CCS News Bytes

LALP-05-015 **May-June 2005**

CCS Rated 'Outstanding' in Latest Division Review

Daniel Reed, chairman of the 2005 Computer and Computation Sciences (CCS) Division Review Committee, told an audience of about 45 staff members June 2 that the committee had awarded CCS a rating of "outstanding."

Reed, director of the Institute for Renaissance Computing at the University of North Carolina at Chapel Hill, pointed out that the rating awarded was higher than the assessment in 2004.

He commented that CCS is "doing great work in the face of obstacles."

He said it also seemed to the committee that "people are reasonably happy"—although some wish things could be different.

Reed had previously provided the same information to senior Laboratory management, including Laboratory Director Robert Kuckuck, during a special briefing.

Details of the Assessment

Reed singled out the Turquoise Network as "a big step forward."

He called for more standardization on review criteria in the future "if possible," commenting that he would have liked to hear "what happened to the poster children of yesteryear." (CCS Deputy Division Leader Stephen Lee said later that this comment came in the context of a call for more strategic planning at the Laboratory and division level and was not a comment about specific projects.)

Among the items Reed mentioned as notable were Implicit Monte Carlo (IMC) innovations, clustermatic deployment, Capsaicin innovations, and mesh-free Lagrangian hydrodynamics.

Turning to "opportunities for improvement," he called for more external research and collaboration; more intergroup collaboration; external network bandwidth improvements (connection to the National Lambda Rail); and predictive performance analysis.

He said improvements in morale are important, commenting that matrix management is stressful and that Laboratory management should be more creative in implementing imposed regulations. He said the Laboratory "should push back against over-regulation."

Division Review Committee Chairman Daniel Reed presents the committee's assessment of CCS. (CCS Deputy Division Leader Stephen Lee is shown in the foreground.)

Reed listed five formal recommendations:

- He said CCS is working well with the Applied Physics Division (X Division), but active management will be needed to keep the collaboration fresh; temporary interdivision staff transfers are desirable; and the longer-term mission of CCS must be preserved.
- He said technical computing is of strategic importance for Los Alamos National Laboratory. The Laboratory needs a leader at the associate-directorate level to steer it, he said. He added that both CCS Division and the Computing, Communications, and Networking Division (CCN) have been limited by a lack of institutional vision.

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REVIEW (Cont'd from P.1)

- He said better contact with the international research community is needed. He added that something like the proposed Santa Fe Information Technology Laboratory could serve as the nucleus for this improvement. (He indicated that this was a comment directed at the entire institution.)
- He said the informatics thrust needs careful planning.
- And he said the advanced architecture effort needs a vision and that its capabilities should be nurtured and grown.

He listed four "topics of enduring interest" (topics that come up each year): balance in short-term versus long-term research and development; difficulty in hosting visitors; protection of the 6% of the Laboratory budget set aside for Laboratory Directed Research and Development; and consolidated physical space for the division.

Comments by CCS Leaders

In a written comment sent out to the division after the close of the Division Review, CCS Director William Feiereisen thanked staff members "for the hard work both in putting together this review and for the top-quality work during the course of the year that allowed the division to shine so well in front of the review committee."

Feiereisen noted that the Review Committee "emphasized that their grade for us this year is better than last year, and they wanted the Director to know this."

He noted the committee's recommendations and commented that they "have a dual character, both for us and for the Lab as a whole. We are embedded within a large institution, and our difficulties reflect the larger difficulties of the Lab. However, we have an active role to play in fixing these difficulties…."

He concluded, "The committee recognized that this has been a difficult year for all but noted that we have still produced outstanding scientific results while increasing concrete deliveries to the program through interactions with X and CCN, all the while maintaining an unexpected 'esprit de corps' as they labeled it. It has been a tough year, and there is no doubt that this has taken a toll on our stress and fed our cynicism, but the scientific work and the opportunity to contribute to the mission greatly outweigh this as the committee noted."

Lee commented, "The review went extremely well and is a direct reflection of the hard work, intellectual capacity, and accomplishments of all of you. Thank you."

