COS301 Mini-Project Group 11

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1 Introduction

This Software Requirements Specification gives an outline of the functionality for a next generation Automatic Teller Machine(ATM) System.

1.1 Purpose

The objective of this document is to formalize the vision of reducing queues at ATMs. This will be achieved by developing a next generation ATM System which can serve clients faster than before. The intended audience are current (and future) FNB clients that use ATMs to withdraw, deposit or get mini-statements.

1.2 Scope

The Next Gen ATM System will be designed for new ATMs (Hardware). The new system allow users to access the ATMs in three different ways. Namely: By using their FNB Bankcard (Old method), by using their fingerprint or by using the mobile app (through NFC). These methods would be used as primary identification and authentication of the customer. This would be followed up by entering a pin as the secondary authentication. An NFC enabled phone can be used as an authentication device as well as an input device (Eg: Set amount to withdraw, before getting to the ATM). This will benefit the customers by giving them faster, card-less alternatives to the standard bankcard method. The new system will come equipped with a monitoring sub-system for ensuring faster technician response, leading to higher uptimes for the ATMs. For the purpose of the project, an underlying customer account creation and management is assumed (Existing FNB account management).

1.3 Definitions, Acronyms, and Abbreviations

- ATM - Automatic Teller Machine. The physical hardware/machine used by customer. Formal Definition: "[A] machine that dispenses cash or performs other banking services when an account holder inserts a bank card." (2. Oxford Dictionaries — English, 2019)
- Bandwidth - The amount of data being transferred over a physical medium in a network. The maximum amount of data a provider allows you to send over a network. Formal Definition: "A range of frequencies within a given band, in particular that used for transmitting a signal." (3. Oxford Dictionaries — English, 2019)
- Modularise - To break a system into smaller parts, so that they can be developed and maintained separately. Formal Definition: "with object To construct on modular principles; to render modular." (4. Oxford Dictionaries — English, 2019)

- Next Gen - Next Generation. Used to describe upcoming ideas, people, hardware, etc. Looking at the future.
- NFC - Near-Field Communication. A wireless technology used for short range communication/interaction of devices. Formal Definition: "[A] technology allowing the short-range wireless intercommunication of mobile phones and other electronic devices for purposes such as making payments." (5. Oxford Dictionaries — English, 2019)
- UI - User Interface. The "screen" or buttons the user interacts with to use the system. Formal Definition: "The means by which the user and a computer system interact, in particular the use of input devices and software." (6. Oxford Dictionaries — English, 2019)
- Uptime - Usually a percentage to describe the ratio of time a system is operation versus the time a system is non operational. Formal Definition: "Time during which a machine, especially a computer, is in operation." (7. Oxford Dictionaries — English, 2019)

1.4 References

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1.5 Overview

The following sections will describe the high-level view of the system. This includes:

- User characteristics, which defines the types of users and groups of users who shall be interacting with the system.
- The functional requirements of the system, depicted by a use case diagram, representing all user interaction with the system and the relationship between all functions of the system.
- A more in depth description of each of the functional requirements depicted by the use case diagram.
- A high-level description of the non-functional requirements in terms of the different quality requirements of the system.
- A trace-ability matrix showing the relationship and correlation between the functions and requirements of the system.

2 User Characteristics

The following user characteristics will focus on the end users and customers of the FNB ATM system. The user characteristics identified in this section will directly contribute to the functional and software requirements discussed within this specification and give an understanding as to why and how certain elements of the system are to be implemented.

The FNB ATM system has an extremely broad user group, this being the general public. To further break down this user group and distinguish the characteristics of specific users and user types, it's best to take the following five market segmentation categories into account:

Geographic's is the segmentation of the users based on user location and their geographic segmentation.

First National Bank is a South African bank, which means majority of the users will be Citizens of South Africa. There will also be a minority of users who are not from South Africa, for example, temporary users who are visitors from abroad with a Foreign Currency Account.

Demographics is the main segmentation description of users. The demographic segmentation is further broken down into the following variables:

Age - the users' age will range from 18years and upwards.

Gender – user of all genders will use the system, with more or less an equal number of each gender.

Nationality - this element also correlates with language and race. As mentioned earlier, majority of the system's users will be South African. With South Africa being such a diverse country, the system's users will be comprised of people who speak various languages, with English being the customary language.

