NANYANG TECHNOLOGICAL UNIVERSITY

Software Requirements Specification

CE2006 SOFTWARE ENGINEERING AY20/21 SEM 2

Darryl Tan Kah Heng
Chew Loh Seng
Chockalingam Kasi
Lim Jun Wei
Royce Tan Chun Wei

Lab Group: SE1

Table of Contents

Introductory Notes

Description of all documents submitted

1. Readme.txt
   Contains all of the descriptions of all documents submitted and how to run the application.

2. Software Requirements Specifications
   Contains:
   a. Functional and Non-functional Requirements
   b. Use Case Model Diagram
   c. Use Case Descriptions Report
   d. Requirement Analysis – Class Diagrams
   e. Requirement Analysis – Sequence Diagrams
   f. Requirement Analysis – Dialogue Map

3. Software Engineering Report
   The Software Requirements Specification (SRS) only covers the Requirements Elicitation and Requirements Analysis part of the SDLC as it is only meant for communicating with the clients and detailed implementation is not necessary when talking to clients. The Software Engineering report will cover the rest of the stages and further iterations to the class and sequence diagrams.
   Contains:
   a. System Architecture Diagram
   b. Object Design – Class Diagrams
   c. Object Design – Sequence Diagrams
   d. Software Engineering Practices Used

4. Use Case Model Diagram
5. Use Case Descriptions Report

6. Requirement Analysis – Class Diagrams
7. Requirement Analysis – Sequence Diagrams
8. Requirement Analysis – Dialogue Map

9. System Architecture Diagram
10. Object Design – Class Diagrams
11. Object Design – Sequence Diagrams

12. HealthZoneApplication.zip
    This is where our actual product lies.
13. HealthZone Demonstration Video

How to run the HealthZone Application

Steps to run the application:

1) Unzip the ZIP with folder name: "medicine_reminders"
2) Open Visual Studio Code (VS Code)
3) Open the project folder
4) You might have to install Flutter and Dart in VS Code, as well as set up Android Studio.
   Details on setting up Android Studio: https://flutter.dev/docs/get-started/install
   Details on installing Flutter and Dart in VS Code:
   https://flutter.dev/docs/development/tools/vs-code
5) Inside terminal, type in "flutter clean". This is to make sure dependencies are not based on the developer's PC.
6) After cleanup, open Android Phone Emulator (in Android Studio) or plug in Android phone in USB debugging mode.
   Details of how to set up Android Phone Emulator in Android Studio:
   https://developer.android.com/studio/run/emulator
   Details of how to set up USB debugging mode:
   https://developer.android.com/studio/debug/dev-options
7) Inside terminal, type in "flutter pub get". This is to get all the external packages set up in your system in VS Code.
8) Inside terminal, type in "flutter run". This is to set up the file structures based on your system in VS Code.
9) After building, you might need to run the application if it is not done automatically.
   Type in F5 (debugging mode) or Ctrl+F5 (Run without debugging) to install the apk into the Android emulator or phone.

In case the flutter build fails, these steps might need to be done:

1) Unzip the ZIP with folder name: "medicine_reminders".
2) Open Visual Studio Code (VS Code).
3) You might have to install Flutter and Dart in VS Code, as well as set up Android Studio.
   Details on setting up Android Studio: https://flutter.dev/docs/get-started/install
   Details on installing Flutter and Dart in VS Code:
   https://flutter.dev/docs/development/tools/vs-code
4) Create new project under the package name "medicine_reminders"
5) Copy and replace the following files from the downloaded (and upzipped) "medicine_reminders" to the newly created "medicine_reminders":
   - All folder and files in the lib folder
   - All folder and files in the assets folder
   - "pubspec.yaml" file in the root folder
   - All folder and files in "android/app/src" folder
6) Open Android Phone Emulator (in Android Studio) or plug in Android phone in USB debugging mode.
   Details of how to set up Android Phone Emulator in Android Studio:
   https://developer.android.com/studio/run/emulator
   Details of how to set up USB debugging mode:
   https://developer.android.com/studio/debug/dev-options

7) Inside terminal, type in "flutter pub get". This is to get all the external packages set up in your system in VS Code.
8) Inside terminal, type in "flutter run". This is to set up the file structures based on your system in VS Code.
9) After building, you might need to run the application if it is not done automatically. Type in F5 (debugging mode) or Ctrl+F5 (Run without debugging) to install the apk into the Android emulator or phone.

Please submit a ticket to Group Leader Darryl Tan (dtan103@e.ntu.edu.sg) or Assistant Group Leader Loh Seng (chew0398@e.ntu.edu.sg) if you need help.

Product Description

Purpose of the System

Taking medicine is often treated as a dull chore and people often forget to take their medicine because of their busy schedules. Therefore, the team would like to develop an application that allows medical patients to keep track and remind them to take their medicine. The nearest locations of CHAS clinics or pharmacies should be included to inform users the nearest locations where they could replenish their medication. As people on medication are more vulnerable to infection diseases, an informational page should be included to inform users of the most recent outbreaks of diseases in Singapore so that users can be better prepared to take steps against catching such diseases.

Scope of the System

Name of the software product: HealthZone Application

Main purposes of the product:

1. Allow users to create and amend reminders to take their medicine.
2. Notify users to take their medicine at the time of the reminders.
3. Track the user's previous medicine intake through tracking previous reminders.
4. Allow users to locate the nearest clinic/pharmacy to replenish their medicine supply.
5. Inform users of the number of cases of various infectious diseases.

Title of the four pages of the application:

1. Medicine Reminder
2. Clinic Locator
3. Infectious Disease Bulletin

Users and Stakeholders

Main target users: People with pre-existing health conditions and are required to take medicine every day

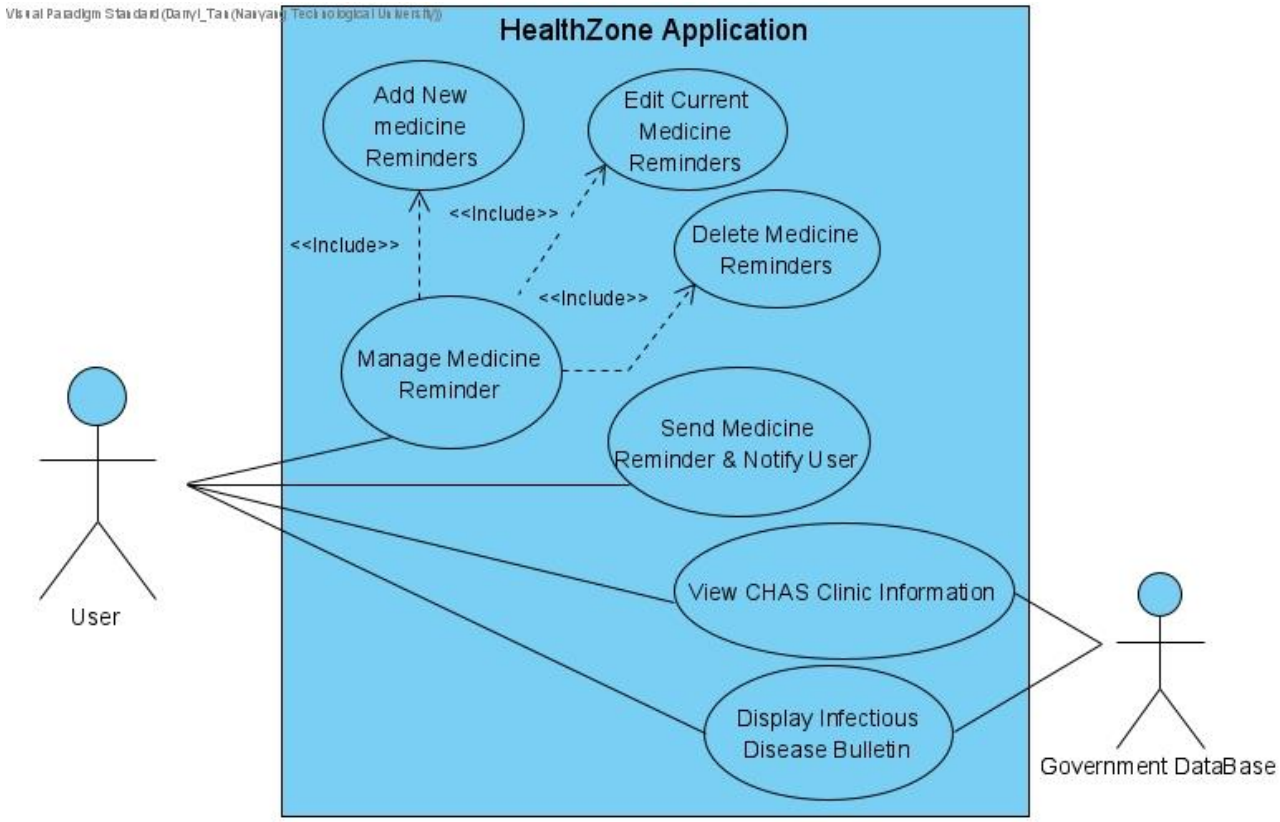
Stakeholders:

1. Government Database Agency
2. Various clinics and pharmacies that support the CHAS scheme

Functional Requirements

1. All pending reminders must be displayed to the user with the following details: Name of the medicine, dosage level, time to consume.
2. The user must be able to add a reminder with the following details: Name of the medicine, dosage level, time to consume.
    2.1. The format of the inputs must be the same for each reminder.
3. The user must be able to edit any of the reminders that was created with the following details: Name of the medicine, dosage level, time to consume.
    3.1. The format of the inputs must be the same for each reminder.
4. The user must be able to delete any of the reminders that was created.
5. A notification must be sent to the user when the time set for the reminder has reached.
6. The application must display the locations of all CHAS clinics and pharmacies that are within their chosen postal code or region in Singapore.
    6.1. The user must be able to choose the clinic within the area to view the details.
    6.2. The application must be able to display the following details of the chosen CHAS clinic/pharmacy: Name, Contact number & Address.
7. The infectious diseases bulletin must show 3 of the most prominent infectious diseases case numbers in Singapore.
    7.1. The data points shown must be taken from the past 4 weeks.

