

# Distributed and Parallel Systems and Algorithms

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**Abstract:** *In order to meet the increasing need for high-performance computing across a variety of domains, including big data analytics, artificial intelligence, and scientific simulations, distributed and parallel systems have become fundamental paradigms in contemporary computing. The basic ideas, structures, and algorithms that support distributed and parallel systems are examined in this study. It offers a thorough analysis of the main algorithms for load balancing, synchronization, and data distribution. It also discusses the difficulties and possible solutions in creating effective systems. Insights into new developments, such as edge computing and quantum parallelism, are included in the paper's conclusion.*

**Keywords:** high-performance computing