Instal : Jurnal Komputer

E-ISSN: 2808-683X
Edisi : Volume 17 Nomor 12 | Tahun 2026

Available online at https://journalinstal.cattleyadf.org/index.php/Instal/index

Rancang Bangun Sistem Informasi Learning Management System menggunakan Metode Waterfall dengan Framework Laravel

Ferdy Syahlan Susilo [1], **Eko Hariyanto** [2], **Rahmad Budi Utomo** [3]
[1,2,3]Universitas Pembangunan Panca Budi, Medan, Indonesia

ARTICLE INFO

Keywords:

Learning Management System,
Waterfall Methode,
Laravel Framework,
PT. Kodinglab Integrasi Indonesia

ABSTRACT

Learning Management System (LMS) is a technology-based system designed to support online learning processes. This study aims to design and develop a web-based LMS information system using the Waterfall method and the Laravel framework as an effort to enhance internship training at PT. Kodinglab Integrasi Indonesia. The research method involves several stages, including requirements analysis, system design, implementation, and testing. The objective of this study is to demonstrate that the developed LMS can assist mentors and interns in managing training materials, monitoring progress, and assessing learning outcomes digitally. This system facilitates the learning process and supports self-directed learning

Corresponding Author:
Ferdy Syahlan Susilo
Universitas Pembangunan Panca Budi
Email: ferdisusilo34@gmail.com

INTRODUCTION

Learning Management System (LMS) is an information technology–based system used to manage online learning activities. LMS provides convenience in managing content, communication, evaluation, and tracking the learning outcomes of internship participants [1]. The use of LMS in learning can improve the teaching and learning process because it can be accessed anytime and anywhere. In addition, LMS also enables institutions to monitor the learning activities of interns in real time. In the development of information systems, various methods and frameworks are used to improve software quality [2]. One of the most commonly applied methods is the Waterfall model. The Waterfall method has structured phases, starting from requirements analysis to system maintenance, which helps minimize the risk of errors during development. However, this method has limitations in terms of flexibility because each phase must be completed before moving on to the next stage.

The Laravel framework is a PHP-based framework that provides various features to accelerate and simplify the development of web applications [3]. Laravel uses the MVC (Model–View–Controller) architecture, which separates program logic, interface components, and data control, making code management more efficient [4]. Laravel also integrates well with frontend frameworks such as Bootstrap, supporting responsive and modern user

Page : 771-776
https://doi.org/10.54209/jurnalinstall.v17i12.466

interface development. Several other studies have also discussed the development of web-based information systems using similar approaches and environments. Lubis, Hariyanto, and Hardinata (2023) [5] conducted research on the development of an electronic mail archiving system using the Agile method, emphasizing iterative processes and user involvement. Their study highlights the importance of utilizing web-based technology to streamline document administration and management.

Yanti, Hariyanto, and Hardinata (2023) [6] developed an online assignment letter information system using the Prototype method. Their research illustrates how web technology can be used to digitalize company administrative processes, demonstrating that web-based approaches can significantly improve work efficiency. In addition, Hariyanto and Hardinata (2023) [7], in their research on a community reading-house education system using web-based learning, emphasize that the application of information technology can enhance learning independence within the community. This aligns with the objective of this study, which is to develop a web-based learning system capable of supporting internship training in a digital environment.

From the various literature reviewed, it can be concluded that web-based system development using structured methods such as Waterfall and the Laravel framework is highly relevant for implementing a Learning Management System. Both approaches provide a balance between development efficiency, system stability, and long-term maintainability.

METHODS

The Waterfall model, also known as the waterfall approach, is a software development life cycle. It is a framework or process used by software development teams. This system development flow is structured, beginning with planning and analysis, followed by design, implementation, operation and maintenance, as well as analysis, design, coding, testing, and support stages [8].

