

A Generalized Framework for Public Mobile Device Tracking System using Central Database and Location Based Services

Venkatesh Suvama

*Computer Engineering Department, NMIMS University
Mumbai, India*

Abstract— Positioning Systems are not a new technology anymore and they do find various applications. Global Positioning Services and Location Based Services have been always used to help people to travel from one place to another, and various such navigation systems have been developed for the same. But one such use of GPS and LBS is tracking the location of mobile devices. The facility is not new but it is being used by authoritative forces only. But this technology is not being widely used as a service available to the public. Here we first give an introduction to the concept which could be realized using the framework discussed in this paper, along with the technologies that would be involved in designing such a framework, proceeding to give a generalized framework for such mobile tracking systems to be made available to public to track their family and friends with their permission. The framework to be discussed here will ensure that the system that will be developed will be complete, secure and will focus on performance and efficiency at the same time.

Keywords— Location Based Services, Global Positioning Systems, Mobile Tracking Systems, Internet Database.

I. INTRODUCTION

The purpose of discussing a new framework is keeping in mind that technology is advancing, and we should use it for the benefit of people. Global Positioning System and Location Based Services is a stable technology and it is yet to find a lot of applications, one of which is mobile device tracking as a public service. The framework could then be used as a system by people to locate their family and friends for security purposes, this could also help people find their lost mobile devices. The framework is to be designed for the public, as a result the framework should be most importantly easy to use, and should be able to concentrate on performance and efficiency simultaneously. The framework should also be easily implementable as a system that should be easily accessible to the public.

With this guidelines clear in mind, we have the right intentions in mind to set the technologies that could be used in the framework.

II. TECHNOLOGIES INVOLVED

The framework should be easily accessible to the public, so we need a universal access method to make the system accessible, and the best method of access would be the Internet. And since the framework is for mobile device tracking, we need mobile devices to update the location

through GPS and LBS to a central database. We would need a webpage to access the data in the central database. Considering all the aspects, there could be various technologies for each subpart of the framework. The mobile devices include a variety of operating systems, the most important ones include Android, Windows and iOS, and would need an application to update the phones location. The webpage to access the central database could be developed using various webpage development programming language like ASP.NET, JavaScript could be used, unless it cannot retrieve information from the database in an efficient manner. As far as the central database is concerned, it could be developed using Structured Query Language, the most widely used technology for developing database systems. It is worth noting that the technologies selected in making this framework could widely vary, it is important that they maintain compatibility and they should not hinder the overall performance and efficiency of the system.

III. PROPOSED FRAMEWORK

Now that the various components and the technologies that the components could be developed with are clear, it is now suitable to proceed with the proposed framework. The components that are in the framework are the client equipment that is the mobile device which is to be tracked. The requirement for the mobile device to work with this framework is that it must be equipped with Location Based Services(LBS) and Global Positioning Services(GPS) and it must be also able to transmit information over the Internet(the communication medium). The mobile device will transmit the location of itself. It can do so through the GPS and GSM hardware modules fitted onto the mobile device. The location could be sent in the form of a pair of float number, and the float number could be the latitude and the longitude of the mobile device. The position of the mobile device is to be update continuously or at a fixed rate of time(say after x minutes each), the time duration is to be decided when a mobile device tracking system is to be developed, this paper strictly concentrates only on the framework. The job of continuously updating the location of the mobile device is being done by an application installed on the mobile device which has to be compatible with the operating system installed on the mobile device to be tracked. The location has to be updated into the specific entries of the central database, they are discussed later.

The next component of the framework is the webpage which allows user to access the information of locations of mobile devices having their authorization. Each user of the webpage is to be given a username and password for them to login to the system. The location of the user’s mobile device is to be retrieved from the central database and shown to the user as some indicator on a map to enable easy understanding of the location of the mobile devices. The basic workflow mentioned above is depicted in the form of a diagram below.

