CHRIST
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DOMAIN: Healthcare Access Management System

TITLE: "CureConnect: Empowering Health, Connecting Lives"

A Group Project Submitted for undergraduate DBMS PROJECT (BCA481) 2023-2024

By

ARISHA JAMAL (226016)

EDWIN SHAJAN (2241015)

KSHITIJ SAKHUJA (2241028)

Bachelor of Computer Science

Under the supervision of

Dr KIRUBANAND V B

Associate Professor

Department of Computer Science

CHRIST (Deemed to be University), Bengaluru, India

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1. INTRODUCTION

1.1 Project Description

"CureConnect" is an innovative web application project dedicated to transforming healthcare access, appointment scheduling, and medical record management. Aligned with Sustainable Development Goal 3 (SDG 3) - "Good Health and Well-being," the project aims to empower patients, simplify healthcare journeys, and ensure robust data security. Drawing insights from an analysis of existing systems, CureConnect introduces modules like virtual consultations, appointment scheduling, payment gateways, and medical records management to enhance the user experience. Noteworthy features include a commitment to inclusivity, addressing inequalities in healthcare access, and aligning with SDGs 9, 10, 16, and 17. The project's key objectives encompass improving user experience, promoting digital health management, facilitating informed decision-making, ensuring data privacy, and fostering community engagement. Through collaborative efforts, CureConnect envisions contributing to a resilient, innovative, and inclusive healthcare landscape.

1.2 Existing Systems

- **Practo**:
  Practo is a leading healthcare app that specializes in online doctor consultations and a comprehensive range of healthcare services. Users can efficiently book appointments, participate in online consultations via video or chat, and access their health records.

- **mfine:**

mfine is an AI-powered healthcare platform providing users with the convenience of online doctor consultations across various specialties. The platform offers video consultations, prescription services, and the option to order medicines through the app.

- **MediBuddy:**
  MediBuddy serves as a connection platform connecting users with specialist doctors in different medical fields. The app facilitates video and chat consultations, allowing users to share images and reports for personalized treatment plans.

- **1mg:**
  1mg by TATA is a comprehensive health platform featuring a Health Resource module covering detailed disease information, benefits, and side effects of medicines. The platform provides in-depth details on medicines, organized by therapeutic class, and allows users to conveniently purchase medicines directly. The Lab Tests module offers resources for diagnostic tests, aiding in informed healthcare decisions.

- **Fortis Hospital:**
  Fortis Hospital's website offers a user-friendly platform listing doctors and their specializations. Users can easily find and book appointments, with the added feature of requesting callbacks. The website supports multiple languages and extends its services across various centres in India. However, it lacks virtual consultation, an open forum, and is limited to the Fortis Hospital brand.

1.2.1 Their Limitations:

- **Absence of Medical Equipment Rental Module:**

Among the existing healthcare platforms, none currently incorporate a dedicated module for renting medical equipment at home. The absence of such a feature limits users' ability to access necessary healthcare resources conveniently within the comfort of their homes. A dedicated module for medical equipment rental would be a valuable addition, allowing users to easily find, rent, and return medical equipment, such as mobility aids, respiratory devices, or monitoring devices, based on their specific needs. This feature would enhance the overall healthcare experience, especially for individuals who require temporary medical equipment for recovery or managing chronic conditions at home. Additionally, it aligns with the growing trend of home-based healthcare services, providing users with a more holistic and comprehensive solution to their healthcare needs.

- **Limited Language Support:**
  All three platforms lack robust support for multiple languages. This limitation hinders their ability to cater effectively to users from diverse linguistic backgrounds, potentially limiting accessibility and user engagement.

- **No Voice Command Functionality:**
  The absence of voice command functionality in these platforms restricts accessibility, particularly for users who may have difficulty navigating through traditional interfaces. Voice command features enhance inclusivity, especially for those with limited mobility.

- **Absence of Dedicated User Forum:**
  The platforms lack a dedicated user forum or review section where users can share their experiences, provide feedback, and engage in discussions. A user forum fosters a sense of community, trust, and transparency.

- **Accessibility Features:**
  The platforms lack accessibility features such as a high-contrast UI and customizable font size. These features are crucial for users with visual impairments or preferences for personalized display settings.

