Best Student Paper
Joe Wigglesworth, Victor R Basili, Krystelenia Tatsi, Kostas Kontogiannis, Kelly Lyons

Best Paper
Joe Wigglesworth, Victor R Basili, Xiang Jiang, Stan Matwin, Kelly Lyons

Most Influential Paper
Donna Dillenberger, Bill O’Farrell, Jon Bennett, Yuan Guan, Marcellus Mindel

27th Annual International Conference on Computer Science and Software Engineering

The theme of CASCON 2017 is the cognitive era: data, systems, and society. This year we aim to explore the economic and societal impacts of cognitive systems. Join us for CASCON 2017 and be exposed to thought-provoking keynotes, original researchers and emerging topics papers, stimulating workshops, and our famous CASCON Expo.

CASCON 2017 Program Guide
CASCON 2017 Flyers
CASCON 2017 Proceedings
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CASCON 2017 Program Guide  
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CASCON 2017 Proceedings
Project of the Year

Amente Bekele, Dr. James R. Green, Marcellus Mindel, Dr. Shermeen Nizami, Yasmine Souley Dosso
Other winner(s): Akihiro Hayashi

Best Expo Exhibit

Maria Patrou, Susan Landau, Marcellus Mindel, Kenneth B. Kent, Gerhard W. Dueck

Expo People's Choice Exhibit

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Showcase your research. Share your knowledge.

We are currently accepting research and position papers, as well as workshops and expo proposals in the following areas:

- Computer Science
- Cloud Computing
- Software Engineering
- Database technologies
- Software Applications and data science
- Compiler Technologies
- Cognitive and Smart Systems
- Data and Analytics
- Cyber and Physical Systems
- Machine Learning
- Internet of Things (IoT)
- Service Systems
- Security
- Blockchain
- DevOps
We also encourage papers, workshop, and expo proposals that describe applications of computing in the following areas:

- Healthcare
- Finance
- Design
- Smart cities
- Innovation
- Commerce
- Smart grid and energy
- Wearable and social computing
- Connected and driverless cars

Innovative use of products, platforms and solutions including (but not limited to):

- Bluemix
Schedule

CASCON 2017: The Cognitive Era: Data, Systems and Society

November 6 - 8

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Full Schedule  Monday, Nov 6  Tuesday, Nov 7  Wednesday, Nov 8
## Full Paper Presentations

### Schedule

**Session Name:** Modeling  
**Day:** Mon 8:30 - 10:00  
**Room:** Evergreen
Session Chair: Alexei Lapouchnian

**A Framework To Extract Personalized Behavioural Patterns of User's IoT Devices Data**
- Pradeep Venkatesh, Daniel Alencar Da Costa, Ying Zou and Joanna Ng

**A Performance Predictive Model for Emergency Medicine Residents**
- Ali Ariaeinejad, Reza Samavi, Teresa Chan and Thomas Doyle

**Improving Garbage Collection-Time String Deduplication**
- Konstantin Nasartschuk, Kenneth Kent, Stephen MacKay, Aleksander Micic and Charlie Gracie

---

Session Name: Algorithms
Day: Mon 8:30 - 10:00
Room: Jasmine
Session Chair: Ken Kent

**Accelerating Poly1305 Cryptographic Message Authentication on z14**
- Bill O'Farrell, Umme Salma Gadiwala, Christopher Anand and Curtis D'Alves

**Classification Algorithms and How to Distribute Them**
- Shadi Khalifa, Patrick Martin and Rebecca Young

**Incremental change propagation from UML software models to LQN performance models**
- Taghreed Altamimi and Dorina Petriu

---

Session Name: Cognitive Computing
Day: Mon 8:30 - 10:00
Room: Primrose
Session Chair: Eleni Strouila

A Probabilistic Approach to Model User Preferences for Recommender Systems - A Case Study on IBM Watson Analytics
- Parisa Lak, Can Kavaklioglu, Mefta Sadat, Martin Petitclerc, Graham Wills, Ayse Bener and Andriy Miranskyy

Chatbots as Assistants: An Architectural Framework
- Adam Di Prospero, Nojan Norouzi, Marios Fokaefs and Marin Litoiu

Using IBM Watson Cloud Services to Build Natural Language Processing Solutions to Leverage Chat Tools
- Sarah Packowski and Arun Lakhana

Session Name: Systems Mgmt
Day: Tue 8:30 - 10:00
Room: Butternut/Holly
Session Chair: Sarah Nadi

Barriers to Adoption of Information Technology in Healthcare
- Christina Christodoulakis, Azin Asgarian and Steve Easterbrook

Cloud meets classroom: Experience Report on Using IBM Bluemix in a Software Architectures Course
- Nikita Sokolov and Nazim Madhavji

Concern-Oriented Incremental Modelling
- Omar Alam and Jörg Kienzle

Session Name: Systems Mgmt with Cloud
Day: Tue 8:30 - 10:00
Room: Evergreen
**Session Chair:** Marin Litoiu

**Session Name:** Machine Learning
**Day:** Tue 8:30 - 10:00
**Room:** Primrose
**Session Chair:** Hausi Müller

- **Assisting Developers Towards Fault Localization by Analyzing Failure Reports**
  - Krystalenia Tatsi and Kostas Kontogiannis

- **Online Detection of Anomalous Applications on the Cloud**
  - Arnamoy Bhattacharyya, Harsh Singh, Seyedali Jokar Jandaghi and Cristiana Amza

- **SLO Request Modeling, Reordering and Scaling**
  - Panagiotis Patros, Kenneth Kent and Michael Dawson

---

**Session Name:** Java Performance
**Day:** Tue 8:30 - 10:00
**Room:** Jasmine

- **Learning Event Count Models with Application to Affiliation Ranking**
  - Tam Nguyen and Ebrahim Bagheri

- **TrajectoryNet: An Embedded GPS Trajectory Representation for Point-based Classification Using Recurrent Neural Networks**
  - Xiang Jiang, Erico N de Souza, Ahmad Pesaranghader, Baifan Hu, Daniel Silver and Stan Matwin

- **Transfer Learning in Neural Networks: An Experience Report**
  - Mark Shtern, Rabia Ejaz and Vassilios Tzerpos
Position Paper Presentations

**Session A**

**Day:** Mon 14:10 - 14:50

**Room:** Jasmine

**Session Chair:** Vio Onut

- **Privacy as an Asset**
  - Jarek Gryz

- **Designing User Engagement for Cognitively-Enhanced Processes**
  - Alexei Lapouchnian, Zia Babar and Eric Yu
**Room:** Evergreen  
**Session Chair:** Dorina Petriu

**Deployment Specification Challenges in the Context of Large Scale Systems**  
- Miguel Jiménez, Norha M. Villegas, Gabriel Tamura and Hausi Müller

**IoT for Remote Wireless Electrophysiological Monitoring: Proof of Concept**  
- Laura Pravato and Thomas E. Doyle

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**Room:** Primrose  
**Session Chair:** Kelly Lyons

**Session:** C  
**Day:** Mon 14:10 - 14:50  
**Room:** Primrose  
**Session Chair:** Kelly Lyons

**Quantifying Duplication to Improve Data Quality**  
- Yu Huang, Fei Chiang, Albert Maier, Martin Petitclerc, Yannick Saillet, Damir Spisic and Calisto Zuzarte

**Reconstructing databases: Instance-based Structure Discovery using Reconstructability Analysis**  
- Periklis Andritsos

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**Room:** Jasmine  
**Session Chair:** Jeremy Bradbury

**Session:** D  
**Day:** Tue 14:10 - 14:50  
**Room:** Jasmine  
**Session Chair:** Jeremy Bradbury

**Foodie Fooderson: A Conversational Agent for the Smart Kitchen**  
- Prashanti Angara, Kirti Agarwal, Miguel Jiménez, Ulrike Stege, Sudhakar Ganti, Hausi Müller, Harshit Jain and Roshni Jain
Session: E  
Day: Tue 14:10 - 14:50  
Room: Evergreen  
Session Chair: Nazim Madhavji

- Federating Natural Language Question Answering Services of a Cognitive Enterprise Data Platform  
  - John Boyer

Elascale: Auto-scaling and Monitoring as a Service  
  - Hamzeh Khazaei, Byungchul Park, Rajsimman Ravichandiran, Hadi Bannazadeh, Ali Tizghadam and Alberto Leon-Garcia

On Challenges of Cloud Monitoring  
  - William Pourmajidi, Tony Erwin, John Steinbacher and Andriy Miranskyy

Session: F  
Day: Tue 14:10 - 14:50  
Room: Primrose  
Session Chair: Farhana Zulkernine

- Software Variability Through Static Polymorphism: Challenges and Open Problems  
  - Samer Al Masri, Sarah Nadi, Nazim Uddin Bhuiyan and Matthew Gaudet
## Schedule

**CASCON 2017: The Cognitive Era: Data, Systems and Society**

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<td>Registration 8:00 - 17:00</td>
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<td>Expo Setup</td>
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<td>8:30 - 10:00</td>
<td>Regular paper tracks Modeling, Algorithms, Cognitive Computing</td>
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<td>Nutrition Break</td>
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| 10:15  | 10:15 - 11:30 Conference Kick-Off (10 mins)  
  Keynote #1 (45 mins) - Victor R Basili  
  Paper Awards (20 mins) |
| 11:30  | 11:30 - 13:00 Lunch  
  11:45 - 12:45 Strategic Foresight Workshop  
  11:45 - 12:45 Expo |
<p>| 13:00  | 13:00 - 14:00 Keynote #2 - We Create The Future (60 mins) |
| 14:00  | Nutrition Break                                                      |
| 14:10  | 14:10 - 14:50 Position Paper Parallel Tracks A, B, C |</p>
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<td>15:00 - 17:00 Workshops</td>
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<td>17:00</td>
<td>Expo Reception / PechaKucha Expo Presentations / Short Talks</td>
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<td>8:30 - 10:00&lt;br&gt;Regular paper tracks Systems Mgmt, Systems Mgmt with Cloud, Machine Learning, Java Performance</td>
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<td>10:15</td>
<td>10:15 - 11:30&lt;br&gt;Keynote #3 (45 mins) - Donna Dillenberger&lt;br&gt;Most Influential Paper (MIP) Presentation (30 mins)</td>
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<td>11:30</td>
<td>11:30 - 13:00&lt;br&gt;Lunch&lt;br&gt;11:45 - 12:45&lt;br&gt;Sponsored Challenge&lt;br&gt;City of Kingston / Queen's University (in CC 1/2)&lt;br&gt;11:45 - 12:45&lt;br&gt;Expo</td>
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<td>13:00</td>
<td>13:00 - 14:00&lt;br&gt;Keynote #4 (45 mins) - Nora Young&lt;br&gt;CAS Awards (15 mins)</td>
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# Schedule

**CASCON 2017: The Cognitive Era: Data, Systems and Society**

**November 6 - 8**

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<td>IBM STEM 4 Girls Workshop (in Expo Area)</td>
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<td>11:45</td>
<td>Women in Technology 11:45 - 12:45 (in CC 1/2)</td>
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<td>Keynote #6 (45 mins) - Susan Landau CAS Awards (15 mins)</td>
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Speakers

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The Evolution of Empirical Software Engineering

10:15 AM EST, November 6

Although most scientific and engineering disciplines view empiricism as a basic element of their discipline, that view has not been the tradition in software engineering. There has not been the symbiotic relationship between the development of theories and engineering concepts and empirical studies that test and evolve those theories and concepts.

In this talk, I present my personal observations of the evolution of empirical software engineering based upon a set of example studies in which I was involved. It begins in the early 1970's and discusses the evolution of the kinds of questions that were asked, the kinds of empirical studies performed, the empirical methods being used, the growth of the community in terms of number of publications and size of the empirical research community. I break the discussions into four phases, starting with the 70's and going on to the 80s, 90s, and 2000s. For each era, I characterize the situation, the relevant particulars of each selected study, and what was learned. I will offer a set of criticisms as to where we have fallen short, suggestions on what we need to do, and the barriers we face in achieving a true engineering discipline that can continue to evolve our knowledge and demonstrate the impact of the research.
2017, a milestone year for Canada, also marks IBM Canada's 100th anniversary, and the 50th anniversary of the IBM Canada Lab. In this session, we turn our gaze ahead. As Alan Kay has famously said, "the best way to predict the future is to invent it." Join us as we ponder some of the ways emerging technical and social trends will shape the future of data, systems and society in the cognitive era. Eight voices will guide us through the insights and implications inspired by their lunch at the Strategic Foresight Workshop. We hope you'll leave with an expanded vision of possible futures, and the intent to make space for the future you create.

- Katherine Atkinson, mHealth R&D Lead, Ottawa Hospital Research Institute
- Ngoni Chipere, Planning and Development Officer, University of the West Indies Open Campus
- Tim Cresswell, Vice President, Ameresco Integrated Green Utility
- Elizabeth Dubois, Assistant Professor, University of Ottawa
- Karl Lu, Director of Outreach, Communications Research Centre Canada
Cognitive Blockchain

10:15 AM EST, November 7

In this session I'll be talking about blockchain and real use cases with governments and companies. We'll go through how analytics and cognitive technologies help clients with compliance, logistics planning, prediction, cost savings, dispute resolution and provenance.
Seeing the Forest and the Trees: Surviving and Thriving in the Coming Data Boom

1:00 PM EST, November 7

Sure, ‘data is the new oil’ as the saying goes. But what we risk losing in that Big Data abstraction is the fact that, directly or indirectly, much of that data comes from us, and is about us. By looking at the human dimension of the current data boom, we can more fully understand not just the technical implications of the Big Data era, but the cultural implications. After all, technological change is also social change, and just as the Industrial Revolution remade economy and society, so will the Data Revolution. The choices we make now will affect the world our grandchildren inherit, in the same way the choices previous generations made created the economy, culture, and politics of the industrial age. Drawing on years of interviews with leading technologists and thinkers on digital culture, as
well as her own research, Nora Young explores the opportunities and challenges of the coming data boom: how we can build smarter societies and more engaged citizens, while remaining alive to the inherent dangers and power imbalances this new data world presents.

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Beyond the Walls: How to Build a Better Communities Using Advanced Technologies and Social Entrepreneurs

10:30 AM EST, November 8

If we have all the resources we need to create a world where everyone can thrive, then why haven’t we done it yet? We are living in the midst of a large scale global shift resulting from recent economic collapse and burgeoning mass adoption of advanced technologies - or what some call the 4th Industrial Revolution. This is a time of change and uncertainty, and it is also a time of great opportunity for
businesses, individuals and communities. Learn how advanced technologies are empowering social entrepreneurs to tackle some of humanities biggest challenges and how you can be part of their success stories. This talk will also feature a sneak preview of a special collaboration co-created by Kind Village for the new Canada Science and Technology Museum.

Susan Landau
Worcester Polytechnic Institute
Professor of Social Science and Policy Studies

Cybersecurity, national security, law and policy

1:00 PM EST, November 8

The encryption issue has bedeviled government policymakers for forty years. With encryption increasingly the default for communications and devices, law enforcement and intelligence agencies find that surveillance is harder, and ability to conduct such investigations is growing "dimmer." At the same time, we see increasingly severe cyberattacks. In December 2015, highly skilled hackers attacked three power distribution companies in western Ukraine, shutting off electricity to almost a quarter million people for six hours. North Korean agents attacked Sony Pictures Entertainment in an effort to prevent the distribution of a film mocking Kim
Jong-un. And then Russian attackers sought to disrupt the 2016 US and 2017 French elections through cyber. What's the right encryption policy in a world that has ISIS using encrypted communications to instruct potential terrorists and Russia uses cyber methods to attack Western democracies? I argue our only answer is securing data and devices---even though that makes investigations more difficult.
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CASCON 2017 Proceedings
Paper schedule is now available
Congratulations to our Winners!

Best Paper

TrajectoryNet: An Embedded GPS Trajectory Representation for Point-based Classification Using Recurrent Neural Networks

Paper Authors

Baifan Hu
Dalhousie University

Biography

Winner's Testimonial

It is truly an honour to see our work be recognized and received this prestigious award from CASCON. My deepest gratitude goes to all of my coauthors for the excellent hard work and dedication.
Winner's Testimonial

CASCON provides an invaluable opportunity to present our work - a recurrent neural network model for trajectory classification. I am very pleased to receive this award, and this wouldn't have been achieved without the hard work and commitment of my coauthors.

Stan Matwin
Professor and Canada Research Chair
Winner’s Testimonial

This is, to the best of our knowledge, the first paper showing how to apply vector embeddings to trajectory data. The paper presents the idea, its implementation, and the results that significantly improve the state of the art solution on the standard human mobility data benchmark dataset (GeoLife). The work is the topic of the PhD thesis of Xiang Jiang, co-supervised by S. Matwin and D. Silver.

Ahmad Pesaranghader

Research Assistant and Ph.D.
Fellow at Institute for Big Data Analytics
Dalhousie University and Institute for Big Data Analytics
Winner's Testimonial

"Having our 'novel ideas' recognized by CASCON, this prestigious international venue that offers a valuable hub for sharing innovative ideas, gives academic-based labs and institute like Institute for Big Data Analytics the deserved chance to shine. Shout-outs to both sides!"

Daniel L. Silver
Professor and Director of the Acadia Institute for Data Analytics
Acadia University

Winner's Testimonial

It was terrific to work with Xiang as a Masters student at Acadia and I have been fortunate to be able to co-supervise him with Stan Matwin at Dalhousie. Xiang has a great desire to learn, develop new ideas and to test them thoroughly. In this paper, the novel use of embeddings to capture discrete features of the input data combines nicely with recurrent GRU neural networks and the maxout approach to force a form of weight sharing over time that learns temporal invariances in a convolutional manner. I think it is pretty cool! Many thanks to all my co-authors for their great efforts in making this a winning paper at CASCON.
Winner's Testimonial

N/A

Best Student Paper

Assisting Developers Towards Fault Localization by Analyzing Failure Reports

— Paper Author
Winner's Testimonial
N/A

Most Influential Paper
Runtime Monitoring of Web Service Conversations

— Paper Author
Yuan Gan
I&IT Lead Technology Specialist
Ministry of Transportation

Winner's Testimonial
I am very pleased to see our paper be recognized by the community and be of any help for peer researchers. As always my sincerest gratitude goes to all of my coauthors for the great inspiration and contribution. This paper wouldn't have existed without their hard work.
Winner's Testimonial

I am very excited that this work received the MIPrecognition. This project took many years and involved work of many people, both from the IBM and the Toronto sides. A big thanks to the vision of Bill O’Farrell and continued support from IBM CAS, and to the talent and effort of amazing UofT students: Jonathan Amir, Yuan Gan, Shiva Negati and Jocelyn Simmonds. I am very lucky to have worked with you guys!
Winner's Testimonial

This is one of the first papers on using UML for runtime monitoring of web services. In particular, the paper describes how temporal formulas can be expressed using abstract and easy-to-understand UML sequence diagrams. These sequence diagrams are then translated into lower-level state machines and used for automated verification of web-service conversations. The work served as a stepping stone for much further research on runtime monitoring and recovery of web services, as well as the development of industry-strength languages and patterns for business process specification. At a more general level, I find the work to be an excellent example of how collaboration between academia and industry can lead to innovative and high-quality research with impact on practice. It was a great privilege for me to participate in the research, and I am very honoured to receive the CASCON Most Influential Paper Award.

Jon Bennett
Winner's Testimonial

Bill is very honored to be a co-recipient of this award. Thanks go out to all the other co-authors. An unsung hero in our receiving this award is Jocelyn Simmonds, who went on to extend and enhance the work, and who is much cited in the literature. Who would have imagined that ten years after this paper, cloud (i.e. web) services would have become IBM's core business, and that web service monitoring would be such a key focus area.
Winner's Testimonial

Thank you for the opportunity to reflect on my time at CAS so many years ago. It seems like a world away from my current life as an entrepreneur and web developer. I thoroughly enjoyed working with my fellow authors. Kudos to them for doing all the hard work behind this paper, and thanks for so generously including me as an author.

Congratulations to the Authors!

Accepted Papers

This year we received 66 full papers and 19 position papers.
We accepted 21 full papers and 11 position papers.
Acceptance rate for full papers was 33.3% and for position papers was 52.6%.
Thank you for your submissions. See you all at CASCON 2017.

