

CASCON 2018 Proceedings

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IBM Advanced Studies
IBM Canada Lab

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Message from the Conference Chair

CASCON 2018

Message from the Conference Chair

CASCON 2018

Welcome to CASCON 2018!

For the past 28 years, IBM Centre for Advanced Studies (CAS) has been hosting the Annual International Conference on Computer Science and Software Engineering. This is a testimony to our commitment to Academia and to the Applied Research in Canada. CASCON is well established yearly international meeting of minds that is unique in nature by being a purely academic conference sponsored by industry. The quality of papers, workshops, expo posters, and presentations showcased at CASCON is proof of the hard work of many academics and IBMers.

CASCON's theme follows the latest trends in Computer Science and Software Engineering, and this year is Think: Cognitive Computing, Big Data, Cloud, Security and Privacy. We see these technological challenges being experienced in all the fields of modern society, with a tremendous impact on our lives. We are excited to have four thought-provoking keynote presentations, 23 technical and 10 position paper presentations, 29 workshops, and 81 exhibits. As with previous years, the CASCON proceedings, which include the technical papers, position papers, and detailed workshop abstracts, are also available online in the ACM Digital Library.

CASCON is an engaging 3 days conference offering a program of exciting sessions. Similar to previous years we have the regular and position paper tracks in the mornings, followed by keynotes around lunch time, workshops mid afternoons and Expo receptions to close off the days. Please plan to attend the Awards Ceremonies as well as the CAS picture happening right after lunch on the first day of the conference.

None of these would be possible without our dedicated community of Academics and IBMers. As conference chair, I am fortunate to be immersed in an exceptional team with professionals that go above and beyond their daily jobs and dedicate a considerable amount of time for the success of our conference. They are the role models I will always look up to and thank them all for their thought leadership, passion and commitment.

I would like to start by thanking the CASCON Steering Committee (Prof. Marin Litoiu, Prof. Kelly Lyons, Mr. Marcellus Mindel, Prof. Hausi Müller, Mrs. Tinny Ng, Mr. Joe Wigglesworth, Prof. Ken Wong and Prof. Ying Zou for all the planning and guidance that shaped this conference, and many more to come.

Special thanks go to our sponsor IBM Center for Advanced Studies and Mr. Marcellus Mindel, Head, IBM CAS for the continuous support, for always finding ways to give back to our Canadian computer science and software engineering community.

An academic conference is not possible without the dedication that the Program Chairs commit prior to the conference day and is always reflected in the quality of papers that are accepted. Mr. Wang Chen from IBM and particularly Professor Dorina Petriu from Carleton University have made a positive impact on the content this year, working tirelessly to orchestrate the paper

submissions, revisions, and paper awards for our conference. Big thank you for the 71 Program Committee members who diligently peer-reviewed the papers and selected the top candidates; for the Best Paper Selection Committee and for the Most Influential Paper Award Committee. I would like to also thank Prof. Guy-Vincent Jourdan (Publication Chair) and Mr. Andrew Jaramillo (Conference Proceedings Editor) who were the force driving the proceedings and ensuring that all content was filtered, approved, and published in the ACM Library.

CASCON Workshops are always well received and well attended, many of which fill all their spots within a few days after the workshop registration is opened. Prof. Hausi Müller and Mrs. Tinny Ng acted this year as Workshop Chairs. I would like to thank them both for preparing a program consisting of an astonishing selection of top workshops. Additionally, I would also like to thank the Workshop Selection Committee members for reviewing the materials and making sure that the best workshops are accepted.

CASCON Technology Expo is the collaboration hub of the conference. With 81 exhibits and presentations, with new content daily and space designed to stimulate collaboration, it is one of the biggest orchestration challenges that was exceptionally handled by Prof. Kenneth Kent and Dr. Robert Enenkel, the Expo Chairs.

