Prototype of Information System of Medical Record Borrowing and Return in Puskesmas

Muhammad Yunus [1*], Firdha Trisna Andriani [2]

[1] Department of Health Information Management, Faculty of Health, Politeknik Negeri, Jember, Indonesia

m.yunus@polije.ac.id, firdhaandriani811@gmail.com

ABSTRACT

The borrowing and returning of medical records carried out at Puskesmas X is still done manually, there is no recording of medical records in and out of the expedition book in the MR unit which makes it difficult for officers to find patient medical records borrowed by the poly. The ineffectiveness of these activities hampers officer work and patient service activities if MR file has not returned to the MR room within 1x24 hours. Recording patient identity is still done manually using books and Excel so that double recording occurs which is considered ineffective by officers. In addition, the numbering of MR is recorded manually into a book based on the village code in Puskesmas X so that it is prone to number errors. The purpose of this study is to design an information system for borrowing and returning medical record files at Puskesmas X Pasuruan Regency to solve these problems. This type of research is Research and Development with the waterfall method and data collection through observation and interviews. The result of this research is a MR file loan and return information system that can facilitate the performance of MR officers at Puskesmas.

Corresponding Author :

Muhammad Yunus,
Politeknik Negeri Jember,
Jl. Mastrip PO BOX 164 Jember,
Email: m.yunus@polije.ac.id

1. INTRODUCTION

Running with the times, the existence of information systems is very helpful for users, especially for health services. One of them is the information system at the puskesmas (SIMPUS), simpus is a system made to achieve the target of implementing Puskesmas management activities through decision making [1]. According to the 2019 Health Facility Research Report (Risfaskes), the percentage of SIMPUS use as electronic medical records in Indonesia is only 8% and the combination of electronic and non-electronic medical records is 43.1% and the remaining 48.9% are still using non-electronic medical records [2].

Puskesmas (Community Health Center) is a first-level health facility that is the initial referral for patients to get health checks and treatment, especially in the BPJS era which requires members to go to first-level facilities first if they want to get an initial examination. According to Permenkes RI Number 43 of 2019 Puskesmas is a health effort organizer for first-level health services that prioritizes promotive and preventive efforts [3].

Medical records are a collection of documents that include patient data such as identity, examination results, treatment and other medical actions given to patients [4]. Medical records in the implementation at the puskesmas begin when the patient comes to the health facility to receive health services which are then recorded into medical record documents. Medical records are used as a reference for future patients,

especially when seeking treatment again [5]. The medical record is managed in the filling and assembling department which is in charge of recording the borrowing and returning of medical record files.

Based on the results of preliminary studies at Puskesmas X Pasuruan Regency, it is known that patient visit data at Puskesmas X from February 2022 to April 2022 are as follows:

Table 1. Number of patient visits at Puskesmas X Pasuruan Regency

No	Month	Number of Visits
1	February 2022	1369 Person
2	March 2022	1473 Person
3	April 2022	1516 Person

Patient visit data at Puskesmas X Pasuruan Regency increases every month, but the borrowing and return of medical record files has not used an expedition book so that tracking of medical record files is not recorded. An expedition book is a manual used to organize and monitor medical records that are being borrowed for patient or other purposes as well as medical records that have been returned. Every medical record borrowed or out of the medical record room must return in good condition and on time [6]. In the last 3 months, there have been approximately 1-3 medical record files that have been returned with a delay of more than 1x24 hours. The late return of medical record files results in hampered patient service because it takes more time to find BRM. Another problem is that the numbering of medical records is done manually using the village code in the Family folder. The medical record number that has been used will be recorded in the book to find out the number that has been used and written back into excel.

Based on the above problems, an information system for borrowing and returning medical record files is needed to facilitate officers in the process of recording borrowing and returning BRM to facilitate BRM tracking and an automatic numbering system to facilitate recording RM numbers. The use of information technology is one of them to realize quality health services [7]. The existence of a medical record file storage information system is expected to make recording the history of borrowing and returning medical records more efficient and effective.

