

# CSC8103 Coursework Report

## Description

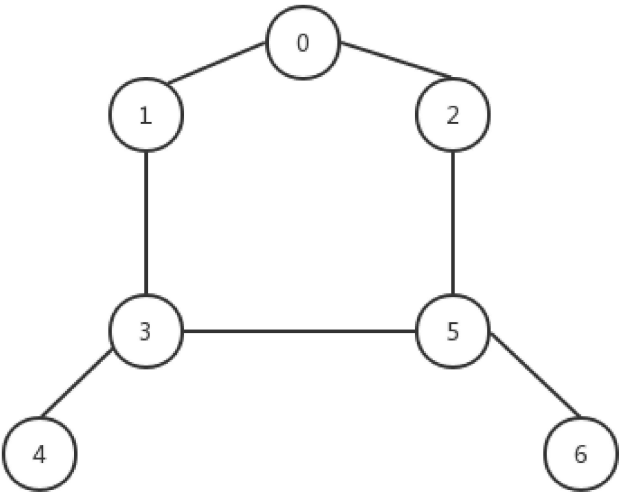
There are 4 structures I used to run the echo algorithm. I used them to do comparative experiments to get a summary of the trend and characteristics of the echo algorithm.

## Experiments and Observations

### Structure 1

This graph is partially connected with 7 nodes. I set it as a reference for the following experiments.

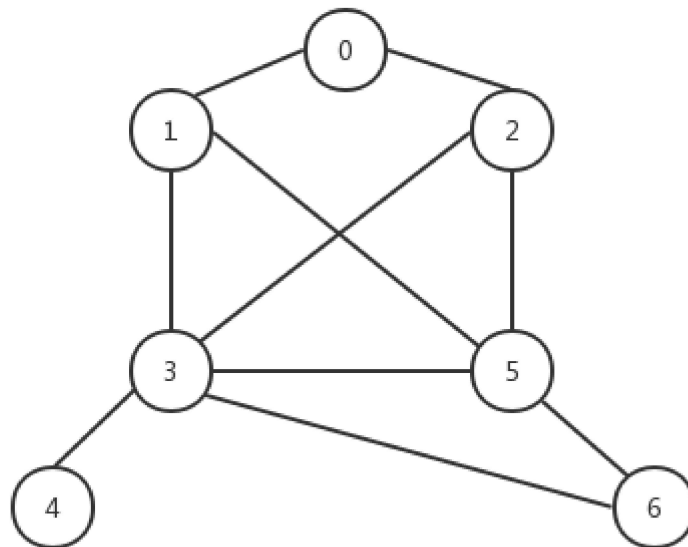
Results:



times	iteration	initiator	Number of neighbours	milliseconds
1	11	6	1	3
2	11	1	2	3
3	12	0	2	3
4	15	0	2	3
5	13	4	1	3
6	11	3	3	3
7	11	4	1	4
8	12	5	3	2
9	11	4	1	4
10	13	3	3	5

### Structure 2

This graph is also partially connected, but it has more edges than **Structure 1**.



### Results:

times	iteration	initiator	Number of neighbours	milliseconds
1	5	3	5	3
2	8	2	2	3
3	6	1	3	3
4	8	5	4	4
5	6	1	3	4
6	8	0	2	4
7	9	5	4	4
8	13	0	2	3
9	11	3	5	3
10	11	4	1	3

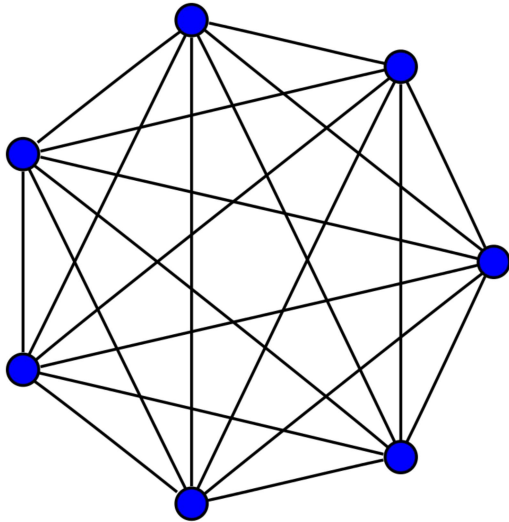
### Observation

Compare to **structure 1**

- The more neighbours initiator (for example, node 3) had , the less iterations were taken.
- When number of edges went up, the execution took less iterations to terminate.

## Structure 3

This graph is a complete graph with 7 nodes.



### Results:

times	iteration	initiator	Number of neighbours	milliseconds
1	9	2	6	4
2	5	4	6	3
3	9	1	6	3
4	9	5	6	4
5	11	2	6	5
6	11	3	6	4
7	13	0	6	6
8	12	1	6	5
9	7	4	6	4
10	11	6	6	4

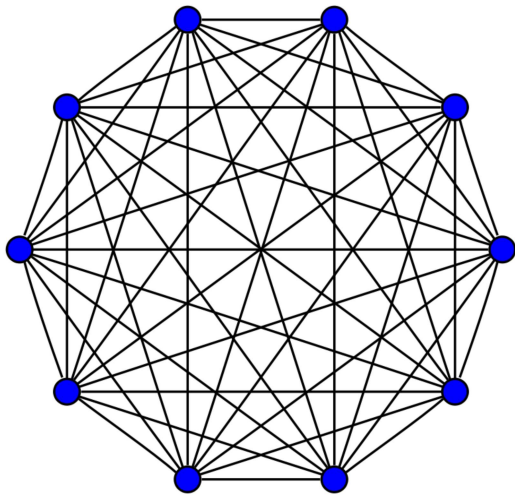
### Observation

Compare to **structure 1** and **structure 2**,

- The complete graph took less iteration than graphs not fully connected.
- Also, it took less time to terminate than these graphs too.

## Structure 4

This is a complete graph with 10 nodes.



### Results:

times	iteration	initiator	Number of neighbors	milliseconds
1	5	4	9	7
2	5	4	9	6
3	6	6	9	7
4	7	2	9	6
5	7	8	9	8
6	5	10	9	9
7	8	5	9	7
8	9	6	9	7
9	4	1	9	6
10	7	7	9	6

### Observation

Compare to **structure 3**,

- It took more time for a complete graph having more nodes to terminate.
- It took less iterations to terminate.

## Conclusion

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1. In a similar graph structure, the more neighbours a node has, the less iterations it needs to run the algorithm.
2. As the same number of nodes, the more edges the graph structure has (the more complex the structure is), the less iterations are needed to run the algorithm.
3. The same number of nodes, the more edges the graph structure has, the more complex the structure, the fewer iterations are needed to run the algorithm.
4. The more nodes in the graph structure, the longer it takes to run the algorithm, but the fewer iterations are taken.