Distributed Operating Systems
Project 2

Group Members-

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Implementation-

The project implements Gossip and Push-sum algorithm for Full, Line, Random 2D, 3D torus, Honeycomb, Random Honeycomb.

Determination of convergence time-

Gossip Algorithm

- In gossip algorithm, a random node is sent a message which it transmits to its neighbours and now whoever has the message sends it to its own neighbours.
- A node stops transmitting once it receives the message 10 times.
- For convergence, the percentage of nodes varies from topology to topology. We have assumed the percentage for line topology to be 60% and for all other topologies to be 90%.
- The algorithm converges if the specified percentage of nodes have received the message at least once.

Push-Sum Algorithm

- In push-sum algorithm, every actor maintains two quantities s and w, initially, $s = x_i = i$ and $w=1$ for all nodes.
- Messages sent and received are pairs of the form (s, w). Upon receive, an actor adds received pair to its own corresponding values. Upon receive, each actor selects a random neighbour and sends it a message.
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Interesting Observations-

- In gossip algorithm, when the no. of nodes is less than 100 then all the algorithms converge in similar time except Rand2D which does not converge at all because of its randomness.
- As no. of nodes, Line and Rand2D take more time to converge as compared to other topologies.
- 3D torus is the best topology for gossip algorithm.
- Full topology is also very good in gossip algorithm but it is the worst in push-sum algorithm.
- Honeycomb is the best algorithm when no. of nodes is high for push-sum algorithm.

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- RandHoneycomb and Honeycomb do not vary in performance by a lot as only 1 random node is connected to the topology.

Graph of Number of Nodes Vs Convergence time-

Gossip
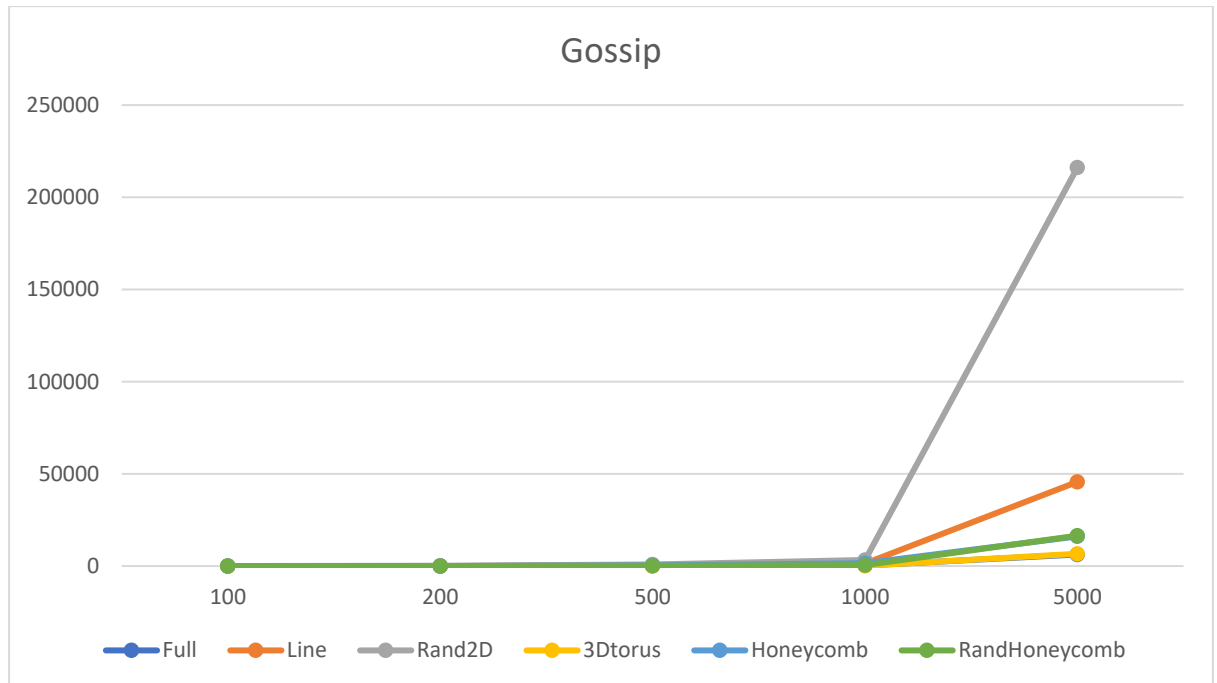
		No. of nodes					
		100	**200**	**500**	**1000**	**5000**	**10000**
	Full	15	31	94	359	6266	42172
	Line	15	47	469	1453	45640	152234
Topologies	**Rand2D**	N.A	141	766	3328	216090	N.A
	3Dtorus	16	17	32	78	6656	26437
	Honeycomb	16	31	343	1515	16078	53985
	RandHoneycomb	15	31	140	453	16485	57532

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Push-Sum
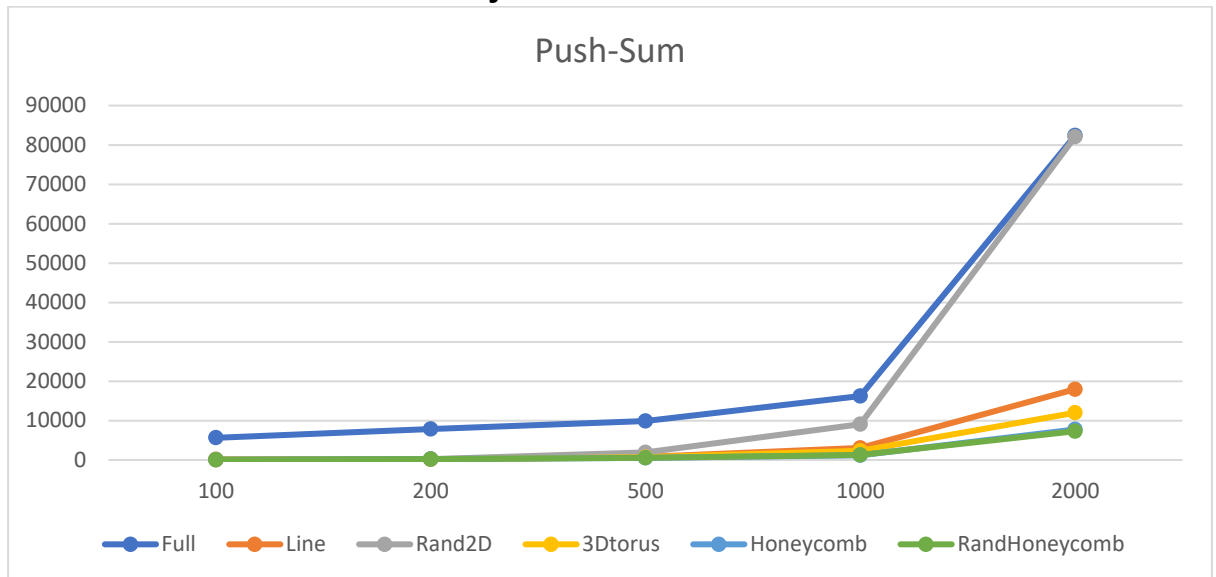
		No. of nodes				
		100	200	500	1000	2000
Topologies	Full	5625	7875	9890	16219	82375
	Line	109	188	781	3078	17969
	Rand2D	78	219	1953	9062	82094
	3Dtorus	78	156	718	2360	12000
	Honeycomb	63	234	500	1187	7750
	RandHoneycomb	47	203	500	1265	7296