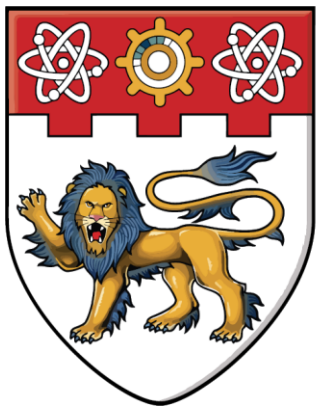

NANYANG TECHNOLOGICAL UNIVERSITY

COLLEGE OF ENGINEERING

SCHOOL OF COMPUTER SCIENCE & ENGINEERING

CZ2006: Software Engineering

Academic Year 2016/17

Project Documentation

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Table of Contents

Revision History

Name	Date	Reason For Changes	Version
Huang Jian Wei	04 Sep	Compiling of information	V1.1
Thomas Lim	15 Sep	Updating of information	V1.2
Sim Long Siang	26 Sep	Inserting of Information	V1.3
Thomas Lim	01 Oct	Addition of UI mock-up diagrams	V1.4
Sim Long Siang	14 Oct	Addition of test cases	V1.5
Genevieve Lam	28 Oct	Updates on diagrams	V1.6
Thomas Lim	08 Nov	Documentation tidy-up	V1.7
Sim Long Siang	09 Nov	Updates on use case, sequence and state machine diagrams, test cases	V1.8
Thomas Lim	11 Nov	Updates of non-functional requirements, system features.	V1.9
Lim Hao Zhe	12 Nov	Updates on UI system features diagrams.	V1.10
Lim Zi Yang	12 Nov	Addition of meeting minutes as Appendix D and documentation tidy-up	V2.0

1. Introduction

1.1 Purpose

The purpose of this document is to present a detailed description of the functional and non-functional requirements for release of BTO@SG version 1.0. It will explain the purpose of the system and features of the system, the interfaces of the system, what the system will do, constraints which are imposed and how the system reacts to external stimuli. UI mock up and dialog maps will also be illustrated to provide a greater understanding of the system.

1.2 Document Conventions

The conventions used to prepare the document are as followed:

Font – Times new Roman, size 12

Main Heading – Times new Roman, size 18, bold

Sub Heading – Times new Roman, size 14, bold

Sub-sub Heading – Times new Roman size 12, bold

Unless specified, all requirement statements are high priority and committed to the release of BTO@SG.

1.3 Intended Audience and Reading Suggestions

This document is intended to be used by the members of the project team that will implement and verify the correct functioning of the system. The brief overview of the system would be focused in section 1 (Introduction) as well as section 2 of the document (Overall description). Section 3 consist of external interface requirements highlighting the local characteristics of each interface between the software products the users discussed. Section 4 gives a breakdown of system features with their functional requirements to describe major service provided by the intended system. Finally, the specification is concluded with the non-functional requirement on which this document is based on.

It is recommended that the reader starts with the overview of the system, followed by the system feature and non-functional requirements. Lastly, the reader can read on the external interface requirement to gain a better understanding of system.

1.4 Product Scope

GJ Enterprise will develop a mobile application that will aid citizens who are in the process of selecting a Build-To-Order (BTO) flat for purchase in Singapore. The application has a full package functionality which allows users to view nearby amenities of the flat of interest, calculate debt repayment and query available grants, hence facilitating users in the process of making a decision about their future flat purchase. In short, BTO@SG is a one stop application to cater convenience for target users with adequate, organised housing information in the entire of Singapore.

2. Overall Description

2.1 Product Perspective

The product is a newly developed standalone product that will be publish into the Android market (Google Play Store). The mobile application is implemented based on the model-view-controller model (MVC) model. BTO@SG provides relevant information for users to make an informed choice before making a decision for their BTO flats.

2.1.1 System Architecture

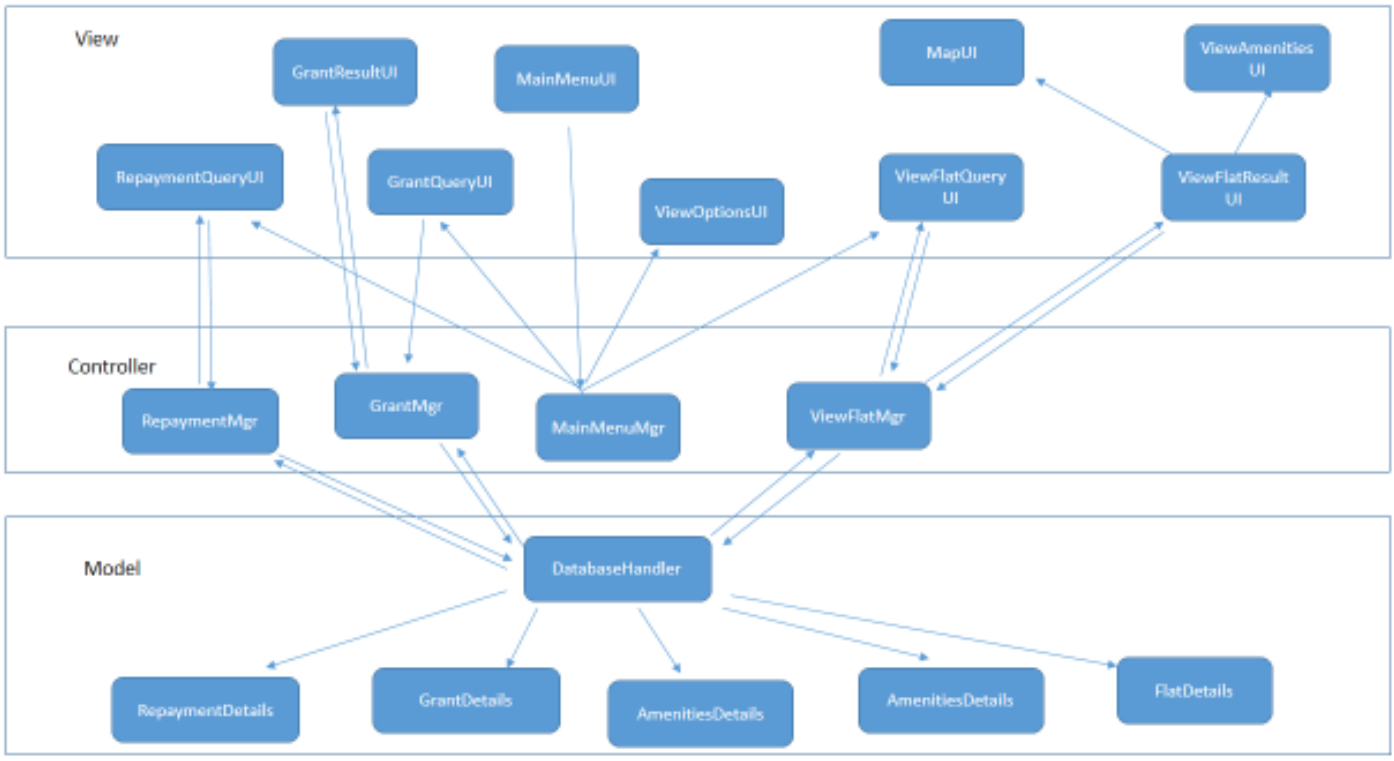


Figure 1. A top-down view of the application implementation and individual components

2.2 Product Functions

The bullet list below are the main functionalities of what the application provides:

- Query grants: Allows users to view all grants available based on combined household income
- Repayment Calculator: Allow users to calculate the amount needed per month or year to finish the loan amount.
- View available flats and surrounding amenities: Allow users to search for available BTO flats in a specific area or region and filter out amenities according to their choices.

2.2.1 Dialog map

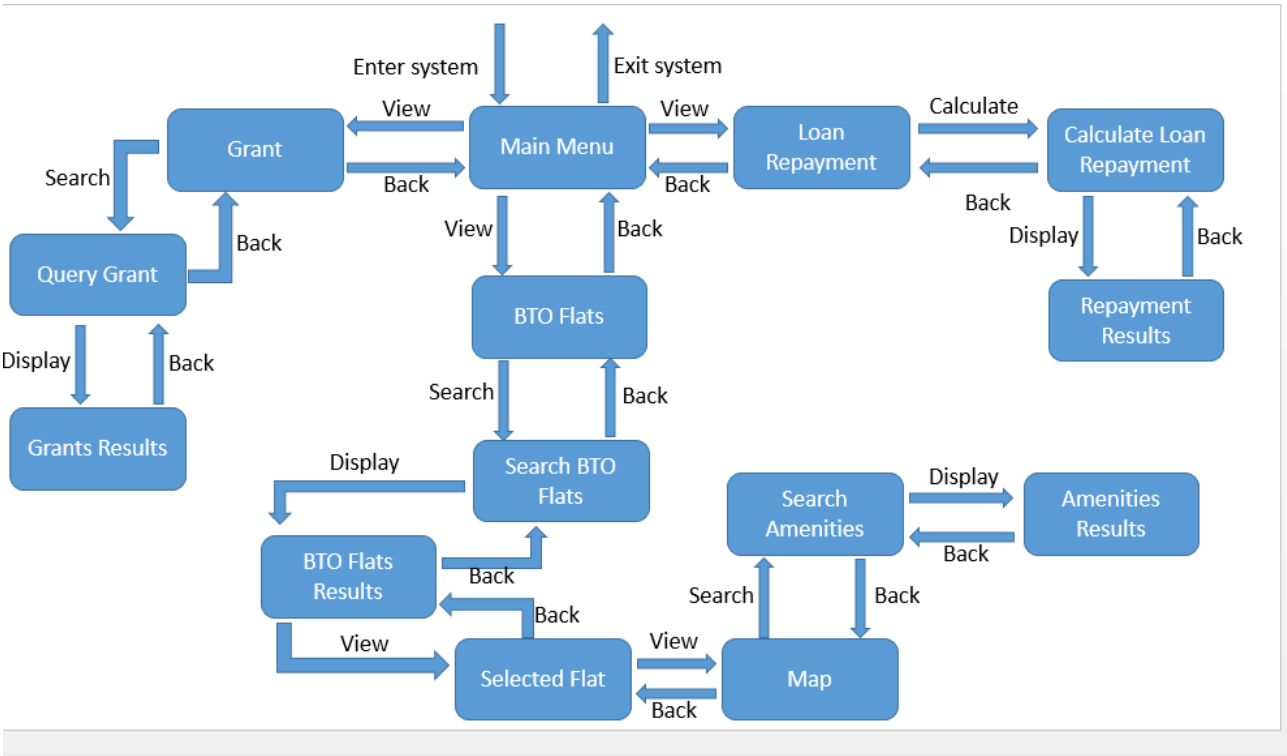


Figure 1.1. A dialog map showing all possible user interaction with the system

2.3 User Classes and Characteristics

The target audience for our mobile application are mainly couples and Singaporeans seeking BTO housing information in Singapore. The development of this application will be closely linked to the governing bodies of housing development board (HDB).

2.4 Operating Environment

BTO@SG must operate in an android smartphone with minimum operating system KitKat 4.4 and above. The application do require internet connection for certain feature (view amenities) and is able to perform other functions (grant query & repayment calculator) offline. There is also no external hardware requirement or software dependencies to run the application. Currently as of 12 November 2016, there are no existing conflict with any existing mobile application in the market.

2.5 Design and Implementation Constraints

The application will be developed using Android Studio, hence developers must be familiar with Java programming language. As it is operated on a mobile platform, developers will be limited to smaller scale database, such as SQLite. Developers have to maintain and update the data every month to ensure that users are provided with the latest information when the application is run offline.

2.6 User Documentation

We provide helpdesk services to our users, when encountered with any problem or if users would like to get more information they could always tap on to the help button in settings page.

2.7 Assumptions and Dependencies

Users are assumed to be equipped with basic navigation of an application. It is also assumed that users are familiar and have prior knowledge of how BTO works. Information provided to the users are based on latest data updated to http://data.gov.sg hence any changes made to the original data will be affecting the one existing in our application. The application also incorporated Map API from Google to display a map showing nearby amenities of flat chosen by user.

3.1 External Interface Requirements

User Interfaces

3.1.1 Home page

When a user opens the application, he/she can view the different features provided by the application. They are View Flats, Grant Query and Calculator; these features come in buttons, at bottom of screen, where users can manoeuvre themselves around the app. See Figure 2.1.

Figure 2.1-Home page

3.1.2 Grant Query

This is the page user will be directed to after pressing the Grant Query button. In this page, user should pick the different options in the drop-down list, provided in the following fields: Type of application, Average monthly income and Sales Launch. Users must select the appropriate options (Section 5.1.2 – Applicable Grant (Functional Requirements)) to the fields above without leaving any of them empty. See Figure 2.2.

After selecting their desired input, user must tap on the calculate button. Based on those criterial chosen by the user, the result will be generated and displayed. See Figure 2.3.