Use Case Model



Use Case Descriptions

Use Case 01

Use Case ID:	01		
Use Case Name:	Manage Medicine Reminders		
Created By:	Darryl Tan	Last Updated By:	Loh Seng
Date Created:	07 FEB 2021	Date Last Updated:	11 APR 2021

Actor:	User (Initiating Actor)
Description:	Users should be able to view their respective reminders to take medicine and choose a corresponding action if necessary.
Preconditions:	Users open the application and navigate to the “Manage Medicine Reminders” page.
Postconditions:	All the medicine reminders and their respective details are shown to the user.
Priority:	High
Frequency of Use:	High
Flow of Events:	1. The user should select the “Manage Medicine Reminders” button. 2. The application will retrieve the list of reminders from the system database. 3. The application will show the various medicine reminders that the user has created with the following details: Medicine name, Intake quantity, and Time of intake.
Alternative Flows:	AF-S3: If there is no medicine reminder to show 1. The application will display a blank table.
Exceptions:	EX1: The application could not connect to the system database, unable to load in the medicine reminders. 1. The application will display a blank table.
Includes:	NA
Special Requirements:	The application cache and data should not be wiped by the user.
Assumptions:	NA
Notes and Issues:	NA

Use Case 02

Use Case ID:	02		
Use Case Name:	Add New Medicine Reminders		
Created By:	Darryl Tan	Last Updated By:	Chockalingam Kasi
Date Created:	07 FEB 2021	Date Last Updated:	13 APR 2021

Actor:	User (Initiating Actor)
Description:	Users should be able to add a reminder for their medicine intake.
Preconditions:	Users are at the “Medicine Reminders” page and have selected the ADD button.
Postconditions:	A reminder is set and shown in the “Medicine Reminders” page.
Priority:	High
Frequency of Use:	Medium
Flow of Events:	1. In the “Medicine Reminders” page, users will select the “ADD” button. 2. Users will be required to fill in the following details: Medicine name, Intake quantity, and Time of intake. 3. The application will prompt the user to take any of the following actions after filling up the required information: CREATE, CANCEL. 4. If the user selects the activity CREATE, then the system will take the information, create a medication reminder, and add that reminder into the database. 4.1. The system will schedule a notification for that reminder with the Android alarm manager. 5. If the user selects the activity CANCEL, then the system will discard the information that was filled in and no alarm will be created.
Alternative Flows:	AF-S3: If the input formatting for any of the fields is incorrect. 1. The application will display the appropriate error messages for the formatting. 2. The application goes back to step 3. AF-S3: If the user selects CREATE with any blank inputs 1. The application will display an error: “The field is empty!”. 2. The application goes back to step 3.
Exceptions:	NA
Includes:	NA
Special Requirements:	The application cache and data should not be wiped by the user. There must be appropriate field space for the user to input data.
Assumptions:	The start date should be the same date or of an earlier date than the end date.
Notes and Issues:	NA

Use Case 03

Use Case ID:	03		
Use Case Name:	Edit Current Medicine Reminders		
Created By:	Loh Seng	Last Updated By:	Chockalingam Kasi
Date Created:	07 FEB 2021	Date Last Updated:	13 APR 2021

Actor:	Users (Initiating Actor)
Description:	Users should be able to add or reduce their existing medication dosage levels as requested by the physician or doctor.
Preconditions:	Users open the application, navigate to the “Medicine Reminders” page, and click on “EDIT” at the bottom of the page.
Postconditions:	The modified medicine dosages will be reflected in the “Medicine Reminders” page.
Priority:	High
Frequency of Use:	Medium
Flow of Events:	1. In the “Medicine Reminders” page, upon selecting a medication reminder, the user will be given the option to edit that reminder. 2. The application will open a new “Edit Dosage Levels” page with prefilled information. 3. The user will be allowed to edit the following details of the reminder: Medicine name, Intake quantity, and Time of intake. 4. The application will prompt the user to take any of the following actions: “SAVE” or “CANCEL” 5. If the user chooses “SAVE”, the application will update the medicine reminder in the system database. 5.1 The notification is rescheduled to the updated time for the user to be notified to consume the medicine 6. The application will revert to the “Medicine Reminders” page with all the updated dosage information.
Alternative Flows:	AF-S5: If the user chooses “CANCEL” 1. The medication will not be updated, and it will retain its old medication details in the database. AF-S5: If the user enters the incorrect input formatting 1. The application will display an error message window: “Error! Try again!” 2. The application will revert to step 3 with previously saved values.
Exceptions:	NA
Includes:	NA
Special Requirements:	The application cache and data should not be wiped by the user.
Assumptions:	Medication exists in the application records.
Notes and Issues:	NA

Use Case 04

Use Case ID:	04		
Use Case Name:	Delete Medicine Reminders		
Created By:	Loh Seng	Last Updated By:	Chockalingam Kasi
Date Created:	07 FEB 2021	Date Last Updated:	13 APR 2021

Actor:	Users (Initiating Actor)
Description:	Users should be able to delete their existing medication as requested.
Preconditions:	Users open the application, navigate to the “Manage Medicine Reminders” page, and click on “DELETE” at the bottom of the page.
Postconditions:	The medicine deleted will be removed in the “Manage Medicine Reminders” page.
Priority:	High
Frequency of Use:	Medium
Flow of Events:	1. In the “Medicine Reminders” page, upon selecting the respective medication reminder, the user will be given the option to delete that reminder. 2. When the user deletes that reminder, the application will do the following: 2.1. The respective medication details are deleted from the database. 2.2. The reminder notifications are deleted from the scheduled list of notifications. 3. The user will not get any notifications regarding the deleted medication with immediate effect.
Alternative Flows:	NA
Exceptions:	NA
Includes:	NA
Special Requirements:	The application cache and data should not be wiped by the user.
Assumptions:	Medication exists in the application records.
Notes and Issues:	If the user chooses to delete the medicine reminder prior to completion of the set duration, all the scheduled reminders will be deleted from the database as well.

Use Case 05

Use Case ID:	05		
Use Case Name:	Send Medicine Reminder & Notify User		
Created By:	Royce Tan	Last Updated By:	Loh Seng
Date Created:	07 APR 2021	Date Last Updated:	14 APR 2021

Actor:	User
Description:	Users will be reminded to take medication through a pushed notification.
Preconditions:	Users will receive a notification and alert the person to take medication.
Postconditions:	The application will stop pushing the notifications, until the next available reminder.
Priority:	High
Frequency of Use:	High
Flow of Events:	1. The user will receive an automatic pushed notification by the application to take medication. 2. The user taps on the notification and the application will be opened automatically. 3. The application may ask for authentication by the user. 4. After authentication is complete, the application will show the name of the medicine, dosage, instructions (To consume before or after meal), and time until next consumption in the Medicine Reminders tab.
Alternative Flows:	AF-S1: If there is no upcoming medication reminder set. 1. The application should not push any notifications.
Exceptions:	EX1: The application could not push the notification to the user. 1. The application will reattempt to push the same notification within the next 5 minutes. 2. Failure to do so, when the user opens the application, the application will show the warning, including a list of the missing medication reminders and the expected date and time of consumption.
Includes:	“Manage medicine reminder”
Special Requirements:	The application cache and data should not be wiped by the user, and Autostart permissions must be enabled for the application.
Assumptions:	NA
Notes and Issues:	Some Android device manufacturers have disabled the Autostart permissions by default, to reduce the background battery consumption. However, it was found to severely impact the reliability for pushed notifications for many applications, including HealthZone. Users are strongly encouraged to enable the Autostart permissions to ensure reliable notifications for their commonly used applications.

Use Case 06

Use Case ID:	06		
Use Case Name:	View CHAS Clinic Information		
Created By:	Chockalingam	Last Updated By:	Loh Seng
Date Created:	07 FEB 2021	Date Last Updated:	14 APR 2021

Actor:	User (initiating actor), Government and GitHub Repo Database
Description:	Users should be able to see the list of General Practitioner (GP) Clinics that participates in CHAS Programme.
Preconditions:	Users will open the application and navigate to the “Clinic Locator” page.
Postconditions:	The information on the CHAS Clinic will be displayed, including but not limited to: Name, Address, and Contact Number of the participating clinic
Priority:	High
Frequency of Use:	High
Flow of Events:	1. The user will enter the “Clinic Locator” page. 2. The application will let users choose whether to display all participating clinics in Singapore, or to choose the list of participating clinics based on their preferred locations. 2.1. If the user chooses to view all participating clinics, the application will retrieve the full list from the government database and display all the clinics in pins for the user to select. 2.2. If the user chooses to view the participating clinics based on their preferred locations, the application will retrieve the list of clinics based on the regional postal code from the filtered database hosted by GitHub, and display all the clinics in pins for the user to select. 3. The user shall select any of the pins available in the selected map to get more details of the selected clinic. 4. The application will display the following details of the clinic upon selection: Name, Address (including Postal Code), and Contact Number of the clinic.
Alternative Flows:	AF-S2: If there is no detailed information of the clinic available. 1. The application will not display the clinic information, instead it will display “Detailed information not available! Click another clinic to view information or return back!”
Exceptions:	EX1: The application could not connect to the relevant databases and load the clinic details. 1. The application will show “Web Page not available” in the built-in Android System WebView.
Includes:	NA

Special Requirements:	The application must be connected to the internet to retrieve the latest information from the database.
Assumptions:	The user has installed the latest supported default mapping application and web browser in the device. The device is connected to the Internet, including but not limited to the following mediums: public cellular network (mobile data), and Wireless Local Area Network (WiFi).
Notes and Issues:	Due to Android System WebView requirements, the HealthZone application will only be allowed to install on devices with Android 5.0 Lollipop (Android API Level 21) or later, instead of the default Android 4.1 Lollipop (Android API Level 16) and later defined by the Flutter Framework.

