The Development of Pictorial Dictionary for Learning Dusun Language

Nyzveldo Augustin, Ruhaya Ab. Aziz[*]

Faculty of Computer Science and Information Technology,
Universiti Tun Hussein Onn Malaysia, Parit Raja, 86400, MALAYSIA

Abstract: The developed project is a web-based dictionary for learning Dusun Language. The purpose of this project is to develop a pictorial dictionary for learning Dusun Language. The dictionary specifically able to translate Malay to Dusun Language and vice versa. The system also help user to understand how to use the word by using the example of sentences using the word searched or selected by the user. This system also provides pronunciation or speech out for the word selected by user, make user easier to pronouns the words. The word selected by the user will be also included with its definition, Synonym to help the user understand more of the word. Comparison with another similar system such as English -KadazanTranslator's Companion had been done as the result been taken to build this system that fulfills what the current system does not have. This system was developed based on the Iterative Model. The outcome of this system is expected can help any user or consumer that wanted to learn Dusun or need to translate Malay language to Dusun. Thus, this system is to help the consumer or user to make decision based on the word they want to use in conversation. Therefore, this system has a great potential in helping user to learn Dusun language.

Keywords: Dusun, KadazanTranslator's, Web-based

1. Introduction

KadazanDusun is the term assigned to the unification of the classification of two indigenous peoples of Sabah, the ethnic groups Kadazan and Dusun. Dusun is the collective of a tribe or ethnic and linguistic group in Malaysia state of Sabah of North- Borneo. Due to similarities in culture and language with Kadazan ethnic group, a term called "KadazanDusun" was created. Other similar term, also found in Brunei and Central Kalimantan, Indonesia. Both Bruneian Dusuns (Sang Jati Dusun) and Dusuns of Indonesia (Barito Dusun) are not related to KadazanDusun people. The Dusun ethnic group at one time made up almost 40% of the population of Sabah and is broken down into more than 30 sub-ethnic, or dialect groups, or tribes, each speaking a slightly different dialect of the Dusunic family language [1]. They are mostly mutually understandable. The name 'Dusun' was popularized by the British colonial masters who borrowed the term from the Brunei Malays. Although, there were similarities between Dusun and Kadazan in language and culture. There were also differences on them especially in the language. Dictionary is a collection of words in one or more specific languages, often arranged alphabetically, which may include information and definition, usage and its translation. A pictorial

representation is a visual representation as by photography or painting [2]. Pictorial can be represented with static or animated images. Text can be added to the images to provide better understanding. There are four basic skills required to master or learn any language which are listening, speaking, reading and writing [3], some of this skill can be implemented in the project to develop a system that is translate Malay language to Dusun language.

There are 3 objectives identified to develop the system:

  i. To analyze and design a translation web application that is Pictorial Dictionary.
  ii. To develop a translation web application that is Pictorial Dictionary.
  iii. To test the implementation of the web application with the user of the system.

This system enables user to translate Malay word to Dusun word and vice versa. In this system, user can use the search function to find the translation of the desired word. The translation will include an example of sentences to help user on how to use the translated word. Each of the translation will also be provided with an image as an illustration of the word if any. In addition, speech out of the translated word are also provided with the aimed to enhance user pronunciation on the translated word. The use of word for several sentences have different meaning, this is useful to every user that have difficulties on using the word or term in the sentences. All of this will be managed at 'manage word translation' that will be done by the administrator. Any feedback or complaint about the system, user can issue it at feedback and complaint.

2. Literature Review

Literature review purpose are to gather the data in order to identify the problems. The existing application will be analyzed and compared to identify the characteristic such as the weakness, advantages, conflicts and issues to gain knowledge and ideas to implement in the developed system. The background domain will be discussed in this section. The example system that influenced the idea of the development of this project also will be discussed.

2.1 Domain Background

The title of this project is "The Development of Pictorial Dictionary for Learning Dusun Language". This project is a web-based system where user can find the desired Malay word to be translated into Dusun. All the word in this system is describes through text and contain some image for the interaction with the user and for better understanding for the certain word. This system will provide a pronunciation for each word. Word selected will be also provided with a definition of the word if it is any, a sample of sentences of word selected will be shown to the user to find out more about how to use the word in sentence. Some word selected may have a similarity to other word, this system also will provide the word synonyms if any.

2.2 Technology

Online technology is basically a computer connected by one or more computers or networks through an electronic information service or the Internet. The importance of an online system is the ability to send and receive information at any time. The rapid growth of the Internet today encourages an organization to use it because the online-based system facilitates the achievement and transmission of information directly to those who need it for a purpose [4].

With the raise of technology such as laptop, smartphone usage by consumers, the increase of internet user increasing rapidly. Not to mention the consumer using computer. The availability of the internet coverage that almost on all Malaysia also affect the technology consumer. A survey determined that percentage of Internet users in 2018 stood at 87.4%, a 10.5% percentage point increased from 76.9% in 2016. Approximately, there were 28.7 million Internet users, an increase from 24.5 million in

2016. On the other hand, non-Internet users continue to decline, from 23.1% in 2016 to 12.6% in 2018 [5].

2.3 Comparison of Existing System and Developed System

The research conducted in detailed to identify the module and the function found in the existing system. The result of this comparison of the existing system will be implemented in the development of Pictorial Dictionary for Learning Dusun Language. There are three systems that will be used in the review and research of existing system which is;

2.3.1 Google Translate

The first system will be compared is Google Translate. Google Translate is a free multilingual machine translation developed by Google. It come with a website interface, mobile apps for Android and iOS. It launched in April 2006, that support over 103 languages [6].
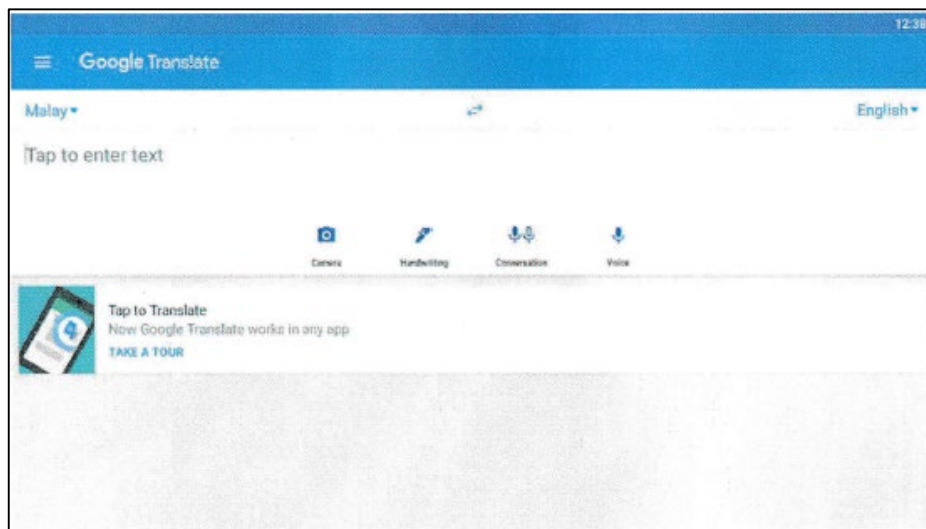

Figure 1: Main form of Google Translate

Figure 1 shows the main form of Google Translate. Google Translate can translate multiple forms of text and media, including text, speech, images, sites or real-time video. The translations are done by searching the word entered by user, the system will translate it and shows alternative translations, that is the similarity of the word searched by user. For some language, the system will provide the speech output for each word translated, it either the word used to be search or its translation or both.

2.3.2 English-Kadazan Translator's Companion

English -Kadazan Tranlator's Companion is dictionary that is translate from English to Kadazan. That created by Rita Lasimbang, it an Android based application, it launched in May 2015, that contains over 15,000 words translated from English to Kadazan.

