SECJ2203: Software Engineering

System Documentation (SD)

Improvising Current DBP Dictionary

Version 1.0

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School of Computing, Faculty of Engineering

Prepared by: Group 2

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Revision Page

a. Overview

The software design in this report is the first version of the Intelligent English Malay Dictionary. This report consists of the introduction, system-specific requirement, system architectural design, detailed description of components, data design, user interface design, requirement matrix, test cases, and test approach analysis.

b. Target Audience

This document is intended for the team members, developers, designers, testers and system administrators.

c. Project Team Members

Member Name	Role	Task	Status
Ahmad Nazran bin Yusri	Leader	● Purpose ● Activity Diagram ● Communication Interface ● Design Constraints ● Use case diagram ● UC001 ● UC002 ● UC003	Complete
Mohand Alaa Abouzeid Mohamed	Software Developer	● Scope ● Hardware interface ● Domain model diagram ● Software system attributes ● UC004 ● UC005 ● UC006	
Anatasya Humaira		● Use case diagram ● Definitions ● Reference ● User Interface ● UC007	**NOT COMPLETED**

		● UC008 ● UC009 ● UC010 ● UC011	
Ng Yen Thong	Vice Leader	● Project Overview ● Software Interface ● Performance and other requirements ● Use case diagram ● UC012 ● UC013 ● UC014	Complete

d. **Version Control History**

Version	Primary Author(s)	Description of Version	Date Completed
1.0	Ng Yen Thong	Consists of Introduction and Specific Requirements.	10/6/2022

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1. Introduction

1.1 **Purpose**

The purpose of this system documentation is to report the specific requirements including external interface requirements, system features, performance and other requirements, design constraints and software system attributes of this project which is Improvising Current DBP Dictionary. Thus, providing clear details to all parties involved in this project to ensure better understanding. Besides that, this report also logs all the details on how our group conducts this project. The details mentioned are the overview, version control history, list of team members and the task distribution applied. This documentation will also play a crucial role in progressing this project as this documentation will be referred to a lot while completing the upcoming phases of the project. Therefore, this document is intended for the team members, developers, designers, testers and system administrators.

1.2 **Scope**

The software product is Intelligent English-Malay dictionary. This system is the new version of the Dewan Bahasa dan Pustaka dictionary. The system will be used by a variety of users, starting from normal users to professional users. Artificial Intelligence is the technology that the system is built on to introduce a satisfying software experience. The new system is developed to provide many useful features. starting with providing basic translation features to advanced translation features. The newly developed translation algorithm reduces the level of intricacy of the specific dictionary-driven rules. Also, it reduces the number of confusing Malay terms. The new website interface was built using modern UI/UX principles to produce a responsive, attractive, and convincing website. In addition, the new mobile application provides a handy and fast user experience. Furthermore, additional features like searching words by audio and image, sentence grammar API generation, Web browser library, and image-to-text will help a variety of users achieve their goals with the system. The main objective and goal of using this system is that users put less effort into the translation operation, so the translation will be faster and sufficient.

1.3 **Definitions, Acronyms and Abbreviation**

DBP : Dewan Bahasa dan Pustaka, the existing English-Malay dictionary that owned by Dewan Bahasa dan Pustaka

OS : An Operating System (OS) is the program that, after being initially loaded into the computer by a boot program, manages all of the other application programs in a computer.

RAM : a Random-Access Memory temporarily stores (remembers) everything that runs on the PC

LAN : Local Area Network

GUI : Graphical User Interface

ACLs : Access Control LIsts

BIOS : Basic Input/Output System

MT : Translation Machine

1.4 References

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1.4 **Overview**

This System Documentation(SD) is divided into eight sections with some of them having various subsections. The sections of the System Documentation are:

1.0 Introduction: This section consists of five subsections that covers the system purpose, system scope, the definitions of terms, acronyms and abbreviation used in this documentation, as well as the references and document overview. Overall, it explains about the contents of System Documentation (SD) and the system, its background, its functionalities, the audiences, and the references used to complete this system.

2.0 Specific Requirements: This section has five subsections that includes external interface requirements, system features, performance and other requirements, design constraints, as well as the software system attributes. Generally, in the first subsection it discusses user interfaces, hardware interfaces, software interfaces and communication interfaces of the system. Meanwhile, the second subsection describes the system features using use case description for each function that the system offers. In addition, the remaining subsections briefly explain about the design constraints, performance requirements and software system attributes.

3.0 System Architecture Design: In this section, it describes the architectural design. The system should be divided into subsections of architectural style and rationale, as well as the component model.

4.0 Detailed Description of Components: Here we describe the detailed description of components consisting of a complete package diagram to show the files and subfiles contained within the system. Also, the details then elaborated according to the content of the package diagram where every file has their class diagram, sequence diagram, entity, method, and the algorithm table.

5.0 Data Design: Data design contains data description that contains every entity name and their description. Beside that there is also a data dictionary which lists out the attribute name, type and description for each entity.

6.0 Interface Design: This section explains about the user interface design. In this section, the external, internal, physical, logical, H/W and also S/W interfaces are provided. Every screen for every transaction in the system is attached. The screens show a step by step process when the user starts to surf the website, register, login, main page as well as all the

other main functions. Moreover, it also contains the screen for all the actors including which are only accessible for specific actors.

7.0 Requirements Matrix: In this section a cross-reference that traces components and data structures to the requirements in the SD is provided. A tabular format is used to show which system components are satisfying each of the functional requirements represented as use cases.

8.0 Test Cases: This section consists of a few kinds of tests and each test will specify the test ID and name, additional description, input data, expected output data, actual output data as well as their results.

2. Specific Requirements

2.1 External Interface Requirements

2.1.1 User Interfaces

This should specify the following:

a) *The **logical characteristics** of each interface between the software product and its users.*
*This includes those **configuration characteristics** (e.g., required screen formats, page or window layouts, content of any reports or menus, or availability of programmable function keys) necessary to accomplish the software requirements.*
b) *All the aspects of **optimizing the interface** with the person who must use the system.*
This may simply comprise a list of do's and don'ts on how the system will appear to the user. One example may be a requirement for the option of long or short error messages. Like all others, these requirements should be verifiable, e.g. "A clerk typist grade 4 can do function X in Z min after 1 h of training" rather than "a typist can do function X." (This may also be specified in the Software System Attributes under a section titled Ease of Use.)

Describe how the system will interact with its users.

2.1.2 Hardware Interfaces

The system runs on a website and a mobile application. The website could run on both computers and smartphones. The application runs on the iOS and Android operating systems. The system server is running on an Amazon Web server. In addition system data is stored on the system local server. The server processes all the major functions and returns the output to the user.

2.1.3 Software Interfaces

1. Our system supports windows, macOS, iOS and android. For windows, the least version we can support is 7 or later and macOS is 10.14 or higher. Besides, we can support any version of iOS and android.
2. Visual Studio Code is used to develop our website. It helps to develop and create dynamic and interactive web pages. It is also widely used among web application developers because of its open-source technology. It is very easy and convenient because we can customize the website on our own.
3. We will implement the Amazon Web Server (AWS) because it offers flexibility, cost efficient and secure.
4. Maria DB technology is used in our project as it is an open-source relational database and is most often used in many projects.

No.	Name	Mnemonic	Specification number	Version number	Source
1	Visual Studio Code	VS Code	-	1.55.1	Microsoft
2	Amazon Web Server	AWS	-	-	GitHub
3	Maria DB	Maria DB	-	10.9	GitHub

2.1.4 **Communication Interfaces**

The system shall use HTTPS (Hypertext Transfer Protocol Secure) protocol for communication between the client and server over the internet. For offline mobile application, there's no communication needed as all of the data regarding the dictionary will be stored on end users' devices. For online mobile application, internet connection will be needed.

2.2 **System Features**

The system features include use case diagram (Figure 2.1), activity diagram (Figure 2.2) and domain model diagram (Figure 2.3).

