

Programming puzzle

You are in charge of selling online video advertising at a large media company. Your job is to make sure that you make as much money as possible from ads running on your site. You are very good at what you do and can sell virtually an infinite amount of impressions (a display of an ad to a user) to a multitude of advertisers.

However, your boss isn't happy. He claims that you cannot show more than 3 ads before each video clip on the site, or no one will visit the site. Although you are very skeptical about this, you must do what your boss tells you. This upcoming month you therefore have a total ad inventory of 32 356 000 impressions available (meaning that you can display ads a maximum of 32 356 000 times).

To further complicate matters, you cannot sell an arbitrary number of impressions to a customer. Your customers buy impressions in chunks of different sizes called campaigns. For instance the advertiser Acme Inc. always buys campaigns of size 2 000 000 impressions that are to be delivered during one month. If you cannot deliver the full 2 000 000 impressions in time, Acme won't pay you. On the other hand, since you are such a good sales person, you are able to sell each customer an arbitrary amount of campaigns, as long as you can deliver all impressions in each campaign.

Your job will be to choose how many campaigns to sell to what customers in order to maximize the revenue. For the upcoming month, your options are as follows:

Customer	Impressions per campaign	Revenue per campaign
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Acme	2 000 000	€ 200
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Lorem	3 500 000	€ 400
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Ipsum	2 300 000	€ 210
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Dolor	8 000 000	€ 730
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SIT	10 000 000	€ 1 000
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Amet	1 500 000	€ 160
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Mauris 1 000 000 € 100

Since you are not only a good sales person, but also an excellent programmer, you decide to write a program that will help you find the best possible mix of campaigns. And since you hate repeating yourself, you make sure you write the program so you can reuse it next month as well: this means the program must be fast enough to handle a variety of different scenarios.

Write a java program that takes a single argument on the command line. This argument must be the name of a file which contains the scenario for a month. This input file will always be formatted as follows:

```
<monthly  
inventory>
```

```
<customer>,<impressions per campaign>,<price per campaign> ...  
<customer>,<impressions per campaign>,<price per campaign>
```

The monthly inventory will be a positive integer. The customer name will contain no spaces. The costs will be integers. The values will be separated by commas.

The program should print the best possible mix of campaigns to sell to standard out in the following form:

```
<customer>,<number of campaigns to sell>,<total impressions for  
customer>,<total revenue for customer>
```

```
... <total number of impressions>,<total  
revenue>
```

Your program should not take more than a minute to run on a modern laptop for each of the cases below using at most 4 GB of java heap space.

Sample input 1

```
32356000  
Acme,2000000,200  
Lorem,3500000,400  
Ipsum,2300000,210  
Dolor,8000000,730  
SIT,10000000,1000  
Amet,1500000,160  
Mauris,1000000,10  
0
```

Sample output 1

```
Acme,0,0,0  
Lorem,8,28000000,3200  
Ipsum,0,0,0  
Dolor,0,0,0 SIT,0,0,0  
Amet,2,3000000,320  
Mauris,1,1000000,100  
32000000,3620
```

Sample input 2

```
50000000 Acme,1,0
Lorem,2,2 Ipsum,3,2
Dolor,70000,71000
Mauris,49000000,5000000
0
```

Sample output 2

```
Acme,0,0,0
Lorem,10000,20000,20000
Ipsum,0,0,0
```

```
Dolor,14,980000,994000
Mauris,1,49000000,50000000
50000000,51014000
```

Sample input 3

```
20000000000
Acme,1000000,5000 Lorem,2000000,9000
Ipsum,3000000,20000
```

Sample output 3

```
Acme,2,2000000,10000
Lorem,0,0,0
Ipsum,666,1998000000,1332000
0 20000000000,13330000
```

Please note: If you get stuck trying to implement the algorithm to solve this, it does not necessarily mean that you are not qualified to work with us.