

# **Multi Agents for Heterogeneous Operating System Environments**

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In loving memory of my aunt

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# Abstract

As IT industries develop, upgrade and diversify, heterogeneous operating environments running a mix of new and legacy systems become increasingly important. Such environments are currently inadequate due to lack of compatibility with each other. This thesis investigates how agents can be utilised to facilitate such heterogeneous environments, aiding enterprise systems in building bridges between incompatible software and hardware systems. An autonomous agent has independent agency and decision-making astuteness. When placed in heterogeneous environments to interact with other such agents, the consequences of its action and its preferred choice of actions are greatly influenced by actions of other agents interacting in heterogeneous environments.

The main objectives of this thesis include examining the roles of agents in heterogeneous operating environments, development of a novel multi agent base architecture and an associated framework for single and heterogeneous environment. The research work also studies the plausible application to test the developed proof of concept by developing application and using the framework that utilises Windows services in a totally incompatible Solaris based Sun Ray ultra thin client environment.

The work includes a novel method of modeling agent based communication architecture suitable for correspondence between two inherently different operating systems – Solaris and Microsoft Windows. The circumstances in which coordination or coordination failure occurs between these systems are investigated. The proposed method of agent based communication that can potentially overcome the barriers formed by two completely different software and hardware architectural regimes.

An analysis of printing services in MS Windows and Solaris environments, review the age long problem of lack of device drivers for commonly (and cheaply) available Ink Jet printers for Unix (and like) operating systems. A novel method is proposed that uses agents in heterogeneous environment to overcome this problem. A new architecture that utilises Windows based printing services on a Sun Ray ultra thin client is presented to test and evaluate the proof of concept.

This thesis is motivated by the need to provide a low cost printing solution to Sun Ray users. Most Windows based desktop users currently have access to variety of low cost printing solutions. Printer vendors ship device drivers only for Windows or at most Macintosh, as other operating systems such as Solaris, MVS, z/OS are used for corporate solutions and low cost desktop printing have not been a major requirement in the past.

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# Table of Contents

<b>ABSTRACT .....</b>	<b>I</b>
<b>ACKNOWLEDGEMENT .....</b>	<b>III</b>
<b>TABLE OF FIGURES .....</b>	<b>VIII</b>
<b>CHAPTER 1 INTRODUCTION.....</b>	<b>1</b>
1.1 MOTIVATION .....	3
1.2 AIMS AND OBJECTIVES .....	3
1.3 BACKGROUND .....	5
1.4 SCOPE OF THESIS .....	7
1.5 EXPECTED OUTCOMES.....	7
1.6 STRUCTURE OF THESIS.....	8
<b>CHAPTER 2 RESEARCH PROBLEM AND ANALYSIS.....</b>	<b>10</b>
2.1 INTRODUCTION .....	10
2.2 THE RESEARCH PROBLEM.....	10
2.2.1 <i>Analysis of Device Drivers</i> .....	11
2.2.2 <i>Device driver philosophy</i> .....	14
2.2.3 <i>USB – Universal Serial Bus</i> .....	15
2.2.4 <i>USB pinout signals</i> .....	16
2.2.5 <i>USB Cable Assemblies and Adaptors</i> .....	17
2.3 INVESTIGATION OF AVAILABLE SOLUTIONS .....	17
2.3.1 <i>UNIX Native Printing Architecture</i> .....	17
2.3.2 <i>Open source solutions</i> .....	18
2.3.3 <i>Using compatible or closely compatible drivers</i> .....	19
2.3.4 <i>Developing USB drivers</i> .....	22
2.3.4.1 <i>Sun Ray USB Architecture</i> .....	22
2.3.5 <i>LibUSB Applications</i> .....	22
2.4 SUMMARY.....	24
<b>CHAPTER 3 HETEROGENEOUS SERVICES .....</b>	<b>25</b>
3.1 INTRODUCTION .....	25
3.2 DISTRIBUTED COMPUTING – CLIENT SERVER ARCHITECTURE .....	25
3.3 THIN CLIENTS VERSUS FAT CLIENTS .....	26
3.4 HETEROGENEOUS COMPUTING .....	27

