ACM MIDDLEWARE 2021

Conference Guide
for Attendees

22nd ACM/IFIP International Middleware Conference

middleware-conf.github.io/2021

UNIVERSITÉ LAVAL

ÉTS Le génie pour l'industrie

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Foreword

The Middleware conference debuted in 1998, and has since evolved into the premier event for presenting and discussing research and innovations in the field of middleware systems. Middleware technologies focus on the design, implementation, deployment, and evaluation of distributed systems, platforms and architectures for computing, storage, and communication.

The following volume contains the proceedings of the research track of the 22nd ACM/IFIP Middleware Conference, which was held virtually on December 6th-10th 2021. This proceedings is divided into two parts: the first cycle (which was published in August), and the second cycle (which was published in December). Separate volumes are available for the other tracks and workshops.

The 2021 edition of Middleware introduced changes to the submission and review process to further enhance the scope and quality of papers at the conference. Starting this year, Middleware will feature twice-a-year submission cycles that will provide more flexibility to authors to submit research papers as they become ready. In addition to the traditional rigorous review and discussion phases, a new "revise-and-resubmit" process will allow authors to respond to reviewer requests for changes and clarifications with an improved submission that will undergo another round of reviewing. This is the first edition of the conference to adopt this new format and process, with previous editions having only a single submission and review cycle. We are delighted to report that in the first cycle, 8 papers were accepted, out of 22 total submissions. During the second cycle, 21 papers were accepted, out of 81 total submissions. Many of these papers went through a thorough shepherding process resulting in a high-quality program. We are thankful to the TPC members who invested significant time with multiple review and shepherding cycles.

The selected papers present the latest results in both traditional and emerging research areas, including big data, data intensive computing, cloud computing and data centers, serverless architectures, programming abstractions, event-based systems, transactions, monitoring, fault tolerance, security and privacy.

The conference also ran the ACM Artifact Review and Badging process. Authors were invited to submit supporting materials to be made publicly available as source materials in the ACM Digital Library. This submission was voluntary, but encouraged, and did not influence the decision regarding paper acceptance. A separate committee conducted the Artifact Review and Badging process. Out of eight accepted papers in the first round review, two papers submitted their code and dataset for artifacts evaluation and both of them were awarded "Artifacts Available" badge. In the second round review, 12 papers submitted their artifacts (code and datasets) for evaluation, out of which six submissions were granted "Artifacts Available" badges and the other six were granted both "Artifacts Available" and "Artifacts Evaluated (Functional)" badges. The Artifacts Evaluation Committee acknowledges the support from https://www.chameleoncloud.org/ where most of the artifacts were hosted and evaluated.

In these challenging times, the Middleware Conference would not have been possible without the dedication and coordinated effort of a large team of volunteers and the support of the research and industrial communities at large. The organizers wish to thank all authors who submitted their work during both cycles of a new format, and all the PC reviewers who worked very hard to provide insightful comments and shepherding feedback to the authors.

Finally, we wish to express our sincere appreciation to the Steering Committee and the rest of the organizing team, which consists of the industry chairs, workshop chairs, tutorial chair, poster and demo chairs, doctoral symposium chairs, publicity chairs, sponsorship chairs, artifact evaluation chair, proceedings chairs, registration chair, test-of-time award chair, local chairs, and web chairs. We greatly appreciate your effort towards organizing this year's Middleware conference!

Dr. Nalini Venkatasubramanian (PC Co-chair)
University of California - Irvine, United States

Dr. Luís Veiga (PC Co-chair)
Instituto Superior Técnico (U.Lisboa) & INESC-ID, Portugal

Dr. Abdelouahed Gherbi (General Co-chair)
École de technologie supérieure, Canada

Dr. Kaiwen Zhang (General Co-chair)
École de technologie supérieure, Canada

Zoom Instructions*

ACM Conference 1 is inviting you to a scheduled Zoom meeting.

