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# Digital Innovation of Election Administration Registration Application to Improve Accuracy of Legislative Candidate Data

Inovasi Digital Aplikasi Pendaftaran Administrasi Pemilu untuk Meningkatkan Akurasi Data Kandidat Legislatif

**Arief Fathur Rahman [1,*], Muhammad Yasin Simargolang [2], Novica Irawati [3]**

[1] Universitas Islam Negeri Sumatera Utara, Medan Indonesia
[2] Universitas Asahan, Kisaran, Indonesia
[3] Universitas Royal, Kisaran, Indonesia

A B S T R A C T

Currently, the data registration procedure required by the North Sumatra Provincial General Election Commission is still done traditionally. Therefore, all legislative candidates from political parties must directly provide the required data in document format or written sheets. As a solution to this problem, it is recommended that an application be used to check and register the data required by the North Sumatra Provincial General Election Commission. This application uses the PHP programming language, MySQL as a database, and the waterfall method will be applied to computerize the process, making it faster and more accurate. The design of this application consists of two elements: the North Sumatra Provincial General Election Commission administrator, who handles the checking and filtering of the required data for each legislative candidate, and the political party administrator, who inputs the data for the legislative candidate. The implementation of this application is expected to increase efficiency, reduce errors, and support transparency in the legislative candidate registration process.

Keyword: Digital Innovation, Application, Legislative Candidate

A B S T R A K

Saat ini, prosedur pendaftaran data yang diperlukan oleh Komisi Pemilihan Umum Provinsi Sumatera Utara masih dilakukan secara tradisional. Oleh karena itu, semua calon legislatif dari partai politik harus secara langsung menyediakan data yang dibutuhkan dalam format dokumen atau lembar tulisan. Sebagai solusi dari masalah ini, disarankan agar digunakan aplikasi untuk memeriksa dan mendaftarkan data yang diperlukan oleh Komisi Pemilihan Umum Provinsi Sumatera Utara. Aplikasi ini menggunakan bahasa pemrograman PHP, MySQL sebagai basis data, dan metode waterfall akan diterapkan untuk mengotomatisasi proses sehingga menjadi lebih cepat dan akurat. Desain aplikasi ini terdiri dari dua elemen: administrator Komisi Pemilihan Umum Provinsi Sumatera Utara yang menangani pemeriksaan dan penyaringan data yang dibutuhkan untuk setiap calon legislatif, dan administrator partai politik yang memasukkan data calon legislatif. Implementasi aplikasi ini diharapkan dapat meningkatkan efisiensi, mengurangi kesalahan, dan mendukung transparansi dalam proses pendaftaran calon legislatif.

Kata Kunci: Inovasi Digital, Aplikasi, Kandidat Legislatif

* Corresponding author:
Arief Fathur Rahman
Universitas Islam Negeri Sumatera Utara, Medan Indonesia
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## 1. INTRODUCTION

General elections are a cornerstone of democracy, enabling citizens to participate directly in governance by electing representatives who reflect their aspirations [1]. To ensure the quality and integrity of these representatives, the candidate registration process must be transparent, accountable, and inclusive, providing equal opportunities for all individuals to participate[2]. Streamlining this process is essential to uphold democratic principles while fostering trust in the electoral system[3].

The application of checking and registering legislative candidates was made to improve the transparency and accountability of the candidate enrollment process at the General Election Commission of North Sumatra Province[4]. This application can be used by political parties to register their candidates as legislative candidates. Legislative candidates are individuals who have received a mandate from political parties and the people to voice the aspirations of the party and its constituents in the legislature who are directly elected. The general election of legislative candidates is the process of appointing legislative candidates from political parties to hold positions in the House of Representatives and the Local People's Representatives Council[5].

In the New Order era, the General Election Commission was the institution responsible for organizing elections. In Indonesia, the General Election Commission is also responsible for all general elections, including the general elections of the President and Vice President, Regional Head and Deputy Regional Head, and Members of the DPR/DPD/DPRD[6][7]. By the mandate of Article 22E of the 1945 Constitution of the Republic of Indonesia, the General Election Commission is the organizer of General Elections in Indonesia[8][9]. The design of a web-based information system media about an object can be used to introduce the object to the public or just to facilitate work[10][11]. Design is defined as the process of applying various principles and approaches to define devices, processes, or systems in detail that allow their physical implementation[12][13]. Software, also called applications, functions as the font end in a system and is processed through certain algorithms to produce outputs that are relevant and useful for users and other systems[14][15].

