COS 301 SRS Document

Group 5 Round 1

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1 Introduction

We have been assigned with the task of designing the next generation ATM's by utilizing different technologies such as NFC, USSD and biometrics to improve the general ATM experience by reducing the need of physical interaction with ATM's.

1.1 Purpose

One of our main purposes is that we want to reduce the amount of time customers spend at an ATM. We want to improve the current user experience with ATM's by simplifying the process in some ways to make interaction as easy and as convenient as possible.

1.2 Definitions,Acronyms and Abbreviations

Term	**Description**
ATM	Automated Teller Machine.
Biometrics	A term used to describe the use of fingerprints for verification
NFC	Near-field communication, is a technology that if 2 NFC-enabled devices are close to each other allows them to communicate with the other device
POS	Point of sale. where you pay for your item/s
API	Application Program Interface
USSD	Unstructured Supplementary Service Data
OTP	One Time Pin
UPS	Incorruptible power supply
SCode	SCode is a unique payment platform that allows customers to pay for their online purchases in-store at one of more than 6,000 retail outlets across South Africa.

Table 1: trace-ability matrix

1.3 References

- Android Authority. 2019. How to use NFC on Android. [ONLINE] Available at: https://www.androidauthority.com/how-to-use-nfc-android-164644/. [Accessed 15 February 2019].
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- QR code - Wikipedia. 2019. QR code - Wikipedia. [ONLINE] Available at: https://en.wikipedia.org/wiki/QR_code. [Accessed 22 February 2019].

- PayFast. 2019. PayFast launches SCode Payment Method — PayFast. [ONLINE] Available at: https://www.payfast.co.za/2018/02/21/scodepaymentmethod/. [Accessed 22 February 2019].

1.4 Overview

The goal of this project is to create a better more convenient customer experience which will allow them to do many banking related things through their phone and pre-select options to reduce the amount of time customers will need to spend at a physical ATM. The purpose of this document is to act a guideline in the planning and development phase of the Next Generation ATM's and is intended for:

- Bank management
- Developers
- Testers

2 User Characteristics

There will be various types of users interacting with the system and as such we have Identified the most common users

- **Customer using NFC**: This is the average income user who can afford a NFC capable device that will be able to use the app and make use of the NFC feature to interact with ATM's. This is the primary target of the project but will not be the only focus.
- **Customer using USSD**: This is your below average user who can either not afford a NFC capable device or has no data to use NFC so the customer mostly interact with the system using USSD.
- **Staff**: This will most likely be a bank employee or a Software Engineer who will be checking if there is any malfunction or if they simply want to monitor the system. In this case the type of skills needed can vary depending on what needs to be done. The system should still be easy to use if new personnel are appointed to the system.

Note: For every user there will most likely be experienced and novice users but for the novice users there will be guides/help options available if they get stuck. although we hope to make the learning curve of the new System as easy as possible for any type of user, to make the transition to the new system as smooth as possible.

3 Functional Requirements

- **NFC (Near-field communication)**: will be used to transfer predefined steps from the phone to the ATM which will then be automatically executed by the ATM. Verification will take place before the transfer and also after for that extra authentication to provide users with a secure method of interacting with ATM's. It will require the user to pre-select steps (to be discussed later), Type in the user's pin on the phone and only after that pin is validated will they be able to tap the phone on the ATM to complete the NFC transfer where the ATM will then prompt the user for 3 their fingerprint to confirm it was them. An example being the following: (Acting as a customer) 1. Open the App 2.logging into my bank account **(R1)** 3. Selecting a withdrawal option **(R2)** 4. Specifying amount 5. Entering Pin **(R3)** 6. Go to the nearest ATM and tap phone on the NFC device **(R14)** 7. Use fingerprint (On ATM) to complete 2 factor authentication **(R4)** 8. Getting the money

- **Two-Factor Authentication:**The user will make of 2 factor authentication whenever he makes use of NFC to prevent fraud and giving the user reassurance that their money is safe every step of the way, depending on the type of transaction verification will take place in different forms, if they use NFC at POS (point of sale) they will open the App select "Make payment" type in their pin **(R3)**, tap the NFC device then confirm the amount again on the App. If the interaction is with an ATM they simply need to use the Biometric scanner to verify its them **(R4)**.

