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Frontend Implementation on EngVenture Application at IntSys Research Lab

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ABSTRACT

In today's digital era, the use of mobile applications for English learning is increasingly popular as an alternative to self-study. However, many available applications still lack the ability to provide an interactive, adaptive, and enjoyable learning experience, and do not provide integrated proficiency measurement features such as the TOEFL test. This research focuses on the frontend implementation of the EngVenture application, an English learning platform developed at IntSys Research Lab using the Rapid Application Development (RAD) method. This application is designed to address these issues by integrating gamification elements and a TOEFL-like practice test system to increase engagement and measure user progress. Data were collected through literature studies and questionnaires distributed to 100 respondents from various educational levels. The results showed that 82% of respondents needed a fun learning medium, 92% wanted a TOEFL test feature, and 88% were interested in the gamification feature. The application was developed using Flutter and Dart, with a responsive UI/UX design and real-time feedback features. System testing was conducted using two methods: black-box User Acceptance Testing (UAT) to assess functionality, and a System Usability Scale (SUS) to measure the application's usability. Test results showed that all features functioned well, with an average SUS score of 84.25, which falls into the Acceptable (Grade B+, Excellent) category. These results demonstrate that EngVenture meets user needs in terms of functionality and usability, and has the potential to become an interactive and effective English language learning tool.

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I. INTRODUCTION

English language proficiency has become an essential skill in today's era of globalization. English is not only used as a tool for international communication, but also as a primary tool in education, business, technology, and innovation[1]. Along with the development of digital technology, English language learning applications are increasingly being used as an effective medium for improving language skills independently and flexibly[2]. The use of English language applications offers various advantages, such as ease of access, interactive learning methods, and the ability to adapt materials to user needs[3]. However, the effectiveness of these applications in improving English language proficiency remains a topic that requires further research, especially in the context of users in Indonesia who have diverse cultural and linguistic backgrounds[4].

This study aims to analyze the role and impact of English language learning apps on the language skills of users in Indonesia. Furthermore, the study examines factors influencing the success of these apps and the challenges users face during the learning process. The results are expected to contribute to the development of more optimal English language learning apps that are more relevant to the needs of users in Indonesia.

In this research, we developed the copyrighted EngVenture Application. This English learning application has features that can support improving English skills in an engaging and enjoyable way, thanks to the application's gamification[5]. Before discussing the EngVenture Applications research, the following data serves as baseline information: (1) Research on Duolingo application usage Sample: 111 respondents from various educational levels, the majority of whom were university students (88.3%). Findings: 84.7% of respondents have used Duolingo, with the majority using it for less than a month (32.4%). The most helpful features were listening practice (74.8%), speaking (67.6%), reading (68.5%), and writing (58.8%). Most respondents considered Duolingo quite effective in improving English skills, especially reading and listening, despite obstacles such as advertising and a limited lives system[6].
(2) The effect of using the Hello English application on junior high school students' learning outcomes Method: Experiment on seventh-grade students of SMP Negeri 1 Kadipaten. Findings: The use of the Android-based Hello English application significantly improved English learning outcomes, particularly listening skills, with an average learning outcome score of 82.16% and a calculated t-value > t-table (6.667 > 1.296)[7].
(3) Use of Google Translate as an English learning medium Sample: 8 Package B students at the Suryani Community Service Center (PKBM) in Jelegong Village, Bandung. Findings: The use of Google Translate helped accelerate the students' mastery and pronunciation of English vocabulary. This application facilitates the learning process because it is practical and can be used directly without a physical dictionary[8].
(4) Student Perceptions of the Use of Google Translate Sample: 50 English Language Education students at STKIP PGRI Banjarmasin in semesters I, III, V, and VII. Methods: Questionnaires and interviews. Findings: The majority of students are familiar with and positive about using Google Translate in their English learning activities, especially for translating English materials[9].

The data presented shows that the use of English learning applications has had a positive impact on improving users' linguistic abilities, particularly in aspects of learning content such as vocabulary, listening, speaking, and translation. However, previous research has focused on the effectiveness of learning content and user perceptions, while technical aspects such as interface design (frontend), user experience (UX), and application performance, which play a crucial role in increasing user engagement (learning engagement), have not received much in-depth study.

In line with these findings, several recent studies have emphasized the importance of frontend quality in the context of mobile-based learning. Good interface design can significantly improve learner engagement and retention[10], while mobile application usability has been shown to influence user performance expectations and self-efficacy in the context of mobile learning [11]. Furthermore, fast, stable, and responsive UI performance contributes to perceived ease of use and learning effectiveness [12]. Meanwhile, the integration of gamification in digital learning has been shown to increase user motivation and engagement in the foreign language learning process [13].

Based on these conditions, this study specifically focuses on the frontend implementation of the EngVenture Application. This focus was chosen to contribute to aspects that have received less attention in previous research, namely how frontend architecture, UI/UX design, and interface performance can support the effectiveness of English language learning. This approach is expected to provide new insights into the significant role of the frontend in mobile language learning applications and serve as a basis for developing technology-based learning strategies that are more adaptive, interactive, and enjoyable for users.

II. METHOD

The research flow begins with data collection through literature studies and questionnaires, followed by problem identification as the basis for system design. Next, the development process uses the Rapid Application Development (RAD) method, which consists of four main stages, namely Requirements Planning, User Design, Construction, and Cutover. All stages of the research are systematically described in the research flow in Figure 1.

