Design and Implementation of an Electronic Library Management System for the Department of Information Technology at Thai Nguyen University

ICTU Student 32
Thai Nguyen University of Information and Communication Technology
Thai Nguyen University, Thai Nguyen, Vietnam

***Abstract*—This thesis presents the design and implementation of an electronic library management system for the Department of Information Technology at Thai Nguyen University. The system utilizes UML and C# to manage reader registration, book management, and borrowing processes. The research covers the analysis and design of the system using UML, including the creation of use case diagrams, activity diagrams, and class diagrams. The implementation details of the system, such as the creation of classes and methods, are also discussed. The system successfully manages reader registration, book management, and borrowing processes, providing a user-friendly interface for both librarians and readers. The implementation was carried out using C# and UML, ensuring a robust and efficient system. However, the system lacks a comprehensive evaluation and testing phase, which could have provided more insights into its performance and usability.**

***Index Terms*—UML, C#, electronic library, system design, object-oriented programming, Thai Nguyen University**

I. Introduction

The thesis introduces UML (Unified Modeling Language) and C#, explaining their roles in software development and system design. UML is described as a standard language for detailed software planning, while C# is highlighted as a modern, object-oriented programming language with various advantages. The research aims to apply these tools to design and implement an electronic library management system for the Department of Information Technology at Thai Nguyen University. The system is intended to streamline the processes of reader registration, book management, and borrowing, thereby improving the efficiency of the library operations. [1]

II. Methods

The methods section covers the analysis and design of the system using UML, including the creation of use case diagrams, activity diagrams, and class diagrams. The implementation details of the system, such as the creation of classes and methods, are also discussed. The use case diagrams outline the interactions between the system and its users, while the activity diagrams provide a step-by-step process of the borrowing and registration procedures. Class diagrams are used to define the structure of the system, including the relationships between different classes. The implementation was carried out using C#, a modern, object-oriented programming language that supports the development of complex and robust applications. The system includes functionalities such as reader registration, book management, and borrowing processes, all of which are implemented using C#. [1]

Supervisor: Nguyễn Đình Dũng, Thai Nguyen University of Information and Communication Technology (nddung@ictu.edu.vn).

III. Results

The results include the successful development and implementation of the electronic library management system for the Department of Information Technology at Thai Nguyen University. The system successfully manages reader registration, book management, and borrowing processes. The implementation was carried out using C# and UML, ensuring a robust and efficient system. The system provides a user-friendly interface for both librarians and readers, allowing them to perform various tasks such as registering new readers, managing books, and borrowing books. However, the system lacks a comprehensive evaluation and testing phase, which could have provided more insights into its performance and usability. The actual implementation involved creating classes and methods for each of the system's functionalities, such as the registration of new readers, management of book information, and the borrowing and returning of books. [1]

IV. Discussion

The discussion focuses on the application of UML and C# in the design and implementation of the system. The author highlights the benefits of using UML for system modeling and C# for its simplicity and modern features. The use of UML allowed for a detailed and structured approach to the design of the system, while C# provided a powerful and flexible programming language for implementation. The system successfully manages reader registration, book management, and borrowing processes, providing a user-friendly interface for both librarians and readers. However, the lack of a comprehensive evaluation and testing phase is a limitation, as it could have provided more insights into the system's performance and usability. Future work could include adding more advanced features and conducting a thorough evaluation of the system's performance. [1]

V. Conclusion

The conclusion reiterates the successful implementation of the electronic library management system and suggests

future directions for the system's development, including its potential use in other institutions. The system provides a robust and efficient solution for managing library operations, but further improvements could be made by adding more advanced features and conducting a comprehensive evaluation. The system's implementation using C# and UML demonstrates the effectiveness of these tools in software development and system design. Future research could explore the integration of the system with other library management systems and the development of a more comprehensive evaluation framework. [1]

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