**JURNAL INFORMATIKA DAN REKAYASA PERANGKAT LUNAK (JATIKA)**
**Volume 6, Number 3, September 2025, Page 324-335**
E-ISSN 2797-2011 P-ISSN 2797-3492
**http://jim.teknokrat.ac.id/index.php/informatika/index**
**DOI: https://doi.org/10.33365/jatika.v6i3.612**

# Developing Web-Based Archiving System with XP: Study Case on UPT Kearsipan Universitas Sam Ratulangi

Egidius C. Runtu[1], Benny Pinontoan[2], Eric Alfonsius[3*]
[1,2,3] Information System, Sam Ratulangi University, Indonesia
[1]arteakun@gmail.com, [2]bpinontoan@unsrat.ac.idm [3*]ericalfonsius@unsrat.ac.id

**Abstract:** UPT Kearsipan Universitas Sam Ratulangi, a technical implementation unit responsible for archive management, faces challenges with traditional manual correspondence processes, leading to potential data loss, recording errors, and slow information distribution. This research aimed to develop a web-based Archiving Correspondence Information System (ARCIS) to address these issues. The system was developed using the Extreme Programming (XP) method, emphasizing frequent iterations, active user involvement, and continuous testing. Built with PHP and MySQL technologies, ARCIS includes features such as incoming and outgoing letter management, disposition tracking, classification, institution and user data management, and notification alerts. The XP method, with its rapid adaptation to changing user needs, was chosen to create a responsive and high-quality solution. Black box testing confirmed that all system functionalities perform effectively and meet user needs, achieving a 100% success rate in Iteration 1 and 83.33% in Iteration 2. This system provides a more effective, efficient, and organized solution for managing letters and archives.
**Keywords:** Archiving System; Web-Based Application; Correspondence Management; Extreme Programming; Digital Tracking; Notification Alerts

## 1. INTRODUCING

In the rapidly evolving digital era, the demand for effective and efficient information systems is increasingly critical across various sectors, including the management of correspondence and mail archiving [1]. Traditional correspondence processes, still reliant on physical documents and manual recording, present several limitations, such as potential data loss, recording errors, and sluggish information distribution [2], [3]. These inefficiencies often lead to uncertainty in mail tracking, negatively impacting organizational performance, particularly regarding response times and assurance of mail receipt by relevant parties.

As the volume of mail and documents to be managed continues to grow, many organizations are turning to technology-based solutions to address these challenges. A web-based correspondence and archiving information system emerges as an appropriate choice, offering easy and rapid access from diverse locations [4], [5]. This system facilitates real-time mail tracking, from dispatch to receipt, thereby minimizing errors and delays.

UPT Kearsipan Universitas Sam Ratulangi, as a key unit responsible for document and correspondence management within the university, faces similar challenges. Manual management of archives and correspondence frequently results in issues related to accuracy and efficiency. Consequently, an information system is imperative to support the management of letters and archives in a more effective, efficient, and organized manner.

Previous research conducted by [6], titled *"IMPLEMENTASI SISTEM PENGELOLAAN ARSIP KORESPONDENSI BERBASIS LAMAN PORTAL (KASUS: KAPANEWON MLATI, SLEMAN, YOGYAKARTA)"*, developed a system using a descriptive method and R&D approach. The research showed that

Eric Alfonsius: * Corresponding Author
Copyright © 2025, Egidius C. Runtu, Benny Pinontoan, Eric Alfonsius.

JURNAL INFORMATIKA DAN REKAYASA PERANGKAT LUNAK (JATIKA)
Volume 6, Number 3, September 2025, Page 324-335
E-ISSN 2797-2011 P-ISSN 2797-3492
http://jim.teknokrat.ac.id/index.php/informatika/index
DOI: https://doi.org/10.33365/jatika.v6i3.612

digitalizing correspondence management could improve accessibility and speed up data retrieval, with recommendations for future mobile app development and improved system security. Meanwhile, [7] in the study *"Sistem informasi manajemen dan tracking berkas (studi kasus: Ptsp kecamatan kebon jeruk)* designed a web-based system using the waterfall model. This system enabled better documentation, reporting, and public access to licensing information, enhancing decision-making effectiveness. In the education sector [8] implemented the Extreme Programming method to develop an academic information system for SDN Kuala Teladas. The study confirmed that XP could produce a system with high flexibility and low risk, as evidenced by a 92.71% feasibility score using the Technology Acceptance Model (TAM).

The Extreme Programming (XP) method was specifically chosen for the development of this archiving correspondence information system due to its high suitability for software development that demands rapid adaptation to evolving user needs [9], [10]. XP emphasizes short, rapid iterations, intensive communication and collaboration between developers and users, and continuous testing to ensure the high quality of the resulting system. The application of the XP method in this system's development is anticipated to yield a solution that is highly responsive to user requirements, simultaneously guaranteeing that every developed feature is robust and user-friendly [11].

This research aims to develop a web-based correspondence archive system, named ARCIS (Archiving Correspondence Information System), utilizing the Extreme Programming (XP) method. ARCIS is designed as a digital solution to manage correspondence and archiving processes more effectively, incorporating features such as real-time status tracking, QR code integration for quick searches, and digital disposition management. This approach directly addresses the existing problems of inefficient manual processes and aims to provide a modern, integrated solution for UPT Kearsipan.

