5. Education and University Integration

The Center has had a major impact on the university in a variety of ways. Above all, it has engendered an unprecedented level of collaboration across disciplines and departments. Even within single disciplines, such as fluid dynamics or structural analysis, faculty collaboration across departmental lines has been enhanced enormously. As a result, the Center has become a model for other interdisciplinary, interdepartmental research initiatives. In addition, because of the broad applicability of the technologies it represents, CSAR has also provided leverage to, and benefited greatly from, many other separately funded programs on our campus, both individual faculty research grants and other large centers such as NCSA.

By hiring more than twenty new professional staff and postdoctoral associates, the Center has significantly enlarged the local technical talent pool, providing a whole new set of collaborators for existing faculty and staff. The Center has also hosted a number of visitors, both long-term and short-term, and has organized a very popular seminar series that is designed specifically to reach out across disciplinary boundaries to enhance collaboration (Table 5.1).

The Center spans twelve departments, and its recognition and influence are pervasive throughout the College of Engineering and beyond. We work very closely with NCSA, which contributes both research personnel and computer time toward our effort. Several key members of our research team are Research Scientists at NCSA. It has been especially convenient to do initial code development locally on parallel systems at NCSA preceding full implementation on the remote ASCI platforms.

Another major impact of the Center has been on graduate education and training. CSAR is playing a major role in educating a new generation of scientists and engineers prepared to work in computational simulation of complex systems by supporting more than forty graduate students. By virtue of this experience, the students we train are already attuned to the needs of interdisciplinary collaboration. The level of involvement by undergraduates has been limited in Year 1, but we are beginning to involve undergraduates, especially in laboratory environments.

The Center has generally enhanced the awareness on our campus of computational simulation, and it has substantially increased the visibility and influence of our interdisciplinary Computational Science and Engineering (CSE) Program, which houses the Center administratively. The computationally-oriented, interdisciplinary educational program provided by CSE fits perfectly with the needs of the Center, and the students in this program are ideally trained to participate in the research activities of the Center. CSE courses are specially designed to lower the usual barriers to interdisciplinary course work and enable students to
master both applied and computational disciplines, which is just what we need for work in the Center.

**Table 5.1**

**1997-98 CSAR Seminars**


Gary Flandro, University of Tennessee Space Institute, “Effects of Vorticity on Rocket Motor Internal Ballistics,” CSAR Seminar, 12:00, Wednesday, September 23, 1998, 2240 DCL.

H. G. Georgiadis, National Technical University of Athens, Greece, “Transient Thermo-Elastodynamic Analysis of Crack Problems,” MIE Seminar, 4:00 P.M., Tuesday, September 22, 1998, 218 MEB.


Steve Lumetta, UIUC/ECE, “Generalizing High-Performance Communication,” Computer Systems Seminar, 4:00 P.M., Tuesday, September 8, 1998, B02 CSRL.

Vladimir Rokhlin, Yale University, “Higher Order Methods, Adaptive Techniques, and Real World Problems,” Special Seminar, 3:00 P.M., Friday, September 4, 1998, B02 CSRL.

Matthew G. Knepley and Vivek Sarin, Purdue University, “Parallel Simulation of Particulate Flows,” NCSA Seminar, 2:00 P.M., Thursday, September 3, 1998, 5239 BI.


Video Presentation, “Opening New Frontiers: We Deliver,” CSAR Noon Seminar, 12:00, Wednesday, August 19, 1998, 2240 DCL.

Video Presentation, “Rocketships,” CSAR Noon Seminar, 12:00, Wednesday, August 12, 1998, 2240 DCL.


Video Presentation, “Rockets and Missiles,” CSAR Noon Seminar, 12:00, Wednesday, July 15, 1998, 2240 DCL.

Eric de Sturler, Swiss Center for Scientific Computing, ETH Zurich, “High Performance Fortran for Regular, Block-Structured, and Irregular Grid-Based Applications,” CSAR seminar, 10:00 A.M., Thursday, July 9, 1998, 2240 DCL.

