



BCash: A Mobile E-wallet Application

A Capstone Project

Presented to the Faculty of Information Technology Department

San Sebastian College-Recoletos de Cavite

In Partial Fulfillment of the
Requirements for the Degree of
Bachelor of Science in Information Technology

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In partial fulfillment of the requirements for the degree in **Bachelor of Science in Information Technology**, this thesis entitled **BCash: A Mobile E-wallet Application** has been prepared and submitted by **Miguel Jean R. Angkiko, Stephen Regan James B. Layson, Fel Michael V. Moraña, Alexander Ray F. Olaes, and Roland Vel P. Pagonzaga**, the acceptance of which is hereby endorsed.

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- The BCash development team



DEDICATION

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- The BCash development team



ABSTRACT

The initial state of the school canteen payment service operated manually using the Coin Chip system. This involved a labor-intensive process, prompting the need for improvement. The BCash application was developed as a solution, introducing a more efficient and secure system with key functions like Payments, Cash In, Account Management, and Security.

To execute this development project, the BCash development team chose to adopt the 5 Cycle DevOps Model, ensuring a comprehensive and iterative approach. The programming languages utilized were JAVA, JAVASCRIPT, and PHP within the CodeIgniter 3 framework. The system employed a MySQL database, and the user interface was designed using HTML, CSS, XML, Canva, and Figma. The development environment consisted of Android Studio and Visual Studio Code, while system documentation was managed using Microsoft Word 2010 and Diagrams.net.

The entire project took 275 days, commencing on January 9, 2022, and concluding on November 25, 2022. This timeline reflects a well-organized and successfully executed project. The BCash application, with its enhanced features, garnered positive feedback during the User Acceptance Testing (UAT), where it demonstrated agreement in terms of functional suitability, performance efficiency, compatibility, usability, reliability, security, and maintainability.

The implementation of the BCash application is poised to address the identified issues from interviews, such as maintenance and security concerns. The overall benefits of this e-wallet system include streamlined operations, reduced transaction times, minimized errors, and heightened customer satisfaction. While the system performed well in various aspects, the team acknowledges areas for improvement in performance efficiency, reliability, and maintainability, signaling a commitment to ongoing enhancement. In conclusion, the BCash development team expresses satisfaction with the testing results and anticipates the positive impact of the implemented system.

Keywords: BCash E-Wallet, 5 Cycle DevOps Model, Coin Chip system, Payments, Cash In, Account Management, and Security



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Chapter I

INTRODUCTION

Overview of the Current State of Technology

Technological advancements have had a significant impact on many aspects of modern society. Among these advancements, the surge in popularity of electronic wallets, or mobile e-wallets, stands out prominently in recent years. This popularity can be attributed to the inherent convenience and efficiency that e-wallets offer. The user provides a swift and hassle-free means of conducting financial transactions, which has led to widespread adoption as the preferred mode of payment for a growing number of individuals. However, it is essential to acknowledge that the impact of e-wallets on users is a complex interplay of both positive and negative effects. While streamlining financial interactions, it is crucial to be mindful of these impacts, particularly with regard to users who may not be well-versed in navigating the intricacies of e-wallet systems, in order to mitigate any adverse consequences on financial well-being.

Through these technologies, the project team took the opportunity to develop a web and mobile application called “BCash” wherein the “B” refers to Baste - a popular name of the client, San Sebastian College - Recoletos de Cavite (SSC-RdC). This application is for the canteen transaction that provides improvement, convenience and financial security. Implementing BCash e-wallets provides a modern solution by eliminating the need for physical money converted into coin chips for making canteen payments more convenient and secure. This move reduced the administrative hassles associated with cash and coin chips for school expenses. Additionally, BCash offers parents transparency and control over the spending, allowing them to track transactions and set limits. While challenges like security, privacy, and technology investment exist, the potential benefits in efficiency and satisfaction outweigh these hurdles, making BCash adoption in schools a promising solution.



Research Problem

This capstone project sought to find answers to the following questions:

1. What is the general environment of the school canteen payment service?
2. How can the current school canteen payment service be improved?
3. What is the assessment of the proposed e-wallet system in terms of functional suitability, performance efficiency, compatibility, usability, reliability, security, and maintainability?
4. How will the proposed e-wallet system be implemented?
5. What are the benefits of implementing the proposed e-wallet system?

Research Objectives

General Objective

This capstone project aimed to create a web and mobile e-wallet application for San Sebastian College - Recoletos de Cavite.

Specific Objectives

The following were the identified specific objectives:

1. To analyze how the school's canteen payment system works, examining operational processes, transaction flows, and interactions to have clear users and system requirements.
2. To design an effective user interface and write codes for functional modules of an e-wallet, ensuring seamless transaction processing and management.
3. To conduct evaluation on the performance of the proposed e-wallet system in terms of the criteria of functional suitability, performance efficiency, compatibility, usability, reliability, security, and maintainability.
4. To prepare the implementation plan that will address all issues concerning smooth operation of the proposed e-wallet system.



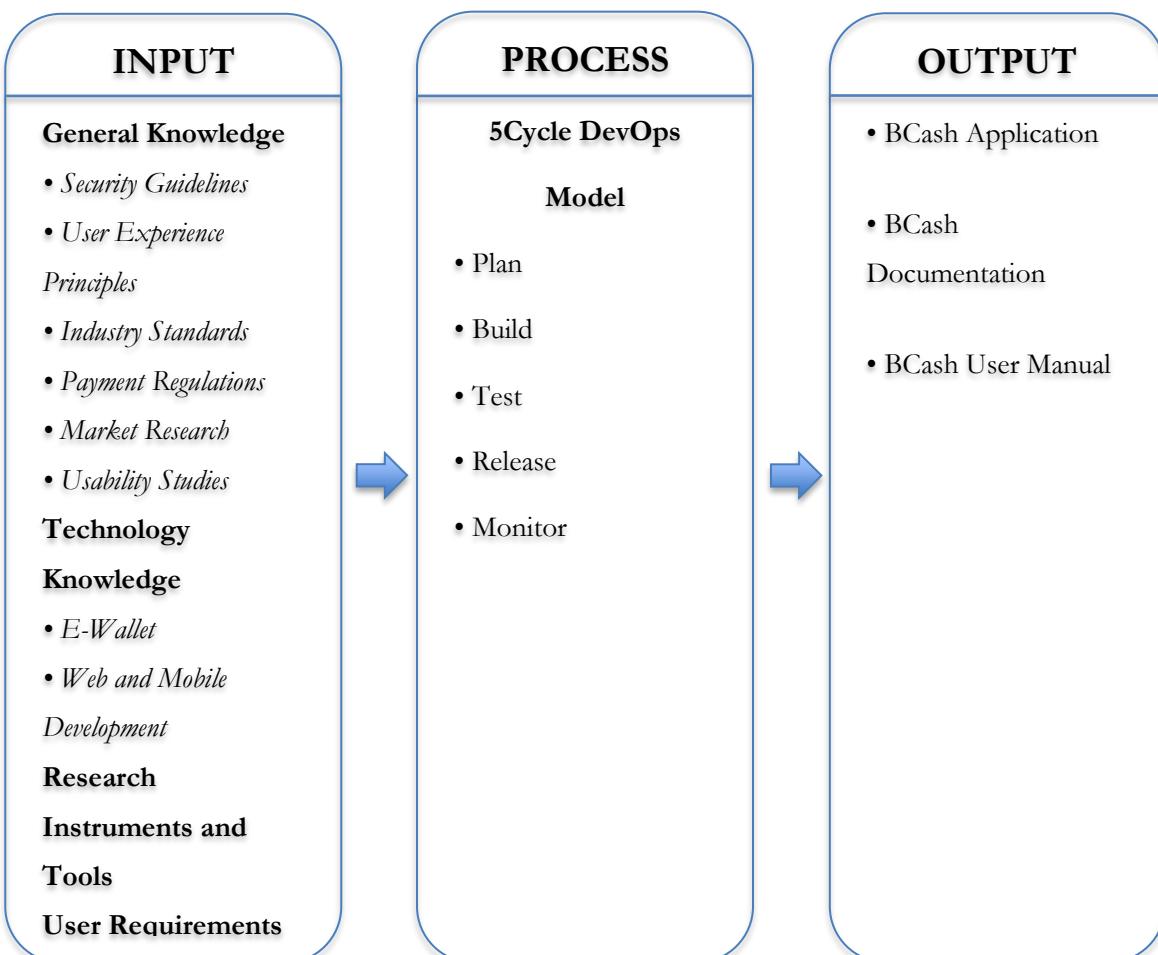
5. To determine the benefits offered by the new e-wallet system appreciated and experienced by the client and users.

Research Framework

This capstone project aimed to provide a clear understanding of the relationship between the different factors that influence the success of the mobile e-wallet application which can be seen in *Figure 1*. Based on the gathered information of developing BCash, the project took into consideration the DevOps as the Software Development Life Cycle adopted in completing the project and achieving the desired output.

Figure 1.

Research Paradigm of BCash





BCash development integrates General Knowledge and Technology Knowledge to develop a secure and user-friendly E-Wallet application. Adhering to industry standards, payment regulations, and the principles of user experience, BCash follows the 5-Cycle DevOps Model, encompassing Planning, Building, Testing, Releasing, and Monitoring phases. The development process is informed by security guidelines, market research, usability studies, and user requirements. This project outputs include the BCash Application, accompanied by detailed documentation and a user manual for seamless implementation and user understanding.

Scope and Limitations of the Research

This capstone project was focused on improving the canteen payment service of San Sebastian College - Recoletos de Cavite (SSC-RdC) Main Campus, catering to students, parents or guardians, staff and faculty members.

This capstone project will not handle other student financial transactions to the Accounting Office, Bookstore, Library, Registrar, and transactions outside the campus. Its primary purpose is to streamline canteen payments, and it does not extend to non-financial functions like managing tuition fees.

Significance Study

This capstone project is beneficial to the following:

San Sebastian College - Recoletos de Cavite. By embracing and implementing a digital payment system, the institution positions itself at the forefront of technological advancement, exemplifying modernity and efficacy.

School Administration. The implementation of this system will streamline financial management processes within the school, leading to improved efficiency.



School Canteen Manager. Streamlines canteen transactions into a digital age, providing detailed summary, efficient tracking, and enhanced sales data for financial management.

Students, Staff, and Visitors. Providing a secure and convenient method for on-campus purchases, the project simplifies transactions and eliminates the need for carrying physical cash.

Parents and Guardians. The project offers the ability to monitor the wards' financial activities within the school premises, fostering transparency and control.

Other Department. The concessionaires operating within the college premises will experience heightened efficiency and ease of conducting business transactions.

The Developers. This project will acquire invaluable experience during its development, which can be applied to their future projects in the realm of web and mobile applications.

Future Researchers. Researchers can get insights and methodologies of this project for their own studies related to web and mobile application development and digital payment systems.

Overall, BCash is a valuable addition to the technological advancements of San Sebastian College - Recoletos de Cavite, paving the way for a more modern and efficient payment system.

Definition of Terms

This section conceptually or operationally defines the constructs of the study. These constructs are written in the research question.

Authentication - Refers to the process of verifying someone's or something's identity. It is a critical component of security, ensuring that only authorized individuals or devices can access sensitive information or resources.

Concessionaire - is a company or individual that is contracted by a school to provide food and beverage services to student, faculty, and staff.

Coin Chips - Refers to small round tokens that are used in place of cash at a school canteen. Coin chips are typically made of plastic and have a denomination printed on them.



Cash In - Refers to the process of adding funds or depositing physical currency into the electronic or digital wallet. The funds in the e-wallet can then be used for various digital transactions, such as buying in canteen, and peer-to-peer transfers.

Cash Out - Refers to the process of converting the electronic or digital funds stored in the e-wallet into physical currency or its equivalent. Essentially, it allows users to access the monetary value stored in their e-wallet in a tangible and spendable form.

White List - Refers to a list of accounts that are authorized to receive transfer funds from a particular account.

Activity Logs - Is a digital record of recent actions of the account during a particular period of time.

Credit - Is the provision of goods or services to a customer without immediate payment, with expectation that payment will be made in the future based on trust.

Debit - Is a record entered on the left side of a double-entry accounting system. This entry serves to increase an asset or expense account or decrease a liability or equity account. In simpler terms, a debit signifies the reduction of funds from an account.

E-wallet - Refers to a digital version of a physical wallet that is used for online transactions. It allows individuals to store and manage their financial information, such as credit card details, account information, and digital currency, in a secure digital format.

Financial Flow - Refers to the movement of money or financial assets between individuals, organizations, or countries. It can include income, expenses, investments, loans, and other financial transactions that impact the overall financial health and stability of an entity.

Financial Report - Is a formal document that summarizes a company's financial performance over a specific period, typically a quarter, a year, or a fiscal year

Merchant - An individual or business entity that sells items in schools.

Receipt - Is a written or printed document that serves as official proof of a transaction between a buyer and a seller. It acknowledges the receipt of money or goods and confirms that payment has



been made or goods/services have been received. Receipts typically include essential information such as the date of the transaction, a detailed description of the items or services purchased, the quantity or unit price, the total amount paid, and any applicable taxes.

RFID - Radio Frequency Identification (RFID) technology is being used in schools in a variety of ways to improve efficiency, security, and student safety. One of the most common uses of RFID in schools is for attendance tracking. Students are issued RFID-enabled ID cards that they wear to school.

QR Code - QR code (Quick Response Code) is a type of barcode that can store a variety of information, including URLs, text, and contact details. QR codes are now widely used for a variety of purposes, including marketing, product tracking, and mobile payments.

Sales Transactions - Refers to the exchange of goods, services, or assets for a mutually agreed-upon amount of money or other forms of payment between a buyer and a seller. These transactions are a fundamental aspect of business and commerce, representing the core activity through which products or services are transferred from producers or providers to consumers or other businesses.

NFC - Stands for Near Field Communication. It is a short-range wireless technology that allows devices to exchange data when they are brought within a few centimeters of each other. NFC is commonly used for contactless payments, but it can also be used for other tasks, such as sharing data, opening doors, and launching apps.



Chapter II

REVIEW OF RELATED LITERATURE

Foreign Literature

The Application of Electronic Wallet in Apu Campus (Julia Juremi, Mohamad Firduas Che Abdul Rani, & Cheng Ma. (2020)) The study discusses the seven technologies that are predicted to have a major impact on our lives in the next decade, with mobile payment being the mainstream. Mobile payment is divided into remote payment and near-field payment (NFC), which offer convenience and efficiency for consumers. The potential of mobile payments has attracted the attention of operators, handset makers, banks, and credit card companies. The international market includes various mobile payment methods such as Square, PayPal Here, Google Wallet, and Zip mark. According to Gartner, mobile payments are expected to reach \$617 billion by 2016, with an average annual growth rate of 42%, and 448 million mobile payment users.

The Impact of E-Wallets for Current Generation (Kolandaismay & Subaramaniam (2020)) The paper discussed the increasing use of digital payments and e-wallets as a preferred mode of payment for consumers worldwide. It evaluates both the positive and negative impacts of e-wallets on users and concludes that awareness is the key to reducing the negative impact of e-wallets. The article also suggests that while some customers prefer cash in hand over e-wallets due to safety concerns, the young generation is more open to using e-wallets. It emphasizes the need for users to make wise choices and have awareness about the e-wallet they use.

Alipay (Alibaba Group Holding Limited (2021)) is a third-party mobile and online payment platform that was established by the Alibaba Group and its founder Jack Ma in 2004. It was initially developed as an escrow service for Alibaba's e-commerce platform, but later expanded to offer a wide range of financial services, including mobile payments, money transfers, and online banking. Alipay



has become a popular payment method in China and is used by hundreds of millions of people, both for online purchases and for making in-store payments through QR code scanning. Alipay also offers a range of other financial services, including investment accounts, credit services, and insurance products. In addition to its domestic operations, Alipay has expanded to serve international users and has formed partnerships with merchants and financial institutions around the world.

E-Wallet adoption: A case of youth customers' acceptance (Muhammad Fozi, Zailan, & Hanim Saidi (2021)) - This paper discusses the use of e-Wallets and their acceptance among youth customers. The study aims to investigate the factors that contribute to the acceptance of e-Wallets by youth customers, and to measure the level of acceptance of these applications. The study used an online questionnaire to collect data from a minimum of 150 youth customers who use e-Wallets. SPSS software was used for statistical analysis, and the reliability of each item was checked. The results indicate that convenience, credibility, and attractiveness of alternatives are the factors that affect youth customers' acceptance of e-Wallets. Structural Equation Modeling (SEM) was used to analyze the factors related to the acceptance of e-Wallets, and the study found that all factors have a strong reliability.

Google Pay (Britannica (2022)) - is a digital wallet and payment system developed by Google that enables users to make online and in-store transactions using their Android phones, tablets or watches. Launched in 2015 as Android Pay, it was rebranded as Google Pay in 2018 to incorporate other Google payment services such as Google Wallet and Google Tez. Google Pay allows users to store credit and debit card information, loyalty cards, and gift cards, making it easy for them to make payments in stores, online, and in-apps that support Google Pay. It uses near field communication (NFC) technology for contactless payments, and can also be used for peer-to-peer transactions. Google Pay operates in multiple countries and supports different currencies. The service is free to use and does not charge any transaction fees, but merchants may be charged a fee for processing payments.



Paytm (Paytm (2022)) - is a mobile payment and financial services company based in India. Founded in 2010, Paytm started as a platform for mobile and DTH recharge, utility bill payments, and online shopping. Over the years, the company has expanded its services to include digital wallets, online banking, and financial products such as insurance, credit cards, and loans. Paytm's success in India can be attributed to its innovative solutions for digital payments, as well as its widespread adoption across the country.

Web based E-wallet Canteen Management System using RFID (Giteshri Kale & Sharad Dube, (2022), IRJET) - The project aims to develop canteen management software for large industries to manage data and provide better services to users. The system maintains accounts of working employees and manages inventory operations. It includes an administrative end that only the administrator can access. The project has three main purposes: to reduce manual work for managing operations, design a hardware system using RFID technology for easy installation and fast operation, and install multiple hardware devices in a canteen using Master and slave hardware concepts to avoid crowding. Employees use the hardware system in their respective canteens, and all data entries are stored in a single SQL database to allow multiple users to swipe their RFID card at one time.

Mobile-based E-wallet Prototype to Support Electronic Payments in Campus Environment (Ghifari Munawar (2022)) - The article discusses the development of a mobile-based e-wallet prototype that specifically handles electronic payment transactions on a university campus. The e-wallet aims to solve the convenience and security problems that arise from using cash, especially in light of the COVID-19 pandemic. The system requirements were gathered through questionnaires distributed to target users (students), and the e-wallet prototype was developed using an iterative rational unified process (RUP) model. The e-wallet was tested for functionality and evaluated based on user experience testing using the user experience questionnaire (UEQ) method. The results show that



the e-wallet prototype was positively evaluated by users in terms of attractiveness, functionality, display design, and comfort of use.

PayPal (Britannica (2023)) - is an American e-commerce company that specializes in Internet money transfer. Founded in March 2000 as a result of a merger between X.com and Confinity. PayPal allows users to make secure online transactions, including payments for purchased goods and money transfers between accounts. Users can link their PayPal accounts to their bank accounts for more efficient transfers and payments. Fees are collected by eBay on certain transactions and vary based on factors such as transaction amount, nature, and currency type. Although PayPal was spun off into an independent company in 2015, it continues to be used by eBay.

Apple Pay (Apple Inc. (2023)) - is a mobile payment and digital wallet service provided by Apple Inc. that allows users to make payments in person, in iOS apps, and on the web. Apple Pay uses Near Field Communication (NFC) technology to transmit payment information from a user's mobile device to a payment terminal. The service was first launched in October 2014 and is available in over 60 countries.

Users can link their Apple Pay account to their credit, debit, or prepaid card, and also to their bank account, allowing for easy transfers of funds. Apple Pay offers a secure and private payment experience, as it uses tokenization to generate a unique code for each transaction, rather than sharing the user's actual payment information. Additionally, Apple Pay transactions are authenticated using biometric identification methods such as Touch ID or Face ID.

Zelle (Zelle (2023)) - is a digital payment platform that allows users to send and receive money using their mobile devices or computers. Launched in 2017, Zelle is owned by Early Warning Services LLC, a financial services company based in the United States. The platform enables users to transfer money between bank accounts in real time, without the need for a physical check or cash. Zelle is



connected to over 1,000 banks and credit unions in the US, which allows for easy and seamless transactions for users. Additionally, Zelle offers payment options for businesses to easily receive payments from their customers. The platform is known for its security measures, including authentication and encryption to ensure that all transactions are safe and secure.

Samsung Pay (Samsung Pay (n.d.)) - is a secure and convenient way to make mobile payments. It allows users to store their credit or debit card information and use their Samsung device to make payments at millions of locations worldwide that accept Samsung Pay. The service is compatible with a wide range of Samsung devices, including smartphones, smartwatches, and even some Samsung TVs. Samsung Pay uses advanced security features, including tokenization and biometric authentication, to ensure that users' financial information remains safe and secure. Additionally, Samsung Pay offers rewards and discounts for using the service at participating merchants.

TransferWise (TransferWise (n.d.)) - TransferWise is an innovative peer-to-peer money transfer service that has revolutionized the traditional international money transfer process. By eliminating the need for banks to act as intermediaries in cross-border transactions, TransferWise enables users to send money to other countries at a significantly lower cost than traditional banks. The platform achieves this through its use of mid-market exchange rates, which it displays transparently upfront to its users. With its user-friendly interface, quick transfer times, and low fees, TransferWise has become a popular choice for those seeking a reliable, affordable, and efficient way to send money across borders.

WeChat Pay (WeChat Pay (n.d.)) - is a mobile payment service owned by Tencent, the Chinese technology giant. WeChat Pay is integrated into the WeChat mobile app, which has over one billion active users. With WeChat Pay, users can link their bank cards to their WeChat account and make mobile payments for goods and services, transfer money to other users, and pay bills. WeChat Pay also



offers international payment services for transactions in selected currencies. In addition to being a payment platform, WeChat Pay also serves as a marketing tool for businesses, enabling them to interact with customers and offer promotional deals. With its popularity in China, WeChat Pay has become a key player in the global mobile payment market.

Binance (Binance.com (n.d.)) - is a cryptocurrency exchange platform founded in China in 2017 by Changpeng Zhao. It quickly gained popularity as a platform for trading various cryptocurrencies, with a focus on Bitcoin and Ethereum. Binance is known for its user-friendly interface and low trading fees, which are among the lowest in the industry. The platform has since expanded to offer a wide range of cryptocurrency-related services, including staking, lending, and borrowing. In addition to its original Chinese site, Binance has launched versions of its platform in multiple languages, including English, Japanese, and Korean, among others. The company has since moved its headquarters to Malta, where it is registered as a cryptocurrency exchange and operates under the supervision of the Malta Financial Services Authority. Binance has become one of the largest cryptocurrency exchanges in the world in terms of trading volume, with millions of users worldwide.

Modular Programming (Busbee, K. L., & Braunschweig, D. (n.d.)) - In the field of software design, modular programming is a fundamental technique that prioritizes the division of a program's functionality into self-contained, interchangeable modules. Each module encapsulates the necessary components to execute a specific aspect of the desired functionality. These modules are commonly referred to as functions, and they play a pivotal role in simplifying the development process. Functions can be broadly categorized into two types: program control functions, which are unique to the program being developed, and specific task functions, often referred to as building blocks, designed for use across multiple programs. Modular programming promotes code organization, ease of testing, and code reusability, contributing to more efficient and manageable software development.



Peer-to-Peer (P2P) Payment Services (Caceres-Santamaria, A. J. (2020, April)) - Researched into the features and benefits of P2P payment apps. These applications offer users the convenience of linking their bank accounts for seamless fund transfers and payments via email or phone numbers. The article discusses how P2P services significantly reduce transaction costs, enhance economic activity by expediting payments to contractors and freelancers, and offer advantages to businesses seeking faster payment processing. However, it also highlights the importance of cautious use, as P2P services lack the same level of protection as traditional bank payment methods, making user diligence essential. In a world where speed and efficiency are paramount, P2P payment services present promising opportunities for the future, provided users remain vigilant against potential risks.

QR Code Security: What are QR codes and are they safe to use? (AO Kaspersky Lab. (2023)) - AO Kaspersky Lab explores the concept of QR codes and their safety implications. QR codes, which stand for "Quick Response," are two-dimensional barcodes capable of storing various data and are frequently employed for product tracking, marketing, and contactless interactions. The article acknowledges the convenience of QR codes but also highlights potential security risks, such as the possibility of embedding malicious URLs that can compromise user data or direct individuals to phishing sites. The article emphasizes the importance of QR code security awareness, especially regarding unexpected actions QR codes can trigger on mobile devices. It also advises users to trust reputable QR scanners and discusses the role of QR readers in interpreting code patterns. Lastly, the article touches on different QR code styles and suggests Kaspersky QR Scanner for enhanced security.

Near Field Communication: Technology and Market Trends (Arcese, G., Campagna, G., Flammini, S., & Martucci, O. (2014)) - Explores the significance of Near Field Communication (NFC) in the telecommunications industry and its potential applications, particularly in mobile payments and the tourism sector. The study assesses NFC's adoption rates, technology life cycle, and technical-economic aspects while highlighting its strengths and opportunities, such as targeted consumer services



and information acquisition. However, it acknowledges challenges like consumer resistance to change and the evolving landscape of payment methods, including biometrics. Overall, NFC technology exhibits promise but faces uncertainties in a competitive market, with the potential for wider adoption in various industries beyond tourism, contingent upon overcoming resistance to change.

MVC (Model, View, Controller) (Codecademy Team(n.d.)) - Codecademy Team introduces the concept of MVC (Model, View, Controller) as an effective way to organize code in web applications. MVC divides the code into distinct sections, each with its unique purpose: Model for data and essential app components, View for user interface and visual design, and Controller as the application's brain, facilitating communication between Model and View. An analogy is drawn to Thanksgiving dinner preparation, where the fridge represents the Model, recipes act as the Controller, and table settings resemble the View. The article emphasizes that MVC is a valuable framework for planning and organizing code, making it easier to translate ideas into functional programs and promoting collaboration among developers. It also highlights the significance of separating concerns and provides insight into how MVC is implemented in the real world. Ultimately, understanding and implementing MVC can enhance a developer's skills and improve the quality of their applications.

What Is CodeIgniter Framework and Its Importance for PHP Web Development

(Shukla, S. (2022) - The article discusses the significance of CodeIgniter, an open-source rapid development web framework for PHP, in web development projects. CodeIgniter follows the MVC development methodology and offers a rich set of libraries, a user-friendly interface, and a logical structure for efficient code development. Noteworthy features that make CodeIgniter stand out include its smaller footprint, leading to better performance and reduced optimization needs, streamlined coding for faster project completion, robust security measures, simplicity, and expandability, as well as strong support, extensive documentation, and a well-structured MVC architecture. These attributes



make CodeIgniter a favored choice among businesses seeking practical and functional websites, alongside other popular PHP frameworks like Laravel and Symfony.

Object-Relational Mapping (ORM) (Awati, R. (2021)) - is a technique that bridges programming code and database structures, using metadata descriptors to establish a connection between object-oriented programming (OOP) code and relational databases. It simplifies interactions between these two worlds by abstracting the underlying data source details and enabling developers to perform CRUD operations without writing SQL queries. ORM creates a logical model of the program, managing data mapping between objects and databases while shielding developers from interface intricacies. It offers advantages such as adaptability to changes in data sources, enhanced development speed, maintenance efficiency, reduced low-level code writing, and system performance improvement through object caching. However, ORM can introduce performance overhead and potential mapping errors, impacting application speed and database maintenance. In comparison to SQL, which provides greater control but requires careful handling of security, ORM tools offer a more secure option by sanitizing and securing the code, although SQL query builders aim to strike a balance between abstraction and visibility into the database structure.

Local Literature

Challenges and Opportunities of Electronic Payment Systems in the Philippines

(Michelle Renee D. Ching, DIT (2017)) - In the Philippines, the adoption of cashless payments has been a challenge due to the country's dependence on cash and cheques, as only 42% of Filipinos have access to banks. However, with the rise of e-commerce and the need for a more efficient way of transmitting money, there has been a strong push from the government to promote electronic payment systems. This research study focuses on the factors that influence the adoption of electronic payment systems in the Philippines, such as general perceptions, privacy, security, and trust. The study collected



data from an online survey of 33 respondents and used linear regression as the statistical technique to identify the factors that affect the use of electronic payment systems. The results show that convenience, individual preferences, daily work hours, and gender all contribute to the adoption of electronic payment systems. The findings of this study can help businesses target their customers' preferences and increase their profits while also supporting the government's initiatives to improve the adoption of cashless payments.

Landbank Mobile Banking App (Land Bank of the Philippines. (2021)) - is a digital banking platform offered by the Land Bank of the Philippines, one of the largest government-owned banks in the country. It is a mobile application that allows users to access a range of banking services, including account management, fund transfers, bill payments, and loan applications, among others. The app is designed to provide convenience and accessibility to Landbank customers, enabling them to manage their finances anytime and anywhere. The platform also offers additional features, such as balance inquiry, transaction history, and a branch and ATM locator, to enhance the banking experience of its users. Overall, the Landbank Mobile Banking App is a comprehensive digital banking platform that aims to improve financial inclusion and access to banking services in the Philippines.

Metrobank Mobile App (Metropolitan Bank and Trust Company. (2021)) - is a digital banking platform offered by Metropolitan Bank & Trust Company (Metrobank), one of the largest banks in the Philippines. The app provides customers with a range of banking services, including balance inquiry, fund transfers, bill payments, and mobile top-up. Metrobank Mobile App is designed to offer convenience and accessibility to customers, enabling them to manage their finances anytime, anywhere. One of the key features of the app is its easy-to-use interface, which allows customers to access their account information and perform transactions with ease. The platform also offers a variety of security features, such as fingerprint and facial recognition, to ensure that customers' transactions are secure. Overall, Metrobank Mobile App is a comprehensive digital banking platform that offers a range of



services to help customers manage their finances more efficiently. Its focus on convenience, accessibility, and security has made it a popular choice among customers in the Philippines who prefer to bank digitally.

Cashalo (Cashalo. (2021)) - Cashalo is one of the fintech platforms in the Philippines that offers Filipinos quick and easy access to credit through its mobile app. Its innovative platform leverages advanced data analytics and machine learning algorithms to provide instant credit decisions and affordable loans to underserved segments of the population, such as the unbanked and underbanked. Cashalo offers a range of loan products, including personal loans, salary loans, and small business loans, with flexible repayment terms and competitive interest rates. It also provides a cashless payment system and financial education resources through its mobile app. With its focus on innovation, accessibility, and security, Cashalo has become a popular choice for Filipinos seeking fast and reliable access to credit.

Utilization of Standard Electronic Payment System among Private Higher Education

Institutions in the Province of Albay (Espeleta, R. M. (2022)) - Electronic Payment Systems (EPS) are increasingly popular in the Philippines due to their quick and efficient nature, offering a practical means of payment for various transactions. This study aims to determine the status of EPS in selected Private Higher Education Institutions (PHEIs) in the second district of Albay, proposing a systematic model to reduce costs and risks associated with cash transactions. The study utilized a mixed method approach, combining qualitative and quantitative research design to ensure the validity of the data collected. The GCASH application emerged as one of the most frequently used platforms for online payments due to its accessibility and ease of use. The selected private HEIs have shown a rare use of EPS based on the data analysis, as they have only recently begun adopting electronic payment systems. Despite their current use of EPS, schools have not yet given students and parents full control over



online payments. The study concludes that the proposed systematic model can help private HEIs transition to an electronic payment system that is efficient, secure, and cost-effective.

UnionBank Online (UnionBank of the Philippines. (2022)) - is the digital banking platform of Union Bank of the Philippines, one of the largest banks in the country. The platform provides customers with a range of banking services, such as account management, fund transfers, bill payments, and investment management, through a web-based platform and mobile app. Its user-friendly interface, personalized dashboard, and convenient payment options make banking more accessible and easier for customers. Moreover, UnionBank Online offers access to a variety of investment products and services through UnionBank GlobalLinker, allowing customers to invest in mutual funds, stocks, and bonds. The platform also prioritizes security, with measures such as multi-factor authentication, device recognition, and real-time fraud monitoring. UnionBank Online's comprehensive digital banking services have made it a popular choice among Filipinos who prefer to bank online.

BPI Mobile App (Bank of the Philippine Islands. (2022)) - is a mobile banking application offered by Bank of the Philippine Islands (BPI) that provides clients with a variety of banking services, including balance inquiry, fund transfer, bill payments, loan applications, and account management, as well as personalized financial insights and recommendations. One of its key features is the ability to perform fund transfers in real-time, enabling users to send money to other BPI accounts or to other banks instantly. The app also offers scheduled payments and recurring transfers, checkbook requests, and stop check payments. Additionally, BPI Mobile App includes an investment and trading platform, BPI Trade, which allows users to invest in the stock market, government securities, and mutual funds. Security features, including fingerprint and face recognition and one-time passwords, protect users from unauthorized transactions. The app is available for download on both iOS and Android devices.



Coins.ph (Coins.ph (2022)) - is regulated by the Bangko Sentral ng Pilipinas (BSP) and is the first ever blockchain-based company in Asia to hold both Virtual Currency and Electronic Money Issuer licenses from a central bank. Coins.ph is a digital wallet and mobile payments app that offers various financial services in the Philippines, including remittances, bill payments, mobile top-ups, and online shopping. It also allows users to buy and sell cryptocurrencies such as Bitcoin and Ethereum. The platform aims to provide convenient and accessible financial services, which has made it a popular option for many Filipinos without access to traditional banking services. One of its key features is the remittance service, which offers competitive exchange rates and low transaction fees. It also has a cash-in service that allows users to top up their digital wallets at over 33,000 partner locations across the country. Additionally, Coins.ph provides investment options for cryptocurrencies and the Philippine Stock Exchange through its Coins Pro platform and a savings account feature that allows users to earn interest on their balance. With its user-friendly interface and security measures such as two-factor authentication and real-time fraud monitoring, Coins.ph has become a trusted payment option in the Philippines.

Tala Philippines (Tala Philippines. (n.d.)) - is a mobile lending application that provides access to credit for underbanked individuals in the Philippines. The app offers fast and easy loan application processes, without requiring collateral or credit history. Users can apply for loans ranging from PHP 1,000 to PHP 15,000 and receive the funds in their accounts within 24 hours. The app also offers flexible repayment terms and interest rates based on a user's credit profile. Tala Philippines uses advanced data analytics and machine learning algorithms to assess a user's creditworthiness, based on their mobile data and financial behavior. The app aims to provide financial inclusion and access to credit to the millions of unbanked and underbanked individuals in the Philippines.

Loan Range (Loan Range. (n.d.)) - is an online platform that simplifies the loan application process for borrowers in the Philippines by providing a convenient way to find and compare loan



options from various lenders. It offers a wide range of loan products, including personal loans, salary loans, business loans, and car loans, among others. Users can fill out a simple online form to search for loans based on their preferred loan amount, term, and other relevant information, and the platform displays a list of loan options from various lenders along with their corresponding interest rates and fees. Loan Range also offers a loan calculator and educational resources to help users make informed borrowing decisions. Overall, Loan Range is a valuable tool for borrowers seeking easy and quick access to loan options in the Philippines.

RCBC Online Banking App (Rizal Commercial Banking Corporation. (n.d.)) - is a mobile banking platform offered by the Rizal Commercial Banking Corporation (RCBC), one of the leading banks in the Philippines. The app provides users with a wide range of banking services, including account management, fund transfers, bill payments, and investment management. It also allows users to access their account information in real-time, view transaction history, and monitor account balances. RCBC Online Banking App is designed to provide convenience and accessibility to customers, allowing them to manage their finances anytime, anywhere. The app also prioritizes security, with features such as biometric authentication and 24/7 fraud monitoring in place to protect users from unauthorized transactions. Overall, RCBC Online Banking App is a comprehensive digital banking platform that offers a range of services to help customers manage their finances more efficiently.

7-Eleven Cliqq (7-Eleven Philippines. (n.d.)) - is a mobile app developed by 7-Eleven Philippines that offers various services, including mobile top-ups, bill payments, and in-store purchases. The app also features a loyalty program that rewards customers with points for every purchase they make, which can be redeemed for discounts or free products. Users can also use Cliqq to pre-order items from 7-Eleven stores and pay for them through the app, reducing the need to wait in line. Furthermore, the app offers a feature that allows users to transfer funds to other Cliqq users,



as well as to non-Clqq users through the use of a unique QR code. Clqq provides a convenient and secure way for users to manage their transactions and earn rewards through their smartphones.

Smart Money (Smart Communications. (n.d.)) - is a digital financial service provided by Smart Communications, a subsidiary of PLDT, one of the largest telecommunications companies in the Philippines. Smart Money allows its users to perform various financial transactions such as fund transfers, bills payment, airtime reloads, and online shopping. Users can also withdraw cash from their Smart Money accounts through Smart Money-enabled ATMs. The service is accessible through mobile phones and can be linked to a user's Smart SIM card. Smart Money provides a convenient and secure way for Filipinos to manage their finances, especially those who do not have access to traditional banking services.

Maya (Maya (n.d.)) - is a mobile payment and financial services provider in the Philippines. It offers a range of services that include mobile wallets, bill payments, money transfers, and online shopping. Maya is a convenient and secure way to pay for goods and services, both online and offline. The platform allows users to load their accounts through various channels, such as bank transfers, debit/credit cards, and over-the-counter transactions. Once the account is funded, users can make payments, send money to other Maya users, and withdraw cash from ATMs. Maya also offers a virtual card that can be used for online transactions. One of the key features of Maya is its accessibility. Users can download the app on their smartphones and register for an account without the need for a physical card or bank account. This makes it an ideal payment solution for those who do not have access to traditional banking services. Maya also prioritizes security, with measures such as two-factor authentication and fraud detection systems in place to protect users from unauthorized transactions.

GCash (GCash (n.d.)) - is a mobile wallet and online payment platform that offers a wide range of financial services in the Philippines. The platform allows users to perform various transactions, such



as money transfers, bill payments, online shopping, and even investing in mutual funds. GCash users can also link their accounts to their physical GCash Mastercard, which they can use to withdraw cash from ATMs or make purchases in physical stores. One of the unique features of GCash is its ability to provide micro-loans to users, which can be used for emergencies, paying bills, or even for business purposes. The platform also offers a savings account feature, allowing users to earn interest on their savings balance. Additionally, GCash has partnered with various merchants and service providers, giving users access to exclusive discounts and cashback rewards. GCash's user-friendly interface and accessibility have made it a popular payment option in the Philippines, particularly among those who do not have access to traditional banking services. Its focus on security is also noteworthy, with measures such as fingerprint authentication, PIN verification, and real-time fraud monitoring in place to protect users from unauthorized transactions.

Synthesis

After conducting a thorough analysis of the relevant literature and studies, the BCash development team identified the essential functions, features, designs, and qualities that the BCash project should possess. This information was critical in creating a well-designed and effective e-payment or e-wallet system that is specifically tailored to the needs of San Sebastian College - Recoletos de Cavite.

One of the most important aspects that the BCash development team focused on was the security features of the BCash system. This is because security is a major concern for any payment system, especially those that deal with sensitive information such as financial data. The BCash development team conducted research on the different security features that are commonly used in e-wallet systems, such as encryption, multi-factor authentication, and biometric verification. By studying these security features, BCash ensures that transactions within the school are safe and secure and that unauthorized transactions are prevented.



Aside from security, the literature gathered has different features that could make the BCash application more convenient and hassle-free for its users. The BCash development team also researched mobile payments, particularly e-wallets, which have QR code security features and Peer-to-Peer. QR code security enhances the safety and ease of making payments within e-wallets, while P2P functionality facilitates quick and direct money transfers between users, making e-wallets not only secure but also convenient for everyday financial transactions.

Factors that affect the acceptance of e-wallets include convenience, credibility, and attractiveness of alternatives. In the case of BCash, the BCash development team aims to create an e-wallet system that is both convenient and credible. By offering features that are easy to use and understand, users are more likely to adopt the system. Additionally, by ensuring that the system is reliable and trustworthy, users will feel more confident in using BCash.

Several popular e-wallets such as GCash, Maya, and Paypal were also analyzed by the BCash development team in their research. These e-wallets have become major in the Philippines due to their effectiveness and convenience. By studying these e-wallets, the development team were able to gain insight into what features and functionalities make them successful, which they could then incorporate into the design of BCash.

In conclusion, the reviews of literature and research conducted by the development team provides a comprehensive understanding of the e-wallet market and the factors that contribute to the success of developing the proposed system. This knowledge is essential in designing and developing a successful e-wallet system such as BCash, which aims to make transactions within the school safer, easier, and more convenient. By incorporating the key features and security measures identified through their research, the developers are confident that BCash will be widely adopted by students, faculty, and staff members at San Sebastian College - Recoletos de Cavite.



Chapter III

METHODOLOGY

Research Design

This capstone project adopted the descriptive and developmental methods to achieve its objectives. The descriptive method utilized to understand the current school canteen financial situation at San Sebastian College - Recoletos de Cavite Main Campus, including the challenges and opportunities involved in implementing a mobile e-wallet application. Meanwhile, the developmental method was used to design and develop the BCash mobile e-wallet application based on the insights gained from the descriptive analysis.

Data Gathering Tools

Online Research - The BCash development team gathers information using online searching about similar mobile e-wallet applications, market trends, and user behavior. This information serves as the building blocks for the project.

Interview - The BCash development team conducted an interview with the Center for Information & Communications Technology and Accounting Department of San Sebastian College-Recoletos de Cavite to gather information on the current process and issues they have encountered. They also discussed potential future implementations that could aid in the development of a project aligned with their future plans.

Survey Questionnaire - The BCash development team utilized a survey form to gather data from a wide range of respondents. A survey was conducted among the students, faculty, and staff of San Sebastian College - Recoletos de Cavite. The collected information could provide valuable insights to align the project according to the respondents' insights.

Online Survey Questionnaire - The BCash development team utilized a Google Form to conduct an online survey and gather data from a wide range of respondents. The survey link was sent to various group chats of different departments consisting of students, faculty, and staff members of



San Sebastian College - Recoletos de Cavite. The aim of this survey was to collect valuable insights from the respondents that could be used to align the project according to their feedback and preferences.

In terms of privacy, The BCash development team ensured the privacy and confidentiality of the data gathered through various data-gathering tools. The developers obtained informed consent from participants and maintained confidentiality throughout the data collection process. The information collected from online research, interviews, and survey forms provided valuable insights and perspectives that helped the developers align the project with the needs and preferences of potential users.

Please refer to the **Appendix F** for the research instruments used in this study.

Data Gathering Procedure and Development Phases

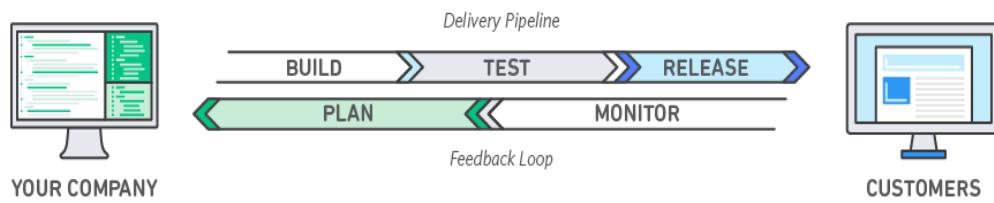
The BCash development team decided to utilize the modern and streamlined SDLC model, the 5 Cycle DevOps Model, as their chosen software development methodology. This approach enabled the development team to execute efficient and well-organized development phases, ensuring the data collected was relevant and aligned with the project's objectives. By utilizing this methodology, the development team were able to create a seamless development process.

According to Amazon Web Services. (n.d.). DevOps is a methodology that brings a lot of benefits to software development. It helps teams move at a faster pace, release updates quickly, and innovate for customers more efficiently. With automation and consistency, it's possible to manage complex or changing systems with reduced risk. Collaboration between developers and operations teams is improved, leading to more productive workflows and time savings. Additionally, the DevOps model is designed to maintain a positive user experience while adhering to compliance regulations through the use of automated compliance policies, fine-grained controls, and configuration management techniques. The 5 Cycle DevOps Model methodology is illustrated below:



Figure 2.

5 Cycle DevOps Model used in BCash



Here under where the development phase followed the project team:

1. Plan Phase

During the BCash project's plan phase, the BCash development team discussed how to carry out the project and went through the following stages of plan phase: planning, data gathering, analysis, and design.

a. Planning

During the planning process, the development team of BCash planned out the project's scope, objectives, and requirements. The development team also identified the resources needed to complete the project, including hardware and software requirements. The development team created a Gantt Chart that served as a guide for the entire project team, ensuring that everyone was on the same phase and working towards the same goals. The development team also conducted a risk analysis that identified potential risks and issues that could arise during the project and developed strategies to address these risks. The planning phase was crucial for the developers in establishing a clear direction for the project and ensuring that all necessary resources were in place to complete the project successfully. Please refer to the Gantt chart in the Appendix A.

b. Data Gathering Procedures

During the data-gathering process, the BCash development team utilized various tools such as online research, interviews, and surveys to gather essential



information for the BCash project. The development team conducted extensive online research on existing e-wallet systems and analyzed their functionalities, user interface design guidelines, and security measures. The development team also conducted an interview with the Center for Information and Information and Communications Technology (CICT) department and accounting office to understand the current system flow and discuss future plans that could be integrated into BCash. Additionally, the development team also conducted online and face-to-face surveys to gather feedback from students, parents, visitors, staff, and faculty at San Sebastian College - Recoletos de Cavite. Through these data-gathering procedures, the developers were able to gain valuable insights that were used to align the project with the current system and Sebastianian's understanding of e-wallets.

For the interview questions and survey questions, please refer to **Appendix F** for more information about the research instruments.

c. Analysis

In the Analysis process, the development team of BCash examined the data gathered during the data gathering process. The development team also used various tools such as flowcharts, diagrams, and use case scenarios to model the system and understand its functionality. This helped them to ensure that the BCash system was not only user-friendly but also efficient and effective in meeting the needs of San Sebastian College - Recoletos de Cavite. The development team also conducted a feasibility study to evaluate the practicality of implementing the BCash system, considering factors such as cost, time, and resources. This analysis allowed them to make informed decisions and refine the project plan to ensure that the BCash development would be successful. Overall, the Analysis phase was a critical step in the development team of BCash, as it allowed the developers to gain a deeper



understanding of the project requirements and make informed decisions to ensure the success of the system.

For the Flowcharts, please refer to **Appendix E**, and for the Use Case Tables, consult **Appendix B**.

d. Design

In the design process, the development team of BCash focused on ensuring that the system was well-designed and met the needs of its users, while also being secure and efficient. The development team conducted extensive research to ensure that the system would be user-friendly. By carefully designing the system, the developers were able to ensure that the BCash project would be successful and meet the needs of San Sebastian College - Recoletos de Cavite. Additionally, during this phase, the developers utilized Figma and Canva for designing user interfaces and employed diagrams.net for creating diagrams, charts, and tables.

2. Build Phase

During the build phase of the BCash project, the BCash development team focused on developing the application based on the requirements and specifications identified during the planning phase. The first step of the development process involved setting up the development environment, including configuring the necessary software and tools required for the project. In alignment with the school's CICT Department, the developers chose to use the CodeIgniter 3 framework of PHP, which was the programming language used within the department and school codebase.

Once the environment was set up, the development team began the actual development process. The development team followed software engineering principles and used modular programming techniques, version control systems, and testing tools. The chosen



framework, CodeIgniter 3, facilitated seamless integration with the existing software architecture.

