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Web-Based Online Queue Design at Siak Hulu-I Public Health Center Kampar-Riau

Mariza Devega[1)*], Zamzami[2)], Yuvi Darmayunata[3)]
[1)2)3)]Lancang Kuning University, Pekanbaru, Indonesia
[1)] marizadevega@unilak.ac.id, [2)] zamzami@unilak.ac.id, [3)] yuvidarmayunata@unilak.ac.id

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Abstract: Increasing patient satisfaction in this case, Public Health Center as the government agency that provides health services for the community, will affect the quality of its services. One of them with an efficient queuing system. A good queue will support regularity in an agency. Previously, analysis and calculation of queuing time had been carried out using the Kolgomorov-Smirnov compatibility test at the Siak Hulu I Public Health Center Kampar- Riau, and the results obtained an average of six working hours of patient care. This research is a pilot project that was carried out as a form of increasing effectiveness and efficiency in Public Health Center. The research has been completed and the results are the basis for this research and further research. The purpose of the current research is to make an online queuing system design, where later the results of this design are used to create a web-based online queuing system. The design is adapted to the existing queuing model at the Public Health Center, namely the Sigle Channel-Multi Steps queuing model. System development using System Development Life Cycle (SDLC). The result is a design consisting of three stages, namely conceptual modeling, database design and interface design. The design starts from making the proposed Rich-Picture to the interface design. With this design, it is hoped that in the future it will facilitate the process of developing a web-based online queuing system which of course can improve Public Health Center services by reducing waiting time in the queuing process.

Keywords: Online Queuing System, Queue Design System, single-channel-multi steps, SDLC, Web-based

INTRODUCTION

A good queue will support regularity in an agency. In addition, queues are also widely applied to agencies or companies, such as banking, service offices, and health facilities. Queues arise because there is a demand for services that exceeds the service limit, so the facilities provided to users cannot be directly accepted due to the busyness of the service(Pramudhita, 2018).

Queue management systems in an agency such as post offices, banks, and other service providers are designed as a form of time efficiency. Conventional queuing methods are considered no longer effective Increasing an effective and efficient queuing system such as an online queuing system is one form of system improvement that a hospital can do (R. H. Y. Perdana et al., 2019).

The online queue changes the conventional queuing system which previously used numbers or papers that were obtained directly at the queue location. While the online queue is a type of queue that utilizes internet technology, where the user can take a queue number anywhere and does not have to be at the queue location first (Junirianto & Wita, 2020).

Queuing at health facilities is a challenge that is felt in almost all big countries (Yaduvanshi et al., 2019). Increasing patient satisfaction, in this case, especially the Public Health Center as a government agency that provides health services for the community, will certainly have an impact on the quality of service from the Public Health Center itself. One of them is with an effective and efficient queuing system.

Hospital Management Systems that do not have predictable waiting times can result in a waste of time for patients, especially patients who have a high severity and who require treatment (Burungale et al., 2018). These weaknesses can be overcome by having an effective queuing system management, which can consider the patient's

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symptoms, and patients can receive an efficient treatment plan and know the estimated waiting time. Queuing system can successfully reduce patient waiting time in hospitals.

An automated queuing system makes it easier for service providers to manage queues and analyze queues and make decisions about which customers will be handled first. In line with developed a queuing scoring model to evaluate overcrowded patient arrivals at public hospitals in Pakistan (Meephu et al., 2018).

Research from (Titarmare & Yerlekar, 2018) applies a queuing system at the hospital to apply the model through SMS notifications to patients. This will minimize patient waiting time in the hospital. Patients can order queue schedules through the android application based on the time provided. On the research of (Safdar et al., 2020) perform queuing optimization for different cases , that is in restaurant. where decision making is used to optimize the use of tables and chairs effectively and also consider waiting times in queues as well as food to be served.

Previous research has conducted queuing analysis at Public Health Center Siak Hulu I Kabupaten-Kampar. In the manual queuing process that happened before. The result, after carrying out the Kolgomorov-Smirnov compatibility test, obtained an average of 5.16 minutes in 6 working hours with 70 patients a day, meaning that the average patient arrival per hour is 11 patients, wherein 5,16 minutes there is one patient arrival (Zamzami, D. Mariza, D. Yuvi, 2019).

Based on the results of the research above, to improve the services of the Siak Hulu I Public Health Center, Kampar Regency - Riau and to eliminate waiting times as a form of efficiency, therefore a Web-based online queuing design was created.

