Development of Automated Teller Machine Simulated Software

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ABSTRACT

An Automated Teller Machine (ATM) allows customers to perform banking transactions anywhere and at anytime without the need of human teller. By using a debit or ATM card at an ATM, individuals can withdraw cash from checking or savings accounts make a deposit or transfer money from one account to another or perform other functions. You can also get cash advances using a credit card at an ATM. The ATM is online with the bank, that is, each transaction will be authorized by the bank on-demand and directly debited from the account's owner. The ATM works as follows. First, the client will insert his/her client card in the ATM and then the ATM will ask for a Personal Identification Number (PIN), if the number is entered incorrectly several times in a row, most ATMs will retain the card as a security precaution to prevent an unauthorized user from working out the PIN by pure guesswork. Once the correct PIN is given, the ATM will ask for the amount of money to be withdrawn. If the amount is available and if the client has enough money on his credit then the said amount of money will be paid. Whether the amount of money is payable or not, i.e. the ATM has enough cash but could be the case the ATM has no change for that amount, will be also checked. Once the money is offered to the client a countdown is started, i.e. the client has a determined amount of time to pick up the money. If this timeout is over, the money will be collected by the ATM and the transaction will be rolled back.

Keywords: Automated Teller Machine, Graphic user Interface, Personal Identification number

INTRODUCTION

Automated teller machine (ATM) is a data terminal that acts as an intermediary between a bank customer and his/her account. It communicates with the bank through wireless broadband or telephone lines. The ATM basically consists of an input terminal and four output terminals which it uses to carry out various financial transactions. When a customer inserts his/her debit or credit card, it reads the information contained on the magnetic strip. The ATM instructs the customer to enter his pin number and confirms if it is correct. The ATM then links the bank to access the customer’s information. Depending on the transaction request the ATM forwards the request to a host processor which in turn routes the request to cardholder’s account[1]. The existing ATMs runs on windows operating system, which is the most popular operating system, but the graphic user interface presented to customer is quite complex for non computer-
literate customer. Also, some do not have language option this makes it difficult for Non-English speaking customers to use it. The existing system also lacks a help menu which can improve its inter-activeness. Most of the ATMs do not have a deposit slot and those that do not list it on the graphic user interface (GUI). If this problem are remedied it will increase the effectiveness of the ATMs, improve user experience and makes the system more interactive. These will make the transition to cashless from cash-light fast and smooth and boost save the banks, Inter-switch and Central Bank of Nigeria (CBN) a lot of money and resources[2]. This study is aimed at developing ATM teller machine simulation software based on the following stated objectives:

- To design and implement a software system that will present customers with user-friendly and effective GUI.
- Present a system with language selection option add audio directive to the ATM system.
- Add deposit button to the ATM GUI.
- Remove additional process that increase queue at the ATM like purchase recharge card option, simplify the use of the ATM and increase overall user experience[3].

REVIEW OF RELATED WORK

Necessity they say is the mother of invention, the invention of the ATM is not an exception to this saying. The history of the ATM and the facts it presents are discussed in this section. According to engineers’ garage (2004) online forum for engineers, it is believed that the history of ATM started when an Armenian named Luther George Simjian was forced to move to the USA in the year 1920, due to Armenian Genocide. He owned to his credit the invention of a portrait camera and later presented the formulated idea of the ATM. Confident of his invention he persuaded Citibank to run his product on a six-month trial basis. Soon enough, he was disappointed with the performance and lack of users and concluded that ATM was a wasteful addition to banking industry. The lack of demand for the ATM finally forced him to take a back seat. During this period it was very clear that the time was not right for this concept to have been accepted generously. Simjian clearly lost out on the fame and similar fate was passed on to two other gentlemen, John Shepherd-Barron and Don Wetzel. John Shepherd-Barron was a Scottish national born in India. He later relocated to Britain and pursued his education at the University of Edinburgh. After returning empty-handed from a bank, He was disappointed to have had no option than to wait till the bank opened the next day. And like Archimedes, he claimed to have hit his interesting moment while taking a bath. A self-sufficient cash dispensing machine was what he was thinking about. And soon the ATM was invented in the early 1960s (NMAH interview, 1995)[4].

