**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

# APPROVAL PAGE

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.

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Chief of Foreign Affairs Office

Nanjing Xiaozhuang University, 2020

*Dedication*

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

# ACKNOWLEDGMENTS

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ABSTRACT

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# 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 recite.
2. This application is used to find the Qur’an ayah easily.

## 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 makes 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 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.

* 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 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.

## 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 schedule for doing the 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 arranging this thesis takes around 12 weeks, based on the 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].

### 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 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]. Swift built using a modern approach to safety, performance, and software design patterns [16]. 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].

### 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].

## 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].

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.

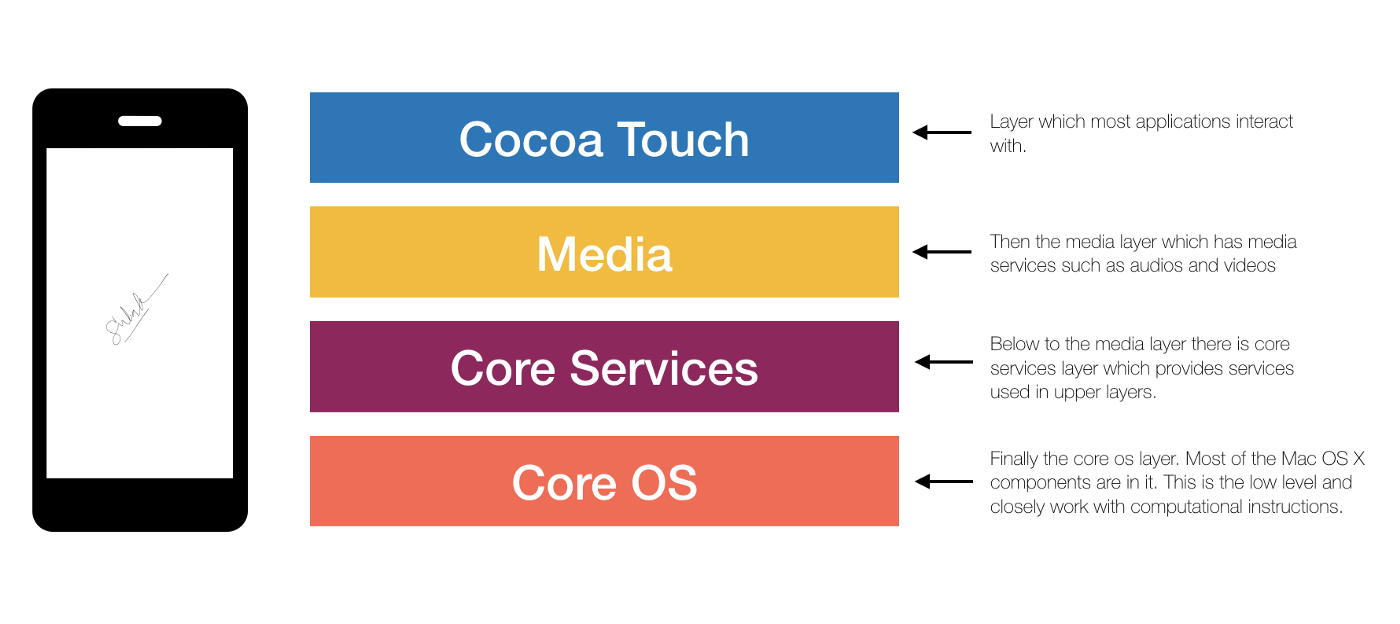


Figure 2.1. iOS Architecture

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]. 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.

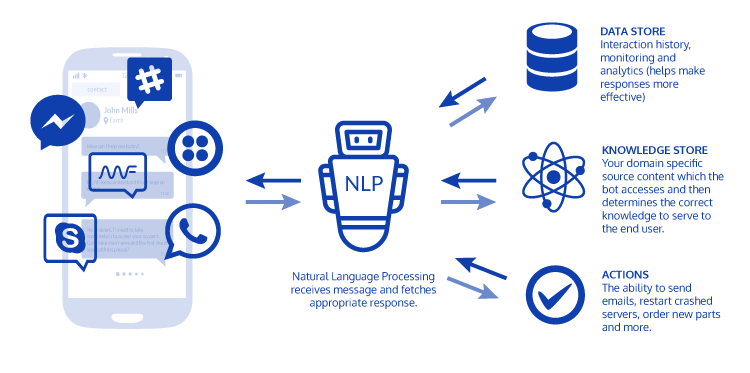


Figure 2.2. Chatbot Architecture

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 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].

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.

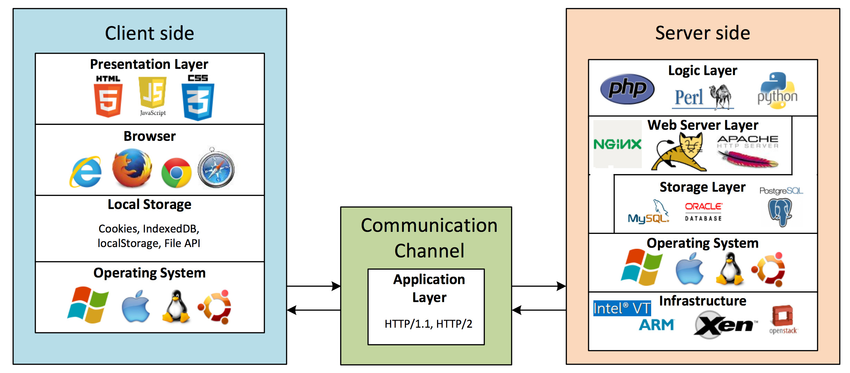


Figure 2.3. Web Application Structure

## 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 a mobile app, web app, device, bot, and so on. Dialogflow can analyze multiple types of input from 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.

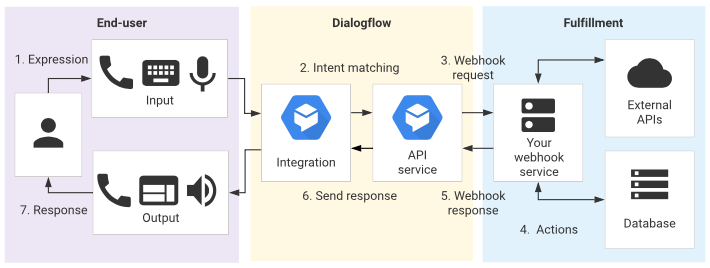


Figure 2.4. Dialogflow Architecture

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 own website service or the database to make the service more dynamic and can save the data.

### 2.4.2 Firebase

Firebase is a mobile and web application development platform developed by Firebase, Inc. in 2011, then acquired by Google in 2014 [25].

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.

### 2.4.3 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 [26].

The architecture of Laravel Framework shown as Figure 2.3.

