Python Programming

Lecture One

Basic Concepts

Introduction To Python

- Python is a popular programming language created by Guido van Rossum in 1991.
- Python works on different platforms (Windows, Mac, Linux) and it has a simple syntax similar to the English language
- It can be treated in a procedural way, an object-oriented way or a functional way.
- The most recent major version of Python is Python 3. Python 2, although not being updated with anything other than security updates, is still quite popular.

Introduction To Python

- To get the version on the python installed in your machine run this command:

```
python --version
```

- Python is an ***interpreted programming language***, this means that as a developer you write Python (.py) files in a text editor and then put those files into the python interpreter to be executed.

- To start interpreting a python file, you need to run the following command:

```
python FileName.py
```

Hello World in Python

- Open an empty file and save it with the extension .py
  example: **HelloWorld.py**
- Write the following piece of code

```
#Print Hello World
print("Hello awesome Python")
```

a comment in python

Call for internal print function

- Notes:
  - Internal functions have don't need a library to include
  - No semicolon is not needed in python lines

- Run the code using ***python*** command

The Python Command Line

To test a short amount of code in python sometimes it is quickest and easiest not to write the code in a file. This is made possible because Python can be run as a command line itself.

To enter the python command line run the following command:

```
python
```

OR

```
py
```

Now you are in python command line, you can write any python code and press enter to run. Example:

```
>>> print("Hello Awesome Python")
Hello Awesome Python
```

Whenever you want to exit, run this command

```
>>> exit()
```

Strings in Python

- It is comprised of a set of characters that can also contain spaces, special characters and numbers.

- In python string is represented between double quotation *“ This is a string “* or single quotation *‘ This is also a string ’*.

Example

```
print("My Name is Ahmed")
print('I'm 28 Years Old')
```

LAB 1

Write a python code that will print your short biography.

Full Name, Birth Year, Faculty, and graduation year

Expected Output

```
I'm Ahmed Assaf

My birth date is 22 Sep 1991

I graduated from Faculty of Engineering

Cairo University 2013
```

Time To

Code

Variables in Python

- Variable is a part from the memory, used to hold a piece of data.
- Unlike other programming languages, Python has no command for declaring a variable. A variable is created the moment you first assign a value to it.
- ***Example code:***

```
x = 1
y = "Ahmed"

print(x)
print(y)
```

- Variables do not need to be declared with any particular type and can even change type after they have been set.

```
x = 1
print(x)
x = "Ahmed"
print(x)
```

Variables in Python

➔ Variable naming rules in Python:

- A variable name must start with a letter or the underscore character
- A variable name cannot start with a number
- A variable name can only contain alphanumeric characters and underscores (A-z, 0-9, and _)
- Variable names are case-sensitive (age, Age and AGE are three different variables)

➔ Using comma operator to define multiple variables in same line:

```
x,y,z = 1,2,3
```

➔ Define many variables with the same value

```
x = y = z = 1
```

Python Data Types

Text Type	***str***		
Numeric Types	***int***	***float***	***complex***
Sequence Types	***list***	***tuple***	***range***
Mapping Type	***dict***		
Set Types	***set***	***forzenset***	
Boolean Type	***bool***		
Binary Types	***bytes***	***bytearray***	***memoryview***

Input internal function

Syntax

input(Optinal_Statement)

Description

If the *Optional_Statement* is present, it is written to standard output without a trailing newline. The function then reads a line from input, converts it to a string (stripping a trailing newline), and returns that.

Example

```
x = input("Please Enter you Name")
```

LAB 2

Write a python code that ask the user to enter his name and then print a welcome message for him.

Expected Output

```
Please enter your name: Ahmed Assaf
Welcome Ahmed Assaf
```

Time To

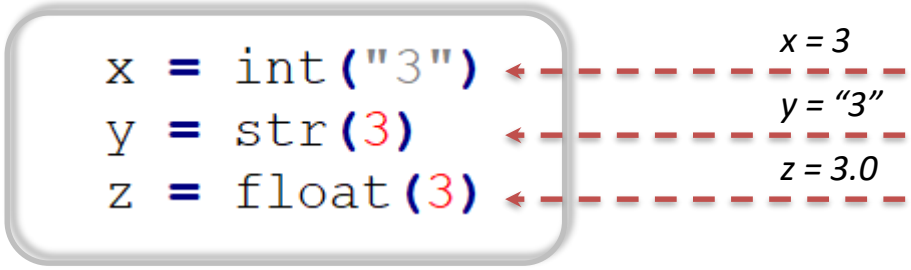
Code

Casting in Python

- **int()** - constructs an integer number from an integer literal, a float literal (by rounding down to the previous whole number), or a string literal (providing the string represents a whole number)

- **float()** - constructs a float number from an integer literal, a float literal or a string literal (providing the string represents a float or an integer)

- **str()** - constructs a string from a wide variety of data types, including strings, integer literals and float literals



LAB 3

Write a python code that ask the user to enter his birth year and then print his age in years.

