Department of Computing and Information Systems
School of Engineering and Technology
Sunway University

SYSTEM TEST REPORT

SEMESTER	: JUNE 2024
COURSE NAME	: BIS2102 INFORMATION SYSTEM ANALYSIS AND DESIGN
INSTRUCTOR	: ASSOC. PROF. TS. DR. ASLINA BAHARUM
SYSTEM NAME	: POS Malaysia Mobile Application Modification
PROGRAM NAME	: Bachelor of Information Systems (Hons)(Data Analytics)
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NO OF DAYS LATE	0

Table of Contents

List of Figures

List of Tables

1.0 Use Case Testing

After creating an initial/paper prototype, the prototype was distributed to 3 users to test the usability of the app. All comments and results were documented as listed below.

1.1 Account Verification System

Tester	Tam Yu Xuan
Test date	4/7/2024
Prototype developer	Lauren Wong Hyun-Ee

1.1.1 Test Case 1 – Normal flow

Test Objective	To test the usability of the application during OTP verification when **successfully enters the OTP pin** and **the system runs without error.**
Potential Test Inputs (with example)	Phone number (e.g. 123456789), OTP pin number (e.g. 123458)
Expected Test Outputs (with example)	To test the usability of the application during OTP verification when **successfully enters the OTP pin** and **the system runs without error.**
Test Procedures	*Precondition:* ✓ *Click on the screen to load the application.* ✓ *Click Log In after the screen loads.* ✓ *Enter log in credentials* ✓ *If user is new to the application, proceed to create an account.* ✓ *If user has forgotten password, proceed to create a new one.*

	1. After logging in to account, choose to authenticate account. 2. Users are prompted to enter their phone numbers. a. Please enter **123456789** as phone number. 3. Users will receive a 6 pin OTP pin after entering their phone number a. For prototyping purposes, the pin is entered by increments or decrements of the default value 123456 via the "ˆ" and "ˇ" buttons. b. For this normal flow test, click on the "ˆ" button twice to increase the default pin number to **123458.** 4. Click *Authenticate Account* button, once users enter the correct pin number, their account will be authenticated, and a notification message will be sent out. 5. Users can access application services. 6. For prototyping purposes, users are prompted to start the authentication process again for alternate flow scenarios. This is initiated at the "Success" page after the completion of normal flow. a. Click *Yes* to initiate.
Actual Test Results	Success, and after clicking "yes", it brought me back to the verify account page.

1.1.2 Test Case 2 – Alternate flow

Test Objective	To test the usability of the application during OTP verification when **POS Malaysia's OTP system is down**.
Potential Test Inputs	Phone number (e.g. 123456789), OTP pin number (e.g.

(with example)	123458)
Expected Test Outputs (with example)	Successful verification of account (Users will be able to authenticate their identify successfully after navigating through scenarios where the OTP system is down)
Test Procedures	1. For prototyping purposes, users are prompted to start the authentication process again for alternate flow scenarios. This is initiated at the “Success” page after the completion of normal flow. 2. Users are prompted to authenticate their account by entering their phone numbers and clicking on *Generate OTP* button. • Enter **123456789** as phone number if the number has not been auto-filled in. **3. An error page pops up when the system encounters an error while trying to generate the OTP pin.** 4. Users are prompted to authenticate their account by entering their phone numbers and clicking on *Generate OTP* button. • Enter **123456789** as phone number 5. Users will receive a 6 pin OTP pin after entering their phone number • For prototyping purposes, the pin is entered by increments or decrements of the default value 123456 via the “ˆ” and “ˇ” buttons. • For this normal flow test, click on the “ˆ” button twice to **increase** the default OTP pin number to **123458.** 6. Once users enter the correct pin number, their account will be authenticated, and a notification message will

	be sent out. 7. Users can access application services. 8. For prototyping purposes, users are prompted to start the authentication process again for alternate flow scenarios. This is initiated at the “Success” page after the completion of normal flow. • Click *Yes* to initiate.
Actual Test Results	Success, error page shown and able to retry again.

1.1.3 Test Case 3 – Alternate flow

Test Objective	To test the usability of the application during OTP verification when **the OTP has expired**.
Potential Test Inputs (with example)	Phone number (e.g. 123456789), OTP pin number (e.g. 123458)
Expected Test Outputs (with example)	Successful verification of account (Users will be able to authenticate their identify successfully after navigating through scenarios where the OTP pin has expired)
Test Procedures	1. For prototyping purposes, users are prompted to start the authentication process again at the end of the authentication process for alternate flow scenarios. 2. Users are prompted to authenticate their account by entering their phone numbers and clicking on *Generate OTP* button. • Enter **123456789** as phone number if the number has not been auto-filled in. 3. Users will receive a 6 pin OTP pin after entering their phone number.

	• For prototyping purposes, the pin is entered by increments or decrements of the default value 123456 via the "ˆ" and "ˇ" buttons. • For this alternate flow test, click on the "ˆ" button to decrease the **increase** pin number to **123458.** 4. An error page is shown as the **OTP has expired**. Users are prompted to generate a new OTP. 5. Users will receive a 6 pin OTP pin after entering their phone number • For prototyping purposes, the pin is entered by increments or decrements of the default value 123456 via the "ˆ" and "ˇ" buttons. • For this normal flow test, click on the "ˆ" button twice to **increase** the default OTP pin number to **123458.** 6. Once users enter the correct pin number, their account will be authenticated, and a notification message will be sent out. 7. Users can access application services. 8. For prototyping purposes, users are prompted to start the authentication process again for alternate flow scenarios. This is initiated at the "Success" page after the completion of normal flow. • Click *Yes* to initiate.
Actual Test Results	Success, error page shown and able to retry again.

1.1.4 Test Case 4 – Alternate flow

Test Objective	To test the usability of the application during OTP verification when **users enter the wrong OTP.**

Potential Test Inputs (with example)	Phone number (e.g. 123456789), OTP pin number (e.g. 32557)
Expected Test Outputs (with example)	Successful verification of account (Users will be able to authenticate their identify successfully after navigating through scenarios where users enter wrong OTP numbers)
Test Procedures	1. For prototyping purposes, users are prompted to start the authentication process again at the end of the authentication process for alternate flow scenarios. 2. Users are prompted to authenticate their account by entering their phone numbers and clicking on *Generate OTP* button. • Enter **123456789** as phone number if the number has not been auto-filled in. 3. Users will receive a 6 pin OTP pin after entering their phone number. • For prototyping purposes, the pin is entered by increments or decrements of the default value 123456 via the "ˆ" and "ˇ" buttons. • For this alternate flow test, click on the "ˆ" button to **increase** the pin number to **123458.** 4. An error page is shown as the OTP has expired. Skip this page by clicking on *Generate OTP* button. 5. Users are prompted to enter phone number again. 6. Users will receive a 6 pin OTP pin after entering their phone number. • For prototyping purposes, the pin is entered by increments or decrements of the default value 123456 via the "ˆ" and "ˇ" buttons. • For this alternate flow test, click on the " ˇ " button to **decrease** the increase pin number to

	123455. 7. An error page is shown as **the OTP is incorrect**. Users are prompted to generate a new OTP. 8. Users will receive a 6 pin OTP pin after entering their phone number. • For prototyping purposes, the pin is entered by increments or decrements of the default value 123456 via the "ˆ" and "ˇ" buttons. • For this alternate flow test, click on the "ˆ" button to **increase** the pin number to **123458.** 9. Once users enter the correct pin number, their account will be authenticated, and a notification message will be sent out. 10. Users can access application services. 11. For prototyping purposes, users are prompted to start the authentication process again for alternate flow scenarios. This is initiated at the "Success" page after the completion of normal flow. • Click No to access features of mobile app.
Actual Test Results	Success, "Incorrect OTP" message shown, and after re-entering correct OTP leading to authenticate identify successfully and able to proceed to explore the features of the application.

1.2 Rate Calculator System

Tester	Lim Shen Yik
Test date	5/7/2024

Prototype developer	Khor Jia Ming

1.2.1 Test Case 1 – Normal flow

Test Objective	To test the usability of the application when users are able to **check shipping rates successfully**.
Potential Test Inputs (with example)	Region Type (Domestic/ International), Parcel Type (Parcel/ Mail), Origin Location (Selangor), Destination Location (Putrajaya), Parcel Weight (5kg)
Expected Test Outputs (with example)	Estimated shipping rates will be displayed (e.g. RATES (RM) 27)
Test Procedures	*Precondition:* ✓ *Users select Rate Calculator from the main page (This can be done from the main page or the main menu from the side bar.)* 1. Users select Region Type and Parcel Type by choosing one of the options from the dropdown menu. 2. Users select Origin and Destination Locations. 3. Users enter Parcel Weight. 4. Users can ignore Parcel Dimensions as static input has been set. 5. Users click on *Calculate* button.
Actual Test Results	Unable to enter the parcel weight.

1.2.2 Test Case 2 – Alternate flow

Test Objective	To test the usability of the application when users **do not fill in**

	parcel weight and fail to calculate shipping rates.
Potential Test Inputs (with example)	Region Type (Domestic/ International), Parcel Type (Parcel/ Mail), Origin Location (Selangor), Destination Location (Putrajaya)
Expected Test Outputs (with example)	An error message that prompts users to enter parcel weight will pop out (e.g. Enter Parcel Weight)
Test Procedures	1. Users press “A” on their keyboard, backspace, then press “A” again to navigate to Alternate Flow 1 Interface 2. Users select Region Type and Parcel Type by choosing one of the options from the dropdown menu. 3. Users select Origin and Destination Locations. 4. Users do not enter Parcel Weight. 5. Users can ignore Parcel Dimensions as static input has been set. 6. Users click on *Calculate* button. 7. Users click *OK* button.
Actual Test Results	Since the parcel weight is unable to be entered, and I have not entered anything in the 'parcel weight' section, it does not pop out any error message while the rates have been shown.

1.2.3 Test Case 3 – Alternate flow

Test Objective	To test the usability of the application when users **do not fill in or select necessary fields** and fail to calculate shipping rates.
Potential Test Inputs (with example)	Region Type (Domestic/ International), Parcel Type (Parcel/ Mail), Origin Location (Selangor), Destination Location

	(Putrajaya)
Expected Test Outputs (with example)	An error message that prompts users to ensure all fields are filled in (e.g. Please ensure all fields are complete.)
Test Procedures	1. Users press “A” on their keyboard, backspace, then press “A” again to navigate to Alternate Flow 2 Interface 2. Users randomly do not select Region Type, Parcel Type, Origin and Destination Locations. 3. Users enter Parcel Weight. 4. Users can ignore Parcel Dimensions as static input has been set. 5. Users click on Calculate. 6. Users click OK. 7. Users click on Back arrow button located on the top left corner to return to main page.
Actual Test Results	This test case is totally same with the test case 2.

1.3 Account Management System

Tester	Megat Kiefer Tan bin Kamarulzaman Tan
Test date	4/7/2024
Prototype developer	Chia Wan Ying

1.3.1 Test Case 1 – Normal flow

a. Changes to account information

Test Objective	To test the accessibility of the account by **viewing and editing information without error.**
Potential Test Inputs (with example)	View and edit with the information like name (e.g. John), phone number (e.g. +6013456789), email (e.g. email@domain.com), gender (e.g. male) and date of birth (e.g. 20/7/2024).
Expected Test Outputs (with example)	Account information saved successfully after finishing editing.
Test Procedures	*Precondition:* ✓ *Account created and logged in* ✓ *Click on the menu pages to access "My Profile" via the profile icon on main page or side menu.* 1. On users' personal profile page, users can view and edit their personal information. (For prototyping purposes, these entries are static inputs.) 2. Click *Save* button after finish working on it. 3. Skip the error page that shows up. 4. Users are notified with a display of "Information Saved". 5. Users can go back to account page by clicking *Back To Account Page* button.
Actual Test Results	• Results are the same as listed in test procedures. No issues found during testing. • After pressing the save button, user is successfully informed of information being saved.

b. Changes of password

Test Objective	To test the usability of **password changing without forgetting**

	the password and without any error.
Potential Test Inputs (with example)	Current password (e.g. abcd5678@), new password (e.g. 1234abcd!) and retype new password (e.g. 1234abcd!)
Expected Test Outputs (with example)	Users are able to change their password successfully .
Test Procedures	*Precondition:* ✓ *Account and password created and logged in* ✓ *Click on the menu pages to access "My Profile"* 1. On users' personal profile page, users can change their passwords easily. 2. Click on the *Change Password* button on the profile page. 3. Users are directed to "Change Password" page. 4. Type in users' current password **abcd5678@**, and the following new password **1234abcd!** (For prototyping purposes, these entries are static inputs.) 5. Retype the new password **1234abcd!** for confirmation. 6. Click *Change Password* button. (For prototyping purposes, these entries are static inputs.) 7. Skip error pop up message. 8. Skip error page. 9. Skip request password change page. 10. Skip request OTP page. 11. Skip reset password page. 12. Users are notified with a display of "Password Changed" 13. Click *Back To Account Page* button.

Actual Test Results	• Issues faced with Step 6: There is no option clickable to go ahead with changing the password. The only way to proceed is by accessing the reset password page. • The rest of the testing cannot be fulfilled after this problem.

c. Changes to profile picture

Test Objective	To test the usability of **uploading profile picture without error**
Potential Test Inputs (with example)	Edit picture (upload from library or take photo)
Expected Test Outputs (with example)	Profile picture uploaded successfully
Test Procedures	*Precondition:* ✓ *Account and password created and logged in* ✓ *Click on the menu pages to access "My Profile"* 1. On users' personal profile page, users can upload, change, or remove their profile pictures. 2. Click the *Edit Picture* on the profile page. 3. Choose *Upload from library, or Take Photo* (For prototyping purposes, these entries are static inputs.) 4. Click *Save* button. 5. Skip error pop message. 6. Users are notified with the display of "Profile Picture Uploaded" and users can go back to account page by clicking *Back To Account Page* button.
Actual Test Results	• Results are the same as listed in test procedures. No

	issues found during testing. • After pressing save, the user is successfully notified about the profile picture being uploaded, and can successfully return back to the account page by clicking the button.

d. Deletion of account

Test Objective	To test the usability **of account deletion without forgetting password and error.**
Potential Test Inputs (with example)	Current password (e.g. abcd5678@)
Expected Test Outputs (with example)	Account deleted successfully.
Test Procedures	*Precondition:* ✓ *Account and password created and logged in* ✓ *Click on the menu pages to access "My Profile"* 1. On users' personal profile page, users can delete their accounts. 2. Click on the *Delete Account* button on the profile page and access the account deletion page. 3. Enter the current password **abcd5678@**. (For prototyping purposes, these entries are static inputs.) 4. Click the *Delete Account* button 5. Skip error pop up message. 6. Skip error page. 7. Users are notified with the display of "Account Deleted

	Successfully". 8. Click *OK* button. 9. Users are directed to the log in page. 10. To continue with alternate flow for account management: • Click *Log In* button • Click *I'll authenticate my account later* button to skip authentication process. • Click on user profile icon on main page or from side menu bar to access account page.
Actual Test Results	• Results are the same as listed in test procedures. No issues found during testing. • The delete account button successfully brings the user back to the main log in page after being pressed.