- **No Hospital Profiles:**
  There is an absence of hospital profiles within the platforms. Including detailed information about healthcare facilities could assist users in making more informed decisions about their healthcare providers.

- **Limited Review Sections:**
  Most systems lack designated review sections for comprehensive user feedback. User reviews are valuable for prospective patients seeking insights into the quality of healthcare services and professionals.

1.3 Objectives

- **Enhance User Experience:**
  Improve the overall user experience by providing efficient tools for finding nearby healthcare facilities, viewing real-time appointment availability, and seamlessly scheduling appointments.

- **Promote Digital Health Management:**
  Facilitate the adoption of digital health management by enabling users to digitize and securely store comprehensive medical records, fostering informed decision-making and active patient engagement.

- **Facilitate Informed Decision-Making:**
  Enhance access to essential healthcare information by providing a comprehensive database of healthcare facilities, including

services, location, contact details, and peer reviews, facilitating informed healthcare decisions.

- **Ensure Data Privacy and Security:**
  Uphold user trust by ensuring the privacy and security of user data through robust authentication and compliance with healthcare data privacy regulations.

- **Empower Personalization:**
  Empower individuals to personalize their healthcare experience by creating and managing profiles, securely storing insurance information, and setting preferences.

- **Foster Community Engagement:**
  Foster a sense of trust and community by enabling users to leave reviews, ratings, and engage in a community forum to share experiences and provide feedback.

- **Enhance Transparency in Healthcare:**
  Enhance transparency in healthcare choices by providing detailed profiles of healthcare professionals, including specialties, qualifications, and patient reviews.

- **Expand Accessibility Across Languages:**
  Broaden the website's reach and usability by ensuring accessibility to users in multiple languages.

- **Promote Accessibility to Medical Resources:**
  Promote accessibility to necessary healthcare resources by allowing users to easily rent medical equipment.

- **Ensure User-Friendly Experience:**
  Ensure a user-friendly experience by providing assistance and guidance through help content, FAQs, and intuitive navigation.

- **Enable Hands-Free Interaction:**
  Provide a hands-free and inclusive navigation experience by enabling users to interact with the website using voice commands.

- **Implement Inclusive Accessibility Features:**
  Implement features for accessibility, such as screen reader compatibility, adjustable font sizes, and keyboard accessibility, to ensure inclusivity for users with diverse needs.

1.4 Purpose, Scope and Applicability

Purpose:

The purpose of the proposed project, named "CureConnect," is to revolutionize healthcare services by developing a comprehensive web application that enhances accessibility, appointment scheduling, and medical record management. Aligned with Sustainable Development Goal 3 (SDG 3) - "Good Health and Well-being," the project aims to empower patients, simplify healthcare journeys, and ensure data security. By addressing the limitations observed in existing healthcare platforms, the project strives to provide an innovative solution that improves the overall user experience and contributes to the well-being of individuals in an increasingly digitized world.

Scope:

The scope of the project encompasses the development of a robust web application with modules such as virtual consultations, appointment scheduling, payment gateways, medical records management, and other innovative features. The project will focus on creating an inclusive platform that caters to diverse healthcare needs, bridging gaps observed in current systems. The scope also includes implementing features for accessibility, language support, and community

engagement to foster transparency and trust. Collaborations with healthcare professionals, payment gateways, and other stakeholders will be explored to ensure the project's success and sustainability.

Applicability:
The "CureConnect" project is designed to be applicable across various healthcare settings and user demographics. It targets individuals seeking convenient and efficient healthcare access, including those in underserved or remote areas. The platform's multi-language support aims to cater to users from diverse linguistic backgrounds, ensuring broad applicability. The project's focus on inclusivity, accessibility, and community engagement makes it relevant for different user groups, ranging from patients and healthcare providers to institutions and organizations involved in the healthcare ecosystem. By adhering to the principles of SDGs, the project aims to contribute to broader societal and environmental objectives, making it applicable in a global context.

1.5 Overview

"CureConnect" is an innovative web application project focused on redefining healthcare services with a user-centric approach. Aligned with SDG 3, the project introduces modules like virtual consultations, appointment scheduling, and medical records management to enhance the overall user experience. Noteworthy features include multi-language support, accessibility enhancements, and community engagement forums, ensuring inclusivity and transparency. Designed for global applicability, the project emphasizes collaboration with healthcare professionals and stakeholders to create a resilient healthcare infrastructure. By aligning with various SDGs, "CureConnect" aspires to contribute to

broader societal well-being through technological innovation and inclusivity.

