Indonesian Journal of Applied Research IJAR

DESIGN OF DESKTOP-BASED LIBRARY APPLICATIONS USING JAVA IN PUBLIC ELEMENTARY SCHOOLS

Volume 3 Issue 2
(August 2022)
e-ISSN 2722-6395
doi: 10.30997/ijar.v3i2.223

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ARTICLE INFO

Article history:
Received: 31-07-2022
Revised version received: 03-08-2022
Accepted: 25-08-2022
Available online: 31-08-2022

Keywords:
Program Planning Library Program.

How to Cite:
Encep, M. (2022). DESIGN OF DESKTOP-BASED LIBRARY APPLICATIONSUSING JAVA IN PUBLIC ELEMENTARY SCHOOLS. *Indonesian Journal of Applied Research (IJAR)*, *3*(2), 115-130. https://doi.org/10.30997/ijar.v3i2.223

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ABSTRACT

The library is a place that provides a vast collection of books, which are financed and operated by a city or institution,and used by people who, on average, cannot afford to buy many books at their own expense. The research was carried out in a library in a Bogor City State Elementary School, which was closed. The library visitors consisted of teachers, staff, and public elementary school students. Borrowing books is usually on the instructions of teaching teachers to do school assignments concerning books that can be borrowed in the library. Library management is still done manually in processing library data, so they often experience difficulties in managing books and membership data, collecting data on the borrowing process, and returning and making reports. In addition, library operations have not yet run optimally. The research method used is Research and Development with several stages, namely Planning and Needs Analysis, Analysis by conducting Literature Studies, interviews and observations, Design, Implementation, Testing and Integration, and Maintenance. The study results are in the form of a computerized system that facilitates library activities to run well, especially in presenting fast, precise, accurate, and safe information that can overcome various existing problems.

1. INTRODUCTION

Facing the era of globalization, education is a significant and fundamental need for everyone because education is the root of a nation's civilization. Education can be obtained in many ways, including through formal and non-formal education. One of the efforts to bring education through non-formal channels can be made by utilizing library facilities. The use of libraries has received government attention through the Law of the Republicof Indonesia Number 20 of 2003 concerning the national education system. In article 45, it isstated that "every formal and non-formal education unit provides facilities and infrastructure that meet educational needs by the growth and development of physical potential, intellectual,social, emotional, and psychological intelligence of students. According to RI Law Number 43 of 2007 concerning Libraries article 23 paragraph (1) states, "Every school/madrasah organizes a library that meets the national library standards by taking into account the national education standards." A library is a room, part of a building, or the building itself that is used to store books and other publications, which are usually held according to a particular arrangement for the use of readers, not for sale (Qalyubi., 2007). Academic libraries are excellent sources of information and knowledge to provide a wide range of services to meet user needs (Iqbal et al., 2020).

In line with the critical role of libraries, library information system applications are now familiar. Many libraries have used library information system applications as an essential part of improving the performance of library staff and library organizations. Technological developments make people think to be able to work more effectively and efficiently. One of them is to create a conventional system into a computerized system (Yahya, 2020). A computerized system can assist the librarian in processing library data and printing reports (Panjaitan et al., 2020). Website-based library applications make it easier to find the desired information and build a more structured library information system (Maimunah et al.,2020). Digital libraries will improve the quality of services and the transmission rate of digitallibrary information (Shi & Zhu, 2020). Library Information System provides convenience andspeed in processing library data to improve library services (Nurhayati, 2019). Digital Library application development in the future will be a solution to the problems that exist in the application (Mayasari & Irawan et al., 2021). Android-based library applications increase children's literacy interest and are easily accessible to the public (Ramadhani & Saputro, 2021). Information systems that can manage library management more effectively and efficiently canuse intelligent libraries (Andriyani et al., 2021).

From this background, the author researched a public elementary school in one of the cities of Bogor, a government-owned educational institution under the auspices of the Education Office. At the school, library facilities are widely used by the students and the teachers and staff as auxiliary facilities in the teaching and learning process. Based on several previous research references related to the creation of a computerized system for libraries that have been found by several researchers above, the results of the research show that an automated system can facilitate work to be more effective and efficient, processing library data and reports more efficiently, realizing a more comprehensive library information system. Structured, improved service quality and digital transformation are easily accessible to the public and support the intelligent library concept. So far, library management is still done manually. In processing the data, in the form ofbook data, membership data, borrowing, returning, and preparing the necessary reports, they have not been managed properly. Hence, they often experience difficulties managing library books, membership data, collecting data on the borrowing and returning process, and makinga report as a form of responsibility for the performance of library staff and library organizations. In addition, the operation of the library until now has not run optimally.

With these problems, making library information system applications is expected to help in library management, and it is hoped that in the future, library operations at the school can run optimally because library applications can make it easier for librarian officers to do work and can work effectively with existing systems (Loi et al., 2021).

1.1.Purpose and objectives

The aims and objectives of this research are:

1. Creation and development of a computerized system for processing library data at SD Negeri Bogor City, from a manual system to an automated system, to facilitate activities in the school library so that the information obtained is faster, more precise, and accurate.
2. Helping the management of the library in one of the public elementary schools in the city of Bogor so that it can be better managed, and it is hoped that in the future, library operations can run optimally.

1.2.Scope

In the scope of this study, the authors provide a limitation of the problem, namely by discussing the problem of borrowing, returning, and reporting transactions at the library in one of the State Elementary Schools in Bogor City, which starts from processing user data, then processing book data, then processing membership data, then processing borrowing and returning. Closed with the process of making several reports, including book data reports, membership reports, loan reports, and return reports.

