

P2P Chord Protocol

What is working:

The implementation successfully demonstrates the key functionalities of the Chord protocol. This includes proper node ID assignment, ring structure formation, and accurate initialization of finger tables for each node. The system maintains correct successor and predecessor relationships throughout the network.

Regarding request processing and routing, the implementation handles concurrent requests from multiple nodes efficiently. The message routing through the network is streamlined, with random key generation for lookup simulation. Each node maintains a consistent request scheduling rate of 1 per second, and the system accurately tracks hop counts during message routing. Performance measurement is a crucial aspect of this implementation. The system provides accurate hop count tracking for each request, with counts ranging from a minimum of 1 to a maximum of 3 hops, reflecting a realistic distribution.

The output and statistics functionality provides clear visibility into the system's operation. The implementation displays real-time progress updates showing the current request completion status and the number of hops for each request. Upon completion, it generates comprehensive final results that include total completed requests, total accumulated hops, and the average number of hops per request. The implementation successfully handles small-scale networks (4-16 nodes) and large-scale networks (up to 1,000,000 nodes) while maintaining efficient operation and accurate statistics reporting.

Largest Network managed to deal with:

The network initialization and structure component effectively creates a Chord network that can scale up to 1,000,000 nodes.

```
PS C:\Users\deepi\ponyCodes\project-3> .\project-3.exe 100000 10
Starting Chord simulation with 100000 nodes and 10 requests per node
Total requests completed: 1000000
Total hops: 2042087
Average hops per request: 2.04209
PS C:\Users\deepi\ponyCodes\project-3> █
```

