Distributed Operating Systems Principles

(COP 5615)

Project 2

Vishnuvardhan reddy, Jammula - UFID: 4659-0292

Krishna Murthy Takkillapati - UFID: 4368-1881

Department of Computer & Information Science & Engineering

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The purpose of this project is to use the F# actor model to implement Gossip and Push-Sum algorithms for “full”, “line”, “3D”, “imp3D” topologies and to analyze their convergence times.

Execution steps

To execute the program which acts as server, navigate into the project folder and run the program using the below command.

dotnet fsi GossipSimulator.fsx number_of_nodes topology algorithm

Project questions

What is working:

1) Gossip and push-sum algorithm are implemented for the line, full, 3d, imp3d topologies.
2) The Convergence time order for both gossip and push- sum is of same order. The order is as shown below

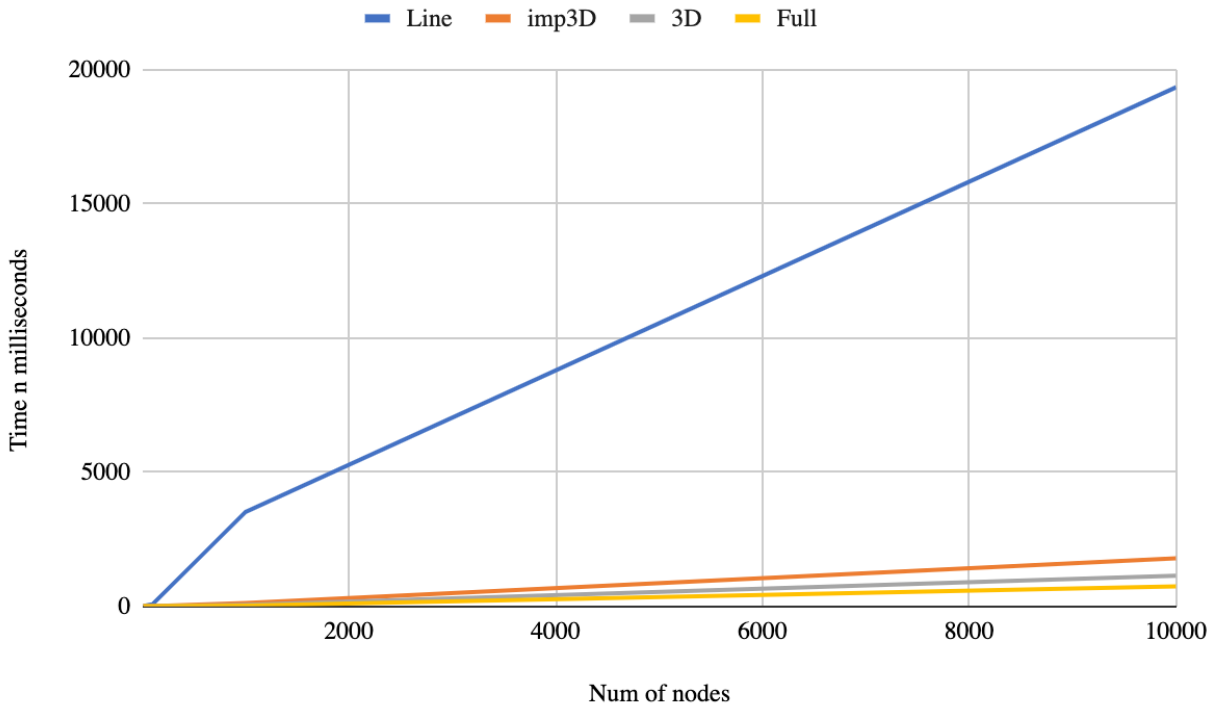
   full < imp3d < 3d < line

3) Full network topology has seen the better convergence times and line network has the worst time for convergence in both the algorithms.

Largest network for each topology and algorithm

1) Gossip
   a. Line – 10000
   b. Full – 10000
   c. 3d – 10000
   d. imp3d – 10000
2) Push Sum
   a. Line – 500
   b. Full – 500
   c. 3d – 500
   d. Imp3d – 500

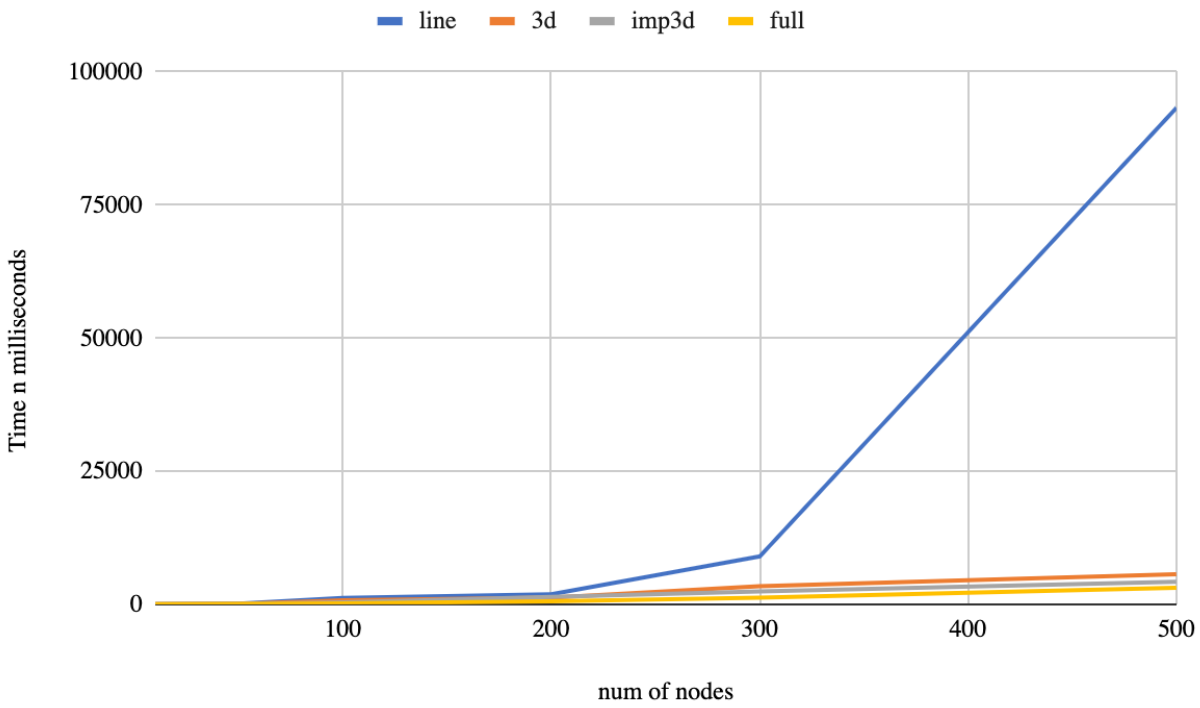
Gossip algorithm – Graph



Num of nodes	Line	Imp3D	3D	Full
10	2	3	4	2
100	72	5	4	8
1000	3512	116	53	21
10000	19328	1786	1137	742

From the plotted graph, we can observer that the full topology is converging faster than any other topology for the given network size and line topology is converging slower.

Push sum algorithm. – Graph



num of nodes	line	3d	imp3d	full
10	20	13	13	12
50	120	93	62	72
100	1225	784	357	173
200	1876	1246	1410	563
300	8983	3421	2416	1241
500	93241	5673	4249	3121

Push sum algorithm has better s/w ratio if it takes longer time for convergence for line topology. The full topology performs better than other in terms of convergence time.