Data Structure and Algorithm

Laboratory Activity No. 8

Stacks

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| *Submitted by:* | *Instructor:* |
| Elpedes, Glen Jorge A. | Engr. Maria Rizette H. Sayo |

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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 abstract data type used is stack, according to the last in, first out (LIFO) principle, which states that the most recently added item should be removed first, a stack is an abstract data type that arranges elements in a linear order. It is frequently likened to a stack of plates, with new plates being added on top (push) and removed from the top (pop). A list can be used to implement a stack in Python. append adds an item to the top, pop removes the top item, and a length check determines whether the stack is empty. For handling data that must be accessed in reverse order of insertion, this simplifies and expedites stack operations.

A screen shot of a computer

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3. To pop 3 elements from the top the stack, you can use the pop function three times to pop three elements from the top of the stack. The following statements would be used since removal is already handled by your pop function

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4. I revise the codes then I add two functions size(stack) returns the number of items in the stack using len, and clear(stack) uses a loop to remove every item from the stack before printing "Stack cleared. The program displays the stack's contents and size prior to clearing, but after invoking clear(stack), the stack is empty and has a size of 0.

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# Conclusion

In order to comprehend how a stack functions as a data structure, I constructed one in Python and experimented with various operations. In order to demonstrate the last in, first out (LIFO) principle, I first constructed a basic stack that permitted pushing and displaying elements. Later, I enhanced it by including the capability to pop three elements from the top. In order to increase the program's flexibility and usefulness, I also added new functions like size to count the number of items in the stack and clear to remove all elements. With these enhancements, I was able to test a stack's fundamental capabilities while simultaneously adding features that increased its usability and potency.

**References**

[1] GeeksforGeeks, “Stack in Python,” *GeeksforGeeks*, Sep. 13, 2025. <https://www.geeksforgeeks.org/python/stack-in-python/>

[2] GeeksforGeeks, “Implementation of Stack in Python using List,” *GeeksforGeeks*, Jul. 23, 2025. <https://www.geeksforgeeks.org/python/implementation-of-stack-in-python-using-list/>