

## TABLE OF CONTENTS

CHAPTER NO.	TITLE	PAGE NO.
	<b>ABSTRACT</b>	<b>v</b>
	<b>LIST OF TABLES</b>	<b>xvii</b>
	<b>LIST OF FIGURES</b>	<b>xviii</b>
	<b>LIST OF SYMBOLS AND BBREVIATIONS</b>	<b>xxi</b>
<b>1</b>	<b>INTRODUCTION</b>	<b>1</b>
1.1	PROBLEM STATEMENT	1
1.2	PROJECT OBJECTIVES	2
1.3	IMPORTANCE OF THIS RESEARCH	2
1.4	WEB SECURITY AND SERVICE LEVEL AGREEMENT IN SOA	3
1.5	NEED FOR WEB SERVICE SECURITY	4
	1.5.1 Authentication	4
	1.5.2 Confidentiality	5
	1.5.3 Integrity	5
1.6	CLASSIFICATION OF ORCHESTRATED WEB SERVICES	10
	1.6.1 Improving Data Quality of Web Service	10
	1.6.2 Trust Worthiness of Services	10
1.7	CREATION AND GENERATION OF SERVICE LEVEL AGREEMENT BETWEEN CUSTOMERS AND PROVIDERS	12
	1.7.1 DoS Attacks in SLA Generation	13
	1.7.2 Hardware Failures	13

<b>CHAPTER NO.</b>	<b>TITLE</b>	<b>PAGE NO.</b>
	1.7.3 Credit Transactions	15
	1.7.4 Fuzzy Approach for Service Agreement Generation	17
1.8	PROPOSED WORK	21
1.9	MAJOR CONTRIBUTIONS OF THE THESIS	22
	1.9.1 Contributions in Security	22
	1.9.2 Contributions in Requirement Classification	23
	1.9.3 Contributions in Fuzzy Based Service Agreement Generation	24
1.10	ORGANIZATION OF THESIS	25
<b>2</b>	<b>LITERATURE SURVEY</b>	<b>27</b>
	2.1 SECURE LOGIC AND PREVENTING ATTACKS IN WEB SERVICES	27
	2.2 LOAD BALANCING AND REDUTION OF RISK FACTORS FOR SERVICE INFORMATIONS	34
	2.3 RULE GENERATION AND AGREEMENT MATCHING IN WEB SERVICES	41
	2.4 PROPOSED WORK	49
<b>3</b>	<b>SYSTEM ARCHITECTURE</b>	<b>51</b>
	3.1 OVERALL SYSTEM ARCHITECTURE	51
	3.2 ANALYZER AND SECURITY ORIGINATOR	52
	3.2.1 Information Packages	53
	3.2.2 Password Transaction – Service Identity	53

<b>CHAPTER NO.</b>	<b>TITLE</b>	<b>PAGE NO.</b>
	3.2.3 Extracted Database	54
	3.2.4 Enforcer Generation	54
	3.2.5 Centralizer	54
	3.2.6 Arbitrator	55
3.3	CLASSIFIED FILTER	55
	3.3.1 Multi Classifier Mixture	55
	3.3.2 Collective Group – Efficient Trim Down Classifiers	56
	3.3.3 Accuracy Analyzer	56
	3.3.4 Banking and Request Recognizer	57
3.4	FUZZY BASED OFFER AGREEMENT GENERATOR	57
	3.4.1 Multi Negotiation Broker	57
	3.4.2 Decision Manager	57
	3.4.2.1 User Oriented Database	58
	3.4.2.2 Expert Advice	58
	3.4.2.3 User Requirements	58
	3.4.3 Fuzzy Support-Service Level Agreement	59
	3.4.5 Customer Approval	59
3.5	ARCHITECTURAL CONTRIBUTIONS	59
<b>4</b>	<b>EVALUATION OF CUSTOMER REQUIREMENTS WITH ANALYZER AND SECURITY ORIGINATOR</b>	<b>61</b>
4.1	USER REQUIREMENT INVESTIGATION IN SOA	61
	4.1.1 Unclear Requirements	61
	4.1.2 Fragmentary Requirements	62

