PARALLEL ALGORITHMS

COMPUTER SCIENCE & ENGINEERING

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TYPE OF COURSE	:	New | Elective| UG/PG
INTENDED AUDIENCE	:	B.E/B.Tech, M.E/M.Tech
PRE-REQUISITES	:	Courses in Data Structures, Algorithms and Discrete Mathematics

COURSE DURATION : 12 weeks (28 Jan'19 - 19 Apr'19)
EXAM DATE : 28 April 2019

COURSE OUTLINE :

A conventional algorithm uses a single processing element. A parallel algorithm assumes that there are multiple processors. These processors may communicate with each other using a shared memory or an interconnection network. An algorithm designed for a large number (for example, a polynomial in the problem size) of processors can be simulated on a machine with a small number of processor for a trade off on time, and therefore is of practical value, while at the same time allowing us to test the limits of parallelism. Many algorithmic design techniques in the parallel setting will be explored. Parallel complexity theory will also be briefly studied.

ABOUT INSTRUCTOR :

Professor Sajith Gopalan has been in the faculty of Computer Science and Engineering, IIT Guwahati since 1997. PhD (IIT Kanpur, 1998), MTech (IIT Kanpur, 1993), BTech (REC Calicut, 1991)

COURSE PLAN :

Week 01 : Theoretical models of parallel computation: PRAM, interconnection networks

Week 02 : Performance of parallel algorithms,Basic techniques

Week 03 : Basic techniques (cont'd)

Week 04 : Comparator Networks. Odd Even Merge Sort.Bitonic Sort Merge Sort.

Week 05 : Optimal List ranking, applications

Week 06 : Algorithms for searching, merging and sorting. Cole's Merge Sort

Week 07 : Cole's Merge Sort(cont'd), Graph algorithms

Week 08 : Graph Algorithms (cont'd), Linear Array, Meshes

Week 09 : Sorting in meshes, Hypercube algorithms, Butterfly network, CCC, Benes network

Week 10 : Butterfly network, ccc, benes network

Week 11 : Limits to parallelizability. Lower bounds

Week 12 : Limits to parallelizability. NC-reductions, P-completeness.