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Medicare
Medicine Identification App

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Project Report submitted in partial fulfilment of the requirements of

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CERTIFICATE

*This is to certify that the report titled **Medi Care** is a bona fide record of work done by **Greeshma Girish C (2241130)**, **Sandeep Mathew (2241155)** of Christ University, Bengaluru, in partial fulfillment of the requirements of 6th Semester BCA during the year 2025.*

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Project Guide

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1. INTRODUCTION

India is one of the largest producers of counterfeit medicines, making the need for a reliable medicine verification system more crucial than ever. Counterfeit drugs pose significant health risks, leading to ineffective treatment, adverse reactions, and even life-threatening consequences. To address this issue, the Medicare app provides an innovative solution that allows users to scan medicines using their mobile device cameras and instantly access vital information. By ensuring safer medicine consumption and reducing the risks of counterfeit drugs, the app plays a vital role in enhancing healthcare management and patient safety.

The Medicare app empowers users with comprehensive information about medicines, including their composition, usage, side effects, and manufacturer details. This enables individuals, even those with limited medical knowledge, to make informed healthcare decisions. By promoting trust in medication and facilitating drug verification, the app contributes to Sustainable Development Goal (SDG) 3: Good Health and Well-Being. It ensures that users have access to authentic medicines and are aware of potential risks, ultimately fostering a healthier society.

In addition to medicine verification, the app enhances medication management through features like prescription tracking and medication scheduling. Users can upload and monitor their prescriptions, helping them stay on track with their treatment plans. Medicine reminder alerts ensure timely consumption, while stock and refill notifications help users manage their supplies efficiently. These features not only improve adherence to prescribed regimens but also prevent the dangers of missed doses or accidental overdoses.

Designed with accessibility in mind, the Medicare app provides a user-friendly interface that caters to individuals from all backgrounds. Whether someone is a patient managing a chronic illness or a caregiver assisting a family member, the app simplifies medicine identification and usage. By leveraging technology to bridge gaps in medical awareness, it enhances healthcare accessibility and empowers individuals to take control of their well-being. Through its innovative approach, the Medicare app stands as a crucial tool in the fight against counterfeit medicines and promotes a safer, more informed healthcare experience for all.

1.1 Project Description

Medicare app is designed to enhance medicine verification and management by leveraging mobile technology to ensure safer and more efficient healthcare practices. Currently, manual processes in pharmacies and individual medication management lead to errors, counterfeit drug risks, and non-adherence to treatment plans. Our app addresses these challenges by allowing users to scan medicines using their mobile device cameras, instantly retrieving details such as composition, usage, side effects, and manufacturer information. This ensures accurate drug validation, reduces medical errors, and enhances trust in medication. Additionally, the app offers features like prescription tracking, medication reminders, allergy reconciliation, and stock alerts to improve adherence and streamline pharmaceutical management. By automating key aspects of medicine identification and ensuring accessibility for users of all backgrounds, the Medicare app contributes to improved patient safety, medication awareness, and better healthcare outcomes.

1.2 Existing Systems

Several existing apps offer medication identification and management, each with specific features and limitations. The MedSnap App utilizes a smartphone camera to identify pills, providing details about their name, dosage, and potential drug interactions. However, it is primarily designed for healthcare providers and requires users to place pills on a special MedSnap tray for accurate identification. The MedHelper App focuses on medication reminders and prescription tracking but lacks a scanning feature for medicine verification and has a limited database for lesser-known drugs. The Pill Identifier App helps users identify medicines based on their physical attributes, such as shape, color, and imprint. However, it requires manual input, does not scan physical packaging, and cannot detect counterfeit drugs. These limitations highlight the need for a more comprehensive solution like the Medicare app, which combines instant medicine scanning, detailed verification, counterfeit detection, and effective medication management in a single, user-friendly platform.

1.3 Objective

The primary objective of the Medicare app is to provide an intelligent and user-friendly solution for medicine verification and management, ensuring public safety and reducing medical errors. By enabling users to scan medicines and instantly access detailed information, the app helps prevent counterfeit drug consumption and enhances medication adherence. It streamlines workflows for both individuals and healthcare providers by offering features like prescription tracking, medication reminders, and stock alerts.

1.4 Purpose, Scope and Applicability

1.4.1 Purpose

The Medicare app offers a comprehensive solution for medicine verification and management, ensuring patient safety and reducing medical errors. By enabling users to scan medicines and instantly access crucial details such as composition, usage, and manufacturer information, it helps prevent counterfeit drug consumption and enhances medication adherence. With features like medicine reminder alerts and stock notifications, it empowers users to manage their medications effectively while fostering a safer and more accessible healthcare system.

The main outcomes of this product focus on ensuring patient safety and improving medication management. Some of the key benefits include:

- Identifies and prevents the use of counterfeit medicines.
- Reliable prescription tracking and management
- Fast medicine identification.
- Medicine reminder alerts.