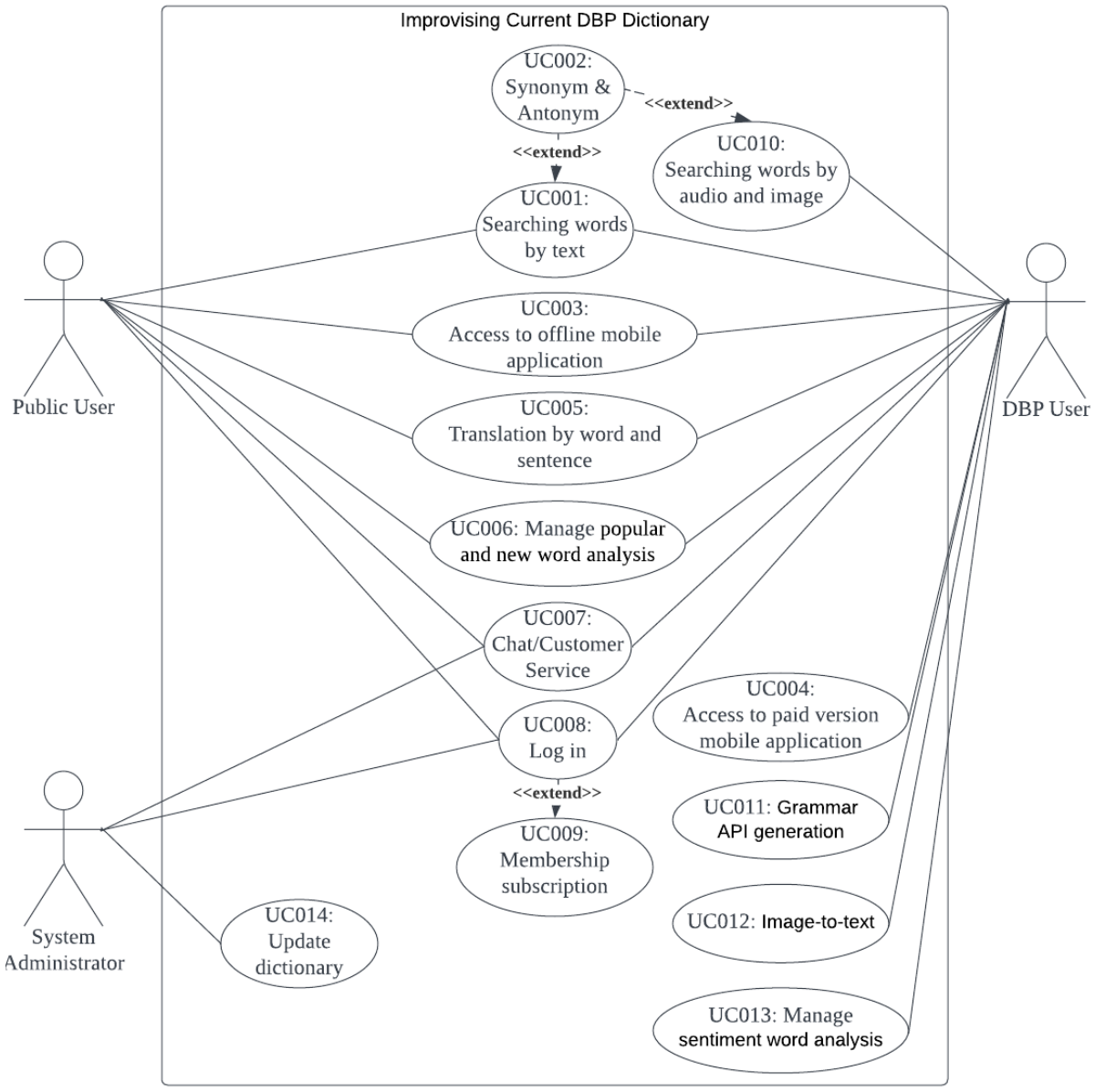

Figure 2.1: Use Case Diagram for Improvising Current DBP Dictionary

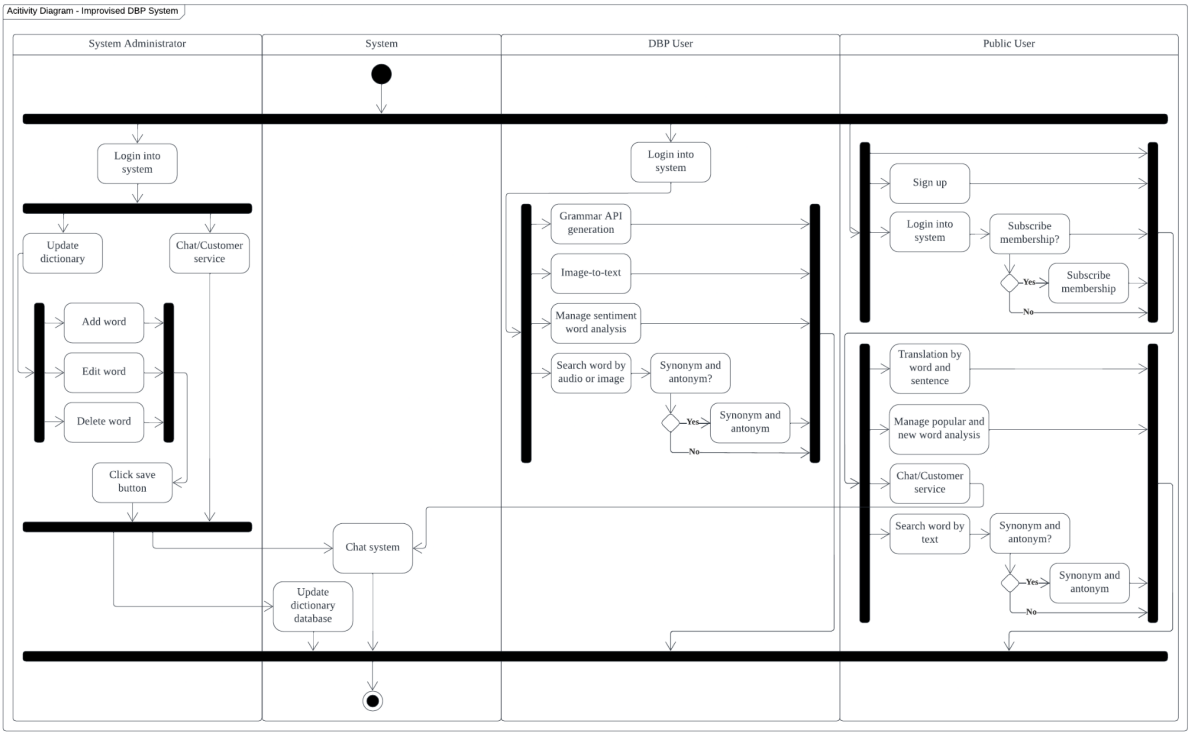

Figure 2.2: Activity Diagram for Improvising Current DBP Dictionary

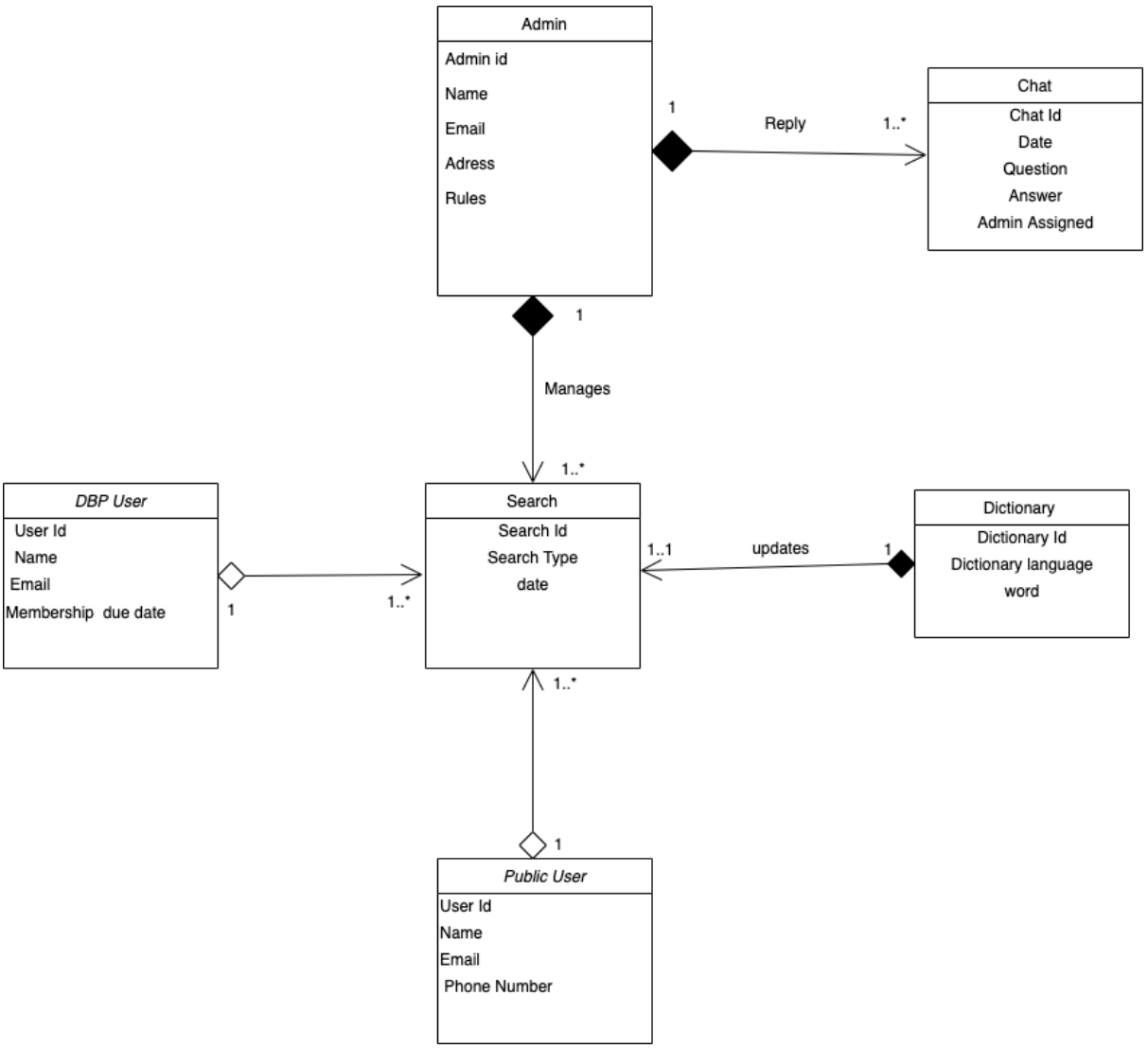

Figure 2.3: Domain Model for Improvising Current DBP Dictionary

2.2.1 UC001: Use Case <Searching words by text>

Table 2.1: Use Case Description for Searching words by text

Use case: Searching words by text
ID: UC001
Actors: Public User, DBP User
Description: This use case describes the process of searching definitions of words in the dictionary by text.
Extension points: <Synonym and Antonym>
Flow of events: 1. User searches for a word in the search bar using text.

2. The system will fetch the definition of word from the database. (EF1) 3. The system will display the definition of the corresponding text entered. 4. If the user chooses synonyms and antonyms options. 4.1. <Synonym and Antonym> 5. Use case ends.
Postconditions: The system successfully displays the definition of the text.
Exception flow: **1. No definition about the text.** 1.1. The system will display an error message. 1.2. Use case aborted

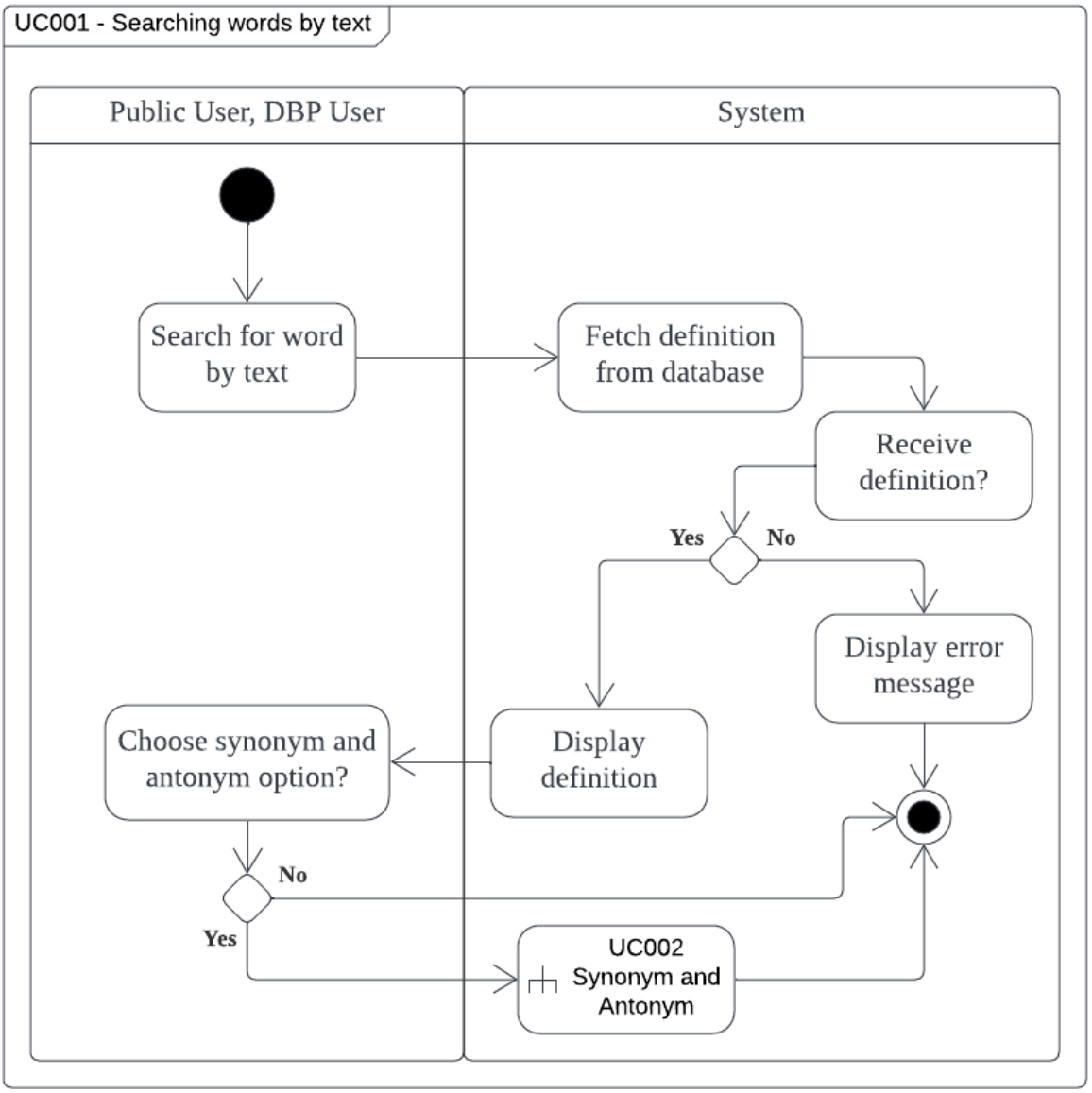

Figure 2.5: Activity Diagram for Searching words by text

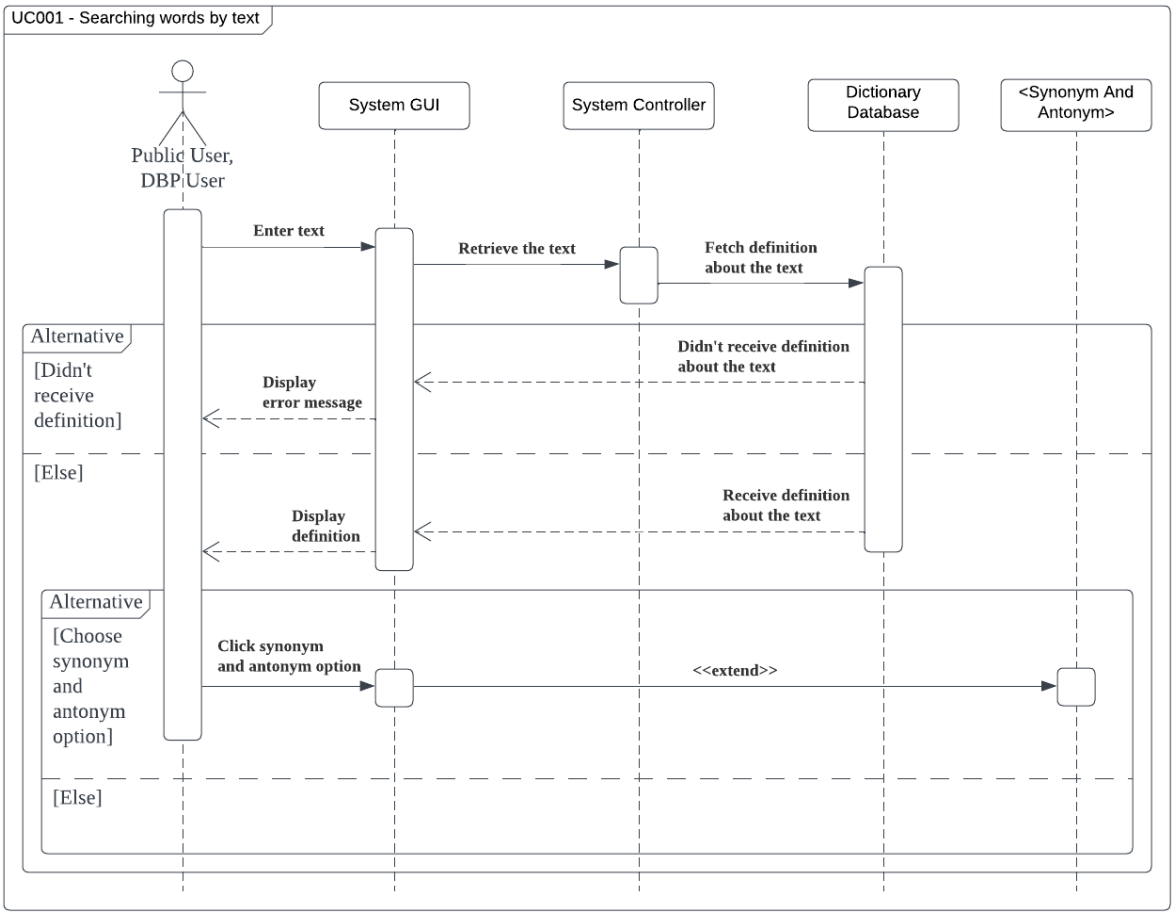

Figure 2.6: Sequence Diagram for Searching words by text

2.2.2 UC002: Use Case <Synonym and Antonym>

Table 2.2: Use Case Description for Synonym and Antonym

Use case: Synonym and Antonym
ID: UC002
Actors: Public User, DBP User
Description: This use case describes the process of getting the synonym and antonym of a word.
Precondition: User must insert a word by text, image or audio.
Flow of events: 1. The system will redirect users to a new page. 2. The system fetches the synonyms and antonyms for the corresponding word from the database. (EF1) 3. The system will display the synonyms and antonyms of the corresponding word entered.

4. Use case ends.
Postconditions: The system successfully displays the synonym and antonym of the text.
Exception flow: **1. No synonym and antonym about the word.** 1.1. The system will display an error message. 1.2. Use case aborted.

