

35th European Conference on Object-Oriented Programming

ECOOP 2021, July 11–17, 2021, Aarhus, Denmark
(Virtual Conference)

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ACM Classification 2012

Software and its engineering

ISBN 978-3-95977-190-0

Published online and open access by

Schloss Dagstuhl – Leibniz-Zentrum für Informatik GmbH, Dagstuhl Publishing, Saarbrücken/Wadern, Germany. Online available at <https://www.dagstuhl.de/dagpub/978-3-95977-190-0>.

Publication date

July, 2021

Bibliographic information published by the Deutsche Nationalbibliothek

The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data are available in the Internet at <https://portal.dnb.de>.

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Digital Object Identifier: 10.4230/LIPIcs.ECOOP.2021.0

ISBN 978-3-95977-190-0

ISSN 1868-8969

<https://www.dagstuhl.de/lipics>

LIPICs – Leibniz International Proceedings in Informatics

LIPICs is a series of high-quality conference proceedings across all fields in informatics. LIPICs volumes are published according to the principle of Open Access, i.e., they are available online and free of charge.

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■ Message from the Chairs

It is our great pleasure to welcome you to ECOOP 2021, to be held during July 11–17. ECOOP is Europe’s longest-standing annual Programming Languages conference, bringing together researchers, practitioners, and students to share their ideas and experiences in all topics related to programming languages, software development, object-oriented technologies, systems and applications.

ECOOP 2021 was originally planned to take place at Aarhus University, Denmark, but the COVID-19 pandemic made that impossible, so again this year it will be a virtual conference. As well as technical papers and keynotes, ECOOP 2021 features a doctoral symposium, a poster session, and a summer school. The event is co-located with the ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA), the International SPIN Symposium on Model Checking of Software, the Rebase conference, and the following workshops:

- Workshop on AI and Software Testing/Analysis (AISTA)
- International Workshop on Smart Contract Analysis (WOSCA)
- International Workshop on Verification of Objects at Runtime Execution (VORTEX)
- International Workshop on Context-Oriented Programming and Advanced Modularity (COP)
- Workshop on Implementation, Compilation, Optimization of OO Languages, Programs and Systems (ICOOOLPS)
- Workshop on Formal Techniques for Java-like Programs (FTfJP)

The ECOOP/ISSTA Summer School consists of invited lectures by Eric Bodden, Marcel Böhme, Claire Le Goues, Satish Chandra, and Andreas Rossberg. The summer school, which was organized by Frank Tip and Andreas Zeller, aims to provide undergraduate and graduate students and postdocs with a gentle introduction to research that is being conducted in the ECOOP and ISSTA communities. The ECOOP/ISSTA Doctoral Symposium, organized by Wei Le and Eric Bodden, provides a forum for PhD students at any stage in their research to get detailed feedback and advice, and to establish new research collaborations.

To make it easy for our international community to attend the event from anywhere across the globe, ECOOP/ISSTA will use a 3-time-band format, with each paper presentation being given twice (in the two time bands that are most convenient for the speaker) so that all attendees are able to attend most talks at reasonable times.

Paper selection process

As in recent years, ECOOP 2021 supported a “journal first” track in addition to the traditional approach of direct paper submission to be considered for the proceedings. The *Science of Computer Programming* ECOOP 2021 Special Issue contains one paper that will be presented at the conference, and a single paper from *ACM Transactions on Programming Languages and Systems* will also be presented. For traditional submissions, ECOOP 2021 again supported the six paper categories introduced in ECOOP 2019: Research Paper, Tool Insight Paper, Reproduction Study, Experience Report, Pearl, and Brave New Idea.

In total, ECOOP 2021 received 57 submissions, of which 22 were accepted (38.6% acceptance rate). There were 50 Research Paper submissions (20 accepted), 3 Pearls (2 accepted), 2 Tool Insight submissions (none accepted), 1 Experience Report (none accepted), and 1 Brave New Idea (none accepted). For the *Science of Computer Programming* Special Issue there were 3 submissions, with 1 accepted.

ECOOP 2021 had a single Program Committee with 32 members, and no External Review Committee. ECOOP 2021 used a *strong* double-blind review process: author identities of accepted papers were only revealed after decisions were made, and author identities for rejected papers were never revealed. Further, the review process took place fully online, with no in-person PC meeting. Given the fully online review process and strong double-blind reviewing, submissions from PC members could be handled via standard conflict mechanisms, and there was no need for a separate external review committee.

Each submission was reviewed by at least three members of the Program Committee and selected additional reviewers. Authors were given a chance to respond to all reviews of their paper, except in rare cases where an additional review was solicited after the author response period. For most papers, particularly those where further discussion occurred after the author response, the authors were provided with a summary of the reviewer discussion, and in the case of a reject decision, the main reasons for the rejection.

New for ECOOP 2021, all authors were asked about their *intent to submit an artifact* at the point of paper submission. Authors could indicate whether they intended to submit an artifact if their paper was accepted, and optionally give an explanation if no artifact would be submitted. It was made clear to authors that artifacts may not be appropriate for all papers and were *not* required. All 20 papers accepted in the Research Paper category had expressed an intent to submit an artifact, and in the end 19 artifacts were submitted for evaluation (the authors of the last paper could not make the artifact evaluation deadline due to illness, but they still made a public artifact). Asking for artifact intent during paper submission successfully led to a very high submission rate for artifact evaluation, and we hope future ECOOP chairs will continue to use this process.