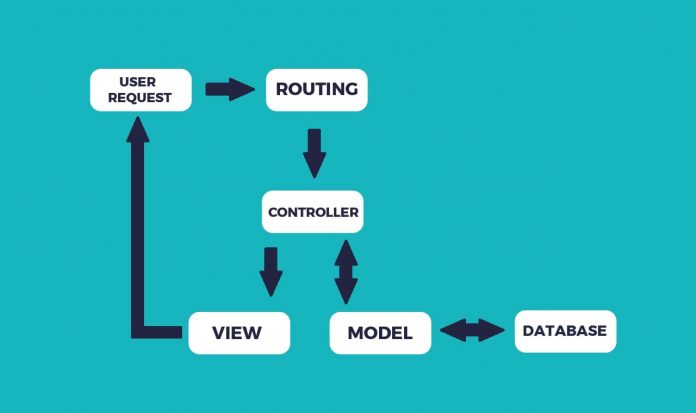


Figure 2.5. Laravel Architecture

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

## 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 [27].

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:

1. 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.
2. 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.
3. 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.
4. Data Migration, this functionality allows migrating 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 products 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 languages and markup language, and functions can be added by the user with plugins, typically community-built and maintained under free-software license [28].

### 2.5.3 Xcode

Xcode is an 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 [29].

The major features of Xcode are supported 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 [30].

## 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 [31].

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 mush 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 [32].

### 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.

|  |  |  |  |
| --- | --- | --- | --- |
| 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 the 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 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). |
| 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

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

The RAD model is shown in Figure 3.1.

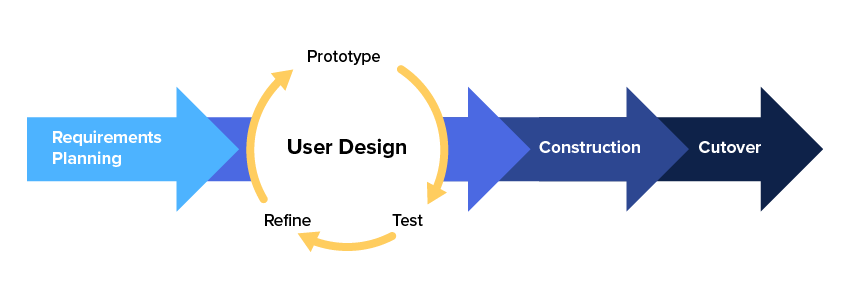


Figure 3.1. Rapid Application Development Model

Rapid Application Development (RAD) consists of four main phases [33]:

### 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:

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 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:

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 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.

## 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, 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 Figure 3.2.



Figure 3.2. Use Case Diagram Manual Business Process

## Phase of Designing

### 3.3.1 Designing Application with UML

Designing an 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 3.3.



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 get a recommendation, send feedback, or search some Qur’an data, then the chatbot saves the chat into the 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 chats to the chatbot to send 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 illustrates the way to get a recommendation from the chatbot:

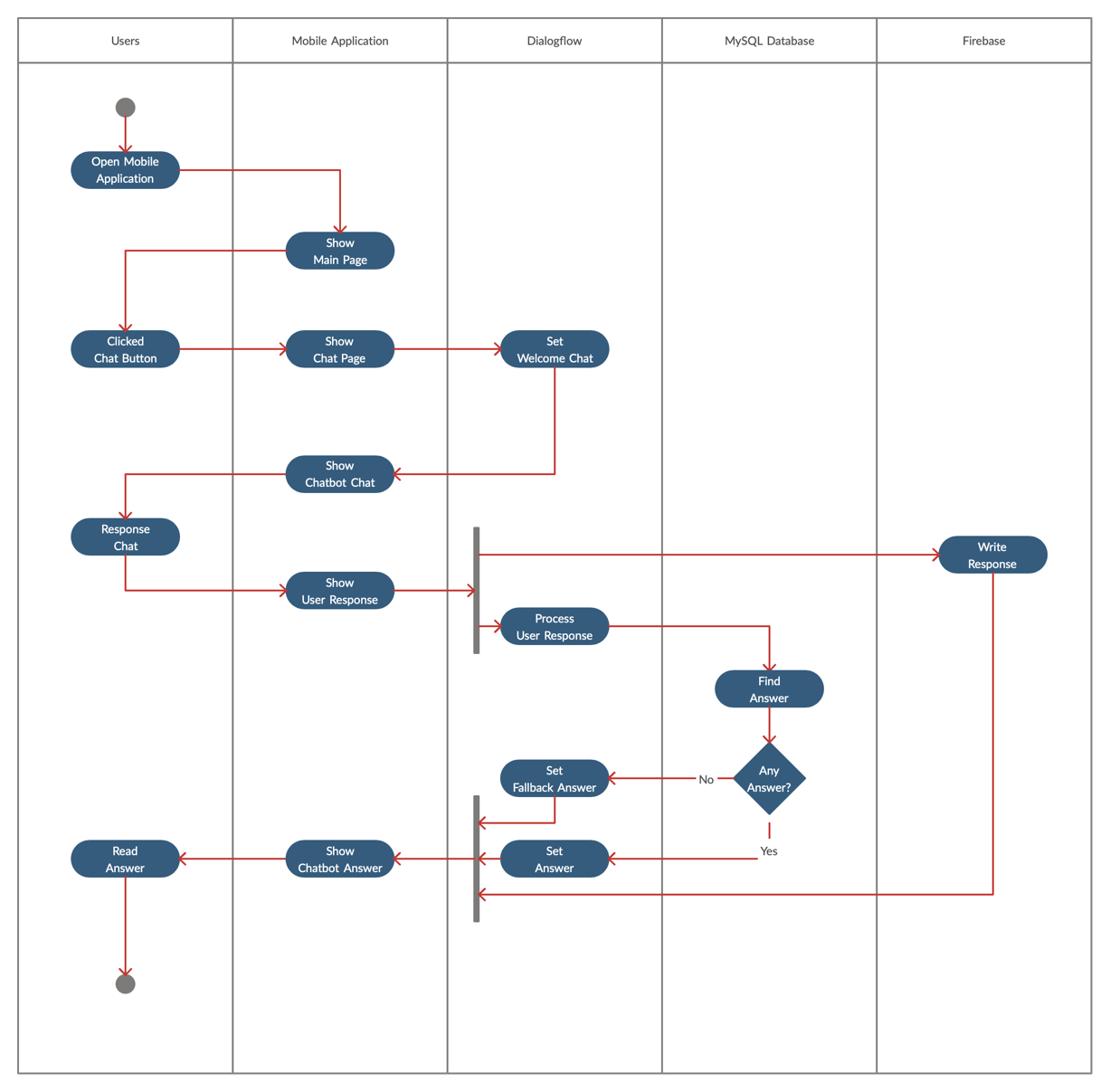


Figure 3.4. Activity Diagram Get Recommendation

1. Activity Find Surah

The following diagram illustrates the way to find some surah:

Figure 3...

1. Activity Find Ayah

The following diagram illustrates the way to find some ayah:

Figure 3...

1. Activity Send Feedback

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

Figure 3...

