1st Intilaq DSA Test (QCM) : Correction

Of python, algorithmic and maths skills

Word or concepts followed by stars (*) are explained or reminded in the last page of this test.

All the following questions have one or multiple right choices.

I. Python Introduction

1. Python is .... ?

- An Interprated typed programming language
- A compiled non-typed programming language
- An Interprated non-typed programming language
- A compiled typed programming language

Python est considéré comme un language fortement typé du point de vue utilisateur mais faiblement typédu point de vue de l'interpreteur ou du point de vue du compilateur (parce que oui ! il y a un compilateur python).

2. Which programming paradigms can python understands?

- Only the object-oriented programming paradigm.
- The object-oriented and functional paradigm.
- The procedural and declarative paradigm.
- Only the procedural and the object-oriented programming paradigm.

3. Python is a high level language built using?

- The C language
- The Java language
- The Caml language
- Unix shell language

Il existe d'autres versions de python dont l'interprêteur est écrit en d'autres languages.Par exemple, l'interprêteur Jython (JPython) est écrit en Java pour être exécuté sur une machine virtuelle java. Mais le python (appelé aussi CPython) est écrit en C.

4. Which reason(s) from the following made Python popular around the IT glob ?

- The easy portability of python programs
- The optimisation and execution speed of python programs
- The open-source aspect of python libraries
- The developing speed compared to other languages

II. Python Basic Programming

1. After executing the three following python lines: a = 2; a += 2; b = 4; which statement (s) return(s) True?

- id(a) != id(2)
- id(b) == id(a)
- a is b
- a == b

2. Python uses lists to store integer-indexed objects. What is the equivalent type in C++ ? Justify your answer.

- Chained lists
- Tables

Justification: Du point de vue architecture informatique et algorithmique, une liste en python peut être vue comme étant une liste-chainée (ou un vecteur, défini dans la bibliothèque d'entête vector.hpp en C++) car elle n'a pas de taille fixe, alors qu'un tableau a une taille fixe. Du point de vue utilisateur, son equivalent est un tableau car ils sont tous les deux indexés par des entiers.

3. What are the base differences between a list and a set in Python?

- A list has infinite size (limited by ram only) while set has a fixed length.
- A set consider duplicated objects as one.
- Only a list can be iterated but trying to iterate over a set returns an error
- A set is String-indexed while a list is integer indexed

4. Which one(s) of the next does not support item assignments?

- Strings
- Dicts
- Sets
- Tuples

5. A dict object is a container with indexes that can be:

- A string
- An integer
- Another dict
- A class

6. What is the correct syntax(s) to slice a list in python and get the first 10 indexed objects?

- List[0:10]
- List[0:9]
- List[:10]
- Sorted(List)[0:10]

7. What would contain the 'lst' variable after the following code execution : lst = [1,2,3]*2 ?

- This will raise an error
- Lst contains [2,4,6]
- Lst contains [1,2,3,1,2,3]
- Lst contains [[1,2,3],[1,2,3]]

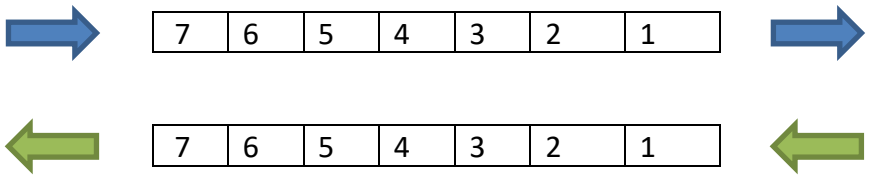
III. Python built-in and common functions

1. What method to use on list to append multiple elements at the end of it?

- Append
- Extend
- Postpend

2. We need to use a list as a FIFO* buffer. What combination will we use?

- Append at the end of the list and pop from its beginning
- Append at the end of the list and pop from its end
- Append at the beginning of the list and pop from its end
- Append at the beginning of the list and pop from its beginning



3. What does the built-in function zip(list1,list2) do ?

- Returns a compressed zip file
- Merge the two lists list1 and list2
- Return an iterator over the doubles (list1[i],list2[i])

4. Which python call returns a file wrapper object that allows reading from a file at 'file_path':

- Open('file_path','r')
- Open('file_path','a')
- Open('file_path','wb')
- Open('file_path','rb')

5. The following call : list(filter(lambda x: x%2==0,[2,4,5])) returns …

- 2
- [2]
- [2,4]
- (2,4)

IV. Python Object Oriented Programming

1. Which function is executed by python when instantiating an object of class type 'C'?

- C.__call__(self)
- C.__self__(self)
- C.__start__(self)
- C.__init__(self)

2. In python, what is the difference between a function and a method?

- A function can't modify an object attribute while a method can.
- A method is bound to a specific object instance.
- A function is bound to a specific object instance.
- A method can't be called outside a class.

