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Design and Development of a Targeted Job Fair Information System for Vocational Education

Huriati Putri[1,2*], Resmi Darni[2], Lativa Mursyida[2] and Rizkayeni Marta[2]

[1] Computer and Informatics Engineering, SMK Negeri 2 Padang Panjang, Padang Panjang, **Indonesia**
[2] Electronic Engineering, Engineering, Padang State University, Padang, **Indonesia**

*Corresponding Author Email: huriatiputri17@gmail.com
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Abstract: The increasing demand for effective school-to-work transition mechanisms in vocational education highlights the need for integrated digital platforms. At State Vocational High School 2 Padang Panjang, the dissemination of job vacancy information and alumni data management remains manual, fragmented, and inefficient. Traditional communication channels, such as WhatsApp groups and direct phone calls, often fail to reach all alumni, while data collection via Google Forms lacks automation, scalability, and security. To address these challenges, this study developed a web-based Special Job Fair Information System using the Prototype development model. The system was implemented using the Laravel framework and MySQL database, allowing for real-time data management, secure job vacancy submissions, automated alumni tracking, and dynamic report generation. Performance testing using GTMetrix demonstrated strong system reliability, with a performance score of 94%, structure score of 97%, and favorable metrics including 1.5 seconds for Largest Contentful Paint (LCP), 0 milliseconds Total Blocking Time (TBT), and a Cumulative Layout Shift (CLS) score of 0. These results indicate a fast, stable, and responsive user experience. The system offers a scalable solution for improving graduate employability services in vocational education institutions, particularly in resource-constrained environments.

Keywords: Information System; Special Job Fair; Prototype Model; Vocational Education; GTMetrix.

1. Introduction

The advancement of information and communication technologies (ICT) has significantly transformed various sectors, including education. In the digital era, the integration of ICT has enhanced the effectiveness and efficiency of educational administration, teaching, and learning processes [1]–[3]. Educational institutions worldwide are leveraging digital platforms to improve

academic outcomes, increase institutional accountability, and facilitate student transition into the workforce [4]–[8].

Vocational education, in particular, has become a central pillar for national human resource development strategies. In developing countries, including Indonesia, vocational education is expected to produce graduates who are skilled, entrepreneurial, and globally competitive [9]–[11]. The Indonesian government has promoted vocational high schools (Sekolah Menengah Kejuruan or SMK) to meet the growing demand for skilled labor aligned with industrial and technological changes [12]–[14]. However, several studies indicate that vocational graduates still face significant barriers in transitioning from school to employment, often due to a mismatch between graduate competencies and labor market expectations [15], [16].

One institutional mechanism that has been widely implemented to address this gap is the Bursa Kerja Khusus (BKK), or Special Job Fair unit, which functions as a formal bridge between vocational schools and the world of work [17], [18]. The BKK is designed to provide job vacancy information, offer workforce readiness training, and facilitate employment or internship placement for graduates [19]. While the initiative is strategically significant, its implementation remains suboptimal in many schools due to lack of digitalization, outdated communication systems, and inefficient alumni tracking mechanisms [20].

At State Vocational High School 2 Padang Panjang, for example, the current BKK practices rely heavily on manual communication via social media, direct telephone calls, and WhatsApp groups. These methods are problematic because alumni frequently change contact numbers or are not active in group communications. As a result, important information such as job openings, recruitment schedules, or training opportunities may not reach all intended recipients [21]. Furthermore, the absence of a centralized and integrated database makes it difficult for schools to evaluate employment absorption rates or adjust curricula based on labor market feedback.

Another significant issue concerns data management and security. Alumni and employer information is often collected through basic tools such as Google Forms, which are not designed for institutional-level database management. Data processing is manual, time-consuming, prone to errors, and lacks features for secure access and real-time tracking [22]. These limitations not only reduce the efficiency of school-industry coordination but also hinder policy development and program evaluation within vocational education institutions.

Previous research has introduced various job matching systems for higher education institutions, yet few have addressed the specific needs and constraints of vocational high schools in decentralized and resource-constrained environments. Moreover, most existing systems focus primarily on

job listing features and neglect the importance of real-time alumni tracking, secure user authentication, and automated reporting that are crucial for sustainable school-industry partnerships. There is also a notable gap in the application of centralized web-based platforms that allow both alumni and employers to interact with schools while maintaining data integrity and system security.

To address these limitations, this study proposes the development of a web-based Special Job Fair Information System tailored to the operational characteristics of vocational high schools. The proposed system includes secure login authentication, real-time alumni tracking, automated data management, vacancy broadcasting, and a centralized dashboard for administrators. Through the application of modern web technologies, the system is expected to improve communication effectiveness, reduce manual errors, and enable strategic use of alumni and employer data for planning and evaluation.

The novelty of this study lies in the system's comprehensive design, which integrates alumni status monitoring, employer interaction, and administrative reporting into a unified digital ecosystem. Unlike previous systems, the proposed platform places a strong emphasis on security protocols, centralized data management, and two-way communication features between schools and stakeholders. In doing so, this research contributes to the advancement of ICT-based solutions in vocational education and provides a scalable model for improving graduate employability and institutional performance in similar educational contexts.

2. Material and methods

The development of this special job fair information system uses the Prototype method, which consists of five stages: Communication, Quick Plan, Modeling Quick Design, Construction of Prototype, and Deployment Delivery & Feedback. The prototype method is a technique for collecting, designing, and building a system based on information needs quickly [23].

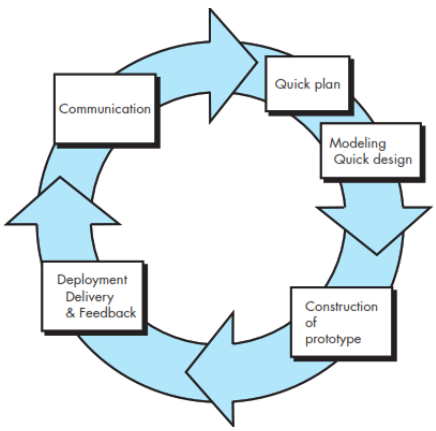

Figure 1. Prototype Method

2.1 Communication

At the communication stage, discussions are held between developers and customers to understand the overall system requirements, identify key features, and expected workflows. The needs analysis is carried out through the following steps:

2.1.1 Identification

The users of this system consist of alumni, students, the head of the Special Job Fair (admin), and the principal. The admin is responsible for managing all data in the system, including student, alumni, teacher, company, and activity data. Alumni have access to apply for jobs and participate in various available activities, while students can see the list of companies and participate in existing activities. In addition, the principal can view the special job fair report.

2.1.2 Functional Requirements

This system must have the ability to manage user data, as well as manage data related to activities, job vacancies, and job applications. The system also needs to provide an automatic message sending feature to alumni WhatsApp when there is a new job vacancy, so that alumni can immediately get information related to suitable job opportunities. This system must be able to provide a feature to view job application history and activity history that allows alumni and students to monitor their participation in various activities and job applications, as well as provide automatic reports for the Special Job Fair.

2.1.3 Non-Functional Requirements

This system needs to have an easy-to-use interface, be accessible online, and have fast processing times to support efficiency.

