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Design of a Web-Based Project Management Information System to Address Document Management and Meeting Scheduling Issues Using the Steepest Ascent Hill Climbing Algorithm

Muhamad Rizqo Adinugroho[1)], Bambang Wisnu Widagdo[2)]
[1,2)] Informatics Engineering, Computer Science, Pamulang University

*Corresponding Author
E-mail: rizqokuliah020902@gmail.com

Abstract

This study aimed to design, implement, and evaluate a web-based Project Management Information System for CV. Surya Sejahtera to improve document management and meeting scheduling processes. The system was developed to address inefficiencies in the existing manual procedures, particularly in document storage and retrieval, meeting scheduling, and communication among administrators, employees, and clients. The system provides several key features, including user login, client registration, document management, document search and download, download logs, meeting scheduling requests, schedule validation, communication, logout, and the implementation of the Steepest Ascent Hill Climbing algorithm for scheduling optimization. The scheduling algorithm evaluates alternative meeting schedules based on heuristic values derived from several criteria, including conflict-free schedules, compliance with working hours, and proximity to the client's preferred schedule, thereby recommending the optimal meeting time. Functional testing using the Black Box method demonstrated that all 32 testing scenarios were successfully completed, indicating that all system features performed as expected. Furthermore, the User Acceptance Test (UAT) achieved a score of 92%, classifying the system as highly feasible for implementation. The findings indicate that the developed system effectively enhances work efficiency, accelerates document retrieval, reduces the risk of document loss, facilitates meeting scheduling, minimizes scheduling conflicts, and supports more structured, organized, and well-documented project management activities at CV. Surya Sejahtera.

Keywords: Project Management Information System, Web-Based System, Steepest Ascent Hill Climbing, Meeting Scheduling, Document Management, User Acceptance Test (UAT).

INTRODUCTION

As digital technology advances, project management has become increasingly important for organizational and business operations, both on a small and large scale. Project management encompasses planning, organizing, and controlling activities to achieve project objectives while utilizing resources as effectively and efficiently as possible (Sandhu et al., 2024). One of the most common implementation challenges involves scheduling meetings with team members, clients, and stakeholders, as well as managing project documents. These challenges often lead to project delays, ineffective communication, and reduced team performance (Titarenko & Camara, 2025).

A common issue is the continued use of manual document management systems or project documents that are scattered across multiple unintegrated applications. This situation makes document storage and retrieval more difficult while increasing the risk of data duplication and the loss of critical documents (Dadongo & Riti, 2025). Furthermore, poor scheduling can create meeting conflicts among stakeholders, particularly in projects involving numerous participants and diverse agendas. Without a system that supports automation, these processes become inefficient and are more susceptible to errors (Wajahat, 2023).

In response to these challenges, one effective solution is the implementation of a web-based Project Management Information System (PMIS). Such a system facilitates digital document management through a single integrated platform while providing a more automated and efficient meeting scheduling and record management system. A web-based platform also offers flexible access from various locations and devices, enabling fast and real-time information exchange among team members (Fajarrini et al., 2025). Previous studies have shown that systems of this kind can enhance

collaboration, improve operational efficiency, and accelerate decision-making processes (Burhan Firdaus et al., 2025).

An optimization algorithm is required to evaluate multiple scheduling alternatives and identify the most efficient solution. In this regard, the Steepest Ascent Hill Climbing algorithm is considered highly suitable. It is a local search algorithm that iteratively selects the neighboring solution with the highest heuristic value, thereby identifying an optimal scheduling alternative (Muklason et al., 2024).

By integrating web-based technology with the Steepest Ascent Hill Climbing algorithm, it is possible to develop an integrated system capable of addressing two major challenges in project management: document management and meeting scheduling. The implementation of such a system is expected to streamline business processes while enhancing the accountability and transparency of project execution (Rustiyana and Budiman, 2019).

Based on these issues, this study is entitled: "Design of a Web-Based Project Management Information System to Address Document Management and Meeting Scheduling Problems Using the Steepest Ascent Hill Climbing Algorithm."

This research adopts a case study at CV. Surya Sejahtera, located at Tomang Tol Raya Block A1/4, Taman Kedoya Baru, South Kedoya, Kebon Jeruk, West Jakarta. The proposed system is expected to provide a practical and efficient solution for the company by enabling systematic document management and facilitating faster, more structured scheduling of meetings with clients and project team members.

RESEARCH METHODS

System Analysis

System analysis is conducted to evaluate the existing system by identifying its components, workflows, problems, and improvement opportunities before developing a new system (Azmi et al., 2025). It emphasizes user requirements, functional and non-functional needs, as well as interactions among users, procedures, and technology, providing a solid foundation for system design (Fadhil et al., 2025). Its primary objective is to understand the current system, identify its limitations, and formulate effective improvements that align with organizational processes and user needs (Sidiq & Dwicahya Supriatman, 2023). Proper system analysis also supports better decision-making, minimizes design errors, optimizes resource utilization, and ensures that the developed system meets actual operational requirements (Irfan Andika et al., 2024).

System Design

System design is conducted after the system analysis stage to define the structure and operation of the proposed web-based Project Management Information System for CV. Surya Sejahtera. The system is designed to improve document management and meeting scheduling, which are currently performed manually, causing inefficiency, service delays, document loss risks, and scheduling conflicts. The system supports three user roles: administrators, employees, and clients. Administrators manage documents, schedules, and system activities; employees can search and download documents; while clients can register, log in, submit meeting requests, and monitor their request status.

