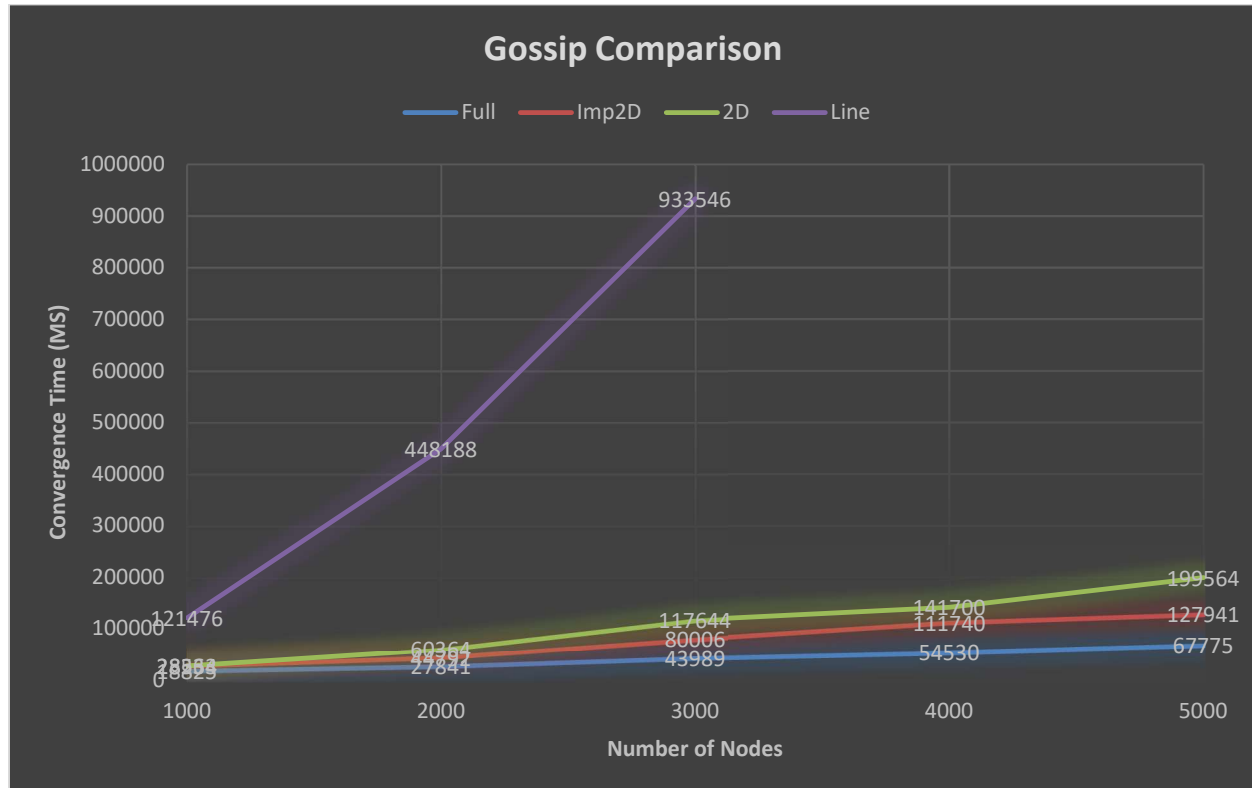# Project 2 Report

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Gossip Convergence Graph

Evaluation (Gossip)

The graph above depicts the convergence time for all four topologies (full, imperfect 2D grid, 2D grid and line) for the Gossip algorithm. An value of 1000 was incremented each time and stopped when at node number 5000. The x-axis represents the number of nodes used to run the algorithm and the y-axis represents the time it took for all the actor to converge, the time is represented in milliseconds. The following bullet points will analyze the graph in depth.

