.NET Challenge - Delen Private Bank

Professional edition

1 Problem description

You will receive an amount of days, an amount of cash and information about a number of securities (see section 1.1). You can perform transactions (buy or sell) on these securities every day, restricted by some rules (see section 1.3). These transactions can increase (or decrease) the amount of cash you have available as well as the number of securities in your portfolio (see section 1.2).

The winner of the challenge will be the person who has the most money at the end of the given number of days (cash and the value of the securities in your portfolio count).

1.1 Securities

There are multiple securities. Each security has a name, a number available and a price during a discrete period. Securities can be bought and sold as long as all rules on transactions are followed (see 1.3).

1.2 Portfolio & cash

Before explaining transactions, you need a short explanation on two concepts that are central to trading securities on the stock market: portfolio and cash.

Your portfolio is an overview of all securities you have. If you buy a number of securities, that number will be added to your portfolio. If you sell a number of securities, that number will be removed from your portfolio. The movements of securities in and out your portfolio will affect the amount of cash you have available. When you buy a security, you have to pay cash for it. When you sell a security, you get cash from selling it. More details on how buy and sell affect your portfolio and cash can be found in the next section (see 1.3).

1.3 Transactions

There are two types of transactions: buy and sell. Buying or selling a security will impact the number available for a given security and the number of securities in your portfolio. Some general rules apply regarding transactions:

- each buy or each sell of a security on a certain day is counted as one transaction
- the amount of cash available has to remain positive (or 0)
- you can only buy a security as long as it is available
- maximum of one transaction per security each day
- maximum of 10 transactions each day
- all calculations should be done with type *decimal*

Apart from these rules, some more specific rules exist regarding buy (see 1.3.1) and sell (see 1.3.2) transactions.

1.3.1 Buy

If you buy a security on a certain day **C**, your cash is lowered by the number you buy **B** times the price **P** of the security on day **C**. Number **B** securities will be added to your portfolio. The following rules apply:

- you buy a security at given price **P** on day **C** (see 1.1)
- you can only buy as many securities as there are available (indicated by number available (see 1.1) and lowered by the amount that you already have in your portfolio)
- your cash is lowered by **B** * **P**
- the number you buy **B** is subtracted from the total available number of that security and that same number is added to your portfolio

1.3.2 Sell

If you sell a security on a certain day **C**, your cash is increased by the number you sell **S** times the price **P** of the security on day **C**. Number **S** securities will be removed from your portfolio. The following rules apply:

- you sell a security at given price **P** on day **C** (see 1.1)
- you can only sell as many securities as there are in your portfolio
- your cash is increased by **S** * **P**
- the number you sell **S** is added to the total available number of that security and that same number is removed from your portfolio

2 File format

2.1 Input file

The input data set is provided in a plain text file. The file contains only ASCII characters with lines ending with a single '\n' character (also called "UNIX-style" line endings). When multiple strings and/or numbers are given in one line, they are separated by a single space between each two elements.

The first line of the data set looks as follows:

- an integer - the number of securities provided in the file
- an integer - the number of days during which transactions can be done
- an integer - the starting amount of cash

This is followed by a number of sections describing each security separately. Each security is described by two lines:

- Line 1: the name of the security (ASCII string without spaces containing only lowercase and uppercase English alphabet letters a-z and A-Z, or numbers 0-9), followed by an integer: the number of that security available for sale
- Line 2: A set of prices, one for each day in the number of days during which a transaction can be done. Decimal separator is a decimal point (.) and has no thousands separator

Example *(see example.in file in GitHub)*

Input file	**Description**
2 5 100	2 securities, 5 days to perform transactions, starting capital of 100
Delen 8	8 *Delen* available
10.12 14.18 9.85 7.23 15.66	Price of *Delen* for buy/sell (Day 0-4)
Ackermans 10	10 *Ackermans* available
39.44 45.98 37.32 32.04 53.38	Price of *Ackermans* for buy/sell (Day 0-4)

Output file

Your submission file should be a plain-text file containing only ASCII characters. It will need to give an overview of all securities you bought and sold at a given moment.
The first line should contain an integer indicating the number of days for which you performed transactions in total. This should be followed by sections describing each day.
For each section, you should submit two lines as follows:

- A first line contains two integers. The first one denotes for which day you are giving transactions. The second one indicates the number of transactions that will follow.
- Lines for each movement, with a string (the security name), a string **SELL** or **BUY** and an integer indicating the number securities to be bought/sold

Example ***(see example.out file in GitHub)***

Output file	**Description**
3	3 days in the 5 day period on which transactions are executed
0 2	Day 0: 2 transactions
Delen BUY 2	Transaction 1: 2 *Delen* securities are bought
Ackermans BUY 1	Transaction 2: 1 *Ackermans* security is bought
3 1	Day 3: 1 transaction
Delen SELL 2	2 *Delen* securities are sold
4 1	Day 4 (last day): 1 transaction
Ackermans SELL 1	1 *Ackermans* security is sold

Hint: you can copy the code on *line 39* in the *Solver.cs* file to parse your input file

3 Important links

- `https://github.com/DieterN/DotNetChallenge`
  → Repository that contains
  - inputfile
  - Solver.cs to test your solution
  - this PDF
- `https://forms.gle/JgRqMYhFXUfCViKn7`
  → Link to submit your solution