1.4.2 Scope

The Medicare app is designed to enhance medication safety and awareness for users by providing instant access to essential drug information. With a simple scan using a mobile device camera, users can verify the authenticity of medicines, check their composition, understand usage instructions, and be alerted to potential side effects. This helps prevent counterfeit drug consumption and ensures informed healthcare decisions.

Additionally, the app assists users in tracking prescriptions, setting medication reminders, and managing their intake schedules, reducing the risk of missed or incorrect doses. By offering a user-friendly and accessible platform, Medicare promotes safe and responsible medicine consumption for individuals of all backgrounds, including those with limited medical knowledge.

1.4.3 Applicability

The Medicare app is beneficial for anyone who consumes medication, especially individuals managing chronic conditions, elderly patients, and caregivers. It helps users verify the authenticity of medicines, understand their effects, and maintain proper intake schedules. The app is also useful in rural and remote areas where access to pharmacists or healthcare professionals may be limited. By offering real-time medicine identification and management, Medicare enhances medication safety and promotes better healthcare adherence.

1.5 Overview of the Report

Chapter 1 introduces the primary factors of the system being developed like its description, a simple study on the existing systems, the main objective and need of this application are discussed. In Chapter 2 the overall system is being analyzed on various parameters like problems and system requirements. Different models are used to better understand the system like block diagrams and feasibility study, an overall system study at various phases of product growth is being put. Chapter 3 basically covers the details regarding the system design, a full-fledged system architecture, modules, databases and user interfaces which were identified and these modules are drilled further down with all the system development and data design structures. Technical implementation details are discussed in Chapter 4, that details the approach that is being implemented, the technologies being used and some of the coding standards that are being followed and used. Chapter 5 solely describes about the testing approaches being followed and about the test reports that the product outputs. Some of the Design issues and Implementation issues, Advantages or the benefits of the system being developed and its demerits and the future scope of the application are discussed in the last Chapter 6. Altogether the entire report chapters deal with the processes, stages, ideas, technologies that are incorporated and used in achieving the end expected product over various cycles of software development process.

2. SYSTEM ANALYSIS AND REQUIREMENTS

2.1 Problem Definition

Identifying and verifying medicines can be challenging for users, leading to risks such as counterfeit drug consumption, incorrect dosage intake, and a lack of awareness about potential side effects. Many individuals, especially those without medical expertise, struggle to access accurate and reliable medicine information. Additionally, missing doses or improper medication management can lead to ineffective treatment and health complications. The lack of an efficient system for verifying drug authenticity, tracking prescriptions, and setting reminders increases the risk of medication errors. These challenges highlight the need for a solution that simplifies medicine identification, enhances user awareness, and ensures safer medication practices.

2.2 Requirement Specification

2.2.1 Functional Requirements

Requirement ID	Requirement Name	Description
C_FR1	Access mode	Users (e.g., General Users, Physicians, Nurses, and Pharmacy Personnel) shall access the system with dedicated privilege sets, ensuring personalized functionality and interface.
C_FR2	Dashboard display	The system shall display a personalized dashboard for users, including medication schedules, stock alerts, prescription tracking, and patient-specific updates.
C_FR3	Medicine Scanning	The system shall enable users to scan medicine packaging or pills using the device camera for identification and detailed information retrieval.
C_FR4	Information Display	Users shall access detailed medicine information, including name, composition, uses, dosage, side effects, manufacturer, and other relevant data.

C_FR5	Prescription Management	The system shall allow users to upload, track, and manage prescriptions for streamlined medication management.
C_FR6	Medicine Reminder Alerts	Users shall set up and receive reminders for medication schedules to ensure timely consumption.
C_FR7	Stock and Refill Alerts	The system shall track medicine stock levels and notify users to restock when supplies are low.

Table 2.1 Functional Requirements

2.2.2 Non-Functional Requirements

Requirement ID	Requirement Name	Description
C_NF_R1	Performance	<p>As it's a Mobile application, the network, hardware and other related infrastructure plays a vital role in determining the application performance.</p> <ul style="list-style-type: none">• Data Compression: Efficient formats and caching reduce network burden.• Navigation: Minimal screens and gestures streamline user interaction.• Graphics: Lightweight visuals and optimized color schemes enhance performance.
C_NF_R2	Safety/Security	<p>Performing frequent backup can reduce the data loss due to sudden server or the system crash. Being a healthcare workflow system, its primary character should be security, thus providing a secure environment for the app flow process. Users can confidently verify the medicines they consume, reducing health risks associated with fake or incorrect drugs.</p>

C_NF_R3	Quality Requirements ● Usability	The Medicare app is designed for users of all backgrounds, ensuring an intuitive and easy-to-use interface. Clear navigation, simple instructions, and accessible features make it user-friendly without requiring technical expertise. Additionally, in-app guides and tooltips enhance user experience and understanding.
	● Reliability	The app ensures accurate medicine identification and counterfeit detection without delays or incomplete processing. Each scan and search is performed thoroughly to provide reliable results, minimizing errors in medicine verification..
	● Availability	The Medicare app is designed to function seamlessly, handling multiple user requests efficiently. The system ensures quick responses and uninterrupted access, allowing users to check medicine authenticity and receive reminders anytime.

Table 2.2 Non-Functional Requirements

2.3 Block Diagram

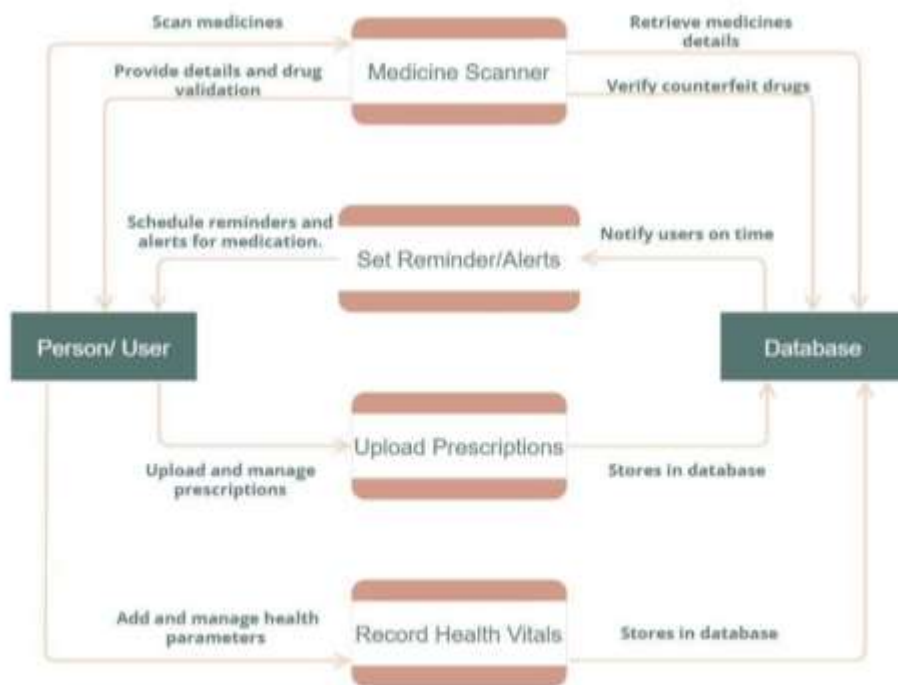


Fig 2.1 Block Diagram

The above diagram illustrates the overall system design and its key functions along with associated components. The Medicare app enables users to scan and identify medicines, verifying their authenticity and retrieving essential drug information. When a user scans a medicine, the app processes the request, cross-referencing it with a comprehensive database to detect counterfeit drugs, provide dosage details, and highlight potential interactions. The system ensures accurate and real-time responses, helping users make informed decisions about their medication. This depiction offers a high-level overview of the application, allowing the team to analyze and refine system requirements effectively.

2.4 System Requirements

This phase being the crucial platform for all the future process of development was focused in analyzing the proposed and existing system and gathering the accurate requirements from our

clients. And analysis is being done various level in this phase to understand the actual requirements that in turn forms a good input for our system design.

2.4.1 Requirements/User Stories

The high-level client requirements in terms of user stories are given as below:

- The system should allow users to scan and identify medicines using their camera.
- The app should provide detailed medicine information, including name, dosage, and potential side effects.
- The system should verify the authenticity of scanned medicines and detect fake drugs.
- Users should receive medicine intake reminders to ensure timely consumption.
- Users should be able to store and access their medication history for future reference.
- The system should maintain a secure and reliable database to ensure accurate medicine verification.

2.4.2 User Characters

- **Users:** The primary actor who scans medicines to verify their authenticity, retrieve detailed information, and receive intake reminders.
- **Admin/App:** Processes the scanned medicine data, identifies the drug, checks for counterfeits, provides interaction warnings, and sends reminders to users.

2.4.3 Use Case Diagram

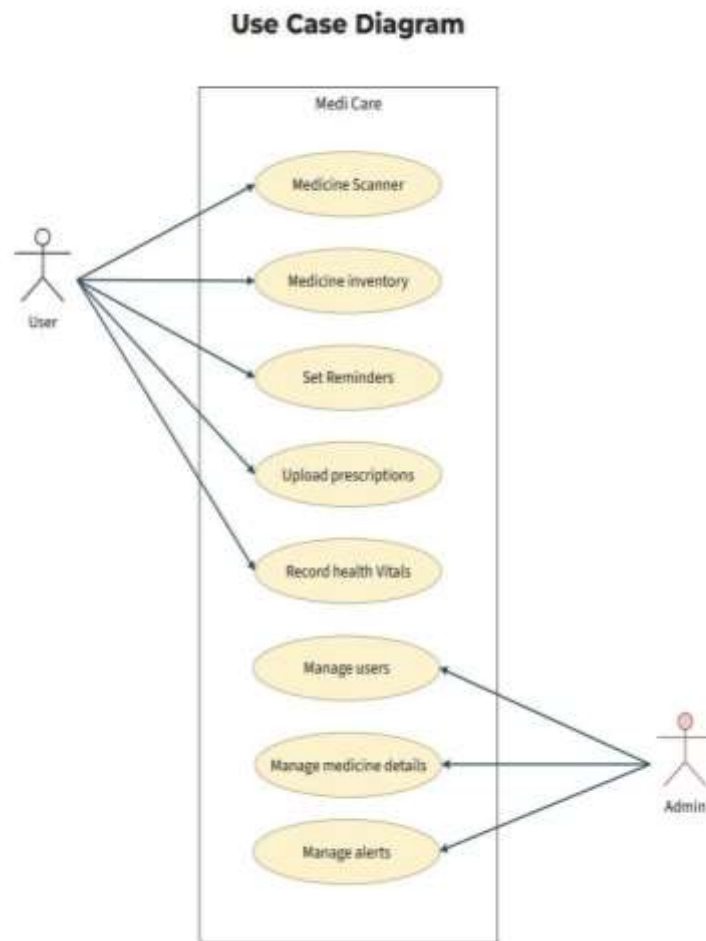


Fig. 2.2 Use case diagram

The above use case diagram depicts the system from the user's point of view. The user interacts with the app to access various functionalities, and the system responds accordingly. The app allows users to scan medicines for identification, detect counterfeit drugs, access detailed medicine information, and set reminder alerts for timely intake. Users can verify the authenticity of their medication, receive accurate dosage details, and ensure they take the right medicine at the right time, improving overall safety and health management.

2.4.4 Software and Hardware Requirements

Hardware Requirements	Software Requirements	Other Requirements
RAM <ul style="list-style-type: none"> • 2GB Internal Storage <ul style="list-style-type: none"> • 4GB or Higher Processor <ul style="list-style-type: none"> • ARMv7 (32-bit). ARM64 (64-bit). x86, x86_64 or higher 	Operating System <ul style="list-style-type: none"> • Android 7 or Higher 	None

2.4.5 Constraints

Though medicine flows can be regulated by the pharmacists since it makes direct connection between the clinicians, managing and controlling non-medicines like X-Ray, Radiology and other laboratory articles are insignificant and not addressed since they follow their own standards that doesn't impact the patient's safety. And this application works only on Windows based systems.