Lee noted, "This year, the committee gave us a grade of outstanding, which is (in the adjectival grading system) the highest grade possible." He concluded, "This result is due entirely to the hard work, dedication, and technical excellence of each and every one of you in the division. It is gratifying, after such a difficult year, to receive recognition for our outstanding scientific contributions."

List of Presenters

Announcement of the division's "grade" capped three days of intense review that took place on May 31, June 1, and June 2.

The first day included an extensive closed session during which Feiereisen, Director Kuckuck, Chief Science Officer Tom Bowles, and Deputy Chief Science Officer David Sharp welcomed the members of the review committee. Representatives from Science and Technology Base Programs—Don Rej, Terry Lowe, and Everett Springer—outlined the Division Review process. Michael Burns gave an overview of the Weapons Physics Directorate (ADWP). Feiereisen gave a CCS Division update; Christopher Webster spoke on the proposed Science Complex; and Andy White spoke on Institutional Computing.

During open sessions in the afternoon, James Ahrens of CCS-1 spoke on "Future Visualization Architectures"; Darren Kerbyson of CCS-3 spoke on "Performance Analysis: Measurement, Modeling, and More"; and Gary Dilts of CCS-2 spoke on "The Tuned Regression Method and Its Applications."

Another closed session was held on June 1. During this executive session, Todd Urbatsch, group leader of CCS-4, spoke on "Numerical Research and Analysis for IMC Simulations"; Randy Baker of CCS-4 spoke on "Ray Effects Mitigation"; Kelly Thompson of CCS-4 provided "An Overview of the Capsaicin Project"; and Ed Dendy of CCS-2 spoke on "Material Interfaces and Hydrodynamics in Support of Code Project A."

There were also two "voice of the customer" presentations during the closed session. Deniece Korzekwa of the Materials Science and Technology Division (MST) spoke on "Advanced Casting Simulation in Support of Manufacturing," and Robert Webster of X-3 spoke on "Delivery of CCS Algorithms and

(Please see MORE REVIEW, page 3.)

MORE REVIEW (Cont'd from P.2)

Technology to X Division Code Projects." Lee said that both Webster and Korzekwa indicated a very high level of direct and critical involvement of CCS Division technical staff members in their work, projects, deliverables, and milestones. He said both were very satisfied with CCS Division's delivery of technical products.

During the subsequent open sessions on June 1, two people provided unclassified "voice of the customer" comments. Dave Neal of CCN spoke on "CCN Operational Experience Using Deployed CCS Research Products—Science Appliance"; and E.N. Elnozahy of IBM spoke on "IBM/PERCS" and CCS-3's involvement in this project.

Neal's comments were especially complimentary. Commenting on CCS staff members, he said, at one point, "They have worked with us as a complete team.… We are joined at the hip." (His comments were made in the context of the deployment of the Science Appliance Software stack in CCN Division from CCS-1.)

Late in the afternoon on June 1, the members of the Division Review Committee split up, and each one attended an information and discussion session on CCS-1, CCS-2, CCS-3, or CCS-4.

Review Committee members Reed and Burton Smith (chief scientist at Cray Inc.) joined Group Leader John Ziebarth and Deputy Group Leader John Thorp at Building 2011 for the CCS-1 briefing. Committee member David Bader (director of the Program for Climate Model Diagnosis and Intercomparison at Lawrence Livermore National Laboratory) stayed at the Study Center for the CCS-2 briefing by Group Leader John Turner. Steve Wallach (vice president of technology at Chiaro Networks) and Francis Sullivan (director of the Center for Computing Sciences Institute for Defense Analyses) joined Deputy Group Leader Frank Alexander in Building 508 for a briefing on CCS-3. And Ken Kennedy (director of the Center for High Performance Software Research at Rice University) and Ed Larsen (a professor in the Department of Nuclear Engineering and Radiological Sciences at the University of Michigan) joined Urbatsch and Deputy Group Leader Scott Turner at Building 422 for a briefing on CCS-4.

After the group briefings, everyone returned to the Study Center to attend an informal session at which 36 CCS posters were presented. They also shared an attractive table of food ranging from shrimp to chocolate-covered strawberries.