- **Monitoring System (U10, U11):** This is a standalone system which will provide different information depending on the type of user that is interacting with it. This system will monitor various things about the ATM such as available Cash, Power, Up-time. If it is a normal User they will be limited to the following when the current ATM does not have the cash available for withdrawal it will show them the closest ATM that has the required amount of money **(R5)**, Or direct them to an ATM that is fully working if the ATM is out of order **(R6)**. If it is a Bank Manager they will be able to simultaneously monitor the state of all the ATM's in an area and see the following, how much money is left in the ATM **(R5)**, daily withdrawal amount **(R7)**, online status **(R8)**, power status (assuming ATM's has a UPS) **(R9)**.

- **USSD (Unstructured Supplementary Service Data)(R11):**: will also make use of the Software's API to accomplish the same basic functions that you can do on the app but instead of sending over the steps via NFC it will save the steps into a database and generate a OTP (one time pin), which will only be valid for 30 minutes **(R10)**, that you can type into the ATM.Note the user will still need to verify using biometrics **(R4)**.

- **Withdrawal (U1-U3):** : Withdrawal can happen in one of 3 main ways, as normal as always using the ATM like nothing has changed **(R12)**.

Second and third being selecting the amount before hand (on the phone,) then using NFC once at the ATM to do the withdrawal **(R2)**, or the USSD **(R11)** if the phone doesn't support NFC .

- **Deposit(U4-U6):** Deposit can happen in one of 2 ways, first will be using a specific ATM to deposit cash (since not every ATM has the ability to deposit cash) **(R13)** second being by making use of other vendors such as your local grocery store **(R15)**. the First option will stay about the same as it currently is but with the option to pre-select steps on the phone before hand then just giving the cash to the ATM the second option will be a new to customers and they can fill in a little form (either on their phone or paper) to deposit 4 cash there (In some ways like SCode) and get a notification of any balance updates.

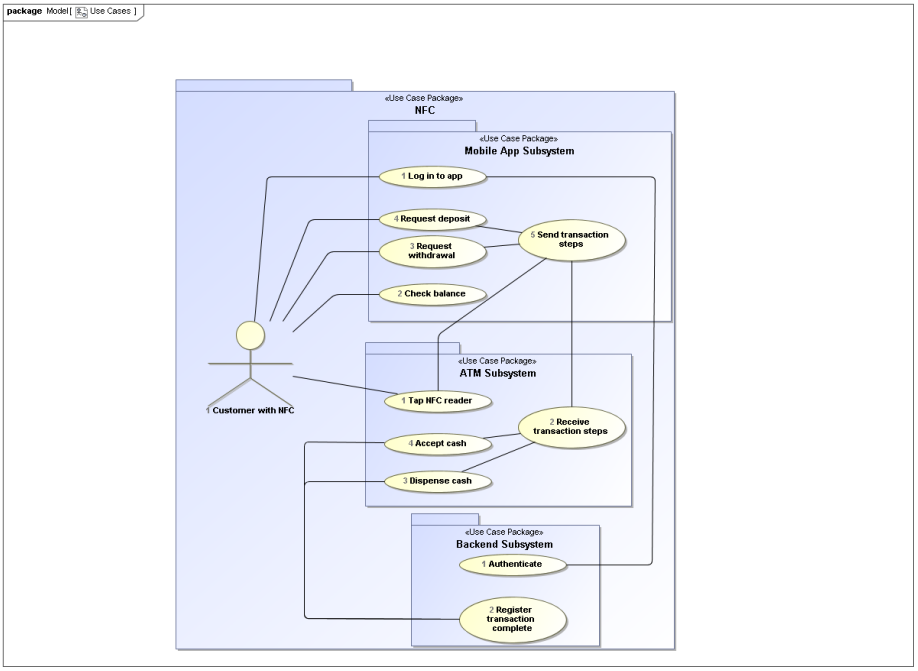
- **Balance enquiry(U7-U9):**Balance enquiry should be able to done on any system so no one gets inconvenienced. The customers should be able to check their Balance on the App if possible, if they don't have the App they should use the USSD to check their balance. In the case where user's don't have a phone they should also still be able to check their balance on the ATM.

- **QR Code:** The system should be able to generate a QR code (R16) that will be used to transfer predefined steps of a transaction from the phone to the ATM for devices without NFC. The user will be prompt to enter their password (R3) as a form of authentication before the transaction is completed.

