COP 5615: Project 2 Report

Project Members:

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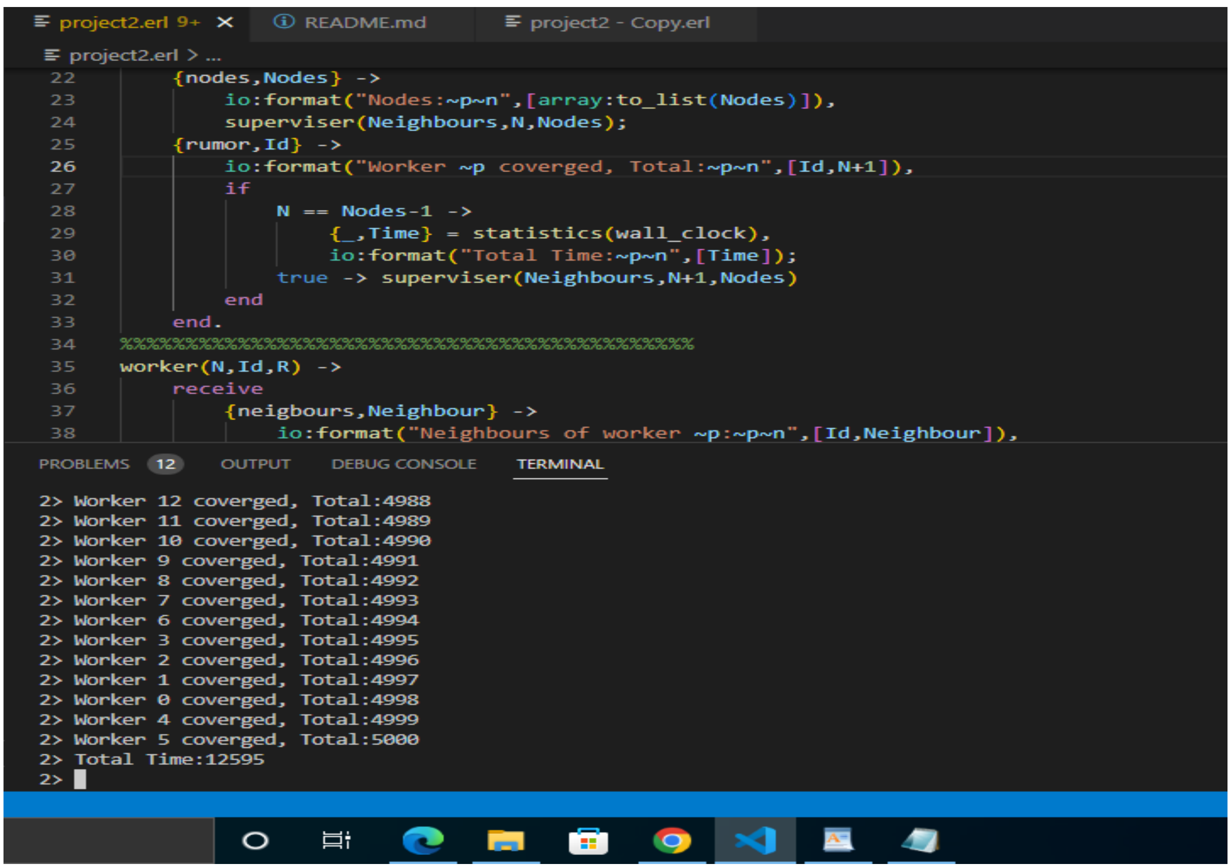
We considered 10000 nodes for Gossip Algorithm, 1000 nodes for Pushsum Algorithm, and attached a sample output for the both algorithms and graphs for all the topologies.