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**Deployment Specification Challenges in the Context of Large Scale Systems**

*Miguel Jiménez, University of Victoria, Norha M. Villegas, Universidad Icesi, Gabriel Tamura, Universidad Icesi and Hausi A. Müller, University of Victoria*

Traditionally, the focus of software deployment has been mainly on the infrastructure to realise deployment and configuration (D&C) of complex and distributed systems, with an increasing interest in deployment of internet of things and cyber-physical systems. Advances in job scheduling, storage orchestration, containerized applications, along with agile practices such as continuous integration and microservices architecture, have improved the state of the practice. However, little effort has been devoted to the need for D&C specifications to support the various levels of detail and abstraction present in large-scale systems. The understanding of the software components hierarchy has shifted from the comprehension of design artefacts, usually specified with static diagrams, to the understanding of runtime concepts. The DevOps movement has dramatically influenced how and when deployment is realised, but little has been done from the software perspective in terms of documentation and linkage between design and runtime artefacts in the sense of software specification as such. This paper presents an overview of the state of the art of deployment requirements for large-scale, distributed and complex software and its automation and characterises a set of deployment specification challenges intended as starting points for advancing the field of software deployment.

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**Designing User Engagement for Cognitively-Enhanced Processes**

*Alexei Lapouchchian, University of Toronto, Zia Babar, University of Toronto and Eric Yu, University of Toronto*
A natural way to ease the introduction of cognitive computing capabilities into a user organization is through already well-established applications such as business process management (BPM) systems. Cognitive capabilities can enhance a business process by offering analytics-based recommendations on decisions and increasingly sophisticated automation through machine learning. Yet the organizational adoption of such advanced capabilities is not straightforward. Unlike conventional IT systems whose functionalities and correct operation are more transparent, user acceptance of advice and recommendations from an automated system requires development of trust over time. Additional supporting processes may emerge and evolve over a period of time to monitor, evaluate, adjust, or modify the cognitively-enhanced business process so as to enable personnel to adapt to the enhanced capabilities. In this paper, we propose that a systematic model-based approach can ease the transition to cognitive business operations. The use of suitable modeling techniques can facilitate the uncovering and analysis of obstacles to adoption, and guide the systematic search for viable modes of interaction and cooperation between human user and cognitive advisor.

Elascale: Auto-scaling and Monitoring as a Service

Hamzeh Khazaei, University of Toronto, Rajsimman Ravichandiran, University of Toronto, Byungchul Park, University of Toronto, Hadi Bannazadeh, University of Toronto, Ali Tizghadam, University of Toronto and Alberto Leon-Garcia, University of Toronto

Auto-scalability has become an evident feature for cloud software systems including but not limited to big data and IoT applications. Cloud application providers now are in full control over their applications' microservices and macroservices; virtual machines and containers can be provisioned or deprovisioned on demand at runtime. Elascale strives to adjust both micro/macro resources with respect to workload and changes in the internal state of the whole application stack. Elascale leverages Elasticsearch stack for collection, analysis and storage of performance metrics. Elascale then uses its default scaling engine to elastically adapt the managed application. Extendibility is guaranteed through provider, schema, plug-in and policy elements in the Elascale by which flexible scalability algorithms, including both reactive and proactive techniques, can be designed and implemented for various technologies, infrastructures and software stacks. In this paper, we present the architecture and initial implementation of Elascale; an instance will be leveraged to add auto-scalability to a generic IoT application. Due to zero dependency to the target software system, Elascale can be leveraged to provide auto-scalability and monitoring as-a-service for any type of cloud software system.
An enterprise data lake (EDL) combines big data storage, governance, and query abilities for structured and unstructured data with a navigable, searchable data catalogue. We define a cognitive enterprise data platform (CEDP) to be an EDL that is further equipped with a scalable deployment platform and an extensible catalogue of deployable cognitive computing services as well as a data science and data engineering environment to develop and train the cognitive computing services and publish them to the CEDP catalogue.

A natural language question answering (NLQA) service is a CEDP cognitive computing service trained to recognize natural language questions and respond using CEDP data queries or cognitive computing services. In order to scale this form of cognition to the enterprise, business units must be able to crowd source the catalogue of trained NLQA that the CEDP must then deploy and federate automatically. However, the machine learned models that contribute to answer confidence values are separately trained, so the answer confidence values from any two NLQA services are not directly comparable. Therefore, federating separately trained NLQA services requires an answer ranking methodology.

This paper includes a solution that is based on two insights. The first is that the problem of answering ranking across separately trained NLQA services is analogous to the left side of Bayes' formula. The second insight is that the factors in the right side of Bayes' formula can be automatically machine learned using the test sets of the NLQA services. Thus, calibrated answer ranking across separately trained NLQA services is achieved via Bayesian inferences on their answer confidence values. In turn, this baseline answer ranking methodology enables a cognitive enterprise data platform to automatically federate a dynamic changeable crowd-sourced catalogue of NLQA services.
Conversational agents aim to offer an alternative to traditional methods for humans to engage with technology. This can mean to reduce the effort to complete a task using reasoning capabilities and by exploiting context, or allow voice interaction when traditional methods are not available or inconvenient. This paper introduces Foodie Fooderson, a conversational kitchen assistant built using IBM Watson technology. The aim of Foodie is to assist families in improving their eating habits through recipe recommendations that take into account personal context, such as allergies and dietary goals, while helping reduce food waste and managing grocery budgets. This paper discusses Foodie's architecture, use and benefits. Foodie uses services from CAPRecipes-our context-aware personalized recipe recommender system, SmarterContext-our personal context management system, and selected publicly available nutrition databases. Foodie reasons using IBM Watson's conversational services to recognize users' intents and understand events related to the users and their context. We also discuss our experiences in building conversational agents with Watson, including requirements that may improve the development experience with Watson for creating rich conversations in this exciting era of cognitive computing.

Laura Pravato, School of Biomedical Engineering, McMaster University and Thomas E. Doyle, McMaster University

The Internet of Things (IoT) offers integrated sensing of all aspects of daily life. The field of healthcare offers the greatest potential for IoT to benefit society, but also presents significant challenges. A key component of IoT is the development of intelligent ubiquitous sensing. Achieving this requires circuits and system that require low power and efficient computation.

As a proof of concept, we present a prototype design of a continuous wireless electrocardiogram (ECG) monitoring device that uses small, low-cost IoT wi-fi modules to upload real-time data to the cloud. Two IoT cloud services were utilized to record and plot real-time ECG data: IBM Bluemix and ThingSpeak. Preliminary data quality was analyzed using kurtosis and spectral distribution ratio. Remote medical and health monitoring is an important step in supporting personalized predictive analytics, smart homes, and chronic illness management. The presented device has the potential to provide health professionals with real-time ECG data allowing for diagnosis of cardiac pathologies, monitoring of patients suffering from heart disease and/or patients recovering from cardiac conditions.
Cloud services are becoming increasingly popular: 60% of information technology spending in 2016 was Cloud-based, and the size of the public Cloud service market will reach $236B by 2020. To ensure reliable operation of the Cloud services, one must monitor their health.

While a number of research challenges in the area of Cloud monitoring have been solved, problems are remaining. This prompted us to highlight three areas, which cause problems to practitioners and require further research. These three areas are as follows: A) defining health states of Cloud systems, B) creating unified monitoring environments, and C) establishing high availability strategies.

In this paper we provide details of these areas and suggest a number of potential solutions to the challenges. We also show that Cloud monitoring presents exciting opportunities for novel research and practice.

Privacy as an Asset

Many attempts to define privacy have been made over the last century. Early definitions and theories of privacy had little to do with the concept of information and, when they did, only in an informal sense. With the advent of information technology, the question of a precise and universally acceptable definition of privacy in this new domain became an urgent issue as legal and business problems regarding privacy started to accrue. In this paper, I propose a definition of informational privacy that is simple, yet strongly tied with the concepts of information and property. Privacy thus defined is similar to intellectual property and should receive commensurate legal protection.

Quantifying Duplication to Improve Data Quality
Deduplication is a costly and tedious task that involves identifying duplicate records in a dataset. High duplication rates lead to poor data quality, where data ambiguity occurs as to whether two records refer to the same entity. Existing deduplication techniques compare a set of attribute values, and verify whether given similarity thresholds are satisfied. While potential duplicate records are identified, these techniques do not provide users with any information about the degree of duplication, i.e., the varying levels of closeness among the attribute values and between records that define the duplicates.

In this paper, we present a duplication metric that quantifies the level of duplication for an attribute value, and within an attribute. This metric can be used by analysts to understand the distribution and similarity of values during the data cleaning process. We present a deduplication framework that differentiates terms during similarity matching step, and is agnostic to the ordering of values within a record. We compare our framework against two existing approaches, and show that we achieve improved accuracy and comparable performance over real data collections.

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Periklis Andritsos, University of Toronto

Exploring database tables, small or large, can be challenging if no proper structure and constraints exist. The usual, textbook-based way to impose structure in relational databases is to define functional dependency constraints and apply decomposition theory to achieve smaller, more concise and semantically meaningful relations, without loss of the original information. This procedure requires the existence or definition of functional dependencies, mostly at design time. Consequently, any data instances need to adhere to these constraints. However, functional dependencies are not always available or easy to deduce.

In this position paper, we explore a new and novel way to perform decomposition, or reconstruction, of database tables, based on their instances and their information content. We present a technique from Systems Theory, called Reconstructability Analysis, (RA), and
discuss how it can be used to decompose relations in a fully unsupervised way and without any pre-existing constraints. RA quantifies the information content of a database relation and searches for sub-relations that retain this information, while they can be described in a more concise fashion than the original one. After defining RA, we show its potential, we discuss advantages and disadvantages and propose problems worth exploring by the database community.

— Software Variability Through C++ Static Polymorphism: A Case Study of Challenges and Open Problems in Eclipse OMR

Samer Al Masri, University of Alberta, Nazim Uddin Bhuiyan, University of Alberta, Sarah Nadi, University of Alberta and Matthew Gaudet, International Business Machines Corporation

Software Product Line Engineering (SPLE) creates configurable platforms that can be used to efficiently produce similar, and yet different, product variants. SPLs are typically modular such that it is easy to connect different blocks of code together, creating different variations of the product. There are many variability implementation mechanisms to achieve a SPL. This paper shows how static polymorphism can be used to implement variability, through a case study of IBM’s open-source Eclipse OMR project. We discuss the current open problems and challenges this variability implementation mechanism raises and highlight technology gaps for reasoning about variability in OMR. We then suggest steps to close these gaps.
Congratulations to our Winners!

Best Paper

TrajectoryNet: An Embedded GPS Trajectory Representation for Point-based Classification Using Recurrent Neural Networks

Best Student Paper

Assisting Developers Towards Fault Localization by Analyzing Failure Reports

Most Influential Paper

Runtime Monitoring of Web Service Conversations

Congratulations to the Authors!
Accepted Papers

This year we received 66 full papers and 19 position papers. We accepted 21 full papers and 11 position papers. Acceptance rate for full papers was 33.3% and for position papers was 52.6%.

Thank you for your submissions. See you all at CASCON 2017.

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— **TrajectoryNet: An Embedded GPS Trajectory Representation for Point-based Classification Using Recurrent Neural Networks** *(Best Paper)*

**Xiang Jiang, Dalhousie University, Erico N de Souza, Dalhousie University, Ahmad Pesaranghader, Dalhousie University, Baifan Hu, Dalhousie University, Daniel Silver, Acadia University and Stan Matwin, Dalhousie University**

Understanding and discovering knowledge from GPS (Global Positioning System) traces of human activities is an essential topic in mobility-based urban computing. We propose TrajectoryNet—a neural network architecture for point-based trajectory classification to infer real world human transportation modes from GPS traces. To overcome the challenge of capturing the underlying latent factors in the low-dimensional and heterogeneous feature space imposed by GPS data, we develop a novel representation that embeds the original feature space into another space that can be understood as a form of basis expansion. We also enrich the feature space via segment-based information and use Maxout activations to improve the predictive power of Recurrent Neural Networks (RNNs). We achieve over 98% classification accuracy when detecting four types of transportation modes, outperforming existing models without additional sensory data or location-based prior knowledge.
The growing trend of devices participation in Internet of Things (IoTs) platforms have created billions of IoT devices in both consumer and industrial environments. IoT devices form the network of devices connected to each other by communication technologies in different environments to monitor, collect, exchange, and to take actions. Due to the growth of IoT devices, users started using these devices to achieve their personal goals, such as to reduce electricity cost at home. Existing research has proposed new interconnection implementation mechanisms for IoT devices to monitor environments by low cost systems. However, existing work does not investigate the historical data of IoT device usage to assist users in achieving their goals. In our research, we propose an engine that identifies the behavioural patterns of IoT device users. Our engine works in three steps: First, the engine uses a database to store the IoT devices usage data. Second, our engine prepares the data in a suitable model for data analysis. Finally, our engine analyses the represented data to extract user behavioural patterns. We perform an empirical study to evaluate our engine. Our results shows that users have, on average, 2 devices that they use at specific times and have a relatively small impact across other devices in the environment.

Competency-based medical education (CBME) is a paradigm of assessing resident performance through well-defined tasks, objectives and milestones. A large number of data points are generated during a five-year period as a resident accomplishes the assigned tasks. However, no tool support exists to process this data for early identification of a resident-at-risk failing to achieve future milestones. In this paper, we study the implementation of CBME at McMaster’s Royal College Emergency Medicine residency program and report the development of a machine learning algorithm (MLA) to identify patterns in resident performance. We evaluate the adaptivity of multiple
MLAs to build a tool support for monitoring residents' progress and flagging those who are in most need of assistance in the context of emergency medicine education.

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**A Probabilistic Approach to Model User Preferences for Recommender Systems- A Case Study on IBM Watson Analytics**

Parisa Lak, Ryerson University, Can Kavaklioglu, Ryerson University, Mefta Sadat, Ryerson University, Martin Petitclerc, IBM Canada, Graham Wills, IBM Canada, Ayse Bener, Ryerson University and Andriy Miranskyy, Ryerson University

IBM Watson Analytics (WA) is a system that helps users to find new patterns within datasets provided by users. WA provides users with visualization recommendations using a rule based algorithm, which uses column headers in the provided dataset and the questions entered by the users as features. Recommendations made by the system are not tailored neither according to specific users nor the situation where users interact with the system. Also the performance of the recommendations severely degrade when the system has to scan a large set of possible recommendations to select from. We believe that the system would benefit from a more personalized recommendation methodology using learning algorithms within Recommender Systems framework.

Recommender systems (RS) provide personalized recommendations to the users based on their prior behavior and historical preferences. In this work, we design a learning algorithm that receives user's historical interaction with the system as input and provides a list of recommendations that are uniquely generated based on his/her preferences. User preferences in WA are not reported explicitly by the users in terms of likes or dislikes and hence should be derived from the implicit cues extracted from user's interaction with the system. In this study, we employ user selection behavior as a cue for user's preferences. The proposed algorithm uses the additional information generated by user’s preferences to increase the accuracy of preference prediction.

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**Accelerating Poly1305 Cryptographic Message Authentication on z14**

Bill O'Farrell, IBM, Umme Salma Gadiwala, McMaster University, Christopher Anand, McMaster University and Curtis D' Alves, McMaster University
In this paper, we examine the implementation and acceleration of the Poly1305 authentication algorithm on the recently announced IBM z14 computer. Two approaches are undertaken to improve performance of this important cryptographic algorithm. First, we restructure the algorithm to take advantage of a new instruction, VMSL, which employs floating-point hardware to perform high-speed high-throughput multiplications on integer limbs of large integers. With VMSL, we are able to eliminate multiplication as the dominant operation in Poly1305. Second, we apply Coconut, an extensible domain-specific language (DSL) embedded in Haskell, to generate near-optimal scheduled assembly code for parts of the algorithm that are performance bottlenecks. This combined approach has implications beyond Poly1305, as the same techniques can be applied to other cryptographic algorithms, such as elliptic curve digital signature algorithm (ECDSA) used in HyperLedger Blockchain.

Assisting Developers Towards Fault Localization by Analyzing Failure Reports

Krystalenia Tatsi, National Technical University of Athens and Kostas Kontogiannis, Western University

Large software applications encompass many components with complex inter-dependencies. When a failure occurs, developers usually have limited information and time in their disposal for localizing the root cause of the observed failure. The most common information developers have readily access to includes failure reports, stack traces, and event logs. In this context, a major challenge is to devise techniques that assist developers utilize this information in order to zero-in their focus on specific methods that have a high probability of containing the root cause of the observed failure. Once such an initial set of methods has been identified, other more elaborate, complex, and computationally expensive data flow analyses could be applied.

In this paper, we present a technique which aims to identify such an initial set of suspicious methods by first, retrieving information from failure reports obtained from Bugzilla repositories, second by combining this information with graph models that denote actual dependencies obtained from the subject system's source code in order to create an hypothesis space and third, by applying a ranking score to identify methods that have high likelihood of containing the root cause. The technique is shown to be tractable when applied to systems with several thousands of source code methods and exhibits high accuracy on the obtained results.
Barriers to Adoption of Information Technology in Healthcare

Christina Christodoulakis, University of Toronto, Azin Asgarian, University of Toronto and Steve Easterbrook, University of Toronto

Healthcare is an important pillar of society, critical for effectively responding to public health emergencies, and addressing disease, ill health, and poverty brought on by communicable disease and non communicable disease and cancer. The increasing need for cost effective, time effective, and preventive healthcare is forcing radical changes in current healthcare systems, to take advantage of capabilities of modern technology. However, this is not straightforward. Despite advances in modern technology, adaptation to healthcare problems has been slow.

In this report, we take a systems thinking perspective to identify barriers to the application of technology in healthcare and adoption of those advances through the prism of two use cases: electronic medical records (EMR) and remote patient monitoring (RPM) technology. Finally, we list ways of dealing with individual barriers and consider negative effects those solutions might have on other barriers. We expect that our analysis of adoption of technology in healthcare as presented in our use cases will help requirements analysts decide on appropriate steps to boost adoption of new technology to achieve more effective and efficient next generation healthcare.

Chatbots as Assistants: An Architectural Framework

Adam Di Prospero, York University, Nojan Norouzi, York University, Marios Fokaefs, York University and Marin Litoiu, York University

Automated text-based or speech-based personal assistants, also known as chatbots, have been prevalent in several domains including marketing and technical support. Through mainstream applications, such as Siri or Alexa, their popularity has increased and we now see them being used in even more domains. Although the purpose of chatbots varies among domains, there are common elements that all chatbots share. By identifying these elements, it is possible to streamline the development of chatbots in mass and in a structured manner.

Additionally, there can be common challenges in the development of such applications, for example, how to treat novice versus expert
users or how to establish memory of the conversation. In this work, we propose a reference architecture for chatbots, where we outline the common elements as well as the common challenges. Using IBM Watson and IBM Bluemix as the basic platforms, we also present the creation of three chatbots, for different purposes, based on this reference architecture to highlight these commonalities.

— Classification Algorithms and How to Distribute Them

Shadi Khalifa, Queen’s University, Patrick Martin, Queen’s University and Rebecca Young, IBM Canada

The problem of how to adapt classification algorithms to handle the large volume of data associated with Big Data is commonly solved by rewriting the algorithms to run in a distributed fashion using a parallel programming language (e.g. OpenMP) or a parallel framework (e.g. Hadoop, Spark). While this approach can result in fast algorithms, it is time consuming and can be very challenging to implement for all algorithms. In this paper, we first categorize classification algorithms in terms of the difficulty to distribute them. Second, we propose the Distributed Classifier Training (DCT) approach for distributing all types of classification algorithms that maintains the same prediction accuracy without having to rewriting them. Finally, we implement the DCT approach as a free open-source IBM SPSS Modeler plugin.

— Cloud meets classroom: Experience Report on Using IBM Bluemix in a Software Architectures Course

Nikita Sokolov, University of Western Ontario and Nazim Madhavji, University of Western Ontario

The process of teaching software architectures should go beyond abstract concepts (such as quality attributes, architectural tactics, patterns, and methods) to getting students to recognise and implement them practically. Clearly, for this, project work is essential so as to familiarise students with the key technologies and tools. We note that “cloud technology”, widely popular in industry for hosting business services, is quite suited to teaching about service-oriented architectures and micro-services. However, our analysis suggests that the use of cloud technology in software architecture (SA) courses is not very strong in tertiary institutions. Given the time constraints in SA courses, the learning curve on both administrative and technical aspects of the underlying infrastructure should arguably be minimised so as to enable focus on the core features of the course.
In this paper, we share our experience on using IBM Bluemix in a half-term course on software architectures at the University of Western Ontario. In particular, we note that while students need to familiarise themselves with the technology and the opportunity it provides for supporting end-user services, the learning curve of Bluemix is gradual enough for students to accomplish creating plausible services in a real world environment. This paper describes a number of observations and lessons learnt from the points of view of both students and instructors.

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**Concern-Oriented Incremental Modelling**

Omar Alam, *Trent University* and Jörg Kienzle, *McGill University*

This paper investigates how to incrementally model a software system in the context of Concern-Oriented Reuse (CORE). CORE proposes concerns as new units of reuse encapsulating software artifacts that span multiple development phases and levels of abstraction. CORE advocates a three-part interface to describe each concern (variation, customization, and usage interfaces) and defines compositions between different concerns. However, the process of incrementally modelling of artifacts in CORE has not been discussed before. We propose two kinds of increments, feature-driven increments within a concern, and reuse-driven increments between concerns. We demonstrate incremental modelling by modelling a workflow concern in CORE.

