


Healthcare Application Proposal

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Overview

| | |
|--------------------------|---|
| Title |  <p style="text-align: center;">Healthcare Mobile Application</p> |
| Description | <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> |
| Target Audience | <ul style="list-style-type: none"> • Health-conscious individuals who wish to stay on top of their health and are looking to adopt healthier lifestyle habits • General public seeking health information and wellness tips • Individuals with chronic illnesses who require regular monitoring, medication reminders, and symptom tracking • Senior citizens who need assistance in managing their health through an intuitive interface |
| Problem Statement | <p>Many individuals struggle to maintain healthy lifestyles due to:</p> <ol style="list-style-type: none"> 1. Information Overload Difficulty in finding reliable health information online 2. Lack of Motivation Unable to maintain consistent healthy habits 3. Inefficient Health Management Lack of a centralised location to conveniently track their vitals and medication |
| Purpose | <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"> • Difficulty in finding accurate and up-to-date health information • Lack of motivation to adopt healthy habits • Inefficient management of medications/health conditions |

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. | Edit Profile | Provides users with the option to edit their profile personal information in their settings. | Profile Customisation |
| 5. | Change Password | Provides users with the option to change their password in their settings. | Profile Customisation |
| 6. | 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 |
| 7. | Display Discover Content | Displays content related to health. This includes healthy habits, exercise, fun facts, diets, etc. | External Database Operation: READ |
| 8. | Add Discover Content | Enables ADMINS to write and add new content. | External Database Operation: CREATE +Authorisation |
| 9. | Edit Discover Content | Enables ADMINS to edit their written content. | External Database Operation: UPDATE +Authorisation |
| 10. | Delete Discover Content | Enables ADMINS to delete any content they've written. | External Database Operation: DELETE +Authorisation |
| 11. | Display User Profile | Displays the user's personal information and measurements. | Internal Database Operation: READ |
| 12. | Edit User Profile | Allows users to update their personal information and measurements. | Internal Database Operation: UPDATE |
| 13. | Delete User Profile | Allows users to delete their account. | Internal Database Operation: DELETE |