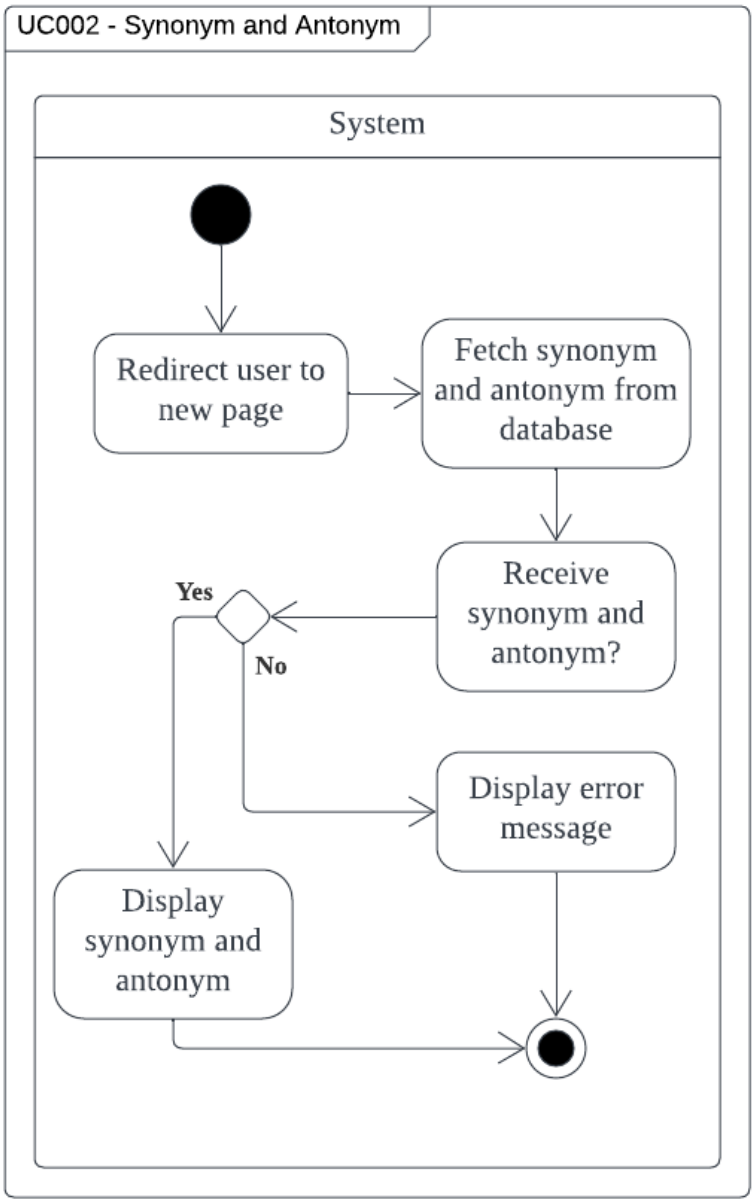

Figure 2.5: Activity Diagram for Synonym and Antonym

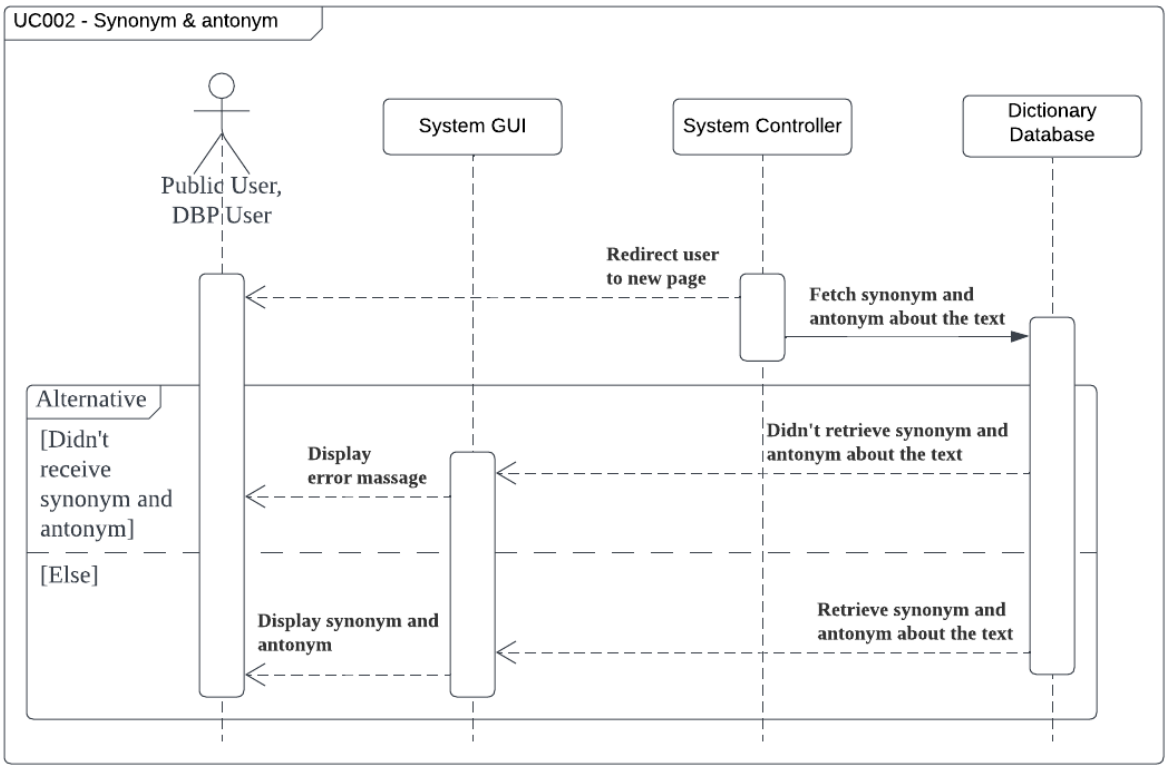

Figure 2.6: Sequence Diagram for Synonym and Antonym

2.2.3 UC003: Use Case <Access to offline mobile application>

Table 2.3: Use Case Description for Access to offline mobile application

Use case: Access to offline mobile application
ID: UC003
Actors: Public User
Description: This use case describes the process of accessing to offline mobile application
Preconditions: User must install the mobile application.
Flow of events: 1. Public user have access to 1.1. Searching for words by text. (AF1) 1.2. Synonym and antonym. (AF2) 1.3. Translation by word and sentence. (AF3) 2. Use case ends.
Alternative flow: **1. User chose to search for words.** 1.1. System invokes UC001. **2. User chose to find synonyms and antonyms.**

2.1. System invokes UC002.

3. User chose to translate words and sentences.

3.1. System invokes UC005.

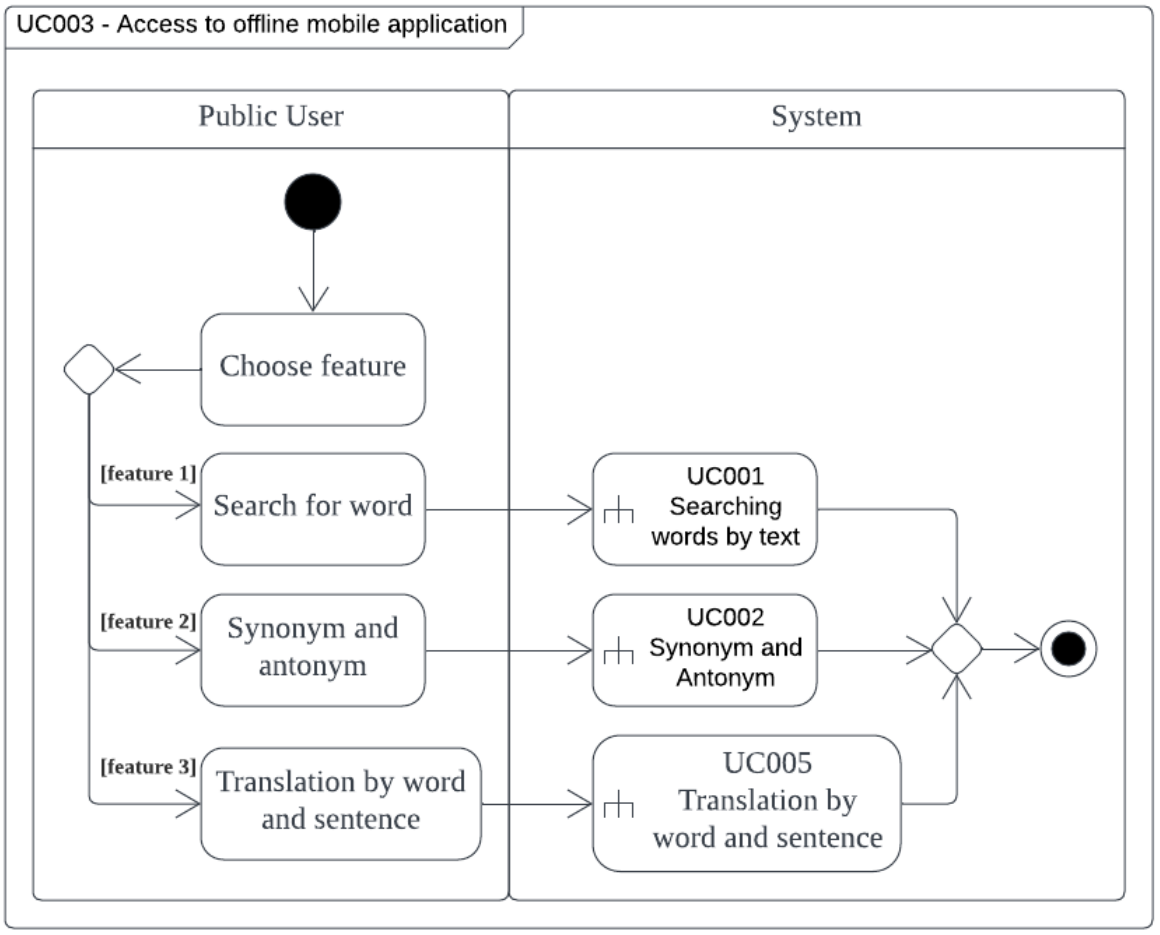

Figure 2.5: Activity Diagram for Access to offline mobile application

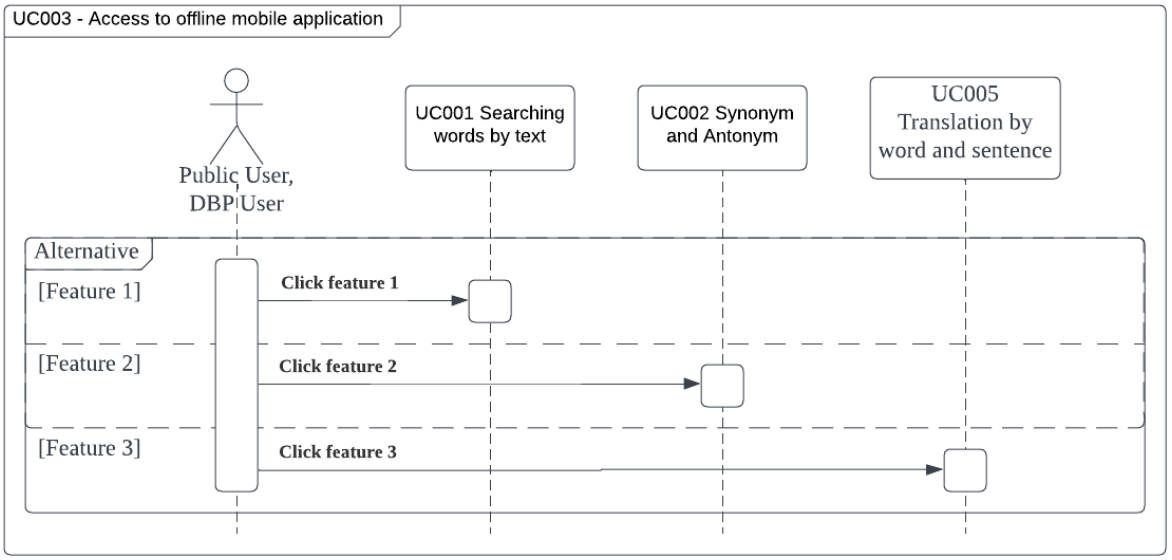

Figure 2.6: Sequence Diagram for Access to offline mobile application

2.2.4 UC004: Use Case <Access to paid mobile application>

Table 2.4: Use Case Description for Access to Paid mobile application

Use case: Access to Paid mobile application
ID: UC004
Actors: DBP User
Description: This use case describes The user will access the application's paid version.
Preconditions: User must install the mobile application.
Flow of events: 1. User enter username and password. 2. The system will check the accuracy of the user data from the database. (EF1) 3. The system will display that the login was successful. 4. If the user has paid membership. 4.1. The system will then open all the paid features in the application. 5.else 5.1. The system will not give permission to access paid features. 5.2 The system will display an option to make paid membership. 5. Use case ends..

Postconditions: The user successfully accesses the membership functions.
Exception flow: 1. Wrong username or password. 1.1. The system will display an error message. 1.2. Use case aborted.

