Mechanism to Prevent Medicine from Getting Wasted

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Abstract

Medication waste is a severe economic and environmental burden in most healthcare systems globally. Much of it is avoidable, and studies suggest that strategic interventions, especially those involving pharmacists, can prevent a significant percentage of wastage. Pharmacists are key professionals in reducing medication wastage through interventions like shared decision-making with the patient, medication redistribution, and a reduction in the dispensing interval. Such strategies carry many benefits, but there are also some barriers to be overcome, such as arguments surrounding the feasibility and low economic value of returned medications. Another key factor is the willingness of patients participating in the re-dispensing systems, and proper awareness and education on the importance of returning unused medications play a crucial role in achieving success.

In light of these challenges, this project is set to design an all-encompassing website aimed at the wastage of medicines through better management of medication. This website will be useful to different users: patients, pharmacies, and health providers, through its tools on medication inventory tracking, reminders on the expiration dates of medicines, and safe disposal or donation of unused medicines. There are also plans for educational tools available on the platform to inform and engage the patients in their efforts to collect used medications, redirect them through safe return systems and re-dispensing of reused medications. Such aspects will promote an integrated system from the online level down to ensuring healthier, environmentally responsible medication management processes. Such management will end with a long-term solution regarding medicine waste problems across the spectrum by encouraging mutualism among key partners in designing effective, durable solutions.

Chapter 1: Introduction

1.1 Motivation

The motivation behind this project is the reduction of medicine wastage, which is becoming a growing concern, especially for medicines nearing their expiration dates. This system bridges the gap by allowing donations of medicines to NGOs, ensuring that those in need receive the medications, preventing wastage, and contributing to healthcare sustainability.

1.2 Problem Statement

In the current setup, medicines due to expire remain unused. In this system, there is no provision to forward these medicines towards the needy

sectors, such as NGOs. These result in two losses: the wastage itself and the missing opportunity to present essential medical necessities to the destitute public.

1.3 Goal of the Project

The goal of the project is to minimize the waste of medicine by helping nearing-expiry medicines be donated, promoting sustainability, and getting the medicines to the people in the best possible inventory and donation management way.

1.4 Scope

This will include management of medicine inventory by sellers, monitoring medicines approaching the expiration date, allowing user purchase, and rerouting expired or reusable medicines to NGOs. The scope of the platform is towards reduction of waste, optimization of the inventory management process, and easier access to medical supplies to both users and society.

1.5 Project Introduction

This project introduces a system that reduces medicine wastage by ensuring that nearing-expiry medicines are donated to NGOs. It involves seller inventory management, admin tracking of expired products, and user-driven requests. The system ensures better utilization of available resources, making a positive impact on both the environment and healthcare sector.

Chapter 2: Literature Review

2.1 Related Work

[1] Sharanya S Bhat; K Shraddha; A.S Bhavana; Shreyas Suresh Rao || Digital Medicine Assistant-Health Application for Expiry Tracking || 19-21 November 2021.

Medicines play an important part in each and everyone's life where some of them relieve us from diseases, disorders or pains and some of them are very essential lifesaving ones. Some of them are hardly available and need to be ordered prior in remote places, and some are too ex-pensive. The most common problem is that we all tend to miss the expiry of our medicines or sometimes the strips get ripped off, and the information related to the tablet or the medicine becomes unavailable. Most of us spend our time writing down the same in notepads and waste time in labelling the medicines. For maintaining proper dosage information of the medicines, many try to organize their prescriptions but there is always a possibility of losing them. Notepads, keynotes and alarm reminders might be an easy solution that strikes to us at the first thought but is not efficient. There is no way of getting reminded about the expiry of any of the medi-cines that's written in a notepad. Many of the conventional applications offer the option to remind of the medicines that need to be taken on a daily basis or give a single notification for the expiry of medicines that are within its entry that the users can clear off from the mobile's notification panel because of having a busy day. Besides, most applications available have the feature of tracking expiry more generally than just limited to medicines. This paper is about an application that provides more convenient and effective solution to the problem and to the best of our knowledge is the first application designed to remind its user through reminder notifications about the expired and about to expire medicines.

[2] Muhammad Nazrul Islam; Ashratuz Zavin; Sanjana Srabanti; Chowdhury Nawrin Ferdous; Sayma Alam Suha; Lameya Afroze || GiveMed: A webportal for medicine distribution among poverty-stricken people || 21-23 December 2017.

A still huge percentage of the population is living in extreme poverty. There is an increasing difficulty of the poor or low-income group to pay for health purpose. Thus, they suffer from various diseases and due to that the death rate is increasing day by day. On the other hand, there

are many people who have plenty of leftover medicines even after finishing those medicines consumption. In this paper, we have proposed a medicine distribution web portal, named 'Give Med'. The Give Med is a platform for the donors

who want to donate their unused medicines to the poor or low-income people who need those medicines. This system will contribute to reduce the cost for national health services by making the proper use of unused medicines; and to help the poor or low-income people to get better health services. The portal was also tested with 16 users (doctors, donor, NGO personnel, and low-income people) and was found to be highly effective, efficient, satisfiable, and useful system.

[3] Ranula Gihara Gamage; Nandana Senarath Bandara; Dunya Dulashani Diyamullage; Kanchala Upethri Senadeera; Kavinga Yapa Abeywardena; Nelum Amarasena || PharmaGo-An Online Pharmaceutical Ordering Platform || 09-11 December 2021.

Pharmacy services are one of the important pillars of health. Because of the COVID-19 pandemic, people have to keep social distance. Therefore, having online services available to dispense medicine is necessary. Quarantine measures put in place by different countries and in those countries have prevented the breakout of the virus, and therefore, online pharmacies have become an extremely popular means to get the correct medication. Today, in Sri Lanka, there are some mobile applications separately owned by each of the pharmacies to provide online pharmaceutical services for their customers. However, all the medicines the customer needs might not be available in a single pharmacy. PharmaGo provides with its cooperation to the customers to get medicines of his necessity at a single pharmacy, as against avoiding him roaming from pharmacy to pharmacy. Similarly, pharmacy owners can read the prescription by using image processing mechanisms and doubtlessly identify the required medicines. Further, the system analyses the previous sales records and gives a prediction regarding the future demand for drugs to the pharmacy owners. PharmaGo also comprises an AI-powered, highly trained medical chatbot that helps the customers navigate through the whole process. PharmaGo provides a reliable platform for both pharmacy users and pharmacists to fulfill the unique needs of pharmacy services.

[4] Dhessamine Maghinay; Christopher Ian Florece; Gabriel Taneza; Paul Jeo Fronda; Michael N. Young || A Comprehensive Study on the Effect of Using Online based Drug Ordering Application for Drug Purchasing Optimization || 23-26 April 2021.

Pandemics such as Covid-19 made access to medicine a little bit tougher. Covid-19 prevented the world as a whole from communicating one another which affected pharmaceutical companies greatly. This inquiry aims to ease that barrier that Covid19 gave us and make medicine accessible for everyone within their own comfort. With the aid of our mobile devices, this study aims to use the comfortability of mobile devices in the ordering of medicinal drugs. Consumers by making an application that has data collected from the Department of Health (DOH) itself for licensed medical drugs and their respective locations could hence now know where or what pharmacy they need to approach. It is found that the tracking of medicinal drugs plays the greatest role in making medical drugs difficult to purchase and even more because of the pandemic. This study answers both the ultimate problem of both the pandemic and the inaccessibility of medicine for the consumers as well as making preventive measures to mitigate the spread of the virus.

