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CHAPTER 1

INTRODUCTION

SNC Dental Clinic has always been dedicated to providing excellent dental care for its patients. As more people seek dental services, the need for efficient and organized clinic operations becomes even more important. In today's digital age, many healthcare facilities are turning to technology to help manage their daily tasks. One promising solution is a Web-Based Management Information System, which can help clinics like SNC manage patient records, appointments, and billing more smoothly. Recent studies highlight that these systems not only streamline administrative work but also improve the overall experience for both staff and patients (Wardhana et al., 2024).

Currently, however, SNC Dental Clinic still relies on a manual, paper-based system for handling most of its administrative processes. This means that staff members spend a lot of time searching through physical files, writing down appointments, and manually calculating bills. According to research, this traditional approach is common in smaller clinics but often leads to problems like



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misplaced records, double-booked appointments, and slow service (Applied Information Technology and Computer Science, 2021). These issues can be frustrating for both staff and patients, and they make it harder for the clinic to keep up with growing demands.

One of the biggest challenges with manual systems is the risk of errors and inefficiency. Paper records can easily be lost or damaged, making it difficult to keep patient information up to date. Scheduling appointments by hand can result in accidental overlaps or missed bookings, while handling billing on paper increases the chance of mistakes or lost invoices. These kinds of problems have been widely reported in clinics that haven't yet adopted digital solutions, and they can slow down operations and affect the quality of patient care (Dentalkingsoftware.com, 2024).

These challenges are not just in theory, they're seen every day in clinics like SNC. Staff often have to dig through stacks of files to find patient records, double-check appointment books, and manually total up bills. It's easy for documents to be misfiled or even lost, and sometimes patients miss their appointments simply because there's no automated reminder system in place. This leads to wasted



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time, missed opportunities, and a lot of unnecessary stress for everyone involved (Modi, 2018).

Manual processes, while reliable, may not keep pace with the clinic's expanding patient base or the need for quick, secure data access. By adopting a web-based system, SNC Dental Clinic can streamline tasks like record updates, appointment bookings, and billing, ensuring consistency and freeing up staff time. Research underscores that such systems help clinics operate more smoothly, leading to better patient experiences and staff morale (Wardhana et al., 2024).

That's why moving to a Web-Based Management Information System is such a promising solution. By automating patient records, scheduling, and billing, SNC Dental Clinic can create a more organized, secure, and efficient environment. Studies have shown that clinics using web-based systems see fewer errors, faster service, and happier patients and staff (Applied Information Technology and Computer Science, 2021; Dentalkingsoftware.com, 2024). The developers hope that with the development of the new system, SNC can focus more on what really matters: providing top-notch up-to date dental care to the community.



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Project Context

SNC Dental Clinic serves a diverse and growing community, providing essential dental care to patients of all ages and backgrounds. The clinic is a trusted part of the neighborhood, with dedicated staff committed to making each visit as comfortable as possible. As more families and individuals seek dental services, the clinic finds itself busier than ever, highlighting the need for efficient systems to keep up with patient needs and expectations.

Currently, the clinic still relies on a paper-based system to manage patient records, schedule appointments, and handle billing. All patient information is written by hand and stored in folders, which means staff must search through physical files for every visit. Appointments are recorded manually, and billing is calculated and tracked on paper. While this method has worked in the past, it often makes the work slow and confusing, especially as the clinic gets busier. The SNC Dental Clini Staff might spend extra time looking for files, information can be easily missed, duplicated, or prone to human error, which can delay treatments and make a bad patient experience.



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These challenges are felt in every part of the clinic's daily routine. Patient records can be lost or damaged, and finding the right folder sometimes takes longer than expected. Double bookings or missed appointments happen because everything is scheduled by hand and there are no automatic reminders, so patients sometimes forget their visits. Billing on paper can lead to misplaced receipts or confusion about payments, making it less safe and harder to manage. Because of these ongoing issues, the clinic is ready for a change. Adopting a Web-Based Information Management System would help the clinic work faster, avoid mistakes, and give better service to patients, while also making staff jobs easier and setting the stage for future growth.

Purpose and Description

The goal of this research is to create a web-based management information system for SNC Dental Clinic in Dasmariñas City, Cavite. By automating patient information management and appointment transactions management, the technology seeks to modernize the clinic's operation. It is then expected that the clinic will increase productivity, reduce human errors, and better serve its expanding patient population by switching from manual paper based to an online system.



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By using modules to assist with patient information management, appointment transactions management, a minimal billing and invoice process, and hierarchical user management, the initial system is expected to elevate the current operational process of SNC Dental Clinic. The Initial system is anticipated to improve SNC Dental Clinic workers process, cut down on administrative time, and reduce risks or errors relevant to data.

SNC Dental Clinic is the project's target company, while the administrative office that manages patient records, appointments, and invoicing is the project's target office. Clinic employees, dentists, and patients who will use the platform for a variety of services are the system's primary clients. The researchers will be in charge of developing and testing the system, in addition to assessing the needs of the clinic. This study can serve as a guide for future academics who wish to enhance dental management systems even more or who intend to create comparable systems for other healthcare institutions.

For SNC Dental Clinic,

The proposed system will streamline the monitoring of the clinic's overall operations, including staff activity tracking, patient record management,



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appointment handling, and schedule coordination. This initial implementation is designed to assist the SNC owner, Head Doctor, or Head Dentist in effectively managing the day-to-day operations of the SNC Dental Clinic.

For SNC Owner / Head Doctor / Head Dentist ,

the proposed system will streamline the monitoring of the clinic's overall operations, including staff activity tracking, patient record management, appointment handling, and schedule coordination. This initial implementation is designed to assist the SNC owner, Head Doctor, or Head Dentist in effectively managing the day-to-day operations of the SNC Dental Clinic.

For SNC Staff / Secondary Doctor / Secondary Dentist,

The initial system will focus on digitizing the clinic's current paper-based workflow, making it easier to assist both the head doctor/head dentist and the patients. It should be able to help minimize or avoid the risk of any errors present on the previous paper-based clinic operations, while leveraging the patient experience through online platform.



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For Patients,

The initial system will offer a more convenient experience by enabling faster appointment scheduling, accurate record-keeping, and secure billing processes. Clients will benefit from more efficient services, reduced waiting times, and improved communication—resulting in a more satisfying and professional dental care experience.

For Researchers and Developers,

The initial system will allow the developers and researchers to apply their knowledge and skills in real-world system development, from analyzing the needs of a real client to designing, building, and testing a working solution. It will also give them a deeper understanding of how web-based systems can solve actual business problems and improve service delivery in healthcare settings.

For Future Researchers and Developers.

the proposed system will serve as a guide and foundation if they want to study or improve web-based management information systems for clinics or similar businesses. They can use the study as a reference for understanding the



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common challenges faced by manual systems and how automation can solve these problems through digital solutions.

Objectives of the Study

General Objectives

The general objective of the study aims to develop a Web-based Information Management system for SNC Dental Clinic in H2 Congressional, North Avenue, Dasmariñas City, Cavite, Philippines. This system will enhance operational efficiency and improve services for staff, doctors, and patients.

Specific Objectives

Specifically, it aims to:

1. design the initial system that is capable of:
 - a. Managing patient records including personal details, treatment history, and medical notes.
 - b. Managing minimal billing processes such as invoices and online payment through Notifications and Schedule Management Module.



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c. Scheduling appointments' efficiency and preventing conflicts.

d. Ensuring user friendly interfaces for the system user.

2. To develop the web-based dental clinic management system by utilizing modern web development technologies and software frameworks, such as HTML, JavaScript, MySQL, while ensuring compatibility with the necessary hardware infrastructure, including servers, storage, and network configurations, to optimize system performance, security, and scalability.

3. Test the system for functionality, reliability, and usability through simplifications and feedback from the owner of the clinic.

4. Evaluate the system using ISO 25010

5. Prepare an implementation plan for SNC Dental Clinic.

Time and Place of the Study

The setting of the study is the SNC Dental Clinic, H2 Congressional, North Avenue, Dasmariñas City, Cavite, Philippines. The duration of the study is within the school year 2025 in preparation of the project proposal, data gathering, system construction, up to the project defense and implementation. The seasons for the vital achievements of system designing, developing, testing, and evaluating would be within the semester relative to the project's timeline in school. This



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setting was chosen because this is the school where the web-based management information system for the project will be applied, and this is where data gathering and evaluation of the system mostly takes place.