## 2. METHOD

This section details the methodology employed for the development of ARCIS, adhering to the Extreme Programming (XP) framework. This approach was selected due to its agile nature, allowing for flexible adaptation to evolving user requirements and ensuring continuous feedback integration.

### 2.1. Website Flowchart

The archiving process within ARCIS incorporates a real-time tracking feature at each stage. The operational flow begins with the reception of mail from a unit within the Faculty of Mathematics and Natural Sciences (FMIPA). This mail then undergoes processing at UPT Kearsipan, followed by disposition to the Head of UPT for verification. A receipt reply is subsequently dispatched to the sending unit to confirm reception, and finally, the mail is systematically entered into the digital archive list. This entire process concludes with the complete recording of the mail within the ARCIS system, ensuring a structured and traceable workflow.

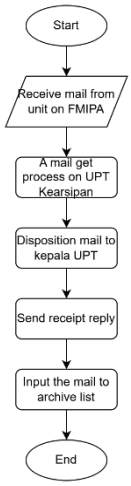


**Figure 1**. Website Development Flowchart

Eric Alfonsius: * Corresponding Author
Copyright © 2025, Egidius C. Runtu, Benny Pinontoan, Eric Alfonsius.

JURNAL INFORMATIKA DAN REKAYASA PERANGKAT LUNAK (JATIKA)
Volume 6, Number 3, September 2025, Page 324-335
E-ISSN 2797-2011 P-ISSN 2797-3492
http://jim.teknokrat.ac.id/index.php/informatika/index
DOI: https://doi.org/10.33365/jatika.v6i3.612

2.2. Data Collection Methods

Data collection for this research utilized a mixed-method approach, combining literature review, direct observation, and interviews to gather comprehensive insights into the existing archiving challenges and user needs.

- Literature Study: This involved an extensive review of various scientific references, including books, journals, articles, and previous research related to information system development, correspondence archiving [12], and the application of the Extreme Programming (XP) method. This phase was crucial for establishing a theoretical foundation and understanding best practices in web-based system development.
- Observation: Direct observation was conducted within the operational environment of UPT Kearsipan Universitas Sam Ratulangi. This allowed for firsthand identification of existing obstacles in the manual correspondence and archiving system, as well as a direct understanding of specific user requirements that the new information system needed to address.
- Interview: Structured interviews were conducted with key personnel, including staff and archive managers at UPT Kearsipan. The primary objective of these interviews was to gather detailed information about the problems faced in the current archiving and correspondence processes and to solicit their expectations and needs for the proposed system. The data obtained from these interviews were instrumental in tailoring the system design to align with actual user requirements.

2.4. Development Method: Extreme Programming (XP)

The Extreme Programming (XP) methodology was chosen for its distinct advantages in software development, particularly its flexibility and adaptability to change [13]. XP fosters rapid feedback cycles from users through short iterations and incremental releases, ensuring that development remains aligned with real-world needs [14]. Furthermore, XP mitigates project risks by enabling early detection of bugs and facilitating quick fixes through continuous refactoring [15]. This methodology also contributes to increased user satisfaction due to their active involvement at every stage of development, while maintaining a stable and sustainable work pace.

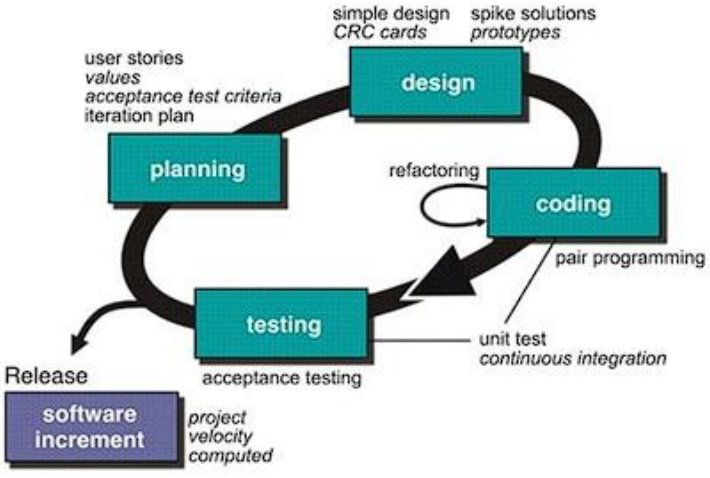


**Figure 2.** Extreme Programming (XP) Method

The development process within ARCIS followed the four core phases of Extreme Programming:

1. Planning: In this initial phase, users (staff of UPT Kearsipan) and the researcher collaboratively identified essential system needs and features. Through a combination of interviews and observations, the researcher gained critical insights into user requirements, such as the necessity for a tracking system to monitor letter status in real-time. This phase also involved defining comprehensive *user stories* that formed the basis for system development, encompassing features like tracking incoming and outgoing mail, archive management, and QR code integration. Recognizing that the average age of potential website users was over 40, a

Eric Alfonsius: * Corresponding Author
Copyright © 2025, Egidius C. Runtu, Benny Pinontoan, Eric Alfonsius.

