# Exercises: Lambda and LINQ

Problems for exercises and homework for the [“Programming Fundamentals Extended” course @ SoftUni](https://softuni.bg/courses/programming-fundamentals).

Check your solutions here: <https://judge.softuni.bg/Contests/435>.

## Registered Users

You will be given several usernames and dates of registry, in the following format:

{username} -> {date}

The **username** will be a **string** and the **date** will be a valid date in format “**dd/MM/yyyy**”.

You must read input lines until you receive the command “**end**”.

You need to store every user, with his date of registry. Then you must print the **LAST 5** registered names, or in other words the **OLDEST** registered users, in **order of registry** – from the **latest registered,** to the **oldest registered**.

If there are **LESS** than **5** people, print **them** in the **order**, **specified above**.  
if any entries have the **SAME date**, print the **LAST** entered one, **FIRST**, and then the other (in **input**).

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| John27 -> 12/02/2004  7H3D347H -> 15/09/2015  Bojo96 -> 15/09/2015  Sanity -> 04/05/2015  Innos -> 04/05/2015  Nakov -> 01/01/2013  Danny -> 04/04/2016  Yori -> 29/02/2016  end | Bojo96  Innos  Sanity  Nakov  John27 |
| Danny -> 04/04/2016  Innos -> 04/05/2015  Sanity -> 04/05/2015  Nakov -> 01/01/2013  end | Danny  Sanity  Innos  Nakov |

## Default Values

You will be given several key-value pairs in the following format: {key} -> {value}

Your task is to store all those pairs, until you receive the command “**end**”. When you receive the ending command, you must read **one last line**, containing the **default value**. Then you must change all values, which are equal to “**null**” with the **given default value**.

At the **end** you must print **all key-value pairs**, which have **NOT** been **replaced** with the **default value**, in **descending** order, by their **value’s length**.

**After** them, you must print **all key-value** pairs which **HAVE been replaced** with the **default value**, in **order of input**.

Each key-value pair, must be printed in the following format: {key} <-> {value}

All variables in the program logic are strings.

Note: If you receive the same key twice or more times, you should update its value everytime.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| What -> null  How -> null  To -> Do  This -> null  Correctly -> null  end  welp | To <-> Do  What <-> welp  How <-> welp  This <-> welp  Correctly <-> welp |
| This -> Input  Will -> Be  Sorted -> null  By -> Descending  Order -> null  end  sortorder | By <-> Descending  This <-> Input  Will <-> Be  Sorted <-> sortorder  Order <-> sortorder |

## Flatten Dictionary

You will be given several input lines containing info about a **key**, an **inner key** and **inner value**, **separated** by a **SPACE**.

Your task is to store every inner key and inner value, in every key’s value. Check the Examples for more info.

If you receive the command “**flatten** **{key}**”, you must **flatten** all the **inner** **keys** and **inner** **values** at the **given key**, or in other words, **CONCATENATE** them.

When you receive the command “**end**” the **input ends**. You must print all **keys** and their **inner-keys** and **inner-values**. **Flattened** **inner keys** and **inner values**, must be printed **AFTER** all else.

The **keys** must be printed in **descending order** of their **length**.

All **inner-keys** must be printed in **ascending order** of their **length**.

Flattened Values must be printed in **order of input**.

The format of printing is: Flattened values should be printed like this

{key} {key}

1. {innerKey} – {innerValue} . . .

2. {innerKey} – {innerValue} x. {flattenedValue}

3. {innerKey} – {innerValue} (x+1). {innerKey} – {innerValue}

. . . . . .

If you receive an **inner** **key** that already **exists**, **replace** its value with the **new given one**.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| Cars Opel Astra  Cars Opel Vectra  Laptops Lenovo T500  Cars BMW X6  Laptops Acer Aspire  Cars Audi Q7  end | Laptops  1. Acer - Aspire  2. Lenovo - T500  Cars  1. BMW - X6  2. Opel - Vectra  3. Audi - Q7 |
| TV Samsung Home  TV Sony Office  TV Samsung Office  Default Get Set  Default Set Get  flatten TV  TV Lenovo General  TV Samsung Home  end | Default  1. Get - Set  2. Set - Get  TV  1. Lenovo - General  2. Samsung - Home  3. SamsungOffice  4. SonyOffice |

## CottageScraper \*

You’re a carpenter at the local woodworking shop. Your client wants you to build a wooden skyscraper/cottage. A **CottageScraper**, he calls it. But in order to accomplish this task, he needs the trees to be **taller** than a **certain height**. The problem is that he **doesn’t know** what type of tree he’ll use yet, and doesn’t know **how tall** he wants to make the CottageScraper yet. You’ve obviously got nothing better to do, so you go to work chopping down logs until he calls you with the details.