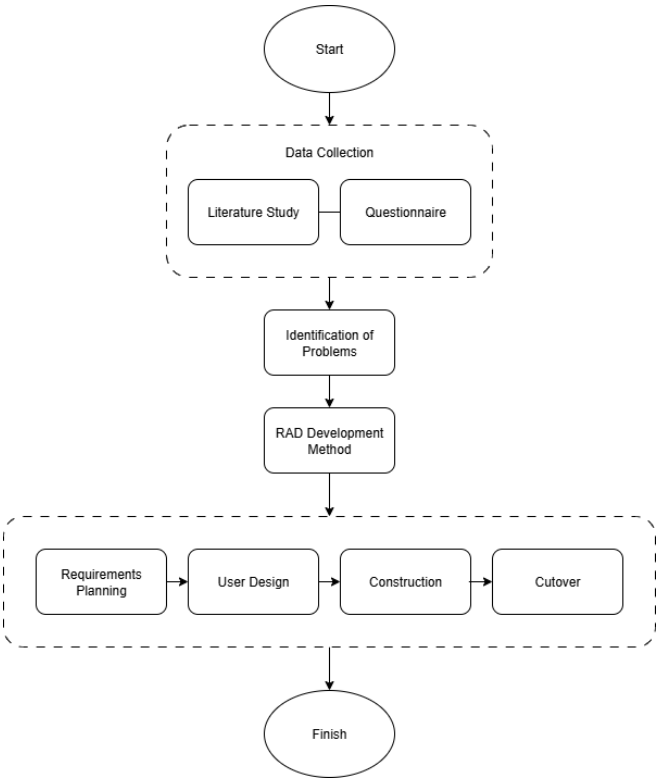

Figure 1. Research Flow

A. Data Collection

In the initial stages of the research, data collection was conducted to obtain basic information for designing and developing an English language learning application. The data collection methods used included:

1. Literature Review

The literature review was conducted by reviewing various journals, scientific articles, and previous research related to application-based English language learning. This review provided the theoretical basis for designing the application's features and workflow[14].

2. Questionnaire

Furthermore, the questionnaire was used in two stages. The first stage was conducted during Requirements Planning to determine user needs and expectations regarding the application's features. This questionnaire was distributed to 100 respondents from various educational backgrounds. The second stage was conducted during Cutover to measure the level of user usability and satisfaction with the application using the System Usability Scale (SUS) method. A total of 20 respondents (15 students and 5 experts) participated in online testing via the Zoom Meeting platform before completing the SUS questionnaire. The results served as the basis for assessing the quality of the interface and user experience.

B. Problem Identification

The results of data collection through literature studies and questionnaire distribution indicate that several obstacles remain in the process of learning English through digital media. One identified obstacle is the lack of engaging and interactive learning media, which often leads to users losing motivation to learn continuously[15]. Furthermore, the learning materials available in some applications are not yet able to adapt to the ability level of each user, resulting in a less than optimal learning process. Gamification aspects, which should be able to stimulate learning enthusiasm, have also not been widely integrated into the applications used by users. Furthermore, ability measurement features, particularly in the form of TOEFL preparation exercises, are still very limited. These various problems serve as the basis for designing and developing English learning applications that are more adaptive, enjoyable, and relevant to user needs.

C. System Development Method

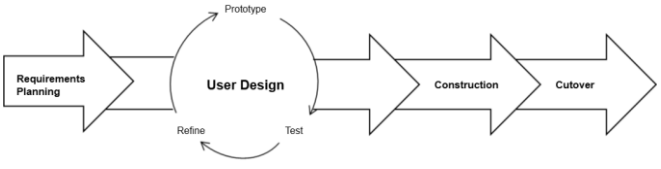

Figure 2. Framework Research[16]

The method applied in the development process of this application is Rapid Application Development (RAD). The RAD method was chosen because it emphasizes active user involvement and its ability to support a rapid and iterative system development process[17]. The stages in the RAD method that were implemented include:

1) Requirements Planning

This stage is the beginning of the development process. Researchers and stakeholders discuss user needs and the goals of the application to be built. Activities at this stage include gathering requirements, identifying key features, and planning business processes[18]. At this stage, user feedback collected through questionnaires served as the basis for determining the initial structure of the user interface (UI) and the key features to be developed. This information also helped identify the interactive elements most relevant to users' English learning needs.

2) User Design

The User Design stage is the application design process that aims to ensure that the application is developed according to the specified requirements and is able to address the problems identified in the previous stage. In this study, the design utilizes Unified Modeling Language (UML), which includes use case diagrams and activity diagrams. In addition, the design also includes the user interface (UI/UX) to make the application easier to use and more convenient[19]. At this stage, end users are actively involved in the initial design validation process through prototypes and wireframes. Users provide feedback on the layout, navigation, and interface appearance. This feedback is then used to inform decision-making regarding the front-end design to make it more responsive to actual user needs.

