Data Structure and Algorithm

Laboratory Activity No. 8

Stacks

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# 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

# 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)

# Results

1.) The name of the abstract data type is a Stack. It is implemented using a Python list (stack = []). Lists in Python are dynamic arrays, and the stack operations (push and pop) are implemented using the list's built-in methods

2.) The result shows the pushing of an element and then printing the whole list of elements

A screen shot of a computer

AI-generated content may be incorrect.

3.) To pop 3 elements from the top of the stack, you would need to call the pop(stack) function three consecutive times.

4.) The statement to determine the length of the stack is len(stack). To revise the in order to count the length, is done through this new method:

**def size(stack): return len(stack)**

# Conclusion

In conclusion, this laboratory activity showed the principles and implementation of the Stack abstract data type. The activity involved typing the given Python program to implement fundamental stack operations. The Stack was effectively implemented using a standard Python list (stack = []), with the push and pop operations using the list's built-in methods. The activity also contains the removing of multiple elements. Lastly, the length of the stack can be easily determined using the len(stack) statement.

**References**

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