Distributed Applications and Interoperable Systems

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Distributed Applications and Interoperable Systems

21st IFIP WG 6.1 International Conference, DAIS 2021
Held as Part of the 16th International Federated Conference
on Distributed Computing Techniques, DisCoTec 2021
Valletta, Malta, June 14–18, 2021
Proceedings

Springer

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Foreword

The 16th International Federated Conference on Distributed Computing Techniques (DisCoTec 2021) took place during June 14–18, 2021. It was organised by the Department of Computer Science at the University of Malta, but was held online due to the abnormal circumstances worldwide affecting physical travel. The DisCoTec series is one of the major events sponsored by the International Federation for Information Processing (IFIP), the European Association for Programming Languages and Systems (EAPLS), and the Microservices Community. It comprises three conferences:

- *COORDINATION*, the IFIP WG 6.1 23rd International Conference on Coordination Models and Languages;
- *DAIS*, the IFIP WG 6.1 21st International Conference on Distributed Applications and Interoperable Systems;
- *FORTE*, the IFIP WG 6.1 41st International Conference on Formal Techniques for Distributed Objects, Components, and Systems.

Together, these conferences cover a broad spectrum of distributed computing subjects, ranging from theoretical foundations and formal description techniques, to systems research issues. As is customary, the event also included several plenary sessions in addition to the individual sessions of each conference, which gathered attendants from the three conferences. These included joint invited speaker sessions and a joint session for the best papers from the respective three conferences. Associated with the federated event, four satellite events took place:

- *DisCoTec Tools*, a tutorial session promoting mature tools in the field of distributed computing;
- *ICE*, the 14th International Workshop on Interaction and Concurrency Experience;
- *FOCODILE*, the 2nd International Workshop on Foundations of Consensus and Distributed Ledgers;
- *REMV*, the 1st Robotics, Electronics, and Machine Vision Workshop.

I would like to thank the Program Committee chairs of the different events for their help and cooperation during the preparation of the conference, and the Steering Committee and Advisory Boards of DisCoTec and its conferences for their guidance and support. The organization of DisCoTec 2021 was only possible thanks to the dedicated work of the Organizing Committee, including Caroline Caruana and Jasmine Xuereb (publicity chairs), Duncan Paul Attard and Christian Bartolo Burlo (workshop chairs), Lucienne Bugeja (logistics and finances), and all the students and colleagues who volunteered their time to help. I would also like to thank the invited speakers for their excellent talks. Finally, I would like to thank IFIP WG 6.1, EAPLS, and the Microservices Community for sponsoring this event, Springer's Lecture Notes in

June 2021   Adrian Francalanza

Preface

This volume contains the papers presented at the 21st IFIP International Conference on Distributed Applications and Interoperable Systems (DAIS 2021), sponsored by the International Federation for Information Processing (IFIP) and organized by the IFIP WG 6.1. The DAIS conference series addresses all practical and conceptual aspects of distributed applications, including their design, modeling, implementation, and operation, the supporting middleware, appropriate software engineering methodologies and tools, and experimental studies and applications. DAIS 2021 was meant to be held during June 14–18, 2021, in Valletta, Malta, as part of DisCoTec 2021, the 12th International Federated Conference on Distributed Computing Techniques, but due to the COVID-19 pandemic it was held completely online.

We offered three distinct paper tracks: full research papers, full practical experience reports, and work-in-progress papers. We received 19 initial abstract submissions, 18 of which were for research papers and 1 for a practical experience report. All submissions were reviewed by three to four Program Committee (PC) members. The review process included a post-review discussion phase, during which the merits of all papers were discussed by the PC. The committee decided to accept six full research papers, two full practical experience reports, and two work-in-progress papers.

The accepted papers cover a broad range of topics in distributed algorithms, scalability and availability, network virtualization, stream processing, privacy, and trusted hardware.

The virtual conference, especially during these last months full of unpredictable events, was made possible by the hard work and cooperation of many people working in several different committees and organizations, all of which are listed in these proceedings. In particular, we are grateful to the PC members for their commitment and thorough reviews, and for their active participation in the discussion phase, and to all the external reviewers for their help in evaluating submissions. Finally, we also thank the DisCoTec general chair, Adrian Francalanza, and the DAIS Steering Committee chair, Luís Veiga, for their constant availability, support, and guidance.

June 2021

Miguel Matos
Fabíola Greve

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iExec: Building a Decentralized, Trusted and Privacy-Preserving Computing Infrastructure (Invited Speaker)

Gilles Fedak

CEO & co-founder of iExec, France

Abstract. iExec is a French startup company based in Lyon which built the first decentralized marketplace in which entities (e.g. traditional cloud providers, research centers and even individuals) can contribute and monetize Cloud Computing resources (CPU, GPU), Decentralized Applications (Dapps) and data-sets (Data Renting) in a secure and confidential way, ensuring the confidentiality and ownership of data. During this talk, I will present how iExec combines Ethereum Smart Contracts, a unique Proof-of-Contribution (PoCo) protocol and Trusted Execution Environments (TEE) to ensure trust between providers and consumers of resources. The project, however, is still facing several scientific and technological barriers related to scalability, interoperability and to supporting more classes of applications. I will discuss several research topics (e.g. ZK-proofs and rollups) and two H2020 projects in which iExec is involved: OntoChain, which aims at building a trusted and transparent knowledge management ecosystem and Datacloud, which goal is to build a platform for big data analytics in the edge-to-cloud continuum.

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