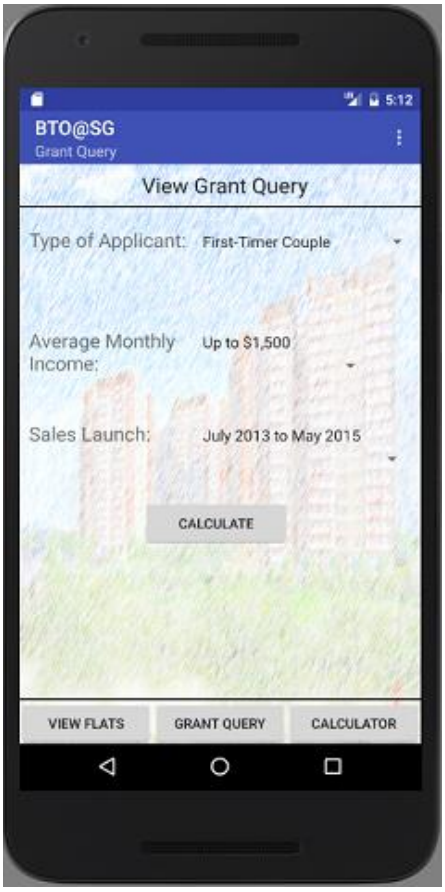


Figure 2.2-Grant Query I

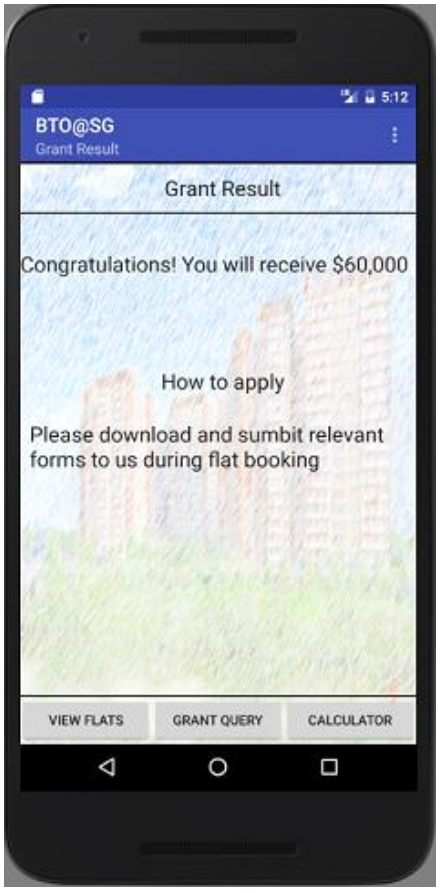


Figure 2.3-Grant Query II

3.1.3 View Flats

In this page, user should pick the different options in the drop-down list, provided in the following fields: Price Range, Room type and Location. Users must select the appropriate options (Section 5.1.2 – Applicable Grant (Functional Requirements)) to the fields above without leaving any fields empty. See Figure 2.4.

After selecting their desired input, user must tap the search button. Based on criterial chosen; results will be generated and displayed on the result page. See Figure 2.5.

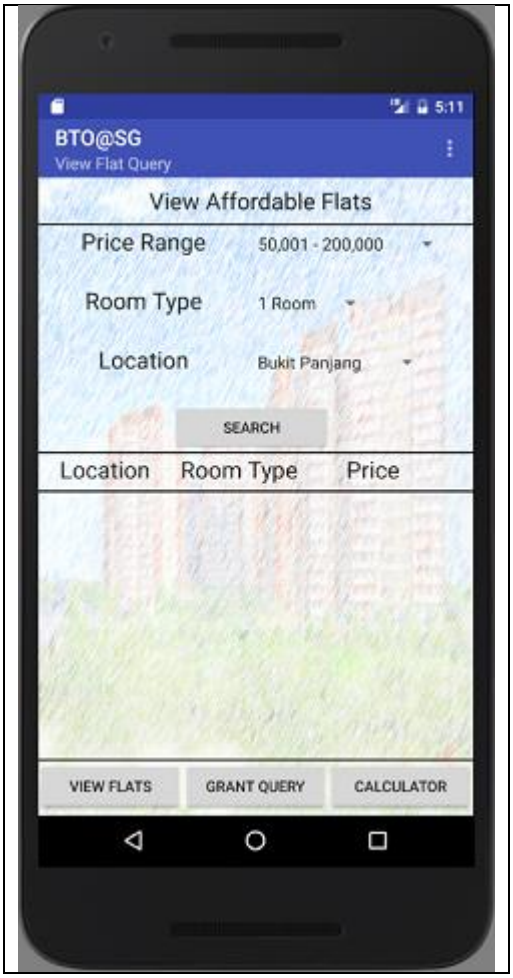


Figure 2.4- View Flat I

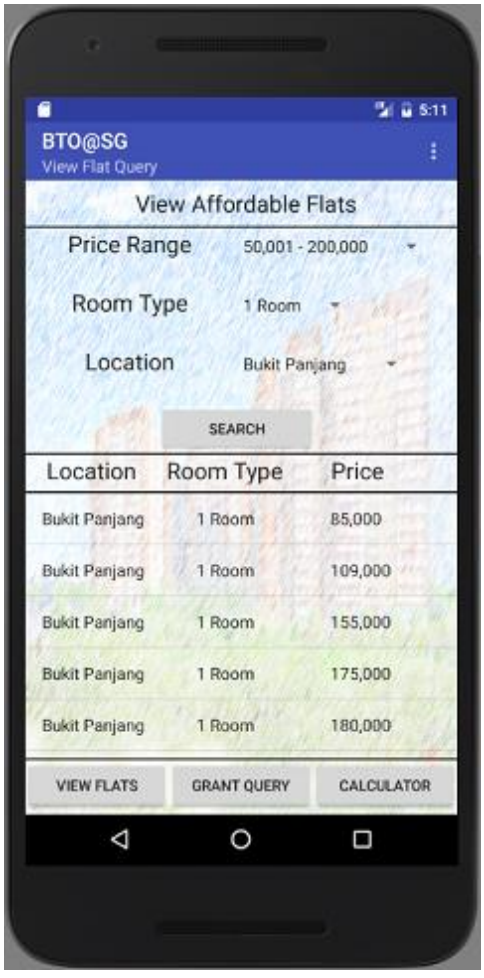


Figure 2.5- View Flat II

3.1.4 View Flat Results

In this page, users will be able to view more details on the flat they have chosen. There is view nearby amenities button which the user can click to bring them to the view amenities page. See Figure 2.6

Figure 2.6- View Flat Results

3.1.5 View Nearby Amenities

In this page, users will be able to learn more about the amenities nearby. By default, when the user enters this page, no details will be shown as no amenity is selected yet. User must tap on the nearby amenities button to select amenity they wish to view. See Figure 2.8

User can then select nearby amenities (See figure 2.9) on the Google map. Detail on the selected amenity will now be displayed on the page. See figure 2.10.

Figure 2.8- View Amenities I

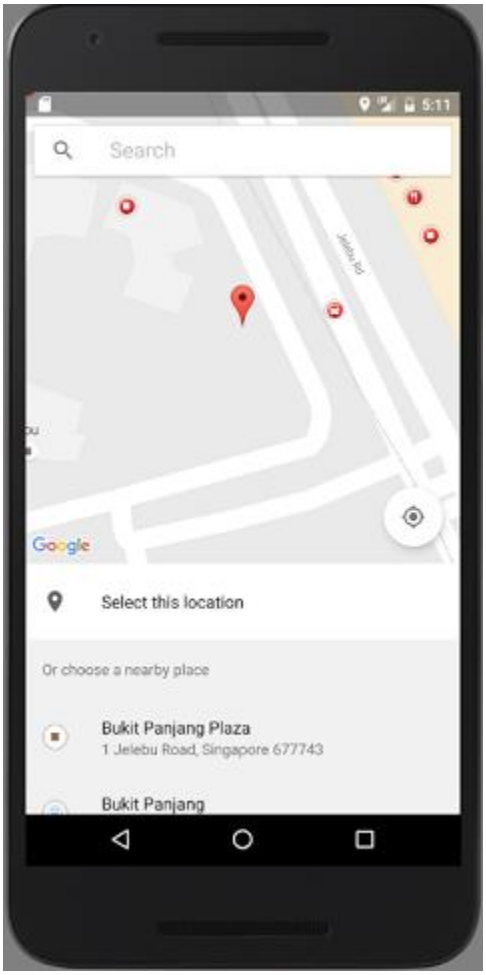


Figure 2.9- View Amenities II

Figure 2.10- View Amenities III

3.1.6 Calculate Repayment

In this page, users should choose from a drop-down list on whether they want Bank Loan or Housing Loan and then input the amount they intend to loan in the Loan amount text box and select the desired years of loan in a yearly basis from the drop-down list then tap on the calculate button. Users must select the appropriate options or fill in (Section 5.1.2 – Applicable Grant (Functional Requirements)) the fields above without leaving any of them empty. See Figure 2.11.

Based on the different criterial chosen by the user, the result will be generated, displaying the monthly instalment amount. See Figure 2.12.

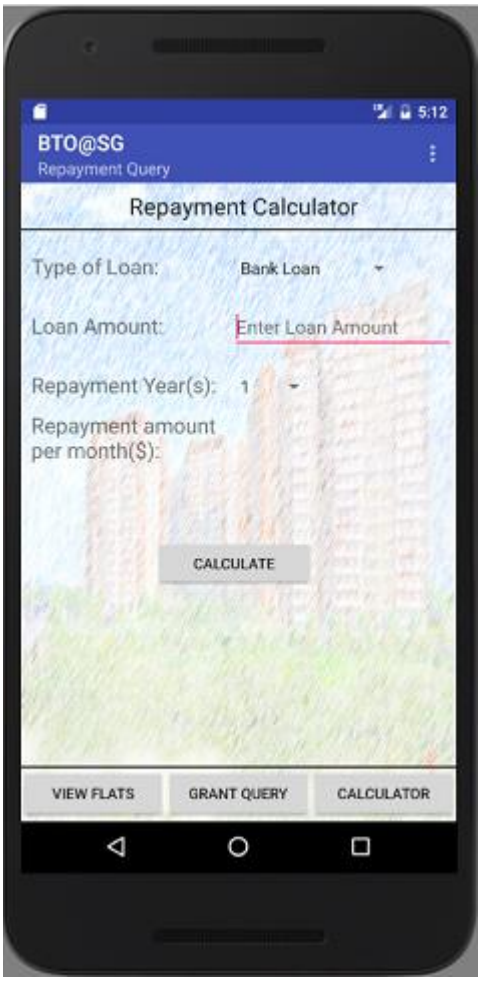


Figure 2.11- Calculate Repayment I

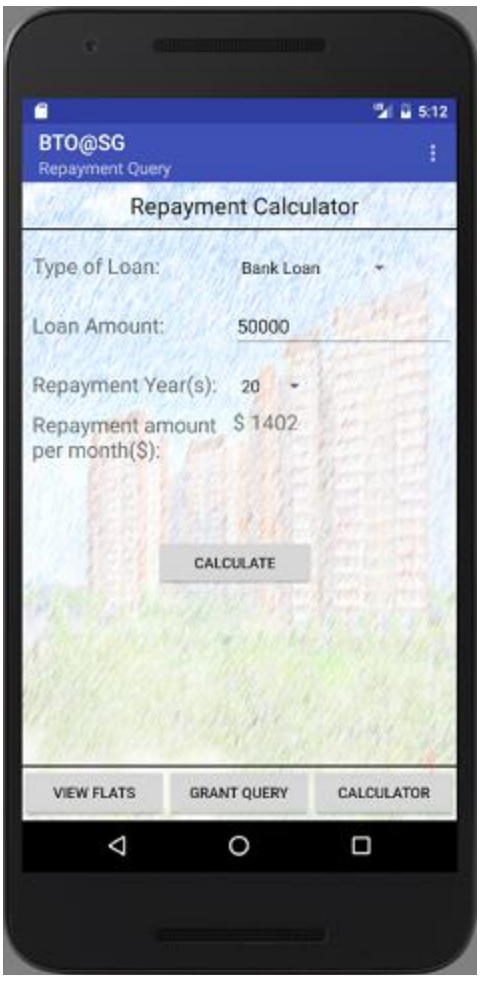


Figure 2.12- Calculate Repayment II

3.1.4 Settings

On the top right hand corner of every page is the ‘more options’ icon. See Figure 2.13. After user tap on it, they can select from a list of options. See Figure 2.14. Figure 2.15 and Figure 2.16 are pages linked from the icon.