The design employs system modeling techniques, including context diagrams, use case diagrams, activity diagrams, sequence diagrams, class diagrams, database design, user interface design, and the implementation of the *Steepest Ascent Hill Climbing* algorithm. The main system functions include user authentication, digital document management, document search and download, download logging, online meeting scheduling, schedule validation, conflict detection, and user communication. The scheduling module automatically checks for scheduling conflicts before confirming requests, while the document management module enables digital storage and controlled document access, with all download activities recorded for monitoring purposes.

RESULTS AND DISCUSSION

System Testing

System Testing Objectives

The purpose of system testing is to ensure that the web-based Project Management Information System for CV. Surya Sejahtera operates according to user requirements and the proposed system design. Testing verifies that each feature can correctly process inputs and produce the expected outputs while identifying any remaining errors before deployment. It also evaluates whether the system effectively addresses existing problems, including manual document management, slow document retrieval, document loss risks, and manual meeting scheduling, thereby improving operational efficiency.

System Testing Methods

System testing was conducted using three methods: Black Box Testing, Steepest Ascent Hill Climbing (SAHC) Algorithm Testing, and User Acceptance Testing (UAT). These methods evaluate the functionality of the system's main features, including user authentication, document management, document search and download, download logging, meeting scheduling, schedule validation, communication, and logout.

Black Box Testing

Black Box Testing evaluates system functionality by comparing expected and actual outputs without examining the source code. It was used to verify the proper operation of major system features, including login, client registration, document management, document retrieval, download functions, meeting scheduling, communication, and logout.

Steepest Ascent Hill Climbing Algorithm Testing

The SAHC algorithm was tested to ensure that the meeting scheduling module correctly evaluates scheduling alternatives using heuristic values. When scheduling conflicts occur, the algorithm generates alternative schedules, calculates their heuristic scores, and recommends the schedule with the highest heuristic value.

User Acceptance Testing (UAT)

User Acceptance Testing was conducted with administrators, employees, and clients to evaluate system usability and suitability for operational needs. Administrators assessed document management and scheduling features, employees evaluated document access functions, and clients assessed registration, scheduling, and communication features. Together with Black Box Testing and algorithm testing, UAT confirmed that the system functions correctly, supports scheduling optimization, and meets user requirements.

Based on these testing methods, the system is tested for functionality, algorithms, and user acceptance. Black Box Testing is used to ensure features function as intended, algorithm testing is used to ensure the scheduling process can generate heuristic values, and UAT is used to determine whether the system is acceptable and usable by users as needed.

Black Box Testing Results

Black Box Testing was conducted to verify whether all functions of the web-based Project Management Information System for CV. Surya Sejahtera operate as intended by comparing system inputs with the resulting outputs. The testing covered key features, including user login, client registration, document management, document search, document download, download logging, meeting scheduling, schedule validation, heuristic value storage, communication, and logout.

The results indicate that all major system functions performed successfully. The login feature correctly authenticated users, client registration stored new account information, document management and search functions operated properly, and document downloads were successfully completed with download activities automatically recorded. The meeting scheduling module also

functioned as expected, allowing clients to submit meeting requests, administrators to validate schedules, and the system to store heuristic values generated by the *Steepest Ascent Hill Climbing* algorithm. Overall, the Black Box Testing confirmed that the system satisfies its functional requirements and effectively supports digital document management and meeting scheduling.

Steepest Ascent Hill Climbing Algorithm Testing Results

The *Steepest Ascent Hill Climbing* algorithm was tested to verify its effectiveness in optimizing meeting scheduling. The testing process involved submitting various meeting requests, after which the system validated the input, detected scheduling conflicts, generated alternative schedules when necessary, calculated heuristic values for each alternative, and selected the schedule with the highest heuristic value. The selected heuristic value was then stored as part of the scheduling data to support the administrator's validation process. The heuristic evaluation was based on predefined scheduling criteria.

