

Software Requirements Specification

for
FindMyFirstHome

Version 1.01 approved

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Script Kiddies

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Revision History

Name	Date	Reason For Changes	Version
Zachary	08/04	Updated Table of Contents	1.01
Xavier	09/04	Added more contents	1.1.0

1. Introduction

1.1. Purpose

This document presents a detailed description of the Android application FindMyFirstHome. It will explain the purpose and features of the application, its implementation, interfaces, as well as the constraints under which it must operate.

1.2. Document Conventions

Title - font: Times, size: 18, style: bold

Subtitle - font: Times, size: 14, style: bold

Text - font: Times, size: 12, style: normal

This document was created based on the IEEE template for System Requirement Specification Documents.

1.3. Intended Audience and Reading Suggestions

- Typical users, most likely first time home buyers in Singapore who want to use FindMyFirstHome to search for new properties
- Programmers who may be interested in working on the project and developing it further

1.4. Product Scope

FindMyFirstHome is an application developed on Android OS that users can use to browse the pricing and location details of new Build-to-Order (BTO) flats. Users can enter their personal information to check the amount of government grant and mortgage loan they qualify for. For each housing development, users will also be shown its location on the map, along with the nearby amenities, as well as if they can afford that flat type. The data for amenities comes from datagov.com.sg while HDB details comes from hdb.com.sg

1.5. References

- <https://developer.android.com>
- https://data.gov.sg/api/action/datastore_search?resource_id=4fc3fd79-64f2-4027-8d5b-ce0d7c279646&limit=10
- https://data.gov.sg/api/action/datastore_search?resource_id=8f6bba57-19fc-4f36-8dcf-c0bda382364d&limit=10
- https://data.gov.sg/api/action/datastore_search?resource_id=ede26d32-01af-4228-b1ed-f05c45a1d8ee&limit=10
- https://data.gov.sg/api/action/datastore_search?resource_id=bb6f5bf8-7d0b-4526-b020-b812ea7d7d89&limit=10

- [http://esales.hdb.gov.sg/bp25/launch/19feb/selection/19FEBBTOJW_page_6280/\\$file/about1.html](http://esales.hdb.gov.sg/bp25/launch/19feb/selection/19FEBBTOJW_page_6280/$file/about1.html)
- [http://esales.hdb.gov.sg/bp25/launch/19feb/selection/19FEBBTOSK_page_6280/\\$file/about1.html](http://esales.hdb.gov.sg/bp25/launch/19feb/selection/19FEBBTOSK_page_6280/$file/about1.html)
- [http://esales.hdb.gov.sg/bp25/launch/19feb/selection/19FEBBTOKWN_page_6280/\\$file/about1.html](http://esales.hdb.gov.sg/bp25/launch/19feb/selection/19FEBBTOKWN_page_6280/$file/about1.html)
- [http://esales.hdb.gov.sg/bp25/launch/19feb/selection/19FEBBTO_page_6280/\\$file/about0.html](http://esales.hdb.gov.sg/bp25/launch/19feb/selection/19FEBBTO_page_6280/$file/about0.html)
- <https://www.hdb.gov.sg/cs/infoweb/residential/buying-a-flat/new/first-timer-applicants>
- <https://www.hdb.gov.sg/cs/infoweb/residential/buying-a-flat/new/first-timer-and-second-timer-couple-applicants>

2. Overall Description

2.1. Product Perspective

FindMyFirstHome is a newly developed application for Android OS. It was created for everyone who is interested to view all BTO flats that are on sale and are purchasable based on the profile's financial ability.

2.2. Product Functions

Profile Screen 1:

- Next: Accepts all user/default input values and displays Profile Screen 2.

Profile Screen 2:

- Skip: Displays Development List
- Next: Accepts all user /default input values and displays Development List

Development List:

- Development thumbnail: Displays details of the development in Property Details
- Show All: Display all developments on sale
- Recalculate: Redirects user to Profile Screen 1 to re-enter values

Property Details

- Generate: Displays Affordability Report for the selected flat type
- Recalculate: Redirects user to Profile Screen 1 to re-enter values

Affordability Report

- Generate PDF: Creates and saves a PDF file that contains the affordability report page

2.3. User Classes and Characteristics

- Typical users, mostly young adults, who want to use FindMyFirstHome to find new BTO flats. This demographic is generally tech-savvy and familiar with using smartphone applications.

2.4. Operating Environment

- Android Nougat
- Android Oreo
- Android Pie
- SQLite Database and SQLiteOpenHelper

2.5. Design and Implementation Constraints

- We retrieve data from datagov.com.sg and hdb.com.sg, these data will be stored locally in a database. If the phone has full memory, the app may not function as per normal.
- Due to hardware limitations, connection to the web takes time and writing into database takes a long time. In terms of software, we try to solve the problem by using asynchronous connection to get data.
- Due to the fast changing pace of the world, the data may change without us knowing, hence instead of keeping the data persistent for a long term, hence we delete the database when the application closes. When user re-opens the application, the system will re-gather the data again, just in-case anything changed in reality. This is done by compromising some loading time. Additionally, it saves some space on user's phone.
- Sqliteopenhelper Interface is also used as Andriod uses SQLite data to store data locally.
- By use Singleton with data access object pattern and factory pattern it ensures encapsulation of data from the user. Since there is only single data access point to access the database.
- Additionally, using such design patterns allows for the application to scale easily and can be maintained easily.
- Comments are written in the code, so client can easily take over to maintain.

2.6. User Documentation

- Readme file link : <https://github.com/SoulXHades/FindMyFirstHome/blob/master/Readme.txt>
- Java Docs : <https://github.com/SoulXHades/FindMyFirstHome/tree/master/Javadoc>
- Full Download of application: <https://github.com/SoulXHades/FindMyFirstHome>

2.7. Assumptions and Dependencies

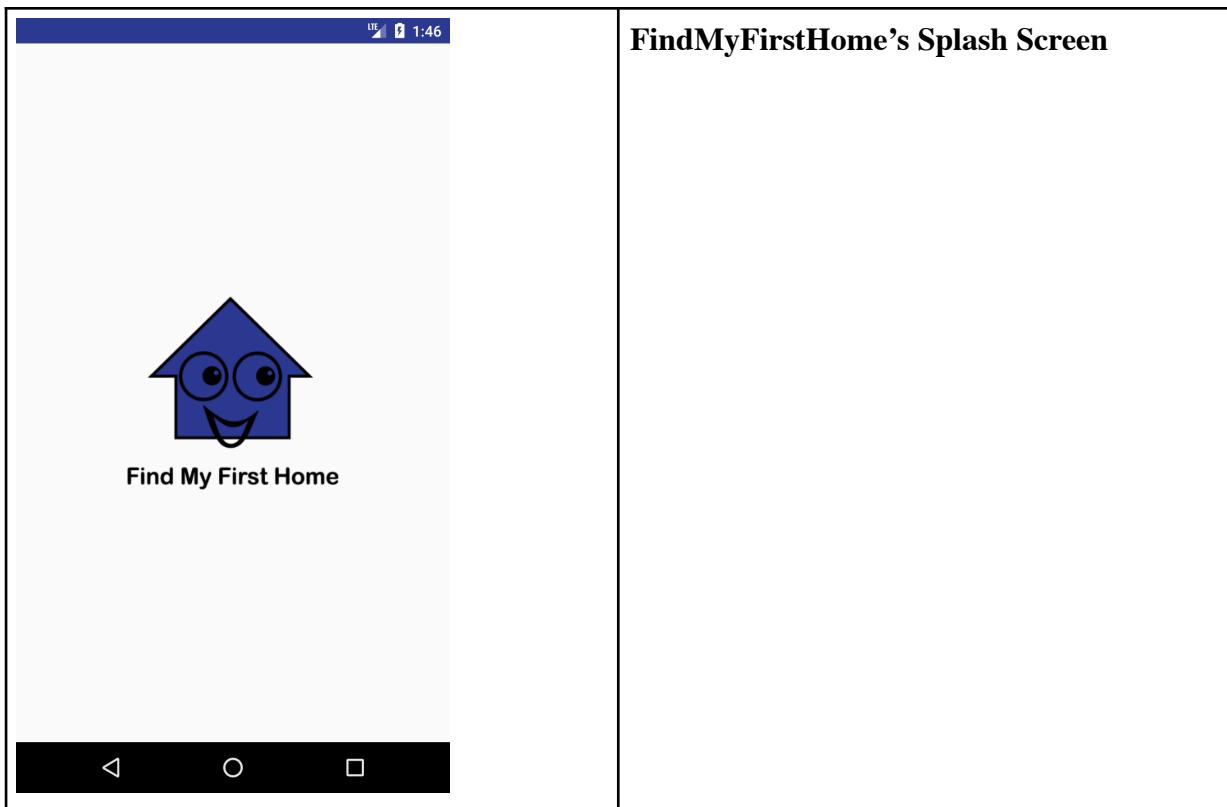
FindMyFirstHome is developed on Android API 24, therefore the stable version of the application requires the device to be installed with Android Nougat or later. The system requires the location of the device to be known, internet access, and the permission to read and write into the phone's storage. Hence, the system assumes that internet access is available and there is enough storage space on the phone for the system to read and write file. If there is no available space, the Download PDF function will not work.

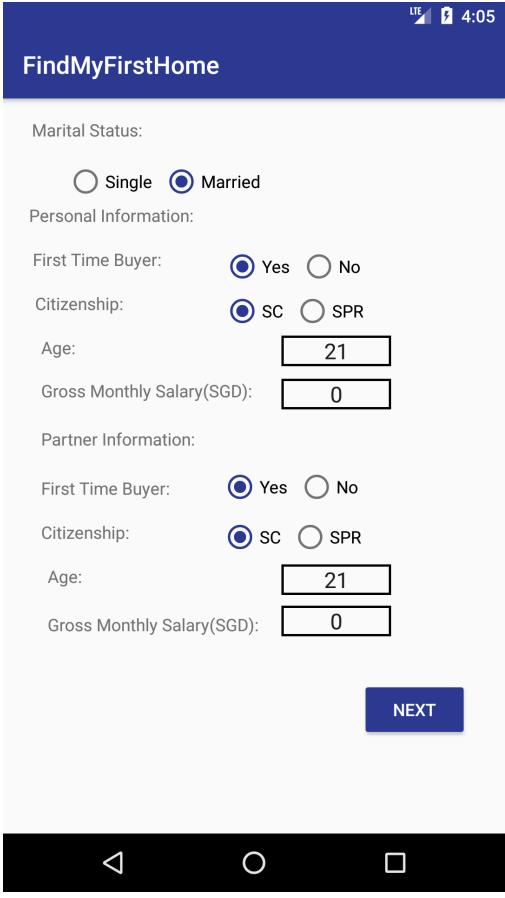
The system also depends heavily on the data available from datagov.com.sg and hdb.com.sg. If either of these website is down, the system, will have missing data and may not work as intended. Any changes in the APIs and HTML may also affect the function of the application.

