# A PROPOSED OFFERING OF AN ONLINE CLINIC APPOINTMENT AND WALK-IN QUEUE MANAGEMENT SYSTEM FOR TONSUYA SUPER HEALTH CENTER

A Project Proposal Presented to the

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# INTRODUCTION

This study aims to develop an Online Clinic Appointment and Walk-In Queue Management System for Tonsuya Super Health Center to improve patient care and operational efficiency. Many health facilities still rely on manual processes such as paper-based records and physical queues, which often cause delays, errors, and overcrowding. The proposed system seeks to modernize these processes by providing a platform where patients can either schedule appointments in advance or register upon arrival as walk-ins. By digitizing these functions, the clinic will be able to provide a more organized and transparent service. Ultimately, the system addresses common healthcare delivery problems and offers a structured solution for managing patient flow.

The system will feature two main components, which are online appointment booking and walk-in queue management. Patients who book appointments online can select a convenient time, reducing unnecessary trips and ensuring proper scheduling. Walk-in patients will also benefit from a computerized process that generates a queue number and provides an estimated waiting time. This feature helps prevent overcrowding in waiting rooms and reduces confusion among patients. Together, these functions will make the patient experience more convenient, predictable, and efficient.

Aside from patient benefits, the system will significantly reduce the administrative workload of healthcare staff. Tasks such as appointment tracking, queue monitoring, and updating patient status will be handled digitally, minimizing human error and avoiding scheduling conflicts. By simplifying these repetitive duties, staff can focus more on delivering quality care rather than paperwork. The system also ensures that patient data, including medical records and visit histories, are securely stored and accessible only to authorized personnel. This not only strengthens confidentiality but also improves the accuracy and reliability of patient information.

In conclusion, the system plays a vital role in the long-term modernization of Tonsuya Super Health Center. With features such as real-time scheduling, data-based reporting, and digital record-keeping, administrators can manage resources more effectively and prepare for peak patient hours. Shorter waiting times and the removal of manual queuing will improve efficiency while also building patient trust and

satisfaction. Moreover, the system can serve as a foundation for further innovations, including telehealth services and expanded digital healthcare solutions.

# CLIENT INFORMATION

Barangay Tonsuya Super Health Center is a government run healthcare facility in Malabon City. It operates under Mayor Jeannie L. Ng Sandoval, the city's first female mayor, who took office on June 30, 2022. Before becoming mayor, she served as Vice Mayor from 2013 to 2019. Mayor Sandoval holds a Bachelor's degree in Computer Science from De La Salle University and has also led the Philippine Red Cross Malabon Chapter and Genesis Industrial Gases Corporation.

This health center is part of the city's effort to improve local healthcare services. It offers basic medical care like general outpatient consultations, maternal and child health programs, medication dispensing, and simple clinical referrals. In November 2024, Mayor Sandoval introduced the "LAB for All" mobile laboratory van, which has diagnostic tools such as hematology, chemistry, X-ray, ultrasound, and ECG machines. This mobile lab has made it easier for communities like Tonsuya to access lab services.

The health center was also upgraded to Super Health Center status, allowing it to offer more services like laboratory testing, pharmacy services, minor procedures, and 24/7 operations. This upgrade is part of Malabon City Government's wider plan to improve barangay health centers, helping over 154,000 patients across the city.



*Figure 1.Client Information*

## PROJECT SCOPE

This project aims to develop a comprehensive web based Online Clinic Appointment and Walk-in Queue Management System tailored for Tonsuya Super Health Center. The system is designed to optimize patient registration, appointment scheduling, and queue tracking processes whether booked online or registered on site by providing a user-friendly interface and real time data updates. Through this system, the clinic can efficiently manage both online appointments and walk-in patients, reduce waiting times, and improve the overall patient experience.

- Online Appointment Booking: with date and service selection.
- Walk-in Registration Panel: managed by clinic staff.
- Real Time Queue Management System: with visual status flow: Waiting → Serving → Done.
- Queue Number Assignment: with an Emergency Flagging Option for priority handling.
- Clinic Services Directory: listing offered services with brief descriptions.
- Appointment Lookup Feature: using reference number or patient details.
- Appointment Management Panel: (for staff) to view, edit, and delete bookings.
- Secure Login System: for clinic staff and admin.
- Responsive Design: supporting desktops, tablets, and mobile phones.
- Firebase Real Time Database Integration: for real time data sync.
- Cloud Deployment: using Firebase Hosting.
- User Interface (UI) built using TailwindCSS: for a clean, modern, and responsive design.
- Basic Report Generation: module (appointment logs, queue).

