

**MUALIM: A CHATBOT APPLICATION FOR ANDROID TO
RECOMMEND RECITING THE QUR'AN AYAH**

by

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In Partial Fulfillment of the Requirements for the degree of

Bachelor of Software Engineering



School of Information Engineering

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APPROVAL PAGE

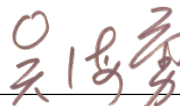
To: Dean Xiangjun Zhao
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This thesis, written by Agung Ramadhan Putra, and entitled Mualim: A Chatbot Application for Android to Recommend Reciting the Qur'an Ayah, having been approved in respect to style and intellectual content, is referred to you for judgment.

We have read this thesis and recommend that it be approved.



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Dean Xiangjun Zhao
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Dedication

To my beloved family, teacher, and friends.

ACKNOWLEDGMENTS

In the name of Allah, The Most Gracious and The Most Merciful. First and foremost, all praise and thanks to Allah for the abundance of grace and guidance, the author finally able to complete the thesis entitled **Mualim: A Chatbot Application for Android to Recommend Reciting the Qur'an Ayah**. This thesis required for achieving a Bachelor of Software Engineering in School of Information Engineering, Nanjing Xiaozhuang University, and Bachelor of Computer Science in Informatics, Universitas Islam Indonesia.

The author would like to express the whole heart thanks to father and mother, sister, brother, and family for their love and support in the author's entire life and particularly through the process of pursuing a bachelor's degree in Nanjing Xiaozhuang University and Universitas Islam Indonesia.

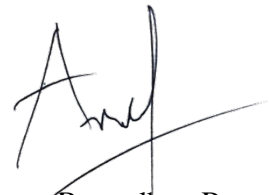
On this occasion, the author would like to express an immeasurable appreciation for all the help and support that has been given, either directly and indirectly during the preparation for the completion of this thesis. In particular, gratitudes that are due to:

1. Dr. Haiyong Wu and Aridhanyati Arifin, S.T., M.Cs., as the author's advisor that guides from the beginning until the thesis completed.
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6. Last but not least, those who cannot be mentioned one by one, who have helped and support the author to finish this thesis.

May Allah bless all of those mentioned above for the sacrifices and the trust for the author to complete this thesis. The author realizes that this thesis has not been perfect, both in terms of presentation and materials. The suggestions and critics are expected in the completion of this thesis. And the completion of this thesis, the author hopes that the application could be beneficial for the others and could be developed for the better in the future.

Nanjing, 19 May 2020



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DECLARATION OF ORIGINALITY

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ABSTRACT

Religion is a doctrine or system that regulates the system of faith or belief and worship of Almighty God. Islam is the last religion that Allah sent down to the Prophet Muhammad bin Abdullah Sallallahu 'alaihi wasallam which is the closing of His prophets and messengers. Indonesia is the 4th most populous country in the world and the population of Muslims was 207 million or 87%. The religious level in Indonesian society itself is very weak at 58%, while the non-religious figure reaches 30%, convince atheist 0% and 12% answered that they do not know, indicating they do not involve religion in their lives so they often fall into a state of depression where depression is a mental disorder characterized by feelings of sadness, loss of interest or pleasure, decreased energy, feelings of guilt or inferiority, problems with sleep or appetite and lack of concentration. This research was conducted to propose a method to fix this problem. The author decides to develop a mobile chatbot application that helps the Indonesian Muslim to prevent depression because of deviate from the right path.

The author chooses a software development method used in the development of this application is the Rapid Application Development (RAD) Methodology. The technologies used are Dialogflow that the author can design the chatbot system that will integrate with the mobile application. The author develops an Android mobile application using Java Programming Language and Android Studio for the end-users. Then the author builds the back-end website using web technology such as HTML, CSS, and Laravel Framework with Sublime Text to build the web application for the admin to manage all data. The result shows that the Dialogflow services can be implemented to the Android mobile application and giving a recommendation Qur'an Ayah to the users to recite based on their problem.

Keywords: Religion, Depression, RAD, Dialogflow, Chatbot, Android

CHAPTER 1. INTRODUCTION

1.1 Background of the Study

Religion is a doctrine or system that regulates the system of faith or belief and worship of Almighty God and the rules relating to the association of humans with humans, and humans with their environment [1]. In 2016, it was recorded that 62% of the world considered themselves to be religious people, 25% consider themselves unreligious, while 9% think they are atheists or have no faith [2].

Islam is the last religion that Allah sent down to the Prophet Muhammad bin Abdullah Sallallahu 'alaihi wasallam which is the closing of his prophets and messengers. Islam is the only true religion. Allah does not accept religion from anyone but Him. And Allah has made Islam an easy religion, there are no difficulties in it [3].

Indonesia is the 4th most populous country in the world, in 2010 data were collected with a total of 238.5 million people and the population of Muslims was 207 million or 87% [4]. The International Community said that Indonesia was the largest Muslim country in the world [5].

But even though the majority of Indonesian people are Muslims, the religious level in Indonesian society itself is very weak at 58%, while the non-religious figure reaches 30%, convince atheist 0% and 12% answered that they do not know [2], whereas religion itself is a guideline, a life guide for those who believe it, because the non-religious rate of the community is very high, indicating they do not involve religion in their lives so they often fall into a state of depression where depression is a mental disorder characterized by feelings of sadness, loss of interest or pleasure, decreased energy, feelings of guilt or inferiority, problems with sleep or appetite and lack of concentration [6]. WHO estimates that in 2020 depression will become the disease with the highest number of cases, which ranks second in the global disease burden, after heart disease. The prevalence of depression in Indonesia in the age group of more than 15 years has reached 6.1 percent or 11,315,500 people [7], this indicates that the level of depression in Indonesia is very high.

With the development of technology in this era, the presence of information technology is inevitably the cause of the emergence of various application, the one of the application is social

media whose initial purpose is to connect between family, friends and those around them to be one of the causes of depression, because they see friends or people around them have a better life, more established or more perfect than themselves to be the causes of the emergence of negative emotions that feel hopeless and helpless, and may ultimately choose to commit suicide.

Based on this problem, the author decides to make a chatbot application on an Android-based smartphone that becomes a counselor for the users so that the bad feeling of the users can be better, the name of the application is Mualim. With chat with the chatbot, the user no need to meet for some counselor if the user feels insecure to talk about their problem. The user can get the recommendation ayah Qur'an easily to recite and understand the meaning based on their problem without searching the Qur'an ayah one by one.

1.2 Problem Identification

Based on the background, the author can identify the problem to develop the application, which is:

- a. How can a chatbot provide a recommendation in the form of verses of the Qur'an Ayah based on the user's problem?
- b. How to design a chatbot to be able to have a conversation like humans?
- c. How can a chatbot help the users to find Qur'an Surah and Ayah easily?
- d. How can the application be easily used by the users?

1.3 Purpose of the Study

The purpose of this application is:

- a. This application is used as a medium of chat for the users to get the advice of the Quranic verses to recite.
- b. This application is used to find the Qur'an Surah and Ayah easily.

1.4 Limitation of the Study

Limitation of the application is:

- a. This application only available on Indonesia's language, the users must understand Indonesian.

- b. This application was made only on the Android Platform.
- c. The application only listens from the first-person angle.
- d. The application can only listen to 1 problem context.
- e. The application only calms the users based on their statements and does not provide a solution to their problem.

1.5 Benefit of the Study

Some benefits of the application include:

- a. The application designed like a human being and a chat media for the users.
- b. The application provides recommendations of the verses of the Qur'an to be read which makes the users feel better.

1.6 Research Methodology

The methodology used in this research is Rapid Application Development (RAD) which is a part of Agile Software Methodology. The author chose RAD, because the authors saw the time available to make this research and were suitable to develop a mobile application, and also prioritized the prototype release and iteration. Rapid Application Development is a sharp alternative to the typical Waterfall Development Model, which often focuses largely on planning and sequential design practices [8]. The approach of used RAD software methodology divides the process into four distinct phases [9]:

1. Requirements Planning Phase

At this stage, the author does the analyze for applications requirement based on the problem, determine the user's need, the scope of the project, and planning for the system requirements.

2. Design Phase

During this phase, the authors design a system design that will be implemented into applications in the form of Unified Modeling Language (UML) such as Activity Diagrams and Use Case Diagrams, and also design the interface of the application.

3. Construction Phase

This stage will focus on program and application development based on the planning and

design done before. To construct the application, the author chooses several tools and technologies that support during the construction.

4. Implementation Phase

The implementation phase is doing the testing for the application that has constructed, consists of testing the interface design and also testing the black box for each function in the application.

1.7 The Writing Structure

As known, this study consists of five chapters, with the explanation of each chapter as follows:

Chapter 1. Introduction

In this chapter, the author explains the background of the issues raised for thesis making, problem identification, the purpose of the study, limitation, benefits, research methodology, the writing structure, and the schedule.

Chapter 2. Theoretical Basis

In this chapter, the author explains the theoretical basis used as a tool to develop applications.

Chapter 3. Analysis & Design

In this chapter, the author explains the system analysis and design of the application to be created.

Chapter 4. Implementation & Testing

In this chapter, the author gives an illustration of the application that has been made, which at this stage the author is coding so that the application can be used by the users. Then the author tests the applications that has been made whether it has realized the functionalities in the predefined proposal.

Chapter 5. Conclusion

In this chapter, the author concludes the solved things and unresolved things that can be used as a reference for future work.

1.8 Schedule

The schedule for doing the research is detailed in Table 1.1, as follows:

Table 1.1 Schedule

No	Activities	Weeks											
		1	2	3	4	5	6	7	8	9	10	11	12
1	Planning	■	■	■									
2	Design		■	■	■	■	■	■	■	■	■	■	
3	Development			■	■	■	■	■	■	■	■	■	
4	Testing				■	■	■	■	■	■	■	■	
5	Documentation											■	■

The process of arranging this thesis takes around 12 weeks, based on the domestic university schedule, start from February 24th to May 16th 2020.

CHAPTER 2. THEORETICAL BASIS

2.1 Theoretical Basis Content

Theoretical Base Content includes the technologies that are used by the author during application creation, therefore this chapter contains follows:

- 2.1 Theoretical Basis Content
- 2.2 Programming Language
- 2.3 Application OS
- 2.4 Technology
- 2.5 Integrated Development Environment
- 2.6 Software Development Technology

2.2 Programming Language

This section is about the programming language used by the author to develop applications, that are:

2.2.1 Hypertext Markup Language (HTML)

HTML is the standard markup language that web browser uses to interpret and compose text, images, and other material into visual or audible web pages.

The web browser receives HTML documents from a web server or local storage and renders the documents into multimedia web pages. HTML describes the structure of a web page semantically and originally included cues for the appearance of the document [10].

2.2.2 Cascading Style Sheets (CSS)

CSS is a style sheet language used for describing the presentation of a document written in a markup language like HTML.

CSS is designed to enable the separation of presentation and content, including layout, colors, and fonts. The separation can improve content accessibility, provide more flexibility and control in the specification of presentation characteristic, enable multiple web pages to share

formatting by specifying the relevant CSS in a separate .css file and reduce complexity and repetition in the structural content [11].

2.2.3 JavaScript (JS)

JS is a programming language that conforms to the ECMAScript specification. JS is a high-level programming language and one of the core technologies of the World Wide Web.

JS enables interactive web pages and is an essential part of web applications, and also supports event-driven, functional, and imperative programming styles. It has Application Programming Interfaces (APIs) for working with text, dates, regular expressions, standard data structures, and the Document Object Model (DOM) [12].

2.2.4 Hypertext Preprocessor (PHP)

PHP is a widely-used open source general-purpose scripting language that is especially suited for web development and can be embedded into HTML [13].

PHP code is usually processed on a web server by a PHP interpreter implemented as a module, a daemon, or as a Common Gateway Interface (CGI) executable. On a web server, the result of the interpreted and executed PHP code which may be any type of data, such as generated HTML or binary image data – would form the whole or part of an HTTP response [14]. From PHP create various web template system, web content management systems, and web frameworks.

2.2.5 Java

Java is a general-purpose, concurrent, class-based, and object-oriented programming language that designed to be simple enough that many programmers can achieve fluency in the language [16]. It is intended to let application developers “write once, run everywhere” [17], means that compiled Java code can run on all platform that support Java without the need for recompilation.

Java application typically compiled to bytecode that can run on any Java Virtual Machine (JVM) regardless of the underlying computer architecture.

2.2.6. Structured Query Language (SQL)

SQL is a domain-specific language used in programming and designed for managing data held in Relational Database Management System (RDBMS), or for stream processing in a Relational Data Stream Management System (RDSMS) [18].

The SQL statement is used to perform a task such as update data on a database or retrieve data from the database. The standard SQL command can be used to accomplish almost everything that one needs to do with the database such as Select, Update, Insert, Create, Delete, and others [19].

2.3 Application OS

2.3.1 Mobile Application

Mobile Application is a rapidly developing segment of the global mobile market. They consist of software that runs on a mobile device/smartphone and performs certain tasks for the user of mobile phones [20].

The author chooses the mobile phone as media for the end-user and mobile application to interact between the user and the chatbot. the mobile application that the author made based on the Android platform.

The Android platform consists of several components, as shown in Figure 2.1.

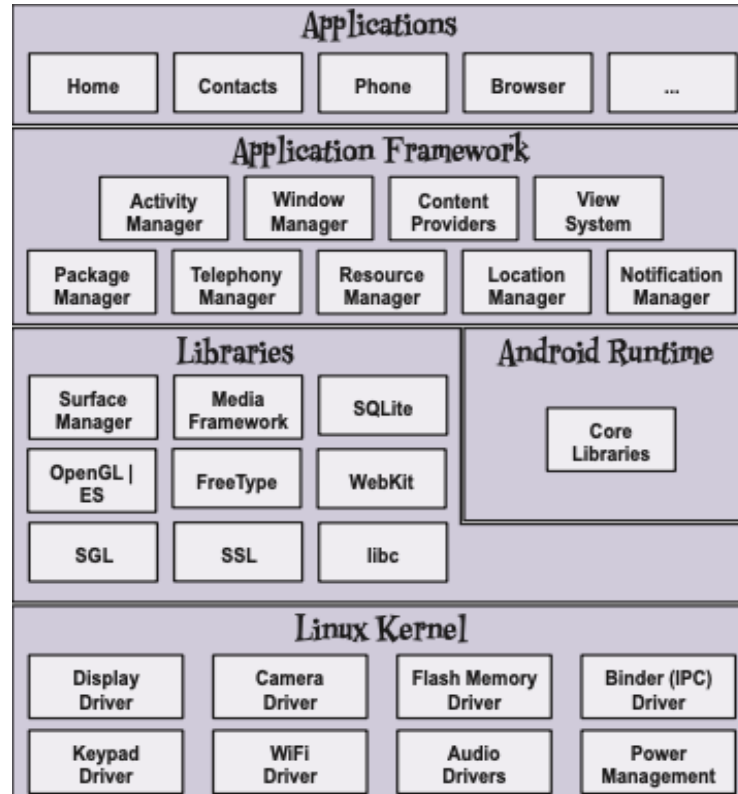


Figure 2.1 Android Platform

1. Applications

The Application layer includes core applications such as Contacts, Phone, and a Browser.

2. Application Framework

When building an application, developers have access to the same APIs used by the core applications. These APIs to control the app looks like and how it behaves.

3. Libraries

Libraries contain a set of C and C++ libraries. These libraries get exposed to the developer through the framework APIs.

4. Android Runtime

The Android runtime comes with a set of core libraries that implement most of the Java programming language. Each Android app runs its process.

5. Linux Kernel

Android relies on the kernel for drivers, and also core services such as security and memory management.

2.3.2 Chatbot Application

Chatbot Application is a computer program that responds like an intelligent entity when conversed with. The conversation may be through text or voice [21]. A chatbot that functions through machine learning has an artificial neural network inspired by the neural nodes of the human brain. The bot is programmed to self-learns as it is introduced to new dialogues and words [22]. Chatbot receives the command from the user in the form of voice or text, then analyzes using Natural Language Processing to understand what the user's meaning than do the command as shown in Figure 2.2.

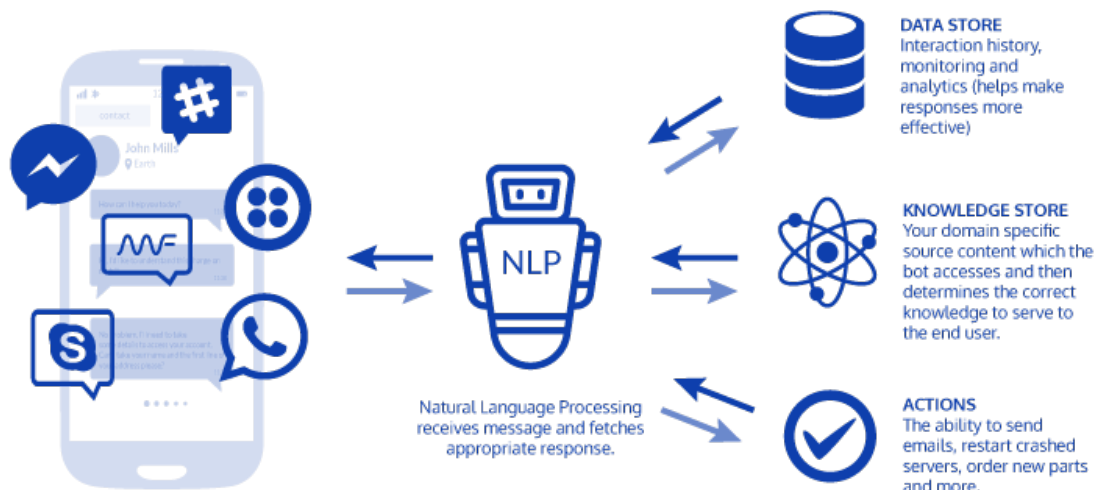


Figure 2.2 Chatbot Architecture

The data store can include some logs and analytics, can monitoring and watch the history of the user's action. While the knowledge store is like a library of information about some topics, services, products, it's the same as the human brain to remember things.

