Implementation Prototype Method on Queue System Development on Android Application

Agistira Lamunde[1*], Alena Uperiati[2], Nurul Hayaty[3]

{agiistira@gmail.com[1],alenaup@umrah.ac.id[2],nurul.hayaty@umrah.ac.id[3]}

Universitas Maritim Raja Ali Haji, Tanjungpinang, Indonesia[1]

Abstract. The rapid development of information and communication technologies has brought many changes and solutions to facilitate human work. One of the problems that can be solved through the use of technology is by providing a solution using a queuing system. For example, at the Bank BRI Tanjungpinang Branch Office, the queuing system is still carried out manually by humans. For faster and better management, an individual can use the android application for a digital queuing system where users do not need to come to the bank and wait until the queue arrives, users can take a number and wait an hour. Therefore, this research aimed to design and build an Android-based digital queuing system using the prototype method, which consists of three stages, namely listening to the user, building a prototype, and testing by the user. Additionally, an Android-based digital queuing system was built and testing was also carried out using BlackBox testing.

Keywords: Android Application Development, Queue System, Prototype Method

1 Introduction

Android is an operating system for mobile devices such as smartphones and tablet. It was developed by Google using the Linux kernel and GNU/Linux software as the base platform. Furthermore, the program code of the android operating system uses the object-oriented Java (Object Oriented Programming - OOP) language based on the Java Core Libraries, as well as other program codes in the XML language [1].

In the financial sector, such as the bank, customers who visit for certain purposes must queue and wait for their turn to be attended to by customer service (bank tellers). Queuing is a process of waiting to be served if a service facility (server) is still busy in order to have access to any service rendered and then leaves the facility after being attended to [2].

In previous research, several online queuing systems existed in different agencies such as hospitals. In research conducted by Melyanti., with the title "Design of Online Queuing Systems for Outpatient Visits at Syafira Hospital Web-based", where the system development method used is the Waterfall method. The results led to the development of a web-based online queuing system for outpatient visits that can facilitate check-in and queue management for agents and patients [3].

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At Bank Bri Tanjungpinang Branch, the queuing system used is still a manual system, where visitors take a queue number on paper at the entrance and wait for their turn to be called. So that in the time span while waiting for the queue to arrive, a lot of time is wasted that should be used for other purposes. The use of android in the financial sector can be used to overcome the queuing system that is still done manually at the bank by using an android-based digital queuing system. This system can help visitors and banks in improving their public services.

In this study, the implementation of the Prototype method in the development of a digital queuing system based on Android will be carried out. Where in this system visitors can register queues with the needs to be carried out at the Bank through a mobile application on their smartphone that is connected to the internet.

2 Prototype Method

The prototype method does not specify specific requirements for describing existing features and functionality, instead, it aims to solve issues that arise when a client files a software request. When the stated requirements are ambiguous, the prototype technique can help the customer and the developer understand what to construct [4].

The Prototype method is an initial software demonstration that explains the concept and appearance. In general, as the demonstration process continues, more problems and solutions will become apparent, thereby permitting the identification of previously unidentified system requirements.

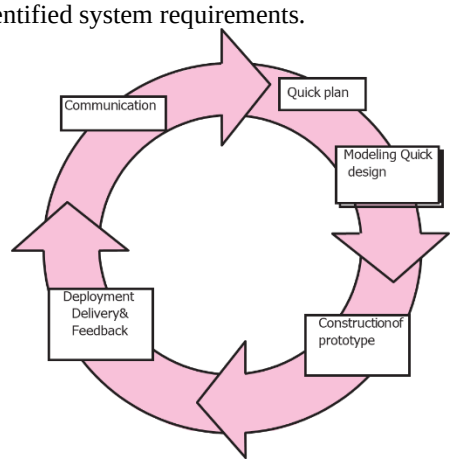

Fig. 1. Prototype Method Development Model.

The stages of the Prototype Development Model can be seen in Figure 1 which starts from communication, namely communication is carried out between the developer and the client to determine and analyze software requirements according to the wishes of the client. The next stage is planning the target working time during development from meeting with clients until the project is complete. After the needs and planning of working time targets have been obtained and arranged, the next step is to do a quick design. Namely building a prototype with the required initial specifications and has been analyzed, quick design is done to provide an overview of the aspects of the software seen by the user (User Interface). The prototype that has been made is then presented and

evaluated by the client. After the client provides feedback to the developer, the developer will refine the prototype according to the client's wishes. Iteration will continue between the client and the developer until the client is satisfied with the Prototype made according to the client's wishes.

