FITE4801 Final Year Project

Detailed Project Plan

E-wallet of E-wallets

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Table of Contents

1. Project Background

In recent years, societies are increasingly going cashless and Hong Kong is no exception. E-wallets are playing an important role in this transition due to its convenience in everyday payments. E-wallets serve as digital payment tools that enable users to make online purchases, conduct transactions in physical retail locations, and send money to other users' wallets. Users can fund their e-wallets using debit or credit cards and bank accounts.

The Hong Kong Monetary Authority (HKMA) has been actively promoting fintech development, through initiatives like the Open API Framework [1] and the Interbank Account Data Sharing [2]. The Open API framework enables financial institutions to provide third-party service providers with programmatic access to their internal systems and data, fostering innovation in product offerings and customer experiences while balancing risks [1]. The Interbank Account Data Sharing initiative allows individuals to share their bank account information with other banks securely and efficiently, and the preliminary study on this initiative shows that this could promote digital banking, bolster risk management for banks, and improve the overall customer experience [2]. These efforts aim to enhance the Hong Kong's fintech ecosystem and foster innovation in financial services. Similarly, the Republic of China is advancing its digital economy through e-CNY, which is a digital fiat currency issued by People's Bank of China, aiming to enhance financial inclusion, streamline monetary and payment systems and more [3,4]. These ongoing initiatives in both Hong Kong and mainland China have served as important inspiration for this proposed project.

In Hong Kong, we have a lot of e-wallet options, such as WeChat Pay, Alipay, PayMe, BoC Pay, and more. The recent expansion of cross-boundary e-CNY pilot in Hong Kong is believed to further diversify the e-wallet landscape [5]. While these e-wallets have made digital payments more accessible, they have also created two main pain points for users. Firstly, fragmented wallet management. With so many e-wallets, users are required to maintain balances separately and top-up each e-wallet individually. This fragmentation can lead to inefficiencies, and a study also discusses this issue of managing multiple digital wallets as an overhead [6]. Secondly, lack of unified QR code payment feature. Whenever users purchase in-store, they need to open the respective e-wallet app to access the QR code for merchant to scan, rather than having a unified solution. This can create a fragmented and inconvenient user experience when making in-store transactions.

To address these inconveniences, the proposed project aims to develop a **centralized e-wallet platform that can serve as an e-wallet of e-wallets**. This solution would provide users with a simplified user experience, enabling them to deposit funds into a single centralized e-wallet that can be used across all their integrated e-wallets. Additionally, the platform would implement an all-in-one QR code payment feature, allowing users to make in-store purchases using a single, unified solution.

2. Project Objective

The specific objective of the project is to demonstrate the feasibility of integrating multiple APIs to create the centralized e-wallet platform. This will enable users to deposit funds into the centralized e-wallet and use those funds across all their integrated e-wallet services, eliminating the need for separate top-ups. Additionally, providing an all-in-one QR code payment feature that allows users to make in-store purchases using a single, unified solution, rather than having to switch between different e-wallets.

3. Project Methodology

3.1 Research

The first stage of the methodology would be research. This research will undertake a comprehensive examination of the existing e-wallet landscape in Hong Kong. This will be commenced with an extensive secondary research effort, including reviews of industry reports, academic publications, and media articles, in order to gain a thorough understanding of the current e-wallet ecosystem in this region. This research will help identify the key e-wallet players, their market share, user base, and the broader technological and regulatory landscape surrounding digital payments in Hong Kong, establishing a solid foundation of knowledge about the domain.

Following the secondary research, a detailed analysis of the features, functionalities, and user experiences of the leading e-wallet platforms currently available in Hong Kong such as WeChat Pay, Alipay, PayMe, and BoC Pay will be performed. This will involve hands-on testing of the apps, reviewing of user feedback, and studying of the technical documentation (if available). Understanding the strengths, weaknesses, and pain points of the existing e-wallet solutions will enable the identification of gaps and unmet needs that the proposed centralized e-wallet platform can address. This will allow the centralized e-wallet platform to provide a differentiated and more compelling value proposition.

Finally, the project team will analyse and consolidate the data gathered from the secondary research and platform analysis to identify the key challenges, pain points, and opportunities in the Hong Kong e-wallet ecosystem. This synthesis will provide a solid foundation to conceptualize and design the centralized e-wallet platform, ensuring that it addresses the most pressing needs and gaps in the market.

3.2 Formulation of the Solution

Building upon the insights gathered and the gaps in market identified, the formulation of the centralized e-wallet platform solution will begin. This will involve brainstorming and conceptualizing the core features and functionalities that the platform should offer. Defining the key features upfront will help align on the platform's value proposition and guide the subsequent design and development efforts.

