Article

Online Learning Service Application Using Flutter Framework and Laravel

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A B S T R A C T

Online learning is a concept of learning that is carried out online or through the internet network. Very advanced technology in the modern era and globalization makes various activities carried out efficiently and can be done using only gadgets. Technological developments in the field of education with the use of e-learning in learning activities in schools, colleges, courses and even online communities have started to use concepts like this. This study uses Flutter to create applications for users and consultants in conducting online consultations on android devices. The author uses a collection of widgets that have been provided by flutter to create components in the user interface such as buttons, input text, text, icons, and others. In this study, we use the Laravel framework to create an admin dashboard and provide a Restful API for android applications to handle database management on the server. The author uses Laravel's features to build a fullstack application that handles requests, routing, controllers, services, models, and views.

INTRODUCTION

Online learning methods can focus on students by means of teachers as facilitators and providing learning media that presents learning content such as in the form of text, video, animation or multimedia. This online learning concept allows students to learn from anywhere. So that students are more enthusiastic and have the opportunity to learn with new, easy, useful, and fun learning concepts.

Seeing from the problems above, the author wants to make a mobile application that can provide a place to carry out learning activities that can be used via the Internet with smartphone media. The author uses the Flutter and Laravel frameworks. By using the Flutter framework in designing this mobile application, you can create android and ios applications with only one code base, while Laravel for making APIs for data exchange uses the JSON language.

Based on the description above, the researcher is interested in taking the title of the research on "Online Learning Service Applications using Flutter and Laravel Frameworks".

How to increase the effectiveness of learning in conducting online learning activities and providing a place of learning apart from school or campus.

The intent and purpose of the research I did was to provide an Android-based online application that can carry out learning activities with interesting materials and questions or tasks, to facilitate tutoring services and activities, to design applications using the Android-based Flutter framework for Front-End and Laravel for Back-End.

Flutter for mobile development focuses on providing developers with tools to deliver mobile apps that have the look and feel of native apps. Moreover, Flutter aims to do application development with just one codebase for any platform[1].

Laravel is an MVP based website development written in PHP designed to improve software quality by reducing initial development and maintenance costs, and to improve website application performance[2].

It is hoped that the benefits of research by the author are being able to improve the learning process for students by studying material or answering questions that can be accessed via the internet so that it helps improve the quality of education, is able to improve the performance process for staff and teachers without having to come to the office but can be productive in handling services. Administration or learning activities, knowing how to implement the design of a mobile-based online learning application system with Flutter and Laravel Frameworks, so that applications can be run on Android and the Website.

I. LITERATURES REVIEW

The research conducted by Paulus Yayan Christian and Wiyono entitled "Android-Based Mobile Learning Information System in Management of Learning Activities Faculty of Science and Technology Buddhi Dharma University"[3].

The research objective is to create an Android-based application for the learning system so that it can help lecturers and students in teaching and learning activities.

Strengths In this study, the design method used can be the basis for further research.

Weaknesses The research does not explain in detail the data retrieval carried out by the application.

Research conclusion The creation of an application or program for android-based learning.

Research conducted by Filian Enggar Krisnada and Radius Tanone entitled "Mobile Based Training Class Ticket Sales Application using Flutter"[4].

The purpose of the research To be able to help make it easier for people who are looking for learning activities to be able to find their activities practically and efficiently by making a training class ticket sales application.

Strengths In this study, the design method used can be the basis for further research and has a detailed application flow.

The weakness of this research is that it does not explain the payment flow until it is successful.

Conclusion This mobile-based training class ticket sales application has met the standard provisions for use by the public and can help facilitate users in finding the desired learning activities through training classes provided by the application.

The research conducted by Hafid Yoza Putra, Hafizah Hanim and Afriyanti Dwi Kartika entitled "Development of Web and Mobile Applications for Webinar Information Systems in the New Normal Era"[5].

The purpose of the research is to assist webinar organizers in conducting pre, post and during the webinar event.

