

Unit 5 - Week 03: DHT Routing Protocol : Pastry and Kademlia

Course outline
How does an NPTEL online course work?
Week 0
Week 01: P2P Networks – Motivation, Basics – Cryptographic Hash, Public Key Cryptography Principles, Security Certificates, Structured and Unstructured P2P Networks, Inconsistent Hashing, Consistent Hashing, Rendezvous Hashing, Locality Preserving Hashing, Distributed Hash Tables
Week 02: Logarithmic Partitioning of Node ID Space and Index Entry Authenticity, Implementation of Voice Over Internet Telephony in P2P Way, Leaf node, Core node and Type of Messages in DHT Networks, Static and Dynamic Partitioning of Node ID Space: Fixed and floating partitioning
Week 03: DHT Routing Protocol : Pastry and Kademlia
<ul style="list-style-type: none"> ● Lecture 08: PASTRY Protocol: The Efficient Use of Internet Infrastructure <input type="radio"/> Lecture 09: Understanding the PASTRY Protocol through Example ● Lecture 10: Kademlia: A DHT Routing Protocol
<ul style="list-style-type: none"> <input type="radio"/> Quiz : Assignment_3 <input type="radio"/> Feedback For Week 3 <input type="radio"/> Solution: Assignment-03
Week 04: Tapestry Routing Protocol, Multi-dimensional Distributed Hash Table, and Multi-Layer DHT
Week 05: Keeping <Key, Value> Pairs at Correct Root Nodes, Abrupt and Graceful Exit of Root Node, Resilience of <Key, Value> Pairs, Distributed File System, Storage Space Problem and Incentives to Share Storage
Week 06: P2P Nodes Communications Challenges in Heterogeneous Network Environments, P2P Overlaid Multicast, and A Design of P2P Email System
Week 07: P2P Mailing List Services, P2P Web, P2P Search Engine, On Being Anonymous and P2P in Blockchain
Week 08: P2P Anonymous Communication, The Anonymous Communication on the Internet through TOR Network, An Introduction to TOR Browser, Hidden Services on TOR Network, and Summary of the Course
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Assignment_3

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-10-07, 23:59 IST.

- 1) Consider the following statements about Pastry protocol: 1 point
- Each node in the Pastry peer-to-peer overlay network is assigned a 160-bit node identifier.
 - The node ID is used to indicate a node's position in a circular node ID space.
 - Node IDs could be generated by computing a cryptographic hash of the node's public key or its IP address.
 - Each Pastry node maintains only a routing table and a leaf set.

Which of the above statement/s is/are true? Choose the correct code.

- i, ii
 i, iii
 ii, iii
 ii, iv

No, the answer is incorrect.
Score: 0

Accepted Answers:
ii, iii

- 2) Consider the following statements about Kademlia? 1 point
- Kademlia is a distributed hash table not implemented in BitTorrent.
 - Kademlia-based networks are not highly resistant to denial of service attacks.
 - Kademlia minimizes internodes messaging through its use of the XOR metric, which defines the distance between points in the keyspace.
 - Kademlia naturally prefers newer entrants over long-lived nodes.

Which of the following options are **NOT** true about Kademlia? Select the correct code.

- i only
 ii, iii
 i, ii, iv
 i, iii, iv

No, the answer is incorrect.
Score: 0

Accepted Answers:
i, iii, iv

- 3) Consider the following statements about Pastry features? 1 point
- Pastry is partially decentralized.
 - Pastry is scalable.
 - Pastry is self-organizing.
 - Pastry automatically adapts to the arrival, departure but not to node failure.

Which of the above statement/s is/are false? Choose the correct code.

- i only
 i, ii
 ii, iii
 i, iv

No, the answer is incorrect.
Score: 0

Accepted Answers:
i, iv

- 4) Consider the following comparative statements about Chord and Pastry? 1 point
- Pastry has message look-up complexity of the logarithmic order like Chord.
 - Pastry has logarithmic storage overhead per node like Chord.
 - Pastry does not have circular ID space like Chord.
 - Pastry does not matches key and node ID like Chord.