This web-based queuing design is used as the basis for making online queuing systems in real-time. Where later with this queuing system, it will be easier for patients to register online from home and automatically get a queue number and the estimated time of arrival. This certainly makes it easier for patients, so patients don't need to register again, so just enter the queue number or code, then the patient data has been pre-filled at the time of online registration.

The difference between this research and previous research is in terms of design, namely the design of this system is more interactive and user friendly. In addition, the interface is presented with the latest design tools so that the appearance can be directly implemented as a real web application display.

METHOD

The Research Method describes the sequence of processes, data, locations, and evaluation methods used in a structured manner regarding the algorithms or methods used in research. System Development Life Cycle (SDLC) used in the process of developing an online queuing system at Public Health Center Siak Hulu I Kabupaten Kampar.

SDLC of different stages which portrays how to develop, design and keep up the program extend guaranteeing that all the useful & client prerequisite, goals, and objective are met. This helps in quality production and customer satisfaction (Barjtya. et al., 2017).

Commonplace SDLC as outlined in Fig. 1 is s representation of a software process and characterizes steps, activities, methods, tools as well as expected deliverables, of a computer program improvement extend.

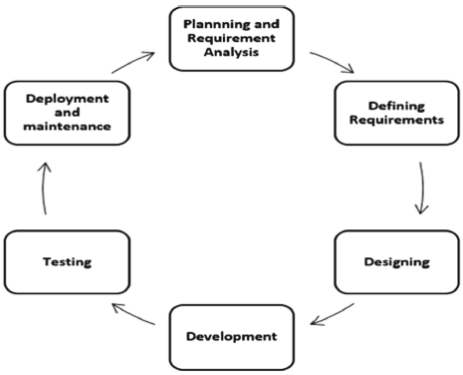

Fig.1 a typical SDLC (Okesola et al., 2020)

The analysis stage has been carried out in previous research. Next is the design stage. Design concentrates on how the system is built for meet the needs of the analysis phase. The benefits of system design are provide a complete blueprint, as a guide (guideline) for programmers in making software application.

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The design is carried out in three stages: **First,** Conseptual Data Modelling, that is Unified Modelling Language (UML). UML is an effective conceptual data modeling reference for object-oriented software system modeling (Muhamad et al., 2019). UML used in this design are: Use Case Diagram and Activity Diagram. **Second,** Database Design. Class diagrams are used to design the database in this study. Modeling class diagram on a system can be provide an overview of the relationship between class of a system, also gives explaination of class rules and responsibilities (E. M. Perdana et al., 2019). Class diagram also gives a inactive see of the structure of the framework variation (Assunção et al., 2020). **Third,** Design Interface. In designing the interface, we use a variety of tools.

Data collection techniques are used in the data collection stage needed. In previous research, data collection has been carried out through interviews with registration officers and the head of the Public Health Center as well as through direct observation at Public Health Center Siak Hulu I Kabupaten Kampar-Riau.

RESULT

The proposed system for queuing at Public Health Center Siak Hulu I Kabupaten Kampar-Riau is described as fig.2:

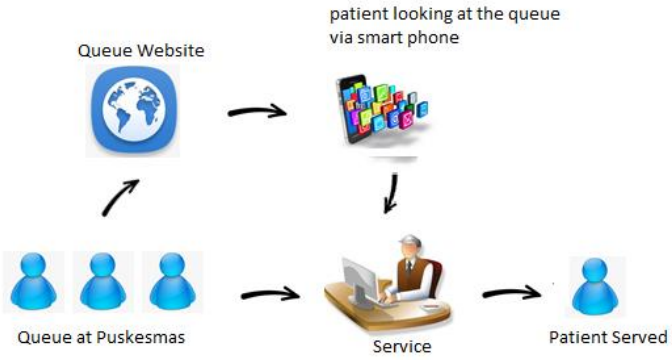

Fig.2 Rich Picture of the Proposed System

The following is a conceptual design, that is Use Case and Activity Diagram:

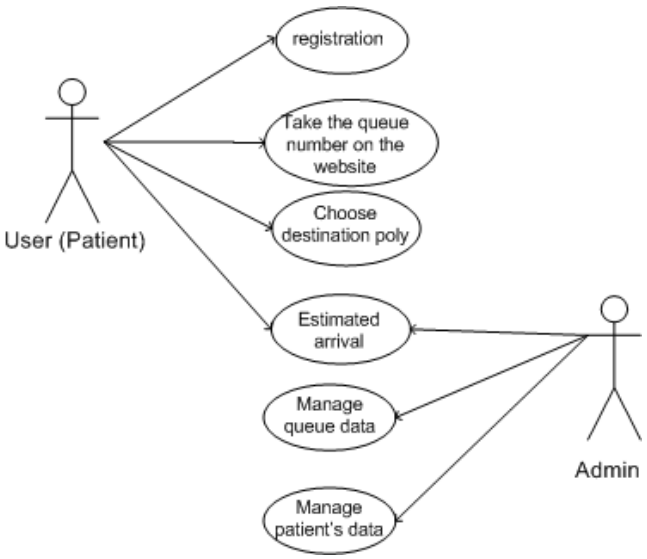

Fig 3. Use Case

Next, activity diagram. The following is an activity diagram to show the processes that exist in the system. Activity Diagram is a use case development where the flow and activities are described in more detail:

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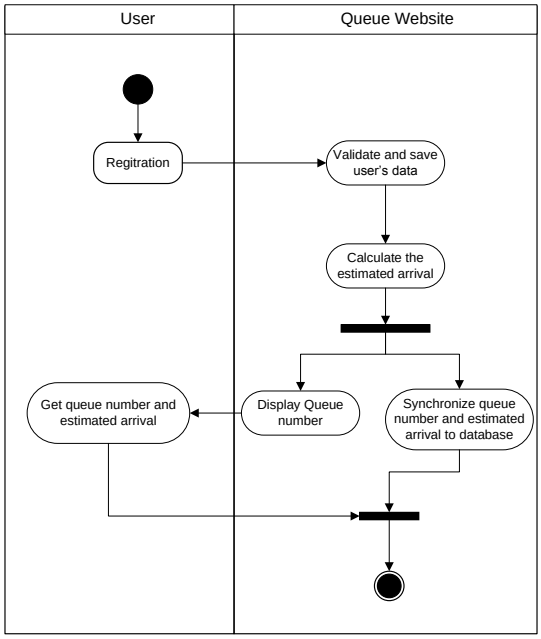

Fig.4 Activity Diagram of taking queue number

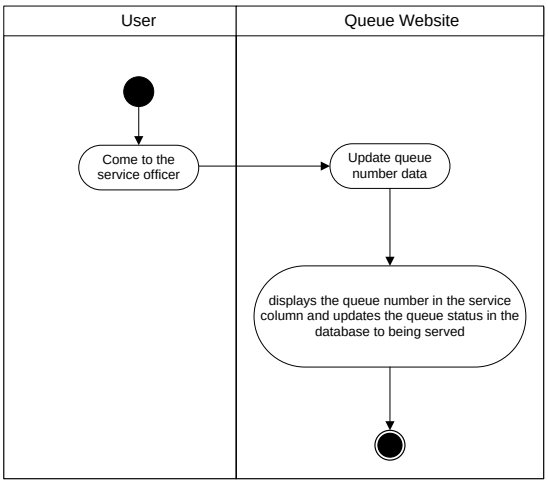

Fig.5 Activity Diagram of queue turn

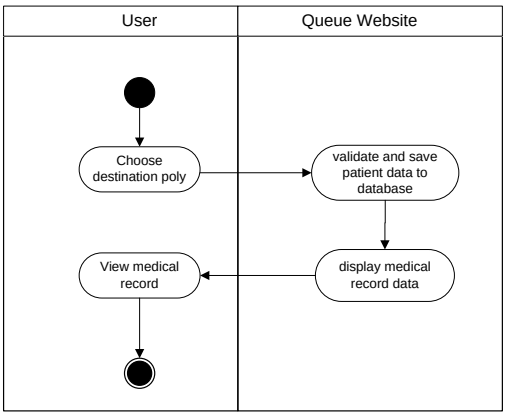

Fig.6 Activity Diagram of Patient Input Data

Further, Database design can be seen ini fig.7 below:

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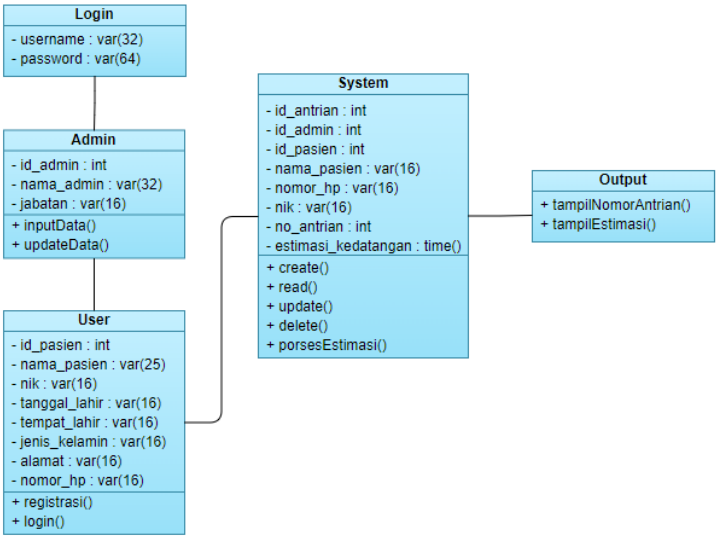

