# Shopping Center – Sample Exam Problem

This document describes a **sample exam problem** for the ["Data Structures" course @ Software University](https://softuni.bg/trainings/1147/Data-Structures-June-2015) along with a step-by-step guidelines how to solve it.

## Problem Description

A **shopping center** keeps a set of **products**. Each product has **name**, **price** and **producer**. Your task is to model the shopping center and design a **data structure holding the products**. Write a program that executes **N** commands, given in the input (a single command at a line):

* AddProduct name;price;producer– adds a product by given name, price and producer. If a product with the same name / producer/ price already exists, the newly added product does not affect the existing ones (duplicates are allowed). As a result the command prints “**Product added**”.
* DeleteProducts producer– deletes all products matching given producer. As a result the command prints “**X products deleted**” where **X** is the number of deleted products or “**No products found**” if no such products exist.
* DeleteProducts name;producer – deletes all products matching given product name and producer. As a result the command prints “**X products deleted**” where **X** is the number of deleted products or “**No products found**” if no such products exist.
* FindProductsByName name – finds all products by given product name. As a result the command prints a list of products in format **{name;producer;price}**, ordered by name, producer and price. Print each product on a separate line. If no products exist with the specified name, the command prints “**No products found**”.
* FindProductsByProducer producer– finds all products by given producer. As a result the command prints a list of products in format **{name;producer;price}**, ordered by name, producer and price. You should print each product on a single line**.** If no products exist by the specified producer, the command prints “**No products found**”.
* FindProductsByPriceRange fromPrice;toPrice – finds all products whose price is greater or equal than **fromPrice** and less or equal than **toPrice**. As a result the command prints a list of products in format **{name;producer;price}**, ordered by name, producer and price. You should print each product on a separate line. If no products exist within the specified price range, the command prints “**No products found**”.

All string matching operations are **case-sensetive**.

### Input

The input data should be read from the console.

* At the first line you will be given the number **N** of the commands.
* At each of the next **N** lines you will be given a command in the format described above.

The input data will always be valid and in the described format. There is no need to check it explicitly.

### Output

The output data should be printed on the console.

The output should contain the output from each command from the input.

### Constraints

* **N** will be between 1 and 150 000, inclusive.
* All strings specified in the commands (e.g. product names and producers) consist of alphabetical characters, numbers and spaces.
* Prices are given as real numbers with up to 2 digits after the decimal point, (e.g. 133.58, or 320)
* The ‘.’ symbol is used as decimal separator.
* Prices should be printed with exactly 2 digits after the decimal point (e.g. 320.30 instead of 320.3).
* Allowed working time for your program: 2.50 seconds.
* Allowed memory: 256 MB.

### Examples

|  |  |
| --- | --- |
| **Input Example** | **Output Example** |
| 17  AddProduct IdeaPad Z560;1536.50;Lenovo  AddProduct ThinkPad T410;3000;Lenovo  AddProduct VAIO Z13;4099.99;Sony  AddProduct CLS 63 AMG;200000;Mercedes  FindProductsByName CLS 63 AMG  FindProductsByName CLS 63  FindProductsByName cls 63 amg  AddProduct 320i;10000;BMW  FindProductsByName 320i  AddProduct G560;999;Lenovo  FindProductsByProducer Lenovo  DeleteProducts Lenovo  FindProductsByProducer Lenovo  FindProductsByPriceRange 100000;200000  DeleteProducts Beer;Ariana  DeleteProducts CLS 63 AMG;Mercedes  FindProductsByName CLS 63 AMG | Product added  Product added  Product added  Product added  {CLS 63 AMG;Mercedes;200000.00}  No products found  No products found  Product added  {320i;BMW;10000.00}  Product added  {G560;Lenovo;999.00}  {IdeaPad Z560;Lenovo;1536.50}  {ThinkPad T410;Lenovo;3000.00}  3 products deleted  No products found  {CLS 63 AMG;Mercedes;200000.00}  No products found  1 products deleted  No products found |

## Step-by-Step Guidelines

This section provides **step-by-step guidelines** for solving the “Shopping Center” problem in C#.