

Chord Protocol – P2P System and Simulation

COP5615 – Distributed Operating System Principles – Project 3

The goal of the project is to implement the chord protocol and a simple object access service to prove its usefulness using Erlang and Actor Model.

Group Members

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What is working?

- The chord protocol is implemented using API's in the Research paper like `n.create()` to create chord network, `join()` to find the immediate successor of the node and `stabilize()` to find the newly joined nodes.
- The project used random number approach to establish unique node ids, which will reduce the risk of collisions when compared to hashing mentioned in requirements.
- when we give more nodes, the network will take time to stabilize the nodes. The application will work better for higher number of messages.
- The implementation is working as expected.

Largest Network

- The maximum number of nodes tested could be 5000 with 100 messages, the average hops taken was between [7.6,8.9] when we tested 9 times.

Compile and Run

- Extract project3.zip file -> `unzip project3.zip`
- Compile chord.erl by entering erl shell in the terminal and command -> `c(chord)`.
- **Input :**
 - > `chord:start(numNodes, numMessages)`
 - > `numNodes` -> Required number of nodes to be set up in a chord.
 - > `numMessages` -> Number of messages each node sends for lookups.
- **Output :**

The below is the screenshot of program with 5000 nodes with 10 messages, we got 5.0993 as average no.of hops for a message.

Results:

```
○ hemanthbandari@Hemanths-MacBook-Air Project3 % erl
Erlang/OTP 25 [erts-13.1] [source] [64-bit] [smp:8:8] [ds:8:8:10] [async-threads:1] [jit] [dtrace]

Eshell V13.1 (abort with ^G)
1> chord:start(4000,10).
true

Average Hops = 4.959725    TotalHops = 198389    NumNodes = 4000    NumRequests = 10
2> chord:start(5000,10).
true

Average Hops = 5.0993    TotalHops = 254965    NumNodes = 5000    NumRequests = 10
3> █
```

| Number of Nodes | Average number of Hops |
|-----------------|------------------------|
| 100 | 2.37 |
| 500 | 3.47 |
| 1000 | 3.96 |
| 5000 | 5.09 |

These are the average no.of hops taken for nodes from 100 – 5000.