3) Construction

The Construction phase begins the design of a pre-planned application. The system architecture in this study uses a modular approach consisting of three main components: the frontend, backend, and database[20]. The frontend was developed using Flutter, implementing the MVVM architectural pattern to support the separation of logic and interface display. Meanwhile, the backend was developed using Go (Golang) to handle business logic and data management, and PostgreSQL served as the primary database. Communication between the frontend and backend was conducted via a REST API in JSON format to ensure fast and stable data exchange. Initial testing (alpha testing) was conducted with users to verify that each interface component functioned properly and was responsive. The results of this testing served as the basis for refining the design and enhancing user interaction.

4) Cutover

The Cutover phase is the final testing phase for the entire application designed in the previous phase. Testing is conducted to ensure all features function properly and the interface is user-friendly. This process utilizes two approaches: a black-box User Acceptance Test (UAT) to

verify system functionality, and a System Usability Scale (SUS) to assess the application's level of satisfaction and usability.

The System Usability Scale (SUS) consists of ten statements designed to describe user perceptions of the system's usability, clarity, and consistency. The questionnaire is presented in Table I. Each statement is rated using a 1–5 Likert scale, representing respondents' level of agreement ranging from strongly disagree to strongly agree. Questions are phrased in alternating positive and negative forms to maintain a balance in user perceptions and reduce potential bias.

TABLE I
QUESTIONNAIRE

No	Question	Skore
1	I think I will use this app a lot.	1-5
2	I found this app complicated to use.	1-5
3	I find this app easy to use.	1-5
4	I feel I need technical assistance to be able to use this application.	1-5
5	I found the various functions in this app well integrated.	1-5
6	I think there are too many inconsistencies in this app.	1-5
7	I'm sure most people will learn to use this app quickly.	1-5
8	I find this app confusing.	1-5
9	I feel confident when using this application.	1-5
10	I need to learn a lot before I can use this app.	1-5

The SUS score calculation process is carried out by converting the answer values for each statement. For odd-numbered (positive) questions, the score is subtracted by 1 from the value chosen by the respondent. Meanwhile, for even-numbered (negative) questions, the score is obtained by subtracting the scale value from 5. The total score of all items is then multiplied by 2.5 to obtain an individual SUS score in the range of 0–100. Next, the average value of all respondents is calculated using Equation (1), as shown below.

$$\bar{x} = \frac{\sum x}{n} \quad (1)$$

Information:
$\bar{x}$: Average SUS score
$\sum x$: Total respondent score
n : Total number of respondents

After the application is declared to be running well, the implementation and distribution process is carried out. The application can be uploaded to platforms such as the Play Store, App Store, or shared through internal media such as school websites, accompanied by a user guide[21]. Evaluation of the effectiveness of the application is carried out using pre-test and post-test methods to measure improvements in user capabilities. Feedback from users is also collected as a basis for future application development and refinement[22]. User involvement at this stage is crucial for final validation of the UI/UX's appearance and usability. Feedback from this testing serves as the basis for evaluating the success of the front-end design and as a guide for developing subsequent versions.

III. RESULTS AND DISCUSSION

A. Requirements Planning

In the early stages of implementing the Rapid Application Development (RAD) model, the requirements planning process was carried out through literature studies and the distribution of questionnaires to potential application users. The results of the literature study showed that applications such as Duolingo, Hello English, and Google Translate have been widely used by students in Indonesia and have had a positive impact on improving English skills, especially in the areas of listening and reading. Several limitations were also found, such as limited material personalization, annoying advertisements, and a lack of interactive gamification features. The data collection process was also carried out by distributing an online questionnaire using Google Forms to 100 respondents from various levels of education. In terms of demographics, the respondents consisted of 50% male and 50% female. In terms of age, the majority of respondents were in the 21–25 age range (67%), followed by the 15–20 age group (33%). In terms of institution, most respondents were students (94%), with the rest being pupils, employees, and other professions in small numbers.

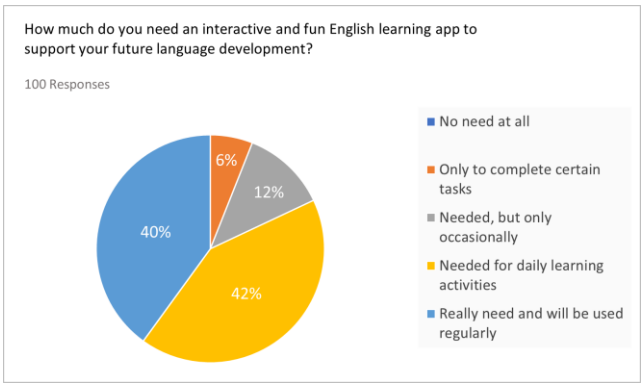

Figure 3. Learning media needs questionnaire

The questionnaire results in Figure 3 show that the majority of responses, namely 82% of respondents, stated that they needed interactive and fun English learning media, consisting of 42% who needed it for daily learning activities and 40% who really needed it and would use it regularly.

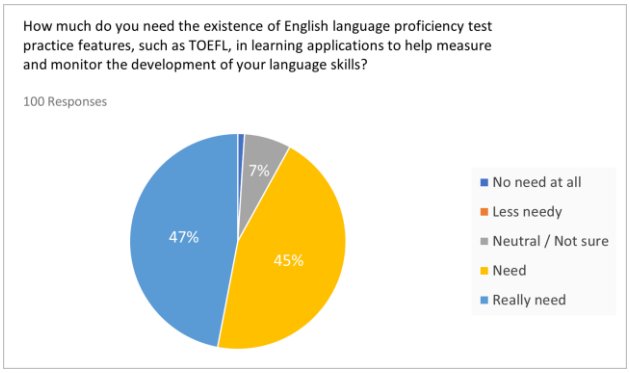

Figure 4. Interest questionnaire features practice test

The questionnaire results in Figure 4 show that the majority of responses, namely 92% of respondents, wanted a TOEFL practice feature or language ability measurement, consisting of 45% who needed it and 47% who really needed it.

