Indonesian Journal of Digital Business

Journal homepage: https://ejournal.upi.edu/index.php/IJDB

Optimization of Cloud-Based Digital Archiving System Using Golang and the ICONIX Process

Zahra Khaerunnisa[1], Deden Pradeka [2], Kukuh Muhammad [3], Fajar Mahardika[4]*

[1,2]Teknik Komputer, Universitas Pendidikan Indonesia, Indonesia
[3,4] Teknik Informatika, Politeknik Negeri Cilacap, Cilacap
Correspondence: E-mail: Fajarmahardika@pnc.ac.id

ABSTRACT

In today's digital era, the need for a fast, secure, and easily accessible archiving system has become increasingly crucial, especially for institutions that manage large volumes of documents. Traditional archiving systems face various challenges, such as limited storage capacity, the risk of physical document damage, and slow, inefficient retrieval processes. This research aims to address these issues by designing and developing a cloud-based digital archiving system using the Golang programming language and the ICONIX development methodology. ICONIX was chosen for its structured approach to analysis and design, encompassing stages such as Domain Model, Use Case Diagram, Robustness Diagram, and Class Diagram. Golang is utilized due to its advantages in execution speed, memory efficiency, and its ability to handle parallel processes, which are well-suited for cloud-based systems. The developed system enables centralized and flexible archive management via the internet, featuring document upload, search, and categorization functionalities that are easily accessible to users. Testing results show that the system improves archiving efficiency, minimizes the risk of data loss, and supports real-time document access. Based on the calculations, the average score of 4.04 out of 5 equals a percentage of 81%. This matter test hypothesis accepted from application with test reception user is Good.

ARTICLE INFO

Article History:
Submitted/Received 10 April 2025
First Revised 14 April 2025
Accepted 22 April 2025
First Available online 30 April 2025
Publication Date 30 April 2025

Keyword:
cloud computing, Digital archiving, Golang, ICONIX Process, Information system.

1. INTRODUCTION

As information technology advances, the demand for efficient, secure, and integrated digital archive management systems is increasing. Many institutions face challenges in managing physical archives that are scattered, prone to damage, and difficult to access in real-time. Cloud technology has become an effective solution as it provides centralized and flexible data storage that can be accessed anytime via the internet. To optimally build such a system, a well-planned and systematic software development approach is required.

The ICONIX Process is an object-oriented software development method that combines elements of the Unified Modeling Language (UML) with a more streamlined development approach compared to other methodologies. This method is considered suitable for medium-scale projects, as it emphasizes thorough analysis and design without becoming overly complex. Applying the ICONIX Process in the development of a cloud-based archiving system can help produce a well-structured system design that aligns with user needs.

One of the studies conducted by (Octavianty et al., 2024), titled "Designing a Burial Letter Archiving Information System at UPP PTSP Slipi Village," shows that the development of the burial letter archiving information system at UPP PTSP Slipi Village can improve time efficiency in managing the archives. With this system, applicants can easily access the burial letter archives when needed.

Golang was chosen as the primary programming language for the development of this system due to its advantages in performance, memory efficiency, and support for concurrent programming architecture, which is highly suitable for cloud-based systems. Golang is also known for its stability and is widely used in the development of large-scale backend systems. For these reasons, the development of a Cloud-Based Data Archiving System using Golang and the ICONIX Process methodology becomes an effective solution to improve the efficiency, security, and availability of archive data in various institutions (Hermawan et al., 2023).

The author includes previous studies that are relevant to their work. One of these studies is the research conducted by (Agustha et al., 2024). The test results showed that the application met the users' needs, as evidenced by the acceptance in each testing scenario. Although this research uses the same method, the ICONIX Process, the difference lies in the subject and theme of the research (Mahardika, Fitriani, et al., 2023)

The study conducted by (Mahardika & Sumantri, 2024). The difference with this study lies in the focus on the food sales archiving system at Pawon MbokE Eating House and the use of the Extreme Programming methodology in its development; The study conducted by (Putra, Aprillia, 2022) After the construction phase was completed, the next phase was deployment, where the website was presented to the partners to ensure whether the website features functioned according to the needs of the Department of Education and Culture of Balikpapan City. The Waterfall method illustrates the system flow through Activity Diagrams, Use Case Diagrams, Sequence Diagrams, Class Diagrams, and Mock Up Systems. The difference with this study lies in the use of a different method, although the theme remains the same.

