

# DEVELOPMENT OF CLOUD-BASED DATA INTEGRATION FOR NON-PROFIT ORGANIZATION SYSTEM

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[https://doi.org/ 10.37715/rmbe.v2i2.3990](https://doi.org/10.37715/rmbe.v2i2.3990)

**Abstract**—Palang Merah Indonesia (PMI) noted that the stock of blood in Indonesia reached 87,238 bags as of June 14, 2022, where it should be estimated that Indonesia needs 5.1 million bags of blood every year. The conventional blood donor process procedure is one of the main reasons the younger generation does not intend to donate blood. A new system is needed to regulate the flow of the blood donation process so that it is faster and attracts the interest of young people to donate blood. This research resulted in a blood donation system in the form of a website application for each blood donor unit and a mobile application for users who are blood donors. The system was developed with the Agile method which makes it easy for researchers to adapt to the evolving needs of users. The system usability test is based on Nielsen's Criteria which includes 5 main aspects, including learnability, efficiency, memorability, errors and satisfaction. The results of the trial on the targeted respondents showed that almost all of them were interested in using and would routinely donate blood with the new system that had been built, because it was considered to simplify the blood donation procedure which was previously considered complicated. In addition, data between blood donor units can be well integrated with the system that has been built. In the end, this research has the main goal of changing people's habits, especially young people to continue to regularly donate blood, not only is it good for health, but also can help others in need.

**Keywords:** *Cloud-Based, Non-Profit Organization, PMI, Data Integration, System*

## 1. Introduction

Blood donation is a humanitarian action for others. Blood donation is an activity of taking blood up to a certain volume which is carried out voluntarily, then the blood that has been taken will be stored in a blood bank that can be used for blood transfusion purposes (Lutfi et al., 2022). This blood donation activity is very important, this refers to the data that the need for blood in Indonesia still needs to be increased. Data as of June 14 2022, states that there are 87,238 bags of blood in Indonesia, Indonesia should need around 5.1 million bags per year. The supply of blood bags was also uneven between blood groups, blood group A+ recorded 16,304 bags, blood group B+ recorded 27,323, blood group AB+ totaled 10,135 bags and blood type O totaled 33,476 bags (Bayu, 2022). This can be triggered because people are still not aware of the importance of donating blood. People still think that after the blood is taken the body will feel weak, sleepy or sometimes reluctant because to draw blood it needs to be pricked with a needle (Lutfi et al., 2022).

So this requires community participation for the importance of donating blood. Blood donation can provide benefits for donors and others. Donating blood can provide benefits, including accelerating blood recovery (regeneration), blood in the body can run more smoothly, reduce fat deposits on blood vessel walls so as to reduce the risk of coronary heart disease (Milenty Putri Djuardi, 2020). This blood donation activity is very much carried out, starting from the elementary school level as a way for students to gain knowledge about the benefits of blood donation, that through blood donation students get benefits as an effort to maintain health and can help others (Puspita et al. , 2021). During the Corona Virus-19 (Covid-19) pandemic, the Imogiri area held training for Family Welfare Empowerment (PKK) cadres as a way to ensure that the blood supply for the area could be fulfilled. Activities like this help the community to be able to give blood when someone needs it (Aini et al., 2021). Apart from that, activities in the Makassar area were also held to raise awareness of blood donors in the community. This activity was carried out by PMI Makassar so that people become aware of the importance of blood donation for donors and for others. This socialization activity is carried out from schools, agencies to campuses to reach young millennials (Malik et al., 2020). These millennials really have a role to play, this is what dr. Wisnu so that millennials can also always maintain their health through blood donation. If these millennials can donate blood at least six times a year according to the Minister of Health regulation No 91 of 2015 (Regulation of the Minister of Health of the Republic of Indonesia No 91 of 2015, n.d.). So that this can help Indonesia meet the need for blood donors of 2% of the country's population based on WHO standards (Milenty Putri Djuardi, 2020).

Based on the problems above, an integrated solution is needed and can be implemented so that it can help with existing problems. This research will use agile development methods with the Scrum model. This agile method is also used for the development of a website-based credit application information system. This method has also been used to produce quality information systems (Mahendra et al., 2018) and development of electronic journal websites at non-governmental research institutions (Murdiani et al., 2020) in a short time. This research focuses on developing a multiplatform mobile application system using Flutter technology to attract millennials who are used to the habit of doing everything instantly and quickly. Flutter technology has also been used to make it easy for users to meet beauty salon owners (Maylia Suhendro et al., 2021) and an academic information system so that all students can access information about the campus (Hakim et al., 2019). Therefore this research will develop an application to integrate data from non-profit organizations based on mobile applications with the latest technology.

