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Dynamic webgis and tracking of mobile devices

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A webgis is a system to manage and deploy spatial data and associated
attributes on the web. Usually, the data are static on the
client-side: a standard webgis application doesn't manage dynamic
information. In this article we illustrate a dynamic webgis: a system
architecture that is able to automatically collect, manage and display
dynamic geographic information. In this way one can monitor in real
time on the map the state of time-evolving entities. Possible
applications are fleet tracking, environmental control, surveillance.
Actually the system is being applied to fleet tracking.

In a standard webgis, once the client has requested and received data,
these data can change on the client, if and only if, the client send a
new request to the server (common HTTP protocol behavior). The main
drawback of this kind of architecture is that every time the user
wants to change or interrogate the map, the server has to update the
view and send it to the user. This can create an impression of poor
interactivity, but this architecture is not able to show the state of
an entity after it is changed.

It is our opinion, that in a dynamic architecture, the changes should
be visible, to the user, in real-time. We mean, for dynamic webgis,
an environment where the entity state can change many times. If one
has to monitor the state of an entity (eg. temperature or alarm sensor
in a building), there is the need of managing dynamic information, in
a more responsive way. Our aim, here, is the proposal of a dynamic
architecture consisting into a real-time webgis where the user can
observe changes over the map as the corresponding information is
available and updated from external sources, without explicit requests
by the user.

The developed system, termed USAlov, is based on Alov /
TimeMap. TimeMap is developed in J2EE technology and it is very

flexible and easily extensible. USAlov is a J2EE / J2ME application developed to track locations of remote mobile devices storing their positions on a relational database. It can be used to view real-time locations of mobile devices.

Our mission has been the integration and development of new features in Alov / TimeMap. We have added a tracking server, and a mobile component, while the applet has been extended with modules for monitor the state of targets.

Tracking server is a new server-side component, that manages dynamic information about mobile devices. It stores this data into a MySQL database, and stores in memory the information about active devices. We have developed a mobile component that runs on mobile devices and communicate, by the bluetooth protocol, with common GPS receivers, and, by GSM network, with the tracking server. Last, we have extended the basic TMJava applet, used to view static GIS data, with the capability to communicate with tracking server and show dynamic information. The extended applet allows to dynamically query the tracking server, to get the position of the mobile devices

The mobile device, J2ME enabled (eg. mobile phone), communicates with a GPS receiver, and it sends information about its location to a web server. Thanks to GPRS / UMTS connection and short size (few bytes) messages it is possible to use this application in a not expensive way.

The server stores the messages from mobile devices into a database and in an active structure that resides in the server. A thread is responsible to load information about monitored targets in memory.

The client is based upon Sun Java applet technology, which allows to view the whereabouts of an entire fleet from a desktop. The applet provides a tracking panel used to configure the request to send at tracking server. After query, the client runs a thread that updates the requested data at configurable intervals time. Indeed, the applet is in a continuous polling to the server with HTTP requests.

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