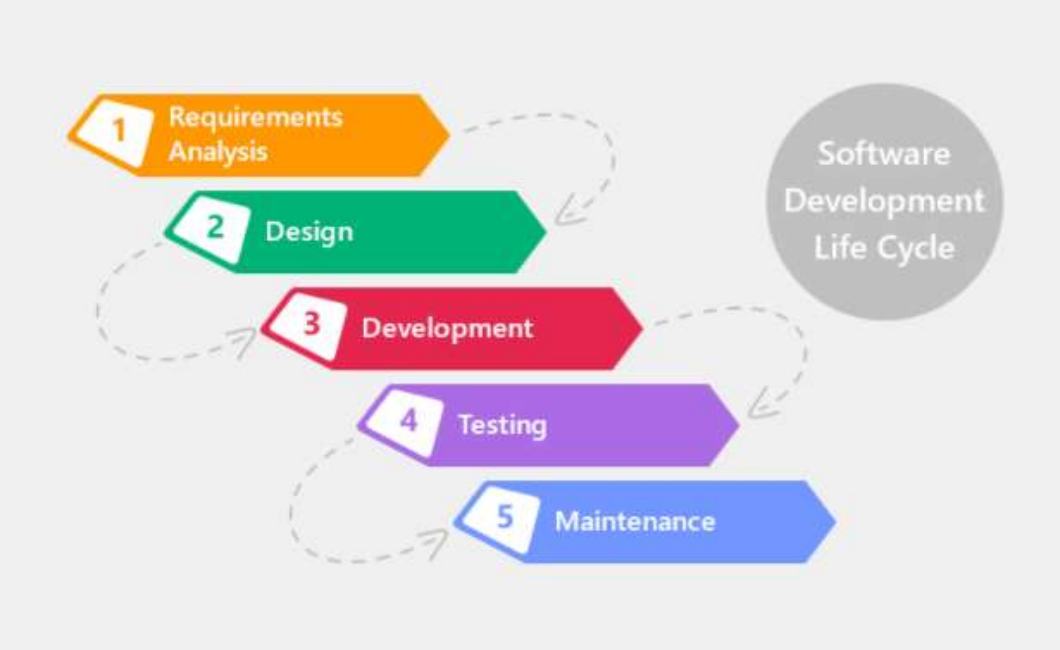

Figure 1. the sequence of research methods

Indonesia to be managed and further developed according to the company's internal needs.

1. Requirements Analysis.

Page : 771-776
https://doi.org/10.54209/jurnalinstall.v17i12.466

At this stage, the process of identifying system requirements is carried out through direct observation and interviews with PT. Kodinglab Integrasi Indonesia to obtain the data and information needed for system development.

2. System Design.
   This stage aims to design the system workflow and describe the interactions between users and system using a use case diagram as a reference in development process.
3. Implementation (Coding).
   In the implementation stage, the system is developed based on the use case design using the Laravel framework along with several supporting libraries required to build the application's functionality.
4. Testing.
   Testing is carried out to ensure that all system features function according to the required specifications. Trials are conducted together with PT. Kodinglab Integrasi Indonesia to ensure alignment between the system and user needs.
5. Maintenance
   In the maintenance stage, the system is fully handed over to PT. Kodinglab Integrasi. These stages are applied in the development of the Laravel-based LMS used for internship training at PT. Kodinglab Integrasi Indonesia.

RESULTS AND DISCUSSION

The results and discussion of this study indicate that the implementation of a Learning Management System (LMS) is an appropriate solution for facilitating the learning process of internship participants at PT. Kodinglab Integrasi Indonesia. This system helps address challenges related to teaching schedule allocation, which previously disrupted employee focus and productivity as mentors. A use case is a model that describes the interaction between an actor and a system to achieve a specific goal. Use cases are used to determine the functions contained within an information system and to identify which users are authorized to access those functions [9].

