

COP5615: DOSP Project 3 Bonus Chord - P2P System and Simulation

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Problem Statement

Implement node and failure models to existing simulation.

language: Erlang

Implementation

A node failure model has been added to the existing implementation of the Chord protocol simulation, which has been described in the main report. The model is parametrised by the percentage of node failures (rate), which determines the number of randomly selected nodes that should fail in the network. We use this model to test the fault tolerance of the simulation. For this report, I have tested the failure model with 1000 nodes and 100 requests and recorded the average number of hops for a set value of the rate of failure.

Execution Details

The program takes three parameters, number of nodes (numNodes), the number of requests (numRequests), and lastly the rate of node failure which is a float between 0 and 1.

Usage:

-> *c(project3_bonus).*

-> *project3_bonus:main(numNodes, numRequests, failRate).*

-> *Ex: project3_bonus:main(1000, 100, 0.2).*

-> *Restart shell after each execution*

Submission Details

The submission zip file contains the code, screenshots, results, and plots.

Example

```
DOSP --zsh-- 80x24
[(base) pranath@Pranaths-MacBook-Pro DOSP % erl
Erlang/OTP 25 [erts-13.1.1] [source] [64-bit] [smp:12:12] [ds:12:12:10] [async-t
hreads:1] [jit:ns] [dtrace]

Eshell V13.1.1 (abort with ^G)
1> c(project3_bonus).
{ok,project3_bonus}
2> project3_bonus:main(1000, 100, 0.2).
numNodes: 1000
numRequests: 100
Failure Rate: 0.2
M: 10
{start}
Total Number of Hops: 441526
Average Number of Hops: 4.41526
Done!
3>
(base) pranath@Pranaths-MacBook-Pro DOSP % _
```

Figure 1: An example run

Result

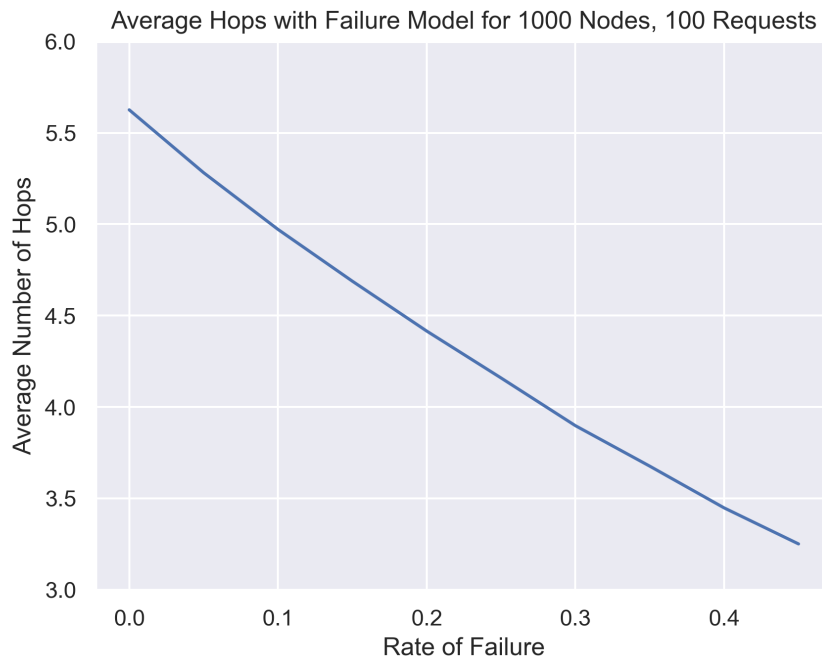


Figure 2: Average number of hops for a failure model (1000 Nodes, 100 Requests)

Observations and Notes:

1. As expected, the average number of hops decreases linearly as we increase the rate of failure due to the decrease in the number of nodes.
 2. The plot is not a perfect straight line, meaning the number of average hops doesn't perfectly scale down as we increase the rate of failure, which could be due to the randomness or the delay caused while updating the finger tables.
 3. The algorithm still converges even after triggering failure, which demonstrates the fault tolerance of the chord protocol.
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