

TABLE OF CONTENTS

STATEMENT.....	i
PREFACE	iv
ABSTRACT.....	vi
TABLE OF CONTENTS	vii
CHAPTER I INTRODUCTION.....	1
1.1 Background.....	1
1.2 Research Problem	3
1.3 Research Scope	4
1.4 Research Objective	6
1.5 Research Benefits.....	6
1.6 Research Methodology	7
1.7 Thesis Organization	8
CHAPTER II LITERATURE REVIEW	11
CHAPTER III THEORETICAL FRAMEWORK	15
3.1 Blockchain	15
3.1.1 Structure of a Blockchain	15
3.1.2 Blockchain Network	16
3.1.3 Consensus	17
3.1.4 Advantages of Blockchain-based Systems	18
3.1.5 Types of Blockchain	19
3.1.6 Blockchain Technologies Application	20
3.2 Ethereum Blockchain Network.....	22
3.2.1 Smart Contracts	23
3.2.2 Ethereum Virtual Machine.....	25
3.2.3 Solidity.....	26
3.2.4 Web3.js	27
3.2.5 Metamask.....	27
3.2.6 Ganache	28
3.2.7 Truffle JS	28
3.3 Web Application.....	28
3.4 Node JS	29
3.5 Decentralized Applications	29

3.6	Election Principles in Indonesia.....	31
CHAPTER IV Analysis and design		32
4.1	Research Description	32
4.2	Architecture Design	32
4.3	Software, Hardware, and Runtime Environment	33
4.4	Scenario of the Election Process	34
4.5	Simulated Election Scenario	36
4.6	System Architecture	38
4.7	Network Architecture.....	42
4.8	Testing Plan.....	44
CHAPTER V Implementation		47
5.1	Voting System Implementation	48
5.1.1	Application Interface Implementation	49
5.1.2	Smart Contract Implementation.....	53
5.2	Simulating Ethereum Virtual Machine Locally using Ganache	56
5.3	Deploying Smart Contracts using Truffle Migrate.....	58
5.4	Verification Interface.....	58
5.5	Running the Application	60
5.6	Registering a Voter	61
5.7	Casting a Vote	62
5.8	Checking and Tracking the Vote	64
CHAPTER VI EVALUATION AND DISCUSSION		67
6.1	Test Results	67
6.2	Advantages Vs. Server-based Voting System	68
6.3	Disdvantages Vs. Server-based Voting System.....	69
6.4	Ethereum Voting System and Indonesia’s Election Principles.....	69
CHAPTER VII CONCLUSION		72
7.1	Conclusion	72
7.2	Future Work	72
APPENDIX		74
REFERENCES.....		90