**A CHATBOT APPLICATION FOR IOS TO RECOMMEND RECITING**

**THE QUR’AN AYAH**

by

**Agung Ramadhan Putra**

**A Thesis**

*Submitted to the Faculty of Nanjing Xiaozhuang University*

*In Partial Fulfillment of the Requirements for the degree of*

**Bachelor of Software Engineering**



School of Information Engineering

Fangshan, Nanjing

May 2020

To:

This thesis, written by Agung Ramadhan Putra, and entitled A Chatbot Application for iOS 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.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

type the name of committee member here

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

type the name of committee member here

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

type the name of committee member here

Date of Defense: May …, 2020

The thesis of Agung Ramadhan Putra is approved.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

XXXXXX

Chief of Foreign Affairs Office

Nanjing Xiaozhuang University, 2020

*Dedication*

*To my beloved family, teacher, and friends.*

**ACKNOWLEDGMENTS**

This page is optional.

To copy & paste your work on this page, please highlight this text and replace it.

If you are not including acknowledgements, delete this page.

If you are acknowledging only *one* person, change the title to ACKNOWLEDGMENT.

**DECLARATION OF ORIGINALITY**

I, the unsigned below:

Name : Agung Ramadhan Putra / 王伟圣

Student ID : L18139907

Study Program : Software Engineering

Faculty : School of Information Engineering

Degree : Bachelor’s Degree

Declared that the thesis I wrote with the title: A CHATBOT APPLICATION FOR IOS TO RECOMMEND RECITING THE QUR’AN AYAH.

1. It is true that what I write from myself, does not copy from others and is also not the result of plagiarism

2. I will follow Nanjing Xiaozhuang University and Universitas Islam Indonesia to manage and keep a copy of this thesis, to be used as they deem necessary.

I make a statement of the declaration with full responsibility, and I am willing to accept all the consequences based on the existing rules and regulations.

Nanjing, May 2020

Agung Ramadhan Putra

L18139907

ABSTRACT

Author: LastName, FirstName, Middle Initial. MS

Institution: Nanjing Xiaozhuang University

Degree Received: Choose Graduation Term

Title: Type Your ThesisCapitalizing the First Letter of Major Words: Do Not Use All Caps. Be sure to indent subsequent lines of your title

Committee Chair: FirstName LastName

**REQUIRED SECTION**

Two different kinds of paragraph spacing will be used on this page. The first three lines, where your personal information is included, make up the introduction block or introduction paragraph. Use only single space and set Before/After space setting to zero (in Paragraph setting box).

In the main body of the abstract, use the same spacing you use throughout the rest of your document (either double spacing or 1.5 line spacing).

To copy & paste your work here, please highlight the paragraphs to replace the text.

Keep the section break below to allow Chapter 1 to start page 1.

**TABLE OF** **CONTENTS**

**APPROVAL PAGE**

**ACKNOWLEDGMENTS**

**DECLARATION OF ORIGINALITY**

**ABSTRACT**

**TABLE OF CONTENTS**

**LIST OF TABLES**

**LIST OF FIGURES**

**ABSTRACT**

**CHAPTER 1. INTRODUCTION**

1.1. Background of the Study

1.2. Problem Identification

1.3. Purpose of the Study

1.4. Limitation of the Study

1.5. Benefit of the Study

1.6. Research Methodology

1.7. The Writing Structure

1.8. Schedule

**CHAPTER 2. THEORETICAL BASIS**

2.1. Theoretical Basis Content

2.2. Programming Language Literature Review

2.2.1. Hypertext Markup Language (HTML)

2.2.2. Cascading Style Sheets (CSS)

2.2.3. Javascript (JS)

2.2.4. Hypertext Preprocessing (PHP)

2.2.5. Swift

2.2.6. Structured Query Language (SQL)

2.3. Application OS Literature Review

2.3.1. Mobile Application

2.3.2. Chatbot Application

2.3.3. Web Application

2.4. Technology Overview

2.4.1. Dialogflow

2.4.2. Laravel Framework

2.5. Integrated Development Environment

2.5.1. MySQL Workbench

2.5.2. Sublime Text

2.5.3. Xcode

2.6. Software Development Technology

2.6.1. Unified Modeling Language (UML)

2.6.2. Activity Diagram

2.6.3. Use Case Diagram

2.6.4. Entity Relationship Diagram

**CHAPTER 3. ANALYSIS & DESIGN**

3.1. Analysis

3.1.1. Software Development Method

3.1.2. Phase of Planning

3.1.3. Phase of Designing

3.1.4. Phase of Constructing

3.1.5. Phase of Implementing

3.2. Phase of Planning

3.3. Phase of Designing

3.3.1. Designing Application with UML

3.3.2. Designing Use Case Diagram

3.3.3. Designing Activity Diagram

3.3.4. Designing Entity Relationship Diagram

3.3.5. Designing Deployment Diagram

3.3.6. Designing Chatbot Application

3.3.7. Designing Mobile Application

3.3.8. Designing Web Application

3.4. Phase of Constructing

3.5. Phase of Implementing

**CHAPTER 4. IMPLEMENTATION & TESTING**

4.1. Implementation

4.2. User Interface

4.2.1. Mobile Application User Interface

4.2.2. Chatbot Application User Interface

4.2.3. Web Application User Interface

4.3. Blackbox Testing

**CHAPTER 5. CONCLUSION**

5.1. Conclusion

**REFERENCES**

**APPENDIX**

**LIST OF TABLES**

Table 1.1 Schedule

**LIST OF FIGURE**

# INTRODUCTION

## 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 shari'ah 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% [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] because of. 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 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, it is inevitable that the presence of information technology is 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 cause of the emergence of negative emotions that feel hopeless and helpless, and ultimately choose to commit suicide.

Based on this problem, the author decides to make a chatbot application on an iOS-based smartphone that becomes a counselor for users so that the bad feeling of 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 feeling. The user can get the recommendation ayah Qur'an easily to recite and understand the meaning based on their feeling without searching the Qur'an ayah one by one.

## Problem Identification

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

1. How to design a bot to be able to have a conversation like humans?
2. How can bots analyze user feelings and provide a solution in the form of verses of the Quran?
3. How can bots help reduce or eliminate a person's negative feelings?
4. How can the application be easily understood by users?

## Purpose of the Study

The purpose of this application is:

1. This application is used as a medium of chat for users to get the advice of the Quranic verses to read.

## Limitation of the Study

Limitation of the application is:

1. This application only available on Indonesia's language, users must understand Indonesian.
2. This application was made only on the iOS platform.
3. The application only listens from the first-person angle.
4. The application can only listen to 1 problem context
5. The application only calms users based on their acknowledgment and does not provide a solution to their problem.

## Benefit of the Study

Some benefit of the application is:

1. Application designed like a human being and a chat media for users.
2. The application provides recommendations of the verses of the Qur'an to be read which make users feel better.

## 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 for making a mobile application, and also prioritized the prototype release and iteration. Rapid Application Development is … [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.

* 1. 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.

* 1. 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.

* 1. Implementation Phase

The implementation phase is do 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.

## The Writing Structure

As known, this study consists of six 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 for making applications.

Chapter 3. Analysis & Design

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

Chapter 4. Implementation

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 user.

Chapter 5. Testing

In this chapter, the author tests the applications that have been made whether there are still errors or not.

Chapter 6. Conclusion

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

## Schedule

The time for doing research is detailed in Table 1.1., as follows:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 |  |  |  |  |  |  |  |  |  |  |  |  |

Table 1.1. Schedule

The process of arrange this thesis takes around 12 weeks, based on domestic schedule, start from February 24th to Mei 14th 2020.

# THEORITICAL BASIS

## 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 Literature Review

2.3 Application OS Literature Review

2.4 Technology Overview

2.5 Integrated Development Environment

2.6 Software Development Technology

## Programming Language Literature Review

Programming Language Literature Review is a programming language used by the author for making 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 from 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] Wikipedia 2020, accessed April, 20 2020, <https://en.wikipedia.org/wiki/HTML>

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] Wikipedia 2020, accessed April, 20 2020, < https://en.wikipedia.org/wiki/Cascading\_Style\_Sheets>

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] Wikipedia 2020, accessed April, 20 2020, < https://en.wikipedia.org/wiki/JavaScript>

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 Documentation, accessed April, 20 2020, <https://www.php.net/manual/en/intro-whatis.php>

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] Wikipedia 2020, accessed April, 20 2020, <https://en.wikipedia.org/wiki/PHP> From PHP create various web template system, web content management systems, and web frameworks.