2. SYSTEM ANALYSIS AND REQUIREMENTS

2.1 Project Definition

In response to evolving healthcare needs, the proposed project, tentatively named "CureConnect," envisions a transformative web application designed to optimize healthcare access, appointment scheduling, and medical record management. Aligned with Sustainable Development Goal 3 (SDG 3) - "Good Health and Well-being," this comprehensive platform seeks to empower patients, streamline healthcare journeys, and ensure robust data security. The project identifies and addresses limitations observed in existing healthcare systems, providing innovative solutions to enhance the overall user experience. By incorporating modules such as virtual consultations, appointment scheduling, payment gateways, and medical records management, the project aims to promote digital health management, foster community engagement, and contribute to broader societal and environmental objectives. Emphasizing inclusivity and accessibility, the project aligns with several SDGs, reflecting its potential to significantly impact healthcare services and contribute to the well-being of individuals in an increasingly digitized world.

2.2 System Requirements

Functional Requirements

Patients:

User Registration:

Users should be able to create a new account with email, password, or Google sign-in.
Validate unique usernames and email addresses via two-step authentication.

Login Authentication:
Authenticate through secure login credentials.
Implement password encryption and recovery options like email verification or security questions.

Profile Management:
Create and manage profiles with personal details, contacts, emergency information, and insurance details.
Provide options for communication preferences and notification settings.

Virtual Consultation Booking:
Search for healthcare professionals, view profiles, and book virtual consultations.
Schedule, receive confirmation, reminders, and reschedule or cancel appointments.
Access a virtual waiting room with secure video conferencing.

Offline Appointment Scheduling:
Search for nearby healthcare facilities, view real-time availability, and schedule in-person appointments.
Receive reminders and real-time updates; reschedule or cancel appointments.

Payment Processing:
Make secure transactions via a payment gateway supporting multiple options.
Maintain a transaction history for user tracking.

Medical Records Management:
Digitize and securely store comprehensive medical records with access controls.

Healthcare Facility Information:
Access a comprehensive database with detailed information and peer reviews.

Medication Reminders:
Set reminders for multiple medications with dosage instructions.

Reviews and Forum Interaction:
Leave reviews, ratings, and engage in discussions through a user forum.

Multi-Language Support:
Select preferred language with platform support for multiple languages.

Help and Navigation:
Access help content, FAQs, and ensure intuitive navigation for a user-friendly experience.

Voice Command Interaction:
Interact with the platform using voice commands and navigation features.

Accessibility Features:
Ensure compatibility with screen readers, adjustable font sizes, and keyboard accessibility.

Disease Catalogue Access:
Access a comprehensive repository with information on various health conditions.

Logout Functionality:
Provide a secure logout option to terminate the user session.

Medical Professionals:

Professional Registration:
Register by providing necessary credentials and certifications.
Validate professional credentials during registration.

Login Authentication:
Authenticate with secure credentials and password encryption.

Profile Management:
Create and manage profiles with specialties, qualifications, languages, and availability.
Set communication and appointment notification preferences.

Virtual Consultation Availability:
Set availability for virtual consultations and manage requests.

In-Person Appointment Availability:
Set availability for in-person appointments and manage requests.

Communication Tools:
Use a secure messaging system for communication.

Payment Processing:
Receive payments securely for services with a transaction history.

Access to Patient Medical Records:

Access patient records during consultations and contribute to updates.
Implement alerts for prescription errors.

Healthcare Facility Information:
Update information about the healthcare facility and respond to reviews.

Logout Functionality:
Provide a secure logout option to terminate the professional session.

Administrators:

Admin Credentials:
Admins should have secure login credentials with password encryption.

User and Professional Account Management:
View and manage user and professional accounts; enable account suspension or termination.

Platform Configuration:
Configure platform settings, including language support and accessibility features.
Manage database configurations and backups.

Review and Forum Moderation:
Monitor and moderate user reviews and forum discussions.
Respond to user queries or issues and conduct periodic reviews.

Healthcare Facility Information Management:
Manage and update information about healthcare facilities.

