FPT INTERNATIONAL TRAINING INSTITUTE

FPT – APTECH COMPUTER EDUCATION

Center name: ACE-HCMC-2-FPT.

Address:24bis Hau Giang, Ho Chi Minh City, Viet Nam.

Sunshine Dental Care

Supervisor:	Mr.Tran Phuoc Sinh	
Term:	2	
Batch No:	T1.2311.M0	
Group No:	03	
Order:	**Full Name**	**Roll No.**
1	Nguyen Minh Hoang	Student1518643
2	Ngo Minh Tuan	Student1518644
3	Son Phi Long	Student1518668
4	Nguyen Quoc Huy	Student1518650
5	Nguyen Huu Hoang	Student1531944

Month 11 Year 2025

ACKNOWLEDGEMENT

We would like to extend our heartfelt appreciation to all those who have provided valuable support during the development of our **Sunshine Dental Care** project.

First and foremost, we would like to express our sincere gratitude to our dedicated instructor, **Mr. Tran Phuoc Sinh**. His insightful suggestions and words of encouragement helped us overcome technical challenges regarding the **complex system logic** and provided us with the confidence to tackle obstacles. Without **his** guidance, our project would not have achieved the level of success it has today.

Secondly, we would like to express our deep appreciation to the Project Team at the Head Office. Their unwavering support and the opportunity they provided us to apply our learning into practical implementation have been invaluable. We are confident that the experiences gained from developing this **Dental Clinic Management System** will greatly benefit our future careers in the software development field.

Thirdly, we would like to acknowledge and thank all the staff members of our center. Their collaboration, not only in allowing us to work with them on this project but also for their continuous support and encouragement throughout the process, has been instrumental in our success.

Lastly, we would like to express our personal gratitude to our fellow classmates and team members of **Group 03**. Their open and enthusiastic support has been truly invaluable. Their willingness to lend a helping hand and work together has made this journey enjoyable and rewarding.

Building the **Sunshine Dental Care** project has been a collaborative effort, and we would like to express our sincere appreciation to everyone involved. The unwavering support, guidance, and encouragement we received have helped us overcome technological challenges and bring this project to fruition. We are grateful for the opportunity to apply our knowledge and skills to create a successful **comprehensive Dental Management platform**.

SYNOPSIS

The **Sunshine Dental Care** project, built using **Java Spring Boot**, **ReactJS**, and **Flutter**, is a modern and flexible platform designed to meet the complex operational needs of dental clinics. Leveraging the robust **Spring Boot** framework for the backend, **ReactJS** for the administration portal, and **Flutter** for the patient mobile application, Sunshine Dental Care offers a seamless and synchronized ecosystem.

This platform allows administrators, doctors, and patients to engage in efficient appointment scheduling, secure medical record management, and intelligent human resource operations. Furthermore, by **integrating multiple advanced AI technologies to automate various operational stages**, the system ensures an efficient and professional healthcare experience, combining robust performance with an intuitive design tailored to enhance the overall user experience in the digital medical marketplace.

Chapter 1. PROBLEM DEFINITION

Sunshine Dental Care is a comprehensive ecosystem for dental clinic management, designed to streamline operations for administrators, medical staff, and patients. Built with **Java Spring Boot**, **ReactJS**, and **Flutter**, it combines advanced AI features with robust database integration, offering a seamless healthcare experience with high-level security and cross-platform accessibility.

1. Modern and Cross-Platform Interface: Sunshine Dental Care features a modern, user-friendly design tailored for different users. The **ReactJS** web portal provides a powerful dashboard for administrators and doctors, while the **Flutter** mobile app offers an intuitive experience for patients to book appointments and view medical history on the go.

2. Smart Scheduling & HR Management: Unlike traditional systems, Sunshine Dental Care leverages **AI technologies**. The system enables **AI-driven scheduling** via Natural Language Processing (NLP) to automate appointment booking. Additionally, it offers advanced HR management with **biometric attendance**, utilizing ArcFace for FaceID verification and Wi-Fi geolocation to ensure accurate staff tracking.

3. Clinical & Patient Management: The platform enables efficient management of **Electronic Medical Records (EMR)**. Doctors can easily add diagnoses, update treatment plans, and upload X-ray images. This feature ensures that patient history is organized, accessible, and secure, enhancing the quality of care provided.

4. SQL Server Database & Security: Sunshine Dental Care is backed by a robust **SQL Server database**, ensuring the secure and efficient storage of sensitive medical data and high-volume transaction records. This guarantees data consistency, integrity, and reliability in managing critical clinic information.

5. Inventory & Financial Analytics: The system offers comprehensive financial tools, allowing the clinic to manage **invoices, payments, and product inventory** efficiently. Integrated analytics features enable the monitoring of revenue, salary calculations based on attendance, and supply usage, helping owners make strategic, data-driven decisions.

6. CRM & Patient Engagement: Replacing traditional communication methods, the system includes a **CRM and Notification module**. This features an **AI Chatbot** for instant patient support and automated appointment reminders. It helps build a strong relationship with patients, reduces no-show rates, and keeps customers informed about their dental health status.

Chapter 2. CUSTOMER'S REQUIREMENTS SPECIFICATIONS

2.1. Business/Project Objective:

Main Objective of the Sunshine Dental Care System:

The primary goal of the Sunshine Dental Care system is to provide a comprehensive and intelligent platform for modernizing dental clinic operations. This platform aims to streamline workflows for administrators, medical staff, and patients by integrating advanced technologies. It covers all aspects of clinic management, including patient records, smart scheduling, human resources, and financial tracking.

Here are the specific objectives:

2.1.1. Patient & Medical Management: Effectively manage patient profiles, medical histories, and Electronic Medical Records (EMR). This includes storing diagnosis details, treatment plans, and digital X-ray images to enhance the quality of care and ensure data accessibility for doctors.

2.1.2. Smart Scheduling & HR Operations: Leverage **AI and Natural Language Processing (NLP)** to automate staff scheduling and validate appointment slots. Implement **Biometric Attendance** (FaceID & Geo-fencing) to accurately track employee work hours, ensuring efficient human resource management.

2.1.3. Appointment & Financial Management: Seamlessly process appointment bookings across multiple clinics and doctors. The system must also handle invoicing, payment processing, and inventory management for dental supplies, ensuring accurate financial reporting and stock control.

2.1.4. CRM & Patient Engagement: Enhance patient interaction through an **AI Chatbot** and automated notification system. This feature aims to provide instant support, send appointment reminders to reduce no-show rates, and foster long-term relationships with patients.

