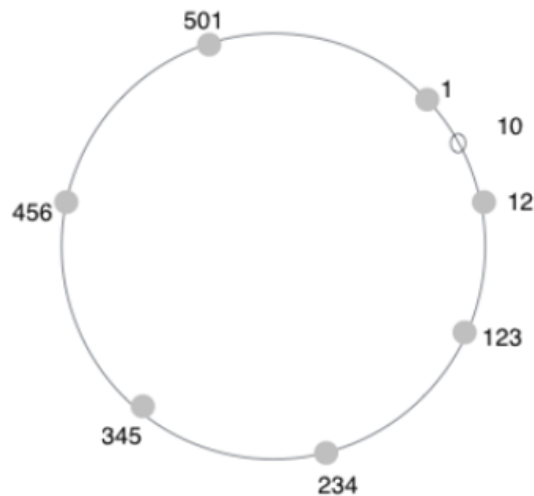


Question 2

Suppose that 7 peers with ids 1, 12, 123, 234, 345, 456, and 501 form a system using a Chord ring with $m = 9$. If node 234 initiates a query for key 10, what is the list of nodes traversed by that query? Show your work.

Answer:

To search key in a chord ring we just move around the circular chord to the next node joining the system, till we find the first successor of the key to be searched, in our case, it is node 12.

So, we start with 234, forward the query to 345, then to 456, then 501, then 1 and finally find 12.

So, sequence of nodes traversed is:

234,345,456,501,1,12

Every node will however refer to the finger table and queries the closest preceding node before the node to be searched in this case it is using finger protocol.

Finger table at node 234:

| i | $(n+2^i)(\text{mod } 2^m)$ | Next successor(Node) |
|---|----------------------------|----------------------|
| 0 | $234+2^0 = 235$ | 345 |
| 1 | $234+2^1 = 236$ | 345 |
| 2 | $234+2^2 = 238$ | 345 |
| 3 | $234+2^3 = 242$ | 345 |
| 4 | $234+2^4 = 250$ | 345 |
| 5 | $234+2^5 = 266$ | 345 |
| 6 | $234+2^6 = 298$ | 345 |
| 7 | $234+2^7 = 362$ | 456 |
| 8 | $234+2^8 = 490$ | 501 |

The closest preceding node before 10 here is N501.

Finger table at node 510:

| i | $(n+2^i)(\text{mod } 2^m)$ | Next successor(Node) |
|---|---------------------------------------|----------------------|
| 0 | $501+2^0 = 502$ | 1 |
| 1 | $501+2^1 = 503$ | 1 |
| 2 | $501+2^2 = 505$ | 1 |
| 3 | $501+2^3 = 509$ | 1 |
| 4 | $501+2^4 = 517 \text{mod } 2^9 = 5$ | 12 |
| 5 | $501+2^5 = 533 \text{mod } 2^9 = 21$ | 123 |
| 6 | $501+2^6 = 565 \text{mod } 2^9 = 53$ | 123 |
| 7 | $501+2^7 = 629 \text{mod } 2^9 = 117$ | 123 |
| 8 | $501+2^8 = 757 \text{mod } 2^9 = 245$ | 345 |

The closest preceding node before 10 here is N1.

At node 1, the protocol will see that the successor node 12 has the key 10 and will finally query N12.

Hence the order of nodes queried is 234,501,1,12