

Encyclopedia of Parallel Computing

David Padua (Ed.)

Encyclopedia of Parallel Computing

With 880 Figures and 98 Tables

Editor-in-Chief

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Preface

Parallelism, the capability of a computer to execute operations concurrently, has been a constant throughout the history of computing. It impacts hardware, software, theory, and applications. The fastest machines of the past few decades, the supercomputers, owe their performance advantage to parallelism. Today, physical limitations have forced the adoption of parallelism as the preeminent strategy of computer manufacturers for continued performance gains of all classes of machines, from embedded and mobile systems to the most powerful servers. Parallelism has been used to simplify the programming of certain applications which react to or simulate the parallelism of the natural world. At the same time, parallelism complicates programming when the objective is to take advantage of the existence of multiple hardware components to improve performance. Formal methods are necessary to study the correctness of parallel algorithms and implementations and to analyze their performance on different classes of real and theoretical systems. Finally, parallelism is crucial for many applications in the sciences, engineering, and interactive services such as search engines.

Because of its importance and the challenging problems it has engendered, there have been numerous research and development projects during the past half century. This Encyclopedia is our attempt to collect accurate and clear descriptions of the most important of those projects. Although not exhaustive, with over 300 entries the Encyclopedia covers most of the topics that we identified at the outset as important for a work of this nature. Entries include many of the best known projects and span all the important dimensions of parallel computing including machine design, software, programming languages, algorithms, theoretical issues, and applications.

This Encyclopedia is the result of the work of many, whose dedication made it possible. The 25 Editorial Board Members created the list of entries, did most of the reviewing, and suggested authors for the entries. Colin Robertson, the Managing Editor, Jennifer Carlson, Springer's Reference Development editor, and Editorial Assistants Julia Koerting and Simone Tavenrath, worked for 3 long years coordinating the recruiting of authors and the review and submission process. Melissa Fearon, Springer's Senior Editor, helped immensely with the coordination of authors and Editorial Board Members, especially during the difficult last few months. The nearly 400 authors wrote crisp, informative entries. They include experts in all major areas, come from many different nations, and span several generations. In many cases, the author is the lead designer or researcher responsible for the contribution reported in the entry. It was a great pleasure for me to be part of this project. The enthusiasm of everybody involved made this a joyful enterprise. I believe we have put together a meaningful snapshot of parallel computing in the last 50 years and presented a believable glimpse of the future. I hope the reader agrees with me on this and finds the entries, as I did, valuable contributions to the literature.

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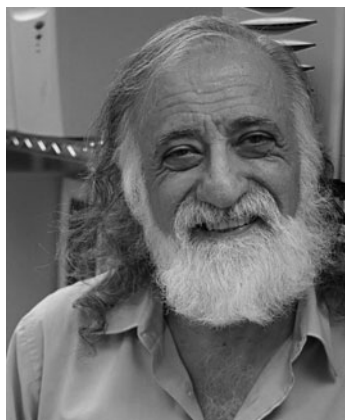
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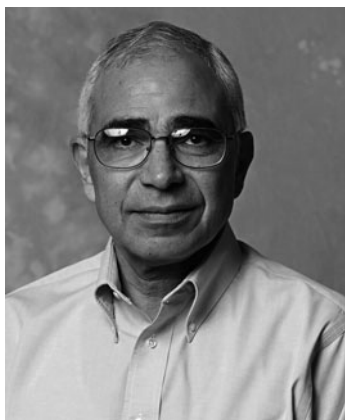
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