

**DATA MANAGEMENT
FOR
MOBILE COMPUTING**

by
**Evaggelia Pitoura
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Universal access and management of information has been one of the driving forces in the evolution of computer technology. Central computing gave the ability to perform large and complex computations and advanced information manipulation. Advances in networking connected computers together and led to distributed computing. Web technology and the Internet went even further to provide hyper-linked information access and global computing. However, restricting access stations to physical location limits the boundary of the vision. The real global network can be achieved only via the ability to compute and access information from anywhere and anytime. This is the fundamental wish that motivates mobile computing.

This evolution is the cumulative result of both hardware and software advances at various levels motivated by tangible application needs. Infrastructure research on communications and networking is essential for realizing wireless systems. Equally important is the design and implementation of data management applications for these systems, a task directly affected by the characteristics of the wireless medium and the resulting mobility of data resources and computation. Although being a relatively new area, mobile data management has provoked a proliferation of research efforts motivated by both a great market potential and by many challenging research problems.

The focus of **DATA MANAGEMENT FOR MOBILE COMPUTING** is on the impact of mobile computing on data management beyond the networking level. The purpose is to provide a thorough and cohesive overview of recent advances in wireless and mobile data management. The book is written with a critical attitude. This volume probes the new issues introduced by wireless and mobile access to data and what are both their conceptual and practical consequences.

DATA MANAGEMENT FOR MOBILE COMPUTING provides a single source for researchers and practitioners who want to keep current on the latest innovations in the field. It can also serve as a textbook for an advanced course on mobile computing or as a companion text for a variety of courses including courses on distributed systems, database management, transaction management, operating or file systems, information retrieval or dissemination, and web computing.

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SOFTWARE ARCHITECTURES

The mobile computing environment is constrained in many ways. Mobile elements themselves are resource-poor and unreliable. Their network connectivity is often achieved through low-bandwidth wireless links. Furthermore, connectivity is frequently lost for variant periods of time. The difficulties raised by these constraints are compounded by mobility that induces variability in the availability of both communication and computational resources. These severe restrictions have a great impact on the design and structure of mobile computing applications and motivate the development of new computing models. These mobile computing models must provide efficient access to both existing and new applications which is a key requirement for the wide acceptance of mobile computing.

An important design consideration is the type of functionality assigned to mobile hosts. Mobile units are still characterized as unreliable and prone to hard failures, i.e., theft, loss or accidental damage. Mobile elements are also resource-poor relative to static hosts. For these reasons, there are approaches that treat the mobile unit as a dumb terminal running just a user-interface. The InfoPad [123] and ParcTab [154] projects employ such a dumb terminal approach and off-load all functionality from the mobile unit to the fixed network. On the other hand, slow and unreliable networks argue for placing more functionality at the mobile hosts so that they are less dependent on remote servers. Although, there is no consensus yet on the specific role the mobile host must play in distributed computation, the above contradictory considerations tend to favor models that provide for a flexible adjustment of the functionality assigned to mobile clients. For instance, in anticipation of a disconnection, a disconnected mobile host may be assigned additional functionality to operate autonomously.

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