OUR LADY OF FATIMA UNIVERSITY
COLLEGE OF COMPUTER STUDIES
ANTIPOLO CITY

A WEB AND MOBILE BASED QUEUEING MANAGEMENT SYSTEM FOR OUR LADY OF FATIMA UNIVERSITY ANTIPOLO REGISTRAR OFFICE

A Capstone Project

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CHAPTER 1

INTRODUCTION

The Registrar's Office of Our Lady of Fatima University Antipolo Campus plays a vital role in managing academic records, enrollment verification, and document requests for students and alumni. As an essential administrative unit, the office ensures that transactions related to academic records are processed accurately and efficiently. However, the increasing number of students and the growing demand for registrar services have highlighted the need for a more streamlined and efficient queueing system to enhance service delivery.

Currently, the registrar's office relies on a traditional face-to-face queuing system, requiring students to physically visit the office to request documents, process transcripts, and verify enrollment. This manual process results in long waiting times, overcrowding, and inefficient service delivery, especially during peak periods such as enrollment and clearance seasons. Additionally, students often need to return multiple times to follow up on their requests, further contributing to congestion and delays.

These inefficiencies present several challenges, including excessive waiting periods, mismanaged queues, and an overall lack of real-time updates for students regarding their

transactions. The absence of a virtual queuing system leads to frustration among students and staff, affecting productivity and service satisfaction. Furthermore, the manual process increases the workload of the registrar's personnel, causing potential delays in document processing and customer service response.

To address these challenges, this study proposes the development of a Web and Mobile-Based Queueing Management System for the registrar's office of Our Lady of Fatima University Antipolo. This system aims to digitize the queueing process by allowing students to secure queue numbers remotely, receive real-time notifications on waiting times, and be notified when their turn is approaching. By integrating web and mobile technologies, the proposed solution will reduce physical congestion, optimize workflow efficiency, and enhance the overall experience for both students and administrative staff. This innovation will serve as a modernized approach to registrar services, ensuring a more convenient and efficient queuing system for the university.

Background of the Study

The Our Lady of Fatima University Antipolo Registrar's Office plays a crucial role in managing student transactions such as document requests, transcript processing, enrollment verification, and graduation applications. However, traditional queuing methods have led to inefficiencies, particularly during peak enrollment and clearance periods, causing long wait times, congestion, and frustration among students and staff.

The Web and Mobile-Based Queueing Management System for Our Lady of

Fatima University Antipolo Registrar's Office seeks to introduce a virtual queueing solution, allowing students to secure queue numbers remotely, receive real-time updates on their estimated waiting time, and get notifications when their turn approaches. By digitizing the queueing process, this system aims to reduce physical congestion, streamline workflows, and improve overall user experience.

The system will be designed to be cost-effective and user-friendly, eliminating the need for physical ticketing machines and large display boards. Instead, it will utilize web-based and mobile technologies to provide a seamless, accessible, and efficient queueing experience. This project will not only benefit students and administrative staff by reducing long wait times and improving transaction management but will also serve as a model for other academic institutions seeking to modernize their registrar services.

Furthermore, this initiative provides an opportunity for IT students to apply their knowledge in database management, web development, real-time notifications, and user interface design. By bridging theoretical learning with practical application, this project contributes to both academic development and institutional innovation, ultimately enhancing service efficiency and student satisfaction at Our Lady of Fatima University Antipolo.

Objectives of the Study

The general objective of the study is to develop and implement a Web and Mobile Based Queueing Management System for the Registrar's Office of Our Lady of Fatima

student experience.

Specifically, the study aims to:

1. Design and develop a web and mobile-based queueing system that allows students to obtain queue numbers remotely.
2. Implement a real-time notification system that provides updates on estimated waiting times and queue status.
3. Reduce congestion and improve workflow efficiency within the Registrar's Office by digitizing queue management.
4. Ensure a user-friendly interface that is accessible to both students and administrative staff for seamless navigation and transaction processing.
5. Evaluate the effectiveness of the system in minimizing wait times, improving service delivery, and enhancing overall user satisfaction.

Scope and Limitation of the Study

The scope of the study is to develop a Smart Queue Management System that enhances efficiency in university offices by implementing a web-based virtual queueing system. The system includes the following features:

- The proposed study can obtain queue numbers remotely through a web and mobile application, reducing the need for physical waiting lines.
- The proposed study provides estimated waiting times and live service status updates to keep students informed about their queue position.

- The proposed study will allow users to receive push notifications when their turn is near, ensuring a smoother experience.
- The proposed study will allow students to book appointments in advance for specific services, reducing congestion and improving time management.
- The proposed study will allow users to rate their experience and provide feedback, enabling continuous improvement of services.

The limitation of the study which is not included in the study are the following:

- The proposed study will not support multiple languages for user interface customization.
- The proposed study will not allow queue reservation for specific times or appointments.
- The proposed study will not provide live call support or direct communication between students and staff.
- The proposed study will not be implemented in other university offices aside from the Registrar Offices.
- The proposed study will only be compatible with Android devices.

Significance of the Study

A discussion of the significance of a study for the Queueing Management System comprises an explanation of the work's relevance, who will benefit when the system is already developed, its prospective benefits, and its overall impact.

Students. This study helps students by reducing wait times and allowing them to manage their transactions more efficiently.

Registrar's Office Staff. This study streamlines queue management, making student transactions faster and reducing staff workload.

University Administration. This study improves service efficiency, modernizing registrar operations for better student satisfaction.

Researchers. This study provides hands-on experience in web development, database management, and real-time notifications.

Future Researchers. This study serves as a reference for future research, helping improve queue management systems.

In addition, the proponents will develop a web and mobile-based queueing system for the Registrar's Office. This system will enhance service efficiency by reducing congestion and improving transaction management, ensuring a more organized and seamless experience for students and staff.

CHAPTER 2

INTRODUCTION

Technical Background

For the development of the Web and Mobile-based Queueing Management System for the Our Lady of Fatima University (OLFU) Antipolo Registrar Office, we carefully selected a combination of software tools to ensure a smooth and efficient development process. Android Studio was chosen for mobile development because it is the official Integrated Development Environment (IDE) for Android applications. It offers a comprehensive suite of features that include real-time testing, debugging tools, and an emulator for simulating mobile devices, which made it ideal for creating a responsive and functional mobile app. Additionally, Android Studio has seamless integration with Firebase, which is essential for handling user authentication and real-time notifications in our system. On the web development side, we used Visual Studio Code (VS Code), a versatile, lightweight code editor that supports various programming languages and offers a rich ecosystem of extensions, making it well-suited for developing the web interface of the queue management system. For the database, we chose MySQL due to its reliability, scalability, and ability to manage relational data effectively, which is crucial for managing the student queue data.

For the hardware components, we decided to use Firebase as the primary cloud-based platform to handle real-time data synchronization between the mobile app and the web application. Firebase allows for seamless integration with Android Studio, enabling us to implement features like push notifications and real-time updates. The firebase was also chosen for its robust backend services, including authentication, cloud storage, and real-time database, making it easier to manage user data and interactions. We considered alternatives like MongoDB, but Firebase's simplicity, scalability, and its specific advantages in real-time functionality were key factors in its selection. Moreover, Firebase's ability to handle high-traffic scenarios without significant performance loss was crucial for the success of the system, especially considering the large number of students who would use the system concurrently.

Foreign Studies

The following citations of the author, articles, books, and journals are the foreign studies and its corresponding synthesis to the proposed study.

Evaluation of Queue System Management Implementation at XYZ Supermarket in Lampung

According to Basory, H. a. B., Prastiyo, Y. P., & Wijaya, S. W. (2024), the Evaluation of Queue System Management Implementation at XYZ Supermarket in Lampung investigates the effectiveness of queuing system management (QSM) in enhancing operational efficiency and customer satisfaction within a supermarket setting. Conducted over a 14-day period, the research focused on optimizing the number of cashier lines to ensure that the average waiting time (Ws) was less than 3 minutes and the average number of customers in the system (Ls) was fewer than 4, aligning with the supermarket's standard operating procedures. Data was collected at hourly intervals from 9:00 AM to 9:00 PM, encompassing all customers entering the supermarket during this timeframe.

The analysis employed a multi-channel single-phase model, assessing system time and customer count to determine optimal cashier staffing levels. Findings indicated that operating with two cashiers during specific hours—9:00-9:59 AM, 12:00-12:59 PM, and 7:00-7:59 PM—achieved the desired performance metrics, with waiting times under 3 minutes and fewer than 4 customers in the system. This study underscores the importance

of effective QSM in modern retail environments, highlighting its role in reducing customer wait times and enhancing service quality. The insights gained can inform similar strategies in other retail settings, aiming to improve customer experiences and operational efficiency. Retrieved from https://d1wqtxts1xzle7.cloudfront.net/112551651/Jurnal_Eqien_Article_Text_6863_2_10_20240317_1_-libre.pdf?1710831052=&response-content-disposition=inline%3B+filename%3DJurnal_Eqien_Article_Text_6863_2_10_2024.pdf&Expires=1742227663&Signature=CuKEueWV4lJ9N708T5wRj9ne~G8GeIAUv6VDvDbVZgF7tVPerL5NcqX8AkpkVVXa~mAxGOzaUrzJrqVrqB1I2w50f9KZMS3Q81ClADwsDxer344j8qFQIjp5Y2QKgVXFOavrGsnTK9xsLv1l6OHpkEVtD911zassqcZYFc-AXFG2tKkCy73vxh3DcKE3SYA3XUAxFMPNSk0T4zZXhIo8cZpTS4ZGAhFU5ExitxOeYbSAMr8Wn0nTzxQ1sDNYfsTnl4cv-lltMCER4ftQqUTfSj1TW9R41xWgJxgy9MDzjEiIPeAxfj0NgPq~9uw2Zv5rZDoyvOn-v~Nq161pMAm8ew__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA

In accordance with Basory, H. a. B., Prastiyo, Y. P., & Wijaya, S. W. (2024), the study highlights the importance of optimizing queue management to enhance service efficiency and customer satisfaction. It demonstrates how structured queueing systems can minimize waiting times and improve overall workflow, aligning with our study on a Web and Mobile-Based Queueing Management System for Our Lady of Fatima University Antipolo Registrar's Office. Just as the supermarket study focuses on reducing customer congestion through strategic cashier allocation, our system aims to streamline student transactions by implementing a virtual queueing solution. Both studies emphasize

the role of technology in improving queue management, reinforcing the need for automated systems to enhance service delivery and user experience.

Effect of Queue Management System on Patient Satisfaction in Emergency Department; a Randomized Controlled Trial

According to Bidari, A., Jafarnejad, S., & Faradonbeh, N. A. (2021), The Effect of Queue Management System on Patient Satisfaction in the Emergency Department; a Randomized Controlled Trial investigated the impact of implementing a queue management system (QMS) on patient satisfaction in an emergency department setting. Conducted from July to August 2020, this prospective randomized single-blinded interventional study involved 236 patients divided into intervention and control groups, each comprising 118 individuals. The research aimed to evaluate patients' perceptions of waiting times and their overall satisfaction before being attended to by an emergency medicine doctor, comparing scenarios with and without the application of a QMS.

The findings revealed that the intervention group, which experienced the QMS, had significantly lower mean actual waiting times (15.5 ± 7.5 minutes) and perceived waiting times (11.9 ± 7.4 minutes) compared to the control group, which had mean actual and perceived waiting times of 27.03 ± 8.5 minutes and 32.8 ± 8.7 minutes, respectively. Additionally, patient satisfaction levels were notably higher in the intervention group. The study concluded that implementing a QMS in emergency departments can effectively reduce both actual and perceived waiting times, thereby enhancing patient satisfaction. Retrieved from https://pmc.ncbi.nlm.nih.gov/articles/PMC8464010/.

With regards to Bidari, A., Jafarnejad, S., & Faradonbeh, N. A. (2021), the study highlights the effectiveness of queue management in reducing actual and perceived waiting times, ultimately improving user satisfaction. This aligns with our study on a Web and Mobile-Based Queueing Management System for Our Lady of Fatima University Antipolo Registrar's Office, as both emphasize the role of technology in streamlining service delivery. Just as the implementation of a QMS in hospitals enhanced patient experience by minimizing wait times, our system aims to optimize student transactions, reduce congestion, and improve efficiency in the Registrar's Office. These findings reinforce the importance of automated queueing solutions in various service-oriented institutions to enhance user experience and operational effectiveness.

Sensor-Enabled Context-Aware and Pro-Active Queue Management Systems in Intelligent Environments

According to Klimek, R. (2020), the Sensor-Enabled Context-Aware and Pro-Active Queue Management Systems in Intelligent Environments explores the development of an intelligent queue management system designed to enhance customer flow and service quality in various institutions and commercial enterprises. By leveraging multiple low-level sensors and devices within an Internet of Things (IoT) network, the system proactively manages queues by monitoring real-time conditions and adapting accordingly. This context-aware approach aims to eliminate or significantly reduce waiting times, leading to increased customer satisfaction and economic benefits for service providers.

The implementation of such a system involves integrating sensor data to assess current queue statuses and predict potential congestion points. By doing so, the system can make informed decisions to optimize customer flow, such as adjusting service rates or reallocating resources. This proactive management not only improves the efficiency of service delivery but also enhances the overall customer experience by minimizing delays and perceived wait times. The study underscores the potential of IoT-enabled solutions in transforming traditional queue management practices into dynamic, responsive systems that align with the goals of smart city initiatives. Retrieved from https://www.mdpi.com/1424-8220/20/20/5837.

In response to Klimek, R. (2020), the study demonstrates how IoT technology can optimize queueing processes by dynamically managing service flow and reducing wait times. Similarly, our Web and Mobile-Based Queueing Management System for Our Lady of Fatima University Antipolo Registrar's Office aims to enhance student transactions by implementing a real-time virtual queueing solution. By leveraging web and mobile technologies, our system seeks to minimize congestion, improve efficiency, and provide a more organized and accessible service experience. Both studies highlight the significance of technology-driven queue management in improving customer satisfaction and streamlining service operations.

Analysis of Queue Management in Theme Parks Introducing the Fast Pass System

According to Li, J. L., & Li, Q. L. (2023), The Analysis of Queue Management in Theme Parks Introducing the Fast Pass System focuses on creating a digital solution to streamline student services. The researchers developed a web-based queue management

system (QMS) tailored for the university's Registrar's Office, aiming to reduce physical queues and improve service efficiency. The system allows students to join virtual queues, receive real-time updates, and schedule appointments, thereby minimizing wait times and congestion within the office premises. This approach not only enhances the student experience but also optimizes the workflow for administrative staff.

