1. **Ask question to make a clear for above requirements and write them in the form of Excel (Q&A)**

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| --- | --- |
| Question | Answer |
| What is the purpose of the automated ticket-issuing system? | The purpose of the automated ticket-issuing system is to sell public transportation tickets (such as Bus and MRT) to users. |
| What are the available modes of payment in the automated ticket-issuing system? | The available modes of payment in the automated ticket-issuing system are Credit Card, QR Code payment linked with banking system, and digital wallet. |
| How does the automated ticket-issuing system work for Credit Card payments? | When a user selects their destination and mode of payment as Credit Card, the ticket vendor machine issues a paper ticket with a bar code itself, and the user's credit card account is charged. The machine displays a menu of potential destinations, and the user selects their destination. Once selected, the user is prompted to input their credit card. When the credit transaction is validated, the ticket is issued. |
| How does the automated ticket-issuing system work for digital wallet payments? | When a user selects their destination and mode of payment as digital wallet, the ticket vendor machine shows a QR Code after the user selects a route for their mobile phone payment. |
| What payment methods are available for users? | Users can pay for their tickets using Credit Card, QR Code payment linked with banking system, or a digital wallet. |
| How does the ticket vendor machine handle credit card payments? | The ticket vendor machine issues a paper ticket with a bar code itself and the user's credit card account is charged. Once the passenger presses the start button, a menu display of potential destinations is activated, along with a message to select a destination. Once a destination is selected, the passenger is prompted to input their credit card information. When the credit transaction is validated, the ticket is issued. |
| How does the ticket vendor machine handle payments made with a digital wallet? | The ticket vendor machine will show a QR Code to the passenger after they select their route for payment with their mobile phone. |
| What information is displayed on the ticket issued by the machine? | The ticket issued by the machine includes a bar code, which is used for scanning at the destination, and information about the selected destination and payment method |
| Can the passenger cancel their transaction after selecting a destination and making a payment? | The requirements specification does not provide information on whether the passenger can cancel their transaction or not. |

1. **Write a set of functional, non-functional and domain requirements for that. Remember to concentrate on expectations of reliability and response time**.

Functional requirements:

* The automated ticket-issuing system shall allow users to select their destination.
* The system shall provide options for mode of payment, such as credit card or digital wallet.
* If the user selects credit card as the mode of payment, the system shall issue a paper ticket with a bar code and charge the user's credit card account.
* If the user selects digital wallet as the mode of payment, the system shall display a QR code for the user to scan and complete the payment transaction.
* The system shall display a menu of potential destinations once the start button is pressed.
* The user shall be able to select a destination from the menu.
* The system shall prompt the user to input their credit card information if they choose to pay by credit card.
* The credit card transaction shall be validated before the ticket is issued.
* The system shall issue the ticket once the payment has been successfully processed.

Non-functional requirements:

* The system shall have a response time of less than 5 seconds for all user interactions.
* The system shall be available 99.9% of the time.
* The system shall be able to handle at least 1000 ticket transactions per hour.
* The system shall be secure and protect user data and payment information from unauthorized access.
* The system shall be easy to use and user-friendly.

Domain requirements:

* The system shall comply with all applicable laws and regulations related to public transportation ticketing and payment processing.
* The system shall integrate with existing public transportation infrastructure and ticketing systems.
* The system shall be able to process payments in multiple currencies if necessary.
* The system shall provide detailed transaction records and reports for auditing and accounting purposes.
* The system shall be able to handle multiple languages and provide instructions in the user's preferred language.

3. **Develop Use Case modelling for Ticket Vendor Machine, you are also encouraged to make Use Case Description for each use case on your use case diagram.**

UseCase DiagramDiagram

Description automatically generated

**Usecase Description**

1. Use Case: Purchase Ticket

Actors: User

Description: The user selects their destination and payment method to purchase a ticket.

Flow of Events:

* User selects "Purchase Ticket" option on the main screen.
* System displays a menu of destination options.
* User selects their desired destination.
* System displays payment options.
* User selects their desired payment method (credit card or digital wallet).
* If credit card is selected:
  + System prompts user to input their credit card information.
  + User enters credit card information.
  + System validates credit card information.
  + System charges the user's credit card account.
  + System prints a ticket with a bar code.
* If digital wallet is selected:
  + System displays a QR code.
  + User scans the QR code with their mobile phone and completes the payment transaction.
  + System prints a ticket with a bar code.
* System dispenses the ticket.
* Use case ends.

2. Use Case: Cancel Purchase

Actors: User

Description: The user cancels a ticket purchase before completing the transaction.

Flow of Events:

* User selects "Cancel" option at any point during the purchase process.
* System cancels the transaction and displays the main screen.
* Use case ends.

3. Use Case: Print Receipt

Actors: User

Description: The user requests a receipt for their ticket purchase.

Flow of Events:

* User selects "Print Receipt" option after purchasing a ticket.
* System prints a receipt with the details of the transaction.
* Use case ends.

**4. Make an Activity diagram to present the process of passenger’s buying a ticket from ticket vendor machine (Look like ATM) and the activity diagram for communication among systems if your system is integrated with other system like Momo, VNPay, ZaloPay,...etc**

* Activity Diagram for Passenger Buying a Ticket from Ticket Vendor Machine:

Diagram

Description automatically generated

* Activity Diagram for Communication Among Systems if Ticket Vendor Machine is Integrated with Other Systems:

Diagram

Description automatically generated

**5. Let’s say that the Ticketing Vendor Machine have main use case: Buy a ticket then you are required to complete the sequence diagram, State chart diagram, and Class diagram**

Sequence Diagram

Diagram

Description automatically generated

State chart diagram

Diagram

Description automatically generated

Class Diagram

Graphical user interface

Description automatically generated with medium confidence

**6. Design an either wireframe/mockup with balsamiq or prototype with figma for your use cases.**

Text

Description automatically generated with medium confidence

**7. Develop Architecture design (System in-a-box or MVC model) and Deployment diagram for Ticket Vendor Machine**

Model-View-Controller (MVC) architecture:

In this architecture, the system is divided into three main components: the model, which represents the data and logic of the system; the view, which presents the data to the user; and the controller, which handles user input and updates the model and view accordingly. This pattern is commonly used for web applications, but can be applied to any system that requires user interaction.

For the Ticket Vendor Machine, the MVC architecture could be used to separate the user interface, payment processing, and ticket issuing components. The model would represent the data and logic of the system, such as the ticket destination and fare information. The view would present the data to the user through a graphical interface, such as a touch screen. The controller would handle user input, such as selecting the destination and payment method, and would update the model and view accordingly.

Deployment Diagram for the Ticket Vendor Machine

Diagram

Description automatically generated

Ticket Vendor Machine is the main component and is connected to two payment systems: Credit Card Payment and Mobile Payment. Each payment system is connected to its own payment gateway or provider, which handles the payment processing.

For the Credit Card Payment system, the payment gateway is connected to the bank system, which is responsible for processing credit card transactions. For the Mobile Payment system, the payment gateway is connected to a digital wallet provider, which handles mobile payments.

This deployment diagram shows how the Ticket Vendor Machine is integrated with other systems and how it communicates with them to process payments and issue tickets.

**8. Demo any use case (form for inputs, report for output) with Visual Programming C# and MSSQL.**

Code:

https://github.com/maoleng/qt1-software-engineer/tree/main/source\_code

Graphical user interface, application

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