

BTO Housing Management System Report

1. Design Considerations

1.1 Identification of Main Problem Domain

The project required us to support core processes for three primary stakeholders, Applicants, HDB Officers and HDB Managers, with each user's actions directly influencing others' user experience. For example, Applicants can only apply for projects when HDB Managers enable their visibility, and Officers can only proceed with flat selection responsibilities after Managers' approval. Such interconnectedness of user interactions highlights the need for a role-sensitive interface that ensures appropriate follow-up procedures with a well-defined logic.

1.2 Explicit, Implicit Requirements & Navigating Ambiguities

Several explicit requirements were outlined, such as the need for role-specific restrictions – Applicants need to satisfy age and status requirements for project application, and HDB Officers have to fulfil eligibility criteria. Meanwhile, HDB Managers oversee the creation, management and approval of BTO listings. Ensuring status flow during bookings and approvals is also crucial since there are handoffs between Officers and Managers.

Implicit requirements are crucial for safe interactions within the system. These include the need for error handling to capture only relevant responses. Moreover, logical status transitions are required for a sequential workflow that mimics the real world; for example, an application cannot be booked before its approval.

However, it was unclear whether our system should accommodate unspecified parameters like instances of other Flat Types apart from 2 and 3-room flats. To resolve this uncertainty, we treated undefined parameters as error cases and implemented error handling to demonstrate how the system can handle unexpected inputs.

1.3 Decisions on Features and Scope

1.3.1 Core Features

Core features are divided into four categories: Controllers, Entities, User Interface (UI) and Repositories.

(a) Controllers: Controller classes govern user interactions, bridge information from UIs and are tailored to serve specific functions. For example, ProjectController facilitates BTO project updates, and RegistrationController oversees officer registrations, ensuring efficient data processing.

(b) Entities: Entities are data models stored within the system. Primary user classes (Applicant, HDBManager, HDBOfficer) encapsulate user-specific attributes and behaviours, while classes like BTOProject and Enquiry define acceptable data boundaries for data processing.

(c) User Interface (UI): UI classes (ApplicantUI, OfficerUI and ManagerUI) serve as a user-engagement point, with each user having personalised dashboards to guide them through relevant menu options.

(d) Repositories: Repository classes like ApplicantRepository and RegistrationRepository retrieve data from external files, such as the User Spreadsheets provided, ensuring data persistence.

1.3.2 Optional and Excluded Features

Bonus features include a notification system that updates users on application status and statistical dashboards that aid HDB Managers in decision-making. However, they are excluded to prioritise core features in 1.3.1.

2. System Architecture and Trade-Offs

To prioritise reusability, extensibility and maintainability, we adopted a modular architecture built on the four components outlined in Section 1.3.1, promoting loose coupling, high cohesion and flexibility. While merging system logic can simplify design by reducing class counts, we chose a layered architecture with clear division of responsibilities as it reduces rigidity, fragility and immobility in the system.

3. Object-Oriented Design

3.1 Object-Oriented Principles

Stream API was employed to filter projects, find highest enquiry ID and retrieve officers-in-charge of a project. This aids in simplifying complex logic into concise and more readable codes while reducing manual looping.

(a) Abstraction: Abstract classes and interfaces, such as the User abstract class, were used to provide templates for shared features like `changePassword()` and `NRIC` for subclasses like `Applicant` and `HDBOfficer`, promoting code reusability and management.

(b) Encapsulation: Encapsulation was applied to restrict access to sensitive information by privatising data like flat details (`sellingPrice`, `flatsAvailable`), which are only accessible through public accessors like `getSellingPrice()` when `BTOProject` is visible, thus preventing unauthorised changes.

(c) Inheritance: Inheritance was used to reduce code duplication. For example, `HDBManager` subclass inherits from the `Applicant` class, allowing them to share the common attributes and methods while being able to implement role-specific functions besides the base behaviour.

(d) Polymorphism: Polymorphism was achieved through method overriding in the abstract `User` class, allowing `getRole()` to be implemented differently for subclasses like `Applicant` and `HDBManager`, enabling specific behaviour while adhering to a common abstract class.