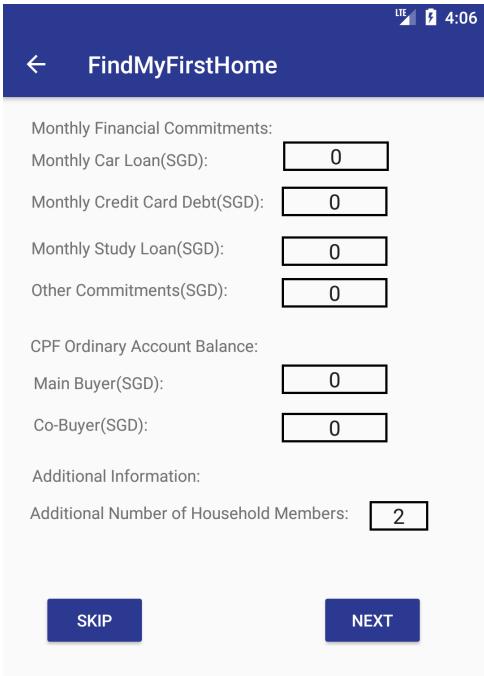
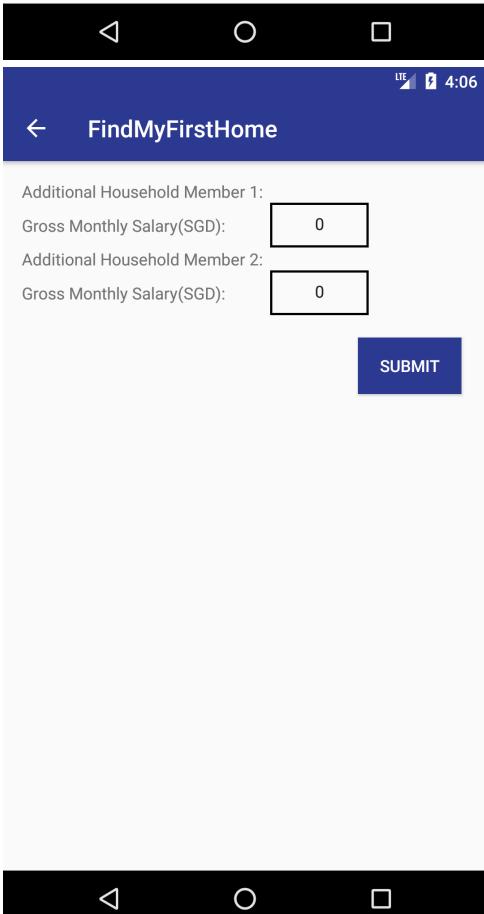
The system's business logic also heavily depends on government policies, as our logic is based on rule and regulations set by the Singapore's government. If the government changes any rules and regulation the system will have to be updated accordingly.

3. External Interface Requirements

3.1. User Interfaces



 <p>The screenshot shows a mobile application interface for 'FindMyFirstHome'. At the top, there's a blue header bar with the app name. Below it, the screen is divided into two sections: 'Personal Information' and 'Partner Information' for each buyer. For the first buyer, the fields are: Marital Status (Married selected), First Time Buyer (Yes selected), Citizenship (SC selected), Age (21), and Gross Monthly Salary (SGD) (0). For the second buyer, the fields are identical. A large blue 'NEXT' button is at the bottom, and a black navigation bar with arrows is at the very bottom.</p>	<p>Profile Screen 1 (required)</p> <p>This is the screen that the user will see after the splash screen. It asks the user to enter their personal details and their partner's, if any. To go to the next page, tap "Next".</p>
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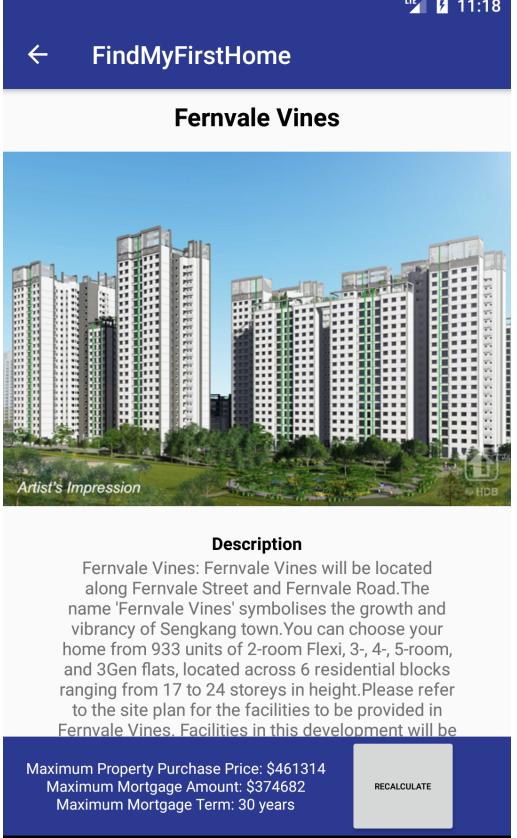
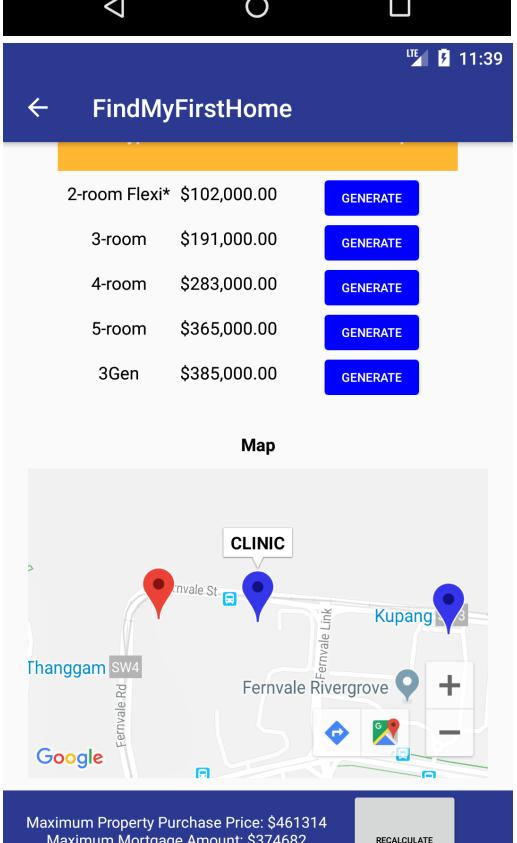
 <p>Profile Screen 2 (optional)</p> <p>The user can enter other financial details, such as their expenditures and debts. If they have additional household members, they will then be required to enter their salary.</p>
 <p>Profile Screen 2 (optional)</p> <p>The user can enter other financial details, such as their expenditures and debts. If they have additional household members, they will then be required to enter their salary.</p>

The screenshot shows the main interface of the FindMyFirstHome app. At the top, there is a blue header bar with the app's name. Below it, a white navigation bar has two tabs: "RECOMMENDED" (which is underlined) and "SHOW ALL". The main content area displays two developments as cards. Each card features an "Artist's Impression" image of the building complex, the development's name, and a "RECALCULATE" button. At the bottom of the screen is a black footer bar with three white icons: a triangle pointing left, a circle, and a square.

Development List

The user can scroll through the list of developments shown. They can also switch between “Show All” and “Recommended”. “All” shows all developments on the app. “Recommended” shows all developments within the user’s financial reach.

The user can tap on any development to view its details.

 <p>Description</p> <p>Fernvale Vines: Fernvale Vines will be located along Fernvale Street and Fernvale Road. The name 'Fernvale Vines' symbolises the growth and vibrancy of Sengkang town. You can choose your home from 933 units of 2-room Flexi, 3-, 4-, 5-room, and 3Gen flats, located across 6 residential blocks ranging from 17 to 24 storeys in height. Please refer to the site plan for the facilities to be provided in Fernvale Vines. Facilities in this development will be</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Maximum Property Purchase Price: \$461314</td> <td style="padding: 2px;">RECALCULATE</td> </tr> <tr> <td style="padding: 2px;">Maximum Mortgage Amount: \$374682</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">Maximum Mortgage Term: 30 years</td> <td style="padding: 2px;"></td> </tr> </table>	Maximum Property Purchase Price: \$461314	RECALCULATE	Maximum Mortgage Amount: \$374682		Maximum Mortgage Term: 30 years		Property Details <p>The user can tap the “Generate” button to display an affordability report where they can see more loan details of the selected flat type.</p>
Maximum Property Purchase Price: \$461314	RECALCULATE						
Maximum Mortgage Amount: \$374682							
Maximum Mortgage Term: 30 years							
 <p>Map</p> <p>A Google Maps interface showing the location of Fernvale Vines. Key landmarks labeled include CLINIC, Kupang, Fernvale Rivergrove, Fernvale Link, Fernvale Rd, and Thanggam SW4. A red pin marks the project's location on Fernvale St.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Maximum Property Purchase Price: \$461314</td> <td style="padding: 2px;">RECALCULATE</td> </tr> <tr> <td style="padding: 2px;">Maximum Mortgage Amount: \$374682</td> <td style="padding: 2px;"></td> </tr> </table>	Maximum Property Purchase Price: \$461314	RECALCULATE	Maximum Mortgage Amount: \$374682				
Maximum Property Purchase Price: \$461314	RECALCULATE						
Maximum Mortgage Amount: \$374682							

The screenshot shows a mobile application interface for 'FindMyFirstHome'. At the top, there is a blue header bar with a back arrow icon and the text 'FindMyFirstHome'. Below the header, the title 'Affordability Report' is displayed. The main content area contains three sections: 'Highest Eligibility', 'Eligible Grants', and 'Current Property: Fernvale Vines'. The 'Highest Eligibility' section lists: Maximum Property Purchase Price: \$461,313.10, Maximum Mortgage Amount: \$374,681.79, and Maximum Mortgage Tenure: 30.0. The 'Eligible Grants' section lists: SHG: \$40,000.00 and AHG: \$5,000.00. The 'Current Property: Fernvale Vines' section lists: Price: \$283,000.00, Flat Type: 4-room, Downpayment Required: \$28,300.00, Mortgage Amount: \$254,700.00, and Monthly Repayment Sum: \$1,019.67. A large grey button labeled 'GENERATE PDF' is positioned below the property details. A circular message bubble at the bottom indicates 'Saved as PDF!'. The bottom of the screen features a black navigation bar with three white icons: a triangle pointing left, a circle, and a square.

Affordability Report

The user can save the report as a PDF file by tapping on the “Generate PDF” button.

3.2. Hardware Interfaces

For running of the system

- An Android phone is needed with minimum Android 7.0 Nougat installed. SQLite Database will come along with the OS.

For network connection:

- Wireless Network Interface Card (WNIC) or a modem chip with cellular modem

For Storage:

- The phone must have enough storage space for the system to store download and store data.

3.3. Software Interfaces

The standard development kit version used is 28. Minimum version needed is 24.

The software uses SQLite database version 3.3.12 for local data storage. Every component from the software which consumes or produce data will require an instance of the data access object to read or write from the database. The database access object uses an android library “SQLiteOpenHelper” to access the database.

The software uses the volley library package version 1.0.19 for all HTTP connections to gather data from the internet. This includes connections to Data.gov’s API and HDB’s website.

The software requires the use Google Maps’ API for geocoding as well as displaying map in the software. Thus the system would require google play service map dependency of version 16.1.0.

The software requires the glide library version 4.9.0 to download image from a given url to display the image in the software.

The software requires the jsoup-1.11.3.jar dependency package for parsing of HyperText Markup Language script in order to extract data from the web. This package is also used to parse the keyhole markup language file’s from Datagov.com.sg

The software also requires multiple standard android support library packages for implementation of methods to design the user interface. These packages includes: support-vector-drawable:28.0.0, constraint:constraint-layout:1.1.3, recyclerview-v7:28.0.0, cardview-v7:28.0.0.

The software also requires itextg library version 5.5.10. This library is for creating and manipulating PDF files in java.

3.4. Communications Interfaces

FindMyFirstHome requires an internet connection to load the Data.gov API, Google Maps API and to get information from HDB’s website to obtain details on the developments. HTTP Connection is

used to get the JSON(Javascript Object Notation) from Data.gov API and Google Maps API. HTTP Connection is used to scrape data from HDB's website.

4. System Features

This section is organised by use cases.

4.1. UC1 Fill in Personal Information

4.1.1 Description and Priority

When the user first runs the application, the system will request user input for personal and partner (if exist) information. The application will then save this information and process it for recommending public housing developments to the user after requesting for more information.

Priority: High

This information is required for computation of estimated financial capability and applicability of housing options.

