Synopsis of the ASPLOS '16 Wild and Crazy Ideas (WACI) Invited-Speakers Session

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Abstract

The Wild and Crazy Ideas (WACI) session is a longstanding tradition at ASPLOS, soliciting talks that consist of forward-looking, visionary, inspiring, creative, far out or just plain amazing ideas presented in an exciting way.[1]

The first WACI session took place in 1998. Back then, the call for talks included a problem statement, which contended that "papers usually do not get admitted to [such conferences as] ISCA or ASPLOS unless the systems that they describe are mature enough to run [some standard benchmark suites, which] has a chilling effect on the idea generation process—encouraging incremental research" [1]. The 1998 WACI session turned out to be a great success. Its webpage states that "there were 42 submissions [competing over] only eight time slots, [which resulted in] this session [having] a lower acceptance rate than the conference itself" [2].

But the times they are a-changin' [3], and the WACI session no longer enjoys that many submissions (Figure 1), perhaps because nowadays there exist many forums for researchers to describe/discuss their preliminary ideas, including: the "hot topics in" workshops [4–7]; a journal like CAL, dedicated to early results [8]; main conferences soliciting short submissions describing "original or unconventional ideas at a preliminary stage" in addition to regular papers [9]; and the many workshops co-located with main conferences, like ISCA '15, which hosted 13 such workshops [10].

Regardless of the reason for the declining number of submissions, this time we've decided to organize the WACI session differently to ensure its continued high quality. Instead of soliciting talks via an open call and hoping for the best, we proactively invited speakers whom we believe are capable of delivering excellent WACI presentations. That is, this year's WACI session consists exclusively of invited speakers. Filling up the available slots turned out to be fairly easy, as most of the researchers we invited promptly accepted our invitation. The duration of each talk was set to be eight minutes (exactly as in the first WACI session from 1998) plus two minutes for questions.

The talks are outlined below. We believe they are interesting and exciting, and we hope the attendees of the session will find them stimulating and insightful.

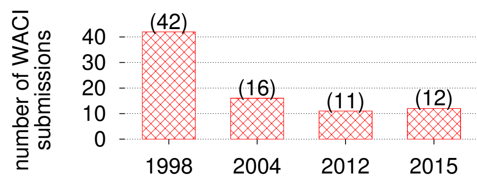

Figure 1. *The number of submissions to the WACI session has declined over the years [2, 11–13]. We contacted WACI session chairs from other years ($\geq$ 2010) in an attempt to obtain more data, but they did not maintain it in their records. They typically agreed, however, that the numbers were depressingly low.*

1. The ASPLOSian Singularity

Emmett Witchel, University of Texas at Austin.

Abstract The technological singularity is the inflection point where machine intelligence recursively self-improves, making it inevitable that machines surpass human intelligence with unknowable motivations. Therefore, logic dictates there will be an ASPLOSian singularity. Will it be speculative execution, a file system or require garbage collection? Yes it will! Our delightful and information-dense talk will enable you to understand and profit from this inevitable yet unknowable event.

Bio Emmett Witchel is an associate professor in computer science at The University of Texas at Austin, since receiving his doctorate from MIT in 2004. He and his group are interested in operating systems, security, and architecture.

[1] Amusing elements in the presentations are tolerated ;-) but are in fact optional.

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ASPLOS '16 April 2–6, 2016, Atlanta, GA, USA
Copyright © 2016 ACM 978-1-4503-4091-5/16/04…$15.00
DOI: http://dx.doi.org/10.1145/2872362.2876512

2. The Elephant in the Room Cannot Write Parallel Code

Yoav Etsion, Technion – Israel Institute of Technology.

Abstract Dennard scaling (or end thereof) has stopped the clock and drove us to multicore architecture. Soon afterwards, Dark Silicon and the power wall sent us to develop various hardware accelerators. Today, many in the computer architecture community believe that future computer systems will be parallel, heterogeneous, and littered with hardware accelerators. This view draws attention to the proverbial Elephant in the room: Can humans really program such systems? In my talk, I wish to argue for an idea that is so wild and crazy that only few dare say it out loud: Automatic Code Parallelization.

