UNIVERSITY OF CALOOCAN CITY
COMPUTER ENGINEERING DEPARTMENT

Data Structure and Algorithm

Laboratory Activity No. 8

Stacks

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I. Objectives

Introduction

A stack is a collection of objects that are inserted and removed according to the last-in, first-out (LIFO) principle.

A user may insert objects into a stack at any time, but may only access or remove the most recently inserted object that remains (at the so-called “top” of the stack)

This laboratory activity aims to implement the principles and techniques in:

- Writing Python program using Stack
- Writing a Python program that will implement Stack operations

II. Methods

Instruction: Type the python codes below in your Colab. After running your codes, answer the questions below.

```
# Stack implementation in python


# Creating a stack
def create_stack():
    stack = []
    return stack


# Creating an empty stack
def is_empty(stack):
    return len(stack) == 0

# Adding items into the stack
def push(stack, item):
    stack.append(item)
    print("Pushed Element: " + item)

# Removing an element from the stack
def pop(stack):
    if (is_empty(stack)):
        return "The stack is empty"
    return stack.pop()

stack = create_stack()
push(stack, str(1))
push(stack, str(2))
push(stack, str(3))
push(stack, str(4))
push(stack, str(5))

print("The elements in the stack are:"+ str(stack))
```

Answer the following questions:

1. Upon typing the codes, what is the name of the abstract data type? How is it implemented?
2. What is the output of the codes?
3. If you want to type additional codes, what will be the statement to pop 3 elements from the top of the stack?
4. If you will revise the codes, what will be the statement to determine the length of the stack? (Note: You may add additional methods to count the no. of elements in the stack)

III. Results

1. The name of the abstract data type is Stack which is a linear data structure that uses the LIFO principle and it is implemented using a list and it is used on append and pop methods.

2. The output of the code is

Pushed Element: 1

Pushed Element: 2

Pushed Element: 3

Pushed Element: 4

Pushed Element: 5

The elements in the stack are:['1', '2', '3', '4', '5']

3. I would pop the item one by one by using the pop function.

element1 = pop(stack)

element2 = pop(stack)

element3 = pop(stack)

4. I would use the python built-in function len to check the length of the stack.

len(stack)

IV. Conclusion

In this Laboratory Report 8, I've learned to apply the stack principle into a python program as well as to analyze it. I have identified what data types are used as well as problem solving. I have to weigh which is better, by adding another function or just using the python built-in function on problem number 4. I chose to just use the python built-in function "len" directly. And also by using the pop function I was able to remove the 3 items starting from top in the list of stacks. Overall, I was able to apply and learn as well as to use my knowledge and experience to solve the problems on stacks.

References

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[2] *W3Schools.com*. (n.d.). https://www.w3schools.com/python/ref_func_len.asp

[3] *W3Schools.com*. (n.d.-b). https://www.w3schools.com/python/python_dsa_stacks.asp