BMS COLLEGE OF ENGINEERING

(Autonomous College under VTU)

Bull Temple Road, Basavanagudi, Bangalore – 560019

An AAT report on

"One Nation One Card"

Submitted in partial fulfillment of the requirements for the award of degree

BACHELOR OF ENGINEERING

IN

INFORMATION SCIENCE AND ENGINEERING

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CERTIFICATE

This is to certify that the project entitled "Intra-City Bus Transit Operations & Management" is a bona-fide work carried out by **Sai Sanketh G(1BM20IS148), Sanket Emala (1BM20IS151), Sheetal Jain (1BM20IS160)** in partial fulfillment for the award of degree of Bachelor of Engineering in **Information Science and Engineering** from **Visvesvaraya Technological University, Belgaum** during the year **2023-2024**. It is certified that all corrections/suggestions indicated for Internal Assessments have been incorporated in the report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of project work prescribed for the Bachelor of Engineering Degree.

Signature of the Faculty
Name and Designation

Signature of the HOD
Name and Designation

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ABSTRACT

The One Card Management System is a software engineering project that aims to streamline the process of organizing and managing information about various types of cards, such as Credit Cards, Metro cards, and FasTag. With the increasing number of cards that individuals and businesses carry, it can become a challenge to keep track of all the details, and it is easy to miss out on benefits and rewards. The One Card Management System addresses these problems by providing a centralized, user-friendly platform for storing and organizing card information.

The system offers an intuitive interface that makes it easy for users to enter and access information about their cards, including the card type, number, expiration date, and other important details. It also provides secure storage of the information to ensure the protection of sensitive data. The fast searching and filtering capabilities of the system allow users to quickly find and retrieve the information they need, making it an efficient tool for managing their cards.

In addition, the One Card Management System offers real-time updates, so users are always aware of the latest information about their cards, including any changes in their expiration dates or credit limits. This helps to reduce the risk of missed payments or declined transactions. The system also allows users to share information with authorized parties, making it an effective tool for managing shared cards or multiple cards for a business.

The One Card Management System is designed to provide a single source of information for managing all cards, reducing the chances of errors and maximizing the use of cards. It helps individuals and businesses to stay organized, stay on top of their finances, and make the most of their card benefits and rewards. With its easy-to-use interface and comprehensive features, the One Card Management System is the ideal solution for managing all types of cards

PROBLEM STATEMENT

The One Card Management System addresses the problem of disorganization and lack of efficiency in managing multiple cards, by providing a secure, centralized platform that enables users to easily store, manage and access information about their cards in one place.

ANALYSIS

A "one card for all" system refers to a single card that can be used for multiple purposes, such as accessing different bank accounts, paying bills, and making purchases. This type of system offers convenience and streamlines financial management by eliminating the need for multiple cards. However, it also increases the risk of fraud and loss if the card is stolen or misused.

SCENARIOS

Normal Scenarios:

- Limit is provided based on Credit score and Eligibility criteria
- Uses of one card:
  1.Metro card: Used one card as Metro card in metro stations.
  2.Fastag: Used bar code on the card for autodetection.
  3.Credit card: Used as a credit card for all physical payments.
  Used for online payments.

- Clubbed bill will be issued to the user at the end of the month which should be settled by the user.
- Clubbed bill if not paid by customer within the set date will incur periodic interest charges.

Exceptional scenarios:

- Furnished documents are found out to be illegitimate.
  - Customer is asked to refurnish the rejected docs.
  - Account blocked for deceiting T&C.
- Payment failure:
  . ● limit exceeded.
  - Transaction timed out.
  - server busy.
  - OTP not rendered /Mismatched.
  - RFID not recognized & validated.

