

Functions

Defining and Using Functions

$$f(x)$$

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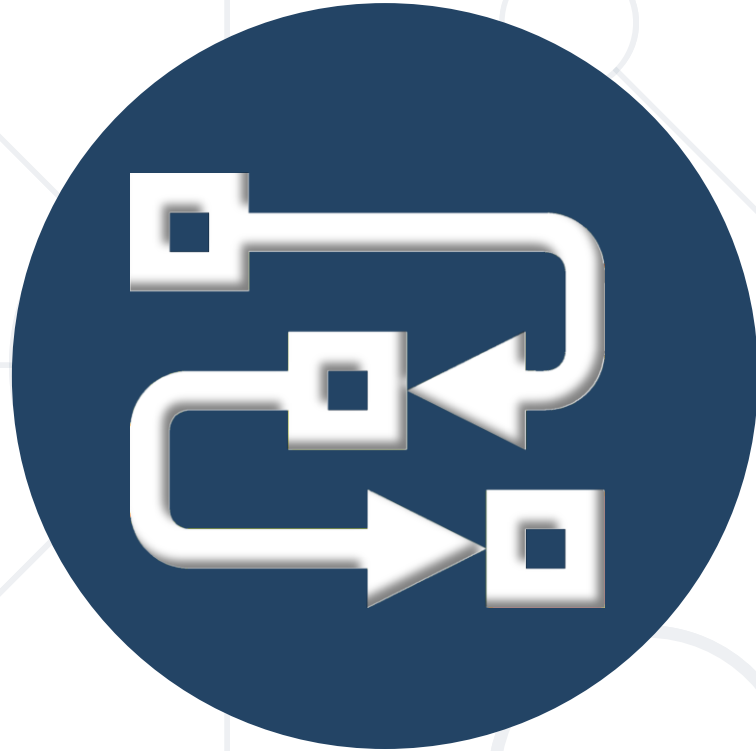
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#fund-python

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Functions Overview

Declaring and Invoking Functions

Functions

- Function == named piece of code
 - Can take parameters and return result

Use snake_case

Function
parameter

```
def function_name(parameter: type):  
    statement(s)
```

Type of the
parameter



Why Use Functions?

- More **manageable programming**
 - Splits large problems into small pieces
 - Better organization of the program
 - Improves code readability
 - Improves code understandability
- Avoiding **repeating code**
 - Improves code maintainability
- Code **reusability**
 - Using existing functions several times



- Python has a set of **built-in functions** that we can call at **any time**
- List of some built-in functions

```
abs()  
min()  
max()  
round()
```

```
sum()  
filter()  
map()  
sorted()
```

Problem: Absolute Values

- Write a program that
 - Receives a sequence of numbers, separated by a **single space**
 - **Prints** their **absolute value** as a list

1 2.5 -3 -4.5



[1.0, 2.5, 3.0, 4.5]

Problem: Absolute Values

```
list_of_strings = input().split()

list_of_numbers = []
for n in list_of_strings:
    number = float(n)
    list_of_numbers.append(number)

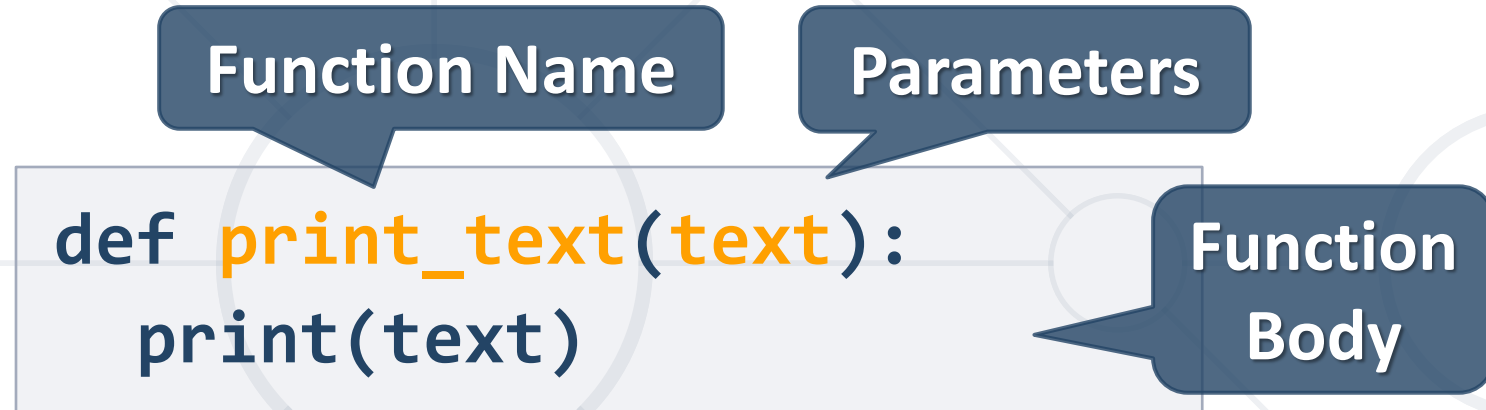
list_of_absolute_numbers = []
for n in list_of_numbers:
    absolute_number = abs(n)
    list_of_absolute_numbers.append(absolute_number)

print(list_of_absolute_numbers)
```



