Indonesian Journal of Computer Science
ISSN 2549-7286 (*online*)
Jln. Khatib Sulaiman Dalam No. 1, Padang, Indonesia
Website: ijcs.stmikindonesia.ac.id | E-mail: ijcs@stmikindonesia.ac.id

Analysis and Design of *Web-based* Internal Office Memo *(IOM)* Management System

Okta Veza[1], *Larisang [2], *Albertus Laurensius Setyabudhi[3], Nofri Yudi Arifin[4], Doni Syofiawan[5], Hisar Gusdian Martino[6]
[1]okta@uis.ac.id, [2]larisang@uis.ac.id, [3]abyan@uis.ac.id, [4]nofri.yudi@uis.ac.id, [5]donisyofiawan15@yahoo.com, [6]hisargusdian@gmail.com
[1,2,3,4,5,6] Fakultas Teknik Program Studi Teknik Informatika, Universitas Ibnu Sina

Article Information

Submitted : 12 Nov 2024
Reviewed: 6 Jan 2024
Accepted : 2 Feb 2024

Keywords

IOM, Management system, SDLC, Waterfall, Black box

Abstract

This research focuses on the design and implementation of a web-based Internal Office Memo (IOM) Management System in the PT InnoArk Servis Internasional Optipedia Team. The main problem relates to ineffective communication and coordination between divisions, which results in backlogs and repetition of work as well as difficulties in monitoring task progress. The research method adopts a System Development Life Cycle (SDLC) approach with a waterfall model and uses the Unified Modeling Language (UML) for system design. Implementation was carried out by utilizing the CodeIgniter framework and MySQL as a database, followed by black box testing of the requirements testing type. The result is a system that successfully improves operational efficiency, team collaboration, and transparency of work progress. This application not only overcomes communication obstacles, but also provides a basis for making better decisions based on actual data, maintaining the smooth implementation of tasks, and improving the quality of team collaboration in the PT InnoArk Servis Internasional Optipedia Team.

A. Introduction

Technological developments that occur, so that all human activities are always connected with things that smell of technology. The influence of technological developments can be felt by various parties including academic and non-academic parties. There are also benefits obtained from technological developments, namely easy and fast to get information and process the data needed. With information technology, all processing processes regarding data can be managed accurately, precisely and quickly in various different places, so that the results to be obtained will be more effective and efficient [1].

The importance of information and data management has resulted in the rapid development of technology in today's modern era. So that more and more use of information technology that can support effectiveness, productivity and efficiency. Information technology encompasses many things and integrated methods for use in data management [2].

Communication is important and is the main key for companies to build relationships with other parties. Communication is carried out internally and externally of the organization in writing and unwritten. Written messages can be made through the medium of mail. A good written message will increase the value of the information conveyed[3].

Duringthis time the communication that runs in doing the work conveys directly to the division concerned and in meetings that are carried out every morning. Communication between divisions is very important to maintain the smooth implementation of work. However, what often happens is that in the process the direct direction given cannot be received properly so that piling up and repeating work often occurs. Communication methods such as physical meetings often lead to delays and confusion in managing information. As a result, there are delays or even errors in execution.

In addition, difficulties in monitoring work progress and implementation of tasks between divisions. This deficiency can lead to less than optimal teamwork, opportunities to exploit existing potential and delayed decision making. An internal management system memo is needed to address the problem. To be able to help manage data, complete tasks, and maximize teamwork.

The objective to be achieved from this research is to design an Internal Office Memo (IOM) Management System based on and implement the results of the web-based Internal Office Memo (IOM) Management System design. It is expected that this system can reduce delays, increase potential utilization, and make easier monitoring of work progress and decision making in each division so as to maintain the smooth implementation of work.

B. Research Method

1. Data Collection Methods

   The method used by the author to display data on this thesis is:

   a. Method

      Literature study is studying literature textbooks, research results and information articles that discuss web-based office management systems.

   b. Interview Method

The technique carried out by the author by conducting questions and answers directly to the resource persons, namely the Scrum Master who is responsible for ensuring the running of the project framework until the required data is obtained.

c. Observation Method

Obserbation is one method of data collection carried out by direct observation of the object of research by looking at the process of distribution and monitoring of tasks. With this researchers can find out what is needed.

2. Data Processing Methods

The data processing method makes the research more structured because the data that has been collected will be processed. The data processing method used in this study uses the following stages::

1. *Communication*
   a. Determination of the subject matter and objectives
   b. Data collection
   c. Literature study
2. *Planning*

   The process of determining resources, specifications for design based on system needs and objectives based on the results of communication carried out so that development can be in accordance with the expected review.
3. Modeling

   System modeling using Unified Modeling Language (UML). The supporting application used for modeling and designing interfaces is the visual paradigm. Here is the process carried out:
   a. Design Use Case Diagram
   b. Perancangan Activity Diagram
   c. Class Diagram Design
   d. Sequence Diagram Design
   e. Interface design
4. Construction

   The process of translating the design form into code, after which testing is carried out on the system and also the code that has been created. In coding using codeigniter framework and MySQL as a database with supporting applications such as google chrome browser, visual studio code and XAMPP.
5. Deployment

   Stages of software implementation to the user. After analysis, design, coding and testing, the finished system will be handed over to the user to be used by the user

C. Result and Discussion

1. Information System Flow

The following is a running and proposed information system flow in the Internal Office Memo (IOM) Management System.