Scope and Limitations

The scope of this study is the development of a Dental Clinic Management System designed to streamline and digitize clinic operations. It will serve three primary users: the administrator, staff, and patient or customer. The system will provide functionalities such as appointment scheduling, patient record management, billing and payment processing, staff scheduling, and system notifications. The administrator will have full control over the system and access to all features, including user and staff management, reports, and logs. Staff members will assist in operational tasks like managing appointments, updating patient records, and handling billing. Patients or customers will be able to register, book appointments, view their records, and make payments. The system is intended for small to medium-sized dental clinics and will operate through a desktop or web-based platform. The propose system consists of three (3) main



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users: The Head Doctor / Head Dentist / SNC Dental Clinic Owner , Staff / Secondary Doctor / Secondary Dentist , and the Patients or Customers

Head Doctor / Head Dentist / SNC Dental Clinic owner oversees the whole SNC D.C Operations and has level 3 account access to the web-based system. Level 3 account access has controls similar to Staff / Secondary Doctor / Secondary Dentist controls (Level 2 account access) , The only difference is that Level 3 account access has controls that can monitor and restrict access of Level 1 and 2 accounts.

Staff / Secondary Doctor / Secondary Dentists has level 2 account access. Level 2 account access includes controls such as Patient (Level 1 account access) account and information management, SNC Dental Clinic Schedule management, and Appointment management.

Patient / Customer can register, log in, and control their personal profiles. They are responsible for booking and canceling appointments, viewing their transaction history, and viewing notifications.



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Web-Based System is pre-built, meaning all users request for system change or debugged must be coordinated directly to the developers. The Web-based System ONLY included a minimal payment, billing and invoice. To verify reservation payments, patients must present a transaction number that corresponds with the one displayed to both the patient and SNC Dental Clinic personnel. This number is provided upon payment through the patient's chosen third-party online payment service. Billing and invoice is sent by the Level 2 and 3 accounts to the patient in a form of either transaction history or notification.

There are Nine (9) modules included in propose system.

Activity history / Logs module - Keeps a record of user actions and system events for tracking and security.

Appointment management module - Helps schedule, update, and keep track of patient appointments. Is relative to Schedule management module.

User Management module - Defines a user account access level or user role, Manage user list, and manages user account or information control

Authentication module - defines user account level (Account level 1, 2, 3), Login, logout, and authenticates a user account level access



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Dashboard Module - Displays a default view for each Users, differentiating based on the users account level access. Also displays what users can do or control on the system.

Notifications module - Sends alerts or reminders to users about appointments or other updates. Shows user

Patient management module - Stores and manages patient information, history, and treatment details. Manages the control of level 2 and 3 accounts over the level 1 account patient. Control the patient's access on the web-based system.

Schedule management module - Helps level 2 and 3 accounts to define SNC Dental Clinic's schedule for the month. Displays the Half day , Closed , Open and fully booked days in a form of color coded calendar. The Color coded calendar then is reflected to the systems users, acting as a sort of limitation for when scheduling appointments (Can't select a fully booked day, Time is either limited or currently booked, The time and day is available).

Dentist and Staff management module – Help level 3 account to have a control over level 2 and 1 accounts. Helps the Head Doctor / Head Dentist



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/ SNC Dental Clinic owner (Level 3 account access) to control and restrict the Staff / Secondary Doctor / Secondary Dentist (Level 2 account access).

Despite the system's comprehensive features, there are several limitations to consider. The system is specifically designed for small to medium-sized dental clinics and may not meet the requirements of larger institutions with more complex operations. It does not include real-time communication features such as live chat or video consultations between patients and dental staff. Integration with third-party platforms, such as insurance providers or government health databases, is not part of the system. Advanced functionalities like AI-powered diagnosis or treatment recommendations are beyond the current scope. Additionally, the initial system is limited to desktop or web browser use, with no mobile application support. Data backup is only available through basic export functions, and robust disaster recovery or automatic backup solutions are not yet planned nor included.



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Conceptual Framework

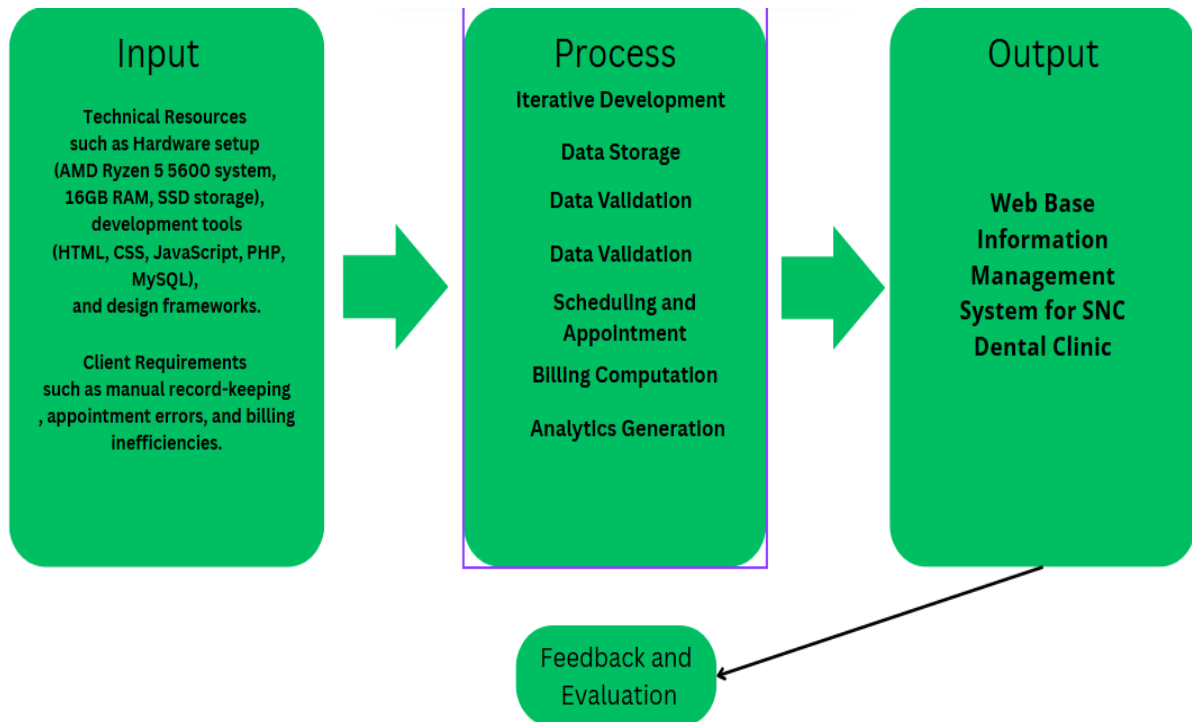


Figure 1. Conceptual Framework of the SNC Dental Clinic Management System

Definition of Terms

Appointment Management

Operational Definition: Refers to the system's module that allows users to schedule, reschedule, and cancel dental appointments.



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General Definition: The process of organizing and setting specific dates and times for meetings or events, particularly for professional services.

Billing System

Operational Definition: The module of the system responsible for generating invoices, processing payments, and tracking patient billing history.

General Definition: A system or process for sending invoices and collecting payments for goods or services provided.

Dashboard

Operational Definition: A system interface that visually displays key metrics and information like appointments, billing summaries, and user activity.

General Definition: A graphical summary of various pieces of important information, typically used to give an overview of business performance.

Dental Clinic Management System

Operational Definition: A web-based platform designed for SNC Dental Clinic to manage appointments, records, billing, and staff data digitally.



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General Definition: Software used in dental practices to assist with administrative and clinical operations.

Patient Records

Operational Definition: Digital profiles in the system containing patient information, treatment history, medical notes, and billing data.

General Definition: A collection of information about a patient's medical history, treatment, and care.

Schedule Management

Operational Definition: A system feature that helps staff organize their shifts and availability.

General Definition: The activity or method of planning and controlling the use of time for specific tasks or responsibilities.

System Notifications

Operational Definition: Automated alerts generated by the system to remind users of upcoming appointments or important tasks.

General Definition: Messages or alerts produced by a digital system to inform users about updates or events.



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User Authentication

Operational Definition: A security process in the system that verifies a user's identity through login credentials.

General Definition: The process of confirming the identity of a user or process, usually as a security measure.



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CHAPTER 2

REVIEW OF RELATED LITERATURE

Foreign Related Literature/Studies

This section provides a review of literature related to the project, presenting existing research on the subject. It emphasizes not only the description of ideas but also the comparison and contrast of different arguments, highlighting similarities and differences among the literature. Additionally, it includes an analysis of published works, discussing their methodologies, scope and limitations, potential impacts, and the technologies utilized.

Dental Clinic Management System Capstone project documentation (2020). The Dental Clinic Management System Capstone Project Documentation suggests that the system is a full overhaul from manually keeping track of dental patients to a dental clinic management system. For instance, a manually run registration system and getting access to patient information means more time spent searching for files, pulling up the wrong patient info, or longer wait times for a simple question. An automated system can streamline employee time,



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accountability, and error margin and grant a more fluid experience for patients. Error reduction and accessibility are two other significant findings of the literature. The system will be user-friendly and accessible to those without technical training project, for example, allows for easy access for adjustments. Furthermore, much was planned in the process and use of resources where it became evident that a digitized system would allow for better access to appointment scheduling and more.

A Systematic Literature Review of Quality Management Initiatives in Dental Clinics (2021). Denyer et al. (2021) conducted a systematic review of quality management initiatives QMIs in dental clinics, using the Context–Intervention–Mechanism–Outcome (CIMO) framework. The review found that quality management in dental clinics is multi-faceted, involving patient satisfaction, service quality, internal process improvement, and business outcomes. The study highlights that implementing QMIs can lead to better patient experiences and improved clinical results. This literature is significant because it provides a theoretical foundation for understanding how quality management can be systematically introduced in dental settings. The findings are especially relevant for projects aiming to improve clinic efficiency and service delivery, as



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they offer a structured approach to evaluating and implementing quality initiatives in dental practice.

Information Technology Platform of "Smart" Dental Clinic (2020).

Kunanets et al. (2020) explore the development of a smart dental clinic information system that integrates various subsystems such as business process planning, medical service management, quality management, and patient communication. The literature highlights how modern information technology can transform dental clinics by automating routine tasks, improving data accuracy, and enabling better decision-making. The architecture described in this work includes modules for appointment scheduling, electronic medical records, document management, and staff management. This comprehensive approach demonstrates the potential for IT solutions to address the growing complexity of dental clinic operations, making them more competitive and responsive to patient needs.

Dental Clinic Management System Capstone Project Report (2025). The Dental Clinic Management System project report details the development and implementation of a system designed to overcome the limitations of manual clinic



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management. The literature points out that automating processes such as patient registration, appointment booking, and record management can significantly minimize errors and improve operational efficiency and the report emphasizes the adaptability of the system to different clinic requirements, supporting strategic planning and resource allocation. It also notes the importance of designing systems that are both secure and reliable, ensuring that sensitive patient information is protected while streamlining day-to-day activities for clinic staff.

Streamlining Dental Clinic Operations: Introducing the Web Application for Efficient Management (2024). This literature examines the effectiveness of web-based dental clinic management systems in automating and optimizing various clinic tasks. It discusses the positive impact of such systems on appointment adherence, reduced wait times, and improved patient outcomes. The study also highlights the importance of usability, user training, and stakeholder engagement in ensuring successful adoption of the technology. Additionally, the research points to future trends in dental clinic management systems, such as integrating telehealth, artificial intelligence, and predictive analytics. Challenges like data standardization, cybersecurity, and



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regulatory compliance are discussed, emphasizing the need for ongoing innovation and adaptation in this field.

An Information System for Private Dental Clinic with Integration of Modern Technologies (Alejandrino et al., 2023). Alejandrino et al. (2023) developed a Dental Clinic Information Management System to fully automate daily clinic operations. Their study emphasized the importance of a web-based platform that allows patients, dentists, and assistants to interact with the system over the Internet, with a central server managing all transactions. The research used the Plan-Do-Check-Act (PDCA) framework to support continuous improvement, ensuring the system could adapt to evolving clinic needs and technological advancements. The study concluded that such a system gives clinics a competitive edge over those still using manual processes, especially in the context of the COVID-19 pandemic. The authors highlighted the need for reliable business process management, secure patient records, and efficient appointment scheduling. They also suggested that future systems should incorporate artificial intelligence to further enhance effectiveness and patient care.



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Requirements Specification, Design, and Evaluation of Dental Image Exchange and Management System with User-Centered Approach (Iran, 2023). This study from Iran focused on developing a dental image exchange and management system using a user-centered approach. The researchers followed a four-phase process based on the software development life cycle (SDLC), starting with interviews and observations to gather user needs. They created a prototype using object-oriented programming and refined it through several iterations, incorporating feedback from focus groups. The results showed that ease of use, security, and mobile app compatibility were the top priorities for users. The final system emphasized instant access to information and a user-friendly interface, which led to high user satisfaction. The study also recommended integrating such systems with electronic health records to improve treatment processes and efficiency in dental clinics.

Novadontics Case Study: Practice Management Software PMS Development (United States, 2024). The Novadontics case study details the development of a cloud-based practice management solution for dental clinics in the United States. The project aimed to automate patient acquisition, engagement, and clinic operations through a comprehensive platform called Care



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Pulse. The development process included planning the software architecture, selecting an efficient technology stack, and designing a user-friendly interface for both patients and dental staff. Security was a major focus, with robust measures implemented to protect patient health information and electronic health records in the cloud. The system also featured interactive dashboards, virtual consultations, and role-based access controls, making it adaptable to various dental practices and regions. This case highlights the importance of customization and security in modern dental management systems.

Streamlining Dental Clinic Operations: Introducing the Web Application for Efficient Management (2024). A 2024 study on streamlining dental clinic operations introduced a web-based management system designed to automate and optimize key tasks. The research found that such systems significantly improve appointment adherence, reduce wait times, and enhance patient satisfaction. The study also discussed the importance of usability and user training for successful adoption. Looking ahead, the authors suggested integrating telehealth, artificial intelligence, and predictive analytics into dental management systems. They also pointed out challenges like data standardization,



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interoperability, and regulatory compliance, emphasizing the need for ongoing innovation to keep up with the evolving needs of dental practices.

Web Application for Dental Clinic Management System (Asvinthraj, 2023). Asvinthraj (2023) developed a comprehensive web application for dental clinic management, aiming to replace manual and paper-based processes. The system centralized patient management, appointment scheduling, billing, and inventory management, making clinic operations more efficient and accurate. The project placed a strong emphasis on user-friendliness, allowing dental staff to easily manage daily tasks and access updated patient information. The study also highlighted the importance of secure data handling, including user authentication and encryption to protect sensitive patient records. By automating billing and integrating with insurance systems, the application reduced administrative workload and improved financial management.

Local Related Literature/Studies

My Klinika: Clinic Management System in the Philippines (2021). My Klinika is a customized clinic management system developed specifically for Philippine dental clinics. The system was designed to organize, manage, and



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monitor patient records, as well as streamline administrative tasks. The literature discusses how My Klinika addressed common challenges faced by clinics, such as managing growing patient databases, reducing appointment errors, and improving record accessibility for both staff and patients. The implementation of My Klinika demonstrated the benefits of digital transformation in local clinics, including faster patient processing and improved data security. The system also provided modules for appointment scheduling and inventory management, which helped clinics operate more efficiently and reduced the risk of lost or misplaced records.

Smile Xperts Dental Clinic Case Study (2022). A study conducted at Smile Xperts Dental Clinic in Quezon City investigated the challenges of using manual record-keeping as the clinic's patient base grew. The research identified issues such as lost records, overloading, and missed appointments, which hindered clinic operations and patient care. To address these problems, the researchers proposed a Dental Clinic Management System that would automate patient record management and appointment scheduling. The proposed system aimed to eliminate common errors in records management and improve overall efficiency. By developing specific modules tailored to the clinic's needs, the team



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demonstrated that digital solutions could significantly enhance clinic performance and patient satisfaction.

Digital Management System for Hospitals and Clinics (2020).A study documented on Academia.edu explored the development of a digital management system to boost hospital and clinic effectiveness in the Philippines. The research focused on integrating various administrative functions, such as patient registration, billing, and records management, into a single digital platform. The system aimed to improve data accuracy, speed up transactions, and support better decision-making for healthcare providers. The study found that digital management systems helped standardize processes across different departments, leading to better systems integration and improved patient care. The literature emphasized the importance of adaptability and scalability, allowing the system to be customized for different clinic sizes and specialties, including dental clinics.