2. METHODS

One of the important factors in the development/development of information systems is to understand the existing system and its problems (Sutabri, 2004)

This study uses the Research and Development research method with several stages carried out, namely as follows:

1. Planning and Needs Analysis
2. Analysis by conducting literature studies, Interview, and Observation.
   Literature Study Covers the collection of theoretical data and information by studying books, references, and other literature related to the research title. The interview process was carried out with the person in charge and the school librarian regarding library management, including processing book data, membership data, borrowing, and returning books and reports, which will be used for library program design. Observations were made by direct observation in the school library, including book data recording, membership registration, borrowing, and returning books and reports made.
3. Design by making a system design that is poured into a business process model equipped with HIPO (Hierarchy Input Process Output) Program Specifications, flowcharts, and User Interface Design.
4. Implementation where the system is built using tools and applies concepts as needed.
5. Testing and Integration with UAT (User Acceptance Testing) ensures the system follows the needs.
6. Maintenance by evaluating to see if the system developed is following the initial design, how successful the implementation is, and the benefits of using the system, Maintenance, and Long-Term Planning.

3. RESULTS AND DISCUSSION

The library in one of the public elementary schools in Bogor City is a closed library type, where the use of library facilities is used by internal school parties, consisting of students, teachers, and staff as support in the teaching and learning process. School library management is still done manually, both in processing data, in the form of book data, membership data, borrowing, returning, and making reports, so they often experience difficulties in managing library books, membership data, collecting data on the borrowing process and returns and reporting as a form of responsibility for the performance of library staff and library organizations. In addition, the operation of the library until now has not run optimally. With these problems, making library information system applications is expected to help in library management, and it is hoped that in the future, school library operations can run optimally.

3.1.File Normalization

A file consisting of several groups of elements that repeatedly need to be reorganized. The process of organizing files to eliminate repetitive groups of elements is called normalization (Jogiyanto, 2005). Normalization can be understood as stages, each of which is related to the standard form. The typical format is a relational state generated by applying simple rules regarding the concept of functional dependence on the relation in question (Nugroho, 2011)

Making normalization is used as a reference for making files or databases that will be used in the application to be made.

1. Un Normalized Form and 1NF/First Normal Form

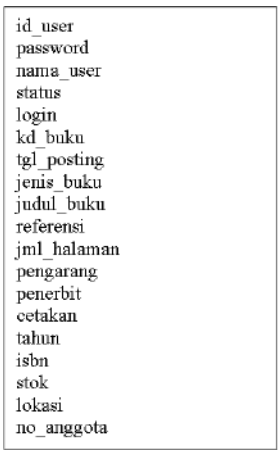
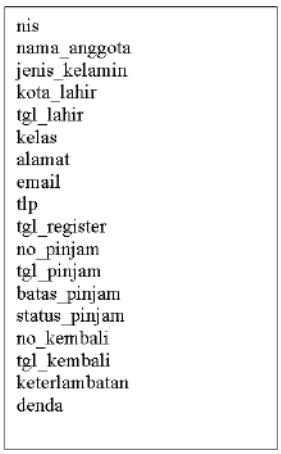
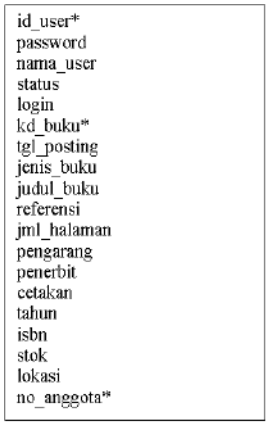
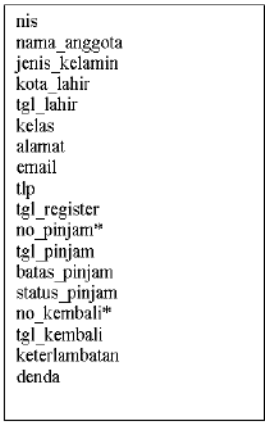


Figure 1 Un Normalized Form







Keterangan:

* : *Candidate Key*

Figure 2 1NF/First Normal Form

Figure 1 is a collection of data to be recorded, and there is no need to follow a specific format. The data may be incomplete or duplicated. The data are grouped as is according to their arrival. Meanwhile, Figure 2 the first standard form is met if a table does not have many-valued attributes or more than one attribute with the same value domain.