2.1.5. User Experience (Cross-Platform): Ensure an intuitive and consistent user experience across different platforms: a powerful **ReactJS Web Portal** for clinic staff and a user-friendly **Flutter Mobile App** for patients to book services and view their health records on the go.

2.2. Hardware/ Software Requirements:

Software & Tools:

- **Operating System:** Windows 10 / 11 or macOS.
- **Database:** Microsoft SQL Server.
- **Backend Development:** Java Development Kit (JDK) 17+, Spring Boot Framework.
- **Frontend Development:** Node.js, ReactJS (for Admin Web), Flutter SDK (for Mobile App).
- **IDE / Code Editors:** IntelliJ IDEA, Visual Studio Code, Android Studio.
- **API Testing:** Postman.
- **Version Control:** Git & GitHub.
- **Design & Modeling:** Draw.io (for Diagrams), Figma (for UI Design).

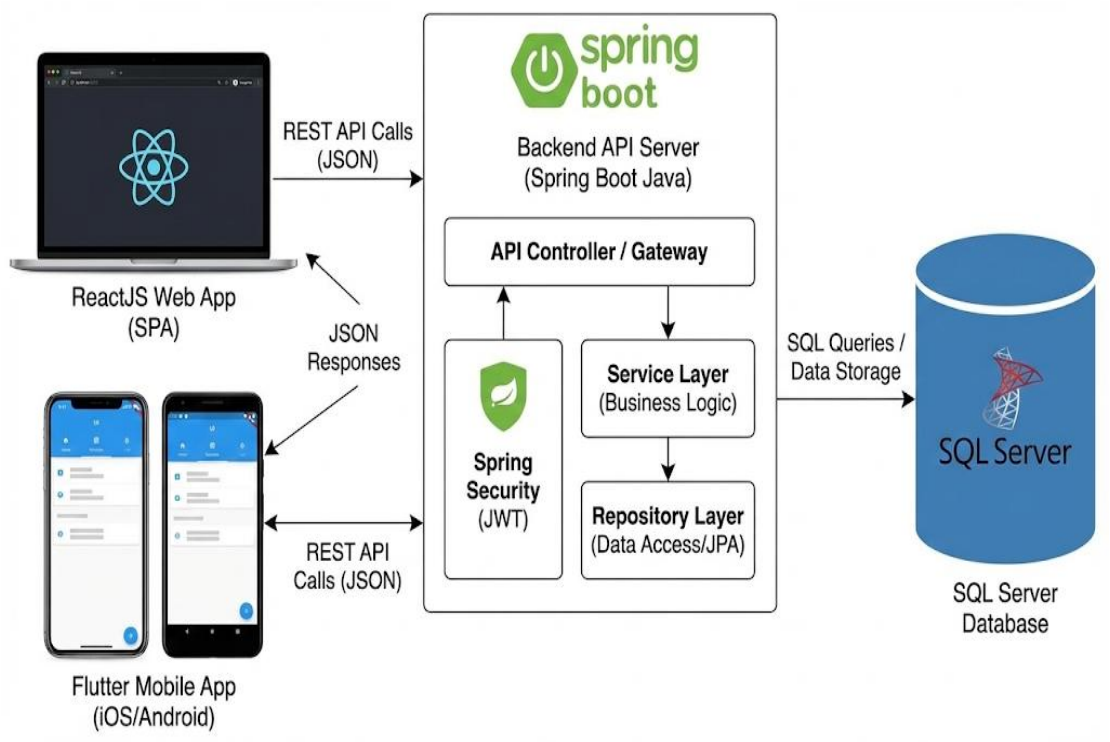
Technology Stack: Java Spring Boot / ReactJS / Flutter / SQL Server

2.3. ARCHITECTURE AND DESIGN OF THE PROJECT

The Sunshine Dental Care system is built upon a robust **Multi-Tier Client-Server Architecture**, utilizing **Java Spring Boot** as the core backend framework. Unlike traditional monolithic applications, this project adopts a **RESTful API-first design**, which decouples the frontend user interfaces from the backend logic.

- **Backend (Server-Side):** Powered by Spring Boot, the server acts as a centralized API hub. It handles complex business logic, AI data processing (NLP & ArcFace), security (Spring Security with JWT), and database interactions via Hibernate/JPA.
- **Frontend (Client-Side):** The system supports cross-platform clients:
    - **ReactJS:** Provides a dynamic and responsive Web Admin Dashboard for clinic staff.
    - **Flutter:** Delivers a high-performance native Mobile Application for patients.

This architecture ensures high scalability, maintainability, and security, allowing different client platforms (Web & Mobile) to communicate seamlessly with the server through standardized JSON data exchange.



Chapter 3. SCOPE OF THE WORK (IN BRIEF)

The scope of work for the **Sunshine Dental Care** project includes the following key components:

1. Multi-Platform Application Development:

- Design and develop a robust backend system using **Java Spring Boot**.
- Create a responsive **ReactJS** Web Admin Portal for clinic staff and a cross-platform **Flutter** Mobile App for patients.

2. Smart Scheduling & HR Management:

- Implement **AI-driven scheduling** using Natural Language Processing (NLP) to automate appointment creation and conflict resolution.
- Develop a **Biometric Attendance System** utilizing ArcFace (FaceID) and Geolocation (WiFi) for accurate staff tracking.

3. Patient & Clinical Management:

- Develop comprehensive **Electronic Medical Records (EMR)** to track diagnosis, treatment plans, and digital X-ray images.
- Implement patient profile management with secure access to medical history via the mobile app.

4. Financial & Inventory Control:

- Enable automated invoicing, payment processing, and revenue tracking.
- Create functionalities for managing dental product inventory, including stock tracking and categorization.

5. AI & CRM Integration:

- Integrate an **AI Chatbot** to assist patients with inquiries and booking.
- Implement a **CRM system** for automated appointment reminders and customer engagement campaigns.

6. Database & Security:

- Set up a robust **SQL Server** database to securely store complex medical and transaction data.
- Ensure high-level security with **Spring Security (JWT)** and Role-Based Access Control (RBAC) across all platforms.