Strengths In this study, the design method used can be the basis for further research and detailed web and mobile interface design.
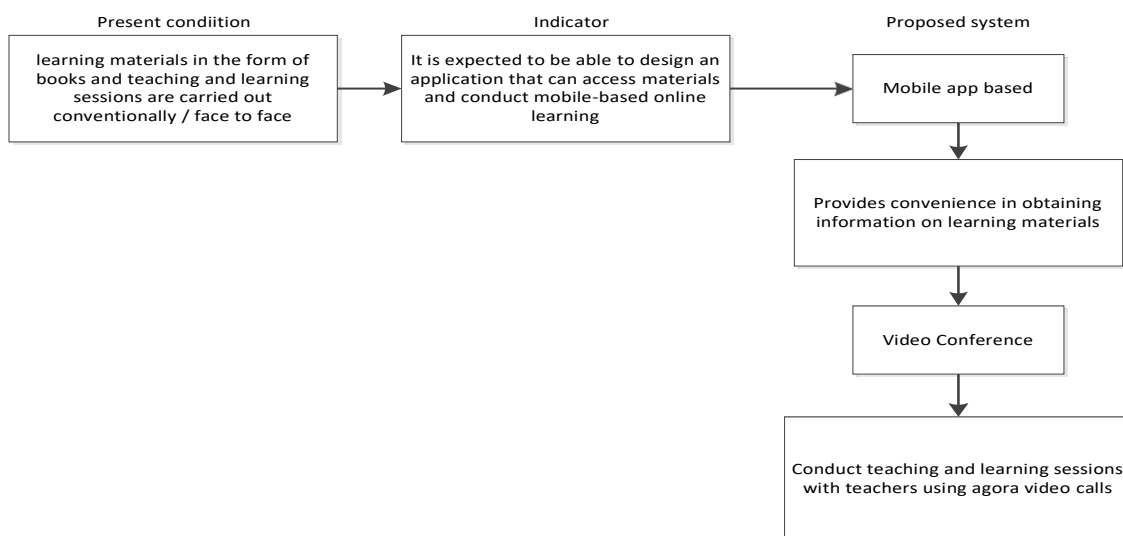
Weaknesses This study does not explain the results of the testing carried out.

Conclusion The development of web and mobile applications has been successfully carried out using the waterfall method, with the results of testing using the black box method showing that all functionalities are running as they should.

II. FRAMEWORK

The framework is a flow that is used as a thought scheme to strengthen the indicators

this framework, explanations will be formed in diagrams.


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Present condiition
┌─────────────────────────────┐        ┌─────────────────────────────┐        ┌─────────────────────────────┐
│ learning materials in the    │        │ It is expected to be able to │        │                             │
│ form of books and teaching    │   →    │ design an application that   │   →    │      Mobile app based       │
│ and learning sessions are     │        │ can access materials and     │        │                             │
│ carried out conventionally /  │        │ conduct mobile-based online  │        └─────────────────────────────┘
│ face to face                  │        │ learning                     │                      │
└─────────────────────────────┘        └─────────────────────────────┘                      ↓
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Present condiition / Indicator / Proposed system

learning materials in the form of books and teaching and learning sessions are carried out conventionally / face to face

It is expected to be able to design an application that can access materials and conduct mobile-based online learning

Mobile app based

Provides convenience in obtaining information on learning materials

Video Conference

Conduct teaching and learning sessions with teachers using agora video calls

behind the making of this application. Within

Figure 1 Framework Diagram

Flutter is a cross-platform framework that targets high-performance mobile application development. Flutter was released publicly in 2016 by Google. Besides running on Android and iOS, Flutter also runs on Fuschia. Flutter was chosen by Google as an application framework for the next generation of operating systems. Flutter uses a high-performance rendering engine to render each view component using its own. This provides an opportunity to build high-performance applications such as native applications[6].

Web service is an application of a collection of data from a database, software or part of a software that can be accessed remotely by various devices with certain intermediaries. In general, web services are similar to the web in general with URLs as identification media, but web services only contain a collection of information, commands, configurations or syntax that are useful in building certain functions of the application[7].

