

Design and development of a web-based seminar and workshop management application at STMIK Jayakarta

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ARTICLE INFO	ABSTRACT
Article history: Received Jul 1, 2025 Revised Jul 10, 2025 Accepted Jul 19, 2025 Keywords: Academic; Auto Generate Certificate; Digital Attendance; Interactive; Seminar Management.	The rapid development of information technology offers opportunities to improve the efficiency and quality of academic event management, including seminars and workshops. This study aims to design and develop a web-based application that facilitates the digital management of seminars and workshops at STMIK Jayakarta. The application includes key features such as online attendance recording using a unique event code, real-time interactive Q&A submission, and automatic certificate generation for both participants and speakers. The system adopts a two-role model—admin and non-admin—where non-admin users may act as participants, moderators, or speakers depending on the event, allowing for flexible role assignments. Developed using HTML, PHP, JavaScript, and MySQL, the application improves data accuracy, reduces the risk of data loss, and simplifies administrative processes. This system is expected to serve as a foundation for future development of similar academic applications. <i>This is an open access article under the CC BY-NC license.</i> 

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1. INTRODUCTION

Seminars and workshops represent a vital component of academic development and institutional quality assurance efforts in higher education (Abidin, 2021)(Mulyono et al., 2020)(Hendrawati, 2024). These events are designed not only to expand participants' knowledge but also to promote collaboration and dissemination of scholarly discourse. However, in practice, many higher education institutions, including STMIK Jayakarta, still rely on manual processes to manage seminar activities, such as registration, attendance tracking, and documentation (PALUPI, n.d.)(Suryasih, 2020)(Dawis et al., 2025). These conventional methods are prone to inefficiencies, data loss, and limited accessibility, particularly when relying on physical forms and face-to-face registration (Katharina, 2021)(Sastradipraja et al., 2022)(Salim, 2023)(Muhammad et al., 2025). In the context of the digital era, the application of web-based systems is increasingly viewed as a strategic necessity for improving administrative effectiveness and service quality within academic institutions (Fadri & Fil, 2024)(Azizah et al., 2024)(Rismawati et al., 2024)(Zulfa et al., 2025).

This study aims to design and develop a web-based seminar and workshop management application tailored to the operational context of STMIK Jayakarta. The system integrates essential functionalities such as online registration, participant role management (participant, moderator, and speaker), digital attendance using event-specific codes, real-time question submission, and automatic certificate generation. To streamline access control and user roles, the system is structured around two main user groups: administrators and non-admins, allowing for dynamic role assignment per event. The development is carried out using HTML, PHP, JavaScript, and MySQL technologies, focusing solely on desktop and mobile browser compatibility. The study is limited to

the design and simulation phase, excluding full-scale institutional deployment. Internally, this system is expected to improve the efficiency and accuracy of seminar administration while supporting the institution's digital transformation goals. Externally, the system may serve as a replicable model for other institutions and contribute to the broader discourse on educational technology in academic event management (Rahayu, 2024)(Hudaya Latuconsina & Sofian, 2024)(Triyono, n.d.)(Abraham, n.d.).

2. RESEARCH METHOD

This study adopts a qualitative research paradigm, which seeks to understand phenomena within their natural context through direct observation, interviews, and literature analysis. The(Nurhayati et al., 2024)(Hasan et al., n.d.) qualitative approach enables the researcher to explore the processes and challenges involved in seminar and workshop management at STMIK Jayakarta by engaging directly with institutional stakeholders. Data collection involved field observations, structured interviews with academic administrators and students, and document reviews to gain insights into user needs and institutional workflows.

The development methodology employed in this study is the Waterfall model, a sequential software development approach suitable for systems with clear, stable, and well-defined requirements (Prabowo, 2020)(Wahyuni et al., 2024)(Damayanthi, 2024). This model involves five structured stages: (1) requirement analysis, where functional needs such as participant registration, attendance, Q&A submission, and certificate generation are identified; (2) system design, including UI/UX design, database structure, and system architecture; (3) implementation and unit testing using PHP and MySQL for web development; (4) system testing and validation; and (5) documentation and reporting. The Waterfall approach was selected due to its suitability for projects with minimal expected changes during development and its strong emphasis on thorough documentation at each stage.