Which of the above statement/s is/are **NOT** true? Choose the correct code.

- i, ii
 i, iii
 ii, iii
 iii, iv

No, the answer is incorrect.
Score: 0

Accepted Answers:
iii, iv

- 5) Most variants of DHT based systems try to optimize the following objectives: 1 point
- Data lookup cost
 - Routing table size
 - Maintenance cost
 - Fault tolerance

Which of the above statement/s is/are **NOT** true? Select the correct code given below.

- i
 i, ii
 i, ii, iii
 None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
None of the above

- 6) Which of the following statements/s is/are **NOT** true for the Pastry routing algorithm? 1 point
- Pastry uses hypercube routing.
 A node has ID 011101. It maintains a neighbour peer with an ID matching with each of the following prefixes ("=starting bit differing from this peer's corresponding bits): 1*, 00*, 010*, 0110*, 01111*, 0111100.
 If more than one node matches the longest prefix, pastry chooses the numerically closer neighbour.
 Pastry uses the dynamic size routing table.

No, the answer is incorrect.
Score: 0

Accepted Answers:
A node has ID 011101. It maintains a neighbour peer with an ID matching with each of the following prefixes ("=starting bit differing from this peer's corresponding bits): 1*, 00*, 010*, 0110*, 01111*, 0111100.
Pastry uses the dynamic size routing table.

- 7) Consider the following statements about various complexities of the Chord and Pastry system if there are N nodes in the system, and B is the base of the peer ID? 1 point
- State per node: Chord: $O(\log N)$, Pastry $O(B \log B N)$
 - Routing performance: Chord $O(\log N)$, Pastry $(\log B N)$
 - Join of nodes: Chord $O(\log N)$, Pastry $O(\log B N)$

Which of the above statement/s is/are **NOT** true? Select the correct code given below.

- i only
 ii only
 iii only
 ii, iii

No, the answer is incorrect.
Score: 0

Accepted Answers:
iii Only

- 8) Consider the following statements: 1 point
- In Chord, key ID is only computed by SHA-1(key), and Node ID is also only computed by Node identifier = SHA-1(IP Address).
 - In Chord, key ID and node ID are uniformly distributed in their respective spaces.
 - In a DHT system, key ID and node ID does exist in the same ID space.
 - In pastry, routing is based on numeric closeness.

Which of the above statement/s is/are **NOT** true? Select the correct code given below.

- i only
 i, iii
 ii, iii
 ii, iv

No, the answer is incorrect.
Score: 0

Accepted Answers:
i, iii

- 9) Consider the following statements about Chord, Pastry and Kademlia. 1 point
- Kademlia structures its ID space in 2-dimension.
 - The ID space in Pastry is structured as a tree.
 - Chord structures its ID in one dimensional space.
 - Kademlia performs iterative lookups.

Which of the above statement/s is/are true? Choose the correct code given below.

- i, ii
 ii,iii
 ii, iv
 iii, iv

No, the answer is incorrect.
Score: 0

Accepted Answers:
iii, iv

- 10) In Kademlia, XOR (Exclusive OR) is chosen as the distance between the two nodes in the node ID space. The reasons are the following: 1 point
- The distance between a node and itself is zero.
 - The distances computed from A to B and from B to A are the same.
 - Given A, B and C are vertices of a triangle, then the distance from A to B is shorter than (or equal to) the sum of the distance from A to C plus the distance from C to B.
 - It is simple and easy to compute.

Which of the above statement/s is/are true? Choose the correct code given below.

- i, ii
 ii, iii
 ii, iii, iv
 i, ii, iii, iv

No, the answer is incorrect.
Score: 0

Accepted Answers:
i, ii, iii, iv