2. RESEARCH METHOD

The type of research used is the Research and Development method [8] information system for borrowing and returning medical records at Puskesmas X Pasuruan Regency with system development using the Waterfall method. The Waterfall method is one of the methods used in making information systems [9]. According to Sommervile, system development is divided into 5 stages, namely requirement analysis, system and software design, implementation and unit testing, integration and system testing, operational and meintenance. Here is a picture of the Waterfall method life cycle:
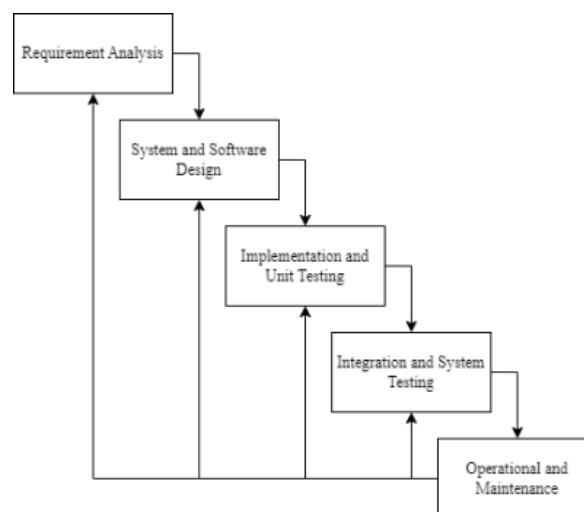

Figure 1. Waterfall model [9]

Data collection procedures were carried out using interviews and observations. Interview is one of the data collection methods in the form of two-way communication face-to-face with a specific purpose

[10]. Observation is an activity of focusing attention using the five senses to obtain research data that is carried out systematically [11].

3. RESULTS AND ANALYSIS

3.1. Requirement Analysis

Requirement analysis is the initial stage in the Waterfall method where the process of collecting data needed in the software development process so that the software needed by users can be made [12]. The results of the analysis found that officers need an information system that can facilitate the work of medical record officers in recording the identity of patient medical records, automatic numbering, history of medical record files from the medical record room and history of medical record borrowing trips.

3.2. System and Software Design

The second stage of the Waterfall method is system and software design, which is the design of system development based on the results of requirement analysis [13].

3.2.1. Flowchart Design

Flowchart is one of the procedures for solving problems using the symbolic of an algorithm so that it makes it easier to check each part in analyzing the problem. Flowchart serves as a communication between programmers in a team [14]. The following system flowchart is made based on the results of Requirement Analysis:
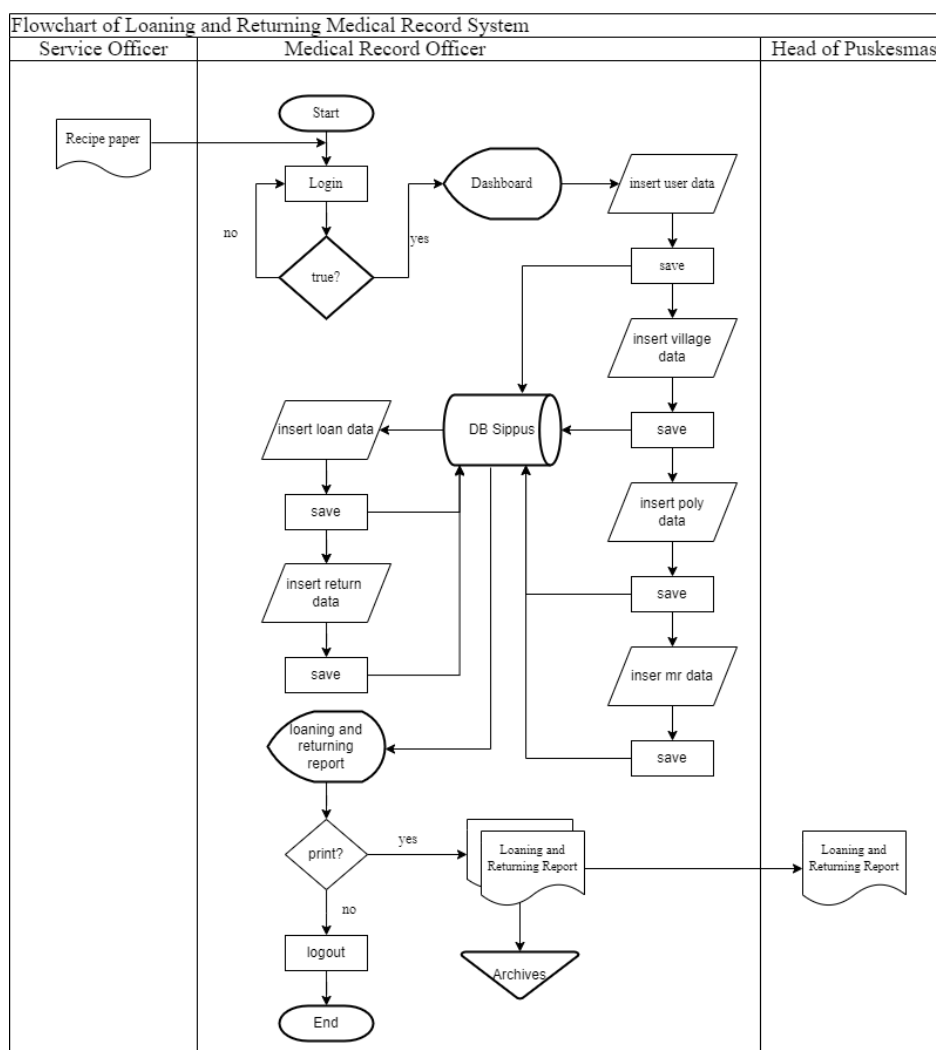