The study conducted by (Wicaksono et al., 2021). The system currently only functions on computers and cannot be accessed through smartphones as it is still running in the computer lab of UPTD SONG SKB Salatiga. From a security standpoint, there may still be vulnerabilities that could be exploited by unauthorized parties, so further development is essential to create a more secure system, protected from hacker attacks (Marthiawati et al., 2024). The study conducted by (Aini & Pratama, 2022). This system is expected to simplify and speed up the process of presenting and searching document archives, which in turn will improve work

efficiency (Mahardika, F Sumantri & Ripai, 2024) and reduce the risk of errors in archiving management at the institution (Lin et al., 2019).

2. METHODS

The ICONIX Process is a software development methodology used to design and build software systems through a systematic and structured approach The ICONIX Process combines elements from various software development methods and techniques, with a primary focus on conceptual modeling, object-oriented design, and reliable implementation (Mahardika, Sandi, et al., 2023). ICONIX Process as shown in **Figure 1**.

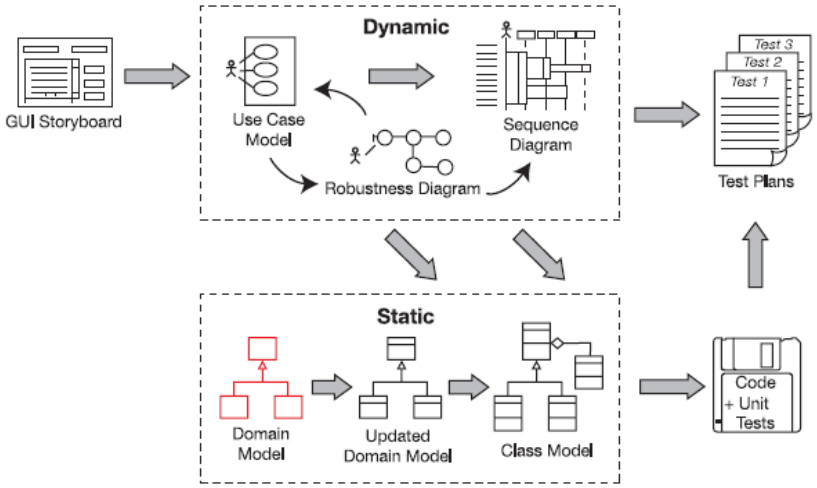

Figure 1. ICONIX Process Method.

The ICONIX Process has four main stages: Initialization, Conceptual Modeling, Object Design, and New Object Design. The explanation of each stage is as follows:

a. Initialization
   In this stage, the main goal is to gain a comprehensive understanding of the project to be developed. The development team identifies stakeholders, defines project objectives, creates a development plan, and establishes a realistic budget and schedule. This stage also involves analyzing user requirements and system goals. (Bulu & Lede, 2024).
b. Conceptual Modeling
   This stage aims to model the concept of the system to be built without discussing technical details. Here, Use Case diagrams and Domain Models are used to depict the main functionalities of the system and the relationships between its elements. The focus of this stage is to describe functional requirements without delving into technical implementation details (Ruliyanto et al., 2021).
c. Object Design
   After the conceptual modeling is completed, the next stage is to design the system in more detail, focusing on the objects to be built. Here, developers use Robustness Diagrams and Sequence Diagrams to determine how objects interact within the system. Developers will identify the main classes, attributes, and methods to be used in the implementation.
d. New Object Design
   This final stage focuses on a more specific object design. In this stage, developers create a more detailed and in-depth Class Diagram to illustrate the data structure and

relationships between objects in detail. This Class Diagram will provide a clearer overview of the system structure to be implemented.

According to (Sugiyono;, 2015), a questionnaire is a data collection technique by providing a set of written questions or statements to respondents for them to answer. This questionnaire approach technique will be tested using the User Acceptance Test (UAT) method. In this study, the measurement scale used is the Likert scale for positive statements The Likert scale is designed to assess the extent to which a subject or respondent agrees or disagrees with a statement on a 5-point scale, as shown in **Table 1**.

Table 1. UAT Metode

Jawaban	Skor
Sangat Setuju	5
Setuju	4
Netral	3
Tidak Setuju	2
Sangat Tidak Setuju	1

With the Likert scale, the variables to be measured are broken down into variable indicators. These indicators are then used as a basis for constructing instruments in the form of statements (Sugiyono, 2015).

