

COP-5615 Project 3 README : Chord Protocol Simulation

Group members:

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Instructions to Run:

- To compile the program, use the following command:

```
c(main).  
c(hopmodule).  
c(fingertablemodule).
```

```
C:\Users\venka\OneDrive\Desktop\DOSP\Project3>erl  
Eshell V13.0.4 (abort with ^G)  
1> c(fingertablemodule).  
{ok,fingertablemodule}  
2> c(main).  
{ok,main}  
3> c(hopmodule).  
{ok,hopmodule}
```

- To execute the program, use the following command:

```
main:start(NumberOfNodes, RequestLimit).  
where NumberOfNodes = Number of Nodes in the Chord Ring  
RequestLimit = Number of requests per peer
```

```
6> main:start(15,10).  
true
```

- After executing the above command, the chord protocol begins and a ring network with the given number of nodes gets created. And the given number of Requests will be handled by each peer before converging.
- Once we reach convergence, we see the average hop count output as below:

```

6> main:start(15,10).
true
7>
Average Hops = 1.04    TotalHops = 156
7>
Allowed Log Hops = 3.9068905956085187
7>

```

What is working?

- We successfully implemented Chord protocol in erlang using the AKKA actor model as per the research paper given.
- The peers are added to the chord ring in a dynamic and continuous manner.
- Message/Request passing starts once the whole network is ready with peers and their keys.
- Queries are passed to find the desired key and the output is delivered by peer hops. Each peer looks up for the desired key and if not found, forwards the query to its peers/neighbors from its finger table.
- In the end, once the key is found, the average hop count is returned, which is always going to be in $O(\log n)$ time.

Output Statistics:

- For the sake of simplicity we have fixed the number of messages to be 10, however it can be any value.

Num of Peers	Number of Messages	Avg. hop count observed
15	10	1.04
50	10	1.756
300	10	2.870
900	10	3.882
2500	10	4.578
5000	10	5.159

Largest Network Managed:

We managed to create a chord network and create the simulation with 5000 nodes. This is our largest network. If the peer/node count is increased any further, the program takes too long to converge.

```
3> main:start(5000,10).  
true  
4>  
Average Hops = 5.15912    TotalHops = 257956  
4>  
Allowed Log Hops = 12.287712379549449  
4>
```