1.3.2 Test Case 2 – Alternate flow

Test Objective	To test the usability of **viewing and editing to profile information** when **entering wrong format of information.**
Potential Test Inputs (with example)	View and edit with the information like name (e.g. John), phone number (e.g. +6013456789), email (e.g. email@domain.com), gender (e.g. male) and date of birth (e.g. 20/7/2024).
Expected Test Outputs (with example)	Successfully save and edit the users' information (Users will be able to save their profile information successfully after entering the correct format for the information).
Test Procedures	Precondition: ✓ To continue with alternate flow for account management:

	• Click *Log In* button • Click *I'll authenticate my account later* button to skip authentication process. • Click on user profile icon on main page or from side menu bar to access account page. 1. On users' personal profile page, users can view and edit their personal information. 2. Users enter the wrong format of email domain gmail.com (For prototyping purposes, these entries are static inputs.) 3. System shows an error message with the specific incorrect column and users unable to save their changes. 4. Users re-enter the correct format of the email 5. Users are notified with a display of "Information Saved". 6. Users can go back to account page by clicking *Back To Account Page* button.
Actual Test Results	• Results are the same as listed in test procedures. No issues found during testing. • After re-entering an email of the correct format, the change is successful, and the information is saved.

1.3.3 Test Case 3 – Alternate flow

Test Objective	To test the usability of **successfully changing password** after entering the **incorrect password and forgotten password**.

Potential Test Inputs (with example)	Current password (e.g. abcd5678@), new password (e.g. 1234abcd!), phone number (123456789), email address (email@domain.com), and OTP (e.g. 123456)
Expected Test Outputs (with example)	Password changed successfully after re-entering or resetting the password.
Test Procedures	1. On users' personal profile page, users can change their password. 2. Click on the *Change Password* button on the profile page. 3. Users are directed to "Change Password" page. 4. Type in users' current password **abcd5678@**, and the following new password **1234abcd!** (For prototyping purposes, these entries are static inputs.) 5. Retype the new password **1234abcd!** for confirmation. (For prototyping purposes, these entries are static inputs.) 6. Click *Change Password* button. 7. Error message pops up due to incorrect current password. 8. Click *Forgot Password?* button. 9. Users enter their registered phone number +60123456789 and click *Next* button to request for resetting the password. (For prototyping purposes, these entries are static inputs.) 10. Users enter the OTP number that send from the system to their devices and click the *Reset Password* button. (For prototyping purposes, these entries are static inputs.) 11. Users enter and retype the new password **1234abcd!**

	(For prototyping purposes, these entries are static inputs.) 12. Click on the *Save* button. 13. Users are notified with a display of “Password Changed” and go back to account page by clicking *Back To Account Page* button.
Actual Test Results	• Results are the same as listed in test procedures. No issues found during testing. • Proceeding through the reset password successfully works, and notified the user about the password change.

1.3.4 Test Case 4 – Alternate flow

Test Objective	To test the usability of **changing profile picture** when **uploading a large sized file as profile photo.**
Potential Test Inputs (with example)	Upload from library or take photo.
Expected Test Outputs (with example)	Profile picture is uploaded successfully after navigating through photo size issues.
Test Procedures	1. On users’ personal profile page, users can upload, change, or remove their profile pictures. 2. Click *Edit Picture* button on the profile page. 3. Choose *Upload from library, or Take Photo* (For prototyping purposes, these entries are static inputs.) 4. Click *Save* button.

	5. An error message is displayed due to large file size. Users are prompted to upload again. 6. Re-upload a picture. 7. Click *Save* button. 8. Users are notified with the display of “Profile Picture Uploaded” and can go back to account page by clicking *Back To Account Page* button.
Actual Test Results	• Issues faced with Step 3: There is no option clickable to upload from library as well as take photo. • The rest of the testing cannot be fulfilled after this problem.

1.3.5 Test Case 5 – Alternate flow

Test Objective	To test the usability of **account deletion** when **entering the incorrect password** or when user has **forgotten password.**
Potential Test Inputs (with example)	Current password (e.g. abcd5678@), OTP (e.g. 123456)
Expected Test Outputs (with example)	Account deleted successfully after resetting the password
Test Procedures	1. On users’ personal profile page, users can delete their accounts. 2. Click on the *Delete Account* button on the profile page and to access the account deletion page. 3. Enter the current password **abcd5678@**. (For prototyping purposes, these entries are static inputs.)

	4. Click the *Delete Account* button. 5. An error message popped out showing an incorrect password. 6. Click the *Forgotten Password* button. 7. Users enter their registered phone number +60123456789 and click *Next* to request for resetting the password. (For prototyping purposes, these entries are static inputs.) 8. Users enter the OTP number sent from the system to their devices and click the *Reset Password* button. (For prototyping purposes, these entries are static inputs.) 9. Users enter and retype the new password **1234abcd**! (For prototyping purposes, these entries are static inputs.) 10. Users click on the *Save* button. 11. Users go back to the delete account page and enter the new reset password. 12. Users are notified with the display of “Account Deleted Successfully”. 13. Click *OK* button. 14. Users are directed to the log in page.
Actual Test Results	• Results are the same as listed in test procedures. No issues found during testing. • User is successfully directed back to the log in page after the deletion of account.

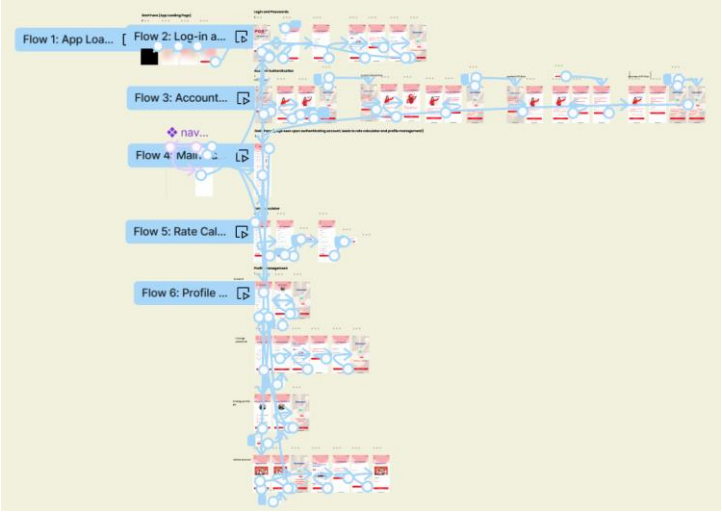
2.0 Initial Prototype

The structure of the initial prototype that was distributed to users for use case testing and heuristic testing is documented as shown in the figures below.