3. RESULTS AND DISCUSSION

3.1. Results

1) Initialization GUI

Storyboard

The ICONIX Process is a lightweight, use case–driven software development methodology that bridges the gap between agile methods and more structured approaches like the Rational Unified Process (RUP). It focuses on modeling and helps teams avoid “analysis paralysis” by using just enough UML (Unified Modeling Language) to drive development (Batubara et al., 2022). GUI Storyboard Analysis as shown in **Table 2**.

Table 2. GUI Storyboard Analysis

No	User	Information
1	Administrator	Login to Cloud Accreditation
		Melakukan pengaturan data User pada Cloud Akreditasi
		Configuring File Type data on Cloud Accreditation
		Perform Accreditation File Upload Settings
2	User	Login to Cloud Accreditation
		View Documents in the Accreditation Cloud

A Use Case for Cloud Accreditation Data would describe the interactions between a system (such as a cloud service platform) and users or other systems to manage the accreditation process of cloud services. In the context of cloud services, accreditation typically refers to the formal process through which a cloud service is approved to meet a set of standards, regulations, or security requirements (Nugraha et al., 2023).

2) Conceptual Modeling

Conceptual Modeling for Cloud Accreditation refers to creating high-level, abstract representations of the key entities, processes, and relationships involved in the accreditation of cloud services. The goal is to clarify the structure and flow of accreditation activities

without getting bogged down in technical details. Conceptual models help stakeholders—such as cloud service providers, regulatory bodies, and technical teams—understand how the accreditation process works. Conceptual Modeling of Use Cases as shown in **Figure 2**.

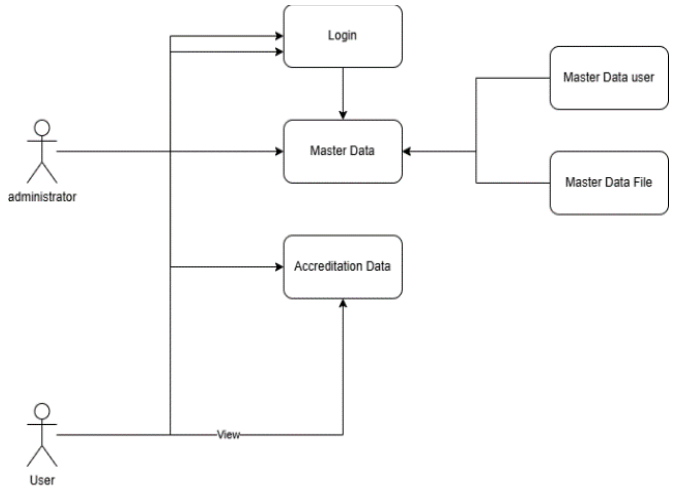

Figure 2. Use Case for Cloud Accreditation Data

Based on **Figure 2**, it shows the tasks of the administrator and the cloud accreditation users. The administrator manages 3 features, which are Login, Master data consisting of user master data and accreditation file master data. The user can only view the accreditation file master data that exists in the cloud accreditation.

Sequence diagram

A Sequence Diagram is used to depict the interactions between entities (such as users and systems) in a scenario or process. This diagram illustrates the sequence of events in that interaction and the messages exchanged during the process. Sequence diagram as shown in **Figure 3** and **Figure 4**.

