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Implementation of object oriented technology concept and rapid application development method in designing church service information system HKBP Perumnas Simalingkar

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A R T I C L E I N F O

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ABSTRACT

Designing information systems that are appropriate and in accordance with user needs is a key element of success in designing information systems that are fast, easy, and able to manage various data and information needed by users. In this context, Object Oriented Technology and the Rapid Application Development Method provide a powerful and easy approach to designing information systems. This article describes the stages of the Rapid Application Development method starting from planning, design, development, and implementation in designing information systems tailored to the needs of the HKBP Perumnas Simalingkar Church Service. In addition, this article also discusses the use of Codeigniter 4 which has adopted the concept of Object Oriented Technology to make it easier to create complex information systems. Then this article also discusses the use of the Unified Modeling Language as a tool to model the design of information systems. The combination of the Object Oriented Technology concept and the Rapid Application Development method can increase the acceleration of making information systems and produce powerful information systems.

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1. INTRODUCTION

Science and technology continue to develop rapidly, these developments cover various fields of life that affect human life and development (Hidayat, Rukmana, and Nurrahman, 2020). Computerization has become an integrated system, making it a tool for information dissemination. In addition, technology provides convenience in various fields such as business, offices, government, health, education, and so on (Batris, 2015). Information systems provide information as decision support in carrying out operations in organizations, the system is a combination of humans, information technology, and various organized procedures (Davis, 2019; Iivari, 2017; Heryanto et al, 2019; Yunanto et al, 2019; Blum and Wetter, 2019).

Information systems are an important part of processing, analyzing, and disseminating information for specific purposes (Anjeli et al, 2022). Information systems are also a combination of various elements, namely humans, software, hardware, communication networks, and resources for collectivity, transformation and dissemination of information in an organization (Heriyanto, 2018). Information systems are various components that are interconnected, collect, process, store and distribute information to support decision making and supervision in organizations (Laudon, 2007). In addition, information systems are systems of organizations that meet transaction processing needs, support operations, are managerial, and strategic activities of an organization and provide various reports for parties outside the organization (Satzinger and Jackson, 2015).

Information systems are also a collectivity of various physical and non-physical sub-systems that have a relationship with one another and work together harmoniously to achieve the goal of processing data into useful information (Susanto, 2017).

Factors that can affect organizational management are data and information management as part of supporting organizational management decision making (Herawaty and Yustien, 2019). The role of information systems is so important for the sustainability of the organization in order to have the ability to face competition and become an added value for the organization (Umar, Riadi, and Elfatiha, 2023). The application of information systems can support the continuity of various communication activities and disseminate information quickly, easily, and as a support for organizations to develop and compete. Organizations try to build information systems that are useful for carrying out business processes (Hayat et al, 2014).

Information system development in organizations based on the capabilities and conditions of the organization by implementing one of the easy and appropriate information system development strategies (Fahana, 2018). Information system development is an activity to create a new system to replace the system or improve the old system (Hermandra and Anofrizen, 2016). The HKBP Church Perumnas Simalingkar congregation does not yet have an information system, so church administrators have difficulty managing congregational data, servants, and church finances. Church administrators experience problems in collecting congregational data because it is still done by distributing using paper forms so that congregational data is often lost, as well as servant data that has not been managed using an information system, church administrators have difficulty knowing who are the members who serve in the church. Financial data management is still using desktop applications, the difficulty of church administrators is to see cash in and out, as well as recording cash in, cash out and making financial reports. Designing an information system through various stages using development methods and design models (Ibrahim, Agus, and Sari, 2021).

This article discusses the application of the Rapid Application Development (RAD) method and the Object Oriented Technology (OOT) model in designing service information systems at the HKBP Church Perumnas Simalingkar The information system design model is based on the conventional approach and object orientation (Davis, 1986). One of the object oriented models is Object Oriented Technology (OOT), which is an information system design model based on the abstraction of various objects from the real world. Object creation is based on a combination of data structure and entity behavior. Object Oriented philosophy is the application of various concepts about class, object, attribute, method, message, event, state and scenario in designing information systems using object-oriented programming languages. (Saputra, 2020). This article also discusses the Rapid Application Development (RAD) information system development method (Pressman, 2015). The use of the RAD method in designing information systems aims to save time in the design process through the steps of planning, design, development, and implementation.
HKBP Perumnas Simalingkar church service information system can help church administrators make decisions related to congregation registration, financial management, and worship schedules. Realizing this requires the RAD method and the OOT model in designing the HKBP Perumnas Simalingkar church service information system. The implication of using the RAD method and the OOT model is that it can speed up the process of designing information systems. The implementation of the OOT model in this study is to use the CodeIgniter Framework in designing information systems.