System Interface Implementation

Implementation of Admin/Employee Login Page

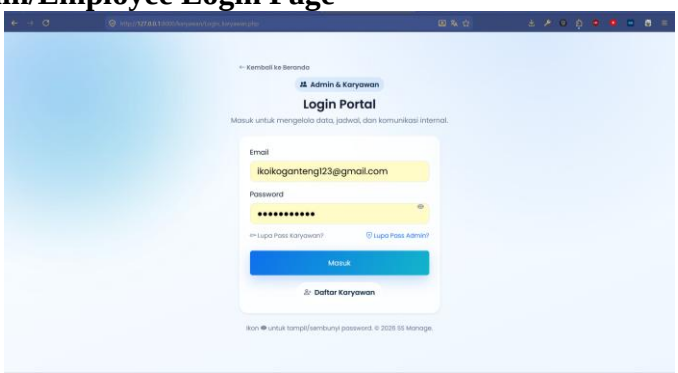

Figure 1. Implementation of the Admin/Employee Login Page

Implementation of the Admin Dashboard Page

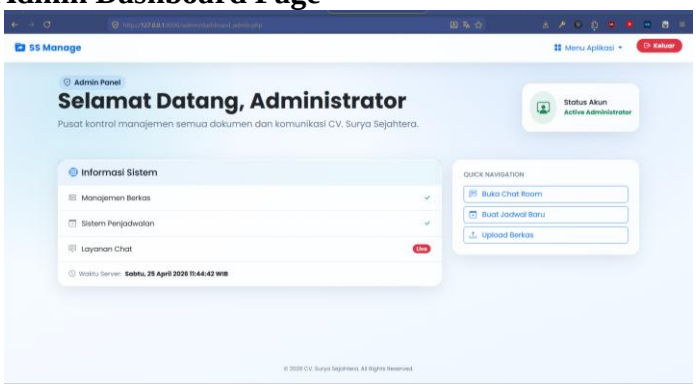

Figure 2. Implementation of the Admin Dashboard Page

Implementation of the Filing Management Page

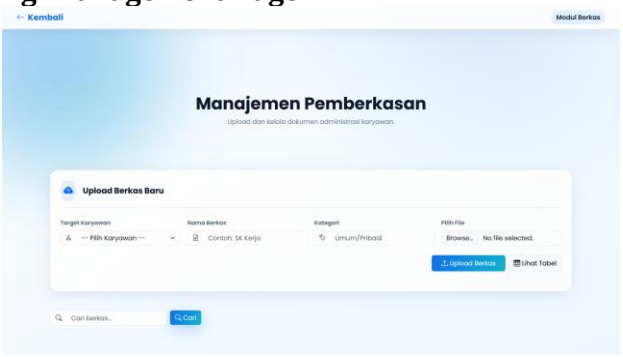

Figure 3. Implementation of the Filing Management Page

Implementation of the Download Log Page

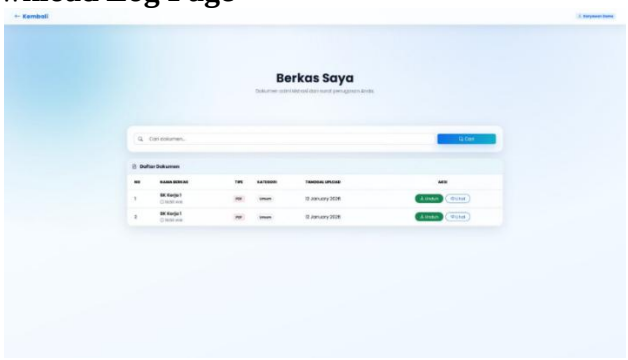

Figure 4. Implementation of the Download Log Page

Implementation of the Admin Scheduling Page

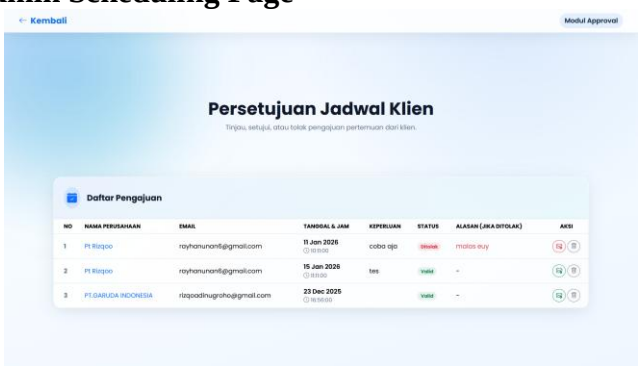

Figure 5. Implementation of the Admin Scheduling Page

Implementation of the Admin/Employee Communication Page

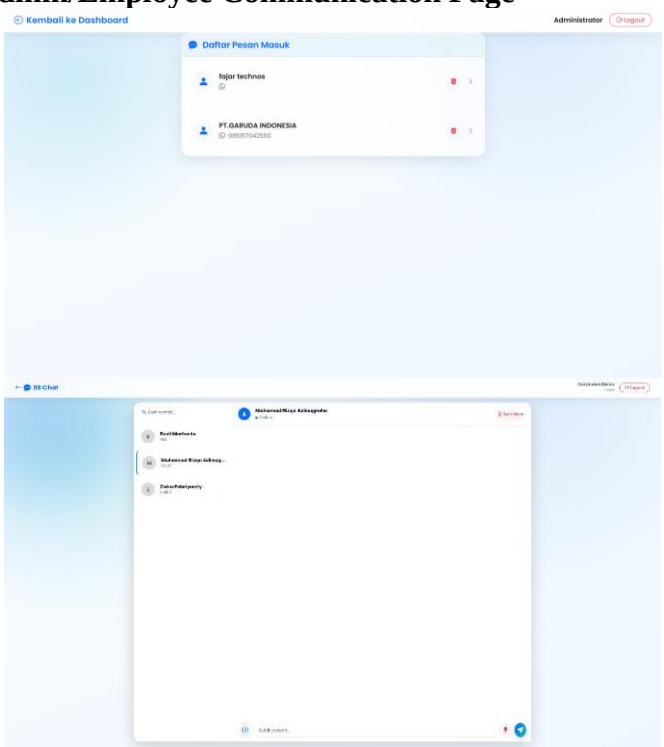

Figure 6. Implementation of the Admin/Employee Communication Page

Implementation of the Client Login Page

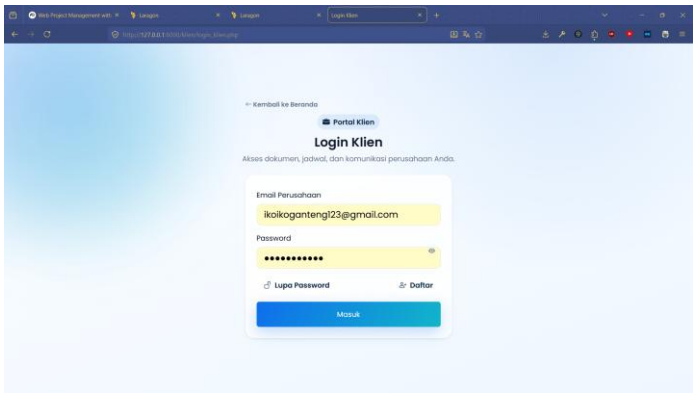

Figure 7. Client Login Page Implementation

Client Registration Page Implementation

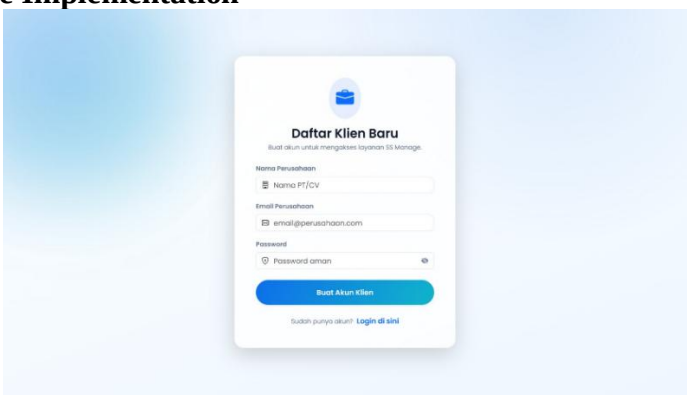

Figure 8. Client Registration Page Implementation

Client Dashboard Page Implementation

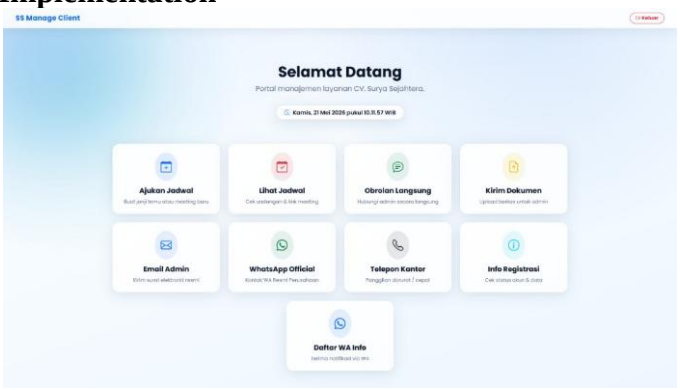

Figure 9. Implementation of the Client Dashboard Page

Implementation of the Client Schedule Submission Page