Figure 2.13- Settings I

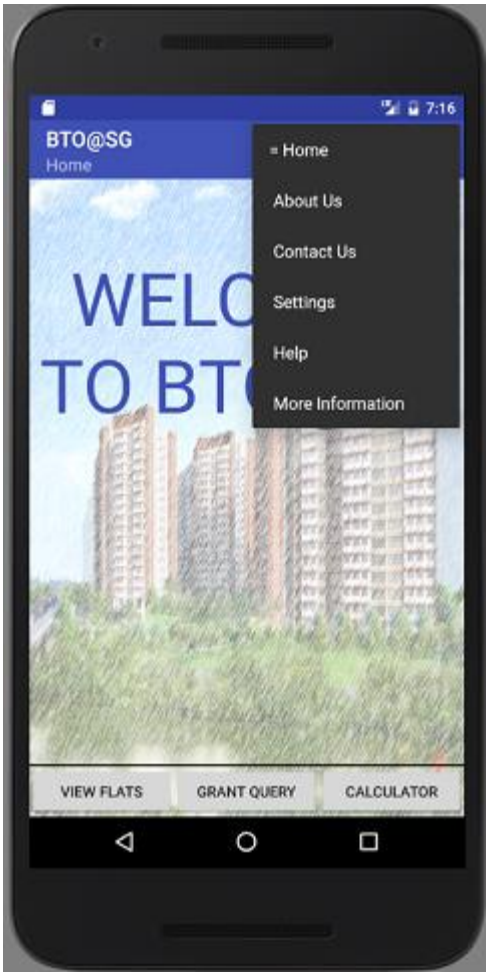


Figure 2.14- Settings II

Figure 2.15- Settings III (About Us)

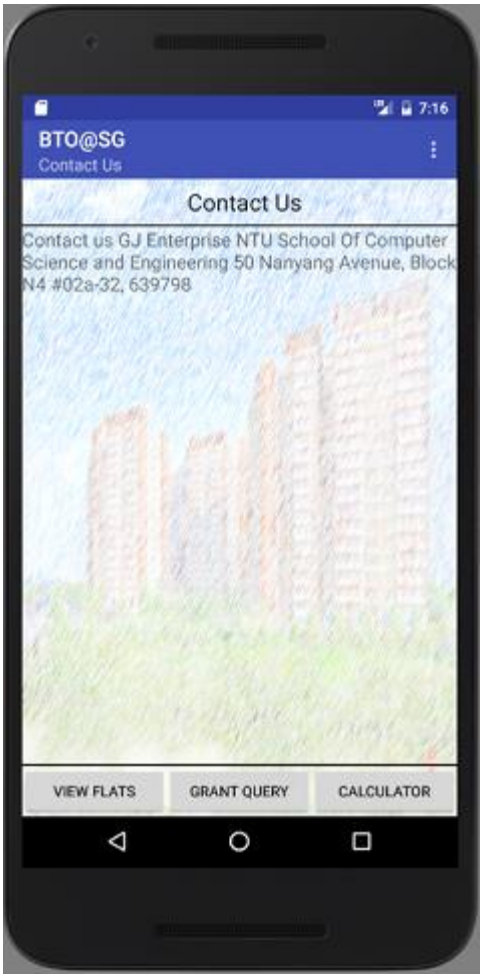


Figure 2.16- Settings III (Contact Us)

3.2 Hardware Interfaces

The hardware interface that are incorporate to BTO@SG include the mobile device that has android operating system KitKat 4.4 and above installed. Data and information will displayed to users both in plain text as well as graphical map representation. To update existing data, there must be internet connection to the mobile device so that downloading can take place.

4. System Features

4.1 View available BTO Flats

1.1 User must be able to search for BTO flats available within Singapore.

1.1.1 User must select available BTO flats based on location area from a drop-down selection box.

1.1.2 Users must select number of room not less than 2 and not more than 5.

1.1.3 Users must select a preferred HDB block among the region.

1.1.4 The application must display a list of BTO flats available together with its price range and room size.

4.2 View Amenities

1.1 User must be able to view all amenities within 10km away from the selected flat region.

1.1.1 User must be able to view nearby amenities around the selected flat region.

1.1.2 User must be able to click and drag map to the direction he or she wants to explore.

1.1.3 User must be able to exit current view with ease by clicking on the back button.

1.2 Application must show different amenities indicated by pin tacks on the on-screen map.

1.2.1 Application must show the name, address, contact number (if applicable) and website (if applicable) of the amenities.

4.3 Query Grant

1.1 User must be able to view grant amount.

1.2 Application must be able to display a grant amount based on user applicant type, user monthly salary and sales launch from a drop-down box.

1.3 Application must be able to display error message if he or she click search without either of the drop-down list.

1.4 Application must show the result of grant amount entitled to the user.

4.4 Calculate Repayment

1.1 User must choose amount of year he or she wants to complete repayment from a drop-down selection box.

1.2 Application must be able to show repayment details according to user loan amount and years of repayment.

1.3 Application must show the result of user repayment amount required per year for the repayment for both cash and CPF category.

5. Other Non-functional Requirements

1. Usability

The application is catered mainly for Singaporean citizen planning to apply for BTO flats.

1.1 The application interface elements (e.g. menu) must be easy to understand and consistent in its layout.

1.2 The application must offer informative feedback for each user action.

1.3 The application must be responsive with regards to its output mapping to user activity.

1.4 The application must be design in a way user cannot make a serious error. Most user input are defined by the application itself.

1.5 The application must be able to handle invalid inputs and prompt error message if necessary.

1.6 The application must allow user to undo their action to relieve anxiety.

2. Reliability

The application must have the ability to behave consistently in a user-acceptable manner when operating within the environment for which the application is intended.

2.1 The application must maintain a 95% uptime.

2.2 The application must yield consistent search result for a specific query.

3. Performance

3.1 The application must provide a feedback upon a user activity within 2 seconds.

3.2 The application must be able to perform with previous retrieved data as backup when there is no internet connection.

3.3 The application must be able to perform as usual when there is mobile device under low power.

4. Supportability

4.1 The application must be able to receive future version updates.

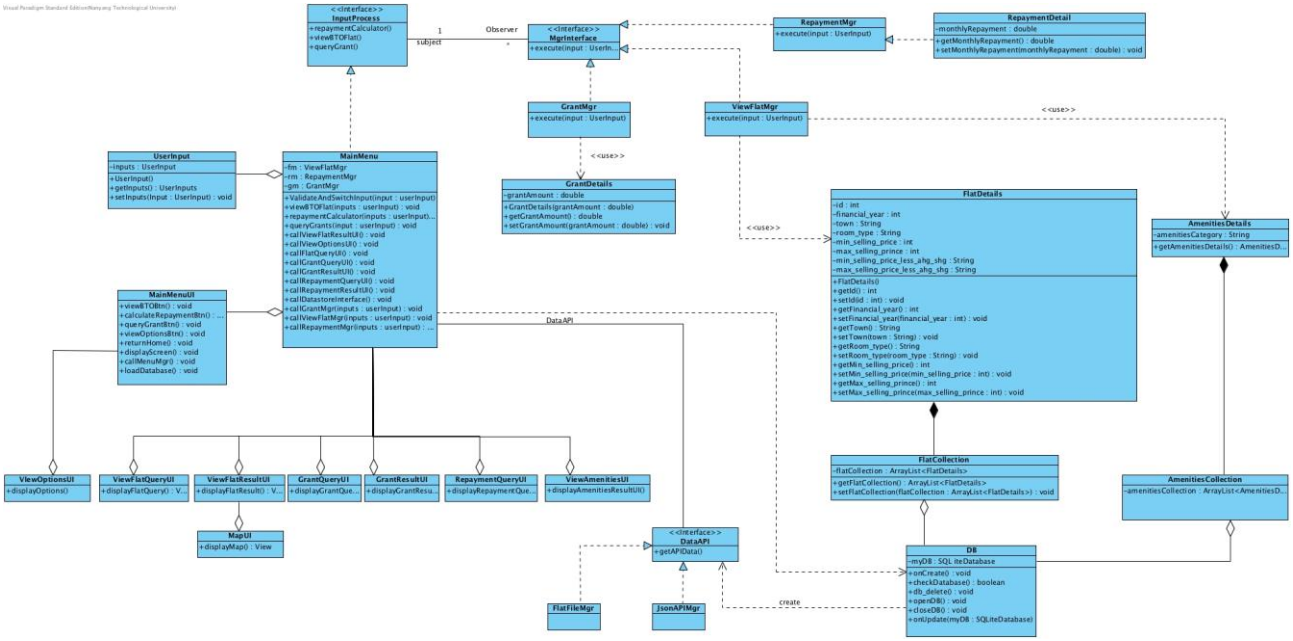
4.2 The application must be able to support all android smartphones running Android 4.4 and above.

