COP5615 – Fall 2021 Project 2 – Gossip Simulator

Team Members

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Gossip:

- To begin the rumor is sent to a random actor of the topology.
- Once a node receives a rumor the node passes on the rumor to a random neighbour
- The node also periodically sends a rumour to its random neighbor once it has received a rumor.
- The topology is considered to converge once all the nodes have heard the rumor at least once

Push Sum:

- To begin a message is sent to a random node of the topology.
- A message contains weight and sum
- When an actor receives a message it adds the sum and weight to it's own value
- When an actor sends a message to a random neighbour it sends half the value of sum and weight and stores half the value of weight and sum
- We consider a node to converge when the value of it's s/w has not changed by more than a factor of 10^{-10} for 3 iterations
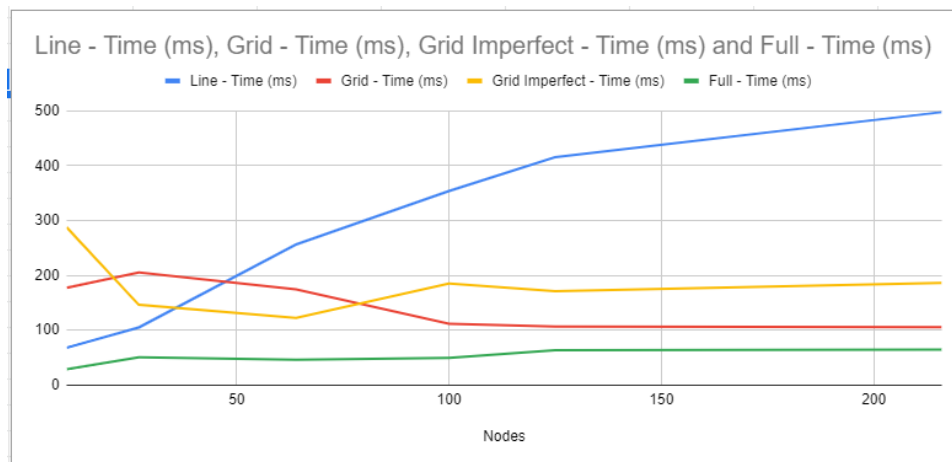- Starting sum of node i = i and weight = 1

For 3D grids the number of nodes have been rounded up to the closest cube. Hence the 3D topology tend to perform a little worse for the same input N

All algorithms and topologys below are working
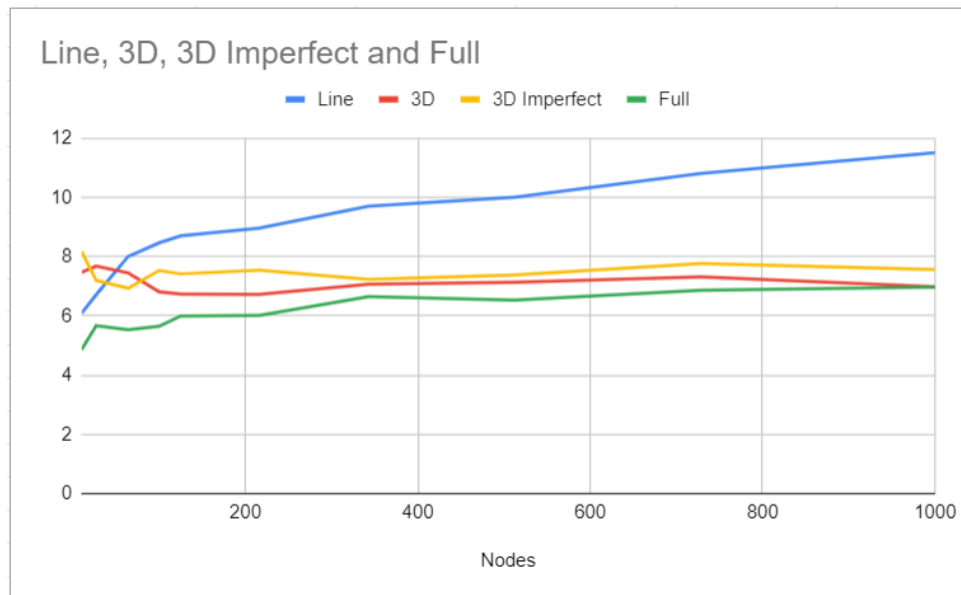
- Gossip:
    - Full Network
    - 3D Grid
    - Line
    - Imperfect 3D Grid

