HW 7 Solution

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a)

There are two shortest routes:

01010, 01110, 01111

01010, 01011, 01111

1b)

4 disjoint shortest paths. The number of node disjoint shortest paths is bounded above by the Hamming distance “d” between the two nodes.

At the final step, to get closer to the destination, the bit to be flipped must be a bit that is different. There are only d nodes that differ from the target node in just one position, which the source node also differs from the target in. Then node-disjointness requires that each new path "uses up" one of those 2nd-to-last nodes.

One possible solution

00101, 10101, 10001, 10000, 10010

00101, 00001, 00000, 00010, 10010

00101, 00111, 10111, 10011, 10010

00101, 00100, 10100, 10110, 10010

2) Additions in the solution below are modulo 256.

The nodes are 9, 10, 20, 24, 90, 105 and 245.

(a) n = 9

i	0	1	2	3	4	5	6	7
n+2^i	10	11	13	17	25	41	73	137
Ft(i)	10	20	20	20	90	90	90	245

(b)

Finger table of node 90:

I	0	1	2	3	4	5	6	7
n+2^i	91	92	94	98	106	122	154	218
Ft(i)	105	105	105	105	245	245	245	245

Finger table of node 105:

I	0	1	2	3	4	5	6	7
n+2^i	106	107	109	113	121	137	169	233
Ft(i)	245	245	245	245	245	245	245	245

The path: 9, 90, 105, 245

3)

(a) Yes

(b) Yes.

(c) False.

(d) True: Write3(Y,5) -> Read2(Y,5) -> Read2(X,2).

Recommended exercise:

In the Chord p2p network above, determine which nodes will store the keys with the following hashed identifiers: 9, 10, 11, 29, 248 and 255.

Answer: 9, 10, 20, 90, 9, 9