Journal of Artificial Intelligence and Engineering Applications

Website: https://ioinformatic.org/

15th February 2026. Vol. 5. No. 2; e-ISSN: 2808-4519

Design and Development of a Hybrid E-Portfolio Application for Islamic Boarding School Students

Ummi Fadlilatus Zakiyah[1], Sofiatun Mukarroma[2*], Amelia Ikmatus Zahro[3] Ahmad Hamdani[4*]

[1,2,3] *Information Systems Study Program, Ibrahimy University*
[4] *Information Technology Study Program, Ibrahimy University*
ummifadlilatuzzakiyah2525@gmail.com [1], sofiatulmukarromah085@gmail.com[2*], ameliaikmatuszahro@gmail.com[3],
dan.kidz88@gmail.com[4*]

Abstract

The development of information and communication technology has encouraged educational institutions, including Islamic boarding schools (pesantren), to adopt digital systems for academic management and documentation. One important requirement in pesantren environments is the management of student portfolios that record academic achievements, religious activities, organizational involvement, and community service. However, limited internet access, digital device usage policies, and uneven technological infrastructure hinder the effective implementation of fully online e-portfolio systems. This study aims to design and develop a Hybrid E-Portfolio Application for pesantren students that can be utilized in both offline and online modes. The system was developed using the System Development Life Cycle (SDLC) with a Prototype model, which includes requirement analysis, initial design, prototype development, and user evaluation. The results indicate that the developed system is capable of supporting structured recording, management, and storage of student portfolios, as well as enabling data synchronization when an internet connection is available. The proposed hybrid e-portfolio application provides an adaptive solution to documentation challenges in pesantren environments and supports sustainable digital transformation in pesantren-based education.

Keywords: *e-portfolio; hybrid system; Islamic boarding school; information system; prototype*

1. Introduction

The evolution of information and communication technology has significantly impacted educational systems, including pesantren, which are beginning to integrate digital tools. Pesantren, as Islamic educational institutions, play a crucial role in cultivating character, spiritual values, and self-reliance among students. However, in this digital age, pesantren are also required to effectively and systematically incorporate technology into their learning processes, administrative functions, and academic documentation [1].

One of the genuine necessities I have seen is management of student portfolios in a digital space. Portfolios are an instrument to document academic achievements, scientific works and social engagements as well as personal religious activities that contribute to the development of competencies. The study of Nafira Ramadhannis and Nurudin Santoso (2023) confirmed that E-Portfolio application based on mobile can help students in documenting assignment, achievement, organization and non-academic regularly. The system developed using Flutter and MongoDB implemented through waterfall model, yielded 100% functionality based validity. These results indicate that e-portfolios might enhance self-reflection, the documentation of accomplishments and career readiness for students [2].

Ridwan Setiawan and Wildan Hidayatul Hamdi (2024) created the career development center (CDC) web-based e-portal. CreatedWithAgile (Scrum) development, this platform enables users to maintain share and download portfolios in PDF format online. E-portfolios have become not only a repository but even a strategic device for enhancing students and alumni's professionalism with the workplace [3].

However, the implementation of an e-portfolio system in the context of Islamic boarding schools faces various challenges, such as limited internet access, policies on the use of digital devices, and uneven technological infrastructure [4]. These conditions result in a fully online-based system not being able to be optimally implemented in Islamic boarding schools. Therefore, an adaptive solution is needed, namely a hybrid e-portfolio system that can be used both offline and online. In offline mode, students can still record and store portfolio data, then automatically synchronize when an internet connection is available.

This concept is particularly relevant in Islamic boarding schools such as the Salafiyah Syafi'iyah Sukorejo Islamic Boarding School, which integrates Islamic boarding school education, higher education, and religious activities. With a hybrid e-portfolio system, academic documentation, memorization, service, achievements, and organizational activities can be digitally archived without relying entirely on the internet [5].

In light of this context, the study's goal is to create a hybrid e-portfolio application for students attending Islamic boarding schools. It is anticipated that this application will serve as an integrated self-documentation tool, facilitate technology-based education, and improve Islamic boarding schools' preparedness for the digital age. The findings of this study are anticipated to serve as a model for integrating technology that is inclusive, sustainable, and consistent with the nature of Islamic boarding school education using a contextual and adaptive approach [6].

