Lab: Functional Programming

In the current bashsoft piece we are going to **make some filters** and **implement** some **sort algorithm** so we can **see how functional programming can be helpful** here. The **filters** and **sort types** are **described in** the **piece for** the **strings**, however let's revise them again. We said that we are going to make a filter for a given course in order to **extract some/all poor/average/excellent students** and print them on the current output in the output writer. After that we are going to **sort** the **wanted data by given criteria** (**ascending/descending**) and again take some or all the students from the query.

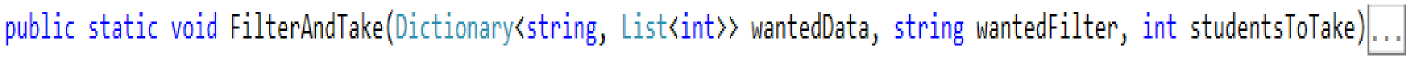
Let's first stat by **making** two **new public static classes** called **RepositoryFilters** and **RepositorySorters**.

Part I: Filtered Students Query

Problem 1. Implement Filters

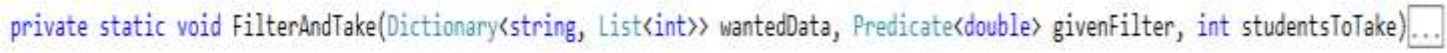
The **first method** we need **in** the **filters repository** class **is** the **public API** we are going to give to the world to use. It's going to be a **public static void method** called **`FilterAndTake`**. Since we are going to **filter students from** a given **course**, we need to **receive** the **dictionary** that corresponds to the **students with** their **scores from** the **wanted course**. Another thing the **method has to receive** is which **filter to use**. Since we are **reading strings**, **from** the **InputReader** , we can **pass them to** this **method as** a **string and** here **in** the **RepositoryFilters** class we can now **decide which filter to apply to** the **data**. The **final parameter** that the method needs to receive is the number of **students** to **take**. Since **we can parse** it **in** the **checking of** the **data**, that we do in **the command interpreter**, the data type of the variable can be an integer.

By now the method signature of **`FilterAndTake`** should look like this:



```
public static void FilterAndTake(Dictionary<string, List<int>> wantedData, string wantedFilter, int studentsToTake)...
```

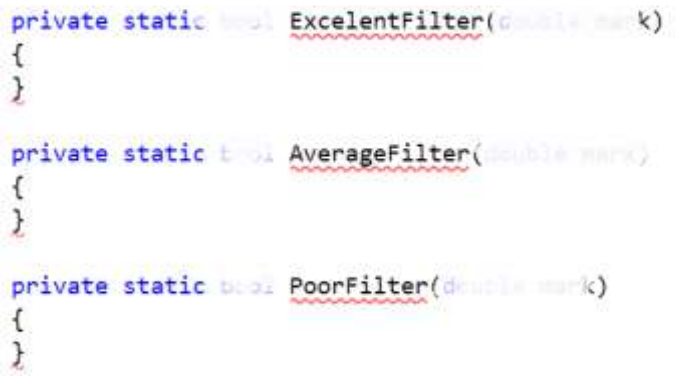
Since the **public method receives** the **wanted filter as** a **string**, it's his job to decide how to **decide which method for filtering to use**. Since it's going to be another method that is actually going to do the filtering, let's **make** it too. It can be called **`FilterAndTake`again**, however it's going to be **private static void** and **with** a **change in** the **parameters**. The **new `FilterAndTake`is** going to **receive** the **same wantedData**, and the **same variable studentsToTake**, **but** the **wantedFilter** is **now** a **Predicate** (method that **returns** a **bool**) that **receives** a **double**. The description above should look like this:



```
private static void FilterAndTake(Dictionary<string, List<int>> wantedData, Predicate<double> givenFilter, int studentsToTake)...
```

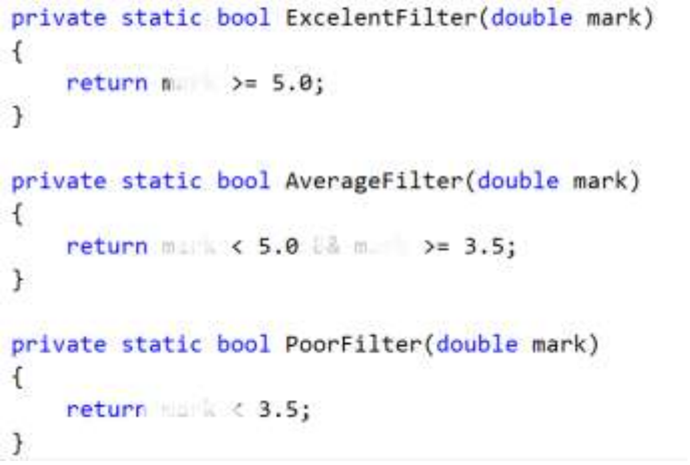
As you can see, the things are a bit coupled, but in the same time quite detached, because we can easily extend it. Now the things we need to **implement**, in order to figure out **how** the **`FilterAndTake` method** is going to **work**, are the methods that we are going to pass as **predicates** that are actually **going to be our filters**.

There are going to be **three methods** of such type since we wanted the three type of students (**excellent/poor/average**). This is how the **initialization of** the **methods should look like**:



```
private static bool ExcelentFilter(double mark)
{
}

private static bool AverageFilter(double mark)
{
}

private static bool PoorFilter(double mark)
{
}
```

The three of them are underlined with red, because the **method has** a **return type** and by now we are not returning anything. Well maybe it's time to start writing, in order to change that. Since we are receiving a mark as a parameter, it's in the range from 2 to 6, so it's up to use, which mark is excellent, which is average and which is poor. We suggest that you return true for an excellent mark if it is more than or equal to 5.00, return true for an average mark if It is more than or equal to 3.50 and less than 5.00 and finally return true for a poor mark if it is less than 3.50. If you've followed the instructions, by now you should have something like this:

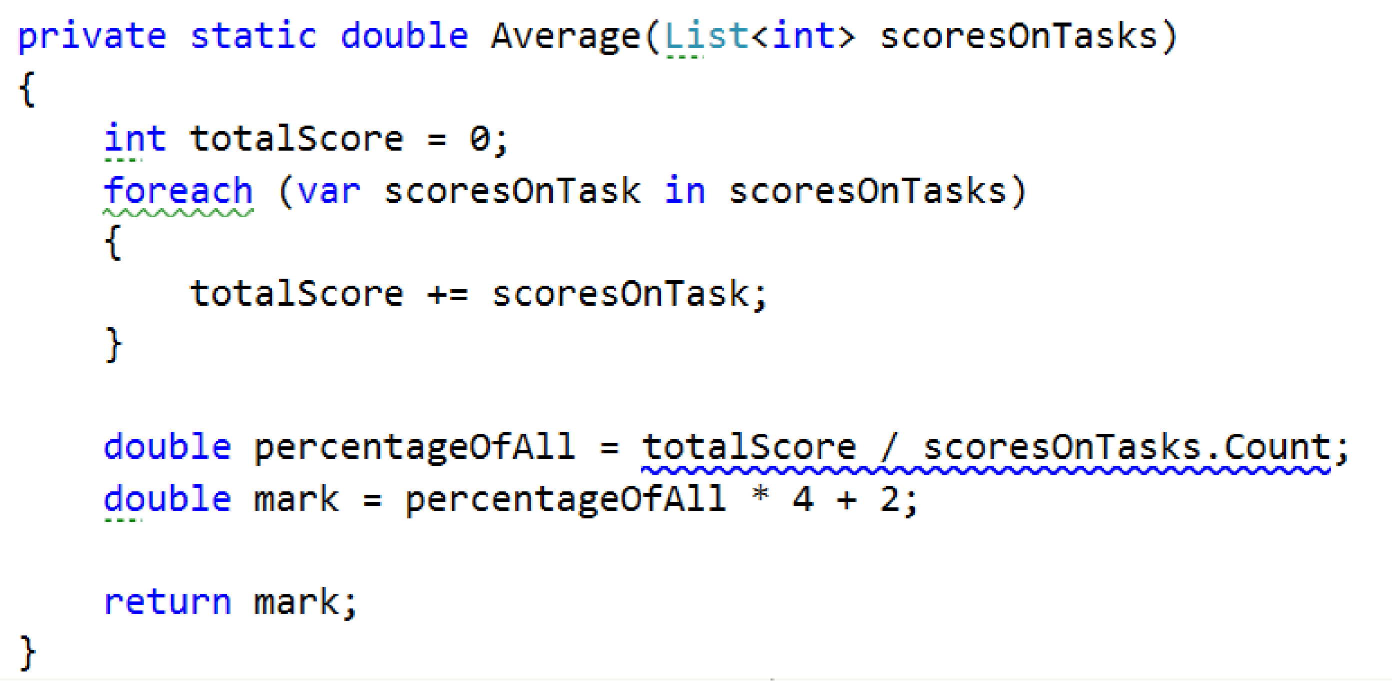


```
private static bool ExcelentFilter(double mark)
{
    return mark >= 5.0;
}

private static bool AverageFilter(double mark)
{
    return mark < 5.0 && mark >= 3.5;
}

private static bool PoorFilter(double mark)
{
    return mark < 3.5;
}
```

