Dependability Evaluation and Validation

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The field of dependable computing can be roughly parted in the area of constructing hardware or software systems that support dependable computing, and in the area of assessing such systems. By assessment, we understand validation of proposed systems and evaluation of implementations, both model based or experimental. Research in this field covers many branches of computer science, such as algorithms, software engineering, distributed computing, communication systems, hardware design, and the broad field of stochastic and deterministic modeling. The field as a whole is of increasing importance as daily life more and more depends on computer systems that work safely and reliable. This trend gives the motivation for the special issue.

Within the field, the design of dependable systems has always drawn more attention in publications, although the importance of assessment — especially validation before costly implementation efforts start — is growing. The challenge of assessment lies in the complexity of fault-tolerant and safety-supporting systems, which requires special efforts in various analysis methods: chosing the degree of details in modeling, exploring large state spaces of models, provision of realistic and yet tractable fault models, conducting fault injection experiments in both the models and implemented systems (the latter for model validation and parameter determination). These techniques affect certification techniques as well, because certification nowadays is done in parallel to the design and implementation process rather than on the basis of the completed product only. Thus, we put our emphasis on the aspects of evaluation and validation within the field of dependability.

The six papers in this issue represent a broad spectrum of activities within the field and cover both theory and practice. Schneeweiss reports on modeling efforts that show alternatives to classical methods like markov chains. Kochs et. al. apply different modeling techniques in order to efficiently approximate reliability parameters. Gärtner gives a survey of techniques to specify and verify fault-tolerant (software) systems. Benso et. al. and Moreno et. al. apply fault injection to hardware prototypes in order to verify correct implementation of their fault-tolerance mechanisms. Finally, Mauser and Thurner present a case study from an industrial setting. We hope you enjoy the selection.