



**The Faculty of Information and Communication Technology
Mahidol University**

Echo Company

Project Phase 2

Miss Russarin	Eaimrittikrai	6488021
Miss Supithcha	Jongphoemwatthanaphon	6488045
Miss Kanita	Karunkittikun	6488049
Miss Sasasuang	Pattanakitjaroenchai	6488052
Miss Chaninan	Phetpangun	6488061
Miss Nisakorn	Ngaosri	6488226

ITCS371 Introduction to Software Engineering

Dr. Thanwadee Sunetnanta

Asst. Dr. Morakot Choetkiertikul

Dr. Chaiyong Ragkhitswetsagul

November 5, 2023

Table of Contents

Revision of Phase 1	2
Identifying actors	2
Use Case Narrative	2
Use Case Diagram	9
Functional Decomposition Diagram	10
Data Flow Diagram Level 0 (Context diagram)	11
Data Flow Diagram Level 1	12
Data Flow Diagram Level 2	13
List of data stores and attributes	14

Revision of Phase 1

Identifying actors

Actor	Associated Use Case
Administrator	<ul style="list-style-type: none">- Modify the information on train and train schedules.- View the user's information.- Create special promotions, such as seasonal promotions and discounts.

Use Case Narrative

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. The user must pass the login validation. 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	<ol style="list-style-type: none">1. The user opens the application.2. The system displays the register or login page.3. The user logs in to the application.

	<ol style="list-style-type: none"> 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. <ol style="list-style-type: none"> 9.1 The system displays bank options to deposit with. 9.2 The user selects a bank 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. <ol style="list-style-type: none"> 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.
--	---

	<p>10.10 The user enters an amount of money to deposit.</p> <p>10.11 The system sends the transaction to the bank system.</p> <p>10.12 The bank system transfers money to the user's virtual wallet.</p> <p>10.13 The system displays the transaction receipt.</p> <p>11. If the user selects the convenience store to deposit money into his or her virtual wallet.</p> <p>11.1 The user enters an amount of money to deposit into the virtual wallet.</p> <p>11.2 The system displays a QR code for payment.</p> <p>11.3 The user shows the QR code to the convenience store staff.</p> <p>11.4 The convenience store staff scans the QR code.</p> <p>11.5 The convenience system displays a confirmation page where the user can input a six-digit PIN.</p> <p>11.6 The user clicks the transfer button.</p> <p>11.7 The convenience system displays the transaction receipt.</p> <p>12. The system updates the user's virtual wallet balance and displays the total money on the homepage.</p>
Exceptions	<p>Exception 1. If the user does not have an account to log on, see the use case <i>Register User Account</i>.</p> <p>Exception 2. If step 3 fails (the user username and password are incorrect), the system will prompt the user to retry to log on.</p> <p>Exception 3. If the bank system is down, the system will be rolled back.</p> <p>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.</p> <p>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.</p>
Postcondition	The user's virtual wallet balance has been updated according to the amount