However, the development process was not without its challenges. The development team encountered several issues, including the constraint of a tight development timeline, necessitating the acceleration and prioritization of certain aspects of the development. The framework itself presented a challenge as the developers needed to study it due to a lack of prior experience. Additionally, errors encountered during development tested the strength of the developers' minds. Despite these difficulties, the team persevered, gaining valuable knowledge and experiences. These challenges served to reinforce the team's determination, ultimately driving the development team to pursue the project with enhanced expertise and resilience.

The development team made sure to use and study the programming languages and frameworks that were appropriate for the project's requirements, ensuring that the application was scalable, secure, and efficient. They also took great care to design an intuitive and user-friendly interface for the application. Collaborating closely with the testing team, both diligently worked to identify and rectify any defects within the application.

Furthermore, the development team maintained a strong connection with the school's Center for Information and Communication Technology (CICT) Department, ensuring that the BCash application seamlessly aligned with the school's existing software architecture. This alignment aimed to guarantee the application's effective implementation, monitoring, and future maintenance. As the CICT Department already has knowledge about the framework used by the BCash developers, enhancing coordination and compatibility.

3. Test Phase

During the test phase of the BCash project, the testing team performed various types of tests, such as unit testing, integration testing, system testing, and acceptance testing, that



ensures that the application functions correctly and meets the project's requirements. The testing team used and evaluated the system to ensure that the application is free of defects and performs as expected. They also work closely with the development team to promptly resolve any issues that are identified during the testing.

In addition, the development team conducted a User Acceptance Testing (UAT) Survey, and a random selection was made to include 59 students, 19 staff members, 4 guests, 7 guardians, 3 IT experts, 1 administrator, 1 merchant admin, and 1 accounting professional. In total, there were 95 respondents who participated in the UAT. These participants tested the application's features, functionalities, and user interface to ensure that they meet their needs and expectations. This will provide valuable feedback to the developers to further improve the application's performance and user experience.

4. Release Phase

In the release phase of the BCash, the application was deployed by the development team. The development team focused on the bugs that arise during the final deployment like problems about the devices and compatibility. And at the end the developers successfully deployed BCash as a local hosted server and database. The development team also finalized the application's documentation and any related materials that will help the users and the future developers understand the project. This includes user manuals, support guides, and technical specifications. These documents provided users and support teams with the necessary information to use and maintain the application effectively.

The development team had taken various security measures to protect data that was transferred online. They had implemented features like authentication, tokens, and hashing to ensure that the data was secure. Additionally, the application had several checks and validations in place before any transaction was completed. The developers also used



transactions in the database to make sure that every query was executed before it was committed to the system.

To help users understand how to use the application, the developers created a help menu. Making it easier for new users to get started.

The development team will keep the software up-to-date and release frequent updates to address any new issues or problems that arise. They also monitored the system to prevent any further problems from occurring.

For data management, the developers had chosen MySQL Server as the database storage solution. They ensured that all imported data was accurate and validated before being saved to the database. Furthermore, the developers continuously monitored for any bugs or system problems to ensure that data encryption and security were up-to-date.

5. Monitor Phase

During this phase, after the BCash development team turned over the BCash application along with the necessary manuals to the school's CICT Department. The CICT department will then take charge of the continuous monitoring of the application in collaboration with the project developers to ensure that any potential bugs or errors are promptly detected and resolved. This approach will help prevent major system problems from occurring and will ensure that the application functions correctly as intended at all times.

To further facilitate the monitoring process, the developers will work closely with the school's CICT Department to align the BCash application with the school's current software architecture. This alignment will ensure that the CICT department can monitor the application without any difficulties and can leverage its existing knowledge and tools to support the application effectively. The development team will use programming languages and frameworks that are already in use by the school, making it easier to maintain and support the



application in the long run. This will ensure that the BCash application remains operational and effective in meeting the needs of its users.

Development Tools

Table 1.

Hardware

I/O Device	N-Vision Monitor, A4Tech OP-720 Mouse, A4Tech KR85 Keyboard
Processor	Intel(R) Core(TM) i3-4100M CPU @ 2.50GHz
Motherboard	LGA 1155 Motherboard DDR3
Memory	8.00 GB
Solid State Drive	128GB
Auxiliaries	NVIDIA GeForce GT 630 M with 2GB Dedicated VRAM 14.0" HD LED LCD DVD-Super Multi DL Drive Acer Nplify 802.11a/g/n

Table 2.

Software

Programming Language	JAVA, JAVASCRIPT, PHP
Framework	CodeIgniter 3
Database	MySQL
Design of User Interface	HTML, CSS, XML, Canva, Figma
Integrated Development Environment	Android Studio and Visual Studio Code
System Documentation	Microsoft Word 2010, Diagrams.net
Operating System	Microsoft Windows 11



Respondents/Evaluators

The BCash development team employed a stratified sampling approach in randomly selecting respondents and conducting a survey using Google Forms among 95 students, 19 faculty, and 16 non-teaching personnel (NTP) of San Sebastian College - Recoletos de Cavite. These individuals were identified as the target and primary users of the proposed web and mobile e-wallet application, specifically for the BCash project.

For the User Acceptance Test (UAT), the developers conducted a User Acceptance Testing (UAT) Survey, and a stratified sampling was made to reach 95 evaluators. Among these evaluators are 59 students, 19 staff members, 4 guests, 7 guardians, 3 IT experts, 1 administrator, 1 merchant admin, and 1 accounting professional. The developers ensured that all participants were given an acknowledgment form, certifying that the information provided by the evaluators is true and accurate to the best of their knowledge. This approach aimed to validate the UAT results and enhance the reliability of the feedback received.

Statistical Treatment of Data

The BCash development team used the formula shown below to determine the percentage of each respondent's answer to the survey questions. They also used the Slovin formula to calculate the sample size of the evaluators for the User Acceptance Test. After obtaining feedback from all the evaluators, they used the mean formula to determine the overall composite mean.

Frequency:

Formula of Percentage:

$$\frac{\text{Number of Respondents}}{\text{Total Number of Respondents}} \times 100$$

Sample Size:

Sample Size Formula:



Slovin's Formula

$$n = \frac{N}{1 + Ne^2}$$

Where,

N is the size of the population

e is the desired margin of error

Mean:

Weighted Mean Formula:

$$X = \frac{\sum (w \cdot x)}{\sum w}$$

Where: \sum = Summation

w = number of weights

x = number of values diagrams

Project Schedule

Based on the Gantt Chart in **Appendix A**, the project went through a 42-day study prep and title approval phase from January 9, 2023 to February 25, 2023, with 46 days dedicated to discussing the IT Capstone. 5 days were spent on securing an advisor, and 1 day was spent on title defense. From February 27, 2023 to May 13, 2023, 66 days were spent planning the 150-day build phase. During this phase, tasks such as Gantt Chart preparation, brainstorming, survey analysis, data evaluation, chart and diagram creation, and preparation and proposal defense were each allocated 12 days. From May 15, 2023 to November 6, 2023 the team spent 7 days on Development and Initial Testing and Debugging. From November 7, 2023 until November 17, 2023 the project went through a 10-day test phase, with 1 day on Pre- Deployment, 6 days on UAT, and 3 days on UAT Analysis and Evaluation. During the release phase, which lasted 7 days from November 18, 2022, to November 25, 2022, the final deployment took 6 days to complete. All in all, the total project execution time was 275 days, beginning on January 9, 2022, and ending on November 25, 2022. This indicates a well-planned and well-executed project.



Chapter IV

RESULTS AND DISCUSSIONS

The General Environment of the School Canteen Payment Service

1. Existing Payment Process

The current school canteen payment service was manual using the coin chip payment method. The canteen operates on a system where students exchange money for "chips," coin chip functioning as the canteen's currency. Notably, these transactions do not involve the issuance of receipts, resembling a direct exchange of standard currency for canteen-specific tokens.

Cash reconciliation was part of the system: cashiers were responsible for matching the cash register's content with the total amount on the receipts. If discrepancies arose, such as shortages, the cashiers were required to address the disparity. Conversely, if an excess amount was present, it remained on hold until claimed. Importantly, the chips possessed a dual role; they were both exchanged for items and reused within the canteen. Furthermore, an auditing process was implemented to ensure the accuracy of this system. This internal control measure not only discouraged potential misappropriation of funds but also allowed for efficient tracking of transactions.

The interactions between cashiers and the canteen involved the utilization of chips instead of receipts, distinguishing it from transactions at other locations such as the bookstore. Daily procedures consisted of cross-referencing the cashier's cash count with the total sum on the receipts, enabling the identification and resolution of any inconsistencies. Audits further validated canteen orders by correlating them with collected chips, thereby aligning actual funds with the corresponding tokens.

This diagram in **Figure 4** and **Figure 5** shows a comprehensive overview of the existing system, highlighting its main components and its main actors.



Figure 3.

Data flow diagram - Level 0

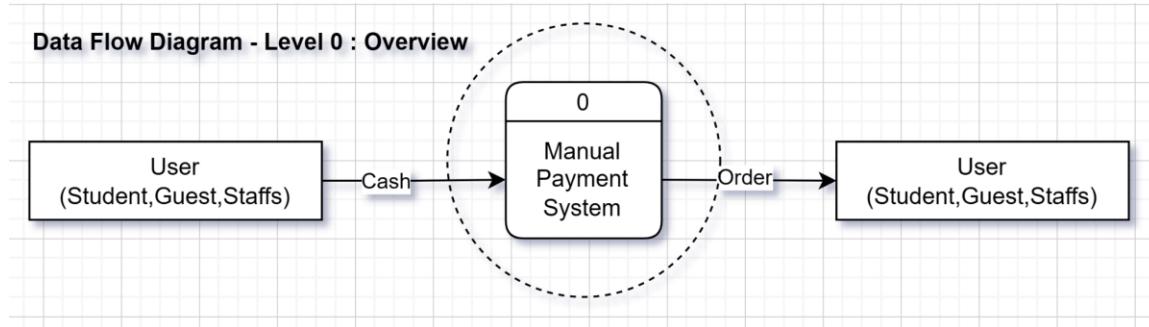
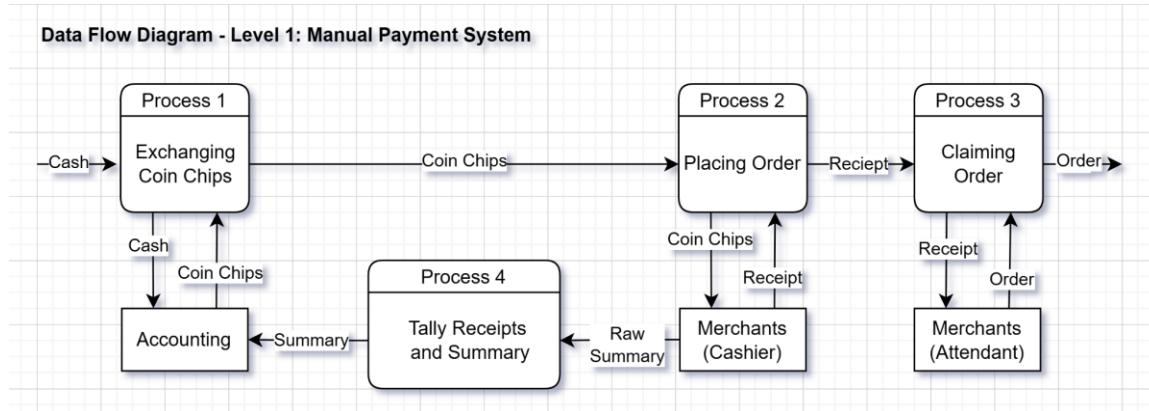


Figure 4.

Data flow diagram - Level 1: Manual Payment System



This diagram provides an in-depth understanding of the processes in the existing system, highlighting key participants and their actions. The sequence begins with the user, who converts cash into coin chips at the accounting office. After this step, the user places an order with the cashier staff at the Merchants, obtaining a receipt for confirmation. Subsequently, the user submits the receipt to the attendant at the Merchants, receiving the actual order in exchange. At day's end, the cashier staff compiles a list of receipts and a summary, which they submit to the accounting office.



2. The need for new payment system

The need of a new payment system was established by the survey conducted with the following findings:

Table: 3.

Respondents

1. Category of Respondents		
Student	95	73%
Faculty	19	15%
NTP (Non-Teaching Personnel)	16	12%

As shown in table above there are 130 respondents, 95 are students, 19 are faculty, and 16 are non-teaching personnel who were identified as being active at the canteen. It appears that the student category has the highest number of individuals who are active at the canteen compared to the other categories.

Table: 4.

Convenience of Transactions

2. From 1 to 5, rate your experience in performing financial transactions here at school in terms of convenience.		
1 (Very Satisfied)	6	5%
2 (Satisfied)	15	12%
3 (Neutral)	50	38%
4 (Unsatisfied)	46	35%



5 (Very Unsatisfied)	13	10%
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The survey shows mixed satisfaction levels with school financial transactions' convenience, with a significant number in the "neutral" category. Addressing this variability in satisfaction is essential for improving the overall experience of financial transactions at the school.

Table: 5.

Bringing of gadgets

3. Do you bring gadgets to school?		
Yes	128	98%
No	2	2%

The survey results indicate that the majority of respondents, 128 out of 130, bring gadgets to school, highlighting the prevalence of technology usage among students or individuals in this educational setting.

Table: 6.

Specific gadget respondents bring

3.1. If yes. (Check all that apply)		
Mobile Phone	126	97%
Tablet	15	11%
Laptop	31	24%



Among respondents who bring gadgets to school, mobile phones are the most commonly brought devices (126), followed by laptops (31) and tablets (15). This highlights the widespread use of mobile phones and the growing presence of laptops in educational settings.

Table: 7.

Familiarity on E-wallet

4. Are you familiar with any e-wallets?		
Yes	122	94%
No	8	6%

The survey results indicate that the majority of respondents, 122 out of 130, are familiar with e-wallets, underlining a notable awareness and potential usage of electronic wallet services among the surveyed individuals.

Table: 8.

Familiarity on Specific Payment Application

4.1. If yes. (Check all that apply)		
Gcash	120	92%
Maya	63	49%
GrabPay	33	25%
Paypal	54	42%
Others	2	2%



Among respondents familiar with e-wallets, Gcash is the most well-known e-wallet with 120 mentions, followed by Maya (63), Paypal (54), and GrabPay (33). Additionally, 2 respondents mentioned "others." These findings emphasize the prevalence and recognition of various e-wallet services among the surveyed individuals.

Table: 9.

E-wallet Experience

5. Have you performed transactions using an e-wallet?		
Yes	112	86%
No	18	14%

The survey results reveal that a substantial portion of respondents, 112 out of 130, have performed transactions using an e-wallet, indicating a significant level of adoption and usage of e-wallets among the surveyed individuals.

Table: 10.

Experience on Specific Payment Application

5.1. If yes. (Check all that apply)		
Gcash	114	88%
Maya	44	34%
Grabpay	26	20%
Paypal	36	28%



Among respondents who have performed transactions using e-wallets, Gcash is the most commonly used e-wallet, with 114 mentions, followed by Paypal (36), Maya (44), and GrabPay (26). These findings illustrate the popularity and widespread usage of Gcash and other e-wallet services among the surveyed individuals, further highlighting the growing reliance on digital payment methods.

Table: 11.

Use of E-wallet

6. How often do you make purchases or perform transactions using an e-wallet?		
1 (Often)	35	27%
2 (Sometimes)	67	52%
3 (Rarely)	28	21%

The survey results indicate that among respondents who use e-wallets, the majority fall into the "Sometimes" category, with 67 respondents, followed by 35 who reported making purchases or performing transactions "Often," and 28 who do so "Rarely." This distribution suggests that e-wallets are regularly used by a significant portion of the surveyed individuals, contributing to their convenience in various financial transactions.

Table: 12.

Convenience of E-wallet

7. Do you think that using an e-wallet is more convenient for you?		
Agree	86	66%
Disagree	4	3%
Neither agree nor disagree	40	31%



The survey findings show that the majority of respondents, with 86 individuals, agree that using an e-wallet is more convenient for them. A smaller number, 4, disagree with this statement, while 40 respondents neither agree nor disagree. These results underscore the widespread belief in the convenience of e-wallets for financial transactions among the surveyed individuals, with only a minority expressing a contrary opinion.

Table: 13.

Willingness to Pay for Transaction Fee

8. Would you be willing to pay a transaction fee each time you cash in?		
Yes	72	55%
No	58	45%

The survey results reveal that a substantial portion of respondents, with 72 individuals, are willing to pay a transaction fee each time they cash in using e-wallets. In contrast, 58 respondents are not inclined to pay such fees. These findings suggest varying attitudes among the surveyed individuals, with a majority being open to the idea of transaction fees, while a significant minority prefers fee-free transactions.

Table: 14.

Method to Cash In

9. Which method would you want to deposit cash into your e-wallet?		
Bank Transfer	62	48%
Loading Station	76	58%



Other	5	4%
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From the survey results, it is apparent that respondents have varying preferences for depositing cash into their e-wallets. A majority of 76 respondents prefer using loading stations, while 62 opt for bank transfers. Additionally, 5 respondents mentioned "other" methods. These findings indicate the importance of providing multiple options for depositing cash into e-wallets to accommodate the diverse preferences of the surveyed individuals.

Table: 15.

Convenience of E-wallet at the school

10. Would it be more convenient for you to use an e-wallet for cashless transactions here at school?		
Yes	106	82%
No	24	18%

The survey results suggest that the majority of respondents, 106 out of 130, find it more convenient to use an e-wallet for cashless transactions at school. In contrast, 24 respondents do not share this view. These findings indicate a notable inclination toward adopting e-wallets as a preferred method for cashless transactions among the surveyed individuals.

Table: 16.

Lost money or coin chips

12. Have you or anyone you know lost track of their money or coin chips while using the new payment system at the school canteen?		
Yes	74	57%



No	56	43%
----	----	-----

The survey results indicate that a significant number of respondents, 74 out of 130, or someone they know, have experienced losing track of their money or coin chips while using the new payment system at the school canteen. In contrast, 56 respondents reported not facing this issue. These findings underscore the importance of addressing and improving the security and user-friendliness of the new payment system to prevent financial losses and ensure a better experience for all users.

Table: 17.

Use of money for other purpose

13. Have you or anyone you know used school funds intended for food and school payments for other purposes?		
Yes	68	52%
No	62	48%

The survey results reveal that a considerable number of respondents, 68 out of 130, or someone they know, have used school funds intended for food and school payments for other purposes. However, 62 respondents have not engaged in such actions. These findings highlight the existence of financial challenges or misappropriation of school funds within the surveyed individuals or their network, indicating a need for better financial management and support mechanisms to ensure that school funds are used as intended.



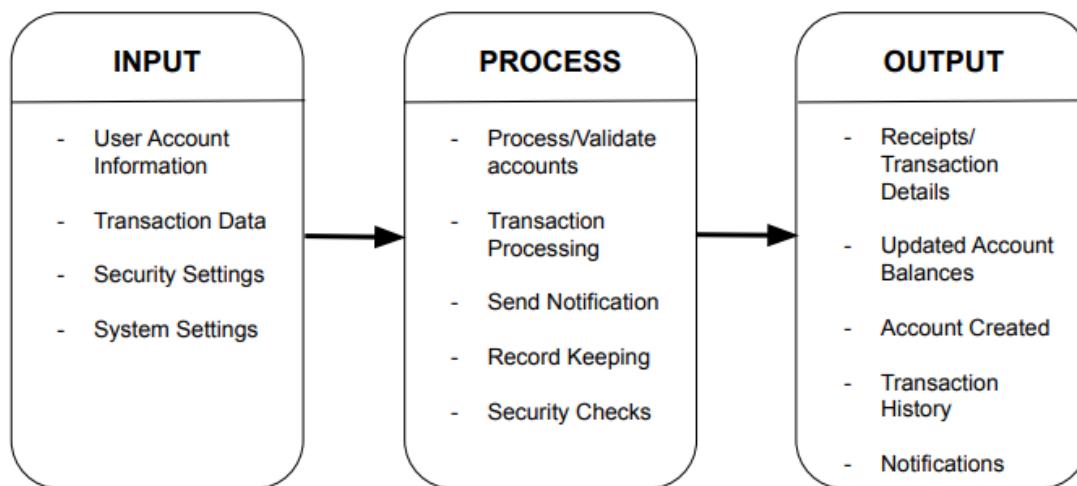
The Description of BCash Application to improve the canteen payment system

1. The Project Details

The BCash E-Wallet Integration Project at SSC-RdC canteen is set to enhance convenience, financial security, and transparency in cafeteria payments for students and staff. The project encompasses phases from planning and system integration to user education, testing, and ongoing support. By introducing the BCash E-Wallet system, the initiative aims to streamline transactions, reduce the need for physical cash, and minimize hassles during meal times. Additionally, it offers a secure financial environment while giving parents access to monitor their children's expenses within the university, ensuring responsible fund allocation. The project seeks to transform the dining experience, making it more convenient and financially secure for the SSC-RdC community while enhancing transparency in financial management. The Figure 5 below shows the Conceptual design of the BCash.

Figure 5.

Conceptual Design of BCash

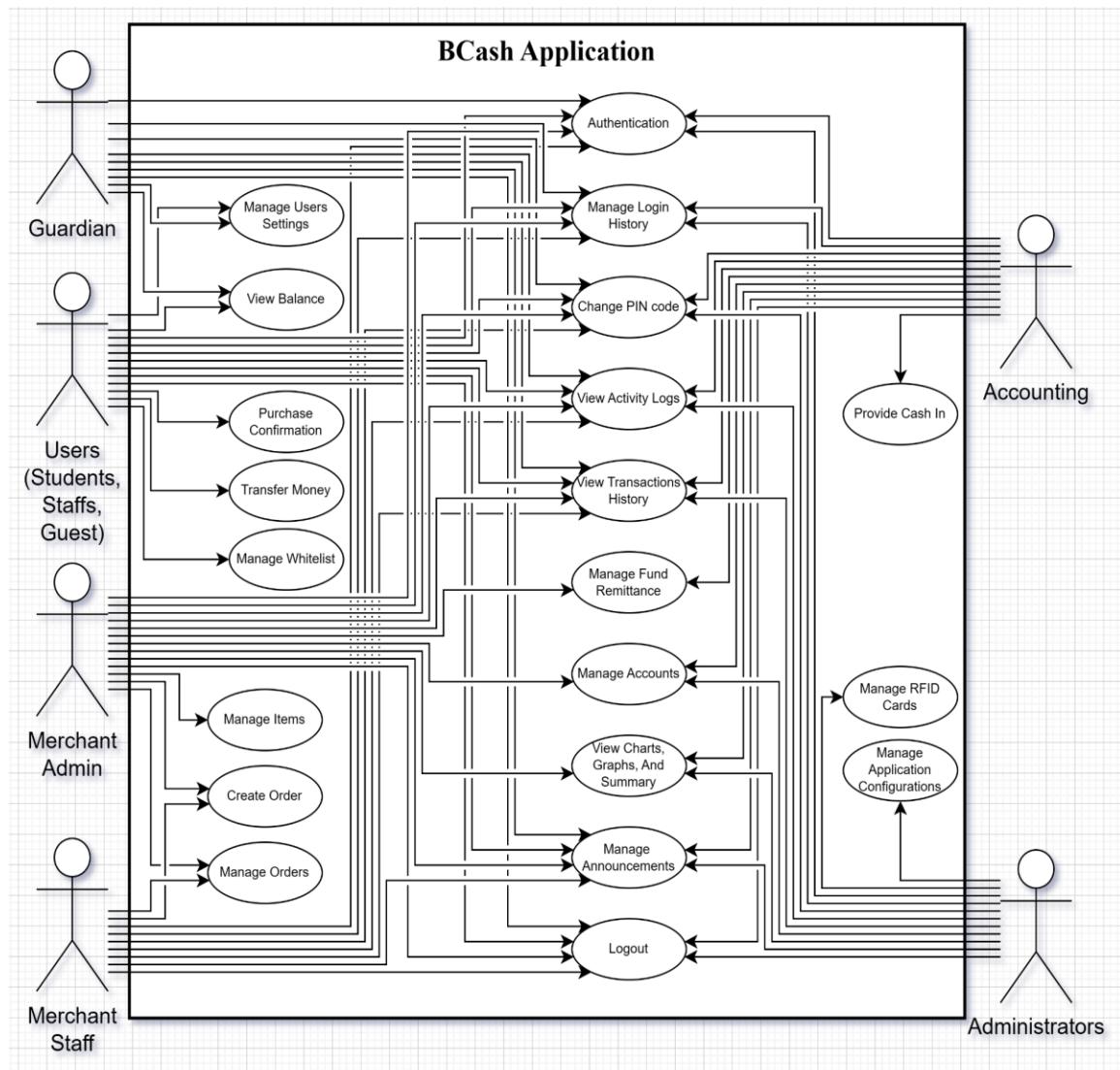




The conceptual design of BCash contains 3 main tables which are the input, process, and output. Input contains user account information, transaction data, security settings, and system settings. Process contains process/validate accounts, transaction processing, send notification, record keeping, security checks. Output contains receipts/transactions details, updated account balances, account created, transaction history, notifications.

Figure 6.

UML Use-Case





The use case diagram of BCash shows how actors interact in the web application and mobile application. It consists of Accounting, Administrators, Merchant Admin and Staff, Guardian, Users (Students, Staffs, Guest). The team chose to include the cases that play bigger roles in the web and mobile applications such as Manage Users Settings, View Balance, Purchase Confirmation, Transfer Money, Manage Whitelist, Manage Items, Create Order, Manage Orders, Authentication, Manage Login History, Change PIN code, View Activity Logs, View Transactions History, Manage Fund Remittance, Manage Accounts, View Charts, Graphs, And Summary, Manage Announcement, Provide Cash In, Manage RFID Cards, Manage Application Configurations, and Logout. Please refer to **Appendix C.** for the Use Case Table.

The system's activity diagram, detailed in **Appendix C**, outlines the seamless flow starting from Guardians. These users sign in using their Gmail accounts registered in the CICT, enabling them to access and view the balances of user accounts linked to them. Guardians hold the unique privilege of modifying user settings, with a PIN code required for validation, ensuring a secure and authorized process.

Moving on to Guests, they log in with their registered accounting accounts, granting them specific functionalities within the system. Their tasks include viewing balances, making limited setting modifications, transferring money, and managing whitelists, all with PIN validation for adding users.

Users, encompassing students and staff, use their SSC-R email for Google sign-in. They possess the capability to view balances, make limited setting adjustments, transfer money to others, and manage whitelists. However, the "CanModifySettings" toggle is exclusive to Guardians, Administrators, and Accounting.

Merchant Staff members play a crucial role, empowered to create orders and view transactions within the merchant system, contributing to the smooth operational flow of the business.



Merchant Administrators wield comprehensive control, able to create orders, view transactions and statistics, and manage staff and items, including additions, edits, or deletions. They can also submit remittances to accounting and access historical summaries.

The Accounting role is pivotal, handling financial tasks such as providing cash to users, managing user accounts, registering guest accounts, and approving or rejecting remittances submitted by Merchant Admins. Additionally, they have access to historical remittance data.

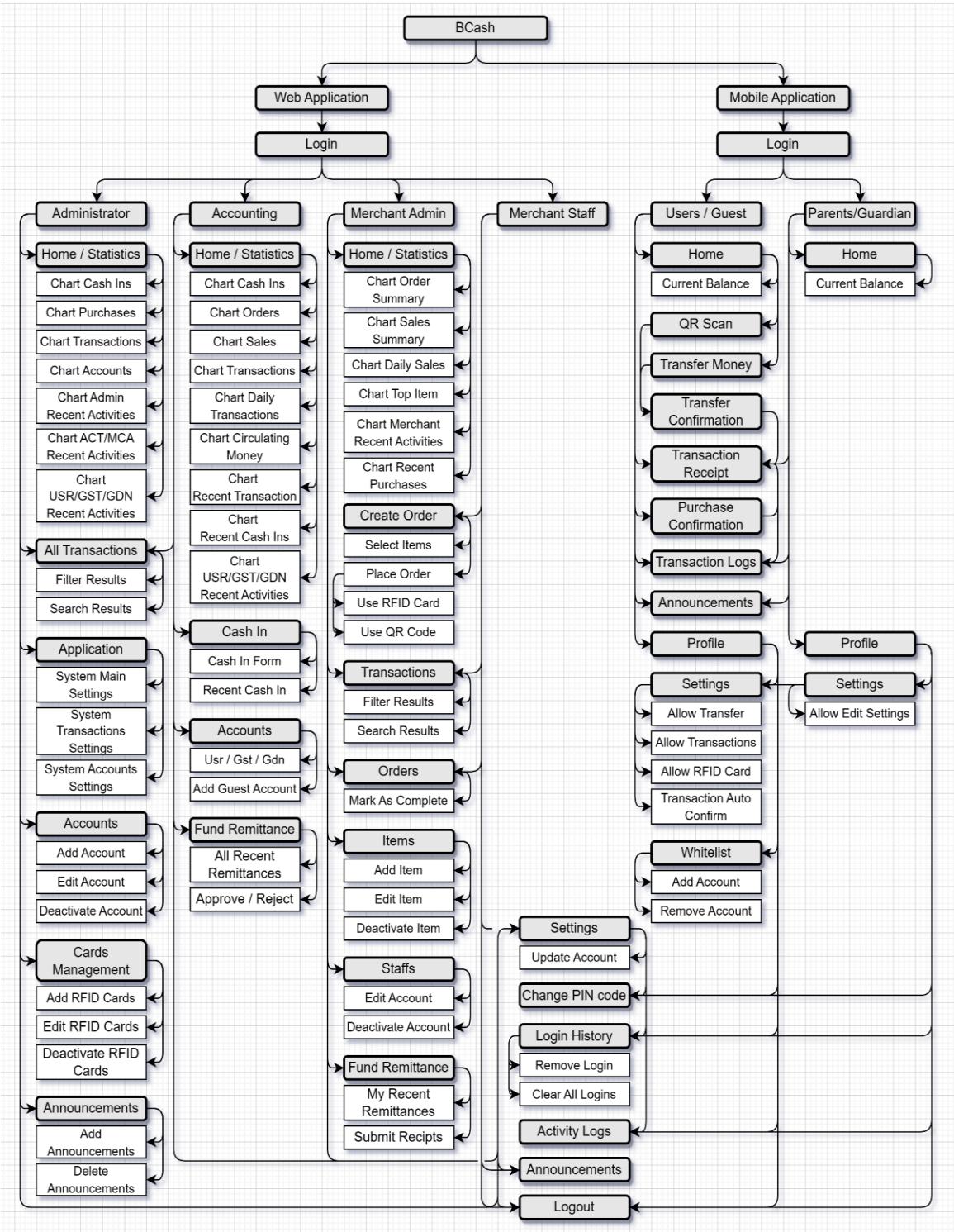
Administrators are at the core of system management, possessing the authority to manage all accounts, add any account, oversee cards (NFC/RFID), manage announcements by adding or removing, and handle system configurations. This ensures the overall functionality and security of the system.

In summary, this well-structured system caters to various roles, each designed for specific responsibilities and access levels, fostering a secure environment for account interactions.



Figure 7.

H-Diagram of BCash





The BCash H-Diagram visually represents the hierarchy and relationships within the platform, between the administrator, accounting, merchant admin and staff and also the users or guests as well as the guardian. It shows each role's function and interactions within the system.

Here under are the functional modules:

Login. This module is the process a user goes through to access their account on the platform. In web applications it includes Administrator, Accounting, Merchant Admin and Merchant Staff. While in the mobile application it includes the Users/Guests and Parents/ Guardians.

Administrator. This module is the process an administrator goes through to access their account on the platform. This includes Home/Statics, All Transactions, Application, Accounts, Cards Management, Announcements, Settings and Logout.

Accounting. This module refers to the accounting go through when using the platform. This includes Home/Statistics, Cash in, Accounts, Fund remittance, Settings and Logout.

Merchant Admin. This module refers to the merchant admin go through when using the platform. This includes Home/Statistics, Transactions, Orders, Items, Staffs, Fund Remittance.

Merchant Staff. This module refers to the merchant staff go through when using the platform. This includes Create Order, Transactions, Orders, Settings, Announcements and Logout.

Users/Guests. This module is the process users/guests go through when using the platform. This includes Home, QR Scan, Transfer Money, Transfer Confirmation, Transaction Receipt, Purchase Confirmation, Transaction Logs, Announcements, Profile, Settings, Whitelist, Change PIN Code, Login History, Activity Logs and Logout.

Guardian. This module refers to what the guardian goes through when using the platform. This includes Home, Transaction Receipt, Transaction Logs, Announcements, Profile, Settings, Change PIN Code, Login History, Activity Logs, Logout.

Home/Statistics (Administrator). This module can provide Chart Cash Ins, Chart Purchases, Chart Transactions, Chart Account, Chart Admin Recent Activities, Chart ACT/MCA Recent Activities and Chart USR/GST/GDN Recent Activities.



All Transactions (Administrator). This module can provide Filter Results, Search Results.

Application (Administrator). This module can provide System Main Settings, System Transaction Settings, System Accounts Settings.

Accounts (Administrator). This module can provide Add Account, Edit Account, Deactivate Account

Cards Management (Administrator). This module can Add RFID Cards, Edit RFID Cards, Deactivate RFID Cards.

Announcements (Administrator). This module can Add Announcements, Delete Announcements.

Home/Statistics (Accounting). This module can provide Chart Cash Ins, Chart Orders, Chart Sales, Chart Transactions, Chart Daily Transactions, Chart Circulating Money, Chart Recent Transactions, Chart Recent Cash Ins, Chart USR/GST/GDN Recent Activities

Cash In (Accounting). This module can see Cash in Form, Recent Cash In.

Accounts (Accounting). This module can see the Usr/Gst/Gdn and can Add Guest Account.

Fund Remittance (Accounting). This module can provide All Recent Remittances and can Approve/Reject.

Home/Statistics (Merchant Admin). This module can provide Chart Order Summary, Chart Sales Summary, Chart Daily Sales, Chart Top Item, Chart Merchant Recent Activities, Chart Recent Activities and Chart Recent Purchases.

Create Order (Merchant Admin). This module can be used to Select Items, Place Order, Use RFID Card, Use QR Code.

Transaction (Merchant Admin). This module can provide Filter Results, Search Result.

Orders (Merchant Admin). This module can Mark as Complete an order.

Items (Merchant Admin). This module can Add Items, Edit Items and Deactivate Items.



Staff (Merchant Admin). This module can Edit Account and Deactivate Account.

Fund Remittance (Merchant Admin). This module can see your Recent Remittances, Submit Receipts.

Settings (Merchant Staff). This module can provide an Update Account.

Change PIN code (Merchant Staff). This module can allow you to Change PIN Code.

Login History (Merchant Staff). This module can provide Remove Login, Clear All Logins.

Activity Logs (Merchant Staff). This module provides Account Activity Logs

Announcements (Merchant Staff). This module provides Application Announcements

Home (Users/Guest). This module can view your Current Balance, Scan a QR and Transfer Money.

QR Scan (Users/Guest). This module can confirm your Transfer.

Transfer Money (Users/Guest). This module can confirm your Transfer.

Transfer Confirmation, Purchase Confirmation, Transaction Logs (Users/Guest). This module can view your Transaction Receipt.

Announcements (Users/Guest). This module can view Announcements.

Profile (Users/Guest). This module provides Profile Settings.

Settings (Users/Guest). This module can turn on or off the Allow Transfer, Allow Transactions, Allow RFID Card and Transaction Auto Confirm.

Whitelist (Users/Guest). This module can Add Account or Remove Account.

Home (Parents/Guardian). This module can view their Current Balance.

Settings (Users/Guest). Allow Edit Settings.

Logout (Administrator, Accounting, Merchant Admin, Merchant Staff, Users/Guest, Parents/Guardian). This module uses to Logout to your account



2. Design Issues

Internal Design

Based on the Entity-Relationship Diagram on **Appendix D**, this is the table that the BCash have. `tbl_activitylogs`, `tbl_authentications`, `tbl_actorcategory`, `tbl_campus`, `tbl_card`, `tbl_configurations`, `tbl_guardianaccount`, `tbl_itemscategory`, `tbl_loginhistory`, `tbl_merchantitems`, `tbl_merchants`, `tbl_merchantscategory`, `tbl_notifications`, `tbl_odersvalidation`, `tbl_remittance`, `tbl_transactionitems`, `tbl_schoolid`, `tbl_transaction`, `tbl_transactioninfo`, `tbl_transactiontype`, `tbl_usersdata`, `tbl_usersaccount`, `tbl_webaccounts` and `tbl_whitelist`. This defines the relationship and structures of all the data tables of the web application.

Table: 18.

Data Dictionary - `tbl_activitylogs`

tbl_activitylogs			
Field Name	Data Type	Constraints	Sample Value
ActivityLogs_Id	int(11)	NOT NULL, AI ,PK	36
Account_Address	varchar(15)	NOT NULL	ADM0000000000000
Target_Account_Address	varchar(15)	NOT NULL	ACTeOXYUqyg4fSx
Action	varchar(6)	NOT NULL	Edit
Task	varchar(255)	NOT NULL	Added new Accounting [name@gmail.com] - [ACTeOXYUqyg4fSx4].
Timestamp	timestamp	NOT NULL	2023-11-16 14:38:52

This table contains the activity logs of the accounts and other details of the logs.

**Table: 19.***Data Dictionary - tbl_authentications*

tbl_authentications			
Field Name	Data Type	Constraints	Sample Value
Account_Address	varchar(15)	NOT NULL, PK	GDNUSuU51cXB1Bq
AuthToken	varchar(30)	NULL	\$2y\$10\$3AZ5YKQpxC G4r0MKY01fq.r
AuthExpirationTime	timestamp	NULL	2023-11-16 09:12:00
AuthCreationTime	timestamp	NULL	2023-11-16 09:05:41
OtpCode	varchar(6)	NULL	123456
OtpCreationTime	timestamp	NULL	2023-11-16 09:12:00
OtpExpirationTime	timestamp	NULL	2023-11-16 09:05:41
IpAddress	varchar(20)	NOT NULL	192.168.100.106
Location	varchar(50)	NOT NULL	Cavite
Device	varchar(100)	NOT NULL	Windows NT 10.0; Win64; x64

This table contains the authentications of the accounts such as tokens, creation and expiration of authentication time, otp.

Table: 20.*Data Dictionary - tbl_actorcategory*

tbl_actorcategory			
Field Name	Data Type	Constraints	Sample Value
ActorCategory_Id	int(11)	NOT NULL, PK	1
Name	varchar(255)	NOT NULL	Administrator
Code	varchar(3)	NULL	ADM

This table contains the details of the roles such as its name and code.

**Table: 21.***Data Dictionary - tbl_campus*

tbl_campus			
Field Name	Data Type	Constraints	Sample Value
Campus_Id	int(11)	NOT NULL, PK	1
Name	varchar(255)	NOT NULL	Cavite Main Campus
Abbreviation	varchar(20)	NULL	SSC-dC

This table contains the details of the name of the campus and its abbreviation and also its campus ID.

Table: 22.*Data Dictionary - tbl_card*

tbl_card			
Field Name	Data Type	Constraints	Sample Value
Card_Id	int(11)	NOT NULL, PK	1
Card_Address	varchar(15)	NULL	1234567890
UsersAccount_Address	varchar(15)	NULL, FK	GSTFg86QoDrAT0w
Campus_Id	int(11)	NULL, FK	1
IsActive	bit(1)	NULL	1
Notes	varchar(50)	NULL	Has problem

This table contains the details of the student ID card.

**Table: 23.***Data Dictionary - tbl_configurations*

tbl_configurations			
Field Name	Data Type	Constraints	Sample Value
Configuration_Id	int(11)	NOT NULL, PK	1
Title	varchar(100)	NOT NULL	IsMaintenance
Value	varchar(100)	NOT NULL	0
Description	text	NULL	The server is under maintenance

This table contains details of the configurations such as title, value, and description.

Table: 24.*Data Dictionary - tbl_guardianaccount*

tbl_guardianaccount			
Field Name	Data Type	Constraints	Sample Value
GuardianAccount_Address	varchar(15)	NOT NULL, PK	GDNUSuU51cXB1Bq
UsersAccount_Address	varchar(15)	NULL	USR1K8aKQbVx8pP
ActorCategory_Id	int(11)	NOT NULL, FK	7
Email	varchar(50)	NOT NULL	name@gmail.com
Firstname	varchar(50)	NOT NULL	Juan
Lastname	varchar(50)	NOT NULL	Dela Cruz
PinCode	varchar(255)	NULL	\$2y\$10\$wGKu11.kN7OyCFLICTl5FessMeT2QHaj1ggGyEZ44dER3719vCy.W
Campus_Id	int(11)	NULL, FK	1
IsAccountActive	bit(1)	NULL	1
DateRegistered	timestamp	NOT NULL	2023-11-16 15:52:06

This table contains the details of the guardian accounts such as email, first name, last name, pin code.



Table: 25.

Data Dictionary - tbl_itemscategory

tbl_itemscategory			
Field Name	Data Type	Constraints	Sample Value
ItemsCategory_Id	int(11)	NOT NULL, PK	1
MerchantsCategory_Id	int(11)	NOT NULL, FK	1
Name	varchar(255)	NOT NULL	Motivational Rice

This table contains the name of the items and merchants and their category.

Table: 26.

Data Dictionary - tbl_loginhistory

tbl_loginhistory			
Field Name	Data Type	Constraints	Sample Value
Account_Address	varchar(15)	NOT NULL, PK	GDNUSuU51cXB1Bq
IpAddress	varchar(20)	NOT NULL, PK	192.168.100.106
Location	varchar(50)	NOT NULL, PK	Cavite
Device	varchar(100)	NOT NULL, PK	Windows NT 10.0; Win64; x64
LastOnline	timestamp	NULL	2023-11-16 15:52:06

This table contains the login history of the accounts such as account address, ip address, device, last online.



Table: 27.

Data Dictionary - tbl_merchantitems

tbl_merchantitems			
Field Name	Data Type	Constraints	Sample Value
MerchantItems_Id	int(11)	NOT NULL, PK	11
ItemCategory	varchar(50)	NULL	Rice Meals
MerchantsCategory_Id	int(11)	NOT NULL, FK	5
Name	varchar(50)	NOT NULL	Chicken Adobo
Price	float	NOT NULL	50
Image	varchar(255)	NOT NULL	default.png
IsActive	bit(1)	NULL	1
CreatedTimestamp	timestamp	NOT NULL	2023-11-16 15:04:21
ModifiedTimestamp	timestamp	NOT NULL	2023-11-16 15:04:21

This table contains the merchants items such as categories, price, name, image, and timestamp.

Table: 28.

Data Dictionary - tbl_merchants

tbl_merchants			
Field Name	Data Type	Constraints	Sample Value
WebAccounts_Address	varchar(15)	NOT NULL, PK, FK	MTAxdeZsFv0EihW
MerchantsCategory_Id	int(11)	NOT NULL, PK, FK	5

This table contains the details of the merchants web accounts address and the merchants category ID.

**Table: 29.***Data Dictionary - tbl_merchantscategory*

tbl_merchantscategory			
Field Name	Data Type	Constraints	Sample Value
MerchantsCategory_Id	int(11)	NOT NULL, PK	5
Campus_Id	int(11)	NOT NULL, FK	1
ShopName	varchar(255)	NOT NULL	Canteen 1

This table contains the shop name and the merchants category including the campus id.

Table: 30.*Data Dictionary - tbl_notifications*

tbl_notifications			
Field Name	Data Type	Constraints	Sample Value
Notification_ID	int(11)	NOT NULL, PK	
Creator_Account_Address	varchar(15)	NOT NULL, FK	
Title	varchar(255)	NOT NULL	
Content	text	NOT NULL	
IsNew	bit(1)	NULL	
Timestamp	timestamp	NOT NULL	

This table contains the details of the notifications such as the title and its contents.

Table: 31.*Data Dictionary - tbl_ordersvalidation*

tbl_ordersvalidation			
Field Name	Data Type	Constraints	Sample Value
WebAccounts_Address	varchar(15)	NOT NULL, PK, FK	MTAxdeZsFv0EihW
UsersAccount_Address	varchar(15)	NULL, FK	USR1K8aKQbVx8pP

This table contains the validation of the orders.

**Table: 32.***Data Dictionary - tbl_remittance*

tbl_remittance			
Field Name	Data Type	Constraints	Sample Value
Remittance_Id	int(11)	NOT NULL, PK	12
Submitted_By	varchar(15)	NOT NULL, FK	MTAxdeZs Fv0EihW
TotalOrders	varchar(11)	NOT NULL	5
TotalAmount	varchar(11)	NOT NULL	535
DateResponse	timestamp	NULL	2023-11-16 08:50:20
Status	varchar(25)	NOT NULL	Approved
Timestamp	timestamp	NOT NULL	2023-11-16 15:48:55

This table contains the details of remittance such as remittance ID, total orders, total amount, date response, status, and the timestamp.

Table: 33.*Data Dictionary - tbl_transactionitems*

tbl_transactionitems			
Field Name	Data Type	Constraints	Sample Value
Transaction_Address	varchar(20)	NOT NULL, PK, FK	2023111608 0648xtFlD9
MerchantItems_Id	int(11)	NOT NULL, PK, FK	12
Quantity	int(11)	NOT NULL	1
Amount	float	NOT NULL	60

This table contains details of transaction items such as the quantity and amount.



Table: 34.

Data Dictionary - tbl_schoolid

tbl_schoolid			
Field Name	Data Type	Constraints	Sample Value
SchoolId	varchar(20)	NOT NULL	202010170
Email	varchar(50)	NOT NULL	S.STEPHEN.LAYSON@SSCR.EDU

This table contains the school id of the users and emails.

Table: 35.

Data Dictionary - tbl_transactions

tbl_transactions			
Field Name	Data Type	Constraints	Sample Value
Transaction_Address	varchar(20)	NOT NULL, PK	20231116075423K7Vk5O
Account_Address	varchar(15)	NOT NULL, PK	ACTeOXYUqyg4fSx
Status	varchar(50)	NOT NULL	Completed
Debit	float	NOT NULL	1000
Credit	float	NOT NULL	0
Remittance_Id	int(11)	NULL, FK	12
Timestamp	timestamp	NOT NULL	2023-11-16 15:06:48

This table contains the details of transactions such as account address, status, debit, credit, remittance ID, and timestamp.

**Table: 36.***Data Dictionary - tbl_transactionsinfo*

tbl_transactionsinfo			
Field Name	Data Type	Constraints	Sample Value
			2023111607
			5423K7Vk5
Transaction_Address	varchar(20)	NOT NULL, PK	O
TransactionType_Id	int(11)	NOT NULL, FK	1
			ACTeOXY
Sender_Address	varchar(15)	NOT NULL	Uqyg4fSx
			USR1K8aK
Receiver_Address	varchar(15)	NOT NULL	QbVx8pP
Status	varchar(50)	NOT NULL	Completed
Amount	float	NOT NULL	1000
Discount	float	NOT NULL	0
TotalAmount	float	NOT NULL	1000
			ACTeOXY
PostedBy	varchar(15)	NOT NULL	Uqyg4fSx
Notes	text	NULL	Hello po
PaymentMethod	varchar(50)	NULL	BCash
			2023-11-16
Timestamp	timestamp	NOT NULL	14:57:05

This table contains the details of the transaction info such as amounts, discounts, status, sender address, and receiver address.

Table: 37.*Data Dictionary - tbl_transactiontype*

tbl_transactiontype			
Field Name	Data Type	Constraints	Sample Value
TransactionType_Id	int(11)	NOT NULL, PK	1
Name	varchar(255)	NOT NULL	Cash In



This table contains the transaction types such as transaction type ID and name.