Income - users will be earners of different levels of income, thus it cannot be assumed that all users have access to the all the same features included in the system. An example of this would be that not all users own a smartphone and thus, will have to use the current ATM method of using a bank card at a physical ATM to do all transactions, rather than the mobile app method.

Occupation - users will range from unemployed and students to adults with occupations and jobs in various fields or industries.

Education - it cannot be assumed that all users will be educated. Users' level of education will range from uneducated, school, university to a level of a higher education.

Technical skills - not all users will be tech-savvy. Users' technical skills will range from minimal to advanced. It is taken into account, that some users will be technophobes.

Firmographics concerns the users as an organization, rather than as individuals. This concerns users as collection of people, for example, organisations and small businesses. There will be users who are business owners or members of an organisation.

Behavioural segmentation divides the user group on the basis of their use of the system, their behaviours and decision making patterns.

Experience - the system will be used by current users and future users; thus current users will have experience with the 'old' (current) methods of performing transactions. All future customers/users will have no experience with the system. Both current and future users will have no experience with the new methods of performing transactions, which are being introduced in this system.

Training – a certain amount of training or guidance may be needed by users for the use of this system.

Usage - time spent interacting with the system varies with all users. Users range from regular users to occasional users, more specifically users will be comprised of light, medium and heavy users.

Attitude - users may prefer different methods of performing transactions. In general, older users tend to prefer the older method of using a bank card at a physical ATM, whereas younger users will prefer to use new methods, such as NFC and biometric authentication introduced in this system.

Time - users have different time constraints. For this reason, the system has methods for performing a transaction, some faster than others. The new system especially focuses on faster ATM interaction, by deferring people from queues and giving them the ability to perform most of the steps of a transaction on the FNB ATM app. New methods for user authentication also provide for a faster process.

Psychographics is concerned with the segmentation of people with regards to their lifestyle, interests, activities and opinions. Psychological segmentation is similar to behavioral segmentation, but takes the psychological aspect of customers and clients behavior into account.

Social - users will be from all different social classes.

Lifestyle - users will all lead different lifestyles, which correlates to the interests and activities of the users, which will vary for each user.

Opinions – users will want the simplest and fastest way of managing their finances. FNB will be the users' choice for banking and thus the users will expect high quality banking interaction.

As mentioned before, the user base and their characteristics is very broad. Hence with regards to psychographics, the common interest and all users who are interacting with system is to manage their finances.

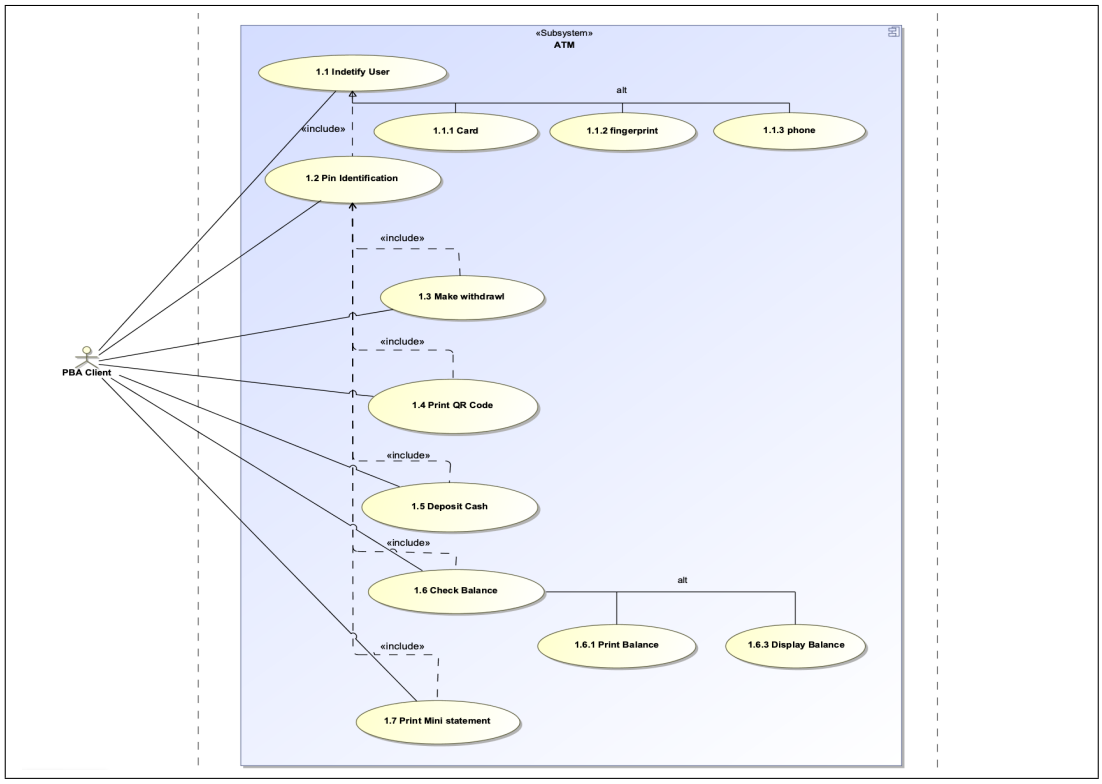
Nothing can be assumed with regards to the users' preferences.

