From the Guest Editors

Mobile computing is a product of a growing wireless network technology and sophisticated advances in small size portable computers. It is bringing new *any time, anywhere* applications and services to us. An extensive amount of research and developments has already started in mobile computing. Unlike some areas such as mobile networking, where there is an initial consensus on practical solutions and alternatives, data management in mobile environments is still in its infancy. In fact, till recently, the database research community was split over a simple fundamental question: *Are there any database research problems to solve in mobile environments?* The same question has been discussed in several recent conference panels of which we mention the *10th Data Engineering* (Houston, Texas, February 1994), and the *Second Information and Knowledge Management, CIKM* (Washington DC, November 1993).

In this special issue of SIGMOD Record we invited five papers that describe ongoing research or projects. These papers, in addition to our overview paper, hopefully will be useful in removing skepticism on the importance and need of research in the area of mobile databases.

The six papers presented here span a range of different but related issues, from managing disconnected operation through caching and materialized views, to wireless client/server model, to ambitious applications like mobile video and ubiquitous digital libraries. The first paper, by the guest editors, provides a brief background and examples that attempt to make the case for the need of mobile database research.

Noble, *et al.*, describe Odyssey, a platform for mobile computing. Odyssey is an extension of the Coda file system. Coda, which was released in 1990, provides adaptability mechanisms that allow the system to operate in a strongly connected mode, or in a disconnected mode. In the former, data is available either in the data server or the mobile client cache memory. When the mobile client is unable to connect to any data server, the client switches to operate in a disconnected mode. The adaptability provided by Coda is an application-transparent, which is a system-level adaptability. Odyssey, on the other hand, provides application-aware adaptability. The difference between the two types of adaptability is well explained in the paper. Oddyssey involves the application in making adaptability decisions. The mobile video play/edit example demonstrates that system-level adaptability alone could be harmful, and that somehow the nature of the application must be considered. It is not clear how to involve applications in a dynamic way. The paper briefly suggests some interesting ideas on how to achieve this involvement, but the architecture of application-aware adaptability is not all clear.

Next, Elmagarmid, *et al.*, present their research on personal information services and applications (PISA). The paper provides a rework of the client/server model under wireless networks. They point to the asymmetric nature of the C/S interaction, and show how this fits well in the wireless environment. They also raise issues of client disconnection and virtual mobility of servers. The paper proposes alternatives to transactional services through algorithms for cache consistency and for reliable service handoff. An interesting idea is facilitating cache consistency at the application level, through explicit update queries from the caching client to the server.

Next, Wolfson, *et al.*, describe a research on View Maintenance in mobile environments. The paper investigates "what it takes" to apply known ideas in materialized views in the mobile environments. The objective of the paper is to facilitate disconnected operation, by letting the mobile client access the view instead of the original data, for improved performance, and during periods of disconnection. The issues raised include maintenance of continuously changing views of location-dependent and time-dependent data. The placement of the view (either in the mobile unit or the stationary system) is another issue discussed. The paper also visits the important issue of divergence control, ranging from replica maintenance with 1-Serializability requirement, to unlimited divergence, which is the case of the virtual view. Related to this issue is how to enforce atomicity in this environment. The authors suggest an interesting approach that allows the mobile user to specify one of several directives that can be used by the participants of the atomic commit to resolve/terminate uncertain updates. Adaptability between LAN- and WAN-optimized view maintenance is also discussed as a transparent mechanism that can be used when the user moves from a wireless LAN and into a wireless WAN. This is a particularly important idea that would benefit famous applications including next-day parcel delivery systems and aircraft in-flight communication services.

Next, Alonso, *et al.*, is a valuable source of basic information on the realization of video data software, hardware, and standards. The paper surveys existing compression standards and comments on their suitability in the mobile environment. The paper also surveys existing wireless communication technology and comments on its effect on the quality of multimedia applications. The authors describe an experimental environment that they used to experiment with the performance of some video applications over a wireless LAN. Their approach was to use all possible support they could get off the shelf for video data communication. They used StarWorks which provides transport optimized for video streams. The paper presents initial experience and points to some interesting problems.

Finally, Bhargava, *et al.*, describe six layers application architecture for ubiquitous digital libraries. They describe possible query scenarios and present the software that supports their execution. A focal issue is the adaptability of the level of details of the query result, to the available communication bandwidth. To facilitate this adaptability, a metadata model is used to represent the data hierarchically, and to attach several size-reduction methods with each data object. Based on the requested response time, the appropriate method will be used. The paper also discusses adaptability of image and video transmission to varying bandwidth availability, through changing the compression ratio, color depth, frame size, and frame resolution.

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