Figure 2. Flowchart System

1.2.2. Context Diagram

Context diagram is the highest level diagram of Data Flow Diagram (DFD) that connects the system with its external environment. Processes in context diagrams are usually not numbered [15].
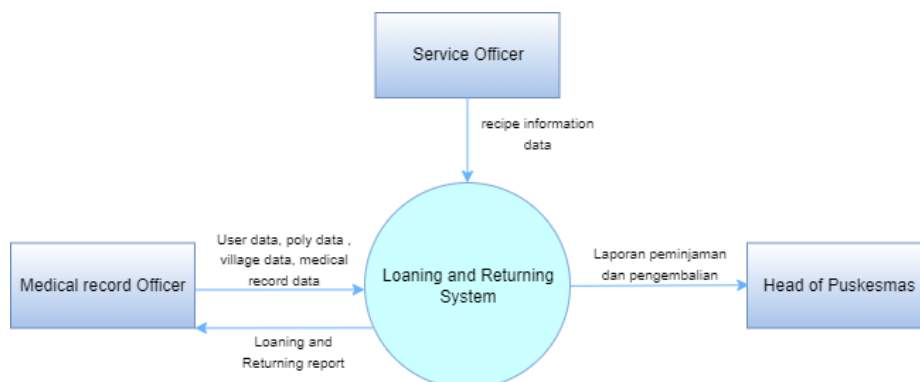

Figure 3. Context Diagram

In the Context Diagram of the medical record borrowing and returning information system above there are 3 entities and one overall process of the borrowing and returning information system. Entities consist of service officers, medical records officers and the head of the Puskesmas.

1.2.3. Data Flow Diagram (DFD)

Data flow diagram (DFD) is a diagram that describes the flow of data from an entity into the system or system to the entity. DFD can be interpreted as a graphical technique that describes the flow of data from input to output. [14]
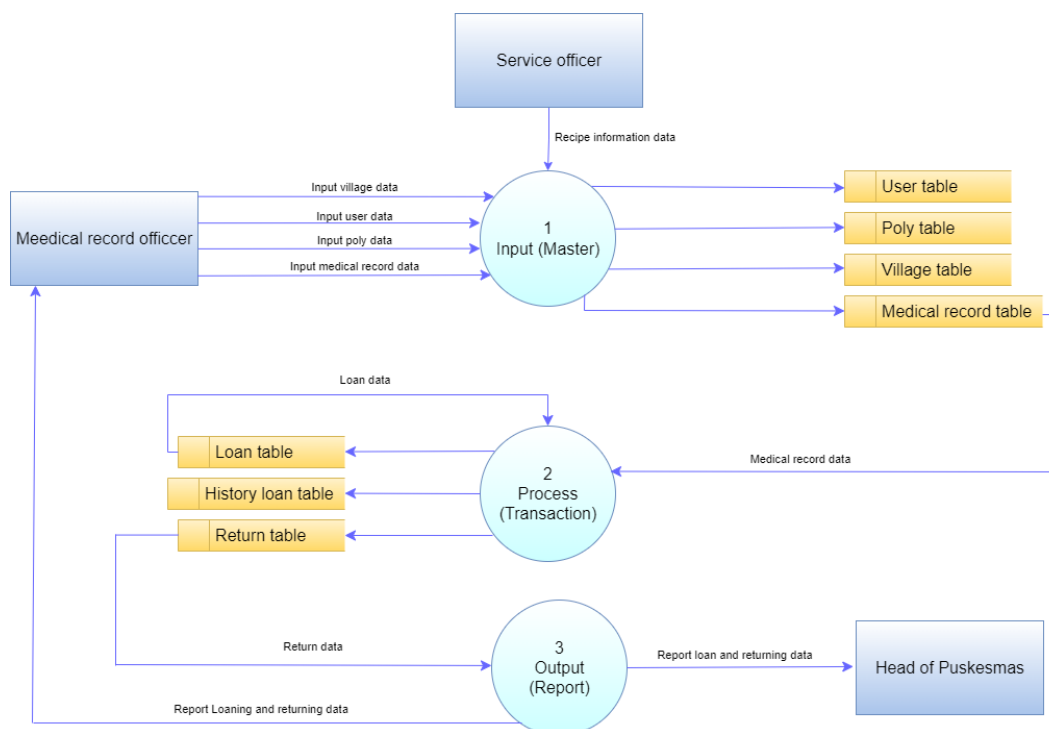