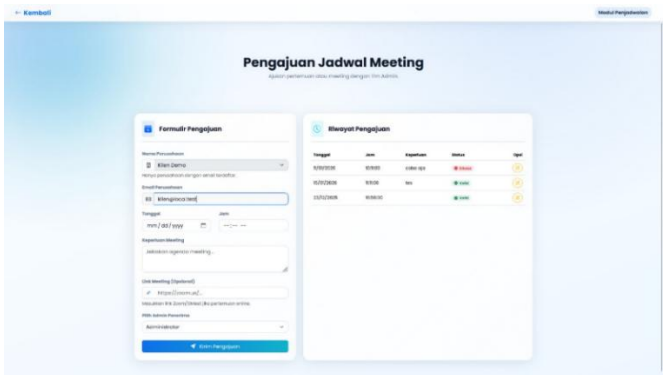

Figure 10. Implementation of the Client Schedule Submission Page

Implementation of the Client Schedule History/Status Page

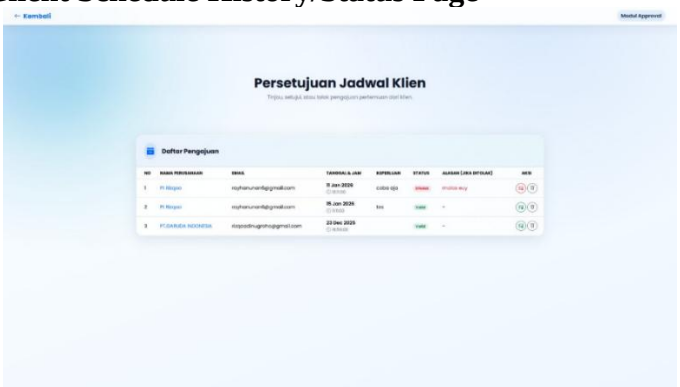

Figure 11. Implementation of the Client Schedule History or Status Page

Implementation of the Client Communication Page

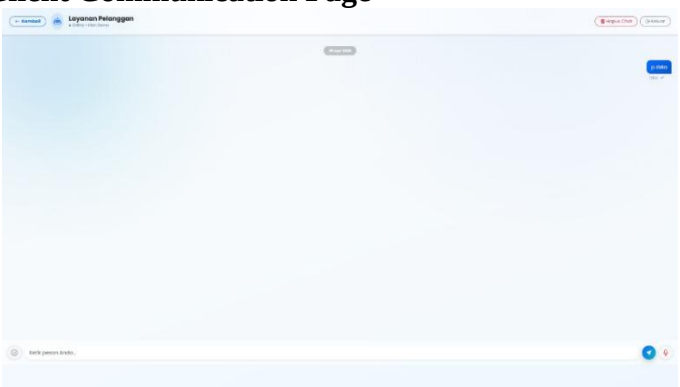

Figure 12. Implementation of the Client Communication Page

The system interface has been developed to meet the needs of each user. Administrators can access the login, dashboard, file management, download log, scheduling, and communication features. Employees can access the login, dashboard, file list, file download, and communication features. Clients can access the login, registration, dashboard, schedule submission, schedule history, and communication features.

The system simplifies document management, file searching and downloading, scheduling, and communication among users in an effective and efficient manner.

System Testing

System testing was conducted to ensure that the web-based Project Management Information System at CV. Surya Sejahtera operates according to the specified requirements. The tested features include login, registration, file management and search, file download, download logs, scheduling, schedule validation, the Steepest Ascent Hill Climbing algorithm, communication, and logout.