2. 2NF/Second Normal Form and 3NF/Third Normal Form

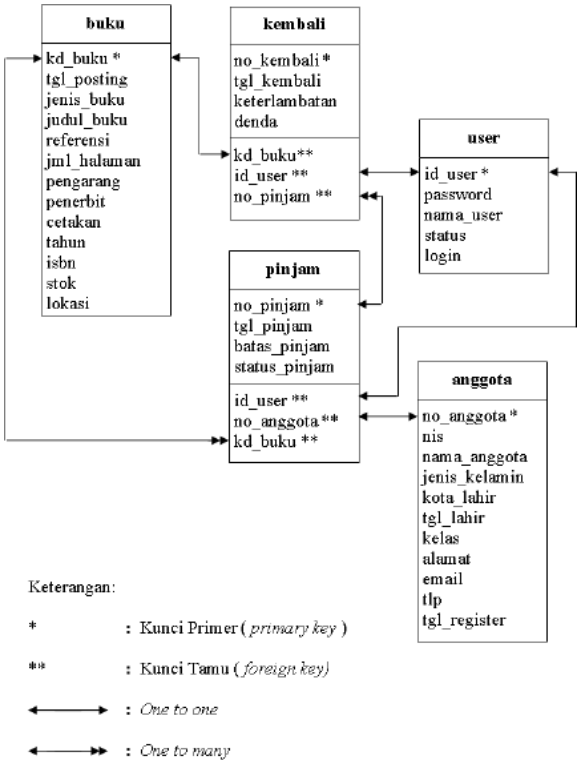


Figure 3 2NF/Second Normal Form

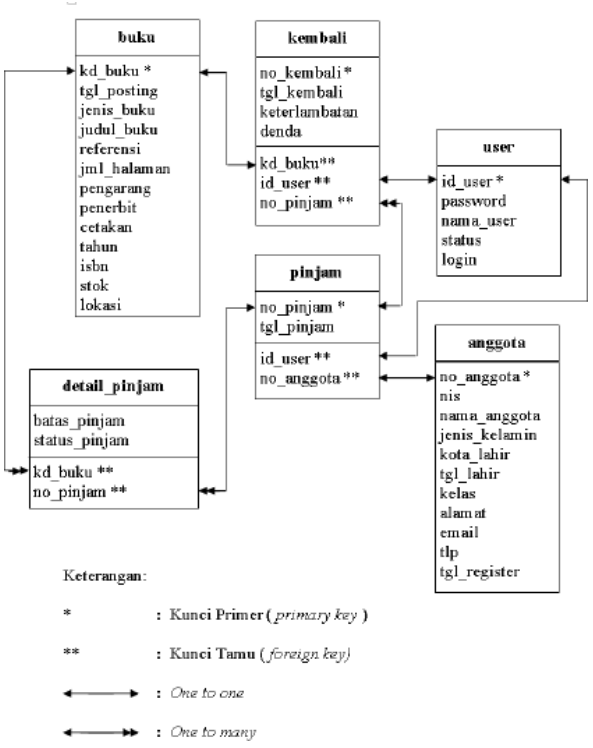


Figure 4 3NF/Third Normal Form

Figure 3 is the second standard form is met if the data has met the criteria of the first standard form, and every non-key attribute must be functionally dependent on the primary key. Figure 4 has the condition that the relation must be in the second standard form, and all non-primary attributes have no transitive relationship.

3.2.File Specification

In designing library programs. The database that the author uses is MySQL. The database file is created with the following file specifications:

1. File User and Member Files

Table 1 User File Specification

No.	Elemen Data	Akronim	Tipe	Panjang	Keterangan
1	ID *User*	id_user	*varchar*	10	*Primary Key*
2	Password	password	*varchar*	25	
3	Nama *User*	nama_user	*varchar*	30	
4	Status *User*	status	*varchar*	5	
5	Login	login	*char*	1	

Table 2 Member File Specification

No.	Elemen Data	Akronim	Tipe	Panjang	Keterangan
1	No Anggota	no_anggota	*varchar*	10	*Primary Key*
2	NIP/NIS	nis	*varchar*	12	
3	Nama Anggota	nama_anggota	*varchar*	30	
4	Jenis Kelamin	jenis_kelamin	*varchar*	10	
5	Kota Lahir	kota_lahir	*varchar*	15	
6	Tgl Lahir	tgl_lahir	*date*	10	
7	Kelas/Jabatan	kelas	*varchar*	5	
8	Alamat Anggota	alamat	*varchar*	100	
9	Email	email	*varchar*	30	
10	Tlp / Hp	tlp	*varchar*	15	
11	Tgl Register	tgl_register	*date*	10	

2. Book Files and Loan Files

Table 3 Book File Specification

No.	Elemen Data	Akronim	Tipe	Panjang	Keterangan
1	Kode Buku	kd_buku	*varchar*	10	*Primary Key*
2	Tanggal Posting	tgl_posting	*date*	10	
3	Jenis Buku	jenis_buku	*varchar*	25	
4	Judul Buku	judul_buku	*varchar*	100	
5	Referensi	referensi	*varchar*	5	
6	Jumlah Halaman	jml_halaman	Int	5	
7	Pengarang Buku	pengarang	*varchar*	50	
8	Penerbit	penerbit	*varchar*	50	
9	Cetakan	cetakan	Int	2	
10	Tahun Cetak	tahun	*varchar*	5	
11	ISBN	isbn	*varchar*	15	
12	Stok	stok	Int	2	
13	Lokasi Penyimpanan	lokasi	*varchar*	10	

Table 4 Loan File Specification

No.	Elemen Data	Akronim	Tipe	Panjang	Keterangan
1	No Peminjaman	no_pinjam	*varchar*	12	*Primary Key*
2	No Anggota	no_anggota	*varchar*	10	*Foreign Key*
3	ID User	id_user	*varchar*	10	*Foreign Key*
4	Tanggal Pinjam	tgl_pinjam	*date*	10	

3. Loan Details File and Return Files

Table 5 Loan Details File Specification

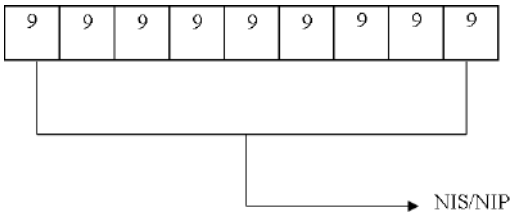
No.	Elemen Data	Akronim	Tipe	Panjang	Keterangan
1	Kode Buku	kd_buku	*varchar*	10	*Foreign Key*
2	Batas Pinjam	batas_pinjam	*date*	10	
3	Status Pinjam	status_pinjam	*char*	1	
4	No Pinjam	no_pinjam	*varchar*	12	*Foreign Key*

Table 6 Return File Specification

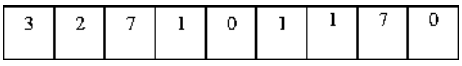
No.	Elemen Data	Akronim	Tipe	Panjang	Keterangan
1	No Pengembalian	no_kembali	*varchar*	12	*Primary Key*
2	No Peminjaman	no_pinjam	*varchar*	12	*Foreign Key*
3	ID User	id_user	*varchar*	10	*Foreign Key*
4	Kode Buku	kd_buku	*varchar*	10	*Foreign Key*
5	Tanggal Kembali	tgl_kembali	*date*	10	
6	Keterlambatan	keterlambatan	*int*	3	
7	Denda	denda	*double*	10	

