# Exercise: Dictionaries

Problems for exercise and homework for the [Python Fundamentals Course @SoftUni](https://softuni.bg/trainings/3450/programming-fundamentals-with-python-september-2021).

Submit your solutions in the SoftUni judge system at <https://judge.softuni.org/Contests/1737>.

## Count Chars in a String

Write a program that **counts all characters** in a string **except for space (" ")**.

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

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

### 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 represents 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 … 2 000 000 000]**

### 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 |

## Capitals

Using a **dictionary comprehension**, write a program that receives **country names** on the **first line,** separated by **comma and space** **", "**, and their corresponding **capital cities** on the second line (again separated by **comma and space** **", "**). **Print** **each country** with their **capital** on a **separate line** in the following format: **"{country} -> {capital}"**.

### Hints

* You could use the **zip()** method.

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| Bulgaria, Romania, Germany, England  Sofia, Bucharest, Berlin, London | Bulgaria -> Sofia  Romania -> Bucharest  Germany -> Berlin  England -> London |

## Phonebook

Write a program that receives info from the console about **people** and their **phone numbers**.

Each **entry** should have **a name** and **a number** (both strings) separated by a **"-"**. If you receive a name that **already exists** in the phonebook, **update its number**.

After filling the phonebook, you will receive a number – **N**. Your program should be able to perform a **search of contact by name** and print its details in the format: "**{name} -> {number}**". In case the contact isn't found, print: **"Contact {name} does not exist."**

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| Adam-0888080808  **2**  Mery  Adam | Contact Mery does not exist.  Adam -> 0888080808 |
| Adam-+359888001122  Ralf-666  George-5559393  Silvester-02/987665544  **4**  Silvester  silvester  Rolf  Ralf | Silvester -> 02/987665544  Contact silvester does not exist.  Contact Rolf does not exist.  Ralf -> 666 |

## Legendary Farming

You are playing a game, and your goal is to **win a** **legendary item** -any legendary item will be good enough. However, it's a tedious process, and it requires quite a bit of farming. The possible **items** are:

* **"Shadowmourne"** - requires **250 Shards**
* **"Valanyr"** - requires **250 Fragments**
* **"Dragonwrath"** - requires **250 Motes**

**"Shards"**, **"Fragments"**,and **"Motes"** are the **key materials** (**case-insensitive**), and everything else is **junk.**

You will be given lines of input in the format:

**"{quantity1} {material1} {quantity2} {material2} … {quantityN} {materialN}"**

Keep track of the **key materials -** the **first** one that reaches **250,** **wins** the **race**. At that point, you have to print that the corresponding legendary item is obtained. Then, print the **remaining** shards, fragments, motes, ordered by **quantity** in **descending** order, each on a new line. If **two** **or more key materials** have the **same quantity**, print them in **ascending** order (**alphabetically**).Finally, print the collected **junk** items in **ascending** order (**alphabetically**).

### Input

* Each line comes in the following format: **"{quantity1} {material1} {quantity2} {material2} … {quantityN} {materialN}"**

### Output

* On **the** **first line**, print the obtained item in the format: "**{Legendary item} obtained!"**
* On **the next three lines**, print the remaining key materials in **descending order by quantity**
  + If **two** key materials have the same quantity, print them in **ascending** order (**alphabetically**)
* On the **several final lines**, print the **junk** items **in ascending** order (**alphabetically**)
  + All materials should be printed in the format: **"{material}: {quantity}"**
  + The output should be **lowercase**, except for the first letter of the legendary

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 3 Motes 5 stones 5 Shards  6 leathers 255 fragments 7 Shards | Valanyr obtained!  fragments: 5  shards: 5  motes: 3  leathers: 6  stones: 5 |
| 123 silver 6 shards 8 shards 5 motes  9 fangs 75 motes 103 MOTES 8 Shards  86 Motes 7 stones 19 silver | Dragonwrath obtained!  shards: 22  motes: 19  fragments: 0  fangs: 9  silver: 123 |

## Orders

Write 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,** **increases** 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. Finally, print all items with their **names** and the **total price** of each product.

**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:   
  **"{product\_name} -> {total\_price}"**
* **Format** the total price to the **2nd digit after the decimal separator**.