Upon implementation, the QMS demonstrated significant improvements in managing student flow and reducing wait times. Feedback from both students and staff indicated increased satisfaction due to the system's user-friendly interface and effective management of appointments. The study concludes that integrating technology into administrative processes, such as a web-based QMS, can substantially enhance operational efficiency and service delivery in educational institutions. Retrieved from https://www.cell.com/heliyon/fulltext/S2405-8440(23)05209-X?_returnURL=https%3A%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS240584402305209X%3Fshowall%3Dtrue.

In relation to the statement made by Li, J. L., & Li, Q. L. (2023), the study aligns with our research by emphasizing the role of technology in streamlining administrative processes and improving service efficiency. Similar to our proposed Web and Mobile-Based Queueing Management System for Our Lady of Fatima University Antipolo Registrar's Office, this study highlights the benefits of reducing physical queues, providing real-time updates, and optimizing workflow for both students and staff. By integrating a digital queueing system, both studies aim to enhance user experience,

minimize congestion, and modernize traditional queuing methods, ultimately creating a more organized and efficient service environment.

Influence of Automated Queue Management System Optimization on Performance of National Cement Company Limited

According to Kiplagat, J. K., Kamaku, P. W. K., & Paul, S. N. P. (2020), Influence of Automated Queue Management System Optimization on Performance of National Cement Company Limited explores the implementation of queue management systems to enhance service efficiency in various organizational settings. It highlights the challenges associated with traditional queuing methods, such as long wait times, customer dissatisfaction, and operational inefficiencies. The research emphasizes how digital queue management solutions leverage technology to automate queuing processes, providing real-time updates and reducing physical congestion. By integrating features such as virtual ticketing, appointment scheduling, and notification systems, these solutions aim to streamline operations and improve user experience. The study further discusses the importance of system adaptability and scalability, ensuring that different institutions can modify the technology to fit their specific needs.

Additionally, the research presents case studies and data-driven insights to validate the effectiveness of queue management systems in improving service delivery. It analyzes various implementations across industries, demonstrating how automation minimizes bottlenecks and optimizes staff workload. The study also addresses potential challenges, including system maintenance, user adaptation, and infrastructure costs, offering recommendations for successful deployment. By focusing on technological

advancements in queue management, the study provides valuable insights into how digital solutions can transform traditional service models, ultimately enhancing efficiency and customer satisfaction. Retrieved from https://www.iajournals.org/articles/iajist_v2_i1_221_244.pdf.

As stated by Kiplagat, J. K., Kamaku, P. W. K., & Paul, S. N. P. (2020), The study highlights the effectiveness of digital queue management systems in reducing wait times, streamlining operations, and improving service efficiency, which directly aligns with the objectives of our research. Similar to how digital solutions have optimized queuing processes in various industries, our Web and Mobile-Based Queueing Management System for Our Lady of Fatima University Antipolo Registrar's Office aims to modernize student transactions. By implementing real-time notifications, virtual ticketing, and automated scheduling, our system seeks to address the inefficiencies of traditional queuing methods, minimizing congestion and enhancing the overall experience for students and administrative staff.

Foreign Literature

The following articles and opinions stated below rests in the foreign literature and its corresponding synthesis.

Automated Queue Management Systems On Service Delivery In Public Hospitals In Kenya During The Covid-19 Era: A Meta-analysis

According to O. Henry, K. O. H., & Njagi, E. N. (2023), the Automated Queue Management Systems on Service Delivery in Public Hospitals in Kenya During the

COVID-19 Era: A Meta-Analysis examines the impact of automated queue management systems (AQMS) on service efficiency in Kenyan public hospitals during the COVID-19 pandemic. It aims to assess how these systems improve service delivery by reducing waiting times, minimizing physical contact, and enhancing overall hospital operations.

The researchers conducted a meta-analysis by reviewing existing literature, including peer-reviewed journals, conference papers, and reports, to understand the effectiveness of AQMS. Their findings indicate that properly implemented queue management systems significantly enhance hospital service efficiency by streamlining patient flow, reducing congestion, and improving staff performance.

The study highlights the necessity for public hospitals in Kenya to adopt digital queueing solutions to improve healthcare services, especially in times of crisis like the pandemic. It recommends that hospital administrators recognize the value of AQMS as a crucial tool for improving patient experience and operational efficiency. Retrieved from https://ijrehc.com/uploads2023/ijrehc04_76.pdf

With regards to O. Henry, K. O. H., & Njagi, E. N. (2023), the effectiveness of digital queueing systems in improving service efficiency, reducing congestion, and enhancing user experience. Similarly, our study on a Web and Mobile-Based Queueing Management System for Our Lady of Fatima University Antipolo Registrar's Office aims to address inefficiencies in traditional queuing methods by implementing a virtual queueing system. Just as AQMS streamlined patient flow in hospitals, our system seeks to optimize student transactions by minimizing wait times and improving workflow

efficiency. This reinforces the importance of technology-driven queue management solutions in enhancing service quality across different institutions.

Performance Analysis of Diverse Active Queue Management Algorithms

According to Abdel-Jaber, H. (2025), The Performance Analysis of Diverse Active Queue Management Algorithms investigates how various Active Queue Management (AQM) methods can alleviate network congestion and enhance performance. Network congestion occurs when the available resources cannot handle incoming packets, leading to deteriorated performance. The research acknowledges that while numerous AQM algorithms have been developed to address this issue, their effectiveness varies significantly and is influenced by the level of congestion—be it light, moderate, or heavy.

The study emphasizes the need for a comprehensive performance analysis of different AQM algorithms under varying congestion scenarios to determine their efficacy in improving resource management and overall network performance. By understanding the strengths and limitations of each algorithm, network administrators can make informed decisions on implementing the most suitable AQM strategies to maintain optimal performance across diverse network conditions. Retrieved from https://link.springer.com/article/10.1007/s44227-025-00056-1.

In accordance with Abdel-Jaber, H. (2025), the study explores how different queue management techniques impact network congestion and efficiency, emphasizing the importance of selecting the right algorithm based on congestion levels. This relates to our Web and Mobile-Based Queueing Management System for Our Lady of Fatima

University Antipolo Registrar's Office, as both studies focus on optimizing queue management to enhance system performance and user experience. Just as AQM algorithms are analyzed to improve network traffic flow, our system aims to streamline student transactions by reducing wait times and congestion. Both studies highlight the role of efficient queue management in ensuring smooth operations, whether in digital networks or administrative processes.

Surgical Waiting Lists and Queue Management in a Brazilian Tertiary Public Hospital

According to Pazin-Filho, A., Dallora, M. E. L. D. V., Velasco, T. R., De Oliveira Cardoso Dos Santos, R., Volpe, G. J., Moroço, D. M., De Souza, D. A., Canabrava, C. M., Garcia, L. V., Joviliano, E. E., & Maciel, B. C. (2024), The Surgical Waiting Lists and Queue Management in a Brazilian Tertiary Public Hospital examines the implementation of a centralized queue management system, known as "Patients with Surgical Indication" (PSI), in a Brazilian public tertiary hospital. This system was introduced to address the inefficiencies in the Brazilian Unified Healthcare System (BUHS), where decentralized queue management often leads to prolonged surgical waiting times. The PSI aimed to streamline the process by centralizing surgical requests, thereby reducing waiting periods and improving overall patient care.

The study analyzed elective surgical requests from 2016 to 2022, assessing the impact of the PSI on waiting times and its effectiveness in prioritizing oncological surgeries, especially during the COVID-19 pandemic. The findings indicated that centralized management through the PSI significantly reduced surgical waiting times

compared to the previous decentralized approach. Additionally, during the pandemic, the PSI facilitated the efficient rationing of oncological surgeries, ensuring that critical cases received timely attention despite the strained healthcare resources. This study underscores the importance of centralized queue management systems in enhancing the efficiency and responsiveness of surgical services within publicly funded healthcare systems. Retrieved from https://link.springer.com/article/10.1186/s12913-024-10735-4.

In response to Pazin-Filho, A., Dallora, M. E. L. D. V., Velasco, T. R., De Oliveira Cardoso Dos Santos, R., Volpe, G. J., Moroço, D. M., De Souza, D. A., Canabrava, C. M., Garcia, L. V., Joviliano, E. E., & Maciel, B. C. (2024), it highlights the benefits of a centralized queue management system in reducing waiting times and improving service efficiency. Similarly, our Web and Mobile-Based Queueing Management System for Our Lady of Fatima University Antipolo Registrar's Office aims to streamline student transactions by implementing a structured virtual queueing approach. Just as the centralized system in the study optimized surgical scheduling and resource allocation, our project seeks to minimize congestion, enhance service accessibility, and improve overall user experience within the Registrar's Office. Both studies emphasize the importance of efficient queue management in enhancing operational efficiency and customer satisfaction in different service environments.

i2X Innovative Queue Management Solutions (iQMS) for Clean Energy Interconnection and Energization

According to I2X Innovative Queue Management Solutions (IQMS) for clean energy interconnection and energization. (n.d.-b), the U.S. Department of Energy's

Interconnection Innovation e-Xchange (i2X) has launched the Innovative Queue Management Solutions (iQMS) program, allocating up to $11.2 million to assist distribution utilities in piloting advanced software solutions. This initiative aims to enhance the management of interconnection and energization queues for renewable energy projects and electric vehicle (EV) charging infrastructure. Announced on August 14, 2024, the program addresses challenges utilities face in processing the increasing number of interconnection applications for mid-scale renewable energy projects (ranging from 100 kilowatts to 5 megawatts) and EV charging equipment. Efficient queue management is crucial to prevent delays and increased costs associated with grid integration of these technologies.

The iQMS program supports pilot projects that demonstrate innovative software solutions for managing interconnection, service load requests, and energization queues. Participating utilities are expected to document and share their experiences, offering valuable insights and best practices to assist other utilities facing similar challenges. By streamlining the interconnection process, the iQMS initiative aims to facilitate a more efficient integration of renewable energy sources and EV charging infrastructure into the electric grid, thereby supporting the transition to a cleaner and more resilient energy system. Retrieved from https://www.energy.gov/eere/i2x/i2x-innovative-queue-management-solutions-iqms-clean-energy-interconnection-and-0.

In relation to the statement made by I2X Innovative Queue Management Solutions (IQMS) for clean energy interconnection and energization. (n.d.-b), the study

focuses on optimizing interconnection and energization queues for renewable energy and EV charging infrastructure, ensuring efficient service delivery. Similarly, our study on a Web and Mobile-Based Queueing Management System for the Our Lady of Fatima University Antipolo Registrar's Office aims to streamline administrative processes by reducing congestion and improving transaction efficiency. Both initiatives emphasize the importance of technology-driven queue management to enhance service accessibility, minimize wait times, and create a more organized and responsive system for users.

A Review on Study of Application of Queueing Models in Hospital Sector

According to Rathore, R. R. (2022), A Review on Study of Application of Queueing Models in the Hospital Sector explores the implementation of a queue management system designed to improve service efficiency in customer-oriented environments. It highlights the challenges associated with traditional queuing methods, such as long wait times, overcrowding, and inefficient resource allocation, which often lead to customer dissatisfaction. By utilizing digital queueing solutions, the study aims to create a more organized and systematic approach to managing customer flow, ensuring that users receive timely service without unnecessary delays. The research discusses various technological components, including web-based platforms, real-time notifications, and automated scheduling, which work together to optimize queue management.

Additionally, the study emphasizes the benefits of integrating queue management systems into service-oriented institutions, such as government offices, healthcare facilities, and educational institutions. It underscores how digital solutions can reduce physical congestion, improve operational workflow, and enhance the overall customer experience. The study also explores the role of data analytics in identifying peak service hours and adjusting staff deployment accordingly to maintain efficiency. By adopting a structured queue management approach, organizations can enhance their service delivery, minimize customer frustration, and create a more streamlined and accessible system for users. Retrieved from https://pdfs.semanticscholar.org/c3df/0057b4ebc2aae2a4d0572e517a49d4b22e7f.pdf.

As stated by Rathore, R. R. (2022), the study highlights the importance of digital solutions in optimizing service efficiency, reducing wait times, and improving customer experiences. Similarly, our research on a Web and Mobile-Based Queueing Management System for the Our Lady of Fatima University Antipolo Registrar's Office aims to address the inefficiencies of traditional queuing methods by implementing a virtual queueing system. By leveraging real-time notifications and automated scheduling, our study aligns with the findings of the referenced research, demonstrating how technology-driven queue management can streamline administrative processes, minimize congestion, and enhance service delivery for students and staff.

Local Literature

The following articles and opinions stated below rests in the local literature and its corresponding synthesis

Queuing Management System in Manuel S. Enverga University Foundation Candelaria Inc.

According to Maala et al. (2023), the Queuing Management System in Manuel S. Enverga University Foundation Candelaria Inc. examined the implementation of a queuing management system in Manuel S. Enverga University Foundation Candelaria Inc. The system aimed to improve user satisfaction, shorten wait times, streamline the queuing process, and boost productivity by digitizing the queuing process, allowing students to join virtual queues and reducing the need to physically wait in line. Retrieved from https://www.ijarcs.info/index.php/Ijarcs/article/view/7039?.

With regards to Maala et al. (2023), This literature is relevant to our study as it underscores the benefits of digitizing queuing processes in academic institutions, which aligns with our objective to enhance service efficiency and student satisfaction at Our Lady of Fatima University Antipolo.

An Adaptation of Industry 4.0: Modifying the Implemented Queuing System in Philippine Statistics Authority Applying Monte Carlo Simulation

According to Solivio et al. (2021), An Adaptation of Industry 4.0: Modifying the Implemented Queuing System in Philippine Statistics Authority Applying Monte Carlo Simulation addressed inefficiencies in the Philippine Statistics Authority's (PSA) queuing system for civil registration services. By utilizing the Define, Measure, Analyze, Design, and Verify (DMADV) process alongside Monte Carlo Simulation, the researchers proposed a hybrid approach incorporating online processing to significantly reduce

customer waiting times. Retrieved from https://index.ieomsociety.org/index.cfm/article/view/ID/4094?

In accordance with Solivio et al. This literature is relevant to our study as it demonstrates the application of simulation techniques and process optimization to improve queuing systems in public institutions, aligning with our objective to enhance service efficiency at Our Lady of Fatima University Antipolo.

Queuing Theory: A Case Study in Analyzing the Vaccination Service in Quezon City

According to Valeriano et al. (2021), Queuing Theory: A Case Study in Analyzing the Vaccination Service in Quezon City utilized queuing theory to assess and improve the vaccination process in Quezon City. Through direct time studies and the application of the M/M/1 queuing model, the study identified bottlenecks and proposed enhancements to streamline the vaccination service. Retrieved from https://index.ieomsociety.org/index.cfm/article/view/ID/4074?utm_source=chatgpt.com

In response to Valeriano et al. (2021), This literature is relevant to our study as it showcases the application of queuing theory to optimize service delivery in public health, providing insights that can be adapted to improve queuing systems in educational institutions.