Table of Contents

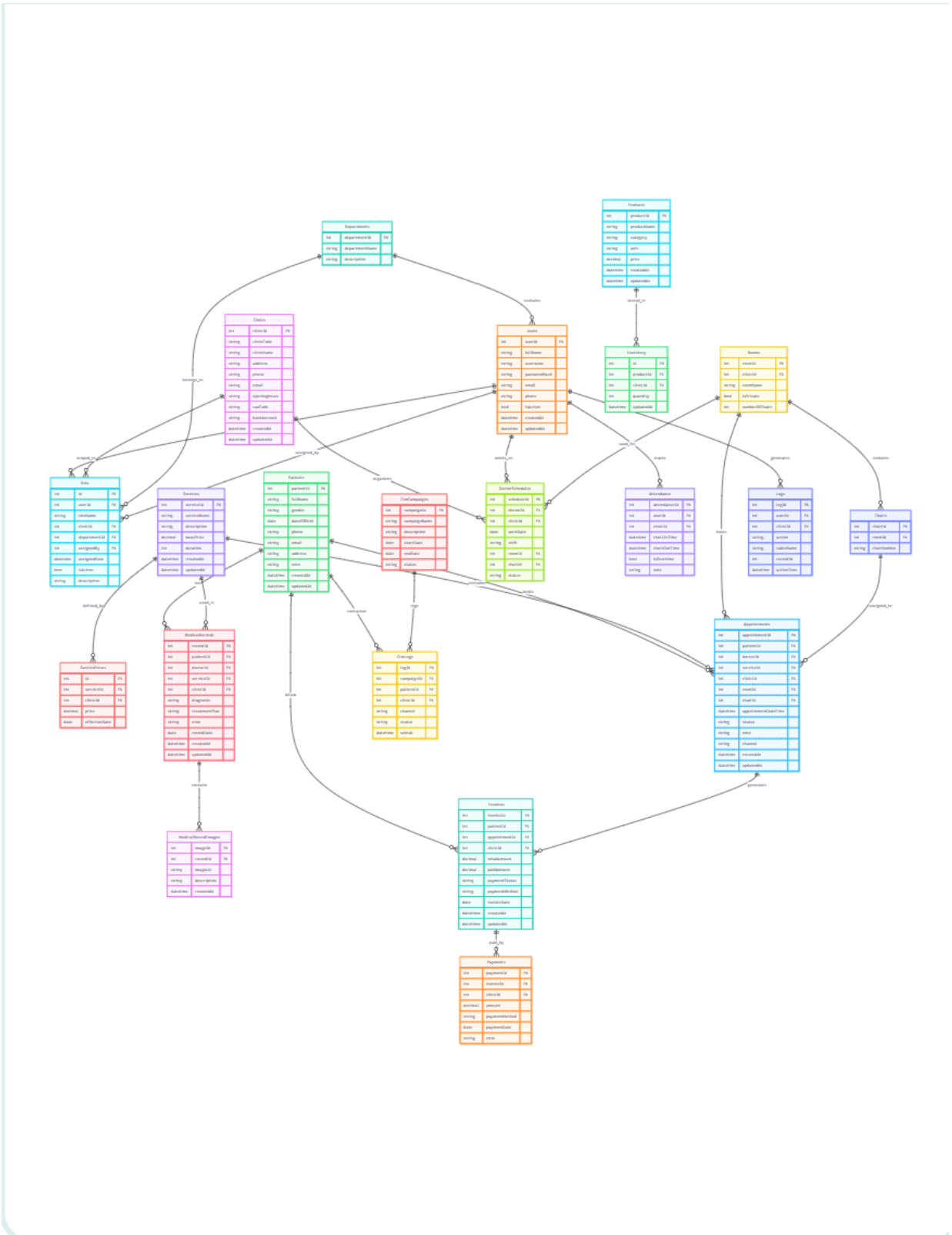
TASK LIST

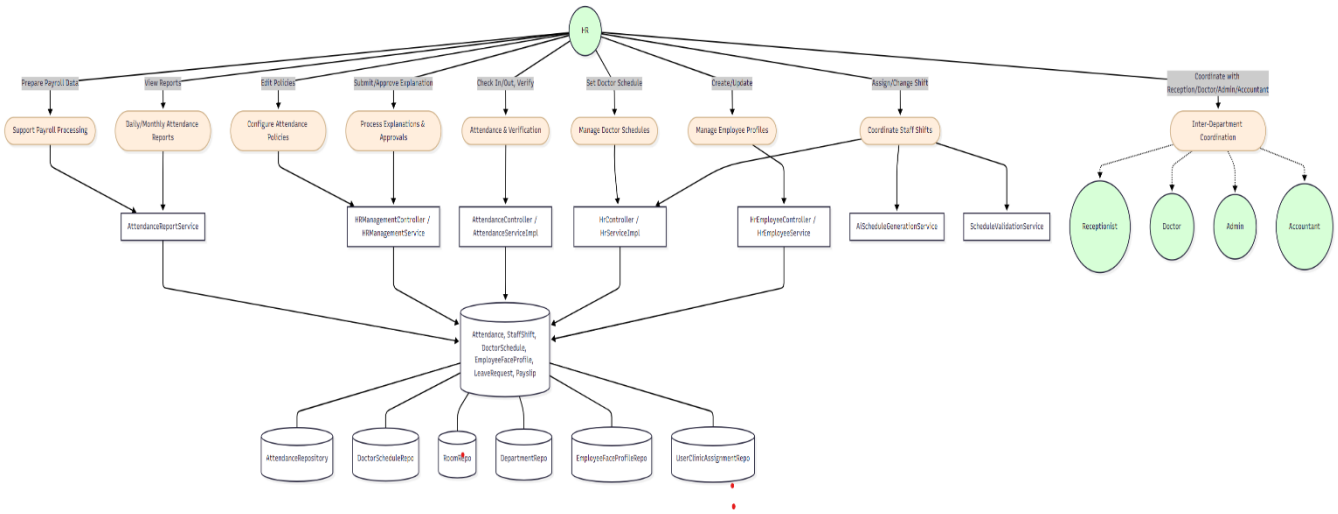
Sr. No.	Task Title	Assigned By	Actual Start Date	Actual Days	Teammate Names	Status
1	Authentication & User Profile(Login, Register, Security)	Tuan	24-November-2025	7	Ngô Minh Tuấn	Completed
2	HR Management & Admin Management	Long	24-November-2025	10	Sơn Phi Long	Completed
3	Doctor & Clinical Operations(Medical Records, Diagnosis)	Hoang (Nho)	24-November-2025	10	Nguyễn Hữu Hoàng	Completed
4	Reception & CRM System(Booking Mgmt, Invoices)	Hoang (Lon)	24-November-2025	10	Nguyễn Minh Hoàng	Completed
5	Accounting & Inventory(Products, Salary, Revenue)	Huy	24-November-2025	8	Nguyễn Quốc Huy	Completed

