

REQUIREMENT ANALYSIS

ATM Banking System

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CONTENTS

System Domain	Page 2
Major Goals	Page 3
<ul style="list-style-type: none"> • Security and Authentication • Transaction and Inquiry Functions • Reliability and Availability • Performance and Scalability • Maintainability and Compatibility 	
System Actors and Components	Page 4
Functional Requirements	Page 5 - 8
Non - Functional Requirements	Page 9
Assumption	Page 10
Responsibilities	Page 11 - 12
Uses Cases Scenario	Page 13

Every diagram, table and item in this document should be identified with a unique identifier marked with the "#" symbol, as explained in more detail in the project outline:

Category	Identifier
Use Case Scenario	UC#
Assumption	A#
Functional Requirements	FR#
Non Functional Requirements	NFR#
Responsibilities	R#
Use Case Diagram	UCD#

System Domain and Objectives

The scope of the system is an ATM (Automated Teller Machine) that allows customers to perform various banking transactions including withdrawals, deposits, fund transfers, bill payments and checking their account balance. The system consists of a hardware component (the physical machine) and a software component (the system that processes the transactions).

System Objectives -

Credentials:

- Customers must enter a valid PIN to access their accounts.
- Security of customer account and transaction information is ensured.
- Customers can change their PINs for security purposes.
- Invalid PINs result in denied account access.
- Customers can manage their bank accounts remotely.
- Physical visits to a bank branch are not required.

Transaction:

- Customers can withdraw cash from their accounts
- Customers can deposit cash or checks into their accounts
- Customers can cancel transactions if necessary
- Transactions are confirmed and a receipt is provided to the customer
- Customers are notified if a transaction fails for any reason
- Customers can transfer funds between accounts and pay bills from their accounts
- User-friendly and intuitive interface for customers
- Range of transaction types with detailed information provided
- ATM is always operational and able to process transactions reliably and quickly

Inquiry:

- The system allows customers to check their account details, including balances and recent transactions.
- The system allows customers to check their account balances.
- The system allows customers to request bank statements.

Maintenance:

- The system is periodically refilled with cash by maintenance personnel.
- The system is marked as "out of order" if it is not functioning properly and needs repairs.
- Enabling maintenance personnel to perform routine maintenance and repairs as needed to keep the ATM functioning properly

Major Goals

The primary objective of this project is to develop a secure and user-friendly ATM banking system that enables customers to perform a wide range of transactions and inquiries without the need to visit a bank branch. By achieving this major goal, the project team and stakeholders will be able to provide a valuable service to customers and contribute to the overall success of the project.

Sub - Goals

The following are an extension of the above mentioned main goals and how they shall be carried out in greater detail.

Security and Authentication

- Develop a secure system that ensures customers' account and transaction information is protected.
- Implement authentication methods to verify customers' identities and prevent unauthorized access.

Transaction and Inquiry Functions

- Provide a user-friendly and intuitive interface for customers to perform various transactions, such as cash withdrawals, deposits, fund transfers and bill payments.
- Allow customers to check their account details including balances and transaction history.
- Enable customers to request bank statements.

Reliability and Availability

- Ensure the system is always operational and able to process transactions reliably and quickly.
- Allow maintenance personnel to perform routine maintenance and repairs as needed to keep the ATM functioning properly.
- Make sure the system is available for use during certain hours or have a certain level of uptime.

Performance and Scalability

- Develop the system to handle a certain number of transactions per second or respond within a certain time limit.
- Ensure the system can handle an increasing number of users or transactions as the system grows.

Maintainability and Compatibility

- Make the system easy to maintain and update with clear documentation and a well-structured codebase.
- Ensure the system is compatible with other software and hardware systems that it needs to interact with.

System Components

Analyzing the Critical Components and Actors responsible for ensuring optimal user experience, Transaction Processing, and System Maintenance.