Topic: ACM Middleware 2021 (All Sessions and Workshops)

Time: Dec 6, 2021 09:00 Eastern Time (US and Canada)

Dec 6, 2021 09:00

Dec 7, 2021 09:00

Dec 8, 2021 08:45

Dec 9, 2021 09:00

Dec 10, 2021 09:00

Please download and import the following iCalendar (.ics) files to your calendar system.

Daily: https://acm-org.zoom.us/meeting/tJEqcuyhrTkiH9HakTxLDwI4-rmz6_mj0Fon/ics?icsToken=98tyKuCtqT4vE9eXuByCRowMB4_4Z_PztnpHgvp1nRTRGwx3dSqie_BPKORAHdKA

Join Zoom Meeting

https://acm-org.zoom.us/j/95755932855?pwd=WEJDc3hSU3BjWG81ZUlIN2ZSckVmdz09

Meeting ID: 957 5593 2855

Passcode: 904398

One tap mobile

+13462487799,,95755932855#,,,,*904398# US (Houston)

+16465588656,,95755932855#,,,,*904398# US (New York)

Dial by your location

+1 346 248 7799 US (Houston)

+1 646 558 8656 US (New York)

+1 669 900 6833 US (San Jose)

+1 253 215 8782 US (Tacoma)

+1 301 715 8592 US (Washington DC)

+1 312 626 6799 US (Chicago)

Meeting ID: 957 5593 2855

Passcode: 904398

Find your local number: https://acm-org.zoom.us/u/abCJ2gW17A

Join by Skype for Business

https://acm-org.zoom.us/skype/95755932855

** These instructions may change during the course of the conference, please subscribe to our Slack channel to receive the latest updates*

Attendee Guide

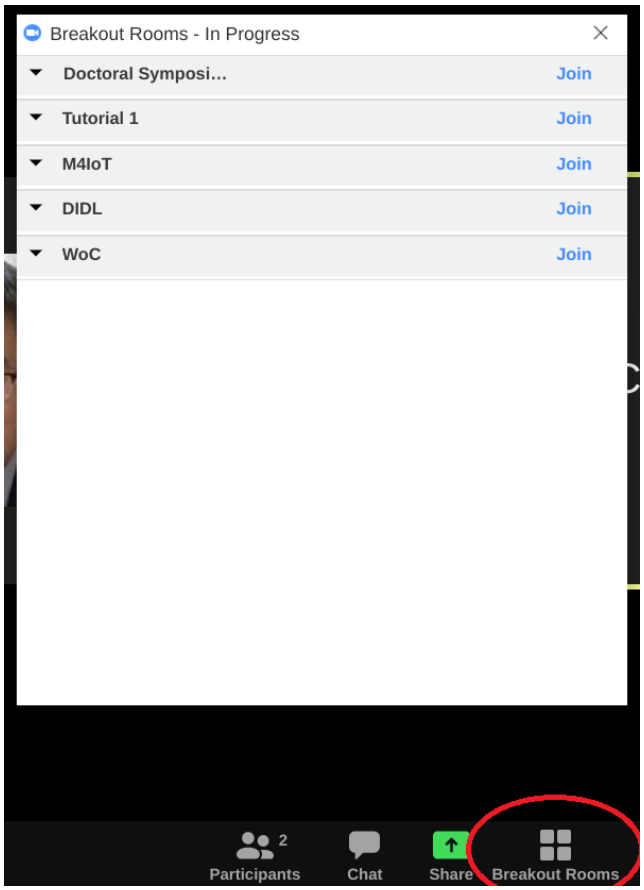
Program details: The up-to-date program details can be found on our website: https://middleware-conf.github.io/2021/full-program/. The main conference starts on Wednesday, while Monday and Tuesday are reserved for pre-conference activities (workshops, tutorials, and the doctoral symposium). For program details for workshops, please visit their respective webpages.