Laravel is an MVP-based website development written in PHP designed to improve software quality by reducing initial development and maintenance costs, and to improve website application performance[8].

Here are the superior features found in Laravel:
- Bundles are features with a modular packaging system and are available in various applications.
- Eloquent ORM, which is an advanced PHP implementation, provides an internal method of the "active record" pattern that solves problems with database object relationships.
- Application Logic is part of the application, using a controller or Route.
- Restful Controller separate logic in serving HTTP, GET and Post
- Auto Loading class provides automatic loading for PHP classes
- Reverse Routing defines the relationship or relationship between Link and Route
- View Composer is a logical code unit that can be executed while the view is loading
- Migration provides a control system for the database schema
- Unit Testing to detect and prevent regression
- Automatic Pagination which simplifies the task of implementing pages.

The advantages of the Laravel framework are as follows:

o Expressif

When programmers see a Laravel syntax, it is expected that they will immediately know the use of the syntax even though they have never learned it.

o Simple

Laravel has simplicity in routing problems due to the Eloquent ORM.

o Accessible

Commitment from Laravel Code Developers to always make complete documentation every time the latest version is released.

III. METHODS

The method in this study used the Survey Research Method (MPS). This survey research method is a research method carried out using surveys or data collection through research respondents. In this study, respondents will usually be given a questionnaire to fill out answers to questions posed by researchers[9]. This study uses the Survey Research Method (MPS) with the following steps:

a. Needs Identification and Analysis User

By conducting a survey of 20 (twenty) people, consisting of 10 (ten) Mentors (descendents and teachers), 2 (two) students, 2 (two) Vocational High School students, 2 (two) High School students , 2 (two) junior high school students, 2 (two) elementary high school students, the researchers got several statements from respondents that will be used as reference material for making online learning applications:

Tables 1 User Needs Identification Table

	Requirement Elicitation	
1	There is a Registration and Login page	
2	Attractive UI design	
3	There is a photo on the profile	
4	There is a Video Conference Feature with Students	
5	There is a Raise Hand feature during Video Conference	
6	There is Video Playback in the material	
7	There is a feature to upload material in pptx, pdf and docx formats	
8	There are Notifications	
9	There is a Chat Feature	
10	There is a Quiz Feature	
11	There is an Assessment Feature on assignments and exams	
12	Students can download materials	

b. Application Needs Analysis

Based on the RE results of 20 (twenty) people, consisting of 10 (ten) Mentors (descendents and teachers), 2 (two) students, 2 (two) Vocational High School students, 2 (two) High School students, 2 (two) junior high school students, 2 (two) elementary school students, researchers designed an online learning application. The details of user needs contained in the application made by the researcher:

Tables 2 User Needs Analysis Table

No.	Kebutuhan Pemakai	Keterangan
1	There is a Registration and Login page	√
2	Attractive UI design	√
3	There is a photo on the profile	√
4	There is a Video Conference Feature with Students	√
5	There is a Raise Hand feature during Video Conference	x

6	There is Video Playback in the material	√
7	There is a feature to upload material in pptx, pdf and docx formats	√
8	There are Notifications	√
9	There is a Chat Feature	√
10	There is a Quiz Feature	√
11	There is an Assessment Feature on assignments and exams	x
12	Students can download materials	√

c. Troubleshooting Solution

With the existing problems, the solution to the problem in this research is to design a mobile-based application for the front-end and a web-based application for the back-end by using an application design framework to facilitate application design.Framework Flutter

- Flutter has a collection of widgets that have been provided to create components in the user interface such as buttons, text inputs, sliders, and others that can be customized according to application needs.

- By using the Flutter framework, it makes application design easier with a collection of widgets that have been provided and can be customized as needed and have a high performance that will make the application more comfortable for users to use.Framework Laravel

- Laravel is an open source framework for creating PHP-based web applications that have a Restful Controller feature that has

a complete set of functions that can create, read, update and delete so that it helps save time in backend creation because there is no need to create these functions and define each of these functions at the same time. routes.