On the final day of the review, Review Committee members held an executive session from 8 a.m. to 11 a.m. at which they developed their "outbrief." They presented their findings to Lab officials (including Feiereisen, Lee, White, Ken Koch, Erma Pearson, CCS group leaders, and CCS deputy group leaders) from 11 a.m. to noon. Also in attendance during this "closed outbrief" were Director Kuckuck, Bowles, Sharp, and Judith Snow from ADWP.

All CCS employees were invited to a meeting from 12:30 p.m. to 1 p.m. in the Study Center, at which Reed gave the final, open "outbrief," which was identical to the one provided during the closed session.

Lee said the final report "should be forthcoming from the committee within a month or so, and will be posted on the CCS web page."

(For MORE PHOTOS, see pages 4 and 5.)

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Andy White, left, leader of Institutional Computing, sits with David Bader, director of the Program for Climate Model Diagnosis and Intercomparison, during the recent CCS Division Review.

White Issues Fourth Call Inviting Institutional Computing Proposals

Institutional Computing (IC) recently issued its fourth call for science and engineering proposals.

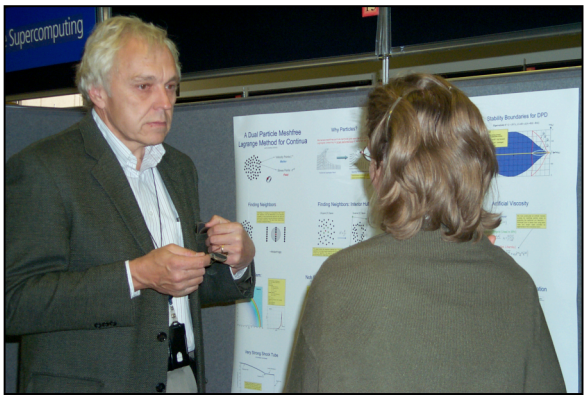
Andy White, director of Institutional Computing, said in a recent interview, "Basically, the idea is to provide free-of-charge access to high-performing computing to every scientist (and engineer) at the Laboratory."

All interested persons may apply.

(Please see FOURTH CALL on page 6.)

Images from the Division Review

Three days of intense discussion produced many memorable images during the 2005 Division Review. On this page, starting with the photo at right: Division Leader William Feiereisen listens intently during a "voice-of-the-customer" presentation. (The man to his right is Edward Larsen, a member of the review team.) The next photo down shows many of the active participants. From top to bottom, they are: Ken Kennedy of the review team; CCS Deputy Division Leader Stephen Lee; Steven Wallach, Frances Sullivan, and Burton Smith, all review team members; and Andy White of Institutional Computing. CCS-4 Deputy Group Leader Scott Turner is shown coming in the door. In the photo at bottom left, CCS-2 Group Leader John Turner prepares for a group presentation. And in the photo immediately below, Darren Kerbyson of CCS-3, and Ken Koch and Erma Pearson of the CCS Director's Office prepare for the next session.



Food, Poster Presentations, and the Final Session

The first photo on this page—at upper left, shows Mark Petersen of CCS-2 chatting with CCS Division Leader William Feiereisen while Feiereisen enjoys the feast spread in the Study Center lobby. The photo at top right and the two photos in the middle of the page show faces in the crowd at the poster session. And the photo at bottom left shows a few of those who came to hear the final report on the review.

FOURTH CALL (Cont'd from P. 3.)

The Institutional Computing Technical Committee then evaluates each proposal and makes recommendations on the allocation of resources. The primary criteria for selection are: quality of science and/or engineering; significance and impact of access on resources; and ability to utilize high-performance, institutional computing infrastructure effectively. The committee also looks for balance and diversity in the program portfolio.

Last year, the program drew 46 proposals for 22 million central processing unit (CPU) hours. Those participating came, primarily, from the Theoretical Division and the Earth and Environmental Sciences Division, but participants were also drawn from other divisions including Computer and Computational Sciences, Applied Physics, Materials Science and Technology, and Decision Applications.

The program provides full operations and acquisition funding—funding for maintenance, infrastructure, staff, and big computers.

The computers now listed as part of the program are Coyote, Pink, Mauve, QSC (which will be supplanted as an IC resource by Coyote), and "TLC"—the "Turquoise Lightning Cluster." (For full details on the computers in the program, the IC application procedures, and this year's deadlines, go to the CCS Division Office internal website, http://int.lanl.gov/orgs/ccs/ and click on "Call for Proposals" under "Institutional Computing.")