Bio Yoav Etsion is an Assistant Professor at Technion – Israel Institute of Technology, where he is a member of both Electrical Engineering and Computer Science departments. In addition, he is a founding member of the Technion Computer Engineering research center (TCE). Previous to that, he was a Senior Researcher at the Barcelona Supercomputing Center (BSC-CNS). Prof. Etsion received his PhD from the Hebrew University in 2010, and he is a member of the ACM and IEEE. His research interests include computer architecture, HW/SW interoperability, operating systems, and parallel programming models.

3. Silicon Meets Biotech: Building Better Computers by Incorporating Biological Parts

Luis Ceze, University of Washington.

Abstract Hybrid silicon and biochemical systems are worth serious consideration: time is ripe for computer architects to consider incorporating biomolecules as an integral part of computer design. I'll provide examples of using biology to improve storage, compute and sensing, leading to systems that would be impossible with just silicon or biology alone. Biotechnology has benefited tremendously from progress in silicon technology developed by the computer industry; perhaps now is the time for the computer industry to borrow back from the biotechnology industry.

Bio Luis Ceze is the Torode Family Associate Professor in the Computer Science and Engineering Department at the University of Washington. His research focuses on the intersection between computer architecture, programming languages and biology. He is a recipient of an NSF CAREER Award, a Sloan Research Fellowship, a Microsoft Research Faculty Fellowship and the 2013 IEEE TCCA Young Computer Architect Award. When he is not working, he is fond of either eating or cooking.

4. Wean the Screen: Systems Challenges for Practical, Non-Visual User Interfaces

Don Porter, Stony Brook University.

Abstract Mark Weiser's vision of ubiquitous computing has been an exciting goal for systems researchers. A prevailing approach to making computers more ubiquitous is proliferating display devices. Although proliferating displays is inexpensive and feels futuristic, this approach misses important opportunities for computing to intrude into our lives. Some activities and situations simply preclude monitors, such as taking a shower, driving a car, or jogging. Moreover, many computer users develop repeated stress injuries that limit time at a traditional computer, and a significant fraction of the population is blind or has reduced vision. Finally, technology itself is trending toward small displays, such as thermostats, watches, and some devices may have no onboard display. This talk explores systems challenges that must be solved in order for systems to support practical user interfaces with little-to-no visual component. As an example, consider responding to email while jogging; the user may be able to look at a few images on a phone or watch, but the primary interaction mode would be audio. The user will need to refer to data outside of her email application, such as checking her calendar, updating a document, or adding data to a spreadsheet.

Bio Don Porter is an Assistant Professor of Computer Science at Stony Brook University. Porter's research interests broadly involve developing more efficient and secure computer systems. Porter earned a PhD and MSc from The University of Texas at Austin, and a BA from Hendrix College.

5. Data Untangling Begins at Home

Vishakha Gupta, Intel.

Abstract Imagine all your documents, emails, photos were not digital but print. Now imagine you had to find photos from an event ten years ago. Assuming you still had those pictures, you might be able to pull up a few from an album created at the time. If you like to hoard and are really really organized, you might be able to find them. Even if you are very organized though, you would probably not be able to easily find pictures of all the games your daughter played in when she was a kid. Storage and classification systems are both impediments to these types of tasks. Then came computers and that made things... worse. Storage may have become cheaper and more abundant but that only made the organization and search problem worse. Solutions like Apple's Spotlight try to free the user from the need to organize and classify data but are still very limited in their understanding of what the user really wants to find or look at; not to mention that those needs may change. What if we never had to worry about where any file got saved on our permanent storage? What if all we understood were elements in life like messages, photos, events, tutorials, conversations but had no idea of how they mapped to storage, just how they mapped to our lives. What if size and number were not a problem? What if one search revealed connections we had even forgotten about? What if I said graphs on next generation memories could make all this possible and more?

Bio Vishakha Gupta is a Research Scientist at the best software lab in the industry at a hardware company called Intel. At around the time she joined Intel in 2011, after begrudgingly leaving Georgia Tech, she fell in love with graphs for some reason and now wants to apply them to solve every problem on the planet. If numerous mathematicians can, why can't she? Other than that, she likes working on systems problems, particularly when it comes to dealing with large memories and big data.

6. We Have People for That

Emery Berger, University of Massachusetts Amherst.

Abstract Since 1960, the world population has been growing by 1 billion people roughly every 12 years. I dub this More's Law. Today, there are more than 7 billion people in the world. Also today, almost 4 billion of them are wasting their vast potential staring into their mobile phone screens. These converging trends mean that there are vast unused human computational resources waiting to be tapped. I argue that getting these people to do anything even remotely productive will make the world a better place.