Figure 4. DFD Level 1

At Data Flow Diagram level 1 there are 3 processes obtained where the master process is the process of service officers only providing prescription data information which contains the identity data of patients who come to the Puskesmas for examination. Medical records officers input user, poly and village data and medical records which are then stored in the table. The second process is a transaction where the

loan process uses data that already exists in the table and is then stored in the loan, return and loan_history tables. The last process is the loan and return report obtained from the return table. The report is given to the medical records officer and the head of the health center.
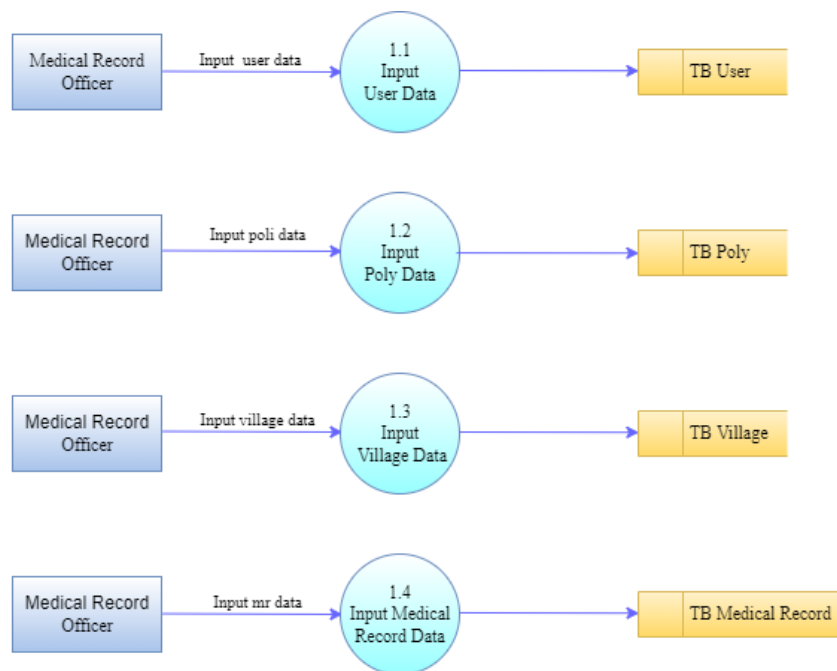

Figure 5. DFD Level 2 Input

DFD level 2 input consists of 4 types of input, namely user data input, poly data input, village data input, and medical record data input. Input is done by medical record officers and stored in each system database table.
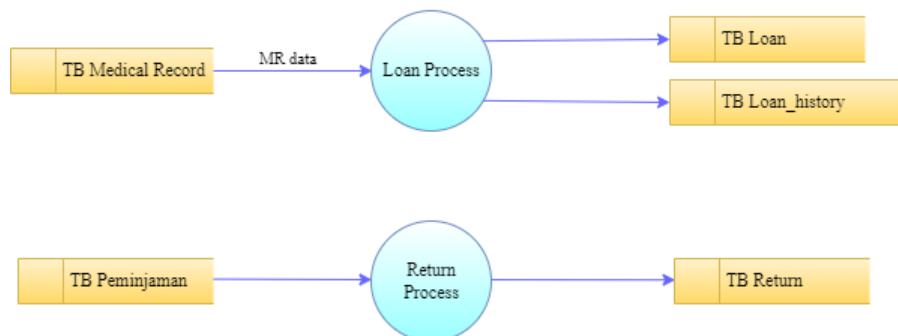
Figure 6. DFD level 2 Process

DFD level 2 process consists of borrowing and returning processes. The loan process is carried out from the data in the medical record table which is then processed by the system and stored in the loan table and loan history table. The return process is carried out by retrieving data in the loan table and stored in the return table.