Transaction Monitoring:
Monitor financial transactions and address payment-related issues.

Disease Catalogue Module:
Administer updates to ensure content accuracy and reliability.

Data Privacy and Security:
Ensure compliance with healthcare data privacy regulations.
Implement security measures and comply with standards like HIPAA, GDPR.

Help and Navigation:
Access and update help content and FAQs.
Provide assistance to users and professionals.

System Updates and Maintenance:
Responsible for system updates and maintenance to ensure smooth operation.

User and Professional Support:
Provide support to users and professionals; address issues, inquiries, or escalations.

Accessibility Features Management:
Configure and manage accessibility features; ensure inclusivity for users with diverse needs.

Logout Functionality:
Provide a secure logout option to terminate the admin session.

Technical Requirements:

Code Editor: Developers working on the project can use code editors such as Visual Studio Code or Sublime Text to write and manage the application code.

Version Control: The project should utilize a version control system like Git and a platform like GitHub to track changes, collaborate with team members, and ensure code integrity.

Network Connectivity: The application requires a stable internet connection to enable users to access the website, schedule appointments, and utilize its various features.

Security:
Implement secure authentication protocols.
Use encryption for data transmission.
Regular security audits and compliance checks.

Scalability:
Design the system to handle a large number of concurrent users.
Implement load balancing for optimal performance.

Integration:
Ensure seamless integration between modules.
API development for third-party integrations (payment gateways, language translation services, etc.).

Data Storage:
Implement a secure and scalable database for storing user and medical data.
Backup and recovery mechanisms for data protection.

User Interface (UI) and User Experience (UX):
Design an intuitive and user-friendly interface.
Conduct usability testing to optimize the user experience.

Cross-Browser Compatibility:
Ensure compatibility with major web browsers.
Responsive design for different devices.

Performance Optimization:
Implement caching mechanisms for improved performance.
Optimize code and database queries.

Compliance:
Adhere to healthcare data privacy regulations (e.g., HIPAA compliance).
Ensure legal and ethical considerations in healthcare information dissemination.

Continuous Improvement:
Plan for regular updates and improvements based on user feedback and technological advancements.

2.3 System Requirements

Hardware Requirements

Microphone and Camera:

- Ensure devices support audio and video functionalities for virtual consultations.

Server:

- High-performance servers with multi-core processors and sufficient RAM for handling concurrent user requests.
- Scalable storage solutions to accommodate growing data volumes, with regular backups.

Networking:

- Fast routers and switches for quick data transfer.
- Backup networking equipment for reliability.

Security Tools:

- Firewalls and security tools for protection.
- Backup systems for data safety.

Development Devices:

- High-performance computers for development and maintenance tasks.

Software Requirements:

Operating Systems:

- Updated server systems, like Linux or Windows.

Database System:

- Reliable database systems (e.g., MySQL).

App Framework:

- Use a chosen framework (e.g., PHP) for easier development.

Version Control:

- Use version control systems (e.g., Git) for code management.

Video Streaming and Document Sharing:

- Integrate tools like Twilio Video API and WebRTC.

Calendar Integration:

- Use Google Calendar API for efficient scheduling.

Encryption:

- Implement encryption using PHP libraries.

Location Services:

- Integrate Google Maps API for accurate location services.

Authentication:

- Use OAuth 2.0 or JWT for secure user access.

Compliance:

- Ensure compliance with healthcare data privacy standards (HIPAA).

Forum Platform:

- Integrate with phpBB or similar for user engagement.

Payment Gateway Tools:

- Integrate payment gateway APIs (e.g., Google Pay, PayPal).

Speech Recognition:

- Implement Web Speech API and Google Cloud Speech-to-Text.

Network Requirements:

Internet Connection:

- A strong and reliable internet connection for smooth service.

Security:

- Set up strong security tools and firewalls to protect against unauthorized access.