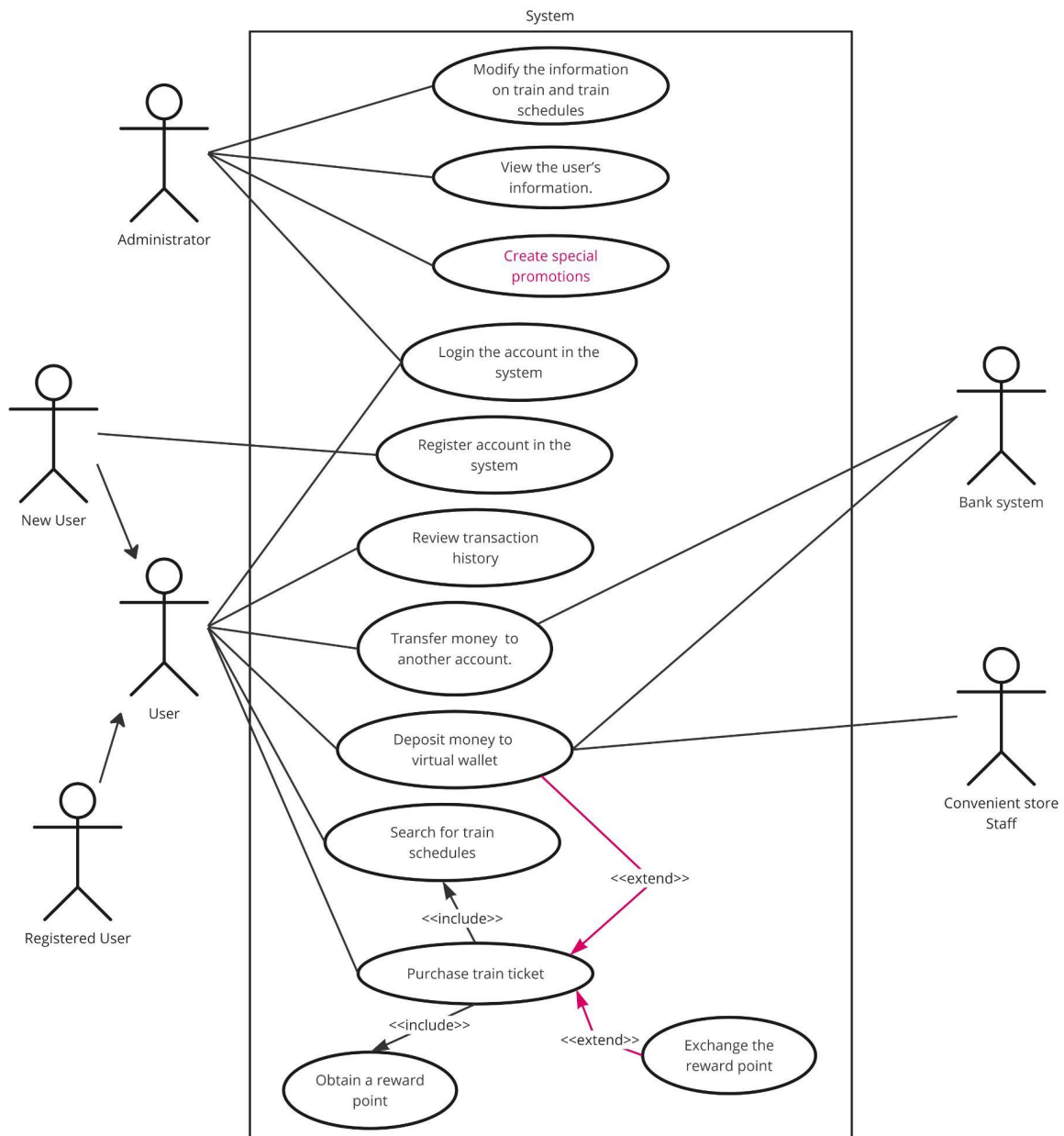
	deposited.
--	------------

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	<p>The user must pass the login validation.</p> <p>The user must select the train ticket options.</p> <p>The user must already select a valid train schedule.</p> <p>The user has a sufficient balance in their virtual wallets, equal to or exceeding the ticket price.</p>
Trigger	The user wants to purchase a train ticket via the application for riding a train.

Scenario	<ol style="list-style-type: none"> 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. The user fills in the details for purchasing. <ol style="list-style-type: none"> 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). 6.3 The user enters the quantity of train tickets that they want to purchase. 6.4 The user selects the available seat. 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

	<p><i>Register User Account.</i></p> <p>Exception 2. If step 3 fails (the user username and password are incorrect), the system will prompt the user to retry to log on.</p> <p>Exception 3. If the user does not have enough balance in his or her virtual wallet, see the use case <i>Deposit Money To User's Virtual Wallet</i>.</p> <p>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.</p>
Postcondition	<p>The user's account contains the purchased train ticket.</p> <p>The user's reward points are updated to reflect the points earned from the ticket purchase.</p>

