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Mahidol University

Echo Company

Project Phase 1

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ITCS371 Introduction to Software Engineering
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Requirements

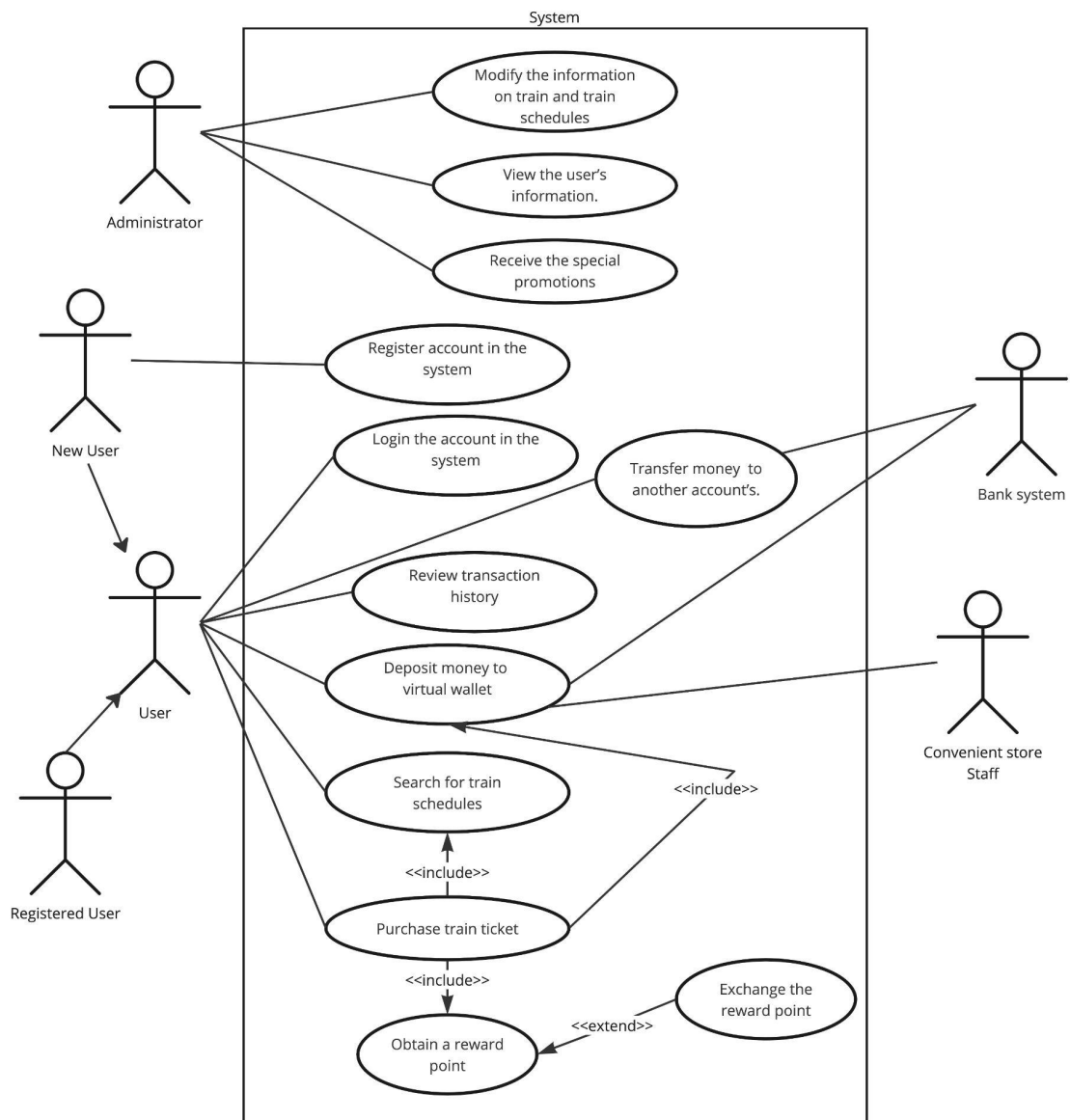| No.	Functional Requirements
User Requirements	
1.	The mobile application must allow the users to make a registration.
2.	The system asks for the user's information input, including first name, last name, national ID, and address.
3.	The users must access the login verification of the application by entering their username and password.
4.	The system must have a function to encrypt the user's sensitive information in the database.
5.	The users can purchase any kind of train ticket within the mobile application. There are two types of train tickets: the top-up train ticket and the annual pass train ticket.
6.	The system must ensure that the users can only buy one top-up train ticket at a time.
7.	The mobile application must display the train schedule and train information.
8.	The mobile application must allow the users to search for a train ticket by inputting the date, time, and specific train number.
9.	The users must be able to create their virtual wallets.
10.	The payment function must allow users to deposit money into their virtual wallets via online banking and credit cards.
11.	The users can input their credit card details including credit card number, expiration date, Card Verification Value (CVV), name of the owner of the credit card, and billing address.
12.	The system must allow the users to transfer funds from their virtual wallet to the virtual

