


# Healthcare Application Proposal

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## Overview

<b>Title</b>	 <p style="text-align: center;"><b>Healthcare Mobile Application</b></p>
<b>Description</b>	<p>A centralised and secure mobile application designed for individuals to conveniently monitor, track, and log their health-related information. Users can access scheduling tools, view trends, as well as reliable health insights.</p>
<b>Target Audience</b>	<ul style="list-style-type: none"> <li>● Heath-conscious individuals who wish to stay on top of their health and are looking to adopt healthier lifestyle habits</li> <li>● General public seeking health information and wellness tips</li> <li>● Individuals with chronic illnesses who require regular monitoring, medication reminders, and symptom tracking</li> <li>● Senior citizens who need assistance in managing their health through an intuitive interface</li> </ul>
<b>Problem Statement</b>	<p>Many individuals struggle to maintain healthy lifestyles due to:</p> <ol style="list-style-type: none"> <li><b>1. Information Overload</b> Difficulty in finding reliable health information online</li> <li><b>2. Lack of Motivation</b> Unable to maintain consistent healthy habits</li> <li><b>3. Inefficient Health Management</b> Lack of a centralised location to conveniently track their vitals and medication</li> </ol>
<b>Purpose</b>	<p>To provide a comprehensive, user-friendly, modern mobile application that empowers users to take control of their health through the platform's provided tools and sensors and be able to access reliable health information.</p> <p>Targeted Pain Points:</p> <ul style="list-style-type: none"> <li>● Difficulty in finding accurate and up-to-date health information</li> <li>● Lack of motivation to adopt healthy habits</li> <li>● Inefficient management of medications/health conditions</li> </ul>

## Project Scope

No.	Function	Description	Type
1.	Log In	Allows users to securely access their accounts by entering their credentials.	Authentication
2.	Sign Up	Allows new users to create an account by providing necessary information like NRIC and Role (These two attributes will be fixed; the user will be able to update other attributes except this). + Validation for fields + Hide/Show Password Feature	Authentication
3.	Log Out	Allows users to log out of their accounts when not in use.	Authentication
4.	Forget Password	Provide users with the option to reset their password, ensuring secure account recovery.	Authentication
5.	Onboarding Assessment	When new users sign up, they will be prompted to fill in a personal particulars form for more accurate calculations based on their measurements.	Internal Database Operation: CREATE
6.	Display Discover Content	Displays content related to health. This includes healthy habits, exercise, fun facts, diets, etc.	<b>External</b> Database Operation: READ
7.	Add Discover Content	Enables ADMINS to write and add new content.	<b>External</b> Database Operation: CREATE +Authorisation
8.	Edit Discover Content	Enables ADMINS to edit their written content.	<b>External</b> Database Operation: UPDATE +Authorisation
9.	Delete Discover Content	Enables ADMINS to delete any content they've written.	<b>External</b> Database Operation: DELETE +Authorisation
10.	Display User Profile	Displays the user's profile photo, personal information and measurements.	Internal Database Operation: READ
11.	Edit User Profile	Allows users to update their profile photo, personal information and measurements.	Internal Database Operation: UPDATE
12.	Delete User Profile	Allows users to delete their account.	Internal Database Operation: DELETE
13.	Display Logs	1. Users will be able to view the updated information (Manual Logs + Sensor Detected Logs).	Internal Database Operation: READ + Additional

