A PROPOSED OFFERING OF AN ONLINE RESERVATION SYSTEM FOR DENTHUB DENTAL CLINIC

A Thesis Project Presented to the
Faculty of Datamex College of Saint Adeline, Inc.

In Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science in Information Technology

By:
Aguilar, Jordan B.
Ancheta, Rowell R.
Araya, Reality M.
Boncales, Jeson L.
Camba, James Ronald L.
Dela Cruz, Donnalyn F.
Dolores, Khing Edsan M.
Galvez, Sean Andrew D.
Gatmaitan, Russel N.
Guillermo, Novie B.
Remoto, Rachel
Solidum, Jasmin E.
Tabor, Aldrine G.

January 2026

DESIGN DOCUMENT

INTRODUCTION

The purpose of this design document is to present the overall structure, components, and technical approach for the Online Appointment System for Denthub Dental Clinic. It serves as a reference for developers, project advisers, and stakeholders by explaining how the system will be designed and implemented based on the approved requirements. This document helps ensure that the system architecture and design decisions align with the project objectives and meet the operational needs of the clinic.

The software system being designed is an online appointment and patient information management system intended to support the daily operations of Denthub Dental Clinic. It will allow clinic staff to schedule patient appointments, keep patient information, and check clinic schedules using a digital system. The system is intended to replace the current manual process, which relies on paper records, phone calls, and messages. The system will be accessible using computers and mobile devices within the clinic and will incorporate basic security features to protect patient data.

The scope of this design document focuses on the architectural layout, system components, data flow, and user interactions of the proposed system. It includes the design of the appointment scheduling module, patient record management, user access roles, and basic reporting features. The document outlines how these components interact to support clinic operations but does not cover system implementation details such as coding, deployment, or maintenance procedures. Advanced features and external integrations are also beyond the scope of this document.

SYSTEM ARCHITECTURE

Overview of the System Architecture

The Denthub Online Appointment System follows a web-based client–server architecture designed to support efficient appointment scheduling, patient record management, and clinic operations. The architecture separates the user interface, application logic, and data storage to ensure better performance, security, and scalability.

The system is accessed through a web browser by authorized clinic staff such as dentists and receptionists. All requests from users are processed by a centralized server where the core business logic is handled, and data is securely stored in a centralized database shared by two clinic branches.

This architectural approach ensures consistent data access, minimizes redundancy, and supports reliable multi-branch operations.

High-Level Components and Their Interactions

The system is composed of the following major components:

1. **Client Layer (Presentation Layer)**

- This layer consists of web browsers used by clinic staff.
- It provides the user interface for login, dashboard viewing, appointment management, patient records, and report generation.
- Users interact with the system through forms, tables, and dashboards.

2. **Application Server (Business Logic Layer)**

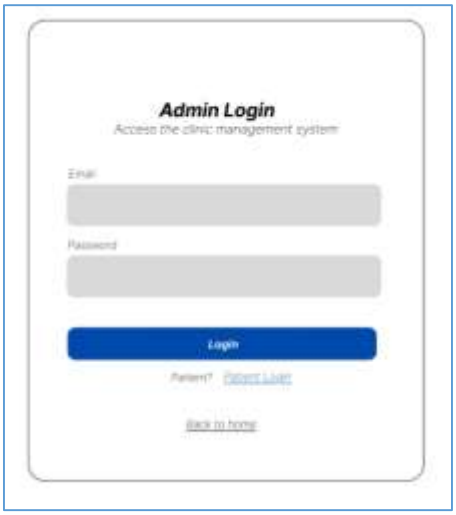
- This layer processes user requests received from the client.
- It contains the core system functionalities such as:
    - User authentication and role-based access control
    - Appointment scheduling and conflict prevention
    - Dentist schedule management
    - Patient record and laboratory case management
    - Report generation and dashboard data processing
- It validates inputs, enforces business rules, and ensures secure access to system features.