Here the application developer plans the target in working on the application, regarding the target time and application work, it can be seen in the Figure 2 below:

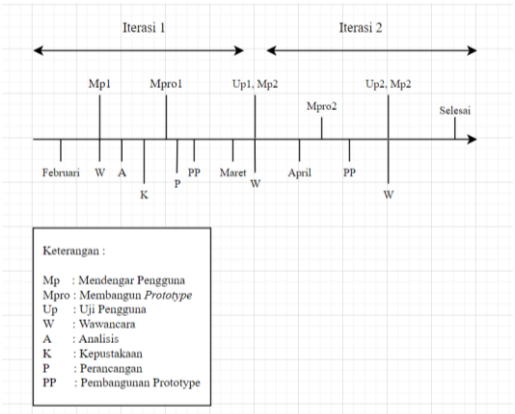

Fig. 2. Work Implementation Schedule (keterangan Bahasa Indonesia)

In Figure 2 it can be seen that the image shows the timeline of the work plan to be carried out, namely the developer plans only for 2 iterations. In each iteration that occurs there will be stages starting from analyzing, then building the prototype, and finally testing the application. After testing the application, the developer will get input from the client on the prototype that has been made for evaluation and analysis in the next iteration improvement.

2.1 Listening User

The initial stage in development using the Prototype method is listening to users, namely the developer conducts interviews with clients to obtain information and also to analyze system requirements. In this study, interviews and field observations were carried out for the research process of the Android-based Digital Queue System Design system which was shown by the client how the queuing system existed at Bank BRI Tanjungpinang Branch Office and also what public service information was available.

2.2 Prototype Building

The next stage is to build a prototype (Mpro2). It can be seen in Figure 2 which shows 2 times the Mpro process for 2 iterations that occur. At this stage the developer does the design (p) and also the Prototype Development (PP), these two things are done simultaneously because they are interrelated with each other.

At this stage, the initial design carried out is to design the system. In designing this system, Flowcharts and Unified Modeling Language (UML) are used which contain Use Case Diagrams, Activity Diagrams, Sequence Diagrams and Class Diagrams. After the initial design is done, the next step is to build a prototype, this is done to give the client

an idea of how the application will look and how this application will run.

2.3 User Testing

After all stages are carried out from listening to the user to building the prototype, the last stage to be carried out is the User Test (UP) where this user test is carried out to get feedback from the client, after the developer presents the prototype that has been built, the client will provide feedback and enter of the prototype to the developer which will be used as evaluation and improvement in the next iteration. If the response from the client is satisfied and there are no further improvements, then the iteration will be considered complete because the client is satisfied with the application made.

2.4 Research Instruments

This research requires several instruments to support the creation of the system in the form of hardware, software and the programming language used.

1. Hardware

   The hardware required in this study is described in table 1 as follows:

   Table 1. Hardware Spesification

Computer Spesification		
No	Needs	Required Capacity
1	Processor	ICORE 3
2	RAM	8GB
3	Hadrdisk	512 GB

2. Software

   The software requirements needed in this study are described in Table 2, namely as follows:

   Tabel 2. Software Spesification

Software Spesification		
No	Needs	Required Capacity
1	Operating System	Operating System Windows 11 64 bit
2	Tools	Android Studio, Figma

3 Result

The iteration procedures are shown in Figure 3 above. When the consumer is happy, the process is repeated two more times. The repetition begins with numbers 1 through 6 up to the vertebra in Figure 3.