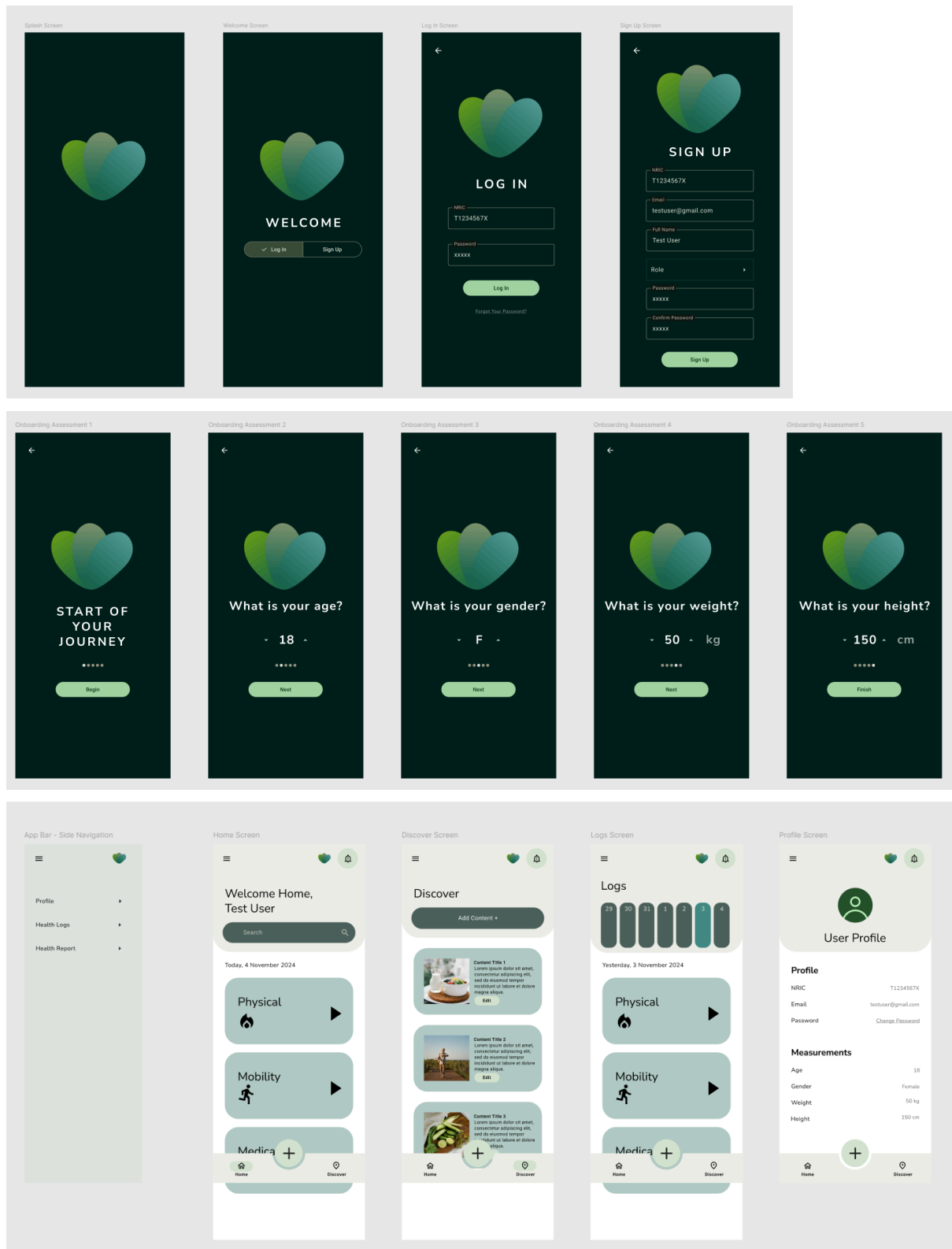
		2. Users will be able to view previous Logs (History). 3. Includes visuals such as charts that are built from scratch instead of library.	Features
14.	Add Logs	Allows users to manually key in their activities (Physical/Mobility) or add new medications into their schedules.	Internal Database Operation: CREATE
15.	Edit Logs	Allows users to edit the logs made on the same day.	Internal Database Operation: UPDATE
16.	Delete Logs	Allows users to delete any logs made on the same day.	Internal Database Operation: DELETE
17.	Physical Activity Monitoring	Uses device sensors to track physical activity: <ul style="list-style-type: none"> <li>• Estimated Calories Burnt</li> <li>• Step Count</li> <li>• Walking/Running Distance (Aided with Global Positioning System)</li> </ul>	Sensors
18.	Mobility Monitoring	Uses device sensors to track physical mobility: <ul style="list-style-type: none"> <li>• Walking Speed</li> <li>• Walking Steadiness</li> </ul>	Sensors
19.	Mobile Camera	User can add/update a profile photo either by opening their camera or accessing their gallery.	Sensors
20.	Search Feature	In the Home Screen, users can search for information using the search bar.	Utility
21.	Filter Feature	In the Discover Screen, users can filter content based on categories.	Utility
22.	Notifications	Users will be able to customise their medication reminders.	Utility