[5] A. Jeandron; M. Page; B. Comte; C. Blanc-Gonnet || Improving practices in medical equipment support projects || 18-19 September 2012

Many articles suggest that much of the medical equipment in hospitals in developing countries is no longer working. Much of it could have been donated, or purchased on very favourable terms, by medical equipment support projects in developed countries. The primary causes of this are well known. In an attempt to correct it, HUMATEM, a French non-profit organization, has specialized in advising organizations running medical equipment support projects. Based on the WHO recommendations on donations of medical equipment [1], our action is oriented along various

axes: encouraging stakeholders to take responsibility for improving the quality of the projects, improving the technical quality of the devices donated and finally, promoting biomedical professions. To that end, we have developed documents, methodologies and services with the main aim of being practical in order to answer all the diverse problems that could arise, available to all who are concerned-whether requestors or donors of equipment, hospitals or funding partners.

Chapter 3: System Design and Architecture

System Overview

3.1 Existing System:

There is no integrated mechanism to handle near-expiry medicines in an efficient manner. Medicines that are close to expiration often go to waste. There is no platform to connect sellers, users, and NGOs to divert such medicines. This results in lost resources, which can otherwise be useful for people in need of medical supplies.

3.2 Drawbacks

•There is no system to handle near-expiry medicines efficiently.

•Medicines are wasted due to a lack of redirection towards the needy.

•Inadequate coordination between sellers, users, and NGOs.

•There is an oversight in providing an opportunity to utilize donated medicines in the deprived regions.

•Inventory management is inefficient with more wastage.

3.3 Proposed System

This is a system with a platform on which the seller updates the stock, flagging medicines approaching the expiry date. Users can order medicines; any approaching the expiry date can request donation. The expired items are then collected by the admins and issued to NGOs in order to have better use of resources and wastage minimised.

3.4 Benefits

•Wastage of medicines is decreased as near-expiry items are channeled towards NGOs.

•Optimal management of the inventory through having a structured process for monitoring of medicines.

•This provides a sustainable solution for unused medical resources to benefit the underserved communities.

•This encourages social responsibility and community involvement in healthcare support.

Chapter 4: Requirement Analysis

4.1 Function and non-functional requirements

Functional and non-functional requirements:

Requirement's analysis is very critical process that enables the success of a system or software project to be assessed. Requirements are generally split into two types: Functional and non-functional requirements.

Functional Requirements: These are the requirements that the end user specifically demands as basic facilities that the system should offer. All these functionalities need to be necessarily incorporated into the system as a part of the contract. These are represented or stated in the form of input to be given to the system, the operation performed and the output expected. They are basically the requirements stated by the user which one can see directly in the final product, unlike the non-functional requirements.

Examples of functional requirements:

1)User authentication each time he/she logs into the system

2)Shut down the system in case of a cyber-attack

Non-functional requirements: These are mainly the quality constraints that the system must fulfill as per the project contract. The priority or degree to which these factors are incorporated differs from one project to other. They are also known as non-behavioral requirements.

They basically involve issues such as:

•Portability

•Security

•Maintainability

•Reliability

•Scalability

•Performance

•Reusability

•Flexibility

Examples of non-functional requirements:

1) All emails should be sent with latency of no more than 12 hours from such activity.

2) The processing time of each request to be within 10 seconds

3) Load time of site should be < 3 seconds in case simultaneous users are > 10000

4.2 Hardware Requirements

* H/W System Configuration: -

* Processor - I3/Intel Processor

* RAM - 8 GB

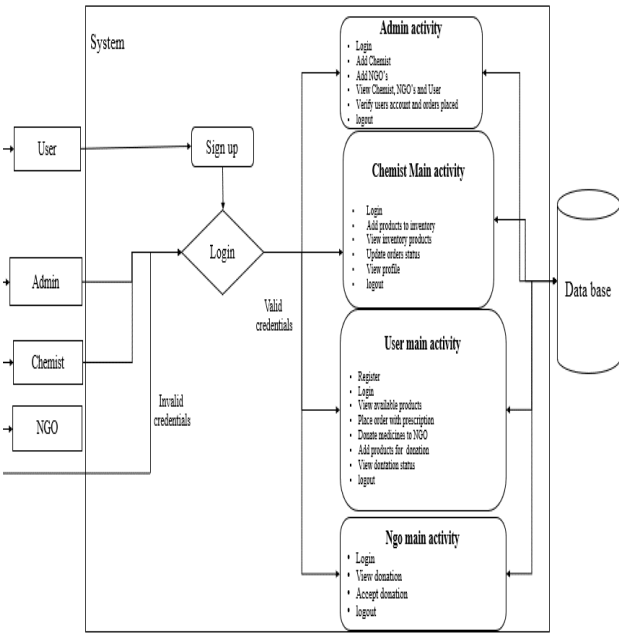
•\tHard Disk - 1TB

4.3 Software Requirements

•Operating System - Windows 10\t

•JDK - Java

4.4 Architecture



Chapter 5: System Design

5.1 Input design introduction

INPUT DESIGN

Input design is the interface between the user and information system. It includes the emergent specification and processes for preparing data and those activities are required in order to have transaction data get into a format that can be used for processing can be completed by examining the computer to take data from a written or printed document or can happen by having people enter data directly into the system. The design of input focuses on controlling the amount of input required, controlling the errors, avoiding delay, avoiding extra steps and keeping the process simple. The input is designed in such a way so that it provides security and ease of use with retaining the privacy. Input Design considered the following things:

What data should be given as input?

How the data should be arranged or coded?

The dialogue to direct the operating staff to give input.

Ways of developing input validations and procedures to be taken in case of error.

OBJECTIVES

1. Input Design is the process of converting a user-oriented description of the input into a computer-based system. This design is important to avoid errors in the data input process and show the correct direction to the management for getting correct information from the computerized system.

2. It is achieved by creating user-friendly screens for the data entry to handle the large volume of data. The goal of designing input is to make data entry easier and to be free from errors. The data entry screen is designed in such a way that all the data manipulates can be performed. It also provides record viewing facilities.

3. When data is entered it will check its validity. Data can be entered through screens. Appropriate messages are shown as when needed so that the user will not get confused of instant. Thus the objective of input design is to create an input layout that can be followed by a person easily

OUTPUT DESIGN

A quality output is one, which meets the requirements of the end user and presents the information clearly.

In any system results of processing are communicated to the users and to other system through outputs. In output design it is determined how the information is to be displaced for immediate need and also the hard copy output. It is the most important and direct source information to the user. Efficient and intelligent output design improves the system's relationship to help user decision-making. 1. Computer output should be designed in a structured, planned manner; the correct output has to be designed ensuring that each element of output is designed in such a way that people will find the system can use it easily and effectively. During the design of computer output in the analysis phase, they have to identify the exact output required to fulfill the requirements.

2. Choose the method for information presentation.

3. Create document, report, or other formats that contain information produced by the system.

The output form of an information system should accomplish one or more of the following objectives.

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Convey information about past activities, current status or projections of the

Future.

- Signal important events, opportunities, problems, or warnings.
- Trigger an action.
-

Confirm an action.

5.2 UML Diagram

UML stands for Unified Modelling Language. UML is a standardized general-purpose modelling language in the field of object-oriented software engineering. The standard is managed, and was created by, the Object Management Group.

The aim is for UML to become a common language for creating models of object-oriented computer software. In its current form UML is comprised of two major components: A Meta-model and a notation. In the future, some form of method or process may also be added to; or associated with, UML.

Unified modeling Language is the standard language to describe, Visualize, Construct, and document software system artifacts and for business modelling as well as other non-software systems.

The UML represents a collection of best engineering practices which have proven to be successful in modeling large and complex systems.

The UML is a very important part of developing objects-oriented software and the software development process. The UML uses mostly graphical notations to express the design of software projects.

GOALS:

The Primary goals in the design of the UML are as follows:

1. Provide users a ready-to-use, expressive visual modelling Language so that they can develop and exchange meaningful models.

