

Editor-in-Chief

Kai Rannenberg, Goethe University Frankfurt, Germany

Editorial Board Members

TC 1 – Foundations of Computer Science

Jacques Sakarovitch, Télécom ParisTech, France

TC 2 – Software: Theory and Practice

Michael Goedicke, University of Duisburg-Essen, Germany

TC 3 – Education

Arthur Tatnall, Victoria University, Melbourne, Australia

TC 5 – Information Technology Applications

Erich J. Neuhold, University of Vienna, Austria

TC 6 – Communication Systems

Aiko Pras, University of Twente, Enschede, The Netherlands

TC 7 – System Modeling and Optimization

Fredi Tröltzsch, TU Berlin, Germany

TC 8 – Information Systems

Jan Pries-Heje, Roskilde University, Denmark

TC 9 – ICT and Society

David Kreps, University of Salford, Greater Manchester, UK

TC 10 – Computer Systems Technology

Ricardo Reis, Federal University of Rio Grande do Sul, Porto Alegre, Brazil

TC 11 – Security and Privacy Protection in Information Processing Systems

Steven Furnell, Plymouth University, UK

TC 12 – Artificial Intelligence

Ulrich Furbach, University of Koblenz-Landau, Germany

TC 13 – Human-Computer Interaction

Marco Winckler, University of Nice Sophia Antipolis, France

TC 14 – Entertainment Computing

Rainer Malaka, University of Bremen, Germany

IFIP – The International Federation for Information Processing

IFIP was founded in 1960 under the auspices of UNESCO, following the first World Computer Congress held in Paris the previous year. A federation for societies working in information processing, IFIP's aim is two-fold: to support information processing in the countries of its members and to encourage technology transfer to developing nations. As its mission statement clearly states:

IFIP is the global non-profit federation of societies of ICT professionals that aims at achieving a worldwide professional and socially responsible development and application of information and communication technologies.

IFIP is a non-profit-making organization, run almost solely by 2500 volunteers. It operates through a number of technical committees and working groups, which organize events and publications. IFIP's events range from large international open conferences to working conferences and local seminars.

The flagship event is the IFIP World Computer Congress, at which both invited and contributed papers are presented. Contributed papers are rigorously refereed and the rejection rate is high.

As with the Congress, participation in the open conferences is open to all and papers may be invited or submitted. Again, submitted papers are stringently refereed.

The working conferences are structured differently. They are usually run by a working group and attendance is generally smaller and occasionally by invitation only. Their purpose is to create an atmosphere conducive to innovation and development. Refereeing is also rigorous and papers are subjected to extensive group discussion.

Publications arising from IFIP events vary. The papers presented at the IFIP World Computer Congress and at open conferences are published as conference proceedings, while the results of the working conferences are often published as collections of selected and edited papers.

IFIP distinguishes three types of institutional membership: Country Representative Members, Members at Large, and Associate Members. The type of organization that can apply for membership is a wide variety and includes national or international societies of individual computer scientists/ICT professionals, associations or federations of such societies, government institutions/government related organizations, national or international research institutes or consortia, universities, academies of sciences, companies, national or international associations or federations of companies.

More information about this series at <http://www.springer.com/series/6102>

Francis Bordeleau · Alberto Sillitti ·
Paulo Meirelles · Valentina Lenarduzzi (Eds.)

Open Source Systems


15th IFIP WG 2.13 International Conference, OSS 2019
Montreal, QC, Canada, May 26–27, 2019
Proceedings

Editors

Francis Bordeleau
École de Technologie Supérieure (ÉTS)
Montreal, QC, Canada

Paulo Meirelles
Federal University of São Paulo
São Paulo, Brazil

Alberto Sillitti
Innopolis University
Innopolis, Russia

Valentina Lenarduzzi 
Tampere University
Tampere, Finland

ISSN 1868-4238 ISSN 1868-422X (electronic)
IFIP Advances in Information and Communication Technology
ISBN 978-3-030-20882-0 ISBN 978-3-030-20883-7 (eBook)
<https://doi.org/10.1007/978-3-030-20883-7>

© IFIP International Federation for Information Processing 2019

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

Welcome to the 15th edition of the International Conference on Open Source Systems (OSS 2019) held in Montreal, Quebec, Canada, during May 26–27, 2019. The conference has been a reference point for the research community in Open Source Systems for 15 years, promoting research activities in the area and anticipating trends.

All of the submitted research papers went through a rigorous peer-review process. Each paper was reviewed by at least three members of the Program Committee. Of the 30 papers submitted, only ten were accepted as full papers (33%). We also accepted five experience reports, with a committee of experts evaluating each submission for new experiences that would be both interesting and beneficial to our community. We accepted papers dealing with several different aspects of OSS including: Mining OSS Data, Organizational Aspects of FLOSS Projects, FLOSS Adoption, FLOSS Cost and Licenses, FLOSS Education and Training.

