THEORY QUESTION ASSIGNMENT

1. Python theory questions

1. Python is a free/open source programming language

The main features of Python are:

- Being an Object Oriented Language which means a programming which works around the concept of an object
- Being an open source language
- Being an High level Language : a programming language designed to be more user friendly programming
- Having extensible feature : we can code some python code into C or C++
- Being a portable langage : python can be used on licensed platforms like windows, mac but as well open source platforms like Linux
- Being an interpreted langage: Python code has a line by line execution, You
 can even add some steps to begin to run the code exactly where you want
- Being dynamically typed langage : you don't need to specify the type of variables in advance
- 2. Python is a open source langage which evolves through different versions
 Python 2 and Python 3 are versions of Python, Python 2 i more a legacy version
 of Python even if it is still wildly used while Python 3 is the recent more used
 version especially for beginners.

Differences between Python 2 and 3:

- Syntax; there is more parentheses used with Python 3 which changes for example print 'hello' statement for Python 2 to a print('hello') function in Python 3
- Default text strings: is ASCII in Python 2 but UTF-8 in Python 3
- Libraries : libraries are not forwards compatible using Python 2 but they are using Python 3

References

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- Number operations accurancy: Python 3 give you the exact number result for a division hwile Python 2 would round down to the nearest whole number,
- 3. PEP stands for Python Enhancement proposal, PEP is a document providing the best practices and guidelines to code in Python. PEP 8 is focus on the improvements of the readibility and consistency of Python code, PEP 8 describes new features, processes and/or environement of Python,
- 4. A program in computer science is a set of instructions that the computer will interprete and perform,
- 5. A process is a program in execution
- 6. Cache is hardware or software which is used to store data in computing environment
- 7. A thread is a unit/sequence of execution within a process, Multithreading is a way process can contain several simultaneous or parallell threads,
- 8. Parralelism is a process which splits into threads/tasks into subtasks/subthreads which can be executed in parallel while concurrency is threads/tasks which can be executed at the same time
- 9. GIL stands for Global Interepreter Lock which is a type of process lock, It prevents to have multi threads execution. Indeed, Only one thread wil be executed at a time in Python
- 10.DRY principle stands for don't repeat yourself; the dry principle is a principle to reduce the repetition and duplication in your code. KISS principle stands for Keep It Simple Stupid; the KISS principle is a principle to make sure to keep the code as simple as possible. BDUF principle stands for Big Design Up Front; the BDUF idea is to have the program to be completed and perfected before the program implementation,
- 11.Garbage collector in Python is realeasing memory when the objects is not used anymore
- 12. At the run time, computer memory is split in different memory parts:code, stack and heap, Code is part of the memory which stores the program :the set of instructions for the computer to interprete and execute. During the program execution , the computer will interprete functions and local variables

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- temporarily and stastically in Stack memory. The objects are stored in Heap memory as Heap memory is a dynamic memory allocation. Indeed, we have to be able to change the size of memory and the objects, This is why we can't store objects in Stack memory. Fortuatenly, Python interpreter is allocating and deallocating actively and automatically on the heap memory,
- 13. Modules are code that someone else has written that you can reuse in your program,
- 14. Docstrings are strings within a function ,method, class. They are represented with closing and opening quotes,
- 15. Pickling is the process by which Python objects are converted to byte stream Unpickling is the reverse operation. Pickling and unpickling are used to help to transfer Python objects from one machine to another.
- 16. For static analysis, you can use Pychecker or/and Pylint tools, For debugging, if using a 'clever' IDE e.g. PyCharm, we can use in-built debugging functionality to run a program in debugging mode.
- 17. Arguments in Python are passed by reference. If you change parameter refers in the function, it will reflect back in the function

```
price_fruits={'orange':2,'banana':1,'grapes':4,'strawberry':5}
def test(student):
    new={'clementine':3,'apple':4}
    price_fruits.update(new)
    print("Inside the function",price_fruits)
    return
test(price_fruits)
print("outside the function:",price_fruits)
```

18. Dictionnaries stores a collection of labelled item where each item has a key and a value. The following is a dictionnary

```
ample_dict = {
"name": "Lisa",
"age":25,
"salary": 50000,
```

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```
List comprehensions provide a concise way to create lists the following example calculates the power of 3 of each item in my_list my_list=[1,2,3,4,5] power=list(map(lambda x:pow(x,3),my_list))
```

- 19. A namespace is a collection of names and information of the objects referenced by the name
- 20. The pass is a statement which doesn't do anything; It avoids getting error when empty code is not allowed lie in loops definition
- 21.A unit test ensures that each part of the code delivers the desired output. In unit testing, developers only look at the interface and the specification for a component.
- 22. Slicing creates a new substring from the source string and the original string remains unchanged.
- 23.Index are used in array to pick item in the array, it start from 0 at the beginning of the array (from the left to the right) while negative indexes start from where the arrays ends,
- 24. Ternary operators called as well conditional operators are operators based on a condition being true or false

