

Implementation Of a Web-Based Queuing System in Hospital Polyclinic Services Using the FIFO Method (Case Study of Karangpawitan Community Health Center)

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Abstract

This study uses a web-based queueing system to enhance efficiency in hospital outpatient clinics by employing the First-In, First-Out (FIFO) approach. The implemented technology is seamlessly incorporated into the preexisting hospital information system to streamline the operations of registration and queue monitoring. The First-In, First-Out (FIFO) method will be utilized to forecast the number of incoming patients and approximate service durations using previous data from outpatient services. By employing this approach, the hospital is anticipated to optimize resource allocation, minimize patient waiting periods, and improve patient contentment. This study will employ software development methodologies such as requirement analysis, system design, implementation, and assessment. Data collection will be carried out using observation, interviews, and current system documentation. The findings of this study are expected to enhance the standard of treatment in hospital outpatient clinics and guide other healthcare organizations in deploying web-based queueing systems utilizing the FIFO method. This research aims to enhance comprehension of the advantages and obstacles of implementing a web-based queueing system in healthcare services..

Keywords : Queueing System, Web-Based, Outpatient Services, Hospital, FIFO Method

INTRODUCTION

The advent of information technology and the internet has substantially influenced several facets of existence, encompassing the healthcare domain. Hospitals, as a part of the healthcare service sector, are under pressure to enhance efficiency and the quality of patient service consistently. The outpatient clinic, a central core of activity in hospitals, provides non-inpatient medical services to patients.

Outpatient clinic services commonly encounter difficulties in effectively managing the queues of patients that arrive daily. (Ningrum & Winarsih, 2020). Inadequately supervised queues can result in extended patient waiting periods, heightened exhaustion and disorientation among patients, and diminished

efficiency of medical services. Hence, a novel methodology is required to enhance efficacy and optimize the patient encounter when obtaining outpatient clinic services.

An intriguing approach is integrating a Web-Based Queueing System with outpatient clinic services. The web-based queue system employs information technology and the internet to systematically and effectively manage the queueing process. (Matondang et., al, 2020). The Web-Based Queueing System enables patients to pre-register online through mobile devices or laptops before their arrival at the hospital, hence diminishing waiting durations and streamlining queue administration for the staff. (Mubarak, A., Metro & Selatan, 2019).

The First-In-First-Out (FIFO) method is employed in the Web-Based Queueing System. (Sangadah & Muntiah, 2021). The FIFO principle assigns priority depending on the sequence of arrival, ensuring that patients who register earlier will be attended to first. Integrating the FIFO (First-In-First-Out) method into the Web-Based Queueing System is anticipated to improve equity in service provision, ensuring that patients who arrive earlier are served more promptly than those who arrive later. (Usman & Putra, 2021).

This study aims to implement and evaluate the efficacy of a Web-Based Queueing System that utilizes the First-In, First-Out (FIFO) strategy for managing outpatient clinic services at the hospital. This approach aims to optimize the management of queues, promote the efficiency of medical services, and improve patient happiness when accessing outpatient clinic services.

System for managing and organizing a queue

Sukmayadi (2022) define queueing theory as the scientific study of queues, which are frequent in daily life and offer advantages to manufacturing and service firms.

Queueing theory is a branch of mathematics that focuses on analyzing and modeling waiting lines. Waiting lines are inherent phenomena resulting from the public's demand for a service system during specified periods, wherein the demand surpasses the service system's capacity. Busy periods are commonly identified using a queueing method, which involves customers arriving, waiting for their turn, and leaving the service system. (Kinasih & Albari, 2012).

Kartikasari et., al (2021). state that the primary objective of most waiting lines is to

determine the optimal degree of service a firm should offer. The queueing theory aims to develop service facilities that can effectively manage unpredictable variations in service demands while achieving a balance between service costs and the expenses associated with waiting in a queue.

Analysis of the system

System analysis involves breaking down a comprehensive information system into its constituent parts to discover and assess issues, opportunities, and challenges that may arise from anticipated requirements, facilitating proposed enhancements. It is analyzing an existing system to create a new or improved one. (Ashari & Muharram, 2022).

The author aims to make a valuable addition to the field of health information technology by researching and creating a web-based queue system that focuses on the FIFO principle to manage outpatient clinic services effectively. The findings of this study are anticipated to function as a blueprint for hospitals and other healthcare establishments to enhance operational effectiveness and deliver an enhanced patient experience.

METHOD

Continuing examination of the system

According to the Qualitative Analysis study approach, the medical records processing and storage methods at Pelita Bunda Clinic are not computerized and are kept in physical books.

Problem	Solving
Queues are piling up due to staff difficulties in	Developing a queue mechanism to optimize efficiency and create a

managing patients who come to the puskesmas.	more favorable environment.
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Analysis required

Chapter I highlights the issues faced by Karangpawitan Community Health Center, particularly the issue of a manual queue system that causes discomfort for multiple parties within the health center. The health facility necessitates a queue application to streamline staff responsibilities and foster a more favorable environment.