Application design is the process of determining how an application will work. It starts by studying user and business needs and then determining the features and functionality of the application[16]. An information system consists of a set of interrelated components used to collect, process, store, and disseminate information to assist problem-solving and decision-making[17][18]. This system facilitates the registration of legislative candidates by collecting, verifying, and storing data in a database. It also provides information about registration requirements and processes. Previous studies, such as those by Ummi Rofiqoh, Yuda Irawan, and Rika Melyanti, demonstrate that similar systems improve the efficiency, transparency, and accountability of registration while promoting environmentally friendly practices[19][20].

From previous research, there are several differences including, the purpose of the application is used, special features for legislative candidates and the admin of the General Election Commission of North Sumatra Province, and good security to protect the personal data of legislative candidates. The design of this legislative candidate checking and registration application aims to make it easier for legislative candidates to register themselves with the terms and conditions that have been determined. With this research, the General Election Commission of North Sumatra Province can use this website-based checking and registration application to easily view legislative candidate registrants. The General Election Commission can also improve the efficiency, transparency, and reliability of the registration process and checking of legislative candidates, providing positive benefits for all parties involved in the election. This application is designed using the waterfall method, which consists of the stages of analysis, design, implementation, testing, and maintenance, to ensure development is done in a structured manner. In its implementation, this application utilizes PHP as the main programming language to build the application's interface and logic, and MySQL as a database to store and manage legislative candidate data efficiently. The selection of PHP and MySQL is based on their reliability, flexibility, and compatibility with web-based system development, which allows for quick and accurate data access and management by both Election Commission and political party administrators. With this approach, the application is expected to meet user needs while improving the efficiency and accuracy of the registration process.

## 2. METHODOLOGY

In the process of creating a system or application, software development requires careful consideration of how the system will be built, including selecting an appropriate development methodology. This research utilizes the waterfall model, a structured approach to system development. The waterfall model is one approach to building a system with a structured sequence from the first stage is the analysis, design, implementation, and operation until the last stage is the maintenance stage[21]. This waterfall model requires five stages that must be met, starting with stage one and ending with stage five.

The design of this legislative candidate checking and registration application aims to make it easier for legislative candidates to register themselves with the terms and conditions that have been set. With this research,

the General Election Commission of North Sumatra Province can use this website-based checking and registration application to easily view legislative candidate registrants. The General Election Commission can also improve the efficiency, transparency, and reliability of the registration process and checking of legislative candidates, providing positive benefits for all parties involved in the election.

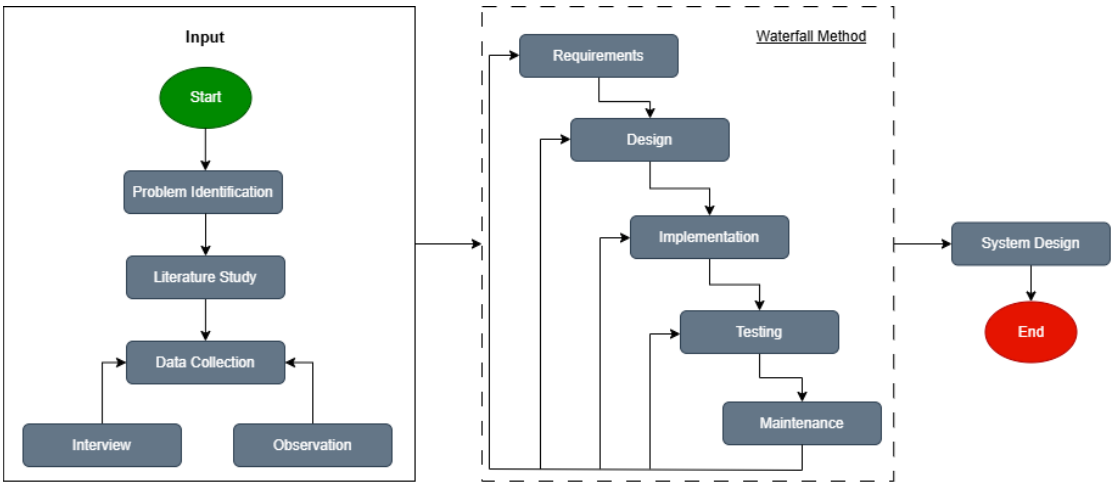



Figure 1. Stages Of Research

Based on Figure 1 above, each stage of the research is explained as follows:

1. Problem Identification
   One part of the research process is problem identification. This can be defined as an attempt to define the problem and make the definition more measurable.
2. Literature Study
   Literature study is an important step in research on legislative candidate interviews. By conducting a literature study, researchers can obtain relevant and in-depth information about the problem under study. Literature studies can be used to obtain relevant data by reading, recording, or literature review.
3. Data Collection
   The method of data collection in this research is conducting direct observations and interviews at the General Election Commission of North Sumatra Province. Interviews were conducted to find out the requirements for registering legislative candidates and potential problems.
4. Needs Analysis
   Requirements analysis is the initial stage in system or software development. This stage aims to collect and analyze user needs, and the interests of the system or software to be developed[22]. This stage aims to understand the needs of the system, such as the data that must be inputted by political parties and verified by the General Election Commission. By analyzing the needs in-depth, the application can be designed to support the transparency and accountability of the registration process.
5. System Design
   At this stage, the application design is created, including the database structure, user interface, and system workflow. A good design ensures the application is easy to use by political party administrators and the General Election Commission while supporting accurate and efficient data management.
6. Implementation
   During the implementation process, several factors to keep in mind involve making sure that the implemented system is comparable to the design that has been designed, ensuring that the system runs well, and ensuring that users can easily access it.
7. Testing
   After the program is created, testing is doe again to assess whether the results match expectations and identify any issues or mistakes. This testing is done using a black box, which improves system performance and fulfills requirements.
8. Maintenance
   The maintenance phase ensures the application is continuously updated to address potential issues or new needs. This supports the continued efficiency and reliability of the application in supporting future registration processes.

## 3. RESULTS AND DISCUSSION

The web-based application for checking and registering legislative candidates is operated by the Admin of the General Election Commission of North Sumatra Province, political party admins, and legislative candidates themselves. Admins of political parties who want to nominate their members as legislative members. This application also allows users to register as legislative candidates and check information about legislative candidates.

### 1. System Requirements Analysis

Application development requires an analysis of system requirements to help implement the design of the legislative candidate checking and registration system to be built. This is because making an application system requires hardware and software that meet specifications.

### 2. System Design

The system design used in this research is UML (Unified Modeling Language). Because UML offers development to create systems that can communicate designs with each other through modeling. UML (Unified Modeling Language) is one of the most effective and useful tools in the field of object-oriented system development[23]. Use Case Diagrams, Class Diagrams, and Activity Diagrams are some of the ways to model UML.

a) Use Case Diagram

Use case diagram presents the way the system interacts with the user. While administrators interact with the system, use cases are the way the system responds to interactions with administrators. Checking candidate registrants is done by General Election Commission officers, while legislative candidate registrants can be checked by admins from political parties. In addition, we can discuss more about how this use case diagram helps users and reduces the time needed to register at the General Election Commission. This will help us understand how this use case diagram can be the basis for the development of an effective and efficient checking and registration system.

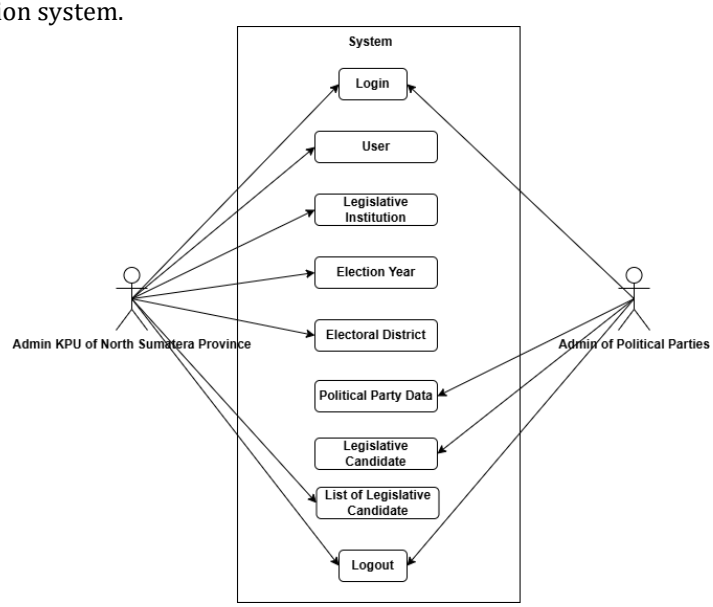



Figure 2. Use Case Diagram

Figure 2 above is a use case diagram of a web-based legislative candidate checking and registration application at the General Election Commission of North Sumatra Province. The picture above also illustrates the interaction between two users, namely the General Election Commission Admin and the Political Party Admin, for legislative candidates can register themselves through the Admin of the Political Party that carries them, with an information system used to manage data related to general elections.