JURNAL INFORMATIKA DAN REKAYASA PERANGKAT LUNAK (JATIKA)
Volume 6, Number 3, September 2025, Page 324-335
E-ISSN 2797-2011 P-ISSN 2797-3492
http://jim.teknokrat.ac.id/index.php/informatika/index
DOI: https://doi.org/10.33365/jatika.v6i3.612

deliberate focus was placed on designing an interface that prioritizes ease of use and intuitiveness, ensuring simple navigation and clear readability to enhance accessibility for all users.

2. Design: This phase focused on creating a streamlined system design based on the collected *user stories*. The design philosophy emphasized efficiency and simplicity, avoiding unnecessary complexity. Key modeling tools employed included *Use Case Diagrams*, *Activity Diagrams*, *Sequence Diagrams*, and a *Class Diagram*. These diagrams provided a clear visual representation of system functionality, process flows, and interaction sequences between various components and user roles. A simple and clear design was crucial to facilitate the development process and allow for quick modifications based on user feedback.
3. Coding: The coding phase commenced immediately after the design was finalized. While XP typically promotes a *pair programming* approach, for this system, which utilized PHP *native*, the emphasis was on direct implementation rather than *Test-Driven Development* (TDD). The coding process focused on building a stable and user-friendly system foundation. Each feature, including login functionalities, dashboard views, incoming and outgoing mail management, reference systems, file galleries, and the agenda book, was developed and tested incrementally.
4. Testing: Testing was an integral and continuous part of the XP methodology within this project. Every completed feature was immediately subjected to testing to ensure the absence of bugs or functional issues. This included both internal verification during coding and subsequent black box testing to confirm that all features performed exactly as expected by the end-users. This iterative testing approach facilitated prompt feedback and ensured the alignment of developed features with user expectations.

### 2.5. Stages of Research

The research workflow adhered to a systematic progression. It commenced with the identification of problems within the existing system, followed by a comprehensive literature study to gather theoretical foundations and relevant references. Subsequently, an observation phase was conducted to collect real-world data from the current operational environment of UPT Kearsipan. After these preliminary steps, the core Extreme Programming (XP) methodology was implemented, encompassing iterative cycles of planning, design, coding, and testing. This iterative process allowed for continuous refinement based on feedback. Upon successful implementation and validation, a final report was prepared to meticulously document the entire research process and its outcomes.

### 2.6. Testing Method

Black Box Testing was the primary testing method employed in this software development. This method focuses exclusively on evaluating the application's functionality without delving into or requiring an understanding of its internal source code. The core objective of black box testing in this research was to verify whether the system's functions performed accurately and in accordance with the specified requirements and user expectations [16].

### 2.7. Wireframe

Wireframes served as essential visual guides during the initial design phase. They functioned as page schematics or screen blueprints, representing the skeletal framework of the website [17]. For instance, Figure 3. Login Page Wireframe illustrate examples of these preliminary design structures.

Eric Alfonsius: * Corresponding Author
Copyright © 2025, Egidius C. Runtu, Benny Pinontoan, Eric Alfonsius.

JURNAL INFORMATIKA DAN REKAYASA PERANGKAT LUNAK (JATIKA)
Volume 6, Number 3, September 2025, Page 324-335
E-ISSN 2797-2011 P-ISSN 2797-3492
http://jim.teknokrat.ac.id/index.php/informatika/index
DOI: https://doi.org/10.33365/jatika.v6i3.612

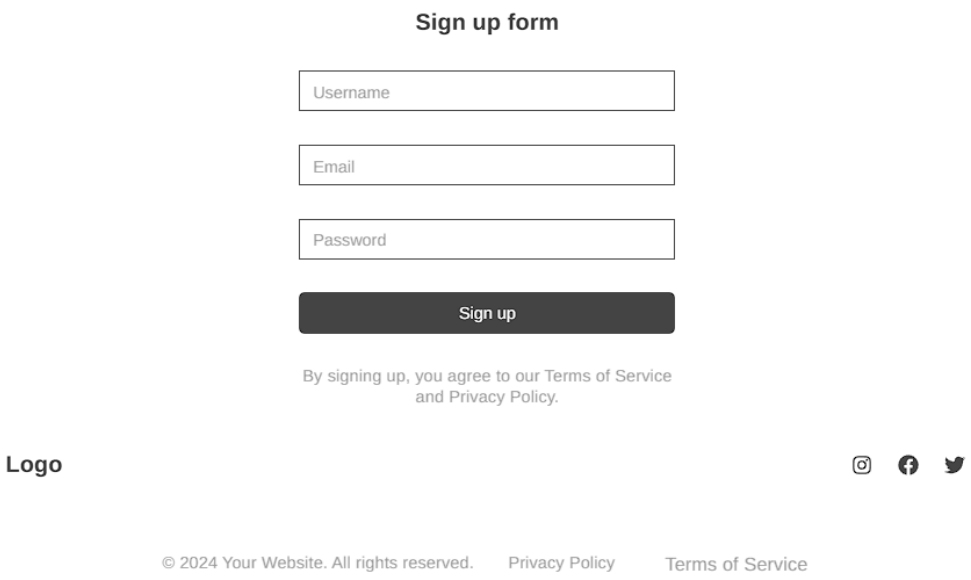


**Figure 3**. Login Page Wireframe

# 3. RESULT AND DISCUSSIONS

3.1. Research Results

The initial phase of system development, utilizing the Extreme Programming (XP) method, involved a comprehensive case study at UPT Kearsipan Universitas Sam Ratulangi. This phase commenced with robust data collection through direct interviews conducted with the Head of UPT, UPT employees, and FMIPA staff, all of whom were identified as primary system users. The interviews aimed to gain a profound understanding of the challenges inherent in the existing document archiving process and to identify the actual, precise needs of the system's prospective users.