Declaring and Invoking Functions

Declaring Function



- Using the **def** statement is the most common way to define a function in Python
- Functions can have **several parameters**
- It is possible for the function to **not** return a value

Invoking a Function

- Functions are **first** declared, then **invoked** (many times)

```
def print_header():  
    print("This is header")
```

Function
Declaration

- Functions can be **invoked** (called) by their name

```
print_header()
```

Function
Invocation

- A function can be invoked from:

- Other functions

```
def print_header():  
    print_header_top()  
    print_header_bottom()
```

Function invoking
functions

- Itself (recursion)

```
def crash():  
    crash()
```

Function invoking
itself

Function without Parameters

- Executes the code after
- Does not return result

```
def multiply_numbers():  
    result = 5 * 5  
    print(result)  
multiply_numbers() #25
```

Prints result
on the
console



return

Return Values

The Return Keyword

- Functions can return a value that you can use directly:

```
def give_me_five():  
    return 5  
print(give_me_five()) # Print the returned value  
#Out: 5
```

- or save the value for later use:

```
num = give_me_five()  
print(num) #Print the saved returned value  
#Out: 5
```


- If **return** is encountered in the function the function will be exited immediately

```
def give_me_another_five():  
    return 5  
    print('This statement will not be printed.')  
print(give_me_another_five()) #Out: 5
```

- Write a program that **receives a grade** between 2.00 and 6.00 and **prints the corresponding grade in words**
 - Between **2.00** and **2.99** - '**Fail**'
 - Between **3.00** and **3.49** - '**Poor**'
 - Between **3.50** and **4.49** - '**Good**'
 - Between **4.50** and **5.49** - '**Very Good**'
 - Between **5.50** and **6.00** - '**Excellent**'

```
def grades(grade):  
    if grade >= 2.00 and grade <= 2.99 :  
        return 'Fail'  
    elif grade >= 3.00 and grade <= 3.49:  
        return 'Poor'  
    # TODO: Add other conditions
```



**params
vs
args**

Parameters vs Arguments

Parameters vs Arguments

- **Parameter** is a variable defined in a function definition, while the **argument** is an actual value passed to the function

parameter

```
def solve(grade):
```

```
...
```

```
solve(6)
```

argument

- Function arguments can have **default** values
- If the function is called **without the argument**, the argument gets its default value

```
def person(first_name = 'George', last_name = 'Brown'):  
    print(first_name, last_name)  
person('Peter') #'Peter Brown'
```

- Functions can be called using **keyword arguments**
- When we use keyword/named arguments, it's the **name** that matters, not the **position**

```
def area(width, height):  
    return width * height  
print(area(height = 2, width = 1))
```

Problem: Calculations

- Write a function that **receives three parameters** and calculates a result depending on the operator
- The operator can be '**multiply**', '**divide**', '**add**', '**subtract**'
- The input comes as three parameters - two **integers** and an operator as a **string**

5, 10, 'multiply'



25


```
def solve(a,b,operator):  
    result = None  
    if operator == 'multiply':  
        result = a * b  
    elif operator == 'divide':  
        result = a / b  
    # TODO : other cases  
    return result  
print(solve(5,10,'multiply')) # 50
```



