LeapOnesia

Gamifications Web Application Prototype For International Student Guidelines to Indonesia

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Abstract— **This project has been aimed for helping international students that are inbound to Indonesia. To build a web application that compiles all the possible difficulties that the students might endure and giving a hint of solution or guides to help them throughout, from pre-departure to arrival to settling in moments. The final result of a web application will be produced alongside with an admin functionality to manage the content of the web application.**

Keywords—Web Gamifications, Application, International Students, Indonesia, Inbound, Vue, Firebase

I. INTRODUCTION

Moving or adapting into a new country with a new lifestyle and new home can be very challenging and sometimes turns into a jumbled mess. It is well known that traversing these challenges needs a lot of planning and preparations.

Some people consider that moving to their new designated country or city is not a big of a deal, especially with all the added benefits such as travel opportunities that awaits, waiting to be discovered. Some people uses this privilege to expand their knowledge, to study, and experience new things, while some other try to challenge, test, and improve themselves by engaging in a brand new situation where they have never endure before, to adapt new life or escape their normal routine life to seek for another enjoyable life that they can find. Alternatively, some people use these opportunities to discover new love, new relationships, new friends, or even new business opportunities [1].

Although with these prestigious benefits, the implication of its price exists without question, a very high price some might say, as some of which cannot be even accounted from a value standpoint, for example, it's psychological price. It is very evidential that moving to a new country or city might need a lot of money. Everybody that wish to move know its high price tag, but what isn't clear to most people is how to prepare for their new temporary or even permanent life, and this is where the trouble begins. These problems can be categorized into 3 phases, that is: pre-departure, arrival, and settling-in.

Other challenges are on how to prepare on their new country, essentially, which clothes they need to prepare, is it for cold climates or is it for hot. Where to book their future accommodations, how to apply new telephone service provider and where they should contact when they are in danger or when they get lost.

Many universities, especially in Indonesia have provide their potential inbound students with a short guidance on how to tackle some of these challenges, but most only shows a short snippet, or a very broad and general guidance. For example, take a look on BINUS International University [2] from Indonesia, their information for students inbound to Indonesia is limited only to its requirement to enter the university, it's campus' information, and an extremely limited information on the accommodations and benefits of settling in the country. It has a very broad scope that results on having a very blurred out details on how to prepare before departing to Indonesia.

Upon arrival, most students can have a hard time on how to travel from the airport to the city or their accommodation destination. Some other complications include how to obtain internet and communications, keeping their safety from pickpockets or thieves, and a compact guide on travelling around the city, such as on which mode of transportation and what is best for them.

Some of the other problems that they might endure are language barrier, which can be solved quiet easily nowadays with the addition of online translator such as google translate, that can be used anywhere and anytime the person needed. But, some of these dilemmas are not as simple to solve, such as culture shock, which the person can feel very stressed to change their old habit, which results to homesickness. The person will feel insecure or comfortable physically or emotionally [3]. This culture shock and homesickness can be cured by occupying their thoughts to something else, something exciting for them. For example, visiting places of interest around the city

The focus of this project has mainly been aimed for students coming inbound to Indonesia.

II. THEORETICAL FOUNDATION

A. Overseas Students Programs

Nowadays, there are a lot of overseas students' program, and is expanding ever so slightly always, these programs have attracted a lot of interest from people around the world, below is only a small proportion, but very prominent and general types of overseas students' programs. Some of these programs includes

student exchange [4], study abroad [5], and summer overseas program.

B. Web Applications

A web application is a computer program that utilizes web browsers and web technology to perform tasks over the internet [6]. It takes advantage of the open and free internet to connect to its users where and when the user request to use the designated web application. There are lot of advantages and disadvantages using web application. Advantages include no installation required [7], centralized data [7], up to date [8], fast development time [9], while disadvantages includes internet reliance[9], unlocking device's full potential[8], different browsers and resolutions[7].

