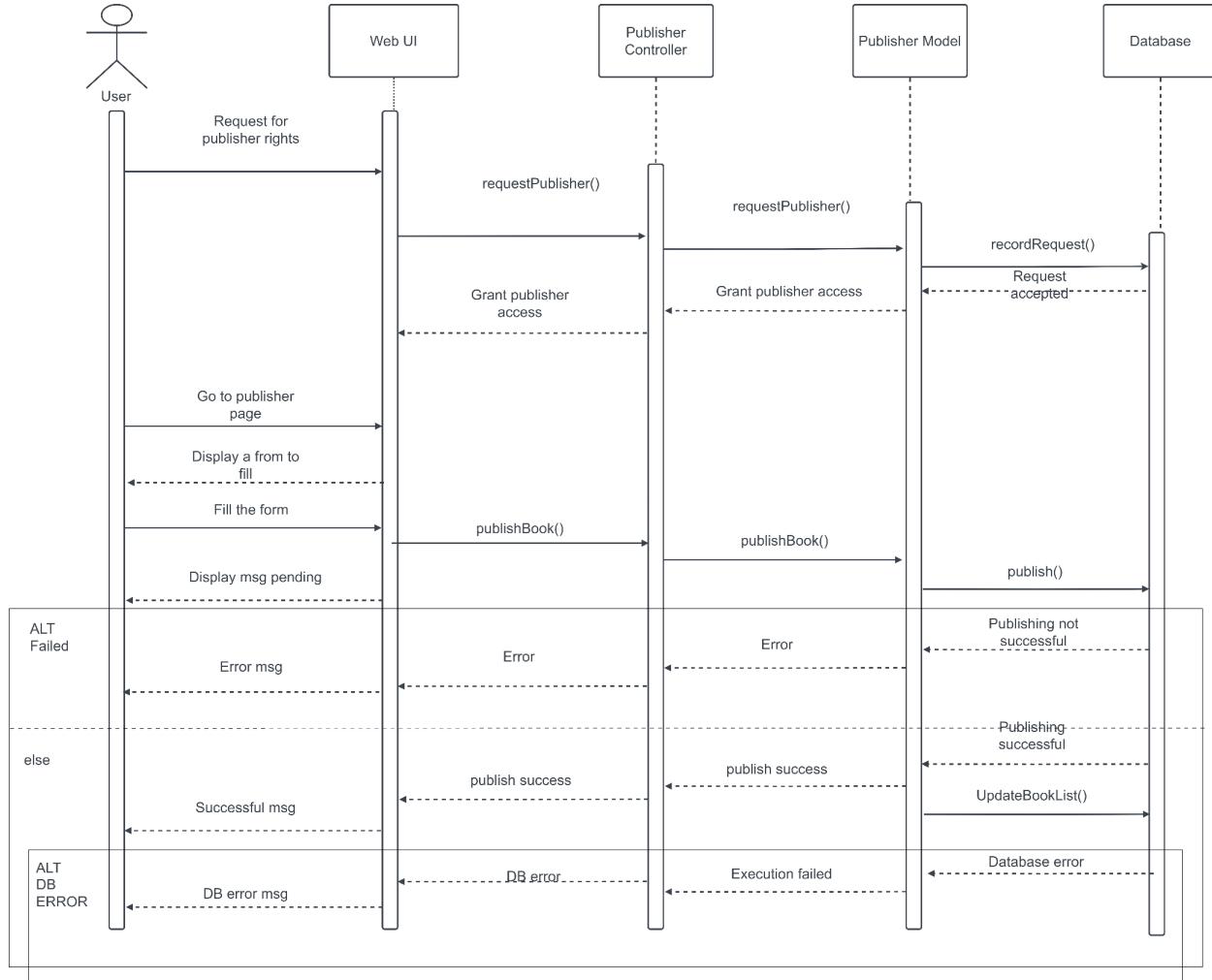
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.2.6 Assign publisher rights



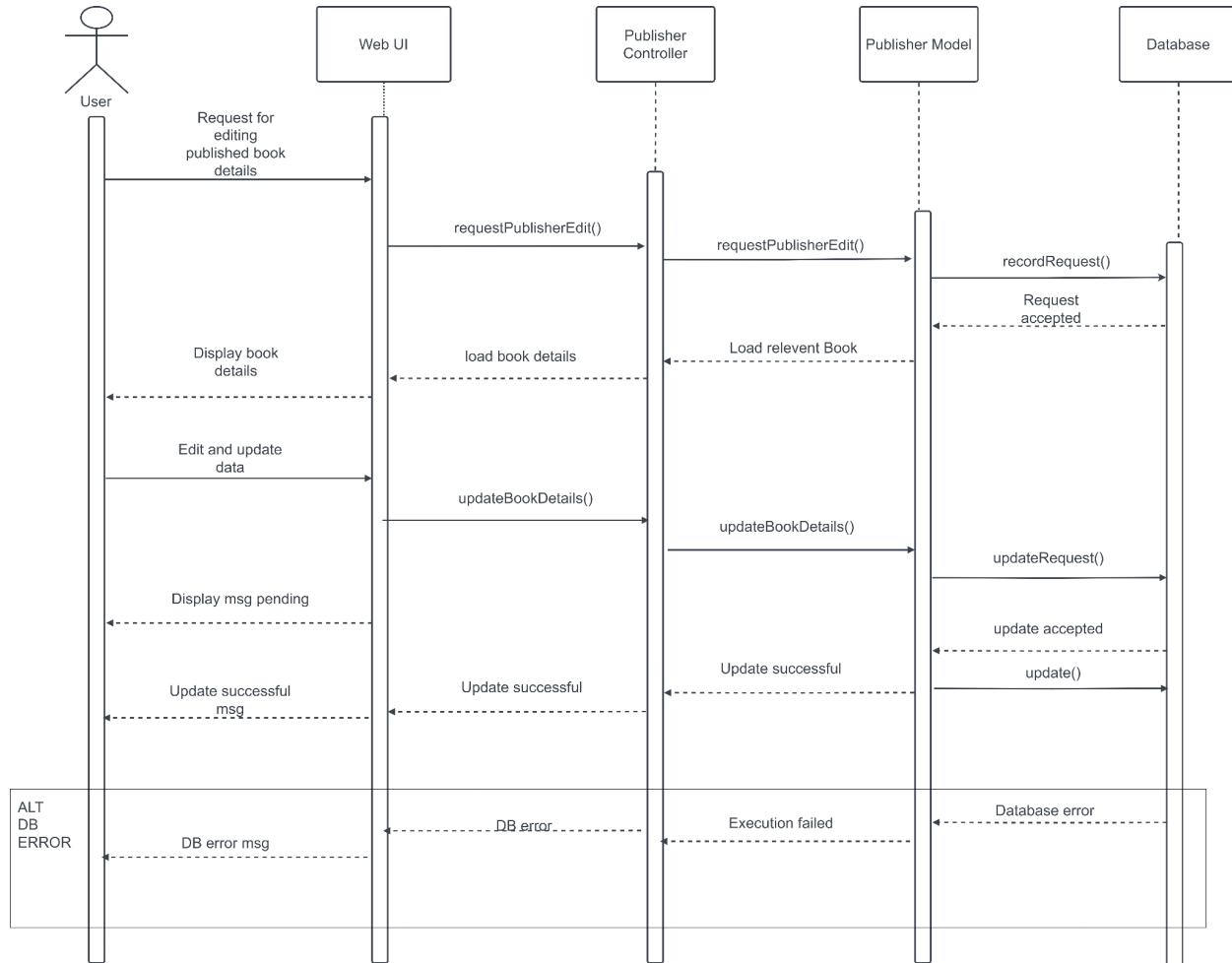
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.2.7 Publish an E-Book



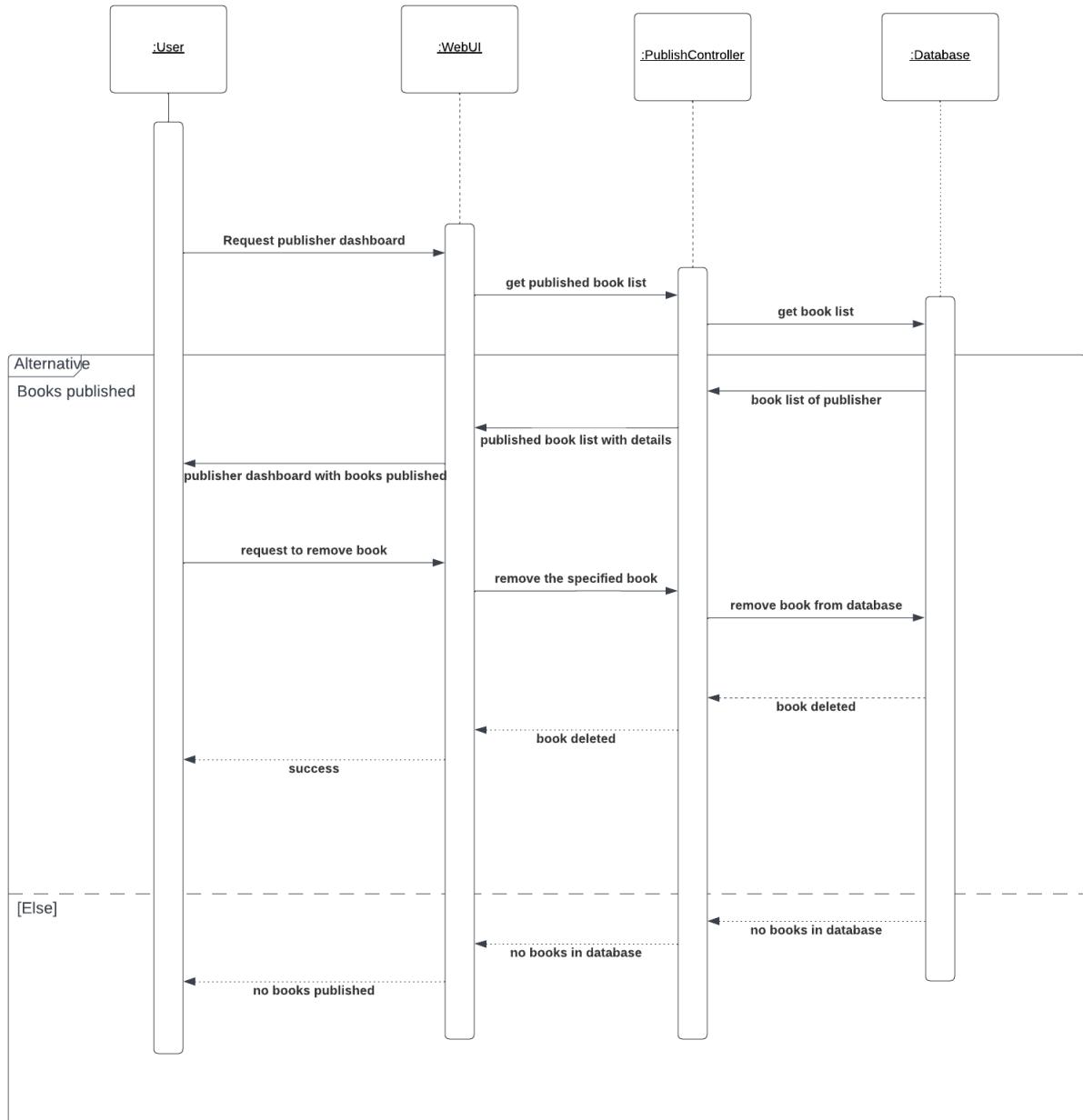
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.2.8 Edit E-Book's details