Special thanks to our IBM CAS Canada Team, Mr. Dennis Buttera, Mrs. Jennifer Collins, Mr. Bailey Duncan, Mr. Andrew Jaramillo, Mrs. Maria Gallaher, Ms. Clare Kim, Mr. Hanoor Manan, Mrs. Tinny Ng, and Mr. Temitayo Oyelowo for all the heavy lifting that goes behind the scenes and often is unnoticed but without which nothing is possible. Thank you to Mr. Rodney D'Silva and Mr. Alan Heighway for taking care of all the CASCON network related tasks.

I would like to thank all the CASCON volunteers and Prof. Marin Litoiu (Volunteer Chair) for all the help during the conference.

Finally, I would personally like to thank all the persons that submitted content to our conference and all our CAS Collaborators for promoting and contributing to this event, and last but not least, **a big thank you to all CASCON participants** for all the idea exchanges and brilliant discussions that happen during the conference.

I wish you all a wonderful and productive time at CASCON 2018!



Iosif-Viorel (Vio) Onut, Ph.D.,



*Conference Chair | CASCON 2018
Principal R&D Strategist | Centre for Advanced Studies | IBM Canada Lab
Adjunct Professor | University of Ottawa*

Message from the Program Co-Chairs

CASCON 2018

Message from the Program Co-Chairs

CASCON 2018

Welcome to CASCON 2018, the 28th Annual International Conference on Computer Science and Software Engineering hosted by the IBM Advanced Studies (CAS)!

The theme of CASCON 2018 is Think: Cognitive Computing, Big Data, Cloud, Security and Privacy. This year we explore the research challenges as well as the economic and societal impacts of areas including cognitive computing, big data analytics, cloud computing, security and privacy through 4 thought-provoking keynote presentations, 23 technical and 10 position paper presentations, 29 workshops and 81 exhibits (posters, demos and short talks). Our keynote presenters who will enlighten the audience on different topics are Steven Astorino, IBM, VP of Development, Hybrid Cloud, z Analytics and Canada Lab Director; Jessica Pointing, Quantum Computing Researcher at Stanford, Harvard, MIT; Walid Rjaibi, IBM, CTO, Data Security; and John Tsotsos, Distinguished Research Professor of Vision Science at York University and Director of the Centre for Innovation in Computing.

This year we received a total of 91 paper submissions, 68 full papers and 23 position papers from twenty different countries in North America, South America, Europe, South and East Asia and Africa. We accepted 23 full papers and 10 position papers. Acceptance rate for full papers was 33.8% and for position papers 43.5%. Each paper was rigorously reviewed by three members of the 71-member Program Committee and eight extra reviewers, resulting in a very high-quality program. The program is organized into the following sessions: Big data analytics, Cognitive computing, Model-Driven Engineering, Software Product Lines, Cloud Systems Mgmt, Machine Learning, Resource mgmt, Security and privacy, Adaptive systems, Compiler development, Microservices, Blockchain and Healthcare. As in previous years, the CASCON 2018 proceedings are archived for ease of access in the ACM Digital Library.

The Technology Expo provides an excellent opportunity to experience emerging research results and leading-edge products and developing product areas. For the third year in a row, CASCON 2018 features very short PechaKucha style presentations to showcase the posters and exhibits to the entire CASCON audience.

The 29 workshops at CASCON 2018 are wonderful forums for presenting, discussing, and debating issues, problems, ideas, technology gaps, works-in-progress, and gaining hands-on experience with new product directions.

One of the most gratifying aspects of the CASCON planning process is the selection of the Best Paper, Best Student Paper, and Most Influential Paper awards. This year, the

Best Paper Award goes to authors Kenny Wehling, David Wille , Christoph Seidl and Ina Schaefer for their paper, "Reducing Variability of Technically Related Software Systems in Large-Scale IT Landscapes." The Best Student Paper Award is given to Amine Barrak , Le An and Marc-André Laverdière for their paper, "Just-in-time Detection of Protection- Impacting Changes on WordPress and MediaWiki " co-authored with their supervisors Foutse Khomh and Ettore Merlo. The Most Influential Paper from CASCON 2008 is awarded to Giuliano Antoniol, Kamel Ayari, Massimiliano Di Penta, Foutse Khomh and Yann-Gaël Guéhéneuc for their paper, "Is it a Bug or an Enhancement? A Text-based Approach to Classify Change Requests".