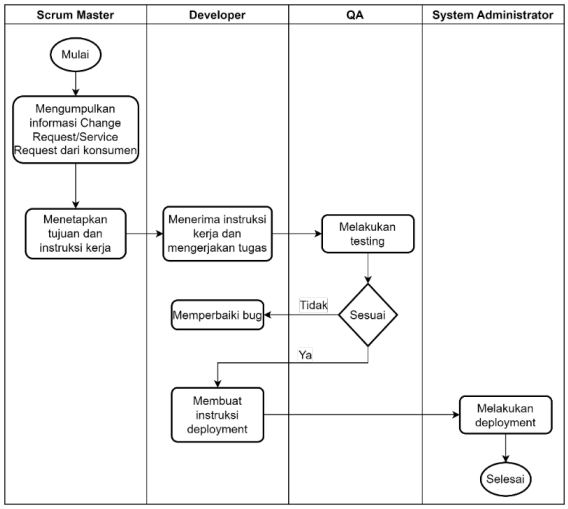

Figure 1. System flow running

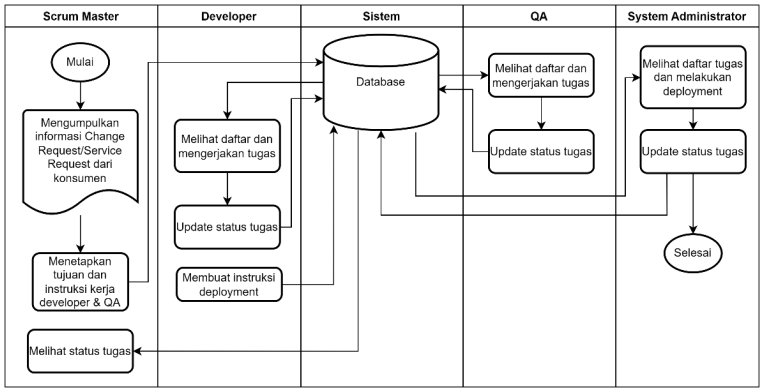

Figure 2. Proposed system flow

2. Functional needs

In this study, functional needs can be seen based on the flow of new systems that have been described previously. Details of functional requirements can be seen below.

a. User Requirements as Scrum Master:
   1. Login and log out to or from the system.
   2. Change the password.
   3. Create an internal office memo (IOM).

b. User Needs as a Developer:
   1. Login and log out to or from the system.
   2. Change your password
   3. Update task status on internal office memos (IOMs).

c. User Needs as Quality Assurance and System Administrator:
   1. Login and log out to or from the system.
   2. Change the password.
   3. Update task status on internal office memos (IOMs).

3. Planning

System modeling using Unified Modeling Language (UML) includes designing Use Case Diagrams, Activity Diagrams, Class Diagrams, Sequence Diagrams.