C. Methodology

According to the Merriam Webster dictionary [10], Methodology is a body of rules and methods employed by a procedure, or a set of procedures. Methodology dictates how to build, do, or simply re-create a particular object, service, or way of doing. Methodologies used includes gamification methodology and agile methodology. Cited from an IEEE journal [11], "Gamification methodology refers to the use of game elements in a non-game context to increase engagement between humans and computers". Studies and research have shown that applying gamification in websites and web applications increases user's engagement and thinking skills. The study has shown a higher number of user engagement when the gamification elements applied to their test fidelity, compared to the non-applied gamification elements. Meanwhile, Agile is a framework for delivering products quickly and efficiently. It encompasses a set of new practices and techniques that make product development more cyclical or iterative. It relies on lean management as opposed to more traditional techniques that rely on heavyweight governance. Agile's hallmark features is that it drives the decision-making process lower in an organization, making that organization more responsive and adaptive.

D. Development Tools

Technology used in this project requires a language that is easy to create a web application, as it needs to be readily accessible wherever the user is connected to the internet. It also needs a resize function that can be highly customizable, as it will be used on different types of devices, ranging from computers to smartphones, and each device will have different types of layouts and sizes. Therefore, it needs to be highly adaptive to its device. Back-end side wise, it needs a database that can store its user login credentials and its progress on their website. Base or basic languages used in this project includes HTML, CSS and JavaScript. While the frameworks used are bootstrap, font awesome, firebase, and NodeJS modules that includes *VueJS*, *Vue-Router*, *Vuex*, and *VuexFire*.

III. PROBLEM ANALYSIS

A. Existing problem

According to a research journal from the journal of international students [12], there are a couple lots of complications upon preparing for departure, such as obtaining accurate information regarding the university and college, finances that must be prepared in advance, preparing visa documents, and many more. There are also post departure challenges according to the journal, such as culture shock, racism, financial, psychological, and academic challenges. Furthermore, according to an online article from apply board [13], there were also challenges that might be invisible to the students upon arrival, such as restricted or prohibited items that were not allowed and managing transportation to the accommodation. From these research journal and article, this project has concluded that there are three common problems that usually faced by students when they are going to start their studies overseas. The problems have been divided into three categories which are problem on pre-departure, problem on arrival, and problem in settling down. Some of the problem on pre departure are passport, visa, travel insurance, booking flights, booking accommodations, support system, money support, and what to bring. Meanwhile, some of the problems on arrival are transportation from the airport, travelling around the city, internet and communication, and safety. Lastly, problems on settling in are finding places of interests, finding famous culinary destinations, and finding useful websites or applications.

B. Existing solution

There are a lot of problems that have been discussed on existing problems above, such as the general complications and problems that the user might face upon moving to another country, in this case, Indonesia. Nonetheless, not all hope is lost as there have been solutions as to resolve some of these issues. However, each and every solution have its pros and cons. The project has been built to look into three of the best current solutions, that tries to coop and deal with the problems listed above. Some of these solutions are:

Wonderful Indonesia [14] website, which is a glamorous and well-designed website, constructed specifically for the broad general audience of any tourists that are planning to go to Indonesia. It is filled with a lot of useful information for their users, from the destinations and how to plan their whole trip. However, they are without a flaw, especially for this project topic, that specifically aims for international students.

GoOverseas [15], which is a great website to find out general knowledge, to study in a specific country. In this case, it has some information regarding Indonesia as a destination to study overboard.

StudyLink [16], which is one of the websites to seek universities and their programs overboard. It has an elegant design with minor flaws or bugs. It is also very similar to *GoOverseas* website, if not a direct competitor, as it has mainly a huge similarity to their functionalities.

However, all these solutions do not solve every single problem that have been discussed above on the existing problem.

C. Proposed solution

Based on existing problems and review on existing solutions above, there are a number of gaps that still needed to be addressed. In regards of information provided, all the existing

solution still could not address all the issues. Therefore, each problem will be addressed with a solution below.

A good solution to tackle the problem within passport, visa, and travel insurance is a very simple list and guide on the steps of how they should apply, and each of the common required documents. Special for the student visa, a list of specific documents that are necessary are provided, complete with a step by step tutorial.