2.2.5. Swift

Swift is a general-purpose, multi-paradigm, compiled programming language developed by Apple Inc. for iOS, iPadOS, macOS, watchOS, tvOS, Linux, and z/OS. [15] Wikipedia 2020, accessed April, 20 2020 < https://en.wikipedia.org/wiki/Swift\_(programming\_language)> Swift built using a modern approach to safety, performance, and software design patterns. [16] About Swift, accessed April, 20 2020 < https://swift.org/about/> It has a clean and modern syntax, offers seamless access to existing C and Objective-C code and frameworks, and is memory safe by default.

Although inspired by Objective-C and many other languages, Swift is not itself a C-derived language. As a complete and independent language, Swift packages core features like flow control, data structures, and functions, with high-level constructs like objects, protocols, closures, and generics. Swift embraces modules, eliminating the need for headers and the code duplication they entail. [17] Github 2020, accessed April, 20 2020 < https://github.com/apple/swift>

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] Wikipedia 2020, accessed April, 20 2020 < https://en.wikipedia.org/wiki/SQL>

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] SQLCourse, accessed April, 20 2020 < http://www.sqlcourse.com/intro.html>

## Application OS Literature Review

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] Mobile Marketing Association, Mobile Application. Education. 2008.

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 iOS platform, which is can be used on the iPhone.

The iOS architecture consists of several layers, as shown in Figure 2.1.

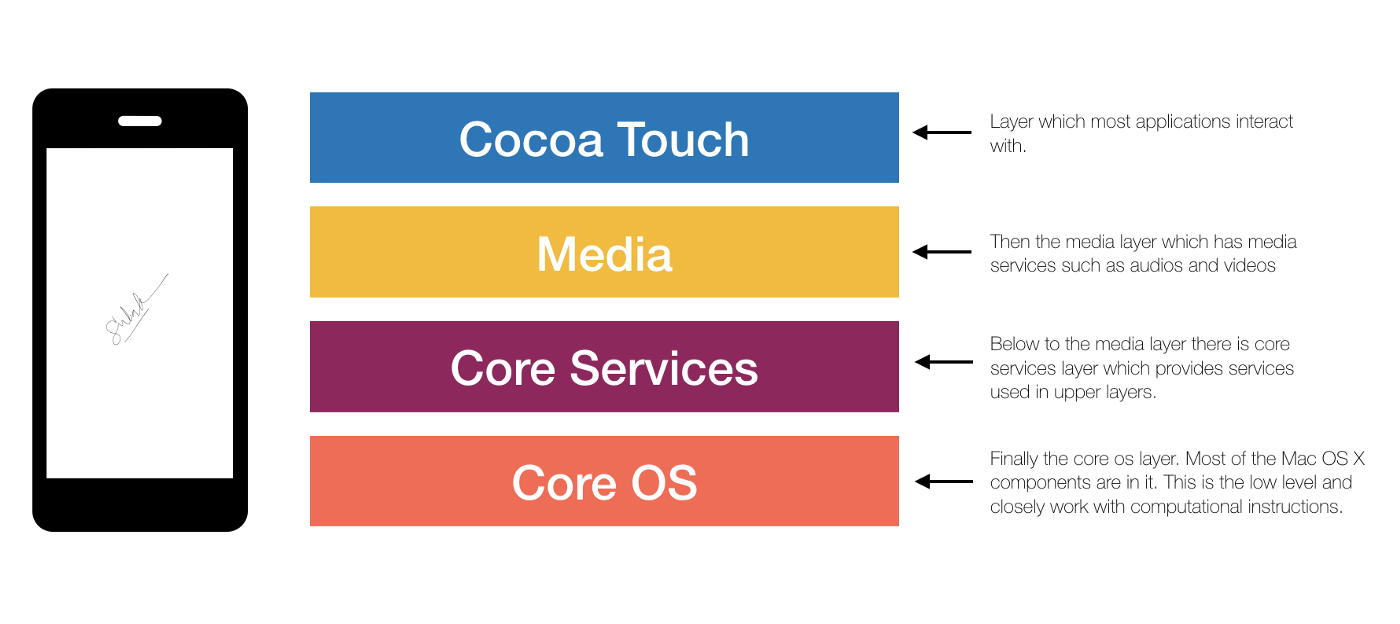


Figure 2.1. iOS Architecture

1. Cocoa Touch Layer, this layer is most applications interact with because Cocoa Touch Layer includes UIKit which is UI element, Life Cycle Management, Gesture, etc. that used for the user.
2. Media Layer, this layer allows the developer to work with photos, videos, audios, animations, etc., which is Assets Library, AVFoundation, Core Audio, etc.
3. Core Services Layer, this layer allows the developer to access the services opened by Apple for iOS application development, which is Address Book, Core Data, Core Media, etc.
4. Core OS Layer, this layer provides low-level features and limited access to the developer, which is Accelerate, Security, System, etc.

Application development can use Swift Programming Language or Objective-C. and also can use the iOS Software Development Kit (SDK) to create an application for Apple mobile devices. The SDK includes tools for developing, installing, running, and testing the application.

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] Anirudh Khanna, Bishwajeet Pandey, Kushgra Vashishta, Kartik Kalia, Bhale Pradeepkumar and Teerath Das. A Study of Today’s A.I. through Chatbots and Rediscovery of Machine Learning. International Journal of u- and e- Service, Science and Technology. 2015. 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] Investopedia, accessed April 20, 2020. <https://www.investopedia.com/terms/c/chatbot.asp> 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.

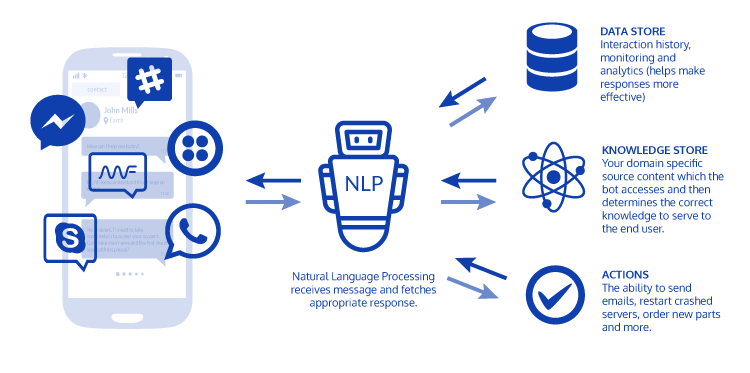


Figure 2.2. Chatbot Architecture

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 function like a setting-up reminder, make a schedule, alarm and 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] Wikipedia 2020, accessed April, 25, 2020. < https://en.wikipedia.org/wiki/Web\_application>

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.

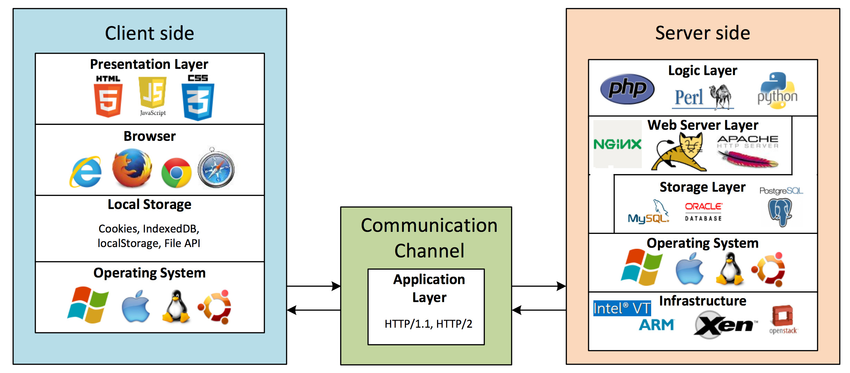


Figure 2.3. Web Application Structure

## Technology Overview

2.4.1 Dialogflow

Dialogflow is a natural language understanding platform that makes it easy to design and integrate a conversational user interface into mobile app, web app, device, bot and so on. Dialogflow can analyse multiple types of input from users (text or audio) and can responds in couple ways, either through text or synthetic speech. [24] Dialogflow, accessed April, 25 2020 <https://cloud.google.com/dialogflow/docs/>

Dialogflow need several technologies to make the chatbot more powerful as shown in Figure 2.4.

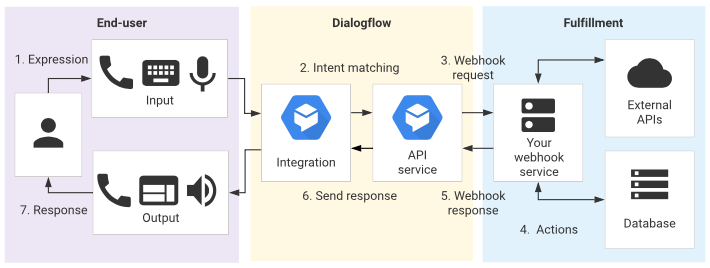


Figure 2.4. Dialogflow Architecture

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

1. The end-user

The end-user need media as input and output, the author choosen 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 integrate with the end-user and the fulfillment, that have several parts in the dialogflow such as Agents, Intent, Entities, etc.