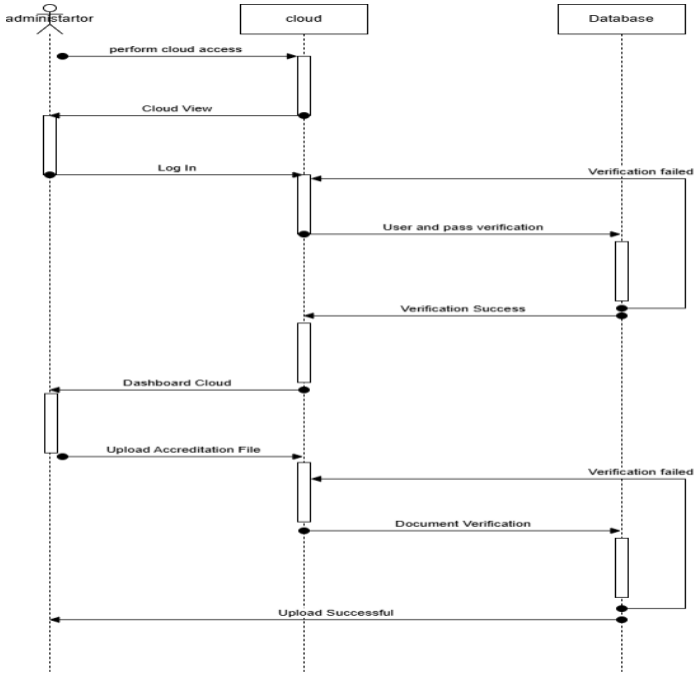

Figure 3. Sequence diagram administrator

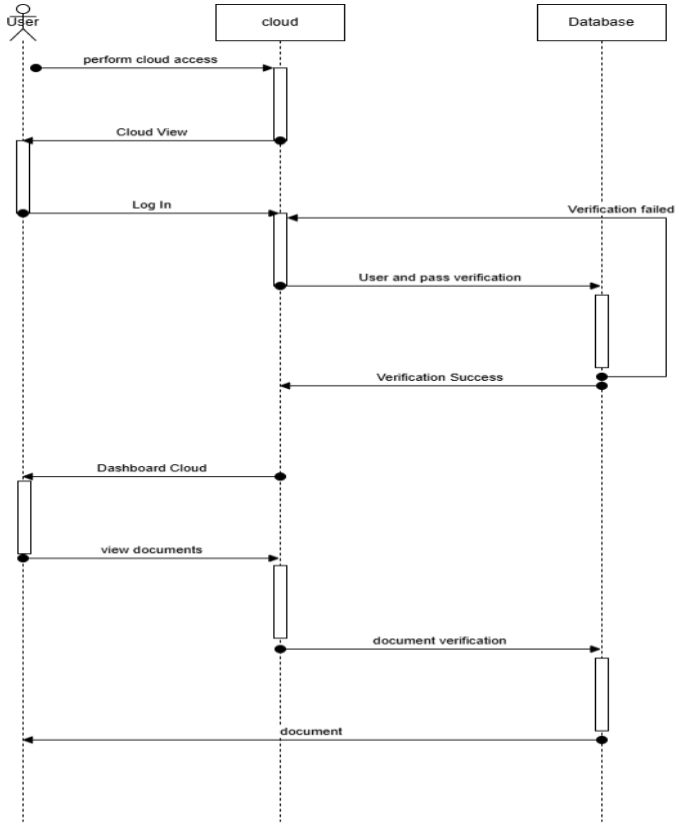

Figure 4. Sequence diagram administrator

3) Object Design

Database modelling or Object Design is an important aspect of a database as it facilitates the data design process. In this section, the database tables for each part of the system will be depicted. Database modelling or Object Design as shown in **Figure 5**.

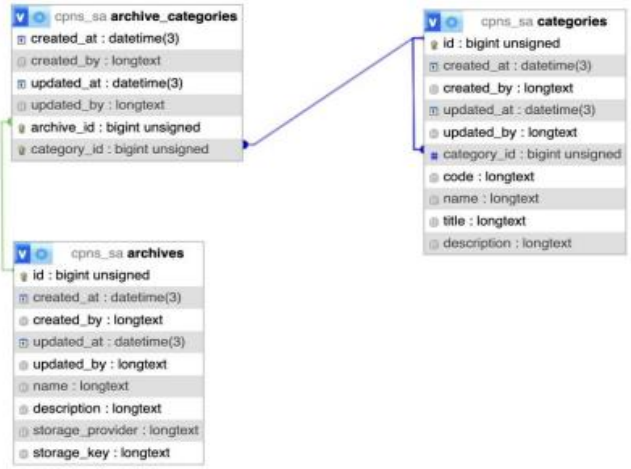

Figure 5. Object Design

4) Code Unit

The process of coding the system (software coding) by the Programmer / Software Engineer in accordance with the planning and design that have been previously made. Code unit as shown in **Figure 6**.