An Approach for Queue Management Systems of Non-Critical Services

According to Handoyo et al. (2021), An Approach for Queue Management Systems of Non-Critical Services proposed a general-purpose, cloud-based queue management system designed for non-critical services. The system aimed to efficiently

manage queues, reduce waiting times, and improve customer satisfaction by allowing users to monitor queue status remotely. Retrieved from https://www.researchgate.net/publication/351340621_An_Approach_for_Queue_Management_Systems_of_Non_Critical_Services?utm_source=chatgpt.com

In relation to the statement made by Handoyo et al. (2021), This literature is relevant to our study as it provides insights into implementing cloud-based queue management solutions, which can enhance the efficiency of the registrar's office at Our Lady of Fatima University Antipolo.

Community Request Queue Management System for Local Government Unit of Cabanatuan City

According to Himo et al. (2022), Community Request Queue Management System for Local Government Unit of Cabanatuan City developed a Community Request Queue Management System to address challenges faced by barangay officials, such as manual record-keeping and complicated retrieval processes. The system provided a modern, efficient way for officials to perform services, reducing physical visits and adhering to COVID-19 protocols. Retrieved from https://www.academia.edu/99617289/Community_Request_Queue_Management_System_for_Local_Government_Unit_of_Cabanatuan_City?

As stated by Himo et al. (2022), This literature is relevant to our study as it demonstrates the successful implementation of a digital queuing system in a local government setting, highlighting the potential benefits of reducing physical congestion and streamlining administrative processes through technology.

Local Studies

The following citations of the author, articles, books, and journals are the local studies and its corresponding synthesis to the proposed study.

Optimizing Queuing Management Systems for Enhanced Service Efficiency in a Government Health Insurance Agency

According to Amosco and Gamboa (2024), Optimizing Queuing Management Systems for Enhanced Service Efficiency in a Government Health Insurance Agency addressed challenges in queuing systems within a government health insurance agency by employing queuing theory models, simulation software, and process flow chart analysis. The research proposed solutions such as balanced break schedules, checklist implementation, and separate queuing systems to reduce waiting times and improve service efficiency. The study highlighted inefficiencies in the current queuing process and identified key factors contributing to delays. By implementing the proposed solutions, the agency could enhance workflow management and customer satisfaction. These findings emphasize the importance of data-driven strategies in optimizing queuing systems for public service institutions.Retrieved from https://www.researchgate.net/publication/381281648_OPTIMIZING_QUEUING_MANAGEMENT_SYSTEMS_FOR_ENHANCED_SERVICE_EFFICIENCY_IN_A_GOVERNMENT_HEALTH_INSURANCE_AGENCY

With regards to Amosco and Gamboa (2024), this study is relevant as it showcases the application of queuing theory and process optimization in a government agency, providing methodologies that can be adapted to improve the efficiency of a university registrar's office.

An Adaptation of Industry 4.0: Comparison between the Implemented Queuing System of Land Transportation Office and Proposed System Applying Monte Carlo Simulation, Lean Management, and Analytical Hierarchy Process Method

According to Robas et al. (2021), An Adaptation of Industry 4.0: Comparison between the Implemented Queuing System of Land Transportation Office and Proposed System Applying Monte Carlo Simulation, Lean Management, and Analytical Hierarchy Process Method conducted a study to evaluate and improve the queuing system at the Land Transportation Office (LTO) for driver's license renewal. The researchers utilized Lean Management, Monte Carlo Simulation, and Analytical Hierarchy Process (AHP) to analyze and compare the current system with proposed modifications. Their goal was to minimize customer waiting times and enhance overall service efficiency. The study highlighted key inefficiencies in the existing process and provided data-driven recommendations for improvement. More details can be found in the full study. Retrieved from https://ieomsociety.org/proceedings/2021rome/634.pdf.

In accordance with Robas et al. (2021), this study is pertinent as it demonstrates the application of advanced methodologies to optimize queuing systems in a government

agency, offering valuable insights that can be adapted to enhance the efficiency of a university registrar's office.

CLIQUE: A Web-Based Queue Management System with Real-Time Queue Tracking and Notification of Units for Angeles University Foundation Office of the University Registrar

According to Mallari et al. (2022), CLIQUE: A Web-Based Queue Management System with Real-Time Queue Tracking and Notification of Units for Angeles University Foundation Office of the University Registrar developed a web-based queue management system named CLIQUE, designed to enhance the queuing process at the Angeles University Foundation's Office of the University Registrar. The system features real-time monitoring of queues and notifications to relevant units, aiming to organize the queuing process for maximum productivity and excellent service. The researchers emphasized the importance of an efficient queuing system in reducing congestion and improving user experience. Their study demonstrated how technology can optimize queue management in academic institutions. Retrieved from https://ieomsociety.org/proceedings/2022istanbul/359.pdf.

In response to Mallari et al. (2022), this study is relevant as it demonstrates the development and implementation of a web-based queue management system in a

university registrar setting, offering insights that can be adapted to improve the efficiency of the Our Lady of Fatima University Antipolo Registrar Office.

Analyzing the Queuing Process of Customer Experience among Bulalo Restaurants in Tagaytay City

According to Serrano et al. (2020), Analyzing the Queuing Process of Customer Experience among Bulalo Restaurants in Tagaytay City assessed the queuing process in selected Bulalo restaurants in Tagaytay City. The researchers evaluated customer experiences based on model entities, activities, resources, and events to propose improvements in the queuing process, aiming to enhance customer satisfaction. Their findings highlighted key factors affecting waiting times and service efficiency in these restaurants. The study emphasized the need for strategic queue management to improve customer flow and overall dining experience.Retrieved from https://www.researchpublish.com/upload/book/paperpdf-1590063322.pdf

In relation to the statement made by Serrano et al. (2020), this study is relevant as it provides insights into optimizing queuing processes in service-oriented establishments, offering strategies that can be adapted to improve the efficiency of the Our Lady of Fatima University Antipolo Registrar Office.

A Queuing Theory Approach to Improve Service Quality of Banking Systems: A Case Study of a Bank in Laguna, Philippines

According to Sy et al. (2021), A Queuing Theory Approach to Improve Service Quality of Banking Systems: A Case Study of a Bank in Laguna, Philippines examined the queuing system of a bank in Laguna, Philippines, applying queuing theory and statistical analysis to improve service quality. The researchers collected data on customer arrival rates, service times, and waiting periods, identifying inefficiencies in the existing system. Their analysis revealed bottlenecks that contributed to long wait times and reduced service efficiency. Based on their findings, they recommended increasing the number of service counters, implementing a digital queuing system, and optimizing staff allocation to reduce waiting times and enhance customer satisfaction. These improvements aimed to create a more efficient and customer-friendly banking experience.Retrieved from https://ieomsociety.org/proceedings/2021monterrey/456.pdf

As stated by Sy et al. (2021), this study is relevant as it applies queuing theory to optimize service efficiency in a banking institution. Its methodologies and recommendations can be adapted to improve the queuing process at the Our Lady of Fatima University Antipolo Registrar Office, ensuring a smoother and more efficient experience for students and staff.

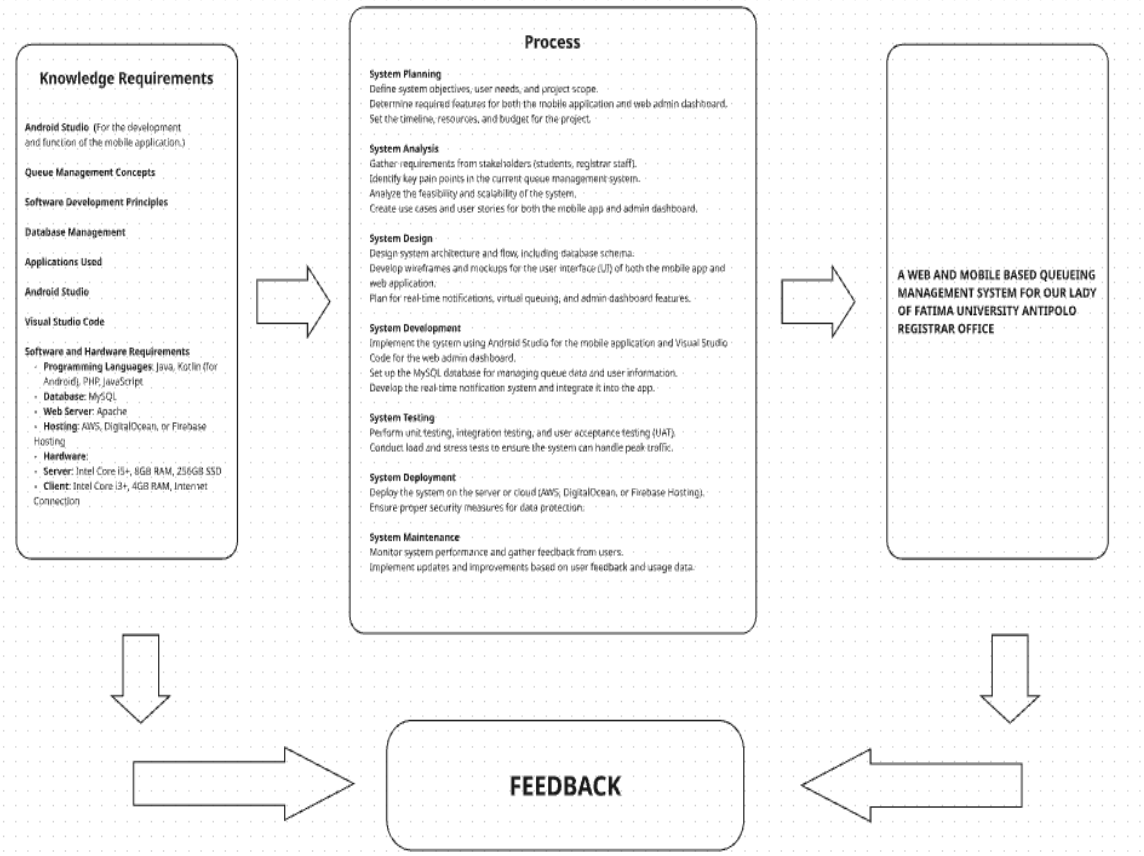


Figure 1. **Conceptual Model of the Study**

The above diagram represents the list of procedures and processes in order to develop the proposed study, A Web and Mobile Based Queueing Management System for Our Lady of Fatima university Antipolo Registrar Office

Operational Definition of Terms

Admin Dashboard – A web-based interface for Registrar's Office staff to manage and monitor student queues, view current queue statuses, and generate reports on service efficiency.

Automated Notifications – Notifications (email or push notifications) automatically sent to students when their turn in the queue is near, allowing them to prepare for their service.

Database – A structured collection of data stored in a system (MySQL in this case) for storing and retrieving information related to students, queue numbers, and system usage.

Front-End Development – The development of the user interface (UI) using technologies like HTML, CSS, and JavaScript, which students and staff interact with to use the queue management system.

Queue Number – A unique identifier assigned to a student when they join the queue, used to track their place in line and ensure fair service distribution.

Queue Management System – A software system designed to manage the flow of students in a queue, allowing them to take virtual queue numbers and receive real-time updates about their wait times.

Real-Time Updates – Immediate updates provided to students regarding their queue status, estimated waiting times, and when their turn is approaching, delivered through the system interface.

Push Notifications – Alerts sent to students' devices through the system to notify them about their queue status or when it is almost their turn for service.

System Analysis – The phase of the Software Development Life Cycle (SDLC) where the system's requirements are gathered, analyzed, and documented to define how the queue management system should function.

Web-Based Application – A software application that runs on a web browser, allowing students and staff to access the queue management system without requiring any specialized software installation on their devices.

Chapter 3

RESEARCH METHODOLOGY

This chapter deals with the different methods used in conducting the research study and design of the system. Including the tools used for the user to see the flow of the proposed system. Also, this chapter discusses the accurate findings in attaining reliable and detailed resources. It also includes the project design, project development, operation, testing procedure, and evaluation procedure.

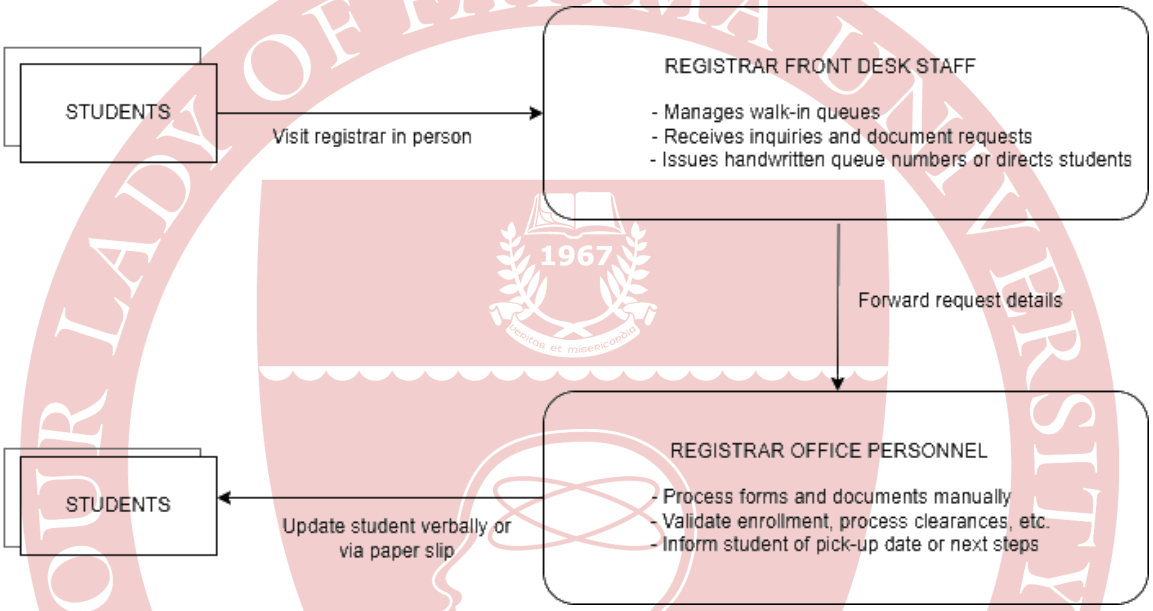
Project Design

The project design represents the different diagrams and processes that can be used in developing the project; system/program flowchart and/or context diagram. Whenever applicable, the schematic and/or data flow diagrams are also included to easily understand how the flow of data is being measured by the proponents. These different diagrams are provided with descriptions that serve as a help to understand the flow of the system development. With these diagrams, the different flows of the processes that are being conducted during the study are included and expressed.

