# Smart Contract Formulation in General Elections

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## ABSTRACT

Voting has become one of the methods used by humans to determine decisions. Voting is also often used in determining something that are very important, such as determining people's representative council. In addition, the current voting is still using the Conventional system that uses paper in balloting, and vote counting. This can cause human error. The technology that is increasingly developing in the current era of globalization is e-voting. From this research, an e-vote system will be developed that applies the concept of the block chain node with smart contract. Smart contracts generate unique code for each new election. So that manipulation of election results will not be possible because each voter has only one account and one address block chain. From the results of the test the author can conclude that the smart contract block chain can be used to prove the results of a safe choice and create e-voting that is honest.

**Key words:** Blockchain, Smart contract, Election in Indonesia.

## 1. INTRODUCTION

In a country that adheres to the principle of democracy, election activities (Elections) are reasonable activities carried out. Elections are one of the most basic ways to channel citizens' rights. Therefore, it is very important for the government to guarantee the implementation of elections in accordance with a predetermined constitutional schedule. [1]

Presidential election activities in Indonesia have been carried out 12 times. Each was carried out in 1955, 1971, 1977, 1982, 1987, 1992, 1997, 1999, 2004, 2009, 2014, and 2019. Every year the election is always accompanied by news of fraud committed by certain elements. One of the phenomena encountered in the holding of the 2019 elections was the National Winning Agency (BPN) candidate number 02, they are Prabowo Subianto-Sandiaga Uno revealed five forms of electoral violations and massive fraud committed by candidate number 01, namely Joko Widodo-Ma'ruf Amin. [2]

There are various forms of fraud that can occur in the electoral arena, including voters not registered on the voter list, ghost voters, double voters, logistical fraud, money politics practices, and others. These forms of cheating, regardless of whether they occur or not, cause unrest for the general public participating in the election. The impact of this anxiety can cause negative impacts such as violence. One example of the alleged election fraud case in the last 5 years was the holding of the 2015 Turkish elections. During the campaign, the local president at the time, Recep Tayyip Erdoğan, was accused of planning an election fraud and some irregularities. They are include AKP use of state resources, erroneous voter data, media bias, and intimidation. These allegations lead to political violence and vandalism especially on the candidate's property. The Supreme Election Council was also accused of printing excess ballots which caused controversy. [3]

Factors causing electoral fraud include low morality and human error. Fraud can be realized because of the large number of persons (third parties) involved in organizing an election. Seeing the rapid technological development currently and the availability of data increase very significant because of the ease of accessing the data and the internet development is increasing year by year [14]. Dissemination of information using various data is felt by everyone [15] and it is not impossible to exploit these developments to create elections that are far from cheating. Nowadays, mobile applications are becoming more popular year by year thanks to advances in computer technology [16]. The terms blockchain and smart contract are often heard. The application of these two

## 2. LITERATURE REVIEW

The methodology used to write this journal article is a systematic literature review (SLR)

### A. Smart Contract

Smart contracts are defined as agreements that can be executed automatically between parties based on predetermined criteria. The parties to such an agreement will determine the obligations and rights that are expected to be enforced automatically based on triggers that are digitally coded. Execution of the agreement through smart contracts will technologically disable the opportunity for renegotiation unless the terms of the agreement specifically allow for that possibility. [4]

### B. Blockchain

Blockchain is an open and distributed ledger that can record transactions between two parties efficiently and it can be

verifiable and also the data once can't be change or permanent. It can also be set to do transaction automatically [6].

The utilization does not have to involve cryptocurrency. Blockchain technology applies to all digital asset transactions exchanged online [7].

Blockchain is a distributed ledger database that used to maintain a growing list of records, it called blocks. Each block has their own timestamp and link to the previous block. In general, Blockchain is controlled by peer-to-peer networks that collectively obey certain protocol rules to validate new blocks [9].

Blockchain a set of group blocks that connected to each other by a hash method, thus forming the chain of blocks. The technologies can help realize the implementation of elections that can minimize fraud.

In this journal article, we will propose how to plan the holding of Indonesia's presidential election with the help of blockchain technology and smart contracts. To design this article, we study the systematic implementation of the current presidential election and design the systematic implementation of the presidential election with the help of combination between technology of blockchain and helped by smart contract.

Examples of the application of smart contracts are as follows. Jack is planning to buy Michelle's house. This deal was transformed into the Ethereum blockchain with help of a smart contract. This smart contract contains statement of agreement between Jack and Michele. The simplest terms statement is: "When Jack pays Michele 400 Ether, then Jack will have Michelle's home ownership". Once this smart contract is enforced, it can't be changed – the meaning is Jack can feel safe to pay Michele 400 Ether for the house. Without using smart contracts in this case, Michele and Jack must pay a lot of fees to third-party companies such as banks, lawyers, and home brokers. [5]

The first block of a blockchain is called a block which is always hardcoded in BC software. The block can be called as a special block if does not refer to the previous block. The block in BC, there is only one path to the genesis block. However, there are several paths from the genesis block to the last block because a blockchain can have branches (forking). [10]. Blockchain technology has the following characteristics [11]:

1. Decentralized control. A decentralization in which there is no absolute governing authority, as shown in Figure 1 below.
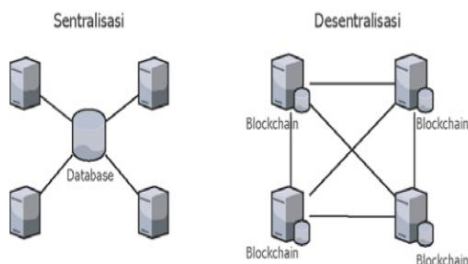


**Figure 1:** Model Data.

2. Data is transparent and easy to audit. Each node connected to the blockchain network that consist of a copy of the (public) blockchain, from the genesis block to the current block.
3. Distributed information. Each node keeps a copy of the blockchain to avoid any centralized authority that stores the information itself.
4. Decentralized consensus. The Transactions being recorded on the blockchain are validated by each node that connected to the BC network. This broke the paradigm of centralized consensus.
5. Secure. Blockchain is immune to intentional damage and cannot be manipulated.

*C. Election in Indonesia*

### 3. DESIGN SYSTEM

The e-voting system model developed in this journal is named "Web E-Vote". The E-Vote is a web-based e-voting model to meet the needs of legislative and presidential elections in Indonesia. Following are the general E-Vote Web Models; E – Reporting (see figure 2).
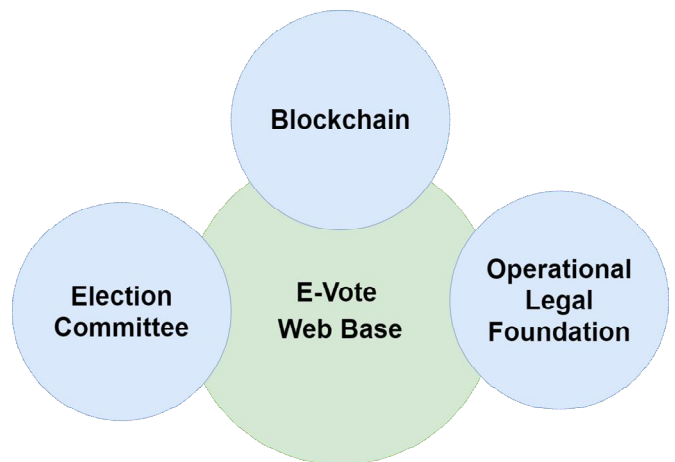


**Figure 2:** General Web E-Vote Model.

*A. Web E-Vote Model*

The technological factor is the most influencing factor in the e-voting system. In general, the design of e-voting systems is client and server based. The general design of the System is web based. The e-voting system and all data is stored on the server computer. Then, the system can be accessed from the client computer using a web browser. In web-based e-voting systems, the prominent

Elections are the means used to realize people's participation in government as the highest authority holder. Elections are a very important part of state activities. As in Indonesia, elections are strictly regulated in the 1945 Constitution amendment III, chapter VII B on General Elections, article 22E. [8] System operational procedures will be based on the law of election.

In Indonesia the election process involves many parties. The parties staff involved include KPU, Provincial KPU, PPK,

PPS, PPLN, KPPS, KPPSLN, Banwaslu, Panwaslu, Kecamatan Panswaslu, Field Election Supervisors, and voters. [9] All parties have rights and obligations as regulated in the law concerning the holding of elections.

Elections in Indonesia until now still use the manual method (using paper). Some of the reasons a country has not yet adopted an online election system is because of the socialization process that will require more effort, inadequate IT infrastructure, and others part is the server part. In the client section, it is only a normal web browser such as Internet Explorer, Mozilla Firefox, Opera, Safari, Google Chrome or other web browsers.

By integrating the e-Voting system with the Blockchain, so it has several characteristics that are suitable for use in Election E-Vote systems which are Web-based and very supportive in achieving a transparent and verifiable system. [11]

