PROJECT 3 - BONUS REPORT

Group Members:

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Failure Model:

We are taking a Third parameter as the number of nodes to kill from the user.

$ escript project3_bonus <No. of Nodes> <No. of Requests> <No. of Nodes to Kill>

The given number of nodes will be killed, and the average number of hops (node connections) that have to be traversed from the remaining nodes, to deliver a message will be calculated. The nodes to kill will be randomly selected by a function.

Experiments Performed:

Firstly, we are comparing the average number of hops the network takes to deliver a message with and without node failures. We are keeping the number of requests fixed for simplification.

Secondly, we are varying the number of failed nodes and keeping the number of nodes and number of requests fixed.

Thirdly, we are creating a graph for comparative analysis between average number of hops and upper bound for average number of hops.

No. of Request = 4

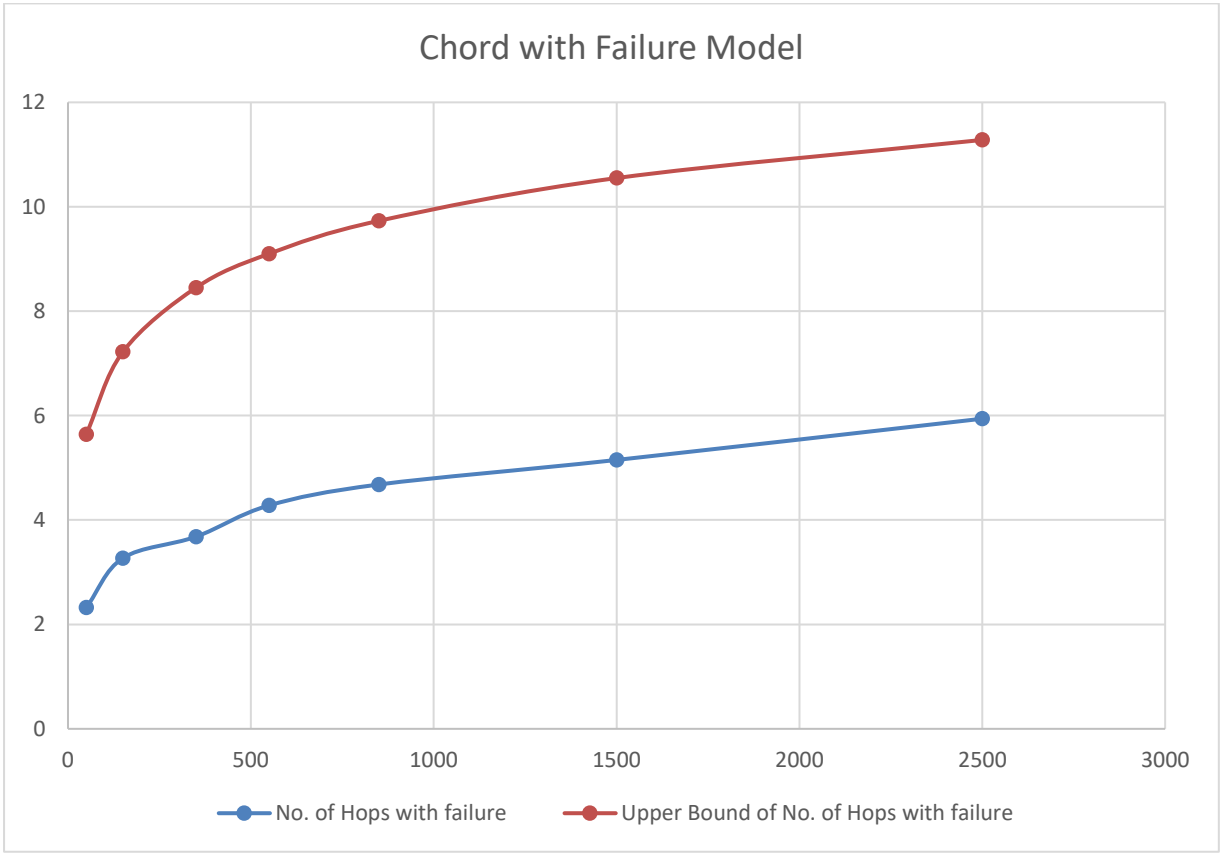
No. of Nodes	No. of Failed Nodes	No. of Hops w/o failure	No. of Hops with failure
100	10	2.37	2.52
1000	100	3.92	4.32
3000	200	4.33	4.56
6000	400	4.86	5.02
7000	500	4.91	5.27
8500	600	5.28	5.59

No. of Nodes = 500 **No. of Requests = 3**

No. of Failed Nodes	No. of Hops with failure
20	3.55
40	3.71
60	3.78
100	4.27

No. of Requests = 5

No. of Nodes	No. of Failed Nodes	No. of Hops with failure	Upper Bound of No. of Hops with failure
50	5	2.32	5.64
150	25	3.27	7.22
350	55	3.68	8.45
550	80	4.28	9.10
850	130	4.68	9.73
1500	225	5.15	10.55
2500	375	5.94	11.28



Observations:

From the above results, the following observations can be inferred about the Chord network that we created:

1. We observed that it takes greater number of hops to deliver a message to the destination node when there are node failures in the network.
2. The average number of hops increase as the number of node failures in a network increase.
3. Resilience of the system can be measured by calculating its failure tolerance for the system, which is about 15% of the total number of nodes in the network.
4. The average number of hops are always less than log(n) with base 2.
5. More is the number of node failures, lesser are the chances of messages getting delivered, and may cause the program to sometimes behave improperly.