**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.

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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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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. Deployment Diagram

2.6.5. Entity Relationship Diagram

2.6.6. User Interface Design

**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 Construction

3.1.5. Phase of Implementation

3.2. Phase of Planning

3.3. Phase of Designing

3.3.1. Designing Application with UML

3.3.2. Designing Activity Diagram

3.3.3. Designing Use Case Diagram

3.3.4. Designing Bot Application

3.3.6. Designing Entity Relationship Diagram

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. Bot Application User Interface

4.2.2. Mobile 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

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 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.

1. **Problem Identification**

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

a. How to design a bot to be able to have a conversation like humans?

b. How can bots analyze user feelings and provide a solution in the form of verses of the Quran?

c. How can bots help reduce or eliminate a person's negative feelings?

d. How can the application be easily understood by users?

1. **Purpose of the Study**

The purpose of this application is:

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

1. **Limitation of the Study**

Limitation of the application is:

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

b. This application was made only on the iOS platform.

c. Aplikasi hanya mendengarkan dari pandangan orang pertama.

d. Aplikasi hanya bisa mendengarkan 1 konteks masalah.

e. Aplikasi tidak memberikan solusi dan hanya menenangkan pengguna berdasarkan pengakuan mereka.

1. **Benefit of the Study**

Some benefit of the application is:

a. Application designed like a human being and a chat media for users.

b. The application provides recommendations of the verses of the Qur'an to be read which make users feel better.

1. **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.

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 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.

1. **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.

1. **Schedule**

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

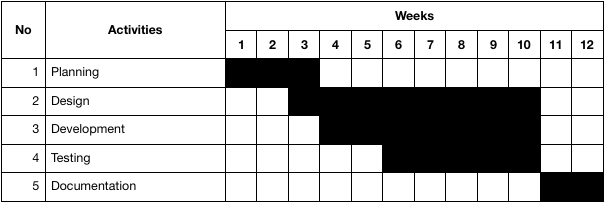
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Table 1.1. Schedule

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

# THEORITICAL BASIS

**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 Literature Review

2.3 Application OS Literature Review

2.4 Technology Overview

2.5 Integrated Development Environment

2.6 Software Development Technology

**2.2 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. [9] Wikipedia 2020, accessed April, 20 2020, <https://en.wikipedia.org/wiki/HTML>

How HTML plays role in Mualim Application:

Why did the author choose HTML, because:

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

How CSS plays role in Mualim Application:

Why did the author choose CSS, because:

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

How JS plays role in Mualim Application:

Why did the author choose JS, because:

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. [12] 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. [13] 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.

How PHP plays role in Mualim Application:

Why did the author choose PHP, because:

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. [14] 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. [15] 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. [16] Github 2020, accessed April, 20 2020 < https://github.com/apple/swift>

How Swift plays role in Mualim Application:

Why did the author choose Swift, because:

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). [17] 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. [18] SQLCourse, accessed April, 20 2020 < http://www.sqlcourse.com/intro.html>

How SQL plays role in Mualim Application:

Why did the author choose SQL, because:

**2.3 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. [19] 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.

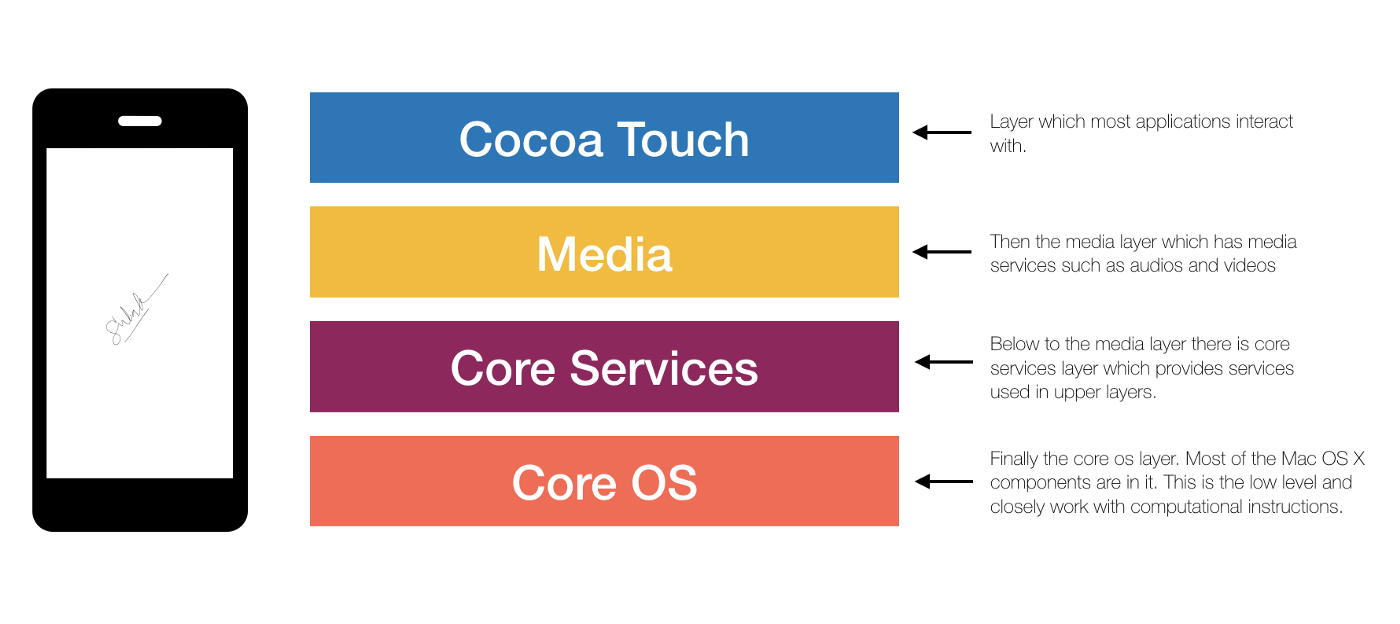


Figure 2.1. iOS Architecture

a. 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.

b. Media Layer, this layer allows the developer to work with photos, videos, audios, animations, etc., which is Assets Library, AVFoundation, Core Audio, etc.

c. 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.

d. 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. [20] 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. [21] 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.

