CIT2C18 - Mobile App Development
Project Specification
AY2025/2026 April Semester

Introduction

This is an **individual** project. The purpose of this project is to understand and apply the knowledge of mobile application development. The project consists of four parts and involves developing a working mobile application using the Flutter framework.

1. Part 1 involves producing a proposal for your mobile application and develop a high-fidelity wireframe.
2. Part 2 involves developing a self-contained basic Flutter application based on the proposed design and navigation.
3. Part 3 involves implementing authentication-related functionalities in the Flutter application from Part 2.
4. Part 4 involves implementing database functionalities, adding personalisation and enhancing the Flutter application from Part 3 with additional features.

The theme of the project is **Sustainability**, which is the ability to exist and develop without depleting natural resources for the future. The mobile application that you developed should help to raise awareness on sustainability and/or promote sustainable living.

In February 2021, the Singapore Green Plan 2030 (https://www.greenplan.gov.sg/) was launched to seek to galvanise a whole-of-nation movement and advance Singapore's national agenda on sustainable development. The five pillars that are identified in the Singapore Green Plan 2030 include City in Nature, Energy Reset, Sustainable Living, Green Economy and Resilient Future.

You are encouraged to read up on Singapore's sustainability effort to derive a suitable problem statement. You are however not required to restrict yourself in the context of Singapore. The suggested applications include but are not limited to the following:

- Reduce waste: Application that allows user to buy/sell unwanted items.
- Educate: Application that teaches user on issues related to sustainability.
- Encourage: Application that allows user to kick-start their sustainability journey by allowing user to keep track of their water usage during shower, carbon footprint, plastic usage, etc.
- Exchange: Application that provides a platform for like-minded sustainability warriors to share and discuss on sustainability topics, events, workshops, etc.

Part 1 – Proposal (20%)

You are required to submit a proposal for the mobile application that you will develop in Part 2, 3 and 4. There is no restriction to the nature of the application, but it must fit the theme and fulfil the project requirements stated in Part 2, 3 and 4.

As part of your UI design process, you'll use DALL·E (https://openart.ai/create), an AI-powered image generation tool, to generate visual concepts such as screen layouts and colour schemes. These ideas can help you explore different design options and guide your final design decisions.

The proposal (refer to LMS for template) must include the following minimum requirements:

Application Description	Describe the sustainability-related issue to be addressed or a condition to be improved upon. Provide a name for your application eg. Sustainability Buddy. Identify your target audience. Highlight how the proposed application addresses the issue highlighted in the problem statement.
Scope	Provide a list of proposed functions that includes authentication and ONE* set of CRUD, along with brief description. * Please refer to the marking rubrics for Part 3. Adding extra CRUD operations will NOT earn additional marks, so keep to just ONE set.
Database Design	Data dictionary* and Entity-Relationship diagram. * Minimum of 2 tables (Users table + one other table). The tables do NOT need to be in good normal form.
Design Analysis and Wireframe	Provide an analysis of three DALL·E-generated visual concepts, explaining the elements you chose or refined and the reasons. High-fidelity design screenshots of screens* * Minimum of 5 screens. Authentication related screens are considered as ONE screen. Modal forms can be considered as separate screens.
Widget Tree	Widget Tree for the main screen* of the application. * Main screen refers to the screen that is NOT authentication related which allows user to interact with most options of the application. It is usually the screen that is shown when the user logs in successfully or when the application launches.

Please note that to qualify for the IHL-NETS-Fintech Certificate (Sandbox), your application must incorporate elements of NETS QR payment.

You are free to be as creative as you can but do ensure that the mobile application can be completed within the specified timeframe and it does NOT include gambling, prohibited content or anything inappropriate. Discuss your mobile application ideas with your tutor and submit a project proposal report by **Week 3 (9 May, Friday, 11.59PM)**.

Submission Instructions

Submit your Microsoft Word document into TP LMS under the Assessments folder. Your files should be named according to the following format:

Part1_YourName_StudentID_YourClass.docx
e.g.: Part1_JohnTan_1234567D_P01.docx

Please ensure that you have a backup copy of your deliverables in case there is a problem with the online submission.

Part 2: Basic Application – Program Code (20%) and Presentation (5%)

Your task is to develop a Flutter application that aligns with the design proposed in Part 1. While functionality is not required, the navigation must be functional and the design must be accurately represented. As a minimum requirement, your application must apply the following knowledge that you have learnt and include the following:

- All proposed screens with navigation
  - E.g. Navigation drawer, Bottom navigation, Tabbed layout
- Varied UI Components
  - To use a variety of widgets and explore advanced widgets* not covered in class
- Good programming practices

* The implementation of complex widgets, such as a calendar that requires external plugins, is not mandatory and may be replaced with an image for Part 2.