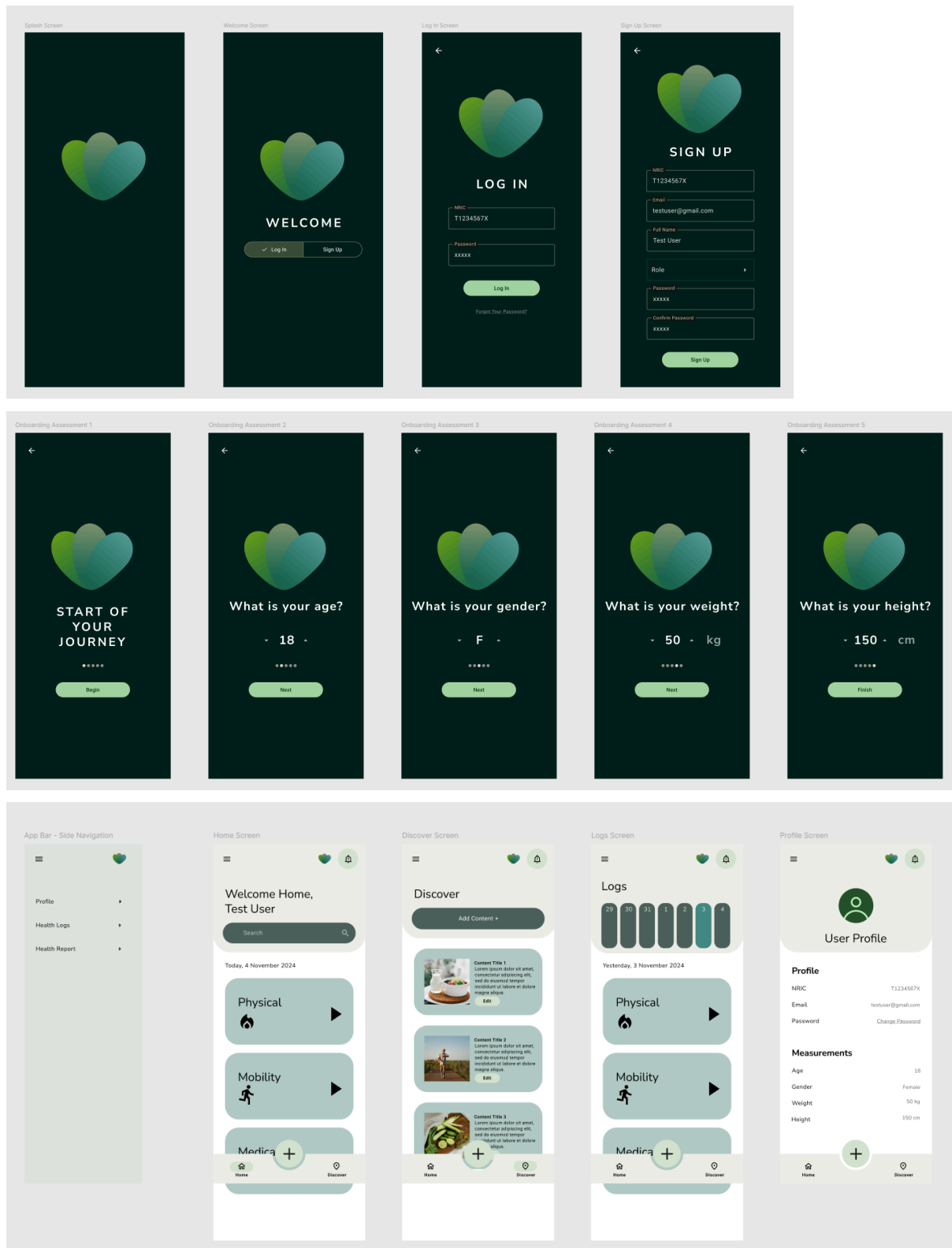
| | | | |
|-----|------------------------------|--|--|
| 14. | Display Logs | <ol style="list-style-type: none"> 1. Users will be able to view the updated information (Manual Logs). 2. Includes visuals such as Sensor Detected Graphs that are built from scratch instead of a library. | Internal Database Operation: READ + Additional Features |
| 15. | Add Logs | Allows users to manually key in their daily activities or add new medications into their schedules. | Internal Database Operation: CREATE |
| 16. | Edit Logs | Allows users to edit the logs made on the same day. | Internal Database Operation: UPDATE |
| 17. | Delete Logs | Allows users to delete any logs made on the same day. | Internal Database Operation: DELETE |
| 18. | Physical Activity Monitoring | <ul style="list-style-type: none"> • Estimated Calories Burnt • Step Count • Walking/Running Distance • Walking Speed • Walking Steadiness | Caching System |
| 19. | Mobility Monitoring | Uses device sensors to track physical mobility: <ul style="list-style-type: none"> • Accelerometer | Sensors |
| 20. | Mobility Monitoring | Uses device sensors to track physical mobility: <ul style="list-style-type: none"> • Gyroscope | Sensors |
| 21. | Search Feature | In the Home Screen, users can search for information using the search bar. | Utility |
| 22. | Filter Feature | In the Discover Screen, users can filter content based on categories. | Utility |

High-Fidelity Prototype

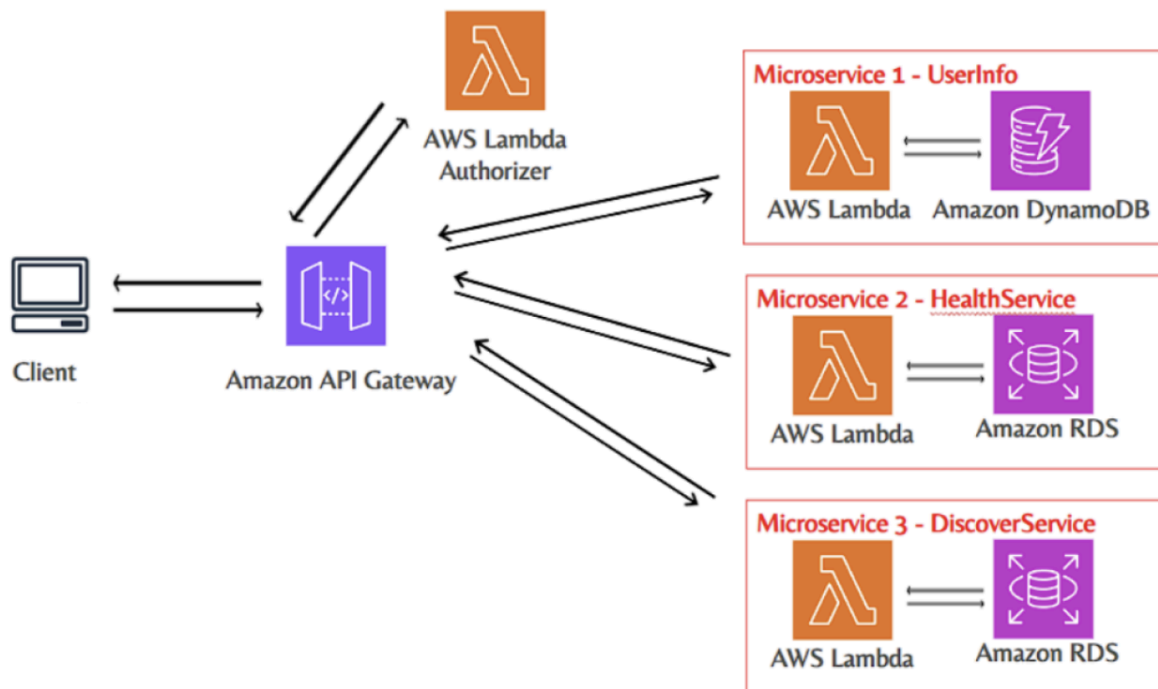
Link:

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

Overview:



Architectural Diagram

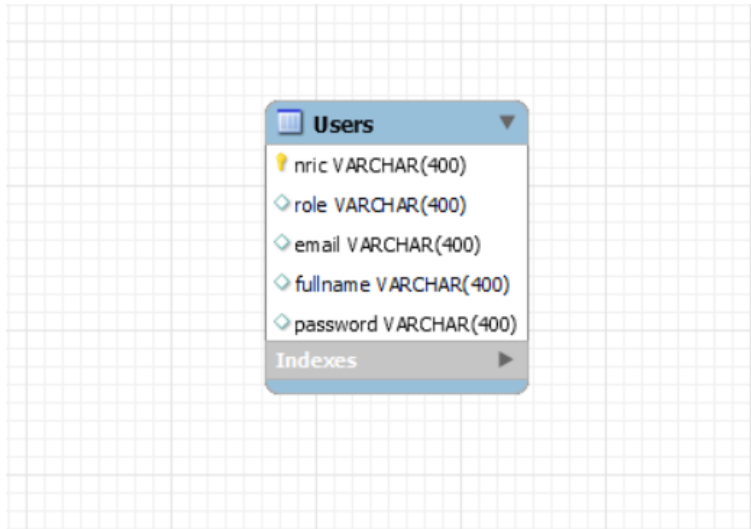


Database Design

Microservice #1 - UserInfo

Diagram

(This is only for visualisation purposes.)

