Transaction Monitor for Mobile Environment (TM-M)

MultiMeetMobile- project: Jari Veijalainen, Vagan Terziyan, Artem Garmash, Artem Katasonov, Jouni Markkula.
Contact information: Jouni Markkula, E-mail: markkula@jyu.fi. Information Technology Research Institute (ITRI), University of Jyväskylä, P.O.Box 35, FIN-40351 Jyväskylä, Finland.

Associated WITS 2001 paper: Jari Veijalainen, Henry Tirri, Vagan Terziyan. *M-Commerce Transactions: Hype or a real need?*

Description of demonstration

Transaction Monitor for Mobile environment (TM-M) is an application-driven terminal-based transaction monitor prototype developed by MultiMeetMobile research project. It is based on the assumption that there is an application that supports certain business transaction(s) and uses the TM-M to store transactional state information and retrieve it after a communication link, application, or terminal crash. The TM-M prototype is implemented using MLS, a Location-Based Service (LBS) pilot system developed also in MultiMeetMobile project, as the transactions supporting application.

TM-M is run as part of an application process. After a terminal or application crash, the user can ask the application to recover a specified non-completed transaction from the list. The recovery application then retrieves the corresponding application information and runs the appropriate application up. Another way to come to this point is that after a crash the user simply runs her interrupted application up. He can then ask the TM-M to list all incomplete transactions and pick one of them to be executed. Notice that in general there can be more than one interrupted transaction as the transactions can be long lasting and the user might run several of them simultaneously. Once the transaction to be continued has been chosen, the application can ask the TM-M to return its state to the application. Depending on the state, the application must either continue the execution (recover forward) or try to cancel the already taken actions at the servers (recover backward) - perhaps with user's help.

The demonstration assumes run of the application with modelling disconnections of the mobile terminal and taking power off in different states of the transactions with showing appropriate application recovery.

Specification of TM-M

The modelling of TM-M is based on the following principles: An M-commerce application execution at the terminal corresponds to one instance of M-commerce transaction, as perceived by the TM-M. Consequently a unique Transaction Identifier (TID) identifies it. Applications will interact with TM-M through a standard, programmatic interface allowing them to START and END a transaction, subtransaction and action. Further, applications can write a CHECKPOINT and retrieve any of the earlier stored items at any time. TM-M basically stores the items handed over by the application into a persistent log in the order they arrive.

For the later purpose, the application must store also the name of the compensating action and parameters with which this must be executed in order to reverse the impact of the action being closed.

A more detailed TM architecture is presented in the figure below. Application Interface is implemented by Dispatcher that keeps track of the TIDs etc. and is able also to analyze the state of the transaction. Archivist handles the log i.e. Application Log Memory (ALM).

The TM-M is implemented using Java. The idea is that the software is included into application during compile time and that the TM runs as part of each process (or thread). In other words, there can be several simultaneously running instances of the TM within one terminal.

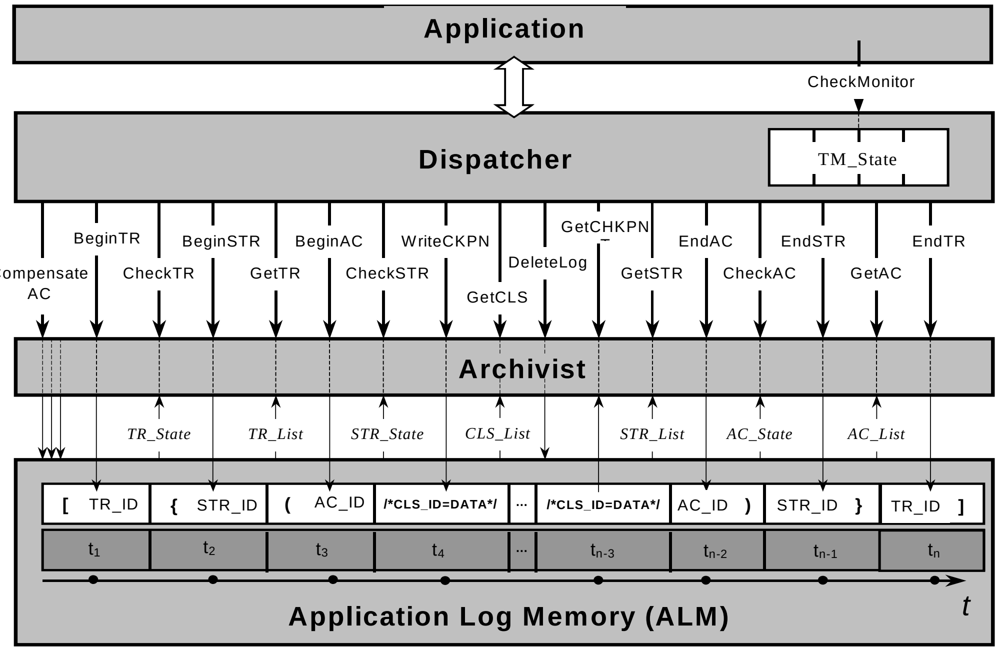

Figure. **Management of the Application Log Memory by Archivist**

References

MultiMeetMobile web site: www.cs.jyu.fi/~mmm.

Terziyan, Vagan & Veijalainen, Jari. M-Commerce Transaction Model Implementation at a Mobile Terminal. Report, MultiMeetMobile- project, ITRI, University of Jyväskylä, 2001.

Veijalainen, Jari & Terziyan, Vagan. *Transaction Management for M-Commerce at a Mobile Terminal*. 20th IEEE Symposium on Reliable Distributed Systems, Workshop on Reliable and Secure Applications in Mobile Environment, New Orleans, USA, October 28-31, 2001.

Agnowledgement

The prototype of the Transaction Monitor for Mobile environment (TM-M) was produced in MultiMeetMobile- project performed by the Information Technology Research Institute, University of Jyväskylä, and financed by the Finnish National Technology Agency (TEKES), Hewlett Packard Finland, Nokia, and Yomi Vision.