Time zones: All time zones indicated on the website are in Eastern Standard Time (EST), which is the time on the east coast of North America and the local time of the conference. Alternatively, the times can be displayed in Central European Time (CET). For other conversions, please refer to: https://www.timeanddate.com/worldclock/converter.html?iso=20211206T140000&p1=165 (Enter your city, and change the date and time desired according to the program)

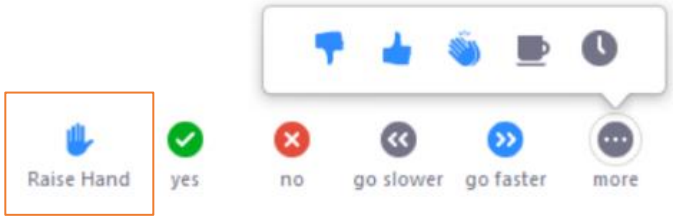
Slack: Slack is the official discussion and announcement platform for MW 2021. You are strongly encouraged to join Slack to discuss and connect with other attendees. Slack channels are categorized by session according to the online program. Furthermore, we will announce each session before it starts live on the Slack. You can also ask your questions for specific papers there asynchronously, and they will be relayed to the authors who can respond to them during the live session. The link to the Slack is: **https://join.slack.com/t/middleware-2021/shared_invite/zt-zbjh4hg6-pmOQU1hPX9zWk1umz8L5uw**

Zoom: We will be using Zoom for the entire week-long program. Presentations will be broadcasted live on at the pre-defined times according to the program. Furthermore, each presentation will be followed by a Q&A session (see the next section for more details on how to ask questions). To minimize disruption, please mute your microphone when you are not speaking. For convenience, we are aiming to use a single Zoom link for the entire conference, as it is a single-track program for the main conference, and breakout rooms for the pre-conference events (see next section). Please refer to the previous section for instructions. Furthermore, the conference may be re-broadcasted on YouTube to provide an alternate mechanism only for those unable to use Zoom.

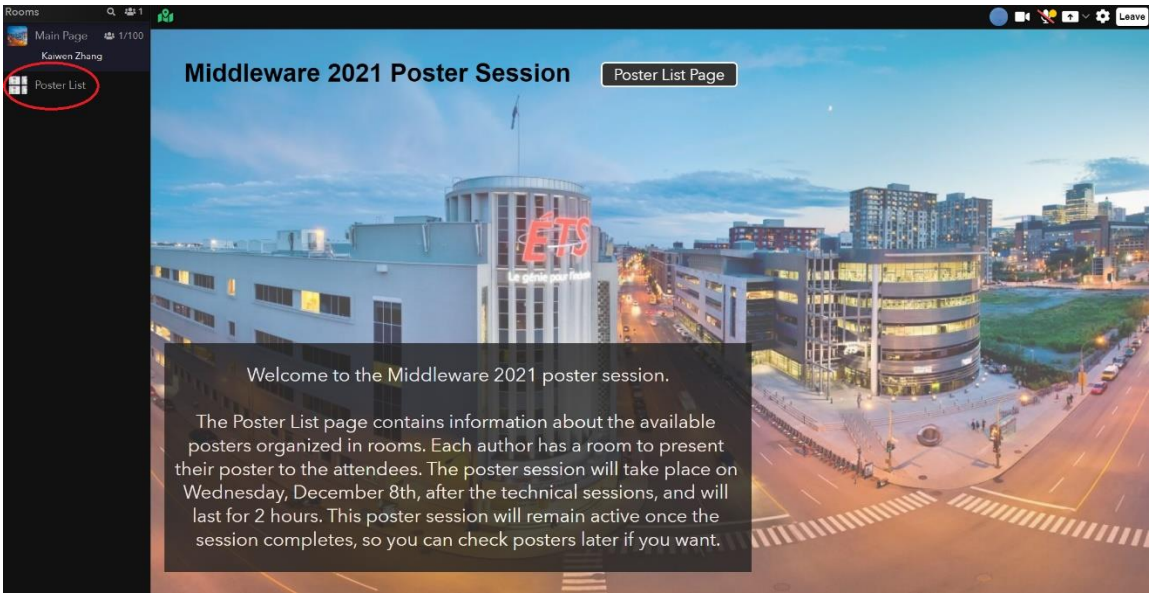
Workshops, Doctoral Symposium and Tutorials**: We will use a single Zoom link for all tracks for Monday and Tuesday.** The Zoom meeting will be enabled in “breakout” mode. Each parallel session will be occurring within a single breakout room. Upon joining the room, please click the “Breakout Room” button immediately to join your desired session (See image). For more information please consult the Zoom website: https://support.zoom.us/hc/en-us/articles/115005769646-Participating-in-breakout-rooms