The use case in the picture above shows the two main actors who have the following roles.

1) Admin of the North Sumatra Provincial Election Commission
   Users with full access rights manage all data in the system, including legislative body data, electoral districts, election years, political party data, and legislative candidate lists.
2) Political Party Admin
   Users with limited access rights, usually only to manage political party data and lists of legislative candidates associated with their party

b) Class Diagram

In object-oriented programming, a class diagram is employed to depict the fixed structure of a system or application. It consists of methods, classes, attributes, and relationships between the classes.

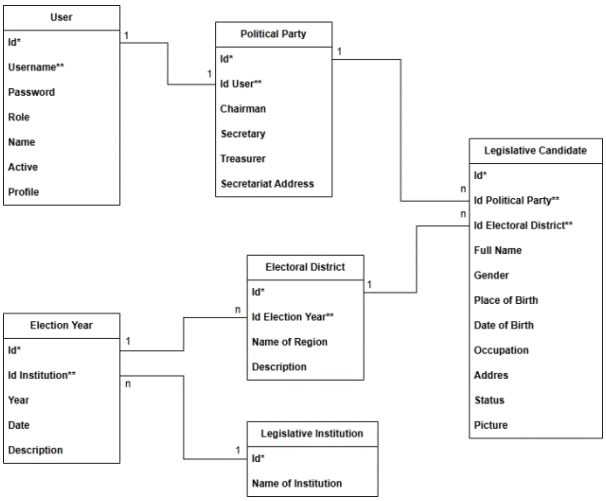



Figure 3. Class Diagram

Figure 3 above demonstrates the class diagram that is part of the system, as well as the attributes and methods of the methods owned by each class. This class diagram illustrates the data structure of an information system used to manage data on general elections. The diagram above shows the relationship between tables in the database that exists in this system, which is also designed to manage data related to general elections systematically.

The data includes information about users, political parties, legislative candidates, electoral districts, election years, and legislative institutions. The relationships between entities show how the data is bound together.

c) Activity Diagram

Activity Diagrams are depicted for each menu created in the system, showing the flow of work or activities carried out by the system or business process, including how each flow starts, choices that can be made materialize, and the overall end of the flow. The following diagrams show the activities of the system created.

1) Activity Diagram of General Election Commission Admin

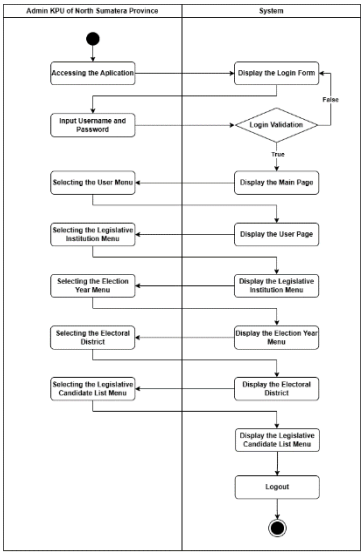



Figure 4. Activity Diagram of General Election Commission Admin

In Figure 4 above, the diagram illustrates the workflow or process carried out by the North Sumatra Provincial Election Commission admin when using the legislative candidate checking and registration

application system, this diagram also shows how an admin can interact with the application and perform various tasks related to processing legislative candidate data.

