2025 IEEE 22nd International Conference on Software Architecture (ICSA 2025)

Odense, **Denmark** 31 March - 4 April 2025



IEEE Catalog Number: CFP25WIC-POD **ISBN:**

979-8-3315-2091-5

Copyright © 2025 by the Institute of Electrical and Electronics Engineers, Inc. All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

*** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.

IEEE Catalog Number:	CFP25WIC-POD
ISBN (Print-On-Demand):	979-8-3315-2091-5
ISBN (Online):	979-8-3315-2090-8
ISSN:	2835-4907

Additional Copies of This Publication Are Available From:

Curran Associates, Inc 57 Morehouse Lane Red Hook, NY 12571 USA Phone: (845) 758-0400 Fax: (845) 758-2633 E-mail: curran@proceedings.com Web: www.proceedings.com



2025 IEEE 22nd International Conference on Software Architecture (ICSA) ICSA 2025

Table of Contents

Message from General Chairs	ix
Message from Program Chairs and Organizing Chair	xi
Organizing Committee	
Program Committee	xv
Steering Committee	xvii
In Memoriam	xviii

2025 IEEE 22nd International Conference on Software Architecture

Enabling Architecture Traceability by LLM-Based Architecture Component Name Extraction Dominik Fuch ³ (Karlsruhe Institute of Technology (KIT), Germany), Haoyu Liu (Karlsruhe Institute of Technology (KIT), Germany), Tobias Hey (Karlsruhe Institute of Technology (KIT), Germany), Jan Keim (Karlsruhe Institute of Technology (KIT), Germany), and Anne Koziolek (Karlsruhe Institute of Technology (KIT), Germany)	1
Do Large Language Models Contain Software Architectural Knowledge?: An Exploratory Case Study with GPT Mohamed Soliman (Heinz Nixdorf Institut, Universität Paderborn, Germany) and Jan Keim (Karlsruhe Institute of Technology (KIT), Germany)	13
LLMs for Generation of Architectural Components: An Exploratory Empirical Study in the Serverless World	25
Swiss Cheese Model for AI Safety: A Taxonomy and Reference Architecture for Multi-Layered Guardrails of Foundation Model Based Agents	37
 Affinity-Aware Serverless Function Scheduling Giuseppe De Palma (Università di Bologna, Italy; INRIA, France), Saverio Giallorenzo (Università di Bologna, Italy; INRIA, France), Jacopo Mauro (University of Southern Denmark, Denmark), Matteo Trentin (Università di Bologna, Italy, INRIA, France; University of Southern Denmark, Denmark), and Gianluigi Zavattaro (Università di Bologna, Italy; INRIA, France) 	49

 Architecture and Performance Anti-patterns Correlation in Microservice Architectures	0
Network Centrality as a New Perspective on Microservice Architecture	2
How Does Microservice Granularity Impact Energy Consumption and Performance? A Controlled Experiment 8 Yiming Zhao (Vrije Universiteit Amsterdam, The Netherlands), Tiziano 8 De Matteis (Vrije Universiteit Amsterdam, The Netherlands), and Justus 8 Bogner (Vrije Universiteit Amsterdam, The Netherlands) 8	4
Characterizing Vulnerabilities in Microservices: Source, Age and Severity	6
An Architecture-Based Approach to Mitigate Confidentiality Violations Using Machine 10 Learning 10 Nils Niehues (Karlsruhe Institute of Technology, Germany), Sebastian 10 Hahner (Karlsruhe Institute of Technology, Germany), and Robert 10 Heinrich (Karlsruhe Institute of Technology, Germany) 10	7
Mining Security Documentation Practices in OpenAPI Descriptions	9
 TrustMesh: A Blockchain-Enabled Trusted Distributed Computing Framework for Open Heterogeneous IoT Environments	1
Data-Centric Model for Architecture's Vulnerabilities Analysis	2
Investigating the Impact of Software Design Patterns on Energy Consumption	3
On the Effectiveness of Microservices Tactics and Patterns to Reduce Energy Consumption: An Experimental Study on Trade-Offs	4

A Comprehensive Experimentation Framework for Energy-Efficient Design of Cloud-Native Applications
Architecture as Code
Tracing the Lifecycle of Architecture Technical Debt in Software Systems: A Dependency Approach Edi Sutoyo (University of Groningen, The Netherlands), Paris Avgeriou (University of Groningen, The Netherlands), and Andrea Capiluppi (University of Groningen, The Netherlands)
Debiasing Architectural Decision-Making: An Experiment With Students and Practitioners 210 Klara Borowa (Warsaw University of Technology, Poland), Rodrigo Rebouças de Almeida (Federal University of Paraíba, Brazil), and Marion Wiese (Universität Hamburg, Germany)
A Map of Cloud-Native Practices and Tools to Achieve Desirable System Qualities
 Bridging the Gap Between MLOps and RLOps: An Industry 4.0 Case Study on Architectural Design Decisions in Practice
 Evaluation of MQTT Bridge Architectures in a Cross-Organizational Context
From Legacy to Intelligent IIoT Systems: Automation, Scalability and Elasticity
Non-Invasive Software Architecture for Data Pipelines with Legacy Support in Smart Manufacturing

Architecture Optimization Using Surrogate-Based Incremental Learning for Quality-Attribute Analyses Vadim Titov (University of Hamburg, Germany), J. Andres Diaz Pace (CONICET-UNICEN University & Globant, Argentina), Sebastian Frank (University of Hamburg, Germany), and Andre van Hoorn (University of Hamburg, Germany)	278
Performance Analysis of Architectural Patterns for Federated Learning Systems Ivan Compagnucci (Gran Sasso Science Institute, Italy), Riccardo Pinciroli (Zimmer Biomet, Italy), and Catia Trubiani (Gran Sasso Science Institute, Italy)	289
Deicide: Decomposing Complex Classes Into Responsibility Modules Jason Lefever (Drexel University, USA), Yuanfang Cai (Drexel University USA), Rick Kazman (University of Hawaii. USA), and Ernst Pisch (Drexel University, USA)	301
Improving Clinical Decision Support: Architecture Design of a Multi-Agent System Based on an Argument Quality Assessment Ontology Pengfei Liu (Hubei University of Technology, China) and Liang Xiao (Hubei University of Technology, China)	313

Author Index	325
--------------	-----