```
Example below :
  new_list = []

for word in ['cat', 'dog', 'rat', 'cow']:
    if word != 'rat':
       new_list.append(word)

print(new_list)
```

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"city": "London"

print(power)

- 25.*args is a non keyword arguments and **kwargs is a keyword arguments We use *agrs and **kwargs as an argument when we are unsure about the arguments numbers to pass in the function
- 26. range returns a Python list object while xrange returns an xrange objects
- 27.Flask is a micro web framework that provides useful tools and features to create web applications easily in Python
- 28. **Cluster INDEX**: A cluster index is the table itself, which enforces the order of the rows in the table.
 - A non-clustered index doesn't sort the physical data inside the table.
- 29.In a database, a deadlock is an unwanted situation in which two or more transactions are waiting indefinitely for one another to give up locks
- 30.in A database, a livelock is an unwanted situation in which two or more programs state change constantly therefor the same interaction repeats again and again and the program is running without stopping,

2, Python string methods

METHOD	DESCRIPTION	EXAMPLE
capitalize()	The first character is	txt = "i HATE My life!"
	converted to upper	x = txt.capitalize()
	case and the rest are	print (x)
	converted to lower	output:
	case	I hate my life!
casefold()	The all string is	txt = "I HATE MY LIFE SO
casefold()		txt = "I HATE MY LIFE SO MUCH"
casefold()	The all string is converted in lower	

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center()	The center() method will	txt = "i hate my life"
	center align the string,	x = txt.center(20)
		print(x)
count()	Count() will count the	txt = "I hate my life, my life is
Count()		a joke"
	number of time a	x = txt.count("life")
	value appears	print(x)
endswith()	The endswith()	txt = "I hate my life !"
	returns True if the	x = txt.endswith("!") print(x)
	string ends with a	
	specific value,	
	otherwise, it will	
	return False	
find()	Finds() returns the	txt = "i hate my life."
	first occurrence of	
	value of a specific	x = txt.find("hate")
	value, otherwise, it	print(x)
	will return -1 if the	
	value is not found	
format()	Format() allows to put	
	the specified value	age = 23
	within a string	output = '{} is {} years
	placeholder	old'.format(user_name, age)
		print(output

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index()	index() returns the	fruits = ['apple', 'banana',
	position at the first	'cherry']
	occurrence of the specified	
	value in a list	x = fruits.index("cherry")
		print(x)
		110
isalnum()	Isalnum returns true	txt = "ihatemylife" txt2="i hate my life"
	if all characters are	x = txt.isalnum()
	alphanumeric	x2=txt2.isalnum()
	•	print(x)
		print(x2)
isalpha()	Isalpha returns true if	txt = "Hanitra"
	all characters are	txt2="Hanitra5"
	alphabet letters	x = txt.isalpha() x2=txt2.isalpha()
	dipridate letters	print(x)
		print(x2)
isdigit()	Isdigit returns true if	txt = "55778"
	all characters are	txt2="Hanitra5"
		x = txt.isdigit()
	digits,	x2=txt2.isdigit() print(x)
		print(x2)
islower()	islower returns true if	txt = "I hate my life"
	all characters are in	txt2="i hate my life"
		x = txt.islower()
	lower case,	x2=txt2.islower()

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isnumeric()	isnumeric returns	<pre>print(x) print(x2) txt = "I hate my life" txt2="15555"</pre>
	true if all characters are numeric	x = txt.isnumeric() x2=txt2.isnumeric() print(x) print(x2)
isppace()	isspace returns true if all characters are whitespaces	<pre>txt = "I hate my life" txt2=" " x = txt.isspace() x2=txt2.isspace() print(x) print(x2)</pre>
join()	Takes all items in an iterable and join them into one string,	<pre>myTuple = ("I", "hate", "my","life") x = " ".join(myTuple) print(x)</pre>
lower()	The lower converts a all string in lower case	<pre>txt = "I HATE my LIFE" x = txt.lower() print(x)</pre>

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Istrip()	Lstrip removes any	txt = " hate"
	leading characters as	
	_	x = txt.lstrip()
	space	
		print("i", x, "my life")
replace()	Replace replaces a	txt = "I hate my life"
	value by another	
		x = txt.replace("hate", "love")
	value	
		print(x)
rsplit()	Rsplit splits a string	txt = "i hate my life"
	into a list	
		x = txt.rsplit()
		print(x)
split()	split splits a string	txt = "i hate my life"
