Today’s IT systems, with its ever-growing communication infrastructures and computing applications, are becoming more and more large in scale, which results in exponential complexity in their engineering, operation, and maintenance. Recently, it has widely been recognized that self-organization and self-management/regulation offer the most promising approach to addressing such challenges. Self-organization and adaptation are concepts stemming from the nature and have been adopted in systems theory. They are considered to be the essential ingredients of any living organism and, as such, are studied intensively in biology, sociology and organizational theory. They have also penetrated into control theory, cybernetics and the study of adaptive complex systems. Computing and communication systems are basically artificial systems. This prevents conventional self-organization and adaptation principles and approaches from being directly applicable to computing and communication systems. The methodology of multi-agent systems and the technology of Grid computing have shed lights for the exploration into the self-organization and adaptation of large-scale complex IT systems.

This book provides in-depth thoughts about the above discussed challenges as well as a range of state-of-the-art methodologies and technologies for the entirely new area. We refer to this newly emerging area as Self-Organization and Autonomic Informatics, which has represented the future generation of IT systems, comprised of communication infrastructures and computing applications, which are inherently large-scale, complex and open.

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