## **2. Literature Review**

### **2.1 Palang Merah Indonesia (PMI)**

Palang Merah Indonesia (PMI) is an association organization on a national scale in Indonesia that is engaged in social humanity (Ashari, 2016). Palang Merah Indonesia (PMI), especially in the city of Banjar, is a non-profit organization with a core business specializing in disaster management and blood donation services. This is similar to PMI in the DKI Jakarta area who are engaged in the same field (Fauzia & Kartika, 2016). UDD in the city of Banjar for its business processes is similar to the UTDC branch of the city of Surakarta (Jauhari et al., 2010). So when viewed from a business perspective, there are four business levels at UTDC PMI Banjar, namely:

1. Level of business: PMI branch of Banjar City

PMI branch of Banjar city is the main business of UDD PMI Banjar City.

2. Level of business unit: UDD PMI Banjar City

This unit is an organization whose role is to manage and carry out blood donation activities, starting from outreach to blood storage.

3. Level of business process: Head of UDD and Section Head

4. Level of activities

UDD in the city of Banjar is quite reliable for its needs in addition to meeting the needs in the city of Banjar, as well as in the surrounding area. To fulfill the need for blood, the UDD of Banjar City is obtained from blood donors (blood donors), be it voluntary donors, mobile donor units (MU) or substitute donors. The process carried out by UDD starts from the process of taking blood, the process of distributing it to the output of the donor recipients in an appropriate manner.

## 2.2 Flutter

Flutter is a Dart-based Cross Platform Framework created by Google. Flutter has advantages in the application development process where application developers do not need to create a different programming language for each operating system so that with one type of code it can be run on different platforms or operating systems such as Android, iOS, Windows, MacOS and Websites. Astuti & Hermawan, 2017). In this study, Flutter is used as a framework for the main source code in making mobile applications.

## 3. Research Methods

The implementation of this research was carried out first by identifying the problem through interview techniques so that you could find out the details of the needs. The next step is determining design requirements and designing and implementing them.

### 3.1. Identification of Problems

At UDD in Banjar City, to carry out these activities, it is necessary to support an administrative activity, especially in data recording. In this study, the needs of stakeholders were identified through interviews with each stakeholder to find out the true condition of UDD in Banjar City. The stakeholders referred to here are:

- *Stakeholder internal* including administrative staff and the head of the Banjar City UDD.
- *Stakeholder eksternal* including donors.

After identifying the problem with the stakeholders, the result is that there are donor data, sometimes there are duplicates, the wrong address or name is written. This is because there is data transfer from the form that has been filled in by the donor to the computer by the admin staff who are exhausted because they can enter hundreds of data in a day. Apart from that, when donating blood, donors need to carry out paper filling activities which require filling out several forms. By filling out lots of forms each time you donate, this makes donors somewhat reluctant to donate. This is sometimes an obstacle in the field. Therefore, in addition to making it easier to fill out forms and reaching more young people, especially millennials, a method is needed. This is done so that millennials can also

participate. Through this research, from the results of interviews with millennials, it was found that a system is needed that helps simplify the administrative process when donating blood.

From the results of the identification of existing problems, a mapping of problems and possible solutions was carried out in this case and can be seen in Table 1 below.

**Table 3.1 Problems-Solutions Identification**

<b>Problems</b>	<b>Solutions</b>
Entry data yang sering salah	Sistem yang bisa membuat admin tidak perlu melakukan entry ulang data, hanya tinggal mengecek.
Pendonor perlu mengisi beberapa lembar berkas tiap kali melakukan donor darah	Sistem untuk melakukan input saat sekali datang saja, Untuk dating selanjutnya tinggal melihat data sebelumnya dan melakukan penyesuaian kemudian klik submit.
Perlu mengajak kaum milenial untuk melakukan kegiatan donor darah.	Ada sistem aplikasi yang mudah dan efisien untuk penodor dapat lakukan dan menerima informasi seputar program kegiatan donor.