**Inclusions:**

- All listed features in the deliverables
- Admin panel for appointment and queue control
- Real time queue status monitoring
- Responsive interface (React.js, HTML, CSS, JavaScript, and TailwindCSS)
- Firebase authentication and database integration

- Hosting setup using Firebase
- Appointment confirmation with auto generated codes
- Basic printable reports (PDF format)

**Exclusions:**

- Integration with SMS or email notification systems (unless added in future scope)
- Payment gateway for paid appointments
- Full fledged Electronic Medical Record (EMR) system
- In depth analytics dashboard

**Assumptions:**

- The clinic has an active internet connection at all times.
- Clinic staff will use the system daily and attend orientation/training.
- Firebase tools and hosting are acceptable deployment platforms.
- The clinic will provide the list of services and staff accounts before deployment.

- No appointment conflicts will occur outside system use (verbal or manual bookings).

**Constraints:**

- System functionality depends on Firebase services; any Firebase outage may impact usage.
- Hosting is limited by the free tier or plan limitations of Firebase unless upgraded.
- Internet connectivity issues may disrupt real time sync.
- The initial version includes only basic reporting and advanced analytics will require a separate module.

# PROJECT APPROACH

To make things faster at Tonsuya Super Health Center, our goal is to build a simple and helpful system where patients can book appointments online or register as walk-ins without the hassle of lining up early. The idea is to make patient flow more organized, reduce waiting times, and help the staff manage things more easily.

We'll work closely with the clinic to understand their needs and make sure the system fits how they really work. Everything from booking appointments to managing queues will be handled through a secure, easy to use platform.

**Methodologies and Frameworks**

Using the Agile approach, we'll build the system step by step instead of doing everything at once. Each time we finish a part, we'll test it right away to spot any issues early and fix them. This helps us keep things running smoothly and avoid bigger problems as we go.

**Advantages**

- Regular updates and testing throughout development
- Continuous involvement of clinic representatives
- Early identification and resolution of issues

**Key activities and milestones**

- Requirement Gathering – Meet with clinic staff to identify user needs and system requirements
- UI/UX Design – Create mockups and wireframes for the booking system and queue dashboard
- Development Phase 1: Appointment Module – Code and test the online booking feature
- Development Phase 2: Walk-In & Queue System – Build real time queue registration and display
- Development Phase 3: Admin Panel – Add tools for managing users, schedules, and reports
- Internal Testing – Run unit testing and fix bugs within each module

- User Testing (UAT) – Let clinic users test the system and provide feedback
- Deployment – Launch the system on a live server
- User Training – Guide staff on how to use the system effectively
- Post launch Support – Monitor the system, fix any issues, and roll out updates if needed

**PROJECT TEAM**

Our team is made up of dedicated and skilled members with different strengths like system analysis, coding, software development, project planning, and data gathering. That's why we're confident we can take on the Online Clinic Appointment and Walk-In Queue Management System for Tonsuya Super Health Center. We're ready to build a system that's reliable, easy to use, and fits what the clinic really needs. Our goal is to make things more organized and help the staff and patients have a smoother experience overall.

**Roldan, John Robert**

Role: Project Leader

Skills & Experience: The project leader previously led the first-year thesis and served as the software Engineer in the second-year project. Skilled in planning, task management, and problem-solving to ensure smooth project execution.

**Esternon, Danielle Joshua**

Role: Software Engineer

Skills & Experience: A proposed Online Clinic Appointment and Walk-In Queue Management System for Tonsuya Super Health Center. The proponent has experience as a team leader and main developer in a first-year thesis and as a software engineer in a second-year project, with strong skills in developing web-based systems and VB.NET applications.

**Honi, Mark Kelly**

Role: System Analyst

Skills & Experience: Took on the role of system analyst in the first-year thesis and data gatherer in the second-year project. Experienced in analyzing workflows and system structures, with strong skills in planning, designing, and ensuring the system meets user needs.