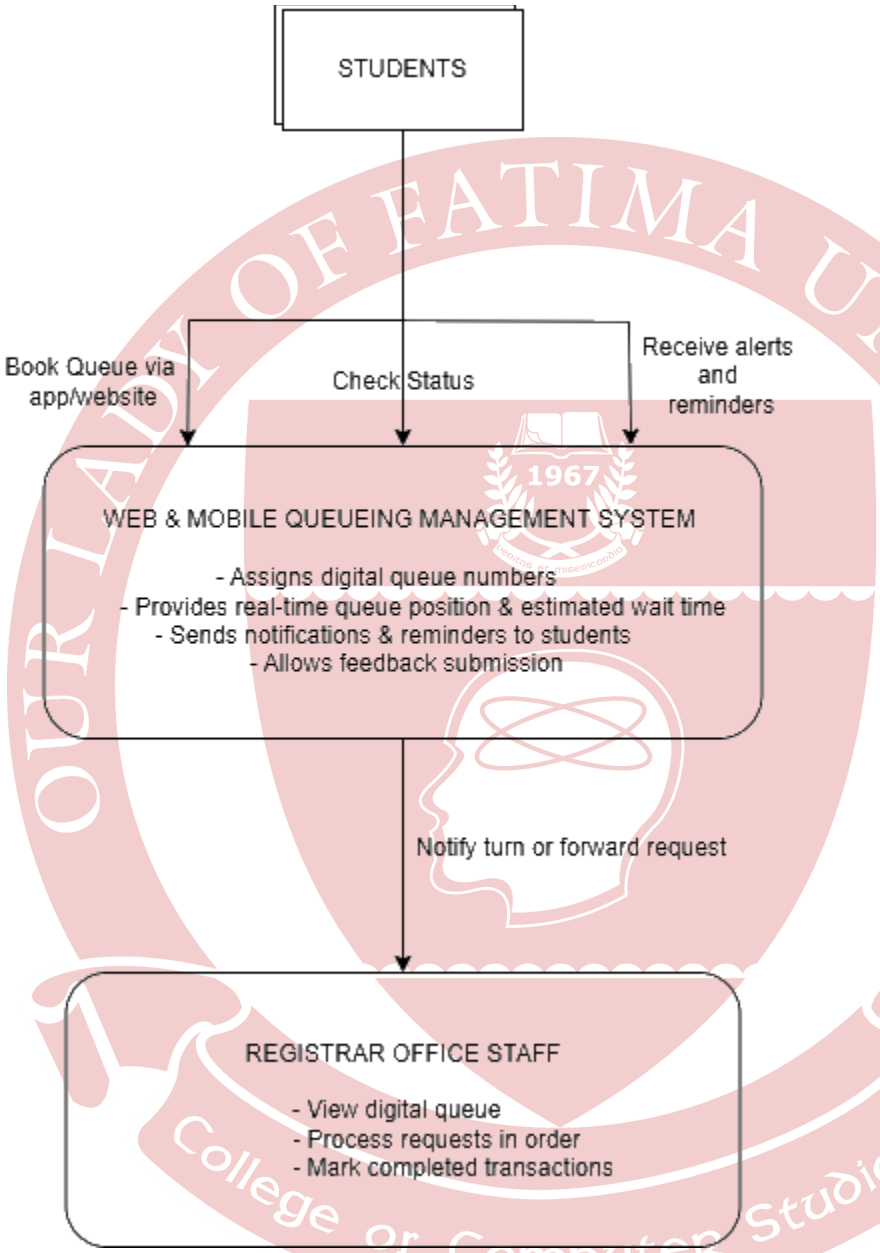
Context Diagram

The context diagram illustrates the boundaries and external entities interacting with the system. It helps to understand the flow of data and the relationship between users and the system being analyzed or developed. This section includes two diagrams: the existing

manual system currently in use by the Our Lady of Fatima University Antipolo Registrar's Office and the proposed Web and Mobile-Based Queueing Management System designed to improve service efficiency and student experience.



The **existing context diagram** shows a manual process that requires students to physically visit the registrar's office to request services. The registrar front desk staff manage queues by assigning numbers or guiding students directly. All transactions are handled manually by personnel, and students are often required to return for updates. There is no automation or digital queue tracking, resulting in inefficiencies, long wait times, and congestion during peak periods.

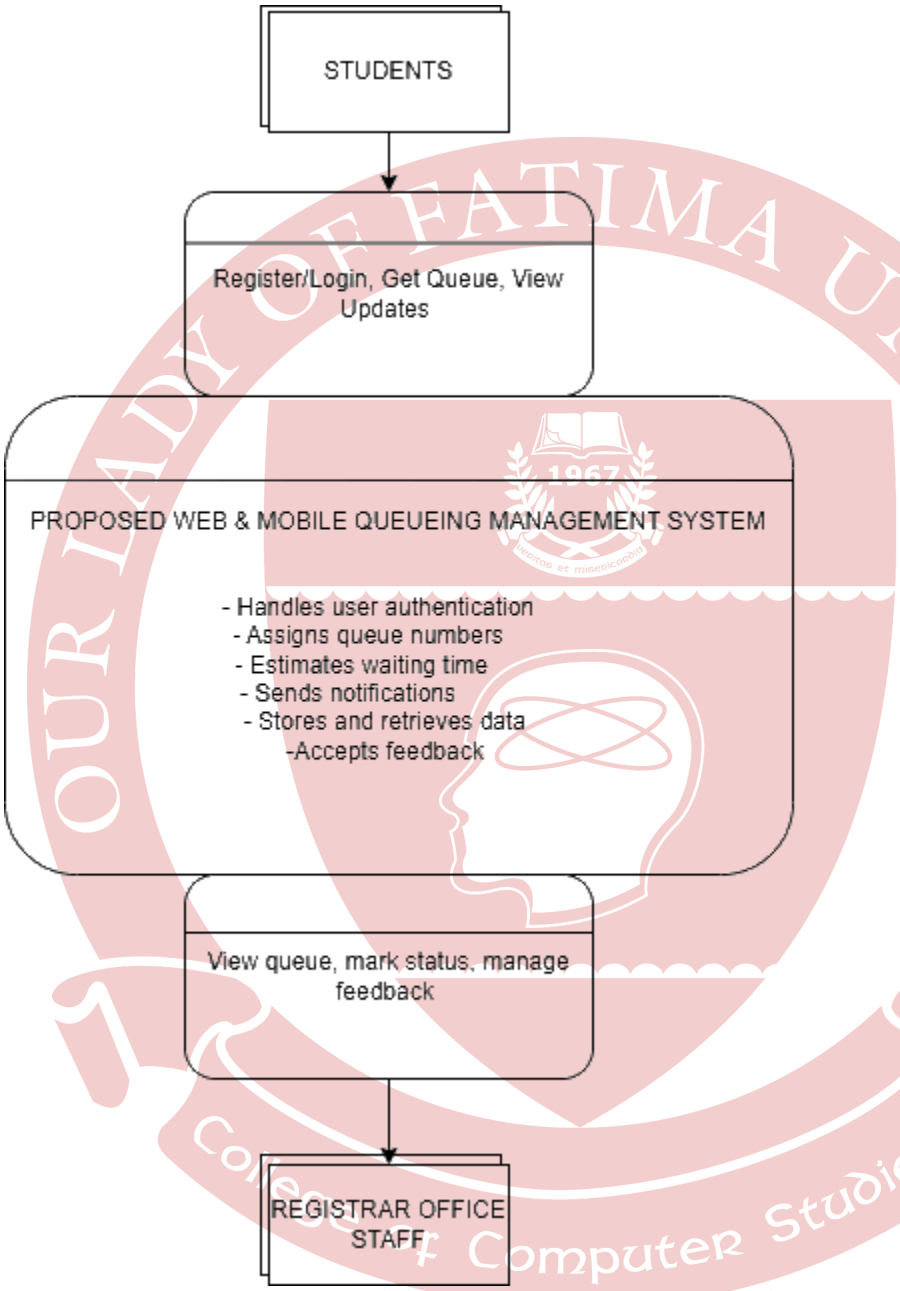


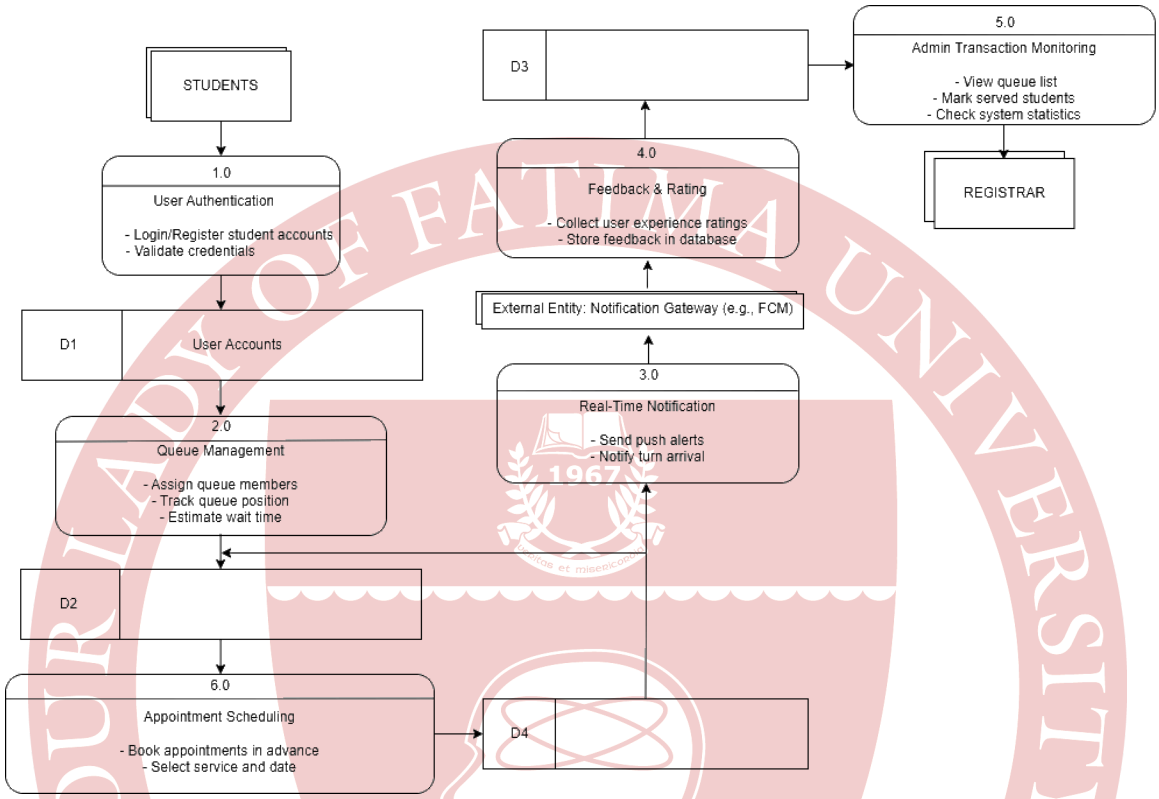
The **proposed context diagram** represents a fully digitized queueing system where students interact via web or mobile platforms. They can book slots remotely, monitor queue status in real time, and receive notifications when their turn is approaching. The

system manages queue logic and sends alerts, reducing the need for physical waiting. Registrar staff use the system to view and serve requests in proper order, improving operational efficiency and transparency. This enhances user experience, reduces congestion, and streamlines transaction management.

Data Flow Diagram

The Data Flow Diagram (DFD) provides a graphical representation of the flow of data through the proposed Web and Mobile-Based Queueing Management System for the Registrar's Office of Our Lady of Fatima University Antipolo. It helps identify the processes, data stores, and external entities that interact with the system. The DFD clarifies how data moves from input (students and staff) to output (notifications, queue status, feedback), emphasizing how the system manages transactions and real-time updates.


STUDENTS
Register/Login, Get Queue, View Updates
PROPOSED WEB & MOBILE QUEUEING MANAGEMENT SYSTEM
- Handles user authentication
- Assigns queue numbers
- Estimates waiting time
- Sends notifications
- Stores and retrieves data
-Accepts feedback
View queue, mark status, manage feedback
REGISTRAR OFFICE STAFF



The **context-level DFD** (Level 0) highlights two main external entities: the *Students* and *Registrar Office Staff*, who interact with the central system. Students register, get queue numbers, check status, and submit feedback, while registrar staff manage queues and process service requests.

The **Level 1 DFD** decomposes the system into five main processes:

1. **User Authentication** – Validates and manages user accounts.

2. **Queue Management** – Assigns queue numbers and estimates wait time.

3. **Real-Time Notification** – Sends alerts to students when their turn is near.

4. **Feedback & Rating** – Collects post-service ratings for evaluation.

5. **Admin Transaction Monitoring** – Allows staff to view/manage queues and mark transactions as complete.

The data moves through these processes, supporting a fully digital and efficient queueing system that reduces manual tasks and improves service delivery.

System Flowchart

The system flowchart is a chart that shows the graphical and sequential representation of the steps which are involved in a systematic process of the system. The

charts consist of different symbols. These symbols are interrelated with each other, and it shows how the system process starts and how it ends. The flowcharts also show what decisions are made in the system and how decisions should be handled. A flowchart uses circles as the start of each flow, and it is also used to connect flowcharts that are separated from each other. An oval is used to start and end the process of the flowchart itself. Arrows are used to connect the process and other entities used in the flowchart. A parallelogram is used to show what the users' input and output are in the system process. Squares are used to show the process that certain inputs or outputs will undergo in the system. A diamond symbol is used when a user or system will undergo decisions.

