

Land Sale Geographic Information System based on Web and Web Mobile using Google Map

¹I Nyoman Piarsa, ²A. A. Kt. A. Cahyawan Wiranatha,
³Yohanes Perdana Putra.

^{1, 2, 3}(Departement of Information Technology, Udayana University Bali-Indonesia)

ABSTRACT: Sale and purchase of land are usually done by people. Most people are confuse how to find land sold in an area that people already specified. Land Sale Geographic Information System based on web and mobile web using google map is an alternative media that can mapping an area where land is sold. This base system is made by using Ruby on Rails framework and CSS responsive layout. Those platforms will facilitate developers in applying it. The Strengths of this application is user can easily see the location where they want to buy by map. The option search include; land sale by type, region, status, price. forum on the land sale information system will allow users to be able to communicate with each other. Bidding recording system is also a medium that helps to get the best between buyers and sellers selling price. and lastly, the web mobile make users able to open web from any mobile devices.

Keywords: Geographic Information System, Land Sale, Forum

I. INTRODUCTION

Land selling is an activity when the owner of some land is changing. The number of people grows rapidly not only because of the economic factor but also because of their need to find places to stay increases too. In addition, many people come from the other provinces to work and they need to find places to stay.

In some place, land selling still uses printed media and also advertising media through internet. Those media will complicate buyers to choose the land which is already decided because they have to read the articles provided one by one in order to get the information they need on the location of the land. Moreover, buyers should not only search for information in one media, but also in another media.

Seeing the issue above, the writer had an idea to develop an information system with data processing center which is integrated with Land Sale Geographic Information System, Forum Website, and Mobile. This system can help both sellers and buyers in getting the latest information easier. The system is also expected to be able to collect, save, combine, arrange, manipulate and analyze Geographic Information System related to spatial field based on Google Map API.

With the existence of Land Sale Geographic Information System, users will find it easier to find the locations of places they want. By using the system, users can also search for certain criteria such as number of home level, electricity, and building size. Users can also trade information to others in this land selling forum. This system

has a flexible ability as it can be opened using mobile.

II. LITERATURE REVIEW

Geographic Information System (GIS) is one of many information technologies that can input, store, recall, process, analyze and produce geographic or geospatial data in order to facilitate decision-making process in the planning and management of spaces, natural resources, environment, urban facilities, and other public services. GIS components are a computer system consisting of hardware and software, geospatial data, and brainware.

Spatial data are data which are related to geographic conditions, such as rivers, administrative areas, buildings, roads, etc. Spatial data are obtained from maps, aerial photos, satellite images, statistical data, and many others. Until today, common perceptions of the representation of spatial entity are raster and vector concepts. Non-spatial data, on the other hand, are data which are in the form of texts or numbers, often referred as attribute. The Figure below is an example of spatial data obtained from a map.

2.1 Google Map

Google Maps is a web mapping service application and technology provided by Google, that powers many map-based services, including the Google Maps website, Google Ride Finder, Google Transit, and maps embedded on third-party websites via the Google Maps API. It offers street maps, a route planner for traveling by foot, car, bike (beta), or public transport and an urban business locator for numerous countries around the world. Google Maps satellite images are not updated in real time; they are several months or years old[5].

Using Google Map API is not a complex that many people think. It just need HTML, CSS and javascript working together inside[1]. The map tiles are images that are loaded in the background with ajax calls and that return new images. And also the API, basically that is consist of javascript files that contain a class with methods to run the program.

2.2 Geocode

Geocoding us the process of assigning a latitude/longitude coordinate to a place[2]. Geocode also return the coordinate from sending address. Geocoding engine work with a variety of inputs, including the following:

- Address
- cros street
- city and state
- zip code

Data that return from geocode is a JSON output format. JSON that can be read from javascript.