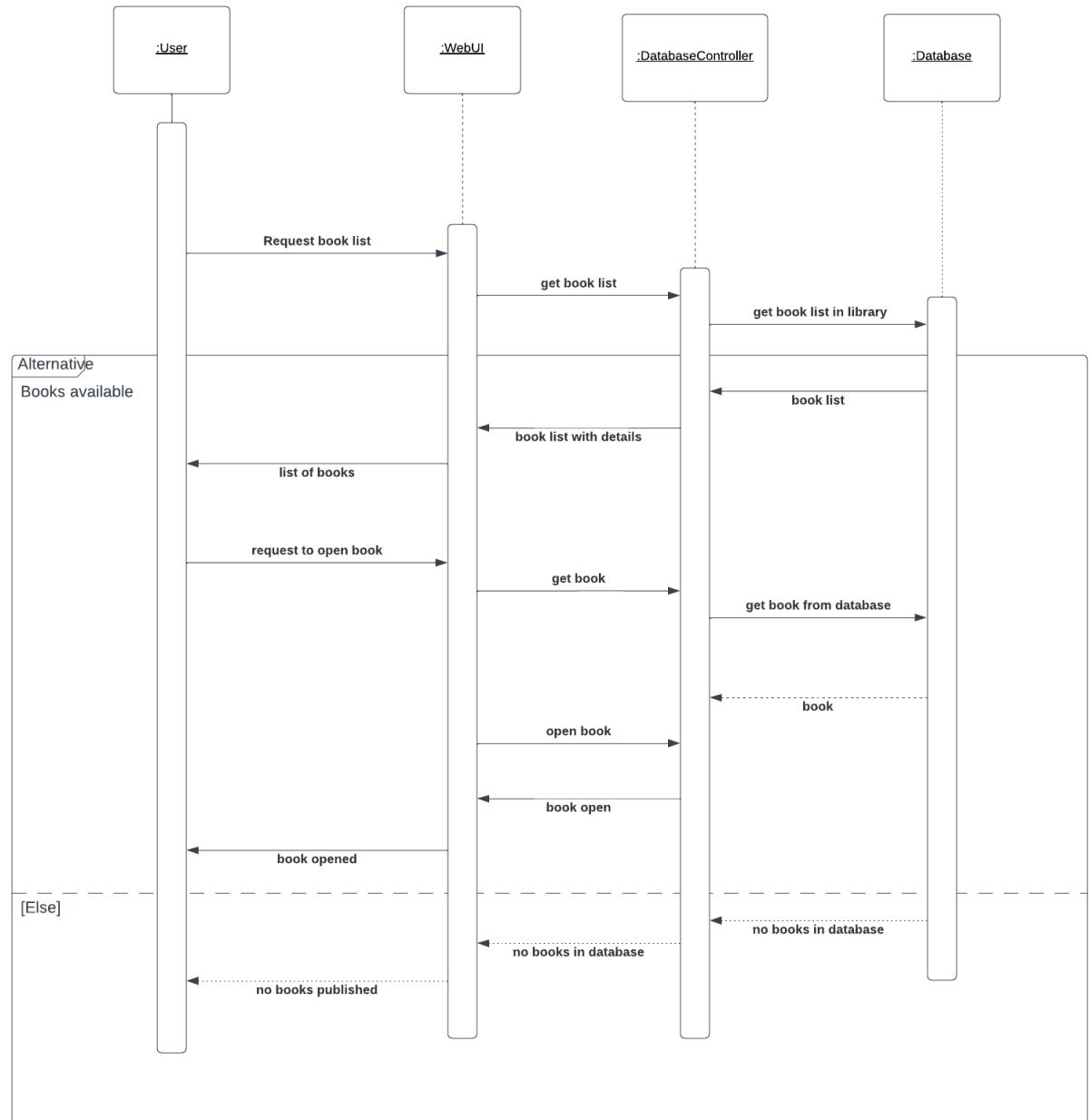
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.2.9 Remove published E-Book from the platform (Publisher)



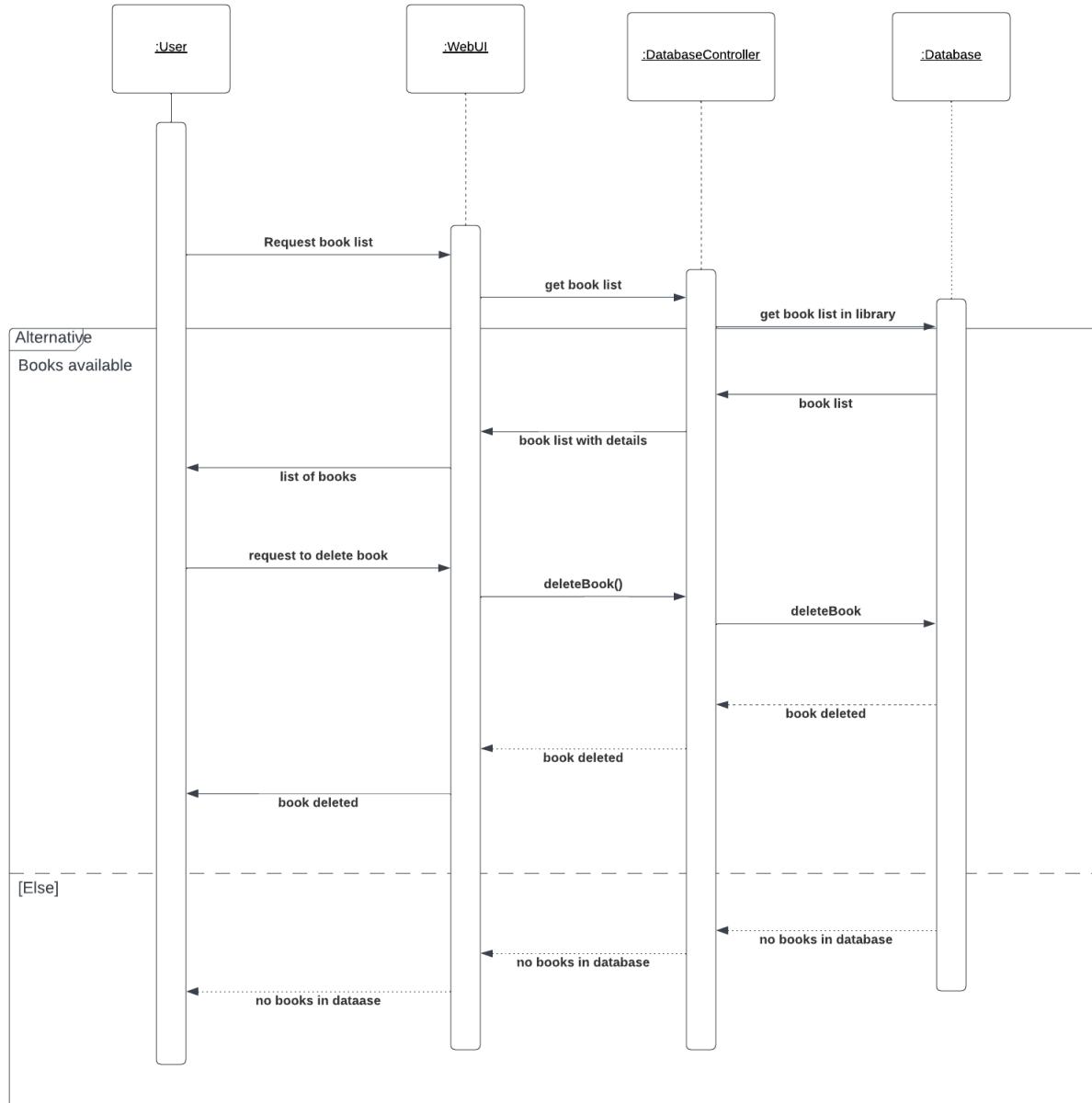
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.2.10 Review the content of E-Books