- First off, the purple line for the "Line" topology seems way different than the rest and it also ends midway. The reason for this is because of the way the algorithm works (talk about how the algo works in

and running it with more than 4000 nodes can take up to 15 minutes to converge, hence we stopped running it at 3000, where it took about 8 minutes to finish running.
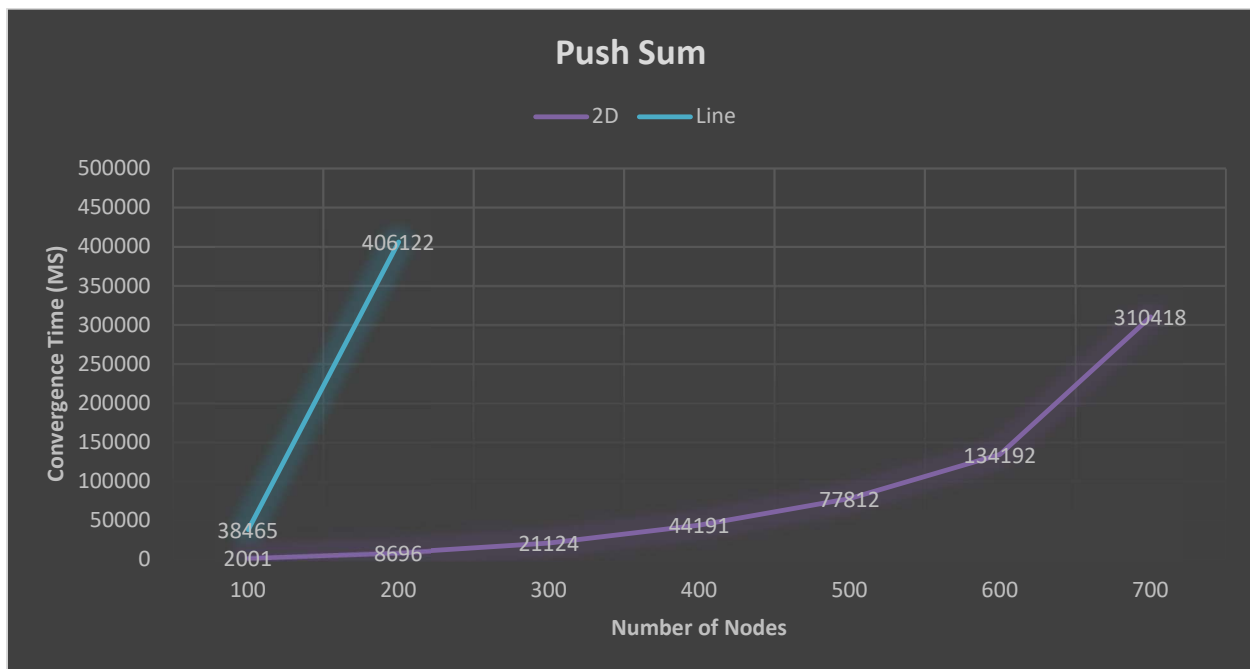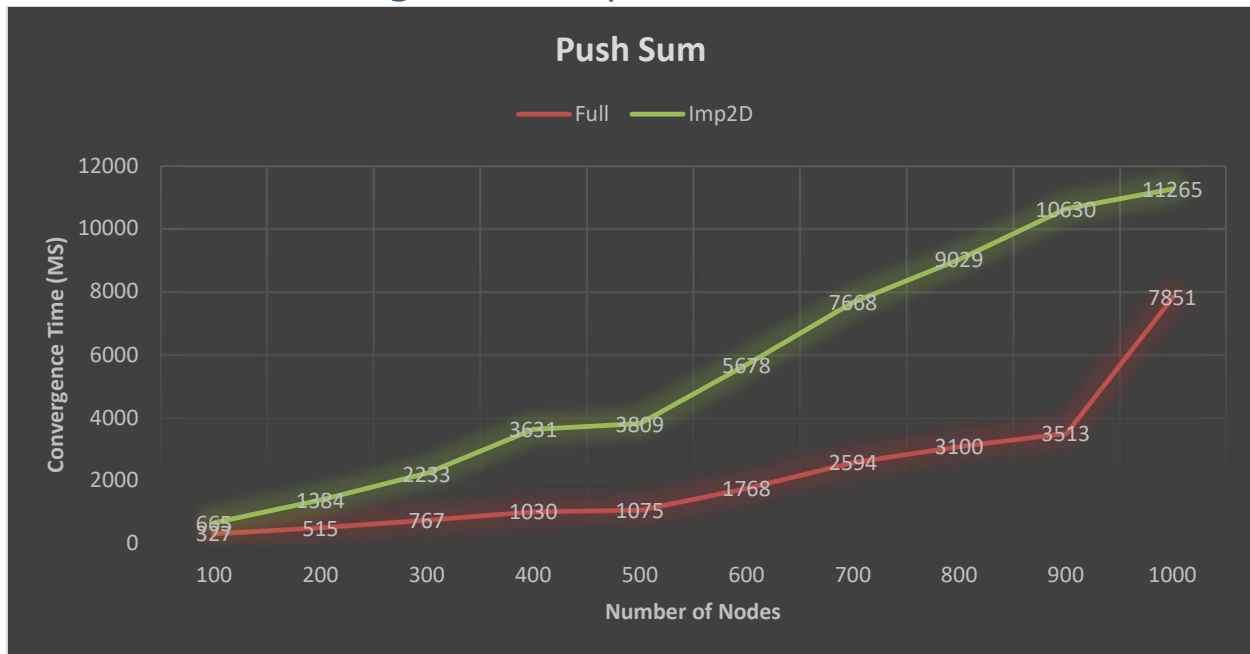- The rest of the topologies ("Full", "Imperfect 2-D" and "2D") converged much faster, with "Full" being the fasted with 67775 ms for 1000 nodes, which is actually pretty good. Another thing to notice is there are times when "Full" and "Imperfect 2-D" will overlap. _____ is the reason why they can overlap at times.
- Lastly, some interesting details that we were able to catch were _____.