The testing methods employed were Black Box Testing to verify system functionality and User Acceptance Testing (UAT) to evaluate user acceptance. Testing involved three main user roles—

administrators, employees, and clients—according to their respective access rights and system features.

Table 1. System Testing

No.	Testing Objective	Description
1	Ensure the login feature functions properly	The system must be able to validate administrator, employee, and client accounts based on the stored data.
2	Ensure the client registration feature functions correctly	The system must be able to store new client data when the submitted information is valid.
3	Ensure the document management feature operates as required	The administrator must be able to add, edit, delete, search for, and download documents.
4	Ensure the document search feature functions properly	The system must be able to display document data based on the entered search keywords.
5	Ensure the document download feature functions correctly	Employees must be able to download documents, and the system must record each download activity in the download log.
6	Ensure the schedule submission feature can be used by clients	Clients must be able to submit meeting schedule requests through the form provided by the system.
7	Ensure the schedule validation feature functions properly	The administrator must be able to approve or reject schedule requests submitted by clients.
8	Ensure the Steepest Ascent Hill Climbing algorithm operates according to its design	The system must be able to calculate heuristic values and assist in determining a more optimal schedule.
9	Ensure the communication feature can be used	Administrators, employees, and clients must be able to exchange messages through the system.
10	Ensure the system meets user requirements	The system must support document management, scheduling, and communication processes at CV. Surya Sejahtera.

Based on the testing objectives, the system was evaluated to verify whether the implementation met the previously identified requirements. If all features function as expected, the system is considered functionally feasible; otherwise, improvements are required before full deployment. This testing also evaluates the system's ability to support digital document management, document retrieval, download logging, meeting scheduling, schedule validation, and user communication at CV. Surya Sejahtera.

System Testing Objectives

System testing aims to ensure that the web-based Project Management Information System at CV. Surya Sejahtera operates according to user requirements and the designed specifications. It verifies that each feature correctly processes inputs and produces the expected outputs while identifying errors before deployment. Key features tested include login, file management, document search, file download, download logs, scheduling, schedule validation, communication, and logout.

In addition, testing evaluates the system's effectiveness in addressing existing issues, including manual document management, slow file retrieval, document loss risks, and manual meeting scheduling. Therefore, system testing is essential to demonstrate that the developed system can improve the efficiency and effectiveness of work processes at CV. Surya Sejahtera. The objectives of system testing are as follows:

Table 2. System Testing Objectives

No.	Testing Objective	Description
1	Test the user login process	Ensure that administrators, employees, and clients can log into the system using valid accounts.
2	Test the client registration process	Ensure that clients can create new accounts using valid information.
3	Test the document management feature	Ensure that administrators can add, edit, delete, search for, and download documents.
4	Test the document search feature	Ensure that the system can display documents based on the keywords entered by the user.
5	Test the document download feature	Ensure that employees can download documents available in the system.

6	Test the download log recording feature	Ensure that every document download activity is accurately recorded in the system's download log.
7	Test the schedule request feature	Ensure that clients can submit meeting schedule requests through the system.
8	Test the schedule validation feature	Ensure that administrators can approve or reject schedule requests submitted by clients.
9	Test the implementation of the Steepest Ascent Hill Climbing algorithm	Ensure that the system can calculate heuristic values and assist in determining a more optimal schedule.
10	Test the communication feature	Ensure that administrators, employees, and clients can exchange messages through the system.
11	Test the logout feature	Ensure that users can securely log out of the system.
12	Test the system's compliance with user requirements	Ensure that the system can be effectively used by administrators, employees, and clients according to their respective access rights.

Based on the testing objectives, the system was evaluated using predefined test scenarios to determine whether it meets the design specifications and user requirements. If all features perform as expected, the system is considered functionally suitable for supporting document management, meeting scheduling, and communication at CV. Surya Sejahtera.

System Testing Methods

This study employed Black Box Testing, Steepest Ascent Hill Climbing algorithm testing, and User Acceptance Testing (UAT). The evaluation covered the system's main features, including user login, client registration, file management, file search, file download, download logs, meeting scheduling, schedule validation, communication, and logout. In addition, the scheduling process was tested to verify the implementation of the Steepest Ascent Hill Climbing algorithm in generating heuristic values for meeting schedules.

Black Box Testing

Black Box Testing evaluates system functionality based on inputs and outputs without examining the source code. It was used to test key features, including administrator, employee, and client login, client registration, file management, file search, file download, download logs, meeting scheduling, schedule validation, communication, and logout. Each feature was tested using predefined scenarios and test data to ensure that it functioned as expected. The aspects evaluated through Black Box Testing are as follows:

Table 3. System Testing Objectives

No.	Feature Tested	Testing Objective
1	Administrator/Employee Login	Ensure that administrators and employees can log into the system using valid accounts.
2	Client Login	Ensure that clients can log into the system using a valid company email address and password.
3	Client Registration	Ensure that clients can create new accounts by providing complete and valid information.
4	Document Management	Ensure that administrators can add, edit, delete, search for, and download documents.
5	Document Search	Ensure that the system can display document data based on the entered search keywords.
6	Document Download	Ensure that employees can download documents and that each download activity is properly recorded.
7	Download Log	Ensure that administrators can view the download history of documents accessed by employees.
8	Client Schedule Request	Ensure that clients can submit meeting schedule requests through the system.
9	Schedule Validation	Ensure that administrators can approve or reject schedule requests submitted by clients.
10	Communication	Ensure that administrators, employees, and clients can exchange messages through the system.
11	Logout	Ensure that users can securely log out of the system.

Black Box Testing was selected because it is suitable for evaluating system functionality from the user's perspective. This method verifies whether the system produces the expected outputs for the given inputs.