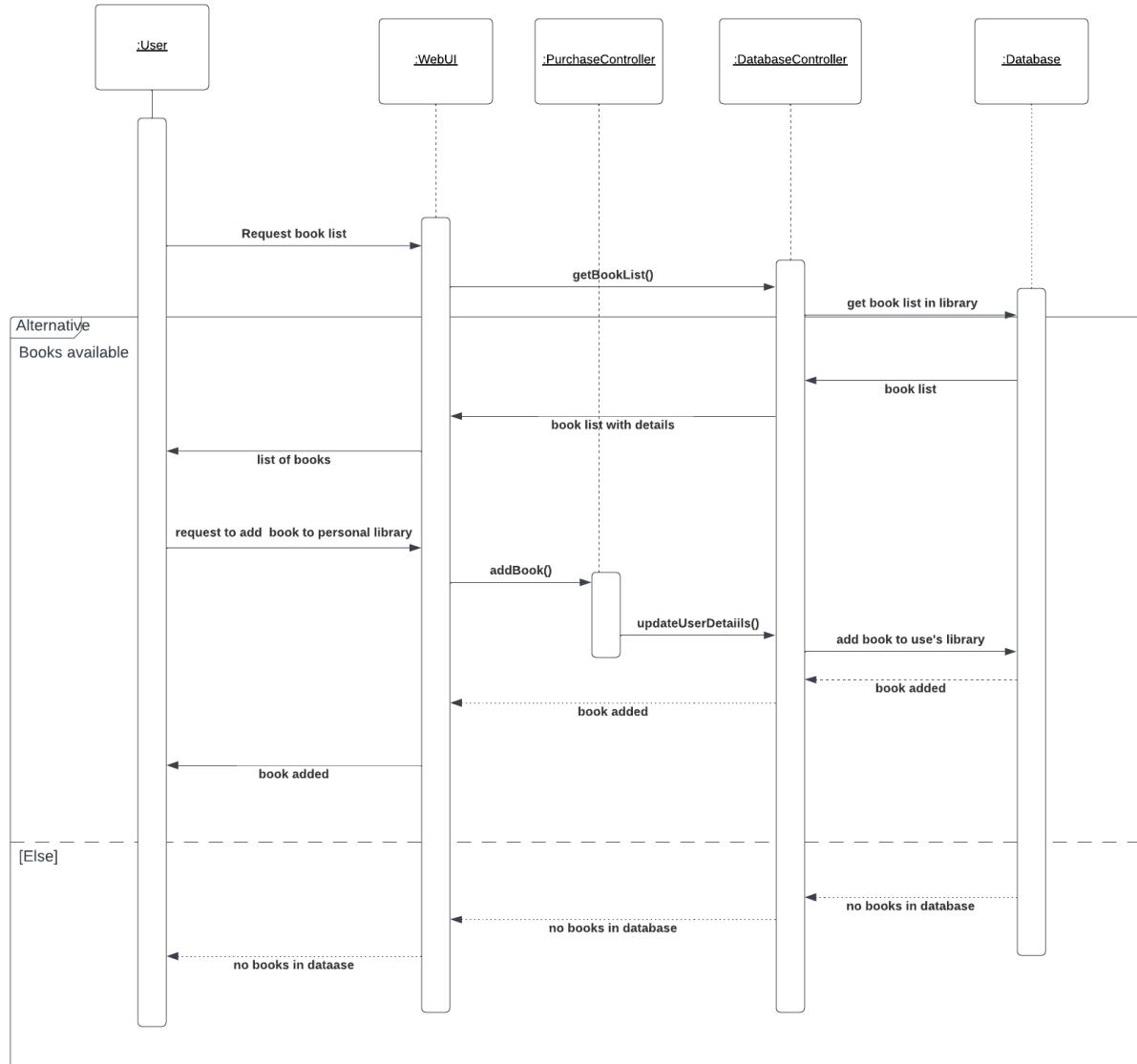
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.2.11 Remove published E-Books from the platform (Admin)



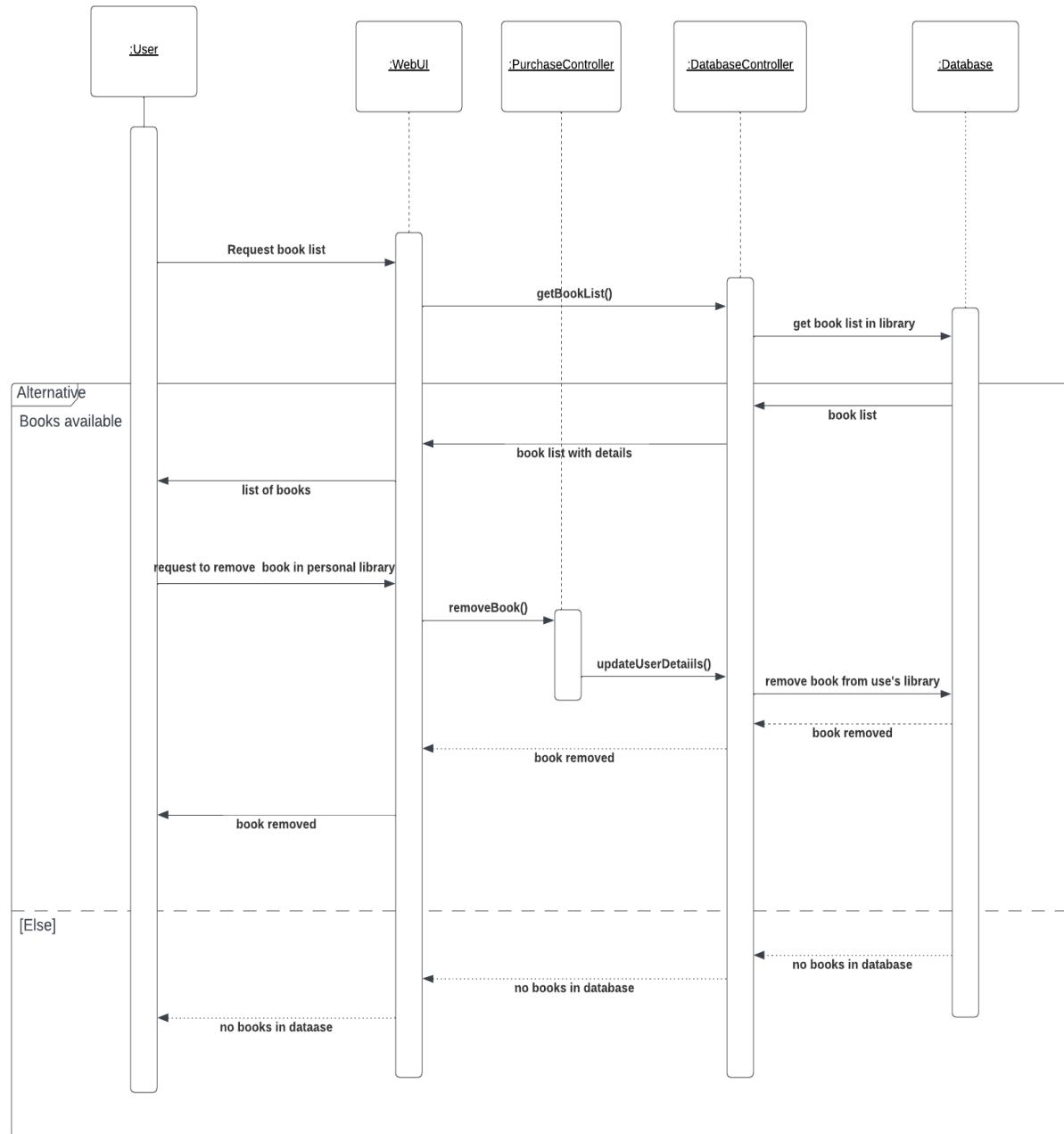
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.2.12 Add books to personal library



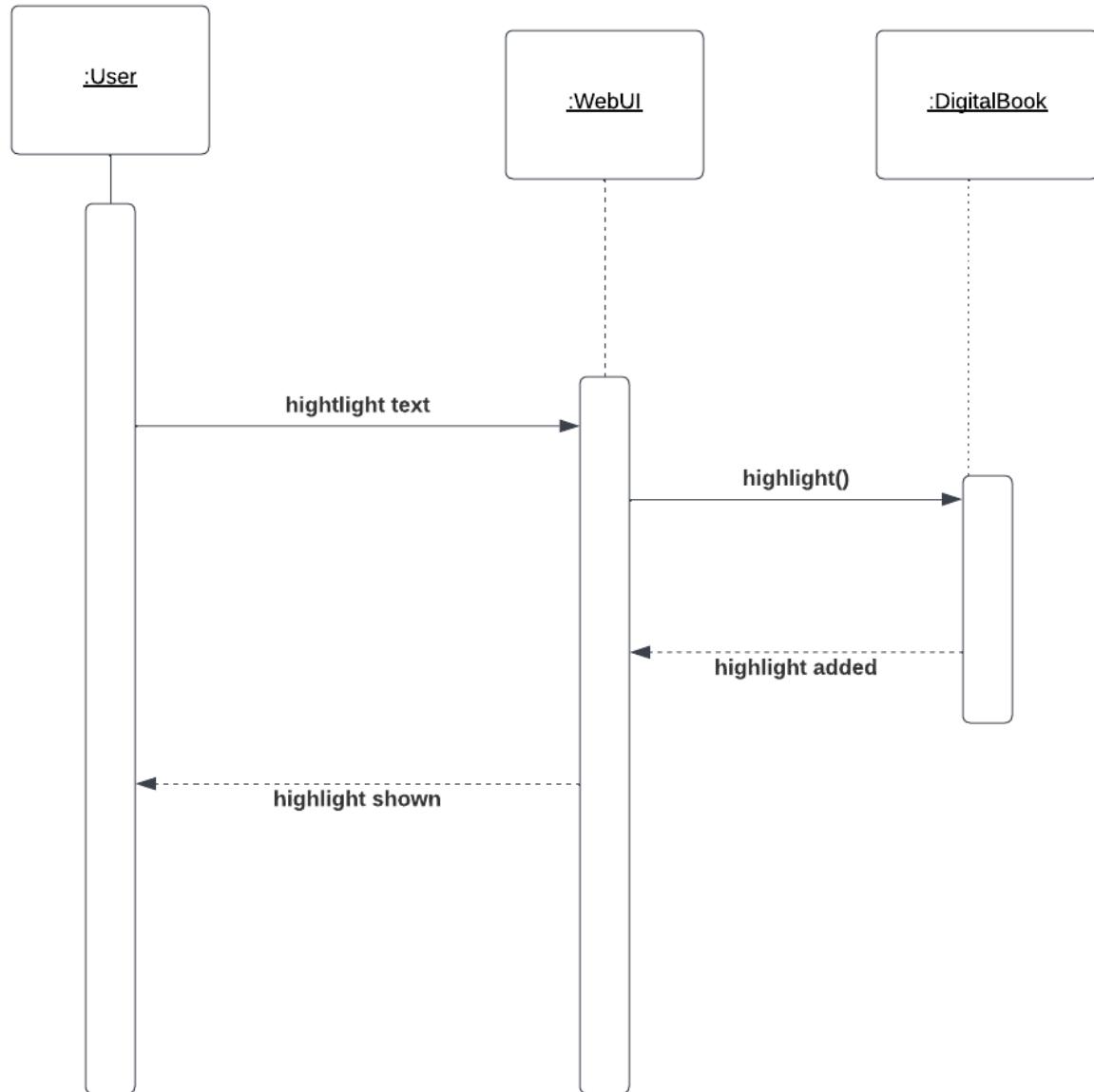
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.2.13 Remove books from user's library