	wallet of another account.
13.	The system must allow the users to see the records of a transaction history.
14.	The system can generate the payment code for money deposits via convenience stores (7-Eleven).
15.	The mobile application must withdraw the balance of the user's virtual wallet when the user purchases the train ticket.
16.	After the users purchase a train ticket via the system, the system must update their reward points balance.
17.	The users can convert the collected points to train tickets or additional rewards.
18.	The users can see the balance of their virtual wallets.
19.	The users can see the balance of their reward points.
Administrator Requirements	
1.	The organization administrators can edit and add information about train schedules and trains on the mobile application.
2.	The administrators can access the records of the train ticket journey history and the national ID of the users who use the train ticket.
3.	The application must be able to provide a special promotion or discount for administrators who are in charge of managing the system on a season-specific event.

No.	Non-Functional Requirements
1.	The cashless train ticket system should be compatible with a mobile application, which in turn must be available for both IOS and Android platforms.
2.	The mobile application should feature a user-friendly UI and UX design to ensure users and administrators can use it effortlessly.
3.	The user interface of the mobile application should incorporate voice commands for controlling and navigating within the application, especially for users with low vision.
4.	The application should provide support, such as screen transcript, and screen magnifier, for individuals with disabilities, including those who are blind or color blind.
5.	The systems should be capable of supporting a diverse range of screen resolutions such as iPhone or iPad devices.
6.	The systems should validate that every user's virtual wallet balance remains below 1 million Thai Baht.
7.	The systems must ensure that the accumulation of reward points for purchasing train tickets of users does not exceed a maximum limit of 100 points.
8.	The transaction history provided in the system should include details about the amount spent per transaction and the purchased ticket history.
9.	The systems must use an encryption process or other security processes, such as password hashing, turning a password into ciphertext, and transport layer security (TLS/SSL), to protect the sensitive information of the users.
10.	The systems should be accessible and available for users to utilize most of the time (99.99%).

Identifying Actors

Actor	Associated Use Case
Administrator	- Modify the information on train and train schedules. - View the user's information. - Receive special promotions.
User	- Register his/her account in the system. - Login to the account in the system. - Purchase train tickets via his/her virtual wallet. - Deposit money to his/her virtual wallet. - Transfer money from his/her virtual wallet to another account's virtual wallet. - Check his/her virtual wallet balance. - Review his/her transaction history. - Search for train schedules by date, time, or train number. - Obtain a reward point after purchasing a train ticket. - Exchange the reward point for a train ticket or gift.
Convenience Store Staff	- Top-up money to users' virtual wallets.
Bank System	- Top-up money to users' virtual wallets.

Use Case Diagram

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Use Case Narrative

Register User Account	
Use Case	Register user account in the system to create a virtual wallet
Primary actor	User
Goal in context	To successfully register a user account in order to access his or her virtual wallet and use it for purchasing a train ticket.
Precondition	System must possess full encryption algorithms. User must input valid information of his or her username, password, first name, last name, national ID, and address into the system.
Trigger	The user accesses the application for the first time.
Scenario	1. The user opens the application. 2. The system displays the register an account page. 3. The user enters his or her first name, last name, national ID, and address. 4. The system checks the authenticity of the user's input. 5. The user enters his or her username. 6. The system checks whether the username already exists in the database. 7. The user enters his or her password (at least 12 characters long with a combination of uppercase letters, lowercase letters, numbers, and symbols). 8. The system displays the successful registration status window. 9. The system displays the home page.
Exceptions	Exception 1. If step 4 fails (the user's first name or last name or national ID or address is invalid), the system will ask the user to re-enter the invalid input until it becomes valid. Exception 2. If step 6 fails (the username that the user input already exists in

	the database), the system will notify the user that the username already exists and ask him or her to re-enter a new username until it is a unique username. Exception 3. If step 7 fails (the user enters an invalid password that does not pass the password strength requirement), the user will re-enter a new password until it meets the requirement.
Postcondition	The user account is created in the system database.

