Requirements document for an automated teller machine network

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Contents

Chapter 1

Introduction

1.1 Purpose

This document describes the software requirements for an automated teller machine network (ATM). It is intended for the designer, developer and maintainer of the ATM.

1.2 Scope

The function of the ATM is to support a computerized banking network.

1.3 Overview

The remainder of this document is organized as follows: There will be some definitions of important terms. Section 2 contains a general description of the ATM. Section 3 identifies the specific functional requirements, the external interfaces and performance requirements of the ATM.

1.4 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.

Chapter 2

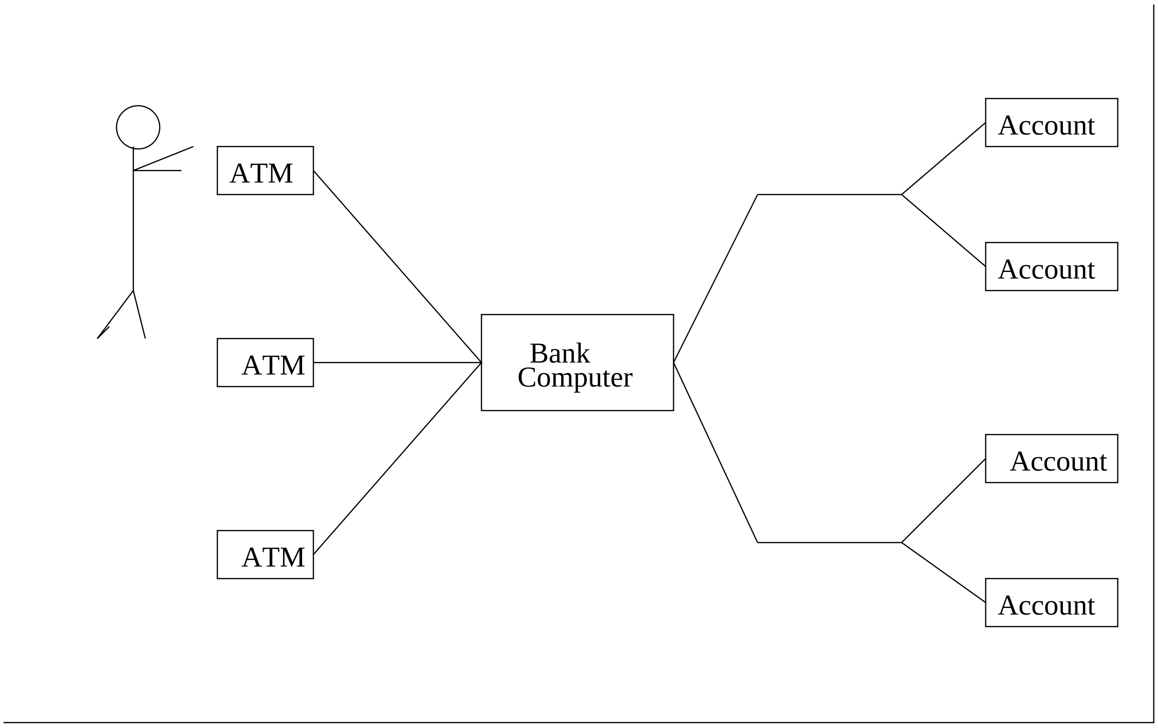
General Description

2.1 Product Perspective

The ATM network doesn't work independently. It has to work together with the computers/software owned by banks. There are clearly defined interfaces for the different systems.

2.2 Product Functions

The software should support a computerized banking network. Each bank provides its own computer to maintain its own accounts and process transactions against them. Automatic teller machines communicate with the banks' computers. An automatic teller machine accepts a cash card, interacts with the user, communicates with the bank computer to carry out the transaction, dispenses cash and prints receipts. The system requires appropriate record keeping and security provisions. The system must handle concurrent access to the same account correctly. The banks will provide their own software for their own computers. The cost of the shared system will be apportioned to the banks according to the number of customers with



cash cards.

Figure: ATM network

2.3 User Characteristics

There are several users of the ATM network:

- Customer
  The customer interacts with the ATM network via the ATM. It must be very easy for them to use the ATM. They should be supported by the system in every possible way.

- Maintainer
  It should be easy to maintain the whole system. The maintainer should be the only person that is allowed to connect a new ATM to the network.

2.4 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

Chapter 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
  1. the information on the card can be read.
  2. 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 predefined 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, the amount is logged
- *Input*
  The number of $20 bills requested is dispensed to the customer.
- *Processing*
  Log the amount of money against the serial number of the card.
- *Output*
  Amount logged 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 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 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.