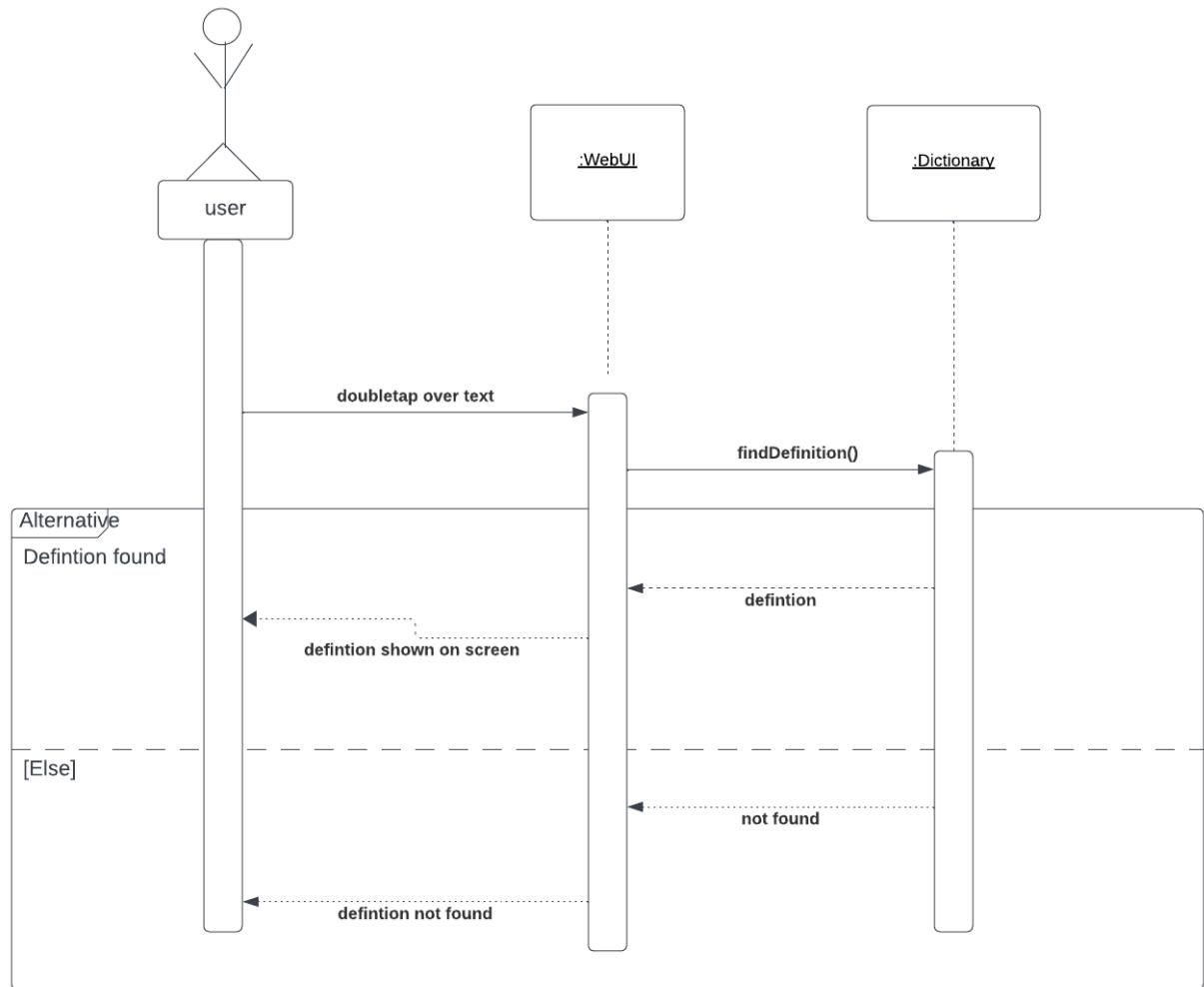
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.2.14 Highlight selected texts



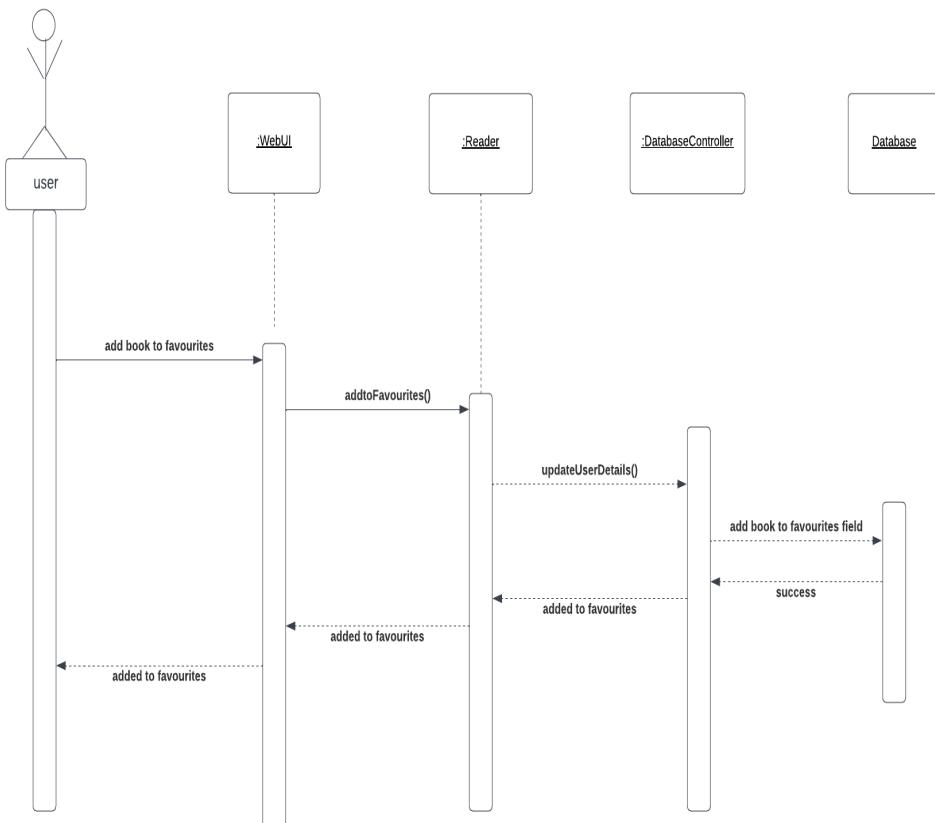
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.2.15 Access digital dictionary



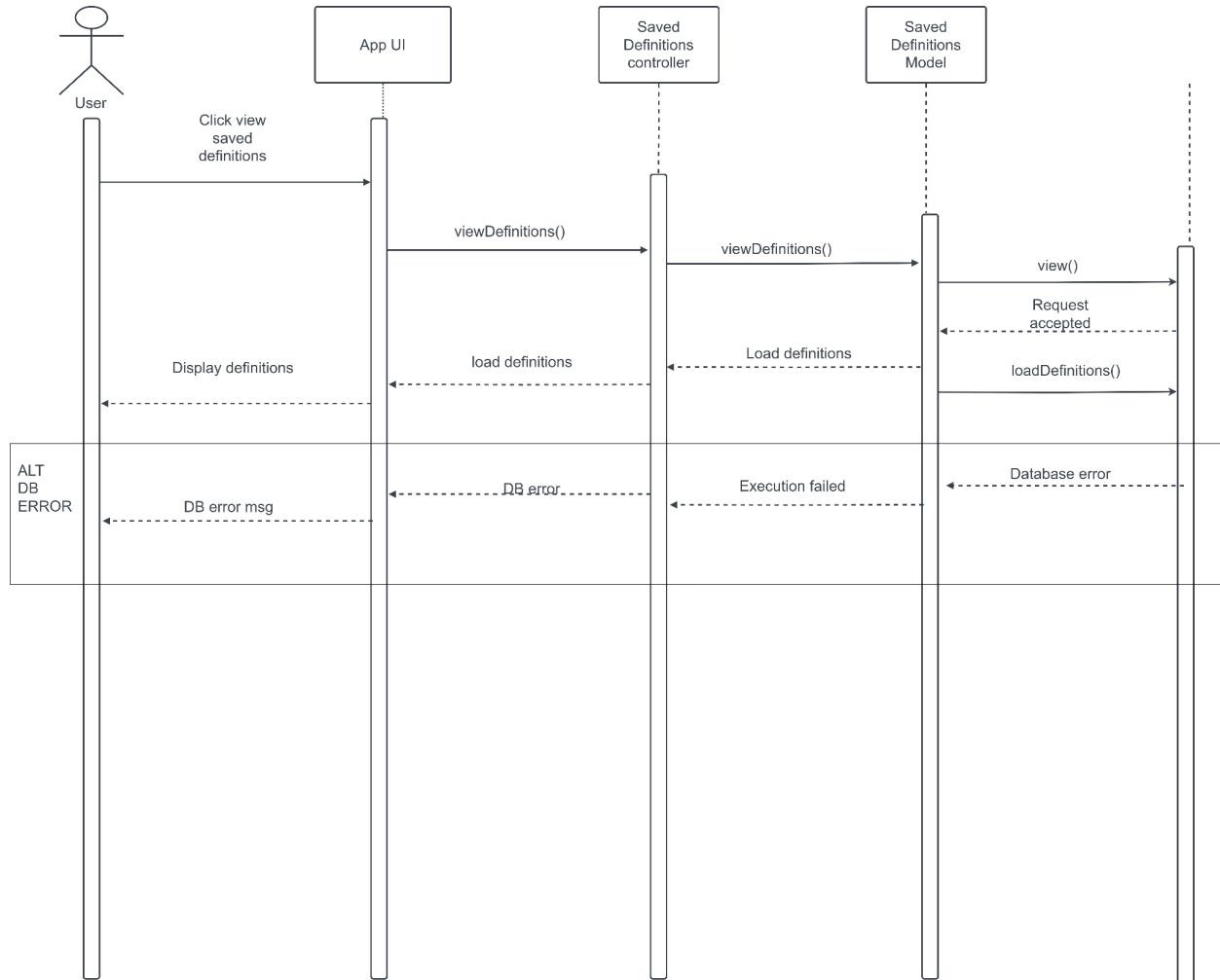
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.2.16 Add a book to favourites