3. Which method signature is unadvised?

- def function(self,var='')
- def function(self,var=[])
- def function(self,var={})
- def function(self,var=None)

https://github.com/AttilaDSA/IntilaqDSAcademy/blob/master/Python%20Labs/Lab%202/Python-OOP-Stanford.pdf

Le 2eme exemple de la classe "dogs".

4. When a python class 'C' inherits from a base class 'B' …

- All objects of type B can execute methods declared in the C class
- All objects of type C can execute methods declared in the B class
- All method declared in the B class must be rewritten in the C class
- A B-class object is at the same time C-class object and a C-class object is at the same time a B-class object

5. Which of the following class related features python allows?

- Change dynamically the base class of an object.
- Add attributes dynamically to a class
- Add methods dynamically to a class
- Change privacy state of a class attribute dynamically

V. Python Pandas

1. Python pandas allows its users to create a Data Frame from…

- A dict
- A nested dict
- A list
- A csv file

2. What method bound to a pandas DataFrame object shows its first lines?

- Sort
- Head
- Iter_rows

3. Which method allows loading a csv file into a pandas DataFrame object?

- From_csv
- Read_csv
- Load_csv

4. Which method sorts the values of a column 'C' of a DF from the biggest value to the smallest value?

- DF.sort_values('C')
- DF.sort_values('C',ascending=True)
- DF.sort_values('C',ascending=False)

La valeur par default du parameter ascending est True.

5. What operations may require data cleaning before executing them into a DataFrame?

- Changing column name
- Sorting a column values
- Indexing a DataFrame

6. Which of the following syntaxes are the correct ones fi we want to select rows where the value of 'name' is 'unknown'?

- DF[DF['name'] == 'unknown']
- DF['name'] == 'unknown'
- DF['name' == 'unknown']

7. When converting a column from its type to another type, which value of the 'error' argument allows the program to continue its execution even in case of conversion failure?

- Coerce
- Stop
- Ignore

Coerce : a la fin de la conversion le data type de la colonne change même s'il y a des erreur de conversion de certains champs.
Ignore : le data type de la colonne devient de type object si la conversion de certains champs échoue.

VI. Algorithms and Data structures

1. Which properties from the following does a listed chain have?

- Insert an element at a certain position without having to move other items in the list
- Remove an element at a certain position without having to move other items in the list
- Directly access an element given its position in the list
- Instant access to the last appended element

2. We want to implement a program that uses a LIFO* Buffer. What data structure is best suited for this? Justify your choice

- A chained list
- A double chained list
- A Binary Tree

Justification: Un seul pointeur est essentiel a cette operation. On empile et on dépile depuis la tête de la liste sans besoin de conserver un pointeur sur la queue de la liste.

3. We want to implement a program that uses a FIFO* Buffer. What data structure is best suited for this? Justify your choice

- A chained list
- A double chained list
- A Binary Tree

Justification: Dans une liste FIFO, nous avons besoin de conserver deux pointeurs dans les deux sens.

4. We want to implement a program that uses a search algorithm to go through collected data. What data structure is best suited for this? Justify your choice

- A chained list
- A double chained list
- A Binary Tree

Justification: L'architecture d'un arbre binaire permet de trouver un noeud recherché sans passer par tout les noeuds. Celle d'une liste chainée ou doublement chainée oblige les algorithmes de recherche à parcourir tous les noeuds qui séparent le noeud de départ et le noeud recherché.

VII. Algorithms and Complexity

1. Which resources are impacted when lowering an algorithm complexity

- CPU usage
- Memory Usage
- Hard Drive Capacity
- Execution Time

L'usage de la CPU dépend de la machine ou bien de la manière d'écrire les instructions suivant le language de programmation choisi. Un algorithme ne comprend ni syntaxe, ni language machine. C'est un ensemble d'instructions, de structures conditionnelles, de boucles et de définition de structures de données qui décrit la logique de mémorisation et la logique de fonctionnement d'un programme.