From the detailed interview outcomes, critical information was extracted, forming the foundation for developing comprehensive *user stories*. These *user stories* were concise descriptions, articulated from the user's perspective, detailing their specific requirements from the system. Examples included the critical need for real-time letter status tracking, immediate notification alerts, and streamlined, web-based letter submission capabilities. These *user stories* were meticulously summarized and tabulated to facilitate subsequent in-depth analysis.

Following the collection of *user stories*, a systematic identification of user needs was performed. This process involved classifying the required system functions for each distinct actor, specifically the UPT Head, UPT staff, and FMIPA staff. The objective of this stage was to clearly delineate the necessary features based on the unique tasks and responsibilities associated with each system user role.

Based on the outcomes of the user needs identification, the primary features (*Determination of Main Features*) that would be prioritized in the development process were established. This prioritization considered several key factors: the urgency of each feature, its technical complexity, and its overall impact on the end-users. These prioritized main features subsequently served as crucial references for defining the content and scope of each iteration within the system development lifecycle.

Furthermore, Business Process Model and Notation (BPMN) diagrams were utilized to visually articulate the existing business process flow within UPT Kearsipan. The BPMN representation provided a more structured and understandable overview of the processes involved in managing incoming mail, dispositions, and tracking mail status. This visual mapping was instrumental in identifying key points within the process flow that could be effectively automated or significantly improved through the implementation of the ARCIS system.

Eric Alfonsius: * Corresponding Author
Copyright © 2025, Egidius C. Runtu, Benny Pinontoan, Eric Alfonsius.

JURNAL INFORMATIKA DAN REKAYASA PERANGKAT LUNAK (JATIKA)
Volume 6, Number 3, September 2025, Page 324-335
E-ISSN 2797-2011 P-ISSN 2797-3492
http://jim.teknokrat.ac.id/index.php/informatika/index
DOI: https://doi.org/10.33365/jatika.v6i3.612

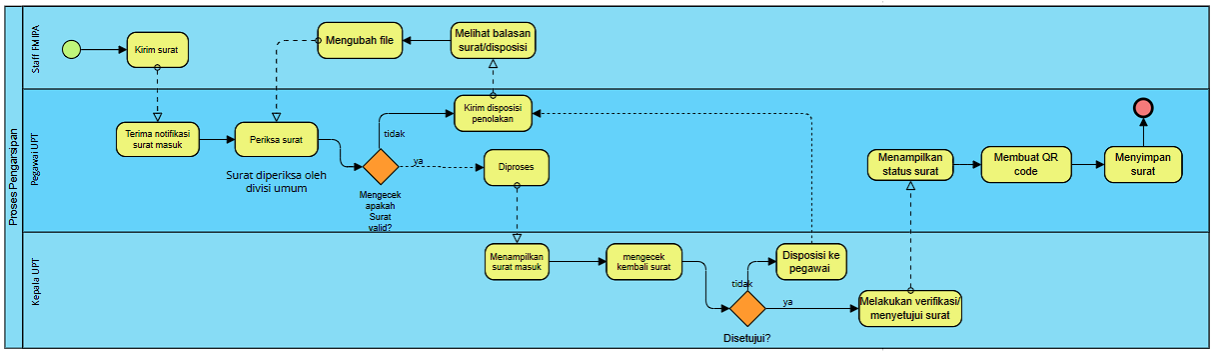


**Figure 4**. Business Process Model and Notation (BPMN) UPT Kearsipan

3.2. Iteration 1 (Foundation)

The first iteration focused on establishing the foundational elements of the system, which were immediately tested to gather initial user feedback.

3.2.1. Planning

In the planning phase of the first iteration, a detailed system development schedule was established. This schedule was based on the projected timeline and the structured task distribution inherent in the Extreme Programming (XP) methodology cycle. This planning commenced after the system requirements were thoroughly gathered through interviews and the prioritization of main features. The core focus of this initial iteration was on building essential functionalities, including the management of incoming and outgoing emails, user login mechanisms, and the development of an initial dashboard tailored to each user's specific role. Concurrently, efforts were directed towards establishing the fundamental database structure and designing the initial user interface, all guided by the identified prioritized features.

