Table of Contents

Preface........................................................................................................................................................viii
Organizing Committee................................................................................................................................ix
Reviewers and Subreviewers .....................................................................................................................x
Keynotes......................................................................................................................................................xi

Session 1: Fault Tolerant
A Fault Tolerant Architecture for Data Fusion Targeting Hardware and Software Faults .................................................................1
   Bader Kaci, Lussier Benjamin, and Schön Walter

Design of Multi-threaded Fault-Tolerant Connection-Oriented Communication ..............................................11
   Naghmeh Ivaki, Filipe Araújo, and Fernando Barros

A Software-Implemented Fault-Tolerance Approach for Control and Display Systems in Avionics .......................................................21
   C. Fayollas, J.C. Fabre, P. Palanque, M. Cronel, D. Navarre, and Y. Deleris

Study on Routing Protocol for Structured P2P Network Taking Account of the Nodes Which Behave Like a Byzantine Fault ................................................31
   Satoshi Fukumoto, Tomoki Endo, Mamoru Ohara, and Masayuki Arai

Parallel Session 2A: Security Systems

Automatic Generation of Security Argument Graphs ...........................................................................................................33
   Nils Ole Tippenhauer, William G. Temple, An Hoa Vu, Binbin Chen,
   David M. Nicol, Zbigniew Kalbarczyk, and William H. Sanders

Towards Secure and Dependable Authentication and Authorization Infrastructures ............................................................43
   Diego Kreutz, Alysson Bessani, Eduardo Feitosa, and Hugo Cunha

Lightweight Bare-Metal Stateful Firewall ......................................................................................................................53
   Yihuan Xing, Ford Long Wong, and Akash Kumar
Parallel Session 2B: Hardware

Reduction of NBTI-Induced Degradation on Ring Oscillators in FPGA ..........................................................59
Yasuo Sato, Masafumi Monden, Yousuke Miyake, and Seiji Kajihara

Protecting RAID Arrays against Unexpectedly High Disk Failure Rates ............................................................68

EA-E0: Endurance Aware Erasure Code for SSD-Based Storage Systems ..........................................................76
Saeideh Alinezhad Chamazcoti and Seyed Ghassem Miremadi

Parallel Session 3A: Algorithm

A Practical Approach for Generating Failure Data for Assessing and Comparing Failure Prediction Algorithms ..........................................................86
Ivano Irrera and Marco Vieira

Algorithm Selection for Error Resilience in Scientific Computing .....................................................................96
Joseph Callenes-Sloan and Hugh McNamara

Exploiting Synchronicity for Immediate Feedback in Self-Stabilizing PIF Algorithms ........................................106
Oday Jubran and Oliver Theel

Coarse-Grained Parallel Uniformization for Continuous-Time Markov Chains ..................................................116
Hiroyuki Okamura, Yusuke Kunimoto, and Tadashi Dohi

Parallel Session 3B: Safety and Correctness

From Safety Analyses to Experimental Validation of Automotive Embedded Systems .............................................125
Ludovic Pintard, Jean-Charles Fabre, Michel Leeman, Karama Kanoun, and Matthieu Roy

The Nature and Content of Safety Contracts: Challenges and Suggestions for a Way Forward ................................135
Patrick Graydon and Iain Bate

FoxyFeed: Forging Device-Level Asynchronous Events for Kernel Development ..................................................145
Kenji Kono, Shunsuke Miyahara, Hiroshi Yamada, and Takeshi Yoshimura

Locating a Faulty Interaction in Pair-wise Testing ...............................................................................................155
Takahiro Nagamoto, Hideharu Kojima, Hiroyuki Nakagawa, and Tatsuhiro Tsuchiya

Simulation of Software Fault Detection and Correction Processes Considering Different Skill Levels of Debuggers .................................................157
Rui Peng and F.R. Shahrzad
Codes Correcting Asymmetric/Unidirectional Errors along with Bidirectional Errors of Small Magnitude .................................................................159
  Shohei Kotaki and Masato Kitakami

Session 4: Cloud
Computing Defects per Million in Cloud Caused by Virtual Machine Failures with Replication .................................................................161
  Subrota K. Mondal, Jogesh K. Muppala, Fumio Machida, and Kishor S. Trivedi
Reliability of Geo-replicated Cloud Storage Systems .................................................................169
  Ilias Iliadis, Dmitry Sotnikov, Paula Ta-Shma, and Vinodh Venkatesan
CloudBFT: Elastic Byzantine Fault Tolerance ........................................................................180
  Rodrigo Nogueira, Filipe Araujo, and Raul Barbosa
Formalizing Google File System .........................................................................................190
  Mengdi Wang, Bo Li, Yongxin Zhao, and Geguang Pu

Session 5: Software Quality
Efficient VM Introspection in KVM and Performance Comparison with Xen ............................192
  Kenichi Kourai and Kousuke Nakamura
Region-Adherent Algorithms: Restricting the Impact of Faults on Service Quality .................................................................203
  Jan Steffen Becker, Dilshod Rahmatov, and Oliver Theel
Optimal Reliability Design for Real-Time Systems with Dynamic Voltage and Frequency Scaling ........................................................................213
  Toshitaka Koga, Tadashi Dohi, and Hiroyuki Okamura
Optimization of Partitioned Architectures to Support Soft Real-Time Applications .................................................................223
  Domitian Támas-Selicean and Paul Pop

Session 6: Distributed Systems
Reliable Shortest Paths in Wireless Sensor Networks: Refocusing on Link Failure Scenarios from Applications ........................................................................225
  Md Zakirul Alam Bhuiyan and Guojun Wang
Responsiveness of Service Discovery in Wireless Mesh Networks ........................................234
  Andreas Dittrich, Daniel Solis Herrera, Pablo Coto, and Miroslaw Malek
Reasoning about Group-Based Mobility in MANETs ..........................................................244
  Xi Wu, Si Liu, Huihiao Zhu, and Yongxin Zhao

Author Index ..........................................................................................................................254