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**Improving Garbage Collection-Time String Deduplication**


Automatic memory management is one of the major fields of research in virtual environments. Improving garbage collection and object layout are two basic goals when optimizing mutator execution. In Java, immutable string objects are the most commonly found objects on the heap, thus inspiring many approaches to optimize their structure, placement on the heap, and to reduce the amount of duplicate memory they use. This paper aims to improve an existing approach for dynamic string deduplication during garbage collection. It is shown that the overhead and maintenance cost of this particular approach was reduced by applying multiple optimizations to the
Model-Driven Engineering (MDE) enables automatic generation of performance models from software design models by model transformations. The performance models thus obtained are used for the performance analysis of software under development. In previous work, we have used a specialized model transformation language, Epsilon ETL, to generate Layered Queueing Network (LQN) performance models from UML software models annotated with the MARTE profile. When the UML model evolves during the development process, the traditional solution for keeping the performance model synchronized is to rerun the entire transformation each time the software model changes. Such a solution is expensive, especially in large-scale models.

In this paper, we propose an incremental change propagation technique (ICP) to propagate changes from the UML+MARTE software model to the corresponding LQN. The entire process starts by automatically generating an LQN model with the previously developed Epsilon ETL transformation. During the development process, when the UML model evolves, we detect the changes with the Eclipse EMF Compare tool, then incrementally propagate them to the LQN model to keep it synchronized. Note that Epsilon does not support incremental model transformation. The proposed ICP is evaluated by applying it to a set of case studies.

Event count prediction is a class of problems in time series analysis, which has been extensively studied over the years. Its applications range from the prediction of the number of publications in the scientific community to ATM cash withdrawal transaction prediction in the banking industry. However, in applied data science problems, using event count prediction models for real-world data often faces difficulties because the data violates not only the Poisson distribution assumption, i.e., the rate at which events occur should be
constant, but the data is also relatively sparse, i.e., only a few event count values are greater than zero. Traditional techniques do not work well under these two conditions. To overcome these limitations, some researchers have proposed the generic autoregressive (AR) models for event count prediction, which work with non-constant event occurrence rates. As AR models solely use historical event count for forecasting, they might not be as flexible for incorporating domain knowledge. Moreover, and similarly, AR models may not work very well with the relatively short length-time series.

In order to overcome these challenges, we propose a machine learning approach to address the event count prediction problem. We benchmark our proposed solution on the KDD Cup 2016 dataset by formalizing affiliation ranking as an event count time series prediction problem. We map the time series onto a highly dimensional state space and systematically apply the state-of-the-art machine learning algorithms to predict event counts. We then compare our proposed approach against solutions in the KDD Cup 2016 competition and show that our work outperforms the best models in this with an NDCG@20 score of 0.7573.

## MicroJIT: A Lightweight, Just-in-Time Compiler to Improve Startup Times

Federico Sogaro, University of New Brunswick, Eric Aubanel, University of New Brunswick, Kenneth Kent, University of New Brunswick, Marius Pirvu, IBM, Vijay Sundaresan, IBM and Peter Shipton, IBM

The startup phase of an application represents a tiny fraction of the total runtime, but it is considered, nevertheless, a critical phase for both client and server environments. In the Java Virtual Machine (JVM), the Just-in-Time compiler (JIT) translates Java bytecode to native machine code to improve the performance of an application. We investigate whether using two different JIT compilers in the same JVM can improve startup time. A lightweight JIT system (i.e., MicroJIT) is integrated into the J9 JVM and performs an initial, low-optimized, but fast compilation while, at a later time, the standard JIT recompiles Java bytecodes with better, but more expensive, optimizations. Experimental results show that enabling MicroJIT, can reduce startup time in some configurations of the JVM, but with a cost in memory usage and, in some cases, a reduction in throughput performance.

## On the Actual Use of Inheritance and Interface in Java Projects: Evolution and Implications
Background: Inheritance is one of the main features in the object-oriented paradigm (OOP). Nonetheless, previous work recommend carefully using it, suggesting alternatives such as the adoption of composition with implementation of interfaces. Despite of being a well-studied theme, there is still little knowledge if such recommendations have been widely adopted by developers in general.

Aims: This work aims at evaluating how the inheritance and composition with interfaces have been used in Java, comparing new projects with older ones (transversal), and also the different releases of the same projects (longitudinal). Method: A total of 1,656 open-source projects built between 1997 and 2013, hosted in the repositories GitHub and SourceForge, were analyzed. The likelihood of more recent projects using inheritance and interfaces differently from older ones was analyzed considering indicators, such as, the prevalence of corrective changes, instanceof operations, and code smells. Regression analysis, chi-squared test of proportions and descriptive statistics were used to analyze the data. In addition, a thematic analysis based method was used to verify how often and why inheritance and interface are added or removed from classes.

Results: We observed that developers still use inheritance primarily for code reuse, motivated by the need to avoid duplicity of source code. In newer projects, classes in inheritance had fewer corrective changes and subclasses had fewer use of the instanceof operator. However, as they evolve, classes in inheritance tend to become complex as changes occur. Classes implementing interfaces have shown little relation to the interfaces, and there is indication that interfaces are still underutilized. Conclusion: These results show there is still some lack of knowledge about the use of recommended object-oriented practices, suggesting the need of training developers on how to design better classes.

Online Detection of Anomalous Applications on the Cloud

Arnamoy Bhattacharyya, University of Toronto, Harsh Singh, University of Toronto, Seyedali Jokar Jandaghi, University of Toronto, Cristiana Amza, University of Toronto

As Cloud platforms are becoming more popular, efficient resource management in these Cloud platforms helps the Cloud provider to deliver better quality of service to its customers. In this paper, we present an online characterization method that can identify potentially
anomalous jobs in a Cloud platform by analyzing the jobs' resource usage profile as the job runs. We show that, by tracking the online resource consumption, we can develop a model through which we can predict whether or not a job will have an abnormal termination. We further show, using both real world and synthetic data, that our online tool can raise alarms as early as within the first 1/8th of the potentially failing job's lifetime, with a false negative rate of as low as 4%. These alarms can become useful in implementing either one of the following resource-conserving Cloud management techniques: alerting clients early, de-prioritizing jobs that are likely to fail or assigning them less performant resources, deploying or up-regulating diagnostic tools for potentially faulty jobs.

— Optimizing the JVM Object Model Using Object Splitting

Taees Eimouri, University of New Brunswick, Kenneth Kent, University of New Brunswick and Aleksandar Micic, IBM Ottawa

Data layout optimization is a well-known method to improve cache performance by reorganizing data elements. In this paper, a novel approach to optimize layout of objects is introduced, called the Object Splitting Technique. In this approach, Java objects are split at allocation time so that those fields of the split objects that are not accessed as often are separated from the rest of the fields. We implemented the approach in IBM's JVM. The modified JVM was tested with different benchmarks and in most cases the number of cache misses was reduced.

— SLO Request Modeling, Reordering and Scaling

Panagiotis Patros, University of New Brunswick, Kenneth Kent, University of New Brunswick and Michael Dawson, IBM

Computations on the cloud predominantly take place with the client/server architecture, which enables straightforward scaling by adding extra instances on one of the clusters the cloud provider operates to cover increased load. Statelessness in cloud applications is achieved by avoiding maintaining data on the application server itself beyond the lifetime of a request. Instead, storing and processing of various components of requests takes place on other services, most of which also run on the cloud. Therefore, cloud systems have increased internal request load. Furthermore, all of these cloud services need to uphold a certain set of Service Level Objectives (SLOs) regarding their Quality of Service (QoS). Because of the current paradigm of microservices, cloud services are so interconnected and
interdependent, it is crucial to uphold their SLO requirements; otherwise, the end-response to the user might time-out or be unacceptably slow; financial penalties might even be applicable.

In this paper, we propose and experimentally evaluate a mathematical model that describes the on-time performance of client/server cloud applications. Using our model, we make a theoretical prediction on the ideal number of server instances required for an application to maintain its on-time response SLOs depending on the number of clients it serves, which we evaluate experimentally. Finally, another prediction of our model is that of load-based, prior-execution-time-based reordering of requests towards increased SLO satisfaction; we implemented and experimentally evaluated our solution with significant on-time response improvements.

Transfer Learning in Neural Networks: An Experience Report

Mark Shtern, York University, Rabia Ejaz, York University and Vassilios Tzerpos, York University

Perhaps the most important characteristic of deep neural networks is their ability to discover and extract the necessary features for a particular machine learning task from a raw input representation. This requires a significant time commitment, both in terms of assembling the training dataset, and training the neural network. Reusing the knowledge inherent in a trained neural network for a machine learning task in a related domain can provide significant improvements in terms of the time required to complete the task.

In this paper, we present our experience with such a transfer learning situation. We reuse a neural network that was trained on a real world image dataset, for the task of classifying music in terms of genre, instrumentation, composer etc. (audio files are converted to spectrograms for this purpose). Even though the image and music domains are not directly related, our experiments show that features extracted to recognize images allow for high accuracy in many music classification tasks.

Using IBM Watson Cloud Services to Build Natural Language Processing Solutions to Leverage Chat Tools

Sarah Packowski, IBM and Arun Lakhana, IBM
Chat tools are changing the way companies engage with customers. On the one hand, these tools have tremendous benefits: they can provide an excellent experience for customers who have questions or who are having trouble. Also, analyzing historical chat conversations can help a company understand customer needs and make better business decisions. On the other hand, keeping up with a large volume of chat messages can be difficult and requires a lot of support staff; and until recently easy-to-use tools for programmatically handling those messages - using natural language processing (NLP) techniques, for example - have not been generally available. This paper describes our experience using IBM Watson cloud services to build cognitive solutions for managing large volumes of customer messages and drawing insight from those messages. In this paper we share some of the lessons we learned while implementing our solutions.
Workshops at CASCON 2017 will provide a forum to present, discuss, and debate issues, problems, ideas, technology gaps, work-in-progress, and/or directions. The format of a workshop may include position papers, expert panels, hands-on exercises, and discussions. All submitted workshop proposals require long abstracts of 1500 words maximum, typically including the abstract, rationale, technical/research scope, organizers, workshop format, and expected outcomes. Long abstracts of accepted workshops will be included in the conference proceedings published by CASCON and included in the ACM Digital Library.
Congratulations to the Workshop Chairs!

Accepted Workshops

Thank you for your submissions. See you all at CASCON 2017.

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<tr>
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Monday PM workshops run from 03:00 to 05:00 PM

— Hands-On: Accessibility in the DevOps Era (*HandsOn, in Holly-Butternut*)

Chair(s): Devan Shah, Larry Lindsay, Thomas Brunet, Ali Asghar, Charu Pandhi
Theme: Others
Room: Holly-Butternut
Format: HandsOn
Level: Beginner
Prereq: GitHub Account
Description: As enterprises adopt continuous deployment practices, the DevOps testing practice must adapt accessibility testing tools and processes or user experience will suffer. These tools must work hand in hand with your application DevOps methodology - both required by & enabling those practices. In this workshop participants will learn about IBM’s cutting-edge accessibility DevOps tooling and experience how simple it is to integrate the tools into an existing continuous integration pipeline (CI). Furthermore, participants will also get to learn about the latest technologies such as Angular 4, Karma, Appium, and Jasmine as part of the end-2-end accessibility testing process.
Supercharge a Language Runtime! *(HandsOn, in Orchid)*

**Chair(s):** Daryl Maier, Xiaoli Liang
**Theme:** Cloud Computing
**Room:** Orchid
**Format:** HandsOn
**Level:** Beginner
**Prereq:** Comfortable programming in C/C++
**Description:** Have you wanted to learn more about the technology that enables modern runtimes like Java and JavaScript to deliver great performance in the cloud? Get ready to hack out some code because this hands-on tutorial will show you how to integrate technology from the Eclipse OMR open-source runtime toolkit into an educational VM called Base9.

You will learn more about how language virtual machines work, the JitBuilder technology in the Eclipse OMR toolkit that allows easy access to runtime compiler technology, and how to specialize and integrate JitBuilder into a language runtime to give it a turbo charged boost of performance!

Introduction to Neural Networks *(HandsOn, in Violet)*

**Chair(s):** Serjik Dikaleh, Di Xiao, Chris Felix, Dharmesh Mistry, Mike Andrea
**Theme:** Cognitive Computing
**Room:** Violet
**Format:** HandsOn
**Level:** Beginner
**Prereq:** It is not important to have any prior experience with machine learning, neural networks, or data science. It is also not a requirement to be proficient in mathematics. Basic coding knowledge is the only requirement.
**Description:** Neural networks are a powerful tool in the field of modern AI and machine learning, originally conceived as an analogy of how neurons connect in the brain. Their effectiveness relies on being able to “taught” what to do by
feeding them many individual data samples. Correctly trained on relevant data sets, neural networks can be applied with a high degree of accuracy to problems such as image recognition, image labeling, stock price prediction, healthcare diagnoses, and more. Most of the difficulty of using these networks lies in training them efficiently and precisely; once trained, a neural network can be easily ported to any application environment. One exciting application is image recognition capabilities offered by many vendors such as IBM’s Visual Recognition, which is capable of not only recognizing faces, but also objects and depictions of objects.

In this workshop, we will begin by covering the theoretical foundation behind neural networks at a high level (no mathematical background required!) – participants will learn the mechanisms behind initializing, training, and validating a basic model. Using IBM’s new Data Science Experience (DSX), we then work through a hands-on lab portion to train and develop their own neural network to recognize handwritten digits. Lastly, we introduce common libraries for creating functioning applications with this tool for developer ease-of-use. This workshop is intended to be a practical introduction to neural networks and machine learning for developers without PhDs.

View Workshop Detail

Human Health in a Modern World - Can Technology Solve the Mismatch? (Panel, in Jasmine)

Chair(s): Randy Giffen, Lysanne Lessard
Theme: Cognitive Computing
Room: Jasmine
Format: Panel
Level: Beginner
Prereq: There are no prerequisites. Experience with healthy lifestyle interventions is obviously an asset.
Description: Behavior has a significant impact on human health. The current prevalence of processed foods and sedentary lifestyles has led to an increase in obesity and associated chronic illnesses such as type 2 diabetes. Adopting a healthier lifestyle is difficult in the modern environment and long-term success is limited. This workshop will discuss ways in which technology could be used to support evidence-based approaches to sustained healthy behavior change.

Rationale
By many measures, human health is better now than at any time in history. The human population continues to
increase and life expectancy is longer than ever. Yet there is a problem. Much of these gains have been achieved by eliminating illnesses due to infection, making childbirth safer, and improving care and outcomes for chronic illnesses such as heart disease and cancer. Beneath these positive outcomes is a pandemic of chronic illnesses such as type 2 diabetes.

There is a mismatch between our modern lifestyle and the ancient biochemistry that keeps us healthy. This lifestyle provides an abundance of great tasting processed food that makes it easy to eat too many calories while not getting the fiber and other nutrients that our biochemistry and microbiome expects. Our modern lifestyle is often sedentary while our biochemistry expects us to be active every day. Treating and managing the chronic illnesses we develop as a result of lifestyle comes at a tremendous cost to the affected individuals and to society.

Stopping this pandemic has proven difficult for many reasons. Because these illnesses typically develop over decades, they are often unappreciated until permanent or difficult to reverse damage has occurred. Since these illnesses affect many people in the community and across generations, it is often assumed that “this is the way it is” and little can be done.

Technical/Research Scope
The goal of this workshop is to explore the possibility of improving this situation by using technology to alter lifestyle through behavior change. Long-term adult behavior change is very difficult and we will propose not focusing on strategies that rely on willpower. Rather we will investigate how changes to a person’s environment and their habits can lead to automatic healthy behavior. Recent research indicates that technology such as fitness trackers may improve health-related behavior when combined with multiple behavioral change techniques. During the workshop we will review the use of the behavioral change technique “implementation intentions”, which is an approach with demonstrated ability to enhance goal achievement through the creation of if-then plans.

Organizers
- Randy Giffen, IBM
- Holly Etchegary, Amanda Hall, Karen Dickson, Memorial Univ.
- Lysanne Lessard, Wojtek Michalowski, Univ. of Ottawa

Workshop Format
The workshop will be divided into three segments
1) Problem
- Review and explore the details of chronic illness due to the above mismatch
2) Strategy  
- Identify and learn about evidence-based approaches to solving this issue using psychological techniques such as implementation intentions

3) Technology  
- Explore how technology can be used to implement the strategy and articulate the basis of a research agenda for technology-supported lifestyle change

Expected Outcomes  
We will take a “design thinking” approach to discussing and developing an intervention for behavior change.  
https://www.ibm.com/design/thinking/

Any solution must be both effective and scalable. Although the focus will be on assisting those who have a strong desire to change, we may also consider how technology could help all individuals to change their behavior. The technology should support behavior change without creating a significant dependency. The technology should primarily act as a catalyst to assist with the transition but ideally it should not be required to sustain the healthy behavior over the long term.

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<thead>
<tr>
<th>Chair(s):</th>
<th>Marin Litoiu, Joe Wigglesworth</th>
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<td>Theme:</td>
<td>Cloud Computing</td>
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<td>Level:</td>
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<td>Prereq:</td>
<td>Goals and Outcomes</td>
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| Description:     | The 9th CASCON Workshop on Cloud Computing *(Speakers, in Conf Center 1)*

The goal of the workshop was to bring together researchers and practitioners from government, industry and academia to present and share the best practices and research agendas on different aspects of hybrid clouds and containerized applications: development, deployment, runtime management, quality of services and economic models. In this workshop, we particularly focused on two aspects of cloud computing: (a) dynamic provisioning of
software and hardware resources in hybrid clouds (b) the advantages and drawback of container platforms. We also explored the state of the art of the software as a service, platform as a service, privacy and security aspects of the hybrid clouds.

This half-day workshop consisted in presentations and a panel. The presentations were structured along two main themes, dynamic provisioning and container management. To encourage discussion and provide a more open discussion and perspective, we included a panel where industry and academic experts presented their visions and answered questions from the audience.

View Workshop Detail

— **12th Workshop on Challenges for Parallel Computing** *(Speakers, in Conf Center 2)*

Chair(s): Robert Ho, Jeeva Paudel, Jeremy Bradbury
Theme: Systems
Room: Conf Center 2
Format: Speakers
Level: Beginner
Description: Parallel computing has expanded significantly over the past decade and now includes the development of applications for multi-core systems, distributed systems and heterogeneous systems. The goals of this workshop are to bring together different groups from the parallel community (application developers, language developers, compiler and tools developers, system architects and academic researchers) to explore the current challenges that parallel computing faces and present ideas on how to deal with these challenges.

View Workshop Detail

— **Open Data, Engagement and the Knowledge Economy** *(Speakers, in Evergreen)*

Chair(s): Marcellus Mindel, Ngoni Chipere, Trevor Deley
Theme: Data Analytics
The digital economy represents a rare opportunity for the Caribbean to free itself from dependence on tourism, financial services and oil. In this position paper, I propose that entry into this economy can be facilitated by a) the development of a culture of open data; b) the availability of a technological platform that enables mass participation in the digital economy and c) the development of exemplary applications that can inspire developers. The paper provides a brief historical background to the current socio-economic conditions in the Caribbean, followed by a brief survey of the status of open data availability, application development and usage. It then describes the emerging relationship between the University of the West Indies and IBM and the role that this relationship can play in facilitating the region’s participation in the digital economy.

The Theory and Applications of Dew Computing (Speakers, in Primrose)

Dew computing is an on-premises computer software-hardware organization paradigm in the cloud computing environment where the on-premises computer provides functionality that is independent of cloud services and is also collaborative with cloud services. The goal of dew computing is to fully realize the potentials of on-premises computers and cloud services.

Here on-premises computer is a cloud computing term. It means local computers, or non-cloud computers, which include personal computers (desktops, laptops), tablets, smart phones, servers, and clusters.

Detailed information related to dew computing can be found in the following link: http://www.dewcomputing.org.
Dew computing has two major features: independence and collaboration. Independence means the on-premises computer is able to provide functionality offline. Collaboration means the dew computing application has to automatically exchange information with cloud services during its operation. Such collaboration includes synchronization, correlation, or other kinds of inter-operation.

Dew computing is an emerging research area and application area. Although the theory and methods of dew computing are being shaped, many dew computing applications have already existed for many years, even before the dew computing concept was proposed.

The goals of this workshop are to introduce dew computing concepts and to explore dew computing applications. The workshop will have the following stages:

Stage 1: Introducing Dew Computing Concepts

In this stage, we will not only introduce the concepts of dew computing, but also its features, existing examples, and resources.