### 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 fancy **parking lot**. 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 - users can **register** to enter the park and **unregister** to leave.

The program **receives 2 types of commands**:

* **"**register {username} {license\_plate\_number}**"**:
  + 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 {license\_plate\_number}**"**
  + If the check above **passes successfully**, the user should be registered, so the system should print:  
     **"{****username} registered {license\_plate\_number} successfully"**
* **"**unregister {username}**"**:
  + If the user is **not present** in the database, the system should print:  
    "ERROR: user {username} not found"
  + If the check above **passes successfully**, the system should print:  
    "{username} unregistered successfully"

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

* **"{username} => {license\_plate\_number}"**

### Input

* First line: **n** - **number of commands** - **integer**
* Next **n** lines: **commands** in one of the **two** possible formats:
  + Register: "register {username} {license\_plate\_number}"
  + Unregister: "unregister {username}"

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

### 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  Anthony => AB1111XX  Joshua => DD1111XX  Samantha => AA9999BB |

## Courses

Write 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**".

You should register each user into the corresponding course. If the given course does not exist, add it.

When you receive the command "**end**", print the courses with their **names** and **total registered users**, ordered by the **number** of registered users in **descending** order. For each course print, the registered users **ordered by name** **in ascending order** (**alphabetically**).

**Input**

* Until the "**end"** command is received, you will be receiving input lines in the format:

**"{course\_name} : {student\_name}"**

* The product data is **always** delimited by **" : "**

**Output**

* Print the information about **each** **course** in the following format:   
  **"{course\_name}: {registered\_students}"**
* Print the information about **each student** in the following format:  
  **"-- {student\_name}"**

### 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 | Python Fundamentals: 3  -- Andrew Robinson  -- Clark Lewis  -- John Anderson  Algorithms: 2  -- Bob Jackson  -- Jay Moore  Programming Basics: 1  -- Martin Taylor |

## Student Academy

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

On the first line, you will receive an integer number representing **the next pair of rows**. On the next lines, you will receive a **student's name and their grade.** Keep track of all grades for each student. I**f the student does not exist, add them**.

When you finish reading the data, keep the students with an **average grade higher than or equal to 4.50**. Order the filtered students by **average grade in descending order**.

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

**"{name} -> {averageGrade}"**

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

### Examples

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Input** | **Output** |  | **Input** | **Output** |
| 5  John  5.5  John  4.5  Alice  6  Alice  3  George  5 | John -> 5.00  George -> 5.00  Alice -> 4.50 |  | 5  Amanda  3.5  Amanda  4  Rob  5.5  Christian  5  Robert  6 | Robert -> 6.00  Rob -> 5.50  Christian -> 5.00 |

## Company Users

Write a program that keeps the information about companies and their employees.

You will be receiving **company** **names** and an **employees' id** until you receive the command "**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, **order the companies by their name in ascending order**.

Print the **company name** and **each employee's id** in the following format:

**"{company\_name}**

**-- {id1}**

**-- {id2}**

**…**

**-- {idN}"**

**Input / Constraints**

* Until you receive the "**End**" command, you will be receiving input in the format:

"**{company\_name} -> {employee\_id}**".

* The input always will be valid.

### Examples

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

## \*Force Book

The force users struggle to remember which side is the different force users from because they switch them too often. So you are tasked to create a web application to manage their profiles. You should store information for every **unique force user** registered in the application.

You will receive **several input lines** in one of the following formats:

"{force\_side} | {force\_user}"

"{force\_user} -> {force\_side}"

The "force\_user" and **"force\_side"** are strings, containing any character.

If you receive "force\_side | force\_user":

* If there is **no such force user** and **no such** **force side -> create a new force side** and **add** the **force user** to the corresponding side.
* Only **if there is no such force user** in any **force side** -> **add** the **force user** to the corresponding side.
* If there is such **force user** already -> **skip** the command and continue to the next operation.

If you receive a **"**force\_user -> force\_side":

* If there is such **force user** already -> **change their side**.
* If there is no such **force user** in any **force side** -> add the **force user** to the corresponding **force side**.
* If there is no such **force user** and no such **force side -> create new force side** and **add** the **force user** to the corresponding side.
* Then you should print on the console: "{force\_user} joins the {force\_side} side!".