3.3 Prototyping

Firstly, a set of core capabilities will be selected to focus on for the prototype of the centralized e-wallet platform. By doing this, it will first involve defining the core e-wallet functions that will be simulated, such as balance checking, fund transfers, and payment processing. Additionally, the implementation of a centralized API management system will be planned to facilitate the integration of the simulated e-wallet services..

Next, with the key features defined, the focus will then be on developing the simulated e-wallet APIs. Using Python, the necessary code will be created to mimic the basic functionalities of e-wallet applications, including balance check, fund transfer, and other core operations. Python programming language is chosen due to its versatility, extensive ecosystem of libraries and frameworks, and ease of use in rapid prototyping. Python's strong support for web development, API creation, and data manipulation make it an ideal choice for quickly building the simulated e-wallet APIs and demonstrating the integration capabilities. This step will ensure that the prototype has the necessary building blocks to demonstrate the feasibility of integrating multiple e-wallet services.

Then, the centralized e-wallet management system for the simulated e-wallet APIs will be implemented, focusing on the chosen core capabilities. Again, using Python, the team will develop the code for a central system that can interact with the multiple simulated APIs. This centralized system will include functions to demonstrate the unified operations across the various e-wallets, showcasing the key capabilities of the proposed integration approach.

Finally, the prototyping phase will culminate in the integration demonstration, where the project team will write code to showcase how the centralized system can be managed across the multiple simulated e-wallets with the core capabilities chosen to focus on.

By following this structured prototyping approach, the project team will be able to effectively demonstrate the feasibility of integrating multiple e-wallet APIs to create a centralized e-wallet platform. The focus will be on showcasing the technical capabilities, design considerations, and potential challenges associated with such an integration approach.

3.4 Evaluation

The evaluation and assessment phase will begin with a comprehensive self-evaluation of the centralized e-wallet platform prototype. The prototype's efficiency and overall integration with the connected e-wallet simulated APIs will be thoroughly assessed. This self-evaluation will help identify the strengths and weaknesses of the prototype, providing valuable insights to guide future development and enhancement efforts.

Based on the self-evaluation data, the key areas that require further improvement or refinement, such as optimizing transaction processing times, enhancing the visual design, or streamlining the user flow will be documented. Clearly identifying the areas for improvement will enable the development of a roadmap for future development, ensuring that the centralized e-wallet platform continues to evolve and address the evolving needs of its target users.

Throughout the evaluation and assessment phase, the learnings and insights gained will be documented, highlighting both the key strengths and the areas that require further enhancements or refinement. Capturing and documenting these learnings will serve as a valuable knowledge base, informing future development decisions and contributing to the overall success of the centralized e-wallet platform project.

By following this detailed and comprehensive methodology, a thorough research of the e-wallet landscape will be conducted, a well-designed solution will be formulated, a functional prototype will be developed, and a comprehensive self-evaluation will be carried out to identify areas for improvement. This approach will be able to demonstrate the feasibility of integrating multiple APIs to create the centralized e-wallet platform and ensure the final centralized e-wallet platform addresses the key needs and pain points of the target users in Hong Kong.

4. Project Schedule and Milestones

#	Time	Phase	Description
1	Sep 2024 – Oct 2024	Research	- Conduct research e-wallet landscape in Hong Kong - Analysis of existing e-wallet platforms - Synthesize research findings and define key gaps *Oct 1 – Deliverables of Phase 1*
2	Nov 2024 – Dec 2024	Formulation of the Solution	- Formulation of centralized e-wallet platform solution - Conceptualize the key features and functionalities - Define key features and functionalities
3	Jan 2025 – Feb 2025	Prototyping	- Select the core capabilities for the prototype - Define the core e-wallet functions that will be simulated - Develop the simulated e-wallet APIs and centralized e-wallet management system - Integration demonstration *Jan 13-17 – First Presentation*

			• *Jan 26 – Deliverables of Phase 2*
4	Mar 2025 – Apr 2025	Evaluation	• Conduct self-evaluation of the prototype and • Identify the strengths and weaknesses to provide insights for future development • Document the learnings and insight gained • *Apr 21 – Deliverables of Phase 3* • *Apr 22-26 – Final Presentation* • *Apr 30 – Project Exhibition*

The schedule is tentative and is subject to change.

5. References

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[3] Working Group on E-CNY Research and Development, People's Bank of China, "Progress of Research & Development of E-CNY in China," Jul. 2021. [Online]. Available: http://www.pbc.gov.cn/en/3688110/3688172/4157443/4293696/2021071614584691871.pdf .

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[6] D. Kumar and U. Sharma, "Design E-Wallet as a Centralized E-wallet," *International Journal of Engineering and Advanced Technology* , vol. 9, no. 2, pp. 1-5, ISSN: 2249-8958, 2019. [Online]. Available: https://www.ijeat.org/wp-content/uploads/papers/v9i2/B2684129219.pdf .