4.3 The application must be able to support multiple languages.

4.4 The application must be installed with ease.

6. Other Requirements

6.1 Class Diagram



6.2 Sequence Diagram

6.2.1 Repayment Calculator

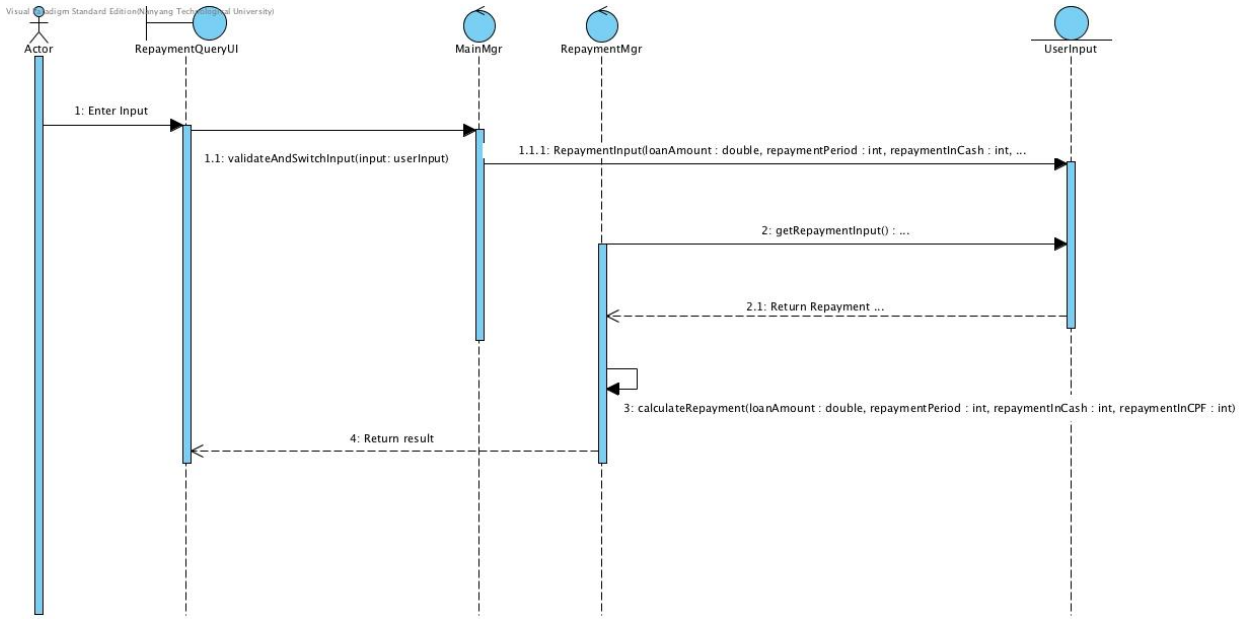


Figure 2. Repayment calculator function

6.2.2 Query available grants

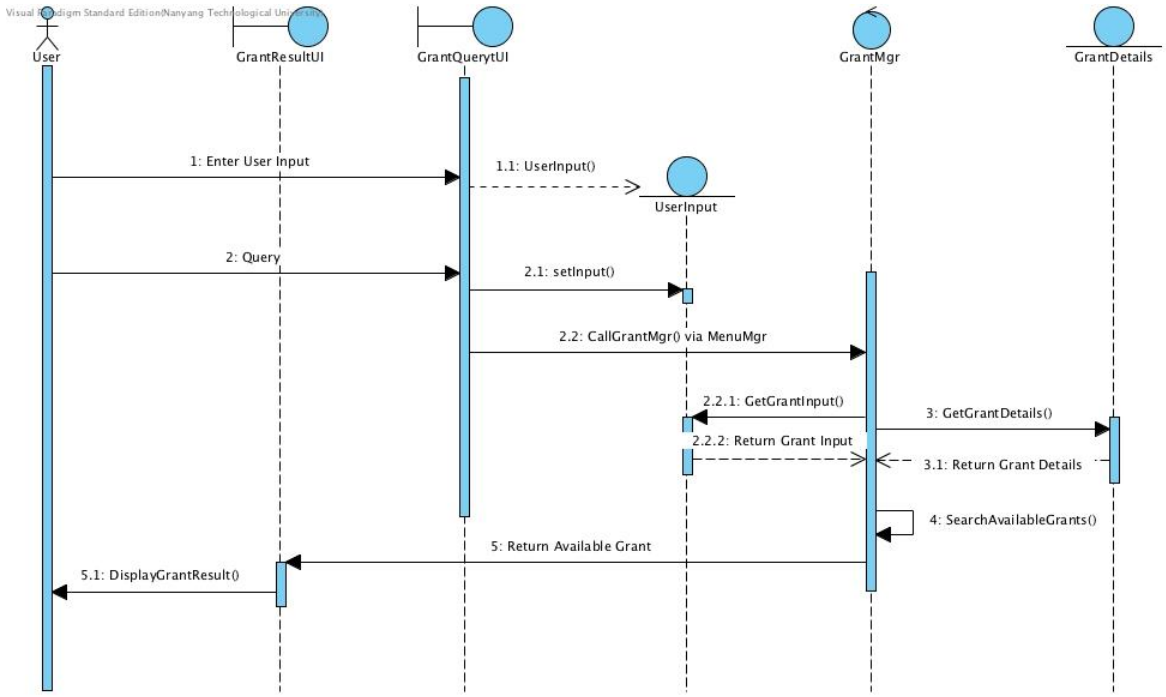


Figure 2.1 Query available grants

6.2.3 View available BTO flats

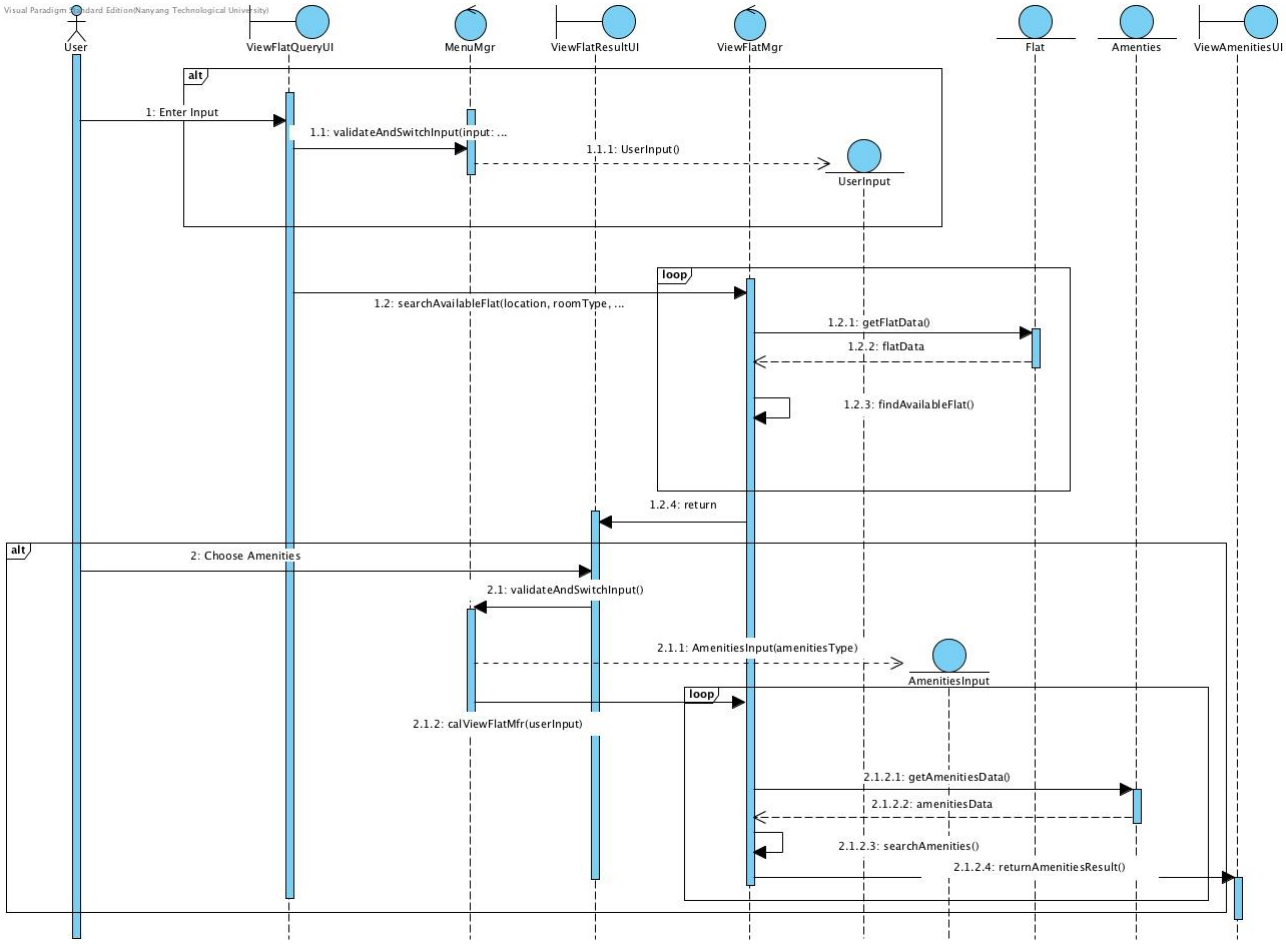


Figure 2.2 View available BTO Flats

6.4 BTO@SG State Machine Diagram

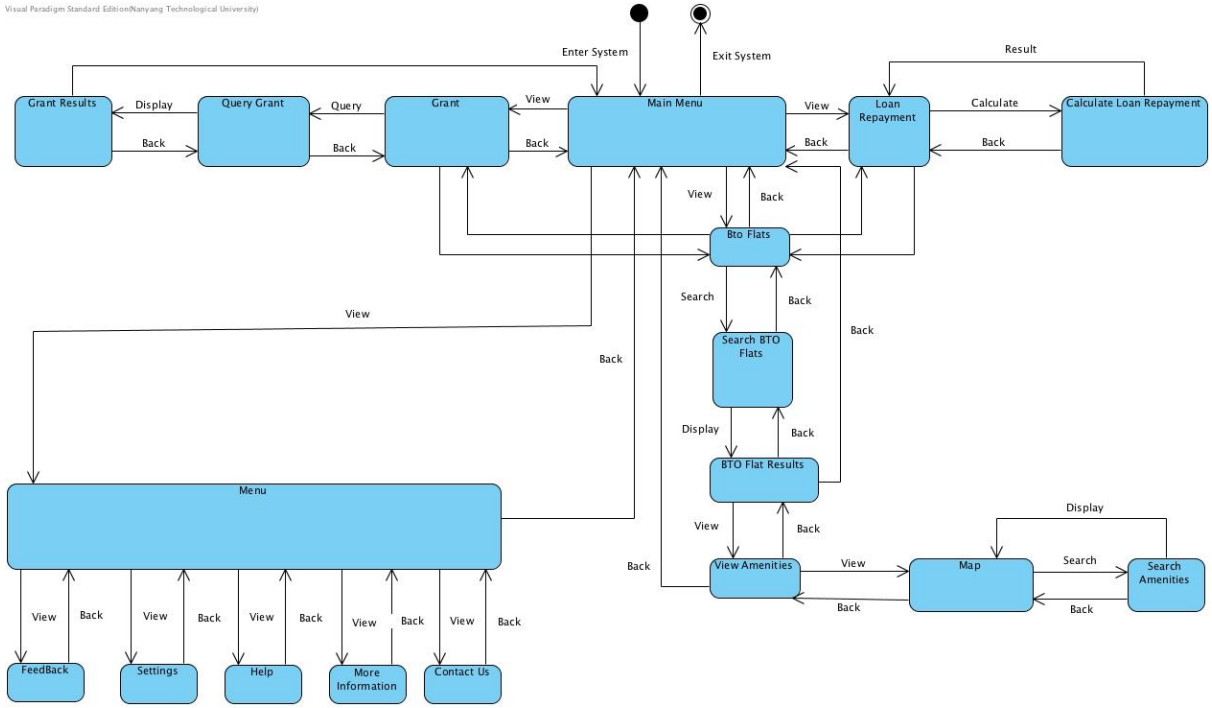
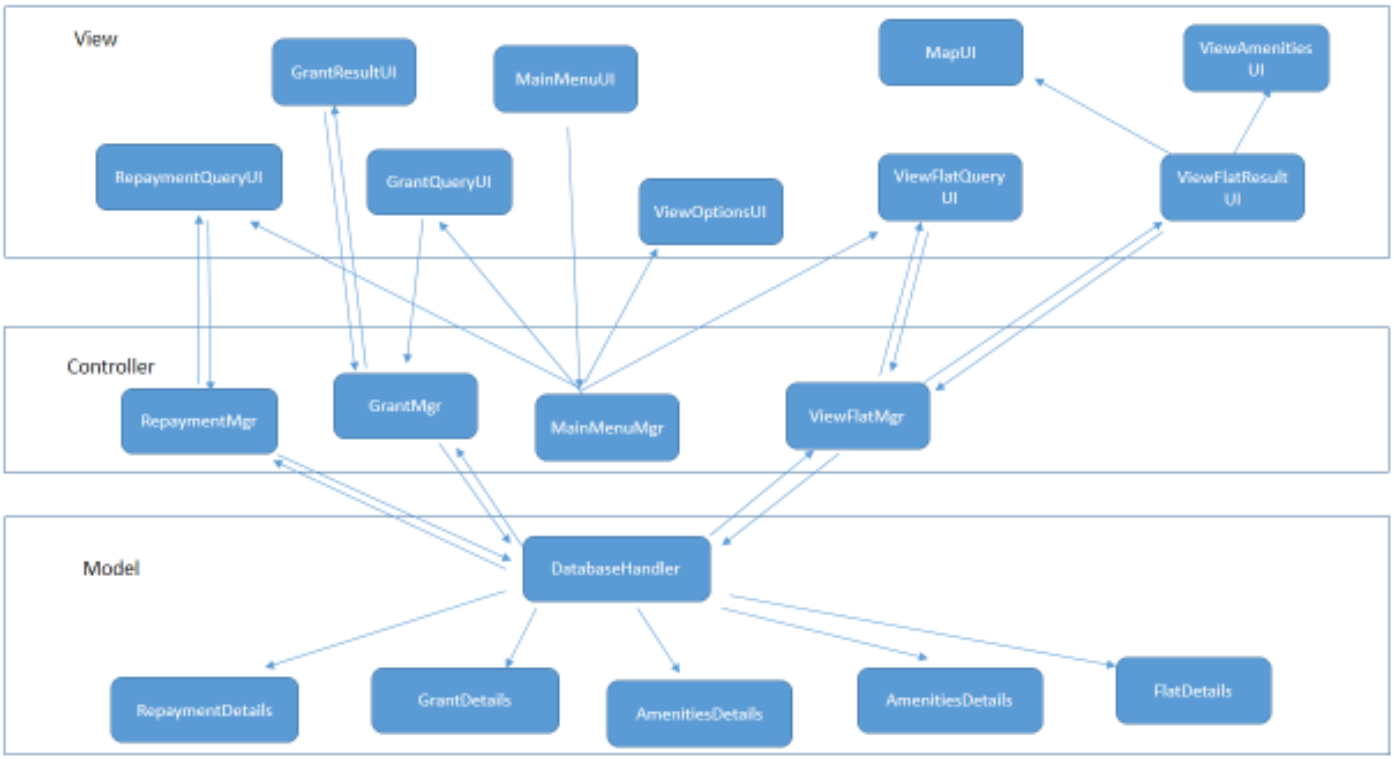


Figure 3 State Machine Diagram

6.4 System Architecture



As the core operation of the application is to retrieve data from a data store and update the user interface with newly requested information based on the user input, the Model-View-Controller (MVC) will be the most suitable architecture for BTO@SG mobile application.

In an MVC Architecture, the core functionality of the application occurs between the model and controller layers and the user interface occurs between the controllers and view layers.

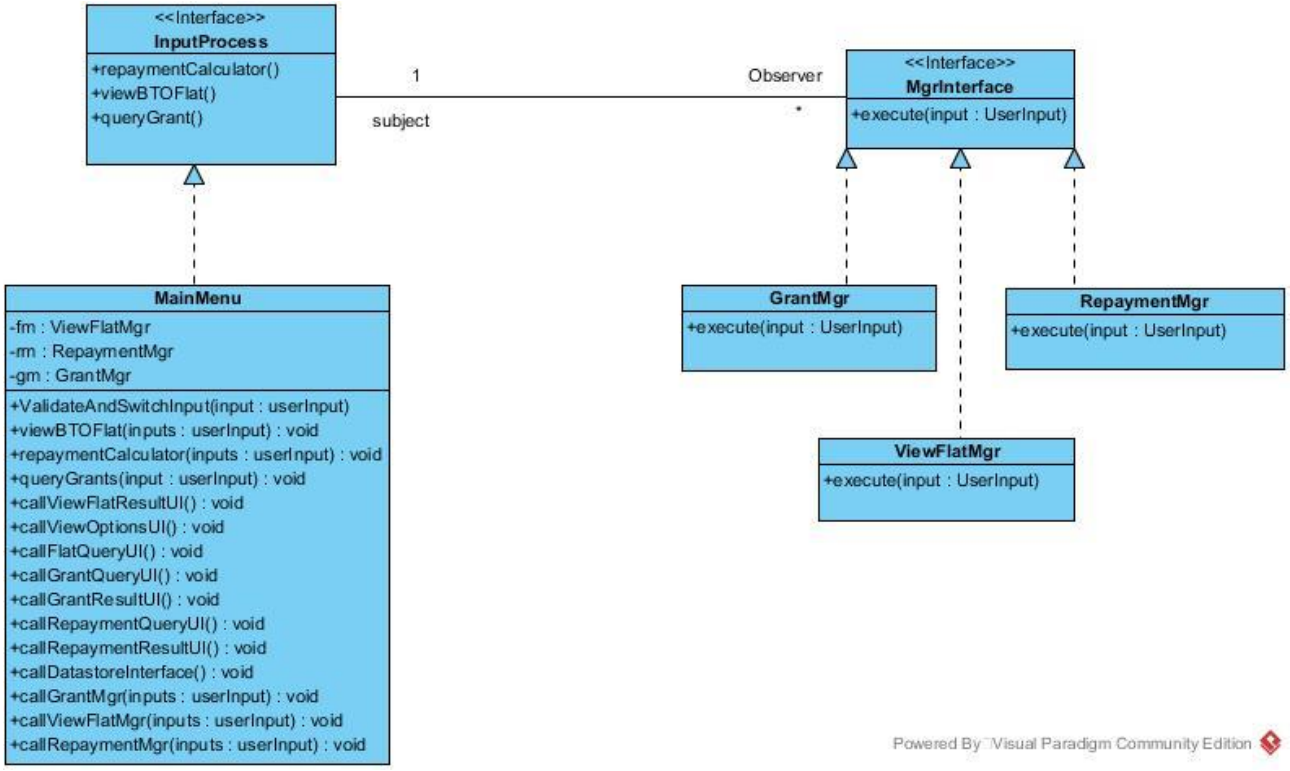
As interface components are regularly updated to accommodate changing user's requirements and technology, it is not wise to tie user interface directly with data store component. By separating the View, Controller and Model, we introduce loose coupling in our system.

In the BTO@SG, the MVC architecture consist of the UI components, service components, data component. The UI components is made up of a package of activities that reflects the View component of the pattern while data component (storing and retrieving) represent the model component of the pattern. The service component are similar to the Controller it waits for a user input and decide which Model to interact with.