2. Provide extendibility and specialization mechanisms to extend the core concepts.

3. Programming languages and development process independent.

4. Formal basis for the understanding of the modelling language.

5. The growth of OO tools market.

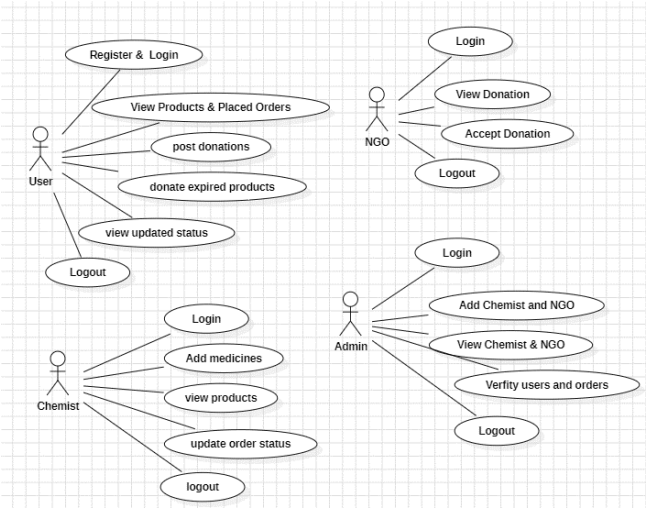
6. Higher level development concepts: collaborations, frameworks, patterns and components.

7. Integration of best practices.

USE CASE DIAGRAM:

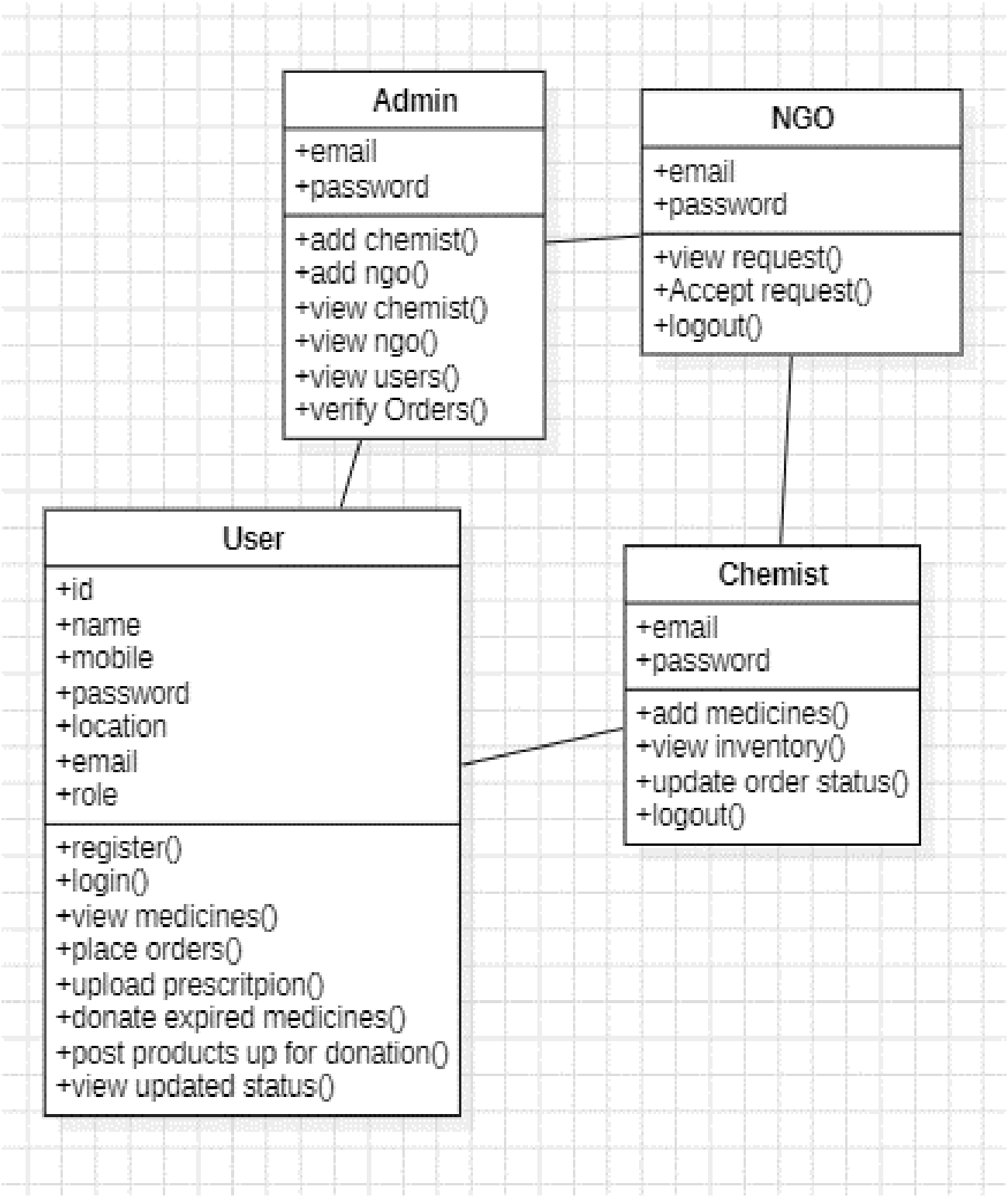
A use case diagram in the Unified Modeling Language (UML) is a type of behavioural diagram defined by and created from a Use-case analysis.

Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors, their goals represented as use cases, and any dependencies between those use cases. The main purpose of a use case diagram is to show what system functions are performed for which actor. Roles of the actors in the system can be depicted.



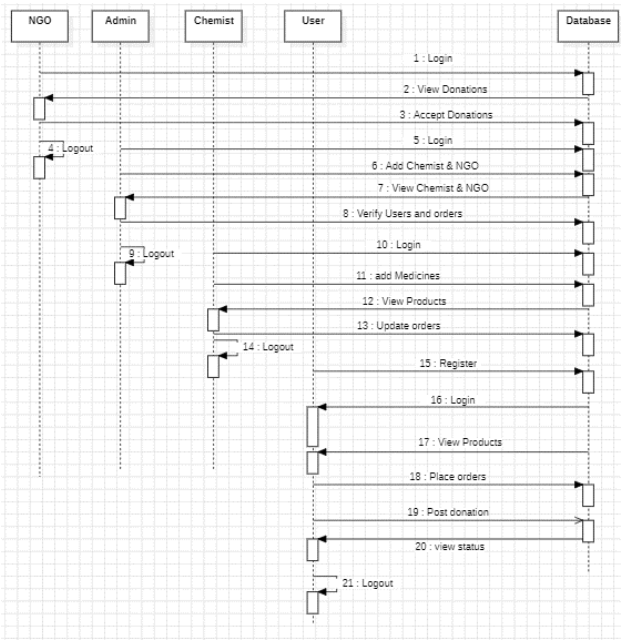
CLASS DIAGRAM:

A class diagram in Unified Modelling Language (UML) is a static structure diagram that describes the structure of a system by showing classes in the system, their attributes, operations or methods, and the relationships between classes. It explains which class


Admin
+email
+password
+add chemist()
+add ngo()
+view chemist()
+view ngo()
+view users()
+verify Orders()
NGO
+email
+password
+view request()
+Accept request()
+logout()
User
+id
+name
+mobile
+password
+location
+email
+role
+register()
+login()
+view medicines()
+place orders()
+upload prescritpion()
+donate expired medicines()
+post products up for donation()
+view updated status()
Chemist
+email
+password
+add medicines()
+view inventory()
+update order status()
+logout()

