

# Geo2Tag Implementation for MAEMO

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## Abstract

Nowadays social networks and blogs have become part of internet users' lives. Such networks connect people all around the world. However information the users post is rarely linked to geo location, rather the content (photos, videos) is associated only with username. Hence, other users do not have an opportunity to know where current photo or video was taken. The Geo2Tag project addresses this problem by combining features of the social networks and GPS technology. The project is a social network where every message contains user location information correspondent to content creation time instant. The service consists out of two parts, a server and a client for a mobile device. Server software provides data storage while client software provides GUI and features offered to the user, like adding new messages and shows closest to user messages on a map. The paper discusses project implementation details, describes its software architecture and overviews the main features.

INDEX TERMS: GPS SERVICES, GEO-SERVICES, BLOGS, LOCATION-BASED SERVICES.

## I. INTRODUCTION

Location Based Services (LBS) are becoming dominant challenge for the operators, providers as well as for manufacturers of wireless handheld devices. Despite the global financial downturn and notable decline in the mobile devices sales of approximately 4%. Correspondingly the revenue is expected to increase from \$998.3 million in 2008 to \$2.2 billion in 2009 [1]. For location determination LBS normally use GPS and A-GPS facilities. WiFi has recently started to pay-off to LBS; well known Skyhook Wireless is offering WiFi-based location facilities with precision of tens of meters, providing free SDK and API for implementation of LBS services by third developers [2].

At the same time social networks are becoming a dominant part of the internet services. They count hundreds millions of users already today. Social networks increase number of features all the time, - from simple text messaging to user's media content storage.

The Geo2Tag project discussed in this paper is combines GPS technology used for navigation with social network. This combination gives a user an opportunity not only for information sharing but also content attachment on a map, which shows where the user content such as text, photos, videos or a combination has been created.

## II. GEO2TAG ARCHITECTURE

Today the Internet contains thousands of different services, that allow users to create his/her own blog and share any information that the owner finds important or interesting for

him/her or for potential readers or, in other words, content consumers. It can be news of policy, culture events or even impressions of new cafe visiting. Often such notes about usual city life attract more attention than other. That is why blogs became more and more popular and common. Quite readers are interested where a particular event took place, where the author was and what he/she saw, where are the places that he/she has visited. Unfortunately most of blogs and social networks does not have an opportunity for location information.

There are two general ways that can be chosen to handle the problem:

1. To extend existing services by adding geographical information such as name of town or longitude/latitude of current place
2. To create service that aggregates all existing platforms and gives single program and user interface

Every way has pros and cons. For example Twitter developers have recently added support of geographical information into the twitter protocol, but only a small fraction of clients uses this feature. First of all it happened because the service that shows the location information on a map is not implemented.

Launching of a service capable of storing and displaying various information linked to geographical coordinates will users let access to a brand social networking scenarios currently unavailable in other social networks. Further integration of Geo2Tag platform with currently available social services like Facebook and VKontakte will bring new usage scenarios and boost added value.

#### A. Architecture

Geo2Tag is a centralized system with server, that storage all information and linked geographical coordinates.

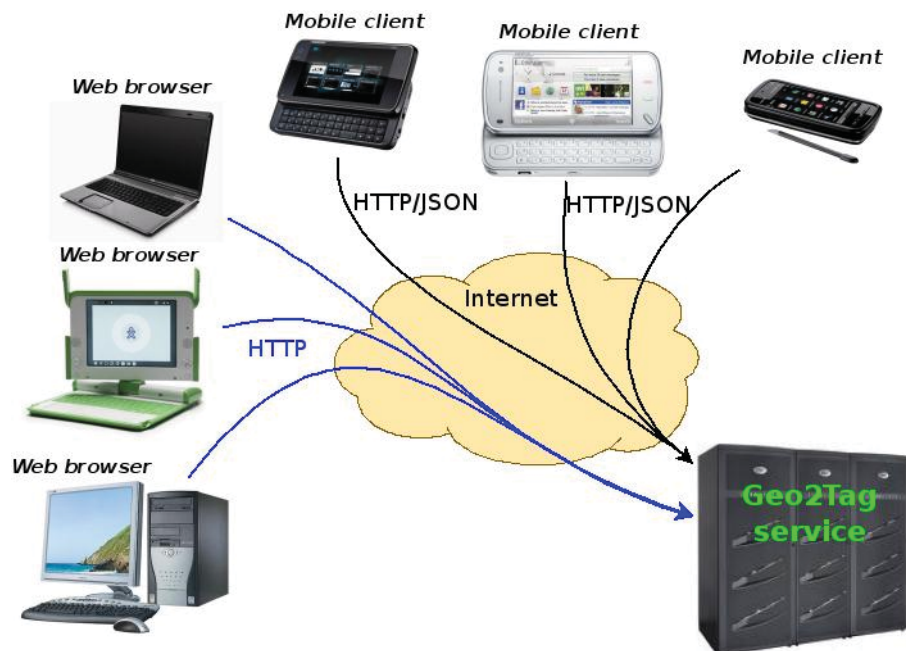


Fig. 1. System architecture.