Fig.7 Class Diagram of Queing System

For Interface design can be seen on the following figures :

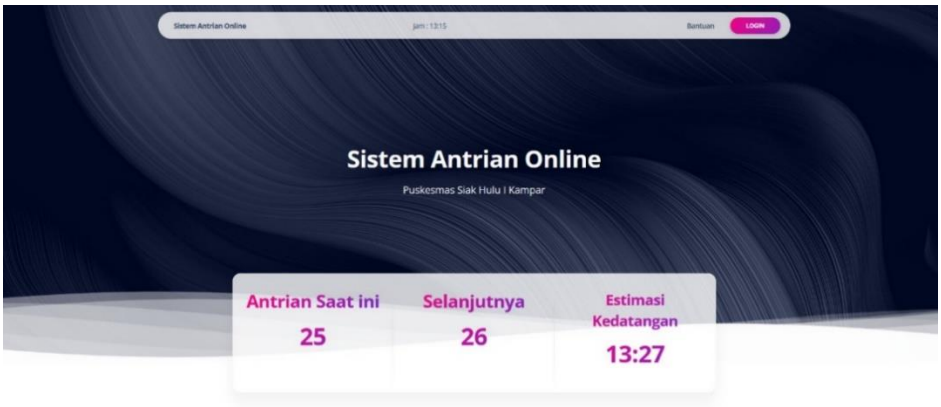

Fig.8 Home page Interface Design

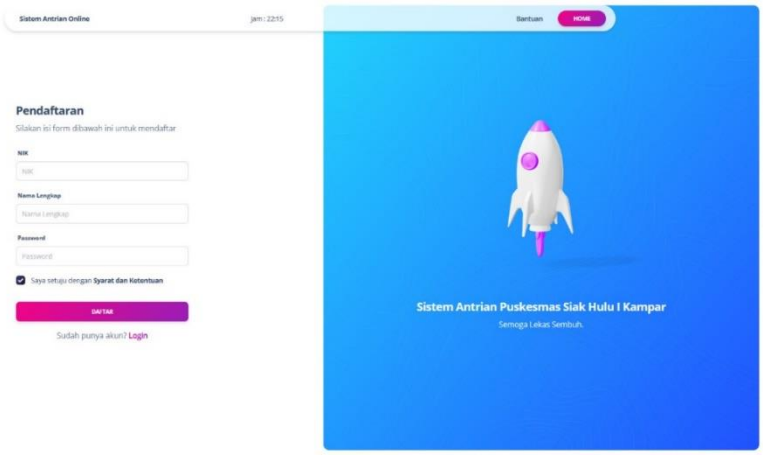

Fig.9 Registration Page Interface Design

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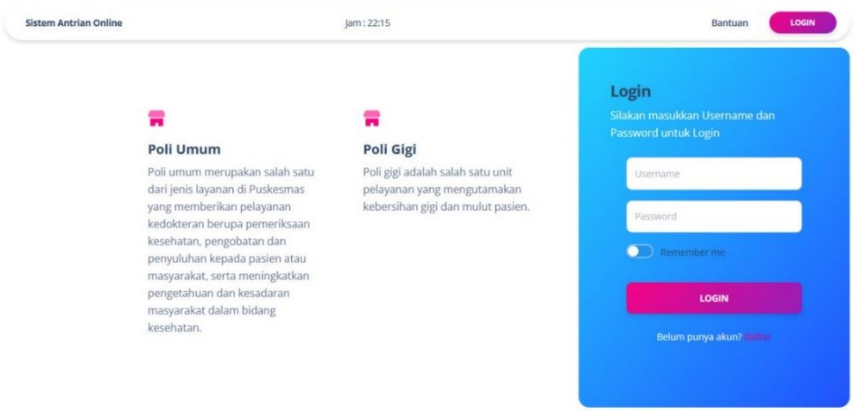