Other advantages of an MVC architecture are speeding up the application development process as different programmers can work on different aspect of the pattern and then integrate it as a whole. Furthermore, modification does not affect the entire model. As components are separated, the application are easier to maintain and scalability and extensibility will not be an issue.

6.5 Design Pattern

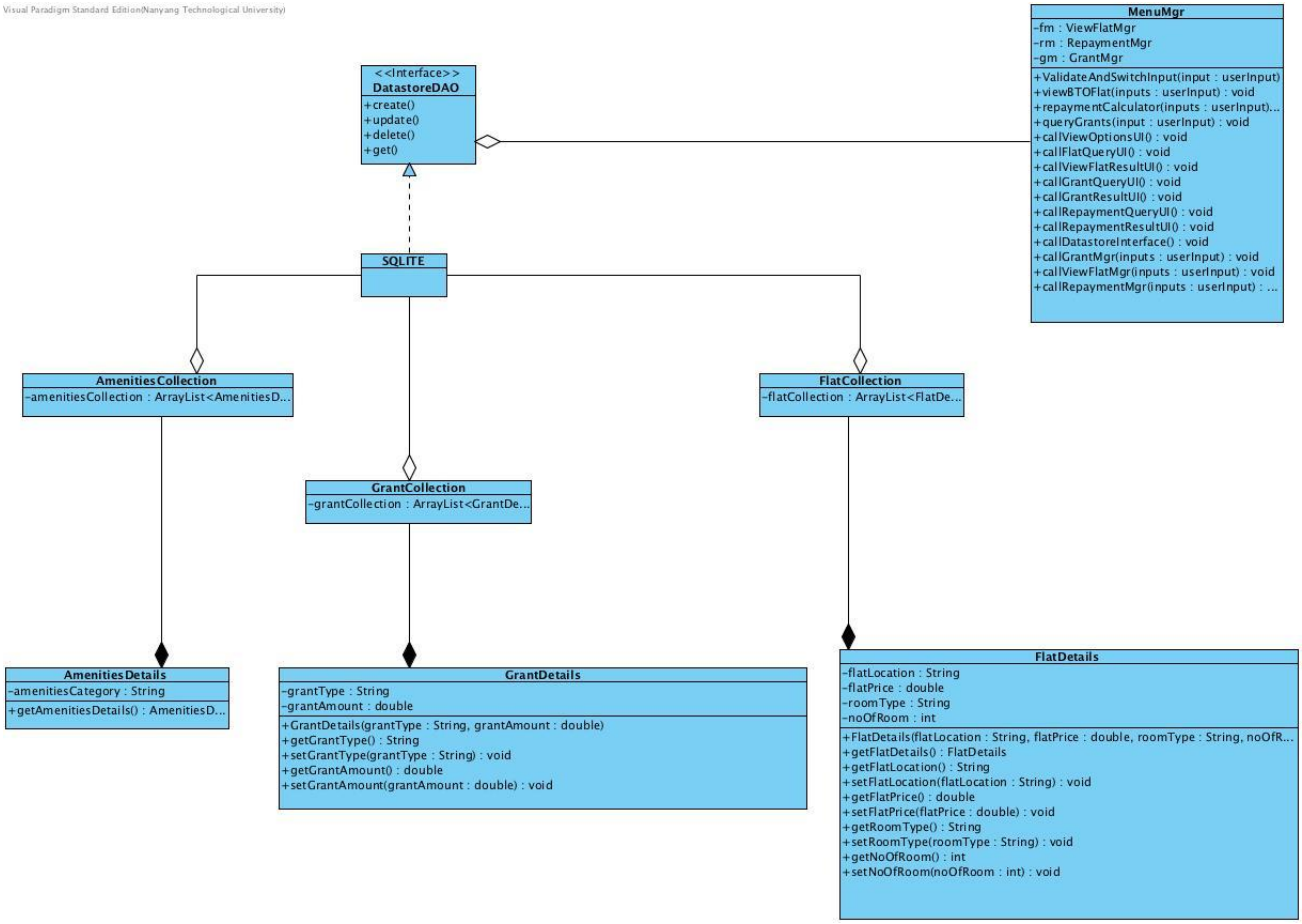
6.5.1 Observer Pattern



In BTO@SG, the application has realised and identified observer pattern as one of its design pattern. The InputProcess interface is being realized by the MenuMgr class where is aggregate of many other classes such as UI, userInput classes and etc., and the individual control classes implement the control interface.

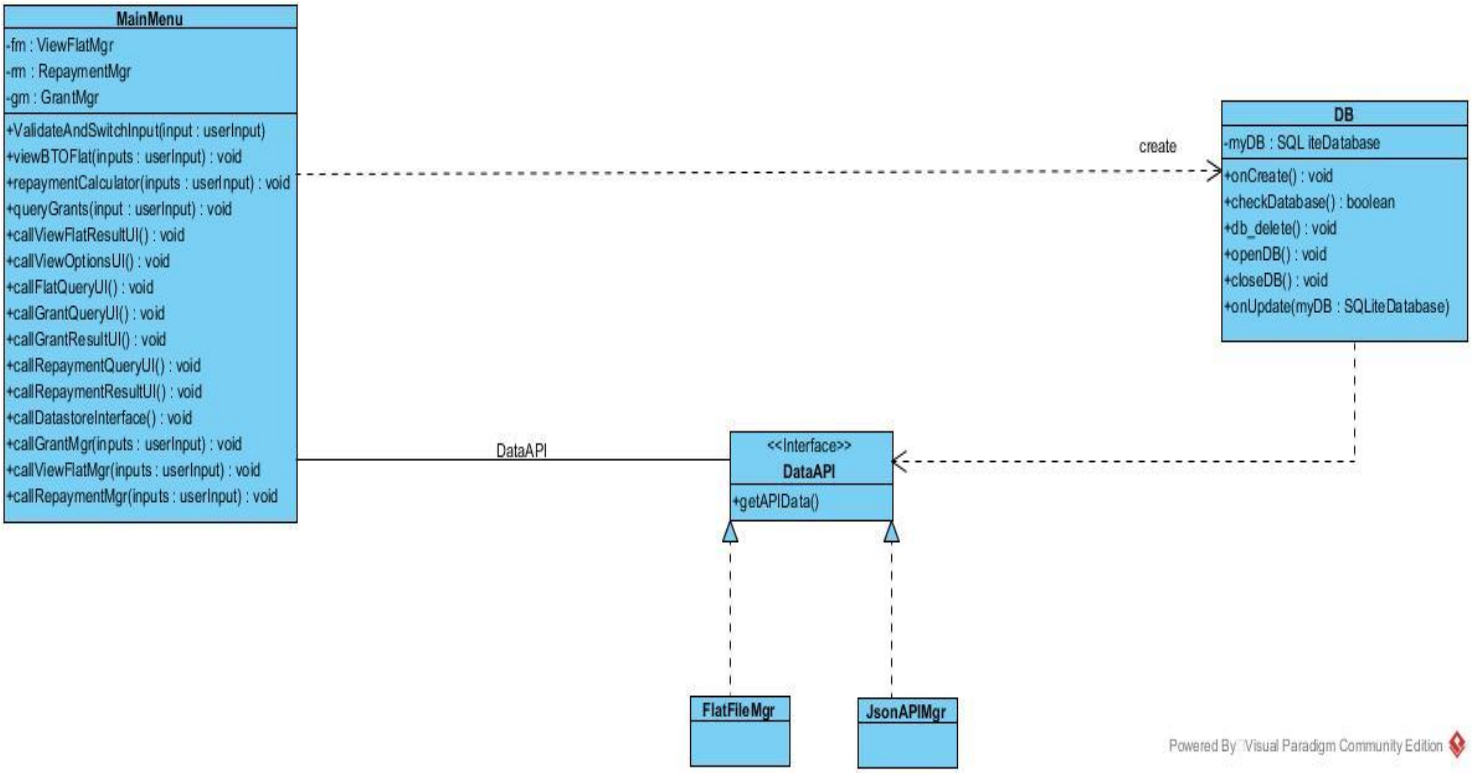
With this design, whenever a user input is entered by the user, the subject, which in this case is the InputProcess will notify the observer class, which is the respective control class. The observer pattern allows us to achieve loose coupling between the subject and observers, which means there is also flexibility and scalability where the software team can expand new observer classes without affecting the subject class.

6.5.2 Design Access Object Pattern



Data Access Object (DAO) pattern can be identified to separate low level data accessing operation from high level business services in BTO@SG. The DAO layer is responsible for data access from the persistence storage (SQLITE) and manipulation of data in the persistence storage. The key benefit of this design pattern is DAO would decouple the persistent storage implementation from the rest of BTO@SG.

6.5.3 Strategic and Factory Pattern



The strategy and factory design pattern is used together to handle all database related operations within BTO@SG. The factory pattern is used to create the database object while the design pattern is used to perform retrieving, updating and deleting operations within the application.

7.1 Black Box Testing

7.1.1 Repayment Calculator

Condition assumption:
Housing Loan simple interest rates at 0.1% per annum

Bank Loan simple interest rates at 10% per annum across all bank institution

Period of repayment available are 1, 5, 10, 15, 20, 25, 30 years.

Maximum/Minimum amount of loan at S$1,000,000/S$10,000

Interest Calculation is based on annual compound rate system.

Equivalence Classes

Loan Amount: I <= 9,999 (Invalid), 10,000 <= I <= 1,000,000 (valid), I >= 1,000,001 (Invalid)

Boundary Values

Lower Boundary: 9,999, 10,000, ~~10,001~~

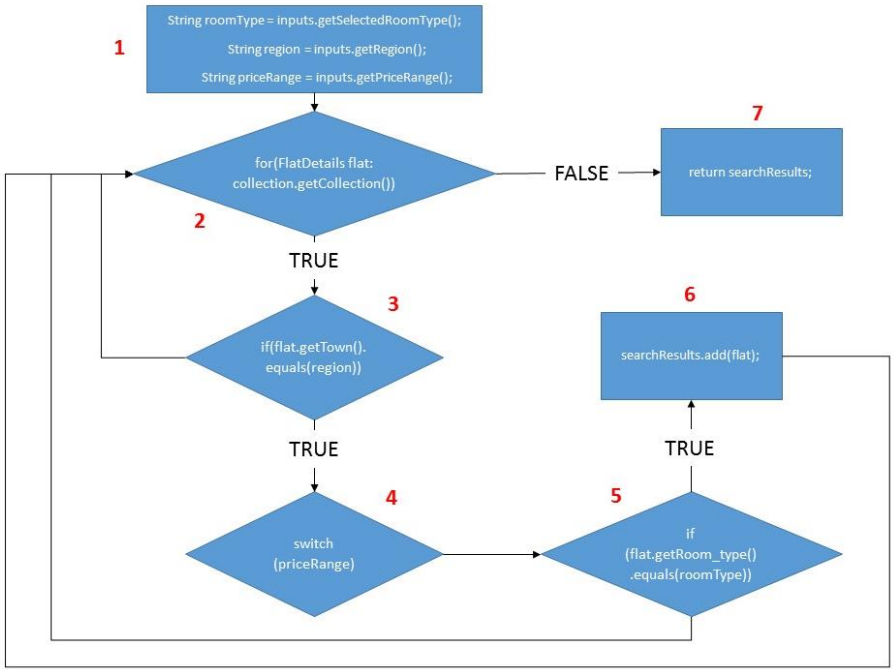
Upper boundary: ~~999,999,~~ 1,000,000, 1,000,001

Testing

Loan Amount	Repayment Period	Type of Loan	Expected output	Actual output
10,000	1	Housing	834	834
10,000	1	Bank	917	917
10,000	30	Housing	29	29
10,000	30	Bank	485	485
9,999	1	Housing	"Amount cannot be less than 10,000"	"Amount cannot be less than 10,000"
9,999	1	Bank	"Amount cannot be less than 10,000"	"Amount cannot be less than 10,000"
9,999	30	Housing	"Amount cannot be less than 10,000"	"Amount cannot be less than 10,000"
9,999	30	Bank	"Amount cannot be less than 10,000"	"Amount cannot be less than 10,000"
1,000,001	1	Housing	"Amount cannot be more than 1,000,000"	"Amount cannot be more than 1,000,000"
1,000,001	1	Bank	"Amount cannot be more than 1,000,000"	"Amount cannot be more than 1,000,000"
1,000,001	30	Housing	"Amount cannot be more than 1,000,000"	"Amount cannot be more than 1,000,000"
1,000,001	30	Bank	"Amount cannot be more than 1,000,000"	"Amount cannot be more than 1,000,000"

