DOSP: Project 3 (Chord - P2P System and Simulation)

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Code Execution Steps:

- Navigate to the project directory [cd directoryname]
- To compile the program, use the command c(chord). [Compiled beam files have been attached with the code]
- Run the chord program using the command: chord:start(NumNodes,NumRequests).

What is working:

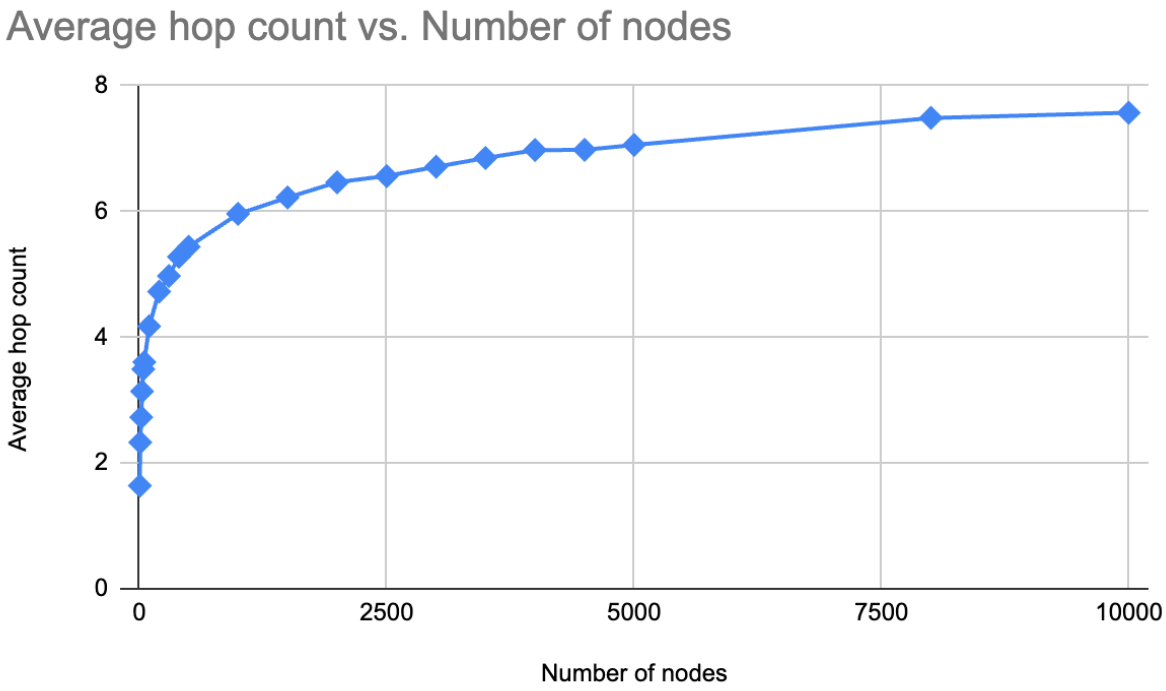
- Our program leverages the actor model in Erlang to implement the chord protocol.
- Using consistent hashing, we have mapped keys to nodes that are distributed uniformly across the chord ring.
- The chord ring is then created based on the number of nodes provided in the input.
- The ring size is set as the next power of 2 that is greater than the number of nodes. For example, for NoOfNodes = 10, RingSize would be 16.
- The nodes have been placed on the chord ring using consistent hashing.
- Once the fingertables have been created and stabilized for all the nodes, we are performing lookup for the data as per the chord algorithm defined in the paper.
- In the end, we have calculated the network performance by computing the average hop count after the given number of requests have been completed by all the nodes.

Key observation - For routing each request, the number of hops made is always less than or equal to log of the ring size.