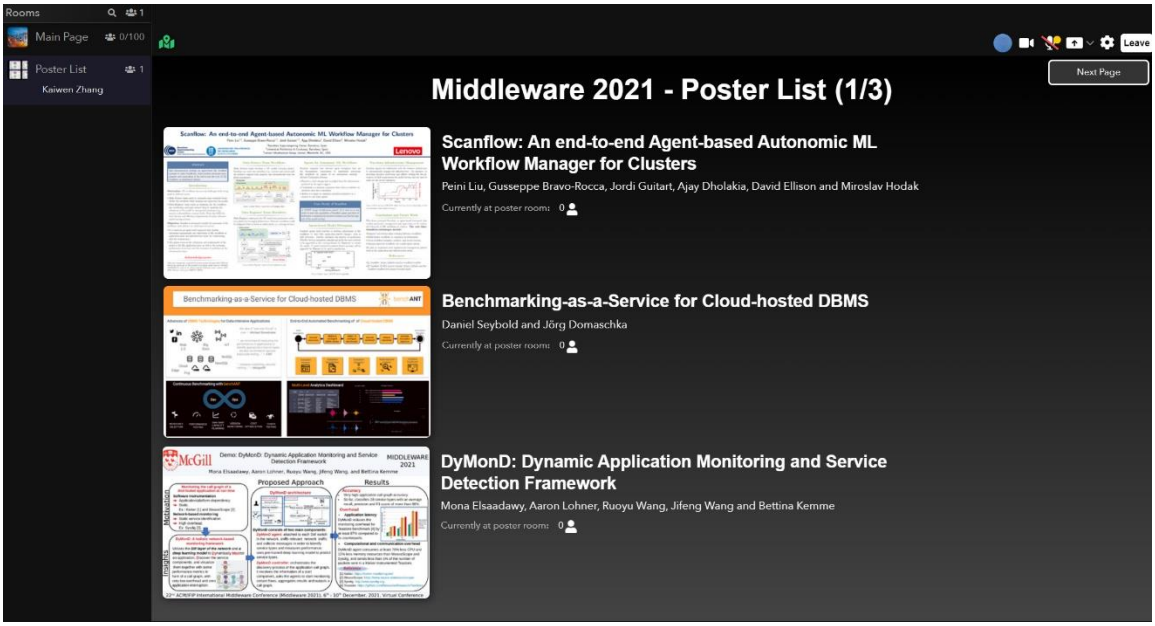
Asking questions**:** We encourage you to discuss and ask questions with our speakers. We provide three methods to ask questions: (1) Asynchronously, in the Slack channel corresponding to the interested paper, (2) Through the Zoom chat, when the live session is taking place, (3) Through the "raise hand" feature in Zoom, in which case you will be prompted to open your mic (and camera) and ask your question directly to the presenter (see the figure below). This feature is usually found in the Participants window. For more information please visit the Zoom website: https://support.zoom.us/hc/en-us/articles/115001286183-Nonverbal-feedback-during-meetings#h_50523139-7bac-403b-9c59-1755ada65ad9



