2017 4th International Conference on New Media Studies
Yogyakarta, Indonesia, November 08-10, 2017

Integration of Google Map in Android "Shop Alliance"

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***Abstract*—Nowadays, smartphone become very popular over the world. People use it on daily basic to assist their work and activities. Now, it not only as communication tools, but it also has become a tool to help people easier to do their job. In the past, people only use cellphone that has limited function like to call or text other people, but now the function of the cellphone become more advanced like people can buy item from online shop by using the phone. Despite the convenience of online shop, Consumers still preferred physical shop but physical shop has some limitation like hard to find the shop and some time the description of the shop is not clear enough so the customer is confuse.Shop Alliance application will help the consumers to find the recommended shop, the location of the shop and guiding the consumers by following the direction displayed on the map to the physical shop. The application can display the detail of the shop like the phone number of the shop. The application allows users to rate the shop, finds the shop by category, and set the shop in the application.**

Keywords—google map; online shop; direction

I. INTRODUCTION

Nowadays, technology rapidly developed and many people took advantage of the technology for many purposes, one of the purposes is for online shopping. Online Shopping today has been easier, just simply grab a phone, and with only a few clicks, then the item will arrive at the doorstep. According to PwC Survey, despite the convenience of online shopping, 85% of consumers still prefer to physical shop compare to online shop. According to survey, around 60% of the consumers prefer physical shop because the consumers want to see, touch, and feel the item before buying the item. They want to interact with the retailer to know more information about the item that they want to buy. Although Physical Shop is still the preferred way to purchase certain items, Physical shop also have several limitations too.

There are some limitations of physical shop to consumers. The location of physical shop is hard to find for consumers because sometimes the address of the physical shop is not clear. The consumers are hard to compare the price between physical shops. The consumers sometimes feel disappointed to physical shop, for example the consumer want to buy bolt, then the consumer come to bolt shop to buy the bolt but when arrive at the shop, the item that the consumer looking for is not there in that shop. Compared to physical shop, online shop more easy, just searching the item in the online shop and then the consumer will find the item so the consumer no need spend time to searching for the items in physical store with the useless result.

A location-based service is a service based on the geographical position of a mobile handheld device [1,2]. The development of mobile map and location applications is complex and difficult, and it is often required to pay high copyright fees to map makers. Android is free and open, providing an easy to use development kit containing flexible map display and control functions [3]. Recently thre has been increasing interest in utilizing Google Maps API to implement web-based mapping services, ranging from simple applications to display just a few points of intereset with information window to sophisticated map mashup [1,4,5,6,7].

The objective of this research is to develop a Mobile application to help user, which has function to search shops from nearby and will be listed in the this application, navigate to the shop, display the detail of the shops, rating the shops from 1 star to 5 star, the owner of the shop can set the location of the shop in this application. This application will help the consumers to find the recommended shop, the location of the shop and guiding the consumers by following the direction displayed on the map. This application also displays the detail of the shop. The application will be named *"Shop Alliance"*.

There are some limitations of this research which are listed below:

- This application only displaying the shop using marker.
- This application will display only the approved shop.
- This application only shows shops in the area of the user.
- The user has to contact admin to get approve the shop to display the shop on map for others users.
- The marker of the all shops is same.

II. LITERATURE STUDY

A. GPS

In recent years, location based applications have increasing with the advent of mobile devices such as netbooks, smart-phones, and PC-tablets. The mobile devices allow some applications to make use of position data collection. GPS is the most accurate location sensor among the most common location sensors that providing with very small location error,

for instance, applications with very high accurate such as turn-by-turn navigation [8].

The Global Positioning System (GPS) is a Global Navigation Satellite System (GNSS) developed by the United States Department of Defense to provide a real-time navigation system for the US military. Its primary mission is to provide the ability to determine accurately one's position at any point on the earth's surface, at any time of the day or night, and in any weather condition. In developing GPS satellite, it took number of years and over 12 billion dollars before the first GPS satellites was deployed and it required a minimum constellation of 24 satellites to meet the objectives of the GPS program. The full complement of 24 operational satellites was finally realized in 1994 [9].