2.1 Overview of Paper/Initial Prototype

Figure 2.1. 1 *Overview of Paper Prototype (UI)*

Figure 2.1. 2 *Overview of Paper Prototype (UX)*



2.2 *Prototype Views based on Functions (Use Cases)*

Figure 2.2. 1 *Overview of App Loading Page*

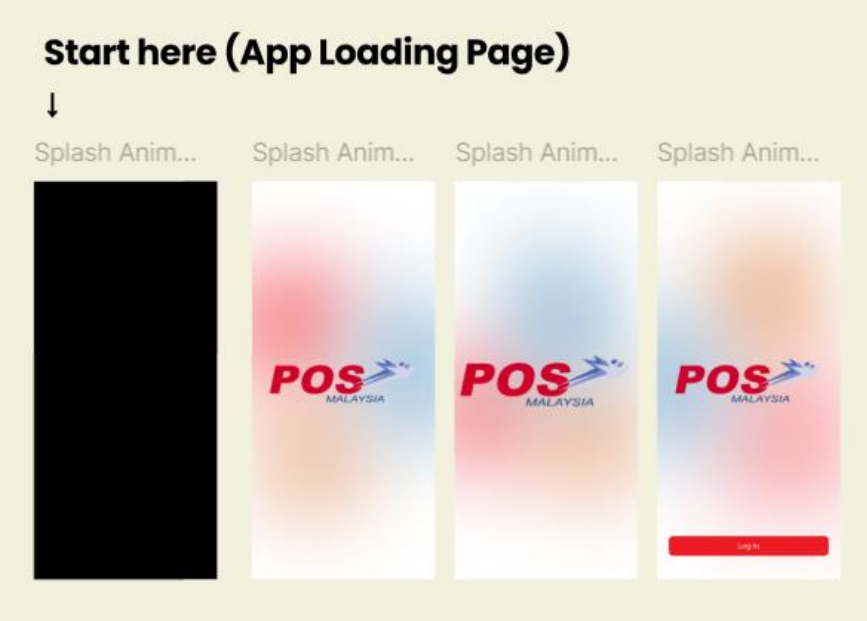


Figure 2.2. 2 *Overview of Login Page*

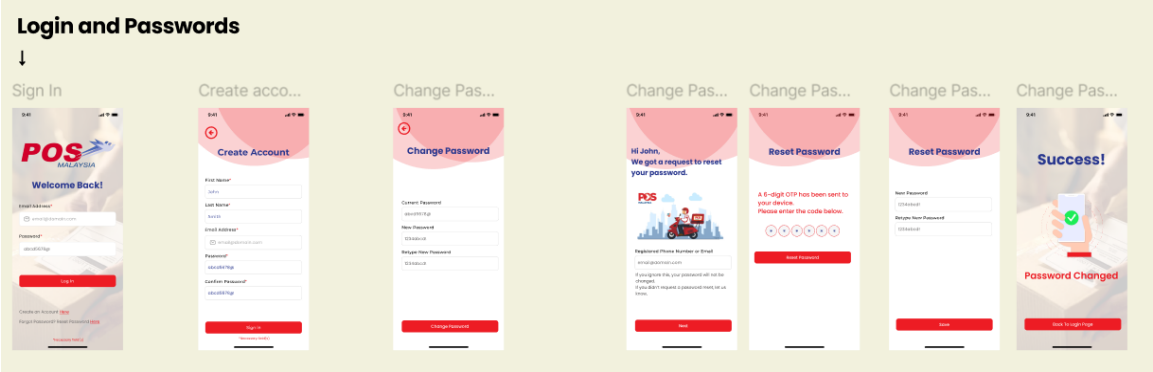


Figure 2.2. 3 *Overview of Account Verification/Authentication Page*

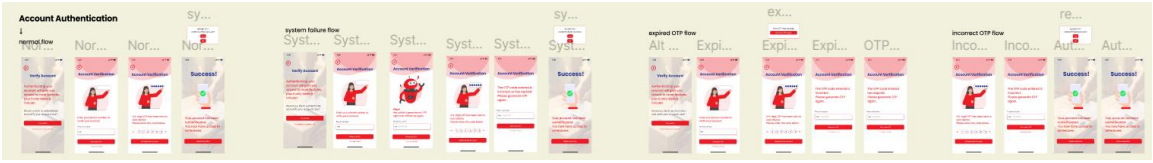


Figure 2.2. 4 *Overview of Main Page*

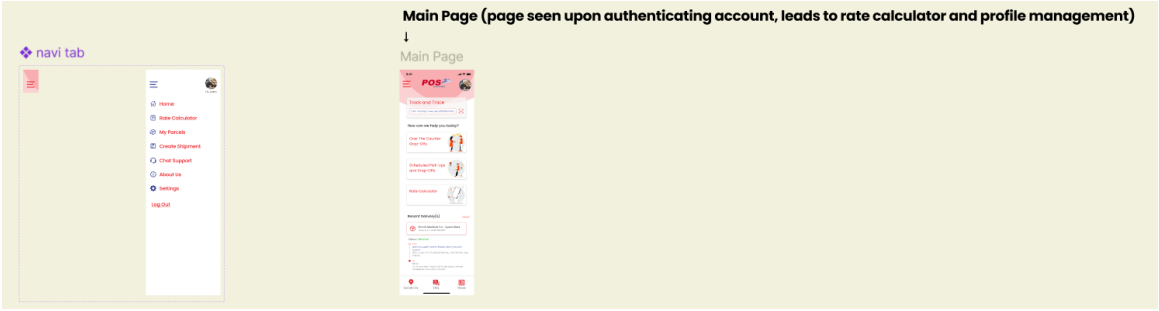


Figure 2.2. 5 *Overview of Rate Calculator Page*

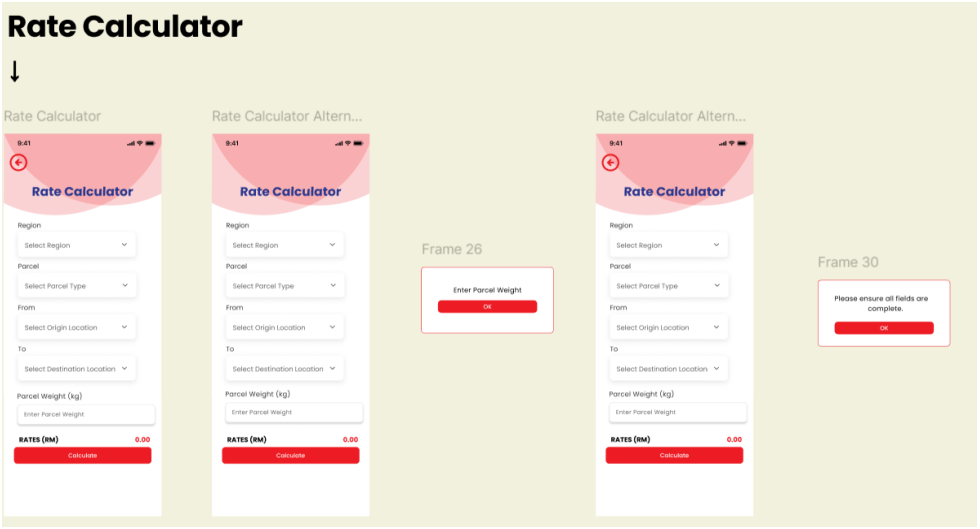
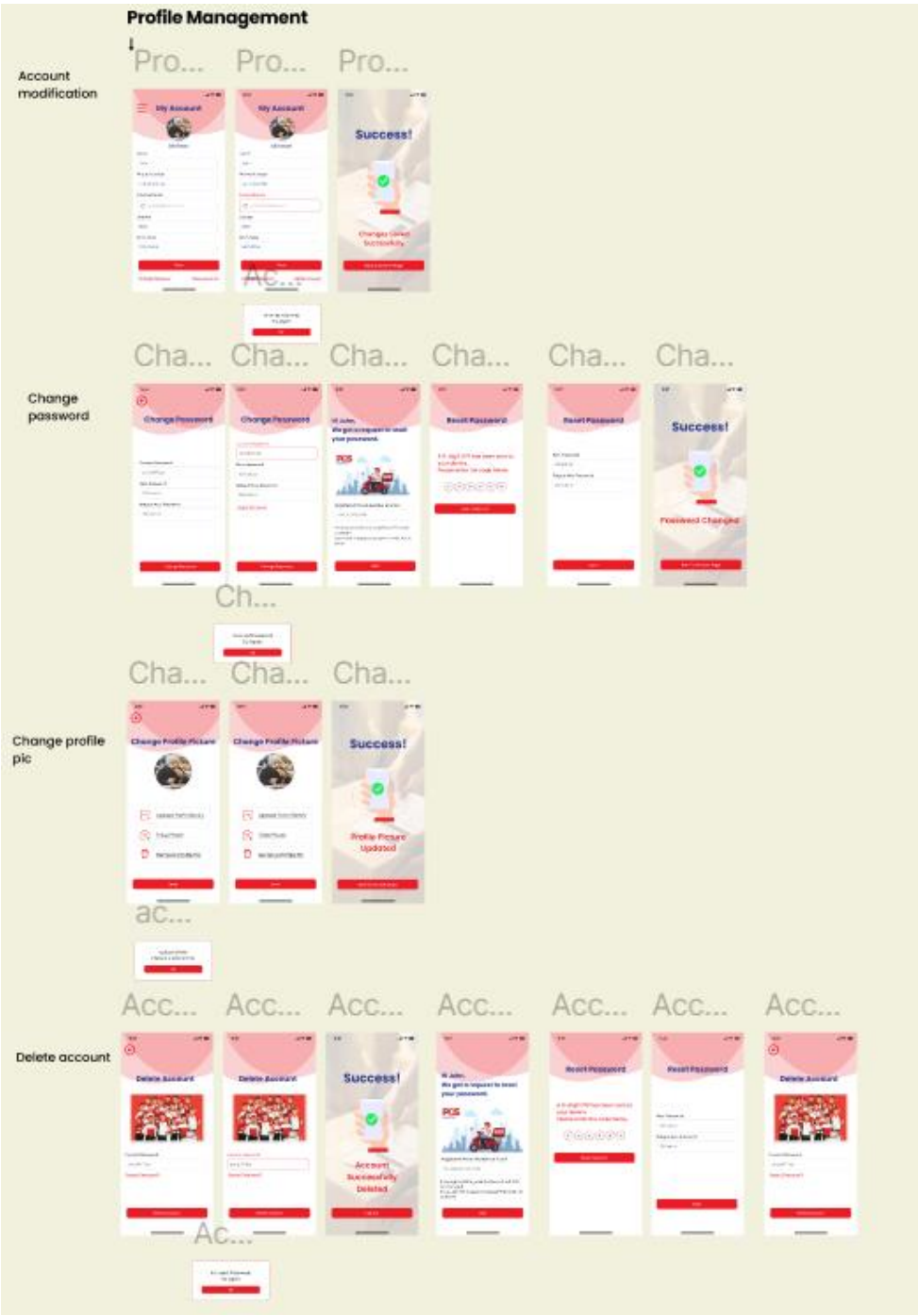


Figure 2.2. 6 *Overview of Profile Management Page*


Profile Management
Account modification
Change password
Change profile pic
Delete account
Success!

3.0 Testing Process

3.1 Heuristic Evaluation

Nielsen and Molich's 10 rules of thumb was implemented to perform the heuristic evaluation of POS Malaysia's modified mobile application (Nielsen, 2024). The template below was adapted from the templates given in the course. The procedures for heuristic evaluation are the same as previous use case testing procedures. The prototype was updated according to user feedback from this testing.

Rating Guidelines:

0	1	2	3	4
No problem or issue.	Cosmetic or minimal issue. Stretch goal to fix.	Minor issue. Low-priority fix.	Major Problem. High-priority fix.	Critical issue. It must be fixed before release.

a) Tester 1

Heuristic AR Evaluation Sheet	Device: Laptop
Evaluator: Terrence Teoh Jin Haw	Browser/OS: Google Chrome
Website/App: App	Task/Feature: To test the usability of the app
Date: 3/7/2024	

UI Design Guidelines	Rating (0 – 4)	Is this role being applied? How so?	Is this rule violated? How so?	How can this rule further improve usability, utility, and desirability?
1. Visibility of system status • Does the design keep users informed	0	Yes, the design application is neat	None	None

about what is going on?		can be read and understood with one go. Home page is also well designed and highlights all the features of the application, enabling ease of access to the user.		
2. Match between system and the real world • Are terms, concepts, icons, images etc clear and understandable?	0	Yes, it is well designed and can be clearly understood. It has the simplicity to the design and making it user friendly.	None	None
3. User control and freedom • Do you have control over the system? Can you navigate to previous pages easily?	0	Yes, it is applied by allowing users to backtrack to previous pages. Users are able to access to the features easily.	None	None
4. Consistency and standards • Are all terms consistent? Do you understand them clearly?	0	Yes, terms are consistent and can be understood clear. Users are able to identify input that are required in the application.	None	None
5. Error prevention • Are errors prevented? Are error measures implemented?	0	Yes, the application implements error prevention, specifically the login	None	None

		page. Error messages are displayed when inputting invalid values.		
6. Recognition rather than recall • Are elements, actions, and options visible? Is information easily retrievable?	0	Information is displayed and designed in a clean way that information can be retrieved at one glance. This applies to information such as the parcel information alongside with its tracking details and status.	None	None
7. Flexibility and efficiency of use • Are there shortcuts that speed up processes?	2	The design is efficient for users to hover for the functions as the home page includes all the features available.	The OTP (one-time password) process will need to be regenerated when attempted with an error once, making the authentication process for user's account inefficient.	A 1-minute time limit could be added for multiple attempts of entering the OTP and users would not need to generate the OTP code multiple times.
8. Aesthetic and minimalist design • Are all information relevant? Is there unnecessary information?	1	The designed is well created with the aim being the simplicity. Aesthetic design with the use of red and white is chosen well with the text being red to highlight the texts.	The password request page includes unnecessary information.	The message "If you did not request a password reset, please let us know. The flaw is that the message in displayed on a password reset page. Instead of displaying the

				message at that page, it could be displayed alongside the OTP (One-Time Password) message.
9. Help users recognise, diagnose and recover from errors • When encountering problems, are there error messages that notify users of the problem and provide solutions?	1	Yes, errors are recoverable when inputting invalid values such as the OTP is applied.	There could be a possibility of an error when inputting an invalid password to its subsequent email.	A pop-up message that suggests the user to reset it password.
10. Help and documentation • Are there ways to help users when encountered with a problem? (e.g. FAQ)	3	Errors such as invalid password are provided with a solution by adding a "Forgot Password" button for users to reset their password.	One possibility is that users could have a specific problem throughout their login process and may need help and contact from PosLaju itself. It would be no available direct solutions for the users.	The design could be improved by adding a contact number to allow users to directly contact customer support staff at PosLaju to address the issue. Another approach would be adding a Frequently Asked Question (FAQ) page, by having a button to redirect users to a FAQ page. The page may consist of common problems users have encountered and its solutions could provide solutions for the users without contacting anyone.

b) Tester 2

Heuristic AR Evaluation Sheet	Device: Laptop
Evaluator: Inpik Deern	Browser/OS: Google Chrome
Website/App: App	Task/Feature: To test the usability of the app
Date: 4/7/2024	

UI Design Guidelines	**Rating (0 – 4)**	**Is this role being applied? How so?**	**Is this rule violated? How so?**	**How can this rule further improve usability, utility, and desirability?**
1. Visibility of system status • Does the design keep users informed about what is going on?	0	Yes, it shows a clear status indicators and feedback mechanisms.	No, the system provides status updates and notifications to ensure users are well-informed.	Continue to enhance real-time feedback to provide clearer status updates for complex operations
2. Match between system and the real world • Are terms, concepts, icons, images etc clear and understandable?	0	Yes, terms, concepts, icons, and images are clear and understandable	No, terms, concepts, icons, and images provide a clear instruction to user.	Continuously update and refine terms and icons.
3. User control and freedom • Do you have control over the system? Can you navigate to previous pages easily?	0	Yes, user can easily control the system with convenient navigation options	No, users can easily navigate the system.	Further improvement can be made by incorporating more advanced navigation aids
4. Consistency and standards • Are all terms consistent? Do you understand them clearly?	0	Yes, the design makes it easy to understand and use the system.	No, the system establishes standards and conventions for users to easily understand	Maintain a style guide to ensure ongoing consistency, and review interfaces regularly as the system evolves to

				ensure adherence to established standards.
5. Error prevention • Are errors prevented? Are error measures implemented?	0	Yes, the design incorporates measures to prevent errors, such as validation checks.	No, the system effectively prevents most user errors and provides a helpful guidance when errors occur.	Provide clearer instructions to prevent errors.
6. Recognition rather than recall • Are elements, actions, and options visible? Is information easily retrievable?	0	Yes, elements, actions, and options are visible, and information is easily retrievable.	No, the interface ensures that users can easily recognise options	Provide visual cues and tooltips to assist in identification.
7. Flexibility and efficiency of use • Are there shortcuts that speed up processes?	1	Yes, the system provides shortcuts to speed up the user's process.	No, this rule is not significantly violated. However, there could be more shortcuts and customisation options to enhance efficiency.	Add more keyboard shortcuts, allowing users to customise shortcuts
8. Aesthetic and minimalist design • Are all information relevant? Is there unnecessary information?	0	Yes, the design is clean, with all information relevant and no unnecessary elements.	No, the interface maintains a minimalist aesthetic.	Continuous improvement can be achieved by regularly reviewing the interface to remove any redundant elements.
9. Help users recognise, diagnose and recover from errors • When encountering problems, are there	0	Yes, error messages notify users of problems and provide clear solutions.	No, the system provides helpful error messages that guide users to diagnose	Provide links to help resources directly in error messages

error messages that notify users of the problem and provide solutions?			and recover from issues.	
10. Help and documentation • Are there ways to help users when encountered with a problem? (e.g. FAQ)	1	Yes, there are resources available to help users when they encounter problems, such as FAQs and help documentation.	No, this rule is not significantly violated. However, the help resources could be more comprehensive and easier to access.	Improve by expanding the help documentation, ensuring it is easy to search, and providing context-sensitive help within the interface.

3.2 Pilot Test

Pilot testing was carried out after gaining feedback from heuristic testing and is conducted before usability testing. The procedure for this testing is included in **Appendix A**. The prototype was updated according to user feedback from this testing.

System	Test Case	Tester (Thurgga Kuna Seelan) Results
Account Verification System	**Test Case 1 – Normal Flow (OTP Pin Generation)**	Tested the OTP process on the app, the flow is good, as a user I understand how to use it, it's a simple process that shows user how to verify.
	Test Case 2 – Alternate Flow (OTP system is down)	The use of the feature is good, it has shown that the error page has pop up, indicated me as a user, I understand and have to try again, by showing me what to do.
	Test Case 3 – Alternate flow (OTP expired)	As a user, I understand that the OTP has expired and have to do to the process again, clear and understanding as a user.
	Test Case 4 – Alternate flow (OTP incorrect)	As users can understand the flow, if entering wrong OTP, instructions clear. Process is good.
Rate Calculator System	**Test Case 1 – Normal flow (Rate Shown)**	The feature works, by giving clear instruction on how to use, it works clearly by giving the right amount.

	Test Case 2 – Alternate flow (Weight not entered)	The feature, the error message did not pop up, when I did not enter any amount in the "**Enter Parcel Weight**", It was not clear to me as a user if, that field was necessary to enter.
	Test Case 3 – Alternate flow (Necessary fields not entered)	Same as before, no error message was shown.
Account Management System	**Test Case 1 – Normal flow (Changes to account information)**	Profile process works well, the steps are easy to navigate.
	Test Case 2 – Normal Flow (Changes to password)	Process is smooth, steps are well understood for any users.
	Test Case 3 – Normal flow (Changes to profile picture)	The profile photo feature works well, steps are easy for users to use.
	Test Case 4 – Normal flow (Deletion of account)	Users are able to view the profile, if users want to Delete Account, the process works smoothly, as the steps are clear.
	Test Case 5 – Alternate Flow (Wrong email format)	Steps are clear for users, if want to save user information, error message box has shown that email is typed incorrectly and have to re-entry correct email.
	Test Case 6 –Alternate flow (Incorrect or forgot password)	Steps to change password is clear, users are able to navigate.
	Test Case 7 – Alternate flow (Large picture/file size	Steps to updates the profile photo is clear.

	uploaded)	
	Test Case 8 – Alternate Flow (Incorrect password entered / User forgot password)	Steps to delete account is simple and clear, as user could navigate smoothly.

3.3 Usability Testing

After gaining feedback from the pilot test and making changes to the prototype, a total of 3 testers tested the usability of the 3 use cases in the application – OTP Authentication System, Rate Calculator System, and Account Management System. The updated procedure for this testing is included in **Appendix B**. The prototype was updated according to user feedback after this testing.