Problem 2. Implement Average Mark

There is **one more** helper **method** we need **to make** in order to do the job. It's called **Average** and **receives** a **list** of **scores**. It should be **private** and **static** and since it's going to **return** the **average mark**, we leave it up to you to decide what's the good return type of the method.

After we've implemented the signature of the method it's time for the implementation. First we'll need a **variable** to **hold** the **total score of all the tasks**. Next thing we should do is **iterate through** the **list** and **add each value to** the **total score**. Finally **after** the **foreach** we should **take** the **percentage of** the **total possible result** and since we have 5 tasks on exam, we **divide** by the number of tasks multiplied by 100. Now we have the percentage of all the possible points and we can easily calculate our mark by the formula `mark = percentageOfAll * 4 + 2.` If you've done everything correct, by now your implementation of the method for the calculation of the average mark should be something pretty close to this piece of code:



```
private static double Average(List<int> scoresOnTasks)
{
    int totalScore = 0;
    foreach (var scoresOnTask in scoresOnTasks)
    {
        totalScore += scoresOnTask;
    }

    double percentageOfAll = totalScore / scoresOnTasks.Count;
    double mark = percentageOfAll * 4 + 2;

    return mark;
}
```

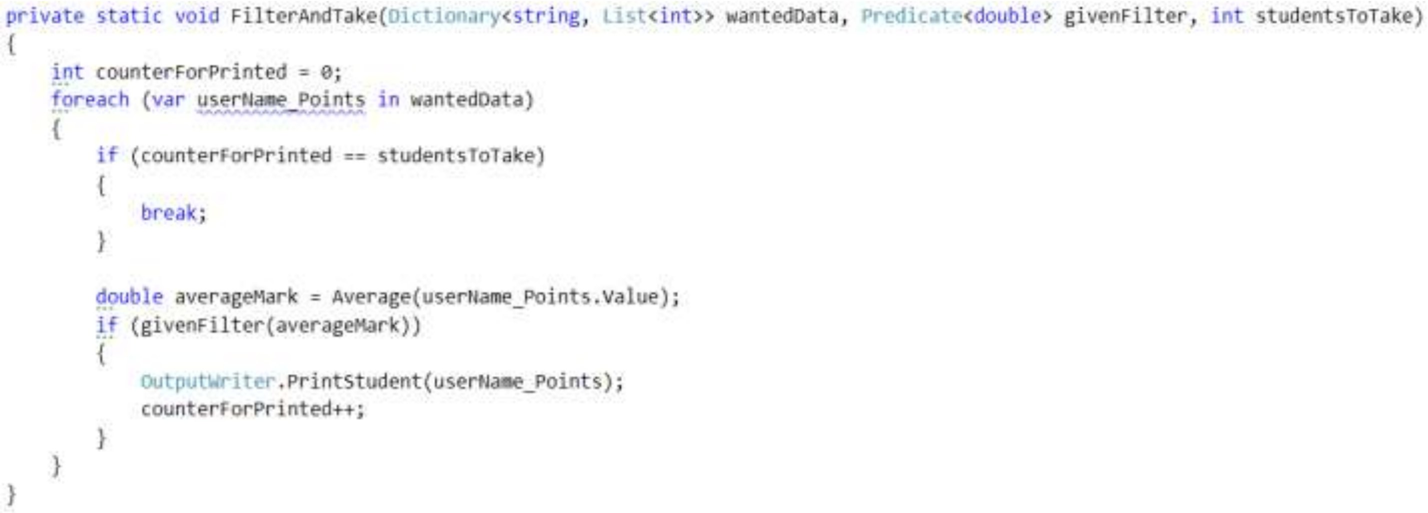
Problem 3. Implement private FilterAndTake method

Now that we are done with the helper methods, I suggest it's time to **move to** the **actual** place where the **filtering** is done and that is the **private `FilterAndTake` method**.

First thing we are going to need in the method is a **variable** to **hold** the **number of printed students** that **match** the **given filter** and therefor are **printed on** the **output writer**.

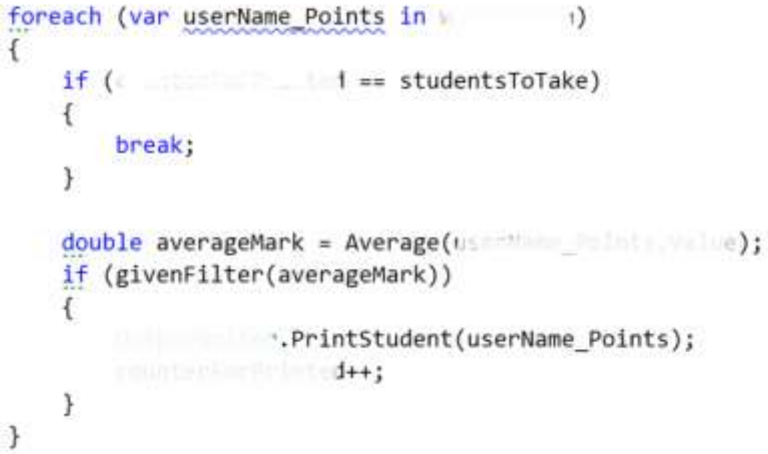
The next thing we do is **iterate through all** the **entries in** the **dictionary** called **wanted data** and **for each student**, we **calculate** it's **average mark** using the method we implemented above, as we pass to it, the value of the key-value pair that give us the current iteration of the dictionary.

