ADVANCED DISTRIBUTED SYSTEMS

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PRE-REQUISITES : Data structures (2nd year level), Operating Systems

INTENDED AUDIENCE : UG and PG students (Computer Science and Electrical Engineering)

INDUSTRY SUPPORT : IBM, Amazon, Google, Microsoft

COURSE OUTLINE :

This course is on Advanced Distributed Systems. It will start with epidemic and gossip based algorithms and then move on to peer-to-peer networks. The core focus in this part will be on distributed hash tables (DHTs). Then, the course will focus on theoretical aspects such as vector clocks, distributed leader election, the FLP result, and the CAP theorem. The last part of the course will focus on practical technologies such as the Paxos and RAFT consensus protocols, commit protocols, Bitcoin and blockchains, distributed file systems, and distributed programming languages.

ABOUT INSTRUCTOR :

Prof. Smruti R. Sarangi is an Associate Professor in the Computer Science and Engineering department at IIT Delhi. He has a Ph.D in computer science from the University of Illinois at Urbana Champaign, USA, and a B.Tech from IIT Kharagpur. Prior to his appointment as a faculty member in IIT Delhi in 2011, he spent 5 years working for IBM Research Labs, and Synopsys Research. He has published 60 papers in prestigious international conferences and journals, and holds 5 US patents. He is a member of the IEEE and ACM.

COURSE PLAN :
Week 1 : Epidemic and gossip based algorithms
Week 2 : Napster and Gnutella
Week 3 : DHTs: Chord, Pastry and BitTorrent
Week 4 : Logical clocks, Mutual Exclusion Algorithms
Week 5 : Distributed Leader Election
Week 6 : Distributed minimum spanning tree, the FLP result
Week 7 : Consistency models and the CAP theorem
Week 8 : Paxos and Raft
Week 9 : Byzantine General's Problem, Virtual synchrony
Week 10 : Bitcoin and Blockchains
Week 11 : Amazon Dynamo, Facebook Cassandra, Google Percolator
Week 12 : Voldemort (LinkedIn), Condor, and Microsoft DryadLINQ