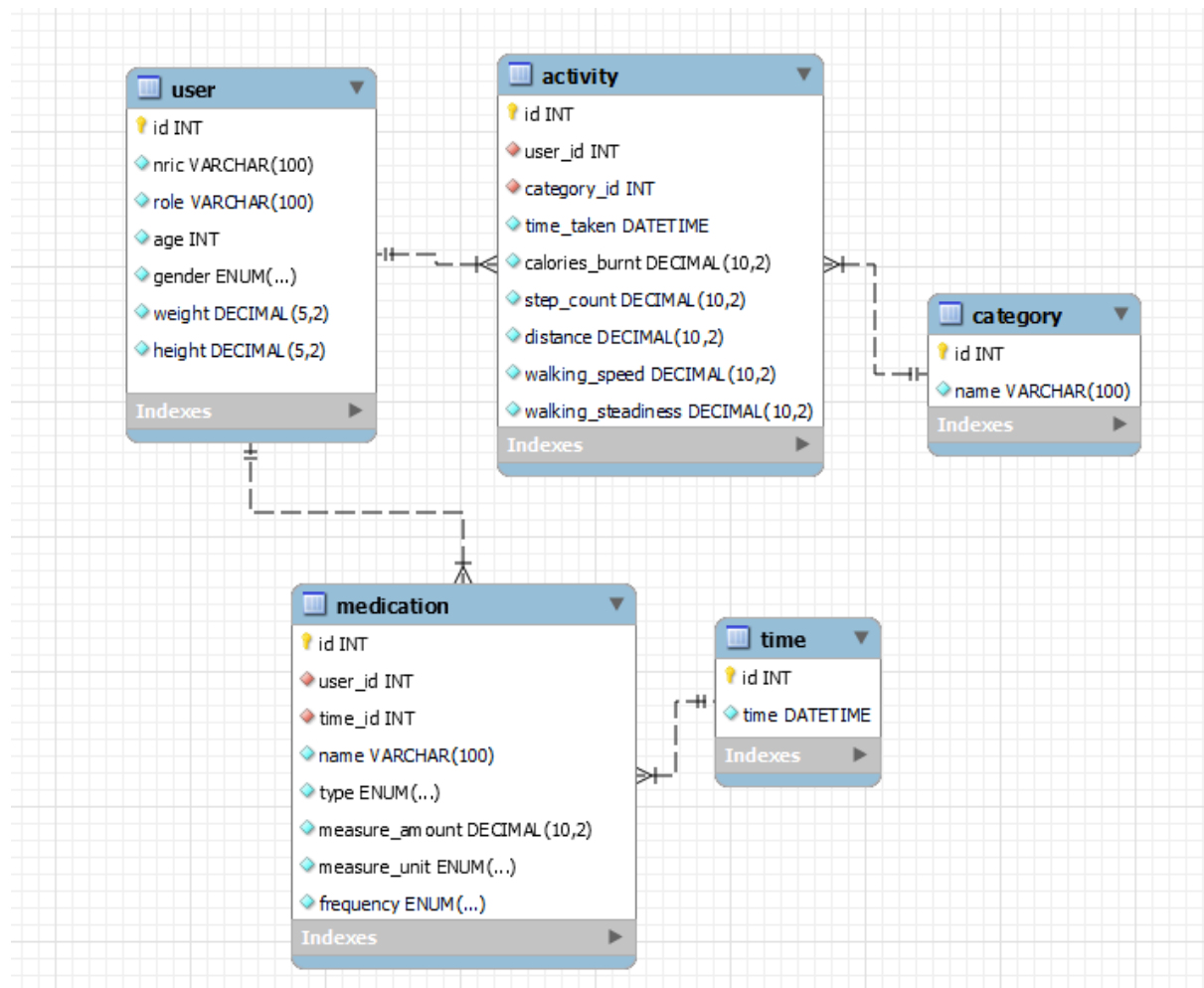


Data Dictionary (Table: Users)

| 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)

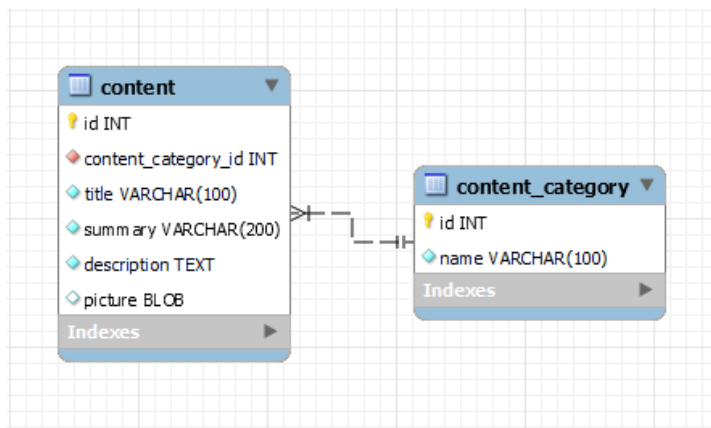
| Field Name | Data Type | Field Size | Primary/Foreign /Partition/Sort Key | Description | Example |
|----------------|-----------------|------------|-------------------------------------|---|-----------------|
| id | Integer | 8 | Primary Key | Unique number for a medication | 10000001 |
| user_id | 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 Hashing, 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 | GET | /info/{id} | Internal | Gets the user's id and measurements to be displayed upon login. |
| HealthService | POST | /user | External | Onboarding Assessment: Obtains the user's measurements. |
| 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. |
| HealthService | GET | /category | Internal | Obtains all categories. |
| HealthService | GET | /category | Internal | Obtains all time slots. |
| DiscoverService | GET | /content | External | Retrieves all content from the database with their details. |
| DiscoverService | GET | /content-category | External | Retrieves all available categories from the database. |
| 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. |