

Report

Pastry Protocol Implementation: Failure Model

1. Team Members:

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2. How to compile and run the program

```
mix escript.build  
/project3_bonus 100 10 70  
(numnodes) (num of message) (num of failure)
```

The number of failure nodes are specified as the 3rd parameter of the command line. After the join step the failures are created

3. Steps involved in handling the failures

In the case of network failure, the dead node may reside in the **Leafset** and the **Routing table** of the other nodes that has to be updated for the network to work properly again.

Updating the Leafset involves filtering out the dead node from every node in the dead node's leafset once the failure is detected. New alive nodes must be now filled in the place of the dead nodes. To do this the nodes that are refilling their leafset will ask the node that is the farthest lying in the side of the dead node. This can either be the smaller or the larger leafset.

On the other hand, updating the routing table will also require filtering out the dead node from every node in the dead node's routing table once the failure is detected. Now, to refill the routing tables the nodes that lying nearest to the dead node are contacted.

| Number of Nodes | Number of Requests | Number of Failure | Average Number of Hops |
|-----------------|--------------------|-------------------|------------------------|
| 100 | 10 | 0 | 1.93 |
| 100 | 10 | 10 | 2.34 |
| 100 | 10 | 20 | 3.06 |
| 100 | 10 | 50 | 3.94 |
| 100 | 10 | 60 | 4.39 |
| | | | |
| 1000 | 10 | 0 | 2.73 |
| 1000 | 10 | 200 | 5.59 |
| 1000 | 10 | 300 | 6.59 |
| 1000 | 10 | 500 | 6.43 |
| 1000 | 10 | 700 | 7.64 |

(Table describing effect of node failure on the pastry protocol)

From the above table it is clear that, even if the we adopted the failure mechanism, the average number of hops still increased because some of the nodes were not able to find a proper replacement for the dead node's ID so, they will end up finding alternate nearest neighbors which leads to the increase in number of average hop size.