- Laravel provides an Authentication interface for the API. Authentication is used to protect pages to make the web only accessible to certain people who have been granted access rights.

By using the Laravel framework, it makes backend design easier and saves time by using the Restful Controller feature and has strong security in protecting the backend so that user data privacy becomes more secure.

IV. RESULT

The system procedure that will be used in this study will be described using a flowchart. The following is a flowchart of the system that will be used (suggestion):
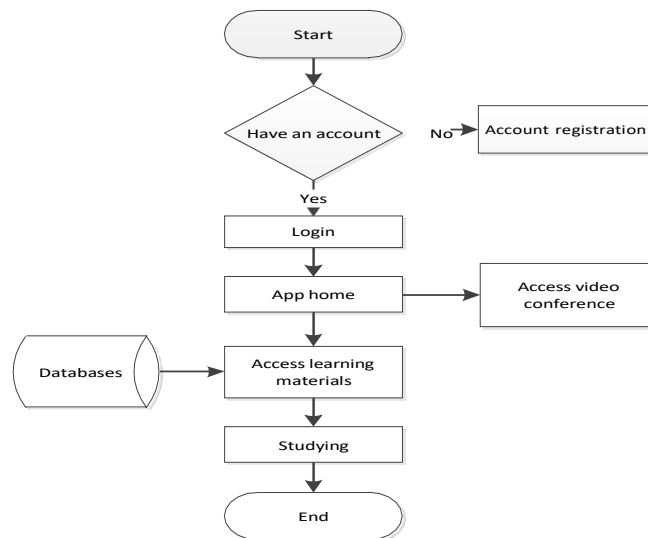
Figures 2 Learning Application Proposal Flowchart

The proposed system uses the Flutter framework to create android-based applications and the Laravel framework to create website-based applications and uses a MySQL database. The following is the design of the entity relationship diagram for the application that will be made:
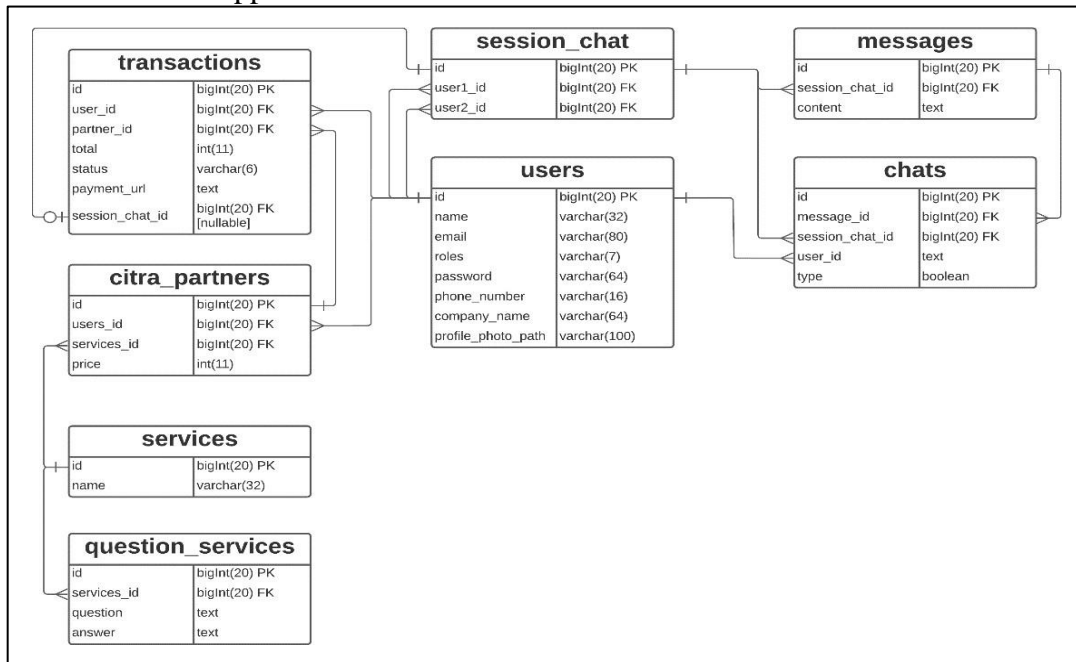
Figures 3 Settings Page View

