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# Fault-Tolerant Message-Passing Distributed Systems

An Algorithmic Approach

 Springer

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# **Fault-Tolerant Message-Passing Distributed Systems: An Algorithmic Approach**



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This book presents the most crucial fault-tolerant distributed programming abstractions and their associated distributed algorithms, specifically when it comes to reliable communication and agreement, which lie in the centre of nearly all distributed applications. The book also presents impossibility results in classic distributed computing models, along with strategies, primarily failure detectors and randomization, that allow us to enrich these models. These programming abstractions, distributed objects or services, allow software designers and programmers to handle asynchrony and the most important types of failures such as procedure crashes, message losses, and malicious behaviors of processing entities, widely known under the term "Byzantine fault-tolerance". The author introduces these notions within an incremental manner, beginning with a clear specification, accompanied by algorithms which are first described intuitively and proved appropriate. In this sense, the reserve constitutes an introduction to the technology of distributed computing, with applications in all domains of distributed systems, such as cloud processing and blockchains. Each chapter includes exercises and bibliographic notes to greatly help the reader approach, understand, and grasp the exciting field of fault-tolerant distributed computing.



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