

Nearest Automatic Teller Machine (ATM), Minimarket, and Restaurants Finder Application based on GPS Technology (Global Positioning System)

Andi Nugroho, Dwi Ma'ruf Alvansuri

Computer Science Faculty, Information System Major, Mercu Buana University
Meruya Selatan, Kebon Jeruk, West Jakarta, Indonesia

Abstrak Searching for locations that we urgently need, such as houses of worship, restaurants, Minimarket, ATM, and many others will sometimes be very challenging. Aside from the condition as a newcomer, such situation may happen due to the difficulty of inquiring information from locals. The existence of this mobile based application will assist us to find such locations based on our desired category. This facility will assist users to find their location of choice. This application was made based on PHP, Ionic framework and GPS technology (Global Positioning System). Therefore the application will locate the nearest objects of interest in accordance with the category and location of application users.

Keywords: Nearest Location, Mobile Hybrid, GPS

I. Prologue

A. Background

Currently smartphone applications have extended not only as communication device but also to ease daily or occupational activities. Smartphone has even been implemented with various applications to cater various needs from basic to complex systems.

However, there are several untapped demands from the applications available at smartphones. One of them is the finder application for necessary locations that we need such as Automatic Teller Machine (ATM), Minimarket, restaurants, places of worship and many others. Although the current technology is heading there such as *Google Maps*, however it is unable to fulfill all the expected demands. In light of such opportunity, it is possible to provide an applicable capable of assisting users to find the nearest location in accordance with the desired categories. This application can also be used in collaboration with business or restaurant owners to grant easier visibility to users.

Based on the description of the prologue above, the author believes that the creation and implementation of this nearest ATM, Minimarket and Restaurant finder application will be able to assist users in locating the places that they need.

B. Formulation of Issues

Based on the prologue mentioned previously, the outline of the formulation of issues discussed in final assignment comprised of:

- How the ATM, Minimarket and Restaurant location finder application can provide information on location based on chosen category for Android mobiles with GPS technology?
- How the ATM, Minimarket and Restaurant finder application can provides information on nearest route to the desired location?
- How comments from other users can be registered to provide information for other users concerning the soon to be visited location?

C. Scope of Issues

The creation of this application encounters several issues such as the following:

- The application was made using hybrid ionic framework and developed using Android.
- This application was made using PHP, Javascript, HTML5, and Java Android programming language.

D. Purpose and Benefit

The main purpose of this research is to provide information concerning the nearest ATM, *Minimarket* and Restaurant position by providing a computerized, properly managed and complete system.

Meanwhile the benefit consists of:

- The existence of this application attempts to ease users and find the location of ATM, Minimarket and Restaurant based on real time user position.
- Time efficiency in locating the desired objects.
- This application aims to be the hosting spot for restaurant owners or other businesses to register their business location, in order to provide greater exposure to the general public.

E. Research Methodology

a). Data Collection Method

The data collection methodology utilized in this thesis adopts observation technique to obtain data samples in form of *latitude* and *longitude* of

the ATM, Minimarket and restaurant location directly to obtain an accurate coordinate.

b). Software Development Method

The method utilized to build this system pertains to the *Waterfall* method [Roger S. Pressman, 2010]. This model is an approach towards systematic software development, with several phases such as *Communication* (Analysis Needs), *Planning*, *Modeling*, *Construction*, *Deployment*.

1. *Communication*

(Analysis Needs) To analyze the required needs in pre-made application to assist software construction.

2. *Planning*

After determining the types of data to be used in application, the next step would be configure the application design. This phase will generate User Requirement as a direct data to explain consumer needs in software construction.

3. *Modelling*

To design the process to be operated in the application, interface design construction in accordance with the analysis result.

4. *Construction*

To create program that implements the design construction into script utilizing PHP, Javascript, HTML5, and CSS programming language. To test the application for operability and to detect bugs when being used by User.

5. *Deployment*

To apply and maintain program for Android based smartphone.