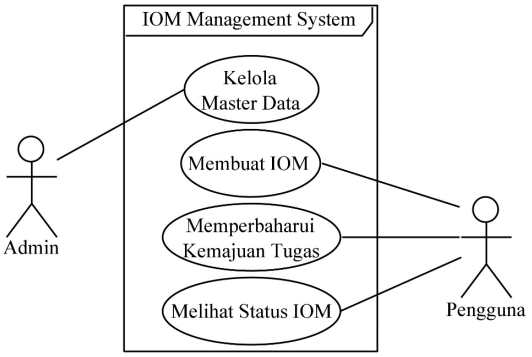

Figure 3. Use Case Diagram

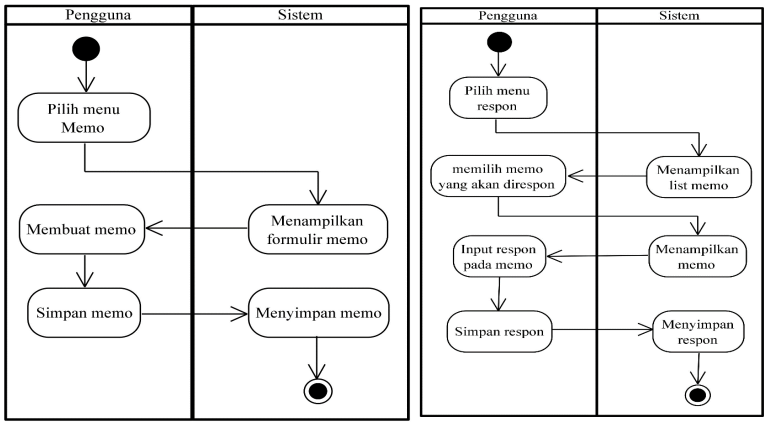

Figure 4. Activity Diagram Create and Response Memo

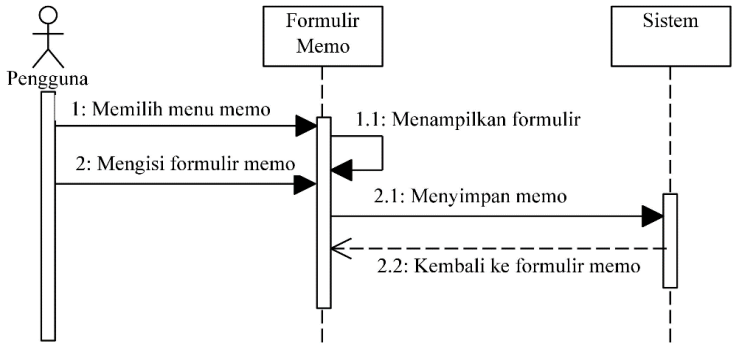

Figure 5. Sequence Diagram creates IOM

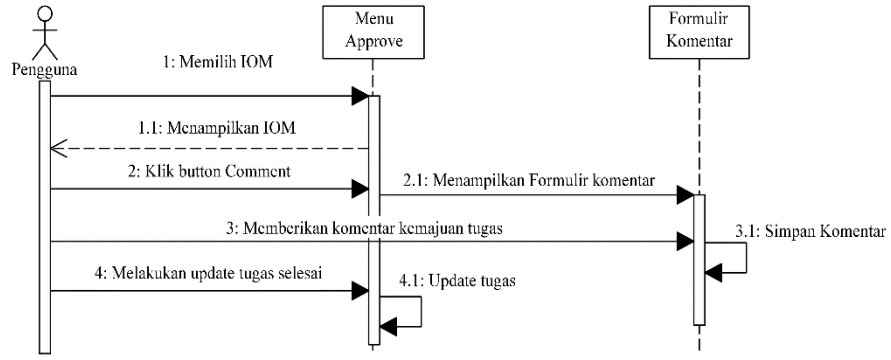

Figure 6. Sequence Diagram updating IOM

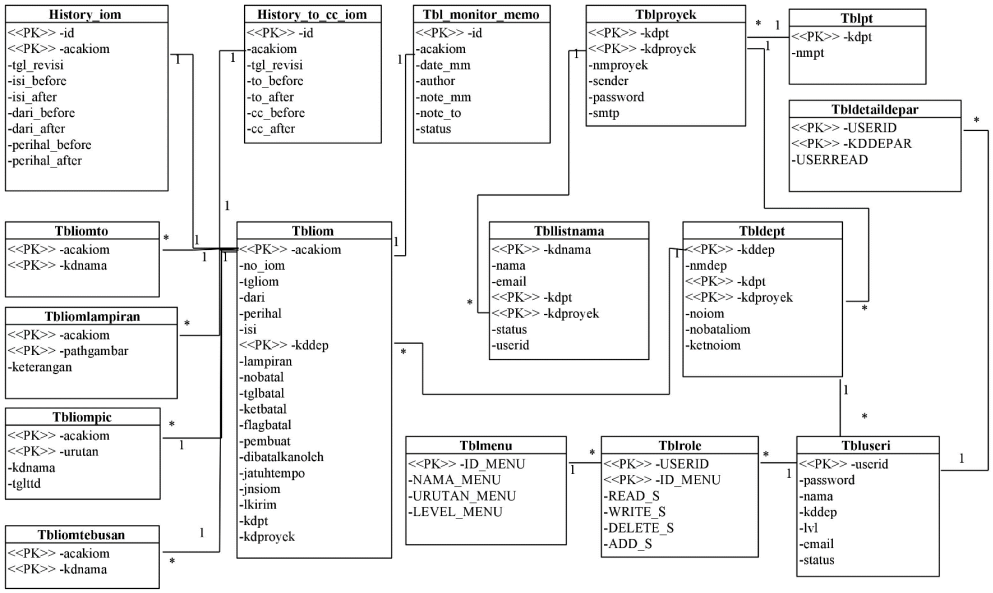

Figure 7. *Class Diagram IOM Management System*

4. Implementation

At this stage the author carries out the program coding process which is an implementation based on the design of Use Cases, Activities, Sequences, Classes and interfaces to become a program according to the needs of system users. The following is a display of the results of the implementation of the web-based Internal Office Memo (IOM) Management System design.