Figure 2 shows the main page for English -Kadazan Translator's Companion. On the system main page, there are four selections that are including, Content Page, Word Search, Translator's Guide, and Like us on FB selection. First, content page will represent all the content or pages inside the system. Second, Word Search will help the user to search any word that is inserted into the search engine. Third, Translator's Guide will guide the user to use the system.
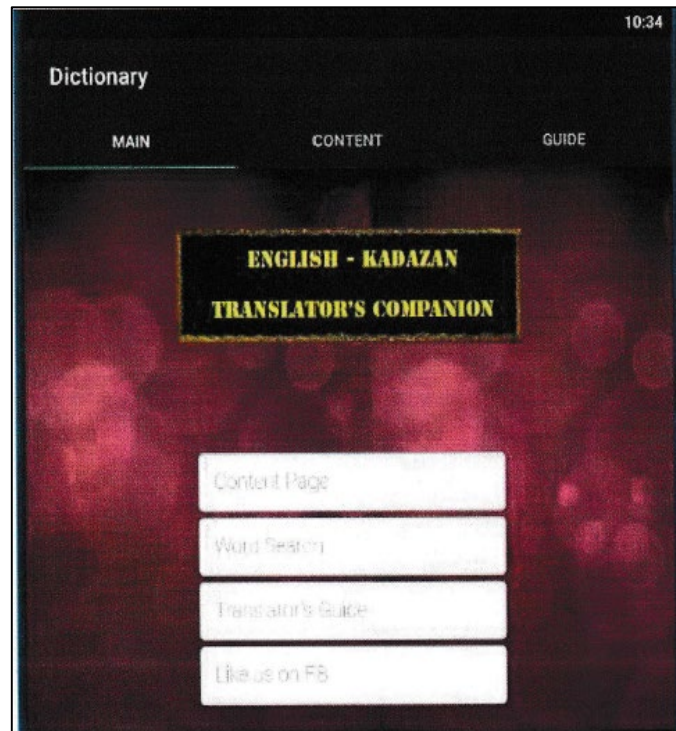
Figure 2: English – Kadazan translator's companion main page

2.3.3 Glosbe

Glosbe is an open source dictionary where appeared first on web in mid-201I there are translation added, and show example of translated word in sentences, pronunciation, images and other. There were around 7,000 languages in Glosbe and almost 50 million bilingual dictionaries [7]. In this aspect, the dictionary selected from Glosbe is Malay -KadazanDusun translation.
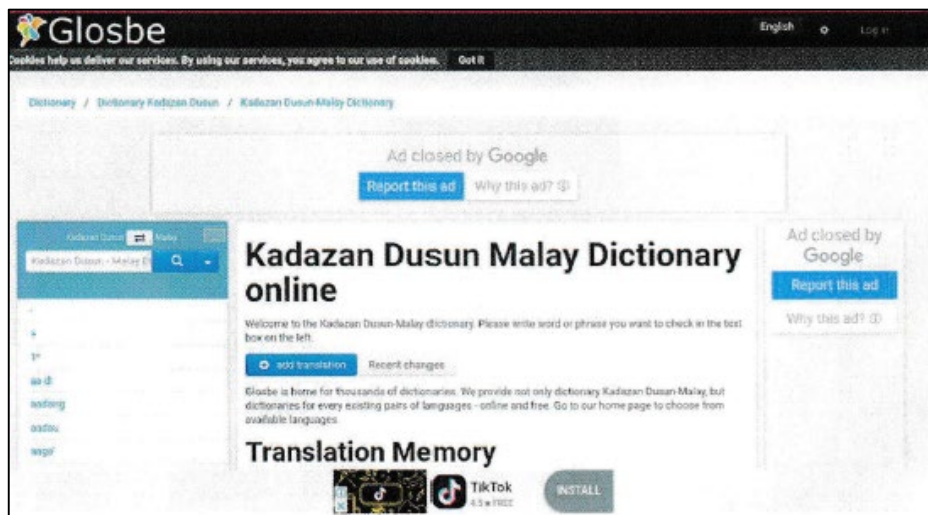

Figure 3: main page of Glosbe

Figure 3 shows the main page for Glosbe. On the system main page, there are search method, where user will inserl selected word, click the search button to search selected word. User also can change translation from Malay to KadazanDusun and KadazanDusun to Malay.

2.3.4 Pictorial Dictionary for Learning Dusun Language

The Development of Pictorial Dictionary for Learning Dusun Language is a development of a system that a web based application, that provide a translation from Malay to Dusun. This system is not

only showing the translation of words, this system also shows the definition, its similar word, the pronunciation, similar words for the searched word and its example sentences of how to use the word in particular circumstances and situation. The administrator, the Organization of KadazanDusun Cultural Association (KDCA), and the user of the system. The administrator is responsible for the maintenance of the application. Moreover, administrator also maintains the new word to be added to the system or any improvement of the system. Administrator also can view all the complaint or feedback sent by the user, this complaint or feedback can be used to the administrator as a way to improve the system in the future.

Table 1: Comparison between existing system and develop system

Systems/Modules	Google Translate	English Kadazan Translator's Companion	Glosbe (Malay - KadazanDusun)	Develop System
Translation of words	Yes (Advanced speech out with variety of language)	Yes (translation only)	Yes (translation only)	Yes (Speech out only for dusun)
Sentences module	Yes	No	Yes	Yes
Search module	Yes	Yes	Yes	Yes
Feedback and complaint module	Yes	No	No	Yes

Table 1 shows the comparison between Google Translate, English – Kadazan Translator's Companion and the develop system. From the comparison above, it can be seen that, Google Translate have translation and pronunciation with variety of languages in their system, English -Kadazan Translator's Companion only have the translation between word, the Glosbe have the translation and for the developed system, it has translation and pronunciation for Dusun language only. Google Translate have the Sentences module for certain word that have different meaning, English - Kadazan Translator's Companion do not have any sentences module, the Glosbe have the Sentences module were the example sentences word were added by user. For feedback and complain module, Google Translate has feedback and help section that guide user to use the system. English-Kadazan Translator's Companion don't have any feedback and complain module, the Glosbe also didn't have the feedback and complain module, and the developed system will have the feedback and complain module.

3. Methodology

Methodology is the general research strategy that outlines the way in which research is to be undertaken and, among other thing, identifies the methods to be used in it. The methods, described in methodology, define the means or modes of data collection or, sometimes, how specific result is to be calculated [8].

However, methodology does not define the specific methods used. There are several methodologies can be used, Structured Approach, Agile Development or Rapid Application Development (RAD). The methodology that has been used in the development of this system is Rapid Application Development (RAD) and the software process used is Iterative Model.

3.1 Iterative Model

The software process model used for this project is Iterative model. The reason of using this process model because it is suitable for the development of this system where there will be a several changes made [9].
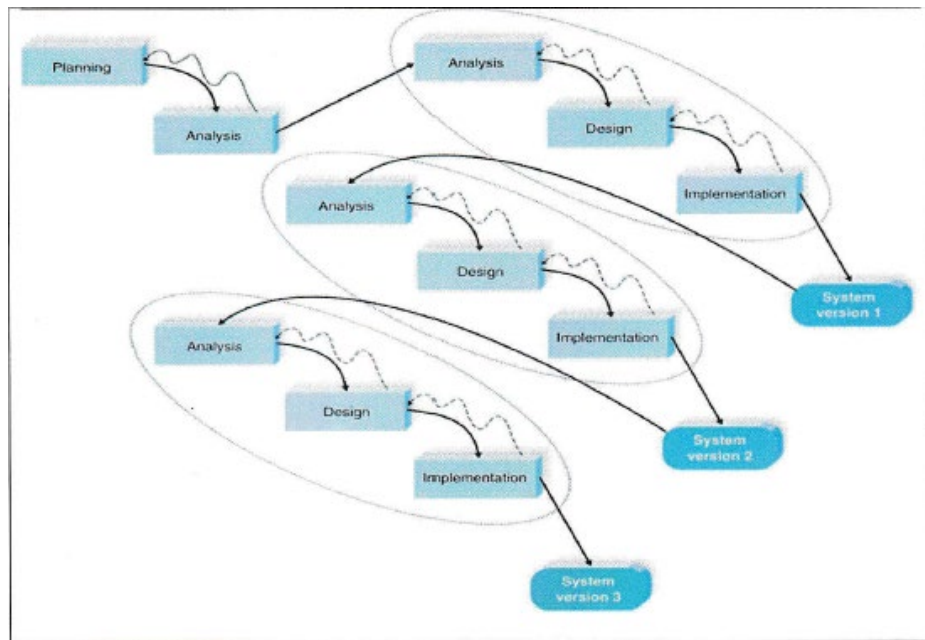
Figure 4: Iterative model [10]

Figure 4 shows the iterative model, there are four main phases in iterative model that have its own function throughout the development of the system. Begin with a simple implementation of a subset of the application system requirements and iteratively enhances the evolving versions until the system is implemented [9]. The phases are planning, analysis, design and implementation. where the system version starts at analysis phase, design phase and implementation phase.