Steepest Ascent Hill Climbing Algorithm Testing

The Steepest Ascent Hill Climbing (SAHC) algorithm was tested to ensure that the scheduling feature operates according to the system design by evaluating meeting schedules based on heuristic values.

The testing used scheduling data, including meeting date, start and end times, meeting purpose, meeting link, WhatsApp number, and existing schedules stored in the database. The scheduling table also includes a heuristic_value field representing the algorithm's evaluation result.

Testing was performed using both conflicting and non-conflicting schedules. For non-conflicting schedules, the system stores the schedule with its heuristic value. For conflicting schedules, the system generates alternative schedules, calculates the heuristic value for each, and selects the schedule with the highest heuristic value. The aspects evaluated in the Steepest Ascent Hill Climbing algorithm are as follows:

Table 4. Steepest Ascent Hill Climbing Algorithm Testing

No.	Testing Aspect	Testing Objective
1	Schedule Validation	Ensure that the schedule data being processed is complete and valid.
2	Schedule Conflict Detection	Ensure that the system can detect scheduling conflicts with existing schedules.
3	Alternative Schedule Generation	Ensure that the system can generate alternative time slots when the initial schedule conflicts with another schedule.
4	Heuristic Value Calculation	Ensure that the system can calculate heuristic values based on the predefined criteria.
5	Best Schedule Selection	Ensure that the system selects the schedule with the highest heuristic value.
6	Heuristic Value Storage	Ensure that the evaluated heuristic values are correctly stored in the scheduling data.

This testing demonstrates that the Steepest Ascent Hill Climbing algorithm improves meeting scheduling by providing a more structured process and reducing scheduling conflicts.

User Acceptance Testing (UAT)

User Acceptance Testing (UAT) was conducted to evaluate user acceptance and ensure that the system meets user requirements and is easy to use.

The evaluation involved three user groups: administrators, employees, and clients. Administrators assessed file management, scheduling, schedule validation, download logs, and communication features. Employees evaluated file search, file download, and communication, while clients assessed registration, login, meeting scheduling, schedule status tracking, and communication.

UAT was employed to verify both the system's functionality and its suitability for users' needs, complementing the results of Black Box Testing. The UAT assessment aspects are as follows:

Table 5. User Acceptance Test (UAT) Assessment Aspects

No.	Evaluation Aspect	Description
1	Ease of Use	Evaluate whether the system is easy to use for administrators, employees, and clients.
2	Feature Suitability	Evaluate whether the available features meet the users' requirements.
3	Interface Clarity	Evaluate whether the system interface is easy to understand and free from confusion.
4	Processing Speed	Evaluate whether the system can process data efficiently and promptly.
5	Access Security	Evaluate whether the system appropriately restricts user access based on their respective roles.

6	System Usefulness	Evaluate whether the system effectively supports document management, scheduling, and communication processes.

Based on these testing methods, the system was evaluated from three perspectives: functionality, algorithm performance, and user acceptance. Black Box Testing verified system functionality, Steepest Ascent Hill Climbing testing confirmed the scheduling process and heuristic value generation, and User Acceptance Testing (UAT) assessed user acceptance and system usability.

Black Box Testing Results

Black Box Testing was conducted to verify that each feature of the web-based Project Management Information System at CV. Surya Sejahtera functions as designed by comparing system outputs with the provided inputs.

The testing focused on core features, including login, client registration, file management, file search, file download, download logs, meeting scheduling, schedule validation, heuristic value storage, communication, and logout, without examining the source code.

The results of the Black Box Testing are presented in the following table.

Table 6. Black Box Test Results

No.	Feature Tested	Test Scenario	Test Data	Expected Result	Test Result	Status
1	Administrator Login	The administrator enters a valid username/email and password.	Valid username/email and password	The system displays the administrator dashboard.	The system successfully displayed the administrator dashboard.	Passed
2	Administrator Login	The administrator enters an incorrect password.	Valid username/email, invalid password	The system displays a login failure message.	The system successfully displayed a login failure message.	Passed
3	Employee Login	The employee enters a valid username/email and password.	Valid employee account	The system displays the employee dashboard.	The system successfully displayed the employee dashboard.	Passed
4	Employee Login	The employee leaves one required field empty.	Empty email or password	The system displays a validation message indicating that the required field must be completed.	The system successfully displayed the validation message.	Passed
5	Client Login	The client enters a valid company email address and password.	Valid company email and password	The system displays the client dashboard.	The system successfully displayed the client dashboard.	Passed
6	Client Login	The client enters an incorrect email or password.	Invalid email or password	The system displays a login failure message.	The system successfully displayed a login failure message.	Passed
7	Client Registration	The client completes the registration form with valid information.	Company name, email, password, WhatsApp number	The system creates the client account and displays a successful registration message.	The system successfully created the client account.	Passed
8	Client Registration	The client leaves a required field empty.	One required field is empty	The system displays a validation message indicating that required data must be provided.	The system successfully displayed the validation message.	Passed
9	Client Registration	The client registers using an email address that already exists.	Existing company email	The system displays a message indicating that	The system successfully displayed the duplicate email message.	Passed

