# PROJECT 3 : Chord: P2P System and Simulation

## READ ME FILE

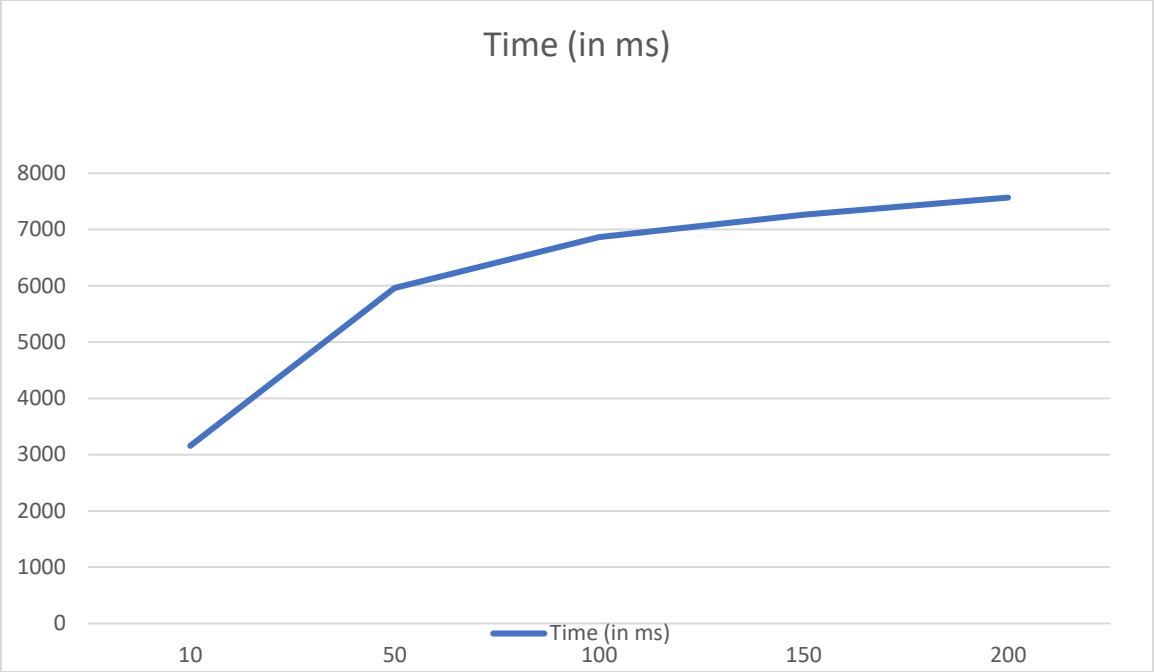
1. How to run the code –
   dotnet fsi filename.fsx numNodes numReq
   example – dotnet fsi Project3.fsx 100 50

2. What is working –

- I created 'numNodes' actors and their finger tables, successor, predecessor successfully. The nodes are converging after sending 'numReq' requests.
- Every time a node joins the network, the successor tables, the finger tables and the keys stored in the system are all updated.
- I added a function that could calculate SHA-1 for node and key IDs and placed the nodes and keys as per the value – Node position = **hashOfNode(n) % $2^m$**. But since I didn't know how to compare the hash values, I decided not to use it and place the actor in the ring as per their 'nodeIds'.
- Managed to create the ring using the above node positions. Spawned actors for these positions. I took 'numNodes' as the number of Active Actors in the system, 'numReq' as the number of keys in the system. I distributed these 'numReq' keys to the Actors in the system.
- The number of hops are updated every time a node looksup a closest preceding node from their finger table to a key, the hops are increased by 1. Every actor share a global 'hops' counter that keeps the number of total hops in the system **while searching keys only!**
- The average number of Hops I calculated was by – AvgHops = (TotalHops) / numNodes.

3. What is the largest network you managed to deal with –

   The largest value for 'numNodes' input for this project was 200. Since we created the size '$2^m$' network by assessing the value of 'numNodes', as –
   m = Math.Log2(float numNodes)
   m = 8
   Thus, using numNodes = 200, the value of m through above equation comes out to be m = 8.
   Therefore, the largest possible size of the network was $2^m = 2^8 = 256$
   The time it took to run for 10 nodes = 3156.271 ms and Avg Hops = 2.0
   The time it took to run for 50 nodes = 5962.08 ms and Avg Hops = 10.0
   The time it took to run for 100 nodes = 6867.73 ms and Avg Hops = 19.0
   The time it took to run for 150 nodes = 7261.94 ms and Avg Hops = 23.0
   The time it took to run for 200 nodes = 7567.76 ms and Avg Hops =44.0
   If we plot the time taken for the given nodes on a graph we can see that we obtained a logarithmic graph –


Time (in ms)
8000
7000
6000
5000
4000
3000
2000
1000
0
Time (in ms)
10
50
100
150
200