2. RESEARCH METHOD

RAD Development Method

The research method used in this research is the RAD development method and the OOT model in designing the service information system of the HKBP Church Perumnas Simalingkar Congregation. Stages of the Rapid Application Development (RAD) development method in Figure 1.

Figure 1. Stages of the rapid application development (RAD) method

Planning: Stages carried out to identify problems and collect data from users or user stakeholders aim to identify the ultimate intent or purpose of the system and information needs. The involvement of both parties is important to identify system development needs.

Design: This stage is for designing and improving what can be described as system design results. Analysts and programmers can work to build and display visual representations of the design and working patterns to users.

Development: The development process stage is transformed into a beta to final version of the application based on the agreed system design and agreement. Programmers continuously develop and integrate while considering feedback from users or clients.

Implementation: The implementation stage of the program maker implements the approved system design. The programmer conducts a testing process for the program to detect errors in the system.

Model Object Oriented Technology

Object Oriented Technology is an information system development model based on the abstraction of various objects from the real world, the basis of creation is objects combined with data structures and entity behavior. The design of the HKBP Church Service Information System using the OOT model adopts object oriented concepts and properties. The OOT position in this research is used to design information systems using CodeIgniter 4, because CodeIgniter adopts the nature and character of OOT. The following object-oriented concepts and properties are used in designing the HKBP Church Service Information System: a) Class, classes are used in program coding to wrap the data and procedural abstractions needed to describe the content and behavior of various entities. b) Object, objects are described as objects, people, places and so on in designing information systems. c) Attribute, attributes describe data to provide information on the class or object to which the attribute belongs. Attribute representation of various fields used to create various tables in the database. d) Method, method is a procedure or function incorporated in the object along with attributes. Method is used to access the data contained in the object to manipulate the data. e) Message, message is a means of communication between objects. The relationship between objects is determined by the problem domain and the system's responsibility for a particular event. f) Event, event is an event at a limited time that describes a stimulus from outside the system. In the information system, it is used to limit the login session time and data filling security which provides a time limit for filling in data. g) State, state is an abstraction of attribute values and links in an object. State is used to provide the object's response to input events. h) Schenario, a scenario is a sequence of events that occur during the execution of the system while performing a certain process.

3. RESULTS AND DISCUSSIONS

Based on the problem analysis, development method, and design model to design the HKBP church service information system Perumnas Simalingkar congregation, the design stages are carried out as follows:

Planning

The design of HKBP Church Service Information System requires data, hardware, and software. The data needed are congregation data, financial data (cash in and cash out), baptism data, sidi data, marriage blessing data, worship schedule data, and other activity data. The data comes from the Church Management. The hardware required to design the information system is a computer with a minimum specification of processor i3, 4 GB RAM, and 500 GB HDD. The software required is the Windows 10 operating system, XAMPP, Adminlte, and Visual Studio Code.

Design

The information system is designed using three types of access levels, namely Superadmin, Management, and Congregation. The design model used is the Unified Modeling Language (UML) of the Use Case Diagram, Class Diagram, and Activity Diagram types. The following is the use case design of superadmin, administrators and congregations:

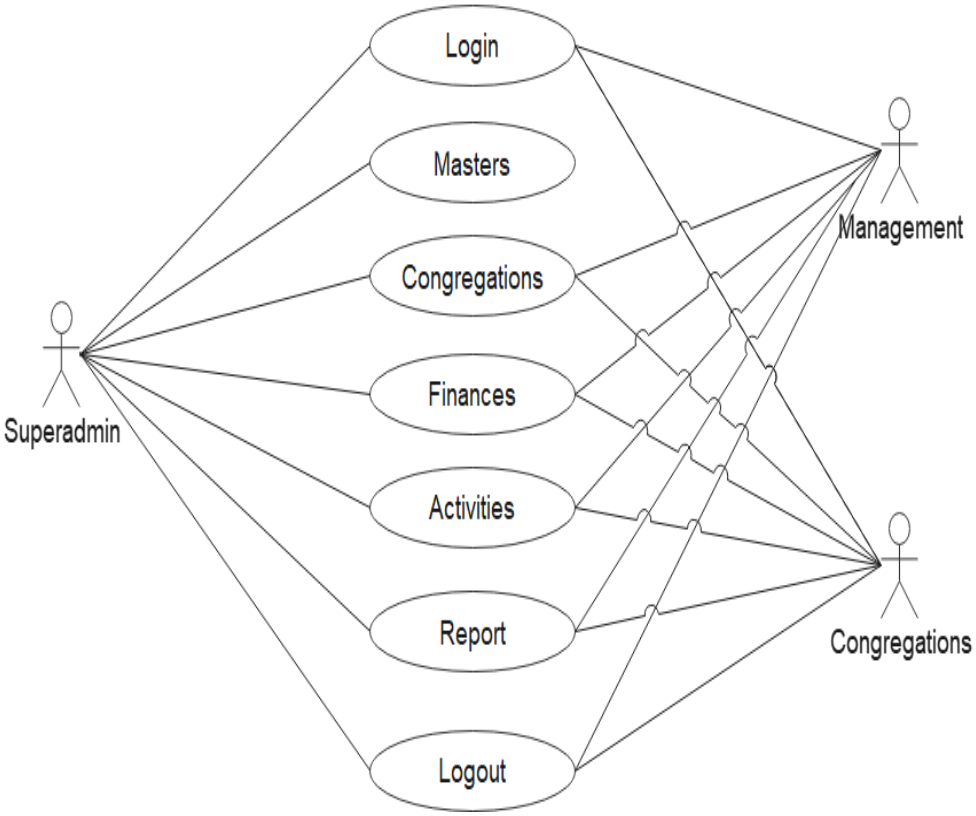

Figure 2. Use cass diagram

Based on Figure 2 each actor has different access rights to the case, Superadmin has full access rights to all cases so that it can carry out the CRUD (Create, Read, Update, Delete) process, the Management actor is not given access rights to the Masters case, the Management actor can perform data processing through the CRUD process in certain parts, while the Congregation actor can only access and is not given access rights to perform the CRUD process.

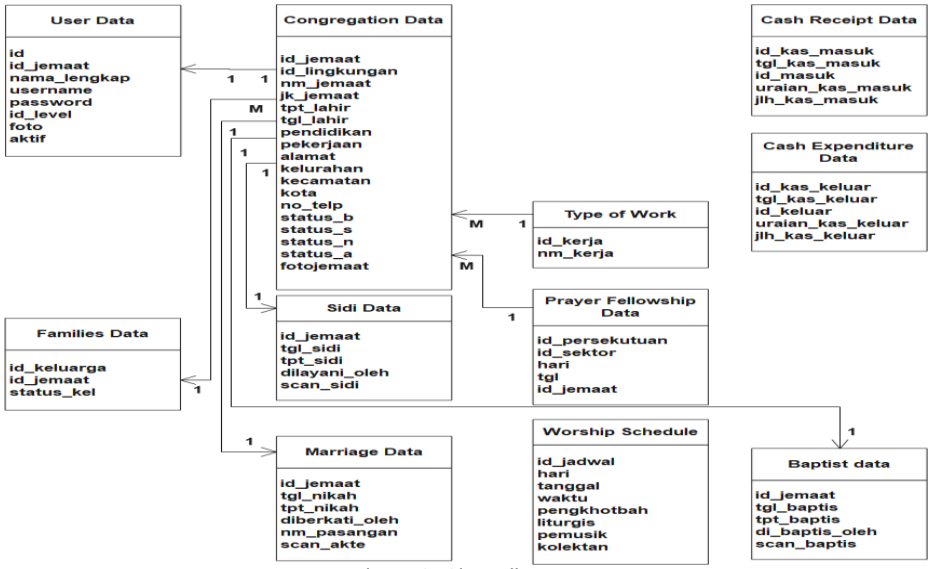

Figure 3. Class diagram

Figure 3 explains the relationship between each class, User Data Class is a class that contains users who can access the information system, User Data is related to Congregation Data containing Congregation data which is related to Families Data Class, Sidi Data Class, Marriage Data Class, and Baptist Data Class. In addition, Congregation Data is related to Type of Work Class and Prayer Fellowship Data. While Worship Schedule, Cash Reciept Data, Case Expenditure Data are Independent Classes that have relationships to certain classes.

