Chapter 3.15
Mobile Information Processing Involving Multiple Non-Collaborative Sources

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ABSTRACT

As more and more servers appearing in the wireless environment provide accesses to mobile users, more and more demand and expectation is required by mobile users toward the available services. Mobile users are no longer satisfied with obtaining data only from one server, but require data from multiple servers either at the same or different locations. This eventually leads to the need for information gathering that spans across several non-collaborative servers. This article describes some of our researches in information gathering from multiple non-collaborative servers that may involve servers that not only accept direct queries from mobile users but also servers that broadcast data. We also look at how location dependent data plays an important role to mobile information gathering.

INTRODUCTION

The direction of the mobile technology industry is beginning to emerge and advance at a rapid pace as more mobile users have evolved (Myers & Beigl, 2003). Interests in mobile technology have grown exponentially over the last few years and are greatly influenced especially by the dramatic reduction in the cost of hardware and protocol standardization (Hurson & Jiao, 2005; Kapp, 2002). The increase in progression and advancement of

mobile technology has created a new paradigm of computing called mobile computing in which people are allowed to be connected wirelessly to access data anytime, anywhere without having to worry about the distance barrier (Lee, Zhu, & Hu, 2005; Lee et al., 2002; Madria, Bhargava, Pitoura, & Kumar, 2000). Users have also become more productive with the achievement of mobility since they are able to access a full range of resources regardless of where they are located and where they are able to get hold of real time information.

The emerging growth of the use of intelligent mobile devices (e.g., mobile phones and PDAs) opens up a whole new world of possibilities, which includes delivering information to mobile devices that are customized and tailored according to their current location (Gutting et al., 2000; Tsalgatidou, Veijalainen, Markkula, Katasonov, & Hadjiefthymiades, 2003; Xu et al., 2003). Mobile queries are requests for certain information that are initiated by mobile users to the appropriate servers from their mobile devices. Query processing in a mobile environment may involve join processing from either single or several different servers with the mobile devices (Liberatore, 2002; Lo, Mamoulis, Cheung, Ho, & Kalnis, 2003). In addition, mobile queries can be performed regardless of where the users are located and the results obtained are influenced by the location of the user. Data that are downloaded from different locations would be different and there is a need to bring together these data according to a user who may want to synchronize the data that are downloaded from different location to be consolidated into a single output. Thus, the intention is to take into account location dependent factors, which allow mobile users to query data without facing location problems (Song, Kang, & Park, 2005; Tse, Lam, Ng, & Chan, 2005; Xu, Tang, & Lee, 2003). This concept is associated with location dependent query.

One of the main objectives of this article is to demonstrate the importance of allowing mobile users who believe that obtaining data from a single server is not enough and may need further processing with data that are obtained from other servers. Furthermore, the user may get data from several servers that are from the same or different providers. In other words, there are times when the user has the desire to gather data from several non-collaborative servers into their mobile devices (Lo, et al, 2003; Malladi & Davis, 2002). Mobile devices have made it capable for mobile users to process and retrieve data from multiple remote databases by sending queries to the servers and then process the multiple data gathered from these sources locally on the mobile devices (Mamoulis, Kalnis, Bakiras, & Li, 2003; Ozakar, Morvan, & Hameurlain, 2005). By processing the data locally, mobile users would have more control over what they actually want as the final result of the query. They can therefore choose to query data from different servers and process them locally according to their requirements. Also, by being able to obtain specific data over several different sites, it would help bring optimum results to mobile user queries. Furthermore, by driving away the computation on the client device, the bandwidth computation may also be reduced.

Example 1: A mobile user may want to know where the available vegetarian restaurants are in the city he or she is currently visiting. There are two major servers (e.g., tourist office and the vegetarian community) that may give information about the available vegetarian restaurants. First, using his or her wireless PDA, he or she would download information broadcast from the tourist office. Then, he or she would download the information provided by the vegetarian community. After obtaining the lists from the two information providers, he or she may perform an operation on his or her mobile device that joins the contents from the two relations obtained earlier from the