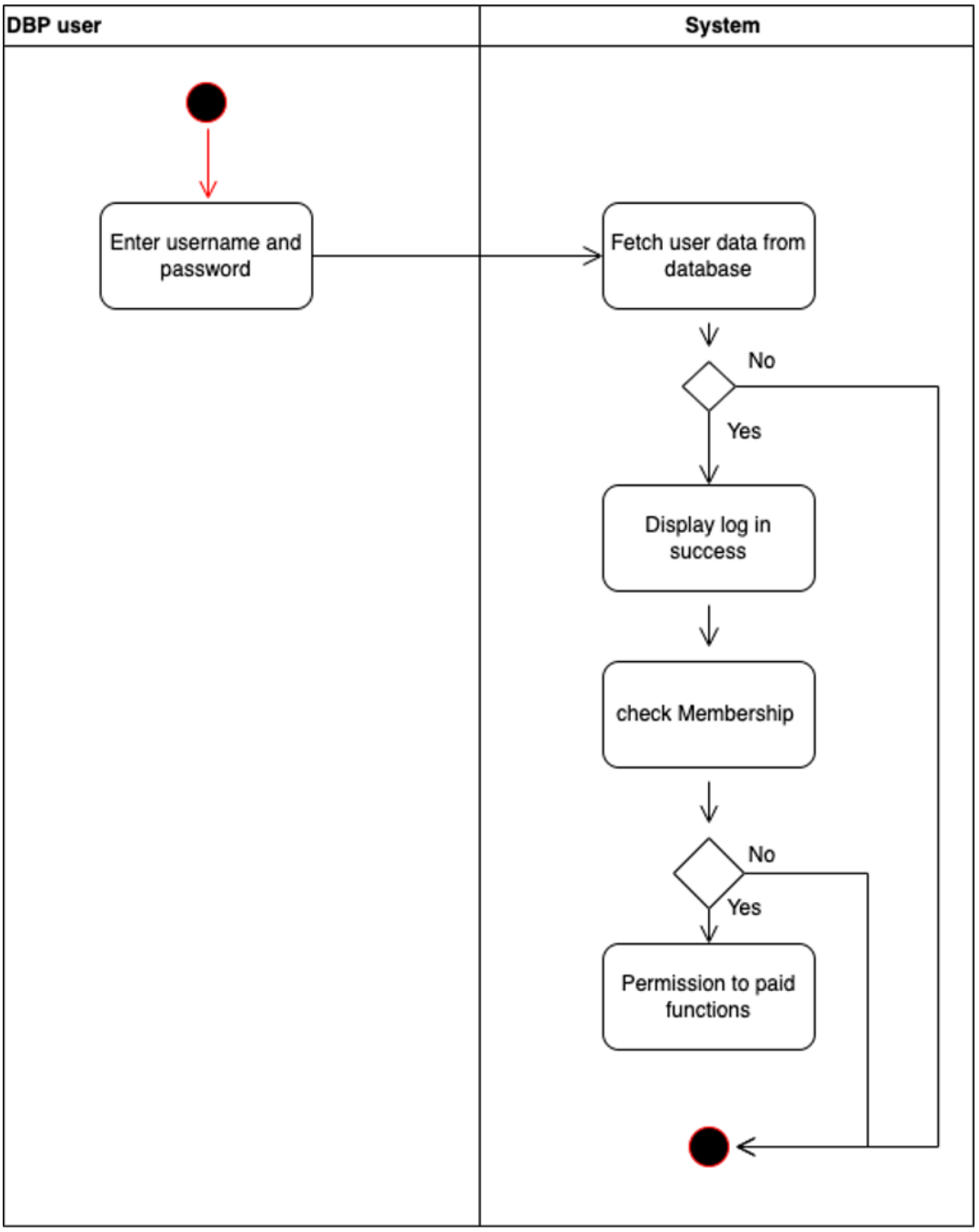

Figure 2.7: Activity Diagram for Access to Paid mobile application

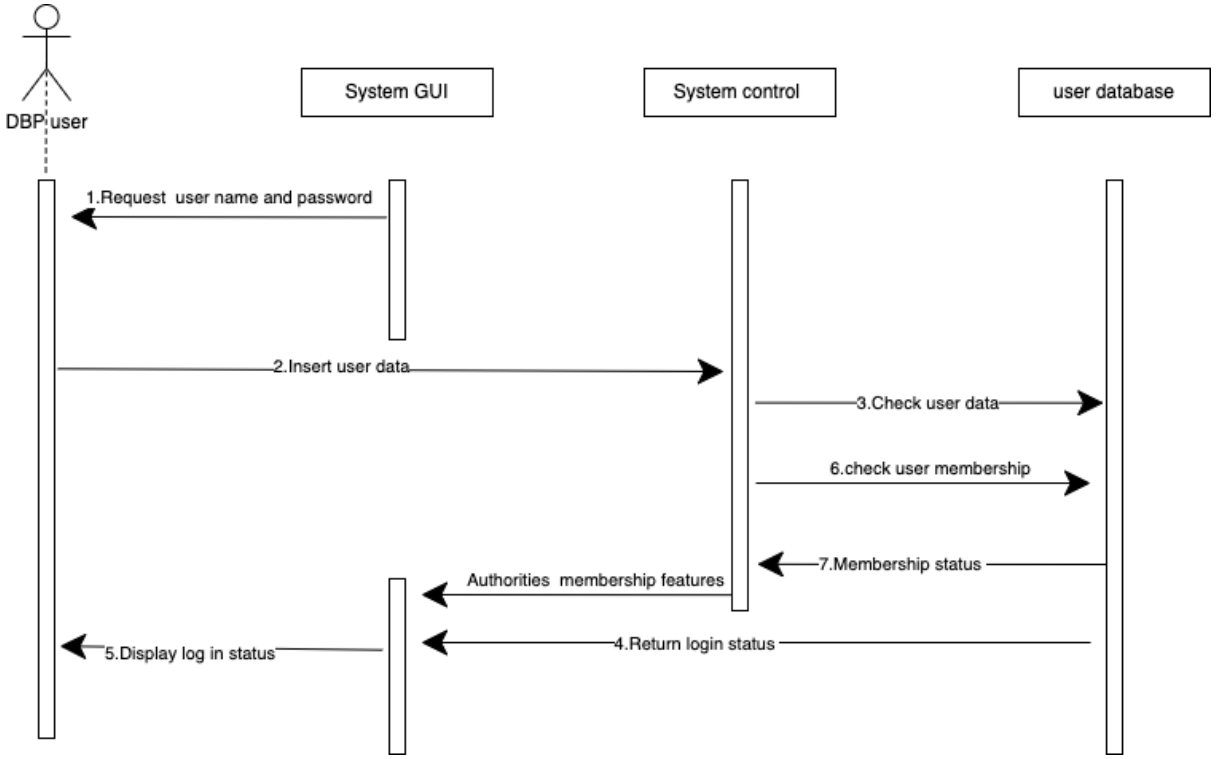

Figure 2.8: Sequence Diagram for Access to Paid Mobile Applications

2.2.5 **UC005: Use Case <Translation by word and sentence>**

Table 2.5: Use Case Description for Translation by word and sentence

Use case: Translation by word and sentence
ID: UC005
Actors: DBP User,Public
Description: This use case describes the translation by word and sentence.
Preconditions: User must insert a word or sentence.
Flow of events: 1. The system will redirect users to a new page. 2. The user inserts a word or a sentence . 3. The system will fetch the definition of a word or the sentence from the database. (EF1). 4. The system will display the definition of the corresponding text entered. 5. If the user chooses to search by image options. 5.1< <Image-to-text>> 5.1 the system will fetch the definition of images text or the sentence from the database. (EF1). 6. Use case ends.
Postconditions: The system successfully identifies and displays the definition of the text. .
Exception flow: 1. No definition of the text. 1.1. The system will display an error message. 1.2. Use case aborted.

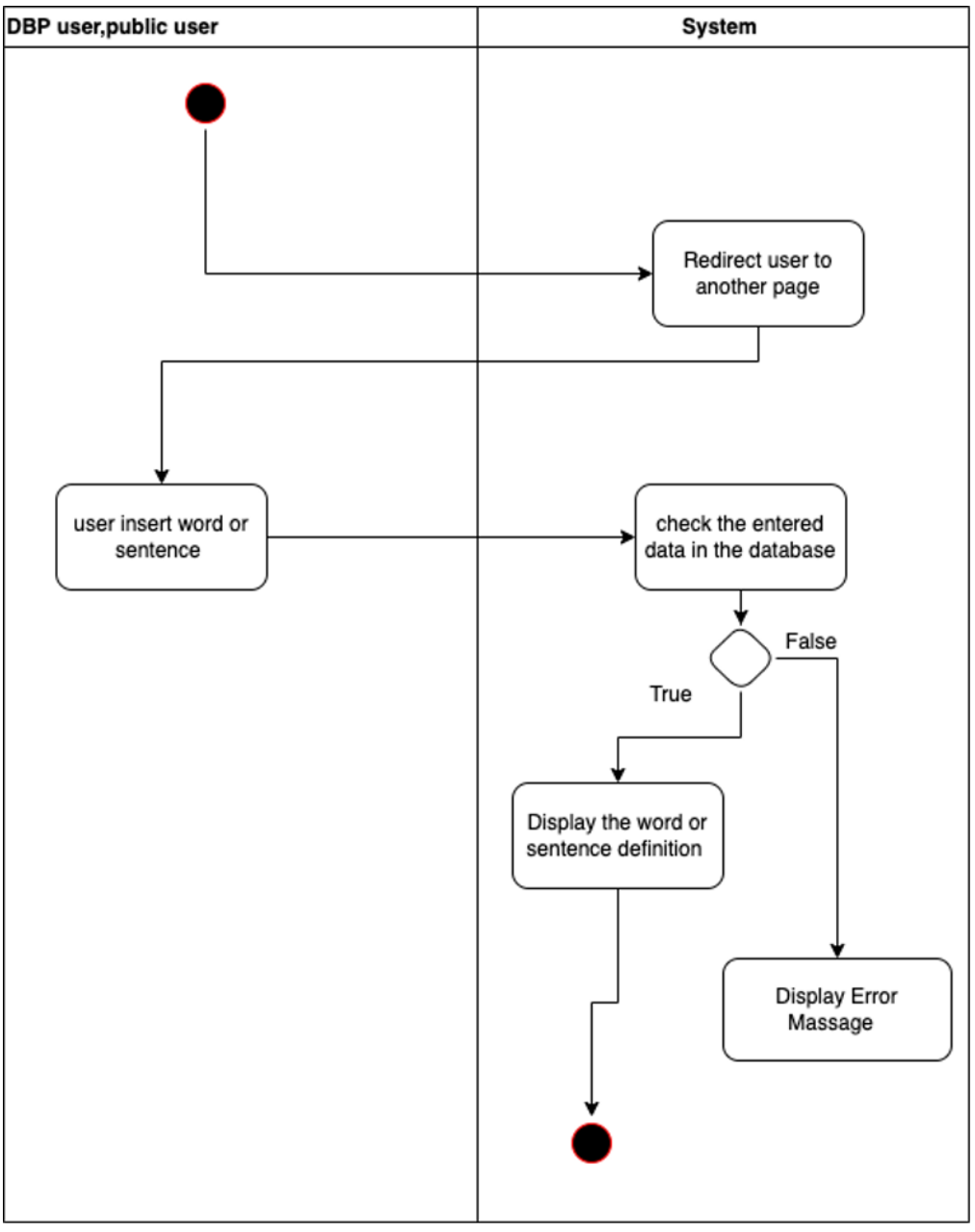

Figure 2.9: Activity Diagram for Translation by Word and Sentence

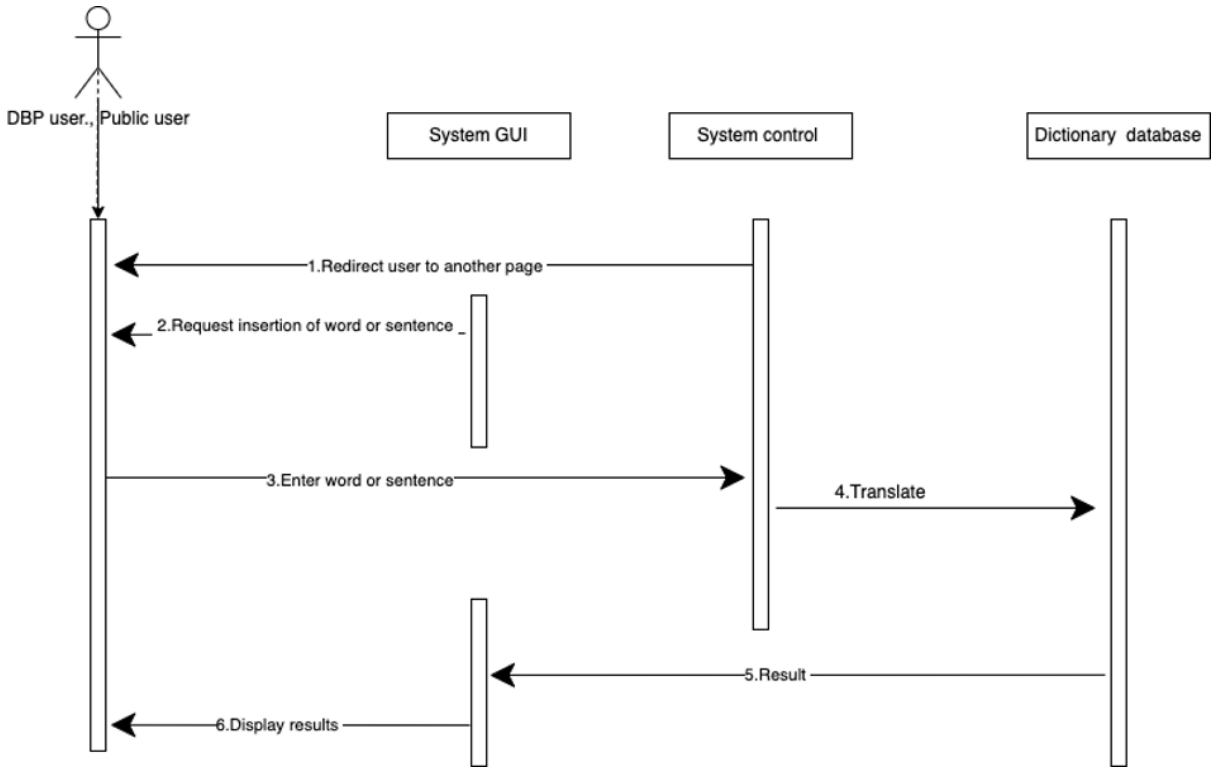

Figure 2.9: Sequence Diagram for Translation by Word and Sentence

2.2.6 **UC006: Use Case <Manage popular word analysis>**

Table 2.6: Use Case Description for Manage popular word analysis.