1. Activity Admin Input Surah

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

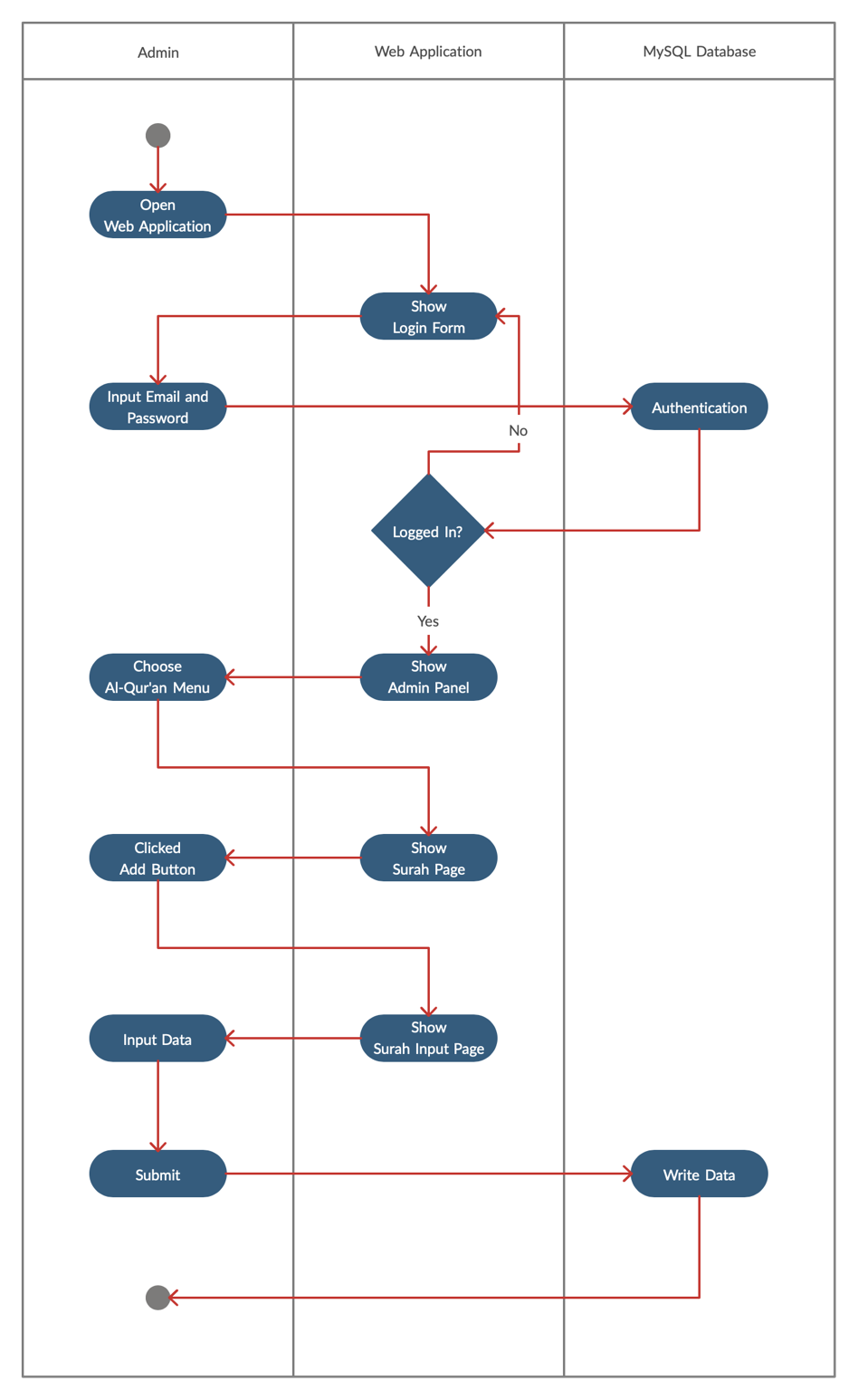


Figure 3.. Activity Diagram Input Surah

1. Activity Admin Edit Surah

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

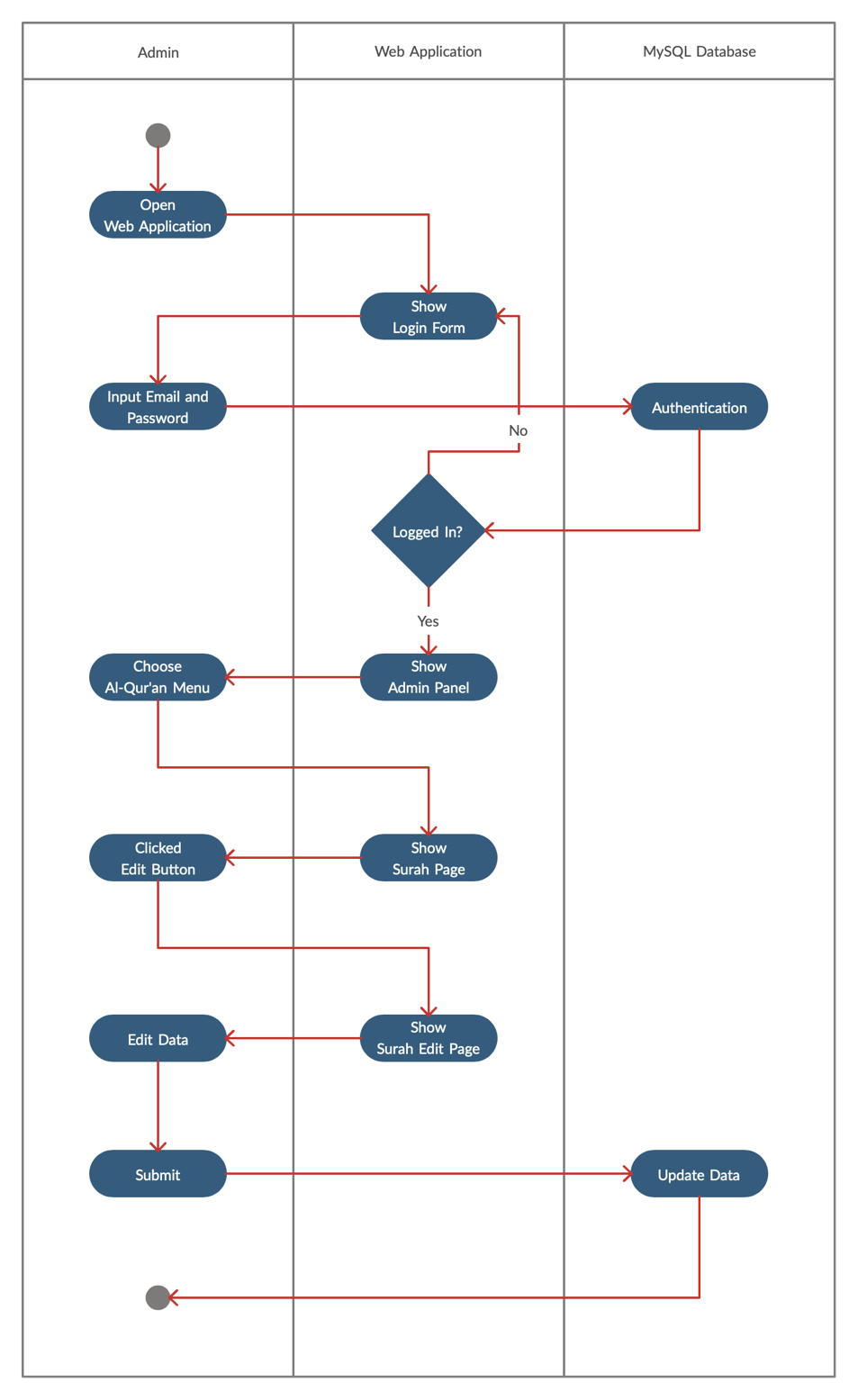


Figure 3.. Activity Diagram Edit Surah

1. Activity Admin Input Ayah