Stage 2: Introducing Dew Computing Categories and Applications

In this stage, we will introduce the categories of dew computing and the applications of each category.

Stage 3: Dew Computing Forum Discussion

In this stage, we will have a leaded discussion about the future of dew computing, its possible applications, and so on.

View Workshop Detail
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Tuesday PM workshops run from 03:00 to 05:00 PM

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**API Economy made easy with LoopBack 4** *(HandsOn, in Holly-Butternut)*

Chair(s): Taranveer Virk, Diana Lau, Kevin Delisle, Biniam Admikew, Loay Gewily, Janny Hou, Ivy Ho

Theme: Cloud Computing

Room: Holly-Butternut

Format: HandsOn

Level: Beginner

Prereq: Knowledge: It is recommended attendees have experience with NodeJS and/or TypeScript

Hardware: Bring your own machine or use a CASCON Configured VM available for others.

Description: APIs play an important role today in providing access to data and capabilities that touch us every day. APIs not only allow companies to monetize their data, but also allow companies to deliver services exclusively through APIs. This is the API Economy.

LoopBack 4 (LB4) is a IBM backed OpenSource platform for building APIs and MicroServices in NodeJS that allows
developers to participate in today’s API Economy with minimal effort. LB4 took key ideas from LoopBack and reengineered them from the ground up and represents the biggest change to the framework since its inception. LB4 is more robust, extensible and simpler than ever before all the while being more powerful.

LB4 allows developers to define API endpoints using the OpenAPI standard (so other compliant tools can be leveraged). It allows you to leverage modern JavaScript (ES2017) or TypeScript (strongly typed JavaScript).

LB4 is still under development but is currently available as a Beta. This workshop will provide attendees a chance to learn about core concepts of the framework (such as Sequence, Context, Controllers, Routes, etc.). Participants will then be guided in applying these concepts to create APIs that leverage IBM Watson and can easily be deployed to IBM BlueMix (or any other cloud provider of their choice).

View Workshop Detail

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**Code The Future! Teach Kids To Program in Elm** *(HandsOn, in Orchid)*

**Chair(s):** Bill O'Farrell, Christopher Anand  
**Theme:** Others  
**Room:** Orchid  
**Format:** HandsOn  
**Level:** Beginner  
**Prereq:**  
**Description:** In recent years, a number of academic, government, non-profit and for-profit groups have been developing tools and curricula for K-12 Computer Science. High schools activities are designed to lead to post-secondary education and to employment. K-8 activities are mostly presented as career-awareness and engagement activities, although some attempts have been made to measure impacts on preparation and enthusiasm for high-school STEM pathways.

In this hands-on workshop we will illustrate our curriculum (using ELM) and approach we have developed, geared for professionals who wish to apply it, or at least to understand how it can enrich education for children.

View Workshop Detail
### Node.js Native Modules *(HandsOn, in Violet)*

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<th>Chair(s):</th>
<th>Sampson Gao, Muntasir Mallick, Anisha Rohra, Jaideep Bajwa</th>
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<td>Theme:</td>
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<tr>
<td>Description:</td>
<td>Node.js is growing in popularity and it is becoming highly likely that you will need to develop Node.js based applications as part of your future solutions. Node.js is lightweight and efficient with an event-driven and non-blocking I/O model, making it a good framework for Microservice architecture. Combining Node.js with Microservice architecture, developers can easily work on individual functional components without affecting the availability and performance of the entire application. Another striking benefit is Node.js' package ecosystem, NPM, is the largest ecosystem of open source libraries in the world, allowing developers to reuse existing modules and libraries into their own solutions. While most code used with Node.js is written in Javascript, it is sometimes necessary to develop native add-ons in C/C++. These add-ons allow Node.js code to interact with existing libraries written in C/C++ or to interact with their environment in ways that the existing Node.js JavaScript API does not support. This workshop is to help you get started in exploiting the benefits of Node.js by teaching you how to fully leverage the power of Node.js native add-ons.</td>
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[View Workshop Detail](#)

### The First Workshop on Blockchain & eHealth: Towards Provable Privacy & Security in Data intensive Health Research *(Speakers, in Conf Center 1)*

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<th>Chair(s):</th>
<th>Reza Samavi, Thomas Doyle, Thodoros Topaloglou</th>
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<td>Theme:</td>
<td>Security</td>
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<td>Room:</td>
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<td>Format:</td>
<td>Speakers</td>
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<td>Level:</td>
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### Description:
The successful adoption of blockchain in auditing of financial transactions and building trust among diverse stakeholders has demonstrated its adaptability in other sectors. The healthcare industry is one of the largest sectors that can be greatly influenced with adoption of blockchain in a variety of applications such as interoperability and cybersecurity of health information exchange (HIE), public health management and health data analytics research. In this workshop, we explore the influence of blockchain technology in promoting data intensive medical research where the data are patient-oriented and the trust and assurance of security and privacy are at its core.

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**Big data analytics - Challenges and applications to health care** *(Speakers, in Conf Center 2)*

**Chair(s):** Serene Wong, Igor Jurisica  
**Theme:** Data Analytics  
**Room:** Conf Center 2  
**Format:** Speakers  
**Level:** Beginner  
**Prereq:** None  
**Description:** With recent technological advancement, biomedical data is growing rapidly, in terms of volume, quality and depth. This creates many challenges, and in this workshop we focus on how one can turn this data using “big data analytics” into knowledge that can be used effectively. One of the main building blocks of this process is diverse networks – typed graphs that provide detailed annotation of relationships among measured entities. This workshop highlights state-of-the-art approaches from machine learning, data mining, and complex graph modeling to translate big data into actionable discoveries. While these approaches can be applied to different domains, this workshop focuses on health care. The enormous amount of health related data such as omics, imaging, clinical, drug and ontology data enables the fathoming of biological mechanisms of diseases and their treatments. However, data alone is not sufficient to achieve precision medicine. Systematic, unbiased analyses of these data are essential to improve treatments and the understanding of diseases. Current computational approaches for turning omics data into knowledge such as identifying prognostic signatures, unraveling mechanism of diseases, and understanding the progression of diseases are presented.
Rationale
With the enormous amount of data, we want to achieve precision medicine where treatment is tailored to individual patients. Systematic, unbiased analyses of these data are essential to generate hypotheses for further clinical validations. Through big data analytics, results may unravel the underlying mechanisms of diseases, disease classifications, diagnostic measures, treatment prognoses, and novel treatments. More relevant diagnostic and treatment planning information will be available to physicians, and better explanation of the disease, its progression, and treatment options will be provided to patients.

Technical/research scope
Data mining, Artificial intelligence, Machine learning, Graph theory, Complex networks

View Workshop Detail

— Using Mini Studies to Gain Competitive Advantage *(Speakers, in Evergreen)*

Chair(s): Joe Wigglesworth, Marcelo Martins
Theme: Evergreen
Format: Speakers
Level: Beginner
Prereq: There are no knowledge prerequisites for this workshop, just an attitude prerequisite of bringing an open mind.
Description:
How to gain a competitive advantage is an important question for businesses and other organizations. But this is a very difficult question to answer. Often, large scale studies or commissions are created with the mandate to exhaustively research a topic and report back to the leadership. But these kinds of studies are expensive in terms of time and staff hours and it can happen that good opportunities are missed because these studies lack agility.

The idea behind this workshop is that mini studies can be used for similar topics, but with the difference of using smaller groups and a much shorter time frame to keep the study focused and to ensure that the study completes while the possibility of gaining a competitive advantage related to the topic still exists.

The purpose of the workshop is to discuss and brainstorm about how best to run mini studies and how best to pick good topics that are appropriate for the mini study process. For example, is it better to take ideas that come down from the senior leaders of the organization, or from practitioners in the field? What are attributes that make a good
mini study topic so that those good topic ideas can be recognized? The last part of the workshop will be a discussion session for coming up with good topic ideas and analyzing them to understand what makes them attractive.

View Workshop Detail

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**Second Annual Workshop on Data Driven Knowledge Mobilization** *(Speakers, in Jasmine)*

Chair(s): Kelly Lyons, Eleni Stroulia, renee miller, Kellogg Booth  
Theme: Data Analytics  
Room: Jasmine  
Format: Speakers  
Level: Beginner  
Prereq: There are no prerequisites required for this workshop.  
Description: Knowledge mobilization and translation describes the process of moving knowledge from research and development (R&D) labs into environments where it can be put to use. There is increasing interest in understanding how knowledge transfer and mobilization takes place. At the same time, the sophistication of data analysis techniques is increasing and the number of available datasets is growing. In this workshop we report on and discuss efforts to understand knowledge mobilization through the analysis of a variety of datasets. We consider knowledge mobilization in industry, academia, and in collaborative industry/academic settings.

View Workshop Detail

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**Cognitive Intelligent Personal Assistants / Agents** *(Speakers, in Primrose)*

Chair(s): Hausi Muller, Norha M. Villegas, Yu Zhao, Ulrike Stege  
Theme: Cognitive Computing  
Room: Primrose  
Format: Speakers  
Level: Beginner  
Prereq:  
Description: In the cognitive era, developers have now a variety of technologies at their finger tips to realize cognitive intelligent
personal assistants. IBM Watson technologies, IoT and cloud platforms, context management systems and adaptive control systems provide ample infrastructure for building cognitive intelligent personal assistants that can gather context on the fly from people and their environments and augment the capabilities of humans and cyber physical systems. With the corpora of ingested knowledge, cognitive systems demonstrate increasing levels of cognitive ability and can engage humans in deep dialogue. Using machine learning technologies, discovery involves finding insights and connections to understand vast amounts of information. Cognitive systems can render decisions made based on evidence and continually evolve based on new information, outcomes and actions. The goal of this workshop is to bring together developers and researchers to explore current research efforts and best practices in the development of cognitive intelligent personal assistants. The invited speakers present their project experiences and discuss the intricacies of intelligent assistant development.

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Congratulations to the Workshop Chairs!

Accepted Workshops

Thank you for your submissions. See you all at CASCON 2017.

Wednesday AM workshops run from 08:30 to 10:15 AM

— Using IoT and cognitive services to provide a personalized experience (HandsOn, in Holly-Butternut)

Chair(s): Cesar Orozco, Heath Thomann, Kyle Johnson, David Christensen
Theme: Internet of Things (IoT)
Room: Holly-Butternut
Format: HandsOn
Level: Beginner
Prereq: 
Description: Every day the world becomes more and more connected. Everything from the cars we drive, the phones we use, devices we wear, and to the factories producing our products. These devices can be linked together and to a huge network of data. It is estimated that by 2020 there will be 50 billion Internet of Things (IoT) devices and an estimated 90% of cars will be connected.
Taking advantage of IoT we can build applications that provide a more personalized experience for each individual user, not only by displaying personalized content, but also by changing the look and feel of the application itself to adapt it to how people “feel” about certain topics, this can be achieved by using the cognitive capabilities of Watson to analyze social networks, in combination with physical sensors we can personalize the experience even more by using information from the environment.

Large companies and independent developers can implement applications that use this combination of technologies to create a new generation of applications, making both the products offered by these applications and the applications themselves more attractive to users.

By implementing this system, users will have the possibility to enter a set of keywords, Watson can analyze social networks (user’s own posts or the social network in general) using this keywords to determine how to change the look and feel of the application, for example, if Watson detects that users are upset, using color psychology, it can automatically change the colors of the application in an attempt to influence the mood of the users, combining this system with light sensors, the application can adapt the colors chosen by Watson to the current light conditions in the user’s environment.

SimpleLink SensorTag by Texas Instruments is a relatively low cost IoT-ready device designed for early adopters and IoT enthusiasts to start experimenting. It has sensors for different purposes: Infrared thermopile temperature, 9-axis motion, altimeter/pressure, ambient light, magnet and humidity sensors. It works under Bluetooth Low Energy (BLE) technology supported by Bluetooth 4.0 and is compatible with Beacons and Bluetooth Smart. The Texas Instruments BLE mobile application allows you to quickly put the data gathered by these sensors right onto the IBM IoT Foundation (IBM IoTF) cloud, either on the Quick Start boilerplate or well in a custom IoT application powered by IBM IoTF.

While IoT is still a buzz word, it is mature enough that most people have a general idea what it is, and what a ‘thing’ is. But what might not be as clear is how to connect to an IoT ‘thing’ to do something useful. That is, the concept of IoT might still be somewhat nebulous, and using it to one’s advantage is still a mystery for most people.

Given the proliferation of small, low consumption sensors, there is a need for software that can be used to create IoT applications that can tie together devices and its data to users. Enter Node-RED. Node-RED is used to create IoT applications. It is a Flow-based Programming tool, meaning it is a network of connected “nodes” where each node has a specific purpose. For example, a node can be created to listen to a sensor on a device, such as a SensorTag, and
pass the sensor data to a temperature function node which might act upon the data at a certain threshold by sending the data to an email, or twitter, node. The network of connected (wired) node is consider a flow.

In this workshop, the attendee will learn how to connect an IoT device to the IBM IoT Foundation (running on IBM Bluemix) to retrieve its data and combining it with Watson services to personalize the experience in the application. A mobile / web application, that displays relevant information to the user, and a Bluemix application, running the backend and gathering the data from IoT Foundation, will be developed using IBM Rational Application Developer.

**View Workshop Detail**

— **Machine Learning Basics with IBM Data Science Experience** *(HandsOn, in Orchid)*

Chair(s): Xueqi Fan, Mihai Iacob, Mihai Nicolae, Eric Dong  
Theme: Data Analytics  
Room: Orchid  
Format: HandsOn  
Level: Beginner  
Prereq: Please sign up for IBM Data Science Experience. https://datascience.ibm.com/  
Description: Participants will learn how the IBM Data Science Experience provides them with a complete framework to manage the end-to-end machine learning workflow.

**View Workshop Detail**

— **Workshop on Financial Risk Analytics** *(Speakers, in Primrose)*

Chair(s): Oleksandr Romanko, Alex Kreinin  
Theme: Data Analytics  
Room: Primrose  
Format: Speakers  
Level: Beginner  
Prereq: None
This workshop presented recent research in risk management, highlighting innovations for obtaining more realistic, yet computationally practical, risk assessments. The presentations featured novel applications of computational tools to a cross-section of financial risk management problems. Specifically, Monte Carlo simulation and optimization were used to manage market, credit and operational risks, and to trade effectively in the face of uncertainty. The workshop facilitated the exchange of information between members of academia and industry, and encouraged future collaborative research in financial risk management.

View Workshop Detail
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Wednesday PM workshops run from 02:15 to 05:00 PM

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**Expose RESTful Microservices Using OpenAPI, WebSphere Liberty and IBM Cloud** *(HandsOn, in Holly-Butternut)*

Chair(s): Leo Christy Jesuraj, Arthur De Magalhaes  
Theme: Cloud Computing  
Room: Holly-Butternut  
Format: HandsOn  
Level: Beginner  
Prereq: The following prerequisites must be completed prior to beginning this workshop:  
- An IBM Cloud (Bluemix) account is available and ready for use. If you do not have an account, register for your free trial at https://console.bluemix.net  
- Familiarity with basic Linux commands  
Description: Application programming interfaces (APIs) are everywhere around us today. Just think – every time you post,
comment or "like" on social media or every time you complete a transaction online, you are interacting with an API. API Economy is a vast domain that covers the exposure and invocation of services from and to anywhere. Cloud computing, mobile devices and the Internet of Things (IoT) are the main catalysts behind the growth of the API Economy. At the center of the API Economy are RESTful APIs because they are, by nature, language-neutral and by far the most widely used type of API today.

The OpenAPI Specification (OAS), originally known as the Swagger Specification, is a specification for machine-readable interface files for describing, producing, consuming, and visualizing RESTful Web services. It's language-agnostic and is also extensible into new technologies and protocols beyond HTTP. The new version of OAS, OpenAPI 3.0, introduces new concepts such as Links and includes lots of improvements such as support for describing callbacks, enhanced security definitions, improved examples, and more.

WebSphere Liberty now provides the way to document and expose REST APIs using OpenAPI 3.0. It also allows to explore all APIs available on a Liberty server easily in a central place. You can also easily push your APIs into the cloud using IBM Cloud.

View Workshop Detail

Introduction to Kubernetes (HandsOn, in Orchid)

Chair(s): Serjik Dikaleh, Ozair Sheikh, Chris Felix
Theme: Cloud Computing
Room: Orchid
Format: HandsOn
Level: Beginner
Prereq: It is nice to have general understanding of cloud computing, cloud native applications, containers (specifically Docker). General familiarity to work with the command line in a Linux environment.
Description: Kubernetes offers a set of capabilities that help with both administration and runtime concerns. It defines a consistent approach to deploying applications, and decouples the deployment process from actual hosts where the application is deployed (whether physical machines or virtual). It also addresses the runtime concerns of an application such as scaling and routing traffic to multiple instances of the same application.

In this session you will learn the main concepts in Kubernetes, and become familiar with some of the
objects/resources that Kubernetes offers to facilitate the deployment and scaling applications. We will perform hands-on and step-by-step exercises to get to know Kubernetes both from a developer’s standpoint, and from the operations team’s. This is an important piece in enabling DevOps in your projects.

View Workshop Detail

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DevOps Toolchains for Continuous Engineering and Improvement *(Speakers, in Primrose)*

Chair(s): Kostas Kontogiannis, Don Cronin, Alberto Giammaria, Chris Brealey, Marios-Stavros Grigoriou

Theme: Systems

Room: Primrose

Format: Speakers

Level: Intermediate

Prereq: A good understanding of software the life-cycle, process models, and development practices.

Note: The list of speakers is tentative and will be updated once other external speakers are confirmed. Will involve 5 speakers (2 from IBM, 1 from SEI, and 2 from academia).

Description: A key issue that emerges in the software engineering community is how to provide efficient DevOps that minimize deployment risk during the continuous the delivery of new features. This workshop aims to bring experts from industry and academia to discuss and debate the latest trends related to the design of frameworks that support DevOps practices of complex systems which are developed and evolved within a “Measure-Analyze-Assess-Act” loop. Such frameworks utilize software repositories, software analytics, process analytics, the quantification of technical debt as a failure risk predictor, and the system’s run-time behavior to dynamically assess deploy/no-deploy choices and achieve continuous deployment.

View Workshop Detail
Workshops at CASCON 2017 will provide a forum to present, discuss, and debate issues, problems, ideas, technology gaps, work-in-progress, and/or directions. The format of a workshop may include position papers, expert panels, hands-on exercises, and discussions. All submitted workshop proposals require long abstracts of 1500 words maximum, typically including the abstract, rationale, technical/research scope, organizers, workshop format, and expected outcomes. Long abstracts of accepted workshops will be included in the conference proceedings published by CASCON and included in the ACM Digital Library.
Congratulations to the Workshop Chairs!

Accepted Workshops

Thank you for your submissions. See you all at CASCON 2017.

<table>
<thead>
<tr>
<th>Monday PM</th>
<th>Tuesday PM</th>
<th>Wednesday AM</th>
<th>Wednesday PM</th>
<th>Wednesday Full Day</th>
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</table>

Wednesday Full-Day workshops run from 08:30 to 10:15 AM, and then continue from 02:15 to 05:00 PM.

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Skills Lab / Cloud Academy / Skills Academy Workshop *(HandsOn, in Violet)*

Chair(s): Trevor Deley, Dennis Buttera, Jennifer Collins

Theme: Others

Room: Violet

Format: HandsOn

Level: Beginner

Prereq:
- Participants with an interest in skills development.
- Participants interested in discussing the future of skills training and competencies.
- Participants interested in collaborative skills training practices.

Description:
Industry technology skills are in high demand as skills gaps in Canada and abroad continue to grow. How can organizations make the most of their skills training given the volatility and quick turnover of new technologies?

Participants will learn about the IBM Advanced Studies Skills Lab and ecosystem through Dennis Buttera. Dennis will talk about the STEAM academy, the Skills Academy, Cognitive Class, On the Hub and other similar initiatives meant to...
bring in-demand industry skills to current students.

Participants will also learn about the IBM Cloud Academy and IBM Academic Cloud from Andy Rindos (RTP & WW CAS leader), with a demo of the latter. Through a front-end based on Apache VCL (see https://vcl.apache.org/), the IBM Academic Cloud provides IaaS-based images of popular IBM and open sources software (on Docker containers, all major hypervisor-based VMs, full physical machines and server clusters) - along with one-click connectivity to IBM Buemix (PaaS), various IBM SaaS-based analytics software (including WAP, WKS, etc.) and IBM Q (quantum computing) programming tools and emulators. The IBM Cloud Academy represents a community of universities (with IBM) working together to sponsor projects and events improving cloud computing solutions and content in support of education and research.

Participants will hear from Pat Martin, a researcher looking into how to develop and teach cognitive computing in a rapidly evolving skills landscape. He will also talk about the challenges of keeping content up to date in such fast moving industries.