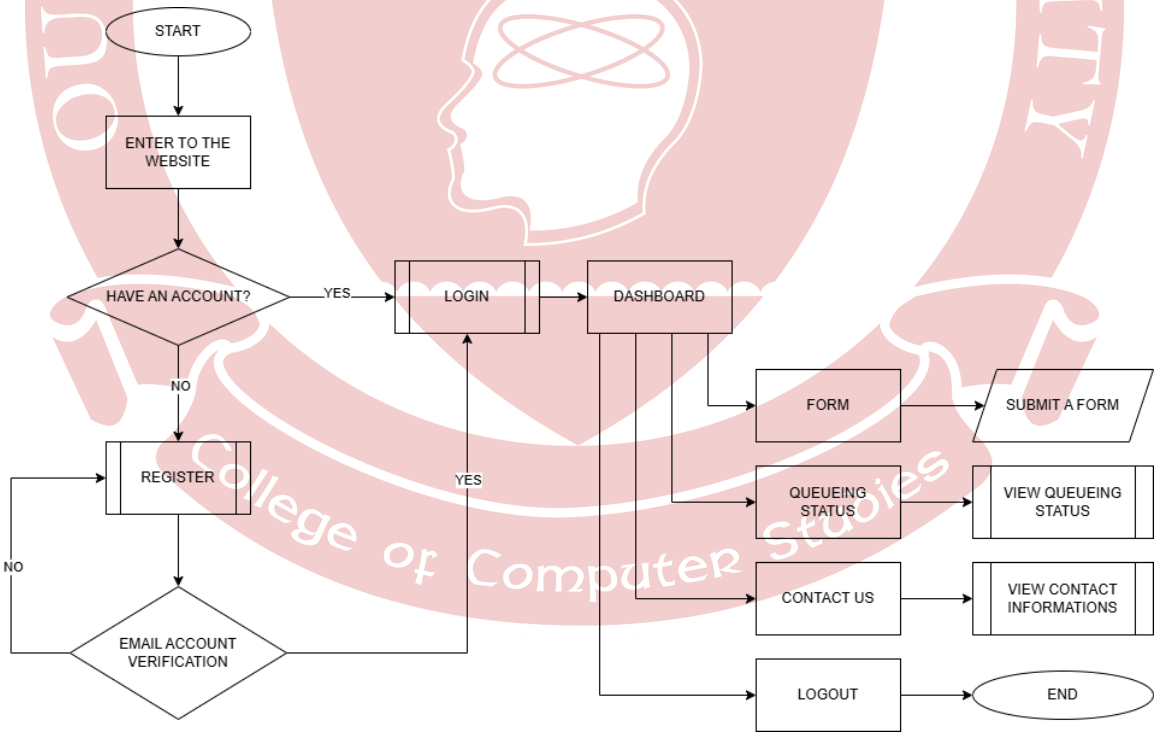


***Figure* #. System Flowchart of the Proposed System (User)**

Based on the figure above, it represents the flow of the entire process of the website for users which is composed of different symbols (start and end, data, decision, and process) as well as the description of every process.

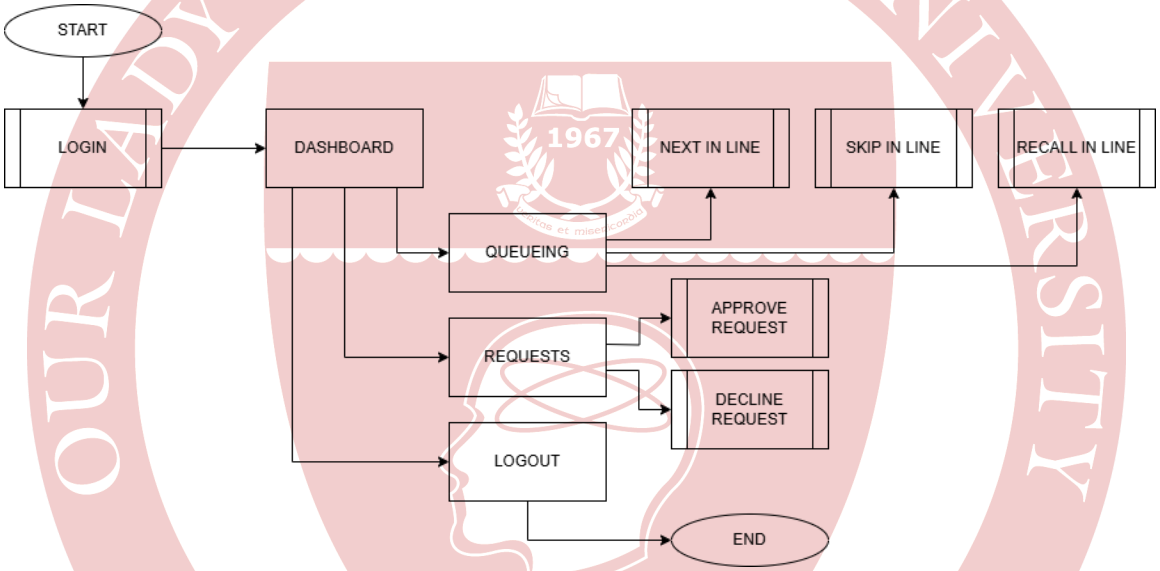


***Figure* #. System Flowchart of the Proposed System (Staff)**

Based on the figure above, it represents the flow of the entire process of the website for the staff which is composed of different symbols (start and end, data, decision, and process) as well as the description of every process.

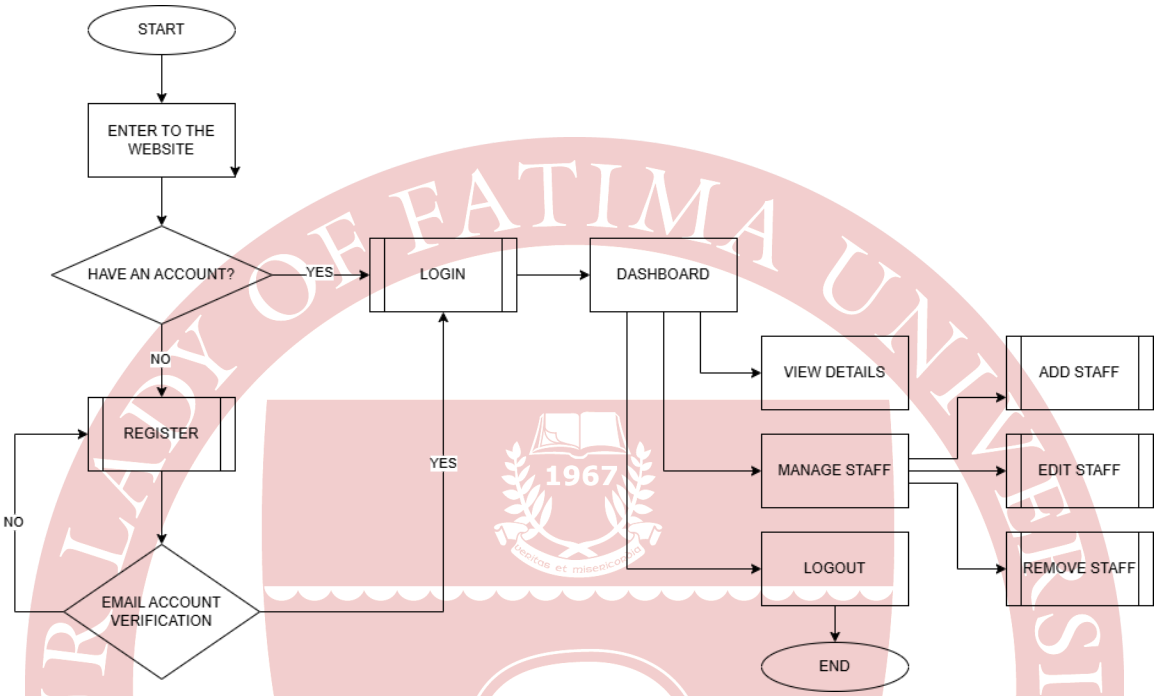


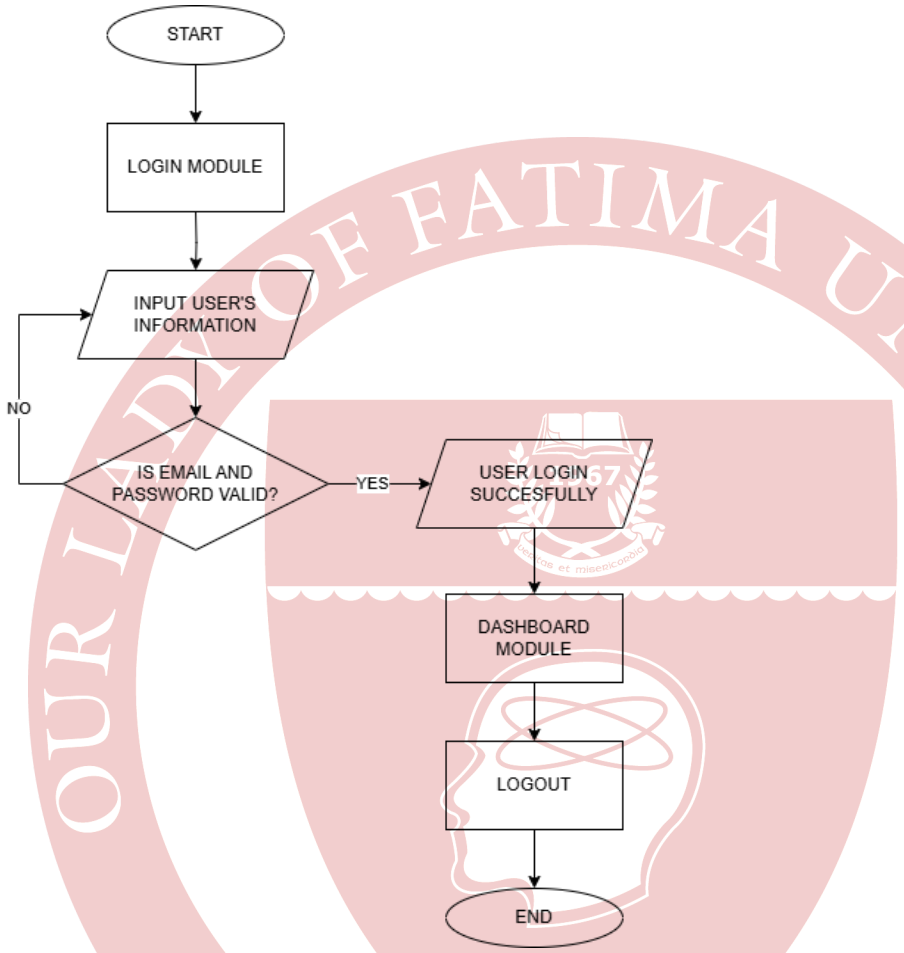
Figure #. **System Flowchart of the Proposed System (Admin)**

Based on the figure above, it represents the flow of the entire process of the website for admins which is composed of different symbols (start and end, data, decision, and process) as well as the description of every process.

Program Flowchart

According to (Lynch, 2021) The program flowchart is a data flow that shows the data flow while writing a program or algorithm. It allows the user to explain the process when collaborating with others. These programming flowcharts also analyze the logic behind the program to process the code of the programming. With the use of program flowcharts, it manifests the improvements within the condition and efficiency of work. The tool or components of program flowchart consists of four basic symbols used as a

reference of a programmer on how to create the flow of the program. These symbols are composed of start, process, decision, and end, and these symbols are the crucial part of the programming flowcharts. With this, it can be used as an aid in forming a relationship between various elements to clearly describe how certain data flows.



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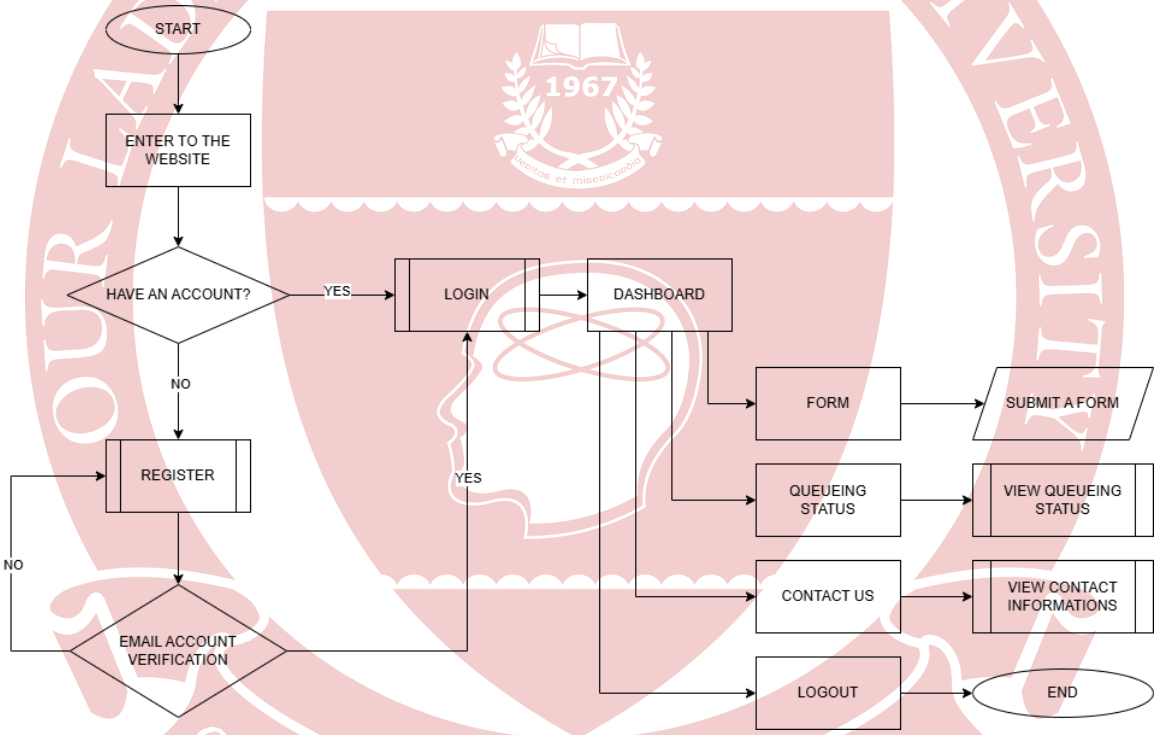