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

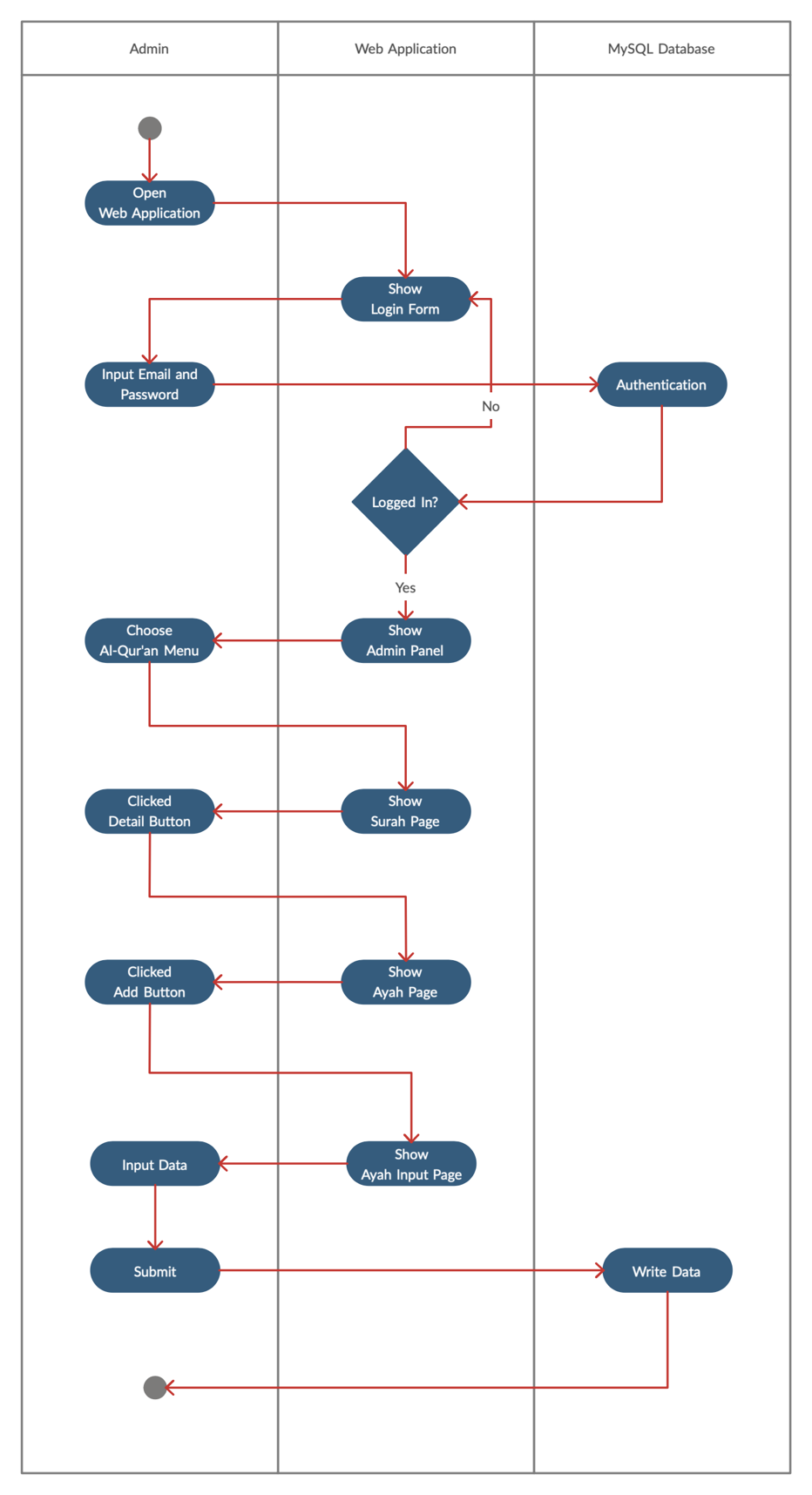


Figure 3.. Activity Diagram Input Ayah

1. Activity Admin Edit Ayah

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

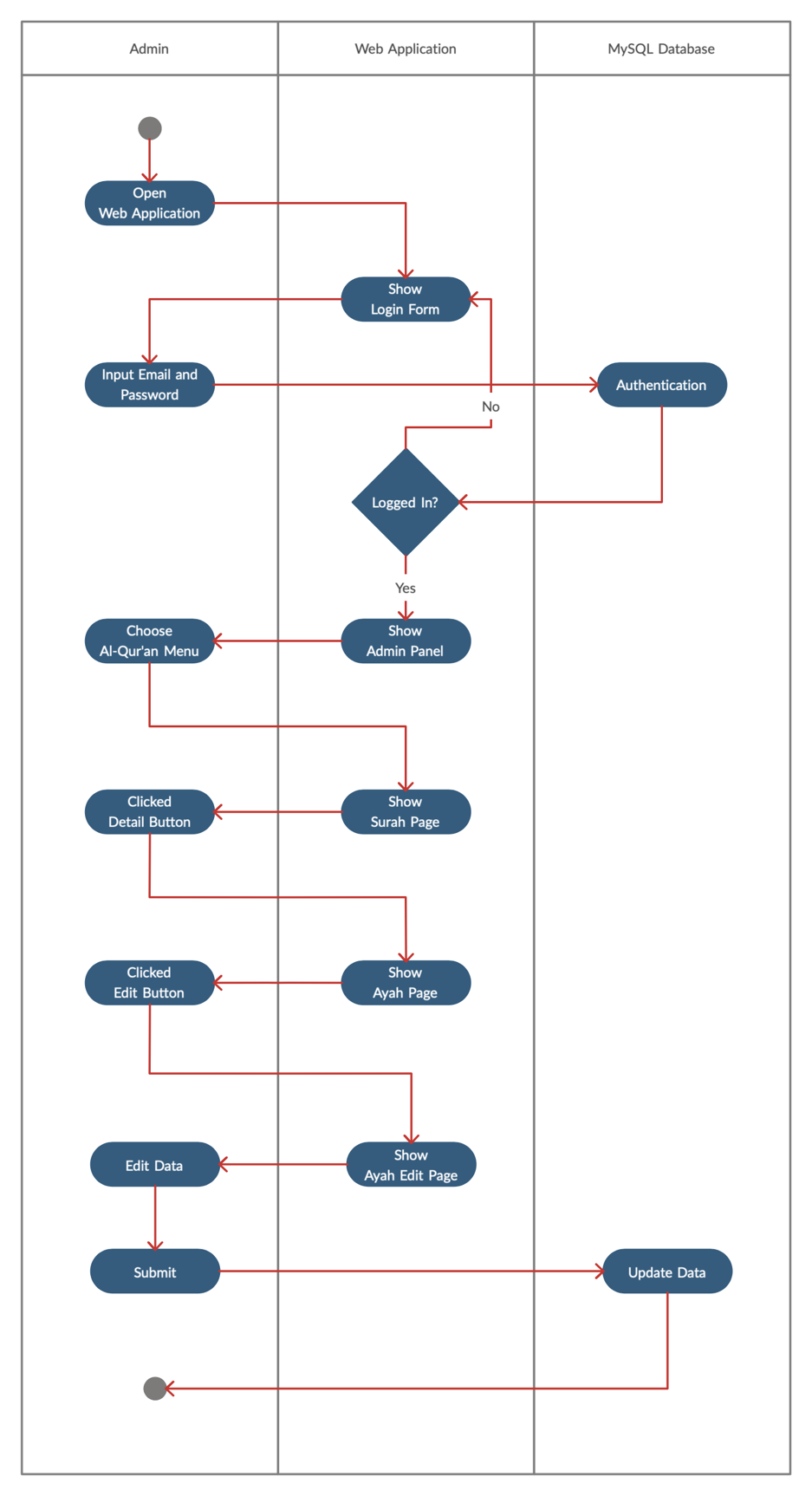


Figure 3.. Activity Diagram Edit Ayah

1. Activity Admin Delete Ayah

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