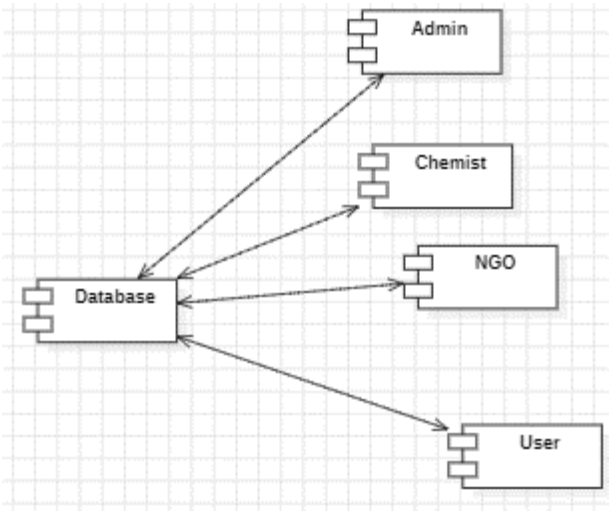
SEQUENCE DIAGRAM:

A sequence diagram in Unified Modelling Language (UML) is an interaction diagram that shows how processes work with one another and in what order. It is a construct of a Message Sequence Chart. Sequence diagrams are sometimes called event diagrams, event scenarios, and timing diagrams.

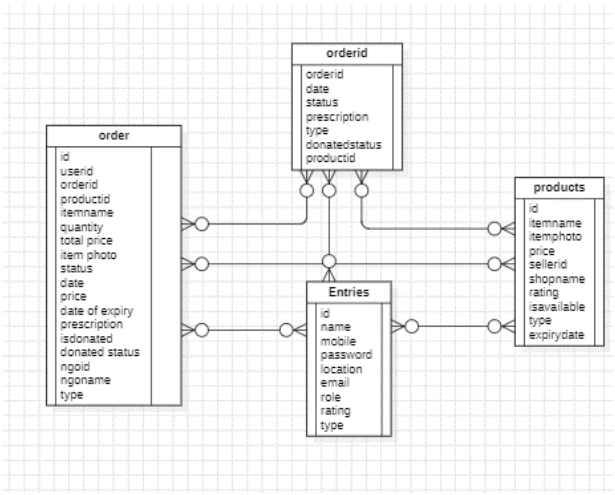


ACTIVITY DIAGRAM:

Activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration, and concurrency. In the Unified Modelling Language, activity diagrams can be used to describe the business and operational step-by-step workflows of components in a system. An activity diagram shows the overall flow of control



ER DIAGRAM:



Chapter 6: Implementation and Results

6. IMPLEMENTATION AND RESULTS

- **6.1 Modules**

- **User Module:** the module comprises registration for any user, login facility, and other operations allowed during authentication; with the user authenticated, browsing is enabled to view the available products and add them to the cart; order placement can be done, donations for expiring or soon-to-expire medicines and medical equipment can also be posted, viewing and managing one's own

profile with the option of up-dating personal details and monitoring donations.

- **Admin Module:** The admin module provides the admin with the administrative control of the platform. The admin can add and manage NGOs and chemists by authenticating their details. Admins can view user profiles, orders, and verify donations and medical equipment requests. The admin manages overall system integrity, ensures that users and organizations are legitimate, and handles user logout functionalities.

- **NGO Module:** The NGO module enables NGOs to log in to the platform and view posted requests for donations or medical supplies. NGOs can accept requests based on their needs or capacity. The system also provides an interface for tracking donated medicines and medical equipment, helping NGOs keep records and manage their resources effectively for distribution.

- **Chemist Module:** The chemist module allows chemists to log in, view their profile, and manage the inventory. They can add new products, update existing ones, and view customer orders. Chemists can update the status of orders based on availability or shipping. This module helps chemists manage stock levels, fulfill customer orders, and ensure timely updates to the product listings.

Chapter: 7

7.1 SOFTWARE DEVELOPMENT LIFE CYCLE

Agile refers to soft or flexible. "Agile process model" is an approach of software development that follows an iterative approach of development. Agile methods split work into small parts and therefore tasks are divided into small iterations; parts do not necessarily have to make direct involvement of long-term planning. Project scope and requirements are stated at the onset of the development process. All the plans are defined regarding how many iterations it is going to be, its duration and the scope, so plans of iterations are determined well in advance. A whole project can be split into different small parts; hence it will definitely help to reduce the project risk, as well as to bring down the entire delivery time of a project. All iterations of this agile process model contain a group that completes a whole cycle of a life of a software application through the software development cycle comprising of planning, requirement analysis, designing, coding and testing, then after testing before delivering it to the client a fully working product.

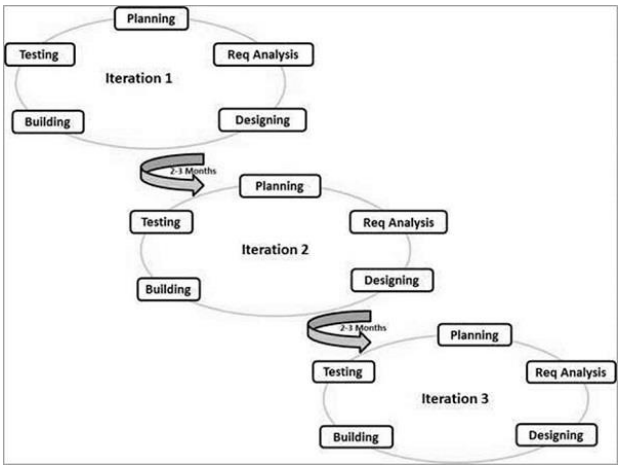
Actually, Agile model is considered to be a set of development processes. These processes possess some basic characteristics but do have certain subtle differences among themselves. A few Agile SDLC models are given below: Crystal A tern Feature-driven development Scrum Extreme programming (XP) Lean development Unified process In the Agile model, the requirements are decomposed into several small parts that can be incrementally developed.

The Agile model uses Iterative development. Each incremental part is developed over an iteration. Each iteration is supposed to be small and manageable and that can be completed in a couple of weeks only. At a time one iteration is planned, developed and deployed to the customers. Long-term plans are not made.

Agile model is the combination of iterative and incremental process models. Steps involve in agile SDLC models are:

•Requirement gathering
•Requirement Analysis
•Design Coding
•Unit testing
•Acceptance testing

The time to complete an iteration is known as a Time Box. Time-box refers to the maximum amount of time needed to deliver an iteration to customers. So, the end date for an iteration does not change. Although the development team can decide to reduce the delivered functionality during a Time-box if necessary to deliver it on time. The central principle of the Agile model is the delivery of an increment to the customer after each Time-box.



7.2 PRINCIPLES OF AGILE MODEL:

•For getting close contact with the customer at the time of development and getting a clear idea of various requirements, each Agile project usually has a customer representative in the team. After the end of each iteration, stakeholders and the customer representative review the progress made and re-evaluate the requirements.

•Agile model depends on the deployment of working software rather than having comprehensive documentation.

• Delivery of incremental versions of the software at regular short time interval, say weekly.

• Request for a change in the requirements by the customer is indeed accepted and readily included.

• Effective members in a team and improve the communication with one another becomes a strong aspect. Effective and high quality communicating of development members will be carried out in human face-to-face, instead of documentation.

•The development team size should be kept small (5 to 9 people) to help the team members meaningfully engage in face-to-face communication and have collaborative work environment.

•Agile development process usually deploys Pair Programming. In Pair programming, two programmers work together at one work-station. One does code while the other reviews the code as it is typed in. The two programmers switch their roles every hour or so.

Advantages:

•Working through Pair programming produce well written compact programs which has fewer errors as compared to programmers working alone.