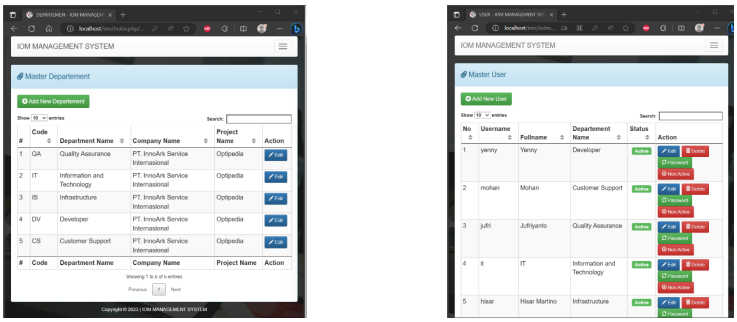

Figure 8. Master department and master user *menu pages*

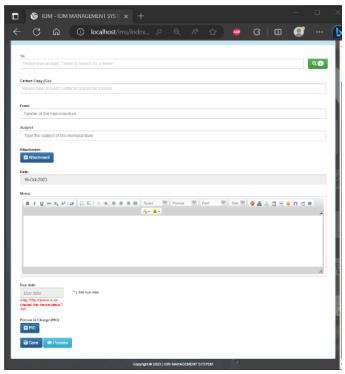

Figure 9. IOM creation form

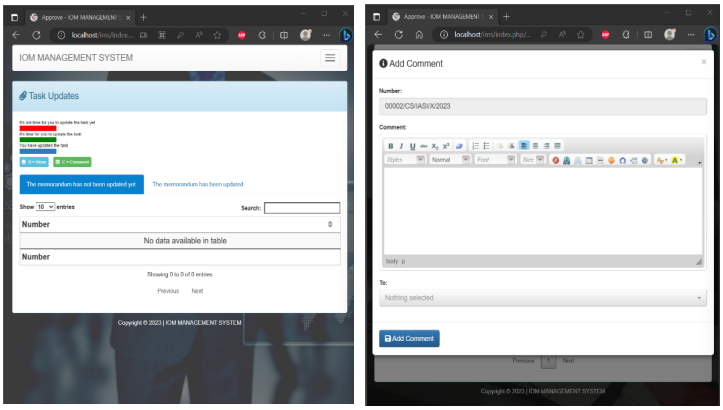

Figure 10. Task updates *menu page* and Comment *form*

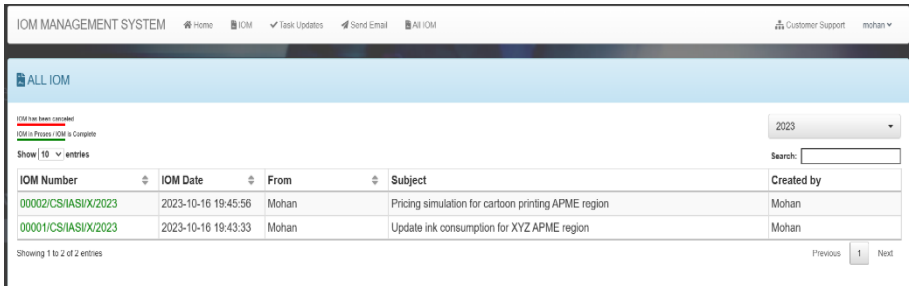

Figure 11. All IOM *Menu*

5. Black box *testing*

After the application is complete, then black box testing of the application with the type of requirement testing that focuses on the functional requirements of the software. Where black box testing deals with testing performed on the software interface. To see if the application program can produce output as expected from the system. If the input provided can already produce output in accordance with its functional needs, then the program created is correct. However, if the output produced is not in accordance with its functional needs, then the system still has some errors, then improvements are made to the errors that occur. Test results can be seen in the following tables:

Table 1. Login testing table

No	Testing	Test Cases	Expected results	Test Results
1	Username textbox testing	Empty	*Alert "This field is required"*	Test success
2	Password textbox testing	Empty	*Alert "This field is required"*	Test success
3	Test admin login functionality	Login by entering admin username and password	View the admin's main page	Test success

Table 2. IOM menu testing table

No	Testing	Test Cases	Expected results	Test Results
1	Test the IOM menu	IOM Menu	View memo form	Test success
2	Test the preview button	Preview button	View draft memos	Test success
3	Test the save button	Save button	*Alert "are you sure want to save the IOM?"*	Test success
			Back to memo form	Test success
			IOM appears in the all iom menu	Test success

Table 3. Task Updates *menu testing table*

No	Testing	Test Cases	Expected results	Test Results
1	Test *Task Updates* menu	Task Updates Menu	Appears the list of iom that will be updated	Test success
2	Test Comment button	Comment button	View the comment form	Test success
3	Test add comment button	Fill in comments and Add comment button	Save comments	Test success
4	Test Done button	Done button	Display a confirmation	Test success
		Approve IOM button	Change IOM status to updated and IOM moved to tab The memorandum has been updated	Test success