Evaluation (Raw Data)

The following table represents the raw data where the values are time converged in milliseconds.

# of Nodes	Full	Imp2D	2D	Line
1000	18825	28533	28264	121476
2000	27841	44792	60364	448188
3000	43989	80006	117644	933546
4000	54530	111740	141700	
5000	67775	127941	199564	

Push Sum Convergence Graph

Push Sum

Full —— Imp2D ——

11265	
10630	
9029	
7851	
7668	
5678	
3631	3809
2233	
2594	3100	3513
1768	
1384	
767	1030	1075
665	
327	515	

Convergence Time (MS) vs *Number of Nodes* (100–1000)

Push Sum

2D —— Line ——

Values: 406122, 310418, 134192, 77812, 44191, 38465, 21124, 8696, 2001

Convergence Time (MS) vs *Number of Nodes* (100–700)

Evaluation (Push Sum)

The graphs above depicts the convergence time for all four topologies (full, imperfect-2d-grid) for the Push Sum algorithm. It is broken up in two

different graphs for the purpose of clear visibility. The x-axis represents the number of nodes used to run the algorithm and the y-axis represents the time it took for all the actor to converge, the time is represented in milliseconds. The following bullet points will analyze the graph in depth.

- As can be seen from the graphs, push sum takes much longer to convert regardless of the topology. The reason for this is because every actor is calculating and sending their sum and weight to almost every other actor.
- "Full" again is the fastest to converge even in this algorithm and that's because full can send a message to anyone, so it has more number of neighbors to choose than compared with the other topologies.
- "Line" is the slowest here as well because _____.

Raw Data (Push Sum)

# of Nodes	Full	Imp2D	2D	Line
100	327	665	2001	38465
200	515	1384	8696	406122
300	767	2233	21124	
400	1030	3631	44191	
500	1075	3809	77812	5E+06
600	1768	5678	134192	
700	2594	7668	310418	
800	3100	9029		
900	3513	10630		
1000	7851	11265		

Failure Implementation

Full — Imp2D — 2D

Convergence Time (milliseconds)

10109	11944	16538	19163	30489
8301	8829	10428	26777	
7181	6664	7431	7138	7717

Number of Failure Nodes