Table: 38.

Data Dictionary - tbl_usersaccount

tbl_usersaccount			
Field Name	Data Type	Constraints	Sample Value
UsersAccount_Address	varchar(15)	NOT NULL, PK	USR1K8aK QbVx8pP
ActorCategory_Id	int(11)	NULL, FK	5
Email	varchar(50)	NULL	s.stephen.lay son@sscr.ed u
Firstname	varchar(50)	NOT NULL	Stephen
Lastname	varchar(50)	NOT NULL	Layson
PinCode	varchar(255)	NULL	\$2y\$10\$0V7 IANPuUTw vxHlAsfFM 3uSWpML1 BTf5ONP4. frvfaTS9R6s Lre8.
IsAccountActive	bit(1)	NULL	1
Campus_Id	int(11)	NULL, FK	1
Password	varchar(255)	NULL	NULL

This table contains the details of the user accounts such as email, first name, last name, pin code, campus ID.

**Table: 39.***Data Dictionary - tbl_usersdata*

tbl_usersdata			
Field Name	Data Type	Constraints	Sample Value
UsersAccount_Address	varchar(15)	NOT NULL, PK	USR1K8aK QbVx8pP
GuardianAccount_Address	varchar(15)	NULL, FK	GDNUSuU 51cXB1Bq
SchoolPersonalId	varchar(15)	NULL	202010170
Balance	float	NULL	515
CanDoTransfers	bit(1)	NULL	1
CanDoTransactions	bit(1)	NULL	1
CanUseCard	bit(1)	NULL	1
CanModifySettings	bit(1)	NULL	1
IsTransactionAutoConfirm	bit(1)	NOT NULL	0
DateRegistered	timestamp	NOT NULL	2023-11-16 14:44:25

This table contains the user data such as school ID, balance, and can modify settings such as can do transfers, can do transactions.

Table: 40.*Data Dictionary - tbl_webaccounts*

tbl_webaccounts			
Field Name	Data Type	Constraints	Sample Value
WebAccounts_Address	varchar(15)	NOT NULL, PK	ADM00000000000000
ActorCategory_Id	int(11)	NOT NULL, FK	1
Username	varchar(50)	NOT NULL	Administrator
Password	varchar(255)	NOT NULL	\$2y\$10\$R6Sq.XaRAnroz of/p8bA.uWpZiSPia2bJ



			oMXPRYf5vDu2N3L9 KvYO
Email	varchar(50)	NOT NULL	jameslayson.0@gmail.co m
Firstname	varchar(50)	NOT NULL	Administrator
Lastname	varchar(50)	NOT NULL	Test
PinCode	varchar(255)	NULL	\$2y\$10\$xCekFilC440bK 4Tc2T9nX.NkJlCgzpcw 3Uu6w5TcXs6./TPykk 4K
IsAccountActive	bit(1)	NULL	1
Campus_Id	int(11)	NULL, FK	1
DateRegistered	timestamp	NOT NULL	2023-10-18 00:41:18

This table contains the details of web accounts such as password, email, and pincode.

Table: 41.

Data Dictionary - tbl_whitelist

tbl_whitelist			
Field Name	Data Type	Constraints	Sample Value
Account_Address	varchar(15)	NOT NULL, PK, FK	USR1K8aK QbVx8pP
Whitelisted_Address	varchar(15)	NOT NULL, PK, FK	GSTFg86Q oDrAT0w
Timestamp	timestamp	NOT NULL	2023-11-16 14:56:37

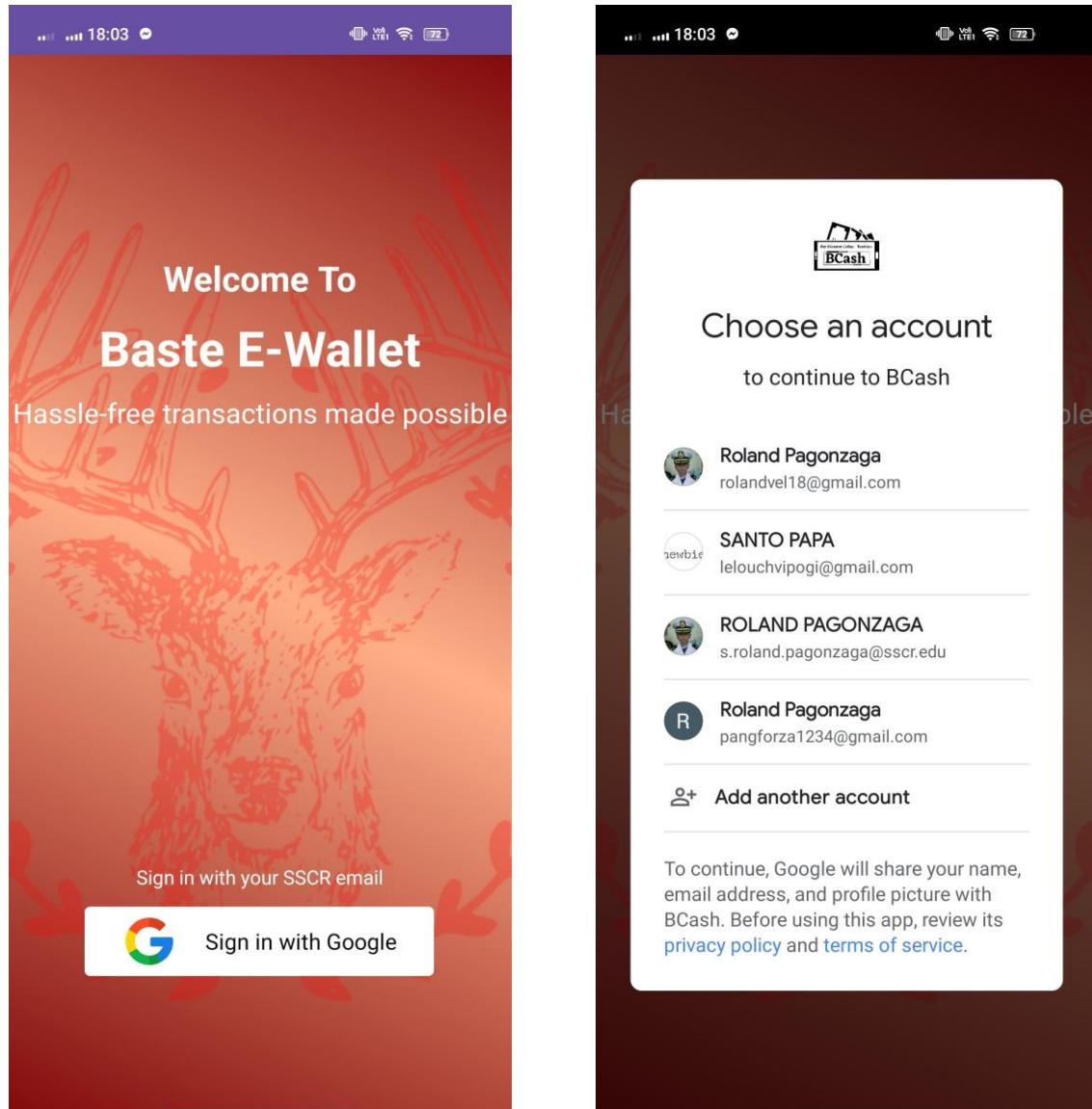
This table contains the whitelisted accounts such as account address, and whitelisted address.



External Design

Figure 8.

Login Page for Mobile



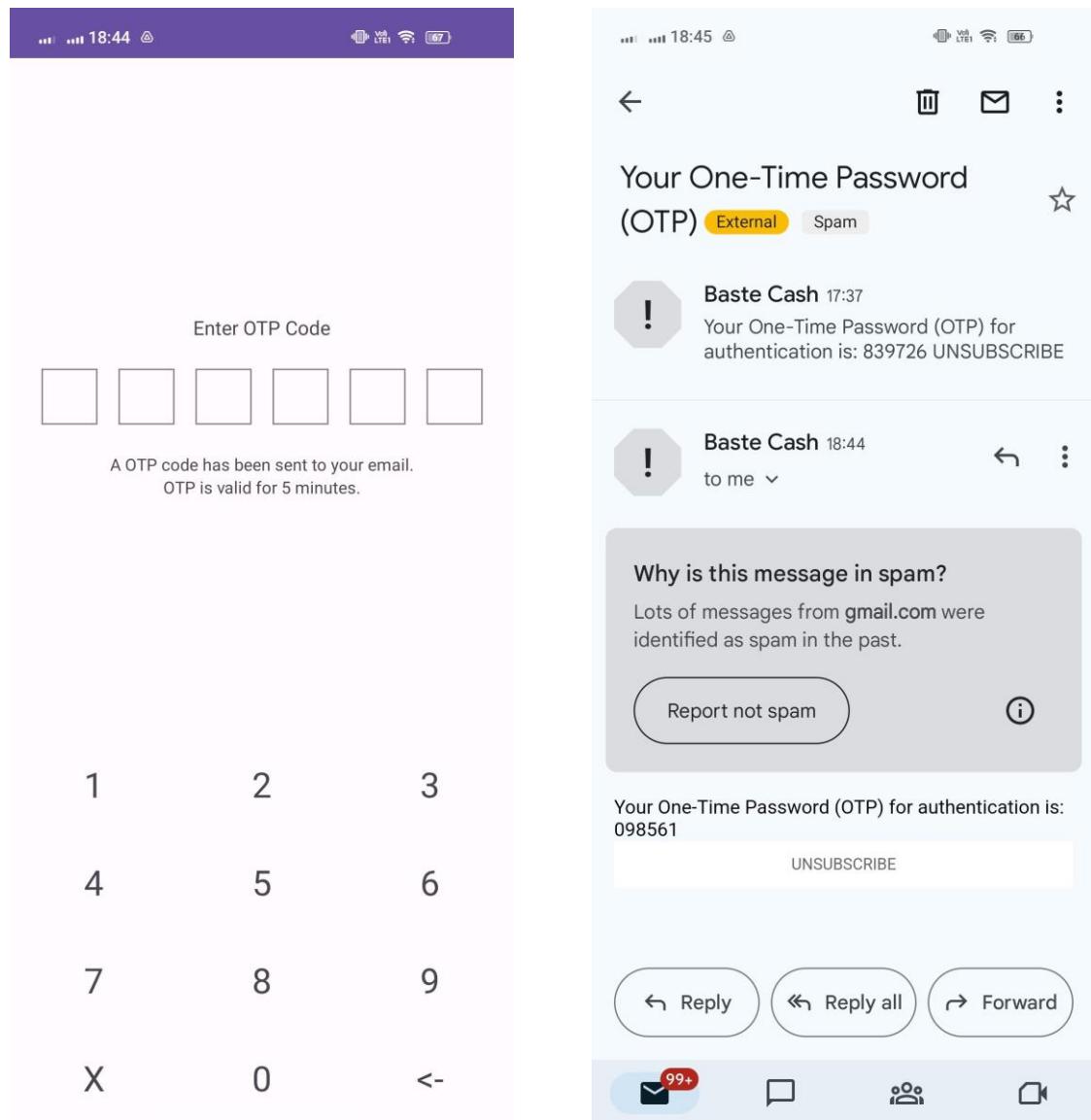
This is the BCash login page, where you can securely sign in using your SSCR Gmail account.

Access the app by signing in with your SSCR Gmail account.



Figure 9.

OTP - Getting and Entering the OTP



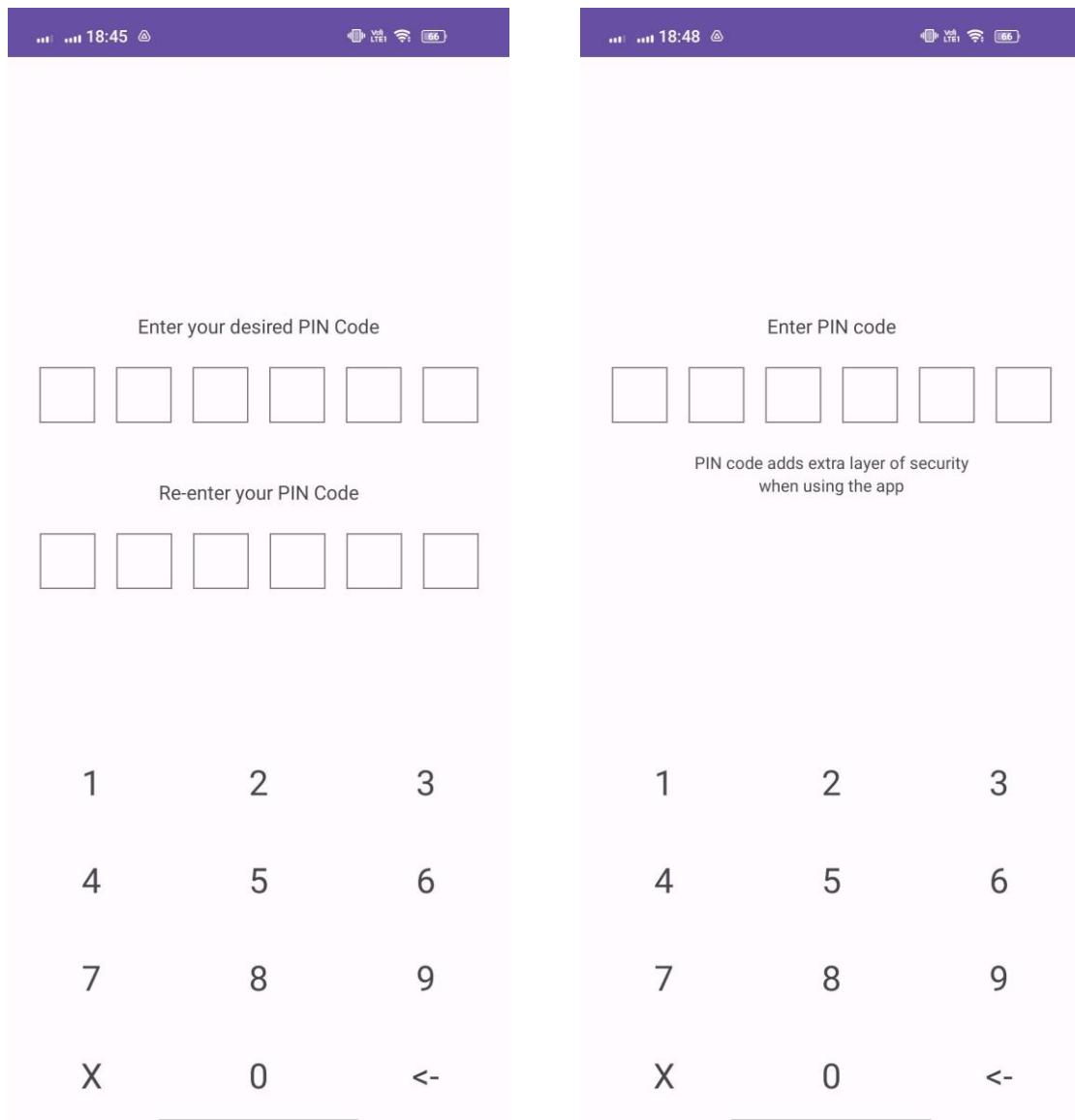
Enter the OTP that was sent to your email.

Go to the spam folder to see the OTP.



Figure 10.

Pin Code - Creating and Entering



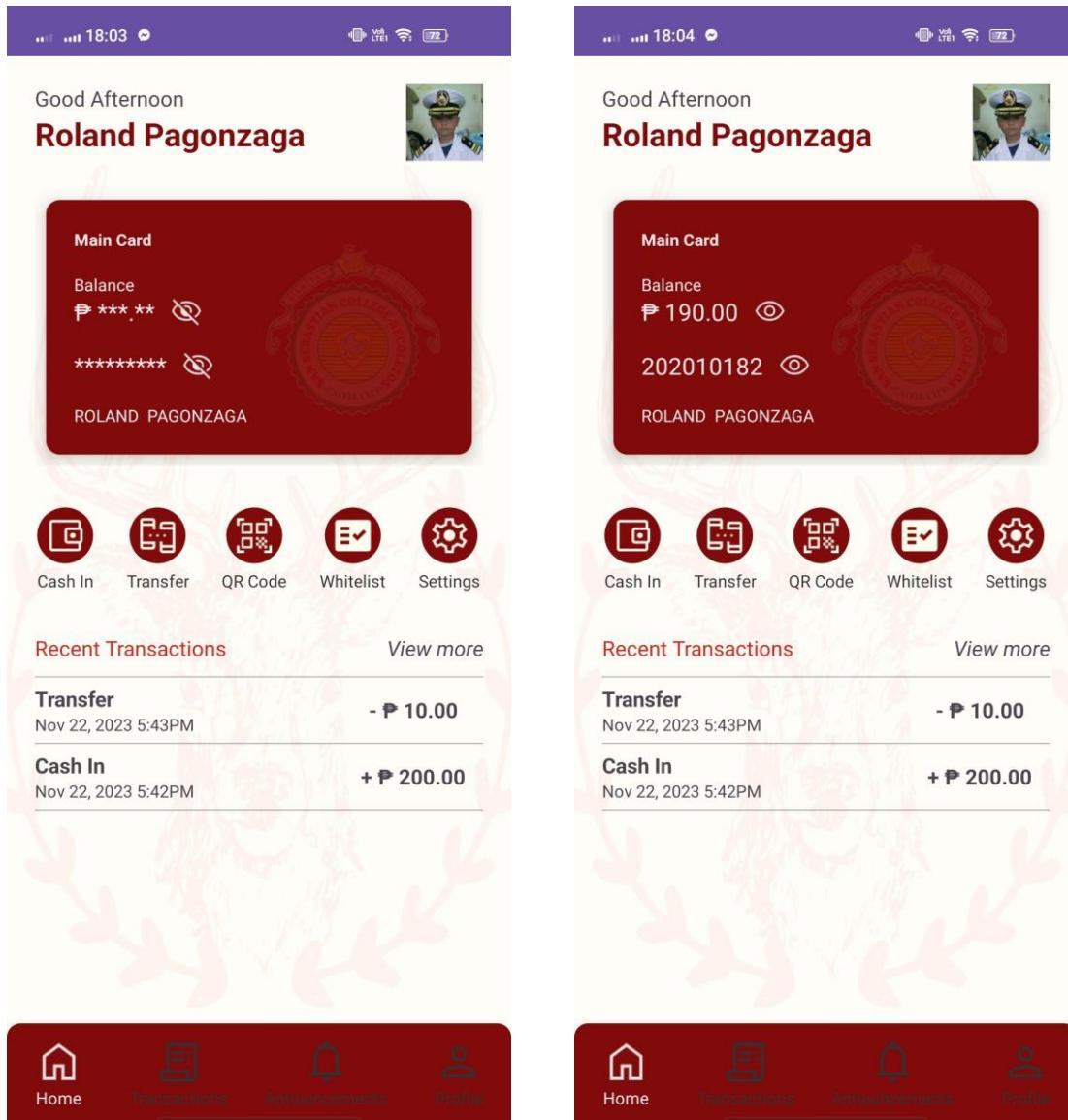
Personalize your security with a unique PIN code.

Enter your PIN code to access the app.



Figure 11.

Homepage



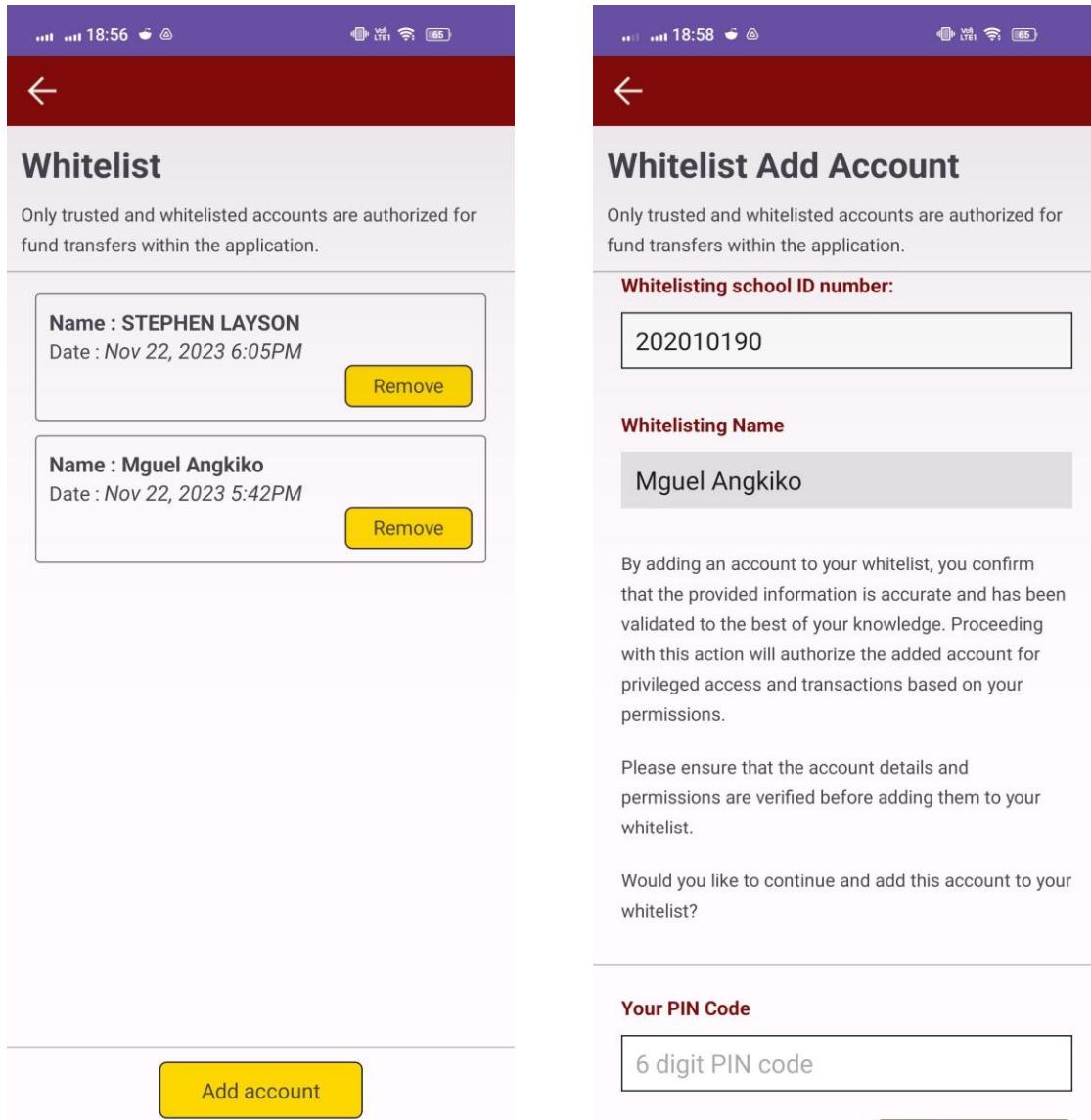
This homepage doesn't display your balance and school ID. cash-in, transfer, whitelist, settings, and recent transactions.

This homepage will display your balance and school id just by clicking the visibility toggle., cash-in, transfer, whitelist, settings, and recent transactions.



Figure 12.

Whitelist - Add/ Remove



In this page you can manage your registered whitelist by adding or removing them in your whitelist.

Add accounts by entering their school ID number; the system auto-populates names. Confirm with your PIN.



Figure 13.

Transfer Form and Transfer Confirmation

Transfer Form

Please double-check the entered amount and recipient before confirming the transfer.

Receiver School Id Number:

Amount:

Message:

Transfer

Transfer Confirmation

Validate all information and confirm it to be correct

Source	Roland Pagonzaga 202010182
Destination	Mguel Angkiko 202010190
Amount:	₱ 10.00
Purpose	Fund Transfer
Message:	

Easily transfer funds from your whitelist.

Enter the receiver's school ID, amount, and an optional message; Click transfer to Confirm.

Please ensure all information is correct. By clicking 'Transfer' button means that you have validated all information and confirming it to be correct.

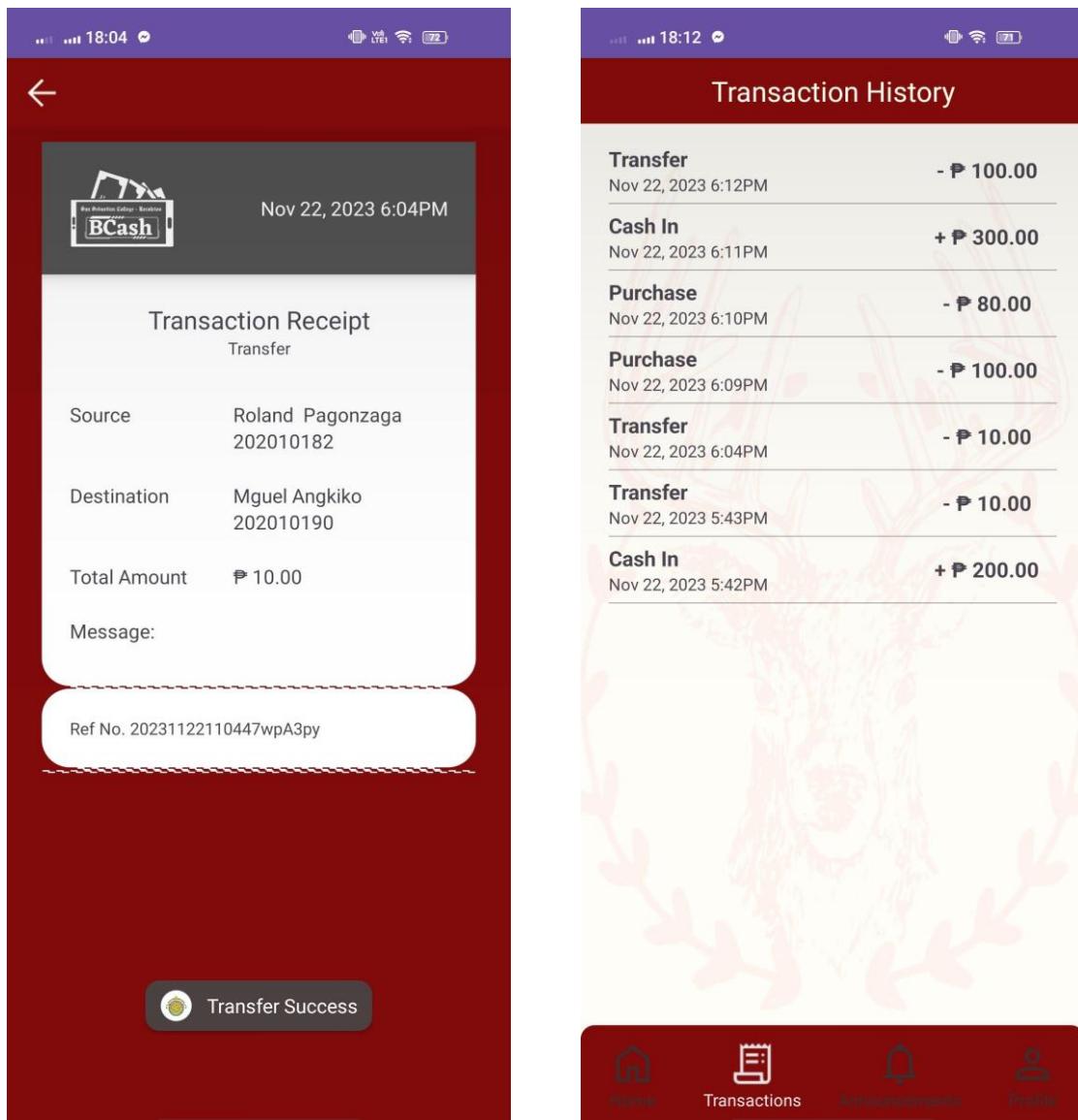
Confirm Transfer

Confirm the details of your money transfer, including source, destination, amount, purpose, and message. Stay informed and secure.



Figure 14.

Transaction Receipt and Transaction History



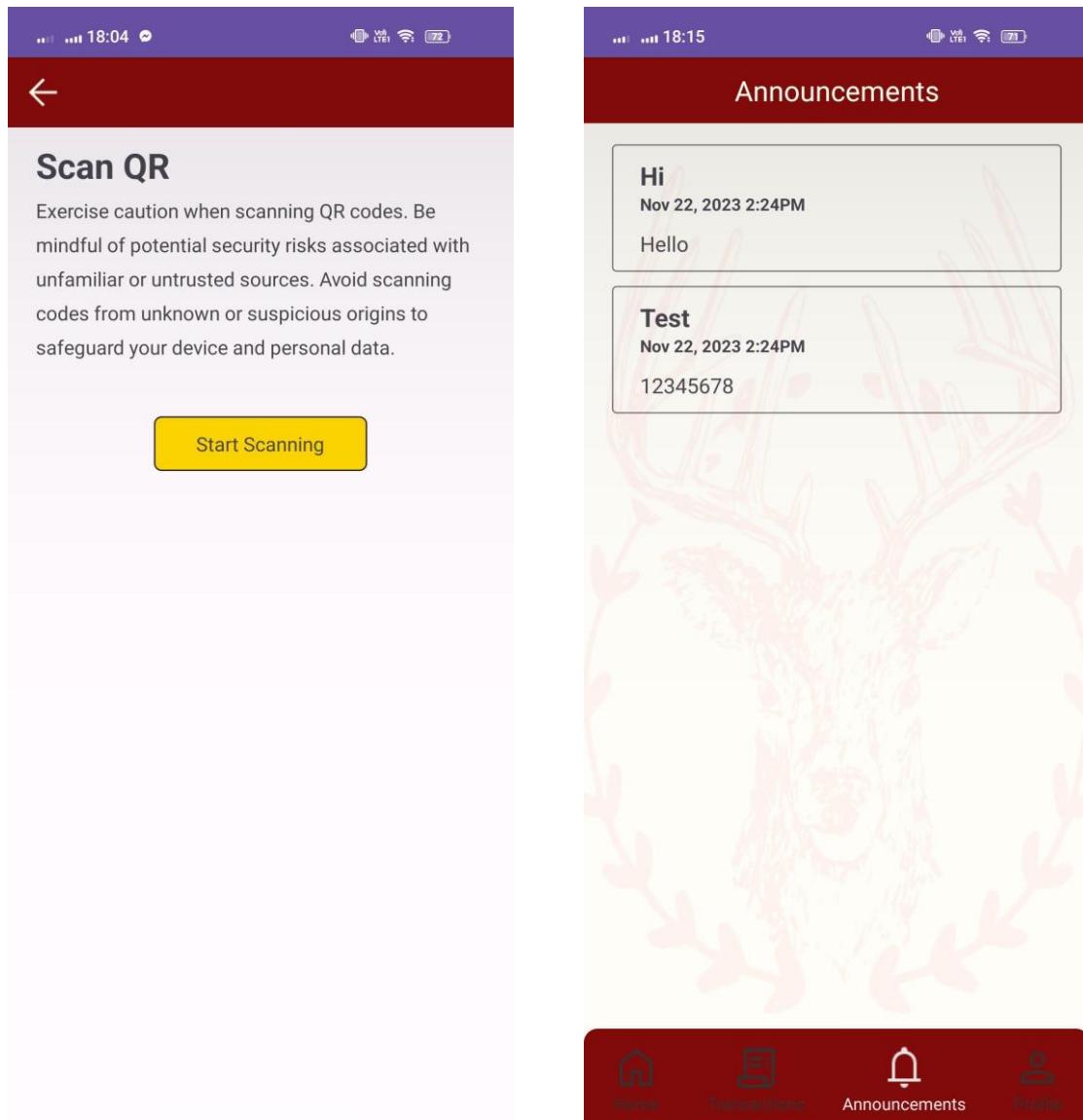
This page will show you your transaction receipt of your money transfer, including source, destination, amount, purpose, and message. Stay informed and secure.

View your transaction history on this page.



Figure 15.

Scan QR



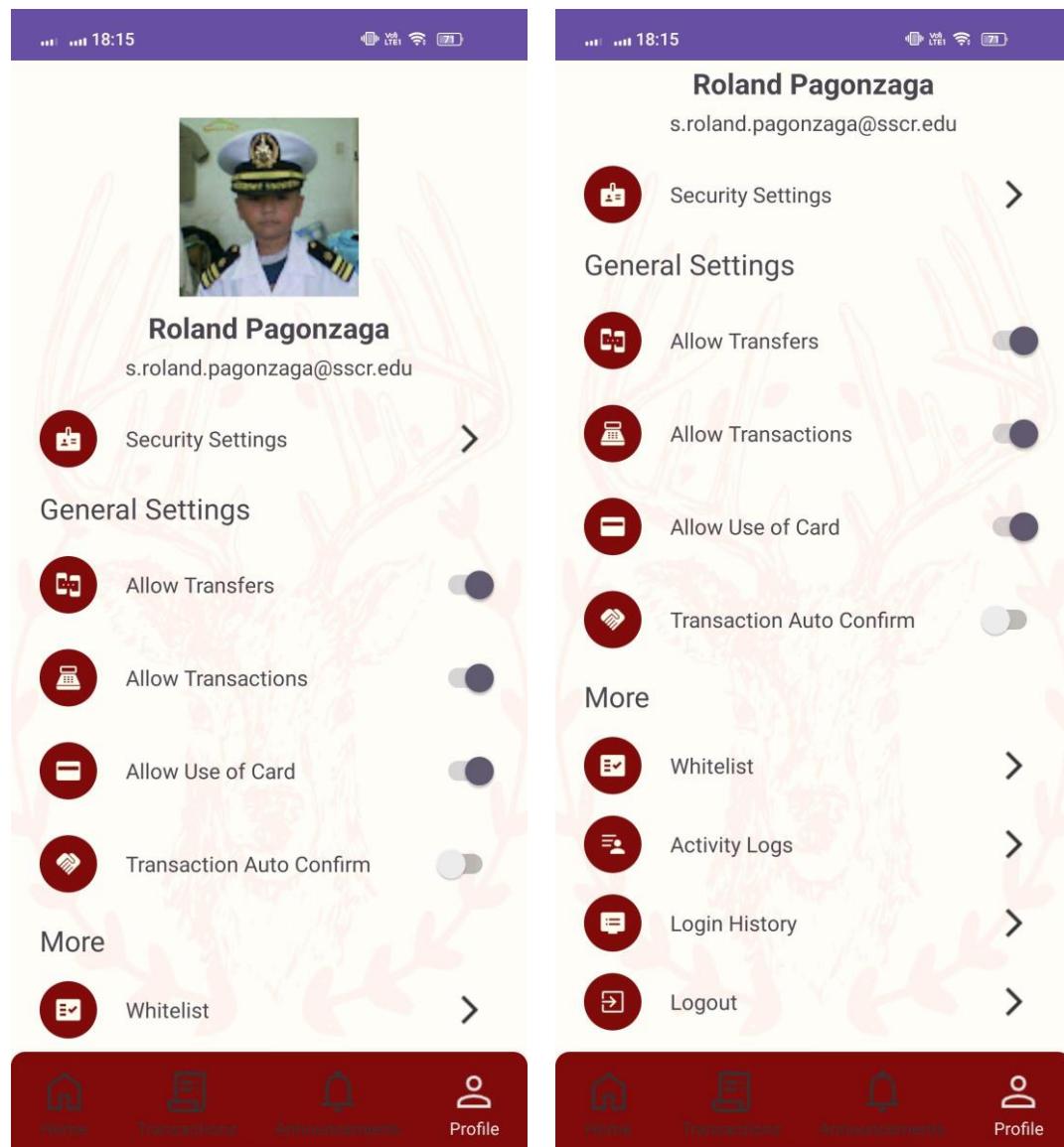
Access features by scanning QR codes on this page.

Stay updated with the latest announcements from the administrator.



Figure 16.

Profile Tab

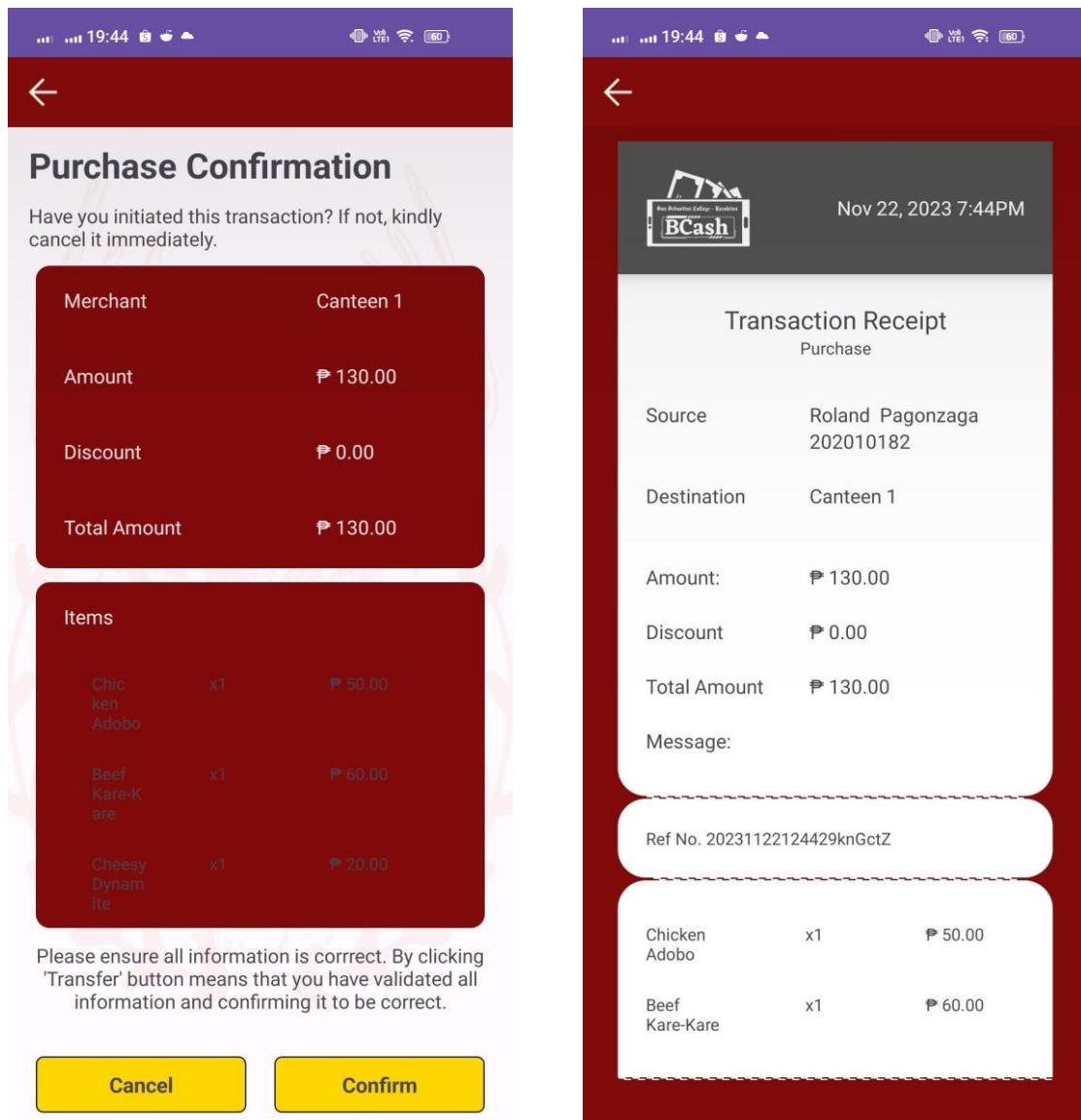


Manage your security settings: change PIN, enable/disable transfers, transactions, card usage, and auto-confirm transactions. Also, access whitelist, activity logs, login history, and logout options.



Figure 17.

Purchase Confirmation



Purchase confirmation page provides a thorough overview, including merchant details, any applicable discounts, and a clear breakdown of the total amount. It also lists the items you've purchased, ensuring you

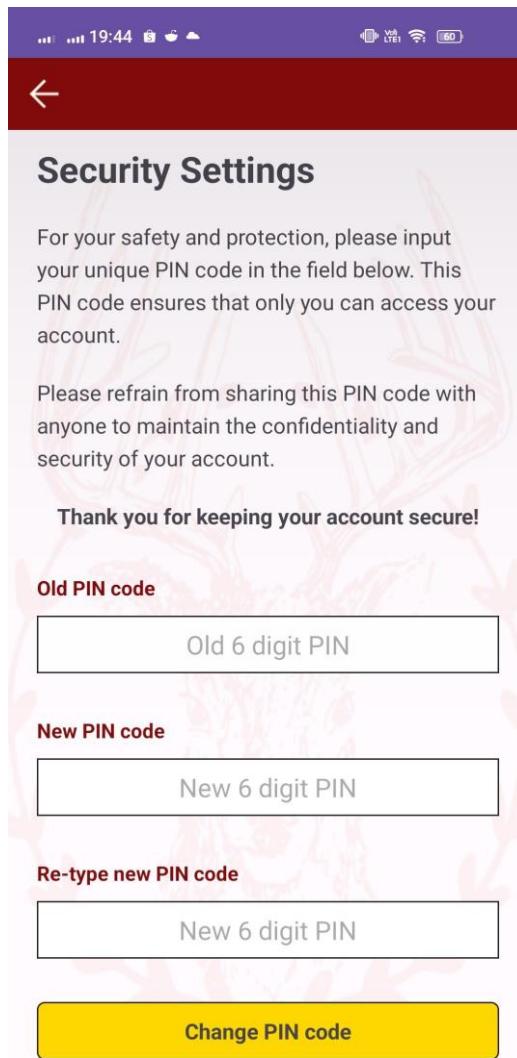
This page provides a comprehensive transaction receipt for your purchase, complete with a unique reference number for your records and convenience.



have all the necessary information about your transaction.

Figure 18.

Security Settings

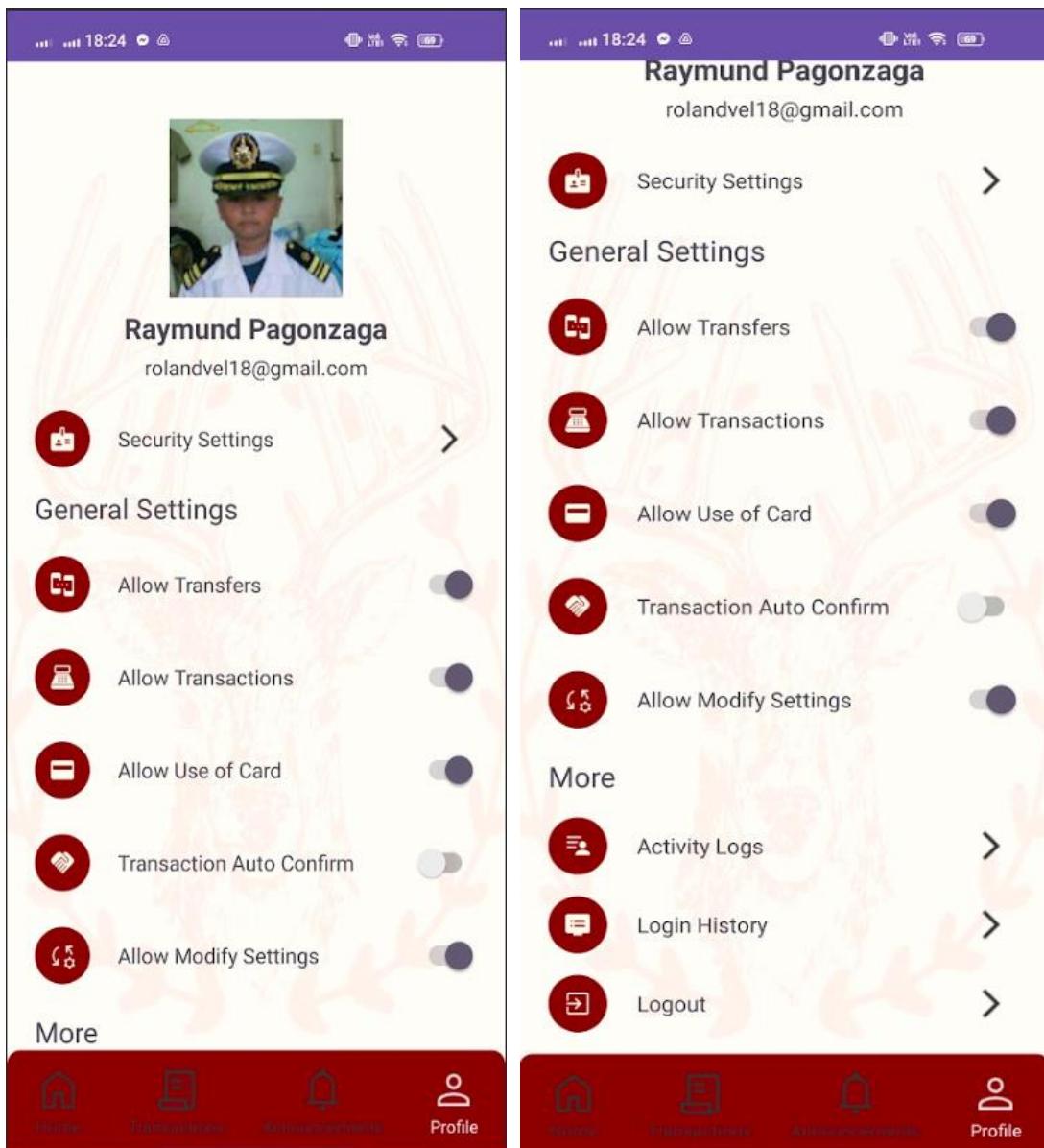


Change your PIN code by entering the old and new codes.



Figure 19.

Profile Page Guardian

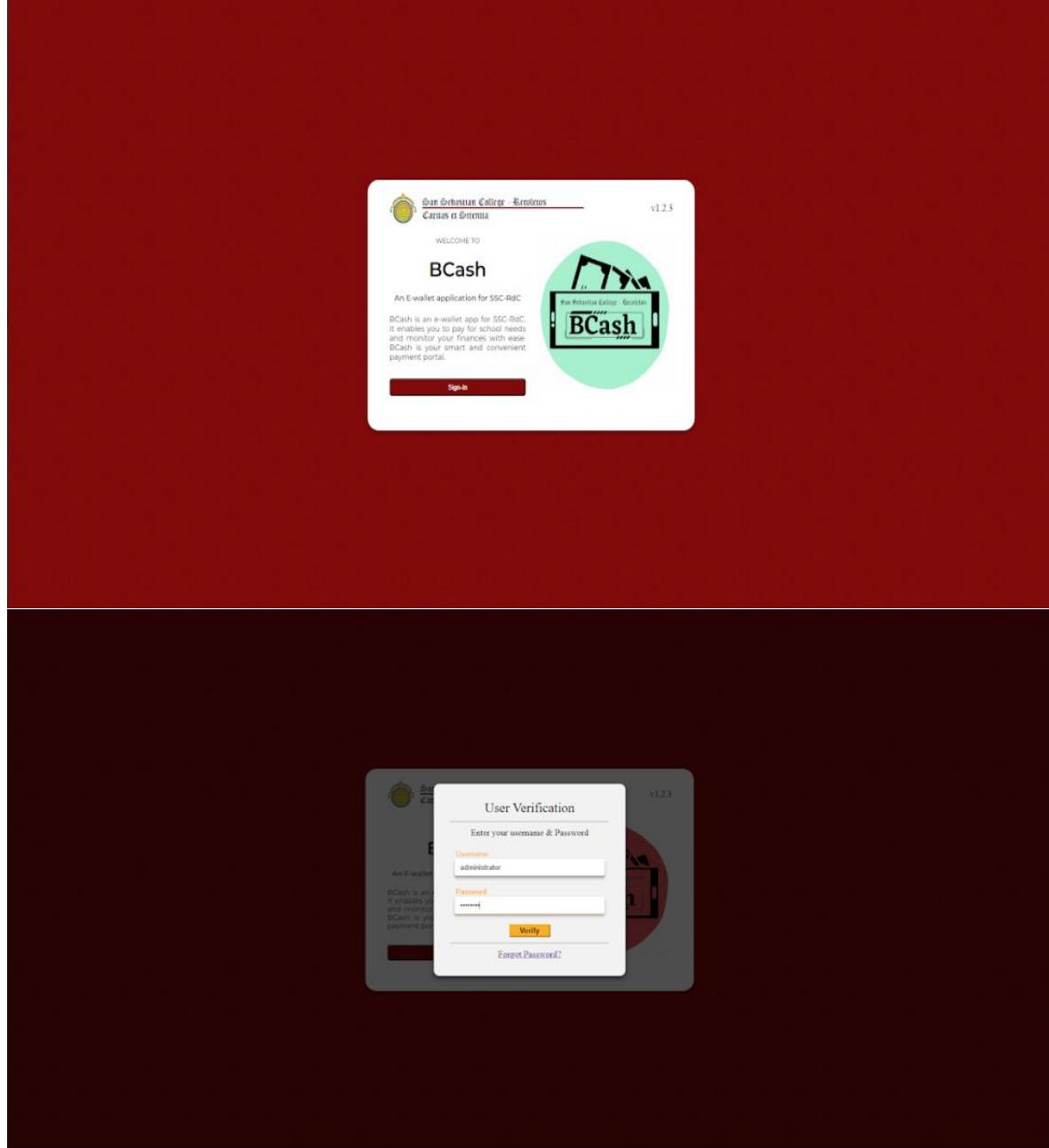


Profile page of the guardian account here the guardian can modify the settings the student's account such as allow transfers, allow transactions, allow use of card, transaction auto confirm, and allow modify settings



Figure 20.

