Software Requirements Specification

For

ATM

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1.Introduction

1.1 Purpose

This document describes the software requirements and specification for an automated teller machine (ATM) network.

1.2 Document Conventions: font: TNR 11

1.3 Intended Audience and Reading Suggestions

The document is intended for all the stakeholders customer and the developer **(designers, testers, maintainers**). The reader is assumed to have basic knowledge of banking accounts and account services. Knowledge and understanding of UML diagrams is also required.

1.4 Definitions, abbreviations

1.4.1 Definitions

- **Account**

A single account in a bank against which transactions can be applied. Accounts may be of various types with at least checking and savings. A customer can hold more than one account.

- **ATM**

A station that allows customers to enter their own transactions using cash cards as identification. The ATM interacts with the customer to gather transaction information, sends the transaction information to the central computer for validation and processing, and dispenses cash to the customer. We assume that an ATM need not operate independently of the network.

- **Bank**

A financial institution that holds accounts for customers and that issues cash cards authorizing access to accounts over the ATM network.

- **Bank computer**

The computer owned by a bank that interfaces with the ATM network and the bank's own cashier stations. A bank may actually have its own internal network of computers to process accounts, but we are only concerned with the one that interacts with the network.

- **Cash Card**

A card assigned to a bank customer that authorizes access to accounts using an ATM Machine. Each card contains a bank code and a card number, coded in accordance with national standards on credit cards and cash cards. The bank code uniquely identifies the bank within the consortium. The card number determines the accounts that the card can access. A card does not necessarily access all of a customer's accounts. Each cash card is owned by a single customer, but multiple copies of it may exist, so the possibility of simultaneous use of the same card from different machines must be considered.

- **Customer**

The holder of one or more accounts in a bank. A customer can consist of one or more persons or corporations, the correspondence is not relevant to this problem. The same person holding an account at a different bank is considered a different customer.

- **Transaction**

A single integral request for operations on the accounts of a single customer. We only specified that ATMs must dispense cash, but we should not preclude the possibility of printing checks or accepting cash or checks. We may also want to provide the flexibility to operate on accounts of different customers, although it is not required yet. The different operations must balance properly.

1.4.2 Abbreviations

Throughout this document the following abbreviations are used:

- k : is the maximum withdrawal per day and account.
- m: is the maximum withdrawal per transaction.
- n : is the minimum cash in the ATM to permit a transaction.
- t : is the total fund in the ATM at start of day.

1.5 Project Scope

The software supports a computerized banking network. The network enables customers to complete simple bank account services via automated teller machines (ATMs) that may be located off premise and that need not be owned and operated by the customer's bank. The ATM identifies a customer by a cash card and password. It collects information about a simple account transaction (e.g., deposit, withdrawal, transfer, bill payment), communicates the transaction information to the customer's bank, and dispenses cash to the customer. The banks provide their own software for their own computers. The bank software requires appropriate record keeping and security provisions. The software must handle concurrent accesses to the same account correctly.

2. Overall Description

2.1 Product Perspective

The ATM network does not work independently. It works together with the banks' computers and the software run by the network's banks.

Communication interface: The ATMs communicate with the banking systems via a communication network.

Software interface: The messages sent via the communication network are specific to the target banking software systems. At present, two known banking systems will participate in the ATM network.

Hardware interface: The software will run on an ATM computer yet to be chosen.

User interfaces

Customer: The customer user interface should be intuitive, such that 99.9% of all new ATM users are able to complete their banking transactions without any assistance.

Bank Security Personnel: Bank security personnel are responsible for removing deposits and adding cash to ATMs. There should be a simple interface (e.g., a switch or button) that they can use to initialize the ATM whenever they restock.

Maintainer: The maintainer is responsible for adding new ATMs to the network and servicing existing ATMs. A maintainer should be possible to add a new ATM to the network within 1 hour.

2.2 Product Features

The ATM should work 24 hrs. The ATM identifies a customer by a cash card and password. It collects information about a simple account transaction (e.g., deposit, withdrawal, transfer, bill payment), communicates the transaction information to the customer's bank, and dispenses cash to the customer. The banks provide their own software for their own computers. The bank software requires appropriate record keeping and security provisions. The software must handle concurrent accesses to the same account correctly.