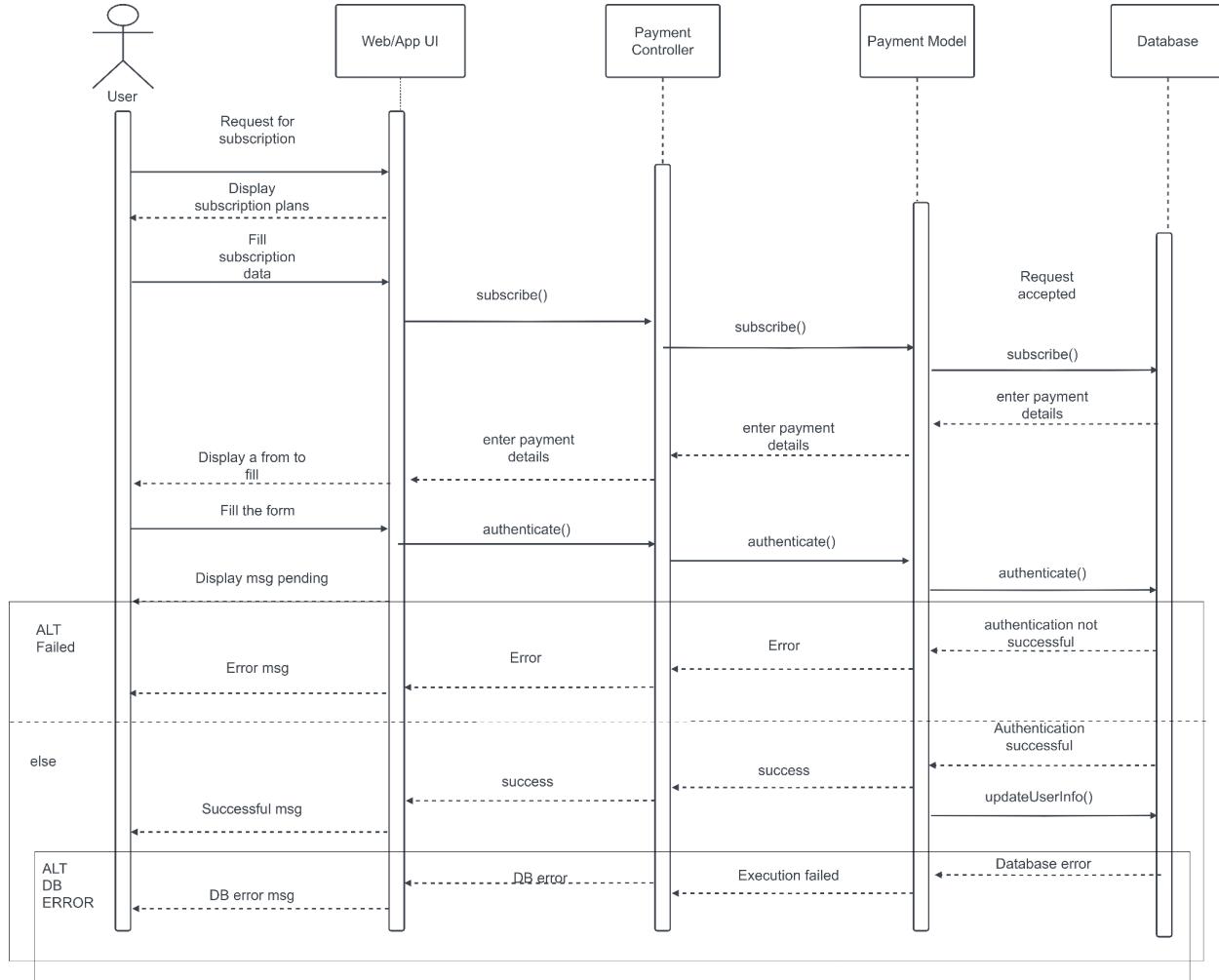
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.2.17 View saved definitions



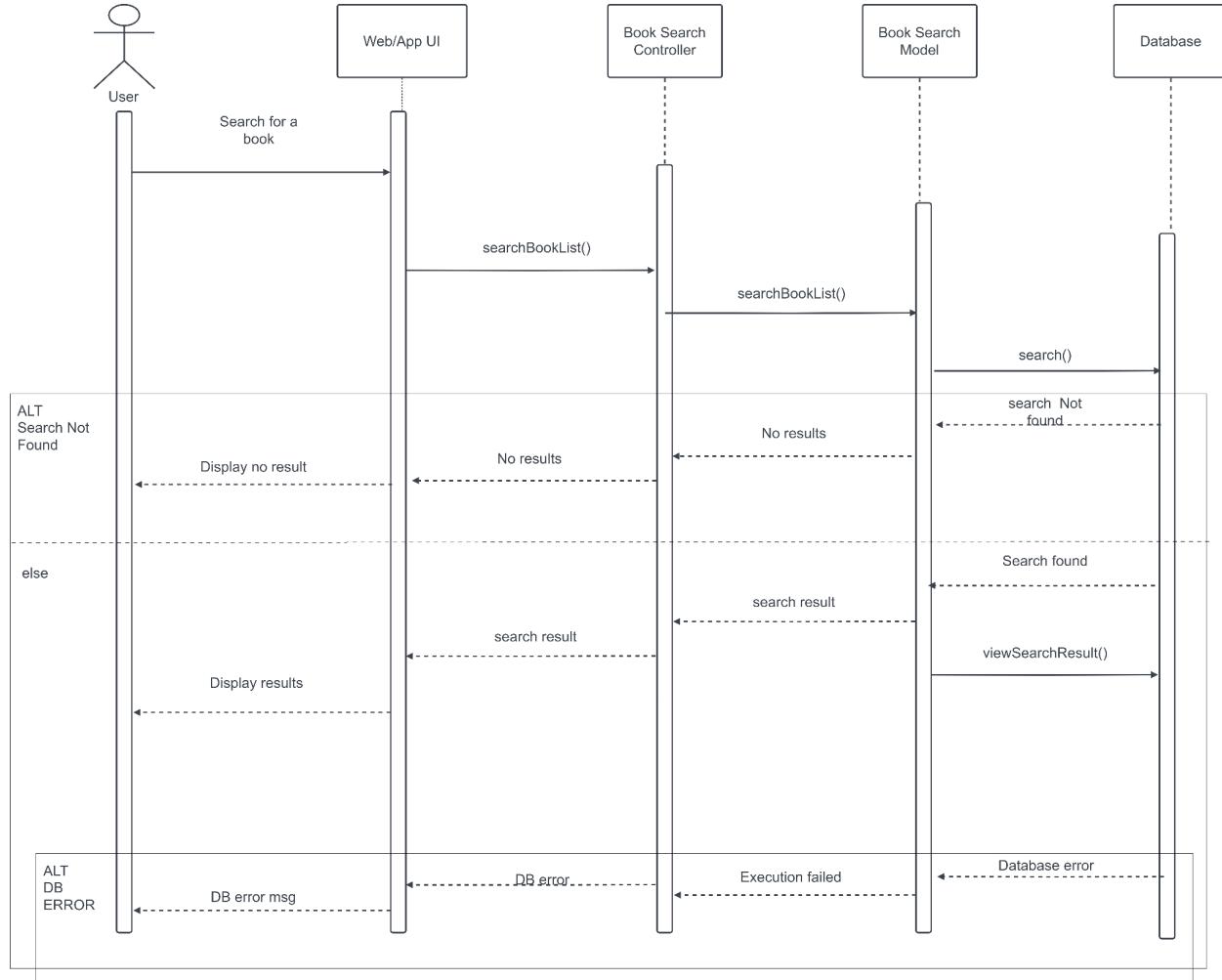
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.2.18 Buy a subscription



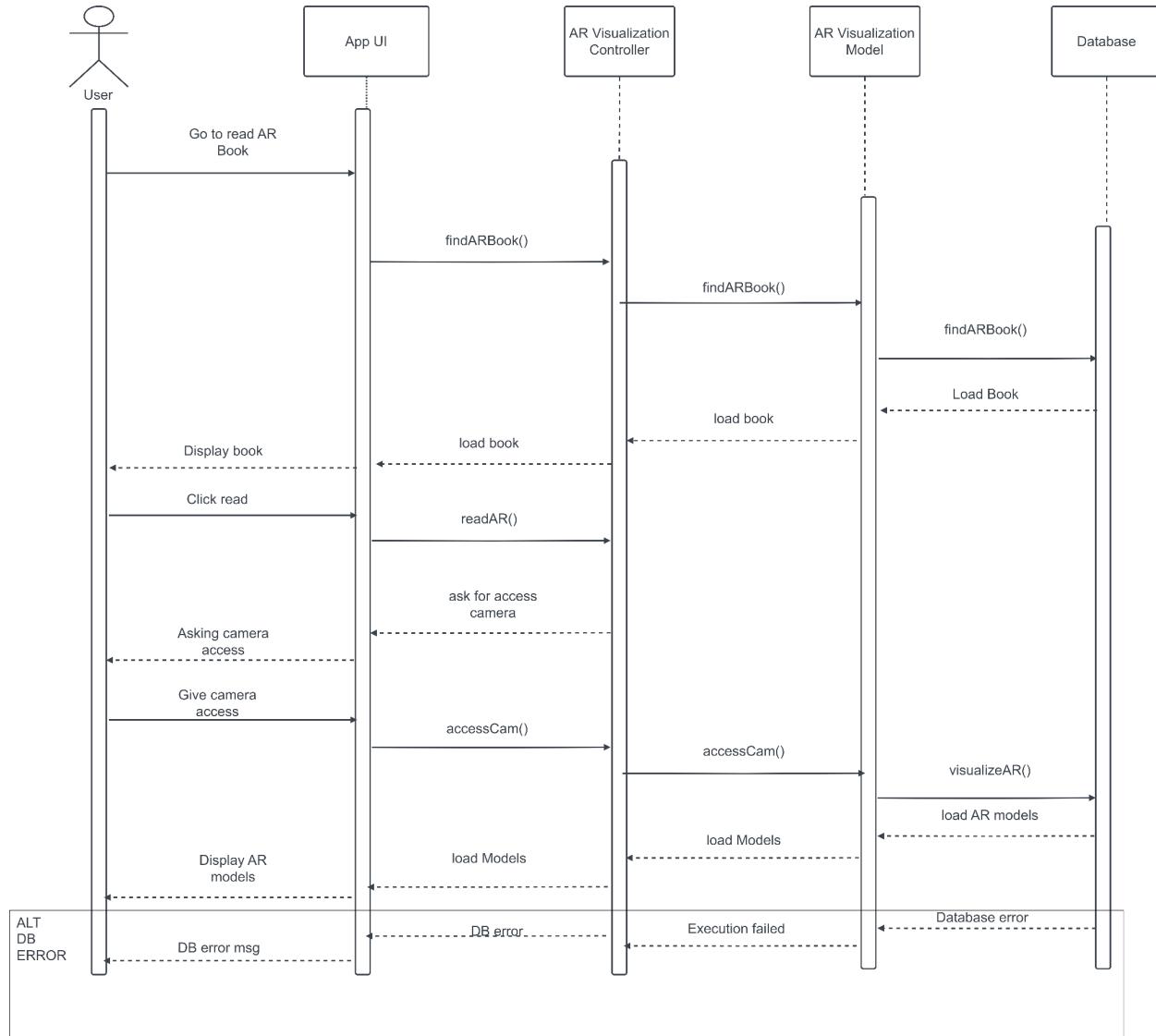
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.2.19 Search the catalog of books