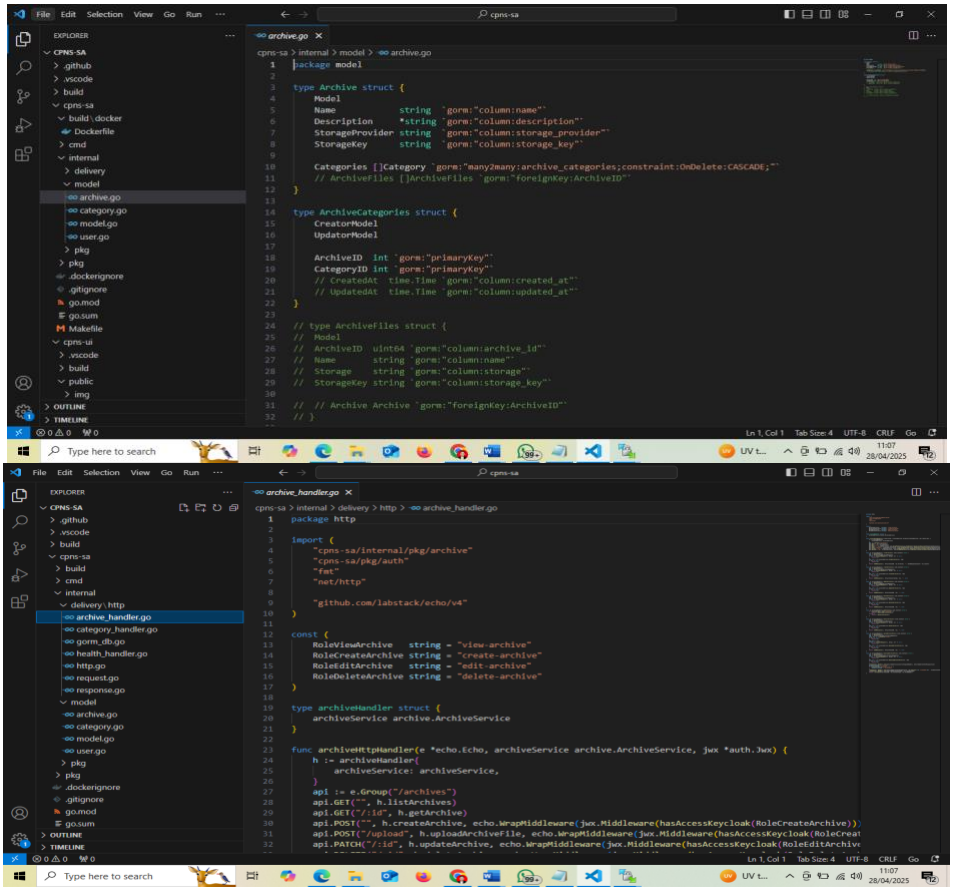

Figure 6. Code Unit

3.2. Discussion

Testing steps This try to justify it feature software already made suitable with details of expected wishes. I also tried this presumption in research. Procedures used are a User Acceptance Test (UAT) (Apriliah et al., n.d.) (Afandi et al., 2024). Author recommends testing This done in the same amount of time to look at skill created applications (Rahmadoni et al., 2022). UAT result shown in **Table 3.**

Table 3. UAT Results

Question	Mark					Amount	Analysis (Amount/25)	Percentage (Analysis/5 *100)
	Ax5	Bx4	Cx3	Dx2	Ex1			
What? This Golang Based Data Archiving Cloud Looks Interesting?	75	30	0	0	0	105	4,2	84%
Is Golang Based Data Archiving ACloud Presentation Information Easy to Understand?	60	38	3	0	0	101	4,1	82%
What? Where Can Golang-Based Data Archiving Cloud Be Accessed?	63	32	6	0	0	101	4,1	82%
What? Golang-Based Data Archiving Cloud is Now Easily Accessible?	60	28	7	0	0	95	3,8	76%
Is Golang Based Data Archiving Cloud Updated?	58	40	3	0	0	101	4,1	82%
What? Golang Based Data Archiving Cloud Can Be Monitored?	60	28	6	0	0	94	3,76	75%

Question	Mark					Amount	Analysis (Amount/25)	Percentage (Analysis/5 *100)
	Ax5	Bx4	Cx3	Dx2	Ex1			
Is Search And Filter Data On Golang Based Cloud Data Archiving Good Enough?	50	48	3	0	0	101	4,1	82%
What? Golang Based Data Archiving Cloud Works Well?	55	36	10	0	0	101	4,1	82%

From the calculations in table 4 the average value is 32,26 / 8 = 4.04 so percentage value is 4.04 / 5 x 100 = 81%. This matter test hypothesis accepted from application with test reception user is Good. Based on the results obtained, the system falls into the "very strong" category according to Riduwan (2008), who stated that if the percentage reaches between 81% and 100%, the test results can be considered very strong. Therefore, the researcher concluded that the system that has been designed and developed is feasible for implementation.