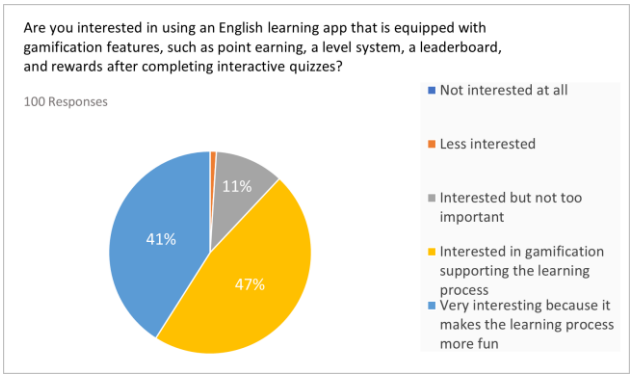

Figure 5. Kuesioner ketertarikan fitur gamifikasi

The questionnaire results in Figure 5 show that the majority of responses, namely 88% of responses, were interested in gamification features such as scores, levels, and rewards, consisting of 47% stating they were interested if these features supported the learning process, and 41% were very interested because they were considered to make the learning process more enjoyable.

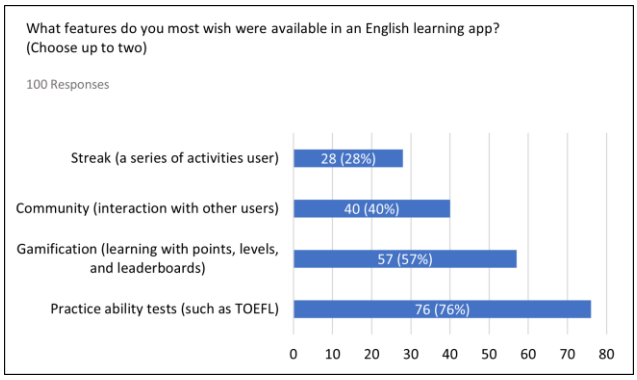

Figure 6. Questionnaire of expectations regarding features

The questionnaire results in Figure 6 show that the most desired feature is available. Most respondents, namely 76%, chose test practice features such as TOEFL as their top priority, followed by gamification features at 57%, community features at 40%, and streak or daily activity log features at 28%. These findings reinforce that users not only need learning materials, but also supporting features that can increase motivation, engagement, and the ability to monitor progress on a regular basis.

The information obtained from the literature review and questionnaires is then systematically analyzed to design the interaction flow and user navigation structure that will be implemented in the User Design stage. At this stage, identified user needs are translated into conceptual representations using UML diagrams such as use cases and activity diagrams, to ensure each feature is structured according to the actual needs of the users. The overall visual interface design is not presented at this stage, but will be explained in detail in the Construction stage along with the complete functional implementation of the application.

B. User Design

At the user design stage, system design is carried out to describe how the application will run in accordance with the user requirements that have been analyzed previously. The application modeling process is carried out using Unified Modeling Language, often known as UML. In UML modeling, two diagrams are used to visualize the system to be built, namely use case and activity diagrams.

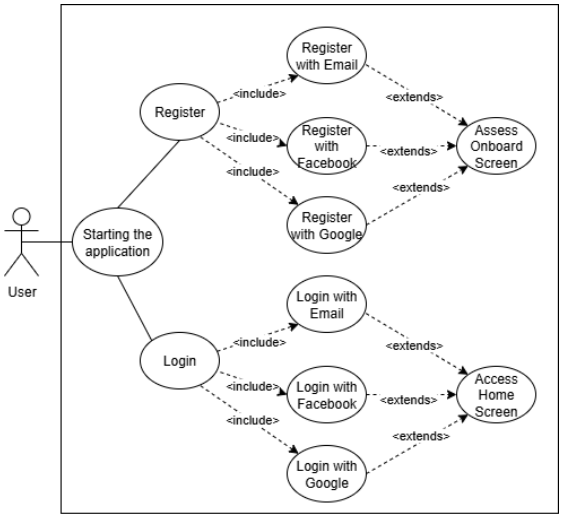

Figure 7. Login and Registration Use Case Diagram

In the use case diagram shown in Figure 7, the user, as the actor, initiates the application and then registers for an account. Registration can be done via email and password or through Google account integration. After successful registration, the user is directed to set learning preferences, such as learning goals and English proficiency level.

