

**SELECTION OF MOBILE AGENT SYSTEMS BASED ON MOBILITY,
COMMUNICATION AND SECURITY ASPECTS**

by

MANOJ LALL

submitted in fulfilment of the requirements for
the degree of

MASTER OF SCIENCE

in the subject

COMPUTER SCIENCE

at the

UNIVERSITY OF SOUTH AFRICA

SUPERVISOR: PROF. L M VENTER

JUNE 2005

ACKNOWLEDGEMENTS

Prof. L M Venter for his expert guidance.

Mr. E Meister for introducing me to the world of Aglet.

Shruti, Namrita and my parents for their unconditional love and support.

A

BSTRACT

The availability of numerous mobile agent systems with its own strengths and weaknesses poses a problem when deciding on a particular mobile agent system. In this dissertation, factors based on mobility, communication and security of the mobile agent systems are presented and used as a means to address this problem. To facilitate in the process of selection, a grouping scheme of the agent system was proposed. Based on this grouping scheme, mobile agent systems with common properties are grouped together and analyzed against the above-mentioned factors. In addition, an application was developed using the Aglet Software Development Toolkit to demonstrate certain features of agent mobility, communication and security.

Key Terms

Agent Communication Language, Agent Mobility, Agent Security, Computational environment, Data state, Distributed systems, Execution environment, KQML, Mobile agents, Mobile agent systems.

List of Figures

Figure 1: The Experimental setup of the application.....	10
Figure 2: Tahiti aglet server.....	11
Figure 3: GUI of the stationary agent.....	12
Figure 4: GUI of a mobile agent.....	14
Figure 5: Code-on-Demand paradigm.....	19
Figure 6: Remote Evaluation paradigm.....	20
Figure 7: Mobile Agent paradigm.....	20
Figure 8: Classification of MAS based on agent component mobility.....	21
Figure 9: Code fragment of an agent using (a) weak and (b) strong mobility.....	24
Figure 10: Agent Communication Model.....	41
Figure 11: Types of Mobile Agent Communication.....	42
Figure 12: Agent Communication Layers.....	47
Figure 13: Agent System Model.....	55
Figure 14: Mobile Agent System Security.....	56
Figure 15: Screen shot of agents.policy file.....	64
Figure 16: Groupings of MAS based on Mobility, Communication and Language...	69

List of Tables

Table 1: Binding, Resources and Data Space Management Mechanism.....	27
Table 2: Mobile agent systems of Group 1.....	70
Table 3: Mobile agent systems of Group 2.....	70
Table 4: Mobile agent systems of Group 3.....	71
Table 5: Mobile agent systems of Group 4.....	71
Table 6: Mobile agent systems of Group 5.....	72
Table 7: Mobile agent systems of Group 6.....	72
Table 8: Evaluation of the selected MAS against the mobility factors.....	93
Table 9: Evaluation of the selected MAS against the communication factors.....	96
Table 10: Evaluation of the selected MAS against the security factors.....	99