

A Location-based Cooperative Web Service Using Google Maps

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Abstract

LoCo (Location-based Cooperative) is a web service that allows people to cooperate on activities that are organized around locales. It allows users to add content-associated markers to a map and to view and search for markers based on selected criteria, such as content, dates, and user names and addresses. This service has many applications, for example, individuals might use it to locate others who are willing to buy or sell items and services that are only feasible to transport and/or utilize within a specific locale, such as piano lessons or leasing farm machinery.

Keywords: *location-based web service, cooperative, Google Maps*

Introduction

Within the last few months, Google has released a free service and programming interface (maps.google.com/apis/) that allows location-based web services to be easily implemented by referencing map locations. Here are some examples: avian flu outbreaks, cheap gas prices, crime incidents, cell-phone towers, free Wi-Fi hotspots, weather conditions, real estate listings, etc. See googlemapsmania.blogspot.com for many more.

According to CNN Money.com's Erick Schonfeld, "What's fascinating about these maps is that they have the potential to link all Internet data to the physical world. Any data feed that includes a street address can be mapped."

Yahoo! (developer.yahoo.net/maps/) and Microsoft (local.live.com/) have also release mapping products recently in response to Google. According to Yahoo!, "[Yahoo! Maps API](#) gives developers of all levels free public access to Yahoo!'s SmartView Technology - enabling them to see their own geographical data on Yahoo! Maps. Developers can now create customized maps by overlaying a variety of content onto an existing Yahoo! Map including weather reports, school district boundaries, open houses, garage sales, vacation photos, and more."

In the process of coming up with a paper topic related to mapping, I wanted something that might be of practical use for small-scale localized activities. I chose to design an easily deployable web service using Google Maps that will allow users to cooperate and collaborate on general-purpose location-based applications. Google Maps was chosen as the most developed of the mapping products.

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Although there are other map-creation services on the Web, such as MapBuilder www.mapbuilder.net/, and Frappr www.frappr.com/, what distinguishes LoCo is the following combination of features:

- Interactivity – users can input annotated information themselves.
- Map content ownership – data and software hosted on web server of choice.
- Open source – completely customizable software.
- Search/filtering – selectively view content based on user-provided criteria.

Location-based service is a term that encompasses a number of categories of service (Kupper, 2005). One type of service, often involving GPS (Global Positioning System) technology, allows mobile wireless users to view and interact with entities within their vicinity, which may include other mobile users (Blyer, 2003; Hightower and Borriello, 2001). A related system is the Onstar service that provides GPS/wireless-based vehicle assistance (Allan, 2003). Another type of service involves localized web searching based on schemes that associate IP (internet protocol) addresses with geographic locales (Papapetrou and Samaras, 2004; Padmanabhan and Subramanian, 2001). So for example, a search of apartment listings could be constrained to produce listings within the user's geographical area. Map-based services are so recent that there is a dearth of research literature on them. For map-based services such as LoCo, a map is the starting point of a query. Maps make use of the power of the human visual system to understand and organize spatial information. Starting with a map, sources of desired content can then be located that are within a desired geographical locale, and transportation issues more easily evaluated.

Description

A view of the web service prototype can be seen in Figure 1. It also can be seen and used at itklinux.itk.ilstu.edu/LoCo/loco.php. The current software package is available at www.itk.ilstu.edu/faculty/portegys/programs/loco.zip. The view is after a user registers and logs in. The panel on the left side of the page shows a Google map of the Illinois State University/downtown Normal, Illinois (USA) vicinity. A marker has been added to the map near the location of my office in Old Union. Google maps allow a user to zoom in and out and smoothly pan in any direction using the mouse.

