# Exercise: Dictionaries

Problems for exercise and homework for the [Python Fundamentals Course @SoftUni](https://softuni.bg/trainings/3368/python-fundamentals-may-2021).

Submit your solutions in the SoftUni judge system at <https://judge.softuni.bg/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}**

text = input().split()  
  
text\_as\_str = "".join(text)  
diction = {}  
  
for x in text\_as\_str:  
 if x not in diction:  
 diction[x] = 0  
 diction[x] += 1  
  
for key, value in diction.items():  
 print(f"{key} -> {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 … 2 000 000 000]**

command = input()  
  
resources\_list = []  
resources\_dict = {}  
key = ''  
value = 0  
  
while command != "stop":  
 resources\_list.append(command)  
  
 command = input()  
  
for i in range(0, len(resources\_list), 2):  
 key = resources\_list[i]  
 value = int(resources\_list[i+1])  
  
 if key not in resources\_dict:  
 resources\_dict[key] = value  
 else:  
 resources\_dict[key] += value  
  
# print(resources\_list)  
# print(resources\_dict)  
  
for key, value in resources\_dict.items():  
 print(f"{key} -> {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 |

## Capitals

Using a **dictionary comprehension**, write a program which 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}"**

countries = input().split(", ")  
capitals = input().split(", ")  
  
for i in range(len(countries)):  
 country = countries[i]  
 capital = capitals[i]  
 print(f"{country} -> {capital}")  
  
# print(countries)  
# print(capitals)

### Hints

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

countries\_list = input().split(", ")  
capitals\_list = input().split(", ")  
  
zipped\_dict = dict(zip(countries\_list, capitals\_list))  
  
for x, y in zipped\_dict.items():  
 print(f"{x} -> {y}")

### Examples

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

## Legendary Farming

You've done all the work and the last thing left to accomplish is to own a **legendary item**. However, it's a tedious process and it requires quite a bit of farming. Anyway, you are not too pretentious - any legendary item will do. The possible **items** are:

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

**Shards, Fragments** and **Motes** are the **key materials** and everything else is **junk.** You will be given lines of input, in the format:

**2 motes 3 ores 15 stones**

Keep track of the **key materials -** the **first** one that reaches the **250 mark,** **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, then by **name** in **ascending** order, each on a new line. Finally, print the collected **junk** items in **alphabetical** order.

### Input

* Each line comes in the following format: **{quantity} {material} {quantity} {material} … {quantity} {material}**

### 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 **alphabetical** **order**
* On the final several lines, print the **junk** items **in alphabetical order**
  + All materials are printed in format **{material}: {quantity}**
  + The output should be **lowercase**, except for the first letter of the legendary

all\_materials = input().split()  
  
key\_materials = {'motes': 0, 'shards': 0, 'fragments': 0}  
junk\_materials = {}  
  
is\_obtained = False  
  
while not is\_obtained:  
 for i in range(0, len(all\_materials), 2):  
 qty = int(all\_materials[i])  
 item = all\_materials[i+1].lower()  
  
 if item in key\_materials:  
 key\_materials[item] += qty  
  
 if item == "motes":  
 if key\_materials[item] >= 250:  
 key\_materials[item] -= 250  
 print('Dragonwrath obtained!')  
 is\_obtained = True  
 break  
  
 elif item == "fragments":  
 if key\_materials[item] >= 250:  
 key\_materials[item] -= 250  
 print('Valanyr obtained!')  
 is\_obtained = True  
 break  
  
 elif item == "shards":  
 if key\_materials[item] >= 250:  
 key\_materials[item] -= 250  
 print('Shadowmourne obtained!')  
 is\_obtained = True  
 break  
  
 else:  
 if item in junk\_materials:  
 junk\_materials[item] += qty  
 else:  
 junk\_materials[item] = qty  
  
 if is\_obtained:  
 break  
  
 all\_materials = input().split()  
  
  
key\_materials\_sorted = sorted(key\_materials.items(), key=lambda x: (-x[1], x[0]))  
junk\_materials\_sorted = sorted(junk\_materials.items(), key=lambda x: x[0])  
  
for material, quantity in key\_materials\_sorted:  
 print(f"{material}: {quantity}")  
for material, quantity in junk\_materials\_sorted:  
 print(f"{material}: {quantity}")

### 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 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 **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**.