3.2 SOLID Design Principles

(a) Single Responsibility Principle (SRP): In our system, each class only has a single responsibility. For example, `ApplicationController` only manages the logic for submitting and managing applications, while UI classes like `ManagerUI` are focused specifically on presenting information and capturing user input. This ensures that changes are independent, thereby ensuring maintainability and flexibility.

(b) Open/Closed Principle (OCP): Classes are also designed to be open for extension but closed for modification – our `ProjectFilter` class encapsulates filtering logic and allows for the addition of modular filter layers by extending the `matches()` methods without altering its current implementation. This allows for flexible enhancements without compromising existing functionality.

(c) Liskov Substitution Principle (LSP): A structured user inheritance hierarchy is upheld, where subclasses like `Applicant` and `HDB Manager` inherit from the abstract `User` class for shared attributes and methods. `HDBOfficer` then extends `Applicant` and adds officer-specific capabilities. This enables classes to interact with user types interchangeably through polymorphism, ensuring that all subclasses can substitute their parent without breaking any program logic.

(d) Interface Segregation Principle (ISP): This principle was applied through the separation of repositories responsibilities into multiple focused interfaces. Each interface provides only the specific operations that are relevant to its respective services, avoiding general-purpose interfaces.

(e) **Dependency Inversion Principle (DIP):** DIP was followed by ensuring that high-level modules like the Services classes do not depend on low-level modules but on abstractions like the Repositories interface. This decouples classes from specific implementations, modularising the system to be more adaptable to future extensions.

4. Diagrams and Implementation

4.1 Class Diagram

A clearer UML class diagram can be found in our submission folder.

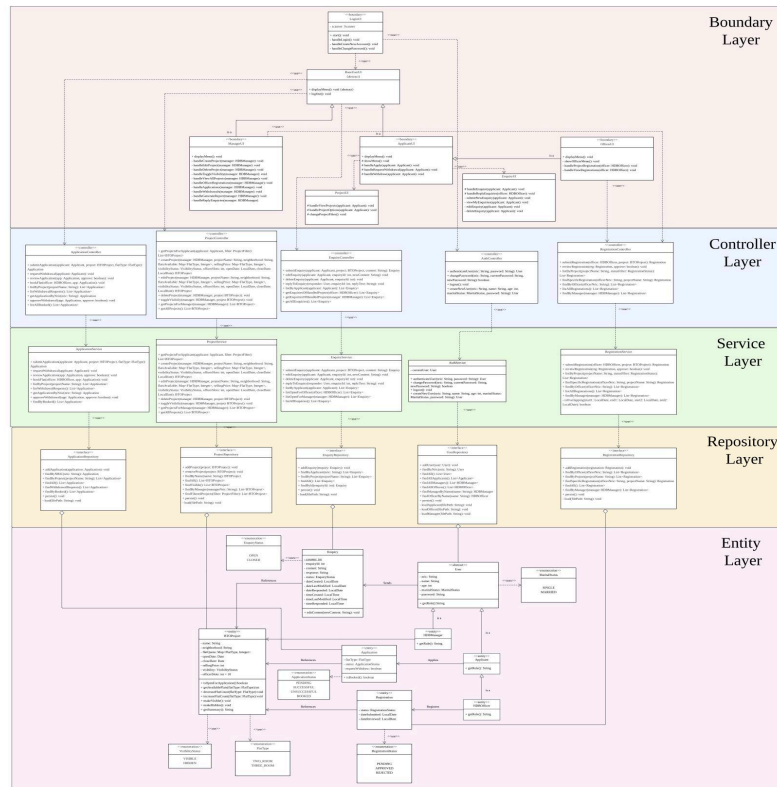


Figure A: Detailed UML Class Diagram

4.1.1 Identification of Classes

We identified main classes by extracting nouns from the problem description, allowing us to recognise other entities apart from users that should be classes, such as `BTOProject`, `Application` and `Enquiry`. Supporting classes like `Controller` and `Repository` were inferred to separate business logic and data handling.

4.1.2 Relationships Between Classes

As stated in 3.2(c), generalisation is shown in “is-a” relationships between `Applicant`, `HDBManager` and abstract `User` class, and between `HDBOfficer` and `Applicant`. Moreover, association models general “has-a” relationships between classes like `Applicant` and `Application`, and aggregation is evident in cases like `ApplicationRepository`, which has multiple `Application` instances without a strict lifecycle dependency. Lastly, dependency is shown in classes like `ProjectController` which uses methods from `ProjectService`.

