2026 IEEE 23rd International Conference on Software Architecture Companion (ICSA-C 2026)

Amsterdam, Netherlands
22-26 June 2026

IEEE Catalog Number: CFP26K38-POD
ISBN: 979-8-3315-7788-9

IEEE
Advancing Technology for Humanity

Copyright © 2026, IEEE

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:	CFP26K38-POD
ISBN (Print-On-Demand):	979-8-3315-7788-9
ISBN (Online):	979-8-3315-7787-2
ISSN:	2768-427X

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

CURRAN ASSOCIATES INC. proceedings .com

TABLE OF CONTENTS

A Comparison of ROS 2 and AUTOSAR Adaptive Platform Against Industry-Elicited Automotive Middleware Requirements 1
Lucas Hegerath, David Philipp Klüner, Philipp Pelcz, Viswanatha Reddy Batchu, Marius Molz Julius Kahle, Thomas Schulik, Stefan Kowalewski, Alexandru Kampmann

Five Years of Microfrontends at Kiavi 9
Michael Keeling

Advancing Decision Tree-Based Online Inference for Edge Computing 11
Lorenzo Abate, Mario Barbareschi

Software Coupling Metrics. An Industrial Evaluation at Cadmatic 17
Venla Liljas, Alexander Bakhtin, Matteo Esposito, Valentina Lenarduzzi, Davide Taibi

A Microservices-Based Architecture for Machine Learning Systems Dedicated to Predictive Maintenance 25
Jérémie Marchand, Jannik Laval, Aicha Sekhari, Vincent Cheutet, Jean-Baptiste Danielou

Adventures in Agile Architecture Governance: Lessons Learned from a Risk- and Cost-Driven Architecture Perspective 33
Eltjo R. Poort

Towards Federated Architecture Knowledge Management: Practices for Scalable, Collaborative Modeling 35
Leon de Vries, Remco C. de Boer

ESG Reporting Lifecycle Management with Large Language Models and AI Agents 37
Thong Hoang, Mykhailo Klymenko, Xiwei Xu, Shidong Pan, Yi Ding, Xushuo Tang, Zhengyi Yang, Jieke Shi David Lo

Split Architecture for Limited Bandwidth and Storage Capacity 45
Espen Oen Lie, Rogardt Heldal, Keila Lima, Patrizio Pelliccione

Edge-Based Standing-Water Detection via FSM-Guided Tiering and Multi-Model Consensus 53
Oliver Larsen, Mahyar T. Moghaddam

Architecture as Code in Industry: A Multiple-Case Empirical Study 61
Valeria Pontillo, Alessio Bucaioni, Italo Carnevale, Amleto Di Salle, Lorenzo Manzoni, Patrizio Pelliccione Francesco Maria Sprotetto

Reusability in MLOps: Trade-offs of Using Ports and Adapters to Build an ML-Enabled System for the Maritime Domain 69
Renato Cordeiro Ferreira, Aditya Dhinavahi, Rowanne Trapmann, Willem-Jan van den Heuvel

Rethinking the Architecture of an Operational Wildfire Simulator System: The Case of Propagator 71
Mirko D'Andrea, Hina Shahid, Vincenzo Scotti, Alessandro Burastero, Giuseppina Cappelluti Martina De Sanctis, Amleto Di Salle, Diego Perez-Palacin, Raffaela Mirandola

Exploring the Reasoning Depth of Small Language Models in Software Architecture: A Multidimensional Evaluation Framework Towards Software Engineering 2.0 79
Ha Vo, Nhut Tran, Khang Vo, Phat T. Tran-Truong, Son Ha

Team-Driven Architecture Evaluation with LASR 87
Stefan Toth, Stefan Zörner

From Legacy to High-Flow: How Large Enterprises Scaled Real-Time Data Integration Through a Contextual Architecture Approach 94
Marcelo Santana Costa, Douglas Dalo, Alexandre Marti, Jéssica Cristina Tironi, Ricardo A. Costa César França