3.1.1 Planning Phase

Before the development of the system, the title selection for the proposed project, a discussion with supervisor is conducted to get the opinion and the selected title for the project is The Development of Pictorial Dictionary for Learning Dusun Language. during the planning phase, identifying the problem statement, objectives and the scope of the project for the proposed project, research regarding the Dusun language was made.

3.1.2 Analysis Phase

In this phase, the environment, existing knowledge or system and method used to gather information is identified. It is carried out to study the existing system and the developed system. There were several problem statements made after the research, there were four main modules developed for the development of the system, which are: Translation of word and pronunciation module, search module, sentences module, and feedback and complain module. In addition, there are several other approaches used to develop the system which is through questionnaire and references materials such as thesis, website, and journals. Other than that, the analysis modelling will be done using the object-oriented programming (OOP), where unified modelling language (UML) that include use case diagram, sequence diagram, and activity diagram and one domain class diagram of the system also have been applied.

3.1.3 Design Phase

In this phase, the gathered information for the developed system used and transferred into designs. There were three important attributes during the design phase, the attributes are;

    ii.   Database.

            Database used to store data that used in the proposed system.

iii.   Build interface design.

The build of the interface design that compiles with the main modules selected and identified during the analysis phase.

3.1.4 Implementation Phase

The processes that occur during this phase is the use of the programming languages. For programming language, the developed system used the common language used to guild a web-based system such as PHP, SQL. The database will be built base on the process modelling that have been done accordingly. During the testing process, users will test the early version of the system in terms of user interfaces. The early version of the system will be determined to find the error exist in the system. After the testing process, the early version of the system will be enhanced and improved by repeating the analysis, design and implementation phase until it satisfied the users.

4.   Analysis and Design

The activities that carried out in the analysis and design phase that involved in the development of the developed system. System analysis and design is the most important part in the development of a system. Analysis phase describes the flow of the system by using model and other documentation tools to visualize and describe the proposed system. System Requirement Analysis and Unified Modelling Language (UML) Diagram such as, Use Case Diagram, Sequence Diagram, and Class Diagram and Activity Diagram will be provided the better understanding of the developed system flow.

4.1 Use Case Diagram

Figure 5 shows the use case diagram of the develop system. There were five use case determine on the use case diagram. The actor user will be involved to use case search word, view word list and create feedback and complaint. The actor administrator will be involved on manage word translation, and view feedback and complaint use case. The use case specification can be referred to Appendix A.
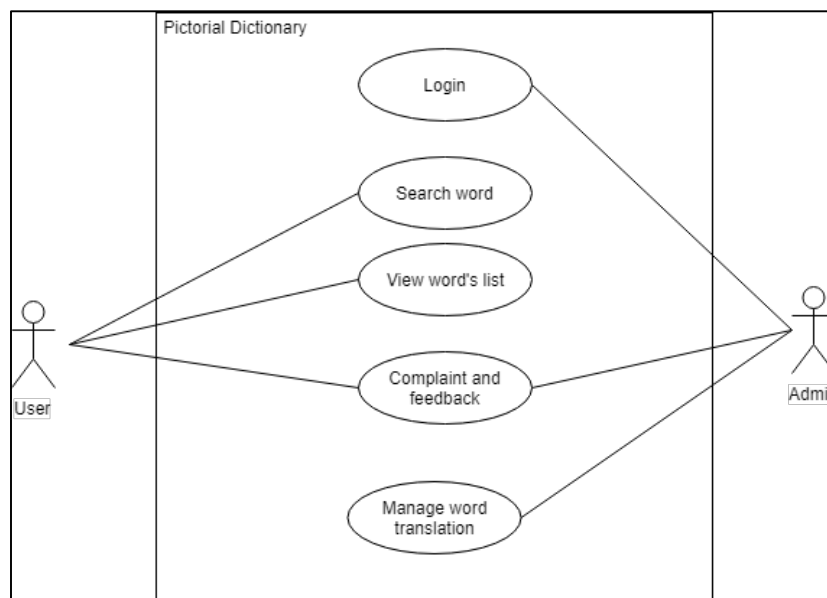

Figure 5: Use Case Diagram

4.2 Activity Diagram

Activity diagram models the dynamic behavior of the application in a specific workflow of the application. Activity diagram gives more details on the flow of work in the application.

Figure 6 shows the activity flow for the user role. First the user enters the user main page. User can search specific word using the search at the top of the page. Then select word to view the detail of the word selected. User also can view the word translation list at the main page. User can select Complaint and Feedback at the top right page to give a feedback.
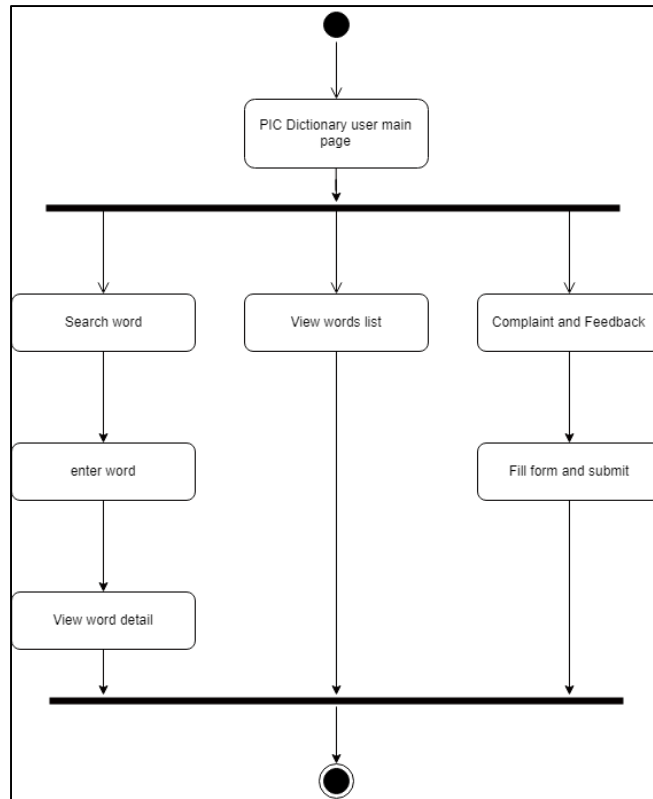

Figure 6: User activity diagram

Figure 7 shows the admin activity diagram. Admin need to login before entering the admin main page using admin credential. There is no registration needed for admin as it already pre-registered in database. After successfully login, the admin can view the word list, add word, edit word, delete word and also view the complaint and feedback from the user.
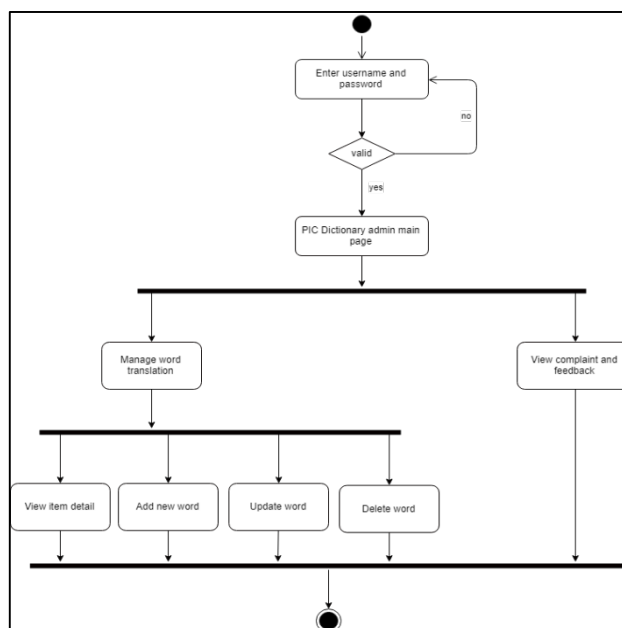