System	Test Case	Tester 1 (Cheong Cheng Yi) Results	Tester 2 (Wong Wan Yi) Results	Tester 3 (De Jia Xian) Results
OTP Authentication System	**Test Case 1 – Normal Flow (OTP Pin Generation)**	Should add request OTP code again to ensure user can receive a new OTP code if user don't receive the previous OTP code. Others function works.	OTP pin is successfully generated.	Successfully generated OTP, and successfully prompted to restart the OTP authentication process.
	Test Case 2 – Alternate Flow (OTP system is down)	Function works	Error message of OTP system is successfully shown.	Successfully viewed error page that indicates error while trying to generate the OTP. Successfully prompted to restart the OTP authentication process.
	Test Case 3 – Alternate flow (OTP expired)	Function works	Error page of OTP code expired is successfully shown.	Successfully viewed error page that indicates OTP has expired.
	Test Case 4 – Alternate flow (OTP incorrect)	Function works	Error message displays successfully when OTP is incorrect.	Successfully viewed error page that indicates OTP entered is incorrect.

Rate Calculator System	**Test Case 1 – Normal flow (Rate Shown)**	Functions works	Parcel rate is displayed.	Rate is successfully calculated and displayed on the page.
	Test Case 2 – Alternate flow (Weight not entered)	Functions works	Error message is shown when parcel weight is not entered.	Error message that prompts user to enter parcel weight is successfully displayed on the page.
	Test Case 3 – Alternate flow (Necessary fields not entered)	Functions works	Error message is shown to fill up necessary fields.	Error message that prompts user to ensure all fields are complete is successfully displayed on the page.
Account Management System	**Test Case 1.1 – Normal flow (Account Information Modification)**	Seems to be weird when I just click on the profile picture without any changes then it shows “Changes Saved Successfully The “Restart account information editing process” notification seems to be quite annoying to user when they just finish their changes, but the system shows the notification of restart editing process.	Modification is saved successfully.	Profile changes are saved successfully. User is successfully prompted to restart profile editing process.
	Test Case 1.2 – Alternate Flow (Wrong email format)	It shows “Changes Saved Successfully” when I just click to the column without fill in new information Can’t trigger the error message.	Error message is shown successfully.	Error message “Incorrect Format. Try Again.” is successfully displayed on the page, prompting users to enter again their email address. After fixing the error, user is successfully

				redirected back to account page.
	Test Case 2.1 – Normal flow (Password modification)	The “Restart password modification process” notification seems to be quite annoying to user when they just finish their changes, but the system shows the notification of restart modification process.	Modification is successfully saved.	Password changes are saved successfully. User is successfully prompted to restart password modification process.
	Test Case 2.2 – Alternate flow (Incorrect password entered)	Function works	Error message successfully shown.	Error message indicating that password is incorrect is successfully displayed. After re-entering password correctly, user’s password changes are successfully saved.
	Test Case 2.3 – Alternate Flow (Forgot password)	Function works	Forgot password feature functions successfully.	User is successfully redirected to reset password page. After entering registered phone number and 6-digit OTP, user can change password successfully. Then, the changed password is saved successfully.
	Test Case 3.1 – Normal flow (Profile picture update)	The “Restart profile picture modification process” notification seems to be quite annoying to user when they just finish their changes, but the system	Update new profile picture is functioned successfully.	Users can change profile picture successfully.

		shows the notification of restart modification process.		
	Test Case 3.2 – Alternate flow (Large picture/file size uploaded)	Function works	Error message to re-upload profile picture is shown.	Error message stating “Upload failed. Choose a smaller file.” is successfully displayed. After re-uploading picture, user can successfully save and update their profile picture.
	Test Case 4.1 – Normal Flow (Account Deleted)	The “Restart account deletion process” notification seems to be quite weird to user when they just finish their changes, but the system shows the notification of restart modification process.	Delete account is functioned successfully.	User can delete account successfully. Display of “Account Deleted Successfully” is shown.
	Test Case 4.2 – Alternate Flow (Incorrect Password Entered)	Function works	Error message of incorrect password is shown successfully.	Error message stating “Incorrect Password. Try Again.” is successfully displayed. After re-entering correct password, user can delete account successfully.
	Test Case 4.3 – Alternate Flow (User forgot password)	Function works	Forgot password function is shown successfully.	User is successfully redirected to reset password page. After entering registered phone number and 6-digit OTP, user can change password successfully. Then, the user is successfully redirected back to “Delete Account”

				page. User can delete account successfully.

4.0 Final Prototype

The final prototype was produced after countless modifications to the prototype according to user feedback from Sections *1.0 Use Case Testing*, *3.1 Heuristic Evaluation*, *3.2 Pilot Test*, and *3.3 Usability Testing*. Provided below is the summary of changes made to the final prototype in addition to the overview of the prototype.

4.1 Summary of Changes Made to Produce Final Prototype

Table 4. 1 *Summary of Changes Made to Prototype*

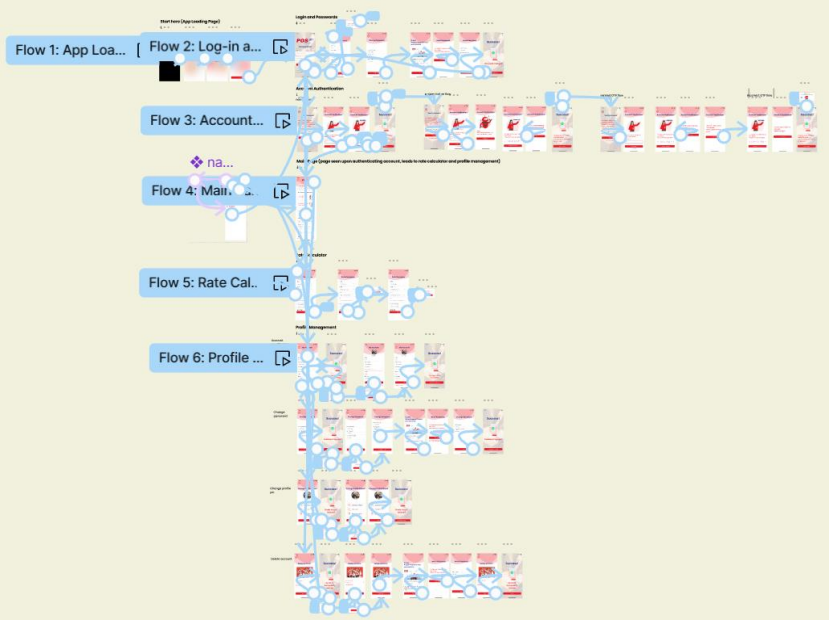
Testing	Changes made after feedback
Use Case Testing	None
Heuristic Testing	1. Repetitive user input for phone numbers in the OTP process was removed to improve usability. 2. A *Help* button was added to the login page so that users know who to contact when they encounter problems. 3. A welcome message was added to the rate calculator page to instruct users on how to use the feature.
Pilot Testing	1. In rate calculator, a welcome message is inserted to indicate that all fields must be filled.
Usability Testing	1. The procedure of the account manangement process was modified for a better user experience between normal flows and alternate flows (see **Appendix B**). 2. The flow for “Alternate Flow (Incorrect Password Entered)” under Account Management System is modified to account for situations where users enter a wrong password without forgetting the password.

Table 4. 1 shows the summary of changes made after gathering tester feedback. These changes ultimately led to the final prototype. The procedures for each test cases in the final prototype can be viewed in **Appendix B**.

4.2 Final Prototype

Figure 4.2. 1 *Overview of Final Prototype (UI)*

Figure 4.2. 2 *Overview of Final Prototype (UX)*



5.0 Digital Mockup

After modifying the prototype according to user feedback, the final prototype was released and can be accessed through this Figma link. The figures below show the mockup of the prototype based on each test case. The procedure for each test case can be viewed in **Appendix B**.

Figure 5. 1 *Overview of App Loading Page*

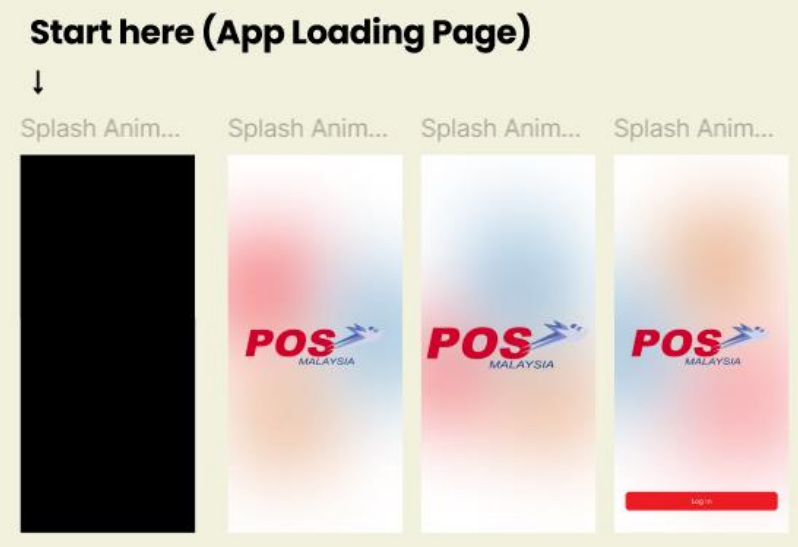


Figure 5. 2 *Overview of Login Page and Change Password Pages*

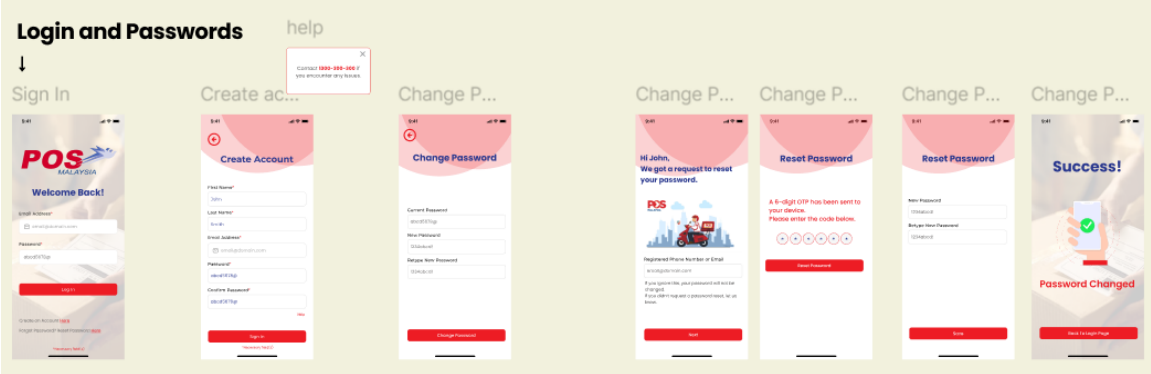
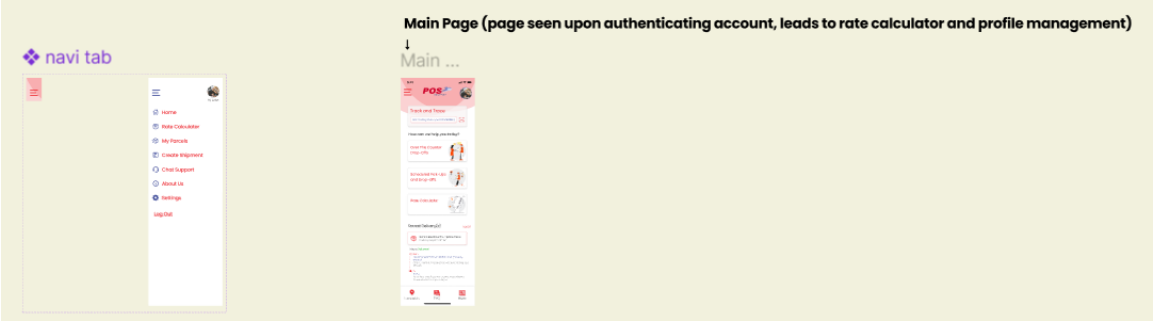


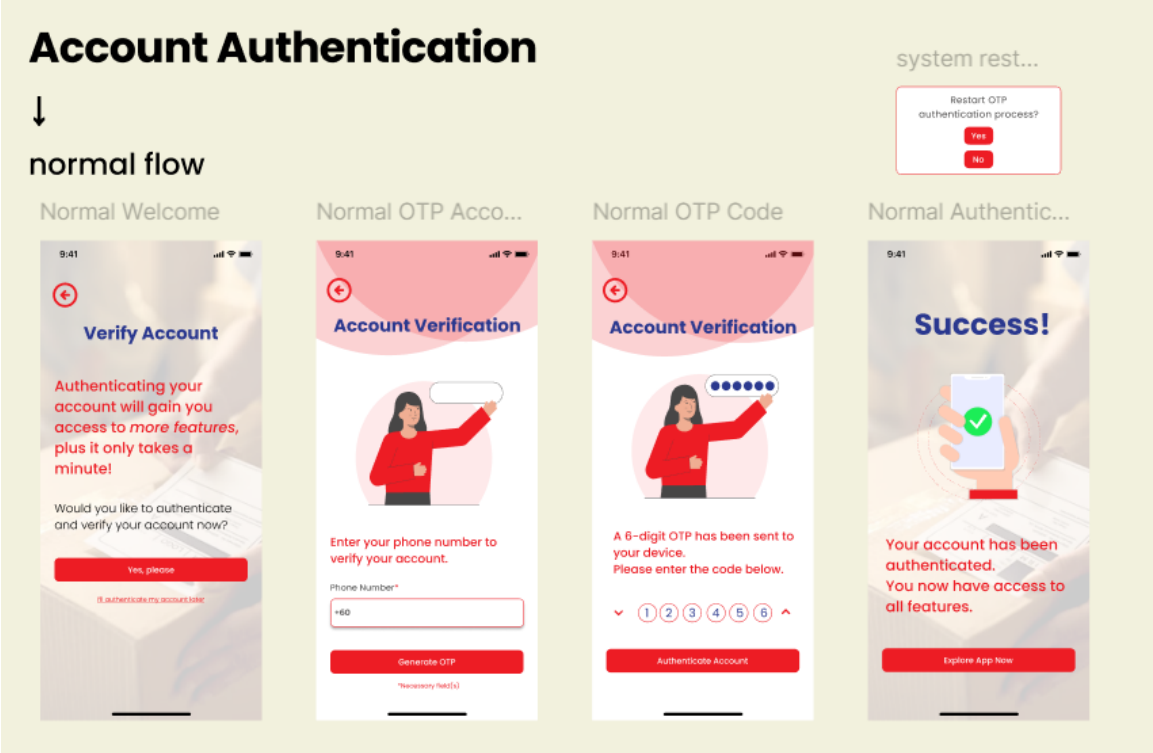
Figure 5. 3 *Overview of Main Page (Accessed After Authenticating Account)*