In making this application there are several libraries or packages provided by flutter or the community such as jitsi_meet, http, and others. The author uses the jitsi_meet package to connect the application with Jitsi Meet in flutter. To perform an HTTP Request command, an http package is needed which contains a set of functions to make it easier to use in managing HTTP Resources.

Figures 4 List of Packages on Pubspec.yaml

In handling transactions and payments made by users on the Flutter application on an Android smartphone, this study uses Midtrans Payment Gateway. To handle transactions on Midtrans, in designing this Laravel using packages provided by Midtrans. There is a controller to handle changes in transaction status, if the user has made a payment, Midtrans will notify Laravel to change the status in the Transaction database.

Application design in Laravel uses Pusher Channel to facilitate chat features in Flutter. This study uses a websocket service, namely the Pusher channel which is used for real-

time communication between the server and the application on the android device.

The author also uses Authentication using Laravel-Sanctum which is listed in the Laravel Jetstream packages to be used to protect pages to make dashboard pages on the web only accessible with certain access rights.

The following are the hardware specifications of developers in application design: Hardware specifications used by developers in making applications on personal computers are:

Tables 3 PC Developer Hardware Specifications

Hardware Components	Specification
Processor	AMD with Windows Hypervisor support
RAM	8GB
Harddisk	256GB
VGA	Onboard Graphics

The hardware specifications used by developers in using consulting applications and admin dashboards on smartphones are:

Tables 4 Mobile Developer Hardware Specifications

Hardware Components	Specification
Processor	ARM architecture 64-bit
RAM	3GB
Storage	32GB
Connection	Wi-FI or 4G
Camera	Front Camera

The following are the hardware specifications used by users, including the following: There is a minimum recommendation for hardware requirements to access the admin dashboard on a browser on a Personal Computer, namely:

Tables 5 PC User Hardware Specifications

Hardware Components	Specification
Processor	Intel atau AMD
RAM	2GB
Harddisk	10GB
VGA	Onboard Graphics

There are minimum recommendations for hardware requirements used by users in using consulting applications and admin dashboards on browsers via smartphones, namely:

Tables 6 Smartphone User Hardware Specifications

Hardware Components	Specification
Processor	ARM architecture 64bit
RAM	2GB
Storage	16GB
Connection	Wi-FI or 4G
Camera	Front Camera

The software specifications used by developers to make Laravel run on the cloud server are:

Tables 7 PC Developer Software Specifications

Hardware Components	Specification
Sistem Operasi	Windows 10 (64bit)
Laragon	5.0
Apache	2.4.47
php	7.4.19
MySQL	5.7.33
Laravel	8.83.12
Microsoft Edge	101.0.1210.53
Android Studio	2021.2.1
Android Virtual Device (Emulator)	Android 7.0
Visual Studio Code	1.67.2
Flutter	2.10.4

The software specifications used by developers in using consulting applications and admin dashboards on websites via smartphones are:

Tables 8 Smartphone Developer Software Specifications

Hardware Components	Specification
Sistem Operasi	Android 11 iOS 15
Browser	Google Chrome Safari

There are minimal recommendations for software requirements to access the admin dashboard on a browser on a Personal Computer, namely:

Tables 9 PC User Software Specification

Hardware Components	Specification
Sistem Operasi	Windows 7
	MacOS
	Linux
Browser	Google Chrome
	Microsoft Edge
	Mozilla Firefox
	Safari
	Opera

There are minimal recommendations for software requirements used by users in using consulting applications or accessing the admin dashboard on a browser via a smartphone, namely:

Tables 10 Smartphone Software Specifications

Hardware Components	Specification
Sistem Operasi	Android 7
	iOS
Browser	Microsoft Edge
	Google Chrome
	Mozilla Firefox
	Opera
	Safari

This online learning service application has 2 applications on different platforms. The first application uses a mobile-based platform using the Android operating system and the second application uses a website-based platform.