3.2.2. Design

This stage involved explaining the system design through various diagrams that depict the workflow and interactions between system components. The diagrams utilized included:

- *Use Case Diagram:* Used to simulate the system to the user and illustrate existing features. This encompassed roles such as Admin, Head of UPT, and Employee UPT, with use cases including viewing the dashboard, managing gallery files, managing references, tracking letters, managing system settings, viewing the agenda book, and managing mail transactions.
- *Activity Diagram:* Focused on depicting the main workflows in the system, such as the login process, dashboard access, mail management, and reference handling. These diagrams illustrated step-by-step how users perform their basic tasks, from opening a menu to completing actions like adding, viewing, or printing mail, for Admin, Head of UPT, and Employee UPT roles.
- *Sequence Diagram:* Employed to show the sequential interaction between actors and the system in executing basic functionalities, such as logging in, retrieving dashboard data, and managing incoming/outgoing mail. These diagrams clarified the sequence of messages and communication flow between system components in response to user actions, with a particular emphasis on ensuring data accuracy and input validation.

3.2.3. Coding

During the first iteration, the coding process was primarily focused on developing core features such as the login module (Figure 5), the dashboard interface, incoming and outgoing mail management, reference data management, the file gallery, and the agenda book. The system was developed using native PHP, maintaining a distinct separation between presentation logic, processing logic, and database connection layers. The overarching goal was to construct a stable and user-friendly system foundation. Each developed feature underwent immediate testing upon completion to ensure its functionality and reliability.

Eric Alfonsius: * Corresponding Author
Copyright © 2025, Egidius C. Runtu, Benny Pinontoan, Eric Alfonsius.

JURNAL INFORMATIKA DAN REKAYASA PERANGKAT LUNAK (JATIKA)
Volume 6, Number 3, September 2025, Page 324-335
E-ISSN 2797-2011 P-ISSN 2797-3492
http://jim.teknokrat.ac.id/index.php/informatika/index
DOI: https://doi.org/10.33365/jatika.v6i3.612

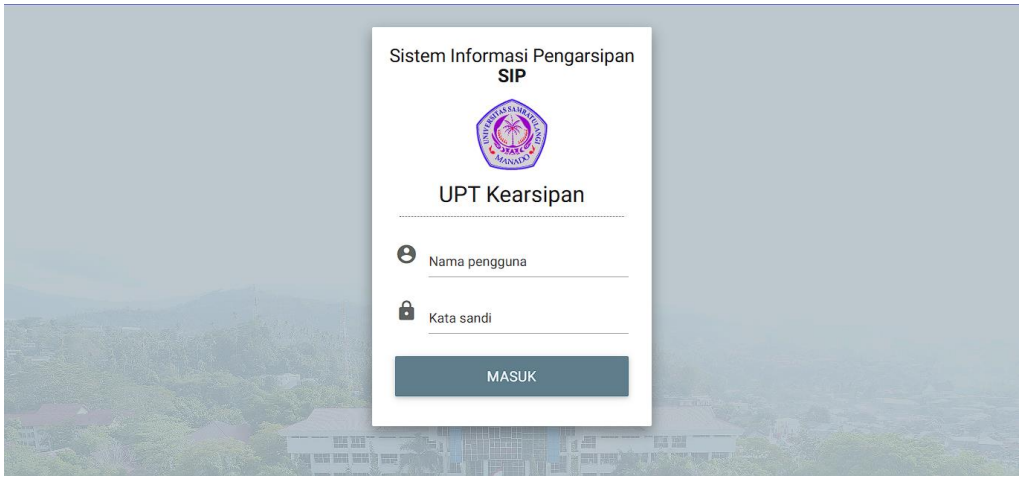


**Figure 5.** Login Page for Iteration 1

3.2.4. Testing

At this stage, the archiving correspondence information system underwent a thorough testing process to ensure that all system functions operated as expected. Testing was conducted using the black box testing method, which specifically focuses on verifying the system's functionality without inspecting or understanding its internal code structure. The results from 13 test scenarios indicated a 100% success rate, confirming that all tested functionalities performed correctly.

**Table 1**. Black Box Testing Iteration 1

| No | Testing Scenario | Test Case | Input | Output | Description |
|---|---|---|---|---|---|
| 1 | Login *sistem* | User enters a valid username and password | Valid username and password | User successfully logs into the dashboard | Success |
| 2 | Logout *sistem* | User logs out of the application | Click logout button | System redirects user to the login page | Success |
| 3 | *Lihat surat* | User click lihat surat to see the document | Click lihat surat button | System redirect user to view page | Success |
| 4 | *Print* | User print the agenda | Click print button | System redirect user to print page | Success |
| 5 | *Hapus Surat Masuk* | User deletes an incoming letter | Click delete button | Incoming letter successfully deleted | Success |
| 6 | *Tambah Surat Keluar* | User fills out the outgoing letter form | Complete outgoing letter data | Outgoing letter successfully sent and saved | Success |
| 7 | *Edit Surat Keluar* | User changes the content of the outgoing letter | Changes to outgoing letter data | Data successfully updated | Success |
| 8 | *Hapus Surat Keluar* | User deletes outgoing letter data | Click delete outgoing letter button | Outgoing letter successfully deleted | Success |

Eric Alfonsius: * Corresponding Author
Copyright © 2025, Egidius C. Runtu, Benny Pinontoan, Eric Alfonsius.