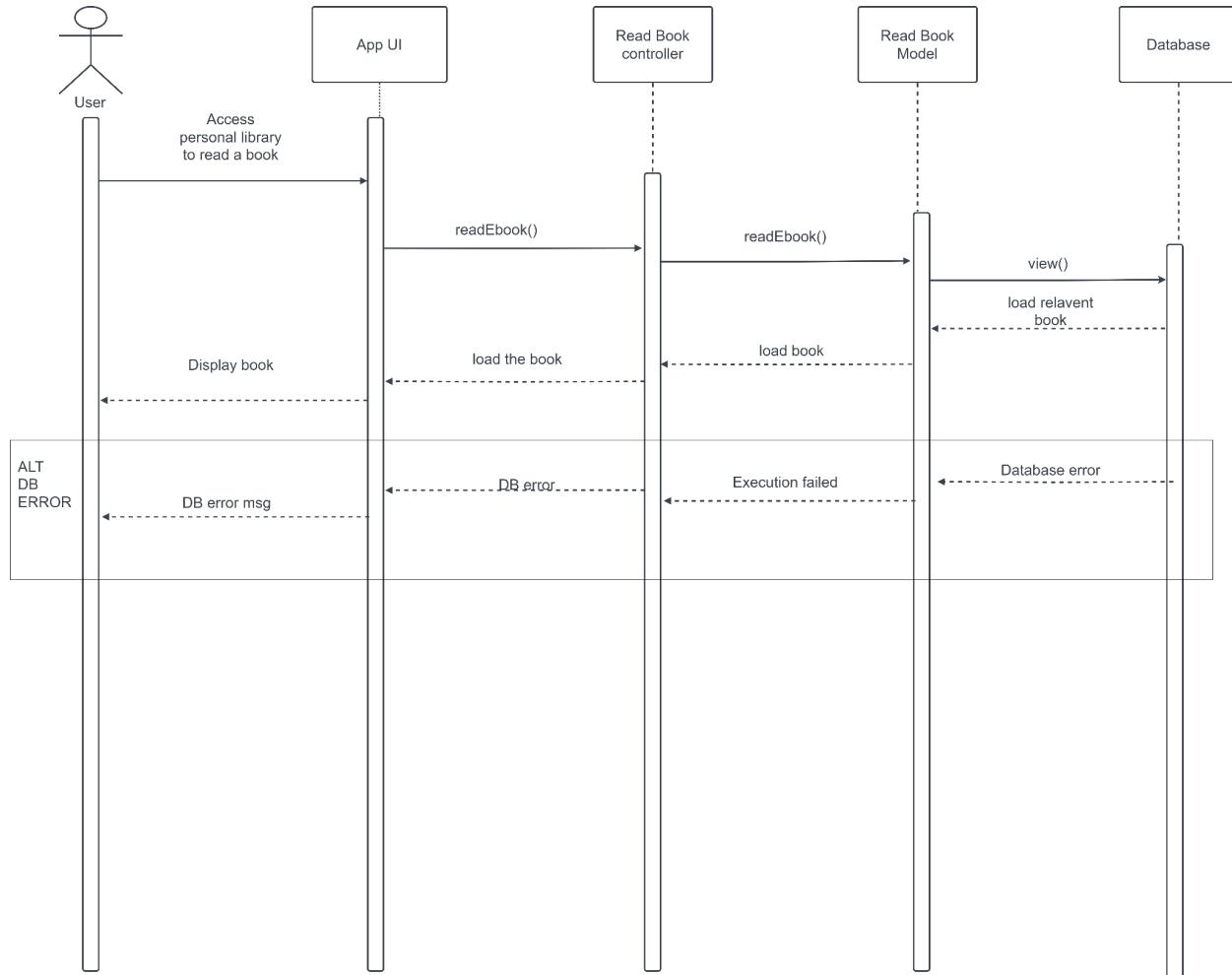
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.2.20 Visualize AR content



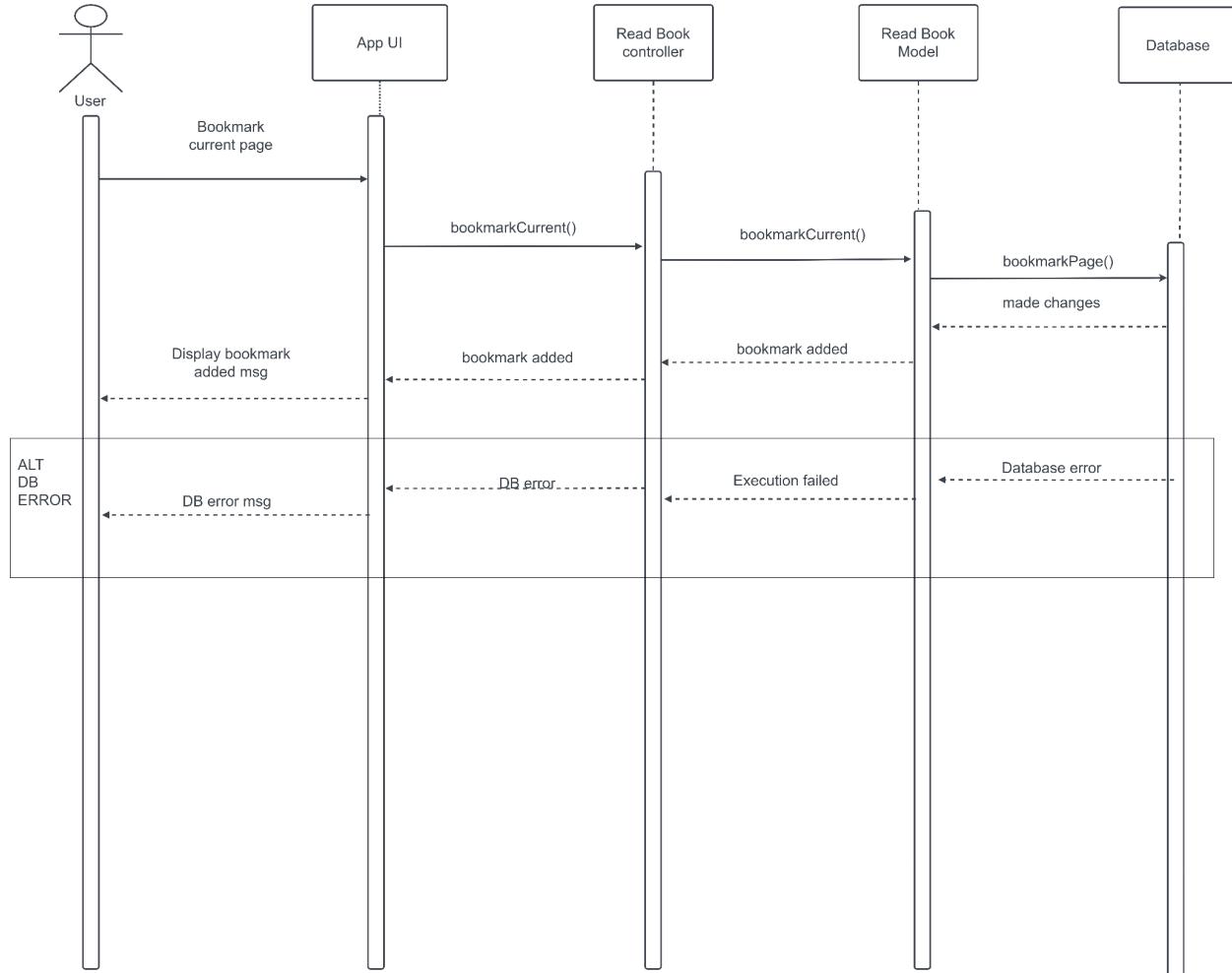
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.2.21 Read E-Books



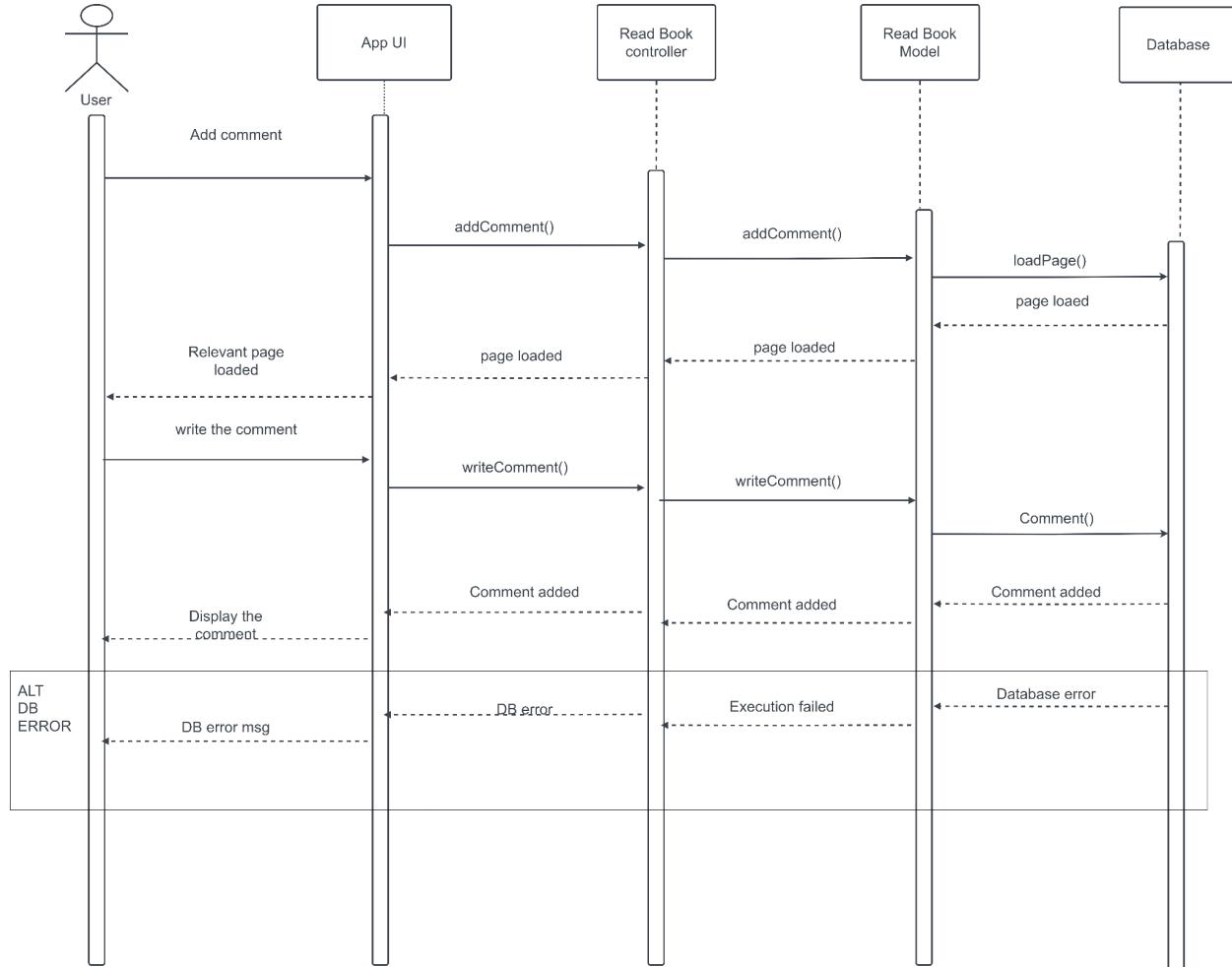
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.2.22 Bookmark pages