# High-Fidelity Prototype

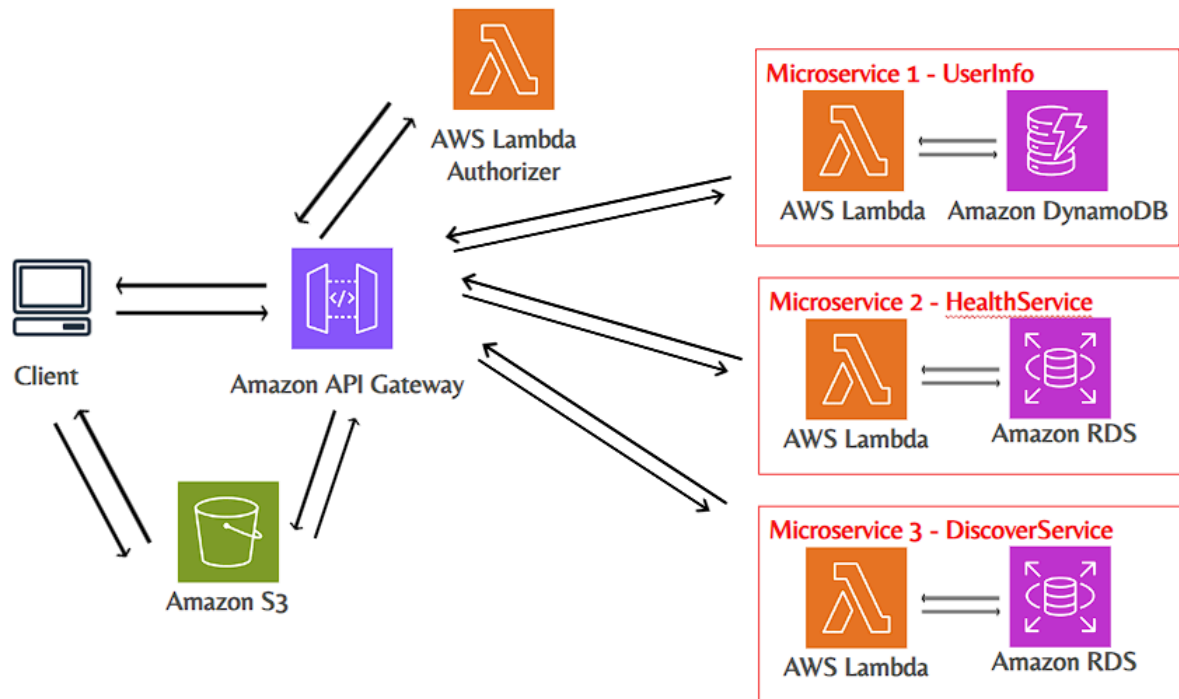
Link:

<https://www.figma.com/proto/5PGjfcQ1BaIS59W6Gbxlkg/Healthcare-Mobile-Application?node-id=0-1&t=DKSMFJLSK6YfRuFU-1>

Overview:



## Architectural Diagram

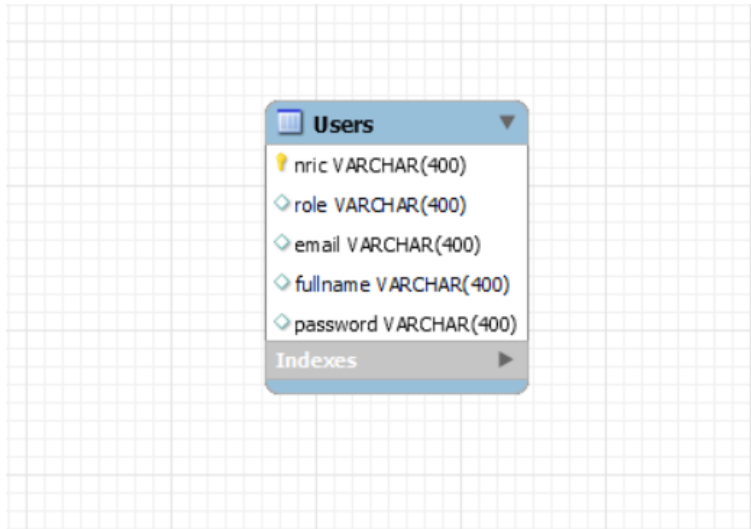


## Database Design

### Microservice #1 - UserInfo

#### Diagram

(This is only for visualisation purposes.)