3. Fulfillment

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

2.4.2 Laravel Framework

Web application that used by the author using Laravel Framework to build the website to manage the backend data such as the database of the Qur’an and the user.

Laravel is free, open source PHP framework, created by Taylor Otwell and intended for the development of web application. [25] Wikipedia, accessed April, 25 2020 <https://en.wikipedia.org/wiki/Laravel>

The architecture of Laravel Framework shown as Figure 2.3.

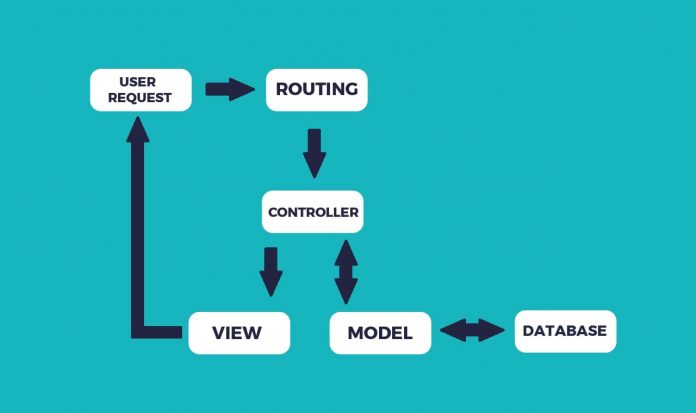


Figure 2.5. Laravel Architecture

Laravel implement Model-View-Controller architectural pattern to structure the process of making the website.

1. Model

Model usually a class with properties that match the column in the database. For example, Student, Teacher, etc.

2. View

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

3. Controller

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

## Integrated Development Environment

2.5.1 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. [26] https://www.mysql.com/products/workbench/

MySQL Workbench is the first MySQL family of products that offer two different edition, which is an open source and a proprietary edition. The different 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:

1. SQL Development, this functionality provides the capability to execute SQL queries, create and manage connections to database server using the built-in SQL Editor.
2. Data Modeling, this functionality enables to create model of the database schema graphically, perform reverse and forward engineer between a schema and a live database, and edit all aspects of database using the comprehensive Table Editor.
3. Server Administration, this functionality enables to administer MySQL server instance by administering users, performing backup and recovery, inspecting audit data, viewing database health, and monitoring the MySQL server performance.
4. Data Migration, this functionality allows to migrate from Microsoft SQL Server, Microsoft Access, and other RDBMS tables, objects, and data to MySQL.
5. MySQL Enterprise Support, this functionality provides support for Enterprise product such as MySQL Enterprise Backup, MySQL Firewall, and MySQL Audit.

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 language and markup language, and functions can be added by user with plugins, typically community-built and maintained under free-software license. [27] Wikipedia 2020, accessed April, 25, 2020 <https://en.wikipedia.org/wiki/Sublime\_Text>

2.5.3 Xcode

Xcode is integrated development environment (IDE) for MacOS containing a suite of software development tools developed by Apple for developing software for macOS, iOS, iPadOS, watchOS, and tvOS. Xcode provides developers a united workflow for user interface design, coding, testing, and debugging.

[28] https://apps.apple.com/id/app/xcode/id497799835?mt=12

The major features of Xcode is support source code for the programming language C, C++, Objective-C, Objective-C++, AppleScript, Python, Ruby, ResEdit (Rez) and Swift, with a variety of programming models, including but not limited to Cocoa, Carbon and Java.

The Xcode suites include most of Apple’s developer documentation, and built-in interface builder, an application used to construct graphical user interfaces. Xcode can build fat binary files containing code for multiple architectures with the Mach-O executable format. Using iOS SDK, Xcode can also be used to compile and debug applications for iOS that run on ARM architecture processors. [29] https://en.wikipedia.org/wiki/Xcode

## 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.

[30] https://en.wikipedia.org/wiki/Unified\_Modeling\_Language#cite\_note-:1-1

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

Behavioral diagram emphasize what mush happen in the system being modeled. Since behavior diagram illustrate the behavior of a system, they are used extensively to describe the functionality of software system. And Structural diagram emphasize 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 software system. [31] https://tallyfy.com/uml-diagram/

2.6.2 Activity Diagram

Activity Diagram are graphical representations of workflow of stepwise activities and actions with support for choice, iteration and concurrency. In Unified Modeling Language, 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 activity diagram shown in Table 2.1.

|  |  |  |  |
| --- | --- | --- | --- |
| 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 |

Tabel 2.1. Activity Diagram Notation

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 use case diagram shown in Table 2.2.

|  |  |  |  |
| --- | --- | --- | --- |
| 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 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). |
| 10 |  | Note | The physical elements that exist,when the application is run and reflect a computing resource. |

Table 2.2. Use Case Diagram Notation

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.

|  |  |  |  |
| --- | --- | --- | --- |
| 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. |

Table 2.3. Entity Relationship Diagram Notation

# ANALYSIS AND DESIGN

## Analysis

3.1.1. Software Development Method

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. [32] (Despa, 2014).

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 for making a mobile application, and also prioritized the prototype release and iteration.

The RAD Model shown in Figure 3.1.

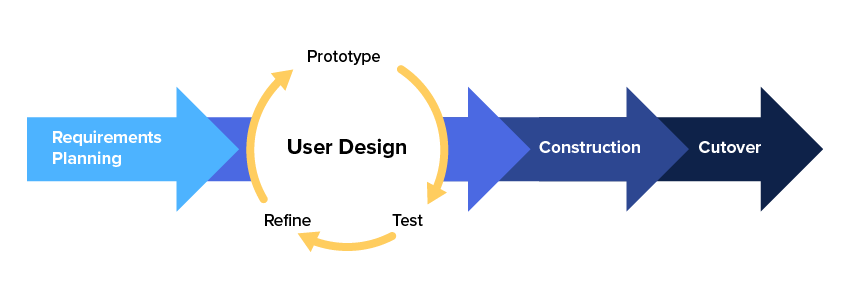


Figure 3.1. Rapid Application Development Model

Rapid Application Development (RAD) consist of four main phases [33] https://www.lucidchart.com/blog/rapid-application-development-methodology :

3.1.2. Phase of Planning

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, developer, clients and team member communicate to determine the goals and expectations for the project as well as current and potential issues that would need to addressed during the development.

A basic breakdown of planning phase follows:

1. Researching the current problem
2. Defining the requirement for the project
3. 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 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:

1. Preparation for rapid construction
2. Program and application development
3. Coding
4. 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 end 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 a new ideas that can solve 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.

## Phase of Planning

3.2.1. Analysis

In preparation for 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 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, there are some users who 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:

1. Read the Qur’an
2. Translate into mother language of the users
3. Decide the right ayah
4. Recite the ayah

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



Figure 3.2. Use Case Diagram Manual Business Process

## Phase of Designing

3.3.1. Designing Application with UML

Designing application to be proposed using UML diagrams as follows:

1. Use Case Diagram
2. Activity Diagram
3. Entity Relationship Diagram
4. Deployment Diagram

3.3.2. Designing Use Case Diagram

Use case diagram of Mualim Application shown in Figure 3.



Figure 3.3. Use Case Diagram Mualim App

The explanation of use case as follows:

1. *Use Case* Chat

The user chat with the chatbot to get a recommendation, send a feedback or search some Qur’an data, then the chatbot save the chat into real-time database.

1. *Use Case* Result

The chatbot giving the result that is a recommendation ayah to the users to recite.

1. *Use Case* Send Feedback

The user chat to the chatbot to send a feedback, the chatbot will ask the sender’s name, the topic and the messages.

1. *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.

1. *Use Case* Manage Data
2. *Use Case* Search Data
3. *Use Case* Input Data
4. *Use Case* Update Data
5. *Use Case* Delete Data
6. *Use Case* Login
7. *Use Case* Logout

3.3.3. Designing Activity Diagram

1. Activity Get Recommendation

The following diagram illustrate the way to get recommendation from the chatbot:

Figure 3...

1. Activity Find Surah

The following diagram illustrate the way to find some:

Figure 3...

1. Activity Find Ayah

The following diagram illustrate the way to find some:

Figure 3...

1. Activity Send Feedback

The following diagram illustrate the way to giving a feedback to the admin:

Figure 3...