6. Deployment

After completing the testing phase, the next stage is to deploy which is the last stage of the Web-Based Internal Office Memo (IOM) Management System Analysis and Design process . This stage is carried out by the author making presentations, demos and handing over applications that have been built to users, in this case brother Mohan Setiawan as Scrum Master of Optipedia division which then the management will decide on the use of the Web-Based Internal Office Memo (IOM) Management System application at PT. InnoArk International Services

D. Conclusion

Based on the discussion that has been carried out and also the results of software testing, conclusions can be drawn, namely: To design a Web-Based

Internal Office Memo (IOM) Management System, the author first conducts an analysis stage of the system that is running in the company, conducts observations and interviews, then designs a system using Unified Modelling Language (UML). The implementation of the design results is done by coding using the codeigniter framework and MySQL as a database. After coding, testing is carried out using the requirement testing type black box method. Implementation results in a system that assists the optimization team in task execution, team collaboration, and internal communication, which can improve operational efficiency. The app also increases clarity or transparency of work progress, as well as being able to make better decisions based on actual data.

E. References

[1] Y. Arvita, A. Siswanto, I. S. Wijaya, Irawan, and A. S. Sholeh, "Perancangan E-Office Administrasi Pada Kantor Kelurahan Muara Bulian," *J. Process.*, vol. 16, no. 2, pp. 118–127, 2021, doi: 10.33998/processor.2021.16.2.1093.

[2] B. Wildan, A. P. Sari, and R. Nasution, "Sistem Informasi Manejemen Surat Berbasis Web Pada PT. Clipan Finance Indonesia, Tbk," *Hexag. J. Tek. dan Sains*, vol. 2, no. 1, pp. 85–90, 2021, doi: 10.36761/hexagon.v2i1.882.

[3] M. Jeffri and K. Kurniawansyah, "Perancangan Sistem Aplikasi E-Office Berbasis Web Pada Dinas Kependudukan Dan Pencatatan Sipil Kabupaten Muaro Jambi," *J. Inform. Sist. Inf. dan Kehutan.*, vol. 2, no. 1, pp. 21–28, 2023, doi: 10.53978/jfsa.v2i1.264.

[4] K. Fakhroutdinov, "The Unified Modeling Language," 2023. https://www.uml-diagrams.org/ (accessed Aug. 29, 2023).

[5] B. H. Rambe, R. Pane, D. Irmayani, M. Nasution, and I. R. Munthe, "UML Modeling and Black Box Testing Methods in the School Payment Information System," *J. Mantik*, vol. 4, no. 3, pp. 1634–1640, 2020, [Online]. Available: https://iocscience.org/ejournal/index.php/mantik

[6] I. Kusyadi, M. Ardiansyah, and A. I. Hidayatullah, *Analisa Dan Perancangan Sistem*, Pertama. Banten: Unpam Press, 2021.

[7] A. Wardhana *et al.*, "Konsep Dasar Ilmu Manajemen," *Media Sains Indones.*, no. January, p. 3, 2021, [Online]. Available: https://books.google.com/books?hl=en&lr=&id=-mU7EAAAQBAJ&oi=fnd&pg=PA1&dq=buku+kepemimpinan+dan+konflik&ots=jXjP5F3iYS&sig=AFpieHIHmG82KZtuUBzxtDwwK14

[8] Y. Mulyanto and S. B. Prakoso, "Rancang Bangun Jaringan Komputer Menggunakan Sistem Manajemen Omada Controller Pada Inspektorat Kabupaten Sumbawadengan Metode Network Development Life Cycle (Ndlc)," *J. Inform. Teknol. dan Sains*, vol. 2, no. 4, pp. 223–233, 2020, doi: 10.51401/jinteks.v2i4.825.

[10] S. Zakir and Amrizal, *Kupas Tuntas Pemograman Berbasis Web*. 2019.

[11] Henderi, U. Rahardja, and E. Rahwanto, *UML Powered Design System Using Visual Paradigm*. Literasi Nusantara Abadi, 2021.

[12] V. Paradigm, "Visual Paradigm," 2023. https://www.visual-paradigm.com/aboutus/faq.jsp (accessed Aug. 22, 2023).

[13] M. Muthohir, "Mengenal Code Editor Visual Studio Code," *Universitas STEKOM*, 2022.

[14] R. Rachmatullah and D. E. Saputra, "Aplikasi Reservasi Penginapan Berbasis Android," *J. Inf. Syst. Comput.*, vol. 01, pp. 22–29, 2021.

[15] R. Melyanti, M. Iqbal, and Muhardi, "Sistem Informasi Manajemen Penelitian Dan Pengabdian Masyarakat Di Bagian P3M (Studi Kasus: Stmik Hang Tuah Pekanbaru)," *J. Ilmu Komput.*, vol. 9, no. 2, pp. 165–176, 2020, doi: 10.33060/jik/2020/vol9.iss2.186.

[16] A. Y. Permana and P. Romadlon, "Perancangan sistem informasi penjualan perumahan menggunakan metode SDLC pada PT. Mandiri Land Prosperous berbasis Mobile," *SIGMA – J. Teknol. Pelita Bangsa*, vol. 10, no. 9, pp. 153–167, 2019.