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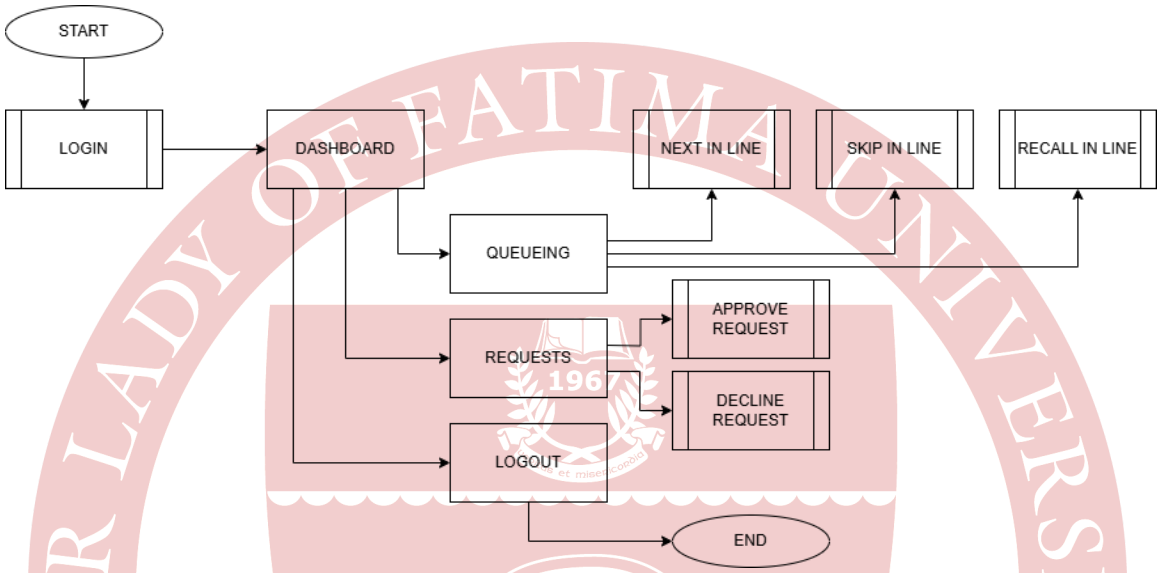
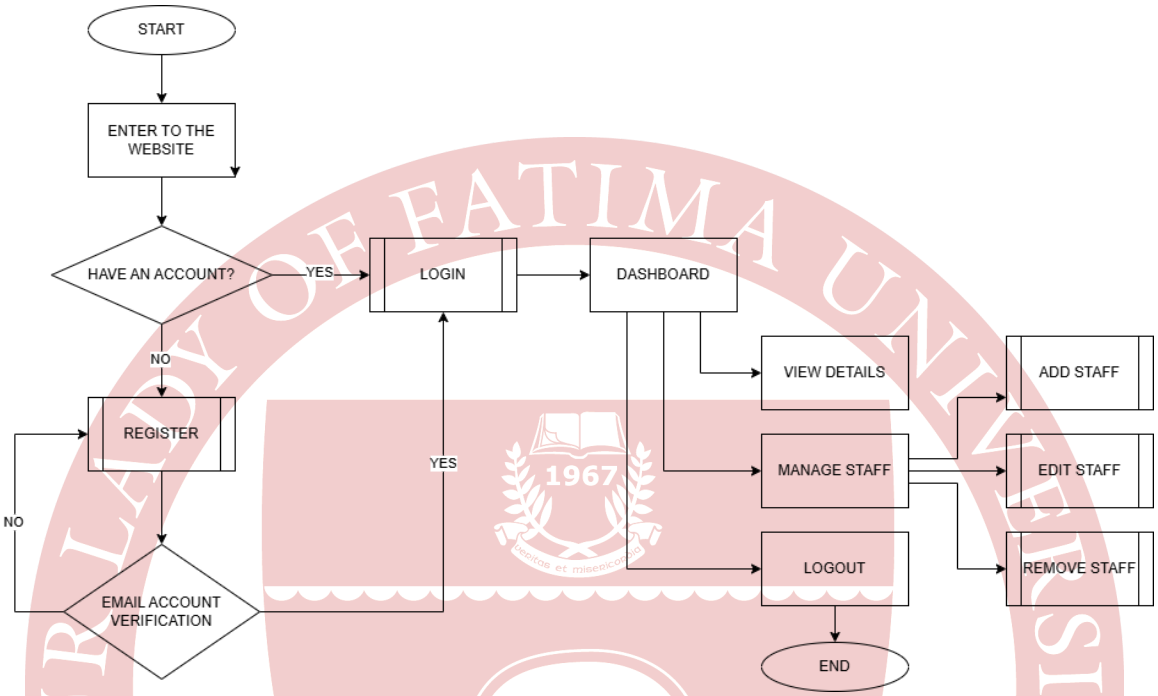


Figure #. **System Flowchart of the Proposed System (Staff)**

Based on the figure above, it represents the flow of the entire process of the website for the staff which is composed of different symbols (start and end, data, decision, and process) as well as the description of every process.



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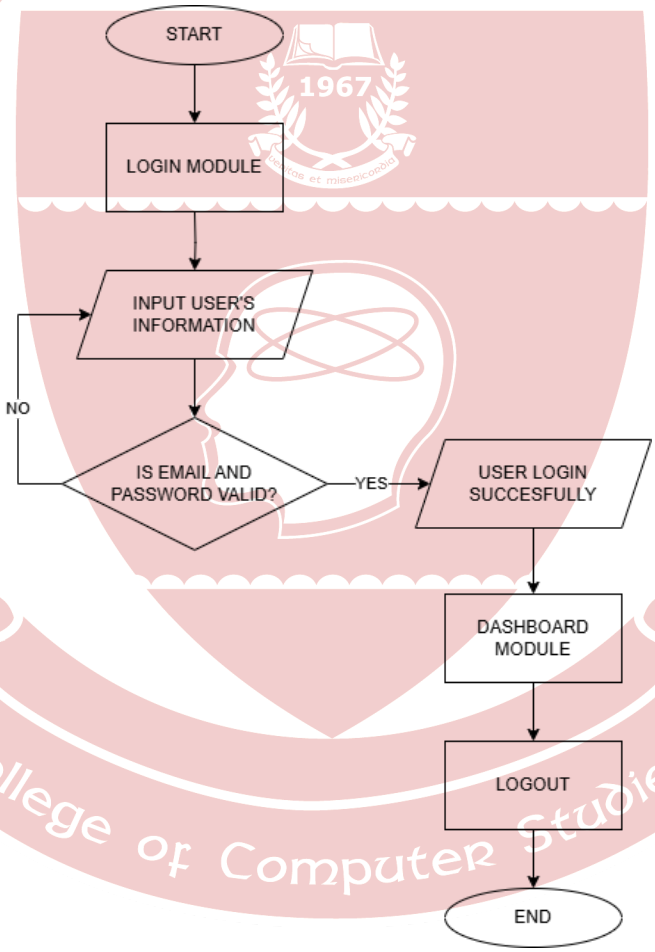


Figure #. **Program Flowchart: Login (User)**

The figure above represents the program flowchart of the login module for users, and it shows how the login process works.

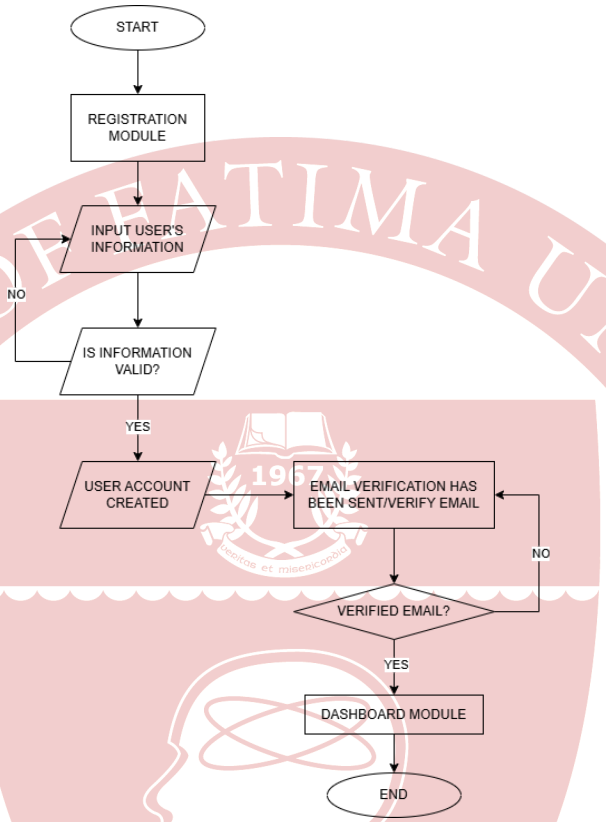


Figure #. **Program Flowchart: Registration (User)**

The figure above represents the program flowchart of the registration module for users where it shows how to create and how to register a new account. One of the unique processes included in the system is the email verification of the new account created by the user. Without email verification, users cannot create a new account. This process is additional for security purposes.

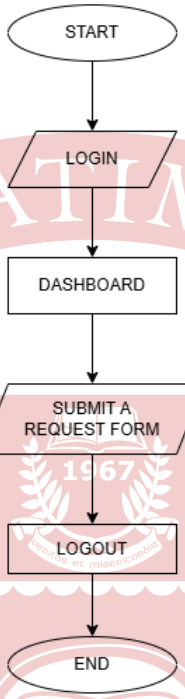


Figure #. **Program Flowchart: Request Form (User)**

The figure above depicts the program flowchart of the submission of the request form, which shows what information the users need to input; the user has eight categories to fill out: first name, last name, student number, section, last school year attended, last semester attended, documents for request, and notes/other concerns which is optional; these informations will be needed for the approval of their request, and it will be automatically sent to the staff once the form is submitted.

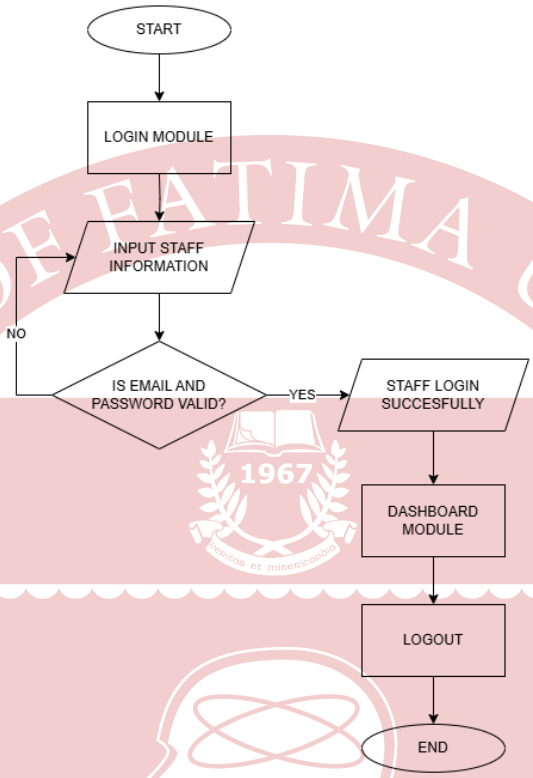


Figure #. **Program Flowchart: Login (Staff)**

The figure above represents the program flowchart of the login module for staff, and it shows how the login process works.

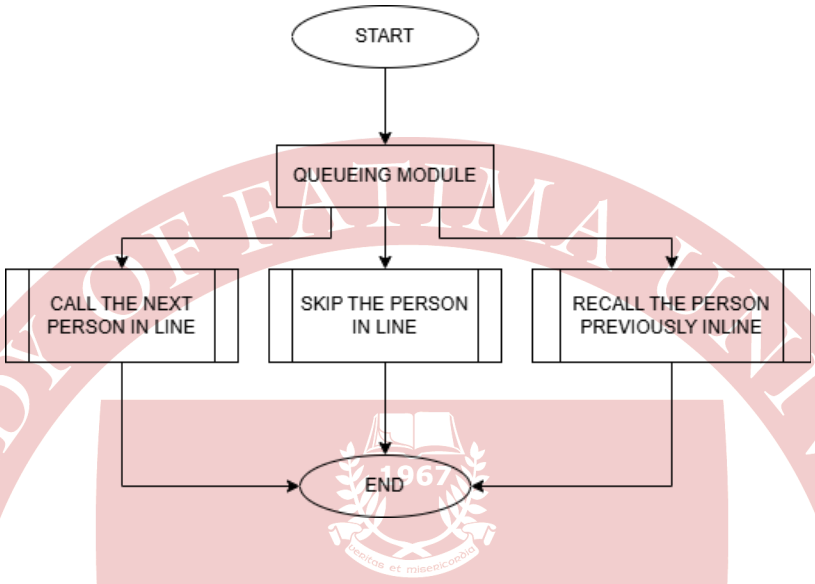


Figure #. **Program Flowchart: Queueing Module (Staff)**

The figure above represents the program flowchart of the queueing module of the staff, and it shows how the queueing process works.

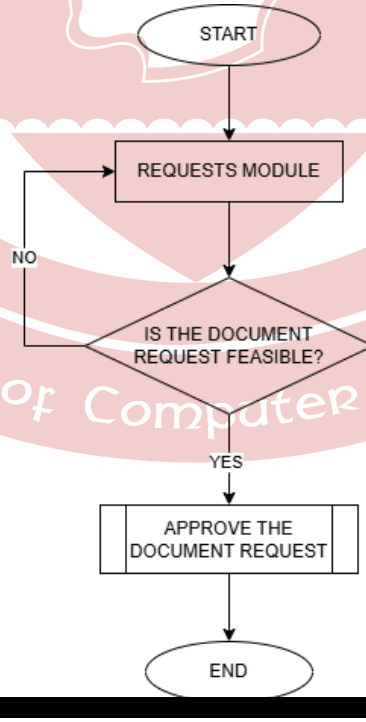


Figure #. **Program Flowchart: Requests Module (Staff)**

The figure above represents the program flowchart of the requests module of the staff, and it shows how the approval and rejection of the document requests process works.

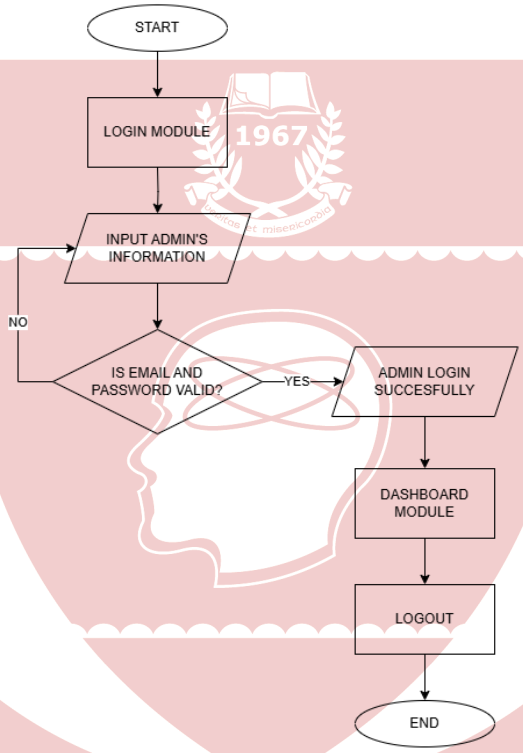
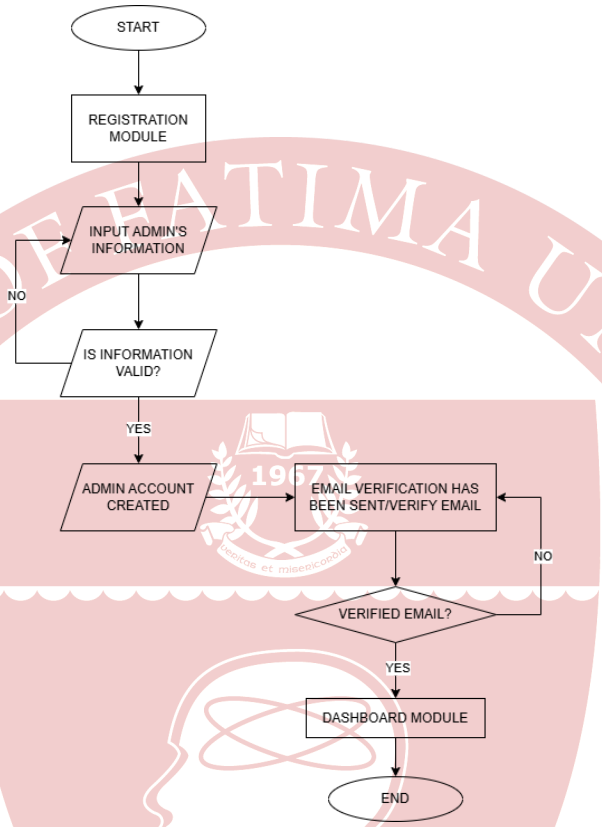


Figure #. **Program Flowchart: Login (Admin)**

The figure above represents the program flowchart of the login module for admins, and it shows how the login process works.