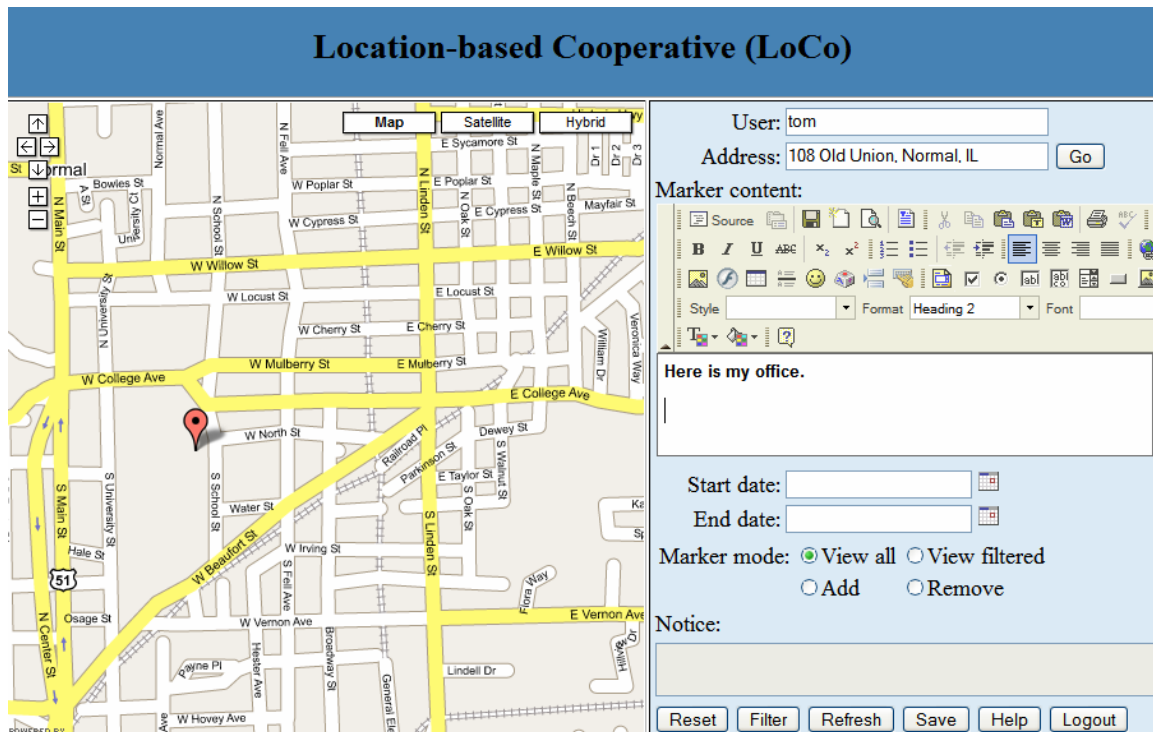


Figure 1 – LoCo Web Page

The right panel contains various controls and information fields, including:

- A user name.
- Address of interest. A geocoding service also allows a user to move and center the map at a given address.
- Marker content – this is information that is associated with a marker, and is displayed over the marker when it is clicked. The marker content can contain an extensive variety of HTML formats, including image links.
- Start and end dates – these would be of use to know when a service or item is available.
- Operational modes:
 - View all – show all the markers on the map.
 - View filtered – show only markers that match user-supplied criteria, such as user name, address, marker content, and dates. These have been selected by the filter command button (see below).
 - Add – in this mode, new markers can be added to the map by clicking on it. Such a marker will have any supplied information, such as content or dates, associated with it for later retrieval. In addition, these markers will be “owned” by the creating user.
 - Remove – remove markers that are owned by the current user by clicking on them.

Below the mode buttons is a notice text box for instructional and error messages. Below that is a set of command buttons that perform the following actions:

- Reset – clear the controls

- Filter – works with view filtered mode; markers are selected based on matching values of controls, such as user, address, etc. Content matching is currently a simple line-by-line string match; in future this will be a Google search function.
- Refresh – request the server to update the map from the server with marker changes made by other users.
- Save – save marker changes to server.
- Help – help page.
- Logout.

The system is written in PHP, HTML, and JavaScript and will run on any server that supports PHP and any browser that supports JavaScript. In the future, the marker content may be stored in a database such as MySQL.

System requirements:

1. A PHP-enabled web server.
2. A Google Maps key, available at maps.google.com/apis/
3. An initial latitude and longitude to center the map, available at geocoder.us/

Installation:

1. Unzip the package in the web root directory. Make the files readable by the web server user id. Make the data files, users.txt and markers.txt, writable.
2. Edit the main.htp file:
Put the Google Maps key in the maps.google.com script line.
3. Edit the loco.js file:
Put the latitude and longitude in the home_* variables, e.g.,
var home_longitude = -88.986189;
var home_latitude = 40.509543;

To invoke:

www.your.host/LoCo/loco.php

Data files:

1. users.txt - user login/encrypted passwords.
2. markers.txt - markers file.

Conclusion

A general, easily-deployed location-based web service has been presented with the goal of facilitating new applications. The software is open source and can be customized to suit (available at www.itk.ilstu.edu/faculty/portegys/programs/loco.zip). A test application is planned in the upcoming months during the garage-sale season in the USA.

As mapping services such as Google expand, the availability and quality of applications built on them will grow. Currently, commercial applications cannot freely use the Google mapping service, but it is to be expected that the influx of new commercial applications will inspire leasing arrangements.

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