4.1.3 Trade-Offs

Instead of abstractions, we used concrete classes like controllers to simplify design and focus on core programme logic, even though this approach limits flexibility.

4.2 Sequence Diagrams

Clearer sequence diagrams can also be found in our submission folder.

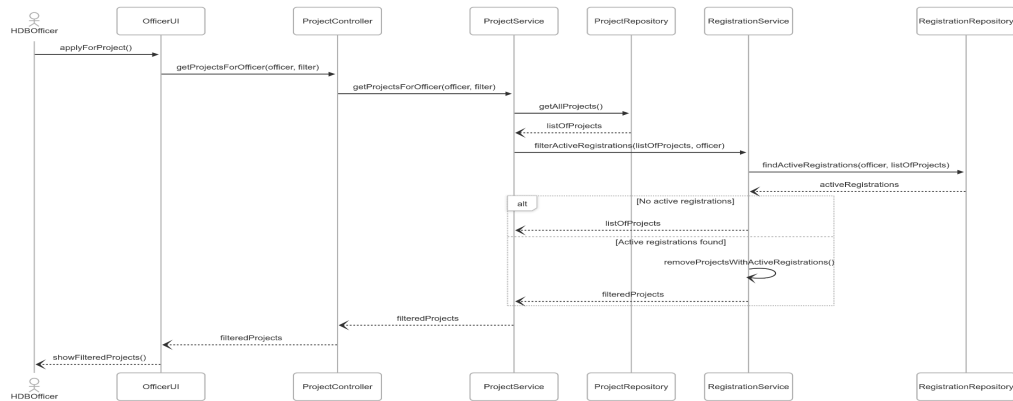


Figure B: Sequence diagram for project application of officers

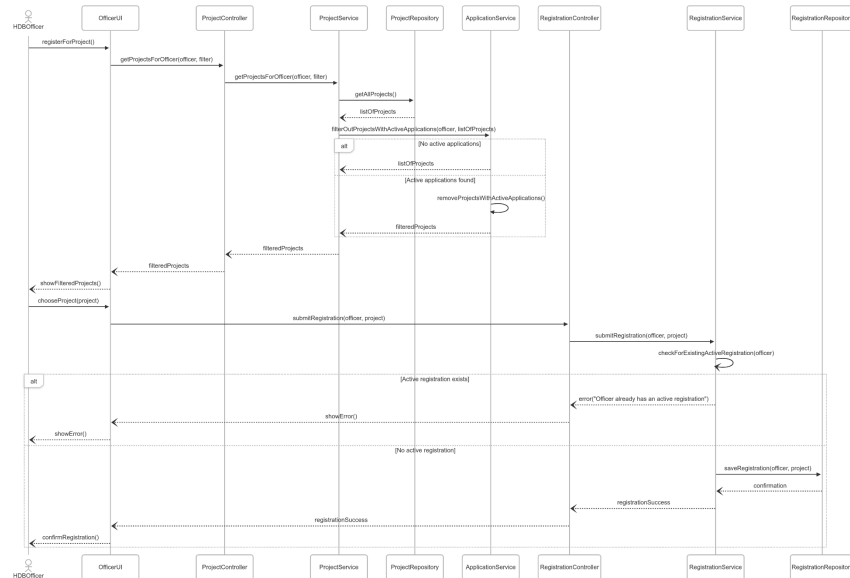


Figure C: Sequence diagram of project registration of officers

We chose to generate sequence diagrams for project application and officer registration for HDB Officers because there are two of the most critical and complex use cases involving multiple objects, conditional logic and layered interactions with other users like HDB Managers.

