

README File:

- **Project Team**

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- **What is working**

- Used SHA-256 is used to create m bit node ID and m bit keys for messages.
- Created chord ring with the number of nodes
- Each node has finger table that is contain m fingers
- Given any key, we use the finger table entries to traverse in the chord ring
- When every node has performed given number of requests, program terminates
- Finger table detail
 - Each node had its own finger table
 - The max number of entries in the finger table is associated with m (number of bits)
 - The successor of a node is the node right next to it in clock wise direction
 - When building finger table, each row ranges between $2^{(i)}$ to $2^{(i+1)} - 1$ where $i = 0$ to $(m-1)$
 - In any Finger table, a node itself should not be present in its own finger table because that would create an infinite loop

- **Operating code**

To run this code, open terminal and type following code after compile assignment3

assignment3:master(NumNodes, NumRequests)

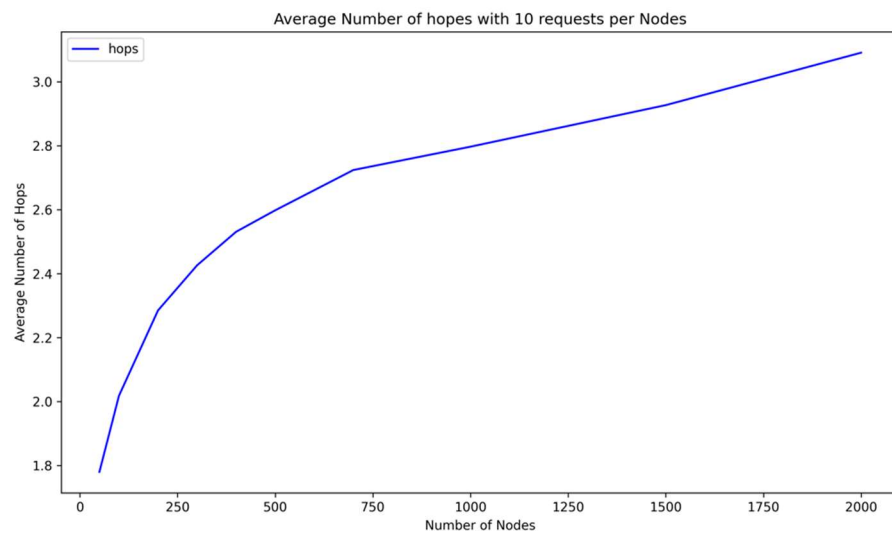
- **Results**

We compute Average Number of hops using formula below,

$$\text{All messages} / (\text{NumNodes} * \text{NumRequests})$$

We set $m = 26$, and tested our chord protocol with the ten sets of NumNodes and NumRequests, details in the following table.

NumNodes	NumRequests	Average Hops
50	10	1.78
100	10	2.018
200	10	2.285
300	10	2.426
400	10	2.531
500	10	2.598
700	10	2.724
1000	10	2.797
1500	10	2.927
2000	10	3.091



All the Average hops is smaller than $\log_2 2^6$

- **Snapshot of the result**

```

3> assignment3:master(30,10).
All the messages have been sent. The avg number of hops with 30 nodes and 10 msg requests is 1.87.
ok
4> assignment3:master(50,10).
All the messages have been sent. The avg number of hops with 50 nodes and 10 msg requests is 1.78.
ok
5> assignment3:master(100,10).
All the messages have been sent. The avg number of hops with 100 nodes and 10 msg requests is 2.018.
ok
6> assignment3:master(200,10).
All the messages have been sent. The avg number of hops with 200 nodes and 10 msg requests is 2.285.
ok
7> assignment3:master(300,10).
All the messages have been sent. The avg number of hops with 300 nodes and 10 msg requests is 2.425666666666667.
ok
8> assignment3:master(400,10).
All the messages have been sent. The avg number of hops with 400 nodes and 10 msg requests is 2.5315.
ok
9> assignment3:master(500,10).
All the messages have been sent. The avg number of hops with 500 nodes and 10 msg requests is 2.5978.
ok
10> assignment3:master(700,10).
All the messages have been sent. The avg number of hops with 700 nodes and 10 msg requests is 2.7235714285714288.
ok
11> assignment3:master(1000,10).
All the messages have been sent. The avg number of hops with 1000 nodes and 10 msg requests is 2.7969.
ok
12> assignment3:master(1500,10).
All the messages have been sent. The avg number of hops with 1500 nodes and 10 msg requests is 2.9269333333333334.
ok
13> assignment3:master(2000,10).
All the messages have been sent. The avg number of hops with 2000 nodes and 10 msg requests is 3.09055.
ok

```

- **Largest network we managed**

$$NumNodes = 1000, NumRequests = 10$$

```
14> assignment3:master(10000,10).  
All the messages have been sent. The avg number of hops with 10000 nodes and 10 msg requests is 3.66319.  
ok
```