Finally, on the issue of skills relevance, participants will also hear about IBM Advanced Studies initiative called InnovationX, which serves to connect researchers, IBMers, and external collaborators for agile and scale-able skills development.

View Workshop Detail

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**Compiler-Driven Performance (Speakers, in Conf Center 1)**

Chair(s): Karim Ali, Andrew Craik, Bardia Mahjour, Gregor Richards  
Theme: Systems  
Room: Conf Center 1  
Format: Speakers  
Level: Intermediate  
Prereq: compilers  
Description: Short Abstract

The compiler-driven performance workshop will consist of the presentation of reports on research progress at various academic and industrial sites across Canada and in the United States. Topics to be discussed in the workshop will include, but are not limited to:
Blockchain Technology (Speakers, in Conf Center 2)

Chair(s): Omid Sadeghi, Volodymyr Paprotski, Arno Jacobsen, Vadim Berestetsky, Phil Coulthard
Theme: Others
Room: Conf Center 2
Format: Speakers
Level: Beginner
Prereq: None.
Description: Blockchain technology has received a significant amount of attention over the last few years as this emerging technology holds significant potential. Use cases are many and varied: ranging from programmable cryptocurrencies to property deeds management to provenance tracking to voting records. With a promising future to disrupt the current value chains and the society, a full-day workshop on this topic seems necessary to help understand this technology and its potential. We will cover introductory concepts, define what a blockchain is, delve into prominent realizations such as Ethereum and Hyperledger, and exemplify use cases. The outcome for the participants is a solid understanding of blockchain technology and industry use cases, which require more in-depth analysis and research and to open a further collaboration opportunity for the participants.

View Workshop Detail
**Advances in Open Runtime Technologies for the Cloud** *(Speakers, in Evergreen)*

<table>
<thead>
<tr>
<th>Chair(s):</th>
<th>Daryl Maier, Kenneth Kent</th>
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<tbody>
<tr>
<td>Theme:</td>
<td>Cloud Computing</td>
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<tr>
<td>Room:</td>
<td>Evergreen</td>
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<td>Format:</td>
<td>Speakers</td>
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<td>Level:</td>
<td>Intermediate</td>
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<td>Prereq:</td>
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<tr>
<td>Description:</td>
<td>Modern language runtimes are complex, dynamic environments that</td>
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<td>involve a myriad of components that must work cooperatively to</td>
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<td>achieve the functional and performance requirements of a given</td>
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<td>language. Typical core runtime technologies include dynamic</td>
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<td>just-in-time compilers for performance, garbage collection for</td>
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<td>heap management, platform abstraction for ease of portability</td>
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<td>to different hardware and operating system environments,</td>
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<td>developer tooling for diagnosis and tuning of the various</td>
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<td>components, and interoperability between different language</td>
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<td>environments. Cloud services such as IBM Bluemix or AWS are</td>
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<td>increasingly becoming the environments where applications are</td>
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<td>developed and deployed, data is stored, and businesses are run.</td>
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<td>Many of the features that define a cloud (e.g., resiliency,</td>
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<td>elasticity, consistency, security) are realized through runtime</td>
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<td>technologies. Clouds are polyglot environments, and therefore</td>
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<td>advances in cloud development are directly driven by innovation</td>
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<td>in runtime technologies. However, cloud environments pose</td>
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<td>unique, often conflicting demands on runtime systems that are</td>
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<td>often less of a concern in isolated systems. Throughput</td>
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<td>performance (how fast is my app?), density (how many instances</td>
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<td>of my app can I run simultaneously in my provisioned</td>
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<td>environment?), startup performance (how quickly can I launch a</td>
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<td>new instance of my app?), and language interoperability (how</td>
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<td>can my Ruby app efficiently call a function in a Python</td>
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<td>module?) are all important considerations that require</td>
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<td>innovation to solve effectively. The goal of this workshop</td>
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<td>is to bring together development and research communities to</td>
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<td>share and discuss innovations, challenges, and research</td>
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<td>across a broad set of open-source runtime technologies (such</td>
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<td>as Eclipse OMR, LLVM, Eclipse OpenJ9, Node.js) for cloud</td>
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<td>environments. The focus on open technology solutions is key as</td>
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<td>it allows for greater collaboration amongst individuals,</td>
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<td>communities, researchers, and companies through shared learning</td>
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<td>on common technology.</td>
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[View Workshop Detail]
Design for Social Impact (Speakers, in Jasmine)

Chair(s): Cathy Edwards, Jennifer Collins, Ngoni Chipere
Theme: Others
Room: Jasmine
Format: Speakers
Level: Beginner
Prereq: Curiosity about Design Thinking
Interest in collaborative processes
Description: Design thinking is a skill set (and mindset) that brings multiple views and perspectives together to observe, reflect and make new solutions. It incorporates the lived experience and needs of users in order to create solutions that are congruent to user needs and lived experience.

Through a series of group activities, participants enter an open collaborative process where ideas are not "owned" by individuals. Moving through the stages of the double-diamond design thinking model created by the British Design Council, together we will apply IBM Design Thinking practices to explore skills experiences for students. We will focus on cross-cultural service learning experiences that can help communities explore, reframe and resolve local challenges, and realize social impact.

Participants will work real-time on understanding the problem, empathizing with the lived experience, reframing the problem, and ideating possible solutions. These activities will introduce a set of tools that, through practice, can be applied effectively to a breadth of challenges in business, engineering and society.

Design thinking is a mindset that benefits from diverse perspectives and viewpoints. We encourage all CASCON attendees to join us for this compelling workshop.

View Workshop Detail
The Technology Expo at CASCON 2017 will provide an excellent opportunity to highlight your research results and generate interest in upcoming product and product areas. Exhibits on emerging technologies are encouraged. The format of an exhibit may be a
demonstration, poster presentation, or a short talk. A booth is provided at no cost to the exhibitors. Each demonstration booth will be set up with power and wireless internet access. Exhibitors are responsible for bringing the necessary equipment such as machines, laptops, monitors, power cables, and security locks; and any printed materials including posters.

Click here to download Call for Exhibits

Accepted exhibits

Congratulations to the exhibit chairs and thank you for your submissions. See you all at CASCON 2017.

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<th>Monday</th>
<th>Tuesday</th>
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See details below:

Exhibit Sessions - 11:45 to 12:45 and 17:00 to 19:30
— **P1: A Machine Learning Based Application Autonomic Management System on Software Defined Networks**

Booth Number: P1  
Title: A Machine Learning Based Application Autonomic Management System on Software Defined Networks  
Chair(s): Nasim Beigi, Mark Shtern, Marin Litoiu, Joe Wigglesworth, and Radu Mateescu  
Format: Poster  
Description: In this work, we propose and implement a machine learning based autonomic manager that controls the bandwidth rates allocated to each scenario of a web application to postpone scaling out for as long as possible despite change in the workload and application configuration. Through experiments, we demonstrate that the autonomic manager is able to quickly meet Service level Agreement (SLA) and reduce the SLA violations by 56% compared to a previous heuristic-based approach.

Industry Company: IBM  
Project Number: 1004  
Product Name: IBM PureApp  
Research Team:  
**York University:** Nasim Beigi, Mark Shtern, Marin Litoiu  
**IBM CAS:** Joe Wigglesworth, and Radu Mateescu

— **D1: Analytics for Endpoints System Data**

Booth Number: D1  
Title: Analytics for Endpoints System Data  
Chair(s): arash Habibi Lashkari  
Format: Demo  
Description: There is a hypothesis that by collecting large amounts of data from endpoints and doing analysis, comparisons and data mining a system could detect systems infected with malware that is currently undetectable by state of the art security systems. This same data could be used for finding eavesdropping
software used by a rogue employee and event data theft. At this point we present the first part of the
User's Universal Security Profile namely network profile out of all five profiles.

<table>
<thead>
<tr>
<th>Industry Company:</th>
<th>IBM</th>
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<tbody>
<tr>
<td>Project Number:</td>
<td>1042</td>
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<tr>
<td>Product Name:</td>
<td>UUP</td>
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<tr>
<td>Web Site:</td>
<td><a href="http://unb.ca/cic/research/applications.html">http://unb.ca/cic/research/applications.html</a></td>
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<tr>
<td>Research Team:</td>
<td><strong>Canadian Institute for Cybersecurity (CIC):</strong> Arash Habibi Lashkari</td>
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**P2: Approximation Algorithms for Instruction Scheduling and Rapid Prototyping in Coconut**

<table>
<thead>
<tr>
<th>Booth Number:</th>
<th>P2</th>
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<tbody>
<tr>
<td>Title:</td>
<td>Approximation Algorithms for Instruction Scheduling and Rapid Prototyping in Coconut</td>
</tr>
<tr>
<td>Chair(s):</td>
<td>Curtis D'Alves</td>
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<tr>
<td>Format:</td>
<td>Poster</td>
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<td>Description:</td>
<td>We explore approximation algorithm based solutions for instruction scheduling on the IBM Z architecture and MASS API capable of scheduling near-optimal code. This includes a relaxation of the problem to a continuous model and a stochastic non-linear programming solution. In collaboration with this project, we have extended our development environment Coconut for modelling code dependencies and generation of scheduled code.</td>
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<th>Industry Company:</th>
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<tr>
<td>Project Number:</td>
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<tr>
<td>Product Name:</td>
<td>Approximation Algorithms for Instruction Scheduling</td>
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<tr>
<td>Research Team:</td>
<td><strong>McMaster University:</strong> Curtis D'Alves Dr Christopher Kumar Anand Wolfram Kahl</td>
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<td><strong>IBM:</strong> Robert Enenkel Bill O'Farrell</td>
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**P3: Bridging the Gap between Deep Learning and Sparse Matrix Format Selection**
Bridging the Gap between Deep Learning and Sparse Matrix Format Selection

Chair(s): Yue Zhao
Format: Poster
Description: Sparse matrix vector multiplication (SpMV) is an important kernel in many applications. In this work, we conduct a systematic exploration on the promise and challenges of deep learning for the sparse matrix format selection. We propose a set of novel techniques to solve special challenges to deep learning, including input matrix representations, a late-merging deep neural network structure design, and the use of transfer learning to alleviate cross-architecture portability issues.

Industry Company: IBM
Project Number: 1009
Product Name: Cognitive Computing-Based Compilation
Research Team: NCSU: Yue Zhao, Xipeng Shen
IBM: Graham Yiu

P4: Center for Health Informatics and Analytics

Booth Number: P4
Title: Center for Health Informatics and Analytics
Chair(s): Randy Giffen
Format: Poster
Description: The Center for Health Informatics and Analytics is a collaboration between Memorial University and IBM Canada. The goal of the center is to jointly develop and validate solutions that help translate knowledge and data into action. The solutions will support both clinical and administrative scenarios. The center is based on a vision for healthcare transformation. Lower healthcare costs can be achieved by improving efficiency and effectiveness and ultimately by improving health.

Industry Company: IBM
— **P5: Cold Object Segregation**

Booth Number: P5  
Title: Cold Object Segregation  
Chair(s): Scott Young, Kenneth Kent, Gerhard Dueck  
Format: Poster  
Description: Cold (infrequently referenced) objects can take up extra space in the areas of memory reserved for frequently accessed, tenured objects. Identifying all cold objects in tenured space during runtime is expensive. This project seeks to find an algorithm for selecting candidate cold objects to be moved to secondary storage so that the difference between time saved during garbage collection and time spent performing the selection is maximized.

Industry Company: IBM  
Project Number 1001  
Product Name: OMR and J9  
Web Site: http://www.unb.ca/research/casatlantic/  
Research Team: **UNB**: Scott Young, Kenneth Kent, Gerhard Dueck  
**IBM Canada**: Randy Giffen

— **D2: Eliminating the societal impact of learning disabilities with cognitive computing**

Booth Number: D2  
Title: Eliminating the societal impact of learning disabilities with cognitive computing  
Chair(s): Devan Shah, Will Scott, Larry Lindsay
Nearly one billion individuals live with some form of learning disability, or benefit from learning in different ways, such as those living with autism spectrum disorder. What if machine learning and cognitive computing-based assistive technologies could eliminate the societal and socio-economic challenges faced by these individuals in the future? In this hands-on demo, the audience will learn about IBM’s cutting-edge research in this space, the IBM AbilityLab Content Clarifier.

Web Site: http://contentclarifier.mybluemix.net/
Research Team: IBM: Devan Shah Will Scott Larry Lindsay Thomas Brunet

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**D3: Foodie: A Conversational Agent for the Smart Kitchen**

Booth Number: D3
Title: Foodie: A Conversational Agent for the Smart Kitchen
Chair(s): Prashanti Angara, Miguel Jimenez, Hausi Muller, Ulrike Stege
Format: Demo
Description: Conversational agents aim to offer an alternative to traditional methods for humans to engage with technology. Foodie is a conversational kitchen assistant that uses IBM Watson's conversational services to recognize users' intents and understand events related to the users and their context. Foodie uses services from CAPRecipes—our context-aware personalized recipe recommender system, SmarterContext—our personal context management system, and selected publicly available nutrition databases.

Industry Company: University of Victoria
Product Name: Foodie Fooderson
Research Team: University Of Victoria: Prashanti Priya Angara Miguel Jimenez Hausi Muller Ulrike Stege
IBM Canada Ltd.: Joanna W. Ng

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**D4: IBM Data Science Experience Local**
Booth Number: D4
Title: IBM Data Science Experience Local
Chair(s): Mihai Iacob, Mihai Nicolae
Format: Demo
Description: Bring Data Science Experience (DSX) to your private cloud and use the tools you know and love: Jupyter notebooks, Zeppelin notebooks, RStudio, all powered by Apache Spark. The admin dashboard lets you control your cluster from managing users to CPU, memory, network, and storage usage. DSX provides a collaborative environment where a team can collaborate on a project, and share notebooks, data sources, etc.
Industry Company: IBM
Business unit: IBM Analytics
Product Name: IBM Data Science Experience Local
Web Site: https://datascience.ibm.com/local
Research Team: IBM Canada: Mihai Iacob, Mihai Nicolae

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**P8: IBM High-Performance Mathematical Function Libraries**

Booth Number: P8
Title: IBM High-Performance Mathematical Function Libraries
Chair(s): Robert Enenkel
Format: Poster
Description: We show how to accelerate numerically intensive applications with the IBM MASS and ATLAS high-performance math libraries, which are tuned for optimal performance on IBM POWER and zSeries processors. MASS provides elementary functions (e.g. exp, log, sin, cos, etc.) while ATLAS provides linear algebra functions (e.g. DGEMM). We also show how to use MASS automatically through the IBM XL C/C++ and Fortran compilers.
Business unit: IBM Systems
### P9: MASS library scalar math functions for the Go Language

**Booth Number:** P9  
**Title:** MASS library scalar math functions for the Go Language  
**Chair(s):** Bill O'Farrell  
**Format:** Poster  
**Description:** Improving scalar math performance in the Go programming language on IBM Z. We took the scalar MASS libraries and translated them from Z assembly to Go assembly, had them approved as open source, and contributed them to Go. The translation was done automatically (mostly) via a python script. The project is complete and was included in go 1.9.

**Industry Company:** IBM  
**Business unit:** Systems  
**Product Name:** Go Language (Open-Source) on IBM Z  
**Research Team:** IBM: Bill O'Farrell  Kang Zhang  Annita Zhang  Robert Enenkel

### P6: NUMA GC

**Booth Number:** P6  
**Title:** NUMA GC  
**Chair(s):** Maria Patrou  
**Format:** Poster  
**Description:** Non-uniform Memory Access (NUMA) systems use different types of memory accesses. IBM's Java Virtual...
Machine identifies a NUMA architecture, while using memory and threads from the available nodes in a distributed way. A design for a node-isolated memory achieved by a node-heap resize functionality and a thread policy is proposed. Finally, different modes regarding hardware and thread characteristics are investigated to identify the application attributes that can benefit from specific modes.

Industry Company: IBM
Project Number: 1020
Product Name: IBM SDK
Web Site: http://www.unb.ca/research/casatlantic/
Research Team: University of New Brunswick: Maria Patrou, Kenneth B. Kent, Gerhard W. Dueck
IBM Canada: Charlie Gracie, Aleksandar Micic

**D5: Optimization of Parametric GPU kernel**

Booth Number: D5
Title: Optimization of Parametric GPU kernel
Chair(s): Marc Moreno-Maza, Haoze Yuan, Masoud Ataei Jaliseh
Format: Demo
Description: This work deals with the optimization of computer programs targeting Graphics Processing Units (GPUs). The goal is to lift, from programmers to optimizing compilers, the heavy burden of determining program details that are dependent on the hardware characteristics. The expected benefit is to improve robustness, portability and efficiency of the generated computer programs.

Industry Company: IBM
Project Number: 880
Product Name: IBM XL compiler
Web Site: www.metafork.org
Research Team: University of Western Ontario: Marc Moreno-Maza, Haoze Yuan, Masoud Ataei
D6: Optimizing your Workforce by Leveraging IBM Predictive Analytics

- **Booth Number:** D6
- **Title:** Optimizing your Workforce by Leveraging IBM Predictive Analytics
- **Chair(s):** Rebecca Young
- **Format:** Demo
- **Description:** IBM Predictive Analytics is used to identify how to address unwanted employee attrition, a problem that can affect any organization within any industry. This solution can be deployed at any stage of the data analytics maturity curve and users from both business and technical groups can leverage IBM Predictive Analytics to derive value and address their organizational challenges.

D7: PANORAMA: Deployment Specification in the Context of Large Scale Systems

- **Booth Number:** D7
- **Title:** PANORAMA: Deployment Specification in the Context of Large Scale Systems
- **Chair(s):** Miguel Jimenez, Hausi Muller, Gabriel Tamura, Norha M. Villegas
- **Format:** Demo
- **Description:** DevOps has dramatically influenced how/when deployment is realised. However, little effort has been devoted to the need for deployment and configuration specifications to support the various levels of detail and abstraction present in large-scale systems. In this exhibit, we present PANORAMA, our envisioned environment to design and visualise large-scale continuous deployment based on the OASIS TOSCA
**P7: Phishing Numbers**

Booth Number: P7  
Title: Phishing Numbers  
Chair(s): Guy Jourdan, Qian Cui  
Format: Poster  
Description: Are popular websites hacked to host phishing attacks? Why do phishing sites sometimes redirect their victims to other sites? How often are phishing attacks hosted on compromised servers? What are the most common paths used in phishing attacks?... We have been gathering sample phishing attacks for the past 18 months, and have conducted a number of analyses to answer some of these questions. This exhibit will provide an overview of our findings to date.

Industry Company: IBM

Project Number: 921  
Product Name: Security Forensics  
Research Team:  
*University of Ottawa:* Guy-Vincent Jourdan, Gregor Bochmann, Qian Cui, Sophie LePage  
*IBM:* Vio Onut, Russ Couturier

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**P10: Poly1305 acceleration on the IBM z14**

Booth Number: P10  
Title: Poly1305 acceleration on the IBM z14  
Chair(s): Bill O'Farrell, Umme Salma Gadiwala  
Format: Poster
IBM z14 has a new integer multiply instruction which is very useful for use in cryptography. Implemented with the floating point pipeline, the instruction -- Vector Multiply Sum Logical -- can be used to accelerate "limbified" multiplication operations that are common in cryptography. We explored this instruction by applying it to a high-performance version of the Poly1305 signing algorithm.

Industry Company: IBM
Business unit: Systems
Product Name: Go Language (Open-Source) on IBM Z
Research Team: McMaster University: Umme Salma Gadirwala Christopher Kumar Anand Curtis D’Alves
IBM: Bill O’Farrell Jonathan Bradbury Michael Munday

**P11: Quantifying Duplication to Improve Data Quality**

Booth Number: P11
Title: Quantifying Duplication to Improve Data Quality
Chair(s): Yu Huang
Format: Poster

Description: We present a record deduplication framework that differentiates terms during the matching process to improve overall accuracy. We also define a duplication metric that quantifies the level of duplication for an attribute value, and within an attribute. This metric can be used by analysts to understand the distribution and similarity of values during the data cleaning process.

Industry Company: IBM
Project Number: 923
Product Name: IBM Watson Analytics
Research Team: McMaster University: Yu Huang Fei Chiang
IBM Ottawa: Martin Petitclerc
IBM Germany: Albert Maier Yannick Saillet
--- **P12: Recommender System for IBM Watson Analytics-Algorithm Development**

**Booth Number:** P12  
**Title:** Recommender System for IBM Watson Analytics-Algorithm Development  
**Chair(s):** Parisa Lak  
**Format:** Poster  
**Description:** IBM Watson Analytics (WA) provides users with visualization recommendations for their provided dataset using a rule based system. Recommender systems (RS) are a set of learning algorithms that provide personalized recommendations to the users based on their historical preferences. In this work, we design a RS that receives user’s historical interaction with WA as input, and provides a list of recommendations that are uniquely generated based on his/her prior interaction with the system.