5. Testing

No.	Test Cases	Input	Output
1	Invalid NRIC Format	1 A1234567B password	<pre> Welcome to the BTO System! ===== Main Menu ===== 1. Login 2. Change Password 3. Create New Account 4. Exit Enter your choice: 1 Enter NRIC: A1234567B Enter Password: password Invalid credentials. Try again. Remaining try: 2 Enter NRIC: </pre>
2	Incorrect Password	S1234567A notpassword	<pre> Enter NRIC: S1234567A Enter Password: notpassword Invalid credentials. Try again. Remaining try: 1 Enter NRIC: </pre>

3	Exceeded Number of Login Tries	A1234567B notpassword	<pre> Enter NRIC: A1234567B Enter Password: notpassword Too many failed attempts. Returning to main menu... ===== Main Menu ===== 1. Login 2. Change Password 3. Create New Account 4. Exit Enter your choice: </pre>
4	Password Change Functionality	2 S1234567A password newpassword	<pre> Welcome to the BT0 System! ===== Main Menu ===== 1. Login 2. Change Password 3. Create New Account 4. Exit Enter your choice: 2 ===== Change Password ===== Enter your NRIC: S1234567A Enter your old password: password Enter your new password: newpassword Password changed successfully! </pre>
5	Creation of New Account and Logging In	<u>Creation:</u> 3 T1234567B Ashley password 30 2 <u>Login:</u> 1 T1234567B password	<div> <pre> ===== Main Menu ===== 1. Login 2. Change Password 3. Create New Account 4. Exit Enter your choice: 3 ===== Create New Account ===== Enter NRIC: T1234567B Enter Name: Ashley Enter Password: password Enter Age: 30 What is your Marital Status? 1. Single 2. Married 2 Account created successfully! Welcome, Ashley </pre> </div> <div> <pre> ===== Main Menu ===== 1. Login 2. Change Password 3. Create New Account 4. Exit Enter your choice: 1 Enter NRIC: T1234567B Enter Password: password Login successful! Welcome, AshleyAPPLICANT Welcome to the Applicant Dashboard! </pre> </div>
6	Valid User Login for another Applicant	1 S1234567A newpassword	<pre> ===== Main Menu ===== 1. Login 2. Change Password 3. Create New Account 4. Exit Enter your choice: 1 Enter NRIC: S1234567A Enter Password: newpassword Login successful! Welcome, JohnAPPLICANT Welcome to the Applicant Dashboard! === Applicant Menu === 1. View Projects 2. Apply for a Project 3. Request Withdrawal 4. View Application Status 5. Enquire about a Project 6. Logout Enter your choice: </pre>
7	View Projects based on Filters	1 1 3	<pre> === Applicant Menu === 1. View Projects 2. Apply for a Project 3. Request Withdrawal 4. View Application Status 5. Enquire about a Project 6. Logout Enter your choice: 1 === View Projects === 1. View projects with current filters 2. Change filter settings 3. Return to main menu Enter your choice: 1 === Eligible Projects === [1] Project Name: Acacia Breeze, Neighborhood: Yishun, Open Date: 2025-02-15, Close Date: 2025-04-30, Available Room Types: [THREE_ROOM, TWO_ROOM], Selling Price: [450000, 350000] [2] Project Name: Spring Breeze, Neighborhood: Jurong West, Open Date: 2025-04-24, Close Date: 2025-05-24, Available Room Types: [THREE_ROOM, TWO_ROOM], Selling Price: [300000, 200000] </pre>