Finally we **check if** the **average mark**, **passed to** the given **filter**, **returns true**. And if that is so. We print the student on the output writer using print student method and increment the counter for printed students. By now the implementation of the method we are talking about should look like this:



```
private static void FilterAndTake(Dictionary<string, List<int>> wantedData, Predicate<double> givenFilter, int studentsToTake)
{
    int counterForPrinted = 0;
    foreach (var userName_Points in wantedData)
    {
        if (counterForPrinted == studentsToTake)
        {
            break;
        }

        double averageMark = Average(userName_Points.Value);
        if (givenFilter(averageMark))
        {
            OutputWriter.PrintStudent(userName_Points);
            counterForPrinted++;
        }
    }
}
```

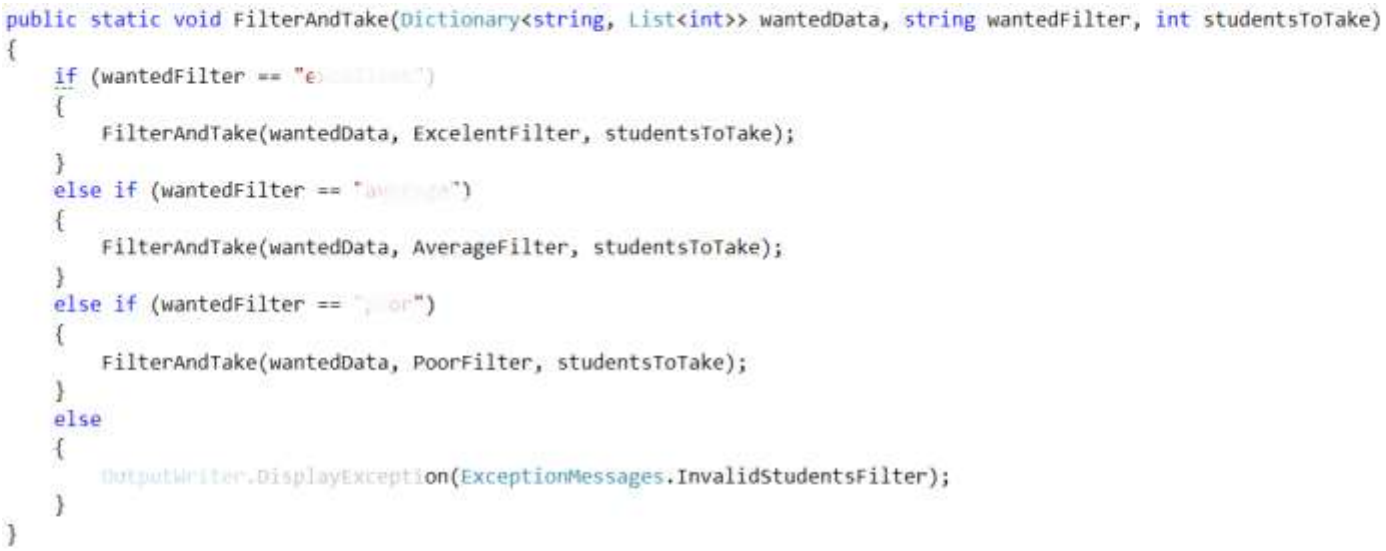
There is just one little problem here and it is the fact that we don't have the implementation for taking only the wanted quantity of students matching the filter and not all of them. So now we have to **add** a **block** of code **that breaks** the **loop if** we've **printed enough students** and it should be **first in** the **foreach loop**. By doing this, our foreach loop now look like the following:



```
foreach (var userName_Points in wantedData)
{
    if (counterForPrinted == studentsToTake)
    {
        break;
    }

    double averageMark = Average(userName_Points.Value);
    if (givenFilter(averageMark))
    {
        OutputWriter.PrintStudent(userName_Points);
        counterForPrinted++;
    }
}
```

Problem 4. Implement Public FilterAndTake Method

Now we are only **left with** the **public `FilterAndTake` method** which is actually going to be the method that the other world is going to use, in order to filter the given data. It's implementation is very straightforward. All we do is **check if** the **wanted filter corresponds to one** of the **possible categories** (**excellent/average/poor**) and if it is one of them, we **call** the **private `FilterAndTake` method**, **with** an **input parameter** for the **Predicate**, the **function that corresponds to** the **category**. **If** the **given word does not match any** of the **categories**, we **display** an **exception** called **InvalidStudentFilter**, which we **first** need to **add to** the **ExceptionMessages with** a **message** of: "`The given filter is not one of the following: excellent/average/poor`". So our implementation of the public method should look likes this:



```
public static void FilterAndTake(Dictionary<string, List<int>> wantedData, string wantedFilter, int studentsToTake)
{
    if (wantedFilter == "excellent")
    {
        FilterAndTake(wantedData, ExcelentFilter, studentsToTake);
    }
    else if (wantedFilter == "average")
    {
        FilterAndTake(wantedData, AverageFilter, studentsToTake);
    }
    else if (wantedFilter == "poor")
    {
        FilterAndTake(wantedData, PoorFilter, studentsToTake);
    }
    else
    {
        OutputWriter.DisplayException(ExceptionMessages.InvalidStudentsFilter);
    }
}
```

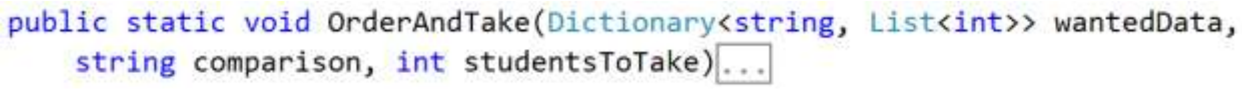
Finally we should be ready with the filtering repositories class and it's time to move on to the sorting repos' class.

Part II: Sorted Students Query

Problem 5. Implement Sorters

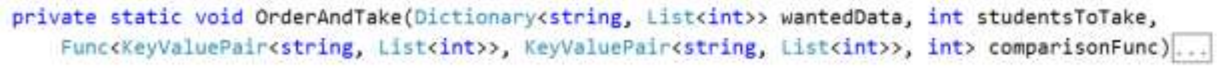
The **first method** we need **in** the **sorter repository** class **is** the **public API** we are going to give to the world to use. It's going to be a **public static void method** called **OrderAndTake**. Since we are going to **sort students from** a given **course**, we need to **receive** the **dictionary** that corresponds to the **students with** their **scores from** the **wanted course**. Another thing the **method has to receive** is which **sorter to use**. Since we are **reading strings**, **from** the **InputReader** , we can **pass them to** this **method as** a **string and** here **in** the RepositorySorters class we can now **decide which sorter to apply to** the **data**. The **final parameter** that the method needs to receive is the number of **students** to **take**. Since **we can parse** it **in** the **checking of** the **data**, that we do in **the command interpreter**, the data type of the variable can be an integer.

By now the method signature of **OrderAndTake** should look like this:



```
public static void OrderAndTake(Dictionary<string, List<int>> wantedData,
    string comparison, int studentsToTake)...
```

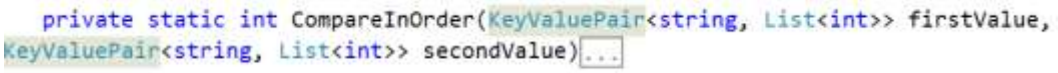
Since the **public method receives** the **wanted sorter as** a **string**, it's his job to decide how to **decide which method for sorting to use**. Since it's going to be another method that is actually going to do the sorting, let's **make** it too. It can be called **OrderAndTake again**, however it's going to be **private static void** and **with** a **change in** the **parameters**. The **new OrderAndTake is** going to **receive** the **same wantedData**, and the **same variable studentsToTake**, **but** the **comparison type (sorter)** is **now** a **Func** that **receives** a **two key value pairs (students with marks) and returns an int which is the result of the comparison**. The description above should look like this:



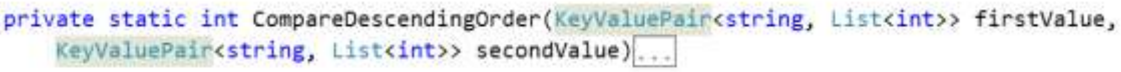
```
private static void OrderAndTake(Dictionary<string, List<int>> wantedData, int studentsToTake,
    Func<KeyValuePair<string, List<int>>, KeyValuePair<string, List<int>>, int> comparisonFunc)...
```

Now the things we need to **implement**, in order to figure out **how** the **`OrderAndTake` method** is going to **work**, are the methods that we are going to pass as **functions** that are actually **going to be our comparison types**.