2.2 Quick Plan

At this stage, the design is done quickly and represents all known aspects of the software, and this design becomes the basis for making a prototype. The planning of the system is arranged by considering the data that has been collected at the communication stage. This stage will produce a flow map which is a representation of all the needs in creating the system. Here is the flow map:

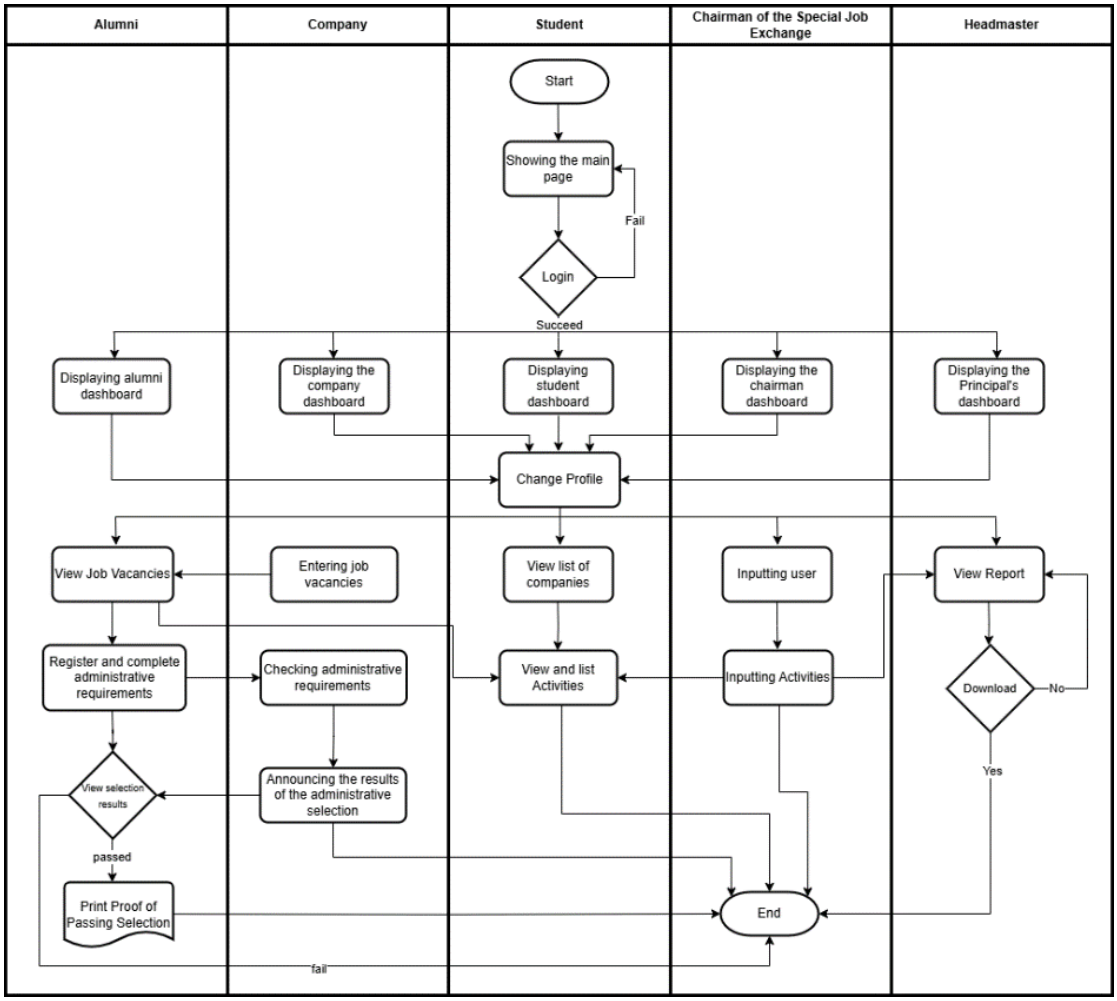

Figure 2. Proposed System Flow Map

Figure 2 shows a system flow map that illustrates the process flow for various users, namely alumni, companies, students, heads of special job fairs, and principals. Each user, after logging in, is directed to the dashboard page, and can access menus that are tailored to their respective access rights and needs.

2.3 Modeling Quick Design

At this stage the focus is on representing aspects of the software that customers/users can see. The data that has been collected is then poured into a system model before being implemented into a code structure (coding). All user needs and information system requirements are defined in UML form. Unified Modeling Language (UML) is a "language" that has become the industry standard for visualizing, designing and documenting software systems. UML offers a standard for designing a system model [24]. The following is a detailed diagram designed to support this information system:

2.3.1 Use Case Diagram

Use case diagrams describe the expected functionality of a system. A use case represents an interaction between an actor and a system [25]. The following is a use case diagram of this system:

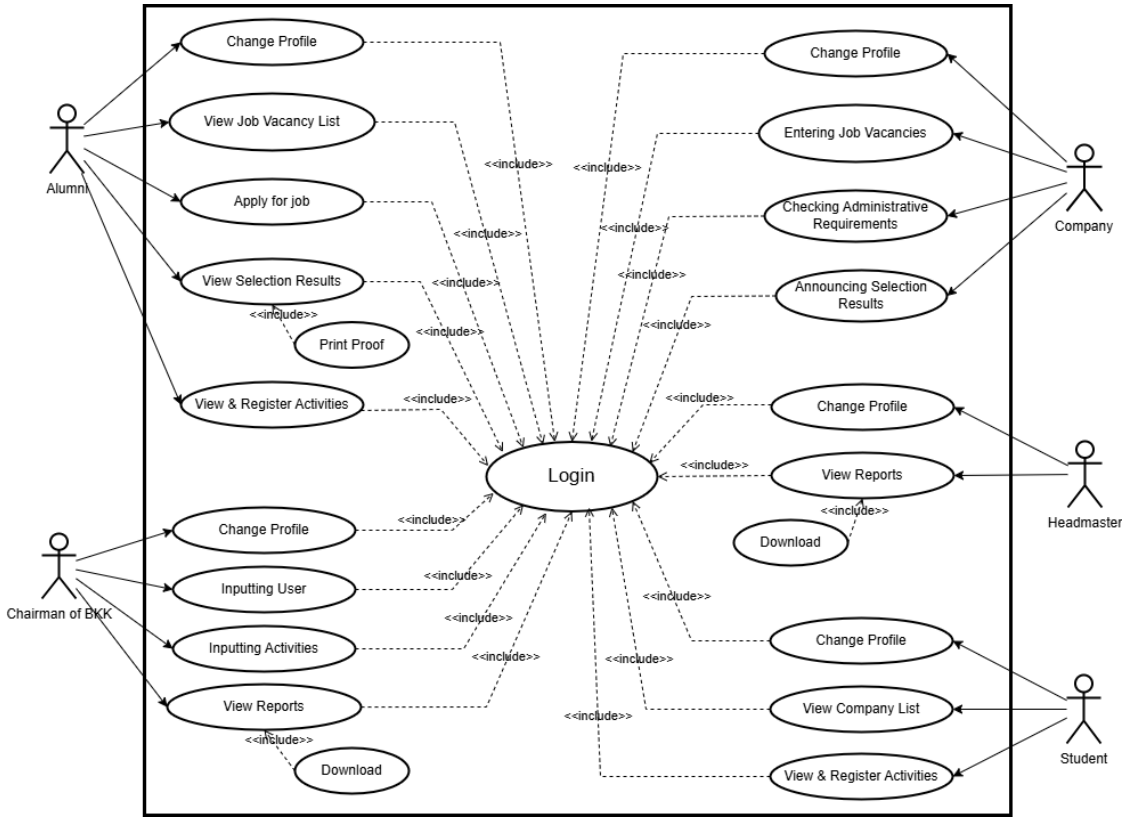

Figure 3. Use Case Diagram

Figure 3 is a use case diagram involving five actors, namely alumni, students, companies, heads of special job fairs, and school principals, who must log in first before accessing the system to carry out activities in accordance with their respective access rights and roles.