Use case: Manage popular word analysis
ID: UC006
Actors: DBP User,Public
Description: This use case describes the management of popular and new words analysis.
Preconditions: User must login in successfully.
Flow of events: 1. The system will redirect users to the "popular words" page. 2. The system will fetch the popular word from the database . (EF1). 3. The system will display all the words with their definitions. 4. If the user chooses new word analysis, 4.1. The system will ask the user to insert the words. 4.2. The system will fetch the definition of the text from the database. (EF1). 4.3.the system will display all the information of the word. 5. Use case ends..
Postconditions: The system successfully displays the definition of the text. .
Exception flow: 1. No information was found about the text. 1.1. The system will display an error message. 1.2. Usecase aborted.

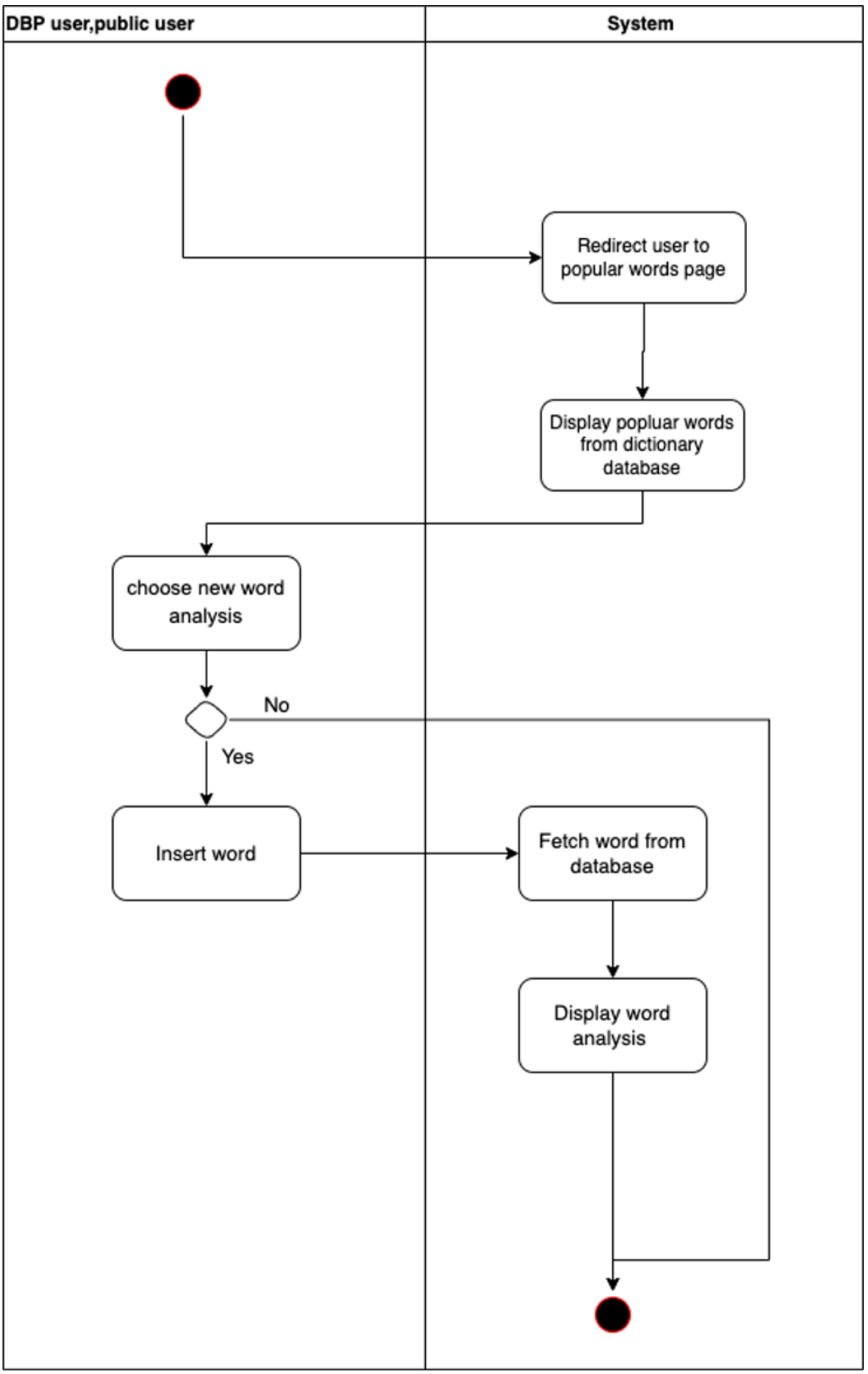

Figure 3: Activity Diagram for Managing Popular and New Word Analysis

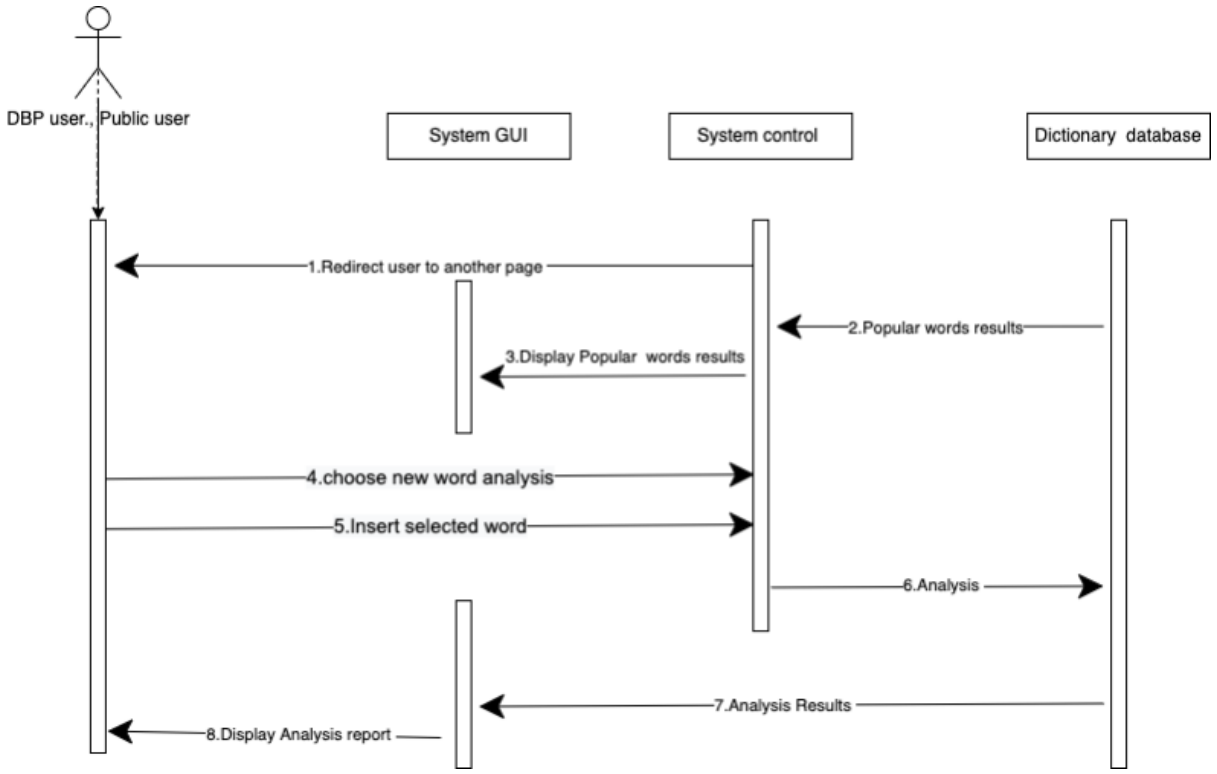

Figure 3.1: Sequence Diagram for Manage popular and new word analysis

2.2.7 **UC007: Use Case <Chat/Customer Service>**

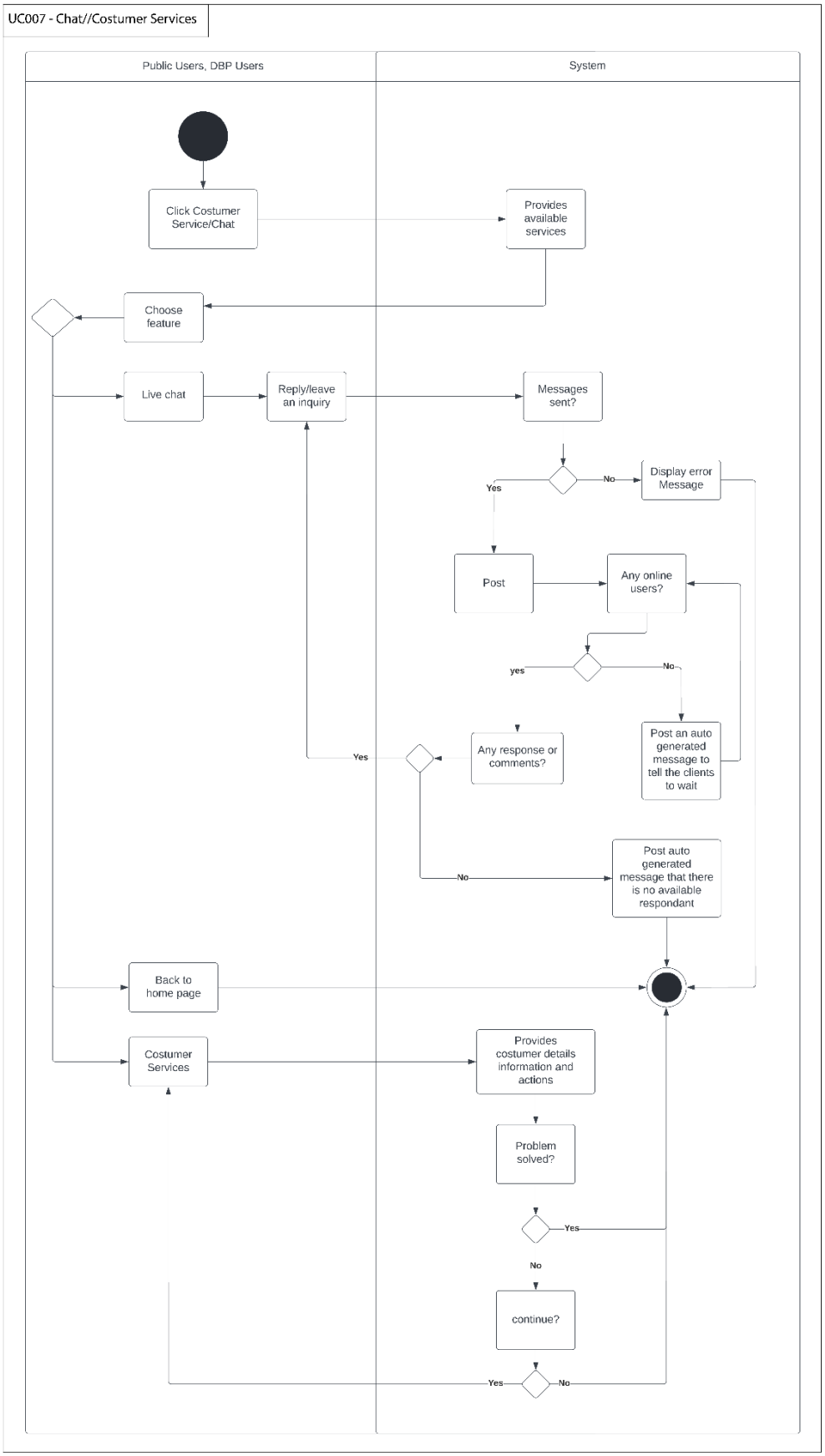

Figure 3.2: Activity Diagram for Chat and Customer Services

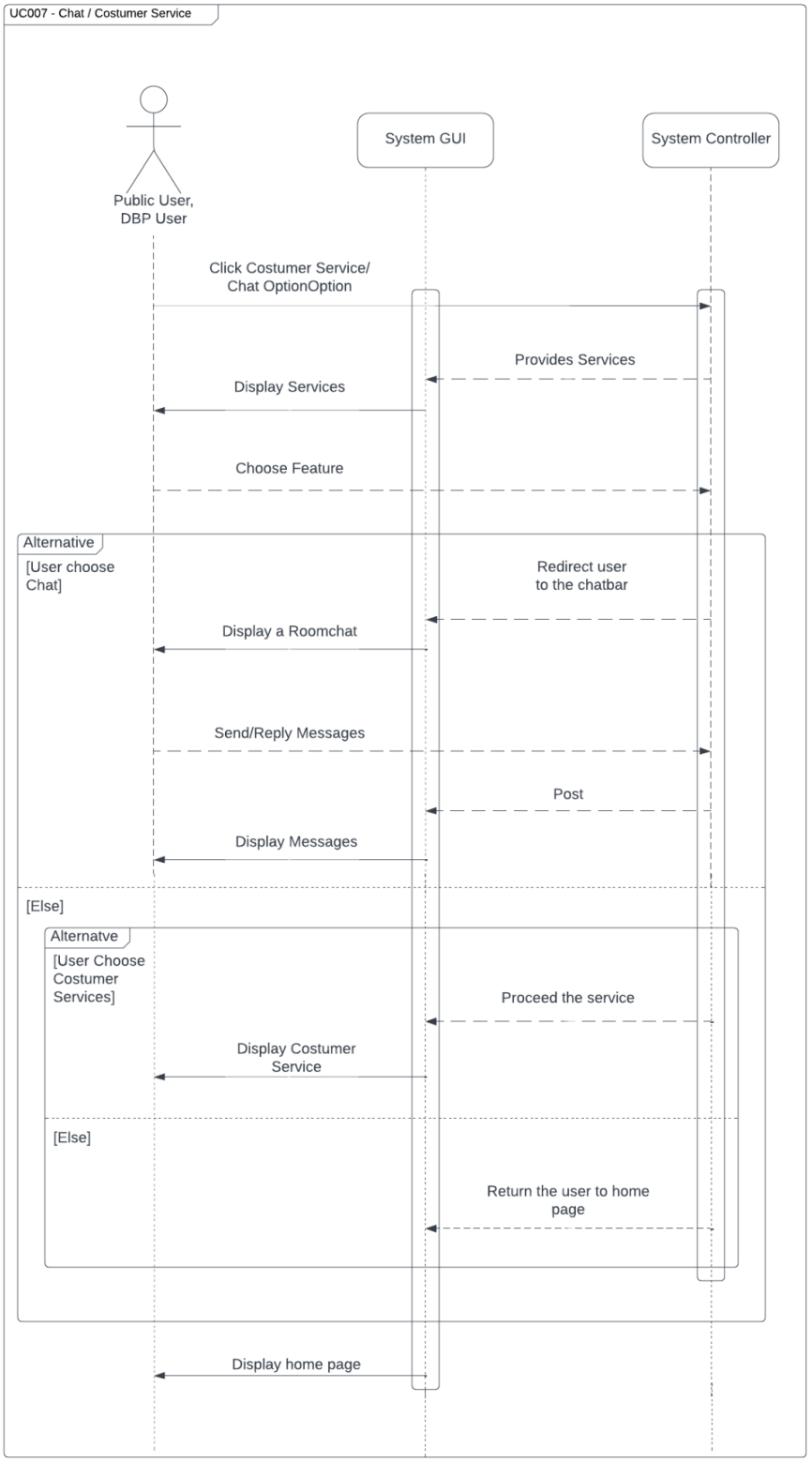

Figure 3.3: Sequence Diagram for Chat and Customer Services

2.2.8 UC008: Use Case <Log In>

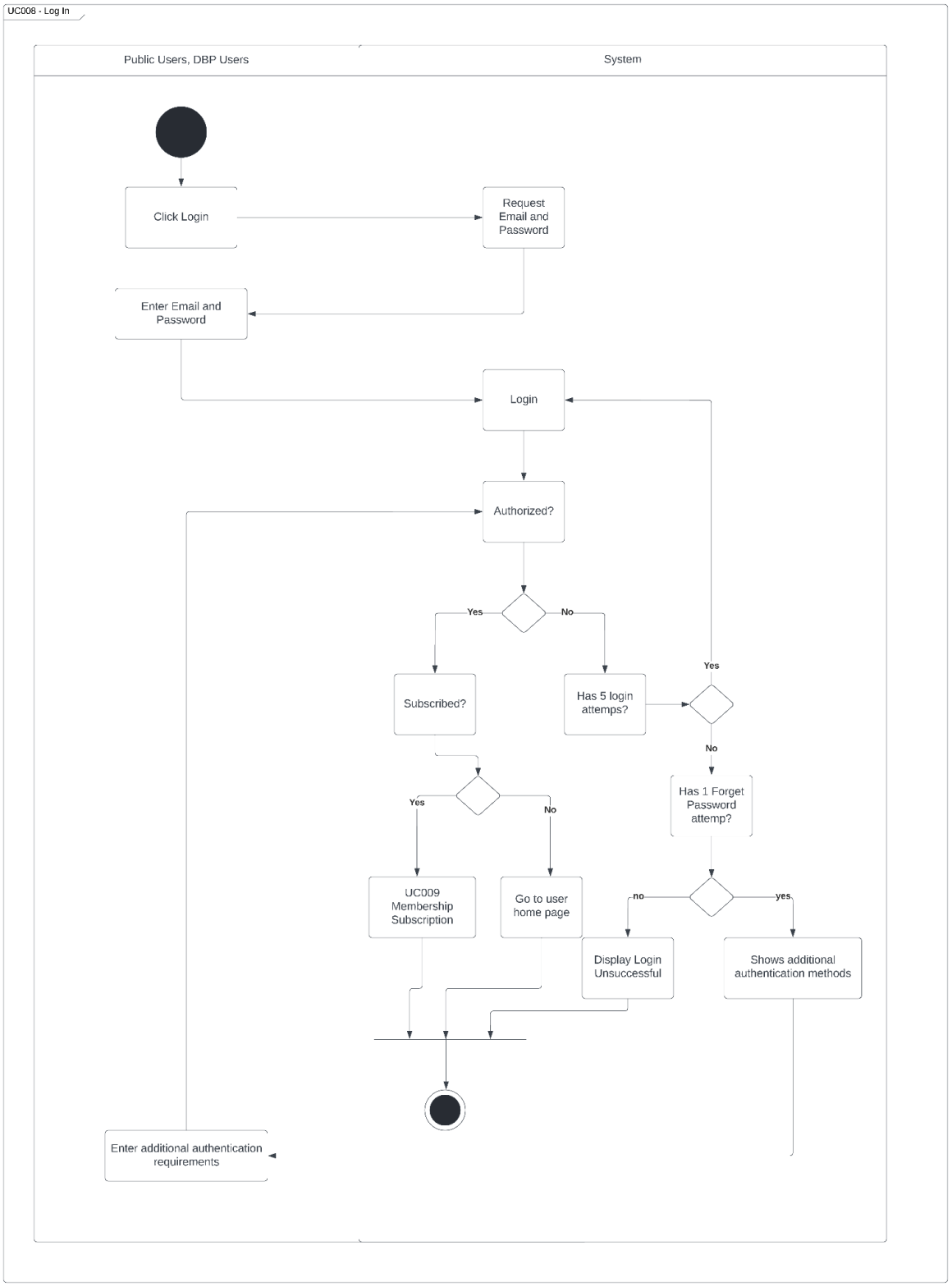

Figure 3.4: Activity Diagram for Logging In

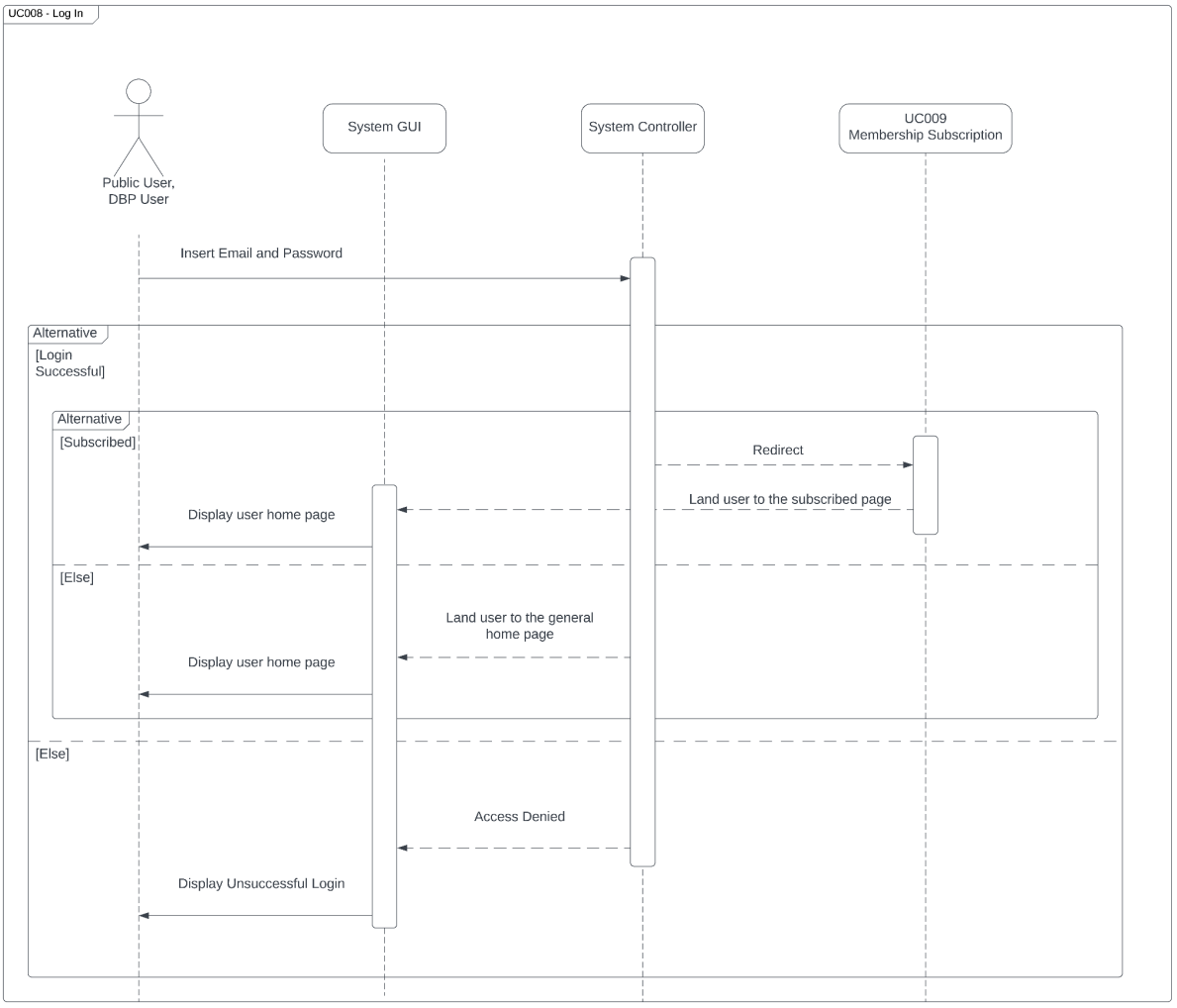

Figure 3.5: Sequence Diagram for Logging In