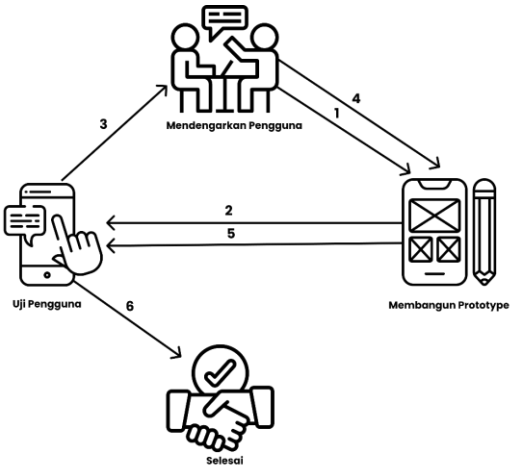

Fig. 3. Prototype Method Ilustration

The iteration procedure is shown in Figure 3 above. After two iterations, the procedure is repeated until the consumer is satisfied. Following the visible vortex, the numbers 1 through 6 are repeated starting at 1.

3.1 Iteration 1

3.1.2 Listening User

The Prototype technique begins with listening to users to determine the system requirements that are appropriate for their needs. At this point, interviews are used to listen to users. The following is a summary of the findings from the initial customer interview conducted to examine the system's preliminary requirements:

1. How is the queue system running at Bank BRI Tanjungpinang Branch Office?
2. What services are provided by customer service **(**tellers**)** at Bank BRI Tanjungpinang Branch Office?
3. Does customers want a system that is easy to use or a system that can be accessed online anywhere?

3.1.3 Prototype Building

The next stage is to build a prototype. Prototype development is done by starting from the initial design of the system, then the prototype will be built based on the initial design that has been made.

a. Quick Planning

Quick Planning is made using Flowcharts and Unified Modeling Language (UML) which consists of Use case diagrams, Activity Diagrams, Sequence Diagrams and Class Diagrams using the online diagrams.net platform and interface design using Figma.

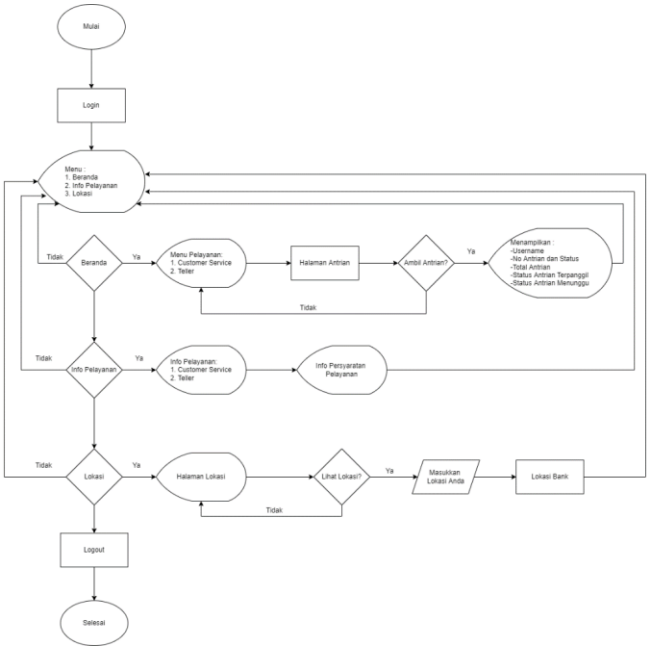

Fig. 4. Flowchart System.

On the Figure 4 is a Flowchart process from an Android-based Digital Queue System, where the flow on the flowchart is when the user first uses the application, the user is directed to login first, and if the user does not have an account, the user can register an account first. After logging in, the user will be shown the home menu of the application, namely the service menu with a choice of customer service or teller, then on the home page there is also a sidebar menu containing a service info menu and a location menu. When the user selects the service menu, the user will be directed to the customer service or teller application queue page, after that the user can take the queue number and the system will display the queue number and the queue status that the user can receive along with the total existing queue and the total waiting status queue and status called. If the user selects the service info menu, the system will display information on what public services are available at Bank BRI Tanjungpinang along with their service requirements for users. Then if the user selects the location menu, the user will be directed to the location page and the user is directed to fill in the user's location then the system will direct the user to the Google Maps application to get a location route from the user's location to the bank location.