Other characteristics to consider that do not specifically fall under the before mentioned categories, included people with disabilities or impairments. These users may not be able to interact with specific features of the system.

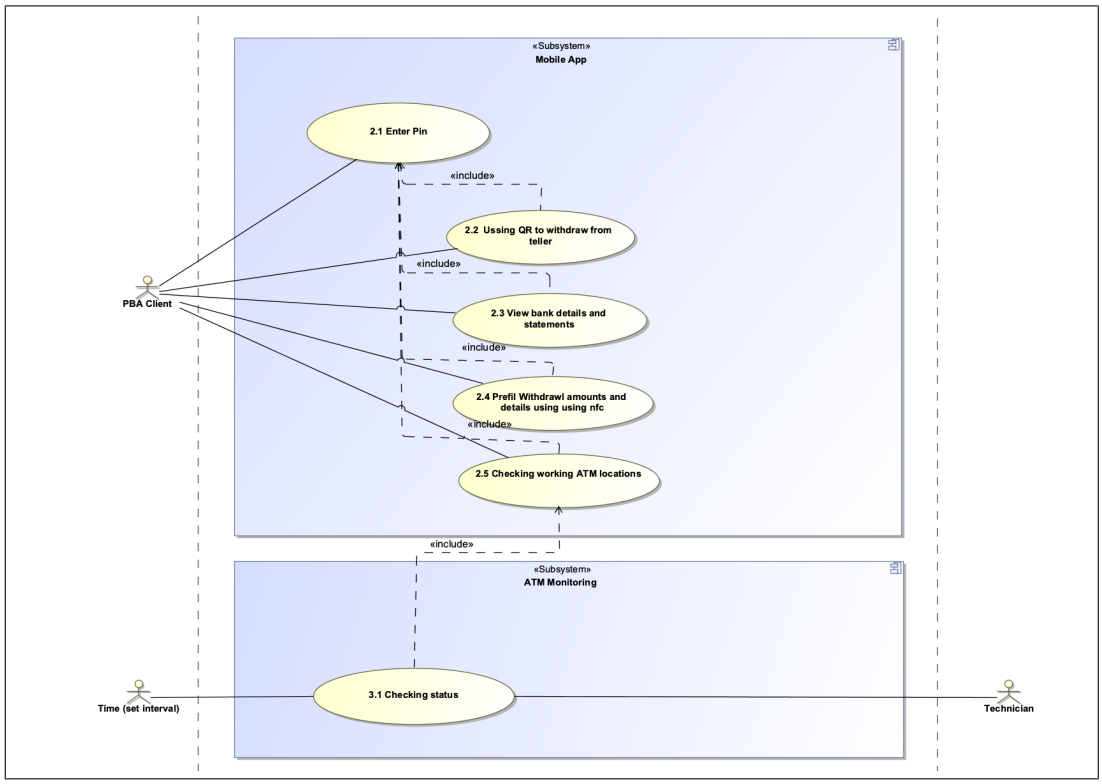
3 Functional Requirements

Diagram 1.1, 1.2 and 1,3 are all one diagram underneath one another

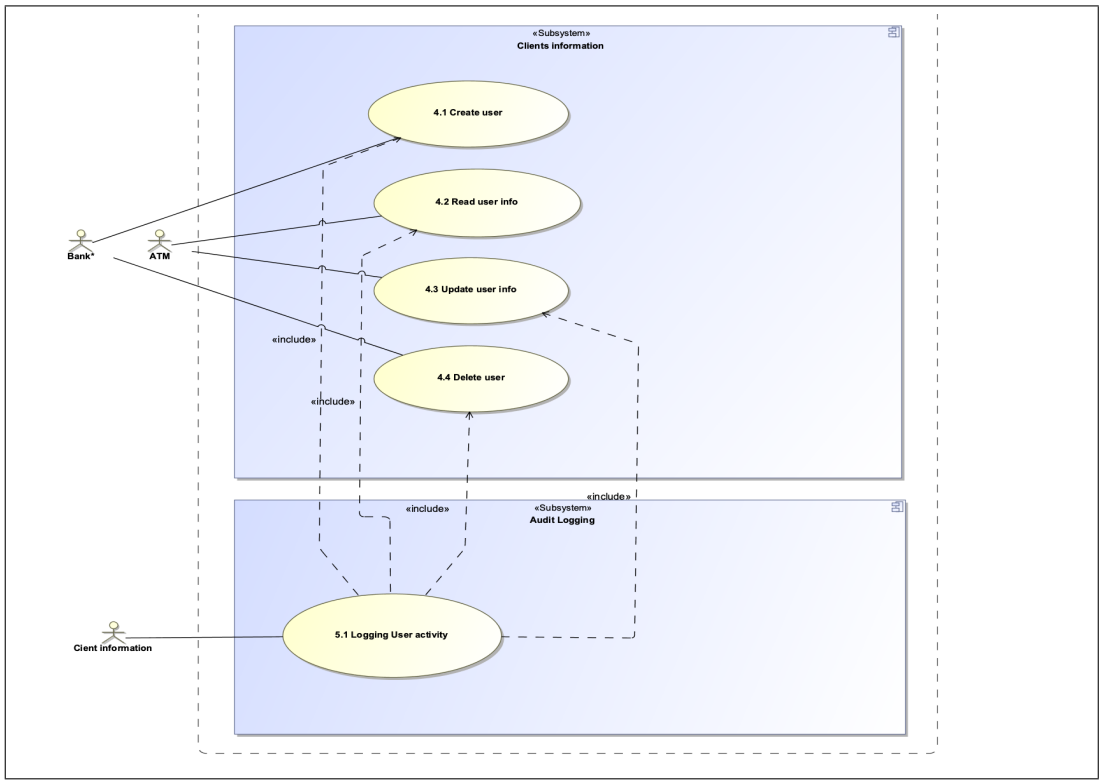
3.1 Diagram 1.1



3.2 Diagram 1.2



3.3 Diagram 1.3



R1.1 AN ATM shall be able to identify a user using 1 of 3 methods.
R1.1.1 An ATM shall allow users to identify themselves via their bank card.
R1.1.2 An ATM shall allow users to identify themselves via their fingerprint
R1.1.3 An ATM shall allow users to identify themselves via their phone or mobile device by use of NFC.
R1.2 An ATM shall require users to enter their pin as a secondary security measure.
R1.3 An ATM shall allow users to make a cash withdraw.
R1.4 An ATM shall allow users to print a QR code as a method of withdrawing funds.
R1.5 An ATM shall allow users to make cash deposit.
R1.6 An ATM shall allow users to check their account balance using 1 of 2 methods.
R.1.6.1 An ATM shall allow users to print their balance sheet.
R.1.6.2 An ATM shall allow users to view their balance by displaying it on screen.
R1.7 An ATM shall allow users to print a mini statement of their transaction information.

R2.1 The mobile app shall require users to log in by entering their pin.
R2.2 The mobile app shall, upon a users request, generate a QR code with the specified amount which that can be used to withdraw cash from a teller at supported stores.
R2.3 The mobile app shall allow users to view their account balance and statements by displaying them on screen.
R2.4 The mobile app shall allow users to prefill withdraw amounts and other details which the the mobile app can then upload to an ATM via NFC.
R2.5 The mobile app shall display locations of functioning ATM's to users upon request by requesting the information from the monitoring system.