You are required to prepare a Word document that includes high-fidelity design screenshots from Part 1, along with screenshots of your implemented Flutter application. Besides submitting the Word document and project source codes on **Week 7 (2 Jun, Monday, 8.30AM)**, you are to demonstrate the navigation flow during your assignment evaluation, which will be held on **Week 7 (Week of 2 Jun) - Timings to be advised by your tutor**.

Submission Instructions

Submit the entire project folder as a zipped file and the Word document into TP LMS under the Assessments folder. Your zipped document file should be named according to the following format:

Part2_YourName_StudentID_YourClass.zip
e.g.: Part2_JohnTan_1234567D_P01.zip

Part2_YourName_StudentID_YourClass.docx
e.g.: Part2_JohnTan_1234567D_P01.docx

Please ensure that you have a backup copy of your deliverables in case there is a problem with the online submission.

Part 3: Authentication – Program Code (20%) and Presentation (5%)

You are required to implement authentication related functionalities in the Flutter application from Part 2. As a minimum requirement, your application must apply the knowledge that you have learnt and include the following:

- All proposed screens with navigation
  - Non-authentication-related screens can be non-functional
- UI Components and Event Handling
  - Form validation and feedback are present for authentication related screens
- User Authentication (using Firebase Authentication)
  - To implement basic authentication (register, login, logout, forget password)
  - To explore account management features not covered in class (E.g. change password, email verification)
  - To explore authentication methods not covered in class (E.g. Google Signin)
- Good programming practices

Besides submitting project source codes on **Week 13 (14 Jul, Monday, 8.30AM)**, you are to present and demonstrate your work during your assignment evaluation, which will be held on **Week 13 (Week of 14 Jul) - Timings to be advised by your tutor**.

Submission Instructions

Submit the entire project folder as a zipped file into TP LMS under the Assessments folder. Your zipped document file should be named according to the following format:

Part3_YourName_StudentID_YourClass.zip
e.g.: Part3_JohnTan_1234567D_P01.zip

Please ensure that you have a backup copy of your application in case there is a problem with the online submission.

Part 4: Database Operations and Additional Features – Program Code (20%) and Presentation (5%)

You are required to enhance the Flutter application from Part 3 with data persistency, include personalisation and enhance the application with additional features. As a minimum requirement, your application must apply the knowledge that you have learnt and include the following:

- All proposed screens with navigation
- UI Components and Event Handling
    - Form validation and feedback are present on all screens
- Data Persistency and CRUD operations (using Google Cloud Firestore)
    - To implement ONE set of basic CRUD
- App Personalisation (App Icon, Splash Screen, Themes)
- Good programming practices

You are also encouraged to implement the following knowledge you have learnt and to explore and implement additional features that are not taught in class. Note that for Part 4, additional features are functional-related and not design-related.

The following topics that you have learnt can be implemented as simple additional features:

- Web Service consumption
- Enhanced NETS Payment implementation
- Camera/ Image Gallery access
- Progress Indicator for asynchronous operations
- Handling of errors from asynchronous operations
- Implementation of query methods not covered in class

Some suggested additional features include but are not limited to the following:

Sample Additional Features – Free to use	
Calendar	https://pub.dev/packages/table_calendar
Social Sharing/ Launch weblink in-app	https://pub.dev/packages/flutter_share_me https://pub.dev/packages/url_launcher
Local Notifications	https://pub.dev/packages/flutter_local_notifications
QR Scanner	https://pub.dev/packages/qr_code_scanner
Text to Speech	https://pub.dev/packages/flutter_tts
Biometric Login	https://pub.dev/packages/local_auth
Flutter Map	https://pub.dev/packages/flutter_map
Offline Mode Detection and Handling	https://pub.dev/packages/connectivity_plus

Besides submitting project source codes on **Week 17 (11 Aug, Monday, 8.30AM)**, you are to present and demonstrate your work during your assignment evaluation, which will be held on **Week 17 (Week of 11 Aug) - Timings to be advised by your tutor**.