In regard to booking flights, most likely, users or students might want to compare prices from one airline to the other, in order to seek the best and cheapest price for them. At once, it must also help the ones that have little to no experience to discover and help them order tickets. There are a lot of websites, and which some offers the ability to compare to other sites. Listing all the useful websites will be a very useful module for the students.

For accommodation, providing them with a list of different websites and redirect them directly to it, specifically, the ones that provides accommodation for mid to long term. For example, universities dorms websites, room/kos finder websites, etc. This feature should be one of the most useful to tackle the problem for accommodation.

On the subject of support, users or students may want to prepare any emergency contacts and phone numbers in advanced before arriving on their destination. As once they have arrived at Indonesia, and once they are in a sticky situation, they might not have a lot of time to search for any emergency contacts around the internet. Therefore, it is very useful for them to actually add these to their phone before they depart. Best solution is to provide the list of all available emergency phone numbers. For example, police stations, hospitals, ambulances, each and every embassy of available countries in Indonesia, and popular international universities.

Other than emergency contacts, money is also a good topic especially before they depart as they need to prepare for some cash in Indonesian Rupiah at least. A good tip can be very crucial for the user. Other tips such as where they can retrieve cash with their international debit or credit cards can be very useful as well. The list of this banks that exist in Indonesia that cooperates internationally also helps outsiders to apply or at least have an account on those banks and transfer money can be much easier. It eases their process of transferring money from a foreign country to Indonesia and vice versa.

In regards to what things to bring, items on what to bring can vary on each user, and it is not a static thing that everyone needs, although most common items can be a very great tip, the user must always be able to edit what they should bring. Therefore, a good solution is to create a checklist where the users can edit and tick off which ones that they have prepared.

In regard to transportation from the airport, a lot of transportation methods are available for anyone to use, but not everyone knows each and every different option, especially the ones from the outside the country who have never had any experience upon arriving in Jakarta or Indonesia. One of the solutions is to create a useful information list of all the available transportation methods, and who provides these services. For example, Taxis and Rail Link can be two of the best options available. The information listed must also have a direct link to each of the transportation method (if a website or application exist) and provide all the detailed information such as their price and routes (if there is a route on the transportation method).

For transportation around the city, transportation methods in travelling from the airport differs with transportation methods that are used for everyday purposes. For example, people may not be able to use the Rail Link network if they want to travel from *Kemang* to *Ancol*. As there are no routes that connect both of them. Two of the biggest transportation agencies mentioned above in the problems section, namely *GoJek* and *Grab* can be a great option for these types of transportations. Furthermore, these are effective methods of transportation, especially the option of motorcycle, it adds the bonus of a very swift method of transportation. These lists of all available transportation method can be very convenient for the user or students, especially if they have not had any experience before.

In regard to internet and communications, mobile phone number provider may work differently from other countries, so a detailed, yet short guide is a good way to start, just to make clear of any confusion. Then, once the user / student has understood how it works, a short list of major mobile phone providers is displayed alongside with its complete details like website, phone number, and one of its address. Additionally, alongside with details, there can also be a comparison table for its major packets for each of the providers. This can easily help the users to compare within all the providers and their respective costs.

For safety, issues regarding the problems mentioned above, are not possible to solve one hundred percent and that is a fact. Nonetheless, it can be avoided as much as possible. One of the solutions to solve it is to have a list of Frequently Asked Question (FAQ) or at least some tips that may be able to help the user in any way possible. For example, what to do if a crime happens near them, or happen to them. Where must they go and who must they contact. But as always, prevention is still better than the real incident. Therefore, some good tips and experience from other people can be a very valuable lesson for the others.

In regards to places of interest, Existing solutions such as Wonderful Indonesia and *GoOverseas* has done a great job on tackling this problem, therefore, a good move is to try and imitate the solution that these websites has, whilst adding some added values to their solutions, such as a pinpoint to the exact location on where the current place of interest is. This might be helpful and cut time for the user to search again in maps provider.