**Industry Company:** IBM  
**Project Number:** 919  
**Product Name:** Watson Analytics  
**Research Team:**  
- **Ryerson University:** Parisa Lak, Can Kavaklioglu, Ayse Bener, Andriy Miranskyy  
- **IBM:** Martin Petitclerc, Graham Wills

--- **P13: Runtime Automatic Parallelization of JVM Applications**

**Booth Number:** P13  
**Title:** Runtime Automatic Parallelization of JVM Applications  
**Chair(s):** Akihiro Hayashi, Gita Koblents  
**Format:** Poster  
**Description:** In this IBM-Rice University collaboration, we push the bounds on integrating JVM applications with GPU
accelerators. This work uses advanced code generation and performance prediction techniques to effectively and automatically offload JVM applications including Apache Spark to hardware accelerators.

Industry Company: IBM
Project Number: 900
Product Name: IBM Testarossa Compiler, IBM J9 VM, IBM Spark-DK
Research Team: Rice University: Akihiro Hayashi Max Grossman Vivek Sarkar
IBM Canada: Gita Koblents Jimmy Kwa Alon Shalev Housfater
IBM Research - Tokyo: Kazuaki Ishizaki

— **P14: Supporting Microservice Evolution**

Booth Number: P14
Title: Supporting Microservice Evolution
Chair(s): Julia Rubin
Format: Poster
Description: Microservices have become a popular pattern for deploying scale-out application logic. An advantage of using microservices is their loose coupling, which leads to agile and rapid evolution, and continuous re-deployment. However, developers are tasked with managing this evolution and largely do so manually by continuously evaluating low-level service behaviors. This is tedious, error-prone, and slow. In this exhibit, we discuss how our approach can help engineers with these tasks.

Industry Company: IBM
Project Number: 1040
Product Name: IBM Bluemix
Research Team: University of British Columbia: Harshavardhan Kadiyala, Bo Hu, Ivan Beschastnikh, Julia Rubin
IBM: John Steinbacher, Tony Erwin
Federal University of Pernambuco: Adalberto R. Sampaio Jr., Nelson Rosa
P15: ThreadedPaws: A Serious Game for Learning the Pitfalls of Concurrent Programming

- Booth Number: P15
- Title: ThreadedPaws: A Serious Game for Learning the Pitfalls of Concurrent Programming
- Chair(s): Luisa Rojas, Jeremy Bradbury, Michael Miljanovic
- Format: Poster
- Description: Advances in multi-core processors continue to increase the need for concurrent programming. Unfortunately, writing concurrent programs remains difficult due to the many, possibly unexpected program executions. Furthermore, students learning concurrent programming need to comprehend and avoid common pitfalls such as data races and deadlocks. To address this need, we have developed Threaded Paws, a game-based learning tool that teaches students to identify and fix concurrency pitfalls and bugs.

Research Team: University of Ontario IT: Luisa Rojas, Jeremy S. Bradbury, Michael Miljanovic

P16: Variability-aware analysis of C++ Code

- Booth Number: P16
- Title: Variability-aware analysis of C++ Code
- Chair(s): Nazim Uddin Bhuiyan, Samer AL Masri
- Format: Poster
- Description: IBM's Eclipse OMR project is a C++ language-agnostic library of run-time components. It implements software variability through static polymorphism (specifically, extensible classes) and #ifdef directives. OMR developers need to reason about multiple architectures and language extensions in an efficient manner, but to the best of our knowledge, there are no existing variability-aware C++ analysis tools that support OMR’s variability implementation. This project aims to provide such support.

Industry Company: IBM
Expo Reception / Short Talks / PechaKucha Expo Presentations

Welcome - 17:15 to 17:45

Short Talk Sessions - 17:45 to 18:15 (2 talks). Talks order as follows (15 mins each)

— **S1: Introduction to Digital Process Automation**

**Booth Number:** S1  
**Title:** Introduction to Digital Process Automation  
**Chair(s):** Sebastian Carbajales, Allen Chan  
**Format:** Short Talk

**Description:** Mundane, repetitive tasks and inflexible processes can hinder the speed where business can react to new challenges or new opportunities. Come here to learn how IBM Digital Process Automation can increase your business success by using the latest automation and cognitive technology.

**Industry Company:** IBM  
**Business unit:** BPM  
**Product Name:** IBM Digital Process Automation  
**Research Team:** IBM: Sebastian Carbajales, IBM BPM Development  
**IBM:** Allen Chan, IBM Distinguished Engineer
Safety Assurance in the Automotive Domain and Model Based Techniques to Support it

Booth Number: S2
Title: Safety Assurance in the Automotive Domain and Model Based Techniques to Support it
Chair(s): Sahar Kokaly
Format: Short Talk
Description: Software has become a large part of many systems including autonomous vehicles. To address issues such as safety and security, compliance of software has emerged as a key issue. Software compliance is costly and is often accomplished by producing "assurance cases". As systems evolve, maintaining assurance cases multiplies the effort. We propose model-based techniques to address issues such as assurance case evolution and reuse. We focus on the automotive domain and the ISO 26262 safety standard.

Research Team: McMaster University/University of Toronto: Sahar Kokaly
University of Toronto: Rick Salay
University of Toronto: Marsha Chechik
McMaster University: Mark Lawford
McMaster University: Tom Maibaum

Break - 18:15 to 18:25

PechaKucha Sessions - 18:25 to 19:30. (13 talks). Presentations order as follows (5 mins each)

A Hierarchical and Dynamic Security Control System for Large Scale Systems

Exhibit Session: Tuesday D1
Title: A Hierarchical and Dynamic Security Control System for Large Scale Systems
We propose a hierarchical distributed architecture for security control in order to partition responsibility and workload among many security controllers. Our architecture proposes a more simplified way of defining security rules to allow security to be enforced on an operational level, rather than a development level. We demonstrate the ability of our system to expand with additional sensors, traffic data and detection rules at run time in a systematic manner.

Industry Company: IBM
Project Number: 1004
Product Name: IBM PureApp
Research Team: York University: Yar Rouf, Mark Shtern, Marios Fokaefs, Marin Litoiu
IBM: Vio Onut

A Scalability-oriented Benchmark Suite for Node.js on the Cloud

Chair(s): Jiapeng Zhu, Panagiotis (Panos) Patros
Format: Poster
Description: Clouds provide on-demand and pay-as-you-go computing resources to their end users. Node.js is a popular choice for cloud applications as it is event-driven, asynchronous and non-blocking. However, Node.js underutilizes multi-core CPUs due to its single-threaded nature, which limits its scalability on the cloud. Because no scalability-oriented benchmark suite exists for Node.js, we will focus on developing one. Our benchmarking suite will facilitate and quantify Node.js scalability improvements.

Industry Company: IBM
Project Number: 1002
Product Name: IBM SDK for Node.js
A Scalable Architecture for the Internet of Things

Exhibit Session: Tuesday P2
Title: A Scalable Architecture for the Internet of Things
Chair(s): Brian Ramprasad, Marios Fokaefs, Marin Litoiu
Format: Poster
Description: As the volume and variety of sensors continues to grow, a solution is needed to process large volumes of streaming data produced by IoT devices. We propose an architecture that is flexible and scalable and an emulation framework to test the scalability of large scale sensor networks. Our design employs IoT gateways using Node-RED, a messaging broker as an aggregation point, and a streaming engine to pre-process and persist the IoT data.

Industry Company: IBM
Project Number: 1004
Product Name: IBM Bluemix (IoT)
Research Team: York University: Brian Ramprasad, Marios Fokaefs, Marin Litoiu
IBM: Joe Wigglesworth

Improving Garbage Collection-Time String Deduplication

Exhibit Session: Tuesday P5
Title: Improving Garbage Collection-Time String Deduplication
Chair(s): Konstantin Nasartschuk
Format: Poster
Immutable string objects in Java are the most common objects on the heap. To optimize their structure, placement on the heap, and to reduce the amount of duplicate memory they consume is an important VM optimization. String deduplication is the approach of identifying duplicate character arrays and reusing them for multiple objects. We describe improvements to the approach to increase performance and dynamically enable/disable the approach when the application structure can benefit from it.

Industry Company: IBM
Project Number: 1019
Product Name: IBM SDK
Web Site: http://www.unb.ca/research/casatlantic/
Research Team: University of New Brunswick: Konstantin Nasartschuk Kenneth B. Kent Stephen A. MacKay

On-demand, Differential, and Incremental Interprocedural Taint Vulnerability Analysis

Exhibit Session: Tuesday P8
Title: On-demand, Differential, and Incremental Interprocedural Taint Vulnerability Analysis
Chair(s): Nicolas Cloutier, Ettore Merlo
Format: Poster
Description: Investigate incremental approaches based on code changes to reduce the computing time of tainted traces. Make use of fixpoints on the data flow (SSA) to investigate differentials and incrementals approaches. Computation time is advantageously proportional to only the size of code changes. Execution times from experiments on WebGoat are short and promising for the future research.

Industry Company: IBM
Project Number: 1044
Product Name: IBM Security AppScan Source
Research Team: Ecole Polytechnique de Montreal: Nicolas Cloutier Ettore Merlo
HCL Technologies: John Peyton
**Private vitals data as a determinant of collaborative care quality**

Exhibit Session: Wednesday P9  
Title: Private vitals data as a determinant of collaborative care quality  
Chair(s): Abidin Akkok, Peter Pennefather, Deb Fels, Patrick Neumann  
Format: Poster  
Description: A conceptual framework for sharing private health data and in particular personal vital signs data from patient-owned digital health devices is presented. It defines a unified storage strategy for all kinds of vital signs data collected from all kinds of devices with a key proviso that it is first registered and stored as patient-owned private data. A system diagram of the conceptual framework showing the relationships and information flow for monitoring care service quality is described.

Research Team:  
Ryerson University: Z. Abidin Akkok, Deborah I. Fels, W. Patrick Neumann  
gDial Inc.: Peter Pennefather, West Suhanic

**Quantifying Duplication to Improve Data Quality**

Exhibit Session: Monday P11  
Title: Quantifying Duplication to Improve Data Quality  
Chair(s): Yu Huang  
Format: Poster  
Description: We present a record deduplication framework that differentiates terms during the matching process to improve overall accuracy. We also define a duplication metric that quantifies the level of duplication for an attribute value, and within an attribute. This metric can be used by analysts to understand the distribution and similarity of values during the data cleaning process.

Industry Company: IBM
— Run-time specialization of parametric kernels for graphics processing units

Exhibit Session: Tuesday P12
Title: Run-time specialization of parametric kernels for graphics processing units
Chair(s): Marc Moreno Maza, Masoud Ataei Jaliseh, Haoze Yuan
Format: Poster
Description: Parametric kernels are GPU programs which are generated from annotated C/C++ code. In general, during this generation process, machine and program parameters may not be determined accurately; for this reason they are manipulated as unknown symbols until these GPU programs are actually run. This poster describes how the values of those parameters are obtained at run-time.
### Sentimental eCrits

**Exhibit Session:** Tuesday P13  
**Title:** Sentimental eCrits  
**Chair(s):** Lloyd Montgomery, Gabriel Tapuc, Tyson Bulmer, Rickus Senekal  
**Format:** Poster  
**Description:** Sentimental eCrits is the second stage of the eCrits project, a project designed to predict escalations against support tickets, particularly Critical Situations against PMRs. The Sentimental stage involves our newly acquired access to the text of PMRs, so now the sentiment of customer and support conversations is being analyzed and reported as a metric against which escalations can be predicted. The sentiment is being extracted using Watson APIs.  
**Industry Company:** IBM  
**Project Number:** 1007  
**Product Name:** Watson-based cognitive support to enhance customer supp  
**Research Team:** University of Victoria: Lloyd, Gabriel, Tyson, Rickus

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### ShopBuddy: Store Path Optimization

**Exhibit Session:** Tuesday P14  
**Title:** ShopBuddy: Store Path Optimization  
**Chair(s):** Prashanti Angara, Athabasca Witschi, Ulrike Stege, Hausi Muller  
**Format:** Poster  
**Description:** The ShopBuddy application aims to suggest paths through stores to customers so that they can shop efficiently while taking into consideration the store's aims at maximizing profits. We present research on a few problem formulations in this regard and how variants of the Traveling Salesman Problem may be used to suggest paths to shoppers.  
**Research Team:** University Of Victoria: Prashanti Angara Athabasca Witschi Ulrike Stege Hausi Müller
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<tr>
<th>Exhibit Session:</th>
<th>Tuesday P15</th>
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<tr>
<td>Title:</td>
<td>Taming services on the Bluemix</td>
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<tr>
<td>Chair(s):</td>
<td>Naresh Eeda, Nikita Sokolov</td>
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<td>Format:</td>
<td>Poster</td>
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<tr>
<td>Description:</td>
<td>This research focuses on: i. Migrating the Bluemix Dashboard to a GraphQL-based UI Architecture to achieve key performance improvements. ii. Creating a smart monitoring system for Bluemix UI, capable of learning and identifying abnormal behavioral patterns with the use of unsupervised and semi-supervised learning algorithms. iii. Alleviating deployment complexity by adopting the use of a container management system, such as kubernetes.</td>
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<td>Industry Company:</td>
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<td>Project Number</td>
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<td>Product Name:</td>
<td>Taming services on the Bluemix</td>
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<td>Research Team:</td>
<td>The University of Western Ontario: Naresh Eeda, Nikita Sokolov, Jehad Fares</td>
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<th>Exhibit Session:</th>
<th>Wednesday P14</th>
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<tr>
<td>Title:</td>
<td>The DevOps/BizOps Integration: A New Vision for Software Engineering</td>
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<tr>
<td>Chair(s):</td>
<td>Marios Fokaefs</td>
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<td>Format:</td>
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<td>Description:</td>
<td>Following new advancements in software, DevOps has risen as a new development paradigm, one that promotes the integration between development and management even after the development and deployment of the system. As digital businesses are also on the rise and software has become ubiquitous as a product or as a tool, we also argue the need for integration with BizOps. We describe an integrated and hierarchical decision process combining technical, economic and business parameters.</td>
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— Tuning Spark Performance Aiming for Various Types of Workloads

Exhibit Session: Wednesday P15
Title: Tuning Spark Performance Aiming for Various Types of Workloads
Chair(s): Jenne Zhang
Format: Poster
Description: As a unified engine for big data analytics, Spark provides high scalability and fault-tolerance with its unique in-memory engine. Ensuring its ease of use, Spark hides the complex settings from users, however, there are approximately 200 configurable parameters in Spark execution engine. The default values might not be the best setting for every workload. My research goal is to develop a tool to help users tune Spark for different types of workloads and to improve overall performance.

Research Team: Queen's University: Jie ni Zhang, Patrick Martin
The Technology Expo at CASCON 2017 will provide an excellent opportunity to highlight your research results and generate interest in upcoming product and product areas. Exhibits on emerging technologies are encouraged. The format of an exhibit may be a
demonstration, poster presentation, or a short talk. A booth is provided at no cost to the exhibitors. Each demonstration booth will be set up with power and wireless internet access. Exhibitors are responsible for bringing the necessary equipment such as machines, laptops, monitors, power cables, and security locks; and any printed materials including posters.

Click [here](#) to download Call for Exhibits

## Accepted exhibits

Congratulations to the exhibit chairs and thank you for your submissions. See you all at CASCON 2017.

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See details below:

Exhibit Sessions - 11:45 to 12:45 and 17:00 to 19:30
**D1: A Hierarchical and Dynamic Security Control System for Large Scale Systems**

Booth Number: D1  
Title: A Hierarchical and Dynamic Security Control System for Large Scale Systems  
Chair(s): Yar Rouf, Marin Litoiu  
Format: Demo  
Description: We propose a hierarchical distributed architecture for security control in order to partition responsibility and workload among many security controllers. Our architecture proposes a more simplified way of defining security rules to allow security to be enforced on an operational level, rather than a development level. We demonstrate the ability of our system to expand with additional sensors, traffic data and detection rules at run time in a systematic manner.

Industry Company: IBM  
Project Number: 1004  
Product Name: IBM PureApp  
Research Team:  
- **York University:** Yar Rouf, Mark Shtern, Marios Fokaefs, Marin Litoiu  
- **IBM:** Vio Onut

**P1: A Scalability-oriented Benchmark Suite for Node.js on the Cloud**

Booth Number: P1  
Title: A Scalability-oriented Benchmark Suite for Node.js on the Cloud  
Chair(s): Jiapeng Zhu, Panagiotis (Panos) Patros  
Format: Poster  
Description: Clouds provide on-demand and pay-as-you-go computing resources to their end users. Node.js is a popular choice for cloud applications as it is event-driven, asynchronous and non-blocking. However, Node.js underutilizes multi-core CPUs due to its single-threaded nature, which limits its scalability on the
cloud. Because no scalability-oriented benchmark suite exists for Node.js, we will focus on developing one. Our benchmarking suite will facilitate and quantify Node.js scalability improvements.

Industry Company: IBM
Project Number: 1002
Product Name: IBM SDK for Node.js
Web Site: http://www.unb.ca/research/casatlantic/
Research Team:
  University of New Brunswick: Jiapeng Zhu, Patros Panagiotis, Kenneth Kent
  IBM Canada: Michael Dawson

— P2: A Scalable Architecture for the Internet of Things

Booth Number: P2
Title: A Scalable Architecture for the Internet of Things
Chair(s): Brian Ramprasad, Marios Fokaefs, Marin Litoiu
Format: Poster
Description: As the volume and variety of sensors continues to grow, a solution is needed to process large volumes of streaming data produced by IoT devices. We propose an architecture that is flexible and scalable and an emulation framework to test the scalability of large scale sensor networks. Our design employs IoT gateways using Node-RED, a messaging broker as an aggregation point, and a streaming engine to pre-process and persist the IoT data.

Industry Company: IBM
Project Number: 1004
Product Name: IBM Bluemix (IoT)
Research Team:
  York University: Brian Ramprasad, Marios Fokaefs, Marin Litoiu
  IBM: Joe Wigglesworth
**D2: Accessibility in the DevOps Era**

- **Booth Number:** D2
- **Title:** Accessibility in the DevOps Era
- **Chair(s):** Devan Shah, Larry Lindsay, Ali Asghar
- **Format:** Demo
- **Description:** As enterprises adopt continuous deployment practices, the DevOps testing practice must adapt accessibility testing tools and processes or user experience will suffer. These tools must work hand in hand with your application DevOps methodology - both required by & enabling those practices. In this hands-on demo, the audience will learn about IBM’s cutting-edge accessibility DevOps tooling and see how simple it is to integrate the tools into an existing continuous integration pipeline (CI).
- **Web Site:** https://ibm.biz/a11yDashboard
- **Research Team:** IBM: Devan Shah, Larry Lindsay, Thomas Brunet, Ali Asghar

**P3: An Automatic Approach for Transforming IoT Applications to RESTful Services**

- **Booth Number:** P3
- **Title:** An Automatic Approach for Transforming IoT Applications to RESTful Services
- **Chair(s):** Yu Zhao, Yongjian Yang
- **Format:** Poster
- **Description:** Internet of Things (IoT) devices are prevalent in all aspects of our lives. Nowadays, IoT devices are controlled by various end-user applications. In this context, the functionalities of IoT devices may be published as IoT services. The uniform interface of IoT services allows them to be integrated with existing applications. We propose an approach that automatically transforms functionalities of IoT devices to IoT services hosted on the cloud.
- **Industry Company:** IBM
- **Project Number:** 920
**D3: Classification Algorithms and How to Distribute Them**

**Booth Number:** D3  
**Title:** Classification Algorithms and How to Distribute Them  
**Chair(s):** Rebecca Young  
**Format:** Demo  
**Description:** This session discusses a Distributed Classifier Training (DCT) approach as a free open-source IBM SPSS Modeler plugin to address the current challenges of adapting classification algorithms in handling large volumes of data from big data environments.

**Industry Company:** IBM  
**Business unit** Analytics  
**Product Name:** IBM SPSS Modeler  
**Research Team:** IBM: Rebecca Young

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**D4: DevOps Infrastructures to Support Continuous Software Deployment**

**Booth Number:** D4  
**Title:** DevOps Infrastructures to Support Continuous Software Deployment  
**Chair(s):** Kostas Kontogiannis  
**Format:** Demo  
**Description:** An approach that is attracting the attention of the software engineering community towards minimizing deployment risks while streamlining the delivery of new product features on a continual basis without sacrificing quality is “release small – release often”. In order to support such an approach efficient
DevOps pipelines have to be assembled. Such pipelines involve tool-chains and infrastructure that uses software analytics and decision support systems to reach release/no-release decisions.