This mobile-based application is intended for users such as students and teachers where this mobile-based application serves to assist the learning process. In this mobile application there is a material menu and also a conference to help the learning process.
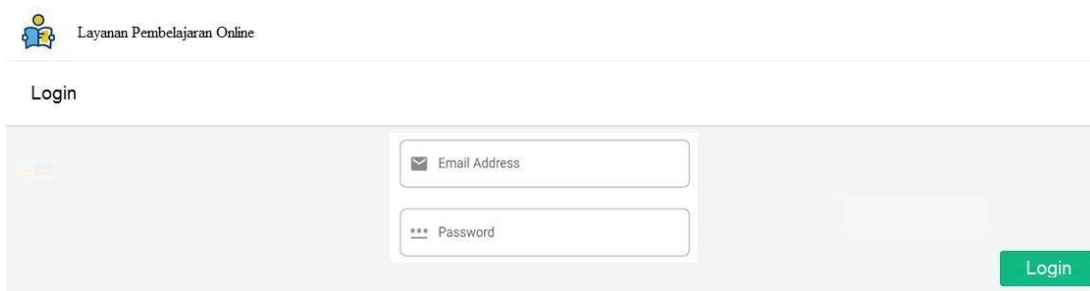

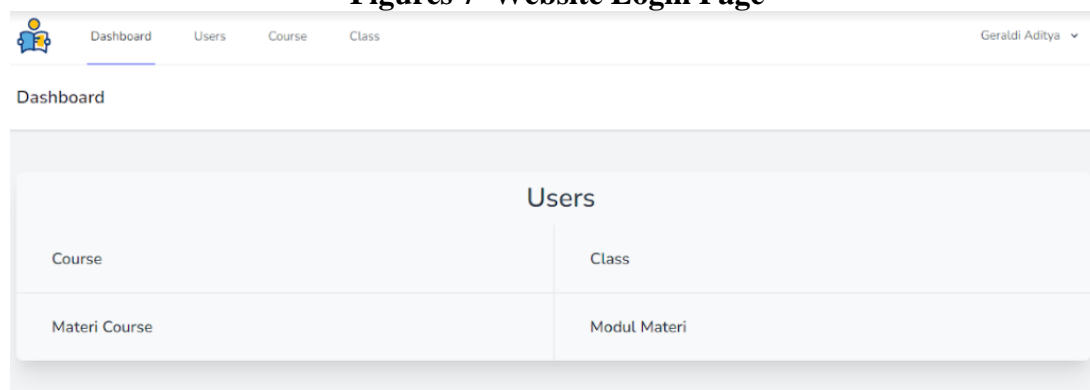**Figures 5 Mobile Splash Screen Page**

Figures 6 Mobile Home

This website-based application is intended for admins where this website-based application functions to regulate the running of mobile-based applications. In this website application the admin can process material, classes, teachers, conference schedules, data processing for teachers and students.

Figures 7 Website Login Page

Figures 8 Website Dashboard Page

V. CONCLUSION

With this application, it can facilitate the learning process for students by studying material on mobile-based applications and the teaching and learning process using video conferencing. Website-based applications make it easier for staff to manage online teaching and learning systems without having to come to the office and provide more efficient learning media. With this application (mobile-based and website-based) it shows the use of the flutter and laravel frameworks so that they can produce applications that can run on two platforms, namely mobile and website.

So that the use of this application can be maximized, the author gives some suggestions, to be able to add a more attractive design to the mobile-based application so that in the future it does not cause saturation in the teaching and learning process. Adding other features such as report cards on learning outcomes because with the current application, you can only see grades per subject, there is no calculation of the assessment of the entire subject being studied. It is hoped that this application can be developed again so that it can run on the IOS operating system because the current mobile application can only run on the Android operating system.

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BIOGRAPHY

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