- Push Sum
    - Full Network
    - 3D Grid
    - Line
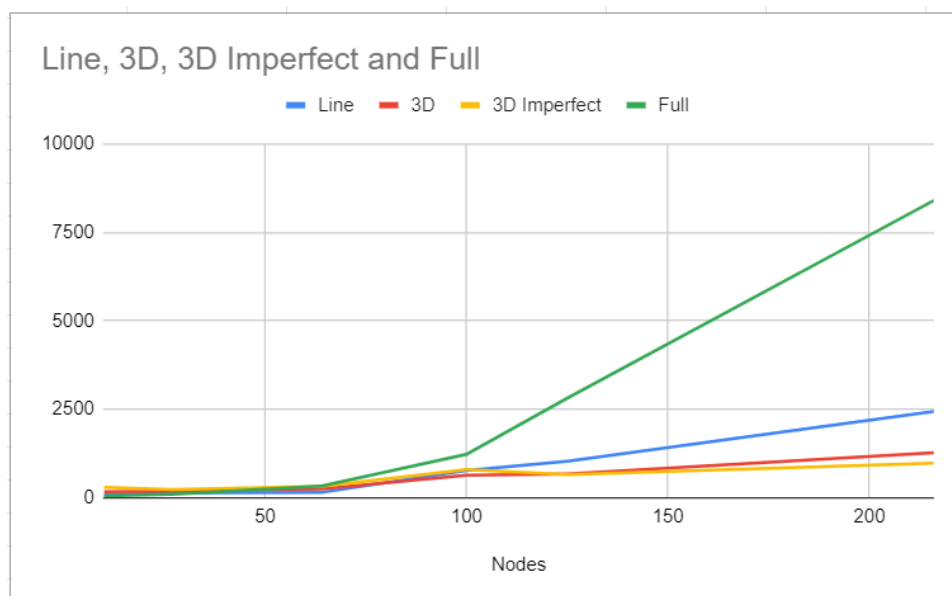   - Imperfect 3D Grid

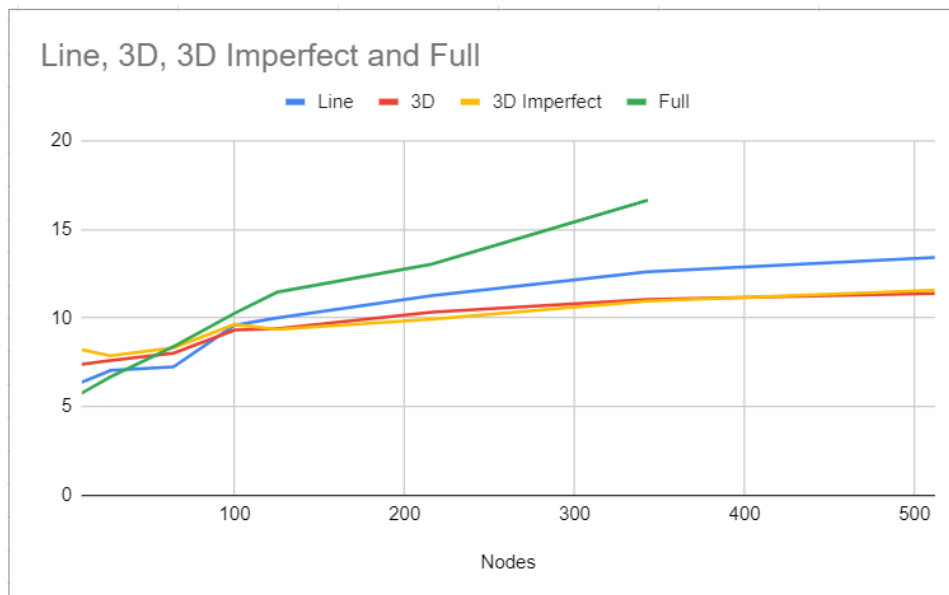Gossip Graph

Gossip Graph- Logarithmic

Line, 3D, 3D Imperfect and Full

- Running time is linear with the Number of nodes in the topology.
- Higher number of neighbours helps the topology to converge faster.

Push Sum Graph

Line, 3D, 3D Imperfect and Full

Push Sum Graph- Logarithmic

Line, 3D, 3D Imperfect and Full

- Running time is linear with the Number of nodes in the topology.
- Convergence is depended on the difference in Sum and weight values of the neighbour nodes. In full topology nodes with very different weights and sum are neighbours and hence the s/w varies by large values
- For linear the sum and weight values of neighbour are closer and hence it converges faster than the full topology

What is the largest network you managed to deal with for each type of topology and algorithm?

- Gossip:
  - Full Network   1000 Nodes
  - 3D Grid   1000 Nodes
  - Line   1000 Nodes
  - Imperfect 3D Grid 1000 Nodes

- Push Sum
  - Full Network   343 Nodes
  - 3D Grid   1000 Nodes
  - Line   1000 Nodes
  - Imperfect 3D Grid 1000 Nodes