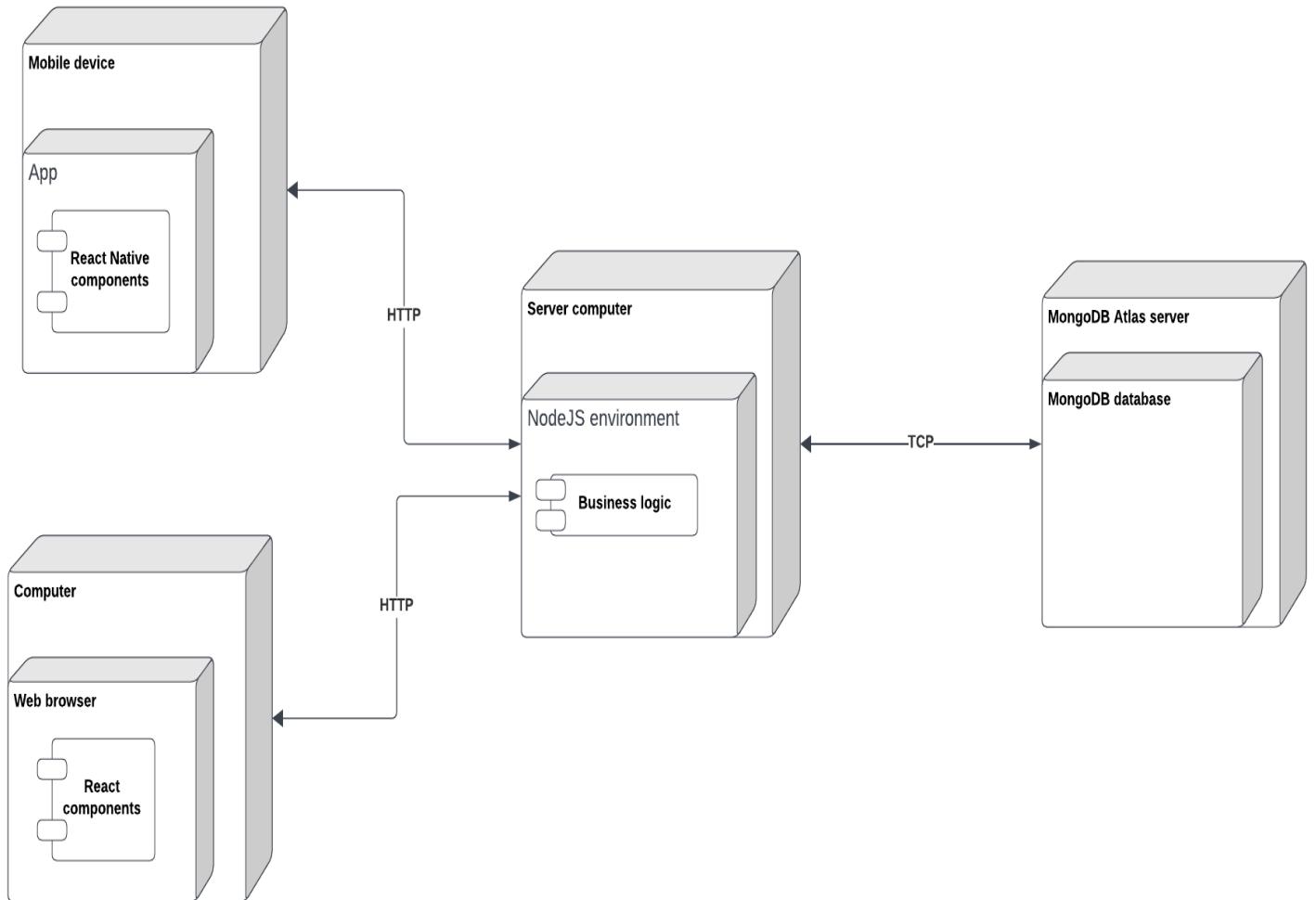
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6.2.23 Add comments to highlighted sections



PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

6. Deployment View



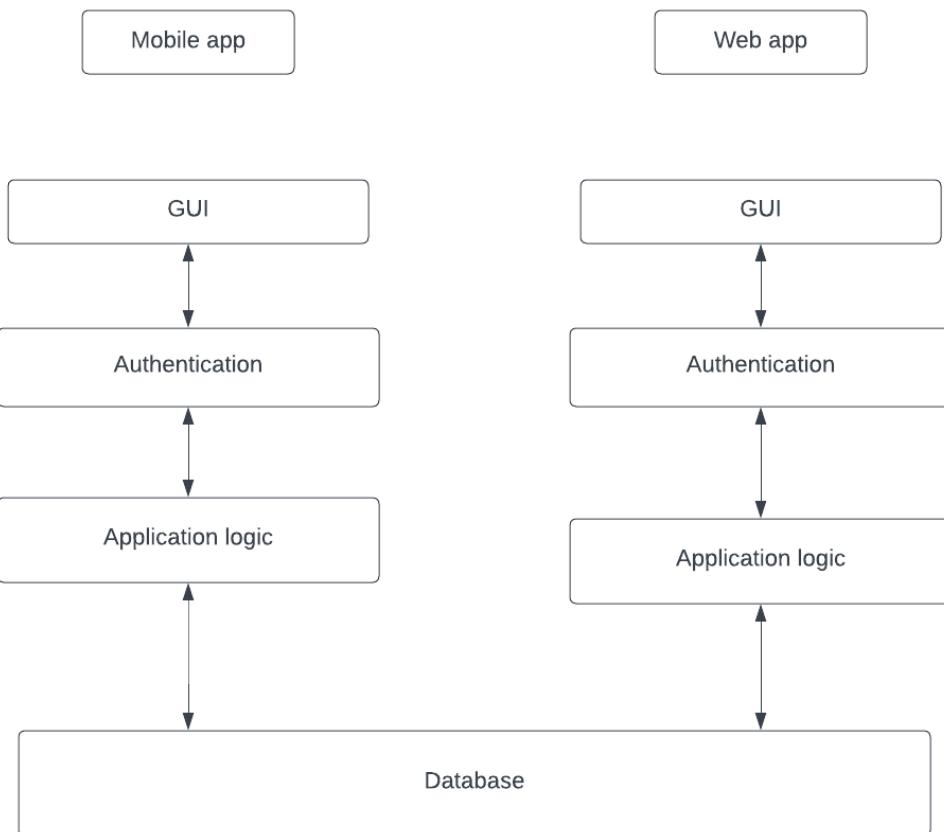
PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

7. Implementation View

7.1 Overview

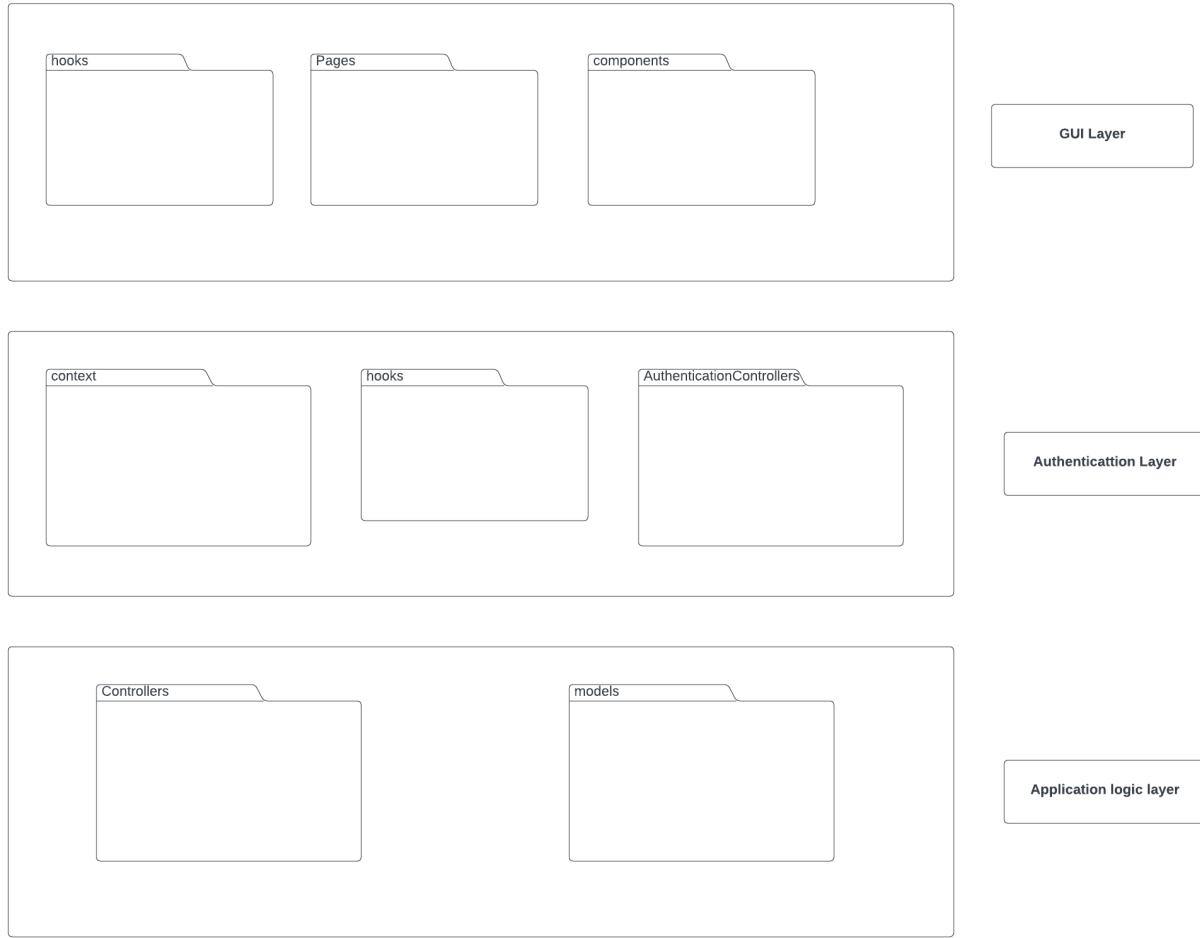
The system is to be implemented as a mobile app for reading and a web app for publishing books. Both the mobile and web apps share a common underlying structure. This implementation is grounded in a layered architectural approach, which serves as the foundation for the system's development and functionality. In this layered approach, the system is divided into distinct tiers or layers, each with a specific set of responsibilities and functions.