Page : 771-776
https://doi.org/10.54209/jurnalinstall.v17i12.466

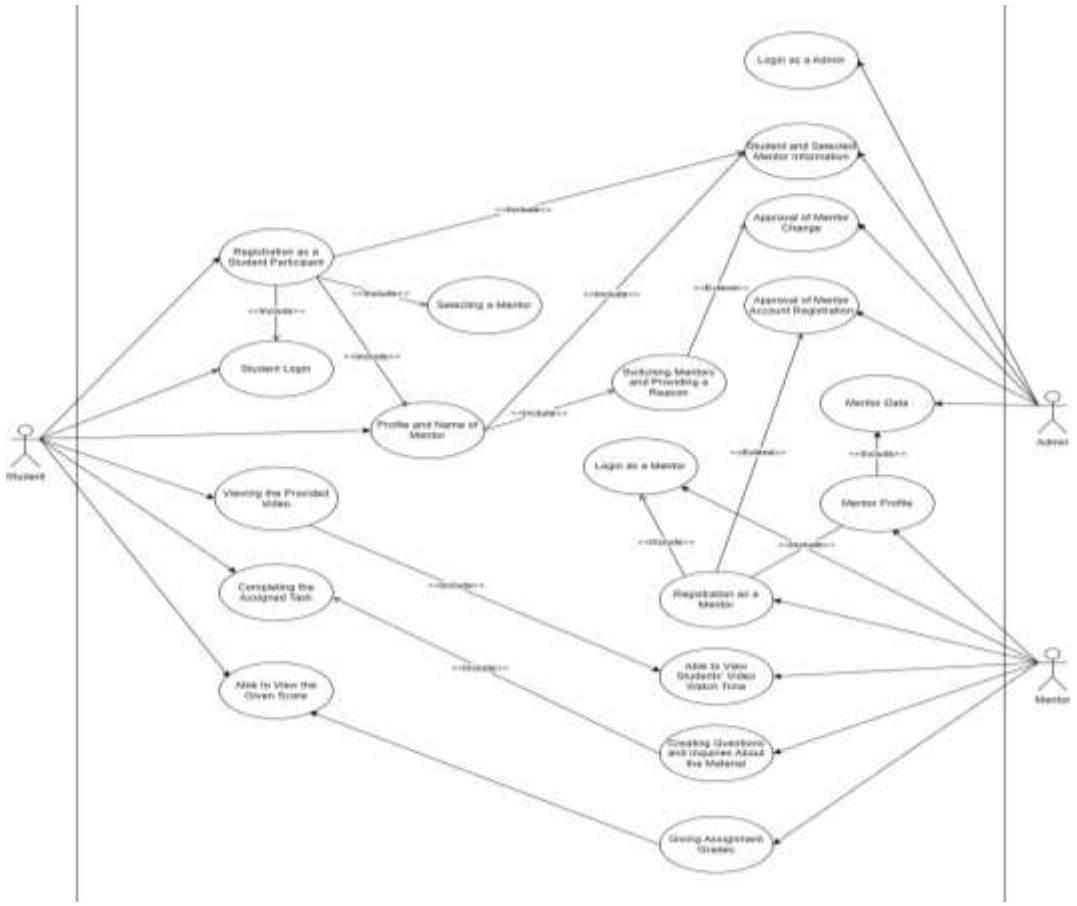

Figure 2. Usecase

In designing this Learning Management System, the use case diagram is utilized to illustrate all activities that can be performed by the three main actors: Admin, Mentor, and Internship Participant. The use case diagram shown in Figure 2 presents the relationship between each actor and the corresponding system functions.

The Admin actor has full access rights to the system, including logging in as an admin, managing data for interns and mentors, approving mentor account registrations, and configuring learning materials such as instructional videos and assignments. The admin is also responsible for verifying user data and ensuring the smooth operation of learning activities within the system.

The Mentor actor plays a role in providing learning materials to interns in the form of videos and assigning tasks as a form of evaluation. Mentors can register and log into the system, manage their personal profiles, and monitor the learning progress of interns through features such as video watch-time tracking and uploaded assignment submissions. With these features, mentors can determine the extent to which interns understand the material provided.

Meanwhile, the Internship Participant is the primary user who interacts directly with the learning materials. Participants register as new users, log into the system, select their preferred mentor, and access the profile of the chosen mentor. Once registered, participants can view the provided learning videos and upload their assignment results through the system.

