

# IEEE Software

## TABLE OF CONTENTS

January/February 2021

Vol. 38 No. 1

### FOCUS

#### SERVERLESS APPLICATIONS ENGINEERING

##### 25 Guest Editors' Introduction

Serverless Computing—Where Are We Now, and Where Are We Heading?

Davide Taibi, Josef Spillner, and Konrad Wawruch

##### 32 Serverless Applications: Why, When, and How?

Simon Eismann, Joel Scheuner, Erwin van Eyk, Maximilian Schwinger, Johannes Grohmann, Nikolas Herbst, Cristina L. Abad, and Alexandru Iosup

##### 40 Toward a Technical Debt Conceptualization for Serverless Computing

Valentina Lenarduzzi, Jeremy Daly, Antonio Martini, Sebastiano Panichella, and Damian Andrew Tamburri

##### 48 DAF: Dependency-Aware FaaSifier for Node.js Monolithic Applications

Sasko Ristov, Stefan Pedratscher, Jakob Wallnöfer, and Thomas Fahringer

##### 54 Serverless Testing: Tool Vendors' and Experts' Points of View

Valentina Lenarduzzi and Annibale Panichella

##### 61 Scientific Software Testing Goes Serverless: Creating and Invoking Metamorphic Functions

Xuanyi Lin, Michelle Simon, and Nan Niu

##### 68 Toward Multicloud Access Transparency in Serverless Computing

Josep Sampé, Pedro García-López, Marc Sánchez-Artigas, Gil Vernik, Pol Roca-Llaberia, and Aitor Arjona

##### 75 A Lightweight Design for Serverless Function as a Service

Ju Long, Hung-Ying Tai, Shen-Ta Hsieh, and Michael Juntao Yuan

##### 81 Benchmarking Deep Neural Network Inference Performance on Serverless Environments With MLPerf

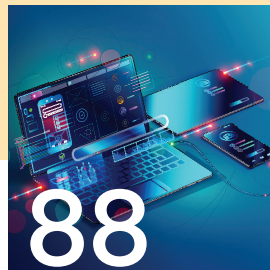
Unai Elordi, Luis Unzueta, Jon Goenetxea, Sergio Sanchez-Carvallido, Ignacio Arganda-Carreras, and Oihana Otaegui

### MISCELLANEOUS

4 Contact Us

COV 3 IEEE Computer Society Information





## FEATURES

### **88** Trends and Challenges for Software Engineering in the Mobile Domain

Luciano Baresi, William G. Griswold, Grace A. Lewis, Marco Autili, Ivano Malavolta, and Christine Julien

### **97** The Four Pillars of Research Software Engineering

Jeremy Cohen, Daniel S. Katz, Michelle Barker, Neil Chue Hong, Robert Haines, and Caroline Jay

### **106** A Case for Human Values in Software Engineering

Jon Whittle, Maria Angela Ferrario, Will Simm, and Waqar Hussain

### **114** An Exploratory Study of Machine Learning Model Stores

Minke Xiu, Zhen Ming (Jack) Jiang, and Bram Adams

## DEPARTMENTS

### **3** From the Editor

Protecting the Health and Longevity of the Peer-Review Process in the Software Engineering Community

Ipek Ozkaya

### **7** Requirements

Requirements, Politics, or Individualism

Muneera Bano, Didar Zowghi, and Chetan Arora

### **13** Reliable Code

Right Code

Gerard J. Holzmann

### **16** Software Technology

Test-Driven Requirements Engineering

Christof Ebert and Ruschil Ray

### **123** Practitioners' Digest

(Research) Insights for Serverless Application Engineering

Jeffrey C. Carver, Birgit Penzenstadler, Joel Scheuner, and Miroslaw Staron

### **126** Software Engineering Radio

Ryan Ripley on Making Scrum Work

Kanchan Shringi