2. Riviewe Literature

2.1 E-Portofolio

A collection of digital artifacts that represent a person, group, community, organization, or institution is known as an e-portfolio, or electronic portfolio (Kamalia, 2014). E-portfolios make it easier and faster for users to present their work to the public. E-portfolios, a type of digital portfolio, offer users the chance to reflect on their work and assess their personal growth over a predetermined time period in addition to containing their work [7].

2.2 Hybrid

Information systems that integrate local (on-premise) technology with public and private clouds are examples of hybrid approaches, which combine two or more independent components to build a more efficient system [8].

2.3 Islamic boarding school

Islamic boarding schools are Islamic educational establishments that strategically influence students' moral development, character, and academic aptitude. As formal and informal educational establishments, they engage in a variety of administrative, academic, and managerial tasks in addition to the teaching and learning process [9].

2.4 Prototype

Users can be involved in identifying requirements and creating systems to address them through the prototyping process, an analytical and design technique. Prior to deployment, prototyping aids in improving the integration of online and in-person components or filtering techniques. This method saves time and money while increasing accuracy in satisfying user needs [10].

3. Methods of research

3.1 Information Gathering

In this study, the following methods of data collecting were employed:

a. Observation
   Customers and research participants were closely observed.
b. Literature Review
   Literature Review A variety of literature sources pertaining to the study topic and objectives were searched and reviewed in order to conduct the literature review.

3.2 Techniques for System Development

A software development strategy called the prototype method entails creating a preliminary model of the system or application that will be developed [11]. This first model facilitates communication between developers and users to gather input, allowing for a more precise comprehension of user requirements. The prototype approach lowers the risk of design flaws and possible system failures prior to the full implementation stage through an iterative review and improvement process. There are typically four primary steps in the prototype process:

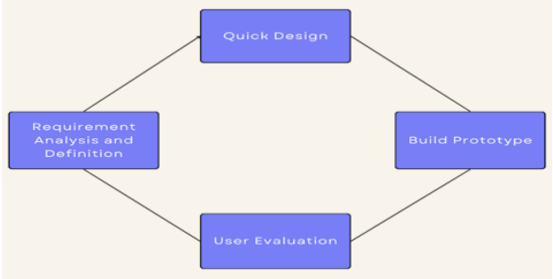

Fig. 1. Prototype Method

a. Analysis and Definition of Requirements
   The first step is to conduct langsung pengamatan in the research location while conducting kuesioner penyebaran to the users. The result of this research is a system requirement that serves as the foundation for the development of the Interior Garis Nuansa website prototype [12].
b. Quick Design
   An initial design is created as a basic overview of the system that will be developed in the subsequent design stage following the completion of the preceding processes.

c. Build Prototype
   Based on the findings of the earlier investigation, then concentrate on developing a prototype of the Interior Garis Nuansa website interface in accordance with user needs.
d. User Evaluation
   Following the creation of the prototype, respondents are interviewed to offer feedback and evaluations of the website design.

4. Results and Discussion

4.1. Design of Information Systems

The design and implementation of a hybrid e-portfolio system for students at the Salafiyah Syafi'iyah Sukorejo Islamic Boarding School is the main topic of this study. This system was created to solve issues that are prevalent in Islamic boarding schools, such as limited internet connection, inconsistent preservation of academic and religious records, and achievement documentation.

The System Development Life Cycle (SDLC) Prototype model with the Unified Modeling Language (UML) was utilized in this study's development phase because it enables iterative design procedures that are customized to the needs of users in an Islamic boarding school setting [13].

a. Use Case Diagram

A use case diagram describes how actors, such as users or other systems, interact with the system to accomplish a particular objective. During the system analysis and design phase, use cases are used to show the functions that users can access and perform within the system without providing technical details [14].

Fig. 2. Use Case Diagram

b. Activity Diagram

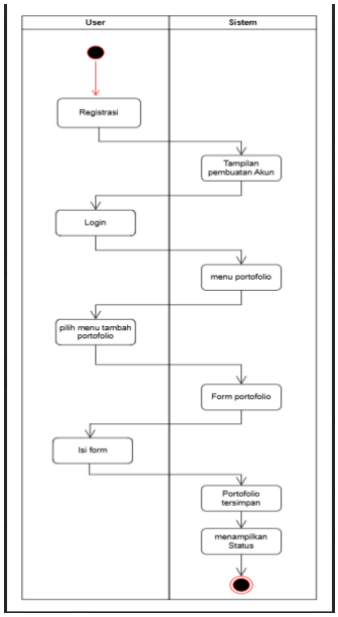

Fig. 3. Activity Diagram

Activity diagrams are one type of internal diagram UML (Unified Modeling Language), an activity diagram is a kind of diagram used to precisely depict a system's workflow or activity flow. This diagram explains the start of a process, the actions that take place, the choices that are made, and the process's outcome [15].

c. Sequence Diagram

Sequence diagrams are used to show how objects in a system interact with one another in chronological sequence. From the start of the process until its conclusion, these diagrams demonstrate how objects exchange messages with one another [16].