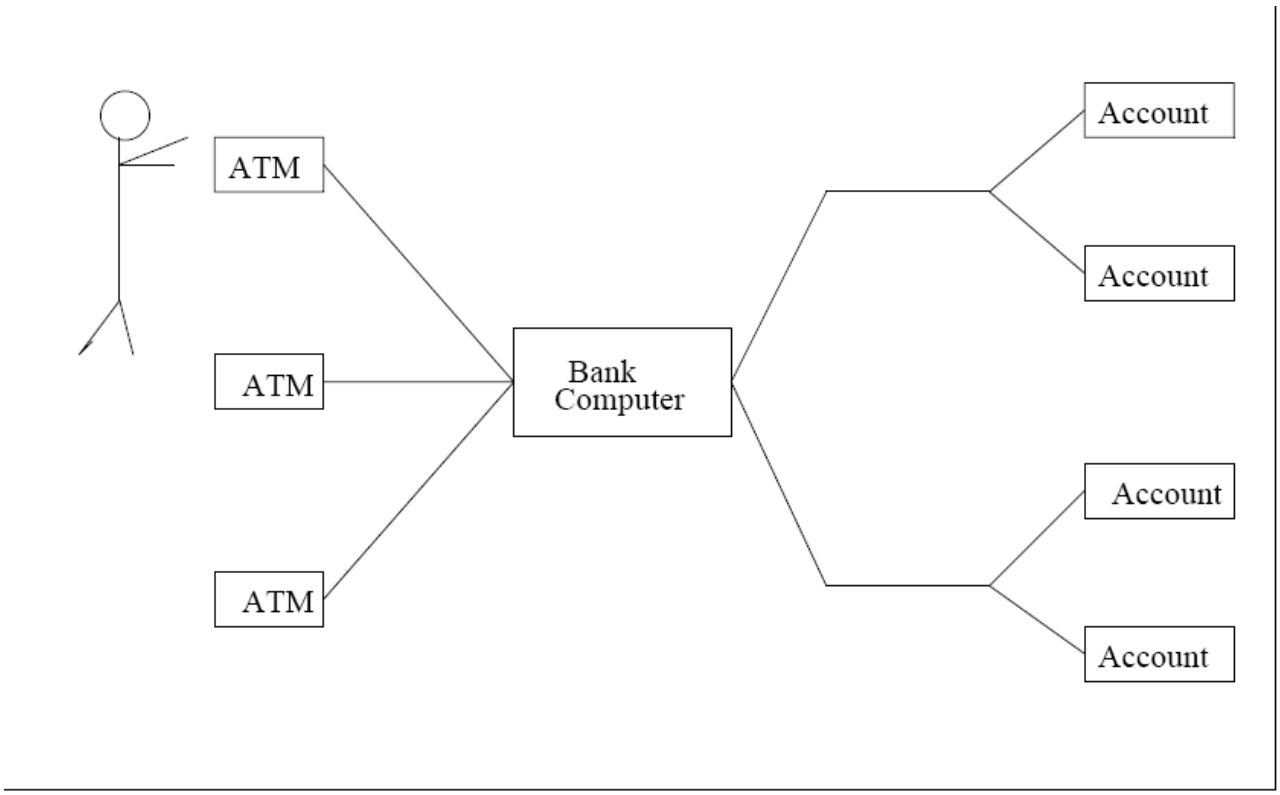

Figure: ATM network

2.3 User Classes and Characteristics

Characteristics: There are several users of the ATM network:

Customers are simply members of the general public with no special training.

Bank security personnel need have no special education or experience.

Maintainers must be experienced network administrators, to be able to connect new ATMs to the network.

2.4 Operating Environment

The hardware, software and technology used should have following specifications:

- Ability to read the ATM card
- Ability to count the currency notes
- Touch screen for convenience
- Keypad (in case touchpad fails)
- Continuous power supply
- Ability to connect to bank's network
- Ability to take input from user
- Ability to validate user

2.5 Design and Implementation Constraints

- Login

Validate Bank Card:

- Validate for Card Expiration Date
- Validate that the card's expiration date is later than today's date
- If card is expired, prompt error message "Card is expired"

Validate for Stolen or Lost Card:

- Validate that the card is not reported lost or stolen
- If card is lost, prompt error message, "Card has been reported lost"
- If card is stolen, prompt error message, "Card has been reported stolen"

Validate for Disabled Card:

- Validate that the card is not disabled
- If card is disabled, prompt error message, "Card has been disabled as of <expiration date>"

Validate for Locked Account:

- Validate that the account is not locked
- If account is locked, prompt error message "Account is locked"

Validate PIN:

- Validate that the password is not blank
- If PIN is blank, prompt error message "Please provide PIN"
- Validate that the password entered matches the password on file
- If password does not match, prompt error message "Password is Incorrect"

Lock Account:

- If number of consecutive unsuccessful logins exceeds three attempts, lock account
- Maintain Consecutive Unsuccessful Login Counter
- Increment Login Counter
- For every consecutive Login attempt, increment logic counter by 1.
- Reset login counter to 0 after login is successful.
- Get Balance Information
- Withdraw Cash
- Transfer Funds

2.6Assumptions and Dependencies

- Hardware never fails
- ATM casing is impenetrable

- Limited number of transactions per day (sufficient paper for receipts)
- Limited amount of money withdrawn per day (sufficient money)

3. Specific Requirements

3.1 Functional Requirements

The functional requirements are organized in two sections First requirements of the ATM and second requirements of the bank.