Geo2tag users can access the service in two ways:

1. Via PC or laptop, using any regular internet browser
2. Via Geo2Tag client for handheld GPS- and EDGE/3G/WiFi- capable device

Geo2Tag logical objects and their interconnections are shown at Fig. 2.

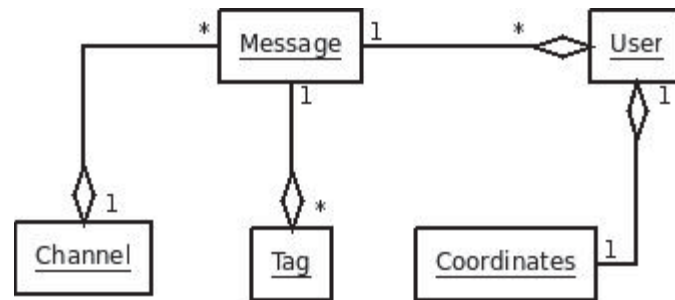


Fig. 2. Application domain.

**User** is a person that has an account on the Geo2tag server. User's handheld device contains Geo2tag client software and GPS module determining terminal's **coordinates** — his location represented by longitude, latitude. User creates and posts **messages** (text or any type of a media content — video, photo) on a server. Message that associated with user's current coordinates called **tag**.

A tag is uploaded to the Geo2Tag server from where it can be accessed by any mobile or fixed device that has the corresponding access rights. Every tag belongs to so-called virtual channel. Virtual channels are user-driven, created and managed by users. Virtual channels are normally associated with the GPS coordinates and/or a topic/audience, meaning a user can have an access to data shared by other users in accordance to his/her location. A virtual channel can be of different types:

- i) Public open channel – any user can openly subscribe to this type of channel;
- ii) Customized channel – a private channel created and owned by user (channel creator/owner); other users of that channel have to be first authorized by channel creator, only then they can read and post to the channel;
- iii) Broadcast channel – all subscribed users located within the channel's coverage can read information from it.

### B. First prototype

First prototype was developed for Nokia N900 mobile device on Maemo platform with using of Qt, unixODBC and curl technologies. Prototype has the following functionality:

- **View map with tags.** User can select view part of google map on his device. Map shifting and scaling are implemented. For each tag there is a bubble with one Latin letter from A to Z. There is a limit on the number of tags shown on a screen at a time.
- **View tags as text feed.** User has a table with next columns: date, tag letter, tag text. User can see text tags with nearest (we have parameter to define what does it mean) location base.
- **Getting GPS/location data form device.** Application uses n900 GPS location interface to determine current location and receive correct tags and map pieces.
- **Persist tags on remote server.** Each tag is placed on a remote server in the database and has next structure:
  - Timestamp
  - Position: latitude, longitude
  - Multimedia data

Additionally each tag usually belongs to one or several virtual channels.

- **Select channels.** User has interface for select channels which he is interested in.
- **Add tag.** User has dialog for adding new multimedia tag to the selected channel. Time and position will be associated with tag automatically.

Data are stored on Geo2Tag server. Data access is organized by direct request to the database from mobile device. The following classes have been created for implementation of listed functionality:

- GoogleClientLogin — implements authentication in GoogleMaps service
- GoogleMapLoader — implements map images loader from GoogleMaps
- MaemoGPS — implements interface of a GPS module
- Channel — implements the concept of channel
- User - implements the concept of user
- Gps - implements abstract interface of a GPS module
- DataMarks - implements tags into a channel
- MapLoader — implements abstract interface of map loader.