^Output was too long

			<pre> === View Projects === 1. View projects with current filters 2. Change filter settings 3. Return to main menu Enter your choice: 3 Returning to main menu. </pre>
8	Project Application	2 1	<pre> === Applicant Menu === 1. View Projects 2. Apply for a Project 3. Request Withdrawal 4. View Application Status 5. Enquire about a Project 6. Logout Enter your choice: 2 </pre> <pre> === Eligible Projects === [1] Project Name: Acacia Breeze, Neighborhood: Yishun, Open Date: 2025-02-15, Close Date: 2025-04-30, Available Room Types: [THREE_ROOM, TWO_ROOM], Selling Price: [450000, 350000] [2] Project Name: Spring Breeze, Neighborhood: Jurong West, Open Date: 2025-04-24, Close Date: 2025-05-24, Available Room Types: [THREE_ROOM, TWO_ROOM], Selling Price: [300000, 200000] </pre> <pre> ✅ You are eligible only for 2-Room. It has been selected automatically. Application submitted successfully! </pre> <pre> === Applicant Menu === 1. View Projects 2. Apply for a Project 3. Request Withdrawal 4. View Application Status 5. Enquire about a Project 6. Logout Enter your choice: </pre>
9	Applicant's enquiries Management	5 <u>Submission:</u> 1 1 How many square feet is a 3 room flat? <u>View:</u> 2 <u>Edit:</u> 3 1 How far is it from the MRT? <u>Delete:</u> 4 1	<p>Submission:</p> <pre> === Applicant Menu === 1. View Projects 2. Apply for a Project 3. Request Withdrawal 4. View Application Status 5. Enquire about a Project 6. Logout Enter your choice: 5 </pre> <pre> === Project Enquiries === 1. Submit a new enquiry 2. View my enquiries 3. Edit an enquiry 4. Delete an enquiry 5. Back to main menu Enter your choice: 1 [1] Acacia Breeze [2] Spring Breeze Choose project (0 to cancel): 1 Enter your enquiry: How many square feet is a 3 room flat? Enquiry submitted. </pre> <p>View:</p> <pre> Enter your choice: 2 ID:1 Project:Acacia Breeze Status:OPEN Content:How many square feet is a 3 room flat? </pre> <p>Edit:</p> <pre> Enter your choice: 3 ID:1 Project:Acacia Breeze Status:OPEN Content:How many square feet is a 3 room flat? Enter ID to edit (0 to cancel): 1 Enter new content: How far it is from the MRT? Enquiry updated. </pre> <p>Delete:</p> <pre> Enter your choice: 4 ID:1 Project:Acacia Breeze Status:OPEN Content:How far it is from the MRT? Enter ID to delete (0 to cancel): 1 Enquiry deleted. </pre>

10	Project Visibility Based on User Group and Toggle	1 1	<pre> === Applicant Menu === 1. View Projects 2. Apply for a Project 3. Request Withdrawal 4. View Application Status 5. Enquire about a Project 6. Logout Enter your choice: 1 === View Projects === 1. View projects with current filters 2. Change filter settings 3. Return to main menu Enter your choice: 1 === Eligible Projects === [1] Project Name: Acacia Breeze, Neighborhood: Yishun, Open Date: 2025-02-15, Close Date: 2025-04-30, Available Room Types: [THREE_ROOM, TWO_ROOM], Selling Price: [450000, 350000] [2] Project Name: Spring Breeze, Neighborhood: Jurong West, Open Date: 2025-04-24, Close Date: 2025-05-24, Available Room Types: [THREE_ROOM, TWO_ROOM], Selling Price: [300000, 200000] </pre>
11	Single Flat Booking per Successful Application	2 2 1	<pre> === Applicant Menu === 1. View Projects 2. Apply for a Project 3. Request Withdrawal 4. View Application Status 5. Enquire about a Project 6. Logout Enter your choice: 2 === Eligible Projects === [1] Project Name: Acacia Breeze, Neighborhood: Yishun, Open Date: 2025-02-15, Close Date: 2025-04-30, Available Room Types: [THREE_ROOM, TWO_ROOM], Selling Price: [450000, 350000] [2] Project Name: Spring Breeze, Neighborhood: Jurong West, Open Date: 2025-04-24, Close Date: 2025-05-24, Available Room Types: [THREE_ROOM, TWO_ROOM], Selling Price: [300000, 200000] Enter the number of the project you'd like to apply for (or 0 to cancel): 2 ✔ You are eligible only for 2-Room. It has been selected automatically. Failed to submit application: You already have an active application. </pre>
12	Viewing Application Status after Visibility Toggle Off	<u>Manager Login:</u> S5678901G password <u>Manager Toggle:</u> 4 1 <u>Applicant Login:</u> S1234567A newpassword <u>Application Status:</u> 4	<pre> === Toggle Visibility === [1] Acacia Breeze (VISIBLE) [2] Spring Breeze (VISIBLE) Choose (0 to cancel): 1 Toggled. === Applicant Menu === 1. View Projects 2. Apply for a Project 3. Request Withdrawal 4. View Application Status 5. Enquire about a Project 6. Logout Enter your choice: 4 Your application status: PENDING Project Name: Acacia Breeze Flat Type: TWO_ROOM Request Withdrawal: No </pre> <p>Application Status remains unchanged even after the project is hidden.</p>