2.5 Conceptual Models

2.5.1 Data Flow Diagram

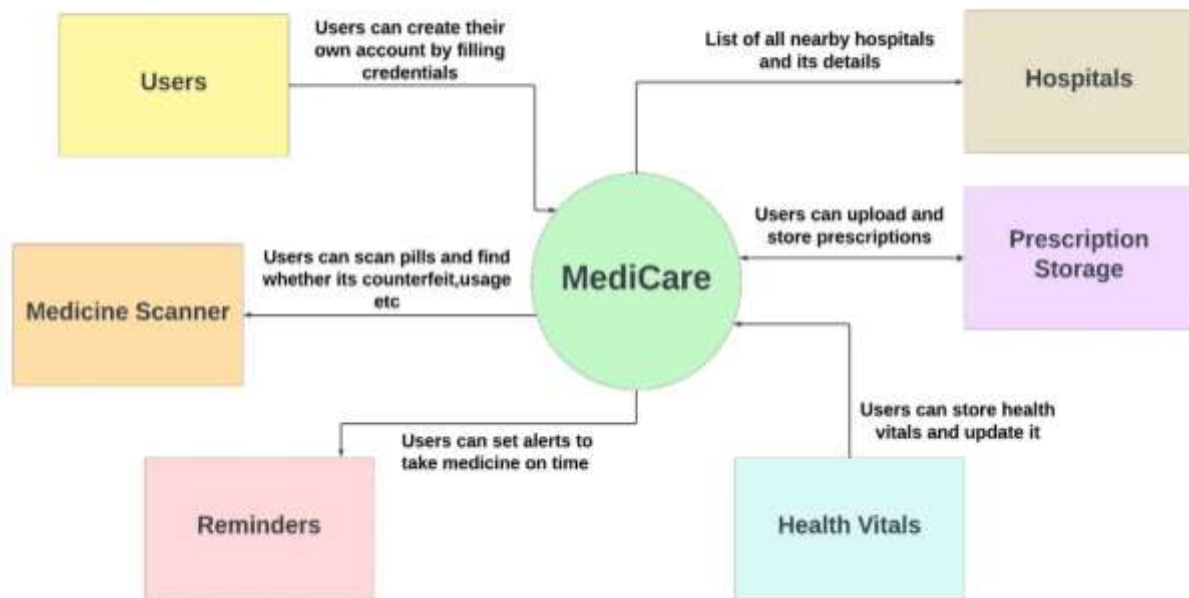


Fig. 2.5.1 Data Flow Diagram

2.5.2 Data Flow Diagram 1

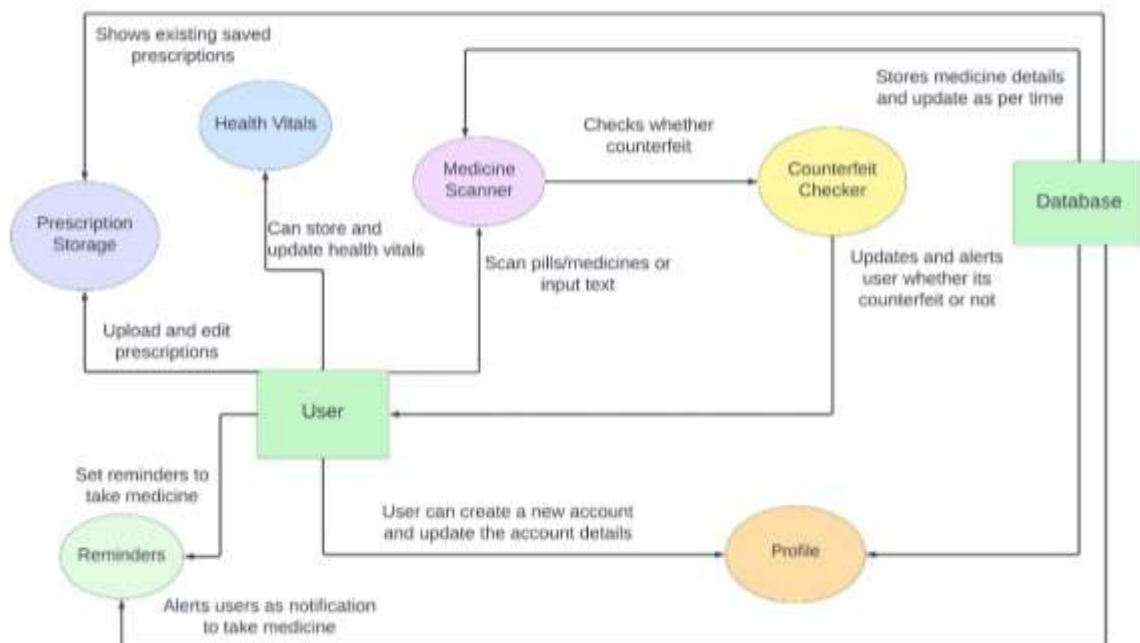


Fig. 2.5.2 Sequence Diagram

The above diagram illustrates the data flow within the MediCare system, showing how different modules interact and exchange information. Users create accounts to access features such as prescription storage, health vitals tracking, and medicine scanning. The system processes user inputs, allowing them to upload and retrieve prescriptions, scan medicines for authenticity, and receive medication reminders. It also fetches hospital details based on location and enables users to store and update their health data. Each module communicates with the central MediCare system, ensuring seamless healthcare management and data processing.