				the email address is already in use.		
10	Document Upload	The administrator uploads a document with complete information.	Document name, category, and file	The system stores the document in the database and file storage.	The system successfully stored the document.	Passed
11	Document Upload	The administrator does not select a file.	Document name and category provided, file omitted	The system displays a message indicating that a file must be uploaded.	The system successfully displayed the file validation message.	Passed
12	Document Upload	The administrator leaves the document name blank.	Empty document name	The system displays a data validation message.	The system successfully displayed the validation message.	Passed
13	View Document List	The administrator or employee opens the document menu.	Available document data	The system displays the list of documents.	The system successfully displayed the document list.	Passed
14	Document Search	The administrator or employee searches using a keyword.	Document name or category keyword	The system displays documents matching the entered keyword.	The system successfully displayed the search results.	Passed
15	Document Search	The user searches for a document that does not exist.	Keyword not matching any document	The system displays a "data not found" message.	The system successfully displayed the "data not found" message.	Passed
16	Document Editing	The administrator updates document information.	Updated document data	The system updates the document information in the database.	The system successfully updated the document information.	Passed
17	Document Deletion	The administrator deletes a document.	Valid document ID	The system deletes or deactivates the document.	The system successfully deleted the document.	Passed
18	Document Download	The employee downloads an available document.	Valid document ID	The system downloads the file and records the activity in the download log.	The system successfully downloaded the file and recorded the activity.	Passed
19	Document Download	The employee attempts to download a document that does not exist.	File not found	The system displays a message indicating that the file cannot be downloaded.	The system successfully displayed the file-not-found message.	Passed
20	Download Log	The administrator opens the download log menu.	Available download log data	The system displays the document download history.	The system successfully displayed the download history.	Passed
21	Client Schedule Request	The client completes the schedule request form with valid information.	Date, start time, end time, purpose, meeting link, WhatsApp number	The system saves the schedule request with a "Submitted" status.	The system successfully saved the schedule request.	Passed

22	Client Schedule Request	The client leaves a required field empty.	Missing date, time, or purpose	The system displays a validation message indicating that required data must be provided.	The system successfully displayed the validation message.	Passed
23	Client Schedule Request	The client enters an end time earlier than the start time.	End time earlier than start time	The system displays a message indicating that the meeting time is invalid.	The system successfully displayed the invalid time message.	Passed
24	Client Schedule Request	The client submits a schedule that conflicts with an existing schedule.	Time overlapping an existing schedule	The system displays a scheduling conflict notification or recommends an alternative schedule.	The system successfully displayed the conflict notification/recommendation.	Passed
25	Schedule Validation	The administrator approves a client's schedule request.	Valid schedule status	The system updates the schedule status to **Approved**.	The system successfully updated the schedule status to **Approved**.	Passed
26	Schedule Validation	The administrator rejects a schedule request and provides a reason.	Rejected status with rejection reason	The system saves the rejected status and rejection reason.	The system successfully saved the rejection status and reason.	Passed
27	Schedule Validation	The administrator rejects a schedule request without providing a reason.	Empty rejection reason	The system prompts the administrator to provide a rejection reason.	The system successfully displayed the required rejection reason message.	Passed
28	View Schedule Status	The client views the history of submitted schedule requests.	Available client schedule data	The system displays the schedule status as **Submitted**, **Approved**, or **Rejected**.	The system successfully displayed the schedule status.	Passed
29	Heuristic Value Calculation	The system processes schedules using the **Steepest Ascent Hill Climbing (SAHC)** algorithm.	Schedule data and alternative time slots	The system calculates and stores heuristic values in the scheduling data.	The system successfully stored the heuristic values.	Passed
30	Communication	The user sends a message.	Valid message content	The system stores and displays the message.	The system successfully stored and displayed the message.	Passed
31	Communication	The user submits an empty message.	Empty message	The system displays a validation message indicating that the message content is required.	The system successfully displayed the validation message.	Passed
32	Logout	The user clicks the logout button.	Active user session	The system terminates the user session and redirects the	The system successfully logged the user out and redirected to the login page.	Passed

				user to the login page.		

Based on the Black Box Testing results, all core system features performed as expected. The system successfully validated user logins, registered new clients, managed files, searched documents, downloaded files while recording download logs, handled meeting scheduling and validation, and stored heuristic values using the Steepest Ascent Hill Climbing algorithm.

Overall, the testing confirms that the web-based Project Management Information System at CV. Surya Sejahtera is functionally reliable and meets user requirements for digital document management, file search and download, download logging, meeting scheduling, schedule validation, communication, and logout.

Steepest Ascent Hill Climbing Algorithm Testing Results

The Steepest Ascent Hill Climbing algorithm was tested to verify that the meeting scheduling feature operates as designed by evaluating proposed schedules based on heuristic values.

The testing involved submitting sample scheduling data, after which the system validated the input, detected scheduling conflicts, generated alternative schedules when necessary, calculated heuristic values, selected the schedule with the highest heuristic value, and stored the result in the scheduling data to support schedule validation.

The heuristic value calculation criteria are presented as follows:

Table 7. Steepest Ascent Hill Climbing Algorithm Test Results

No.	Criterion	Maximum Score	Description
1	No Schedule Conflict	50	A schedule receives **50 points** if it does not conflict with any existing schedule and **0 points** if a conflict exists.
2	Compliance with Working Hours	30	A schedule receives **30 points** if it falls within the designated working hours and **0 points** if it falls outside the working hours.
3	Proximity to the Preferred Time	20	A schedule receives **20 points** if it is very close to the preferred time, **10 points** if it is moderately close, and **0 points** if it is too far from the preferred time.

Algorithm Testing Conclusion

The Steepest Ascent Hill Climbing (SAHC) algorithm performed as designed, successfully checking schedules, calculating heuristic values, comparing alternative schedules, and selecting the schedule with the highest heuristic value. It assigned high heuristic values to conflict-free schedules, generated alternatives for conflicting schedules, and assigned lower values to schedules outside working hours.