The invention of a self-sufficient cash dispensing machine was his second and successful attempt at inventions. Prior to this invention he had invented an instrument to scare away seals (fish eating mammals) at his Scottish Salmon farms. Unfortunately, this device instead of deterring the seals attracted them, and was thus a failure. The same website also shows that the ATM gained Shepherd-Barron an ever-lasting recognition in the banking world and paved the way for hi-tech banking techniques, online bank accounts, Personal Identification Number (PIN) and chip security technology. The four-digit internationally accepted standard PIN was also invented by him. Earlier, he had a six-digit Army serial number in his mind but later his wife suggested for a shorter PIN as it would be easy to remember. Finally, in 1967, the first ATM that dispensed paper currency round the clock (24 hour basis) was unveiled. The ATM was installed outside a Barclay’s bank in North London. The ATM accepted and generated money through cheques impregnated substance had no ill effects on the health of users and Shepherd-Barron claimed that a user would have to eat about 136,000 cheques to suffer any kind of ill-effects. Reg Varney, a famous TV sitcom popular became the first person to use the ATM in the year 1967 and withdrew about 10 dollars. The amount seems too less for us, but this money was enough for a
complete night out spent on the tiles in London, inclusive of dinner; drinks, a show and a taxi-ride back home[5].

While this prototype device originated by Shepherd-Barron had started functioning, various parallel developments were happening in different parts of the world. The same website further shows that an American engineer Donald Wetzel of Docutel engineered the Docuteller ATM which was declared as the first modern magnetic stripe machine. It recognized magnetically encoded plastic (credit cards) and not the usual paper stripe cheques. The development of ATM has gone through many stages; it started from its baby stage in the late 1930s and then geared up for longer runs in the 1960s, and finally a matured and stable stage that we see today. Undoubtedly, most of the ideas and patents contributed for makeover of the ATM from time to time form the backbone of what was initiated as "holes in the wall"[6].

Today, ATMs hold a strong foothold in the world, offering everyone a better access to their money, be it in any corner of the world. There are about 1.8 million ATMs in use around the world with ATMs on cruise and navy ships, airports, news agents and petrol stations. ATMs have been categorized as on and off premise ATMs. On Premise ATMs are capable to connect the users to the bank with multi-function capabilities. Off premise, ATMs on the other hand are the "white label ATMs" and are limited to cash dispense. NMAH interview, (1995).

The developments have not stopped; the contactless technology is on its rise. The same website concludes that Shepherd-Barron continued to take inimitable and lively interest in technology well even in his old age and had foreseen a future where plastic cards too would be numbered. For his excellent and unforgettable contributions to financial technologies, Shepherd-Barron was offered the OBE award in the year 2005. In the year 2010, he took his last breath and left behind his legacy of technological advancements [7].

**RESEARCH METHODOLOGY**

In the design of the new system, it is intended to improve and modify the existing system by providing a better GUI, language change option, and cash deposit button. Netbean IDE will be used in designing this simulation software due to its effectiveness in designing state-of-the-art GUI. The design presents different classes to handle the cash deposit button, withdrawal button, language option button and lot more. Event handlers are assigned to each button to perform a particular function once the button is pressed. The software will also incorporate a Print button that prints the customer transaction receipt based on whether the customer wants a receipt[8].

The project will make use of java packages like Java Swing and Java AWT. This package and classes contains makes it easier to develop the software program. Other java classes will be used to aid the print function and other miscellaneous object oriented activities. The program provides event handling for all the errors that may occur with the aid of try to catch block[9].