13	HDB Officer Registration Eligibility for a Project	1 T2109876H password 6 1 1	<pre> ===== Main Menu ===== 1. Login 2. Change Password 3. Create New Account 4. Exit Enter your choice: 1 Enter NRIC: T2109876H Enter Password: password Login successful! Welcome, DanielHDB_OFFICER === Officer Menu === 1. Register for a Project 2. Apply for a Project 3. Request Withdrawal 4. View Application Status 5. Enquire about a Project 6. View My Registrations 7. Reply To Enquiries 8. Confirm the Booking for Applicant 9. Logout Enter choice: 6 </pre> <pre> === My Registrations === Project: Lakeholmz Status: APPROVED === Officer Menu === 1. Register for a Project 2. Apply for a Project 3. Request Withdrawal 4. View Application Status 5. Enquire about a Project 6. View My Registrations 7. Reply To Enquiries 8. Confirm the Booking for Applicant 9. Logout Enter choice: 1 </pre> <pre> [1] Project Name: Acacia Breeze, Neighborhood: Yishun, Open Date: 2025-02-15, Close Date: 2025-04-30, Available Room Types: [THREE_ROOM, TWO_ROOM], Selling Price: [450000, 350000] [2] Project Name: Spring Breeze, Neighborhood: Jurong West, Open Date: 2025-04-24, Close Date: 2025-05-24, Available Room Types: [THREE_ROOM, TWO_ROOM], Selling Price: [300000, 200000] [3] Project Name: Lakeholmz, Neighborhood: Lakeide, Open Date: 2025-04-24, Close Date: 2025-05-24, Available Room Types: [THREE_ROOM, TWO_ROOM], Selling Price: [30000, 20000] Choose (0 to cancel): 1 You already have an approved registration in this application period. </pre>
14	HDB Officer Application for a Project as an Applicant	2 1	<pre> === Officer Menu === 1. Register for a Project 2. Apply for a Project 3. Request Withdrawal 4. View Application Status 5. Enquire about a Project 6. View My Registrations 7. Reply To Enquiries 8. Confirm the Booking for Applicant 9. Logout Enter choice: 2 </pre> <pre> === Eligible Projects === [1] Project Name: Acacia Breeze, Neighborhood: Yishun, Open Date: 2025-02-15, Close Date: 2025-04-30, Available Room Types: [THREE_ROOM, TWO_ROOM], Selling Price: [450000, 350000] [2] Project Name: Spring Breeze, Neighborhood: Jurong West, Open Date: 2025-04-24, Close Date: 2025-05-24, Available Room Types: [THREE_ROOM, TWO_ROOM], Selling Price: [300000, 200000] Enter the number of the project you'd like to apply for (or 0 to cancel): 1 ✔ You are eligible only for 2-Room. It has been selected automatically. Application submitted successfully! </pre> <p>After an officer has registered to be an Officer for a HDB Project, the project is no longer visible to them as an Applicant, ensuring that they cannot be an Officer for a project they are applying for.</p>
15	HDB Officer Registration Status	<u>Applicant:</u> 4 <u>Officer:</u> 6	<div>Applicant:</div> <pre> Your application status: PENDING Project Name: Acacia Breeze Flat Type: TWO_ROOM Request Withdrawal: No </pre> <div>Officer:</div> <pre> === My Registrations === Project: Lakeholmz Status: APPROVED </pre>
16	Project Detail Access for HDB Officer (after approval, put after manager approve)	6	<pre> === My Registrations === Project: Lakeholmz Status: APPROVED → Neighborhood : Lakeide → Open Date : 2025-04-24 → Close Date : 2025-05-24 → Flats Available: • THREE_ROOM : 20 • TWO_ROOM : 9 → Selling Price: • THREE_ROOM : \$30,000 • TWO_ROOM : \$20,000 </pre>

