# COP5615 – DOSP PROJECT 3 Readme
# Chord - P2P System and Simulation

**Team Members:**
**Aadithya Kandeth – (UFID: 69802791)**
**Anol Kurian Vadakkeparampil – (UFID: 56268544)**

## PROJECT OBJECTIVE:

The Chord protocol is a lookup protocol that describes how to find key locations, how to add new nodes to the system, and node failure recovery. Every node in the system holds a set of key/values and entries in a routing table that points to a chord server subset. This project aims to use Erlang to implement the chord protocol and a simple object access service using the actor model. The project takes the number of nodes and the number of requests as input and outputs the average number of hops that is required to be travelled to send the message.

## IMPLEMENTATION:

- The P2P simulation was implemented successfully using Erlang and the actor model
- As per the chord protocol, every node has an associated finger table that holds values.
- The nodes generate a random key for each request.
- The hop count is incremented with each lookup.
- The average hop count is calculated by dividing the total number of hops by the total number of requests.

## OBSERVATIONS:

- The number of hops taken was directly proportional to the input number of nodes.
  I.e., passing a higher number of nodes as input led to a higher hop count.

- The more the number of requests sent from a specific node to the same chord server, the lesser the average number of hops.

## LARGEST NETWORK USED:

The largest number of nodes passed as input was 60000. This took a hop time of 7.46.

## OUTPUT:

The output shown below is obtained when the program was run for 100 nodes and 10 requests.

```
51    listen_completion_of_task(0, CountOfHops) ->
52        main_process ! {totalhops, CountOfHops}
53    ;
listen_completion_of_task/2

Terminal:  Local (2) ×  + ∨

98 Completed , Number of Hops : 4, Key : 101
2>
Average Hops : 2.26, Total Hops : 2260  for 100 Num of Nodes and 10 Num of Requests
2>
```

## PLOTS:

No. of nodes vs Average number of Hops Taken

| Num Nodes | Sum of Hop Time (AVG) |
|-----------|-----------------------|
| 100 | 2.26 |
| 500 | 3.41 |
| 1000 | 4.12 |
| 2000 | 4.36 |
| 4000 | 4.77 |
| 5000 | 5.03 |
| 10000 | 6.03 |
| 20000 | 6.74 |
| 30000 | 7.11 |
| 40000 | 6.95 |
| 50000 | 7.31 |
| 60000 | 7.46 |