B. *Google Maps API*

Google Maps was introduced in a blog post on Google in February 2005. It revolutionized the way maps on web pages work by letting the user drag the map to navigate it. This was new at the time. The map solutions used then were expensive and required special map servers, yet they didn't deliver the same level of interactivity. Two Danish brothers, Lars and Jens Rasmussen, originally developed Google Maps. They cofounded Where 2 Technologies, a company dedicated to creating mapping solutions. Google acquired the company in October 2004, and the two brothers then created Google Maps. Before there was a public API, some developers figured out how to hack Google Maps to incorporate maps on their own web sites. This led Google to the conclusion that there was a need for a public API, and in June 2005, it was publically released. The first mashup on the Internet is often considered to be Housingmaps.com, a combination of Google Maps with realty listings from Craiglist.org plotted on it. It was in fact created before the public API was released and was hacked together by developer Paul Rademacher. At the time, this was pretty revolutionary and started a new era of mashing information from different sources [10].

Android contains theandroid.locationpackage which provides the API to determine the current geo position. Thispackage contains various classes as shown in table 1 [11]

Table 1. Classes in Android Package [11]

Address	It is a class representing an Address, which is a set of Strings describing a location.
Criteria	It is a class indicating the application criteria for selecting a location provider.
Geocoder	It is a class for handling geocoding and reverse geocoding.
GpsSatellite	This class represents the current state of a GPS satellite.
GpsStatus	This class represents the current state of the GPS engine.
Location	This is a data class representing a geographic location.
LocationManager	It is a class which provides access to the system location services.
LocationProvider	It is an abstract superclass for location providers.

III. RELATED WORKS

A. *Coffee Shop*

Coffee Shop is a mobile application to help people find recommended coffee shop in the user area. For example, the user ask the application to find the best coffee shops / houses or search favorite brand of coffee then the application will display the result the coffee shops / houses that sell the great coffee. However, Shop Alliance is not only for coffee shop but also for any kind of products. It is up to the users who are registered as the shop owners to set what kind of products they provide.

B. *A*dress – Girls Fashion Shop Guide*

A*dress – Girls Fashion Shop Guide is a mobile application with navigation features that help people to find the fashion shop in japan and all information that user need about the favorite brands. However, Shop alliance doesn't restrict the shop to be located in japan. The shop owners are free to choose any location on the map. The A*dress – Girls Fashion Shop Guide application is can be download in App Store. The application only can be use for the Apple Products like Iphone and Ipad.

C. *Posse: Restaurant / Shop Reviews*

Posse: Restaurant / Shop Reviews is a mobile application that help user to Search for popular cafes, restaurants, bars, fashion boutiques, salons, shops, and hotels. The User can the popular place by read reviews or suggest from friends. The application allow user to find a place near user and get directions by GPS. The Posse application is can be download in App Store. The application only can be use for the Apple Products like Iphone and Ipad.

Listed in Table 2 are the features comparison of Shop Alliance with Related Works.

Table 2. Comparison Overview

No	Program Features	Shop Alliance	Coffee Shop	A*dress	Posse
1	Find Recommended Shop	v	v	x	v
2	Set the location of the user's shop	v	x	x	x
3	Rating the shop	v	x	x	v
4	Find shop by category	v	x	x	v
5	Search Nearby	v	x	x	v

IV. METHODOLOGY

The methodology used to create Shop Alliances android Application software is a Rapid Application Development (RAD). RAD methodology consists of 4 major phases, which are:

- Requirements Planning Phase

Some activities that are involved in this phase are: defining problems; creating sketches of solution and alternatives; analyzing data input and output; analyzing data flow; making system requirement; and making specification of system process.

- User Design Phase
  This phase covers the business modeling of the system into modules, which covers data process of every module, database design, user experience and user interface design.
- Construction Phase
  Construction phase covers the continuous prototyping of every module, so the module is ready to be integrated with other components. If any mistakes occurred at the modular component, it is easier for the component to be fixed.
- Cutover Phase
  Cutover Phase covers the testing, evaluation and final delivery. Testing ensures that the application does not have any problem or mistake that hampered during its operation and also avoids the error occurrence, which can be led into fatal failure.

V. IMPLEMENTATION RESULTS

Shop Alliance application is intended to help the consumers to find the recommended shop, the location of the shop and guiding the consumers by following the direction displayed on the map to the physical shop. The application can display the detail of the shop like the phone number of the shop, the user also can chatting to the owner of the shop to know more about the shop or for ask the item in the shop. The application allows users to give the comment, rate the shop, finds the shop by category, and set the shop in the application. The more the star (rate) is the more recommended the shop.

