Strongly Connected Components

Description A strongly connected component (SCC) of a directed graph $G = (V, E)$ is defined as a maximal set of vertices $C \subseteq V$ such that for every pair of vertices u and v in C, the two vertices are reachable from each other. In this lab assignment, you are asked to decompose a given directed graph $G = (V, E)$ into a collection of SCCs.

Input The input will have the following format. The first integer refers to the number of vertices, i.e. $|V|$. The second integer is the number of edges, i.e. $|E|$. Vertices are indexed by 0, 1, ..., $|V| - 1$. Then, two numbers u v appearing in each line means an edge (u, v). See the example given below.

Output Output the SCC ID of every vertex. A SCC's ID must be the smallest index of any vertex in the SCC. In other words you have to output, for each vertex v, the ID of the unique SCC the vertex v belongs to. You must output the result for each vertex in the order of 0, 1, ..., $|V| - 1$.

Examples of input and output

Input

```
8
13
0 1
1 2
1 4
1 5
2 3
2 6
3 2
3 7
4 0
4 5
5 6
6 5
6 7
```

Output for problem 2

```
0
0
2
2
0
5
5
7
```

What this answer implies is that the graph is decomposed into four SCCs, $\{0, 1, 4\}, \{2, 3\}, \{5, 6\}, \{7\}$. Note that all vertices in the same SCC have the same label, which is equal to the smallest index of all vertices in the same component. For example, vertices 0,1 and 4 are all labeled with 0.

Testing your code Your execution file name must be 'SCC.exe'. Use Grade08 to test your program.

Your solutions Before leaving the lab, submit a zipped tar archive of your program through the assignments page of CatCourse. Please use your UCMNetID as the filename for the zipped tar archive.

Submission As usual, before the posted deadline, submit a .zip or zipped tar archive of your program through the assignments page of CatCourses. Please use your UCMNetID as the filename for the zipped archive. Be careful since CatCourses strictly enforces the assignment deadline. Recall that submission alone is not enough, you must present your work to your TA before submission.

Important Reminder Never change the grading scripts of the files under the "testfiles" folder. If you do so, it will be considered as SERIOUS CHEATING.