

**DATA MANAGEMENT  
FOR  
MOBILE COMPUTING**

by  
**Evaggelia Pitoura  
George Samaras**

**Kluwer Academic Publishers  
Boston/Dordrecht/London**

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.

ISBN 0-7923-8053-3



9 780792 380535

ADBS10  
0-7923-8053-3

---

**DATA MANAGEMENT FOR  
MOBILE COMPUTING**

*by*

**Evaggelia Pitoura**  
*University of Ioannina*  
*Ioannina, Greece*

*and*

**George Samaras**  
*University of Cyprus*  
*Nicosia, Cyprus*

**KLUWER ACADEMIC PUBLISHERS**  
Boston / Dordrecht / London



---

**Distributors for North America:**

Kluwer Academic Publishers  
101 Philip Drive  
Assinippi Park  
Norwell, Massachusetts 02061 USA

**Distributors for all other countries:**

Kluwer Academic Publishers Group  
Distribution Centre  
Post Office Box 322  
3300 AH Dordrecht, THE NETHERLANDS

---

**Library of Congress Cataloging-in-Publication Data**

A C.I.P. Catalogue record for this book is available  
from the Library of Congress.

---

*The publisher offers discounts on this book when ordered in bulk quantities. For  
more information contact: Sales Department, Kluwer Academic Publishers,  
101 Philip Drive, Assinippi Park, Norwell, MA 02061*

**Copyright © 1998 by Kluwer Academic Publishers**

All rights reserved. No part of this publication may be reproduced, stored in a  
retrieval system or transmitted in any form or by any means, mechanical, photo-  
copying, recording, or otherwise, without the prior written permission of the  
publisher, Kluwer Academic Publishers, 101 Philip Drive, Assinippi Park, Norwell,  
Massachusetts 02061

*Printed on acid-free paper.*

Printed in the United States of America

---

## 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.

# Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

## Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

## Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

## API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

## LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

## FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

## E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.