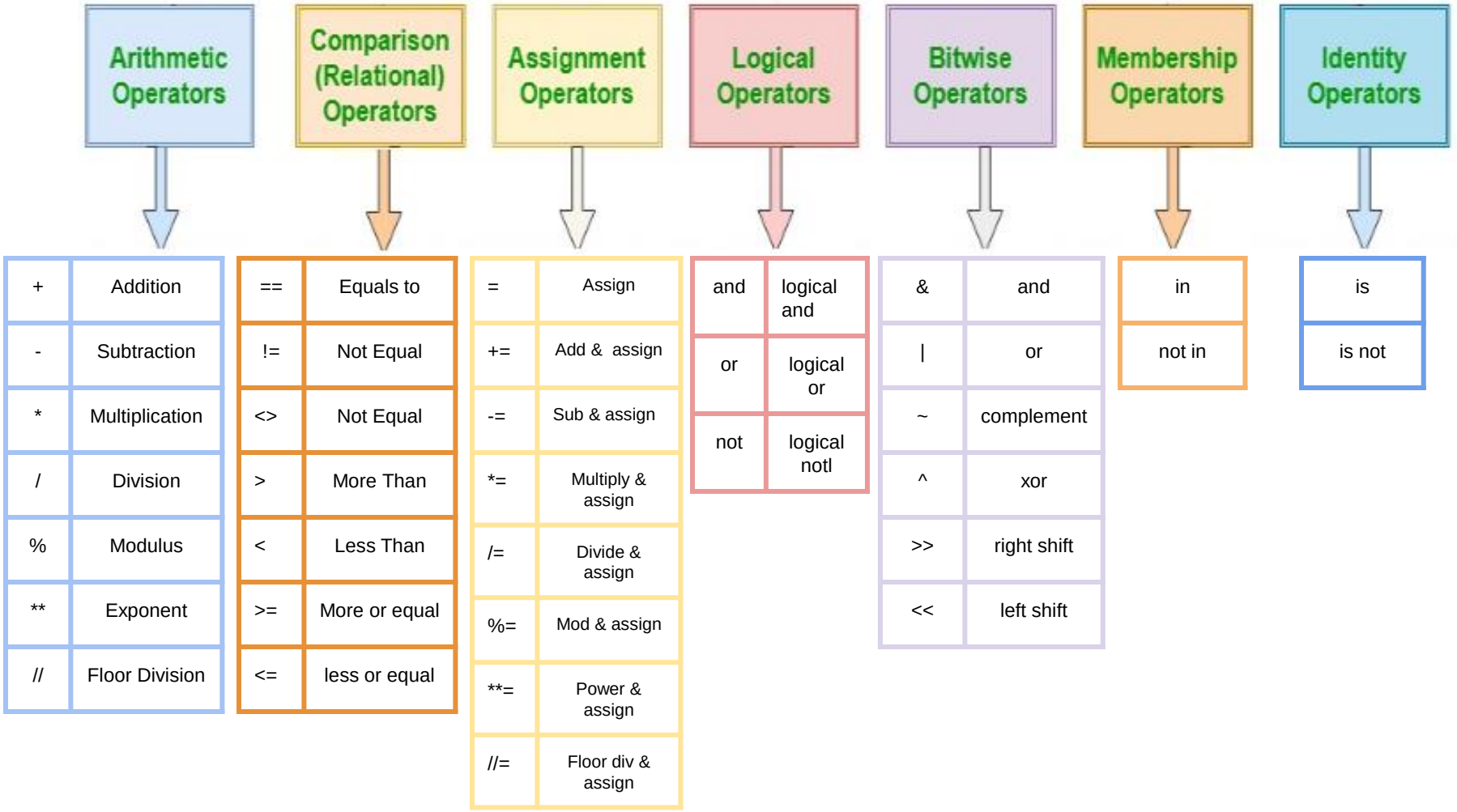
Expected Output

```
Please enter your birth year: 1991
You are 29 Years Old
```

Time To

Code

Python Operators



LAB 4

Write a python code that calculate the installment value for loan. The system will ask the user to enter the loan value and number of installment years, then the system will print the monthly installment. given that the bank has a fixed interest rate 12 %.

