ELECTIVE V

Parallel Computing

Introduction:

Paradigms of parallel computing: Synchronous - vector/array, SIMD, Systolic; Asynchronous - MIMD, reduction paradigm.

Hardware taxonomy:

Flynn's classifications, Handler's classifications. Software taxonomy: Kung's taxonomy, SPMD.

Abstract parallel computational models:

Combinational circuits, Sorting network, PRAM models, Interconnection RAMs. Parallelism approaches - data parallelism, control parallelism

Performance Metrices:

Laws governing performance measurements. Metrices - speedups, efficiency, utilization, communication overheads, single/multiple program performances, bench marks.

Parallel Processors:

Taxonomy and topology - shared memory multiprocessors, distributed memory networks. Processor organization - Static and dynamic interconnections. Embeddings and simulations.

Parallel Programming:

Shared memory programming, distributed memory programming, object oriented programming, data parallel programming, functional and dataflow programming.

Scheduling and Parallelization:

Scheduling parallel programs. Loop scheduling. Parallelization of sequential programs. Parallel programming support environments.