There are going to be **two methods** of such type since we wanted the **two type** of **comparisons** (**ascending/descending**) . This is how the **initialization of** the **methods should look like**:

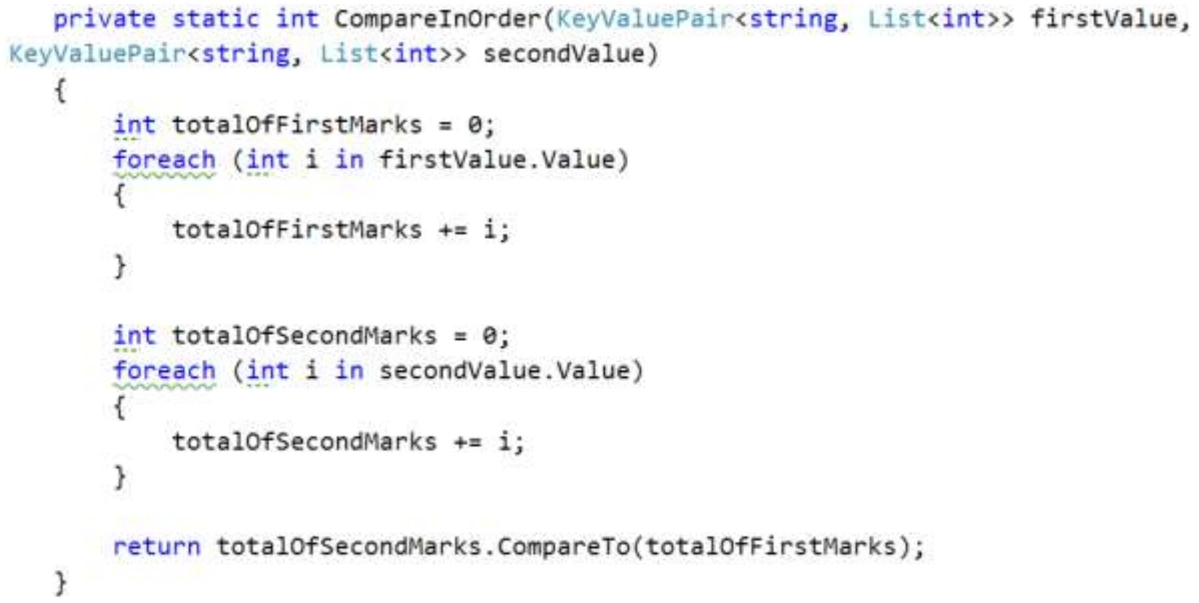


```
  private static int CompareInOrder(KeyValuePair<string, List<int>> firstValue,
KeyValuePair<string, List<int>> secondValue)...
```

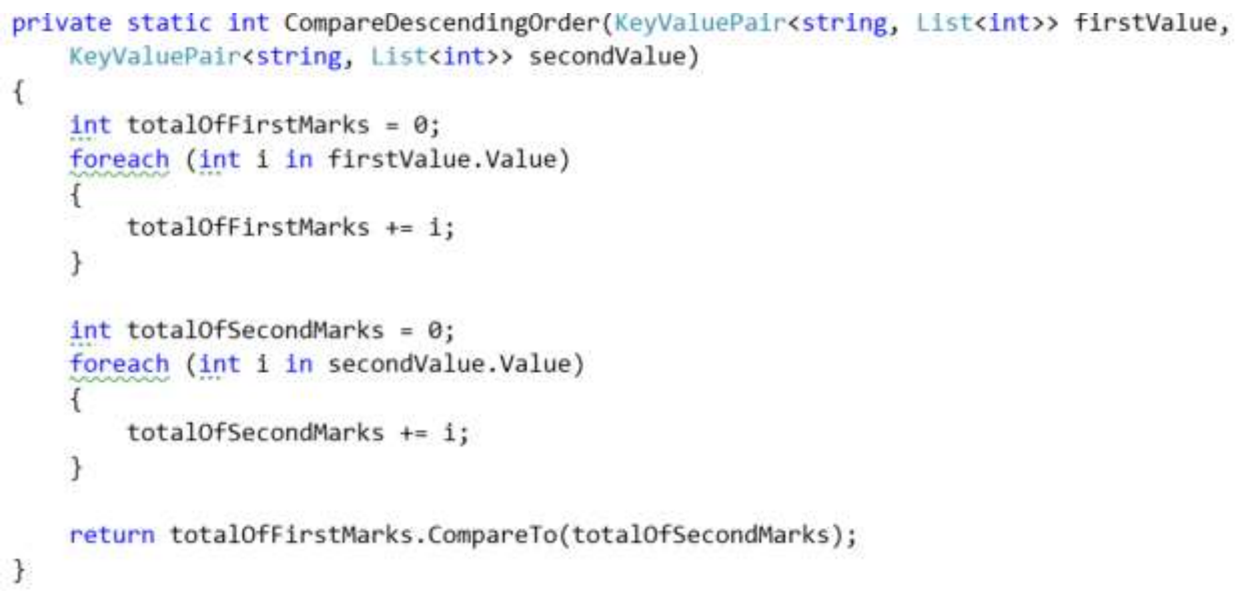


```
  private static int CompareDescendingOrder(KeyValuePair<string, List<int>> firstValue,
      KeyValuePair<string, List<int>> secondValue)...
```

Since we are receiving a two students, we have to compare them in by a given way and return 1, 0 or -1 depending on which one is greater/smaller. To compare them in order, we compare the sum of the scores of all tasks and return the result of the second compared to the first. For the other one we do the same thing, but we compare them in the opposite way. The way the implementation should look is like the following:



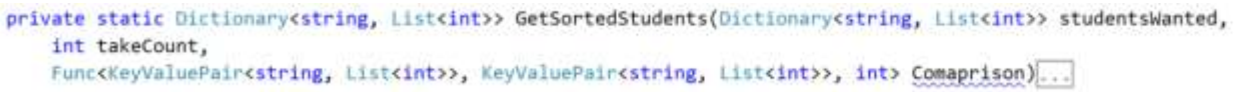
```
    private static int CompareInOrder(KeyValuePair<string, List<int>> firstValue,
 KeyValuePair<string, List<int>> secondValue)
    {
        int totalOfFirstMarks = 0;
        foreach (int i in firstValue.Value)
        {
            totalOfFirstMarks += i;
        }

        int totalOfSecondMarks = 0;
        foreach (int i in secondValue.Value)
        {
            totalOfSecondMarks += i;
        }

        return totalOfSecondMarks.CompareTo(totalOfFirstMarks);
    }
```



```
private static int CompareDescendingOrder(KeyValuePair<string, List<int>> firstValue,
    KeyValuePair<string, List<int>> secondValue)
{
    int totalOfFirstMarks = 0;
    foreach (int i in firstValue.Value)
    {
        totalOfFirstMarks += i;
    }

    int totalOfSecondMarks = 0;
    foreach (int i in secondValue.Value)
    {
        totalOfSecondMarks += i;
    }

    return totalOfFirstMarks.CompareTo(totalOfSecondMarks);
}
```

Problem 6. Implement Private OrderAndTake Method

Now that we are done with the helper methods, I suggest it's time to **move to** the **actual** place where the **sorting** is printed and that is the **private OrderAndTake method**. We simply make a new dictionary of string and list of ints called studentsSorted that is equal to the GetSortedStudents method, which we haven't talked about, but it's signature look like this:



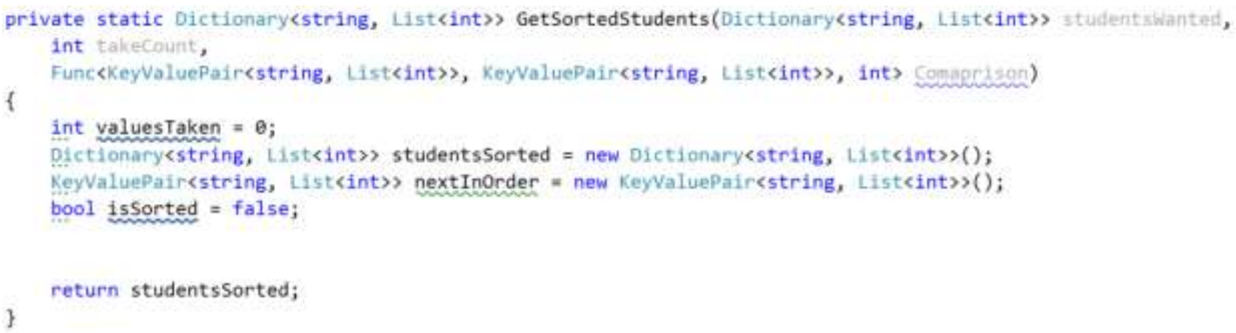
```
private static Dictionary<string, List<int>> GetSortedStudents(Dictionary<string, List<int>> studentsWanted,
    int takeCount,
    Func<KeyValuePair<string, List<int>>, KeyValuePair<string, List<int>>, int> Comaprison)...
```

After we've gotten the sorted student in a dictionary, we simply print it on the output writer using the print student method.