2.5.3 ER Diagram

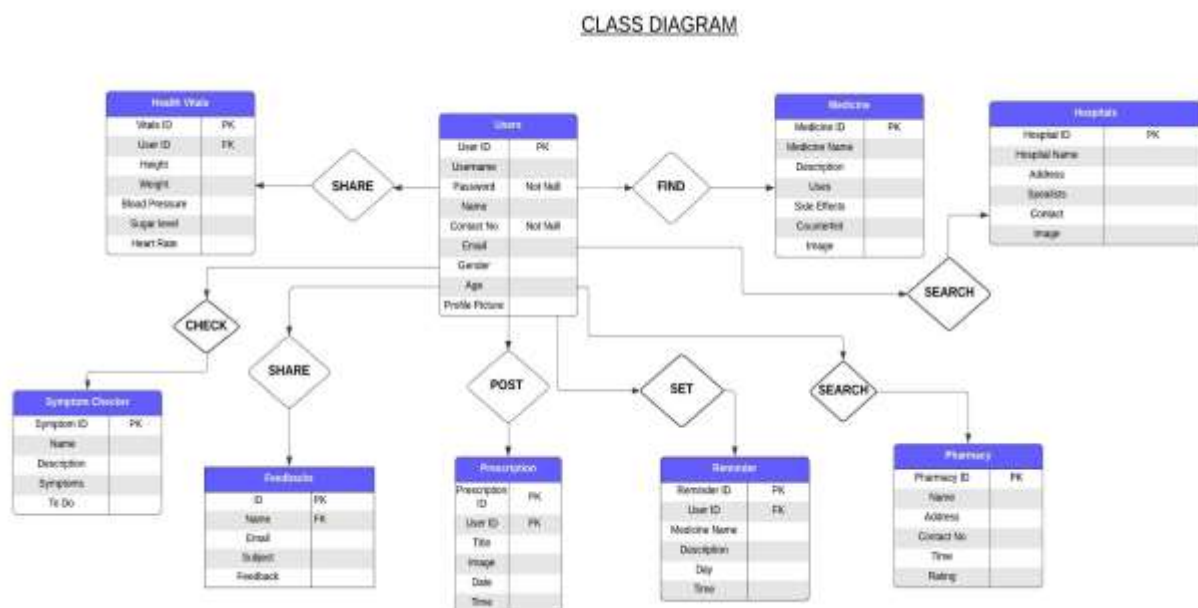


Fig 2.5 Entity Relationship Diagram

The above ER diagram depicts the entities involved in the proposed system and the relationship that they share between each of the other entities. The association links describes these relationships and the cardinality represents the number of instances of the entities and the participation tells what level the entity participation is important.

3. SYSTEM DESIGN

3.1 System Architecture

3.1.1 System Perspective

After freezing the gathered requirements, the system designing is performed based on the analysis and feasibility study from previous development phases the following designs are accepted at a whole. These diagrams give a whole picture of the entire system that is being built.

3.1.2 Architecture

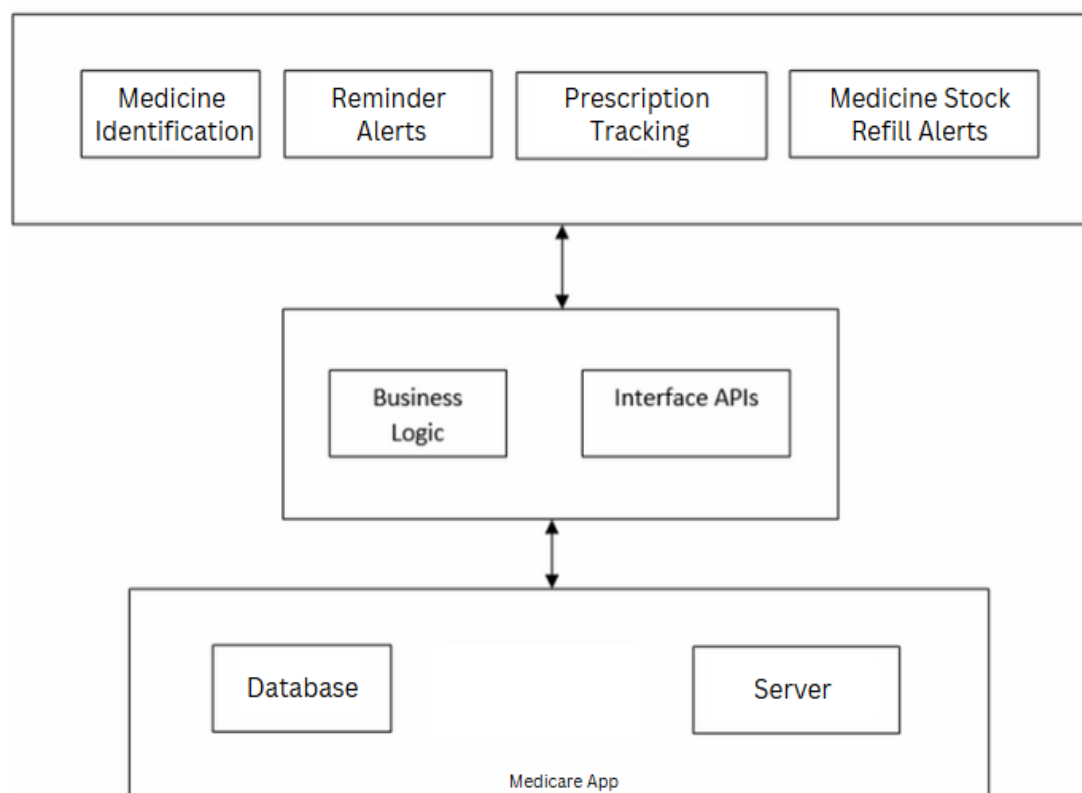


Fig 3.1.2 Medicare Management System

The above figure depicts a very high-level architecture of the system. The first level holds four different modules that provides set of functionalities to its user at the front. The middle layer which is the business layer makes an interface connection between the top and bottom layer in serving and processing the user request. The bottom most layer holds the backend database, webserver and drug repository that provides the required information to all the above layers.