• It reduces total development time of the whole project. Customer representatives get the idea of updated software products after each iteration. So, it is easy for him to change any requirement if needed.

Disadvantages:

• Due to lack of formal documents, it creates confusion and important decisions taken during different phases can be misinterpreted at any time by different team members.

* If the proper documentation is not provided, when the project is over and the developers are transferred to some other project, then maintaining the developed project may become an issue.

7.3 SOFTWARE ENVIRONMENT

Software Environment

Android is a software stack for mobile devices that contains an operating system, middleware, and key applications. Google Inc. acquired the initial developer of the software, Android Inc., in 2005.

Android's mobile operating system is based on the Linux kernel. Google and other members of the Open Handset Alliance collaborated on Android's development and release.

The Android Open-Source Project (AOSP) is responsible for the maintenance and further development of Android. The Android operating system is the world's best-selling Smartphone platform.

The Android SDK supplies the tools and APIs needed to start creating applications on the Android platform using the Java language. There is a huge community of developers producing applications (or "apps") that expand the capabilities of the devices. There are now over 250,000 available apps for Android .

Features: -

•Application framework, which enables reuse and replacement of components

•Dalvik virtual machine specially optimized for mobile devices

•Browser based on the open source Web Kit engine

•Graphics optimized by a custom 2D graphics library; 3D graphics based on the OpenGL ES 1.0 specification (hardware acceleration optional)

•SQLite for structured data storage

•Media support for common audio, video, and still

image formats (MPEG4, H.264, MP3, AAC, AMR, JPG, PNG, GIF)
•GSM Telephony (hardware dependent)
•Bluetooth, EDGE, 3G, and WIFI (hardware dependent)
•Camera, GPS, compass, and accelerometer (hardware dependent)
•Rich development environment including a device emulator, tools for debugging, memory and performance profiling, and a plugin for the Eclipse IDE

7.4 LIBRARIES

Android has a number of C/C++ libraries used by different components of the Android system. These capabilities are exposed to developers through the Android application framework. Some of the core libraries are listed below:
•System C library - a BSD-derived implementation of the standard C system library (libc), tuned for embedded Linux-based devices
•Media Libraries- The libraries rely on Packet Video's Open CORE; the libraries support playback and recording of many popular audio and video formats, as well as static image files. These include MPEG4, H.264, MP3, AAC, AMR, JPG, and PNG.
•Surface Manager- The manager manages access to the display subsystem and seamlessly composites 2D and 3D graphic layers from multiple applications.
•LibWebCore - a new-generation web browser engine that both Android's browser and an embeddable web view run on
•SGL - the base 2D graphics engine
•3D libraries - an implementation based on OpenGL ES 1.0 APIs; the libraries make use of hardware 3D acceleration (where possible) or of the highly optimized 3D software rasterizer included
•Free Type - bitmap and vector font rendering
•SQLite. SQLite is powerful and lightweight database engine available for all applications. Android Runtime - Android includes its own set of core libraries in addition to, which provides almost all the functions available in its core libraries' counterpart in Java programming language.
Every Android application runs in its own process, with its own instance of the Dalvik virtual machine. Dalvik has been written so that a device can run multiple VMs efficiently. The Dalvik VM executes files in the Dalvik Executable (.dex) format which is optimized for minimal memory footprint. The VM is register-based, and runs classes compiled by a Java language compiler that have been transformed into the. dex format by the included "dx" tool.
This one relies on a Linux kernel in particular at the underlying, for example to provide threading support and low memory-level functionalities.
Linux Kernel
Android uses linux version 2.6 kernel for core services such as memory management, network stack, and many more. Here, the linux kernel also becomes an abstraction between the hardware it is running, and the whole software stack below it. The Linux kernel is the kernel of the Linux family of Unix-like operating systems. It is one of the most prominent examples of free and open source software. The Linux kernel is released under the GNU General Public License version 2 (GPLv2), (plus some firmware images with various licenses), and is developed by contributors worldwide. Day-to-day development takes place on the Linux kernel mailing list. The Linux kernel was first designed and developed by Finnish computer science student Linus Torvalds in 1991. Linux quickly gained developers and users who modified code from other free software projects to work with the new operating system. The Linux kernel has been contributed to by thousands of programmers Many Linux distributions have been released based upon the Linux kernel. The Linux kernel is widely supported for and runs on numerous virtual machine architectures both as the host operating system and as a guest operating system. The emulated systems usually are members of the Intel x86 family of processors, though in a few instances PowerPC or ARM processors are also emulated. At Google, Rubin led a group to develop a mobile device platform powered by the Linux kernel. Google marketed the platform to handset makers and carriers on the premise of providing a flexible, upgradable system. Google had lined up a series of hardware component and software partners and signaled to carriers that it was open to various degrees of cooperation on their part. Speculation that Google was planning to launch in the mobile communications sector just kept building during

December 2006. From the BBC and The Wall Street Journal, reports indicated that Google wanted search and apps on mobile phones and was working hard to get those delivered. Print and online media outlet soon reported that Google was working on a handset under the Google brand. Some guessed that as Google was setting technical specifications, it was showing prototypes to cell phone manufacturers and network operators.

Hardware running Android

The primary supported platform for Android is the ARM architecture.

The Android OS can be used as an operating system for cellphones, netbooks and tablets, including the Dell Streak, Samsung Galaxy Tab, TV and other devices.[68][69] The first commercially available phone to run the Android operating system was the HTC Dream, released on 22 October 2008.[70] In early 2010 Google collaborated with HTC to launch its flagship [71] Android device, the Nexus One. This was followed later in 2010 with the Samsung-made Nexus S.

Early feedback on developing applications for the Android platform was mixed. Some of the issues that are cited include bugs, lack of documentation, not enough QA infrastructure, and no public issue-tracking system. (Google announced an issue tracker on 18 January 2008.) In December 2007, Merge Lab mobile startup founder Adam Macbeth declared, "Functionality is not there, is poorly documented or just doesn't work. It's clearly not ready for prime time." Still, Android-targeted applications began to appear the week after the platform was announced. The first publicly available application was the Snake game The Android Dev Phone is a SIM unlocked and hardware-unlocked device specifically designed for advanced developers. As developers can also use regular consumer, devices bought at retail in order to test and use their applications, some may not want to use a retail device, wanting an unlocked or no-contract device instead.

In turn, the Android Software Development Kit has a wide ranging set of developer tools.[80] They come including a debugger; libraries, documents, sample codes, tutorials. The SDK downloads off the android developers website. Among the development environments supported by developers so far, ones running on: Linux: almost any modern Desktop Distribution, Mac: OS X10.4.9 or higher, Windows : XP or newer. The officially supported integrated development environment (IDE) is Eclipse (currently 3.5 or 3.6) using the Android Development Tools (ADT) Plugin, though developers may use any text editor to edit Java and XML files then use command line tools (Java Development Kit and Apache Ant are required) to create, build and debug Android applications as well as control attached Android devices (e.g., triggering a reboot, installing software package(s) remotely).[81]

Android applications are package in.apk format and put under /data/app folder in the Android OS (the folder is accessible to root user only for security reasons). The APK package contains.dex files (Compiled byte code file called Dalvik executables) resource files etc.

Android Operation System

Android is a system based on the Linux operating system, but with the interface of programming in Java. It offers additional tools, including a compiler and debugger, plus its own Java Virtual machine-Dalvik Virtual Machine - DVM. Android is developed by the Open Handset Alliance whose main leader is Google.

Android makes use of a special virtual machine, the Dalvik Virtual Machine. It uses special bytecode. Therefore, you cannot run standard Java bytecode on Android. Android provides a tool "dx" which allows to convert Java Class files into "dex" (Dalvik Executable) files. Android applications are packed into an.apk (Android Package) file by the program "aapt" (Android Asset Packaging Tool) To simplify development Google provides the Android Development Tools (ADT) for Eclipse. The ADT automatically converts the class to dex files and generates the apk during deployment. Android supports 2-D and 3-D graphics using the OpenGL libraries and supports data storage in a SQLite database.