Problem 7. Implement Private GetSortedStudents

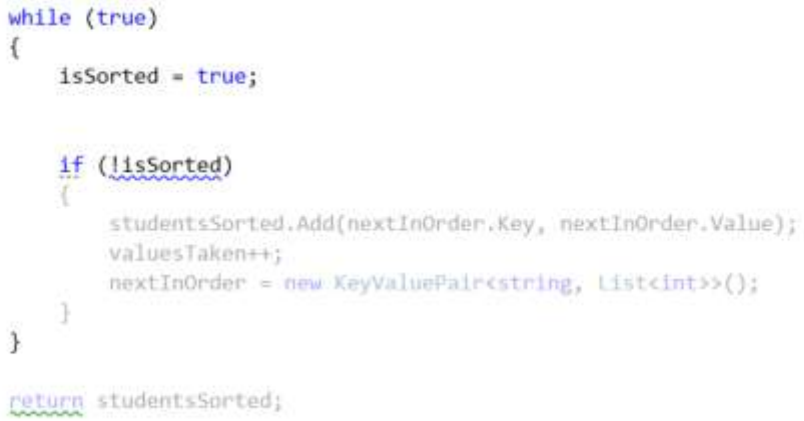
The first thing we do in this method is to **make** a **variable for** the **number** of **values taken** and **set** it **to zero**, because as with the filters, we do not want to take all the students from the sorting, but only the requested amount. Next thing in order is to **make** a **new dictionary for** the **sorted students**. Finally we should make **one more helper variable** to **hold** the **next value** that is in the requested order.

Now it's time to **implement** an easily **understandable sorting algorithm** and for that reason we've chosen **bubble sort**. For the job you need to **add one final helper variable** of **Boolean type** that is **called isSorted**, because you should all know that the **bubble sort needs such** a **variable for** the **condition** of the **loop**. By now your method should look like this:



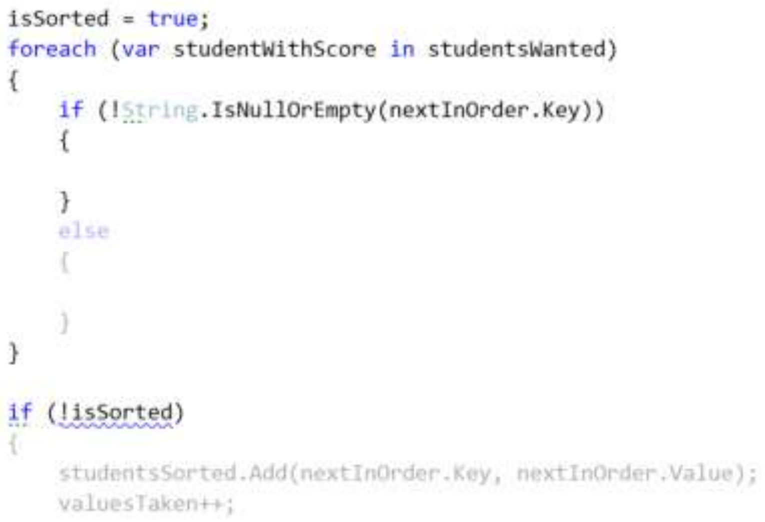
```
private static Dictionary<string, List<int>> GetSortedStudents(Dictionary<string, List<int>> studentsWanted,
    int takeCount,
    Func<KeyValuePair<string, List<int>>, KeyValuePair<string, List<int>>, int> Comaprison)
{
    int valuesTaken = 0;
    Dictionary<string, List<int>> studentsSorted = new Dictionary<string, List<int>>();
    KeyValuePair<string, List<int>> nextInOrder = new KeyValuePair<string, List<int>>();
    bool isSorted = false;


    return studentsSorted;
}
```

From now on we **place** the **while loop of** the **bubble sort** and on each iteration we first **set** the **is sorted to true**. **At** the **end of** the **loop** we **check if** the **isSorted bool** is **not true** and **if so**, **add** the **data from** the **nextInOrder to** the **studentsSorted**. After that **increment** the **valuesTaken** and **finally set** the **nextInOrder to** a **new KeyValuePair**:



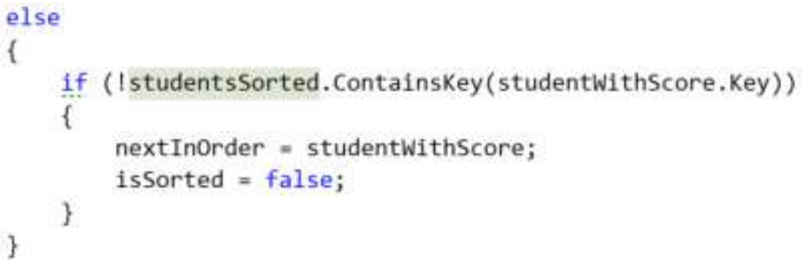
```
while (true)
{
    isSorted = true;


    if (!isSorted)
    {
        studentsSorted.Add(nextInOrder.Key, nextInOrder.Value);
        valuesTaken++;
        nextInOrder = new KeyValuePair<string, List<int>>();
    }
}

return studentsSorted;
```

Next thing in the queue with the things **to implement is** the **inner loop** that **finds** the **current min/max element**. For that reason we **make** a **new foreach over** the **studentsWanted**. Since we have two possibilities for the **keyvalue pair nextInOrder**. It's value **is either set or not set so** we have a **null key** and a **null value**. So we can check **if** the **nextInOrder's key** is **not null** or **empty** and **do one thing** and **if not do another** thing:



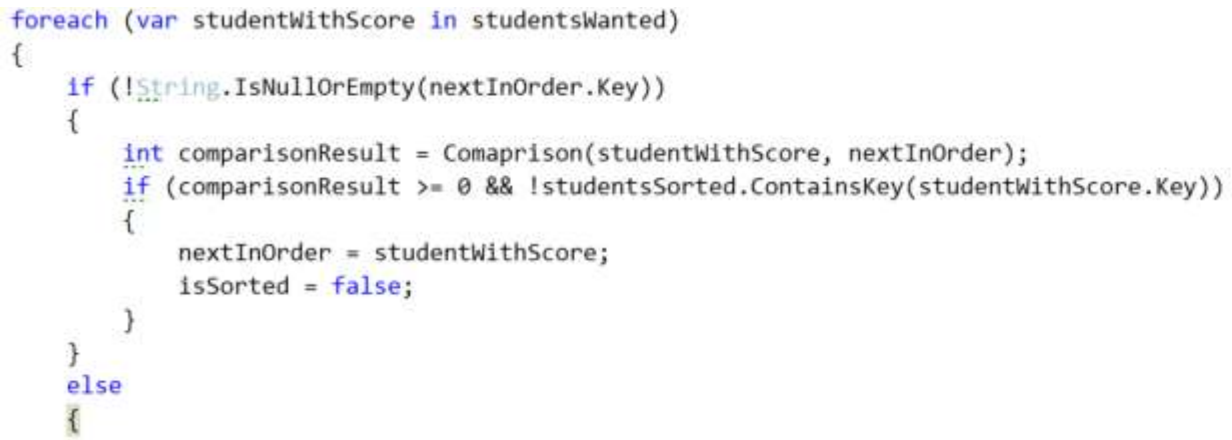
```
isSorted = true;
foreach (var studentWithScore in studentsWanted)
{
    if (!String.IsNullOrEmpty(nextInOrder.Key))
    {

    }
    else
    {

    }
}

if (!isSorted)
{
    studentsSorted.Add(nextInOrder.Key, nextInOrder.Value);
    valuesTaken++;
```

