Chapter 21

Typology and Challenges in Developing Mobile Middleware Based Community Network Infrastructure

Vijayan Sugumaran
Oakland University, USA & Sogang University, South Korea

Shriram Raghunathan
B. S. Abdur Rahman University, India

ABSTRACT

The evolution of mobile devices has opened new opportunities for collaboration, communication and computation on the move. Increasing device capabilities, instant connectivity, portability, rapidly reducing costs, etc. are some of the drivers for this change. Though mobile devices have lower processing power, memory capabilities compared to the stationary computing devices and deal with varying network conditions with reduced power, the demand for anywhere anytime computing is a significant driver for change. There is great interest in application development for mobile devices which caters to different needs of the users. Applications can be easily developed as complete middleware systems which can provide a great deal of abstraction for users. There is great interest in designing novel and scalable mobile middleware especially utilizing the capabilities available for collaboration and communication. This work traces the factors contributing to the proliferation of mobile communities and places the middleware for mobile community networks in a current and future perspective. The architecture for middleware based mobile community network is proposed and the challenges in implementing such a network are also discussed.

INTRODUCTION

In general, a middleware system resides between the operating system and the applications providing the user with a high degree of abstraction. In a mobile device based context, the role of the middleware is crucial due to the demands and constraints in the domain. While middleware itself is a software, the key difference from a software application and a middleware system is in the characteristic of allowing other applications to work on top of them. A middleware for mobile devices will allow other applications to use it whereas a software application may not. The middleware system can be installed on top of the operating environment, and in this, the term operating environment is defined loosely. In some cases, the operating environment is the hardware and in others it is the hardware, combined with the operating system.

Mobile middleware systems are widely used in recent years for a range of applications. This chapter focuses on the development of the middleware using community networks and especially in the domains of information retrieval and service composition. Currently, mobile community networks are receiving considerable attention due to the great strides made in the development of newer generation of hand held devices. Mobile community networks allow for devices with a reduced computational power to transfer the computation to a dedicated remote computational platform providing greater flexibility for users. The middleware systems allow this remote operation within the confines of the mobile phone-network environment. Thus the developments in mobile community networks can provide a convenient mode of communication and computation for mobile users. The main purpose of this work is to summarize and add to the literature on mobile middleware systems using mobile community networks in four specific areas: a) historical timeline tracing the evolution from communities to mobile community networks, b) typology for mobile com-

munity networks and c) the issues and challenges in developing mobile community networks.

In general, a community is composed of users with shared purpose, content and communication systems. Community services enable users who share common interests to join together in a closed user group (*community*) to have the means to communicate with each other via chat, whiteboards, or messaging services. The key terms are shared interests, communication ability and paradigms of interaction. Due to the steady progress in technologies and processes for information sharing, communication and collaboration, the work environment has gone in the direction of a more technology supported world. In future, the network, internet, mobile devices and the web of people – will become the workplace and the information gained from the community will become more relevant.

Community networks are different from communities in that community networks have a broad agenda of using technology to foster social objectives of community cohesion, enhanced education and strong democracy (Schuler, 1994). Community networks are defined as systems that use information and communications technologies (ICTs) to help revitalize, strengthen, and expand existing geographically-based human networks (Venkatesh, 2003). The phrase "community network" is often used in conjunction with the phrase "virtual community." We prefer the phrase community network over the virtual or online connotations, since the presence of internet and online portals are central to the goal of community relationships. The internet is a technology, not the goal. Ultimately, the traditional relationships are the most important.

Typically, community networks are also used to refer to physical location based entities. A search for the term community networks on the web yields results that show multiple case studies of communities which are in the same location, for e.g. the campus community network or the village community network. However, it need not be the

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