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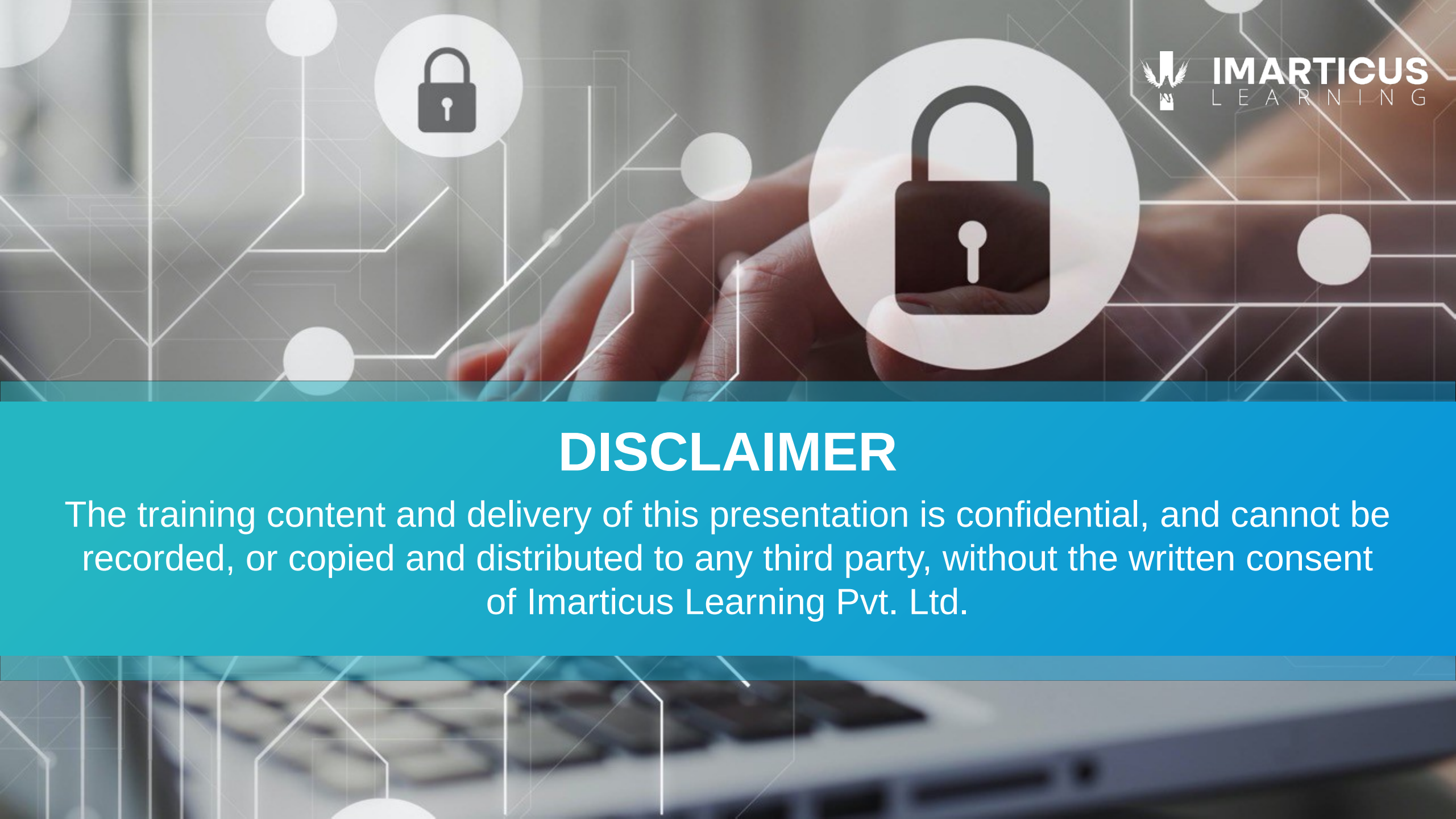
Python Programming

