



Mobile Development of Android-Based Beginner E-Voting System

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Abstract

One of the implementations of Pancasila democracy in Indonesia is the implementation of the election of leaders, by voting. In addition to within the scope of government, the implementation can also be carried out within the scope of educational institutions such as schools or campuses, where voters are referred to as novice voters. Elections are still carried out conventionally which requires a large nominal budget, as well as problems or fraud that often occur during elections. So in this study, a digital voting system was created using an electronic device, namely an Android-based mobile e-voting system that can be accessed via a smartphone. the existence of this system is considered to be able to provide convenience and comfort in the implementation of the voting process and provide an important role to the generation of novice voters who are now entering the digital era where technology is developing rapidly, namely to continue to cultivate democratic values in it. Based on the data obtained, smartphone users now have a percentage value of 66.31% among the public and 33.69% of people do not own a smartphone. While the survey results related to the operating system market pairs in Indonesia, accounting for 91.56% of Android users, show that the majority of smartphone users in Indonesia use Android, with this the e-voting system has the potential to be used by the general public, especially novice voters. For this reason, this e-voting system aims to provide convenience and comfort in the implementation of the election process.

Keywords : Beginner Voter , Democracy, E-Voting, Mobile Voting, Voting

Introduction

The Unitary State of the Republic of Indonesia adheres to a democratic system of government. A democratic state is a state that adheres to a government system by recognizing that sovereignty is in the hands of the people, the highest power is in a joint decision with the people in power, by running a state government that embodies the sovereignty of the people over the state. Democracy as power comes from the people and because of that the people have the right to determine and give direction and organize life and the state [1]. As the concept of the Unitary State of the Republic of Indonesia is regulated in Article 1 paragraph (2) of the 1945 Constitution, it contains the basis that "Sovereignty is in the hands of the people and is implemented according to the Constitution" [2]. One of the ways in which the holding of elections is to be a part of the implementation of a democratic system, in which the people participate in determining their attitude towards the government and their country. This means that the people have the right to choose or select who will be their representatives to run and fight for all their interests [1].

The implementation of the democratic system is not only carried out within the scope of the state government, it is also important to apply the democratic system within the scope of society, including in the scale of educational institutions such as elections in the scope of schools or campuses. The democratic system can be run within this scope because it has an organizational structure in it, although it is not absolute like the government organizational structure [1]. Participation in this scope is included in the Beginner Voters, namely those who are using their right to vote for the first time and are even 17 years old or before the age of 17 but have been married. The existence of a democratic system within that scope teaches and invites the younger generation of novice voters to be more concerned and wise in choosing a leadership. [3].

The general election procedure which is still carried out conventionally using ballots and voting nails, now some view it as an old method, and there have been many problems in the implementation process, ranging from the use of a lot of paper, accusations of cheating on the organizing committee, vote manipulation data and voters, as well as other technical problems that become recurring problems [4]. Even now, with the problems related to the Covid-19 virus that attacks the body's health and is contagious, it has a bad impact, not only on the health aspect but also on other aspects such as the impact on the holding of elections. So that



the conventional election procedure by conducting direct elections in places is not appropriate at this time [5].

In the digital era where internet technology is growing, it is possible to realize several new ideas, including the idea of holding general elections using technology, known as electronic voting or e-voting. E-voting is a method of voting and counting votes in general elections using electronic devices. This system is considered to have the potential to provide benefits for election organizers as well as for the general public, such as convenience, efficiency, increased voter participation, and accuracy of vote counting. In the context of elections in state institutions, in general, e-voting is seen as having the potential to support the realization of good governance, mainly related to issues of efficiency, transparency, budget expenditure, and accountability of election results. Even during the Covid-19 pandemic, the existence of an e-voting system is also seen as an effort to reduce the spread of Covid-19 in holding elections. For the general public, the issue of ease and convenience in elections is an important role that must be implemented. [6].

The use of technology and information certainly does not escape the devices we usually use, namely smartphones. Of course, now many people are using smartphones, even the results of the Kominfo survey show that more than half of Indonesians already have smartphones, with a percentage value of 66.31% already owning a smartphone and 33.69% not having a smartphone [7]. Of course, the smartphone used already has an operating system, be it Android or IOS. The results of a survey related to the operating system market pairs in Indonesia, with the percentage of Android users at 91.56% and Ios at 8.33%, show that the majority of smartphone users in Indonesia are using Android [8].