Local Studies on Dental Appointment Scheduling and Primary Care (2025).Recent local studies in the Philippines have examined dental appointment scheduling and the impact of improved primary care on patient satisfaction.



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During the COVID-19 pandemic, clinics adopted innovative workforce models and tele-dentistry to maintain safe and efficient services. These changes led to lower dental expenditures and increased access, especially in rural areas, by using dental therapists and digital scheduling tools. Another study from the University of the Philippines highlighted that the public perceives the healthcare system as inefficient, but improvements in primary care services-such as better scheduling and patient communication-can significantly boost patient satisfaction. These findings support the ongoing shift toward digital solutions in Philippine dental clinics.

Evaluating the Impact of ClinicCare System at Universidad de Manila

(2024). This study by Isidro et al. (2024) focused on the implementation of the ClinicCare system at the Universidad de Manila Medical and Dental Clinic. The research aimed to address the inefficiencies of manual patient record management by introducing an automated system that streamlined processes, improved communication, and prioritized special cases. Using both quantitative and qualitative methods, the researchers assessed the system's impact on efficiency, accuracy, accessibility, and user experience. They collected data



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through questionnaires and interviews with clinic staff, comparing metrics before and after the system was put in place.

The results showed significant improvements across all measured aspects. The ClinicCare system was rated “very efficient,” “very accurate,” and “very accessible,” with users expressing high satisfaction. Staff noted faster record retrieval, better handling of urgent cases, and more time for patient care. While there were minor challenges during the adaptation phase, these were quickly resolved with proper training. The study concluded that digital systems like ClinicCare play a vital role in enhancing healthcare management and recommended further enhancements such as analytics and notification features.

Dental Clinic Management System for Mabida Dental Clinic (2025).The Mabida Dental Clinic study developed a web-based management system to modernize appointment scheduling and patient record management. The system allowed patients to book appointments online, reducing long waits and helping the clinic manage the flow of arrivals. Dentists could monitor appointment histories and generate reports, while staff found it easier to manage their tasks without relying on manual processes. The research used an iterative waterfall



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model for development and gathered feedback through Likert-scale surveys. The system received high ratings for efficiency, usability, and satisfaction, with a weighted mean of 4.50 out of 5. However, the study noted some limitations, such as the lack of spam prevention and sales reporting features. Overall, the system greatly improved clinic operations and patient convenience.

System Technical Background

The proposed system is a **Web-Based Management Information System** tailored specifically for the operational needs of SNC Dental Clinic. This system is intended to replace the existing manual and paper-based procedures currently used by the clinic for managing patient information, appointments, and billing.

The system is developed using modern web development technologies, including **HTML**, **CSS**, **JavaScript**, and **PHP** for front-end and back-end programming. **MySQL** serves as the relational database for storing all critical information such as patient records, appointment logs, and billing transactions. The system will be deployed on a **web server** to ensure remote access and centralized data management for clinic staff, administrators, and patients. To maintain data security and user privacy, the system implements **user authentication** and **role-based access control**, ensuring that only authorized



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personnel can access or modify sensitive information. The platform will also support **data backups** and **audit logging** through an activity logs module to improve accountability and prevent data loss. The architecture of the system is modular, composed of key functional components such as **Patient Management, Appointment Management, Billing and Payment, Dashboard,** and **Notifications**. These modules are designed to work in coordination to simplify and automate daily clinic tasks, reducing the time and errors associated with manual processes. Compatibility with standard desktop browsers ensures that the system can be easily used without requiring additional devices or mobile applications.

Overall, the technical design of the proposed system focuses on usability, scalability, and data security, in line with the operational requirements of small to medium-sized dental clinics like SNC Dental Clinic.

Synthesis

The review of both foreign and local related literature has emphasized the growing importance of automation and digital transformation in healthcare operations, particularly in dental clinics. Across various studies, researchers have



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identified common challenges faced by manual systems—such as slow service delivery, record mismanagement, and billing inaccuracies—and presented web-based management systems as an effective solution.

Foreign literature, such as the studies by Kunanets et al. (2020) and Alejandrino et al. (2023), showcased advanced systems that integrate quality management, scheduling, and medical record tracking to streamline clinic operations. These systems have proven to reduce human error, improve data accessibility, and enhance the patient experience. Similarly, local literature—like the My Klinika and Smile Xperts case studies—demonstrated how automation led to better efficiency, data organization, and reduced appointment-related issues in

Philippine clinics. All reviewed studies support the notion that incorporating digital systems in clinic operations not only modernizes services but also promotes greater organizational control and improved decision-making. Importantly, the literature highlights the relevance of user-centered design, secure data handling, and adaptability to future trends like telehealth and AI.

The proposed Web-Based Management Information System for SNC Dental Clinic aligns with these findings. It intends to solve the same set of issues—inefficiency,



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inaccuracy, and inconvenience—through the application of a digital platform specifically designed for the clinic’s unique environment. The literature reviewed serves as a strong foundation and justification for the implementation of the system, affirming that the project is both timely and essential for improving healthcare service delivery at SNC Dental Clinic



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CHAPTER 3

METHODOLOGY

The methodology applied in the development of the Web-Based Information Management System for SNC Dental Clinic follows a **qualitative and iterative approach**, allowing for ongoing feedback and adjustments throughout the project lifecycle. Data were sourced directly from SNC Dental Clinic staff and the head doctor through physical and online questionnaires, as well as informal interviews. These instruments were designed with concise, situation-based yes-or-no questions to easily identify system preferences and operational needs. While no formal statistical treatment was employed, the responses helped shape early assumptions and system features. The initial phase focused on gathering requirements through questionnaires and interviews, though formal confirmation of system requirements will be conducted after the initial prototype is demonstrated. System design is supported by theoretical and contextual Data Flow Diagrams (DFDs), with plans to create an Entity-Relationship Diagram (ERD) as development progresses. A wireframe prototype was created in Figma to visually represent the user interface and system flow. Although development has



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not yet started, the project will follow a cycle of prototyping, stakeholder feedback, and iterative improvements. Deployment will begin on a local machine for testing, with future considerations for hosting the system online via a domain provided by the clinic, if approved.

Materials

It discussed the materials being used in the development of the proposed and developed system. The development of the proposed web-based information management system for SNC Dental Clinic utilizes a range of software tools and hardware components. The system is being developed using a modern personal computer equipped with a Ryzen 5 5600 processor, 16GB RAM, and a fast SSD, ensuring efficient performance during both the development and testing phases. Essential software tools include a local web server environment such as XAMPP for backend development, a code editor like Visual Studio Code, and version control using Git. The system is built using web technologies such as HTML, CSS, JavaScript, and PHP, with MySQL for database management. These materials collectively support the creation of a responsive, secure, and user-friendly system tailored to streamline the clinic's operations.



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Project Design

The project design for the web-based information management system of SNC Dental Clinic follows a modular and user-centered approach to ensure clarity, usability, and efficiency. The system architecture is structured to separate concerns between the frontend, backend, and database layers. A responsive web interface is designed to accommodate both staff and administrative users, with user roles and access privileges clearly defined. The design incorporates Kanban-style appointment management, intuitive dashboards, and secure login systems to streamline clinic operations. Each module—for example; patient records, appointment scheduling, and proof of payment handling—is planned using Dataflow diagrams such as Contextual and Theoretical diagram to visualize data flow and system behavior. This design serves as the foundation for implementing a robust and scalable system tailored to the needs of the dental clinic.