**Junio, Jeric**

Role: Data Gatherer

Skills & Experience: Served as the data gatherer for both the first and second year thesis projects. Skilled in collecting and organizing accurate data, and contributed to creating detailed system designs using tools like PowerPoint to support the planning and development process

**Malpitan, Junmar**

Role: Data Gatherer

Skills & Experience: Served as a data gatherer in both the first and second year thesis projects. Experienced in collecting, organizing, and presenting data to support system planning, and assisted in designing system layouts using PowerPoint for past IT projects.

# PROJECT TIMELINE

The development of the project will follow the standard SDLC phases, with key milestones and deliverables scheduled over the course of several months. Below is the high-level timeline

| Phase | Title | Duration | Key Activities / Deliverables |
|-------|-------|----------|-------------------------------|
| Phase 1 | Brainstorming | Week 1 | Initial idea generation, team discussions, project goal setting |
| Phase 2 | Project Planning | Week 2 | Project proposal, timeline, team roles, tools, and platforms selection |
| Phase 3 | Requirements Gathering | Weeks 3–4 | Gathering user requirements, competitor analysis, related studies |
| Phase 4 | System & UI Design | Week 5 | Wireframes, UI/UX sketches, ER diagrams, data flow diagrams |
| Phase 5 | System Development (Front End) | Weeks 6–8 | User interface coding, system integration, role-based access |

| Phase 6 | Database | Week 9 | Database schema, system architecture, API design |
|---------|----------|--------|---------------------------------------------------|
| Phase 7 | System Development (Back-end) | Weeks 10–12 | Back-end coding, database integration |
| Phase 8 | Testing & Debugging | Week 13 | Unit testing, bug fixing, usability testing, updated build |
| Phase 9 | Deployment | Week 14 | System installation, training users, user manual, admin guide |

*Tabel 1.Project Timeline*

**Dependencies**

- Phase 1: Brainstorming – Foundation for generating project ideas and directions.
- Phase 2: Project Planning – Depends on brainstorming to define scope, roles, tools, and schedules.
- Phase 3: Requirements Gathering – Relies on planning to gather requirements and goals.
- Phase 4: System & UI Design – Depends on Phase 3 to design accurate flows and interfaces.
- Phase 5: System Development (Front-end) – Depends on UI design. UI is built first, but full integration will follow once the back-end is completed in Phase.
- Phase 6: Database – Defines system structure and storage, required before full back-end development.

- Phase 7: System Development (Back-end) – Requires completed and approved design and database.
- Phase 8: Testing & Debugging – Requires a developed system to test all modules and features.
- Phase 9: Deployment – Needs a stable and tested system for installation and training.

**Critical Path**
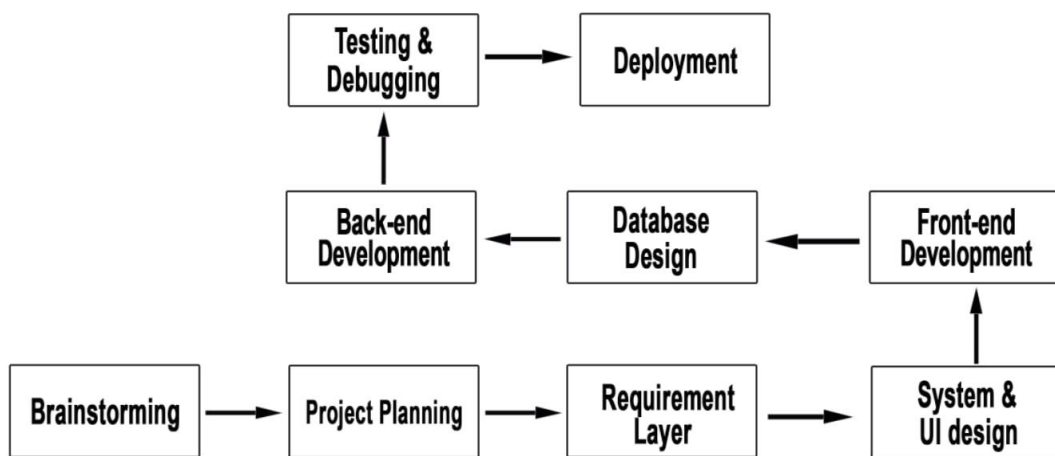


*Figure 2.Critical Path*

- Phase1: Brainstorming – Establishes core ideas and vision for the entire project.
- Phase 2: Project Planning – Outlines scope, roles, and project schedule.
- Phase 3: Requirements Gathering – Identifies user needs and system goals.
- Phase 4: System & UI Design – Creates visual and functional blueprint of the system.
- Phase 5: System Development (Front-end) – Builds the user interface (UI). Integration with the back-end will follow after Phase 7.
- Phase 6: Database – Defines system structure and data storage.
- Phase 7: System Development (Back-end) – Implements system logic and functionalities.
- Phase 8: Testing & Debugging – Ensures system trains users.
- Phase 9: Deployment – Installs the system and quality and fixes errors.