User-Defined & Lambda functions



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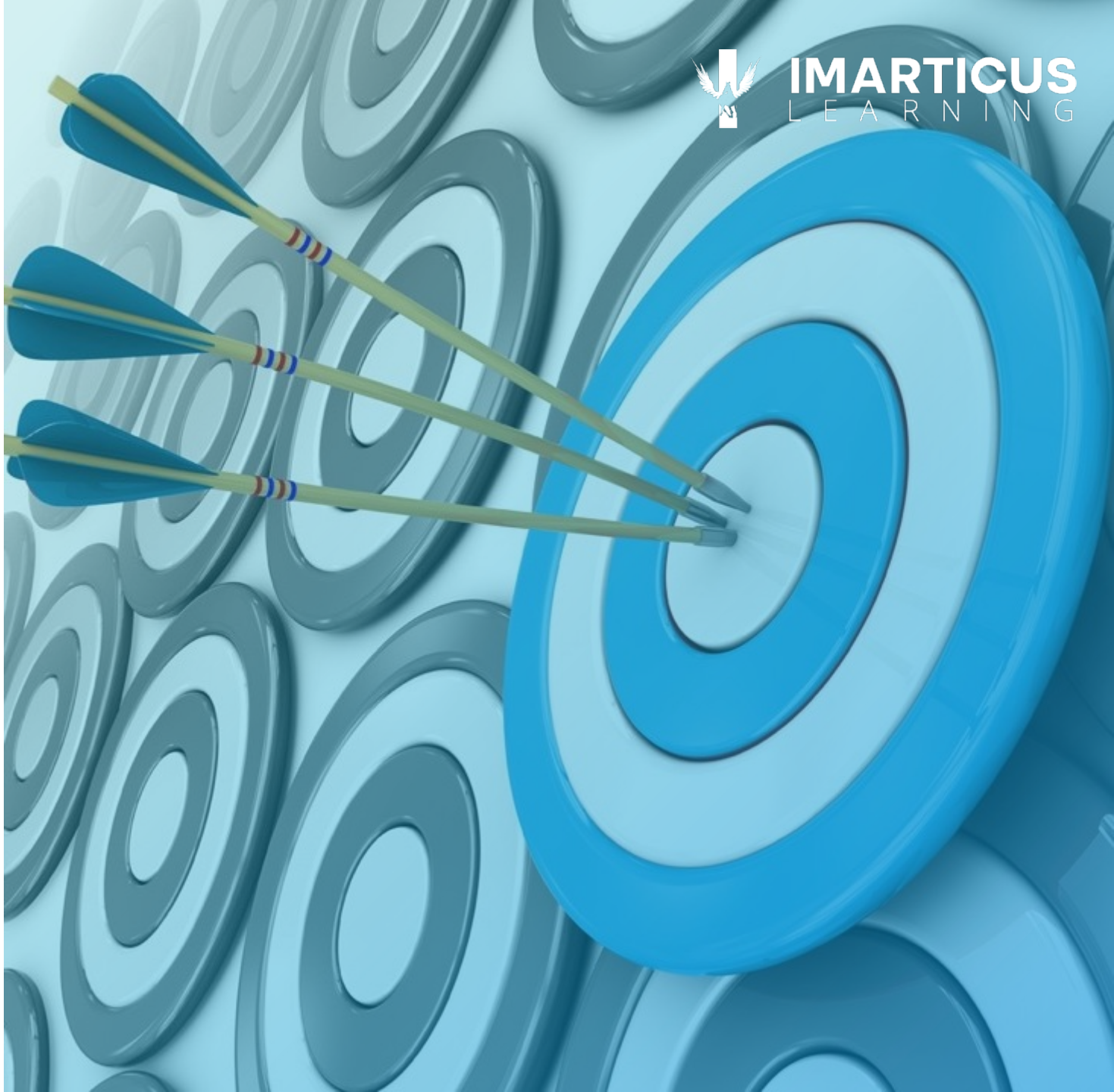
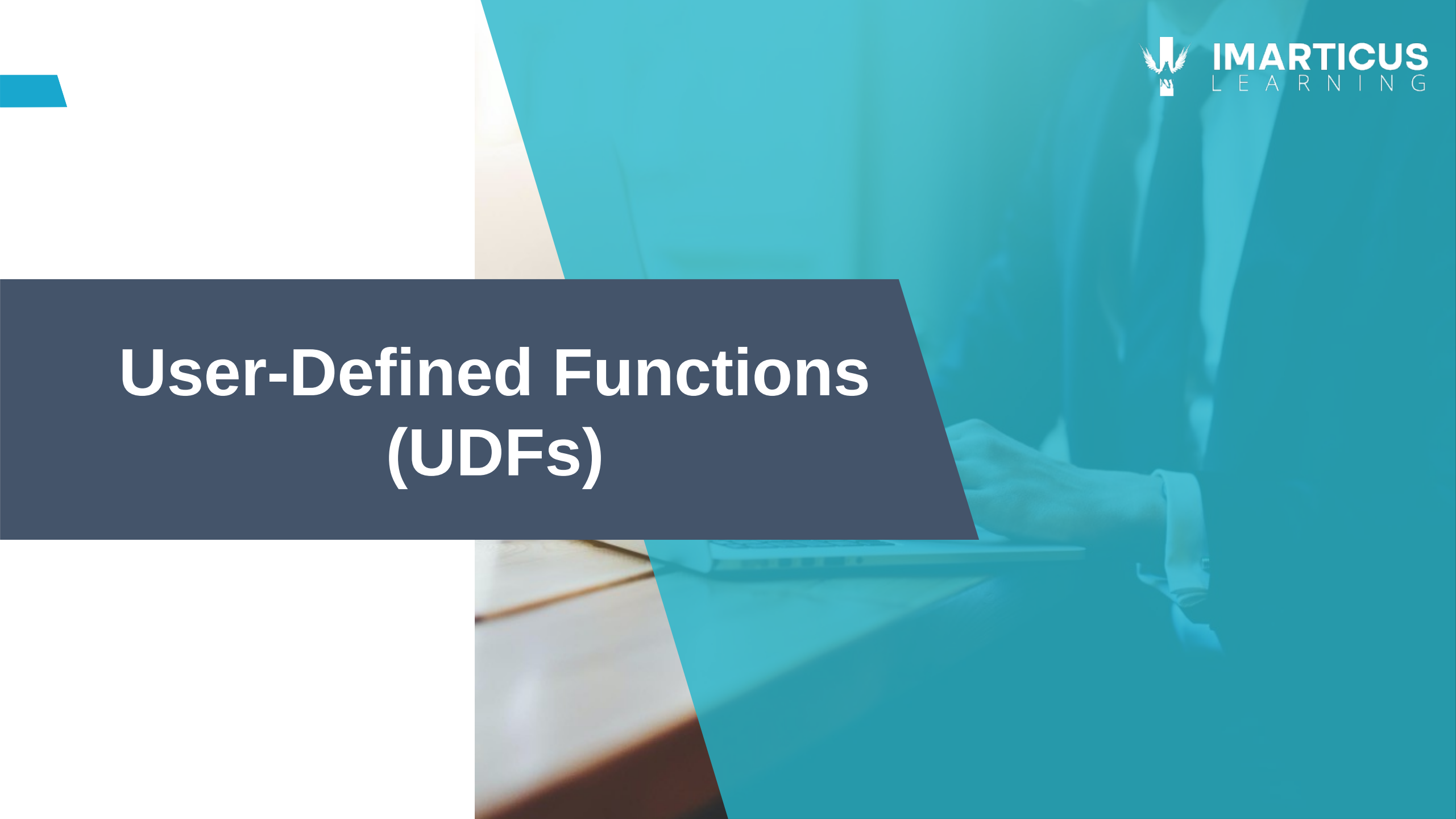
LEARNING OBJECTIVES