4.1.2 Stimulus/Response Sequences

User Action: Select marital status

System Response: If "Married" is selected, the system will allow inputs for partner's information. Else if "Single" is selected, the system will grey-out the inputs for partner's information, denying any inputs.

User Action: Enter personal information

System Response: Save inputs in View objects depending on the type of View, e.g: Saving age into EditText object.

User Action: Enter partner's information

System Response: Save inputs in View objects depending on the type of View, e.g: Saving partner's age into EditText object.

User Action: Click on submit button

System Response: Display next UI, ProfileUI2, to enter optional information. Send all current information entered to the next page.

4.1.3 Functional Requirements

1. The system must prompt the user for personal information to calculate the mortgage.

1.1. The system must prompt the user to select age.

- Value is reset to minimum required age if input for age is less than 21 for married couples or age less than 35 for singles. Invalid prompt is displayed.
- Value is reset to minimum required age if input for age is more than 65. Invalid prompt is displayed.

1.2. The system must prompt the user to select whether he/she is a Singapore Citizen.

1.3. The system must prompt the user to input gross monthly salary.

- Value is reset to 0 if input is a negative value. Invalid prompt is displayed.
- Value is reset to 0 if total salary is more than 12000. Invalid prompt is displayed.

1.4. The system must prompt the user to select whether he/she is buying a public housing unit alone or with a partner.

- If the user selects “Married”, he/she will be allowed to key in Partner’s information.
 - If the user selects “Single”, the input fields for the Partner’s information will be disabled. User will not be allowed to key into the fields.
- 1.4.1. If the user is buying a public housing unit with a partner, the system must prompt the user to select age of their partner.
- Value is reset to minimum required age if input for age is more than 21 for married couples or age less than 35 for singles. Invalid prompt is displayed.
 - Value is reset to minimum required age if input for age is more than 65. Invalid prompt is displayed.

1.4.2. If the user is buying a public housing unit with a partner, the system must prompt the user to select whether their partner is a Singapore Citizen.

1.4.3. If the user is buying a public housing unit with a partner, the system must prompt the user to input gross monthly salary of their partner.

- Value is reset to 0 if input is a negative value. Invalid prompt is displayed.
- Value is reset to 0 if total salary is more than 12000. Invalid prompt is displayed.

2. The system must prompt the user for additional personal information to check eligibility of available grants.

2.1. The system must prompt the user to input the number of additional members in the household.

- Value is reset to 0 if field is empty or negative.

2.1.1. The system must prompt the user to input gross monthly salary of each additional member in the household.

- Value is reset to 0 if field is empty or negative.

2.1.2. The system must provide a default value of 0 for gross monthly salary of each additional member in the household if there is no input.

- Value is reset to 0 if field is empty or negative.

2.2. The system must prompt the user to input Central Provident Fund Ordinary Account balance.

- Value is reset to 0 if field is empty or negative.

2.2.1. The system must provide a default value of 0 for Central Provident Fund Ordinary Account balance.

- Value is reset to 0 if field is empty or negative.

4.2. UC1.1 Fill in Optional Personal Information

4.2.1 Description and Priority

After the user has input the compulsory personal information, the system would prompt the user for optional personal information which would allow the system to make a more accurate assessment of the user's financial capability.

Priority: Low

User can choose not to add in any additional information. He/She can click Skip or Next to general their financial capability for viewing of housing developments.

4.2.2 Stimulus/Response Sequences

User Action: Fill in different variation of commitments.

System Response: Save inputs in View objects depending on the type of View, e.g: Saving car loan into EditText object.

User Action: Click on Skip button (In ProfileUI2)

System Response: Compute financial capability and go to the housing developments UI.

User Action: Click on Next button (In ProfileUI2)

System Response: If the number of additional household members is 0, the system responds like Skip button. If it is more than 0, go to ProfileUI3 to input individual household member's gross monthly salary.

User Action: Click on Next button (In ProfileUI3)

System Response: Compute financial capability and go to the housing developments UI.

4.2.3 Functional Requirements

2.3. The system must prompt the user to input monthly financial liabilities.

 2.3.1. The system must prompt the user to input monthly car loan.

 2.3.1.1. The system must provide a default value of 0 for monthly car loan if there is no input.

 – Value is reset to 0 if field is empty or negative.

 2.3.2. The system must prompt the user to input monthly credit card debt.

 2.3.2.1. The system must provide a default value of 0 for monthly credit card debt if there is no input.

 – Value is reset to 0 if field is empty or negative.

 2.3.3. The system must prompt the user to input monthly study loan.

 2.3.3.1. The system must provide a default value of 0 for monthly study loan if there is no input.

 – Value is reset to 0 if field is empty or negative.

 2.3.4. The system must prompt the user to input other loan commitments.

 2.3.4.1. The system must provide a default value of 0 for other loan commitments if there is no input.

 – Value is reset to 0 if field is empty or negative.

2.4. The system must allow the user to skip the input of additional personal information.

4. The system must calculate the maximum mortgage amount for the user.

5. The system must calculate the maximum public housing unit purchase price for the user.

4.3. UC2 View Recommended Public Housing Developments

4.3.1 Description and Priority

The user is allowed to view a list of public housing estate with recommended flat types available for sale. Estates that the user cannot afford will not appear.

Priority: High

User is required to select a development to see the price of each individual flat types in the development. Then also can he view the map and generate an affordability report.

4.3.2 Stimulus/Response Sequences

User Action: Select “All” developments

System Response: Display all developments instead of just recommended.

User Action: Select a development

System Response: Enters the specific development detail page.

User Action: Select “RECALCULATE”

System Response: Go to ProfileUI page to allow user to re-input their information for recalculation of financial capability. The page will load previous inputs from database to be displayed in the input fields.

4.3.3 Functional Requirements

3. The system must allow the user to modify the input given in point 1 and 2 from other screens in the application.

6. The system must display a summary for the financial capability of the user.

6.1. The summary must consist of the maximum public housing unit price purchasable.

6.2. The summary must consist of the eligible mortgage amount.

6.3. The summary must consist of the eligible mortgage period.

7. The system must display a list of recommended public housing developments with public housing units for sale below the maximum public housing price purchasable by the user in a tab.

7.1. The system must display a message to notify the user if there are no public housing developments with public housing units valued below the maximum public housing price purchasable by the user.

7.2. The system must display a message to notify the user if there are no public housing developments for sale.

7.3. Each listing under the list of recommended public housing developments must include information about the public housing development.

7.3.1. The information about the public housing development must include an artist impression of the public housing development.

7.3.2. The information about the public housing development must include the name of the public housing development.

7.3.3. The information about the public housing development must include the estate of the public housing development.

7.4. Each listing under the list of recommended public housing developments must be expandable to display additional information about the public housing development.

4.4. UC3 Generate Affordability Report

4.4.1 Description and Priority

The user generates the affordability report to obtain a summary of their highest purchase eligibility, eligible grants and the payment breakdown of the current public housing Development.

Priority: Medium

User only needs to view it if they want to see the full summary of the flat in the development they are interested in, or to generate a pdf summary.

4.4.2 Stimulus/Response Sequences

User Action: Click on “GENERATE PDF” button

System Response: Take a screenshot to create a pdf copy of the affordability report, then download it into the mobile phone.

4.4.3 Functional Requirements

7.4.1.1. The affordability report must display the maximum public housing purchase price purchasable by the user.

7.4.1.2. The affordability report must display the maximum mortgage amount eligible.

7.4.1.3. The affordability report must display the maximum mortgage tenure eligible.

7.4.1.4. The affordability report must display the price of the current listing.

7.4.1.5. The affordability report must display the grants applied for the current listing.

7.4.1.6. The affordability report must display the down payment required for the current listing.

7.4.1.7. The affordability report must display the loan amount for the current listing.

7.4.1.8. The affordability report must display the monthly repayment sum for the current listing.

7.4.1.9. The system must allow user to save a copy of the affordability report.

4.5. UC4 View Public Housing Development Details

4.5.1 Description and Priority

For a specific Public Housing Development selected by the user, the system would display a picture of the estate, a description of the Public Housing Development, a map of the amenities within 1.5 kilometre of the Public Housing Development, the available flat type in the public housing development, the cost of the flat type and generate an affordability report for each flat type the user is eligible to purchase.

Priority: High

To allow user to generate an affordability report for the flat they are applicable for. To allow user to view the map for the location of the development.

4.5.2 Stimulus/Response Sequences

User Action: Click on “Generate”

System Response: Calculate the values required to be display in the affordability report. Move over to Affordability Report UI page.

User Action: Select “RECALCULATE”

System Response: Go to ProfileUI page to allow user to re-input their information for recalculation of financial capability. The page will load previous inputs from database to be displayed in the input fields.

4.5.3 Functional Requirements

3. The system must allow the user to modify the input given in point 1 and 2 from other screens in the application.
6. The system must display a summary for the financial capability of the user.
 - 6.1. The summary must consist of the maximum public housing unit price purchasable.
 - 6.2. The summary must consist of the eligible mortgage amount.
 - 6.3. The summary must consist of the eligible mortgage period.
7. The system must display a list of recommended public housing developments with public housing units for sale below the maximum public housing price purchasable by the user in a tab.
 - 7.4. Each listing under the list of recommended public housing developments must be expandable to display additional information about the public housing development.
 - 7.4.1. The system must allow the user to generate an affordability report for each flat type valued below the maximum public housing price purchasable by the user.
 - 7.4.2. The system must not allow the user to generate an affordability report for each flat type valued above the maximum public housing price purchasable by the user.

4.6. UC5 View Map

4.6.1 Description and Priority

The user views the map, retrieved from Google Maps, which would show amenities within 1.5 kilometre of the public housing development.

Priority: Highest

This use case must be realized in order to view the usage of Data.gov API. Our points plotted on the Google map for all our amenities is taken from there.

4.6.2 Stimulus/Response Sequences

User Action: Click on “+” or “-”

System Response: Zoom in or out of the map to view more of the surrounding of the development.

User Action: Click on a marker in the map

System Response: Display the type of amenities residing in that area. For example, tapping on the blue marker may display “CLINIC”.

User Action: Click navigation icon

System Response: Direct user to Google Maps to show the navigation route to that area.

User Action: Click Google Maps icon

System Response: Direct user to Google Maps to display the development in Google Maps.

4.6.3 Functional Requirements

8.3.3. The additional information about the public housing development must include a map of the amenities within 1.5 kilometre of the public housing unit.

8.3.3.1. The system must retrieve map coordinates from Google Maps.

8.3.3.2. The map must display Mass Rapid Transit stations within 1.5 kilometre of the public housing development.

8.3.3.3. The map must display educational institutes within 1.5 kilometre of the public housing development.

8.3.3.4. The map must display polyclinics within 1.5 kilometre of the public housing development.

8.3.3.5. The map must display markets within 1.5 kilometre of the public housing development.

8.3.3.6. The map must display food centres within 1.5 kilometre of the public housing development.

4.7. UC5.1 Provide Housing Development Coordinates using API

4.7.1 Description and Priority

The Housing Development Board (HDB) provides the address of the Public Housing Development which will be parsed through Google Maps to get the coordinate. The use case UC5 View Map will use the coordinate to display the exact location of the Public Housing Development the user is interested in.

Priority: Highest

This use case is required to obtain the coordinates of the development to allow it to be displayed on the Google Map. Without it, user will not be able to know the exact location of the development.

4.7.2 Stimulus/Response Sequences

User Action: Click on red marker in View Map

System Response: Display the name of the development.

4.7.3 Functional Requirements

7.4.3. The additional information about the public housing development must include a map of the amenities within 1.5 kilometre of the public housing unit.

7.4.3.1. The system must retrieve map coordinates from Google Maps.

4.8. UC6 Provide Data through API

4.8.1 Description and Priority

The system would retrieve from required data from the Singapore government's one-stop portal for publicly available datasets from 70 public agencies via an Application Programming Interface (API).