<b>CHAPTER NO.</b>	<b>TITLE</b>	<b>PAGE NO.</b>
	4.1.3 Non Stable Requirements	63
	4.1.4 Uncertainty Requirements	64
	4.1.5 Conflicting Requirements	65
4.2	WORKING PROCESS OF ANALYZER SECURITY ORIGINATOR	66
	4.2.1 Information Packages	67
	4.2.2 Password Transaction– Service Identity	68
	4.2.3 Extracted Database	68
	4.2.4 Enforcer Algorithms	69
	4.2.4.1 Enforcer Encryption E1 Algorithm	70
	4.2.4.2 Enforcer Encryption E2 Algorithm	71
	4.2.4.3 Enforcer Decryption D3 Algorithm	72
	4.2.4.4 Enforcer Decryption D4 Algorithm	72
	4.2.5 Centralizer	73
	4.2.6 Arbitrator	74
4.3	SAMPLE VALUE ANALYSIS OF LAYER1	74
	4.3.1 Sample Value Execution of Enforcer Encryption E1	74
	4.3.2 Sample Value Execution of Enforcer Encryption E2	76
	4.3.3 Sample Value Execution of Enforcer Decryption D3	77

<b>CHAPTER NO.</b>	<b>TITLE</b>	<b>PAGE NO.</b>
4.3.4	Sample Value Execution of Enforcer Decryption D4	78
4.4	EXPERIMENTAL TESTING OF LAYER 1	79
4.4.1	Performance Analysis of Proposed Enforcer Algorithms	80
4.4.1.1	Enforcer Encryption E1 Experiment	81
4.4.1.2	Enforcer Encryption E2 Experiment	82
4.4.1.3	Enforcer Decryption D3 Experiment	84
4.4.1.4	Enforcer Decryption D4 Experiment	85
4.5	SUMMARY	86
<b>5</b>	<b>BULK ARRIVAL REDUCTION AND CLASSIFICATION OF AUTHENTICATED REQUIREMENTS</b>	<b>88</b>
5.1	SERVICE CLASSIFICATION AND FILTERING	88
5.1.1	Topic Based Information	89
5.1.2	Structured Based Information	90
5.1.3	User Environment Information	91
5.2	DESIGN ARCHITECTURE OF CLASSIFIED FILTER	92
5.2.1	Multi Classifier Mixture	93
5.2.2	CG-ETD Classifiers	94

<b>CHAPTER NO.</b>	<b>TITLE</b>	<b>PAGE NO.</b>
	5.2.2.1 Collective Group classifiers	94
	5.2.2.1.1 J48	94
	5.2.2.1.2 Random Tree	95
	5.2.2.1.3 Random Forest	95
	5.2.2.1.4 AD Tree	95
	5.2.2.2 Efficient Trim Down classifier	97
	5.2.3 Accuracy Analyzer	99
	5.2.4 Bank Progression	99
	5.2.4.1 Request Recognizer	99
5.3	SAMPLE VALUE ANALYSIS FOR LAYER 2	100
5.4	EXPERIMENTAL TESTING OF LAYER 2	103
	5.4.1 Stratified Cross Validation	103
	5.4.2 Accuracy Measure Class	105
	5.4.2.1 Male Dataset Analysis	106
	5.4.2.2 Female Dataset Analysis	107
5.5	PERFORMANCE ANALYSIS OF CG AND ETD CLASSIFIERS FOR MALE, FEMALE DATASET	107
5.6	PICTORIAL VIEW REPRESENTATION	109
	5.6.1 Card Authentication	109
	5.6.2 Client Details in SQL Database	110
	5.6.3 J48 classifier	110
	5.6.4 Random Forest	111
	5.6.5 Random Tree	111
	5.6.6 AD Tree	112
	5.6.7 Proposed Efficient Trim Down Classification	112
5.7	SUMMARY	113