4. To create a software with low maintenance cost.

The basic for software is a layered process. Software engineering process is continuously repetitive, since the characteristic of software requires sustainable maintenance and development to avoid software expiration. In the maintenance process, other functions are done such as error correction, needs adaptation, function or capacity enhancement and other preventive measures to ensure that the software does not expire. [Roger S. Pressman, 2015: 15] The software engineering tool is an element that supports the process and method. When the tools are interconnected and provide information, and such information are usable by the other, then the system to support software development can be constructed using computer. [Roger S. Pressman, 2015: 16]

B. Waterfall Model

Waterfall Model was also named as *Classic Life Cycle*. It shows a systematic approach for software development. Overall it starts with communication, planning, modelling, construction, and deployment phase. [Roger S. Pressman, 2015: 39]

Below are the generic phases/ processes commonly applicable for most software project: [Roger S. Pressman, 2015: 17] :

1. *Communication (Project Initiation, Requirements Gathering)*

This framework activity involves intense communication and cooperation with customers (and other stakeholders) and include gathering requirements and other related activities. This phase identifies the category of information to be processed, desired function and performance, expected system behavior, established interface, existing design issues, and required validation criteria to determine a successful system. Although the method applied during definition phase shall vary depending upon software engineering paradigm (or combinations of paradigm) applied, the three main functions will occur in several forms: information system or engineering, software project planning and needs analysis.

2. *Planning (Estimating, Scheduling, Tracking)*

This activity states the plan for the following software engineering by describing the technical duties, possible risks, required resources, mandatory work products and work schedules.

3. *Modeling (Analysis, Design)*

This activity encompasses developer and customer model construction to observe software and design needs to achieve such result. This activity will detail the issues and methods to resolve it.

4. *Construction (Code, Test)*

II. Theoretical Baseline

A. Software Engineering

Software engineering is an internal combination of program, data base and documentation, made with the purpose to solve issues with predetermined requirement or needs. Without the software, computer would simply become an unusable electronic box for some of mankind [Elvis C. Foster, 2014: 26]. *Software* consists of digitally programmed and stored data containing instructions that would be read and written by computers. Software provides the desired function and performance, data structure that enables the program to manipulate common information, and documents detailing program operation and application. [Roger S. Pressman, 2015 : 4] The purpose of software engineering is to:

1. Obtain low software production cost.
2. Create an high powered, reliable and accurate software.
3. To create software that could operate in various platforms.

This phase constructs the previously determined design. As such, the activity combines code generation (whether manual or automatic) and required testing to reveal code errors.

5. *Deployment (Delivery, Support, Feedback)*

Software (as a complete or partially complete entity) to be sent to customer/*User* so that they can evaluate such software and provide feedback for repair or improvement

C. Geographical Information System (GIS)

According to Budiyanto et al. in his research [Budiyanto, et al, 2012], the geographical information system can assist to map a dot or even region into a longitude and latitude information, which is useful in decision making to determine the location for thermal sensor detector equipment placement.

Therefore, geographical information system can commonly be inferred to as a computer system capable of processing, integrating and displaying places within the earth’s surface.

D. Application Engineering Material

a) PHP + SlimFramework

PHP or shortly known as PHP Hypertext Preprocessor is a programming language function to build a dynamic website. PHP merges with HTML code, with differed conditions. HTML is used as a builder or foundation from web layout framework, meanwhile PHP is functioned as process so that the web will be easily maintained due to PHP. [Agus Saputra, 2011]

PHP is an abbreviation for PHP Hypertext Preprocessor, an interpreting language similar to C and Perl language that offers simplified command, used to create a web application. [Sidiq, 2004]

Slim Framework is a slim PHP framework and one of the micro frameworks with standard features that can be easily utilized by developers for its operation. [https://www.slimframework.com/docs/]

b) Ionic Framework

Ionic is one of the hybrid frameworks as the variant of PhoneGap and earn much popularity in a global scale. This framework was made above AngularJS and commonly used to create simple and quick application when developing softwares. In addition, according to Ionic official website (<http://ionicframework.com/docs/v1/overview/>), this Framework also comes with a similar design with the native application adjustive with mobile UI elements. Ionic also possesses compatible integration with cordova device API, which means that we can access the hardware using library provided by the developer such as ngCordova.

