Chapter XII

A Framework for Analyzing Mobile Transaction Models

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ABSTRACT

Currently, mobile technology is undergoing a high growth stage, allowing an increasing plethora of mobile devices (handheld PCs, handsets, etc.) to access daily-distributed resources and information. This availability entails the requirement for transactional capabilities adapted to the specific characteristics of the mobile environment, without losing the consistency and reliability guarantees of traditional OLTP systems. This chapter surveys the definition and extension of transactional models to a mobile environment, starting with an explanation of this environment and a review of transactional systems applied to mobile computing. Afterwards, a framework for analyzing competing mobile models is defined. This framework allows for different
INTRODUCTION

In a mobile computing environment, computers are connected to the network via a wireless interface, and move through different geographical areas trying to maintain their connections. Mobile users are potentially allowed to access remote data at any moment and place (Mazumdar et al., 1999). The high current growth of mobile technology increases the number of mobile users and of available resources, thus bringing the need of using transactional systems that take into account the characteristic features of the environment. Although in essence a wireless network of mobile clients can be also considered a distributed system, there are some features that makes it unique (Lee et al., 1997; Satyanarayanan, 1996; Barbará, 1999; Mazumdar et al., 1999; Pitoura, 1998):

- **Communications asymmetry:** server-client communication bandwidth is much bigger than that of the client-server communication. In some systems, clients do not even have the capability to send messages to the servers. Therefore, it is better for the server to disseminate (broadcast) data to the clients instead of waiting for their request. This is called push-based dissemination. In this case, the clients frequently monitor received data and take what they need as it arrives through the communication channel. In the opposite schema, denominated pull-based, the server receives explicit client requests, localizes the corresponding data and sends it back.

- **Resource limited capacity:** mobile computers have smaller capability resources (disk, memory, processing power) than that of static computers.

- **More physical risks:** there are more possibilities of theft, damages caused by crashes, loss of the computer, etc. These factors should be kept in mind when evaluating where critical or sensitive data will be stored or how it will be managed.

- **Frequent disconnections:** mobile clients do not stay connected to the network as fixed computers do, since users turn on and off their computers regularly, or due to slowness of communication networks. An effect of weak connectivity can also take place where messages are received in an intermittent way (for example when passing under a tunnel). Also, mobile clients can roam, disconnecting themselves from a cell and then connecting to another.

constraints to be imposed on the most general “motion independence” requirement. Finally, existing mobile transaction proposals are assessed against the framework and classified, highlighting their relative strengths and weaknesses in different situations.
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