### 3.2. Analysis of Requirements

Based on the mapping of problems and solutions that have been carried out, an application is needed that can specifically reach young people, namely a mobile application, with feature requirements including:

1. Dashboard feature that displays important information regarding blood donor data from a donor. In addition, there is also additional information such as donor schedules, events organized by UDD PMI.
2. The blood donor registration feature is not complex, you only need to scan the QR code and fill in a short electronic assessment form.
3. Donor history feature to re-monitor the results of recording previous donor data from a donor.
4. Account personalization feature to make some user profile settings.

With the features described above, a needs analysis is carried out from the side of the device for application users. The following are the minimum hardware specifications required:

1. Android operating system version 6.0 (Marshmallow) or higher.
2. Dual-Core Processor 1.00 GHz or higher.
3. RAM 2 GB minimum.
4. 5 MP rear camera.
5. Free storage of 100MB.

### 3.3. System Design

Berdasarkan masalah yang telah dipetakan pada Table . Maka dirancang sebuah sistem yang akan mempermudah pendonor untuk melakukan donor darah dan kesalahan entri data tidak yang double tidak terjadi. Maka dari itu dari penelitian ini akan mengubah cara pendonor melakukan entry data. Usulan pada penelitian ini memberikan terbaharuan dalam procedure pendonor melakukan entry data. Pendonor hanya perlu satu kali saja

melakukan entry data, apabila datang untuk selanjutnya cukup melakukan scan barcode dan data yang pernah tertampil akan muncul, bila ada data yang ingin diubah tinggal diubah dan kemudian submit. Sehingga dengan sistem baru ini lebih efisien dan dari sisi admin tidak perlu lagi mengentry data yang sama.

The system architecture is created to provide an overview of the conceptual model of the structure, behavior, and view of the cloud-based data integration for non-profit organization. System architecture is presented in Figure 3.1 below.

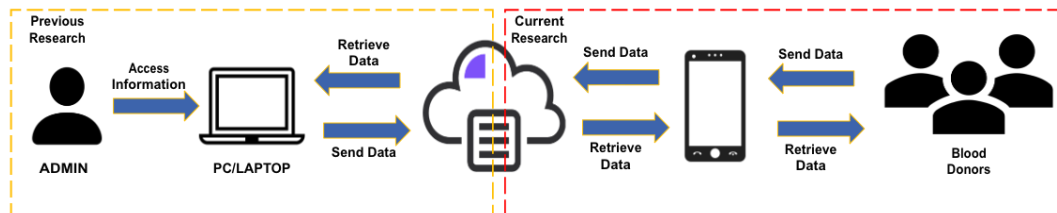


Figure 3.1. Architecture Systems

Based on the figure 3.1 above, administrator can immediately view the data via an existing PC/Laptop. However, this section has not been the focus of this research because this section has been developed on research that has been carried out by the previous research team. The research in question is the development of website creation for website-based non-profit organizations. The research focuses on the development of mobile applications. So that donors can be processed more quickly and can save time.

#### 4. Results and Discussion

##### 4.1 Implementation Results

Based on the needs of the existing problems, a system is needed that is comfortable and attractive to users, especially millennials. Research produces applications that are minimalist, but still attractive and user friendly. Figure 4.1 below is an onboarding page which is useful as an initial guide to using the application and informs the user what features are available in the application.

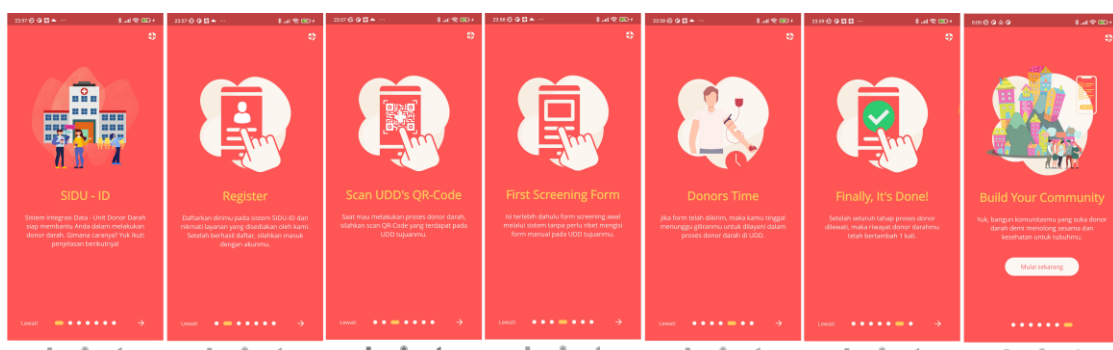
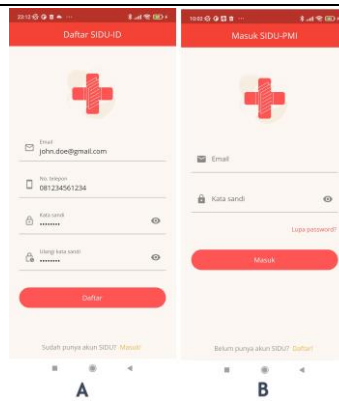


