README.md

Programming Languages Lab Assignment 2

Name: Kotkar Anket Sanjay

Roll Number: 180101037

To run the code, follow the following instructions:

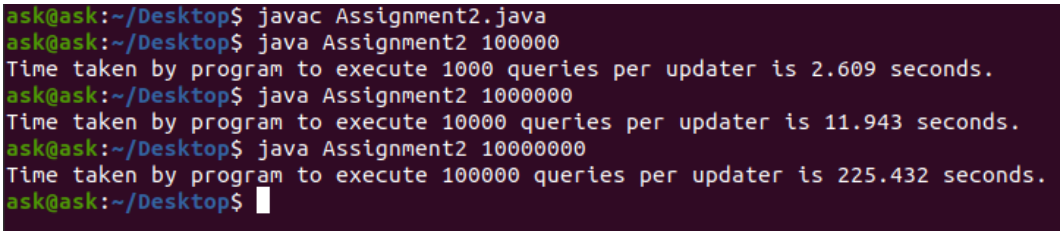
```
$ javac Assignment2.java
$ java Assignment2 <total_number_of_requests_to_updaters>

where, total_number_of_requests_to_updaters = 100 * requests to be simulated per updater.

For example:
$ javac Assignment2.java
$ java Assignment2 1000000

Here, total number of requests given is 10^6. So, approximately 10^4 updates are simulated per updator.
```

Here is an image of execution of program in terminal.



While executing the program,

1. For total 10^5 simulations or 10^3 simulations per updater, it takes around 1 to 3 seconds.

2. For total 10^6 simulations or 10^4 simulations per updater, it takes around 15 to 30 seconds.

3. For total 10^7 simulations or 10^5 simulations per updater, it takes around 150 to 300 seconds or 3 to 5 minutes.

Caution:

As 10^5 simulations per updater or 10^7 total simulations take around 3 to 5 minutes and from the observations noted above, it can be seen that time gets around 10 times when we increase simulations to 10 times. So running the code for 10^6 simulations per updater or total of 10^8 simulations may take upto 1 hr for complete execution. So running the code for 10^6 simulations per updater or total of 10^8 simulations should be avoided as it may cause heavy heating of the system and execution may get interupted in between by OS due to heavy heating producing wrong results. If the system will not get affected by such long running process, it will produce the desired results.

Assumptions:

1. Queries will be generated in the code itself while executing. To check the queries and to verify the correctness of the code, program can be run for the small number of total simulations/updates and checking can be done manually.
2. The total number of requests should be a multiple of 1000.

While executing the program, 3 files namely 'input.txt', 'queries.txt' and 'output.txt' will be generated.

1. input.txt file list down all the accounts and balance in the respective account before start of any queries.

An image of part of sample input file:

```
Account number 3564162134 with balance 1003752794
Account number 3904448261 with balance 1007537678
Account number 3540166858 with balance 1308486327
Account number 3871202011 with balance 1822446133
Account number 3976047597 with balance 1415841866
Account number 3748282411 with balance 1905078142
Account number 3843345934 with balance 1597390593
Account number 3965607462 with balance 1402867718
Account number 3210074713 with balance 1601978209
Account number 3662037295 with balance 1157016949
Account number 3977180692 with balance 1321085367
Account number 3838761920 with balance 1111123022
Account number 3192158757 with balance 1259412883
Account number 4540632791 with balance 1641152118
Account number 4887670506 with balance 1842650972
Account number 4026025949 with balance 1146411978
Account number 4688629353 with balance 1726116447
Account number 4446323350 with balance 1790834705
Account number 4947929799 with balance 1025568211
Account number 4634349202 with balance 1797951329
Account number 4293322504 with balance 1353366074
Account number 4835520084 with balance 1336922895
Account number 4960048351 with balance 1623607085
Account number 4947547225 with balance 1214122666
Account number 4608778067 with balance 1395742059
Account number 4965421657 with balance 1211649067
```

2. queries.txt file list down all the queries/requests provided to updaters.