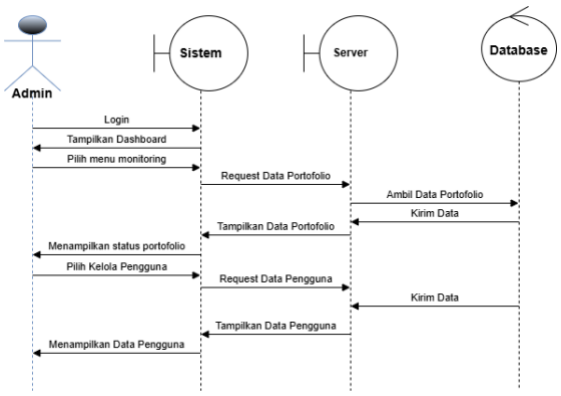

Fig. 4. *Sequence Diagram Admin*

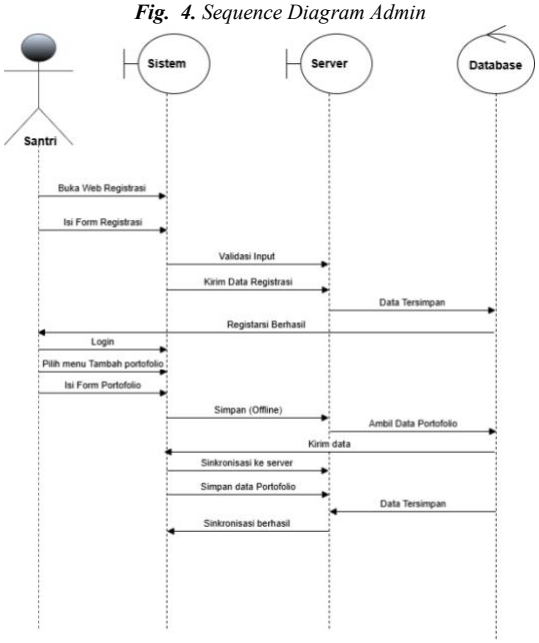

Fig. 5. Sequence Diagram Santri

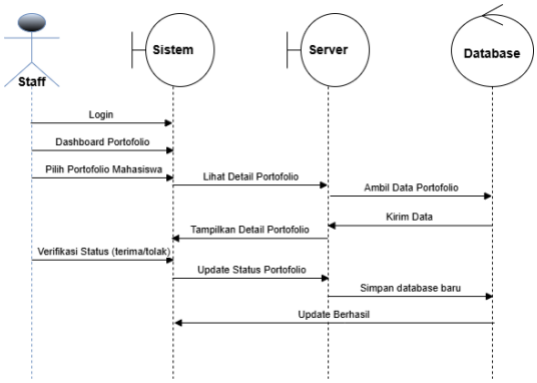

Fig. 6. Sequence Diagram Staff

d. Class Diagram

Class diagrams serve as a foundation for database implementation and program code by statically modeling system structures and describing classes, properties, operations, and relationships between classes [17].

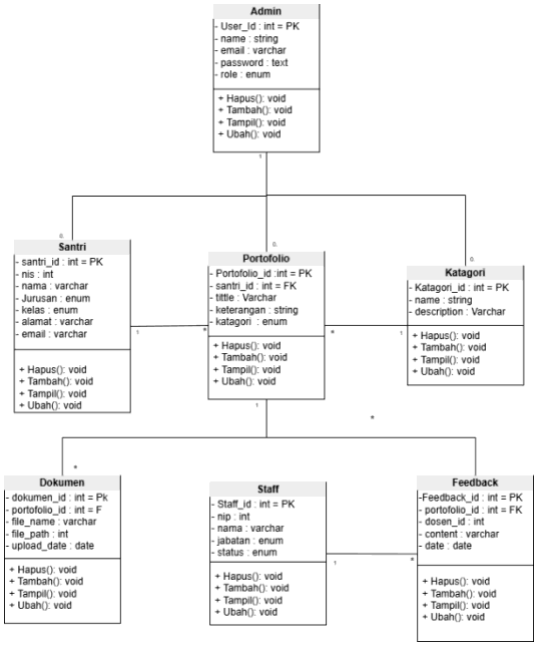

Fig. 7. Class Diagram

4.2. Design of the Interface

a. Login Form

The Santri E-Portfolio system's login page acts as the primary entry point for users to access the services that are offered. Users must choose a role depending on their access permissions and input authentication information, such as an email address and password, on this page. Only authorized users will be able to access the system thanks to this authentication procedure.

