

IT314 - Software Engineering
Lab 5 - Static Analysis

Name : Parth Prajapati

ID : 202001177

Repository Link used for static analysis :

<https://github.com/geekcomputers/Python>

Tool Used for Static Analysis :

- ***Pylint***

Code file 1:

```
import sys

class colors:
    CYAN = "\033[36m"
    GREEN = "\033[32m"
    YELLOW = "\033[33m"
    BLUE = "\033[34m"
    RED = "\033[31m"
    ENDC = "\033[0m"

def printc(color, message):
    print(color + message + colors.ENDC)

# color which we print or import
printc(colors.CYAN, sys.argv[1])
printc(colors.GREEN, sys.argv[1])
printc(colors.YELLOW, sys.argv[1])
printc(colors.BLUE, sys.argv[1])
printc(colors.RED, sys.argv[1])
```

Static Analysis:

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  JUPYTER: VARIABLES

PS C:\Users\student\Documents\202001177_Lab5> py -m pylint file1.py
***** Module file1
file1.py:22:0: C0304: Final newline missing (missing-final-newline)
file1.py:1:0: C0114: Missing module docstring (missing-module-docstring)
file1.py:4:0: C0115: Missing class docstring (missing-class-docstring)
file1.py:4:0: C0103: Class name "colors" doesn't conform to PascalCase naming style (invalid-name)
file1.py:4:0: R0903: Too few public methods (0/2) (too-few-public-methods)
file1.py:13:0: C0116: Missing function or method docstring (missing-function-docstring)

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Your code has been rated at 6.00/10 (previous run: 6.07/10, -0.07)

PS C:\Users\student\Documents\202001177_Lab5> 
```

Code File 2:

```
class Node:
    def __init__(self, data):
        self.data = data
        self.next = None

class Linked_List:
    def __init__(self):
        self.head = None

    def Insert_At_Beginning(self, new_data):
        new_node = Node(new_data)
        if self.head is None:
            self.head = new_node
            return
        new_node.next = self.head
        self.head = new_node

    def Add_two_no(self, First, Second):
        prev = None
        temp = None
```

```

        carry = 0
        while First is not None or Second is not None:
            first_data = 0 if First is None else First.data
            second_data = 0 if Second is None else Second.data
            Sum = carry + first_data + second_data
            carry = 1 if Sum >= 10 else 0
            Sum = Sum if Sum < 10 else Sum % 10
            temp = Node(Sum)
            if self.head is None:
                self.head = temp
            else:
                prev.next = temp
            prev = temp
            if First is not None:
                First = First.next
            if Second is not None:
                Second = Second.next
        if carry > 0:
            temp.next = Node(carry)

    def Display(self):
        temp = self.head
        while temp:
            print(temp.data, "->", end=" ")
            temp = temp.next
        print("None")

if __name__ == "__main__":
    First = Linked_List()
    Second = Linked_List()
    First.Insert_At_Beginning(6)
    First.Insert_At_Beginning(4)
    First.Insert_At_Beginning(9)

    Second.Insert_At_Beginning(2)
    Second.Insert_At_Beginning(2)

    print("First Linked List: ")
    First.Display()

```

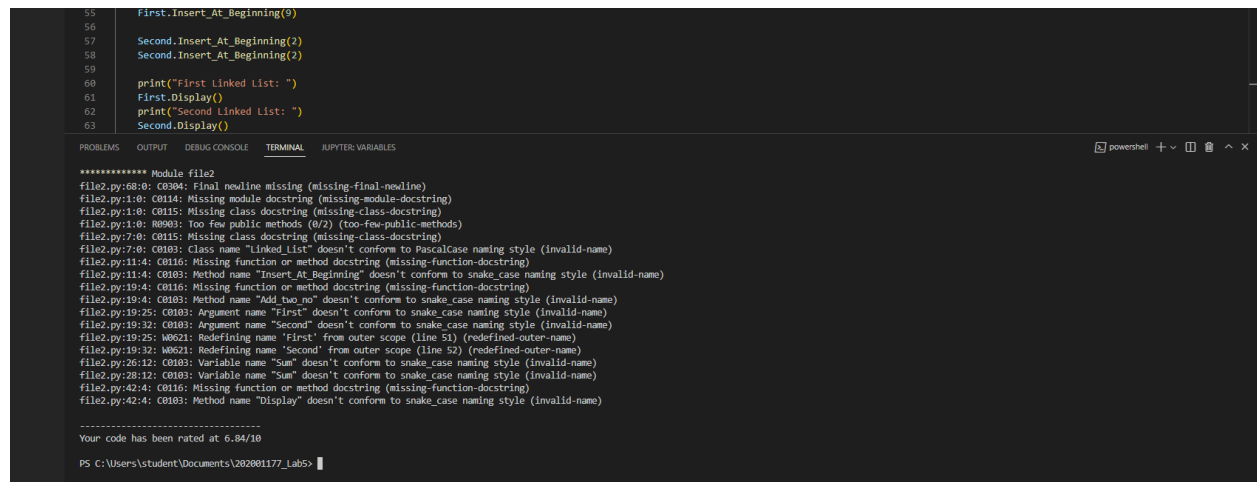
```

print("Second Linked List: ")
Second.Display()