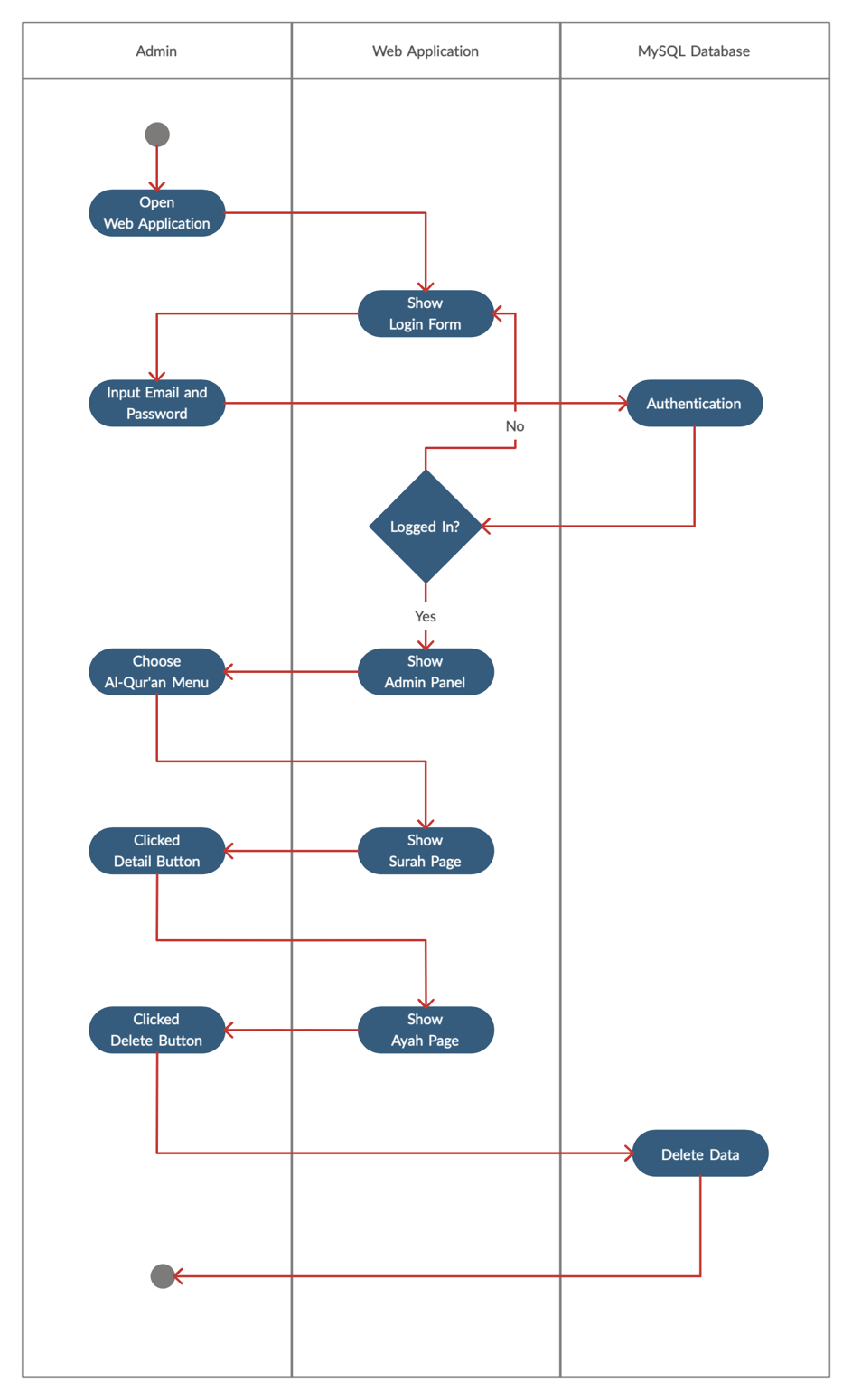


Figure 3.. Activity Diagram Delete Ayah

### 3.3.4 Designing Entity Relationship Diagram

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



Figure 3... 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

### 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.

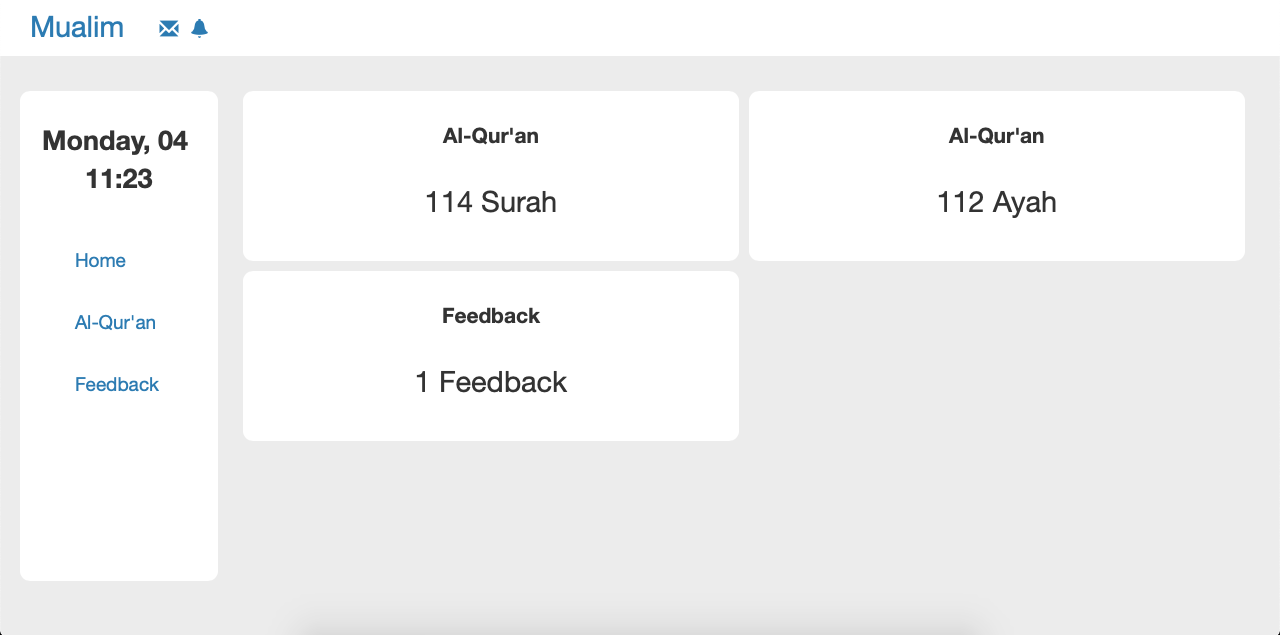