Actor Type	Major Components	Major Responsibilities and Roles
Primary Actor	Customer	The customer is the user of the ATM system. They use the front-end or user interface of the machine to access their account and perform transactions.
Secondary Actor	Bank/System (back-end)	The bank or back-end system is responsible for processing transactions, managing customer accounts, and communicating with the ATM machine to authorize transactions and dispense cash.
Secondary Actor	Machine (front-end/user interface)	The ATM machine serves as the front-end or user interface for the customer. It allows the customer to access their account, withdraw cash, transfer funds, and perform other transactions.
Secondary Actor	Maintenance	The maintenance personnel are responsible for keeping the ATM system in good working order. They perform regular maintenance and repair tasks to ensure that the system is functioning properly.

Table of Functional Requirements (FR)

The following is a list of the Functional Requirements (FR) for the ATM system and their description:.

ID	Description: FR for Customer (CT)
FR01	Can check their account balance and transaction history using the ATM machine.
FR02	Can deposit cash and checks into their account using the ATM machine.
FR03	Should be able to navigate a secure and user-friendly UI to interact with the ATM machine.
FR04	Should be able to select their preferred language option for the UI.
FR05	Should be logged out automatically after a period of inactivity.
FR06	Should be able to receive a printed receipt for all transactions.
SFR07	Can initiate and complete transactions such as cash withdrawals, deposits, and balance inquiries using their ATM card and PIN.
ID	Description: FR for Bank (BK)
FR08	Should validate ATM cards and PIN numbers for security before allowing any transaction.
FR09	Should securely communicate with the ATM machine to update account information.

FR10	Should be able to remotely update software and configuration settings of the ATM machine.
FR11	Should be able to monitor the status and performance of the ATM machine.
FR12	Should keep a record of all transactions for auditing purposes
ID	Description: FR for ATM SYSTEM (AT)
FR13	Should validate ATM cards and PIN numbers entered by the customer for security.
FR14	Should dispense the correct amount of cash requested by the customer.
FR15	Should provide a secure and user-friendly UI for the customer to interact with.
FR16	Should be able to communicate securely with the bank/system.
FR17	Should automatically log out the customer after a period of inactivity.
FR18	Should be able to print receipts for all transactions.
FR19	Should provide options for customers to deposit cash and checks into their account.
ID	Description: FR for Maintenance (M)
FR20	Should be able to perform routine maintenance on the ATM machine, including replenishing cash and replacing parts as needed.
FR21	Should be able to diagnose and repair any issues with the ATM machine.

FR22	Should be able to communicate with the bank/system in case of any major issues.
FR23	Should be able to monitor the health of the ATM machine and proactively identify potential issues.

Functional Requirements Of Customer (CT):

Customers should be able to insert a valid ATM card, enter a correct PIN, and perform various transactions such as balance inquiry, withdrawal, and transfer. The customer should be able to cancel a transaction if necessary. These requirements ensure a smooth and secure customer experience when using an ATM.

Functional Requirements Of Bank (B):

The bank is responsible for updating account balances for each transaction, tracking transaction logs, configuring transaction limits, and generating transaction reports. The system should also have sufficient security measures in place to protect the confidentiality of customer information.

Functional Requirements Of Maintenance(M):

The maintenance personnel should be able to access the ATM for maintenance and repair purposes, diagnose and resolve issues, update software and firmware, and perform routine maintenance. The system should provide alerts for maintenance attention.

Functional Requirements Of ATM(AT):

The ATM should be able to read and validate ATM cards. The ATM should be able to authenticate the customer's PIN. The ATM should be able to dispense cash and provide a receipt. The ATM should be able to perform other transactions such as balance inquiries and fund transfers. The ATM should have a user-friendly interface for customer interaction.

Table of Non Functional Requirements (NFR)

The following is a list of Non-Functional Requirements (NFR) for the ATM system. NFs can include Security, Performance, Compatibility, Maintainability, Usability, Reliability, Scalability, Availability requirements

ID	Description
NFR01	Performance: the system should be able to handle a certain number of transactions per second or respond within a certain time limit
NFR02	Reliability: the system should operate without errors or failures and be able to recover from any failures that do occur
NFR03	Compatibility: the system should be compatible with other software and hardware systems that it needs to interact with.
NFR04	Maintainability: the system should be easy to maintain and update, with clear documentation and a well-structured codebase
NFR05	Usability: the system should be easy to use and intuitive for the end user
NFR06	Scalability: the system should be able to handle an increasing number of users or transactions as the system grows
NFR07	Availability: the system should be available for use during certain hours or have a certain level of uptime
NFR08	Security: the system should have certain security measures in place to protect against unauthorized access or attacks

Table of Assumption (A)

This table lists the key assumptions made during the development of the ATM system. These assumptions help to clarify the limitations of the system and ensure a common understanding of the ATM's capabilities & constraints.

