# Problem Statement

A bank provides money exchange service for its clients. For every trade, the bank makes profit by adding a mark-up (also known as commission or fee). The mark-up rate depends on the type of customer and also the amount of money traded. The final rate will be the result of applying the mark-up to the current market rate. At the end of the day, the bank will take all transactions done for the day and all the market rates published to generate a daily PnL report.

**Finding the markup**

There are 2 types of clients that we will consider in this scenario: Individual and Corporate.

Below is the mark up table for individual clients.

|  |  |
| --- | --- |
| Amount range (**in USD**) | Mark Up (in bps) |
| (0,8000] | 40 |
| (8000,20000] | 35 |
| (20000,35000] | 30 |
| (35000,+∞) | 25 |

And the mark up table for corporate clients.

|  |  |
| --- | --- |
| Amount range (**in million USD**) | Mark Up (in bps) |
| (0,1] | 15 |
| (1,3] | 10 |
| (3,+∞) | 5 |

If an individual client wants to trade 8000.00 USD to SGD, then the bank will use the mark up of 40 bps (basis point, 1 bps is 1/100th of 1%, i.e. 0.01%). If a corporate client wants to trade 1,500,000.00 USD to SGD, then the bank will use the mark up of 10 bps.

**Finding the market-rate**

Given a transaction we need to find the proper market rate to use. The rule is simple, the next available market for the currency pair, is the rate that we should use.

Given a transaction

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Base Ccy | Wanted Ccy | Amt (in base) | Client Type | Time of Tx |
| CNY | SGD | 40000 | Individual | 8:32 |

And rates

|  |  |  |  |
| --- | --- | --- | --- |
| Base Ccy | Wanted Ccy | Rate | Valid Until |
| CNY | SGD | 0.2012 | 9:00 |
| CNY | USD | 0.161 | 9:00 |
| CNY | SGD | 0.2013 | 11:00 |

The CNY SGD rate to use is 0.2012 instead of 0.2013. If the transaction was done at 9:01 then the rate to use would have been 0.2013.

**Calculating the final rate and profit**

Using the same transaction example as above, we are going to calculate the final rate and profit. Since the base currency is not in USD, we will need to convert it to USD in order to find the mark-up to use.

USD Amount = 0.161 \* 40,000.00 = 6440.00.

The fact that the USD amount <= 8000.00 and the client is an individual client, the charges that we will use is 40 bps. The final rate can then be calculated as below

Final Rate = 0.2012 \* (1 – 0.4%) = 0.2004

Please note that all rates are rounded to 4 decimal places. This then generates the below profit to the bank in the wanted currency.

Profit = (0.2012-0.2004) \* 40000 = 32.00 SGD

**Calculating the profit in SGD**

Assuming that the bank is Singapore based, the report should also contain the profit in SGD. This simply means converting the profit amount in wanted to currency to SGD using the current rate if the wanted currency is not in SGD.

# Delivery

Implement a working solution in Java to generate profit report based on the given inputs.

* transactions.csv contains list of transactions that the bank executed for the day.
* rates.csv contains list of relevant published rates for the day.
* Keep 4 decimal places for rate and 2 decimal places for amount.
* Use the mark-up tables above to calculate the final rates.

The expected output:

* expected-output.csv

Notes:

* Describe your design in one to two pages.
* Use only JDK provided library.
* Your solution will also be judged for correctness, test coverage, quality.