Bio Emery Berger is a Professor in the College of Information and Computer Sciences at the University of Massachusetts Amherst, where he co-directs the PLASMA lab (Programming Languages and Systems at Massachusetts) and is a regular visiting researcher at Microsoft Research. He is the creator of a number of influential software systems including Hoard, a fast and scalable memory manager that accelerates multithreaded applications (used by companies including British Telecom, Cisco, Credit Suisse, Reuters, Royal Bank of Canada, SAP, and Tata, and on which the Mac OS X memory manager is based); DieHard, an error-avoiding memory manager that directly influenced the design of the Windows 7 Fault-Tolerant Heap; and DieHarder, a secure memory manager that was an inspiration for hardening changes made to the Windows 8 heap. He is currently serving / surviving as Program Chair for PLDI 2016, and maintains his blood-caffeine level at roughly 0.94.

7. Making Reconfigurable Fabric Actually Reconfigurable

Chris Rossbach, VMware and University of Texas at Austin.

Abstract A wealth of research and engineering effort has been devoted to enabling an era of FPGA ubiquity through improvements to front-end programmability and through better support for familiar interfaces to resources such as memory. Despite this effort, using FPGAs in a setting where reconfiguration is a common operation remains a surprisingly radical idea. The same is true for related systems-level concerns such as sharing and virtualization. This talk considers the challenges associated with making reconfigurable resources actually reconfigurable and sharable, and sets a technical course for restructuring and improving system software in a way that enables more widespread use of FPGAs.

Bio Chris Rossbach is a Senior Researcher at VMware Research Group, an Assistant Professor at the University of Texas at Austin, and an alumnus of Microsoft Research's Silicon Valley Lab. He received his PhD in computer science from The University of Texas at Austin in 2009. Chris's research focuses on operating system and architectural support for emerging hardware, particularly those that leverage concurrency. He is interested in concurrency in the broadest sense, but has a particular affinity for exploring abstractions that enable systems to take advantage of concurrency to improve performance and mechanisms that simplify the development of parallel programs.

8. Remembrances From Future Spaces: Nano-Computing and the Imitation Game in 2050

Radu Sion, Stony Brook University.

Abstract We will talk about small things, happiness, and free energy. We explore the year 2050. How to power up your computing using your sweat. Whether the singularity will really happen or stop at passing the Turing test. How chaotic a world in which energy is free may end up being.

Bio Radu Sion is the CEO of Private Machines Inc., and a Professor of Computer Science at Stony Brook (on leave). Radu and his group are interested in systems, cybersec and large scale computing. Radu is currently leading Private Machines Inc., a cyber security startup designing the next generation secure cloud computing technologies.

9. A Captain of Industry Who Is Me Changes The Technology Business Forever

James Mickens, Harvard University.

Abstract It's not clear what hardware designers and OS architects should be doing these days. Moore's Law is dead. File descriptor tables have already been invented. Making computers more power-efficient is supposed to save the earth for future people, but the future people are not here yet, and if they're anything like the current people, we already don't like them. It is well-known that making things go fast is very fun and occasionally useful. We can make software go fast by moving it to hardware. So, I propose that we take the top five applications that a platform executes, and implement them in hardware, leaving only a thin software layer to coordinate the particularly tricky parts. So, uh, let's implement Linux in hardware. We should also implement Firefox in hardware. And Emacs. OK AND VI TOO. You vi people are so needy. Stockholm syndrome will do that to you.

Bio James Mickens is an IEEE Knight of the Republic, an ACM Templar for Non-Open Access, and a Royal Proceeding of Her Majesty's Royal Proceedings. His appreciation for syntactically correct code has led him to be called "a semicolon in human form." His online shopping habits have too many dimensions to be k-means clustered, so he is only shown ads about dinosaurs and ancient siege machines. This does not bother James Mickens, and explains why he spends his summers attacking France with triceratops horns.

Acknowledgments

We warmly thank Apple and Netapp for sponsoring this session, and the speakers for boldly accepting the challenge. The session chair would like to additionally thank YY Zhou, the ASPLOS '16 program chair, for supporting this year's experiment of changing the format of the WACI session.

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