DISTRIBUTED OPERATING SYSTEMS – FALL 2020
PROJECT 2-GOSSIP SIMULATOR
PROJECT REPORT

TEAM MEMBERS:

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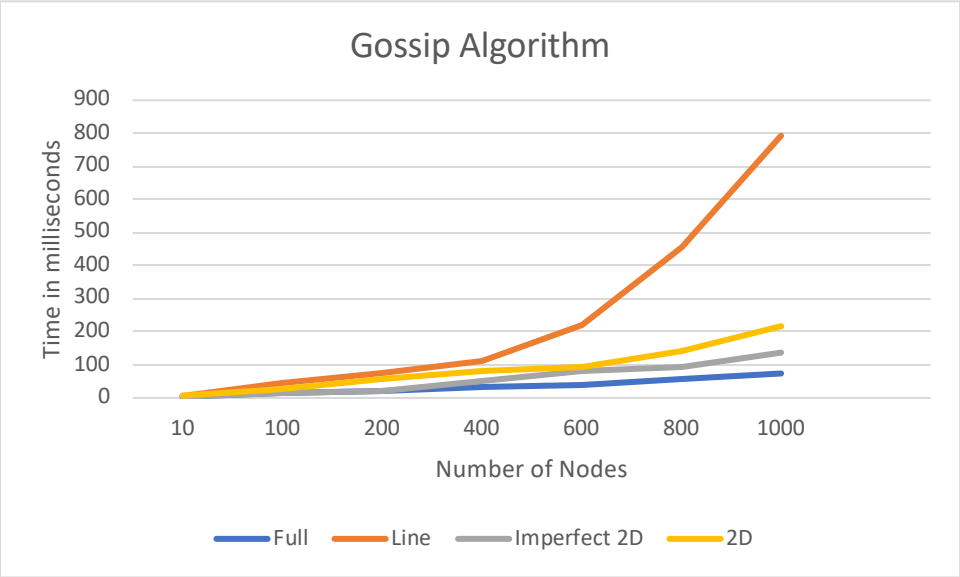
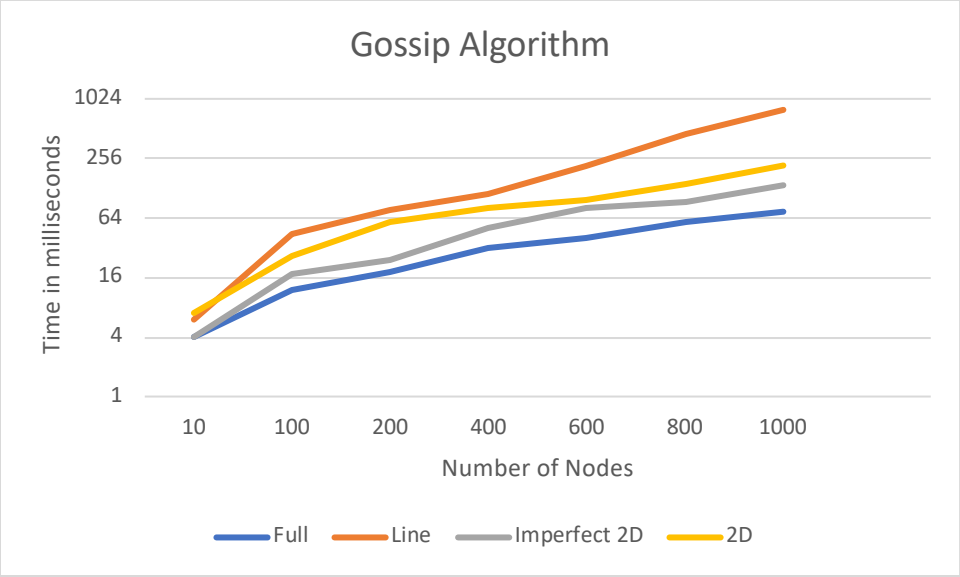
This report contains the findings and observations from the project. For both the algorithms and each topology, we have plotted a graph between the size of the topology (Number of nodes) and Time taken for convergence.

GOSSIP:

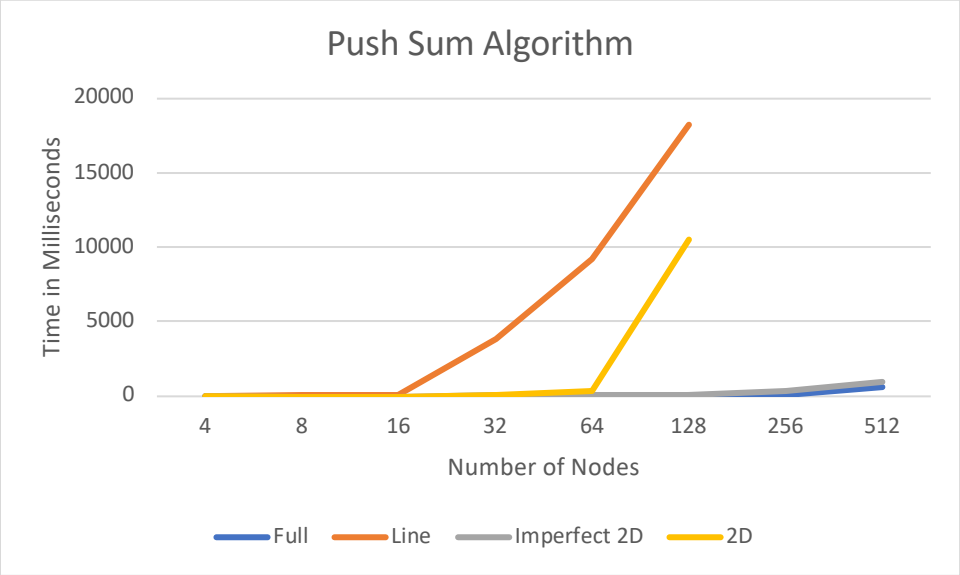


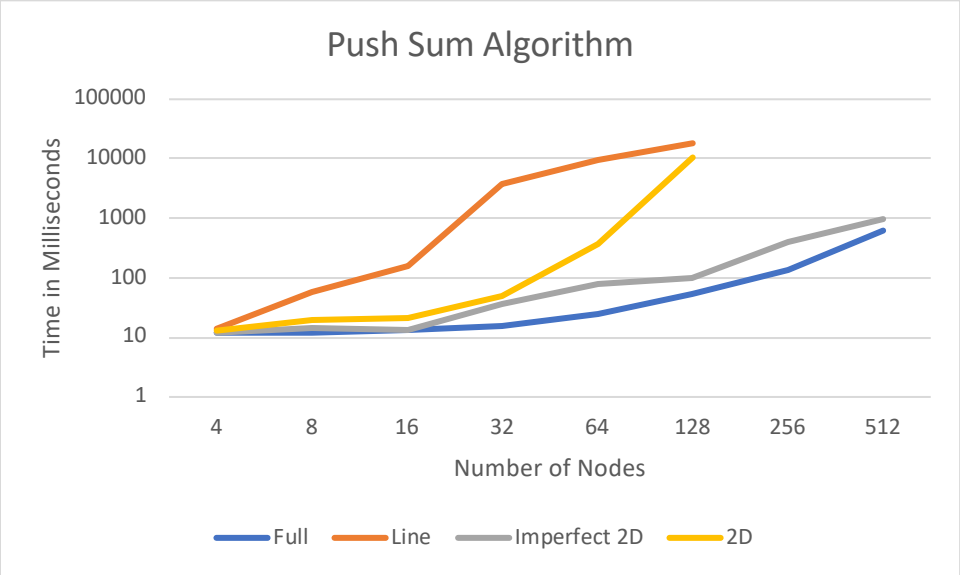


Logarithmic Scale (Base 2) (y-axis)

PUSH-SUM:

In both cases it was noted that as the number of neighbors or adjacent nodes(actors) for each node increased the time taken for convergence decreased. For this very reason Full topology takes the least time, followed by Imperfect 2D Grid, 2D Grid and finally Line.





Logarithmic scale (Base 10) (y-axis)

Implementation Design:

Convergence is reached for Gossip Algorithm when an actor has received the gossip 10 times. For push sum, convergence is reached when the difference is s/w ratio is not greater than (10^-10) for three consecutive rounds. Once an actor has met this condition, it does not participate in the convergence process but it might aid in propagation for total convergence of all nodes.

Interesting Observations made:

- The order of convergence from fastest to slowest is Full, Imperfect 2D Grid, 2D Grid and line for both Gossip algorithm and Push Sum Algorithm
- From the results we can infer that the convergence depends on the number of neighbors for each node
- In Full topology every node is directly connected to every other node making the spread of the algorithms quicker and accessible from any node
- Imperfect 2D Grid has an advantage over 2D Grid due to the fact that each node is connected to an additional random neighbor from the rest of the grid making it much better suited for convergence
- Line suffers the most as each node is connected to at most two other nodes which can create roadblocks for convergence

Data Used:

Gossip Algorithm

	Full	**Line**	**Imperfect 2D Grid**	**2D Grid**
10	4	6	4	7
100	12	45	17	26
200	18	77	24	57
400	32	113	50	81
600	40	218	80	96
800	57	454	92	143
1000	74	793	137	217

Push Sum

	Full	**Line**	**Imperfect 2D Grid**	**2D Grid**
4	12	14	12	13
8	12	59	14	20
16	13	158	13	22
32	16	3916	37	48
64	25	31188	80	384
128	55		103	10533
256	132		397	
512	623		972	