1. Activity Admin Input Surah

The following diagram illustrate the admin to input a new Qur’an Surah into database:

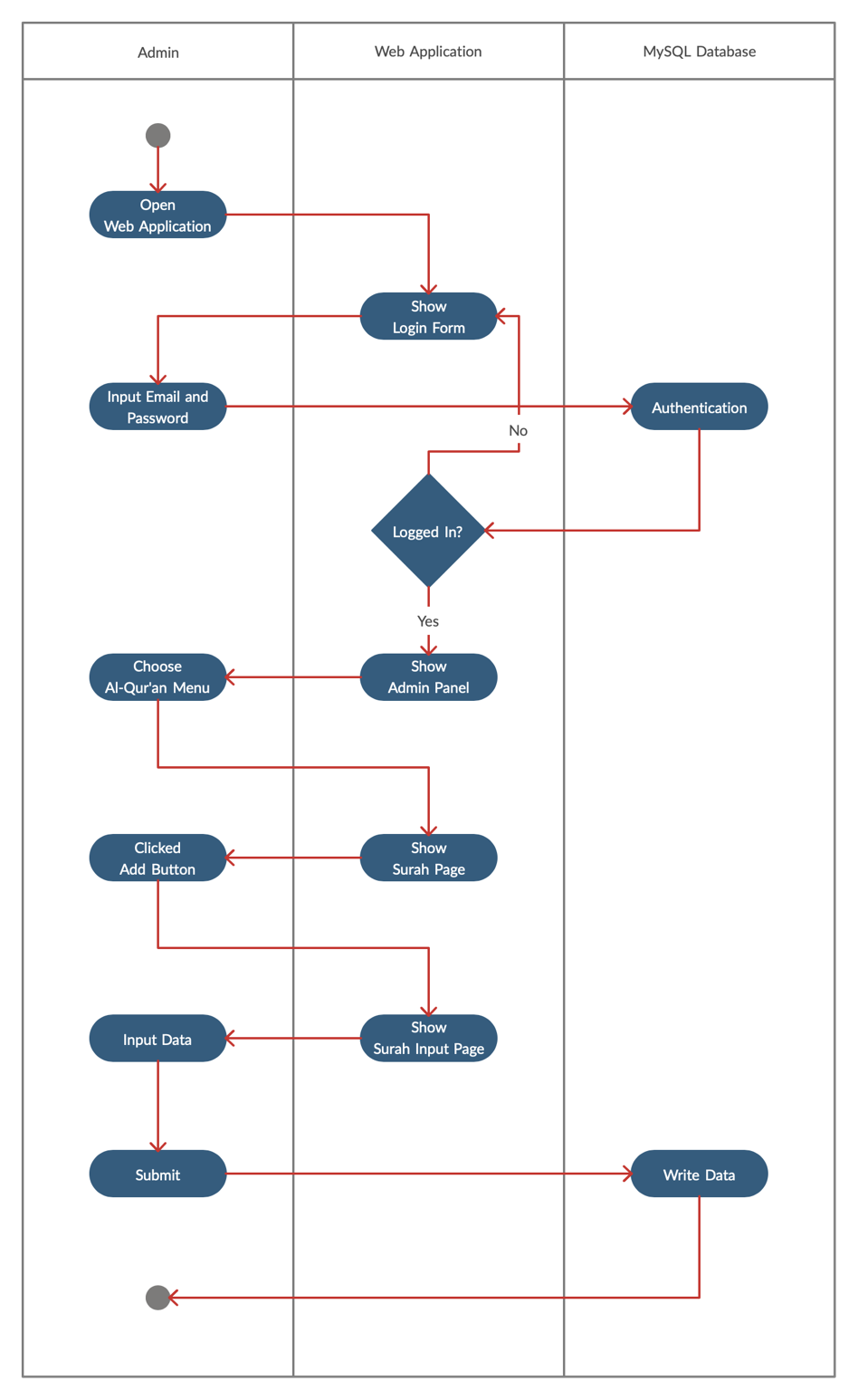


Figure 3.. Activity Diagram Input Surah

1. Activity Admin Edit Surah

The following diagram illustrate the admin to edit the Qur’an Surah from database:

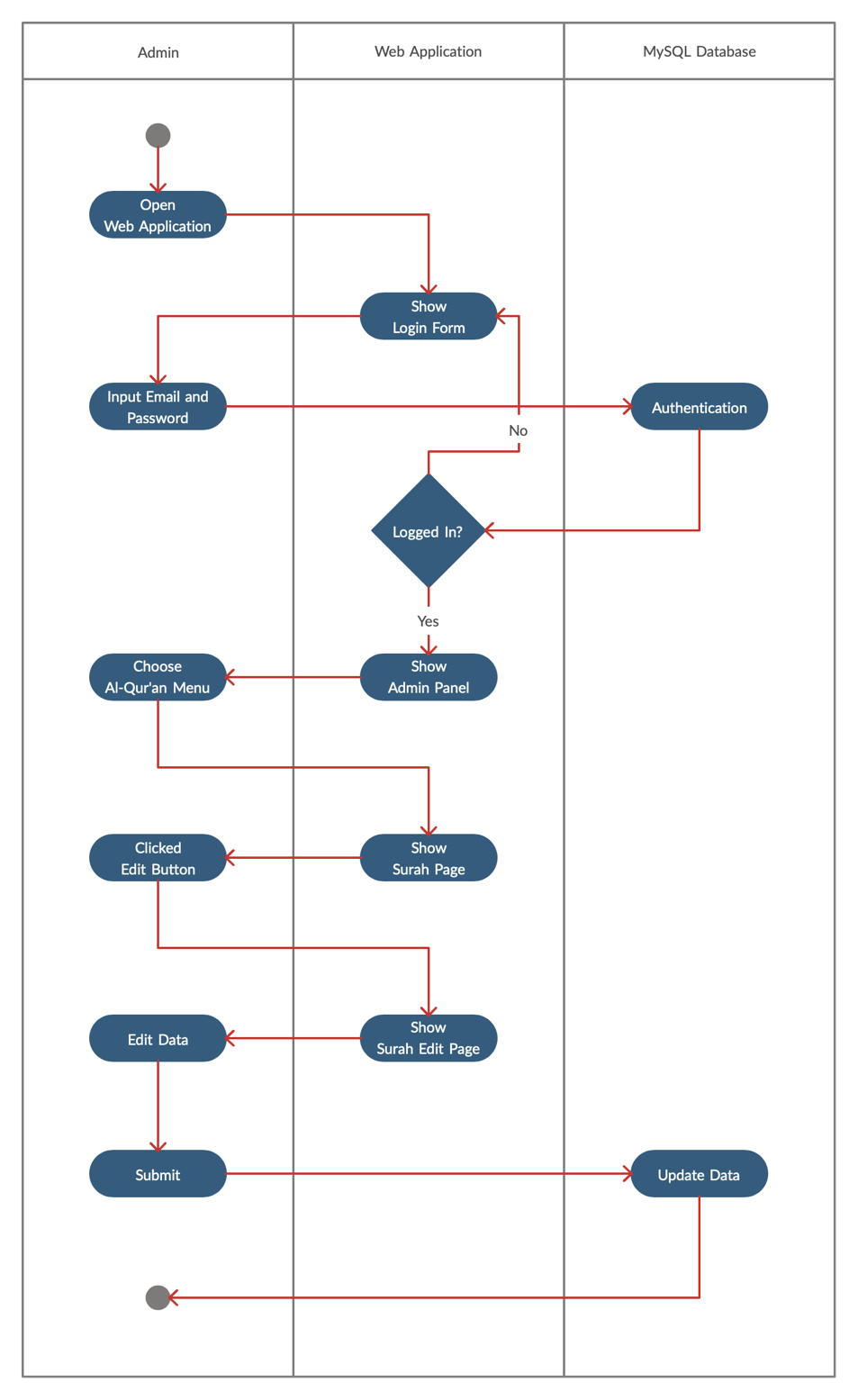


Figure 3.. Activity Diagram Edit Surah

1. Activity Admin Input Ayah

The following diagram illustrate the admin to delete the Qur’an Ayah from database:

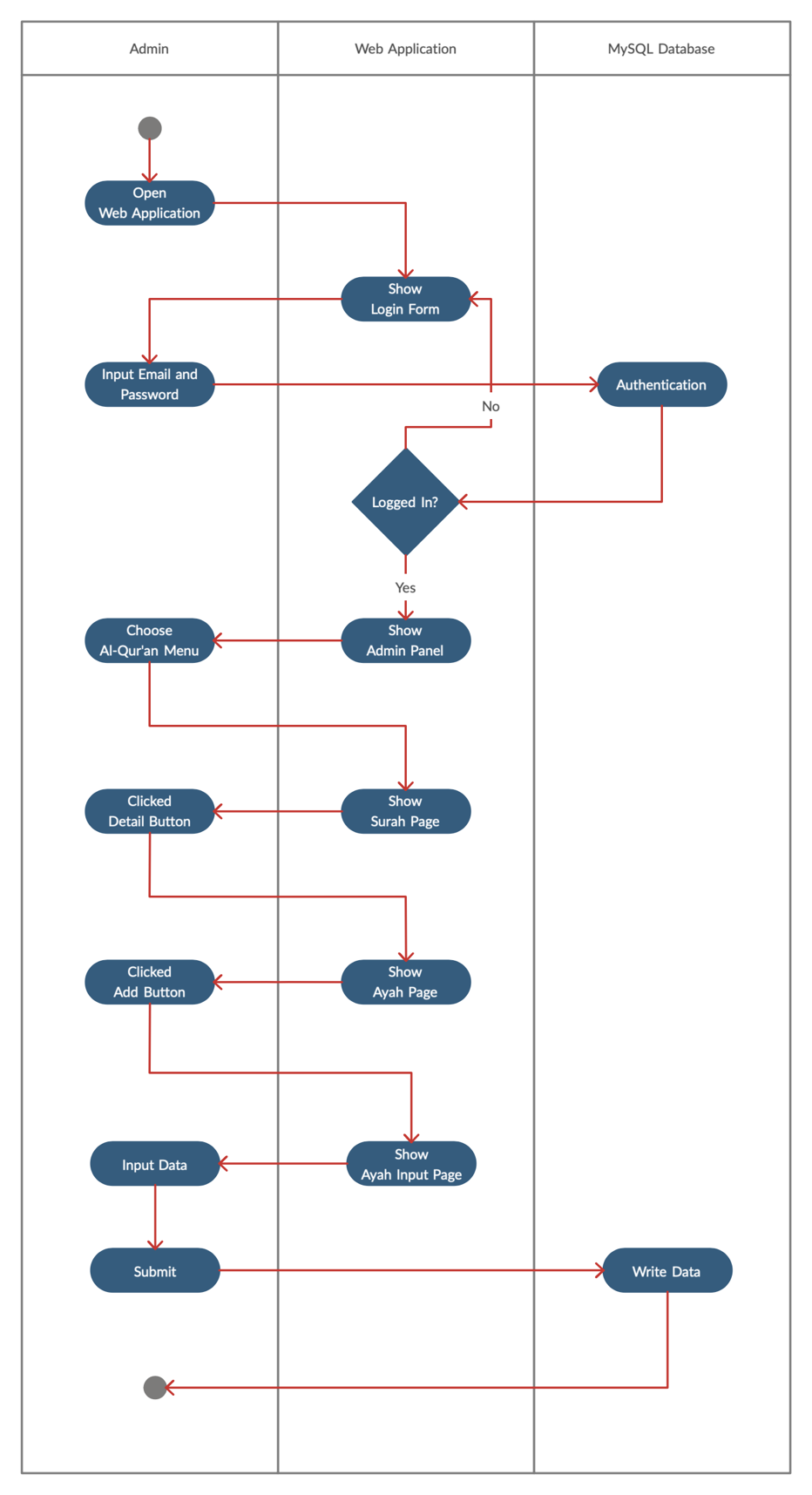


Figure 3.. Activity Diagram Input Ayah

1. Activity Admin Edit Ayah

The following diagram illustrate the admin to delete the Qur’an Ayah from database:

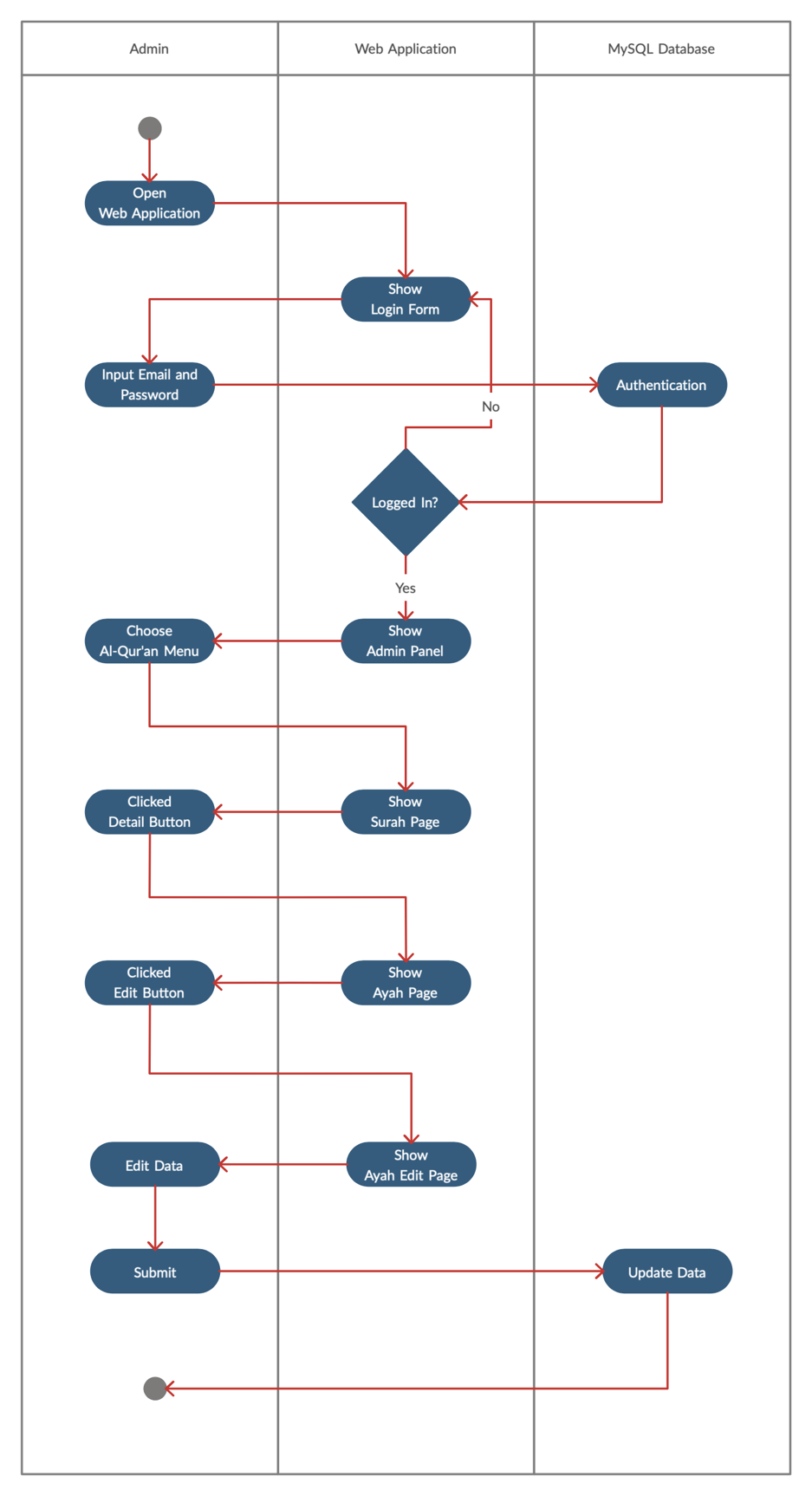


Figure 3.. Activity Diagram Edit Ayah

1. Activity Admin Delete Ayah

The following diagram illustrate the admin to delete the Qur’an Ayah from database:

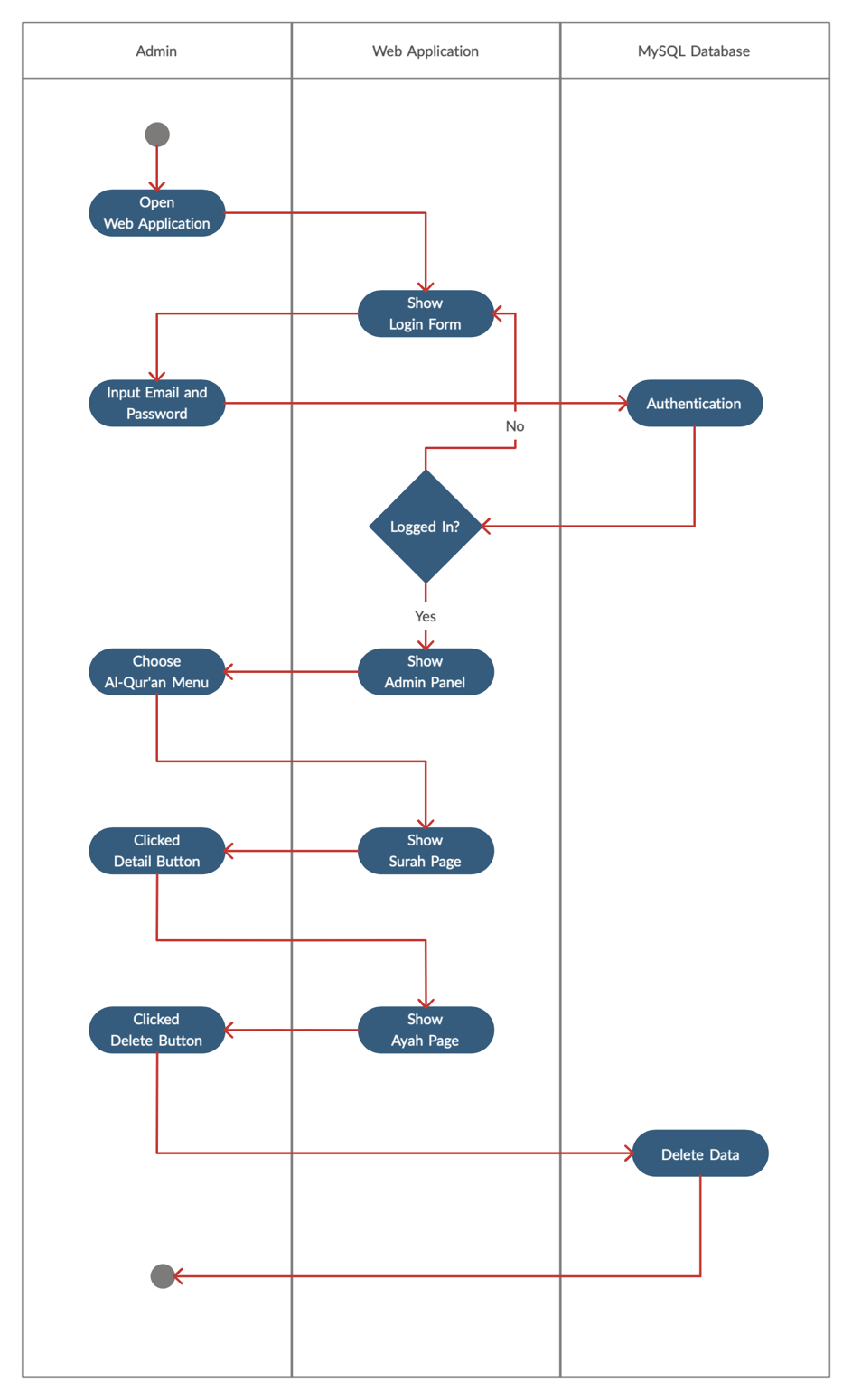


Figure 3.. Activity Diagram Delete Ayah

3.3.4. Designing Entity Relationship Diagram

Entity Relationship Diagram of the Qur’an shown in Figure 3…



Figure 3...

3.3.5. Designing Deployment Diagram

3.3.6. Designing Chatbot Application

3.3.7. Designing Mobile Application

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 MySQL database.

1. Home Page

This page is to inform how many Qur’an Surah, Ayah are available in the database and how many Feedback from the users.

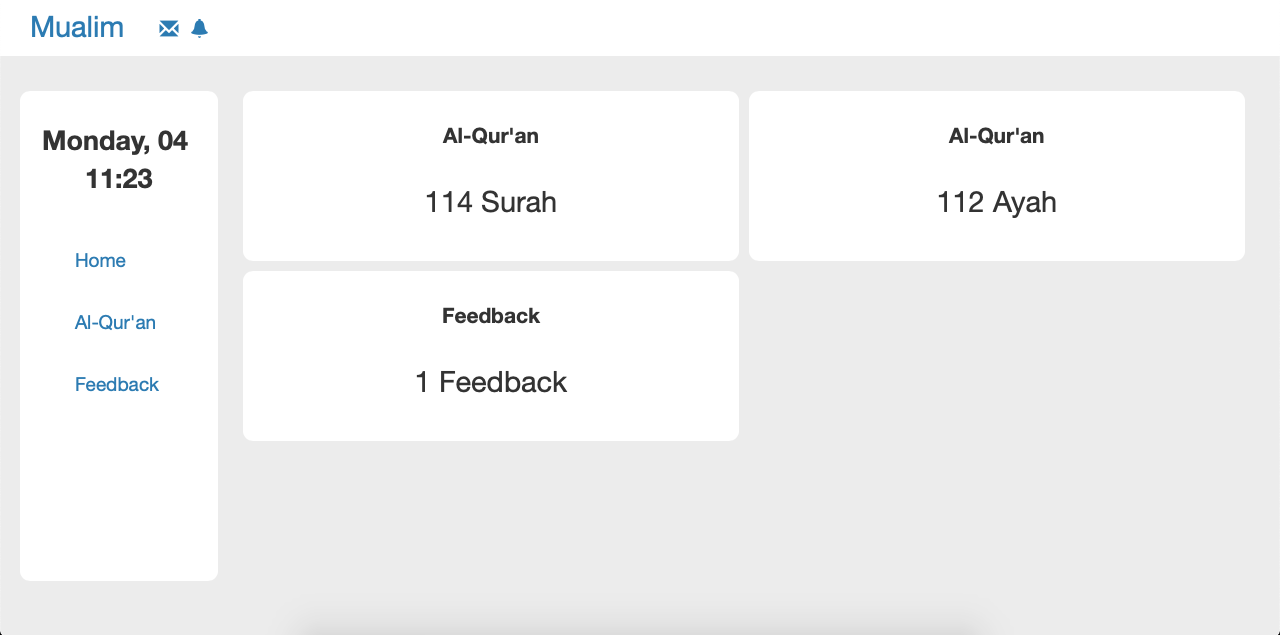


Figure 3...

1. Surah Page

This page shows the list of Qur’an Surah and the button to add or edit, and to shows the Surah’s detail.

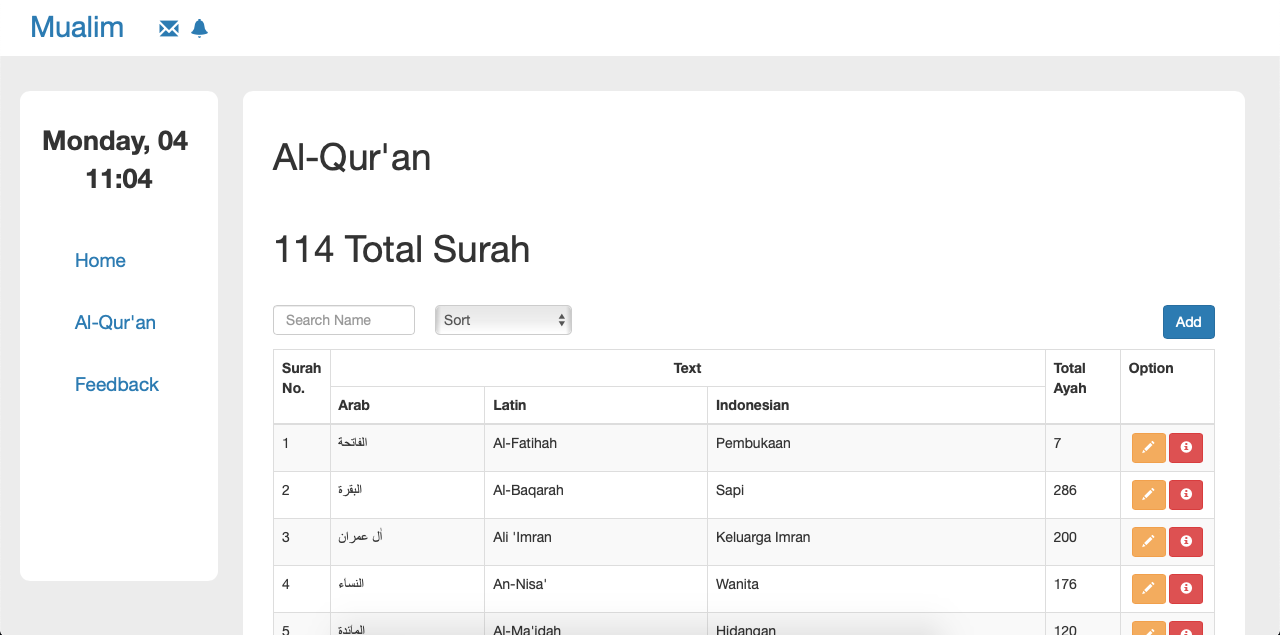


Figure 3...

1. Surah Page: Add

This page is to add new Surah into the database.