Bandwidth:

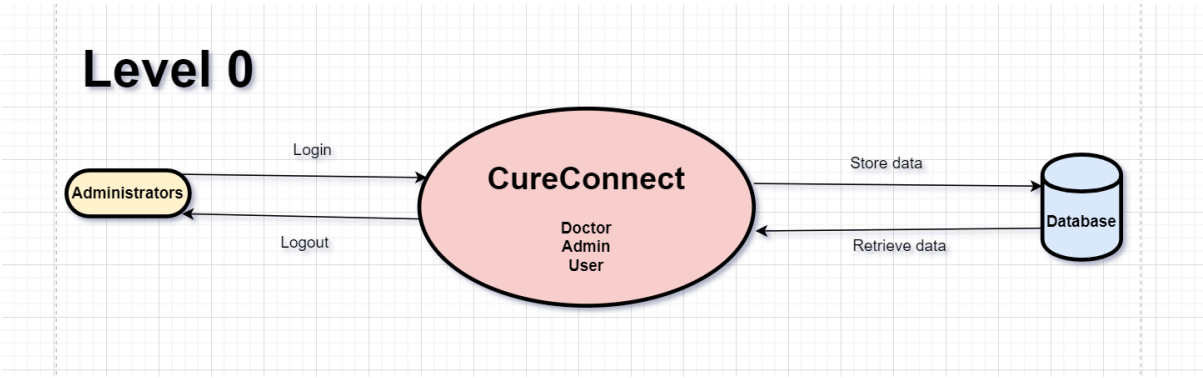
- Ensure enough bandwidth to handle video streaming and data transfer.

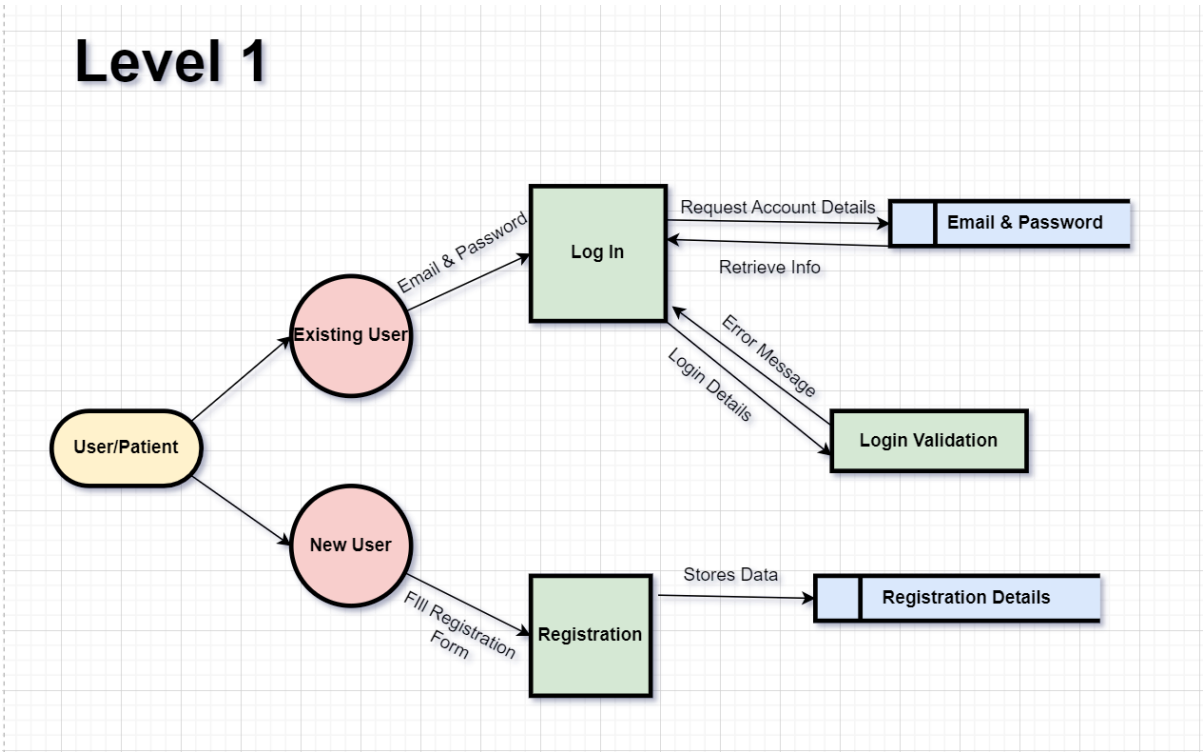
Protocols:

- Use secure protocols (e.g., HTTPS) for safe data transfer.

