CHAPTER 4

PERFORMANCE ANALYSIS OF RELIABLE MOBILE AGENT BANKING ARCHITECTURE

4.1 INTRODUCTION

Mobile agents are considered a suitable technology to develop applications such as Mobile Banking System. Mobile Agents are autonomous and dynamic entities that can migrate between various nodes in the Network. They offer many advantages over traditional design methodologies like: reduction in network load, overcoming network latency and disconnected operations. Since the mobile agents do not need continuous communication with the mobile host, they are not affected by the sudden disconnection of wireless network and the situation of turning mobile phone off for power saving. In order to get the complete benefit of mobile agent system, the system must be fault tolerant. In the context of mobile agents, fault-tolerance prevents a partial or complete loss of the agent.

4.2 MOBILE AGENT SYSTEM

As shown in the Figure 4.1, mobile agents departed from Mobile phone, migrate and search to get the information appropriate to user’s requirements. After they finish their job, MA wants to migrate from Mobile Support Station (MSS) to Mobile phone and return the result to Mobile phone. The problem of Mobile phone currently disconnected or Mobile phone moved to some other network can be solved by using proxy agent (PA) in the proposed system. If MA fails to connect with Mobile phone, it is saved as the proxy in MSS. It has the functionality for monitoring the connection status of
the Mobile phone when the server would like to return a mobile agent. Banking Server receives the mobile agent and processes user’s request and produces result. It also dispatches the mobile agent after the processing is completed Kim and Noh (2003).

4.3 RELIABLE MOBILE AGENT BANKING SYSTEM

In Mobile Banking System, only after the mobile user’s account number and their password are verified, user is permitted to do any transactions. After the user request is accepted, mobile agent is dispatched to
the mobile server. Mobile server gets the location of the server system corresponds to the user request from server selection database. Mobile agent is dispatched to the server system to do the required processing. It is retracted from the mobile server and proxy agent is created. It also has the functionality for monitoring the connection with the mobile phone when it would like to return a mobile agent. In scenario 1, if the mobile phone is currently disconnected, the PA is set to inactive status. After the mobile phone is connected to mobile server, PA is set to active status and it is migrated from the mobile server to the mobile phone. As shown in Figure 4.2, in scenario 2, mobile agent wants to jump to mobile phone, but mobile phone already departed from the region of the mobile server. Mobile server knows that mobile phone had already moved to the cell of another mobile server using Internet Engineering Task Force (IETF)’s IP mobility Support Brown and Singh (1996).

The pseudo code for the above two scenarios are proposed and named as scene 1 and Scene 2 are as follows:

Pseudo Code

**Scene 1:**

Initiate MA with user request at Mobile Phone;
Dispatch MA to the server;
Execute at server;
Retract MA at MSS;
If (MA@ MSS = = True)
   Create PA to make reliable;
   If ( IsMobilePhone alive)
      Activate PA;
Else

Deactivate PA;

Monitor the status after every 10 milliseconds;

Dispatch all active MAs to Mobile Phone

Figure 4.2  Mobile Phone Moving to Another Cell

Scene 2:

If (MA @ MSS = = True)

If ( IsMobilePhone roaming)

Find Care of Address (COA) of Mobile Phone;
Create PA to make reliable;

If (IsMobilePhone alive)
    Dispatch PA to COA;
Else
    Deactivate PA;
    Monitor the status after every 10 milliseconds;

Dispatch all active MAs to Mobile Phone

The flowcharts of scenarios 1 and 2 are given in the Figures 4.3 and 4.4.
Figure 4.3 Scenario 1

Start

Create Mobile Agent (MA) with user request at mobile phone

Dispatch MA to the banking server

Execute at server

Retract MA at Mobile Agent server

If MA @ Mobile Agent Server == True

Create PA to make reliable

Is MobilePhone alive

Yes

Activate PA

No

Deactivate PA

Monitor the status after every 10 milliseconds

Terminate
After the user entered his/her request, he/she is able to get the reply and continue the service, which is provided by the system even when the mobile is handoff or switched off either due to power saving or voluntary disconnection.
As shown in the Figure 4.5, mobile phone has the functionality for transferring mobile agents corresponding to user’s request in parallel and gathering results from the agents. After sending the mobile agent, the mobile phone may or may not be connected. If the mobile phone connects to the network after the disconnection also, it will be available to gather the result from the agents.

Banking Server receives the mobile agent and processes user’s request and produces result. It also dispatches the mobile agent after the processing is completed.

Figure 4.5 Mobile Agent Architecture
### 4.4 PERFORMANCE ANALYSIS OF MOBILE AGENT SYSTEM VS RELIABLE MOBILE AGENT SYSTEM

**Table 4.1 Performance Of Mobile Agent Vs Reliable Mobile Agent System**

<table>
<thead>
<tr>
<th>Number of User Requests</th>
<th>Response Time in milli seconds (Mobile Agent)</th>
<th>Response Time in milli seconds (Reliable Mobile Agent)</th>
</tr>
</thead>
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<tr>
<td>1</td>
<td>105</td>
<td>123</td>
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<tr>
<td>2</td>
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</tbody>
</table>
As shown in the Table 4.1 and Figure 4.6, the response time for all the requests in reliable mobile agent system is higher than the mobile agent system. This is because of the creation of proxy agent and the processing overhead required for implementing reliability within the existing mobile agent system.

In client server architecture, if the connection is lost during the transaction, the user has to send his request once again to get the results.

The proposed system overcomes that problem as well as the system is reliable. And also, the system allows sending more user requests by the way of creating many mobile agents without affecting the performance.

![Figure 4.6 Performance of Mobile Agent Vs Reliable Mobile Agent System](image)

Figure 4.6 Performance of Mobile Agent Vs Reliable Mobile Agent System
4.5 SUMMARY

The proposed reliable mobile agent banking system, which uses multi agent concept, provides a more flexible approach against existing client-server implementations. The system supports better utilization of network bandwidth, improves user's response time and thus increases network performance.