Basic Syntax, Conditional Statements and Loops

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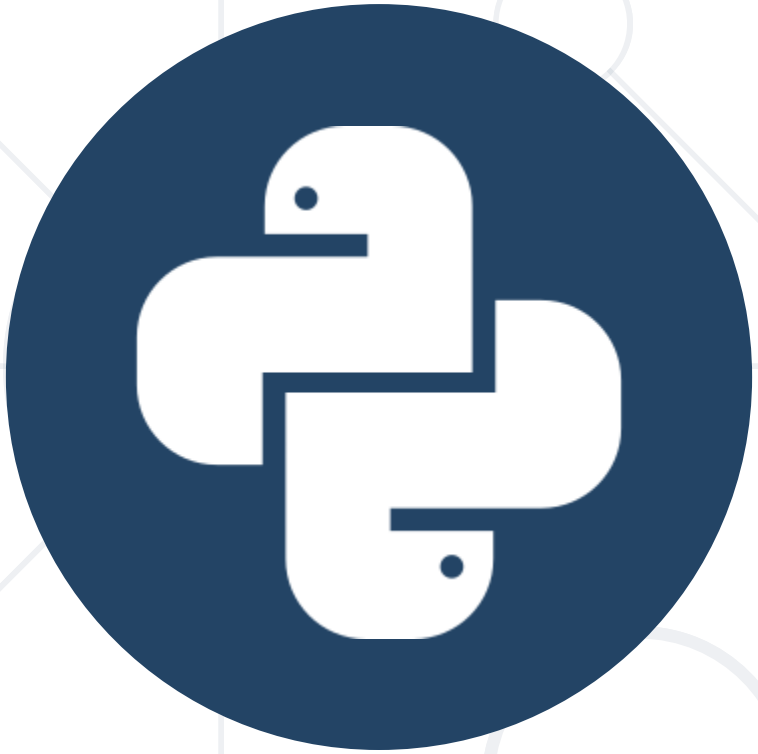
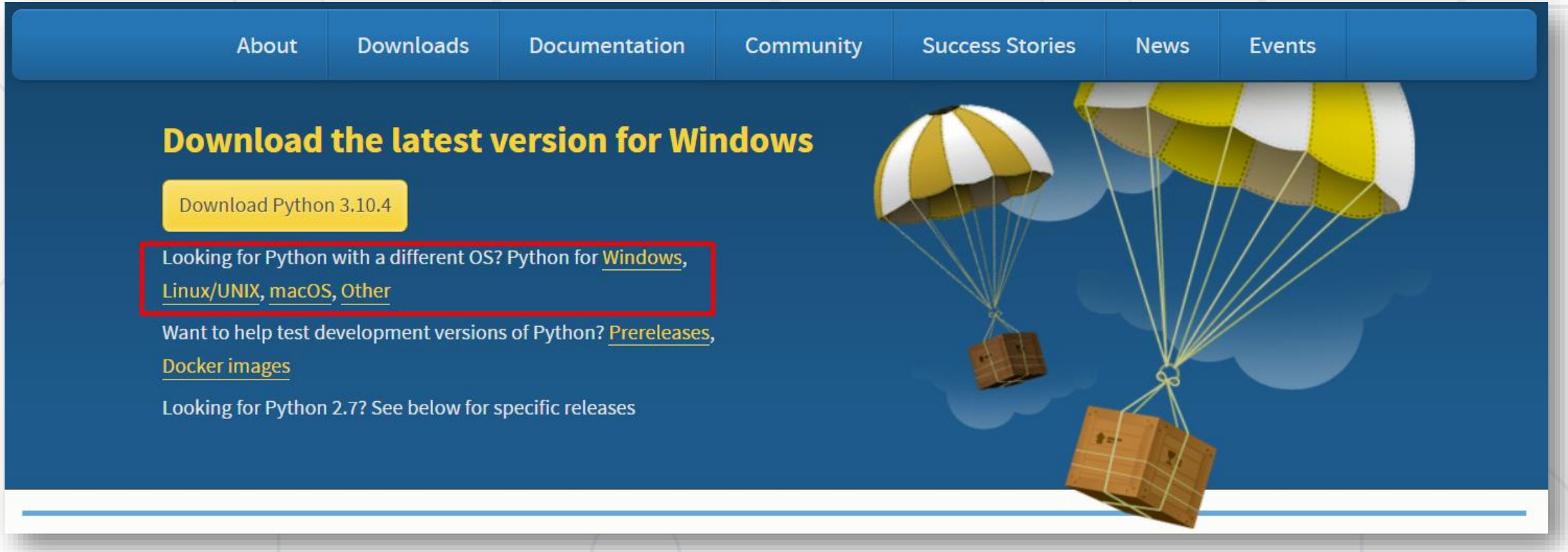