Page : 771-776
https://doi.org/10.54209/jurnalinstall.v17i12.466

Table 3. Use Case Diagram Description

No.	*Usec ase*	Deskripsi	Aktor
1	Login	Login is performed by all actors to distinguish the roles they have selected.	Student, Mentor dan Admin
2	Selecting a Mentor	Aimed at selecting a mentor according to the user's preference.	Student
3	Viewing the Provided Videos and Assignments	Internship participants can view the videos provided by the admin and the assignments given by the mentor.	Student
4	Providing Learning Videos	The learning videos viewed by the interns can be edited as needed.	Admin
5	Assigning Tasks	The assignments received by the internship participants can be provided directly by their respective mentors and the admin.	Admin and Mentor
6	Monitoring	Mentors can monitor the viewing progress to see how far the interns have watched the assigned videos.	Pembimbing
7	Giving Grades	Mentors and admin can provide grades for the assignments given.	Mentor and Admin

CONCLUSION

Based on the research conducted, it can be concluded that the web-based Learning Management System (LMS) developed using the Waterfall method and the Laravel framework is an appropriate solution for the internship training process at PT. Kodinglab Integrasi Indonesia. The results of the study show that the implementation of the LMS is able to:

1. Facilitate the learning and training process for internship participants, as all materials can be accessed online anytime and anywhere.
2. Support independent learning, allowing interns to study without having to wait for face-to-face sessions with mentors.
3. Improve time efficiency and mentor productivity, as the system reduces obstacles related to balancing teaching activities and primary job responsibilities.
4. Provide convenience for mentors and administrators in monitoring the learning progress of interns through activity tracking features, assignment submissions, and digital assessments.
5. Organize all learning data effectively, including user management (admin, mentor, and intern), learning videos, and evaluation results.

Page : 771-776
https://doi.org/10.54209/jurnalinstall.v17i12.466

Thus, the LMS developed using Laravel and the Waterfall model is capable of optimizing the digital-based internship training process within a technology-oriented company such as PT. Kodinglab Integrasi Indonesia. This system also has the potential to be further developed by adding interactive features such as discussion forums, online quizzes, and automated certification to enhance the user learning experience.

REFERENCES

[1] I. G. N. Wiragunawan, "Pemanfaatan Learning Management System (LMS) dalam Pengelolaan Pembelajaran Daring pada Satuan Pendidikan," EDUTECH: Jurnal Inovasi Pendidikan Berbantuan Teknologi, vol. 2, no. 1, pp. 82–89, 2022.

[2] A. A. Wahid, "Analisis Metode Waterfall untuk Pengembangan Sistem Informasi," Jurnal Ilmu-Ilmu Informasi dan Manajemen STMIK, vol. 1, no. 1, pp. 1–5, 2020.

[3] A. Ratino, R. Astri, and P. Anggraini, "Implementasi Framework Laravel dalam Pengembangan Aplikasi E-Commerce untuk Toko Jago Software," Journal of Informatics and Business, vol. 1, no. 2, pp. 33–43, 2023.

[4] D. Alpina and H. Witriyono, "Pemanfaatan Framework Laravel dan Framework Bootstrap pada Pembangunan Aplikasi Penjualan Hijab Berbasis Web," Jurnal Media Infotama, vol. 18, no. 1, pp. 36–42, 2022.

[5] F. Lubis, E. Hariyanto, and A. Hardinata, "Rancang Bangun Aplikasi Arsip Surat Menyurat Elektronik dengan Model Agile pada Kantor Desa Setia Karya Mandailing Natal," Jurnal KomtekInfo, vol. 10, no. 2, pp. 50–58, 2023.

[6] L. Yanti, E. Hariyanto, and A. Hardinata, "Rancang Bangun Sistem Informasi Surat Tugas Online dengan Metode Prototype di PT PLN (Persero) Sumatera Utara," Jurnal KomtekInfo, vol. 10, no. 3, pp. 45–52, 2023.

[7] E. Hariyanto and A. Hardinata, "Desain Sistem Edukasi Rumah Baca Berbasis Resource Sharing dengan Model Web-Based Learning di Desa Lau Gumba Kabupaten Karo," Jurnal KomtekInfo, vol. 10, no. 4, pp. 60–68, 2023.

[8] S. Supiyandi et al., "Perancangan Sistem Informasi Desa Tomuan Holbung Menggunakan Metode Waterfall," JURIKOM (Jurnal Riset Komputer), vol. 9, no. 2, pp. 274–281, 2022.

[9] Hariyanto, E., & Hardinata, A. (2023). Desain Sistem Edukasi Rumah Baca Berbasis Resource Sharing dengan Model Web-Based Learning di Desa Lau Gumba Kabupaten Karo. Jurnal KomtekInfo, 10(4), 60–68.