# Exercise: Associative Arrays

Problems for exercise and homework for the ["C# Fundamentals" course @ SoftUni](https://softuni.bg/trainings/3836/programming-fundamentals-with-csharp-september-2022)  
You can check your solutions in [Judge](https://judge.softuni.org/Contests/1213/Associative-Arrays-Exercise)

## Count Chars in a String

Create a program that **counts all characters** in a string, **except for space (' ')**.

**Print all the occurrences in the following format:**

**"{char} -> {occurrences}"**

using System;

using System.Collections.Generic;

using System.Linq;

namespace \_01.\_Count\_Chars\_in\_a\_String

{

class Program

{

static void Main(string[] args)

{

Dictionary<char, int> strings = new Dictionary<char, int>();

string word = Console.ReadLine();

foreach (var ch in word)

{

if (ch != ' ')

{

if (!strings.ContainsKey(ch))

{

strings[ch] = 0;

}

strings[ch] ++;

}

}

foreach (var item in strings)

{

Console.WriteLine($"{item.Key} -> {item.Value}");

}

}

}

}

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| text | t -> 2  e -> 1  x -> 1 |
| text text text | t -> 6  e -> 3  x -> 3 |

## A Miner Task

You will be given a sequence of strings, each on a new line. Every odd line on the console is representing a resource (e.g. Gold, Silver, Copper and so on) and every even - quantity. Your task is to collect the resources and print them each on a new line.

**Print the resources and their quantities in the following format:**

"**{resource} –> {quantity}**"

The quantities will be **in the range** **[1… 2 000000000].**

using System;

using System.Collections.Generic;

namespace \_02.\_A\_Miner\_Task

{

class Program

{

static void Main(string[] args)

{

Dictionary<string, int> resourses = new Dictionary<string, int>();

string input = Console.ReadLine();

while(input!="stop")

{

int count = int.Parse(Console.ReadLine());

if(!resourses.ContainsKey(input))

{

resourses.Add(input,count);

}

else

{

resourses[input] += count;

}

input = Console.ReadLine();

}

foreach (var item in resourses)

{

Console.WriteLine($"{item.Key} -> {item.Value}");

}

}

}

}

### Examples

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Input** | **Output** |  | **Input** | **Output** |
| Gold  155  Silver  10  Copper  17  stop | Gold -> 155  Silver -> 10  Copper -> 17 |  | gold  155  silver  10  copper  17  gold  15  stop | gold -> 170  silver -> 10  copper -> 17 |

## Orders

Create a program that keeps the information about **products** and their prices. Each product has a **name**, a **price** and a **quantity**. If the product **doesn't exist** yet, **add** it with its **starting quantity**.

If you receive a product, which **already exists**, increase its quantity by the input quantity and if its price is different, **replace** the price as well.

You will receive products' names, prices and quantities on new lines. Until you receive the command "**buy**", keep adding items. When you do receive the command "**buy**", print the items with their **names** and the **total price** of all **the products with that name**.

**Input**

* Until you receive "**buy**", the products will be coming in the format: "**{name} {price} {quantity}**".
* The product data is **always** delimited by a **single space**.

**Output**

* Print information about **each** **product** in the following format:   
  **"{productName} -> {totalPrice}"**
* **Format** the average grade to the **2nd digit after the decimal separator**.

using System;

using System.Collections.Generic;

using System.Linq;

namespace \_03.\_Orders

{

class Program

{

static void Main(string[] args)

{

Dictionary<string, Dictionary<double, int>> products = new Dictionary<string, Dictionary<double, int>>();

string input = Console.ReadLine();

while(input!="buy")

{

string[] cmdArg = input.Split(" ");

string product = cmdArg[0];

double price = double.Parse(cmdArg[1]);

int count = int.Parse(cmdArg[2]);

if(!products.ContainsKey(product))

{

products[product] = new Dictionary<double, int>();

products[product].Add(price, count);

}

else

{

Dictionary<double, int> priceAndCount = new Dictionary<double,int>();

int oldCount=0;

double oldPrice;

foreach (var product1 in products.Where(x=>x.Key==product))

{

foreach (var product2 in product1.Value)

{

oldCount=product2.Value;

oldPrice = product2.Key;

}

}

//double oldCount = priceAndCount.Values;

products.Remove(product);

products[product] = new Dictionary<double, int>();

products[product].Add(price, count + oldCount);

}

input = Console.ReadLine();

}

Dictionary<string, double> productAndPrice = new Dictionary<string, double>();

foreach (var product in products)

{

foreach (var item in product.Value)

{

productAndPrice[product.Key] = item.Key \* item.Value;

}

}

foreach (var product in productAndPrice)

{

Console.WriteLine($"{product.Key} -> {product.Value:f2}");