17	Restriction on Editing Project Details	NIL	<pre> === Officer Menu === 1. Register for a Project 2. Apply for a Project 3. Request Withdrawal 4. View Application Status 5. Enquire about a Project 6. View My Registrations 7. Reply To Enquiries 8. Confirm the Booking for Applicant 9. Logout </pre> <p>Our HDB Officer Menu does not have an option to edit project details</p>
18	Response to Project Enquiries	7 4 Yes, it is less than a 10 minute walk	<pre> === Open Enquiries === [1] From: James Project: Acacia Breeze "Where is the bus stop" [3] From: John Project: Acacia Breeze "How large is it?" [4] From: John Project: Acacia Breeze "Is it near MRT Station?" Enter enquiry ID to reply (0 to cancel): 4 Enter your reply: Yes, it is less than a 10 minute walk Reply sent successfully. </pre>
19	Flat Selection and Booking Management	8 1	<pre> Enter your choice: 4 Your application status: SUCCESSFUL Project Name: Atlantic Breeze Flat Type: THREE_ROOM Request Withdrawal: No Would you like to proceed to flat booking? (yes/no): yes ✔ Booking request submitted. Awaiting officer approval. === Officer Menu === 1. Register for a Project 2. Apply for a Project 3. Request Withdrawal 4. View Application Status 5. Enquire about a Project 6. View My Registrations 7. Reply To Enquiries 8. Confirm the Booking for Applicant 9. Logout Enter choice: 8 === Pending Bookings === [1] NRIC: T12345678 Project: Atlantic Breeze Flat: THREE_ROOM Select application to confirm booking (0 to cancel): 1 ✔ Booking successful. Receipt: </pre>
20	Receipt Generation for Flat Booking	8 1	<pre> ✔ Booking successful. Receipt: === BTO Application Receipt === Date Issued: 2025-04-24 Time Issued: 22:01:51.190462 Applicant Name: Ashley Applicant NRIC: T12345678 Applicant Age: 40 Applicant Marital Status: MARRIED Project: Atlantic Breeze Flat Type: THREE_ROOM Issued By: Emily ===== </pre> <p>Receipt is automatically generated after booking is successful</p>
21	Create, Edit, and Delete BTO Project Listings	<u>Create:</u> Atlantic Breeze Woodlands 3 300000 2 400000 4 2025-05-01 2026-05-01 <u>Edit:</u>	<p>Create:</p> <pre> === Create Project === Project Name: Atlantic Breeze Neighborhood: Woodlands Available units for TWO_ROOM: 3 Selling price for TWO_ROOM: 300000 Available units for THREE_ROOM: 2 Selling price for THREE_ROOM: 400000 Officer slots (max 10): 4 Opening date (yyyy-MM-dd): 2025-05-01 Closing date (yyyy-MM-dd): 2026-05-01 Project created successfully! </pre> <p>Edit:</p> <pre> 1) Project Name: Atlantic Breeze, Neighborhood: Woodlands, Open Date: 2025-05-01, Close Date: 2026-05-01, Available Room Types: [TWO_ROOM, THREE_ROOM], Selling Price: [300000, 400000] </pre>

		1 Oceanic Breeze Woodlands 2 300000 3 4500000 3 2025-05-01 2027-05-01 VISIBLE <u>Delete:</u> 1	<div> Choose (0 to cancel): 1 === Editing "Atlantic Breeze" === Project Name [Atlantic Breeze]: Oceanic Breeze Neighborhood [Woodlands]: Woodlands Units for TWO_ROOM [3]: 2 Price for TWO_ROOM [300000]: 300000 Units for THREE_ROOM [2]: 3 Price for THREE_ROOM [400000]: 4500000 Officer slots [4]: 3 Opening date [2025-05-01] (yyyy-MM-dd): 2025-05-01 Closing date [2026-05-01] (yyyy-MM-dd): 2027-05-01 Visibility [HIDDEN] (VISIBLE/HIDDEN): VISIBLE Project updated successfully! </div> <div> Delete: <div> === Delete Project === [1] Oceanic Breeze Choose (0 to cancel): 1 Deleted. </div> </div>
22	Single Project Management per Application Period	6 (to check status) 1 (to create new project)	<div> === My Projects === Project Name: Atlantic Breeze, Neighborhood: Woodlands, Open Date: 2025-05-01, Close Date: 2026-05-01, Available Room Types: [THREE_ROOM, TWO_ROOM], Selling Price: [300000, 200000] </div> <div> === Create Project === Project Name: Fe Breeze Neighborhood: Bukit Timah Available units for TWO_ROOM: 4 Selling price for TWO_ROOM: 300000 Available units for THREE_ROOM: 3 Selling price for THREE_ROOM: 4000000 Officer slots (max 10): 2 Opening date (yyyy-MM-dd): 2025-05-01 Closing date (yyyy-MM-dd): 2026-05-01 Failed to create project: New project window [2025-05-01-2026-05-01] overlaps with your existing project "Atlantic Breeze" [2025-05-01-2026-05-01]. </div>
23	Toggle Project Visibility	4 1	<div> === Toggle Visibility === [1] Oceanic Breeze (HIDDEN) Choose (0 to cancel): 1 Toggled. </div>
24	View All and Filtered Project Listings	5	<div> === Manager Menu === 1. Create Project 2. Edit Project 3. Delete Project 4. Toggle Project Visibility 5. View All Projects 6. View My Projects 7. Handle Officer Registrations 8. Handle Applications 9. Handle Withdrawals 10. Generate Report 11. View/Reply to Enquiries 12. Logout Enter choice: 5 </div> <div> === All Projects === Project Name: Acacia Breeze, Neighborhood: Yishun, Open Date: 2025-02-15, Close Date: 2025-04-30, Available Room Types: [THREE_ROOM, TWO_ROOM], Selling Price: [450000, 350000] Project Name: Spring Breeze, Neighborhood: Jurong West, Open Date: 2025-04-24, Close Date: 2025-05-24, Available Room Types: [THREE_ROOM, TWO_ROOM], Selling Price: [300000, 200000] Project Name: Oceanic Breeze, Neighborhood: Woodlands, Open Date: 2025-05-01, Close Date: 2026-05-01, Available Room Types: [TWO_ROOM, THREE_ROOM], Selling Price: [300000, 400000] </div>
25	Manage HDB Officer Registrations	1 1 2 y N	<div> === Officer Registrations Menu === 1. All registrations 2. Registrations under my projects 0. Back Choice: 1 </div>