2. Which sorting algorithm of the following is the least time-consuming?

- Bubble Sorting (Tri à bulles) **
- Insertion Sorting (Tri par insertion) **
- Selection Sorting (Tri par selection) **

3. Which sorting algorithm of the following has the most memory usage?

- Bubble Sorting (Tri à bulles) **
- Insertion Sorting (Tri par insertion) **
- Selection Sorting (Tri par selection) **

4. Which storage structure consumes the least RAM space

- Chained Lists
- Binary Trees
- Files
- Double Chained Lists

5. An algorithm contains 3 nested loops: loop3 inside loop2 and loop2 inside loop1. Which must be the priority when looking to optimize the algorithm?

- Loop3
- Loop2
- Loop1
- Depends on the algorithm

VIII. Algorithms and Parallelism

1. A Mono core computer is running windows media player while its user is reading a word file. These two programs are run by…

- Different Threads
- Different Process'

2. What are the differences between a Thread and a Process?

- A thread runs exactly at the same time than the main program while a process shares alternatively the CPU time with the main program.
- A process runs exactly at the same time than the main program while a thread shares alternatively the CPU time with the main program.
- Threads need Synchronisation when sharing variables between them while process does not.
- A Process has its own data stack and its own instructions stack while a Thread only has its own data stack and shares the same instruction stack with its parent program.

Les threads ont besoin d'une synchronisation entre eux car dans le cas de partage de données, ils peut arriver que la machine arrête le thread 1 au plein milleu d'un traitement d'une donnée x et donne la main au thread 2 qui commence à exloitre cette même donnée x (le fonctionnement du système sera donc altéré).

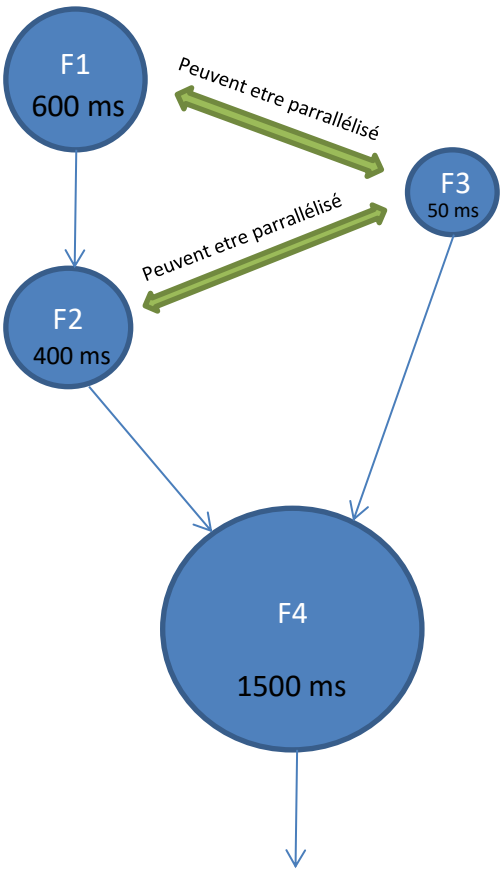
3. A python program executes a loop where each iteration is independent from the rest. The best way to gain time is to...

- Dispatch iteration over multiple threads
- Dispatch iteration over multiple process'

Justification: Comme spécifié dans la question précédente, seuls les processus permettent une réelle parraléllisation du traitement (idéalement utilisée lorsque les iterations sont indépendantes)

4. A python program contains the four following functions: f1,f2,f3 and f4. F1 consumes 600 ms of CPU time and is independent from the rest. F2 takes as parameter the result returned by F1 and consumes 400 ms of CPU time. F3 is independent from the rest and takes 50 ms of CPU time. F4 take as parameters the results returned by F2 and F3 and consumes 1500 ms of CPU time.
Which function should we assign to a parallel process in order to optimize the execution time of the entire program?

- F1
- F2
- F3
- F4


F1
600 ms
Peuvent etre parrallélisé
F3
50 ms
Peuvent etre parrallélisé
F2
400 ms
F4
1500 ms