III. System Analysis

A. Communication

a) ATM in Indonesia

Indonesia currently faces an ever increasing constant demand for ATM, Minimarket and restaurants from the public. Several banks in Indonesia has also increased the amount of their ATM facility to meet the transactional demand of Indonesian society.

Nama Bank	2010	2011	2012	2013	2014
BRI	541	676	808	813	830
Mandiri	393	490	586	605	625
BCA	334	417	499	562	618
BNI	258	323	386	400	414
BTN	45	56	68	85	103
Lainnya	241	300	309	423	557
Total	1.812	2.262	2.656	2.888	3.147

Fig 1 Total Value of ATM Transactions in trillion

b) One of Minimarket in Indonesia



Fig 2 Alfamart Logo

Alfamart, for example, boasts a 10.666 minimarket network comprised of 7.596 self established minimarket and 3.070 franchised minimarket. All of the outlets are spread in several places such as Jakarta, Cileungsi, Tangerang, Cikarang, Bandung, Sidoarjo, Cirebon, Cilacap, Semarang, Lampung, Malang, Bali, Klaten, Makassar, Balaraja, Palembang, Bogor, Jember, Medan, Banjarmasin, Jambi, Pekanbaru, Pontianak, Manado, Lombok, Rembang, Karawang dan Batam. (sumber alfamartku.com, 2017).

c) Restaurant in Indonesia

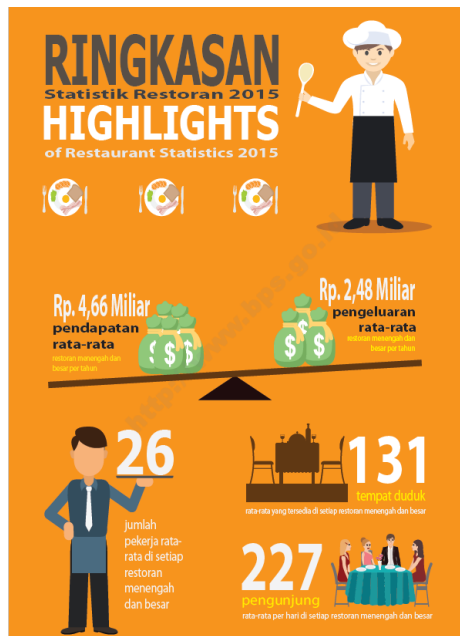


Fig 3 Summary of Restaurant Statistics

Business location wise, most of the restaurants are location in shopping/office districts amounting to 54.57 percent. Meanwhile the tourist object consists only of 15.71 percent. Aside from that, 54.55 percent of restaurants provide Indonesian cuisine, around 22.43 percent provides American or European cuisine, along with 10.69 percent serves Chinese cuisine and 12.33 percent provides other various cuisines.

B. System Development Planning

This process is a system development planning:

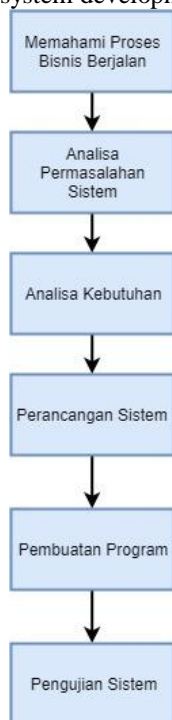


Fig 4 System Development Planning

C. Modeling

a) PIECES Analyses

The PIECES analyses on the ongoing system are as the following:

Table 1 PIECES Analyses

No	Aspect	Obstacle	Solution
1	Performance	The capacity required on smartphones to install <i>Google Maps</i> application due to the amount of data mandatory to be stored and thus inhibiting when opening application.	Application with smaller capacity and does not store excessive data.
2	Information	No related information concerning the condition of location of condition to be visited such as availability of ATM and realtime situation of the location.	Creation of commentary and rating menu for users, so that other users can obtain information concerning the visited object.
3	Economics	The large data capacity to be downloaded in <i>Google Maps</i> . Other cases occurred when the user has reached the designated ATM location, however, the ATM malfunctioned and the user suffered	Application with a smaller capacity, supplemented with commentary feature for user, to provide information on availability of the chosen location.

