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:

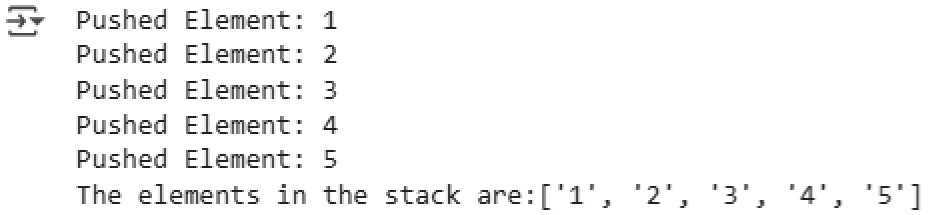
1 Upon typing the codes, what is the name of the abstract data type? How is it implemented?
2 What is the output of the codes?
3 If you want to type additional codes, what will be the statement to pop 3 elements from the top of the stack?
4 If you will revise the codes, what will be the statement to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

III. Results

Answers:

1. This code creates a Stack. The stack works like a stack of plates: you can only add a new plate to the top, and you can only take a plate off from the top. This is known as Last-In, First-Out (LIFO). The code uses simple list commands to make this work is Push and Pull. Push uses append() to add item to the end of the list and Pop uses pop() to remove the item from the list.

2. Output:



```
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. To pop 3 elements from the top of the stack I will use this :

```
for i in range(3):
        print(pop(stack))
```

It can remove the 3 elements at the top and see what's are being remove.

4. To determine the length of the stack, I can just use the built-in len() function directly. After executing the provided code that pushing five elements, using this :

```
print("Length of stack:", len(stack))
```

the output would be 5, determining the number of the items.

IV. Conclusion

In conclusion, this code successfully implements a stack using a Python list demonstrating LIFO operations with push and pop methods. With the given questions I was able to answer them based on my own understanding and execute them. I was able to answer it because I have already have basic understanding of stacks from the past lessons and also other functions.

References

[1] Co Arthur O.. “University of Caloocan City Computer Engineering Department Honor Code,” UCC-CpE Departmental Policies, 2020.