Priority: Highest

The scrapping of data from the API to storing in the database is done during application launch. As such, if this use case fails to meet its criteria, the application startup may return an exception.

4.8.2 Stimulus/Response Sequences

User Action: Click on "Generate" in HDB Development Details UI.

System Response: Take in data from API, which stored in database, and calculate the values required to display in the affordability report. Move over to Affordability Report UI page.

User Action: Click on a development in HDB Developments UI.

System Response: Parse in data from API to obtain coordinates points on the Google Maps for displaying marker for developments and amenities described in use case View Map.

4.8.3 Functional Requirements

7.4.3.1. The system must retrieve map coordinates from Google Maps.

7.4.3.2. The map must display Mass Rapid Transit stations within 1.5 kilometre of the public housing development.

- 7.4.3.3. The map must display educational institutes within 1.5 kilometre of the public housing development.
- 7.4.3.4. The map must display polyclinics within 1.5 kilometre of the public housing development.
- 7.4.3.5. The map must display markets within 1.5 kilometre of the public housing development.
- 7.4.3.6. The map must display food centres within 1.5 kilometre of the public housing development.

4.9. UC7 Modify Personal Information

4.9.1 Description and Priority

The user is allowed to add or modify the data that they had previously input. This changes their financial capability that was previously calculated, and a revised Recommended Public Housing Developments can be displayed.

Priority: Lowest

Not really used often after UC1, unless user wants to calculate again based on an assumed financial capability.

4.9.2 Stimulus/Response Sequences

User Action: Click on “RECALCULATE” in any screen with the financial capability widget.

System Response: Go to ProfileUI page to allow user to re-input their information for recalculation of financial capability. The page will load previous inputs from database to be displayed in the input fields.

User Action: Select marital status

System Response: If “Married” is selected, the system will allow inputs for partner’s information. Else if “Single” is selected, the system will grey-out the inputs for partner’s information, denying any inputs.

User Action: Enter personal information

System Response: Save inputs in View objects depending on the type of View, e.g: Saving age into EditText object.

User Action: Enter partner’s information

System Response: Save inputs in View objects depending on the type of View, e.g: Saving partner’s age into EditText object.

User Action: Click on submit button

System Response: Display next UI, ProfileUI2, to enter optional information. Send all current information entered to the next page.

4.9.3 Functional Requirements

Refer to 4.1.3

4.10. UC8 View All Public Housing Developments

4.10.1 Description and Priority

The user is allowed to view a list of all public housing development available for sales, even if the user is unable to afford derived from his/her financial capability.

Priority: Moderate

User will usually look through UC2, View Recommended Public Housing Developments, instead as it reflects their financial capability. This option is more for user to check out the available flats and developments available currently.

4.10.2 Stimulus/Response Sequences

Refer to 4.3.2

4.10.3 Functional Requirements

8. The system must display a list of all public housing developments for sale in a tab.
 - 8.1. The system must display a message to notify the user if there are no public housing developments for sale.
 - 8.2. Each listing under the list of all public housing developments must include information about the public housing development.
 - 8.2.1. The information about the public housing development must include an artist impression of the public housing development.
 - 8.2.2. The information about the public housing development must include the name of the public housing development.
 - 8.2.3. The information about the public housing development must include the estate of the public housing development.
 - 8.3. Each listing under the list of all public housing developments must be expandable to display additional information about the public housing development.
 - 8.3.1. The system must allow the user to generate an affordability report for each flat type valued below the maximum public housing price purchasable by the user.
 - 8.3.1.1. The affordability report must display the maximum public housing purchase price purchasable by the user.
 - 8.3.1.2. The affordability report must display the maximum mortgage amount eligible.
 - 8.3.1.3. The affordability report must display the maximum mortgage tenure eligible.
 - 8.3.1.4. The affordability report must display the price of the current listing.
 - 8.3.1.5. The affordability report must display the grants applied for the current listing.
 - 8.3.1.6. The affordability report must display the downpayment required for the current listing.
 - 8.3.1.7. The affordability report must display the loan amount for the current listing.
 - 8.3.1.8. The affordability report must display the monthly repayment sum for the current listing.

- 8.3.1.9. The system must allow user to save a copy of the affordability report.
- 8.3.2. The system must not allow the user to generate an affordability report for each flat type valued above the maximum public housing price purchasable by the user.
- 8.3.3. The additional information about the public housing development must include a map of the amenities within 1.5 kilometre of the public housing unit.
 - 8.3.3.1. The system must retrieve map coordinates from Google Cloud.
 - 8.3.3.2. The map must display Mass Rapid Transit stations within 1.5 kilometre of the public housing development.
 - 8.3.3.3. The map must display educational institutes within 1.5 kilometre of the public housing development.
 - 8.3.3.4. The map must display polyclinics within 1.5 kilometre of the public housing development.
 - 8.3.3.5. The map must display markets within 1.5 kilometre of the public housing development.
 - 8.3.3.6. The map must display food centres within 1.5 kilometre of the public housing development.

5. Other Nonfunctional Requirements

5.1. Performance Requirements

FindMyFirstHome requires a device with at least 1 gigabyte of RAM, a quad core CPU at 1.0 GHz and a stable network connection. The performance depends on the device's network speed and the amount of information to scrape from the HDB website.

5.2. Safety Requirements

FindMyFirstHome does not have any safety requirements as no data is stored on the application, therefore there is no risk of data loss or damage.

5.3. Security Requirements

Data retrieved in each session is deleted after the session is finished. All user input shall also be destroyed upon exiting the session, hence no personal information entered on FindMyFirstHome is stored.

5.4. Software Quality Attributes

1. The user interface of FindMyFirstHome is designed to scale well and adapt responsively to all common screen sizes due to the use of ConstraintLayout and RelativeLayout. Information provided by the application will also be as updated and accurate as the official sources they are retrieved from when the application starts.
2. The system must meet or exceed 99% uptime.
3. The system must provide up-to-date information regarding available grants refreshed within 24 hours.
4. The system must provide up-to-date information regarding available property refreshed within 24 hours.
5. 80% of first-time users must be able to generate an affordability report for a public housing unit within 5 minutes of entering their personal information.
6. The system must be able to show all documentation pertaining to the grants provided by housing development board.
7. The system must interface with the application programming interface from data.gov.sg to extract property tax information.
8. The system must interface with the application programming interface from data.gov.sg to extract personal tax information.
9. The system must scrape documentation about grants from HDB.gov.sg.
10. The system must scrape prices of public houses from HDB.gov.sg.

6. Other Requirements

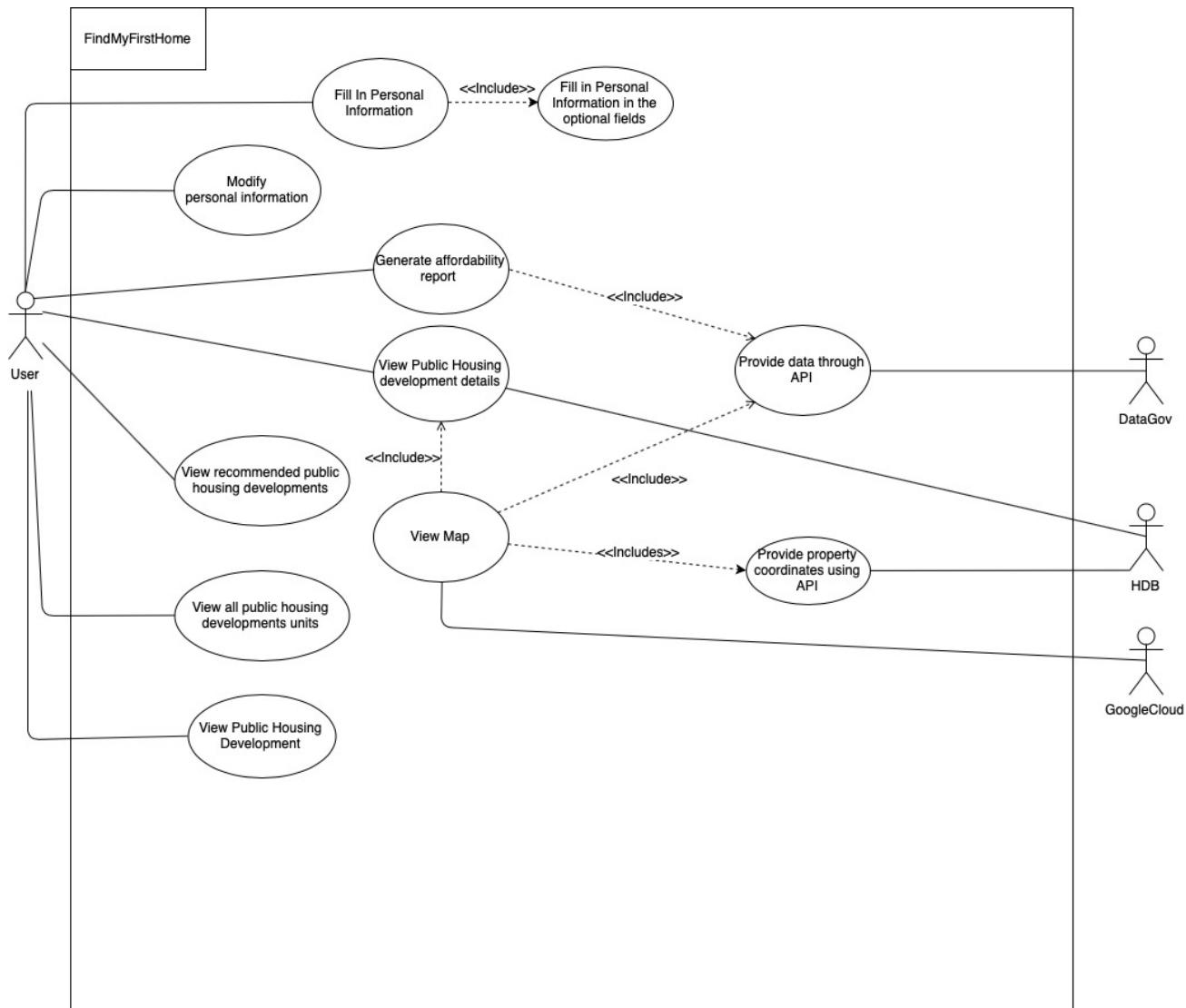
The software requires SQLite database version 3.3.12 for local data storage.

