CS515 CS Lab 2
Assignment No: 10

Let $G = (V, E)$ be a directed graph with $|V| = n$ and $|E| = m$. As usual, we take $V = \{1, 2, \ldots, n\}$. It is possible that there are loops and multiple edges. Strongly connected component (SCC) is a maximal subset of vertices V1 such that any two vertices of this subset are reachable from each other,

i.e. for any u, v ε V1: u → v, v → u

where → means reachability, i.e. existence of the path from first vertex to the second.

It is obvious, that strongly connected components do not intersect each other, i.e. this is a partition of all graph vertices.

(i) Write a program to obtain the maximal strongly connected components (SCC) in a directed graph. Maximal strongly connected components is that SCC which has maximum number of nodes.
Implement the algorithm using a function for DFS. The program to be run using command line arguments with the first argument as the **input file name** and the second argument as the **output file name**. Ex.: : ./scc input.txt output.txt

Input: Input is given in a file with first line containing number of vertices (n) followed by the number of edges (m) followed by the graph given as an edge list.

n m

(u v)

Output: Number of strongly connected components (SCC) followed by the maximal strongly connected component (s) .

Example:

Input:

7 9

(1 2), (1 4), (2 3), (3 1), (3 5), (4 3), (5 6), (5 7), (6 7)

Output:

Number of strongly connected components: 4

maximal strongly connected component : 1 2 3 4