

Core Course – VIII - PARALLEL ALGORITHMS

Unit I

Fondations of Parallel Computing : Parallel Computers – Parallel Processing Concepts – High Performance Computers – Levels of parallelism – Taxonomy of Parallel Computers – Models of Parallel Computation – PRAM model – Some simple algorithms – Performance of Parallel Algorithms.

Unit II

Data Structures for Parallel Computing: Array and Lists – Linked lists – Graphs and Trees – Preliminaries – Euler and Hamiltonian Graphs – Trees – Graph Traversal – Connectivity – Planner Graphs – Coloring and Independence – Clique Covering – Intersection Graph – Chordal Graphs.

Unit III

Binary Tree Paradigm – Growing by doubling – Pointer Jumping – Divide and Conquer – Partitioning – Simple Algorithms: Scalar Product of Two Vectors – Matrix Manipulation – Partial Sums – Binomial Coefficients – Range Minima Problem.

Unit IV

Tree Algorithms: Euler Circuits – Routing a tree – Post order numbering – Number of Descendents – Level of each vertex – Lowest common ancestor – Tree Contraction – Arithmetic Expression evaluation.

Unit V

Graph Algorithms: Simple Algorithms – BFS – Connected components using BFS – Transitive closure matrix – Vertex Collapse – Bi connected components – Spanning Trees – Shortest Path Problem.

Array Manipulation Algorithms: Searching and Merging – Sorting Algorithms.

Text Book(s):

1. Introduction to Parallel Algorithms, C Xavier, S S Iyengar, Wiley Inter Science, 1998.

References

1. Selim G. Akl, "The design and analysis of Parallel Algorithm", PHI, 1998.
2. Introduction to Parallel Processing Algorithms and Architectures, Behrooz Parhami, Plenum Series, 2002.