

An Architectural Approach of a Web-Based Monitoring System for Efficient Internship Time Tracking

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ABSTRACT

Internships bridge the gap between academic learning and professional experience, yet traditional time-tracking methods often lead to inefficiencies, inaccuracies, and administrative burdens. This study presented the development of a web-based monitoring system designed to enhance the accuracy and efficiency of internship time tracking. Utilizing Laravel, PHP, HTML, and Tailwind CSS, the system provided a user-friendly platform for student interns, subject teachers, and coordinators, enabling real-time logging, automated reporting, and streamlined progress monitoring. Implemented following the Agile methodology, the system was evaluated through structured surveys, interviews, and usability testing involving 50 respondents, including student interns, a subject teacher, an Information Technologist expert, and an internship coordinator. Results indicated that the system significantly reduced human error, improved tracking efficiency, and enhanced compliance with internship requirements. Additionally, automated reporting minimized administrative workload, while real-time tracking improved transparency and accountability. The system's three-tier architecture ensured scalability, flexibility, and secure data management. By replacing manual record-keeping with a scalable, automated solution, this study contributed to the advancement of internship management in academic institutions, offering a more reliable and transparent approach to monitoring student internship performance. These findings demonstrated that a web-based solution could modernize internship tracking, optimize administrative processes, and improve the overall effectiveness of internship programs.

Keywords: Internship Management, Web-Based Monitoring, Real-Time Tracking, Automated Reporting, Digital System Architecture

INTRODUCTION

Internships are essential for bridging the gap between academic learning and real-world experience, helping students develop skills like communication, leadership, and time management^[1]. However, managing internships presents significant challenges, including tracking student attendance, monitoring progress, and coordinating with industry partners. While systems like the Student Internship Placement Management System have streamlined placement and evaluation processes^[2] many still struggle with inefficiencies, especially in supervising activities across various locations.

To address these challenges, a web-based internship time-tracking system was developed, integrating lean management principles and advanced technologies to improve efficiency. The system consists of four modules—student, Subject teachers, administration, and monitoring—that collectively ensure accurate tracking of student progress and reduce errors^[3].

This study focuses on 4th year IT students, aiming to demonstrate how this system enhances internship management through features such as real-time monitoring, transparent progress tracking, and seamless collaboration among stakeholders. By automating tasks like eligibility checks, registration, and program monitoring, the system provides a comprehensive solution to existing problems^[4].

The goal is to present measurable outcomes that highlight the system's effectiveness in improving internship

management, with clear comparisons to prior methods, ultimately showcasing its potential to reduce administrative workload and enhance the internship experience for all stakeholders.

METHODOLOGY

This study employs a descriptive and developmental research approach to design and implement an architectural framework for a web-based monitoring system aimed at enhancing internship time tracking. The system is designed to streamline attendance tracking, ensuring transparency, accuracy, and accessibility for key stakeholders, including student interns, coordinators, and subject teachers. By integrating modern web technologies within a structured development framework, the system aims to address existing inefficiencies in internship tracking while providing a user-centric and data-driven monitoring solution.

The Agile methodology, recognized for its flexibility, iterative development, and team-driven approach, was adopted as the software development framework for this study^[5]. Unlike traditional methodologies that rely on rigid, linear project planning, Agile promotes an incremental approach, breaking the project into small, manageable iterations. This methodology allows for continuous system refinement, enabling developers to quickly adapt to evolving user needs and feedback. Agile further fosters enhanced communication and collaboration among stakeholders, ensuring that main participants remain actively engaged in the development process^[6]. By focusing on real-time progress tracking and iterative improvements, Agile ensures that the system remains aligned with user requirements and operational objectives throughout the development cycle.

To achieve a comprehensive evaluation of the system's usability and effectiveness, the study incorporated qualitative data collection methods. A purposive sampling strategy was used to select respondents, comprising student interns, subject teachers, an internship coordinator, and IT specialists. This diverse group facilitated a holistic assessment, ensuring that the system was evaluated from both a technical and end-user perspective. The inclusion of IT specialists provided a technical validation of the system's architectural robustness, while feedback from interns and subject teacher members ensured a user-centric evaluation of its functionality.



