Chapter IX
Framework for Proximity Aware Mobile Services

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ABSTRACT

This chapter discusses a service oriented framework to realize proximity aware services for mobile devices. It describes the architecture at both client and server ends. Using the proposed framework we develop a prototype to realize a real world application. The chapter ends with a discussion on the framework and possible future enhancements.[1]

INTRODUCTION

In recent years, demand for value added services has shown tremendous growth. Yet another trend which is on an upswing is of mobile phones being perceived as means of reaching almost anyone, anytime, anywhere. These ubiquitous devices have proliferated beyond the confines of just means to exchange conversation. These are the devices which unite the communication space and mobility. Services coupled with context aware handset could make quite a convenient combination. Users want to be able to do more with fewer hassles and definitely without carrying dedicated device for each task. Apart from being a convergence device, mobile handsets are something that all of us carry at all times. They are perfect candidates to tap into information on the go. Context has various interpretations. Proximity is one of the contexts which can be used to trigger exchange of data/services. Although we focus on mobile handsets, there are plenty of other devices which may not be as capable but nevertheless can be instrumental in variety of other ways. Mobile handset is typically at the service consumer's end and a more capable device acts a service provider. We do not

necessarily lack the technology to provide this capability but what we do lack at the moment are collaborative technologies, standardized application development framework, wide array of sensor technologies to name a few. Over the past decade, researchers have put forth various proposals to tackle some of these hindering factors. This chapter reports one such attempt, i.e. by emphasizing on the service-oriented perspective of delivering context aware information.

Proximity-aware services are applications that are capable of delivering certain information whenever we are in the vicinity of a service provider. It is different from the notion of Location Based Services (LBS) in that it does not necessarily cater to absolute GPS like positioning but instead relies on relative positioning with respect to the other services in the present vicinity. Global Positioning System (GPS), Triangulation techniques can provide positioning accuracy of within 10 feet. This kind of accuracy would be useful if we were to be in a remote location and needed to convey our co-ordinates to someone. But, coming to think of our day-to-day routine, we live in the concrete jungle and we have plenty of other mobile devices that come in close proximity to each other. Here, we would be interested in what is present in our immediate vicinity and how we can interact with it. This kind of interaction can be related to Ad-Hoc networking where devices form a community on the fly. To this concept, if we were to add multiple sensors and context-aware information exchange we have proximity-aware services.

By targeting at services present in a small area, we bring down the equipment setup costs. The simplest of the services should be such that it can be setup by just about anyone with limited resources and tight budget. This is another design goal which is considered in our framework. Services can be built and offered to the consumers at a much faster rate by the localized service providers than say, a telecommunication operator setting up the service and offering it to its subscribers. Since, the risks are much lower and the service can be modified to cater to variety of consumers.

LITERATURE REVIEW

Most notable works on this topic have been from Dey et al(2000), Abowd G.D et al(1997) and Schilit et al(1994). Active Badges (Want, Hopper et al. 1992) is perhaps the first implemention of context aware application. This was an infrared transmitter that transmitted a unique identity code. As users moved throughout their building, a database was being dynamically updated with information about each user's current location, the nearest phone extension, and the likelihood of finding someone at that location (based on age of the available data). Servers are designed to poll the Active Badge sensor network distributed throughout the building and to maintain current location information. Applications that use these servers simply poll the servers for the context information that they collect. This was an application specific implementation and offered little scope for applying the same design for some other application.

Another specific application is the Cyberguide (Long et al., 1996) that served as an intelligent tour guide. Visitors were given handheld computing devices. The device displayed a map of the laboratory, highlighting interesting sites to visit and making available more information on those sites. As a visitor moved throughout the laboratory, the display re-centered itself on the new location and provided information on the current site. The Cyberguide system suffered from the use of a hardwired infrared positioning system, where remote controls were hung from the ceiling, each with a different button taped down to provide a unique infrared signature. This tight coupling of the application and the location information made it difficult to make changes to the application.

Moving to frameworks, Dey et al.(1998) implemented CyberDesk, a component based