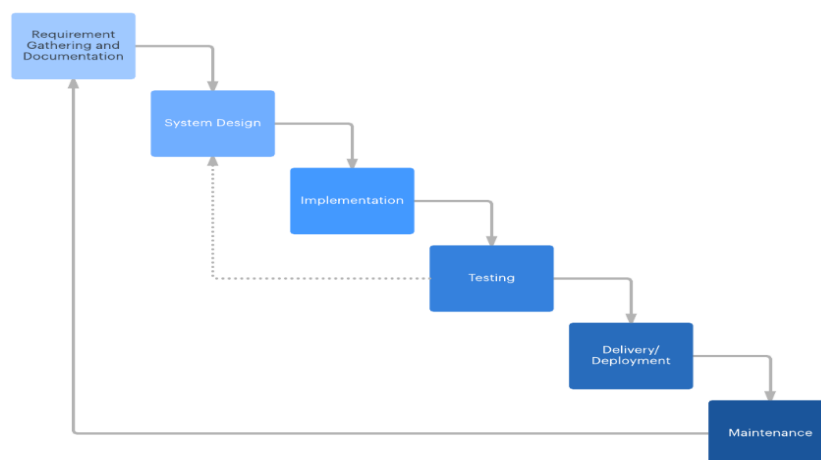


Figure 1. Waterfall method

Object-Oriented Analysis (OOA) and Object-Oriented Design (OOD) were used to define system structure and behavior. The OOA phase included problem analysis, identification of objects and attributes (e.g., events, participants, documents), and modeling of operations such as attendance logging and certificate issuance. The OOD phase translated these findings into UML diagrams—including use case diagrams, activity diagrams, and class diagrams—developed using Astah Community as a modeling tool. The use of Unified Modeling Language (UML) facilitated structured visualization of both system behavior and component interactions.

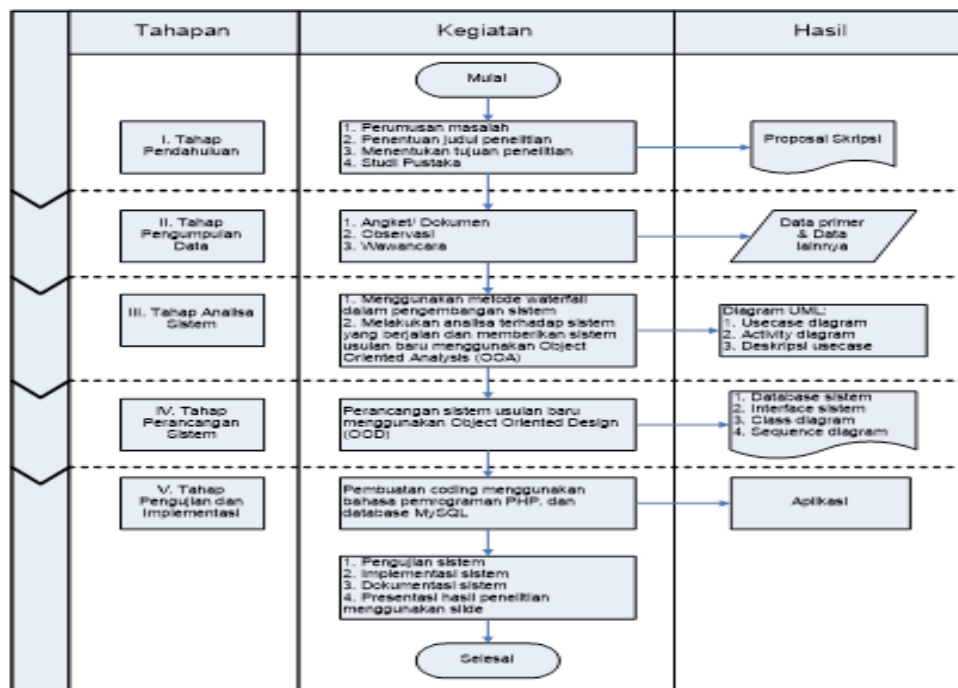


Figure 2. Research process flow

For data analysis, the study combined primary and secondary sources. Primary data were obtained through direct engagement with users and stakeholders, while secondary data were derived from previous studies and academic literature relevant to digital academic event systems. This dual-source strategy ensured both empirical grounding and theoretical validation, increasing the accuracy and relevance of the system design for educational institutions.

Table 1. Primary data source

No	Nama	Keterangan	Data yang didapat
1	I. J.		Informasi kebutuhan STMIK Jayakarta terkait aplikasi yang dibangun, termasuk: - Fitur yang diharapkan, seperti pendaftaran online, pengelolaan jadwal, dan pengiriman materi seminar. - Tantangan yang dihadapi dalam pengelolaan seminar saat ini, seperti kesulitan dalam pencatatan kehadiran dan distribusi sertifikat. - Saran untuk meningkatkan efektivitas aplikasi, termasuk integrasi dengan sistem akademik yang sudah ada dan pelatihan bagi pengguna.
2	A. P.	Mahasiswa STMIK Jayakarta	Informasi terkait proses alur pelaksanaan seminar, termasuk: - Pengalaman pribadi dalam menggunakan sistem pendaftaran seminar yang ada, serta kendala yang dihadapi, seperti kesulitan dalam mengakses informasi seminar. - Harapan terhadap aplikasi baru, seperti kemudahan dalam mengajukan pertanyaan selama seminar dan kecepatan dalam menerima sertifikat keikutsertaan. - Masukan mengenai fitur tambahan yang diinginkan, seperti forum diskusi setelah seminar dan akses ke rekaman seminar.