JURNAL INFORMATIKA DAN REKAYASA PERANGKAT LUNAK (JATIKA)
Volume 6, Number 3, September 2025, Page 324-335
E-ISSN 2797-2011 P-ISSN 2797-3492
http://jim.teknokrat.ac.id/index.php/informatika/index
DOI: https://doi.org/10.33365/jatika.v6i3.612

| | | | | | |
|---|---|---|---|---|---|
| 9 | *Tambah data Instansi* | User adds sender agency data | Agency name and address | Agency data successfully added | Success |
| 10 | *Tambah Klasifikasi Surat* | User adds type of letter classification | Classification code and name | Classification data successfully saved | Success |
| 11 | *Tambah pengguna* | Web User adds a new user account | Valid user data | New user account successfully created | Success |
| 12 | *Edit pengguna* | Web User changes user account information | Changes to user data | User data successfully updated | Success |
| 13 | *Hapus pengguna* | Web User deletes a specific user account | Click delete button | User data successfully deleted | Success |

3.3. Iteration 2 (Input and Feedback)

The second iteration was developed by incorporating inputs and feedback gathered from the testing phase of the first iteration. The evaluation results from the previous stage were instrumental in refining existing features and introducing new functionalities based on evolving user needs, such as enhanced letter tracking capabilities, improved notification systems, and more sophisticated role-based user management.

3.3.1. Planning

The second iteration was a direct continuation of the system development process, building upon the testing and evaluation outcomes from the first iteration. User feedback from the preceding stage served as the foundational basis for further refining the system, adding new features, and enhancing existing functionalities in alignment with updated user requirements, particularly for letter tracking, notifications, and role-based access.

3.3.2. Design

In this stage, the system design was further elaborated based on the feedback received from Iteration 1. The diagrams utilized included:

- *Use Case Diagram:* Developed to reflect more advanced user needs, specifically for FMIPA Staff and UPT Employees. This diagram incorporated features such as mail tracking, mail delivery functionalities from faculty to UPT, and comprehensive mail reply management.
- *Activity Diagram:* Illustrated more interactive and specific processes. This included the mail tracking feature, mail delivery by FMIPA staff, detailed mail disposition management workflows, and the overall notification system for Admin, Head of UPT, and Employee UPT roles.
- *Sequence Diagram:* Explained advanced interactions, specifically focusing on letter status checking (tracking), detailed disposition status updates, QR code generation, and the process of mail delivery by FMIPA staff. These diagrams provided an in-depth view of how the system responds to complex user actions, encompassing not only data viewing but also status updates and inter-unit document transfers.
- *Class Diagram:* Served to elucidate the data model for the program, whether simple or complex, providing a clear visualization of the application's schema. This diagram comprised seven primary classes: User, Incoming Letter, Outgoing Letter, Disposition, Instance, Classification, and Sett. Each class was defined with attributes representing database fields and fundamental operation methods (create, read, update, delete) for data modification.

3.3.3. Coding

Eric Alfonsius: * Corresponding Author
Copyright © 2025, Egidius C. Runtu, Benny Pinontoan, Eric Alfonsius.

JURNAL INFORMATIKA DAN REKAYASA PERANGKAT LUNAK (JATIKA)
Volume 6, Number 3, September 2025, Page 324-335
E-ISSN 2797-2011 P-ISSN 2797-3492
http://jim.teknokrat.ac.id/index.php/informatika/index
DOI: https://doi.org/10.33365/jatika.v6i3.612

In the second iteration, the development efforts were directed towards the implementation of advanced features, including comprehensive mail tracking, sophisticated notification systems, detailed disposition management, functionalities for sending mail, and robust mail reply mechanisms. The coding continued to utilize native PHP, with careful adjustments made to user access rights via sessions to ensure proper authorization. Input validation and feedback messages were significantly strengthened to enhance user experience and data integrity. Furthermore, the tracking feature was seamlessly integrated with QR codes to streamline document identification. All newly implemented features and enhancements underwent rigorous black box testing to verify their adherence to specified requirements.

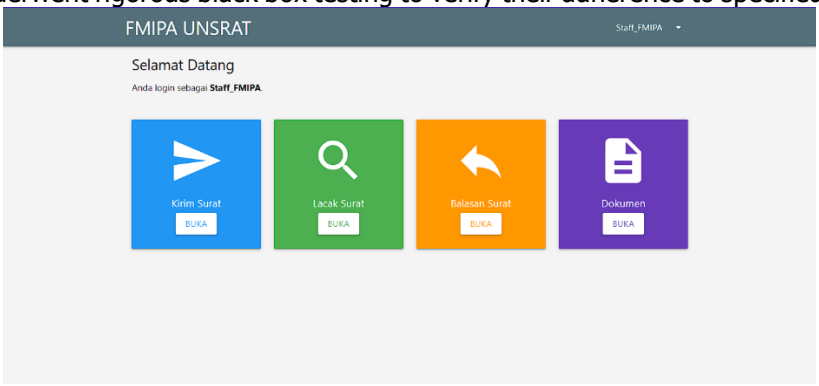


**Figure 6.** Dashboard Staff FMIPA

3.3.4. Testing

Testing in the second iteration was conducted to ensure that the newly added features and improvements from the previous iteration functioned correctly according to user requirements. This testing phase utilized the black box testing method, focusing exclusively on verifying system functionality without examining its internal code structure. The results are summarized in Table 1. Black Box Testing Iteration 2, showing 5 successful tests out of 6 scenarios, yielding an 83.33% success rate. The specific test case "QR Code: Employee Create and scan QR Code, Mail QR Code can be create and scan but the file doesn't show" indicated a failure, suggesting an area for future improvement.