First Steps

Installing Python

- Go to python.org and click the download link depending on your operating system



Run Python in Command Prompt

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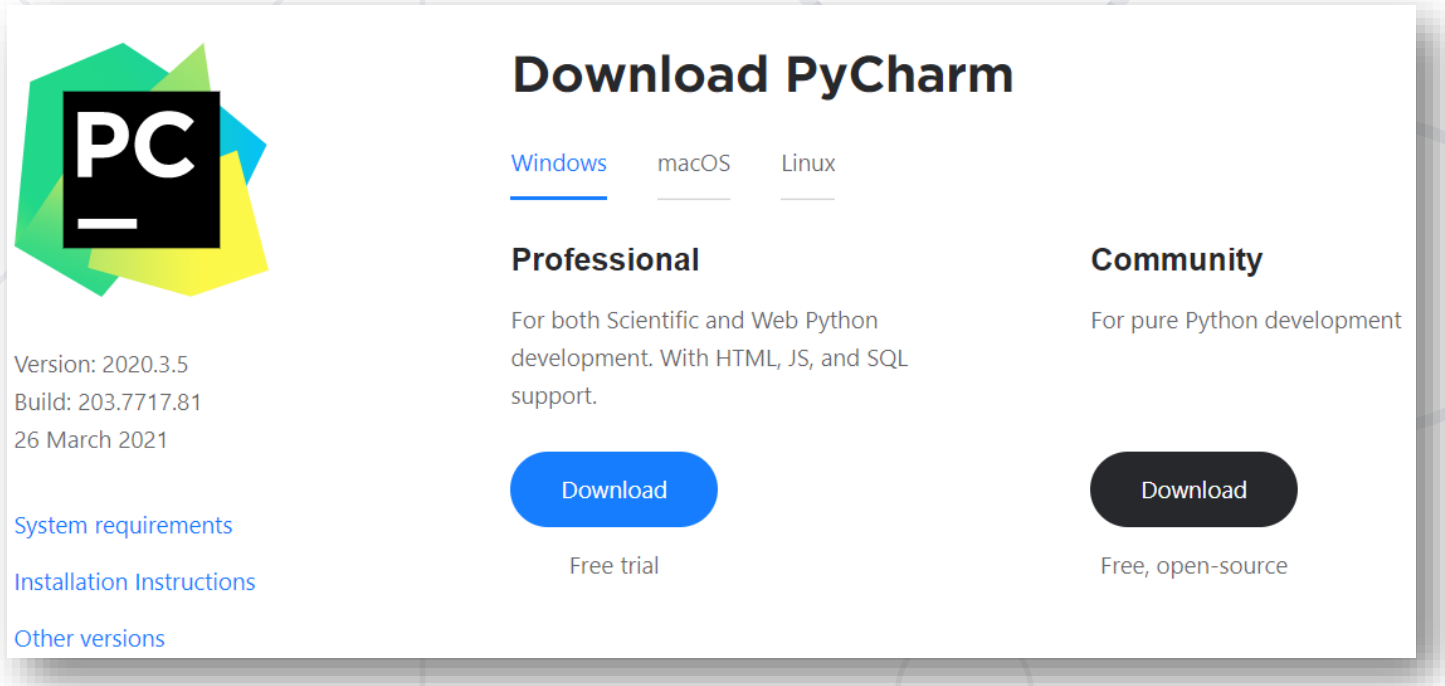
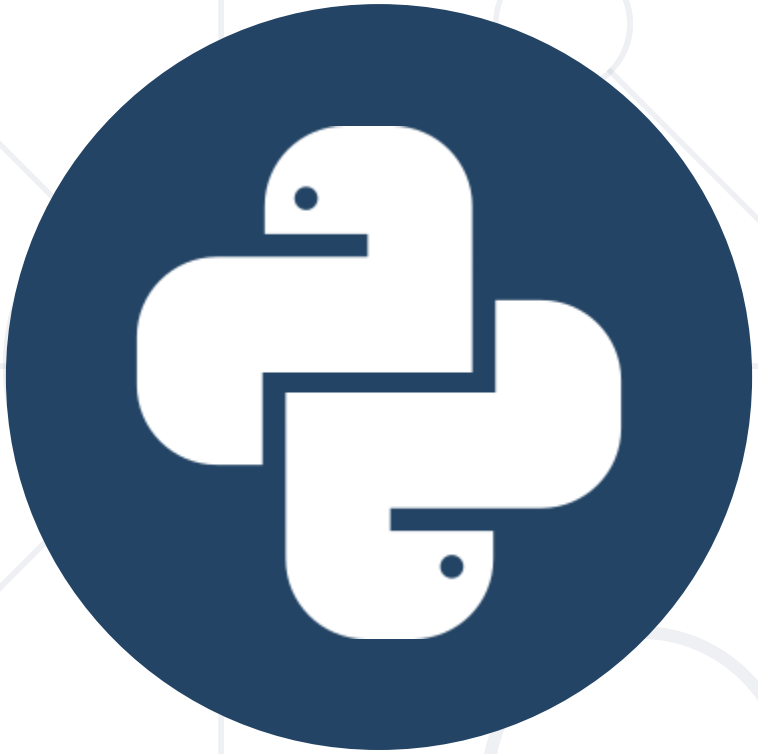
- You can code and execute python directly in the command prompt by typing "**python**" or "**py**"

```
C:\Users\Dell>python
Python 3.7.3 (default, Mar 27 2019, 17:13:21) [MSC v.1915 64 bit (AMD64)] :: Ana
conda, Inc. on win32

Warning:
This Python interpreter is in a conda environment, but the environment has
not been activated.  Libraries may fail to load.  To activate this environment
please see https://conda.io/activation

Type "help", "copyright", "credits" or "license" for more information.
>>> print("Hello World")
Hello World
>>>
```