2) Activity Diagram of Political Party Admin

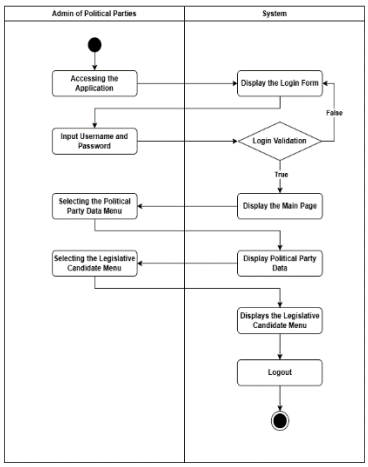



Figure 5. Diagram Activity Of Political Party Admin

Figure 5 above is the workflow of a Political Party Admin when interacting with the legislative candidate registration system. The activity diagram describes the workflow carried out by a Political Party Admin when interacting with the election information system. The Political Party Admin will access the system application. After that, the system will exhibit a login form that requires the admin to enter a valid username and password. If the login information is correct, the user will be directed to the main page. After completing his duties, the admin can choose the logout option to end the session. This diagram shows that this application was created as an information system to assist political party admins in managing party data and legislative candidates. With this system, the data management process becomes more accurate and efficient. In addition, this system can also help increase transparency in the election process.

d) Flowchart

A flowchart is a flowchart used to describe the steps, sequence, and decisions of a process or workflow. Flowcharts are also very useful tools in both technical and non-technical fields.

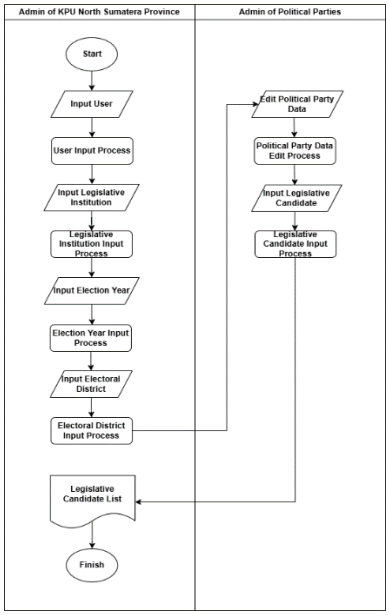



Figure 6. Flowchart

In Figure 6 above, this Flowchart describes two different process flows, namely the process flow carried out by the North Sumatra KPU admin and the process flow carried out by the political party admin in the registration data management system. Through this system, it is anticipated that the process of managing legislative candidate registrant data can run more efficiently and accurately.

## 3. User Interface Design

a) Login Page

On this page, users must enter a username and password to be able to access the website.

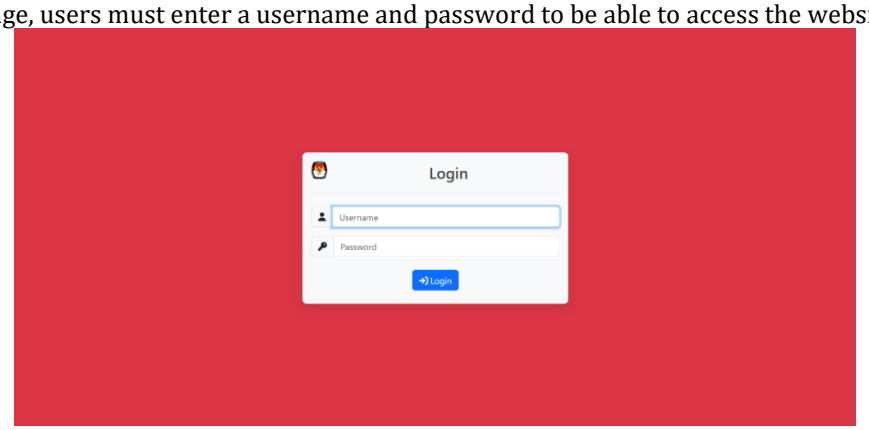



Figure 7. Login Page

b) User Page

On the user page, there are features to add, edit, and delete user data.

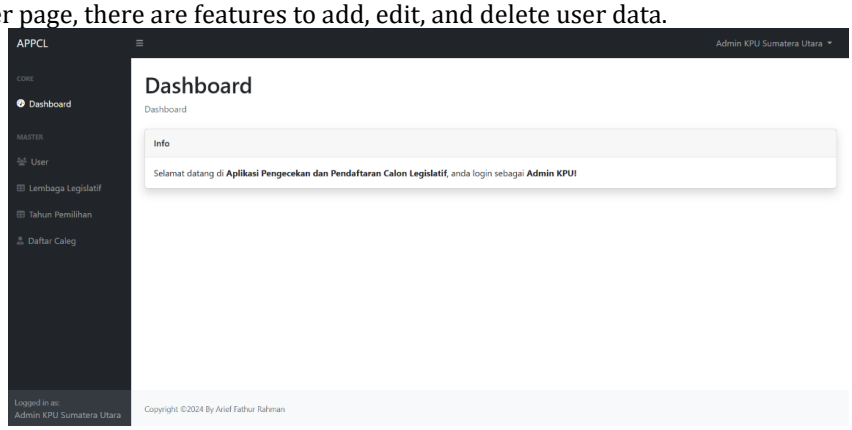



Figure 8. User Page

c) Legislative Institution Page

Manage Legislative Institution data by adding, editing, or deleting records as needed.