At the end of this session, you will learn:

- User-Defined Functions
- Function Arguments
- Lambda Functions





User-Defined Functions (UDFs)

BUILT-IN FUNCTIONS

The functions whose functionalities are pre-defined in Python are called as built-in functions

The Python interpreter has a number of functions built into it that are always available

Some examples of built-in functions are:

- Print()
- Input()
- Min()
- Max()
- Type() etc.

We can defines functions according to our need as well.
Such functions are called as built-in functions.

USER-DEFINED FUNCTIONS

A function that a user defines is known as **user defined function**

A user can give any name to a user-defined function except that the function name should not have any special character including a space character

Any pre-defined Python keywords should not be used as function name

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You cannot use the Python keywords as function name

THE DEF KEYWORD

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- In python, a user-defined function’s declaration begins with the def keyword, followed by the function name
- Keyword **def** marks the start of function header

DEFINING THE USER-DEFINED FUNCTION

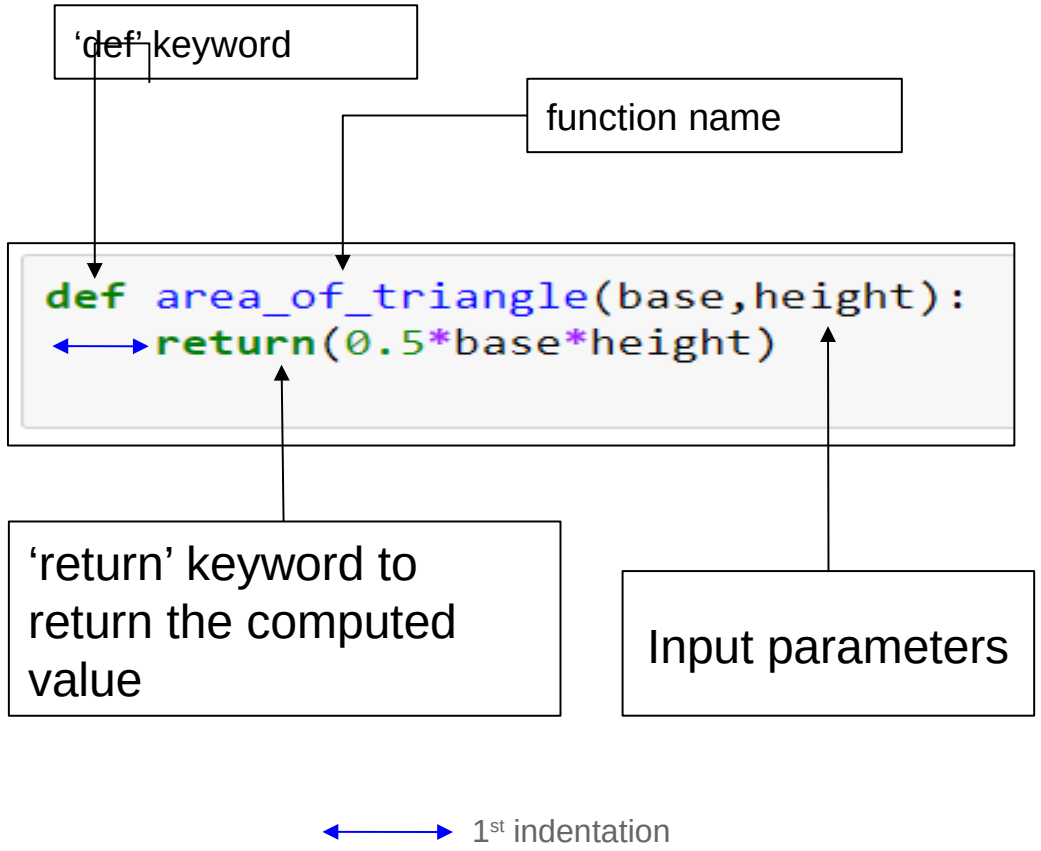
Step 1: Keyword def marks the start of the function header

Step 2: Provide a unique function name

Step 3 (optional): Provide parameters (arguments) by which we pass value to the function

Step 4: Add colon(:) to mark the end of the function header

Step 5: Write the necessary code. A function can be ended with or without a return statement



WRITE YOUR OWN FUNCTION

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```
# create a function 'greet' to display greeting whenever the function is called
def greet():
    print("Hello and welcome")
```

```
# call the function
greet()
```

```
Hello and welcome
```

WRITE YOUR OWN FUNCTION WITH A PARAMETER

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```
# create a function 'greet' that displays a greeting to the person whose name is provided
def greet(name):
    print("Hello", name, "Welcome to the show")
```

```
# take name from the user
person_name = input("Enter your name: ")

# call the function
greet(person_name)
```

```
Enter your name: Shawn
Hello Shawn Welcome to the show
```

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```
# take name from the user
person_name = input("Enter your name: ")

# call the function
greet()
```

```
Enter your name: John

---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
<ipython-input-60-3ce897404fa0> in <module>()
      3
      4 # call the function
----> 5 greet()

TypeError: greet() missing 1 required positional argument: 'name'
```

The function will throw an error if we do not pass the required parameter as per the function definition

THE RETURN KEYWORD

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```
# create a function 'addition' that takes two input parameters and adds them
def addition(num1, num2):
    add = num1 + num2
    return(add)
```

```
# call the function by passing two values and assing to a variable
summation = addition(2, 8)
print(summation)
```

```
10
```