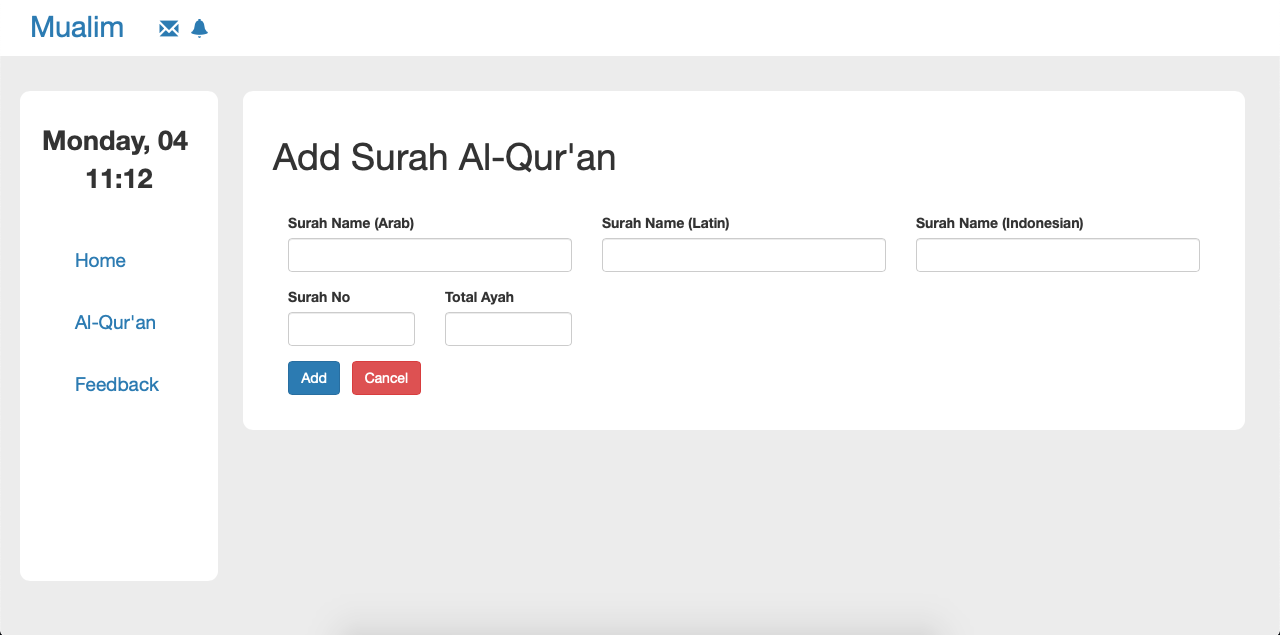


Figure 3...

1. Surah Page: Edit

This page is to edit Surah from the database.

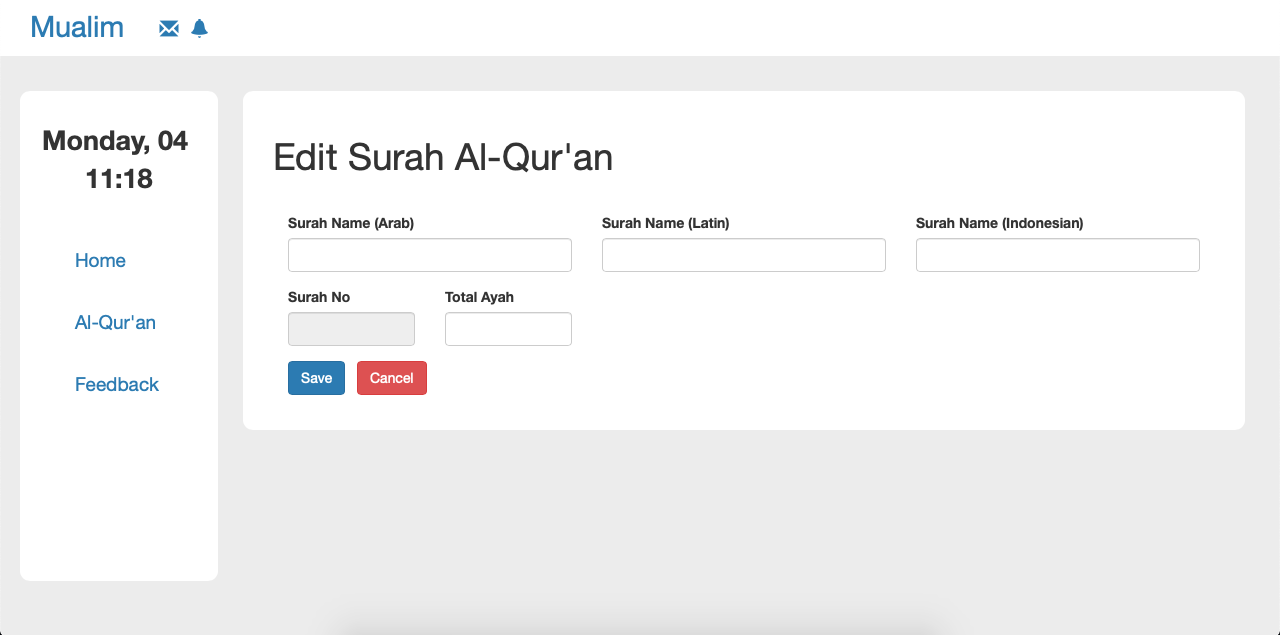


Figure 3...

1. Ayah Page

This page shows the list of Ayah from the Surah that clicked.

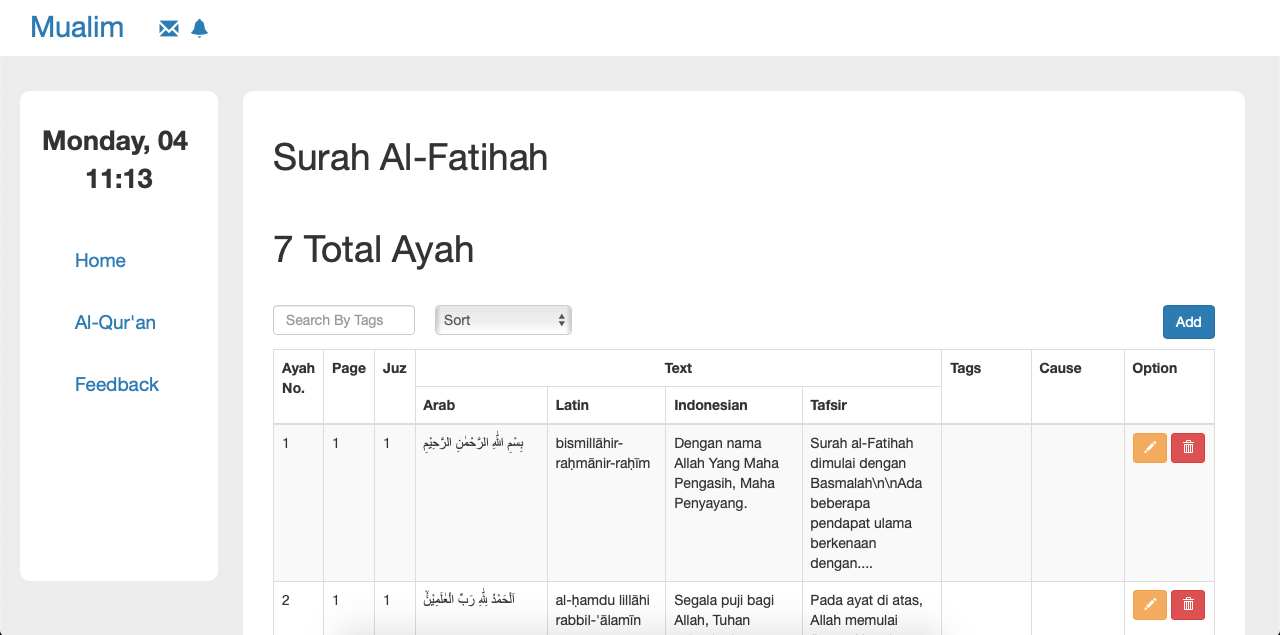


Figure 3...

1. Ayah Page: Add

This page is to add new Ayah into the database.

