Chapter IV

Data Broadcasting in a Mobile Environment

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Abstract

The advances in mobile devices and wireless communication techniques have enabled anywhere, anytime data access. Data being accessed can be categorized into three classes: private data, shared data, and public data. Private and shared data are usually accessed through on-demand-based approaches, while public data can be most effectively disseminated using broadcasting. In the mobile computing environment, the characteristics of mobile devices and limitations of wireless communication technology pose challenges on broadcasting strategy as well as data-retrieval method designs. Major research issues include indexing scheme, broadcasting over single and parallel channels, data distribution and replication strategy, conflict resolution, and data retrieval method. In this chapter, we investigate solutions proposed for these issues. High performance and low power consumption are the two main objectives of the proposed schemes. Comprehensive simulation results are used to demonstrate the effectiveness of each solution and compare different approaches.

Introduction

The increasing development and spread of wireless networks and the need for information sharing has created a considerable demand for cooperation among existing, distributed, heterogeneous, and autonomous information sources. The growing diversity in the range of information that is accessible to a user and rapidly expanding technology have changed the traditional notion of timely and reliable access to global information in a distributed system. Remote access to data refers to both mobile nodes and fixed nodes accessing data within a platform characterized by the following:

- low bandwidth,
- frequent disconnection,
- high error rates,
- limited processing resources, and
- limited power sources.

Regardless of the hardware device, connection medium, and type of data accessed, users require timely and reliable access to various types of data that are classified as follows:

- Private data, that is, personal daily schedules, phone numbers, and so forth. The reader of this type of data is the sole owner or user of the data.
- Public data, that is, news, weather information, traffic information, flight information, and so forth. This type of data is maintained by one source and shared by many—a user mainly queries the information source(s).
- Shared data, that is, traditional, replicated, or fragmented databases. Users usually send transactions as well as queries to the information source(s).

    Access requests to these data sources can be on-demand-based or broadcast-based.

On-Demand-Based Requests

In this case users normally obtain information through a dialogue (two-way communication) with the database server—the request is pushed to the system, data sources are accessed, operations are performed, partial results are collected and integrated, and the final result is communicated back to the user. This access scenario requires a solution that addresses the following issues.

- **Security and access control.** Methods that guarantee authorized access to the resources.
- **Isolation.** Means that support operations off-line if an intentional or unintentional disconnection has occurred.

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