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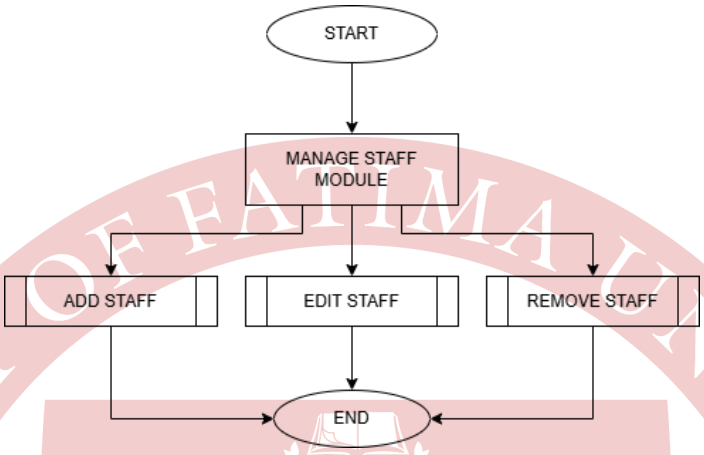


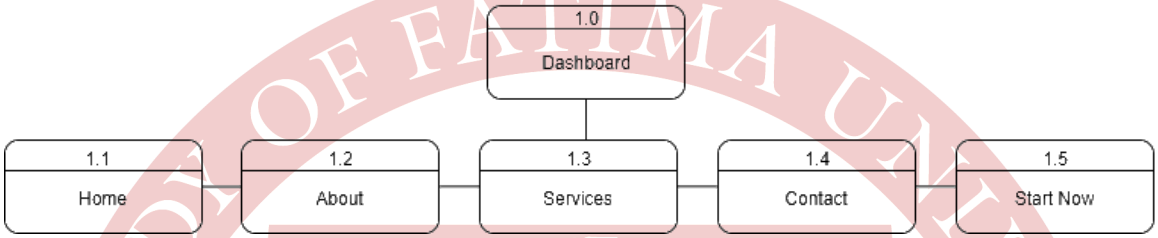
Figure #. **Program Flowchart: Manage Staff Module (Admin)**

The figure above depicts the program flowchart of the management of staff, which shows what information the admin needs to input; the admin has four categories to fill out: first name, last name, email, and password; these informations will be needed for the account creation of the staff. The admin can also edit the staff information and remove/delete a staff account.

Visual Table of Contents

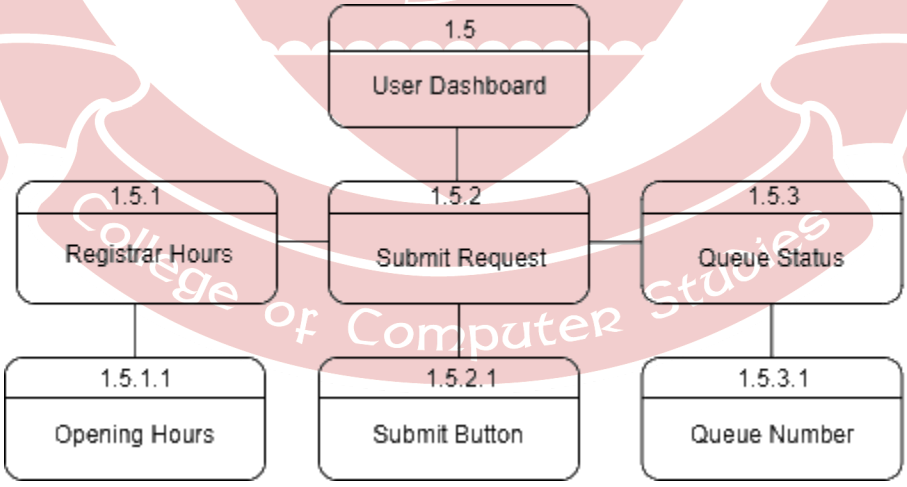
The diagram above illustrates the **Visual Table of Contents (VTOC)**, a feature that displays dynamic, clickable tiles based on the course material. This hierarchical structure helps users navigate through various sections of the system, offering a clear overview of its modules and their relationships. The VTOC enhances the user experience

the progression of the system or course material. It serves as a guide to help users explore the system's structure and identify the key components within.



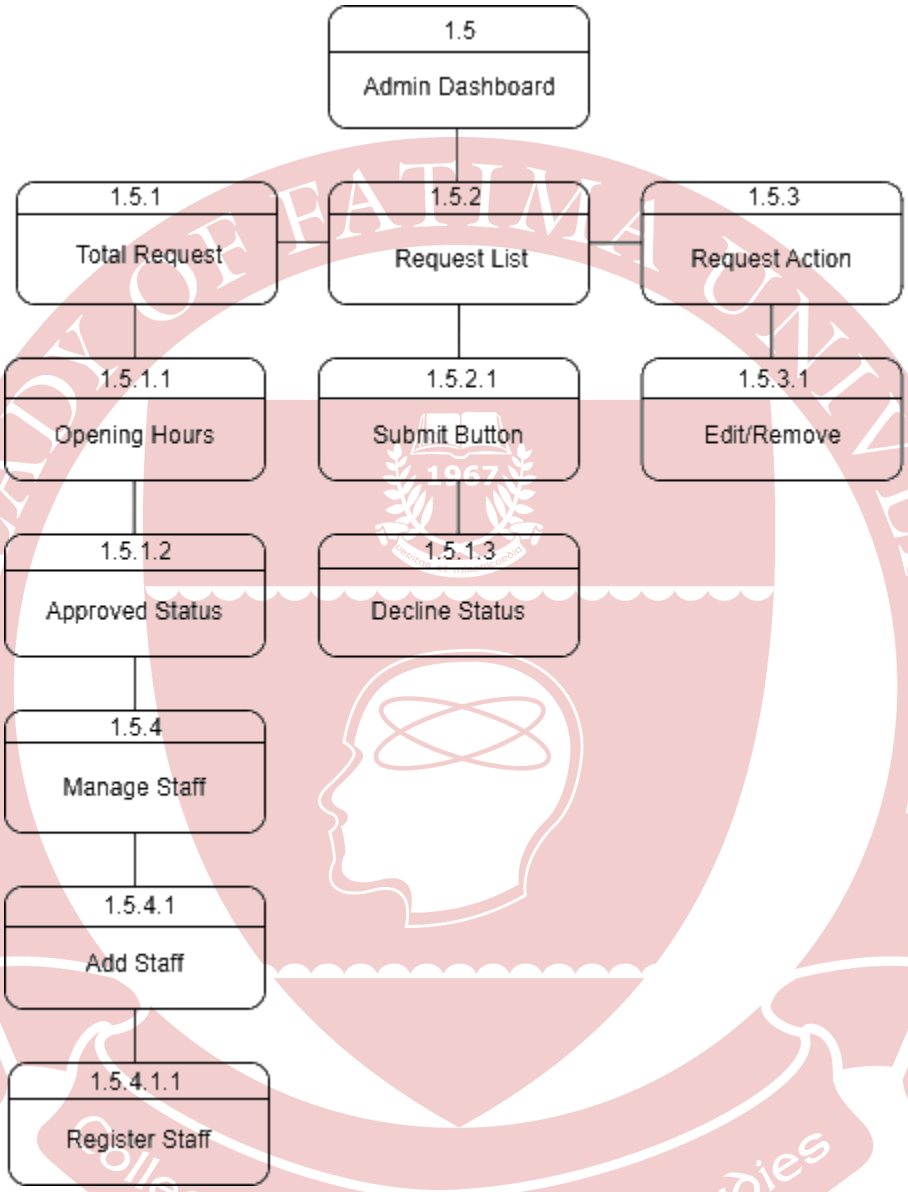
Dashboard Module

The diagram above shows the **Dashboard Module**, which serves as the main landing page for users. It presents key sections and functionalities, allowing users to easily navigate through the system. The dashboard typically includes various modules that give users quick access to important information and actions within the system, offering an overview of its features and processes.



User Dashboard Module

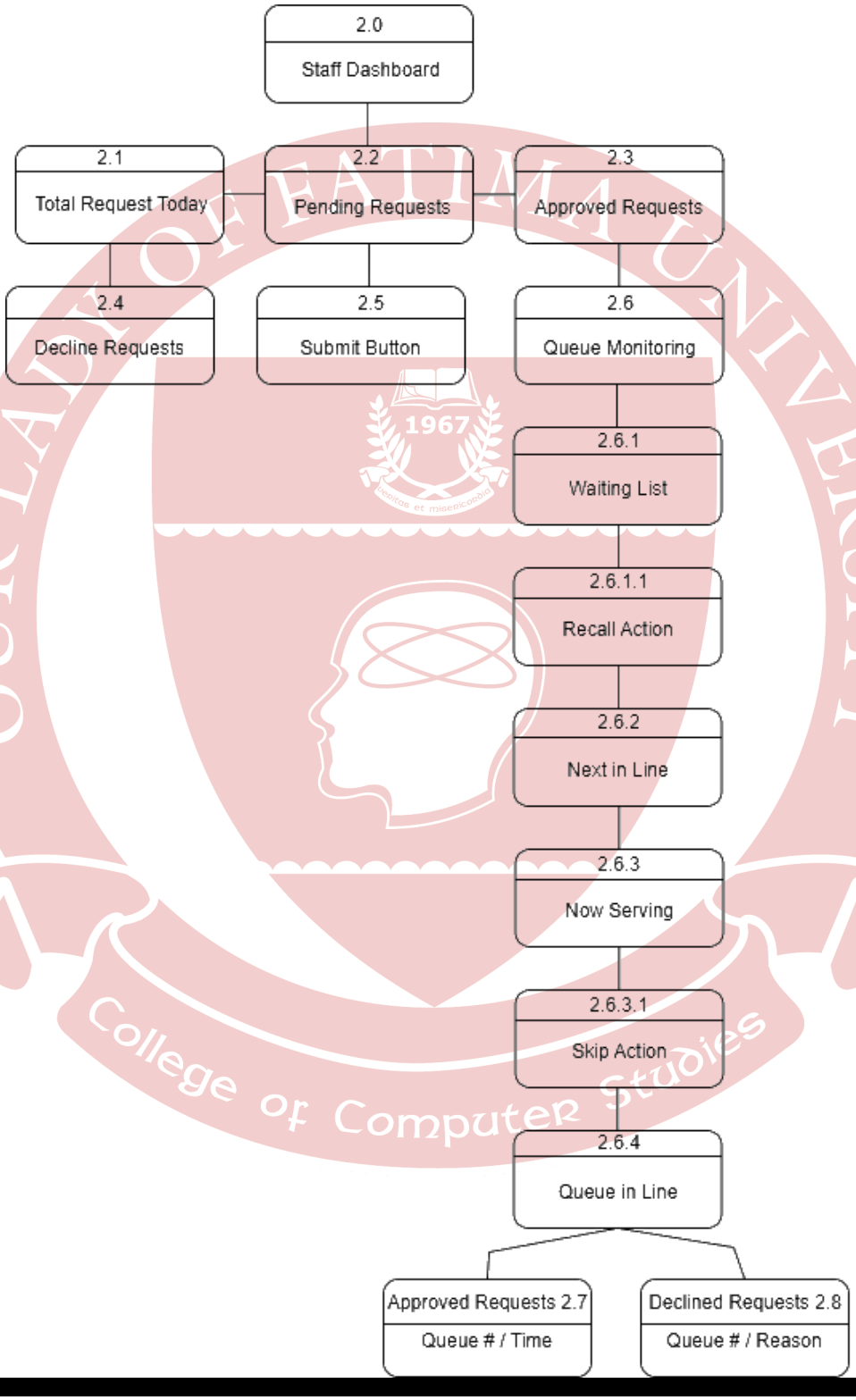
The diagram above presents the **User Dashboard Module**, which serves as the main interface for users to interact with the system. This module provides users with essential information and tools, such as displaying registrar hours, submitting requests, and showing queue status. Users can view the registrar's current status (open or closed), see the opening and closing hours, and submit their requests via a simple form. After submitting the request, users can check their queue number and estimated wait time. Additionally, there's an option to contact the support team for further assistance. This module aims to enhance the user experience by making it easy for users to access key information, submit requests, and monitor their status in the queue, all from one centralized dashboard.



Admin Dashboard Module

The diagram above presents the **Admin Dashboard Module**, which allows administrators to monitor and manage user requests and staff accounts efficiently. It provides a summarized view of request statuses such as total, pending, approved, and

declined, giving the admin quick insights into the system's current workload. The request list displays all user submissions with corresponding statuses and an option to view details. This module also includes a staff management section where admins can add, edit, or remove staff members. The functionalities provided in this module are essential for maintaining oversight and ensuring smooth administrative operations within the system.


2.0
Staff Dashboard
2.1
Total Request Today
2.2
Pending Requests
2.3
Approved Requests
2.4
Decline Requests
2.5
Submit Button
2.6
Queue Monitoring
2.6.1
Waiting List
2.6.1.1
Recall Action
2.6.2
Next in Line
2.6.3
Now Serving
2.6.3.1
Skip Action
2.6.4
Queue in Line
Approved Requests 2.7
Queue # / Time
Declined Requests 2.8
Queue # / Reason

Staff Dashboard Module

The diagram above presents the **Staff Dashboard Module**, which equips staff members with tools to monitor and manage queue activity and client requests. It displays real-time data such as the number of requests categorized by status (e.g., pending, approved, declined, completed) and the total requests for the day. The queue monitoring section allows staff to view clients currently in line, recall queue numbers, skip, or serve the next in line. Additionally, the dashboard lists approved and declined requests, providing staff with essential details such as estimated waiting time or reasons for decline. This module enhances operational efficiency by centralizing the queue and request handling in one interface.