1) Use Case 1: OTP Verification System

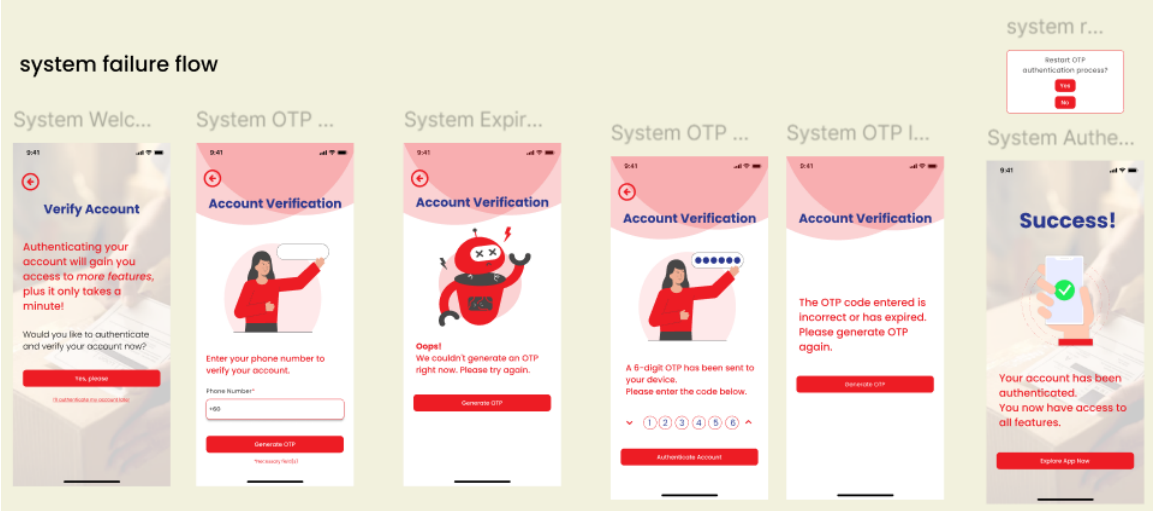
a) Test Case 1 – Normal Flow (OTP Pin Generation)

Figure 5. 4 *Account Verification/Authentication Page (Normal Flow)*



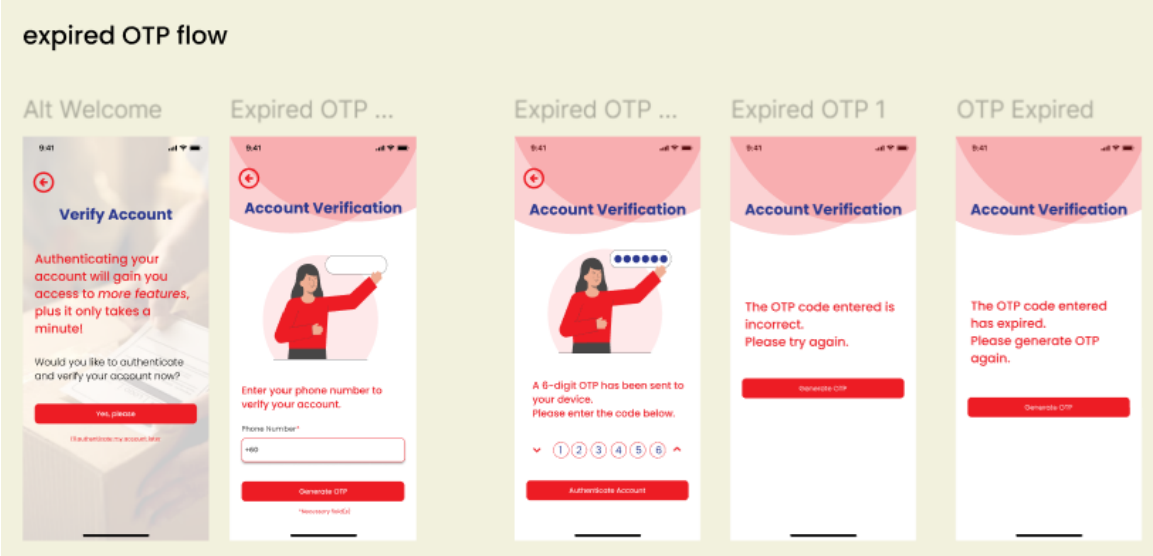
b) Test Case 2 – Alternate Flow (OTP system is down)

Figure 5. 5 *Account Verification/Authentication Page (Alternate Flow for OTP System Failure)*



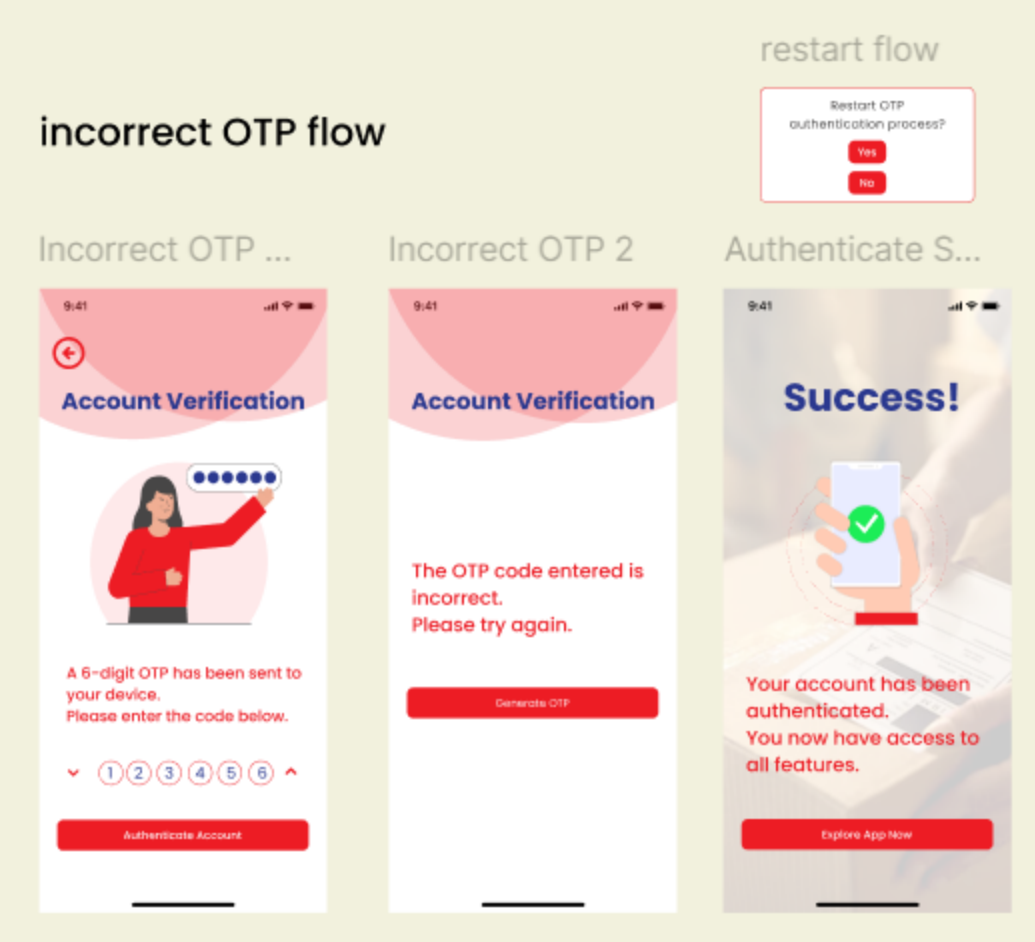
c) Test Case 3 – Alternate flow (OTP expired)

Figure 5. 6 *Account Verification/Authentication Page (Alternate Flow for Expired OTP)*



d) Test Case 4 – Alternate flow (OTP incorrect)

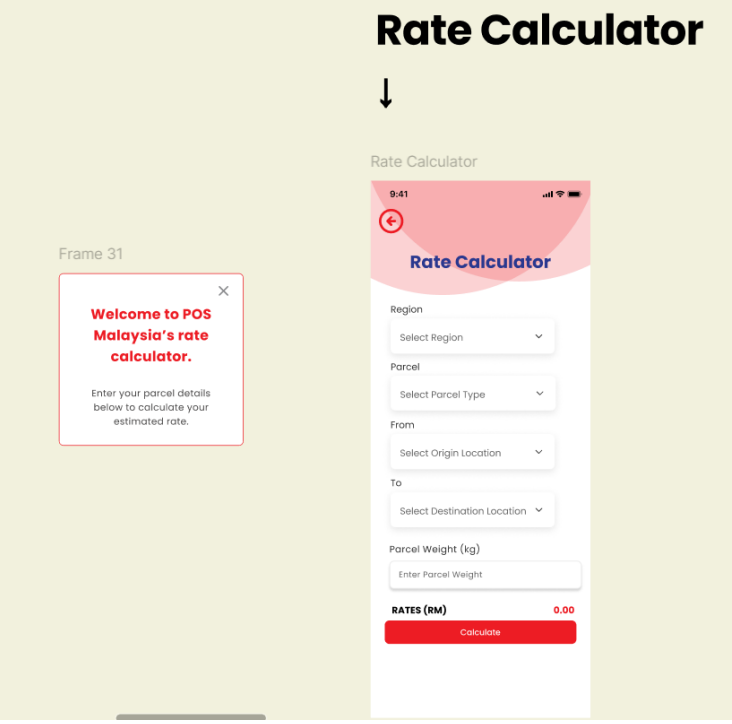
Figure 5. 7 *Account Verification/Authentication Page (Alternate Flow for Incorrect OTP)*



2) Use Case 2: Rate Calculator System

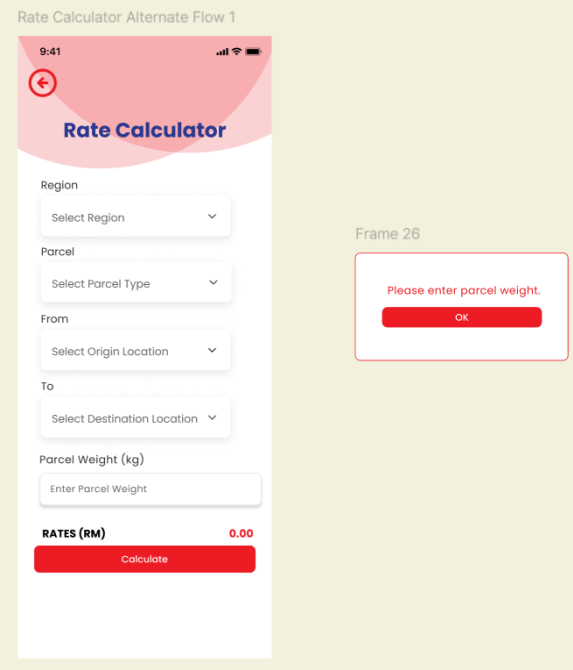
a) Test Case 1 – Normal flow (Rate Shown)

Figure 5. 8 *Rate Calculator Page (Normal Flow)*



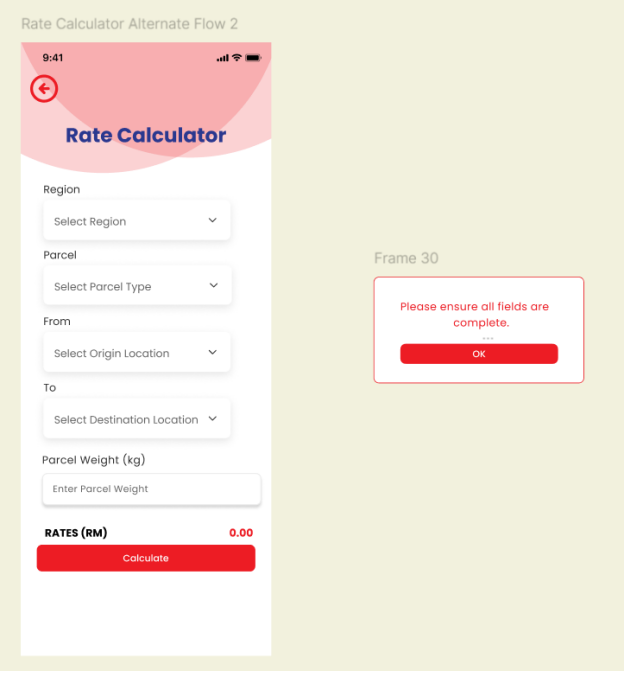
b) Test Case 2 – Alternate flow (Weight not entered)

Figure 5. 9 *Rate Calculator Page (Alternate Flow for Empty Weight Field)*



c) Test Case 3 – Alternate flow (Necessary fields not entered)

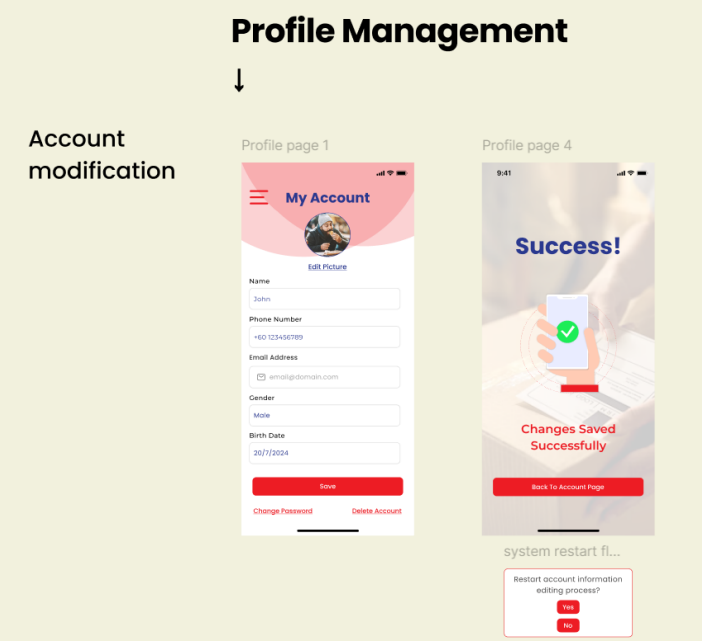
Figure 5. 10 *Rate Calculator Page (Alternate Flow for Unentered Fields)*