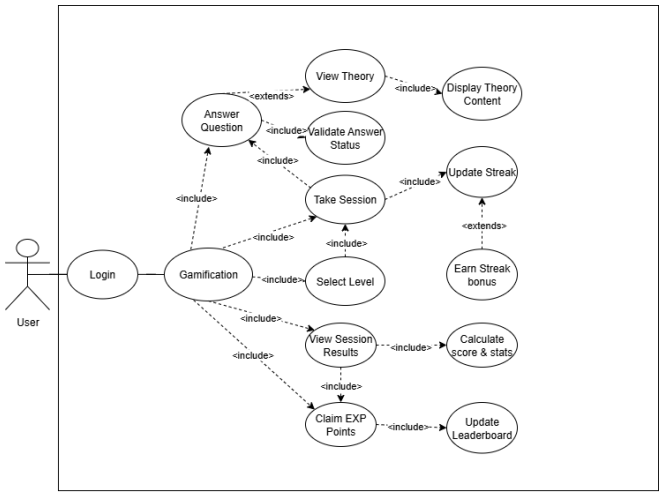

Figure 8. Gamification Use Case Diagram

In the use case diagram shown in Figure 8, the user, as the actor, logs in before accessing the gamification page. Next, the user can select a level, participate in learning sessions by answering questions, view session results in the form of scores, and claim experience points (EXP) to track learning progress. This diagram emphasizes the primary functionality that users can perform within the system.

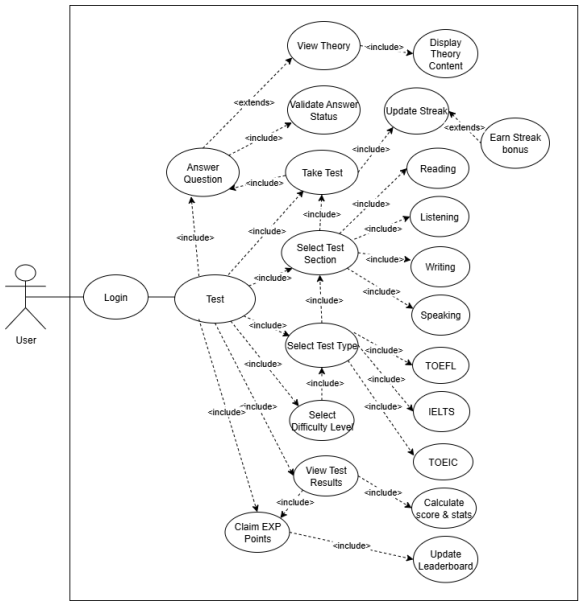

Figure 9. Test Use Case Diagram

In the use case diagram shown in Figure 9 above, the user, as the actor, first logs in and then accesses the test section, which consists of various types of English language tests. Next, the user can answer questions according to the selected test section, complete the test, view the test results in the form of a score, and claim experience points (EXP) to record their learning outcomes.

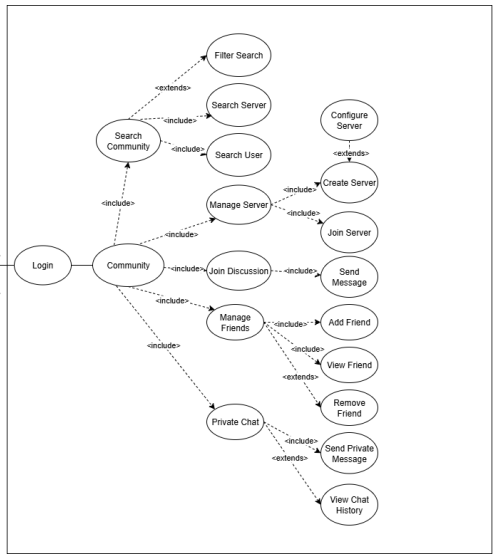

Figure 10. Community Usecase Diagram

In the use case diagram shown in Figure 10, users as actors must first log in to the application before accessing community features, such as searching the community, managing servers, joining discussions, managing friends, and private chat. The flow of interaction between users and the system on the mobile application with each available feature is further illustrated through an activity diagram. Figure 11 shows that the initial activity that users must perform is to register an account. The process begins when users open the application and attempt to log in if they already have an account. If an account is not yet available, users are required to register.

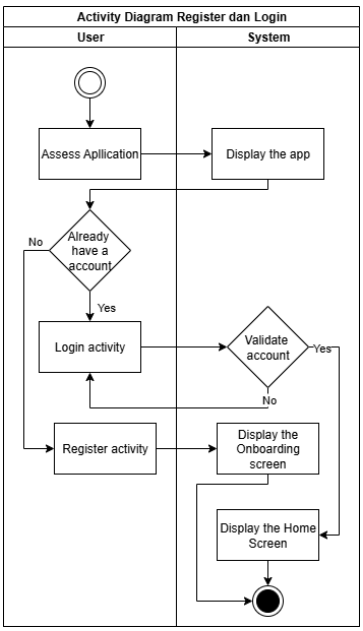

Figure 11. Register and Login Activity Diagram

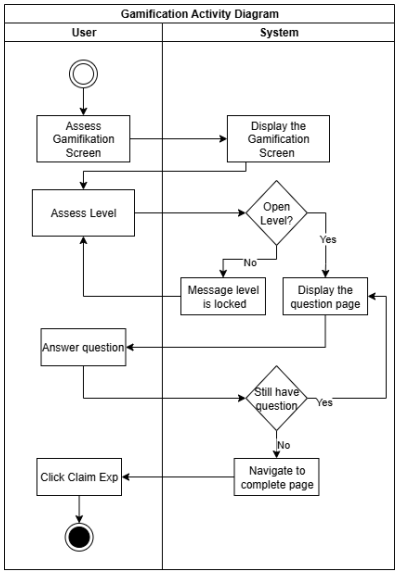

Figure 12. Gamification Activity Diagram

As seen in Figure 12, the process begins when the user accesses the gamification screen and selects a level. If the level is locked, the system displays a message; if the level is unlocked, the system displays a question page. The user answers the displayed questions until all questions are completed. The system then directs the user to the completion page, where the user can claim experience points (XP) earned from the gamification activity.