No	Aspect	Obstacle	Solution
		loss from fuel costs.	
4	Control	Control to non existent locations	Created menu on <i>Web Admin</i> to manage the displayed location.
5	Efficiency	Uncertain location category and manual input of desired location.	Created list of available category in this application, in addition to the sub category for a more specific search.
6	Service	User must manually input the desired location, unavailability of menu to provide information on location.	Created list of location category available in the application. Created commentary and rating forms on the desired location.

b) Use Case Diagram

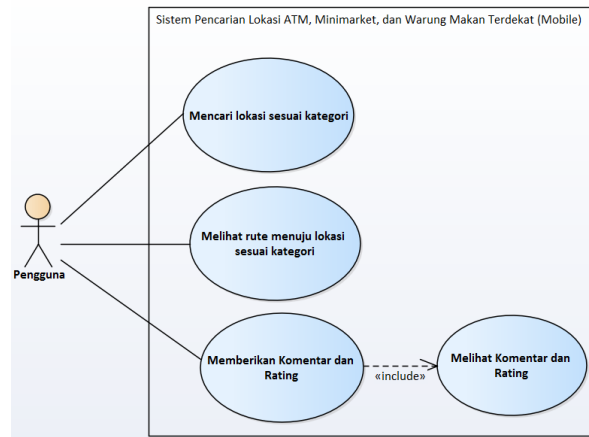


Fig 6 Use Case Mobile Application

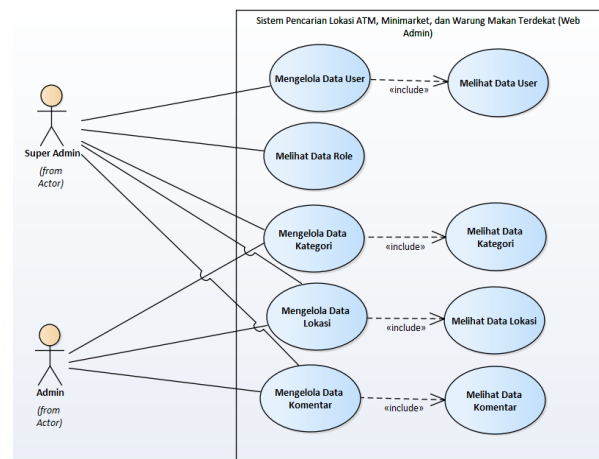


Fig 7 Use Case Web Admin

D. System Planning

a) Architecture Design

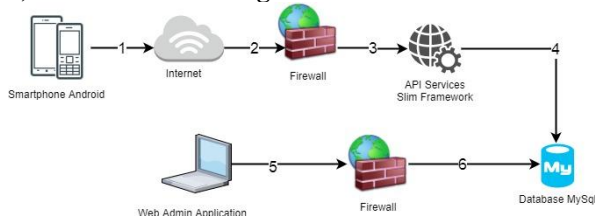


Fig 5 System Planning Architecture

Infrastructure used in this application consists of two (two) parts: Mobile Application and Web Admin.