A chatbot may also perform some productive functions like a setting-up reminder, make a schedule, alarm, etc.

2.3.3 Web Application

A web application is a client-server computer program that the client runs in a web browser. Unlike the desktop application, the web application accessible on a web browser [23].

A web application is a dynamic website which has a client-side that the presentation layer code by HTML, CSS, and JS, and the end-user can access the web application through the browser like Safari, Chrome, etc. and then communicate with the server-side that have a logic layer for store the data using supported programming languages like PHP, Python or Perl. And Web server layer like Nginx and Apache, the storage layer to store the data into the database using MySQL, Oracle, or PostgreSQL, that shown in Figure 2.3.

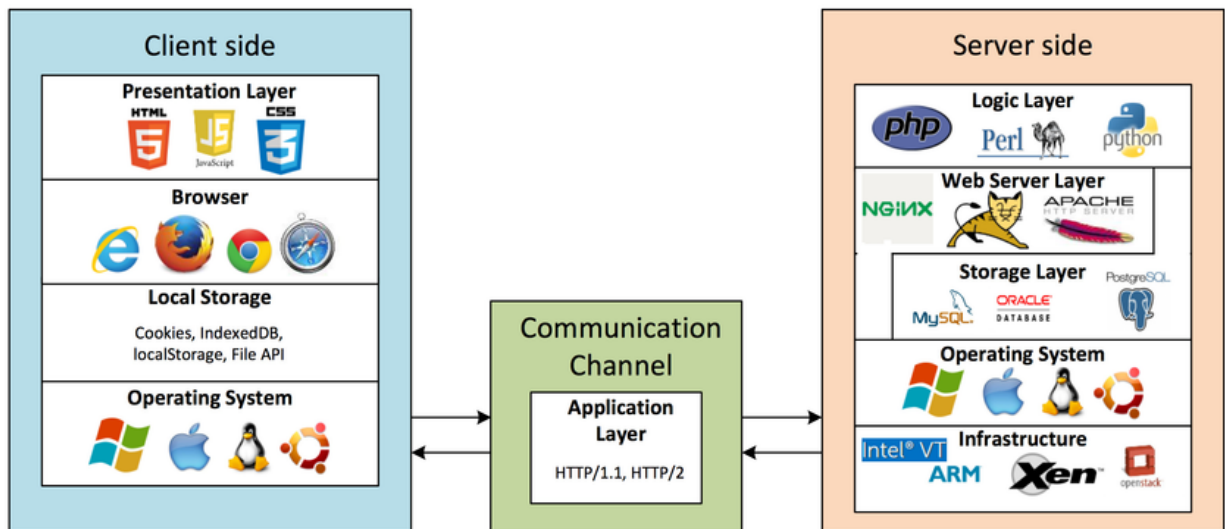


Figure 2.3 Web Application Structure

2.4 Technology

2.4.1 Dialogflow

Dialogflow is a natural language understanding platform that makes it easy to design and integrate a conversational user interface into a mobile app, web app, device, bot, and so on. Dialogflow can analyze multiple types of input from the users (text or audio) and can respond in a couple of ways, either through text or synthetic speech [24].

Dialogflow need several technologies to make the chatbot more powerful.

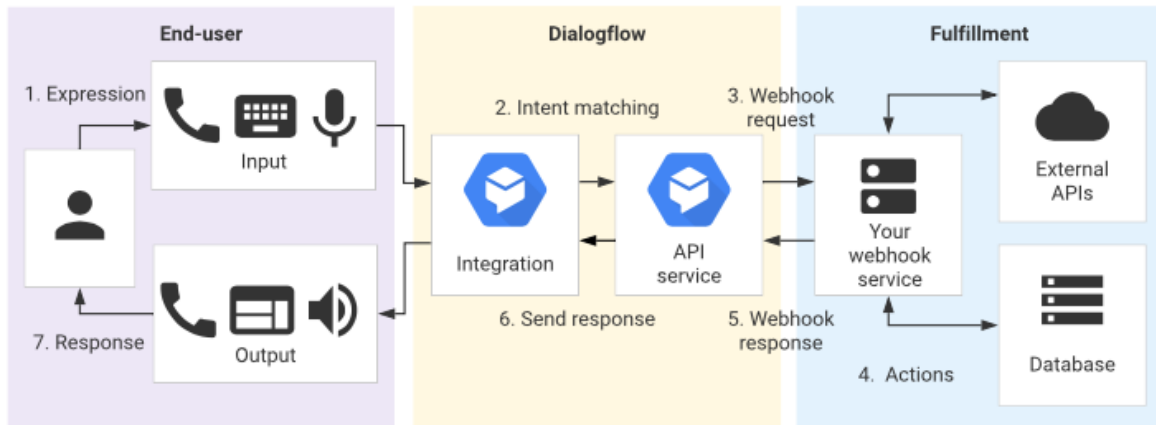


Figure 2.4 Dialogflow Architecture

The figure above shows that the technologies separate into three parts:

1. The end-user

The end-user need media as input and output, the author chose a mobile phone as a media and the application that the author made to create an input and output media to the end-user and also to communicate with the Dialogflow service.

2. Dialogflow

Dialogflow is the chatbot service as a bridge to integrating with the end-user and the fulfillment, that have several parts in the Dialogflow such as Agents, Intent, Entities, etc.

3. Fulfillment

Fulfillment includes Webhook Service, External APIs, and Database, to integrate with our website service or the database to make the service more dynamic and can save the data.

2.4.2 JavaScript Object Notation (JSON)

JSON is an open standard file format, and data interchange format, that uses human-readable text to store and transmit data objects consisting of attribute-value pairs and array data types [25].

JSON is a text format that is completely language independent but uses conventions that are familiar to programmers of the C-family of language, including C, C++, C#, Java, JavaScript, Perl, Python, and many others [26].

JSON built on two structures, as follows:

1. A collection of name or value pairs. In various languages, this is realized as an object, record, struct, dictionary, hash table, keyed list, or associative array.
2. An ordered list of values. In most languages, this is realized as an array, vector, list, or sequence.

2.4.3 Firebase

Firebase is a mobile and web application development platform developed by Firebase, Inc. in 2011, then acquired by Google in 2014 [27].

Firebase has several services, as follows:

1. Firebase Authentication.
2. Firebase Real-Time Database.
3. Firebase Storage.
4. Firebase Cloud Messaging.
5. Cloud Firestore.
6. ML Kit.

2.4.4 Laravel Framework

The web application used by the author using the Laravel Framework to build the website to manage the backend data such as the database of the Qur'an and the user.

Laravel is a free, open-source PHP framework, created by Taylor Otwell and intended for the development of web applications [28].

The architecture of Laravel Framework shown as Figure 2.3.

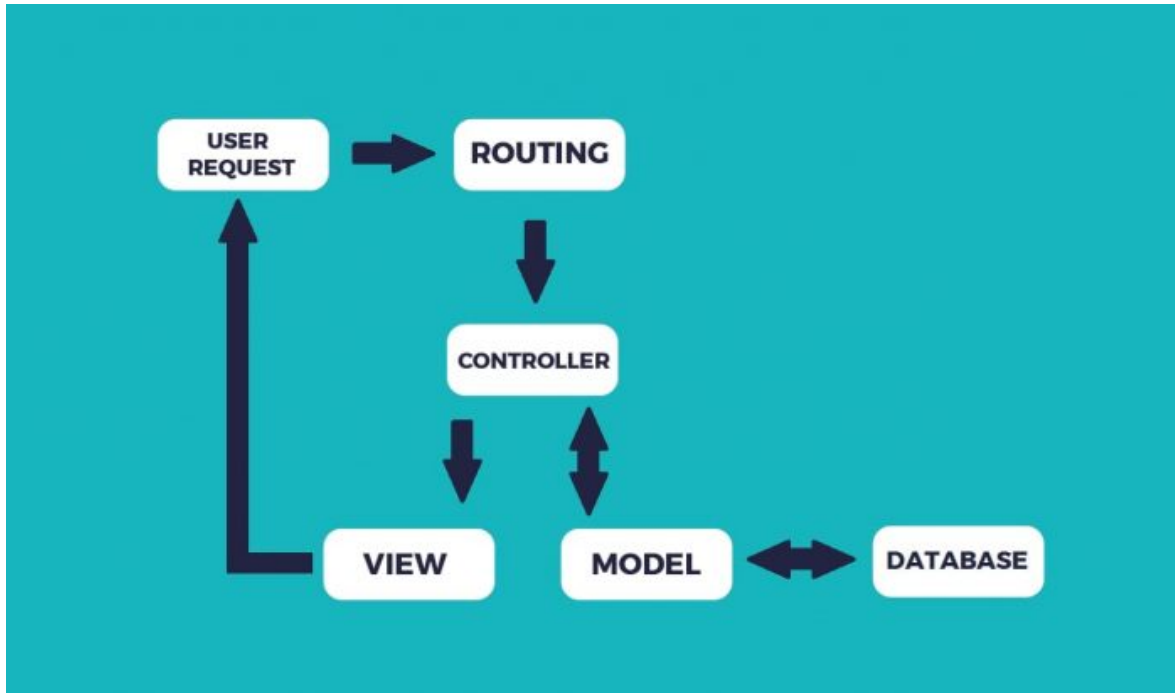


Figure 2.5 Laravel Architecture

Laravel implement a Model-View-Controller architectural pattern to structure the process to develop the website.

1. Model

The model usually a class with properties that match the column in the database. For example, Students, Teachers, etc.

2. View

The view is to display the data. The view in Laravel is stored in the directory resources/views. The view in Laravel using Blade Templating. The blade is pretty much HTML but with some injectable PHP-like syntax.

3. Controller

The controller is responsible for completing user actions and managing the business logic of our application. With a single line of code, Laravel resource routing assigns the typical “CRUD” routes to the controller. It works as directing traffic between Views and Models.

2.5 Integrated Development Environment

2.5.1 Android Studio

Android Studio is the official Integrated Development Environment (IDE) based on IntelliJ IDEA for Android app development [29]. Android Studio offers even more features that enhance productivity when building Android app, such as:

- a) A flexible Gradle-based build system.
- b) A fast and feature-rich emulator.
- c) A unified environment where can develop for all Android devices.
- d) Extensive testing tools and frameworks.
- e) Lint tools to catch performance, usability, version compatibility, and other problems.
- f) C++ and NDK support.
- g) Built-in support for Google Cloud Platform (GCP), making it easy to integrate Google Cloud Messaging and App Engine.

2.5.2 Sublime Text

Sublime Text is a shareware cross-platform source code editor with Python Application Programming Interface (API). It natively supports many programming languages and markup language, and functions can be added by the user with plugins, typically community-built and maintained under free-software license [30].

2.5.3 MySQL Workbench

MySQL Workbench is a unified visual tool for database architects, developers, and DBAs. MySQL Workbench provides data modeling, SQL development, and comprehensive administration tools for server configuration, user administration, backup, and available on Windows, Linux, and Mac OS X [31].

MySQL Workbench is the first MySQL family of products that offer two different editions, which is an open source and a proprietary edition. The difference is that open-source “Community Edition” is a full-featured product and the proprietary “Standard Edition” extends the community edition with a series of modules and plugins.

The functionalities of MySQL Workbench are as follow:

- a) SQL Development, this functionality provides the capability to execute SQL queries, create and manage connections to the database server using the built-in SQL Editor.
- b) Data Modeling, this functionality enables to create a model of the database schema graphically, perform reverse and forward engineer between a schema and a live database, and edit all aspects of the database using the comprehensive Table Editor.
- c) Server Administration, this functionality enables us to administer MySQL server instance by administering users, performing backup and recovery, inspecting audit data, viewing database health, and monitoring the MySQL server performance.
- d) Data Migration, this functionality allows migrating from Microsoft SQL Server, Microsoft Access, and other RDBMS tables, objects, and data to MySQL.

MySQL Enterprise Support, this functionality provides support for Enterprise products such as MySQL Enterprise Backup, MySQL Firewall, and MySQL Audit.

2.6 Software Development Technology

2.6.1 Unified Modeling Language (UML)

Unified Modeling Language (UML) is a general-purpose, developmental, modeling language in the field in software engineering that is intended to provide a standard way to visualize the design of a system [32].


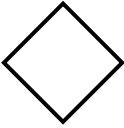



UML has several types of diagrams, the two most broad categories that encompass all other types are Behavioral UML diagram and Structural UML diagram.

The behavioral diagram emphasizes what must happen in the system being modeled. Since the behavior diagram illustrates the behavior of a system, they are used extensively to describe the functionality of the software system. and the structural diagram emphasizes the things that must be present in the system being modeled. Since structure diagrams represent the structure, they are used extensively in documenting the software architecture of the software system [33].

2.6.2 Activity Diagram

Activity Diagram is graphical representations of the workflow of stepwise activities and actions with support for choice, iteration, and concurrency. In Unified Modeling Language, an activity diagram intended to model both computational and organizational processes (i.e., workflows), as well as the data flows intersecting with the relative activities. The notation of the activity diagram shown in Table 2.1.

Table 2.1 Activity Diagram Notation

No.	Image	Name	Information
1		Activity	Show how each interface class interacts with each other
2		Decision	A branching association where there is more than one choice of activity
3		Initial Node	How objects are formed or started
4		Activity Final Node	How objects are formed and destroyed
5		Fork Node	One flow which at some stage turned into several streams

2.6.3 Use Case Diagram

Use case diagram is a representation of a user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved.

The notation of the use case diagram shown in Table 2.2.

Table 2.2 Use Case Diagram Notation


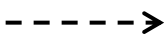
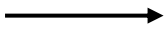
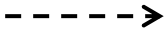
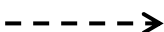





No.	Picture	Name	Information
1		Actor	Persons, processes or other system that interact with information systems that will be created outside the information system itself.
2		Dependency	The relationship where changes that occur on an independent element will affect the dependent elements of an independent element.
3		Generalization	Generalization and Specialization relationship between two use case where one function is a more general function than the other.
4		Include	Additional use case related to a use case, where use case added can stand on its own.
5		Extend	Additional use case related to a use case, where use case is added requires this use case to perform its function or as a condition of running this use case.
6		Association	Communication between actors and use case that participate in use case or use case has interaction with the actor.
7		System	Specifies packages that feature systems on a limited basis.
8		Use Case	A description of the sequence of actions a system performs that produces a measurable result for an actor.
9		Collaboration	Interaction of rules and other elements that work together to provide greater behavior of numbers and elements (synergies).

Table 2.2. Use Case Diagram Notation Continued


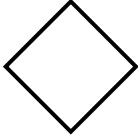
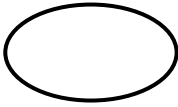

10		Note	The physical elements that exist, when the application is run and reflect a computing resource.
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2.6.4 Entity Relationship Diagram

Entity Relationship Diagram shows the relationship of entity sets stored in a database. An entity in the context in an object, a component of data. An entity set is a collection of similar entities. These entities can have attributes that define its properties.

By defining the entities, their attributes, and showing the relationships between them, an ERD illustrates the logical structure of databases. The notation of ERD shown in Table 2.3.

Table 2.3 Entity Relationship Diagram Notation

No.	Picture	Name	Information
1		Entity	Object or concept about which want to store information.
2		Relationship	How two entities share information in the database.
3		Attributes	Characteristics of the entity that help users to better understand the database. Attributes are included to include details of the various entities that are highlighted in a conceptual ERD.
4		Connecting Lines	Solid line that connect attributes to show the relationship of entities in the diagram.

CHAPTER 3. ANALYSIS & DESIGN

3.1 Analysis

3.1.1 Software Development Method

The software development method is a set of rules and guidelines used in the research process, planning, designing, developing, testing, setup, and maintaining a device product Software. Software development methods consist of some of the most commonly used models, including Waterfall, Prototyping, Spiral, RAD (Rapid Application Development), V-model, Scrum, Cleanroom, Test-Driven Development, Behavior-Driven Development, Feature-Driven development, Model-Driven Development, etc.

The methodology used in this research is Rapid Application Development (RAD) which is a part of Agile Software Methodology. The author chose RAD, because the authors saw the time available to make this research and were suitable to develop a mobile application, and also prioritized the prototype release and iteration.

The RAD model is shown in Figure 3.1.