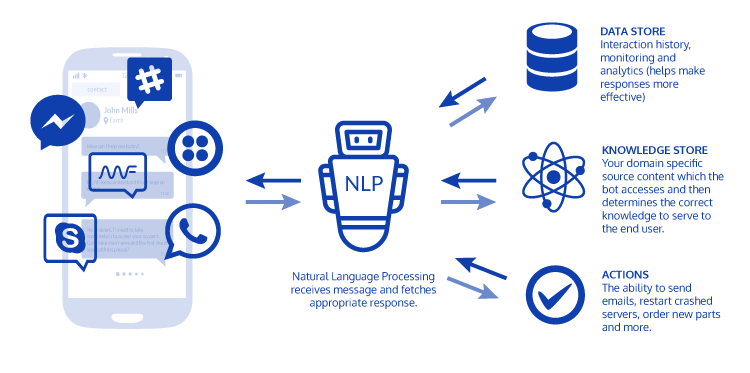


Figure 2.2. Chatbot Architecture

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. [22] 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.

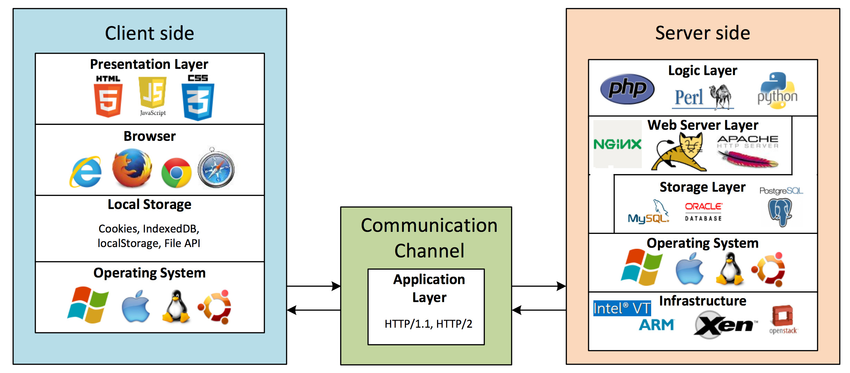


Figure 2.3. Web Application Structure

**2.4 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. [23] Dialogflow, accessed April, 25 2020 <https://cloud.google.com/dialogflow/docs/>

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

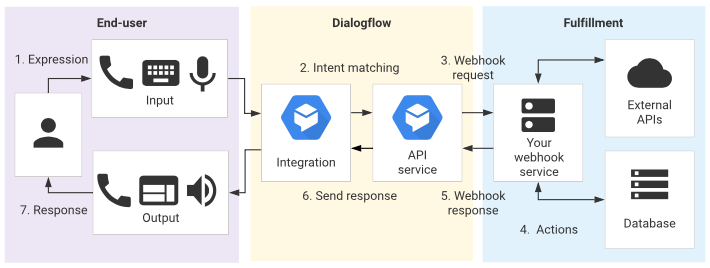


Figure 2.4. Bot Integration

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. [24] Wikipedia, accessed April, 25 2020 <https://en.wikipedia.org/wiki/Laravel>

The architecture of Laravel Framework shown as Figure 2.3.

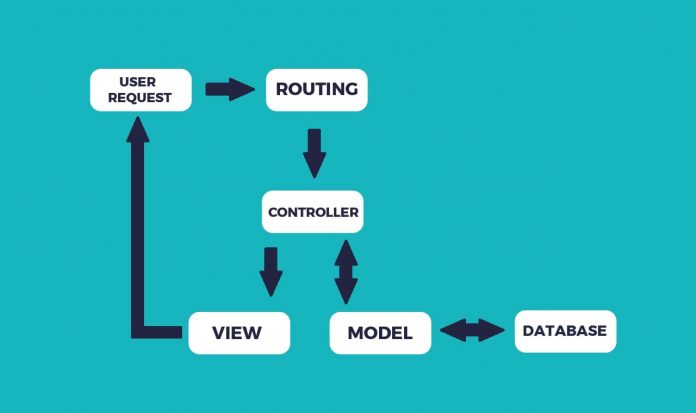


Figure 2.5. Laravel Architecture

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.

**2.5 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. [25] 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:

a. SQL Development, this functionality provides the capability to execute SQL queries, create and manage connections to database server using the built-in SQL Editor.

b. 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.

c. 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.

d. Data Migration, this functionality allows to migrate from Microsoft SQL Server, Microsoft Access, and other RDBMS tables, objects, and data to MySQL.

e. 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. [26] 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. [27] 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. [28] https://en.wikipedia.org/wiki/Xcode

**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.

[29] 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. [30] https://tallyfy.com/uml-diagram/

2.6.2 Activity Diagram

2.6.3 Use Case Diagram

2.6.4 Deployment Diagram

2.6.5 Entity Relationship Diagram

2.6.6 User Interface Design

# ANALYSIS AND DESIGN

a

# IMPLEMENTATION

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# TESTING

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# CONCLUSION

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**References**

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[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.