c) Activity Diagram

I). Activity Diagram View Location Data

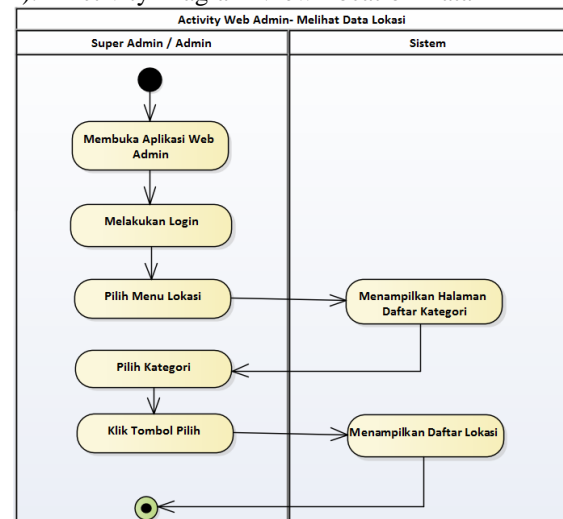


Fig 8 Activity Diagram View Location Data

II). Activity Diagram Add Location Data

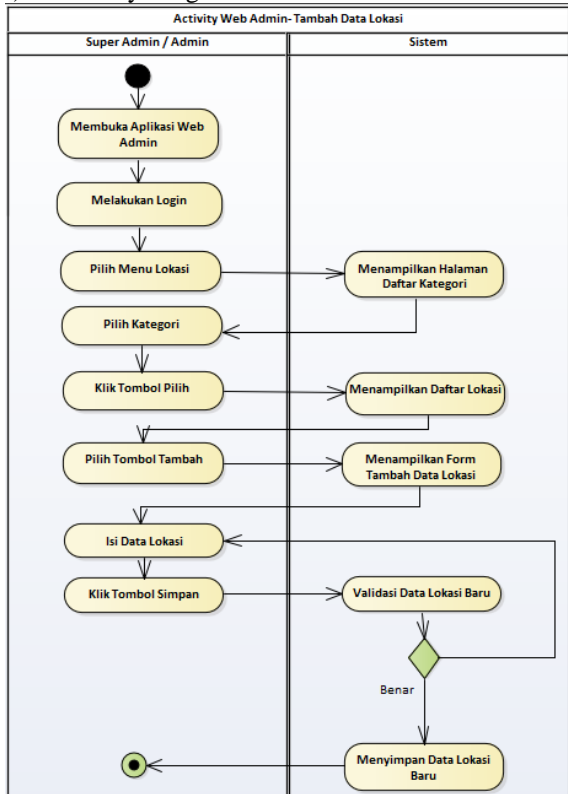


Fig 9 Activity Diagram Add Location Data

III). Activity Diagram Update Comment Date

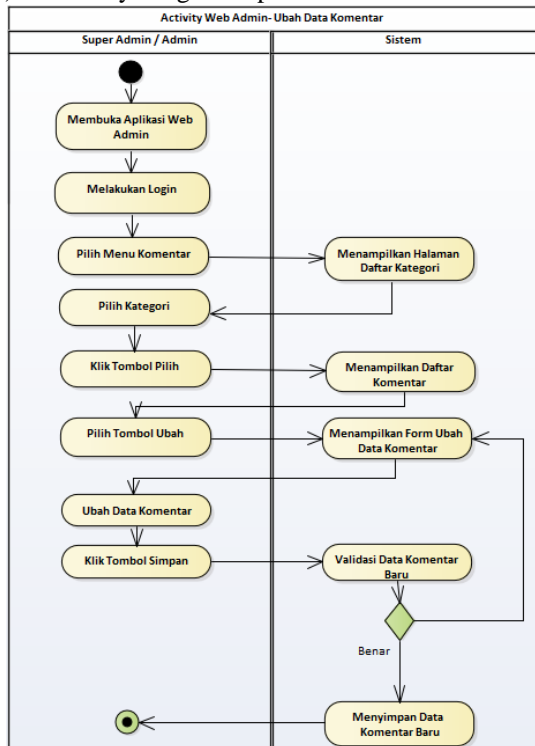


Fig 10 Activity Diagram Update Comment Data

d) Sequence Diagram

I). Sequence Diagram View Location Data

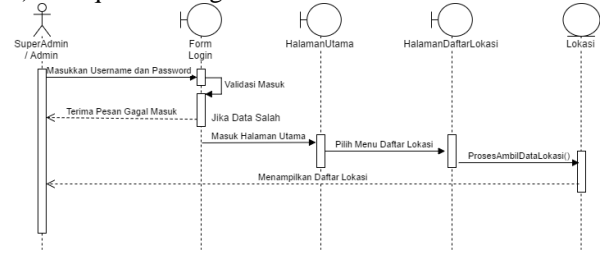


Fig 11 Sequence Diagram View Location Data

II). Sequence Diagram Add Location Data

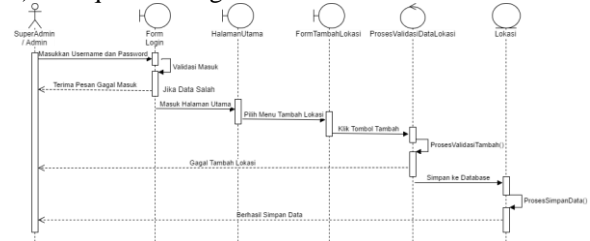


Fig 12 Sequence Diagram Add Location Data

III). Sequence Diagram Update Comment Data

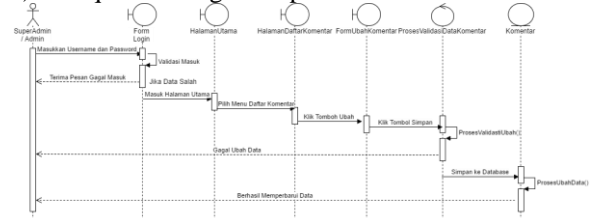


Fig 13 Sequence Diagram Update Comment Data