Every Android application executes in its very own process as well as under its own user ID that is produced automatically by the Android system in the course of its deployment. As a result, the application is isolated from other running applications, and one misbehaving application cannot harm other Android applications easily.

Chapter 8. SYSTEM STUDY AND TESTING

8.1 Feasibility study

FEASIBILITY STUDY

This phase analyses the feasibility of the project and business proposal is put forth with a very general plan for the project and some cost estimates. In the system analysis phase, the feasibility study of the proposed system has to be carried out. This is done to ensure that the proposed system does not pose a burden on the company. For feasibility analysis, some understanding of the major requirements for the system is essential.

Three important factors that are involved in the feasibility analysis are

•ECONOMICAL FEASIBILITY

•TECHNICAL FEASIBILITY

•SOCIAL FEASIBILITY

ECONOMICAL FEASIBILITY

This study is done to determine the economic effect that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus, the developed system as well within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased.

TECHNICAL FEASIBILITY

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system should have modest requirement as it will require minimal or null changes in the process to implement this system.

SOCIAL FEASIBILITY

This is the aspect of study where one checks the extent of acceptance by the user about the system.. This will comprise the process where the user has to be trained on the system for him to efficiently use the system. The user should not fear the system; he must rather accept the system as a need. Acceptance of the user entirely depends upon the techniques which are adopted in making the user familiar with the system. So the user needs to be motivated about his understanding, which could even let him do some constructive criticism of it; and these criticism of him would always be acceptable since he is the actual end user of the system.

SYSTEM TESTING

The purpose of testing is to discover errors.

Testing is the act of trying to discover every imaginable fault or weakness in a work product. It provides a means for checking the operation of units, sub-structures, structures, and/or the final product. It is exercising software in an effort to establish that a software system complies with its requirements and the user's expectations without failing in a way considered unsatisfactory. There are numerous types of testing. Each of the test type fulfills specific testing need.

8.2 TYPES OF TEST & TEST CASES

UNIT TESTING

Unit testing is designing test cases that verify that the internal program logic is working as it should and that program inputs generate valid outputs.

All decision branches and internal code flow must be tested. It is the testing of individual software units of the application.it is done after the completion of an individual unit before integration. This is a structural test, that is based on its design and it is intrusive. Unit tests execute simple tests at the component level and test one particular business process, application and/or system setup. Unit tests ensure that each unique path of a business process behaves correctly according to the documented requirements and has clearly defined inputs and expected results.

INTEGRATION TESTING

These are integration tests designed to test integrated software components to ascertain whether they do run as one program.

Testing is event driven, and more concerned with basic outcome of screens or fields. Integration tests, therefore, show that whereas the components satisfied individually, as demonstrated by successful unit testing, their combination is correct and consistent. This phase of integration testing is specifically meant to uncover the problems created by the coupling of components.

FUNCTIONAL TEST

Functional tests offer systematic demonstrations that functions tested are available as specified by business and technical requirements, system documentation, and user manuals.

Functional testing is concentrated on the following items:

Valid Input : identified classes of valid input must be accepted.

Invalid Input : identified classes of invalid input must be rejected.

Functions : identified functions must be exercised.

Output : identified classes of application outputs must be exercised.

Systems/Procedures: interfacing systems or procedures need to be invoked. Organization and preparation of functional tests is done on the basis of requirements, key functions, or special test cases. Furthermore, systematic coverage in respect of identify Business process flows; data fields, predefined processes, and successive processes needs to be considered for testing. Further tests are identified before the completion of functional testing and the effective value of current tests is determined.

SYSTEM TEST

System testing is sure that the entire integrated software system meets requirements. It tests a configuration to ensure known and predictable results. A simple example of system testing is the configuration-oriented system integration test. System testing is indeed based on process descriptions and flows, emphasizing pre-driven process links and integration points.

WHITE BOX TESTING

White Box Testing is a testing in which the software tester knows the inner workings, structure and language of the software, or at least knows its purpose. It is used to test areas that cannot be reached from a black box level.

BLACK BOX TESTING

Black Box Testing is the testing of software without any knowledge of the inner workings, structure or language of the module being tested.

Black box tests, like most other types of tests, must be based on a clear source document, such as specification or requirements document, such as specification or requirements document. It is a testing in which the software under test is treated, as a black box. You can't see into it. The test is given inputs, and output results are received based on that; it has nothing to do with how the software works.

UNIT TESTING:

Generally, unit testing is carried out as a joint code and unit test phase in the lifecycle of the software but is also very normal for the codes and unit test to be separately carried out phases.

Test strategy and approach

The field testing will be carried out manually. Functional tests will be written in detail.

Test objectives

•All field entries must work correctly.

•Pages must be activated from the link identified.

•The entry screen, messages, and responses should not be delayed.

Features to be tested

•Check if the entries are in the correct format

•No duplicate entries should be allowed

•All links must lead the user to the correct page.

INTEGRATION TESTINGSS

Software integration testing is the incremental

integration testing of two or more integrated software components on a single platform to produce failures caused by interface defects.

The task of the integration test is to check that components or software applications, e.g., components in a software system or – one step up – software applications at the company level – interact without error.

Test Results: All the test cases mentioned above passed successfully. No defects encountered.

ACCEPTANCE TESTING

User Acceptance Testing is one of the critical phases of any project and needs significant participation from the end user. It also ensures that the system meets the functional requirements.

Test Results: All the test cases mentioned above passed successfully. No defects encountered.

Chapter 9- Conclusion

Future improvements could be the inclusion of advanced inventory algorithms that can predict near-expiry medicines based on usage trends. The platform can also be expanded to include a wider range of healthcare products and services, such as medical equipment or supplies, to further optimize healthcare distribution and waste reduction efforts across communities.

This system creates a sustainable approach to medicine distribution, prevents wastage, and helps those in need. The platform promotes responsible resource utilization by efficiently managing near-expiry medicines and redirecting them to NGOs. The project enhances healthcare sustainability while improving access to vital medicines for underprivileged individuals.

This project will reduce medication waste through effective management, reminders, and safe disposal or donation mechanisms. Features such as expiration alerts are designed to minimize waste, while the reminder system seeks to improve medication adherence. Safe disposal and donation options focus on redirecting unused medicines to NGOs, supporting environmental sustainability and healthcare access.

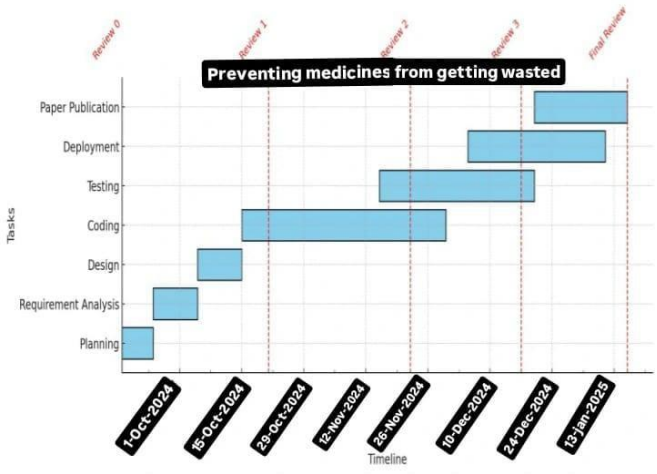
The system encourages responsible utilization of resources, as it can manage near-expiry medications with efficiency and redirect them to patients who need the medication. This system still requires addressing issues, like user engagement, and logistical issues in redistribution.