The System is expected to:

i. Provide a login page
ii. Provide a window for the ATM Transaction
iii. Welcome the user
iv. Direct the user on how to go about the transaction
v. Provide a language selection button
vi. Provide a withdrawal button
vii. Provide a balance button
viii. Provide a deposit button
ix. Fund transfer button
x. And a prompt for printing selection

**DESIGN CONSIDERATION**

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**IDOSR JOURNAL OF SCIENTIFIC RESEARCH 2(2) 52-59, 2017**
For this research work Java Database and MYSQL was used to store the user account the creation of the account number and PIN was done inside the program and stored in a database. Only five account numbers will be created as creation and opening of accounts is outside the scope of the ATM. The study makes use of the Netbean IDE due to flexibility and compatibility with Java programming. The IDE makes the creation of the GUI easier and helps in debugging, testing, cleaning and building the application[10].

**SYSTEM TESTING**

System testing is very crucial aspect of system development cycle. The aim of testing is to discover and fix bugs before final deployment of new system. The following are various tests that will be carried out on the system[11].

**Recovery Testing:** This is carried out to test the ability of the system to recover from errors; processing fault must not lead to overall system failure. Recovery time from errors must be within a specific period[12].

**Stress Testing:** Stress test is conducted to see how the system will behave in abnormal situation. This is to know the quantity of input that the system can cope with. Stress test case is designed with maximum memory and other resources in excess of what normal situation demands[13].

**Performance Testing:** Performance testing is conducted to test again run time performance, this is important for embedded and real-time system[14].

**Response Testing:** The testing is performed to measure system’s response time, this is important for online transaction processing system[15].

**Usability Test:** This testing is done to review the friendliness of the software, that is, the ease of use. During testing of the new system, all the above criteria for successful software testing were met[16].

**INSTALLING THE NEW SYSTEM**

The following requirements are needed for the developed application to run seamlessly on the client’s machine[17].

**HARDWARE REQUIREMENT**

**PROCESSOR AND MEMORY**

**Require:** At least Pentium M Dual core processor with 2GB Ram memory is required[18].

**Recommendation:** Processor and memory requirement increase with amount of the storage[19]

**DISK SPACE**

**Require:** (IDE Drive)
500 MB and storage space for all users plus 30% data free space[20].

**Recommended:** 2GB and storage space for all users plus 60% of all protected data free space Virtual memory Recommendation
Double the amount of RAM, with minimum of 2GB (total for all disk Volume)
Minimum colour setting
800x600 resolutions, 256 colours[21].
SOFTWARE REQUIREMENT

The software requirements for the installation of the system are listed below:
1. Windows Operating System or Linux
2. JDK 6 Update 11 or higher
3. NetBeans IDE
4. Notepad
6. Anti Virus Software[22].

DATA SOURCE

The major data for the ATM program are the account numbers, the customer pin, the ledger Balance and the available balance. This information is stored in two arrays with four elements each: account numbers, the customer pin, the ledger Balance and the available balance[23].

RESULT DISPLAY

Figure 1: graphical user interface of the ATM machine.
EVALUATION RESULTS

The system provides a simulation of the ATM. The machine incorporates a deposit option which is an improvement on the existing system. The research work also added Yoruba language to the ATM in order to improve the ease of use. Some innovations of the study can help bank in designing their ATM software[24].

CONCLUSIONS

Based on this study on the ATM we hereby conclude that ATM is the easiest way of depositing and withdrawing money. Transaction is possible any time, that’s why in India some people call ATM as “all time money”. If ATMs were to be connected to the internet then it is possible to do transaction from any location where there is internet access, 24 hours a day and 365 days a year. With the security of ATM improving it has now become a safe mode of transaction. Hence, it can be concluded that ATM is safe, fast, reliable, convenient, excisable and any time money machine.

RECOMMENDATION

Due to the limitations faced during this study, some valuable features have not been included in the package. Therefore, the following suggestions are recommended for further research concerning different aspects of the developed fleet management system.

In future the facilities that can be added to ATM are:
Filling of bills,
Daily news headline, Check matches score,
REFERENCES


