1. How to compile.

**gcc hw4.c –o result**

1. How to run

Put hw4.c and data file(hw4.data) in same directory.

./exec\_program\_name data\_file\_name

**./result hw4.data**

1. How it works & Result

First, read the original data file to two-dimension array.

* File open and read using getc function

Then, make adjacency matrix using first data.

And (1)make adjacency list using adjacency matrix.

Through DFS(alphabetical order) for original graph, (2)record discovery time and finish time.

* **Sort** by finish time and put the vertex number to new array.

To transpose the graph, use adjacency matrix.

And (3)new adjacency list of transpose graph is made.

Through DFS in order of decreasing finish-time for transposed graph, (4)record discovery and finish time.

* **Check** the node index that start in main.

Grouping in order array by the node index called in second-DFS of main, put the result to SCC array.

(5)We can find the SCC in this way.

1. Array of adjacency list of given graph

list[0]: A -> B -> C -> F

list[1]: B -> C -> D

list[2]: C

list[3]: D -> A -> C

list[4]: E -> C -> G

list[5]: F -> A -> C

list[6]: G -> D -> E

2. Discovery and finish time of each vertex after step1

A's discovery time is 1

B's discovery time is 2

C's discovery time is 3

D's discovery time is 5

E's discovery time is 11

F's discovery time is 8

G's discovery time is 12

A's finish time is 10

B's finish time is 7

C's finish time is 4

D's finish time is 6

E's finish time is 14

F's finish time is 9

G's finish time is 13

3. Array of adjacency list of transpose graph after step2

new\_list[0]: A -> D -> F

new\_list[1]: B -> A

new\_list[2]: C -> A -> B -> D -> E -> F

new\_list[3]: D -> B -> G

new\_list[4]: E -> G

new\_list[5]: F -> A

new\_list[6]: G -> E

4. Discovery and finish time of each vertex after step3

A's discovery time is 5

B's discovery time is 7

C's discovery time is 13

D's discovery time is 6

E's discovery time is 1

F's discovery time is 10

G's discovery time is 2

A's finish time is 12

B's finish time is 8

C's finish time is 14

D's finish time is 9

E's finish time is 4

F's finish time is 11

G's finish time is 3

5. SCC result

SCC1: vertex C

SCC2: vertex A F D B

SCC3: vertex E G