Sri Lanka Institute of Information Technology

Software Engineering – SE2030 Year 2 – Semester 1 Dental Management System

Group No: 2025-Y2-S1-MLB-B12G2-08

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Introduction

The Web-based Dental Management System is developed to help dental clinics manage their daily operations more easily and efficiently. This project aims to automate and optimize both administrative and clinical tasks. The system enables smooth interaction among key stakeholders The project is about allowing patients to book appointments, help staff to manage patients' records, track dental supplies, and dentists to access patient's information and X-rays.

Objectives

• Replace the current paper based manual system with a digital solution.

• Improve appointment booking and management.

• Provides secure access to patients' records

• View and manage dental supplies

• Reduce waiting times and improve patient experience within user friendly UI

Target Users/ stakeholders

• Patients

• Dentists

• Receptionists

• Admin officer

• Suppliers

• X-ray Lab Assistant

Scope:

The system will be a web-based application that works on computers and mobile devices. It will handle appointment booking, patient management, X-ray storage, supply tracking, and user management. The system enhances the overall quality of dental care and provides better experience for both staff and patients.

Limitations:

• The system will work with internet connection.

• Designed especially for dental clinics

• Will not handle financial transactions or payments

• No high-level reporting or analytics

• Limited control for admin over all modules

Functional Requirements

• User Authentication-Secure login for different types of users

• Appointment Booking- patients can book and view appointments online

• User management- manage all types of users

• X-ray management- upload, store and view dental x-ray images

• Supply management- add, update and delete dental supplies

• Appointment management- dentist, receptionist and admin can manage appointments

• Dashboard Access- Role-based dashboard for different user types
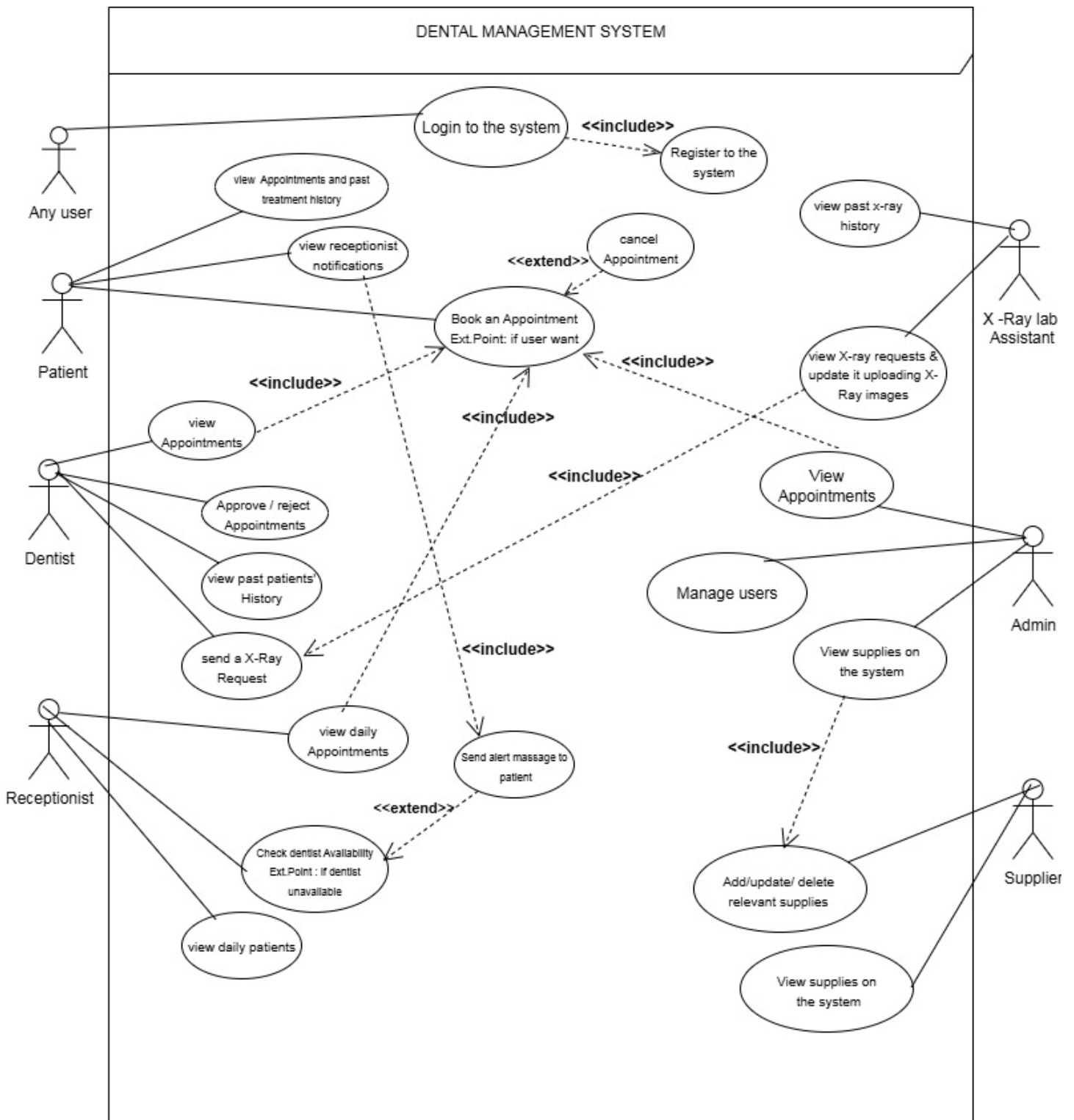
Nonfunctional Requirements