e) Class Diagram

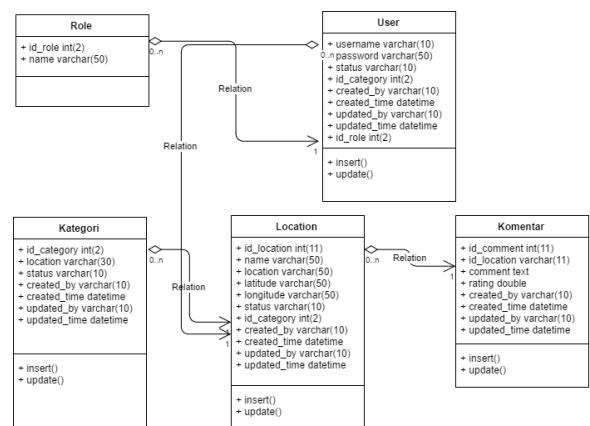


Fig 14 Class Diagram

IV. Implementation

A. System Implementation

a) Implementation Login View

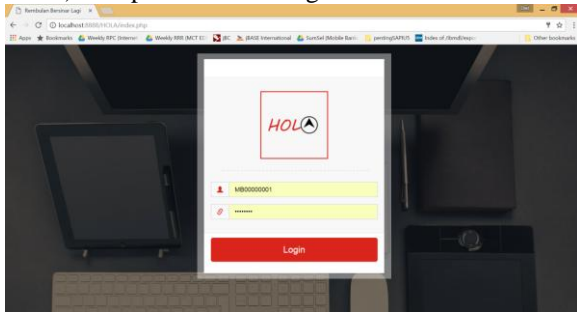


Fig 15 Login View

b) Implementation List User View

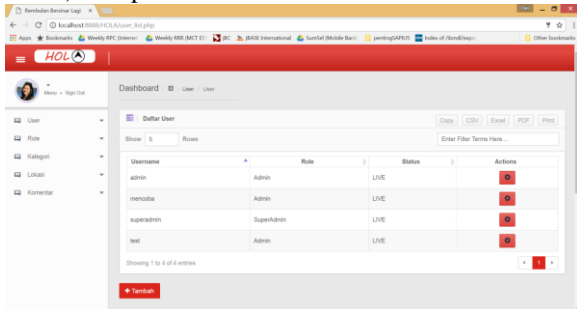


Fig 16 List User View

c) Implementation List Role View

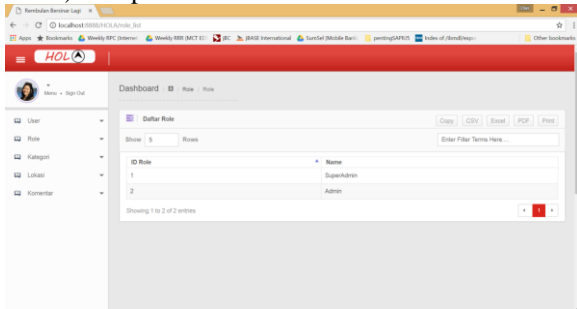


Fig 17 List Role View

d) Implementation List Category View

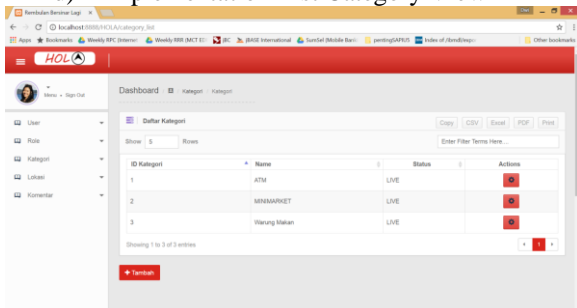


Fig 18 List Category View

e) Implementation List Location View

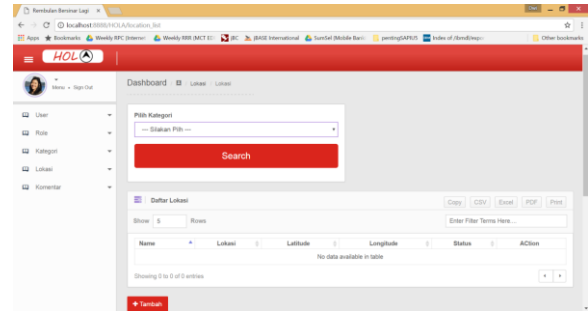


Fig 19 List Location View

f) Implementation Add Location View

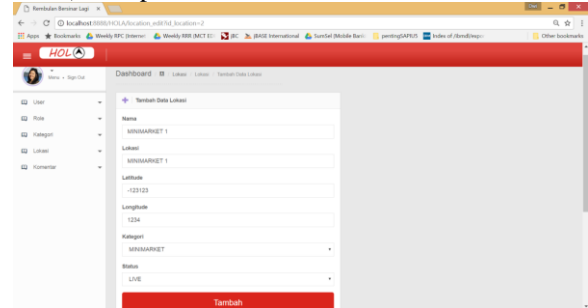


Fig 20 Add Location View

g) Implementation Update Comment View