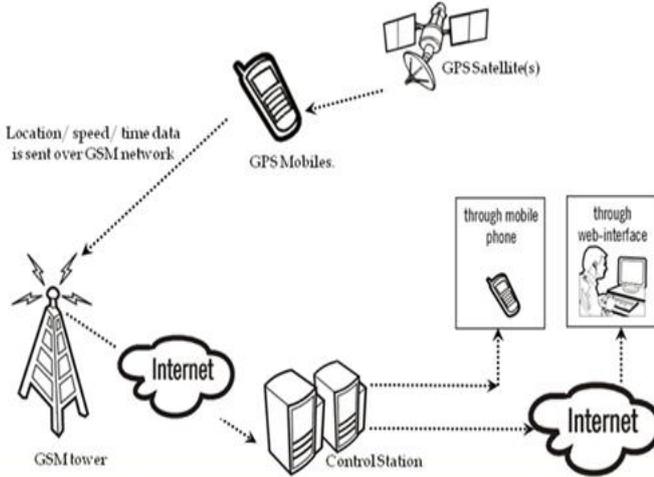


Fig 1. Workflow of Proposed Framework

The major component of the framework is the central database, consisting of several columns, including the credentials of the user such as the username and the password, and the device credentials, such as the device unique identity and the device name for the user’s reference, and the location of the mobile device in terms of latitude and longitude. Some points have to be taken into consideration during the implementation of the central database. First of all we need to understand that an entry will be created in the table when a new user or an existing customer adds a device to track. Similarly an entry will be removed from the table when an existing user removes a device they do not want to track. Also, the database should be ready to receive commands to update and retrieve information from itself at all times. In case of database unavailability, or database maintenance, a backup database could be created and updates at all times, so that the queries to the database could be redirected to the alternative database, sometimes also called copy database. The database entries could be encrypted to reduce the risk against attacks. If all these points are taken into consideration, then the database would ensure smooth functioning at all times. The concept of copy database could be understood from the figure 2

The client is the user that accesses the system through the webpage in this framework, as we are having two servers having connected to two databases. In normal scenario, the client interacts with the active server at all times. A heartbeat is a fixed time intervals at which the server synchronize with each other and the databases are replicated with the same information. At times when the active server is unavailable or is under maintenance, the client queries are redirected towards the standby server.

This mechanism allows for the service to be available to the user at all times.

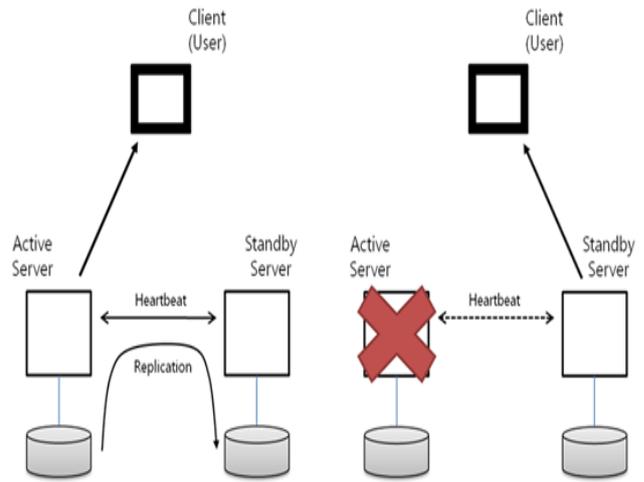


Fig 2. Copy Database Scenario

Now that we have understood the proposed framework, we need to proceed with the future work, understanding the limitations of the framework, and what could be done to make it better.

IV. CONCLUSION AND FUTURE SCOPE

Every concept can have new aspects added to it. I personally encourage all researchers to take this framework as a reference to make your own framework out of it, or modify this framework, to make it more secure, more accessible and to make it better. I would be obliged if the framework discussed in this paper could be used to build intensive mobile tracking systems, with all legal rights. The framework discussed in this paper is just an overview of a possible system that could be developed out of it, that could be used by people to track their loved ones. I feel that technology is well utilized if it is used for the benefit of the people and society.

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