The development of Shop Alliance application is using some software in application creation, source library, and platform. They are:

- Intel XDK
  Intel XDK is used to develop the code of the Shop Alliance application in HTML5, CSS3, PHP, JQuery, Cordova Apache, MySQL, AngularJS, Ionic Framework, Google Maps API, and JavaScript language. Intel XDK required some plugins like Geolocation to get the latitude and longitude of the user, Google map for IOS and Android to display the map in Shop Alliance application.
- Operating System
  OS X El Captain as the operating system of the PC where the Shop Alliance application is developed.

The Use-case diagram of the Shop Alliance can be seen in Fig.1. The register is required (include) when the user open the Shop Alliance application for the first time to create id and password for using Shop Alliance application and the register will be exclude (extend) when the user already have the id and password so the user will go to main application of Shop Alliance and display the map. On the map, the user can perform click to marker shop and double click to the map. When the user perform double click on the map, then the blue marker will appear to the map and when clicked the blue marker, it will display the InfoWindow. The user can navigate or add shop when in the InfoWindow state.

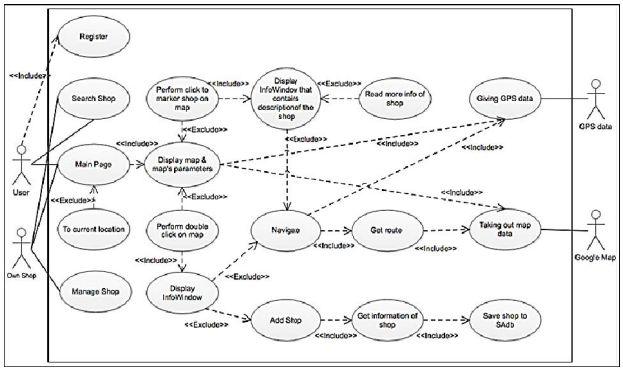

Fig.1 Usecase Diagram

There are four classes in Shop Alliance class diagrams such as Main, Add Shop, Navigate, and System. The picture of class diagram can be seen in Fig.2.

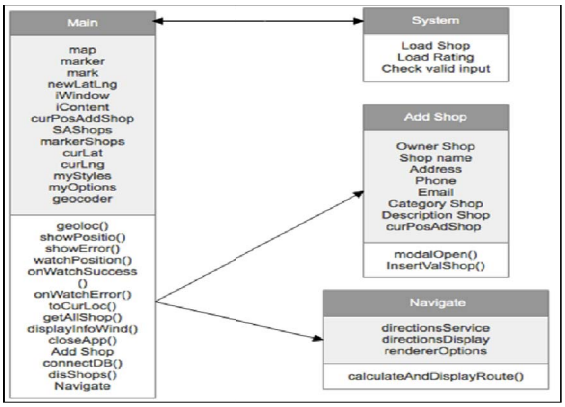

Fig.2 Class Diagram

To navigate from current location of the user to the shop, the user must click one of the shop marker on the map that user want to navigate. After the user click one of the shop markers on map, the system will display InfoWindow that contain the information of the shop, navigate button, and More Detail button. To navigate to the shop, the user must click the navigate button and then the system will get the latitude and longitude from current location of the user and shop then the system call direction service and direction rendered from Google Map to navigate from current user location to the shop and display the route on map for user. The system also displays the distance and duration from current location of the user to the shop as shown in Fig.3.

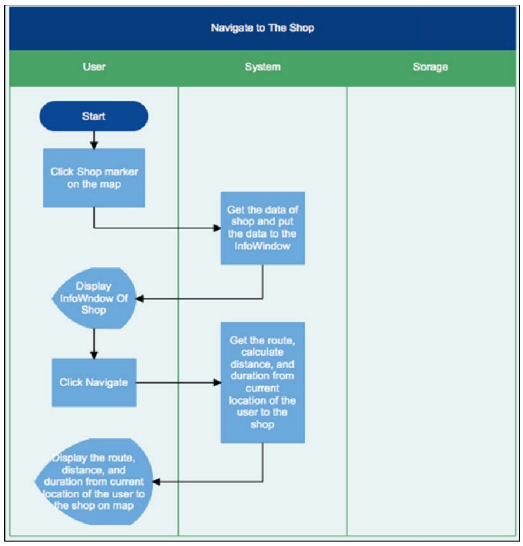

Fig.3 Navigate to the Shop

The application will calculate the distance, duration, and the display the route. To calculate the distance and duration is using Direction Service and to display the route on map is use Direction Renderer. There are two parameters, which are x and y. The x parameter is differentiating for navigation for shop and navigation for blue marker. The value of x is 1 for blue marker navigation and 2 for shop navigation.