Write Python in IDE

- You can also code in Python using **IDE** (for example: **PyCharm**)
- You can download **PyCharm** from here: https://www.jetbrains.com/pycharm/download

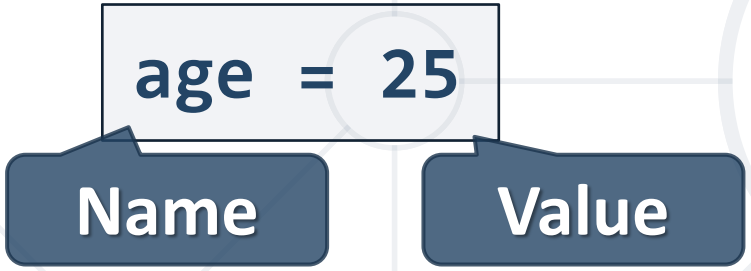




Basic Syntax

Basic Syntax

- Variables - they are the way to **store information** and are characterized by **name**, **type**, and **value**



- Data types – variables are used to hold different data types
  - **int** - integer number: **1, 2, 3, 4, …**
  - **float** - real number: **0.5, 3.14, -0.5, …**
  - **str** - string and chars: **"a", "Hello", …**
  - **bool** - boolean: **True**, **False**

Conditional Statements

Conditional Code Execution

The if-Statement

- An "if statement" is written by using the `if` keyword

```
a = 33
b = 200
if b > a:
    print("b is greater than a")
```

The if-Statement

- Python supports the usual logical conditions from mathematics
  - Equals: a == b
  - Not Equals: a != b
  - Less than: a < b
  - Less than or equal to: a <= b
  - Greater than: a > b
  - Greater than or equal to: a >= b

Indentation

- Python relies on **indentation**, using whitespace, to define scope in the code
- Other programming languages often use curly-brackets for this purpose
- If statement, without indentation will raise an error

```
a = 33
b = 200
if b > a:
print("b is greater than a") # error
```

The else-Statement

- The `else` keyword catches anything which isn't caught by the preceding conditions

```
a = 200
b = 33
if b > a:
    print("b is greater than a")
else:
    print("b is not greater than a")
```

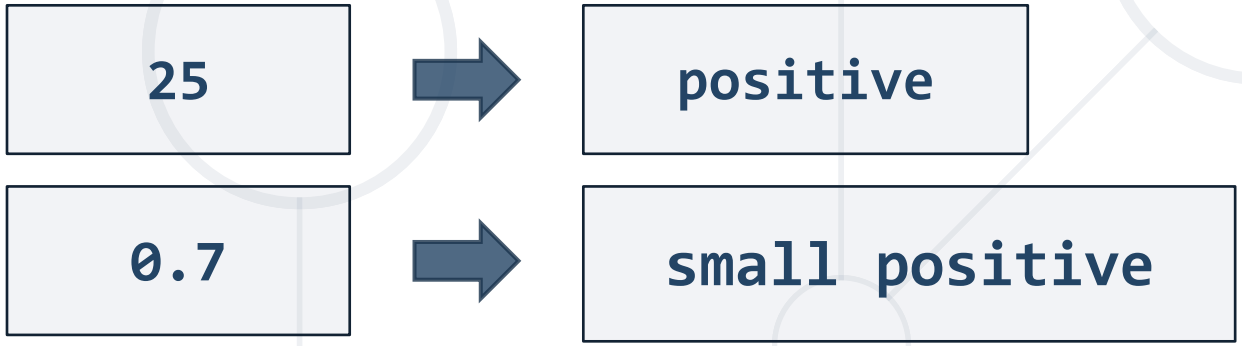
The elif-Statement

- The `elif` keyword is pythonic way of saying "if the previous conditions were not true, then try this condition"

```
a = 33
b = 33
if b > a:
    print("b is greater than a")
elif a == b:
    print("a and b are equal")
```

