Location Search Application for Refuelling Stations on Android Based Mobile Devices

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Abstract. The infrastructure provided by PT Pertamina to meet fuel needs is the gas station (SPBU). Gas station infrastructure is an important infrastructure in every city. Information about the location of the gas station is necessary for motorists, especially during emergencies, namely the availability of fuel in vehicles that are running low when the user is on his way. The purpose of this study is to create a mobile device that provides gas station location information to make it easy for users to get a gas station that is close to the user's position. The object of this research is a gas station in the city of Bandung, Indonesia. The method used to find the nearest location is Location-Based Services (LBS), a cellular service that uses user location information consisting of X and Y coordinates generated by GPS, most of which use positioning techniques. Functional analysis using Unified Modeling Language (UML). Based on testing that has been done using alpha testing, the application made already provides information about the location of the nearest gas station. Based on the results of discussions with application users, this application can help users find the closest gas station.

1. Introduction
The rapid development is marked by infrastructure development [1]. One of them is gas station infrastructure development. The gas station has an important role because it is an infrastructure that can serve the community in meeting the needs of vehicle fuel. Bandung city is one of the tourist destination cities, many tourists from outside the city who come to travel [2]. This also resulted in many vehicles entering the city of Bandung. Drivers who come from out of town usually do not know the location of the gas station location, so they have difficulty in deciding which path to go to find the closest gas station location.

With advancements in technology, particularly in the field of mobile technology, communication networks have largely switched to mobile, enabling the rapid dissemination of information with various mobile devices. Not only that, but mobile technology has also been integrated to determine the location that involves GPS. This makes an extraordinary need for information dissemination with mobile Location-based Service. Location-Based Service (LBS) can detect the user's location so that it can provide services according to the user's location. The user's geographical location is determined using separate services such as, for example, Global Positioning System (GPS) [3]. Analysis of application development using an object approach with UML tools. This tool is a standard tool used to document, specify, and build software systems [4]. Several studies have been conducted related to making applications for public facilities information. One of the researches that explain that the application users get information about hospital facility services [5]. Previous studies related to the use...
of the LBS method have been carried out [6 - 8]. Based on previous research, the user's position allows the application of LBS to find certain locations, one of which is the location of gas stations.

Based on the problems and references from the previous studio, this research will make the closest gas station application to be made on a mobile device with the aim of providing information on the nearest gas station so that it makes it easier for users to find the location of the nearest gas station to the user.

2. Method

In this study, the data used are gas station location data in the city of Bandung. Parking location maps are obtained from Google Map which is a free service for online map applications provided by Google. Google Maps API is used to integrate into the system that will be created [9] (see Figure 1).

![Flowchart](image)

**Figure 1.** Location Search Flowchart using LBS

Figure 1 shows the stages of locating the location using the LBS method [10]. This method is used to provide parking location information services based on the location closest to the driver. The functional needs of this application are displaying gas station maps in the city of Bandung that is integrated by using the Google Maps API, and displaying gas station information in the form of gas stations and the closest gas stations, navigation or directions that are equipped with street names recognized by Google Maps.
The application evaluation phase is carried out using an approach in the form of semi-structured interviews. We are recruiting users who are 25 years or older, must have an Android smartphone, and have a vehicle. Users are given an explanation of the research objectives and how to use the application. Users are asked to try the application, then asked to answer a series of questions. After getting answers to user questions, the next step is to analyze the answers. Figure 2 shows the stages of application testing.

![Diagram](image)

**Figure 2.** Stages of Application Testing

3. Results and Discussion
In this section, we report our findings for the results of functional application tests (Part A), user acceptance of applications (Part B).

3.1. Part A: Results of functional testing of gas station search applications
Example screenshots of the application interface are shown in Figure 3. This test is carried out to see whether functional is running using alpha testing. Testing is done using the Blackbox method. This method focuses on the functional requirements of the software to see whether the application program produces the desired output and matches the function of the program. Table 1 shows the results of alpha testing on the application being built.
Figure 3. Screenshot of the application interface.

Table 1. Alpha testing results

| Test item                                               | Description |
|--------------------------------------------------------|-------------|
| The button displays all gas stations in Bandung        | Successful  |
| The button displays the closest gas station            | Successful  |
| Longitude and latitude of gas stations on the map and given the icon | Successful  |
| Longitude and latitude of the user on the map          | Successful  |
| The gas station when selected displays the name and distance | Successful  |
| Navigate to the selected gas station                   | Successful  |
| Displays the closest gas station in the list view      | Successful  |
| Longitude and latitude of gas stations on the map and given the icon | Successful  |
| Longitude and latitude of the user on the map          | Successful  |
| Displays the route to the gas station with LBS Method  | Successful  |
| Navigate to the selected gas station                   | successful  |

From the test results shown in Table 1, all functions or processes were successfully carried out by the predetermined analysis.

