Building Location-based Service with Java Technologies

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Abstract – The growing use of Java in Location-based Service provides an opportunity to find solutions for problems and challenges in the rapidly changing telecommunications environment. This paper describes the development of location-based service components using Java technologies. The technologies include J2ME, Servlet, Java Server Pages (JSP) and XML Java Binding Tool. The developed components are the location server simulator, location service application and device client application. This study is crucial for support of BT’s launch of User Location Service on prototype ERICA mobile application platform through supporting the testing and validation of the platform components.

Keywords: Location Based Service, Simulator, Mobile Location Protocol, XML, J2ME

1 Introduction

Location-based Services or LBS are any services use spatial data that are available to anyone, anywhere, anytime on any mobile-based device. Common services for the consumers include Safety and Emergency, Tracking, Navigation, Information Guide, and so forth. This project deals with the design delivery and testing of location-based service components using Java technologies. This paper is structured into several parts. The first part opens discussion leads to the formulation of the problem that is to be analyzed. The second part contains theory; focusing on basic concepts and technologies to build LBS. The third part presents design and development of each component in the system. In the last part, the future and open work items are clarified and conclusions are presented.

1.1 Background

Before Windows, developers faced many problems to develop applications on computers. However, when Microsoft created basic software standard that took care of the system operation, the developers enable to build new applications with minimal fuss. Project Erica aims to do the same for mobile communications. This prototype mobile application platform (Figure 1) is purposely developed by BT to provide a middleware service access point to the network infrastructure enabling the mobile operators to build and deploy wide range of wireless API services with management capabilities [3]. One of mobile services offered by Erica is the User Location Service or ULS. The ULS is mainly designed to enable a single location Application Programming Interfaces (API) for network based location services. Application developers can easily integrate and deploy new and existing location based applications, utilizing real time positioning data from UK mobile operators such as Three, O2, Vodafone, T-Mobile and Orange. This helps to reduce the risk and cost to both parties. However, testing each application with real time data is charged per lookup. As the complex and expensive testing can inhibit cost-effective development of location-based applications, we need a different approach to testing and evaluating these applications without access to a real mobile network. In response to this need, this project introduces a location server simulator based on Location Interoperability Forum (LIF) API [11]. A location-based service application and a J2ME client called 'Map4U' are developed as part of the test and evaluation process for the simulator. Apart from this, there is a portal, which allows developers to remotely manage the location data.

Figure 1. Erica mobile application platform

2 Basic Concepts and Technologies

In order to develop location-based service system, the location APIs, protocols, technologies and infrastructure of LBS must be understood and reconciled.

2.1 Positioning technology

There are two basic of positioning a mobile device, firstly by using satellite for instance, Global Positioning system (GPS); secondly by using mobile telephone network. This section will discuss the most prominent network based positioning, the Global System for Mobile