Enhancing Banking Operations Using Design Science Research and Speech-To-Text Processing With Google Gemini 96
Marcelo Santana Costa, Jéssica Cristina Tironi, Vitor Profeta, Raphael V. de Castro, César França Ricardo A. Costa, Rodrigo Araújo

A Safety-Orchestrated Architecture for Large Language Models-Based Remote Healthcare Guidance 104
Minh Long Hoang, Guido Matrella, Paolo Ciampolini

AI Engineering Blueprint for On-Premises Retrieval-Augmented Generation Systems 108
Nicolas Weeger, Jakob Winkler, Annika Stiehl, Jóakim Von Kistowski, Christian Uhl, Stefan Geißelsöder

Towards Architectural Ontology Reuse Recommendation Service for Software Engineering 112
João Luiz Rebelo Moreira, Luís Ferreira Pires, Esra Bektaş

Monoliths to Microservices: Evidence from Cloud Computing Pedagogy 116
Naomi Unkelos-Shpigel, Natali Levi-Soskin

Toward Evidence-Based Architectural Decision Making Over Fragmented Knowledge 120
Shunsuke Mori, Kohei Nishio, Taku Inagawa, Hironori Washizaki, Naoyasu Ubayashi

Mining Architectural Decisions and Trade-Offs from ADRs with LLMs at Scale 124
Ruoyu Su, Matteo Esposito, Davide Taibi, Valentina Lenarduzzi

Software Engineering Practices for Advanced Therapy Medicinal Products 126
Pablo Oliveira Antonino, Jessica Mariño Salguero, Rolf Hendrik van Lengen

Software Architecture Meets Agentic AI 129
Karthik Vaidhyanathan, Henry Muccini

Designing Multi-Agent Systems: From Classical to Modern Approaches 131
Indika Kumara, Cristoffer Leite, Georgios Manias, Damian Andrew Tamburri, Willem-Jan van den Heuvel

Architecting Human Oversight in AI-Enabled Software Systems: From Principles to Implementation 133
George Manias, Vrettos Moulos, Anna Gatzioura, Tanja Zdolsek Draksler, Alenka Gucek Dimosthenis Kyriazis

AI-Augmented Microservices Architecture: Rapid Design and Validation of an Authentication Service Using GitHub Copilot 135
Renjith Ramachandran

Toward an Architectural Blueprint to Observe Sustainability in and by Software Systems 137
Klervie Toczé, Andrei Dragomir, Vincenzo Stoico, Patricia Lago

ArchBench: Benchmarking Generative-AI for Software Architecture Tasks 142
Bassam Adnan, Aviral Gupta, Sreemaee Akshathala, Karthik Vaidhyanathan

Visualizing the Runtime Behavior of Microservices 147
Supun Wijayakoon, Filip Zamfirov, Tomas Molina, Jacob Krüger, Michel R. V. Chaudron

Modeling Sustainability for Autonomous Cyber-Physical Systems 152
Khawlah Al-shubati

Design Decision Guidance for Human-Centric Ai Systems 157
Shaurya Gaur

A No-Code Composable Pipeline for Holistic Microservice Assurance 163
Shakthi Weerasinghe

Understanding and Managing Architecture Technical Debt Through Cross-Artifact Integration 169
Saagarika Gosu

Identifying Confounders in Cloud-Native Technology Adoption: Evidence from Kubernetes 175
Ruoyu Su, Matteo Esposito, Andrea Janes, Davide Taibi, Valentina Lenarduzzi

The Dependency Black Hole 180
Ehsan Zabardast, Bhuwan Paudel, Javier Gonzalez-Huerta

A Trust Governance Architecture for Ethical-Aware Autonomous Systems in Smart Ecosystems 185
Dasa Kusnirakova, Mashal Afzal Memon, Marco Autili, Bruno Rossi