The call for proposals said, in part, "…Resources on the Turquoise Network will include Coyote, which will be delivered in October 2005, Pink, Mauve, and TLC … Today, Pink is delivering approximately one million CPU hours per month for Institutional Computing users; Coyote should more than double the available resources. In addition, there is high-speed access between the Turquoise and Yellow networks, 100 TB of parallel scratch space and two PetaBytes (10^{15} or 2^{50} Bytes) of long-term storage available to Institutional Computing users.… We expect 15 million CPU hours to be available for this call…. TLC is intended to provide a learning, code development, benchmarking, and validation platform available to a wide set of Los Alamos staff, students, and collaborators."

White said he hopes the Coyote hardware will actually arrive about October 1 and will be "mature and ready to go into production as soon as it passes acceptance." He said he expects Coyote to be "larger and faster than any machine we have." It will have more memory than Pink and should be, in general, a "better machine."

TLC will launch a new concept for IC this year. It will help Laboratory staff and students learn about parallel computing, and those interested in using this computer will only have to present a one-paragraph request (tlc@lanl.gov) to get the chance to try it out.

IC awards and allocations will be announced in September. Access to resources will begin in October.

The program has facilitated extremely varied and interesting results. Asked for some examples, White mentioned Galen Gisler, in X-2, who is doing his work on the K-T impact in part through this program; Kevin Sanbonmatsu, T-10, who is modeling the ribosome; Rod Linn, EES-2, who is doing wildfire modeling; and Mike Warren, T-6, who is working on astrophysics—and these are just a few of more than 50 projects.

White has been at the helm of the program since it was first started in fiscal year 2002. The idea was initially approved by the Laboratory science council at the time. Champions of this initiative were William Press, then Laboratory deputy director for science and technology; Ray Juzaitis, then associate director for weapons physics; and Tom Meyer, then associate director for strategic research.

Tom Bowles, chief science officer, is the current champion and oversees the program.

White's enthusiasm for the program is obvious—but this isn't his first major achievement at the Laboratory. He founded the Advanced Computing Laboratory in the late 1980s.

Laboratory Developing Eclipse-Based Tools for High-Performance Parallel Computers

(Jim Danneskiold of Public Affairs recently produced a notable story about the Parallel Tools Platform Project. A lightly edited version appears below.)

Los Alamos National Laboratory and the Eclipse Foundation recently announced the Parallel Tools Platform Project, a new Eclipse Technology project aimed at creating better open source software tools for parallel computers.

(Please see ECLIPSE on page 7.)

ECLIPSE (Cont'd from P.6)

Los Alamos will lead the project and will collaborate with institutions and companies worldwide to develop an open source platform that will enable their products to operate on a wide range of parallel computing platforms.

As high-end computing moves from one-of-a-kind machines to commodity-based systems such as clustered computers, developers must deal with a greater complexity of systems and a wide array of disparate tools. Given the fragmentation of the parallel tools market today, developers make do with a profusion of interfaces, from minimal command line tools and text editors to tools with different graphical user interfaces. Some of these software tools are available only for specific systems, so the tools must be changed every time that work is moved to a new parallel machine. In addition, there is little integration between tools from different vendors, a situation that makes it difficult to use modern software engineering techniques.

"Los Alamos knows first-hand the pain of using many parallel programming tools and trying to make them work together before we can get to the critical task of solving tough scientific and industrial problems," said Greg Watson, project leader in Los Alamos' Advanced Computing Laboratory. "The Parallel Tools Platform Project can eliminate this pain point once and for all by providing a single, portable, consistent and highly integrated parallel development environment that will significantly drive productivity at the engineering level. Eclipse provides the ideal extensible platform to involve the open source community, as well as industry, universities, and other laboratories."

The project aims to extend the Eclipse platform to build up a user-friendly environment for parallel computer systems. Los Alamos staff and their collaborators at other institutions plan to add support for a wide range of parallel architectures, provide an integrated parallel debugger, and develop infrastructure to assist in the integration of other parallel tools. A separate, but related, component of the project will be to add Fortran language support to the Eclipse integrated development environment.