Let’s first **implement** the **else clause**. In it we have to **check whether** the **new sorted dictionary does NOT contain** as a **key** the **current studentWithScore’s key**. **If so**, we **set** the **nextInOrder to** the **studentWithScore** and **set** the **isSorted** to **false**.



```
else
{
    if (!studentsSorted.ContainsKey(studentWithScore.Key))
    {
        nextInOrder = studentWithScore;
        isSorted = false;
    }
}
```

Waiting up next is the if clause. We **take** the **int** that our **Comparison** function **returns**, **by passing** it the **nextInOrder and** the **studentWithScore If** the **comparison result** is **greater than or equal to 0** and the **dictionary** that we use **for** the **sorted students does NOT contain** the **key of** the **studentsWithScore’s key**, we **set** the **nextInOrder to** the **studentWithScore and** the **isSorted** to **false**.

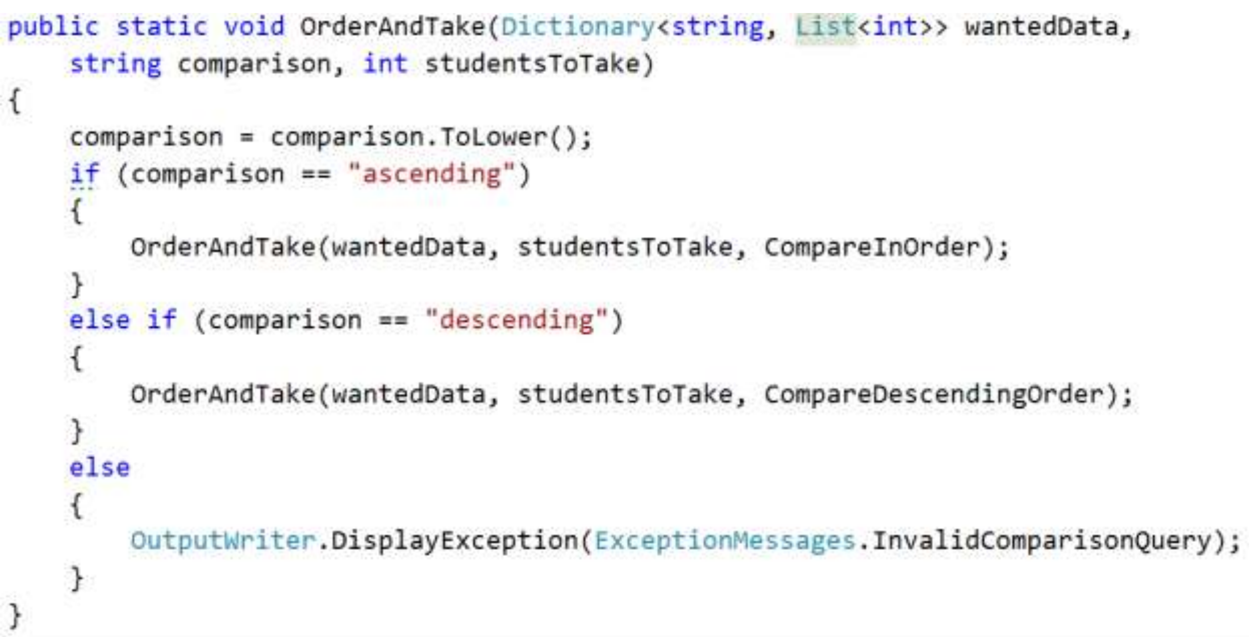


```
foreach (var studentWithScore in studentsWanted)
{
    if (!String.IsNullOrEmpty(nextInOrder.Key))
    {
        int comparisonResult = Comaprison(studentWithScore, nextInOrder);
        if (comparisonResult >= 0 && !studentsSorted.ContainsKey(studentWithScore.Key))
        {
            nextInOrder = studentWithScore;
            isSorted = false;
        }
    }
    else
    {
```

Now that we are ready with the get sorted students, we hope that the private OrderAndTake will also work correctly. So one last thing is left in the current class and it is to implement the public OrderAndTake.

Problem 8. Implement Public OrderAndTake Method

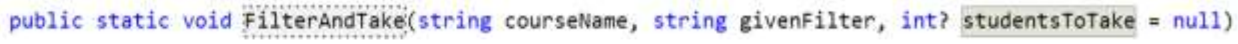
Here our only job is to decide how to **choose which comparison type to use**. That is why we do pretty much the same thing as in the public FilterAndTake. First we check **if** the **comparisonType** string is **ascending** and if so, **call** the private **OrderAndTake**, **passing** the **in order comparison Func**. **If descending** is **chosen**, **call** the same **method with** the **descending order comparison Func**. **If none** of the comparisons is chosen we **display** a new **Exception message**, which we should **first add to** the **ExceptionMessages** called **`InvalidComparisonQuery`** `with a message` “`The comparison query you want, does not exist in the context of the current program!`”



```
public static void OrderAndTake(Dictionary<string, List<int>> wantedData,
    string comparison, int studentsToTake)
{
    comparison = comparison.ToLower();
    if (comparison == "ascending")
    {
        OrderAndTake(wantedData, studentsToTake, CompareInOrder);
    }
    else if (comparison == "descending")
    {
        OrderAndTake(wantedData, studentsToTake, CompareDescendingOrder);
    }
    else
    {
        OutputWriter.DisplayException(ExceptionMessages.InvalidComparisonQuery);
    }
}
```

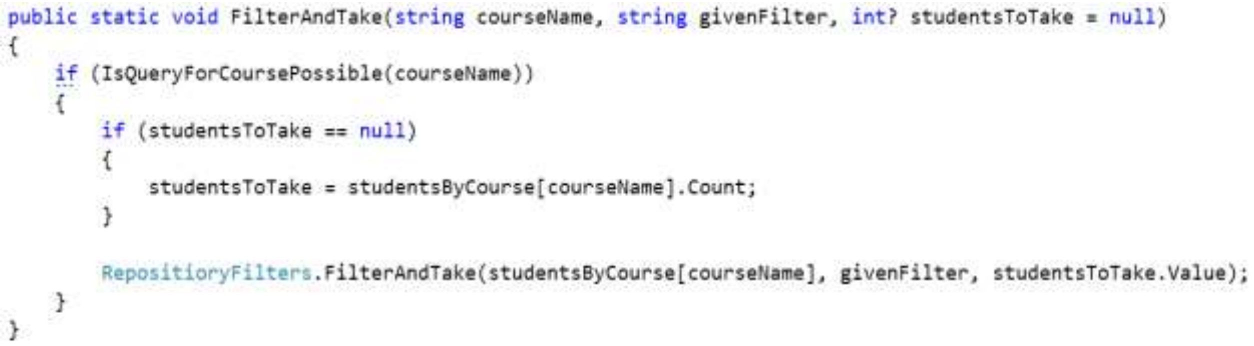
Student Repository Implementation Part of Filters and Sorters

Since we are going to use the **dictionary from** the **StudentsRepository class** and it is **private**, we can **easily take all** that **we need from** the **StudentsRepository by using it** as a **mediator between** the **command interpreter and** the **filters/sorters**. So what we are going to **make** are **two methods** in **this class**. **One** that **called FilterAndTake and one OrderAndTake**. The **filter follows** the **following signature**:



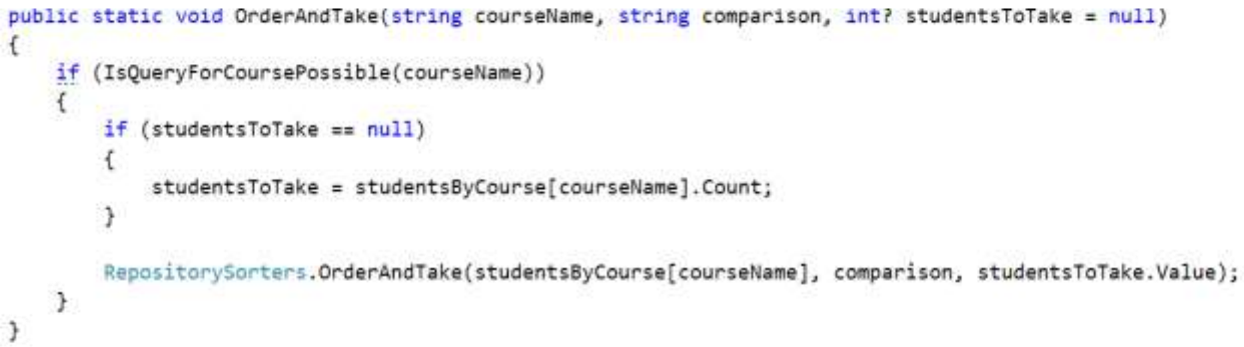
```
public static void FilterAndTake(string courseName, string givenFilter, int? studentsToTake = null)
```

If you're wondering why the students to take is **nullable with** a **default value** of **null** it's because we want to call the method with giving it the parsed value and if it hasn't parsed (in the command interpreter – we'll get there soon) for example if the user has inputted "**all**", we want to **make sure** we **take** the **number of students in** the **current course** and that **is** only **possible** one we're **in** the **StudentRepository class**. If you are confused, don't worry it's harder to explain that to see it in code.



```
public static void FilterAndTake(string courseName, string givenFilter, int? studentsToTake = null)
{
    if (IsQueryForCoursePossible(courseName))
    {
        if (studentsToTake == null)
        {
            studentsToTake = studentsByCourse[courseName].Count;
        }

        RepositioryFilters.FilterAndTake(studentsByCourse[courseName], givenFilter, studentsToTake.Value);
    }
}
```

This situation with the OrderAndTake is pretty much the same as you can see :



```
public static void OrderAndTake(string courseName, string comparison, int? studentsToTake = null)
{
    if (IsQueryForCoursePossible(courseName))
    {
        if (studentsToTake == null)
        {
            studentsToTake = studentsByCourse[courseName].Count;
        }

        RepositorySorters.OrderAndTake(studentsByCourse[courseName], comparison, studentsToTake.Value);
    }
}
```

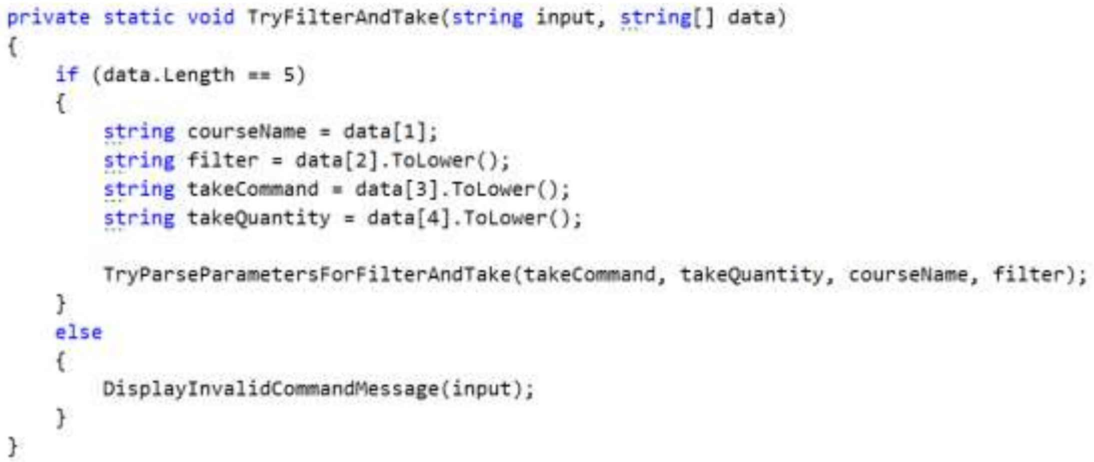
Now that we have these methods we can easily **communicate with** the **RepositoeryFilters indirectly using** the **StudentsRepository**.

Part III Command Interpreter Implementation Part of Filters and Sorters.

In the **command interpreter** we should **make two methods called TryFilterAndTake** and **TryOrderAndTake** that **take input parameters**, the **same as all** the **other try methods** in this class. After making them we should **call them in** the **InterpredCommand method in** the **appropriate place**.

Problem 9. Implement Filtering Data Parsing in Command Interpreter

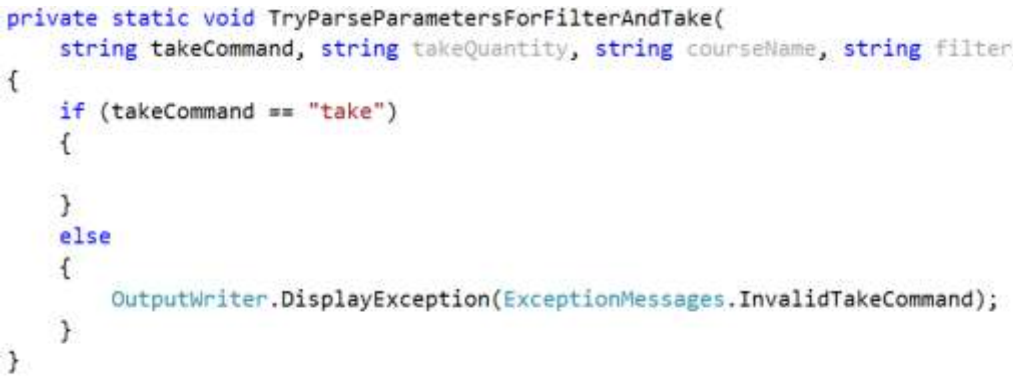
Let's first **look at** the **implementation** of the **TryFilterAndTake** method. All we have to do there is **check if** the **number** of **input parameters are 5** and **if not**, **DisplayInvalidCommandMessage**. **If** they **are**, we **take** the **course name** which is **at index 1,** the **filter** in **lower case** at **index 2**, the take **command** in **lower case** at **index 3** and finally the take **quantity** in **lower case** at **index 4.** Finally we should **pass** all those **parameters to** a **new method TryParseParametersForFilterAndTake**.



```
private static void TryFilterAndTake(string input, string[] data)
{
    if (data.Length == 5)
    {
        string courseName = data[1];
        string filter = data[2].ToLower();
        string takeCommand = data[3].ToLower();
        string takeQuantity = data[4].ToLower();

        TryParseParametersForFilterAndTake(takeCommand, takeQuantity, courseName, filter);
    }
    else
    {
        DisplayInvalidCommandMessage(input);
    }
}
```

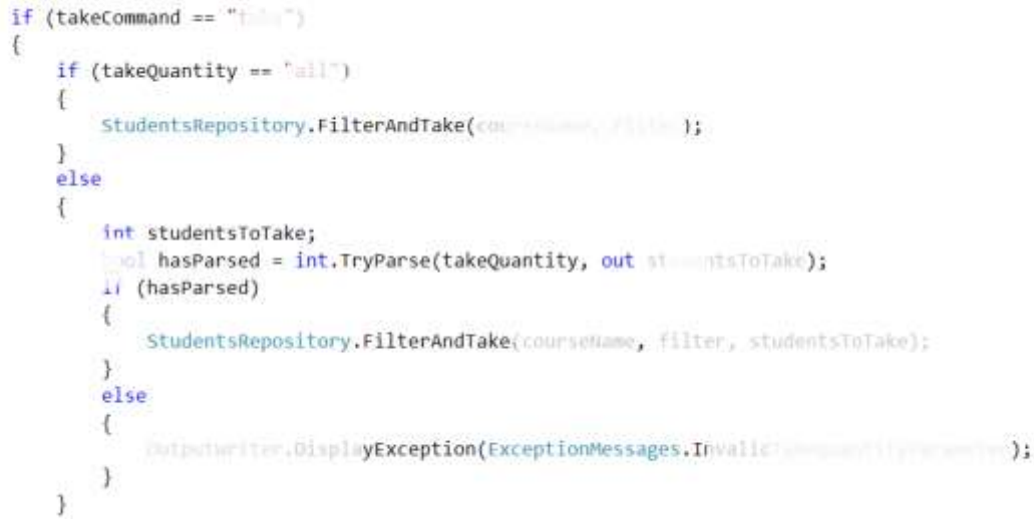
Actually the method we mentioned above does almost all of the validation of the parameters so let's look at it's implementation.