Use Case 07

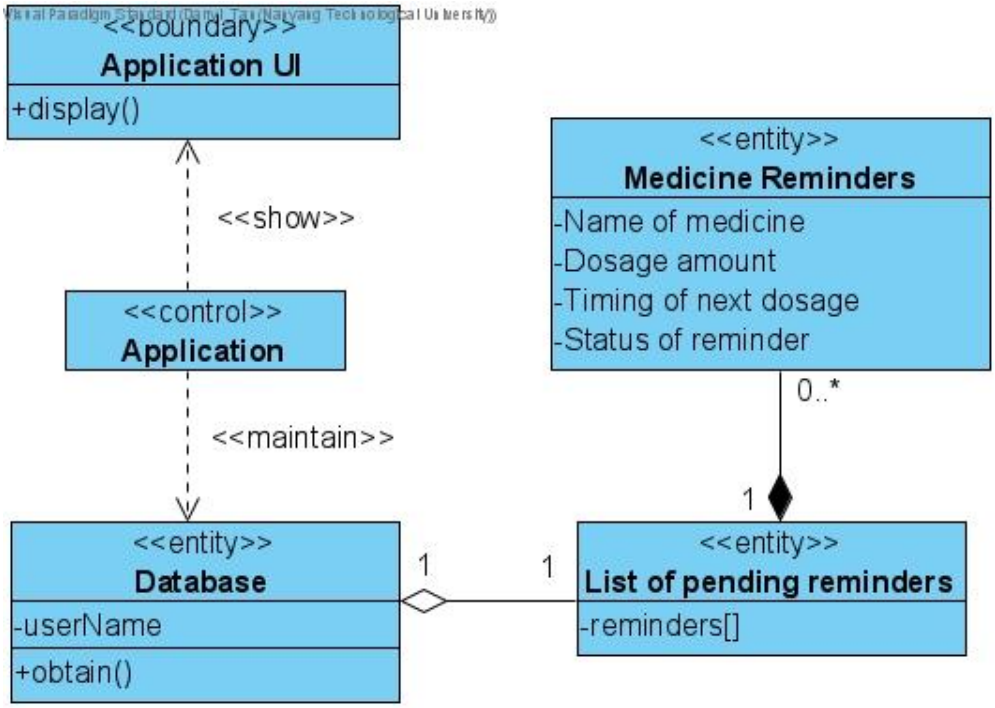
Use Case ID:	07		
Use Case Name:	Display Infectious Disease Bulletin		
Created By:	Jun Wei	Last Updated By:	Loh Seng
Date Created:	07 FEB 2021	Date Last Updated:	14 APR 2021

Actor:	User (initiating actor), Government Database
Description:	Users should be able to request and view the top three infectious diseases (based on number of active cases) in Singapore
Preconditions:	Users open the application and navigate to the “Infectious Bulletin” page.
Postconditions:	The top three infectious diseases, with the respective number of cases for each of the three diseases are listed. The latest recorded date of the weekly infectious bulletin is displayed.
Priority:	Medium
Frequency of Use:	Medium
Flow of Events:	1. The user should select the “Infectious Bulletin” page. 2. The user must allow the HealthZone application storage access rights. 3. The application will request for the weekly infectious bulletin from the government database upon user’s request. 4. The government database will transmit the requested information to the application. 5. The top three infectious diseases will the displayed in three separate graphs, from topmost common on the left to the third most common on the right. 6. The number of cases for each respective disease within 4 weeks before the latest recorded is shown on each graph for each disease listed, from oldest to newest weekly numbers.
Alternative Flows:	AF-S2: If the user deny storage rights to the application 1. The application will not display the correct information, instead it will display “Please allow storage rights!”
Exceptions:	EX1: The application could not connect to the relevant databases 1. The latest health hazard information will not be available. 2. The application will show 0 cases throughout the 4 week period for all the charts.
Includes:	NA
Special Requirements:	The application must be connected to the Internet to retrieve the latest information from the database.

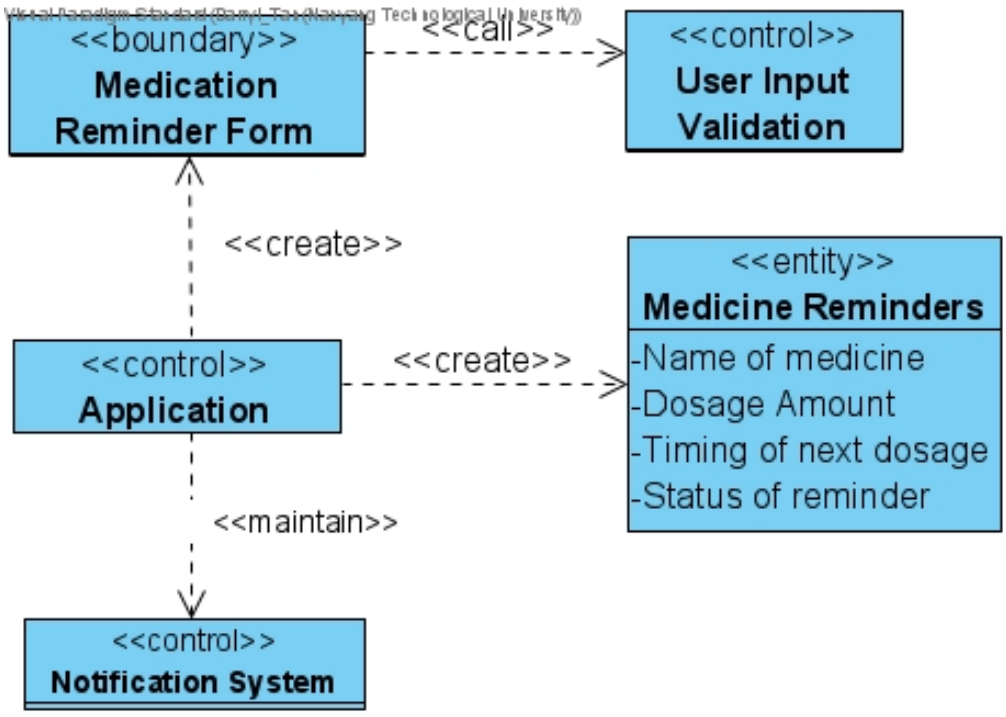
Assumptions:	The government database that includes the weekly infectious bulletin has been updated and is currently online. The device is connected to the Internet, including but not limited to the following mediums: public cellular network (mobile data), and Wireless Local Area Network (WiFi). The device has enabled storage access rights* for the application and has enough storage to store the downloaded file.
Notes and Issues:	On Android 6.0 Marshmallow (Android API Level 23) and later, Google has mandated app permissions control for new Android application installs. As the HealthZone application requires storage access outside the "*com.example.medicine_reminders*" project, the user must allow the storage access rights to enable the application to run properly.

Class Diagrams

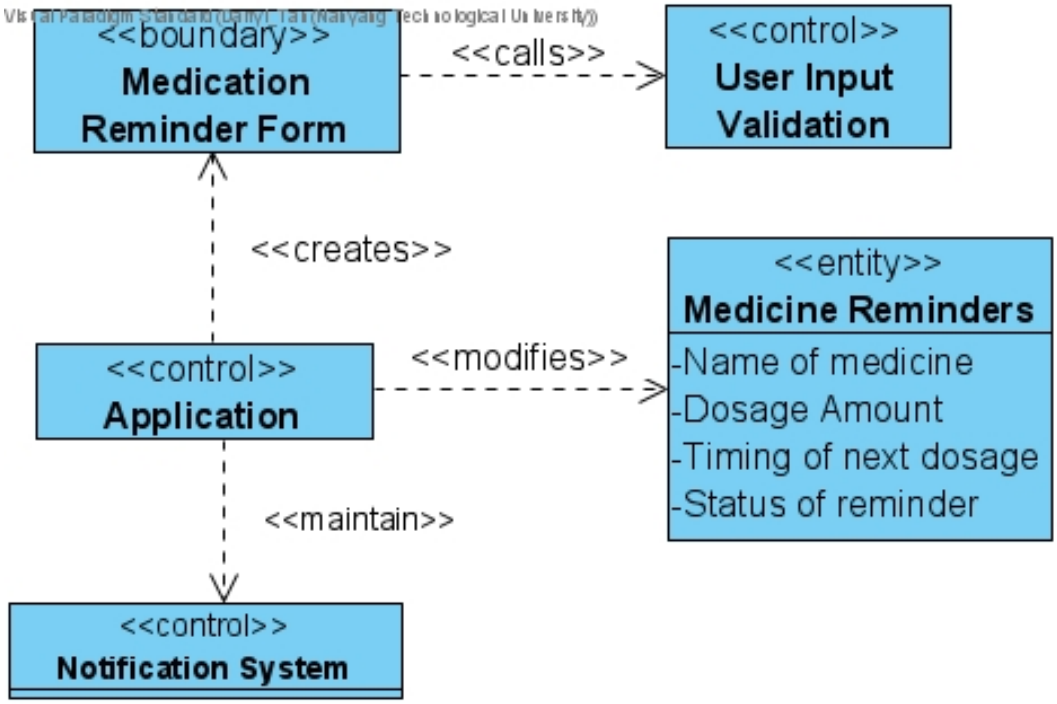
Use Case 01 – Manage Medicine Reminder



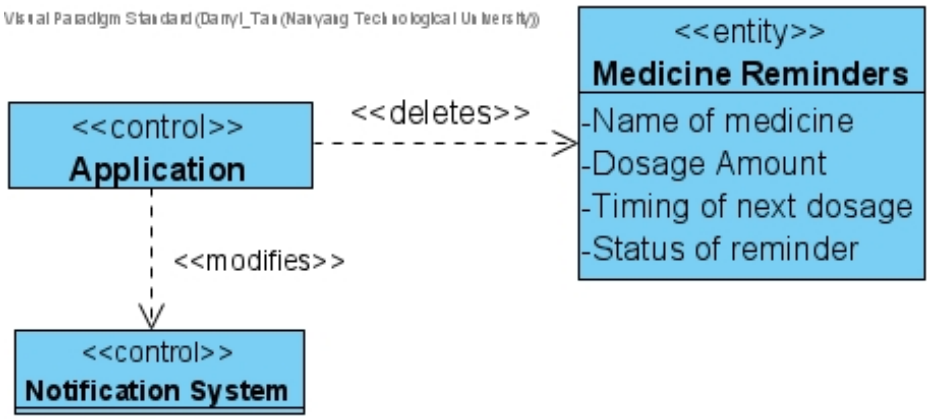
Use Case 02 – Add New Medicine Reminder



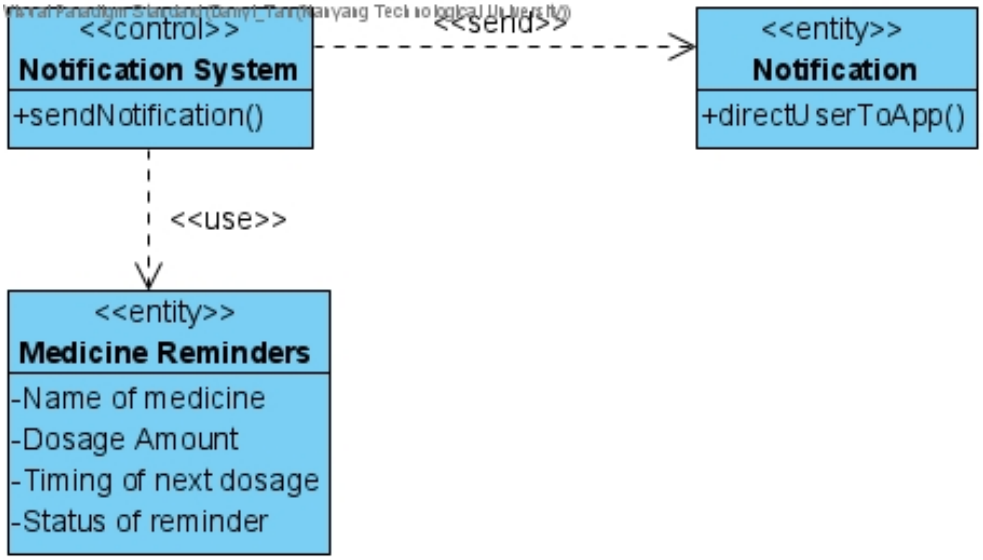
Use Case 03 – Edit Current Medicine Reminder



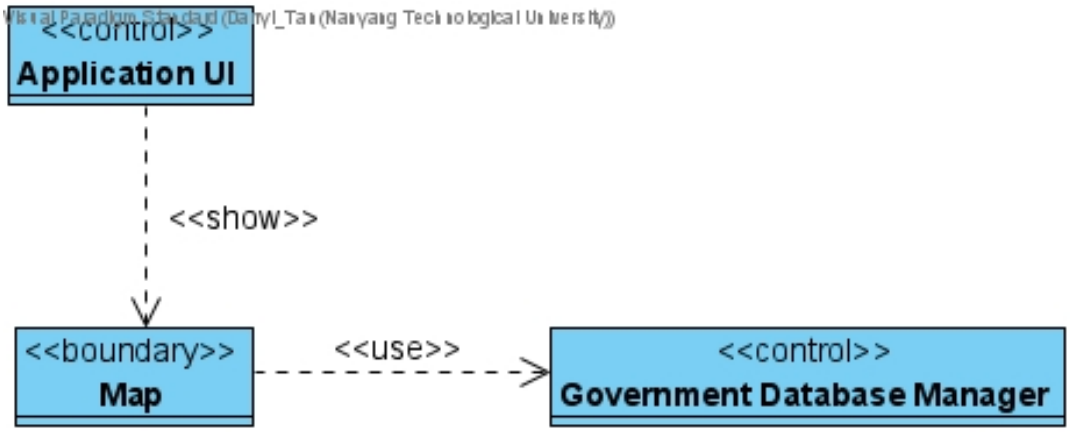
Use Case 04 – Delete Medicine Reminders



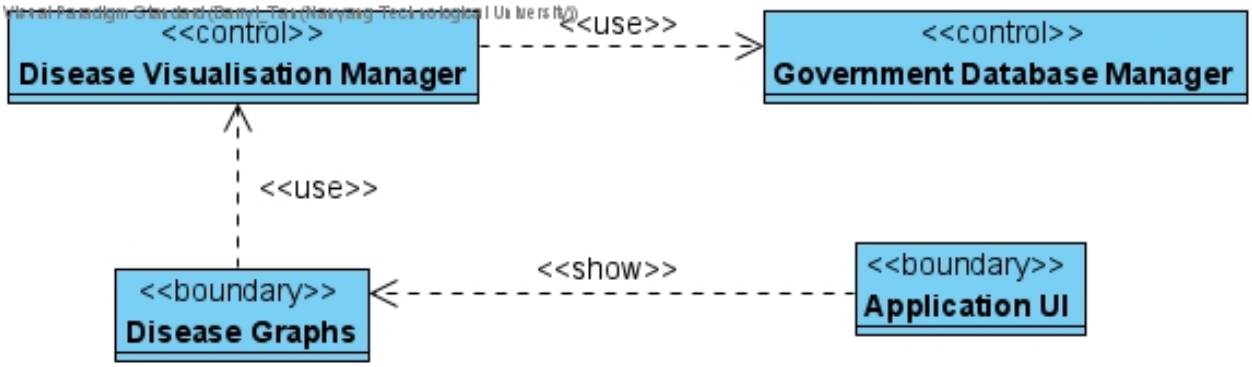
Use Case 05 – Send Medicine Reminder & Notify User



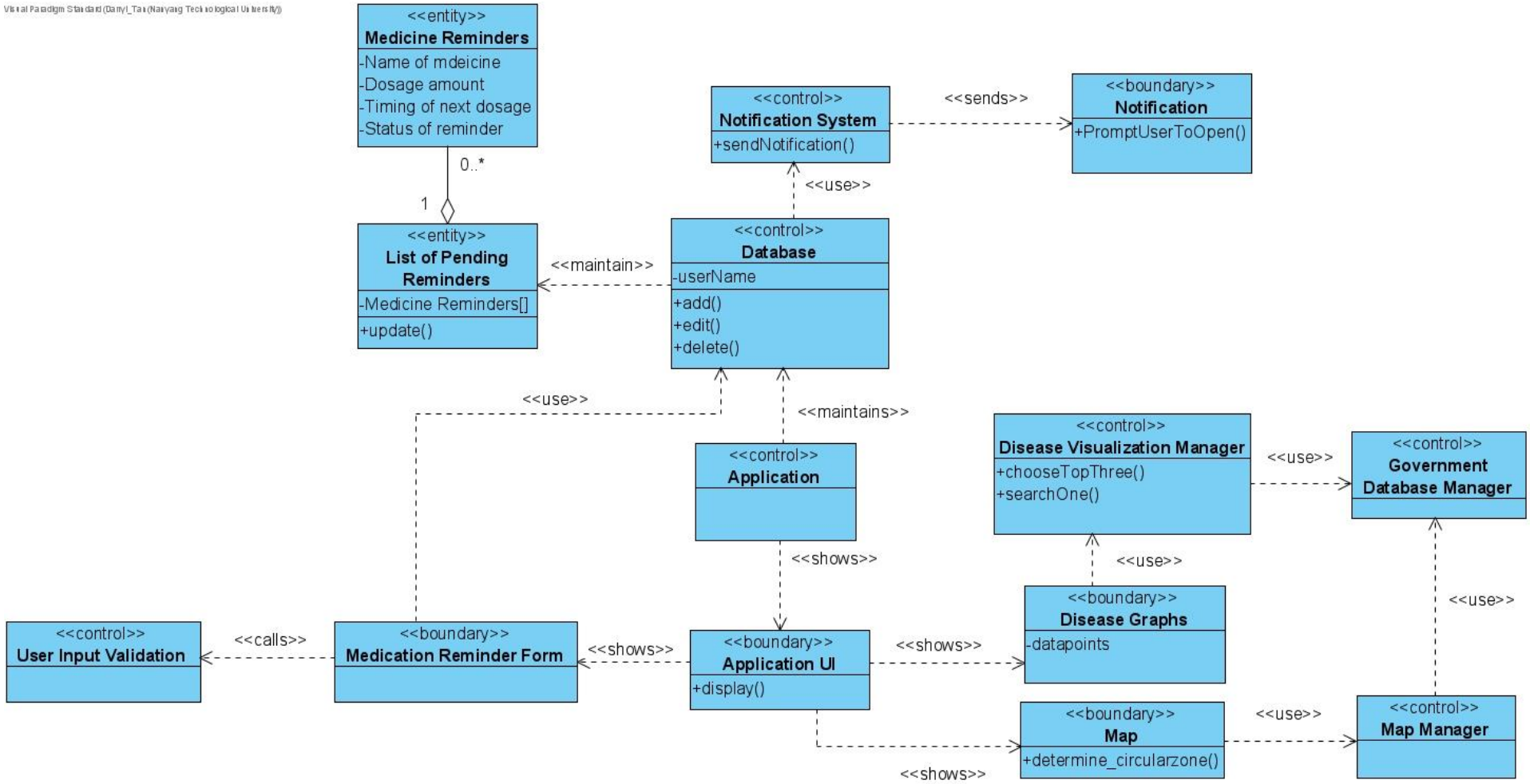
Use Case 06 – View CHAS Clinic Information