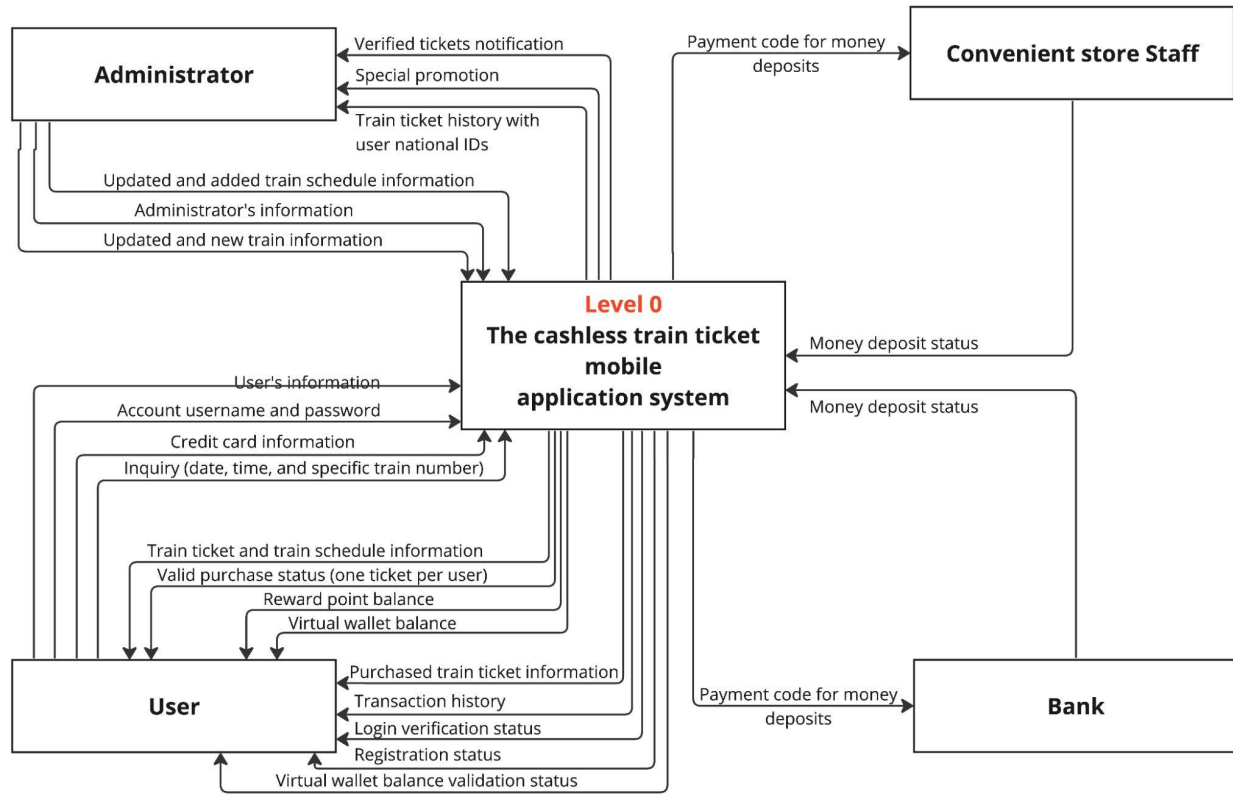| Deposit Money To User's Virtual Wallet	
Use Case	The user deposits money into his or her virtual wallet.
Primary actor	User
Secondary actors	Convenience Store Staff Bank System
Goal in context	To add money into the user's virtual wallet. The system must collect this transaction history.
Precondition	The user must have an account and a valid virtual wallet. Convenience store staff must be available. The Bank System must be available.
Trigger	The user wants to purchase a train ticket via the application but he or she does not have enough balance in the virtual wallet.
Scenario	1. The user opens the application. 2. The system displays the register or login page. 3. The user logs in to the application. 4. The system displays the homepage. 5. The user clicks on the virtual wallet icon on the homepage. 6. The system displays all major function buttons for the virtual wallet. 7. The user selects 'deposit money' from the major function buttons. 8. The system displays the payment process page with options to deposit money by multiple methods: mobile banking, credit card, and convenience store cashier. 9. If the user selects mobile banking to deposit money into his or her virtual wallet. 9.1 The system displays bank options to deposit with.