In regard to famous culinary destinations, existing solution such as Wonderful Indonesia has solved some part of this issue by listing all the foods originated from Indonesia. However, they have not mention where the users should find these types of foods or which shops or stalls are the best for these types of foods. One of the best solutions is to actually obtain this information from the locals themselves, list it and pinpoint the exact locations of each and every place with third party maps such as Google Maps. But some culinary destinations might be

different to the others, therefore, websites such as Zomato can be a helpful reference and a redirect link is a good way to go.

In regard to useful websites or applications, a long list of these type of websites or applications can be a handy tool for students. In this way, they can compare prices between the traditional shops and online shops, in order to save some money, as many of the things displayed in traditional shops can be bought cheaper through online. Not only a long list, but a direct link to these websites are mandatory and also some short description for their respective specialty, what it is famous for, pros, and cons if they currently have any.

Lastly, to even further add value to the solution, progressive web application and gamification methodology will be used. With the implementation of progressive web application into the following project, it will increase the flexibility of the system as once the web application has been built, it can be ported to other devices, such as Android or Apple devices. This is very functional as when it reaches the point of a progressive web application, the application can be saved directly to the devices natively and can still work offline without the use of the Internet and connected to the servers. The implementation of a gamification technique or transforming a work activity into a game-like activity will automatically increase the engagement rate of the users and students [17]. It works by molding certain non-game context activities with the application of game design elements. In this project example, this can be easily done by adding an achievement on which items the students have done and adding a progress bar. This stimulates the student to thinking they are playing a game instead of doing a boring activity and keep working on their to do list.

IV.   DESIGN AND IMPLEMENTATION

A. System Architecture

In Figure 1, the system will be a model view controller (MVC) architecture where clients will request from the client page and displayed their views from the node js server along with vue.js, bootstrap, and font awesome to enhance its appealing appearance. The view module also obtains data directing from the model using the *vuex* store and uses controller utilizing vue.js and *vuexfire* to add, edit and delete data. The controller itself can also obtain additional data from any third-party API to verify or obtain a needed data. The model, utilizing *VueX* store can also obtain data from an external database from Firebase Realtime Database. The admin page has the same setup with client page, as it all has gone through the view module to access and alter any data.
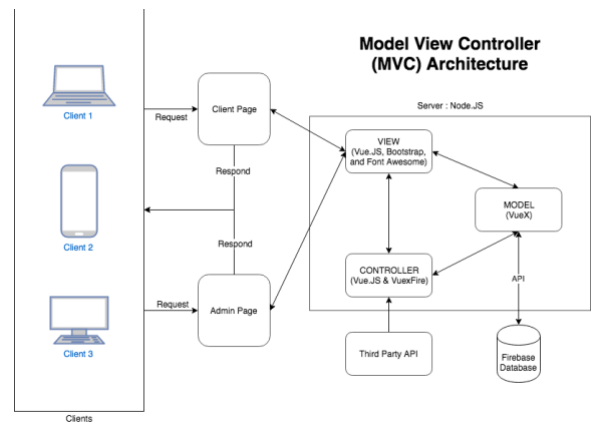

Figure. 1. MVC System Architecture

B. Use Case Diagram

In figure 2, the user can login through the portal and register if they do not exist yet. The user can then view the categories and select the individual guides. In each guide, they can see information. They can also view their progress through the achievements page. The admin can access the admin page, while the API connect to the firebase database server provides the data. However, it is part of a bigger system therefore the connecting of the API to other modules cannot be fully visualized in this use case diagram.
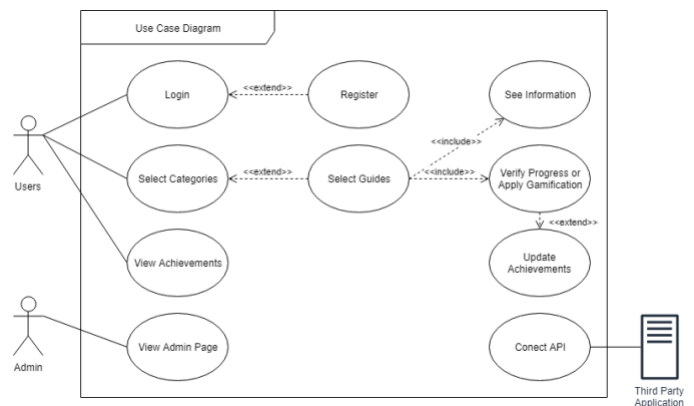