Lambda Functions

Lambda Definition

- Lambda is an **anonymous one-time** function
 - Like a function, it can take a parameter and return a result



key word


arguments

expression

```
x = lambda a: a + 10  
print(x(5))  # 15
```

Lambda Example

- It can take multiple parameters



```
x = lambda a, b: a * b  
print(x(3, 4))  # 12
```

```
full_name = lambda first, last: f'I am {first} {last}'  
result = full_name('Guido', 'van Rossum')  
print(result)  # I am Guido van Rossum
```

Problem: Repeat String

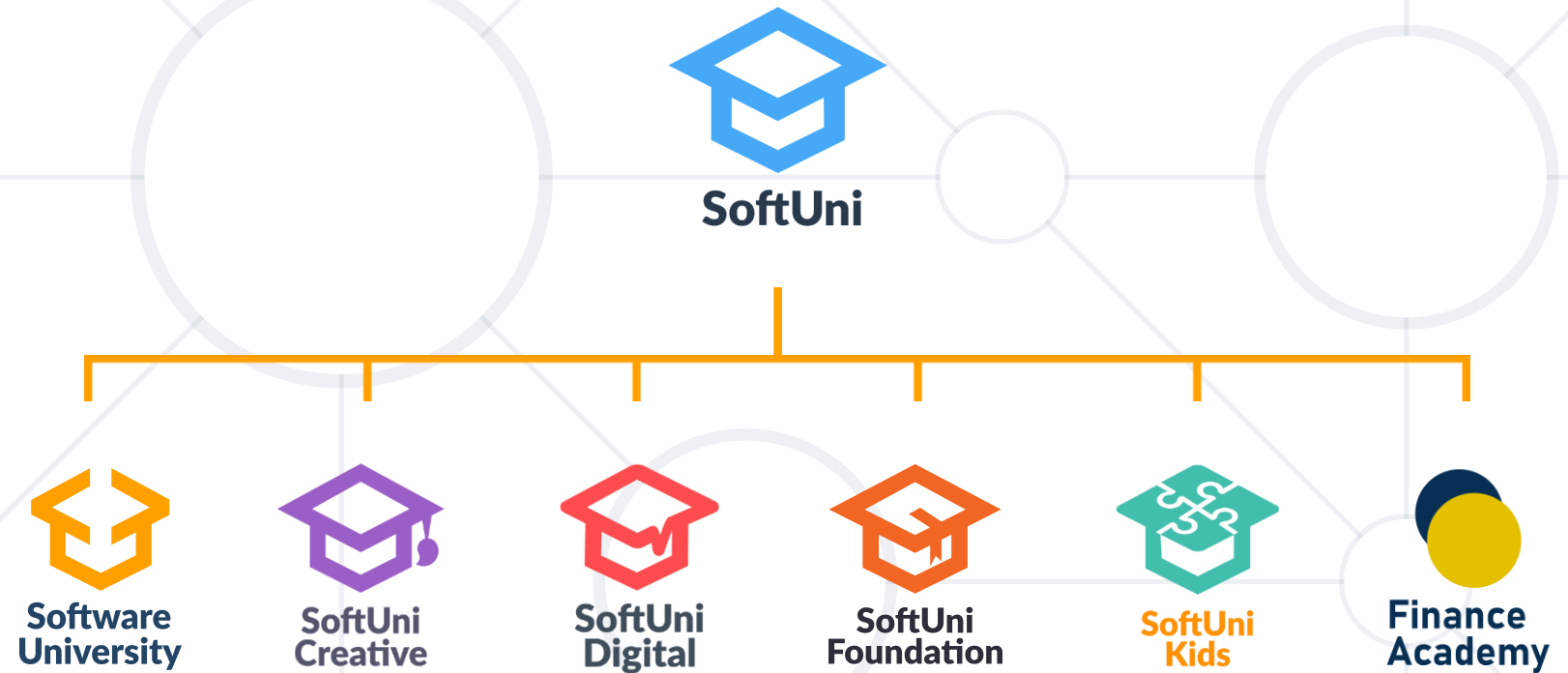
- Write a function which **receives** a **string** and a **counter n**
- The function should return a **new string** – the **result** of repeating the old string **n** times
- Print the result on the console



- Break large programs into simple **functions** that solve small sub-problems
- Consist of **declaration** and **body**
- Are invoked by their **name**
- Can accept **parameters**



Questions?



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