[17] D. S. Rusdianto, A. Arwan, F. Pradana, T. A. Kurniawan, and F. Amalia, "Pelatihan Pemodelan Kebutuhan Perangkat Lunak dengan Menggunakan Use Case Diagram," *Bubungan Tinggi J. Pengabdi. Masy.*, vol. 4, no. 2, p. 600, 2022, doi: 10.20527/btjpm.v4i2.5273.

[18] M. Mukmin and L. Lestiyani, "Rancang Bangun Sistem Informasi Komoditas Ternak Pada Dinas Pertanian Kabupaten Buton Selatan," *J. Inform.*, vol. 8, no. 1, pp. 50–59, 2019.

[19] D. Susilo, C. Sari, and G. W. Krisna, "Sistem Kendali Lampu Pada Smart Home Berbasis IOT (Internet of Things)," *ELECTRA Electr. Eng. Artic.*, vol. 2, no. 1, p. 23, 2021, doi: 10.25273/electra.v2i1.10504.

[20] A. Noviantoro, A. B. Silviana, R. R. Fitriani, and H. P. Permatasari, "Rancangan Dan Implementasi Aplikasi Sewa Lapangan Badminton Wilayah Depok Berbasis Web," *J. Tek. dan Sci.*, vol. 1, no. 2, pp. 88–103, 2022, doi: 10.56127/jts.v1i2.108.

[21] N. Azis, G. Pribadi, and M. S. Nurcahya, "Analisa dan Perancangan Aplikasi Pembelajaran Bahasa Inggris Dasar Berbasis Android," *J. IKRA-ITH Inform.*, vol. 32, no. 2, pp. 58–65, 2020.

[22] H. Situmorang, "Sistem Informasi Pengelolahan Data Alumni Berbasis Web (Studi Pada Fakultas Sain, Teknologi Dan Informasi) Universitas Sari Mutiara Indonesia," *J. Mahajana Inf.*, vol. 4, no. 1, pp. 34–48, 2019.

[23] S. Sulistyowati, A. Rohmah, and A. Dwianto, "Analisa Dan Perancangan Aplikasi Surat Menyurat Pada Badan Meteorologi, Klimatologi dan Geofisika (BMKG) Palangka Raya Berbasis Web," *J. Sains Komput. dan Teknol. Inf.*, vol. 1, no. 2, pp. 27–30, 2019, doi: 10.33084/jsakti.v1i2.873.

[24] D. F. Waidah and L. Tarika, "Analisis Dan Pengembangan Sistem Informasi Data E-Raport Dapodik Di SD Swasta 001 Pt. Kg meral Barat," *J. Tikar*, vol. 3, no. 1, pp. 9–18, 2022.

[25] D. F. Wabula, D. F. Wabula, and M. I. Mustaqim, "Perancangan Pelayanan Surat Berbasis Android," *Pros. Semin. Nas. Teknol. Dan Sains*, vol. 1, pp. 206–212, 2022, [Online]. Available: https://proceeding.unpkediri.ac.id/index.php/stains/article/view/1427/1221

[26] A. Sugianto and N. Cendriono, *Korespondensi Dalam Bahasa Inggris Dan Indonesia*. Unmuh Ponorogo Press, 2023.

[27] S. Sugiarti and G. W. Saputra, "Mendampingi Siswa untuk Mengenal dan Memahami Surat Pribadi dan Surat Dinas pada Kelas VII MTs NU Umbul

Sari," *J. Pengabdi. Masy.*, vol. 2, no. 2, pp. 69–72, 2022, doi: 10.31004/abdira.v2i2.137.

[28] F. Herdiana and Marsofiyati, "Penerapan dan Pemanfaatan E-Office Sebagai Perwujudan Paperless Office," *J. Inf. dan Komun. Adm. Perkantoran*, vol. 3, no. 1, pp. 68–74, 2019, [Online]. Available: http://jurnal.fkip.uns.ac.id/index.php/jikap

[29] R. Naufal and R. Z. Nasution, "Metode Black Box Pada E-Aplikasi di Gudang Material Pabrik Gula PT Perkebunan Nusantara 2 Sei Semayang," *J. Comput. Sci. Informatics Eng.*, vol. 02, no. 1, pp. 1–12, 2023, [Online]. Available: http://creativecommons.org/licenses/by-sa/4.0/

[30] I. Budiman, S. Saori, R. N. Anwar, Fitriani, and M. Y. Pangestu, "Analisis Pengendalian Mutu Di Bidang Industri Makanan (Studi Kasus: UMKM Mochi Kaswari Lampion Kota Sukabumi)," *J. Inov. Penelit.*, vol. 1, no. 0.1101/2021.02.25.432866, pp. 1–15, 2021.

