**Gossip Algorithm**

Full:

| No of nodes | Convergence time (microseconds) |
|---|---|
| 50 | 311245 |
| 100 | 315689 |
| 200 | 335495 |
| 350 | 338146 |
| 500 | 390086 |
| 700 | 379767 |
| 1000 | 407312 |

3DGrid:

| No of nodes | Convergence time (microseconds) |
|---|---|
| 50 | 301438 |
| 100 | 334571 |
| 200 | 355008 |
| 350 | 456373 |
| 500 | 459311 |
| 700 | 458498 |
| 1000 | 506709 |

Random2DGrid:

| No of nodes | Convergence time (microseconds) |
|---|---|
| 350 | 699763 |
| 500 | 624568 |
| 700 | 555550 |
| 1000 | 566006 |

Sphere:

| No of nodes | Convergence time (microseconds) |
|---|---|
| 50 | 333437 |
| 100 | 390683 |
| 200 | 445383 |
| 350 | 558143 |
| 500 | 659514 |
| 700 | 705155 |
| 1000 | 800812 |

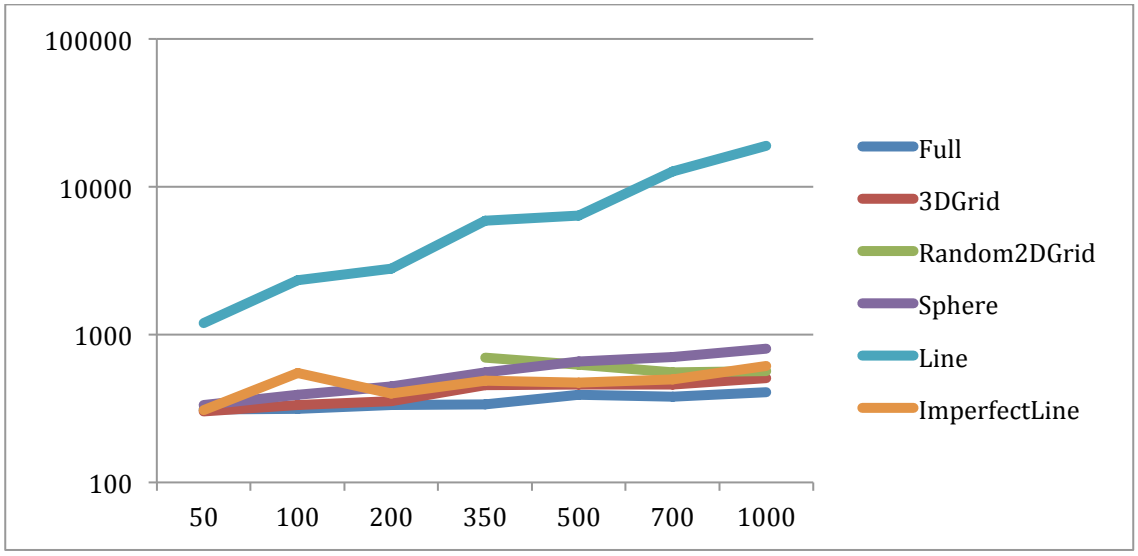
Line:

| No of nodes | Convergence time (microseconds) |
|---|---|
| 50 | 1192774 |
| 100 | 2325484 |
| 200 | 2786326 |
| 350 | 5924397 |
| 500 | 6407674 |
| 700 | 12666630 |
| 1000 | 18949529 |

Imperfect Line:

| No of nodes | Convergence time (microseconds) |
|---|---|
| 50 | 308024 |
| 100 | 550377 |
| 200 | 397679 |
| 350 | 486497 |
| 500 | 475558 |
| 700 | 499437 |
| 1000 | 610742 |

Graph:
The convergence time for line was too high compared to other topologies. So we took logarithm scale on y-axis and it represents the time in milliseconds.



