SCHOOL OF COMPUTING
Faculty of Engineering

SECP1513-05
TECHNOLOGY & INFORMATION SYSTEM

<u>LOW FIDELITY PROTOTYPE PROJECT</u>

REPORT OF PROJECT : PART 1

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INTRODUCTION

With the advancement of information technology, manual routines, systems, and activities have proven to be ineffective and time-consuming. In Malaysia, the manual system is still in use as a means of carrying out daily tasks. The fundamental reason for the manual system's existence and failure to be changed was a lack of knowledge and learning. Public transit on the UTM campus is crucial, especially for first-year students who are not permitted to bring their own transportation. However, those who opt to take public transportation have difficulties because they must wait for the bus for more than 30 minutes. They will miss the bus if they are late, but waiting for the bus sooner will result in a waste of time, even if it is only 5-10 minutes. Remember, time is gold. Therefore, our group agreed to design and evaluate a prototype of an integrated shuttle bus service system project to facilitate the movement of UTM students and staff.

AIM

The goal of this integrated shuttle bus service system is to convert the manual routine of shuttle bus booking into a computerized system to ease the routine process. The proposed system will serve as a communication platform between drivers and students. The system will allow users to book an express bus ticket to return to their hometown and pick a drop-off destination beforehand. The system will also allow the bus driver to see the list of bus stops they need to pick and drop users. The rides information will be recorded for internal usage. This system allows public bus users in UTM to know the real-time-location of the bus, the time the bus will start moving and the time for the bus to reach its destination. This will make it easier for users to prepare and organize their journey and time productively and systematically. It will be one of the on-demand services in UTM.

CHOSEN IR4.0 TECHNOLOGIES

We decided to implement system integration technologies to make all the tiring processes become more convenient . The process of connecting multiple elements to a single IT system is known as system integration . The Integration results in a coordinated system consisting of linked databases and data sources. Many businesses now use a variety of IT subsystems for various tasks such as administration, data collection, and payment processing. However, these systems frequently operate independently, resulting in lost time and even money. When systems are linked, they run more smoothly and provide many more benefits than when they work separately. Our applications primarily focus on letting users know the location of the bus, the time it moves and the time it arrives at the destination so that users don't have to wait long to board the bus and the time can be well planned. Shuttle+ also allows users to book express bus tickets to return to their hometown by taking users to the link of the company that offers the express bus service involved. Even though there are multiple express bus companies that offer online booking , it is much easier to do the booking at a one stop center which is on our application , Shuttle+ . On top of that , we agree to make this application more multifunctional by adding features where students can book activities/facilities available in UTM using our app such as kayaking , cycling , rock climbing and so forth . The reason why we came up with these ideas is because we noticed that it is time consuming to book some of the facilities in UTM . For instance , if one wants to go kayaking , they have to walk to the sports excellence hall to book for sports facilities that they want to use . But keep in mind that it is first come first serve . Imagine if we had arrived at the sports center but the booking was full , we wasted our time walking to the sports center and it also required energy . With the examples given , it is great if we can just do the booking while sipping tea on our bed . Based on the scenario , we wanted to make user's movement around UTM become more efficient , fast and does not need to be time-consuming only by doing a few touches on our smartphones . To allow those simple steps , we need to integrate the time management system data , the bus locations , the geographical structure of UTM, the data from UTM sports management system , the express bus company data and also the users data . The process of accessing the facilities provided in UTM becomes more simple and faster with all the necessary information integrated together .