Use Case 07 – Display Infectious Disease Bulletin

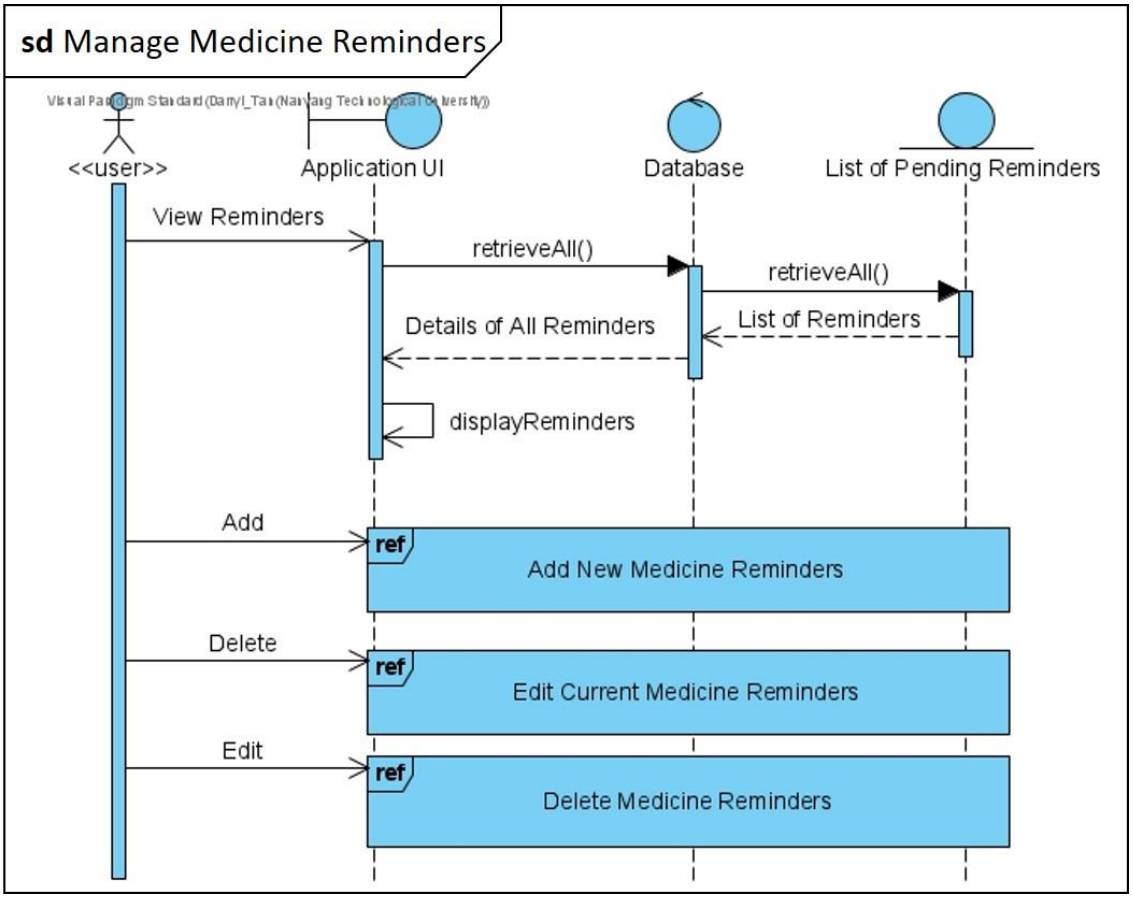


Overall Class Diagram

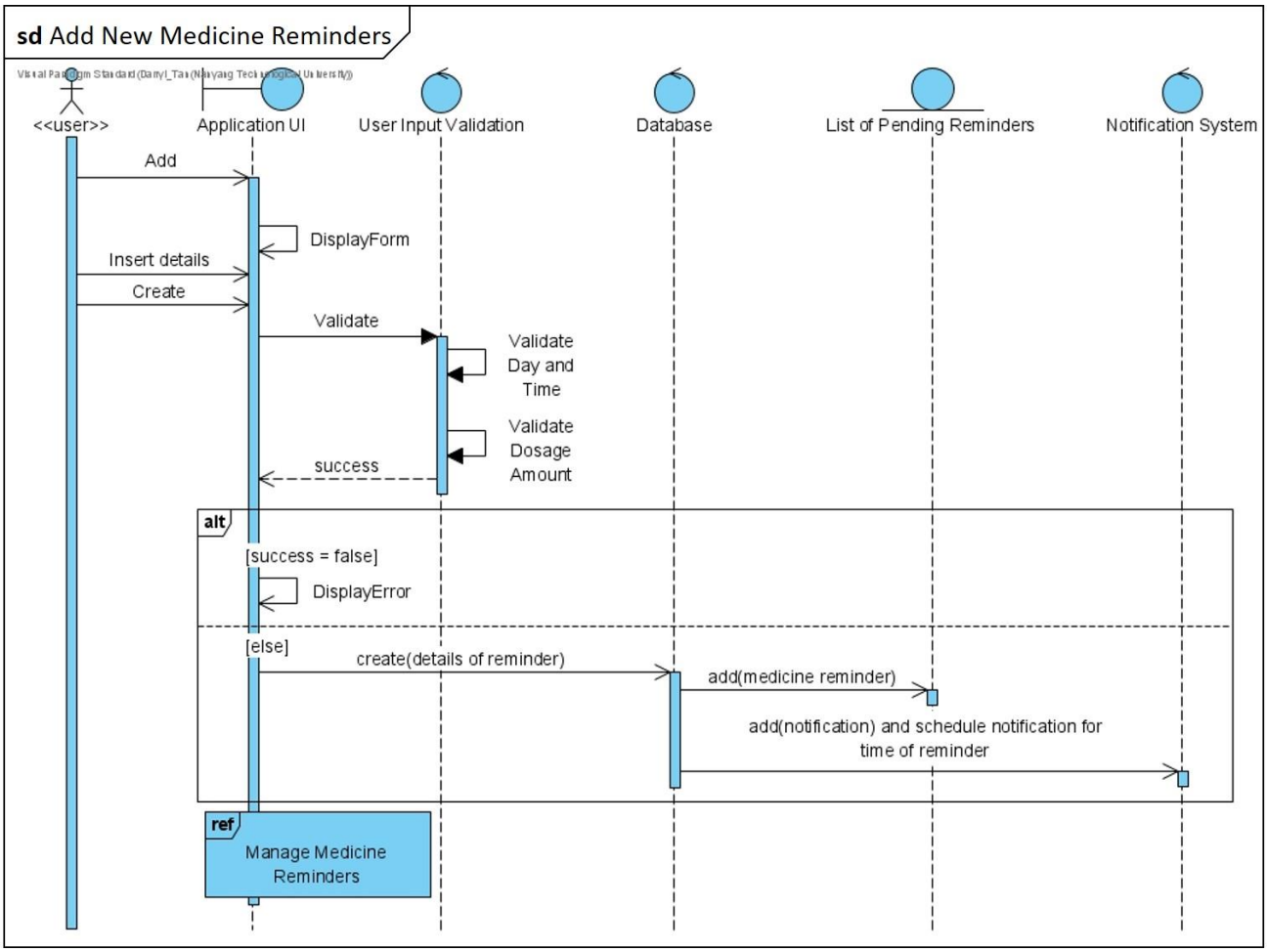


Sequence Diagrams

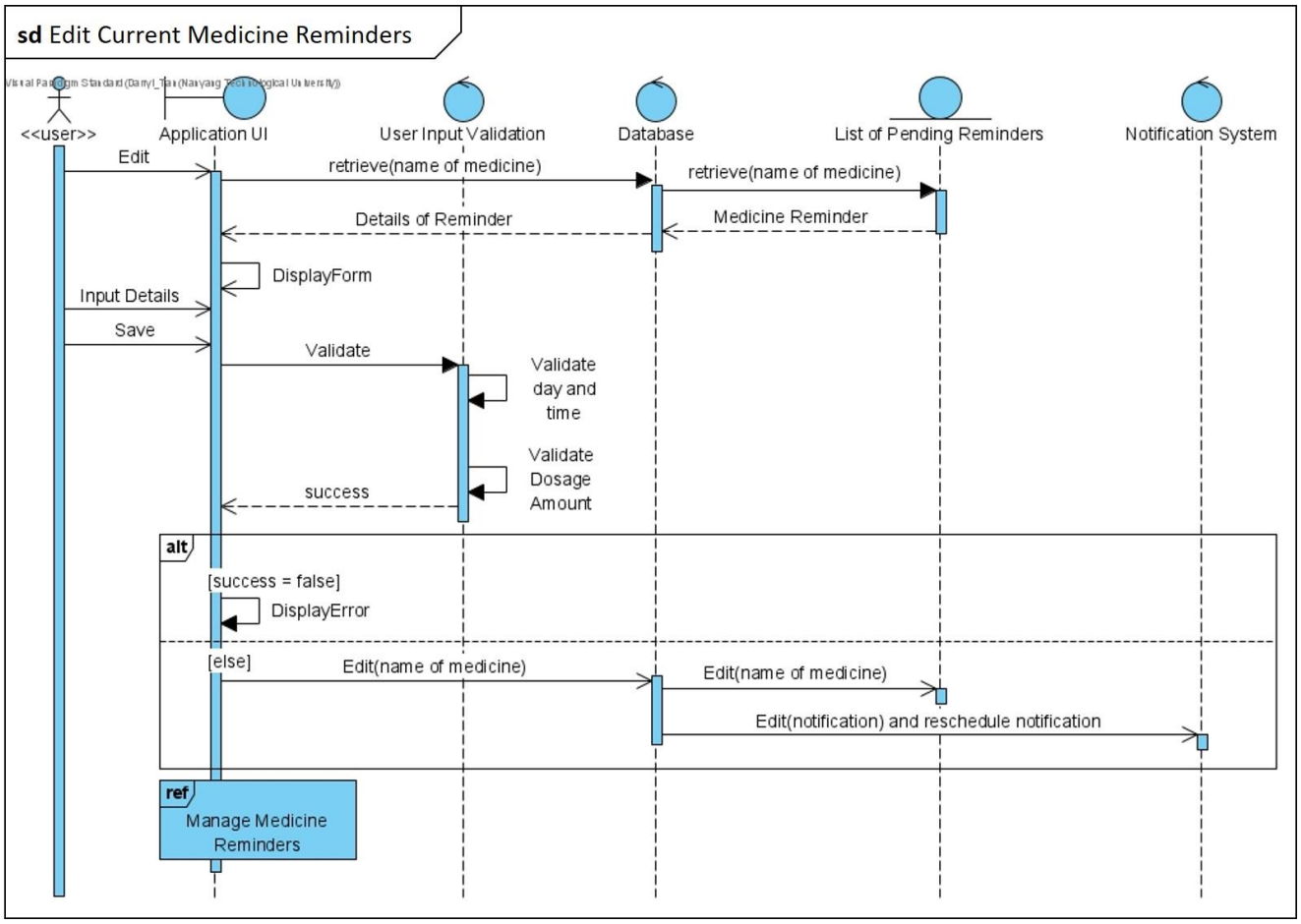