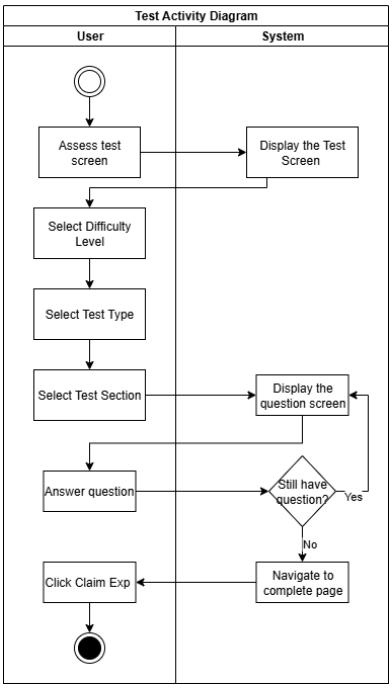

Figure 13. Test Activity Diagram

As seen in Figure 13, this diagram illustrates the process flow when a user accesses the test screen, selects the difficulty level, determines the test type, and selects a test section. The system then displays questions to be answered until all questions are completed. At the end of the process, the user can claim experience points (EXP) as a result of the test activity.

As seen in Figure 14, the user interaction flow starts with logging in, searching for servers or friends, and then joining a server to discuss or send private messages. The system responds to each activity by displaying search results, processing join requests, and displaying messages in discussion rooms and private chats.

The conceptual design results, visualized through UML diagrams, serve as a reference for the application implementation process during the Construction phase. All interaction flows, business processes, and navigation structures designed in this phase are then translated into a concrete interface using a front-end framework and back-end logic. Thus, the system design validated in the User Design phase can be realized as a fully functional application that meets previously identified user needs.

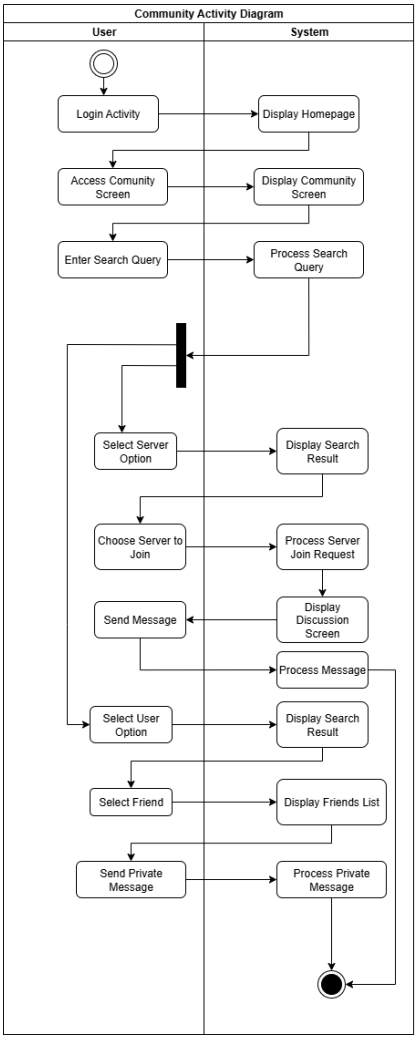

Figure 14. Community Activity Diagram

C. Construction

The Construction phase is the process of realizing the system design formulated in the User Design phase into a functional application. Implementation is carried out using a layered architecture approach that connects the three main components of the system, namely frontend, backend, and database, as shown in Figure 15. On the frontend side, the application is developed using Flutter, adopting the MVVM architectural pattern and state management using Providers. The backend is developed using Go (Golang) to handle business logic and database integration. Communication between the frontend and backend is done through a REST API in JSON format.

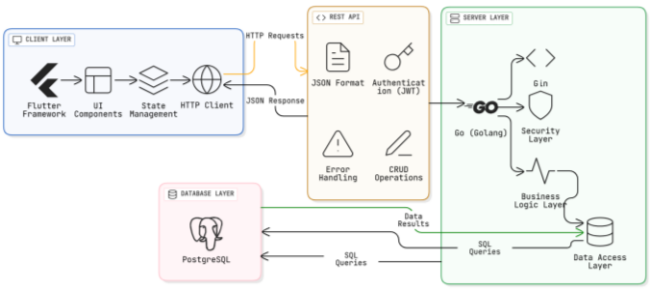

Figure 15. System Architecture & Frontend–Backend Integration.

To clarify the internal structure of the frontend, the Model–View–ViewModel (MVVM) approach is used, as illustrated in Figure 16. In this pattern, the View is responsible for the interface display, the ViewModel manages the presentation logic and state, while the Model and Service handle the process of retrieving and sending data through the API. This pattern allows for a clear separation between logic and display, making the application easier to maintain and develop.