[31] R. Risald, "Implementasi Sistem Penjualan Online Berbasis E-Commerce Pada Usaha UKM Ike Suti Menggunakan Metode Waterfall," *J. Inf. Technol.*, vol. 1, no. 1, pp. 37–42, 2021, doi: 10.32938/jitu.v1i1.1393.

[32] A. F. Prasetya, Sintia, and U. L. D. Putri, "Perancangan Aplikasi Rental Mobil Menggunakan Diagram UML (Unified Modelling Language)," *J. Ilm. Komput. Terap. dan Inf.*, vol. 1, no. 1, pp. 14–18, 2022.

[33] R. S. Pressman and B. R. Maxim, *Software Engineering: A Practitioner's Approach 9th Edition*. 2019.

[34] H. Tohari, A. Kudhori, and S. Guntur Wibowo, "Aplikasi Paperless Office dalam Implementasi Electronic Office Menggunakan Pendekatan Unified Modelling Language," *Smart Comp Jurnalnya Orang Pint. Komput.*, vol. 10, no. 3, pp. 170–175, 2021, doi: 10.30591/smartcomp.v10i3.2904.

[35] H. A. Christianto, D. Trisnawarman, and T. Sutrisno, "Pembuatan Dashboard Penjualan Dan Pembelian Hevindo Sport," *J. Ilmu Komput. dan Sist. Inf.*, vol. 8, no. 1, p. 69, 2020, doi: 10.24912/jiksi.v8i1.11471.

[36] A. Jimi, "Perancangan Sistem E-Learning Berbasis Web Pada SMP N 2 Busalangga," *J. Pendidik. Teknol. Inf.*, vol. 3, no. 1, pp. 29–37, 2020, doi: 10.37792/jukanti.v3i1.108.

[37] K. Beda, F. L. Witi, and M. Radja, "Sistem Informasi Penerimaan Mahasiswa Baru," pp. 433–443, 2022.

[38] R. Risma, D. D. Apriyani, and N. T. Astuti, "Perancangan Sistem Aplikasi Rental Mobil pada Rental Mobil Toko 28 Berbasis Java Netbeans," *J. Ris. dan Apl. Mhs. Inform.*, vol. 3, no. 04, pp. 723–730, 2022, doi: 10.30998/jrami.v3i04.2523.

[39] S. L. Saepudin and R. P. Dhaniawaty, "Sistem Informasi Penyewaan Mobil Berbasis Web Pada PT. Frasindo Lima Mandiri," *J. Manaj. Inform.*, no. 49, pp. 1–2, 2019.

[40] R. Hermiati, A. Asnawati, and I. Kanedi, "Pembuatan E-Commerce Pada Raja Komputer Menggunakan Bahasa Pemrograman Php Dan Database Mysql," *J. Media Infotama*, vol. 17, no. 1, 2021, doi: 10.37676/jmi.v17i1.1317.

[41] I. K. Dewi, "Rancang Bangun Sistem Monitoring Kehadiran Karyawan Pada Cv. Wechun Illufa Jaya," vol. 9, no. 1, 2021, [Online]. Available: https://ejournal.stmikgici.ac.id/index.php/jursima/article/view/298%0Ah

ttps://ejournal.stmikgici.ac.id/index.php/jursima/article/download/298/179

[42] Khairil and A. D. Syafutra, "Penilaian Kepuasan Pelanggan Dengan Aplikasi Survei Pada PDAM Kota Bengkulu," *J. TEKNOSIA Vol. 1 No. 1, Bulan Juni 2021, Hal 16 – 21*, vol. 1, no. 1, pp. 16–21, 2021.

[43] D. D. J. T. Sitinjak, Maman, and J. Suwita, "Analisa Dan Perancangan Sistem Informasi Administrasi Kursus Bahasa Inggris Pada Intensive English Course Di Ciledug Tangerang," *Insa. Pembang. Sist. Inf. dan Komput.*, vol. 8, no. 1, 2020, doi: 10.58217/ipsikom.v8i1.164.

[44] S. P. Lumban Batu, A. S. Budiman, and N. Nuraeni, "Perancangan Sistem Informasi Penjualan Berbasis Web Pada Toko Bk Ethnic Cloth," *JSTIE (Jurnal Sarj. Tek. Inform.*, vol. 9, no. 1, 2021, doi: 10.12928/jstie.v1i1.18905.

[45] F. Ria, J. Lorenza, and Y. Mukti, "Aplikasi Management Surat Pada Dinas Kesehatan Kota Pagaralam Menggunakan Codeigniter," 2020. doi: 10.36050/betrik.v11i2.203.

[46] D. A. Budiman and D. M. Nugraha, "Aplikasi Raport Online Berbasis Web Menggunakan Framework Codeigniter (Studi Kasus di SMK Angkasa 1 Margahayu)," *J. Comput. Bisnis*, vol. 13, no. 2, pp. 112–121, 2019.