2.3.2 Activity Diagram

Activity Diagram is a diagram that functions to model the workflow of the system. This diagram shows the sequence of activities of a process and models how these activities relate to each other [25]. The following is the activity diagram of this system:

2.3.2.1 Activity Diagram Login

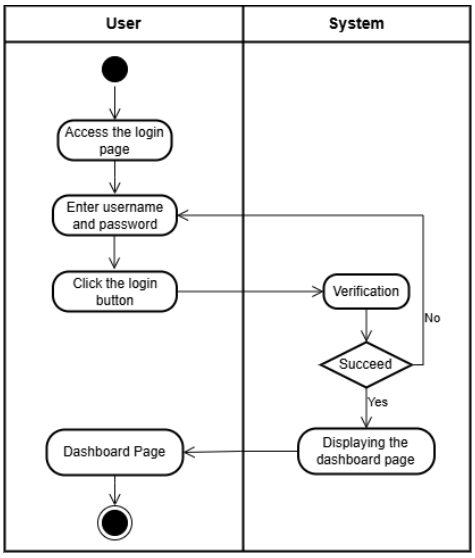

Figure 4. Activity Diagram Login

Figure 4 is a login activity diagram that shows the flow of interaction between the user and the system, starting from entering the username and password to verification, where the user successfully logs in if the data is appropriate or is asked to re-process if it is not appropriate.

2.3.2.2 Activity Diagram Input Job Vacancies

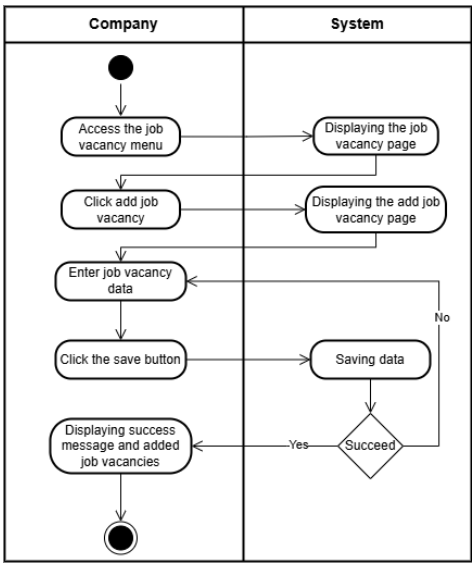

Figure 5. Activity Diagram Input Job Vacancies

Figure 5 is a job vacancy input activity diagram which depicts the process flow of adding vacancies by the company, starting from accessing the menu, filling out the form, saving data, to the system processing and displaying a success message or requesting a repeat if a failure occurs.

2.3.2.3 Activity Diagram Applying for a Job

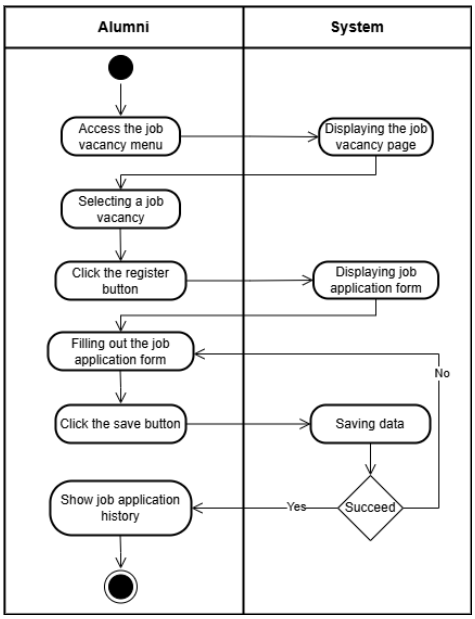

Figure 6. Activity Diagram Applying for a Job

Figure 6 is an activity diagram for applying for a job which depicts the process flow that alumni go through when applying for a job, starting from accessing the vacancy menu, filling out the application form, pressing the "save" button, until the system displays the application history or asks for a repeat if an error occurs.

2.3.2.4 Activity Diagram Job Application Management

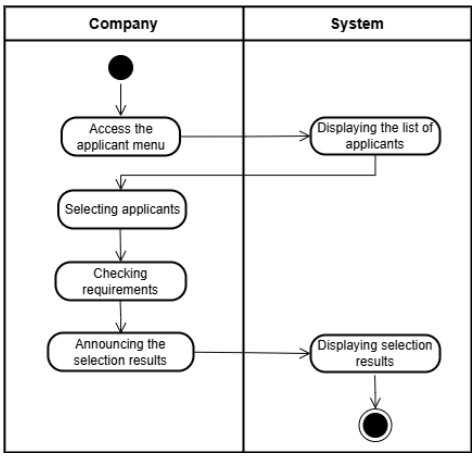

Figure 7. Activity Diagram Job Application Management

Figure 7 is a job application management activity diagram which depicts the flow of applicant selection by the company, starting with accessing the list of applicants, checking the completeness and suitability of the requirements, then

deciding whether the applicant is accepted or not, and announcing the decision to the applicant.

2.3.2.5 Activity Diagram Viewing Selection Results

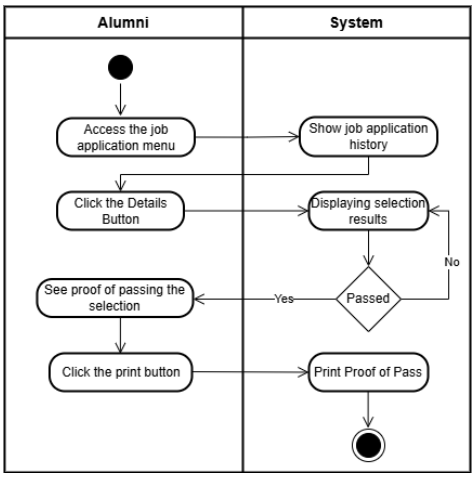

Figure 8. Activity Diagram Viewing Selection Results

Figure 8 is an activity diagram for viewing selection results which depicts the flow of alumni to view application status, starting with accessing the application menu, displaying application history, selecting the application to see the details, and providing the option to print proof of graduation if passed, or no printing option available if stated otherwise. passed.