SWOT analysis

SWOT analysis, a condensed form of Strengths, Weaknesses, Opportunities, and Threats, is used to delineate and assess a predicament, venture, or company idea by considering internal and external aspects. This analysis is grounded in a logical approach that aims to optimize strengths and opportunities while reducing weaknesses and threats. This enables the redesign of the current system, resulting in a new information system that fulfills the anticipated requirements for enhancing the integration of existing business processes.

Below is a SWOT analysis for constructing the Medical Record Information System utilizing the Extreme Programming (XP) Method in Karangpawitan Community Health Center:

Streght	Web-based queueing solutions can be adjusted in size to meet specific requirements. The program can promptly adapt to
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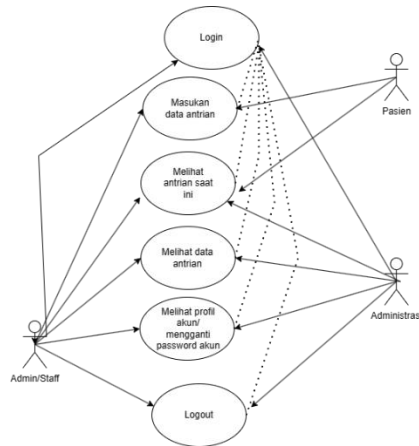
	accommodate higher loads during increased traffic or heavy usage.
Weakness	While web apps are accessible from different devices, individuals with physical impairments or technological constraints may encounter obstacles when utilizing specific web interfaces.
Opportunities	Queueing applications can help companies enhance customer experience by reducing waiting times and allowing customers to monitor queues remotely..
Threats	Web-based queueing applications may possess unnoticed security issues, including software flaws or inadequate server setups. Attackers can exploit these vulnerabilities to obtain unauthorized access.

Creating a Use Case Diagram

A use case represents the essential interaction between a system and an actor in a simplified manner. Hence, it is imperative to

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select appropriate abstractions. Use cases are generated according to the specific requirements of each actor. The following are the applications for the medical record information system of Karangpawitan Community Health Center:

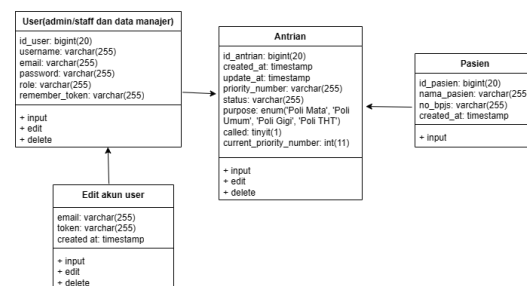


Actor Definition

An actor is an individual or user who interacts with the system. An actor exclusively engages with use cases but lacks authority over them.

Actor	Description
Admin/staff	People who have access rights to manage all menus on the dashboard
Patient	People must fill in queue data and enter the queue number so they can be examined by a doctor.
Manager data	The person who checks patient data that will be examined by the doctor

Diagram representing the structure and relationships of classes in a software system. This feature showcases the classes and packages employed in a given system. Hence, this diagram can comprehensively depict the system and its interconnections. Below is the Class diagram representing the web-based queuing system implemented at Karangpawitan Community Health Center:



RESULT AND DISCUSSION

Deployment of the system

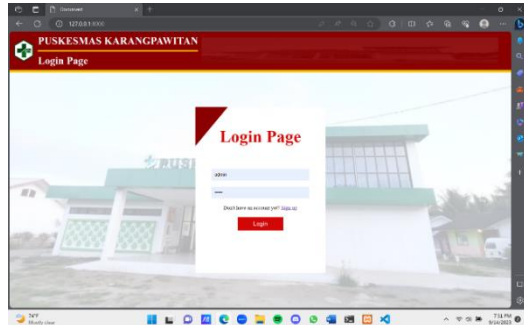
System implementation is the phase in which the solution or system researched and developed during the study is implemented and tested in a suitable setting. The objective is to evaluate the proposed solution's functionality, performance, and dependability and determine if it fulfills the study objectives.

Following the completion of the design phase, this step will be swiftly executed using the suitable programming language. After completing the implementation stage, the subsequent step involves thorough system testing to detect any possible deficiencies. The results obtained from these tests provide essential groundwork for the system's ongoing

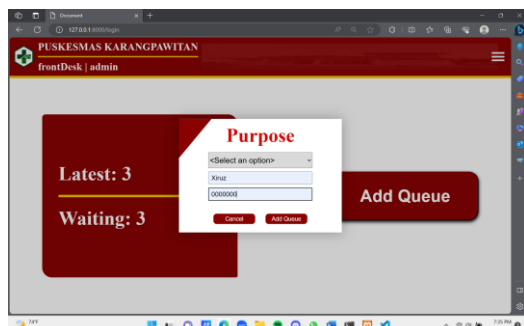
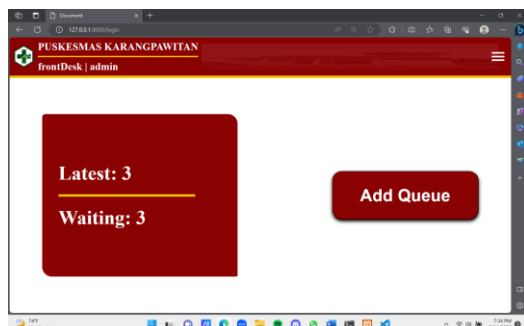
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development, directing efforts toward improvement and further advancement.