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```
# create a function 'addition' that takes two input parameters and adds them
def addition(num1, num2):
    add = num1 + num2
    return
```

```
# call the function by passing two values and assing to a variable
summation = addition(2, 8)
print(summation)
```

```
None
```

The function returns no value if we use return keyword in the function with any return value

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Function Arguments

FUNCTION ARGUMENTS

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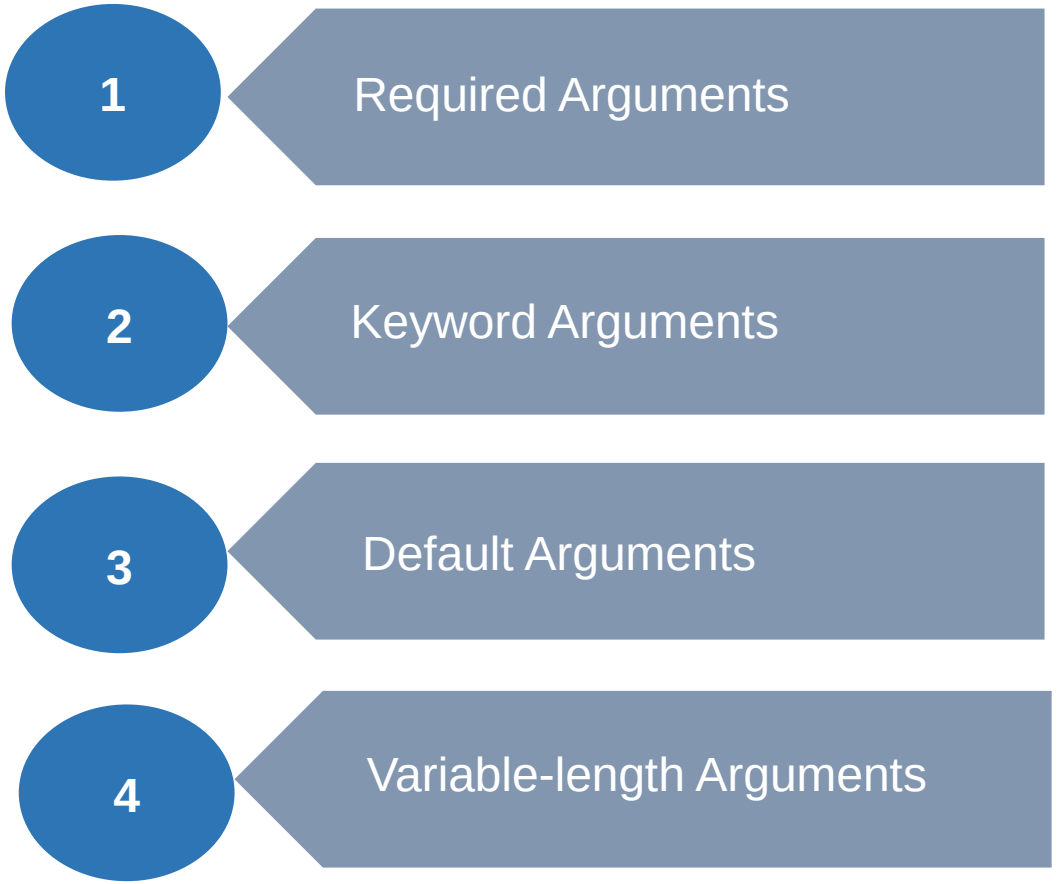
Four types of formal arguments:



REQUIRED ARGUMENTS

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Required arguments are the arguments passed to a function in correct positional order

```
# create a function 'reg_arg' with
def reg_arg(num1, num2):
    print("First argument is: ", num1)
    print("Second argument is: ", num2)
```

```
# call the function by passing two values
num1 = 2
num2 = 8
reg_arg(num2, num1)
```

```
First argument is:  8
Second argument is:  2
```

REQUIRED ARGUMENTS

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In case, if the function does not requires the argument and is still passed it will throw an error

```
# create a function 'greet' that displays a greeting to the person whose name is provided
def greet():
    print("Hello and Welcome to the show")

# take name from the user
person_name = input("Enter your name: ")

# call the function
greet(person_name)
```

```
Enter your name: John

---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
<ipython-input-2-c8ce153fb1aa> in <module>()
      3
      4 # call the function
----> 5 greet(person_name)