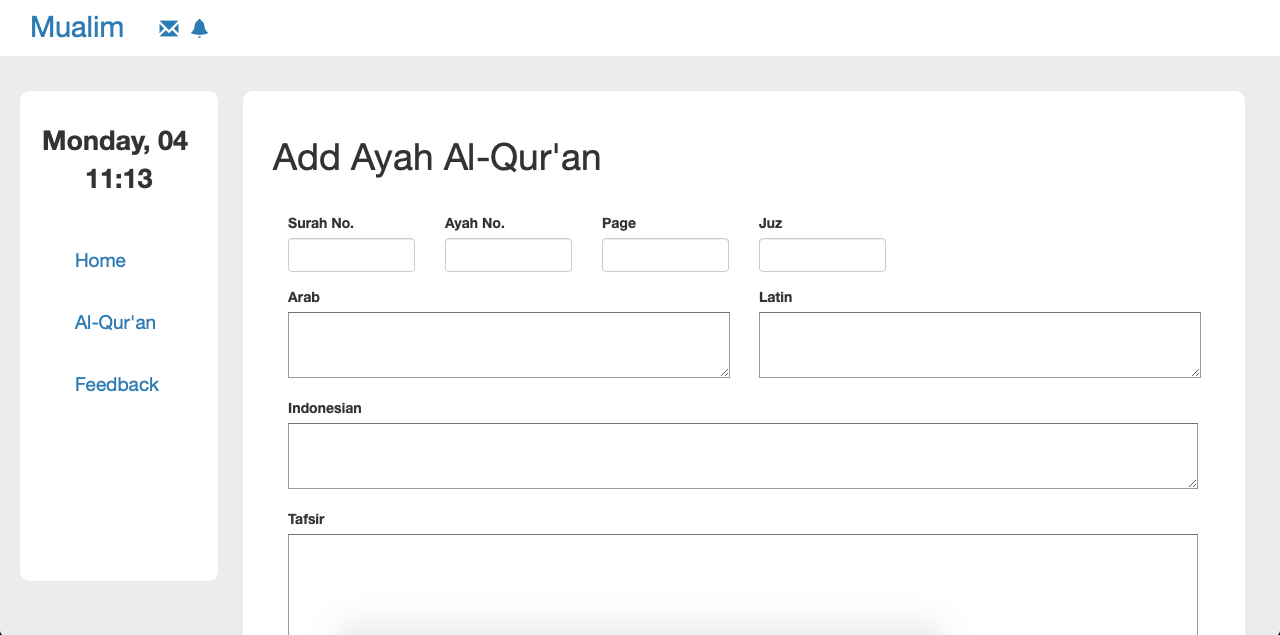


Figure 3...

1. Ayah Page: Edit

This page is to edit Ayah from the database.

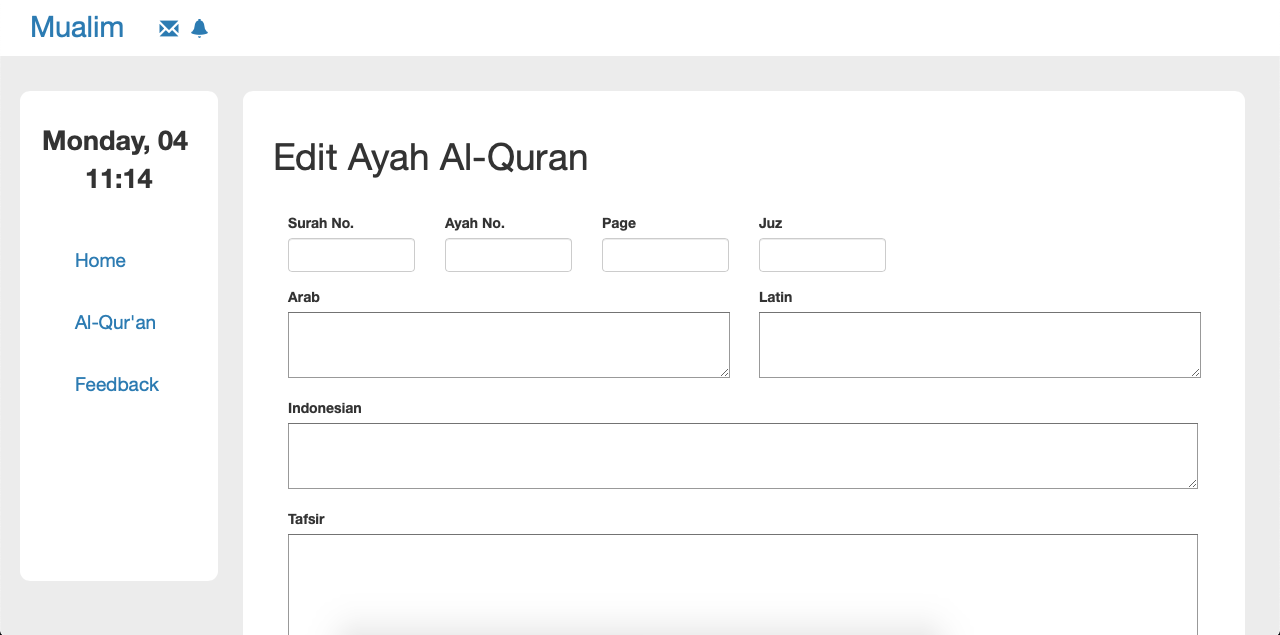


Figure 3...

1. Feedback Page

This page shows the feedback from the users.

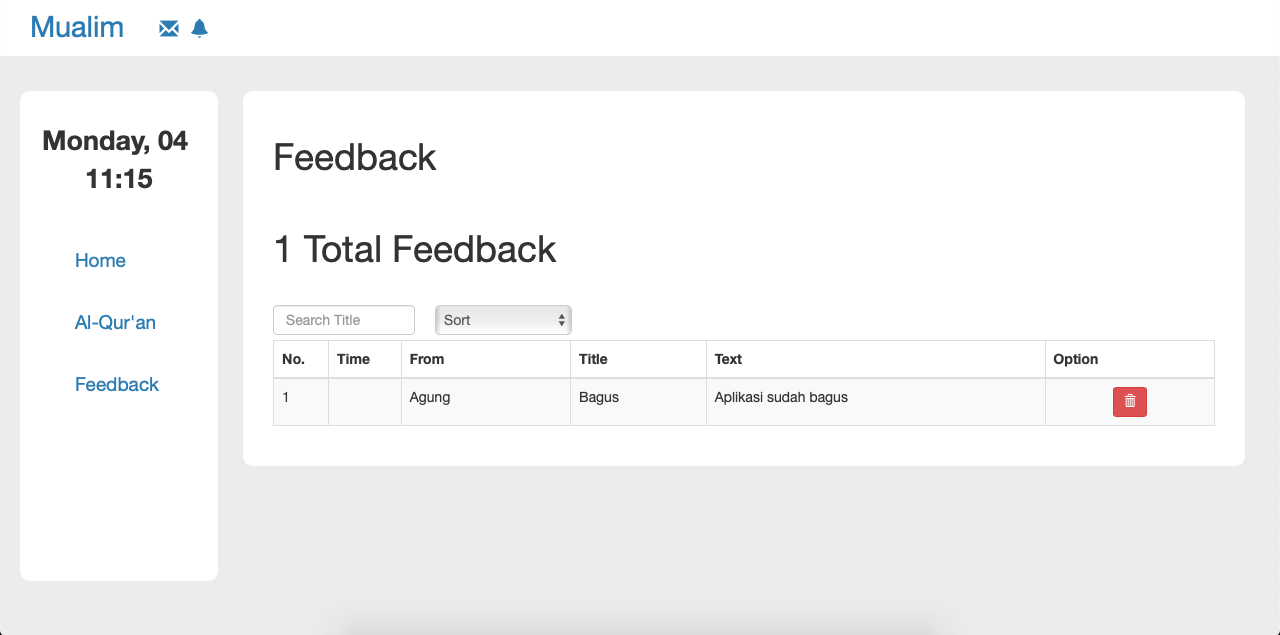


Figure 3...

## Phase of Constructing

## Phase of Implementing

# IMPLEMENTATION & TESTING

## 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 that used in making the application are as follows:

1. Mackbook Pro 13-inch Mid 2012
2. iPhone 7

4.1.2. Software

Software that used in making the application are as follows:

1. macOS Catalina
2. MySQL Workbench
3. Safari
4. Sublime Text
5. Xcode

## User Interface

4.2.1. A

A

4.2.2. B

B

## Blackbox Testing

# CONCLUSION

a

**References**

[1] Kementerian Pendidikan dan Kebudayaan Republik Indonesia. *Agama*. Badan Pengembangan Bahasa dan Perbukuan. 2016. Retrieved from <https://kbbi.kemdikbud.go.id/entri/agama>

[2] International, Gallup. *Global Report on Religiosity*. 2017. p. 3.

[3] Askar, Zulfi. *Introduction to Islam in Indonesian Language*. Darul Qosim. 2007. p. 2.

[4] Badan Pusat Statistik Republik Indonesia. *Penduduk Menurut Wilayah dan Agama yang Dianut*. 2010. Retrieved from <https://sp2010.bps.go.id/index.php/site/tabel?tid=321&wid=0>

[5] Hasyim, Syafiq. *State and Religion: Considering Indonesian Islam as Model of Democratisation for the Muslim World*. Liberal Institute. 2013. p. 5.

[6] Marsasina, Arhatya, & Fitrikasari, Alifiati. *Gambaran dan Hubungann Tingkat Depresi dengan Faktor-Faktor yang Mempengaruhi Pada Pasien Rawat Jalan Puskesmas (Studi Deskriptif Analitik di Puskesmas Halmahera Semarang).* Jurnal Kedokteran Diponegoro. 2016. p. 2.

[7] Kementerian Kesehatan Republik Indonesia. *Hasil Utama Riset Kesehatan Dasar*. Badan Penelitian dan Pengembangan Kesehatan. p. 81.

[8]

[9] Martin, James. *Rapid Application Development*. Macmillan. 1991.