Login Page for Web



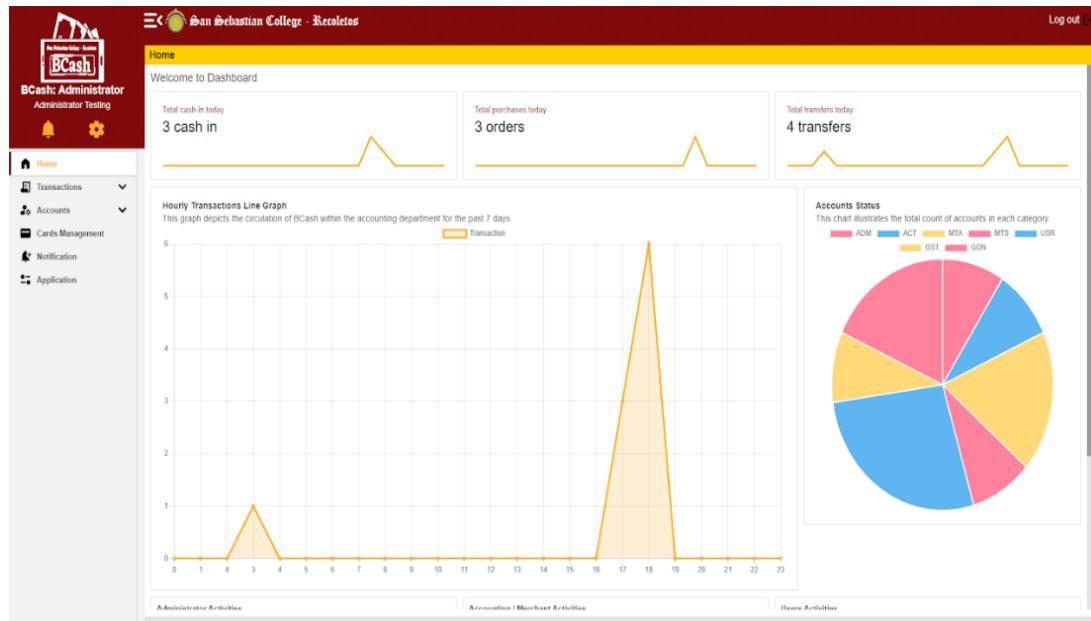
The login page for the BCash website is exclusively accessible to designated roles:

Administrator, Merchant Admin, Merchant Staff, and Accounting. Users with these roles can securely log in to access their respective accounts



Figure 21.

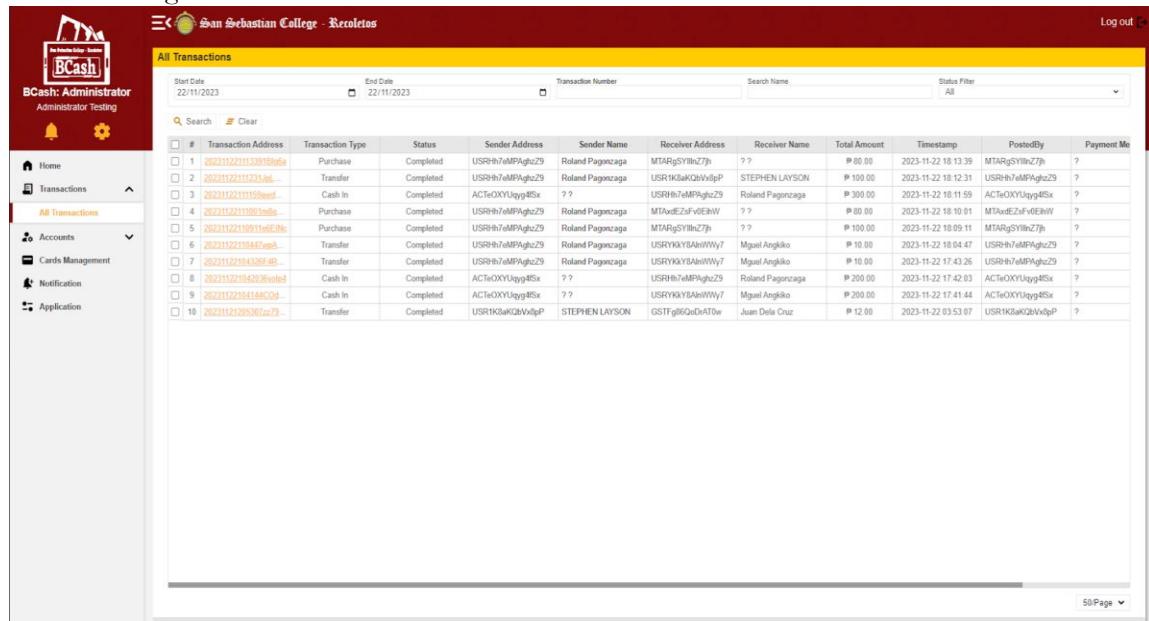
Homepage Administrator



This is the administrator homepage, providing account management functionalities. Here, you can view daily transaction summaries, including total purchases, cash inflow, and transfers for the day.

Figure 22.

Transactions Page





These are the transaction logs accessible in the 'Transactions' tab. Here, you can review all transactions for the day or set specific dates for a detailed overview.

Figure 23.

User Accounts

#	Account Address	Status	Category	Firstname	Lastname	Email	School Personal Id	Campus	Date Registered
1	GSTIfg6QuD@t0r	Active	Guest	Juan	Dela Cruz	stephiegregjames.layson@g...	12345	Cavite Main Campus	2023-11-16 14:56:15
2	USR1k5atQ2hVd@P	Active	User	STEPHEN	LAYSON	s.stephen.layson@sscr.edu	202010170	Cavite Main Campus	2023-11-16 14:44:25
3	USRh7eMP9yjZ9	Active	User	Roland	Pagonzaga	s.roland.pagonzaga@sscr.edu	202010182	Cavite Main Campus	2023-11-22 17:13:34
4	USR0XXYB8hWWnZ	Active	User	Miguel	Angliko	s.miguel.angliko@sscr.edu	202010190	Cavite Main Campus	2023-11-22 17:14:03

Here are the user accounts registered in the system you can select them and modify the details such as password and pin code.

Figure 24.

Merchant Accounts

#	Account Address	Status	Category	Firstname	Lastname	Email	Merchant Category	Campus	Date Registered
1	MTA8y0YlnZ7h	Active	Merchant Admin	Miguel	Abad	rolandver10@gmail.com	Canteen 2	Cavite Main Campus	2023-11-22 17:26:03
2	MTA8y0ZyFv0RNY	Active	Merchant Admin	Merchant Admin	Test	jameslayson.0@gmail.com	Canteen 1	Cavite Main Campus	2023-11-16 14:39:24



Here are the merchant accounts registered in the system you can select them and modify the details such as password and pin code.

Figure 25.

Merchant Staff Accounts

#	Account Address	Status	Category	Firstname	Lastname	Email	Merchant Category	Campus	Date Registered
1	MTS52w5QYs4d0	Active	Merchant Staff	Test	jameslayson5@gmail.com	Canteen 1	Cavite Main Campus	2023-11-16 14:40:38	
2	MTS5AU1CmBwLc	Active	Merchant Staff	Ochim	Divad	ochimdivad@gmail.com	Canteen 1	Cavite Main Campus	2023-11-22 19:15:23
3	MTS5e09haRs5y	Active	Merchant Staff	Wally	Baldvin	wallybaldvin@gmail.com	Canteen 2	Cavite Main Campus	2023-11-22 19:14:24
4	MTS5dU7v7w3d5S	Active	Merchant Staff	Patrick	Cruz	patrick@gmail.com	Canteen 2	Cavite Main Campus	2023-11-22 19:16:42

Here are the merchant staff accounts registered in the system you can select them and modify the details such as password and pin code.

Figure 26.

Guardian Accounts

#	Account Address	Status	Category	Firstname	Lastname	Email	Campus	Date Registered
1	GDNu5uJ51cB1b9	Active	Guardian	Guardian	Test	jameslayson5@gmail.com	Cavite Main Campus	2023-11-16 15:52:06
2	GDNzaC9QAEafw	Active	Guardian	Raymund	Pagonzaga	rolandvel10@gmail.com	Cavite Main Campus	2023-11-22 17:47:07



Here are the guardian accounts registered in the system you can select them and modify the details such as password and pin code.

Figure 27.

Accounting Accounts

The screenshot shows a web-based application interface for managing accounting accounts. The top navigation bar includes the college logo, the title 'San Sebastian College – Recoletos', and a 'Log out' link. The left sidebar menu is titled 'BCash' and 'BCash: Administrator' and includes links for Home, Transactions, Accounts (User Accounts, Merchant Accounts, Merchant Staffs Accounts, Guardian Accounts, Accounting Accounts, Administrator Accounts, Add Account), Cards Management, Notification, and Application. The main content area is titled 'Accounting Accounts' and displays a table with the following data:

#	Account Address	Status	Category	Firstname	Lastname	Email	Campus	Date Registered
1	ACTis0XYUayqafBx	Active	Accounting	Accounting	Test	jameslayson@gmail.com	Cavite Main Campus	2023-11-16 14:30:52
2	ACTsdekZ7ntaDg	Active	Accounting	Mark	Ahong	mark@gmail.com	Cavite Main Campus	2023-11-22 19:21:07

Here are the accounting accounts registered in the system you can select them and modify the details such as password and pin code.

Figure 28.

Administrator Accounts

The screenshot shows a web-based application interface for managing administrator accounts. The top navigation bar includes the college logo, the title 'San Sebastian College – Recoletos', and a 'Log out' link. The left sidebar menu is titled 'BCash' and 'BCash: Administrator' and includes links for Home, Transactions, Accounts (User Accounts, Merchant Accounts, Merchant Staffs Accounts, Guardian Accounts, Accounting Accounts, Administrator Accounts, Add Account), Cards Management, Notification, and Application. The main content area is titled 'Administrator Accounts' and displays a table with the following data:

#	Account Address	Status	Category	Firstname	Lastname	Email	Campus	Date Registered
1	ADM000000000000	Active	Administrator	Administrator	Testing	jameslayson@gmail.com	Cavite Main Campus	2023-10-18 00:41:10



Here are the administrator accounts registered in the system you can select them and modify the details such as password and pin code.

Figure 29.

Add an account form

The screenshot shows the 'Add Account' form in the BCash application. The form is titled 'Add Account' and contains the following fields: Firstname, Lastname, Email, Actor Category (a dropdown menu), Username, and Password. There is also an 'Add Account' button at the bottom. The background shows the BCash application interface with a sidebar menu for Accounts, User Accounts, Merchant Accounts, and so on.

This is the 'Add Account' form. Fill in the required details and select the account category

Figure 30.

Cards management

The screenshot shows the 'Cards Management' section in the BCash application. The table has the following columns: #, Card Address, Status, User Address, User Fristname, User Lastname, and Notes. The data is as follows:

#	Card Address	Status	User Address	User Fristname	User Lastname	Notes
1	Card1	Active	USR1K0aQ2IVa8f8P	STEPHEN	LAYSON	?
2	Card2	Active	GSTR9g0QzD7At9w	Juan	Dela Cruz	?
3	Card3	Active	USR1b7aM9hghaZ9	Roland	Pagracaga	?
4	Card4	Active	USR1nX1b6hWWy7	Miguel	Angkola	?
5	Card5	Active	?	?	?	?
6	Card6	Active	?	?	?	?
7	Card	Active	?	?	?	?

This is the card management section of the NFC card database.

Figure 31.



Announcements

This is the Announcement tab. Here, the administrator can create announcements for everyone.

Figure 32.

Application control management

This is where the administrator adjusts the settings for user roles.

Figure 33.



Profile settings for administrator

BCash: Administrator Testing

User Accounts

#	Account Address	Status
1	65171602Q09370e	Active
2	USR1UserGeVd0P	Active
3	USR1th7uM9yghzC9	Active
4	USR1yKXtAhWWn7	Active

Personal Settings

Account Address	ADM8000000000000000
Firstname	Administrator
Lastname	Testing
Category	Administrator
E-Mail	jamesdayson.0@gmail.com

Password Settings

Change Password?	<input type="checkbox"/>
New Password:	*****
Re-type New Password:	*****

Pin Code Settings

Change PIN code?	<input type="checkbox"/>
New PIN Code:	*****
Re-type New PIN Code:	*****

Confirmation

Required to apply changes.	
Current Password:	Current PIN Code:

All Activity Logs Administrators Activity Logs Activity Logs Login History Update Changes

This is where the administrator can modify account details, change passwords, and update PIN codes

Figure 34.

Notification

BCash: Administrator Testing

Notifications

Hi	Hello	2023-11-22 14:24:18
Test	12345678	2023-11-22 14:24:13

Personal Id	Campus	Date Registered
2345	Cavite Main Campus	2023-11-16 14:56:15
2010170	Cavite Main Campus	2023-11-16 14:44:25
2010182	Cavite Main Campus	2023-11-22 17:13:34
20201090	Cavite Main Campus	2023-11-22 17:14:03

In this tab, you can view announcements posted by the administrator.

Figure 35.



Homepage Accounting



This is the homepage of Accounting. You can see here the total cash in of the day and total orders from the merchant of the day and total sales in merchants of the day and total transactions today.

Figure 36.

Cash in form

The screenshot shows the 'Cash In Form' page. The left sidebar is identical to the homepage. The main form has fields for 'Id' (202010162) and 'Amount' (100). Below these is a 'Details' box showing 'Name: Roland Pagonzaga' and 'Current Balance: 2350'. A 'Confirm Transfer' button is at the bottom. To the right is a 'Recent Cash-In' table:

User	Date	Amount
Roland Pagonzaga	2023-11-27 19:29:05	₱ 3,000.00
Roland Pagonzaga	2023-11-22 16:11:59	₱ 300.00
Roland Pagonzaga	2023-11-22 17:42:03	₱ 200.00
MGH M Argelito	2023-11-22 17:41:44	₱ 200.00
Juan Dela Cruz	2023-11-18 14:58:15	₱ 100.00
STEPHEN LAYSON	2023-11-18 14:54:38	₱ 50.00
STEPHEN LAYSON	2023-11-18 14:54:29	₱ 50.00
STEPHEN LAYSON	2023-11-16 14:54:23	₱ 1,000.00

This is the Cash-In form. The accounting department will input the ID and the transfer amount; the system will verify the ID's existence and process the transaction accordingly.



Figure 37.

All transactions

#	Transaction Address	Transaction Type	Status	Sender Address	Sender Name	Receiver Address	Receiver Name	Total Amount	Timestamp	PostedBy
1	2023112212233042749654	Purchase	Paid	USRh7t4MPYhgZ9	Roland Pagonzaga	MTAxelZnfv0EHW	??	₱ 130.00	2023-11-22 19:44:29	MTAxelZnfv0EHW ?
2	2023112212233042749659	Purchase	Paid	USRh7t4MPYhgZ9	Roland Pagonzaga	MTAxelZnfv0EHW	??	₱ 105.00	2023-11-22 19:33:23	MTAxelZnfv0EHW ?
3	202311221223304274965Q	Purchase	Paid	USRh7t4MPYhgZ9	Roland Pagonzaga	MTAxelZnfv0EHW	??	₱ 105.00	2023-11-22 19:33:23	MTAxelZnfv0EHW ?
4	2023112212233042749651	Purchase	Completed	USRh7t4MPYhgZ9	Roland Pagonzaga	MTAxelZnfv0EHW	??	₱ 125.00	2023-11-22 19:31:31	MTAxelZnfv0EHW ?
5	202311221223304274965Y	Purchase	Completed	USRh7t4MPYhgZ9	Roland Pagonzaga	MTAxelZnfv0EHW	??	₱ 225.00	2023-11-22 19:30:30	MTAxelZnfv0EHW ?
6	202311221223304274965Z	Purchase	Completed	USRh7t4MPYhgZ9	Roland Pagonzaga	MTAxelZnfv0EHW	??	₱ 0.00	2023-11-22 19:30:30	MTAxelZnfv0EHW ?
7	202311221223304274965Q	Cash In	Completed	ACTeOXYUygsfSx	??	USRh7t4MPYhgZ9	Roland Pagonzaga	₱ 3,000.00	2023-11-22 19:29:05	ACTeOXYUygsfSx ?
8	2023112212233042749659	Purchase	Completed	USRh7t4MPYhgZ9	Roland Pagonzaga	MTARgSYb27p	??	₱ 0.00	2023-11-22 18:13:39	MTARgSYb27p ?
9	202311221223304274965A	Transfer	Completed	USRh7t4MPYhgZ9	Roland Pagonzaga	USRh7t4MPYhgZ9	STEPHEN LAYSON	₱ 100.00	2023-11-22 18:12:31	USRh7t4MPYhgZ9 ?
10	202311221223304274965J	Cash In	Completed	ACTeOXYUygsfSx	??	USRh7t4MPYhgZ9	Roland Pagonzaga	₱ 300.00	2023-11-22 18:11:59	ACTeOXYUygsfSx ?
11	202311221223304274965C	Purchase	Completed	USRh7t4MPYhgZ9	Roland Pagonzaga	MTARgSYb27p	??	₱ 0.00	2023-11-22 18:10:01	MTARgSYb27p ?
12	2023112212233042749656	Purchase	Completed	USRh7t4MPYhgZ9	Roland Pagonzaga	MTARgSYb27p	??	₱ 100.00	2023-11-22 18:09:09	MTARgSYb27p ?
13	202311221223304274965Y	Transfer	Completed	USRh7t4MPYhgZ9	Roland Pagonzaga	USRh7t4MPYhgZ9	Miguel Angliko	₱ 10.00	2023-11-22 18:04:47	USRh7t4MPYhgZ9 ?
14	202311221223304274965Z	Transfer	Completed	USRh7t4MPYhgZ9	Roland Pagonzaga	USRh7t4MPYhgZ9	Miguel Angliko	₱ 10.00	2023-11-22 17:43:20	USRh7t4MPYhgZ9 ?
15	202311221223304274965H	Cash In	Completed	ACTeOXYUygsfSx	??	USRh7t4MPYhgZ9	Roland Pagonzaga	₱ 200.00	2023-11-22 17:42:03	ACTeOXYUygsfSx ?
16	202311221223304274965Y	Cash In	Completed	ACTeOXYUygsfSx	??	USRh7t4MPYhgZ9	Miguel Angliko	₱ 200.00	2023-11-22 17:41:44	ACTeOXYUygsfSx ?
17	202311221223304274965V	Transfer	Completed	USRh7t4QWpVdp	STEPHEN LAYSON	GSTFg6QdQdAT9w	Juan dela Cruz	₱ 12.00	2023-11-22 03:53:07	USRh7t4QWpVdp ?
18	202311221223304274965D	Purchase	Completed	GSTFg6QdQdAT9w	Juan dela Cruz	MTAxelZnfv0EHW	??	₱ 90.00	2023-11-16 15:56:59	MTAxelZnfv0EHW ?
19	2023112212233042749659	Purchase	Completed	USRh7t4QWpVdp	STEPHEN LAYSON	MTAxelZnfv0EHW	??	₱ 20.00	2023-11-16 15:46:31	MTAxelZnfv0EHW ?
20	202311221223304274965W	Purchase	Completed	USRh7t4QWpVdp	STEPHEN LAYSON	MTAxelZnfv0EHW	??	₱ 75.00	2023-11-16 15:45:41	MTAxelZnfv0EHW ?
21	202311221223304274965Z	Purchase	Completed	USRh7t4QWpVdp	STEPHEN LAYSON	MTAxelZnfv0EHW	??	₱ 85.00	2023-11-16 15:43:30	MTAxelZnfv0EHW ?
22	202311221223304274965H	Purchase	Completed	USRh7t4QWpVdp	STEPHEN LAYSON	MTAxelZnfv0EHW	??	₱ 200.00	2023-11-16 15:15:46	MTAxelZnfv0EHW ?
23	2023112212233042749659	Purchase	Completed	USRh7t4QWpVdp	STEPHEN LAYSON	MTAxelZnfv0EHW	??	₱ 155.00	2023-11-16 15:06:48	MTAxelZnfv0EHW ?
24	202311221223304274965Q	Cash In	Completed	ACTeOXYUygsfSx	??	GSTFg6QdQdAT9w	Juan dela Cruz	₱ 100.00	2023-11-16 14:58:15	ACTeOXYUygsfSx ?
25	202311221223304274965L	Transfer	Completed	USRh7t4QWpVdp	STEPHEN LAYSON	GSTFg6QdQdAT9w	Juan dela Cruz	₱ 50.00	2023-11-16 14:57:05	USRh7t4QWpVdp ?
26	202311221223304274965G	Cash In	Completed	ACTeOXYUygsfSx	??	USRh7t4QWpVdp	STEPHEN LAYSON	₱ 50.00	2023-11-16 14:54:38	ACTeOXYUygsfSx ?

This is the list of transactions. You can customize the date range by setting the starting date

to your desired endpoint.

Figure 38.

Accounts

#	Account Address	School Personal ID	Name	Email	Status
Accounts					
1	GSTFg6QdQdAT9w	12345	Juan dela Cruz	stephenergjani@gmail.com	Active
2	USRh7t4QWpVdp	202019170	STEPHEN LAYSON	s.stephen.layson@sscr.edu	Active
3	USRh7t4MPYhgZ9	202019182	Roland Pagonzaga	s.roland.pagonzaga@sscr.edu	Active
4	USRh7t4MPYhgZ9	202019190	Miguel Angliko	s.miguel.angliko@sscr.edu	Active

Here is the list of accounts that are registered as users(Students, Guest,Staff).

Figure 39.

Add guest account



The screenshot shows the BCash Accounting system interface. On the left, a sidebar lists 'Home', 'Cash In Form', 'Transactions' (with 'Accounting Transactions' and 'All Transactions' sub-options), 'Accounts', 'Add Guest Account' (which is highlighted in orange), and 'Fund Remittance'. The main content area is titled 'Add Guest Account' and contains a form with the following fields:

- Firstname: Alfonso
- Lastname: Torres
- Email: alfonso@gmail.com
- Actor Category: Guest
- Cart Address: cards
- School Personal Id: 202010172

At the bottom right of the form is a 'Add Account' button.

Here is the add guest account form to create a guest account for guest users.

Figure 40.

Fund Remittance of the accounting

The screenshot shows the BCash Accounting system interface with the 'Fund Remittance' tab selected. The sidebar on the left is identical to Figure 40. The main content area is titled 'Fund Remittance' and shows a table of 'Recent Remittances' with the following data:

#	Date	Status	Merchant
13	1970-01-01	Waiting	MTAxDEZsFvOEiW
12	2023-11-16	Approved	MTAxDEZsFvOEiW

Below this, there are four detailed transaction reports:

- Id: 20231116085659lwRv0** (Total Sales: ₱ 600.00)

Item	Quantity	Price
Chicken Adobo	x1	₱ 50.00
Beef Kare-Kare	x1	₱ 40.00
Vegetable Curry	x1	₱ 55.00
Sisigang na Baboy	x1	₱ 60.00
Chicharon Dynamite	x1	₱ 40.00
Lumpia	x1	₱ 20.00
Hongdog Sandwich	x1	₱ 20.00
Sisig	x1	₱ 15.00
Mountain Dew	x1	₱ 15.00
Mineral Water	x1	₱ 15.00
Coke Mismo	x1	₱ 15.00
Sprite	x1	₱ 15.00
- Id: 20231122111001m8qnE3** (Total Sales: ₱ 80.00)

Item	Quantity	Price
Beef Kare-Kare	x1	₱ 60.00
Mountain Dew	x1	₱ 20.00
- Id: 20231122123009HD9x7d** (Total Sales: ₱ 80.00)

Item	Quantity	Price
Mineral Water	x1	₱ 15.00
Royal	x1	₱ 20.00
Stopao	x1	₱ 45.00
- Id: 20231122123008HSYB0r** (Total Sales: ₱ 225.00)

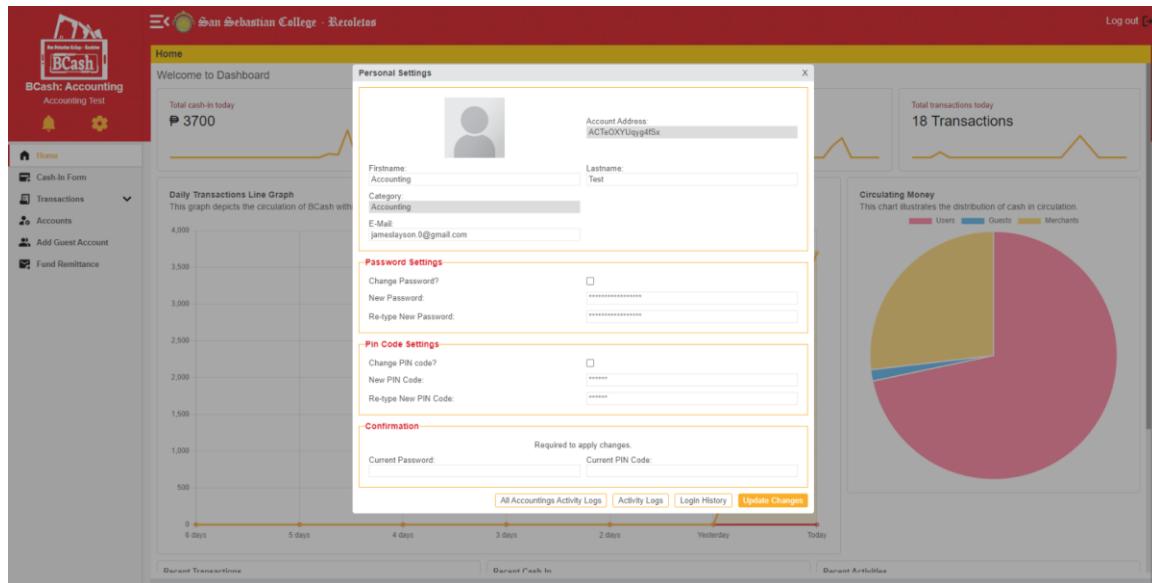
Item	Quantity	Price
Vegetable Curry	x1	₱ 50.00
Hongdog Sandwich	x1	₱ 50.00
Mountain Dew	x1	₱ 20.00
Sisigang na Baboy	x1	₱ 100.00
- Id: 202311221231241JHyG1** (Total Sales: ₱ 125.00)

Item	Quantity	Price
Lumpia	x1	₱ 20.00
Sisig	x1	₱ 45.00

Here is the fund remittance tab where in the accounting receives the reports of the merchants and has the authority to reject or approve remittances.

Figure 41.

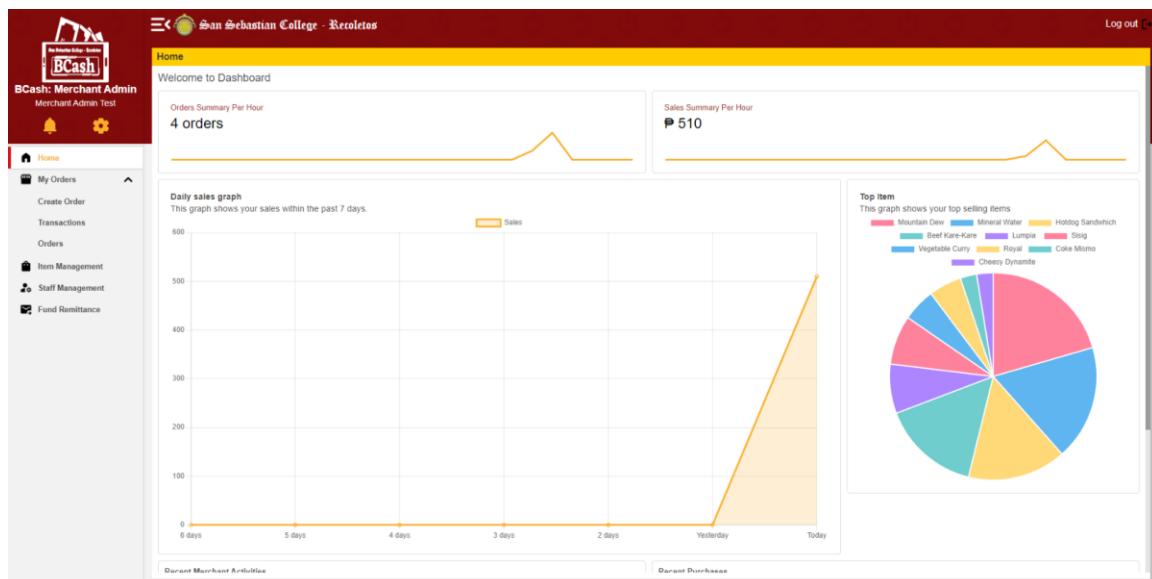
Profile settings for accounting



This is where the accounting modifies its account details and changes password and pin code.

Figure 42.

Homepage of Merchant Admin



This is the homepage of the merchant admin where you can see the orders summary per hour and sales summary per hour.

Figure 43.

Create order of the merchant admin



BCash: Merchant Admin Merchant Admin Test

Create Order

Category: Rice Meals Snacks Drinks

Item	Cost	Quantity
Brief Kare-Kare	₱60.00	1
Fishball	₱10.00	1
Kwek Kwek	₱25.00	1
Pork Adobo	₱80.00	1
Siopao	₱45.00	1
Cheesy Dynamite	₱20.00	1
French Fries	₱40.00	1
Lumpia	₱20.00	1
Sisig	₱45.00	1
Chicken Adobo	₱50.00	1
Fried Noodles	₱50.00	1
Mineral Water	₱15.00	1
Sprite	₱15.00	1
Coke Minimo	₱15.00	1
Hotdog Sandwich	₱50.00	1
Mountain Dew	₱20.00	1
Sinigang na baboy	₱80.00	1
Sinigang na baka	₱100.00	1
Vegetable Curry	₱65.00	1

Order:

Item	Cost	Quantity
Fried Noodles	₱50.00	1
French Fries	₱40.00	1
Lumpia	₱20.00	1
Mineral Water	₱15.00	1

Quantity: 4 Subtotal: ₱105.00 Discount: ₱ 0.00 Total: ₱105.00

Place Order

This is the create order tab where the merchant admin inputs the order of the user and places order to be paid by the user.

Figure 44.

Transactions of the merchant admin

BCash: Merchant Admin Merchant Admin Test

Transactions

#	Transaction Address	Transaction Type	Status	Sender Address	Sender Name	Receiver Address	Receiver Name	Total Amount	Timestamp	PostedBy
1	2023112212112414HyG1	Purchase	Completed	USR9t7eMP4ghzZ9	Roland Pagonza	MTAxdeZzFv0EBnW	??	₱ 125.00	2023-11-22 19:31:24	MTAxdeZzFv0EBnW
2	20231122121303MHSYB0x	Purchase	Completed	USR9t7eMP4ghzZ9	Roland Pagonza	MTAxdeZzFv0EBnW	??	₱ 225.00	2023-11-22 19:30:38	MTAxdeZzFv0EBnW
3	202311221230060927z	Purchase	Completed	USR9t7eMP4ghzZ9	Roland Pagonza	MTAxdeZzFv0EBnW	??	₱ 80.00	2023-11-22 19:30:09	MTAxdeZzFv0EBnW
4	202311221211007mfpnE	Purchase	Completed	USR9t7eMP4ghzZ9	Roland Pagonza	MTAxdeZzFv0EBnW	??	₱ 80.00	2023-11-22 18:10:01	MTAxdeZzFv0EBnW

This is where the transaction logs are stored.



Figure 45.

Orders of merchant admin

The screenshot shows the 'Orders' section of the BCash Merchant Admin interface. It displays two separate order entries. Each entry includes a reference number, customer name, amount, and a list of items with their names and quantities. There are two 'Mark As Complete' buttons, one for each order.

Ref. No.	Name	Amount
20231122123301M3ZjQ	Roland Pagonzaga	P 105.00
20231122123333cB71Kp	Roland Pagonzaga	P 105.00

Name	Quantity
Lumpia	x1
Mineral Water	x1
Fried Noodles	x1
French Fries	x1

Name	Quantity
Beef Tapa	x1
Mineral Water	x1
Fried Noodles	x1
French Fries	x1

This is where the orders waiting to be processed and marked as complete by the merchant.

Figure 46.

Item management of merchant admin

The screenshot shows the 'Item Management' section of the BCash Merchant Admin interface. It lists various food and drink items categorized into Rice Meals, Snacks, and Drinks. Each item has a checkbox next to it, likely for selecting multiple items. The items are arranged in a grid format.

Category	Item	Cost
Rice Meals	Beef Kare-Kare	P 60
	Fishball	P 10
	Kwek Kwek	P 25
	Pork Adobo	P 80
	Siopao	P 45
Snacks	Cheesy Dynamite	P 20
	French Fries	P 40
	Lumpia	P 20
	Royal	P 20
	Sisig	P 45
Drinks	Chicken Adobo	P 50
	Fried Noodles	P 30
	Mineral Water	P 15
	Singgang na baboy	P 80
	Sprite	P 15
	Coke Mismo	P 15
	Hotdog Sandwich	P 50
	Mountain Dew	P 20
	Singgang na baka	P 100
	Vegetable Curry	P 55



This is the item management you can add, remove, rename items depending on what the merchant offers in its merchandise.

Figure 47.

Staff management of merchant admin

#	Status	UserId	Username	Firstname	Lastname
1	Active	MT552490YCJdJh	merchantstaff	Merchant Staff	Test
2	Active	MT5B2AUUm4BwCLc	ochim	Ochim	Divad

This is the staff management the merchant admin manages the staff working under the merchant admin.

Figure 48.

Fund remittance of merchant admin

#	Date	Status	Merchant
12	2023-11-16	Approved	MT5B2AUUm4BwCLc

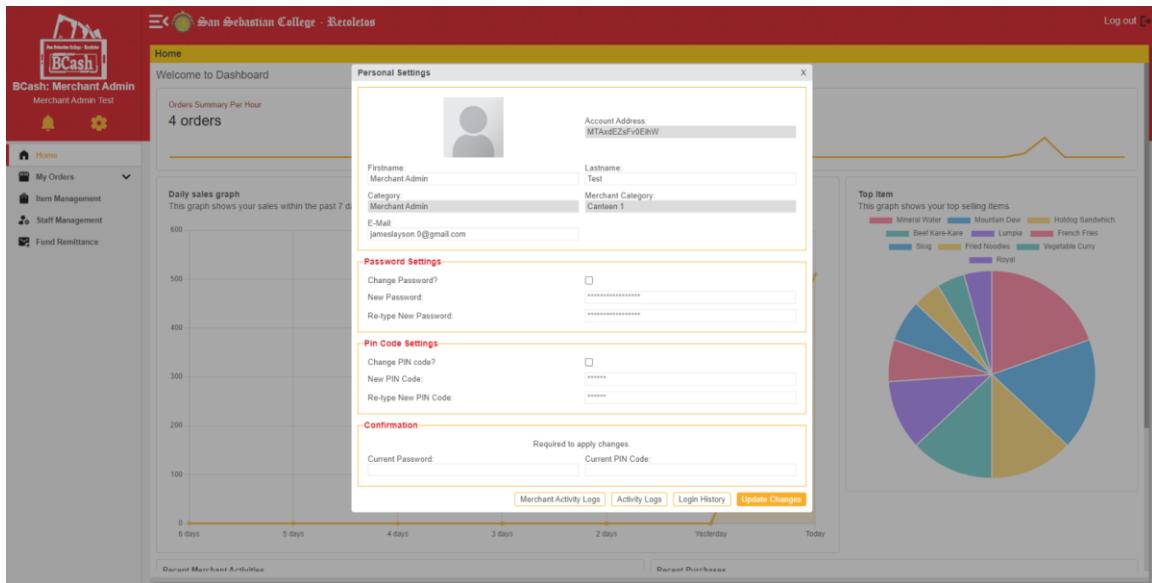
Details																																								
Today Orders: 5	Today Sales: ₱ 600.00																																							
<p>Id: 202311160856598wRvC</p> <table border="1"> <thead> <tr> <th colspan="2">Items</th> <th>Total: ₱ 50.00</th> </tr> </thead> <tbody> <tr> <td>x1</td> <td>Chicken Adobo</td> <td>₱ 50.00</td> </tr> <tr> <td>x1</td> <td>Beef Kare-Kare</td> <td>₱ 50.00</td> </tr> <tr> <td>x1</td> <td>Vegetable Curry</td> <td>₱ 55.00</td> </tr> <tr> <td>x1</td> <td>Sisigang na baboy</td> <td>₱ 60.00</td> </tr> <tr> <td>x1</td> <td>Chicken Dynamite</td> <td>₱ 60.00</td> </tr> <tr> <td>x1</td> <td>Lumpia</td> <td>₱ 20.00</td> </tr> <tr> <td>x1</td> <td>Hongdog Sandwich</td> <td>₱ 20.00</td> </tr> <tr> <td>x1</td> <td>Steak</td> <td>₱ 15.00</td> </tr> <tr> <td>x1</td> <td>Mountain Dew</td> <td>₱ 15.00</td> </tr> <tr> <td>x1</td> <td>Mineral Water</td> <td>₱ 15.00</td> </tr> <tr> <td>x1</td> <td>Coke Meso</td> <td>₱ 15.00</td> </tr> <tr> <td>x1</td> <td>Sprite</td> <td>₱ 15.00</td> </tr> </tbody> </table>		Items		Total: ₱ 50.00	x1	Chicken Adobo	₱ 50.00	x1	Beef Kare-Kare	₱ 50.00	x1	Vegetable Curry	₱ 55.00	x1	Sisigang na baboy	₱ 60.00	x1	Chicken Dynamite	₱ 60.00	x1	Lumpia	₱ 20.00	x1	Hongdog Sandwich	₱ 20.00	x1	Steak	₱ 15.00	x1	Mountain Dew	₱ 15.00	x1	Mineral Water	₱ 15.00	x1	Coke Meso	₱ 15.00	x1	Sprite	₱ 15.00
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x1	Sprite	₱ 15.00																																						
<p>Id: 20231122111001m8qneG3</p> <table border="1"> <thead> <tr> <th colspan="2">Items</th> <th>Total: ₱ 60.00</th> </tr> </thead> <tbody> <tr> <td>x1</td> <td>Beef Kare-Kare</td> <td>₱ 60.00</td> </tr> <tr> <td>x1</td> <td>Mountain Dew</td> <td>₱ 20.00</td> </tr> </tbody> </table>		Items		Total: ₱ 60.00	x1	Beef Kare-Kare	₱ 60.00	x1	Mountain Dew	₱ 20.00																														
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x1	Mountain Dew	₱ 20.00																																						
<p>Id: 20231122120009HD9z7d</p> <table border="1"> <thead> <tr> <th colspan="2">Items</th> <th>Total: ₱ 80.00</th> </tr> </thead> <tbody> <tr> <td>x1</td> <td>Mineral Water</td> <td>₱ 15.00</td> </tr> <tr> <td>x1</td> <td>Royal</td> <td>₱ 20.00</td> </tr> <tr> <td>x1</td> <td>Stopao</td> <td>₱ 45.00</td> </tr> </tbody> </table>		Items		Total: ₱ 80.00	x1	Mineral Water	₱ 15.00	x1	Royal	₱ 20.00	x1	Stopao	₱ 45.00																											
Items		Total: ₱ 80.00																																						
x1	Mineral Water	₱ 15.00																																						
x1	Royal	₱ 20.00																																						
x1	Stopao	₱ 45.00																																						
<p>Id: 20231122123008HSY80R</p> <table border="1"> <thead> <tr> <th colspan="2">Items</th> <th>Total: ₱ 225.00</th> </tr> </thead> <tbody> <tr> <td>x1</td> <td>Vegetable Curry</td> <td>₱ 65.00</td> </tr> <tr> <td>x1</td> <td>Hongdog Sandwich</td> <td>₱ 50.00</td> </tr> <tr> <td>x1</td> <td>Mountain Dew</td> <td>₱ 20.00</td> </tr> <tr> <td>x1</td> <td>Sisigang na babak</td> <td>₱ 100.00</td> </tr> </tbody> </table>		Items		Total: ₱ 225.00	x1	Vegetable Curry	₱ 65.00	x1	Hongdog Sandwich	₱ 50.00	x1	Mountain Dew	₱ 20.00	x1	Sisigang na babak	₱ 100.00																								
Items		Total: ₱ 225.00																																						
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<p>Id: 202311221231241JHyG1</p> <table border="1"> <thead> <tr> <th colspan="2">Items</th> <th>Total: ₱ 125.00</th> </tr> </thead> <tbody> <tr> <td>x1</td> <td>Lumpia</td> <td>₱ 20.00</td> </tr> <tr> <td>x1</td> <td>Steak</td> <td>₱ 45.00</td> </tr> </tbody> </table>		Items		Total: ₱ 125.00	x1	Lumpia	₱ 20.00	x1	Steak	₱ 45.00																														
Items		Total: ₱ 125.00																																						
x1	Lumpia	₱ 20.00																																						
x1	Steak	₱ 45.00																																						

This is the fund remittance the merchant admin submits the remittances to the accounting.



Figure 49.

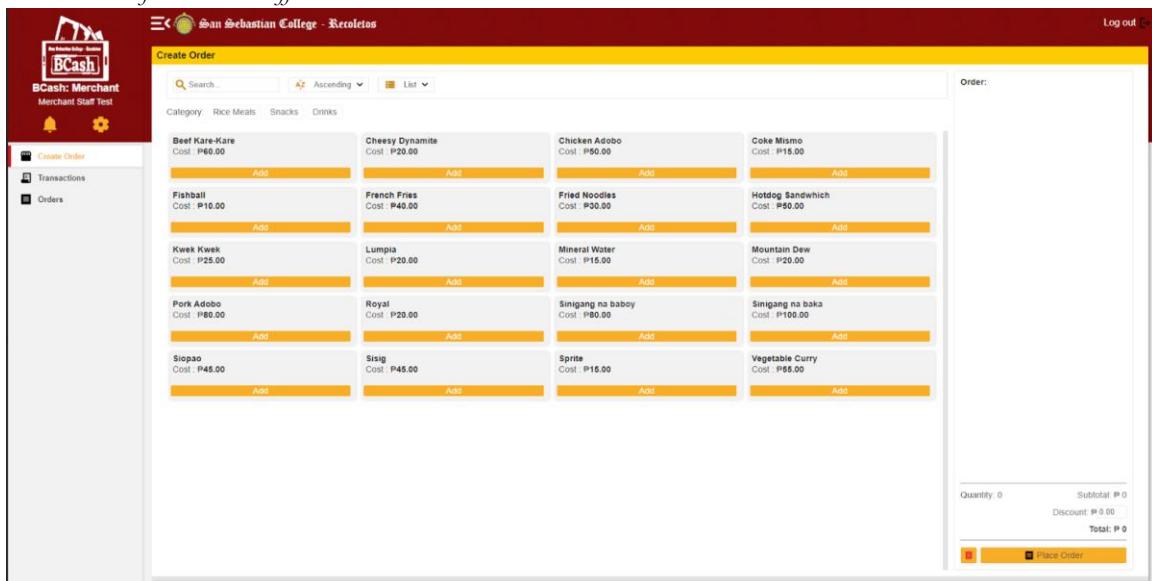
Profile settings of merchant admin



This is where the merchant admin modifies its account details and changes password and pin code.

Figure 50.

Create order of merchant staff



This is the create order tab where the merchant staff inputs the order of the user and places order to be paid by the user.



Figure 51.

Transactions of merchant staff

San Sebastian College - Recoletos												Log out	
Transactions													
Start Date 22/11/2023		End Date 22/11/2023		Transaction Number		Search Name		Status Filter			All		
Search	Clear												
#	Transaction Address	Transaction Type	Status	Sender Address	Sender Name	Receiver Address	Receiver Name	Total Amount	Timestamp	PostedBy			
1	20231122123323e8d79e	Purchase	Paid	USRh7eMfAghz29	Roland Pagonzaga	MTAvdEZsFv0EhNW	??	₱ 105.00	2023-11-22 19:33:23	MTAvdEZsFv0EhNW	?		
2	20231122123309Mf5209	Purchase	Paid	USRh7eMfAghz29	Roland Pagonzaga	MTAvdEZsFv0EhNW	??	₱ 105.00	2023-11-22 19:33:01	MTAvdEZsFv0EhNW	?		
3	202311221231231h6c03	Purchase	Completed	USRh7eMfAghz29	Roland Pagonzaga	MTAvdEZsFv0EhNW	??	₱ 125.00	2023-11-22 19:31:24	MTAvdEZsFv0EhNW	?		
4	20231122123039eCY0k	Purchase	Completed	USRh7eMfAghz29	Roland Pagonzaga	MTAvdEZsFv0EhNW	??	₱ 225.00	2023-11-22 19:30:38	MTAvdEZsFv0EhNW	?		
5	20231122123099h09e7d	Purchase	Completed	USRh7eMfAghz29	Roland Pagonzaga	MTAvdEZsFv0EhNW	??	₱ 80.00	2023-11-22 19:30:09	MTAvdEZsFv0EhNW	?		
6	202311221231091m0gE53	Purchase	Completed	USRh7eMfAghz29	Roland Pagonzaga	MTAvdEZsFv0EhNW	??	₱ 80.00	2023-11-22 18:10:01	MTAvdEZsFv0EhNW	?		

This is where the transaction logs are stored.

Figure 52.

Orders of merchant staff



BCash: Merchant
Merchant Staff Test

Log out 

Orders

Name	Quantity
Lumpia	x1
Mineral Water	x1
Fried Noodles	x1
French Fries	x1

Time: 19:33 [Mark As Complete](#)

Name	Quantity
Lumpia	x1
Mineral Water	x1
Fried Noodles	x1
French Fries	x1

Time: 19:33 [Mark As Complete](#)

 Create Order
 Transactions
 Orders

staff.