Use Case 01 - – Manage Medicine Reminder



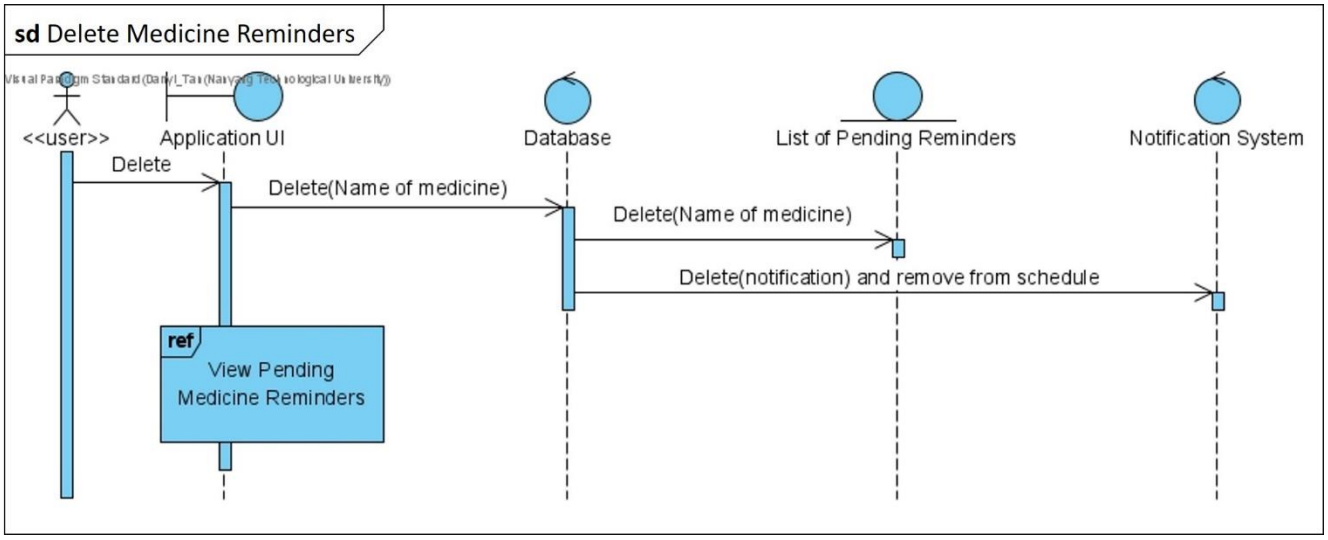
Use Case 02 – Add New Medication Reminder



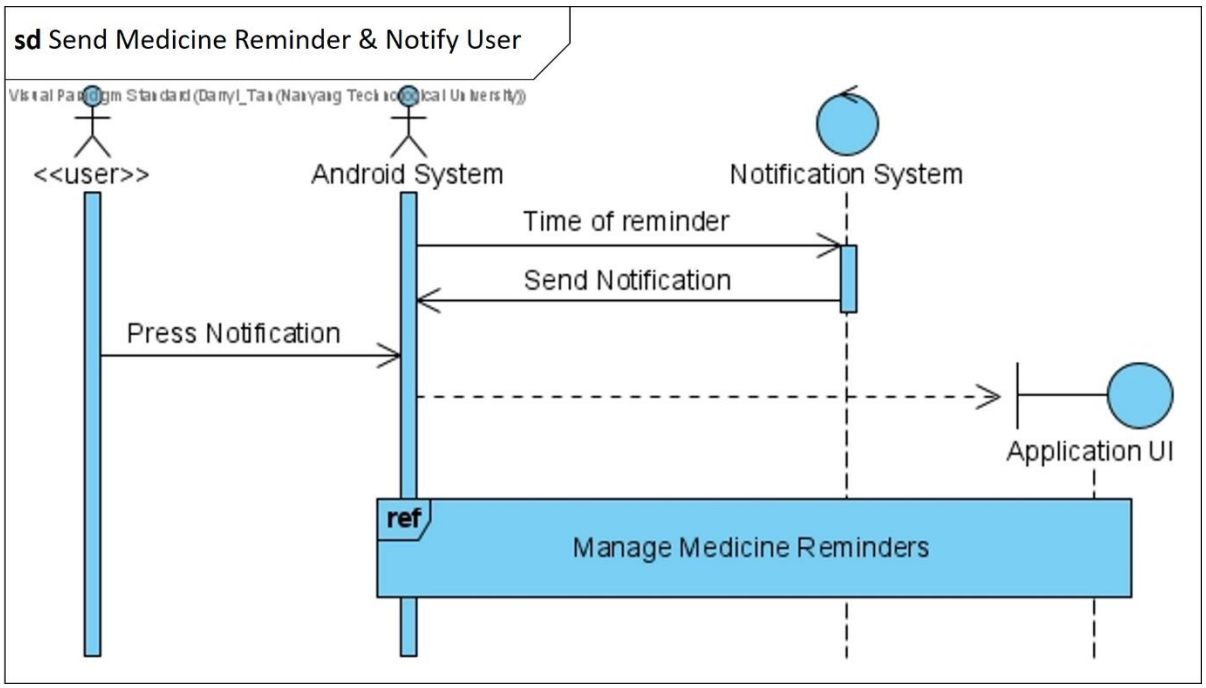
Use Case 03 – Edit Current Medicine Reminders



