



CLOUD COMPUTING AND DISTRIBUTED SYSTEMS

PROF. RAJIV MISRA

Department of Computer Science and Engineering
IIT Patna

TYPE OF COURSE : Rerun | Elective | UG/PG

COURSE DURATION : 8 weeks (24 Jan' 22 - 18 Mar' 22)

EXAM DATE : 27 Mar 2022

PRE-REQUISITES : Minimum: Data Structures and Algorithms; Ideal: Computer Architecture, Basic OS and Networking concepts

INDUSTRIES SUPPORT : Companies like Amazon, Microsoft, Google, IBM, Facebook and start-ups working on this field.

COURSE OUTLINE :

Cloud computing is the on-demand delivery of computations, storage, applications, and other IT resources through a cloud services platform over the internet with pay-as-you-go business model. Today's Cloud computing systems are built using fundamental principles and models of distributed systems. This course provides an in-depth understanding of distributed computing "concepts", distributed algorithms, and the techniques, that underlie today's cloud computing technologies. The cloud computing and distributed systems concepts and models covered in course includes: virtualization, cloud storage: key-value/NoSQL stores, cloud networking, fault-tolerance cloud using PAXOS, peer-to-peer systems, classical distributed algorithms such as leader election, time, ordering in distributed systems, distributed mutual exclusion, distributed algorithms for failures and recovery approaches, emerging areas of big data and many more. And while discussing the concepts and techniques, we will also look at aspects of industry systems such as Apache Spark, Google's Chubby, Apache Zookeeper, HBase, MapReduce, Apache Cassandra, Google's B4, Microsoft's Swan and many others. Upon completing this course, students will have intimate knowledge about the internals of cloud computing and how the distributed systems concepts work inside clouds.

ABOUT INSTRUCTOR :

Prof. Rajiv Misra is an Associate Professor in Department of Computer Science and Engineering at Indian Institute of Technology Patna, India. He obtained his Ph.D degree from IIT Kharagpur, M.Tech degree in Computer Science and Engineering from the Indian Institute of Technology (IIT) Bombay, and Bachelors of engineering degree in Computer Science from MNIT Allahabad. His research interests spanned a design of distributed algorithms for Mobile, Adhoc and Sensor Networks, Cloud Computing and Wireless Networks. He has contributed significantly to these areas and published more than 70 papers in high quality journals and conferences, and 2 book chapters. His h-index is 10 with more than 590 citations. He has authored papers in IEEE Transactions on Mobile Computing, IEEE Transaction on Parallel and Distributed Systems, Adhoc Networks, Journal of Parallel and Distributed Computing.

COURSE PLAN :

Week 1: Introduction to Clouds, Virtualization and Virtual Machine

Week 2: Network Virtualization and Geo-distributed Clouds

Week 3: Leader Election in Cloud, Distributed Systems and Industry Systems

Week 4: Classical Distributed Algorithms and the Industry Systems

Week 5: Consensus, Paxos and Recovery in Clouds

Week 6: Cloud Storage: Key-value stores/NoSQL

Week 7: P2P Systems and their use in Industry Systems

Week 8: Cloud Applications: MapReduce, Spark and Apache Kafka