Figure 53.

Profile settings of merchant staff

This is where the merchant staff modifies its account details and changes password and pin code.

The Assessment of Users on BCash Application

Based on the User Acceptable Test conducted, here are the findings:

Criteria	I.T Expert (Mobile App) (3)		I.T Expert (Web App) (3)		Administrator (1)		Accounting (1)	
	Mean	Interpretation	Mean	Interpretation	Mean	Interpretation	Mean	Interpretation
FUNCTIONALITY	3.00	Agree	3.21	Agree	3.67	Agree	3.00	Agree
PERFORMANCE EFFICIENCY	3.00	Agree	3.17	Agree	3.00	Agree	3.00	Agree
COMPATIBILITY	2.67	Disagree	3.00	Agree	3.00	Agree	3.00	Agree
USABILITY	3.00	Agree	2.67	Disagree	3.00	Agree	3.00	Agree
RELIABILITY	3.00	Agree	3.00	Agree	3.00	Agree	3.00	Agree
SECURITY	3.22	Agree	3.00	Agree	3.00	Agree	3.00	Agree
MAINTAINABILITY	N/A	N/A	3.00	Agree	3.00	Agree	N/A	N/A
Total Composite Mean	3.03	Agree	3.07	Agree	3.17	Agree	3.00	Agree

Merchant Admin (1)		Guardian (7)		User (Students, Staff, Guest) (82)		Total (95)	
Mean	Interpretation	Mean	Interpretation	Mean	Interpretation	Overall Composite Mean	Interpretation
4.00	Strongly Agree	3.57	Agree	3.61	Agree	3.44	Agree
3.00	Agree	3.43	Agree	3.61	Agree	3.17	Agree
4.00	Strongly Agree	3.29	Agree	3.61	Agree	3.22	Agree
3.50	Agree	3.64	Agree	3.65	Agree	3.21	Agree
3.00	Agree	3.43	Agree	3.65	Agree	3.15	Agree
3.67	Agree	3.67	Agree	3.65	Agree	3.32	Agree
N/A	N/A	N/A	N/A	N/A	N/A	3.00	Agree
3.27	Agree	3.56	Agree	3.63	Agree	3.24	Agree



The table presents a summary of the results of the User Acceptance Test (UAT) conducted to assess the overall feature and quality of the BCash E-wallet System. The testing adhered to ISO 9126 standards, with criteria including Functionality, Performance Efficiency, Compatibility, Usability, Reliability, Security, and Maintainability (tested only by IT Experts and the Administrator). Ninety-five evaluators were randomly selected, comprising 3 IT Experts, 1 Administrator, 1 Accounting professional, 1 Merchant Admin, 7 Guardians/Parents, and 82 Users (Students, Staff, Guests).

Firstly, three IT experts assessed the mobile application, resulting in varying composite means across different criteria: Functionality (3.00), Performance Efficiency (3.00), Compatibility (2.67), Usability (3.00), Reliability (3.00), and Security (3.22). This led to an overall rating of 'Agree' for the application. Notably, the Compatibility score was lower due to issues with iOS devices, prompting the developers to create a web application for IOS users and still accessible for android users that do not have the application.

Secondly, three IT experts evaluated the web application, yielding varying composite means across criteria: Functionality (3.21), Performance Efficiency (3.17), Compatibility (3.00), Usability (2.67), Reliability (3.00), Security (3.00), and Maintainability (3.00). This resulted in an overall rating of 'Agree' for the application. The Usability score was lower due to help function issues, leading the developers to incorporate FAQs.

Thirdly, one Administrator evaluated the web application for Administrator Accounts, with varying composite means across criteria: Functionality (3.67), Performance Efficiency (3.00), Compatibility (3.00), Usability (3.00), Reliability (3.00), Security (3.00), and Maintainability (3.00). The Administrator's evaluation rated the application as "Agree," indicating that it meets expected standards and is generally satisfactory.

Fourth, an accounting professional evaluated the web application for accounting, resulting in an overall rating of 3.00, indicating satisfaction. However, suggestions were made to enhance the system, such as direct system connection to a cash register and receipt printer, and integration of the SSC-RdC new theme color.



Fifth, a Merchant Admin evaluated the web application for managing the canteen, with varying composite means: Functionality (4.00), Performance Efficiency (3.00), Compatibility (4.00), Usability (3.50), Reliability (3.00), and Security (3.67). The overall rating was "Agree," but the Merchant Administrator suggested implementing inventory management for menu food items.

Sixth, seven Guardians/Parents evaluated the mobile app, providing average ratings of 3.57 for functionality, 3.43 for performance efficiency, 3.29 for compatibility, 3.64 for usability, 3.43 for reliability, and 3.67 for security. The overall rating was "Agree," indicating positive reception.

Lastly, 82 users evaluated the mobile application with composite means as follows: Functionality (3.61), Performance Efficiency (3.61), Compatibility (3.61), Usability (3.65), Reliability (3.65), and Security (3.65). The overall user assessment resulted in an "Agree" rating, reflecting a generally positive reception across various aspects.

After calculating all composite means, the overall composite mean is (3.24), which translates to 'Agree.' This indicates that the developed system will be especially helpful for the client, particularly the Canteen and Accounting office, with scores of (3.27) and (3.00) respectively. The results suggest that the system performs well in terms of functional suitability, security, compatibility, and usability. However, criteria such as performance efficiency, reliability, and maintainability indicate that there is room for improvement. In conclusion, the team is satisfied with the testing results.

Implementation Issues

A. Hardware and Software Requirements

Table 42.
Web and Internet Requirement

Internet Bandwidth	Minimum	Recommended
Mobile Data	500 kbps	≥ 2 mbps
Mobile Internet	500 kbps	≥ 2 mbps

**Table 43.***Supported Web Browser*

Browsers	Minimum	Recommended
Chrome	23	122
Edge	12	119
Safari	6	17.2
Firefox	21	122
Opera	15	103

Table 44.*Supported Mobile Operating System*

System	Minimum	Recommended
Android	Android 7 “Nougat”	Android 11 “Red Velvet Cake”
iOS	N/A	N/A

Table 45.*Hardware Requirement for Web Application*

Hardware	Minimum	Recommended
Processor	Single Core	Dual Core
Storage	10mb	>=20mb
RAM	1gb	2gb
NFC Reader (optional)	125kHz	13.56 MHz

Table 46.*Hardware Requirement for Mobile Application*

Hardware	Minimum	Recommended
Processor	Dual Core	QuadCore
Storage	32gb	>=20mb
RAM	1gb	2gb



B. Installation and Initialization of the Application

Accessing the BCash mobile application involves following a series of steps.

1. Ensure your device is connected to the internet.
2. If don't have a QR Scanner installed, download a QR code scanner app from your device's app store.
3. Scan the QR code provided to download the application.
4. Launch the application you just downloaded.
5. If you are a student or staff member, sign in using your SSCR email.
6. For guest or guardian accounts, sign in using the specified dedicated email.
7. If you face any difficulties during the sign-in process, reach out to the CICT department for assistance.
8. Once signed in, you're all set to explore and use the application's features.

Accessing the BCash web application involves following a series of steps.

1. Ensure your device is connected to the internet.
2. Launch your device's web browser (e.g., Chrome, Firefox, Safari).
3. Type the provided URL for BCash into the browser's address bar and press Enter.
4. For Administrators, use the default email address and password provided for administrative access.
5. For Accounting, Merchant Admin and Staff should utilize the dedicated email and password assigned by the Administrator for their sign-in.
6. If facing any login difficulties. Reach out to the CICT department for assistance.
7. Upon successful login, Administrators can oversee administrative tasks, while other users can perform transactions or operations within BCash.



C. Training

The developers will schedule and conduct seminars to explain how the BCash system works, breaking down its internal processes and application components. To aid in understanding, developers will provide comprehensive documentation for BCash, offering insights into internal processes and settings. This documentation serves as a valuable resource for future developers, facilitating their comprehension of the application's intricacies.

In addition to documentation, developers will deliver a clear and informative video presentation demonstrating how to navigate within the BCash application. This visual guide aims to enhance the learning experience, providing a practical overview of the application's functionalities.

The BCash application is designed with a layout that aligns with current industry standards, ensuring a familiar interface for users. This design choice is intentional, aiming to minimize the learning curve for clients. Developers believe that a simple layout, with clearly displayed text and information, contributes to a user-friendly experience, making it easier for clients to understand and interact with the application. This approach reflects the developers' commitment to creating an accessible and user-centric application.

D. Data Management

BCash relies on MySQL as its database, and access to the database requires login credentials. However, accessing the database is strongly discouraged by BCash developers to maintain data integrity. Any alteration, particularly in balances, prompts the system to automatically halt its processes to prevent the circulation of inconsistent data.

In terms of database security, only authorized database personnel should have access to the credentials. BCash emphasizes robust access controls, encryption measures, and regular security audits. Staying updated on security best practices is crucial, and prompt application of patches is prioritized to address potential vulnerabilities.



Regarding data privacy, BCash utilizes public information from Google for fields such as Full name, profile images, SSCR, and email. Passwords and PINs are hashed to enhance data security.

To ensure data quality, BCash employs normalization in some tables to prevent inconsistent data in the database, promoting data integrity. While this approach results in a more complex database structure and queries, the developers prioritize data quality. Implementing data validation processes before saving data in the database further contributes to maintaining high data quality standards.

For scalability and performance, BCash focuses on optimizing database queries by implementing standard practices. This approach ensures efficient and effective handling of increasing data volumes without compromising system performance.

In summary, BCash places a strong emphasis on database security, data privacy, quality, scalability, and performance to provide a robust and reliable financial application. The developers prioritize maintaining data integrity and implementing stringent security measures to safeguard accounts information.

E. Maintenance

In the maintenance phase, post-handover to the school's Center for Information and Communication Technology (CICT), the collaborative efforts between CICT administrators and the project development team extend to keeping the BCash application in optimal condition. Developers take proactive measures, ensuring the software is consistently up to date, implementing routine updates to address evolving challenges encountered by users. This approach not only involves resolving bugs but also includes incorporating frequent updates to address new issues reported by users, thereby enhancing the application's functionality.

The development team is committed to maintaining the system's continuous activity, employing preventive measures to avert potential problems. Through regular updates and vigilant oversight, developers aim to preemptively address issues, ensuring the BCash application remains active and resilient against unforeseen challenges. This commitment to ongoing improvement and



proactive maintenance underscores the developers' dedication to delivering a robust and reliable system for the benefit of its users.

F. Backup and Recovery

In the context of Backup and Recovery for the BCash application, the development team adopts a meticulous approach to safeguard both the database and codebase. They implement a manual export process for daily database backups, ensuring a comprehensive snapshot is taken each day. The decision to use the date as the filename not only simplifies identification but also establishes a chronological record of backups, enhancing traceability.

Simultaneously, the codebase undergoes continuous protection through the use of version control systems like GIT. This practice ensures that an updated copy of the files is always available. GIT's versioning capabilities not only aid in separating development and updates but also enable the retrieval of specific code versions in case of unexpected issues.

This dual strategy, encompassing daily manual database exports and version-controlled codebase management, lays a robust foundation for the BCash application's Backup and Recovery procedures. It reflects the team's commitment to addressing potential challenges in data and code protection, providing a systematic and organized approach to handling unforeseen situations.

G. Performance Optimization

The BCash development team encountered a notable learning curve associated with integrating APIs and comprehending their intricacies. The process of understanding API functionality, endpoints, and data transfer mechanisms posed an initial challenge. However, the team recognized the long-term benefits, including code efficiency and reduced redundancy, outweighing the initial learning investment.

The decision to embrace a single-page application (SPA) architecture introduced its own set of challenges to the codebase. Maintaining a cohesive and organized code structure within a single page



can be intricate, particularly as the application grows in complexity. However, the developers, acknowledging this challenge, strategically prioritized navigation speed after the initial load. This emphasis on user experience and speed informed their design decisions, ensuring that the advantages of reduced loading times during navigation outweighed the challenges associated with managing a single-page codebase.

The team's deliberate focus on addressing these challenges reflects a commitment to delivering an optimized and efficient application. By overcoming the learning curve of API integration and strategically managing the complexities of a single-page architecture, the developers aimed to strike a balance between functionality and user experience, ultimately enhancing the overall performance of the web and mobile applications.

H. Database Operations

The BCash developers implemented database transactions, ensuring the precise execution of all data changes, insertions, or updates before committing. This approach, designed to fortify application stability in the face of interruptions and internet failures, reflects a commitment to unwavering data integrity.

Guided by CodeIgniter 3's query builder, the developers harnessed its full potential by adhering rigorously to the framework's documentation. This not only streamlined database interactions but also exemplified a dedication to industry best practices, enhancing code maintainability and readability. The conscientious use of CodeIgniter's query builder strengthened data integrity, guaranteeing the completion of updates before finalizing transactions and mitigating the risk of introducing false or incomplete data into the database.

I. Security

BCash primarily utilizes APIs or HTTP requests for data transfer between clients and the server. The web application employs a single-page architecture where all components are loaded



initially, and subsequent API calls dynamically modify the appearance of the web page. The connection in the mobile application is also established through APIs.

On the server side, each client request undergoes thorough input sanitization, treating each API call as a new request. Before processing, headers are scrutinized to validate the account address, authentication token, IP address, device used, location, and intent. Once the authentication token is validated, the server assigns specific roles to the account, ensuring that each API call is routed to its designated set of functions. Strict role enforcement prevents accounts from accessing functions that are not associated with their roles.

For mobile users, BCash utilizes Google login. Developers use the SSCR email to simplify account management and eliminate complications. The token from Google authentication is transmitted to the server, which validates it with the Google authentication service before proceeding with the login request and providing necessary details.

During both login and active sessions, the system continually records and checks the client's IP address, device used, and location. If these details do not match any saved information, the system prompts the user to input an OTP code, sent to their email, for further verification. Additionally, if the client is logged in and the IP address changes while active, BCash enforces strict security protocols by automatically signing them out.

To enhance security, authentication tokens expire every 5 minutes of inactivity, prompting the account to log in again. This measure ensures that only authorized accounts have prolonged access to the system. Throughout this entire process, BCash development team places a high priority on ensuring the safety and security of the data handled online, implementing robust security measures to protect user information.

Enhancing security further, BCash incorporates activity logs to monitor all accounts actions and system events, serving as an audit trail and meeting compliance requirements. To prevent accidental transfers, the application requires whitelisted accounts for fund transfers, adding an extra



layer of verification. This multi-layered approach underscores BCash commitment to transparency, accountability, and the safeguarding of user data.

J. New Canteen Payment Procedures

Below will be the new payment procedures in the Canteen:

1. Kindly visit the accounting department to add funds to your account. This balance will be used for your transactions at the canteen.
2. Go to the canteen to purchase an order.
3. In the event of dissatisfaction with the food, you have the option to request a refund at the accounting department.
4. Scan the provided QR code or tap your ID at the cashier before confirming your order.
5. Upon scanning the QR code or tapping your ID, you'll receive a confirmation receipt displaying the details of your order.
6. Click 'confirm' to finalize your transaction, receiving a final receipt for your order.
7. Lastly, wait for your order to be prepared and delivered to you.

K. Third Party Integrations

1. Google Auth:

- *Integration Purpose:* Facilitates user authentication through Google accounts.
- *Implementation Considerations:* The development team incorporated Google Auth for validating mobile accounts, including users such as students, guests, staff, and guardians, as they sign in to the application.

2. Google QR Scanner:

- *Integration Purpose:* Incorporates QR code scanning functionality into the application.
- *Implementation Considerations:* Utilized for QR scanning, the developers integrated this feature for purchasing at merchants, serving as a counterpart to the NFC reader.

3. Chart.js:



- *Integration Purpose:* Enhances the application with interactive and visually appealing charts.
- *Implementation Considerations:* Integrated into the web application accounts, such as administrators, accounting, and merchant admin, to display graphs and charts for better data visualization.

4. Picasso:

- *Integration Purpose:* Streamlines the loading and caching of images in the Android app.
- *Implementation Considerations:* Integrated into the Android application, Picasso optimizes image rendering using links within the app, providing an enhanced user experience.

5. OkHttp:

- *Integration Purpose:* Provides a reliable HTTP client for network requests in the Android app.
- *Implementation Considerations:* The Android app utilizes OkHttp to establish connections with the server. OkHttp serves as the bridge for communication between the mobile client and the server.

6. Elastic Email:

- *Integration Purpose:* Enables the use of Elastic Email as the external SMTP server for email sending.
- *Implementation Considerations:* Elastic Email is employed by the developers as the SMTP server for sending OTP codes to user accounts, ensuring secure and efficient email communication.

7. NFC Reader:

- *Integration Purpose:* Enables communication with NFC-enabled devices, enhancing the application's functionality.



- *Implementation Considerations:* Used for reading the CID cards of users, including students, staff, and guests. It serves as a fast and efficient scanning solution, particularly in merchant purchasing, acting as a counterpart to QR codes.

L. Payment Platform

The possibility of collaborating with external payment platforms like GCash was discussed. However, concerns emerged regarding supplementary charges linked to these platforms and the willingness of students to bear such costs.

The Benefits of Implementing BCash Application

The introduction of the BCash application at the San Sebastian - Recoletos de Cavite canteen signifies a notable departure from the current coin chip system. Unlike coin chips, which often result in queues forming during peak hours, BCash streamlines operations, ensuring effective financial tracking. The implementation of BCash leads to expedited transactions, contributing to a more seamless and efficient process for both students and staff. This advancement not only reduces wait times but also grants individuals more time to savor their meals or breaks, thereby enhancing the overall dining experience. By automating transactions, BCash mitigates errors and improves financial accuracy, representing a significant improvement over the manual handling required with coin chips. Its adaptability and scalability further allow for future changes or expansions. Ultimately, when compared to the coin chip system, BCash significantly elevates customer satisfaction, greatly enhancing the canteen experience for the SSC-RdC community.

The new system at the San Sebastian Recoletos-De Cavite canteen introduces several positive changes. One major advantage is its ability to enhance the canteen's financial management and provide greater clarity in transactions. This system simplifies the tracking of financial transactions, ensuring accuracy in monetary matters. For students and staff, it resolves the issue of long queues, offering a



quicker and more efficient process, particularly during busy periods. Students no longer need to endure multiple waits in line, contributing to an overall expedited experience. The BCash application not only modernizes transaction processes but also holds the promise of significantly improving customer satisfaction in comparison to the coin chip system, thereby transforming the canteen experience for the SSC-RdC community. Additionally, unlike coin chips, BCash helps prevent the loss of coins, adding an extra layer of security to the financial transactions.



Chapter V

SUMMARY, CONCLUSION, AND RECOMMENDATION

Summary

In the current school canteen payment system, students use a manual coin chip method without receipts, relying on cash reconciliation by cashiers. The survey reveals a mixed satisfaction level with financial transactions, while a majority of students bring gadgets and are familiar with e-wallets. Recognizing the need for improvement, the proposed BCash E-Wallet Integration Project aims to revolutionize the system by introducing a secure, transparent, and efficient electronic payment method.

The BCash system is designed with three main tables for input, process, and output, catering to specific roles with various responsibilities and access levels. The assessment indicates positive performance in functional suitability, security, compatibility, and usability, though improvements are suggested for performance efficiency, reliability, and maintainability. Implementation involves thorough education through seminars, documentation, and video presentations, ensuring users can easily navigate the BCash application. The maintenance phase emphasizes collaboration between the development team and the school's Center for Information and Communication Technology to keep the system updated, secure, and resilient.

The benefits of implementing BCash are significant, promising to streamline operations, reduce transaction times, minimize errors, and enhance overall customer satisfaction compared to the current manual coin chip system. The adaptability and scalability of BCash also position it for future changes or expansions, marking a substantial improvement in the canteen experience for the San Sebastian Recoletos-De Cavite community.

Conclusion

The general environment of the school canteen payment service was manual using the Coin Chip.



The school canteen payment service is improved using the BCash Application that is more convenient, efficient and secured having majors' functions such as: Payments, Cash In, Account management, and Security.

The overall User Acceptance Testing (UAT) resulted to agree on the proposed payment system in terms of functional Suitability, performance efficiency, compatibility, usability, reliability, security, and maintainability

The developed BCash application will be implemented based on the implementation issues garnered during the interviews such as maintenance, security, etc. and implementation plan formulated during the course of the project.

The benefits of implementing the proposed e-wallet system includes the streamline operations, reduce transaction times, minimize errors, and enhance overall customer satisfaction.

Recommendations

For the Future Researcher. Future researchers can utilize this study as a reference for conducting research on e-wallets applications, particularly in the context of San Sebastian College - Recoletos de Cavite. Gathering data from a larger sample size and employing diverse methodologies can yield more comprehensive and insightful results. In addition, future research should involve a greater number of IT professionals and administrators in User Acceptance Testing (UAT) due to its substantial impact on the final outcomes.

For the Future Developer. This capstone project can be enhancing their systems while incorporating additional features such as:

Cash-in vending kiosks - Installing multiple cash-in vending kiosks within the SSC-RdC would significantly enhance transaction efficiency and user convenience due to their constant availability.

Connection with cash register - Connecting directly to the cash register will help to ensure the safety of funds and make accounting processes more efficient.



Connection with receipt printer - Integrating a receipt printer into the system will promote accuracy, transparency, and accountability in financial transactions.

Continuation of version control system - The integration of a robust version control system as a core component of the system will substantially elevate both user experience and security.

Fingerprint sensor for mobile login - Incorporating this feature will shield the system from unauthorized access attempts.

Improve Security measures - Fortifying the system's security will bolster its defenses and maintain its dependability.

QR to QR Transfer – This panel recommendation proposes a convenient way for users to transfer funds directly between their QR codes. This would streamline the transfer process and eliminate the need for manual account numbers.

Refunding of Transaction – This feature aims to mitigate accidental cash-ins and prevent unnecessary account terminations. Users would have the option to request refunds for erroneous transactions, offering them peace of mind.

Adding of more UAT Respondents – Increasing the pool of User Acceptance Testing (UAT) participants would broaden the range of feedback and perspectives collected. This would allow for a more comprehensive evaluation of the system, leading to greater reliability and effectiveness of the final application.



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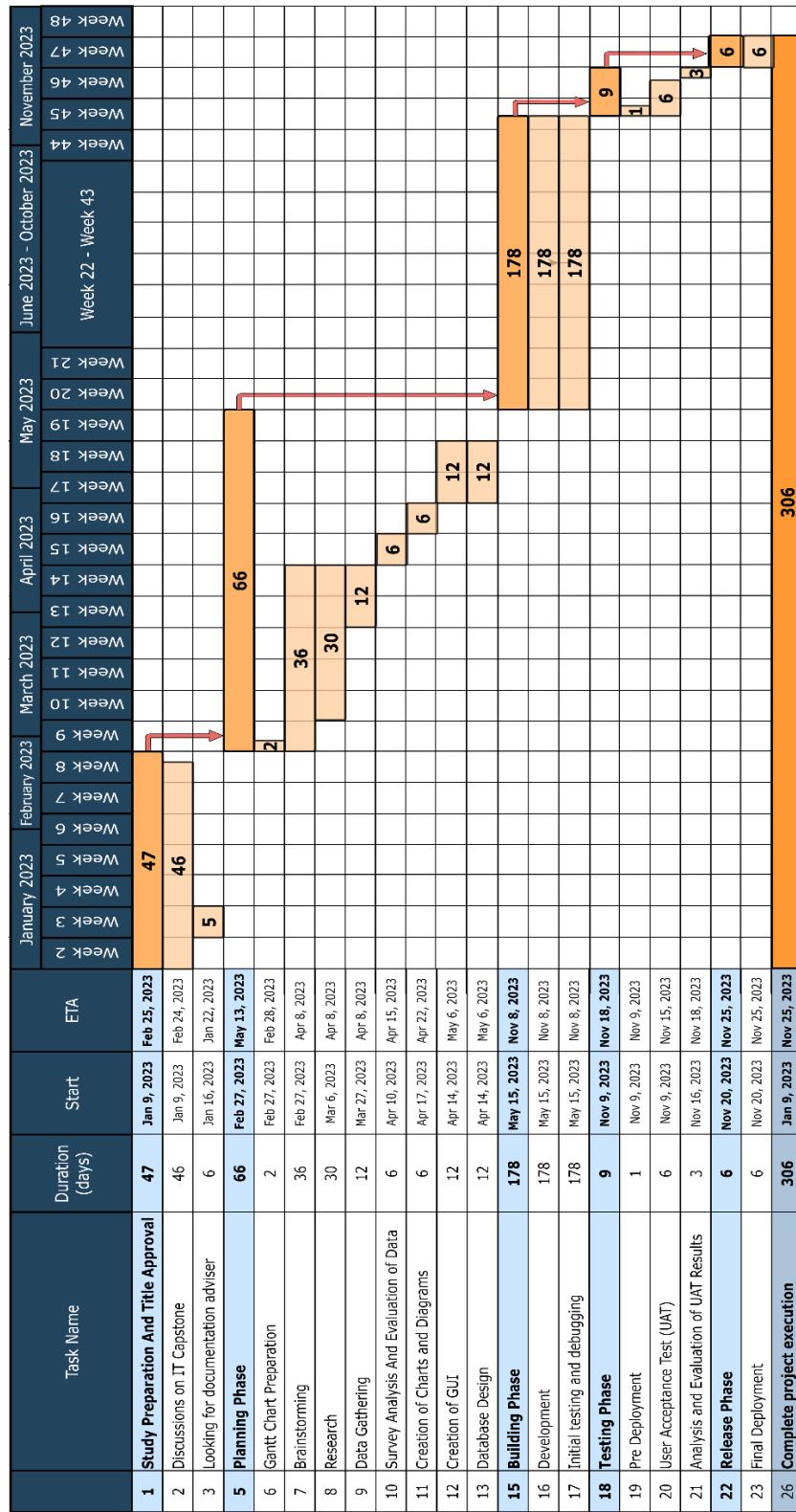


APPENDICES



Appendix A

Gantt Chart





Appendix B

Use Case Tables

Use Case Name:	Authentication
Description:	The use case involves authentication of accounts.
Actor:	Administrator, Accounting, Merchant Admin, Merchant Staff, Users (Students, Guest, Staffs), Guardian
Pre-Condition:	The actor must be connected to the internet.
Basic Flow:	<p>For Administrator, Accounting, Merchant Admin, Merchant Staff</p> <ol style="list-style-type: none">1. Input email and password.2. Receive OTP in email.3. Input PIN code. <p>For User (Students and Staffs)</p> <ol style="list-style-type: none">1. Login SSCR google account.2. Receive OTP in email.3. Input PIN code. <p>For Guest and Guardian</p> <ol style="list-style-type: none">1. Login using provided gmail account..2. Receive OTP in email.3. Input PIN code.
Post-Condition:	The actor remains connected to the internet.

Authentication Use Case Table

Use Case Name:	Manage Login History
Description:	The use case involves a login history list of the accounts.
Actor:	Administrator, Accounting, Merchant Admin, Merchant Staff, Users (Students, Guest, Staffs), Guardian
Pre-Condition:	The actor must be connected to the internet and already logged in.
Basic Flow:	<ol style="list-style-type: none">1. Open login history.2. Select remove or remove all saved login.
Post-Condition:	The actor remains connected to the internet.

Manage Login History Use Case Table



Use Case Name:	Change PIN Code
Description:	The use case involves changing the PIN Code.
Actor:	Administrator, Accounting, Merchant Admin, Merchant Staff, Users (Students, Guest, Staffs), Guardian
Pre-Condition:	The actor must be connected to the internet and already logged in.
Basic Flow:	<p>For Users (Students, Guest, Staffs, Guardian)</p> <ol style="list-style-type: none">1. Open settings.2. Select security settings.3. Input old PIN code.4. Input new PIN code.5. Reininput new PIN code.6. Select Change PIN code. <p>For Administrator, Accounting, Merchant Admin, Merchant Staff</p> <ol style="list-style-type: none">1. Open settings.2. Select change pin code box.3. Input new PIN code.4. Reininput new PIN code.5. Input current password and PIN code.6. Select update changes.
Post-Condition:	The actor remains connected to the internet.

Change PIN Code Use Case Table

Use Case Name:	View Activity Logs
Description:	The use case involves activities involving the account.
Actor:	Administrator, Accounting, Merchant Admin, Merchant Staff, Users (Students, Guest, Staffs), Guardian
Pre-Condition:	The actor must be connected to the internet and already logged in.
Basic Flow:	<p>For User (Students, Guest, Guardian)</p> <ol style="list-style-type: none">1. Open profile.2. Select activity logs.3. View activity logs. <p>For Administrator</p> <ol style="list-style-type: none">1. Open settings.2. Select all activity logs or administrator activity logs or my activity logs.3. View all activity logs or administrator activity logs or my activity logs.



	<p>For Accounting</p> <ol style="list-style-type: none">1. Open settings.2. Select accounting activity logs or my activity logs.3. View accounting activity logs or my activity logs. <p>For Merchant Staff</p> <ol style="list-style-type: none">1. Open settings.2. Select my activity logs.3. View my activity logs. <p>For Merchant Admin</p> <ol style="list-style-type: none">1. Open settings2. Select merchant staff activity or my activity logs.3. View merchant staff activity or my activity logs.
Post-Condition:	The actor remains connected to the internet.

View Activity Logs Use Case Table

Use Case Name:	View Transaction History
Description:	The use case involves viewing of the transaction history and transaction receipts or details.
Actor:	Administrator, Accounting, Merchant Admin, Merchant Staff, Users (Students, Guest, Staffs), Guardian
Pre-Condition:	The actor must be connected to the internet and already logged in.
Basic Flow:	<p>For User (Students, Guardian, Guest)</p> <ol style="list-style-type: none">1. Open transactions.2. View transaction history.3. Select transaction details.4. View transaction details. <p>For Administrator</p> <ol style="list-style-type: none">1. Open transactions.2. Open all transactions.3. View all transactions.4. Select transaction from the list or filter the transactions list.5. View transaction transaction details. <p>For Accounting</p> <ol style="list-style-type: none">1. Open transactions.2. Select accounting transactions or all transactions.3. View accounting transactions or all transactions.4. Select transaction from the list or filter the transactions list.5. View transaction transaction details.



	For Merchant Admin and Merchant Staff 1. Open transactions. 2. View transactions. 3. Select transaction from the list or filter the transactions list. 4. View transaction transaction details.
Post-Condition:	The actor remains connected to the internet.

View Transaction History Use Case Table

Use Case Name:	Manage Fund Remittance
Description:	The use case involves the viewing of remitted funds and sales history. Accounting has the authority to approve or reject remitted funds based on specific circumstances.
Actor:	Accounting, Merchant Admin
Pre-Condition:	The actor must be connected to the internet and already logged in.
Basic Flow:	For Accounting 1. Open fund remittance. 2. View recent remittances list. 3. Select recorded remittance. 4. View recorded remittance details. 5. Select approve or reject. For Merchant Admin 1. Open fund remittance. 2. View recent remitted and unremitting remittances list. 3. Select remitted and unremitting remittances. 4. View remitted and unremitting remittances details. 4. Select send.
Post-Condition:	The actor remains connected to the internet.

Manage Fund Remittance Use Case Table

Use Case Name:	Manage Accounts
Description:	The use case involves the management of accounts within the system. The Administrator handles all accounts and can add any account, the Accounting role manages all accounts and can add Guest accounts, and the Merchant Admin handles staff accounts.
Actor:	Administrator, Accounting, Merchant Admin



Pre-Condition:	The actor must be connected to the internet and already logged in
Basic Flow:	<p>For Administrator</p> <ol style="list-style-type: none">1. Open accounts.2. Select or add user or merchant or merchant staff or guardian or accounting or administrator. <p>If select account:</p> <ol style="list-style-type: none">1. View accounts list.2. Select recorded account or filter account list.3. View account details.4. Modify account details.5. Input PIN code.6. Select upload changes. <p>If add account:</p> <ol style="list-style-type: none">1. Input account details.2. Select add account. <p>For Accounting:</p> <ol style="list-style-type: none">1. Open accounts.2. View account list3. Select recorded account or filter account list.4. View account details.5. Modify account details.6. Input PIN code.7. Select upload changes. <p>If add Guest account:</p> <ol style="list-style-type: none">1. Input account details.2. Select add account. <p>For Merchant Admin</p> <ol style="list-style-type: none">1. Open staff management.2. View staff list3. Select recorded staff account or filter staff account list.4. View staff account details.5. Modify account details.6. Input PIN code.7. Select upload changes.
Post-Condition:	The actor remains connected to the internet.

Manage Accounts Use Case Table

Use Case Name:	View Charts, Graphs, and Summary
Description:	The use case involves the viewing of charts, graphs, and summaries that provide insights into activities within the program.



Actor:	Administrator, Accounting, Merchant Admin
Pre-Condition:	The actor must be connected to the internet and already logged in
Basic Flow:	1. Open Home. 2. View Charts, Graphs, and Summary.
Post-Condition:	The actor remains connected to the internet.

View Charts, Graphs, and Summary Use Case Table

Use Case Name:	Manage Announcements
Description:	The use case involves the management of announcements within the system. The Administrator role handles the creation and deletion of announcements, while other roles have the capability to view the announcements.
Actor:	Administrator, Accounting, Merchant Admin, Merchant Staff, Users (Students, Guest, Staffs), Guardian
Pre-Condition:	The actor must be connected to the internet and already logged in
Basic Flow:	For Users (Students, Guest, Staffs), Guardian, Accounting, Merchant Admin, Merchant Staff 1. Open announcements. 2. View announcements. For Administrator 1. Open announcements. 2. View announcements control management. 3. Input announcements details. 4. Select set announcements. 5. View announcements list.
Post-Condition:	The actor remains connected to the internet.

Manage Announcements Use Case Table

Use Case Name:	Logout
Description:	The use case involves logout of accounts.
Actor:	Administrator, Accounting, Merchant Admin, Merchant Staff, Users (Students, Guest, Staffs), Guardian
Pre-Condition:	The actor must be connected to the internet and already logged in



Basic Flow:	For Users (Students, Guest, Staffs), Guardian 1. Open profile. 2. Select logout.
	For Administrator, Accounting, Merchant Admin, Merchant Staff 1. Select logout.
Post-Condition:	The actor remains connected to the internet.

Logout Use Case Table

Use Case Name:	Provide Cash In
Description:	The use case involves cash in of Users role (Students, Guest, Staff).
Actor:	Accounting
Pre-Condition:	The actor must be connected to the internet and already logged in
Basic Flow:	1. Open cash-in form. 2. Input ID of students or guests or staff. 3. View students or guests or staff details. 4. Input amount. 5. Select confirm transfer. 6. View recent cash in list.
Post-Condition:	The actor remains connected to the internet.

Provide Cash In Use Case Table

Use Case Name:	Manage RFID Cards
Description:	The use case involves the management of RFID cards within the system. The Administrator role is responsible for creating and modifying RFID cards.
Actor:	Administrator
Pre-Condition:	The actor must be connected to the internet and already logged in
Basic Flow:	1. Open card management. If modify RFID card details: 1. Select or filter cards list. 2. View card details. 3. Modify card details. 4. Input PIN code.



	<p>5. Select upload changes.</p> <p>If upload RFID cards:</p> <ol style="list-style-type: none">1. Input card address.2. Select upload card.
Post-Condition:	The actor remains connected to the internet.

Manage RFID Cards Use Case Table

Use Case Name:	Manage Applications Configurations
Description:	The use case involves the management of system configurations.
Actor:	Administrator
Pre-Condition:	The actor must be connected to the internet and already logged in
Basic Flow:	<ol style="list-style-type: none">1. Open application settings.2. View application control management.3. Update application configurations.4. Input PIN code.5. Select update.
Post-Condition:	The actor remains connected to the internet.

Manage Applications Configurations Use Case Table

Use Case Name:	Manage Users Settings
Description:	The use case involves the management of user settings by the account owner.
Actor:	Users (Students, Guest, Staff), Guardian
Pre-Condition:	The actor must be connected to the internet and already logged in
Basic Flow:	<ol style="list-style-type: none">1. Open profile.2. Modify user settings.3. Input PIN code.4. Select confirm changes.
Post-Condition:	The actor remains connected to the internet.

Manage Users Settings Use Case Table



Use Case Name:	View Balance
Description:	The use case involves the viewing of the account's current balance by the account owner.
Actor:	Users (Students, Guest, Staffs), Guardian
Pre-Condition:	The actor must be connected to the internet and already logged in
Basic Flow:	1. Open Home 2. Select view icon on balance.
Post-Condition:	The actor remains connected to the internet.

View Balance Use Case Table

Use Case Name:	Purchase Confirmation
Description:	The use case involves approving or rejecting a purchase confirmation coming from the merchants.
Actor:	Users (Students, Guest, Staffs)
Pre-Condition:	The actor must be connected to the internet and already logged in
Basic Flow:	1. View purchase details. 2. Select confirm purchase. 3. Select yes or no.
Post-Condition:	The actor remains connected to the internet.

Purchase Confirmation Use Case Table

Use Case Name:	Transfer Money
Description:	The use case involves transferring money to a whitelisted Users role.
Actor:	Users (Students, Guest, Staffs)
Pre-Condition:	The actor must be connected to the internet and already logged in
Basic Flow:	1. Go to home. 2. Click transfer. 3. Input school ID number. 4. Input amount. 5. Input message(optional). 6. Select transfer. 7. Select confirm transfer.



Post-Condition:	The actor remains connected to the internet.
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Transfer Money Use Case Table

Use Case Name:	Manage Whitelist
Description:	The use case involves the management of whitelisted accounts.
Actor:	Users (Students, Guest, Staffs)
Pre-Condition:	The actor must be connected to the internet and already logged in
Basic Flow:	<ol style="list-style-type: none">1. Open profile.2. Select whitelist3. View whitelist records.4. Select add account5. Input whitelisting school ID number.6. Input pin code.7. Select add account. <p>If removing a whitelist:</p> <ol style="list-style-type: none">1. Open profile.2. Select whitelist.3. View whitelist records.3. Select remove.
Post-Condition:	The actor remains connected to the internet.

Manage Whitelist Use Case Table

Use Case Name:	Manage Items
Description:	The use case involves the management of items sold by the merchants. It is responsible for adding, updating, and removing items from the list.
Actor:	Merchant Admin
Pre-Condition:	The actor must be connected to the internet and already logged in
Basic Flow:	<ol style="list-style-type: none">1. Open item management.2. View item list.3. Select add item.4. Input item details.5. Select save changes. <p>If modify item</p> <ol style="list-style-type: none">1. Select modify item icon.2. Modify item details.



	<p>3. Select save changes.</p> <p>If delete item</p> <ol style="list-style-type: none">1. Select delete item icon.2. Input PIN code.3. Select delete.
Post-Condition:	The actor remains connected to the internet.

Manage Items Use Case Table

Use Case Name:	Create Order
Description:	The use case involves the creation of orders.
Actor:	Merchant Admin, Merchant Staff
Pre-Condition:	The actor must be connected to the internet and already logged in
Basic Flow:	<ol style="list-style-type: none">1. Open create order.2. Select or filter items.3. Modify quantity (optional)4. Select place order.5. View order confirmation details.6. Scan QR or card.7. Wait for user confirmation.8. Order placed.
Post-Condition:	The actor remains connected to the internet.

Create Order Use Case Table

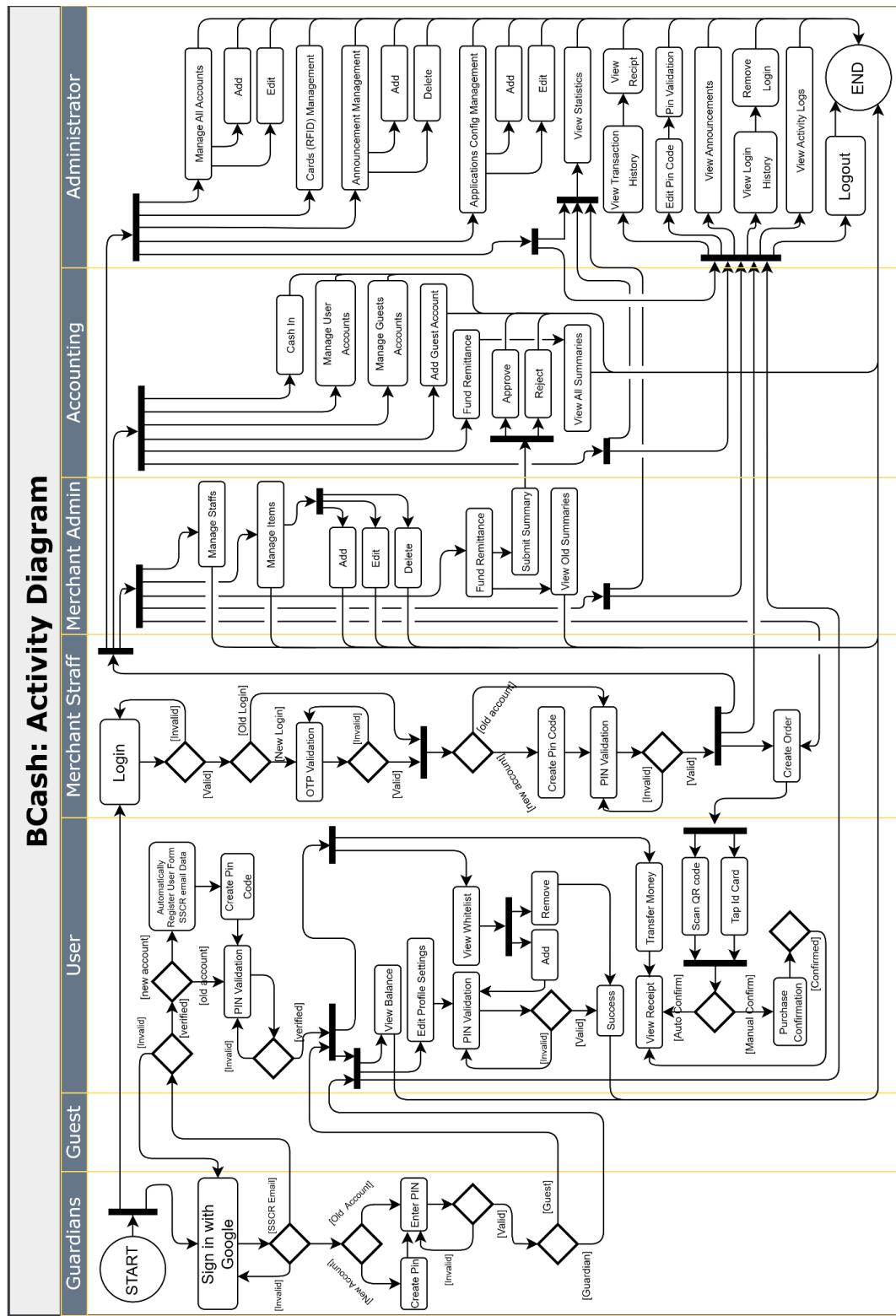
Use Case Name:	Manage Orders
Description:	The use case involves the completion of the purchase. It is responsible for displaying the orders paid by the Users role, and is ready for preparation.
Actor:	Merchant Admin, Merchant Staff
Pre-Condition:	The actor must be connected to the internet and already logged in
Basic Flow:	<ol style="list-style-type: none">1. Open manage orders.2. Select order.3. Mark as complete.
Post-Condition:	The actor remains connected to the internet.