• High system availability (uptime)

• Responsive UI for all devices

• Role-based access control

• Data security and patient confidentiality

• Backup and recovery support
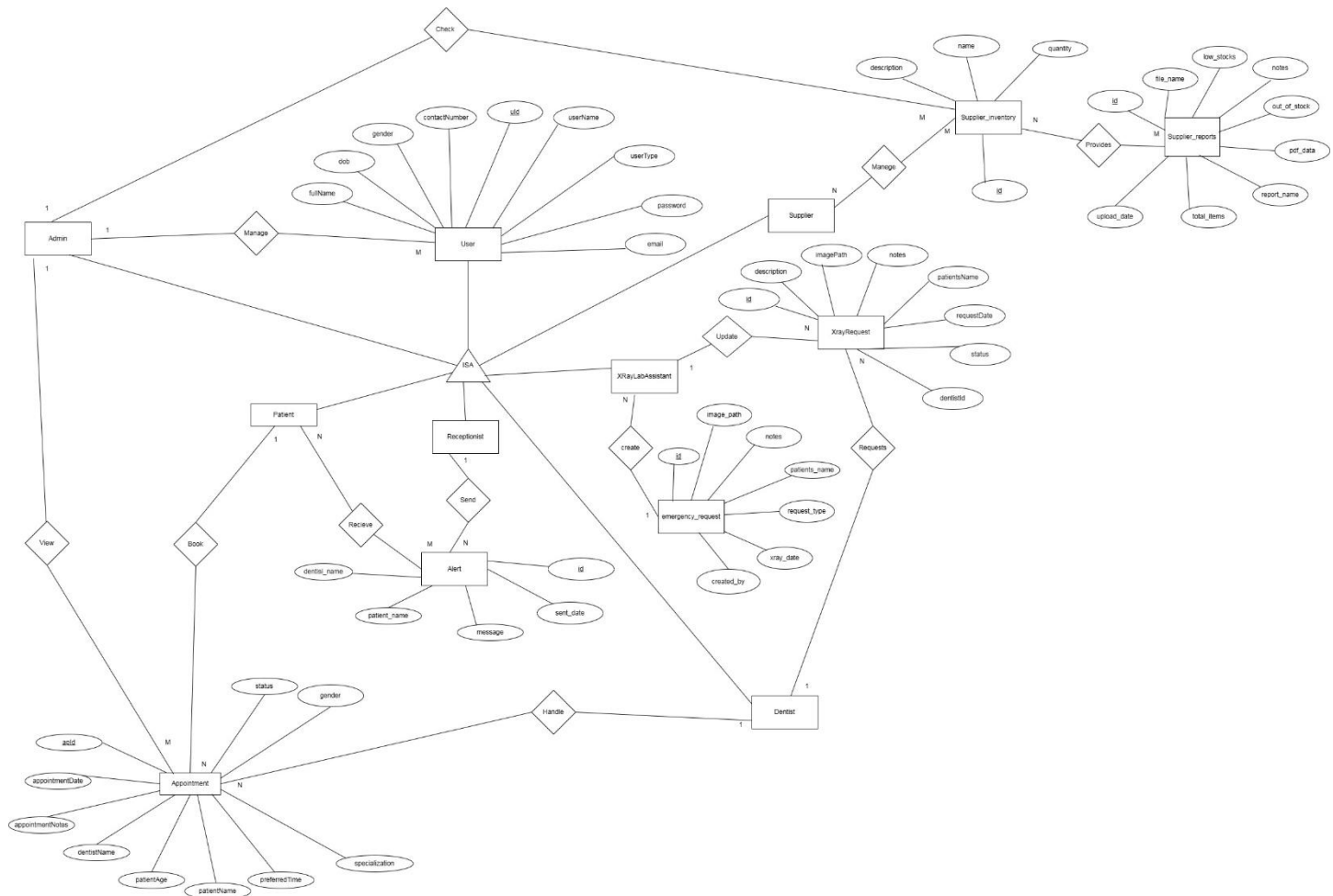
• Fast load times