Layered diagram:



7.2 Layers

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	



PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

Package diagram

Package diagram description

The package diagram outlines the modular structure of our software system, illustrating how different components interact and contribute to the overall functionality of the application. The system is organized into distinct packages, each serving a specific purpose:

1.components:

This package houses a collection of reusable UI elements, such as buttons, forms, cards, and modals. These components are designed to be utilized across various sections of the user interface, promoting consistency and efficiency in UI development.

2. pages:

The frontend-pages package encompasses higher-level UI structures, representing individual pages or views within the application. These pages are assembled using the frontend components to create coherent user interfaces for specific tasks or content presentation.

3. context:

Within the frontend-context package, we manage the state and data-sharing aspects of the frontend. Leveraging technologies like React Context or Redux, this package facilitates the effective sharing of global states among different UI elements.

4.hooks:

This package contains custom hooks that encapsulate specialized functionalities, promoting code reuse across the frontend. By abstracting complex logic into reusable hooks, we enhance the maintainability and scalability of our frontend components.

5.routes:

The backend-routes package defines the various routes or endpoints exposed by the backend server. These routes enable clients to interact with the backend application, each route serving a specific function or operation.

6.models:

Within the backend-models package, we define the core data structures or models that underpin our application's functionality. These models dictate how data is structured, validated, and stored in the database, aligning closely with frontend data needs.

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

7. controllers:

The backend-controllers package hosts the logic responsible for processing incoming requests from clients, whether frontend or external. These controllers serve as intermediaries, handling interactions with backend models and providing suitable responses.

Layered approach description

1. Presentation Layer: This layer is responsible for the user interface (UI) and user experience (UX) components of both the mobile and web apps. It handles the presentation of content, user interactions, and graphical elements. By maintaining a clear separation between the presentation layer and other components, changes to the UI can be made without affecting the underlying functionality.

2. Authentication Layer: This new layer manages user authentication and authorization. It handles user registration, login, logout, and password reset. Additionally, it enforces access control policies to ensure that only authorized users can access certain functionalities and data.

3. Application logic layer

3.1. Application Layer: The application layer contains the core logic of the system. It handles user input from the presentation layer, processes requests, and orchestrates the interactions between various components. This layer encapsulates the business logic and rules that govern the behavior of the system.

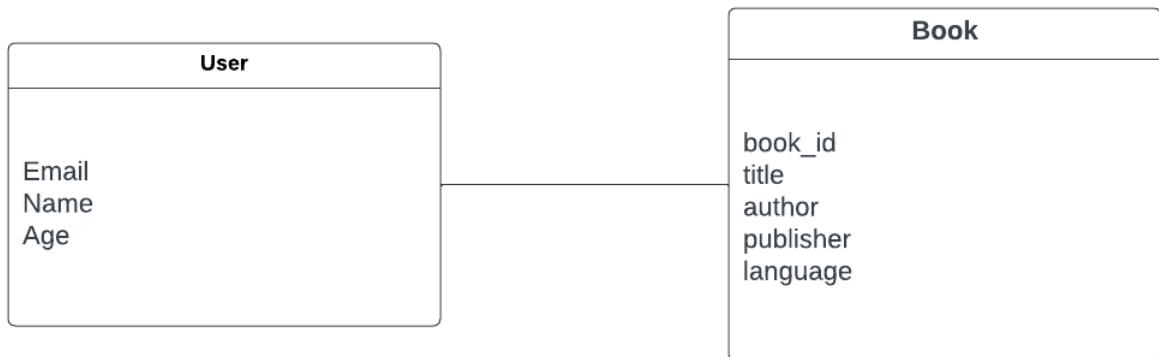
3.2. Service Layer: The service layer provides a bridge between the application layer and the data layer. It manages the communication with external services, APIs, and databases. By abstracting data access and external integrations, the service layer enhances modularity and maintainability.

3.3. Data Layer: This layer deals with data storage and retrieval. It includes components responsible for interacting with databases, file systems, or any other data storage mechanisms. Separating data-related operations from the rest of the system ensures data consistency and security.

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

8. Data View (optional)

As we are using a non relational database the data view is redundant.



9. Size and Performance

Size Considerations:

1. App Footprint:

- Description: The total storage space occupied by the app on the user's device.
- Strategy: Optimize code, assets, and resources to reduce overall app size.

2. Asset Compression:

- Description: Compress graphics, images, and media assets to maintain quality while minimizing size.
- Strategy: Implement modern image compression techniques and formats.

3. Code Modularity:

- Description: Organize code into modular components to load only required modules.
- Strategy: Design architecture to support modular code organization.

Performance Considerations:

1. Load Time:

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

- Description: Time taken for the app to launch and display content.
- Strategy: Optimize code, utilize resource caching, and employ lazy loading for non-essential components.

2. Responsiveness:

- Description: Ensuring quick responses to user interactions, smooth scrolling, and transitions.
- Strategy: Implement efficient algorithms, minimize unnecessary operations.

3. Network Efficiency:

- Description: Efficient communication with servers for content updates and user data.
- Strategy: Reduce network requests, use CDNs, implement data caching.

4. Battery Efficiency:

- Description: Minimizing app's impact on device battery life.
- Strategy: Optimize background tasks, manage network connections, reduce CPU-intensive operations.

5. Scalability:

- Description: Design to handle varying loads during peak usage periods.
- Strategy: Use load balancing, caching, and optimized database queries.

10. Quality

Extensibility:

The software architecture is designed with extensibility in mind, allowing for seamless integration of new features and modules in the future. By employing a modular structure and well-defined interfaces, the system promotes the addition of functionalities without requiring significant rework. This extensibility fosters adaptability to evolving user needs and technological advancements, ensuring the app remains relevant over time.

Reliability:

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

Reliability is a paramount concern in the architecture of the app. To ensure consistent performance, the system employs robust error handling mechanisms, graceful degradation under adverse conditions, and thorough testing. By adhering to industry best practices, the architecture minimizes the occurrence of crashes, freezes, and data loss, contributing to a reliable user experience.

Portability:

The architecture is designed to facilitate portability across various platforms and devices. Through the use of responsive design principles for the web app and platform-agnostic development practices for the mobile app, the system can function optimally on a wide range of screen sizes and resolutions. This portability ensures that users can access and engage with the app seamlessly, regardless of their preferred device or platform.

Security and Privacy:

Security and privacy are of paramount importance in the design. The architecture implements encryption mechanisms to safeguard user data during transmission and storage. User authentication and authorization processes are robustly implemented to prevent unauthorized access. Additionally, measures are taken to anonymize user data where appropriate, respecting user privacy. The architecture is continuously evaluated and updated to address emerging security threats and adhere to industry standards.

Performance Optimization:

The architecture is optimized for high performance, ensuring a smooth and responsive user experience. Caching strategies, data compression techniques, and efficient algorithms are employed to minimize load times, reduce network latency, and conserve device resources. By prioritizing performance optimization, the app maintains its efficiency even under varying load conditions, enhancing user satisfaction.

Accessibility:

PIXIE	Version: 1.0
Software Architecture Document	Date: 10/08/2023
Group-14-SAD-1.0	

The architecture emphasizes accessibility to ensure that the app is usable by individuals with diverse abilities. Design considerations include semantic markup, adjustable font sizes, compatibility with screen readers, and adherence to accessibility guidelines. This commitment to accessibility enhances inclusivity and usability for a wider audience.

Scalability:

The architecture is designed to accommodate scalability requirements as the user base grows. By utilizing scalable database solutions, load balancing mechanisms, and cloud resources, the system can handle increased traffic and usage without compromising performance. This scalability ensures that the app remains responsive and accessible during peak demand periods.

12. References

- [1] Augmented Reality in Books. [Online] Retrieved from <https://blog.kotobee.com/augmented-reality-in-books/> [Accessed on 16/7/2023]
- [2] ARBIBOOK. [Online] Retrieved from <https://www.arbobook.com/?lang=en> [Accessed on 16/7/2023]
- [3] How Publishers Are Using Augmented Reality to Bring Stories to Life. [Online] Retrieved from <https://econsultancy.com/how-publishers-are-using-augmented-reality-to-bring-stories-to-life/> [Accessed on 16/7/2023]
- [5] Unity.[Online] Retrieved from <https://unity.com> [Accessed on 16/7/2023]
- [6] Vuforia Developer Portal. [Online] Retrieved from <https://developer.vuforia.com> [Accessed on 16/7/2023]
- [7] How to Build AR App. [Online] Retrieved from <https://program-ace.com/blog/how-to-build-ar-app/> [Accessed on 16/7/2023]
- [8] Kids Bookful: Kids' Books & Games Book Library for Kids. [Online] Retrieved from <https://apps.apple.com/us/app/bookful-kids-books-games/id1428323777> [Accessed on 31/7/2023]
- [9] Design Tools used to complete this Software Architecture Document.
 - LucidChart
 - drawio