Based on the results of the Kominfo related to smartphone user data, of course this e-voting system allows it to be developed via a smartphone into a mobile-based e-voting system, where the e-voting system for the implementation of this election can be accessed via a smartphone. The e-voting system will run when we have entered it into the smartphone, and we have registered to the DPT for the election event so that we can use our voting rights to choose the candidate according to what we want. Based on Fajar Sidik Suganda's research, he has created an android-based e-voting application for the election of student presidents using the geofence method and produces good results, namely the e-voting application helps vote counting quickly and accurately, and can display real counts in real time [4].

This research is realized from the collection of the problems that have been described above. Thus, it is hoped that the research entitled "Mobile Development of the Android-Based Beginner E-voting System" can be realized properly and can increase voter participation rates, of course with a positive correlation in order to produce good democracy, and can realize the implementation of elections that run more efficiently. easy, convenient and fast.

Methodology

Waterfall is a method that is implemented in research for the development of an android-based mobile voting system for beginners.

Data collection

At this stage the data collection process is carried out to continue the analysis stage. This study uses primary data in the form of interviews with the Bogor City KPU which produces information related to how to manage matters relating to the implementation of elections. Researchers also collect secondary data from several sources such as journals, books, e-books, and others related to e-voting, the implementation of e-voting in the form of a mobile system.

Analysis (Requirements Definition)

The analysis process is carried out to define system development requirements based on data processing analysis including functional requirements analysis, non-functional requirements analysis, system architecture, and the system to be made.

Design (System and software design)

At this stage, the system design is carried out using Object Oriented Programming (OOP) which is described through UML.

Implementation

This stage is the implementation of the design into a language recognized by the computer. At this stage, the program code is typed using a javascript-based programming language with the React Native Framework.

Testing (Integration and System Testing)

This stage is a test of the system that has been created. Tests are carried out using the black box method for testing each function of the mobile e-voting system when it is operated

Result

Analysis

Functional Needs Analysis

Analysis of functional requirements based on election needs, the main functions of the e-voting system for novice voters are as follows: a) Login Function. Used by voters to access the voting system. b) Token Verification Function. The selector is used to verify that the personal data entered is correct. c) Selection Function. Used by voters to carry out the election process, voters will be given a display in the form of several candidate candidates to be able to choose the desired candidate. d) Selection Verification Function. It is used to ensure that the voter exercising his right to vote is himself. e) Electoral Proof Function. Used to provide electoral evidence to voters for the purpose of ensuring that voters have voted and voted for the desired candidate.

Non-Functional Needs Analysis

Analysis of non-functional requirements is an analysis that is used to define things related to the system that is running. The following are non-functional system requirements: a) Correctness. This e-voting system is made properly, namely by presenting the correct data according to the election data for each agency. b) Reliability. This e-voting system can be used anywhere with a predetermined time. c) Portability. In using this e-voting system, voters must have an internet network to be able to access the e-voting system. d) Testability. This e-voting system can be tested before the election begins. e) Usability. This e-voting system provides a user-friendly interface, thus providing convenience to users when the e-voting system is accessed.

System Architecture Analysis

The system architecture that is made refers to the client-server model, where in the client-server model, the client is active in sending and requesting from the services provided by the server as a service provider. The system architecture is shown in Figure 1.

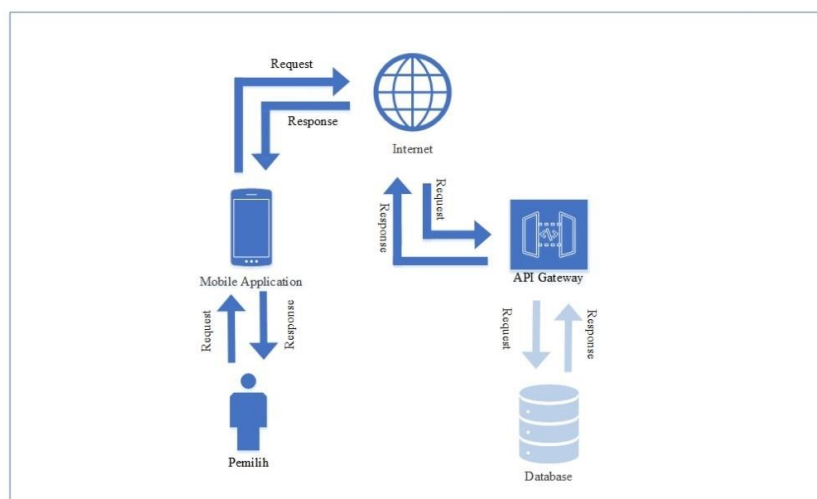


Figure 1. System Architecture Analysis

Design

At the design stage the design is designed using one of the UML diagrams, namely the use case diagram. Use case diagrams describe the interaction between actors and the system to be created. Table 1 is a description of each use case