With further refinement of the interface, improved user education, and streamlined donation logistics, this project has a good potential to significantly reduce medication waste and enhance healthcare sustainability.

STEPS FOR EXECUTING THE PROJECTS

Step 1:
Open Android Studio
Step2:
Choose a virtual device or Physical device from the menu
Step3:
Click on the project Run
Step4:
View the application performance on virtual or Physical device.

PROJECT TIMELINE:

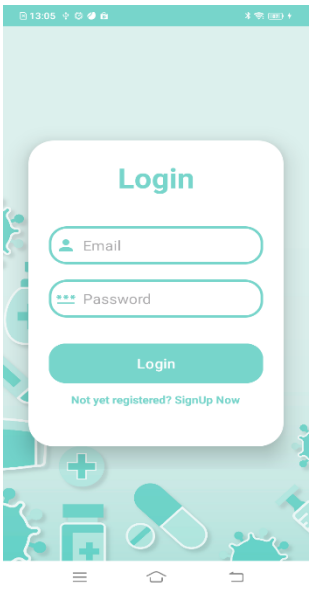


Chapter 10.Appendices

Appendix A: User Interface Designs and Screenshots

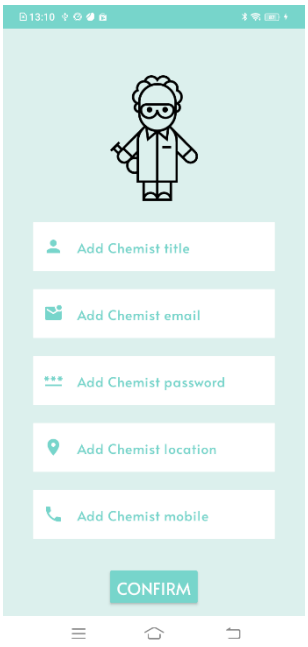
1.User Login Interface0

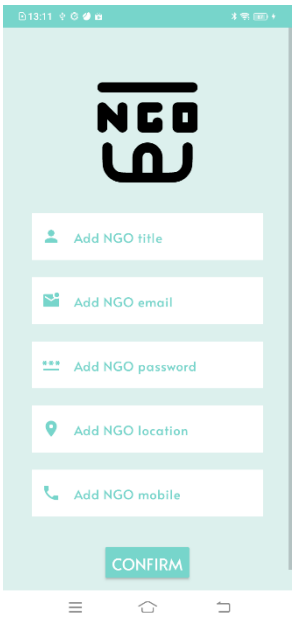
Users can log in through a simple authentication page.

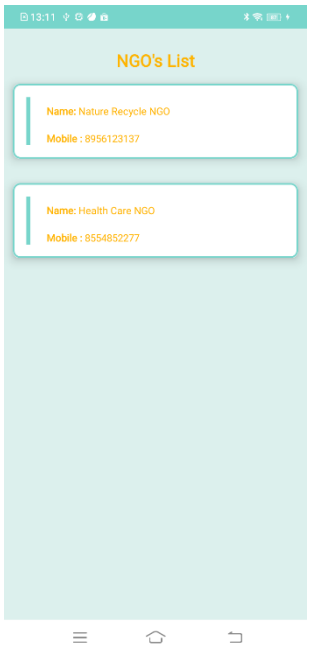


Login Page: Displays username and password fields with a login button.

2.Admin Dashboard

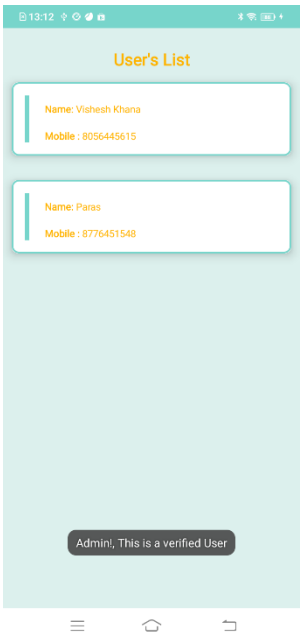




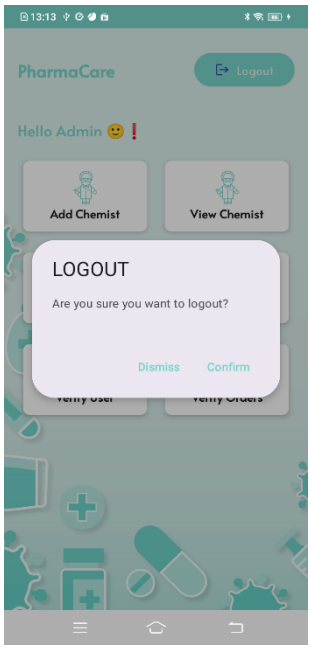

13:11
NGO's List
Name: Nature Recycle NGO
Mobile : 8956123137
Name: Health Care NGO
Mobile : 8554852277

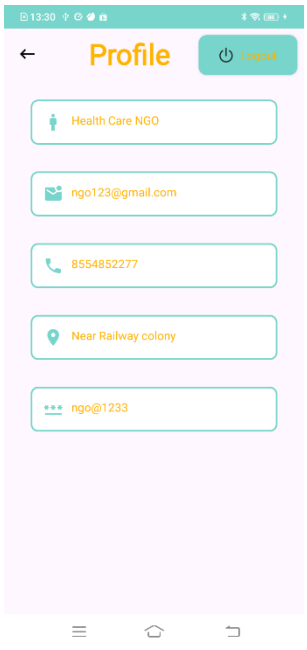
\


13:12
Orders's List
Order ID: Rel734699374457Med
Time: 20/December/2024(06:26:14)
Status: Completed
Order ID: Rel734764714394Med
Time: 21/December/2024(12:35:14)
Status: Completed
Orders Retrieved


13:12
User's List
Name: Vishesh Khana
Mobile : 8056445615
Name: Paras
Mobile : 8776451548
Admin!, This is a verified User


13:12
Orders's List
Order ID: Rel734699374457Med
Time: 20/December/2024(06:26:14)
Status: Completed
Order ID: Rel734764714394Med
CLOSE





➢ Provides functionalities for managing users, NGOs, and inventory.

➢ *a dmin Home*: Shows user verification status.

➢ *I nventory Management*: Allows admins to view and manage products flagged as near expiry.

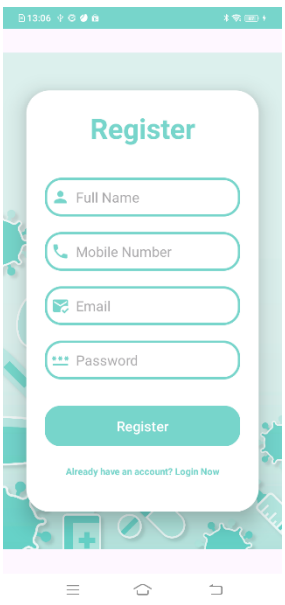
3.**NGO Dashboard**

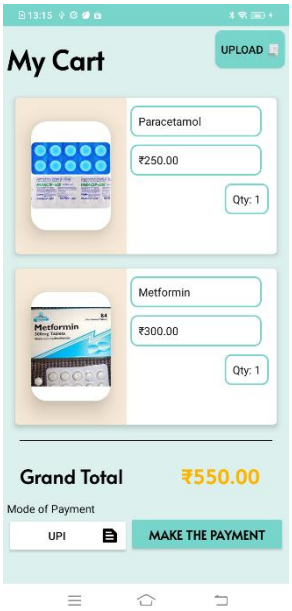
- Enables NGOs to view donation requests and manage resources.