command = input()  
  
price\_and\_product = {}  
qty\_and\_product = {}  
  
while command != "buy":  
 data = command.split()  
 product = data[0]  
 price = float(data[1])  
 qty = int(data[2])  
  
 if product not in qty\_and\_product:  
 qty\_and\_product[product] = 0  
 qty\_and\_product[product] += qty  
  
 if product not in price\_and\_product:  
 price\_and\_product[product] = 0  
 price\_and\_product[product] = price  
  
 command = input()  
  
for x in qty\_and\_product:  
 print(f"{x} -> {(qty\_and\_product[x] \* price\_and\_product[x]):.2f}")

### 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 types of 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 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.

n = int(input())  
  
register\_dict = {}  
  
for i in range(n):  
 data = input().split()  
 action = data[0]  
  
 if action == "register":  
 user = data[1]  
 license = data[2]  
  
 if user not in register\_dict:  
 register\_dict[user] = license  
 print(f"{user} registered {license} successfully")  
 else:  
 print(f"ERROR: already registered with plate number {license}")  
  
 elif action == "unregister":  
 user = data[1]  
  
 if user not in register\_dict:  
 print(f"ERROR: user {user} not found")  
 else:  
 print(f"{user} unregistered successfully")  
 register\_dict.pop(user)  
  
for key, value in register\_dict.items():  
 print(f"{key} => {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  Anthony => AB1111XX  Joshua => DD1111XX  Samantha => AA9999BB |

## Courses

Write a program that keeps 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 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**, ordered by the count of registered users in descending order. For each contest print the registered users **ordered by name** **in ascending order**.

**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}"**

# (RS solution Jul 2021)  
  
command = input()  
  
courses\_dict = {}  
  
while command != "end":  
 data = command.split(" : ")  
 course = data[0]  
 username = data[1]  
  
 if course not in courses\_dict:  
 courses\_dict[course] = [username]  
 else:  
 courses\_dict[course].append(username)  
  
 command = input()  
  
sorted\_dict = dict(sorted(courses\_dict.items(), key=lambda x: len(x[1]), reverse=True))  
  
for key, value in sorted\_dict.items():  
 print(f"{key}: {len(value)}")  
 for v in sorted(value):  
 print(f"-- {''.join(v)}")

### 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 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 his 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 **average grade higher than or equal to 4.50**. Order the filtered students by **average grade in descending order**.

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

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

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

#RS solution Jul 2021

n = int(input())  
  
student\_dict = {}  
average\_grades\_dict = {}  
average\_grade = 0  
  
for i in range(0, n\*2, 2):  
 student\_name = input()  
 student\_grade = float(input())  
  
 if student\_name not in student\_dict:  
 student\_dict[student\_name] = [student\_grade]  
 else:  
 student\_dict[student\_name].append(student\_grade)  
  
  
for key, value in student\_dict.items():  
 average\_grade = sum(value) / len(value)  
 average\_grades\_dict[key] = average\_grade  
 if average\_grade < 4.50:  
 average\_grades\_dict.pop(key)  
  
  
sorted\_average\_grades\_dict = dict(sorted(average\_grades\_dict.items(), key=lambda x: -x[1]))  
  
for key, value in sorted\_average\_grades\_dict.items():  
 print(f"{key} -> {value:.2f}")

### 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 information about companies and their employees.

You will be receiving a **company** **name** and an **employee's 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 the name in ascending order**.

Print the company 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.

# RS solutionJul 2021  
commmand = input()  
  
company\_dict = {}  
  
while commmand != "End":  
 data = commmand.split(" -> ")  
 company = data[0]  
 employee = data[1]  
  
 if company not in company\_dict:  
 company\_dict[company] = []  
  
 if employee not in company\_dict[company]:  
 company\_dict[company].append(employee)  
  
 commmand = input()  
  
sorted\_dict = dict(sorted(company\_dict.items(), key=lambda x: x[0]))  
  
for key, value in sorted\_dict.items():  
 print(f"{key}")  
 for v in value:  
 print(f"-- {''.join(v)}")

### 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 |

## \*ForceBook

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

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

{forceSide} | {forceUser}

{forceUser} -> {forceSide}

The forceUser and forceSide are strings, containing any character.

If you receive forceSide | forceUser:

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

If you receive a forceUser -> forceSide:

* If there is such **forceUser** already -> **change his/her side**.
* If there is no such **forceUser** in any **forceSide** -> add the **forceUser** to the corresponding **forceSide**.
* If there is no such **forceUser** and no such **forceSide -> create new forceSide** and **add** the **forceUser** to the corresponding side.
* Then you should print on the console: "{forceUser} joins the {forceSide} side!" .