1.2.4. Entity Relationship Diagram

Entity Relationship Diagram (ERD) is a diagram used to describe the relationship between data storage contained in the Data Flow Diagram. ERD has a number of symbols that are used to describe the structure and relationships between data [16].
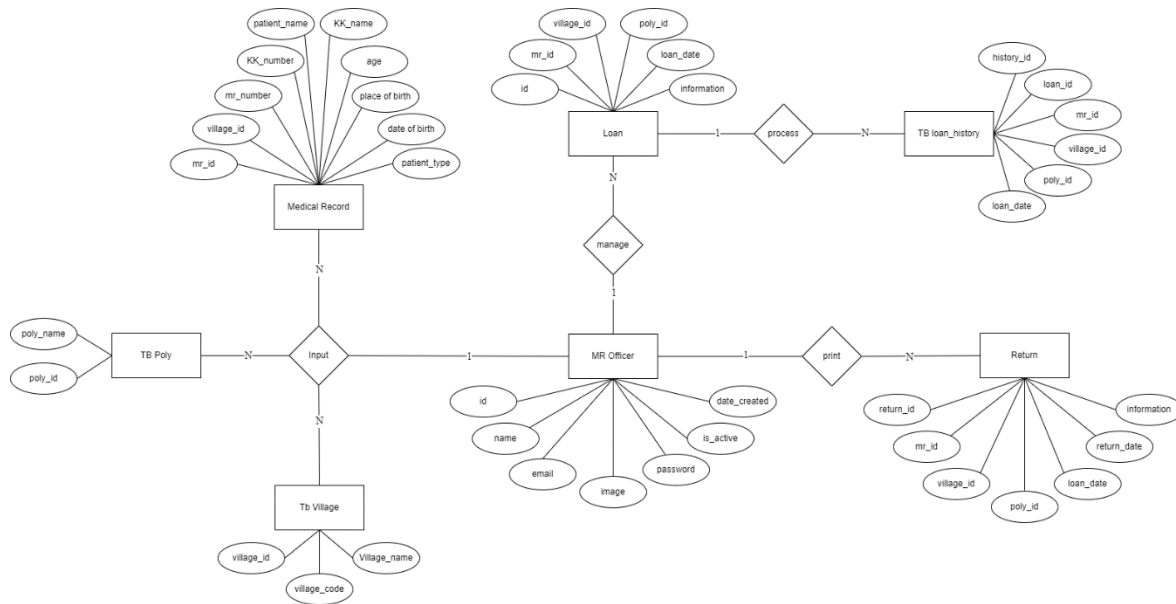
Figure 7. Entity Relationship Diagram

The entity relationship diagram design has 7 entities, namely the officer / user entity, medical record entity, village entity, poly entity, loan entity, loan_history entity, return entity. The seven entities form an interconnected relationship.

1.3. Implementation and Unit Testing

The third stage of the waterfall method is implementation and unit testing, which is the process of translating the results of system design into software [17]. The translation process into a programming language using PHP, which is an open source programming language [18]. Database creation and management using MySQL to store and manage data [19]. At this stage, email notifications are added [20] so an internet network is needed to obtain email [21]. The following are the results of Implementation and Unit Testing:
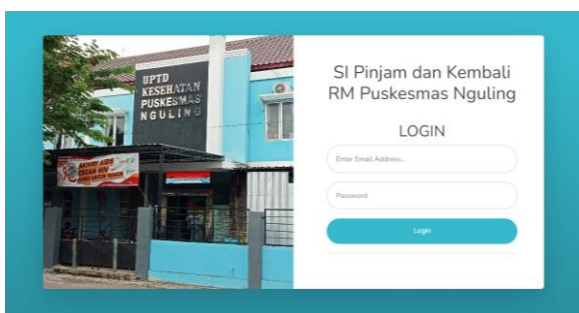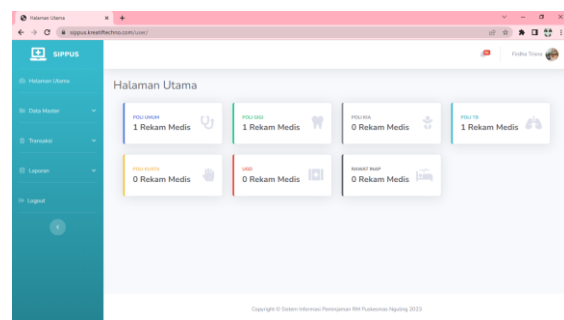

