# Homework: Data Structures Efficiency

This document defines the **homework assignments** for the ["Data Structures" course @ Software University](https://softuni.bg/trainings/1147/Data-Structures-June-2015). Please submit a single zip / rar / 7z archive holding the solutions (source code) of all below described problems.

## Students and Courses

A text file **students.txt** holds information about students and their courses.

Using SortedDictionary<K, T> print the courses in **alphabetical order** and for each of them prints the students **ordered by** family and then by name.

|  |  |
| --- | --- |
| **Input** | **Output** |
| Kiril | Ivanov | C#  Stefka | Nikolova | SQL  Stela | Mineva | Java  Milena | Petrova | C#  Ivan | Grigorov | C#  Ivan | Kolev | SQL | C#: Ivan Grigorov, Kiril Ivanov, Milena Petrova  Java: Stela Mineva  SQL: Ivan Kolev, Stefka Nikolova |

## Implement BiDictionary<K1,K2,T>

Implement a class BiDictionary<K1,K2,T> that allows adding **triples {**key1**,** key2**,** value**}** and **fast search** by key1, key2 or by both key1 and key2. Note: multiple values can be stored for given key.

## Collection of Products

A large trade company has millions of **products**, each described by **id** (unique), **title**, **supplier** and **price**. Implement a data structure to store them that allows:

* **Add** new product
* **Remove** product by id
* **Fast retrieval** of all products in **given price range** [x…y]
* **Find products** by title
* **Find products** by title + price
* **Find products** by title + price range
* **Find products** by supplier + price
* **Find products** by supplier + price range

Hints:

* Combine multiple data structures for best performance of the individual operations.
* Use OrderedMultiDictionary<K,T> from [Wintellect's Power Collections for .NET](http://powercollections.codeplex.com/).