Acknowledgements

Organizing ECOOP has involved many members of our community, and we would like to express our gratitude towards all the people involved. We are particularly thankful to Cristian Cadar, the General Chair of ISSSTA 2021, for enjoyable and effective collaboration about the organization of the joint events, and to Lucie Lerch for managing finances and coordination with AITO. We thank the Program Committee members and external reviewers for the thorough reviews and discussions of the submitted papers, and the Artifact Evaluation Committee for their efforts.

Many other people contributed to various aspects of the conference. We thank Marcel Böhme and Maria Christakis for organizing an exciting collection of workshops, Ajitha Rajan and Sebastian Erdweg for managing the poster sessions, Omer Tripp and Darko Marinov for successfully attracting corporate supporters, and Lisa Nguyen Quang Do for taking care of publicity. We also thank Daniel Grumberg for assisting with the website and video upload system and Elmer van Chastelet for providing excellent support and accommodating our requests for new features in the `conf.researchr.org` system.

We gratefully acknowledge our sponsor AITO and our financial supporters, Google, Dragon Testing, Amazon, Microsoft Research, KBR and NASA, Facebook, and JetBrains, as well as the cooperation with ACM and SIGPLAN. Thanks to the generous contributions from the financial supporters, participation at ECOOP 2021 and the affiliated events is free.

Finally, we want to thank all the authors for submitting their work and the attendees for contributing to making the conference a success. We hope that you will find the ECOOP 2021 program inspiring and valuable, and that the conference will bring new ideas and give opportunities to meet with researchers and practitioners in our community.

Anders Møller

ECOOP 2021 General Chair

Aarhus University

Manu Sridharan

ECOOP 2021 Program Chair

University of California, Riverside

■ Message from the Artifact Evaluation Chairs

The goals of the *Artifact Evaluation* (AE) are to foster the reproducibility of results by providing authors the possibility to submit an artifact for accepted papers. Artifacts include, but are not limited to, software artifacts, data sets, and proofs. An *Artifact Evaluation Committee* (AEC) reviews these artifacts and decides upon their acceptance. The accepted artifacts are archived in the *Dagstuhl Artifacts Series* (DARTS) published on the *Dagstuhl Research Online Publication Server* (DROPS). Each artifact is assigned a *Digital Object Identifier* (DOI) that can be used in future citations.

This year, the committee evaluated 19 artifacts out of 20 papers accepted at the conference's research track. This corresponds to a record participation rate of 95%. 15 of those artifacts were accepted (a 79% acceptance rate). In total, 75% of the regular research papers published at ECOOP 2021 have successfully passed the AE process, indicated by an artifact-evaluation badge on the paper. The improvement from last year continues: from 2017 to 2020, respectively 59%, 38%, 50%, and 70% of the research papers were accompanied by accepted artifacts.

The AE process for 2021 was a continuation of the AE process of previous ECOOP editions. In particular, the process was still based on the artifact evaluation guidelines by Shriram Krishnamurthi, Matthias Hauswirth, Steve Blackburn, and Jan Vitek published on the Artifact Evaluation site. The guidelines for artifacts that contain mechanized proofs developed by the ECOOP 2018 AEC were also reused to help both reviewers and authors in creating and reviewing such artifacts.

Each artifact was evaluated by two AEC members, which corresponded to a reviewer load of two artifacts. The reviewing process consisted of three phases.

- In the “kick-the-tires” phase, reviewers briefly verified the basic integrity of the artifacts to discover any issues that could prevent the evaluation of the artifact (e.g., a corrupted virtual machine image) and to assign a grade for the getting-started guide.
- In case of any issues, reviewers could, as part of a response phase, indicate issues and ask clarifying questions to the authors. Authors could respond to the reviewers' first feedback, and update their artifacts to address any issues that were raised by the reviewers.
- In the main review phase, each reviewer had two weeks to do a comprehensive evaluation of each artifact. Reviewers were asked to assess the consistency of the artifact with respect to the paper, the artifact's completeness, documentation, and reusability for future research and to decide on an overall grade. The review phase was followed by a discussion phase, in which artifacts were discussed to converge on either the artifacts' acceptance or rejection. Authors that received an acceptance notification were given two weeks to incorporate reviewers' feedback and submit the camera-ready version of their artifacts.

We would like to thank the 22 members of this year's AEC, who donated their valuable time and effort to make the AE process possible. We would also like to thank Michael Wagner for the publication of the artifacts volume, as well as ECOOP 2021's General Chair Anders Møller and the Program Chair Manu Sridharan for helping us coordinate the artifact evaluation with the paper review process.

William G.J. Halfond

Artifact Evaluation Co-Chair

University of Southern California

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Artifact Evaluation Co-Chair

Vrije Universiteit Brussel

■ Foreword by the President of AITO

Dear ECOOP participants,

It has been yet another year dominated by COVID-19 and so ECOOP again will be virtual – last year was successful and this year is looking even better: The organizers have done a great job and the program is exciting. On the up-side of doing the event virtually is that even more will be able to attend.

ECOOP 2021 is co-located (in the virtual world) with ISSTA 2021 – a cooperation that traditionally is fruitful.

I would like to thank the organizers – lead by Anders Møller – and the PC – lead by PC Chair Manu Sridharan – for their parts in making ECOOP successful – and the authors for their contributions – they provide the essentials that we are meeting to discuss and learn from.

May ECOOP be a good experience for you – and let's hope that for ECOOP 2022, we again will be able to meet physically and enjoy both a great scientific program and the benefits of social interaction.

All the best,

Eric Jul
AITO President



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