3. **Database Server (Data Layer)**

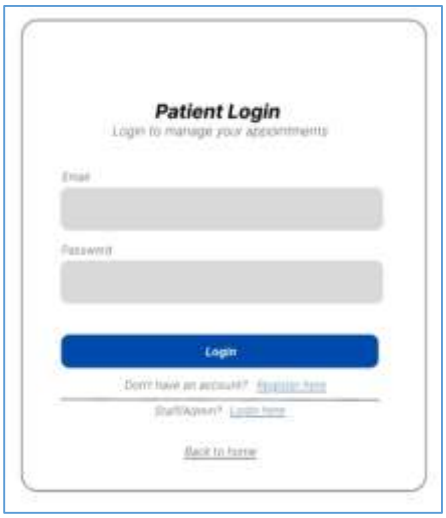
    - This layer stores all system data in a centralized database.
    - It includes patient information, appointment records, dentist schedules, laboratory cases, branch details, system logs, and backup data.
    - Both clinic branches access the same database to maintain data consistency and accuracy.

USER INTERFACE DESIGN

This shows the homepage of the Denthub Dental Clinic website. It serves as the main entry point for users and provides an overview of the clinic's services and



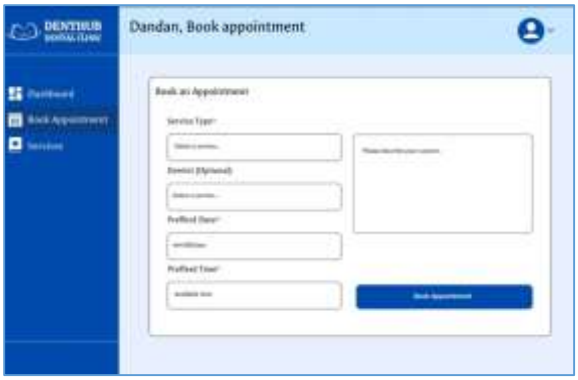
This shows the Admin Login page where administrators access the clinic management system.



This shows the Patient Login page where patients can access their accounts.

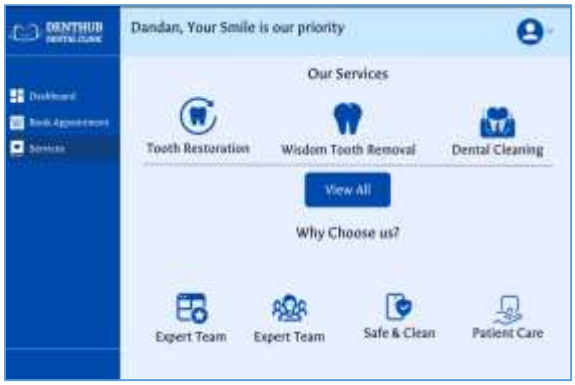
This shows the Patient Dashboard where users can manage their appointments and profile.

This shows the Admin Dashboard, which serves as the main page for clinic staff and dentists. It displays the clinic's daily activities, helping administrators monitor patient appointments and manage basic tasks efficiently.



This shows the Book Appointment page where patients or staff can schedule appointments by filling out the required details before confirmation.

This is the after the patient enter details for a dental consultation. It includes the service type, preferred date and time, dentist selection, and a concern field for describing the dental issue.



This shows the Services page where patients can view the clinic's available treatments.

This shows the Reports page, where administrators can generate and view clinic data. It includes date range selectors and a Generate button for custom reports, status summary cards showing Today's Appointments, Completed, Pending, and Cancelled counts, and a Daily Appointment Report table detailing total, pending, completed, rescheduled, and cancelled appointments.

COMPONENT DESIGN

The DentHub Dental Clinic System is composed of modular components that separate configuration, logic, data access, and presentation. Each component is reusable and interacts with others through clearly defined interfaces.