Imagine that you are in the **final week of your internship** where you had developed this Flutter application. You had arranged for a short meeting to **hand over** this project to the **next intern (your tutor)**. Presentation slides should include but not limited to the following information:

- Name, matriculation number and class
- Functionalities (including Additional features)
- Future Enhancements
- Video Recording of Application (YouTube link – max 5 mins)
- Reflection

You are required to be dressed in **formal attire** for this presentation.

Submission Instructions

Submit the entire project folder as a zipped file and the PowerPoint slides into TP LMS under the Assessments folder. Your zipped document file and PowerPoint slides should be named according to the following format:

Part4_YourName_StudentID_YourClass.zip
e.g.: Part4_JohnTan_1234567D_P01.zip

Part4_YourName_StudentID_YourClass.pptx
e.g.: Part4_*JohnTan_1234567D_P01.pptx*

Please ensure that you have a backup copy of your application in case there is a problem with the online submission. Please submit the above by **Week 17 (11 Aug, Monday, 8.30AM)**.

Penalty for Late Submission

late and <1 day : 10% deduction from absolute mark given for the assignment
late >=1 and <2 days : 20% deduction from absolute mark
late >=2 days : No marks awarded

Project - Grading Criteria

The grading criteria for Part 1 (20%) will be based on the following:

Criteria	In Context	Performance Level				
		Excellent	**Good**	**Average**	**Poor**	**Below Standard**
Project Proposal (20%)	**Clarity of proposal write-up (2%)**	Proposal write-up includes ALL of the following: - problem statement, - application name, - target audience identified clearly Problem statement is clear and aligns well with theme, justification for the mobile application is strong and valid and is supported by relevant news report or statistical data.	Proposal write-up includes ALL of the following: - problem statement, - application name, - target audience identified clearly Problem statement is clear and aligns with theme, justification for the mobile application is strong and valid.	Proposal write-up includes ALL of the following: - problem statement, - application name, - target audience identified Problem statement is given and somewhat aligns with theme, justification for the mobile application is clear and explained in some detail.	Proposal write-up includes SOME of the following: - problem statement, - application name, - target audience identified Problem statement and justification for the mobile application are given but unclear or irrelevant.	Proposal write-up is incomplete, non-submission, or Clear evidence of plagiarism detected (disciplinable offence)
	Project Scope (5%)	Comprehensive, clear and meaningful description of proposed functions described with aid of diagrams or some form of visual aids.	Comprehensive and clear description of the proposed functions.	Proposed functions are described clearly.	Description of proposed functions is vague.	Description of proposed main functions is incomplete, or non-submission, or Clear evidence of plagiarism detected (disciplinable offence)
	Database Schema (5%)	Extensive ER Diagram that contains appropriate tables and constraints that fully supports the proposed functions. All data items in the tables are elaborated with more details with the aid of their respective data dictionary.	ER Diagram that contains mostly correct tables and constraints that supports most of the proposed functions. All data items in the tables are elaborated with more details with the aid of their respective data dictionary.	Partial ER Diagram that contains some correct tables and constraints used that supports most of the proposed functions. Some data items in the tables are elaborated with some details with the aid of their respective data dictionary.	Sparse ER Diagram and/ or data dictionary that contains few correct tables and constraints that supports the proposed functions and/or lack in details.	Database Schema are incomplete, or Non-submission of database schema or clear evidence of plagiarism detected (disciplinable offence)

	Reflection on Design choice (2%)	Provides a thorough and insightful reflection on three DALL·E-generated visual concepts and design choices, linking them clearly to user experience, usability, aesthetics, and app goals.	Provides a clear reflection with good reasoning on three DALL·E-generated visual concepts and design choices, considering most aspects of usability and aesthetics.	Reflection is basic but addresses key aspects like usability and aesthetics; reasoning lacks depth.	Superficial reflection with minimal reasoning on the design choices made.	No meaningful reflection; does not explain or justify design choices.
	Design Screenshots (hi-fi) (5%)	The screenshots clearly and fully illustrate functions as highlighted in the project scope. Contains at least 5 screens. Design is professional looking, easy to learn, and easy to use.	The screenshots clearly and fully illustrate functions as highlighted in the project scope. Contains at least 5 screens. Design is easy to use once you learn it.	The screenshots partially illustrate functions as highlighted in the project scope. Contains at least 5 screens. Design is easy to use once you learn it.	The screenshots barely illustrate functions as highlighted in the project scope. Contains 4 screens or less. Design is easy to use once you learn it.	The screenshots are incomplete, or Non-submission of hi-fi design screenshots or clear evidence of plagiarism detected (disciplinable offence)
	Widgets Tree (1%)	Widget tree of main screen is complete and mostly correct.		Widget tree of main screen is incomplete or mostly incorrect.		Non-submission or clear evidence of plagiarism detected (disciplinable offence)