3.3.Code Structure

1. Member Code

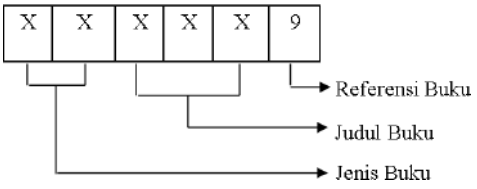


Example**:**

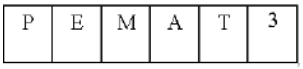


Information**:** 327101170 : NIS/NIP

2. Book Code

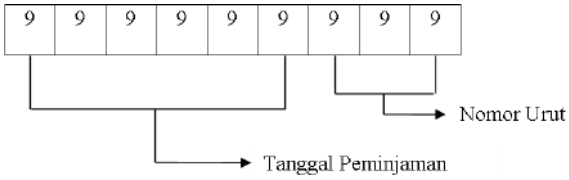


Example **:**



Information**:**
PE : Book Type 'Pembelajaran'
MAT : Book title 'Matematika'
3 : Book Reference 'Kelas 3'

3. Loan Number Code

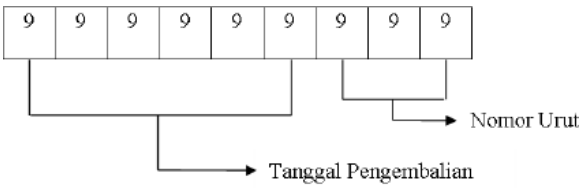


Example:

0	1	0	5	1	2	0	0	1

Information:
010512 : Borrowing date
01 : Loan Serial Number

4. Return Transaction Number Code



Example:

0	1	0	5	1	2	0	0	1

Information:
010512: Date of return
001 : Return Sequence Number

3.4. Data Security Plan

In designing this program, the author makes a data security design through a login form where everyone using this program must enter a user name and password. It is intended that not just anyone can apply to this program. The author makes a data security design with two access rights, namely:

1. Admin

Is access that has the right (privilege) to perform all activities in the application program that the author has made.

2. User

It is accessible with limited rights for certain activities such as managing book data, membership data, borrowing, returning, and searching. Meanwhile, officers' data management, login updates, and reports are not given access and authority.

3.5. HIPO (Hierarchy Input Process Output) Program Specifications

The program specifications that the author made are a more accurate description of the HIPO (Hierarchy Input Process Output) diagram to make it easier for users to find out the HIPO form of the Pamoyanan 3 Elementary School library application, which the author has made, as for the HIPO form, namely:

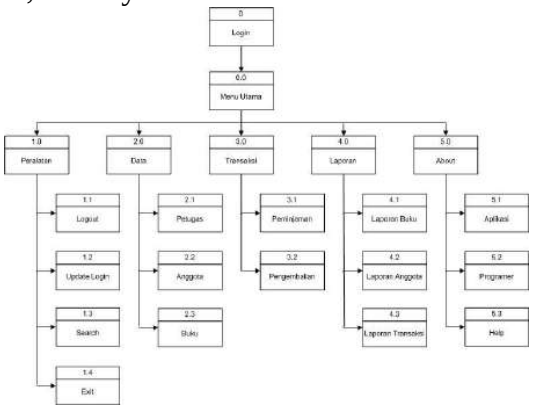


Figure 5 HIPO (Hierarchy Input Process Output) Diagram

3.6. Program Flowchart

Flowcharts are used in describing an algorithm. The function of making a program flowchart is:

a. So that the program made can be more easily understood.
b. To make the relationship between procedures and instructions clearer.