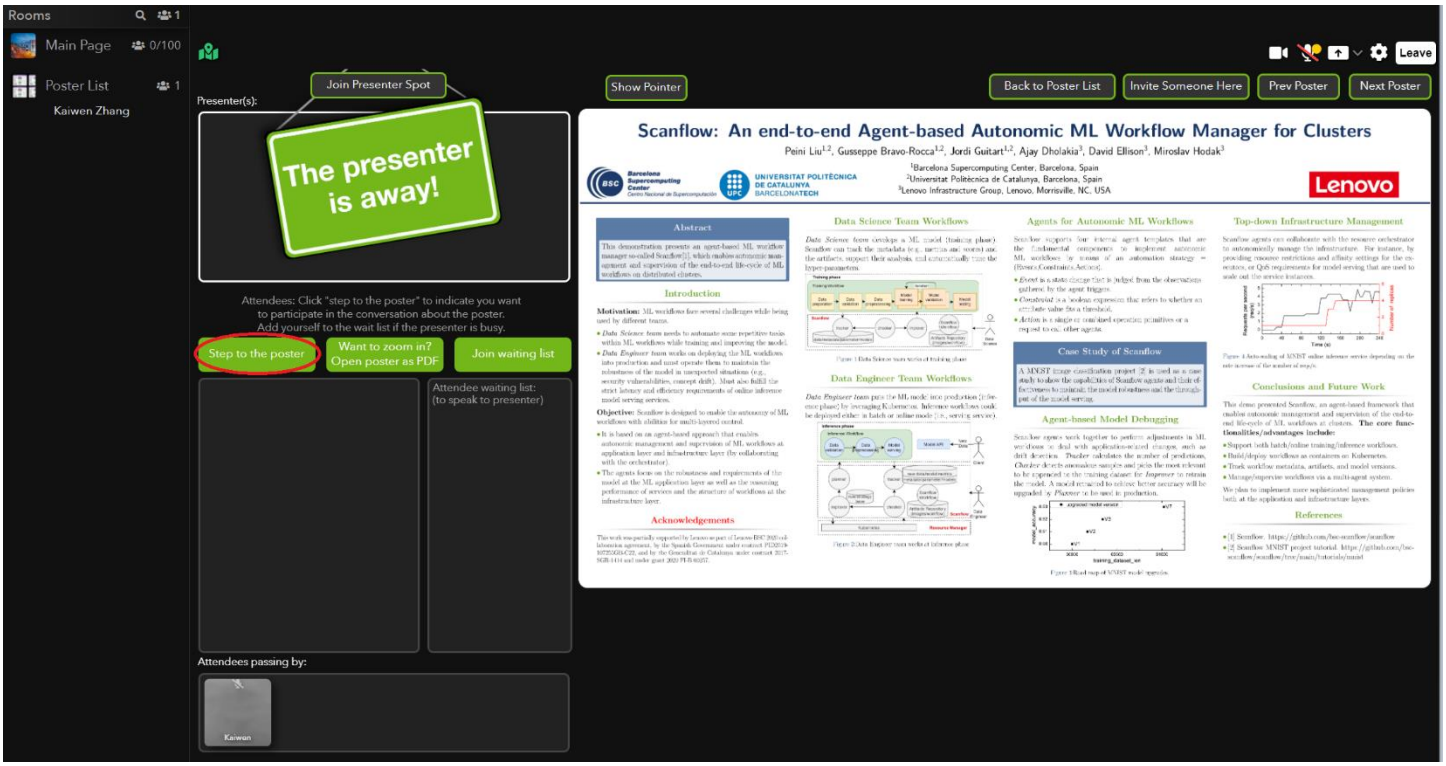
Demos and posters session (ohyay): This year, we will be using the **ohyay platform** for demos and posters on wednesday**. The link is:** https://ohyay.co/app.html?wsid=ws_Tx198e1b. Ohyay is an interactive platform which faithfully simulates small group conversations attendees may have with a demo and poster presenter. Once you click on the link, you will land in the Main page:



From there, simply click on the **Poster List** to access the list of posters:



From there you can access any poster you wish to read and interact with the presenter:



If you wish to discuss with the presenter, simply click the button “Step to the poster”. If you wish to visit another poster, simply click on “Poster List” again. If you need any help using ohyay, please contact us on the #help channel in Slack. The ohyay link will be online the entire week should you wish to visit other posters later.