The following is a list of responsibilities of the ATM system:

ID	Description
A01	The ATM machine is powered on and functioning properly
A02	The ATM machine is connected to the banking network
A03	The user has a valid ATM card and PIN
A04	The user has sufficient funds in their account to complete transactions
A05	The ATM machine is loaded with sufficient cash for dispensing
A06	The communication between the ATM machine and the banking network is secure
A07	The user will not attempt to tamper with the ATM machine or software
A08	The ATM machine meets all regulatory and compliance requirements for banking transactions.
A09	The ATM machine is located in a secure physical environment The ATM machine is able to read and process the user's card and transaction requests

Table of Responsibilities (R)

The following is a list of Responsibilities of the ATM system:

ID	Description
Responsibilities of the Bank (BK)	
R01	Authorize transactions and manage customer accounts
R02	Monitor and maintain the ATM system and its components
R03	Set transaction limits and security protocols to protect customer information and prevent fraud
R04	Replenish cash reserves and repair any system malfunctions
R05	Manage and maintain the customer database, including customer account, chequing account, savings account, and credit account information
R06	Manage and maintain the system IDs, including customer account, chequing account, savings account, and credit account information
R07	Maintain accurate and up-to-date records of customer balances, transactions, and bank statements.
Responsibilities of the Customer (CT)	
R101	Insert the ATM card to initiate a transaction
R102	Insert the ATM card to initiate a transaction
R103	Enter a Pin to authenticate the transaction
R104	Select the type of transaction (Withdraw ,Deposit, Transfer funds,Pay bills etc)
R105	Provide accurate and up-to-date information to the bank for account management purposes, including name, phone number, account number, email, and address.
Responsibilities of ATM Machine (AT)	
R201	Dispense cash to customers when authorized by the bank
R202	Validate and process deposits and withdrawals
R203	Print receipts for each transaction and keep records of all transactions
R204	Provide clear instructions and guidance to customers during transactions.
R205	Maintain security measures to protect the machine from theft or damage
Responsibilities of Maintenance (M)	

R301	Regularly inspect and maintain all components of the ATM, including the card reader, dispenser, screen, and keypad, to ensure that they are in proper working order.
R302	Keep the ATM clean and free of debris or damage, both inside and outside of the machine
R304	Update software and firmware as needed to ensure that the ATM is running the latest version and is secure against any known vulnerabilities.
R305	Perform regular tests to ensure that the ATM is functioning properly and all transactions are processed accurately.
R306	Quickly repair or replace any malfunctioning components to minimize downtime and customer inconvenience.

Use Cases (UC)

These Use Cases represent the various functions and features of the ATM system which are essential to the smooth and secure operation of the system.

Below is a comprehensive list of Use Cases (goals) for the ATM System:

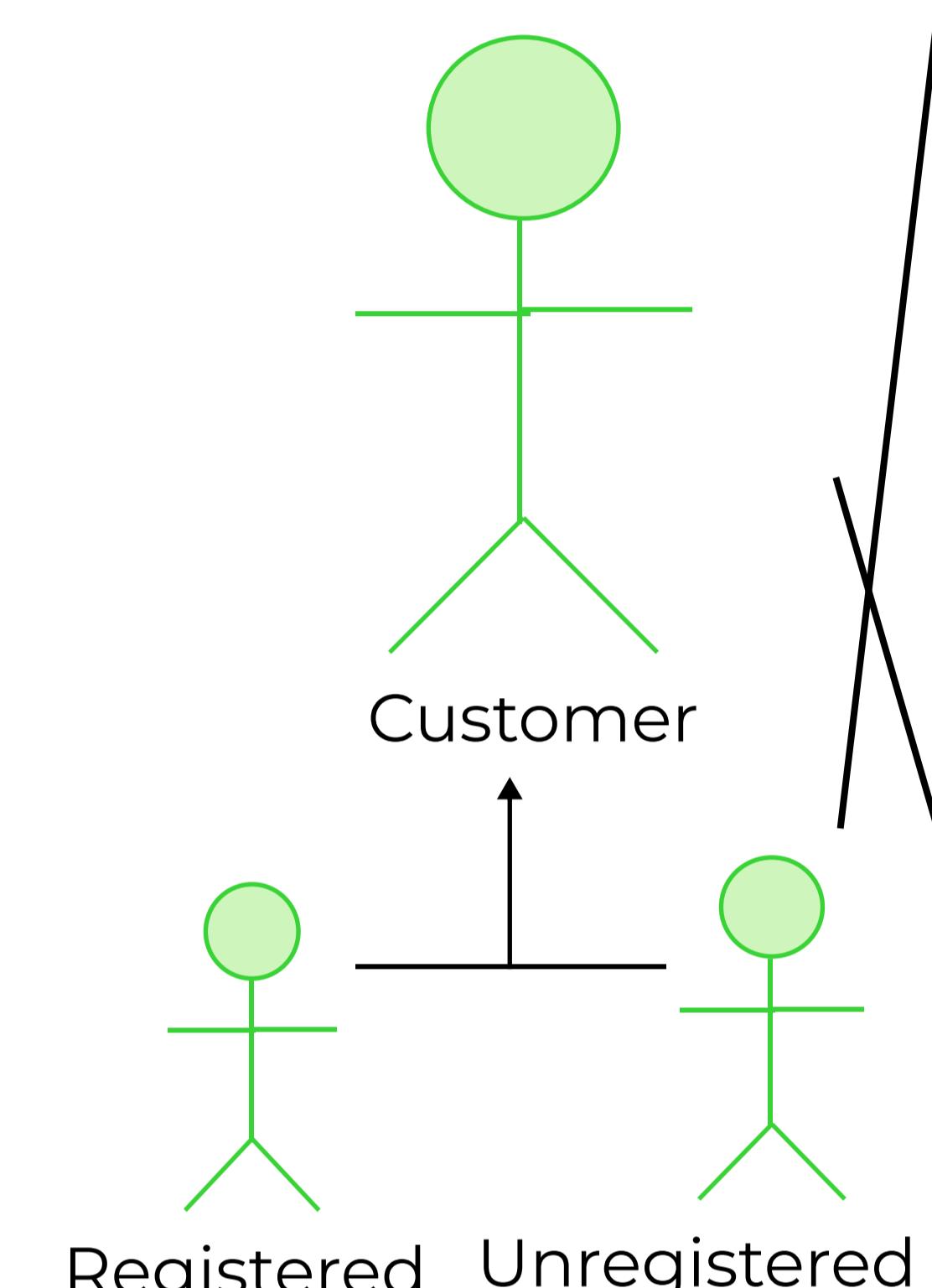
ID	Use Case	Description	Actor(s)	Trigger	Flow of Events	Precondition(s)	Postcondition(s)
UC#01	Credential check	System checks if user is registered with that bank or not	- Machine - Customer - System	Card is inserted into ATM	- User inserts card - Account associated with card is accessed by system	User owns a card	Machine prompts user to enter PIN
UC#02	Enter PIN	Prompts user for login PIN for verification	- Machine - Customer	System is powered on	- Keypad is displayed on machine for user to enter PIN	System is powered on	- Validates PIN from system - Valid → proceed to option menu - Invalid → prompts re-entering PIN. Prompts "Forgot PIN" after 3 failed attempts
UC#03	Change PIN	Prompts user to Change PIN if forgotten or other reasons	- Machine - Customer	Invalid PIN	- User is prompted to enter old PIN - User is prompted to enter new PIN - System verifies new PIN isn't same as old PIN - If same, prompts to enter new PIN until satisfied	User has entered a PIN	- System validates PIN by prompting security question previously decided by user - System conducts double encryption
UC#04	Invalid PIN	Displays error message stating incorrect PIN entered	- Machine - Customer	PIN doesn't match PIN stored in database	- System matches PIN against database info - User is allowed 3 attempts to enter PIN	Credential check has been conducted	- User is locked out of their account - System returns to home screen
UC#05	Withdraw	Prompts user to enter a value to withdraw from chequing/savings account	- Machine - Customer - Bank	User selects withdraw option	- User selects account to withdraw funds from - User enters amount to be withdrawn	Bills being withdrawn are within set threshold	- If successful transaction, proceeds to printing receipt - If unsuccessful, displays appropriate message

