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Mobile data and transaction management

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Abstract

Mobile computing paradigm has emerged due to advances in wireless or cellular networking technology. This rapidly expanding technology poses many challenging research problems in the area of mobile database systems. The mobile users can access information independent of their physical location through wireless connections. However, accessing and manipulating information without restricting users to specific locations complicates data processing activities. There are computing constraints that make mobile database processing different from the wired distributed database computing. In this paper, we survey the fundamental research challenges particular to mobile database computing, review some of the proposed solutions and identify some of the upcoming research challenges. We discuss interesting research areas, which include mobile location data management, transaction processing and broadcast, cache management and replication and query processing. We highlight new upcoming research directions in mobile digital library, mobile data warehousing, mobile workflow and mobile web and e-commerce.

Keywords: Mobile computing; Wireless or cellular networking; Mobile database; Distributed database

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1. Introduction

The rapid technological advancements in cellular communications, wireless LAN and satellite services have led to the emergence of mobile computing [11]. In mobile computing, users are not attached to a fixed geographical location; instead their point of attachment to the network changes as they move. The emergence of relatively sophisticated low-power, low-cost and portable computing platforms such as laptops and personal digital assistants (PDA) have made possible for people to work from anywhere at any time (from their offices, homes and while travelling) via wireless communication network. As the technology advancing, millions of users carry portable computer and communicator devices that use a wireless connection to access worldwide global information network. Each mobile unit equipped with wireless network can be connected to global information network to provide unrestricted user mobility.

Mobility and portability pose new challenges to the mobile database management and distributed computing [34]. The database software support for mobile computing is still in the germinating stage. There is necessity to design specifications for energy efficient data access methodologies and in general develop database software systems that extend existing database systems designs and platforms to satisfy the constraints imposed by mobile computing (see Fig. 1). How to handle long period of disconnection, and other constrained resources of mobile computing such as limited battery life and variable bandwidth etc.? In mobile computing, there will be more competition for shared data since it provides users with ability to access information and

- Low bandwidth.
- Frequent disconnections.
- High bandwidth variability.
- Predictable disconnections.
- Expensive.
- Broadcast is physically supported in a cell.
- Limited battery power.
- Limited resources.
- Small size and screen of laptop.
- Susceptible to damaging data due to theft and accidents.
- Fast changing locations.
- Scalability
- Security

Fig. 1. Constraints of mobile computing.