Result = Linked_List()
Result.Add_two_no(First.head, Second.head)
print("Final Result: ")
Result.Display()

```

Static Analysis :



The screenshot shows a code editor with the following Python code:

```

55 First.Insert_At_Beginning(0)
56
57 Second.Insert_At_Beginning(2)
58 Second.Insert_At_Beginning(2)
59
60 print("First Linked List: ")
61 First.Display()
62 print("Second Linked List: ")
63 Second.Display()

```

Below the code, the terminal displays the static analysis results for the file `file2.py`. The results include various linting errors and warnings:

```

***** Module file2
file2.py:68:8: C9304: Final newline missing (missing-final-newline)
file2.py:1:0: C0114: Missing module docstring (missing-module-docstring)
file2.py:1:0: C0115: Missing class docstring (missing-class-docstring)
file2.py:1:0: R0903: Too few public methods (0/2) (too-few-public-methods)
file2.py:7:0: C0115: Missing class docstring (missing-class-docstring)
file2.py:7:8: C0103: Class name "Linked_List" doesn't conform to PascalCase naming style (invalid-name)
file2.py:11:4: C0116: Missing function or method docstring (missing-function-docstring)
file2.py:11:4: C0103: Method name "Insert_At_Beginning" doesn't conform to snake_case naming style (invalid-name)
file2.py:19:4: C0116: Missing function or method docstring (missing-function-docstring)
file2.py:19:4: C0103: Method name "Add_two_no" doesn't conform to snake_case naming style (invalid-name)
file2.py:19:25: C0103: Argument name "First" doesn't conform to snake_case naming style (invalid-name)
file2.py:19:32: C0103: Argument name "Second" doesn't conform to snake_case naming style (invalid-name)
file2.py:19:25: W0621: Redefining name 'First' from outer scope (line 51) (redefined-outer-name)
file2.py:19:32: W0621: Redefining name 'Second' from outer scope (line 52) (redefined-outer-name)
file2.py:26:12: C0103: Variable name "Sum" doesn't conform to snake_case naming style (invalid-name)
file2.py:28:12: C0103: Variable name "Sum" doesn't conform to snake_case naming style (invalid-name)
file2.py:42:4: C0116: Missing function or method docstring (missing-function-docstring)
file2.py:42:4: C0103: Method name "Display" doesn't conform to snake_case naming style (invalid-name)

```

At the bottom of the terminal, it states: "Your code has been rated at 6.04/10" and shows the command prompt: `PS C:\Users\student\Documents\202001177_lab5>`

Code File 3:

```
# It returns location of x in given array arr
# if present, else returns -1
def binary_search(arr, l, r, x):
    # Base case: if left index is greater than right index, element is not
    present
    if l > r:
        return -1

    # Calculate the mid index
    mid = (l + r) // 2

    # If element is present at the middle itself
    if arr[mid] == x:
        return mid

    # If element is smaller than mid, then it can only be present in left
    subarray
    elif arr[mid] > x:
        return binary_search(arr, l, mid - 1, x)

    # Else the element can only be present in right subarray
    else:
        return binary_search(arr, mid + 1, r, x)

# Main Function
if __name__ == "__main__":
    # User input array
    arr = [int(x) for x in input("Enter the array with elements separated
    by commas: ").split(",")]

    # User input element to search for
    x = int(input("Enter the element you want to search for: "))

    # Function call
    result = binary_search(arr, 0, len(arr) - 1, x)
```

```
# printing the output
if result != -1:
    print("Element is present at index {}".format(result))
else:
    print("Element is not present in array")
```

Static Analysis :

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER VARIABLES

PS C:\Users\student\Documents\202001177_Lab5> py -m pylint file3.py

***** Module file3

file3.py:39:0: C0304: Final newline missing (missing-final-newline)
file3.py:1:0: C0114: Missing module docstring (missing-module-docstring)
file3.py:3:0: C0116: Missing function or method docstring (missing-function-docstring)
file3.py:3:23: C0103: Argument name "l" doesn't conform to snake_case naming style (invalid-name)
file3.py:3:26: C0103: Argument name "r" doesn't conform to snake_case naming style (invalid-name)
file3.py:3:29: C0103: Argument name "x" doesn't conform to snake_case naming style (invalid-name)
file3.py:3:18: W0621: Redefining name 'arr' from outer scope (line 27) (redefined-outer-name)
file3.py:3:29: W0621: Redefining name 'x' from outer scope (line 30) (redefined-outer-name)
file3.py:12:4: R1705: Unnecessary "elif" after "return", remove the leading "el" from "elif" (no-else-return)
file3.py:37:14: C0209: Formatting a regular string which could be a f-string (consider-using-f-string)

Your code has been rated at 3.75/10

PS C:\Users\student\Documents\202001177_Lab5> []

Code File 4:

```
from plyer import notification # pip install plyer
import psutil # pip install psutil

# psutil.sensors_battery() will return the information related to battery
battery = psutil.sensors_battery()

# battery percent will return the current battery prcentage
percent = battery.percent
charging = (
    battery.power_plugged
)

# Notification(title, description, duration)--to send
# notification to desktop
# help(Notification)
if charging:
    if percent == 100:
        charging_message = "Unplug your Charger"
    else:
        charging_message = "Charging"
else:
    charging_message = "Not Charging"
message = str(percent) + "% Charged\n" + charging_message

notification.notify("Battery Information", message, timeout=10)
```


Static Analysis :

```
16 21 charging:
17     if percent == 100:

PROBLEMS 2 OUTPUT DEBUG CONSOLE TERMINAL JUPYTER: VARIABLES

PS C:\Users\student\Documents\202001177_Lab5> py -m pylint file4.py
***** Module file4
file4.py:8:12: E0001: leading zeros in decimal integer literals are not permitted; use an 0o prefix for octal integers (<unknown>, line 8) (syntax-error)
PS C:\Users\student\Documents\202001177_Lab5> py -m pylint file4.py
***** Module file4
file4.py:25:0: C0304: Final newline missing (missing-final-newline)
file4.py:1:0: C0114: Missing module docstring (missing-module-docstring)
file4.py:1:0: E0401: Unable to import 'plyer' (import-error)
file4.py:2:0: E0401: Unable to import 'psutil' (import-error)
file4.py:18:8: C0103: Constant name "charging_message" doesn't conform to UPPER_CASE naming style (invalid-name)
file4.py:20:8: C0103: Constant name "charging_message" doesn't conform to UPPER_CASE naming style (invalid-name)
file4.py:22:4: C0103: Constant name "charging_message" doesn't conform to UPPER_CASE naming style (invalid-name)
file4.py:23:0: C0103: Constant name "message" doesn't conform to UPPER_CASE naming style (invalid-name)

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Your code has been rated at 0.00/10

PS C:\Users\student\Documents\202001177_Lab5> 
```

Code file 5:

```
def is_square_free(factors):  
    """  
    This functions takes a list of prime factors as input.  
    returns True if the factors are square free.  
    """  
    for i in factors:  
        if factors.count(i) > 1:  
            return False  
    return True  
  
def prime_factors(n):  
    """  
    Returns prime factors of n as a list.  
    """  
    i = 2  
    factors = []  
    while i * i <= n:  
        if n % i:  
            i += 1  
        else:  
            n //= i  
            factors.append(i)  
    if n > 1:  
        factors.append(n)  
    return factors  
  
def mobius_function(n):  
    """  
    Defines Mobius function  
    """  
    factors = prime_factors(n)  
    if is_square_free(factors):  
        if len(factors) % 2 == 0:  
            return 1  
        elif len(factors) % 2 != 0:
```

```
        return -1

    else:
        return 0
```

Static Analysis :

```
PROBLEMS 2 OUTPUT DEBUG CONSOLE TERMINAL JUPYTER VARIABLES
PS C:\Users\student\Documents\202001177_Lab5> py -m pylint file5.py
***** Module file5
file5.py:40:0: C0304: Final newline missing (missing-final-newline)
file5.py:1:0: C0114: Missing module docstring (missing-module-docstring)
file5.py:12:18: C0103: Argument name "n" doesn't conform to snake case naming style (invalid-name)
file5.py:29:20: C0103: Argument name "n" doesn't conform to snake case naming style (invalid-name)
file5.py:35:8: R1705: Unnecessary "elif" after "return", remove the leading "el" from "elif" (no-else-return)
file5.py:29:0: R1710: Either all return statements in a function should return an expression, or none of them should. (inconsistent-return-statements)

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Your code has been rated at 7.50/10

PS C:\Users\student\Documents\202001177_Lab5> []
```

Analysis of Errors :

| S.No | Message Object | Expansion | Explanation |
|------|----------------|------------|---|
| 1. | C | Convention | It is displayed when the program is not following the standard rules. |
| 2. | R | Refactor | It is displayed for bad code smell |
| 3. | W | Warning | It is displayed for python specific problems |
| 4. | E | Error | It is displayed when that particular line execution results some error |
| 5. | F | Fatal | It is displayed when pylint has no access to further process that line. |