**LondonTransportFareSystem**

**ASSUMPTIONS**

* There are only two MODES available, Bus – 1, Tube – 2
* Swipe out happens only in tube (not in bus)
* When swiping IN, if a station comes under MORE THAN ONE zone (FOR EX: Earl's Court – Zone 1 & 2), get the one with MINIMUM Fare
* When swiping out take the MinFare based on the closest zone from swiping in.
  + IDEALLY, we must get the station ID of Swipe IN from the latest transaction table, so we can choose the closest zone and get Min Fare for the CLOSEST Zone

**SOLUTION DETAILS**

The solution has four methods defined with the logic as below:

* TopUp ==> INPUT: customerId, amount /OUTPUT ==> Balance after update
  + Checks if customerId and amount is valid.
  + Updates Balance column in the table.
* SwipeIn ==> INPUT: customerId, modeID, stationID/ OUTPUT ==> isAllowed
  + Checks if customerId is valid.
  + Checks for the Mode’s (Tube’s or Bus’s max fare) with current balance
  + If current balance is less than max fare (for bus) – return false.
  + If current balance is less than max fare (for tube) – Check for the min fare for the ZONE of the given station ID.
  + If the current balance is less than min fare, return false.
  + Else if current balance is greater than or equal to min fare return true.
  + Update table with status 1 in the customer table to note that the customer has swiped in.
  + Insert a record in the transaction table with mode, zone information along with temporary debit of MaxFare, or MinFare whichever is for the condition above and current balance which will be the temporary balance on the card of the customer before they swipe out.
* SwipeOut ==>INPUT: customerId, modeID, stationID/ OUTPUT ==> isSuccess
  + Checks if customerId is valid.
  + ASSUME that swipe out happens only in mode Tube
  + Check if the status of the customer.
  + If Status = 0, that is customer has NOT swiped in, then update Customer table with balance = balance – maxFare
  + Else, get the minimum fare for the station’s Zone with respect to the last swiped in zoneId.
  + Update balance = balance – min fare.
  + Insert record in Transaction table.
* ShowBalance ==>INPUT: customerId /OUTPUT ==> Current Balance
  + Checks if customerId is valid.
  + If the customer’s Status = 0 (not swiped in), the show balance from the Customer table.
  + Else show the current balance from the Transaction table which will have temporary balance after the temporary debit before swipe out.

**QUESTIONS**

* During swipe in if the current balance on the card of the customer is greater than or equal to MinFare BUT less than MaxFare, do we deduct/debit the MinFare or MaxFare on swipe out? If we deduct MaxFare, does the value of the current balance go negative? Is this possible?
* Can a customer/user swipe in at two different zones without swiping out in between?

**POSSIBLE IMPROVEMENTS**

* Combination of FKs to form PK and indexing on the customer transaction table for faster retrieval.
* Possible column on Customer table for account ‘LOCK’ for security concerns, and a possible security question and answer/code.