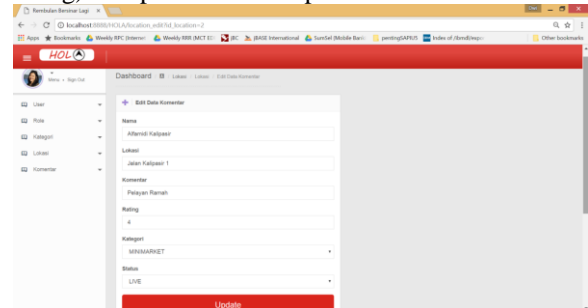


Fig 21 Update Comment View

h) Implementation Select Category Location View

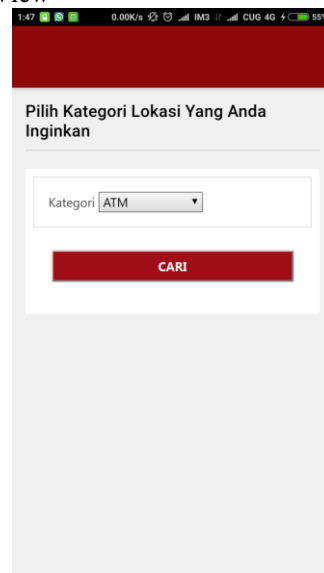


Fig 22 Select Category View

i) Implementation Maps

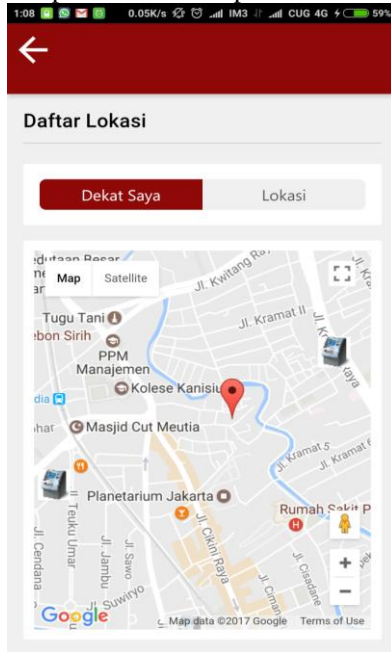


Fig 23 Maps

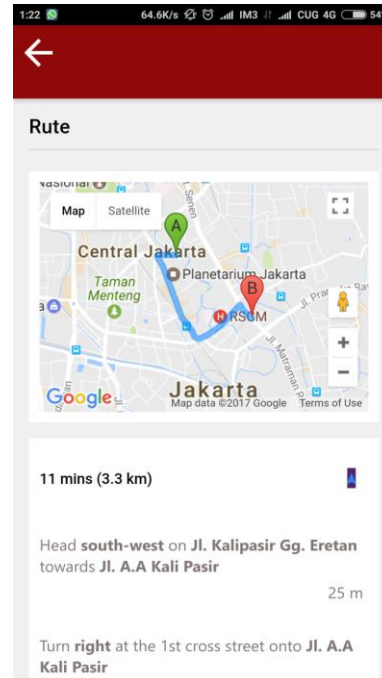


Fig 25 Route Location View

j) Implementation Location Information View

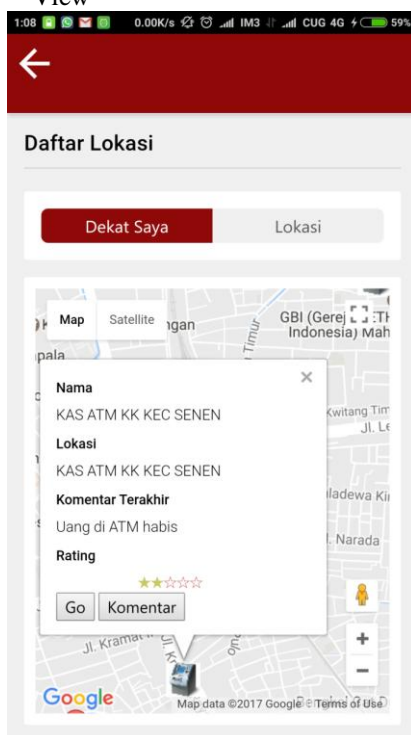


Fig 24 Location Information View

l) Implementation Comment Location View

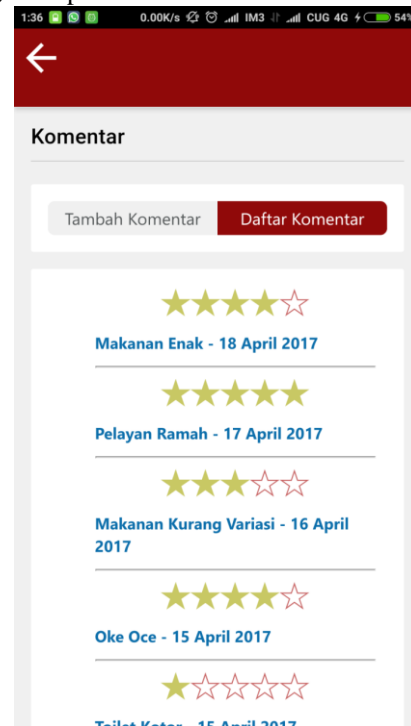


Fig 26 Comment Location View

k) Implementation Route Location View

V. Conclusion and Suggestion

A. Conclusion

Based on the implementation of this application and research, design, implementation until finishing phase results, the conclusion are as the following:

1. Application may provide solution to users when finding location for ATM, *Minimarket*

or nearest restaurants based on the position of user's location.

2. Application provides information on distance and route to the nearest ATM, Minimarket or Restaurants from user.
3. Application provides information on comments and Rating from users pertaining to the condition of ATM, *Minimarket* or Restaurants.

B. Suggestion

Several considerations for future application developments among other:

1. Mobile application development for platforms aside from Android platforms.
2. Additional new location categories based on demand by the public.
3. Create a more attractive *User Interface* by a more experienced team in its field (UI / UX).

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