Microsoft Executive Mundie Demonstrates the Future of Computing

Craig Mundie, chief research and strategy officer of Microsoft, visited UC San Diego on Oct. 10 to meet with faculty and students and to share his vision of where technology is moving in the near future. Mundie is one of the two executives who assumed Bill Gates’ responsibilities at Microsoft. He now directs Microsoft’s long-term technical strategy and investments and oversees Microsoft Research, which employs more than 800 Ph.D. level researchers.

At UC San Diego, Mundie connected with students through a dynamic new-technology demonstration and lecture that ended with a Q&A moderated by CNS Director Amin Vahdat. To watch a webcast of the talk, go to http://video.jose.ucsd.edu/ass/CraigMundie.asx.

“Microsoft Research is one of the last remaining corporate research laboratories in the world dedicated to computer science and engineering — and a consistent and important source of fundamental advances in computing,” explained Vahdat. “I can’t overestimate the importance of our research collaborations with Microsoft Research, or the valuable experiences our students gain when they intern or take full-time jobs there.” Mundie demonstrated prototypes of flexible screens that will connect wirelessly to powerful cell phones of the future, and a collaborative computing interface called Microsoft Surface, a tabletop computing display that allows several users to work either independently or cooperatively without the use of a mouse or a keyboard. CSE and CNS Ph.D. student Justin Ma thinks the presentation “showcased the breadth of Microsoft” and he calls “very impressive” Microsoft’s efforts to integrate various technologies. “During the Q&A, I thought Craig Mundie provided some insights into Microsoft’s role in technology and how that technology will affect the ways people will interact socially in the future,” says Ma.

Craig Mundie’s visit also included a poster session with CNS graduate students, and a lively meeting with CNS faculty members.

Upcoming Events

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<th>Event</th>
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<tr>
<td>Windows Azure: An Operating System for the Cloud</td>
<td>December 3</td>
<td>1 p.m.</td>
<td>Room 1202, CSE Building, UC San Diego</td>
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The public is welcome to attend. For more information, please contact kkrane@ucsd.edu or call 858-822-5964. For a map of the campus, go to http://maps.ucsd.edu/Default.htm.

Mission and Objectives of CNS

The mission of CNS is to develop key technologies and frameworks for networked systems. By combining our research talents and strengths in partnership with industrial leaders, CNS achieves critical mass and relevant focus, accelerating research progress and creating key technologies, frameworks and systems understanding for robust, secure networked systems and new applications. CNS also works to educate the next generation of top students with a perspective on industry-relevant research and to train students on how to continue their leadership throughout their careers. This is accomplished by bringing together leading faculty, students, and companies to investigate the most challenging, interesting and important problems in computer networks.

If you are interested in joining the Center, please contact Director Amin Vahdat at vahdat@cns.ucsd.edu.
New Algorithm Significantly Boosts Routing Efficiency of Networks

A time-and-money-saving question shared by computer scientists and engineers throughout the network and has been a topic of research for many years. The latest approach to solving this problem is a new routing algorithm developed by the team at the Center for Networked Systems (CNS).

The traditional approach, said Stefan Savage, a computer science professor and member of CNS, “is to tell everyone: flood the network with a flood of packets to communicate that something has changed.” This approach is time-consuming and expensive, especially when dealing with large-scale networks.

What the team did with their new routing algorithm, according to Savage’s student Kirill Levchenko, was “to calculate the paths they use in the great matrix of the Internet.”

Typically, computers are connected by a network architecture that consists of a “tree” of routing and switching elements regulated by specialized equipment, with expensive, non-commodity switches at the top of the hierarchy. But even with the highest-end IP switches and routing equipment, the networks are only capable of handling a small fraction of the combined bandwidth available to end hosts. This limits the overall cluster size, while still incurring considerable costs. Application design is further complicated by non-uniform bandwidth among data center nodes, which limits overall system performance.

The CNS researchers envision creating a data center that will have scalable interconnection bandwidth, making it possible for an arbitrary host in the data center to communicate with any other host in the network at the full bandwidth of its local network interface. Their approach requires no modifications to the end host network interface, operates at the core of most data centers, and is effective on currently available switches and routers.

As for the cost differential between his team’s technique and those in current use, Vahdat says it’s significant: “From a cost perspective, to build out a 25,000-node cluster today using current techniques with 100 percent bandwidth, just the switching equipment would cost somewhere in the order of $28 million, whereas with our technique using the identical network elements, it would deliver the same performance but incur costs of maybe $4 million. That’s a factor-of-seven difference.”

CNS Welcomes Motorola, Inc. As Newest Member

In September 2008, Motorola, Inc. became the newest member of CNS. Motorola is a leader in global communications and is devoted to developing communications solutions with a focus on connectedness and mobility for individuals, government, and businesses. This dedication to investment in research and to the development of networking and mobile device innovation makes Motorola a natural fit for the mission of CNS.