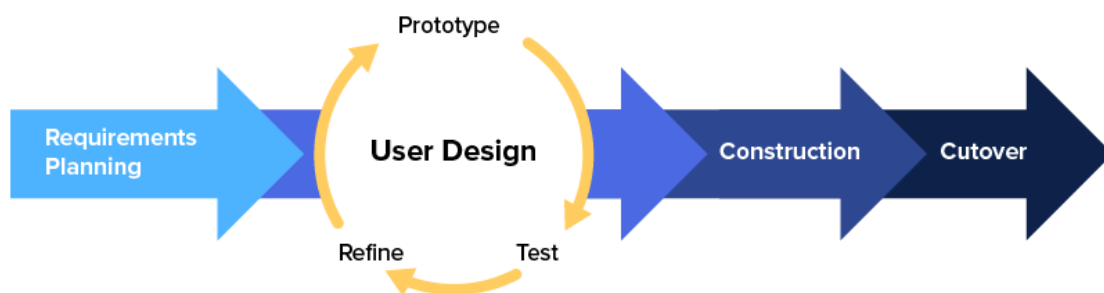


Figure 3.1 Rapid Application Development Model

Rapid Application Development (RAD) consists of four main phases [34]:

3.1.2 Phase of Planning

The planning phase is equivalent to a project scoping meeting. Although the planning phase is condensed compared to other project management methodologies, this is a critical step for the ultimate success of the project.

During this phase, the developer, clients, and team members communicate to determine the goals and expectations for the project as well as current and potential issues that would need to address during the development.

A basic breakdown of planning phase follows:

- a) Researching the current problem
- b) Defining the requirement for the project
- c) Finalizing the requirements with each stakeholder's approval

This phase is very important to everyone that can avoid the miscommunication and costly change order down the road.

3.1.3 Phase of Designing

Designing phase building out the user design through various prototype iterations. Clients work hand in hand with developers to ensure their needs are being met at every step in the design process.

3.1.4 Phase of Constructing

Constructing phase takes the prototypes and beta systems from the design phase and converts them into the working model.

A basic breakdown of constructing phase follows:

- a) Preparation for rapid construction
- b) Program and application development
- c) Coding
- d) Unit, integration, and system testing

The development team of programmers, coders, testers, and developers work together during this phase to make sure everything is working smoothly and that the result satisfies the client's expectations and objectives. This phase is important because the client still gets to

give input throughout the process. The client can suggest alterations, changes, or even new ideas that can solve the problem as they arise.

3.1.5 Phase of Implementing

Implementing phase is where the product goes to launch. It includes data conversion, testing, and changeover to the new system, as well as user training.

All final changes are made while the coders and clients continue to look for bugs in the system.

3.2 Phase of Planning

3.2.1 Analysis

In preparation for the next phase of this thesis, conducted analysis or observation in advice to obtain data and information.

3.2.2 Analysis of the Current System

Based on the result of the analysis and observation by the author, the user should read the Qur'an manually and translate it into mother language to get the right recommendation of the Qur'an ayah that suited with the user emotion.

3.2.3 Weakness of Current System

In the analysis of current system above, the author found some weakness of the system that runs manually, some users do not have the Qur'an translation which makes them do not know which Qur'an verses to read, users must have the Qur'an along with the translation so that they can understand the meaning of the verse they are reading, users must read the verses one by one along with the translation to know the appropriate verse with their condition at the time.

3.2.4 Manual Business Process

Here is a business process that runs manually when the users need to get a recommendation Qur'an ayah based on their problem:

a) Read the Qur'an

- b) Translate into mother language of the users
- c) Decide the right ayah
- d) Recite the ayah

Use case diagram of the system that is running manually, illustrated in Figure 3.2.

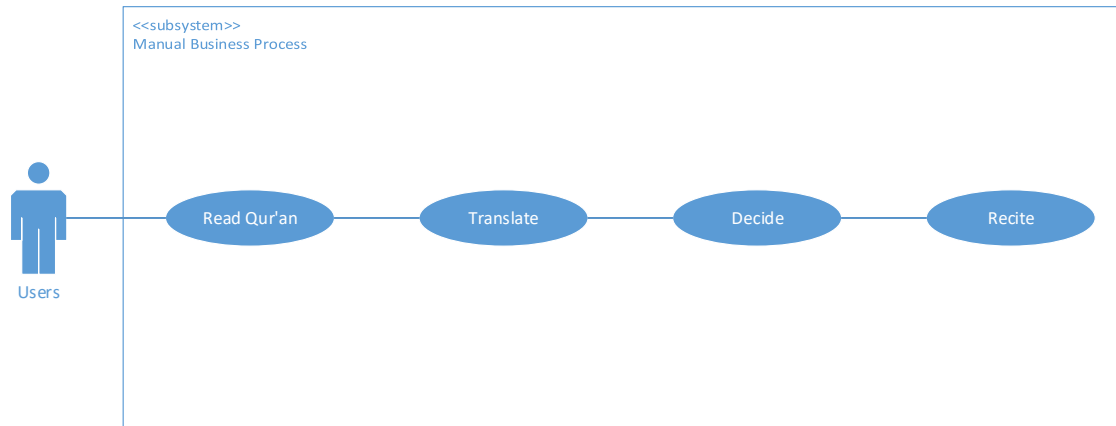


Figure 3.2 Use Case Diagram Manual Business Process

3.3 Phase of Designing

3.3.1 Designing Application with UML

Designing an application to be proposed using UML diagrams as follows:

- a) Use Case Diagram
- b) Activity Diagram
- c) Entity Relationship Diagram
- d) Deployment Diagram

3.3.2 Designing Use Case Diagram

Use case diagram of Mualim Application shown in Figure 3.3.

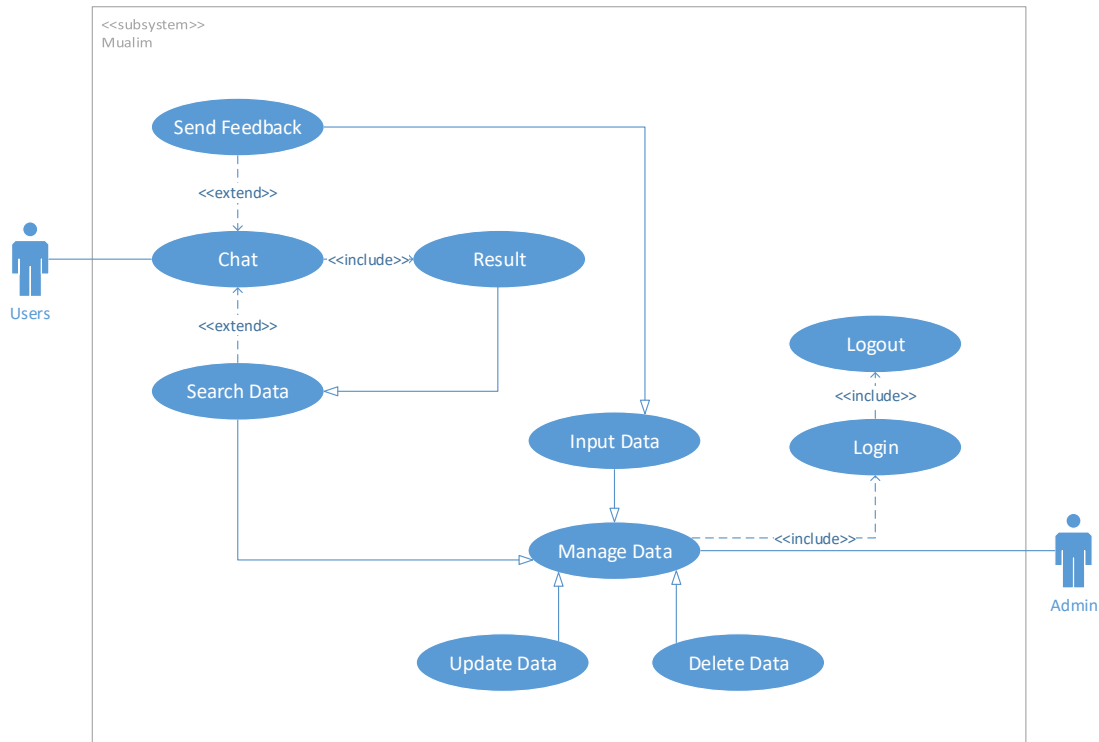


Figure 3.3 Use Case Diagram Mualim App

The explanation of the use case as follows:

1. Use Case Chat

The user chats with the chatbot to matching with the intents, the features that build in the chatbot system are to get a recommendation, send feedback, or search some Qur'an data, then the chatbot saves the chat into the real-time database.

2. Use Case Result

The chatbot giving the result that is a recommendation ayah to the users to recite after the user answer specific question from the chatbot, the chatbot will ask the user's feeling then matching the data with the database.

3. Use Case Send Feedback

The user chats to the chatbot to send feedback, the chatbot will ask the sender's name,

the topic, and the messages then save the feedback to the database.

4. *Use Case Search Data*

The user chat to the chatbot to find some Qur'an data, the chatbot will ask which data that the users want to display, the user can choose to search Surah or Ayah then user need to provide some data to the chatbot for matching with the database.

5. *Use Case Login*

The website contains the Qur'an database, the admin need login to manage the data.

6. *Use Case Logout*

The logout for who login into the website.

7. *Use Case Manage Data*

Manage data is only for admin that needs to login to the website, admin can manage data including search data, view data, input data, update data, and delete data.

8. *Use Case Search Data*

Search data is to search for some data from the Surah or Ayah table, the admin can search based on Surah's name, or Ayah's tags, its need login first to access the features.

9. *Use Case Input Data*

Input data is for the admin who wants to input the Qur'an data into the database, it needs login first to access the features.

10. *Use Case Update Data*

Update data is for the admin to update some Qur'an data if there's any update or wrong Qur'an in the database, it needs login first to access the features.

11. *Use Case Delete Data*

Delete data is to delete some Ayah's data if any data that is not correct in the database, it needs login first to access the features.

3.3.3 Designing Activity Diagram

1. Activity Get Recommendation

The following diagram illustrates the way to get a recommendation from the chatbot:

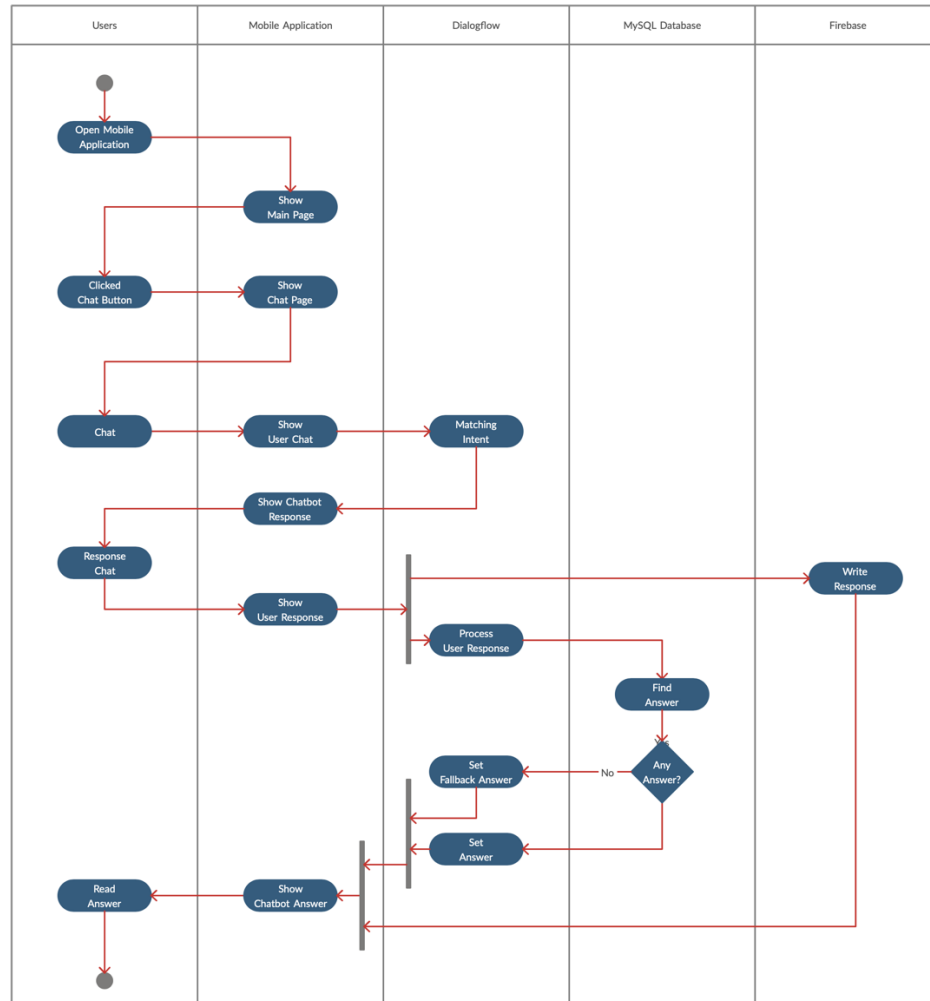


Figure 3.4 Activity Diagram Get Recommendation

2. Activity Find Surah

The following diagram illustrates the way to find some surah:

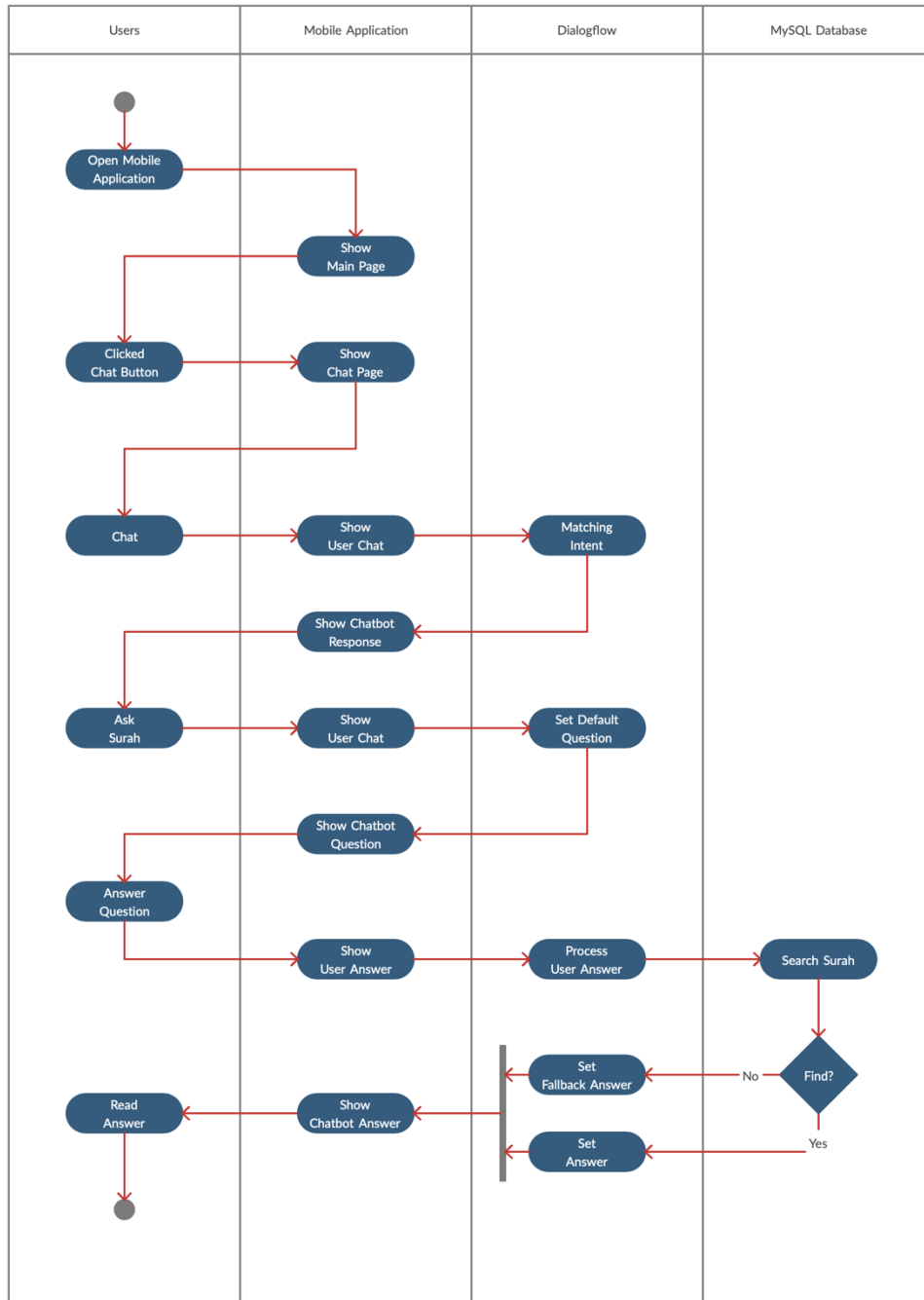


Figure 3.5 Activity Diagram Find Surah

3. Activity Find Ayah

The following diagram illustrates the way to find some ayah:

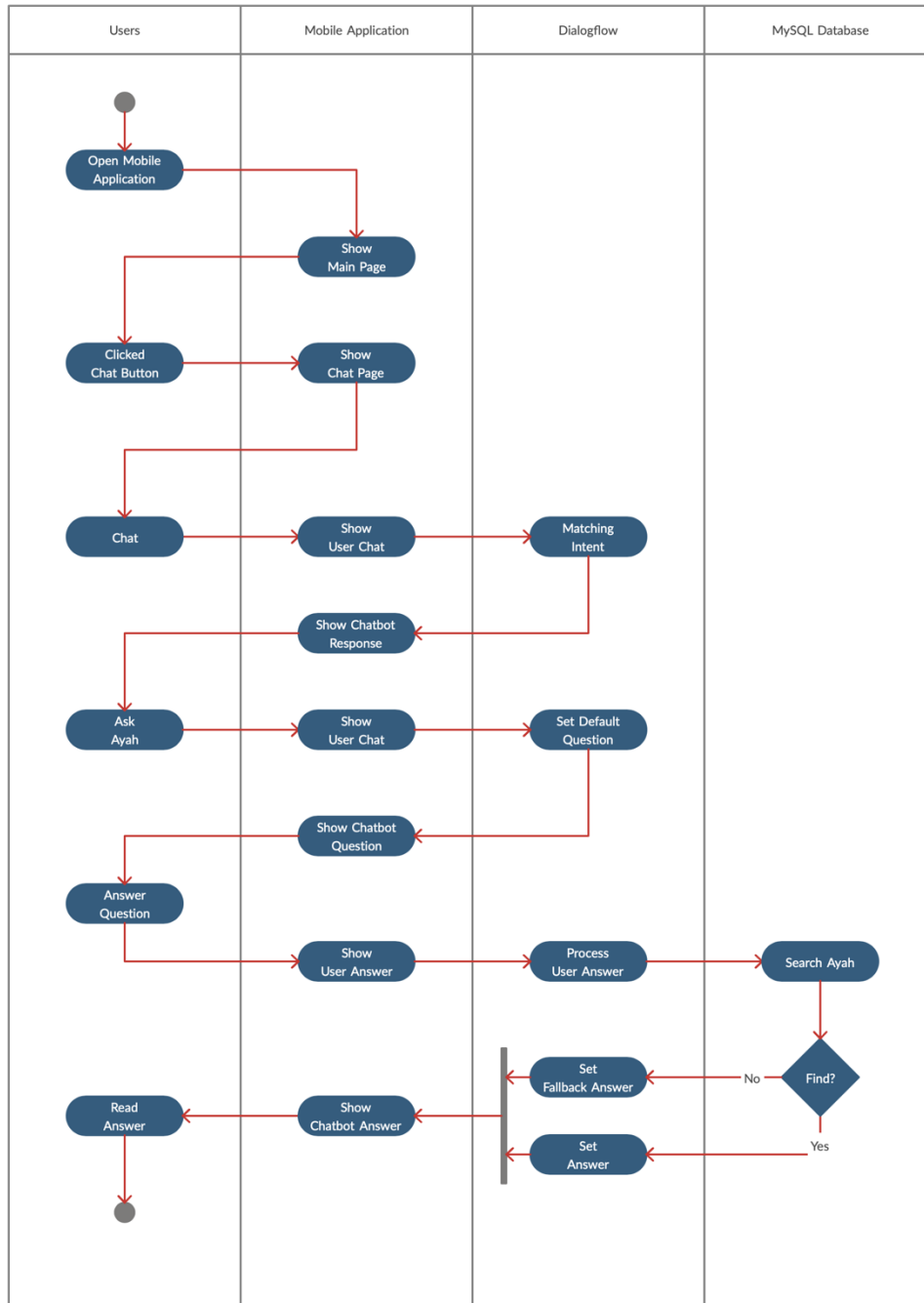


Figure 3.6 Activity Diagram Find Ayah

4. Activity Send Feedback

The following diagram illustrates the way to giving feedback to the admin:

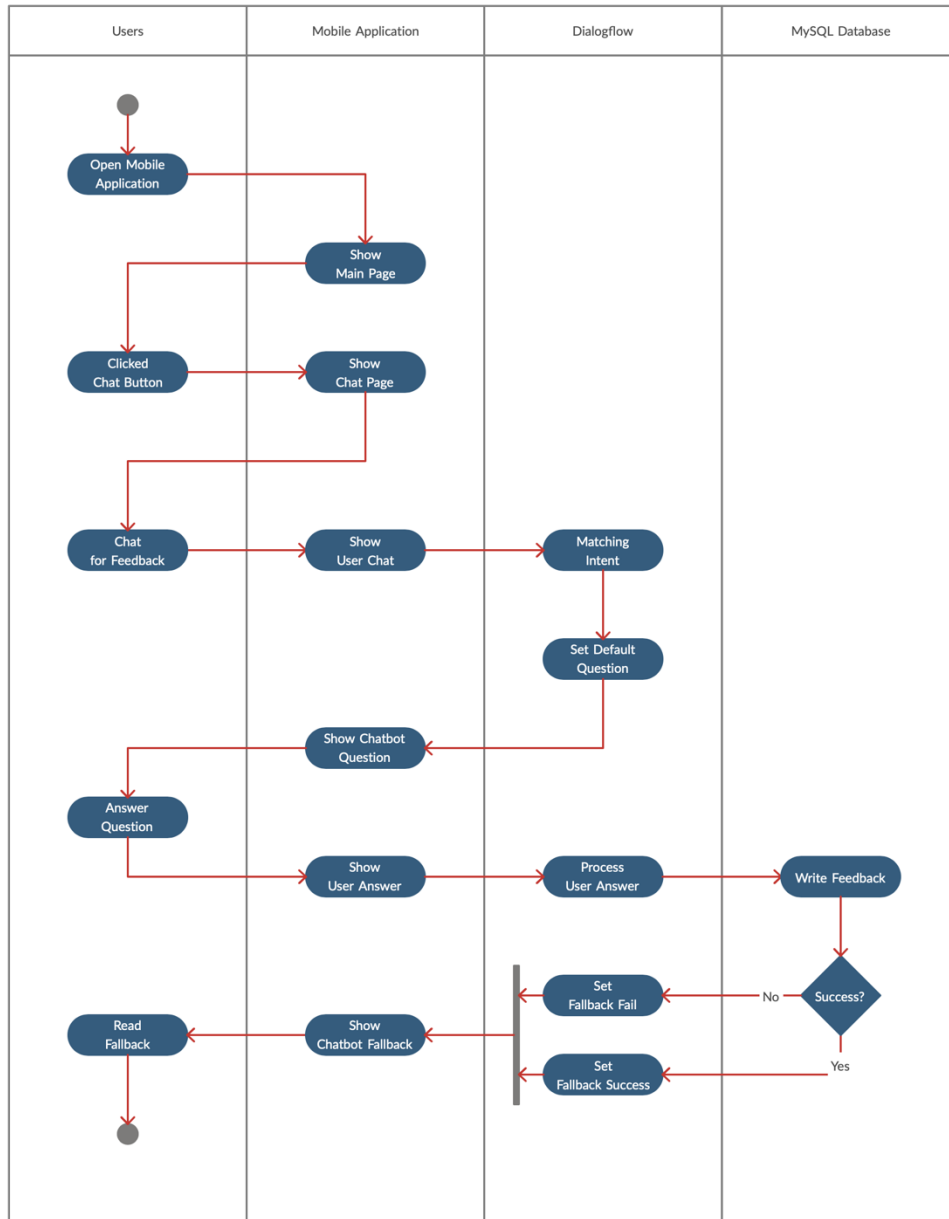


Figure 3.7 Activity Diagram Send Feedback

5. Activity Admin Input Surah

The following diagram illustrates the admin to input a new Qur'an Surah into the database:

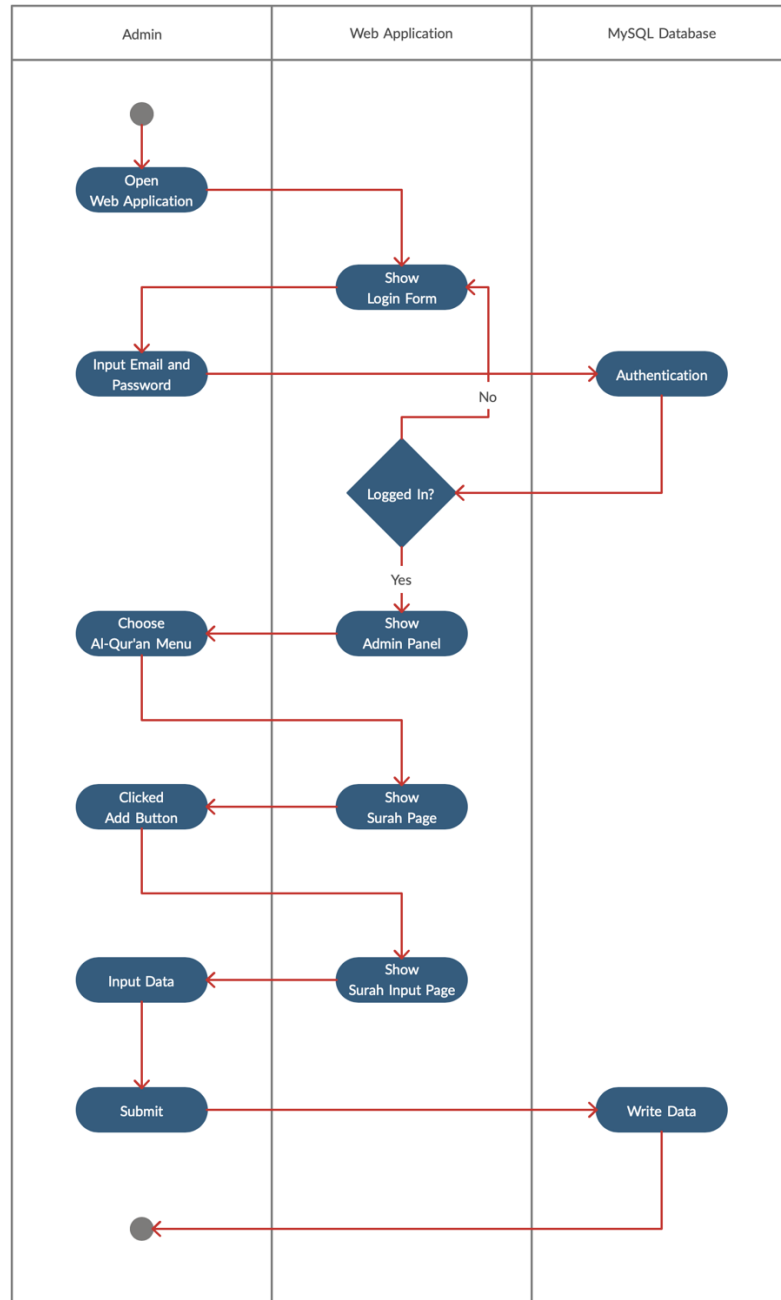


Figure 3.8 Activity Diagram Input Surah

6. Activity Admin Edit Surah

The following diagram illustrates the admin to edit the Qur'an Surah from the database:

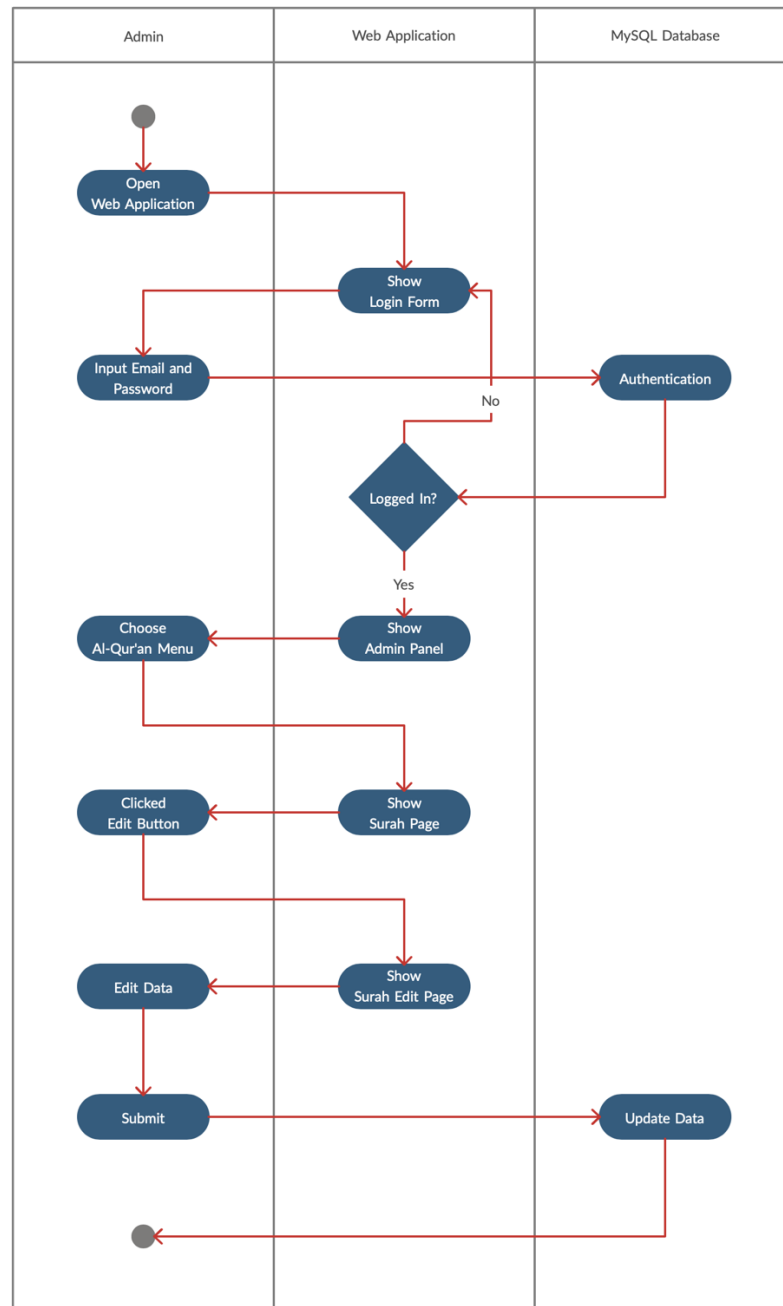


Figure 3.9 Activity Diagram Edit Surah

7. Activity Admin Input Ayah

The following diagram illustrates the admin to delete the Qur'an Ayah from the database:

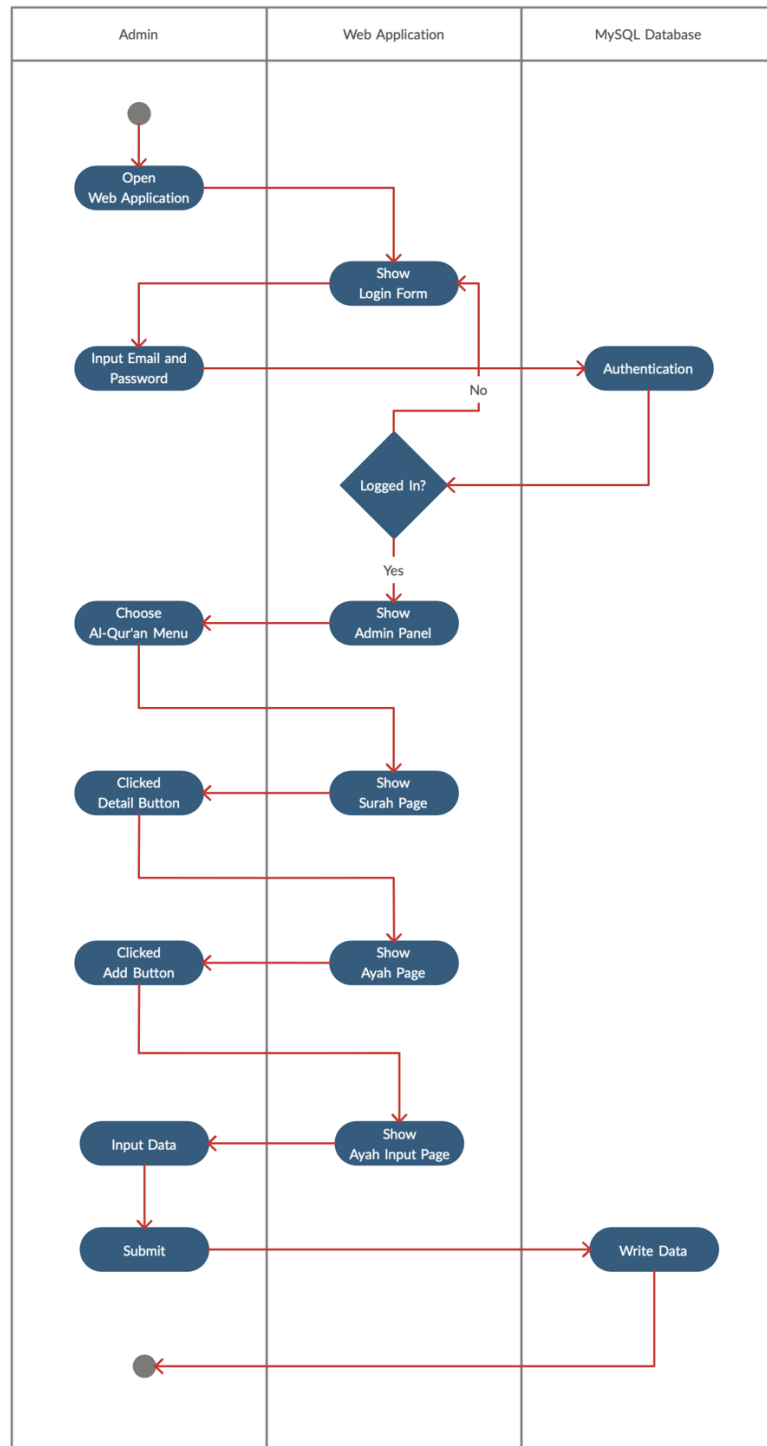


Figure 3.10 Activity Diagram Input Ayah

8. Activity Admin Edit Ayah

The following diagram illustrates the admin to delete the Qur'an Ayah from the database:

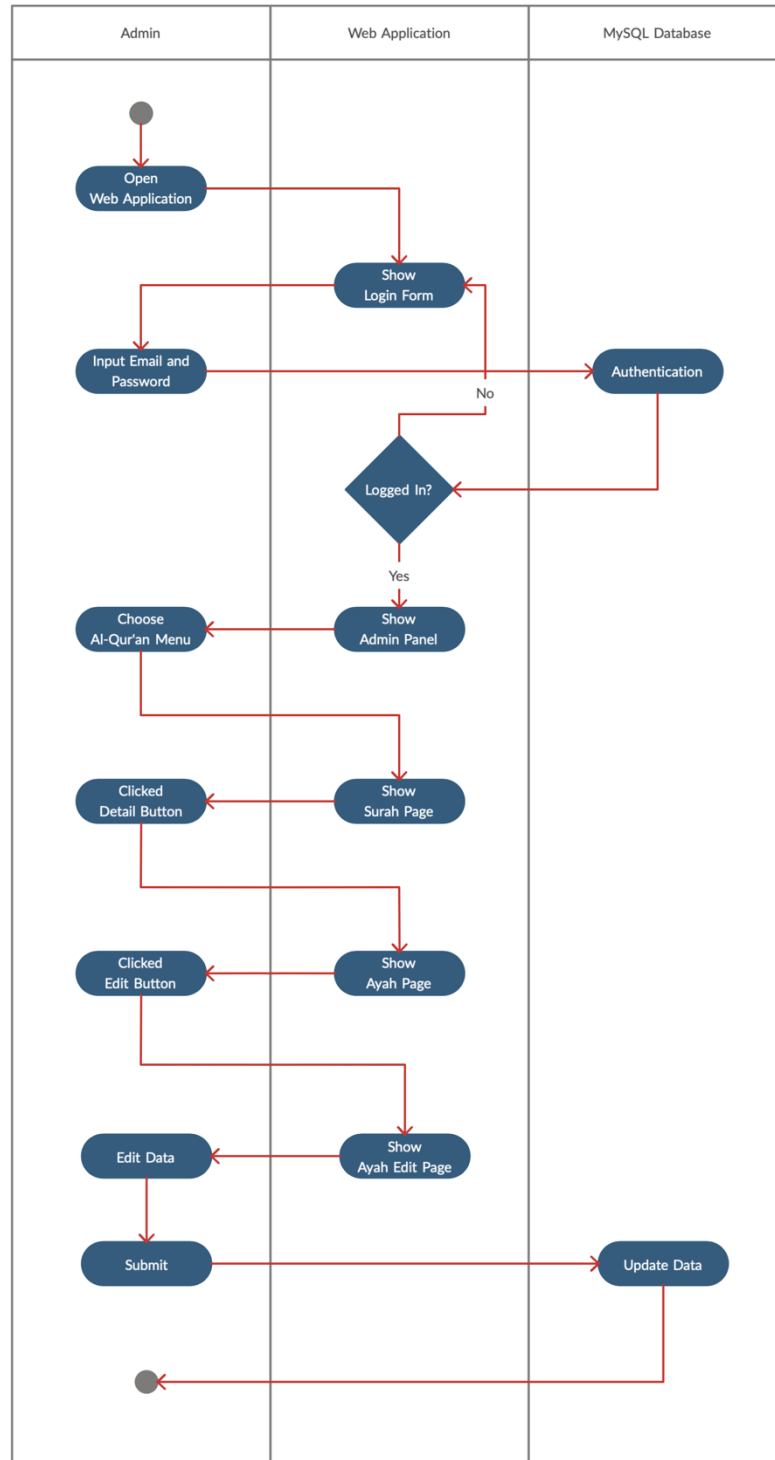


Figure 3.11 Activity Diagram Edit Ayah

9. Activity Admin Delete Ayah

The following diagram illustrates the admin to delete the Qur'an Ayah from the database:

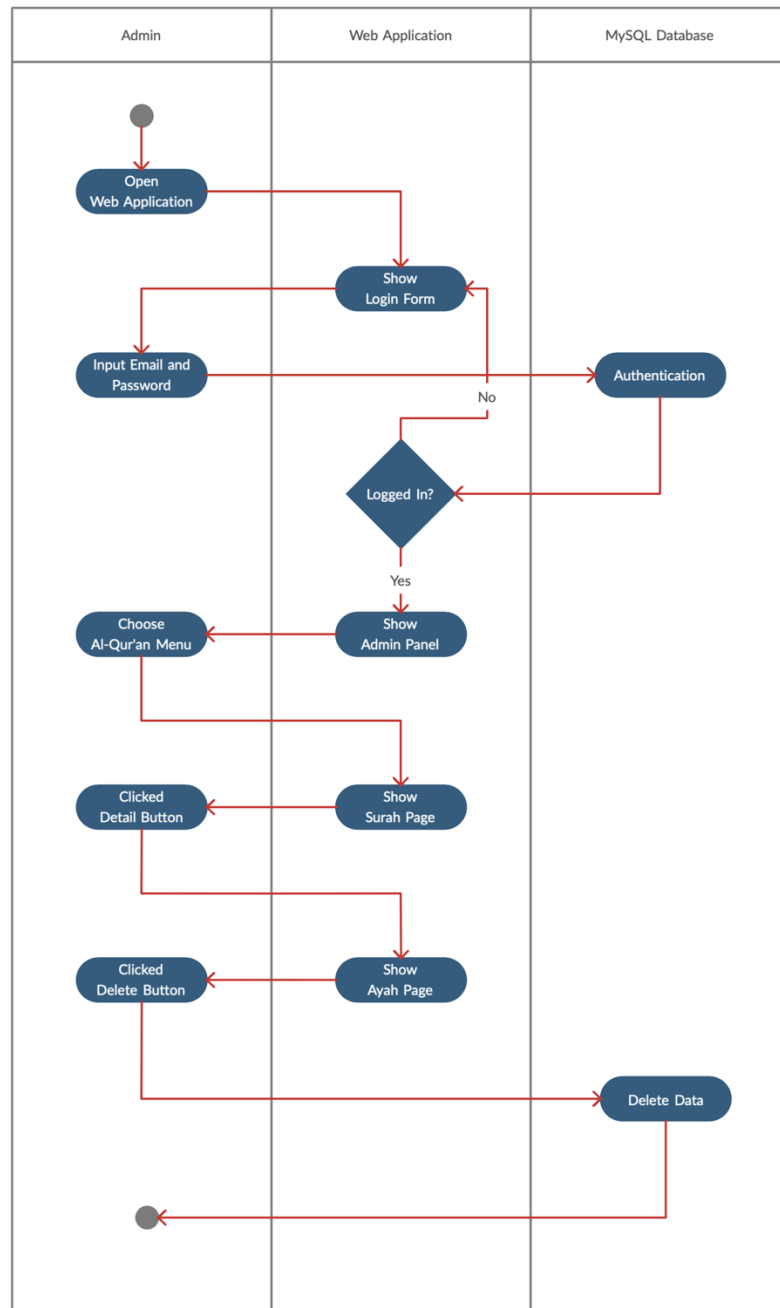


Figure 3.12 Activity Diagram Delete Ayah

3.3.4 Designing Entity Relationship Diagram

Entity Relationship Diagram of the Qur'an shown in Figure 3.13.

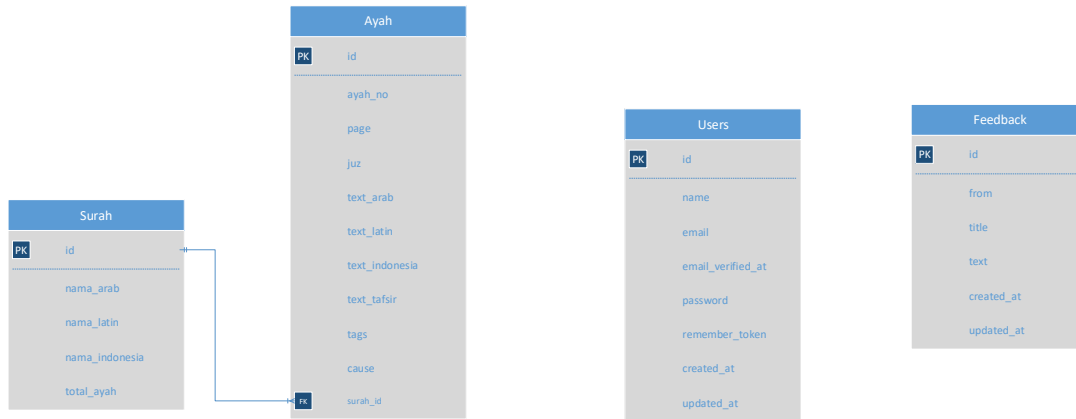


Figure 3.13 Entity Relationship Diagram

The explanation for each table is:

1. Surah table is to save the Qur'an surah data which each one surah has many ayahs.
2. Ayah table is to save the Qur'an ayah data to giving the recommendation ayah to the users.
3. User table is to the admin data which can login to the web to manage the Qur'an and feedback data.
4. Feedback table is to save the feedback data from the users.

3.3.5 Designing Deployment Diagram

Deployment diagram provide an overview of the software's physical architecture, hardware, and architecture of the system.

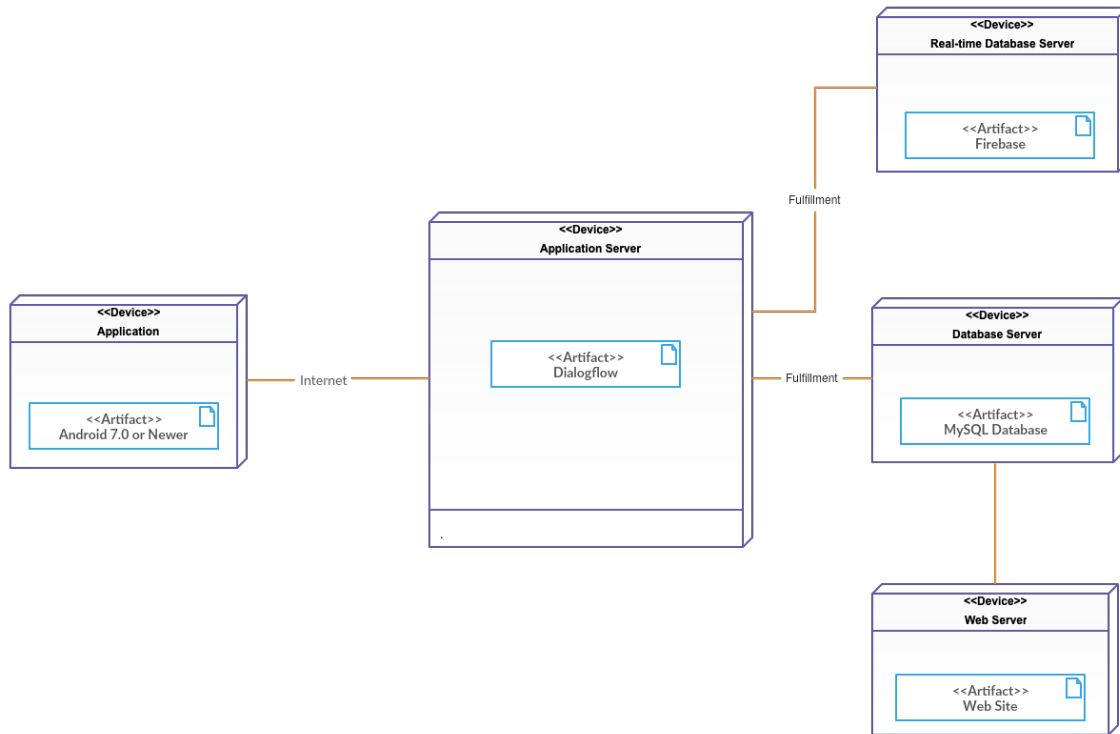


Figure 3.14 Deployment Diagram

3.3.6 Designing Chatbot Application

The chatbot application is to process the user's chat to matching with the Dialogflow's agent.

1. Intent
Intent design of the chatbot is show in Table 3.1.

Table 3.1 Dialogflow Intent Description

No	Intent Name	Context		Training Phrases	Parameters	Responses/Fulfillment
		Input	Output			
1	welcome.default		await_salam_response			Assalamu'alaikum
2	welcome.salam			Assalamu'alaikum		Wa'alaikumsalam, ada yang bisa saya bantu?
3	welcome.standard		await_salam_response	Hai		Hai, Assalamu'alaikum,
4	welcome.response.salam		await_condition	Wa'alaikumsalam		Apa kabar?
5	welcome.response.standard		await_condition	Iya		Apa kabar?
6	condition.response.positive	awaiting_condition	ask_chat	Alhamdulillah		Alhamdulillah, selalu bersyukur ya
7	condition.response.negative	awaiting_condition	ask_chat	Kurang sehat		Semoga lekas membaik ya, aamiin
8	condition.response.fallback			Apa kabar?		Alhamdulillah saya sehat, ada yang bisa saya bantu?
9	ask.ayah		ask_ayah_language	Cari ayat		Mau ditampilkan dalam bentuk apa? Arab? Latin? Indonesia?semuanya?
10	ask.ayah.arab	ask_ayah_language		Arab	surah_id ayah_no	handleAyahArab
11	ask.ayah.latin	ask_ayah_language		Latin		handleAyahArab

Table 3.1 Dialogflow Intent Description Continued

No	Intent Name	Context		Training Phrases	Parameters	Responses/Fulfillment
		Input	Output			
12	ask.ayah.indonesia	ask_ayah_language		Indonesia	surah_id ayah_no	handleAyahIndonesia
13	ask.ayah.text	ask_ayah_language		Semuanya		handleAyahText
14	ask.surah		ask_surah_type	Cari surah		Mau cari tentang apa? Nama Surah? Nomor Surah atau Total?
15	ask.surah.name	ask_surah_type		Nama surah	id	handleSurahName
16	ask.surah.number	ask_surah_type		Nomor surah	nama_latin	handleSurahNumber
17	ask.surah.total	ask_surah_type		Total surah	nama_latin	handleSurahTotal
18	ask.chat	ask_chat		Iya		Ada yang bisa saya bantu?
19	chat.start.ask		awaiting_chat_start	Kak		Iya? Ada yang bisa saya bantu?
20	chat.start.default		await_chat	Aku mau cerita		Mau cerita?
21	chat.start.yes	await_chat		Iya	text tags	handleResponseAyah
22	chat.start.no	await_chat	chatstartno-followup	Tidak jadi		Loh kenapa? Cerita aja kak
23	chat.start.no.yes	chatstartno-followup		Iya	text tags	handleResponseAyah
24	chat.start.no.no	chatstartno-followup		Lain waktu		Oke deh, kalau ada yang mau diceritain, cerita aja ya
25	chat.start.no.no.yes	chatstartnono-followup	await_chat chatstartnonoyes-followup			Cerita aja kak, aku ini pendengar yang baik

Table 3.1 Dialogflow Intent Description Continued

No	Intent Name	Context		Training Phrases	Parameters	Responses/Fulfillment
		Input	Output			
26	chat.start.no.no.no	chatstartnono-followup		Iya		Terima kasih
27	chat.start.no.no.yes.yes	chatstartnonoyes-followup		Iya	text tags	handleResponseAyah
28	chat.start.no.no.yes.no	chatstartnonoyes-followup	chatstartnonoyesno-followup	Tidak		Oke deh, kalau ada yang mau diceritain, cerita aja ya
29	chat.start.no.no.yes.no.yes	chatstartnonoyesno-followup		Iya	text tags	handleResponseAyah
30	chat.start.no.no.yes.no.no	chatstartnonoyesno-followup		Oke		Terima kasih
31	feedback		feedback_done	Feedback	from title text	handleFeedback
32	feedback.done	feedback_done		Iya		Ada lagi yang bisa saya bantu?
33	finish.yes			Terima kasih		Oke kak, ada lagi yang bisa saya bantu?
34	finish.no			Tidak		Oke kak, chat aja ya kalau ada yang ingin ditanyakan
35	fallback.confuse			Bingung		Mungkin kk mau cerita? Atau cari ayat?
36	fallback.default					Maaf kak, bisa ulangi lagi?