2.3.3 Sequence Diagram

Sequence diagrams describe dynamic collaboration between a number and to show the sequence of messages sent between objects as well as interactions between objects, something that occurs at a certain point in system execution. Sequence diagrams describe interactions between objects in and around the system in the form of messages depicted over time [26]. The following is a sequence diagram of this system:

2.3.3.1 Login

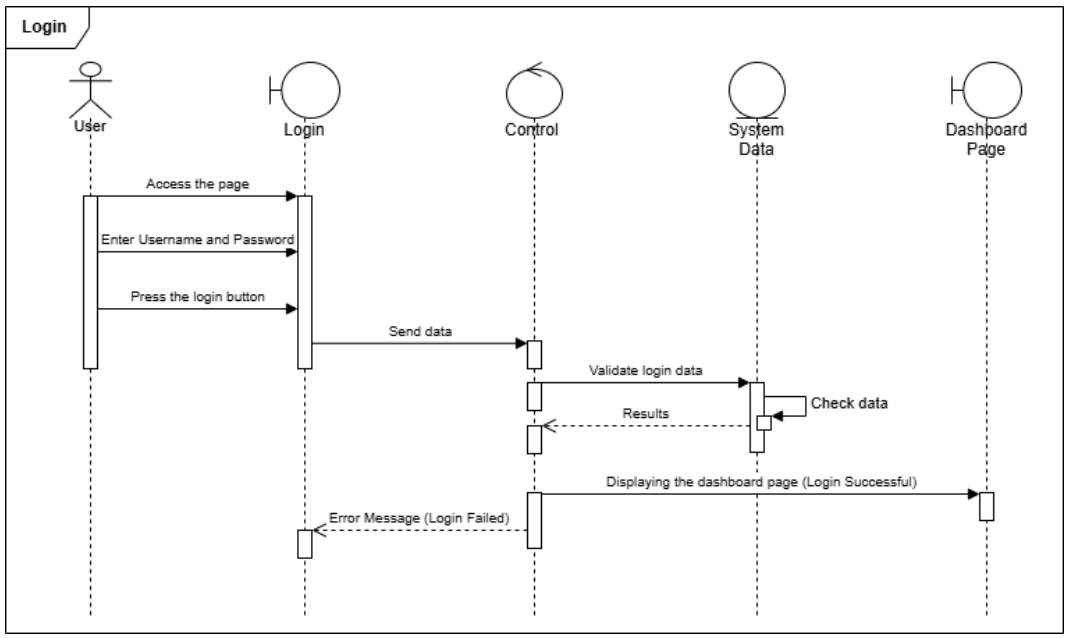

Figure 9. Login Diagram Sequence

Figure 9 is a login sequence diagram which depicts the flow of the login process, starting with the user accessing the login page, entering a username and password, sending data to the system, then the Control object validates the data through the System Data object and displays a dashboard page if successful or an error message if it fails.

2.3.3.2 Input Job Vacancies

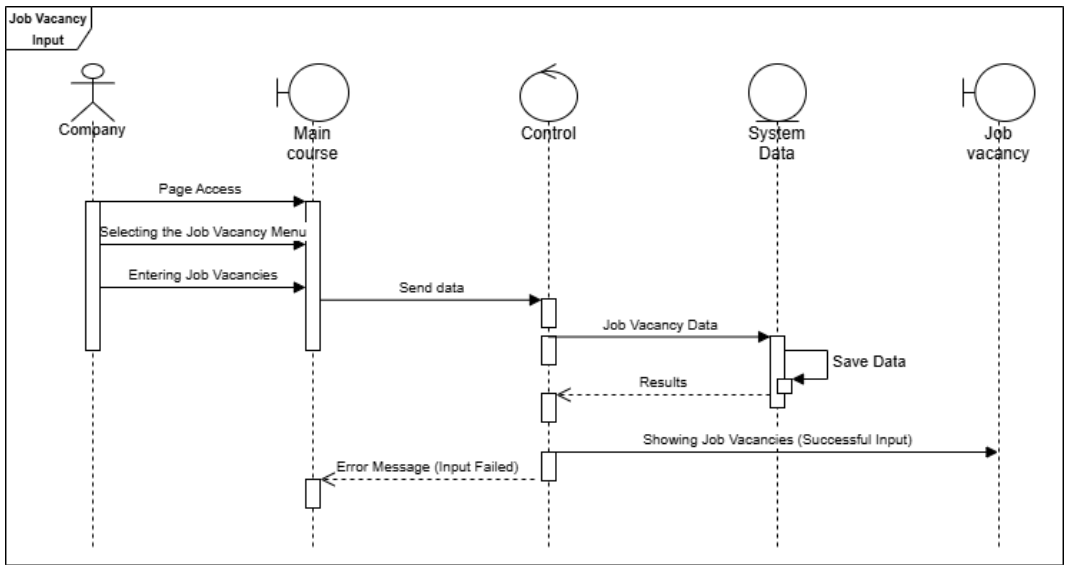

Figure 10. Job Vacancies Input Diagram Sequence

Figure 10 is a sequence diagram of job vacancy input which illustrates the flow of the company's job input process, starting with accessing the job menu, inputting data, sending data to the system, which is then verified by the Control component and, if valid, stored in the database, with the results stored sent back to Control to display a success or failure message, and if successful, displays the newly entered job vacancy.