3.4.1	<i>Distributed Object Systems</i> .....	27
3.4.2	<i>CORBA: Common Object Request Broker</i> .....	28
3.4.3	<i>COM: Component Object Model Technologies</i> .....	29
3.4.4	<i>SOAP: Simple Object Access Protocol</i> .....	30
3.4.5	<i>Distributed Agents</i> .....	32
3.5	COMPUTING IN A SUN RAY ENVIRONMENT .....	32
3.5.1	<i>Sun Ray thin client and Solaris</i> .....	34
3.5.2	<i>Sun Ray on Wide Area Network</i> .....	35
3.6	AGENT BASED COMPUTING .....	38
3.6.1	<i>Historical Context</i> .....	38
3.6.2	<i>Multi Agent Systems</i> .....	39
3.7	INTELLIGENT AGENTS .....	41
3.8	SUMMARY .....	41
<b>CHAPTER 4 MULTI AGENT BASED SERVICE ORIENTED ARCHITECTURE</b> .....		<b>43</b>
4.1	INTRODUCTION .....	43
4.2	ASOA AGENT DISTRIBUTION AND COMMUNICATION .....	43
4.3	THE ASOA FRAMEWORK .....	46
4.4	AGENT BASED DESIGN .....	47
4.4.1	<i>The Agent Ecosystem</i> .....	47
4.4.2	<i>Agent Presence</i> .....	48
4.4.3	<i>ASOA Presence Architecture</i> .....	48
4.4.4	<i>Agent Communication</i> .....	51
4.5	SUMMARY .....	53
<b>CHAPTER 5 IMPLEMENTING MAPS FRAMEWORK ON SUN SOLARIS AND MS WINDOWS</b> .....		<b>54</b>
5.1	INTRODUCTION .....	54
5.2	TECHNOLOGY BASE .....	55
5.3	AGENT MANAGEMENT .....	55
5.3.1	<i>Sun Ray Printing</i> .....	56
5.3.2	<i>Windows Native Printing</i> .....	56
5.4	MAPS – THE PRINTING FRAMEWORK .....	56
5.4.1	<i>Heterogeneous Ontology based messaging and mapping</i> .....	56
5.4.2	<i>Setting up Solaris Proxy Agent</i> .....	61
5.4.3	<i>Setting up Windows Conversion Agent</i> .....	62
5.4.4	<i>Collecting Solaris print request (Solaris Proxy Agent)</i> .....	62
5.4.5	<i>Conversion engine (Windows Conversion Agent)</i> .....	63



5.4.6 Transmitting printer script data to Sun Ray .....	64
5.5 SUMMARY.....	65
<b>CHAPTER 6 EVALUATION AND PERFORMANCE OF MAPS.....</b>	<b>66</b>
6.1 INTRODUCTION .....	66
6.2 EVALUATION .....	66
6.3 PERFORMANCE TESTING .....	67
6.3.1 Test bed Construction .....	68
6.3.2 Observations.....	71
6.4 SUMMARY.....	71
<b>CHAPTER 7 CONCLUSION AND FUTURE WORK.....</b>	<b>72</b>
7.1 CONCLUSION .....	72
7.2 FUTURE WORK .....	73
<b>BIBLIOGRAPHY .....</b>	<b>75</b>
<b>PUBLICATIONS AND PRESENTATIONS .....</b>	<b>83</b>
<b>APPENDIX 1 .....</b>	<b>85</b>
<b>APPENDIX 2 .....</b>	<b>91</b>
<b>APPENDIX 3 .....</b>	<b>103</b>

# Table of Figures

Figure: 1. Inter communication in a mixed environment. ....	2
Figure: 2. Device Drivers and their access [53].....	13
Figure: 3. Interface of a device driver [53].....	14
Figure: 4. Kernal Interface of a Device Driver .....	15
Figure: 5. USB pinout.....	16
Figure: 6. USB Cable cross section .....	17
Figure: 7. LibUSB and GPhoto architecture.....	23
Figure: 8. Object Request Broker .....	29
Figure: 9. Distributed Systems Models.....	31
Figure: 10. Sun Ray Session Management .....	33
Figure: 11. SRSS and Solaris.....	34
Figure: 12. Comparative Analysis of Web Transfer in Thin Clients [44]. ....	36
Figure: 13. Comparative Analysis of Latency in Thin Clients [44]. ....	36
Figure: 14. Sun Rays on Wide Area Network .....	37
Figure: 15. Agent interacting with its environment.....	38
Figure: 16. Translator Agent in Heterogeneous Environment.....	39
Figure: 17. The Contract Net Protocol.....	44
Figure: 18. The Contract Net manager-contractor hierarchy.....	46
Figure: 19. ASOA Heterogenous Control Framework .....	49
Figure: 20. ASOA – A case of single RAS provider and RAS receipient.....	52
Figure: 21. Part of Print Conversion Ontology.....	57
Figure: 22. MAPS, an implementation of ASOA .....	60
Figure: 23. MAPS Test Bed.....	61
Figure: 24. Test bed for Sun Ray print latency measurement .....	70