4. CONCLUSION

Based on the development and testing results that have been conducted, it can be concluded that:

1. The use of the ICONIX Process methodology in the development of a cloud-based archiving system has proven to be effective in guiding the system design process in a structured manner. The stages, starting from domain modeling, use case, robustness analysis, to class diagrams, help produce a system design that meets user needs and minimizes errors from the early stages
2. This research contributes to designing and developing a cloud-based digital archiving system that leverages the latest technology. The system is designed to address the main issues of conventional archiving systems, such as limited storage space, the risk of physical document damage, and slow retrieval processes. By using cloud technology, this system provides a centralized, flexible data storage solution that can be accessed anytime via the internet.
3. Improvement in archiving process efficiency. With the developed system, the processes of uploading, searching, and categorizing documents become faster and more accessible. This is undoubtedly very beneficial for institutions that require quick and accurate access to important documents.
4. Based on the results obtained, the system falls into the "very strong" category according to Riduwan (2008), who stated that if the percentage reaches between 81% and 100%, the test results can be considered very strong. Therefore, the researcher concluded that the system that has been designed and developed is feasible for implementation.

Based on the results of the development and testing that has been carried out, we can see the limitations and suggestions for developing the system:

1. The developed system does not yet include integration with other systems or applications used by the institution. Integration with other archiving management systems or third-party software has not been tested in this research.
2. Development of more advanced security features, such as end-to-end data encryption, multi-factor authentication (MFA), and role-based access control (RBAC).

3. Adding real-time collaboration features, where users can edit, share, and comment on documents simultaneously. This feature will enhance efficiency in archiving management in environments that involve multiple parties.

5. REFERENCES

Afandi, K., Arief, M. H., Faizatul Laily, N., & Maulana Nugroho, D. (2024). Analisis Performa Akademik Mahasiswa Menggunakan Social Network Analysis (Studi Kasus: Prodi Bisnis Digital Universitas dr. Soebandi). *Journal of Technology and Informatics (JoTI)*, *5*(2), 64–69. https://doi.org/10.37802/joti.v5i2.514

Agustha, E. B., Adhy, S., Mutiara, D., & Nugraheni, K. (2024). Pengembangan Aplikasi Monitoring Informasi Proyek Berbasis Web Menggunakan Metode Iconix Process (Studi Kasus : PT Telkom Akses Witel Semarang). *Jurnal Masyarakat Informatika Undip*, *15*(February). https://doi.org/10.14710/jmasif.15.2.62416

Aini, L. N., & Pratama, F. I. (2022). Rancang Bangun Sistem Informasi Pengarsipan Surat Berbasis Web pada Perumda Air Minum Tirta Moedal Kota Semarang. *Jurnal Informatika Dan Rekayasa Perangkat Lunak*, *4*(2), 152. https://doi.org/10.36499/jinrpl.v4i2.7074

Apriliah, W., Subekti, N., Jurnal, T. H.-J. I., & 2019, undefined. (n.d.). Penerapan model waterfall dalam perancangan aplikasi sistem informasi simpan pinjam pada koperasi PT. Chiyoda Integre Indonesia Karawang. *E-Journal.Rosma.Ac.Id*. https://doi.org/10.35969/interkom.v14i2.50

Batubara, S., Wahyono, T., Khaliq, A., & Lubis, Y. E. (2022). Perancangan Aplikasi Pelatihan Kerja Online Berbasis Website Menggunakan Unified Modelling Language. *Brahmana: Jurnal Penerapan Kecerdasan Buatan*, *4*(1A), 100–103.