}

}

}

}

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| Beer 2,20 100  IceTea 1,50 50  NukaCola 3,30 80  Water 1,00 500  buy | Beer -> 220.00  IceTea -> 75.00  NukaCola -> 264.00  Water -> 500.00 |
| Beer 2,40 350  Water 1,25 200  IceTea 5,20 100  Beer 1,20 200  IceTea 0,50 120  buy | Beer -> 660.00  Water -> 250.00  IceTea -> 110.00 |
| CesarSalad 10.20 25  SuperEnergy 0.80 400  Beer 1.35 350  IceCream 1.50 25  buy | CesarSalad -> 255.00  SuperEnergy -> 320.00  Beer -> 472.50  IceCream -> 37.50 |

## SoftUni Parking

SoftUni just got a new **parking lot**. It's so fancy, it even has online **parking validation**. Except the online service doesn't work. It can only receive users' data, but it doesn't know what to do with it. Good thing you're on the dev team and know how to fix it, right?

Write a program, which validates a parking place for an online service. Users can **register** to park and **unregister** to leave.

The program **receives 2 commands**:

* "register {username} {licensePlateNumber}":
  + The system only supports **one car per user** at the moment, so if a user tries to register **another license plate**, using the **same username**, the system should print:  
    "ERROR: already registered with plate number {licensePlateNumber}"
  + If the aforementioned checks passes successfully, the plate can be registered, so the system should print:  
     **"{****username} registered {licensePlateNumber} successfully"**
* "unregister {username}":
  + If the user is **not present** in the database, the system should print:  
    "ERROR: user {username} not found"
  + If the aforementioned check passes successfully, the system should print:  
    "{username} unregistered successfully"

After you execute all of the commands, **print** all of the currently **registered users** and their **license plates** in the format:

* "**{username} => {licensePlateNumber}**"

### Input

* First line: **n** - **number of commands** – **integer**.
* Next **n** lines: **commands** in one of the **two** possible formats:
  + Register: "register {username} {licensePlateNumber}"
  + Unregister: "unregister {username}"

The input will **always** be **valid** and you **do not need** to check it explicitly.

using System;

using System.Collections.Generic;

using System.Linq;

namespace \_04.\_SoftUni\_Parking

{

class Program

{

static void Main(string[] args)

{

int n = int.Parse(Console.ReadLine());

Dictionary<string, string> users = new Dictionary<string, string>();

for (int i = 0; i < n; i++)

{

string[] input = Console.ReadLine().Split(" ");

string command = input[0];

string user = input[1];

if(command=="register")

{

string plate = input[2];

if (!users.ContainsKey(user))

{

users[user] = plate;

Console.WriteLine($"{user} registered {plate} successfully");

}

else

{

Console.WriteLine($"ERROR: already registered with plate number {users[user]}");

}

}

else

{

if (!users.ContainsKey(user))

{

Console.WriteLine($"ERROR: user {user} not found");

}

else

{

users.Remove(user);

Console.WriteLine($"{user} unregistered successfully");

}

}

}

foreach (var user in users)

{

Console.WriteLine($"{user.Key} => {user.Value}");

}

}

}

}

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 5  register John CS1234JS  register George JAVA123S  register Andy AB4142CD  register Jesica VR1223EE  unregister Andy | John registered CS1234JS successfully  George registered JAVA123S successfully  Andy registered AB4142CD successfully  Jesica registered VR1223EE successfully  Andy unregistered successfully  John => CS1234JS  George => JAVA123S  Jesica => VR1223EE |
| 4  register Jony AA4132BB  register Jony AA4132BB  register Linda AA9999BB  unregister Jony | Jony registered AA4132BB successfully  ERROR: already registered with plate number AA4132BB  Linda registered AA9999BB successfully  Jony unregistered successfully  Linda => AA9999BB |
| 6  register Jacob MM1111XX  register Anthony AB1111XX  unregister Jacob  register Joshua DD1111XX  unregister Lily  register Samantha AA9999BB | Jacob registered MM1111XX successfully  Anthony registered AB1111XX successfully  Jacob unregistered successfully  Joshua registered DD1111XX successfully  ERROR: user Lily not found  Samantha registered AA9999BB successfully  Joshua => DD1111XX  Anthony => AB1111XX  Samantha => AA9999BB |

## Courses

Create a program that keeps the information about courses. Each course has a name and registered students.