# PROJECT RESOURCES

Hardware Resources

- Client Devices: Desktops, laptops, or tablets for health center staff to access and manage appointments and queues.
- Server: We use Firebase as our server and database. It's cloud-based, reliable, and handles real-time data, user login, and hosting for our system.
- Network Equipment: Routers and modems to ensure stable internet connectivity for both staff and users.
- Printers: For printing queue numbers and appointment summaries.

**Software Resources**

- Languages & Tools: The system is built using React.js along with HTML, CSS, JavaScript, and TailwindCSS.
- Database System: The system uses Firebase to handle patient records, appointments, and queue data.
- Server OS: The system runs on a Windows operating system.

**Human Resources**

- Project Leader: Oversees planning, scheduling, and coordination of tasks.
- Web Developers: Responsible for coding the front-end and back-end functionalities.
- UI/UX Designer: Designs user-friendly interface for both clinic staff and patients.
- Database Administrator: Manages database design and optimization.
- IT Support Staff: Ensures system maintenance and technical assistance post-deployment.
- QA/Testers: Conduct system testing and ensure functionality before deployment.

| Category | Cost | Purpose |
|---|---|---|
| Hardware (PCs, Printer, Scanners, Extra Monitor) | ₱80,000 | To enable clinic staff to manage appointments and walk-in queues efficiently, print documents such as queue numbers or patient records, scan patient information, and use the extra monitor to publicly display the current queue status for patients. |
| Web Hosting (1 year) | ₱10,000 | To host the online appointment and queue management system. |
| Firebase (Database and Hosting) | ₱10,000 | Used as the main database and backend service for storing and syncing real-time data. |
| Developer Fees | ₱100,000 | Compensation for development team |
| Total | ₱200,000 | |

*Table 2. Project Resources*

## RISK MANAGEMENT

This section identifies the potential risks that may arise during the development and deployment of the Online Clinic Appointment and Walk In queue Management System. Each risk is assessed by its priority level, with corresponding mitigation strategies to reduce its impact. Proper risk management ensures smoother project execution and minimizes delays or failures.

### 1. No-Show or Missed Appointments

- Cause: Absence of automated reminders to patients.
- Risk: Clinic staff time is wasted when patients fail to show up, reducing service efficiency.
- Handle: Provide in-system notifications and allow users to easily cancel or reschedule. (SMS or email reminders may be added in a future scope.)

### 2. Unauthorized Access

- Cause: Weak user authentication methods or poorly implemented access controls.
- Risk: Unauthorized individuals may view or alter sensitive patient information.
- Handle: Enforce strong password policies, and implement role-based access controls.

### 3. User Input Errors

- Cause: Lack of proper input validation on forms (e.g., wrong date, time, or email format).
- Risk: Invalid or failed appointments due to incorrect input.
- Handle: Add comprehensive front-end and back-end form validation for all fields, such as date formats, time ranges, and email addresses.

## 4. Privacy and Data Protection Violations

- Cause: Improper handling or storage of personal data (name, email, phone number).
- Risk: Violation of data privacy laws, such as the Data Privacy Act of 2012.
- Handle: Use encryption for data in transit and at rest, restrict data access to authorized users only, and ensure full compliance with data protection regulations.

<h1 style="text-align:center">COMMUNICATION PLAN</h1>

Communication throughout the project will be structured and consistent to ensure that all team members and stakeholders are informed, aligned, and updated on the progress. Effective communication will help in avoiding misunderstandings, identifying issues early, and maintaining project momentum.

## Frequency and Format of Project Meetings

- Weekly Project Meetings – Held every Friday via Google Meet or in person, to discuss progress, challenges, and upcoming tasks.
- Emergency Discussions – Triggered by critical issues, handled via direct call or urgent messaging.