Appendix A: Glossary

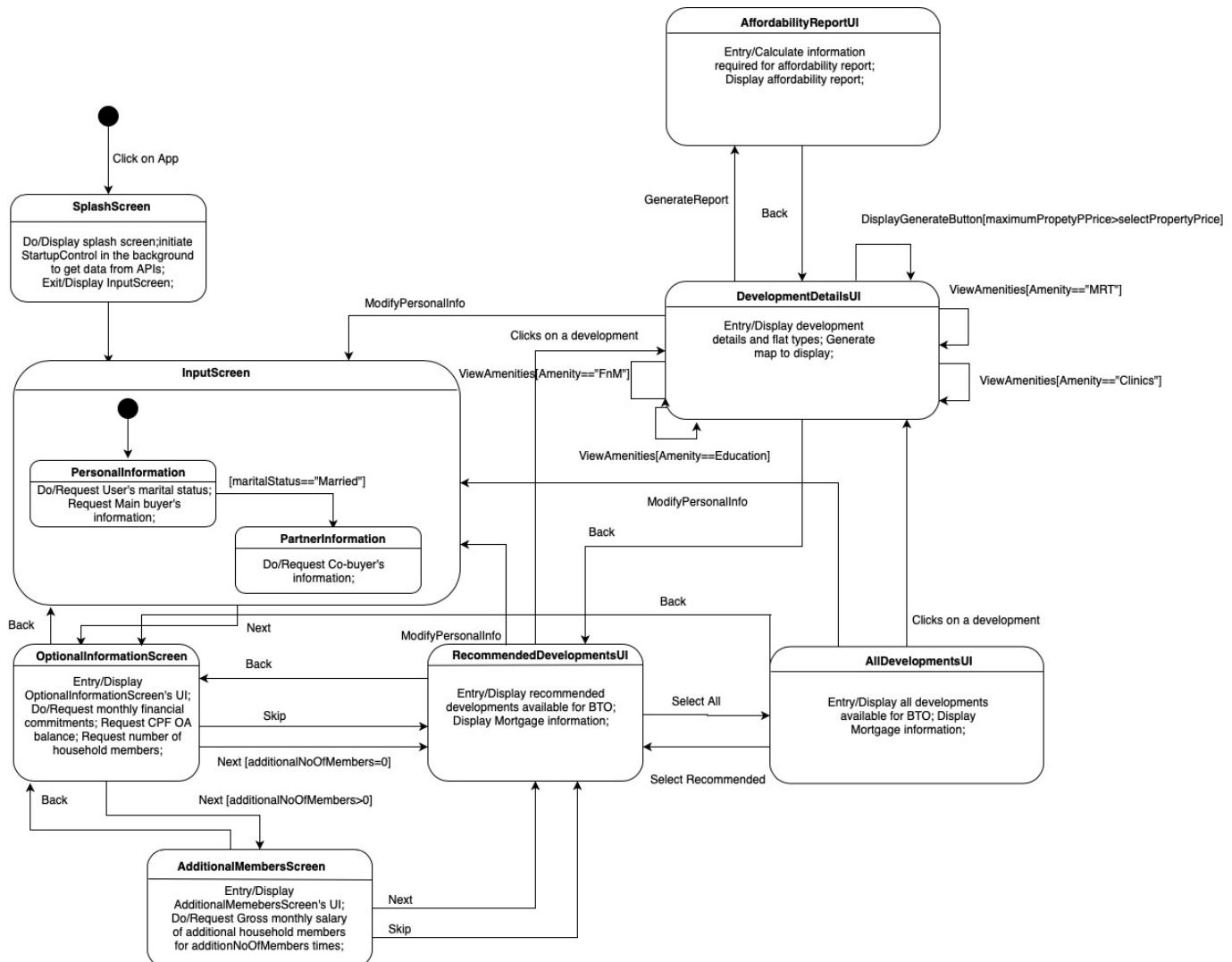
Public Housing	Public housing in Singapore is a residential housing development managed by the Housing and Development Board under temporary leaseholds for 99 years only.
Mortgage	A mortgage is a debt instrument, secured by the collateral of specified real estate property, that the borrower is obliged to pay back with a predetermined set of payments. Mortgages are used to make large real estate purchases without paying the entire purchase price up front.
Educational Institutes	Educational Institute includes Primary School, Secondary School, Pre-University, Polytechnic, Institute of Technical Education, University.
Mass Rapid Transit	A rapid transit system forming the major component of the railway system in Singapore, spanning most of the city-state.
Financial Capability	The maximum amount that the user can afford for buying a property this includes all liquidable and debt assets the user can gather.
Thumbnail of the estate	The artist's rendition of the estate provided by HDB, in image format.
Flat Type	HDB flats span across different categories to cater to different household sizes and budgets, from 2-Room Flexi, 3-Room, 4-Room, Executive Flat.

Grant	Grant is the sum of money given by the government to reduce housing costs. Can be stack between different grants types. Type of grants: Additional CPF Housing Grant (AHG) and Special CPF Housing Grant (SHG).
Central Provident Fund (CPF) Ordinary Account	Ordinary account is the primary account into which the maximum percentage of your CPF savings get deposited. The amount that gets deposited in the CPF ordinary account is used to fund housing, insurance, education and investment needs of CPF account holders.
Average Gross Monthly Household Income	It is the limit on how much gross income a household can earn to be eligible for a housing development board loan.
Session	The duration of which the system is active on the user's device.
Recommended Public Housing Developments with Public Housing Unit	The public housing unit for which the system thinks that is eligible for the user.
Estates	They are self-contained satellite towns that consists of important amenities and facilities like schools, supermarkets, clinics, hawker centres, and sports and recreational facilities.