Figure. 2. Use Case Diagram

C. Software Requirements

The *LeapOnesia* project is developed for web application, where it can be opened in browser in most devices. The project relies on HTML and CSS for its structure and appearance, and the JavaScript scripting language for data processing and data transfer. It also uses a JavaScript framework, Node JS and requires Node Package Manager (NPM) to install its dependencies. Dependencies and libraries used that makes the project possible which includes bootstrap (version 4.3.1), core-js (version 2.6.5), firebase (version 6.1.0), *vue* (version 2.6.10), *vue*-moment (version 4.0.0), *vue*-router (version 3.0.3), *vuex* (version 3.0.1), *vuex-persistedstate* (version 2.5.4), and *vuexfire* (version 3.0.0).

D. Hardware Requirements

Most modern computers with browser supported are able to run the web application and there are no specific requirements in order to run or use the web application, but for development and testing the author used these specifications for the server: Intel Core I7-6700, 32GB RAM, 2TB HDD, RTX 2060, with Windows 10 Operating system. Clients hardware tested specifications ranges from Phone to Laptop to Computer. Phone ranges from *XiaoMi* Redmi Note 4x to iPhone 7, while laptop ranges from Lenovo B490 to MacBook Pro 2013, while computer range from iMac 21.5-inch Late 2012 to custom updated Personal Computer with the same specification with the server.
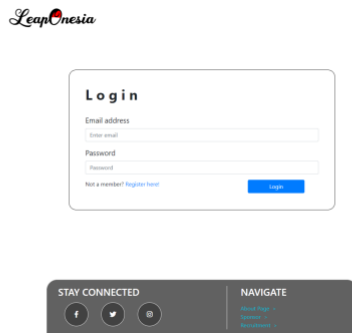
E. Testing

There are 19 technical test sets conducted during the making of the project, and here are 3 of the most interesting test results conducted along with its screenshot as proof.

1. Login Page

Test ID	Name	Expected Result	Status
PT1	I want to login to the website	System should verify the user and redirects to the home page if verified	Passed

Screenshot:

2. Home Page

Test ID	Name	Expected Result	Status
PT3	I want to view the home page	The website should display the home page	Passed

Screenshot:
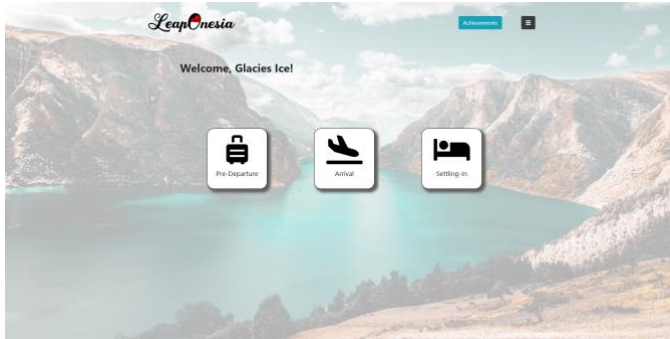
3. Admin Page

Test ID	Name	Expected Result	Status
PT3	I want to access and view the admin page	The system should display the admin page when accessed	Passed