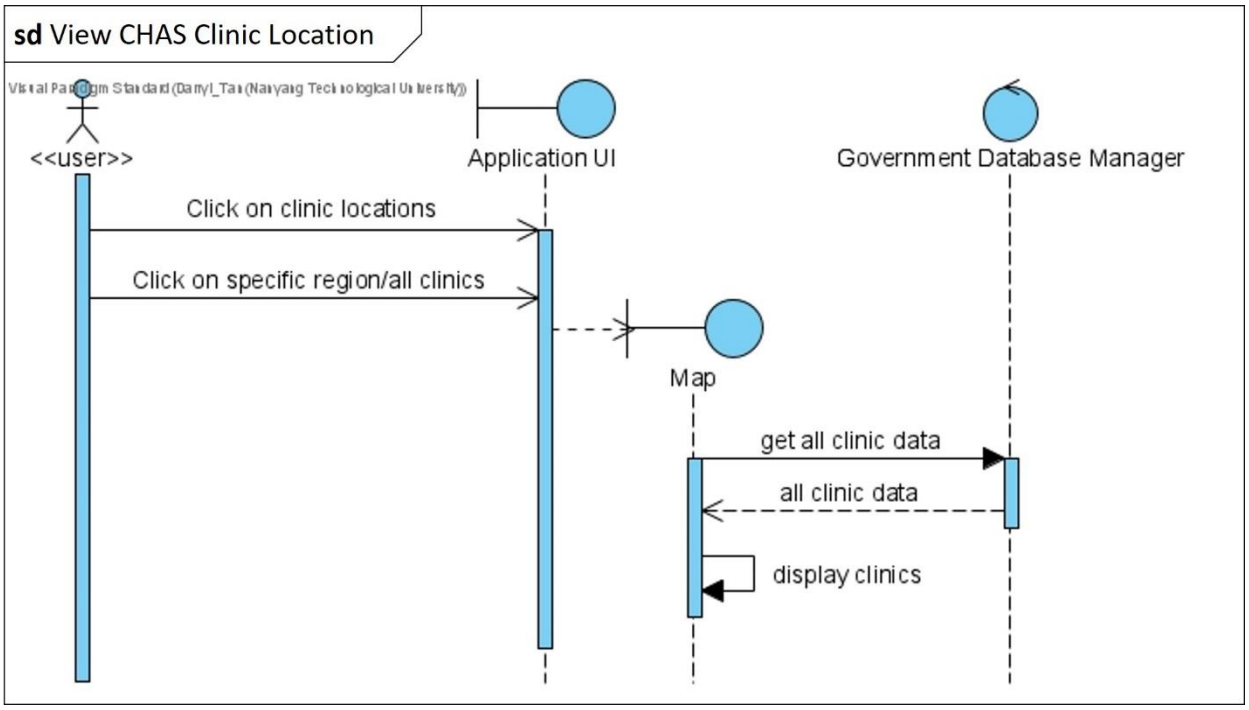
Use Case 04 – Delete Medicine Reminder



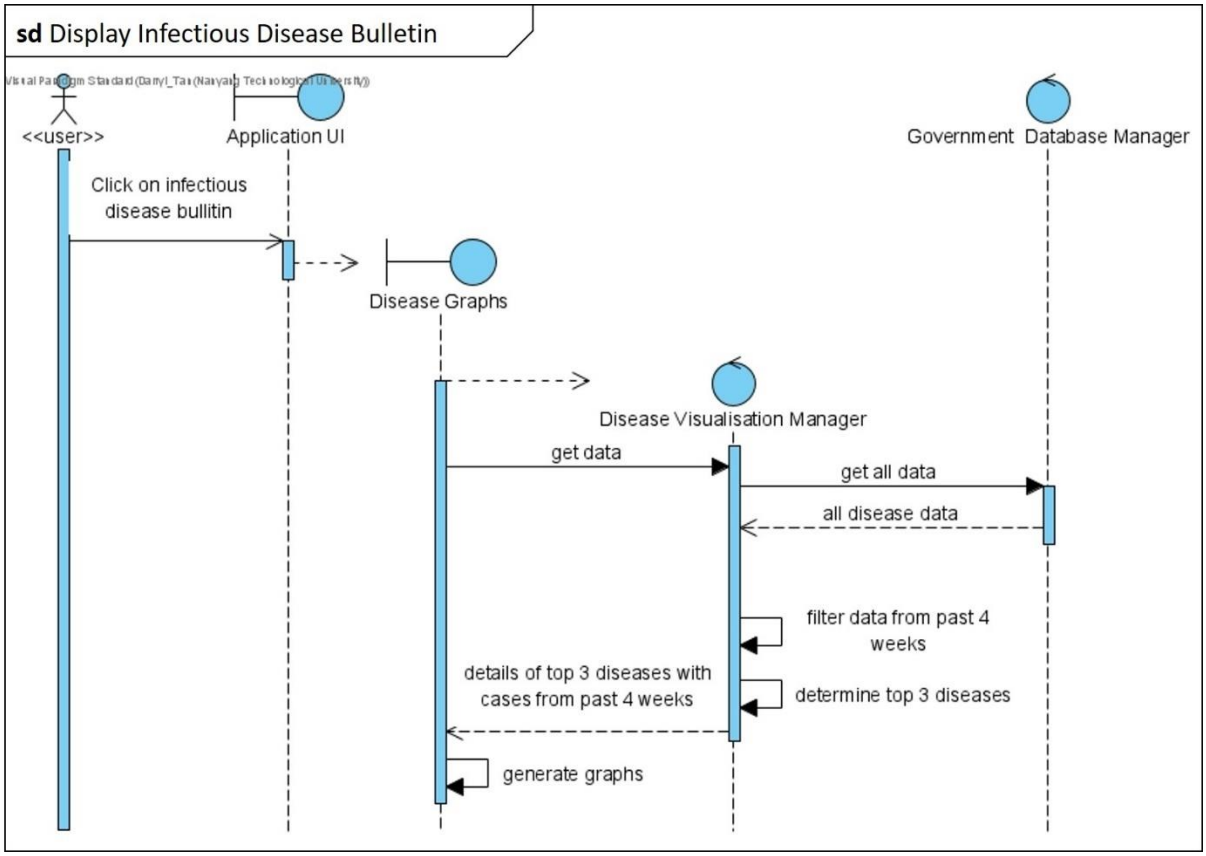
Use Case 05 – Send Notification Reminder & Notify User



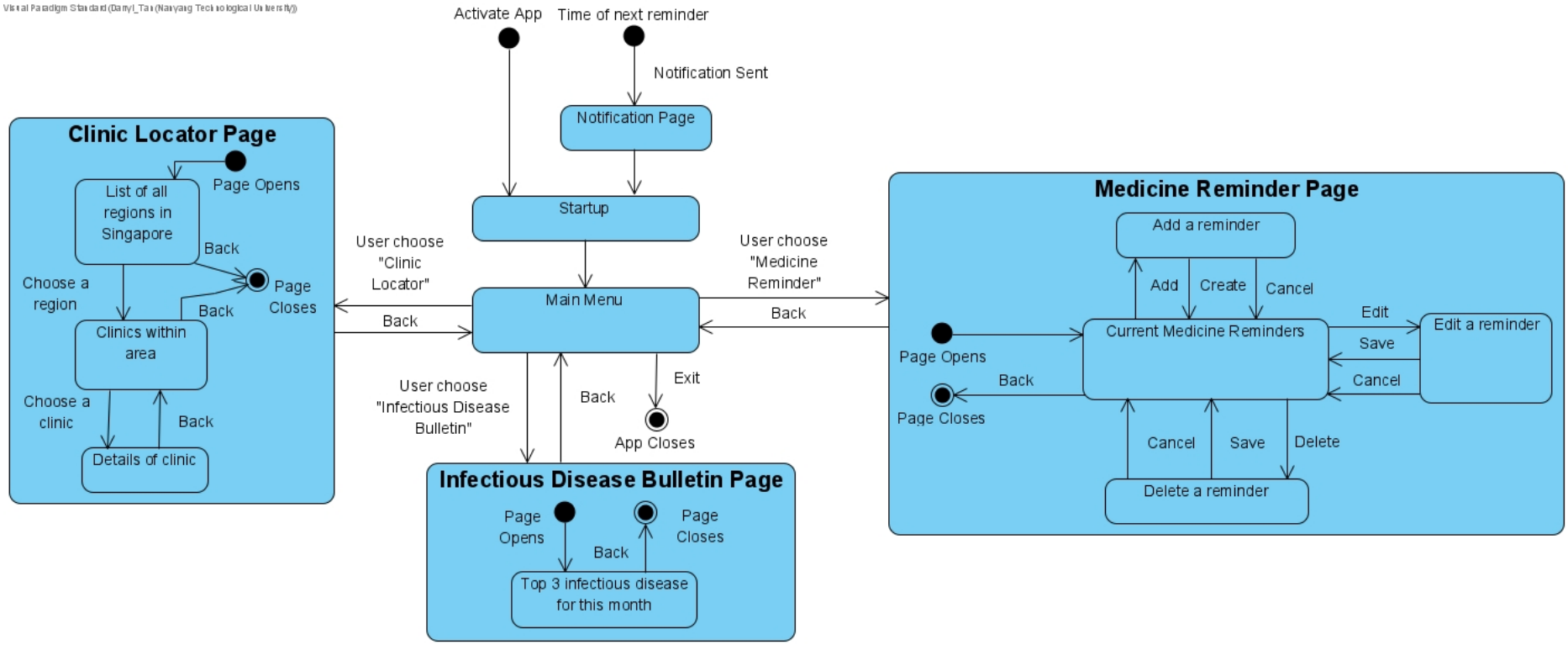
Use Case 06 – View CHAS Clinic Information



Use Case 07 – Display Infectious Disease Bulletin



Dialogue Map (An overview of the User Interface)