Manage Orders Use Case Table



Appendix C

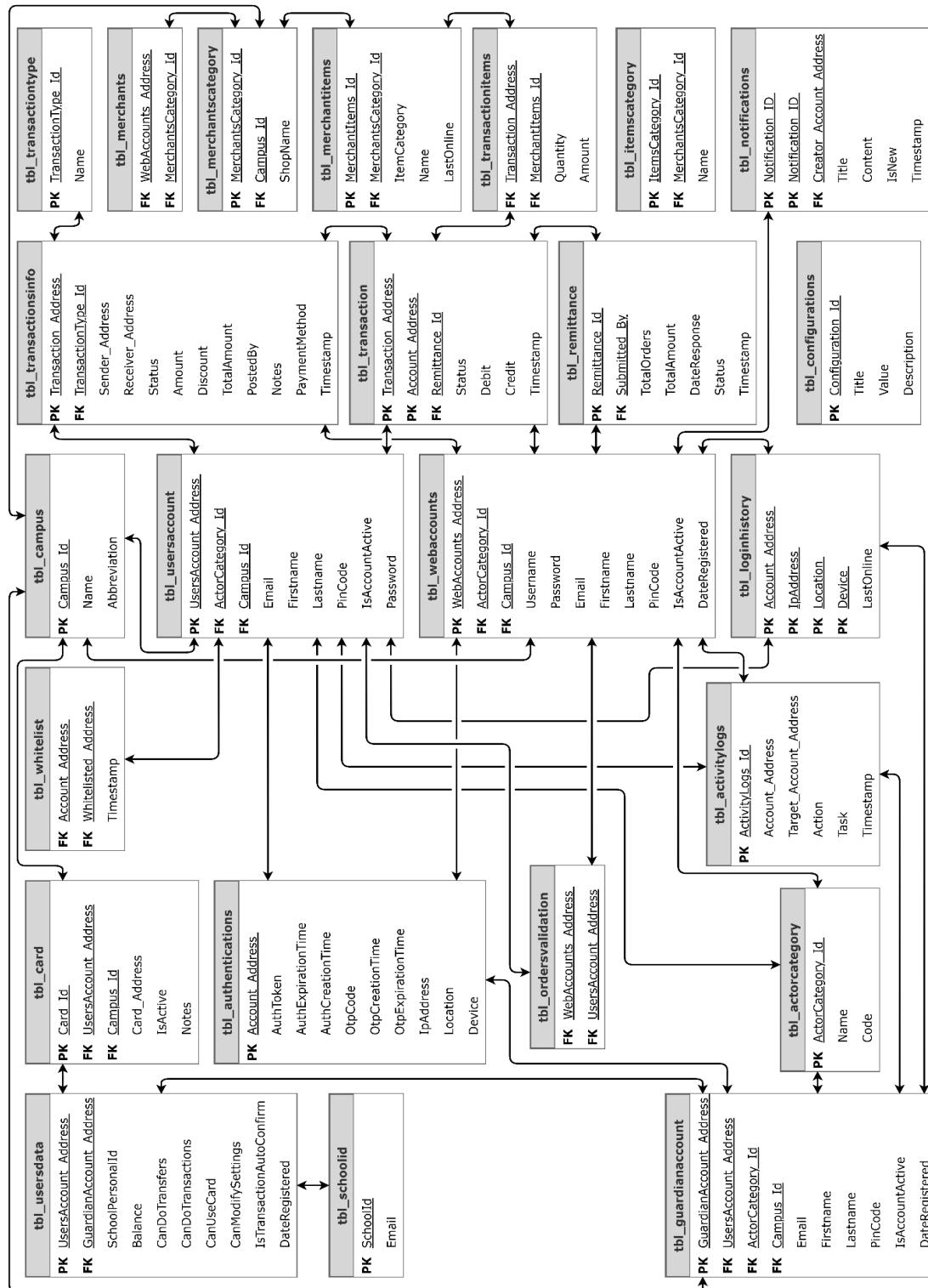
Activity Diagram





Appendix D

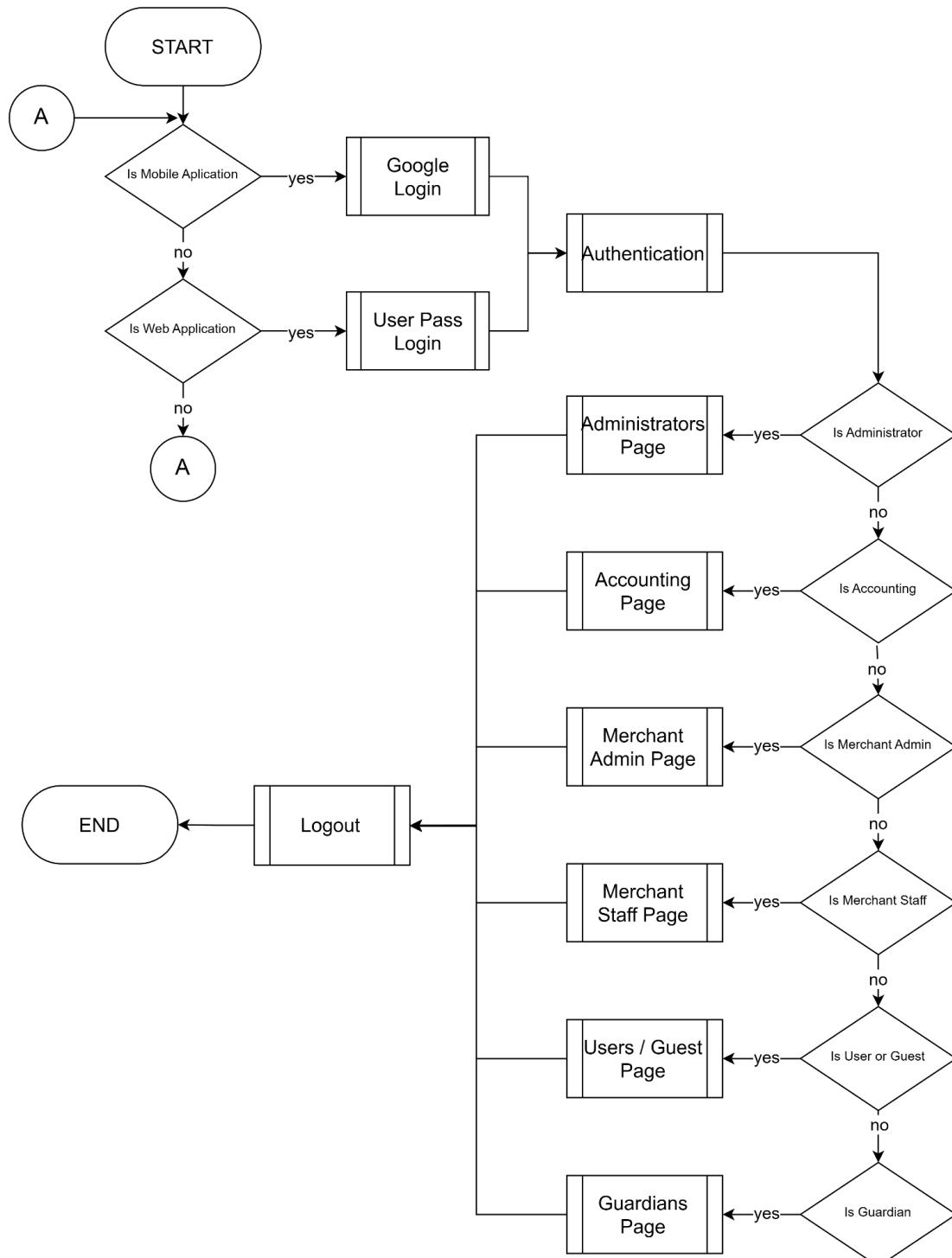
Entity–Relationship Diagrams



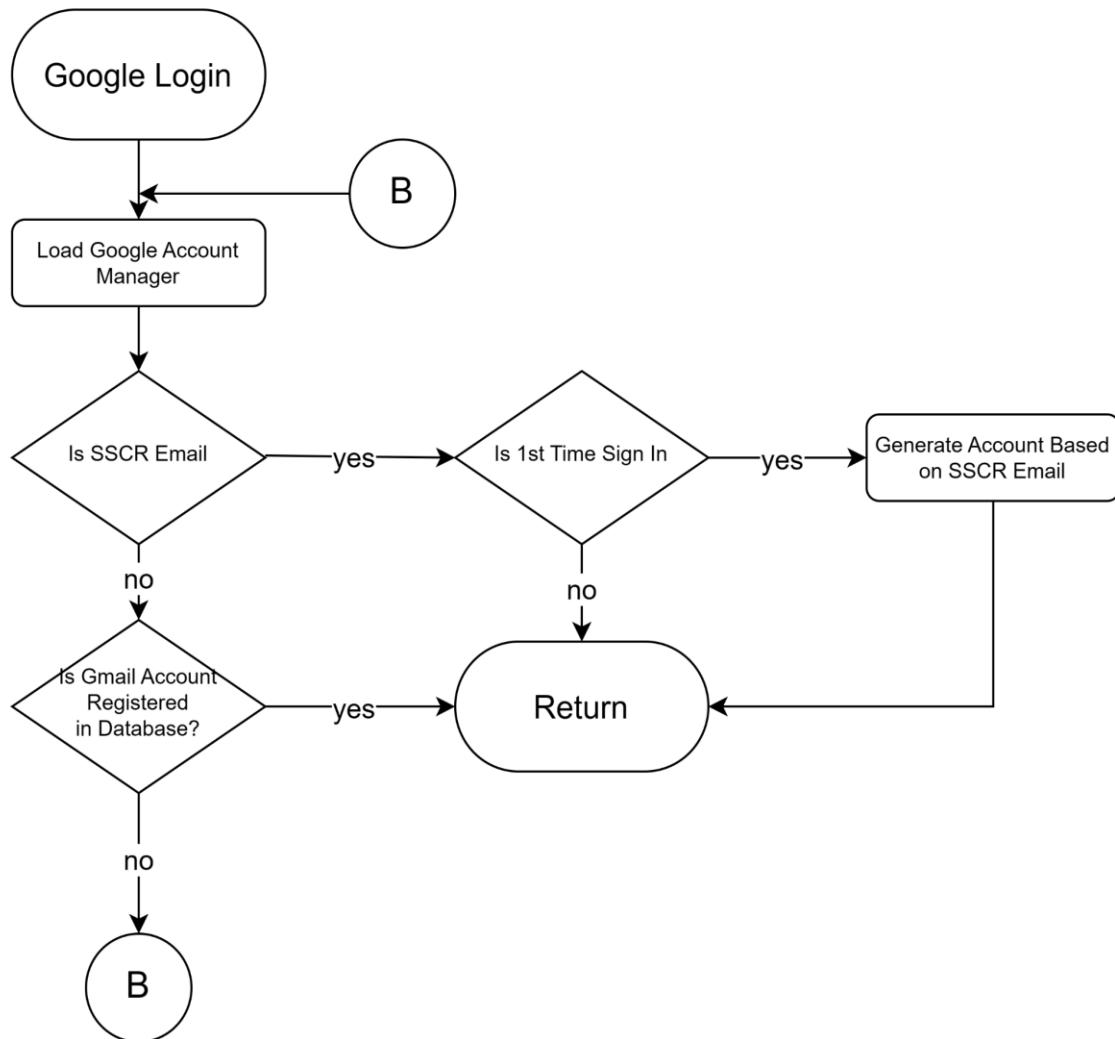


Appendix E

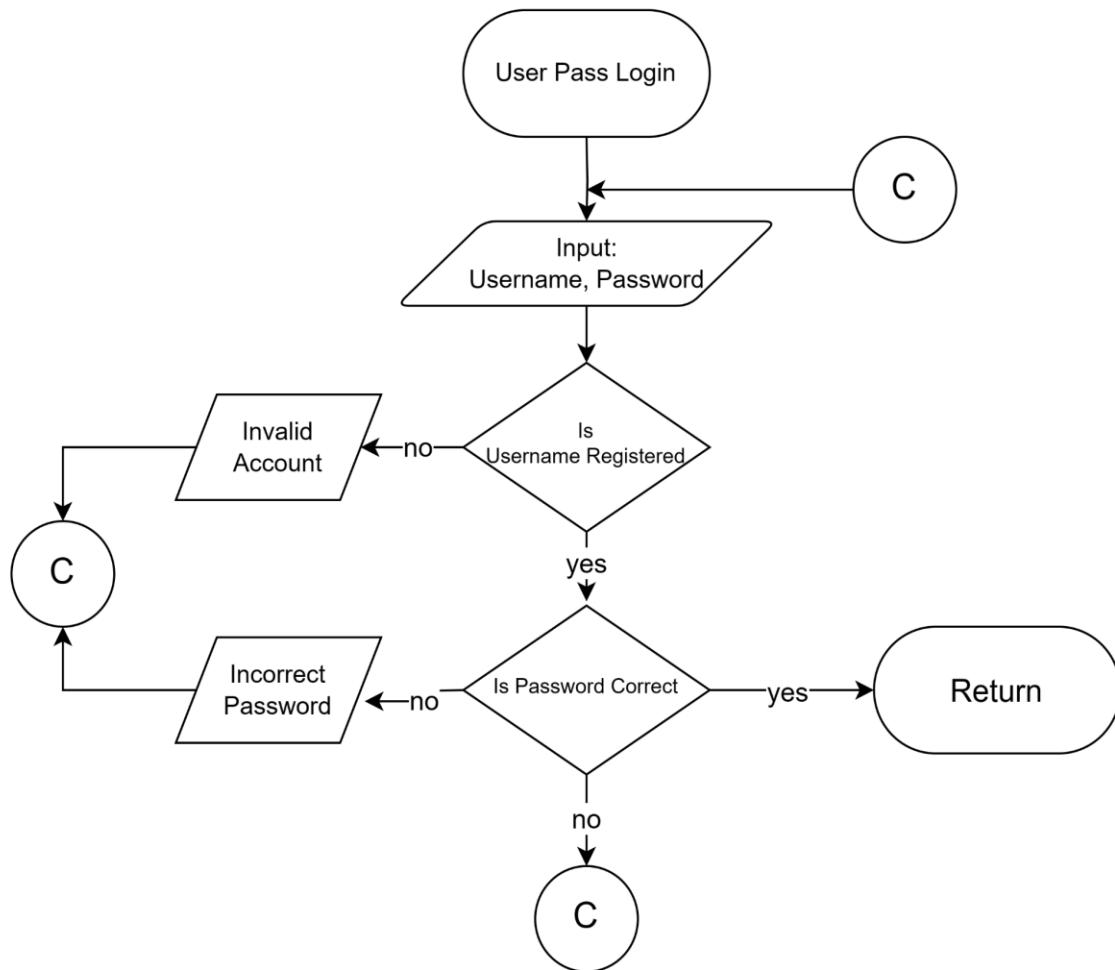
Program Flowcharts



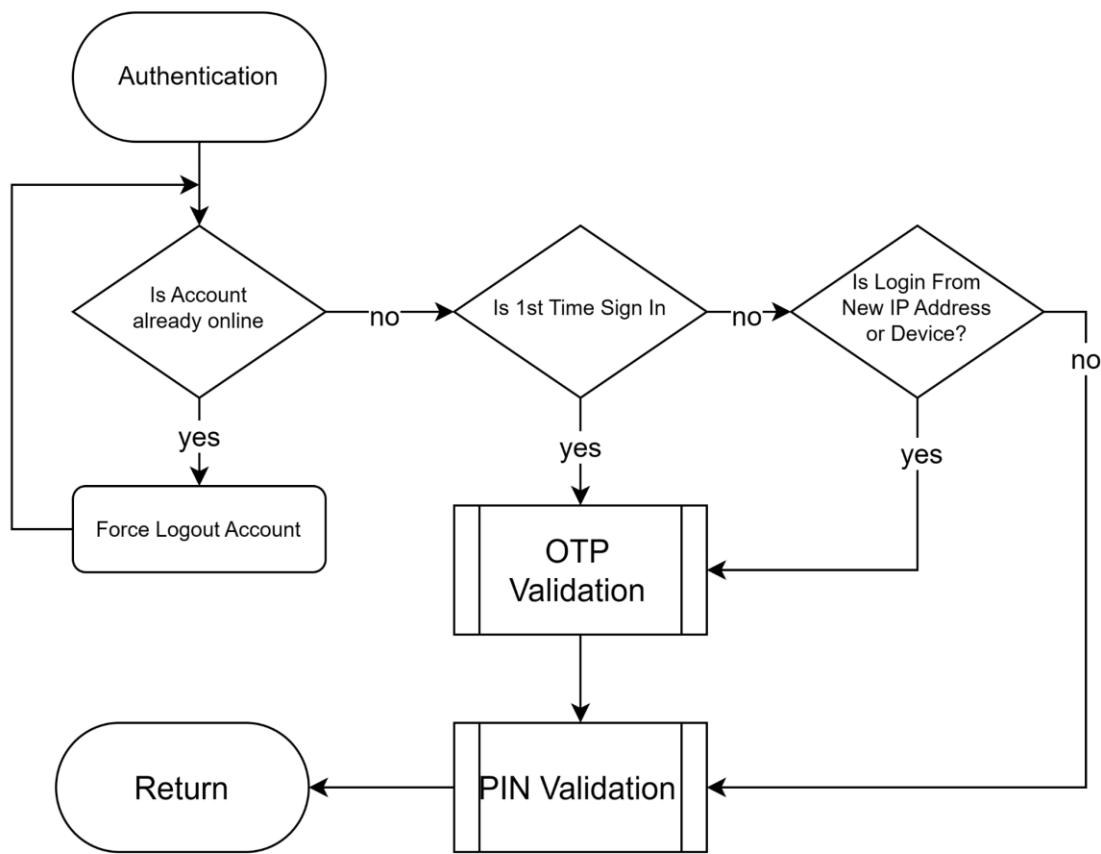
Program Flowchart



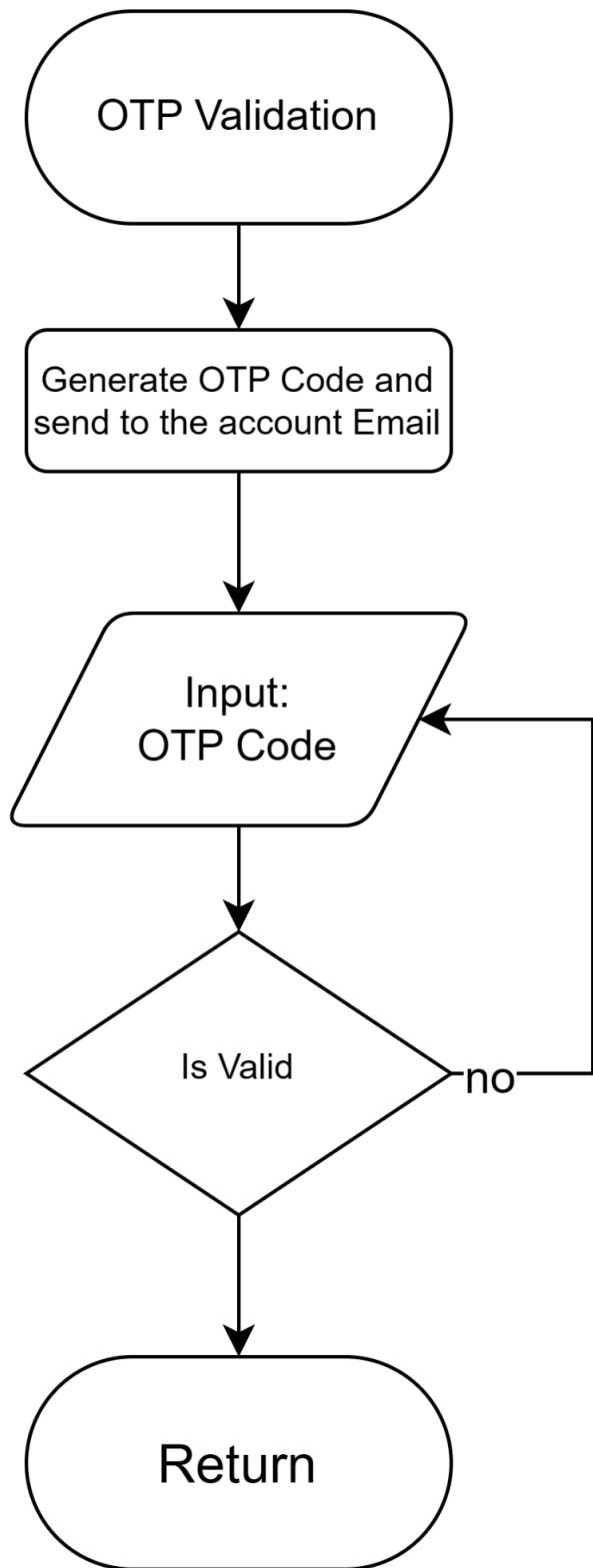
Google Login Flowchart



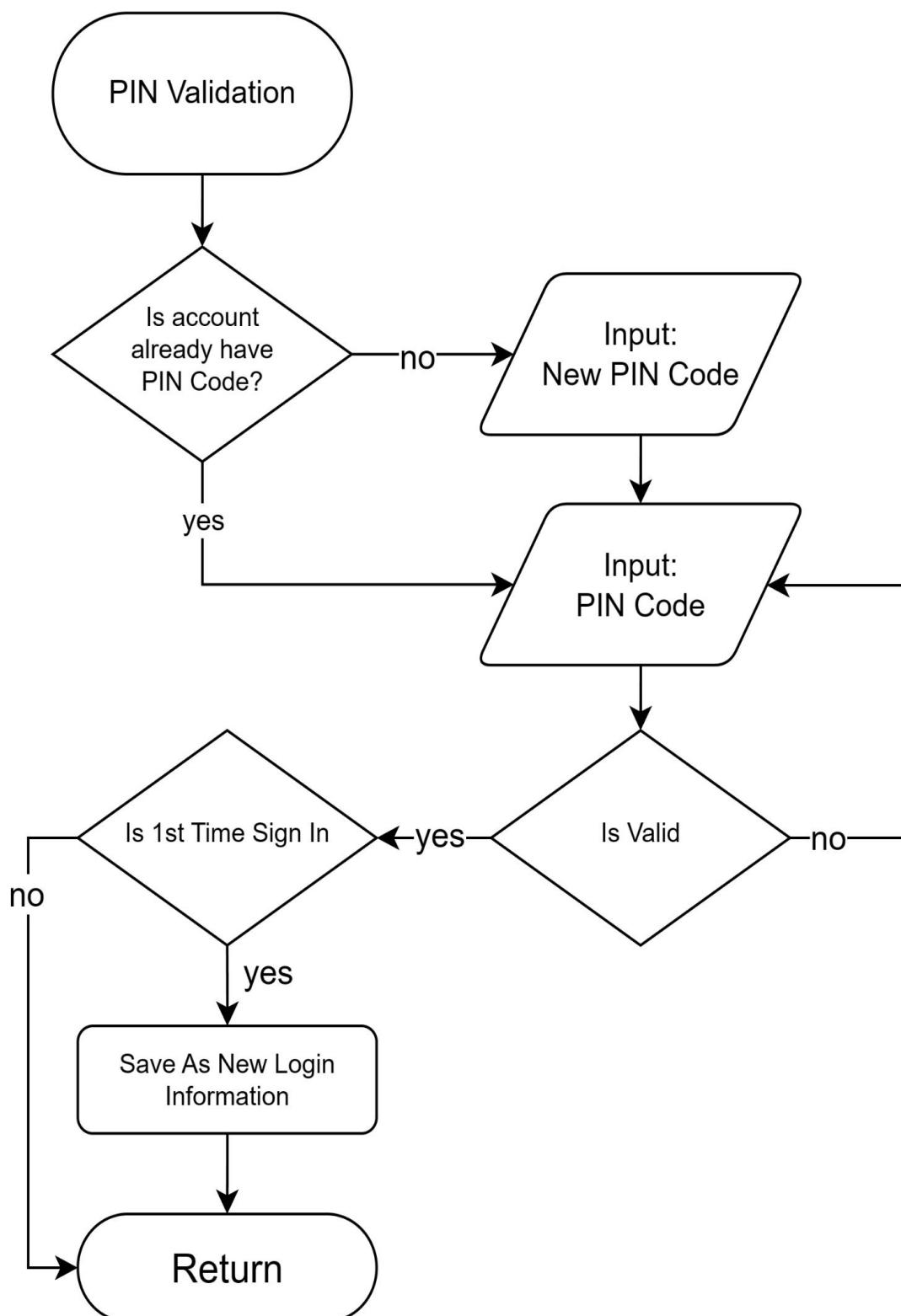
User Pass Login Flowchart



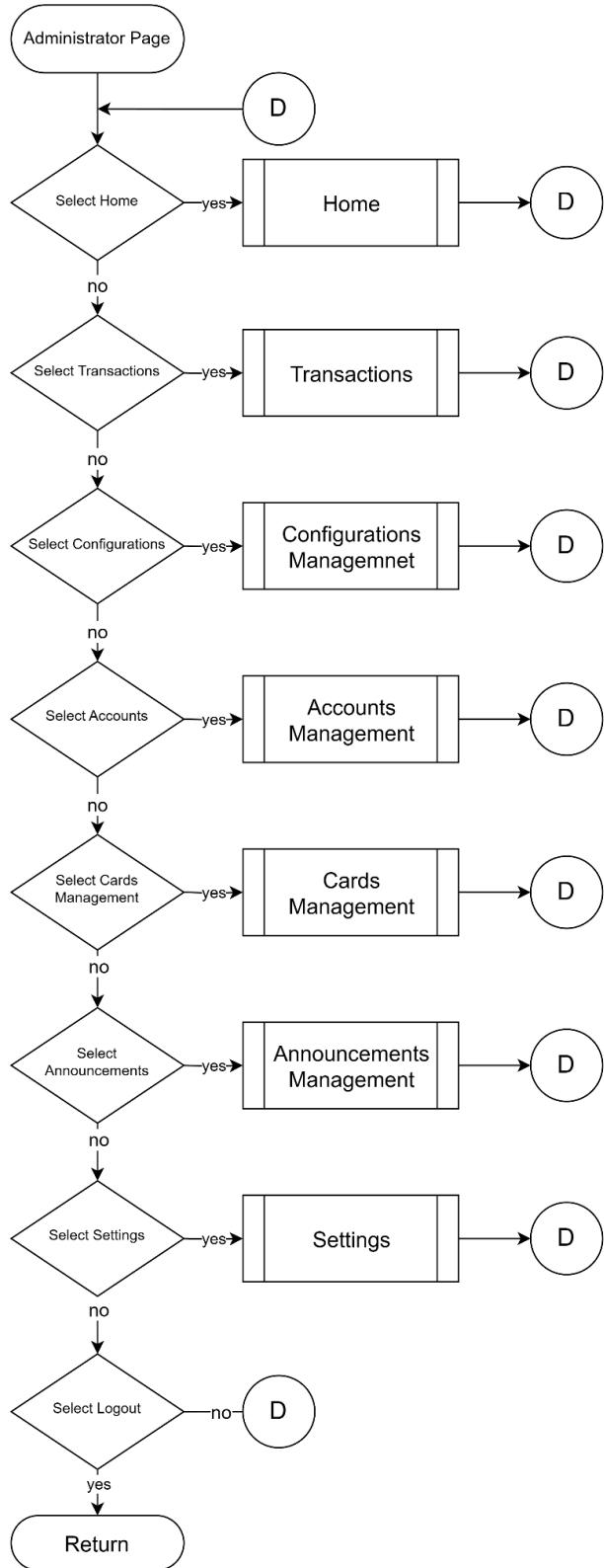
Authentication Flowchart



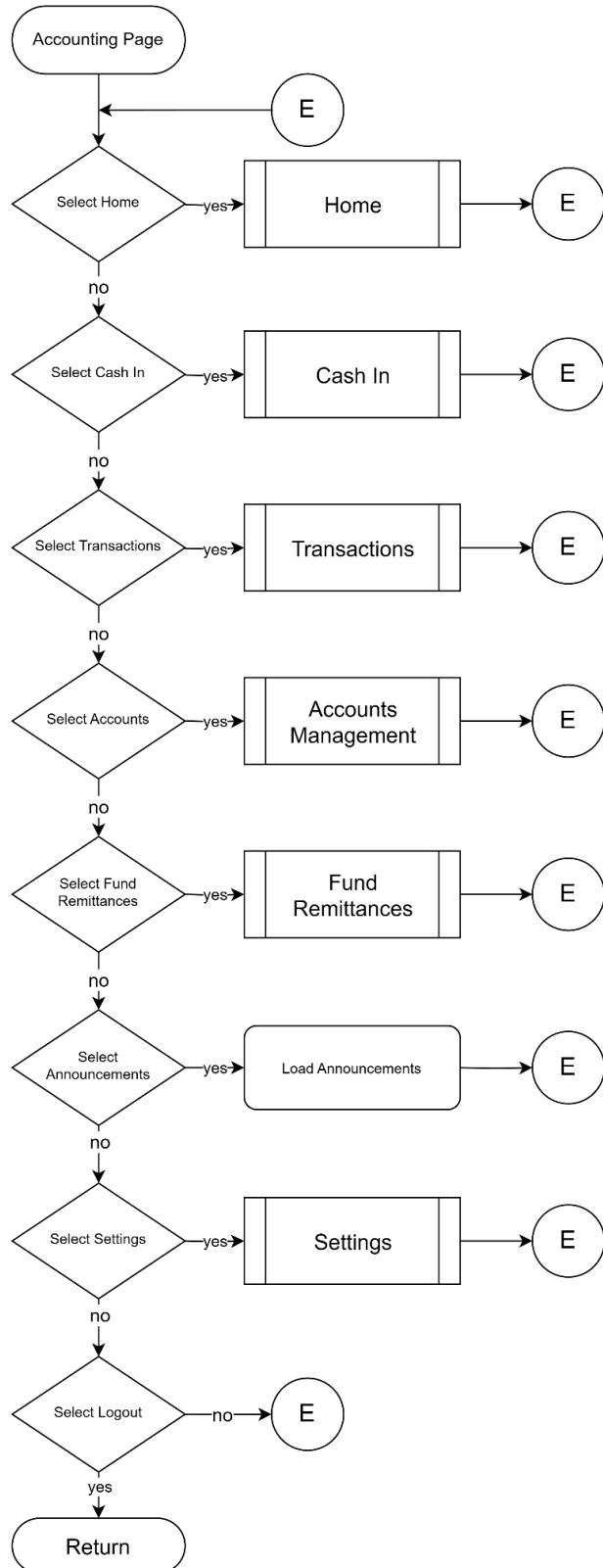
OTP Validation Flowchart



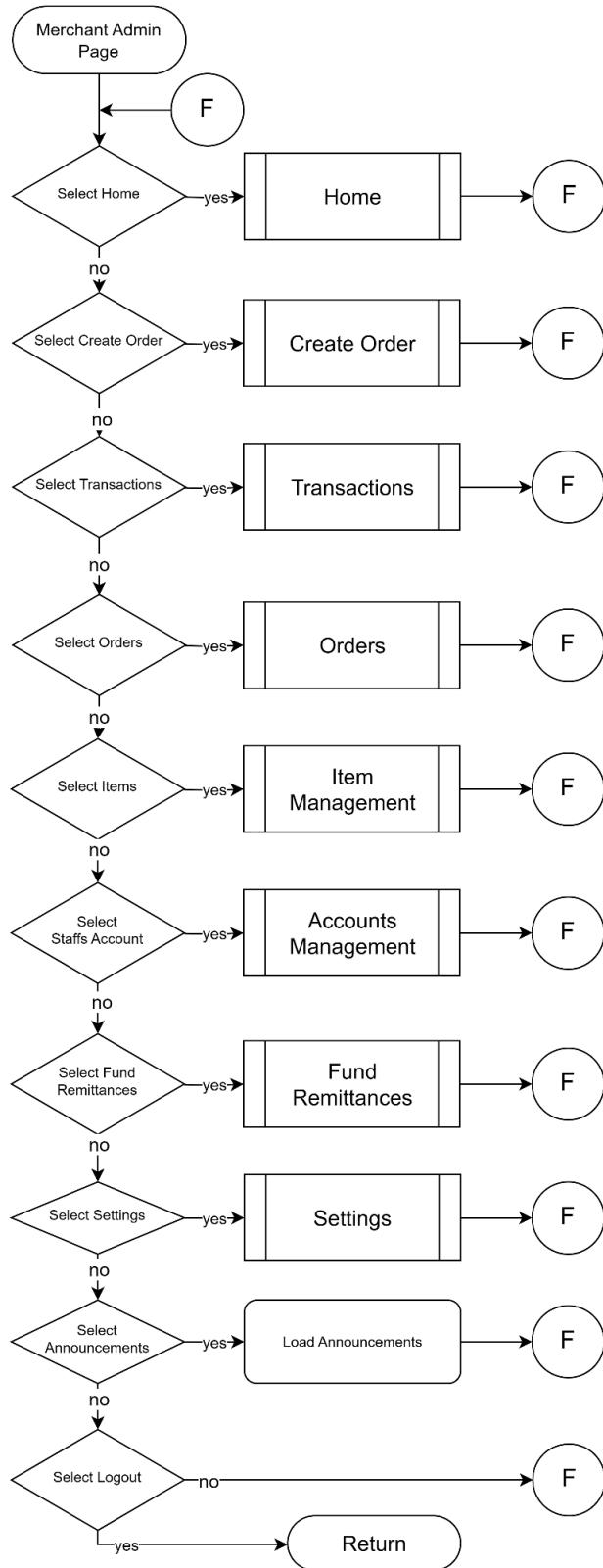
PIN Validation Flowchart



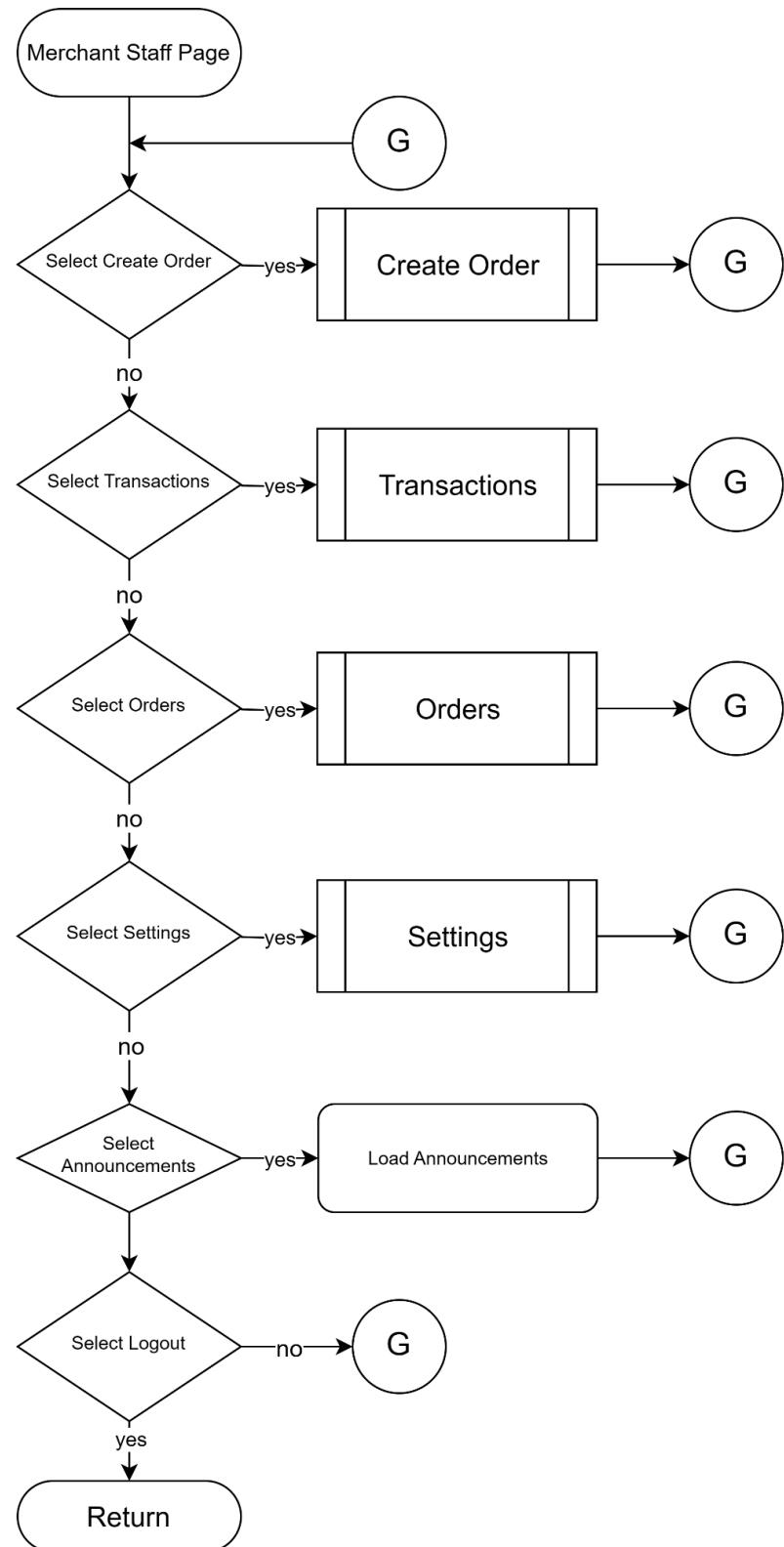
Administrators Page Flowchart



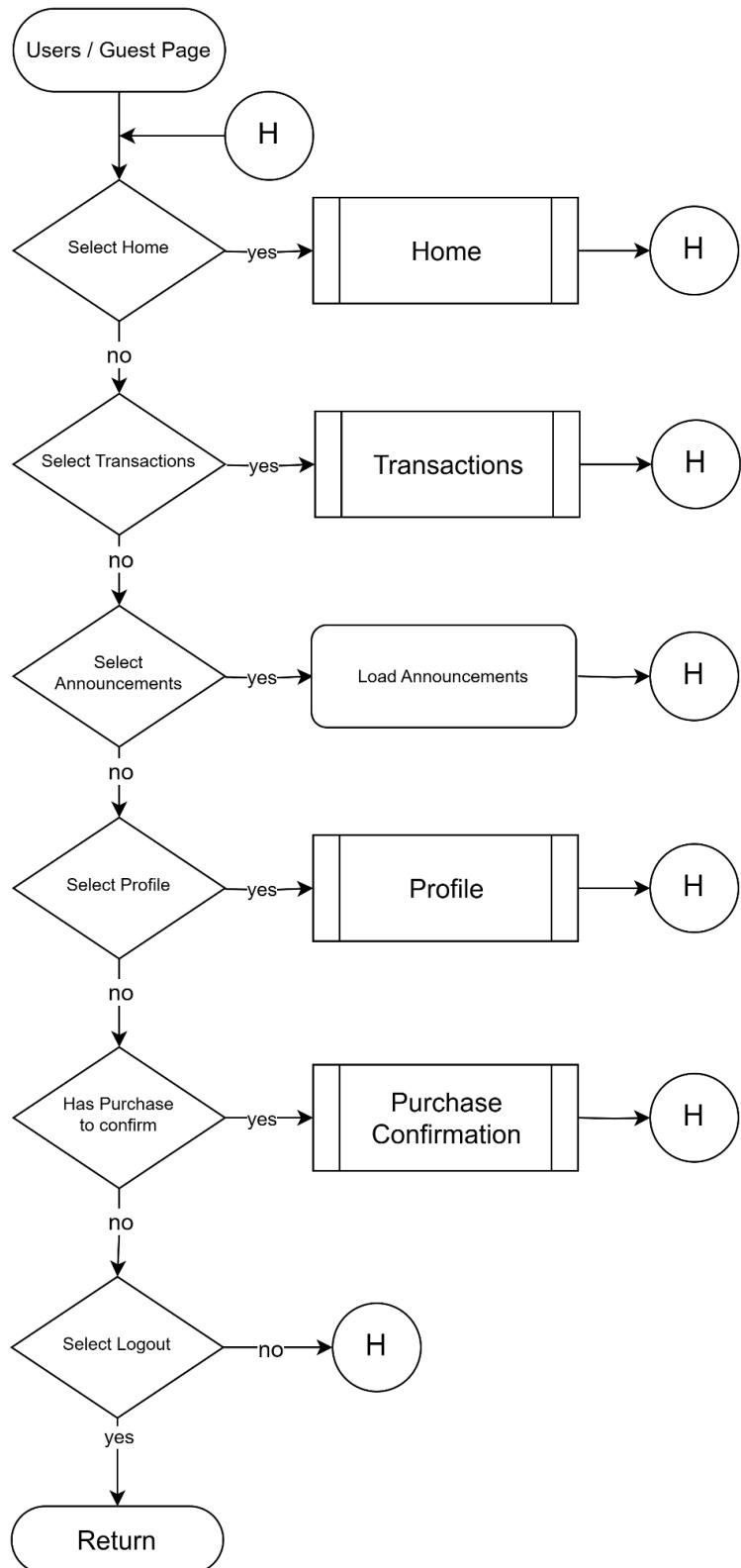
Accounting Page Flowchart



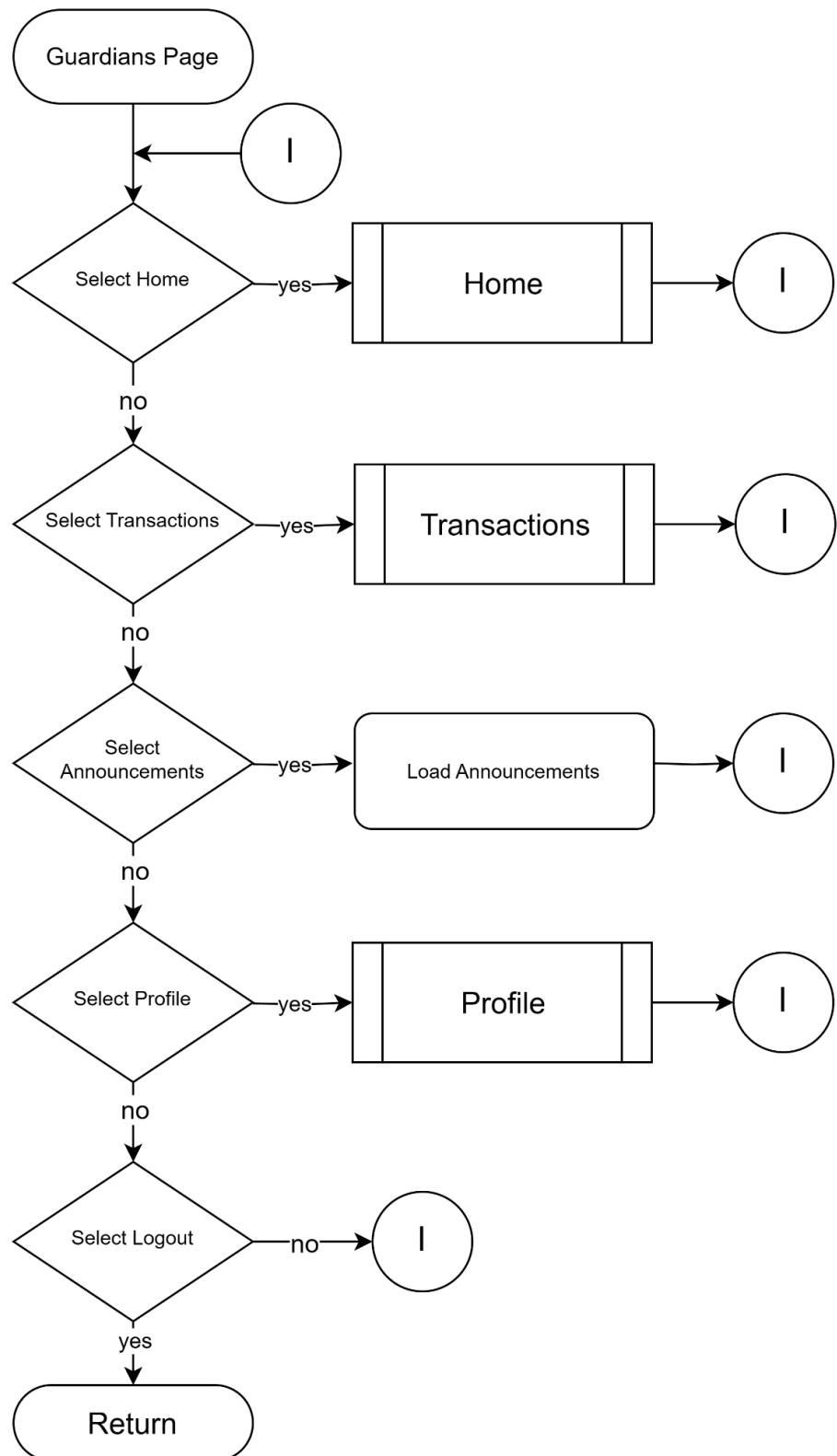
Merchant Admin Page Flowchart



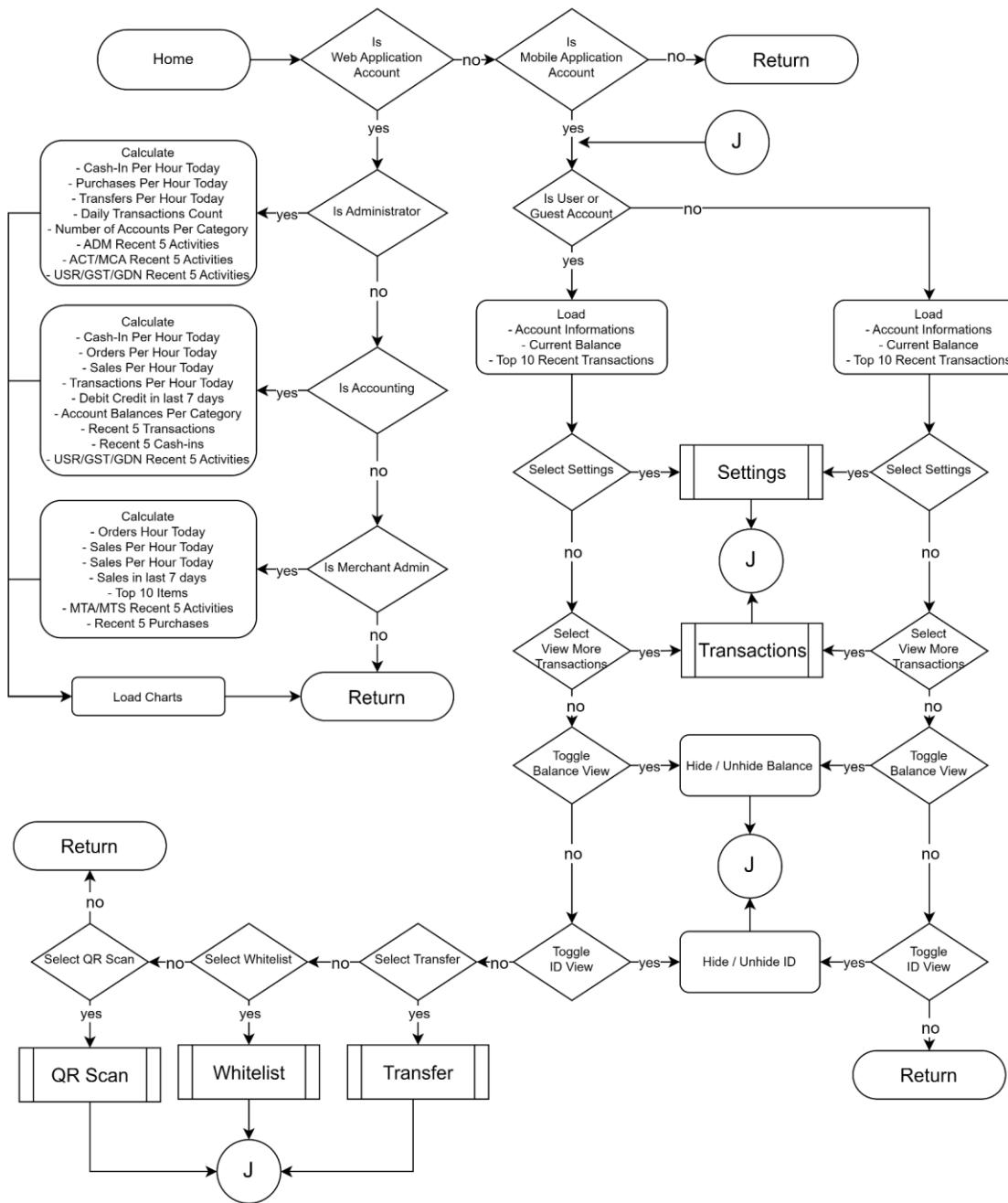
Merchant Staff Page Flowchart



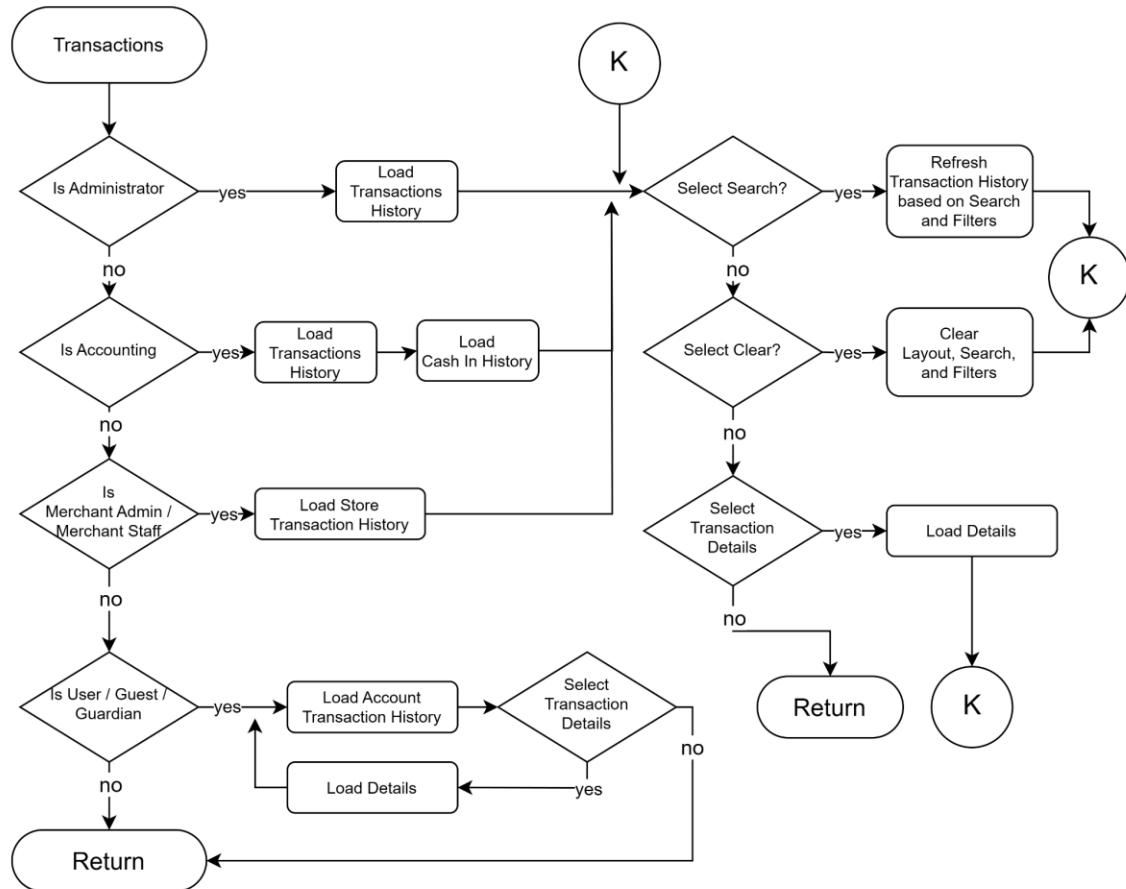
Users / Guest Page Flowchart



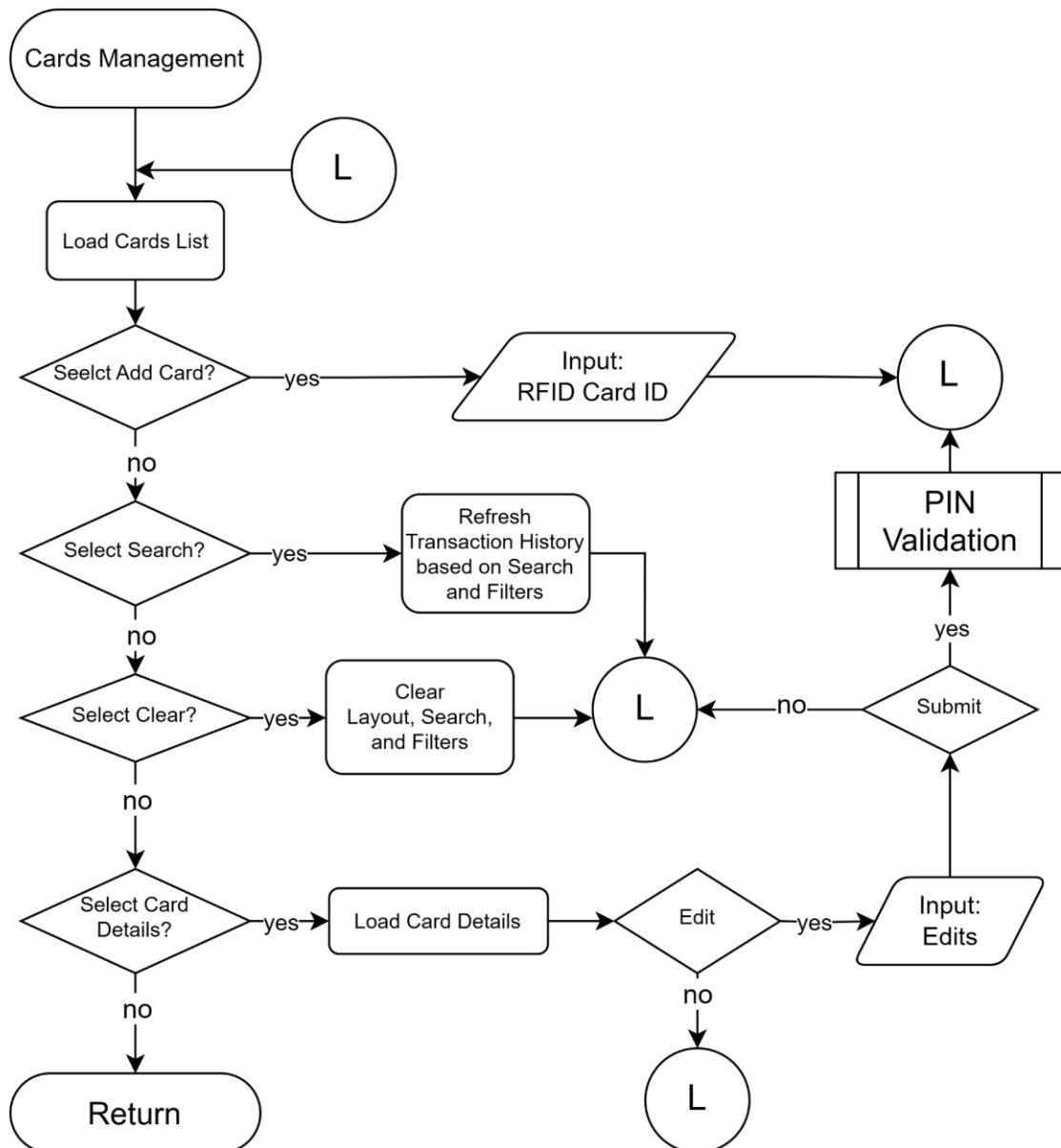
Guardians Page Flowchart



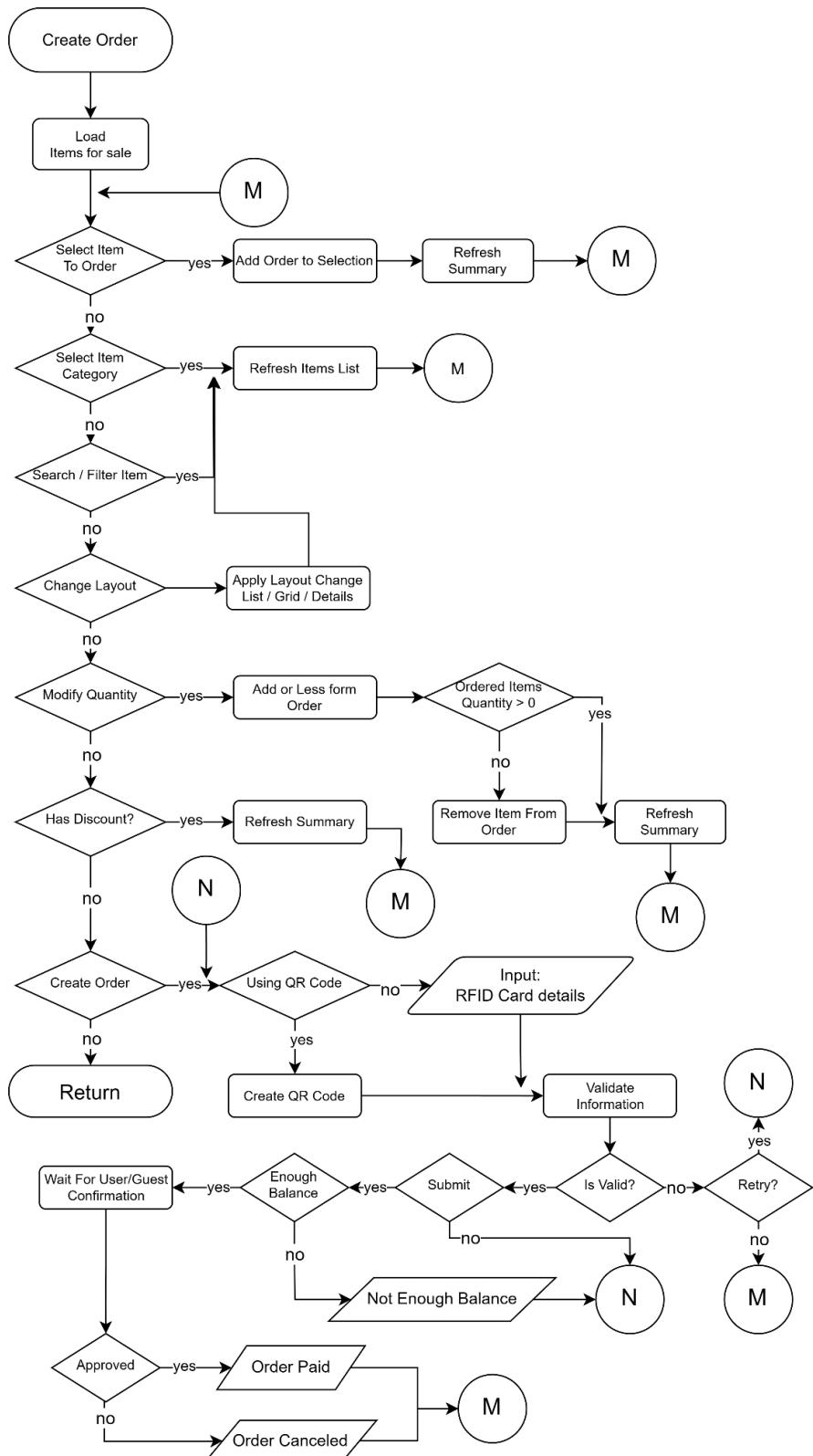
Home Flowchart



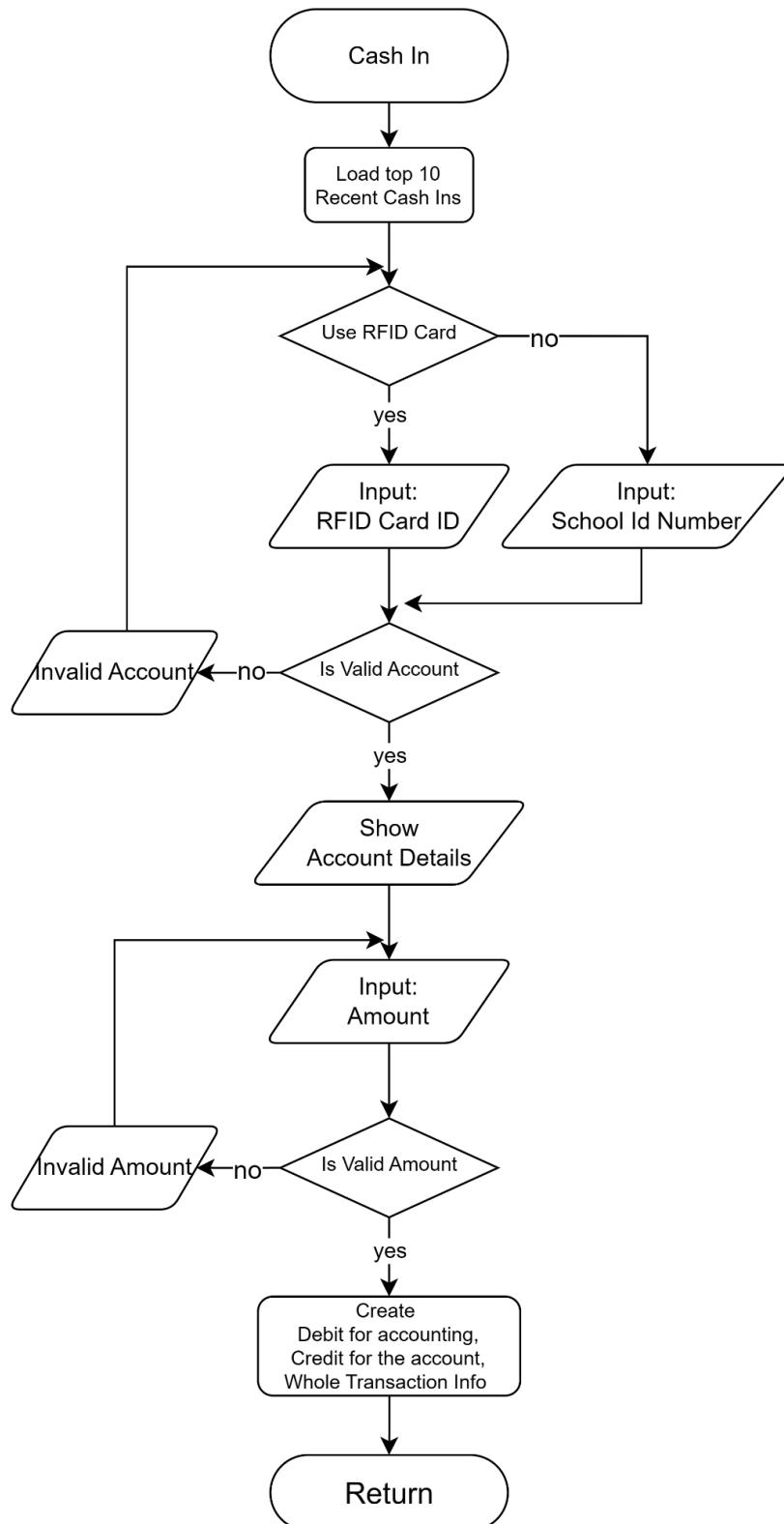
Transactions Flowchart



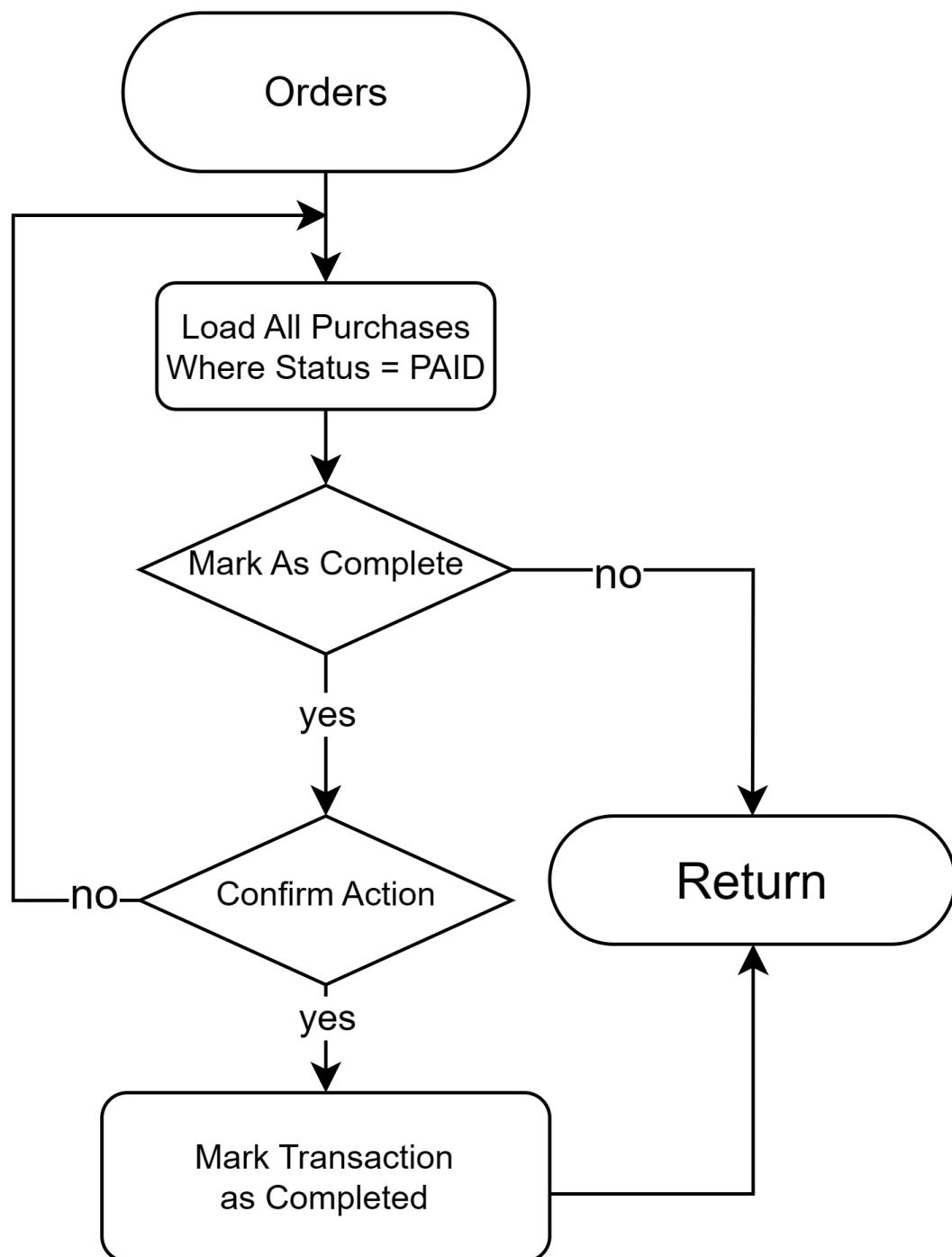
Cards Management Flowchart



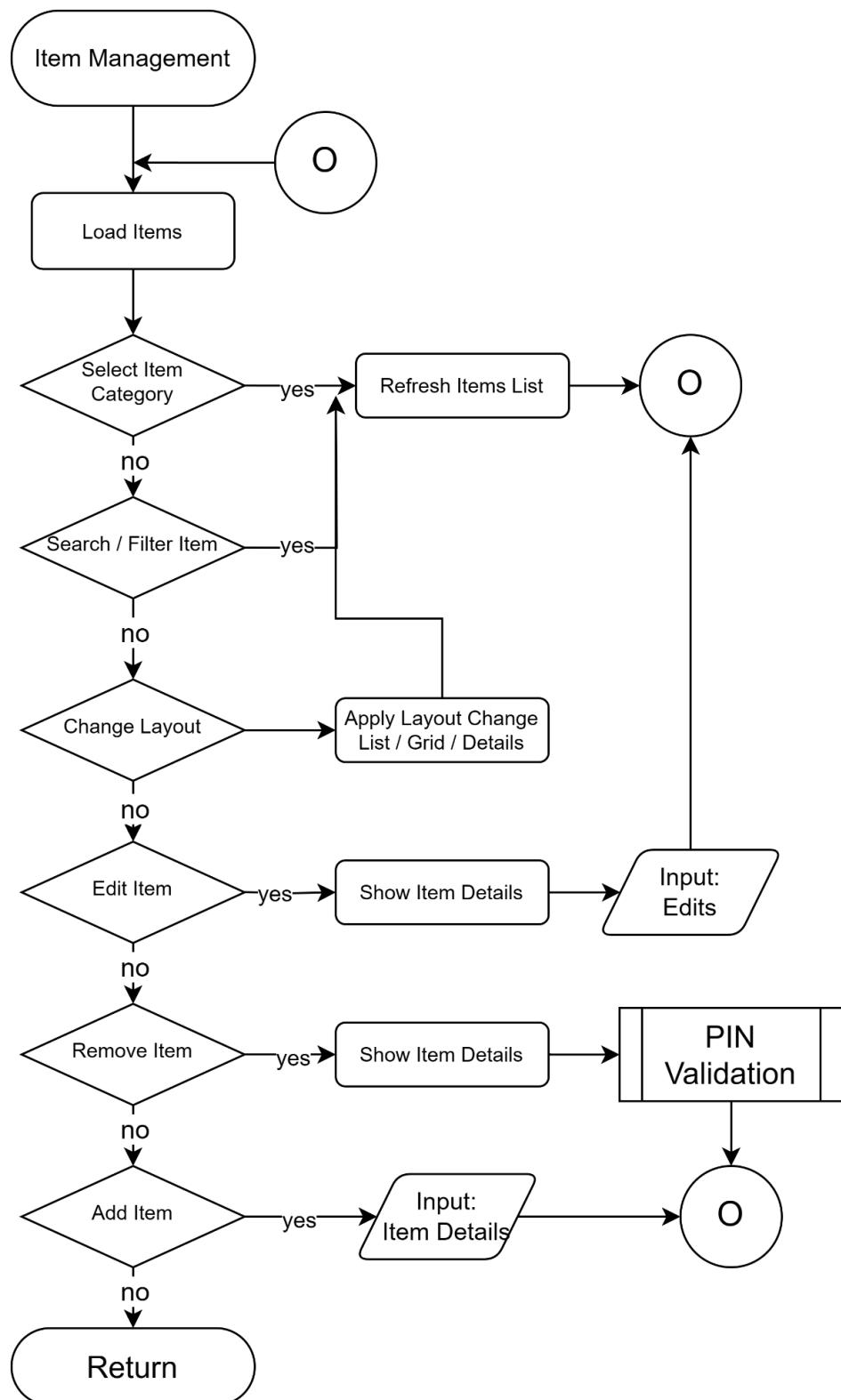
Create Order Flowchart



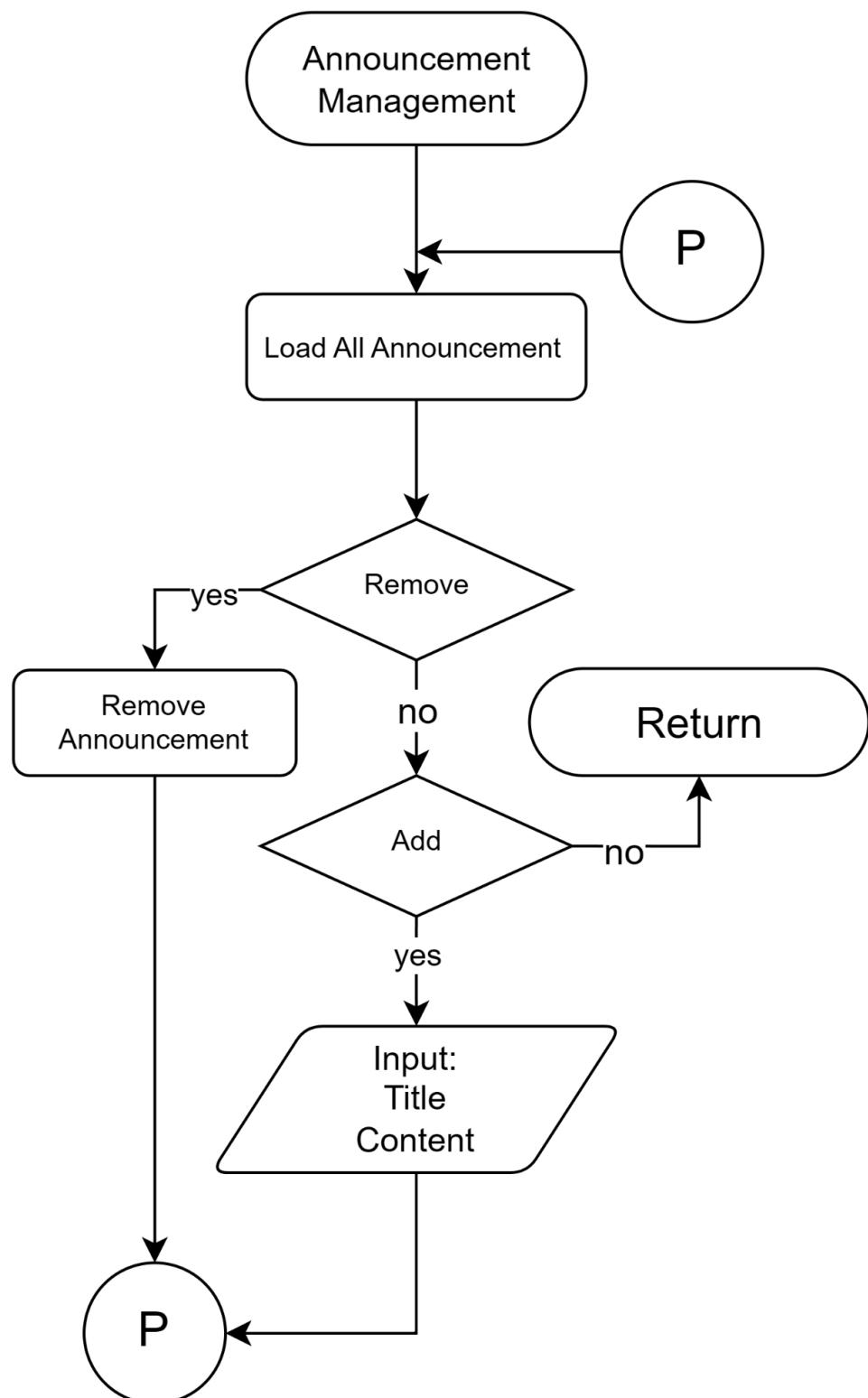
Cash In Flowchart



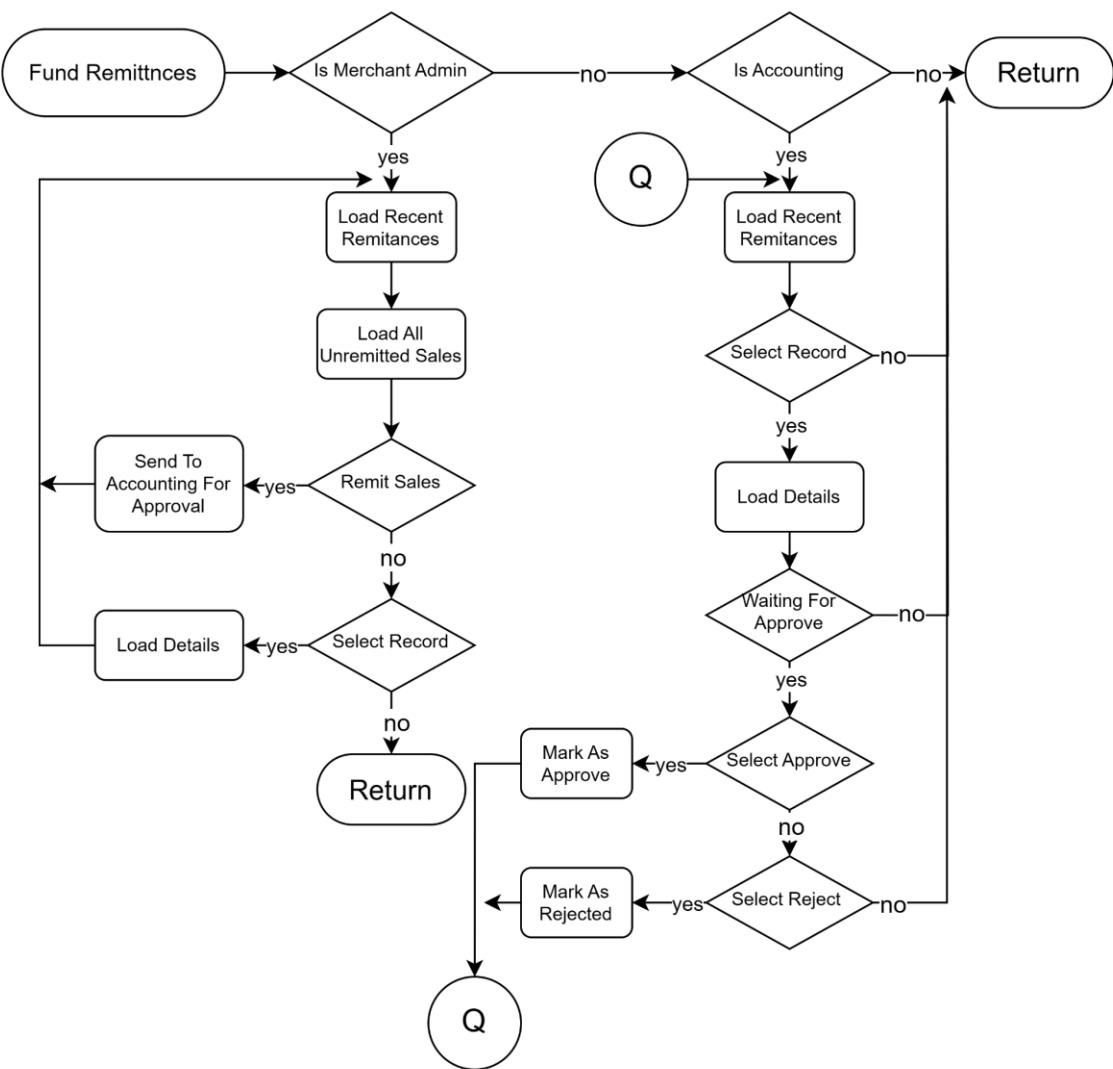
Order Flowchart



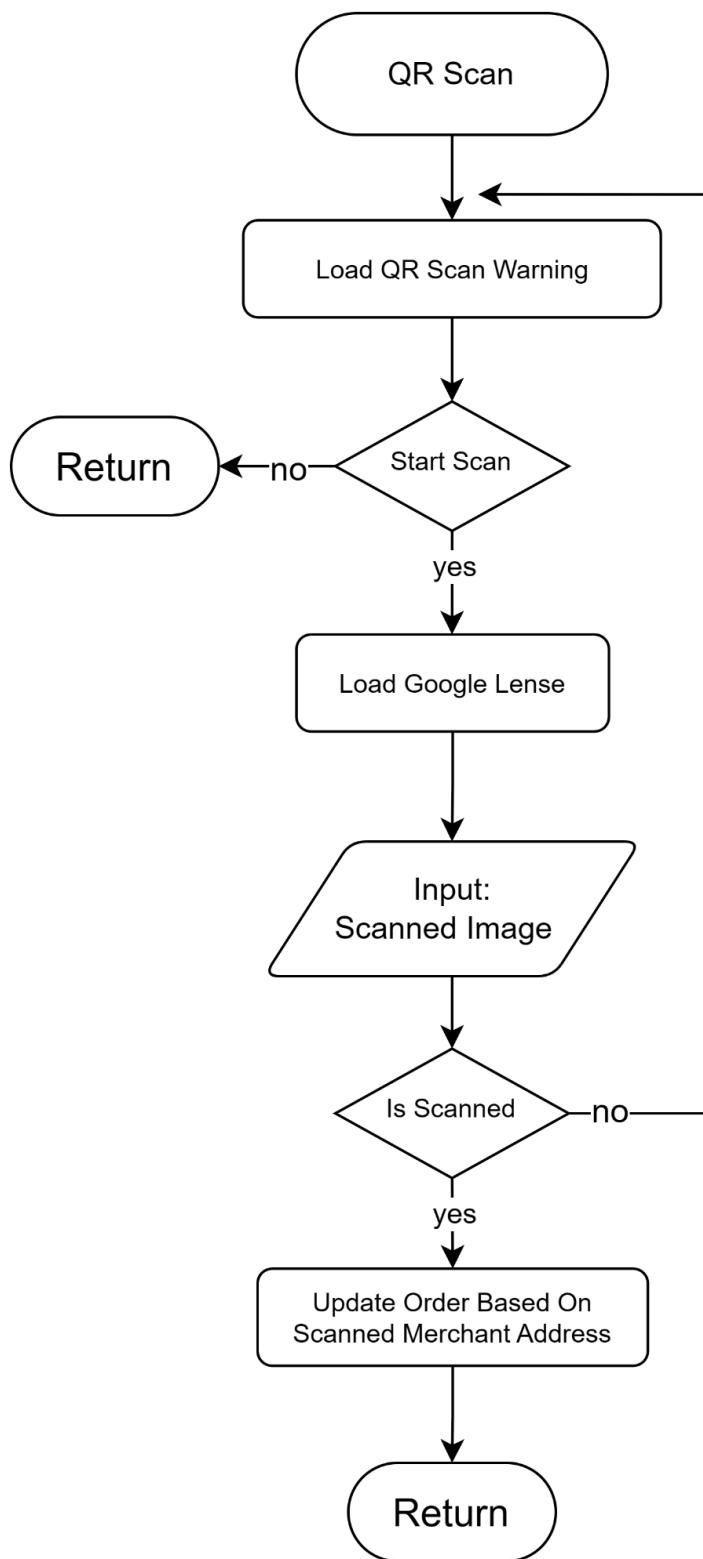
Items Management Flowchart



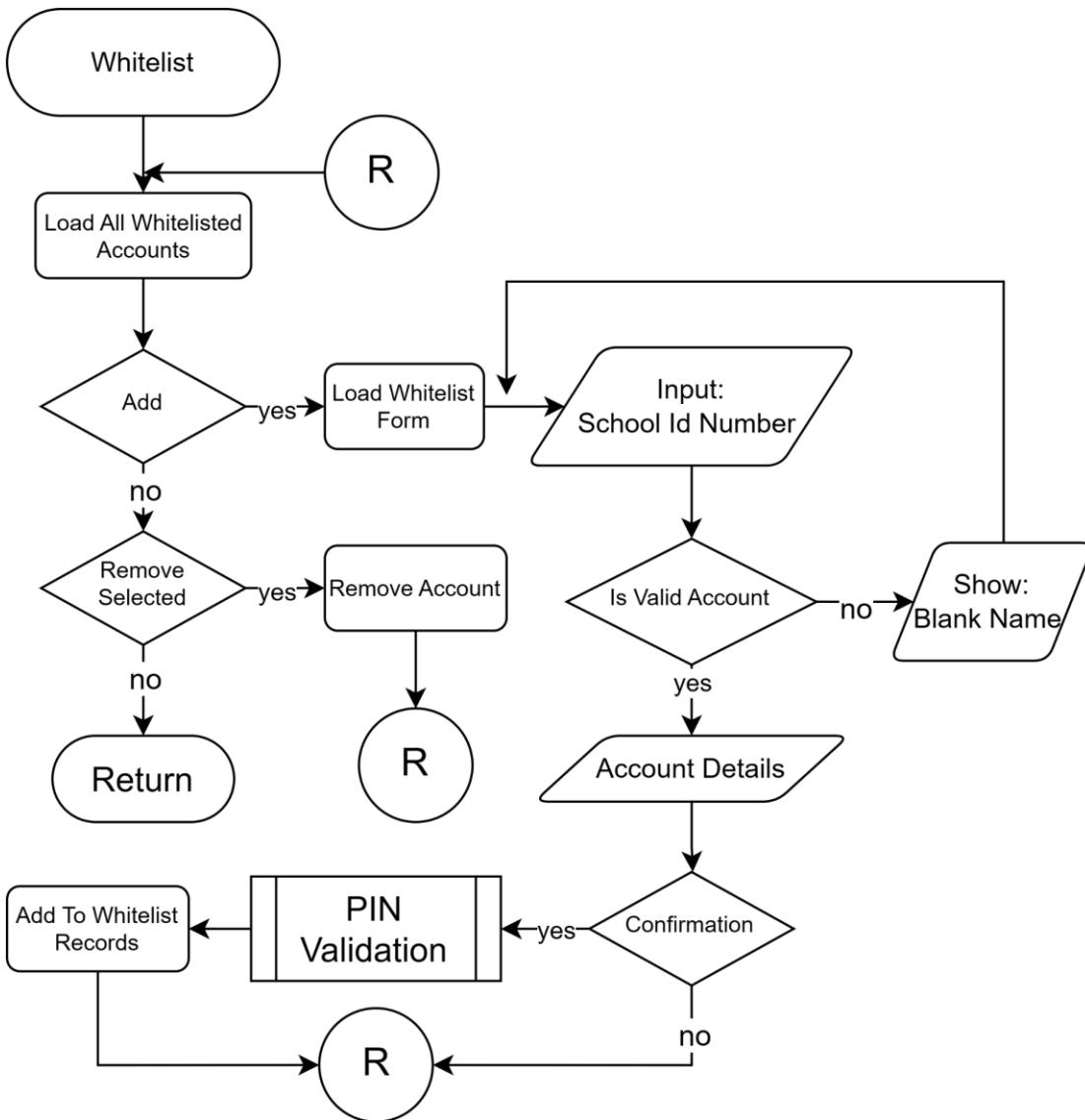
Announcements Management Flowchart



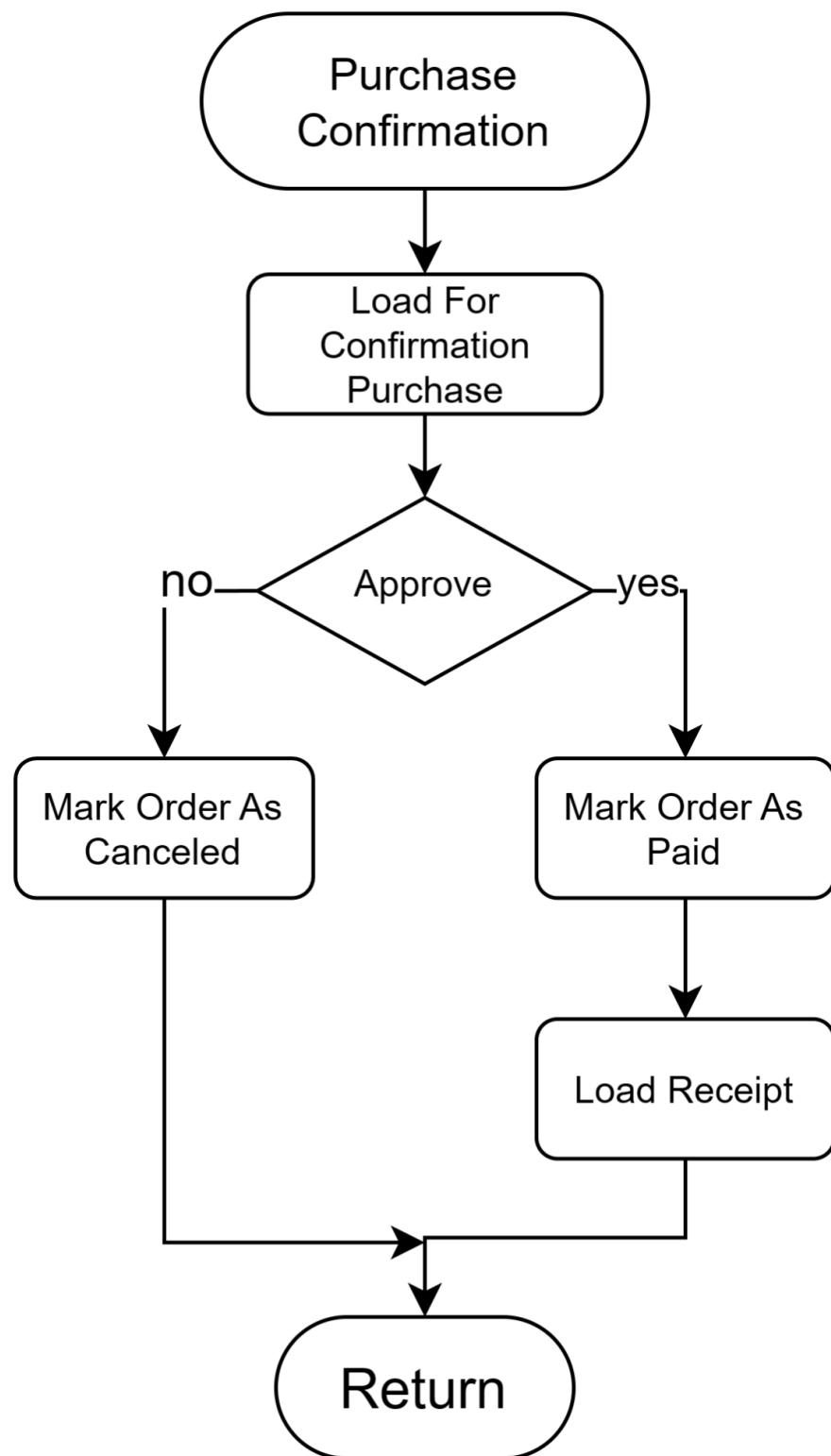
Fund Remittance Flowchart



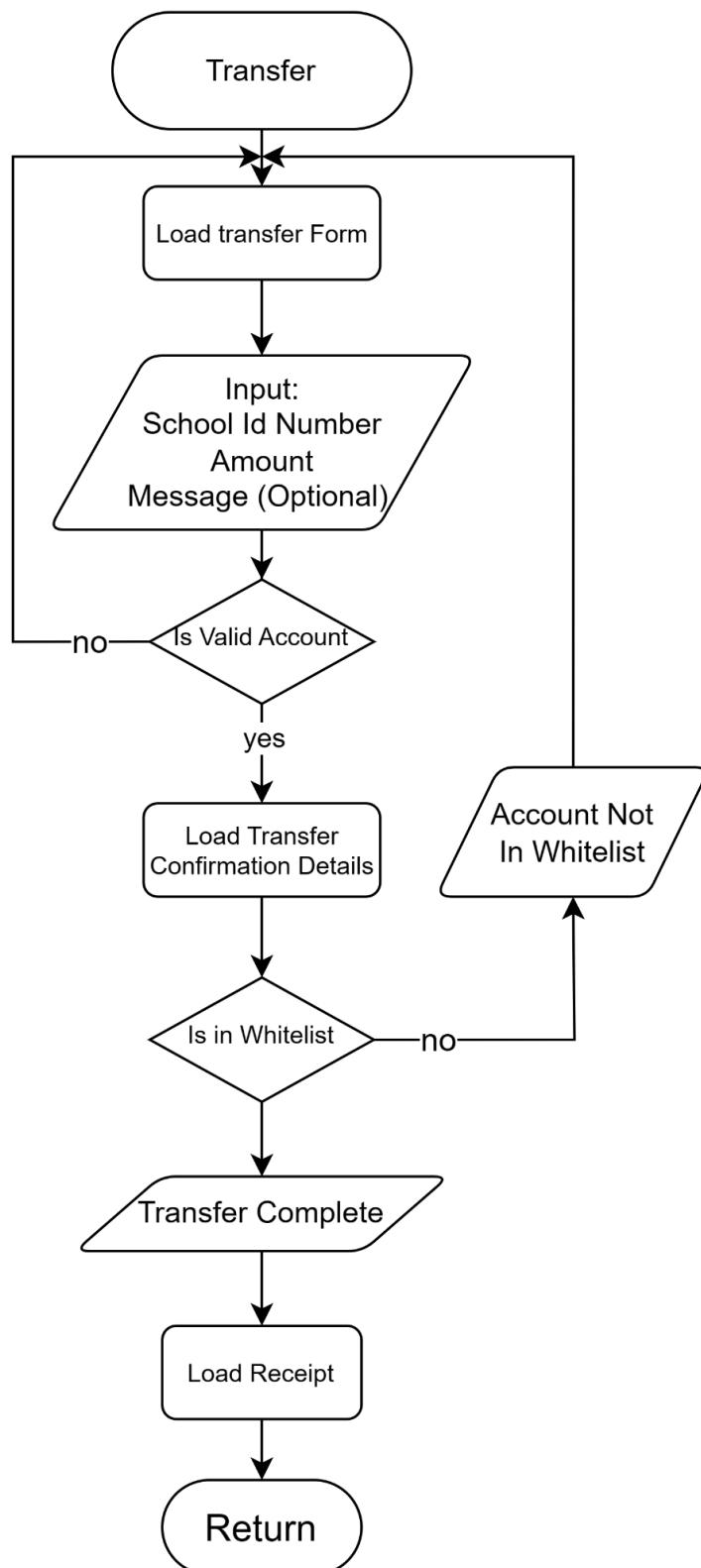
QR Scan Flowchart



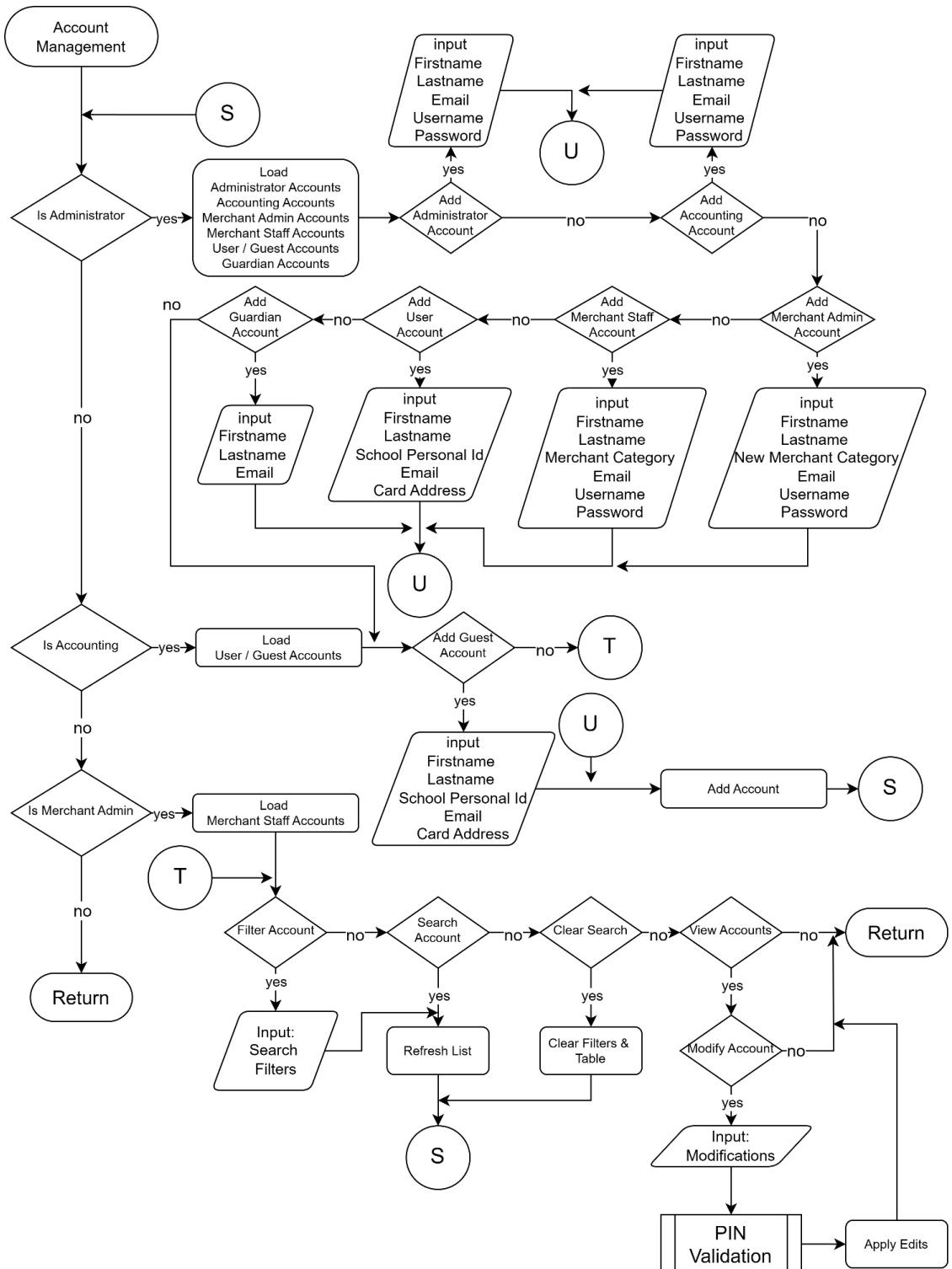
Whitelist Flowchart



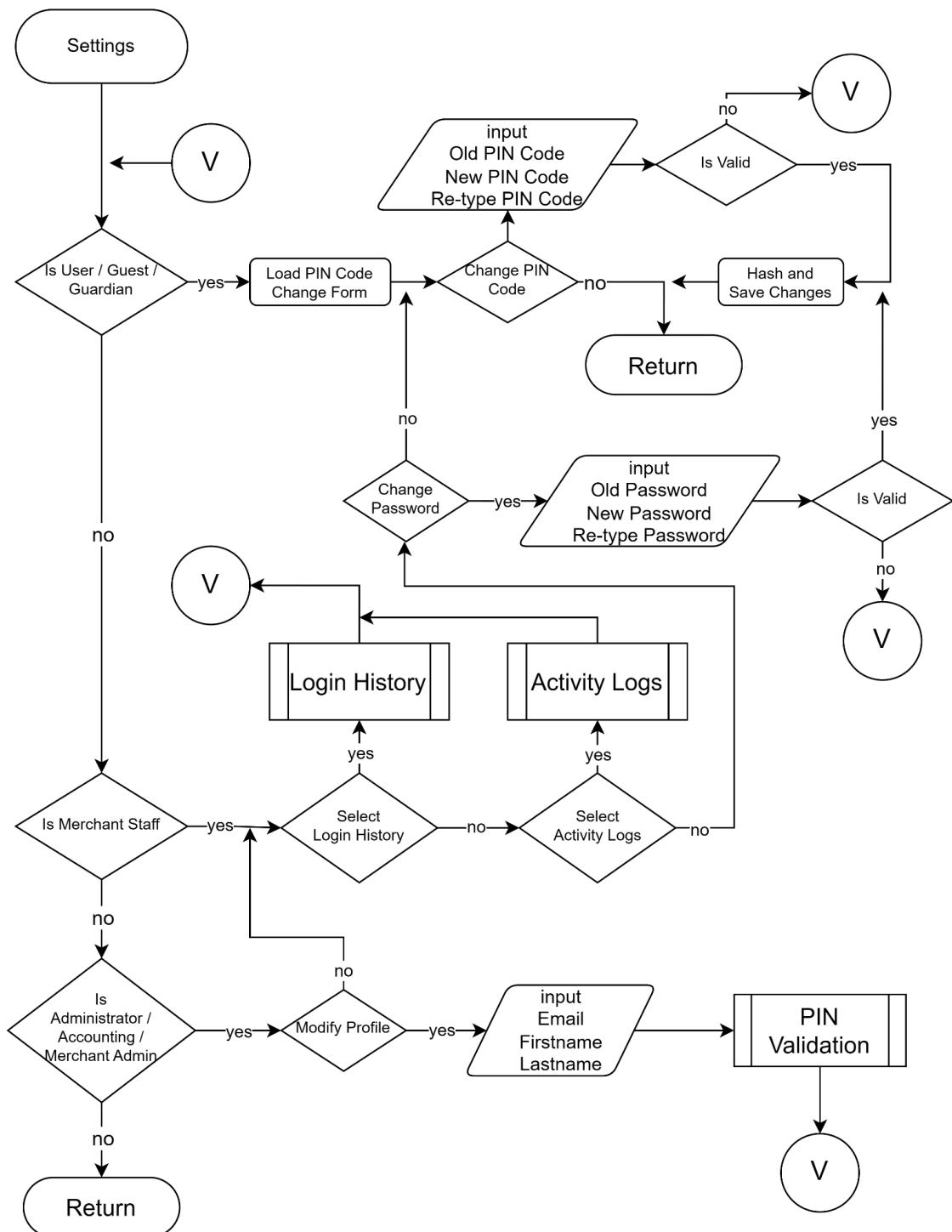
Purchase Confirmation Flowchart



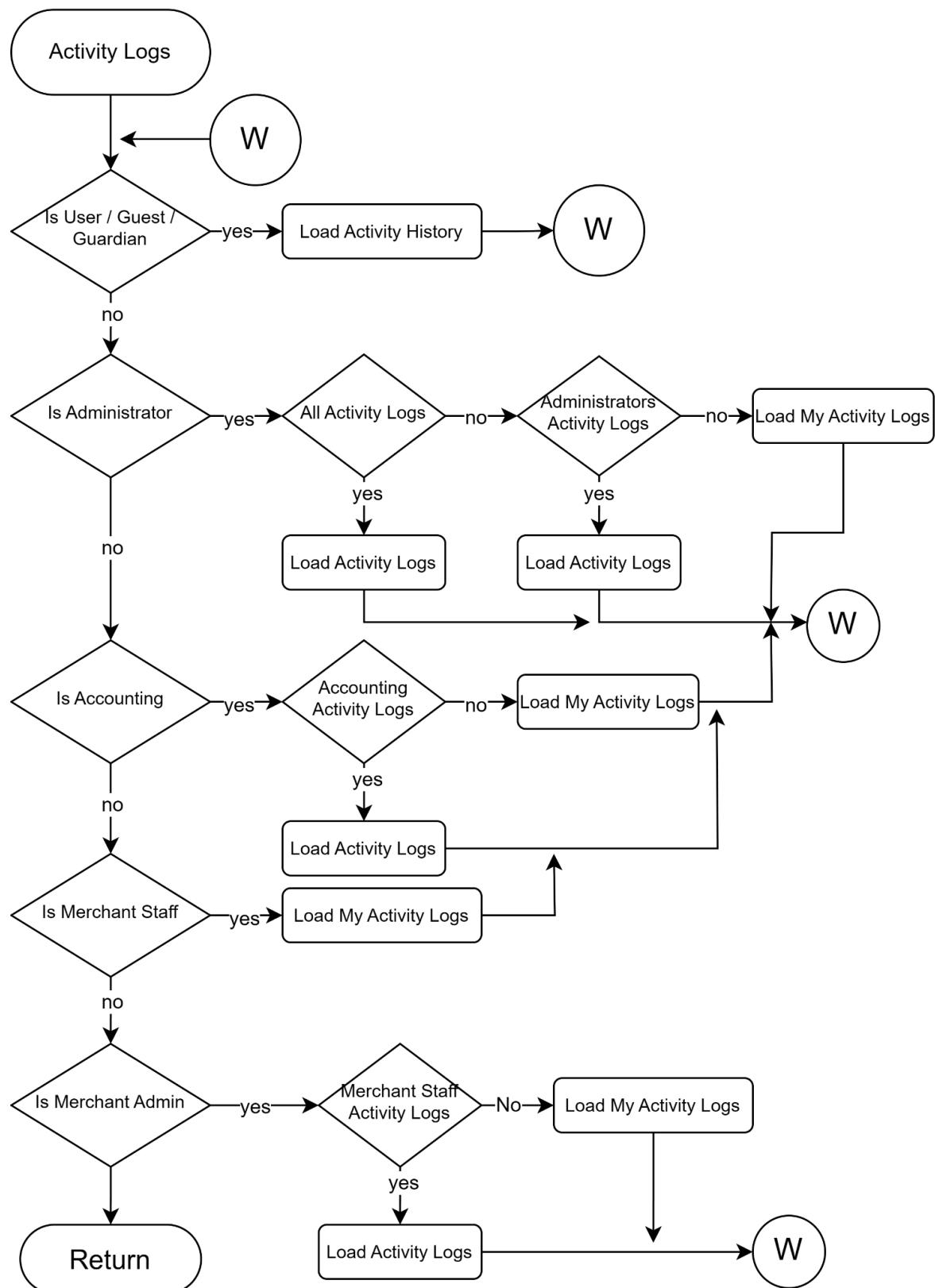
Transfer Flowchart



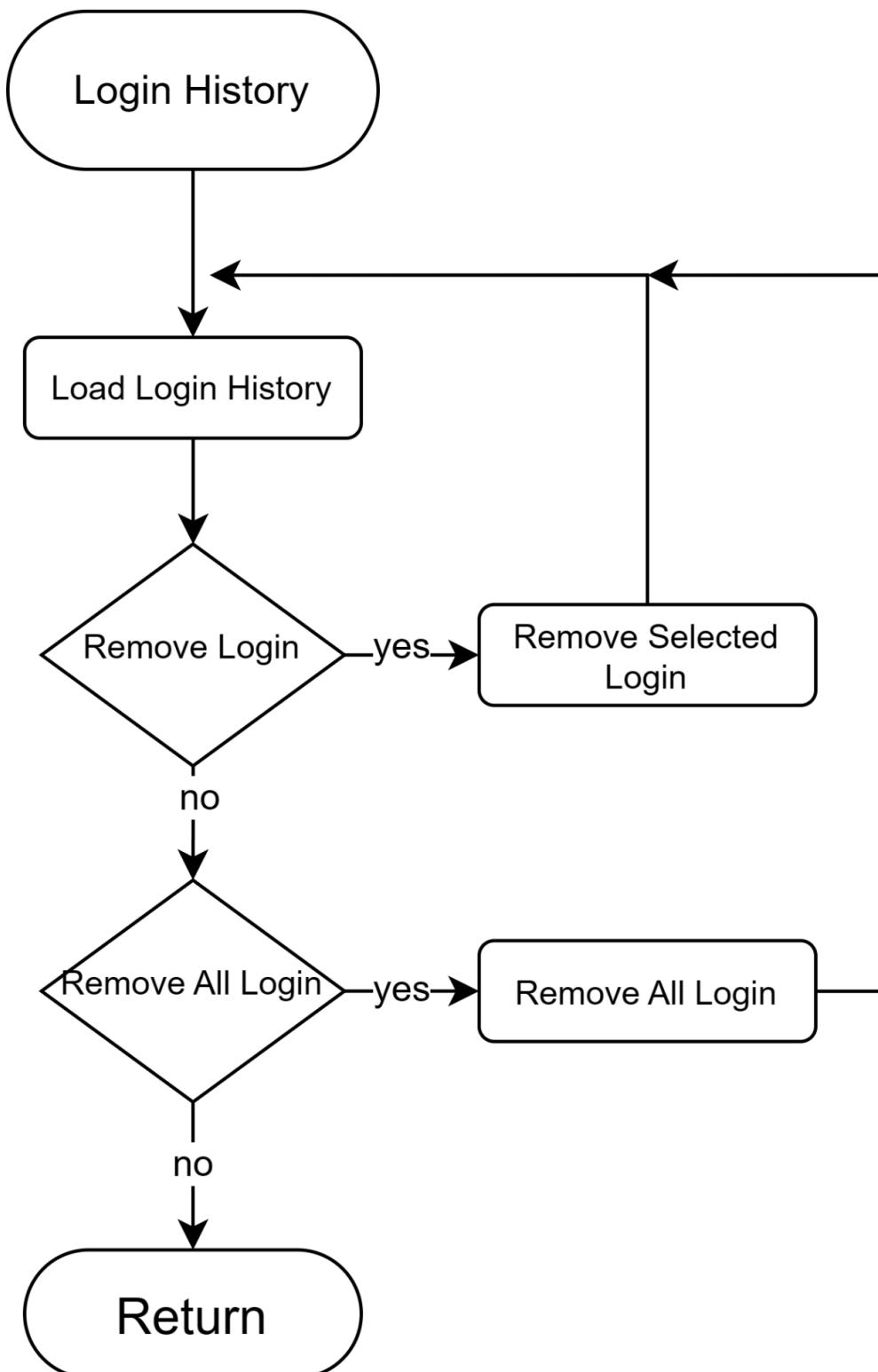
Account Management Flowchart



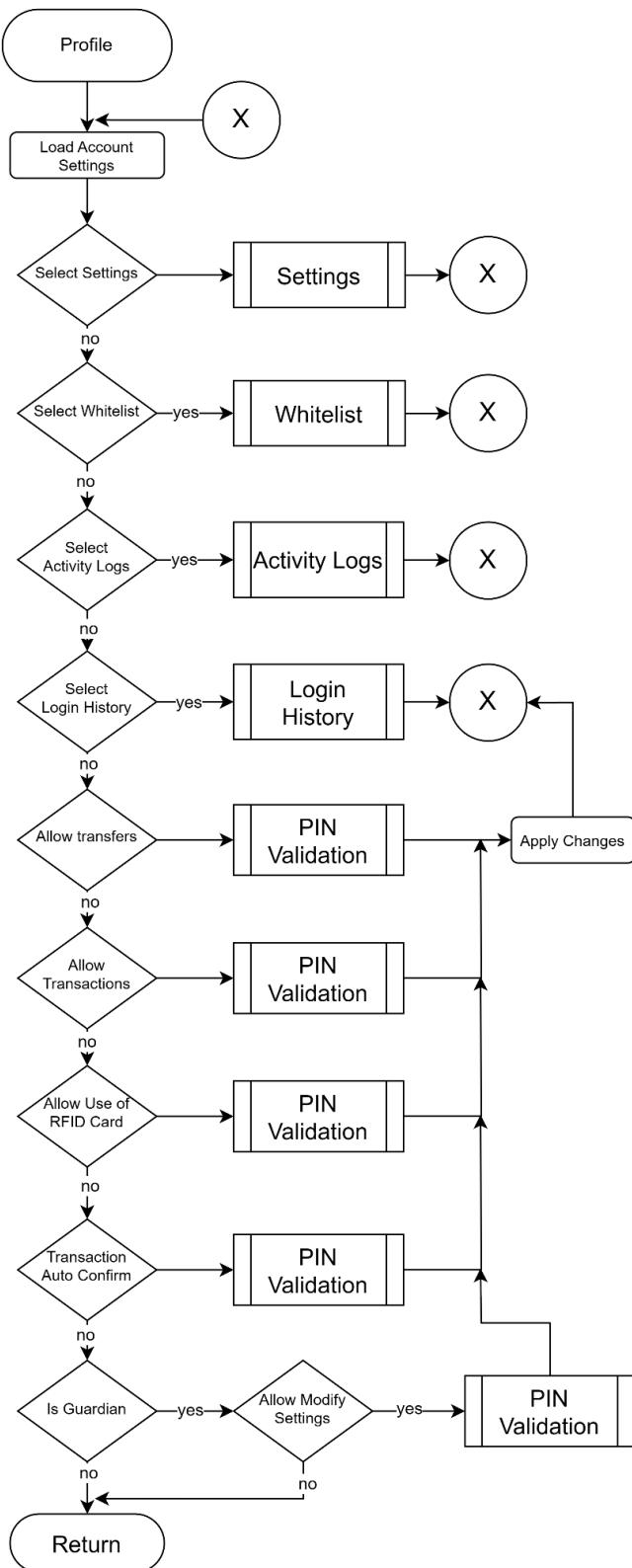
Settings Flowchart



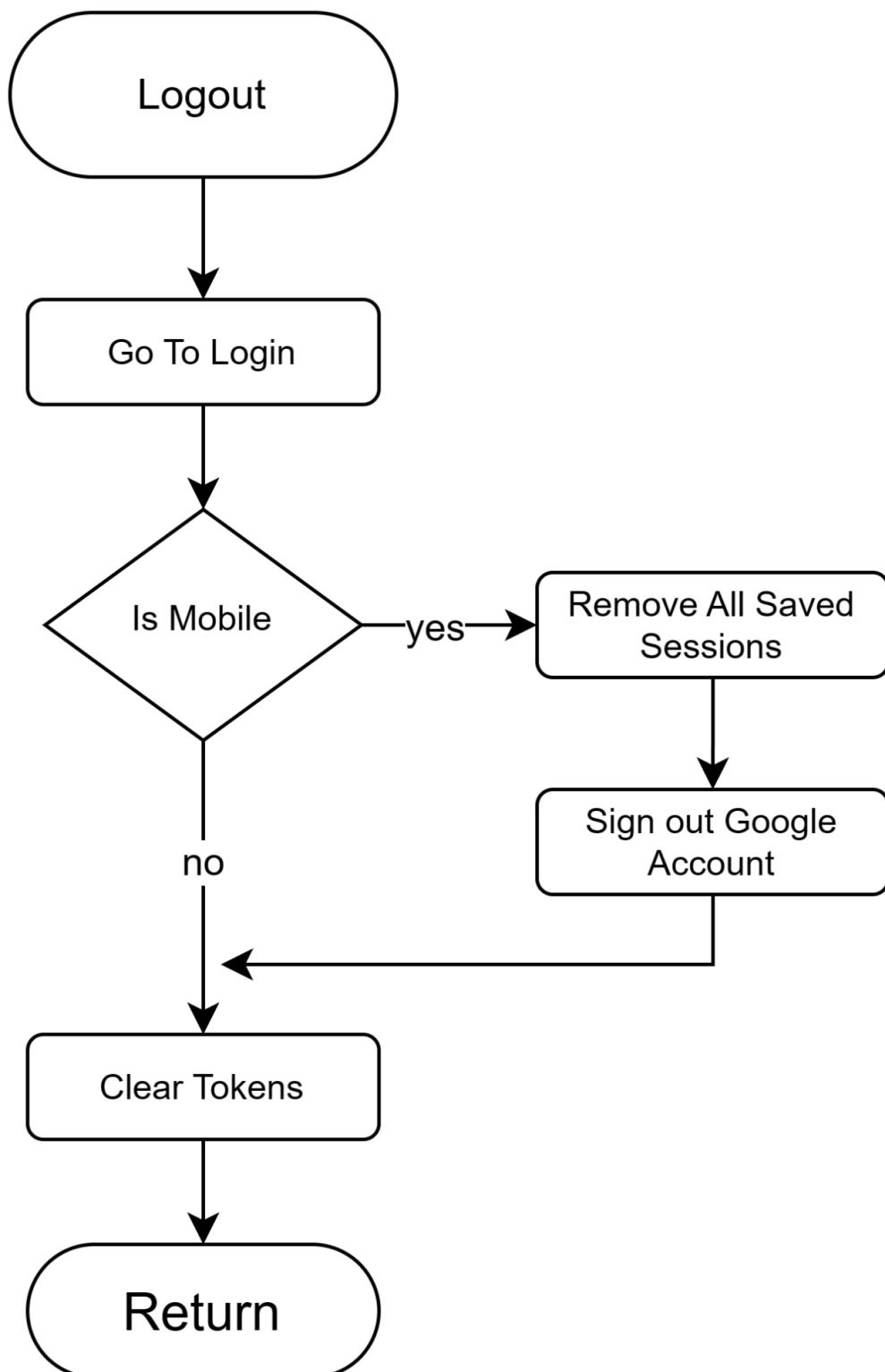
Activity Logs Flowchart



Login History Flowchart



Profile Flowchart



Logout Flowchart



Appendix F

Research Instruments



B-CASH: A mobile e-wallet application of BASTE

Dear Respondent,

Greetings, we are the 4th year students of BS Information Technology. This survey questionnaire is part of the requirements in our Capstone Project. The questionnaire is designed to evaluate various elements of school payments and transactions processes. This survey form is only intended for research purposes only. We would appreciate it if you could spare some time to answer this survey questionnaire. Thank you very much.

Our capstone project aims to make payments safer, easier, and more convenient for the Sebastianian community. We are developing a mobile e-wallet application called BCash, which will allow Sebastianians to do cashless transactions using their own mobile devices on-campus. With BCash, users can make purchases more conveniently and even transfer funds to other BCash users within the SSCR campuses.

Sincerely,

The developers:

Angkiko, Miguel Jean R.

Layson, Stephen Regan James B.

Morana, Fel Michael V.

Olaes, Alexander Ray F

Pagonzaga, Roland Vel P.

Category

- Student
- Faculty
- NTP / Non-Teaching Personnel
- Visitor

1. At school, what departments you usually pay or perform transactions with? Select all that apply.

- Bookstore
- Library
- Canteen
- Accounting
- Registrar
- Other: _____

2. From 1 to 5, rate your experience in performing financial transactions here at school in terms of convenience.

Very Satisfied Very Unsatisfied
1 2 3 4 5

3. Do you bring gadgets at school?

- Yes
- No

3.1. If yes. (Check all that apply)

- Mobile Phone
- Tablet
- Laptop

4. Are you familiar with any e-wallets?

- Yes
- No

3.1. If yes. (Check all that apply)

- Gcash
- Maya
- GrabPay
- Paypal
- Other: _____



5. Have you performed transactions using e-wallet?

- Yes
- No

3.1. If yes. (Check all that apply)

- Gcash
- Maya
- GrabPay
- Paypal

6. How often do you make purchases or perform transactions using an e-wallet?

Always/Often



Never/Rarely

1 2 3

7. Do you think that using an e-wallet is more convenient for you?

- Agree
- Disagree
- Neither agree nor disagree

8. Would you be willing to pay transaction fee each time you cash in?

- Yes
- No

9. Which method would you want to deposit cash into your e-wallet?

- Bank transfer
- Loading station
- Other: _____

10. Would it be more convenient for you to use e-wallet for cashless transactions here at school?

- Bank transfer
- Loading station
- Other: _____

11. Have you adapted to the new system of purchasing food at the school canteen?

- Yes
- No

12. Have you or anyone you know lost track of their money or coin chips while using the new payment system at the school canteen?

- Yes
- No

13. Have you or anyone you know used school funds intended for food and school payments for other purposes?

- Yes
- No

14. Do you have any recommendations for improving the school's canteen services?

Dear Respondent,

We are conducting a survey for our capstone project and would like to ask for your consent to be part of the next survey. Your answers will help us gather valuable insights for our research. We value your time and opinions, and we want to make sure that we have your consent before proceeding with the next survey

If you agree to participate in our next survey, please provide us with your contact details (Phone number, Facebook name, or Email) below so that we can reach out to you. If you do not wish to participate, you may leave the contact details section blank and submit the form.

Thank you for your time and consideration. Your participation is greatly appreciated.

Sincerely,
The Developers

Phone Number (optional)

SSCR email (optional)

Facebook Name (optional)



Appendix G

User Acceptance Test (UAT) Questionnaire

Accounting

UAT QUESTIONNAIRE

Dear Evaluators,

Greetings! We are 4th-year students of BS Information Technology. This UAT Survey questionnaire aims to assess the system's approval level. Your insights are crucial in ensuring the quality and effectiveness of BCash. Your valuable feedback will guide our final improvements and decisions. Thank you for being such an integral part of this process.

Our capstone project aims to make payments safer, easier, and more convenient for the Sebastianian community. We are developing a mobile e-wallet application called BCash, enabling Sebastianians to conduct cashless transactions using their mobile devices on the campus of San Sebastian College Recoletos - de Cavite. With BCash, users can conveniently make purchases and transfer funds to other BCash users within the campus.

Sincerely,

The BCash Development Team:

Angkiko, Miguel Jean R.

Layson, Stephen Regan James B.

Moraña, Fel Michael V.

Olaes, Alexander Ray F.

Pagonzaga, Roland Vel P.

1 – Strongly Disagree 2 – Disagree 3 – Agree 4 – Strongly Agree

Functional Suitability*	1	2	3	4
1. BCash as digital wallet can grant and revoke users' access.				
2. BCash as digital wallet can perform cash-in on behalf of the user.				
3. BCash as digital wallet performs accurate, timely and seamless transactions as well as reconciliation process to avoid cash loss risk.				
Performance Efficiency*	1	2	3	4
1. BCash as digital wallet can be accessed with ease both speed and efficiency (or processes are optimized) even peak times.				
Compatibility*	1	2	3	4
1. BCash as digital wallet is cross-platforms compatible i.e. screen resolutions.				
Usability*	1	2	3	4



Accounting

1. BCash as digital wallet is intuitive, user-friendly or the interface has elements that are easy to access.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. BCash as digital wallet can provide help functional.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reliability*	1	2	3	4
1. BCash as digital wallet is easily accessible and stable even during peak hours or network interruptions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Security*	1	2	3	4
1. BCash as digital wallet is secure and can be used for cashless transactions (cash in, funds transfer and payments).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. BCash as digital wallet has security measures (with authentication) to protect personal and financial information.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. BCash as digital wallet has the highest compliance security standard protocols and regulations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Declaration:

I, the undersigned, hereby confirm that I have completed this survey to the best of my knowledge and understanding. I understand that the information provided is truthful and accurate to the best of my ability.

Name: _____

Signature: _____

Date: _____



IT Experts

UAT QUESTIONNAIRE

Dear Evaluators,

Greetings! We are 4th-year students of BS Information Technology. This UAT Survey questionnaire aims to assess the system's approval level. Your insights are crucial in ensuring the quality and effectiveness of BCash. Your valuable feedback will guide our final improvements and decisions. Thank you for being such an integral part of this process.

Our capstone project aims to make payments safer, easier, and more convenient for the Sebastianian community. We are developing a mobile e-wallet application called BCash, enabling Sebastianians to conduct cashless transactions using their mobile devices on the campus of San Sebastian College Recoletos - de Cavite. With BCash, users can conveniently make purchases and transfer funds to other BCash users within the campus.

Sincerely,

The BCash Development Team:

Angkiko, Miguel Jean R.

Layson, Stephen Regan James B.

Moraña, Fel Michael V.

Olaes, Alexander Ray F.

Pagonzaga, Roland Vel P.

1 – Strongly Disagree 2 – Disagree 3 – Agree 4 – Strongly Agree

Functional Suitability*	1	2	3	4
1. BCash as digital wallet allows users to make quick and easy cash in, fund transfer and payments online.				
2. BCash as digital wallet performs accurate, timely and seamless transactions as well as reconciliation process to avoid cash loss risk.				
3. BCash as digital wallet ensures accurate balance calculations and transaction amounts.				
Performance Efficiency*	1	2	3	4
1. BCash as a digital wallet is optimized for quick transaction processing time.				
2. BCash as digital wallet can be accessed with ease both speed and efficiency.				
Compatibility*	1	2	3	4
1. BCash as digital wallet functions seamlessly on different screen resolutions found on mobile phones.				



IT Experts

Usability*	1	2	3	4
1. BCash as digital wallet is intuitive, user-friendly or the interface has elements that are easy to access.				
2. BCash as digital wallet can provide help functional.				
Reliability*	1	2	3	4
1. BCash as digital wallet is easily accessible and stable even during network interruptions.				
2. BCash as digital wallet has the capability for backup and recovery mechanisms.				
Security*	1	2	3	4
1. BCash as digital wallet is secure and can be used for cashless transactions (cash in, funds transfer and payments).				
2. BCash as digital wallet has security measures (with authentication) to protect personal and financial information.				
3. BCash as digital wallet has the compliance security standard protocols and regulations.				

Declaration:

I, the undersigned, hereby confirm that I have completed this survey to the best of my knowledge and understanding. I understand that the information provided is truthful and accurate to the best of my ability.

Name: _____

Signature: _____

Date: _____



IT Experts

UAT QUESTIONNAIRE

Dear Evaluators,

Greetings! We are 4th-year students of BS Information Technology. This UAT Survey questionnaire aims to assess the system's approval level. Your insights are crucial in ensuring the quality and effectiveness of BCash. Your valuable feedback will guide our final improvements and decisions. Thank you for being such an integral part of this process.

Our capstone project aims to make payments safer, easier, and more convenient for the Sebastianian community. We are developing a mobile e-wallet application called BCash, enabling Sebastianians to conduct cashless transactions using their mobile devices on the campus of San Sebastian College Recoletos - de Cavite. With BCash, users can conveniently make purchases and transfer funds to other BCash users within the campus.

Sincerely,

The BCash Development Team:

Angkiko, Miguel Jean R.

Layson, Stephen Regan James B.

Moraña, Fel Michael V.

Olaes, Alexander Ray F.

Pagonzaga, Roland Vel P.

1 – Strongly Disagree 2 – Disagree 3 – Agree 4 – Strongly Agree

