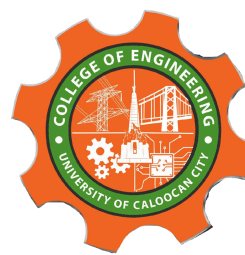




UNIVERSITY OF CALOOCAN CITY
COMPUTER ENGINEERING DEPARTMENT



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

```
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']
```

Figure 1 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']
Length of the stack: 5
```

Figure 2 Determining the Length

ANSWERS:

1. **Upon typing the codes, what is the name of the abstract data type? How is it implemented?**

The abstract data type is called a Stack. It is implemented using a Python list with functions like push to add elements and pop to remove elements, following the Last In First Out (LIFO) rule.

2. **What is the output of the codes?**

```
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. If you want to type additional codes, what will be the statement to pop 3 elements from the top of the stack?**

If I want to pop 3 elements from the top of the stack, I can type
`print(pop(stack))`
`print(pop(stack))`
`print(pop(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)**

If I will revise the codes to know the length of the stack, I can add this method
`def stack_length(stack):`
 `return len(stack)`

Then I will use

`print("Length of the stack: " + str(stack_length(stack)))`

IV. Conclusion

In this activity, I was able to apply the principles of using Stack in Python. I learned how to create a stack, check if it is empty, push elements, and pop elements following the Last In First Out process. By writing the program, I also practiced how stack operations work and how they are implemented in a simple way using lists in Python. This helped me understand not only how to code stack operations but also the importance of stacks in solving problems.