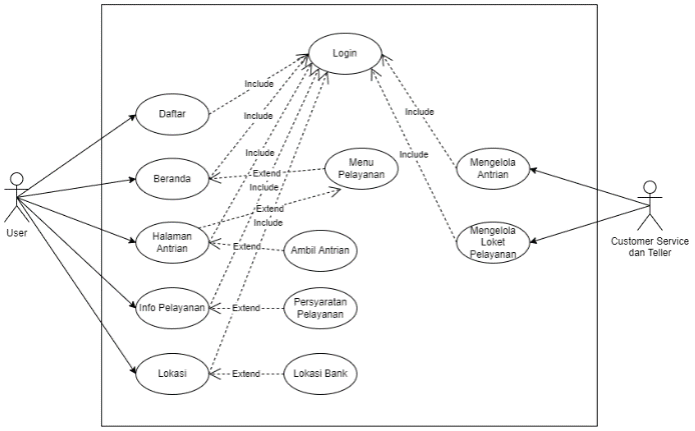

Fig. 5. Use Case Diagram.

3.1.4 User Testing

The last stage is the User Test (UP1) on the prototype that has been built. User Test is done by presenting the prototype that has been made to the client. In the 1st iteration of the User Test (UP1) carried out on March 5, 2022, the presentation was carried out by giving an overview of how the application looks and what features are in the application.

In the first User Test (UP1) the client gave feedback for evaluation to the developer, the client quite liked the Prototype which had been built with some improvements on the home page, service menu page, and queue page.

3.2 Iteration 2

3.2.1 Listening User

The stage of listening to the user in iteration 2 is carried out simultaneously with the User Test (UP1) in iteration 1.

3.2.2 Prototype Building

At the Prototype development stage, Prototype development is carried out based on the results of the improvements in the first iteration Prototype. In this second Prototype development process, there were no significant changes in the form and design of the Prototype from the client, only for this client there were several changes, namely on the Home Page, Service Menu, and Queue Page. Here the prototype is built based on the results of the first iteration. Here the developer displays the whole system and on request from the client.

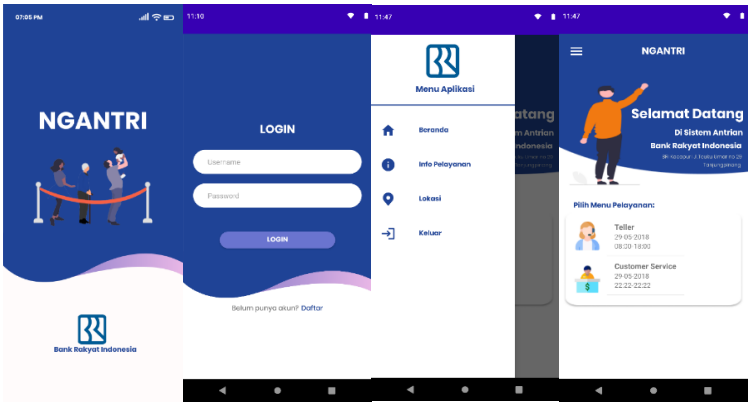

Fig. 6. Home Page

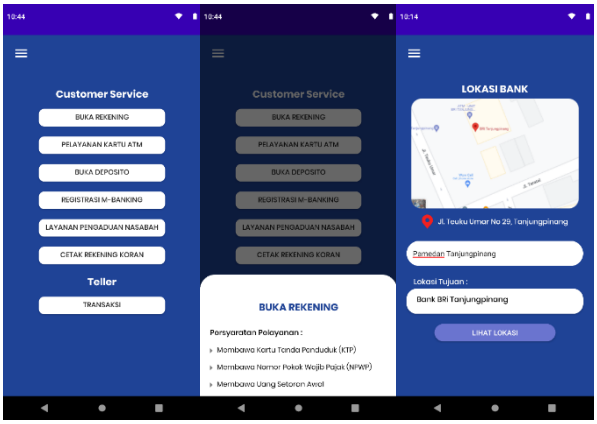

Fig. 7. Info Page and Location Page

3.2.3 User Testing

The last stage of the Prototype method is the User Test, at this stage the User Test is carried out in iteration 2 (UP2) on April 19, 2022. The results of the User Test (UP2) are that the client is satisfied and is in accordance with the needs of the client the application is made, therefore The iteration of the Prototype process is declared complete.

4 Conclusion

From the research, it can be concluded that the Prototype Method has been successfully implemented in the Android-based Digital Queue System Design. This implementation is expected to be able to assist users to queue at Bank BRI Tanjungpinang branches anytime, anywhere through online applications. It also helps the agencies to manage visitor queues at the BRI in managing the bank. In addition to the queuing feature, this application is also equipped with information on services to increase user knowledge. There is also a bank location feature that can help users find out where the location is along with routes and estimated travel times from the location to the other location of the Bank.