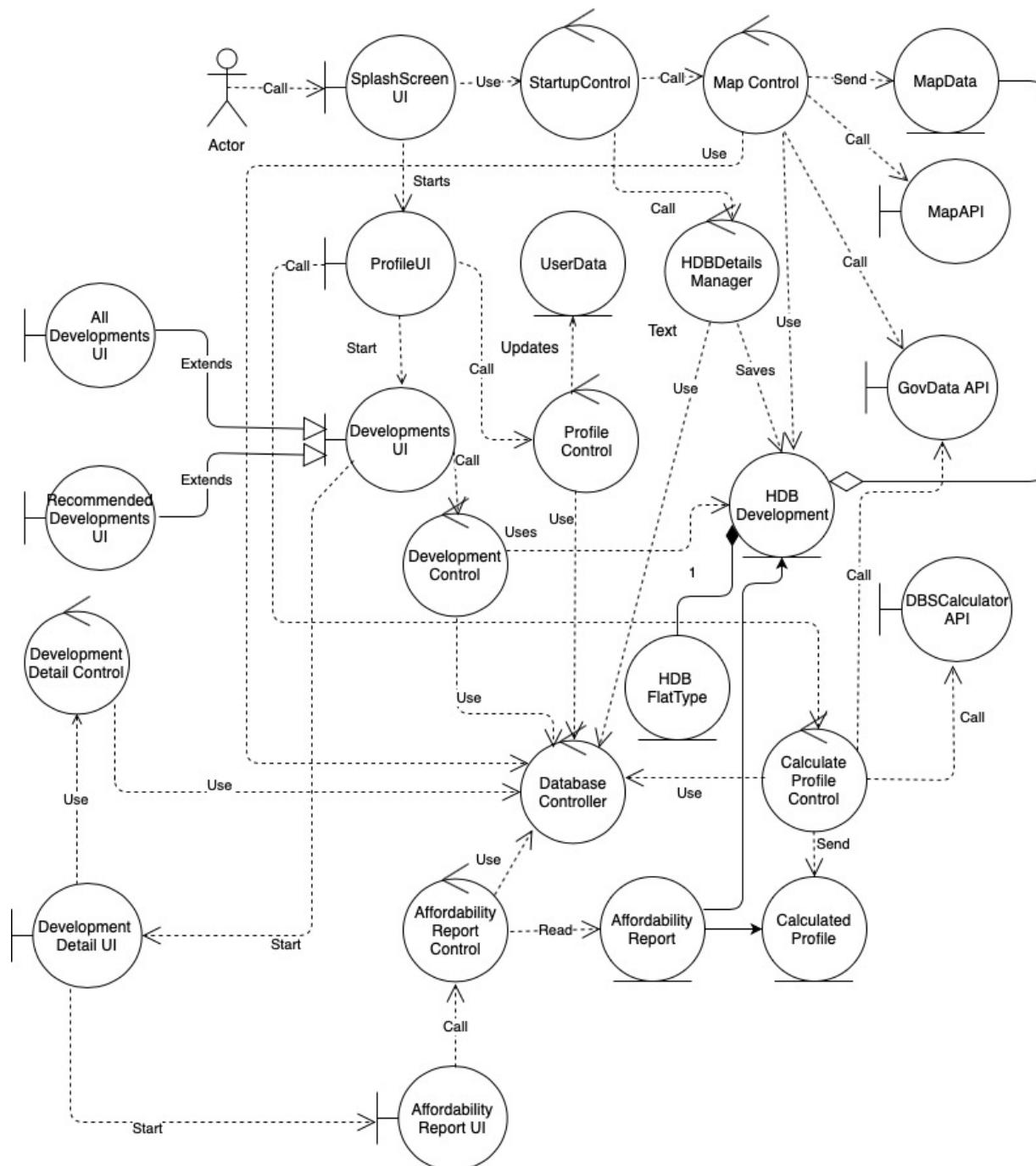
Appendix B: Analysis Model



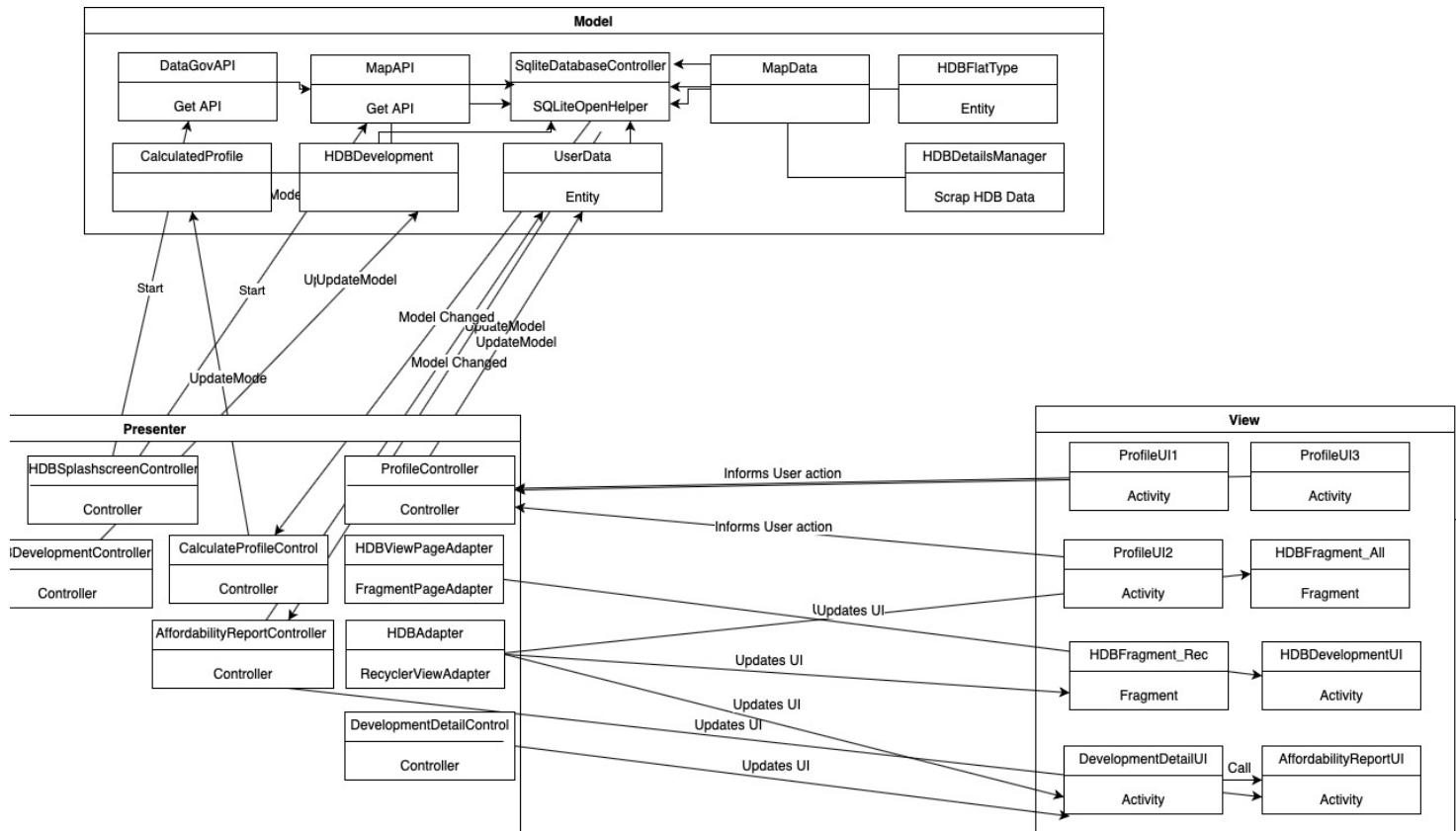
USE CASE DIAGRAM



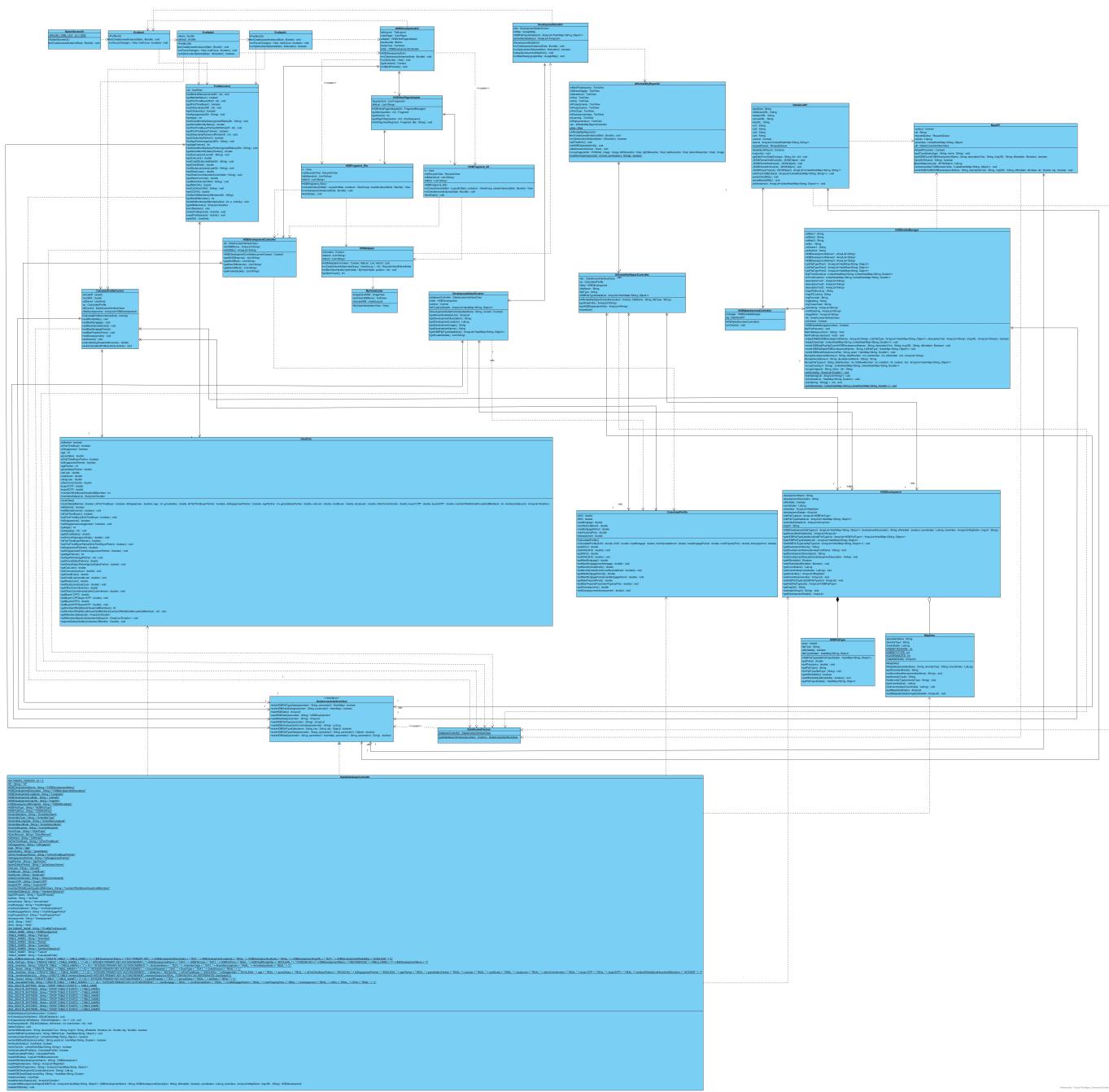
DIALOG MAP



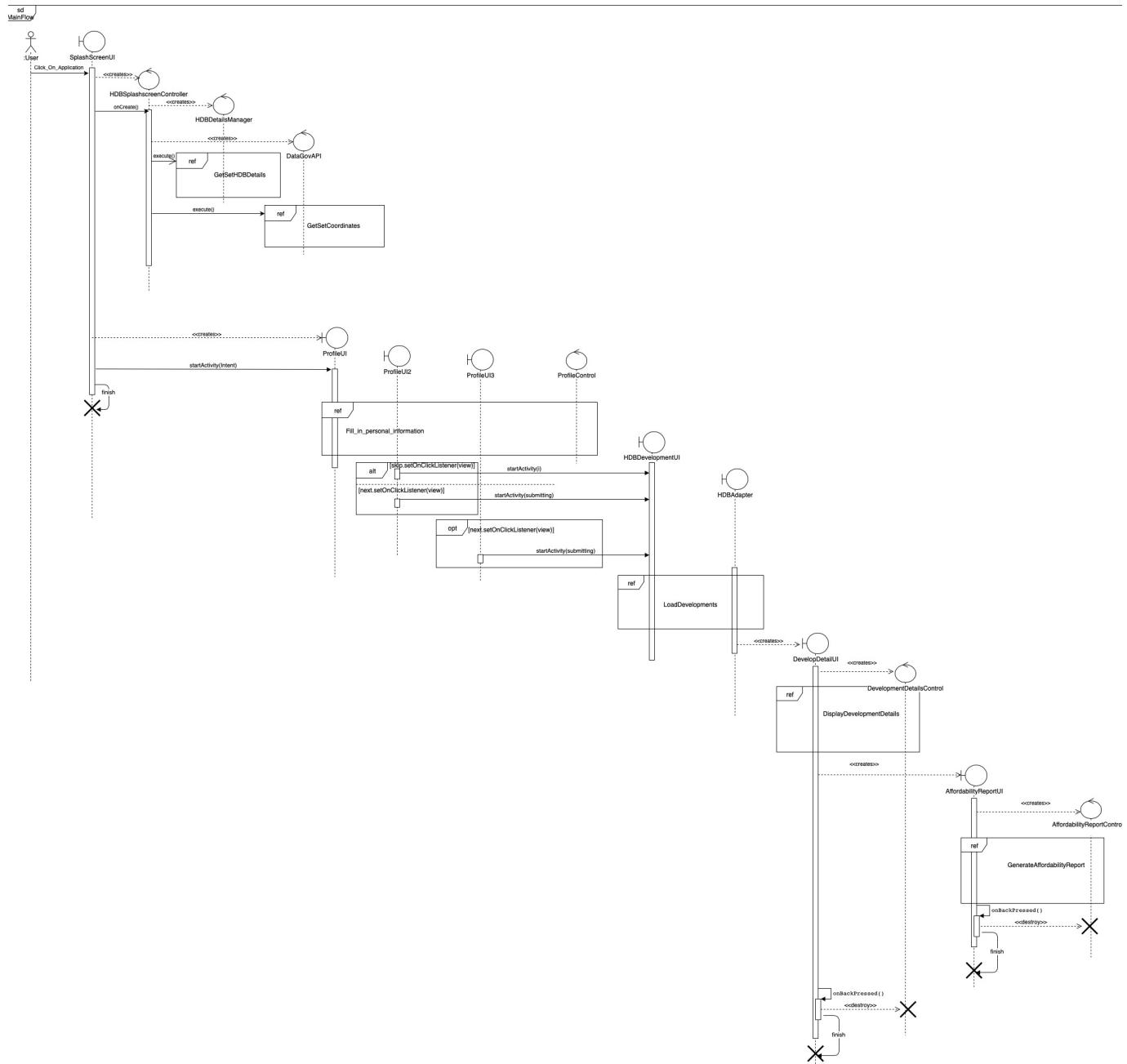
ANALYSIS CLASS DIAGRAM



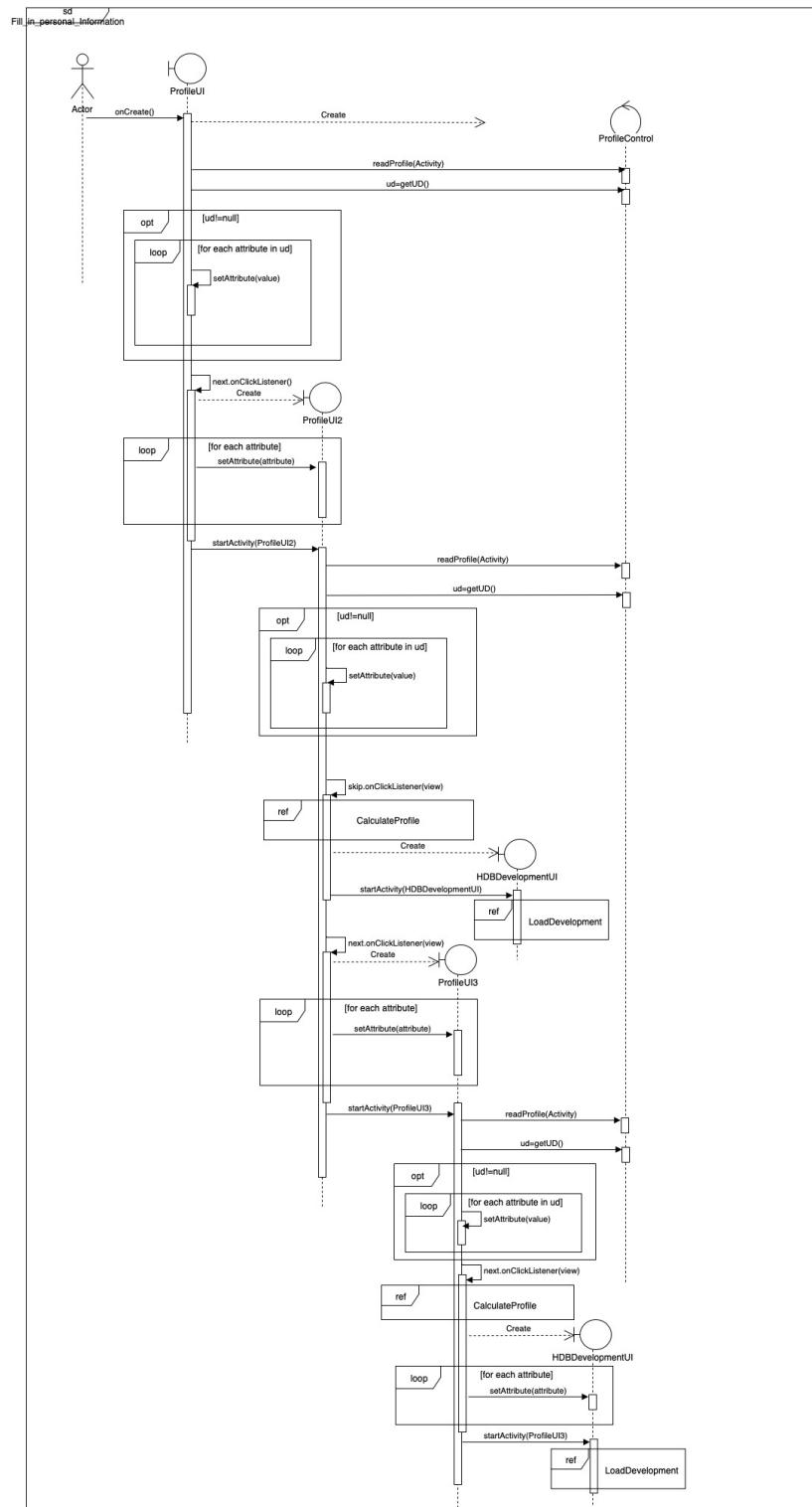