The Eclipse Foundation will supply the open-source infrastructure in which code developers and collaborators can work. Eclipse is a community of open source software projects that builds developer tools and frameworks. The Eclipse framework provides a robust, full-featured, commercial-quality, industry platform for the development of highly integrated programming tools. Companies such as IBM, Intel, and Hewlett-Packard include Eclipse technology in their commercial software products.

"Los Alamos National Laboratory is an innovator and leader in the use of parallel computing," said Mike Milinkovich, executive director of the Eclipse Foundation. "The addition of the Parallel Tools Platform Project supports the Eclipse vision for integrated open source tools that enable organizations to extend the Eclipse platform to support different programming needs. We are delighted that Los Alamos has decided to lead the project to develop tools for parallel programming."

A key project goal of the project is to transform current practice into best practice for parallel application development, while providing support for software vendors to bring their proprietary computing tools into the larger open-source computing environment. Both Los Alamos and the Eclipse Foundation are encouraging other interested parties to become involved in the design and development of the Parallel Tools Platform, particularly parallel tool developers and vendors.

For more information about the Eclipse Parallel Tools Platform Project, go to http://www.eclipse.org/ptp/ online.

Eclipse is an open source community whose projects are focused on providing an extensible development platform and application frameworks for building software. Eclipse provides extensible tools and frameworks that span the software development lifecycle, including support for modeling, language development environments for Java, C/C++ and others, testing and performance, business intelligence, rich client applications and embedded development. A large, vibrant ecosystem of major technology vendors, innovative start-ups, universities and research institutions, and individuals extend, complement and support the Eclipse Platform. The Eclipse Foundation is a not-for-profit, member-supported corporation that hosts the Eclipse projects. Full details are available at www.eclipse.org online.

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Websites Revised

If you haven't visited the CCS websites lately, please take a moment to look.

The websites for CCS-DO-Internal, CCS-DO-External, CCS-1, CCS-2, CCS-3, CCS-4, and CCS-DSS have all been updated recently. Broken links and very old material have been removed; new items have been added; and design changes have been made.

Websites, by their very nature, are always a "work in progress," but we hope that you will find the revised sites useful. CCS-DO-Internal (http://int.lanl.gov/orgs/ccs/), for example, was used to post information during preparation for the recent Division Review. The site now also includes the fourth call for proposals for Institutional Computing.

The slides from recent all-hands meetings, copies of all issues of CCS News Bytes, and interviews with new CCS employees are also available on CCS-DO-Internal.

In addition, Deputy Division Leader Stephen Lee has posted a link to a new "Nested Safety and Security" site on CCS-DO-Internal.

By the way, if you are a Laboratory employee, make sure that the CCS-DO site you consult is the "yellow" site at the address listed above. If you are looking at a one of the group sites (all in the "green") and you go "home," you will find yourself looking at CCS-DO-External (http://www.ccs.lanl.gov/index.shtml), a green site for the public that lacks many of the features provided for staff members.

All of these sites will be changing again soon to bring them into compliance with new Laboratory design standards.

We also hope to keep adding new material and weeding out old items on a regular basis.

Charmian Schaller

Meet Our New People

Deputy Division Leader Stephen Lee recently sent out a list of the 55 summer students joining CCS this year. Please welcome them to Los Alamos.

CCS-1

Jeremy Archuleta
Mentors: Wu Feng and Mark Gardner
Jeremy will work on the RADIANT team on 10-GigE high-performance networking.

Ryan Armstrong
Mentor: Jim Ahrens
Ryan will work on the Visualization team on comparative visualization.

Pavan Balaji
Mentors: Wu Feng and Mark Gardner
Pavan will work on the RADIANT team on 10-GigE high-performance networking.

Amitabha Banerjee
Mentors: Wu Feng and Mark Gardner
Amitabha will work on the RADIANT team on end-system optimization of data transport over circuit-switched networks.

Genevieve Bartlett
Mentor: Gina Fisk
Genevieve will work with Gina on cyber security in the area of spyware detection.

Avery Ching
Mentors: Wu Feng and Mark Gardner
Avery will work on the RADIANT team on high-performance systems and applications programming.