In order to display the shop, the application will make the array of the markerShops become empty. After that, loop the array of the SAShops to get the data of the every shop location, make the marker object, and then store it into markerShops array. Then, loop the markerShops array and then set the marker to the map.

A. User Interface

The interface of the Shop Alliance application has two sections, first is the header and the content and the second is login and register. There will be side menu, popover menu, icon, label, search box, button, and modal in the application to help users easily interact with the application and its features in main application. The header contains Menu icon, name of the application, search icon, and more vertical icon. The content menu contains map and button. The header and the content created by using ionic framework components. The details of Shop Alliance user interface application describe in Fig.4 Main Page.

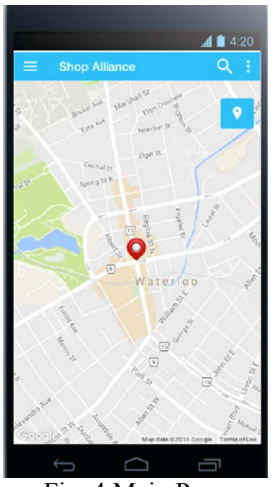

Fig. 4 Main Page

In the header, contains menu icon, name of the application, search icon, and more-vertical icon. Menu icon will display left side menu when clicked, search icon will display search box in modal when clicked, and more-vertical icon will display popover menu when clicked. While Left Side Menu will appear when the menu icon in the header is clicked. In the left side menu there will be button power off to close the Shop Alliance application, photo profile of the user, name of the user, ID user, and list of menu which is My Shop and Search Nearby.

In the content, contains map and button. Shop Alliance use Google Map to display map for user and there is icon location button. The icon location button is used to shift the map to the current position of the user and make the current position of the user to the center of the map. The user can perform map click, double click, zoom-in, zoom-out, and click marker. The content of Shop Alliance can be seen in Fig.4.

In Fig.5 also can be seen threetype of markers in the map, one is marker for user position, the second is marker that display when double clicked on the map, and other one is the marker for display shop position.

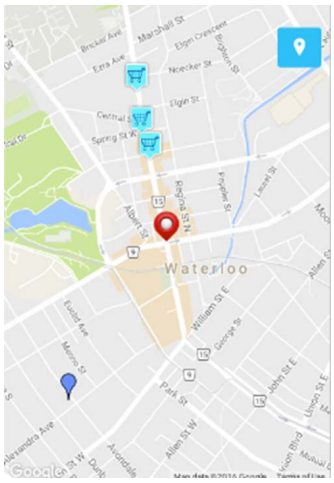

Fig.5The Content of Shop Alliance

There are two types of InfoWindow in Shop Alliance application that differentiate by type of marker. First is the InfoWindow that display when the user click marker of the shop. The content of InfoWindow for shop is about the name of the shop, name of the owner, the short description of shop, photo of the shop, address, phone, email, navigate button, and more info button. The InfoWindow for shop can be seen in Fig.6.

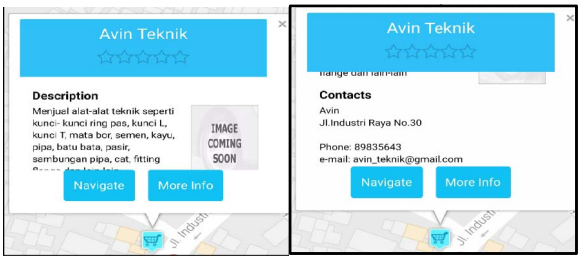

Fig.6. InfoWindow for Shop

The second is the InfoWindow that display when user click blue marker (Fig.6). The content of the InfoWindow for blue marker is the address of the marker, navigate button, and add shop button.