You should **end your program** when you receive the command "Lumpawaroo". At that point, you should print each force side, **ordered descending by force users count, then ordered by name**. For each side, print the **force users**, **ordered by name alphabetically**.

In case there are **no force users in a side**, you **shouldn't print** the side information.

### Input / Constraints

* The input comes in the form of commands in one of the formats specified above
* The input ends when you receive the command "Lumpawaroo"

### Output

* As output for each force side, **ordered descending by force users count**, **then by name**, you must print all the force users, **ordered by name alphabetically**.
* The output format is:

"Side: {force\_side}, Members: {force\_users\_count}

! {force\_user1}

! {force\_user2}

…

! {force\_userN}"

* In case there are **NO** force users in a side, don't print this side.

### Examples

|  |  |  |
| --- | --- | --- |
| **Input** | **Output** | **Comments** |
| Light | Peter  Dark | Kim  Lumpawaroo | Side: Dark, Members: 1  ! Kim  Side: Light, Members: 1  ! Peter | We register Peter on the Light side and Kim on the Dark side. After receiving "Lumpawaroo", we print both sides, ordered by members count and then by name. |
| Lighter | Royal  Darker | DCay  Ivan Ivanov -> Lighter  DCay -> Lighter  Lumpawaroo | Ivan Ivanov joins the Lighter side!  DCay joins the Lighter side!  Side: Lighter, Members: 3  ! DCay  ! Ivan Ivanov  ! Royal | Although Ivan Ivanov doesn't have a profile, we **register** him and add him to the Lighter side.  We **remove DCay** from the Darker side and add him to the Lighter side.  We print only the Lighter side because the Darker side **has no members.** |

## \*SoftUni Exam Results

Judge statistics on the last Programing Fundamentals exam were not working correctly, so you have the task of taking all the submissions and analyzing them properly. You should collect all the submissions and print the final results and statistics about each language in which the participants submitted their solutions.

You will be receiving lines in the following format: "{username}-{language}-{points}" **until you receive** "exam finished".You should store each username and their submissions and points.   
You can receive a **command to ban** a user for cheating in the following format: "{username}-banned". In that case, you should **remove** the user from the contest but **preserve his submissions in the total count of submissions for each language**.

After receiving "exam finished", print each of the participants, ordered **descending** by their **max points**, then by **username ascending** order (**alphabetically**), in the following format:

"Results:

{username1} | {points}

{username2} | {points}

…

{usernameN} | {points}"

After that, **print each language** used in the exam, ordered **descending** by **total submission count** and then by language **name** in **ascending** order (**alphabetically**), in the following format:

"Submissions:

{language1} - {submissions\_count}

{language2} - {submissions\_count}

…

{language3} - {submissions\_count}"

### Input / Constraints

Until you receive **"exam finished"** you will be receiving participant submissions in the following format: "{username}-{language}-{points}"

You can receive a ban command -> "{username}-banned"

The points of the participant will always be a **valid integer in the range [0-100];**

### Output

* Print the exam results for each participant, ordered descending by max points and then by username, in the format shown above:
* After that, print each language, ordered descending by total submissions and then by language name in ascending order (alphabetically), in the format shown above:
* Allowed working **time** / **memory**: **100ms** / **16MB**.

### Examples

|  |  |  |
| --- | --- | --- |
| **Input** | **Output** | **Comment** |
| Peter-Java-84  George-C#-84  George-C#-70  Katy-C#-94  exam finished | Results:  Katy | 94  George | 84  Peter | 84  Submissions:  C# - 3  Java - 1 | We order the participant descending by max points and then by name, printing only the username and the max points.  After that, we print each language and the count of submissions, ordered descending by submissions count and then by language name. |
| Peter-Java-91  George-C#-84  Katy-Java-90  Katy-C#-50  Katy-banned  exam finished | Results:  Peter | 91  George | 84  Submissions:  C# - 2  Java - 2 | Katy is banned, so she is removed from the contest, but her submissions are still preserved in the languages submissions count.  So although there are only 2 participants in the results, there are 4 submissions in total. |