2.3 JSON

JSON (JavaScript Object Notation) is a light data-exchange format which is easy to be written and read by human, and also easy to be translated and generated by computer[4]. JSON is only a text format that does not depend on any programming languages, as it uses a language commonly utilized by C programming family, such as C, C++, C#, Java, JavaScript, Perl, Python, etc. These characteristics make JSON ideal as a language of data exchange.

2.4 Ruby On Rails

Ruby is a script-based, object-oriented dynamic programming language. Ruby is used to combine the superiority of the existing programming languages. Ruby is written in C programming language which basic abilities similar to Perl and Python. Ruby on Rails is built around the Model-View-Controller(MVC) pattern. MVC is a design pattern used for separate an application's data model, user interface, and control logic into three separate layers with minimal dependencies.

There are three data model on RoR:

1. The controller is the component that receives the request from the browse or mobile device and performs the users-specified action.
2. The model is the data layer that is used usually from a controller to read, insert,update, and delete data stored, for example, in relational database.
3. The view is the representation of the page that the users see in their browser.

2.5 Responsive layout

Responsive layout is like an approach to web cascading style that make a flexible layout. The main objective is to build a web can detect a width and height of visitor screen size using media query.

Media queries, a feature of cascading style sheets (CSS), allow the developer to specify when a certain style takes effect. With media queries can solves a lot of design problems caused by the proliferation of new types of mobile devices. Responsive design pages use x and y coordinates on a grid for layout and mathematical percentages for images instead of fixed-width parameters. Using percentages instead of fixed-width parameters and a grid layout creates a more fluid layout that will resize itself to fit the size of the display.

This capacity means that instead of having to build a special mobile version of a website -- which often requires writing new code from scratch -- developers can simply build multiple style sheets for the same web page and perhaps even associate different images with each of the style sheets. As a result, HTML code can be repurposed instead of having to be rewritten, which saves considerable development time.

III. APPLICATION DESCRIPTION

The involved components in this geographic information system are: users, administrator, and google map.

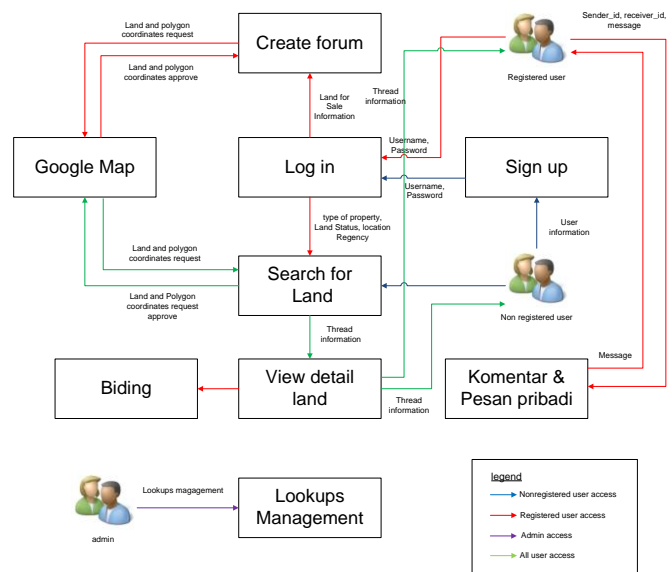


Figure 1. System Overview

Figure 1 describes the overview of Land Sale Information System. It elaborates the flow of figures and features accessible to each user. This system has three user types: guest user, registered user, and admin.

Guest user may access *land search* in the map and may also view *land details*. The search can be done by categorizing the lands based on its department (regency), sale status, prices, and type of land to be sold. The purpose is to facilitate guest user in looking for information on what other users are selling or renting out in this geographic information system.

Guest user may also register himself in the geographic information system by completing the signup process. This method enables guest users to become registered users, and could login in the system.

After logging in, registered users may create a thread to promote the land they want to sell or rent out. In creating threads, users elaborate the details of land-related information and are also able to draw their land location in a polygon shape as well as the department/regency where the land is located. As the map is clicked upon, the system will obtain latitude and longitude coordinates from Google Map to be stored as land-sale location.