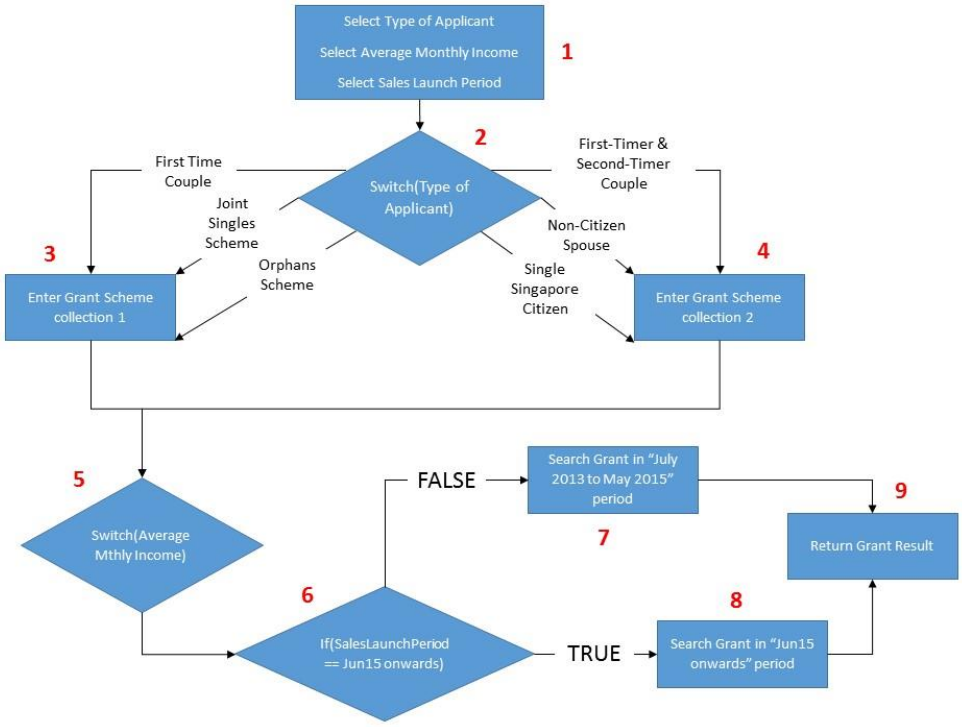
7. 2 White Box Testing

7.2.1 View Flat



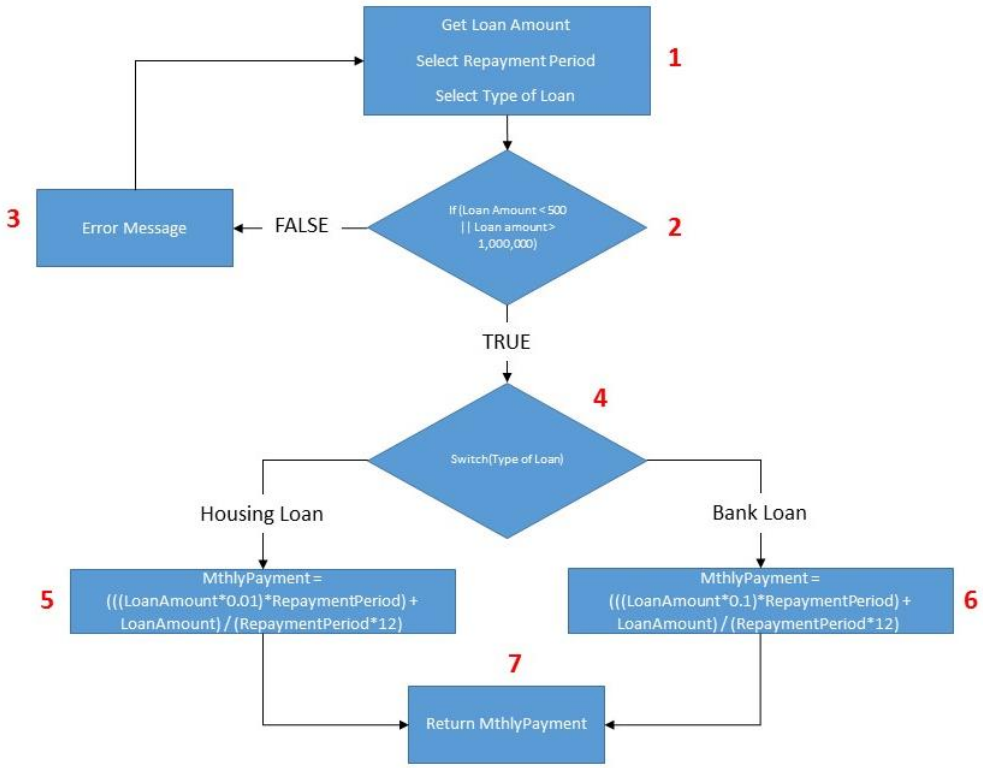
S/N	Basic Path	Test Cases	Expected Result	Test Result
1	**1,2,3,4,5,6,2,7**	**Room Type :** 3-Room **Region :** Bukit Panjang **Price Range :** 200,000 – 400,000	Display result	Display result
2	**1,2,3,2,7**	**Room Type :** 2-Room(Flexi) **Region :** Punggol **Price Range :** > 600,000	"Error message – No result found, please choose another location"	"Error message – No result found, please choose another location"
3	**1,2,3,4,5,2,7**	**Room Type :** 4-Room **Region :** Chua Chu Kang **Price Range :** 400,000 – 600,000	Display results	Display results

7.2.2 Grant Query



S/N	Basic Path	Test Cases	Expected Result	Test Result
1	**1,2,3,5,6,7,9**	**Type of Applicant :** First Time Couple **Avg. Monthly Income :** $3,001 to $3,500 **Sales Launches :** July 2013 – May 2015	**S$40,000**	**S$40,000**
2	**1,2,3,5,6,8,9**	**Type of Applicant :** Orphans Scheme **Avg. Monthly Income :** $7,501 to $8,000 **Sales Launches :** Jun 2015 onwards	**S$10,000**	**S$10,000**
3	**1,2,4,5,6,7,9**	**Type of Applicant :** Non-Citizen Spouse **Avg. Monthly Income :** $3,751 to $4,000 **Sales Launches :** July 2013 – May 2015	**"Sorry ! you are not eligible for any grant !**	**Sorry ! you are not eligible for any grant !"**

7.2.3 Repayment Calculator



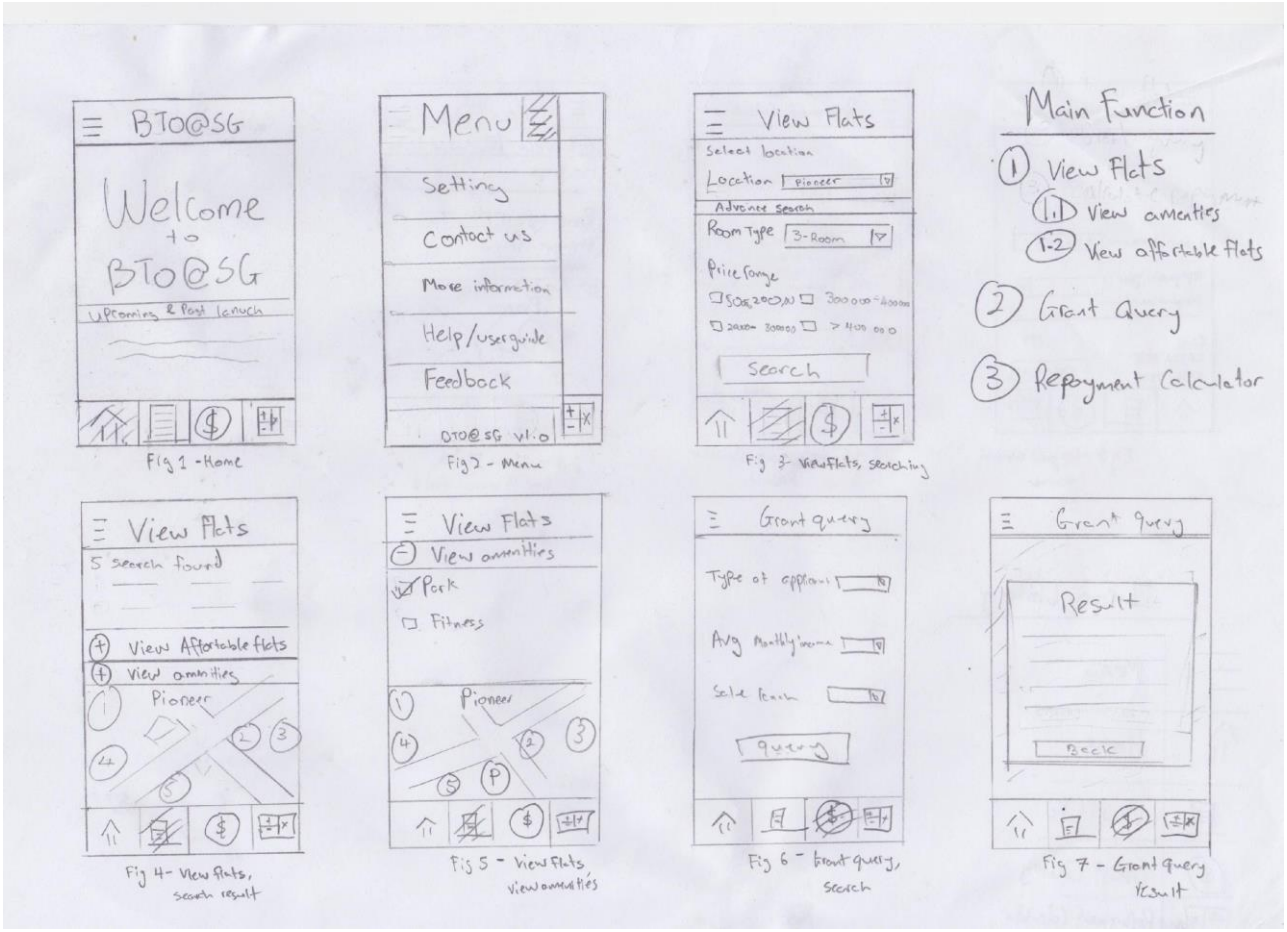
S/N	Basic Path	Test Cases	Expected Result	Test Result
1	**1,2,4,5,7**	**Loan Amount :** 16000 **Repayment Period :** 1 **Type of Loan :** Housing Loan	Display MthlyPayment = 1,335	Display MthlyPayment = 1,335
2	**1,2,3,1,2,4,6,7**	**Loan Amount :** 250 **Repayment Period :** 5 **Type of Loan :** Bank Loan	Display Error Message = "Amount cannot be less than 10,000"	Display Error Message = "Amount cannot be less than 10,000"
3	**1,2,4,6,7**	**Loan Amount :** 199,300 **Repayment Period :** 15 **Type of Loan :** Bank Loan	Display MthlyPayment = 4,625	Display MthlyPayment = 4,625

Appendix A: Data Dictionary

Name	Terms
Amenities	Amenities refers to the following infrastructures: School Gym Swimming complex Clinics Shopping Centres Restaurants and Fast Food branches Petrol Kiosks
Flat type	It refers to the type of flat: ● 1-room to 5-room flat ● Executive flat ● Multi-generation Flat ● Adjoined flat ● 2-Room Flexi
Grants	Grants refers to a sum eligible from the government if one meets certain criteria (CPF housing grants, Staggered Down Payment Scheme)
Build-To-Order(BTO)	BTO refers to the Housing Development Board's allocation scheme that offers flexibility in timing and location for owners
User	Refers to person who is using the application
Affordable Flat	Affordable Flat is defined as the flat(s) deem as the desired monthly instalment and repayment time frame chosen by the user
Repayment	Repayment is a term that refers to the monthly instalment the user has to pay to afford the flat. Repayment period is defined to be 1, 5, 10, 15, 20, 25, 30 years

Sales Launch	Sales Launch refers to the time frame (quarterly) where new flats available for sale.
Principal amount	It refers to the amount borrowed or the amount yet to payoff from the loan
Annual Interest Rate	It refers to the yearly interest rates needed to be paid (cost of loan)
Loan Period	The period taken to pay off the loan
Type of Applicant	Type of applicant refers to the different category of applicants: ● First-Timer Applicants ● Second-Timer Applicants ● First-Timer and Second-Timer Couple Applicants ● Non-Citizen Spouse Applicants ● Single Singapore Citizen Applicants ● Joint Singles Scheme or Orphans Applicants ● Single Mother Applicants
Monthly Household Income	It refers to the monthly gross income of the household excluding CPF deduction.