3.2 External Interface Requirements

3.2.1 User Interfaces

The interface of the ATM must fulfill ergonomic requirements. The following is just an example for a possible interface to the ATM

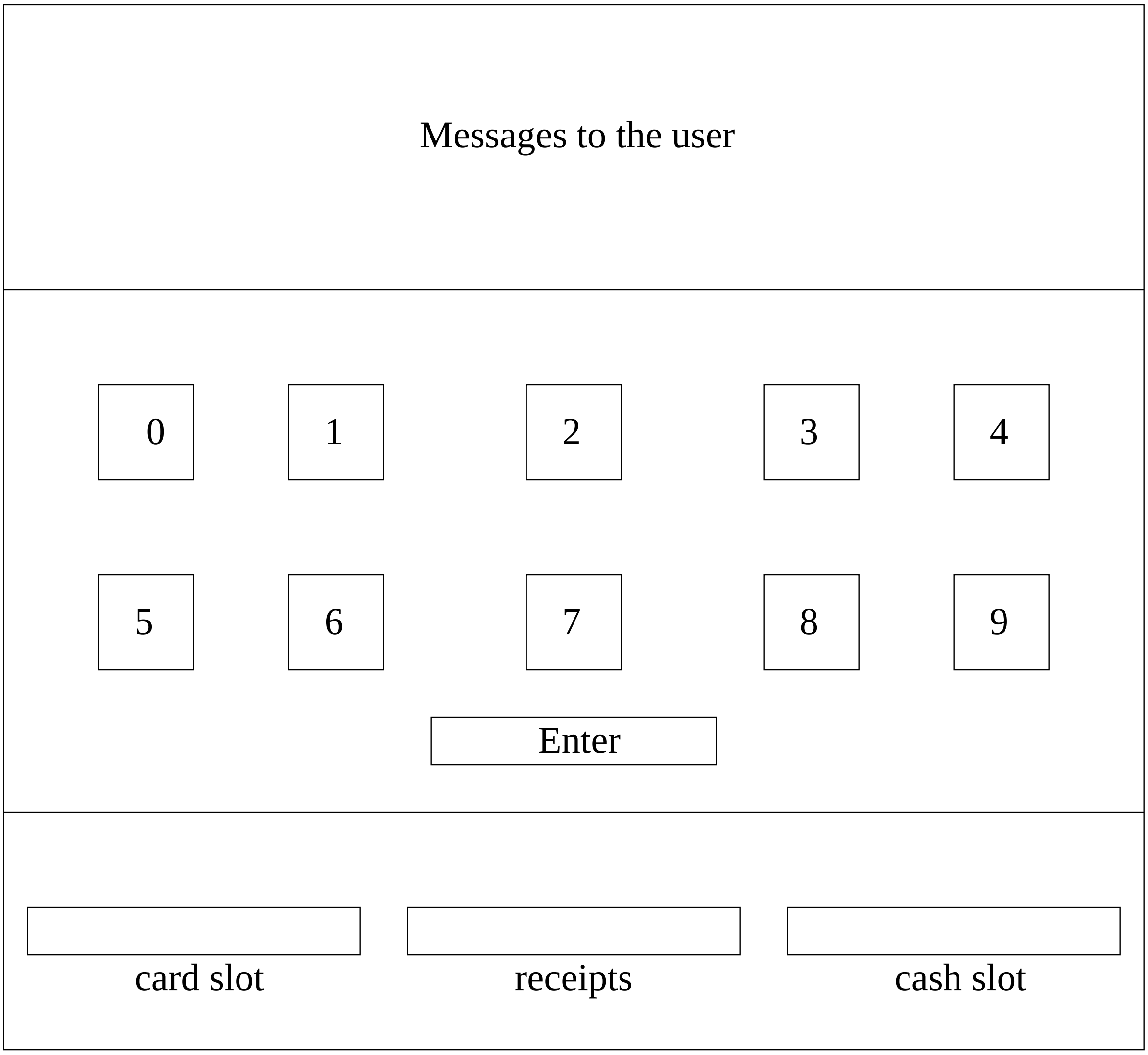


Figure: Format of the ATM interface

3.2.2 Hardware Interfaces

The ATM network has to provide hardware interfaces to:

- various printers
- various ATM machines (There are several companies producing the ATM machines.)
- several types of networks The exact specification of the hardware interfaces is not part of this document

3.2.3 Software Interfaces

The ATM network has to provide software interfaces to:

- the software used by different banks
- different network software

The exact, detailed specification of the software interfaces is not part of this document.

3.2.4 Communication Interfaces

There is no restriction of the ATM network to a specific network protocol as long as the performance requirements are satisfied.

3.3 Performance Requirements

Performance requirement 1

- *Description*
  Error message should be displayed at least 30 sec.

Performance Requirement 2

- Description
  If there is no response from the bank computer after a request within 2 minutes the card is rejected with an error message.

Performance Requirement 3

- Description
  The ATM dispenses money if and only if the withdrawal from the account is processed and accepted by the bank.

Performance Requirement 4

- Description
  Each bank may be processing transactions from several ATMs at the same time.

3.4 Attributes

3.4.1 Availability

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

3.4.2 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.

3.4.3 Maintainability

Only maintainers are allowed to connect new ATM's to the network.

3.4.4 Transferability/Conversions

Not Applicable

3.5 Other Requirements

3.5.1 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).