1. Login, Connection and Main Menu (Admin) Program Flowchart

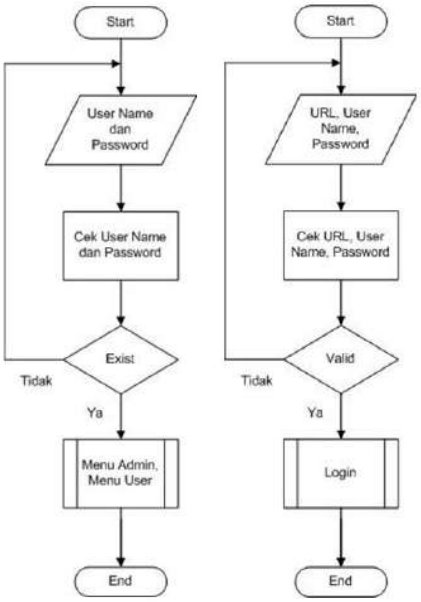


Figure 6 Login and Connection ProgramFlowchart

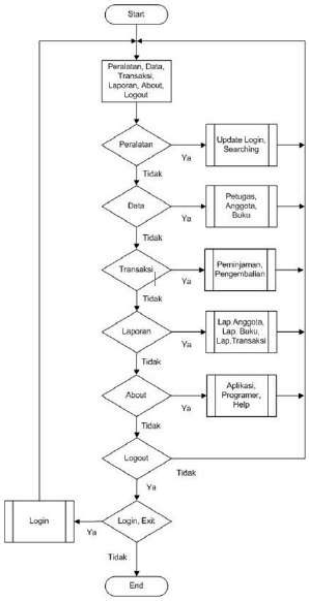


Figure 7 Main Menu (Admin) Program Flowchart

2. Main Menu (User) and Update Login Program Flowchart

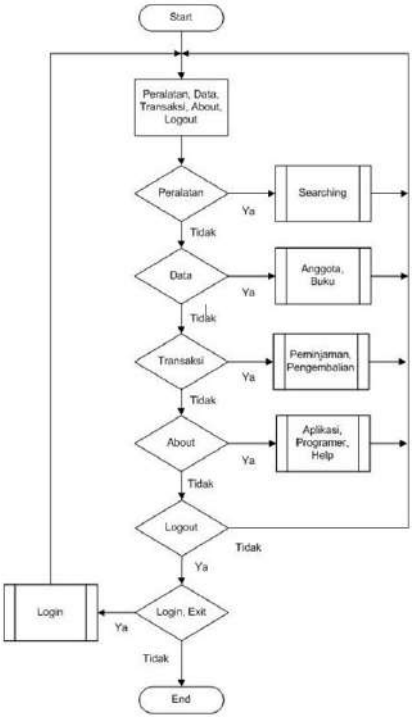


Figure 8 Main Menu (User) ProgramFlowchart

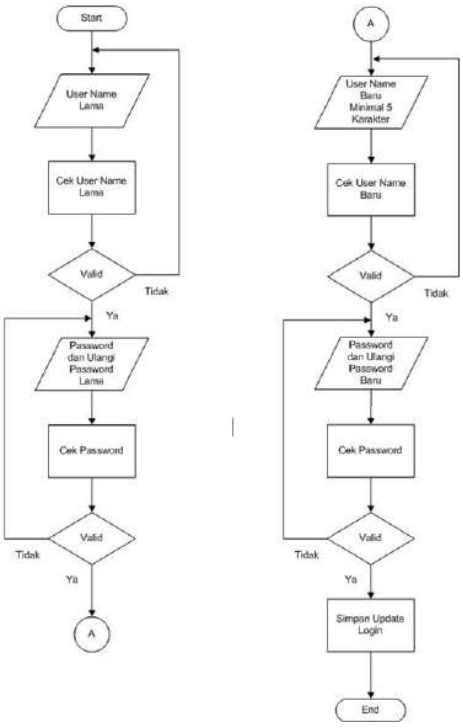


Figure 9 Update Login ProgramFlowchart

3. Searching and Officer Data Program Flowchart

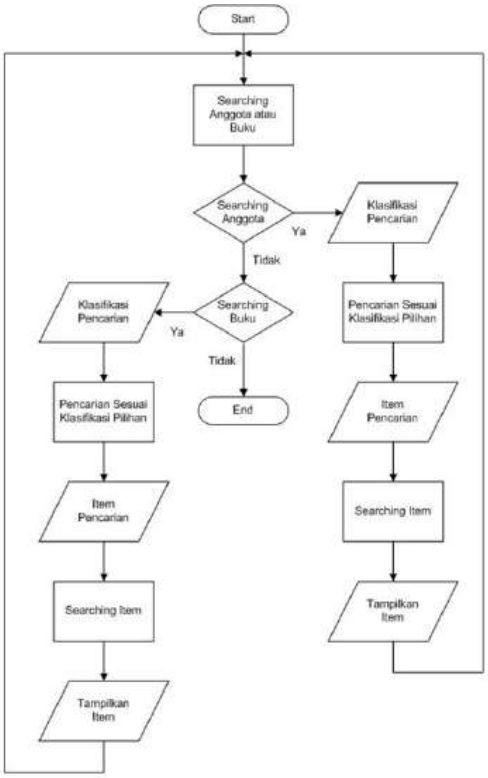


Figure 10 Flowchart Program Searching

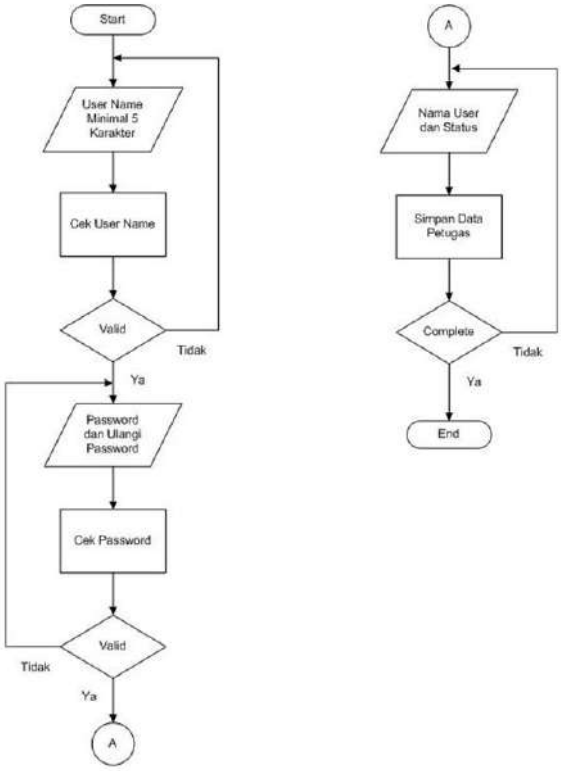


Figure 11 Officer Data Program Flowchart

4. Member Data, Book Data and Data Lending Transaction Program Flowchart

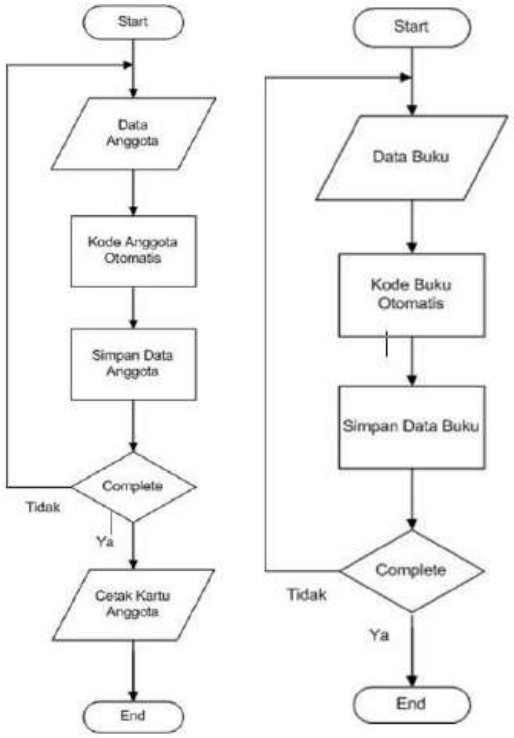


Figure 12 Member Data and Book Data Program Flowchart

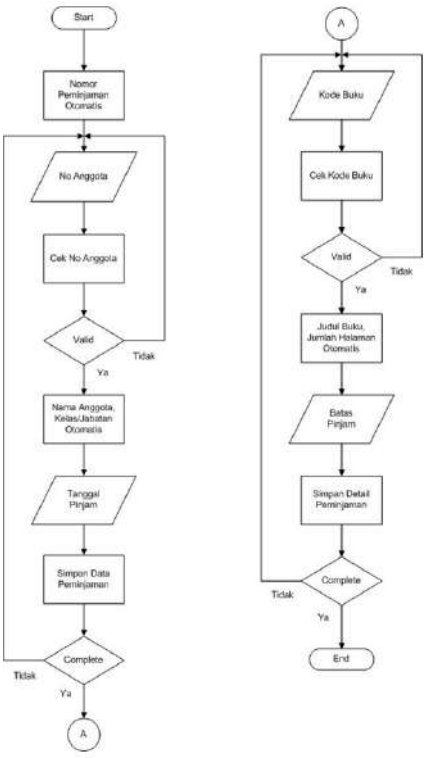


Figure 13 Lending Transaction Program Flowchart

5. Return Transaction and Member Report Program Flowchart

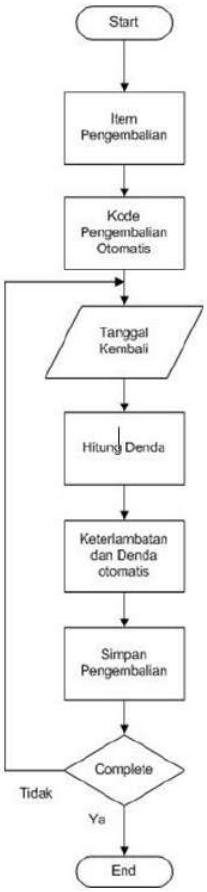


Figure 14 Return Transaction ProgramFlowchart

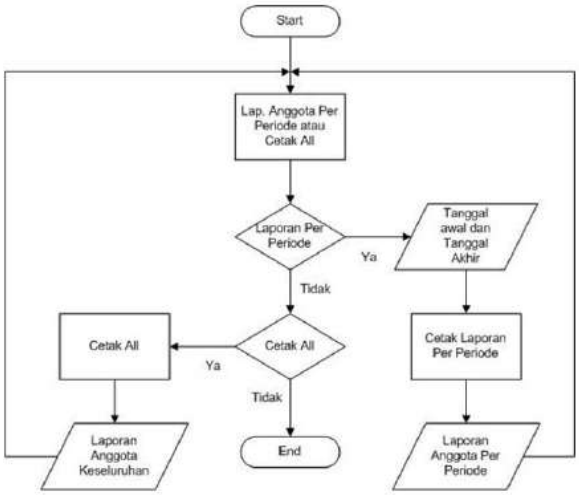


Figure 15 Member Report ProgramFlowchart

6. Book Report and Transaction Report Program Flowchart

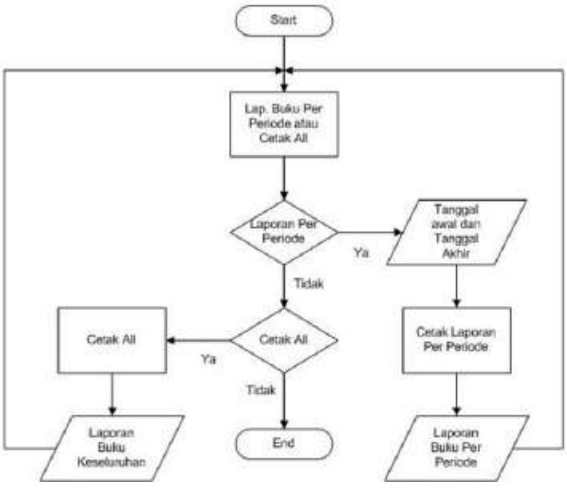


Figure 16 Book Report Program Flowchart

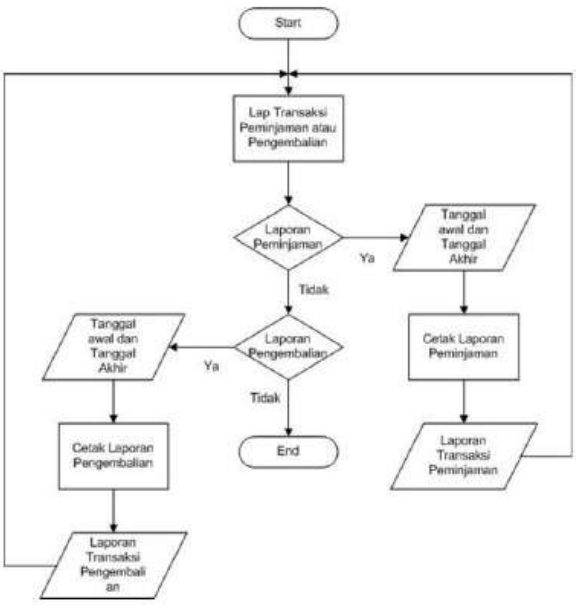


Figure 17 Transaction Report ProgramFlowchart

7. Application, Programmer and Program Help Program Flowchart