A Pattern Language for Resilient Visual Agents 190
Habtom Kahsay Gidey, Alexander Lenz, Alois Knoll

Rethinking MVC Violations as Security-Aware Architectural Smells in Android Applications 195
Mohamed Sylla, Karim Elish

Design-First Governance for Reliable AI-Assisted Software Development 200
Fatma Meawad

Decentralized Proof-Of-Location for Content Provenance: Towards Capture-Time Authenticity 205
Eduardo Brito, Fernando Castillo, Amnir Hadachi, Ulrich Norbisrath, Jonathan Heiss

Towards Semantic Interoperability in Digital Twins: An Ontology Based Approach 213
Kevin Bouwmeester, Felipe Xavier, Loek Cleophas, Michel R.V. Chaudron

Digital Twins for Security-Based Assurance of Edge-Cloud Software - a Data Platform Approach 217
Hong-Linh Truong, Phu Nguyen

APDT: A Digital Twin for Assessing Access Point Characteristics in a Network 221
Dharmineni Sree Yashaswinee, Y. Raghu Reddy

RAD-AI: Rethinking Architecture Documentation for AI-Augmented Ecosystems 229
Oliver Aleksander Larsen, Mahyar T. Moghaddam

Human-in-the-Loop in MLOps: A Systematic Review on Balancing Automation and Human Oversight 237
Louisa Klüter, Dóra Kementzey, Faezeh Amou Najafabadi, Keerthiga Rajenthiram, Ilias Gerostathopoulos

Toward Behavior-Based Adaptive Decision-Making Systems for Cognitive Cities 245
Rawan Alraddadi, Mohammad Alshayeb, Sajjad Mahmood, Mahmood Niazi

Rewriting the Maze: Developer Experiences Moving from Bare Metal C to Lingua Franca in Embedded CPS 253
Maciej Jakub Grasela, Rahime Yılmaz, Krzysztof Sierszecki

Identity-Centric Architectural Approach for Decentralized Personal Data Exchange 258
Silvio Langer, Fabiano Hessel, Jorge Marx Gómez

BitSov: A Composable Bitcoin-Native Architecture for Sovereign Internet Infrastructure 266
Oliver Aleksander Larsen, Rasmus Thorsen Larsen, Mahyar T. Moghaddam

Towards a Reference Architecture for Blockchain-Based Document Management Systems 270
Hauke Precht, Joschka Andreas Hüllmann, Jorge Marx Gómez

The One-Token Model: a Measurement Architecture for Energy and Carbon-Aware Ai Inference 278
Mathieu Francois, Raj Banerjee, Kumail Amiruddin

Feature Degradation for Frugality: A Case Study of Overleaf Application 286
Lucas Gazeau, Thomas Ledoux

An Empirical Study on How Architectural Topology Affects Microservice Performance and Energy Usage 294
Irena Ristova, Vincenzo Stoico

Scaling Sustainability: A Carbon-Aware Reasoning Framework for Multi-Tenant Software-as-a-Service 302
Samuele Giussani, Mauro Caporuscio, Diego Perez-Palacin

Using Budgets to Reduce Application Emissions 310
Leo Wilhelm Lierse, Mahyar Tourchi Moghaddam, Sebastian Werner

Toward a Sustainable Software Architecture Community: Evaluating Icsa's Environmental Impact 318
Mahyar Tourchi Moghaddam, Mina Alipour, Torben Worm, Mikkel Baun Kjærgaard

A Curated List of Open-Source Software-Only Energy Efficiency Measurement Tools: A Github Mining Study 326
Manuela Bechara Cannizza, Michel Albonico

Carbon-Aware Governance Gates: An Architecture for Sustainable GenAI Development 334
Mateen A. Abbasi, Tommi J. Mikkonen, Petri J. Ihantola, Muhammad Waseem, Pekka Abrahamsson Niko K. Mäkitalo