Registered users may also give comments both in their own threads and in others' threads. This enables users to easily provide additional information which can be viewed and responded by other users. A private message feature is also provided to registered users, where information can be sent privately between registered users, without the knowledge of uninvited users.

Private message, only for register user. It can be made for anyone who already registered in the system.

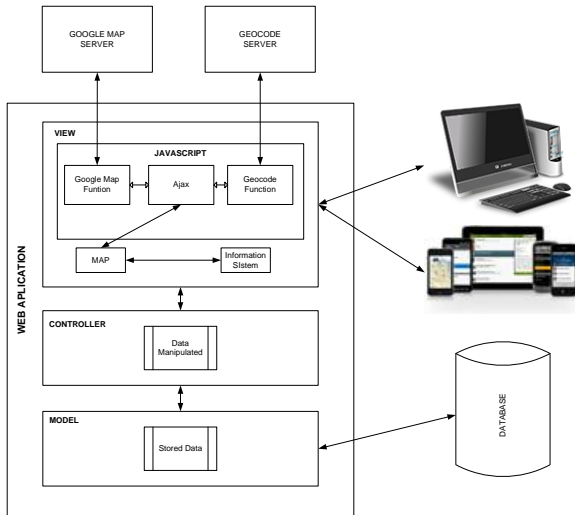


Figure 2. Flow System Description

Users may use either desktop computers or mobile devices. These devices will directly access View. In the viewing process, View would send data request to controller, where it consequently accesses to the database to obtain the data needed. The data are then sent back to View Process in a JSON format where JSON will be processed in JavaScript. Next, Ajax would send the coordinates to geocode to find out in which regency the land is located, where it would send back the information related to the regency in JSON format. Finally, Ajax sends the same coordinates to be marked in Google Map, and Google Map displays the map and its location markers.

IV. RESULTS

This geographic information system provides search feature. In this search system, users are faced with several choices: sale types, region, forum types, and price. Users may choose more than one available options. Forum Types in the map are displayed differently based on icons as can be seen in Figure3.

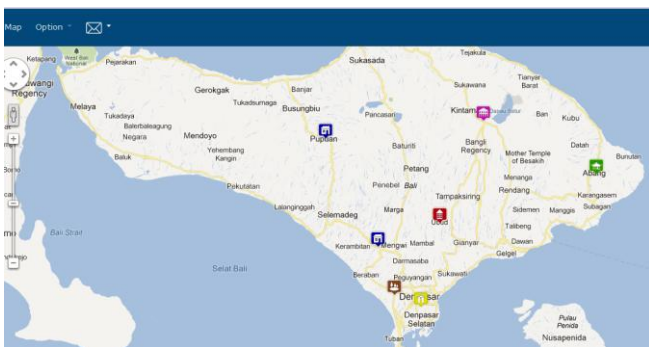


Figure 3. Search Results Based on Maps

Search results can also be seen based on the forum types. Forum displays organize information based on tables sorted by dates and prices. Figure 4 shows an example of forum-based search results.

Rumah	Treads/Post	Post Terakhir
 DISEWAKAN RUMAH LT.2 Perum.Kediri Rp.15000000 Sewa Jl. By Pass Kediri No. 24	Dikunjungi: 6 Post: 3 oleh:ari	2012-06-28 04:49:35 lebar jalan di depan berapa meter??
 Dijual Rumah Sederhana Rumah Power Rp.2000000000 Jual Jl. Raya Pupuan no. 34	Dikunjungi: 1 Post: 1 oleh:intan	2012-07-03 17:08:21 rumah kosongan apa ada isinya??
 Jual rumah seputaran renon Jual Rumah Renon Rp.3000000000 Jual Jl Raya renon	Dikunjungi: 0 Post: 1 oleh:boke	2012-07-02 19:37:17 Senin boleh ketemuan??

Figure 4. Search Results Based on Forum

Apart from the ability to display information based on its forum, users are also able to easily interact with each other using commentaries and private messages as seen in Figure 5.