Figure 7: Admin activity diagram

4.3 Class Diagram

Class diagram describes the attributes and operations of a class and also the constraints imposed on the system. Class diagram is used to model the static view of a system. Class diagram is not only used to describing, visualizing and documenting the different aspects of a system, but also for constructing executable code for the software system.
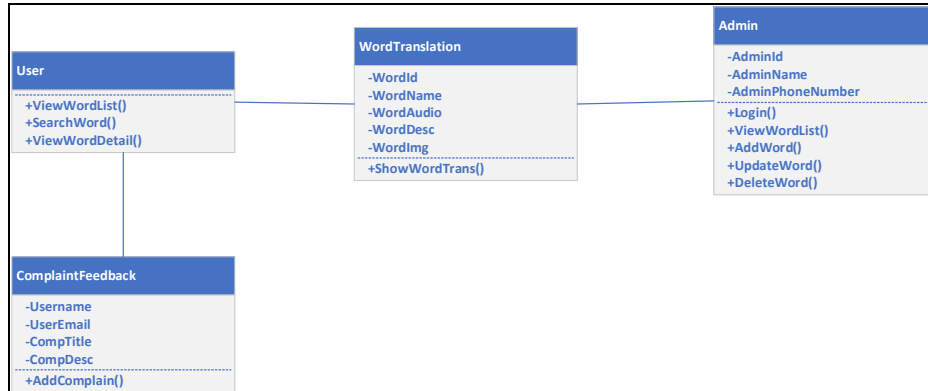

Figure 8: Class diagram

Figure 8 shows the design of the class diagram for the develop system. There are 4 classes which are User class, WordTranslation class, Admin class, and ComplaintFeedback class.

4.4 Sequence Diagram

A sequence diagram shows object interactions arranged in time sequence. It is used to describe the dynamic behavior between actors and system and between the objects of the system. Figure 9 shows the system sequence diagram that map to the methods in the class diagram. The sequence diagram for each of the use case can be referred to Appendix B.
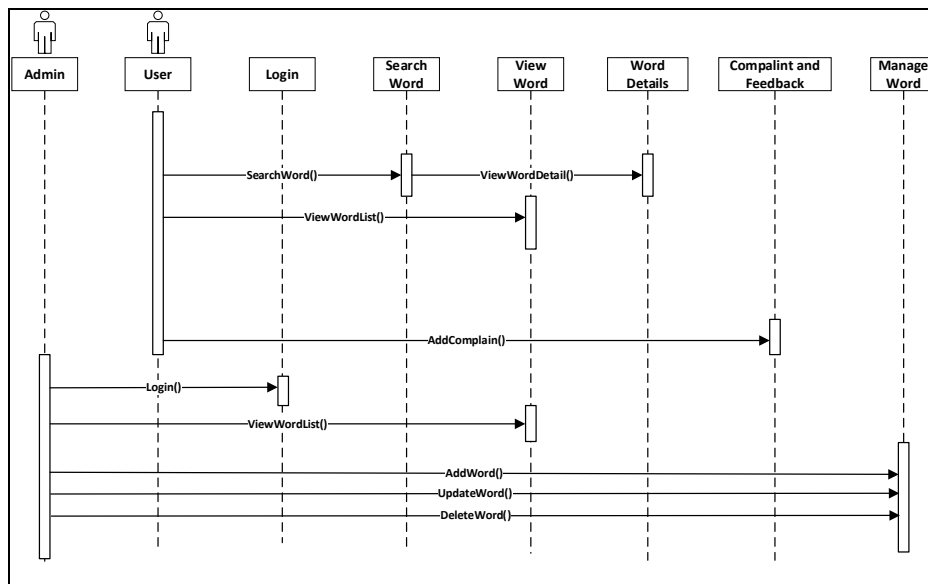

Figure 9: Sequence Diagram

4.5 Interface Design

Interface design focuses on predict what the users might need to do and to ensure that the interface has a good usability and ease the experience. There are several components that need to consider when

designing a good interface. The components are the design must be consistent, simple, the pattern and the placement of the functionalities.
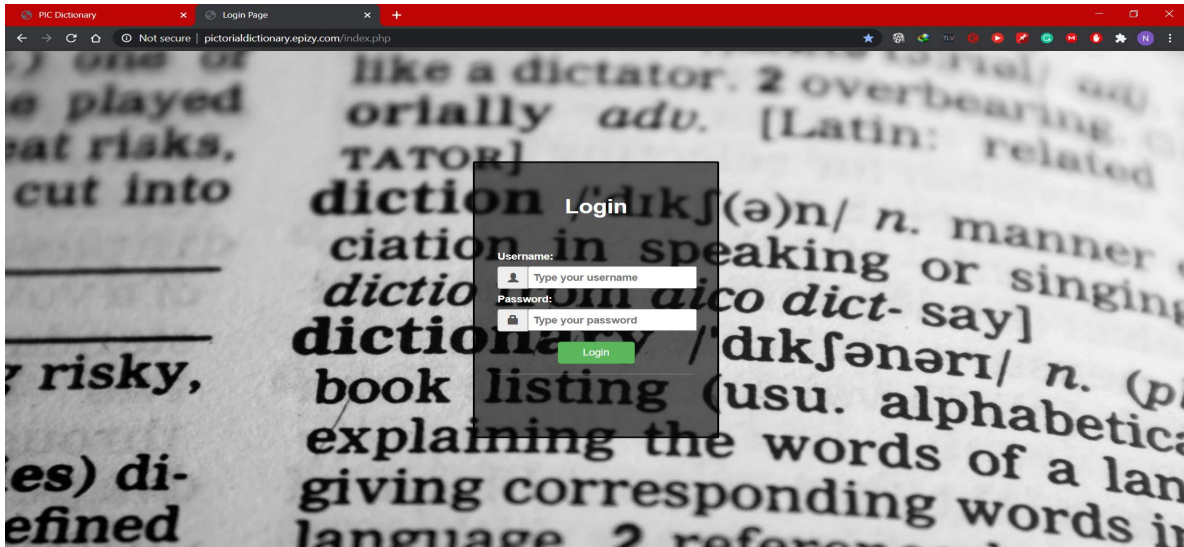

Figure 10: Admin login page

Figure 10 shows the login page for admin when the system launched. In this page, admin required to enter their username and password, if admin successfully login, admin will redirect to admin main page, if fail, otherwise.
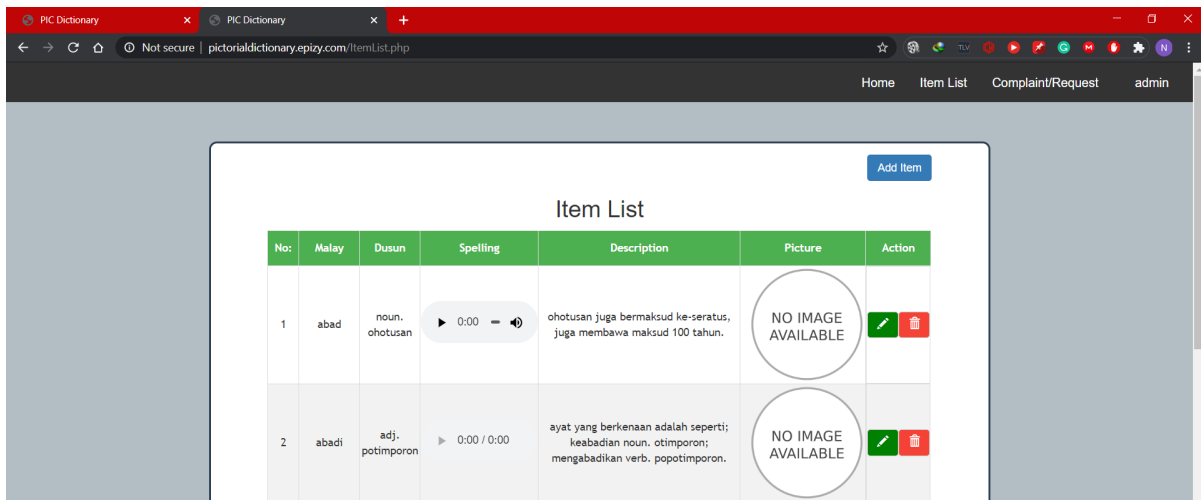