The System is made using the following:



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Figure 1. Contextual dataflow diagram of Head Dentist / Doctor / SNC Dental Clinic owner to Web-Based Information Management Systems

Figure 2. Contextual dataflow diagram of Staff / Secondary Doctor / Secondary Dentist to Web-Based Information Management Systems

Figure 3. Contextual dataflow diagram of Patient / Customer to Web-Based Information Management Systems

Figure 4. Theoretical dataflow diagram of Head Dentist / Doctor / SNC Dental Clinic owner to Web-Based Information Management Systems

Figure 5. Theoretical dataflow diagram of Staff / Secondary Doctor / Secondary Dentist to Web-Based Information Management Systems

Figure 6. Theoretical dataflow diagram of Patient / Customer to Web-Based Information Management Systems



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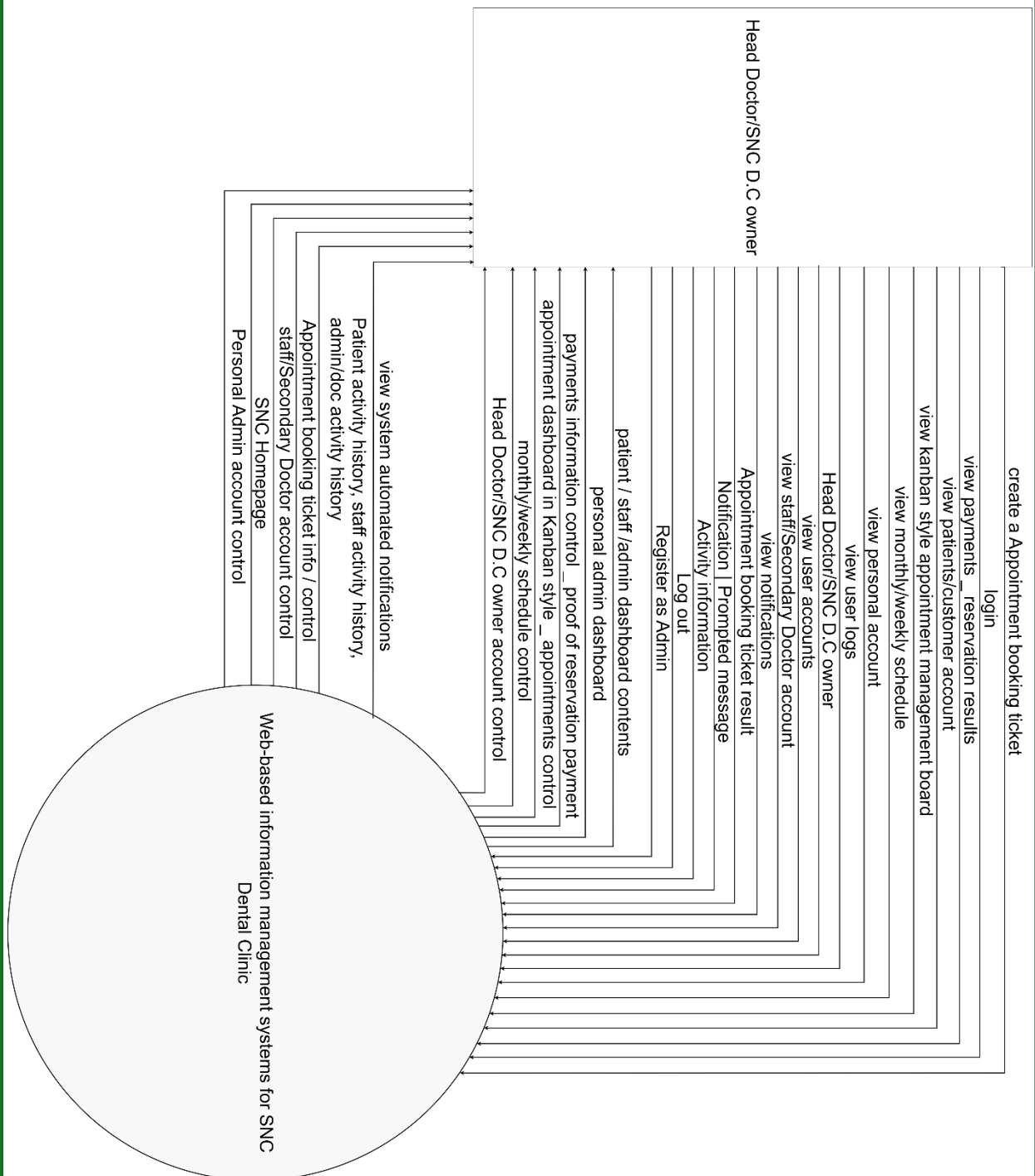


Figure 1. Contextual dataflow diagram of Head Dentist / Doctor / SNC Dental Clinic owner to Web-Based Information Management Systems



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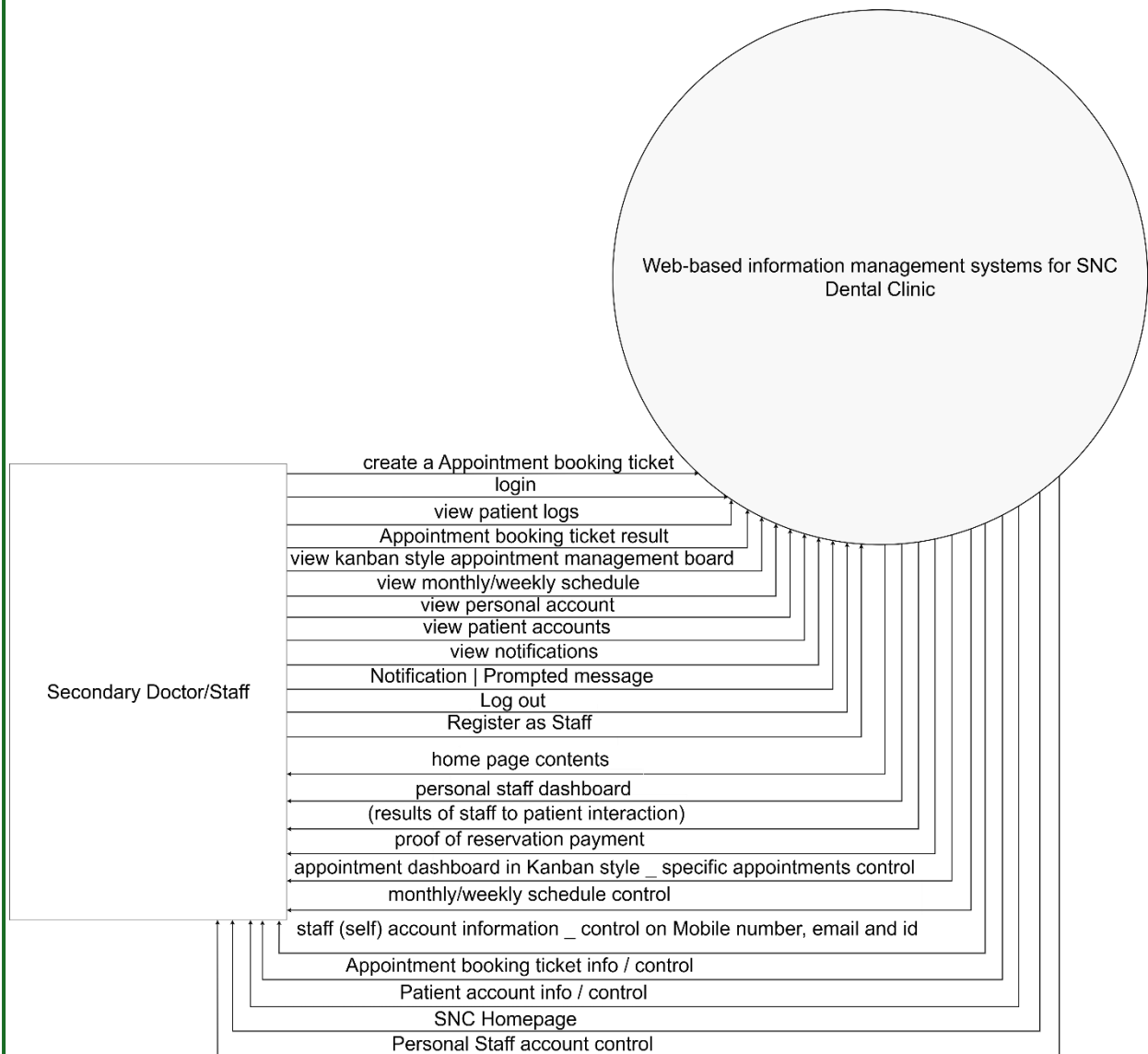


Figure 2. Contextual dataflow diagram of Staff / Secondary Doctor / Secondary Dentist to Web-Based Information Management Systems