3.2 Module Design

This system basically composed of four main high-level modules as mentioned below. Each of these modules in turn broke down into multiple sub modules.

a. Scanning and Identification Module

The Scanning and Identification module leverages advanced image recognition algorithms to analyze medicine packaging, pills, or barcodes using the device camera. It identifies the medicine and retrieves comprehensive information, including name, composition, uses, dosage, side effects, and manufacturer details, ensuring users receive accurate and quick access to essential medication data.

b. Prescription Management Module

The Prescription Management module enables users to upload digital copies of prescriptions through images or PDFs. Users can view and organize their prescriptions, track prescribed medication schedules, and maintain a history of medical records. This ensures better medication adherence and simplifies the management of prescriptions for ongoing treatments or consultations.

c. Allergy Reconciler:

The Reminder and Alert module help users stay on top of their medication regimen by enabling custom schedules with timely notifications. It provides alerts for upcoming doses, tracks medicine stock levels, and sends refill reminders when supplies are low, ensuring consistent and efficient medication management for better health outcomes. These main modules are further composed of following sub modules.

d. User Profile Module:

The User Profile module stores personalized user data, including medicine history, health preferences, and prescription records. It enables tailored recommendations, efficient tracking of past medications, and easy retrieval of health information, offering a customized experience to improve medication adherence and support individual health management goals.

e. Admin Module:

The Admin Module handles backend operations, enabling administrators to manage drug databases, including adding, updating, or removing medicine information. It oversees app functionalities, user data management, and system performance, ensuring accurate information delivery, seamless user experience, and compliance with regulatory standards for efficient app operation.

These main modules are further composed of following sub modules

i Login Module

This module provides all access definitions to its users at various level.

ii Medicine Scanning

The module uses the device camera and image recognition to identify medicines, with a manual search option for added reliability.

iii Stock Management Module

The inventory feature tracks medicine stock, sends low stock alerts, and provides refill suggestions via nearby pharmacies or online options.