The listed classes form the following hierarchy:

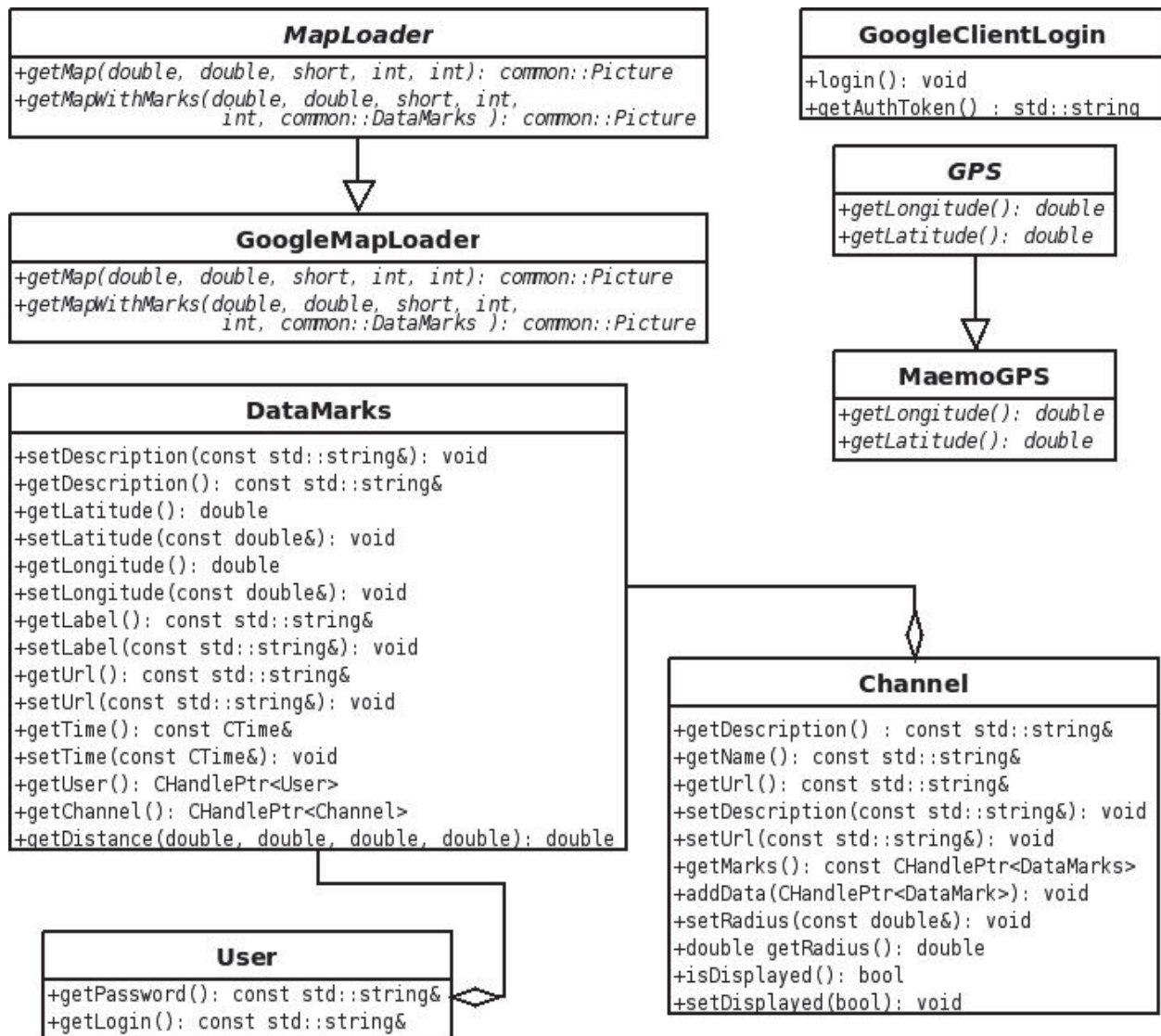


Fig. 3. Class hierarchy.

The main idea for the first prototype was to test approach and identify potential weaknesses in the selected architecture. This prototype demonstrates that access to tag database through ODBC connection does not work properly when the internet connection is

unstable. Also we can say that it is worth to use lightweight transport protocols, like http, SOAP or JSon [4].

### III. CONCLUSION

Geo2Tag functionality allows integration with the existing map servers and services. Everyone who has an account could add personal tagged information through common web interface to the available geo solutions. The generated content is integrated to the server data and next time could be delivered to the mobile device of the user and be also provided to the other users of the system.

The next phases of Geo2Tag project will be considered for the further project implementation:

- Prototype demonstration and feedback collection at the 7th FRUCT seminar - April 2009.
- Public testing and launch of the Geo2Tag service by the end of May 2009

Now we can say that all demonstrated solutions are fit to user and technology requirements. In next version we will focused on security and usability aspects. Also, one of the important issues which we will consider in the future is API simplification. This aspect of our project will quite significant for potential developers of client applications.

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