Abby Day
Mentor: Gina Fisk
Abby will work with Gina on cyber security in the area of spyware and P2P detection and elimination.

Abrina Duffield
Mentor: Gina Fisk
Abrina will work with Gina on cyber security in the area of spyware and P2P detection and elimination.

Josiah England
Mentor: Ron Minnich
Josiah will work with on the Cluster Research team on Clustermatic support.

Tianchaio Li
Mentor: Greg Watson
Tianchaio will work on the Cluster Research team on the Eclipse Parallel Tools Platform.

Heshan Lin
Mentors: Wu Feng and Mark Gardner
Heshan will work on the RADIANT team on data-intensive HPC.

Vanessa Martinez
Mentor: Gina Fisk
Vanessa will work with Gina on cyber security in the area of spyware and P2P detection and elimination.

Susan Meyers
Mentor: Gina Fisk
Susan will work with Gina on cyber security in the area of spyware and P2P detection and elimination.

Adam Moerschell
Mentor: Pat McCormick
Adam will work on the Visualization team on Scout and advanced architectures.

Paul Navratil
Mentor: Al McPherson
Paul will work on the Visualization team on real-time ray tracing.

Eric Nelson
Mentor: Gina Fisk
Eric will work with Gina on cyber security in the area of cyber security visualization.

Carl Nygaard
Mentor: John Patchett
Carl will work on "MPI Hammer."

Jozsef Patvarczki
Mentor: Cindy Sievers
Jozsef will work with Cindy on distributed applications for grid computing.

Kris Peterson
Mentor: Justin Tripp
Kris will work on the Advanced Architectures team in the area of scalable reconfigurable computing.

Jeffrey Poznanovic
Mentor: Justin Tripp
Jeffrey will work on the Advanced Architectures team in the area of scalable reconfigurable computing.

Tim Prins
Mentor: Tim Woodall
Tim will work on the Resilient Technologies team on Open MPI.

Greg Roth
Mentor: Pat McCormick
Greg will work on the Visualization team on Scout and advanced architectures.

Ron Scrofano
Mentor: Maya Gokhale
Ron will work on the Advanced Architectures team in the area of scalable reconfigurable computing.

Gaylen Shipman
Mentor: Tim Woodall
Gaylen will work on the Resilient Technologies team on Open MPI resilient messaging.

Neil Steiner
Mentor: Maya Gokhale
Neil will work on the Advanced Architectures team in the area of scalable reconfigurable computing.

Christof Teuscher
Mentor: Maya Gokhale
Christof will work on the Advanced Architectures team in the area of scalable reconfigurable computing.

Venkatram Viswanath
Mentors: Wu Feng and Mark Gardner
Venkatram will work on the RADIANT team on MAGNET: Monitoring Apparatus for General kerNel Event Tracing.

Jonathon Woodring
Mentor: Jim Ahrens
Jonathon will work on the Visualization team on streaming visualization.

CCS-2

Ousseini Lankoande
Mentor: Tom Asaki
Ousseini will work with Tom on a variety of X-ray image analysis problems.

Matthew Dixon
Mentor: Darryl Holm
Matthew will investigate with Holm, Beth Wingate, and Matthew Hecht (all CCS-2) the implementation of particle methods for numerical predictions of weather and atmospheric circulation.

Carrie Dean
Mentors: Phil Jones (T-3) and Scott Elliott (CCS-2)
Carrie will conduct large-scale biological and chemical oceanography simulations for the Los Alamos COSIM team.

CCS-3

Paul Beinfest (University of California [UC])
Mentor: Scott Pakin.
Paul will work on the Performance Analysis team.

Shou-De Lin (University of Southern California)
Mentor: Karin Verspoor
Shou-De will work on a Knowledge Discovery project.

Alexander Olshersky (Georgia Institute of Technology)
Mentor: Leonid Gurvits
Alexander will work on a Quantum Computing project.

Adam Sears (Caltech)
Mentor: Howard Barnum
Adam will work on a Quantum Computing project.

Sudhir Singh (UC)
Mentor: Leonid Gurvits
Sudhir will work on a Quantum Computing project.

Ramkumar Sriniasan (New Mexico State University)
Mentor: Olaf Lubeck
Ramkumar will work on the Performance Analysis team.