2.3.3.3 Apply for job

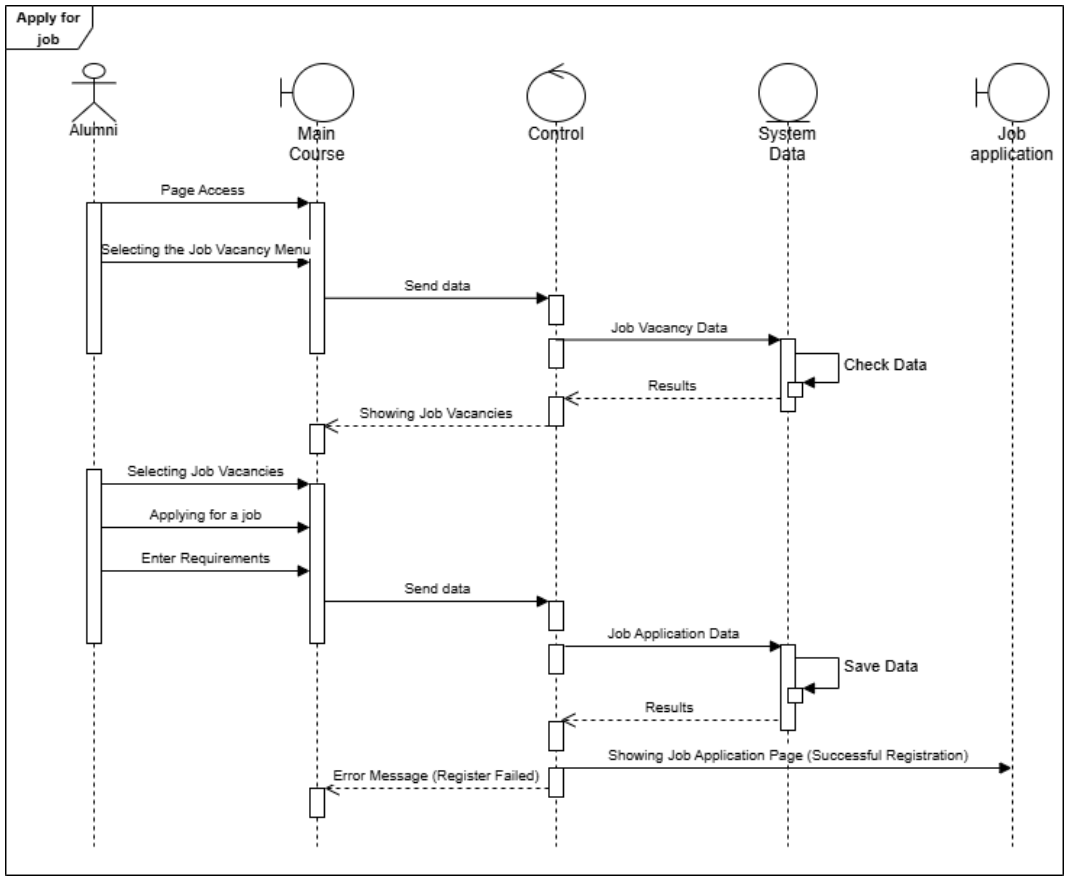

Figure 11. Sequence Diagram for Applying for a Job

Figure 11 shows the sequence diagram for job applications which begins when alumni access the main page, select the job vacancy menu, click the "apply" button, fill out the form, and send the application which is received by the Control component and stored in System Data, with the results of the storage sent back to Control to display a success or failure message, and finally display the job application data page.

2.4 Construction of Prototype

At this stage, the process of assembling the program code structure (coding) is carried out by translating the design using a programming language recognized by the computer. The programmer writes code for each system function

according to user needs, making this stage the peak in software development. This system adopts the Model View Controller (MVC) architecture, which separates data, user interface, and control logic to increase modularity and facilitate development and maintenance. This system is designed with a web-based architecture using the Laravel framework, which supports modular and efficient application development, and separates the front-end and back-end parts to ensure optimal system functionality and performance. For the frontend, this system will be designed using the Bootstrap framework, while the backend uses the Laravel framework. In addition, data processing in the database uses MySQL.

2.5 Deployment Delivery & Feedback

The final stage involves sending the prototype version to stakeholders to get initial feedback. Before delivery is carried out, testing is carried out to ensure that the system running well in accordance with the needs and expected goals. Testing aims to find errors or bugs systems/software that have been built to be repaired before being handed over to clients. This feedback is then used to iterate and improvements to the prototype before it is fully launched.

The testing method used in this system is the application performance testing method. Application performance testing methods are a series of processes for measuring an application's ability to meet performance, stability and scalability requirements under various conditions. GTMetrix is an automated software testing tool used to measure website performance. GTMetrix makes it easy for users to analyze website performance quickly and efficiently. This tool integrates Google PageSpeed and Yahoo YSlow to analyze page load time, page size, and number of HTTP requests. Test results are used to provide recommendations for improvements that need to be implemented to improve website performance [27].

3. Results and discussion

A special job market information system has been successfully designed with a web-based architecture using the Laravel framework, which separates the user interface (front-end) and data processing (back-end). This system is equipped with various main features, such as managing user data, input of job vacancies and activities. Apart from that, this system also provides a display of application and activity history, as well as proof of passing the selection.

3.1 Website Main Page Appearance

The main page is the page that users will see first when accessing the application. On this main page there is a Home menu, About Us, Job Vacancies, Activities, Contact and Login. Users can see information from the menu on this

page. For the login menu, users can click the button to access the system. The following is a display of the main page of this system.

Figure 12. Website Main Page

3.2 Login Page Display

The login page is displayed after the user clicks the login menu on the main application page. This page functions as login access for users with access rights, using email and password. After successful login, the user is directed to the dashboard page. The following is a display of the login page for this application:

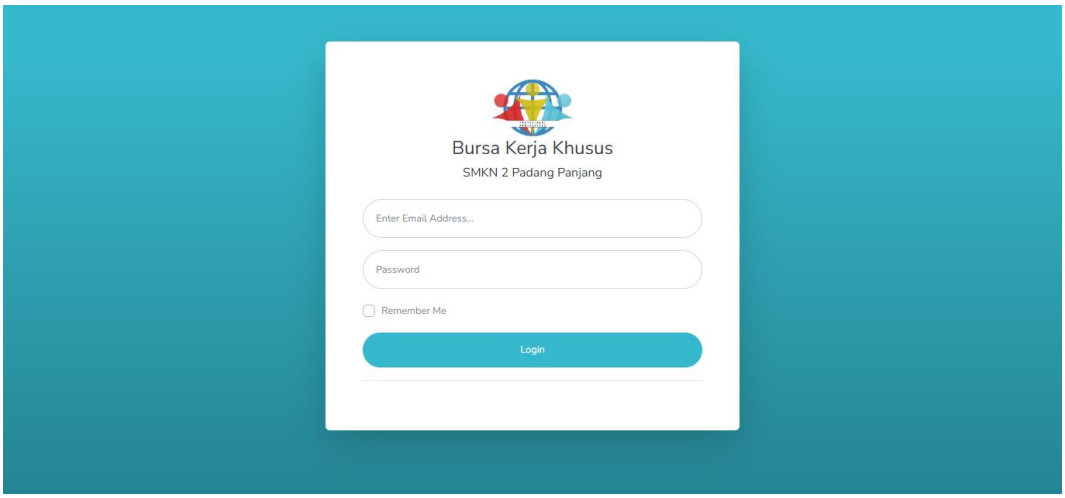

Figure 13. Login Page

3.3 User data page display

The user data page contains complete information about users, namely students, alumni, teachers and school principals. This data includes the user's identity. Admins can view, add, edit, or delete user data as needed.

Figure 14. User data page

3.4 Display job vacancies page

The job vacancy page provides complete information regarding available vacancies, including company name, position offered, company address, application deadline, status, vacancy quota, job description, and requirements that must be met by applicants. Alumni can view job vacancy details, search for vacancies that match their criteria, and apply for jobs by clicking the "Register" button.

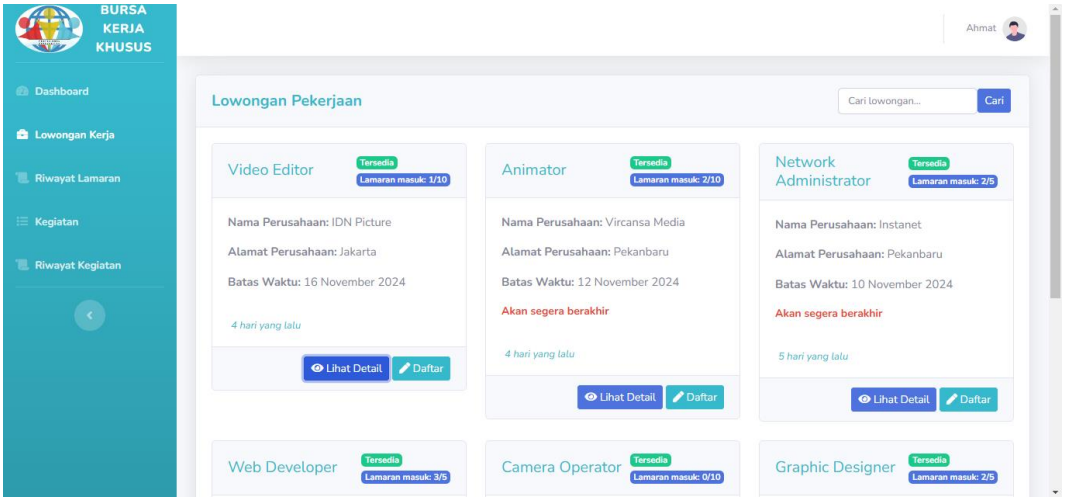

Figure 15. Job vacancy page

Every time there is a new job vacancy, an automatic message will be sent to each alumni's WhatsApp, providing direct information about available opportunities. This feature makes it easier for alumni to stay informed about the latest job opportunities without having to check the website regularly.