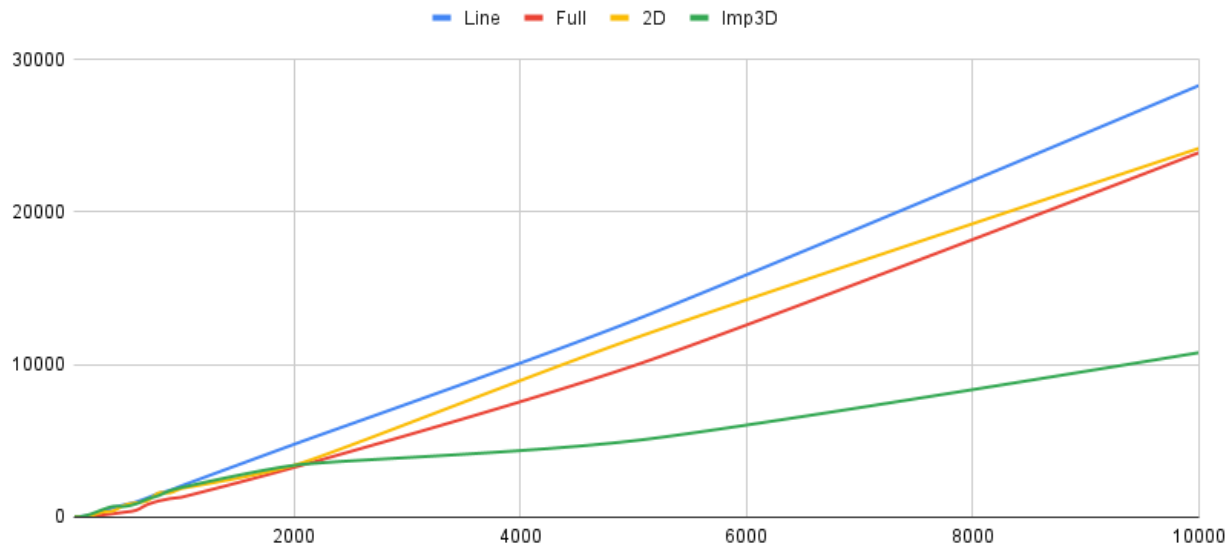
Sample code run screenshot:



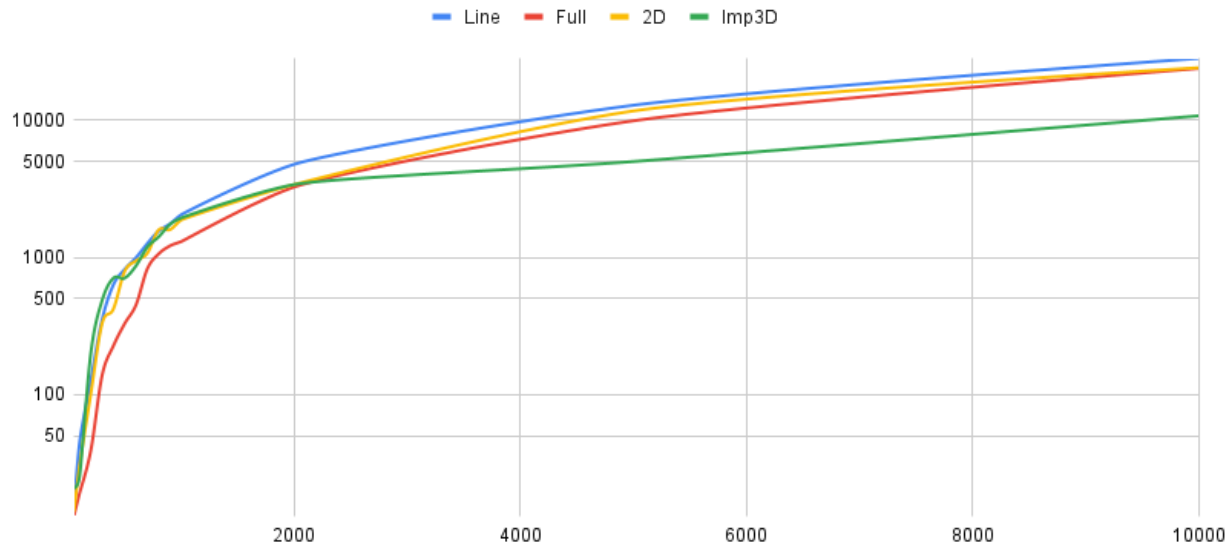
Time Comparisons: Gossip Algorithm (Intel I5)