An image of part of sample queries file:

```
1240  Withdraw 1689323090 from 0298186024
1241  Transfer 19848924 from 4289115567 to 8727865958
1242  Deposit 82243821 in 1491216943
1243  Transfer 75195133 from 8852290954 to 4144260181
1244  Withdraw 1746355640 from 0123121248
1245  Deposit 63074965 in 7325877310
1246  AddAcount to branch 0 with account number 0067489610 and balance 1335362402
1247  Deposit 98115741 in 6862473258
1248  Transfer 50419958 from 6546013206 to 1614517317
1249  Transfer 52522252 from 9536379249 to 6388806392
1250  Withdraw 1066692211 from 5817275181
1251  Deposit 22258224 in 0342574717
1252  Deposit 28671801 in 2573150235
1253  Withdraw 1034337624 from 7758093432
1254  Deposit 6701568 in 2833738279
1255  Deposit 52439167 in 5520724967
1256  Deposit 66618013 in 3436259789
1257  TransferAccount from account number 0957731977 to 7685229969
1258  Deposit 31292814 in 8345189334
1259  Deposit 45577911 in 6648358453
1260  Withdraw 1249883645 from 6368738912
1261  Withdraw 1238439845 from 6489840628
1262  Transfer 69592362 from 7218659720 to 4967441006
1263  Transfer 59290686 from 6269478896 to 5324858188
1264  Withdraw 1584483410 from 3877503753
1265  Transfer 55549038 from 6077021886 to 7204340653
```

```
5575   Transfer 99752062 from 8101783697 to 3051227667
5576   Deposit 38982237 in 0316684974
5577   Transfer 43500855 from 5672884346 to 5647150213
5578   Withdraw 1485353182 from 0603592098
5579   Transfer 35724205 from 9471543910 to 6990265668
5580   Withdraw 1692895686 from 9396464165
5581   AddAcount to branch 8 with account number 8721707754 and balance 1480914648
5582   Deposit 38888062 in 3006765877
5583   Transfer 75050976 from 2893045338 to 5519760393
5584   Withdraw 1559147781 from 0618042140
5585   Withdraw 1690831984 from 8717621299
5586   Transfer 66034431 from 2476107964 to 1816238443
5587   Deposit 79650380 in 8479616648
5588   Deposit 62937916 in 8173009252
5589   Withdraw 1861396981 from 0922929606
5590   Transfer 90225405 from 3180313670 to 8652332421
5591   Transfer 96390676 from 7871761806 to 1569509798
5592   Deposit 80694613 in 2808154286
5593   Deposit 57792464 in 6604739967
5594   Transfer 75455973 from 3997279144 to 5230850518
5595   Deposit 40135719 in 7037860988
5596   Transfer 82529094 from 2776018439 to 5379646314
5597   Transfer 70093336 from 3557845416 to 1654800362
5598   Transfer 66056410 from 4197205374 to 2686124496
5599   Transfer 21569452 from 2247194475 to 4369943083
5600   RemoveAccount 0567182078
5601   Withdraw 1978705415 from 5566528812
5602   Transfer 60954805 from 6299082868 to 7511408947
5603   Withdraw 1235374897 from 9475140855
5604   Deposit 85739507 in 9185317567
5605   Withdraw 1510964191 from 1094786841
```

3. output.txt file list down all the accounts and balance in the respective account after all the queries.

An image of part of sample output file:

```
Account 8560035691 has balance 1755165724
Account 8542491294 has balance 1720708671
Account 8497242477 has balance 1126986113
Account 8485237678 has balance 1887593284
Account 8738762618 has balance 1422065505
Account 8049323635 has balance 1486196933
Account 8765431510 has balance 248258663
Account 8202413767 has balance 1297539824
Account 8752788062 has balance 1281099974
Account 8538456037 has balance 1124390962
Account 8447726092 has balance 1501173234
Account 8555056607 has balance 1728323608
Account 8969055200 has balance 791605644
Bank 9
Account 9493460803 has balance 1051434331
Account 9459046147 has balance 1788093952
Account 9164921975 has balance 257578383
Account 9543705360 has balance 1223276951
Account 9519800942 has balance 1975253706
Account 9913062191 has balance 1133053568
Account 9663226067 has balance 1507614256
Account 9343599689 has balance 1719100041
Account 9033186072 has balance 1563005331
Account 9501657927 has balance 842905387
Account 9765694068 has balance 1666666022
Account 9541655599 has balance 437398759
```