We hope that you will find the OSS 2019 proceedings useful for your professional and academic activities.

Finally, we would like to thank all the people who contributed to OSS 2019 including the authors, the sponsors, the reviewers, the volunteers, and the chairs.

April 2019

Francis Bordeleau
Alberto Sillitti
Paulo Meirelles
Valentina Lenarduzzi

Organization

General Chair

Francis Bordeleau École de technologie supérieure (ÉTS), Canada

Program Chairs

Paulo Meirelles Federal University of São Paulo, Brazil
Alberto Sillitti Innopolis University, Russia

Program Committee

Alexandre Bergel	University of Chile, Chile
Abby Cabunoc Mayes	Mozilla, Canada
Andrea Capiluppi	Brunel University, UK
Kevin Crowston	Syracuse University, USA
Matt Germonprez	University of Nebraska, USA
Jesus M. Gonzalez-Barahona	Universidad Rey Juan Carlos, Spain
Imed Hammouda	Chalmers and University of Gothenburg, Sweden
Daniel S. Katz	University of Illinois at Urbana-Champaign, USA
Fabio Kon	University of São Paulo, Brazil
Akinori Ihara	Wakayama University, Japan
Luigi Lavazza	University of Insubria, Italy
Valentina Lenarduzzi	Tampere University, Finland
Manuel Mazzara	Innopolis University, Russia
Sandro Morasca	University of Insubria, Italy
Masood Mortazavi	Huawei, USA
John Noll	University of East London, and Lero, Ireland
Sarah Novotny	Google, USA
Peter Rigby	Concordia University, Canada
Chris Riley	Mozilla, USA
Gregorio Robles	Universidad Rey Juan Carlos, Spain
Walter Scacchi	University of California, USA
Alolita Sharma	Amazon Web Services, USA
Diomidis Spinellis	Athens University of Economics and Business, Greece
Kate Stewart	Linux Foundation, USA
Davide Taibi	Tampere University, Finland
Jens Weber	University of Victoria, Canada

Contents

Mining OSS Data

Building an Open-Source Cross-Cloud DevOps Stack for a CRM Enterprise Application: A Case Study	3
<i>Sebastian Schork, Feroz Zahid, Dipesh Pradhan, Sébastien Kicin, and Antonia Schwichtenberg</i>	

Open Source Vulnerability Notification	12
<i>Brandon Carlson, Kevin Leach, Darko Marinov, Meiyappan Nagappan, and Atul Prakash</i>	

Organizational Aspects of FLOSS Projects

EJ: A Free Software Platform for Social Participation	27
<i>Fábio Macêdo Mendes, Ricardo Poppi, Henrique Parra, and Bruna Moreira</i>	

Introducing Agile Product Owners in a FLOSS Project	38
<i>Matthias Müller, Christian Schindler, and Wolfgang Slany</i>	

What Are the Perception Gaps Between FLOSS Developers and SE Researchers? A Case of Bug Finding Research	44
<i>Yutaro Kashiwa, Akinori Ihara, and Masao Ohira</i>	

FLOSS Adoption

Fifteen Years of Open Source Software Evolution	61
<i>Francis Bordeleau, Paulo Meirelles, and Alberto Sillitti</i>	

Open Source Software Community Inclusion Initiatives to Support Women Participation	68
<i>Vandana Singh and William Brandon</i>	

Predicting Popularity of Open Source Projects Using Recurrent Neural Networks	80
<i>Sefa Eren Sahin, Kubilay Karpaz, and Ayse Tosun</i>	

What Attracts Newcomers to Onboard on OSS Projects? TL;DR: Popularity	91
<i>Felipe Fronchetti, Igor Wiese, Gustavo Pinto, and Igor Steinmacher</i>	

Why Do Developers Adopt Open Source Software?
Past, Present and Future. 104
*Valentina Lenarduzzi, Davide Tosi, Luigi Lavazza,
and Sandro Morasca*

Why Do People Give Up FLOSSing? A Study of Contributor
Disengagement in Open Source 116
*Courtney Miller, David Gray Widder, Christian Kästner,
and Bogdan Vasilescu*

FLOSS Cost and Licences

Open Source for Open Source License Compliance 133
Oliver Fendt and Michael C. Jaeger

Opportunity Costs in Free Open-Source Software 139
Siim Karus

FLOSS Education and Training

Does FLOSS in Software Engineering Education Narrow
the Theory-Practice Gap? A Study Grounded on Students' Perception 153
*Deborá Maria Coelho Nascimento, Christina von Flach Garcia Chavez,
and Roberto Almeida Bittencourt*

Faculty Development for FLOSS Education 165
Becka Morgan, Gregory W. Hislop, and Heidi J. C. Ellis

Author Index 173