Project 2

Group members:

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Requirements:

1. What is working
   We used different data structures in different topologies. First we have different types of nodes, that means in different topologies, the arguments that the nodes carry are different. Basically we generate different Names for different threads, to get unique pids so that when a thread receives rumor, he can know who his neighbors are and send rumor to them. In full topology, neighbors are just all the threads other than self. In this topology we simply use serial numbers to represent different nodes. In 2D topology it's a bit more complex. We used coordinates to represent diffenrent nodes. For example, node (4, 3) could only access these nodes: (3, 2), (3, 3), (3, 4), (4, 2), (4, 4), (5, 2), (5, 3), (5, 4), by doing so we have a list of coordinate operations for (4, 3) to get to his neighbors, so that every time when a node needs to get a neighbor id, we randomly pick a operation in the operation list, then we get the coordinate of the neighbor, then we get pid and we pass rumor onto that node. In imperfect 2D it's basically the same. In line topology, every node could only access their previous node and the next node so the operation list would be (-1, 1), that means we randomly let the node pass rumor forward or backward. For two different algorithm we just implemented them as the requirements.
2. What is the largest network you managed to deal with for each type of topology and algorithm?

   For Gossip

Topologies	Largest Nodes
Full Network	260000
2D Grid	260000
Line	260000
Imperfect 3D Grid	260000

   For Push-Sum

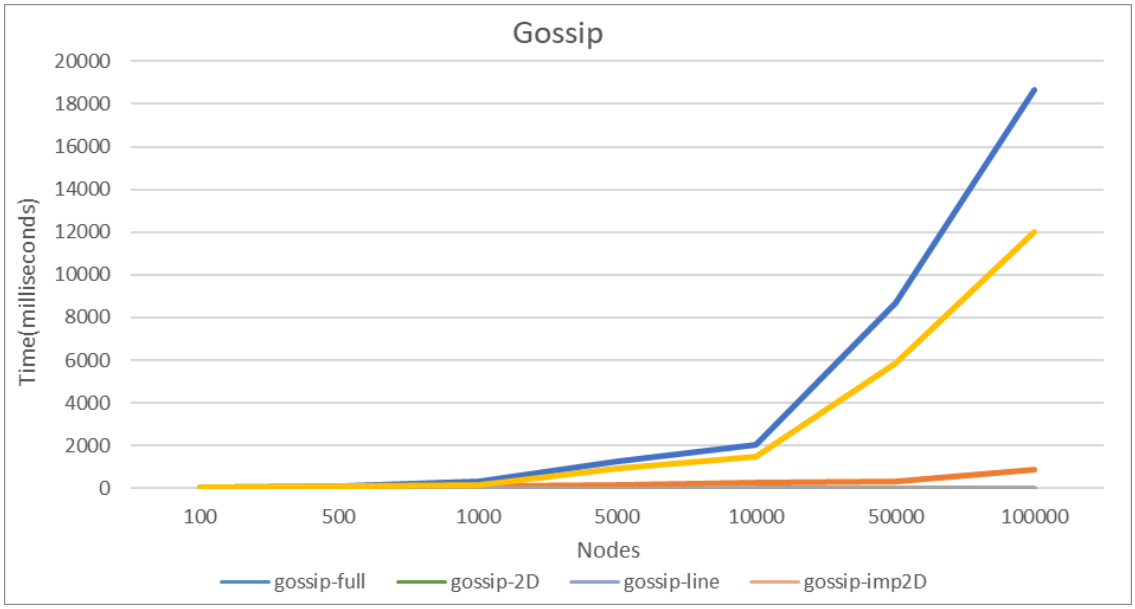
Topologies	Largest Nodes
Full Network	260000
2D Grid	260000
Line	260000

Topologies	Largest Nodes
Imperfect 3D Grid	260000

3. For each type of topology and algorithm, draw the dependency of convergence time as a function of the size of the network