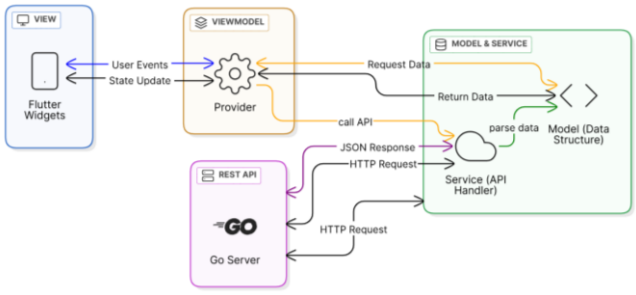

Figure 16. MVVM Frontend Architecture

The system integration process was carried out by connecting the user interface to the backend using a developed REST API endpoint. Interface performance was optimized through lazy loading mechanisms, efficient widget management, and responsive layouts to ensure the display remains stable across various device sizes. Initial testing (alpha testing) was conducted to ensure each interface component functioned as intended, including the registration, home, test, gamification, and community pages.

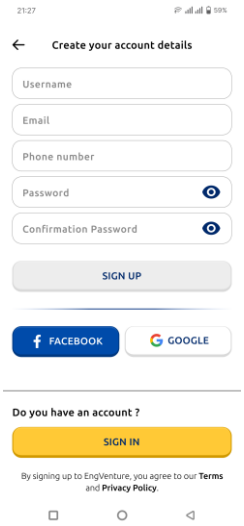

Figure 17. Registration Screen

Figure 17 shows the user interface for registering an account. Users register by filling in all the required data. If any data is incomplete, the user cannot register an account. Username, email, phone number, and password data are entered into the authentication backend and stored on a Virtual Private Server.

Figure 18. Home Screen

Figure 18 shows the user interface for the home screen. After logging into the application using their account, the home page is displayed. Users can view information about their streak and leaderboard.

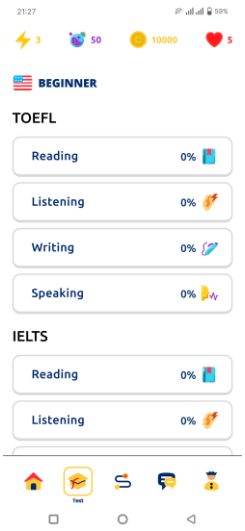

Figure 19. Test Screen

Figure 19 shows the test page interface, where users can access test difficulty levels such as BEGINNER, INTERMIDATE, and ADVANCE. Each difficulty level contains test types such as TOEFL, IELTS, and TOEIC. The questions in these test types include Reading, Listening, Writing, and Speaking, which will train the user's comprehension. This page is focused on being a tool for systematically measuring the user's initial abilities and development. Each answer will be converted into a score, which is immediately accumulated as XP. This data will be used as a basis for learning evaluation and user ranking on the leaderboard, as well as providing motivational encouragement in the learning process.

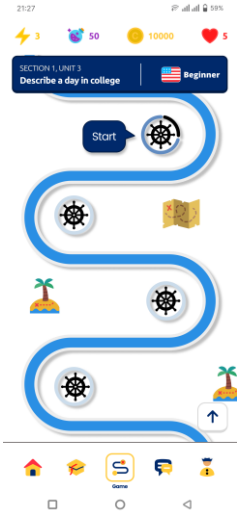

Figure 20. Gamification Screen

Figure 20 shows the gamification page. The gamification page presents questions, including a choice of images, audio, and word-filling in sentences. Selected answers are processed in real time, and the results are immediately displayed as a score. Unlike more formal test pages, this page prioritizes fun learning while also recording results as a form of ongoing training. Accumulated scores from the gamification are also added to the user's XP total, which influences their position on the leaderboard, enhancing the competitive and motivational aspect.

Figure 21. Community Screen

Figure 21 shows the community page. On the community page, users can search for servers and friends using the search bar. The menu is divided into two sections: Server and Friends. On the Server page, users can join existing discussion communities or create new ones using the Create New Server button. On the Friends page, users can add friends and engage in personal communication. This feature provides a space for interaction and collaboration between users to support the English learning process.

These interfaces represent the complete user interaction flow, from the registration process to learning activities and communication within the community. This implementation demonstrates the alignment between the initial user needs analysis and the conceptual design during the User Design phase. The results of this construction phase serve as a crucial basis for conducting system acceptance testing (User Acceptance Testing) and testing the level of user usability and satisfaction (System Usability Scale) during the subsequent Cutover phase.

D. Cutover

The Cutover stage is the final phase of the application development process, where comprehensive testing of the system's functionality and usability is conducted. This testing aims to ensure that the developed implementation truly meets user needs identified in the Requirements Planning and User Design stages. The testing process is carried out through two main approaches: a black-box testing-based User Acceptance Test (UAT) to evaluate system functionality, and a System Usability Scale (SUS) method to quantitatively assess the level of satisfaction and ease of use of the application. This

testing involved 20 respondents, consisting of 15 students as end users and 5 experts as technical validators, to ensure the evaluation results are objective and comprehensive.