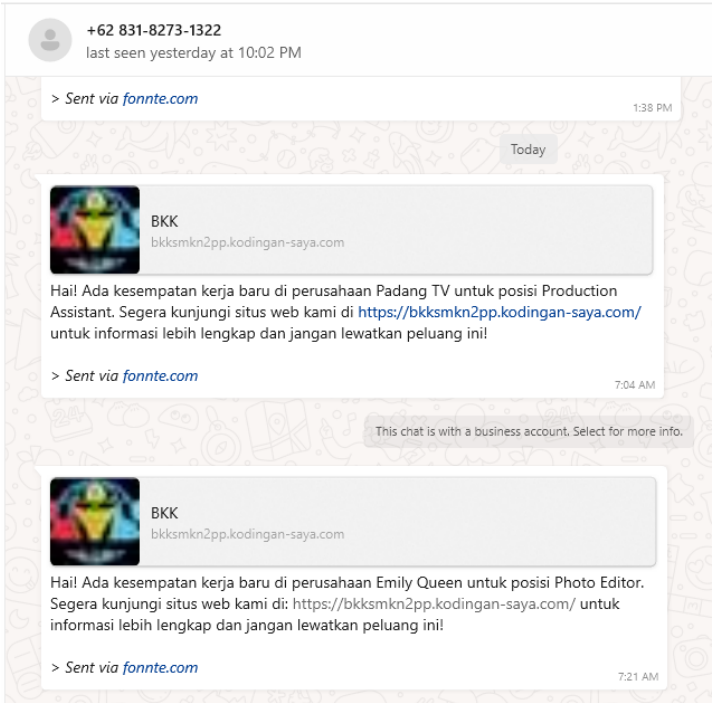

Figure 16. New Job Vacancies Whatsapp Message

3.5 Display the application history page

The job application history page provides complete information regarding job vacancies that alumni have applied for, including the application status and administrative files that have been submitted. Alumni can view and edit the administrative files that have been entered if necessary. If they pass the administrative selection, alumni can view and download proof of passing the selection as a sign that the alumni meet the requirements to proceed to the next stage.

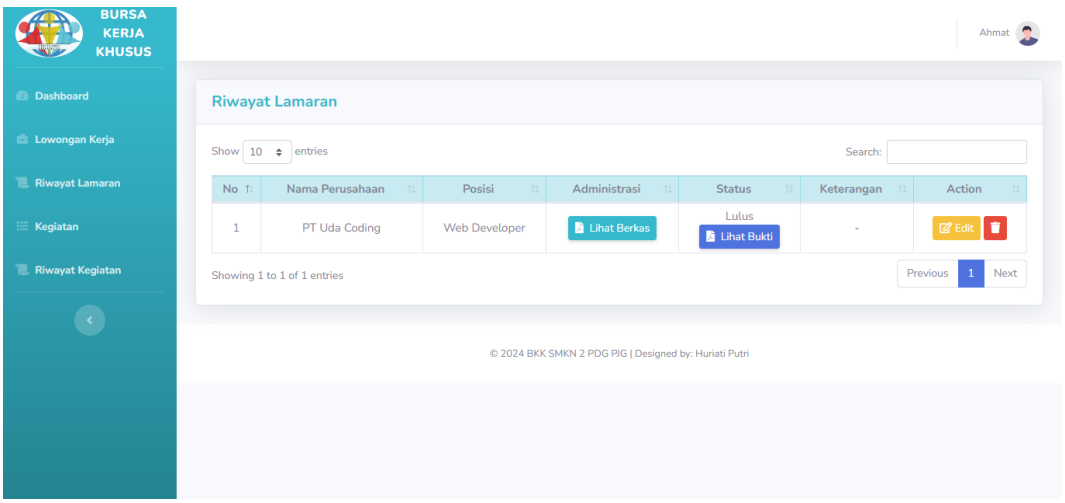

Figure 17. Application history page

Proof of passing the selection contains information about the position applied for, the name of the company, as well as details about the interview stages that must be followed next.

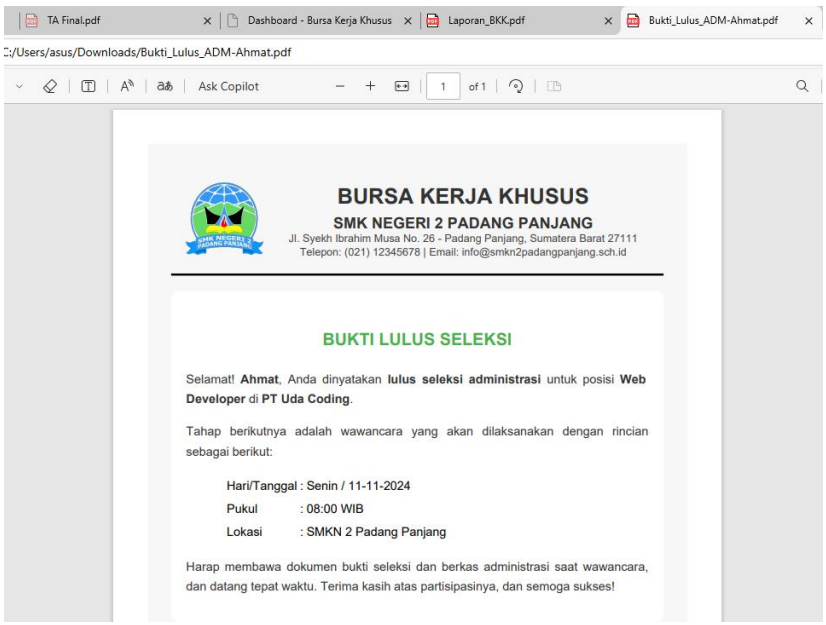

Figure 18. Proof of passing the selection

3.6 Activity page display

The activities page provides information regarding various activities organized by the Special Job Fair. Alumni and students can view details and register for each activity.