Fig. 8. Login Page

b. Portfolio Upload

Students can use the Upload Portfolio site to contribute and record their accomplishments or work to the E-Portfolio system. This page allows users to provide structured portfolio information, such as the title of the portfolio, the category, and a description that explains the purpose and substance of the uploaded document.

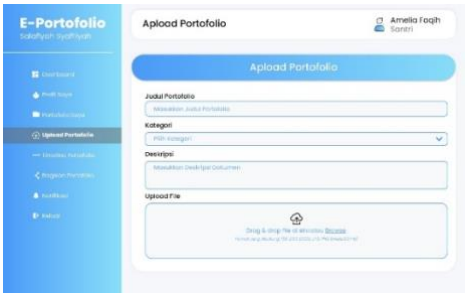

Fig. 9. Portfolio Upload Page

c. Portfolio of Students

All of the portfolios that students upload to the E-Portfolio system are managed centrally on the My Portfolio page. The portfolio category, title, brief description, and upload date are all included in the list of portfolios that are shown as information cards on this page.

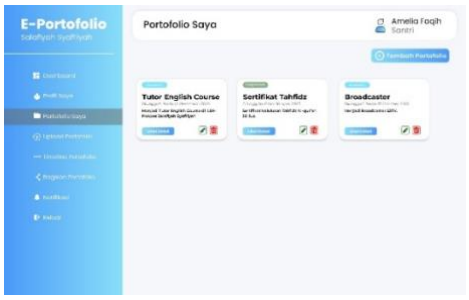

Fig. 10. Student Portfolio Page

d. Page for Student Data

Staff members can manage and keep an eye on student data that is registered in the E-Portfolio system by using the Student Data Page. Important details, such as each student's name, Student Identification Number (NIS), and the quantity of portfolios they have submitted, are listed in tabular form on this page.

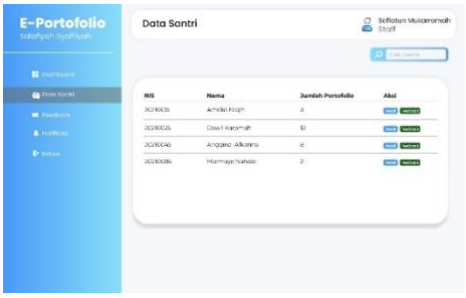

Fig. 11. Student Data Page

e. Page for User Management

Administrators can manage user accounts in the E-Portfolio system using the User Management Page. Through the different tabs on this site, administrators can see a list of users categorized by role (administrators, staff, and students). The user's name, email address, position, account status, and Student ID (NIP) are among the details shown.

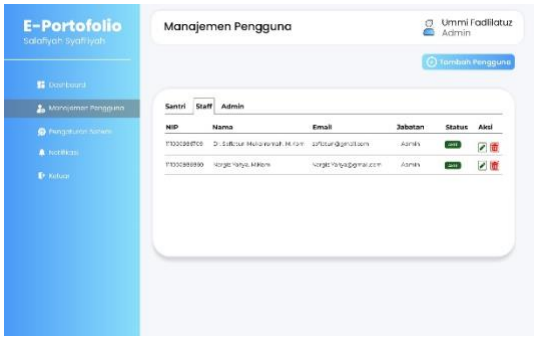

Fig. 12. User Management Page

5. Conclusion

In order to address uneven technology infrastructure and restricted internet access, this research effectively planned and constructed a hybrid e-portfolio application for Islamic boarding school students. By implementing a system that can be utilized both offline and online with a data synchronization mechanism, the research objective of creating an adaptive, integrated portfolio documentation medium that matches with the characteristics of Islamic boarding school education was accomplished. The design process was made iterative and sensitive to user needs through the use of the prototype system development technique, which produced a system that is more in line with the actual conditions in the Islamic boarding school setting. The application's implementation showed that the system can facilitate the organized and long-lasting recording and maintenance of academic, religious, and organizational portfolios. As a result, the developed application has the potential to serve as a model for the implementation of an educational information system that supports Islamic boarding schools' sustainable digital transformation and improves students' preparedness for the demands of the digital age in both their academic and professional lives.