TABLE II
TESTING FEATURES

No	Tested Features	Testing Scenario	Status
1	Account Registration	Users register with complete data	Succeed
2	Login	User logs in with the appropriate data	Succeed
3	Test	Users access the test feature	Succeed
4	Interactive Exercises (Gamification)	Users complete interactive pictorial/audio problems	Succeed
5	Leaderboard	Users see a ranking based on total XP score	Succeed
6	Daily Streak	Users work on questions for the first time in a day	Succeed
7	Community (Server)	Users create or join community servers	Succeed
8	Community (Friends Discussion)	Users discuss privately with friends	Succeed
9	Logout	User exits the application	Succeed

The test results presented in Table II show that nine key features account registration, login, TOEFL test, gamification, leaderboard, daily streak, community, and logout run smoothly and meet the designed test scenarios. All features achieved a "Succeed" status, indicating the application is ready for usability testing.

To strengthen user acceptance validation, usability measurements were conducted using the System Usability Scale (SUS), which consists of 10 statements on a Likert scale of 1–5, with five positive and five negative statements. A total of 20 respondents completed the System Usability Scale (SUS) questionnaire after running all application test scenarios.

TABLE III
SYSTEM USABILITY SCALE (SUS)

Respondents	Question										Total	Value
	1	2	3	4	5	6	7	8	9	10		
R1	4	3	4	4	3	4	2	3	3	3	33	82.5
R2	4	3	3	2	3	1	4	3	3	2	28	70
R3	4	4	4	2	4	2	4	4	4	2	34	85
R4	3	3	3	2	3	1	3	4	3	3	28	70
R5	4	3	3	2	3	3	3	3	3	3	30	75
R6	3	4	4	4	2	3	4	4	2	3	33	82.5
R7	4	4	4	4	3	4	4	4	4	4	39	97.5
R8	2	4	4	4	4	4	4	4	4	4	38	95
R9	3	3	4	3	3	3	3	3	2	3	30	75
R10	4	3	4	3	4	1	4	4	3	4	34	85
R11	4	4	4	4	3	4	4	4	3	4	38	95
R12	4	4	4	4	3	4	4	4	4	3	38	95
R13	3	4	4	3	3	4	4	4	4	3	36	90
R14	4	4	4	0	4	4	4	0	4	0	28	70
R15	4	4	4	3	4	4	4	4	3	3	37	92.5
R16	4	3	3	3	4	4	4	3	4	4	36	90
R17	3	3	3	3	3	2	3	3	3	2	28	70
R18	4	4	4	3	3	3	4	3	4	3	35	87.5
R19	3	4	4	3	3	1	4	4	4	3	33	82.5
R20	4	4	4	2	4	4	4	4	4	4	38	95
Final Result												84.25

Based on the SUS questionnaire results presented in Table II, the data represent the transformed SUS scores that were previously calculated following the procedure described in the methodology section. Each respondent's total score was converted into an individual SUS score within a range of 0–100. These results provide a quantitative overview of the system's usability level based on user feedback after completing all defined testing scenarios. The classification of the SUS results includes three key indicators: Acceptability, Grade Scale, and Adjective Rating, which together illustrate the level of user satisfaction and system quality.

TABLE IV
SUS INTERPRETATION RESULT

SUS Total Score	Acceptability	Grade Scale	Adjective Rating
84.25	Acceptable	B+	Excellent

The Table IV shows that the average SUS score of 84.25 falls into the Acceptable category, with a Grade Scale of B+ and an Adjective Rating of Excellent. These results indicate that the majority of respondents found the EngVenture app easy, comfortable, and confident to use. It also demonstrates that the app's interface supports interactive and efficient learning.

In addition to functional and usability testing, interface performance measurements were also conducted to ensure that the user experience runs optimally on various devices. Measurements were conducted on a mid-range device with 4 GB RAM and an Octa-core processor. The results showed that the average interface rendering time was 1.8 seconds, which is considered fast and responsive. Furthermore, the application installation package size was 73 MB, which is relatively light and in accordance with the standards for educational mobile applications. Optimal UI performance is one of the important factors supporting the level of user satisfaction as reflected in the SUS Score results. Thus, the test results indicate that the developed system has been able to meet user needs in terms of functionality and usability, and can serve as a strong foundation for application development and refinement in the next stage.

IV. CONCLUSION

This research successfully designed and developed the EngVenture mobile-based English learning application using the Rapid Application Development (RAD) approach. This application was developed by implementing a modular architecture that includes three main components: frontend, backend, and database, as well as the Model, View, ViewModel (MVVM) pattern to support continuous system maintenance and development. Through key features such as TOEFL, IELTS, TOEIC, and gamification integration, this application is designed to create an interactive and motivating learning experience.

The results of functional testing using the black box testing method showed that all the application's main features functioned according to the test scenario. To strengthen validation, usability measurements were conducted using the System Usability Scale (SUS) on 20 respondents. The average SUS score was 84.25, falling into the Acceptable category with a Scale Grade of B and an Adjective Rating of Excellent. These findings indicate that the application has provided a good user experience, is easy to understand, and comfortable to use.

Furthermore, the interface performance evaluation results show an average rendering time of 1.8 seconds and an installation package size of 73 MB, indicating that the application is lightweight and responsive. However, limitations remain, such as reliance on an internet connection and potential performance degradation on low-spec devices. Therefore, further development will focus on optimizing caching and data compression. Overall, this research contributes to the development of an English language learning application that is adaptive, responsive, and has a high level of user acceptance.

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