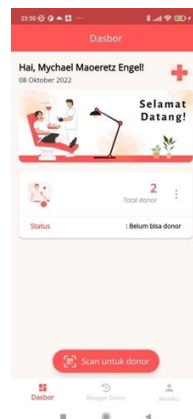
Figure 4.1 Onboarding Page

The registration page requires the user to register by entering some data. Input data include name, email no. tel and password. The registration page can be seen in Figure 4.2 (A). After successful registration, the user can enter the application via the login page as shown in Figure 4.2 (B).



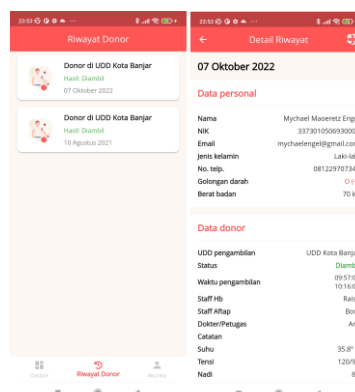
**Figure 4.2. Registration Page (A) and Login Page (B)**

The dashboard page functions to see the status of donors whether they can return to donating or not. This can happen if during the previous process when the donor was found to be in poor condition or there was something in the blood that made it impossible to donate. If you are able to donate, the donor can press the scan button for the donor. This dashboard page can be seen in Figure 4.3 below.



**Figure 4.3 Dashboard Page**

Donor history page, functions that the donor will see the history of donors that have been made. Clicking on one of the donor's history will display more detailed data regarding personal data and data on donor examination results. Donor history page can be seen in Figure 4.4 below.



**Figure 4.4 Donor History Page**

The My Account page functions to make some application settings, change passwords, and view personal information. This page can be seen in Figure 4.5 below.

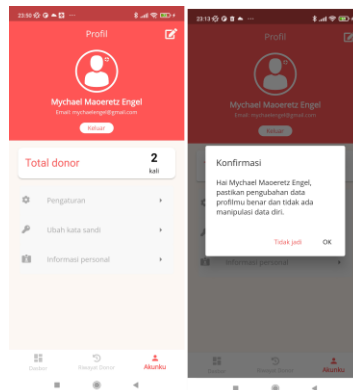


Figure 4.5 My Account Page

## 4.2 Application Testing

Application testing is carried out with the aim of finding bugs or problems that may arise when the application is used. Besides that, application testing is also needed to find out things that still need to be repaired or developed again. In this study the application testing that will be used is Alpha and Beta testing.

Alpha testing is a test carried out by the application designer and/or everyone involved in making the application. This test is carried out with the aim of finding problems, bugs or deficiencies that exist in the application before the application is released and used by users publicly. In this study the alpha test used was black box testing. Black box testing is a test that is used to observe the input and output functionality of an application or software system without knowing the internal structure of the application or system. This test is carried out to find out whether the results of the input and output of the application or system that has been made can function properly. The test table for black box testing can be seen in Table 4.1 below.

Table 4.1 Functionality (Black-Box) Testing

Tested Function	Condition	Expected Result	Actual Result	Status
Registration	• User lets one or more fields empty	• Registration failed	• Registration failed	• Valid
	• User registers with same email	• Registration failed	• Registration failed	• Valid
	• User fills the registration form correctly	• Registration success and user receive verification email	• Registration success and user receive verification email	• Valid
Login	• User fills the wrong email and password	• Login failed	• Login failed	• Valid
	• User fills the right email and password	• Login Success	• Login Success	• Valid
Dashboard	• No history data of blood donation in database	• There is no data to show	• There is no data to show	• Valid
	• History data of blood donation is available in database	• Shows list of history data of blood donation	• Shows list of history data of blood donation	• Valid
MyAccount	• User fills the same data when update account	• Data is not change	• Data is not change	• Valid

