# 04. Advanced C++ Class Members – Homework Exercises

Write C++ code for solving the tasks on the following pages.

Submit your solutions here: https://judge.softuni.bg/Contests/1183/04-Advanced-CPlusPlus-Class-Members-Homework

Any code files that are part of the task are provided under the folder **Skeleton**.

Please follow the exact instructions on uploading the solutions for each task.

# Task 1 – Car

You are given program in a CarMain.cppfile that reads and creates constobjects of class Car, which has the following attributes:

* Brand (string)
* Model (string)
* Year (int)

The program reads input and writes output to the console, using the Car class and getters for the above-mentioned attributes.

Your task is to study the code in CarMain.cpp and implement the Car class in Car.h (which is #include-d by CarMain.cpp), so that CarMain.cpp compiles successfully and accomplishes the task described. Your Car.h file should resemble the following:

|  |
| --- |
| **Car.h** |
| #ifndef CAR\_H  #define CAR\_H  // Place your code here  #endif // !CAR\_H |

You should submit a single .zip file for this task, containing ONLY the Car.h file. The Judge system has a copy of the other files and will compile them, along with your file, in the same directory.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| Volkswagen  Golf  2015 | Brand -> Volkswagen  Model -> Golf  Year -> 2015 |

**Task 2 – SumOfVectors**

You are given program in a Main**.cpp** file that read:

* How many couples of data you have
* Elements data 1
* Elements data 2

The number of couples is an integer, the datas are strings.

With the couples in the data vectors, you have to create a new vector with concatenation of the previous 2 vectors data.

Write a function that does the concatenation

Your task is to study the code in **Main.cpp** and implement the **SumOfVectors** function in **SumOfVectors.h** (which is **#include**-d by **Main.cpp**), so that **Main.cpp** compiles successfully and accomplishes the task described. Your SumOfVectors**.h** file should resemble the following:

|  |
| --- |
| **SumOfVectors.h** |
| #ifndef SUMOFVECTORS\_H  #define SUMOFVECTORS\_H  // Place your code here  #endif // !SUMOFVECTORS\_H |

You should submit a single **.zip** file for this task, containing ONLY the **SumOfVectors.h** file. The Judge system has a copy of the other files and will compile them, along with your file, in the same directory.

**Examples**

|  |  |
| --- | --- |
| **Input** | **Output** |
| 2  Ivan  Dragan 22 23 | Ivan 22  Dragan 23 |
| 1  Polya Pavlova | Polya Pavlova |

# Task 3 – Operators

You are given code for a program which reads a specified number of lines from the console, and then formats them in the following way:

* It prepends two lines of characters before the lines from the input
* It then places each of the original lines prefixing it with its number (starting from 1) followed by ". "
* It then appends a line of characters at the end

The program does all this (you don’t have to do input, output, or determining of line numbers), but it uses operators which aren’t defined in the C++ language.

Your task is to study what the code in OperatorsMain.cpp and implement the necessary operators in Operators.h (which is #include-d by OperatorsMain.cpp), so that OperatorsMain.cpp compiles successfully and accomplishes the task described. Your Operators.h file should resemble the following:

|  |
| --- |
| **Operators.h** |
| #ifndef OPERATORS\_H  #define OPERATORS\_H  #include <ostream>  #include <vector>  #include <string>  #include <sstream>  // Place your code here  #endif // !OPERATORS\_H |

You should submit a single .zip file for this task, containing ONLY the Operators.h file. The Judge system has a copy of the other files and will compile them, along with your file, in the same directory.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 2  hello  c++ operators | Formatted Lines  ----------------  1. hello (5)  2. c++ operators (13)  ---------------- |

# Task 4 – Resources

You are given code for a program which reads information about Resources (links to Presentations, Demos or Videos) in the SoftUni Learning system *(well, ok, not the real system, but at least this one won’t break the links…)* and then sorts them by their id, and also prints how many of each type of resource there was in the input.

Each Resource has the following properties:

* An integer id
* A ResourceType – one of Presentation, Demo, or Video
* A string representing the link to the resource

The code for the program is in the ResourcesMain.cpp and it uses a Resource class, which it expects to be defined in a file named "Resource.h" in the same directory.

Your task is to study the ResourcesMain.cpp file and the ResourceType.h file, and to create the Resource.h file and implement the Resource class in such a way that the program correctly reads the input, orders it by id, prints it as lines on the output (each Resource output line should have the same format as the matching Resource input line) and then prints the number of Resources of each type.

Your Resource.h file should resemble the following:

|  |
| --- |
| **Resource.h** |
| #ifndef RESOURCE\_H  #define RESOURCE\_H  #include "ResourceType.h"  // Place your code here  #endif // !RESOURCE\_H |

You should submit a single .zip file for this task, containing ONLY the Resource.h file. The Judge system has a copy of the other files and will compile them, along with your file, in the same directory.

### Examples

|  |
| --- |
| **Input** |
| 4  255 Demo http://kottakoa.com  42 Presentation http://theanswertolifetheuniverseandeverything.com  13 Demo http://example.com  69 Video http://yeahyouwish.com |
| **Output** |
| ... by id:  13 Demo http://example.com  42 Presentation http://theanswertolifetheuniverseandeverything.com  69 Video http://yeahyouwish.com  255 Demo http://kottakoa.com  ... by type:  Presentation: 1  Demo: 2  Video: 1 |

# Task 5 – Lectures

You are given code similar to **Task 4 – Resources**, however this time the main() code uses a Lecture object (the class for which should be defined in a Lecture.h file) to store and organize the resources. It also uses several operators to do that, and iterates the Resources in the Lecture through a range-based for loop (*hint: the Lecture class will need begin() and end() methods which return iterators*).

Another difference is that in this task, there can be two Resource objects in the input which have different links, but have the same id. This indicates that the Resource has been changed – i.e. if a Resource with the same id is encountered **multiple times**, only keep its version appearing **latest** in the input.

The program’s output should be the same as in **Task 4** – the resources ordered by id, followed by the number of occurrences of each ResourceType, ordered Presentation (if non-zero), then Demos (if non-zero) and last Video (if non-zero).

Your task is to study the code, figure out what operators and classes you need to implement, search the Web for concepts you aren’t familiar with, and submit the files necessary for the program to compile and run successfully.

You should submit a single .zip file for this task, containing ONLY the files YOU created. The Judge system has a copy of the other files and will compile them, along with your file, in the same directory.

### Examples

|  |
| --- |
| **Input** |
| 6  42 Presentation http://thisiswillberenamed.com  255 Demo http://kottakoa.com  42 Presentation http://theanswertolifetheuniverseandeverything.com  13 Demo http://this.will.also.be.renamed.com  13 Demo http://example.com  69 Video http://yeahyouwish.com |
| **Output** |
| ... by id:  13 Demo http://example.com  42 Presentation http://theanswertolifetheuniverseandeverything.com  69 Video http://yeahyouwish.com  255 Demo http://kottakoa.com  ... by type:  Presentation: 1  Demo: 2  Video: 1 |

|  |
| --- |
| **Input** |
| 6  42 Demo http://thisiswillberenamed.com  255 Demo http://kottakoa.com  42 Demo http://theanswertolifetheuniverseandeverything.com  13 Demo http://this.will.also.be.renamed.com  13 Demo http://example.com  69 Video http://yeahyouwish.com |
| **Output** |
| ... by id:  13 Demo http://example.com  42 Demo http://theanswertolifetheuniverseandeverything.com  69 Video http://yeahyouwish.com  255 Demo http://kottakoa.com  ... by type:  Demo: 3  Video: 1 |