**Table 2**. Black Box Testing Iteration 2

| No | Testing Scenario | Test Case | Input | Output | Description |
|---|---|---|---|---|---|
| 1 | Kirim Surat | User fills out the letter form completely | Complete letter data | Letter successfully sent and saved | Success |
| 2 | Lacak Surat | User search for letter status using letter number | Valid letter number | System displays letter status information | Success |
| 3 | Tambah Disposisi Surat | User adds letter disposition | Complete disposition data | Disposition successfully added | Success |
| 4 | Lihat Balasan Surat | User opens the letter response page from UPT | Click disposition details | Letter response information displayed | Success |

Eric Alfonsius: * Corresponding Author
Copyright © 2025, Egidius C. Runtu, Benny Pinontoan, Eric Alfonsius.

JURNAL INFORMATIKA DAN REKAYASA PERANGKAT LUNAK (JATIKA)
Volume 6, Number 3, September 2025, Page 324-335
E-ISSN 2797-2011 P-ISSN 2797-3492
http://jim.teknokrat.ac.id/index.php/informatika/index
DOI: https://doi.org/10.33365/jatika.v6i3.612

| | | | | | |
|---|---|---|---|---|---|
| 5 | QR Code | Employee Create and scan QR Code | Click QR Code button | Mail QR Code can be create and scan but the file doesn't show | Failed |
| 6 | Dokumen | Staff FMIPA see the document sended | See the incoming mail from UPT | The system show the file | Success |

Testing in the second iteration was conducted to ensure that the newly added features and improvements from the previous iteration functioned correctly according to user requirements. This testing phase utilized the black box testing method, focusing exclusively on verifying system functionality without examining its internal code structure.

In addition to iteration testing, **system testing** was also carried out to validate the overall integration of all modules and ensure that the system performs as a cohesive unit. System testing included checking data flow between modules, verifying user interface consistency, and ensuring that performance criteria such as response time and error handling met the specified requirements. This step was essential to confirm that the system works end-to-end in a real-world usage scenario.

The results are summarized in Table 3. Black Box Testing Iteration 2, showing 5 successful tests out of 6 scenarios, yielding an 83.33% success rate. The specific test case "QR Code: Employee Create and scan QR Code, Mail QR Code can be create and scan but the file doesn't show" indicated a failure, suggesting an area for future improvement.

**Table 3. Black Box Testing Iteration 2 Results**

| No | Test Scenario | Test Case Description | Expected Result | Actual Result | Status |
|---|---|---|---|---|---|
| 1 | User Login | User enters valid username & password | System grants access to dashboard | System successfully redirects to dashboard | ☑ Pass |
| 2 | Add Employee | Admin inputs complete employee data | Data saved and displayed in employee list | Data successfully saved and displayed | ☑ Pass |
| 3 | Generate QR Code | System generates QR code for selected employee | QR code is generated and displayed | QR code successfully generated and visible | ☑ Pass |
| 4 | Scan QR Code | User scans employee QR code | System retrieves and displays employee data | Employee data retrieved and displayed correctly | ☑ Pass |
| 5 | Email Notification | System sends email with attached QR code | Email received with correct QR code attachment | Email received but file attachment does not open | ✗ Fail |
| 6 | Delete Employee | Admin deletes employee data | Data is removed from database and no longer visible | Data successfully removed and no longer visible | ☑ Pass |

Summary:
- Total Test Cases: 6
- Successful: 5

Eric Alfonsius: * Corresponding Author
Copyright © 2025, Egidius C. Runtu, Benny Pinontoan, Eric Alfonsius.

JURNAL INFORMATIKA DAN REKAYASA PERANGKAT LUNAK (JATIKA)
Volume 6, Number 3, September 2025, Page 324-335
E-ISSN 2797-2011 P-ISSN 2797-3492
http://jim.teknokrat.ac.id/index.php/informatika/index
DOI: https://doi.org/10.33365/jatika.v6i3.612

- Failed: 1
- Success Rate: 83.33%

# 4. CONCLUSION

The web-based mail archiving information system, developed using the Extreme Programming (XP) approach, has successfully provided robust features supporting the management of incoming and outgoing mail, comprehensive mail tracking, and efficient management of agency, classification, and user data. The system is specifically designed with a user-friendly interface tailored for the employees of UPT Kearsipan Universitas Sam Ratulangi. The results of testing conducted using the black box method consistently demonstrate that the primary functions within the system operate effectively and align precisely with the designed test scenarios. Consequently, this system stands as a viable and effective alternative solution to enhance the mail administration process within the UPT Kearsipan environment. For future development, this letter filing information system can be continuously improved in terms of both functionality and security. The addition of real-time notification features, potentially via email or SMS, could significantly enhance the user experience by providing immediate information updates. Furthermore, exploring the integration with other existing correspondence systems within the university environment could substantially broaden the system's scope of use and foster greater institutional efficiency.