Functional Suitability*	1	2	3	4
1. BCash as web application performs accurate, timely and seamless transactions as well as reconciliation process to avoid cash loss risk.				
2. BCash as web application allows Administrator to modify user and system configurations.				
3. BCash as web application ensures accurate balance calculations and transaction amounts.				
4. BCash as web application has the capability to control alerts, cards, and users.				
5. BCash as web application can grant and revoke users' access.				
6. BCash as web application can perform cash-in on behalf of the user.				



IT Experts

1. BCash as web application can be accessed with ease both speed and efficiency.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. BCash as a web application is optimized for quick transaction processing time.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Compatibility*	1	2	3	4
1. BCash, as a web application, functions seamlessly on different screen resolutions on computers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Usability*	1	2	3	4
1. BCash as web application is intuitive, user-friendly or the interface has elements that are easy to access.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. BCash as web application can provide help functional.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reliability*	1	2	3	4
1. BCash as web application is easily accessible and stable even during network interruptions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. BCash as web application has the capability for backup and recovery mechanisms.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Security*	1	2	3	4
1. BCash as web application is secure and can be used for cashless transactions (cash in and funds transfer).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. BCash as web application has security measures (with authentication) to protect personal and financial information.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. BCash as web application has the highest compliance security standard protocols and regulations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Declaration:

I, the undersigned, hereby confirm that I have completed this survey to the best of my knowledge and understanding. I understand that the information provided is truthful and accurate to the best of my ability.

Name: _____

Signature: _____

Date: _____



Administrator

UAT QUESTIONNAIRE

Dear Evaluators,

Greetings! We are 4th-year students of BS Information Technology. This UAT Survey questionnaire aims to assess the system's approval level. Your insights are crucial in ensuring the quality and effectiveness of BCash. Your valuable feedback will guide our final improvements and decisions. Thank you for being such an integral part of this process.

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Sincerely,

The BCash Development Team:

Angkiko, Miguel Jean R.

Layson, Stephen Regan James B.

Moraña, Fel Michael V.

Olaes, Alexander Ray F.

Pagonzaga, Roland Vel P.

1 – Strongly Disagree 2 – Disagree 3 – Agree 4 – Strongly Agree

Functional Suitability*	1	2	3	4
1. BCash as web application allows Administrator to modify user and system configurations.				
2. BCash as web application ensures accurate balance calculations and transaction amounts.				
3. BCash as web application has the capability to control alerts, cards, and users.				
4. BCash as web application can grant and revoke users' access.				
Performance Efficiency*	1	2	3	4
1. BCash as web application can be accessed with ease both speed and efficiency (or processes are optimized) even peak times.				
Compatibility*	1	2	3	4
1. BCash, as a web application, functions seamlessly on different screen resolutions on computers.				

**Administrator**

Usability*	1	2	3	4
1. BCash as web application is intuitive, user-friendly or the interface has elements that are easy to access.				
2. BCash as web application can provide help functional.				
Reliability*	1	2	3	4
1. BCash as web application is easily accessible and stable even during peak hours or network interruptions.				
2. BCash as web application has the capability for backup and recovery mechanisms.				
Security*	1	2	3	4
1. BCash as web application is secure and can be used for cashless transactions (cash in and funds transfer).				
2. BCash as web application has security measures (with authentication) to protect personal and financial information.				
3. BCash as web application has the highest compliance security standard protocols and regulations.				

Declaration:

I, the undersigned, hereby confirm that I have completed this survey to the best of my knowledge and understanding. I understand that the information provided is truthful and accurate to the best of my ability.

Name: _____

Signature: _____

Date: _____



USER (STUDENT, STAFF, GUEST)

UAT QUESTIONNAIRE

Dear Evaluators,

Greetings! We are 4th-year students of BS Information Technology. This UAT Survey questionnaire aims to assess the system's approval level. Your insights are crucial in ensuring the quality and effectiveness of BCash. Your valuable feedback will guide our final improvements and decisions. Thank you for being such an integral part of this process.

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Sincerely,

The BCash Development Team:

Angkiko, Miguel Jean R.

Layson, Stephen Regan James B.

Moraña, Fel Michael V.

Olaes, Alexander Ray F.

Pagonzaga, Roland Vel P.

1 – Strongly Disagree 2 – Disagree 3 – Agree 4 – Strongly Agree

Functional Suitability*	1	2	3	4
1. BCash as digital wallet allows users to make quick and easy cash in, fund transfer and payments online.				
2. BCash as digital wallet performs accurate, timely and seamless transactions as well as reconciliation process to avoid cash loss risk.				
Performance Efficiency*	1	2	3	4
1. BCash as digital wallet can be accessed with ease both speed and efficiency (or processes are optimized) even peak times.				
Compatibility*	1	2	3	4
1. BCash as digital wallet is cross-platforms compatible i.e. screen resolutions.				
Usability*	1	2	3	4
1. BCash as digital wallet is intuitive, user-friendly or the interface has elements that are easy to access.				



USER (STUDENT, STAFF, GUEST)

2. BCash as digital wallet can provide help functional.				
Reliability*	1	2	3	4
1. BCash as digital wallet is easily accessible and stable even during peak hours or network interruptions.				
Security*	1	2	3	4
1. BCash as digital wallet is secure and can be used for cashless transactions (cash in, funds transfer and payments).				
2. BCash as digital wallet has security measures (with authentication) to protect personal and financial information.				
3. BCash as digital wallet has the highest compliance security standard protocols and regulations.				

Declaration:

I, the undersigned, hereby confirm that I have completed this survey to the best of my knowledge and understanding. I understand that the information provided is truthful and accurate to the best of my ability.

Name: _____

Signature: _____

Date: _____



GUARDIAN

UAT QUESTIONNAIRE

Dear Evaluators,

Greetings! We are 4th-year students of BS Information Technology. This UAT Survey questionnaire aims to assess the system's approval level. Your insights are crucial in ensuring the quality and effectiveness of BCash. Your valuable feedback will guide our final improvements and decisions. Thank you for being such an integral part of this process.

Our capstone project aims to make payments safer, easier, and more convenient for the Sebastianian community. We are developing a mobile e-wallet application called BCash, enabling Sebastianians to conduct cashless transactions using their mobile devices on the campus of San Sebastian College Recoletos - de Cavite. With BCash, users can conveniently make purchases and transfer funds to other BCash users within the campus.

Sincerely,

The BCash Development Team:

Angkiko, Miguel Jean R.

Layson, Stephen Regan James B.

Moraña, Fel Michael V.

Olaes, Alexander Ray F.

Pagonzaga, Roland Vel P.

1 – Strongly Disagree 2 – Disagree 3 – Agree 4 – Strongly Agree

Functional Suitability*	1	2	3	4
1. BCash as digital wallet has the capability to limit and handle user settings.				
2. BCash as digital wallet performs accurate, timely and seamless transactions as well as reconciliation process to avoid cash loss risk.				
Performance Efficiency*	1	2	3	4
1. BCash as digital wallet can be accessed with ease both speed and efficiency (or processes are optimized) even peak times.				
Compatibility*	1	2	3	4
1. BCash as digital wallet is cross-platforms compatible i.e. screen resolutions.				
Usability*	1	2	3	4
1. BCash as digital wallet is intuitive, user-friendly or the interface has elements that are easy to access.				

**GUARDIAN**

2. BCash as digital wallet can provide help functional.				
Reliability*	1	2	3	4
1. BCash as digital wallet is easily accessible and stable even during peak hours or network interruptions.				
Security*	1	2	3	4
1. BCash as digital wallet is secure and can be used for cashless transactions (cash in, funds transfer and payments).				
2. BCash as digital wallet has security measures (with authentication) to protect personal and financial information.				
3. BCash as digital wallet has the highest compliance security standard protocols and regulations.				

Declaration:

I, the undersigned, hereby confirm that I have completed this survey to the best of my knowledge and understanding. I understand that the information provided is truthful and accurate to the best of my ability.

Name: _____

Signature: _____

Date: _____



Merchant

UAT QUESTIONNAIRE

Dear Evaluators,

Greetings! We are 4th-year students of BS Information Technology. This UAT Survey questionnaire aims to assess the system's approval level. Your insights are crucial in ensuring the quality and effectiveness of BCash. Your valuable feedback will guide our final improvements and decisions. Thank you for being such an integral part of this process.

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Sincerely,

The BCash Development Team:

Angkiko, Miguel Jean R.

Layson, Stephen Regan James B.

Moraña, Fel Michael V.

Olaes, Alexander Ray F.

Pagonzaga, Roland Vel P.

1 – Strongly Disagree 2 – Disagree 3 – Agree 4 – Strongly Agree

Functional Suitability*	1	2	3	4
1. BCash as digital wallet has the capacity to manage a list of items and a staff list.				
2. BCash as a digital wallet is accurate in remitting revenue to the accounting office.				
3. BCash as digital wallet performs accurate, timely and seamless transactions as well as reconciliation process to avoid cash loss risk.				
Performance Efficiency*	1	2	3	4
1. BCash as digital wallet can be accessed with ease both speed and efficiency (or processes are optimized) even peak times.				
Compatibility*	1	2	3	4
1. BCash as digital wallet is cross-platforms compatible i.e. screen resolutions.				
Usability*	1	2	3	4

**Merchant**

1. BCash as digital wallet is intuitive, user-friendly or the interface has elements that are easy to access.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. BCash as digital wallet can provide help functional.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reliability*	1	2	3	4
1. BCash as digital wallet is easily accessible and stable even during peak hours or network interruptions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Security*	1	2	3	4
1. BCash as digital wallet is secure and can be used for cashless transactions (cash in, funds transfer and payments).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. BCash as digital wallet has security measures (with authentication) to protect personal and financial information.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. BCash as digital wallet has the highest compliance security standard protocols and regulations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Declaration:

I, the undersigned, hereby confirm that I have completed this survey to the best of my knowledge and understanding. I understand that the information provided is truthful and accurate to the best of my ability.

Name: _____

Signature: _____

Date: _____



Appendix H

System Acknowledgements

SYSTEM ACKNOWLEDGEMENT

This is to certify that the study made by Miguel Jean R. Angkiko, Stephen Regan James B. Layson, Fel Michael V. Morana, Alexander Ray F. Olaes and Roland Vel P. Pagonzaga entitled “BCash: A Mobile E-wallet Application” has been accepted with possible implementation.

Furthermore, the information that has been documented about our BCash E-wallet System is true and correct.

For your kind consideration.



Christopher C. Lim, CPA, MBA

School Comptroller

San Sebastian College-Recoletos de Cavite