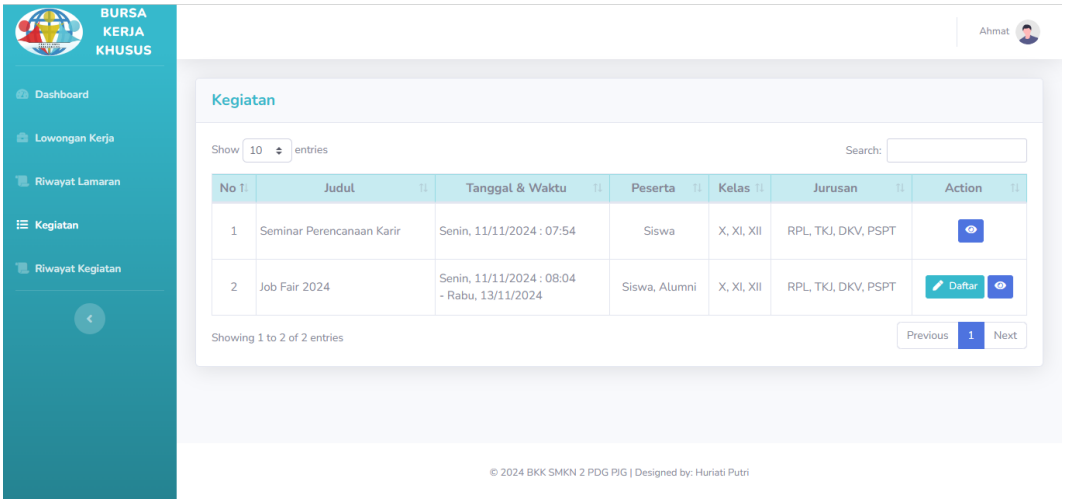

Figure 19. Activity page

The activity history page contains information regarding a list of activities that alumni have participated in, including the name of the activity, date, organizer and location of the activity.

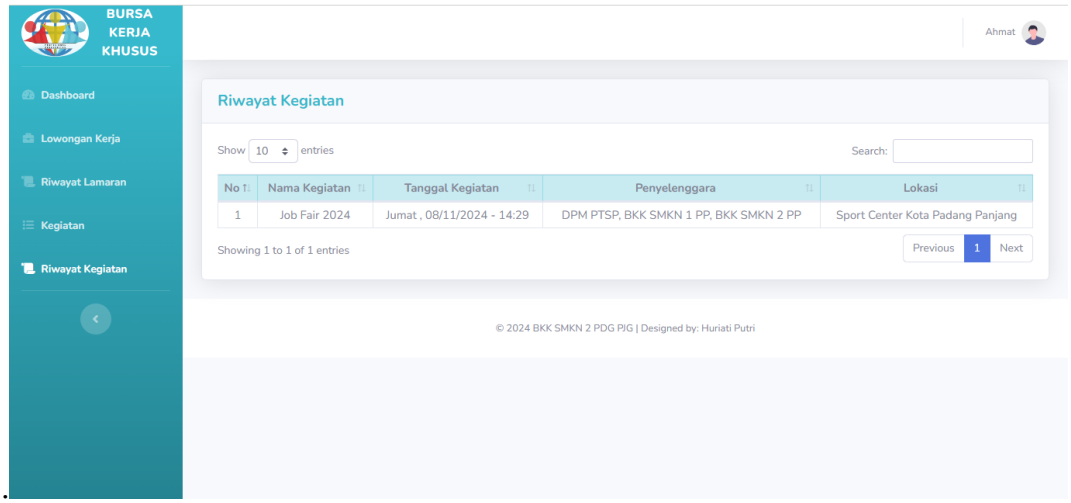

Figure 20. Activity history page

3.7 Report page display

The report page is equipped with a filter feature to produce reports based on a date range, namely start date and end date. The resulting report includes all specific job market data and is available in both Excel and PDF formats.

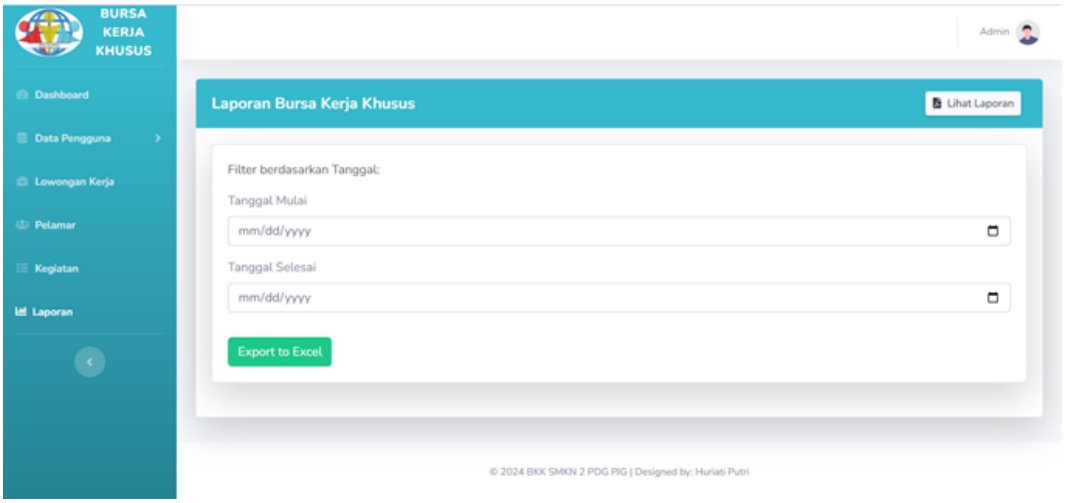

Figure 21. Report page

3.8 System test results

The performance testing method using GTMetrix helps measure application performance in terms of speed, stability and scalability, with the results in the form of a numerical score that makes it easier to analyze the quality of site performance. The tool also provides recommended improvements to improve page load time, page size, and HTTP request efficiency. The following are the results of testing a special job market information system using GTmetrix:

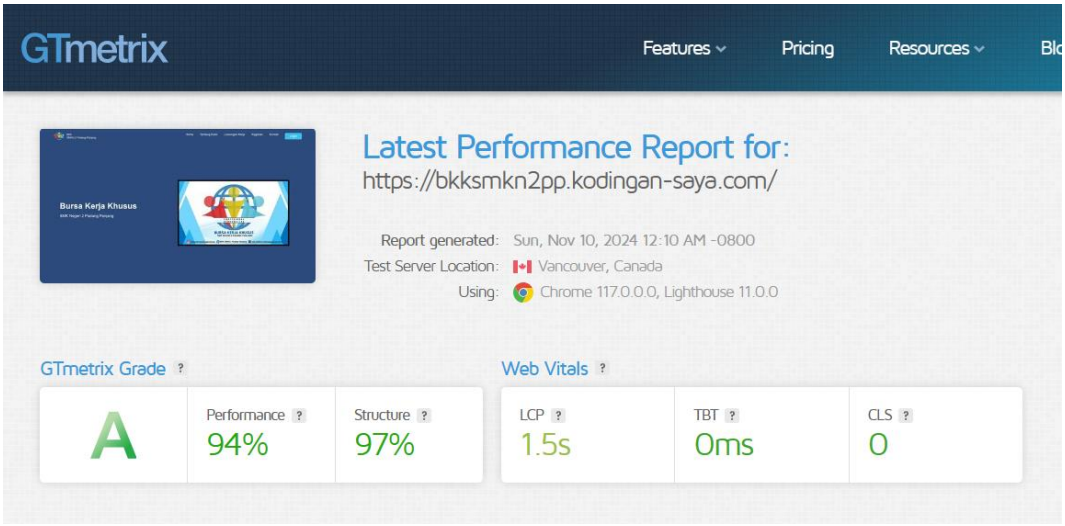

Figure 22. System test results using GTMetrix

Figure 22 is the result of system testing using GTMetrix, the website has very good performance, with an overall rating of "A" which indicates optimal performance. The performance score reached 94%, indicating high speed and responsiveness of the site, while the structure score reached 97%, indicating good optimization of HTML, CSS and JavaScript elements. Other important metrics also show satisfactory results, such as Largest Contentful Paint (LCP) which is only 1.5 seconds, Total Blocking Time (TBT) 0 milliseconds, and Cumulative Layout Shift (CLS) which gets a perfect score of 0. Overall, the results of this test indicates that the website has been well optimized in terms of speed, stability and user experience.