Video Presentation, “Extreme Machines: Spaceplanes,” CSAR Noon Seminar, 12:00, Wednesday, July 8, 1998, 2240 DCL.

Video Presentation, “Rockets! Man in Space,” CSAR Noon Seminar, 12:00, Wednesday, July 1, 1998, 2240 DCL.

Video Presentation, “Rockets! Missiles of the Cold War,” CSAR Noon Seminar, 12:00, Wednesday, June 24, 1998, 2240 DCL.

Video Presentation, “Rockets! The Vengeance Weapon,” CSAR Noon Seminar, 12:00, Wednesday, June 17, 1998, 2240 DCL.

Video Presentation, “Rockets! First Steps to the Stars,” CSAR Noon Seminar, 12:00, Wednesday, June 10, 1998, 2240 DCL.

Sam Midkiff, IBM T.J. Watson Research Center, “From Flop to Megaflops: Java for Technical Computing,” CS/CSAR Seminar, 4:00 P.M., Thursday, June 4, 1998, 2240 DCL.

John Gustafson and Don Heller, Ames Laboratory, Iowa State University, “HINT, NetPIPE, and More,” NCSA Seminar, 2:00 P.M., Wednesday, June 3, 1998, 5239 BI.

Video Presentation, “Extreme Machines: Rockets,” CSAR Noon Seminar, 12:00, Wednesday, June 3, 1998, 2240 DCL.

Peter Brezany, University of Vienna, Parallel Input/Output Support for High Performance Fortran Programming Environments, CS/CSAR Seminar, 4:00 P.M., Monday, June 1, 1998, 2240 DCL.


Sunil Dwivedi, Purdue University, “Large Deformation Finite Element and Contact Analysis,” CSAR Seminar, 4:00 P.M., Thursday, May 21, 1998, 2117 Newmark Lab.


Philip Papadopoulos, Oak Ridge National Laboratory, “HARNESS: Heterogeneous Adaptable Reconfigurable NEtworked SystemS, the Next Step Beyond PVM,” CS Seminar, 1:00 P.M., Monday, May 11, 1998, 2240 DCL.


Stephen Guarini, Stanford University, “Direct Numerical Simulation of Supersonic Turbulent Boundary Layers,” CSAR Seminar, 2:00 P.M., Friday, May 1, 1998, 3211 DCL.


Robert Moser, UIUC/TAM, “Reliable Large Eddy Simulations,” CSAR Noon Seminar, 12:00, Wednesday, April 22, 1998, 2240 DCL.

Tony Chan, UCLA, “Nonlinear PDE Models in Image Processing,” CSE Symposium, 3:00 P.M., Friday, April 17, 1998, B02 CSRL.

John Gustafson, Ames Laboratory, Iowa State University, “Experimentless Science,” CSE Symposium, 10:00 A.M., Friday, April 17, 1998, B02 CSRL.

Dennis Parsons, UIUC/CE, “Multi-Grid Methods: The Future?,” CSAR Noon Seminar, 12:00, Wednesday, April 15, 1998, 2240 DCL.


David Padua, UIUC/CS, “Compiler Technology and the Shared-Memory Programming Model,” CSAR Noon Seminar, 12:00, Wednesday, April 8, 1998, 2240 DCL.

Richard A. Yetter, Princeton University, “Fundamental Studies Towards the Development of a Metalized Propellant Combustion Model,” MIE Seminar, 4:00 P.M., Tuesday, April 7, 1998, 218 MEB.

Marianne Winslett, UIUC/CS, “Parallel I/O Part II: Panda Library,” CSAR Noon Seminar, 12:00, Wednesday, April 1, 1998, 2240 DCL.