The grading criteria for Part 2 (25%) – Program Code (20%) and Presentation (5%) will be based on the following:

Criteria	In Context	Performance Level				
		Excellent	**Good**	**Average**	**Poor**	**Below Standard**
Program Code (20%)	**Implemented screens (10%)**	5 proposed screens are implemented. Max 4 marks for each screen, breakdown: 2 marks for each implemented screen 1 mark for aligning implemented screen with proposed design in Part 1 1 mark for effective use of white space, graphic elements and/or alignment to organise content.				No screens implemented Clear evidence of plagiarism detected (disciplinable offence)
	Variety of widgets (2.5%)	Extensive use of basic UI component that were taught: Container, Column, Row, Text, Image, TextButton, ElevatedButton, TextFormField, DropdownButtonFormField, Icon or any basic UI widgets that was covered in class. 0.5 mark for each basic UI component, max 4 marks. 0.5 mark for each additional UI component not covered in class, max 1 mark.				No basic UI component present, or Clear evidence of plagiarism detected (disciplinable offence)
	Good programming practices (1.5%)	Project is well structured with folders, good naming convention and code is well commented.		Project is well structured with folders, good naming convention or code is well commented.		Little or no evidence of good programming practices. Clear evidence of plagiarism detected (disciplinable offence)
	Navigation (1%)	Navigation is neat and does not contain any error.				Navigation is untidy or contains error. Clear evidence of plagiarism detected (disciplinable offence)
	Additional features (5%)	Multiple design-related advanced additional features implemented with no bugs and errors.	Some design-related advanced additional features implemented with no bugs and errors.	At least one design-related advanced additional feature implemented with no bugs and errors.	At least one design-related simple additional feature implemented with no bugs and errors.	Incomplete or no attempts of any design-related additional feature, or Clear evidence of plagiarism detected (disciplinable offence)
Presentation (5%)	**Q&A (5%)**	Answers all technical/code-related questions confidently, including reasoning behind implementation choices; explains key parts of the code accurately and in detail Present within the given time-limit.	Answers most technical/code-related questions confidently; gives reasonable explanation of code and logic. Present within the given time-limit.	Struggles with some code-related questions; explanations lack depth or clarity.	Unable to respond to most code or technical questions; shows limited understanding of own code.	Student was absent for project presentation and demonstration without a valid reason Clear evidence of plagiarism detected (disciplinable offence)

The grading criteria for Part 3 (25%) – Program Code (20%) and Presentation (5%) will be based on the following:

Criteria	In Context	Performance Level				
		Excellent	**Good**	**Average**	**Poor**	**Below Standard**
Program Code (20%)	**User Authentication (15%)**	Basic Firebase authentication (register, login, logout and forgot password) implemented with customised settings with no bugs and errors. At least two other account management features and two other authentication methods (which must not be taught in class) is implemented with no bugs and errors. Proper feedback is implemented.	Basic Firebase authentication (register, login, logout and forgot password) implemented with customised settings with no bugs and errors. At least one other account management features and one other authentication methods (which must not be taught in class) is implemented with no bugs and errors. Proper feedback is implemented.	Basic Firebase authentication (register, login, logout and forgot password) implemented with no bugs and errors. Some feedback is implemented.	Some form of user authentication present but with errors, or At least one simple authentication method implemented with no bugs and errors.	No form of user authentication present, or Clear evidence of plagiarism detected (disciplinable offence)
	Form validation (2.5%)	Input validations are present in all input fields. Appropriate keyboard types are implemented for all input fields.	Input validations are present in most input fields. Appropriate keyboard types are implemented for most input fields.	Input validations are present in some input fields. Appropriate keyboard types are implemented for some input fields.	Input validations or appropriate keyboard types are present in a few input fields.	Form validation not implemented in mobile application, or Clear evidence of plagiarism detected (disciplinable offence)
	Program Code (2.5%)	Project is well structured with folders, good naming convention and code is well commented.		Project is well structured with folders, good naming convention or code is well commented.		Little or no evidence of good programming practices. Clear evidence of plagiarism detected (disciplinable offence)
Presentation (5%)	**Q&A (5%)**	Answers all technical/code-related questions confidently, including reasoning behind implementation choices; explains key parts of the code accurately and in detail. Present within the given time-limit.	Answers most technical/code-related questions confidently; gives reasonable explanation of code and logic. Present within the given time-limit.	Struggles with some code-related questions; explanations lack depth or clarity.	Unable to respond to most code or technical questions; shows limited understanding of own code.	Student was absent for project presentation and demonstration without a valid reason Clear evidence of plagiarism detected (disciplinable offence)