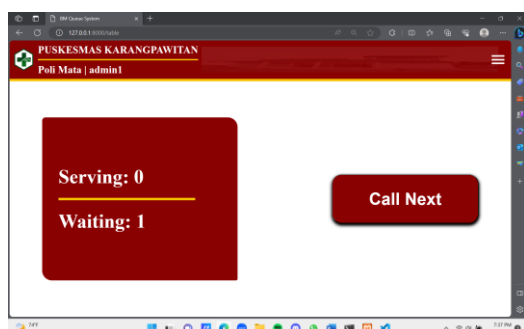
Login Interface



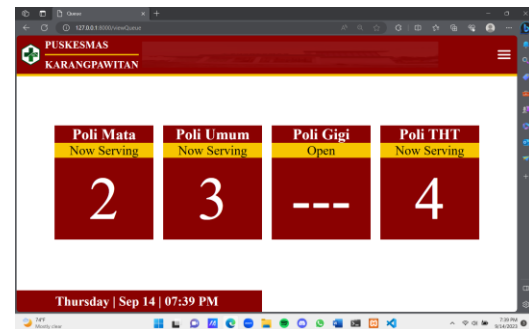
Patient Home Interface



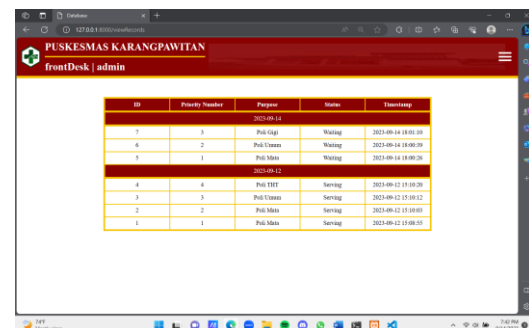
Home Admin/staff and Data Manager interface



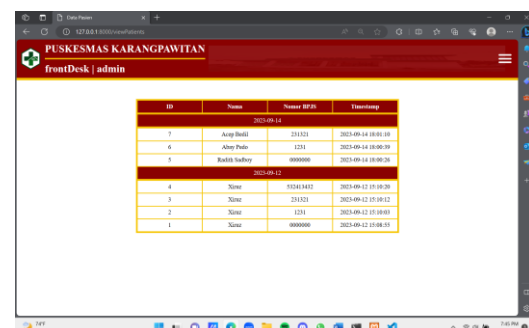
Queue View Interface



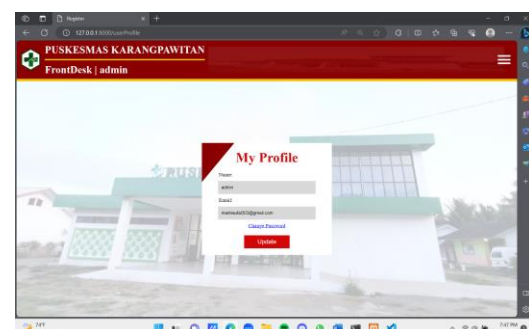
Queue Visit History Interface



Patient Data Interface



User Account Profile Interface



CONCLUSION

Conclusion

The study established a web-based queueing system within the hospital's outpatient clinic service. From the research findings and analysis carried out, several significant conclusions may be inferred:

Deployment of the Internet-based Queue Management System: The introduction of the web-based queueing system at the Karangpawitan Community Health Center has yielded substantial advantages in enhancing efficiency, precision, and patient contentment. Patients can register and get queue information through an online platform, decreasing waiting times and enabling them to be better informed.

Implementing the web-based queueing system has effectively decreased the time patients have to wait at the Karangpawitan Community Health Center. This has a beneficial effect on the patient experience and allows medical personnel to prioritize high-quality healthcare.

Administrative Enhancement: This system has bolstered hospital administration efficacy by automating registration, scheduling, and reporting procedures. This minimizes human errors and enables administrative staff to concentrate on other significant tasks.

Suggestions

According to this research, the author suggests the following tips to ensure the application operates consistently and improves:

Maintenance and Support: Develop an effective system maintenance strategy and offer sufficient technical support to resolve potential problems.

Case studies or comparisons enable program users to identify and implement solutions for specific challenges.

Conduct thorough research and execute robust data security protocols, mainly due to the system's handling of confidential patient medical data. Ensure robust protection of patient data against security risks.

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