UC#06	Deposit	Allows user to deposit funds into chequing/savings account	- Machine - Customer - Bank	User selects deposit option	- User selects account to deposit funds into - User enters amount to be deposited - User inserts bills	Bills inserted are in valid currency	- If successful transaction, proceeds to printing receipt - If unsuccessful, displays appropriate message
UC#07	Transfer Funds	Allows user to transfer funds between chequing, savings, credit accounts or transfer funds to another user's account	- Machine - Customer - Bank	User selects transfer funds option	- System checks if funds being transferred are within valid threshold - User is prompted to enter amount to be transferred	Funds are being sent to a valid account	- If successful transaction, proceeds to printing receipt - If unsuccessful, displays appropriate message
UC#08	Pay Bills	Allows user to transfer funds to pay bills	- Machine - Customer	User selects pay bills option	- User is prompted to enter amount to be paid	Bills to be paid are linked to account	- If successful transaction, proceeds to printing receipt - If unsuccessful, displays appropriate message
UC#09	Print Receipt	Prints receipt of activity after successful transaction	- Machine - Customer	User requests receipt of transaction	- User is asked to choose between physical or virtual receipt	Transactions were successfully made	Physical → receipt is printed Virtual → receipt is sent to email linked to account
UC#10	Cancel Transaction	Allows user to cancel ongoing transaction and return to home screen	- Machine - Customer	User requests to cancel transaction	- User is asked whether to cancel transaction - Ongoing transaction is aborted	Some transaction was being attempted	User is returned to home screen
UC#11	Confirm Transaction	Confirms user wants to go ahead with current transaction	- Machine - Customer	User confirms transaction	- User is asked to confirm transaction - Ongoing transaction is successfully made	User and machine have satisfied transaction needs	Proceeds to printing receipt
UC#12	Failed Transaction	Displays error message stating that current transaction is not valid and can't be processed	- Machine - Customer	User or machine has failed to satisfy transaction needs	- System checks validity of current transaction - Terminates transaction being attempted when found invalid	Some transaction was being attempted	- Prints appropriate message - Returns user to home screen
UC#13	Customer	Displays customer's account details	- Machine - Customer	User requests	- Personal details of the user linked	User has entered valid credentials of	Changes user info or returns user to option

	Account Details			their details stored on account	to the account are printed - User is allowed to change details shown or return to previous screen	account	bar
UC#14	Balance Check	Shows customer the current balance in chequing, savings or credit account	- Machine - Customer	User requests to check their balance	- Asks user for account to check balance - Prints balance to screen	User has entered valid credentials of account	Asks if user wants to check another account or return to option bar
UC#15	Bank Statement	Displays bank statements of past transactions made by user	- Machine - Customer	User requests their bank statements	- Asks user for account to check statement - Provides detailed list of transactions made with that account	User has entered valid credentials of account	Asks if user wants to check another account or return to option bar
UC#16	Out of Order	Displays message if machine is out of order	- Machine - Customer - Maintenance	System is powered on	- System checks for hardware, software or technical malfunction - If found, prints appropriate message to alert user	- Bill quantity in machine is below set threshold - General hardware issues with machine	Returns user to home screen
UC#17	Refill Machine	Allows maintenance personnel to refill machine when under set threshold	- Machine - Maintenance	User chooses to withdraw or transfer funds	- System checks if set threshold is below limit required to be stored in machine	Bills in machine are below set threshold	- Moves to out of order case

Use Case Diagram:

ATM Banking System



Use Case Diagram Key

● Use cases

● Errors

● System

○ Actors