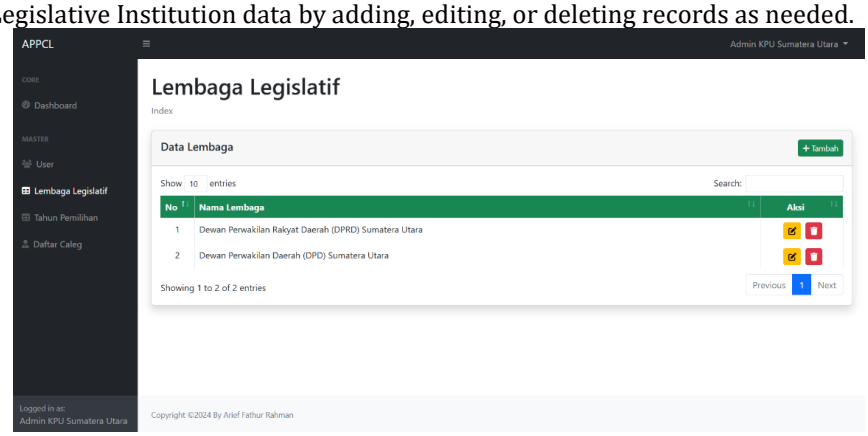



Figure 9. Legislative Institution Page

d) Election Year Page

On the Election Year page, users can add, edit, and delete election year data easily and efficiently.

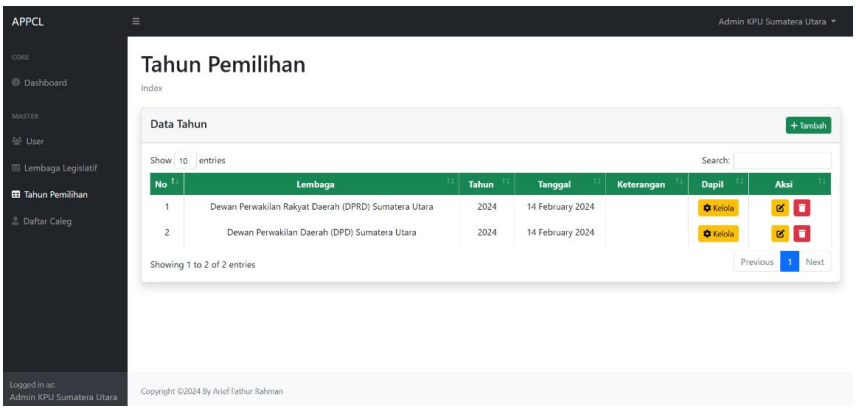



Figure 10. Election Year Page

e) Registration Page

The Registration page is designed to facilitate the registration process easily, allowing users to fill in data completely and organize as it needed.

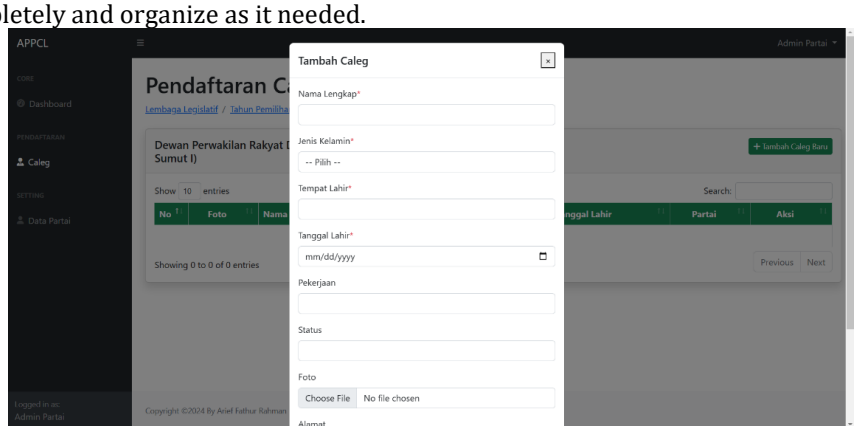



Figure 11. Registration Page

f) List of Legislative Candidates Page

The List of Legislative Candidates Page provides an overview of all registered legislative candidates, including their details such as name, party affiliation, electoral district, and other relevant information. This page allows users to view, manage, and update candidate data efficiently.

