Chapter XXVI
Real-Time Location Tracking Mashup for Enterprise

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ABSTRACT

Real-time location applications are mainly desktop based and costly for development and maintenance. In this project we worked on a Web service based architecture for monitoring and driving real-time analysis of fire truck missions. We used Web 2.0 technologies on the client side and SAP NetWeaver enterprise service oriented platform on the server side.

INTRODUCTION

Cities and communities have large vehicle fleets for emergency services. These fleets, which are centrally dispatched, need to be deployed efficiently and dispatchers need to know the current location of the vehicles.

Automatic vehicle location (AVL) technology from a number of different vendors has been in use for many years. Our group has designed and implemented a new AVL system from the ground up, with the goal of taking advantage of technologies that are currently gaining popularity in the enterprise, namely, online maps, real-time GPS location tracking, and service-oriented architectures (SOA).

Our prototype uses a service-oriented architecture and Ajax-style user interface technology. Ajax technology is not ideally suited for applications that require real-time updates. For Ajax

technology to be widely adopted for applications involving real-time data updates, a server-side push mechanism is needed.

AUTOMATIC VEHICLE LOCATION (AVL)

Automatic vehicle location (AVL) technology has been in use for many years. Devices that obtain location information using the global positioning system (GPS) are installed inside vehicles. These devices are connected to a desktop software application over wireless radio communication networks. Desktop AVL applications are easy to use but expensive to maintain because of their monolithic or thick client implementation. Moreover, the data collected by these applications cannot be easily accessed or analyzed, because the applications usually are not integrated with other enterprise applications such as financial management systems.

NEW TECHNOLOGIES

To address the problems mentioned above, we have designed and implemented a new enterprise-scale AVL system from the ground up. Our goal was to take advantage of the following three technologies that are currently gaining popularity in the enterprise:

1. **Online Maps:** Interactive online maps from Google, ESRI, Yahoo! and Microsoft are very popular. They can now be embedded in Web applications or enterprise portals, usually via a Javascript Application Programming Interface (API). They provide "flicker-free" zooming and panning functionality inside a Web browser. Location information can thus be made easily accessible through a Web browser side-by-side with other enterprise data.
2. **Real-Time GPS Location:** With inexpensive GPS devices, accurate real-time location data collection has become relatively easy.
3. **Service-Oriented Architecture:** Enterprise and geographic information is now available through Web services. This information can be used to create a variety of mashups – applications that combine disparate data from multiple sources into a single application running inside a Web browser.

Besides these, we incorporated two other technologies:

1. **VoIP:** Voice-over-IP technology can be used to reduce communication costs and to integrate voice communication with the workflow inside the dispatch center.
2. **High-Speed Wireless Network Connectivity** such as WiFi, WiMax, and third generation cellular networks (3G): Increased wireless communication bandwidth makes it possible for vehicles to communicate rich information (such as location information) more frequently and using more standardized protocols, such as eXtensible Markup Language (XML) or Simple Object Access Protocol (SOAP).

However, bringing all these technologies together poses many challenges for system integration, usability and reliability.

SYSTEM ARCHITECTURE

The AVL application uses a service-oriented architecture and a mashup structure (Figure 1). The two main services used are:

1. **Real-Time Data Management Service:** This service is used to receive, filter and aggregate real-time location information, and make it available for viewing and analysis