Industry Company: IBM
Project Number: 1048
Product Name: IBM DevOps Insights
Web Site: www.csd.uwo.ca/~kostas
Research Team: Western University: Marios Grigoriou: Ph.D. Candidate, Western U  Kostas Kontogiannis: Professor, Western Univ  Don Cronin: Program Director, Lead Architect  Alberto Giammaria: STSM, IBM Watson & Cloud  DevOps Analytics  Chris Brealey: STSM - IBM STSM - IBM Cloud,

— **P4: Hybrid Scaling of Dockerized Microservices Architectures in Cloud Data Centres**

Booth Number: P4
Title: Hybrid Scaling of Dockerized Microservices Architectures in Cloud Data Centres
Chair(s): Anthony Kwan
Format: Poster
Description: Our research presents an experimental platform that enables the evaluation of various resource adjustment algorithms. Two novel hybrid autoscaling algorithms are presented and benchmarked against the Kubernetes horizontal scaling algorithm.

Industry Company: IBM
Project Number: 1008
Product Name: IBM Blueworks Live
Research Team: University of Toronto: Anthony Kwan  Jonathon Wong  Hans-Arno Jacobsen
IBM: Vinod Muthuswamy  Suzette Samoojh  Allen Chan

— **P5: Improving Garbage Collection-Time String Deduplication**
Booth Number: P5
Title: Improving Garbage Collection-Time String Deduplication
Chair(s): Konstantin Nasartschuk
Format: Poster
Description: Immutable string objects in Java are the most common objects on the heap. To optimize their structure, placement on the heap, and to reduce the amount of duplicate memory they consume is an important VM optimization. String deduplication is the approach of identifying duplicate character arrays and reusing them for multiple objects. We describe improvements to the approach to increase performance and dynamically enable/disable the approach when the application structure can benefit from it.

Industry Company: IBM
Project Number 1019
Product Name: IBM SDK
Web Site: http://www.unb.ca/research/casatlantic/
Research Team: University of New Brunswick: Konstantin Nasartschuk  Kenneth B. Kent  Stephen A. MacKay

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P6: Modernizing Inlining Strategies in Just-in-Time Compilers

Booth Number: P6
Title: Modernizing Inlining Strategies in Just-in-Time Compilers
Chair(s): Erick Ochoa Lopez
Format: Poster
Description: Method inline substitution is traditionally driven by a greedy algorithm that minimizes the number of dynamic method calls. Instead of minimizing the number of dynamic method calls, we propose to guide inlining decisions by the optimizations that are enabled after inlining has happened.

Industry Company: IBM
Project Number 1047
Product Name: IBM Java SDK
**P7: OMR: A robust open-source language runtime toolkit**

**Booth Number:** P7  
**Title:** OMR: A robust open-source language runtime toolkit  
**Chair(s):** Xiaoli Liang, Arianne Butler, Daryl Maier  
**Format:** Poster  
**Description:** The Eclipse OMR project is a set of open-source C and C++ components that can be used to build robust language runtimes that support many different hardware and operating system platforms. By using the Eclipse OMR project, language implementers can create full featured languages more quickly and easily to enrich the options available to programmers. We have implemented working Ruby and Lua prototypes using OMR, in addition to OpenJ9 which will soon be released.

**Industry Company:** IBM  
**Business unit:** IBM Cloud  
**Product Name:** OMR  
**Web Site:** https://github.com/eclipse/omr/  
**Research Team:** IBM Canada: Arianne Butler, Daryl Maier, Xiaoli Liang

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**P8: On-demand, Differential, and Incremental Interprocedural Taint Vulnerability Analysis**

**Booth Number:** P8  
**Title:** On-demand, Differential, and Incremental Interprocedural Taint Vulnerability Analysis  
**Chair(s):** Nicolas Cloutier, Ettore Merlo  
**Format:** Poster  
**Description:** Investigate incremental approaches based on code changes to reduce the computing time of tainted
traces. Make use of fixpoints on the data flow (SSA) to investigate differentials and incrementals approaches. Computation time is advantageously proportional to only the size of code changes. Execution times from experiments on WebGoat are short and promising for the future research.

Industry Company: IBM
Project Number: 1044
Product Name: IBM Security AppScan Source
Research Team: Ecole Polytechnique de Montreal: Nicolas Cloutier  Ettore Merlo
HCL Technologies: John Peyton
IBM Security Systems: Babita Sharma

——— P10: Optimizing the JVM Object Model Using Object Splitting

Booth Number: P10
Title: Optimizing the JVM Object Model Using Object Splitting
Chair(s): Taees Eimouri , Kenneth Kent , Aleksandar Micic
Format: Poster
Description: Data layout optimization is a well-known method to improve cache performance by reorganizing data elements. We introduce a novel approach to optimize layout of objects, called the Object Splitting Technique, whereby Java objects are split at allocation time so that those fields of the split objects that are not accessed as often are separated from the rest of the fields. We implemented the approach in IBM's JVM. Tests with different benchmarks, in most cases, reduced the number of cache misses.

Industry Company: IBM
Project Number: 1021
Product Name: IBM SDK
Web Site: http://www.unb.ca/research/casatlantic/
Research Team: University of New Brunswick: Taees Eimouri Dr. Kenneth B. Kent
— **P9: OptImatch: Semantic-Web System for Automated Discovery of Query Problem Patterns**

Booth Number: P9
Title: OptImatch: Semantic-Web System for Automated Discovery of Query Problem Patterns
Chair(s): Guilherme Damasio
Format: Poster
Description: OptImatch is a graph-based system that offers a way to look for varied user defined problem patterns in Query Execution Plans (QEPs) and automatically get recommendations from an expert provided and user customizable knowledge base. As current work, we are extending the tool to automatically discover, based on previously knowledge, the best QEP to be applied to a given query and to automatically give recommendations such as changing database configuration in order to improve the performance.

Industry Company: IBM
Project Number 1049
Product Name: OptImatch
Research Team: **UOIT:** Guilherme Damasio, Jarek Szlichta
**York University:** Parke Godfrey
**IBM:** Calisto Zuzarte, Piotr Mierzejewski, Vincent Corvinelli

— **P11: Post-mortem debugging with Promises for Node.js**

Booth Number: P11
Title: Post-mortem debugging with Promises for Node.js
Chair(s): Maxim Uzun, Patros Panagiotis
Format: Poster
Description: As larger distributed systems increase their reliance on Node.js, tools to better understand complex
software failures become more important. Post-mortem debugging for dynamic environments is behind that of native environments. Given the asynchronous nature of Node.js, a function passed to a Promise object is executed on the next tick and any unhandled rejections will show at a later time. We are investigating improved debugging methods for Node.js when using Promises and evaluating their cost.

Industry Company: IBM
Project Number: 1002
Product Name: IBM SDK for Node.js
Web Site: http://www.unb.ca/research/casatlantic/
Research Team: **University of New Brunswick:** Maxim Uzun, Patros Panagiotis, Kenneth Kent

**P12:** Run-time specialization of parametric kernels for graphics processing units

Booth Number: P12
Title: Run-time specialization of parametric kernels for graphics processing units
Chair(s): Marc Moreno Maza, Masoud Ataei Jaliseh, Haoze Yuan
Format: Poster
Description: Parametric kernels are GPU programs which are generated from annotated C/C++ code. In general, during this generation process, machine and program parameters may not be determined accurately; for this reason they are manipulated as unknown symbols until these GPU programs are actually run. This poster describes how the values of those parameters are obtained at run-time.

Industry Company: IBM
Project Number: 880
Product Name: IBM XL
Web Site: www.metafork.org
Research Team: **University of Western Ontario:** Marc Moreno-Maza, Masoud Ataei, Haoze Yuan
**D5: Semantic Aware Anomaly Detection on the Cloud**

- **Booth Number:** D5
- **Title:** Semantic Aware Anomaly Detection on the Cloud
- **Chair(s):** Arnamoy Bhattacharyya, Stelios Sotiriadis
- **Format:** Demo
- **Description:** We introduce a new tool for phase detection and characterization for applications running on the cloud. We evaluate our tool for a number of C, C++ and Java application servers. Our tool is integrated with an IBM Watson Conversation engine so that administrators can know about system health using simple texts.

**Industry Company:** IBM
**Project Number:** 916
**Product Name:** Bluemix
**Research Team:**
- **University of Toronto:** Arnamoy, Stelios, Cristiana Amza
- **IBM Toronto:** Joe Wigglesworth

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**P13: Sentimental eCrits**

- **Booth Number:** P13
- **Title:** Sentimental eCrits
- **Chair(s):** Lloyd Montgomery, Gabriel Tapuc, Tyson Bulmer, Rickus Senekal
- **Format:** Poster
- **Description:** Sentimental eCrits is the second stage of the eCrits project, a project designed to predict escalations against support tickets, particularly Critical Situations against PMRs. The Sentimental stage involves our newly acquired access to the text of PMRs, so now the sentiment of customer and support conversations is being analyzed and reported as a metric against which escalations can be predicted. The sentiment is
**P14: ShopBuddy: Store Path Optimization**

- **Booth Number:** P14
- **Title:** ShopBuddy: Store Path Optimization
- **Chair(s):** Prashanti Angara, Athabasca Witschi, Ulrike Stege, Hausi Muller
- **Format:** Poster
- **Description:** The ShopBuddy application aims to suggest paths through stores to customers so that they can shop efficiently while taking into consideration the store's aims at maximizing profits. We present research on a few problem formulations in this regard and how variants of the Traveling Salesman Problem may be used to suggest paths to shoppers.

**Research Team:** University Of Victoria: Prashanti Angara, Athabasca Witschi, Ulrike Stege, Hausi Müller

**P15: Taming services on the Bluemix**

- **Booth Number:** P15
- **Title:** Taming services on the Bluemix
- **Chair(s):** Naresh Eeda, Nikita Sokolov
- **Format:** Poster
- **Description:** This research focuses on: i. Migrating the Bluemix Dashboard to a GraphQL-based UI Architecture to achieve key performance improvements. ii. Creating a smart monitoring system for Bluemix UI, capable of learning and identifying abnormal behavioral patterns with the use of unsupervised and semi-supervised
learning algorithms. iii. Alleviating deployment complexity by adopting the use of a container management system, such as kubernetes.

Industry Company: IBM
Project Number 1045
Product Name: Taming services on the Bluemix
Research Team: The University of Western Ontario: Naresh Eeda, Nikita Sokolov, Jehad Fares

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**D6: Using IBM Watson cloud services to analyze chat conversations and forum posts**

Booth Number: D6
Title: Using IBM Watson cloud services to analyze chat conversations and forum posts
Chair(s): Sarah Packowski
Format: Demo
Description: Chat tools and forums are popular for engaging with potential customers and supporting users. Beyond their effectiveness at answering questions in the moment, these tools provide valuable insight into what potential customers and users are thinking, saying, and doing. This exhibit demonstrates how to use IBM Watson cloud services to identify trends, pain points, and customer satisfaction in chat conversations and forums.

Business unit IBM Hybrid Cloud
Product Name: IBM Watson cloud services
Web Site: http://ibm.biz/CASCON-2017_Analyzing_chat
Research Team: IBM: Sarah Packowski

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**D7: Using the IBM OpenMP XL compiler to accelerate scientific applications**

Booth Number: D7
Title: Using the IBM OpenMP XL compiler to accelerate scientific applications
The IBM XL compilers are used to accelerate scientific computation on IBM POWER system connected NVIDIA Pascal GPUs. The compilers support the new OpenMP 4.5 programming model which allows offloading computation to GPUs easily and with excellent performance, and is much easier to use than the CUDA programming model.

**Product Name:** IBM XL C/C++ and Fortran compilers

**Research Team:** IBM Canada Laboratory: Ettore Tiotto, Bardia Mahjour, Kelvin Li, Whitney Tsang, Wael Yehia, Samer Jacob, Tarique Islam, Xing Xue, Robert Ho, Jeeva Paudel

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**P16: XL Compiler Extensions for GPU Platforms**

**Booth Number:** P16

**Title:** XL Compiler Extensions for GPU Platforms

**Chair(s):** Akihiro Hayashi, Jun Shirako

**Format:** Poster

**Description:** In this CAS project, we explore compile-time optimizations for OpenMP accelerator programs targeting the POWER8+GPUs platform. We build on existing optimizations in the TPO component of the IBM XL compiler, by introducing: aggressive dependence analysis of explicitly parallelized OpenMP programs; and loop transformations to enhance GPU parallelism and memory efficiency.

**Industry Company:** IBM

**Project Number:** 896

**Product Name:** IBM XL C/C++ compiler, XL Fortran compiler

**Research Team:** Rice University: Jun Shirako, Akihiro Hayashi, Vivek Sarkar

**IBM Canada:** Robert Ho, Ettore Tiotto
Expo Reception / Short Talks / PechaKucha Expo Presentations

Welcome - 17:15 to 17:30

Short Talk Sessions - 17:30 to 18:15 (3 talks).  Talks order as follows (15 mins each)

--- S1: Making Stuff Fast
Booth Number: S1
Title: Making Stuff Fast
Chair(s): Mark Stoodley
Format: Short Talk
Description: It’s never been easier to create your own Just In Time Compiler, be it for a language, for an application, or just to learn how! Learn how to use the JitBuilder library at the open source Eclipse OMR project to dynamically generate executable native code that does whatever you want! This library has been used to dynamically compile Swift, Javascript, Lua, Smalltalk, the Rosie Pattern Language, the LLVM Kaleiedoscope tutorial language, and an educational runtime called Base9. What will you build?
Product Name: IBM Canada
Web Site: www.github.com/eclipse/omr
Research Team: IBM Canada: Mark

--- S2: Phishing clustering based on MST
Booth Number: S2
Title: Phishing clustering based on MST
Chair(s): Qian Cui
Format: Short Talk
We provide a new method to analyze and detect phishing attacks based on minimal spanning tree (MST). Compared with other models, this new method is able to track more effectively the evolution of phishing attacks and the similarities between related instances. Our method creates clusters of related attack instances based on an MST of the cluster and a locally defined threshold. Our method is able to detect more than 90% of the new attack instances in our experiments.

Research Team: **University of Ottawa**: Qian Cui, Ph.D. candidate

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**S3: Supporting Microservice Evolution**

**Booth Number**: S3  
**Title**: Supporting Microservice Evolution  
**Chair(s)**: Julia Rubin  
**Format**: Short Talk  
**Description**: Microservices have become a popular pattern for deploying scale-out application logic. An advantage of using microservices is their loose coupling, which leads to agile and rapid evolution, and continuous re-deployment. However, developers are tasked with managing this evolution and largely do so manually by continuously evaluating low-level service behaviors. This is tedious, error-prone, and slow. In this talk, we discuss how our approach can help engineers with these tasks.

**Industry Company**: IBM  
**Project Number**: 1040  
**Product Name**: IBM Bluemix  

**Research Team**:  
**University of British Columbia**: Harshavardhan Kadiyala, Bo Hu, Ivan Beschastnikh, Julia Rubin  
**IBM**: John Steinbacher, Tony Erwin,  
**Federal University of Pernambuco, Brazil**: Adalberto R. Sampaio Jr. Nelson Rosa
**Break - 18:15 to 18:25**

**PechaKucha Sessions - 18:25 to 19:30. (13 talks).** Presentations order as follows (5 mins each)

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**Center for Health Informatics and Analytics**

Exhibit Session: Monday P4  
Title: Center for Health Informatics and Analytics  
Chair(s): Randy Giffen  
Format: Poster  
Description: The Center for Health Informatics and Analytics is a collaboration between Memorial University and IBM Canada. The goal of the center is to jointly develop and validate solutions that help translate knowledge and data into action. The solutions will support both clinical and administrative scenarios. The center is based on a vision for healthcare transformation. Lower healthcare costs can be achieved by improving efficiency and effectiveness and ultimately by improving health.  

Industry Company: IBM  
Product Name: Center for Health Informatics and Analytics  
Web Site: http://www.med.mun.ca/CHIA/Home.aspx  
Research Team: **IBM Canada:** Randy Giffen

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**Cognitive Telescope Network**

Exhibit Session: Wednesday P1  
Title: Cognitive Telescope Network  
Chair(s): Arunava Majumdar  
Format: Poster  
Description: Telescopic follow-up of transient astronomical events is one of the most desirable and scientifically useful activities in modern observational astronomy. Pinpointing a transient is essential for discovering more
about the source by directing more powerful telescopes to observe and maintain records as the transient evolves. Join us to see how IBM Watson Visual Recognition, Machine Learning and Conversation are used to help build the telescope network on Bluemix.

Business unit: Cloud
Product Name: Cognitive Telescope Network
Research Team: IBM: Arunava Majumdar

— Cold Object Segregation

Exhibit Session: Monday P5
Title: Cold Object Segregation
Chair(s): Scott Young, Kenneth Kent, Gerhard Dueck
Format: Poster
Description: Cold (infrequently referenced) objects can take up extra space in the areas of memory reserved for frequently accessed, tenured objects. Identifying all cold objects in tenured space during runtime is expensive. This project seeks to find an algorithm for selecting candidate cold objects to be moved to secondary storage so that the difference between time saved during garbage collection and time spent performing the selection is maximized.

Industry Company: IBM
Project Number: 1001
Product Name: OMR and J9
Web Site: http://www.unb.ca/research/casatlantic/
Research Team: UNB: Scott Young, Kenneth Kent, Gerhard Dueck
IBM Canada: Charlie Gracie

— MASS library scalar math functions for the Go Language
Exhibit Session: Monday P9
Title: MASS library scalar math functions for the Go Language
Chair(s): Bill O’Farrell
Format: Poster
Description: Improving scalar math performance in the Go programming language on IBM Z. We took the scalar MASS libraries and translated them from Z assembly to Go assembly, had them approved as open source, and contributed them to Go. The translation was done automatically (mostly) via a python script. The project is complete and was included in go 1.9.

Industry Company: IBM
Business unit: Systems
Product Name: Go Language (Open-Source) on IBM Z

NUMA GC
Exhibit Session: Monday P6
Title: NUMA GC
Chair(s): Maria Patrou
Format: Poster
Description: Non-uniform Memory Access (NUMA) systems use different types of memory accesses. IBM’s Java Virtual Machine identifies a NUMA architecture, while using memory and threads from the available nodes in a distributed way. A design for a node-isolated memory achieved by a node-heap resize functionality and a thread policy is proposed. Finally, different modes regarding hardware and thread characteristics are investigated to identify the application attributes that can benefit from specific modes.

Industry Company: IBM
Project Number: 1020
— **OptImatch: Semantic-Web System for Automated Discovery of Query Problem Patterns**

**Exhibit Session:** Tuesday P9  
**Title:** OptImatch: Semantic-Web System for Automated Discovery of Query Problem Patterns  
**Chair(s):** Guilherme Damasio  
**Format:** Poster  
**Description:** OptImatch is a graph-based system that offers a way to look for varied user defined problem patterns in Query Execution Plans (QEPs) and automatically get recommendations from an expert provided and user customizable knowledge base. As current work, we are extending the tool to automatically discover, based on previously knowledge, the best QEP to be applied to a given query and to automatically give recommendations such as changing database configuration in order to improve the performance.

**Industry Company:** IBM  
**Project Number:** 1049  
**Product Name:** OptImatch  
**Research Team:**  
**UOIT:** Guilherme Damasio, Jarek Szlichta  
**York University:** Parke Godfrey  
**IBM:** Calisto Zuzarte, Piotr Mierzejewski, Vincent Corvinelli

— **PANORAMA: Deployment Specification in the Context of Large Scale Systems**

**Exhibit Session:** Monday D7  
**Title:** PANORAMA: Deployment Specification in the Context of Large Scale Systems
DevOps has dramatically influenced how/when deployment is realised. However, little effort has been devoted to the need for deployment and configuration specifications to support the various levels of detail and abstraction present in large-scale systems. In this exhibit, we present PANORAMA, our envisioned environment to design and visualise large-scale continuous deployment based on the OASIS TOSCA specification.

— Phishing Numbers

Are popular websites hacked to host phishing attacks? Why do phishing sites sometimes redirect their victims to other sites? How often are phishing attacks hosted on compromised servers? What are the most common paths used in phishing attacks?... We have been gathering sample phishing attacks for the past 18 months, and have conducted a number of analyses to answer some of these questions. This exhibit will provide an overview of our findings to date.
Pressure Sensitive Mats in the NICU

Exhibit Session: Wednesday P7
Title: Pressure Sensitive Mats in the NICU
Chair(s): Shermeen Nizami
Format: Poster
Description: To examine the potential for incorporating Pressure Sensitive Mats (PSM) and video data analysis as part of an integrated patient monitoring environment. Data will be collected simultaneously from PSM, video, and existing patient monitors, and shall be integrated with gold-standard bed-side annotations collected on an mHealth app developed as part of this project. Data analytics are being developed and evaluated to detect various events of clinical interest in the neonatal intensive care unit.