Write a program which receives tree **types** and their **lengths** in the format “{type} -> {height}”. When you receive the command “chop chop”, it’s time to get paid.

On the next line, you will receive the **type** **of tree** that needs to be used to build the **CottageScraper**. On the final input line, you will receive the **minimum length per tree**, needed to accomplish the task. Filter the trees based on type and minimum length, making sure that you’ll only use the trees of the specified **type** and **minimum length**.

After which, calculate the **total price** of the **CottageScraper**, which includes the price of all the trees you collected up to that point. The price is calculated as being the **average** meters of **all** **logs** you collected, per **meter** of log, **rounded to the second decimal place**.

You’re going to charge the client **100%** of the **price per log** for logs you’ll use in the skyscraper, and **25%** of the price per log for logs you **won’t** use for the **CottageScraper**. Both of the fees are **rounded to the second decimal place**.

After you make the calculations, **print** them on the console. On the first line of the console, print “Price per meter: ${pricePerMeter:F2}”. On the second, print “Used logs price: ${usedLogsPrice:F2}”. On the third line, print “Unused logs price: ${unusedLogsPrice:F2}”.

On the final line of the output, print “CottageScraper subtotal: ${subTotal:F2}”.

### Examples

|  |  |  |
| --- | --- | --- |
| **Input** | **Output** | **Comments** |
| Maple -> 20  Oak -> 12  Poplar -> 25  Maple -> 33  Poplar -> 11  Poplar -> 30  chop chop  Poplar  12 | Price per meter: $21.83  Used logs price: $1200.65  Unused logs price: $414.77  CottageScraper subtotal: $1615.42 | Needed type: Poplar  Needed height: at least 12m  Price per meter == (sum of all logs) / (count) == 21.83  Used logs (taller than 12m): Poplar -> 25, 30  Used logs price: (25 + 30) \* 21.83 = **$1200.65**  Unused logs: Maple -> 20, 33; Oak -> 12; Poplar -> 11  Unused logs price: (20 + 33 + 12 + 11) \* 21.83 \* 0.25 = **$414.77**  Used + unused logs price: 1200.65 + 414.77 = **$1615.42** |
| Cherry -> 918  Oak -> 112  Maple -> 1423  Maple -> 9118  Poplar -> 122  Oak -> 232  chop chop  Maple  250 | Price per meter: $1987.50  Used logs price: $20950237.50  Unused logs price: $687675.00  CottageScraper subtotal: $21637912.50 | Needed type: Maple  Needed height: at least 250m  Price per meter = (sum of all logs) / (count) == **$1987.50**  Used logs (taller than 250m): Maple -> 1423, 9118  Used logs price: (1423 + 9118) \* 1987.50 = **$20950237.50**  Unused logs: Cherry -> 918; Oak -> 112, 232; Poplar -> 122  Unused logs price: (918+ 112+ 232+ 122) \* $1987.50 \* 0.25 = **$687675.00**  Used + unused logs price: **$21637912.50** |
| Apple -> 218  Pear -> 112  Apple -> 123  Apple -> 118  Pear -> 122  Cherry -> 232  chop chop  Apple  120 | Price per meter: $154.17  Used logs price: $52571.97  Unused logs price: $22508.82  CottageScraper subtotal: $75080.79 | Needed type: Apple  Needed height: at least 120m  Price per meter = 218 + 112 + 123 + 118 + 122 + 232 / 6 = **$154.17**  Used logs (taller than 250m): Apple -> 218  Used logs price: 218 \* 154.17 = **$52571.97**  Unused logs: Pear -> 112, 122, Apple -> 123, 118, Cherry -> 232  Unused logs price: (112 + 122+ 123 + 118 + 232) \* $154.17 \* 0.25 = **$22508.82**  Used + unused logs price: **$75080.79** |

### Hints

* In order to flatten the dictionary’s values (in order to calculate the price per log), you can use the LINQ .SelectMany() method to “squash down” the multiple types of logs into one list.
* The unused logs include not only the logs from different types than needed, but also the logs of the **needed type** whose height was **lower** than the minimum height.
* **Every** mathematical calculation in this exercise is **rounded** **to the second decimal place**.