System Constraints:

- Device Constraint: Expected to run on standard desktop or laptop computers with modern browsers (Chrome, Firefox, Edge).
- Manual Input Assumption: Assumes X-ray images are manually uploaded by the lab assistant; no direct integration with X-ray devices.
- User Role Constraint: Each user type (Dentist, Patient, Lab Assistant, Admin, supplier) has fixed permissions; limited cross-role functionality.
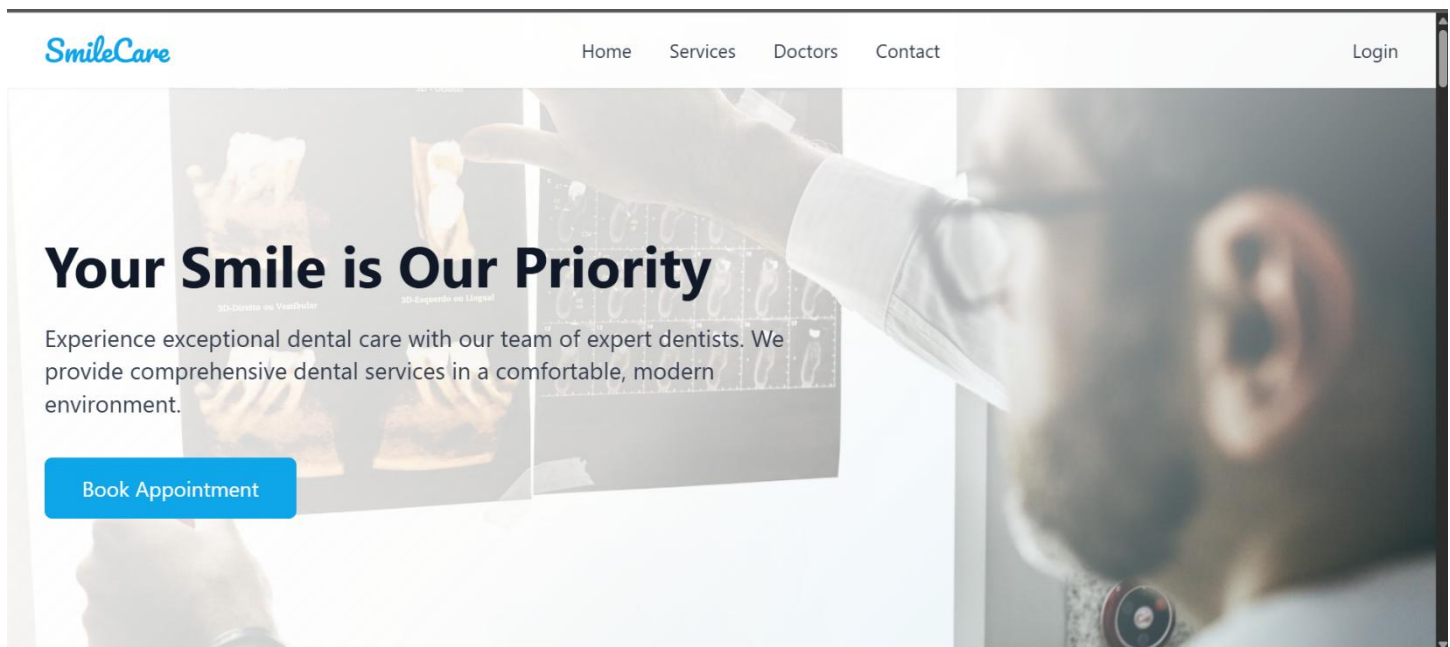
4. Design