	into a list	
		x = txt.split()
		print(x)
splitlines()	The splitlines() method	txt = "i hate my life"
	splits a string into a list.	

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	The splitting is done at line breaks.	
		print(x)
startswith()	Startswith returns true if the strings start with the	txt = "i hate my life" txt2 = "Hello, welcome to my world."
	specified value	<pre>x = txt.startswith("Hello") x2 = txt2.startswith("Hello") print(x) print(x2)</pre>
strip()	Strip() removes any leading and trailing characters as spaces	<pre>txt = " hate " x = txt.strip()</pre>
		print("I", x, "my life")
swapcase()	Swapcase converts all characters in lower	txt = "I HATE my life" x = txt.swapcase()
	and all characters in upper case to lower	print(x)
title()	case Title() converts every	txt = "i hate my life"
	first character of a word in upper case	x = txt.title()

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	print(x)
Jper() converts all	txt = "i hate my life"
characters in a string	
n upper case	x = txt.upper()
	print(x)
2	haracters in a string

3,Python list methods

Method	Description	Example
append()	Append() appends an	fruits = ["apple",
	item at the end of a	"banana", "cherry"]
	list	
		fruits.append("orange
		")
		print(fruits)
clear()	The clear() method	fruits =
	removes all the elements	['apple', 'banana', 'cherry',
	from a list.	'orange']
		fruits.clear()
copy()	The copy() method returns	
	a copy of the specified list.	fruits = ['apple', 'banana',
		'cherry', 'orange']

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		<pre>x = fruits.copy() print(x)</pre>
count()	the count() method returns the number of elements with the specified value.	<pre>fruits = ['apple', 'banana', 'cherry'] x = fruits.count("cherry") print(x)</pre>
extend()	The extend() method adds the specified list elements (or any iterable) to the end of the current list.	<pre>fruits = ['apple', 'banana', 'cherry'] cars = ['Ford', 'BMW', 'Volvo'] fruits.extend(cars) print(fruits)</pre>
index()	The index() method returns the position at the first occurrence of the specified value.	<pre>fruits = ['apple', 'banana', 'cherry'] x = fruits.index("cherry") print(x)</pre>
insert()	the insert() method inserts the specified value at the specified position.	<pre>fruits = ['apple', 'banana', 'cherry'] fruits.insert(1, "orange") print(fruits)</pre>
pop()	The pop() method removes the element at the specified position.	fruits = ['apple', 'banana', 'cherry']

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remove()	The remove() method removes the first occurrence of the element with the specified value.	<pre>fruits.pop(1) print(fruits) fruits = ['apple', 'banana', 'cherry'] fruits.remove("banan a") print(fruits)</pre>
reverse()	The reverse() method reverses the sorting order of the elements.	<pre>fruits = ['apple', 'banana', 'cherry'] fruits.reverse() print(fruits)</pre>
sort()	The sort() method sorts the list ascending by default.	<pre>cars = ['Ford', 'BMW', 'Volvo'] cars.sort()</pre>
		print(cars)

4,Python tuple methods

Method	description	example
count()	The count() method	thistuple = (1, 3, 7, 8, 7, 5, 4,
	returns the number of	6, 8, 5)
	times a specified value	x = thistuple.count(5) print(x)
	appears in the tuple.	princ(x)
index()	The index() method finds	#index

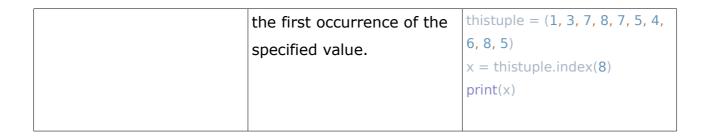
References

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5, Python dictionnary methods

Methods	Description	Example
clear()	The clear() method removes all the elements from a dictionary.	<pre>car = { "brand": "Ford", "model": "Mustang", "year": 1964 } car.clear() print(car)</pre>
copy()	The copy() method returns a copy of the specified dictionary.	<pre>car = { "brand": "Ford", "model": "Mustang", "year": 1964 } x = car.copy() print(x)</pre>
fromkeys()	The fromkeys() method returns a dictionary with the specified keys and the	<pre>x = ('key1', 'key2', 'key3') y = 0 thisdict = dict.fromkeys(x, y)</pre>
	specified value.	print(thisdict)

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get() items()	The get() method returns the value of the item with the specified key. he items() method returns a view object. The view object contains the key-value pairs of the dictionary, as tuples in a list.	<pre>car = { "brand": "Ford", "model": "Mustang", "year": 1964 } x = car.get("model") print(x) car = { "brand": "Ford", "model": "Mustang", "year": 1964 } x = car.items()</pre>