Figure 3... Home Page

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.

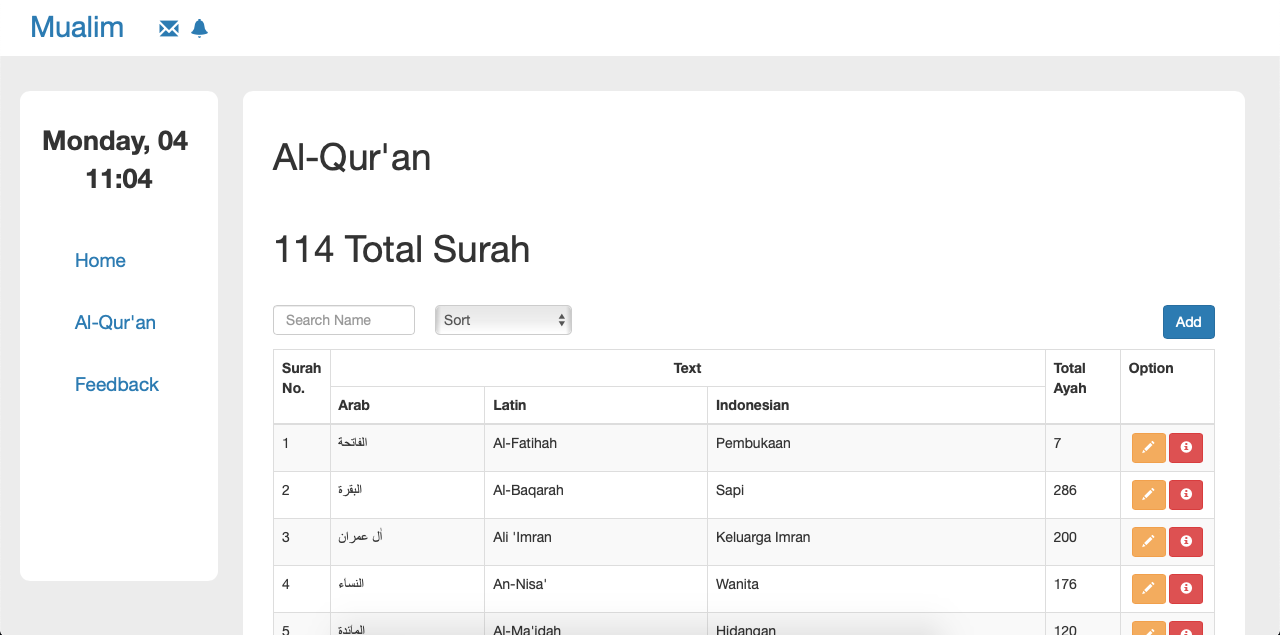


Figure 3... Surah Page

1. Surah Page: Add

This page is to add new Surah into the database.

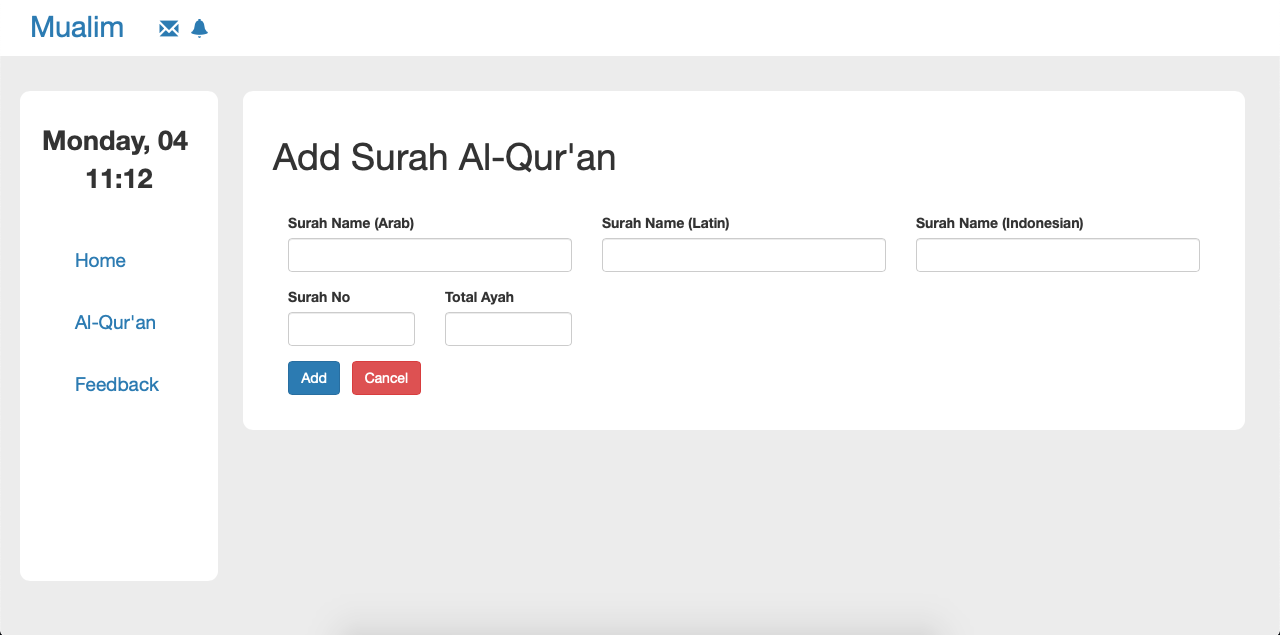


Figure 3... Add Surah Page

1. Surah Page: Edit

This page is to edit Surah from the database.