We are very grateful to many people for their help and support in organizing CASCON 2018. First of all, we thank all the authors of technical papers, workshop proposals and technology expo submissions. We thank the hard-working members of the CASCON 2018 Program Committee for their dedication to excellence in completing the reviews and engaging in online discussion of the papers. We also recognize the workshops and technology showcase committees, as well as the awards committees, for their hard work. We thank the entire CASCON 2018 organizing team: Hausi Müller and Tinny Ng who coordinated the workshop selection and program, Kenneth Kent and Robert Enenkel who orchestrated the technology expo selection and program, Andrew Jaramillo and Guy-Vincent Jourdan who assembled the CASCON 2018 proceedings and Harnoor Manan who kept the CASCON 2018 website up-to-date.

We wish you a wonderful time at CASCON 2018 and hope you will find time to enjoy the opportunities for networking in the stimulating social events.



Dorina Petriu
Carleton University
CASCON 2018 Program Co-Chair

A handwritten signature in black ink, appearing to read "D. Petriu".



Wang Chen
IBM Canada Ltd.
CASCON 2018 Program Co-Chair

A handwritten signature in black ink, appearing to read "Wang Chen".

Message from the Most Influential Paper
of 2008 Award Committee Co-Chairs

CASCON 2018

Message from the Most Influential Paper of 2008 Award Committee Co-Chairs

CASCON 2018

Since 2010, CASCON has presented a “Most Influential Paper” (MIP) Award to a paper published a decade earlier at CASCON. The MIP Award recognizes lasting contributions and impact to theory and practice.

The Most Influential Paper for 2008 was selected by the MIP Selection Committee:

- Dorina Petriu, Carleton University (co-chair)
- Wang Chen, IBM Canada Ltd. (co-chair)
- Marsha Chechik, University of Toronto
- Ken Wong, University of Alberta

The committee followed a selection process similar to that established in previous years. Each MIP Award Committee member was provided with links to all of the CASCON 2008 papers in the ACM Digital Library, their citation and download statistics as reported by the ACM Digital Library, as well as the Google Scholar citation counts for each paper. The committee then focused on the top five papers selected on the basis of the gathered statistics. Each member reviewed the short-listed papers and their associated bibliographic data according to the following criteria adapted from the ACM SIGSoft Impact Project and the Journal of the American Society for Information Science (JASIST) published by Wiley:

A. Impact (50%)

- A.1. Contributions that have had substantial impact in industry or academia;
- A.2. Results that are directly useful to IBM products, processes, methods or developers;
- A.3. Usefulness to practicing information professionals (e.g., applicability, timeliness, scope, problem-solving value, product value);
- A.4. Societal or scientific/technical significance of the topic or problem investigated or expounded;
- A.5. Technology transition approaches that have worked well;

B. Professional Merit (50%)

- B.1. Creativity and originality, as reflected in new insights, interpretations, facts, innovations, methods, applications (e.g., stimulating, informative, or enlightening);
- B.2. Scientific and professional quality of the research, review, development work, methods of inquiry (e.g., competent, valid, or replicable);
- B.3. Scholarship embodied in the presentation, explanations, interpretations, and discussions (e.g., researched, documented or balanced).

On behalf of the CASCON 2018 MIP Award Committee, we are happy to announce the winners of the CASCON “Most Influential Paper of 2008” Award:

Giuliano Antoniol (Polytechnique de Montréal), Kamel Ayari (Polytechnique de Montréal at the time), Massimiliano Di Penta (University of Sannio), Foutse Khomh (Université de Montréal at the time) and Yann-Gaël Guéhéneuc (Université de Montréal at the time) for their CASCON 2008 paper entitled

“Is it a Bug or an Enhancement? A Text-based Approach to Classify Change Requests”.