**PushSum Algorithm**

Full:

| No of nodes | Convergence time (microseconds) |
|---|---|
| 50 | 29489 |
| 100 | 38905 |
| 200 | 78345 |
| 350 | 182443 |
| 500 | 299182 |
| 700 | 515048 |
| 1000 | 1029774 |

3DGrid:

| No of nodes | Convergence time (microseconds) |
|---|---|
| 50 | 17275 |
| 100 | 36203 |
| 200 | 81166 |
| 350 | 360718 |
| 500 | 337338 |
| 700 | 693369 |
| 1000 | 1462659 |

Random2DGrid:

| No of nodes | Convergence time (microseconds) |
|---|---|
| 50 | 27355 |
| 100 | 140929 |
| 200 | 9963 |
| 350 | 10362 |
| 500 | 13184 |
| 700 | 19846 |
| 1000 | 19046 |

Sphere:

| No of nodes | Convergence time (microseconds) |
|---|---|
| 50 | 31338 |
| 100 | 61219 |
| 200 | 158066 |
| 350 | 373825 |
| 500 | 753871 |
| 700 | 1625097 |
| 1000 | 2248335 |

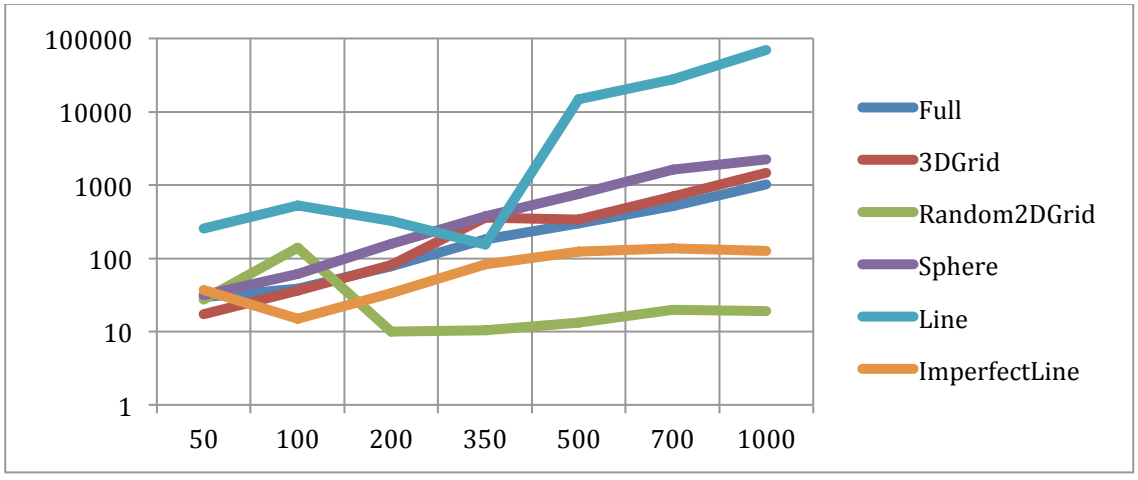
Line:

| No of nodes | Convergence time (microseconds) |
|---|---|
| 50 | 254136 |
| 100 | 529220 |
| 200 | 326965 |
| 350 | 154474 |
| 500 | 14812426 |
| 700 | 27526827 |
| 1000 | 69242680 |

Imperfect Line:

| No of nodes | Convergence time (microseconds) |
|---|---|
| 50 | 36930 |
| 100 | 14911 |
| 200 | 33171 |
| 350 | 83187 |
| 500 | 122781 |
| 700 | 137819 |
| 1000 | 127475 |

Graph:
The convergence time for line was too high compared to other topologies. So we took logarithm scale on y-axis and it represents the time in milliseconds.



## Interesting findings

- Among all the topologies, line topology took the longest time to converge in both Gossip and PushSum algorithm.
- The order of convergence for the topologies is as follows for PushSum algorithm:
  T(Random2DGrid)<T(ImperfectLine)<T(Full)<T(3DGrid)<T(Sphere)<T(Line)
- The order of convergence for the topologies is as follows for Gossip algorithm:
  T(Full)<T(3DGrid)<T(Random2DGrid)<T(ImperfectLine)<T(Sphere)<T(Line)
- After calculating the convergence time for Gossip and PushSum, we found out that PushSum took longer time when compared to Gossip as we increased the number of nodes.
- Another interesting find was the different average values in PushSum for each topology.
- The nodes in Random2DGrid did not converge until we increased the number of nodes to 350 in Gossip Algorithm.
- The time to converge increased exponentially after a certain number of nodes.
- Just by changing the randomness of the second neighbor, the time difference between line and imperfect line became huge

## Team Members: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