3.3.7 Designing Mobile Application

The mobile application is to the end-user to interact with the chatbot.

1. Welcome Page

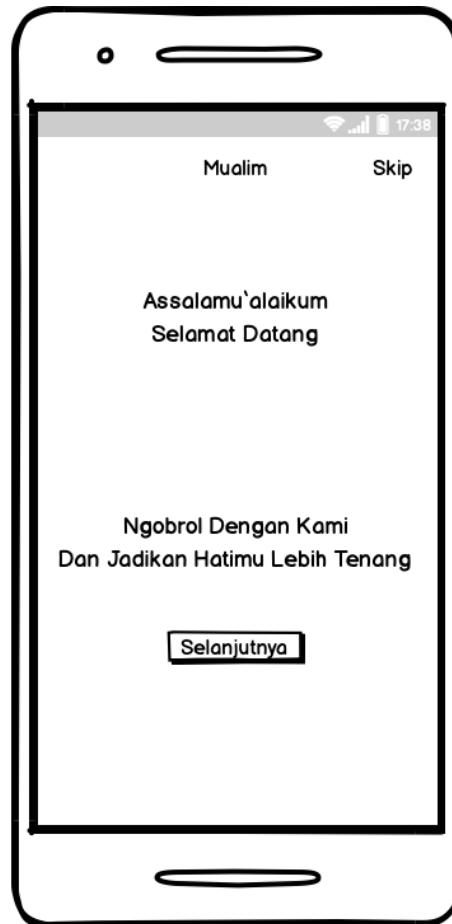


Figure 3.15 Mobile Welcome Page Design

2. Chat Page

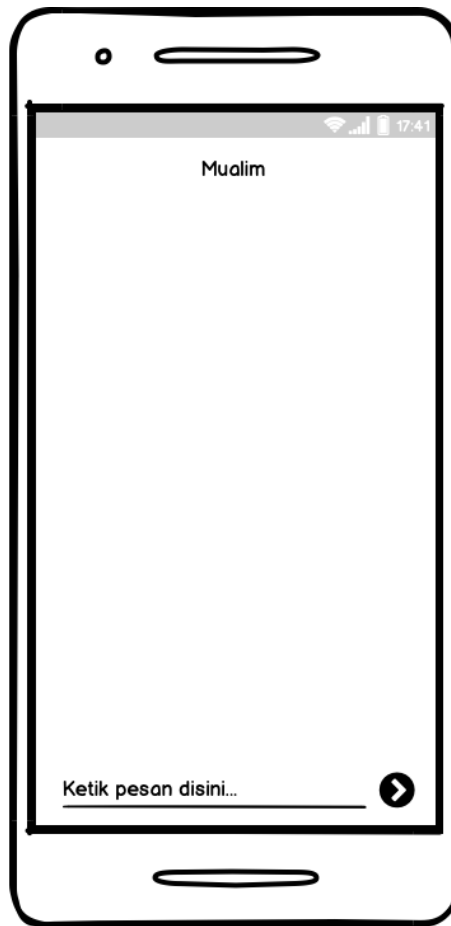


Figure 3.16 Mobile Chat Page Design

3.3.8 Designing Web Application

The web application is only accessible for admin, the admin can input, edit, delete, and search the Qur'an data from the database and see the feedback from the users.

1. Login Page

The diagram illustrates a web browser window titled "A Web Page". The address bar contains "https://". Below the address bar is a header area labeled "Muallim". The main content area features a centered "Admin Login" form. This form includes two input fields: "Email" and "Password", each followed by a horizontal line representing the input area. Below these fields is a "Login" button. The browser window also shows standard navigation icons (back, forward, stop, home) and a search icon in the top right corner.

Figure 3.17 Admin Login Page Design

2. Home Page

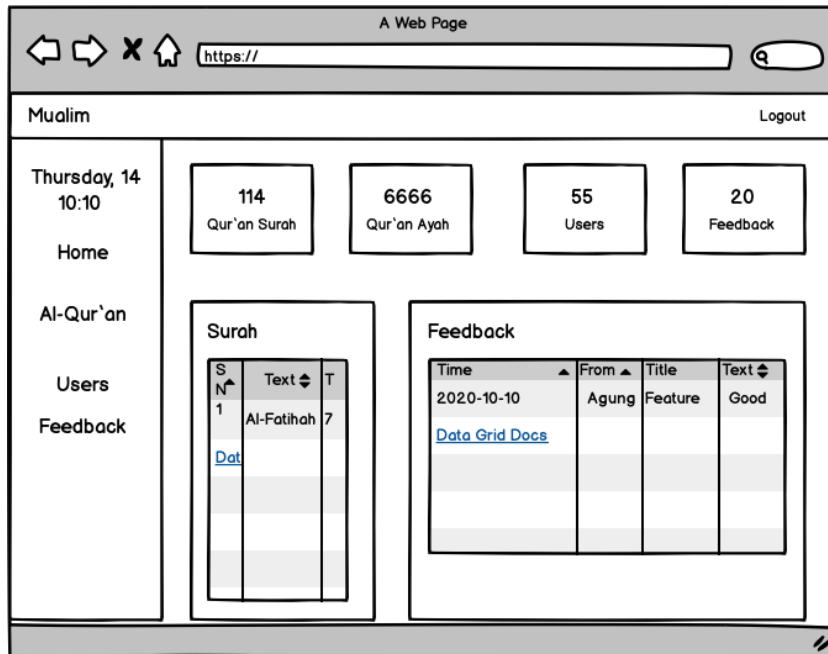


Figure 3.18 Admin Home Page Design

3. Surah Page

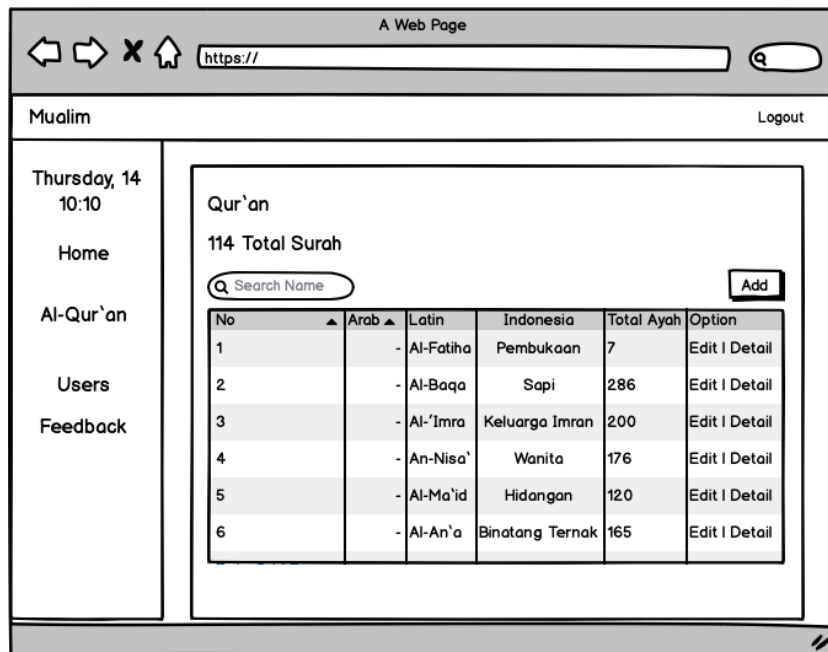
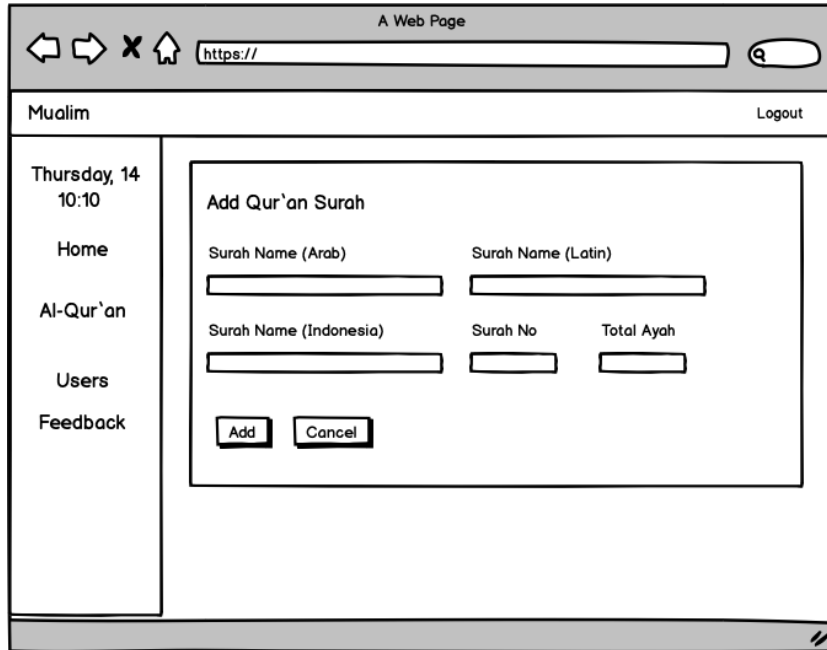


Figure 3.19 Admin Surah Page Design

4. Surah Page: Add



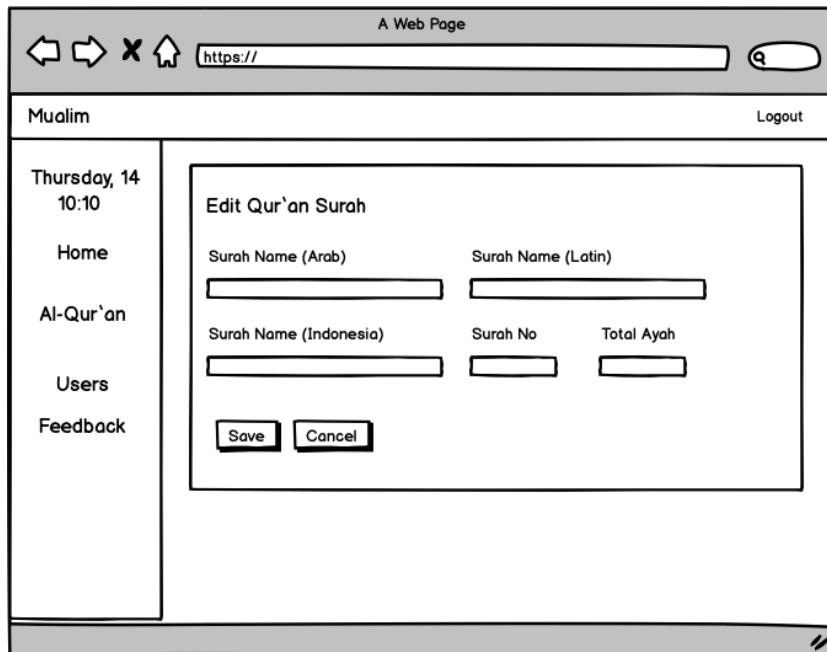
The screenshot shows a web browser window titled "A Web Page" with a URL bar containing "https://". The page header includes "Mualim" on the left and "Logout" on the right. A sidebar on the left contains the following menu items: "Thursday, 14 10:10", "Home", "Al-Qur'an", "Users", and "Feedback". The main content area is titled "Add Qur'an Surah" and contains the following form fields:

Surah Name (Arab)	Surah Name (Latin)	
<input type="text"/>	<input type="text"/>	
Surah Name (Indonesia)	Surah No	Total Ayah
<input type="text"/>	<input type="text"/>	<input type="text"/>

At the bottom of the form are two buttons: "Add" and "Cancel".

Figure 3.20 Admin Add Surah Page Design

5. Surah Page: Edit



The screenshot shows a web browser window titled "A Web Page" with a URL bar containing "https://". The page header includes "Mualim" on the left and "Logout" on the right. A sidebar on the left contains the following menu items: "Thursday, 14 10:10", "Home", "Al-Qur'an", "Users", and "Feedback". The main content area is titled "Edit Qur'an Surah" and contains the following form fields:

Surah Name (Arab)	Surah Name (Latin)	
<input type="text"/>	<input type="text"/>	
Surah Name (Indonesia)	Surah No	Total Ayah
<input type="text"/>	<input type="text"/>	<input type="text"/>

At the bottom of the form are two buttons: "Save" and "Cancel".

