DOS PROJECT

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Project 2 Bonus Report

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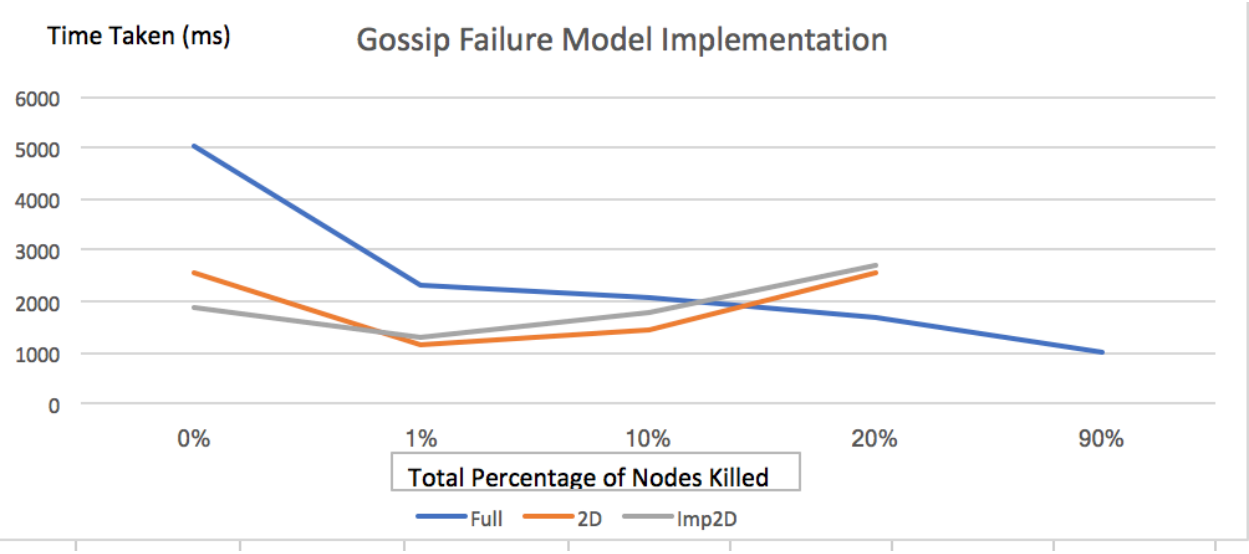
Failure Model Implementation Details- In the failure model implementation, we have added an extra parameter which takes the number of nodes which should be killed before the process takes place. We randomly delete a certain number of nodes which has been entered by the user and then we see how much time the remaining number of nodes took to converge. We tested the failure model with the number of nodes as 500.

We first tested our model on the line topology but almost 95% of the time, it wasn't converging and the reason was because the line topology has a single point of failure so there is a chance that the picked-up node is the start point so it never converged.

Gossip Protocol Graph

We tested all the network topologies using the gossip protocol. The number of nodes with which we tested our failure model was 500.

The graph and the table for the fault tolerance implementation is :-



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	Total Percentage of nodes killed				
Topology	0%	1%	10%	20%	90%
Full	5034	2294	2094	1708	1004
2D	2568	1150	1460	2566	
Imp2D	1868	1282	1780	2716	

Interesting observation-

- The full topology handled failure nodes very well because it's connected with every other node. So, even if the picked-up neighbor is dead, it'll keep choosing till it finds an alive neighbor. Hence, the nodes always get converged. So, the full topology's convergence time keeps decreasing when the total percentage of nodes killed are more.
- In 2D and Imp2D topologies, the maximum number of neighbors for a single node is 4 and 5. So, if those neighbors are dead because of the maximum numbers of nodes killed, then the process will never converge. That's why for 90% of the nodes killed in 500 (450 nodes), 2D and Imp2D topology never converge for 500 nodes.

Push-sum Algorithm

We tested all the network topologies using the push-sum protocol. The number of nodes with which we tested our failure model was 500.

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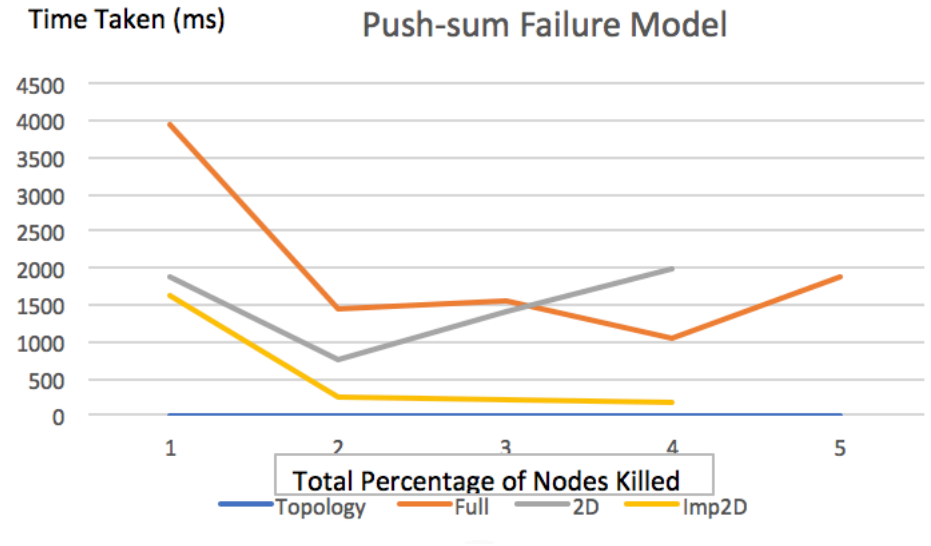

	Total Percentage of Nodes killed				
Topology	0%	1%	10%	20%	90%
Full	3950	1460	1566	1052	1889
2D	1893	747	1407	2006	
Imp2D	1623	245	224	196	

Interesting observations-

- Here, in full topology, the convergence in push-sum protocol doesn't significantly decrease like it did in gossip failure-model implementation.
- Even in the push-sum algorithm, the Imp2D and 2D algorithm doesn't get converged when the percentage of killed nodes is 90%.
- We notice that the convergence ratio decreases as we introduce more number of failure nodes.