COMPUTER SCIENCE COLLOQUIUM

FORTY-SECOND SERIES
SPRING 2015
THURSDAYS AT NOON
SALAZAR 2016

JAN.29	Timothy Doughty, DriveSavers, Novato, California **WHAT I LEARNED AND WHAT I WISHED I HAD LEARNED** Given the wide variety of subjects related to programming and software engineering, it's hard to keep up with everything. This talk will involve a discussion of the things that have served me well since graduation, the things that I wished I had spent more time with before graduation, and the things I didn't even consider I'd use.
FEB.05	Michael Nathanson, St. Mary's College, Moraga, California **FROM BIT TO QUBIT: QUANTUM INFORMATION FOR EVERYONE** Classical information theory abstracts all data into strings of zeroes and ones. The particular medium used to encode them is theoretically irrelevant, and any strange behavior introduced by the medium becomes a challenge to overcome. In quantum information theory, information is encoded in the states of quantum systems, and the extent to which its behavior deviates from the classical is no longer seen as a challenge but as a fundamental resource. In this talk, I will describe how properties of quantum mechanics such as superposition and entanglement offer the possibility of more efficient algorithms and secure cryptographic protocols, giving specific examples of each.
FEB.12	Chris Finan, former White House Cybersecurity Advisor **GOVERNMENT CYBERSECURITY 2015: WHAT TO EXPECT FROM CONGRESS AND THE EXECUTIVE BRANCH IN THE COMING YEAR** Will Congress ever pass cybersecurity legislation? Will the Obama administration build on the Executive Order and NIST framework with additional initiatives in the coming year? How will policymakers balance privacy and security concerns? What are the strategic priorities and what can we expect? Chris will offer insight into key legislative and policymaking issues, and provide analysis of what Washington is likely to do to address the nation's cybersecurity challenges in 2015.
FEB.19	Barry Rountree, Lawrence Livermore National Laboratory **OPTIMIZING PERFORMANCE AT 20 MEGAWATTS: OPEN PROBLEMS IN POWER-CONSTRAINED SUPERCOMPUTING** Through the history of supercomputing, we've been able to assume that, in effect, we can plug each new machine into the wall and expect that there will be enough electricity to run the system. As the fastest machines on the planet make the transition from petaflop to exaflop architectures, this assumption no longer holds: future machines will have hard limits on the power they are allowed to consume. Performance optimization will have to be done within these power constraints, which leads to several unexpected complications.
FEB.26	Yi Fang, Santa Clara University **TOWARDS THE NEXT GENERATION OF SEARCH ENGINES** Owing to the massive amount of data on the Web, search engines have become an indispensable means for people to find relevant information in their daily lives. The traditional paradigm of search being just a way of locating the top ten relevant web pages is undergoing changes. In this talk, I will introduce some recent developments of search technologies. One of them is entity-oriented search, which enables users to search for things and objects (such as people, places, and products) instead of documents and instantly get information that is relevant to the query. I will also discuss the convergence of search engines with other technologies such as recommender systems.
MAR.05	Cynthia Thompson, University of San Francisco **FINE-GRAINED SENTIMENT ANALYSIS** Targeted sentiment analysis expands on document or sentence-level polarity classification by identifying the sentiment expressed towards specific entities in a span of text. The task is challenging due to the large variety of such entities and to the fact that not all entities are relevant to sentiment analysis. I will describe our work applying supervised and semi-supervised learning techniques to performing fine-grained sentiment analysis.
MAR.12	Bob Ippolito, Nom Labs **AVOIDING PAIN WITH PERSISTENT DATA STRUCTURES** The work we do with data structures has gotten a lot more sophisticated in recent years due to the rise of multicore devices, distributed applications, and the expectation that updates should be transactional and/or reversible. Many of the mutable data structures in common use do not adapt well to these constraints without excessive locking, copying, or other forms of bookkeeping. Persistent (effectively immutable) variants of data structures can often be used to simplify these classes of problems. While many of these data structures are already commonplace in functional programming languages such as Haskell, Scala or Erlang, they can be adapted for use in any garbage-collected language such as Java, Python or JavaScript. I will discuss the implementation and usage of several persistent data structures and compare them with their mutable counterparts.