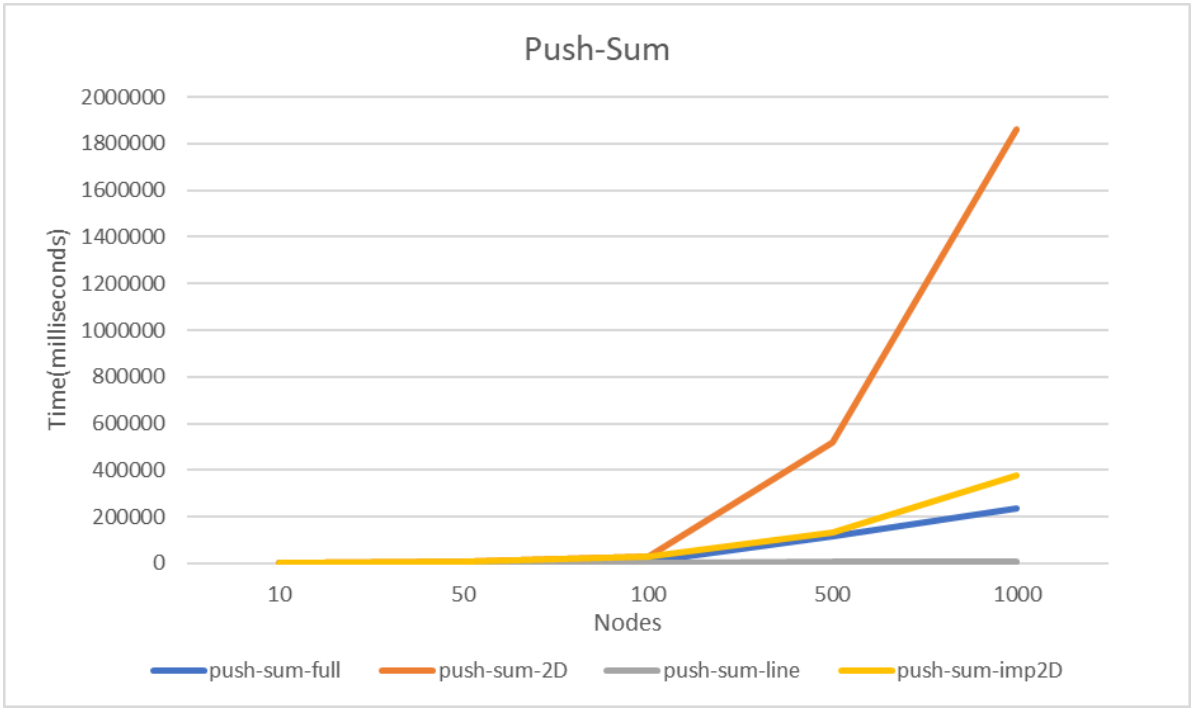
Gossip

	100	500	1000	5000	10000	50000	100000
gossip-full	27.4432	118.4768	323.072	1279.2832	2035.0976	8679.424	18662.3
gossip-2D	11.1616	30.6176	88.4736	149.7088	255.5904	341.2992	858.112
gossip-line	5.632	6.7584	6.4512	5.4272	5.5296	6.144	7.168
gossip-imp2D	38.5024	124.3136	156.0576	935.1168	1495.3472	5869.4656	12000.26



Push-Sum

	10	50	100	500	1000
push-sum-full	335.1552	2298.9824	9326.49	116903.424	236892.672
push-sum-2D	358.8096	7186.2272	27454.16	516318.208	1861466.833
push-sum-line	385.3312	2033.2544	3863.347	7096.6272	8697.1392
push-sum-imp2D	389.632	6504.8576	27137.23	135072.5632	375171.072


Push-Sum
2000000
1800000
1600000
1400000
1200000
1000000
800000
600000
400000
200000
0
Time(milliseconds)
10
50
100
500
1000
Nodes
push-sum-full
push-sum-2D
push-sum-line
push-sum-imp2D