3. RESULTS AND DISCUSSIONS

The main focus of this section is to elaborate on the findings and evaluations from each stage of planning, as well as how the implementation of the proposed system addresses the identified needs and requirements.

UML Design Layout

The Unified Modeling Language (UML) was employed in this study as a modeling tool to visually represent the system's structure, processes, and interactions during the design phase of the web-based seminar and workshop management application. UML facilitates communication between developers and stakeholders by standardizing the representation of system components and behavior. The primary diagrams used include the use case diagram, entity relationship

diagram (ERD), sequence diagram, class diagram, and activity diagram. These visual models support the analysis of both the functional and non-functional requirements of the system by depicting interactions among users (actors) and system processes.

The use case diagram illustrates the interactions between actors such as guest users, participants, moderators, speakers, and administrators with the system. It highlights the roles and responsibilities of each user and the core functionalities they can access, such as registration, managing events, submitting questions, and issuing certificates. The Entity Relationship Diagram (ERD) depicts eight key entities: akun (user), acara (event), peserta (participant), presensi (attendance), dokumen, moderator, narsum (speaker), and tanyajawab (Q&A). Relationships among entities were designed to ensure data consistency, normalization, and efficient data retrieval, particularly in tracking participation, verifying attendance, and managing digital documentation.

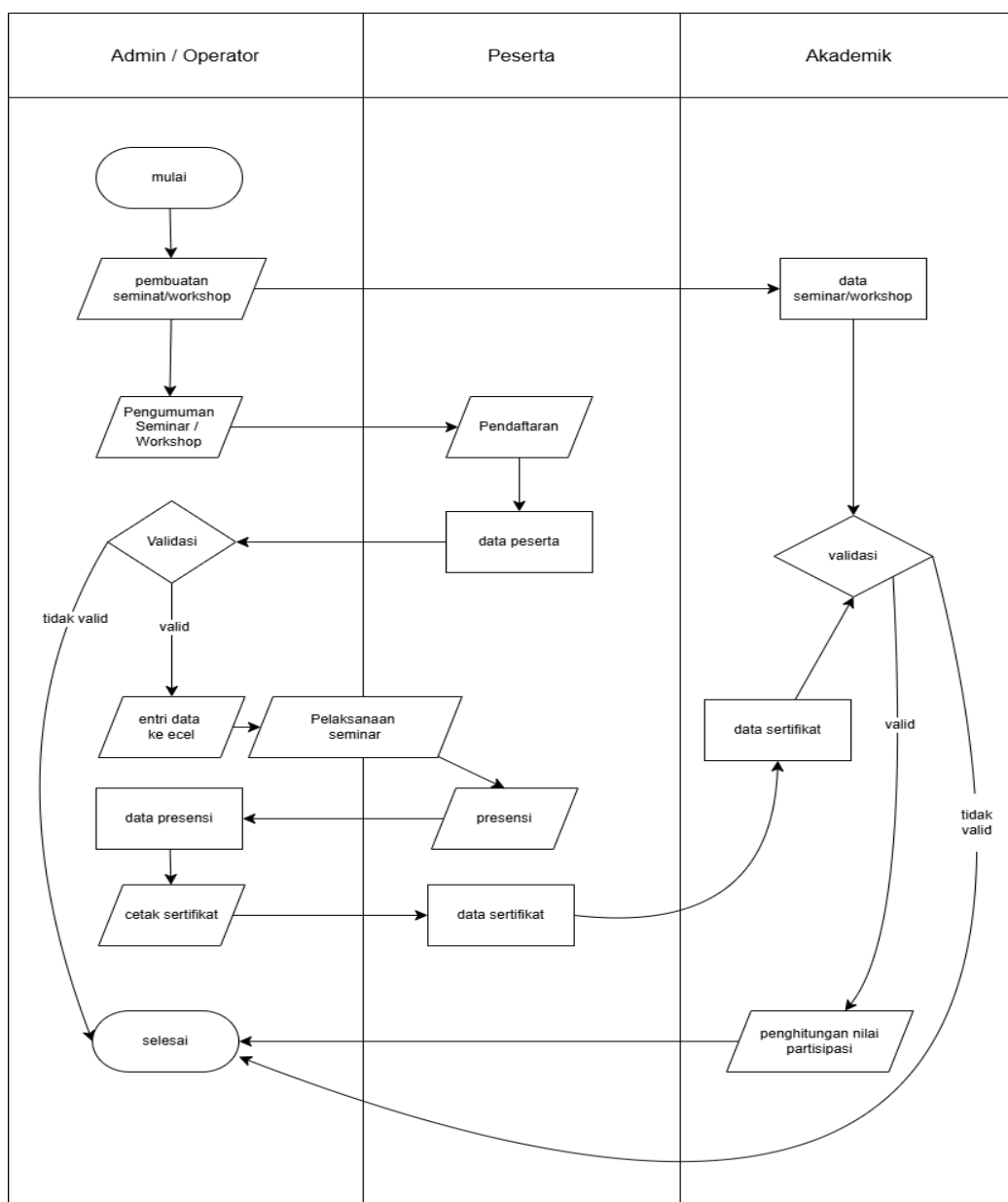


Figure 3. Flowchart analysis of the running system

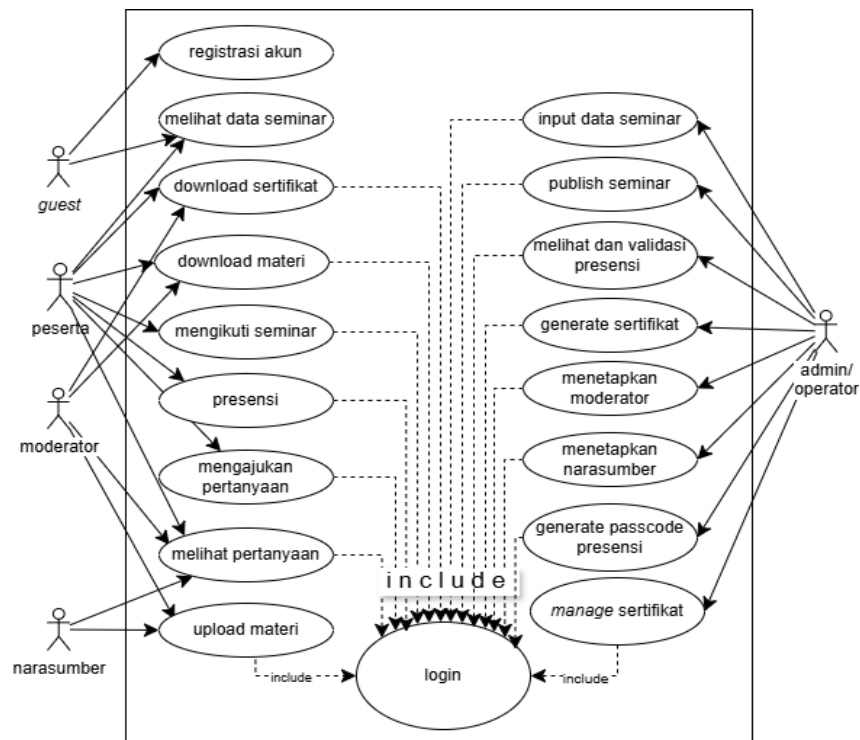


Figure 4. Use case diagram

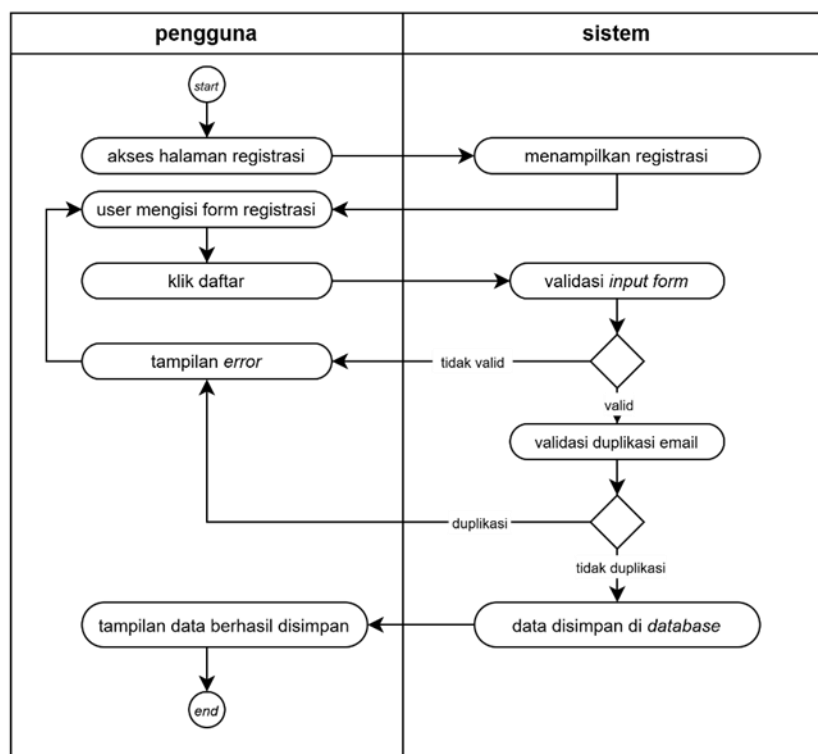


Figure 5. Activity diagram registration

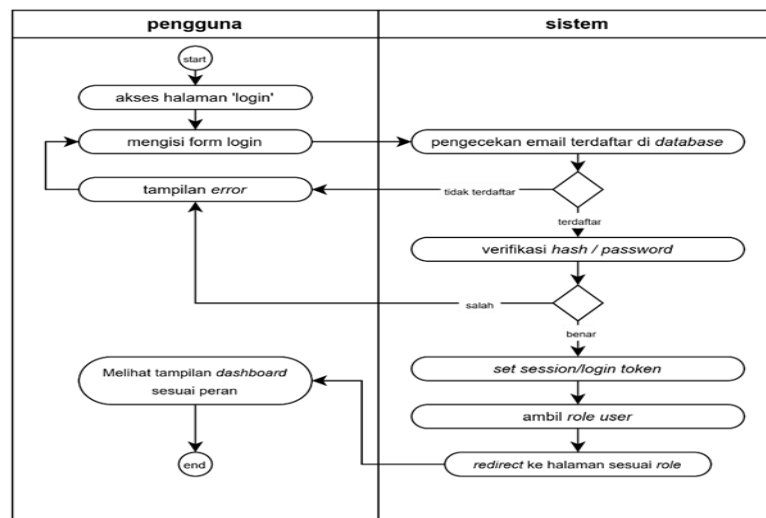


Figure 6. Activity diagram login

Furthermore, the sequence diagram models the chronological flow of interactions between the admin, system, and database during event creation. It demonstrates the detailed process, starting from admin login, input of seminar data, system validation, and finally, database insertion. By incorporating UML in the system design, the development team was able to construct a clear and structured blueprint that guides implementation while minimizing ambiguity. This approach not only enhanced system integrity but also supported modular development and future scalability of the platform (Watrianthos et al., 2025)(Herdiana et al., 2023).

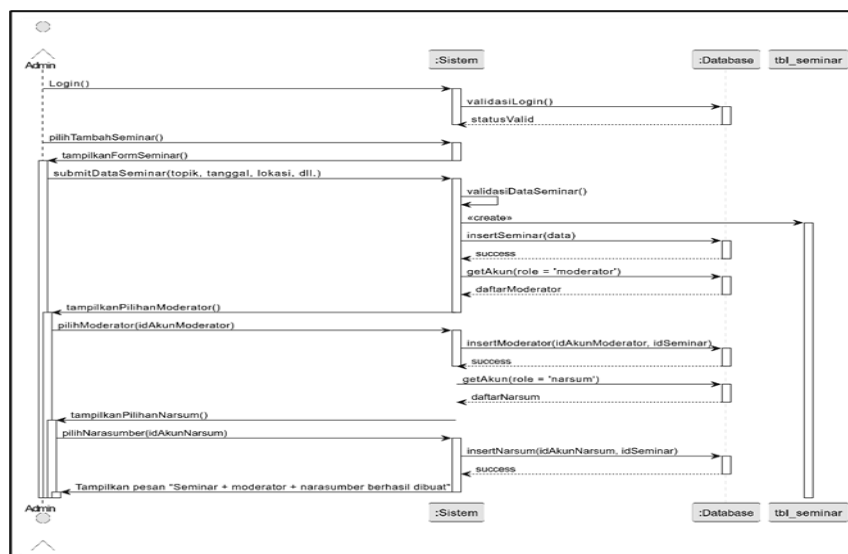


Figure 7. Sequence diagram create seminar

Design Development/Implementation

The implementation of the Jawa system was carried out through a structured web-based development process using PHP and MySQL, resulting in several interactive and responsive interfaces that support academic seminar and workshop management at STMIK Jayakarta. The homepage dynamically connects to the database to retrieve and display the two most recently published events in a promotional carousel, along with an introductory slide describing the platform. It also includes a feature-rich table that lists all seminars with details such as title, speaker, date, and status, enhanced with DataTables functionality for sorting and searching. Key promotional highlights such as easy registration, digital certificates, interactive Q&A, and access to seminar materials are emphasized to provide users with an engaging and informative browsing experience.

User interaction flows are carefully implemented across various modules. The registration page verifies password consistency and email uniqueness before storing user data securely using password hashing, assigning them a default role as non-admin. Upon successful login, non-admin users are directed to a dashboard that displays their profile data and seminar participation metrics, including attendance and submitted questions. This implementation demonstrates a practical application of user-centered design and data-driven interactivity, resulting in a system that effectively supports the digitization of academic event workflows in a higher education environment.