			<pre>-- Status Filter -- 1. Pending only 2. Approved only 3. All Choice: 1</pre> <pre>=== Matching Registrations === [1] Sean Spring Breeze PENDING [2] Daniel Acacia Breeze PENDING Select one to process (0 to back): 2 Approve (y) or Reject (n)? y Approved. Process another? (y/N): N</pre>
26	Approve or Reject BTO Applications and Withdrawals	1 S5678901G password <u>Applications:</u> 8 1 y	<pre>==== Main Menu ==== 1. Login 2. Change Password 3. Create New Account 4. Exit Enter your choice: 1 Enter NRIC: S5678901G Enter Password: password Login successful! Welcome, JessicaHOB_MANAGER === Manager Menu === 1. Create Project 2. Edit Project 3. Delete Project 4. Toggle Project Visibility 5. View All Projects 6. View My Projects 7. Handle Officer Registrations 8. Handle Applications 9. Handle Withdrawals 10. Generate Report 11. View/Reply to Enquiries 12. Logout Enter choice: 8</pre> <pre>=== Pending Applications by Project === Project: Acacia Breeze [1] NRIC: T7654321B Flat: THREE_ROOM Project: Spring Breeze [2] NRIC: T2109876H Flat: TWO_ROOM Choose application to process (0 to cancel): 1 Approve? (y/n): y Approved.</pre>
27	Generate and Filter Reports	10 N N N	<pre>Enter choice: 10 === Booking Report === Apply filters-enter Y to enable, N to skip: • Marital status? N • Flat type? N • Age range? N === Filtered Booking Report === T7654321B age: 40 TWO_ROOM project: Lakeholmz T1234567B age: 40 THREE_ROOM project: Atlantic Breeze</pre>

6. Reflections

The application of SOLID principles was unexpectedly challenging. We often struggled to identify appropriate relationships between classes and determine when to use concrete, abstract classes or interfaces. This issue was exacerbated by the lack of a collaborative coding platform, resulting in us having to work on different parts independently. To address these problems, we leveraged VS Code's LiveShare and our group chat to facilitate discussions regarding the principles and provide regular updates on changes made to codebases and diagrams.

Although many revisions were made, there is still room for improvements. For example, we could have established composition relationships between classes like Applicant, Application and Enquiry such that it better reflects ownership and lifecycle dependencies. More interfaces and abstract classes could also be used to enhance programme extensibility.

In conclusion, this project has provided us with hands-on experience to apply OOP concepts in the design of common programmes and highlighted the need for frequent revisions to improve programme robustness.