3.1.1 Requirements of the automated teller machine

The requirements for the automated teller machine are organized in the following way General requirements, requirements for authorization, requirements for a transaction.

General

Functional requirement 1:

- **Description:** Initialize parameters t, k, m, n
- **Input:** ATM is initialized with t dollars, k, m, n are entered
- **Processing:** Storing the parameters.
- **Output:** Parameters are set.

Functional requirement 2:

- **Description:** If no cash card is in the ATM, the system should display initial display.

Functional requirement 3:

- **Description:** If the ATM is running out of money, no card should be accepted. An error message is displayed.
- **Input:** A card is entered.
- **Processing:** The amount of cash is less than t.
- **Output:** Display an error message. Return cash card.
- **Authorization**: The authorization starts after a customer has entered his card in the ATM

Functional requirement 4:

- **Description:** The ATM has to check if the entered card is a valid cash-card.
- **Input:** Customer enters the cash card.
- **Processing:** Check if it is a valid cash card. It will be valid if
  - The information on the card can be read.
  - It is not expired.
- **Output:** Display error message and return cash card if it is invalid.

Functional requirement 5:

- **Description**: If the cash card is valid, the ATM should read the serial number and bank code.
- **Input:** Valid cash card.
- **Processing:** Read the serial number.
- **Output:** Initiate authorization dialog

Functional requirement 6:

- **Description:** The serial number should be logged.
- **Input:** Serial number from cash card
- **Processing:** Log the number.
- **Output:** Update to log file.

Functional requirement 7:

- **Description Authorization dialog:** The user is requested to enter his password. The ATM verifies the bank code and password with the bank computer
- **Input:** Password from user, bank code from cash card.
- **Processing:** Send serial number and password to bank computer, receive response from bank.
- **Output:** Accept or reject authorization from bank.

Functional requirement 8:

- **Description:** Different negative answers from bank computer for authorization dialog.
- **Input:** Response from bank or authorization dialog:

  -“bad password” if the password was wrong.

-"bad bank code" if the cash card of the bank is not supported by the ATM.

-"bad account" if there are problems with the account.

- **Processing:** If the ATM gets any of these messages from the bank computer, the card will be ejected and the user will get the relevant error message.
- **Output:** Card is ejected and error message is displayed.

Functional requirement 9:

- **Description:** If password and serial number are ok, the authorization process is finished.
- **Input:** The ATM gets accept from the bank computer from authorization process.
- **Processing:** Finishing authorization.
- **Output:** Start transaction dialog.

Functional requirement 10:

- **Description:** If a card was entered more than three times in a row at any ATM and the password was wrong each time, the card is kept by the ATM. A message will be displayed that the customer should call the bank.
- **Input:** Entering a wrong password for the fourth time in succession
- **Processing:** Initiate authorization process Response from bank computer is to keep the card.
- **Output:** Display error message that the customer should call the bank.

Functions: These are the requirements for the different functions the ATM should provide after authorization.

Functional requirement 11:

- **Description:** The kind of transactions the ATM offers is: withdrawal
- **Input:** Authorization successfully completed. Enter the amount to withdraw.
- **Processing**: Amount entered is compared with m.
- **Output:** Amount of money to be dispensed is displayed. Begin initial withdrawal sequence.

Functional requirement 12:

- **Description:** Initial withdrawal sequence. If it is too much withdrawal redo the transaction.
- **Input:** Customer has entered the amount of money.
- **Processing:** Error if the amount is greater than m.

- **Output:** Start transaction or re-initiate transaction dialog if the amount is not within the pre-defined transaction policy.

Functional requirement 13:

- **Description:** Perform transaction.
- **Input:** Initial withdrawal sequence successful.
- **Processing:** Send request to the bank computer.
- **Output:** Wait for response from the bank computer.

Functional requirement 14:

- **Description:** If the transaction is successful, the money is dispensed.
- **Input:** ATM gets message "transaction succeeded" from the bank computer.
- **Processing:** ATM prints receipt, updates t and ejects the card. Dialog: Customer should take the card.
- **Output:** After the Customer has taken the card the money is dispensed.

Functional requirement 15:

- **Description:** If the money is dispensed, collects amount.
- **Input:** The amount requested is dispensed to the customer.
- **Processing:** the attaches the amount of money against the serial number of the card.
- **Output:** Amount together with the serial number. Response sent to bank for money dispensed.