2.4 Conceptual Models

2.4.1 Data Flow Diagram





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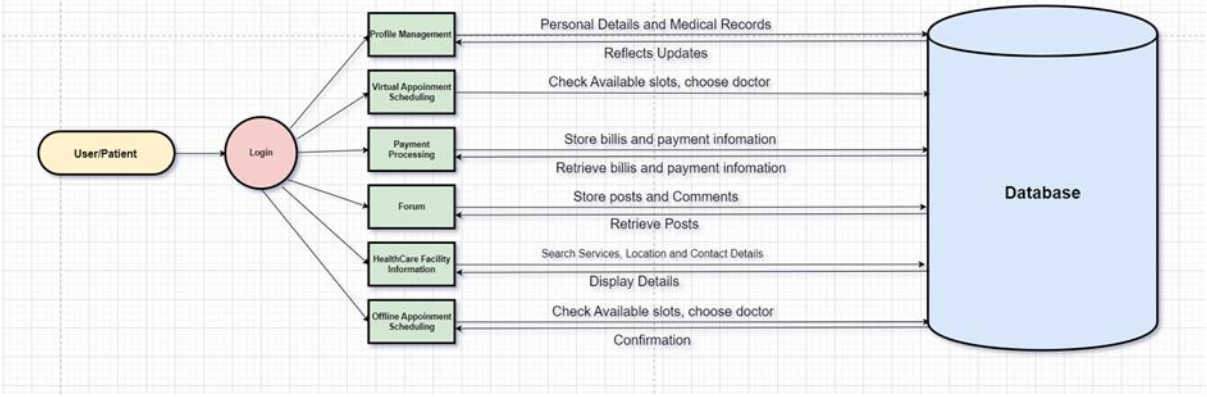

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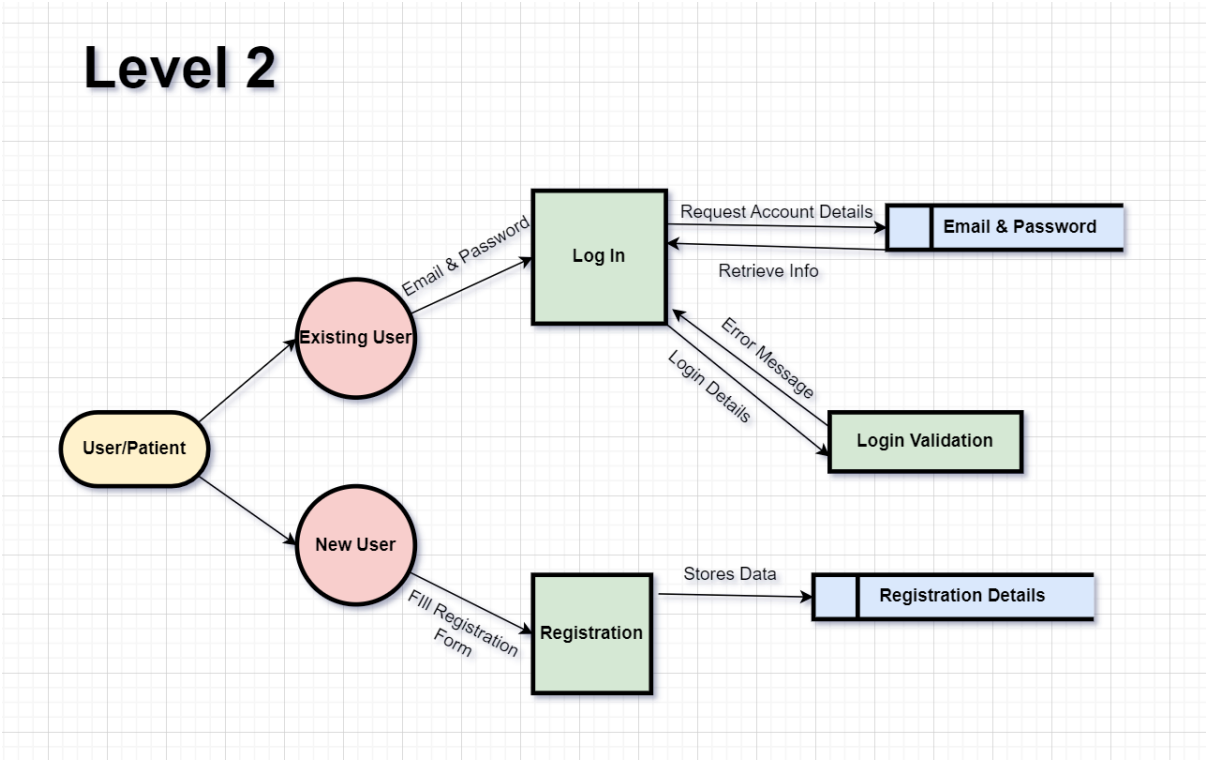