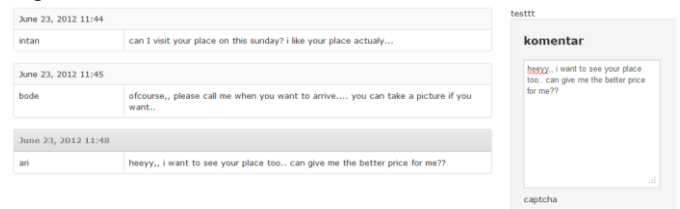


Figure 5. Sample komentar

Another feature is the media which facilitates sellers and potential buyers to bargain and negotiate. For example, potential buyers may offer a price lower than what the seller asks, and this can be done several times. Sellers then could pick the offer they like the most to close the deal. Offers are sorted in a descending manner based on their prices. The higher the offer, the higher its position is displayed in the result.

Penawar	Harga	Waktu	Terima
ina	500000000	July 01, 2012 19:05	DEAL
dana	435000000	July 02, 2012 19:06	
bode	400000000	July 04, 2012 18:51	
boke	375000000	July 01, 2012 05:31	
indra	300000000	July 02, 2012 05:30	
dana	125000000	July 03, 2012 17:16	

Figure 6. Users bidding sample

In addition, this system also has several notification features, such as:

- 1 Comment Notification
Comment Notification informs all users commenting on a thread if there is a new reply from another user.
- 2 Private Message Notification
Private Message Notification appears if a new message from another user is received
- 3 Negotiation Notification
Negotiation Notification shows users if a new user is involved in a negotiation or if a new offer is made
- 4 Land Sold Notification
Land Sold Notification informs all the users who have been involved either in a commentary thread or negotiation thread when the related land has been sold or rented out

Rating System is the last feature of this geographic information system. Users may give rating to a certain thread. The highest rating is 5 stars, while the lowest is 0. The rating score is displayed based on the average rating given by all users on certain thread.

V. STRENGTHS AND WEAKNESSES

5.1 Strengths of Land Sale Information System

Here are some advantages of this system:

- 1 The main feature, map, enables users to search for lands based on the desired location.
- 2 Its web-based characteristics let users easily access the information from any device as long as they are connected to the Internet.
- 3 This system is accessible for mobile devices which can run JavaScript such as tablet computers or smartphones. Obtaining and sharing land-related information from users' handsets would be easier.
- 4 Users may browse for land-related information in two ways: map and forum. Forum-based View provides an alternative and help users which might have difficulties in reading maps.
- 5 Registered users can give comments or ask questions in a related thread.
- 6 Registered users can send private messages to each other, in order to prevent uninvited users from viewing their conversations.

5.2 Weaknesses of Land Sale Information System

This System cannot verify whether or not the information the users have input are reliable.

VI. CONCLUSIONS

The followings are the conclusions from the research "Designing Web-Based and Mobile-Based Land Sale Geographic Information System":

1. Google Map has the capabilities of providing spatial data for exact mapping and real mapping. In addition, Google Map also has numerous features such as street mapping, satellite images, and hybrid features which can support users in map-based information search.
2. Land Sale Geographic Information System gives users easy access to search for land sales based on its location and sale status.
3. Web-Mobile version helps users to access information related to land sales, although it is not as fast and as efficient as accessing it from the computer.

REFERENCES

- [1] Svennerberg, Gabriel, *Beginning Google Maps API 3*. Spinger Science, Business Media, 1966.
- [2] Jagoe, Andrew, *Mobile Location Services*. Prentice Hall, 2003.
- [3] Hutchinson, Matthew J (2010). *Developing an Agent-Based Framework for Intelligent Geocoding* (Ph.D. thesis). Curtin University.
- [4] Zakas, Nicholas. *High Performance javascript*. O'REILLY Media, 2010.
- [5] <http://en.wikipedia.org/wiki/Google>