9.2 The user selects a back of his or her interest.

9.3 The system redirects the page to the chosen bank application.

9.4 The bank system displays a money-transferring page.

9.5 The user enters an amount of money to deposit.

9.6 The user clicks the transfer button.

9.7 The bank system displays the transaction receipt.

10. If the user selects the credit card to deposit money into his or her virtual wallet.

    10.1 The system asks for credit card information.

    10.2 The user enters his or her credit card number, expiration date, Card Verification Value (CVV), name of the owner of the credit card, and billing address.

    10.3 The system redirects to the bank system of the credit card.

    10.4 The bank system sends an OTP code to the phone number of the credit card.

    10.5 The user enters the OTP code that is sent by the bank system.

    10.6 The bank system shows successfully adding credit card status.

    10.7 The bank system redirects to the system of the application.

    10.8 The system displays the newly added credit card number.

    10.9 The user selects the newly added credit card.

    10.10 The user enters an amount of money to deposit.

    10.11 The system sends the transaction to the bank system.

    10.12 The bank system transfers money to the user's virtual wallet.

    10.13 The system displays the transaction receipt.

11. If the user selects the convenience store to deposit money into his or her virtual wallet.

    11.1 The user enters an amount of money to deposit into the virtual wallet.

    11.2 The system displays a QR code for payment.

    11.3 The user shows the QR code to the convenience store staff.

	11.4 The convenience store staff scans the QR code. 11.5 The convenience system displays a confirmation page where the user can input a six-digit PIN. 11.6 The user clicks the transfer button. 11.7 The convenience system displays the transaction receipt. 12. The system updates the user's virtual wallet balance and displays the total money on the homepage.
Exceptions	Exception 1. If the user does not have an account to log on, see the use case *Register User Account*. Exception 2. If step 3 fails (the user username and password are incorrect), the system will prompt the user to retry to log on. Exception 3. If the bank system is down, the system will be rolled back. Exception 4. If the user deposits money of more than 1 million baht into his or her virtual wallet, the system will cancel the transaction and warn the user. Exception 5. If the user deposits money into his or her virtual wallet which results in a total balance with an amount of more than 1 million baht, the system will cancel the transaction and warn the user.
Postcondition	The user's virtual wallet balance has been updated according to the amount deposited.

Purchase Train Ticket	
Use Case	Purchase train tickets via his/her virtual wallet.
Primary actor	User
Goal in context	To receive a virtual train ticket.
Precondition	The user must pass the login validation. The user must select the train ticket options. The user has a sufficient balance in their virtual wallets, equal to or exceeding the ticket price.
Trigger	The user wants to purchase a train ticket via the application for riding a train.

Scenario	1. The user opens the application.
	2. The system displays the login page.
	3. The user enters a username and password.
	4. The system displays the homepage.
	5. The user selects the "Purchase Tickets" button on the homepage's navigation menu.
	6. The user searches for the train ticket.
	    6.1 The user searches the train schedule by entering the date, time, and a specific train number.
	    6.2 The user selects the type of train ticket that they want to purchase (e.g. Top-up train ticket, Annual pass train ticket).
	7. The system displays the payment screen showing the selected ticket, quantity, and amount summation.
	8. The user selects his or her virtual wallet to purchase the ticket.
	9. The user confirms the payment.
	10. The system deducts the ticket fare from their virtual wallet balance.
	11. The system sends a confirmation message and virtual train ticket to the

	user's account.
	12. The system adds the purchased train ticket to the user's transaction history.
	13. The system displays a confirmation page indicating the successful purchase of the train ticket.
	14. The system updates the user's reward points after purchasing the train ticket.
Exceptions	Exception 1. If the user does not have an account to log on, see the use case *Register User Account*.
	Exception 2. If step 3 fails (the user username and password are incorrect), the system will prompt the user to retry to log on.
	Exception 3. If the user does not have enough balance in his or her virtual wallet, see the use case *Deposit Money To User's Virtual Wallet.*
	Exception 4. If the user's reward points balance exceeds 100 points, the system will not grant more reward points for the new ticket purchasing and warn the user.
Postcondition	The user's account contains the purchased train ticket.
	The user's reward points are updated to reflect the points earned from the ticket purchase.

Data Flow Diagram Level 0

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