DOSP Project 2: Gossip and Push sum

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Problem Statement

Implement Gossip and Push Sum algorithms using actor model in F#, where actor nodes are connected in line, full, 3D or imperfect 3D topology.

Converge Gossip when all actors have heard rumor 10 times

Converge Push sum when all actor ratios did not change more that 10^-10 in 3 consecutive rounds

Implementation Details

Implemented using AKKA.net for F# to implement actor model.

Used Stopwatch from System.Diagnostics to keep track of real time. We used Process TotalProcessorTime to keep track of CPU time.

We used a boss actor which receives messages from worker actors once the job is done by worker actors.

How To Run Script

dotnet fsi Gossip.fsx number of nodes topology algorithm

number of nodes: total number of actor nodes

topology: line, full, 3D or Imperfect3D

algorithm: gossip or push-sum

What Works

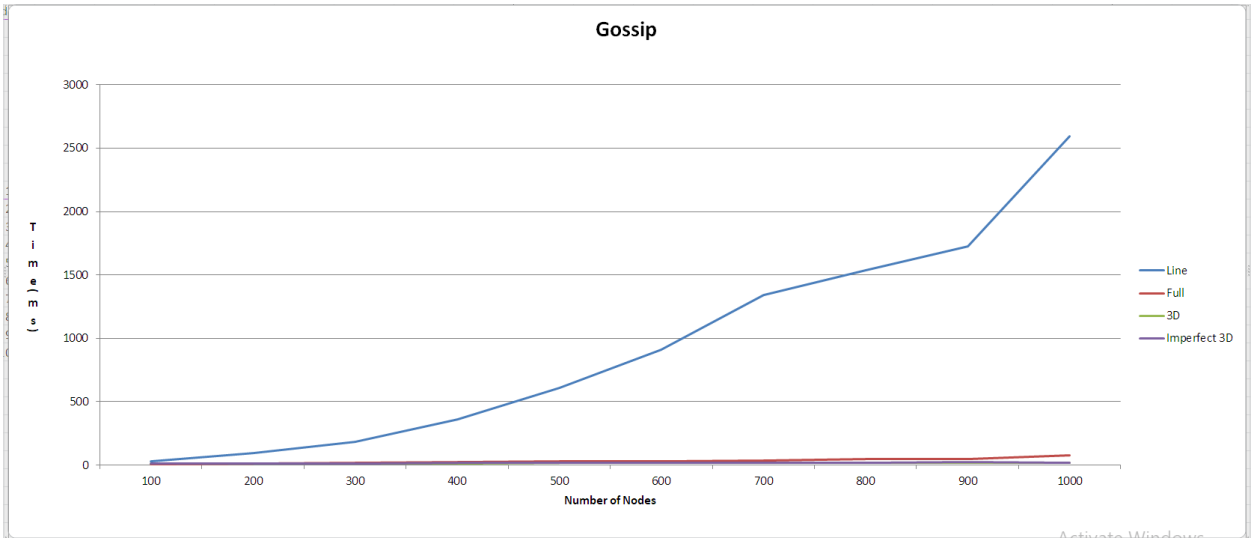
Convergence of both Gossip and Push sum algorithms when nodes are connected in line, full, 3D and imp3D topology

What is the largest network you managed to deal with for each type oftopology and algorithm

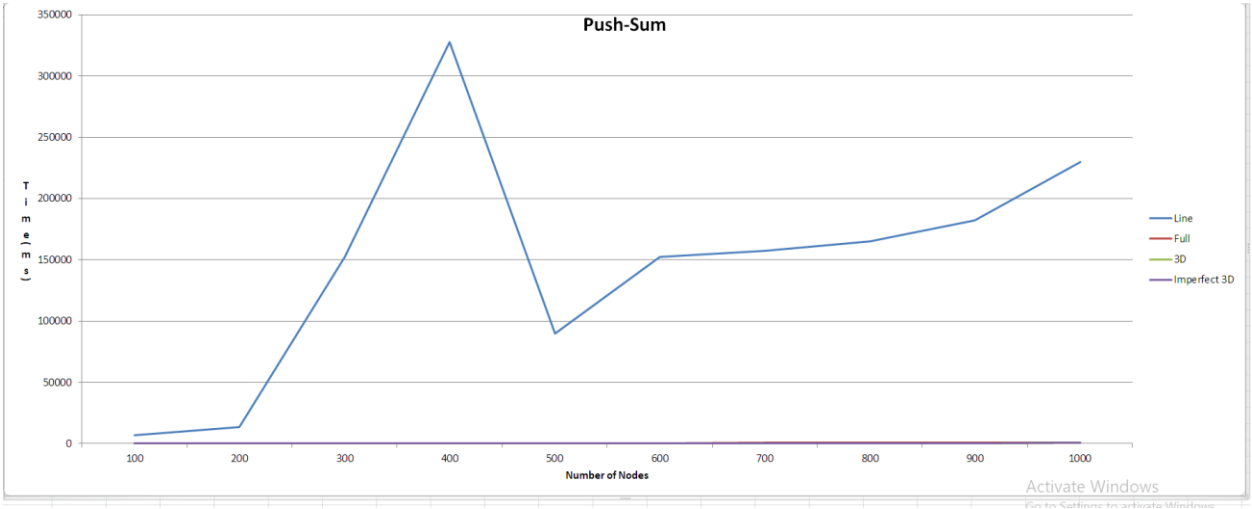
We have managed to implement all the topologies for both algorithms with 10K nodes.

Graphs

Gossip Algorithm



Push-sum Algorithm



Interesting Findings

1) Because the number of neighbors is the least, the line algorithm will perform badly, increasing the probability of failure.
2) For the gossip Algorithm, full topology is the best because all the nodes are connected.