6. Recognition

We are grateful to our professors for their guidance during the creation of this journal. To you and our parents, who have shown us such love and kindness, we wish you great success.

Reference

[1] S. Jurnal, S. Informasi, R. Fatikhin, and N. A. Sivi, “Effective and efficient Madrasah or Islamic Boarding School Education Information System. In-

depth analysis of real conditions in madrasahs/Islamic boarding schools, especially related to administrative processes," no. April, 2025.
[2[D. Fernando, "DESIGN AND CONSTRUCTION OF E-PORTFOLIO APPLICATION OF WORK RESULTS," no. 1, pp. 7–12, 2018.
[3] L. Fitriani, R. Setiawan, and W. H. Hamdi, "Development of Web-Based E-Portfolio for Career Development," pp. 249–258, 2024, doi: 10.33364/algoritma/v.21-1.1619.
[4] P. E. In et al., "STUDENTS' SKILLS IN BASIC GRAPHIC DESIGN SUBJECTS," pp. 67–74.
[5] J. Science and P. Vol, "No Title," vol. 5, no. 1, pp. 10–19, 2025.
[6] K. et al 2023, "No Title 済無 No Title No Title No Title," vol. 32, no. 3, pp. 167–186, 2021.
[7] N. Ramadhannis and N. Santoso, "Design and Construction of Mobile-Based E-Portfolio Application," Journal of Information Technology and Computer Science Development, vol. 7, no. 3, pp. 1518–1523, Mar. 2023.
[8] Haris Mujianto. (2025). "Transformation of Learning Systems with a Hybrid Approach Based on Information Technology", Vol. 9, No. 1 December - June 2025.
[9] R. Fatikhin, N. A. Sivi, Nurhidayah "Madrasah or Islamic Boarding School Education Information System", Volume. 3, Number. 2, April 2025 e-ISSN: 3031-9943; and p-ISSN: 3031-9935; Pages 23-29.
[10] I. P. Sari, O. K. Sulaiman, Al-Khowarizmi, M. Azhari "Design of Public Service Information System in Sipagimbar Village using Web-Based Prototype Method" Vol. 2 No. 2 (2023) October Edition.
[11] D. Meisak, Hendri, and S. R. Agustini, "Application of Prototype Method in Designing Sales Information System of Mediatama Solusindo Jambi," STORAGE J. Ilm. Tech. and Comput. Science, vol. 1, no. 4, pp. 1–11, 2022, doi: 10.55123/storage.v1i4.1066.
[12] D. Meliani, K. Dewi, A. Lestari, and D. Oktaviyani, "Development of Website-Based Thematic Community Service Lecture Application at Palangka Raya University," JOINTECOMS (Journal Inf. Technol. Comput. Sci. p-ISSN 2798-284X, vol. 1, no. 2, pp. 2798–3862, 2021).
[13] M. F. A. Prasetyo, M. R. Ardiansyah, A. A. Ashari, D. T. Putro, and E. Rahmawati, "Design and Construction of Website-Based Shipment Tracking Using the Systems Development Life Cycle (SDLC) Method with the Waterfall Model," J. JTIK (Jurnal Teknol. Inf. dan Komunikasi), vol. 8, no. 2, pp. 306–315, 2024, doi: 10.35870/jtik.v8i2.1387.
[14] R. Putri, A. Hafizhah, and F. H. Rahmah, "UML Diagram Modeling for Designing a Pet Consultation Application System," vol. XII, no. 2, pp. 130–139, 2021.
[15] M. R. Wayahdi and F. Ruziq, "Modeling a New Member Recruitment System with Unified Modeling Language (UML) (Case Study: Programmer Association of Battuta)," J. Minfo Polgan, vol. 12, no. 1, pp. 1514–1521, 2023, doi: 10.33395/jmp.v12i1.12870.
[16] V. Y. Pudya Ardhana, "Designing Qamarul Huda Pharmacy Information System Using Unified Modeling Language (UML)," J. Health. Qamarul Huda, vol. 9, no. 2, pp. 115–119, 2021, [Online]. Available: https://jkqh.uniqhba.ac.id/index.php/kesehatan/article/view/309
[17] E. Elis and A. Voutama, "Utilization of UML (Unified Modeling Language) in Planning a Website-Based Traditional Clothing Rental System," I N F O R M a T I C a, vol. 14, no. 2, p. 26, 2023, doi: 10.36723/juri.v14i2.445.