Use Case Diagram

Database Design / ER Diagram

UI Sketches/Screenshots and Descriptions:

SmileCare

Welcome Back!
Please sign in to continue.

Username

Password

Sign In

Don't have an account? Register Now

Preventive Care
Regular cleanings, check-ups, and preventive treatments to maintain optimal oral health.
- Dental Cleanings
- Oral Examinations
- Fluoride Treatments

Cosmetic Dentistry
Enhance your smile with our advanced cosmetic dental procedures.
- Teeth Whitening
- Porcelain Veneers
- Smile Makeovers

Restorative Services
Restore damaged teeth with our comprehensive restorative treatments.
- Dental Fillings
- Crowns & Bridges
- Dental Implants

Orthodontics
Straighten your teeth with modern orthodontic solutions.
- Traditional Braces
- Clear Aligners
- Retainers

Oral Surgery
Advanced surgical procedures performed with precision and care.
- Tooth Extractions
- Wisdom Teeth Removal
- Gum Surgery

Emergency Care
Immediate dental care for urgent situations and dental emergencies.
- Emergency Appointments
- Pain Relief
- Urgent Repairs

Common Dental Disorders
Understanding and treating various dental conditions

Tooth Decay & Cavities
Dental caries or tooth decay occurs when bacteria form a film (plaque) on teeth and produce acid that erodes tooth enamel. Early signs include dark spots and sensitivity.
- Regular brushing & flossing
- Fluoride treatments
- Dental sealants

Periodontal Disease
Gum disease begins with gingivitis and can progress to periodontitis. Symptoms include bleeding gums, recession, and loose teeth if left untreated.
- Professional cleaning
- Scaling & root planing
- Antibiotic treatment

Tooth Sensitivity
Sensitivity occurs when tooth enamel wears down or gums recede, exposing dentin. Common triggers include hot, cold, sweet, and acidic substances.
- Desensitizing toothpaste
- Fluoride treatments
- Bonding procedures

Malocclusion
Misaligned teeth or incorrect bite relationships can cause difficulty in chewing, speaking, and maintaining oral hygiene. May lead to TMJ disorders.
- Orthodontic braces
- Clear aligners
- Dental surgery

Dental Abscess
A severe infection that creates a pocket of pus in tooth or gum tissue. Causes severe pain, swelling, and fever. Requires immediate treatment.
- Root canal therapy
- Antibiotics
- Drainage procedure

Dental Trauma
Injuries to teeth and surrounding tissues from accidents or impacts. Can include chips, cracks, displacement, or complete tooth loss.
- Emergency care
- Dental bonding
- Crown placement

Create Your Account
Let's get you started!

Full Name
e.g., Nimal Priyantha

Date of Birth
mm/dd/yyyy

Gender
Male

Contact Number
e.g., 0775821487

Email Address
you@example.com

Username
Choose a unique username

Password

Register Account

Already have an account? Sign In

Welcome
Join our family and let us take care of your smile. Creating an account is the first step towards a healthier, brighter you.

Meet Our Expert Dentists
Experienced professionals dedicated to your oral health

Dr. Nilusha Sudharaka
General Dentistry
Metropolitan Dental Center
15 years of experience in comprehensive dental care with a focus on patient comfort and preventive treatments.
DOCTOR ID- 01

Dr. Pankaja Yunidu
Orthodontics
Smile Specialists Clinic
Specializing in braces and clear aligners with over 12 years of experience in creating beautiful smiles.
DOCTOR ID- 02

Dr. Nadara Wanigasekara
Oral Surgery
Advanced Dental Surgery Center
Expert in complex oral surgeries and dental implants with 18 years of surgical experience.
DOCTOR ID- 03