REQUIREMENTS:

Hardware Requirements

1. Smart Card (RFID tags)
2. Infrared Sensors
3. RFID reader (Radio-Frequency Identification)
4. EMV Chips (Euro pay, MasterCard, Visa)
5. GSM (Global System for Mobile Communication)
6. NFC

Functional Requirements

1. Card will be used based on the Sensors in use
2. Credit will be deducted based on expenses & Usage
3. IR, microchip & Scanners to detect passenger entry & exists.
4. Toll fare charged based after reading the barcode.
5. Embodiment of EMV chips in one card for credit card usability.
6. Users bank account is linked with One card for credit maintenance.
    - Certain credit limit is set for monthly usage.
    - Repayments are user friendly & will incur interest when interest repayment period is crossed.
7. One card can be locked when card is cost/stolen to preserve privacy & security of users

Non-Functional Requirements

1. Quality Requirements:

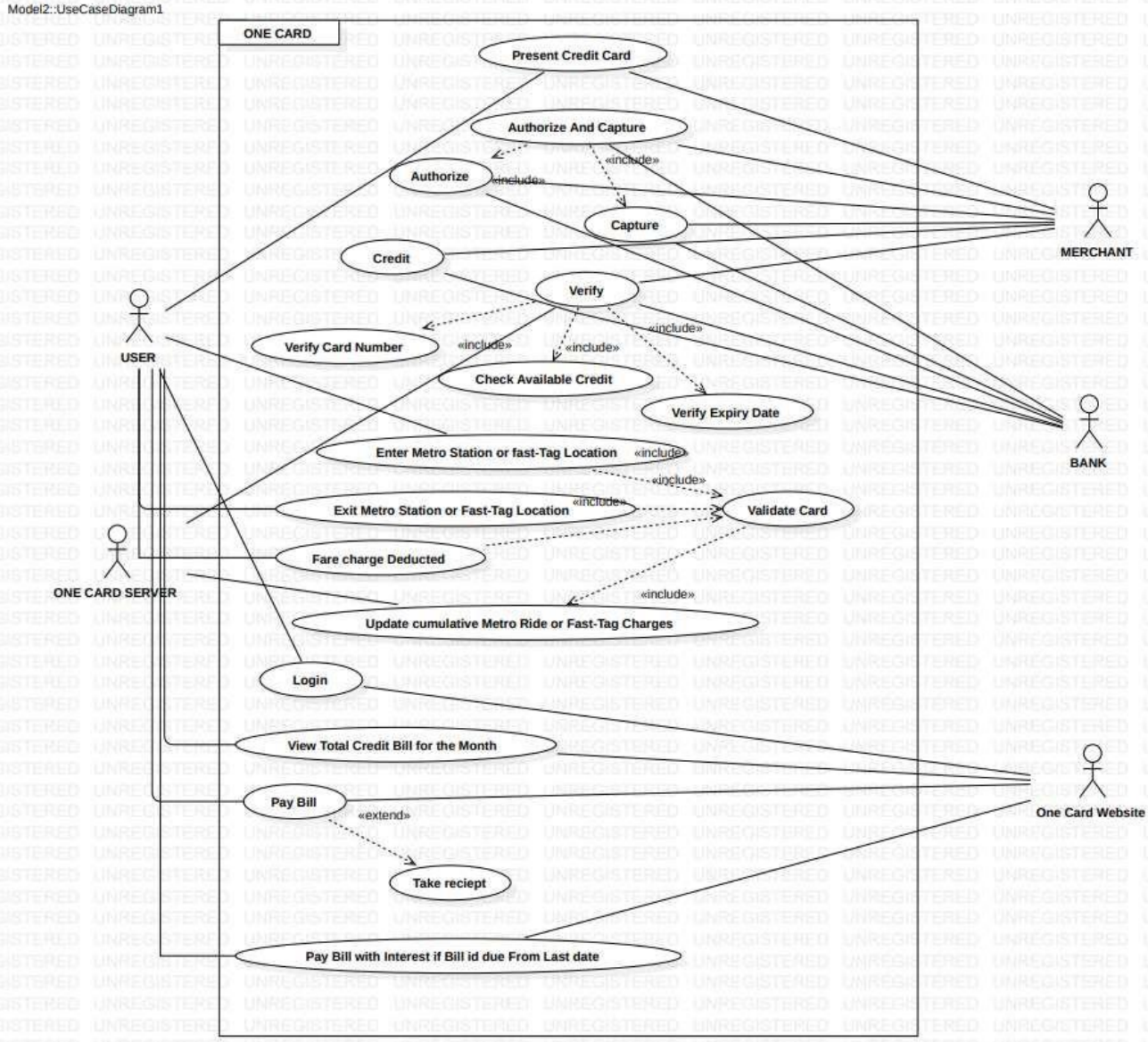
- ➢ Usability: -Handles free payment method and sensor detection with credit limit based on timely repayments
- ➢ Functional: - unambiguous and independent sensors detection and usage
- ➢ Reliability: - Trustworthy and authentic usability in card every scenarios. Reliable customer care portal and maintenance.
- ➢ Performance: -One card is capable of accommodating EMV, RFID sensors and NFC chips
- ➢ Accuracy: -IR sensors are accurate enough to detect overloading condition
- ➢ Adaptability: -with emergence in technology, one card can counter and lit to exception scenarios