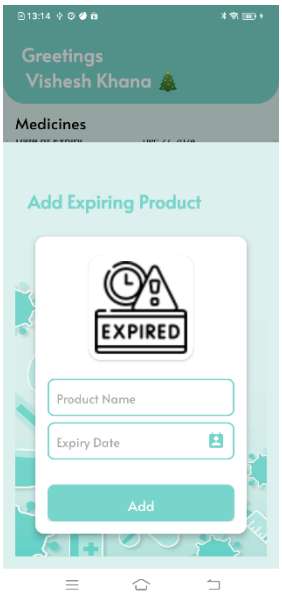
➢ *NGO Requests*: A list of donation requests with filters for status and urgency.

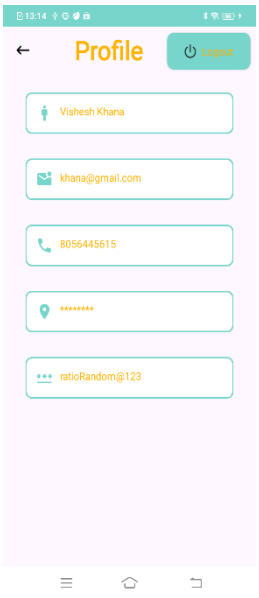
2. User Dashboard

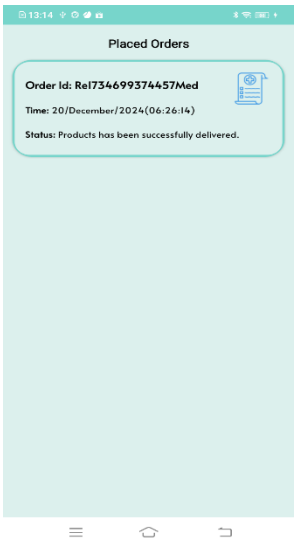
➢ Users can view placed orders and manage donations.

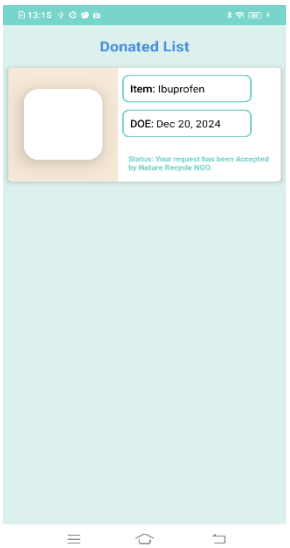












➢ *Donation Posting*: Interface for adding expired or unused medicines for donation.

Appendix B: Test Cases and Results

Test Case 1: User Registration

- **Objective**: Verify the successful registration process for new users.
- **Procedure**:

1. Open the registration page within the application.
2. Fill in the required fields with valid user details (e.g., name, email, password, etc.).
3. Submit the registration form by clicking the "Signup" button.

- **Expected Outcome**: The user's data is saved in the database without errors.
- **Observed Outcome**: The process was completed as expected, and the system stored the data successfully.

Test Case 2: Admin Inventory Management

- **Objective**: Ensure that the admin can accurately flag medicines nearing their expiration date.

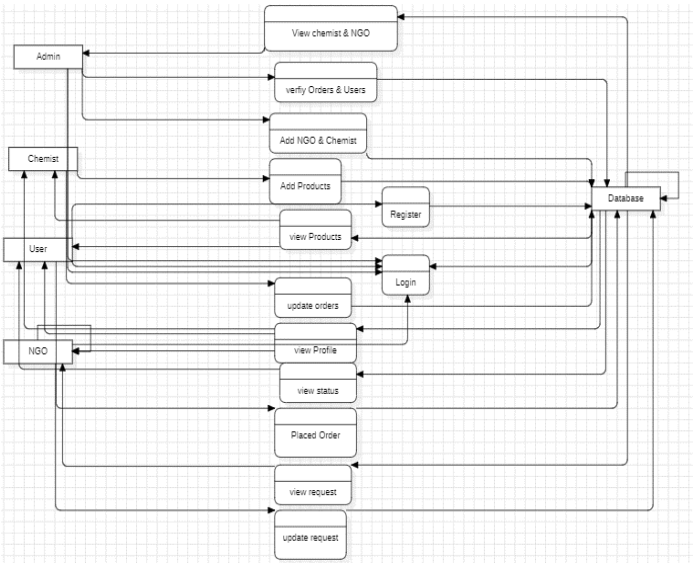
- **Procedure**:

1. Log into the application as an admin.
2. Access the inventory management section from the dashboard.
3. Identify medicines approaching their expiry date and select them.
4. Update their status by marking them as near-expiry.

- **Expected Outcome**: The selected medicines are flagged in the system, reflecting their near-expiry status.
- **Observed Outcome**: The functionality worked as intended, and the flagged status was updated correctly.

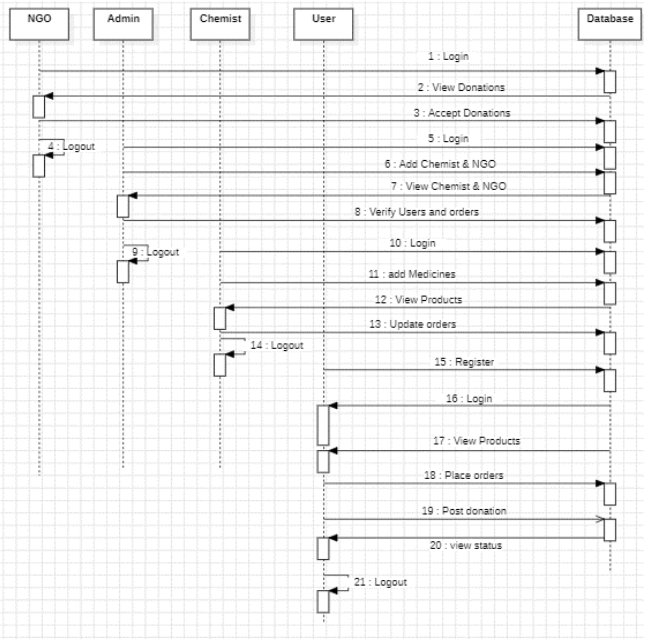
Appendix C: Supplementary Information

1. Data Flow Diagrams (DFDs):

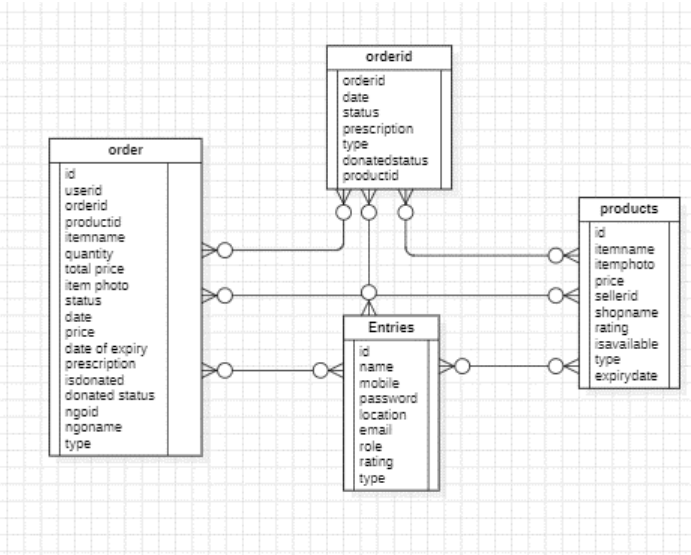


2. **UML diagrams:**

➢ Sequence diagram:



➢ ER DIAGRAM:



FUTURE ENHANCEMENT

Future enhancements could include integrating advanced inventory algorithms to predict near-expiry medicines based on usage trends. Additionally, expanding the platform to include a wider range of healthcare products and services, such as medical equipment or supplies, could further optimize healthcare distribution and waste reduction efforts across communities.

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