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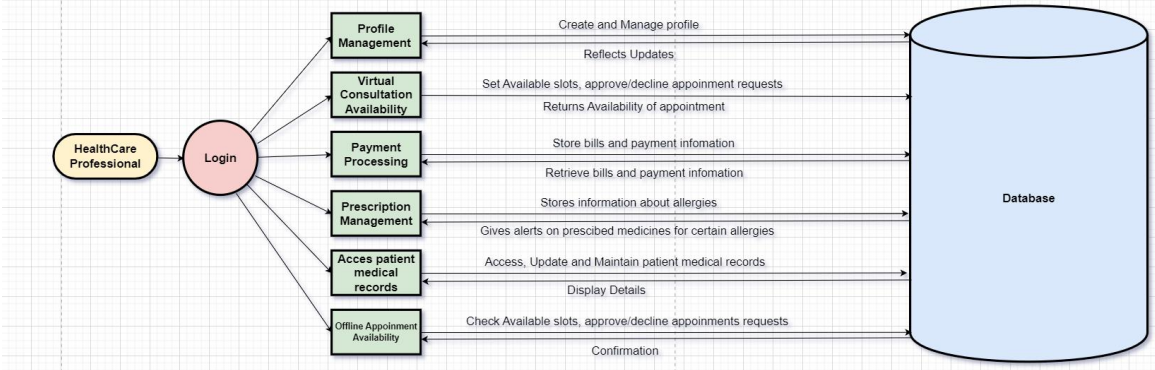

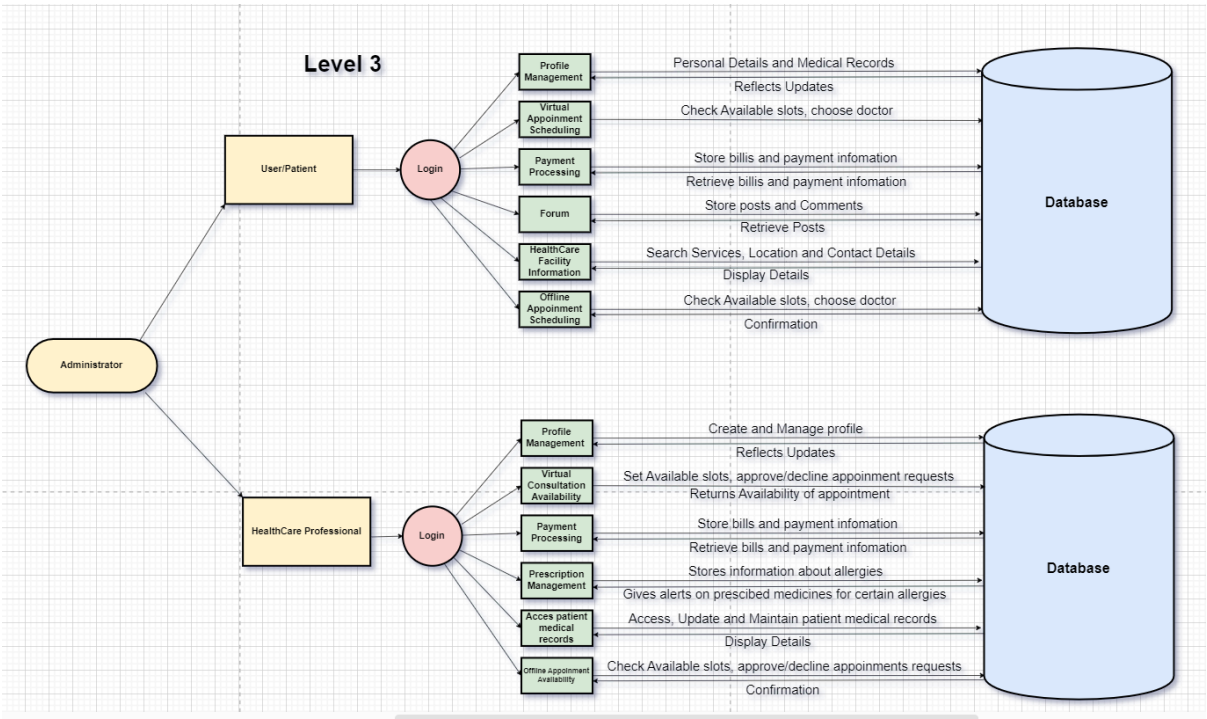
Level 3
Administrator
User/Patient
Login
Profile Management
Virtual Appoinment Scheduling
Payment Processing
Forum
HealthCare Facility Information
Offline Appoinment Scheduling
Personal Details and Medical Records
Reflects Updates
Check Available slots, choose doctor
Store billis and payment infomation
Retrieve billis and payment infomation
Store posts and Comments
Retrieve Posts
Search Services, Location and Contact Details
Display Details
Check Available slots, choose doctor
Confirmation
Database
HealthCare Professional
Login
Profile Management
Virtual Consultation Availability
Payment Processing
Prescription Management
Acces patient medical records
Offline Appoinment Availability
Create and Manage profile
Reflects Updates
Set Available slots, approve/decline appoinment requests
Returns Availability of appointment
Store bills and payment infomation
Retrieve bills and payment infomation
Stores information about allergies
Gives alerts on prescibed medicines for certain allergies
Access, Update and Maintain patient medical records
Display Details
Check Available slots, approve/decline appoinments requests
Confirmation
Database

