CHAPTER 8
CONCLUSIONS AND FUTURE ENHANCEMENTS

8.1 Conclusions

In this research work, an agent based mobile transaction framework is proposed by investigating the existing mobile transaction frameworks. Four mobile transaction schemes are proposed: two schemes with direct transaction support (FADTA and MADTA) and two schemes with multi-hop support (FAMTA and MAMTA). Factors of energy availability and connectivity of the Mobile Hosts are considered and priority levels are set based on these constraints. Concurrency control is enforced using cache invalidation technique. For the purpose of addressing timing constraints, firm and soft transactions are handled by FAMTA and MAMTA schemes. In order to reduce energy consumption, each MH will operate in three modes: active, doze and EC mode. The effectiveness of all the proposed schemes are analysed individually and comparatively.

For small wireless local area networks in which wireless communication only occurs on the last link between a base station and the wireless end system, FADTA and MADTA schemes which use Direct Transaction Architecture are found to be more suitable. But FAMTA and MAMTA schemes are more applicable in large wireless networks where there is a need for extended coverage and more connectivity.

For a small number of transactions, Fixed Agent based schemes FADTA and FAMTA show better performance in terms of response time. The use of Fixed Agents in the wired networks increases data availability which results in less response time.
As the number of transactions increases, MADTA and MAMTA schemes are found to perform better because of Agent availability which increases with mobility.

MAMTA scheme results in less number of aborted transactions compared to FAMTA scheme due to the proper distribution of transactions. Here firm transactions are submitted to the nearest Mobile Agent so that transactions can meet their deadlines and soft transactions are submitted to the Mobile Agent with highest available energy. MAMTA scheme allows more number of firm transactions to be completed for smaller number of transactions. But for higher number of transactions because of the mobility of Mobile Agents, MAMTA scheme shows poor performance.

By using Fixed / Mobile Agents and concurrency control without locking, message communication costs and database update costs are minimized substantially. The waiting time for the execution of the transaction is minimized and the resources are not unnecessarily locked.

By reviewing the results and analyses of all the proposed schemes, it is found that as far as response time is concerned, FADTA scheme outperforms all the other three schemes for lower number of transactions. It is also found that Agent based Direct Transaction Architecture schemes (FADTA and MADTA) take less response time compared to Agent based Multi-hop Mobile Transaction Architecture schemes (FAMTA and MAMTA). This is due to the extra time involved in finding the route to submit the transaction requests to the agent and to get back the results. However, in real time applications, FAMTA and MAMTA schemes are found more useful than Fixed Agent based schemes. Also, the impact of these schemes in real time applications is yet to be explored.
8.2 Research Contributions

The contributions and major outcomes of this research can be summarized as follows.

- The use of data cache at every Fixed / Mobile Agent to improve system performance.
- Concurrency control without locking using cache invalidation.
- Scheduling database access requests at each Fixed / Mobile Agent by giving higher priority to energy losing MHs.
- The use of Energy Conservation (EC) mode for an MH.
- Efficient mobile transaction management with minimum response time.
- Support for disconnected operations.
- Support for mobility.

8.3 Future Enhancements

The proposed transaction management schemes work well in an environment in which Fixed / Mobile Agents are present. They can be further extended to provide support for an environment in which both Fixed Agents and Mobile Agents are present. These schemes can also be modified to enable mobile users to access data from different sites by means of Mobile Multi Database Management Systems (MMDBMSs). Further research may be carried out to provide full mobility support and fault tolerance.