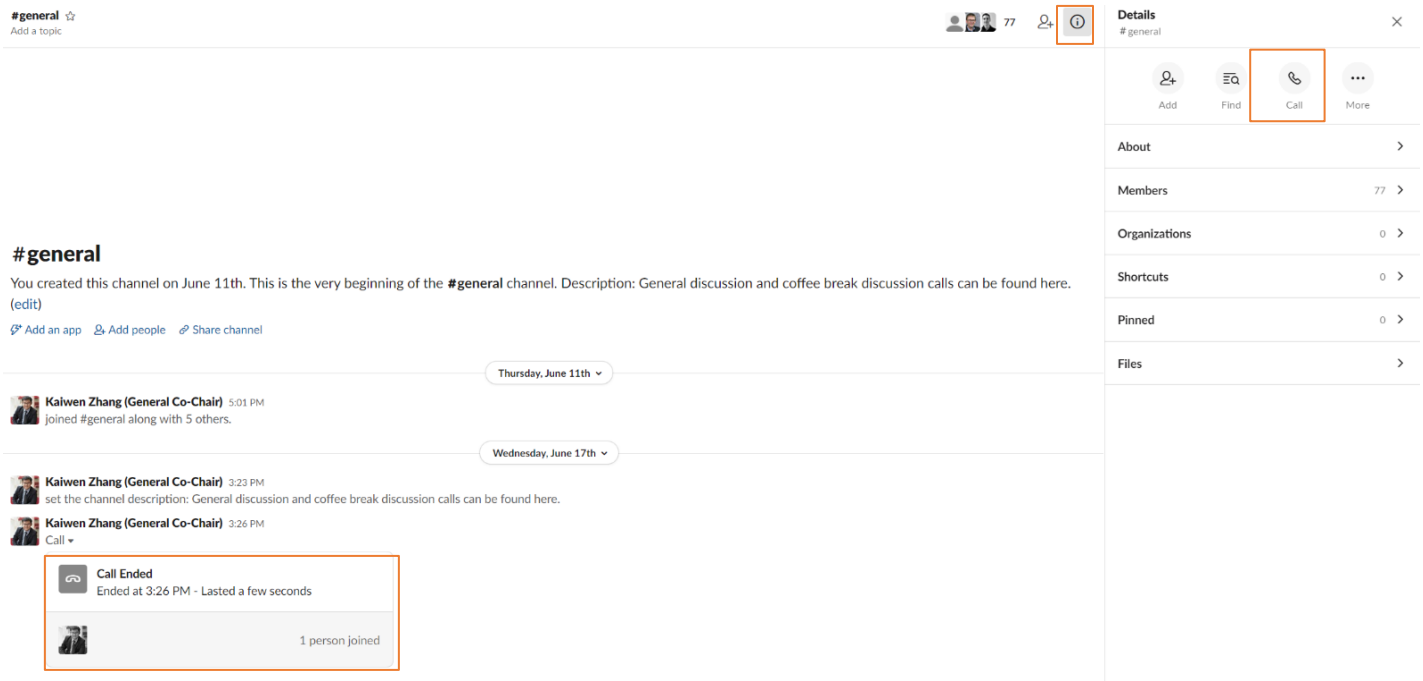
Awards**:** Middleware 2021 will grant 3 awards: the Best Paper award, Best Student Paper award, and the Test-of-Time award. The Best Paper awards will be announced during the business meeting, and the Test-of-time during its respective session on Friday.

Support team: A support team, composed of student volunteers, will provide assistance during the conference. If you need any help during the conference, you can address your concerns to @volunteers in Slack and visit the #help channel.

Business meeting: MW 2021 will conclude with the business meeting on Friday. This meeting is open to all and provides an opportunity to communicate your feedback and suggestions towards improving future editions of Middleware. You are encouraged to participate. Prior to the meeting proper, we will announce the winners of the Best Paper awards.