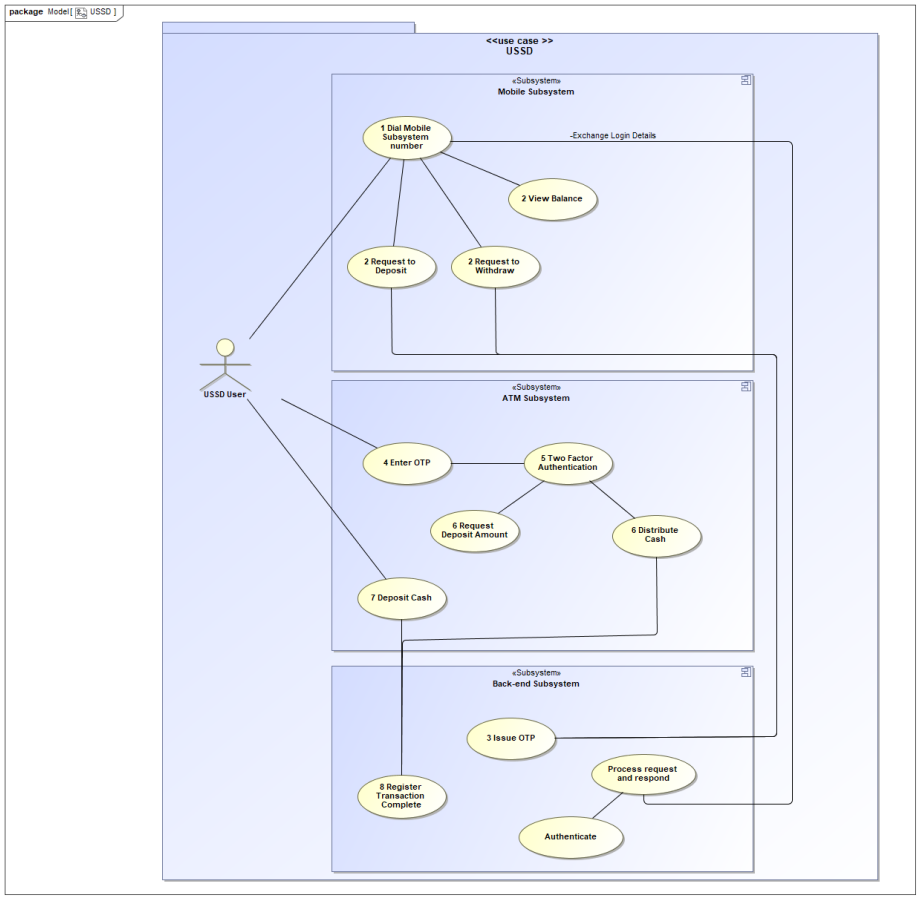
- **OTP:** The system should be able to generate an OTP (One-time-pin) (R17) to transfer predefined steps of a transaction for users without smart phones.