Figure 3.21 Admin Edit Surah Page Design

6. Ayah Page

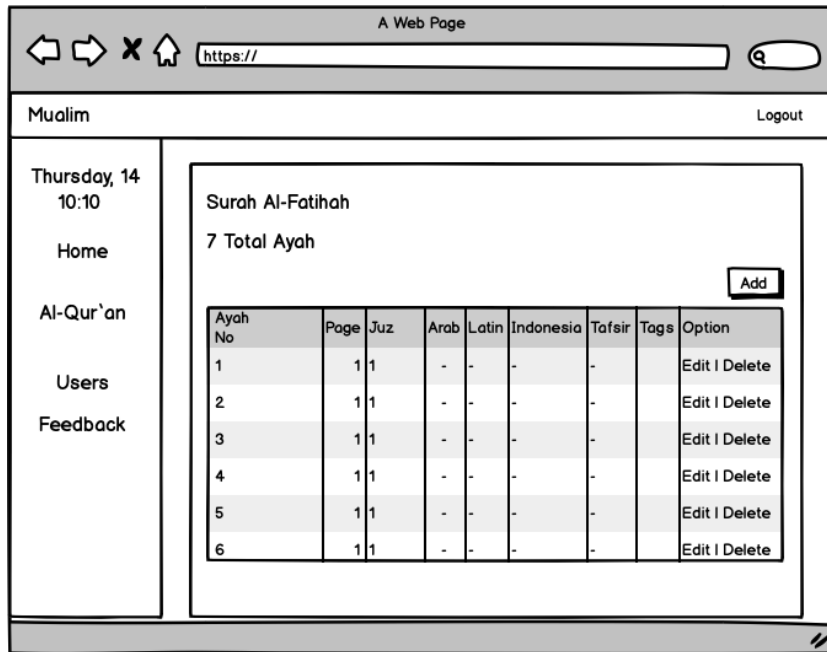


Figure 3.22 Admin Ayah Page Design

7. Ayah Page: Add

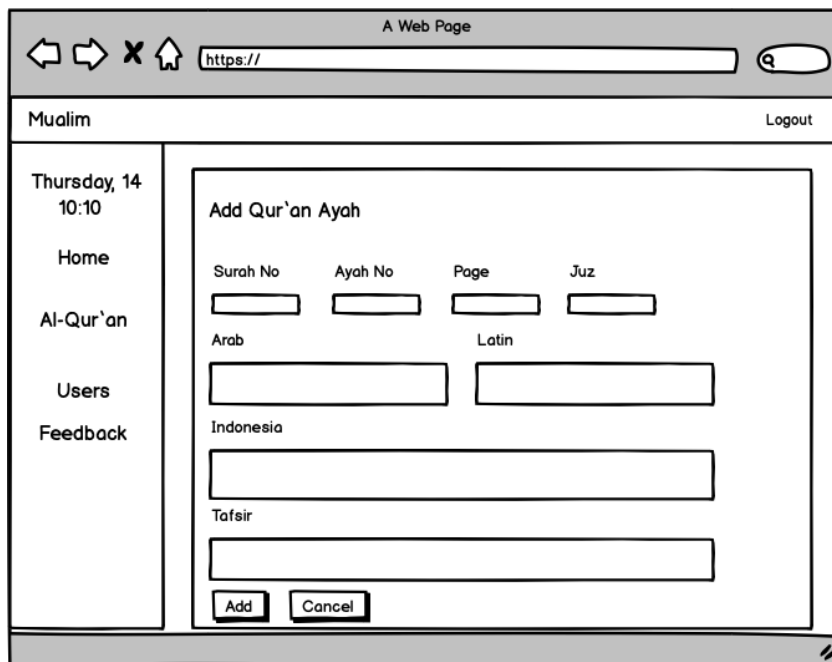


Figure 3.23 Admin Add Ayah Page Design

8. Ayah Page: Edit

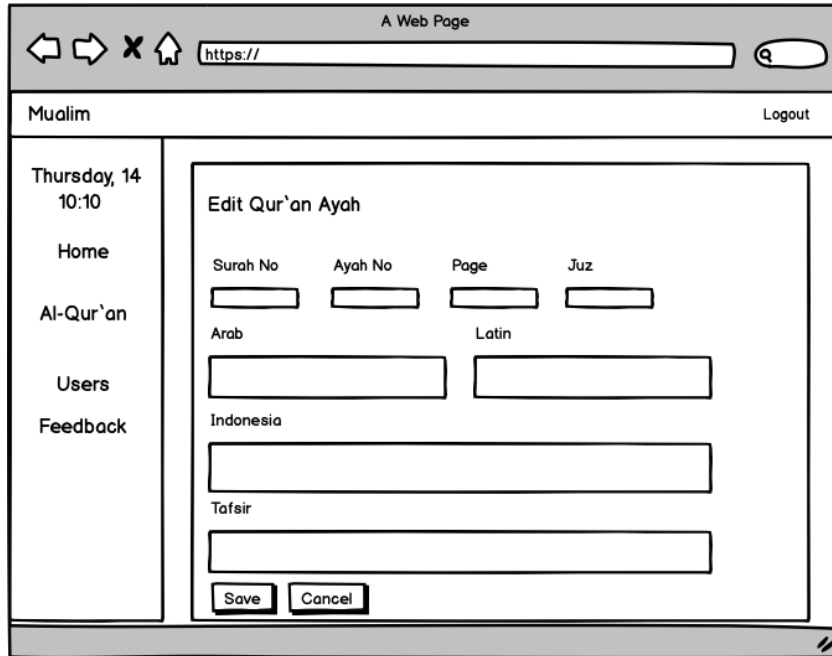


Figure 3.24 Admin Edit Ayah Page Design

9. Feedback Page

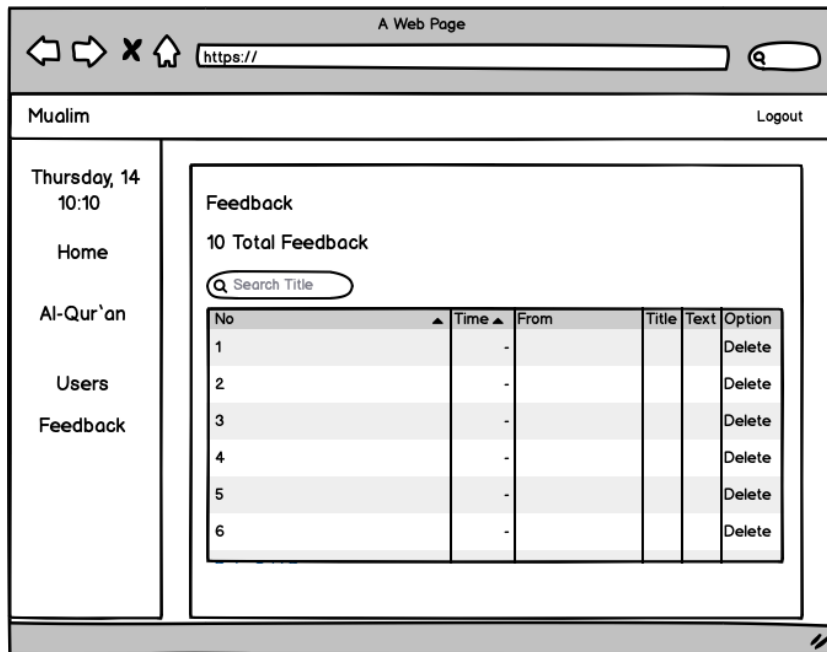


Figure 3.25 Admin Feedback Page Design

3.4 Phase of Constructing

After the design phase, the next step is constructing to create an application based on the design that has been created.

At this phase, the software uses an Android Studio to build the mobile application and Sublime Text to build the web application. The programming language used is Java Programming Language for the development of mobile application on the Android operating system, and for the development of the website the author use Laravel as a framework that use PHP Programming Language to build the back-end website, and HTML, CSS, and JS to build the front-end website. And for the database, the author uses MySQL Database and Firebase Real-time Database.

3.5 Phase of Implementing

After the construction phase of the application is completed, the next is the implementation phase. This phase includes Application Testing as the last stage in the Rapid Application Development (RAD) method before touching the release stage. The system is should be ready for testing. The testing method used is Blackbox Testing.

The Blackbox Testing method performs testing regardless of the program source code and is running by the tester or user to observe the program whether it has received input, processed, and generated the appropriate output. The implementation phase will be discussed further in the next chapter.

CHAPTER 4. IMPLEMENTATION & TESTING

4.1 Implementation

In this chapter, implementation will be explained about a hardware device (hardware) and software (software) used in building the system, files that were used in building the system, the application displays, along with pieces of script program.

4.1.1 Hardware

Hardware specification used in developing the application are as follows:

1. Mackbook Pro 13-inch Mid 2012
2. Xiaomi Redmi 7 Android OS

4.1.2 Software

Software used in developing the application are as follows:

1. OS: macOS Catalina.
2. IDE: Android Studio, MySQL Workbench, Sublime Text.
3. Browser: Safari, Google Chrome, Firefox.
4. Prototype Design: Balsamiq.
5. System Design: Microsoft Visio, Creately.

4.2 User Interface

4.2.1 Mobile Application Implementation

Mobile application is Android platform based. The mobile application is for the end-user who interact with the chatbot.

Figure 4.1, shows the welcome page. This page is about the introduction of the application's features. After the user clicks the start button, the user will show the chat page that is shown in Figure 4.2.

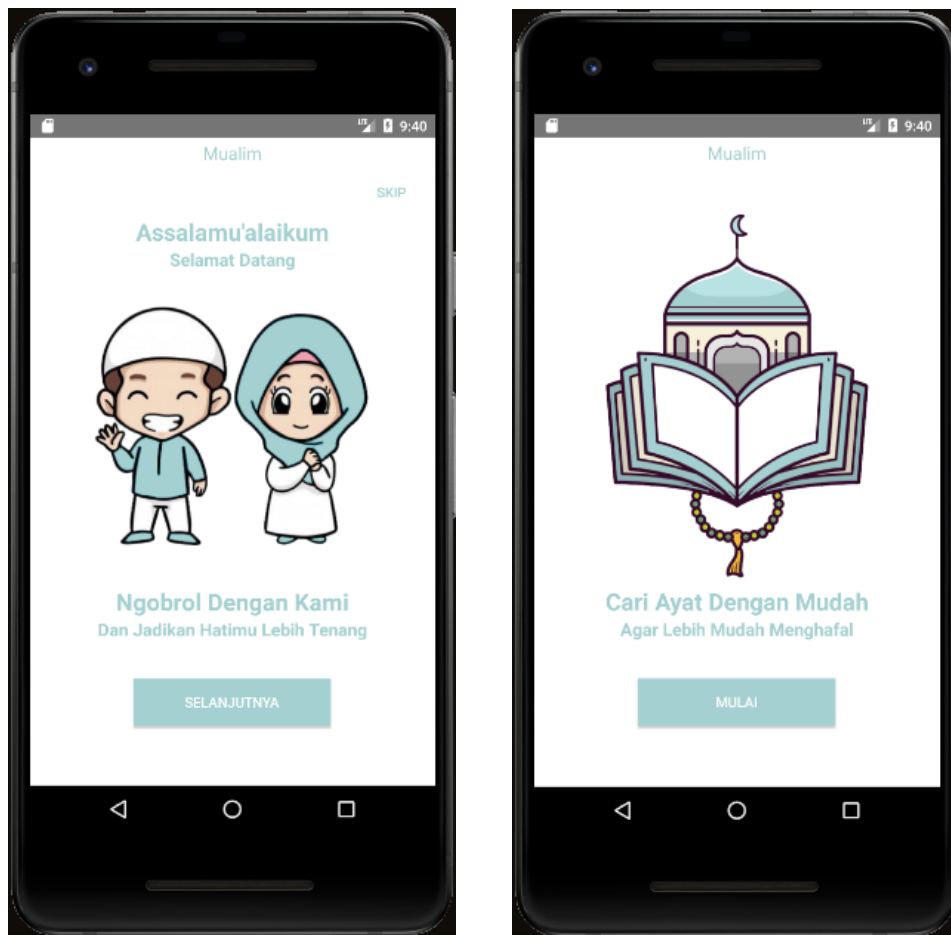


Figure 4.1 Mualim Welcome Page

Figure 4.2, shows the chat page. This page enables the users to interact with the chatbot that integrates with the Dialogflow services, the user can ask the chatbot to get a recommendation or ask for the Qur'an Surah or Ayah and also can send feedback to the admin.

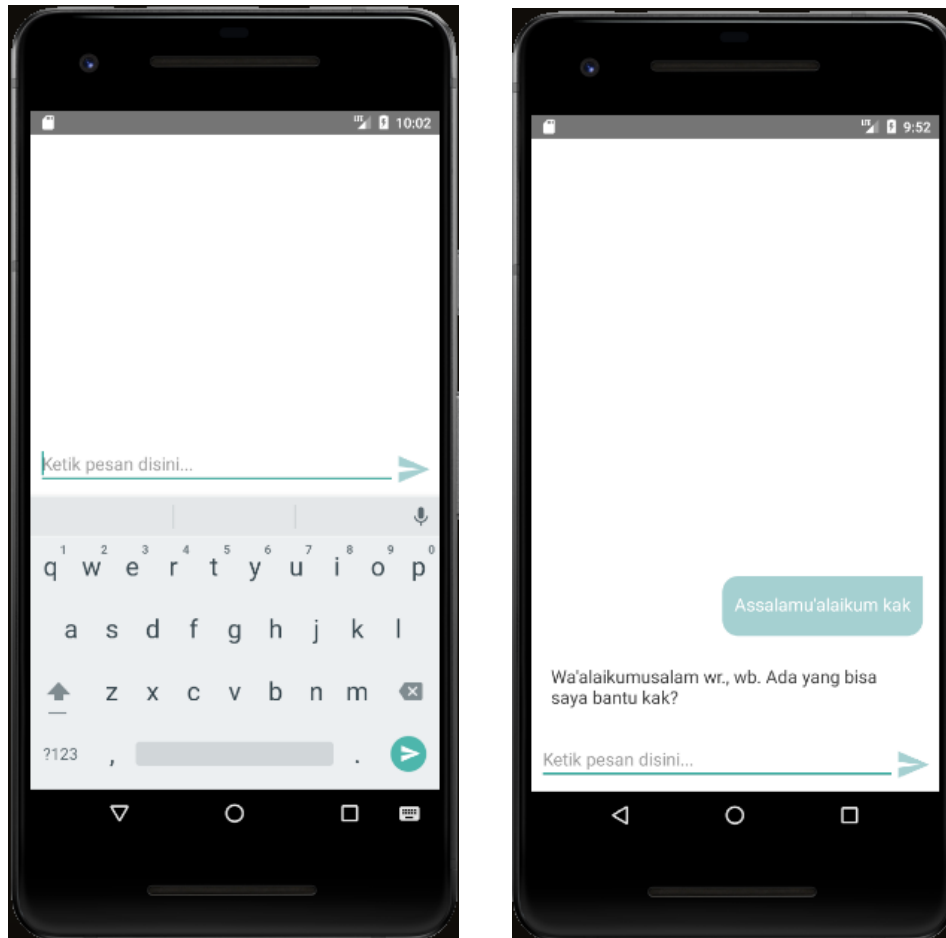


Figure 4.2 Mualim Chat Page

If the users want to get a recommendation ayah based on their problem, they should talk about their problem and answer the chatbot question to get the result from the chatbot as shown in Figure 4.3.

Figure 4.3, shows the chat page to get a recommendation. The user can chat with the chatbot that they want to talk about something, then the chatbot will ask a question to the user and the users should answer the chatbot question to get a recommendation ayah. The recommendation ayah is based on Qur'an data in the database and matching by the tags.

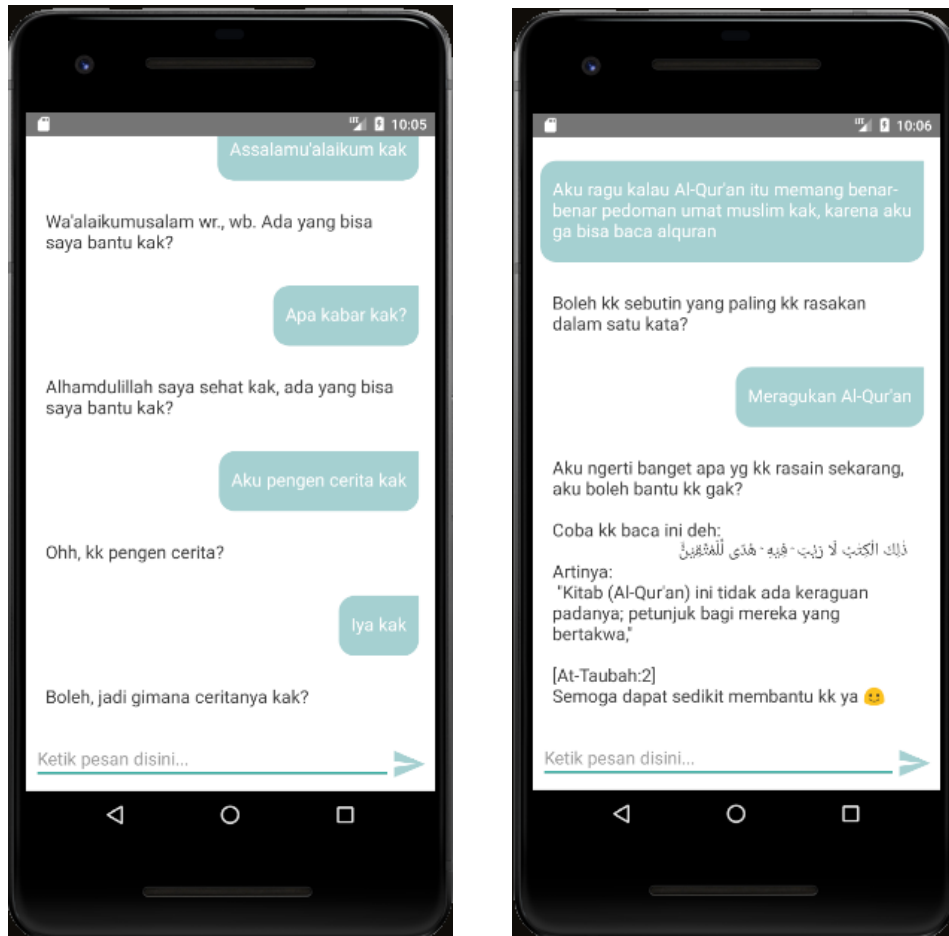


Figure 4.3 Muallim Chat Page: Get Recommendation

The user can ask about Qur'an Surah or Ayah with chat with the chatbot, if the user wants to know about Qur'an Surah, the chatbot will ask some question that needs to be answered by the user, the implementation of Qur'an Surah shows in Figure 4.4.

Figure 4.4, shows the chat page to get some information about Qur'an Surah. The chatbot will ask what the user wants to know, about Surah's name, number, or the total ayah in the Surah. After the user answer which data to know, the chatbot will ask some questions that the user needs to answer.

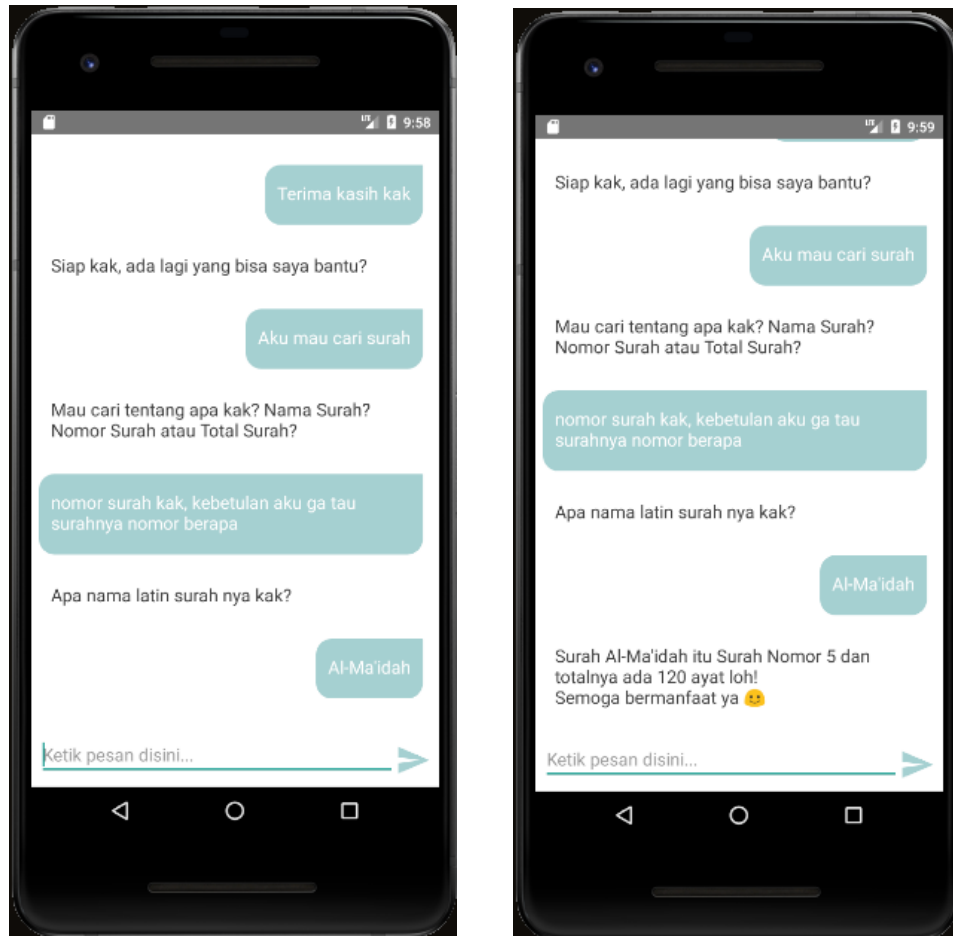


Figure 4.4 Mualim Chat Page: Get Qur'an Surah Information

If the user wants to know about Qur'an Ayah, the chatbot will ask some question that needs to answer by the user, as shown in Figure 4.5.