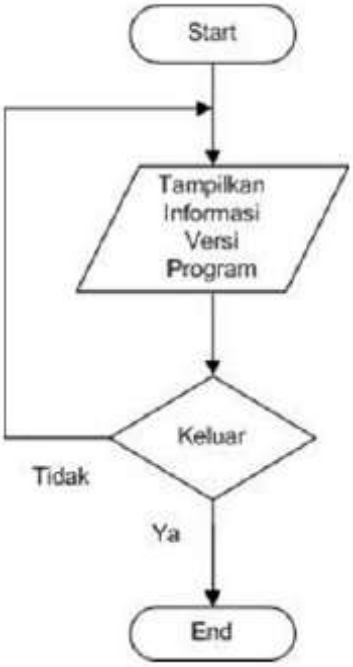


Figure 18 Application Program Flowchart

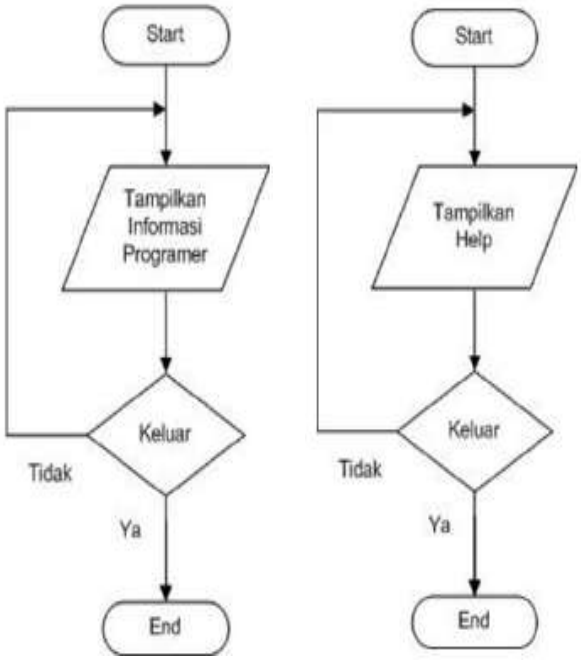


Figure 19 Programmer and Program Help

3.7. User Interface

The following is a user interface of the library application that has been created:

1. Login Form and Main Menu Form

Figure 20 Login Form

Figure 21 Main Menu Form

2. Update Login Form and Search Form

Figure 22 Update Login Form

Figure 23 Search Form

3. User Form and Member Form

Figure 24 User Form

Figure 25 Member Form

4. Book Form and Loan Form

Figure 26 Book Form

Figure 27 Loan Form

5. Return Form and Transaction Report Form

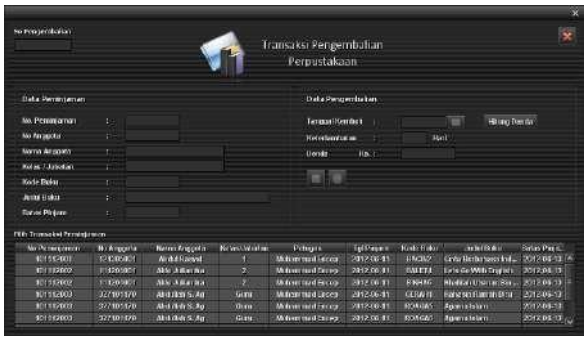


Figure 28 Return Form

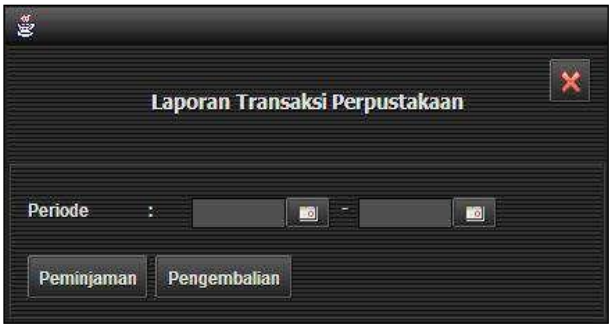


Figure 29 Transaction Report Form

6. Application Form and Help Form

Figure 30 Application Form

Figure 31 Help Form

3.8. Program Support Facilities

To support the data processing needs, a computer is needed as a tool because the speed of data processing is one of the advantages of computers. In its use, computers require appropriate application programs to process data to produce faster, more precise, and accurate information, as well as human resources that run computers and their programs. Thus, a sound information system must be supported by the following components:

(a) Hardware is equipment from a computersystem that can be physically seen and touched; (b) Software is a program that contains commands to process data; (c) Brainware is a human who plays a role inoperating and managing computer systems. These three elements must be interconnected and form a single unit. Hardware without Software will not function as expected, and hardware supported by Software will not work if there is no brainwave to operate it. Taking this into account, supporting facilities are needed in implementing a computerized system so that the automated system that has been created can work as expected.

1. Hardware

The application of a computerized system is closely related to the specifications of the hardware that will be used to run software or application programs. The proper hardware specifications must be selected so the computer system's performance can run well. Computer system users can feel that ease and comfort. The hardware consists of three main parts, namely:

a. CPU (Central Processing Unit)
b. Input Device

c. Output Device

With the above considerations, the authors provide hardware specifications that will be used in the computerization process, including:

a. Proccesor : Pentium Core i5
b. Memory (RAM) : 4 GB atau lebih
c. Monitor : SVGA 15”
d. Harddisk : SSD 500 GB
e. Disk : CD ROM
f. Keyboard : 102 Keys
g. Mouse : PS/2 Optical/Standard
h. Printer : Ink jet

The authors refer to these specifications considering the rapid development of technology in the computer field so that the computer specifications can still show good performance results for the next few years.