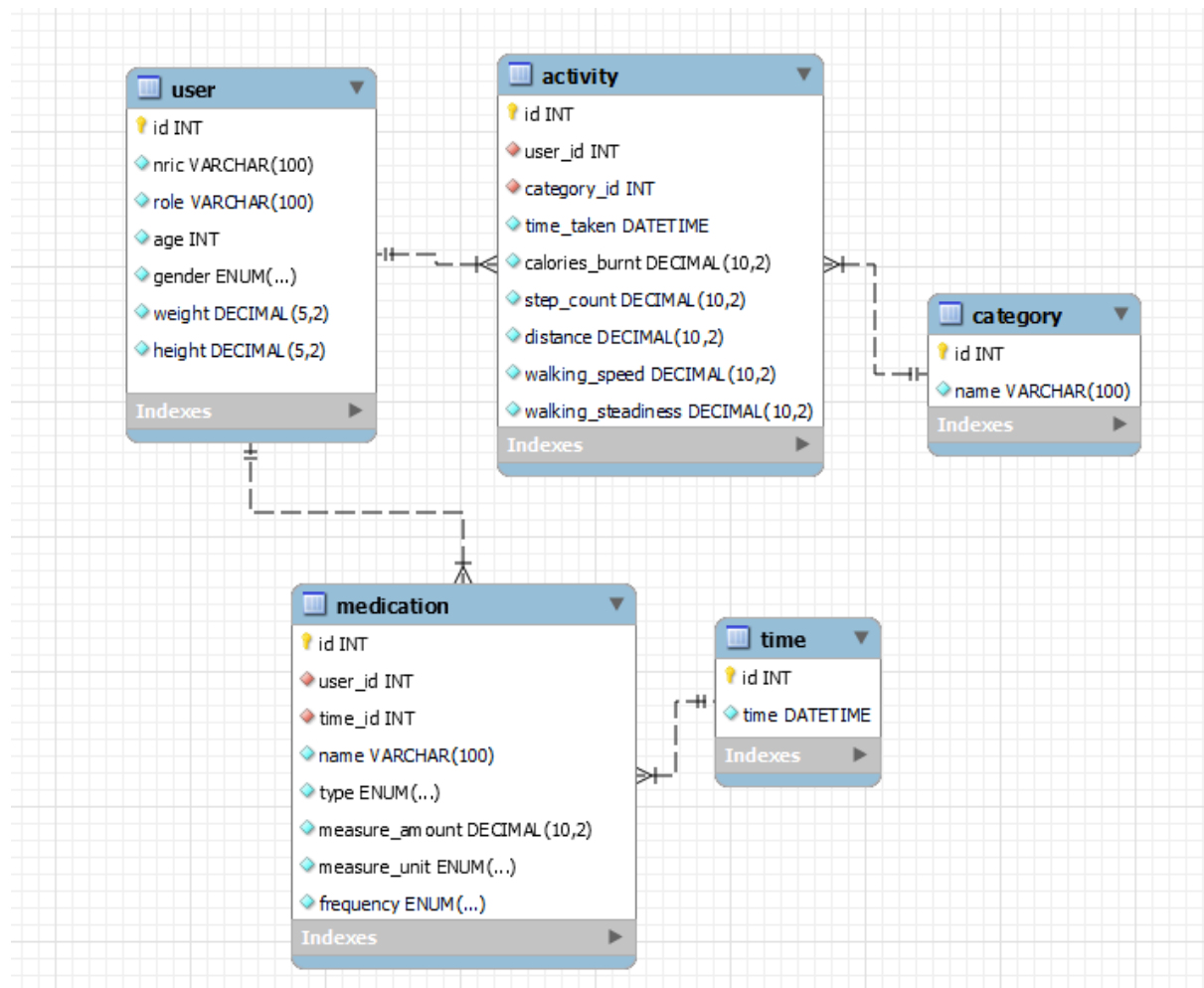
#### Data Dictionary (Table: Users)

Field Name	Data Type	Field Size	Primary/Foreign/Partition/Sort Key	Description	Example
nric	String	400	Primary Key	Unique identification for user	T1234567X
role	String	400	Sort Key	Determines role for user	admin
email	String	400	-	Email of user	admin@gmail.com
fullname	String	400	-	User's full name	Admin Admin
password	String	400	-	User's password	12345#passWORD



