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

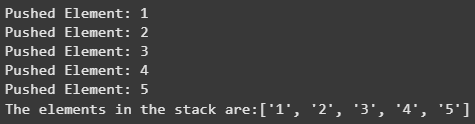
* + 1. The name of the abstract data type is stack and implemented using a python list: create\_stack that initialize a empty list which serves as empty stack, push(stack, item) used to add element to the end of the list, pop(stack) used to remove the last element, and is\_empty(stack) used check if the stack is empty or not.
    2. 

Figure 1. Output

* + 1. A black background with white text

       AI-generated content may be incorrect.

A screenshot of a computer program

AI-generated content may be incorrect.

Figure 2. Screenshot of program

Elements 5, 4, and 3 will be removed, and the stack will only contain 1 and 2.



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AI-generated content may be incorrect.

Figure 3. Screenshot of program

with the use of len(), we can now determine the length of the stack

# Conclusion

This laboratory enhances my understanding of python data structure, especially on stack. This makes me revise the codes by adding a new function to remove the last element and determine the length of the stack. Overall, the activity was fun, and it taught a lot of information in programing.

**References**

[1] “W3Schools.com.” <https://www.w3schools.com/python/python_dsa_stacks.asp>

[2] “Stack data structure and implementation in Python, Java and C/C++.” <https://www.programiz.com/dsa/stack>

[3] S. Gruppetta, “Using the len() Function in Python,” Nov. 16, 2024. <https://realpython.com/len-python-function/>