

Parallel Computation Topics Covered:

Survey of parallel and vector computers.

Central questions: processing elements, memory, I/O, communication, synchronization, granularity, degree, level, paradigms, algorithms, programming.

DAG model, complexity measures, speedup, efficiency, Amdahl's law.

Computational models, classification, problem complexity, examples.

Interconnection topologies – mesh, ring, star, tree, hypercube, CCC, crossbars, busses, multistage switches, fault tolerance.

Communication links, data link control, routing, broadcast, scatter, gather, exchange.

Hypercube particulars —Gray codes, communications, normal algorithms, examples.

Concurrency/communication tradeoffs.

Parallel algorithms: linear equations, optimization, network flows, two-point boundary value problems, Markov chains, genetic algorithms, cellular automata, simulating annealing.

Architecture: SIMD, MIMD, hybrid.

Parallel software: languages (MPI, OpenMP, Fortran 95), compilers, operating systems.

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