## Communication Tools

- Messenger/Group Chat : For daily coordination and quick updates
- Email: For formal communications, reports, and deliverables
- Google Drive: For file sharing and document collaboration
- Google Docs/Sheets: For collaborative documentation and tracking
- Google Meet (GMeet): Used for online meetings, live presentations, and instant team discussions

| Types of communication | Frequency | Format/Tools Used | Purpose |
|---|---|---|---|
| Weekly Project Meetings | Every Friday | Google Meet or In-person | Discuss progress, challenges, and upcoming tasks |
| Emergency Discussions | As needed (critical issues) | Direct calls or urgent messaging | Quick response to urgent problems |
| Messenger/Group Chat | Daily | Messenger, Viber | Quick coordination and informal |

| | | | updates |
|---|---|---|---|
| Email | As needed | Gmail or other email platforms | Formal communication, sending reports/deliverables |
| Google Drive | Ongoing | Shared Drive folders | File sharing and document storage |
| Google Docs/Sheets | Ongoing | Collaborative editing tools | Real time documentation and progress tracking |

*Table 3. Communication Plan*

# PROJECT GOVERNANCE

The project will use a structured approach with clear decision-making where major changes require Project Leader and Client approval, minor issues are handled by the Team Lead, and critical blockers are escalated to protect timeline and quality.

| Role | Responsibilities |
|---|---|
| Client Representative | Provides project requirements, approves major changes, and receives progress updates. |
| Project Leader | Oversees the entire project, facilitates communication between all stakeholders, ensures deadlines and quality standards are met. |
| System Analyst | Analyzes client requirements, assists in designing system specifications, and ensures alignment with business goals. |
| Data Gatherer | Responsible for collecting accurate and relevant data from various sources, conducting interviews or surveys when needed, and ensuring the integrity of gathered information for analysis and reporting. |
| Software Engineer | Write and test code, implement features based on specifications, and report to the Team Lead. |
| UI/UX Designer | Designs the user interface and ensures a user-friendly experience. |
| Tester | Conducts testing to ensure system functionality and performance. |

*Table 4. Roles and Responsibilities*

# APPENDIX

The appendix provides supplementary materials that support the main content of the study. It contains additional references, research summaries, task distributions, diagrams, and other supporting documents that give readers deeper insights without overcrowding the main sections. These materials are essential for validating the research, showing related works, and presenting detailed data that may be too lengthy for the core chapters.

| Author / Year | Study Title | Findings / Features | Relevance to Study |
|---|---|---|---|
| Batoon & Piad (2023) | Optimizing Vaccine Access: A Web-Based Scheduling System… | Web scheduling system with geotagging and decision support for local clinics. | Shows how scheduling tech improves healthcare at a barangay/clinic level. |
| Safdar et al. (2014) | An Optimized Queue Management System… | DEA-based queue model to manage staffing and reduce wait times without appointment systems. | Demonstrates analytical queue control in walk-in-heavy environments. |
| Capoy et al. (2019) | Web-based Health Monitoring System for Sta. Cruz Health Centers | Integrated modules for patient records, reporting, and monitoring using agile SDLC. | Validates combining scheduling, records, and monitoring |

| | | | —similar to your proposal. |
|---|---|---|---|
| | | | |

*Appendix A.1 Related Research / Studies (RRS)*

**Batoon & Piad (2023)** – Optimizing Vaccine Access: A Web-Based Scheduling System with Geo-Tagging Integration and Decision Support for Local Health Centers. *https://www.scirp.org/journal/paperinformation?paperid=125105*

**Safdar, Emrouznejad & Dey (2014)** – An Optimized Queue Management System to Improve Patient Flow in the Absence of Appointment Systems. *https://pubmed.ncbi.nlm.nih.gov/33179461/*

**Capoy et al. (2019)** – Web-based Health Monitoring System for the Municipality of Sta. Cruz Health Centers. *https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3779341*

| Name | Role | Assigned Task |
|---|---|---|
| Roldan, John Robert | Project Leader | Oversees project timeline, assigns tasks, and ensures coordination among team members |
| Esternon, Danielle Joshua | Software Engineer | Develops front-end and back-end components, handles debugging and deployment |
| Honi, Mark Kelly | System Analyst | Analyzes system requirements, |

| | | prepares documentation, and validates system design |
|---|---|---|
| Junio, Jeric | Data Gatherer | Collects and organizes client/system data for requirements analysis |
| Malapitan, Junmar | Data Gatherer | Collects, verifies, formats, and prepares data for system use |

*Appendix B.1 Group Members' Task Distribution*