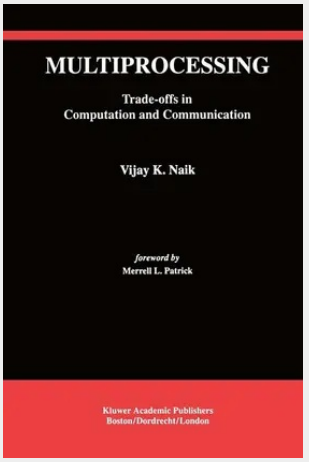
Naik

Multiprocessing

Trade-Offs in Computation and Communication



presents an in-depth analysis of several commonly observed regular and irregular computations for multiprocessor systems. This book includes techniques which enable researchers and application developers to quantitatively determine the effects of algorithm data dependencies on execution time, on communication requirements, on processor utilization and on the speedups possible.
Starting with simple, two-dimensional, diamond-shaped directed acyclic graphs, the analysis is extended to more complex and higher dimensional directed acyclic graphs. The analysis allows for the quantification of the computation and communication costs and their interdependencies. The practical significance of these results on the performance of various data distribution schemes is clearly explained. Using these results, the performance of the parallel computations are formulated in an architecture independent fashion. These formulations allow for the parameterization of the architecture specitific entities such as the computation and communication rates. This type of parameterized performance analysis can be used at compile time or at run-time so as to achieve the most optimal distribution of the computations.
The material in connects theory with practice, so that the inherent performance limitations in many computations can be understood, and practical methods can be devised that would assist in the development of software for scalable high performance systems.

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