TypeError: greet() takes 0 positional arguments but 1 was given
```

REQUIRED ARGUMENTS

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In case, if the function requires the argument and is not passed it will throw an error

```
# create a function 'hello' to display greetings for the day
# the function has argument 'name'

def hello(name):
    print("Hello," + name + " have a wonderful day ahead!")
```

```
hello()
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
<ipython-input-87-a75d7781aaeb> in <module>
----> 1 hello()

TypeError: hello() missing 1 required positional argument: 'name'
```

```
hello("Steve")
```

```
Hello,Steve have a wonderful day ahead!
```

KEYWORD ARGUMENTS

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- When we call a function with some values, these values get assigned to the arguments according to their position
- When we call functions in this way, the order (position) of the arguments can be changed
- Such arguments are called as keyword arguments

```
# pass the argument and change in position of the argument
def employee(Name, Designation):
    print(Name, Designation)
```

```
# Keyword arguments
employee(Name = "John", Designation="CEO")

employee(Designation = "CEO", Name = "John")
```

```
John CEO
John CEO
```

DEFAULT ARGUMENTS

A default argument is a value provided in a function declaration that is automatically assigned by the compiler if the caller of the function doesn't provide a value for the argument

```
# define a function with a default arguement
def emp(name, sal = 12000):
    print("emp name - ", name)
    print("emp salary - ", sal)

emp("Sam")
```

```
emp name -  Sam
emp salary -  12000
```

We have passed a default value for salary in the function definition

VARIABLE-LENGTH ARGUMENTS

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- Using **args* helps you in passing variable number of arguments
- This is especially helpful when you do not know how many arguments to pass to the function

```
# define a function the returns the addition on numbers passed
def addition(*numbers):
    add = 0
    for num in numbers:
        add = add + num
    print(add)
```

```
addition(1,2)
```

```
3
```

```
addition(5,4,6,7,10)
```

```
32
```

VARIABLE-LENGTH KEYWORDED ARGUMENTS

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- **kwargs allows the users to pass keyword-ed arguments of variable length to a function

```
def employee(**details):
    print(type(details))
    for k, v in details.items():
        print(k, "-->", v)
```

```
employee(first_name = "Jack", salary = 12000)
```

```
<class 'dict'>
first_name --> Jack
salary --> 12000
```

```
employee(first_name = "Jack",seconf_name = "Mayer", salary = 12000, designation = "Financial Advisor")
```

```
<class 'dict'>
first_name --> Jack
seconf_name --> Mayer
salary --> 12000
designation --> Financial Advisor
```

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LAMBDA FUNCTION

LAMBDA FUNCTION

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Lambda functions are anonymous

They do not have any name

‘Lambda’ keyword to be used to create lambda function

Simple one-line function

No **‘def’** or **‘return’** keyword to be used with a lambda function

LAMBDA FUNCTION

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Every lambda function begins with the “lambda” keyword

A lambda function can have multiple arguments separated by commas

A colon precedes the expression

The expression always returns an object

```
lambda arguments : expression
```

LAMBDA FUNCTION

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Python function code to find the greater number

```
def greater(num1,num2):
    if (num1>num2):
        return num1
    else:
        return num2