3.9 Discussion

The development and implementation of the Special Job Fair Information System reflect an effective application of ICT in improving graduate employment readiness within vocational education settings. As shown in the system architecture and user interface design, the platform facilitates efficient interaction between alumni, companies, and administrators. These results support previous studies indicating that digital systems significantly enhance access to job opportunities and streamline the recruitment process in educational institutions [28]–[30].

Compared to traditional BKK (Bursa Kerja Khusus) practices, which often rely on fragmented communication through WhatsApp or manual calls, this system introduces a centralized platform with real-time features such as vacancy broadcasting, alumni activity tracking, and automated report generation. These features are consistent with best practices in job placement systems adopted in higher education [31], but adapted here for the unique constraints of vocational schools.

The GTMetrix testing results, which show a performance score of 94% and structure optimization of 97%, validate the technical reliability of the system in terms of speed, usability, and accessibility. Key indicators such as Largest Contentful Paint (1.5 s) and Total Blocking Time (0 ms) fall within the benchmark values for high-performing web applications [4]. These findings confirm that the system is technically robust and suitable for deployment in real-world school environments.

The integration of WhatsApp-based notifications represents an innovative approach to maintaining alumni engagement. In contrast to previous platforms that rely solely on web-based dashboards, the incorporation of messaging services helps overcome communication gaps commonly faced by schools in rural or semi-urban areas, where alumni may not regularly check digital portals.

From a system architecture perspective, the adoption of the Model-View-Controller (MVC) pattern, supported by Laravel and Bootstrap frameworks, enhances modularity, maintainability, and scalability of the application. These technical decisions align with modern web development standards recommended for educational software [32].

In terms of usability, the system fulfills core user-centered design principles. The features such as job application history, automatic proof of selection passing, and filtering tools for administrators support task efficiency and cognitive clarity, which are essential elements in educational informatics systems [33].

However, several limitations must be acknowledged. First, the system's testing and deployment were limited to a single vocational school, which may not capture the full variability of user behaviors or infrastructure conditions found in other regions. Second, the WhatsApp messaging feature, while effective, relies on external APIs that may have usage limitations or privacy concerns. Additionally, the system does not yet include advanced analytics such as predictive modeling of job matching or AI-driven career recommendations, which have shown promise in similar systems [34].

Despite these limitations, the system contributes significantly to the field by addressing a gap in ICT integration at the vocational secondary level, an area often underrepresented in educational technology research. It also demonstrates the viability of low-cost, scalable solutions to support graduate employability, especially in decentralized and resource-constrained school environments.

This study provides evidence that digital transformation in vocational school job placement services can be successfully implemented through a user-centered, iterative development process. The prototype method proved

effective in capturing user requirements and refining the system iteratively based on stakeholder feedback.

Future work should focus on expanding the system to multiple schools to test its scalability and adaptability. Furthermore, the integration of advanced data analytics, feedback loops from employers, and career path visualization tools could increase the strategic value of the system for long-term workforce development.

4. Conclusion

This study successfully developed a web-based Special Job Fair Information System tailored to the operational needs of vocational high schools in Indonesia. The system integrates key functionalities such as alumni registration, job vacancy dissemination, application tracking, and automated reporting. The application of the Prototype development model enabled iterative feedback and ensured that user needs were incorporated at each development stage. The use of modern web frameworks (Laravel, Bootstrap, and MySQL) and the MVC architectural pattern resulted in a modular and scalable platform with high performance, as confirmed by GTMetrix testing with a performance score of 94% and structure optimization of 97%.

The findings demonstrate that ICT-based solutions can effectively bridge communication gaps between schools, alumni, and industry partners. The system facilitates real-time engagement, improves data accuracy, and enhances the accountability of job placement services in vocational education. Furthermore, features such as WhatsApp integration for alumni notifications and dynamic role-based dashboards represent novel additions that increase the practicality and usability of such systems in resource-constrained environments.

Despite these achievements, the study acknowledges several limitations. First, the system was tested in a single vocational school, which may not reflect broader regional variability in infrastructure, digital literacy, or school-industry relationships. Second, the current system does not incorporate advanced features such as artificial intelligence for job recommendations, predictive analytics for labor market trends, or employer feedback mechanisms. Additionally, reliance on third-party messaging platforms raises potential concerns regarding privacy, data ownership, and long-term platform stability.

Future research should explore multi-site deployment across diverse educational contexts to evaluate system adaptability and scalability. The integration of intelligent decision-support tools such as AI-driven recommendation engines and real-time labor market analytics is strongly encouraged to enhance personalization and strategic planning. Moreover, a comprehensive evaluation of user satisfaction and long-term employability

outcomes should be conducted to validate the broader educational impact of such systems.

Ultimately, this study contributes a scalable model for improving school-to-work transitions through digital innovation, addressing a critical need in vocational education systems within developing country contexts. Continued interdisciplinary collaboration between educators, system developers, and labor market stakeholders will be essential to maximize the system's impact and sustainability.

Author's declaration

Author contribution

Huriati Putri contributed to the conceptualization, system design, and manuscript writing. **Resmi Darni** was responsible for methodology development, data analysis, and refinement of the prototype. **Lativa Mursyida** assisted in conducting the system testing, interpreting the results, and preparing the visual documentation. **Rizkayeni Marta** provided supervision, critical revision of the manuscript, and validation of the research findings. All authors read and approved the final manuscript.

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Competing interest

The authors declare that there are no competing interests that could have influenced the conduct or findings of this research.

Ethical clearance

This study did not involve any experiments on humans or animals. All procedures involving human participants, such as user testing and feedback

collection, were conducted in accordance with ethical standards and informed consent was obtained from all participants prior to their involvement. The research protocol was reviewed and deemed to adhere to acceptable ethical guidelines for educational and system development research.

AI statement

No generative artificial intelligence (AI) tools were used in the writing of this manuscript. All content was developed, reviewed, and finalized by the authors. AI-based tools were only utilized, where applicable, for language enhancement and grammar checking, and their use did not influence the originality or integrity of the research findings.

Publisher's and Journal's note

Universitas Negeri Padang as the publisher and Editor of Jurnal Vokasi Informatika (JAVIT) state that there is no conflict of interest towards this article publication.

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