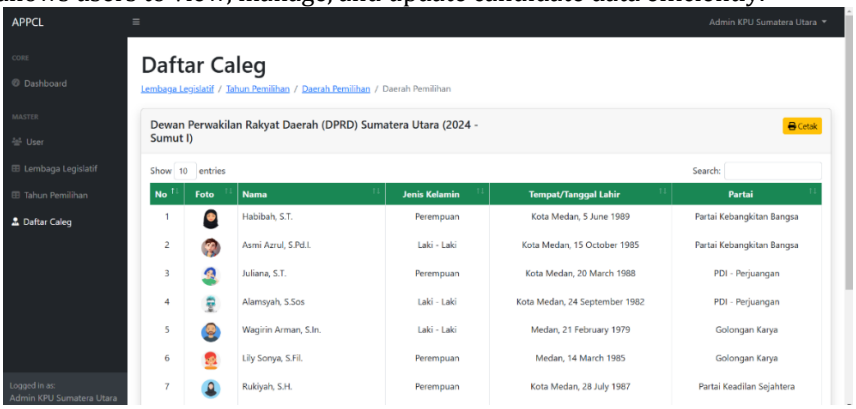
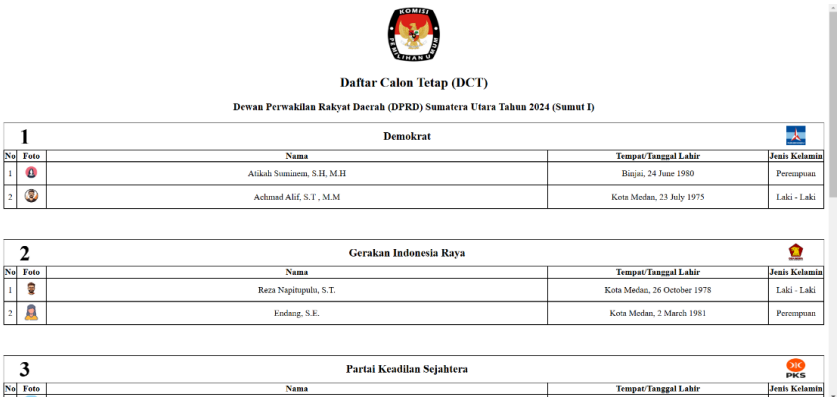



Figure 12. List of Legislative Candidates Page

g) Data Print View

The Data Print View page is designed to display information in a format optimized for printing. It provides a clean and organized layout, ensuring that all essential data is presented clearly and is ready for physical documentation or sharing.



Daftar Calon Tetap (DCT)

Dewan Perwakilan Rakyat Daerah (DPRD) Sumatera Utara Tahun 2024 (Sumut I)

1 Demokrat

| No | Foto | Nama | Tempat/Tanggal Lahir | Jenis Kelamin |
|---|---|---|---|---|
| 1 | | Atikah Suminem, S.H, M.H | Binjai, 24 June 1980 | Perempuan |
| 2 | | Achmad Alif, S.T , M.M | Kota Medan, 23 July 1975 | Laki - Laki |

2 Gerakan Indonesia Raya

| No | Foto | Nama | Tempat/Tanggal Lahir | Jenis Kelamin |
|---|---|---|---|---|
| 1 | | Reza Napitupulu, S.T. | Kota Medan, 26 October 1978 | Laki - Laki |
| 2 | | Endang, S.E. | Kota Medan, 2 March 1981 | Perempuan |

3 Partai Keadilan Sejahtera

| No | Foto | Nama | Tempat/Tanggal Lahir | Jenis Kelamin |
|---|---|---|---|---|

Figure 13. Page Of Data Print View

The user interface in this application is designed by following design principles such as simplicity, consistency, and intuitiveness to ensure ease of use. Important elements are clearly displayed without unnecessary visual distractions, so users can quickly understand the function of each feature. Consistency in layout, style, and navigation is applied throughout the interface to provide an organized and familiar experience. In addition, visual hierarchy is used to highlight important information or actions, while accessibility is considered so that the app can be used easily by different groups of users. With this approach, the app not only supports work efficiency but also reduces the potential for errors in use