3.1 Use Case Diagrams

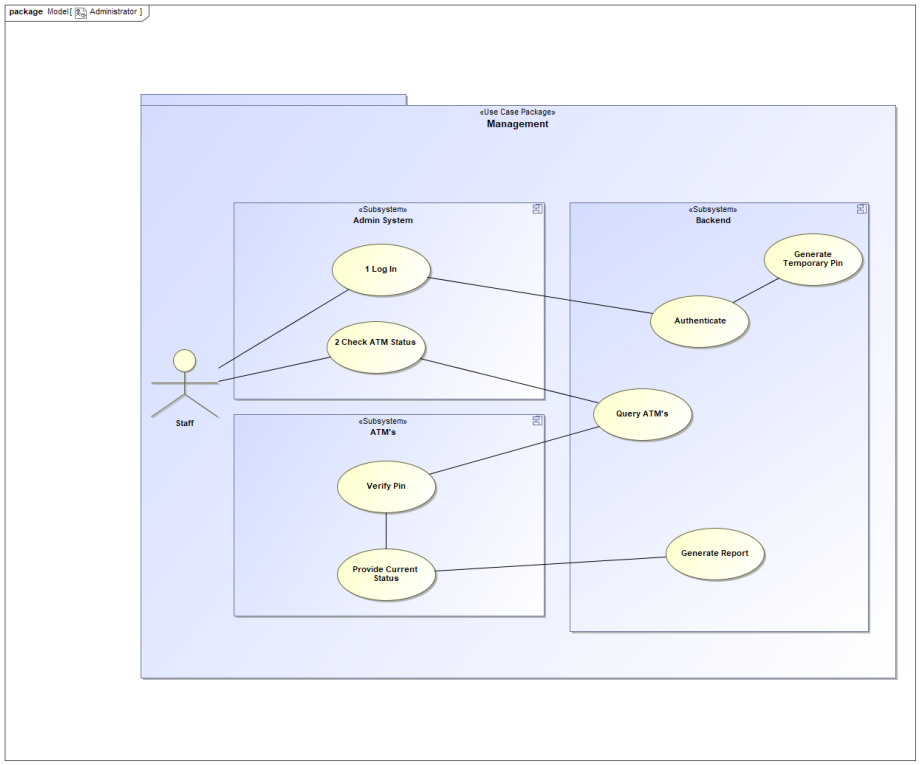
3.1.1 NFC



3.1.2 USSD


package Model[USSD]
<<use case >>
USSD
«Subsystem»
Mobile Subsystem
1 Dial Mobile Subsystem number
-Exchange Login Details
2 View Balance
2 Request to Deposit
2 Request to Withdraw
USSD User
«Subsystem»
ATM Subsystem
4 Enter OTP
5 Two Factor Authentication
6 Request Deposit Amount
6 Distribute Cash
7 Deposit Cash
«Subsystem»
Back-end Subsystem
3 Issue OTP
Process request and respond
8 Register Transaction Complete
Authenticate

3.1.3 Administrator



3.2 Tables

R1	Authenticate Login to bank account
R2	Selecting Withdrawal via App
R3	Authentication using PIN code
R4	Authentication using biometric scanner
R5	Locate other ATM's with money
R6	Locate other working ATM's
R7	View ATM's daily withdrawal amounts
R8	View ATM's online status
R9	Viewing the ATM's power status (battery level of UPS)
R10	Authentication using OTP that auto expires
R11	using USSD to interact with the system
R12	Normal ATM usage as before
R13	Cash deposit at ATM
R14	Transfer data using NFC
R15	Cash deposit at qualified vendors
R16	Generate QR code that links to steps
R17	Generate OTP that links to steps

Table 2: Requirements Table

U1	Withdraw Money using NFC
U2	Withdraw money at ATM
U3	Withdraw money using USSD
U4	Deposit Money using ATM (NFC setup)
U5	Deposit Money using ATM (normal)
U6	Deposit Money using other vendors
U7	Balance enquiry using USSD
U8	Balance enquiry using App
U9	Balance enquiry using ATM
U10	Locate other ATM using ATM
U11	Locate other ATM using APP
U12	Log in to app

Table 3: Use case Table

4 Quality Requirements

4.1 Reliability:

- The System should be able to perform all stated requirements and produce correct and consistent results.

4.2 Security:

- The system should performs Two-Factor Authentication before any sort of transaction is completed.
- The System will be logging all transactions on the ATM and phone for any Audit that has to take place. In the case of the phone's logs it will only be used when theft, user impersonation, or any illegal activity took place.
- (Optional) The app will verify itself at least once a day to make sure there are no changes to its source code. A downfall of this is that it can cause a lot of overhead for the Bank's servers

4.3 Usability:

- The system should use generic icons. (e.g. house icon for the homepage.)
- The system should ensure ease of use to the customers. Too many clicks to perform a single transaction defeats the whole purpose of having the ATM functionality on the device.
- To ensure usability for any type of user we will add a guide that will explain the system to them

4.4 Cost:

- The system should be affordable to build and maintain.
- The system will require all ATM's to be equipped with NFC and bio-metric scanners to be able to support the new system
- The new system should reduce maintenance costs on the keyboards and touch screens since if the new system is in place customers will be interacting less with the ATM giving some hardware longer lifespans.

4.5 Scalability:

- The System should be able to perform all transactions successfully even under a high number of transactions.

5 Trace-ability Matrix

	U1	U2	U3	U4	U5	U6	U7	U8	U9	U10	U11	U12
R1												x
R2	x											
R3	x	x	x	x	x	x	x	x	x			
R4	x	x	x	x	x			x	x			
R5										x	x	
R6											x	
R7												
R8										x	x	
R9												
R10	x	x	x	x	x	x	x	x	x			
R11												
R12												
R13				x	x							
R14	x	x		x								
R15						x						
R16	x	x			x							
R17	x	x	x		x							

Table 4: