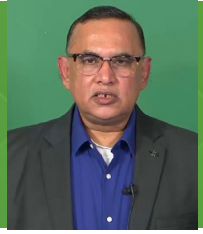

Distributed Systems

Prof. Rajiv Misra
Computer Science and Engineering
IIT Patna

TYPE OF COURSE : Rerun | Elective | UG/PG
COURSE DURATION : 8 weeks (26 Jul' 21 - 17 Sep' 21)
EXAM DATE : 26 Sep 2021

INTENDED AUDIENCE: Any Interested Learners.

PREREQUISITES: Minimum: Data Structures and Algorithms

Ideal: Basic networking concepts, Basic OS concepts (e.g., processes, threads, synchronization, file systems, scheduling etc.), Advanced Programming (Good knowledge in C and C++).

INDUSTRY SUPPORT: Microsoft Research has conducted this course. Various companies like Google, IBM, Cisco, etc, Distributed systems Group and Distributed systems start-ups are working on this field.

COURSE OUTLINE :
A distributed system is a software system in which components located on networked computers communicate and coordinate their actions by passing messages. The components interact with each other in order to achieve a common goal. Distributed applications (distributed apps) are applications or software that runs on multiple computers within a network at the same time and can be stored on servers or with cloud computing.

ABOUT INSTRUCTOR :
Dr. Rajiv Misra is an Associate Professor in Department of Computer Science and Engineering at Indian Institute of Technology Patna. He earned his Ph.D degree from IIT Kharagpur, M.Tech degree in Computer Science and Engineering from the Indian Institute of Technology(IIT), Bombay, and Bachelor's of engineering degree in Computer Science from MNIT Allahabad. He has published more than 50 papers in various Conferences and Journals with his h-index is 8. He has authored papers in IEEE Transactions on Mobile Computing, IEEE Transaction on Parallel and Distributed Systems. He has been elevated to Senior member of the IEEE recently. His current research interests include Large Scale Distributed Computing, Big Data, Hadoop and Spark. Recently, he has been awarded IMPRINT-MHRD Sponsored Research Project title “Smart Weather : Location based Deep weather event prediction using spatial big data computing”. Currently, he is supervising two Phd students and has graduated three Phd students. His graduated Phd students are currently working as Assistant Professors in BITs-Goa, NIIT-University and JIIT-University. Recently, he has conducted a workshop titled "Big Data Analytics using Hadoop" at IIT Patna.

COURSE PLAN :

Week 1: Introduction to DS, Message Passing, Leader Election, Distributed Models, Causality and Logical Time

Week 2: Logical Time, Global State & Snapshot and Distributed Mutual Exclusion-Non-Token and Quorum based approaches

Week 3: Distributed Mutual Exclusion-Token based approaches, Consensus & Agreement, Checkpointing & Rollback Recovery

Week 4: Deadlock Detection, DSM and Distributed MST

Week 5: Termination Detection, Message Ordering & Group Communication, Fault Tolerance and Self-Stabilization

Week 6: Distributed Randomized Algorithms, DHT and P2P Computing

Week 7: Case Studies: GFS, HDFS, Map Reduce and Spark

Week 8: Case Studies: Sensor Networks, Authentication & Security in DS