Figure 11: Manage word translation page

Figure 11 shows the manage word translation page, where admin can add, update or delete word. To add word, admin must click Add Item button and will be redirected to add word page. To update, simply click the pen symbol with green colour button and click the bin with red colour button.
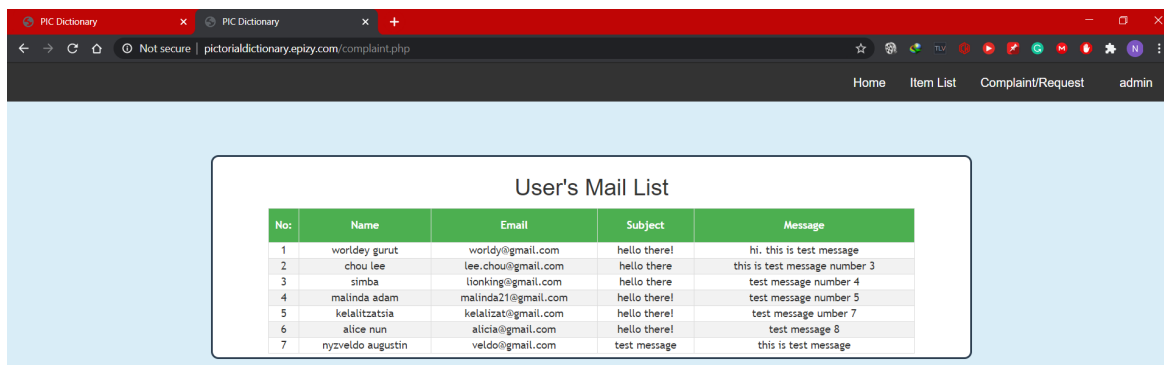
Figure 12: Complaint and Feedback page

Figure 12 shows the complaint and feedback done by user. Here admin can view all the feedback and complaint by the user.
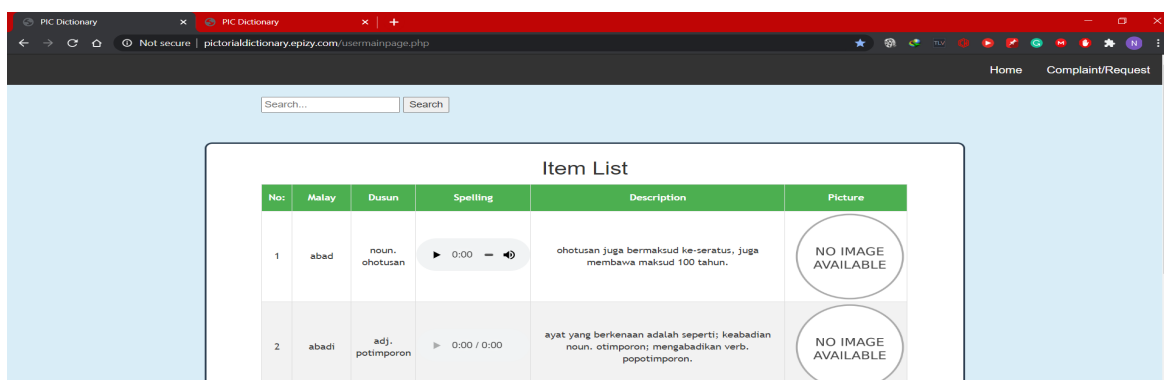

Figure 13: user main page

Figure 13 shows the user main page. Where user can view list of the word translated and user can search word by entering it on search at the top of the page.
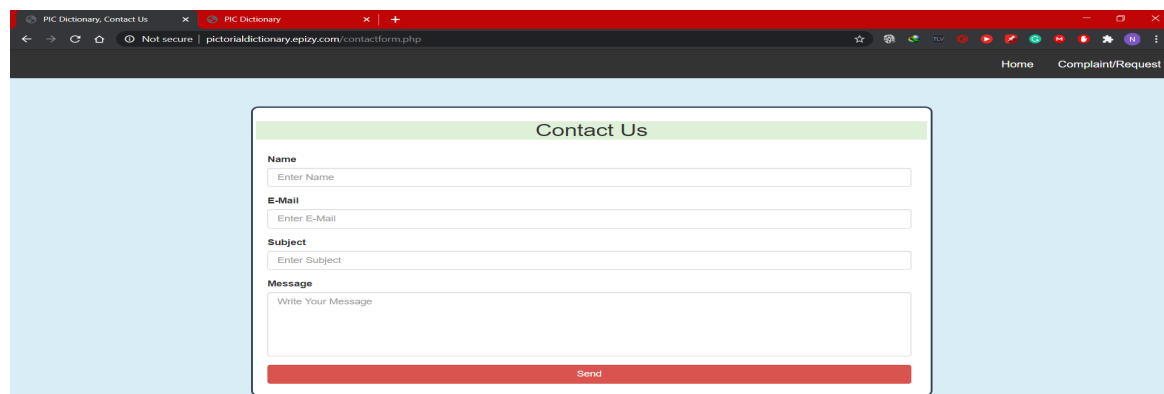
Figure 14: User complaint and feedback page

Figure 14 shows the form that can be fill by user to give a complaint or feedback to admin. In this page, user can enter their name, email, subject, and message that will be sent to admin email.

4.4 Database Design

Database design defines the entities that reside in the database of the system. The attributes of the entities are also defined in the database design as shown in Tables 2 to 4. The database is to link the entities; thus, some important keys must be determined such as primary key, foreign key and data type.

Table 2: Admin table

Attribute	Data Type	Size	Description
AdminId	integer	Default	Admin id that auto generate.
Username	Text	Default	Username used to login
Email	Text	Default	Email of the admin.
Password	Text	Default	The password used to login

Table 3: Itemtbl table

Attribute	Data Type	Size	Description
Item_id	Integer	Default	Item's id, auto generate
Item_malay	Text	Default	Word in malay
Item_trans	Text	Default	The translation in Dusun
Item_audio	File	Default	Pronunciation of Dusun word
Item_desc	Text	Default	Translation description or example.
Item_img	File	Default	Image of the word.

Table 4: ComplainTbl table

Attribute	Data Type	Size	Description
User_id	Integer	Default	User id, auto generate
User_name	Text	Default	Users name.
User_email	Text	Default	Users email
User_subject	Text	Default	Subject of the feedback
User_message	Text	Default	Message of the feedback

5. Implementation and Testing

The implementation for the system is using the Atom text and source code editor as the main editor to code and designing the system. The main database that store all the data is using phpMyAdmin. phpMyAdmin is a free and open source administration tool for MySQL and MariaDB.

The code implementation is done by modules which is Translation of words module that implement view word list, add word, update word and delete word, Sentences module where the detail of word translated, Search Module implement the feature to search the word to be translated and lastly, Complaint and Feedback module that implement the feature of user to request, or give feedback.

The testing part is the final phase after complete the final product of the system. The testing is divided into two which are Functionality Testing where all the main features in the system is tested and User Acceptance Testing where the system is tested by user and evaluated using a questionnaire. Table 5 shows the functional testing for translation of word module. Table 6 shows the test plan for sentences module and search module. Table 7 shows test plan for complaint and feedback module.

Table 5: Test Plan for Translation of Word module

No.	Test Case	Expected Result	Actual Result
1	Admin enter correct credentials for login	Redirect to admin main page.	Redirect to admin main page.
2	admin enter incorrect credentials for login	Toast message "Invalid Credential"	Toast message "Invalid Credential"
3	admin enter incomplete credentials for login	Toast message "Please fill all details"	Toast message "Invalid Credential"

Table 5: (cont.)