great = greater(8,15)
print(great)
```

```
15
```

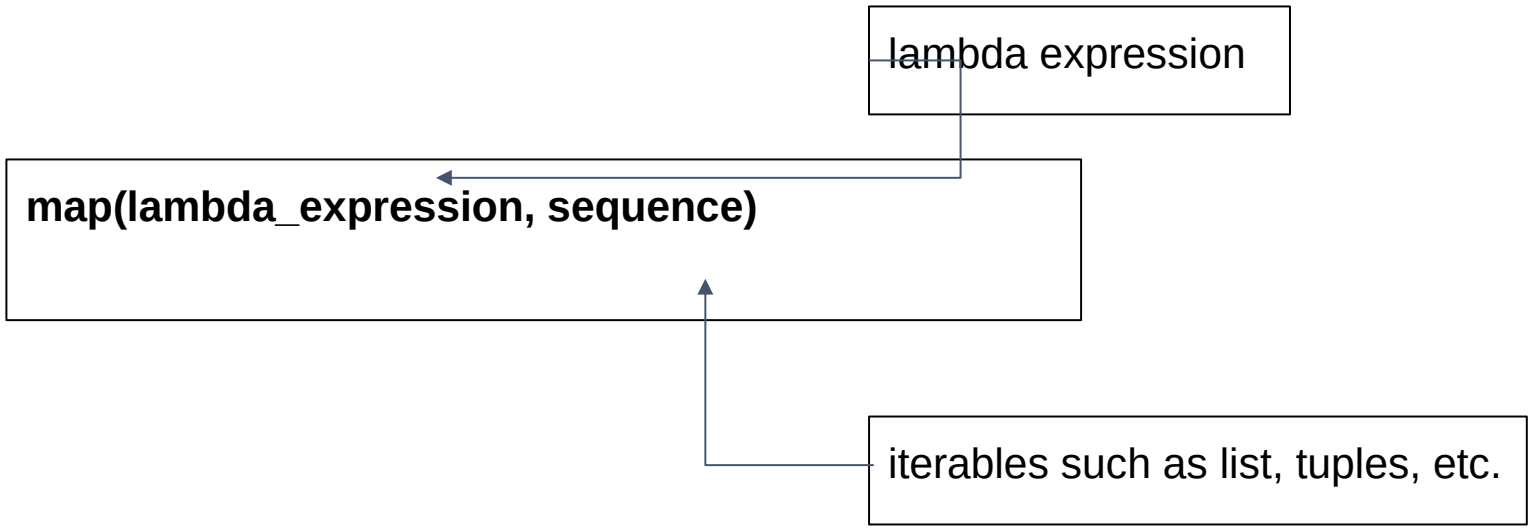
Lambda function to find the greater number

```
greater = lambda num1, num2: num1 if num1 > num2 else num2
greater(8,15)
```

```
15
```

LAMBDA WITH MAP()

- *map()* functions expect a function_object, in our case a lambda function,and an iterable
- It executes the function_object for each element in the sequence and returns a sequence of the elements modified by the function object



LAMBDA WITH MAP()

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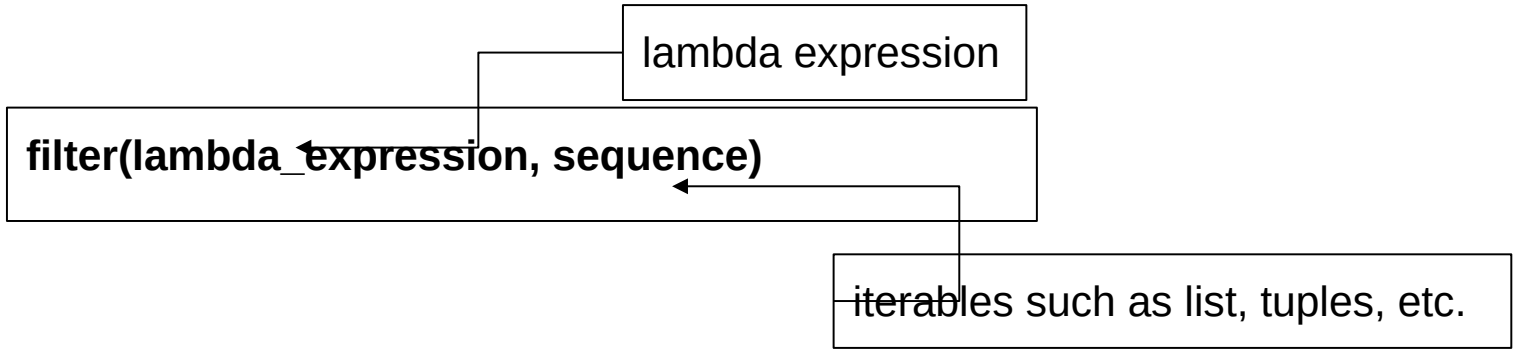
```
# The output is often type-casted into a seq type, as follow:

num_list = list(range(1,11))
sq_list = list(map(lambda x: x**2, num_list))
sq_list
```