References

[1] Developers Android, “Mengenal Android Studio,” 19 Mei 2021. [Online]. Available: https://developer.android.com/studio/intro?hl=id.

[2] S. B. Aziz, T. A. Riza dan R. Tulloh, “PERANCANGAN DAN IMPLEMENTASI APLIKASI SISTEM ANTRIAN UNTUK PASIEN PADA DOKTER UMUM BERBASIS ANDROID DAN SMS GATEWAY,” *Jurnal Elektro Telekomunikasi Terapan,* vol. Android, no. Jurnal Elektro Telekomunikasi Terapan, pp. 72-73, 2015.

[3] R. Melyanti, D. Irfan, A. A. Febriani dan R. Khairana, “RANCANG BANGUN SISTEM ANTRIAN ONLINE KUNJUNGAN PASIEN RAWAT JALAN PADA RUMAH SAKIT SYAFIRA BERBASIS WEB,” *Journal of Information Technology and Computer Science (INTECOMS),* vol. Antrian, no. 3, pp. 192-193, 2020.

[4] R. S. Pressman, Software Engineering: A Practitioners Approach, Seventh Edition, New York: McGraw-Hill, 2010.

[5] R. Melyanti, D. Irfan, A. A. Febriani dan R. Khairana, “DESIGN OF ONLINE QUEUE SYSTEM FOR WEB-BASED VISIT OF PATIENTS IN SYAFIRA HOSPITAL,” *Journal of Information Technology and Computer Science (INTECOMS),* vol. III, no. 3, pp. 192-194, 2020.

[6] Public [Online]: Bluetooth Low Energy. https://en.wikipedia.org/wiki/Bluetooth_Low_Energy

[7] Deleu, E., Elez, S., Gadodia, A., Macvaugh, K., and Zhao, G.: Using Deep Learning for Urban Pedestrian Counting. IEEE MIT Undergraduate Research Technology Conference (URTC). pp. 1-5. (2021)

[8] Csönde, G., Sekimoto, Y., and Kashiyama, T.: Online real-time pedestrian tracking from medium altitude aerial footage with camera motion cancellation. Vol. 217, pp. 103386. Computer Vision and Image Understanding (2022)

[9] Yu, Y., Qin, X., Hussain, S., Hou, W., and Weis, T.: Pedestrian Counting Based on Piezoelectric Vibration Sensor. Vol. 12 (4), pp. 1920. Applied Sciences (2022)

[10] Alahi, M. E. E., Akhter, F., Nag, A., Afsarimanesh, N., and Mukhopadhyay, S.: Internet of Things (IoT)-enabled pedestrian counting in a smart city. Proceedings of International Conference on Computational Intelligence and Computing. pp. 89-104. (2022)

[11] Guillen-Perez, A., and Cano, M. D.: Pedestrian characterisation in urban environments combining WiFi and AI. Vol. 37 (1), pp. 48-60. International Journal of Sensor Networks (2021)

[12] Sandaruwan, R., Alagiyawanna, I., Sandeepa, S., Dias, S., and Dias, D.: Device-free pedestrian count estimation using wi-fi channel state information. 2021 IEEE International Intelligent Transportation Systems Conference (ITSC). pp. 2610-2616 (2021)

[13] Rahim, A., Maqbool, A., and Rana, T.: Monitoring social distancing under various low light conditions with deep learning and a single motionless time of flight camera. Vol. 16 (2). Plos one (2021)

[14] Saponara, S., Elhanashi, A., and Gagliardi, A.: Implementing a real-time, AI-based, people detection and social distancing measuring system for Covid-19. Vol. 18 (6), pp. 1937-1947. Journal of Real-Time Image Processing (2021)

[15] Priyan, L., Johar, M. G. M., Alkawaz, M. H., and Helmi, R. A. A.: Augmented Reality-Based COVID-19 SOP Compliance: Social Distancing Monitoring and Reporting System based on IOT. 2021 IEEE 12th Control and System Graduate Research Colloquium (ICSGRC). pp. 183-188 (2021)