6	System Documentation(CRS, SRS, Slide Prep)	All Team	24-November-2025	4	Group 03	Completed

Chapter 4. DATABASE DESIGN

4.1. Relational model of the database




HR
Prepare Payroll Data
View Reports
Edit Policies
Submit/Approve Explanation
Check In/Out, Verify
Set Doctor Schedule
Create/Locate
Assign/Change Shift
Coordinate with Reception/Doctor/Admin/Accountant
Support Payroll Processing
Daily/Monthly Attendance Reports
Configure Attendance Policies
Process Explanations & Approvals
Attendance & Verification
Manage Doctor Schedules
Manage Employee Profiles
Coordinate Staff Shifts
Inter-Department Coordination
AttendanceReportService
HRManagementController / HRManagementService
AttendanceController / AttendanceServiceImpl
HrController / HrServiceImpl
HrEmployeeController / HrEmployeeService
AIScheduleGenerationService
ScheduleValidationService
Receptionist
Doctor
Admin
Accountant
Attendance, StaffShift, DoctorSchedule, EmployeeFaceProfile, LeaveRequest, Payslip
AttendanceRepository
DoctorScheduleRepo
RoomRepo
DepartmentRepo
EmployeeFaceProfileRepo
UserClinicAssignmentRepo

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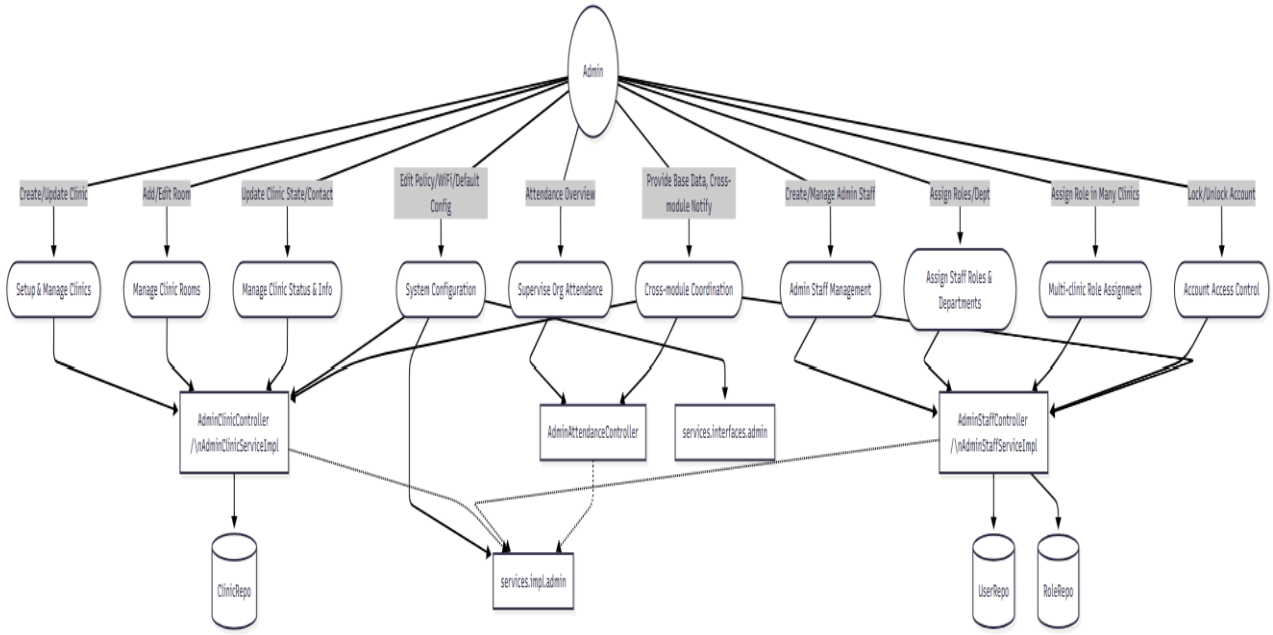

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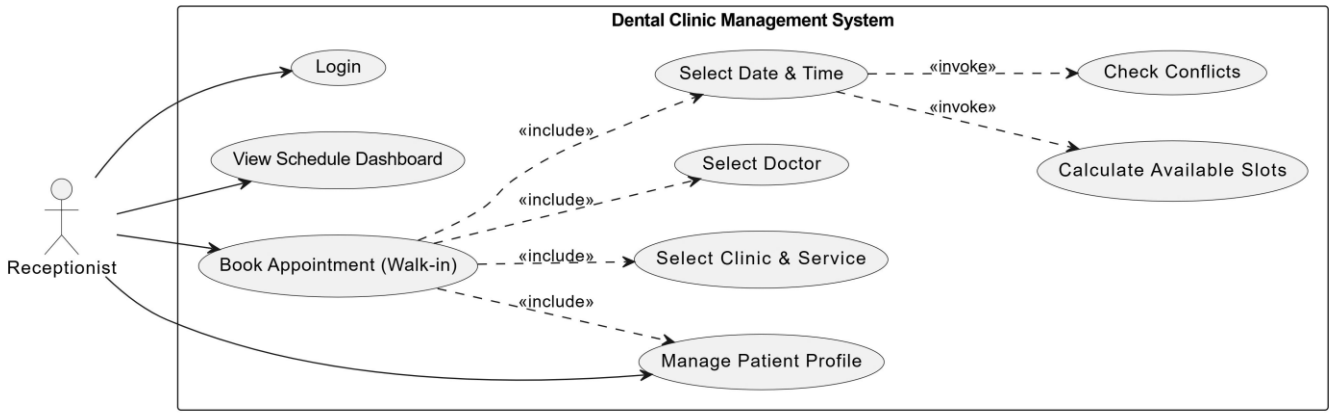

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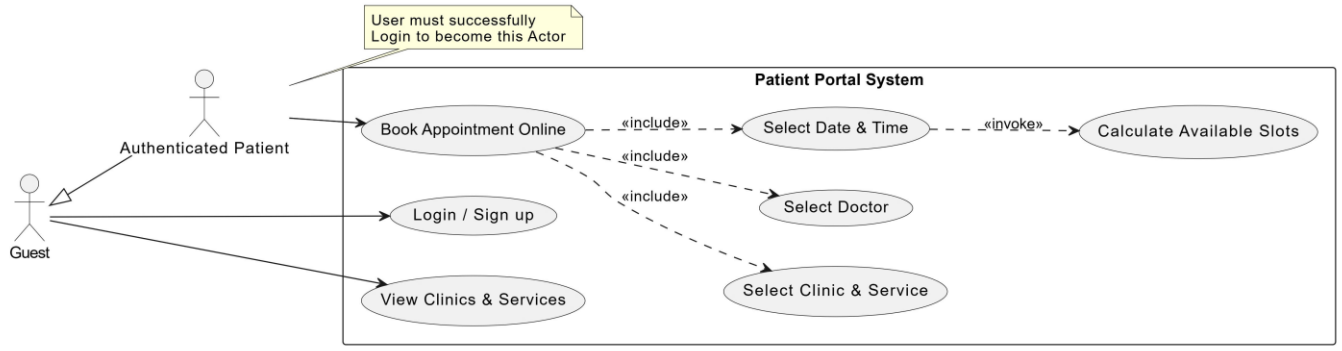