2. Software

The use of a computerized system will not be separated from the problem of software (software) that will be used to run the application program. The required software specifications are JDK 8, Apache NetBeans 14, and MySQL. Java NetBeans programming and data storage in the MySQL database can provide the library's smooth processing of information systems (Yulianti, 2021). Software is functionally divided into operating systems and program packages:

a. Operating system

The operating system used is a Windows-based operating system, which is one of the operating systems that support theapplication program that the author makes because the programming that the author makes uses the Java programming language, which has the advantage of multi-platform, which can be run on various operating systems in which there are Java DevelopmentKit (JDK), which contains the JRE (Java Runtime Environment).

b. Program Packages

The program packages that the author uses in making this final project are:

1) Operating System: Microsoft Windows10
2) Program Packages: JDK 8 and Java SEDevelopment Kit 8
3) Apache NetBeans IDE 14
4) Database: MySQL (Xampp Version3.3.0)

4. CONCLUSION

The conclusion that can be formulated after the author completes this research is that this library program helps the performance of library staff and library organizations to implement library operations effectively and efficiently. This library system can provide fast, precise, accurate, and safe information. The author tries to provide suggestions, especially on several matters relating to application programs that have been developed, including:

a. The initial stage of using a computerizedsystem should be training Library Staff and Library Organizations in the use of the program, anticipating errors that mayarise when

using it later, and producing the desired output. And socialize thisnew computerized system to all teachers,staff, and students.

b. In using the application program, it is better to determine the parties who can access the program by providing a user name and password to maintain data security and access.
c. The use of computers is beneficial incompleting a job, but that does not meanits use without risk. The risk that often arises in the use of computers is the loss of data on the hard disk or data exposed to viruses. For this reason, the user mustback up any data used regularly to avoidthis risk.
d. Regular upgrades and program revisionsare needed. So that the applicationprogram that has been created alwaysruns as expected and keeps up with technological developments that continue to grow.

ACKNOWLEDGMENT

The author realizes that the completion of this writing is also thanks to the guidance and encouragement from all parties. Therefore, the author would like to express his gratitude to Mrs. Hj. Oneng Harsiti, M.MPd As the Principal, Parents, and beloved family, who have helped morally and materially. All parties cannot be mentioned one by one who has helped in completing this writing. Finally, the author realizes that this writing is not perfect. Therefore, he asks for constructive criticism and suggestions for the perfection of writing in the future. Hopefully, this writing can be helpful, especially for writers and readers.

REFERENCES

Andriyani, I., Saepudin, S., & Sastradipraja, C. K. (2021). Perancangan Dan Implementasi Smart Library Untuk. *Indonesian Journal on Computer and Information Technology*,

Iqbal, N., Jamil, F., Ahmad, S., & Kim, D. (2020). Toward effective planning and management using predictive analytics based on rental book data of academic libraries. *Ieee Access*, *8*, 81978-81996.

Jogiyanto, H. M. (2005). Analisis dan Desain Sistem Informasi: Pendekatan Terstruktur. *Andi, Yogyakarta*.

Loi, F. J., Sitanggang, R., Sibero, A. F., & Hutagalung, D. M. (2021). PERANCANGAN SISTEM INFORMASI PERPUTAKAAN SEKOLAH BERBASIS WEB. *JURNAL TEKNOLOGI KESEHATAN DAN ILMU SOSIAL (TEKESNOS)*, *3*(2), 82-87.

Maimunah, M., Anggraeni, D., & Annazili, M. B. (2020). Perancangan Sistem Informasi Desain Perpustakaan Berbasis Web pada SMKN 3 Kota Tangerang. Journal Sensi, 6(1), 100-111.

Mayasari, R., & Irawan, A. S. Y. (2021). Penerapan Metode LEAN UX Pada Perancangan UI/UX Aplikasi Digilib Unsika Versi Windows. *INTECOMS: Journal of Information Technology and Computer Science*, *4*(2), 392-405.

Nuansa Informatika, 13(1), 71–75. https://doi.org/10.25134/nuansa.v13i1.1636

Nugroho, A. (2011). Perancangan dan Implementasi Sistem Basis Data, Yogyakarta.

Nurhayati, Y. (2019). Sistem Informasi Perpustakaan Menggunakan Barcode Berbasis Web.

Panjaitan, R. Y., Suparyo, H. V., & Sunarmintyastuti, L. (2020). Perancangan Aplikasi Perpustakaan Berbasis Desktop di SMP Negeri 01 Citeureup. Jurnal Riset Dan Aplikasi Mahasiswa Informatika (JRAMI), 1(01).

Qalyubi, S. (2007). Dasar-dasar ilmu perpustakaan dan informasi. Yogyakarta: Jurusan Ilmu Perpustakaan dan Informasi (IPI), Fakultas Adab UIN Sunan Kalijaga.

Ramadhani, A., & Saputro, G. E. (2021). PERANCANGAN APLIKASI PERPUSTAKAAN ANAK "SOLIT" BERBASIS ANDROID SEBAGAI MEDIA LITERASI DIGITAL. *CITRAKARA*, *3*(2), 222-234.

Shi, Y., & Zhu, Y. (2020). Research on aided reading system of digital library based on text image features and edge computing. IEEE Access, 8, 205980-205988.

Sutabri, T. (2004). Analisa Sistem Informasi", Penerbit Andi Yogyakarta.

Undang-undang Republik Indonesia Nomor 20 tahun 2003 Tentang Sistem Pendidikan Nasional.

Undang-undang Republik Indonesia Nomor 43 Tahun 2007 Tentang Perpustakaan.

Yahya, H. A. Q. (2020). Rancang Bangun Aplikasi Perpustakaan Menggunakan Framework Codeigniter (Studi Kasus Sdn Cibubur 05). Jurnal Sistem Informasi dan Sains Teknologi, 2(2).

Yulianti, S. (2021). Perancangan Aplikasi Perpustakaan pada Sekolah Menengah Atas Negeri 6 Depok Berbasis Java. *Jurnal Riset dan Aplikasi Mahasiswa Informatika (JRAMI)*, *2*(01).