PEER TO PEER NETWORKS

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TYPE OF COURSE : New | Elective | PG
COURSE DURATION : 8 weeks (17 Aug' 20 - 9 Oct' 20)
EXAM DATE : 17 Oct 2020

PRE-REQUISITES : Preferably, Digital Communication Networks/Computer Networks

INTENDED AUDIENCE : Computer Science and Engineering, Electronics and Communication, Electrical Engineering

INDUSTRIES APPLICABLE TO : Cisco, Lucent-Alcatel

COURSE OUTLINE :

This course will discuss about the concepts and architecture of peer to peer networks. These systems are built as an overlay on the existing Internet. The idea is basically to build the collaboration between user machines to implement services like telephony, distribute resilient file system, messaging system and other collaborative computing services. Such systems do not require server or need them in very limited fashion. The course will discuss at length the various DHT algorithms and their implementation complexities, the mechanisms to implement resilience using replication factor, efficiency of storage using universal file system where sharing the content does not create additional copies, mechanisms to ensure that nodes with different storage capacities can be used. Further architecture of Briahaspati4 an ongoing p2p system opensource project will also be discussed. The basics taught here will form the foundation of formation of user cloud systems.

ABOUT INSTRUCTOR :

Prof. Y. N. Singh did PhD from IIT Delhi in 1997. He was visiting faculty in University of Roorkee (Now IIT Roorkee) from Jan 1997 to July 1997 in Electronics and Computer Engineering Department, and faculty in Electrical Engineering Department, IIT Kanpur from July 1997 onwards. Currently, he is working as a Professor. He has research interests in Peer to peer networks, optical networks, digital switching systems. He have also been involved in opensource software development, and currently pursuing Brihaspati a peer to peer software system for supporting teaching and learning processes.

COURSE PLAN :

Week 1**:** P2P Networks - motivation. Basics - cryptographic hash, public key cryptography principles, security certificates, structured and unstructured p2p networks

Week 2**:** Inconsistent hashing, Consistent hashing, Rendezvous hashing, locality preserving hashing, Distributed hash tables

Week 3**:** Chord, Finger Tables, Distance function, Finger table creation and management

Week 4**:** Kadmilia, Tapestry, Pastry, Logarithmic portioning, Other geometric structures, Locality aware DHT

Week 5**:** P2P VoIP system, Transport - UDP, TCP, Http tunneling, Proxying

Week 6**:** Distributed File System, DFS based Backup System, Universal File System.

Week 7**:** Use case scenarios for P2P VoIP and DFS systems, Unstructured systems.

Week 8**:** TOR routing (anonymous routing), Overlaid multicasting, Reslience of overlaid multicast, Generic Multiservice architecture of Brihaspati