The winning paper raises the problem of misclassified issue reports—that is, reports classified as bugs, but actually referring to non-bug issues (e.g., request for an enhancement). The authors used text mining techniques on the descriptions of reported bugs to predict whether a report is either a real bug or a feature request. They used techniques like decision trees, logistic regression and also a Naïve Bayesian classifier for this purpose. The performance of this approach on three cases (Mozilla, Eclipse and JBoss) indicated that reports can be predicted to be a bug or an enhancement with between 77% and 82% correct decisions.

This is a highly influential paper, not only because it has an impressive number of citations, but many of its citing papers have numerous citations themselves. The work continues to be cited today. The paper articulates a particular insight into an area that took off and is heavily cited in the mainstream publications.

We congratulate the authors for their outstanding contribution, and we thank the MIP Award Committee for their reviews and deliberations.



Dorina Petriu
Carleton University
CASCON 2018 Program Co-Chair

A handwritten signature in black ink, appearing to read 'D. Petriu'.



Wang Chen
IBM Canada Ltd.
CASCON 2018 Program Co-Chair

A handwritten signature in black ink, appearing to read 'Wang Chen'.

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CASCON 2018

Organizing Committee

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IBM Canada Ltd.
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Most Influential Paper of 2008

CASCON 2018

Full Papers

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Position Papers

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Workshops

CASCON 2018

Cognitive Computing

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Cloud Computing

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Systems

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Security

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Data and Analytics

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Other

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Hands-On: Easy Microservices Application Development with Microclimate

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- Elson Yuen
- Eric Peters
- Rajiv Senthilnathan
- Maysun Jamil Faisal
- Steven Hung

Microclimate is a brand-new, cloud native development environment that offers a complete, end-to-end development experience for Microservices. Since Microclimate has been designed with a focus on containerization, it can run anywhere from your local laptop, to an IBM Cloud private cluster. With Microclimate, you can create or import Java, Node.js, or Swift applications into the development environment, and using any editor of your choosing, you can quickly start development on your application in a containerized environment. Through a process called Rapid Iteration, Microclimate will quickly detect any changes that occur in your project and determine the minimal and best course of action to update your application. From there, using our integrated DevOps pipeline, you can deploy your application with Jenkins to a live ICP cluster. With these features, Microclimate offers a fully featured development experience that many other environments don't offer today. During the hands-on workshop, we will give you an introduction to Microclimate, starting from product installation to write Microservices applications to run on Microclimate in a Docker environment. You will get hands on experiences to create new applications and import existing applications into Microclimate. For developers, a crucial part of the development cycle is the ability to quickly develop and test applications changes on a running application. The develop-deploy-test-repeat cycle must be as short as possible in order to prevent lost developer productivity due to deployment downtime. You will be given the opportunity to experience this rapid iterative development support by developing Java and JavaScript applications in this workshop. Finally, during the workshop we will introduce the integrated DevOps pipeline functions provided that allows you get into production fast with a preconfigured DevOps pipeline and deploy application to IBM Cloud Private (ICP). We will also show you the diagnostic services that helps you to do problem determination in production.

Build better APIs with the next generation of API testing and monitoring

Chairs / Speakers

- Ivy ho
- JJ Tang
- Jisoo Lee
- Amirali Jafarian
- Peter El-koreh
- Biniam Admikew
- Wendy Hua
- Nora Abdelgadir

The proliferation of APIs across all facets of life continued to explode and grow. The quality of the APIs and the data retrieval become a critical factor. In this workshop, we will walk you through a new no-code way of validating the API quality. How you can validate the API payload accuracy. How you can get new insights into API data from real business use-cases in different sectors. You will witness the innovation of the API test and monitor approach in this workshop.