The Sixteenth Annual HCSS Conference (2016)

Call for Presentations

Introduction

The sixteenth annual HCSS Conference will be held May 10-12, 2016 at the Historic Inns of Annapolis in Annapolis, Maryland. You are invited to submit a proposal to present a talk at this year’s conference. As in previous years, you are also invited to participate in a poster session. See details below for more information.

Background

Our security, safety, privacy, and well-being are all increasingly dependent upon the correctness, reliability, resilience, and integrity of software-intensive systems of all kinds, including cyber-physical systems (CPS). These systems must be capable of interacting correctly, safely, and securely with humans and the physical world even while they operate in changing, difficult-to-predict, and possibly malicious environments. New foundations in science, technology, and methodology continue to be needed. Moreover, these methods and tools have to be transitioned into mainstream use to build and assure these systems?and to move towards more effective models for acceptance and certification.

Conference Scope, Goals, and Vision

The High Confidence Software and Systems (HCSS) Conference, now in its second decade, draws together researchers, practitioners, and management leaders from government, universities, and industry. The conference provides a forum for dialogue centered upon the development of scientific foundations for the assured engineering of software-intensive complex computing systems and the transition of science into practice. The technical emphasis of the HCSS conference is on mathematically-based tools and techniques, scientific foundations supporting evidence creation, systems assurance, and security. The HCSS vision is one of engaging and growing a community?including researchers and skilled practitioners?that is focused around the creation of dependable systems that are capable, efficient, and responsive; that can work in dangerous or inaccessible environments; that can support large-scale, distributed coordination; that augment human capabilities; that can advance the mission of national
security; and that enhance quality of life, safety, and security

Conference Themes

We invite submissions on any topic related to high-confidence software and systems that align with the conference scope and goals listed above. In addition, the 2016 HCSS Conference will highlight the following themes:

- **Measuring Security**: If we could accurately measure the security provided by a computer system, we could drive dramatic improvements in cybersecurity. For example, such measurements could form the basis for computing return on security investments, enhancing our ability to prioritize spending and assess risk. Unfortunately, no one really knows how to effectively measure the security of a system. The most relevant measure seems to be some notion of friction -- the time or complexity cost of breaking in. Various approaches approximate this measure: red teams, process-compliance (SDL), design evaluation (Common Criteria), bug-bounty programs that leverage crowdsourcing (bugcrowd.com), DARPA's cyber-grand challenge, and various software metrics. This topic focuses on the state of the art in assessing the security of software: where are we now, where should we be, and how can we get there? What are the various individual factors that might contribute (in a manner weighted by mission context) to an aggregate measure?

- **Proofs that Cross IP Boundaries**: Recent advances in proof engineering and machine-checked proofs of program correctness indicate the potential feasibility of system assurance and trust frameworks that emphasize the use of machine-checked proofs as evidence that a component or system satisfies its specification. In such frameworks, proof-based evidence could be reviewed by stakeholders external to the manufacturing organization and could potentially enable greater trust in systems constructed from components contributed by multiple vendors. However, the wealth of high-level information encoded in these proof artifacts often causes intellectual property concerns to limit their use to a single entity. As software supply chains that involve multiple organizations become more common, we need scalable, composable approaches to proof that can simultaneously protect vendor IP.

- **Programming and Reasoning With Uncertainty**: Current software frequently manipulates values that are known to be imprecise: sensor readings, the output of machine learning algorithms, likelihood estimates, etc. Technologies like differential privacy bring another type of uncertainty in the form of noise added to prevent data leakage. Moving target defense enhances system security by increasing attacker uncertainty. And unknown environmental factors and the actions of other entities bring uncertainty to cyber physical systems. This topic is focused on logics, languages, and type systems that provide a principled means of dealing explicitly with this uncertainty.

- **Verification of Autonomous and Adaptive Systems**: Autonomy and adaptability are making their way into critical systems. These forays include
systems designed to be resilient in the face of attacks or changes in the operating environment, as well as low-level, high-frequency adaptations such as control loops. The lack of a static model presents new challenges for verification. These systems base decisions on non-deterministic events, making reasoning more difficult. They also frequently include machine learning components, which have guarantees that are not easily captured by most languages for specifying system invariants. This topic is focused on languages, logics, and reasoning principles for constructing specifications and proofs of such systems.

Conference Presentations

The conference program features invited speakers, panel discussions, poster presentations, and a technical track of contributed talks.

Technical Track Presentations

The technical track features two kinds of talks:

- **Experience reports.** These talks inform participants about how emerging HCSS and CPS techniques play out in real-world applications, focusing especially on lessons learned and insights gained. While experience reports do not have to be highly technical, they should emphasize substantive reflection on all aspects of experience, building on data and direct experience. Experience reports can focus on topics such as transitioning science into practice, architecture and requirements, use of advanced languages and tools, evaluation and assessment, team practice and tooling, supply-chain issues, and so on.

- **Technical talks.** These talks highlight state-of-the-art techniques and methods for high-confidence software systems with an emphasis on how those techniques and methods can be used in practice. Presenters of these talks should strive to make their material accessible to the broader HCSS community even as they discuss deep technical results in areas as diverse as concurrency analysis, hybrid reasoning approaches, theorem proving, separation logic, analysis, synthesis, analytics, various modeling techniques etc.

If you are interested in offering a talk?or nominating someone else to be invited to do so?please upload an abstract of one page or less for your proposed talk or a one paragraph description of your nominee?s proposed talk by Friday, December 18, 2015 to http://cps-vo.org/hcss16/presentation/cfp. Abstracts and nomination paragraphs should clearly indicate why the talk would be relevant to HCSS and which, if any, of this year?s themes the talk would address. Notifications of accepted talks will be made by Friday, January 15, 2016.

Poster Presentations
If you are interested in participating in the poster session, please upload an abstract of your proposed poster theme with title by Friday, December 18, 2015 to http://cps-vo.org/hcss16/poster/cfp. Abstracts should clearly indicate why the poster is relevant to HCSS and which, if any, of this year’s themes the poster would address. Only a limited number of posters will be accepted due to space availability. All posters for display should be printed in a 3?x4? size format. Notifications of accepted posters will be made by Friday, January 15, 2016.

The conference organizers will print posters free of charge if design content is electronically submitted by Friday, April 29, 2016. After April 29, poster session participants will be responsible for the printing and delivery of their own posters. Content designs of accepted posters can be submitted electronically in either Adobe InDesign or PDF formats. The conference organizers will provide easels and basic setup for all poster displays. Poster session participants should contact the conference organizers in advance if additional materials or props are desired.

Additional Information

Further instructions for electronically submitting camera-ready abstracts, final slide presentations of accepted talks and poster designs will be provided in the notification message that will be sent on Friday, January 15, 2016. Abstracts of accepted talks and posters will be printed in the 2016 HCSS Conference proceedings.

Important Dates

Friday, December 18, 2015 - Abstracts of proposed talks and poster topics submission deadline
Friday, January 15, 2016 - Notifications of acceptance/rejection
Monday, April 4, 2016 - Camera-Ready Abstracts Due
Friday, April 29, 2016 - Poster Files Due
Tuesday, May 10, 2016 - Presentation Files Due
May 10-12, 2016 - HCSS Conference

Planning Committee

Co-Chairs
Kathleen Fisher, Tufts University
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Brad Martin, NSA
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