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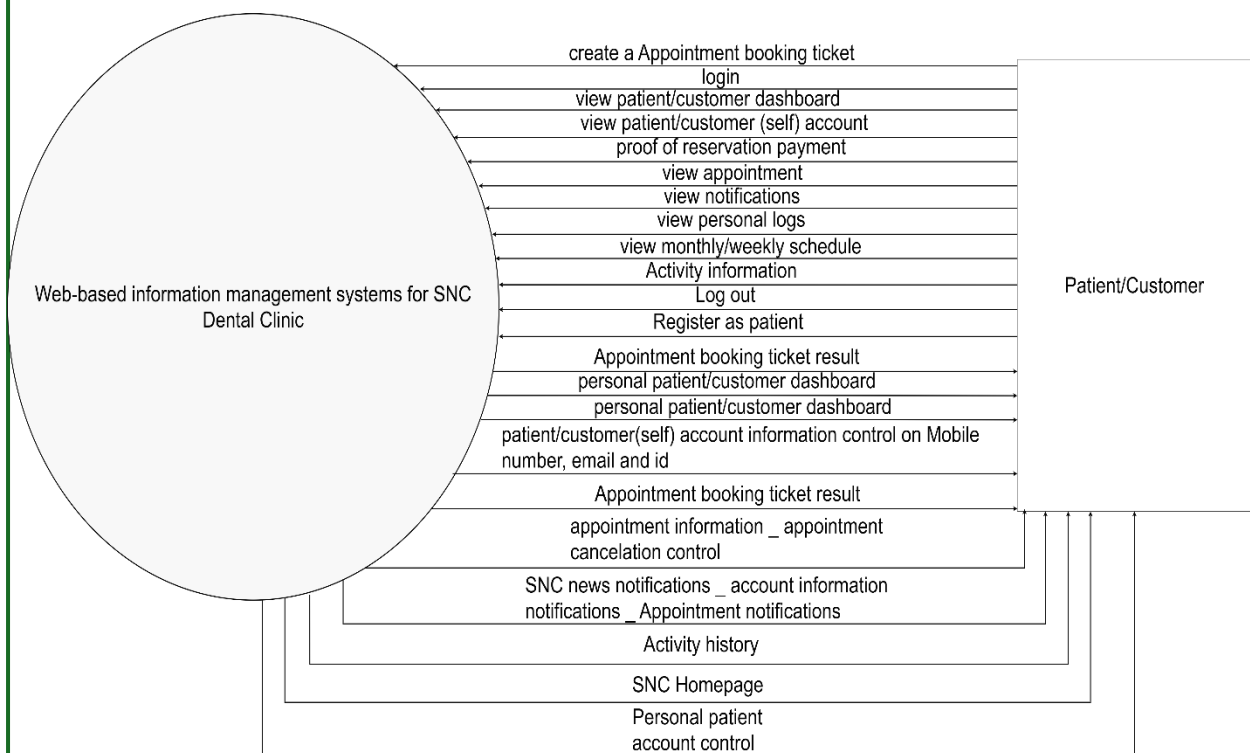


Figure 3. Contextual dataflow diagram of Patient / Customer to Web-Based Information Management Systems



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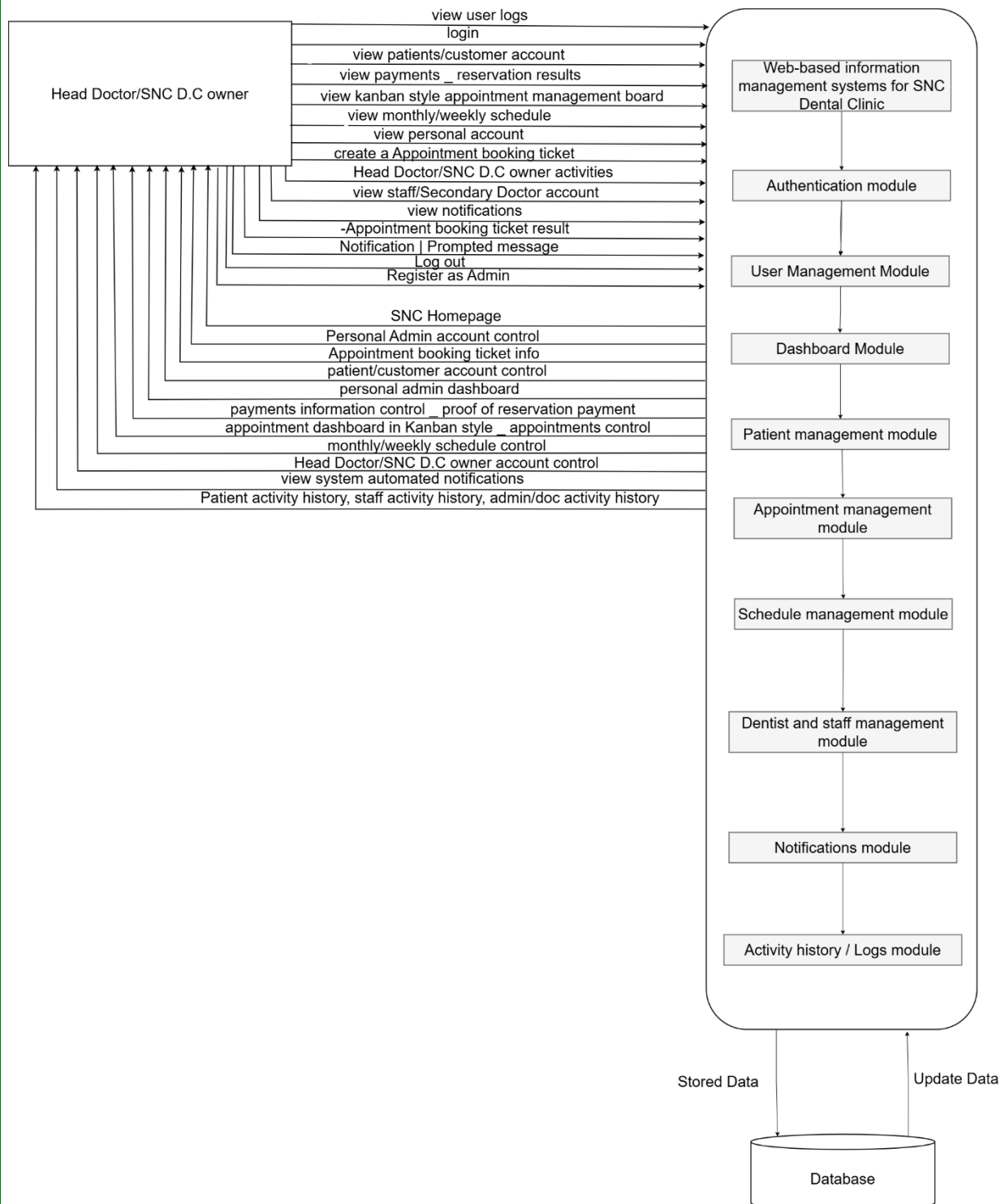


Figure 4. Theoretical dataflow diagram of Head Dentist / Doctor / SNC Dental Clinic owner to Web-Based Information Management Systems



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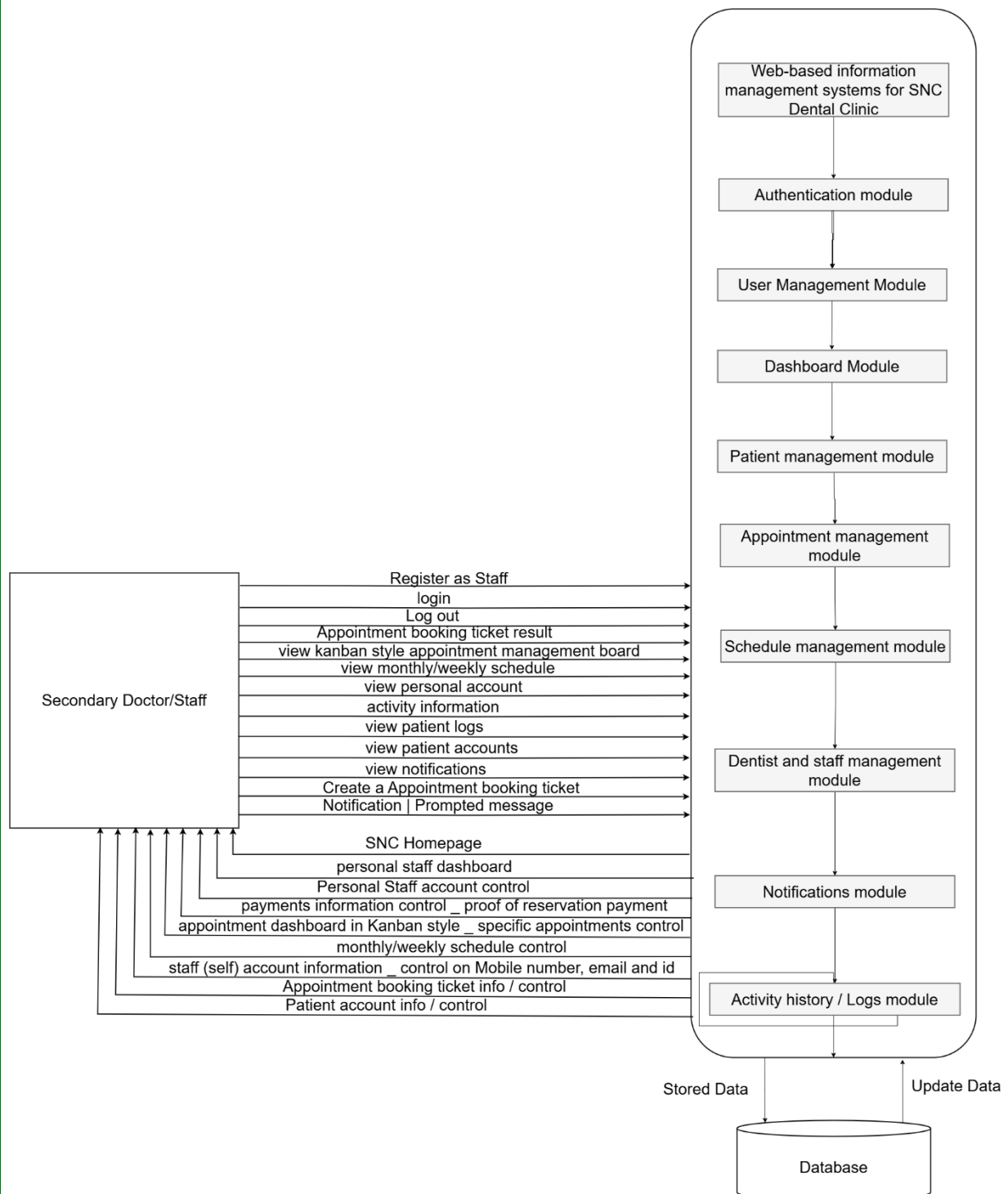


