

MOBISNAP

Managing Database Snapshots on a Mobile Environment

Recent technological breakthroughs such as increased battery capacity, low-consumption, small light components and widespread use of cellular communication devices, have resulted in a significant development of portable computer models. As a consequence, an heterogeneous array of mobile computers with varying dimensions, weight and computing power is currently available, leading to an ever increasing number of users.

Depending on their features, portable computers are mostly being used either as transportable workstations or as personal digital assistants (e.g. hosting calendars and to-do lists) occasionally providing some access to Internet resources (e.g. email). This happens because developing applications which take advantage of mobility and wireless communication requires balancing the availability and consistency of data.

In this context, this projects aims to provide methodologies and tools to develop database applications on mobile computers. This should be achieved by providing tools to extend current applications which use central databases.

In order to allow continued use of mobile computers, which often get disconnected from the network, the MOBISNAP framework will provide mechanisms to semi-automatically maintain weakly consistent partial copies of the central database. This will require facilities to define the policy to control which data to replicate and how concurrent updates of data are reintegrated into the central database. The programming environment provided to the client application will be a subset of SQL, suitably extended to explicitly deal with weak coherence. For instance, it should be possible to specify the expected behavior of delayed transactions.

On the central server, the MOBISNAP framework will use a proxy for each mobile client, which will be responsible for mediating the access to the central database. The proxy will guarantee that the divergence of mobile copies from the central database is bounded within reasonable limits. In this context, reasonable limits imply the definition of divergence metrics for each application, which should be tightly related to the risk involved. To bound divergence, the server will also be able to use several media to notify clients, ranging from the short message service of cellular networks (SMS) to traditional local area networks.

In short, the goal is to build a framework to extend current database applications, which already exist in most organizations, to encompass a new class of clients residing in mobile computers. The key issue is the homogeneous support through the relational model and the SQL interface, which is the standard in most database systems. A systematic approach to the definition of replication, update and coherence policies will enable the development of tools that safely introduce a radical change into mobile database access. The freedom to select which policy is effectively used for each application will allow the framework to be useful in the context of various economic activities that can take advantage of the mobility of current computing devices.