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GET CABS AND BUSES IN METROPOLITAN AREAS - A MOBILE APPLICATION

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Abstract. The current paper introduces new mobile software to get cabs or to identify the closer bus station in a particular metropolitan area. The software could be easily modified to be used in any large metropolitan area. The application is developed for the Android operating system and uses the Google services to create a mutual agreement localizing application.

I. INTRODUCTION

Many analysis shows that the mainly used devices today are the smart phones. The reason why people choose these devices are their utilities in addition to the ability to initiate a phone call; they have many functions similar to a personal computer, such as: the ability to send and receive emails; support for viewing and editing office documents, images, play games, etc. Typically a mobile phone is a wireless device used to initiate audio communications. Like any phone such a device makes sense in the context of use when connected to a mobile data network; so mobile devices technology is closely related to wireless network infrastructure and services provided.

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Smartphone status is given by the defining characteristic that gives mobile devices the presence of an operating system that makes it possible to run applications with complex applications like classic platforms such as personal computers. The most popular smart phones on the market today are iPhone with iOS operating system followed very closely by the Samsung Galaxy, HTC, Nexus with Android OS.

Among the most popular applications that run on Android are: Google Now - offering a "companion" who can respond to voice commands, Facebook - social platform, Google Maps - a collection of the most detailed maps. Any user can download applications for Android from Play Store; here anyone can publish an registered application. In Play Store there are many applications providing opportunities to facilitate daily activities. From these applications the navigation guidance have an important role in providing safety, do not get lost in a foreign place, do not use an old physical map and found the shortest route. Having access to all maps from around the world in one place is very useful. Many applications were made to use digital mapping and navigation applications.

The current paper introduces a flexible application to help users in various situations. It is used Google Play service to achieve tracking applications of a device using GPS coordinates. For this purpose it is used parse-1.5.0 library to make communication architecture with the library. The application is able to perform the following operations: to enable a user to log in with their account application; to view users in a particular area and check the user current location. The application must support user location selected in a new window. Both devices must be connected, in agreement, to the internet and logged to the application to be able to follow or to be followed. The application could be used to find the closer cab (taxi) or a bus station in an unknown area.

II. ANDROID- PRELIMINARIES

Android operating system enables developers to develop applications written in the Java programming language using the libraries provided by the SDK. One of the disadvantages is that Android does not ensure complete all class libraries and API in Java SE or ME packages, so you cannot run any code written in Java Android. Android SDK includes a comprehensive set of development tools; these include a debugger, libraries, a device emulator, documentation, etc. The following factors are decisive when choosing a development platform: an enterprise platform dedicated area; support for development; continuity in the release version; data security device management options and the use of diverse range of terminals and accessories.

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For implementation and application development of the introduced application it is used IntelliJ IDEA Community Edition 13.0 IDE, Java SE 1.6 and Android SDK Tools - revision 22.6.3 platform Android 4.4.2, API Level 19. The application is available in the format of a file with the extension .apk. In the development process were used the following tools and programming environments: JAVA virtual machine, the Java version at least 1.7; tools to develop Android application (client): IntelliJ IDEA development environment, Android Software Development Kit (SDK); plug-in Android Development Tools (ADT) to develop Android applications with Eclipse; ADT provide the developer tool for debugging and testing sites applications and emulators for different versions of the Android operating system; Google Play Services in SDK Manager 9 are also installed; are imported the resources from *androidSdkPath* and added the module imported as application module dependencies GPS tracker; add jar's from *androidSdkPath* and add dependency jar's as GPS tracker module.

III. THE MUTUAL AGREEMENT TRACKING APPLICATION

The purpose of this project is developing a new application using Android platform that allows developers to write managed code in the Java language. The application is used to track other devices in real-time. Tracking can be viewed on Google Maps and require both users to be connected to the Internet.

The application could be launched on a mobile device with Android OS by simply startup of the source code. Fig.1 illustrates the first screen with the login interface followed by the main screen.

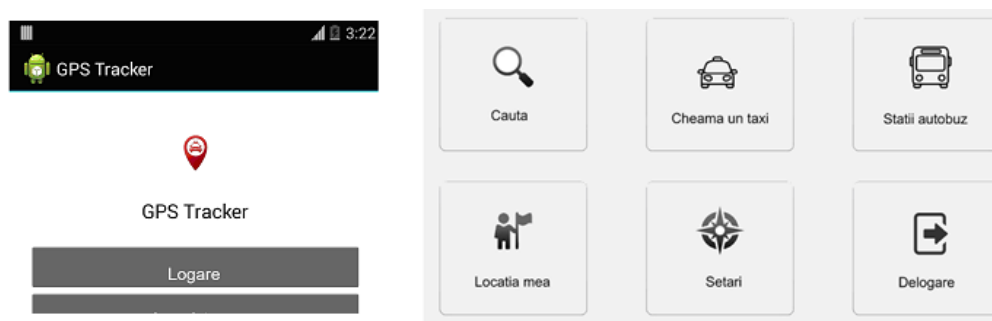


FIG. 1. Registration, Login Screen, and Main screen.

A login screen is used to identify the user. The fields to make a new account are: *username and password*. Registration will be done successfully if all fields will be filled in and the phone is connected to internet. After a successful registration the user will be redirected to the login screen. Logging

into the application is necessary because the user name is used as the unique key when localize. Logging will be done successfully if both the user and the tracked device (from a cab /a bus station) are connected to the Internet.

