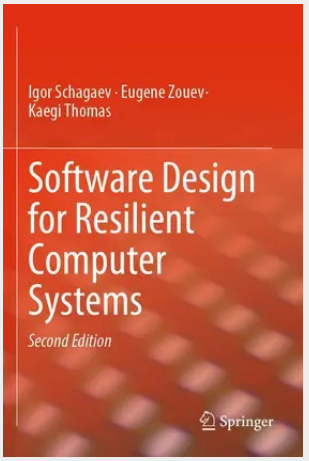
Schagaev / Zouev / Thomas

Software Design for Resilient Computer Systems



This book addresses the question of how system software should be designed to account for faults, and which fault tolerance features it should provide for highest reliability. With this second edition of *Software Design for Resilient Computer Systems* the book is thoroughly updated to contain the newest advice regarding software resilience. With additional chapters on computer system performance and system resilience, as well as online resources, the new edition is ideal for researchers and industry professionals.

The authors first show how the system software interacts with the hardware to tolerate faults. They analyze and further develop the theory of fault tolerance to understand the different ways to increase the reliability of a system, with special attention on the role of system software in this process. They further develop the general algorithm of fault tolerance (GAFT) with its three main processes: hardware checking, preparation for recovery, andthe recovery procedure. For each of the three processes, they analyze the requirements and properties theoretically and give possible implementation scenarios and system software support required. Based on the theoretical results, the authors derive an Oberon-based programming language with direct support of the three processes of GAFT. In the last part of this book, they introduce a simulator, using it as a proof of concept implementation of a novel fault tolerant processor architecture (ERRIC) and its newly developed runtime system feature-wise and performance-wise. Due to the wide reaching nature of the content, this book applies to a host of industries and research areas, including military, aviation, intensive health care, industrial control, and space exploration.

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