No.	Test Case	Expected Result	Actual Result
4	Admin click on list item/word	System redirect to item list page.	System redirect to item list page.
5	Admin click add item	System redirect to add item page.	System redirect to item list page.
6	Admin fill in all form at add item and click Send	Toast message "Values inserted successfully"	Toast message "Values inserted successfully"
7	Admin did no fill in all form at add item and click send	Toast message "Error missing input"	Toast message "Error missing input"
8	Admin click edit button	System redirect to edit item page.	System redirect to edit item page.
9	Admin click delete button	Word deleted.	Word deleted.

Table 6: Test plan for Sentences module and search module

No.	Test Case	Expected Result	Actual Result
1	User click on play audio button.	Audio for spelling played	Audio for spelling played
2	User enter word in form and click search button	The system returns search result correctly.	The system returns search result correctly.
3	User clicks on the searched result.	The system go to the place details screen.	The system go to the place details screen.

Table 7: Test plan for complaint and feedback module

No.	Test Case	Expected Result	Actual Result
1	User fill in form correctly and click send	Toast message "Email Sent Successfully"	Toast message "Email Sent Successfully"
2	User fill in form incomplete and click send	Warning message "Please fill out this field"	Warning message "Please fill out this field"
3	Admin click on complaint/feedback at admin side page	Shows all complaint and feedback successfully sent from user	Shows all complaint and feedback successfully sent from user

User acceptance testing is evaluate using the questionnaire given to 20 respondents. The questionnaire can be referred in Appendix C. The results are graphed accordingly. Figure 15 shows the graph for part A which evaluate on the interface design of the system. Based on the graph, it can be concluded that the users are slightly satisfied with the interface design of the system because there is 14 people evaluate the interface design as 'poor'.

Figure 16 shows the graph of evaluation on the functional testing for the system. Based on the graph shown, it can be concluded that the functionality of the system is satisfied by the users. The most aspect evaluated is in 'Good' and the least evaluated are 'Poor'. The aspects that evaluated as 'Poor' are the information is reliable. The aspect that evaluated as 'Moderate' are the manage word translation. This can be concluded that the main issue for the system is the information reliability and the way word translations are managed.
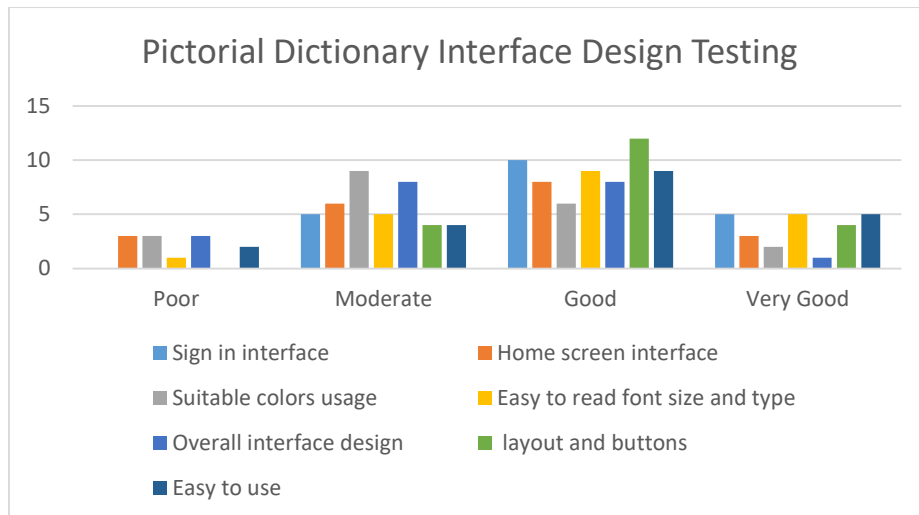
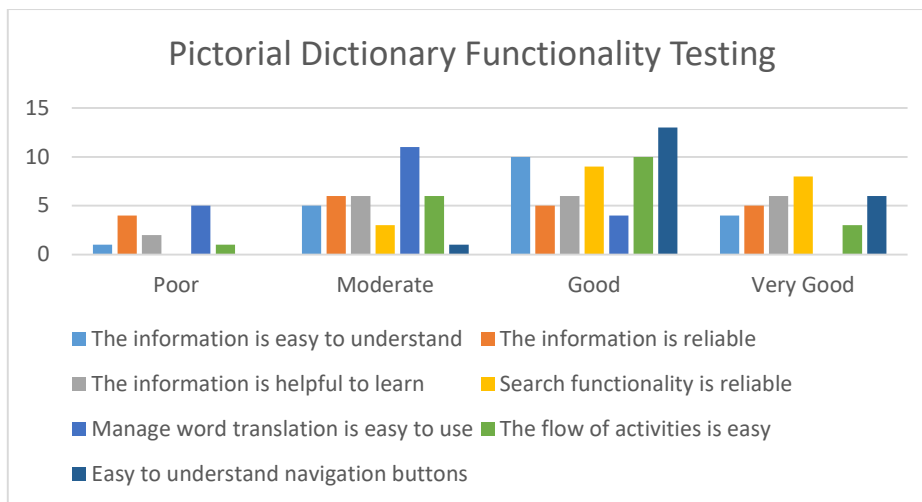**Figure 15: Pictorial Dictionary Interface Design Testing**

Figure 16: Pictorial Dictionary Functionality Testing

6. Discussion and Conclusion

In conclusion, Pictorial Dictionary system is a system that will help anyone, user or consumer to translate Malay to Dusun and manage the admin side of the system. The system provides basic knowledge or translation for user. However, it is proved that this system nowhere to be an excellent system, there are more improvement must be done more on the information reliability and the word translation management. However, it is a decent system for translation system as it provided basic translation of the word search. Finally, this system is indeed useful to all Malaysian and also maybe non-Malaysian that have the interest to learn Dusun.

Acknowledgement

APPENDIX A

Use case specification for Login

Use case ID	UC-1		
Use case name	Login		
Actors	Admin		
Description	The admin can login into the system using their own credentials.		
Preconditions	1. The system must be running. 2. There are Internet connection.		
Postcondition	1. The admin can add new item, update the item details, view place and delete item.		
Basic Flow	1. Admin launch the system. 2. Admin enter username and password. 3. Admin click "login". 4. If the credentials are correct, it will be redirected to the admin home page.		
Exception	1. Login failed.		
Related Document	**ID**	**Requirement**	**Priority**
	FR01-01	The system shall let authorized admin to login the system	High
	FR01-02	Upon successfully login, admin shall redirect to admin home page.	High
	CR01-01	The system shall only authorize admin to use the system.	High
	QR01-01	When key in the wrong information, the warning message will be displayed and admin must re-enter the information.	Medium

Use case specification for View Word Details

Use case ID	UC-3
Use case name	View Word Details
Actors	User(primary), Admin(Secondary)
Description	The system displays the list of words translated and the details.
Preconditions	1. The system must be running. 2. There are Internet connection.
Postcondition	1. The user can view word translated list. 2. The user can view the or such as the place location, price range, opening hour and description.
Basic Flow	1. The user launches the system. 2. In user main page, user can view all word translation list in details.
Alternative Flow	1. The user shall launch the system. 2. Enter the key in the word in search form. 3. The search result is return. 4. The user can click the searched result to view word detail.