Dr. Vishwa Nethsara
Cosmetic Dentistry
Aesthetic Smile Studio
Renowned for smile makeovers and aesthetic dental procedures with 14 years of cosmetic expertise.
DOCTOR ID- 04

Dr. Thisuka Senan
Pediatric Dentistry
Kids Dental Care Center
Specializing in children's dental health with 10 years of experience in pediatric care.
DOCTOR ID- 05

Dr. Amasha Sawandi
Periodontics
Gum Health Specialists
Expert in gum disease treatment and prevention with 16 years of periodontal experience.
DOCTOR ID- 06

Book Your Dental Appointment

Schedule your visit with our experienced dental professionals

Patient Information

Full Name *
Enter your full name

Age *
Enter your age

Gender *
Male

Contact Number *
+1 (555) 123-4567

Email Address *
your.email@example.com

Appointment Details

Select Doctor *
Dr. Nilusha Sudharaka (General Dentistry)

Preferred Date *
mm/dd/yyyy

Preferred Time *
10:00 AM

Minimum 1 day advance booking required

Appointment Notes (Optional)
Please describe your symptoms or reason for visit...

0/500 characters

ⓘ Important Information:
- Appointments must be booked at least 1 day in advance
- Maximum 30 appointments per day (some dates may be unavailable)
- Please arrive 15 minutes early for your appointment
- Bring a valid ID and insurance information

Book Appointment

👤 My Profile

🔔 ☾ **Logout**

nadara2004
Premium Member

Full Name:	Nadara Sandewniiiii
Date of Birth:	2005-04-05
Gender:	Female
Email:	nadara@gmail.com
Phone:	0770600447

✏ Update Profile

⟲ Appointment History

Date	Time	Patient Name	Dentist	Status	Actions
Oct 29, 2025	11:30 AM	Asanka Gunasinghe	Dr. Nilusha Sudharaka (General Dentistry)	REJECTED	No actions available
Notes: hey, My teeth pain					
Oct 29, 2025	04:30 PM	k k Yasith	Dr. Nilusha Sudharaka (General Dentistry)	ACCEPTED	No actions available
Notes: ane deyyane					

SmileCare
Admin Dashboard

- 👤 User Management
- 🗓 Appointment Manager
- 🗄 Supplier Manager

⊟ Logout

User Management

Create, view, update, and delete system users.

+ Create New User

Patients	Dentists	Receptionists	Admins	Suppliers
2	3	1	1	1

Filter by type: All Users

USER ID	FULL NAME	EMAIL	TYPE	ACTIONS
U001	Default Admin	admin@clinic.com	Admin	✏ 🗑
U002	Nilusha Sudharaka	nilusha1234@gmail.com	Dentist	✏ 🗑
U003	Nadara Sandewniiiii	nadara@gmail.com	Patient	✏ 🗑
U004	Amasha sawandi	amasha2003@gmail.com	X-Ray Lab Assistant	✏ 🗑
U005	Thisuka Senan	senan@gmail.com	Supplier	✏ 🗑
U006	Vishwa nethsaa	vishwa123@gmail.com	Receptionist	✏ 🗑
U007	Pankaja Yunidu	pankaja1345@gmail.com	Dentist	✏ 🗑
U008	sayuri hansika	vishwa11123@gmail.com	Patient	✏ 🗑
U009	amarabandu rupasinghe	senanamara@gmail.com	Dentist	✏ 🗑

SmileCare

Dr. Nilusha Sudharaka
General Dentistry • SmileCare Dental Clinic

🗓 **0** Appointment Requests	🗒 **1** X-ray Requests

Appointment Requests

ID	PATIENT	NOTE	DATE/TIME	ACTIONS
			No pending appointment requests.	