2.2.9 **UC009: Use Case <Membership Subscription>**

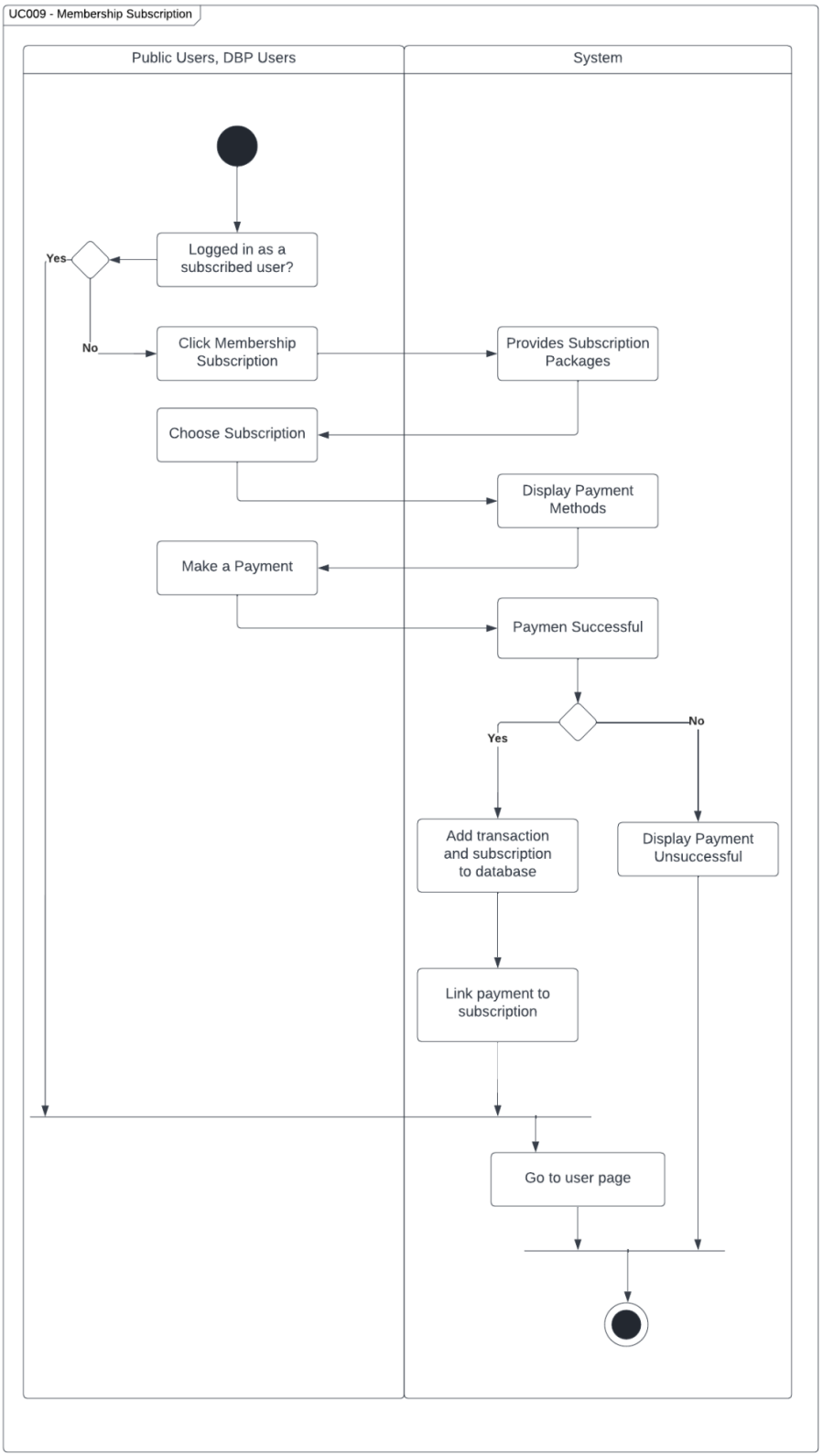

Figure 3.6: Activity Diagram for Membership Subscription

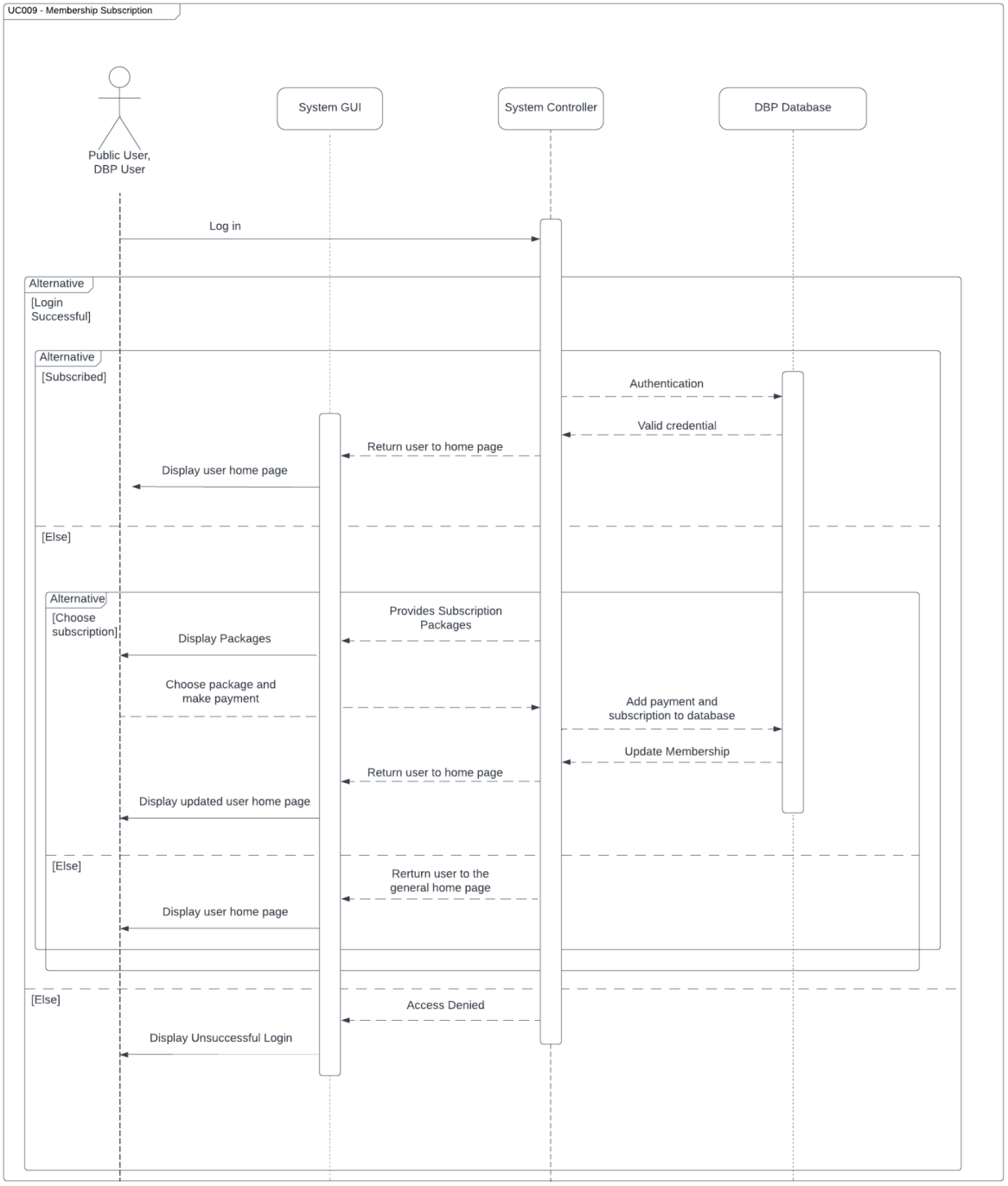

Figure 3.7: Sequence Diagram for Membership Subscription

2.2.10 **UC010: Use Case <Searching Words by Audio or Image>**

2.2.11 **UC011: Use Case <Grammar API Generation>**

2.2.12 **UC012: Use Case <Image-to-text>**

Table 2.12: Use Case Description for <Image-to-text>

Use case: <Image-to-text>
ID: UC012
Actors: DBP User
Brief Description: This use case describes the process of translating the image into text.
Preconditions: DBP User subscribes to the membership and successfully login to the system.
Flow of events: 1. The use case starts when the user selects the camera icon which refers to the “Image-to-text” function beside the search tab. 2. The system will request authorization for using the device’s camera. 3. If user allows the permission, 3.1. The camera will be turned on. 3.2. The user can capture the image of anything he/she wants to translate. 3.3. The system will ask the user to choose whether they want to translate from English to Malay or from Malay to English. 3.4. The system will translate any words that it captures in the image. 4. Else, 4.1. Exception 1 is followed. 5. The use case ends.
Postconditions: 1. Successful operation 1.1. User successfully translate the image. 1.2. User redirected to the home page. 2. Failure operation 2.1. System displays an error message.