## Microservice #2 - HealthService

### ER Diagram



### Data Dictionary (Table: user)

Field Name	Data Type	Field Size	Primary/Foreign/Partition/Sort Key	Description	Example
id	Integer	8	Primary Key	Unique number for user	10000001
nric	VarChar (100)	100	-	Unique identification for user	T1234567X
role	VarChar (100)	100	-	Determines role for user	admin
age	Integer	8	-	User's age	18
gender	Enum()	-	-	User's gender	F
weight	Decimal	7	-	User's weight	50.00

	(5,2)				
height	Decimal (5,2)	7	-	User's Height	150.00

**Data Dictionary (Table: activity)**

Field Name	Data Type	Field Size	Primary/Foreign/Partition/Sort Key	Description	Example
id	Integer	8	Primary Key	Unique number for activity	10000001
user_id	Integer	8	Foreign Key	User this activity is associated to	10000001
category_id	Integer	8	Foreign Key	Category this activity is associated to	10000001
time_taken	DATETIME	-	-	When this activity was recorded	1970-01-01 00:00:01.000000
calories_burnt	Decimal (10,2)	12	-	Estimated number of calories the user burnt	1000000001.00
step_count	Decimal (10,2)	12	-	Estimated number of steps the user took	1000000001.00
distance	Decimal (10,2)	12	-	Estimated distance the user walked	1000000001.00
walking_speed	Decimal (10,2)	12	-	Estimated walking speed of the user	1000000001.00
walking_steadiness	Decimal (10,2)	12	-	Estimated walking steadiness of the user	1000000001.00

**Data Dictionary (Table: category)**

Field Name	Data Type	Field Size	Primary/Foreign/Partition/Sort Key	Description	Example
id	Integer	8	Primary Key	Unique number for a category	10000001
name	VarChar (100)	100	-	Name of a category	Category Name

**Data Dictionary (Table: medication)**

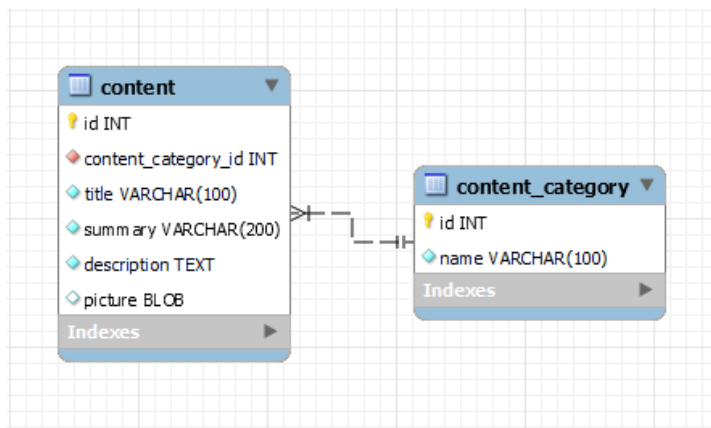
Field Name	Data Type	Field Size	Primary/Foreign /Partition/Sort Key	Description	Example
id	Integer	8	Primary Key	Unique number for a medication	10000001
user_id	Integer	8	Foreign Key	User this medication is associated to	10000001
time_id	Integer	8	Foreign Key	When this medication should be taken	10000001
name	VarChar (100)	100	-	Medication Name	Medication Name
type	Enum()	-	-	Medication Type	Capsule
measure_amount	Decimal (10, 2)	12	-	Amount needed	1000000001.00
measure_unit	Enum()	-	-	Unit of measurement for above amount	1000000001.00
frequency	Enum()	-	-	How often this medication must be taken in a week	Daily

**Data Dictionary (Table: time)**

Field Name	Data Type	Field Size	Primary/Foreign /Partition/Sort Key	Description	Example
id	Integer	8	Primary Key	Unique number for the timing	10000001
time	DATETIME	-	-	Timings noted for scheduling	1970-01-01 00:00:01.0000 00

## Microservice #3 - DiscoverService

### ER Diagram



### Data Dictionary (Table: content)

Field Name	Data Type	Field Size	Primary/Foreign/Partition/Sort Key	Description	Example
id	Integer	8	Primary Key	Unique number for a content segment	10000001
content_category_id	Integer	8	Foreign Key	Category this content belongs to	10000001
title	VARCHAR (100)	100	-	Title of Content	Content Title
summary	VARCHAR (200)	200	-	Summary of Content	This is a summary.
description	TEXT	-	-	Detailed Description of Content	This is a description.
picture	BLOB	-	-	Picture associated to Content	-

### Data Dictionary (Table: content\_category)

Field Name	Data Type	Field Size	Primary/Foreign/Partition/Sort Key	Description	Example
id	Integer	8	Primary Key	Unique number for a category	10000001
name	VARCHAR (100)	100	-	Name of a category	Category Name

## Elaborations

Includes any explanations or justifications.