Screenshot:
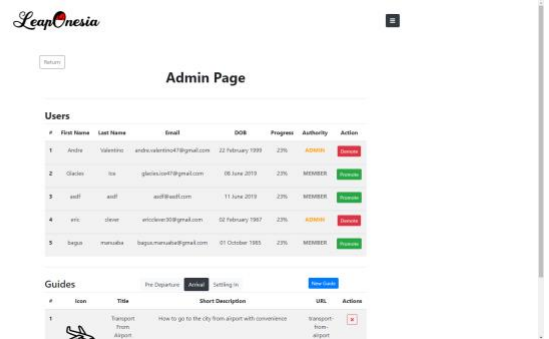
V. DISCUSSION

A. Evaluation

Post testing and after evaluating the test results, PT1, PT2, and PT3 covers the scope, around users able to create a personalized account as they are able to create an account, and login with their credentials accordingly. Then, when the login and register process are successful, they will be redirected to the home page. PT4, PT17, PT18 and PT19 covers the benefit of admin to manage roles, add, edit, and delete guides. PT5, PT6, PT7 is useful as a menu and a bridge to PT8 that will solve the aims and benefits for creating necessities and essentials checklist, troubleshoot any problems upon arriving in Indonesia, master their destination area, and emergency contact. PT9, PT10, PT11 and PT14 tackles the scope of the users able to be rewarded with digital badges and uses gamification methodology. PT12 and PT13 is an aesthetic decision to improve reactivity of the web application and appearance. PT15 and PT16 is a navigational guard test to prevent any illegal access.

Upon inspecting and further examination of the test results *conducted*, it can be concluded that every test objective have been met accordingly and have expected their definition of done, which has been defined in a separate document of product backlog. This product backlog and its reference can be found in the development methodology section from sub section *2*. Although the technical test set report does not fully depend on the product backlog and its definition of done, it is safe to say that the product backlog has had a huge influence and heavily affects the technical test sets.

VI. CONCLUSION

The project so far has been doing fairly well in terms of development and results. The project has fulfilled most of the scopes, particularly, the project has been developed for almost

all modern devices, the project has also used the gamification methodology to further engage the users, every user that complete the tasks has also been rewarded with a digital badge or achievement, and some modules have been equipped with an extended variety of features, such as API receivers.

Regarding the aims and benefits mentioned in the section 1, it has completed the aim of building a one-stop solution for any inbound overseas students, and has also achieve its benefits of check listing the user's necessities, troubleshoot any problems they might face upon landing to Indonesia, comprehend and master their destination in the area, and have a ready to go emergency contacts when needed.

However, all these achieved milestones are not without its defects. For example, the project has missed some one of its aims and benefits each. Particularly, the aim for the user to be able to give feedback, rate, and comment on their respective universities, which leads to the lack of benefit for collecting data about student's opinions and ratings. Nonetheless, this shortfall can be fixed and be filed in for future works and recommendation.

Nowadays, there are a lot of overseas student program, such as study abroad, student exchange program, and summer overseas program. However, these programs are without its troubles that follows, such as difficulty for seeking visa, accommodation, and things to prepare. Therefore, it needs a one stop solution using web application, as web application is very flexible and easy to setup. Web application does not need any installation, there is a centralized data, so it is easier to control, always up to date as it is always connected to the world wide web, and it is pretty fast to develop. However, in the same way it keeps it updated, it also relies heavily on the internet connection. It also may not use the device's full potential, it poses a security risk, if not careful

The problem has been simplified and deducted into three major categories, that is pre-departure, arrival, and settling-in. Problems in pre-departure mainly consists of passport, visa, travel insurance, booking flight, booking accommodation, support system, money, and what to prepare. Meanwhile, problems in arrival mainly consists of transport from airport, travelling around the city, internet, communication and safety. Last, settling in problems mainly consists of seeking places of interest and famous culinary destinations, and useful websites or applications that can be helpful for the users.

There have been a few solutions available to support these problems, but each of the solutions did not solve every single common problem. So *LeapOnesia* has been developed to solve most if not all of this problem simultaneously. It also offers more additional features that are a shortcut and can make it much more engaging to use, such as progressive web application and gamification applied to the application.

The solution design has been drawn with a model view controller (MVC) architecture, with a straightforward diagram that have been represented in section 4.

The web application has also been fully developed, implemented, and tested accordingly with a full hardware and software specification that was used for testing in this project. It

also mentions the development methodology in use along with the three different development iterations.

Section 5 covers analysis of test results and evaluation of the overall project. It will also talk around the constraints that was faced by the author or developer of the project, such as questionnaires, surveys and the limited number available API. At the end of the paper, it will cover the conclusion and summary of the project and how the project has grown, and which aspects of the objective have been completed by the project.

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