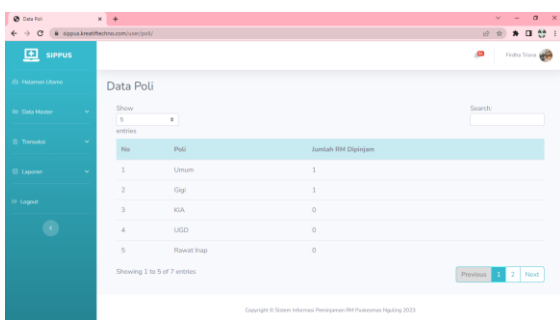Figure 8. Login view

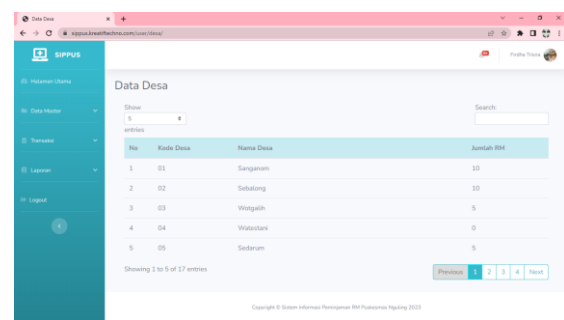Figure 9. Dashboard view

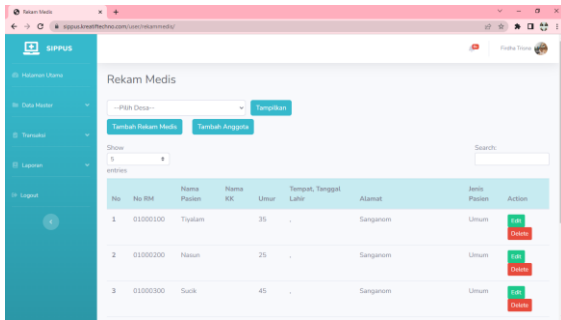Figure 10. Poly data view

Figure 11. Village data view
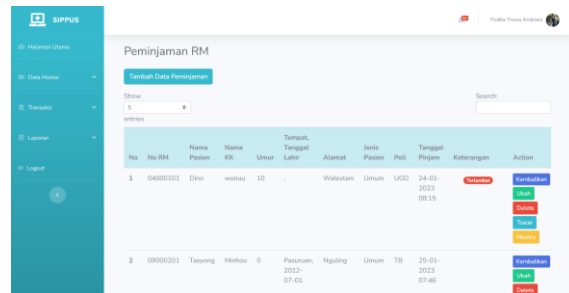
Figure 12. Medical record data view
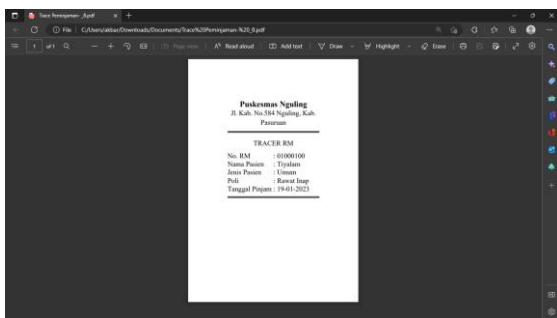

Figure 13. Loan data view
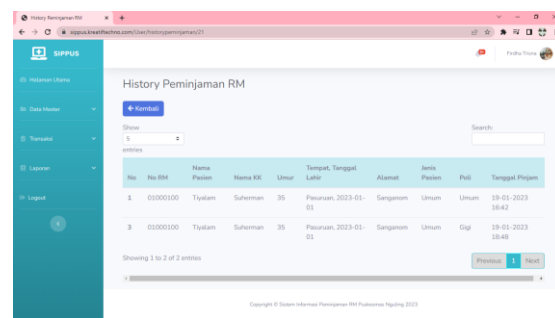

Figure 14. Tracer print view
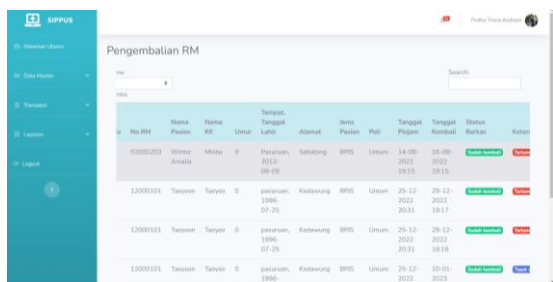

Figure 15. Loan history view

Figure 16. Medical record return view
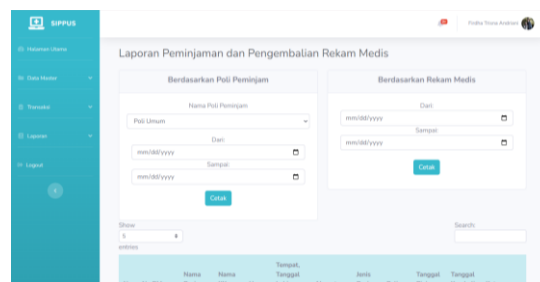
Figure 17. Report view
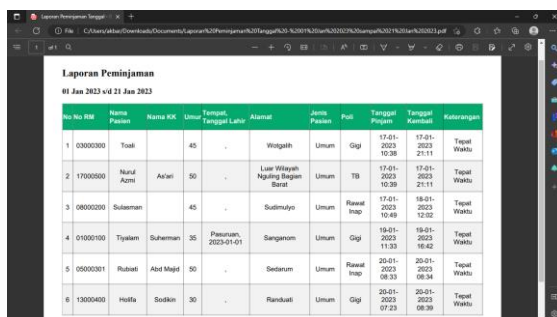
Figure 18. Repost print view