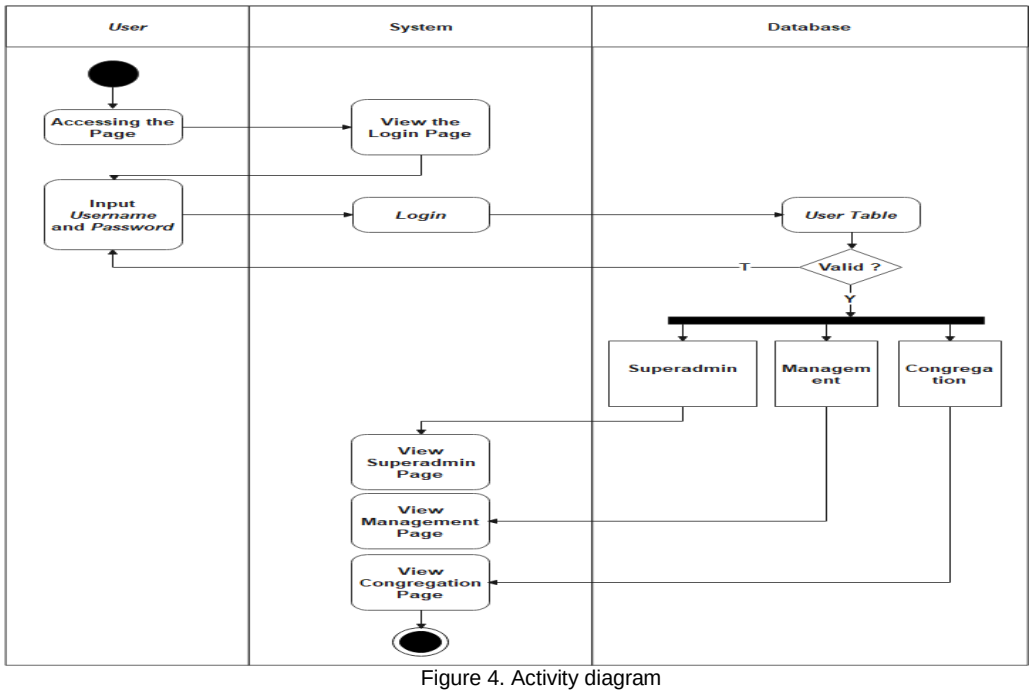

Figure 4. Activity diagram

Figure 4 explains the activity of the user accessing the information system, when accessing the information system, the login page will appear. Users fill in their username and password then the system will validate the User Table in the database, the system will validate the access level, if the Superadmin access level will display the Superadmin dashboard, if the Management access level will display the Management dashboard, and if the Congregation access level will display the Congregation dashboard.

Development

HKBP Church Service Information System Perumnas Simalingkar is designed using CodeIgniter, Adminlte, and MySQL. The OOT position in this research is used to design information systems using CodeIgniter 4, because CodeIgniter adopts the nature and character of OOT. The following object-oriented concepts and properties are used in designing the HKBP Church Service Information System: a) Class, classes are used in building information systems to create Models and Controllers to wrap data and procedural abstractions needed to describe the content and behavior of various entities in creating website templates from each view. b) Object, objects are described as objects, people, places and so on that exist in HKBP Jemaat Perumnas Simalingkar which are important in designing church service information systems. The objects used are congregation data, financial data, baptism data, sidi data, marriage data, and worship schedule data. c) Attribute, attribute describes data to provide information about the class or object where the attribute is located. Attribute in designing HKBP church service information system Perumnas Simalingkar is a variety of fields used to design various tables in the database. d) Method, method is a procedure or function that is incorporated in the object along with the attribute. Method is used to access the data contained in the object, namely to save, edit, delete, and others. e) Message, message is a means of communication between objects. The relationship between objects is determined by the problem domain and system responsibility for certain events when save, edit, delete, etc. f) Event, event is an event at a limited time that describes a stimulus from outside the system. The information system is used to limit the login session time and secure data filling in each form using CSRF (Cross Site Request Forgery) security which provides a time limit for filling in data. g) State, state is an abstraction of attribute values and links in an object. State is used to provide the object's response to input events. The use of state is in the communication between controller, model, and view. h) Schenario, a scenario is a sequence of events that occur throughout the execution of the system when saving, editing, deleting, and others.

