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# Exercise for Lecture "P2P Systems"

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Submission only via the Moodle platform in PDF, plain text, or JPG/PNG.

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## Problem 10.1 - Kademlia

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For the following questions, please consider the following Kademlia routing table for node 101010. Assume that the network has reached steady state. Also assume that all the nodes remain in the network for an unlimited amount of time, unless stated otherwise.

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- a) How much routing state information is stored in each Kademlia node at maximum in bytes? Assume 26 bytes for each entry consisting of IP address, UDP port, and node ID. The identifier space is 160-bit long. The variable  $k$  shall remain a parameter in the result.  $k$  is the number of entries per bucket.
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d) Now, let us assume that three new nodes with IDs 001110, 111111, and 110101 join the network, in that order. How will each of these actions affect the routing table for node 101010?

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e) Let us assume that the network has reached steady state after the above changes. We would now like to route a message from node 101010 to node 111100. If  $\alpha = 2$ , which node IDs are selected from the routing table in the first routing step?

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### **Problem 10.2 - Distributed Hash Tables**

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3 Several DHT based approaches have been designed, each one with different limitations and characteristics. Explain in which scenarios you would select:

- a) Chord over CAN
- b) Kademlia over Chord
- c) CAN over Kademlia