Advanced Internet Technology 1. Zulassungsklausur
WS 2012/ 2013 Prof. Wehrle
60 Minuten, 50 Punkte

1. Unstructured P2P

a. Napster, Gnutella 0.4, Gnutella 0.6 - explain & characteristic (3)

Napster: centralised entity, unstructured, --single point of fail
Gnutella 0.4: unstructured, decentralised - pure P2P, flooded Request Model, --high traffic
Gnutella 0.6: unstructured, hybrid P2P, superpeers, --high traffic in superpeers

b. pure P2P not necessarily returns hits even all nodes are reachable - why (2)

Flooding: time to live - false negatives (exists but not reachable)

c. search queries in structured Peer-to-Peer limited in expressive compared to unstructured Peer-to-Peer networks - explain why (2)

In structured P2P networks you need exact queries, because of hash-function were as unstructured P2P allows fuzzy queries

2. Small World & Power Law

a. formalise cluster coefficient (2)

c(v)=e(v) *2 / deg(v)*(deg(v)-1)

b. Draw node degree of a Power Law - coordinate system (2)

slide I.III 67 - coordinate system with falling linear function

c. Under which circumstances is a network both powerlaw and small world network?

node degree: power law distributed, high clustering coefficient, low average path length

3. DHT

a. DHT two limitations (2)

i.) do not allow fuzzy query ii.) not robust against attacks

b. correlation overlay underlay DHT (1)

real and logical topology most uncorellated

c. DHT maximum number of nodes (1)

in generally it depends on implementation - Pastry: 2^(128), Chord: 2^(160)

4. Chord

a. purpose of a finger table in chord (2)

improvement of routing performance

b. what happens, if a node leaves in chord (1)

Update of fingers pointing to node -> successor of node treat departures as failures

c. id for node n finger table : solution 15, 16 (5)

finger	node ID
0	18
1	18

finger	node ID
2	21
3	24
4	1

5. Pastry

a. geometric of Pastry (1)

hybrid of tree and ring

b. Pastry 128-bit identifier space - min base 2^b that limits the path length of two nodes by at most 30 hops (3)

(l/b); b=5, base 2^b = 32

c. Routing information of pastry - purpose of leaf and neighbour set and kind of nodes are contained in each set (3)

leaf set: numerically closest nodes

neighbourhood set: closes nodes based on a proximity metric

6.CAN

a. Name advantages and disadvantages of very high-dimensional CAN DHT compared having only few dimensions (2)

++ more neighbours and shorter path

-- higher node states (more information needs to be saved in the nodes)

b. to which DHT is similar to a one dimensional CAN (2)

Chord (one dimension = ring)

c. complexity of CAN and explain each variable (4)

O(D/4 * N^(1/D))

7. i3

a. Explain using brief examples the three communications/ addressing forms that are enable by i3. (3)

single communication:

anycast communication: trigger with common prefix + postfix

multicast communication: each receiver sets a trigger

b. explain triangle problem of i3 + solution (2)

content can be far away, but sender and receiver nodes could be quite close to each other

-> choose close id for private communication (initialise via public id)

8. BitTorrent

a. which entities are the supernodes from Gnutella in BitTorent

Tracker

b. Can you search a BitTorrent File only bases on the name? (1)

No, you need meta information about Tracker