You will be receiving a **course name** and a **student name,** until you receive the command "**end**". **Check if such a course already exists, and if not, add the course.** Register the user into the course. When you receive the command "**end**", print the courses with their **names** and **total** registered users. For each contest print the registered users**.**

using System;

using System.Collections.Generic;

using System.Linq;

namespace \_05.\_Courses

{

class Program

{

static void Main(string[] args)

{

Dictionary<string, List<string>> courses = new Dictionary<string, List<string>>();

string input = Console.ReadLine();

while(input!="end")

{

string[] cmdArg = input.Split(" : ");

string course = cmdArg[0];

string user = cmdArg[1];

if (!courses.ContainsKey(course))

{

courses[course] = new List<string>();

}

courses[course].Add(user);

input = Console.ReadLine();

}

foreach (var course in courses)

{

Console.WriteLine($"{course.Key}: {course.Value.Count}");

foreach (var user in course.Value)

{

Console.WriteLine($"-- {user}");

}

}

}

}

}

**Input**

* Until the "**end**" command is received, you will be receiving input in the format: "**{courseName} : {studentName}**".
* The product data is **always** delimited by **" : ".**

**Output**

* Print the information about **each** **course** in the following the format:   
  **"{courseName}: {registeredStudents}"**
* Print the information about each student in the following the format:  
  **"-- {studentName}"**

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| Programming Fundamentals : John Smith  Programming Fundamentals : Linda Johnson  JS Core : Will Wilson  Java Advanced : Harrison White  end | Programming Fundamentals: 2  -- John Smith  -- Linda Johnson  JS Core: 1  -- Will Wilson  Java Advanced: 1  -- Harrison White |
| Algorithms : Jay Moore  Programming Basics : Martin Taylor  Python Fundamentals : John Anderson  Python Fundamentals : Andrew Robinson  Algorithms : Bob Jackson  Python Fundamentals : Clark Lewis  end | Algorithms: 2  -- Jay Moore  -- Bob Jackson  Programming Basics: 1  -- Martin Taylor  Python Fundamentals: 3  -- John Anderson  -- Andrew Robinson  -- Clark Lewis |

## 6. Student Academy

Create a program that keeps the information about **students** and **their grades**.

You will receive **n pair of rows**. First, you will receive the **student's name**, **after that, you will receive their grade**. **Check if the student already exists and if not, add him.** Keep track of all grades for each student.

When you finish reading the data, keep the students with **an average grade higher than or equal to 4.50**.

**Print the students and their average grade in the following format:**

"**{name} –> {averageGrade}**"

**Format** the average grade to the **2nd decimal place**.

using System;

using System.Collections.Generic;

using System.Linq;

namespace \_06.\_Student\_Academy

{

class Program

{

static void Main(string[] args)

{

Dictionary<string, double> students = new Dictionary<string, double>();

int n = int.Parse(Console.ReadLine());

for (int i = 0; i < n; i++)

{

string name = Console.ReadLine();

double grade = double.Parse(Console.ReadLine());

if(!students.ContainsKey(name))

{

students.Add(name, grade);

}

else

{

students[name] = (students[name] + grade) / 2;

}

}

foreach (var student in students.Where(x=>x.Value>=4.50))

{

Console.WriteLine($"{student.Key} -> {student.Value:f2}");

}

}

}

}

### Examples

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Input** | **Output** |  | **Input** | **Output** |
| 5  John  5,5  John  4,5  Alice  6  Alice  3  George  5 | John -> 5.00  Alice -> 4.50  George -> 5.00 |  | 5  Amanda  3.5  Amanda  4  Rob  5.5  Christian  5  Robert  6 | Rob -> 5.50  Christian -> 5.00  Robert -> 6.00 |

## 7.Company Users

Create a program that keeps information about companies and their employees.

You will be receiving a **company** **name** and an **employee's id,** until you receive the "**End**" command. Add each employee to the given company. Keep in mind that a company cannot have two employees with the same id.

When you finish reading the data, print the company's name and each employee's id in the following format:

**{companyName}**

**-- {id1}**

**-- {id2}**

**-- {idN}**

**Input / Constraints**

* Until you receive the "**End**" command, you will be receiving input in the format: "**{companyName} -> {employeeId}**".
* The input always will be valid.

using System;

using System.Collections.Generic;

using System.Linq;

namespace \_07.\_Company\_Users

{

class Program

{

static void Main(string[] args)

{

Dictionary<string, List<string>> companies = new Dictionary<string, List<string>>();

string input = Console.ReadLine();

while(input!="End")

{

string[] cmdArg = input.Split(" -> ");

string company = cmdArg[0];

string id = cmdArg[1];

if (!companies.ContainsKey(company))

{

companies[company] = new List<string>();

}

if (!companies[company].Contains(id))

{

companies[company].Add(id);

}

input = Console.ReadLine();

}

foreach (var company in companies)

{

Console.WriteLine($"{company.Key}");

foreach (var worker in company.Value)

{

Console.WriteLine($"-- {worker}");

}

}

}

}

}

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| SoftUni -> AA12345  SoftUni -> BB12345  Microsoft -> CC12345  HP -> BB12345  End | SoftUni  -- AA12345  -- BB12345  Microsoft  -- CC12345  HP  -- BB12345 |
| SoftUni -> AA12345  SoftUni -> CC12344  Lenovo -> XX23456  SoftUni -> AA12345  Movement -> DD11111  End | SoftUni  -- AA12345  -- CC12344  Lenovo  -- XX23456  Movement  -- DD11111 |