Jessica Tung (UC-Santa Cruz)
Mentor: Michael Wall
Jessica will work on computational biology.

Nick Moss (UC-Santa Barbara)
Mentor: Scott Pakin
Nick will work on the Performance Analysis team.

CCS-4

Allan Wollaber (University of Michigan)
Mentor: Todd Urbatsch
Allan is a Department of Energy (DOE) Computational Science Graduate Fellow and will work on "A Hybrid Monte Carlo-Deterministic Method for Global Transport Calculations."

Massimiliano "Max" Rosa (Pennsylvania State University)
Mentor: Jim Warsa
Max will work on Fourier analysis for using the parallel block Jacobi solution technique to solve the transport equation with TSA and DSA.

Carrie Beck (University of Michigan)
Mentor: Tom Evans
Carrie will work on 3-D residual discrete diffusion Monte Carlo.

Greg Davidson (University of Michigan)
Mentor: Jeff Densmore
Greg is a DOE Computational Science Graduate Fellow, and will work on "Investigation of Monte Carlo Transport-Diffusion Interfaces."

Jarrod Edwards (Texas A&M)
Mentor: Kelly ("KT") Thompson
Jarrod will work on arbitrary-order finite element basis functions in lumped linear discontinuous radiative transfer.

CCS-5

Weizhao Wang (Illinois Institute of Technology)
Mentor: Stephan Eidenbenz
Weizhao is a Ph.D. candidate in computer science, and will work on combinatorial optimization, game theory application in networks, and algorithms and protocols for wireless ad hoc communication networks.

Shiva Kasiviswanan (Pennsylvania State University)
Mentor: Gabriel Istrate
Shiva, a Ph.D. candidate in computer science and engineering, will work on combinatorial optimization, randomized, and approximation algorithms, and parallel algorithms and architectures.

Karthikeyan Sundaresan (Georgia Institute of Technology)
Mentor: Stephan Eidenbenz
Karthikeyan, a Ph.D. candidate in telecommunications, will work on wireless (ad-hoc, mesh and sensor) networks, cross-layer protocol design, network protocol (MAC, routing and transport) design, and multi-carrier wireless communication.

Zoya Svitkina (Cornell University)
Mentor: Gabriel Istrate
Zoya, a Ph.D. candidate in computer science, will work on combinatorial optimization, approximation algorithms for NP-hard problems, graph theory and algorithms, network flows and graph cuts, and algorithmic game theory.

Anthony Widjaja To (University of Melbourne, Austrialia)
Mentor: Anders Hansson
Anthony, a Ph.D. candidate in computer science and mathematics, will work on complexity theory, design and analysis of graph algorithms, finite model theory, database theory, and automata theory.

Lisa Glendenning (University of New Mexico)
Mentor: Graham Mark
Lisa is a post-baccalaureate student in computer science and will work on synchronizing processes for distributed discrete event simulation.

Venkatesh Ramaswamy (University of Mississippi)
Mentor: Anders Hansson
Venkatesh, a Ph.D. candidate in telecommunications, will work on computer networking, wireless communications, applied probability modeling, stochastic modeling, quality of service, and scheduling.

Matthew Nassr (Cornell)
Mentor: Anders Hansson
Matthew, a Ph.D. candidate in electrical and computer engineering, will work on reconfigurable computing, developing high performance parallel codes, and network routing and analysis.

Rajiv Raman (University of Iowa)
Mentor: Anil Kumar Vullikanti
Rajiv, a Ph.D. candidate in computer science, will work on combinatorial optimization, approximation and online algorithms, graph coloring, scheduling and resource allocation, and computation of market equilibria.

Gentain Jakllari (UC-Riverside)
Mentor: Stephan Eidenbenz
Gentain, a Ph.D. candidate in telecommunications, will work on cross-layer design and evaluation of protocols spanning the three OSI layers, PHY/MAC/Routing, use of spatial diversity for improving capacity in wireless networks, and cooperation paradigm and implications on network protocol design.

Meg Blume-Kahout (Rand Graduate School, California)
Mentor: James Smith
Meg is a Ph.D. candidate in policy analysis, and a returning graduate research assistant working on EpiSims.

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