

COMPARISON OF SOFTWARE, PROGRAMMING LANGUAGE AND FRAMEWORK FOR SYSTEM DEVELOPMENT IN INSTITUTE OF HIGHER LEARNING

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Abstract. Software or programming language is one of the most crucial aspects in system development, especially in education institutions. Various software need to be considered from each angle, which includes pricing, after sales service, ease of integration and learnability. Model-View-Controller (VC) based software or programming language such as Laravel PHP is being considered since it is widely used by software house. Another software that is considered is Microsoft PowerApps because of its low code approach in system development. Finally, an application development framework that is considered is Corrad. Corrad is a local-based framework that has its own library which can reduce development time. After comparison have been conducted, Laravel PHP have been chosen as the most suitable development framework. Some of the contributing factors include pricing, integration with existing platform and learnability.

Keywords: System Development, Application for Development, Programming Language

1 INTRODUCTION

Since the introduction of first-generation computers, computer technology has undergone significant advancements. This progression witnessed the eras of vacuum tubes, transistors, and integrated circuits before the emergence of the microprocessor in 1970, often referred to as the Fourth Generation. The advent of the microprocessor era brought about the creation of personal computers (PCs) and also spurred the development of graphical user interfaces (GUIs) along with various handheld devices (A Suliman et al, 2014). In order to stay competitive, organizations have to pay higher price for overall system functionality (J. Mills, 2018). Higher education institutions face unique challenges in system development due to their nature. It encompasses academic, administrative, and research functions. Most organizations face challenges

such as cost and schedule overrun because of limitation in terms of interoperability and certification requirements (Considine, 2016). Certain higher education institute have decided to developed its own system by utilizing exiting staff. This paper is part of decision-making process in terms of determining which development tools is the most suitable to be used. This paper also explores the comparison between system development framework or application of system development. Some of the system that must be developed for a higher education institute includes:

- Academic Management System
- University Research System
- Complaint Management System
- Facility Management System
- Asset Management System

The timeline that has been allocated is two years. The methodology that is used for this project is Rapid Application Development (RAD). Rapid Application Development (RAD) is an expedited software development approach that emphasizes continuous improvement and feature addition based on user feedback. A survey is conducted to assess user requirements, followed by a User Acceptance Test (UAT) to gather feedback on the developed system (Gananjaya et al, 2022). This methodology was chosen because it can shorten development speed, provides flexibility and most importantly involves close collaboration with the user. With total user around 7000 people that consists of staff and students, this method allows for flexibility and fast development.

2 SYSTEM DEVELOPMENT FRAMEWORK AND TOOLS

2.1 Microsoft PowerApps

Microsoft PowerApps is one of the low-code development platforms that is available in the market. It allows users to create custom business applications without the need for extensive coding expertise. Microsoft PowerApps enables developers to build tailored applications to streamline processes, automate tasks, and connect data across various Microsoft and third-party services (Ghangave et al, 2023). Some of the positive features of Microsoft PowerApps includes low code development hence easy to learn. It also allows integration with other Microsoft Services. Developers must purchase Microsoft PowerApps to use it. Since it is an off the rack application, it comes with updates and support by Microsoft. Limitation for Microsoft PowerApps includes limited customization especially for complex scenarios. Another concern for Microsoft PowerApps is about scalability (Bordoli, 2021). For a higher learning education institute which caters to various users and fields, this can be a concern. In

summary, Microsoft PowerApps is a unique tool that can create custom applications, especially for organizations within the Microsoft ecosystem.

2.2 Corrad

Corrad is an application development framework that promotes fast application development. It is a local-based framework that belongs to an organization. The framework comes with limited period technical support. Corrad has its own library which stores thousands of codes. Developers may utilize these libraries to create various applications. Currently Corrad is used on various organizations in Malaysia. Its backbone is PHP and it is able to be integrated with other databases such as MySQL, Microsoft SQL Server, Oracle RDBMS, Sybase.

2.3 Laravel PHP

Laravel PHP is an open-source development framework which during the earlier phase of the project was produced until Laravel 7. It has a massive number of users. It has the capability to be integrated with various types of databases. Laravel PHP can be downloaded from the website. Most programmers tend to share codes and shortcuts to the online community. Utilizing the Laravel framework leads to an efficient reduction in both development time and design workflow (Hsieh et al, 2020). With its clean and intuitive syntax, coupled with robust features such as routing, authentication, and caching, Laravel empowers developers to create powerful, scalable web applications with relative ease.

3 COMPARISON OF EACH APPLICATION OR DEVELOPMENT FRAMEWORK

A committee that consists of management level, system analyst, database administrator and programmers were established to ensure that the right decisions were made and expedite the development process. In order to decide which application or framework that is going to be used throughout the project, committee have identified these criteria that must be met which are project requirements, learning curve, community and support, library and framework availability, performance requirement, platform independence, security, scalability, cost, integration with existing system and long-term maintenance. By considering these factors carefully, an informed decision can be made about which programming language is best suited for this project. Table 1 shows the comparison between each application or development framework.

Table 1. Comparison between each application or development framework

Application/ Development Framework	Pros	Cons
Microsoft PowerApps	- no code/low code	- have to purchase -lack of community among developer -limited scalability capa- bility
Corrad	- library that is accessible by developer	- limited support and community
Laravel PHP	- large community - scalability - open-source	- learning curve since it has extensive features

After each application and development framework were presented by the experts, the committee decided that Laravel PHP is the best option. Some of the factors that influence decision making include costing, capability to integrate with legacy system and community to support the development phase.

4 SUMMARY

Each application and development framework have its own pros and cons. It depends on the developer's approach in system development. After a thorough evaluation, the committee, consisting of management, system analysts, database administrators, and programmers, concluded that Laravel PHP is the best option. Factors influencing this decision include its capability to integrate with legacy systems and the supportive community for the development phase.

5 ACKNOWLEDGEMENT

The authors extend their sincere gratitude to Universiti Pertahanan Nasional Malaysia for their unwavering support and financial sponsorship, without which this research would not have been possible. We would also like to express our deep appreciation to the volunteer participants whose dedication and invaluable contributions greatly enriched the quality of our study.

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