Figure 5. Theoretical dataflow diagram of Staff / Secondary Doctor / Secondary Dentist to Web-Based Information Management Systems



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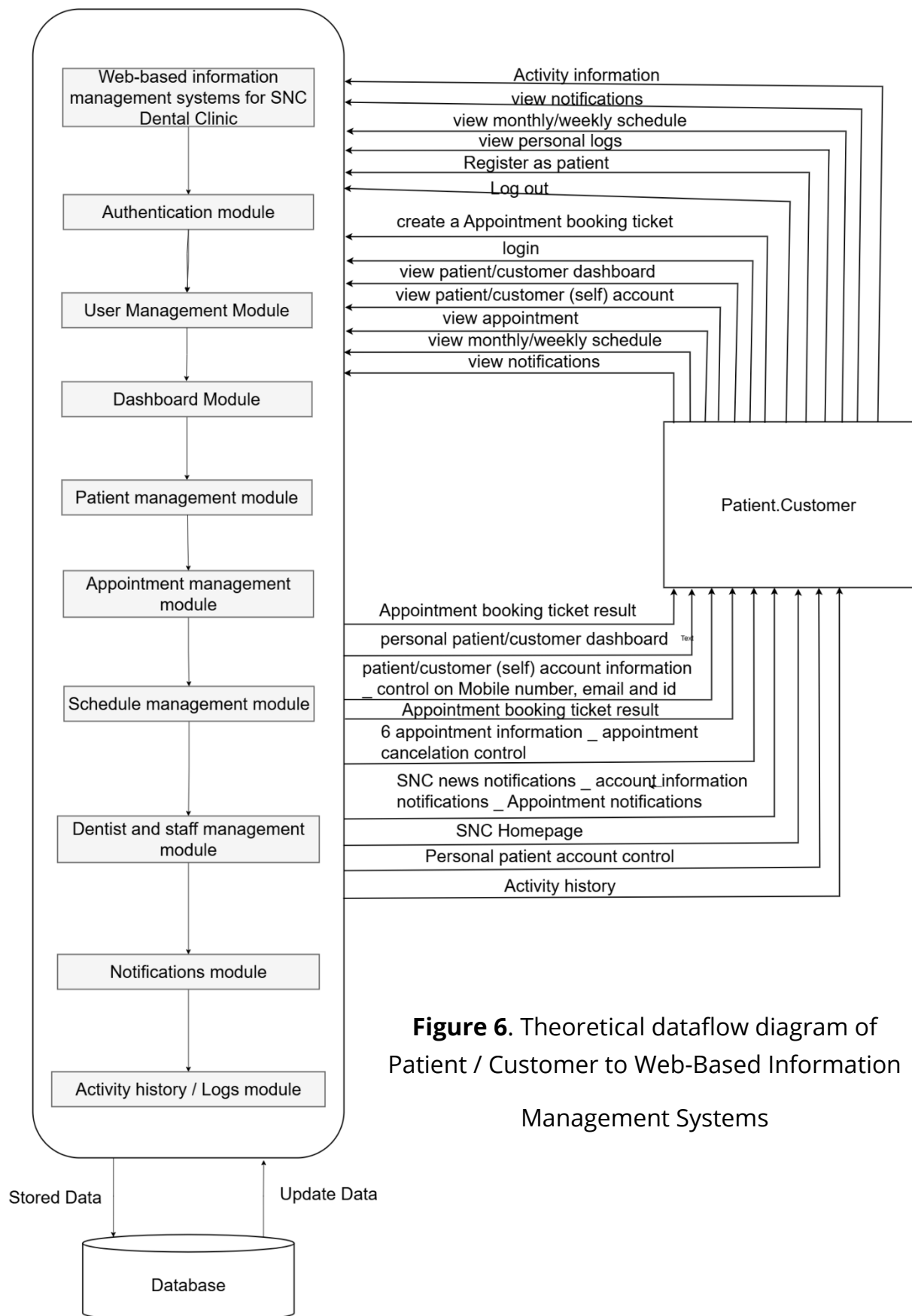


Figure 6. Theoretical dataflow diagram of Patient / Customer to Web-Based Information Management Systems



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Requirement Documentation Materials

The development of the **Web-Based Information Management System for SNC Dental Clinic** utilized a combination of software tools, programming languages, and frameworks to ensure functionality, security, and efficiency. The proposed web-system development will be built using HTML, CSS, JavaScript, and PHP, with MySQL serving as the database management system. Development and testing were conducted using a local server environment such as XAMPP, and the system was designed to be accessed through modern web browsers for both administrative and staff use within the clinic premises.

Product and process design

Patients using the SNC Dental Clinic Management System have access to a user-friendly portal that allows them to book appointments, manage their profiles, and receive updates regarding their dental visits. They begin by signing up through the platform, using a verification system that may include OTP confirmation to ensure secure account creation. Once registered, patients can log in to access their personal dashboard, which shows their upcoming and finished or cancelled appointments, SNC Dental Clinic monthly schedule, access



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to creation of Appointment booking ticket, access to the transaction history they made with SNC Dental Clinic, and inbox that contains any relevant notifications. The system is designed to display only essential personal data to staff and admin for privacy reasons, while allowing patients full access to their own records. The interface is mobile-friendly and easy to navigate.

To book an appointment, the patient selects a date and time from an interactive calendar where available time slots are marked in green, booked slots in red, and clinic breaks in gray. Patients must also choose the dental procedure they need and upload proof of payment along with a valid transaction code. Once submitted, the appointment enters the "To Process" queue for staff or admin review. While waiting for confirmation, the appointment appears in a pending state. Once approved or denied, the patient is notified immediately with a predefined message customized by the staff or admin.

If the patient decides to cancel their appointment, the system first displays an automatic warning outlining the consequences of repeated cancellations, including potential account flags and rebooking restrictions. The patient may proceed only after acknowledging the warning. Repeated cancellations will



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eventually notify the admin, who can investigate the patient's activity and take further action if needed. If the cancellation is accepted, the system allows the patient to rebook without requiring another payment, provided the payment has already been validated and recorded.

Patients also receive notification updates in real time. These alerts include appointment approvals or rejections, rescheduling notices, cancellation confirmations, and general announcements from the clinic. Each notification includes relevant dates, times, and explanations to help the patient stay informed. Patients may also review their previous appointments and payment history through the dashboard. Personal information can be edited, though sensitive changes may require staff or admin verification.