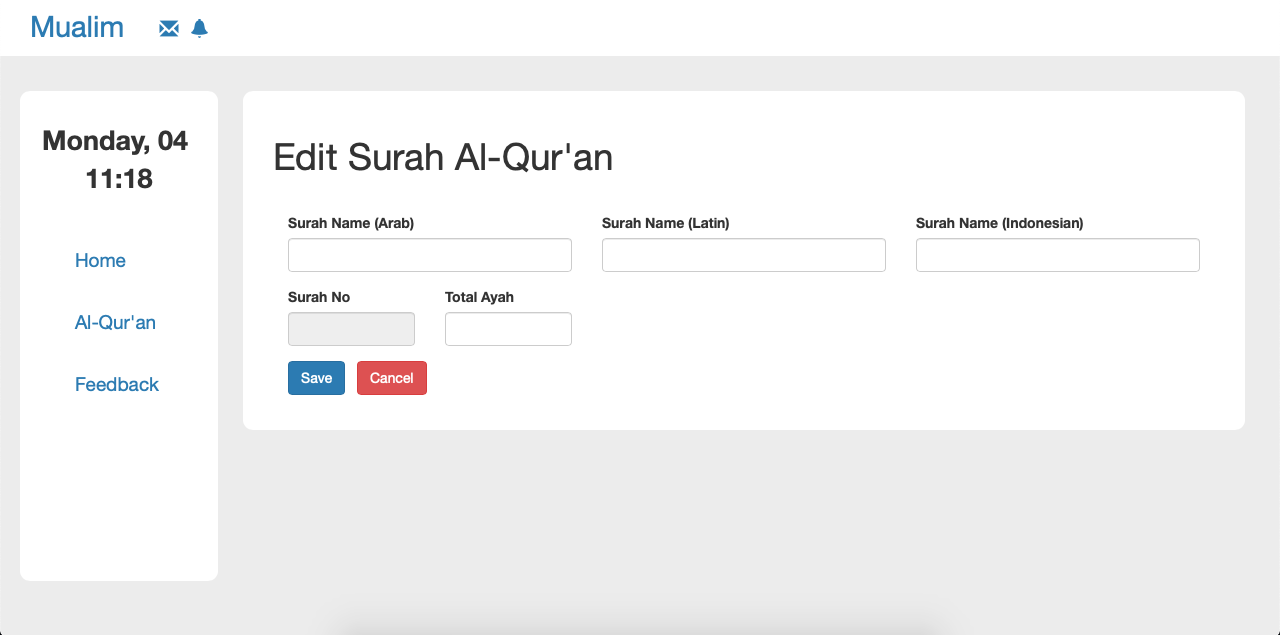


Figure 3... Edit Surah Page

1. Ayah Page

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

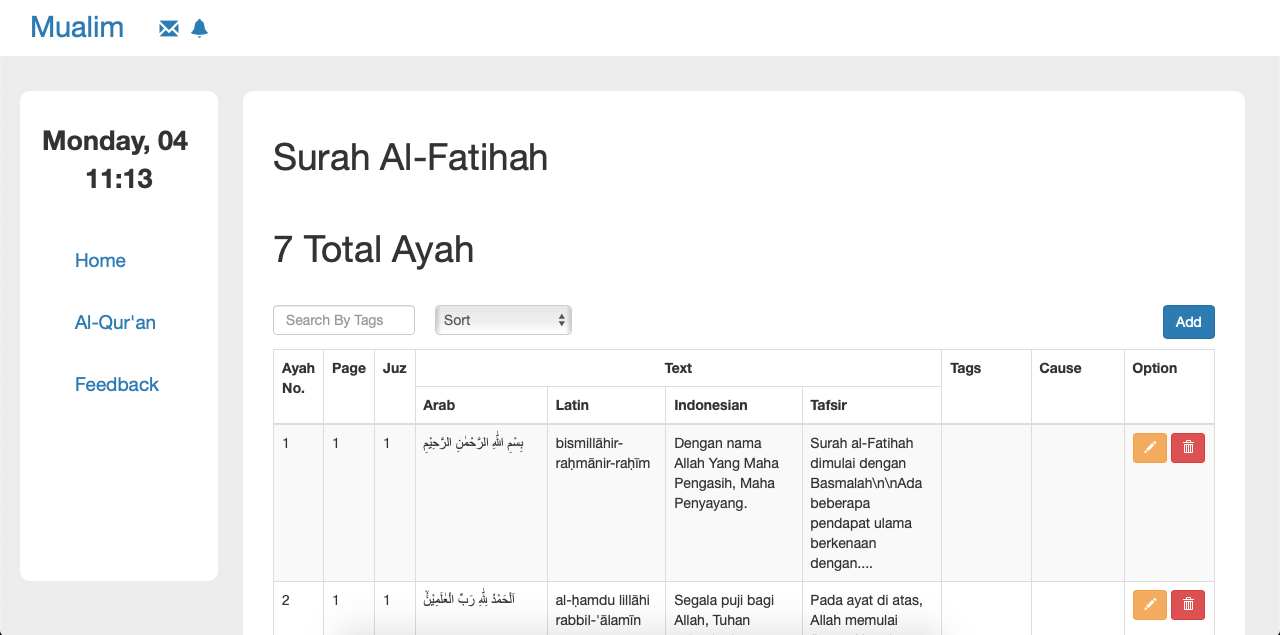


Figure 3... Ayah Page

1. Ayah Page: Add

This page is to add new Ayah into the database.