Industry Company: IBM
Project Number: SRG_2015_1
Product Name: Watson Analytics, Watson Health
Research Team: Carleton University: Dr. Shermeen Nizami Amente Bekele Yasmina Souley Dosso Mohamed Hozayen
Dr. James R. Green
IBM CAS: Dr. Randy Giffen Nathalie Le Prohon
Children's Hospital of Eastern Ontario: Dr. JoAnn Harrold Kim Greenwood

Prioritize and Visualize Vulnerability Findings

Exhibit Session: Wednesday P8
Title: Prioritize and Visualize Vulnerability Findings
Chair(s): Jinqiu Yang, Lin Tan
Format: Poster
Description: We propose to prioritize and visualize vulnerability findings of AppScan. The visualization helps
developers prioritize workloads accordingly by grouping vulnerability findings with the same potential fix location. In addition, we propose a tree-based visualization to link two relevant vulnerability findings. For example, it is beneficial to link second-order SQL injections and their relevant SQL injections for easier understanding.

Industry Company: IBM
Project Number: 911
Product Name: AppScan
Research Team: 
- University of Waterloo: Jinqiu Yang  Lin Tan
- AppScan: John Peyton  Kristofer A Duer

Recommender System for IBM Watson Analytics-Algorithm Development

Exhibit Session: Monday P12
Title: Recommender System for IBM Watson Analytics-Algorithm Development
Chair(s): Parisa Lak
Format: Poster
Description: IBM Watson Analytics (WA) provides users with visualization recommendations for their provided dataset using a rule based system. Recommender systems (RS) are a set of learning algorithms that provide personalized recommendations to the users based on their historical preferences. In this work, we design a RS that receives user's historical interaction with WA as input, and provides a list of recommendations that are uniquely generated based on his/her prior interaction with the system.
Supporting Microservice Evolution

Exhibit Session: Monday P14
Title: Supporting Microservice Evolution
Chair(s): Julia Rubin
Format: Poster
Description: Microservices have become a popular pattern for deploying scale-out application logic. An advantage of using microservices is their loose coupling, which leads to agile and rapid evolution, and continuous re-deployment. However, developers are tasked with managing this evolution and largely do so manually by continuously evaluating low-level service behaviors. This is tedious, error-prone, and slow. In this exhibit, we discuss how our approach can help engineers with these tasks.

Industry Company: IBM
Project Number: 1040
Product Name: IBM Bluemix
Research Team: University of British Columbia: Harshavardhan Kadiyala, Bo Hu, Ivan Beschastnikh, Julia Rubin
IBM: John Steinbacher, Tony Erwin
Federal University of Pernambuco: Adalberto R. Sampaio Jr., Nelson Rosa

Test Case Traceability

Exhibit Session: Wednesday P13
Title: Test Case Traceability
Chair(s): Sravya Polisetty, Shirin Akbarinasaji
Format: Poster
Description: As products evolve and teams expand in size and across different locations, the link between test cases and source code files becomes weak or is sometimes lost. To enhance semantic traceability between these artifacts we use a popular trace network that uses deep learning to predict the probability score between...
a test case and source code file. We also compare the performance of our network with the traditional bag-of-words approach and popular tracing methods like VSM and LSI.

Industry Company: IBM
Project Number: SRG_2014_1
Product Name: RTC
Research Team: Ryerson University, Toronto, Canada: Sravya Polisetty, Shirin Akbarinasaji, Dr. Andriy Miranskyy, Dr. Ayse Bener
IBM, Canada: Adam Neal
The Technology Expo at CASCON 2017 will provide an excellent opportunity to highlight your research results and generate interest in upcoming product and product areas. Exhibits on emerging technologies are encouraged. The format of an exhibit may be a
demonstration, poster presentation, or a short talk. A booth is provided at no cost to the exhibitors. Each demonstration booth will be set up with power and wireless internet access. Exhibitors are responsible for bringing the necessary equipment such as machines, laptops, monitors, power cables, and security locks; and any printed materials including posters.

Click here to download Call for Exhibits

## Accepted exhibits

Congratulations to the exhibit chairs and thank you for your submissions. See you all at CASCON 2017.

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See details below:

Exhibit Sessions - 11:45 to 12:45 and 14:15 to 15:30
**D1: Arvin II: Towards Biomechanical Gait Analytics on the Cloud**

Booth Number: D1  
Title: Arvin II: Towards Biomechanical Gait Analytics on the Cloud  
Chair(s): Sana Oladi, Panagiotis (Panos) Patros  
Format: Demo  
Description: Data analytics systems, such as IBM Watson Health Cloud, provide a secure platform for researchers and practitioners; however, they currently neglect gait biomechanics. We present Arvin II, a prototype tool, which we intend to incorporate into an analytics cloud platform. Arvin II targets force distribution data acquired from cheap, portable and even wearable devices. Such analytics is vital for neurological conditions; back pain prevention and treatment; insole design; fall prevention; etc.  
Product Name: Arvin II  
Research Team: University of New Brunswick: Sana Oladi, Panagiotis (Panos) Patros

**D2: Cognitive Agents with Bluemix**

Booth Number: D2  
Title: Cognitive Agents with Bluemix  
Chair(s): Adam Di Prospero, Marin Litoiu  
Format: Demo  
Description: The exhibit will demo a cognitive agent developed with IBM Bluemix technologies. The bot is primarily designed for students with disabilities looking to learn about the resources, tools and services available on the York University campus. The bot itself utilizes a number of IBM services such as Watson Conversation, Speech-to-text and Text-to-speech.  
Industry Company: IBM  
Project Number: 1004  
Product Name: IBM Bluemix
P1: Cognitive Telescope Network

Booth Number: P1
Title: Cognitive Telescope Network
Chair(s): Arunava Majumdar
Format: Poster
Description: Telescopic follow-up of transient astronomical events is one of the most desirable and scientifically useful activities in modern observational astronomy. Pinpointing a transient is essential for discovering more about the source by directing more powerful telescopes to observe and maintain records as the transient evolves. Join us to see how IBM Watson Visual Recognition, Machine Learning and Conversation are used to help build the telescope network on Bluemix.

D3: Customer Value Analysis

Booth Number: D3
Title: Customer Value Analysis
Chair(s): Damir Spisic
Format: Demo
Description: Analytic solution provides insights on how RFM analysis can help discover the most valuable customers. Sales teams can take action based on Recency (how recent is the sale), Frequency (active customers) and Monetary (who spends the most). The solution is based on IBM Watson Analytics storybook enhanced by
an application hosted on IBM Bluemix. It uses predictive modeling methods and a rich set of visualizations as well as annotations to help interpret the results.

Industry Company: IBM
Business unit IBM Business Analytics
Product Name: IBM Watson Analytics
Web Site: https://www.ibm.com/watson-analytics
Research Team: **IBM Hybrid Cloud:** Damir Spisic  Keith Kroeger  Ruth Briones  Richard Oswald

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**P2: Designing User Engagement for Cognitively-Enhanced Processes**

**Booth Number:** P2  
**Title:** Designing User Engagement for Cognitively-Enhanced Processes  
**Chair(s):** Zia Babar, Alexei Lapouchnian, Eric Yu  
**Format:** Poster

**Description:** Enterprise business processes can be enhanced using cognitive capabilities by offering analytics-based decision recommendations and increased sophisticated automation in order to achieve enterprise functional objectives. Conceptual modeling techniques are proposed which allow structured analysis of these business processes as a process architecture, to guide systematic search for viable modes of interaction and cooperation between human user and cognitive advisor by studying adoption obstacles.

**Industry Company:** IBM  
**Project Number:** 1030  
**Product Name:** IBM BPM, IBM Blueworks  
**Research Team:**  
**University of Toronto:** Zia Babar, Alexei Lapouchnian, Eric Yu  
**IBM Canada:** Allen Chan, John Mourra, Sebastian Carbajale, Paul Pacholski, Kam To Ngo

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**P3: Developing serverless event driven solutions with OpenWhisk**
Booth Number: P3
Title: Developing serverless event driven solutions with OpenWhisk
Chair(s): NEIL DELIMA, Murali Pattathe
Format: Poster
Description: This exhibit will showcase IBM's serverless platform on Bluemix called Cloud Function which is based on Apache OpenWhisk. Key serverless and OpenWhisk concepts, components and use cases will be highlighted. The exhibit will include an illustration of the creation of OpenWhisk actions, sequences, triggers, rules, packages and the creation and management of APIs that wrap actions and sequences. Code snippets and sample applications will be made available for illustration and demonstration.

Industry Company: IBM
Business unit Hybrid Cloud
Product Name: IBM Bluemix Cloud Functions (OpenWhisk)
Research Team:
- IBM Canada Lab: NEIL DELIMA
- IBM Canada Lab: Murali Pattathe

D4: Elascale: A Comprehensive Autoscaling and Monitoring Solution

Booth Number: D4
Title: Elascale: A Comprehensive Autoscaling and Monitoring Solution
Chair(s): Rajsimman Ravichandiran, Hamzeh Khazaei
Format: Demo
Description: Autoscalability is one of the crucial features necessary for cloud software systems nowadays. Elascale strives to adjust both micro/macro services’ resources (using it’s default autoscaling engine), with respect to workload and changes in the internal state of the whole application stack. The zero dependency of Elascale to the target software system enables it to be deployed as a service for any type of cloud platform.

Product Name: Elascale
Research Team: University of Toronto: Rajsimman Ravichandiran Hamzeh Khazaei

P4: Hybrid Similarity based Web Services Clustering (HSWSClustering)

Booth Number: P4
Title: Hybrid Similarity based Web Services Clustering (HSWSClustering)
Chair(s): Waeal Obidallah
Format: Poster
Description: The massive number of web services over the internet with different formats and functionalities motivate our work to develop web service discovery framework based on clustering similar web services using syntactic and semantic based similarities to minimize the search space. We propose a hybrid approach that performs non-logic similarity matching for clustering web services using Cosine, WordNet, and search engine based similarities in a multilayer framework.

Research Team: University of Ottawa: Waeal J.Obidallah, Bijan Raahemi

P5: Managing developer interruption

Booth Number: P5
Title: Managing developer interruption
Chair(s): Gabrielle Perez Dias, Jeremy Bradbury
Format: Poster
Description: The high frequency of interruptions during cognitively-intense activities can be annoying and detrimental to deadline-drive work, such as software development. Studies show that programmers tend to spend up to 30 minutes to get back to work after a pause. As interruptions are inevitable, our research focus is on the recovery of momentum. Interruption recovery is an open problem and involves understanding the interrupted activity, the developer as well as the context of the work.

Research Team: University of Ontario IT: Gabrielle Perez Dias, Christopher Collins, Jeremy S. Bradbury
— **D5: Managing Software Evolution Through Semantic History Slicing**

Booth Number: D5  
Title: Managing Software Evolution Through Semantic History Slicing  
Chair(s): Yi Li  
Format: Demo  
Description: Traditional commit-based sequential organization of version histories lacks semantic structure and thus are insufficient for many development tasks that require high-level, semantic understanding of program functionality, e.g., locating features and porting hot fixes. We propose to use unit tests as identifiers for corresponding software functionalities and present a family of automated techniques which analyze the semantics of historical changes and assist developers in many practical settings.  
Web Site: [http://www.cs.toronto.edu/~liyi/cslicer](http://www.cs.toronto.edu/~liyi/cslicer)  
Research Team:  
University of Toronto: Yi Li, Marsha Chechik  
University of British Columbia: Julia Rubin

— **P6: Modelling Design Topics in Online Discussions**

Booth Number: P6  
Title: Modelling Design Topics in Online Discussions  
Chair(s): Calahan Janik-Jones, Arthur Dailland  
Format: Poster  
Description: We demonstrate a tool that helps developers understand what topics are discussed in software design discussions in pull requests on GitHub. Specifically, we combine previous work on classifying design points in discussions with topic modelling techniques. This allows us to visualize design-specific information in a model that connects the discussion with relevant code fragments.  
Research Team:  
University of Toronto: Calahan Janik-Jones
Université de Montréal: Arthur Dailland  Michalis Famelis

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**P7: Pressure Sensitive Mats in the NICU**

Booth Number: P7  
Title: Pressure Sensitive Mats in the NICU  
Chair(s): Shermeen Nizami  
Format: Poster  
Description: To examine the potential for incorporating Pressure Sensitive Mats (PSM) and video data analysis as part of an integrated patient monitoring environment. Data will be collected simultaneously from PSM, video, and existing patient monitors, and shall be integrated with gold-standard bed-side annotations collected on an mHealth app developed as part of this project. Data analytics are being developed and evaluated to detect various events of clinical interest in the neonatal intensive care unit.

Industry Company: IBM  
Project Number: SRG_2015_1  
Product Name: Watson Analytics, Watson Health  
Research Team:  
**Carleton University:** Dr.Shermeen Nizami  Amente Bekele  Yasmina Souley Dosso  Mohamed Hozayen  
Dr.James R.Green  
**IBM CAS:** Dr.Randy Giffen  Nathalie Le Prohon  
**Children's Hospital of Eastern Ontario:** Dr.JoAnn Harrold  Kim Greenwood

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**P8: Prioritize and Visualize Vulnerability Findings**

Booth Number: P8  
Title: Prioritize and Visualize Vulnerability Findings  
Chair(s): Jinqiu Yang , Lin Tan  
Format: Poster
We propose to prioritize and visualize vulnerability findings of AppScan. The visualization helps developers prioritize workloads accordingly by grouping vulnerability findings with the same potential fix location. In addition, we propose a tree-based visualization to link two relevant vulnerability findings. For example, it is beneficial to link second-order SQL injections and their relevant SQL injections for easier understanding.

Industry Company: IBM
Project Number: 911
Product Name: AppScan
Research Team: University of Waterloo: Jinqiu Yang, Lin Tan
AppScan: John Peyton, Kristofer A Duer

— **P9: Private vitals data as a determinant of collaborative care quality**

Booth Number: P9

Title: Private vitals data as a determinant of collaborative care quality

Chair(s): Abidin Akkok, Peter Pennefather, Deb Fels, Patrick Neumann

Format: Poster

Description: A conceptual framework for sharing private health data and in particular personal vital signs data from patient-owned digital health devices is presented. It defines a unified storage strategy for all kinds of vital signs data collected from all kinds of devices with a key proviso that it is first registered and stored as patient-owned private data. A system diagram of the conceptual framework showing the relationships and information flow for monitoring care service quality is described.

Research Team: Ryerson University: Z. Abidin Akkok, Deborah I. Fels, W. Patrick Neumann
gDial Inc.: Peter Pennefather, West Suhanic

— **P10: Profiling Billions of Triples: The Case of Freebase Data Dumps**
Profiling Billions of Triples: The Case of Freebase Data Dumps

Chair(s): Niel Chah
Format: Poster
Description: Freebase was a Semantic Web knowledge base that was acquired by Google to support its Knowledge Graph and provide structured answers in Google Search. After its shutdown in 2016, Freebase data is archived in a data dump of billions of RDF triples. In this research, we present best practices in using the rich semantic data for applications such as information retrieval, present various data analytics findings that profile the data, and propose improvements to compress the data further.

Web Site: https://github.com/nchah/freebase-triples
Research Team: University of Toronto: Niel Chah Periklis Andritsos

SlackBot for API Connect

Booth Number: P11
Title: SlackBot for API Connect
Chair(s): Jisoo Lee, Laven Sathiyanathan, David Cheung, Ivy Ho
Format: Poster
Description: Automation of API Connect resources through Slack integration. With this SlackBot, a number of errands could be done, such as creating or rebuilding on-prem environment based on a code release version, checking status of on-prem environment, etc. by typing commands on specific slack channel. This will save time for all API Connect users who need on-prem environment for problem reproduction, debugging, creating course content or demos.

Industry Company: IBM
Business unit: IBM Cloud
Product Name: API Connect
Web Site: https://github.com/elkorep/stack-bot
— **P12: Social Media for Support - Research Overview**

Booth Number: P12  
Title: Social Media for Support - Research Overview  
Chair(s): Aindrila Basak, Mona Nashaat  
Format: Poster  
Description: The poster gives an overview of a framework for building, evaluating and validating machine learning models. The framework aims at involving the end-users in every step of the model construction pipeline. The framework includes two machine learning models, where one of the models focuses on generating interpretable predictions, the other model aims at leading end-users to successful actions for each prediction.  

Research Team:  
University of Alberta: Aindrila Basak  
University of Alberta: Mona Nashaat  
University of Alberta: Prof. Dr. James Miller  
IBM Canada: Shaikh Quader

— **D6: SOSCIP**

Booth Number: D6  
Title: SOSCIP  
Chair(s): Elissa Strome, Natalia Mykhaylova  
Format: Demo  
Description: Established in 2012, SOSCIP is a collaborative R&D consortium that brings together academic and industry researchers to do R&D projects that leverage HPC, data analytics, AI and cognitive computing.
Comprised of 15 of Ontario's most research-intensive academic institutions and IBM Canada as the founding and lead industry partner, SOSCIP has supported more than 100 collaborative projects, worked with over 60 different SMEs and helped more than 450 HQP develop data science skills and expertise.

Industry Company: SOSCIP
Product Name: SOSCIP
Web Site: www.soscip.org
Research Team: University of Toronto: Elissa Strome  Jenn MacLean  Krista Davidson  Jillian Dempsey  Natalia Mykhaylova  Sedef Akinli Kocak  Amy Hackney  Andrew Jones

—— P13: Test Case Traceability

Booth Number: P13
Title: Test Case Traceability
Chair(s): Sravya Polisetty, Shirin Akbarinasaji
Format: Poster

Description: As products evolve and teams expand in size and across different locations, the link between test cases and source code files becomes weak or is sometimes lost. To enhance semantic traceability between these artifacts we use a popular trace network that uses deep learning to predict the probability score between a test case and source code file. We also compare the performance of our network with the traditional bag-of-words approach and popular tracing methods like VSM and LSI.

Industry Company: IBM
Project Number SRG_2014_1
Product Name: RTC
Research Team: Ryerson University, Toronto, Canada: Sravya Polisetty, Shirin Akbarinasaji, Dr. Andriy Miranskyy, Dr. Ayse Bener
IBM, Canada: Adam Neal
— **P14: The DevOps/BizOps Integration: A New Vision for Software Engineering**

Booth Number: P14  
Title: The DevOps/BizOps Integration: A New Vision for Software Engineering  
Chair(s): Marios Fokaefs  
Format: Poster  
Description: Following new advancements in software, DevOps has risen as a new development paradigm, one that promotes the integration between development and management even after the development and deployment of the system. As digital businesses are also on the rise and software has become ubiquitous as a product or as a tool, we also argue the need for integration with BizOps. We describe an integrated and hierarchical decision process combining technical, economic and business parameters.

Research Team:  
**Polytechnique Montréal:** Marios Fokaefs  
**York University:** Marin Litoiu

— **P15: Tuning Spark Performance Aiming for Various Types of Workloads**

Booth Number: P15  
Title: Tuning Spark Performance Aiming for Various Types of Workloads  
Chair(s): Jenne Zhang  
Format: Poster  
Description: As a unified engine for big data analytics, Spark provides high scalability and fault-tolerance with its unique in-memory engine. Ensuring its ease of use, Spark hides the complex settings from users, however, there are approximately 200 configurable parameters in Spark execution engine. The default values might not be the best setting for every workload. My research goal is to develop a tool to help users tune Spark for different types of workloads and to improve overall performance.

Research Team:  
**Queen's University:** Jie ni Zhang, Patrick Martin
**D7: Using IoT and cognitive services to provide a personalized experience**

Booth Number: D7  
Title: Using IoT and cognitive services to provide a personalized experience  
Chair(s): Cesar Orozco, Heath Thomann, Kyle Johnson, David Christensen  
Format: Demo  
Description: Taking advantage of IoT and cognitive services, we can build applications that provide a more personalized experience, not only by displaying personalized content, but also by changing the look and feel of the application itself to adapt it to how people “feel” about certain topics. You can build applications that use this combination of technologies to create a new generation of applications, making the products offered by these applications and the applications themselves more attractive.  
Product Name: Rational Application Developer  
Research Team: **HCL:** Cesar Orozco, Heath Thomann, Kyle Johnson, David Christensen
# Conference Chair & Co-Chairs

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**CASCON 2017: The Cognitive Era: Data, Systems and Society**

November 6 - 8
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**Program Committee**

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## Paper Subreviewers

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## Best Paper Selection Committee

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**Most Influential Paper from 2007 Selection Committee**

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**— Best Exhibit Award Selection Committee**

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CASCON recognizes the best technical contributions of the event in terms of originality, clarity, and potential impact with two awards: Best Paper and Best Student Paper. To be eligible for the Best Student Paper award, a student must have primarily authored the paper, and student(s) at the time must have done the work described.
Questions, Suggestions, Concerns?

Email Us!

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