```
[1, 4, 9, 16, 25, 36, 49, 64, 81, 100]
```

LAMBDA WITH FILTER()

- The *filter()* function expects two arguments: *function_object(lambda)* and an iterable
- *Lambda expression* returns a boolean value and is called for each element of the iterable
- It returns only those elements for which the function_object returns *true*



LAMBDA WITH FILTER()

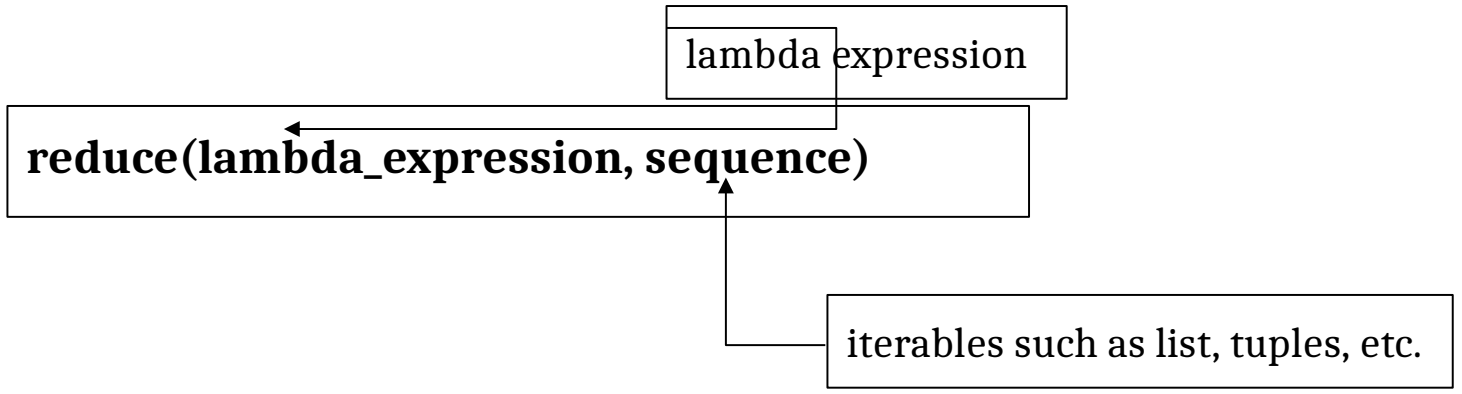
```
# The output is often type-casted into a seq type, as follow:

num_list = list(range(1,11))
sq_list = list(filter(lambda x: x % 5 == 0, num_list))
sq_list
```

```
[5, 10]
```

Unlike map(), the filter() function can have only one iterable as input.

LAMBDA WITH REDUCE()

- The reduce() function in Python takes in a function and a sequence as argument.
- The function is called with a lambda function and a sequence. A new reduced result is returned.
- This performs a repetitive operation over the pairs of the sequence object.



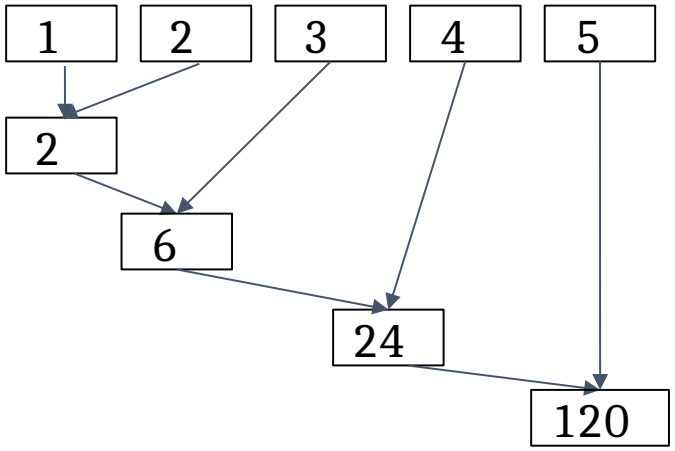
LAMBDA WITH REDUCE()

Determining the factorial of a number

```
# import reduce function from the functools library
from functools import reduce
num_list = [1,2,3,4,5]

# the following function prints factorial of 5
reduce(lambda a,b: a*b, num_list)
```

```
120
```

Working:



LAMBDA WITH REDUCE()

Determining the minimum of a numeric tuple by using reduce:

```
# import reduce function from the functools library
from functools import reduce

# create a numeric tuple
num_tup = (0, -8, 55, -100, 1000, 33)

# the following function prints the minimum value from the iterable passed
reduce(lambda x, y: x if (x<y) else y, num_tup)
```

```
-100
```

Note:

reduce() can only have iterables of same type as input

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