2. Constraints:

a. Implementation: -Size of the card(85*53mm), material of the card(plastic), proximity between the RFID tag and the reader(<=4cm), Programming language (C++, Java)

b. Legal: - One card supports legal, secure and authentic payment methods as per RBI guidelines

USE CASE DIAGRAM



Set of actors:

The users who interact with the system as in this case, the one card operations and management, form the set of actors. The actors who play a major role in the one card system are as follows:

- Bank
- User
- One card website
- Merchant
- One card server

Use Cases:

1. Present Credit card- The user presents the One card to the merchant.
2. Authorize and capture- The payment Gateway is captured and authorized by the means of Bank.
3. Check available Credit- the available credit is checked before processing(checking if the purchase is not above credit limit)
4. Enter Metro Station/ Fast-Tag- The card now works on RFID technology and the credit limit for separate metro and fast-tag will be created.
5. Fare charge Deducted- The charge will be deducted and this charge will be accumulated in the users web portal account.
6. Login-The user has to login to the web portal to access his account.
7. View total bill for the month- The bill for the month will be generated at the end of the month including all the charges.
8. Pay bill with interest – The user has to pay bill with interest if the bill has not been paid before the stipulated time.

Use Case Description:

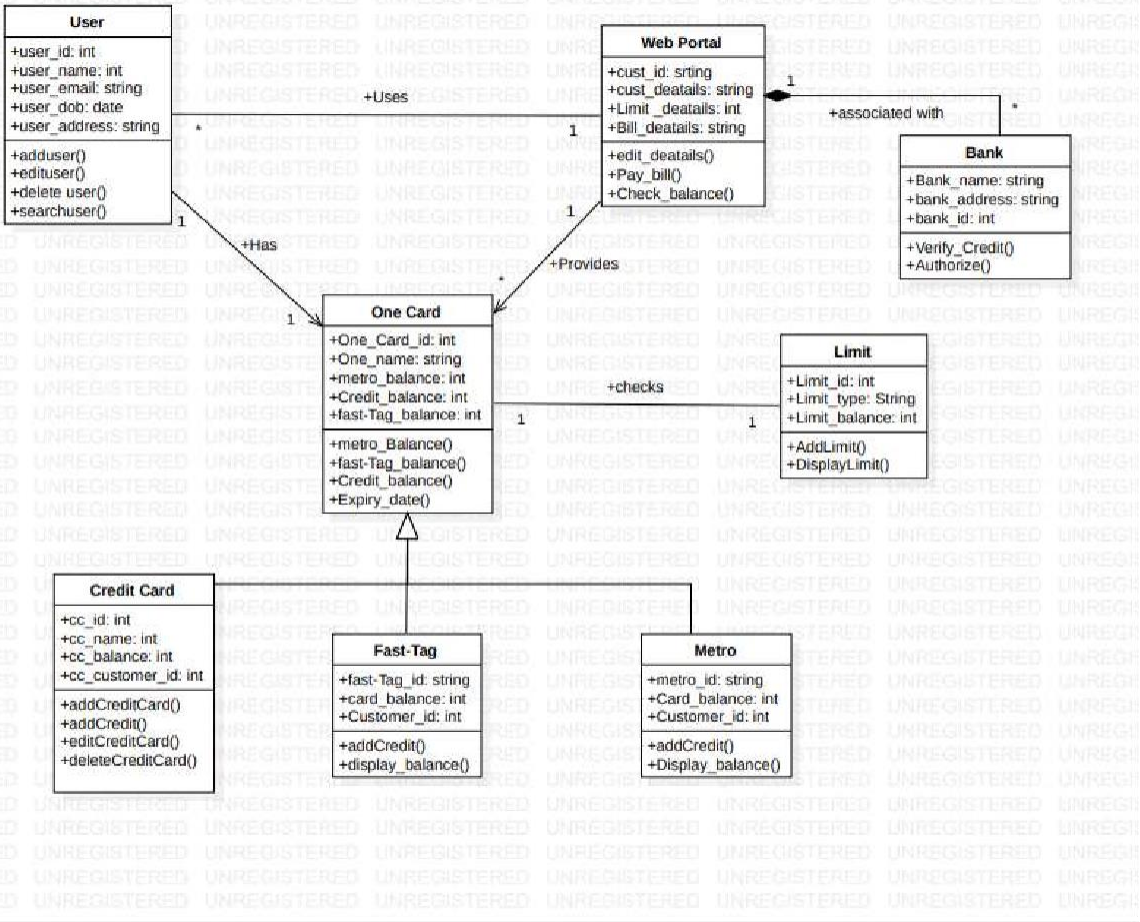
Use case name: Pay Bill
Participating actors: Initiated by user, validated by web portal, verified by bank.
Flow of events:

1) User initiates payment of bill from his/ her account.
2) Web portal send the user OTP, who enters it to complete transaction.
3) The website verifies payment and provides receipt to the user.

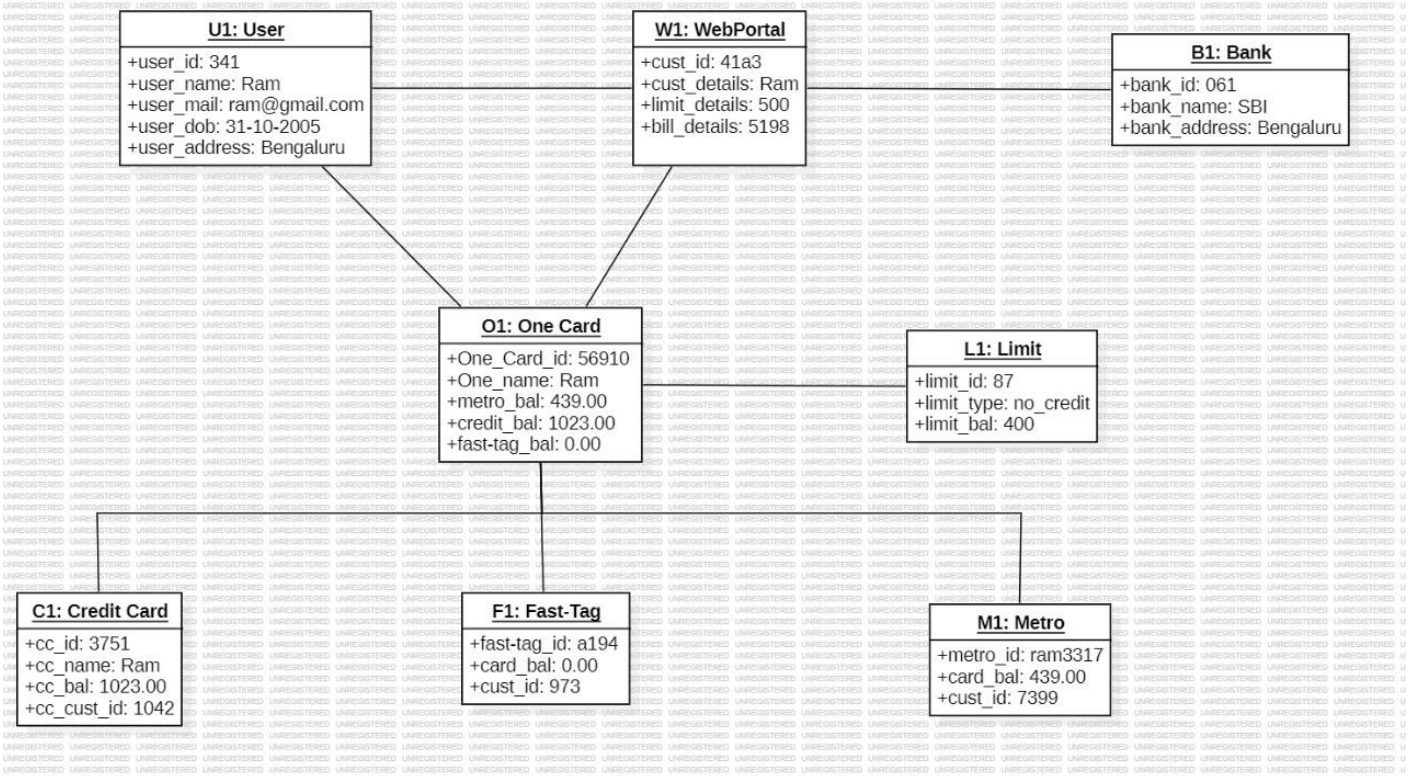
Entry condition: User initiates Bill payment.
Exit condition: The passenger has received an acknowledgment from the admin in the form of an SMS confirmation.
Quality requirements:

1) OTP for verification should be sent in less than 30 seconds.
2) The receipt should include necessary information of the user and with information that the user has paid bill before time or not which will later affect the credit score of users if bill has been defaulted.

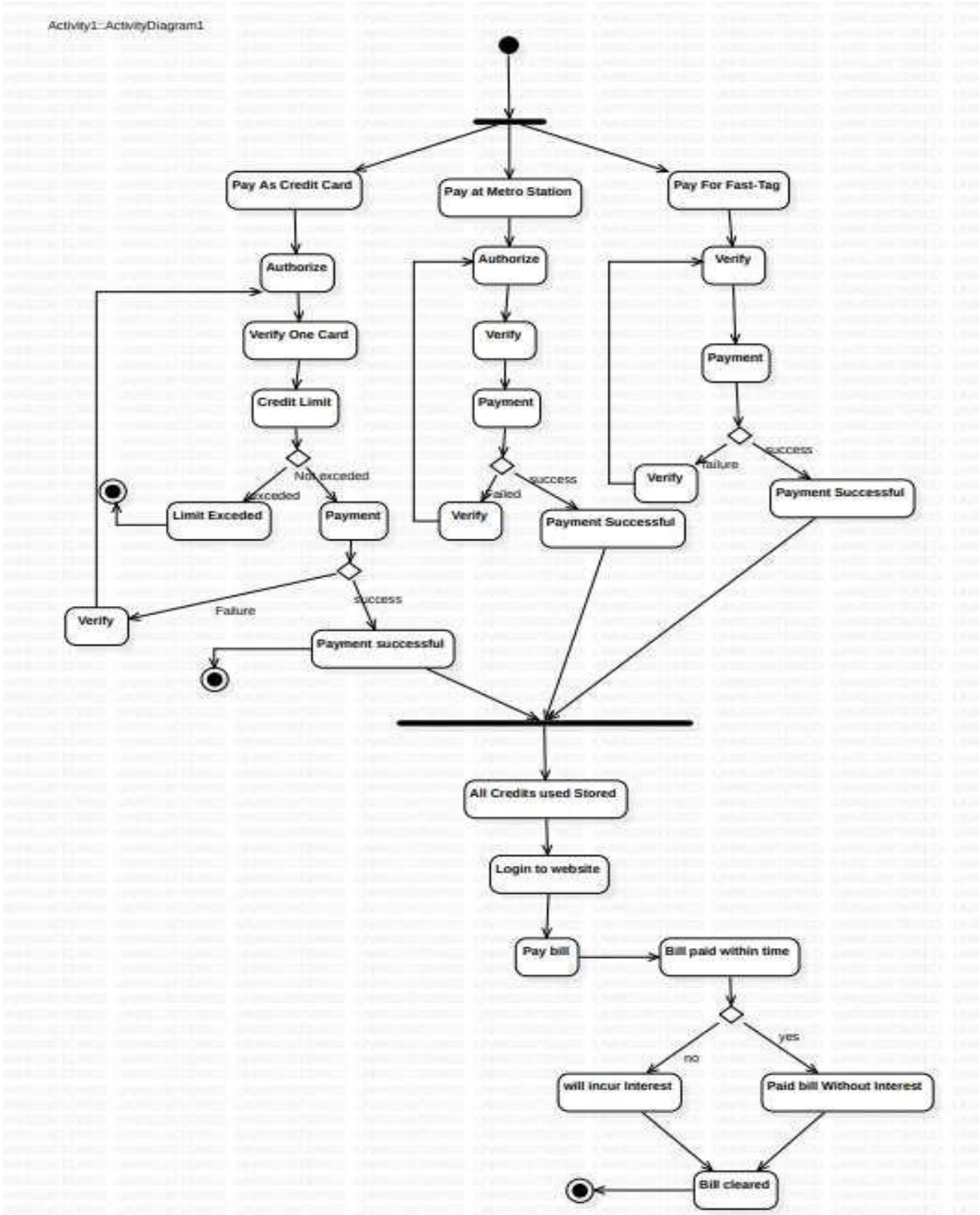
Class Diagram



Object Diagram:



Activity diagram



Implementation

` https://github.com/SaiSankethG/OneNationOneCard.git

Test Suite

Test Case ID	Test Scenario	Test Case Description	Pre-Condition	Test Steps	Test Input	Expected Behaviour	Actual Result	Status
TC1.1	Documents Validated	Validity and aptness of documents	User has Applied and registered for issuement of OneCard	1)Documents checked by the concerned official 2) Check the validation period	Documents furnished by the user for validation	Documents successfully validated	Validation Succeeded	Pass
TC1.2	Validation of User's Personal Details	Details checked and compared with that of the documents	Documents are furnished at the portal	1)Validator may use concerned software 2)Matching the details as in the documents	User Details filled and fed to the portal	User Details Matched	Used Details is same as in the documents	Pass
TC1.3	Validation of User's Personal Details	Details checked and compared with that of the documents	Documents are furnished at the portal	1)Validator may use concerned software 2)Matching the details as in the documents	User Details filled and fed to the portal	User Details Matched	Used Details didn't match with details in the documents	Fail

Fig. 1) TC1 which demonstrated User Eligibility and legitness of the documents and the details hence produced

Test Case ID	Test Scenario	Test Case Description	Pre-Condition	Test Steps	Test Input	Expected Behaviour	Actual Result	Status
TC2.1	RFID tag detection Status	Validation of RFID tag Balance i.e. transaction within limit	User's OneCard must have valid RFID tag	1)User enters 2)Card is read 3)Transaction within limit	RFID tag visible to the sensor	RFID tag validated and the amount is deducted	Card Detected and RFID validation Success	PASS
TC2.2	EMV Chip Detection	Chip in the Card is detected	EMV chip's presence in the card	1)User enters 2)Card is read	EMV Chip detected by the sensor	EMV chip detected by the sensor and the amount is deducted	Card Detected and EMV Validation Success	PASS
TC2.3	NFC establishment status	NFC connection with the sensor establishment and balance checking	NFC technology embedded in the card	1)User enters the entry gates 2)Card is read 3)Balance is checked	Near Field Connection is established with the sensor	Valid entry and transaction within the limit	Valid entry, passenger may entry	PASS
TC2.4	NFC establishment status	NFC connection with the sensor establishment and balance checking	NFC technology embedded in the card	1)User enters the entry gates 2)Card is read 3)Balance is checked	Near Field Connection is established with the sensor	Valid entry and transaction exceeded	Valid entry, passenger may entry	FAIL
T2.5	Retry the entry with the card status	Card detection at the entry and exit gates	Card produced at the entry	1)User enters the entry gates 2)Card is read 3)Balance is checked 4)Sensors detected at the entry	User produces the card at the entry card Sensors detected	Card Validated and is successful	Entry accepted, Card validated and balance deducted	PASS

Fig 2) TC2 which demonstrates the boarding/alighting status of passengers

Documentation

Sl. No	Requirement ID	Requirement description	Test case ID	Test case description	Test design	Test execution		Requirement coverage
						Test environment	Product environment	
1]	R1)	Manage bus (Overload check)	TC_1.1	Valid entry & total passengers within limit	Completed	Passed	No run	COMPLETED
			TC_1.2	Valid entry & passenger limit exceeded	Completed	Passed	No run	
			TC_1.3	Invalid entry	Completed	Passed	No run	
2]	R2)	Verifying boarding status	TC_2.1	Sufficient balance on RFID tag	Completed	Passed	No run	PARTIAL
			TC_2.2	Insufficient balance on RFID tag	Completed	Passed	No run	
			TC_2.3	Valid exit & amount deducted appropriately	Completed	Passed	No run	
			TC_2.4	Valid exit & amount deducted incorrectly	Completed	Failed	No run	
			TC_2.5	Invalid exit	Completed	Passed	No run	

Fig 3) Requirement Traceability Matrix