A. *System & Blockchain Arsitecture*
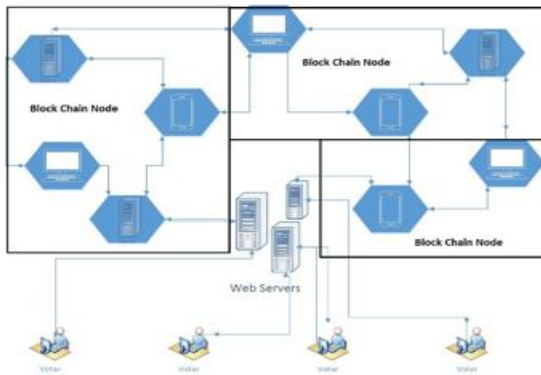


**Figure 3:** System Architecture Adapted From [10].

From the figure 3 above, it can explain the architectural system design that will be applied to the Election. In this architecture system it has components in the form of Blockchain Node, Webserver and Client Computer (see figure 4 below).
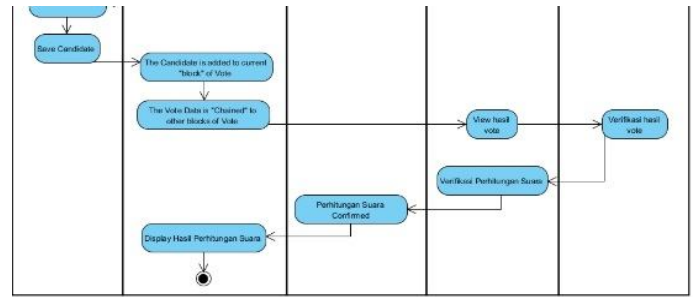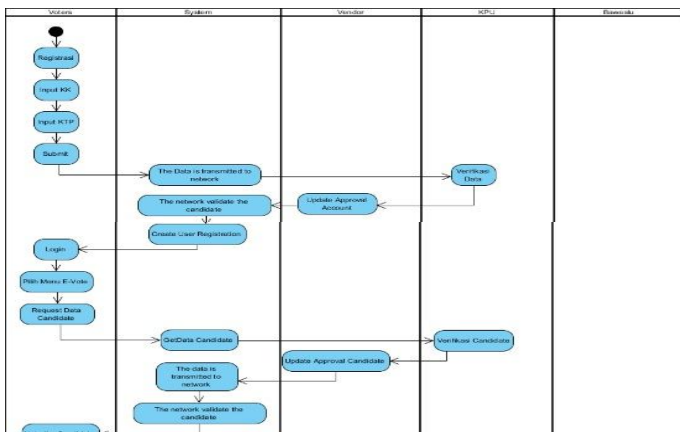




**Figure 4:** Activity Diagram E- Vote Smart Contract.

The webserver component is a web application that provides services for voters in the voting process. Webserver uses a computer (centralized) to manage all activities carried out from the client computer (voter). Webserver is also connected to a local database to store data needed in voting such as election data, user data (voter, candidate, organizer) and other supporting data.
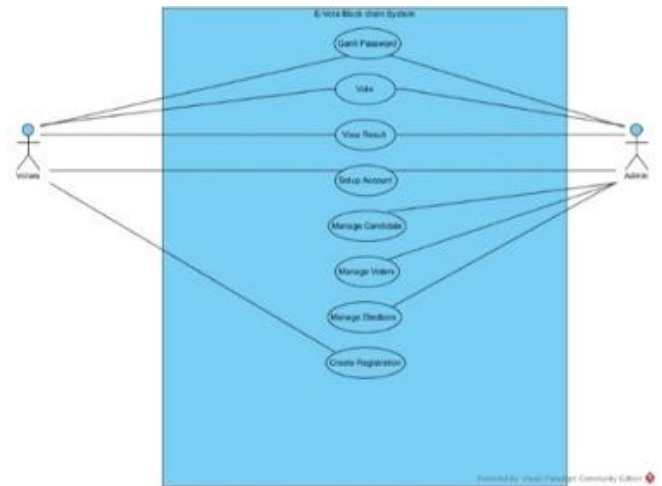


**Figure 5:** UseCase Diagram

The client computer component is a computer that is used at a general election place to be used in voting. The client computer accesses web pages on the web server. All data and web application interactions between client computers and web servers use HTTP or HTTP method [10].

The Usecase diagram in the figure 5 above describes the actors that play a role in the system, namely Voters, and Admin. Each of these actors has the same function and role and there are several functions that are specific to the Admin only. The first is the Voters (Candidate or Non-Candidate) actor, the system provides features or use cases to Voters including "Change Password, Vote, View Result, Account Setup, Create Registration". The second is the Admin actor, use case which consists of "Change Password, Vote, View Result, Account Setup, Manage Candidate, Manage Voter, and Manage Election

## 4. DISCUSSION

The architecture system design above can be summarized as follows:

1. Voters Register to the system using Identification Number (KTP, KK).
2. The system will store voter data and make a voter contract for each voter. performed on the Center contract.
3. After registering, voter data will automatically be distributed to the blockchain address. The voter contract will have a unique code that differs between voters so that voters will not allowed vote more than once.
4. Then, voters automatically enter the E-Vote system
5. The system will make a candidate contract for each candidate included in the election
6. *requestKandidat* to call the candidate's blockchain address that is already registered in the contract. (Candidate address is a unique code).
7. Voters choose their choice.
8. *requestPemilih* to call the candidate's blockchain address that is already registered with the contract.
9. The system will verify the blockchain voter's address with the candidate
10. The system will calculate the results of the vote and the calculation results will be monitored by the relevant agencies.
11. Voting Result

## 4. CONCLUSION

Blockchain technology is not only applied to the development of crypto currencies, games, and mobile applications. With the help of blockchain technology in online voting, in order to reduce hacker attacks and voting accuracy. Throughout the development of crypto, blockchain has shown concrete evidence as one of the safest technologies to protect data. Including duplication, securing from changes and deleting data.

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