Finally, the system uses visual indicators to show patients if their account is in good standing or flagged due to previous activity. These flags are only visible to the admin but impact how the system processes future bookings. Patients are encouraged to follow clinic policies and maintain accurate information to ensure a smooth experience. With this system in place, patients can independently



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manage their dental care while staying connected with clinic staff through streamlined communication and updates.

Staff members of the SNC Dental Clinic Management System are provided access to essential modules that help them manage daily clinic operations. Their homepage includes an overview of current tasks, such as appointments, personal logs, and access to the Kanban-style appointment board. Staff members must log in using their credentials, and their access is restricted to on-site usage only, meaning they can only use the system while physically present at the clinic. The login and password recovery process may include OTP verification, although some access options are controlled entirely by the admin. Once logged in, the staff member is guided through a simplified dashboard tailored to their role.

The appointment management section allows staff members to view requests, schedules, and appointment statuses using a Kanban layout divided into "To Process," "Scheduled," "Ongoing (Today)," and "Finished (Today)." Appointment requests include the patient's name, chosen date and time, proof of payment, and transaction code. Staff can either approve, deny, or cancel appointments, but cannot do so if another staff member or the admin is already



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working on the request. The system prevents duplicate actions by locking access when someone is actively editing. After taking action on a request, the staff member must send a predefined notification to the patient, with customizable message fields to personalize the response.

In the “Scheduled” section, staff can view upcoming appointments, reschedule them, or cancel them. If a staff member edits a schedule that has already been modified, the system alerts them and prevents further action until the current editing session is complete. Any updates automatically notify the patient involved, especially if their slot has changed. Patients are allowed to rebook without paying again, as long as they have previously completed payment and the cancellation was clinic-related. These preventive measures maintain order and ensure fair service for all patients.

The “Ongoing (Today)” section shows current appointments in progress. From here, staff can mark appointments as “Finished” or modify the status as necessary. Similar restrictions apply if another user is editing. Once marked as finished, the appointment moves to the “Finished (Today)” section. For cancelled



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appointments, the staff must indicate who cancelled the session and provide a reason, which is then recorded and displayed for the admin to review.

Staff members can also manage their own personal logs and view assigned activities. All staff actions are recorded in system logs, which the admin can monitor. In case of patient misconduct or excessive cancellations, staff can flag the patient's account for review, triggering a visual warning to the admin. The notification module provides real-time alerts about booking requests, changes to patient records, or new admin instructions. This helps staff stay informed and respond promptly without needing direct supervision. Overall, the staff interface ensures efficiency, transparency, and accountability in daily operations.

The admin of the SNC Dental Clinic Management System is granted full access to the homepage, appointment creation features, and user authentication tools such as sign-up, login, and password recovery. These authentication processes are secured by OTP verification before any access is granted. In addition, the admin has exclusive access to the admin dashboard and the ability to log out from any session. The dashboard displays appointments using a Kanban-style



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layout, which is divided into key categories: appointment requests, approved and scheduled, ongoing, finished today, and cancelled. This structure enables the admin to manage appointments efficiently and monitor the clinic's workflow in real time.

Within the appointment request queue, only surface-level details are displayed, including the patient's name, scheduled date and time, and a color-coded status indicator of the patient's account. The admin can examine each request further by reviewing the proof of payment and verifying the transaction code. Once evaluated, the admin sends the result—either approved, denied, or cancelled—to the patient along with an automated notification. If a staff member is currently handling a particular request, the system temporarily blocks the admin or others from editing it, ensuring that no overlapping actions occur. Each interaction by the admin is recorded in the system logs for transparency and accountability.

The approved and scheduled queue displays upcoming appointments in chronological order. From this view, the admin can reschedule appointments or cancel them when necessary. Any changes made are automatically



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communicated to the patients, typically including a formal apology and instructions to rebook without having to repay. If a staff member is already making changes to the appointment, the admin is temporarily restricted from editing until the process is completed. These access controls ensure data consistency and prevent accidental overwrites or conflicts in scheduling.

For appointments marked as ongoing, the admin has the option to mark them as “Finished,” reschedule them, or cancel them. Similar to other queues, patients receive a notification if any changes occur. Editing access is exclusive; if another user is updating an appointment, the admin must wait. The finished and cancelled queues present essential information like the patient’s name, date, and time of the appointment. Cancelled appointments also include the reason, the user who initiated the cancellation, and a field where the admin can write a custom message to the patient if necessary.

The admin also has the ability to manually book appointments through the appointment booking page. This feature allows the admin to select dates and times, enter patient details, choose procedures, and upload proof of payment. Time slots are visually coded: green for available, red for booked, and gray for



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break times, which are unavailable. The system validates each booking by checking the transaction code against SNC's GCash records. Once verified, the admin finalizes the booking status and triggers the appropriate notification to the patient.

The system also allows the admin to access and manage both patient and staff records. For patients, the admin can perform searches by first name, middle name, last name, or account status. From the search results, the admin can view or edit surface-level and detailed personal information. Each patient's transaction history is also accessible. For staff, similar functions apply, but the admin can also update employment status, such as marking a staff member "absent," which automatically disables their access to the system.

Schedule management is a critical admin responsibility. Using a color-coded calendar interface, the admin can view or modify the weekly and monthly clinic schedule. To prevent conflicts, only one user can edit the schedule at a time, and the system displays a lock notice when someone is editing. If a schedule change impacts existing appointments, the system prompts the admin and sends out notifications to affected patients. These flagged appointments are marked in



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the dashboard, making it easier for the admin to track which ones require follow-up.

The admin receives notifications in a stack format, which provides updates about various system activities. These include appointment cancellations, recurring patient misconduct, staff changes, or updates to patient information. Notifications include timestamps and sender information for clarity. Finally, the admin has full access to the system logs, which are categorized by patient activity, staff activity, and admin activity. Logs are filterable by name, date, or time, and each entry contains detailed information about who performed what action and when, allowing for thorough system oversight and accountability.

Project Development Procedure

In this study, the researchers adopted the Iterative Development Life Cycle to ensure continuous refinement and improvement of the Web-Based Management Information System for SNC Dental Clinic. In the initial planning and requirement gathering phase, the team engaged with the clinic staff and



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administrators through interviews and observations to understand their workflows and pain points with the current manual system. This helped establish core functional requirements such as patient record management, appointment scheduling, and billing. In the first iteration of system design, the researchers developed initial wireframes, database structures, and user interface layouts that aligned with the clinic's needs. Afterward, the team moved to the first cycle of development, where a basic version of the system with limited functionality was created. This prototype was then tested and reviewed by clinic staff, and their feedback was collected and analyzed. Based on their input, the second iteration involved refining and expanding features—such as improving the appointment module and adding notification capabilities. This cycle of design, development, testing, and evaluation was repeated several times, with each iteration enhancing system reliability, usability, and performance. In the final iteration, the fully functional system was completed, thoroughly tested using ISO 25010 standards, and prepared for implementation, along with user training and documentation. This iterative approach allowed the team to adapt to feedback continuously, resulting in a system that closely meets the clinic's actual operational needs.



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Project Testing Procedure

The testing process for the system follows a structured approach to ensure its reliability and functionality. **Unit Testing** is the first step, where each module of the system is individually tested, along with its associated procedures and control data. This helps verify that each component works correctly on its own without any issues. After unit testing, **Integration Testing** takes place, where individual modules are combined into a group and tested as a whole. The modules are checked to ensure that they work together seamlessly, with proper inputs leading to the expected outputs. Following this, **System Testing** is conducted, which evaluates the entire system to ensure it meets all the defined requirements. This stage is crucial for identifying any flaws or defects within the system as a whole. To assess the system's performance, **Performance Testing** is carried out by testing it on various devices and browsers, such as PCs, laptops, and mobile phones, to ensure it functions properly across different platforms. Lastly, **Acceptance Testing** involves gathering feedback from IT professionals, faculty, and students who evaluate the system's accuracy and functionality. Their suggestions and recommendations are used to further improve the system's capabilities.



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Project Evaluation Procedure

State what the criterion in ISO 25010 applicable in the capstone project evaluation. Insert table of matrix target evaluators who will evaluate the system. Number of evaluator should be based on stastical result input in _____.

Standard Numerical Scale for System Evaluation

Table 1. Descriptive interpretation of the mean

NUMERICAL SCALE	INTERPRETATION
4.21 – 5.00	Excellent
3.41 – 4.20	Very Good
2.61 – 3.40	Good
1.81 – 2.60	Fair
1.00 – 1.80	Poor