Implementation

Implementation is the stage of using the service information system of HKBP Church Perumnas Simalingkar to find out the system can run as designed based on the design and concept of OOT. HKBP Church service information system provides various management of congregation data, financial data, activity data, and print reports. Here's a look at the design of the church service information system HKBP Jemaat Perumnas Simalingkar, namely:

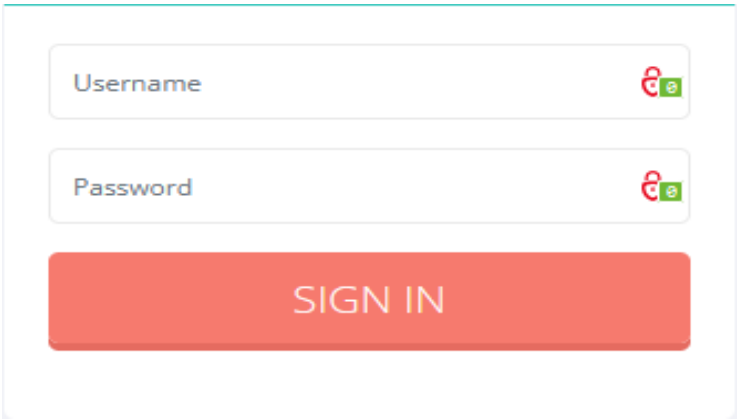

Figure 5. Login Page Display

The login page is the initial stage to access the HKBP church service information system Perumnas Simalingkar. The login page is also a validation stage for users who will log in. The Superadmin, Management, and Congregation dashboard page is the initial display of each access level, which contains a welcome display and a menu that can be accessed by superadmins, administrators, and congregations.