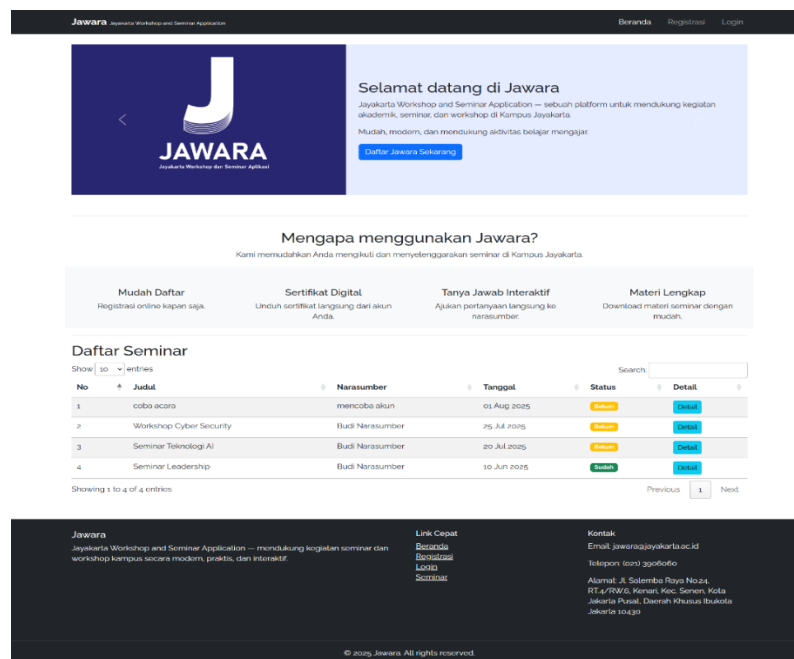


Figure 8. Homepage

Figure 9. Registration page

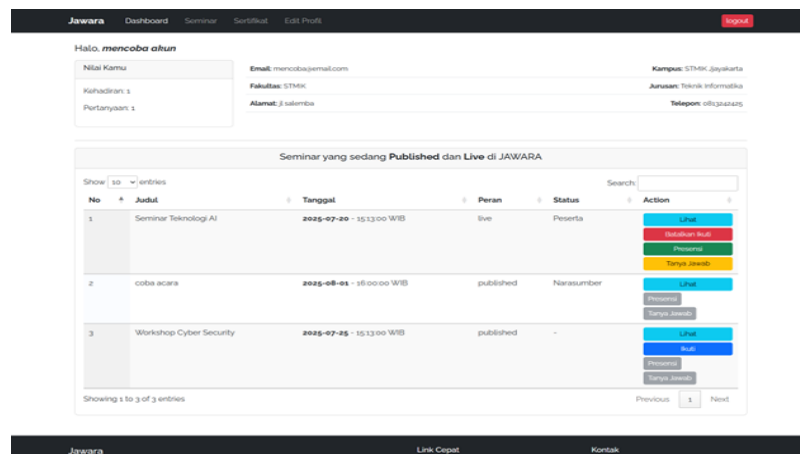


Figure 10. Dashboard page non-admin

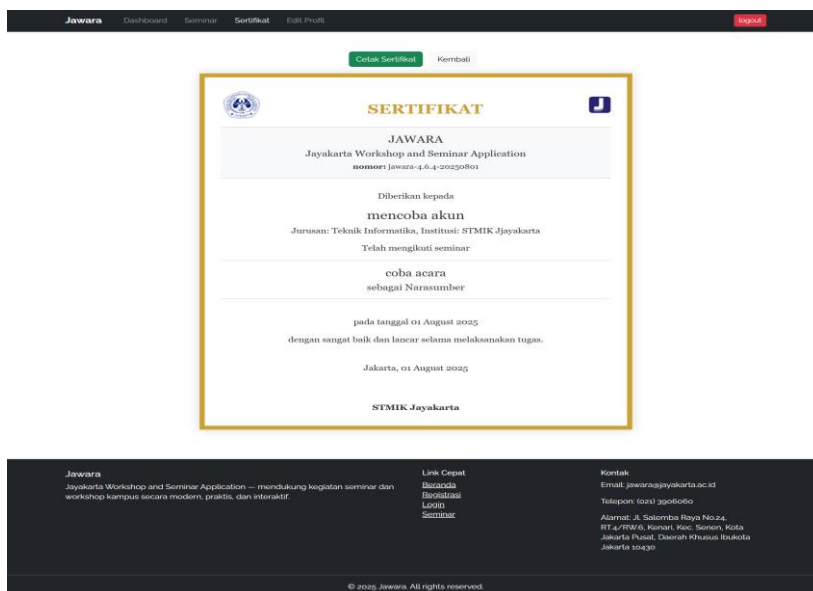


Figure 11. Certificate page

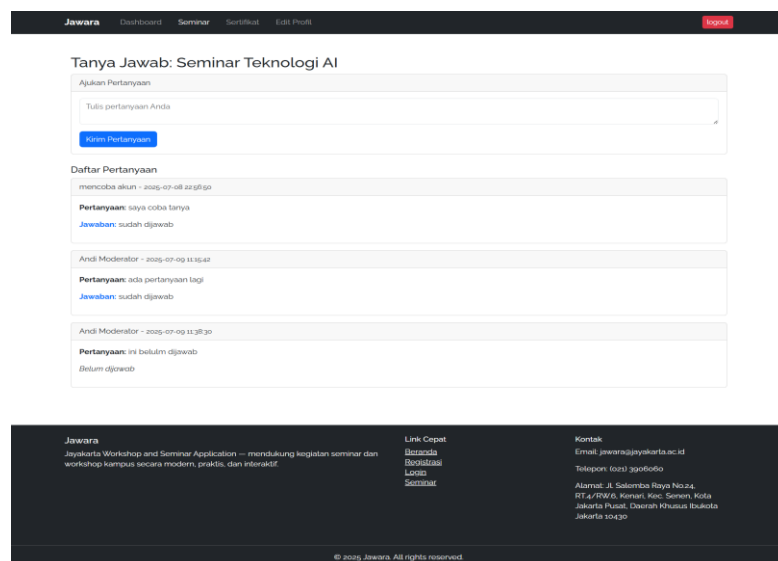


Figure 12. QnA page

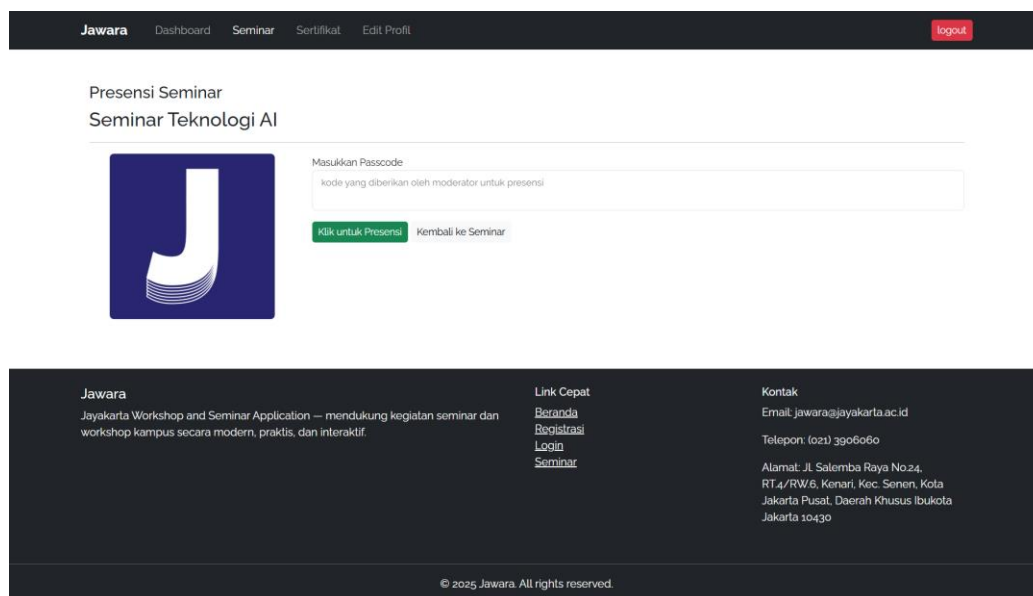


Figure 13. Presensi seminar

Comprehensive Analysis JAWARA: Black Box Testing

The implementation of the Jawara system was carried out through a structured web-based development approach, utilizing PHP and MySQL to create interactive modules that enhance the management of seminars and workshops at STMIK Jayakarta. The system features a dynamic homepage connected to a database that displays the two most recent published events in a promotional carousel, followed by a searchable and sortable seminar list equipped with DataTables. Among its key functionalities are user registration, session-based access control, real-time Q&A, digital certification, and an integrated attendance feature using a unique passcode. This passcode-based attendance mechanism is restricted to users who have registered for the seminar and is only enabled during the event's live status, thereby ensuring data validity and minimizing fraudulent attendance.

In addition, the system includes a document management feature, allowing speakers, moderators, and administrators to upload seminar materials such as presentations or handouts. These materials are automatically linked to the relevant event and made available for download by all users, including guests and registered participants. This ensures transparent information sharing and post-event accessibility. The dashboard for non-admin users also integrates personalized statistics, such as attendance count and total questions submitted. Role-based access is implemented across all modules using UNION queries to detect whether users are acting as participants, moderators, or speakers in a given seminar. These design choices not only support academic transparency and engagement but also reflect a scalable digital solution that improves institutional service delivery in higher education.