Figure 4.5, shows the chat page to get some information about Qur'an Ayah. The chatbot will ask which language that the Ayah will show, the user can choose Arabic, Latin, Indonesia, or all the language, then the chatbot will ask which number of Surah and the number of Ayah that user want to recite.

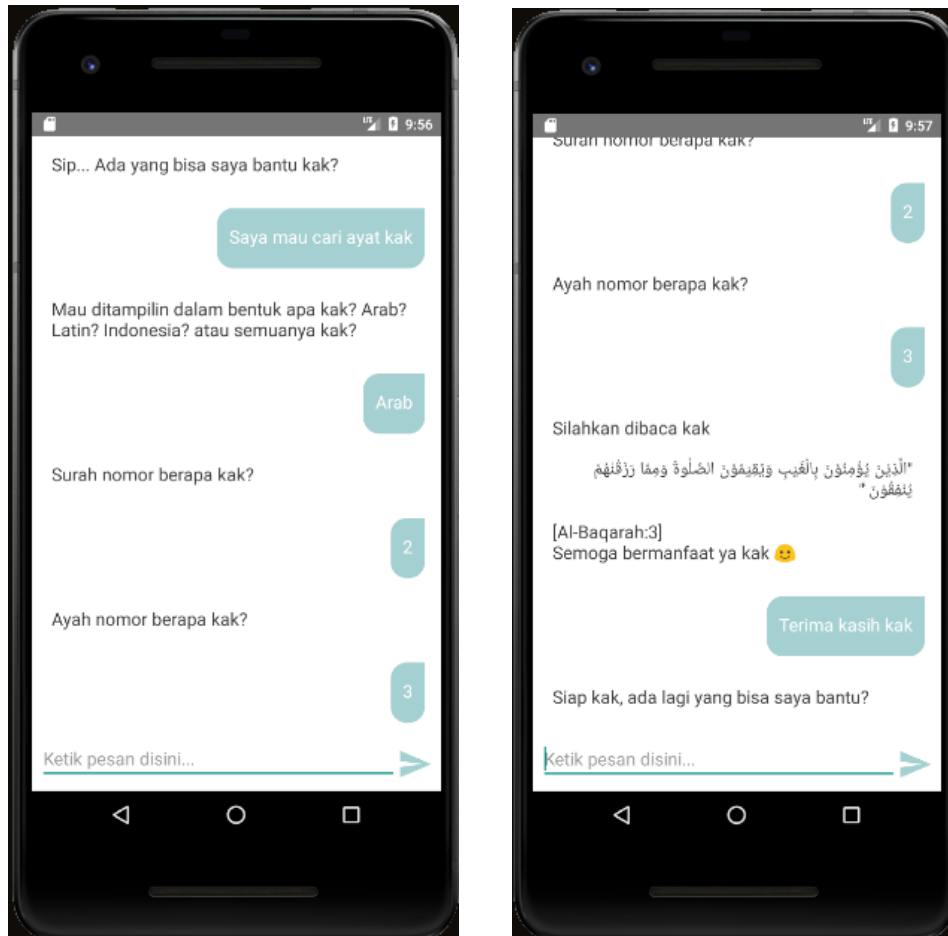


Figure 4.5 Muallim Chat Page: Get Qur'an Ayah Information

The user can send feedback to the admin by a chat with the chatbot, the chatbot will ask some question that needs to answer by the user, as shown in Figure 4.6.

Figure 4.6, shows the chat page to send feedback to the admin. The chatbot will ask the user's name, the topic of the feedback, and the messages. Then the feedback will send to the admin and the admin can see in an admin page that shown in Figure 4.15.



Figure 4.6 Mualim Chat Page: Send Feedback

4.2.2 Web Application Implementation

Figure 4.7, shows the login page. This page is for the admin to manage the Qur'an data. If the admin success logged in to the website, the home page will show as in Figure 4.8.

Figure 4.7 Admin Login Page

Figure 4.8, shows the admin home page. This page is to inform how many Qur'an Surah, Ayah are available in the database and how much feedback from the users. The admin can go to Qur'an page by clicked Al-Qur'an in the left menu, Qur'an page shown in Figure 4.9.

Surah No.	Text		Total Ayah
	Arab	Latin	
1	الفاتحة	Al-Fatihah	7
2	البقرة	Al-Baqarah	286
3	آل عمران	Ali 'Imran	200
4	النساء	An-Nisa'	176
5	المائدة	Al-Ma'idah	120
6	الأنعام	Al-An'am	165
7	الأعراف	Al-A'raf	206

No.	Time	From	Title	Text
1	14 May, 2020	Agung	Fitur	Tingkatkan terus ya
2	18 May, 2020	Heri	Ayat nya harua lebih banyak lagi dong	Ayat nya haris dibanyakin

Figure 4.8 Admin Home Page

Figure 4.9, shows the Qur'an Surah's page. This page shows the list of Qur'an Surah. If the admin wants to add some Surah's data, the admin needs to click add button then go to the add page that shows in Figure 4.10, if the admin wants to edit the Surah's data, the admin needs to click the edit button, then go to the edit page that shows in Figure 4.11, or clicked the detail button to sees the Qur'an Ayah for each Surah that shows in Figure 4.12, the admin can find some Surah by search the Surah's name in the search input.

Mualim ✉ ▲ Logout

Monday, 18
21:13

Home
Al-Qur'an
Feedback

Qur'an

114 Total Surah

Search Name Add

Surah No.	Text			Total Ayah	Option
	Arab	Latin	Indonesian		
1	الفاتحة	Al-Fatihah	Pembukaan	7	✍ ✖
2	البقرة	Al-Baqarah	Sapi	286	✍ ✖
3	آل عمران	Ali 'Imran	Keluarga Imran	200	✍ ✖
4	النساء	An-Nisa'	Wanita	176	✍ ✖
5	المائدة	Al-Ma'idah	Hidangan	120	✍ ✖
6	الانعام	Al-An'am	Binatang Ternak	165	✍ ✖
7	الاعراف	Al-A'raf	Tempat Tertinggi	206	✍ ✖

Figure 4.9 Admin Surah Page

Figure 4.10, shows the add page for the Qur'an Surah. The data that need to input is Surah's name in Arab, Latin, and Indonesian and Surah's number and total ayah.

Mualim ✉ 🔔 Logout

Monday, 18
21:12

Home
Al-Qur'an
Feedback

Add Qur'an Surah

Surah Name (Arab) Surah Name (Latin) Surah Name (Indonesian)

Surah No Total Ayah

Figure 4.10 Admin Add Surah Page

Figure 4.11, shows the edit page for the Qur'an Surah. This page is edit for each Surah that the admin clicked, the Surah's number cannot be edited because it has a relation with the Qur'an Ayah.

Mualim ✉ 🔔 Logout

Monday, 18
21:14

Home
Al-Qur'an
Feedback



Edit Qur'an Surah

Surah Name (Arab) Surah Name (Latin) Surah Name (Indonesian)

Surah No Total Ayah

Figure 4.11 Admin Edit Surah Page

Figure 4.12, shows the Qur'an Ayah page. This page shows the list of Ayah from the Surah that clicked by the admin. If the admin wants to add some Ayah's data, the admin needs to click add button then go to the add page that shows in Figure 4.13, if the admin wants to edit the Ayah's data, the admin needs to click the edit button, then go to the edit page that shows in Figure 4.14.

Mualim   Logout

Monday, 18
21:15

[Home](#)
[Al-Qur'an](#)
[Feedback](#)

Surah Al-Fatihah

7 Total Ayah [Add](#)







Ayah No.	Page	Juz	Text				Tags	Cause	Option
			Arab	Latin	Indonesia	Tafsir			
1	1	1	بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ	bismillāh-rahmānir-rahīm	Dengan nama Allah Yang Maha Pengasih, Maha Penyayang.	Surah al-Fatihah dimulai dengan Basmalah\n\nAda beberapa pendapat ulama berkenaan dengan....			 
2	1	1	الْحَمْدُ لِلَّهِ رَبِّ الْعَالَمِينَ	al-hamdu lillāhi rabbil-'ālamīn	Segala puji bagi Allah, Tuhan seluruh alam,	Pada ayat di atas, Allah memulai firman-Nya dengan menyebut \"Basmalah\"....			 
3	1	1	الرَّحْمَنِ الرَّحِيمِ	ar-rahmānir-rahīm	Yang Maha Pengasih, Maha	Pada ayat dua di atas Allah swt			 

Figure 4.12 Admin Ayah Page

Figure 4.13, shows the add page the Qur'an Ayah. The data that need to input are Ayah's page, juz, Arab text, Latin text, Indonesian text, Tafsir text, the tags, and cause. The Surah's number is automatically added based on which Surah that clicked, the Ayah's number is auto incremental for prevents the human error.

Mualim ✉ 🔔 Logout

Monday, 18
21:17

Home

Al-Qur'an

Feedback

Add Qur'an Ayah

Surah No. Ayah No. Page Juz

Arab

Latin

Indonesian

Tafsir

Figure 4.13 Admin Add Ayah Page

Figure 4.14, shows the edit page for Qur'an Ayah. This page is to edit Ayah from the database if there's have something wrong with the Qur'an data.

Mualim ✉ 🔔 Logout

Monday, 18
21:17

Home

Al-Qur'an

Feedback

Edit Qur'an Ayah

Surah No. Ayah No. Page Juz

Arab

Latin

Indonesian

Tafsir

Figure 4.14 Admin Edit Ayah Page

Figure 4.15, shows the feedback page. This page shows the feedback from the users, the admin cannot add or edit the feedback and can only delete the feedback. The admin can also find the feedback by the title.

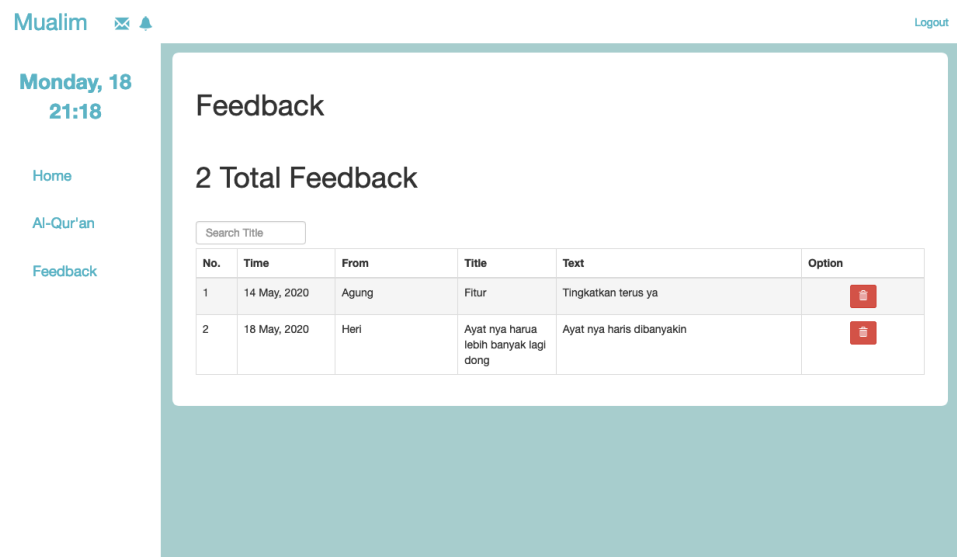


Figure 4.15 Admin Feedback Page

4.3 Blackbox Testing

The author divided the testing into two parts. The first part is to test the mobile application and the second part is to test the web application.

4.3.1 Mobile Application Testing

In the mobile application testing, the authors made some test case to check whether the application meets the requirement and can be used for the users. Table 4.1, shows the result of the testing.

Table 4.1 Mobile Application Testing Result

No.	Test Case	Expected Result	Test Result
1	Click Next Button on Welcome Page	Displaying the second welcome page.	Success

Table 4.1 Mobile Application Testing Result Continued

No.	Test Case	Expected Result	Test Result
2	Click Skip Button on Welcome Page	Displaying the chat page to chat with the chatbot.	Success
3	Click Start Button on Welcome Page	Displaying the chat page to chat with the chatbot.	Success
4	Fill the Edit Text on Chat Page	The user can typing in the edit text.	Success
5	Click Send Button on Chat Page	It will send the user's chat to the chatbot and get the response from the chatbot.	Success

4.3.2 Web Application Testing

In the web application testing, the authors made some test case to check whether the application meets the requirement and can be used for the admin. Table 4.2, shows the result of the testing.

Table 4.2 Web Application Testing Result

No.	Test Case	Expected Result	Test Result
1	Admin fills in recorded email and password text field on Login Page and click Login Button	Authentication success and the website will go to the Admin Home Page	Success
2	Admin fills in invalid email and password text field on Login Page and click Login Button	The system shows invalid message in Login Page	Success

Table 4.2 Web Application Testing Result Continued

No.	Test Case	Expected Result	Test Result
3	Admin clicked Al-Qur'an link	Go to Qur'an Surah Page	Success
4	Admin fill the recorded Surah's name in search text field on Qur'an Surah Page	Show the Qur'an Surah search results	Success
5	Admin clicked Add Button on Qur'an Surah Page	Go to Add Qur'an Surah Page	Success
6	Admin fill in all the text field on Add Qur'an Surah Page	Saving the data into the database	Success
7	Admin does not fill in some text field on Add Qur'an Surah Page	The system shows a message that some field should be filled in	Success
8	Admin clicked Cancel Button on Add Qur'an Surah Page	Back to the Qur'an Surah Page	Success
9	Admin clicked Edit Button on Qur'an Surah Page	Go to Edit Qur'an Surah Page with Surah's Data	Success
10	Admin edit all the text field in Edit Qur'an Surah Page	Update the data in the database	Success
11	Admin clicked Cancel Button on Edit Qur'an Surah Page	Back to the Qur'an Surah Page	Success
12	Admin clicked Detail Button on Qur'an Surah Page	Go to Qur'an Ayah Page with Ayah's Data	Success
13	Admin clicked Add Button on Qur'an Ayah Page	Go to Add Qur'an Ayah Page	Success

Table 4.2 Web Application Testing Result Continued

No.	Test Case	Expected Result	Test Result
14	Admin fill in all the text field on Add Qur'an Ayah Page	Saving the data into the database	Success
15	Admin does not fill in some text field on Add Qur'an Ayah Page	The system shows a message that some field should be filled in	Success
16	Admin clicked Cancel Button on Add Qur'an Ayah Page	Back to the Qur'an Ayah Page	Success
17	Admin clicked Edit Button on Qur'an Ayah Page	Go to Edit Qur'an Ayah Page with Ayah's Data	Success
18	Admin edit all the text field in Edit Qur'an Ayah Page	Update the data in the database	Success
19	Admin does not fill in some text field on Edit Qur'an Ayah Page	The system shows a message that some field should be filled in	Success
20	Admin clicked Cancel Button on Edit Qur'an Ayah Page	Back to the Qur'an Ayah Page	Success
21	Admin clicked Delete Button on Qur'an Ayah Page	Delete Qur'an Ayah data	Success
22	Admin clicked Feedback link	Go to the Feedback Page	Success
23	Admin fill the recorded Feedback title in search text field on Feedback Page	Show the feedback search results	Success
24	Admin clicked Delete Button on Feedback Page	Delete the feedback data	Success

Table 4.2 Web Application Testing Result Continued

No.	Test Case	Expected Result	Test Result
25	Admin clicked Mualim link on top menu	Go to Admin Home Page	Success
26	Admin clicked Home link	Go to Admin Home Page	Success
27	Admin clicked Logout link	Logout and back to Login Page	Success

CHAPTER 5. CONCLUSION

5.1 Conclusion

From the implementation and testing results, there were some conclusions that the authors obtain. These conclusions are:

1. In this research, the authors successfully develop the Mualim application to giving a recommendation Qur'an Ayah to the users based on their problem.
2. Dialogflow services successfully implemented to the Mualim application that able to make the chatbot have a conversation like humans.
3. The Mualim application can help the users to find Qur'an Surah and Ayah easily.
4. The mobile and web application is easy to use by the users and the admin.
5. With Dialogflow services, Mualim application could be more scalable with more phrase availability.

5.2 Recommendations

From the implementation and testing result, the authors realized that the application that was developed in this research still has some limitations that the author unable to do and implement due to limited knowledge and time during the development of the application. Some recommendations from the authors so this application can be better for the future are:

1. The application that was developed only runs on the Android platform and needs to develop for the iOS platform.
2. Log in feature for the mobile application so the chatbot can save the user's data.
3. Improve the phrases in Dialogflow service, so the limitation of phrases can be overcome.
4. Improve the query in Dialogflow service to make the chatbot matching the user's feeling with the database more perfectly.
5. Adding more features on the mobile application not only chat features, such as prayer time, reading Qur'an, etc.
6. Adding more data in the database, not only Qur'an but can add Hadists or Duah to integrate with Dialogflow services.

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