Discussion and lunch breaks**:** Each day contains several coffee breaks and one lunch break. You are encouraged to use this time to engage in informal “hallway” discussion, as you would in a physical conference. You can use Slack channels/calls to do so.

Slack calls**:** Slack supports group calls with up to 15 persons. The calls can be either in private by directly contacting another person using direct messages, or publicly in a channel. We recommend using either the #general channel or the session channel corresponding to the discussion you wish to have. To access this feature, click the info button, and click call. Your call will then be displayed in the chat and will allow others to join it. Please see the figure below.



Diversity and inclusion**:** Middleware 2021 supports those who promote inclusivity and follows ACM guidelines to promote a safe community for all. We take great care to ensure the conference will be inclusive and respectful of the diverse make-up of our community. If you have any concern, you are encouraged to contact the organizing team or the support team in order to take immediate actions. The Middleware conference adheres strictly to the ACM policies against discrimination and harassment.

CALL FOR PAPERS

ACM Transactions on Storage

The Leading Journal in Storage Research and Practice

Editor-in-Chief

Sam H. Noh, UNIST (Ulsan National Institute of Science and Technology), Republic of Korea

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Information For Contributors

ACM Transactions on Storage (TOS) is the premier journal for publishing advancements in storage research and practice. The field of storage is one of the cornerstones for data availability. Storage is a broad and multidisciplinary area that comprises network protocols, resource management, data backup, replication, recovery, devices, security, theory of data coding, densities, and energy-efficiency. Designing and developing storage systems continues to be a challenge due to both software and hardware heterogeneity in enterprise environments and data centers. ACM TOS seeks to fill an important void as a peer-reviewed comprehensive journal focused on storage.

The scope of ACM TOS includes, but is not limited to, the following areas:

- Storage Systems Architecture, Design, and Validation
- Storage Networking
- Storage Resource Management
- Replication, Backup and Recovery
- Operating System and Application Support
- Information Lifecycle Management (ILM)
- Storage Media and Devices
- Theory

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ACM Transactions on Modeling and Computer Simulation

The Archival Source for Quality Research

ACM Transactions on Modeling and Computer Simulation (TOMACS) provides a single archival source for the publication of high-quality research and developmental results referring to all phases of the modeling and simulation life cycle. The subjects of emphasis are discrete event simulation, combined discrete and continuous simulation, as well as Monte Carlo methods.

The use of simulation techniques is pervasive, extending to virtually all the sciences. TOMACS serves to enhance the understanding, improve the practice, and increase the utilization of computer simulation. Submissions should contribute to the realization of these objectives, and papers treating applications should stress their contributions vis-á-vis these objectives.

Scope
The scope of papers published in TOMACS includes, but is not limited to, the following general areas:

- Modeling Methodology
- Model Execution
- Random numbers and objects
- Experiment design and simulation analysis
- Support for conducting simulation experiments, and simulation studies
- Verification, validation, and accreditation of models
- Interplay between other areas of computer science and simulation
- Advanced Applications

On the ACM Digital Library: *https://dl.acm.org/tomacs*
ISSN: 1049-3301 **eISSN:** 1558-1195

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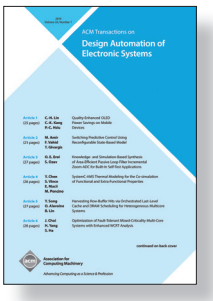
Visit tomacs.acm.org for further information or to submit your manuscript.

ACM Journals on Design Methods for Smart and Connected Systems

Featured journals: TODAES, JETC, TECS, TCPS, TIOT & TOSN

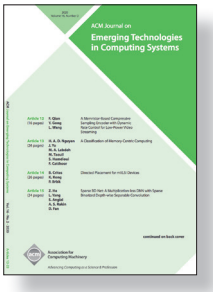
ACM Transactions on Design Automation of Electronic Systems (TODAES)