SYSTEM ARCHITECTURE



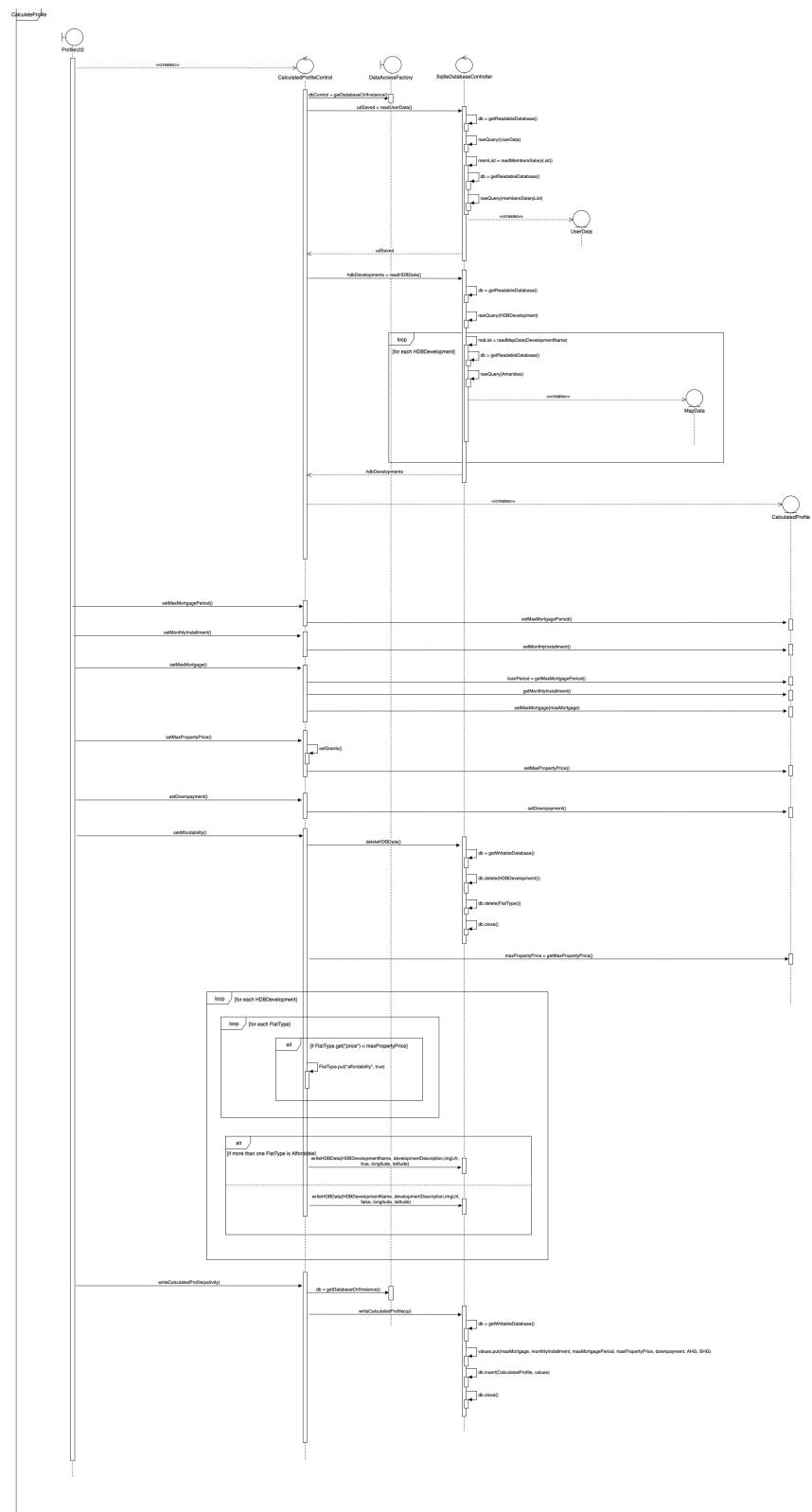
DESIGN CLASS DIAGRAM



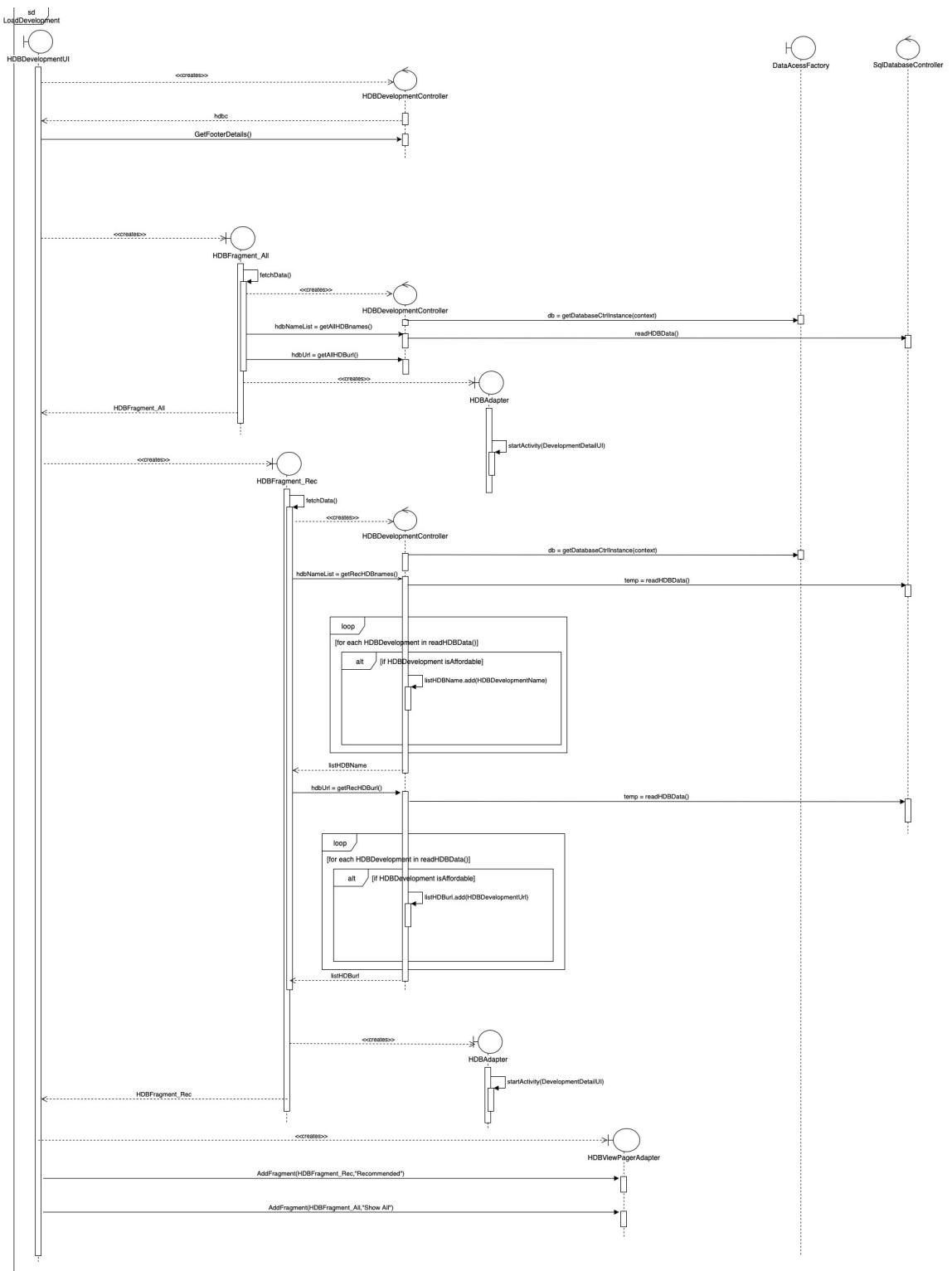
SEQUENCE DIAGRAM - MAIN FLOW



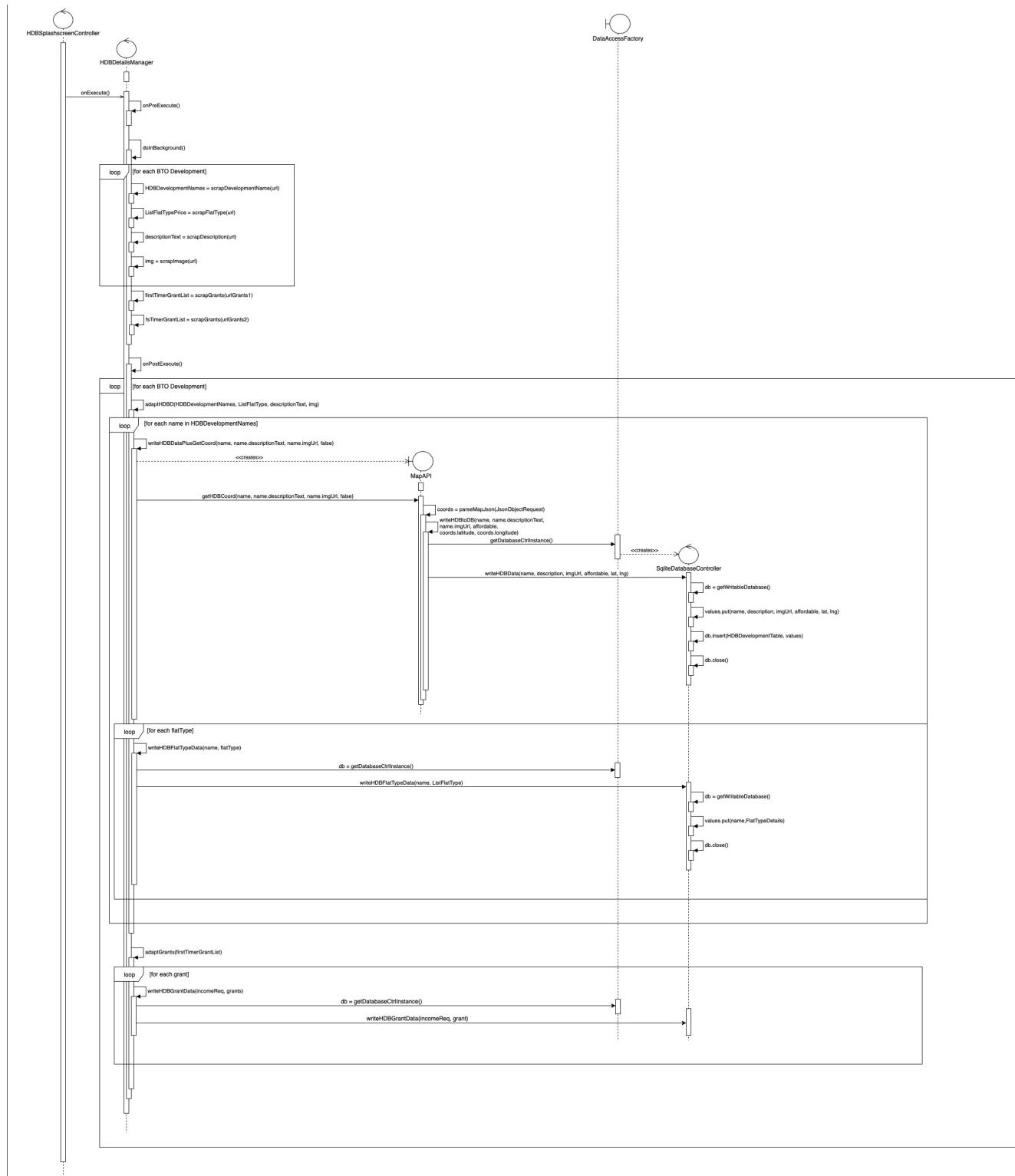
SEQUENCE DIAGRAM-FILL IN PERSONAL INFORMATION



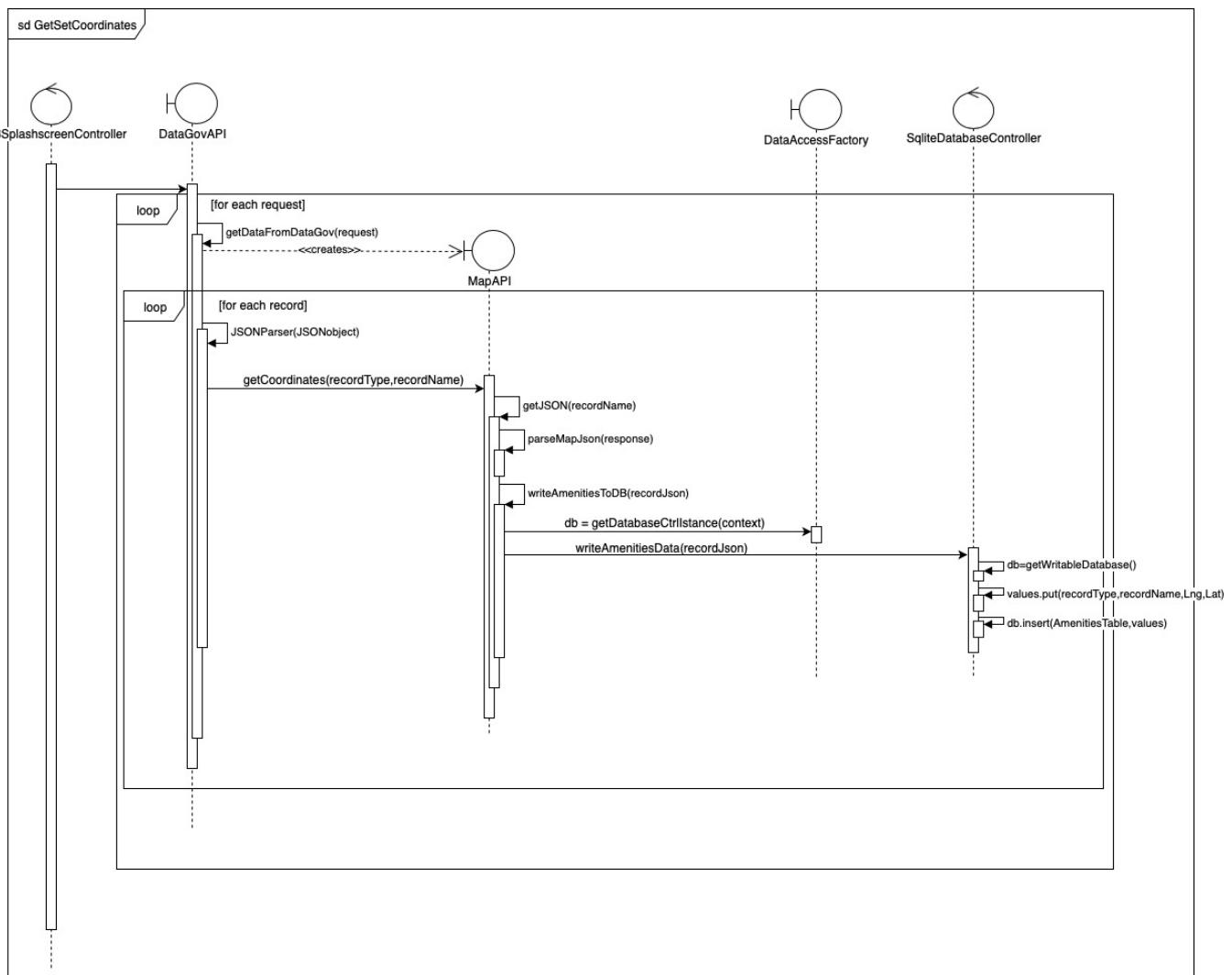
SEQUENCE DIAGRAM - CALCULATED PROFILE