Figure 19. Email notification view

1.4. Integration and System Testing

At the integration and system testing stage, the Waterfall method functions to test the system based on units that form a functional unit. Testing is done to find out the errors that exist in the system based on the design in the early stages [22]. System testing using blackbox where the system will be tested based on the appearance of the system and the function of each feature whether it is in accordance with what is expected by the user [23]. The following are the results of tests that have been carried out by medical record officers at the Puskesmas:

Table 2. Blackbox Testing

No	Functionality	Test Scenario	Expected results	Conclusion
1	Login into system	Fill in the username and password then click login	If the username and password are correct and registered in the system, it will directly enter the system.	Successful
2	Manage medical record data	Add, edit and delete medical records.	Can save data, display data, change data, and delete medical record data	Successful
3	Manage loan data	Add borrowing data, edit data, print tracer, delete data, display history and email notification	Can save data, display data, change data, delete data, print tracers, and receive email notifications.	Successful
4	Manage return data	Add return data, delete return data	Can display data and delete return data	Successful
5	Manage report data	Display report data, print report data by date and poly	Display data and successfully print based on date and poly filters	Successful

1.5. Operation and Mintenance

The last stage of the waterfall method is Operation and maintenance which is an advanced stage where after the system is installed and used, corrections will be made if errors occur in the previous stage so that it becomes the longest stage [24]. Operation and maintenance are also used as device maintenance so that it meets management needs better and can be accounted for [25].

4. CONCLUSION

The conclusion of this study is the design and creation of an information system for borrowing and returning medical records at Puskesmas X in accordance with the research objectives. Designing and making information systems using the waterfall method starts with Requirement analysis by identifying the needs of the system. System and Software design is carried out using a flowchart system, Context diagram, Data flow diagram and Entity Relationship diagram. Implementation and Unit Testing using the PHP programming language and database processing using MySQL to produce an information system for borrowing and returning medical records. Integration and System Testing is carried out using Blackbox Testing which is tested by medical record officers where the information system for borrowing and returning medical records is successfully run and in accordance with what medical record officers need. Suggestions that can be given by researchers should be further system development so that it can be connected to the existing SIMPUS and add other features.

REFERENCES

[1] Peraturan Menteri Kesehatan RI No 31 tahun 2019, "Peraturan Menteri Kesehatan RI No 31 tahun2019 tentang sistem informasi puskesmas," *Peratur. Menteri Kesehat. RI No 31 tahun 2019 tentang Puskesmas*, 2019.

[2] Badan Penelitian dan Pengembangan Kesehatan Kementerian Kesehatan RI, "Laporan Riset Fasilitas Kesehatan 2019 Puskesmas," pp. 1–817, 2019, [Online]. Available: https://www.litbang.kemkes.go.id/laporan-hasil-riset-fasilitas-kesehatan/

[3] Peraturan Menteri Kesehatan RI No 43 tahun 2019, "Peraturan Menteri Kesehatan RI No 43 tahun 2019 tentang Puskesmas," *Peratur. Menteri Kesehat. RI No 43 tahun 2019 tentang Puskesmas*, vol. Nomor 65, no. 879, pp. 2004–2006, 2019.

[4]   Peraturan Menteri Kesehatan RI No 24 tahun 2022 tentang Rekam Medis, *Peraturan Menteri Kesehatan RI No 24 tahun 2022 tentang Rekam Medis*, no. 8.5.2017. 2022.

[5]   K. Kedokteran, "Manual Rekam medis," 2006.

[6]   L. N. F. Zuhro, I. Nurmawati, R. A. Wijayanti, and G. N. Permana, "Perancangan Sistem Informasi Peminjaman dan Pengembalian BRM Rawat Jalan di Rumah Sakit Husada Utama," *J-REMI J. Rekam Med. dan Inf. Kesehat.*, vol. 1, no. 4, pp. 604–613, 2020, doi: 10.25047/j-remi.v1i4.2136.

[7]   F. Erawantini and N. S. Wibowo, "Implementasi Rekam Medis Elektronik dengan Sistem Pendukung Keputusan Klinis," *J. Teknol. Inf. dan Terap.*, vol. 6, no. 2, pp. 75–78, 2019, doi: 10.25047/jtit.v6i2.115.

[8]   S. Rabiah, "Penggunaan Metode Research and Development dalam Penelitian Bahasa Indonesia di Perguruan Tinggi," no. April 2015, pp. 1–7, 2018, doi: 10.31227/osf.io/bzfsj.

[9]   I. Sommerville, *Software Engineering Rekayasa Perangkat Lunak*. Jakarta: Erlangga, 2011.