Bulu, M. P., & Lede, P. A. R. L. (2024). Rancang Bangun Sistem Informasi Pengaduan Mahasiswa Univerisitas Kristen Wira Wacana Sumba Berbasis Object Oriented Analysis and Design. *MALCOM: Indonesian Journal of Machine Learning and Computer Science*, *4*(2), 538–546. https://doi.org/10.57152/malcom.v4i2.1262

Hermawan, H., Mahardika, F., Darmayanti, I., Sumantri, R. B. B., Saputra, D. I. S., & Aminuddin, A. (2023). New Media as a Tools to Improve Creative Thinking: A Systematic Literature Review. *Proceedings - 2023 IEEE 7th International Conference on Information Technology, Information Systems and Electrical Engineering, ICITISEE 2023*, 64–69. https://doi.org/10.1109/ICITISEE58992.2023.10404556

Lin, W., Zhang, Z., & Peng, S. (2019). Academic research trend analysis based on big data technology. *International Journal of Computational Science and Engineering*, *20*(1), 31–39. https://doi.org/10.1504/IJCSE.2019.103247

Mahardika, F Sumantri, R. B. B., & Ripai, R. (2024). IMPLEMENTASI PROTOTYPE PADA SISTEM APLIKASI PERSURATAN KELURAHAN KEDUNGWUNI BARAT (SIPRAKAT) BERBASIS ANDROID. *METHOMIKA: Jurnal Manajemen Informatika & Komputerisasi Akuntansi*, *8*(1), 1–8.

Mahardika, F., Fitriani, A., & Amin, M. Al. (2023). Testing Sistem pada Dealer Management System Service Menggunakan Metode Black Box Testing. *Hello World Jurnal Ilmu Komputer*, *2*(3), 110–119.

Mahardika, F., Sandi, M., & Naufal, A. R. (2023). Implementasi Sistem Informasi Management Dealer pada Jasa Service Motor Berbasis Web Menggunakan Extreme Programming. *Blend Sains Jurnal Teknik*, *2*(2), 99–111. https://doi.org/10.56211/BLENDSAINS.V2I2.304

Mahardika, F., & Sumantri, R. B. B. (2024). Implementation of Payment Gateway in the Mobile-Based Pawon Mbok ` E Eating House Ordering System. *Journal of Innovation Information Technology and Application (JINITA)*, 60–70.

Marthiawati, N., Kurniawansyah, K., Nugraha, H., & Khairunnisa, F. (2024). Pelatihan Pembuatan UML (Unified Modelling Language) Menggunakan Aplikasi Draw. io Pada Prodi Sistem Informasi Universitas Muhammadiyah Jambi. *Pkm.Lpkd.or.IdN Marthiawati, K Kurniawansyah, H Nugraha, F KhairunnisaTransformasi Masyarakat: Jurnal Inovasi Sosial Dan Pengabdian, 2024•pkm.Lpkd.or.Id*, *1*(2), 25–33. https://doi.org/10.62383/transformasi.v1i2.109

Nugraha, G. S., Darmawan, M. I., & Dwiyansaputra, R. (2023). Comparison of CNN's Architecture GoogleNet, AlexNet, VGG-16, Lenet -5, Resnet-50 in Arabic Handwriting Pattern Recognition. *Kinetik: Game Technology, Information System, Computer Network, Computing, Electronics, and Control*, *4*(2). https://doi.org/10.22219/kinetik.v8i2.1667

Octavianty, R. R., Rahmayu, M., Nainggolan, E. R., Informasi, F. T., Mandiri, U. N., Teknik, F., Bina, U., Informatika, S., Informasi, F. T., Mandiri, U. N., & Info, A. (2024). Perancangan sistem informasi pengarsipan surat pemakaman pada uppmptsp kelurahan slipi. *Djtechno: Jurnal Teknologi Informasi*, *5*(3), 699–712. https://doi.org/10.46576/djtechno

Rahmadoni, J., Akbar, R., & Ulya, R. (2022). Analysis of Nagari Management Information System Evaluation (Simnag) Using Pieces and Uat Methods. *Journal of Applied Engineering and Technological Science*, *4*(1), 512–521. https://doi.org/10.37385/jaets.v4i1.1326

Ruliyanto, K., Andryana, S., & Gunaryati, A. (2021). Sistem Informasi Manajemen Persediaan Obat Berbasis Web Menggunakan Metode Prototype Pada Apotek. *STRING (Satuan Tulisan Riset Dan Inovasi Teknologi)*, *5*(3), 284. https://doi.org/10.30998/string.v5i3.8113

Sugiyono;, P. D. (2015). *Statistika untuk penelitian*. Alfabeta, Bandung.

Wicaksono, M. A., Rudianto, C., & Tanaem, P. F. (2021). Rancang Bangun Sistem Informasi Arsip Surat Menggunakan Metode Prototype. *Jurnal Teknik Informatika Dan Sistem Informasi*, *7*(2), 390–403. https://doi.org/10.28932/jutisi.v7i2.3664