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Issa Traore · Isaac Woungang
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# Intelligent, Secure, and Dependable Systems in Distributed and Cloud Environments

First International Conference, ISDDC 2017
Vancouver, BC, Canada, October 26–28, 2017
Proceedings

Springer

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# Welcome Message From ISDDC 2017 General Co-chairs

Welcome to the proceedings of the First International Conference on Intelligent, Secure and Dependable Systems in Distributed and Cloud Environments (ISDDC 2017).

We were happy to present an impressive technical program thanks to the work of many volunteers. We would like to thank all of these volunteers for their contributions to ISDDC 2017.

Our thanks go to the authors, and our sincere gratitude goes to the Program Committee, who gave much extra time to carefully review the submissions. About 43 technical papers were submitted from around the world, and were thoroughly peer reviewed; 30% were accepted for presentation at the conference and publication in the conference proceedings. Papers were peer-reviewed by three or more Program Committee members, in a single round of review.

In addition to the technical paper presentations, ISDDC 2017 invited select guest speakers to provide stimulating presentations on topics of broad interest. This year's distinguished speakers were:

- Lloyd Jura, CISSP, Director, Information Security, Vivonet
- Ian Paterson, CEO, Plurilock Security Solutions Inc.
- Leo de Sousa, Director, Enterprise Technology, City of Vancouver Adjunct Faculty, New York Institute of Technology, Vancouver

We are pleased that authors of selected papers were invited to submit extended versions for publication in Wiley's *Journal of Security and Privacy*.

Finally, we thank the larger ISDDC community for their continuing support, by submitting papers and by volunteering their time and talent in other ways. Whether you attended ISDDC in person this year or are reading these proceedings, we hope that you find these papers interesting, inspiring, and relevant. Enjoy!

September 2017

Issa Traore
Isaac Woungang

# Welcome Message From ISDDC 2017 Program Co-chairs

Welcome to the proceedings of the First International Conference on Intelligent, Secure and Dependable Systems in Distributed and Cloud Environments (ISDDC 2017), which was held October 26–28 in Vancouver, BC, Canada.

The purpose of the ISDDC conference is to bring together developers and researchers to share ideas and research work in the emerging areas of intelligent, secure, dependable systems, and cloud environments.

The contributions included in the proceedings of ISDDC 2017 cover many aspects of theory and application of effective and efficient paradigms, approaches, and tools for building, maintaining, and managing secure and dependable systems and infrastructures, such as botnet detection, secure cloud computing and cryptosystems, IoT security, sensor and social network security, behavioral systems and data science, and mobile computing.

In this edition, 43 submissions were received from all over the world. Each submitted paper was peer-reviewed by the Program Committee members and external reviewers who are experts in the topical areas covered by the papers. The Program Committee accepted 13 papers (about 30% acceptance ratio). The conference program also included three distinguished keynote speeches and two tutorials.

The organization of an international conference requires the support and help of many people. First, we would like to thank all authors for submitting their papers. We would also like to thank the Program Committee members, who took care of the most difficult task of carefully evaluating the submitted papers. We would like to thank the ISDDC 2017 local arrangements chair for the excellent organization of the conference, and for his effective coordination creating the recipe for a very successful conference.

September 2017

Isaac Woungang
Issa Traore
Sanjay K. Dhurandher

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# ISDDC 2017 Keynote Talks

# What are the Current Cyber-Threats? Exploring the Trend in Yesteryear

Lloyd Jura

CISSP, Information Security, Vivonet

**Abstract.** With the ever-increasing number of devices online, ever increasing sophisticated human attacks, have we reached the peak of cyber threats? With the perimeter almost vanished, could it be time to shift the battle inside? It is not a secret that even organizations with the deepest pockets cannot keep up with the speed of cyber attackers out there. This session will highlight the following:

- Internet Security Threats of 2016
- The bad guys
- Targeted attacks
- Email attacks
- IoT and the Cloud
- Ransomware
- Best Practices

# Disrupting the Paradigm of Authentication: Leveraging Continuous Authentication to Replace out Point-in-Time Solutions

Ian Paterson

Plurilock Security Solutions Inc.

**Abstract.** Passwords are notoriously known to be flawed. They can be broken through automated attacks, social engineering, phishing, and related attack vectors. As a result, in the last decade, much effort has been invested in reinforcing passwords, primarily through multifactor authentication solutions. Despite encouraging progress made in this front, we have witnessed exponential increase in the number and sophistication of hacking incidents rooted in the circumvention of authentication methods. Now there is a push to replace passwords altogether. In this context, there is an urgent need for a paradigm shift. Continuous authentication provides a foundation for such paradigm shift. This talk will present and discuss industry advances and perspectives in leveraging continuous authentication toward replacing out point-in-time authentication solutions. The talk will discuss perception from real-world deployments and end-users, and will identify some challenges in research toward achieving the ultimate goal of a password-free world.

# Building a Cybersecurity Practice to Support Smart Cities

Leo de Sousa

Enterprise Technology, City of Vancouver Adjunct Faculty,
New York Institute of Technology, Vancouver

**Abstract.** Governments are on a journey to leverage information technology to improve citizen engagement, service delivery and manage ever increasing costs. This session provides practical approaches to building a Cybersecurity Practice to address the risks facing governments in the "Smart City" context. The Canadian Federal Government issued the Smart Cities Challenge (http://www.infrastructure.gc.ca/plan/cities-villes-eng.html) to all Canadian municipalities, regional governments and Indigenous communities in June 2017. The Smart Cities Challenge offers several prizes from $5M to $50M CAD to winning submissions. The City of Vancouver has created an internal working group to respond to this opportunity. As part of the working group, we recognized the need to build a Cybersecurity Practice to ensure that we can securely adopt "smart" technologies to support the City's strategic direction.

# ISDDC 2017 Tutorials

# Ransomware: Emerging Threat and Anatomy

Asem Almekhlafy

**Abstract**. Among the various forms of malware, ransomware is currently one of the most common forms of cybercrime. Ransomware works on encrypting victim's data or locking victim's screen until extortionist's demands are met usually by paying a sum of money as ransom. The prevalence of ransomware attacks continues to grow and the number of reported ransomware incidents increased significantly in the past few years. Reports stated that more than 4,000 ransomware attacks happen every day and there is a massive increase at rate of 300 percent annually in the volume of ransomware attacks. The first half of the year 2017 witnessed the emergence of ransomware attacks, e.g. Wannacry, which infected hundred thousand of machines across the world. This massive growth of ransomware attacks is accompanied with an increase in the number of attacks particularly targeting organizations at rapid pace. The shift toward business sectors rather than individual victims is a profit-driven endeavor and represents a bigger potential gain especially when attacks can result in exposing confidential information or disturbing critical services. In this tutorial, we will highlight the ransomware phenomenon and the impact of ransomware on individuals and businesses, and illustrate ransomware attack anatomy through a case study. In addition, we will discuss the new advances in ransomware detection and defense techniques and mitigation of ransomware risk. We will talk about what are the important trends and forecasts.

# Emerging Biometrics Technologies

Mohammed Alshahrani

**Abstract.** Nowadays, technological resources, devices, and services are being widely used by humans. In fact, technologies are infiltrating every part of modern living. In this context, critical resources that were accessible only through physical perimeters, are now available in digitized forms, and can be accessed from anywhere, by anybody. Traditional identification technologies like passwords and PINs are used as primary means of protection for these technologies and digitized resources, but they are no longer reliable or able to resist security threats. Therefore, security researchers and professionals have started thinking seriously about a strong alternative solution to replace or reinforce resiliently these technologies. Biometric technologies are commonly considered by security practitioners as one of the strongest contenders in achieving the aforementioned goal. Biometric refers to metrics related to human's characteristics such as gait, DNA and iris. These characteristics are unique and hence can be used to identify and distinguish people from one another. Some biometric technologies have already been deployed and implemented in the last decades such as fingerprint and iris, and others might emerge in the next few years or are recently emerging such as body odor and gait. The purpose of this tutorial is to explore and present the emerging biometric technologies along with their different foundational techniques to highlight recent advances and potential challenges these technologies face in their development. In this context, we will briefly review several new biometric technologies including DNA, EEG, ECG, PPG, Gait, Body odor, Lip, keystroke and Ear recognition. Also, biometrics performance and convenience will be discussed. This work derives from an in-depth study of various biometric research papers that have been published so far. Participants will gain a better understanding of biometric systems and their recent advances. The intended audience of this tutorial are those with a general computing background and researchers from all fields. There is no specific background knowledge that will be required because this tutorial.

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