Dr. Hamid Ahmadi, Corporate Vice President, Senior Fellow and Chief Architect, Motorola Technology, says that Motorola joined the Center because, “UCSD’s Center for Networked Systems’ broad research portfolio and diverse faculty expertise complement Motorola’s research vision of converged computing, content and connectivity to deliver multimedia and information product and service solutions to our customers.”

New Data Center Architecture - continued from page one

It was also announced in August that Vahdat is one of only 41 researchers worldwide to be awarded a newly-created Hewlett-Packard Labs Innovation Research Award. The award will allow Vahdat and his team to develop further their proposed new networking architecture outlined in their SIGCOMM paper. The researchers’ work addresses problems inherent to current data center networks found in scientific computing, financial analysis, social networking, or any industry with large-scale computation or storage needs. Explained Vahdat: “Our work addresses the problem of data center network connectivity in a world where consolidation is increasingly taking place in data centers.”

At Summer 2008 Research Review, CNS Members Vote to Fund Six New Projects

Over 75 industry representatives, UC San Diego graduate students and engineering faculty attended the CNS Summer 2008 Research Review, making it one of the Center’s most successful reviews ever. Featured speakers included Greg Lavender of Sun Microsystems, Inc., Brad Chen of Google, Inc., and Mehmet Yavuz of Qualcomm, Inc. Faculty members presented progress and summary reports on projects sponsored by CNS, and they proposed new projects that could benefit from Center support. There was also a lively poster session where CNS graduate students got a chance to interact closely with members from industry.

The CNS Advisory Board, comprised of member company representatives, met the morning of the Review’s second day to decide which of the new project proposals would be granted Center support. The Board voted to sponsor the following projects from CNS membership funds (followed by names of each project’s CNS investigators):

- Bluesky: System Support for Transparent Cloud Computing
  Stefan Savage, Geoffrey M. Voelker, Alex Snoeren and Amin Vahdat
- Energy and Thermal Management in Virtualized Environments
  Tajana Rosing and Amin Vahdat
- Energy Efficient Design of Heterogeneous Wireless Sensing Systems for Healthcare Applications
  Tajana Rosing
- Scam Analysis and Defense Via Botnet Infiltration
  Stefan Savage and Geoff Voelker
- Can Coarse Circuit Switching Work and What to Do When it Doesn’t
  Bill Lin
- Investigating Proximal Resource Architectures for Thinner Client Computing
  Joe Pasquale and Amin Vahdat

Deption of Internet Universe on Display at MoMA

A visualization depicting a frozen moment of activity in the Internet universe, created by researchers affiliated with the Center for Networked Systems and UCSD’s San Diego Supercomputer Center, is part of a special exhibit that ran through mid-May at the Museum of Modern Art in New York called Design and the Elastic Mind.

The image was created by Young Hyun and Bradley Huffaker, researchers in the Cooperative Association for Internet Data Analysis. The visualization on display at MoMA depicted unique times for data packets sent from a web site in Herndon, Virginia, to hundreds of thousands of nodes on the Internet, and back again. It was generated using a visualization tool created by Hyun called Walrus, which enables researchers to view large data sets using 3D hyperbolic geometry — a form of image distortion resembling a tree viewed from a fish-eye lens. This allows users to examine a smaller area while always having the whole graph, rendered inside a sphere, available as a frame of reference.

Graduating Student Members of CNS

Varun Almala, M.S., CSE, June 2008
Work: Stefan Savage
Visiting Research Program Fund
Daren Dao, M.S., CSE, July 2008
Work: Amin Vahdat
Visiting Research Program Fund
Deeaker Gupta, Ph.D., CSE, November 2008
Work: Amin Vahdat
Visiting Research Program Fund
Chip Killian, Ph.D., CSE, June 2008
Work: Geoff Voelker
Visiting Research Program Fund
Alexander Loukissas, M.S., CSE, June 2008
Work: Stefan Savage
Visiting Research Program Fund
Marvin McNett, Ph.D., CSE, November 2008
Work: Geoff Voelker
Visiting Research Program Fund
Kashik Vishwanath, Ph.D., CSE, November 2008
Work: Amin Vahdat
Visiting Research Program Fund
Professor George Varghese

Professor George Varghese receives a generous gift at the recommendation of CNS industry partner Cisco Systems, Inc., from the Cisco University Research Program Fund. The gift is intended to support Professor Varghese’s research project studying randomized distributed control with applications to video encoding, control and intrusion detection system logging.

Professor George Varghese

Number of Updates

Date of Publication

- Visits to CNS websites increased by 10X over the past year.
- More than 25% of all visits to CNS websites came from new visitors.

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