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Homework 2 Answers

Programming Concepts

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How the money withdrawal process in an ATM works.

The first step is, requesting the customer to insert his/her card using the output device in the ATM (Inbuilt display).

Secondly the system will check the validity of the card inserted. If an invalid card, then display an error message and return the ATM card back. If card is valid, then the customer is prompted to select the preferred language.

After entering the language, He/She is requested to insert the PIN. After the insertion of the PIN, the ATM checks whether the PIN is correct or not. If the PIN is correct, customer will be allowed to continue the process. If the PIN is incorrect customer will be required to re-enter the PIN. If the customer makes mistakes while inserting the PIN, then the card will be ejected after 3 attempts.

After the correct insertion of PIN. Customer will have to choose the account type. If the account type is incorrect, then the customer will be redirected to select the correct account type again.

If the account type is correct, customer has to select the transaction type as Withdrawal and insert the amount he/ she wants.

Atter inserting the amount, the machine Will check tor the available balance. If the balance of the customer's account is insufficient then the machine will inform the user and select whether to exit or enter the amount again. If the balance of the customer's account is sufficient, the machine will continue the process. ATM will process the money to be dispensed and the account balance is updated. Then the machine will prompt the customer to collect his/her money.

After customer collects the money, The ATM will prompt whether a receipt for the transaction is needed or not. If a receipt is requested, a receipt will be printed and released.

if a receipt is not requested, then the customer will be asked to end the transaction or whether they need another transaction to be done.

If a customer chooses to do another transaction, he will be directed to select the account type step again and afterwards machine will repeat the same process.

If the customer select to end the transaction, the ATM machine will eject the card and is reset to the initial state.

1. What assumptions did you have to make to work out the problem?

- The ATM machine contains enough money to be dispensed.
- A customer can withdraw from his/her account until account's balance is equal to zero.
- All the hardware / software is working well without any interruptions.
- Inserted card is a valid one and there is always a bank account associated with it.
- The ATM machine is connected to the relevant bank's database and ATM machine have the permissions to update the database.
- There are no connectivity issues in between ATM machine and the database in the bank.
- ATM machine is always powered on and doesn't have any power outage issues.
- User always select only one option from the presented menus.

2. How many components (modules) did you find in your model?

- Insert ATM card
- Language selector
- Card Validator
- Validating the PIN
- Select Account type
- Select Transaction type
- Cash withdrawing module
- Release ATM card
- Print receipt
- Connect to the bank server

3. Describe the "mechanics" used by your ATM machine to dispense a specific amount of money.

A. Prompt the customer to insert the card. Read the card data and check the card details against the bank's central database and validate them.
B. If card is invalid, display an error message and return the ATM card.
C. If card is valid, Let the customer to select the preferred language.
D. Prompt the customer to enter the PIN number.
E. If the PIN is incorrect, ask customer to enter the PIN again. After 3 unsuccessful attempts, the card will be ejected.
F. If the PIN is correct, then the customer is asked to choose the account type.
G. if the account type is incorrect, then the customer will be redirected to select the correct account type again.
H. If the account type is correct, customer has to insert the amount he/she want to withdraw
I. Connect to the bank server and check whether customer has sufficient balance to withdraw
J. If balance is not enough, display as insufficient balance and ask to select whether to exit or enter the amount again.
K. If balance is enough, continue and withdraw money.
L. Update the bank server with data.
M. After customer collects the requested amount of money, he/ she have to select whether a receipt for the transaction is needed or not.
N. If a receipt is requested, a receipt will be released to the customer.
O. If a receipt is not requested or not, then the customer will be asked to end the transaction or whether they need another transaction to be done.
P. If customer selects another transaction option, he will be directed to select the account type step again and afterwards machine will repeat the same process.
Q. If customer selects end transaction option, the card will be ejected and displays a message to collect the card and/or the receipt.
R. Return to the initial welcome screen.