The grading criteria for Part 4 (30%) – Program Code (25%) and Presentation (5%) will be based on the following:

Criteria	In Context	Performance Level				
		Excellent	**Good**	**Average**	**Poor**	**Below Standard**
Program Code (25%)	**CRUD operations (5%)**	CRUD with Cloud Firestore implemented: Select all, Select one, Insert, Update, Delete (2 marks for each category of database operation that was implemented meaningfully, as proposed, with no errors)				No database operation is present, or Clear evidence of plagiarism detected (disciplinable offence)
	Advanced queries (2.5%)	CRUD with Cloud Firestore implemented: Select with filter criteria (other than identifier), Select with multiple filter criteria (same field), Select with multiple filter criteria (different fields), Select with sort order, Select with aggregation (1 mark for each category of database operation that was implemented meaningfully, max 5 marks)				No advanced queries present, or Clear evidence of plagiarism detected (disciplinable offence)
	Data (1.5%)	Firebase documents contain comprehensive set of meaningful records/items.	Firebase documents contain good set of meaningful records/items.		Firebase documents contain very few records/items.	Non-submission or clear evidence of plagiarism detected (disciplinable offence)
	Form validation and Feedback (2.5%)	Input validations are present in all input fields. Multiple feedback is provided via AlertDialog and SnackBar. Other form of feedback are explored and implemented.	Input validations are present in most input fields. Multiple feedback is provided via AlertDialog or SnackBar	Input validations are present in some input fields. Some feedback is provided via AlertDialog or SnackBar.	Input validations are present in a few input fields. Few feedback are provided via AlertDialog or SnackBar.	Form validation not implemented in mobile application, or Feedback is not implemented in mobile application, or Clear evidence of plagiarism detected (disciplinable offence)
	Additional features (7.5%)	Multiple advanced additional features implemented with no bugs and errors. Mobile app is highly responsive. Effective use of white spaces.	Some advanced additional features implemented with no bugs and errors.	At least one advanced additional feature implemented with no bugs and errors.	At least one simple additional feature implemented with no bugs and errors.	Incomplete or no attempts of any advanced feature, or Clear evidence of plagiarism detected (disciplinable offence)

	Competition and commercial viability (2.5%)	Mobile application is complete with comprehensive set of functionalities that has good competition and commercial viability with high relevance to the theme.	Mobile application is complete with comprehensive set of functionalities that has good competition and commercial viability with high relevance to the theme.	Mobile application has good competition and commercial viability with some relevance to the theme but some touching up is required.	Little competition, commercial viability or relevance to theme.	No competition, commercial viability or relevance to theme.
	Personalisation (2.5%)	Mobile application is personalised with relevant and attractive app icon and splash screen. Personalisation via highly customised themes is implemented in the mobile app.	Mobile application is personalised with relevant app icon and splash screen. Personalisation via themes is implemented in the mobile app.	Mobile application is personalised with relevant app icon and splash screen, or Personalisation via themes is implemented in the mobile app.	Some form of personalisation present	Some form of personalisation present but with errors, or Clear evidence of plagiarism detected (disciplinable offence)" Program failed to compile or run successfully.
	App functionality and code quality (1%)	Mobile application is able to run on web browser and emulator with no errors. Code is well commented.	Mobile application is able to run on web browser and emulator with no errors. Code is commented.	Mobile application is able to run on web browser with very few (<3) errors.	Mobile application is able to run on web browser with some (3 to 5) errors.	Program failed to compile or run successfully.
Presentation (5%)	**Q&A (5%)**	Answers all technical/code-related questions confidently, including reasoning behind implementation choices; explains key parts of the code accurately and in detail. Present within the given time-limit.	Answers most technical/code-related questions confidently; gives reasonable explanation of code and logic. Present within the given time-limit.	Struggles with some code-related questions; explanations lack depth or clarity.	Unable to respond to most code or technical questions; shows limited understanding of own code.	Student was absent for project presentation and demonstration without a valid reason. Clear evidence of plagiarism detected (disciplinable offence)