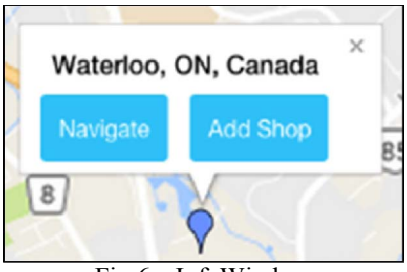

Fig.6a. InfoWindow

Modal add shop will be appear when user click Add Shop button. The modal of add shop, contains the textbox for user to input the data of the user's shop, there are some textboxes or data that must be filled by the user like the name, name of the shop, address, phone, email, category shop, and description of the shop. While Modal My Shop will appear when the user clicked the My Shop button in Left Side menu, the My Shop modal contains list of the user's shops. In this modal, the user can edit they shop and also can delete shop.

If the user click Edit icon in the modal My Shop then the Modal Edit Shop will appear. The Edit Shop modal, contains the information of the shop like the name of the shop, owner name, phone, address, category, email, category shop, short description of shop, detail description of shop, list of the items of the shop. In the modal, the user can edit the data of the shop, delete item, edit item, and add item.

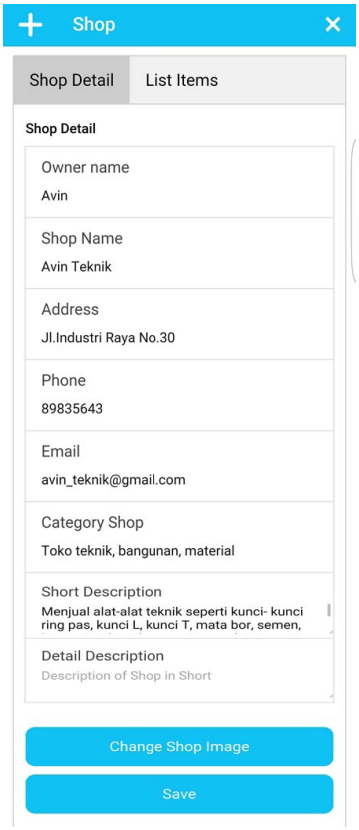

Fig.7. Modal Edit Shop

Modal Edit Item will appear when the user click icon edit in the List Items tab in Modal Edit Shop. In the Modal Edit Item contains the name of the item and the price of the item, the user can edit the name or the price and then click Edit Button to submit the data. The Figure of the Modal Edit Item can be seen in Fig.8.

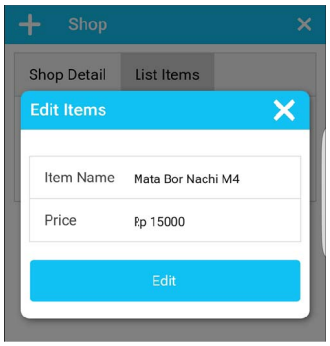

Fig. 8 Modal Edit Item

Modal Add Item will appear when the user clicks plus icon in the Modal Edit Shop. The Modal contains two textboxes and a button, which are for the name of the item, the price of the item, and Add button to submit the data. The button Add is disabled by default and will be active when the data is valid.

Fig.9 is the figure of the Register Form of the Shop Alliance application. The "X" button in the header of the register form is to close the application of the Shop Alliance. There are 4 textboxes, which are for username, password, re-

type password, email, and register button. The register form will appear when the user opens the Shop Alliance for the first or the file of the SAuser.txt is not exist. When the SAuser.txt is not exist in the device and the user already have account, then the user can "Click Here" to go to Login Form. The Login Form consists of username textbox and password textbox, and login button. The user also can go to the register form by clicking the "Click Here" button.

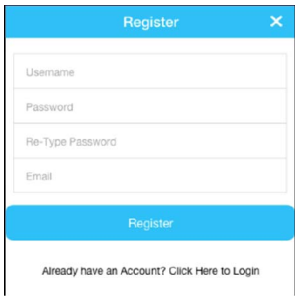

Fig.9 Register Form

VI. CONCLUSIONS

This research is created to help the consumers to find the recommended shop, the location of the shop and guiding / navigate the users by following the direction displayed on the map. There are several conclusions gained from this research:

- Users can Add Shop on the map of the Shop Alliance application. User must contact the admin to display the shop on the map so the shop that created by user can be see for all user of Shop Alliance application.
- Shop Alliance application can navigate to the destination or to the shop by using direction service from Google Map and display the route on map by using direction rendered. From using direction service, the system can get the distance and duration from current position of the user to the destination.
- User can edit their shop in Left Side Menu and click My Shop Menu to edit the information of the Shop.
- Shop Alliance application using rating for the shop that displayed by Shop Alliance to know the quality of the shop. The rating is the calculation of the points that given by users.

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