First we **check if** the **take command is** actually **equal to** the word "**take**" and **if not** we **print** an **exception message** on the **output writer**, which of course we should first **add**, called **InvalidTakeQuantityParameter** with a **message** "`The take command expected does not match the format wanted!`"



```
private static void TryParseParametersForFilterAndTake(
    string takeCommand, string takeQuantity, string courseName, string filter)
{
    if (takeCommand == "take")
    {

    }
    else
    {
        OutputWriter.DisplayException(ExceptionMessages.InvalidTakeCommand);
    }
}
```

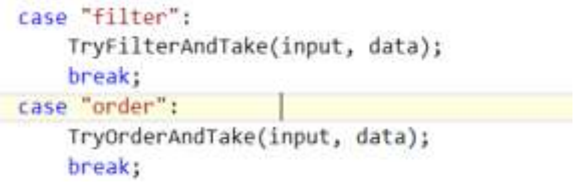
If this is the actual command we now have to **check if** the **take quantity is** "**all**" and **if so**, **call FilterAndTake from** the **StudentsRepository without** the **last parameter for** the **quantity** and therefor it is **null by default**, because we set it to a nullable int. However **if** that is **not the case**, we have to **check if** it is a **number** that **can be parsed**. **If** the number **can be parsed**, we **get** the **result from** the **parse** and **call** the **FilterAndTake** but **including** the **last parameter**. In the case where the **number hasn't been parsed** we should **display** an **exception** for **InvalidTakeQuantityParameter**. All of the above should look something like this:



```
if (takeCommand == "take")
{
    if (takeQuantity == "all")
    {
        StudentsRepository.FilterAndTake(courseName, filter);
    }
    else
    {
        int studentsToTake;
        bool hasParsed = int.TryParse(takeQuantity, out studentsToTake);
        if (hasParsed)
        {
            StudentsRepository.FilterAndTake(courseName, filter, studentsToTake);
        }
        else
        {
            OutputWriter.DisplayException(ExceptionMessages.InvalidTakeQuantityParameter);
        }
    }
```

The situation with the `TryParseParametersForOrderAndTake` is the **same** so leave the **implementation** of this **method to you.**

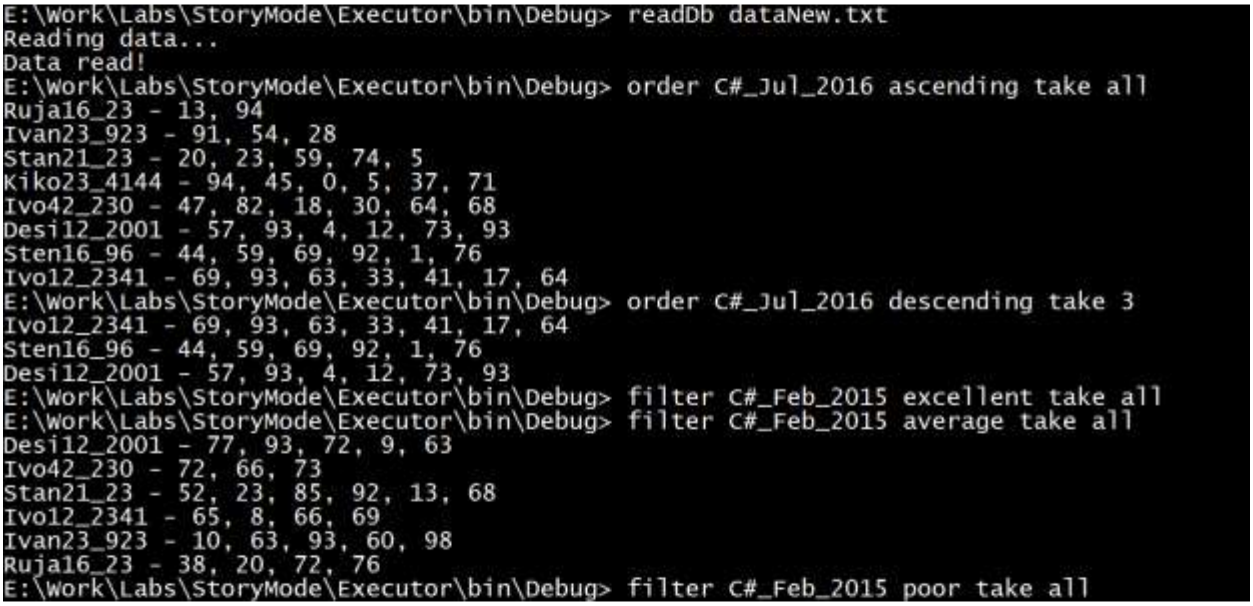
Now if you've done everything and the situation in the switch case in the **InterpredCommand** method is the following :



```
case "filter":
    TryFilterAndTake(input, data);
    break;
case "order":
    TryOrderAndTake(input, data);
    break;
```

..everything should be ok and we are **ready to start reading from** the **input**.

Next thing to do is read the **dataNew.txt** from where you've saved it and **apply** one **sorting** and one **filtering**.



```
E:\Work\Labs\StoryMode\Executor\bin\Debug> readDb dataNew.txt
Reading data...
Data read!
E:\Work\Labs\StoryMode\Executor\bin\Debug> order C#_Jul_2016 ascending take all
Ruja16_23 - 13, 94
Ivan23_923 - 91, 54, 28
Stan21_23 - 20, 23, 59, 74, 5
Kiko23_4144 - 94, 45, 0, 5, 37, 71
Ivo42_230 - 47, 82, 18, 30, 64, 68
Desi12_2001 - 57, 93, 4, 12, 73, 93
Sten16_96 - 44, 59, 69, 92, 1, 76
Ivo12_2341 - 69, 93, 63, 33, 41, 17, 64
E:\Work\Labs\StoryMode\Executor\bin\Debug> order C#_Jul_2016 descending take 3
Ivo12_2341 - 69, 93, 63, 33, 41, 17, 64
Sten16_96 - 44, 59, 69, 92, 1, 76
Desi12_2001 - 57, 93, 4, 12, 73, 93
E:\Work\Labs\StoryMode\Executor\bin\Debug> filter C#_Feb_2015 excellent take all
E:\Work\Labs\StoryMode\Executor\bin\Debug> filter C#_Feb_2015 average take all
Desi12_2001 - 77, 93, 72, 9, 63
Ivo42_230 - 72, 66, 73
Stan21_23 - 52, 23, 85, 92, 13, 68
Ivo12_2341 - 65, 8, 66, 69
Ivan23_923 - 10, 63, 93, 60, 98
Ruja16_23 - 38, 20, 72, 76
E:\Work\Labs\StoryMode\Executor\bin\Debug> filter C#_Feb_2015 poor take all
```