Figure 1. Agile Methodology Cycle

The system was developed using XAMPP to provide an integrated Apache, MySQL, and PHP stack, which facilitated efficient testing and debugging. The backend was developed using PHP with Laravel, incorporating built-in security features to ensure a scalable and secure internship time-tracking system. The frontend was constructed using HTML and styled with Tailwind CSS, enabling rapid prototyping of responsive and modern user interfaces that integrate dynamically^[7]. This cohesive integration of technologies, aligned with Agile development practices, allowed for continuous iteration and refinement based on user feedback, ultimately resulting in a scalable, secure, and user-centric web-based internship time-tracking system suitable for publication.

Data collection involved a combination of structured surveys, semi-structured interviews, and usability testing. Surveys and interviews were designed to assess user perceptions, identify usability challenges, and evaluate system performance based on predefined metrics. Usability testing was conducted in multiple iterations, allowing for continuous system enhancements following Agile principles^[8]. This iterative evaluation process ensured that each development cycle incorporated empirical user insights, leading to progressive system improvements and greater alignment with stakeholder needs.

Table 1. Respondents of the Study

Respondents	Number of Respondents
Internship Coordinator	1
Subject Teacher	1
Student Interns	46
IT expert/specialist	2
Total	50

The proponents identified key individuals for participation in the study. Purposive sampling was utilized to select respondents, including the internship coordinator, subject teacher, IT expert, and fourth-year students enrolled in the academic year 2024-2025. This selection aims to test the accuracy and efficiency of the proposed system.

The scale of measurement is a fundamental aspect of research, as it dictates how data is categorized, interpreted, and analyzed, ultimately shaping the type of statistical evaluation that can be applied to assess system performance, usability, and user satisfaction. Within Agile software development, measurement scales are essential for evaluating various aspects, including usability, efficiency, system reliability, and overall user experience. Agile’s iterative nature and reliance on continuous user feedback, incorporating structured measurement tools ensures data-driven decision-making. It facilitates an adaptive development process that evolves based on real-time user insights^[9]. This study employed a Likert scale as a standardized instrument for quantitative feedback collection to systematically assess the effectiveness and efficiency of the proposed web-based internship time-tracking system. The Likert scale, a widely used tool in software usability research, provides a structured framework for capturing subjective perceptions, enabling comparative statistical analysis across different user groups^[10]. By utilizing this scale, the study ensured that user experience and system performance were objectively quantified, offering a comprehensive and evidence-based evaluation of the system’s usability and efficiency.

By integrating a standardized measurement framework within Agile methodology, this study established a methodical, iterative evaluation process for the proposed internship time-tracking system. The combination of ISO 9126 standards and Likert-scale-driven usability assessment provided a quantitative foundation for system refinements, ensuring an objective validation of user experience^[11]. This methodological approach highlights the importance of structured measurement in Agile software development, demonstrating how empirical evaluation can seamlessly integrate with iterative system enhancements, ultimately resulting in an efficient, user-centric, and continuously optimized solution.

Table 2. Scale of Measurement

Scale	Statistical Limits	Descriptive	Interpretation Equivalent
1	1.00 – 1.75	Poor	Not Accepted
2	1.76 – 2.50	Good	Accepted

3	2.56 – 3.25	Very Good	Very Accepted
4	3.26 – 4.00	Excellent	Highly Accepted

In alignment with Agile software development principles, the internship time-tracking system at Pangasinan State University – Alaminos City Campus was developed and refined through incremental and iterative improvements. Agile’s adaptive framework allowed for continuous integration of user feedback, enabling real-time enhancements to system functionality and usability^[10]. This iterative approach facilitated the progressive optimization of the system, ensuring that each development cycle incorporated empirical insights from usability assessments.

By leveraging Agile’s flexible and user-centered methodology, the institution achieved greater system efficiency, improved accuracy in internship tracking, and increased user satisfaction, ultimately resulting in a more reliable and effective monitoring system for student interns, faculty, and administrators.

RESULT AND DISCUSSION

The Internship Time Track Efficient Monitoring System is specifically designed to enhance the efficiency and accuracy of internship attendance tracking at Pangasinan State University - Alaminos City Campus. Traditional manual methods, such as paper logs and spreadsheets, often lead to inaccuracies, missing records, and difficulties in real-time monitoring. These challenges make it difficult for subject teachers to effectively verify and manage intern work hours. To address these issues, a web-based system utilizing a three-tier architecture was developed, ensuring seamless monitoring, accurate reporting, and improved accessibility for subject teachers.