‹ October 2025 ›

Mon Tue Wed Thu Fri Sat Sun
1 2 3 4 5
6 7 8 9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 29 30 31

Accepted Appointments

ID	NAME	NOTE	DATE/TIME	STATUS
4	k k Yasith	ane deyyane	Oct 29, 2025, 04:30 AM	ACCEPTED

X-ray Requests

PATIENT NAME	DESCRIPTION	REQUEST DATE	STATUS
Pathum harshana	fdfgf	Oct 22, 2025	PROCESSED

⊕ Create X-ray Request

Detailed X-ray Requests

Pathum harshana PROCESSED
Description: fdfgf
Requested: Oct 22, 2025
Lab Notes: vfggfgf

🗄 View X-ray

SmileCare | Receptionist Dashboard

| Scheduled Appointments | Alert System | Alert History |

☑ Scheduled Appointments

October 2025

				2				
2	1	0	1
Total Appointments	Accepted	Pending	Active Dentists

ID	Patient Name	Contact	Dentist	Date & Time	Status
2	Asanka Gunasinghe	0765856854	Dr. Nilusha Sudharaka (General Dentistry)	10/29/2025 11:30 AM	● REJECTED
4	k k Yasith	0789581155	Dr. Nilusha Sudharaka (General Dentistry)	10/29/2025 04:30 PM	● ACCEPTED

📇 X-ray Lab Assistant
Professional Medical Imaging System

Logout

🕐	✅	🚑
0	**1**	**1**
PENDING REQUESTS	PROCESSED TODAY	EMERGENCY CASES

⊞ Dentist X-ray Requests

ID	PATIENT NAME	DENTIST	DATE	STATUS	NOTES	ACTIONS
			No pending requests found			

≫ Processed X-ray Requests

ID	PATIENT NAME	DENTIST	DATE	STATUS	NOTES
#1	Pathum harshana	Dr. Nilusha Sudharaka	Oct 22, 2025, 05:30 AM	✔ PROCESSED	**Dentist Notes:** fdfgf

🚑 Emergency X-ray Requests

+ Create Emergency Request

ID	PATIENT	DATE	TYPE	STATUS	NOTES
#1	Asanka	Oct 20, 2025, 07:50 PM	Panoramic	✔ PROCESSED	test1

9

SmileCare

Today: 23 Oct 2025, 12:02 pm IST   Search items...   Logout

TOTAL ITEMS **2**	LOW STOCK **0**	OUT OF STOCK **0**

Quick Add Items
Search and select from common dental supplies

Type common dental supplies...

Nitrile Gloves · Endodontic Files · Composites · Addition Silicone · Turbines & Couplings · Interdental Brushes · Dental Anesthetic · Surgical Masks · Dental Syringes · Curing Light · Dental Cement · X-Ray Films · Cotton Rolls · Dental Floss · Mouth Mirrors · Prophy Angles

VIEW All Items   **SORT BY** ID ▲

+ Add Item   📄 Export PDF   ⬆ Upload to Admin

Inventory Items
2 items

# ID	ITEM	DESCRIPTION	QUANTITY	ACTIONS
1	Nitrile Gloves	Box of 100 disposable gloves	100 ✓OK	✏ 🗑
2	Turbines & Couplings	High-speed handpieces	12 ✓OK	✏ 🗑

+ Add Item   ✕

🏷 Name

Enter item name

ℹ Description

Enter description (optional)

🛍 Quantity

0

📄 Upload PDF to Admin   ✕

📝 Report Name

Inventory Report

💬 Notes (Optional)

Add any notes for the admin...

👁 Preview

SmileCare — Inventory Report
Generated on: 10/23/2025, 12:07:18 PM

Total Items: 2
Low Stock: 0
Out of Stock: 0

ID	Name	Description	Quantity	Status
1	Nitrile Gloves	Box of 100 disposable gloves	100	OK
2	Turbines & Couplings	High-speed handpieces	12	OK

5. Implementation

Tools and Technologies Used

- Language: Java

- Backend Framework: Spring Boot

- Frontend: HTML, CSS, JavaScript

- Database: Microsoft SQL Server Management Studio

- Web Server: Apache Tomcat

- Version Control: GitHub

Key Features Developed

- Appointment booking and approval system.

- Secure authentication with Role base access.

- Patient data and X-ray storage.

- Supply management and inventory tracking.

- All appointments tracked by Receptionist

- User profile manage and view Alerts

6. Project Management

Agile Approach and Sprint Summary

The team followed the Agile (Scrum) methodology with multiple sprints:

- Sprint 1: Requirement gathering and UI design.

- Sprint 2: Backend setup and database design.

- Sprint 3: Implementation of appointment and X-ray modules.

