

## MASTER'S THESIS

### Designing and implementing relaxed-criteria G-negotiation agents

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Designing and Implementing Relaxed-Criteria  
G-Negotiation Agents

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# Abstract

Grid is a network computing system platform with a very large number of heterogeneous machines interconnected for resources sharing, to address virtually unbounded demands from applications. Effective management of resources is thus regarded as the key to realize the vision of grid computing. However providing a mechanism for allocating resources to different applications in an efficient manner is a difficult and challenging task, due to the scale and complexity of the grid. Instead of the traditional centralized management approach, grid commerce has emerged as a decentralized, market-oriented framework for self-organization of grid resources, where resource providers charge consumers for services or leasing out resources.

As each service consumer or provider has a different set of preferences, requirements, objectives and policies, negotiation among grid participants is necessary prior to the use or lease of resources. This thesis provides empirical evidence to further support Sim's claim that market-driven agents (MDA) are appropriate mechanisms for grid resource negotiation, where MDA are e-negotiation agents designed to bargain trading terms of resources with trading partners. With a focus on computational grid, the aim of this work is to develop a testbed for simulating Grid resource management using Sim's MDAs and relaxed-criteria negotiation protocol. Whereas MDAs make adjustable amounts of concession based on different market situations and trading alternatives, Sim's relaxed-criteria protocol augments the alternating offers protocol by allowing agents to reach agreements if their proposals are sufficiently close. Adopting and adapting some of the ideas from Sim and Wang's enhanced market-driven agents, this work designs and implements two fuzzy decision controllers with two sets of relax-

ation criteria: one for consumer agents and one for provider agents. Empirical results generated using our testbed show that by slightly relaxing bargaining criteria when agents are under an intense negotiation pressure, the negotiation speed and chance of leasing or acquiring resources can be improved without sacrificing significant trading utility. Additionally, this work implements some of Sim's ideas of relaxed-criteria negotiation for Grid resource co-allocation by developing a testbed consisting of consumers that attempt to acquire multiple resources for simultaneous access. Empirical results generated using the testbed to simulate Grid resource co-allocation together with their analyses are also presented.

# Table of Contents

<b>Declaration</b>	<b>i</b>
<b>Abstract</b>	<b>ii</b>
<b>Acknowledgements</b>	<b>iv</b>
<b>Table of Contents</b>	<b>iv</b>
<b>List of Tables</b>	<b>viii</b>
<b>List of Figures</b>	<b>ix</b>
<b>1 Introduction</b>	<b>1</b>
1.1 Grid Commerce . . . . .	3
1.1.1 Economic Models for Resource Allocation . . . . .	4
1.1.2 Agent-Based Market-Driven Grid Negotiation . . . . .	5
1.2 Motivation and Contribution of this Thesis . . . . .	6
1.3 Outline of the Thesis . . . . .	7
<b>2 Market-Driven G-Negotiation Strategies and Relaxed Criteria Bar-</b>	
<b>gaining Protocol</b>	<b>8</b>
2.1 Negotiation Mechanism . . . . .	8
2.1.1 Assumptions . . . . .	8
2.1.2 Negotiation Set . . . . .	9
2.1.3 Negotiation Protocol . . . . .	10

2.2	MDGA and its Strategies . . . . .	13
2.2.1	Opportunity Function . . . . .	15
2.2.2	Competition Function . . . . .	18
2.2.3	Time Function . . . . .	20
2.3	Relaxed-Criteria Bargaining Protocol . . . . .	22
2.3.1	Rationale of Relaxed-Criteria Bargaining Protocol . . . . .	22
2.3.2	Relaxation Criteria . . . . .	25
2.3.3	Fuzzy Decision Controller . . . . .	28
<b>3</b>	<b>Stochastic Simulation and Performance Evaluation</b>	<b>34</b>
3.1	Simulation Testbed . . . . .	34
3.1.1	Architecture . . . . .	34
3.1.2	Interaction Model . . . . .	37
3.2	Simulation Parameters . . . . .	37
3.3	Performance Metrics . . . . .	42
3.4	Empirical Simulation Results, Observations and Analysis . . . . .	45
3.4.1	Extremely Short Deadline Environment . . . . .	45
3.4.2	Short Deadline Environment . . . . .	51
3.4.3	Moderate Deadline Environment . . . . .	54
3.4.4	Long Deadline Environment . . . . .	57
3.4.5	More Difficult Negotiation Price Range in Different Deadline Environment . . . . .	59
3.4.6	Simulations Statistics . . . . .	64
3.4.7	Conclusion . . . . .	64
<b>4</b>	<b>Grid Resource Co-allocation</b>	<b>68</b>
4.1	Introduction . . . . .	68
4.2	Co-allocation Simulation . . . . .	69
4.3	Co-allocation Relaxation Criteria . . . . .	70
4.4	Empirical Co-allocation Simulation Results, Observations and Analysis	73

4.4.1	5 Resources Co-allocation with Different Concession Rate and Moderate Deadline . . . . .	75
4.4.2	5 Resources Co-allocation with Different Concession Rate and Short Deadline . . . . .	79
4.4.3	5 Resources Co-allocation with More Difficult Negotiation Price Range and Short Deadline . . . . .	87
4.4.4	5 Resources Co-allocation with Same Difficulty Level and Moderate Deadline . . . . .	96
4.4.5	Simulations Statistics . . . . .	103
4.4.6	Conclusion . . . . .	103
<b>5</b>	<b>Literature Review</b>	<b>109</b>
5.1	Related Research Works . . . . .	110
5.1.1	Contributions of this Research . . . . .	114
<b>6</b>	<b>Conclusion and Future Works</b>	<b>119</b>
6.1	Conclusion . . . . .	119
6.2	Future Works . . . . .	120
	<b>Curriculum Vitae</b>	<b>126</b>