Hierarchical Input Process Output

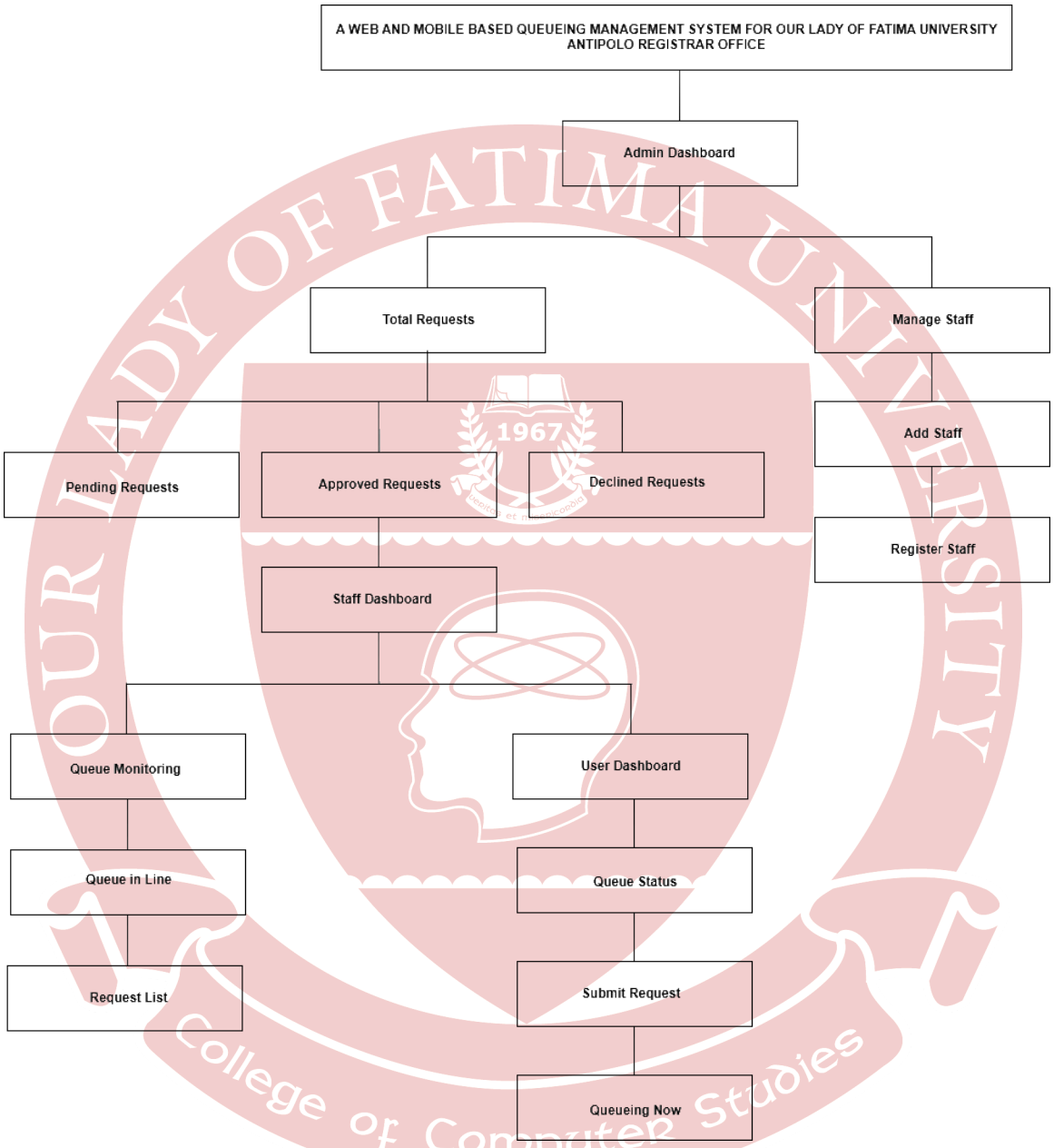
The **Hierarchical-Input-Process-Output (HIPO)** model is a system analysis, design, and documentation methodology used to describe and organize the components of a system hierarchically. This model is particularly effective for breaking down large, complex systems into smaller, more manageable parts. It allows for clear representation and understanding of how data flows through the system, how it is processed, and what outputs or results are produced.

In the **HIPO** model, the system is divided into three major components:

Input: This represents the data or information that enters the system. It includes user input, system-generated data, or external data sources that the system needs to process.

Process: The process refers to the activities or operations that occur within the system. These operations take the input data, manipulate it, and transform it into useful information or actions. This can include tasks such as calculating, storing, updating records, and more.

Output: The output is the result produced by the system after processing the input data. It could be in the form of reports, updated statuses, alerts, or visual feedback displayed to the user.



The figure above illustrates the **Hierarchical Input Process Output (HIPO)** model of the **Web and Mobile-Based Queueing Management System for Our Lady of Fatima University Antipolo Registrar Office**. This system is designed to manage the queueing

process for the Registrar's Office efficiently, providing both staff and students with an easy-to-use interface for managing and tracking requests.

At the top level of the hierarchy is the **Admin Dashboard**, where the administrative staff can monitor and control the entire queue management process. The admin has access to the **Total Requests** section, which provides an overview of all requests, as well as specific details on **Pending Requests**, **Approved Requests**, and **Declined Requests**. The admin can also manage the **Staff Dashboard**, which allows them to assign and manage staff involved in the system. The **Add Staff** feature enables the admin to register new staff members who will participate in processing the requests. This section also includes a **Register Staff** option, where the admin can input details for new staff members and configure their roles.

The **Staff Dashboard** enables the registrar staff to monitor the queue and handle student requests. Staff members can view **Pending Requests**, **Approved Requests**, and **Declined Requests**, providing real-time updates on the status of each request. The staff can take action on the requests, either approving or declining them, based on the student's needs.

For students, the **User Dashboard** serves as their entry point into the queueing system. Students can view their **Queue Status**, submit requests, and track their position in the queue. The system provides a **Submit Request** feature, allowing students to input their data and submit requests for services from the Registrar's Office. As their requests are

processed, students can monitor the progress of their requests, ensuring they are always aware of their status in the queue.

The system's **Queue Management Process** ensures that all requests are processed efficiently, with each request reviewed and queued in real-time. The **Queueing Now** feature ensures that students are always updated on their position, and the staff can manage the queue seamlessly.

In summary, the **Web and Mobile-Based Queueing Management System for the Our Lady of Fatima University Antipolo Registrar Office** offers a streamlined, user-friendly approach to managing student requests and queue management. With its hierarchical structure, the system enables effective management of requests by both staff and students, ensuring smooth operation and improved service delivery within the Registrar's Office.

Project Development

This section covered the comprehensive techniques used in constructing the proposed study. Moreover, different components of the chosen methodology are being defined to understand the detailed processes of the study. In developing the proponents' proposed study, different components and methods are involved in identifying and solving the research problem. One of the methods and/or components used by the proponents of this study is the System Development Life Cycle wherein this methodology has different

kinds. Primarily the proponents of this study use the Agile Model as part of the methodology used in conducting the study. Conforming to (Biltawi et al., 2017), Agile methodologies is an iterative, lightweight, and lean software design and development methodology that was being introduced in the late 1990s. This methodology was being used to be highly compatible with the rapid development of the WWW (World Wide Web). Moreover, this kind of method is based on iterative enhancement which focuses on the ability to continuously adapt and make improvements to the way work should be managed based on each iteration process. Also, agile methodology creates values and principles that would be beneficial in deciding and planning on the things that may be encountered during the process of conducting the study.

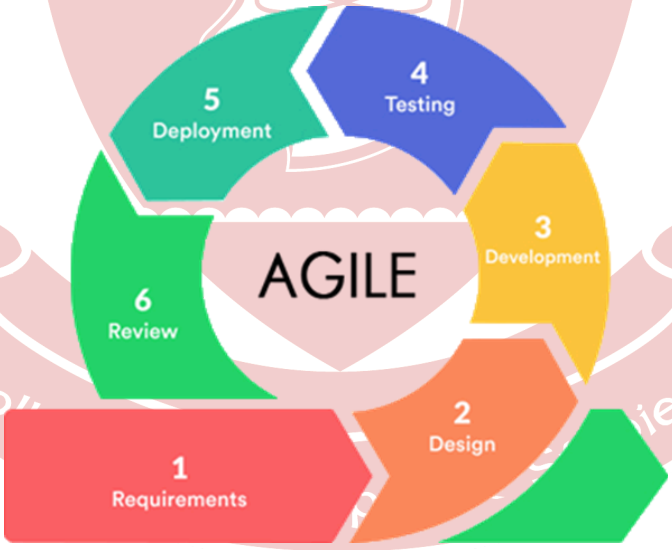


Figure #. **Agile Methodology (Pawar, 2019)**

The figure above depicts the research approach employed by the study's developers. The Agile Model is a six-phase process that includes requirements, design, development, testing, deployment, and review.

Requirements. This phase focuses on assessing the extent of the problem and the solution that will be required throughout the study. It also specifies the study's resources, costs, timeline, and benefits. This phase should begin with the collection of project requirements and the identification of system requirements in order to examine and analyze a firm's core demands: this is done through interviews or one-on-one engagement with the business. Furthermore, it entails understanding system needs through continuous contact between the client and the analyst. It is also a phase in which the study's proponents analyze the functional requirements of the project or a solution for a project, during which a system analysis is performed - or it is a method of examining the demands of the end user to guarantee that the system can meet expectations.

Design. This phase defines the specifications, features, and operations required to satisfy the functional requirements of the proposed system. The design process begins with architectural design, which includes (Data Flow Diagrams, System & Program Flowcharts, Hierarchical Input-Output Charts), logical design of modules, (System Storyboarding and Prototyping), physical product design, and final system design.

Development. This phase marks the end of the first stage of the procedure. Furthermore, this period marks the beginning of production.

Testing. This is the phase in which the programs and processes are integrated into the system and tested. Typically, a Quality Assurance specialist determines if the proposed design fits the functional requirements and business goals.

Deployment. This is the stage at which end users may utilize the system to run the business. It is also a location where users may test and review software, offer comments, and suggest new features and requirements for the software system. One of the primary goals of this phase is to enhance the capabilities of the software system designed to meet the objectives of the end user.

Review. This is the phase in which the system analysts, programmers, and development team add an extra feature to the planned system in response to user requests. This phase is mostly utilized to bring upgrades and further adjustments to the system that is being constructed. .

Data Gathering Procedures

To ensure the relevance and effectiveness of the proposed system, the researchers employed systematic data gathering procedures to understand the current processes and challenges faced by the registrar's office of Our Lady of Fatima University – Antipolo. These procedures aimed to collect qualitative and quantitative data from key stakeholders, including students and registrar staff, who are directly involved in or affected by the queuing process.

The data gathering process began with **preliminary observations** conducted within the registrar's office. The researchers observed the queuing behavior, service handling, and overall efficiency of the existing manual queuing process. This allowed the team to identify visible bottlenecks, such as long wait times, lack of real-time updates, and overcrowding during peak hours.

Following the observations, **semi-structured interviews** were conducted with registrar personnel to gain insight into the workflow, challenges in queue management, and their openness to adopting a digital solution. These interviews helped the researchers understand the specific administrative requirements for a system that could improve queue monitoring and service distribution.

In addition to staff input, **survey questionnaires** were distributed to a sample group of students. The survey aimed to assess student experiences with the existing queuing process and their level of interest in a mobile-based queuing system. Questions focused on their satisfaction, waiting time, convenience, and technological preferences. The data gathered from the surveys provided valuable feedback on user expectations and guided the design of system features such as queue registration, notification alerts, and estimated waiting time displays.

Lastly, the researchers engaged in **informal consultations** with IT personnel of the institution to ensure that the proposed system would comply with technical standards and data privacy protocols. These discussions were instrumental in identifying system integration points and ensuring a smooth deployment of both web and mobile platforms.

By combining multiple data collection methods—observation, interviews, surveys, and consultations—the researchers were able to gather comprehensive information that informed the development of a user-centered, efficient, and responsive queueing management system tailored to the needs of the Our Lady of Fatima University Antipolo Registrar Office.

Observation

As part of the initial phase of the study, the researchers conducted a series of direct observations within the registrar's office at Our Lady of Fatima University Antipolo. The purpose of this observation was to gain firsthand insight into the existing queuing process, identify recurring issues, and understand the day-to-day challenges encountered by both students and staff.

During the observation, it was noted that the current queuing system was primarily manual, relying on students lining up physically to access services such as document requests, enrollment assistance, and academic records processing. This often resulted in long lines, congestion in waiting areas, and extended waiting times, especially during peak periods such as enrollment and clearance week.

Additionally, there was a lack of real-time updates regarding queue status, which led to uncertainty and frustration among students. Staff members also faced challenges in managing and organizing the queue, as they had to manually monitor the flow and

address student concerns without the aid of a centralized system. These inefficiencies contributed to delays in service delivery and added pressure on registrar personnel.

The environment was also observed to be stressful for both parties, with students frequently leaving their positions in line to inquire about their turn, further disrupting the flow of service. There was no mechanism in place to notify students about their position in the queue or estimated wait times.

Through these observations, the researchers identified the need for a more systematic, technology-based solution that could streamline the queuing process, improve transparency, and reduce waiting time. The insights gathered served as a critical foundation for the design and development of the proposed web and mobile-based queueing management system.

Survey

As stated by Formplus 2020, Survey research is simply a systematic investigation conducted via a survey. In other words, it is a type of research carried out by administering surveys to respondents. Using surveys as part of the research methodology in collecting different information and data, a survey has proven to be the most effective tool for the reason that it can help a researcher to gather relevant and timely data through the use of a large number of respondents or audience. With these people who will participate in the said event (survey), the data that is being gathered will arrive at a valid

and objective conclusion. But one thing that is needed to consider in conducting this kind of research method is, “survey research must be conducted in the right way in order to have valid results”.

Operation and Testing Procedure

Performance testing is executed to determine how fast a system or sub-system performs under a particular workload. It can also serve to validate and verify other quality attributes of the system, such as scalability, reliability, and resource usage. Load testing is primarily concerned with testing that can continue to operate under a specific load, whether that be large quantities of data or a large number of users. This is generally referred to as software scalability. The related load testing activity when performed as a non-functional activity is often referred to as endurance testing.

Operational Procedure (User)

1. Access the website.
2. Register as a user through the website.
3. Login using the newly created account.
4. Submit a document request.
5. Wait for the approval of the request.
6. Once approved, the queueing number can now be viewed with the estimated time of waiting

Operational Procedure (Staff)

1. Access the website.
2. Login as Staff.
3. View the requests submitted and assess whether the request is feasible or not.
4. Check the queueing line and choose who to call next, skip, and recall in line.

Operational Procedure (Admin)

1. Access the website.
2. Login as Admin.
3. View the list of all requests.
4. Check the staff accounts whether there is information to be added, updated, or removed.

Testing Procedure

The proponents will employ two types of testing. Initially, the system underwent alpha testing, which all system/application functionalities were thoroughly examined to confirm that the requirements were met. In this phase, the proponents assessed the entire system's features to ensure smooth operation and validate its functionality prior to deployment. Subsequently, beta testing was conducted, specifically designed for end users. During this phase, end users followed provided instructions to execute the program.

Evaluation Procedures

The evaluation procedures have been measured with the use of ISO Standards specifically ISO/IEC 25010. This standard describes the quality of a software model that categorizes into six characteristics.