Component	Purpose	Dependencies
Configuration Component (config.php)	Stores system settings such as database credentials and constants	Used by all system components
Database Component (database.php)	Handles database connections and queries	Configuration Component
Authentication Component (auth.php)	Manages login, sessions, and role-based access	Database Component
Business Logic Component (functions.php)	Implements system rules and reusable functions	Database Component
Email Service Component (mailer.php)	Sends automated system emails	Configuration Component
API Component (api/)	Provides dynamic data through AJAX requests	Business Logic, Database
Admin Module (admin/)	Manages appointments, users, patients, and reports	Auth, Business Logic, Database
Dentist Module (dentist/)	Allows dentists to view and manage appointments	Auth, Business Logic, Database
Patient Module (patient/)	Allows patients to manage profiles and view appointments	Auth, Business Logic, Database

SECURITY DESIGN

The Security Design of the Online Appointment System for Denthub Dental Clinic defines the measures implemented to protect the system, patient information, and clinic records from unauthorized access, data loss, and security threats. Since the system handles sensitive personal and medical-related data, security is a critical component to ensure confidentiality, integrity, and availability of information.

Security Requirements and Considerations

The system is designed to:

- Protect patient personal information and appointment records
- Prevent unauthorized access to clinic data
- Reduce risks of data loss, duplication, and manipulation
- Ensure that only authorized clinic staff can manage patient records and appointments
- Security considerations include protection against common threats such as unauthorized login attempts, data breaches, and accidental data deletion.

Authentication and Authorization

- The system implements authentication and authorization mechanisms to control access.
- Authentication
- Users must log in using a valid username and password.
- Only registered and authorized clinic staff can access the system.
- Authorization

User roles are defined to limit access based on responsibilities:

- Administrator – manages user accounts, system settings, and full access to records.
- Clinic Staff – manages appointments and patient records but has limited administrative access.
- This role-based access control ensures that users can only perform actions relevant to their role.

Data Encryption and Protection

To ensure data security:

- User passwords are stored in the database using secure hashing techniques.
- Sensitive patient data is protected from unauthorized viewing or modification.
- Data transmitted between the client and server is secured using encrypted communication protocols (e.g., HTTPS).
- Regular data backups are implemented to prevent data loss due to system failure or human error.
- These measures help maintain data confidentiality and system reliability.

Audit and Data Integrity

- The system maintains logs of important activities such as user logins, record updates, and appointment changes.
- This helps track system usage, detect suspicious activity, and ensure data integrity.
- Data validation is implemented to prevent incorrect or incomplete information from being saved.

PERFORMANCE DESIGN

Objective

The goal of performance testing is to ensure the dental appointment system:

- Handles expected and peak user loads without degradation
- Responds within acceptable time limits
- Scales for growth (more clinics, dentists, patients)

Scope of Testing

- Patient portal (web/mobile)
- Appointment booking & rescheduling
- Dentist availability lookup
- User authentication (login/signup)
- Admin/clinic dashboard
- Notifications

Performance Requirements & Objectives

The system must be optimized for both administrative efficiency (front-desk speed) and technical stability (server response).

Scalable Architecture & Load Balancing

Database : For multi-location practices, by ensuring that a heavy workload in one clinic doesn't slow down a separate practice on the same platform.

ERROR HANDLING AND LOGGING

Error Handling

The Online Appointment System for Denthub Dental Clinic will implement proper error handling to ensure system reliability, data integrity, and smooth clinic operations. The system will validate user inputs such as appointment details, patient information, and login credentials to prevent incomplete or incorrect data entry. If an error occurs, the system will display clear and user-friendly error messages to guide authorized staff in correcting the issue without exposing sensitive system details.

System-level errors such as failed database connections, scheduling conflicts (e.g., double bookings), or unavailable dentist schedules will be handled gracefully by preventing the action from proceeding and notifying the user of the issue. This approach helps reduce data inconsistencies, minimizes workflow disruptions, and supports continuous system availability during clinic operating hours.

Logging

The system will maintain system logs to record important activities and events performed by authorized users. Logged information will include user actions such as login attempts, appointment creation, updates, cancellations, patient record modifications, and system access times. These logs will be automatically generated and securely stored in the database.