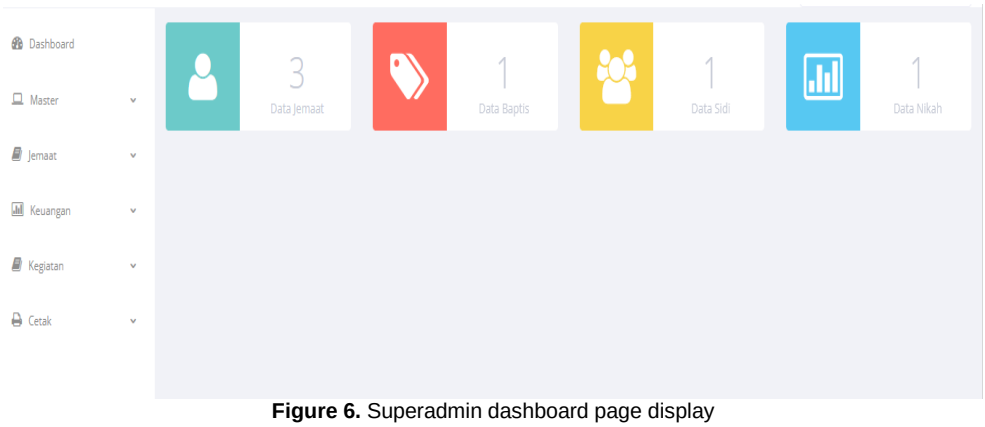

Figure 6. Superadmin dashboard page display

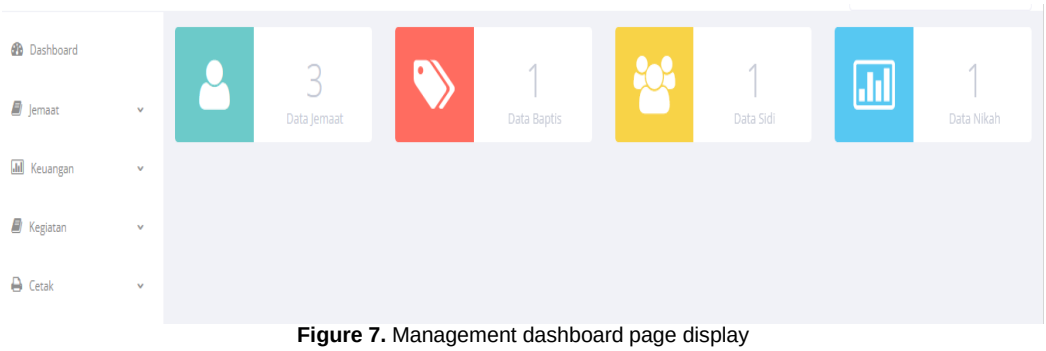

Figure 7. Management dashboard page display

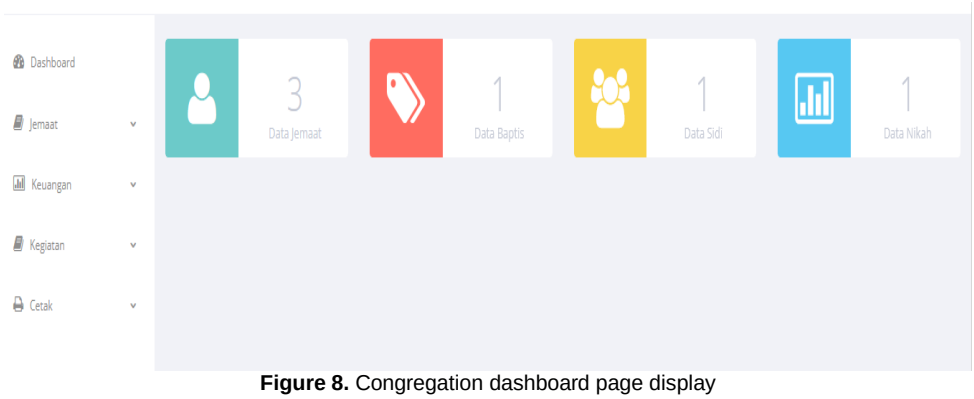

Figure 8. Congregation dashboard page display

Discussions

The process of designing an information system for church services of HKBP Jemaat Perumnas Simalingkar is proven to be done through the stages of designing the RAD method and creating information systems using Codeigniter 4 which adopts the concept of OOT so that it can facilitate and accelerate the process of designing effective and efficient information systems. Through the steps or stages of the RAD method, namely planning, design, development, and implementation of information systems and the combination of OOT in the creation of information systems using Codeigniter 4 can produce information systems that are flexible and relevant to the circumstances in the HKBP Church Jemaat Perumnas Simalingkar.

The most important thing about the design of information systems is the success of the design stages using the RAD method and the use of the OOT concept model in the PHP programming language Codeigniter Framework 4. Continuous evaluation of the design of information systems is carried out based on the RAD method and the OOT concept model so that information systems can provide services to users concretely over time and create dynamic information systems that evolve along with the evolution of user preferences and expectations.

4. CONCLUSION

Implementation of Object Oriented Technology Concept and Rapid Application Development Method in Designing HKBP Church Service Information System Perumnas Simalingkar provides a powerful approach to produce information systems in accordance with the preferences of the HKBP Church Perumnas Simalingkar. The concept of Object Oriented Technology is in Codeigniter so that it can help make applications or information systems quickly and easily because it reduces the use of repetitive and long program codes. The combination with the RAD design method can help in the process of designing applications or information systems. The concept of Object Oriented Technology and the Rapid Application Development Method can be combined to design or build applications or other information systems from small, medium and large scales. The design of the HKBP church service information system Perumnas Simalingkar that has been built can provide convenience for church administrators and congregations to register congregation members, manage data on baptism, sidi, marriage blessings, and finance activities. Implementation of Object Oriented Technology Concepts and Rapid Application Development Methods and the use of Codeigniter 4 as a PHP Framework that adopts Object Oriented concepts is in accordance with the needs of information system design, this is because the design can be done quickly and easily. In addition, the information system has been integrated so that it can improve the excellent service in the HKBP Church Perumnas Simalingkar. In future research, it is recommended to further explore the use of Object Oriented Technology Concepts and Rapid Application Development Methods in designing information systems to improve the creation of information systems that are more contextual and nuanced. This research is still limited to the scope of the web so it needs to be developed towards the Mobile Phone base by applying the concept of Object Oriented Technology and Rapid Application Development Method.

REFERENCES

A. D. Hermandra dan Anofrizen. (2016). Pengembangan Sistem Informasi Kerja Praktek (Studi Kasus : Jurusan Sistem Informasi UIN SUSKA Riau). J. Rekayasa dan Manaj. Sist. Inf., vol. 2, no. 1, hal. 11–14.

