Project Report

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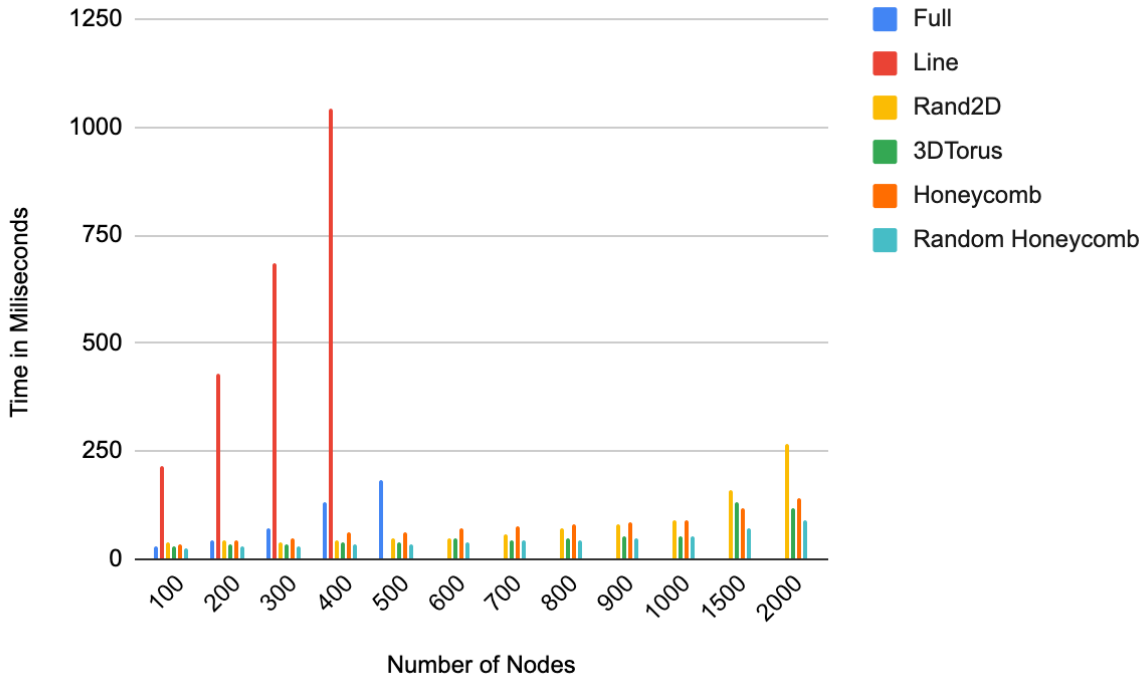
Topologies Implemented:

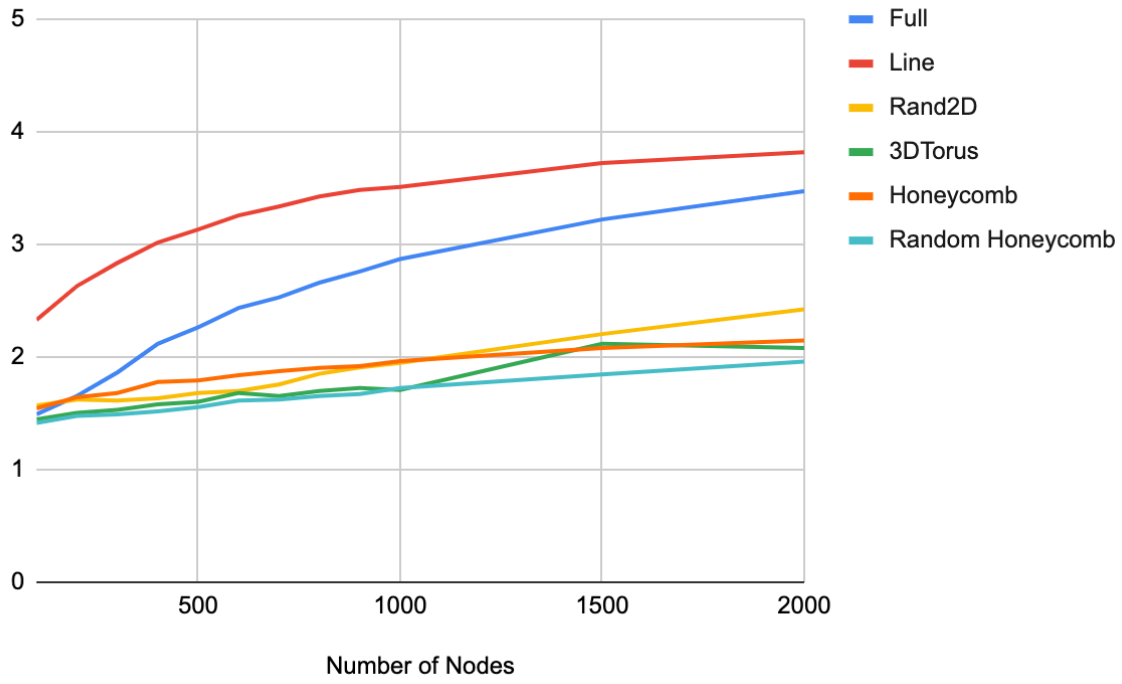
1) Full
2) Line
3) Random 2D
4) Torus 3D
5) Honeycomb
6) Random Honeycomb