MAR.19	**SPRING RECESS (No Colloquium)**
MAR.26	Cooper Quintin, Electronic Frontier Foundation, San Francisco **PRIVACY BADGER, DNT, AND A WEB WITHOUT TRACKING** Cooper will introduce the design and implementation of Privacy Badger, EFF's new browser extension that automatically blocks both invisible trackers and spying ads. It is intended to be a minimal or zero-configuration option that most Internet users can use to prevent non-consensual third party collection of their reading habits from their everyday browser. Privacy Badger couples the recently developed HTTP Do Not Track opt out header with a number of heuristics for classifying the behavior of third parties, to automatically determine which should be blocked, which are needed but should have cookies blocked, and which are safe from a privacy perspective. Cooper will also talk about the current state of non-consensual tracking on the web, what methods are currently being used to track people and exploring what alternatives we can pursue.
APR.02	Jason Shankel, The Stupid Fun Club **PIZZA AFTER TALK IN DARWIN 28** **QUANTIFIED SELF, AUGMENTED REALITY AND PSYCHOLOGICAL MODELING** Let's explore how the century-old technology of psychological modeling will impact the development of quantified self and augmented reality technologies in the century to come.
APR.09	Kim Zetter, WIRED **STUXNET AND THE AGE OF DIGITAL WARFARE** In June 2010, a small security firm in Belarus discovered a computer worm that had infected computers in Iran and was causing them to crash. The worm used an ingenious zero-day exploit to spread, but other than this it appeared to be generic malware designed for corporate espionage. But as digital detectives dug through the code and began to reverse-engineer its commands, they discovered it was much more sophisticated than previously believed and had a much more insidious goal— to physically sabotage equipment used in Iran's nuclear program. Stuxnet, as the malicious program was dubbed, was a landmark attack since it was the first cyberweapon ever discovered in the wild and was the first digital code to jump the gap from the digital world to the real world to cause physical destruction. This presentation focuses on how the brilliant attack was designed and unleashed on computers in Iran -- being targeted against five companies in Iran who could help the attackers reach their target -- how researchers discovered and deciphered it and how it's discovery led them to uncover an arsenal of espionage tools that were also created and unleashed by the same attackers. It will also examine how Stuxnet launched a new era of warfare and how critical infrastructure systems in the U.S. and elsewhere are now at risk of 'blowback' and copycat attacks thanks to the authors of Stuxnet.
APR.16	Kimberly Cupps, Lawrence Livermore National Laboratory **HIGH PERFORMANCE COMPUTING (HPC) AND THE SEQUOIA SUPERCOMPUTER AT LAWRENCE LIVERMORE NATIONAL LABORATORY** Lawrence Livermore National Laboratory (LLNL) has fielded high performance computers to solve problems of national interest for over 50 years. Sequoia is an IBM Blue Gene Q supercomputer capable of 20 petaFLOPs of peak performance sited at LLNL. It is the third fastest computer in the world and is built upon massive numbers of low power cores. In this talk I will touch on HPC applications at LLNL and key components of Sequoia. I will also comment on future challenges facing Exascale computers, expected in the early 2020s.
APR.23	John W. Mamer, Anderson School of Management, UCLA **AN ECONOMIC MODEL OF MASS INTERNET ATTACKS** Mass attacks by malware-infected third party hosts, most famously employed against Iran's nuclear program, constitute only one vector of cyber crime/warfare, but one that has been much reported in the news media. How dangerous are such attacks? How effective? And, most importantly, how best to defend against such attacks? We explore a simple economic model of attacks for the purposes of better understanding the potential threats and possible countermeasures.
APR.30	**PIZZA DURING TALK IN SAL 2016** **STUDENT PRESENTATIONS** / SHORT PRESENTATIONS OF RESEARCH CARRIED OUT BY SONOMA STATE COMPUTER SCIENCE STUDENTS
MAY.07	**PIZZA DURING TALK IN SAL 2016** **END OF SEMESTER CELEBRATION** / AWARDS PRESENTED TO SONOMA STATE COMPUTER SCIENCE MAJORS

Supported by the SSU Instructionally Related Activities Fund and the generous donations of friends of the SSU Computer Science Department.

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