### External Database

- External Database CRUD Functions: Performed for DiscoverService only if the user's role = admin.
- *nric* and *role* will be fixed. This allows the data to be stored from Microservice #1 to Microservice #2 as there won't be any inconsistent data.
- Basic OWASP Implementations to be included such as Password Hasing, and Regex.
- *role* for both Internal and External databases aren't Enums to allow for future scalability of the application.
- Since *id* and *nric* are both unique, it becomes a composite key for Table: user.
- A default image will be displayed if none is detected for Display Content.
- DiscoverService - Only operational with Internet Connection.
- The user's initial will be displayed if they don't have a profile photo.
- Enum Elaborations

Table	Attribute	Enum
user	gender	Enum('M', 'F', 'PNTS')
medication	type	Enum('Capsule', 'Tablet', 'Liquid')
medication	measure_unit	Enum('mg', 'mcg', 'g', 'ml', '%')
medication	frequency	Enum('Daily', 'Weekly')

### Local Database

- Room Persistent Library will be utilised to do offline caching for both UserInfo and HealthService under the condition that the user has to already be logged into the application.
- Internal Database CRUD Functions: UserInfo and HealthService
- Sensor Considerations for Realme RMX3231:
  1. Accelerometer - Measures acceleration in three axes (x, y, z)
  2. Gyroscope - Measures rotational motion in three axes
  3. Proximity Sensor - Detects objects near the device
  4. Compass - Measures the direction of the Earth's magnetic field
  5. Comms Positioning - GPS, GLONASS, GALILEO, BDS

## API Documentation

Service Name	HTTP Method	Relative URI	Database	Action
UserInfo	POST	/user-sign-up	External	Registers a user into the database.
UserInfo	POST	/user-login	External	Logs in a user by comparing the nric and password against the database.
UserInfo	PUT	/user-profile	External	Allows the user to edit and update their email/fullname.
UserInfo	PUT	/user-password	External	Allows the user to edit and update their password.
UserInfo	DELETE	/user-profile	External	Deletes the user's account.
HealthService	POST	/user	External	Onboarding Assessment: Obtains the user's measurements.
HealthService	GET	/user/{id}	Internal	Displays the user's measurements on their profile page.
HealthService	PUT	/user/{id}	External	Updates the user's measurements on their profile page.
Health Service	DELETE	/user/{id}	External	Deletes the user's account.
HealthService	GET	/activity/{user_id}/{day}	Internal	Retrieves all of the user's activity based on their ID and the date/time.
HealthService	POST	/activity	Internal	Adds new activities into the database.
HealthService	PUT	/activity/{id}	Internal	Updates an activity based on the obtained activity_id.
HealthService	DELETE	/activity/{id}	Internal	Deletes an activity based on the obtained activity_id.
HealthService	GET	/medication/{user_id}	Internal	Retrieves all of the user's medications based on their ID.
HealthService	POST	/medication	Internal	Adds a new medication into the database.

HealthService	PUT	/medication/{id}	Internal	Updates the details of the user's medication based on the obtained medication_id.
HealthService	DELETE	/medication/{id}	Internal	Deletes a medication based on the obtained medication_id.
DiscoverService	GET	/content	External	Retrieves all content from the database with their details.
DiscoverService	GET	/content/{id}	External	Retrieves details of one content in the database based on the provided ID.
DiscoverService	GET	/content-category/{category}	External	Retrieves content from the database with their details based on the specified category.
DiscoverService	POST	/content	External	Adds new content into the database.
DiscoverService	PUT	/content/{id}	External	Updates the details of one content in the database based on the provided ID.
DiscoverService	DELETE	/content/{id}	External	Deletes content from the database based on the provided ID.