User Interface Mock-ups

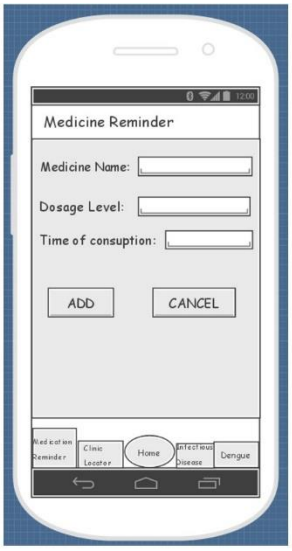
WHEN APPLICATION STARTS UP

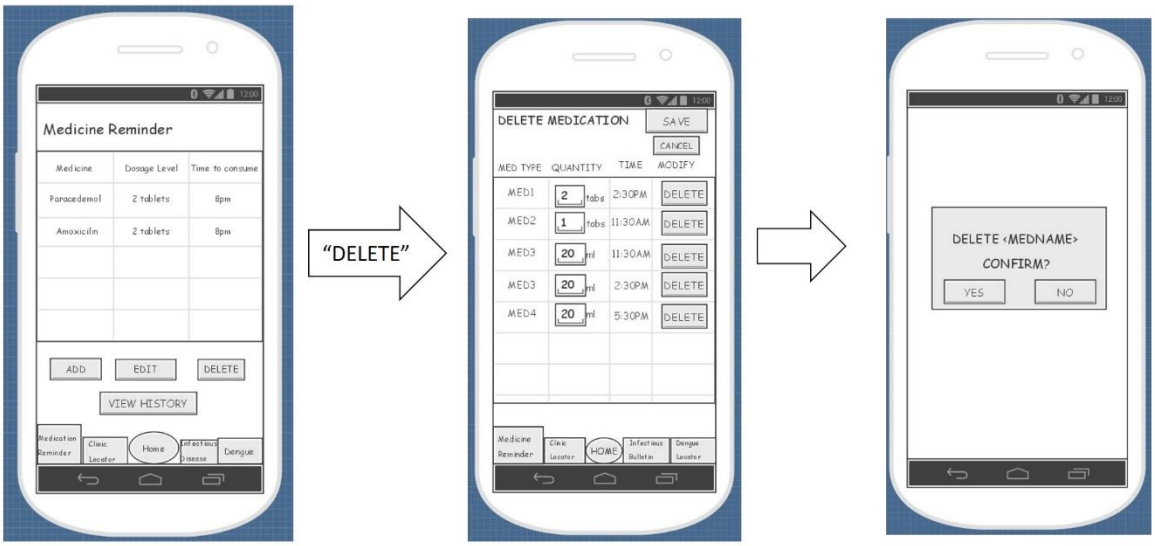
THE APPLICATION MAIN PAGE

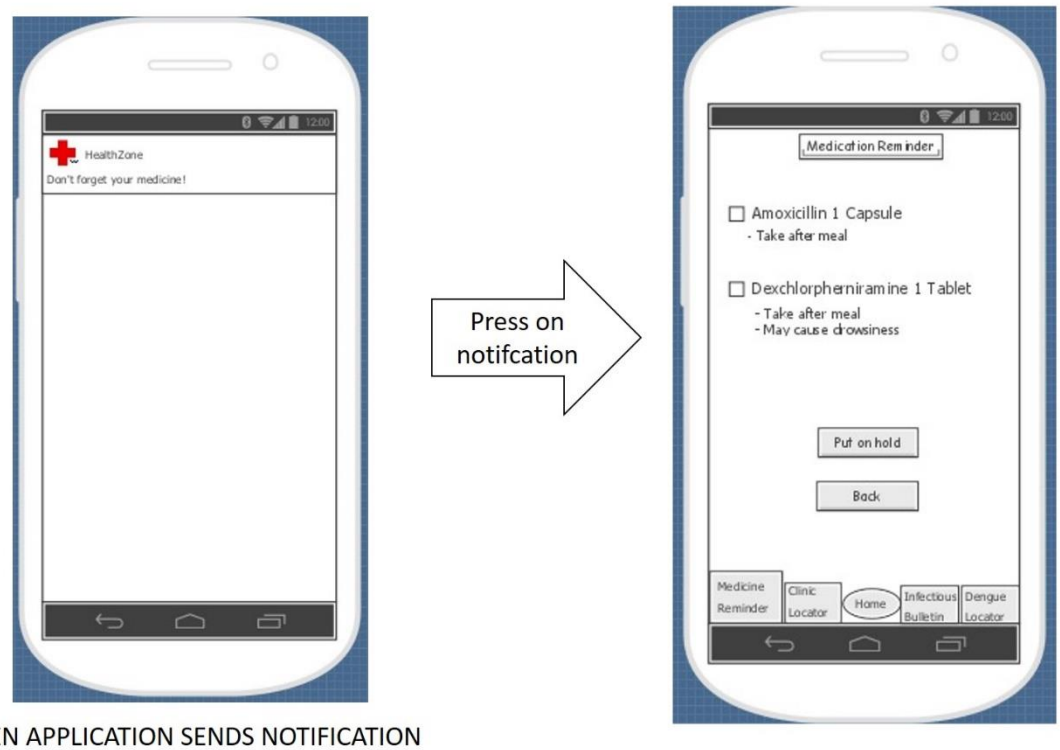
THE APPLICATION MAIN PAGE

Select "Medicine Reminder"

"ADD"



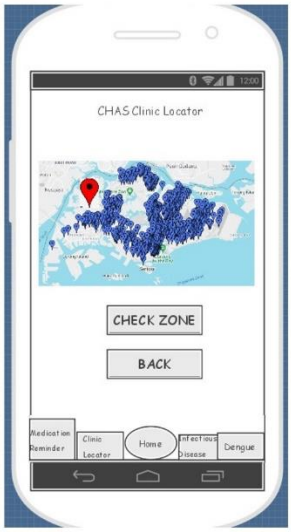




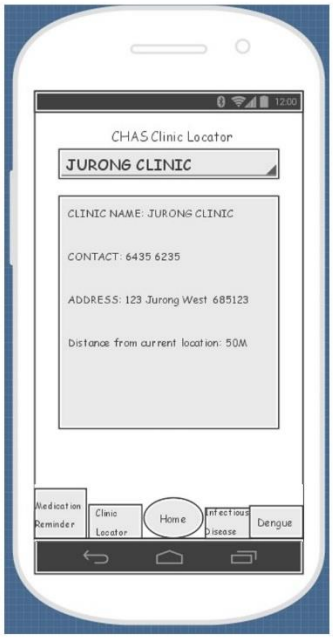
WHEN APPLICATION SENDS NOTIFICATION CLOSER TO TIME OF DOSAGE

THE APPLICATION MAIN PAGE

Select "Clinic Locator"

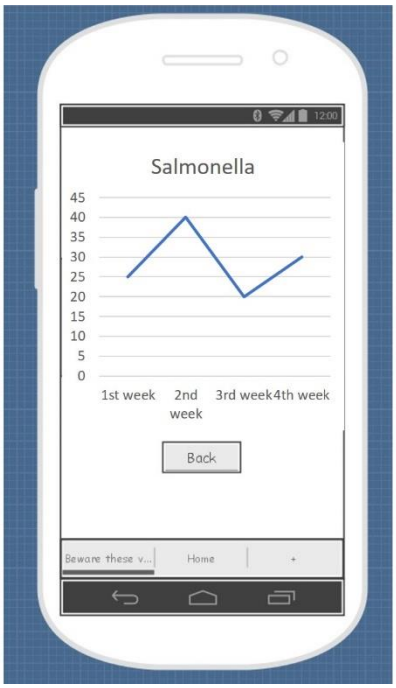


Click on a clinic



THE APPLICATION MAIN PAGE

Select "Infectious Bulletin"



Non-functional Requirements

Usability	1.	The system must be employed on a mobile application for easy access.
	2.	The system must utilize the smartphone's notification system to prompt the user on medicinal dosage.
	3.	The locations of the clinics and pharmacies must be indicated on a GPS map.
	4.	A drop-down menu must be used for the user to indicate the clinic/pharmacy that he/she wants to take a look at.
	5.	The infectious disease data must be shown in graphical format.
	6.	Have a login/logout system for users to transfer data
Reliability	1.	The application will create a persistent notification service to ensure reliable reminders.
	2.	The application must periodically synchronise with the server to ensure up-to-date data.
Performance	1.	The application should operate smoothly on most supported devices.
Platform Compatibility	1.	The application is designed to work for Android devices running Android 5.0 and later.
	2.	The same application will be available for iOS devices in the future.
	3.	The application will be periodically updated to ensure compatibility with third party add-ons.

Data Dictionary

Term	Definition
Medicine	A medication is a drug used to diagnose, cure, treat, or prevent disease
Intake timing	A specific timing when an amount of food, air, or another substance taken into the body
Dosage	size or frequency of a dose of a medicine or drug
Prompt	A notification to encourage a person to carry out the relevant task
Clinic	An establishment where outpatients are given general medical treatment or advice
Pharmacy	An establishment where one can buy medication
CHAS	Community Health Assist Scheme- A scheme where all Singapore Citizens receive subsidies for medical care at participating general practitioner and dental clinics near their homes
Infectious diseases	Viral or bacterial infections that can be transferred from one organism to another organisation at a rapid pace
Bulletin	Short report or notice, intended for immediate publication, typically by an authoritative source
Consumption	The process of taking food or a specific substance into the body
Latest Recorded Date	The final recorded end date in the document/file that has been obtained.
Weekly Top 3 Infectious Diseases	The three infectious diseases with the highest number of cases in the week, according to the latest recorded date.