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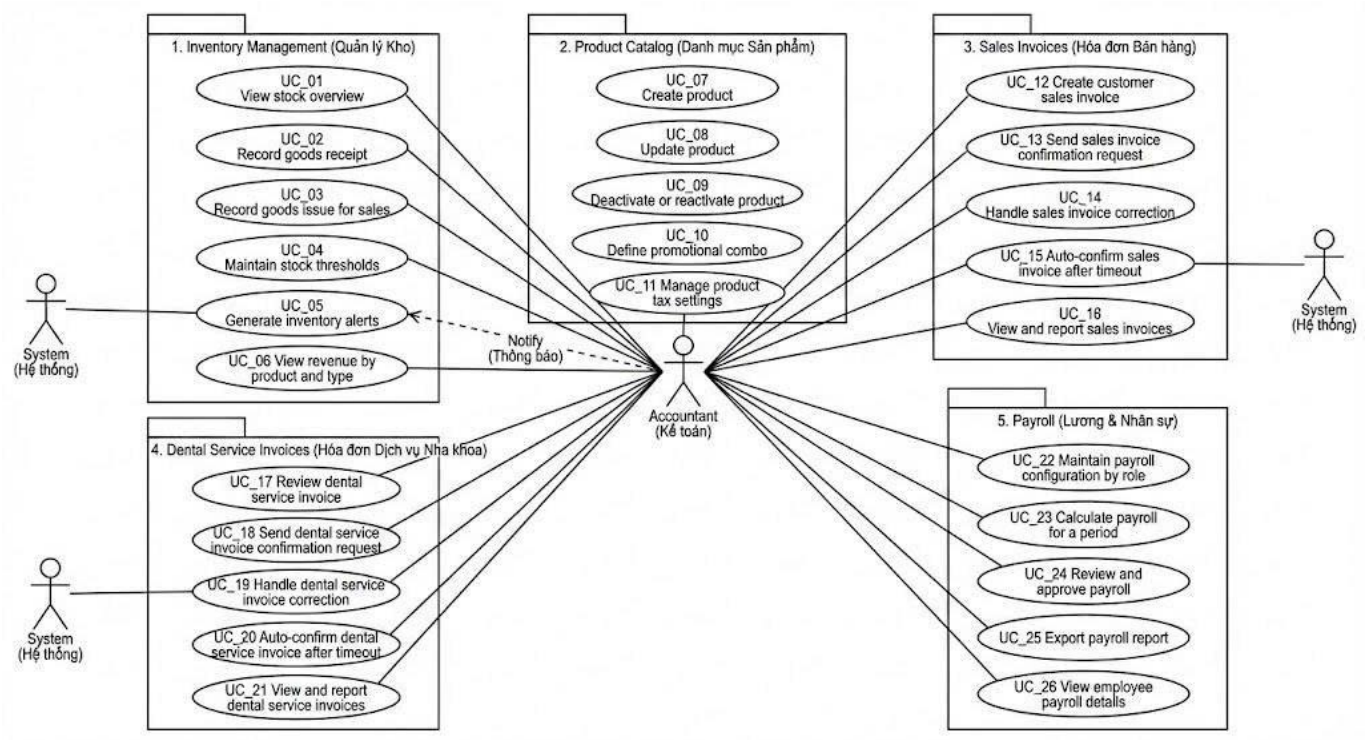

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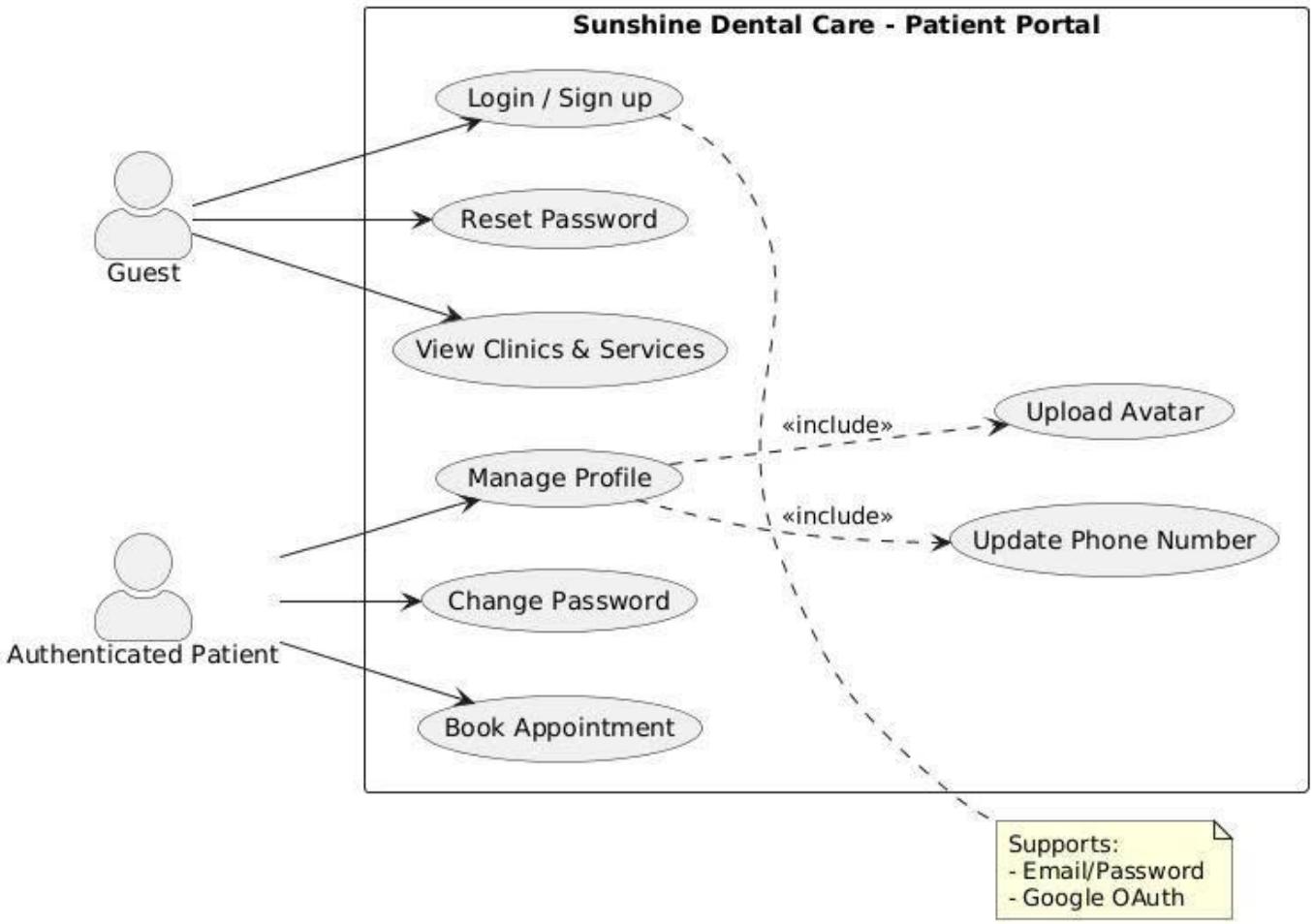