<b>CHAPTER NO.</b>	<b>TITLE</b>	<b>PAGE NO.</b>
<b>6</b>	<b>FUZZY SLA AGREEMENT GENERATION FOR MULTI PARTY USERS</b>	<b>114</b>
6.1	USER TRANSACTIONS AND SERVICE LEVEL AGREEMENT GENERATION	114
6.1.1	Service History Information Verification	115
6.1.2	Fixing Agreement Confirmation	115
6.1.3	Agreement Generation	116
6.1.4	Completion of Service Agreement	116
6.2	ESTABLISHING EFFECTIVE SLA AGREEMENTS	117
6.3	DESIGN ARCHITECTURE OF FUZZY BASED OFFER AGREEMENT GENERATOR	118
6.3.1	Decision Manager	119
6.3.2	User-Oriented Database system	120
6.3.3	User Requirements	121
6.3.4	Expert Advice	123
6.3.5	Fuzzy Support-Service Level Agreements (FS-SLA)	125
6.3.6	Customer Approval	128
6.4	SAMPLE ANALYSIS OF LAYER 3	129
6.5	EXPERIMENTAL RESULTS OF LAYER 3	131
6.5.1	Decision Manager	131
6.5.2	Fuzzy Support- Service Level Agreement (FS-SLA)	133
6.5.2.1	Comparative Result with Respect to Cost	133

<b>CHAPTER NO.</b>	<b>TITLE</b>	<b>PAGE NO.</b>
	6.5.2.2 Comparative Result with Respect to Duration	135
	6.5.2.3 Comparative Result with Respect to Quality	137
	6.5.2.4 Multiparty Negotiation System vs. Bilateral System	138
6.6	SUMMARY	140
<b>7</b>	<b>RESEARCH METHODOLOGY</b>	<b>141</b>
7.1	SYSTEM CONFIGURATION	141
7.2	VISUAL STUDIO. NET 2010	141
7.3	SQL SERVER 2008	142
7.4	WEKA CLASSIFIER	142
<b>8</b>	<b>CONCLUSIONS AND FUTURE ENHANCEMENTS</b>	<b>143</b>
8.1	ANALYZER AND SECURITY ORIGINATOR SYSTEM	144
8.2	CLASSIFIED FILTER SYSTEM	145
8.3	FUZZY BASED OFFER AGREEMENT GENERATOR SYSTEM	146
8.4	FUTURE ENHANCEMENTS	147
	<b>APPENDIX</b>	<b>148</b>
	<b>REFERENCES</b>	<b>160</b>
	<b>LIST OF PUBLICATIONS</b>	<b>171</b>



## LIST OF TABLES

TABLE NO.	TITLE	PAGE NO.
4.1	Experimental Testing of Enforcer Encryption E1 and Legacy Component	81
4.2	Experimental Testing of Enforcer Encryption E2 with Legacy Component	83
4.3	Experimental Testing of Enforcer Decryption D3 with Legacy Component	84
4.4	Experimental Testing of Enforcer Decryption D4 with Legacy Component	85
5.1	Stratified Cross Validation of CG-ETD Classifiers	104
5.2	Accurate Measure Results for Male and Female Dataset	105
6.1	Experimental Results of Proposed DM	132
6.2	Comparative Analysis of FS-SLA with BSLA Agreement with Respect to Cost	134
6.3	Comparative Analysis of FS-SLA with BSLA Agreement with Respect to Duration	136
6.4	Comparative Analysis of FS-SLA with BSLA Agreement with Respect to Quality	137
6.5	Comparative Analysis of Multiparty System with Bilateral System	139

## LIST OF FIGURES

FIGURE NO.	TITLE	PAGE NO.
3.1	Heterogeneous Offer Agreement Generation (HOAG) system	52
4.1	Analyzer and Security Originator	67
4.2	Enforcer Execution	69
4.3	Enforcer Encryption E1 Algorithm	70
4.4	Enforcer Encryption E2 Algorithm	71
4.5	Enforcer Decryption D3 Algorithm	72
4.6	Enforcer Decryption D4 Algorithm	73
4.7	Sample Value Execution of Analyzer and Security Originator	79
4.8	Comparative Analysis of Enforcer Encryption E1 and Legacy System	81
4.9	Comparative analysis of Enforcer Encryption E2 and Legacy System	83
4.10	Comparative analysis of Enforcer Decryption D3 and Legacy System	84
4.11	Comparative Analysis of Enforcer Decryption D4 and Legacy System	86
5.1	Layer 2 Technique of Classified Filter	92
5.2	MCM Algorithm	93
5.3	Collective Group Classifier Algorithm	96
5.4	ETD Classification Algorithm	98
5.5	Request Recognizer Algorithm	100