Table 2. Black box testing

No	Modul yang Diuji	Input yang Diberikan	Output yang Diharapkan	Hasil Pengujian	Keterangan
1	Registrasi Akun	Data lengkap, password cocok, email belum terdaftar	Akun berhasil dibuat, notifikasi sukses	Berhasil	Validasi form dan hash password
2	Registrasi Akun	Password dan ulangi password tidak cocok	Notifikasi kesalahan	Berhasil	Validasi client dan server
3	Login	Email dan password valid	Masuk ke dashboard sesuai role pengguna	Berhasil	Role-based redirect berjalan
4	Presensi Acara	Input passcode benar, acara status "live", peserta terdaftar	Status "hadir" dicatat di sistem	Berhasil	Validasi status & peserta berjalan
5	Presensi Acara	Input passcode salah atau acara belum live	Presensi gagal, ditampilkan error	Berhasil	Sistem menolak presensi tidak valid
6	Upload Materi	File oleh narasumber/moderator/admin	Tersimpan, muncul dalam daftar	Berhasil	Hak akses & penyimpanan sesuai

7	Download Materi	User buka detail acara	download File tersedia untuk diunduh semua pengguna	Berhasil	Terbuka untuk semua role
8	Tanya Jawab	Peserta mengirim pertanyaan	Pertanyaan tampil di daftar	Berhasil	Sinkronisasi real-time oke
9	Jawaban Tanya Jawab	Moderator/narsum menjawab saat status acara "live"	Jawaban tersimpan, status jadi "sudah dijawab"	Berhasil	Hak akses tepat waktu
10	Dashboard Non-Admin	User login non-admin dan pernah ikut acara	Statistik kehadiran & pertanyaan tampil	Berhasil	Data dari multiple table tampil
11	Detail Acara	Klik tombol detail	Informasi lengkap seminar muncul	Berhasil	Navigasi dan fetch data tepat
12	Upload Poster Seminar	Admin unggah file poster .jpg/.png	Poster muncul pada halaman carousel dan detail acara	Berhasil	Validasi file & path sukses
13	Upload Foto Narasumber	Upload foto profil oleh admin/narsum	Foto tampil pada detail acara/seminar	Berhasil	Path tersimpan, preview muncul
14	Ubah Status Acara	Admin ubah status menjadi "draft", "live", atau "selesai"	Status berubah dan mempengaruhi fitur presensi & sertifikat	Berhasil	Validasi status dinamis berjalan
15	Generate Sertifikat Peserta	Peserta hadir, acara selesai	Sertifikat peserta dapat diunduh	Berhasil	Tersedia jika status = hadir
16	Generate Sertifikat Narasumber	Narsum aktif, acara selesai	Sertifikat narasumber tersedia	Berhasil	Berdasarkan role dan kehadiran
17	Generate Sertifikat Moderator	Moderator hadir, acara selesai	Sertifikat moderator dapat diakses	Berhasil	Sistem cetak dinamis per peran
18	Edit Profil (User Non-Admin)	Input perubahan nama/email/telepon/jurusan dll	Data tersimpan, notifikasi sukses	Berhasil	Form update sesuai session user
19	Rekapitulasi Nilai Kehadiran & Tanya Jawab	Data kehadiran dan tanya user ditarik oleh sistem	Total hadir & total pertanyaan muncul	Berhasil	Data akumulasi tampil di dashboard
20	Reset Password	User input email & password baru pada form reset	Password diperbarui, hash tersimpan, bisa login ulang	Berhasil	Fungsi reset berjalan dan aman

4. CONCLUSION

The development of the Jawara system as a web-based seminar and workshop management application at STMIK Jayakarta represents a significant step toward the digital transformation of academic event management. By integrating core functionalities such as online registration, attendance tracking using passcodes, real-time Q&A, digital certificate generation, and centralized document sharing, the system addresses key limitations found in manual processes. The use of role-based access (admin, moderator, speaker, participant) and the implementation of status-based seminar workflows (draft, published, live, completed) provide a flexible and structured framework for managing diverse academic events.

Through a combination of black box testing and user feedback analysis, the system has demonstrated its effectiveness in enhancing operational efficiency, minimizing data loss, and improving user experience. The system's usability, clarity of navigation, and responsiveness received positive evaluation, particularly in terms of simplifying administrative tasks and broadening access to seminar resources. Overall, the Jawara system offers a reliable and scalable solution to support academic event management in higher education institutions. Future development may focus on extending integration with academic information systems and enhancing mobile accessibility to further support institutional digitalization goals.

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