Usecase Auth & Paitent

Function Description

Funtion for HR

No.	Function Group	Detailed Tasks & Processes	Technical Components & Data	Objective / Outcome
1	**Human Resource Profile Management**	- **Create/Update Staff:** Input personal info, contact details. - **Assignment:** Assign Departments, Roles, and Clinics (UserClinicAssignment). - **Attendance Setup:** Set up face data (EmployeeFaceProfile). - **Transfer:** Monitor primary staff (isPrimary) and transfer employees between clinics.	- **Controller:** HrEmployeeController → HrEmployeeService - **Entities:** Users, Roles, Departments, UserClinicAssignment, EmployeeFaceProfile	Ensure employee profiles are complete, correctly authorized, and ready for attendance/work.
2	**Shift Coordination & Doctor Scheduling**	- **Shift Mgmt:** Configure working hours and notes for StaffShift. - **Doctor Schedule:** Manipulate DoctorSchedule, confirm room/clinic for each shift. - **AI Automation:** Use AI to suggest schedules based on demand and history. - **Validation:** Ensure no conflicting shifts and compliance with policies.	- **Controller:** HrController + HrServiceImpl - **Services:** AiScheduleGenerationService, ScheduleValidationService - **Entities:** DoctorSchedule, StaffShift	Create optimal, conflict-free schedules to ensure sufficient operational capacity.
3	**Attendance & Verification**	- **Operations:** Monitor daily check-in/out processes. - **Configuration:** Set up	- **Controller:** AttendanceController → AttendanceServiceImpl	Ensure accurate and transparent attendance data as a basis for

No.	Function Group	Detailed Tasks & Processes	Technical Components & Data	Objective / Outcome
		authentication methods (Face ID, WiFi, Shift types). - **Troubleshooting:** Resolve invalid check-ins, WiFi errors, etc. - **Data Processing:** Ensure correct recording of work hours, Overtime (OT), Late/Early minutes.	- **Entities:** Attendance - **Logic:** Face Matching, WiFi Check, Shift Type Logic	payroll calculation.
4	**Explanations & Policies**	- **Explanation Processing:** Evaluate requests from staff (AttendanceExplanationRequest), update status. - **Approval:** Make decisions (APPROVED/REJECTED) and log actions. - **Policy Setup:** Configure WiFi Whitelist, face matching thresholds, and lock/unlock shifts.	- **Controller:** HRManagementController - **Services:** HRManagementService - **Entities:** AttendanceExplanation, SystemConfig	Maintain labor discipline while flexibly handling reasonable exceptions.
5	**Reporting & Payroll Support**	- **Reporting:** Export DailySummary and MonthlySummary reports. - **Payroll Support:** Provide work hour and OT data to generate Payslips. - **KPI Monitoring:** Evaluate staff compliance and productivity.	- **Services:** AttendanceReportService - **Output:** DailySummaryResponse, MonthlySummaryResponse - **Integration:** Connects to Payroll Module	Provide accurate metrics for the Accountant (Payroll) and Managers (Evaluation).
6	**Inter-departmental Coordination**	- **Reception:** Update doctor schedules for booking arrangement.	- **Entities:** Appointments, LeaveRequest - **Flow:** HR →	Ensure seamless information flow and smooth cross-

No.	Function Group	Detailed Tasks & Processes	Technical Components & Data	Objective / Outcome
		- **Doctor:** Inform schedules/shifts, handle LeaveRequests. - **Admin:** Coordinate when opening new clinics or departments. - **Accountant:** Share attendance data for salary reconciliation.	Reception/Doctor/Admin/Accountant	departmental operations.

Funtion for Admin

No.	Function Group	Detailed Tasks & Processes	Technical Components & Data	Objective / Outcome
1	**Clinic Infrastructure & Setup**	- **Create/Update Clinic:** Manage basic info, contact details, and operating hours. - **Room Management:** Add/Edit/Delete treatment rooms, mark as private/active. - **Status Mgmt:** Toggle clinic activation (Active/Inactive) to sync with Reception/HR. - **Sequences:** Configure auto-numbering for PatientSequences and InvoiceSequences.	- **Controller:** AdminClinicController → AdminClinicServiceImpl - **Entities:** Clinics, Rooms, PatientSequences, InvoiceSequences	Ensure physical and logical infrastructure (Clinics/Rooms) is ready for operations.
2	**Senior Staff & Role Management**	- **User Administration:** Create admin-level users, assign Roles and Departments. - **Cross-Clinic**	- **Controller:** AdminStaffController → AdminStaffServiceImpl - **Entities:** Users, Roles, UserClinicAssignment, Departments	Maintain a secure and organized hierarchy, ensuring staff have correct access across facilities.

No.	Function Group	Detailed Tasks & Processes	Technical Components & Data	Objective / Outcome
		Assignment: Assign a single user to multiple clinics with different roles. - **Account Control:** Lock/Unlock accounts, manage staff lists by clinic/role. - **Permissions:** Define high-level system access in UserRoles.		
3	**Operational Oversight (Attendance)**	- **Global Monitoring:** View high-level attendance data across the organization. - **Compliance Check:** Verify organizational compliance with working hours. - **Intervention:** Assist HR in resolving complex attendance disputes or system errors. - **Data Access:** Call underlying HR	- **Controller:** AdminAttendanceController - **Integration:** Calls HR Service Interfaces - **Data:** Global Attendance Logs	Provide high-level supervision to support HR and ensure organizational discipline.