<b>FIGURE NO.</b>	<b>TITLE</b>	<b>PAGE NO.</b>
5.6	Proposed Efficient Trim Down (ETD) Execution	102
5.7	Accuracy Measure Comparison for Male Dataset	108
5.8	Accuracy Measure Comparison for Female Dataset	109
5.9	Card Authentication Details from Bank Database	109
5.10	Client Details in SQL Database	110
5.11	Sample Data Execution in J48 Classifier	110
5.12	Sample Data Execution in Random Forest Classifier	111
5.13	Sample Data Execution in Random Tree Classifier	111
5.14	Sample Data Execution in AD Tree Classifier	112
5.15	Sample Data Execution in Proposed ETD Classification Algorithm	112
6.1	Fuzzy Based Offer Agreement Generator System	118
6.2	Decision Manager Algorithm	120
6.3(a)	User Requirement Algorithm	122
6.3(b)	User Requirement Function	123
6.4(a)	Expert Advice Algorithm	123
6.4(b)	Expert Advice Algorithm Function	124
6.5(a)	FS-SLA Algorithm for Multi Party providers	125
6.5(b)	FS-SLA Algorithm for Multi Party Providers Function	127

<b>FIGURE NO.</b>	<b>TITLE</b>	<b>PAGE NO.</b>
6.6	Customer Approval Algorithm	129
6.7	Sample Data Execution in Fuzzy Based Agreement Generation	130
6.8	Customer Required Fuzzy Based SLA Agreement Generation	130
6.9	Comparative Results of Proposed DM with Experimental	132
6.10	FS-SLA Vs BSLA with Respect to Cost	134
6.11	FS-SLA Vs BSLA with Respect to Duration	136
6.12	FS-SLA Vs BSLA with Respect to Quality	138
6.13	Multiparty Agreement System Vs Bilateral Agreement System	139

## LIST OF SYMBOLS AND ABBREVIATIONS

AA	-	Accuracy Analyzer
AS	-	Authentication Server
CG-ETD	-	Collective Group – Efficient Trim Down
CA	-	Customer Approval
DM	-	Decision Manager
DoS	-	Denial of Service
DAG	-	Direct Acyclic Graph
DTP	-	Distributed Transaction Processing
Enforcer D3	-	Enforcer Decryption3
Enforcer D4	-	Enforcer Decryption4
Enforcer E1	-	Enforcer Encryption1
Enforcer E2	-	Enforcer Encryption2
EA	-	Expert Advice
XML	-	Extensible Markup Language
ED	-	Extracted Database
FS-SLA	-	Fuzzy Support- Service Level Agreement
HOAG	-	Heterogeneous Offer Agreement Generator
IDB	-	Information Data Base
IP	-	Information Packages
MS	-	Management Server
ME	-	Maximum Entropy
MCM	-	Multi Classifier Mixer
MNB	-	Multi Negotiation Broker
NB	-	Navie Bays
PT-SI	-	Password Transaction – Service Identity
QoT	-	Quality of Trust

RR	-	Request Recognizer
RMS	-	Resource Management System
RMSE	-	Root Mean Square Error
SDB	-	Security Data Base
SLA	-	Service Level Agreement
SP	-	Service Provider
SR	-	Service Requestor
SOAP	-	Simple Object Access Protocol
SVM	-	Support Vector Machines
UDDI	-	Universal Description Discovery Interchange
UO-DB	-	User Oriented Data Base
UR	-	User Requirements
WS-CDL	-	Web Service- Choreography Description Language
WSDL	-	Web Service Description Language
WSN	-	Wireless Sensor Networks