Appendix B: UI Low-fi Mock-up



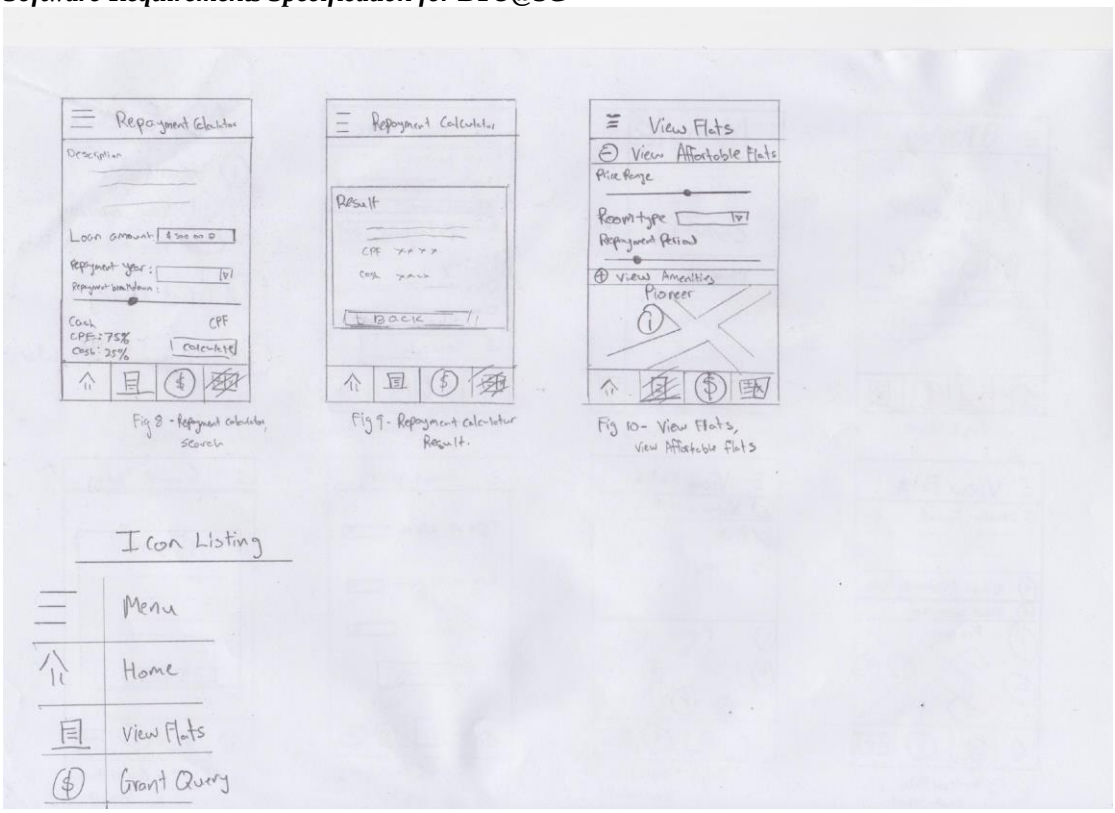
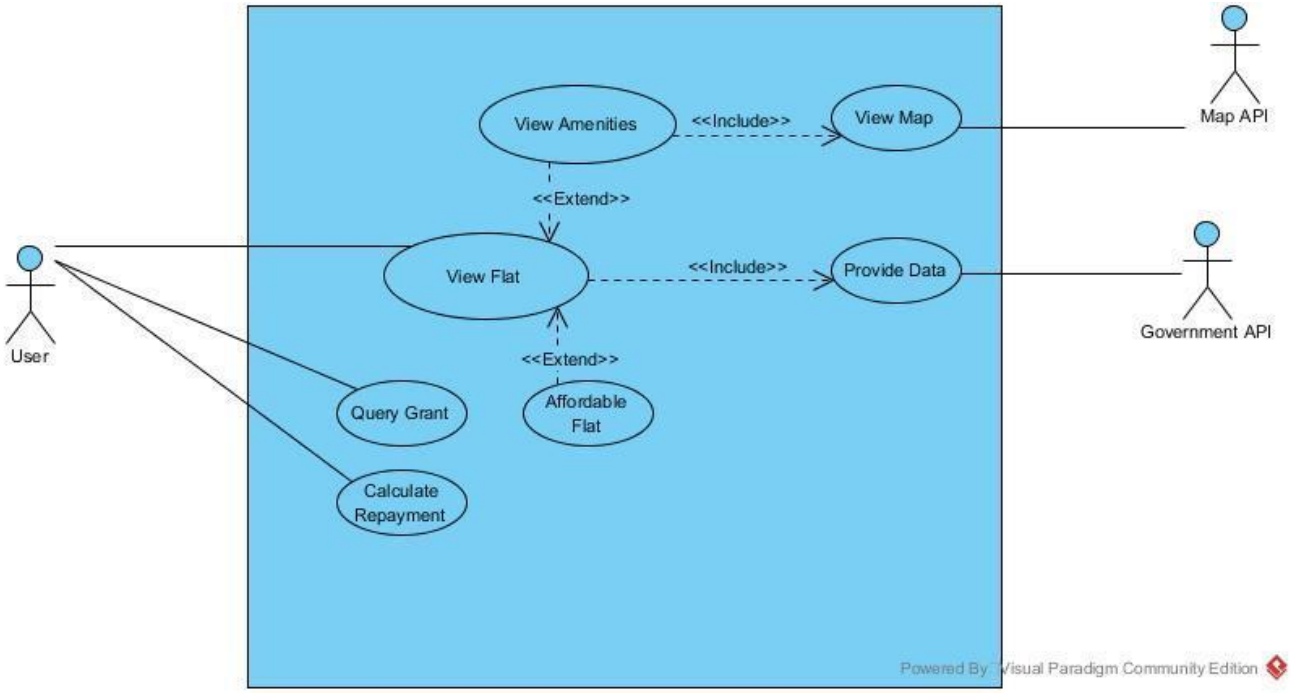


Fig 8 - Repayment calculator, screen

Fig 9 - Repayment calculator Result.

Fig 10 - View Flats, view Affordable flats

Appendix C: Use case Diagrams and description



Use Case ID:	**BTO@SG App**		
Use Case Name:	View flat		
Created By:	Long Siang	Last Updated By:	Thomas
Date Created:	04 Sep 2016	Date Last Updated:	15 Sep 2016
Actor:	- User		
Description:	- User is able to see the current available Build-To-Order(BTO) flats released by Housing Development Board (HDB) based on location area		
Preconditions:	- The user has loaded the application		
Postconditions:	- Interface to list the available BTO flats based on the input given.		
Priority:	- Very High (Main function of the app)		
Frequency of Use:	- Most Frequent		
Flow of Events:	1. User to click on "View available BTOs" button. 2. Interface will display to the "View Available BTOs" page. 3. The interface will prompt user to select location region of interest from a drop-down selection box, preferred room-type from a drop down box and price range from checkbox. 4. User must choose his/her preferred location region (e.g. Jurong East, Pioneer, etc). 5. User must choose his/her preferred room type (e.g. 3-room flat, 4-room flat, etc). 6. User must select his/her preferred price range. 7. User click on "Search" 8. Interface will show a list of available BTOs block based on his/her preference 9. User to click on preferred block 10. Interface will extend down and show a list of BTOs flat available, together with its price range and room type.		
Alternative Flows:	AF1 - When user wants to search a new preference combination 1. User click on "back" 2. Return back to step 3. AF2 – When user wants to search for nearby amenities 1. User to click on "Nearby Amenities".		

Exceptions:	
Includes:	- View Amenities Use Case
Special Requirements:	- Searching for nearby amenities can only be done after a flat region is selection
Assumptions:	
Notes and Issues:	

Use Case ID:	**BTO@SG App**		
Use Case Name:	View Amenities		
Created By:	Long Siang	Last Updated By:	Thomas
Date Created:	04 Sep 2016	Date Last Updated:	12 Nov 2016
Actor:	- User		
Description:	- User is able to know available amenities surrounding his/her preferred location area.		
Preconditions:	- Interface has listed available BTOs flat according to user's preference		
Postconditions:	- Interface to show map of preferred location area and pin tacks of nearby amenities		
Priority:	High		
Frequency of Use:	Frequent		
Flow of Events:	1. User click "View Amenities" button 2. Application will show a result through a pop-up. The map will have pin tacks, indicating different amenities around the block 3. User to mouse over pin tacks 4. Application to show name of amenities 5. User to click "Select Amenity" 6. Application to display name, address, contact number and website of amenity.		
Alternative Flows:	AF1: When User wants to explore another area within 10km of the selected block		

	- User to click and drag map to the direction he/she wants to explore. -Pin tacks will pop onto the map if amenities is available on the new area of search. -Return to step 3.
Exceptions:	
Includes:	
Special Requirements:	
Assumptions:	
Notes and Issues:	

Use Case ID:	**BTO@SG App**		
Use Case Name:	Calculate Repayment		
Created By:	Long Siang	Last Updated By:	Thomas
Date Created:	04 Sep 2016	Date Last Updated:	15 Sep 2016
Actor:	- User		
Description:	- To assist users by projecting house repayment amount with cash and CPF breakdown.		
Preconditions:	- The user has loaded the application		
Postconditions:	- Interface to show repayment details according to user's loan amount and years of repayment		
Priority:	Medium		
Frequency of Use:	Less Frequent (Used by first-time buyers)		
Flow of Events:	1. User to click on "Repayment Calculator" button. 2. Interface will switch to the "Calculate repayment" page. 3. User to enter loan amount. 4. User to choose amount of year he/she wishes to complete the repayment from the drop-box selection box. 5. User to click "Calculate". 6. Interface will have a pop-out window that shows the result of the user's preferred repayment plan and the amount required per month for the repayment.		
Alternative Flows:	AF1: User wants to do a new calculation. 1. User click on "back" 2. Return to step 3.		

Exceptions:	
Includes:	
Special Requirements:	
Assumptions:	
Notes and Issues:	

Use Case ID:	**BTO@SG App**		
Use Case Name:	View Map		
Created By:	Zi Yang	Last Updated By:	Zi Yang
Date Created:	04 Sep 2016	Date Last Updated:	04 Sep 2016
Actor:	User and Map API		
Description:	When user searched for flats, he/she can view amenities surrounding the flats.		
Preconditions:	User must searched for list of available flats.		
Postconditions:	User will view amenities within 10km of the searched flat.		
Priority:	High		
Frequency of Use:	Frequent		
Flow of Events:	User clicks on 'View Amenities' tab. Application displays checkboxes to show categories of amenities. User selects amenities he is interested in. Application display the selected amenities.		
Alternative Flows:			
Exceptions:	EX1: No amenity was chosen. The map is updated with no amenity shown.		
Includes:			
Special Requirements:			

Assumptions:	
Notes and Issues:	

Use Case ID:	**BTO@SG App**		
Use Case Name:	Provide Data		
Created By:	Zi Yang	Last Updated By:	Zi Yang
Date Created:	04 Sep 2016	Date Last Updated:	04 Sep 2016
Actor:	Government API and User		
Description:	The data in application database is updated with new data from government API.		
Preconditions:	The user has loaded the application.		
Postconditions:	The application is updated with new data retrieved from government API.		
Priority:	High		
Frequency of Use:	Frequent		
Flow of Events:	User starts up application. Application runs in the background to connect to government data API. Government API provides data. Application database will be updated with new data.		
Alternative Flows:	AF1: No internet connection		

	1. The application will display the message “Previous Data will be used instead.” Return to step 2.
Exceptions:	EX1: No new data The application will run on existing database.
Includes:	
Special Requirements:	
Assumptions:	
Notes and Issues:	

Use Case ID:	**BTO@SG App**		
Use Case Name:	Query Grant		
Created By:	Zi Yang	Last Updated By:	Zi Yang
Date Created:	04 Sep 2016	Date Last Updated:	04 Sep 2016
Actor:	User		
Description:	The user can check which grant he/she is eligible for based on his/her average monthly household income.		
Preconditions:	User must select ‘Query Grant’ icon on the application.		
Postconditions:	User will view list of eligible grants.		
Priority:	High		
Frequency of Use:	Frequent		
Flow of Events:	User selects ‘Query Grant’ icon. Application will display drop-down box for user to make selection.		

	User selects applicant type from drop-down list. User selects average monthly household income from drop-down list. User selects sale period from drop down list. User clicks 'Query' button. Application displays list of grant eligible to user.
Alternative Flows:	AF1: User clicks 'Search' button without making selection from either or both of the drop-down list Application displays the message "Fields marked with * cannot be blank." Please fill in the information and resubmit." Return to step 2.
Exceptions:	EX1: User did not click on 'Query' button. Application remains on that page.
Includes:	
Special Requirements:	
Assumptions:	
Notes and Issues:	

Appendix D: Meeting Minutes

Subject			
GJ Enterprise – Deliverable 1 Meeting			
Date, Time (duration) and Venue			
· 1/September/2016 11:00 – 3:00 pm · Lee Wee Nam Library, Discussion Pod 1, Nanyang Technological University			
Attendees		**Non-Attendees**	
• Huang Jian Wei • Thomas Lim Jun Wei • Sim Long Siang • Lim Zi Yang • Lim Hao Zhe		• Genevieve Lam Wen Qi	
Chaired by: Huang Jian Wei			
Last meeting minutes have been reviewed			Yes
Progress Updates			
Task	**Problem/Issue/Progress**	**Solution/Action**	**Taken by & deadline**
Task 1	Conceptual Modelling	Discussion and proposal of requirement analysis	Jian Wei 17/09/2016
Task 2	Re-defining use case description	Long Siang – Use Case Description	Thomas 19/09/2016
Task 3	Dynamic Modelling	Thomas, Zi Yang – View Flat Long Siang – Grant Query Gen – Repayment Calculator Hao Zhe – Dialog Map	Everyone 19/09/2016
The next meeting will be held			07/09/2016
This minutes have been agreed by all attendees			Huang

Subject
GJ Enterprise – Deliverable 1 Meeting
Date, Time (duration) and Venue

- 04/September/2016 2:30 – 4:30 pm
- Nanyang Business Library, Meeting Pod 1, Nanyang Technological University

Attendees	**Non-Attendees**
• Huang Jian Wei • Thomas Lim Jun Wei • Sim Long Siang • Lim Zi Yang • Lim Hao Zhe • Genevieve Lam Wen Qi	• nil

Chaired by: Huang Jian Wei	
Last meeting minutes have been reviewed	Yes

Progress Updates

Task	**Problem/Issue/Progress**	**Solution/Action**	**Taken by & deadline**
Task 1	Settle on project topic	Build an application for BTO user enquires/research	Thomas 04/09/2016
Task 2	Determine Elicit document requirement job scope	Complete by 7/09/2016, assigned to Jian Wei & Gen	Thomas 04/09/2016
Task 3	Determine Use Case diagram & description job scope	Complete by 14/09/2016, assign to Zi Yang& Long Siang	Thomas 04/09/2016
Task 4	Determine UI mockup job scope	Complete by 14/09/2016, assign to Thomas & Hao Zhe	Thomas 04/09/2016

