

COP 5615: Project 3 Chord Protocol

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Introduction:

The bonus part of chord protocol implementation requires fault tolerance to be included in the network. Fault tolerance implies that when a node in the chord P2P network crashes, the working of the network should continue. The key point in achieving this is maintaining the correct successor pointer in the finger table of every active node, which must get updated every time an active node fails so that every other active nodes knows about it's failure.

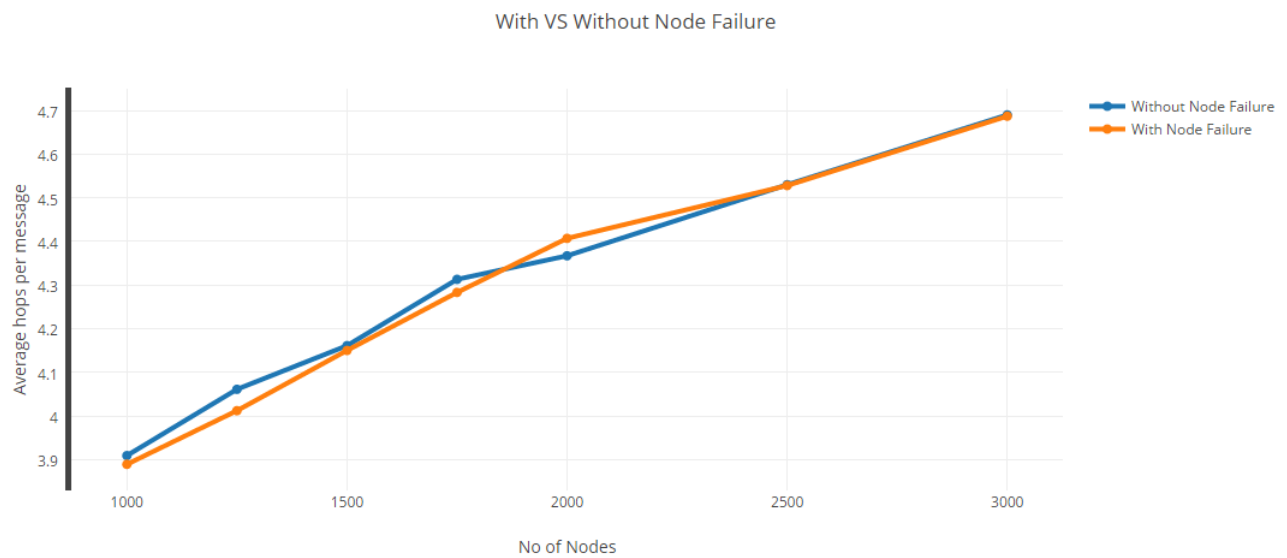
Implementation:

To implement fault tolerance every active node is given a list of active successors. If node N_i notices that its successor node N_j has failed, it replaces all entries in its finger table that had successor as N_j , with the next first active node. Also, node N_i tells its alive successors that node N_j has crashed and tells them to Stabilize themselves. Stabilize is a function that ensure that in occurrence of a failure, every node updates its finger table.

Results and Observations:

Since failure of nodes means that the number of active nodes is reduced, logically this implies that the segment length that each active node is responsible for increases. This also means that the average number of hops should decrease. However this decrease in average number of hops depends upon the total number of failed nodes as a percentage of active nodes. We did some research online and found that since this percentage is extremely small there is no significant decrease in the average hops per message. We also found the same for our own simulation where there was a minuscule decrease in the average hops per message. The tabular data and the graphical representation for the same is as bellows:

Total # of Active Nodes	Average Hops without Failure	Average Hops With failures
1000	3.909	3.889
1250	4.061	4.012
1500	4.161	4.15
1750	4.313	4.283
2000	4.367	4.407
2500	4.53	4.528
3000	4.69	4.687



Exploration:

We also thought of our additional logic that can be implemented such as adding another node in place of failed node and mapping its effect over the entire network performance. This could be a worthwhile idea which if implemented could even reveal the working of actual P2P networks in more detail.