		print(x)
keys()	The keys() method returns a view object. The view object contains the keys of the dictionary, as a list.	<pre>car = { "brand": "Ford", "model": "Mustang", "year": 1964 } x = car.keys() print(x)</pre>
pop()	The pop() method removes the specified item from the	<pre>car = { "brand": "Ford", "model": "Mustang",</pre>

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	dictionary.	"year": 1964
	dictional y.	}
		car.pop("model")
		print(car)
popitem()	The popitem() method	car = {
	removes the item that was	"brand": "Ford",
	last inserted into the	"model": "Mustang",
	dictionary	"year": 1964
		}
		car.popitem()
		print(car)
setdefault()	The setdefault() method	car = {
	returns the value of the	"brand": "Ford",
	item with the specified	"model": "Mustang",
	key.	"year": 1964
		}
		x =
		car.setdefault("model", "Br
		onco")
		print(x)
update()		car = {
	The update() method	"brand": "Ford",
	inserts the specified items to the dictionary.	"model": "Mustang",
		"year": 1964
		}
		car.update({"color": "White

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		"})
		print(car)
values()	values() method returns	sales = { 'apple': 2, 'orange':
	a view object that	3, 'grapes': 4 }
	displays a list of all	print(sales.values())
	values in a given	princ(sales.values())
	dictionary.	

6,Python set methods

Method	Description	Example
add()	Add an item to a set, using the add() method:	<pre>thisset = {"apple", "banana", "cherr y"} thisset.add("orange") print(thisset)</pre>
clear()	The clear() method removes all elements in a set.	<pre>fruits = {"apple", "banana", "che rry"} fruits.clear() print(fruits)</pre>
copy()	The copy() method copies the set.	#copy fruits = {"apple", "banana",

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		"cherry"}
		x = fruits.copy()
		print(x)
difference()	The difference() method returns a set that contains the difference between two sets.	<pre>#difference x = {"apple", "banana", "cherry"} y = {"google", "microsoft", "apple"} z = x.difference(y)</pre>
		print(z)
intersection()	The intersection() method returns a set that contains the similarity between two or more sets.	<pre>x = {"apple", "banana", "cherry"} y = {"google", "microsoft", "apple"} z = x.intersection(y) print(z)</pre>
issubset()	Return True if all items in	x = {"a", "b", "c"}
	set x are present in set y:	y = {"f", "e", "d", "c", "b", "a"} z = x.issubset(y)

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	T	
		print(z)
issuperset()	Return True if all items	x =
	set y are present in set x:	{"f", "e", "d", "c", "b", "a"} y = {"a", "b", "c"}
		z = x.issuperset(y)
		print(z)
pop()	The pop() method removes	#pop
	a random item from the	fruits = {"apple", "banana",
	set.	"cherry"} fruits.pop()
		print(fruits)
remove()	The remove() method	fruits =
	removes the specified	{"apple", "banana", "cherr
	element from the set.	y"}
		fruits.remove("banana")
		print(fruits)
symmetric_difference	The symmetric_difference(
()) method returns a set that	#symmetricdifference
	contains all items from	x = {"apple", "banana",
	both set, but not the items	"cherry"} y = {"google", "microsoft",
	that are present in both	"apple"}
	sets.	

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		<pre>z = x.symmetric_difference(y) print(z)</pre>
union()	The union() method returns a set that contains all items from the original set, and all items from the specified set(s).	<pre>x = {"apple", "banana", "cherr y"} y = {"google", "microsoft", "ap ple"} z = x.union(y)</pre>

7,Python file methods

Methods	Description	Example
read()	The read() method returns	f = open("demofile.txt", "r")
	the specified number of	<pre>print(f.read())</pre>
	bytes from the file	
readline()	The readline() method	f = open("demofile.txt", "r")
	returns one line from the	<pre>print(f.readline())</pre>
	file.	
readlines()	The readlines() method	f = open("demofile.txt", "r")
	returns the content of the	<pre>print(f.readlines())</pre>
	file line by line	
write()	Create a file and	poem="this is a file"
		f = open("demofile.txt", "w")

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	write inside the file	<pre>print(f.write(poem))</pre>
writelines()	Rewrite inside the file	
		poem="this is a file 2"
		f = open("demofile.txt", "w")
		<pre>print(f.writelines(poem))</pre>

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