The Need for a Green ICT Reference Framework 339
Marco Aiello, Mina Alipour, Antonio Brogi, Rafael Capilla, Lidia Fuentes, Ilche Georgievski Gabriele Gianini, Mahyar Tourchi Moghaddam, Monica Vitali, Sebastian Werner

CellFlow: A Tool for Automatic Jupyter Notebook Workflow Visualization 342
Selin Coban, David Kierdorf, Çağatay Akpınar, Horst Lichter

An Efficient Approach for Model Recovery From Image Containing Diagrams 346
Gopal Shendge, Lisha Ahuja, Chandan Prakash, Pavan Kumar Chittimalli, Ravindra Naik

CAKE: Cloud Architecture Knowledge Evaluation of Large Language Models 354
Tim Lukas Adam, Phongsakon Mark Konrad, Riccardo Terrenzi, Florian Girardo Lukas, Rahime Yilmaz Krzysztof Sierszecki, Serkan Ayvaz

An Empirical Analysis of LLM-Driven Refactoring for Microservices 362
Abdullah Huzeyfe Köse, Rahime Yılmaz, Feza Buzluca

Model-Driven Development of Data Space-Enabled Asset Administration Shell Digital Twins 370
Quang-Duy Nguyen, Guéréguin Der Sylvestre Sidibe, Marcos Didonet Del Fabro, Fabien Baligand

Towards a Reference Architecture for Delta-Based Cross-Organizational Collaboration Preserving IP 378
Thomas Weber Weber, Thorben Willimek, Sebastian Weber, Nathan Hagel, Erik Burger, Ralf Reussner

Automating Change Propagation in Software Applications for Heterogeneous Computing 386
Simone Bauco, Guglielmo De Angelis, Alessandro Pellegrini

Modeling and Recovering Hierarchical Structural Architectures of ROS 2 Systems from Code and Launch Configurations Using LLM-Based Agents 394
Mohamed Benchat, Dominique Briechle, Raj Chanchad, Mitbhai Chauhan, Meet Chavda, Ruidi He Dhruv Jajadiya, Dhruv Kapadiya, Nidhiben Kaswala, Daniel Osterholz, Andreas Rausch, Meng Zhang

Towards Continuous Round-Trip Engineering of Architectural Performance Models 402
Alp Toraç Genç, Martin Armbruster, Manar Mazkatli, Anne Koziolek

Pynguin-MVP: Automated Test Generation for Lightweight Architectural Validation 410
Anuja Sawant, Muhammad Abdul Basit Ur Rahim

Towards an LLM-Powered Expert System for AAS-Based Product Digital Twin Development 414
Quang-Duy Nguyen, Kunal Suri, Guéréguin Der Sylvestre Sidibe

Generative AI in Safety Engineering: Transforming HARA Artifacts into DDI Models 420
Pascal Gerber, Marc Lorenz, Joshua Frey, Jan Reich, Markus Schweizer, Josef Kolatschek

Reliability of Large Language Models for Design Synthesis: An Empirical Study of Variance, Prompt Sensitivity, and Method Scaffolding 426
Rabia Iftikhar, Andreas Rausch

GARMA: Generative Architectural Resource Demand Estimation for Microservice Applications 434
Maximilian Hummel, Dominik Fuchß, Sophie Corallo, Nathan Hagel, Minakshi Kaushik, Jan Keim Ralf Reussner, Heiko Koziolek

Automating Domain-Driven Design: Experience with a Prompting Framework 442
Tobias Eisenreich, Husein Jusic, Stefan Wagner

Bridging Formal Syntax and LLM Semantics: Extracting Knowledge Graphs for Legacy Code Understanding 450
Henrik Thillmann, Bernhard Rumpe, Andreas Biesdorf

Architecture Without Architects: How AI Coding Agents Shape Software Architecture 456
Phongsakon Mark Konrad, Tim Lukas Adam, Riccardo Terrenzi, Serkan Ayvaz