System logs will support monitoring, auditing, troubleshooting, and security purposes. In case of system errors, unexpected behavior, or data issues, logs will help administrators and developers identify the cause and take corrective action. Logging also supports accountability by tracking user activities and helps ensure compliance with data security and access control requirements defined in the system specifications.

THIRD-PARTY INTEGRATIONS

The system is developed as a web-based online reservation system that operates through the internet. While the system's core functionalities such as user registration, reservation management, and record processing are handled internally, it relies on third-party platforms for hosting, database management, and development support.

The system utilizes MySQL hosted through Neontech as its database service to store and manage reservation data securely and efficiently. For deployment and online accessibility, the system is hosted on Render, which enables users and staff to access the reservation system through a web browser. These third-party services provide the necessary infrastructure for the system to function online but do not directly control the system's internal business logic.

In addition, GitHub is used as a version control platform to manage the source code, track system changes, and support collaboration among the development team. This ensures proper code management, version tracking, and system stability throughout the development process.

No external third-party APIs, such as payment gateways, SMS services, or email automation tools, are integrated into the current version of the system. All reservation processing and user interactions are managed within the system itself.

DEPLOYMENT PLAN

The deployment of the Online Appointment System for Denthub Dental Clinic will be carried out in a structured and controlled manner to ensure a smooth transition from the existing manual and semi-digital processes to the new system. The process will begin with system preparation and testing in a local or staging environment to verify that all features function correctly. Once testing is completed, the system will be deployed to the production environment where it will be accessible to authorized clinic staff.

Before full implementation, clinic staff will be oriented and trained on how to use the system, including appointment scheduling, patient record management, and basic system navigation. Initial deployment will be monitored closely to identify and resolve any technical issues. Regular backups and system checks will be conducted to ensure data integrity and system stability after deployment.

Hardware Requirements:

- Desktop computers or laptops for clinic staff (at least 8 GB RAM)
- Stable internet connection
- Optional printer for printing appointment schedules and patient records

Software Requirements:

- Operating System: Windows or Linux
- Web Server: Apache or
- Database Management System: MySQL
- Programming Language and Framework: PHP / Python / JavaScript (depending on system design)
- Web Browser: Google Chrome, Mozilla Firefox, or Microsoft Edge
- Hosting Platform: Local server or cloud-based hosting service

Configuration Management and Version Control Procedures

Configuration management shall be implemented to ensure consistency, reliability, and maintainability throughout the deployment process. System configuration files, database schemas, and environment settings shall be properly documented and maintained to minimize deployment errors and system inconsistencies.

Version control procedures shall be enforced through the use of a centralized version control system, such as Git. All source code modifications shall be tracked and documented to facilitate efficient management of system updates, enhancements, and bug fixes. Regular system backups and version tagging shall be performed to preserve system integrity and to enable rapid recovery in the event of system failure or data loss.

MAINTENANCE AND SUPPORT

The Denthub Dental Clinic Online Appointment System will undergo regular maintenance to ensure stable performance, data security, and reliable operation. Routine system monitoring, database backups, and compatibility checks will be performed to prevent errors and reduce downtime. These activities help maintain the accuracy of patient and appointment records while ensuring smooth access for both patients and clinic staff.

Software updates will be implemented carefully to minimize disruption to clinic operations. Minor updates and bug fixes will be applied during scheduled maintenance periods, while major enhancements will be tested before deployment. Version control will be used to track changes and allow recovery in case issues occur. Users will be informed in advance of important updates or maintenance activities.

System support will be handled by designated technical personnel who will manage issue reports and provide assistance when needed. Critical issues will be addressed immediately, while non-critical concerns will be resolved during regular maintenance cycles. A clear escalation process ensures that complex technical problems are handled efficiently. Regular data backups, recovery testing, and updated documentation will support long-term system reliability and effective system use.