3.3 Database Design

3.3.1 Tables and Relationship

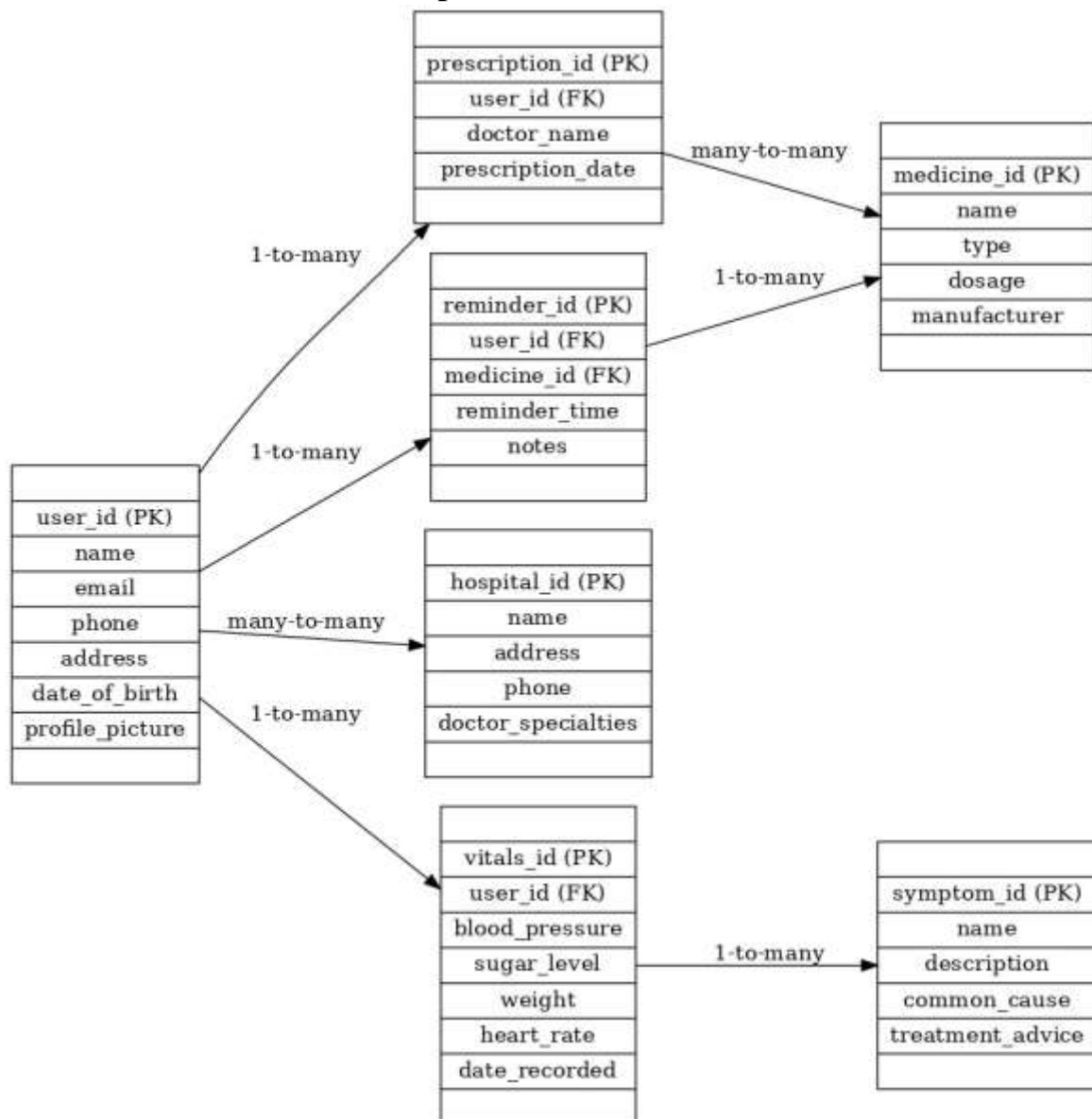


Table 3.1.1 Table Relationship Diagram

The above diagram clearly shows the relationship that exists between the system database tables. Cardinality and the Participation links tell what number of instances and what level of participation is required by each entity. The primary key, foreign key links describe how each table is interconnected together in accessing common information.

3.3.2 Data Integrity and Constraints

Field	Data type	Length	Constraint
username	Varchar	16	FOREIGN KEY
password	Varchar	16	Not_Null

Table 3.1 Login

Field	Data type	Length	Constraint
Medicine_id	int	250	PRIMARY KEY
Medicine_Name	Varchar	50	Not_Null
Medicine_Imprint	Varchar	50	Not_Null
Description	Varchar	255	Default
Uses	Varchar	255	Default
Side_Effects	Varchar	255	Default
Counterfeit	Boolean	-	Default_FALSE
Image	image	10	Default

Table 3.2 Medicine Table

Field	Data type	Length	Constraint
Vitals_ID	Int	250	PRIMARY KEY
User_ID	Int	250	FOREIGN KEY
Height	Float	-	Default
Weight	Float	-	Default
Blood_Pressure	Varchar	255	Default
Sugar_Level	Varchar	255	Default
Heart_Rate	Int	12	Default

Table 3.3 – Health Vitals Table.

Field	Data Type	Length	Constraint
Reminder_ID	Int	250	PRIMARY KEY
User_ID	Int	250	FOREIGN KEY
Medicine_Name	Varchar	255	Not Null
Description	Varchar	255	Default
Day	Varchar	50	Default
Time	Time	-	Default

Table 3.4 – Reminders Table.

Field	Data Type	Length	Constraint
Hospital_ID	Int	250	PRIMARY KEY
Hospital_Name	Varchar	100	Not Null
Address	Varchar	255	Not Null
Specialists	Varchar	255	Default
Contact	Varchar	50	Default
Image	Varchar	255	Default

Table 3.5 – Hospitals Table.

Field	Data Type	Length	Constraint
Prescription_ID	Int	250	PRIMARY KEY
User_ID	Int	250	FOREIGN KEY
Title	Varchar	255	Not Null
Image	Varchar	255	Default
Date	Date	-	Not Null
Time	Time	-	Not Null

Table 3.6 – Prescriptions Table.

Field	Data Type	Length	Constraint
Symptom_ID	Int	250	PRIMARY KEY
Name	Varchar	100	Not Null
Description	Varchar	255	Default
Symptoms	Varchar	255	Default
To_Do	Varchar	255	Default

Table 3.7 – Symptom Checker Table.

3.4 Interface Design and Procedural Design

3.4.1 User Interface Design

The Medicare app is being designed for the following healthcare users, which provides user specific interface feature to perform role-based tasks.

- a) **Elderly Users:** Older adults often struggle with managing medications due to memory decline, chronic illnesses, and complex regimens. Challenges like forgetting doses, vision impairments, or handling pills can affect adherence. Medicare’s reminders, health tracking, and easy-to-use design empower older adults to manage medications independently, improving health outcomes and reducing stress.
- b) **Patients with Chronic Conditions:** Patients with chronic conditions like diabetes, hypertension, or heart disease often require strict adherence to medication schedules to manage their health effectively. Missing doses or inconsistent tracking can lead to complications. Medicare provides medication reminders, tracking features, and personalized health insights, ensuring these patients stay on track and improve their long-term health outcomes.
- c) **Caregivers:** Family members or professional caregivers responsible for managing the medication and health of others, such as elderly parents or patients with disabilities.

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- d) Pharmacists and Healthcare Providers:** Professionals who may recommend the app to their patients for medication adherence and prescription tracking.