The options of the main screen are for Romanian users and specified further in parenthesis. The options of the main screen are: *Search (Cauta)*, *Get a Cab (Cheama un taxi)*, *Bus Stations (Statii autobuz)*, *My Location (Locatia mea)*, *Settings (Setari)* and *Logoff (Delogare)*. The option to search is about finding a location as a bus station; the results are from a neighborhood radius; the application it is able to choose one of the results and follow that location on the map; it has also the option to call a cab (taxi) and tracking it on the map; has the option to view the bus stops from a given range, as well as information about which buses runs (if it is included the buses scheduling); it has the option to find out the location and current address; the settings options has the possibility to limit the number of results the search radius setting specified in kilometers and finally the option to log out of the application.

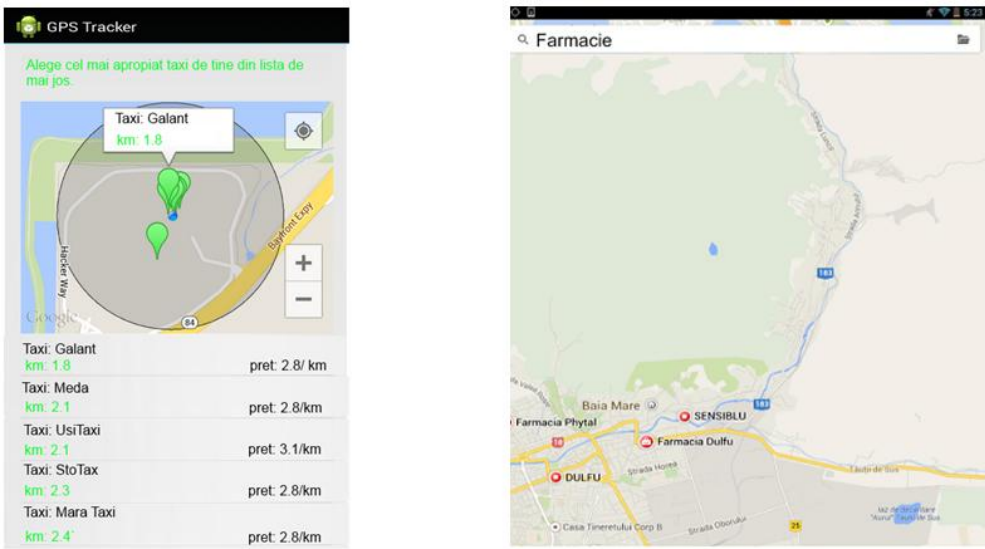


FIG. 2. The list of the taxi (left) from the current neighborhood and the tracking screen for “pharmacy” bus station keyword (right)

The search screen includes a map, a field where you enter the location. In the left part of the Fig. 2 we can see the list of the available cabs and the closest ones to our current location. In the right part of Fig. 2 we can see how is searched the maps with the “pharmacy” bus-station keyword and see the results on the map with the names of pharmacies with bus-stations in the neighborhood area.

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The application should satisfy a wide range of users, for example people who want to follow the position of a bus, people who apply for and pursue a taxi in an unfamiliar area, etc. The application allow the user to connect with another user (both agree with it) and will be able to view in real time its location and whether it is moving on a map display.

The Google Play service is used to create a tracking application of a device connected to the internet and display the real-time map of the location of users. It is used and integrate library-1.5.0 parse provided by Facebook which contains API to communicate with their servers. It is create a Framework to make possible to use easily the library parse - 1.5.0. On create a thread executor to handle the execution of long-term processes on another thread than the main one; on find a solution to improve the execution of complex asynchronous code; the presentation stages, technology and knowledge necessary for an android application.

IV. DISCUSSIONS

The use of mobile phones it is very common over the last decade, it become a necessity. They evolved considerably in recent years. Today the smart phones have operating systems and can perform operations similar to those of a PC. The current project is an application that offers a fast and simple way to follow the map of other device requiring both devices to be connected internet. The basic idea was to create a flexible application to various situations, by watching the movement in real time.

The main contributions are: communication with parse - 1.5.0.jar library; register users and servers save data from Parse.com; creating a communication mode with library parse using Factory pattern to avoid nested structures, duplicate code and running some long-term processes on the main thread; using decoupling processes so that components such as communication library, animation logic to map a user's movement, the logic for obtaining the current location can be decoupled and used elsewhere easily; using a service that updates the logical location for obtaining GPS coordinates; creating a user location algorithm animation; creating a route where there provided that each user to have one route that will save: GPS coordinates of the follower, the follower username, the person username, GPS coordinates of the cab/bus sought; using the API provided by GoogleInc enable location on the map display and watched the animation when the user or device is in motion.

There are some things that would be improved in time, such as: the short duration phone's battery, the loading RAM and possible crash sites memory. Live view of the location of a device and use a service intended for obtaining current location consumes much of battery life. This could be improved by reducing the time at which updates are locating or obtaining

coordinates from the Network location Provider or only from the GPS instead of using the both.

5. CONCLUSIONS AND FURTHER WORK

The developed application allows you to communicate with other devices that will have also the application installed on their mobile devices. The application uses the parse.com servers to store information on name, address and location as well as routing. All processes are optimized to run as fast as possible and view user's movement sought is done in real time.

The application could be improved by integrating some of the following ideas: improving communication with parse - 1.5.0 library; adjust logic for obtaining location to save battery and data exchange; improving logic map display real time location; display real-time speed and distance between the user and the person updating tracked; longer testing the functionality of a device tracking map and application behavior if used for a longer period of time and extending documentation for inclusion of Indoor Maps.

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