Problem: Number Definer

- Write a program that
  - Reads a floating-point number
  - Prints `zero` if the number is zero or otherwise prints `positive` or `negative`
  - Adds `small` if the absolute value of the number < 1, or `large` if the number > 1 000 000



Solution: Number Definer

```
number = float(input())
if number == 0:
    print("zero")
elif number > 0:
    if number < 1:
        print("small positive")
    elif number > 1000000:
        print("large positive")
    else:
        print("positive")
# TODO
```

Logical Operators

- They are used to **combine** conditional statements

```
if a > b or a > c:
    print("At least one of the conditions is True")
```

```
if a > b and c > a:
    print("Both conditions are True")
```

```
if not a > c:
    print("The condition is False")
```

Logical Operators Priority

- **or** has a lower priority than **and**
- **and** has a lower priority than **not**

```
if 2 > 1 or 3 < 4 and not 4 > 0:
    print('This will be printed')
```

```
if (2 > 1 or 3 < 4) and not 4 > 0:
    print('This will NOT be printed')
```

Check Number Range

- If you want to check whether a number is in a given range, you can use the following syntax

```
a = int(input())
if 1 <= a <= 10:
    print("a is in the range 1 and 10")
```

1 … 10

Problem: Largest of Three Numbers

- Write a program which
  - Reads three whole numbers from the console
  - Prints the largest number

```
3
-1
5
```

→

```
5
```

```
0
-1
-2
```

→

```
0
```

Solution: Largest of Three Numbers

```
first_num = int(input())
second_num = int(input())
third_num = int(input())
if first_num > second_num and first_num > third_num:
    print(first_num)
elif second_num > first_num and second_num > third_num:
    print(second_num)
else:
    print(third_num)
```

Loops

Repeating Blocks of Code

For-Loops

- A `for` loop is used to iterate over a sequence of iterable types like
  - string
  - list
  - other iterable types
- The for loop does not require an indexing variable to set beforehand

The range() Function

- To loop through a set of code a specified number of times, we can use the `range()` function

```
for x in range(3):
    print(x)
# 0
# 1
# 2
```

Problem: Word Reverse

- Write a program that
  - Receives a single word from a user
  - Reverses it and prints it

```
Python
```

```
nohtyP
```

Solution: Word Reverse

```
word = input()
reversed_word = ""
for i in range(len(word) - 1, -1, -1):
    reversed_word += word[i]
print(reversed_word)
```

The Break Statement

- The **break** statement **stops** the loop before it has looped through all the items

```
for x in range(3):
    if x == 1:
        break
    print(x)
```

```
0
```

The Continue Statement

- The `continue` statement **skips** the current iteration of the loop and continues with the next

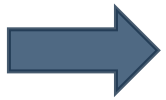
```
for x in range(3):
    if x == 1:
        continue
    print(x)
```

```
0
2
```

The else Clause

- The **else** clause is executed when the loop finishes iterating without hitting the **break** statement

```
for x in range(3):
    if x == 3:
        break
else:
    print("Finish")
```



```
Finish
```

Problem: Even Numbers

- Write a program that
  - Receives a number n and then receives n **different numbers**
  - If it receives an **odd number**, print **`"{num} is odd!"`** and end the program
  - If all numbers are **even**, print **`"All numbers are even"`**

```
2
12
286
```

```
All numbers are even.
```

Solution: Even Numbers

```
n = int(input())

for i in range(n):
    number = int(input())
    if not number % 2 == 0:
        print(f"{number} is odd!")
        break
else:
    print("All numbers are even.")
```

While-Loops

- With a `while` loop we can execute a set of statements as long as the condition is true

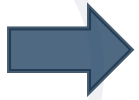
```
i = 1
while i < 6:
    print(i)
    i += 1
```

- **Note:** remember to increment `i`, or else the loop will continue forever

Problem: Number Between 1 and 100

- Write a program that
  - Reads floating-point numbers from the console until it receives a number between 1 and 100 inclusive
  - When the correct number is received, stop reading and print `"The number {number} is between 1 and 100"`

```
-3
0.9
44
```



```
The number 44 is between 1 and 100
```