Nodes	Line - Times(ms)	Full -Times(ms)	2D - Times(ms)	Imp3D - Times(ms)
50	15	13	14	21
100	44	19	30	25
200	127	39	101	200
300	352	138	330	486
400	633	227	421	708
500	820	330	794	707
600	997	451	946	869
700	1264	827	1073	1192
800	1560	1062	1589	1412
900	1757	1216	1595	1741
1000	2051	1306	1876	1941
2000	4782	3265	3404	3404
5000	12884	9921	11702	5007
10000	28288	23888	24172	10783

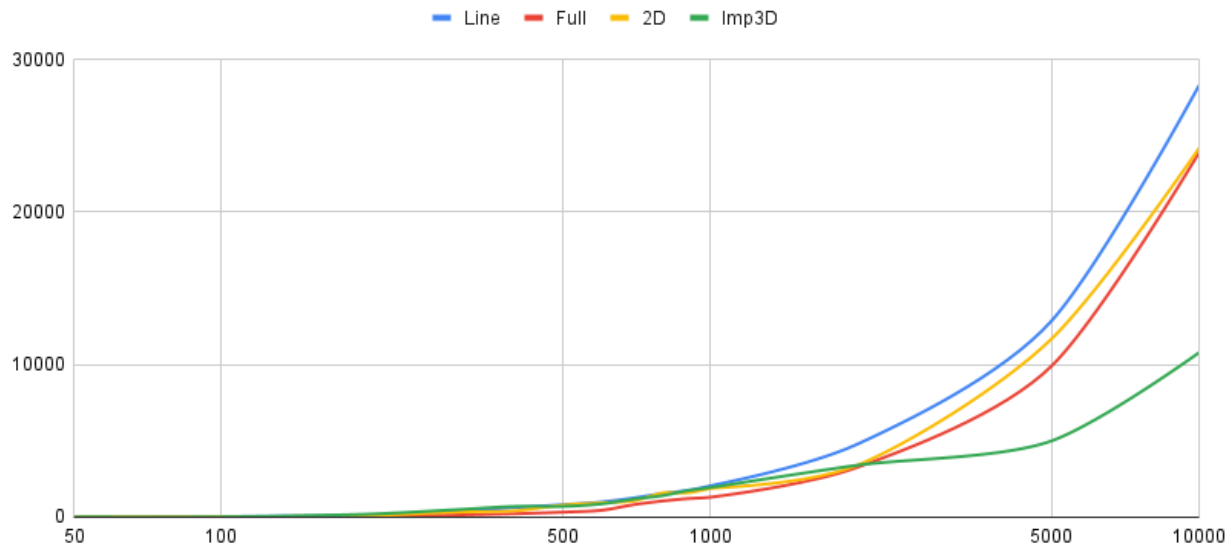
Gossip Algorithm Graph: (Time (ms) - Linear vs Nodes - Linear)



Gossip Algorithm Graph: (Time (ms) - Log vs Nodes - Linear)