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

In case there are **no forceUsers 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 forceSide, **ordered descending by forceUsers count**, **then by name**, you must print all the forceUsers, **ordered by name alphabetically**.
* The output format is:

Side: {forceSide}, Members: {forceUsers.Count}

! {forceUser}

! {forceUser}

! {forceUser}

* In case there are **NO** forceUsers, don`t print this side.

command = input()  
sides = {}  
  
while command != "Lumpawaroo":  
 if " | " in command:  
 data = command.split(" | ")  
 side = data[0]  
 user = data[1]  
  
 if side not in sides:  
 sides[side] = []  
  
 all\_values = []  
  
 for x in sides.values():  
 all\_values += x  
  
 if user not in all\_values:  
 sides[side].append(user)  
  
 else:  
 data = command.split(" -> ")  
 user = data[0]  
 side = data[1]  
 old\_side = ""  
  
 for key, value in sides.items():  
 if user in value:  
 old\_side = key  
 break  
  
 if old\_side != "":  
 sides[old\_side].remove(user)  
  
 if side not in sides:  
 sides[side] = []  
  
 sides[side].append(user)  
 else:  
 if side not in sides:  
 sides[side] = []  
  
 sides[side].append(user)  
  
 print(f"{user} joins the {side} side!")  
  
 command = input()  
  
sides = dict(sorted(sides.items(), key=lambda x: (-len(x[1]), x[0])))  
  
for side, users in sides.items():  
 if len(users) == 0:  
 continue  
  
 print(f"Side: {side}, Members: {len(users)}")  
  
 for user in sorted(users):  
 print(f"! {user}")

### Examples

|  |  |  |
| --- | --- | --- |
| **Input** | **Output** | **Comments** |
| Light | Gosho  Dark | Pesho  Lumpawaroo | Side: Dark, Members: 1  ! Pesho  Side: Light, Members: 1  ! Gosho | We register Gosho in the Light side and Pesho in the Dark side. After receiving "Lumpawaroo" we print both sides, ordered by membersCount 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 profile, we **register** him and add him to the Lighter side.  We **remove DCay** from Darker side and add him to Lighter side.  We print only Lighter side because Darker side **has no members.** |

## \*SoftUni Exam Results

Judge statistics on the last Programing Fundamentals exam was not working correctly, so you have the task to take all the submissions and analyze them properly. You should collect all the submissions and print the final results and statistics about each language that the participants submitted their solutions in.

You will be receiving lines in the following format: "{username}-{language}-{points}" **until you receive** "exam finished".You should store each username and his 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, in the following format:

Results:

{username} | {points}

…

After that print each language, used in the exam, ordered descending by total submission count and then by language name, in the following format:

Submissions:

{language} - {submissionsCount}

…

### 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 following format:

Results:

{username} | {points}

…

* After that print each language, ordered descending by total submissions and then by language name, in the following format:

Submissions:

{language} - {submissionsCount}

…

* Allowed working **time** / **memory**: **100ms** / **16MB**.

### Examples

|  |  |  |
| --- | --- | --- |
| **Input** | **Output** | **Comment** |
| Pesho-Java-84  Gosho-C#-84  Gosho-C#-70  Kiro-C#-94  exam finished | Results:  Kiro | 94  Gosho | 84  Pesho | 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 along with the count of submissions, ordered descending by submissions count, and then by language name. |
| Pesho-Java-91  Gosho-C#-84  Kiro-Java-90  Kiro-C#-50  Kiro-banned  exam finished | Results:  Pesho | 91  Gosho | 84  Submissions:  C# - 2  Java - 2 | Kiro is banned so he is removed from the contest, but he`s submissions are still preserved in the languages submissions count.  So althou there are only 2 participants in the results, there are 4 submissions in total. |

# RadoslavGeorgiev – pastebin - BL00DT3ARS

total\_points = {}  
submissions = {}  
data = input()  
  
while not data == "exam finished":  
 data = data.split("-")  
 if "banned" not in data:  
 username = data[0]  
 language = data[1]  
 points = int(data[2])  
 if username not in total\_points:  
 total\_points[username] = points  
 else:  
 if total\_points[username] < points:  
 total\_points[username] = points  
 if language not in submissions:  
 submissions[language] = 0  
 submissions[language] += 1  
 else:  
 username = data[0]  
 total\_points.pop(username)  
 data = input()  
  
print("Results:")  
[print(f"{k} | {v}") for k, v in sorted(total\_points.items(), key=lambda x: (-x[1], x[0]))]  
print("Submissions:")  
[print(f"{k} - {v}") for k, v in sorted(submissions.items(), key=lambda x: (-x[1], x[0]))]