

**COP5615**  
**Distributed Operating Systems Principles**  
**Fall 2014**

**Project III (Bonus)**

**Pastry**

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## Introduction

1. Specify number of failed nodes as a command line parameter. Its value should be greater than equal to 0 and less than equal to number of pastry nodes.
2. We start the failing process after the join step is complete. Rest of the program works as before.

## Handling Failures

In the event of failure we are doing following:

1. Removing dead nodelds that exist in the LEAFSETs of other nodes and replacing them with live nodelds. If dead node's Id is less than this node's Id then ask leafset from smallest nodeld in the leafset of this node otherwise ask leafset from from largest nodeld in the leafset of this node.
2. Removing dead nodelds that exist in the ROUTING TABLEs of other nodes and replacing them with live nodelds. Ask routing table from first non-null node entry in the row where dead nodeld exists in the routing table of this node.

For example, consider below status table for node 10233102

If node **10211302** becomes **dead**, then,

- **Leaf set** requested from node = 10233000
- **Routing table** requested from node = 10200230

Nodeld 10233102			
Leaf set	SMALLER	LARGER	
10233033	10233021	10233120	10233122
10233001	10233000	10233230	10233232
Routing Table			
-0-2212102	1	-0-2301203	-3-1203203
0	1-1-301233	1-2-230203	1-3-021022
10-0-31203	10-1-32102	2	10-3-23302
102-0-0230	102-1-1302	102-2-2302	3
1023-0-322	1023-1-000	1023-2-121	3
10233-0-01	1	10233-2-32	
0		102331-2-0	
		2	

## **Results**

Number of nodes	Number of requests	Number of failures	Average Hops
100	10	0	3.835
100	10	10	6.421
100	10	20	4.809
100	10	30	4.583
100	10	40	4.481
100	10	50	3.798
1000	10	0	7.909
1000	10	100	10.049
1000	10	200	8.076
1000	10	300	5.353
1000	10	400	6.206
1000	10	500	6.123
1000	10	600	5.861
1000	10	700	4.843

## **Observations**

1. Average number of hops first increases because some of the nodes don't get proper nodes to replace dead nodes.
2. But the average number of hops decreases when number of failed nodes increases as it leads to fewer nodes in the network which means less hops required in reaching destination node.