3. MODULE DESCRIPTION

3.1 Virtual Consultation Module:

Enables secure and convenient virtual appointments, connecting users with healthcare professionals for real-time consultations. Features include secure video streaming, document sharing, and a virtual waiting room, enhancing accessibility to medical advice from any location.

3.2 Appointment Scheduling Module:

Empowers users to efficiently find nearby healthcare facilities, view real-time appointment availability, and schedule appointments. Features include appointment reminders, real-time updates, and flexibility for rescheduling or cancellation.

3.3 Payment Gateway Module:

Facilitates secure and seamless financial transactions within the CureConnect platform. Integrates with various payment methods, allowing users to make payments for services, medical equipment rentals, or any other applicable transactions.

3.4 Medical Records Management Module:

Allows users to digitize and securely store comprehensive medical records, including diagnoses, test results, prescriptions, and medical histories. This module supports informed decision-making and active patient engagement.

3.5 Healthcare Facility Information Module:

Provides a comprehensive database of healthcare facilities, offering precise information about services, location, contact details, and peer reviews. Enhances access to essential healthcare information.

3.6 User Authentication and Security Module:

Ensures the privacy and security of user data through robust authentication and compliance with healthcare data privacy regulations. Fundamental to achieving SDG 3 by building trust in healthcare services.

3.7 User Profile Module:

Allows users to create and manage profiles, securely store insurance information, and set preferences for appointment notifications and communication. Empowers individuals to personalize their healthcare experience.

3.8 Reviews/Forum Module:

Enables users to leave reviews, ratings, and engage in a community forum to share experiences and provide feedback, fostering a sense of trust and community.

3.9 Professional Profiles Module:

Provides detailed profiles of healthcare professionals, including specialties, qualifications, and patient reviews, enhancing transparency and facilitating informed choices.

3.10 Multi-Language Support Module:

Ensures the website is accessible to users in multiple languages, broadening its reach and usability.

3.11 Medical Equipment on Rent Module:

Allows users to rent medical equipment, promoting accessibility to necessary healthcare resources.

3.12 Help/FAQ/Navigation Modules:

Provides assistance and guidance through help content, FAQs, and intuitive navigation, ensuring a user-friendly experience.

3.13 Voice Command Module:

Enables users to interact with the website using voice commands, providing a hands-free and inclusive navigation experience.

3.14 Disease Catalogue Module:

A comprehensive repository providing users with information on symptoms, causes, treatments, and preventive measures for various health conditions. The module supports informed decision-making by offering curated content from reputable sources, contributing to user health literacy and awareness.