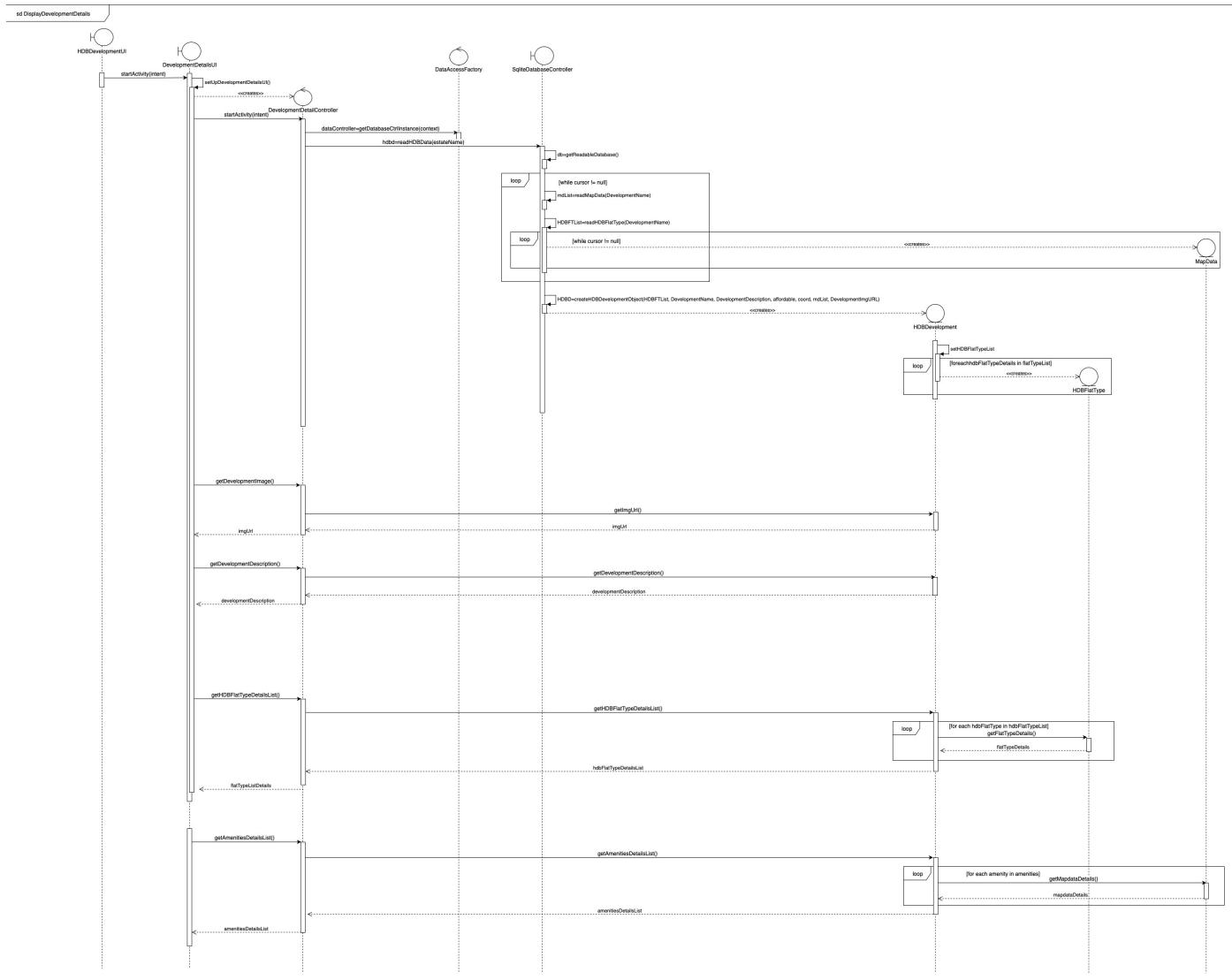
SEQUENCE DIAGRAM - LOAD DEVELOPMENTS



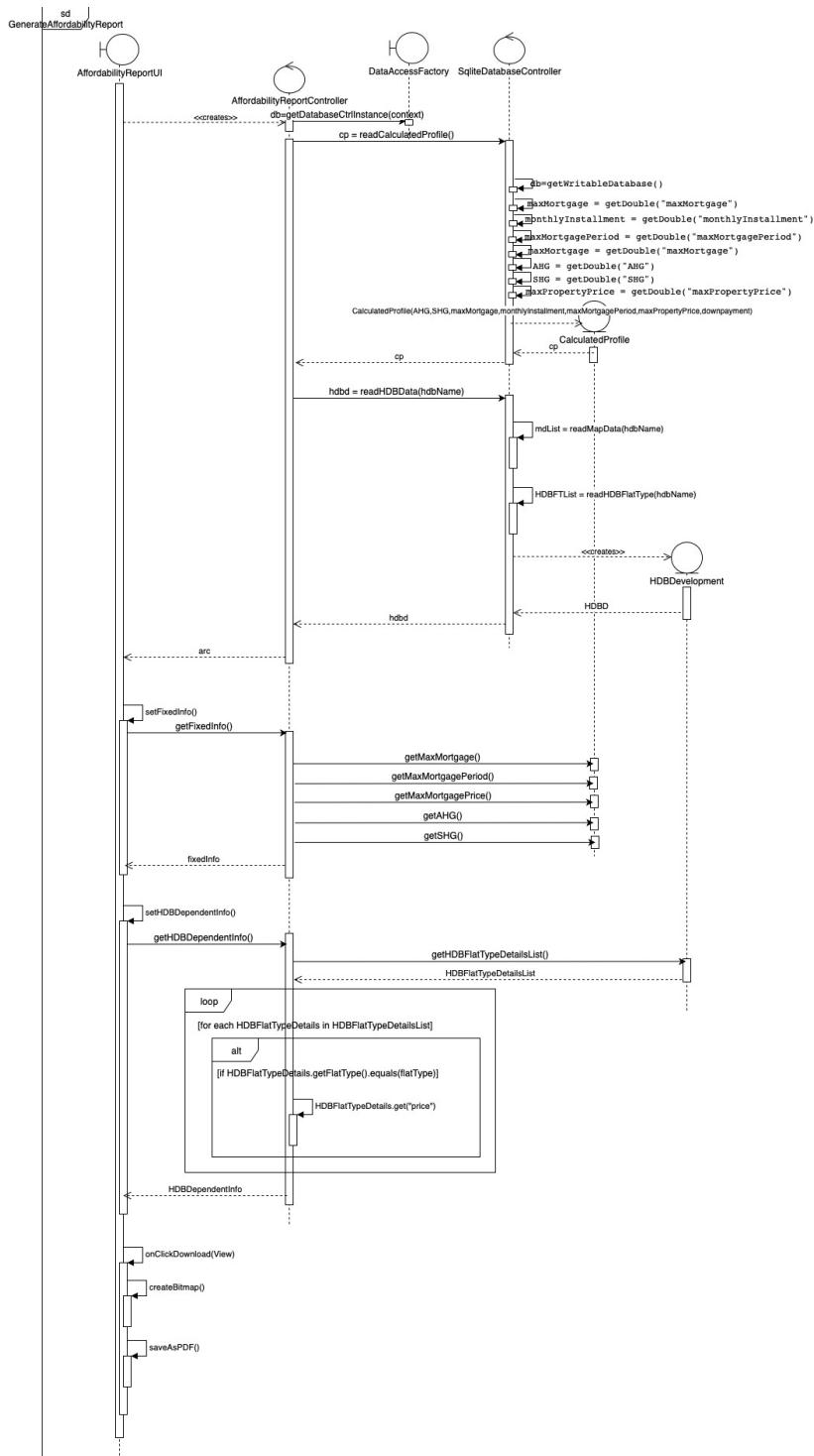
SEQUENCE DIAGRAM - GETSETHDBDETAILS



SEQUENCE DIAGRAM - GETSETCOORDINATES



SEQUENCE DIAGRAM - DEVELOPMENT DETAILS



SEQUENCE DIAGRAM - GENERATEAFFORDABILITYREPORT