POTENTIAL CLIENT

First of all we agreed to name this prototype of an integrated shuttle bus service system project as Shuttle+ . We are targeting UTM students, staff and also visitors as the potential clients for our integrated shuttle bus service system. Our target users from UTM students are mainly from the first year students who are not permitted to bring their own transportation. Hence we are also targeting the second, third and fourth year students to be our clients by using Shuttle+ system. Therefore, UTM staff and visitors are also encouraged to use Shuttle+ to facilitate their movement around UTM. The major reason our group agreed to design and evaluate this prototype named Shuttle+ is to facilitate the movement of UTM students, staff and visitors. In line with our aim, this system will serve as a communication platform between bus drivers and students in UTM. This idea sparked when students were often late to go to class because they missed the bus. Students also complain that it is difficult to get a transport such as grab or uber to facilitate their movement around UTM. Even though it is not possible to walk from one place to another place, it would be quite tiring as most UTM buildings are quite far from one another. Shuttle+ is a system that hopefully can prevent this from happening. To use Shuttle+, the user needs to be in the range of UTM area as this system will use UTM server to be fully functional. Shuttle+ also applies geo-blocking technology that will block websites from users in specific locations and based upon the user's geographical location. With this technology, the system automatically measures the details of user locations and determines the real-time-location of the bus that will be displayed in the system. In a geo-blocking scheme, the user's location is determined using Internet geolocation techniques, such as checking the user's IP address against a blacklist or whitelist, accounts, and measuring the end-to-end delay of a network connection to estimate the physical location of the user. This system is available to be accessed 24 hours a day, but the service will be off during weekends and public holidays. The end users can access the system by downloading the Shuttle+ application or visiting our website. Shuttle+ system could help our potential users to book express bus tickets to return to their hometown and select a drop-off location. The system will also allow the bus driver to see a list of bus stops where users must be picked up and dropped off. This system informs UTM public bus users of the bus's real-time location, the time the bus will begin moving, and the time the bus will arrive at its destination. This makes it easier for users to plan and arrange their journey and time in a productive and systematic manner. Furthermore, we have agreed to make this application more versatile by adding features that allow students to book activities or facilities accessible at UTM using our app, such as kayaking, cycling, rock climbing, and so on. We came up with these ideas since we realised that it takes time to book some of the facilities at UTM because students have to go to that service centre to book the facilities without knowing if the facilities are fully booked.

CLOUD COMPUTING ARCHITECTURE

As we all know, cloud computing technology is used by both small and large businesses to store information in the cloud and access it from anywhere at any time via an internet connection. By using cloud computing , a business will have a low maintenance cost , highly secured data , unlimited storage space and many other great benefits .

There are two parts of cloud computing architecture which are the front end and the back end . Each part will be communicating using a network or the internet . front-end provides the applications and interfaces needed for the cloud-based service.It is made up of client-side applications such as web browsers like Google Chrome and Internet Explorer.The only component of the front-end is cloud infrastructure .Cloud infrastructure is made up of hardware and software components like data storage, servers, virtualization software, and so on.It also provides end-users with a graphical user interface to help them complete their tasks . We will be using Shuttle+ as an application and the interfaces for the front end . We are planning to provide a user-friendly application that will make things easier for the user to access the application .

The service provider makes use of the back end. It is in charge of managing all of the resources required to provide cloud computing services.
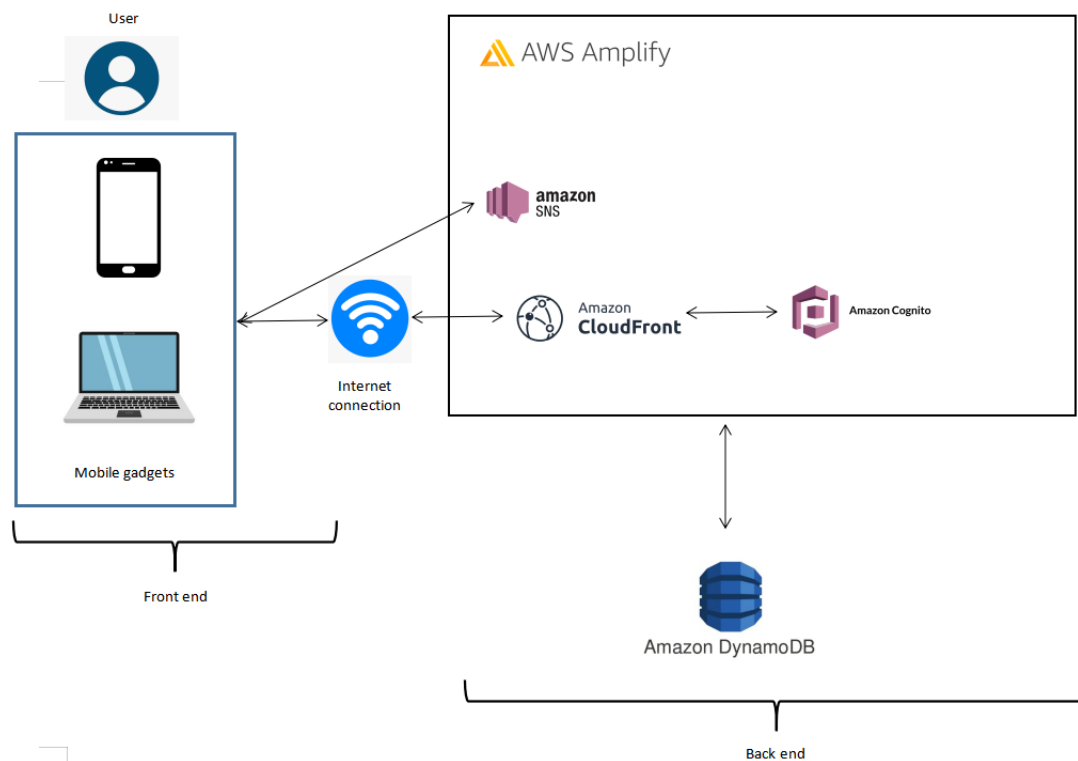
User : Consists of students who are using the service