Exception flow: 1. Unsuccessful authorization 1.1. The system will prompt the message that it did not get the permission from the user’s device for using the camera, and the user redirected to the home page.

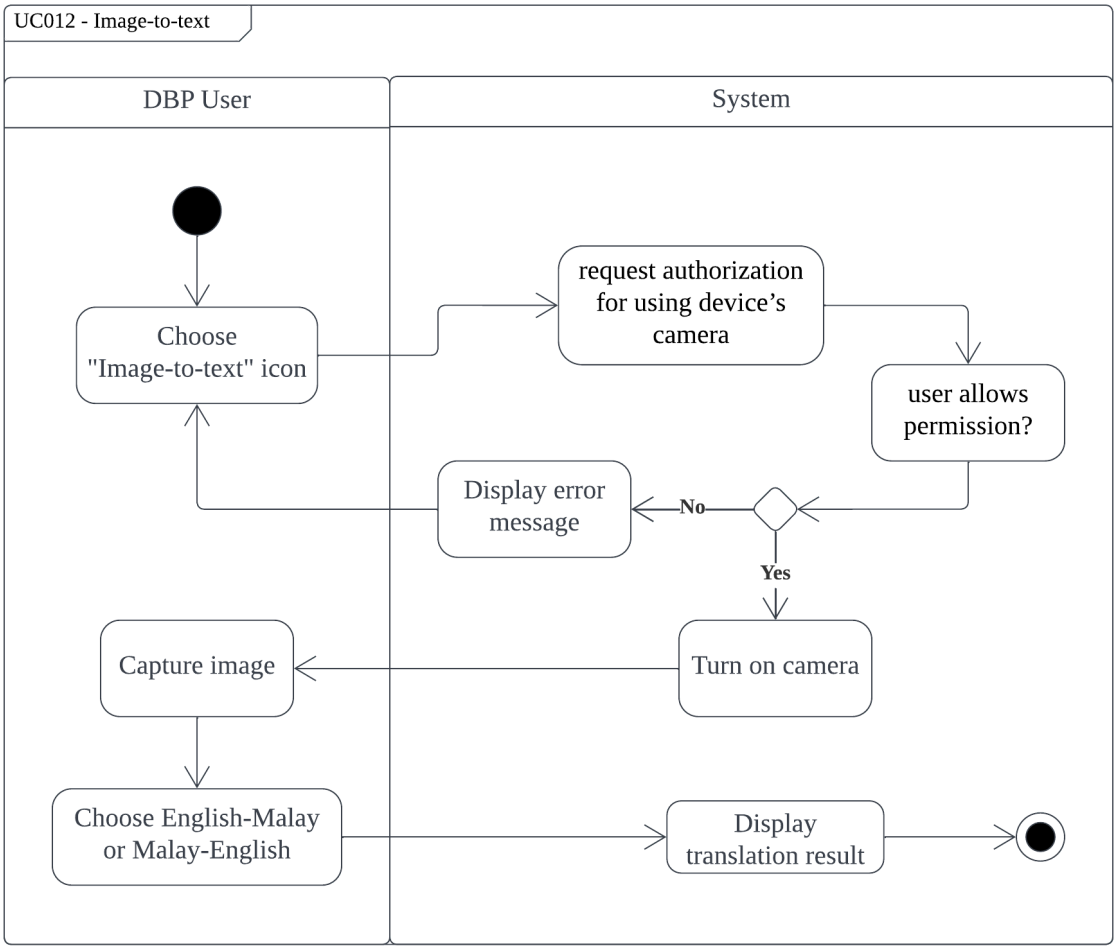

Figure XX: Activity Diagram for Translating Image-to-text

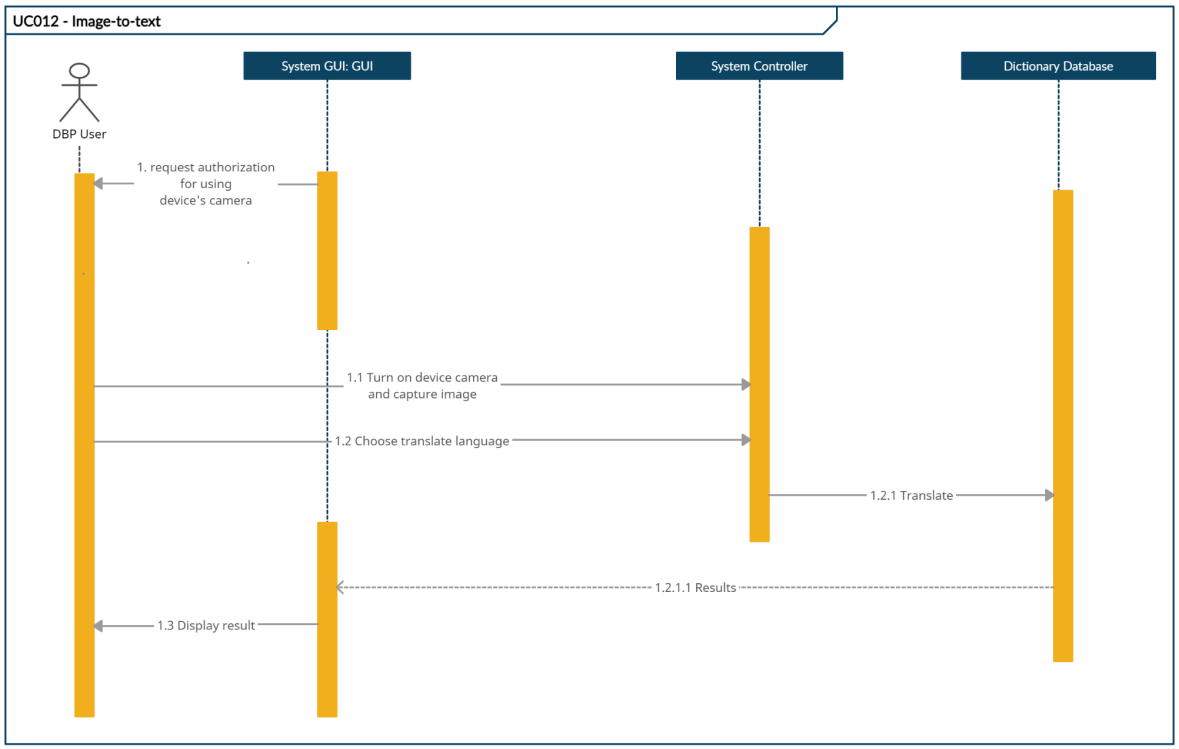

Figure XX: Sequence Diagram for Translating Image-to-text

2.2.13 **UC013: Use Case <Manage sentiment word analysis>**

Table 2.13: Use Case Description for <Manage sentiment word analysis>

Use case: <Manage sentiment word analysis>
ID: UC013
Actors: DBP User
Brief Description: This use case describes the process of
Preconditions: DBP User subscribes to the membership and successfully login to the system.
Flow of events: 1. DBP Users write and submit their feedback in the “Feedback” page. 2. System will analyze the feedback and get the keyword that represents the user’s words. 3. All of the feedback will be classified by the keywords. 4. If the user click on the “Sentiment Word Analysis Report”, 4.1. The system will display the result of all feedback in a sentiment analysis dashboard. 5. Else, 5.1. The user can click on the home icon to go back to the main page. 6. The use case ends.
Postconditions: 1. Successful operation

1.1. Users successfully submit their feedback. 1.2. Users successfully view the Sentiment Word Analysis Report. 1.3. Users are redirected to the home page. 2. Failure operation 2.1. System displays an error message. 2.2. Users are redirected to the home page.	
Exception flow (if any): 1. Failure operation 1.1. System displays an error message. 1.2. Users are redirected to the home page.	

