

## Peer-to-Peer Networking

### *Exercises for lecture P2P Overlay Networks*

#### **Task 1: Search and addressing**

Discovering data objects, i.e., searching is one of the main issues when comparing structured and unstructured P2P systems:

1. Clarify the concepts of “searching” and “addressing” for data discovery. (Hint: consider how they relate to Google and URL.)
2. What do searching and addressing mean to P2P system structure? They determine 3 fundamental issue relating to the P2P construction

#### **Task 2: Practical DHT**

Below are presented example figures for Chord and CAN networks. Both are simplified versions for this exercise. You don't need to consider how the keys are calculated.

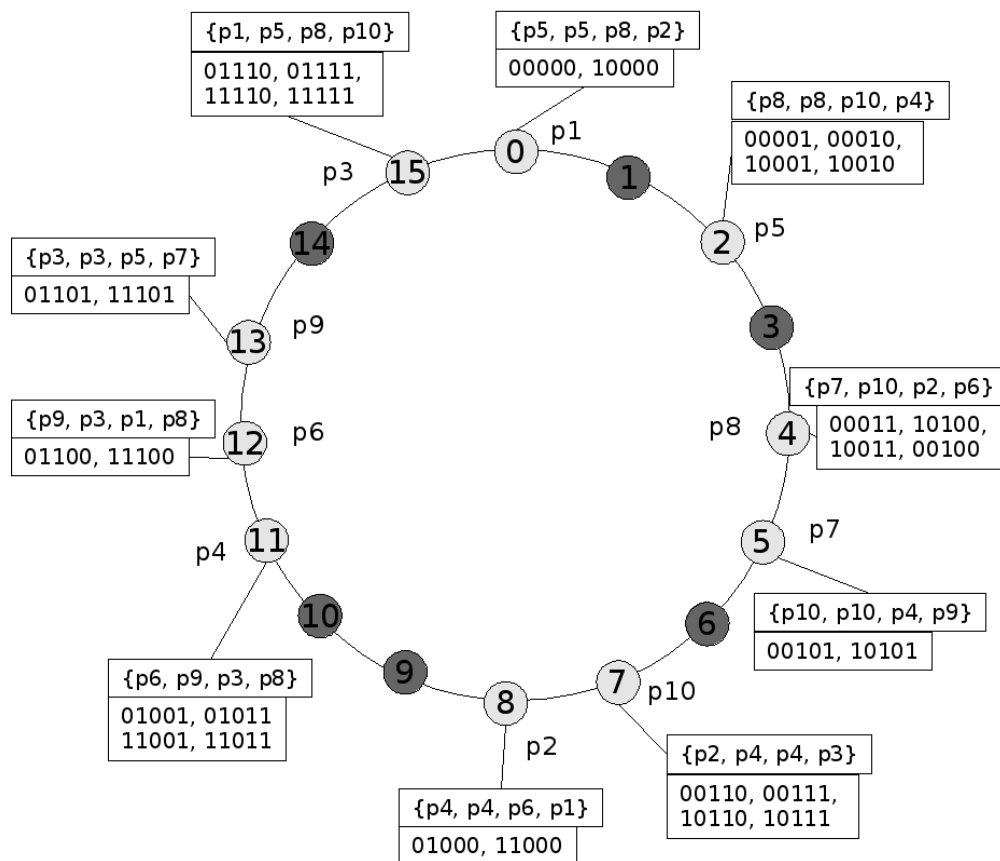
**Chord:** Identifier length for Chord ring is 4 bits, and the index is presented in decimal for simplicity. Finger table information is given in the upper box and keys for data objects are in the lower boxes. Storing keys: ignore the leftmost bit to determine which peer should hold the key and data. E.g. keys 00110 and 10110 become 0110 (decimal: 6) thus being stored at peer “p10”, because that key index is maintained by the next active peer node “p10” at position 7 (0111).

**CAN:** 2 dimensional region is split according to the bits in the key. Starting from the most significant bit (leftmost), split region vertically, the second bits splits region horizontally, third splits again the selected region vertically etc. For example, peer “p9” is placed on region 1001: The first 1 means splitting the original region in half and taking the right side. The second 0 gets the lower part, the third 0 gets the left half of the current region and the fourth 1 selects the upper half.

- a) Searching data objects in Chord and CAN. How many messages is required to reach the peer holding appropriate key? (Assume that the reply can be sent directly back.)
- o p1 searches for key 10000
  - o p6 searches for key 11110
  - o p2 searches for key 00110
- b) New peer “p11” arrives in the network:
- o Chord: at location 10
  - o CAN: splitting peer “p10” zone in half

You must update the routing tables and transfer appropriate keys (data) to the new peer.

### CHORD



CAN