Fig.10 Login Page Interface Design

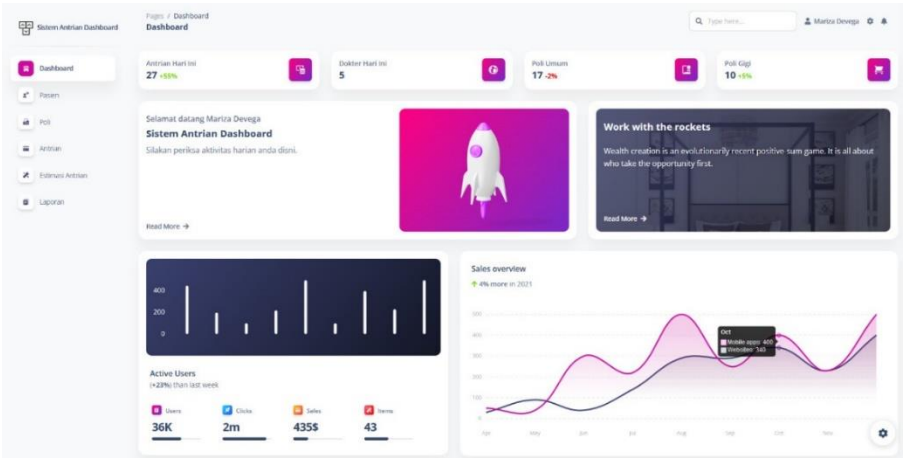

Fig.11 Dashboard Interface Design

DISCUSSIONS

Based on the results above, it can be seen that there are several designs, starting from the proposed rich picture, then designing a system consisting of conceptual data modeling, database design and interface design. For conceptual data modeling consists of use cases and activity diagrams. As for the database design is described through class diagrams and for interface design using Figma.

In figure 2 (Rich Picture of the proposed system) it can be explained that the patient takes the queue number by accessing the Public Health Center queue website using a smartphone or computer which connected to the internet network. After getting the queue number and estimated arrival, the patient comes to the Health Center and re-registers with the service section. The patient is then directed to the poly-destination.

UML describes a visual language for modeling and communication regarding a system using diagrams and supporting texts .Some of the modeling included into UML modeling such as use cases diagrams, class diagrams, activity diagrams, and sequence diagrams (Syarif & Nugraha, 2020). The use case in Figure 3 describes user interaction with the system. There are two actors, namely the patient and the admin. Patient interaction with the system is registration, taking the queue number on the website, choosing the destination poly, then getting an estimated time of arrival. While the admin can provide arrival estimates, manage queues and manage patient data.

The next conceptual modeling is the activity diagram which can be seen in Figures 4,5, and 6. Figure 4 describes the activity diagram of the queue number taking process. The process begins with the user (patient) registering, then the system validates and stores patient data, then the system calculates the estimated arrival and displays the queue number.

Figure 5 depicts an activity diagram of a queue turn. Where the patient comes to the officer, then the officer updates the queue number on the system and displays the queue number in the service column and updates the status in the database to being served.

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Figure 6 illustrates an activity diagram of patient's data input. This process starts from the user selecting the destination poly, then the system validates and saves patient data to the database, then the system displays medical record data and finally the user sees his medical record data.

Figure 7 is a class diagram that describes the structure of a programming system. The class diagram above describes the attributes of each class, namely, login, admin, user, system and output as well as the relationship between each class.

Next, the interface design shown in Figures 8.9, 10 and 11. For the design of the interface in Figure 8, the interface is displayed on the home page. On the home page there is a display of the current queue (in progress), the next queue, and the estimated arrival. The estimated arrival shown is for the next queue.

Figure 9 is the registration page interface design. On the registration page, new patients are required to register by filling out the form on the registration page.

Furthermore, the interface design of the login page is shown in Figure 10. On the login page, there is poly information available at Public Health Center Siak Hulu I Kabupaten Kampar, namely general poly and dental poly. Then like the login page in general there is a user name and password that can be filled in by patients who have previously registered.

The admin dashboard page that can be seen in Figure 11 displays several menus, namely patients, poly, queues, queue estimates and reports. The patient menu contains patient data, the poly menu consists of poly information (general poly and dental poly) and doctor information. Furthermore, the queue menu and the queue estimation menu contain queue information and estimated arrivals. Next, the report menu contains information on patient data reports and poly reports. Basically this dashboard page displays an overview and overall data, where more detailed data can be seen in the menus provided.

The limitation of this research is to focus on the proposed online queuing system design. It is hoped that the next research will be able to make a system, implement it and further develop the system.

CONCLUSION

The online queuing design of Public Health Center Siak Hulu Kabupaten Kampar was created as a basis and facilitates the creation of an online queuing system. Queue design not include handling emergency patients or patients who need treatment in the Emergency Room (IGD). In the future, queuing can be done online using a smart phone or desktop, this is in line with the goal of paperless eco-friendly technology.

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