Tested Function	Condition	Expected Result	Actual Result	Status
	<ul style="list-style-type: none"> <li>User input the wrong old password</li> <li>User input the correct old password</li> </ul>	<ul style="list-style-type: none"> <li>Reset password failed</li> <li>Reset password success</li> </ul>	<ul style="list-style-type: none"> <li>Reset password failed</li> <li>Reset password success</li> </ul>	<ul style="list-style-type: none"> <li>Valid</li> <li>Valid</li> </ul>
Logout	<ul style="list-style-type: none"> <li>Press button logout and choose cancel option</li> <li>Press button logout and choose ok option</li> </ul>	<ul style="list-style-type: none"> <li>Logout failed</li> <li>Logout success, user goes back to login page</li> </ul>	<ul style="list-style-type: none"> <li>Logout failed</li> <li>Logout success, user goes back to login page</li> </ul>	<ul style="list-style-type: none"> <li>Valid</li> <li>Valid</li> </ul>

Based on the results of trials that have been carried out using the black box method in Table 4.1 above, it can be concluded that all the features made have been running well and as expected.

Furthermore, beta testing is carried out on prospective users where this test aims to find out whether the application or software created is in accordance with what is needed and expected by end users before the product is launched and used publicly. At this stage, testing was carried out on internal and external stakeholders from UDD, where the results of this trial were User Acceptance Testing (UAT) to answer the needs of UDD stakeholders. The aspects tested are based on Nielsen's Usability Criteria in Software Development defined by the Nielsen Norman Group, where there are 5 quality components consisting of: Learnability; efficiency; Memorability; Errors; Satisfaction (Nielsen, 2012). Testing is carried out online so that stakeholders can also try the application and provide feedback, as shown in Figure 4.6 below.

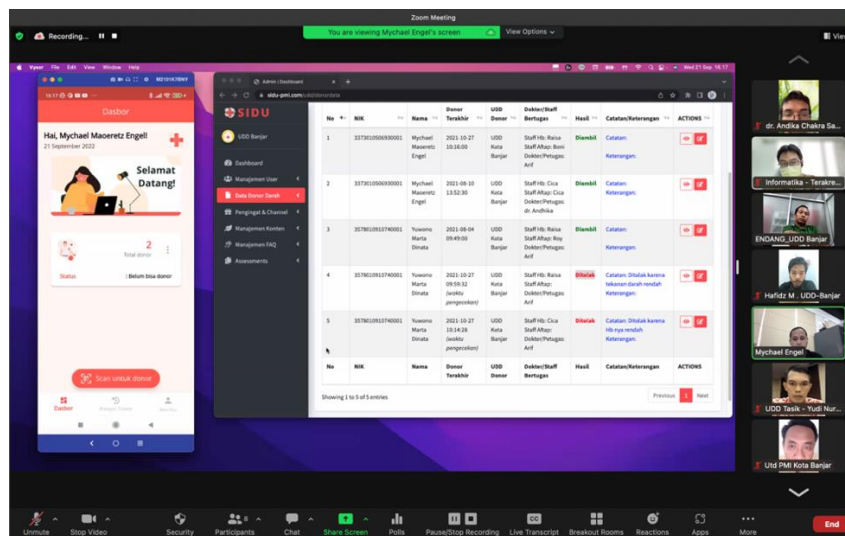


Figure 4.6 Documentation of Beta Testing Process with UDD PMI Stakeholders

The results of the beta testing found that stakeholders provide support that the features that have been made meet the needs of UDD. This study also shows that the mobile application developed is well integrated with the website application that was developed at the previous research stage, so that monitoring of donor data can be carried out in real time via the website application by the UDD admin.



## 5. Conclusions and Practical Implication

This research was carried out from a needs analysis to system design and testing, and resulted in the following conclusions:

- The designed solution satisfies the analysis phase's requirements. The proposed solution is to develop an application in which the donor enters data only once. When it returns, the donor only needs to make minor changes to the data.
- In this research, a mobile application was successfully developed using cloud computing technology and Flutter. Application features can function properly based on the requirements. Stakeholders provide feedback that this application is very useful and meets the needs of the line of work.

## 6. Acknowledgement

The research is donated by Directorate of Resources, Directorate General of Higher Education, Ministry of Education, Culture, Research and Technology. No 313/E4.1/AK.04.PT/2021 (Amandemen KEMDIKBUD -LLDIKTI VII); 024/AMD-SP2H/LT-MULTI-TERAPAN/LL7/2021 (LLDIKTI VII-UC); 023/AMD-UC LPPM/LT-MULTI-TERAPAN/2021 (UC-Peneliti)

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