


CONCUR Test-Of-Time Award 2023

Bengt Jonsson ✉ 🏠 

Department of Information Technology, Uppsala University, Sweden

Marta Kwiatkowska ✉ 🏠 

Department of Computer Science, University of Oxford, UK

Igor Walukiewicz ✉ 🏠 

CNRS, University of Bordeaux, France

Abstract

This short article recaps the purpose of the CONCUR Test-of-Time Award and presents the paper that received the Award in 2023.

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Category Invited Paper

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1 Introduction

The CONCUR Test-of-Time Award was established in 2020 by the Steering Committee of the CONCUR conference and by the IFIP Working Group 1.8 on Concurrency Theory. Its purpose is to recognise important achievements in Concurrency Theory that were published at CONCUR and have stood the test of time. At its normal pace, starting from 2024, the CONCUR Test-of-Time Award will be attributed every other year, during the CONCUR conference, to one or two papers published in the 4-year period from 20 to 17 years earlier. In the transient period from 2020 to 2023, on the other hand, two such awards are attributed every year, in order to catch up with papers published in the first fifteen years of the conference, namely between 1990 and 2004. At CONCUR 2020 two awards were given, each rewarding two papers published in the period 1990–1995. Similarly, at CONCUR 2021 two awards were given, each rewarding two papers published in the period 1994–1999. At CONCUR 2022, four awards were given, two for the period 1998–2001 and another two for 2000–2003. We had the honour to serve as members of the fourth CONCUR Test-of-Time Award Jury. All papers published at CONCUR in the period 2002–2005 were eligible. After agreeing a shortlist of candidate papers and discussing their relative merits and influence on the CONCUR research community and beyond, we selected the paper described below for the Award, out of a number of excellent candidates. The presentation of the Award will take place during CONCUR 2023, the 34th edition of the CONCUR conference, which is co-chaired by Guillermo A. Pérez and Jean-François Raskin, and will be held in Antwerp.

2 The Award Winning Contribution

For the period 2002–2005 the jury has chosen to award the paper:

Vincent Danos and Jean Krivine

Reversible Communicating Systems, published in CONCUR 2004

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34th International Conference on Concurrency Theory (CONCUR 2023).

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This paper represents the first exploration of the reversibility of concurrent computation within process algebra. The notion of reversible computation expands the conventional forward computation by incorporating the ability to roll back a computation. The roots of this concept can be traced back to the 1970s, where it was studied by Landauer and Bennett in the context of thermodynamics and Turing machines. They established that any deterministic computation could be simulated by a logically reversible Turing machine.

The challenge in applying reversibility to concurrent systems arises from the fact that actions are not linearly organized by execution time but are partially ordered by a causal relationship. The authors put forward the fundamental notion of causally-consistent reversibility capturing the concept that an action can only be undone if all its subsequent effects have been reversed. The introduced notion has direct applicability to reversibility in distributed settings.

This paper has since served as a source of inspiration, either directly or indirectly, for numerous studies on reversible concurrent systems modelled through (higher-order) process algebras, Petri nets, event structures, as well as reversible logic circuits made of DNA. The principle of reversibility has a wide range of applications in distributed systems, including debugging, rollback, and error recovery. These applications will undoubtedly continue to benefit from the pioneering and elegant formalization introduced by Danos and Krivine.

3 Concluding Remarks

Interview with the award recipients, which provides information on the historical context that led them to develop their award-winning work and on their research philosophy, has been conducted by Marta Kwiatkowska with the help of the jury members. The interview is accessible on the award's webpage <https://www.uantwerpen.be/en/conferences/confest-2023/concur/awards/>.