COP5615: Distributed Systems
Project 3 Bonus Report

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Objective

The goal for this part of the project is to implement failure models and test the system for resiliency. This is being achieved by programmatically failing either a user-specified number of nodes, or 5% of the total number of nodes in the network by default.

Results

We present our results in two parts. The first table compares the average number of hops the network takes to deliver a message with and without node failures. The second table varies the number of nodes to fail for the same combination of total number of nodes and requests to be performed per node.

NumNodes	NumRequests	NumNodesToFail	Without Failure	With Failure
50	3	25	2	2
5000	3	200	3	3
10000	3	250	3	4
30000	3	500	4	5

NumNodes = 1000; NumRequests = 5

NumNodesToFail	Average Number of Hops
10	2
50	3
100	3
200	4

Findings

From the above results, a couple observations we have about the Pastry network created by our system are as follows:

1. Overall, it takes greater number of hops to deliver a message to its destination node in case of node failures in the network.
2. As the number of node failures in a network increases, the average number of hops also increase.
3. The failure tolerance for the current system is about 10% of the total number of nodes in the network. For higher number of node failures, the chances of some messages getting delivered reduces greatly, causing the program to sometimes fail from meeting termination criteria.

References

- http://rowstron.azurewebsites.net/PAST/pastry.pdf
- https://en.wikipedia.org/wiki/Pastry_(DHT)