R3.1 The monitoring system shall keep track of functioning ATM's

R4.1 The clients subsystem shall allow the creation of new records which includes the creation of new accounts.
R4.2 The clients subsystem shall allow records to be read by the authorised parties.
R4.3 The clients subsystem shall allow the update of records and accounts.
R4.4 The clients subsystem shall allow the deletion of records as well as accounts after it has been achieved.

R5.1 The audit logging subsystem shall log and persistently store all transactions and actions that are performed within the system.

4 Quality Requirements

4.1 Performance

- The system shall enable users to compile their ATM request (such as specifying the amount to withdraw) on the mobile app before approaching the physical ATM in order to maximize customer throughput at ATM stations.
- There shall be no apparent immediate delays while performing any action such as selections, traversing between screens, saving settings,etc.
- Each of the subsystems shall have a fast and reliable network connection to ensure that delays while performing transactions are minimal.

4.2 Reliability

- All audit logs shall be permanently stored on the main server and backed up on a secondary medium for the legal required amount of time where after it will be achieved.
- Any ATM that has been detected by the monitoring subsystem to contain an amount of physical cash or paper below the threshold (to be decided) shall immediately be scheduled for service by said monitoring system.

4.3 Scalability

- The system shall be able to process an average of 2 774 transactions per hour concurrently. (FirstRand Annual Integrated Report, 2018)

4.4 Security

- The system shall send all messages using encrypted protocols.
- The system shall hash and salt all passwords before sending them over a network as well as before storing them in any database.
- The ATM system shall at all times require 2 verification methods before allowing the user to make use of any given service.

4.5 Flexibility

- Each subsystem's dependencies shall be limited only to subsystems required to complete a task.
- Each newly created subsystem shall contain an interface capable of communicating with already existing subsystems.
- A removed subsystem shall not damage the system as a whole.

- Each subsystem when modified shall not affect other subsystems' functionalities.

4.6 Maintainability

- The system shall modularised in such a way that all subsystems can be maintained and updated while influencing other subsystems as little as possible.

4.7 Monitorability

- The system shall monitor transactions to flag irregular or prohibited transactions.
- The system shall monitor each subsystem's performance, and log all system errors.

4.8 Integrability

- All subsystems shall be written in the same language.
- Subsystems dependent on each other shall use the same data exchange format.

4.9 Interoperability

- The system shall retrieve necessary user information from an already existing FNB system to perform required tasks.
- The system shall use data exchange format used by the existing FNB system to facilitate communication between the systems.

4.10 Cost

- The system shall minimize hardware costs without sacrificing performance or reliability.
- The system shall minimize them amount and size of message passing in order to reduce bandwidth costs.

4.11 Usability

- The user interface shall be as simplistic as possible;
- Navigation between different windows shall take place in a logical and clear manner.
- Physical ATM's shall have braille patterns on all buttons for ease of use by visually impaired users.

5 Trace-ability Matrix

R1.1 ATM Identifying User
- R1.1.1 Card Identification
- R1.1.2 Fingerprint Identification
- R1.1.3 Phone Identification

R1.2 ATM 2 Factor pin authentication
R1.3 Making cash withdrawal
R1.4 Printing QR code
R1.5 Deposit cash
R1.6 Check Balances
R1.7 Print statements

R2.1 Enter Pin
R2.2 Using QR to withdraw from teller
R2.3 View Bank details and statements
R2.4 Prefill Withdrawal amounts and details using NFC
R2.5 Checking Working ATM locations

R3.1 Checking ATM status

R4.1 Create customer
R4.2 Read customer info
R4.3 Update customer info
R4.4 Delete customer

R5.1 Logging User activity

Trace-ability Table

	ATM	Mobile App	ATM Monitor	Client Info	Logging System
R1.1	x			x	
R1.1.1	x				
R1.1.2	x				
R1.1.3	x				
R1.2	x			x	
R1.3	x			x	
R1.4	x			x	
R1.5	x			x	
R1.6	x			x	
R1.7	x			x	
R2.1		x		x	
R2.2		x			
R2.3		x			
R2.4		x			
R2.5		x	x		
R3.1			x		
R4.1				x	
R4.2				x	
R4.3				x	
R4.4				x	
R5.1				x	x