3.2. Part B: Test Result for Application User Acceptance

The results for this section are about system user acceptance. Users are given a questionnaire to answer after using the system.

This study involved 30 users who would use the system. They all have experience using mobile applications. The majority of users often use mobile applications (see Table 2).
Table 2. Application is Useful

| User (n = 30)          |          |
|-----------------------|----------|
| Strongly Disagree     |          |
| Disagree              |          |
| Neutral               |          |
| Agree                 | 14       |
| Strongly Agree        | 16       |

Overall, Table 2 shows the user agrees with the statement that the Smart Home Application is useful. Fourteen of them chose "Agree," and the rest chose "Strongly Agree" in response to this statement. Users of this application are familiar with the use of mobile devices such as smartphones. As many as 69 percent of Indonesians access the internet through mobile devices [11]. This shows that users in Indonesia have sufficient exposure and familiarity with mobile applications (see Table 3).

Table 3. Application is Easy to Use

| User (n = 30)          |          |
|-----------------------|----------|
| Strongly Disagree     |          |
| Disagree              |          |
| Neutral               |          |
| Agree                 | 7        |
| Strongly Agree        | 23       |

From Table 3, most users agree with the statement. This application is easy to use. Seven of them chose "Agree," and the rest chose "Strongly Agree" in response to this statement. Some users are involved in using applications on their smartphones and use them every day in their daily lives. Users do not find problems to learn about using the application (see Table 4).

Table 4. Application Has Consistent Quality

| User (n = 30)          |          |
|-----------------------|----------|
| Strongly Disagree     |          |
| Disagree              |          |
| Neutral               | 10       |
| Agree                 | 20       |
| Strongly Agree        |          |

From Table 4, the majority of users choose to agree with the statement that the application has consistent quality. Some users choose neutral because they use cell phones with lower hardware specifications such as RAM. Also, users face a lack of memory space for applications. This kind of problem can affect application performance.
4. Conclusion
From the results of tests that have been done, it can be concluded that functional applications can be used and produce the expected output information. The application has provided information about the nearest gas station and displays the route to that location. Also based on test results to application users, the application has provided comfort in getting information about the nearest gas station.

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References
[1] Sleuwaegen, L., & Goedhuys, M. 2002. Growth of firms in developing countries, evidence from Cote d'Ivoire. *Journal of development Economics*, 68(1), pp. 117-135.
[2] Lestari, Y. D., & Saputra, D. 2018. Market Study on Hospitality Sector: Evidence from 4/5-Star Hotel in Bandung City Indonesia. *International Journal of Business & Society*, 19(1).
[3] Doshi, P., Jain, P., & Shakwala, A. 2014. Location based services and integration of google maps in android. *International Journal of Engineering and Computer Science*, 3(03).
[4] Deeptimahanti, D. K., & Babar, M. A. 2009. An automated tool for generating UML models from natural language requirements. In *2009 IEEE/ACM International Conference on Automated Software Engineering* (pp. 680-682). IEEE.
[5] Yang, C. T., Chu, Y. Y., & Tsaur, S. C. (2010). Implementation of a medical information service on android mobile devices. In *4th International Conference on New Trends in Information Science and Service Science*.
[6] D. Lee, J. Shin, and S. Lee, 2013. Location-Based Information sharing system using Social Network Service in the mobile environment. *Information (Japan)*, 16(12 B), pp. 8677-8682.
[7] Qadeer, M. A., Chandra, A., & Jain, S. 2012. Design and implementation of location awareness and sharing system using GPS and 3G/GPRS. *International Journal of Multimedia and Ubiquitous Engineering*, 7(4), pp. 124-140.
[8] Petcovici, A., & Stroulia, E. (2016, December). Location-based services on a smart campus: A system and a study. In *2016 IEEE 3rd world forum on internet of things (WF-IOT)* (pp. 94-99). IEEE.
[9] Hu, S., & Dai, T. 2013. Online map application development using Google Maps API, SQL database, and ASPNET. *International Journal of Information and Communication Technology Research*, 3(3).
[10] Nurhayati, S., & Nugraha, R. H. 2018. Sistem Informasi Pencarian Lokasi Donor Darah PMI Kota Bandung Berbasis Web. *Komputika: Jurnal Sistem Komputer*, 7(2), pp. 79-86.
[11] Pratama, A. H. 2017. Pertumbuhan Pengguna Internet di Indonesia Tahun 2016. *Diakses tanggal, 29*. 