

Problem 1 : Strongly Connected Components – Kosaraju's Algorithm: G-54 Problem

Statement: Given a Directed Graph with V vertices (Numbered from 0 to V-1) and E edges, Find the number of strongly connected components in the graph.

```
from collections import defaultdict
```

```
class Graph:
```

```
    def __init__(self, vertices):
```

```
        self.V = vertices
```

```
        self.graph = defaultdict(list)
```

```
    def add_edge(self, u, v):
```

```
        self.graph[u].append(v)
```

```
    def dfs(self, v, visited, stack):
```

```
        visited[v] = True
```

```
        for i in self.graph[v]:
```

```
            if not visited[i]:
```

```
                self.dfs(i, visited, stack)
```

```
        stack.append(v)
```

```
    def transpose(self):
```

```
        g = Graph(self.V)
```

```
        for i in self.graph:
```

```
            for j in self.graph[i]:
```

```
                g.add_edge(j, i)
```

```
        return g
```

```
    def count_scc(self):
```

```
        stack = []
```

```
        visited = [False] * self.V
```

```
        for i in range(self.V):
```

```

        if not visited[i]:
            self.dfs(i, visited, stack)

    transposed_graph = self.transpose()

    visited = [False] * self.V
    scc_count = 0

    while stack:
        v = stack.pop()
        if not visited[v]:
            transposed_graph.dfs(v, visited, [])
            scc_count += 1

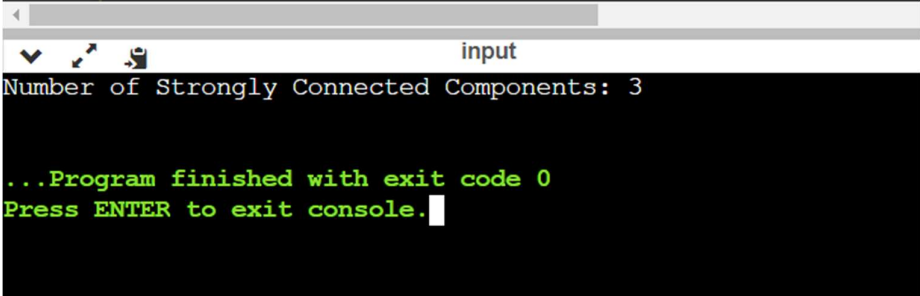
    return scc_count

```

```

V = 5
graph = Graph(V)
graph.add_edge(0, 1)
graph.add_edge(1, 2)
graph.add_edge(2, 0)
graph.add_edge(1, 3)
graph.add_edge(3, 4)
num_scc = graph.count_scc()
print("Number of Strongly Connected Components:", num_scc)

```



The screenshot shows a terminal window with a title bar that includes a close button, a maximize button, and a label 'input'. The terminal output displays the result of the program execution: 'Number of Strongly Connected Components: 3'. Below this, a green message indicates the program has finished successfully with exit code 0 and prompts the user to press ENTER to exit the console.

```

Number of Strongly Connected Components: 3

...Program finished with exit code 0
Press ENTER to exit console.

```