Towards Leveraging LLMs to Generate Abstract Penetration Test Cases from Software Architecture 462
Mahdi Jafari, Rahul Sharma, Sami Naim, Christopher Gerking, Ralf Reussner

Designing Adaptive Digital Nudging Systems with LLM-Driven Reasoning 470
Tiziano Santilli, Mina Alipour, Mahyar Tourchi Moghaddam

SAGAI-MID: A Generative AI-Driven Middleware for Dynamic Runtime Interoperability 478
Oliver Aleksander Larsen, Mahyar T. Moghaddam

Architecting Cognitive Federated Digital Twins with LLM Agents for Privacy-Preserving Adaptive Systems 486
Gizealew Alazie Dagnaw, Henry Muccini

Describing Agentic AI Systems with C4: Lessons from Industry Projects 494
Andreas Rausch, Stefan Wittek

From Agent-First to Deterministic-First: Architectural Design Decisions for Engineering Data Extraction 500
Nicolai Schoch, Nafise Eskandani

Willma: A Production-Ready Inference Platform for Generative AI in the Dutch Education Sector 506
Duncan Kampert, Thomas van Osch, Bas van der Vlies, Jaap Dijkshoorn, Xavier Álvarez-Farré

Towards Architecting LLM-Based Systems 513
Giovanna Belasco, Pedro Delgado, Vinicius dos Santos, Rick Kazman, Elisa Yumi Nakagawa

Understanding Architectural Approaches for MLOPS Systems 520
Pedro Delgado, Giovanna Belasco, Damian Tamburri, Elisa Yumi Nakagawa

Knowledge-Guided Architecture Documentation Recovery with Evidence Grounding and Traceability: A Registered Report (Stage 1) 527
Moustapha El Outmani, Ahmad Hatahet, Daniel Alexander Osterholz, Andreas Rausch Manthan Venkataramana Shenoy

A Reference Architecture for Agentic Hybrid Retrieval in Dataset Search 535
Riccardo Terrenzi, Phongsakon Mark Konrad, Tim Lukas Adam, Serkan Ayvaz

Expert Perspectives on Designing the Architecture of Software-Defined Electric Vehicles 542
Rodi Jolak, Christian Casanova, Efi Papatheocharous, Ellen Scott, Iraklis Symeonidis, Pontus Svenson

A Survey on Risk-Adaptive Approaches in Autonomous Ecosystems 549
Rui Zhang, Dávid Halász, Dimitri Van Landuyt

Towards Collecting Large-Scale Vehicular Sensor Data for Open Access 557
Benjamin Kämä, Olli Timonen, Nicklas Stafford, Jere Lotvonen, Otto Kalliokoski, Aleksi Kanerva Prabhash Rathnayake, Sameera Gamage, Aleksi Vuorinen, Siva Ariram, Ekaterina Gilman, Ella Peltonen

Evolvable Knowledge Graph Demonstration for Route Planning: Learning Through Utilization 561
Anna Teern, Hassan Khattak, Syed Jawad Akhtar, Nada Elgendy, Pertti Seppänen, Tero Päivärinta

Learning from a Big-Bang Integration Failure in a Distributed Reactive System: An xOps Industry Case Study 569
Alessandro Aneggi, Xiaozhou Li, Andrea Rosani, Andrea Janes, Oswald Lanz

Operationalize Self-Managing Machine Learning Systems with a Generalizable Knowledge-Driven Architecture 577
Anders Launer Bæk-Petersen, Mahyar T. Moghaddam, Jakob Hviid, Mikkel Baun Kjærgaard

Domain-Aware Software Architecture: Implementing Url Endpoint Health Monitoring With Domain-Specific Languages 585
Aneta Poniszewska-Marańda, Mateusz Idec

Ops Patterns for Education: Aligning Software Engineering Curricula with Emerging xOps Architectures 593
Nuno Pombo