Related Document	ID	Requirement	Priority
	FR03-01	The system should show all the list of word translated from database	Low
	FR03-02	The system shall play the audio when button play click	Low

Use case specification for Search Word

Use case ID	UC-2		
Use case name	Search Word		
Actors	User(primary)		
Description	The user key in the word they want to translate for.		
Preconditions	1. The system must be running. 2. There are Internet connection.		
Postcondition	1. The system returns the search result. 2. The user can view the result of word translation 3. The user can click the searched word to view detail.		
Basic Flow	1. The user launches the system. 2. Fill in the search form and click button search. 3. The search result is return. 4. The user can click the searched result to view word detail.		
Exception	1. The search result does not return anything. 2. The word searched may not exist in system. 3. The word searched may out in Malay or Dusun.		
Related Document	ID	Requirement	Priority
	FR02-01	The system shall display the searched word result.	High
	FR02-02	The system shall able to allow user to enter new word to be search	Medium
	QR02-01	When the searched word clicks, the system shall redirect to other page to show the word details	High

Use case specification for Complaint and Feedback

Use case ID	UC-4
Use case name	Complaint and Feedback
Actors	User(primary), Admin(secondary)
Description	Will provide the user to give a feedback or complaint about the system.
Preconditions	1. The system must be running. 2. There are Internet connection. 3. User must have email.
Postcondition	1. The user able to send their feedback to the administrator. 2. Feedback will be sent to admin email. 3. Admin will able to see the feedback done by user.
Basic Flow	1. The use case begins when the user launches the system.

|			
	2. User click the Complaint and Feedback button in navigation bar. 3. Fill in the feedback form. 4. Click button send. 5. Admin login to the system. 6. Admin click the Complaint/Feedback button in navigation bar. 7. Admin able to view feedback done by user.		
Alternative Flow	1. Admin login to admin's email (third party system). 2. Admin will able to view feedback or complaint sent by user.		
Exception	1. The form not fully fill in by user, form will not be sent 2. The email keyed in by user is not an email.		
Related Document	**ID**	**Requirement**	**Priority**
	FR04-01	The system shall allow user to issues any feedback or complaint.	Low
	FR04-02	The system shall be able to let user to go to other pages.	Low
	QR04-01	When feedback sent, warning message will display state that issues has been sent.	Medium

Use case specification for Manage Word Translation

|	
Use case ID	UC-5
Use case name	Manage Word Translation
Actors	Admin(primary)
Description	The admin can add new word, update and delete word and view word.
Preconditions	1. The system must be running. 2. There are Internet connection. 3. The admin must log in using admin's username and password.
Postcondition	1. The admin successfully adds new word, update and delete word and view word.
Basic Flow	1. The admin launches the system. 2. The admin log in with admin's username and password. 3. Admin click on Item List to view the list of word translation. 4. The admin clicks on add item button to add new word. 5. To add item, admin must add the word to be translate and the translated word, its meaning, and picture if any. 6. To update, admin can select the word translation that wanted to be update. 7. To delete, admin can select any unwanted word translation to be deleted.
Exception	1. The Add item form is not all fill in. 2. The path of file not found.
Related Document	**ID**	**Requirement**	**Priority**
	FR05-01	The system shall allow admin to add, update and delete word translation	High
	FR05-02	The system shall be able to display any changes after admin made a change.	High

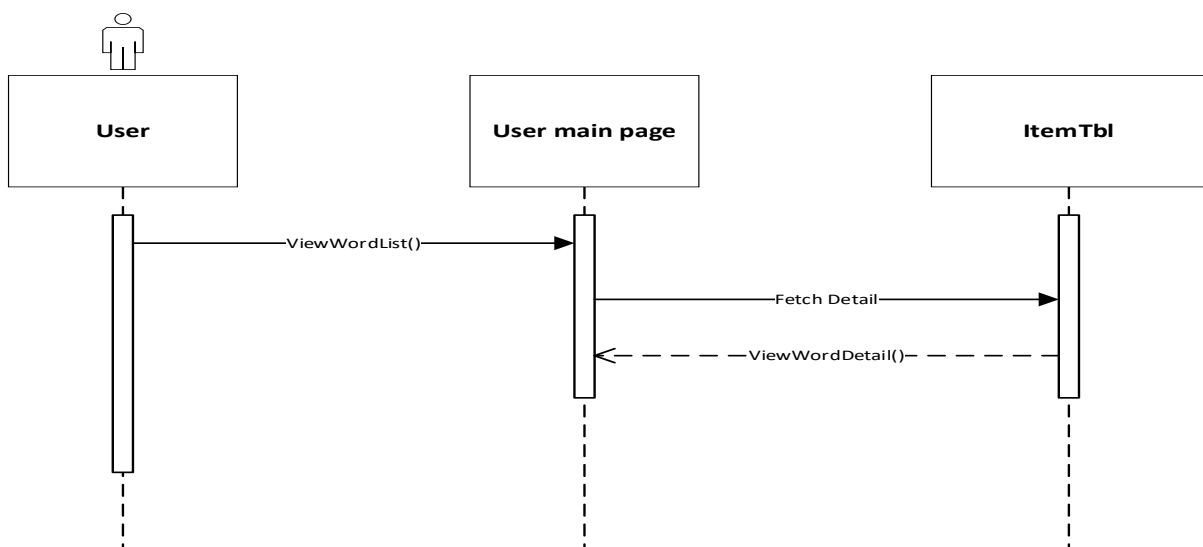|	QR05-01	When word added, updated or deleted, warning message will be displayed.	Medium

APPENDIX B

Sequence diagram for Login use case
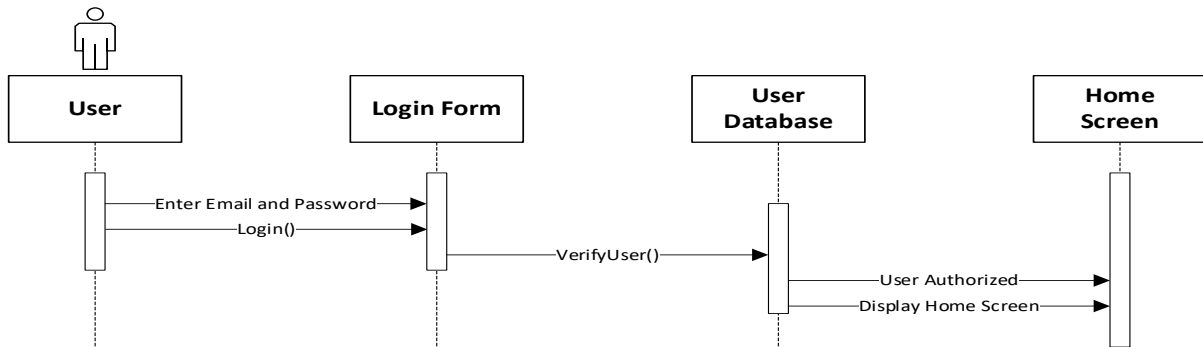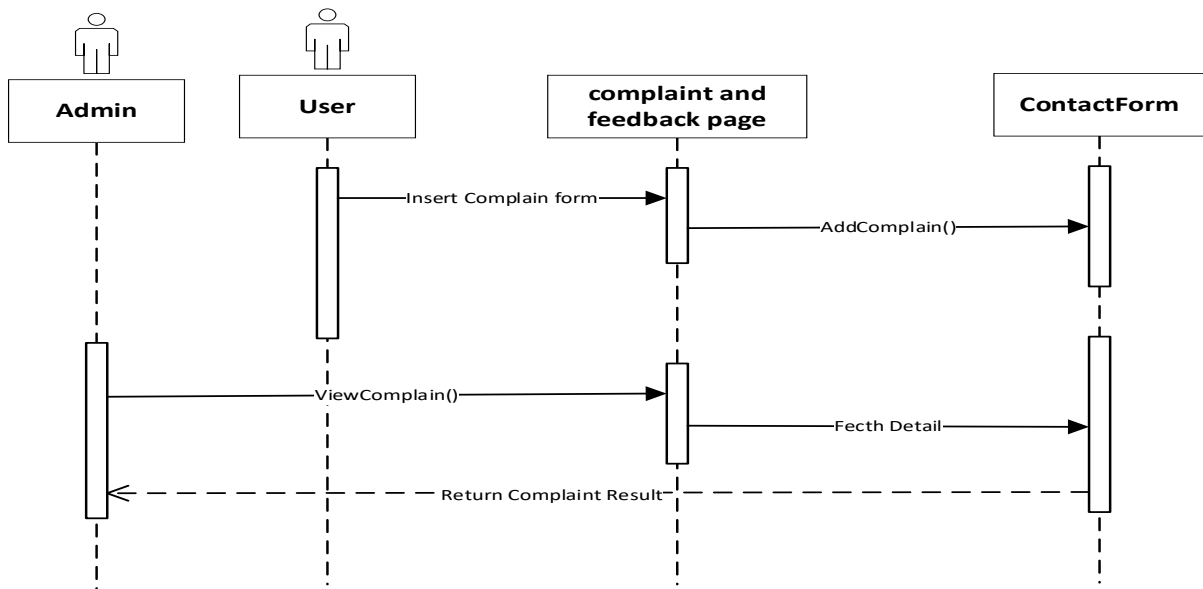