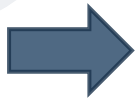
Solution: Number Between 1 and 100

```
number = float(input())
while not (1 <= number <= 100):
    number = float(input())
print(f'The number {number} is between 1 and 100')
```

Problem: Shopping

- Write a program that
  - Reads a **budget** and then **prices of each product** you need to buy until it receives the command **"End"**
  - If there is **not enough budget** left for the next product, print **"You went in overdraft!"** and end the program
  - If you **bought everything** needed and the program receives **"End"**, prints **"You bought everything needed."**

```
100
5
End
```



```
You bought everything needed.
```

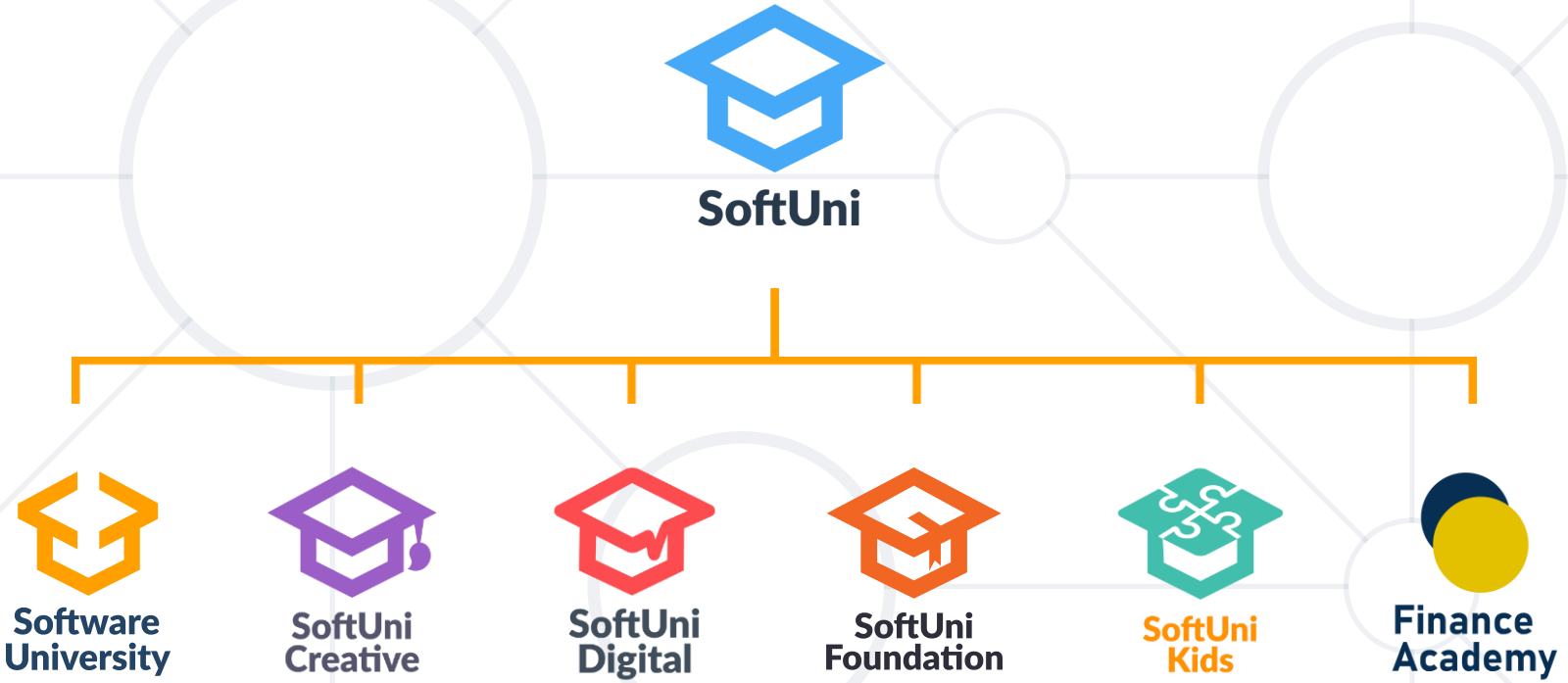
Solution: Shopping

```
budget = int(input())
command = input()
while command != "End":
    product_price = int(command)
    budget -= product_price
    if budget < 0:
        print("You went in overdraft!")
        break
    command = input()
else:
    print("You bought everything needed.")
```

Summary

- We learned how to:
  - Execute code based on different conditions
  - Use loops to execute a block of code multiple times on different elements
  - Stop/skip iterations in loops

Questions?



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