Expected Output

```
Please enter the loan value: 100000
Please enter the number of Years: 5
Your monthly Installment is 2666.6666666666665
```

Time To

Code

LAB 5

Write a python code that calculate the overflow value for a timer. The system will ask the user to enter the timer resolution, the prescaler value and system frequency then it would print the timer overflow value in milliseconds.

Expected Output

```
Please enter the timer resolution: 10
Please enter the system frequency in MHz: 1
Please enter the Prescaller value: 8
The timer would overflow after 8.192 milliseconds
```

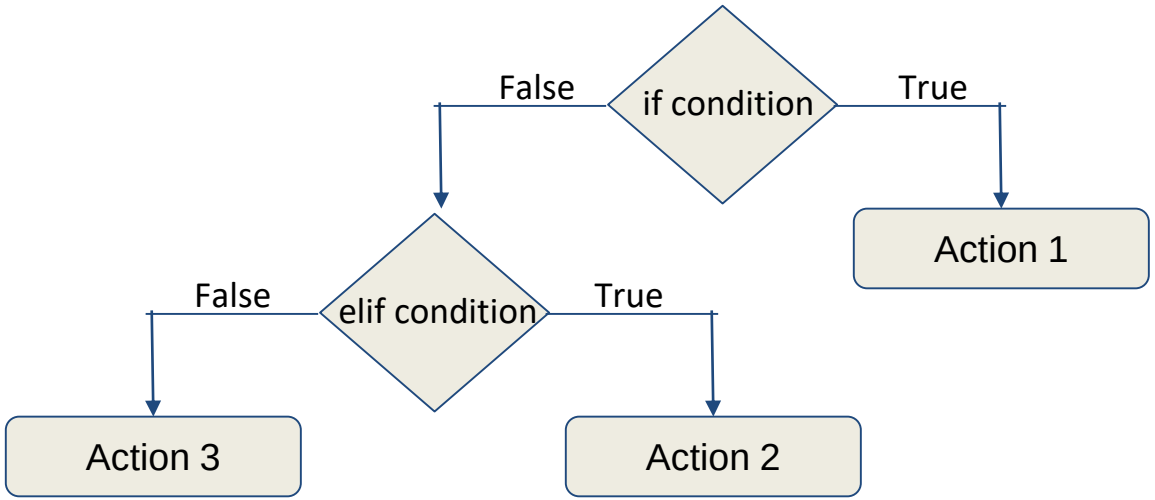
Time To

Code

if conditional statement

Syntax:

```
if condition:
<Spaces> Action_1
elif condition:
<Spaces> Action_2
else:
<Spaces> Action_3
```



Notes:

-> elif and else statements are optional
-> you can have unlimited number of elif statements
-> Indentation defines the scope
-> In case the action is only one line, you can write it after the colon directly (No new line needed)

LAB 6

Write a python code that handle the following login system:

User Name	Password
Ahmed	1394
Ali	6078
Amr	9345

If the data entered is correct, the system shall show a welcome message, if not the system will print incorrect entry.

Time To

Code

Expected Output

```
Please enter Your Name: Ahmed
Please enter Your Password: 1394
Welcome back, Ahmed
```

```
Please enter Your Name: Wael
Incorrect Username
```

Loops in Python

In python there are two types of loops

While Loop

Syntax:

while condition :
<Spaces>Action

Example:

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

For Loop

Syntax:

for iterator **in** source :
<Spaces>Action

Note: Source may be **string**, **list**, **dict**, **tuple** or **set**

Example:

```
f = 'Ahmed Assaf'
for x in f:
    print(x)
```

break and continue

break:

With the break statement we can stop the loop before it has looped through all the items

Example:

```
f = 'Ahmed Assaf'
for x in f:
    print(x)
    if x == 'e'
        break
```

continue:

With the continue statement we can stop the current iteration of the loop, and continue with the next

Example:

```
f = 'Ahmed Assaf'
for x in f:
    print(x)
    if x == 'e'
        continue
```

LAB 7

Write a python code that ask the user to enter a sentence and then print it in opposite direction.

Expected Output

```
Please enter a sentence: Ahmed
The sentence after mirrorring is demhA
```

Time To Code

LAB 8

Write a python code that handle the following login system:

User Name	Password
Ahmed	1394
Ali	6078
Amr	9345

If the data entered is correct, the system shall show a welcome message, if not for **three times** the system will print incorrect entry.

Time To Code

Expected Output

```
Please enter Your Name: Ahmed
Please enter Your Password: 1394
Welcome back, Ahmed
```

```
Please enter Your Name: Wael
Incorrect Username
```

The End …

Other types of operators will be discussed later on, …..

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