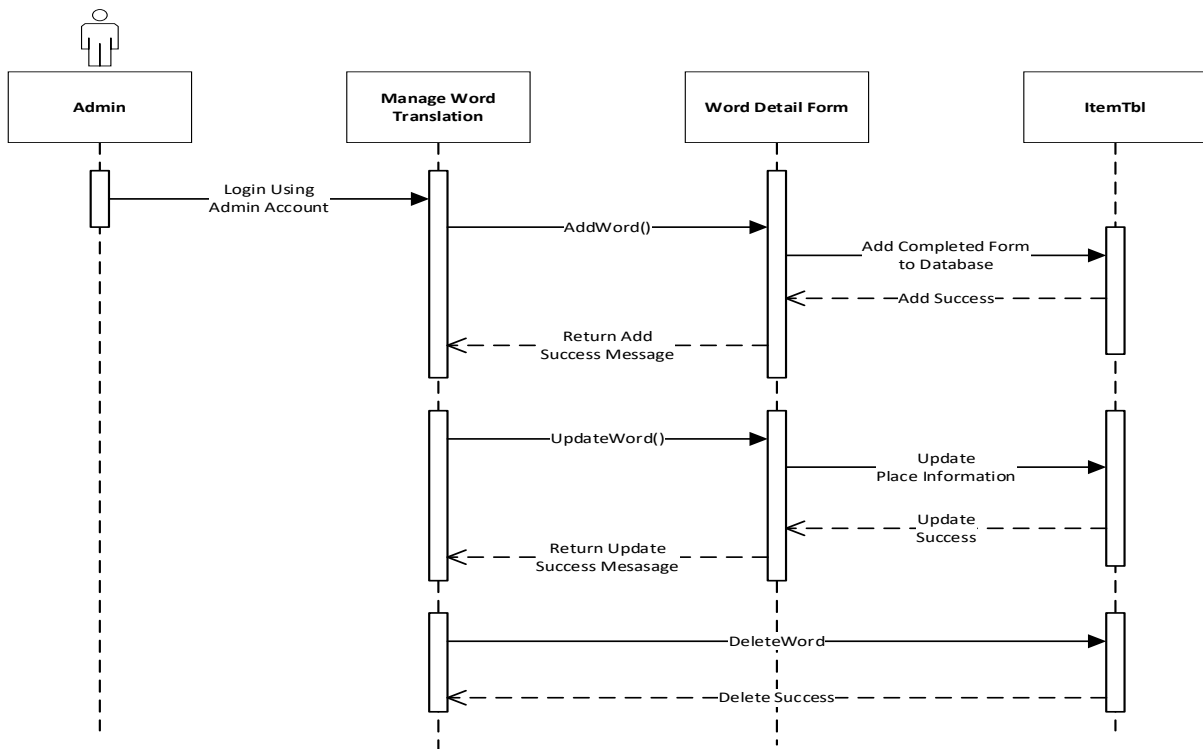**Sequence diagram for Search Word use case**
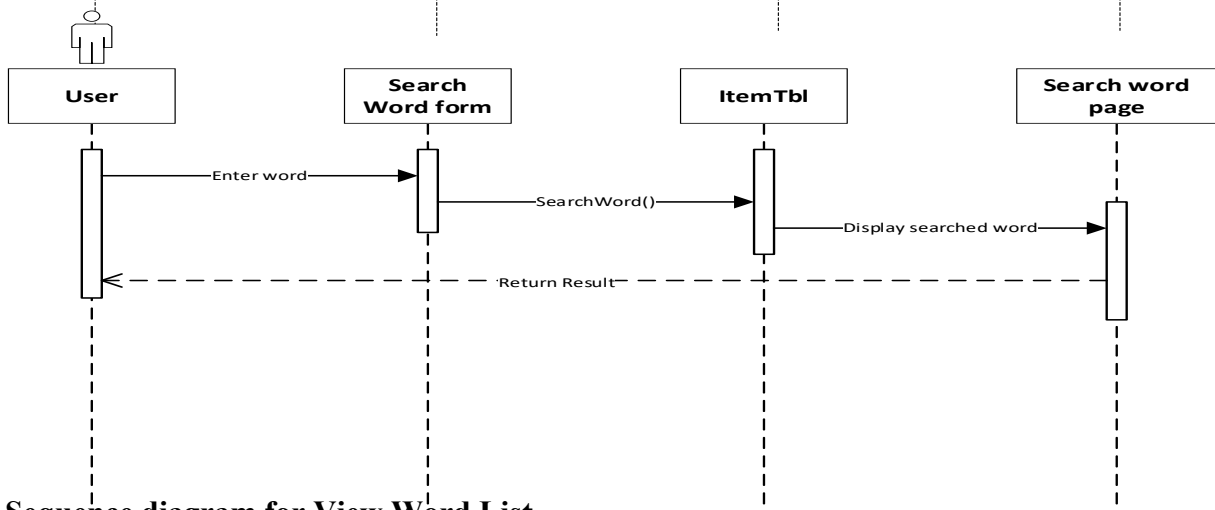
Sequence diagram for View Word List

Sequence diagram for Manage Complaint and Feedback

Sequence diagram for Manage Word Translation

APPENDIX C

User Acceptance Testing for Pictorial Dictionary

Part A: Pictorial Dictionary Interface Design Testing

Please mark [✓] for every design aspect based on the scale provided:

1 – Poor   2 – Moderate   3 – Good   4 – Very Good

No.	Aspect	Scale			
1	Sign in interface	1	2	3	4
2	Home screen interface	1	2	3	4
3	Suitable colors usage	1	2	3	4
4	Easy to read font size and type	1	2	3	4
5	Overall interface design	1	2	3	4
6	layout and buttons	1	2	3	4
7	Easy to use	1	2	3	4

Part B: Pictorial Dictionary Functionality Testing

Please mark [✓] for every design aspect based on the scale provided:

1 – Poor   2 – Moderate   3 – Good   4 – Very Good

No.	Aspect	Scale			
1	The information is easy to understand	1	2	3	4
2	The information is reliable	1	2	3	4
3	The information is helpful to learn	1	2	3	4
4	Search functionality is reliable	1	2	3	4
5	Manage word translation is easy to use	1	2	3	4
6	The flow of activities is easy	1	2	3	4
7	Easy to understand navigation buttons	1	2	3	4

References

[1]   S. Swee-Hock, The Population of Malaysia (Second Edition), Institute of Southeast Asian Studies, 2015.

[2]   Farlex Inc., "pictorial representation," Farlex Inc., 2003-2012. [Online]. Available: https://www.thefreedictionary.com/pictorial+representation. [Accessed 10 March 2019].

[3]   D. H. Brown, Principles of language learning & teaching. (4th ed.), New York: Longman., 2000.

[4]   A. Berisha-Shaqiri, "Impact of Information Technology and Internet in Businesses," *Academic Journal of Business, Administration, Law and Social Sciences,* 2015.

[5]   Malaysian Communications and Multimedia Commission, "Internet Users Survey 2018," Malaysian Communications and Multimedia Commission, Cyberjaya, Selangor, 2018.

[6]   B. Turovsky, "Ten years of Google Translate," Google, 28 April 2016. [Online]. Available: https://www.blog.google/products/translate/ten-years-of-google-translate/.   [Accessed   12 March 2019].

[7]   "Glosbe,"   Glosbe,   8   May   2014.   [Online].   Available: https://blog.glosbe.com/post/85119355711/about-glosbe. [Accessed 12 march 2019].

[8]   K. E. Howell, Introduction to the Philosophy of Methodology, London: Sage Publications, 2013.

[9]   " Andrew   Powell-Morse,"   airbrake,   23   November   2016.   [Online].   Available: https://airbrake.io/blog/sdlc/rapid-application-development. [Accessed 13 march 2019].

[10]   A. Dennis, B. H. Wixom and R. M. Roth, System Analysis And Design, fifth edition., Wiley, 2012.