Assignment 1

OPS435 Assignment 1
2020 Semester

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Due Date

Feb 14, 2020

Before End of Day

Upload your algorithm, python script, and test results

On Blackboard

Problem Statement

Take **a date** as a string in "YYYY-MM-DD" format and a **number of day before** or **after** (+/- n) the given date as the command line arguments,

calculate and output to the standard output data channel **the requested date**, which is the number of days **before** or **after** the given date in the same format.

Script Development Cycle

- Design an algorithm (step-by-step instruction) which solve a given computation problem
- Convert the algorithm into a scripting language (one task at a time if the language support function)
- Formula test cases and execute each test and document the results

Script Development Cycle (2)

- Document the scripts and functions (in python, you should use the built-in docstring to make it easy for other to access and use your codes, examples to follow)
- Release and maintenance

Rephrase the Computation problem of Assignment 1

- We are provided with two data items:
  - A given date as as a string in YYYY-MM-DD format, e.g. 2019-09-15
  - A given integer number -/+ n, which indications the number of days before or after the above given date
- We are asked to
  - Calculate the target date of the day which is -/+ n days (before or after) from the given date
  - Output the target date in YYYY-MM-DD format

Algorithm for Assignment 1
First try

- Take the first data item YYYY-MM-DD (e.g. 2019-01-20), remove the two '-' and convert it to an integer
- Take the second data item N and convert it to an integer (could be a positive or negative number)
- Add the 2nd integer to the 1st integer and assign the result to another integer object named “result”
- Convert the “result” integer object to a string object and insert two '-', one between 'YYYY' and 'MM', the other between 'MM', and 'DD', and send it to the standard output

Convert the algorithm to Python Codes

```
#! /usr/bin/env python3
import sys
first_number = int(sys.argv[1].replace('-',''))
second_number = int(sys.argv[2])
result = str(first_number + second_number)
print(result[0:4]+'-'+result[4:6]+'-'+result[6:])
```

Test and test results

```
>python3 a1_rchan.py 2019-01-20 1
2019-01-21
>python3 a1_rchan.py 2019-01-20 2
2019-01-22
>python3 a1_rchan.py 2019-01-20 15
2019-01-35
```

Test and test results

```
>python3 a1_rchan.py 2019-01-20 -1
2019-01-19
>python3 a1_rchan.py 2019-01-20 -2
2019-01-18
>python3 a1_rchan.py 2019-01-20 -30
2019-00-90
```

More tests

```
>python3 2019-01-31 1
????
>python3 2019-02-28 1
????
>python3 2019-12-31 2
????
```

More tests

```
>python3 2019-10-01 -1
????
>python3 2019-01-01 -1
????
>python3 2019-03-01 -1
????
```

Errors?

Conclusion:

- Syntax error? – No
- Runtime error? – No
- Logical error? – YES!

Debug and Update

- The original algorithm works only in very limited cases
- Logical error is identified and should be fixed
- The original algorithm does not pay attention to the maximum number of days each month has, and the maximum number of days of February depends even on the year of the given date.
- The algorithm needs to be re-designed or refined.

Breaking down the original computation task into smaller tasks

- Reduce the complexity of the original computation problem into smaller tasks by performing date calculation one day at a time and create a function for that task:
  - (a) after() - calculate the date for the next day of the given date → i.e. tomorrow, or day after
  - (b) before() - calculate the date for the previous day of the give date → i.e. yesterday, day before
  - (c) repeat (a) or (b) a given number of times based on the value of the 2nd number

Algorithm for computing the next day of a given date

This is one of the main tasks for assignment 1

- Study the bash script and/or the python function after() for computing the next date for a given date in “YYYY-MM-DD”
- Take into consideration the maximum number of days for each month, including which year the month is in.
- Write a detail algorithm for computing the next date of a given date.

Algorithm for computing the date for the previous day of a given date

Another major task of assignment 1 - before().

- Same as computing the date for the next day for a given date in “YYYY-MM-DD” format. Write a detail algorithm for computing the date before a given date in “YYYY-MM-DD” format.

Other functions

Other possible sub-tasks:

- dbda()
- leapyear()
- validdate()
- usage()

Documentation

- Doctstring – ''' documentation text '''
- Script level
- Function level

- Examples on how to do it in class

Doctstring – single line

```
#!/usr/bin/env python3
'''put your docstring here for your script '''

def func1():
    '''put your docstring for func1 here'''
    ...
    return

Def func2():
    '''put your docstring for func2 here'''
    ...
    Return

if __name__ == '__main__':
    ...
    Main block of code
```

Docstring – multi-lines

```
#!/usr/bin/env python3
'''
put your multi-lines docstring for your script
Here, as many lines as you need. Tell the user
mainly what your script can do, and how to use
it.
'''
Def func1():
    ''' multi-lines docstring for func1 here
        As many lines as you need.
    '''
```

Releasing your code

- Add codes to your script to enable other users to reuse the functions that you have created for this assignment by importing your script.

- The use of the

  “`if __name__ == '__main__':`”

  block

Questions / Answers