Functional requirement 16:

- **Description:** If the transaction is not successful, an error message should be displayed. The card should be ejected.
- **Input:** ATM gets message "transaction not successful" from the bank computer.
- **Processing:** ATM displays error message. Dialog: Customer should take the card.
- **Output:** Eject card.

3.1.2 Requirements of the bank computer for the ATM

Authorization

The bank computer gets a request from the ATM to verify an account.

Functional requirement 1:

- **Description:** The bank computer checks if the bank code is valid. A bank code is valid if the cash card was issued by the bank.
- **Input:** Request from the ATM to verify card (Serial number and password.)
- **Processing:** Check if the cash card was issued by the bank.
- **Output:** Valid or invalid bank code.

Functional requirement 2:

- **Description:** If it is not a valid bank code, the bank computer will send a message to the ATM.
- **Input:** Invalid bank code
- **Processing:** Process message
- **Output:** The bank computer sends the message "bad bank code" to the ATM.

Functional requirement 3:

- **Description:** The bank computer checks if the password is valid for a valid cash card.
- **Input:** Request from the ATM to verify password.
- **Processing:** Check password of the customer.
- **Output:** Valid or invalid password.

Functional requirement 4:

- **Description:** If it is not a valid password, the bank computer will send a message to the ATM.
- **Input:** Invalid password.
- **Processing:** Process message. Update count for invalid password for the account.
- **Output:** The bank computer sends the message "bad password" to the ATM.

Functional requirement 5:

- **Description:** If it is a valid cash card and a valid password but there are problems with the account, the bank will send a message to the ATM that there are problems.
- **Input:** Valid cash card and password.
- **Processing:** Process message.
- **Output:** The bank sends "bad account" to the ATM.

Functional requirement 6:

- **Description:** If it is a valid cash card a valid password and there are no problems with the account the bank computer will send a message to the ATM that everything is ok.
- **Input:** Valid cash card password and account.
- **Processing:** Process message.
- **Output**: Send "account ok" to the ATM

Transaction

The bank computer gets a request to process a transaction from the ATM.

Functional requirement 7:

- **Description**: After a request the bank computer processes the transaction.
- **Input:** Request to process a transaction on an account and amount m to withdraw.
- **Processing:** Process transaction (together with the software of the bank.) Update k for amount.
- **Output:** If transaction succeeded, the bank computer sends the message "transaction succeeded" to the ATM. If not, it will send "transaction failed".

Functional requirement 8:

- **Description:** Update account after money is dispensed.
- **Input**: Response from ATM about money dispensed.
- **Processing:** Updates account.
- **Output:** New account record

Functional requirement 9:

- **Description:** Each bank has a limit k for each account about the amount of money that is available via cash card each day monthly.
- **Input:** Request to process transaction.

- **Processing:** Check if the amount of money doesn't exceed k
- **Output:** If the amount exceeds the limit, the transaction will fail.

Functional requirement 10:

- **Description:** The bank only provides security for their own computer and their own software.

4. External Interface Requirements

4.1 User Interfaces

The customer user interface should be intuitive, such that 99.9% of all new ATM users are able to complete their banking transactions without any assistance

4.2 Hardware Interfaces

The hardware should have following specifications:

- Ability to read the ATM card
- Ability to count the currency notes
- Touch screen for convenience
- Keypad (in case touchpad fails)
- Continuous power supply
- Ability to connect to bank's network
- Ability to take input from user
- Ability to validate user

4.3 Software Interfaces

The software interfaces are specific to the target banking software systems**.**

5. Other Nonfunctional Requirements

5.1 Performance Requirements

- It must be able to perform in adverse conditions like high/low temperature etc.
- Uninterrupted interrupted connections
- High data transfer rate

5.2 Safety Requirements

- Must be safe kept in physical aspects, say in a cabin
- Must be bolted to floor to prevent any kind of theft
- Must have an emergency phone outside the cabin
- There must be an emergency phone just outside the cabin
- The cabin door must have an ATM card swipe slot
- • The cabin door will always be locked, which will open only when user swipes his/her ATM card in the slot & is validated as genuine

5.3 Security Requirements

- Users accessibility is censured in all the ways
- Users are advised to change their PIN on first use
- Users are advised not to tell their PIN to anyone
- The maximum number of attempts to enter PIN will be three

5.4 Software Quality Attributes

Security.

Performance.

5.4.1 Availability: The ATM network has to be available 24 hours a day.

5.4.2 Security: The ATM network should provide maximal security .In order to make that much more transparent there are the following requirements:

1. It must be impossible to plug into the network.

5.4.3 Maintainability: Only maintainers are allowed to connect new ATMs to the network.

6. Other Requirements

6.1 Data Base

The ATM must be able to use several data formats according to the data formats that are provided by the data bases of different banks. A transaction should have all the properties of a data base transaction (Atomicity, Consistency, Isolation, Durability).