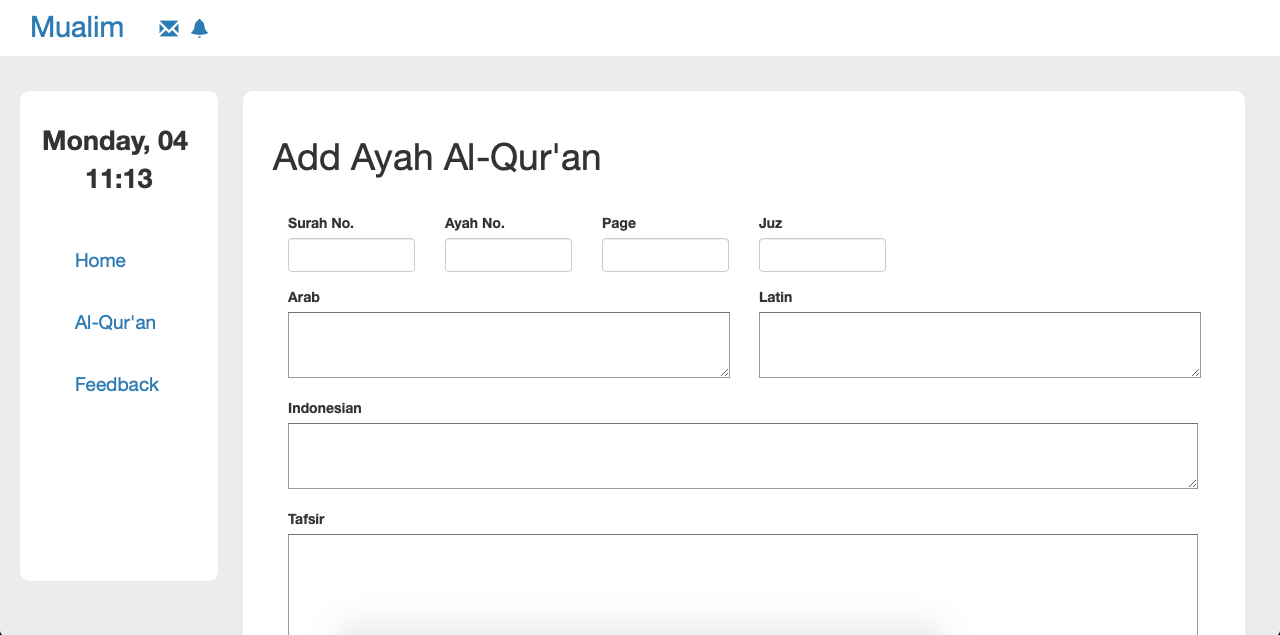


Figure 3... Add Ayah Page

1. Ayah Page: Edit

This page is to edit Ayah from the database.

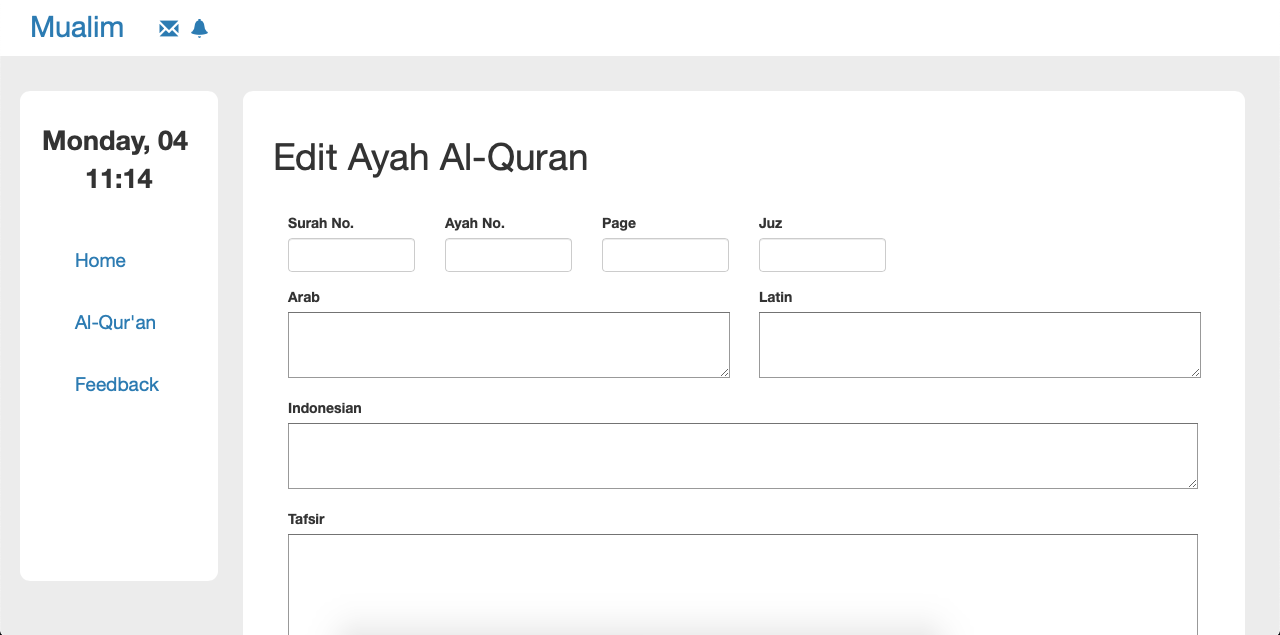


Figure 3... Edit Ayah Page

1. Feedback Page

This page shows the feedback from the users.

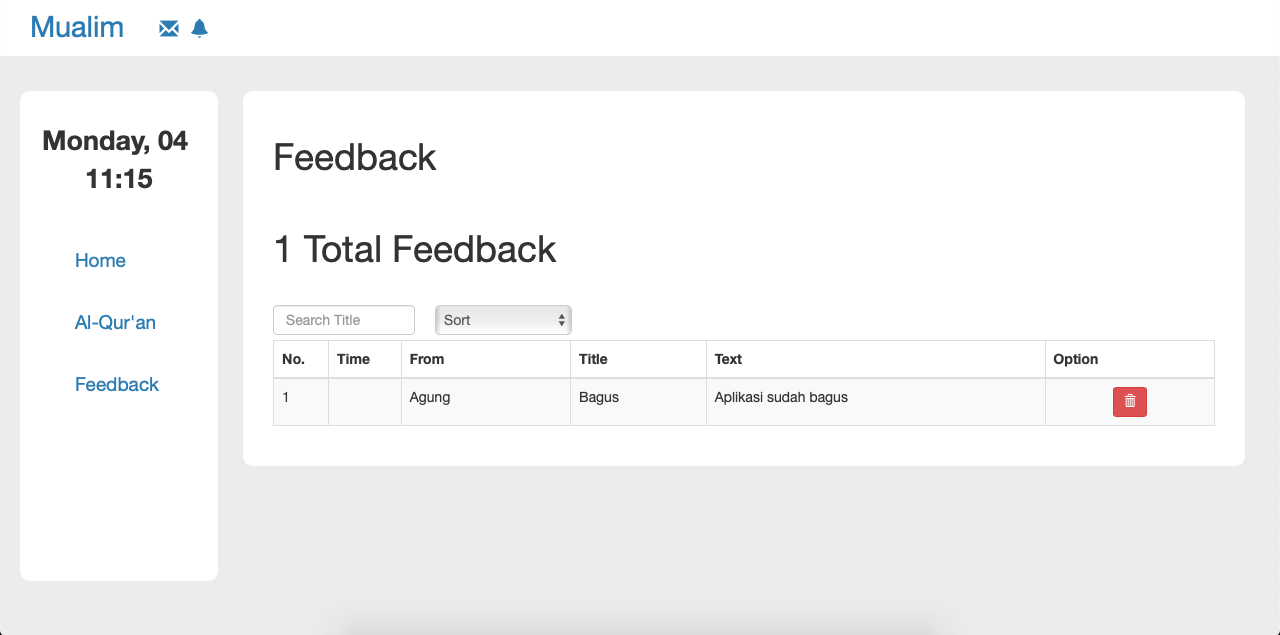


Figure 3... Feedback Page

## 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 Mobile Application

A

### 4.2.2 Web Application

B

## Blackbox Testing

# CONCLUSION

## Conclusion

## Future Work

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