The next meeting will be held	07/09/2016
This minutes have been agreed by all attendees	Huang

Subject	
GJ Enterprise – Deliverable 2 Meeting	
Date, Time (duration) and Venue	
· 7/September/2016 2:30 – 4:30 pm · Software Project Lab 3	
Attendees	**Non-Attendees**
• Huang Jian Wei • Thomas Lim Jun Wei • Sim Long Siang • Lim Zi Yang • Lim Hao Zhe • Genevieve Lam Wen Qi	• nil
Chaired by: Huang Jian Wei	
Last meeting minutes have been reviewed	Yes

Progress Updates

Task	Problem/Issue/Progress	Solution/Action	Taken by & deadline
Task 1	Present on Lab 1 Deliverables	Demo by Jian Wei	Thomas 07/09/2016
Task 2	Tidy up of Lab 1 Deliverables and submission	Completed on the spot and submitted by Jian Wei	Thomas 07/09/2016

The next meeting will be held	19/09/2016
This minutes have been agreed by all attendees	Huang

Subject			
GJ Enterprise – Deliverable 2 Meeting			
Date, Time (duration) and Venue			
· 19/September/2016 3:30 – 7:30 pm · TR+ 17			
Attendees		**Non-Attendees**	
• Huang Jian Wei • Thomas Lim Jun Wei • Lim Zi Yang • Lim Hao Zhe		• Genevieve Lam Wen Qi • Sim Long Siang	
Chaired by: Huang Jian Wei			
Last meeting minutes have been reviewed			Yes
Progress Updates			
Task	**Problem/Issue/Progress**	**Solution/Action**	**Taken by & deadline**
Task 1	Refinement and Confirmation of Use Case Diagram	Demo by Jian Wei	Thomas 19/09/2016
Task 2	Refinement and Confirmation of Dialog Map	Demo by Thomas and Hao Zhe	Thomas 19/09/2016
Task 3	Refinement and Confirmation of Sequence Diagram	Demo by Zi Yang	Thomas 19/09/2016
The next meeting will be held			21/09/2016
This minutes have been agreed by all attendees			Huang

Subject	
GJ Enterprise – Deliverable 2 Meeting	
Date, Time (duration) and Venue	
· 21/September/2016 3:30 – 7:30 pm · Software Project Lab 3	
Attendees	**Non-Attendees**
• Huang Jian Wei • Thomas Lim Jun Wei • Lim Zi Yang • Lim Hao Zhe • Genevieve Lam Wen Qi • Sim Long Siang	• nil
Chaired by: Huang Jian Wei	
Last meeting minutes have been reviewed	Yes

Progress Updates

Task	Problem/Issue/Progress	Solution/Action	Taken by & deadline
Task 1	Present on Lab 2 Deliverables	Demo by Jian Wei	Thomas 21/09/2016
Task 2	Tidy up of Lab 2 Deliverables and submission	Completed on the spot and submitted by Long Siang	Thomas 21/09/2016
Task 3	Complete Use Case Diagram	Complete by 28/09/2016, assigned to Jian Wei	Thomas 21/09/2016
Task 4	System Architecture	Complete by 7/10/2016, assigned to Hao Zhe, Zi Yang and Gen	Thomas 21/09/2016
Task 5	System Architecture	Complete by 7/10/2016, assigned to Thomas and Long Siang	Thomas 21/09/2016

The next meeting will be held	07/10/2016
This minutes have been agreed by all attendees	Huang

Subject	
GJ Enterprise – Deliverable 3 Meeting	
Date, Time (duration) and Venue	
· 07/October/2016 12:30 – 5:00 pm · Software Project Lab	
Attendees	**Non-Attendees**
• Huang Jian Wei • Thomas Lim Jun Wei • Lim Zi Yang • Lim Hao Zhe • Sim Long Siang • Genevieve Lam Wen Qi	• nil
Chaired by: Huang Jian Wei	
Last meeting minutes have been reviewed	Yes

Progress Updates

Task	**Problem/Issue/Progress**	**Solution/Action**	**Taken by & deadline**
Task 1	Refinement and Confirmation of Use Case Diagram	Demo by Jian Wei	Thomas 7/10/2016
Task 2	Refinement and Confirmation of System Architecture	Demo by Thomas and Long Siang	Thomas 7/10/2016
Task 3	Demo of Application Skeleton	Demo by Zi Yang and Thomas	Thomas 7/10/2016

The next meeting will be held	11/10/2016
This minutes have been agreed by all attendees	Huang

Subject			
GJ Enterprise – Deliverable 3 Meeting			
Date, Time (duration) and Venue			
· 11/October/2016 3:30 – 9:00 pm · TR+ 17			
Attendees		**Non-Attendees**	
• Huang Jian Wei • Thomas Lim Jun Wei • Lim Zi Yang • Lim Hao Zhe • Sim Long Siang		• Genevieve Lam Wen Qi	
Chaired by: Huang Jian Wei			
Last meeting minutes have been reviewed			Yes
Progress Updates			
Task	**Problem/Issue/Progress**	**Solution/Action**	**Taken by & deadline**
Task 1	Demo of Application Skeleton and Refinement	Demo by Hao Zhe	Thomas 7/10/2016
The next meeting will be held			12/10/2016
This minutes have been agreed by all attendees			Huang

Subject	
GJ Enterprise – Deliverable 4 Meeting	
Date, Time (duration) and Venue	
· 12/October/2016 2:30 – 4:30 pm · Software Project Lab 3	
Attendees	**Non-Attendees**
• Huang Jian Wei • Thomas Lim Jun Wei • Lim Zi Yang • Lim Hao Zhe • Genevieve Lam Wen Qi • Sim Long Siang	• nil
Chaired by: Huang Jian Wei	
Last meeting minutes have been reviewed	Yes

Progress Updates

Task	Problem/Issue/Progress	Solution/Action	Taken by & deadline
Task 1	Demo of Application Skeleton and Refinement	Demo by Hao Zhe	Thomas 12/10/2016
Task 2	Coding of Features	Assigned to Hao Zhe, Gen, Zi Yang, Thomas	Thomas 12/10/2016
Task 3	Test Cases	Complete by /09/2016, assigned to Jian Wei and Long Siang	Thomas 12/10/2016

The next meeting will be held	24/10/2016
This minutes have been agreed by all attendees	Huang

Subject			
GJ Enterprise – Deliverable 4 Meeting			
Date, Time (duration) and Venue			
· 24/October/2016 3:30 – 9:00 pm · Software Project Lab			
Attendees		**Non-Attendees**	
• Huang Jian Wei • Thomas Lim Jun Wei • Lim Zi Yang • Lim Hao Zhe • Sim Long Siang • Genevieve Lam Wen Qi		• nil	
Chaired by: Huang Jian Wei			
Last meeting minutes have been reviewed			Yes
Progress Updates			
Task	**Problem/Issue/Progress**	**Solution/Action**	**Taken by & deadline**
Task 1	Demo of Application and Refinement	Demo by Hao Zhe, Zi Yang	Thomas 24/10/2016
Task 2	Confirmation of System Architecture	Demo by Jian Wei and Long Siang	Thomas 24/10/2016
The next meeting will be held			26/10/2016
This minutes have been agreed by all attendees			Huang

Subject			
GJ Enterprise – Deliverable 5 Meeting			
Date, Time (duration) and Venue			
· 26/October/2016 2:30 – 4:30 pm · Software Project Lab 3			
Attendees		**Non-Attendees**	
• Huang Jian Wei • Thomas Lim Jun Wei • Lim Zi Yang • Lim Hao Zhe • Genevieve Lam Wen Qi • Sim Long Siang		• nil	
Chaired by: Huang Jian Wei			
Last meeting minutes have been reviewed			Yes
Progress Updates			
Task	**Problem/Issue/Progress**	**Solution/Action**	**Taken by & deadline**
Task 1	Demo of Application Skeleton and Refinement	Demo by Hao Zhe	Thomas 26/10/2016
Task 2	Coding of Features	Assigned to Hao Zhe, Gen, Zi Yang, Jian Wei	Thomas 26/10/2016
Task 3	Demo of Test cases	Demo by Long Siang	Thomas 26/10/2016
Task 4	Updates on UML Diagrams	Assigned to Thomas	Thomas 26/10/2016
The next meeting will be held			04/11/2016
This minutes have been agreed by all attendees			Huang

Subject

GJ Enterprise – Deliverable 5 Meeting

Date, Time (duration) and Venue

- 04/November/2016 12:30 – 4:30 pm
- Software Project Lab

Attendees	Non-Attendees
• Huang Jian Wei • Thomas Lim Jun Wei • Lim Zi Yang • Lim Hao Zhe • Sim Long Siang	• Genevieve Lam Wen Qi

Chaired by: Huang Jian Wei	
Last meeting minutes have been reviewed	Yes

Progress Updates

Task	Problem/Issue/Progress	Solution/Action	Taken by & deadline
Task 1	Demo of Application Skeleton and Refinement	Demo by Hao Zhe	Thomas 4/11/2016
Task 2	Coding of Features	Assigned to Hao Zhe, Gen, Zi Yang, Jian Wei	Thomas 4/11/2016
Task 3	Testing Test cases	Demo by Long Siang	Thomas 4/11/2016
Task 4	Demo on UML Diagrams	Demo by Thomas	Thomas 4/11/2016
The next meeting will be held			07/11/2016
This minutes have been agreed by all attendees			Huang

Subject			
GJ Enterprise – Deliverable 5 Meeting			
Date, Time (duration) and Venue			
· 07/November/2016 4:30 – 8:00 pm · TR+23			
Attendees		**Non-Attendees**	
• Huang Jian Wei • Thomas Lim Jun Wei • Lim Zi Yang • Lim Hao Zhe • Sim Long Siang		• Genevieve Lam Wen Qi	
Chaired by: Huang Jian Wei			
Last meeting minutes have been reviewed			Yes
Progress Updates			
Task	**Problem/Issue/Progress**	**Solution/Action**	**Taken by & deadline**
Task 1	Demo of Application Skeleton and Refinement	Demo by Hao Zhe	Thomas 7/11/2016
Task 2	Coding of Features	Assigned to Hao Zhe, Zi Yang, Jian Wei	Thomas 7/11/2016
Task 3	Testing Test cases	Demo by Long Siang	Thomas 7/11/2016
Task 4	PowerPoint Slides	Assigned to Thomas	Thomas 7/11/2016
The next meeting will be held			07/11/2016
This minutes have been agreed by all attendees			Huang

Subject			
GJ Enterprise – Deliverable 5 Meeting			
Date, Time (duration) and Venue			
· 08/November/2016 4:30 – 9:30 pm · TR+32			
Attendees		**Non-Attendees**	
• Huang Jian Wei • Thomas Lim Jun Wei • Lim Zi Yang • Lim Hao Zhe • Sim Long Siang		• Genevieve Lam Wen Qi	
Chaired by: Huang Jian Wei			
Last meeting minutes have been reviewed			Yes
Progress Updates			
Task	**Problem/Issue/Progress**	**Solution/Action**	**Taken by & deadline**
Task 1	Demo of Application Skeleton and Refinement	Demo by Hao Zhe	Thomas 8/11/2016
Task 2	Coding of Features	Assigned to Hao Zhe, Zi Yang, Jian Wei	Thomas 8/11/2016
Task 3	Testing Test cases & Updating documentation	Assigned to Long Siang	Thomas 8/11/2016
Task 4	PowerPoint Slides	Assigned to Thomas	Thomas 8/11/2016
The next meeting will be held			08/11/2016
This minutes have been agreed by all attendees			Huang

Subject			
GJ Enterprise – Deliverable 5 Meeting			
Date, Time (duration) and Venue			
· 09/November/2016 10:30 – 2:30 pm · TR+32			
Attendees		**Non-Attendees**	
• Huang Jian Wei • Thomas Lim Jun Wei • Lim Zi Yang • Lim Hao Zhe • Sim Long Siang • Genevieve Lam Wen Qi		• nil	
Chaired by: Huang Jian Wei			
Last meeting minutes have been reviewed			Yes
Progress Updates			
Task	**Problem/Issue/Progress**	**Solution/Action**	**Taken by & deadline**
Task 1	Demo of Application	Demo by Hao Zhe and Jian Wei	Thomas 9/11/2016
Task 3	Updating documentation	Assigned to Long Siang , Zi Yang and Gen	Thomas 9/11/2016
Task 4	Presentation rehearsal	Demo by everyone	Thomas 9/11/2016
The next meeting will be held			10/11/2016
This minutes have been agreed by all attendees			Huang

Subject			
GJ Enterprise – Deliverable 5 Meeting			
Date, Time (duration) and Venue			
· 10/November/2016 1:30 – 2:30 pm · TR+17			
Attendees		**Non-Attendees**	
• Huang Jian Wei • Thomas Lim Jun Wei • Lim Zi Yang • Lim Hao Zhe • Sim Long Siang		• Genevieve Lam Wen Qi	
Chaired by: Huang Jian Wei			
Last meeting minutes have been reviewed			Yes
Progress Updates			
Task	**Problem/Issue/Progress**	**Solution/Action**	**Taken by & deadline**
Task 1	Video of Application	Assignment to Hao Zhe	Thomas 10/11/2016
Task 3	Updating documentation	Assigned to everyone	Thomas 10/11/2016
Task 3	Submission of Project	Complete by 13/11/2016, assigned to Jian Wei	Thomas 10/11/2016
The next meeting will be held			-
This minutes have been agreed by all attendees			Huang