## 4. Testing (System Testing)

System testing, often referred to as "system testing," is a process that involves evaluating and verifying the components of a system to ensure that the system operates according to predetermined requirements. System testing can be applied to various types of systems, including software, hardware, and a combination of both. The goal is to identify potential problems or defects early, optimize performance, and ensure that the system can operate effectively and efficiently according to user needs. System testing aims to identify problems early on, ensure optimal performance, and meet user needs. In addition, testing is also the basis for improving the scalability of the application in the future, such as the ability to handle larger amounts of data, integration with other systems, or the addition of new features to meet evolving needs. This approach ensures the application remains relevant and adaptable to future changes.

Table 1. Black Box Test Admin of the General Election Commission

| No | Tested Page | Action | System Reaction | | Results |
|---|---|---|---|---|---|
| | | | True | False (Error) | |
| 1 | Login Page | Enter the correct Username and Password, then press the Login button | Successfully Login to the Application and redirected to the Dashboard main page | Failed to log in to the app and remained on the Login page | Valid |
| 2 | User Page | Add, edit, and delete User data | User data can be added, edited, and deleted. | User data failed to be added, edited and deleted | Valid |
| 3 | Legislative Institution Page | Add, edit, and delete Legislative Institution data | Legislative Institution data can be added, edited, and deleted | Legislative Institution data fails to be added, edited and deleted | Valid |
| 4 | Election Year Page | Add, edit, and delete Election Year Data | Election Year data can be added, edited, and deleted | Election Year data fails to be added, edited and deleted | Valid |
| 5 | List of Legislative Candidates Page | View all Candidate data that has been registered by the Political Party Admin. | Candidate data can be displayed. | Candidate data cannot be displayed. | Valid |
| 6 | Entire Dashboard Page | Pressing the Logout button | Successful Logout and redirected to the Login page. | Failed Logout and remained on the Dashboard page. | Valid |

This table summarizes the black box testing results of the Admin KPU system, covering tests on the login page, user management, legislative institution management, election year data management, display of legislative candidate data, and the logout function. Each test involves specific actions—such as entering correct credentials, adding, editing, or deleting data—with the system expected to respond accordingly (for example, successfully logging in, properly managing data, or redirecting to the login page upon logout). All tests are deemed valid since the system reacted as expected.

Table 2. Black Box Test Admin of Political Party

| No | Tested Page | Action | System Reaction | | Results |
|---|---|---|---|---|---|
| | | | True | False (Error) | |
| 1 | Login Page | Enter the correct Username and Password, then press the Login button | Successfully Login to the Application and redirected to the Dashboard main page. | Failed to log in to the app and remained on the Login page | Valid |
| 2 | Legislative Candidate Page | Add, edit, and delete legislative candidate data | Candidate data can be added, edited, and deleted | Legislative candidate data fails to be added, edited and deleted | Valid |
| 3 | Political Party Page | Editing Political Party data | Political party data can be edited. | Political party data failed to edit | Valid |
| 4 | Entire Dashboard Page | Pressing the Logout button | Successful Logout and redirected to the Login page | Failed Logout and remained on the Dashboard page | Valid |

Table 2 presents the black box testing results for the Political Party Admin system, covering four key pages: the Login page, Legislative Candidate page, Political Party page, and the Entire Dashboard page. The tests verify that entering the correct credentials allows for a successful login and redirection to the Dashboard; that legislative candidate data can be added, edited, and deleted as required; that political party data can be edited successfully; and that the Logout button functions properly by redirecting to the Login page. In every instance, the system responded as expected, rendering all tests valid.

## 4. CONCLUSION

The discussion on the application of checking and registering legislative candidates at the North Sumatra Provincial Election Commission led to the conclusion that a web-based application, designed using PHP, was successfully created to facilitate both the North Sumatra Provincial General Election Commission Admin and the Political Party Admin. This application streamlines the data entry process for the Political Party Admin, who will register legislative candidates, while allowing the Admin of the General Election Commission to easily verify and process the registration of these candidates. As a result, the application design simplifies the registration process and promotes an efficient workflow for both parties involved.

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