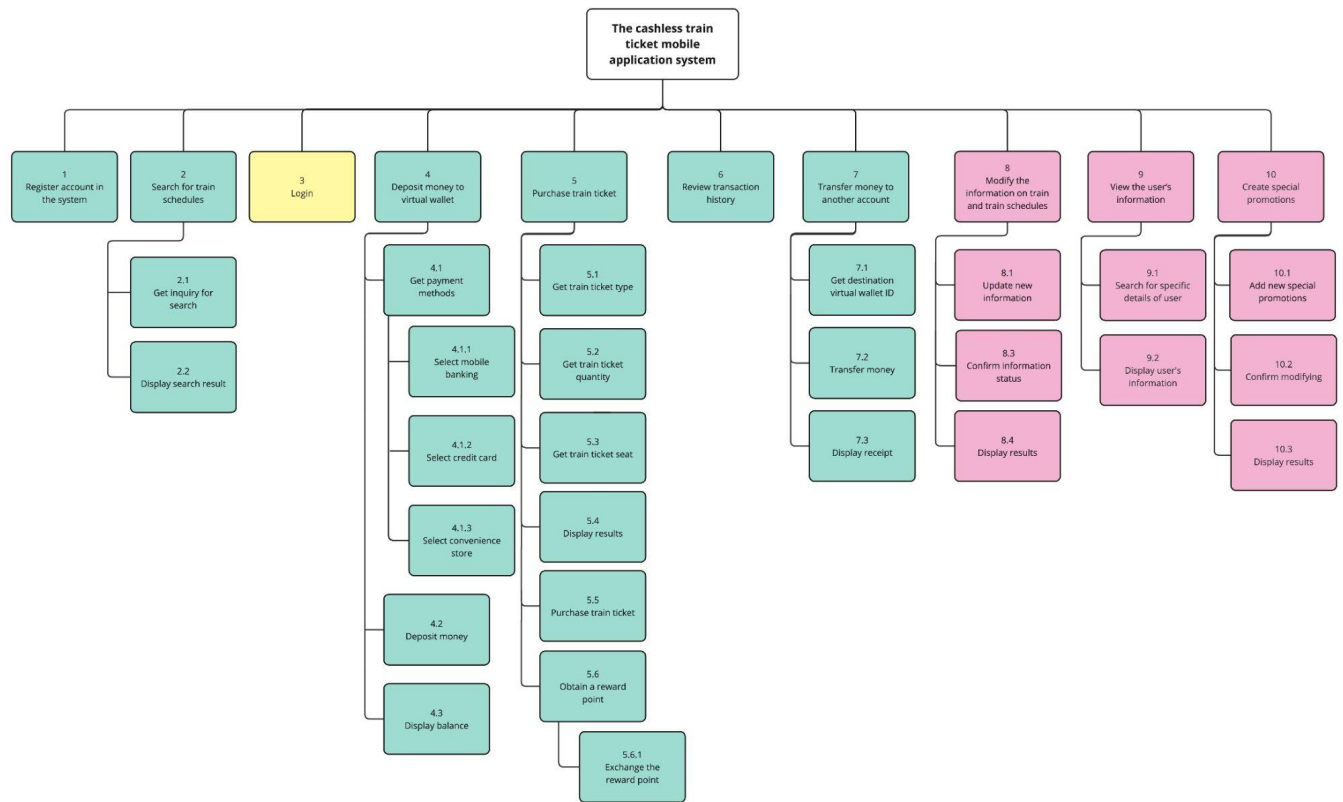
Use Case Diagram



Link to the full board:

https://miro.com/app/board/uXjVNTi9tkA=?share_link_id=884011422207

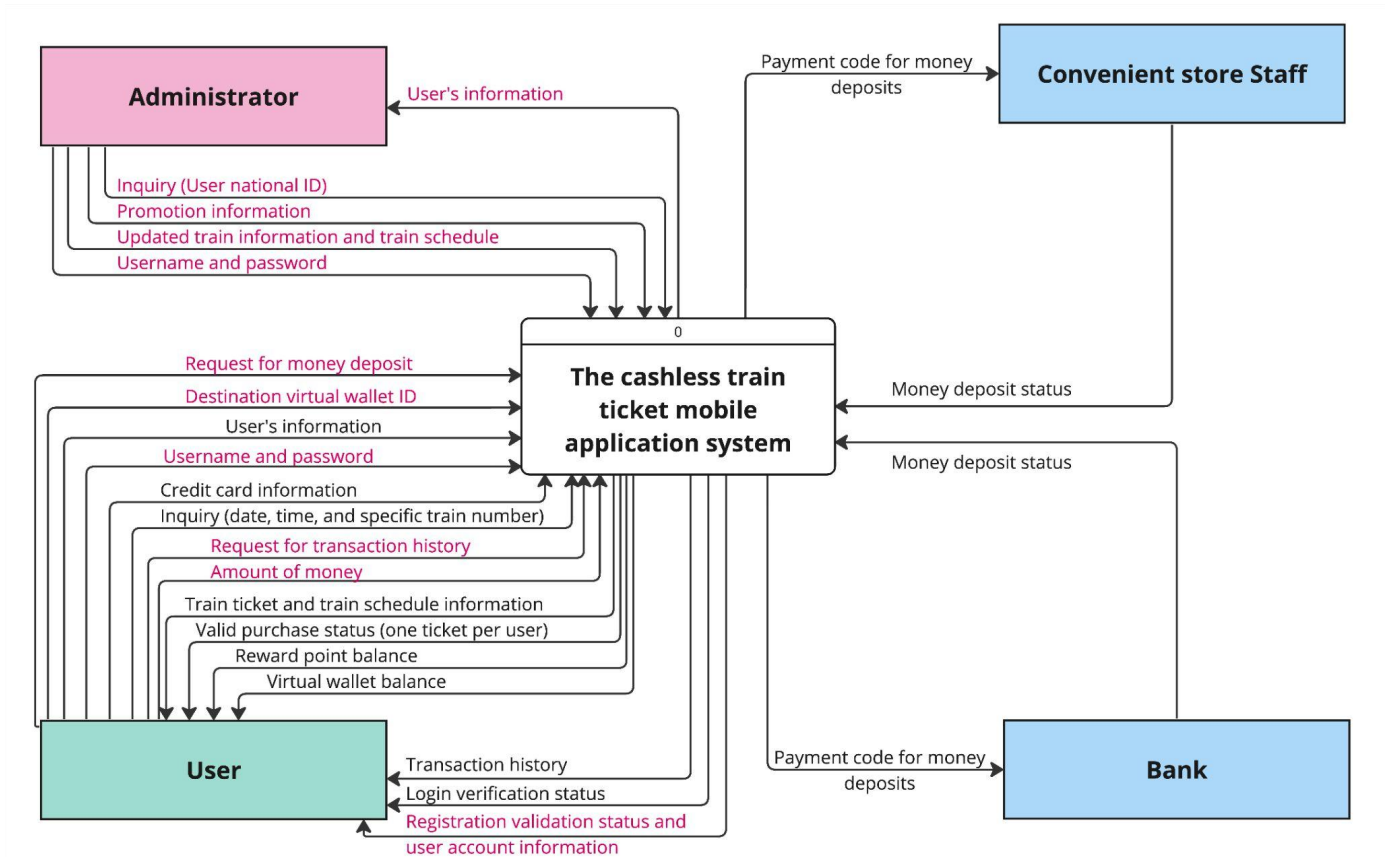
Functional Decomposition Diagram



Link to the full board:

https://miro.com/app/board/uXjVNTi9tkA=?share_link_id=884011422207

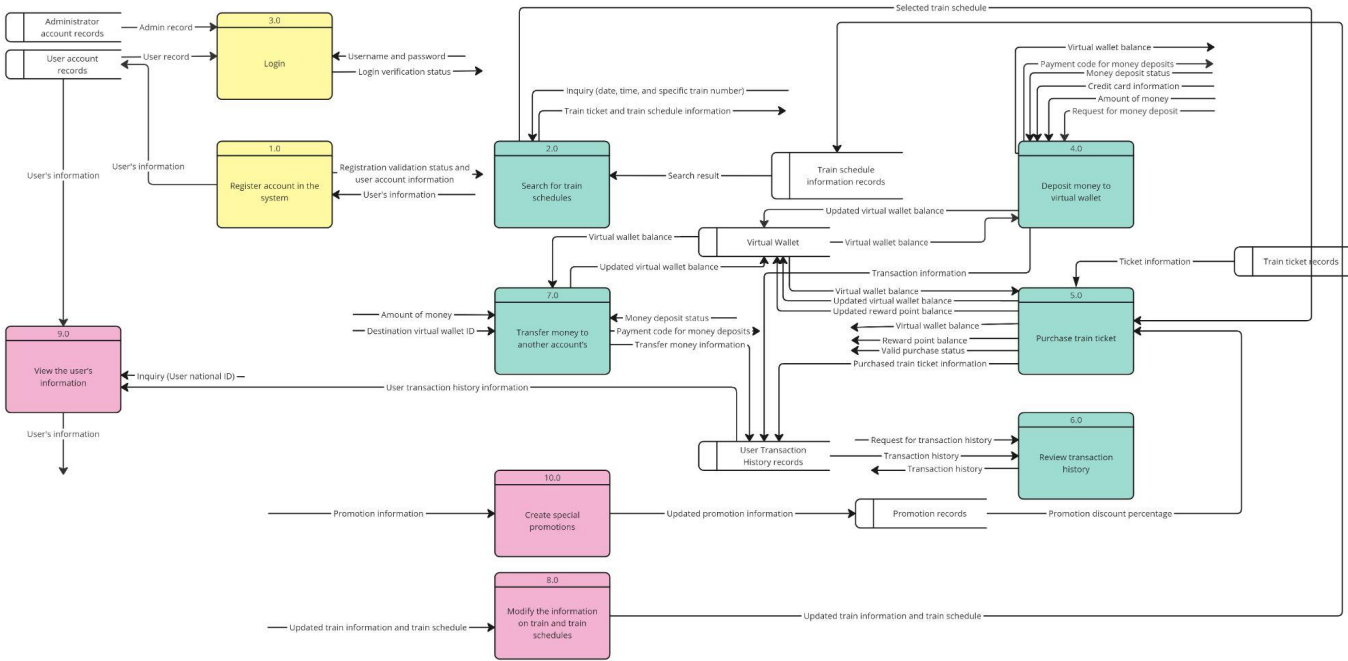
Data Flow Diagram Level 0 (Context diagram)



Link to the full board:

https://miro.com/app/board/uXjVNTi9tkA=?share_link_id=884011422207

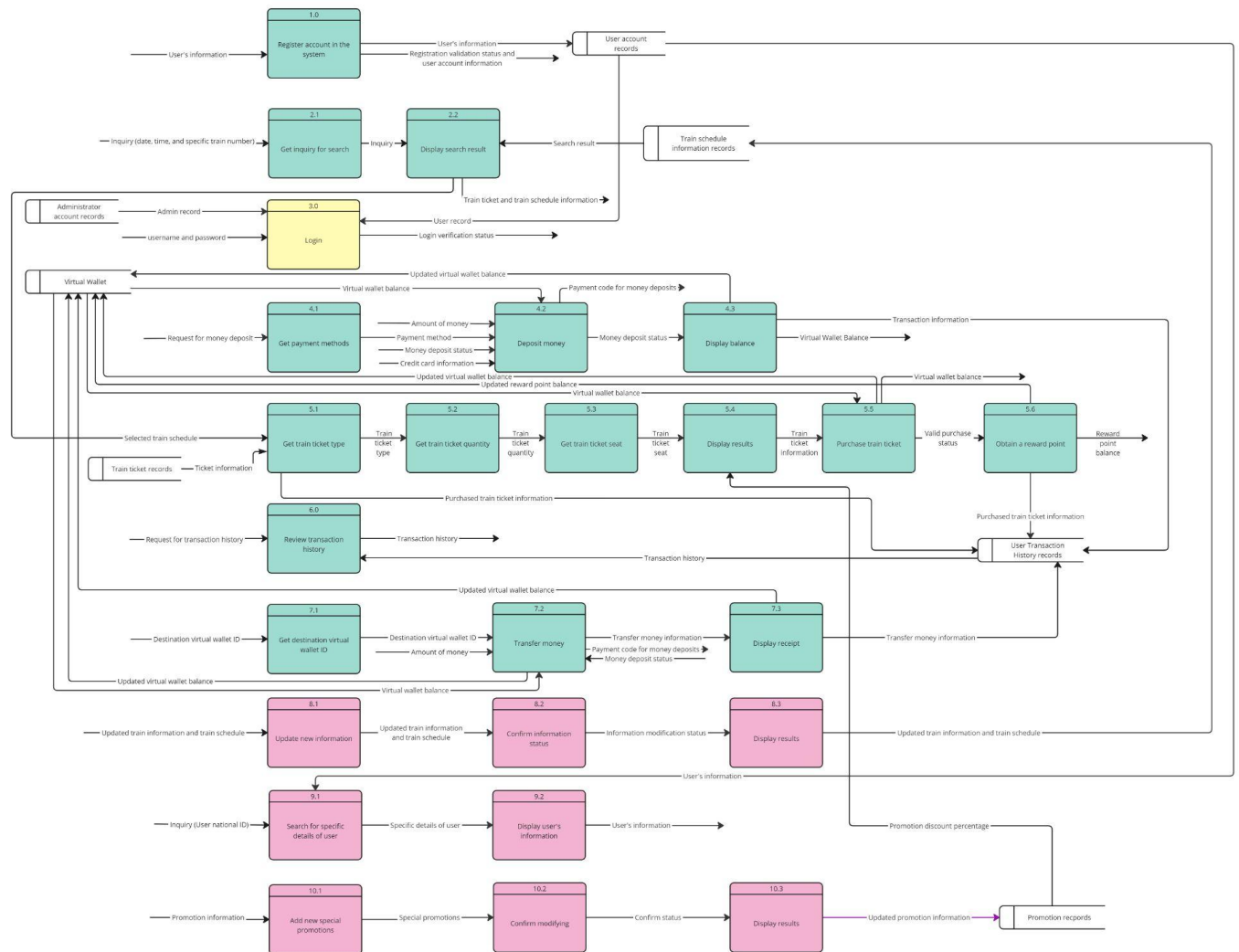
Data Flow Diagram Level 1



Link to the full board:

https://miro.com/app/board/uXjVNTi9tkA=?share_link_id=884011422207

Data Flow Diagram Level 2



Link to the full board:

https://miro.com/app/board/uXjVNTi9tkA=/?share_link_id=884011422207

List of data stores and attributes

Data Store	Attribute
User account records	User's ID (Primary Key) User's national ID User's first name User's last name User's username User's password User's email address User's date of birth User's address User's phone number User's gender User's virtual wallet ID User's credit card number
Administrator account records	Administrator's ID (Primary Key) Administrator's national ID Administrator's first name Administrator's last name Adminsistrator's username Adminsistrator's password Adminsistrator's email address Adminsistrator's date of birth Adminsistrator's address Adminsistrator's gender
User Transaction History records	Transaction's ID (Primary Key) User's ID (Foreign Key) Train ID (Foreign Key)

	Payment's date Reward point Promotion ID (Foreign Key)
Virtual Wallet	Virtual Wallet ID (Primary Key) Balance Reward point balance User's ID (Foreign Key)
Train schedule information records	Train ID (Primary Key) Train name Departure date Departure time Arrival time Origin station name Destination station name
Train ticket records	Ticket ID (Primary Key) Ticket type Ticket fare Class number Seat number Coach type Train ID (Foreign Key)
Promotion records	Promotion ID (Primary Key) Promotion's name Promotion start date Promotion end date Promotion discount percentage