# 5. REFERENCES

[1] T. Darmansah, N. A. Daulay, and R. F. Zulna, "Efektivitas penggunaan media teknologi dan informasi dalam pengelolaan surat masuk dan keluar di sekolah menengah atas," *Algebra: Jurnal Pendidikan, Sosial dan Sains*, vol. 4, no. 2, pp. 35–42, 2024.

[2] J. Joni and S. Sriyatin, "Sistem Informasi Pengarsipan Berbasis Web Mobile Pada UPT SMPN 3 Pardasuka," *Journal of Software Engineering and Technology.*, vol. 3, no. 1, pp. 47–51, 2023.

[3] A. Agusman *et al.*, "Pendekatan Terintegrasi dalam Administrasi Bisnis: Strategi dan Tantangan Digitalisasi UMKM Desa Buntu Bedimbar," *Journal Of Community Research & Engagement*, vol. 1, no. 2, pp. 176–190, 2025.

[4] H. Hafiz and A. Nababan, "Perancangan sistem manajemen informasi surat menyurat berbasis web pada kantor BDK Medan," *J. Pendidik. Sains dan Komput*, vol. 3, no. 02, pp. 188–197, 2023.

[5] T. Darmansah, A. M. Nur, H. S. Suryadi, and L. T. Nurarfiansyah, "Tantangan dan solusi dalam pengelolaan arsip di era digital," *Jurnal Ekonomi Dan Bisnis Digital*, vol. 2, no. 1, pp. 16–20, 2024.

[6] J. A. Putra and A. Ratnasari, "IMPLEMENTASI SISTEM PENGELOLAAN ARSIP KORESPONDENSI BERBASIS LAMAN PORTAL (KASUS: KAPANEWON MLATI, SLEMAN, YOGYAKARTA)," *Indonesian Journal of Business Intelligence (IJUBI)*, vol. 6, no. 2, pp. 106–114, 2024.

[7] A. Hermawan, "Sistem informasi manajemen dan tracking berkas (studi kasus: Ptsp kecamatan kebon jeruk)," *JUSIBI (Jurnal Sistem Informasi dan E-Bisnis)*, vol. 1, no. 2, 2019.

[8] T. Ardiansah, Y. Rahmanto, and Z. Amir, "Penerapan Extreme Programming Dalam Sistem Informasi Akademik SDN Kuala Teladas," *Journal of Information Technology, Software Engineering and Computer Science*, vol. 1, no. 2, pp. 44–51, 2023.

[9] G. Taufiq and Y. Handrianto, "Rancang Bangun Sistem Informasi Rekap Data Akademik Mahasiswa dengan Model Extreme Programming," *SATIN-Sains Dan Teknologi Informasi*, vol. 8, no. 1, pp. 42–51, 2022.

[10] K. E. Almajed, W. Medhat, and T. El-Shishtawy, "An Iterative Hybrid Agile Methodology for Developing Archiving Systems," *International Journal of Software Engineering & Applications (IJSEA)*, vol. 10, no. 1, 2019.

[11] A. M. Dawis *et al.*, *Rekayasa perangkat lunak panduan praktis untuk pengembangan aplikasi berkualitas*. Penerbit Widina, 2023.

Eric Alfonsius: * Corresponding Author
Copyright © 2025, Egidius C. Runtu, Benny Pinontoan, Eric Alfonsius.

JURNAL INFORMATIKA DAN REKAYASA PERANGKAT LUNAK (JATIKA)
Volume 6, Number 3, September 2025, Page 324-335
E-ISSN 2797-2011 P-ISSN 2797-3492
http://jim.teknokrat.ac.id/index.php/informatika/index
DOI: https://doi.org/10.33365/jatika.v6i3.612

[12] E. A. R. Hakim, "Rancang bangun sistem informasi persuratan pelanggaran kode etik penyelenggara pemilu: studi kasus Dewan Kehormatan Penyelenggara Pemilu (DKPP)," 2015.
[13] A. Akhtar, B. Bakhtawar, and S. Akhtar, "Extreme programming vs scrum: A comparison of agile models," *International Journal of Technology Innovation and Management (IJTIM)*, vol. 2, no. 2, pp. 80–96, 2022.
[14] T. Hulugh and B. Emmanuel, "Agile Project Management in Developing Business-Centric Information Systems".
[15] S. Soleman, D. Retnoningsih, and A. Y. Vandika, "Inovasi Terbaru Dalam Rekayasa Perangkat Lunak Ilmu Komputer," 2024, *Mutiara Intelektual Indonesia Press*.
[16] S. Nidhra and J. Dondeti, "Black box and white box testing techniques-a literature review," *International Journal of Embedded Systems and Applications (IJESA)*, vol. 2, no. 2, pp. 29–50, 2012.
[17] S. Tchistiakova, "Service design and information architecture for collaborative platform," 2021.

Eric Alfonsius: * Corresponding Author
Copyright © 2025, Egidius C. Runtu, Benny Pinontoan, Eric Alfonsius.