Anjeli, D., Tita Faulina, S., & Fakih, A. (2022). Sistem Informasi Perpustakaan Sekolah Dasar Negeri 49 OKU Menggunakan Embarcadero XE2 Berbasis Client Server. Jurnal Informatika Dan Komputer (JIK), 13(2), 57–66.

Batris, W B. (2015). Analisis dan Perancangan E-Learning Berbasis Web Pada ILP English Institute K.S. Tubun (Jakarta: Binus University)

Blum D dan Wetter M. (2019). MPCPy: An open-source software platform for model predictive control in buildings (No. LBNL-2001226) (CA, United States: Lawrence Berkeley National Lab.(LBNL), Berkeley)

Davis W S and Yen D C (Eds.) (2019). The information system consultant's handbook: Systems analysis and design (USA: CRC press).

E. A. Hayat, E. Retnadi, dan E. Gunadhi. (2014). Perancangan Sistem Informasi Kependudukan Berbasis Web, J. Algoritm., vol. 11, no. 1.

Fahana. J. (2018). Perencanaan Strategis Sistem Informasi untuk Pengelolaan Guru Sekolah Muhammadiyah, J. Ilm. Tek. Elektro Komput. dan Inform., vol. 4, no. 1, p. 51, doi:10.26555/jiteki.v4i1.9929.

Heriyanto, Y. (2018). Perancangan Sistem Informasi Rental Mobil Berbasis Web Pada PT.APM Rent Car. Jurnal Intra-Tech, 2(2), 64–77.

Heryanto D, Sutedi A and Cahyana R. (2019). The proposed information system design to improve new students Journal of Physics: Conference Series 1402(2) 022080

Hidayat, T., Rukmana, O., Nurrahman, A. A. (2020). Design information system of registration and scheduling information laboratory of information systems and the decision of Bandung Islamic University. International Conference on Innovation in Research, IOP Conf. Series: Journal of Physics: Conf. Series 1469 (2020) 012134, doi:10.1088/1742-6596/1469/1/012134.

Ibrahim, Fardiansyah., Agus, Thami Rusdi., Sari, Nariza Wanti Wulan. (2021). Identifikasi Metode Pengembangan Sistem Informasi di Indonesia: A Systematic Literature Review. Jurnal METIK Volume. 5 Nomor. 1 2021 ISSN-P 2442-9562 ISSN-E 2580-1503. Hal. 47-59. doi: 10.47002/metik.v5i1.215

Iivari J. (2017). Information system artefact or information system application: that is the question Information Systems Journal 27(6) 753-774

Laudon, C, K., & P., J. (2007). Sistem Informasi Manajemen (Tenth ed.). (C. S. P., Penerj.) Jakarta: Salemba Empat.

N. Herawaty, & R. Yustien (2019). Pengaruh Modal, Penggunaan Informasi Akuntansi Dan Karakteristik Wirausaha Terhadap Keberhasilan Usaha Kecil (Survei Pada Usaha Rumahan Produksi Pempek di Kota Jambi). Julnal Ilmiah Akuntansi dan Finansial Indonesia, vol. 3, no. 1, pp. 63-76.

Pressman, Roger S., Bruce R. Maxim (2015), Software Engineering A Practitioner's Approach, Edisi ke-8, New York: McGraw Hill Education.

Saputra, I.P. dan Nudin, Salamun Rohman (2020). Rancang Bangun Aplikasi SISKA (Sistem Informasi Karir) Berbasis Android. Jurnal Manajemen Informatika. Volume 10 Nomor 02 Tahun 2020, 21-27.

Satzinger, John E, et al. (2015). Introduction To System Analysis and Design. Edisi ke-6, Boston, Nelson Education, Ltd.

Susanto, Azhar (2017). Sistem Informasi Manajemen Konsep dan Perkembangan Terpadu, Edisi ke-1, Bandung: Lingga Jaya.

Umar, Rusydi., Riadi, Imam., Elfatiha, Muhammad Ihya Aulia. (2023). Analisis Keamanan Sistem Informasi Akademik Berbasis Web Menggunakan Framework ISSAF. Jutisi: Jurnal Ilmiah Teknik Informatika dan Sistem Informasi. Vol. 12, No. 1, April 2023: 280-292

Yunanto P W, Nurhidayat D and Wicaksono R. (2019). Development of Web-based Information System for Universitas Negeri Jakarta KnE Social Sciences 453-461