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

- This is a stack data type, It is implemented using append and pop function

2 What is the output of the codes?

```
# Creating a stack
def create_stack():  1 usage
    stack = []
    return stack


# Creating an empty stack
def is_empty(stack):  1 usage
    return len(stack) == 0

# Adding items into the stack
def push(stack, item):  5 usages
    stack.append(item)
    print("Pushed Element: " + item)

# Removing an element from the stack
def pop(stack):  1 usage (1 dynamic)
    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))
```

```
C:\Users\acer\PycharmProjects\pythonProject\.venv\Scripts\python.exe C:\Users\acer\PycharmProject
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?

- You can do it by doing
  Print(“pop element: “ Pop(stack))
  Print(“pop element: “ Pop(stack))
  Print(“pop element: “ 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)

- print("Length of the stack: ", len(stack))

IV. Conclusion

-It shows how to implement stack data type and how append and pop function works

References

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