Mobile gadgets : Will be used to access the app

Internet connection : Internet connection is needed in order to access the app

AWS Amplify : A set of purpose-built tools and features that lets frontend web and mobile developers quickly and easily build full-stack applications on AWS also it visually builds a web frontend UI and eases the management of app contents outside the AWS console. This lightens the effort needed to create our application optimized for both web and mobile users.

Amazon SNS (Simple Notification Service) : Amazon SNS is a fully managed messaging solution that provides low-cost infrastructure for bulk message delivery, primarily to mobile users. This enables the app to send a notification to the students to their gadgets wherever they are when the bus arrives.

Amazon Cloudfront : CloudFront is a content delivery network platform that executes at rapid rates with the secure distribution of data, videos, apps, and APIs on a global scale with low delay-times. By using this AWS, our application will be more responsive and does not require a long time for the application to load the information needed such as the timetable of the bus.

Amazon Cognito : AWS Cognito administers a control access dashboard for on-boarding users through sign-up, and sign-in features to their web and mobile apps. This helps in securing the user accounts using their usernames and their dedicated passwords so that their information will not be easily exploited and leaked to the public.

Amazon DynamoDB : DynamoDB is a document database with key-value structuring that delivers single-digit millisecond performance at scale. Dynamo has built-in security with a fully managed, multimaster, multiregion, durable database, backup and restore, and in-memory archiving for web-scale applications. It is used to store all kinds of information from the ETD (estimated time of departure) and ETA (estimated time of arrival) for the bus, user information and the information on how many stops the bus is going to have on that particular day.

CONCLUSION

1.0 DISCUSSIONS

We realized that it is difficult to conclude anything valid when we have not tested the prototype yet. We will be conducting a survey regarding the idea of the proposed system from the perspective of our potential clients. We will need more user testing to get a reliable test result for our system prototype in the future. We are expecting the survey result to positively prove that this system is a need in UTM. We hope that our potential clients like the project and want to use the app as early as possible so that they can save their precious time and energy. So this will give us hope that we are on the right track. But we can not conclude anything yet.

2.0 ACHIEVEMENT

We are motivated to make this system a success because it will provide several short-term and long-term benefits. Students will have a better insight of the bus movement and will be able to precisely plan their movements throughout and across UTM. As a result, their time will not be squandered and will be utilised to the fullest. With an accurate and efficient integrated shuttle bus service system, more people will use this transportation instead of their personal vehicles because it will be less costly. Because the number of shuttle buses currently available at UTM is quite satisfying, more than 30 buses, there will be no issue that there are not enough buses. We will assist in making sure that the bus is available for the most of the time as scheduled. Hydrocarbons, carbon monoxide, and other car pollutants can all be hazardous to one's health. Diesel engines produce a lot of particulate matter, which is airborne soot and metal particles. These cause skin and eye irritation, as well as allergies, and very small particles lodge deep in the lungs, causing respiratory issues. Aside from that, vehicle noise is also detrimental, causing hearing damage and psychological distress. With more people using this public transportation system, the environment in UTM will be more pleasant and relaxing because there will be fewer vehicles on the road, and we will be able to reduce air pollution caused by the production of harmful gases from many vehicles, particularly personal vehicles.

3.0 LIMITATIONS

The time and our insufficient knowledge about web application development limited our prototype and there by our project. No one in our group has developed a system application from scratch before, and it was therefore a steep learning curve for the system app development work. We will learn and test many different system app frameworks and libraries in order to choose the ones that fit our project, therefore to complete this project (producing the low fidelity prototype) will take quite some time .The project setting did also limit our possibilities of conducting usability testing, as most of our potential clients and UTM students are very busy and occupied, also they are currently have not return to UTM yet. In addition, the time was limited. We had only a few weeks to complete this project. On the other hand, the limitations of this prototype system is the punctuality of the bus driver and considering the bus speed and condition. Even though the system automatically measures the details of user locations and determines the real-time-location of the bus that will be displayed in the system, it will not guarantee the punctuality of the bus to arrive at the destination as per time calculated by the system. This is due to the competency of the bus driver, and also considering the bus condition and its different speed. Last but not least is the lack of awareness among our potential users about the benefits and what they could contribute to the environment of UTM by using Shuttle+ system.