No.	Function Group	Detailed Tasks & Processes	Technical Components & Data	Objective / Outcome
		services to retrieve raw logs.		
4	**System Configuration & Policy**	- **Global Config:** Update WiFi Whitelists for check-in. - **Thresholds:** Set allowed late/early leave minutes. - **Defaults:** Define default policies for new clinics or service price templates. - **Impact:** These configs propagate to HR, Reception, and Accounting modules.	- **Services:** SystemConfigService - **Entities:** SystemConfig, WiFiWhitelist - **Scope:** System-wide settings	Define the "Rules of the Game" for the entire system (Network, Time, Pricing).
5	**Inter-departmental Coordination**	- **HR:** Provide ready-to-use Clinic/Dept data for staff assignment. - **Reception:** Notify when new Rooms/Clinics are open for booking.	- **Flow:** Admin → HR/Reception/Doctor/Accountant - **Data:** Metadata (Ids, Codes, Configs)	Ensure the backend configuration supports the frontend operations of all other departments.

No.	Function Group	Detailed Tasks & Processes	Technical Components & Data	Objective / Outcome
		- **Doctor:** Confirm resource availability (Rooms/Equipment). - **Accountant:** Configure Invoice Sequences for compliant billing documents.		

Funtion for Doctor

No.	Function Group	Detailed Tasks & Processes	Technical Components & Data	Objective / Outcome
1	**Appointment & Schedule Management**	- **View Appointments:** Access assigned appointments with details (clinic, room, time, service). - **Personal Schedule:** View DoctorSchedule to organize work shifts and room usage. - **Sync:** Receive	- **Controller:** DoctorController (GET by day/week) - **Services:** DoctorAppointmentService - **Entities:** Appointments, DoctorSchedule, Rooms	Ensure doctors know their daily caseload and room allocations efficiently.

No.	Function Group	Detailed Tasks & Processes	Technical Components & Data	Objective / Outcome
		schedule updates assigned by Reception or HR.		
2	**Examination & Medical Records (EMR)**	- **Patient Lookup:** Access Patient profiles and historical MedicalRecords. - **Diagnosis:** Create/Update records with diagnosis, treatment plans, and notes. - **Imaging:** Upload MedicalRecordImages (X-rays, dental photos) with description tags.	- **Controller:** PatientMedicalRecordController → PatientMedicalRecordServiceImpl - **Entities:** MedicalRecord, MedicalRecordImage, Patient	Maintain comprehensive, digital, and accessible health records for better treatment quality.
3	**Prescription & Service Indication**	- **Prescribing:** Create Prescriptions, add PrescriptionItems (Medicine, dosage, instructions). - **Service Update:** Add extra services performed during the visit to AppointmentService. - **Billing Impact:** Data entered here directly	- **Entities:** Prescription, PrescriptionItem, AppointmentService, Medicines - **Integration:** Data flows to Invoice/Payment module	Provide accurate treatment (medicines) and ensure precise billing for services rendered.

No.	Function Group	Detailed Tasks & Processes	Technical Components & Data	Objective / Outcome
		updates the Invoice for the Accountant.		
4	**Attendance & Shift Compliance**	- **Check-in/out:** Perform biometric check-in using the HR Attendance flow (Morning/Afternoon shifts). - **Shift Logic:** AttendanceService verifies the "Doctor" role to apply specific shift rules. - **Leave Mgmt:** Submit LeaveRequest for HR approval to block calendars.	- **Services:** AttendanceService - **Entities:** Attendance, LeaveRequest - **Logic:** Shift-based check-in	Compliance with clinic work regulations; basis for salary calculation.
5	**Inter-departmental Coordination**	- **Reception:** Update appointment status (e.g., "In Progress" to "Completed"), request specific room equipment. - **HR:** Sync work hours and leave days. - **Accountant:** Provide accurate "Service Used"	- **Flow:** Doctor → Reception/Accountant/HR - **Data:** Status updates, Service Lists	Ensure a smooth patient journey from examination to payment and aftercare.

No.	Function Group	Detailed Tasks & Processes	Technical Components & Data	Objective / Outcome
		data for billing. - **CS/Marketing:** Trigger follow-up reminders (e.g., re-examination).		

Funtion for auth

No.	Function Group	Detailed Tasks & Processes	Technical Components & Data	Objective / Outcome
1	**Authentication (Login/Signup)**	- **Login (Local):** Verify credentials (username/password), check active status, generate JWT (Access + Refresh). - **Signup:** Validate input (email/username duplication), hash password, assign default role (ROLE_USER), create User entity. - **Google OAuth2:** Redirect	- **Controller:** AuthController - **Service:** AuthService, JwtService - **Security:** SecurityConfig, JwtAuthFilter, GoogleOAuth2UserService - **DTOs:** LoginRequest, LoginResponse, SignUpRequest	Secure entry point for all users; issue tokens for stateless session management.

No.	Function Group	Detailed Tasks & Processes	Technical Components & Data	Objective / Outcome
		to Google, map Google user to system user via OAuth2SuccessHandler, auto-register if new. - **Refresh Token:** Validate refresh token and issue new access token.		
2	**User Profile Management**	- **View Profile:** Retrieve current user details (CurrentUser). - **Update Profile:** Edit personal info (Name, Email, Phone). - **Change Password:** Verify old password, hash and save new password. - **Avatar Upload:** Upload image to Cloudinary, update avatarUrl and avatarPublicId in DB.	- **Controller:** UserController - **Service:** UserService, UserAvatarService, CloudinaryUploadService - **Entities:** User, UserRole	Allow users to manage their personal identity and account security.
3	**Authorization & Role Management**	- **Role Assignment:** Assign default roles upon signup; Admin/HR can assign advanced roles (DOCTOR, HR, ADMIN).	- **Repository:** UserRoleRepo, RoleRepo - **Security:** SecurityConfig (Filter Chain)	Ensure users can only access resources permitted by their assigned roles.

No.	Function Group	Detailed Tasks & Processes	Technical Components & Data	Objective / Outcome
		- **Permission Check:** JwtAuthFilter extracts roles from token to populate SecurityContext. - **Access Control:** Protect endpoints based on roles (e.g., only HR can access /api/hr/**).	- **Logic:** RBAC (Role-Based Access Control)	
4	**System Integrations (Mail/Utils)**	- **Email Notifications:** Send welcome emails, password reset links via MailService using templates. - **Patient Code Gen:** Generate unique patient codes (PatientCodeService + PatientSequence). - **Cloudinary:** Integration for storing user avatars.	- **Service:** MailService, PatientCodeService - **Utils:** EmailTemplate - **External:** SMTP Server, Cloudinary API	Enhance user experience with notifications and handle file/data generation logic.