ACM Transactions on Design Automation of Electronic Systems is a premier ACM journal in design and automation of electronic systems. It publishes innovative work documenting significant research and development advances on the specification, design, analysis, simulation, testing, and evaluation of electronic systems, emphasizing a computer science/engineering orientation. Both theoretical analysis and practical solutions are welcome. Topics include, but are not limited to: Architecture- and System-Level Design and Automation; Circuit- and Logic-Level Design and Automation; Emerging Technology and Platform based Design and Automation; Machine Learning for Design Automation and Design Automation for Machine Learning; Physical Design and Design for Manufacturability; Reliability, Verification and Test; and Security for Electronic Systems.

https://todaes.acm.org

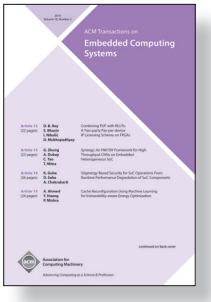
ACM Journal on Emerging Technologies in Computing Systems (JETC)



The *ACM Journal of Emerging Technologies in Computing Systems* invites submissions of original technical papers describing research and development in emerging technologies in computing systems. Major economic and technical challenges are expected to impede the continued scaling of semiconductor devices. The journal provides comprehensive coverage of innovative work in the specification, design analysis, simulation, verification, testing, and evaluation of computing systems constructed out of emerging technologies and advanced semiconductors. Topics include: Logic Primitive Design and Synthesis; System-Level Specification, Design and Synthesis; Software-Level Specification, Design and Synthesis; Mixed-Technology Systems; and Interactions of Emerging Technologies and Applications.

https://jetc.acm.org

ACM Transactions on Embedded Computing Systems (TECS)



The design of embedded computing systems, both the software and hardware, increasingly relies on sophisticated algorithms, analytical models, and methodologies. *ACM Transactions on Embedded Computing Systems* aims to present leading works relating to the analysis, design, behavior, and experience with embedded computing systems. TECS welcomes original research articles, industry design papers, perspectives, tutorials, and surveys that help advance the field by addressing the key challenges.

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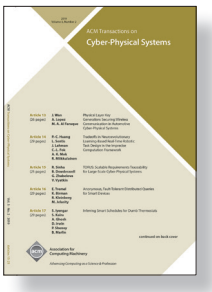
ACM Journals on Design Methods for Smart and Connected Systems

Featured journals: TODAES, JETC, TECS, TCPS, TIOT & TOSN

ACM Transactions on Cyber-Physical Systems (TCPS)



ACM Transactions on Cyber-Physical Systems publishes high-quality original research papers and survey papers that have scientific and technological understanding of the interactions of information processing, networking and physical processes. TCPS covers Computation Abstractions, System Modeling and Languages, System Compositionality and Integration, Design Automation and Tool Chains, Trustworthy System Designs, Resilient and Robust System Designs, and Human in the Loop. Application domains covered by TCPS include, but are not limited to: Healthcare, Transportation, Automotive, Avionics, Energy, Living Space, and Robotics.

https://tcps.acm.org

ACM Transactions on Internet of Things (TIOT)

ACM Transactions on Internet of Things is a new ACM journal that publishes novel research contributions and experience reports in several research domains whose synergy and interrelations enable the IoT vision. TIOT focuses on system designs, end-to-end architectures, and enabling technologies, and on publishing results and insights corroborated by a strong experimental component. All submissions are expected to provide experimental evidence of their effectiveness in realistic scenarios (e.g., based on field deployments or user studies), and the related datasets. The submission of purely theoretical or speculative papers is discouraged, and so is the use of simulation as the sole form of experimental validation. Experience reports about the use or adaptation of known systems and techniques in real-world applications are equally welcome.

https://tiot.acm.org

ACM Transactions on Sensor Networks (TOSN)

ACM Transactions on Sensor Networks serves as a central, archival venue for the interdisciplinary sensor network research community. It covers research contributions that introduce new concepts, techniques, analyses, or architectures, as well as applied contributions that report on development of new tools and systems or experiences and experiments with high-impact, innovative applications. The Transactions places special attention to contributions on systemic approaches to sensor networks.

https://tosn.acm.org

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