Gossip Protocol Implementation Details:

In the implementation of gossip protocol, we take in the number of nodes as an input and the same number of actors are created. Each of the actors transmits the message to its neighbours and keeps a track of the number of times it has received the message from the neighbours. The neighbours of an actor are determined using the topologies. The terminating condition for the protocol is when all the actors have received the message 10 times or no neighbors are present to send the rumor.



Logarithmic Scale Plot

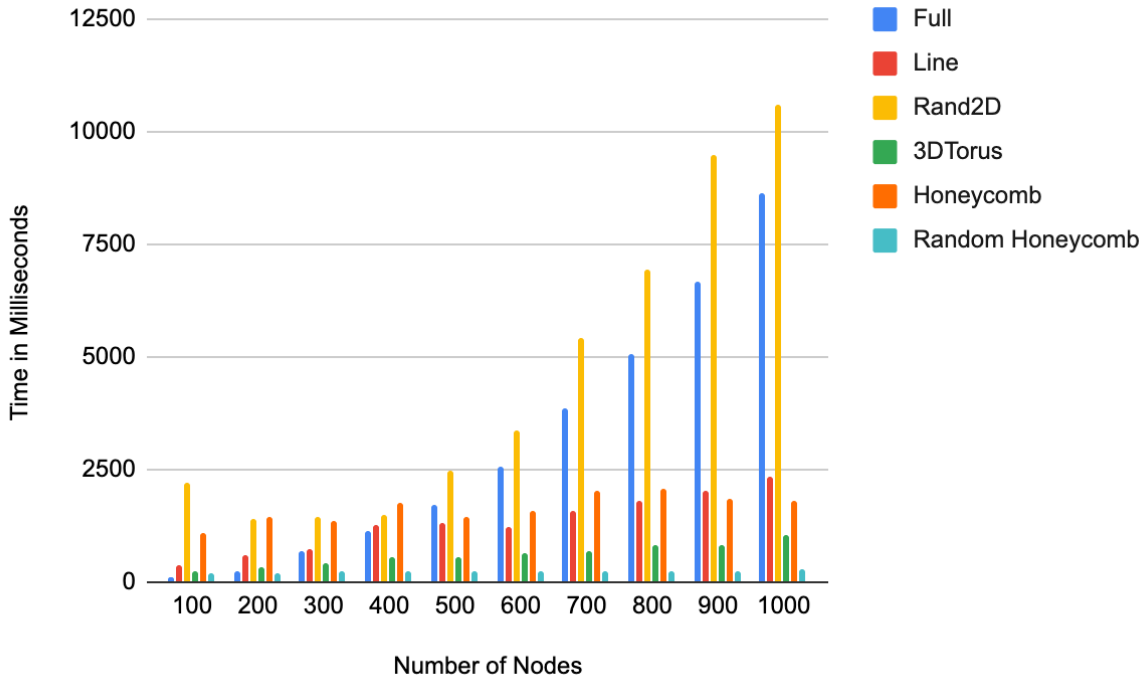


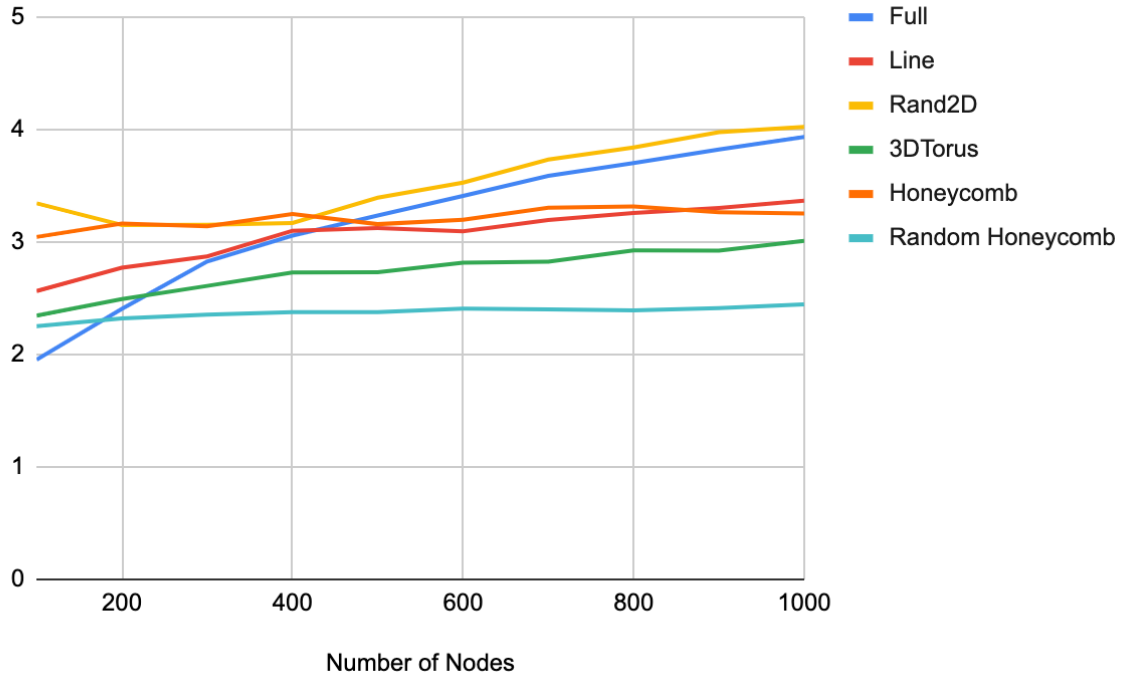
Observations:

- Good Topologies for gossip are Honeycomb, Random Honeycomb and 3D Torus. For smaller number of nodes Full topology also have good performance.
- Line topology have the worst performance, it can be due to each actor having maximum of two neighbours but for the number of nodes more than 5000, full topology performs worse than line topology.
- The reason is that all actors are neighbours so the rumor is spread first across all actors and hence program terminates quickly but for large number of nodes full topology it have overhead of asynchronous calling to actors as all actors are considered as neighbours.
- Honeycomb, Random Honeycomb and 3D Torus performs almost similar, it can be due to having balance in number of neighbours and interactions with other neighbours.
- Rand Honeycomb have the best performance because of its balance in number of neighbours and randomness in network i.e. three neighbour nodes and a random neighbour in the network by which the spread is done by multiple places in the network.

Push-Sum Implementation

For push sum algo, we assume that convergence of a node happens when it's average estimate (S/W) does not change more than *pow(10, -10)* in three consecutive rounds.





Observations

- When implementing push-sum, random honeycomb performs the best whereas rand2D followed by full topology has the worst performance.

- For number of nodes less than 400, full topology performs better than honeycomb but later honeycomb beats full topology due to it’s consistent number of neighbours and actor interaction calls

- Random Honeycomb it the best topology for push sum because of it’s random spread in the network and random increase in the converging rate.

- 3D Torus and Honeycomb performs well because of their random neighbour picking is faster