[10]   Fadhallah, *Wawancara*. Jakarta: UNJ Press, 2021. [Online]. Available: https://books.google.co.id/books?id=rN4fEAAAQBAJ&lpg=PP4&ots=yxJKH4Z-6T&dq=wawancara merupakan&lr&pg=PA1#v=onepage&q=wawancara merupakan&f=false

[11]   A. Wardhono and Y. Istiana, *Prosiding Seminar Nasional 2018 Jilid 2: Memaksimalkan peran pendidik dalam membangun karakter anak usia dini sebagai wujud investasi bangsa*. Fakultas Keguruan dan Ilmu Pendidikan Universitas PGRI Ronggolawe Tuban, 2018. [Online]. Available: https://books.google.co.id/books?id=5TYDEAAAQBAJ

[12]   S. Herawati, Y. D. P. Negara, H. F. Febriansyah, and D. A. Fatah, "Application of the Waterfall Method on a Web-Based Job Training Management Information System at Trunojoyo University Madura," *E3S Web Conf.*, vol. 328, p. 04026, 2021, doi: 10.1051/e3sconf/202132804026.

[13]   L. E and Subhiyakto E.R, "Rancang Bangun Sistem Inventory Gudang Menggunakan Metode Waterfall (Studi Kasus Di CV . Aqualux Duspha Abadi," vol. 1, no. 1, pp. 74–82, 2021.

[14]   S. Santoso and R. Nurmalina, "Perencanaan dan Pengembangan Aplikasi Absensi Mahasiswa Menggunakan Smart Card Guna Pengembangan Kampus Cerdas," *J. Integr.*, vol. 9, no. 1, p. 84, 2017, doi: 10.30871/ji.v9i1.288.

[15]   F. Soufitri, "Perancangan Data Flow Diagram Untuk Sistem Informasi Sekolah (Studi Kasus Pada Smp Plus Terpadu)," *Ready Star*, vol. 2, no. 1, pp. 240–246, 2019.

[16]   S. Khotijah, "Perancangan Database E-Learning Manajemen System untuk Pembelajaran pada Sekolah Menengah Pertama," *STRING (Satuan Tulisan Ris. dan Inov. Teknol.*, vol. 1, no. 1, pp. 65–73, 2016, doi: 10.30998/string.v1i1.970.

[17]   U. Khasanah, A. Saputro, P. Studi, S. Informasi, U. Nahdlatul, and U. Sidoarjo, "Sistem Informasi Layanan Jasa CCTV dan AC di CV Adhi Nawa Jaya Menggunakan Metode Waterfall," pp. 1–19.

[18]   R. Riyanti, Ulinnuha Latifa, and Yuliarman Saragih, "Pengembangan Learning Management System (LMS) Untuk Bahasa Pemrograman PHP," *J. Ilm. Core IT Community Res. Inf. Technol.*, vol. 5, no. 1, pp. 20–29, 2020.

[19]   B. Raharjo, "Belajar otodidak membuat database menggunakan MySQL," 2011.

[20]   A. H. Saptadi and J. Arifin, "SISTEM PEMANTAU SUHU DAN KELEMBABAN RUANGAN DENGAN NOTIFIKASI VIA EMAIL," *Semin. Nas. MULTI DISIPLIN ILMU CALL Pap. UNISBANK*, no. 128, pp. 15–24, 2019.

[21]   Supriyade, L. Listiyoko, A. Fahrudin, and A. A. Saputra, "Sistem Pendeteksi Ketinggian Air Menggunakan Internet of Things Berbasis Android Untuk Memberikan Informasi Data Ketinggian Air Melalui Notifikasi Email," *J. Komput. dan Inform.*, vol. 15, no. 1, pp. 260–273, 2020.

[22]   M. Syarif, E. B. Pratama, U. Bina, S. Informatika, and K. Barat, "TESTING DAN PEMODELAN DIAGRAM UML PADA APLIKASI VETERINARY SERVICES YANG DIKEMBANGKAN DENGAN," vol. 5, no. 2, pp. 253–258, 2021.

[23]   B. A. Priyaungga, D. B. Aji, M. Syahroni, N. Tri, S. Aji, and A. Saifudin, "Pengujian Black Box pada Aplikasi Perpustakaan Menggunakan Teknik Equivalence Partitions," vol. 3, no. 3, pp. 150–157, 2020, doi: 10.32493/jtsi.v3i3.5343.

[24]   B. Oktober *et al.*, "Implementasi Metode Waterfall Pada Sistem Informasi Pendaftaran Sekolah Seni Tari Balet Berbasis Website (Studi Kasus: On Point Balet School)," vol. 13, no. 2, pp. 202–211, 2021.

[25]   A. I. Harsapranata, P. S. Manajemen, U. Bina, and S. Informatika, "PERANCANGAN SISTEM INFORMASI PERHITUNGAN BIAYA PERJALANAN DINAS MENGGUNAKAN METODE WATERFALL," pp. 978–979, 2021.