- Sprint 4: Integration testing and final polishing.

Task Distribution Among Team Members

Member	Task
Wanigasekara W M S N M	Appointment Booking & Patient Dashboard
Sawandi T.G.A	X-ray Upload and Management
Yunidu E.D.P	Admin & User Management
Senan R.A.D.T	Supply Management
Abesundara N S	Dentist Dashboard and Approvals
Perera K.V.N	Receptionist Scheduling and Notifications

Development Timeline

- Week 1–3: Proposal and requirement gathering

- Week 4–6: Design and database creation

- Week 7–10: Implementation

- Week 11–13: Testing and debugging / Adding Strategy design Pattern

- Week 14: Final presentation

7. Conclusion & Future Work

Summary of Achievements

- Fully functional web-based system for dental clinic management.

- Improved efficiency and accuracy in appointment handling.

- Secure, role-based access for all stakeholders.

- Centralized patient data and supply management.

Challenges Faced

- Role-based permission control complexity.

- Handling concurrent appointment requests.

- UI responsiveness on different devices.

- Create the logic for necessary functions accurately.

Suggestions for Improvement

- Integrate payment and billing module.

- Add advanced analytics and reporting.

- Enable automated appointment reminders via email/SMS.

- Patients also can view x-ray images directly.

8. Individual Contribution, Teamwork & Lessons Learned

Member	Role	Challenges	How Overcome	Lessons Learned	Reflection
Wanigasekara W M S N M	Appointment Module	UI integration issues	Collaborated with backend team	Improved JavaScript & API handling	Great teamwork experience
Sawandi T.G.A	X-ray Management	file handling	Used compression & lazy loading	Image optimization & validation	Learned about handling binary data
Yunidu E.D.P	Admin Module	Complex CRUD operations	Broke tasks into small steps	SQL optimization & MVC patterns	Learned leadership & coordination
Senan R.A.D.T	Supply Module	Data inconsistency	Added validations & constraints	Learned data integrity	Understood database relationships
Perera K.V.N	Dentist Dashboard	Role conflict errors	Debugged authentication rules	Improved Spring Security	Learned backend troubleshooting

9. Team Contributions

Each group member led one major functional module (following Agile/Scrum roles, each sprint also had designated tasks):

- Wanigasekara WMSNM: Developed the *Appointment Booking* and *Patient Dashboard* functionality (patient registration, booking form, appointment status view).

- T.G.A. Sawandi: Implemented the *X-ray Management* module (image upload UI and storage logic, linking images to patient records).

- E.D.P. Yunidu: Handled *User & Appointment Administration* (admin pages to manage users and full appointment control).

- R.A.D.T. Senan: Created the *Supply Management* module (inventory add/update/delete, stock-level views).

- N.S. Abesundara: Developed the *Dentist Dashboard* features (viewing appointments, patient histories, approving requests).

- K.V.N. Perera: Implemented *Appointment Management* for receptionists (daily schedule interface, notification alerts to patients).

Each member also participated in system integration and testing of the other modules. We adopted a culture of code reviews and pair-programming during sprint handoffs to ensure knowledge transfer. This collaboration ensured all parts of the system worked together smoothly.

10. Conclusion

The complete Web-based Dental Management System meets the defined objectives by providing an effective digital solution for SmileCare Dental Clinic. Key features include online appointment scheduling, secure patient record access, X-ray uploads, and supply tracking. By automating these processes with role-based interfaces, the system reduces manual work and errors, improves data accuracy, and accelerates information flow between departments. As a result, clinic staff can focus more on patient care rather than paperwork. The system's secure, user-friendly platform enhances overall operational efficiency and patient experience. Future work could add modules such as automated reminders or analytics, but the current implementation fulfills all major requirements and demonstrates the intended benefits.

References

Frameworks and Libraries

[1] Spring, "Spring Framework," *Pivotal Software*, 2024. [Online]. Available: https://spring.io/projects/spring-framework. Accessed on: Oct. 21, 2025.

[2] Spring, "Spring Boot," *Pivotal Software*, 2024. [Online]. Available: https://spring.io/projects/spring-boot. Accessed on: Oct. 21, 2025.

GitHub Repository Link

https://github.com/IT24103504/SE_Dental_Management.git