[47] D. Debiyanti, S. Sutrisna, B. Budrio, A. K. Kamal, and Y. Yulianti, "Pengujian Black Box pada Perangkat Lunak Sistem Penilaian Mahasiswa Menggunakan Teknik Boundary Value Analysis," *J. Inform. Univ. Pamulang*, vol. 5, no. 2, p. 162, 2020, doi: 10.32493/informatika.v5i2.5446.

[48] B. A. Priyaungga, D. B. Aji, M. Syahroni, N. T. S. Aji, and A. Saifudin, "Pengujian Black Box pada Aplikasi Perpustakaan Menggunakan Teknik Equivalence Partitions," *J. Teknol. Sist. Inf. dan Apl.*, vol. 3, no. 3, p. 150, 2020, doi: 10.32493/jtsi.v3i3.5343.

[49] F. N. Hasanah and R. S. Untari, *Buku Ajar Rekayasa Perangkat Lunak*. UMSIDA Press, 2020.

[50] D. Murdiani and M. Sobirin, "Perbandingan Metodologi Waterfall Dan Rad (Rapid Application Development) Dalam Pengembangan Sistem Informasi," *J. Inform. Teknol. dan Sains*, vol. 4, no. 4, pp. 302–306, 2022, doi: 10.51401/jinteks.v4i4.2008.

[51] S. Suhada, M. R. A. Kaluku, L. Hadjaratie, and M. S. Mustapa, "Pemesanan Jasa BarberShop Berbasis Android pada Era New Normal," 2020.

[52] S. Anwar and M. C. Johan, "Analisis dan Perancangan Aplikasi Logistik dan Penerapan Metode Operasional Customer Relationship Management (Studi Kasus:Natur Salon & Spa)," *J. Tek. Inform. dan Sist. Inf.*, vol. 5, no. 1, 2019, doi: 10.28932/jutisi.v5i1.1589.

[53] K. C. & Lestari and A. M. Amri, *Sistem Informasi Akuntansi (Beserta Contoh Penerapan Aplikasi SIA Sederhana dalam UMKM)*. Sleman: Deepublish, 2020. [Online]. Available: https://books.google.co.id/books?id=ShrWDwAAQBAJ&pg=PA41&dq=intitle:sistem+informasi+manajemen&hl=id&source=gbs_selected_pages&cad=2#v=onepage&q=intitle%3Asistem informasi manajemen&f=false

[54] A. Mulyanto and S. A. F. Salam, "Penerapan Metode Waterfall Pada Aplikasi Toko Online Bima Kirana Cibitung," *J. Teknol. Inf. Dan Komun.*, vol. 12, no. 2, pp. 34–41, 2021, doi: 10.51903/jtikp.v12i2.283.

[55] L. Muniroh, N. F. Nisaa, and Y. Amrozi, "Perancangan Sistem Informasi Administrasi E-Office Pada Dinas XYZ," *J. .IT*, vol. 11, no. 1, pp. 1–10, 2020.

[56] T. Mulyono and K. Kholid, "Sistem Informasi E-Office Pendukung Program Paperless Korespondensi Perkantoran (Studi Kasus: Bagian Administrasi Akademik Akademi Komunitas Semen Indonesia Gresik)," *CAHAYAtech*, vol. 6, no. 2, p. 33, 2019, doi: 10.47047/ct.v6i2.8.

[57] M. A. Avila and D. Kurniadi, "Rancang Bangun Sistem Informasi E-Office pada Tata Usaha Fakultas Teknik Universitas Negeri Padang," *Voteteknika (Vocational Tek. Elektron. dan Inform.*, vol. 9, no. 1, p. 137, 2021, doi: 10.24036/voteteknika.v9i1.111285.

[58] Y. Wahyudin and D. N. Rahayu, "Analisis Metode Pengembangan Sistem Informasi Berbasis Website: A Literatur Review," *J. Interkom J. Publ. Ilm. Bid. Teknol. Inf. dan Komun.*, vol. 15, no. 3, pp. 26–40, 2020, doi: 10.35969/interkom.v15i3.74.

[59] N. Azis, *Analisis Perancangan Sistem Informasi*, vol. 13, no. 1. Widina Bhakti Persada Bandung, 2022.

[60] R. Y. Endra and S. Hadi, "Aplikasi Pengelolaan Surat Masuk Dan Surat Keluar Berbasis Framework Codeigniter Pada Polres Pesawaran," *Explor. Sist. Inf. dan Telemat.*, vol. 12, no. 2, p. 166, 2021, doi: 10.36448/jsit.v12i2.2207.

[61] P. Hartanti, S. Selfiana, and S. Rahmawati, "Penanganan Surat Menyurat Berbasis Elektronik di PT Bhanda Ghara Reksa (Persero)," *J. Adm. dan Kesekretarisan*, vol. 6, no. 1, pp. 1–15, 2021.

[62] E. P. A. Akhmad, *Pengenalan Komputer*. Surabaya: Hang Tuah University Press, 2019.