The system integrates several key features to optimize attendance tracking and monitoring. The remaining hours filter allows subject teachers to track pending internship hours for each student, ensuring compliance with program requirements. The total working hour display provides a real-time summary of accumulated hours, helping teachers easily monitor each intern’s progress. The export attendance report feature enables the automatic generation of attendance records, which can be used for documentation and evaluation. Additionally, the real-time log with image evidence captures an intern’s image during time-in and time-out, enhancing accountability and preventing fraudulent entries.

The three-tier architecture ensures the system’s scalability, flexibility, and maintainability^[12]. The presentation layer provides subject teachers with an intuitive interface to access attendance records, review internship hour summaries, and generate reports. The application layer processes business logic, validating attendance entries, enforcing program rules, and handling automated calculations. Meanwhile, the data layer serves as a secure storage system, maintaining structured attendance records, images, and reports while ensuring data integrity, fast retrieval, and efficient management.

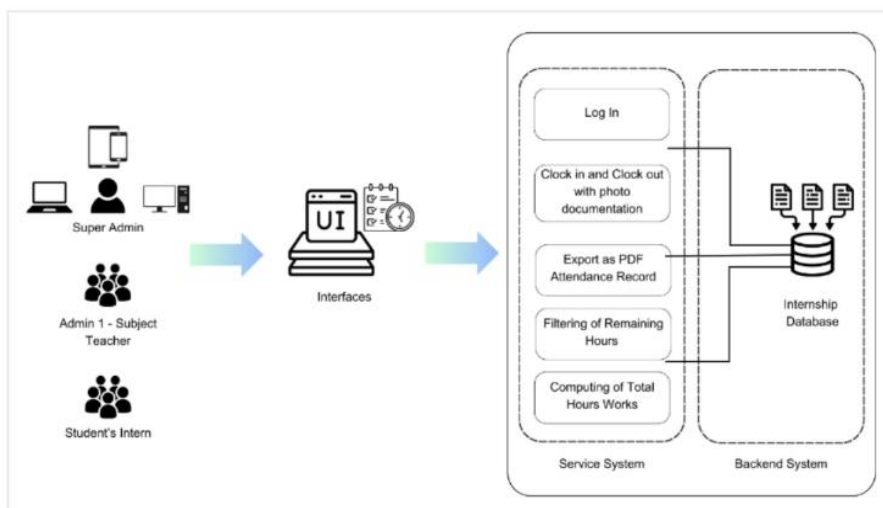


Figure 2. Three-Tier Framework Model

By leveraging this three-tier framework, the system significantly enhances performance, security, and reliability while minimizing processing errors. The modular structure allows independent updates to be applied to any layer without disrupting the entire system, ensuring seamless maintenance and scalability. The exclusive monitoring access for subject teachers ensures a centralized and controlled approach to internship tracking, improving accuracy, efficiency, and compliance with program requirements.

Through these integrated features, the Internship Time Track Efficient Monitoring System modernizes internship tracking at Pangasinan State University - Alaminos City Campus, replacing manual processes with a secure, automated, and highly accurate solution. By empowering subject teachers with real-time monitoring and reporting tools, the system ensures a transparent, accountable, and efficient internship tracking process.

CONCLUSION

The development of the web-based internship time tracking system was crucial for addressing the inherent inefficiencies and challenges of manual tracking methods previously used at Pangasinan State University – Alaminos City Campus. By automating the tracking process, the system eliminated human errors, ensured real-time monitoring, and provided accurate reporting, which enhanced the overall management and evaluation of internship activities. This was particularly important in an academic setting where timely and precise data management was essential for monitoring students' progress and ensuring that internship requirements were met effectively.

The system's use of Agile methodology ensured that it was adaptable to the evolving needs of users, providing a flexible and responsive solution. The positive feedback from usability assessments emphasized its reliability, ease of use, and efficiency, making it a valuable tool for academic institutions. This system not only streamlined administrative processes but also enhanced transparency and accountability, contributing to the overall success of internship programs and fostering a more organized and professional learning environment.

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