Funtion for Recceotion

No.	Function Group	Detailed Tasks & Processes	Technical Components & Data	Objective / Outcome
1	**Appointment Management**	- **Create/Edit:** Handle requests (Call-in, Walk-in, Online), create Appointment with Clinic, Doctor, Service, and Room. - **Status Mgmt:** Update status (PENDING, CONFIRMED, COMPLETED, CANCELLED, NO-SHOW). - **Patient Lookup:** Retrieve existing patient info or create a new profile instantly via DTO. - **Channel Tracking:** Log source of booking (Online, Walk-in, etc.).	- **Controller:** ReceptionAppointmentController - **Service:** ReceptionService - **Entities:** Appointment, Patient, Room, DoctorSchedule	Efficiently manage the patient queue and ensure optimal resource allocation (Doctors/Rooms).
2	**Public Booking Channel**	- **Online Booking:** Handle form submissions from the public website/app.	- **Controller:** PatientBookingController, PublicController	Enable self-service for patients, reducing manual workload for receptionists.

No.	Function Group	Detailed Tasks & Processes	Technical Components & Data	Objective / Outcome
		- **Validation:** Check availability of slots, temporary hold logic. - **Public Info:** Provide APIs for service lists, doctor profiles, and available time slots. - **Confirmation:** Trigger email/SMS confirmation upon successful booking.	- **Service:** BookingService, PublicService - **DTOs:** AppointmentRequest, ServiceDTO	
3	**Daily Operations (Check-in)**	- **Patient Check-in:** Mark patient arrival, update notes, notify the assigned doctor. - **Rescheduling:** Adjust appointments due to doctor unavailability or patient request. - **No-show Handling:** Log no-shows to track patient reliability.	- **Service:** ReceptionService - **Logic:** Real-time status updates - **Integration:** Syncs with DoctorDashboard	Ensure smooth patient flow within the clinic on the day of the appointment.
4	**Inter-departmental Coordination**	- **Doctor:** Provide daily appointment lists, transfer patient notes.	- **Flow:** Reception → Doctor/HR/Accountant/CRM	Act as the central communication hub, ensuring all

No.	Function Group	Detailed Tasks & Processes	Technical Components & Data	Objective / Outcome
		- **HR:** Notify HR of doctor schedule changes (shift swaps) to update DoctorSchedule. - **Accounting:** Pass AppointmentService data (services used) to the Accountant for Invoice creation. - **Marketing:** Feed booking data into CRM for follow-up emails/reminders.	- **Data:** AppointmentService, EmailLog	departments are aligned.

Funtion for product

No.	Function Group	Detailed Tasks & Processes	Technical Components & Data	Objective / Outcome
1	**Product Master Data Management**	- **CRUD Operations:** Create, Read, Update, and Soft-delete products. - **Details:** Manage SKU, Name, Brand, Description, Default Retail Price, Currency, and Tax Code. - **Status:** Toggle isActive to control visibility in sales/prescriptions.	- **Controller:** ProductController - **Service:** ProductService (CRUD Logic) - **Entities:** Product - **Repo:** ProductRepository (Custom queries by SKU/Name)	Maintain a single source of truth for all saleable items and medical supplies.
2	**Categorization & Filtering**	- **Type Assignment:** Assign products to multiple types (Many-to-Many) via ProductsProductType. - **Advanced Search:** Filter catalog by Category, Brand, Price Range, and Active Status. - **Pagination:** Handle large datasets using PageResponseDto.	- **Entities:** ProductType, ProductsProductType - **DTOs:** ProductFilterDto, PageResponseDto - **Logic:** Dynamic Filtering	Enable easy retrieval of products for reporting and sales selection.
3	**Digital Asset Management**	- **Upload:** Attach images to products (e.g., medicine	- **Entities:** ProductImage	Provide visual references for

No.	Function Group	Detailed Tasks & Processes	Technical Components & Data	Objective / Outcome
	(Images)	packaging, equipment photos). - **Organization:** Manage imageOrder for display priority. - **Storage:** Handle publicId and URLs (integrated with Cloudinary).	- **Repo:** ProductImageRepository - **API:** POST /products/{id}/images	doctors (during prescription) and patients (online view).
4	**System Integration (Data Serving)**	- **For Reception/Doctor:** Provide product details for consultation and billing. - **For Inventory:** Provide productId as a Foreign Key for Stock Movements/Transfers. - **For Accounting:** Provide price/name snapshots for immutable InvoiceItems.	- **Flow:** Product Module → Inventory/Invoice/Marketing - **Data:** Snapshot Data, Product IDs	Ensure data consistency across Billing, Inventory, and Clinical modules.

Progress review1

No.	Student Name	Role in Project	Main Responsibilities (Review 1)	Contribution (%)
1	**Sơn Phi Long**	HR&Adnmin	- HR & Admin Modules - AI Integration (Schedule/FaceID) - Project Management	60%
2	**Ngô Minh Tuấn**	Auth& Paitent	- Authentication System - Patient Mobile App (Flutter) - Security Configuration	60%
Value 60%	**Nguyễn Hữu Hoàng**	Doctor	- Doctor Module - Medical Records Logic - Image Handling	60%
4	**Nguyễn Minh Hoàng**	Recception	- Reception Module - Booking Logic - CRM Integration	60%
5	**Nguyễn Quốc Huy**	Acoutant&Product	- Accounting Module	

No.	Student Name	Role in Project	Main Responsibilities (Review 1)	Contribution (%)
			- Inventory & Products - Reporting Logic	60%

Progress review2

No.	Student Name	Role in Project	Main Responsibilities (Review 1)	Contribution (%)
1	**Sơn Phi Long**	HR&Adnmin	- HR & Admin Modules - AI Integration (Schedule/FaceID) -Nottification realtime - Project Management	80%
2	**Ngô Minh Tuấn**	Auth& Paitent	- Authentication System - Patient Mobile App (Flutter) - Security Configuration	70%
Value 60%	**Nguyễn Hữu Hoàng**	Doctor	- Doctor Module - Medical Records Logic - Image Handling	70%
4	**Nguyễn Minh Hoàng**	Recception	- Reception Module - Booking Logic - CRM Integration	80%

No.	Student Name	Role in Project	Main Responsibilities (Review 1)	Contribution (%)
5	**Nguyễn Quốc Huy**	Acoutant&Product	- Accounting Module - Inventory & Products - Reporting Logic	80%

Sumary review 2:

Task / Feature	Description / Status
Core Functions Optimization	**Completed:** Finalized Auth, User Profile, and Basic CRUD APIs for all roles.
AI Integration (Ongoing)	**In Progress:** Integrating advanced AI models (ArcFace for Attendance, NLP for Smart Scheduling) to automate operational workflows.
Advanced Logic Implementation	**In Progress:** Developing complex flows for Medical Records, Prescriptions, and Payment Gateways.
System Status	**Transition Phase:** Moving from backend foundation to full-stack AI integration.