Tabel 1. Identification Use Case

<i>Use Case Name</i>	<i>Actor</i>	<i>Description</i>
<i>Login</i>	User	<i>This use case serves as login authentication so that actors can enter the system.</i>
<i>Token Verification</i>	User	<i>This use case serves to verify tokens which aim to determine that the actors entering the system are real.</i>
<i>Choosing a Candidate</i>	User	<i>This use case serves so that the actor can choose the desired choice.</i>
<i>See evidence that the user has chosen</i>	User	<i>This use case is used to see evidence of the election in which the actor can feel confident with his choice.</i>
<i>Logout</i>	User	<i>This use case works when the actor is about to leave the system.</i>

System Implementation

System implementation is the application of the system design that has been made. The implementation of the mobile-based e-voting system in Figure 2 shows the main page display, Figure 3 Election page, the final voting page is shown in Figure 4.

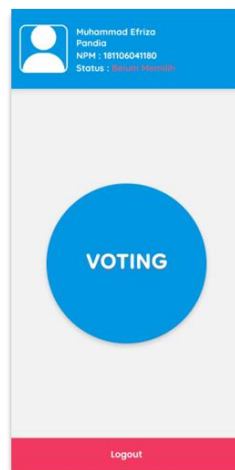


Figure 2. Main Page

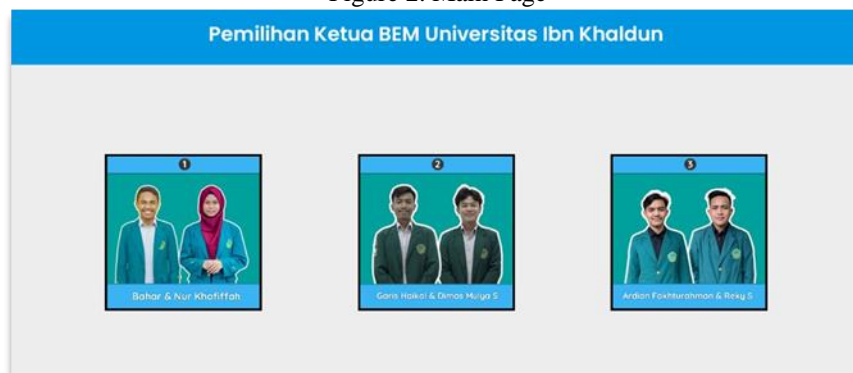


Figure 3. Options Page



Figure 4. Page Done Voting

Test

System testing is intended for testing each stage of the system that has been built. In this study the system testing using the blackbox method. The test can be seen in Table 2.

No	Function Name	Test Scenario	Expected output	Conclusion
1.	Login	Test login by entering username and password.	If the user's username and password are correct, the login is successful and the system will move to the token verification page, if the login fails, the system will still display the login page.	Test Successful
2.	Token Verification	Enter the token that the user has obtained via email.	Displays the token verification page. If the token entered is correct, the user has successfully entered the main page, if it fails, the system will still display the verification page.	Test Successful
3.	Main Page	Displays the main page that contains user data, profile photo, name, npm, election status, and voting buttons for making elections.	The personal data profile of the user is all appropriate and the voting button can function to be able to proceed to the election page	Test Successful
4.	Election Page	Display candidate data and make elections	Candidate data is in accordance with what has been registered, if the user chooses one candidate the system will appear a pop-up in the form of verifying the name of the biological	Test Successful

5.	Mother's Name Verification Page	Enter the name of the biological mother in the available input field.	mother. If the biological mother's name is correct, then the user is sure to have chosen and continues to the page after selecting, if it does not match then it remains on that page.	Test Successful
6.	Page Done Selecting	Showing election results	Displaying the finished voting page containing the candidate selected by the voters, this page will appear for 5 seconds, then after that the system will display the main page again with the election status changed to have voted.	Test Successful
7.	Page QR Code	Displays a QR Code in the form of a barcode	Displays a barcode on the main page, the barcode contains the results of the elections that have been made by the voters.	Test Successful

Conclusion

The conclusion of the research that has been done is that an Android-based mobile e-voting system has been built. Voting is still carried out conventionally by using paper and voting nails, now this method is seen as an old method and many problems occur in the implementation of the election. The role of novice voters who are now accustomed to technology has become very important in the implementation of elections, namely to foster democratic values and so that these novice voters understand the proper use of voting rights. The e-voting system is now present to minimize problems that occur in the conventional election process by utilizing technology, namely smartphones as a voting tool, where voters, especially novice voters, can conduct the election process via smartphones. to facilitate the implementation of the election process, to conduct voting and vote counting quickly and accurately, and to minimize the manipulation of voting rights and voter data. With this, the e-voting system can make the implementation of elections easier, faster, and more convenient.

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