

Mobile Computing: Fertile Research Area or Black Hole?

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Abstract

Mobile communication and mobile computing are emerging as a critical technology for the 1990s. Issues in mobile computing will, in our opinion, have a profound impact on data management research. The panel will include discussion of issues in mobile computing with a focus on data management-specific issues.

This panel provides a forum for discussing which of these issues are truly new research areas and which are straightforward applications of known results.

1 Introduction

Mobile (or Nomadic) Computing refers to the environment where tens of millions of users will use various palmtop and laptop computers, connected by wireless (possibly cellular) connection to the fixed network. It is anticipated that such an infrastructure will be created by the end of this decade or even earlier. The computers used in this environment must be lightweight, and many will be pen-based rather than keyboard-based. The panel will discuss new exciting data management challenges which arise in such a massive and dynamic distributed environment. In particular the following questions will be discussed:

1. How will mobility of users and machines affect access, replication and migration of data?
2. What is the role of wireless media in broadcasting information to massive number of users and

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serving as the "entrance and exit ramps" of the information superhighway of the future?

3. How will battery power constraints affect the optimization of queries?
4. How will frequent, foreseeable disconnections affect recovery and concurrency techniques?
5. What will be the "killer applications" in this new massive information market? Indeed will these be database application?
6. How can data security be maintained, especially when a mobile computer is operating in a foreign environment and must share local resources?
7. Given the complexity of most database interfaces, and the small physical size of mobile computers, how will users interact with a distributed database system?
8. To what extent are the above issues uniquely data management issues rather than network, operating system, or application issues?

2 Controversy

There appears to be no question that mobile communication has huge market potential. There is controversy over exactly what people will do with this medium:

- Will they use it only as a telephone and fax machine?
- Will they treat it as a glorified laptop computer?
- More generally, will this be simply an incremental technology or one that fundamentally changes the way in which one works?

Even if one believes mobile computing will introduce fundamental changes and introduce significant new research issues, there remains the controversy over whether those new issues include matters which relate to the special skills and knowledge of the database community. It appears that the many interesting data management-related issues in mobile computing arise from the following domains:

- A distributed database that spans *both* mobile and stationary computers.
- Accessing and organizing broadcasted data.
- Database interfaces that take into account the constraints imposed by mobile hardware.
- The delivery of multi-media data from heterogeneous information sources (both database and non-database sources) to users of mobile computers.

However, there are those who argue that mobile database applications are sufficiently simple that their needs will be met by ongoing data management research (without considering mobility) combined with developments in networks and operating systems for mobile computers.

3 Panelists

The following people will join us on the panel:

1. Avi Silberschatz, AT&T Bell Labs, on leave from the University of Texas at Austin
2. Witold Litwin, University of California at Berkeley
3. Mike Brodie, GTE Labs

4 Panel Format

The panel will begin with a brief overview of mobile computing technology and issues. The panel will be structured so as to explore the controversies relating to the area. Most of the time will be allocated to questions and discussion rather than to prepared presentations. It is our hope that this discussion will help the database community determine its proper role in this emerging area of research.