



Universität
Zürich^{UZH}

703 - Overlay Networks, Decentralized Systems and Their Applications

Exercise 4

19 May 2015

Optional Exercise

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This exercise is optional and it will not be discussed in class. Students may send questions to p2p@lists.ifi.uzh.ch. The questions are taken from old exams. Points awarded for the correct answer are indicated in brackets. In the exam you will have 1 minute per point.

1 Dual-Choice-Exercises (12 Points)

Choose for each statement either true or false. Please mark the correct answer with a cross. For each statement there is only one correct answer. (1 point each)

(Please note: for each incorrect answer within the question as many points will be deducted as you get for each correct answer. Negative points will result in zero points for the corresponding question.).

	Statement	True	False
a)	If a flooding based search is executed in a P2P system, the requested file will always be found as long as it resides in the network.		
b)	Napster and Kademia are examples of structured P2P systems.		
c)	P2P systems follow the ACID principle.		
d)	In DHTs the identifier space for peers is the same as the identifier space for content.		
e)	Using another peer's ID to receive messages addressed to this peer is called a sybil attack.		
f)	With the STUN protocol a peer can determine the private address of another peer behind a NAT router.		
g)	No routing information is required to execute a flooding based search in a P2P system.		
h)	The Bitcoin mining process allows the creation of an arbitrary amount of Bitcoins.		
j)	Incentive Patterns can be categorized in Trust Based Patterns and Trade Based Pattern.		
k)	Flooding scales well in large networks.		
l)	In DHTs, nodes are only responsible for content with an ID equal to their own node ID.		
m)	In the original BitTorrent protocol, peers organize themselves autonomously by using a DHT to find other peers.		

2 BitTorrent (10 Points)

For each of the following BitTorrent terms, write its definition (e.g. what it is, how it works) and one advantage it brings (e.g. why it is used, why it is good). Please use at most one sentence for each item. (2 points each term)

(Please note: correct answers with more than 1 sentence will have 1/2 point deducted)

a) Bencoding.

Definition:

Advantage:

b) DHT Tracker.

Definition:

Advantage:

c) Tit for tat.

Definition:

Advantage:

d) Rarest first..

Definition:

Advantage:

e) Optimistic unchoking.

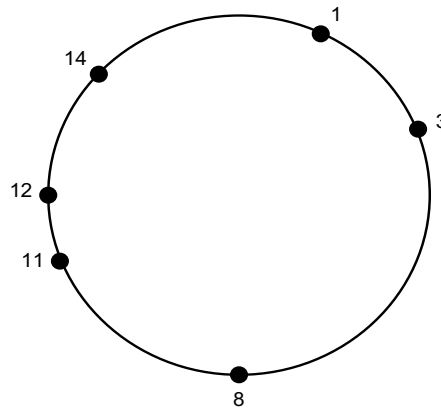
Definition:

Advantage:

3 Distributed Hash Tables (11 Points)

Note: This question is here as an example of type of questions you have to expect. For the exam only high level knowledge of chord, as presented in the lecture, will be required.

The following figure represents a Chord P2P overlay. Bullet points represent peers in the P2P network and their respective identities (Peer IDs), each one consisting of a 4-bit integer. Assume the following hash function for hashing a key: $h = \text{key} \bmod 16$. A key hash h is assigned to peer $\text{successor}(h)$, which is the peer whose Peer ID is greater than or equal to h , or, in case there is none, the peer with lowest Peer ID.



- a) What is the absolute *maximum number of peers* supported by the overlay? (1 point)

- b) Fill in the table below with the hash of each given key and the corresponding *responsible node*. (3 pt.)

Key	Hash	Responsible Node
1		
25		
255		

- c) Fill in the table below with the *routing table* of Peer 11. (4 points)

Finger	Node
3	
2	
1	
0 (successor)	

- d) Suppose that Peer 11 looks up the key 1021. Which nodes will be traversed and in which order?

(3 pt.)

4 Comprehension and Discussion (16 Punkte)

Answer to following questions with a maximum of 4 sentences each.

Note that not more than 4 sentences are requested per question. No penalties are given for incorrect answers.

a)	Given are three peers A, B, and C. Peer A is storing data D_A , peer B is storing data D_B . How can peer C query the intersection of D_A and D_B and create as little overhead as possible.
Answer:	
b)	How is double spending avoided in the BitCoin system?
Answer:	
c)	Generally, structured P2P overlay networks consisting of n peers have a lookup complexity of $O(\log n)$. How could the overlay be changed that to reduce lookup complexity to $O(1)$? What drawback does this change have?
Change:	

Drawback:	
d)	Why are maintenance messages important in DHTs that use iterative routing? How is it with DHTs that use recursive routing?
Iterative Routing:	
Rekursive Routing:	