

Editor's Note

With the increasing impact of software systems on everyone's daily work and life, it is becoming increasingly important that software engineers produce software systems with high confidence. In the past decade, many efforts have been devoted in research on technologies to achieve higher confidence in software during software development and evolution. To help researchers understand recent advances being made and challenges being faced in this emerging field, this special focus provides overviews of advances, visions, and challenges in high confidence software technologies.

In the article "*Service fault tolerance for highly reliable service-oriented systems: an overview*", the authors provide an overview of various fault tolerance techniques for service-oriented systems, including fault tolerance strategy design, fault tolerance strategy selection, and Byzantine fault tolerance.

In the article "*A survey on dependability improvement techniques for pervasive computing systems*", the authors summarize various state-of-the-art techniques and research challenges for developing and deploying dependable pervasive computing systems, laying out an outlook for future research directions in this research area.

In the article "*Necessary and sufficient checkpoint selection for temporal verification of high-confidence cloud workflow systems*", the authors present an overview of workflow temporal checkpoint selection for temporal verification, providing experimental results of their proposed checkpoint selection strategies and discussing some open issues in this research area.

In the article "*A revisit of three studies related to random testing*", the authors present empirical studies for investigating a sufficient condition for partition testing to outperform random testing, for enhancing random testing by using adaptive random testing, and for developing effective test case selection strategies; the empirical studies in the article show that diversity appears to be one of the most important concepts in software testing.

In the article "*Fixing, preventing, and recovering from concurrency bugs*", the authors discuss their recent research results on fixing, preventing, and recovering from concurrency bugs, which are increasingly widespread due to the emerging ubiquity of multicore processors and multithreaded software.

In the article "*The essence of bidirectional programming*", the authors show that ambiguity is essential for bidirectional transformations and the synchronization strategy should be considered from the start; the authors also propose a novel approach to specifying well-behaved bidirectional programs by their backward transformations.

In summary, these six articles cover different aspects of high-confidence software technologies, such as those for high-confidence service-oriented systems, pervasive computing systems, and cloud workflow systems, and those focusing on software testing, debugging, and transformation for high-confidence software.

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