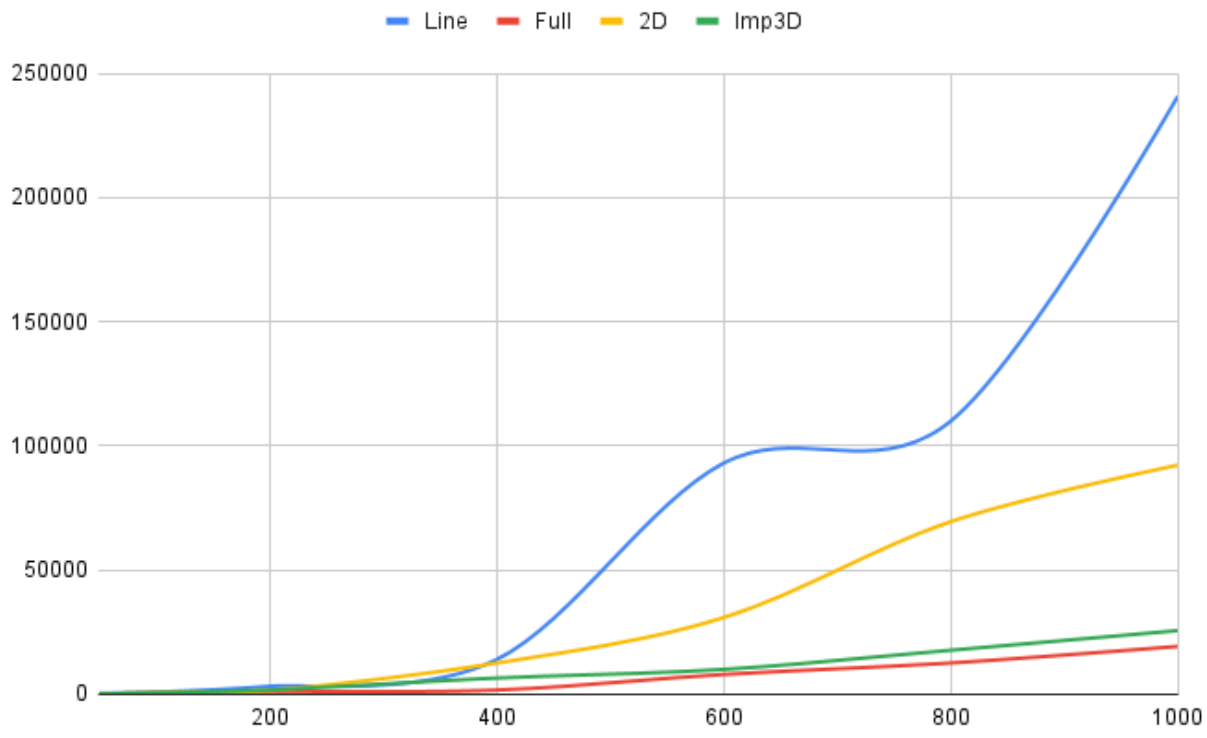
Gossip Algorithm Graph: (Time (ms) - Linear vs Nodes - Log)



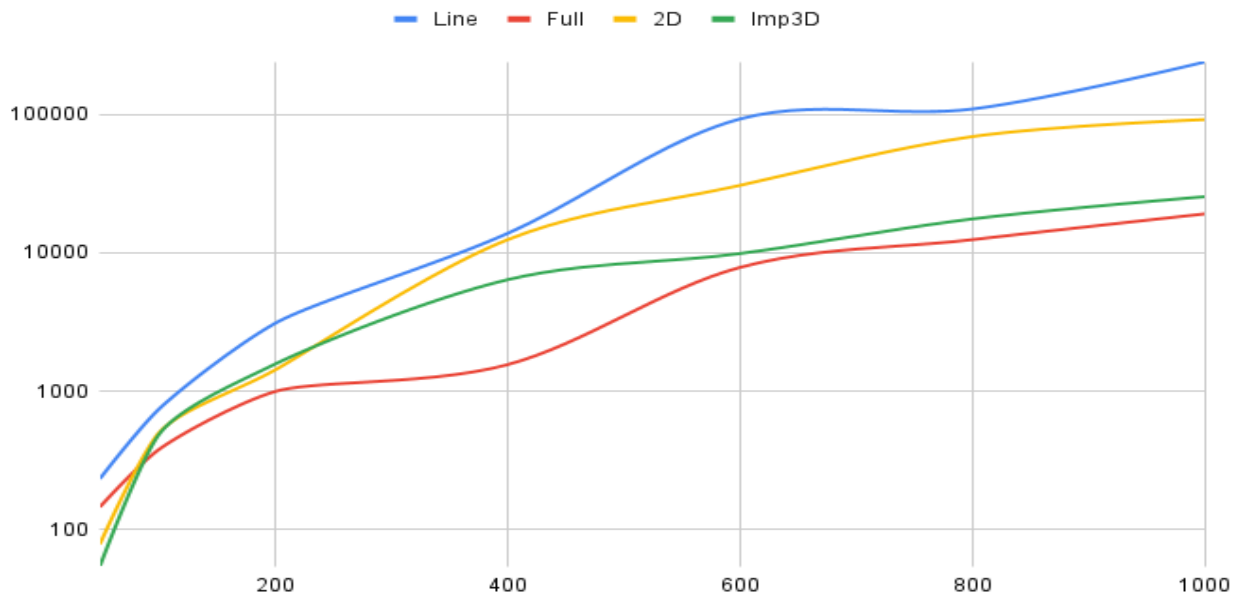
Push Sum time data for all topologies (Macbook M1 Chip)