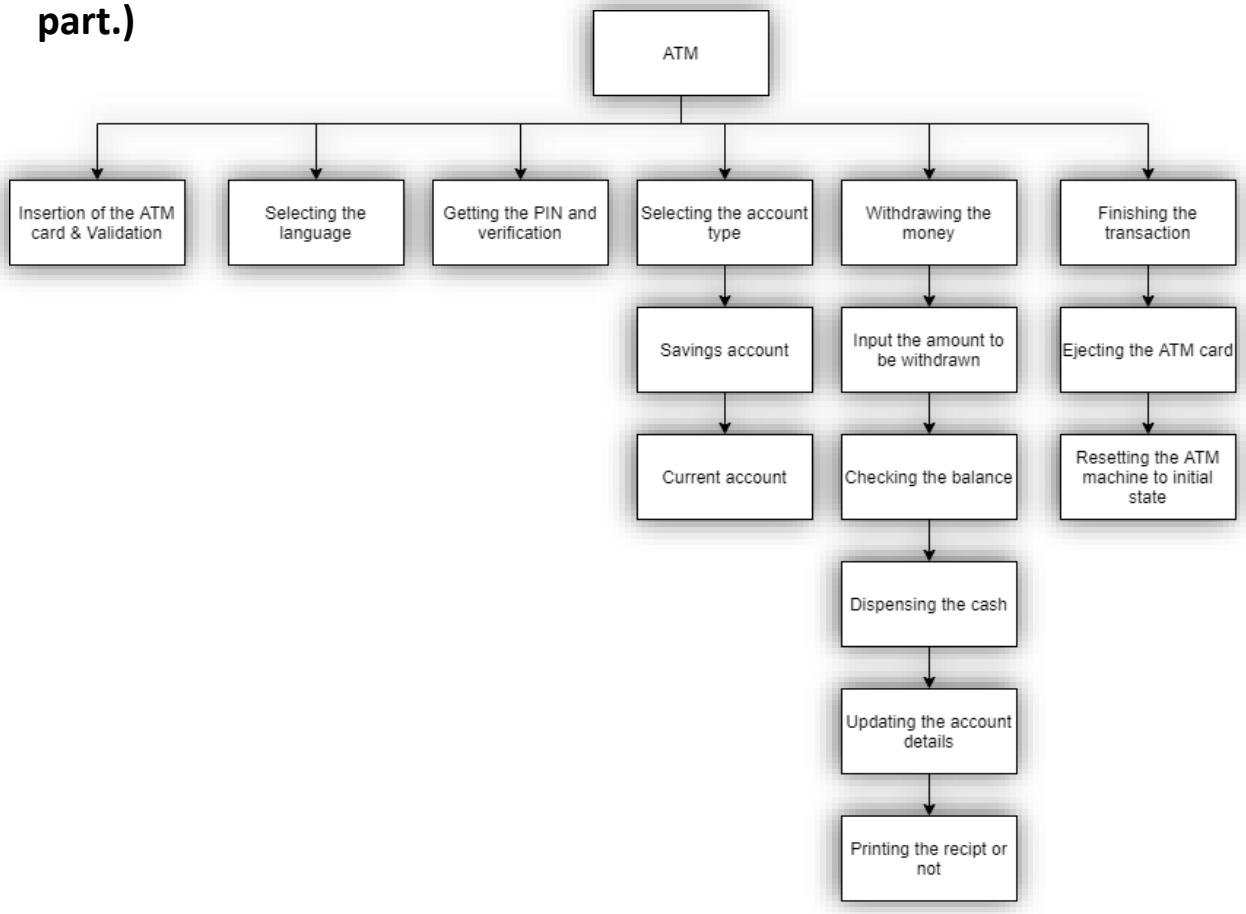
4. Indicate why your plan for the ATM is just a model.

Unlike the ATM machine described in here, Real world ATM machines have many features. Those features are essential when performing functions in practical world. Some of them are,

I. In some ATMs we can deposit money, check the balance of the account, change our PIN number, etc. But this model doesn't have any of those.
II. The security functions of this ATM machine is minimal. Hackers can easily hack these type of ATM machines. So we can't deploy this kind of ATM machine in real world.
III. In a real ATM it is displaying messages for each reason for steps and errors, but this model doesn't contain that feature.
IV. Unlike in real world scenarios, There is no way to inform the account owner about the balance updates via SMS.
V. There are many such differences in our plan that a real-world case. So according to above reasons, we can say this plan is a model.

Above mentioned are only a few of such differences .According to those, We can distinguish this described ATM as a model ATM.

5. Describe the "architecture" of your model by drawing a hierarchical scheme of its components (use a rectangle for each part.)



6.Can you find any pattern among different components?

- ✓ There is a sequential flow in the whole process
- ✓ Conditions and repetitions have used.
- ✓ They are depending on one another. (A change in one step can cause a change in the whole process)

7. Describe, as a sequence of if-then statements, the way different components of your model are activated.

- If the ATM card is valid then enter the PIN number, else return the card with an error message.
- If the entered PIN is correct, then ask the customer to choose the account type, else asks the customer to enter it again.
- If the selected account type is correct, then customer has to insert the amount he/ she want to withdraw else the customer will be redirected to select the correct account type again.
- If the balance is sufficient for a withdrawal, then withdraws money and updates the account balance else display "insufficient balance "and ask for another service.
- Ask whether customer need a receipt or not. If he needs as a receipt, then print the receipt else do not provide a receipt.
- Ask there are any other services they needed. If yes, then start from the beginning, else return the card.

8. Which do you think are basic actions the ATM can perform and are used to build everything else?

- Get the ATM card and read information in it.
- Getting the PIN and validating it.
- Selecting the Language and account type.
- Getting the amount the customer wants to withdraw and validate it with the account balance.
- Dispensing the required amount of money.
- Issue a receipt if required.

9. Make a list of special cases (situations that are not expected to occur during normal operation) any ATM has to face, and eventually has to be addressed in your design.

- Unexpected connection issues occurred when connecting the ATM with the bank's central database.
- Unexpected power interruptions.
- User is trying to select multiple menu items simultaneously.
- When ATM doesn't have enough money to perform a transaction.
- Hackers are trying to access the central banks database and modify it through the network connection of the ATM.
- When there are database updates and modification in the banks central database occurs. ATM may not function properly.