3) Use Case 3: Account Management System

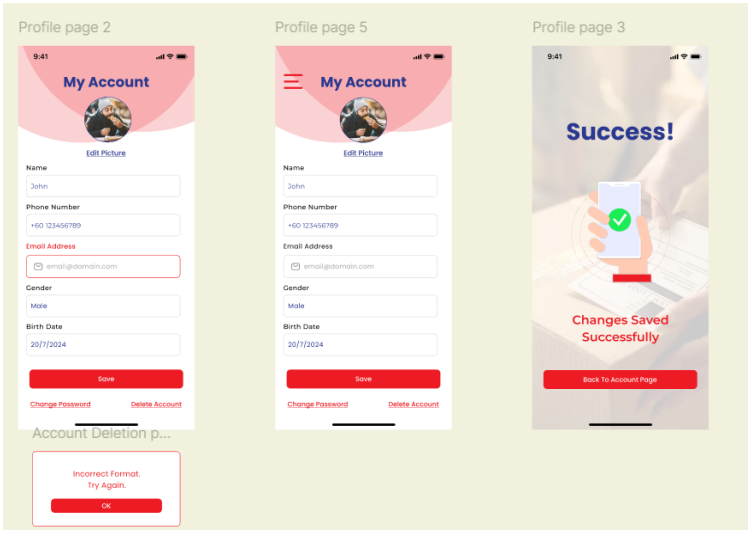
a) Test Case 1.1 – Normal flow (Account Information Modification)

Figure 5. 11 *Profile Management Page (Normal Flow for Account Modification)*



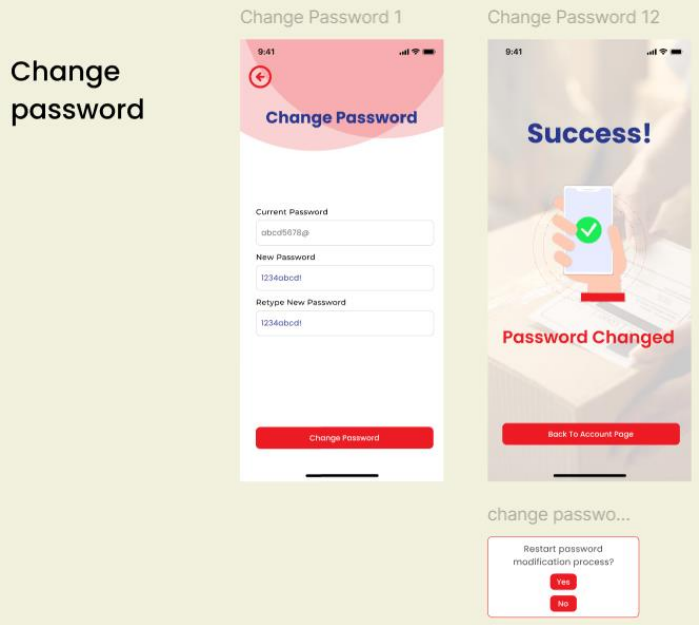
b) Test Case 1.2 – Alternate Flow (Wrong email format)

Figure 5. 12 *Profile Management Page (Alternate Flow for Account Modification when Incorrect Email Format is Entered)*



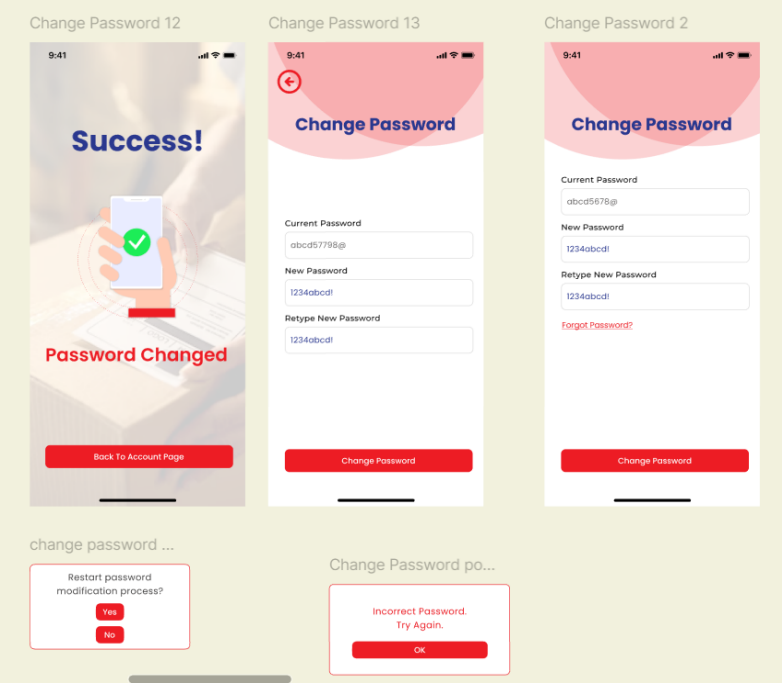
c) Test Case 2.1 – Normal flow (Password modification)

Figure 5. 13 *Profile Management Page (Normal Flow for Password Modification)*



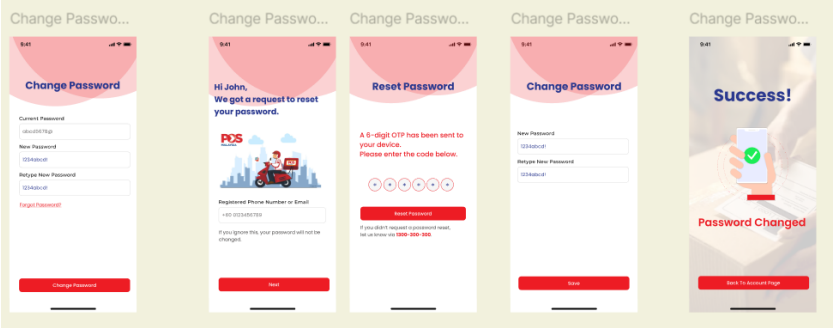
d) Test Case 2.2 – Alternate flow (Incorrect password entered)

Figure 5. 14 *Profile Management Page (Alternate Flow for Password Modification when Incorrect Password is Entered)*



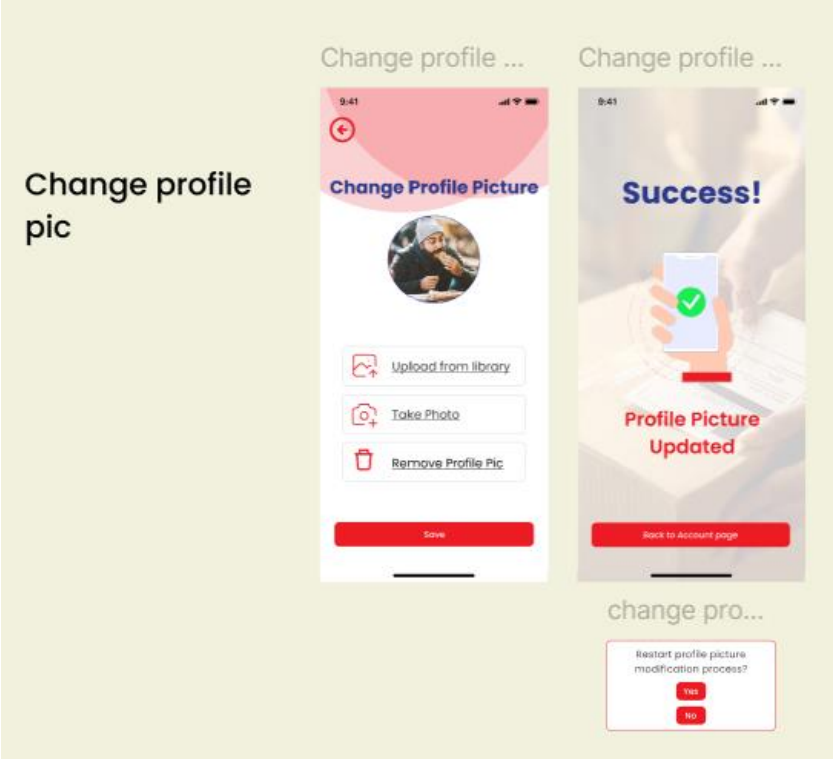
e) Test Case 2.3 – Alternate Flow (Forgot password)

Figure 5. 15 *Profile Management Page (Alternate Flow for Password Modification when Password is Forgotten)*



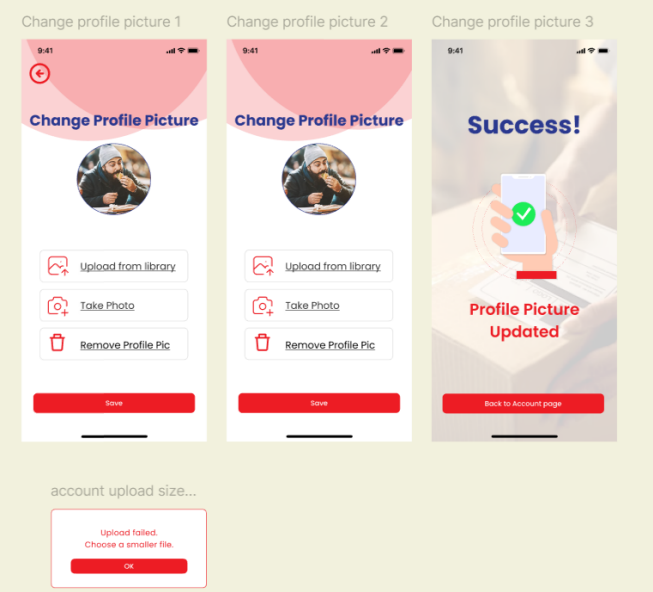
f) Test Case 3.1 – Normal flow (Profile picture update)

Figure 5. 16 *Profile Management Page (Normal Flow for Profile Picture Modification)*



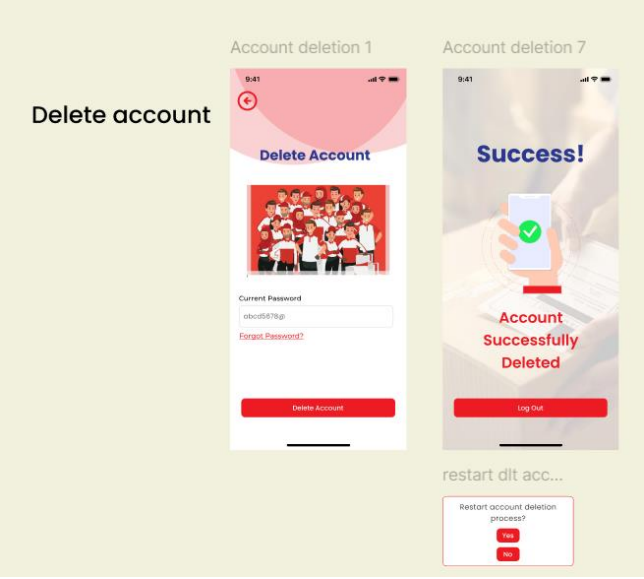
g) Test Case 3.2 – Alternate flow (Large picture/file size uploaded)

Figure 5. 17 *Profile Management Page (Alternate Flow for Profile Picture Modification when Large File Size is Uploaded)*



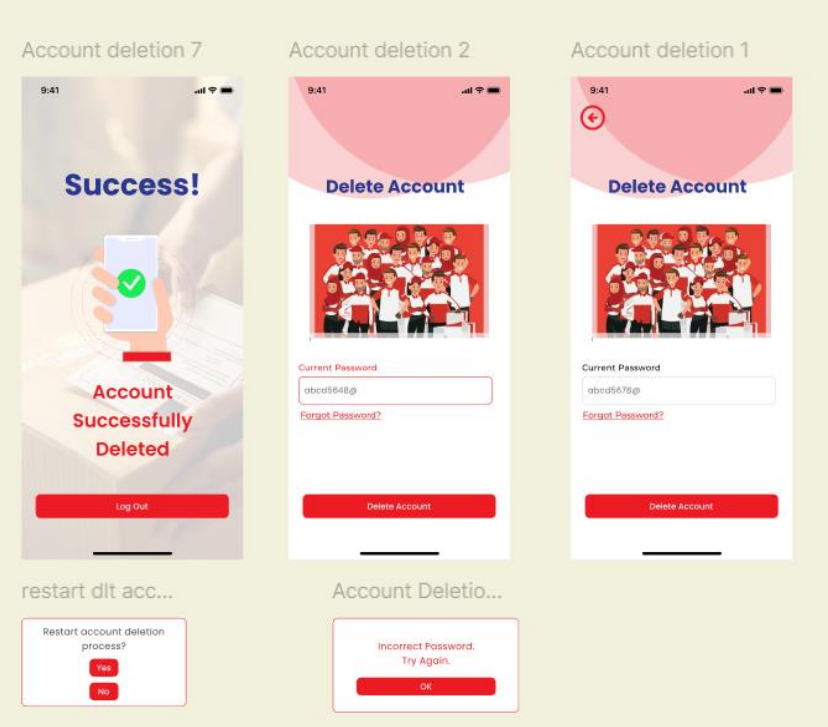
h) Test Case 4.1 – Normal Flow (Account Deleted)

Figure 5. 18 *Profile Management Page (Normal Flow for Account Deletion)*



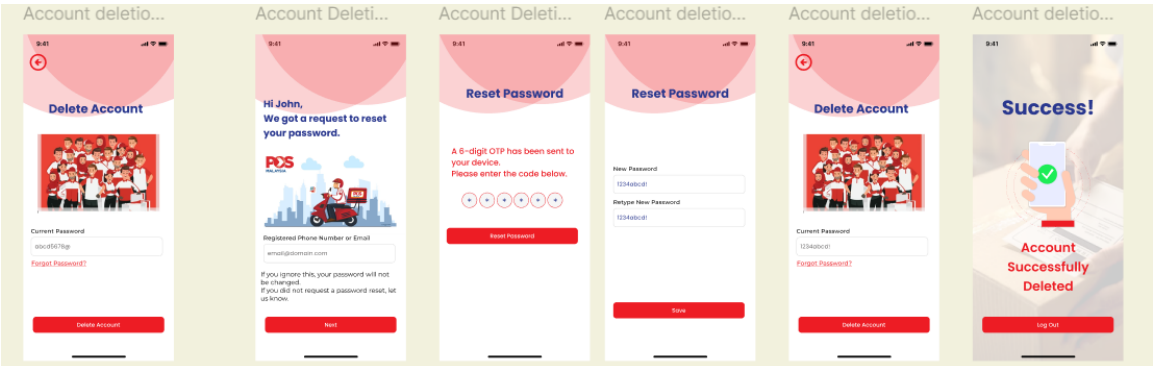
i) Test Case 4.2 – Alternate Flow (Incorrect Password Entered)

Figure 5. 19 *Profile Management Page (Alternate Flow for Account Deletion when Incorrect Password is Entered)*



j) Test Case 4.3 – Alternate Flow (User forgot password)

Figure 5. 20 *Profile Management Page (Alternate Flow for Account Deletion when Password is Forgotten)*



Contribution Statement

Name	StudentID	Percentage	Activities
Lauren Wong Hyun-Ee	21046305	20%	• Prepared STR Section 1.1 Account Verification System for use case testing. • Prepared STR Section 2.0 Initial Prototype, 4.0 Final Prototype, and 5.0 Digital Mockup.
Khor Jia Ming	21044516	20%	• Prepared STR Section 1.2 Rate Calculator System for use case testing. • Prepared STR Section 2.0 Initial Prototype, 4.0 Final Prototype, and 5.0 Digital Mockup.
Tai Yong Xuan	22012835	20%	• Gathered testers and their feedback/evaluation for Section 3.1 Heuristic Evaluation, 3.2 Pilot Test, and 3.3 Usability Testing.
Ooi Shi Qi	21098272	20%	• Gathered testers and their feedback/evaluation for Section 3.1 Heuristic Evaluation, 3.2 Pilot Test, and 3.3 Usability Testing.
Chia Wan Ying	23020829	20%	• Prepared STR Section 1.3 Account Management System for use case testing. • Prepared STR Section 2.0 Initial Prototype, 4.0 Final Prototype, and 5.0 Digital Mockup.

References

Nielsen, J. (2024, January 30). *10 usability Heuristics for User Interface Design*. Nielsen Norman Group. https://www.nngroup.com/articles/ten-usability-heuristics/

Appendix A

Procedure – Pilot test

Table A 1 *Procedure for Pilot Testing*

System	Test Case	Procedure
Account Verification System	**Test Case 1 – Normal Flow (OTP Pin Generation)**	*Precondition:* ✓ *Click on the screen to load the application.* ✓ *Click Log In after the screen loads.* ✓ *Enter log in credentials* ✓ *If user is new to the application, proceed to create an account.* ✓ *If user has forgotten password, proceed to create a new one.* 1. After logging in to account, choose to authenticate account. 2. Users are prompted to enter their phone numbers. a. Please enter **123456789** as phone number. 3. Users will receive a 6 pin OTP pin after entering their phone number a. For prototyping purposes, the pin is entered by increments or decrements of the default value 123456 via the "ˆ" and "ˇ" buttons. b. For this normal flow test, click on the "ˆ" button twice to increase the default pin number to **123458.** 4. Click *Authenticate Account* button, once users enter the correct pin number, their account will be authenticated, and a notification message will

		be sent out. 5. Users can access application services. 6. For prototyping purposes, users are prompted to start the authentication process again for alternate flow scenarios. This is initiated at the “Success” page after the completion of normal flow. *a.* Click *Yes* to initiate.
	Test Case 2 – Alternate Flow (OTP system is down)	1. For prototyping purposes, users are prompted to start the authentication process again for alternate flow scenarios. This is initiated at the “Success” page after the completion of normal flow. 2. Users are prompted to authenticate their account by entering their phone numbers and clicking on *Generate OTP* button. a. Enter **123456789** as phone number if the number has not been auto-filled in. **3. An error page pops up when the system encounters an error while trying to generate the OTP pin.** 4. Users are prompted to authenticate their account by clicking on *Generate OTP* button. 5. Users will receive a 6 pin OTP pin a. For prototyping purposes, the pin is entered by increments or decrements of the default value 123456 via the “ˆ” and “ˇ” buttons. b. For this normal flow test, click on the “ˆ” button twice to **increase**

		the default OTP pin number to **123458.** 6. Once users enter the correct pin number, their account will be authenticated, and a notification message will be sent out. 7. Users can access application services. 8. For prototyping purposes, users are prompted to start the authentication process again for alternate flow scenarios. This is initiated at the “Success” page after the completion of normal flow. a. Click *Yes* to initiate.
	Test Case 3 – Alternate flow (OTP expired)	1. For prototyping purposes, users are prompted to start the authentication process again at the end of the authentication process for alternate flow scenarios. 2. Users are prompted to authenticate their account by entering their phone numbers and clicking on *Generate OTP* button. • Enter **123456789** as phone number if the number has not been auto-filled in. 3. Users will receive a 6 pin OTP pin after entering their phone number. • For prototyping purposes, the pin is entered by increments or decrements of the default value 123456 via the “ˆ” and “ˇ” buttons. • For this alternate flow test, click on the “ˆ” button to decrease the **increase** pin number to **123458.** 4. An error page is shown as the **OTP has expired**. Users are prompted to generate a new OTP.

		• For prototyping purposes, the pin is entered by increments or decrements of the default value 123456 via the "ˆ" and "ˇ" buttons. • For this normal flow test, click on the "ˆ" button twice to **increase** the default OTP pin number to **123458.** 5. Once users enter the correct pin number, their account will be authenticated, and a notification message will be sent out. 6. Users can access application services. 7. For prototyping purposes, users are prompted to start the authentication process again for alternate flow scenarios. This is initiated at the "Success" page after the completion of normal flow. • Click *Yes* to initiate.
	Test Case 4 – Alternate flow (OTP incorrect)	1. For prototyping purposes, users are prompted to start the authentication process again at the end of the authentication process for alternate flow scenarios. 2. Users are prompted to authenticate their account by entering their phone numbers and clicking on *Generate OTP* button. • Enter **123456789** as phone number if the number has not been auto-filled in. 3. Users will receive a 6 pin OTP pin • For prototyping purposes, the pin is entered by increments or decrements of the default value 123456 via the "ˆ" and "ˇ" buttons.

		• For this alternate flow test, click on the "ˆ" button to **increase** the pin number to **123458.** 4. An error page is shown as the OTP has expired. Skip this page by clicking on *Generate OTP* button. 5. Users are prompted to enter phone number again. 6. Users will receive a 6 pin OTP pin • For prototyping purposes, the pin is entered by increments or decrements of the default value 123456 via the "ˆ" and "ˇ" buttons. • For this alternate flow test, click on the " ˇ " button to **decrease** the increase pin number to **123455.** 7. An error page is shown as **the OTP is incorrect**. Users are prompted to generate a new OTP. 8. Users will receive a 6 pin OTP pin • For prototyping purposes, the pin is entered by increments or decrements of the default value 123456 via the "ˆ" and "ˇ" buttons. • For this alternate flow test, click on the "ˆ" button to **increase** the pin number to **123458.** 9. Once users enter the correct pin number, their account will be authenticated, and a notification message will be sent out. 10. Users can access application services. 11. For prototyping purposes, users are prompted to start the authentication process again for alternate flow scenarios. This is initiated at the "Success"

		page after the completion of normal flow. • Click No to access features of mobile app.
Rate Calculator System	**Test Case 1 – Normal flow (Rate Shown)**	*Precondition:* ✓ *Users select Rate Calculator from the main page (This can be done from the main page or the main menu from the side bar.)* 1. Users are greeted with a Welcome pop-up message that instructs them on how to use the rate calculator feature. Click X to close message. 2. Users select Region Type and Parcel Type by choosing one of the options from the dropdown menu. 3. Users select Origin and Destination Locations. 4. Users enter Parcel Weight. 5. Users can ignore Parcel Dimensions as static input has been set. 6. Users click on *Calculate* button.
	Test Case 2 – Alternate flow (Weight not entered)	1. Users are greeted with a Welcome pop-up message that instructs them on how to use the rate calculator feature. Click X to close message. 2. Users press “A” on their keyboard, backspace, then press “A” again to navigate to Alternate Flow 1 Interface 3. Users select Region Type and Parcel Type by choosing one of the options from the dropdown menu.

		4. Users select Origin and Destination Locations. 5. Users do not enter Parcel Weight. 6. Users can ignore Parcel Dimensions as static input has been set. 7. Users click on *Calculate* button. 8. Users click *OK* button.
	Test Case 3 – Alternate flow (Necessary fields not entered)	1. Users are greeted with a Welcome pop-up message that instructs them on how to use the rate calculator feature. Click X to close message. 2. Users press “A” on their keyboard, backspace, then press “A” again to navigate to Alternate Flow 2 Interface 3. Users randomly do not select Region Type, Parcel Type, Origin and Destination Locations. 4. Users enter Parcel Weight. 5. Users can ignore Parcel Dimensions as static input has been set. 6. Users click on *Calculate*. 7. Users click *OK*. 8. Users click on *Back* arrow button located on the top left corner to return to main page.
Account Management System	**Test Case 1 – Normal flow (Changes to account information)**	*Precondition:* ✓ *Account created and logged in* ✓ *Click on the menu pages to access “My Profile” via the profile icon on main page or side menu.*

		1. On users' personal profile page, users can view and edit their personal information. (For prototyping purposes, these entries are static inputs.) 2. Click *Save* button after finish working on it. 3. Skip the error page that shows up. 4. Users are notified with a display of "Information Saved". 5. Users can go back to account page by clicking *Back To Account Page* button.
	Test Case 2 – Normal Flow (Changes of password)	*Precondition:* ✓ *Account and password created and logged in* ✓ *Click on the menu pages to access "My Profile"* 1. On users' personal profile page, users can change their passwords easily. 2. Click on the *Change Password* button on the profile page. 3. Users are directed to "Change Password" page. 4. Type in users' current password **abcd5678@**, and the following new password **1234abcd!** (For prototyping purposes, these entries are static inputs.) 5. Retype the new password **1234abcd!** for confirmation. 6. Click *Change Password* button. (For prototyping purposes, these entries are static inputs.)

		7. Skip error pop up message. 8. Skip error page. 9. Skip request password change page. 10. Skip request OTP page. 11. Skip reset password page. 12. Users are notified with a display of “Password Changed” 13. Click *Back To Account Page* button.
	Test Case 3 – Normal flow (Changes to profile picture)	*Precondition:* ✓ *Account and password created and logged in* ✓ *Click on the menu pages to access “My Profile”* 1. On users’ personal profile page, users can upload, change, or remove their profile pictures. 2. Click the *Edit Picture* on the profile page. 3. Choose *Upload from library, or Take Photo* (For prototyping purposes, these entries are static inputs.) 4. Click *Save* button. 5. Skip error pop message. 6. Users are notified with the display of “Profile Picture Uploaded” and users can go back to account page by clicking *Back To Account Page* button.

	Test Case 4 – Normal flow (Deletion of account)	*Precondition:* ✓ *Account and password created and logged in* ✓ *Click on the menu pages to access "My Profile"* 1. On users' personal profile page, users can delete their accounts. 2. Click on the *Delete Account* button on the profile page and access the account deletion page. 3. Enter the current password **abcd5678@**. (For prototyping purposes, these entries are static inputs.) 4. Click the *Delete Account* button 5. Skip error pop up message. 6. Skip error page. 7. Users are notified with the display of "Account Deleted Successfully". 8. Click *OK* button. 9. Users are directed to the log in page. 10. To continue with alternate flow for account management: a. Click *Log In* button b. Click *I'll authenticate my account later* button to skip authentication

		process. c. Click on user profile icon on main page or from side menu bar to access account page.
	Test Case 5 – Alternate Flow (Wrong email format)	Precondition: ✓ To continue with alternate flow for account management: a. Click *Log In* button *b.* Click *I'll authenticate my account later* button to skip authentication process. *c.* Click on user profile icon on main page or from side menu bar to access account page. 1. On users' personal profile page, users can view and edit their personal information. 2. Users enter the wrong format of email domain gmail.com (For prototyping purposes, these entries are static inputs.) 3. System shows an error message with the specific incorrect column and users unable to save their changes. 4. Users re-enter the correct format of the email

		5. Users are notified with a display of “Information Saved”. 6. Users can go back to account page by clicking *Back To Account Page* button.
	Test Case 6 – Alternate flow (Incorrect or forgot password)	1. On users’ personal profile page, users can change their password. 2. Click on the *Change Password* button on the profile page. 3. Users are directed to “Change Password” page. 4. Type in users’ current password **abcd5678@**, and the following new password **1234abcd!** (For prototyping purposes, these entries are static inputs.) 5. Retype the new password **1234abcd!** for confirmation. (For prototyping purposes, these entries are static inputs.) 6. Click *Change Password* button. 7. Error message pops up due to incorrect current password. 8. Click *Forgot Password?* button. 9. Users enter their registered phone number +60123456789 and click *Next* button to request for resetting the password. (For prototyping purposes, these entries are static inputs.) 10. Users enter the OTP number that is sent from the system to their devices and click the *Reset Password* button. (For prototyping purposes, these entries are static inputs.) 11. Users enter and retype the new password **1234abcd!** (For prototyping

		purposes, these entries are static inputs.) 12. Click on the *Save* button. 13. Users are notified with a display of “Password Changed” and go back to account page by clicking *Back To Account Page* button.
	Test Case 7 – Alternate flow (Large picture/file size uploaded)	1. On users’ personal profile page, users can upload, change, or remove their profile pictures. 2. Click *Edit Picture* button on the profile page. 3. Choose *Upload from library, or Take Photo* (For prototyping purposes, these entries are static inputs.) 4. Click *Save* button. 5. An error message is displayed due to large file size. Users are prompted to upload again. 6. Re-upload a picture. 7. Click *Save* button. 8. Users are notified with the display of “Profile Picture Uploaded” and can go back to account page by clicking *Back To Account Page* button.
	Test Case 8 – Alternate Flow (Incorrect password entered / User forgot password)	1. On users’ personal profile page, users can delete their accounts. 2. Click on the *Delete Account* button on the profile page and access the account deletion page.

		3. Enter the current password **abcd5678@**. (For prototyping purposes, these entries are static inputs.) 4. Click the *Delete Account* button. 5. An error message popped out showing an incorrect password. 6. Click the *Forgotten Password* button. 7. Users enter their registered phone number +60123456789 and click *Next* to request for resetting the password. (For prototyping purposes, these entries are static inputs.) 8. Users enter the OTP number sent from the system to their devices and click the *Reset Password* button. (For prototyping purposes, these entries are static inputs.) 9. Users enter and retype the new password **1234abcd!** (For prototyping purposes, these entries are static inputs.) 10. Users click on the *Save* button. 11. Users go back to the delete account page and enter the new reset password. 12. Users are notified with the display of “Account Deleted Successfully”. 13. Click *OK* button. 14. Users are directed to the log in page.

Appendix B

Procedure – Usability Test

Table B 1 *Procedure for Usability Testing*

OTP Verification	**Test Case 1 –**	*Precondition:*

System	**Normal Flow (OTP Pin Generation)**	✓ *Click anywhere on the black screen to load the application.* ✓ *Click Log In after the screen loads.* ✓ *Enter log in credentials* ✓ *If user is new to the application, proceed to create an account.* ✓ *If user has forgotten password, proceed to create a new one.* 1. After logging in to account, choose to authenticate account. 2. Click *Yes, please* to start verification process. 3. Users are prompted to enter their phone numbers. a. Please enter **123456789** as phone number. 4. Users will receive a 6 pin OTP pin after entering their phone number a. For prototyping purposes, the pin is entered by increments or decrements of the default value 123456 via the "ˆ " and "ˇ " buttons. b. For this normal flow test, click on the "ˆ " button twice to increase the default pin number to **123458.** 5. Click *Authenticate Account* button, once users enter the correct pin number, their account will be authenticated, and a notification message will be sent out. 6. Users can access application services. 7. For prototyping purposes, users are prompted to start the authentication process again for alternate flow scenarios. This is initiated at the "Success" page after the completion of normal flow. **a. Click *Yes* to initiate.**

	Test Case 2 – Alternate Flow (OTP system is down)	1. Continuing from the test case above, users are redirected to the “Verify Account” page. 2. Click *Yes, please* to start verification process. 3. Users are prompted to authenticate their account by entering their phone numbers and clicking on *Generate OTP* button. • Enter **123456789** as phone number if the number has not been auto-filled in. **4. An error page pops up when the system encounters an error while trying to generate the OTP pin.** 5. Users are prompted to authenticate their account by clicking on *Generate OTP* button. 6. Users will receive a 6 pin OTP pin • For prototyping purposes, the pin is entered by increments or decrements of the default value 123456 via the “ˆ ” and “ˇ ” buttons. • For this normal flow test, click on the “ˆ ” button twice to **increase** the default OTP pin number to **123458.** 7. Once users enter the correct pin number, their account will be authenticated, and a notification message will be sent out. 8. Users can access application services. 9. For prototyping purposes, users are prompted to start the authentication process again for alternate flow scenarios. This is initiated at the “Success” page after the completion of normal flow.

		• **Click *Yes* to initiate.**
	Test Case 3 – Alternate flow (OTP expired)	1. Continuing from the test case above, users are redirected to the “Verify Account” page. 2. Click *Yes, please* to start verification process. 3. Users are prompted to authenticate their account by entering their phone numbers and clicking on *Generate OTP* button. • Enter **123456789** as phone number if the number has not been auto-filled in. 4. Users will receive a 6 pin OTP pin after entering their phone number. • For prototyping purposes, the pin is entered by increments or decrements of the default value 123456 via the “ˆ ” and “ˇ ” buttons. • For this alternate flow test, click on the “ˆ ” button to decrease the **increase** pin number to **123458.** 5. An error page is shown as the **OTP has expired**. Users are prompted to generate a new OTP. • For prototyping purposes, the pin is entered by increments or decrements of the default value 123456 via the “ˆ ” and “ˇ ” buttons. • For this normal flow test, click on the “ˆ” button twice to **increase** the default OTP pin number to **123458.** 6. Once users enter the correct pin number, their account will be

		authenticated, and a notification message will be sent out. 7. Users can access application services. 8. For prototyping purposes, users are prompted to start the authentication process again for alternate flow scenarios. This is initiated at the “Success” page after the completion of normal flow. • **Click *Yes* to initiate.**
	Test Case 4 – Alternate flow (OTP incorrect)	1. Continuing from the test case above, users are redirected to the “Verify Account” page. 2. Click *Yes, please* to start verification process. 3. Users are prompted to authenticate their account by entering their phone numbers and clicking on *Generate OTP* button. • Enter **123456789** as phone number if the number has not been auto-filled in. 4. Users will receive a 6 pin OTP pin • For prototyping purposes, the pin is entered by increments or decrements of the default value 123456 via the “ˆ ” and “ˇ ” buttons. • For this alternate flow test, click on the “ˆ ” button to **increase** the pin number to **123458.** 5. An error page is shown as the OTP has expired. Skip this page by clicking on *Generate OTP* button. 6. Users are prompted to enter phone number again. 7. Users will receive a 6 pin OTP pin

		• For prototyping purposes, the pin is entered by increments or decrements of the default value 123456 via the "ˆ" and "ˇ" buttons. • For this alternate flow test, click on the " ˇ " button to **decrease** the increase pin number to **123455.** 8. An error page is shown as **the OTP is incorrect**. Users are prompted to generate a new OTP. 9. Users will receive a 6 pin OTP pin • For prototyping purposes, the pin is entered by increments or decrements of the default value 123456 via the "ˆ " and "ˇ " buttons. • For this alternate flow test, click on the "ˆ " button to **increase** the pin number to **123458.** 10. Once users enter the correct pin number, their account will be authenticated, and a notification message will be sent out. 11. Users can access application services. 12. For prototyping purposes, users are prompted to start the authentication process again for alternate flow scenarios. This is initiated at the "Success" page after the completion of normal flow. • **Click *No* to access features of mobile app.** 13. Click *Explore App Now* to explore POS Malaysia mobile app.
Rate Calculator System	**Test Case 1 – Normal flow**	*Precondition:* ✓ *Users select Rate Calculator from the main page (This can be done from*

	(Rate Shown)	*the main page or the main menu from the side bar.)* 1. Users are greeted with a Welcome pop-up message that instructs them on how to use the rate calculator feature. Click X to close message. 2. Users select Region Type and Parcel Type by choosing one of the options from the dropdown menu. 3. Users select Origin and Destination Locations. 4. Users enter Parcel Weight. 5. Users can ignore Parcel Dimensions as static input has been set. 6. Users click on *Calculate* button. 7. Calculated rate is displayed.
	Test Case 2 – Alternate flow (Weight not entered)	1. Users press “A” on their keyboard, backspace, then press “A” again to navigate to Alternate Flow 1 Interface 2. Users select Region Type and Parcel Type by choosing one of the options from the dropdown menu. 3. Users select Origin and Destination Locations. 4. Users do not enter Parcel Weight. 5. Users can ignore Parcel Dimensions as static input has been set. 6. Users click on *Calculate* button. 7. Pop up error message is shown to prompt users to enter the weight. 8. Users click *OK* button.
	Test Case 3 – Alternate flow	1. Users press “A” on their keyboard, backspace, then press “A” again to navigate to Alternate Flow 2 Interface

	(Necessary fields not entered)	2. Users randomly do not select Region Type, Parcel Type, Origin and Destination Locations. 3. Users enter Parcel Weight. 4. Users can ignore Parcel Dimensions as static input has been set. 5. Users click on *Calculate*. 6. Pop up error message is shown to prompt users to ensure all fields are entered. 7. Users click *OK*. 8. Users click on *Back* arrow button located on the top left corner to return to main page.
Account Management System	**Test Case 1.1 – Normal flow (Account Information Modification)**	*Precondition:* ✓ *Account created and logged in* ✓ *Click on the menu pages to access "My Profile" via the profile icon on main page or side menu.* 1. On users' personal profile page, users can view and edit their personal information. (For prototyping purposes, these entries are static inputs.) 2. Click *Save* button after finish working on it. 3. Users are notified with a display of "Information Saved". 4. For prototyping purposes, users are prompted to start the account information modification process again for alternate flow scenarios. This is initiated at the "Success" page after the completion of normal flow. **a. Click *Yes* to initiate.**

	Test Case 1.2 – Alternate Flow (Wrong email format)	1. Continuing from the test case above, users are redirected to the account information modification page. 2. Users enter the wrong format of email domain gmail.com (For prototyping purposes, these entries are static inputs.) 3. System shows an error message with the specific incorrect column and users are unable to save their changes. 4. Users re-enter the correct format of the email 5. Users are notified with a display of “Information Saved”. 6. For prototyping purposes, users are prompted to start the account information modification process again for alternate flow scenarios. This is initiated at the “Success” page after the completion of normal flow. **a. Click *No* to proceed with other functions.** 7. Users can go back to account page by clicking *Back To Account Page* button.
	Test Case 2.1 – Normal flow (Password modification)	1. On users’ personal profile page, users can change their passwords easily. 2. Click on the *Change Password* button on the profile page. 3. Users are directed to “Change Password” page. 4. Type in users’ current password **abcd5678@**, and the following new password **1234abcd!** (For prototyping purposes, these entries are static inputs.) 5. Retype the new password **1234abcd!** for confirmation. (For prototyping

		purposes, these entries are static inputs.) 6. Click *Change Password* button. 7. Users are notified with a display of “Password Changed” 8. For prototyping purposes, users are prompted to start the password modification process again for alternate flow scenarios. This is initiated at the “Success” page after the completion of normal flow. **a. Click *Yes* to initiate.**
	Test Case 2.2 – Alternate flow (Incorrect password entered)	1. Continuing from the test case above, users are redirected to the “Change Password” page. 2. Type in users’ current password **abcd5678@**, and the following new password **1234abcd!** (For prototyping purposes, these entries are static inputs.) 3. Retype the new password **1234abcd!** for confirmation. (For prototyping purposes, these entries are static inputs.) 4. Click *Change Password* button. 5. Error message pops up due to incorrect current password. 6. User re-enter their password correctly. (For prototyping purposes, these entries are static inputs.) 7. Click on the *Save* button. 8. Users are notified with a display of “Password Changed”. 9. For prototyping purposes, users are prompted to start the password modification process again for alternate flow scenarios. This is initiated at the “Success” page after the completion of normal flow.

		a. Click *Yes* to initiate.
	Test Case 2.3 – Alternate Flow (Forgot password)	1. Continuing from the test case above, users are redirected to the “Change Password” page. 2. Type in users’ current password **abcd5678@**, and the following new password **1234abcd!** (For prototyping purposes, these entries are static inputs.) 3. Retype the new password **1234abcd!** for confirmation. (For prototyping purposes, these entries are static inputs.) 4. Click *Change Password* button. 5. Error message pops up due to incorrect current password. 6. Click *Forgot Password?* button. 7. Users enter their registered phone number +60123456789 and click *Next* button to request for resetting the password. (For prototyping purposes, these entries are static inputs.) 8. Users enter the OTP number that is sent from the system to their devices and click the *Reset Password* button. (For prototyping purposes, these entries are static inputs.) 9. Users enter and retype the new password **1234abcd!** (For prototyping purposes, these entries are static inputs.) 10. Click on the *Save* button. 11. Users are notified with a display of “Password Changed”. 12. For prototyping purposes, users are prompted to start the password

		modification process again for alternate flow scenarios. This is initiated at the "Success" page after the completion of normal flow. **a. Click *No* to proceed with other functions.** 13. Users can go back to account page by clicking *Back To Account Page* button.
	Test Case 3.1 – Normal flow (Profile picture update)	1. On users' personal profile page, users can upload, change, or remove their profile pictures. 2. Click *Edit Picture* button on the profile page. 3. Choose *Upload from library, or Take Photo* (For prototyping purposes, these entries are static inputs.) 4. Click *Save* button. 5. Users are notified with the display of "Profile Picture Uploaded". 6. For prototyping purposes, users are prompted to start the profile picture update process again for alternate flow scenarios. This is initiated at the "Success" page after the completion of normal flow. **a. Click *Yes* to initiate.**
	Test Case 3.2 – Alternate flow (Large picture/file size	1. Continuing from the test case above, users are redirected to the "Change Profile Picture" page. 2. On users' personal profile page, users can upload, change, or remove their profile pictures.

	uploaded)	3. Click *Edit Picture* button on the profile page. 4. Choose *Upload from library, or Take Photo* (For prototyping purposes, these entries are static inputs.) 5. Click *Save* button. 6. An error message is displayed due to large file size. Users are prompted to upload again. 7. Re-upload a picture. 8. Click *Save* button. 9. Users are notified with the display of “Profile Picture Uploaded”. 10. For prototyping purposes, users are prompted to start the picture update process again for alternate flow scenarios. This is initiated at the “Success” page after the completion of normal flow. a. **Click *No* to proceed with other functions**. 11. Users can go back to account page by clicking *Back To Account Page* button.
	Test Case 4.1 – Normal Flow	1. On users’ personal profile page, users can delete their accounts. 2. Click on the *Delete Account* button on the profile page and access the account deletion page. 3. Enter the current password **abcd5678@**. (For prototyping purposes, these entries are static inputs.) 4. Click the *Delete Account* button. 5. Users are notified with the display of “Account Deleted Successfully”.

		6. For prototyping purposes, users are prompted to start the account deletion process again for alternate flow scenarios. This is initiated at the “Success” page after the completion of normal flow. **a. Click *Yes* to initiate.**
	Test Case 4.2 – Alternate Flow (Incorrect Password Entered)	1. Continuing from the test case above, users are redirected to the “Delete Account” page. 2. Enter the current password **abcd5678@**. (For prototyping purposes, these entries are static inputs.) 3. Click the *Delete Account* button. 4. An error message popped out showing an incorrect password. 5. Users re-enter the correct password. 6. Users are notified with the display of “Account Deleted Successfully”. 7. For prototyping purposes, users are prompted to start the account deletion process again for alternate flow scenarios. This is initiated at the “Success” page after the completion of normal flow. **a. Click *Yes* to initiate.**
	Test Case 4.3 – Alternate Flow (User forgot password)	1. Continuing from the test case above, users are redirected to the “Delete Account” page. 2. Enter the current password **abcd5678@**. (For prototyping purposes, these entries are static inputs.) 3. Click the *Delete Account* button.

		4. An error message popped out showing an incorrect password. 5. Click the *Forgotten Password* button. 6. Users enter their registered phone number +60123456789 and click *Next* to request for resetting the password. (For prototyping purposes, these entries are static inputs.) 7. Users enter the OTP number sent from the system to their devices and click the *Reset Password* button. (For prototyping purposes, these entries are static inputs.) 8. Users enter and retype the new password **1234abcd**! (For prototyping purposes, these entries are static inputs.) 9. Users click on the *Save* button. 10. Users go back to the delete account page and enter the new reset password. 11. Users are notified with the display of “Account Deleted Successfully”. 12. Click *Log Out* button. 13. Users are directed to the log in page.