The algorithm was implemented in the scheduling module, where administrators manage meeting information, and scheduling data are stored for evaluation. Based on schedule availability, conflicts, and suitability, the system determines the schedule status (e.g., Valid or Rejected) and notifies clients when a schedule is approved. Overall, the implementation improves scheduling, reduces conflicts, accelerates approval, and ensures proper documentation.

User Acceptance Testing Results

User Acceptance Testing (UAT) was conducted with administrators, employees, and clients to evaluate usability, functionality, interface clarity, and support for document management, meeting scheduling, and communication.

The system achieved a 92% UAT score, placing it in the Highly Feasible category (81%–100%). The results indicate that users accepted the system and found its features suitable for their needs. Consequently, the system is considered appropriate for supporting digital document management, faster document retrieval, meeting scheduling and validation, and communication among administrators, employees, and clients.

Testing Results Summary

The testing summary combines the results of Black Box Testing, Steepest Ascent Hill Climbing algorithm testing, and User Acceptance Testing. Black Box Testing confirmed that all core system features functioned correctly, while algorithm testing verified that the scheduling module effectively evaluates heuristic values, detects scheduling conflicts, and recommends the best schedule.

The UAT score of 92% indicates a Highly Feasible level of user acceptance in terms of usability, interface clarity, feature suitability, security, and overall usefulness. Overall, Black Box Testing and algorithm testing achieved 100% success, while UAT demonstrated strong user acceptance.

In conclusion, the web-based Project Management Information System at CV. Surya Sejahtera effectively supports digital document management, file retrieval and downloads, download logging, meeting scheduling and validation, the implementation of the Steepest Ascent Hill Climbing algorithm, and user communication. Therefore, the system is considered suitable for deployment, as it improves the company's operational efficiency, effectiveness, and workflow organization.

Evaluation of Implementation and Testing Results

The evaluation assessed the extent to which the web-based Project Management Information System at CV. Surya Sejahtera addresses the identified problems, based on the implementation results, Black Box Testing, Steepest Ascent Hill Climbing (SAHC) algorithm testing, and User Acceptance Testing (UAT).

The implemented system successfully provides key features, including user login, client registration, document management, file search and download, download logs, meeting scheduling, schedule validation, communication, and logout. These features improve digital document management, accelerate document retrieval, record download activities, facilitate meeting scheduling, and enhance communication.

The SAHC algorithm effectively evaluates meeting schedules using heuristic values, recommends alternative schedules when conflicts occur, and reduces scheduling conflicts. Black Box Testing confirmed that all 32 test scenarios were successfully completed, demonstrating that the system functions as intended. Algorithm testing verified accurate heuristic calculations and schedule selection, while UAT achieved a 92% score, indicating that the system is Highly Feasible and well accepted by users.

Overall, the evaluation shows that the system successfully meets the operational needs of CV. Surya Sejahtera by improving document management, scheduling, monitoring, and communication, making business processes more efficient, organized, and well documented than the previous manual approach.

Conclusion

Based on the implementation and testing results, the web-based Project Management Information System at CV. Surya Sejahtera has been successfully developed according to the proposed design. The system includes user login, client registration, document management, file search and download, download logs, meeting scheduling, schedule validation, communication, logout, and the implementation of the Steepest Ascent Hill Climbing algorithm for scheduling.

The system enables efficient digital document management, independent file access for employees, comprehensive download monitoring, and streamlined meeting scheduling with schedule validation. The SAHC algorithm effectively calculates heuristic values, identifies the best scheduling alternatives, and minimizes scheduling conflicts.

Testing results further confirm the system's reliability. Black Box Testing achieved a 100% success rate across 32 test scenarios, algorithm testing verified accurate heuristic-based scheduling, and User Acceptance Testing obtained a 92% score, classifying the system as Highly Feasible.

In conclusion, the developed system effectively supports document management, meeting scheduling, and user communication while improving operational efficiency, accelerating document retrieval, simplifying scheduling, reducing scheduling conflicts, and providing a more structured and well-documented project management process.

CONCLUSIONS

Based on the research, system design, implementation, and testing, it can be concluded that the web-based Project Management Information System at CV. Surya Sejahtera was successfully developed to improve document management and meeting scheduling. The system addresses the limitations of the previous manual process, particularly in document retrieval and storage, meeting schedule requests, and communication among administrators, employees, and clients.

The system provides key features, including user login, client registration, document management, file search and download, download logs, meeting scheduling, schedule validation, communication, logout, and the implementation of the Steepest Ascent Hill Climbing (SAHC) algorithm for scheduling. These features enable administrators to manage documents and schedules more efficiently, allow employees to independently search and download files, and enable clients to submit meeting requests through the system instead of using manual email-based procedures.

The SAHC algorithm optimizes meeting scheduling by evaluating alternative schedules using heuristic values based on scheduling conflicts, compliance with working hours, and proximity to the client's preferred meeting time. The testing results showed that the system successfully selected the schedule with the highest heuristic value as the optimal recommendation.

Black Box Testing demonstrated that all 32 test scenarios were successfully completed, confirming that the system functions correctly across all major features, including login, document management, file search, file download, meeting scheduling, schedule validation, communication, and logout. Furthermore, User Acceptance Testing (UAT) achieved a 92% score, placing the system in the Highly Feasible category and indicating strong user acceptance in terms of functionality, usability, and interface design.

Overall, the web-based Project Management Information System at CV. Surya Sejahtera enhances operational efficiency by accelerating document retrieval, reducing the risk of document loss, simplifying meeting scheduling, minimizing scheduling conflicts, and providing a more organized, structured, and well-documented project management process.

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