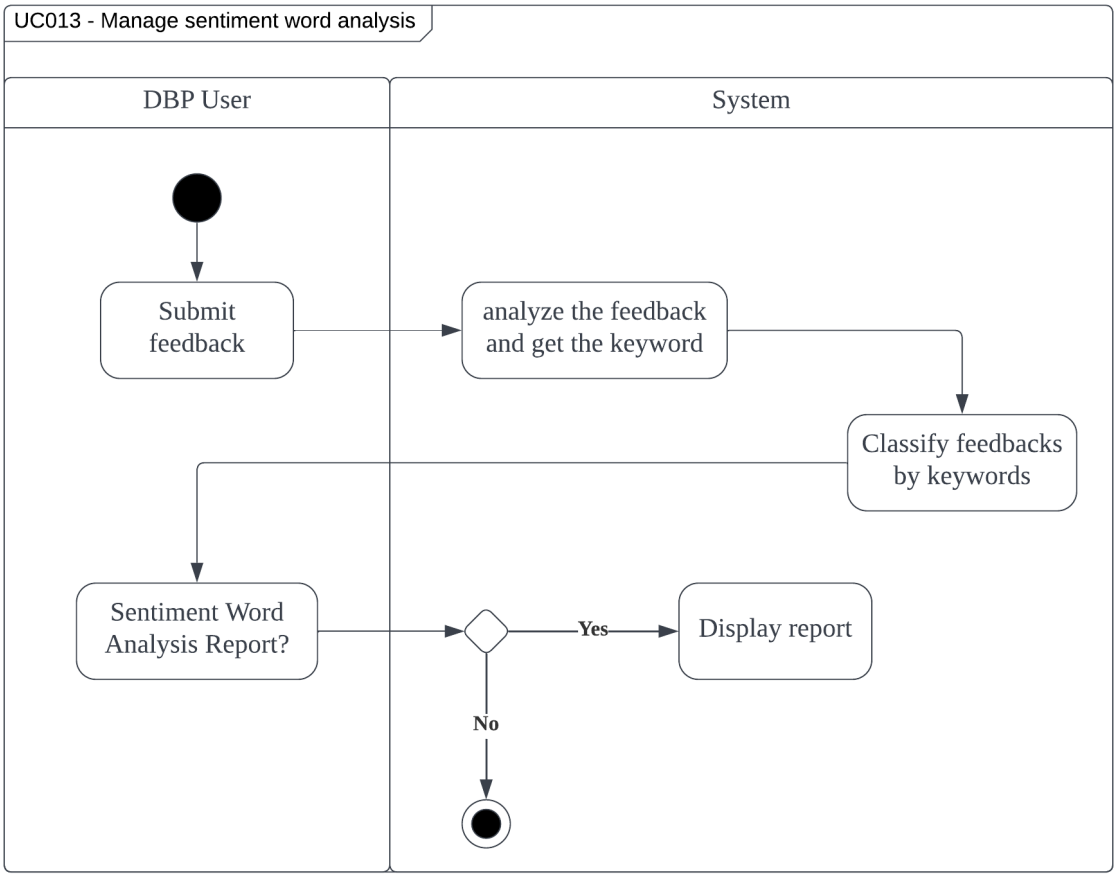

Figure XX: Activity Diagram for Manage sentiment word analysis

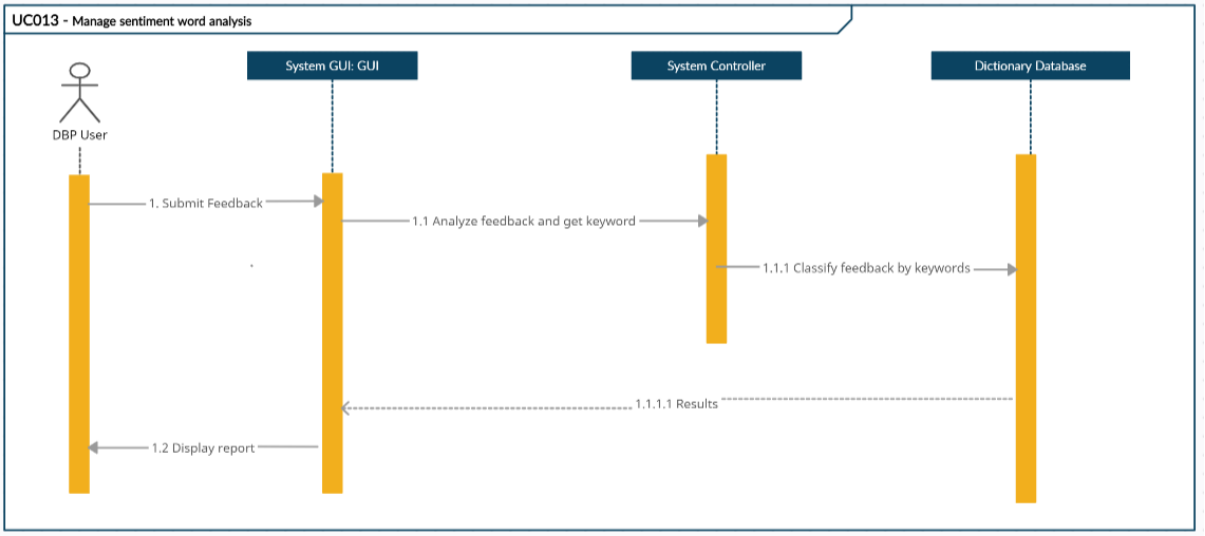

Figure XX: Sequence Diagram for Manage sentiment word analysis

2.2.14 **UC014: Use Case <Update dictionary>**

Table 2.14: Use Case Description for <Update dictionary>

Use case: <Update dictionary>
ID: UC014
Actors: System Administrator
Brief Description: This use case describes the process of updating the dictionary.
Preconditions: System Administrator successfully login to the system.
Flow of events: 1. The use case starts when the system administrator selects the "Update Dictionary" button at the home page. 2. The system will list all the existing words in the dictionary ascendingly from the words starting with letter A. 3. If the system administrator choose the "Add New Words" button, 3.1. A "New Word" form will be given and the system administrator is required to fill in the form with the new word and its details. 4. At the right-hand side of every word, there will be an "Delete" button. 4.1. When the system administrator clicks on the delete button, the system will prompt a message to confirm the action. 5. At the right-hand side of every word, there will be an "Edit" button. 5.1. When the system administrator clicks on the edit button, the system will go to the edit form of the specified word. 5.2. In the edit form, the system administrator can do any changes to the words and its description. 5.3. The system administrator can click on the "Save" button to save their changes to the words.

6. For the add, delete and edit words function, the system will require the system administrator to type their password.
    6.1. If the password is correct, the operation is successful and the dictionary will be updated.
    6.2. If the password is incorrect, Exception 1 is followed.
7. When the system administrator clicks on the arrow button at the end of the page,
    7.1. The system will go to the next page, previous page, first page or last page according to the system administrator's choice of arrow button.
    7.2. If the system fails to redirect to the pages, Exception 1 is followed.
8. When the system administrator clicks on the search tab,
    8.1. The system administrator are required to choose the type of searching.
    8.2. If "Search by page number" is chosen,
        8.2.1. The system administrator can enter the number of pages in the search tab.
    8.3. If "Search by word" is chosen,
        8.3.1. The system administrator will enter the word they want to find.
    8.4. If "Search by starting letter" is chosen,
        8.4.1. The system administrator can enter the starting letter that they want to search.
    8.5. The system will show the searching result.
    8.6. Else,
        8.6.1. Exception 1 is followed.
9. When the system administrator clicks on the "Cancel" button at the end of the page,
    9.1. The system administrator redirected to the home page.
10. The use case ends.

Postconditions:

1. Successful Operation
    1.1. System administrator successfully updated the dictionary.
    1.2. System administrator redirected to the home page.
2. Failure Operation
    2.1. System displays an error message.

Exception flow:

1. Failure operation
    1.1. System displays an error message.
    1.2. System redirect to the home page.

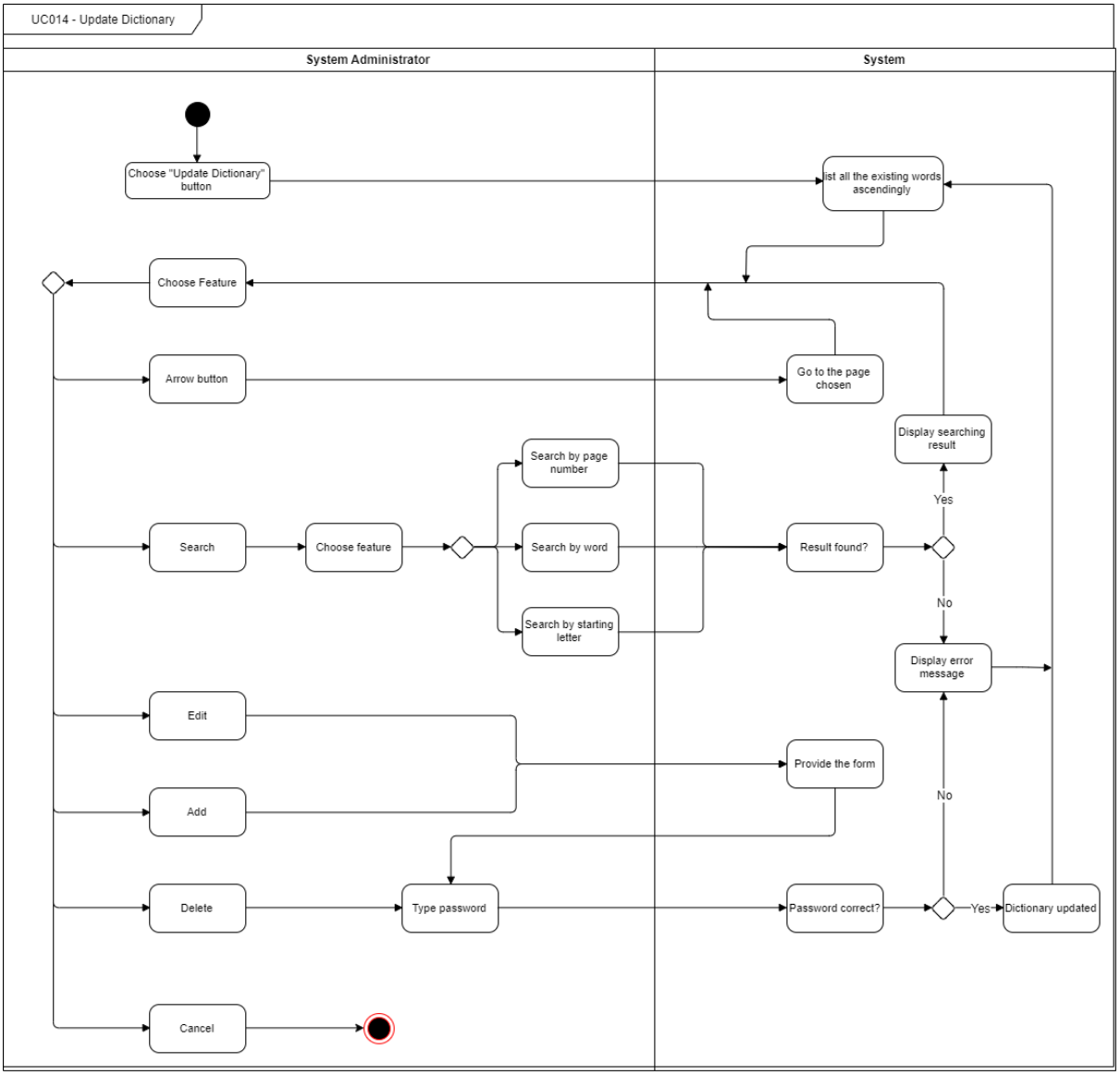

Figure XX: Activity Diagram for Updating Dictionary

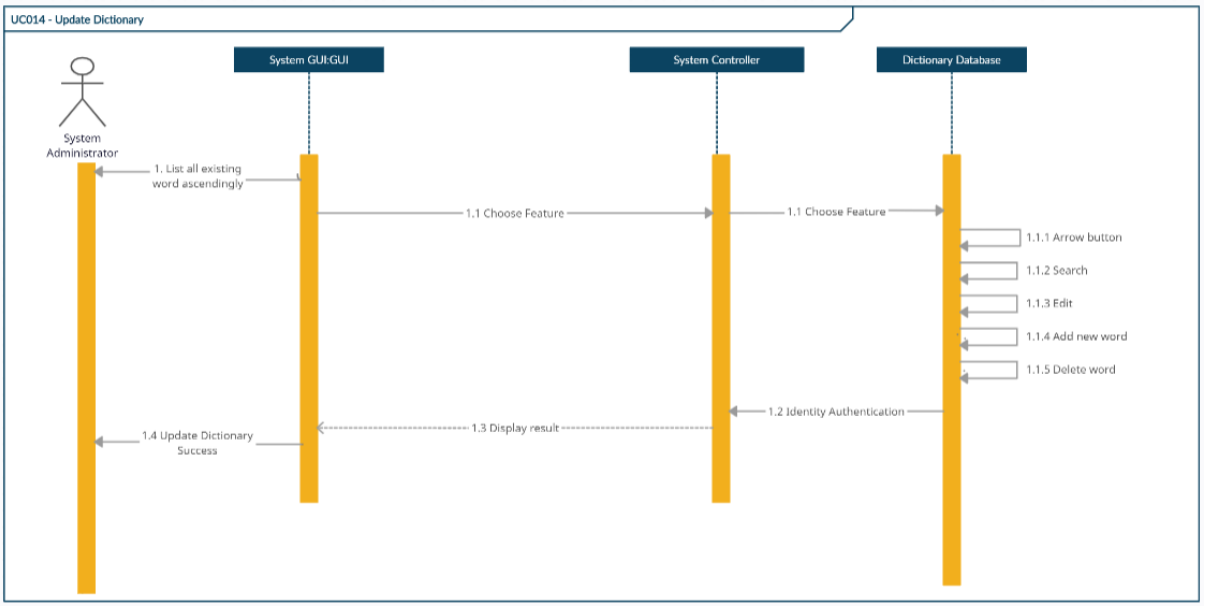

Figure XX: Sequence Diagram for Update Dictionary

2.3 **Performance and Other Requirements**

The system should be optimized in terms of utilization and performance. Therefore, the requirements are as below:

Table 2.15: Performance and Other Requirements

Requirement	Description
Security	• User authentication: Any user who wants to do the translation needs to have access to the system. The system should recognize the user through their unique id and password. • Database: Any insertion, deletion or update on the database can be made by the system administrator only.
Portability	• The website should be both mobile-friendly and desktop-friendly. It is compatible with various browsers (E.g: Google Chrome, Safari, Mozilla Firefox etc).
Usability	• All functions in the system work accurately and efficiently. The system will produce correct output for the user.
Maintainability	• The system offers the efficiency of data backup.

2.4 **Design Constraints**

There are some design constraints that are needed to be applied in completing this project. Those constraints are as follow:

Table 2.16: Design constraints

Constraint	Description
Brand and Style Guidelines	● Any design created shall adhere to DBP's brand identity in terms of colors, font and professionnalisme. ● Every page shall have a header with DBP's logo.
Device Specifics	● The system shall be compatible on both website and mobile application. ● The interface should be minimalistic but compact with features for every device used.
Usability	● The interface should be easy to use for new users with none to little learning curve.
Compliance	● Any pages displayed shall not contain any copyrighted items that can violate the copyright laws.
User Feedback	● The system shall provide a way to gather user's feedback in order to improve the product.

2.5 **Software System Attributes**

1. Speed: The system functions must be fast and accurate for all kinds of tasks.
2. Scalability: The system must be able to handle a large number of all at once.
3. Integrity or security: The system's sensitive functions can only be accessed by authorized users.
4. Usability: The system's user interface must be appealing, simple to understand, and simple to use for all sorts of users.
5. Availability: The system must be able to operate 24 hours a day, seven days a week.

6. Reliability: Any changes to the dictionary will be quickly updated to the system, with a maximum downtime of five seconds.