Nodes	Line - Times(ms)	Full -Times(ms)	2D - Times(ms)	Imp3d-Times (ms)
50	232	145	175	153
100	730	374	491	475
200	3072	990	1412	1312
400	13776	1550	12411	6385
600	92995	7838	30754	9888
800	109927	12466	69423	17606
1000	240903	19165	92196	25519

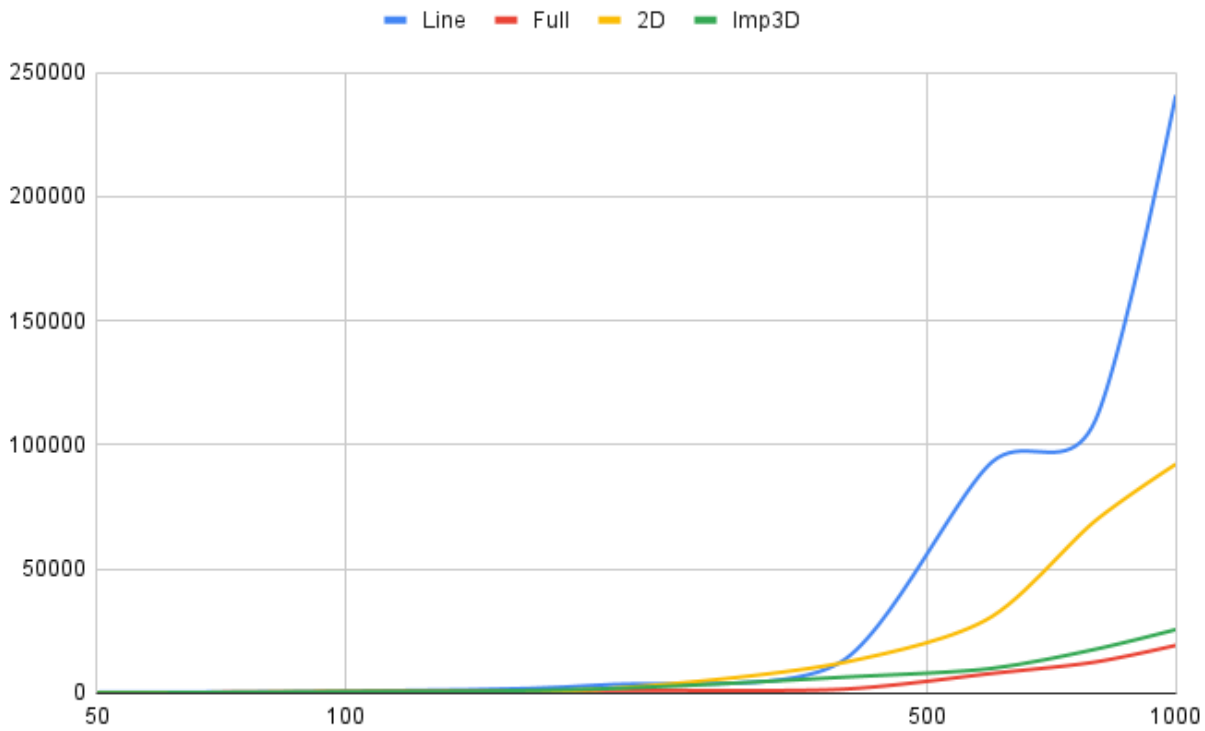
Push Sum Graph for all topologies : Linear Scale



<u>Push Sum</u> Graph for all topologies : Time (Log Scale) vs Nodes (Linear)



<u>Push Sum</u> Algorithm Graph: (Time (ms) - Linear vs Nodes - Log):



Interesting Findings:

- For both Gossip and Pushsum Algorithms we observed that the Line topology has aways the worst convergence time when compared to all the remaining topologies.
- Till 2000 nodes the order observed is Line> 2D> Imperfect 3D > Full.
- After 2000 nodes we observed that the imperfect 3D converges faster when compared to full topology in Gossip algorithm. We think this might be because of the increasing distance between nodes in full topology as the number of nodes increases.
- After 2000 nodes the order of convergence time is Line> 2D> Full > Imperfect 3D.
- For Pushsum algorithm we observed the order of convergence
  Line> 2D> Imperfect 3D> Full
- The last some nodes (3-4%) for line topology are taking more time to converge when compared to other nodes in pushsum.