SYSTEM ACKNOWLEDGEMENT

This is to certify that the study made by Miguel Jean R. Angkiko, Stephen Regan James B. Layson, Fel Michael V. Morana, Alexander Ray F. Olaes and Roland Vel P. Pagonzaga entitled “BCash: A Mobile E-wallet Application” has been accepted with possible implementation.

Furthermore, the information that has been documented about our BCash E-wallet System is true and correct.

For your kind consideration.

A handwritten signature in black ink, appearing to read "Xevious Pauliver Quemuel".

Xevious Pauliver Quemuel
Canteen Manager
San Sebastian College-Recoletos de Cavite



SYSTEM ACKNOWLEDGEMENT

This is to certify that the study made by Miguel Jean R. Angkiko, Stephen Regan James B. Layson, Fel Michael V. Morana, Alexander Ray F. Olaes and Roland Vel P. Pagonzaga entitled "BCash: A Mobile E-wallet Application" has been accepted with possible implementation.

Furthermore, the information that has been documented about our BCash E-wallet System is true and correct.

For your kind consideration.

A handwritten signature in black ink, appearing to read "Rheyndard G. Doneza, MBA".

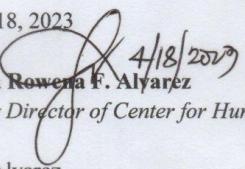
Rheyndard G. Doneza, MBA
Director of Center for Information and Communication Technology
San Sebastian College - Recoletos de Cavite



Appendix I

Letters

April 18, 2023


Maria Rowena F. Alvarez

Acting Director of Center for Human Resource Management and Development

Mrs. Alvarez,

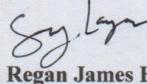
We, the third-year students of BSIT (Bachelor of Science in Information Technology) at San Sebastian College – Recoletos de Cavite, are currently working on our Capstone Project as a partial requirement for our degree program. Our capstone project entitled "BCash: A Mobile E-Wallet Application of BASTE" aims to study the feasibility of implementing a mobile e-wallet application for the San Sebastian College community.

With this in mind, we would like to request your permission to distribute the attached survey questionnaires to the faculty and non-teaching personnel of the school. The respondents will be randomly selected for the study, and the data collected will be used solely for academic purposes.

We appreciate your time and consideration in this matter, and we hope for a positive response from your good office.

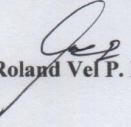
Respectfully yours,


Miguel Jean R. Angkiko


Stephen Regan James B. Layson

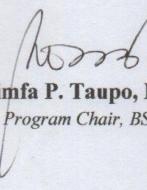

Fel Michael V. Moraña


Alexander Ray F. Olaes


Roland Vel P. Pagonzaga

Noted by:


Depnize Perea Sta. Barbara
Capstone Project Adviser


Nimfa P. Taupo, MSCS
Program Chair, BSIT


Tommy A. Ditucalan, RME
Director, CRCW



April 18, 2023

Edwin H. Expectacion, LPT
Principal, Junior High School

Mr. Expectacion,

We, the third-year students of BSIT (Bachelor of Science in Information Technology) at San Sebastian College – Recoletos de Cavite, are currently working on our Capstone Project as a partial requirement for our degree program. Our capstone project entitled "BCash: A Mobile E-Wallet Application of BASTE" aims to study the feasibility of implementing a mobile e-wallet application for the San Sebastian College community.

With this in mind, we would like to request your permission to distribute the attached survey questionnaires to the junior high school students of the school. The respondents will be randomly selected for the study, and the data collected will be used solely for academic purposes.

We appreciate your time and consideration in this matter, and we hope for a positive response from your good office.

Respectfully yours,

Miguel Jean R. Angkiko

Stephen Regan James B. Layson

Fel Michael V. Moraña

Alexander Ray F. Olaes

Roland Vel P. Pagonzaga

Noted by:

Denize Perea Sta. Barbara
Capstone Project Adviser

Nimfa P. Taupo, MSCS
Program Chair, BSIT

Tommy A. Ditucalan, RME
Director, CRCW



April 18, 2023

Olivia B. del Rosario, LPT
Principal, Kinder – Grade School

Mrs. del Rosario,

We, the third-year students of BSIT (Bachelor of Science in Information Technology) at San Sebastian College – Recoletos de Cavite, are currently working on our Capstone Project as a partial requirement for our degree program. Our capstone project entitled "BCash: A Mobile E-Wallet Application of BASTE" aims to study the feasibility of implementing a mobile e-wallet application for the San Sebastian College community.

With this in mind, we would like to request your permission to distribute the attached survey questionnaires to the grade school students of the school. The respondents will be randomly selected for the study, and the data collected will be used solely for academic purposes.

We appreciate your time and consideration in this matter, and we hope for a positive response from your good office.

Respectfully yours,

Miguel Jean R. Angkiko

Stephen Regan James B. Layson

Fel Michael V. Moraña

Alexander Ray F. Olaes

Roland Vel P. Pagonzaga

Noted by:

Denizte Ferea Sta. Barbara
Capstone Project Adviser

Nimfa P. Taupo, MSCS
Program Chair, BSIT

Tommy A. Ditucalan, RME
Director, CRCW



April 18, 2023

Joan Pangilinan 4/17/23
Principal, Senior High School

Mrs. Pangilinan,

We, the third-year students of BSIT (Bachelor of Science in Information Technology) at San Sebastian College – Recoletos de Cavite, are currently working on our Capstone Project as a partial requirement for our degree program. Our capstone project entitled "BCash: A Mobile E-Wallet Application of BASTE" aims to study the feasibility of implementing a mobile e-wallet application for the San Sebastian College community.

With this in mind, we would like to request your permission to distribute the attached survey questionnaires to the senior high school students of the school. The respondents will be randomly selected for the study, and the data collected will be used solely for academic purposes.

We appreciate your time and consideration in this matter, and we hope for a positive response from your good office.

Respectfully yours,

Miguel Jean R. Angkiko

Stephen Regan James B. Layson

Fel Michael V. Moraña

Alexander Ray F. Olaes

Roland Vel P. Pagonzaga

Noted by:

Denizte Perea Sta. Barbara
Capstone Project Adviser

Nimfa P. Taupo, MSCS
Program Chair, BSIT

Tommy A. Ditucalan, RME
Director, CRCW

→ Could seek help from the
SHS SSG to share the task of
the survey through ASOP

Meam Joan



April 18, 2023

4/20/23
Jennifer B. Escobar, PhD
College Dean

Dr. Escobar,

We, the third-year students of BSIT (Bachelor of Science in Information Technology) at San Sebastian College – Recoletos de Cavite, are currently working on our Capstone Project as a partial requirement for our degree program. Our capstone project entitled "BCash: A Mobile E-Wallet Application of BASTE" aims to study the feasibility of implementing a mobile e-wallet application for the San Sebastian College community.

With this in mind, we would like to request your permission to distribute the attached survey questionnaires to the college students of the school. The respondents will be randomly selected for the study, and the data collected will be used solely for academic purposes.

We appreciate your time and consideration in this matter, and we hope for a positive response from your good office.

Respectfully yours,

M. Angkiko
Miguel Jean R. Angkiko

S. Layson
Stephen Regan James B. Layson

F. Moraña
Fel Michael V. Moraña

A. Olaes
Alexander Ray F. Olaes

R. Pagonzaga
Roland Vel P. Pagonzaga

Noted by:

D. Sta. Barbara
Dennize Perea Sta. Barbara
Capstone Project Adviser

N. Taupo
Nimfa P. Taupo, MSCS
Program Chair, BSIT

T. Ditucalan
Tommy A. Ditucalan, RME
Director, CRCW



November 16, 2023

for: *John 11/17/23*
Fr. Dexter D. Palagtiosa, OAR
Vice President for Administration

<input checked="" type="checkbox"/> Approved	<input type="checkbox"/> Disapproved
--	--------------------------------------

Thru: *Maria Rowena F. Alvarez*
11/17/23
Director of Center for Human Resource Management and Development

<input checked="" type="checkbox"/> Endorsed	<input type="checkbox"/> Not Endorsed
--	---------------------------------------

Fr. Palagtiosa, OAR,

We, the fourth-year students of BSIT (Bachelor of Science in Information Technology) at San Sebastian College Recoletos de Cavite, are currently working on our Capstone Project as a partial requirement for our degree program. Our capstone entitled "BCash: A Mobile E-Wallet Application of BASTE" aims to study the feasibility of implementing a mobile e-wallet application for the San Sebastian College community.

With this in mind, we would like to request to know the accurate and up-to-date data on the number of the following employees of San Sebastian Recoletos - de Cavite (Main Campus):

- | | |
|--|-----------------------------------|
| 1. College Faculty - 41 | 6. Religious Administrator - 7 |
| 2. Senior High Faculty - 10 | 7. Coalition Security Agency - 10 |
| 3. Non-Teaching Person (NTP) - 48 | 8. German manpower - 26 |
| 4. Academic Non-Teaching Person (ANTP) - 5 | |
| 5. Lay Administrator - 13 | |

We appreciate your time and consideration in this matter, and we look forward to a positive response from your good office.

Respectfully yours,

Mer
11/21/2023*Miguel Jean R. Angkiko* *Stephen Regal James B. Layson* *Fel Michael V. Morana**Alexander Ray F. Olaes**Roland G. Pagonzaga*

Noted by:

Nimfa P. Taupo, MSCS
Program Chair, BSIT



Appendix J

BCash System



The image shows a promotional graphic for the BCash app. On the left, a yellow banner with a red and white design features the text "LAUNCHING NOW BCASH APP" and a description: "Meet BCash, our new mobile e-wallet for San Sebastian College Recoletos - de Cavite. It's designed to make payments safer and simpler. With BCash, Sebastianians can easily make purchases and transfer funds hassle-free." Below this, three icons represent "Easy To Use" (a thumbs up), "User Friendly" (a person icon), and "Secure" (a shield with a checkmark). On the right, a smartphone displays the BCash app's user interface, showing a welcome message "WELCOME SEBASTINO!", a main card with a balance of ₱ 15.00, and a QR code. Below the phone is a large QR code with the text "SCAN ME! TO DOWNLOAD!".



Appendix K

Curriculum Vitae



MIGUEL JEAN R. ANGKIKO

System Analyst

📞 09972164905

✉️ s.miguel.angkiko@sscr.edu

📍 637 Cavite City

CAREER OBJECTIVES

Aspire to a role in IT Project Management, leveraging strong organizational and communication skills for successful project delivery.

EDUCATION

Bachelor of Science in Information Technology

San Sebastian College - Recoletos de Cavite

2020 - 2024

Computer System Servicing

Cavite National High School - Senior High School

2018 - 2020

SKILLS

Communication

Teamwork

IT Support



STEPHEN REGAN JAMES B. LAYSON

Programmer



09168777580



s.stephen.layson@sscr.edu



@KyahJemz



Metroland, Trece
Martires

EDUCATION

**Bachelor of Science in
Information Technology**
San Sebastian College -
Recoletos de Cavite
2020 - 2024

**Science, Technology,
Engineering, and
Mathematic**

New Generation International
School
2018 - 2020

SKILLS

Web Development
Mobile Development
Game Development
Database Management
Teamwork

CAREER OBJECTIVES

Obtain a challenging role in Information Technology, leveraging skills in software development and database management to contribute to organizational success.



FEL MICHAEL P. MORANA

Database Designer / UI Designer



09557354395



s.fel.morana@sscr.edu



Sanja Mayor, Tanza

EDUCATION

Bachelor of Science in
Information Technology
San Sebastian College -
Recoletos de Cavite
2020 - 2024

General Academic
Strand

Holy Nazarene Christian
School
2018 - 2020

SKILLS

Web Design

Branding

Graphic Design

CAREER OBJECTIVES

Secure a position in Computer Networking, applying proficiency in configuring and troubleshooting network systems.



ALEXANDER RAY F. OLAES

Team Leader

📞 09176905821

✉️ s.alexander.olaes@sscr.edu

📍 873 Cavite City

EDUCATION

**Bachelor of Science in
Information Technology**
San Sebastian College -
Recoletos de Cavite
2020 - 2024

**Home Economics -
Cookery**
Cavite National High School -
Senior High School
2018 - 2020

SKILLS

Leadership

Communication

Attention to Detail



ROLAND VEL P. PAGONZAGA

Documentation Specialist

📞 09916909053

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📍 Blk 7 Lot 14 Noveleta

CAREER OBJECTIVES

Seek opportunities in Web Development to apply programming skills and creativity for innovative solutions and responsive designs.

EDUCATION

Bachelor of Science in Information Technology
San Sebastian College - Recoletos de Cavite
2020 - 2024

Science, Technology, Engineering, and Mathematic
San Sebastian College - Recoletos de Cavite
2018 - 2020

SKILLS

Teamwork

Attention to Detail

Graphic Design