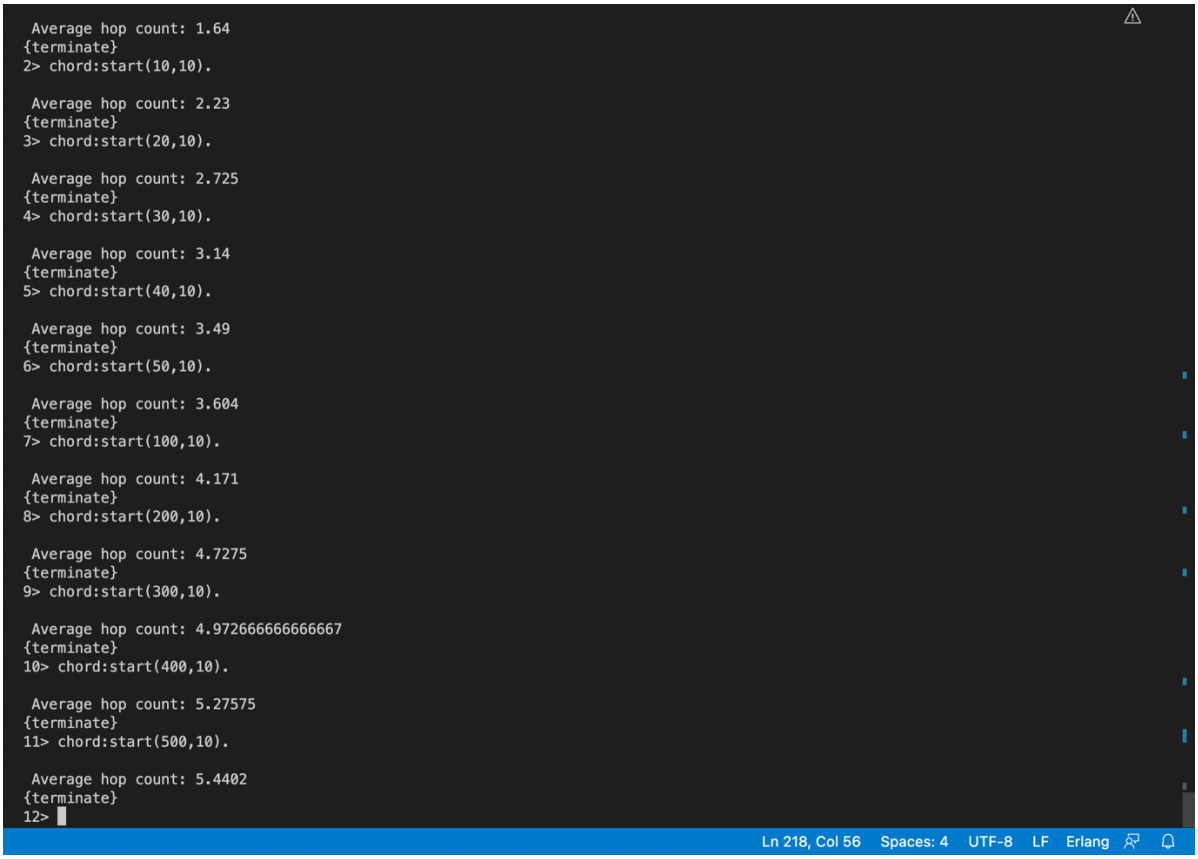
Chord execution results:

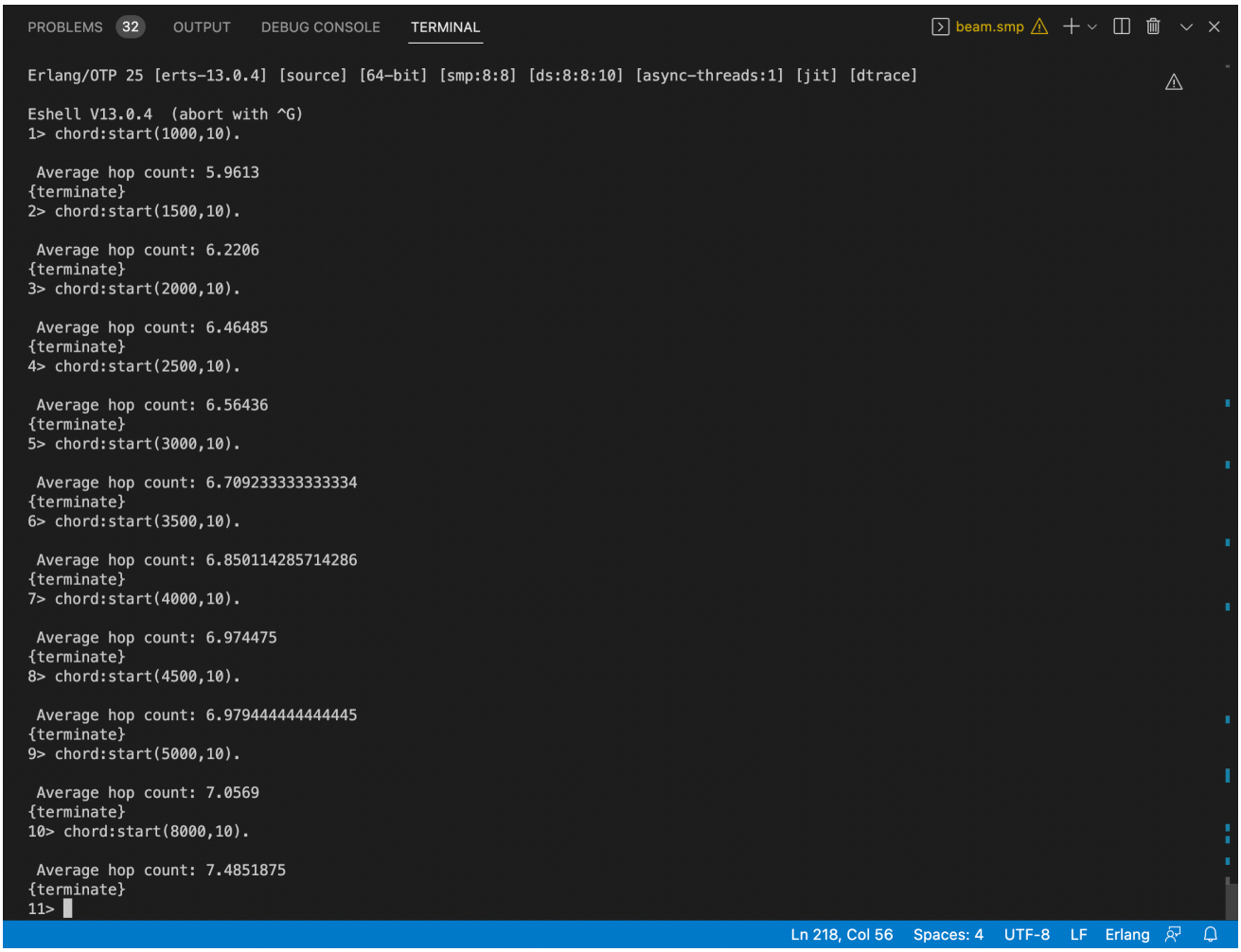
Following are the implementation details for our program, for Node values tested from 5 to 10000.

Number of nodes	Average hop count
5	1.64
10	2.33
20	2.73
30	3.14
40	3.49
50	3.60
100	4.17
200	4.78
300	4.97
400	5.28
500	5.44
1000	5.96
1500	6.22
2000	6.46
2500	6.56
3000	6.71
3500	6.85
4000	6.97
4500	6.98
5000	7.06
8000	7.49
10000	7.57

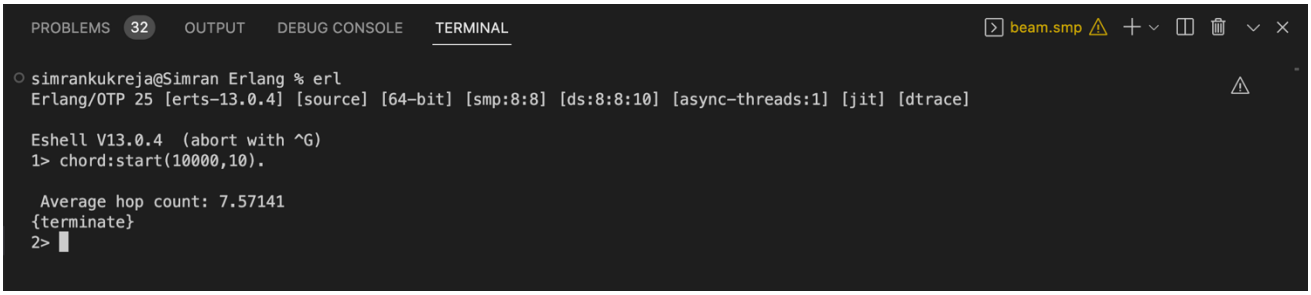


Following are the screenshots for the program output for the nodes in the table above:





Largest network size output:



Largest network we managed to deal with:

The largest network we tested our program on comprised of 10000 nodes and 10 requests per node. To calculate the performance of this network, we computed the average number of hops, which was observed as 7.57.