Robert Fiedler, UIUC/CSAR, “Strategies for Developing MPI Based Parallel Codes,” CSAR Noon Seminar, 12:00, Wednesday, March 11, 1998, 2240 DCL.

Quinn Brewster, UIUC/MIE, “Models for Burning of Solid Propellants,” CSAR Noon Seminar, 12:00, Wednesday, March 4, 1998, 2240 DCL.


Michael Mascagni, University of Southern Mississippi, “SPRNG: A Scalable Library For Pseudorandom Number Generation” NCSA Seminar, 2:00 P.M., Monday, March 2, 1998, 4269 BI.


Sanjay Kale, UIUC/CS, “Parallel Programming with Objects and Threads,” CSAR Noon Seminar, 12:00, Wednesday, February 25, 1998, 2240 DCL.

Vigor Yang, Pennsylvania State University, “Nonsteady Combustion of Solid Propellants in Rocket Propulsion Systems,” MIE/CSAR Seminar, 4:00 P.M., Tuesday, February 24, 1998, 218 MEB.

Arif Karabeyoglu, Stanford University, “Transient Combustion in Hybrid Rockets,” CSAR Seminar, 2:00 P.M., Friday, February 20, 1998, 2240 DCL.

Robert Haber, UIUC/TAM, “An Introduction to Space-Time Finite Elements,” CSAR Noon Seminar, 12:00, Wednesday, February 18, 1998, 2240 DCL.

Rudolf Eigenmann, Purdue University, “Performance Evaluation and Benchmarking with Large-Scope Applications,” NCSA Seminar, 2:00 P.M., Friday, February 13, 1998, 5239 BI.


Randall Bramley, Indiana University, “The Linear System Analyzer Project,” NCSA/CSAR Seminar, 11:00 A.M., Friday, January 30, 1998, 5239 BI.

William Humphrey, Los Alamos National Laboratory, “Object-Oriented Scientific Application Development Using the POOMA Framework,” CSAR Seminar, 2:00 P.M., Tuesday, January 20, 1998, 2240 DCL.
Carter Edwards, University of Texas at Austin, “A Parallel Infrastructure for Scalable Adaptive Finite Element Methods,” CSAR Seminar, 3:00 P.M., Friday, January 9, 1998, 2240 DCL.

Fady Najjar, UIUC/NCSA, “A Perspective on High-Performance Computing for DNS/LES Computations,” CSAR Seminar, 11:00 A.M., Thursday, January 8, 1998, 2240 DCL.


Suvas Vajracharya, University of Colorado, “Runtime Optimization for Locality and Parallelism,” CSAR Seminar, 3:30 P.M., Monday, December 1, 1997, 2222 DCL.

Robert Fiedler, Hewlett-Packard, “Optimization and Scaling of Shared-Memory and Message-Passing Implementations of the ZEUS Hydrodynamics Algorithm,” CSAR Seminar, 4:00 P.M., Tuesday, November 25, 1997, 2240 DCL.

Keshav Pingali, Cornell University, “Data-Centric Compilation: A New Approach to Program Restructuring,” CSAR/DCS Seminar, 4:00 P.M., Monday, November 24, 1997, 1310 DCL.


Jay Hoeflinger, UIUC/CS, “The Story of Polaris: Computer Science Meets Experimental Science,” CSAR Seminar, 1:00 P.M., Monday, November 17, 1997, 2240 DCL.

Zhiqiang Cai, Purdue University, “First-Order System Least Squares (FOSLS) for Partial Differential Equations,” CSAR/CSE Seminar, 4:00 P.M., Wednesday, November 12, 1997, 2240 DCL.

Alan Davies, University of Hertfordshire, “Developments in Parallel Boundary Element Methods,” CSAR/AAE Seminar, 10:00 A.M., Wednesday, November 12, 1997, 2240 DCL.

Matthew Pierce, Boeing, “Numerical Optimization: Applications to Wing Design,” CSAR Seminar, Friday, November 7, 1997, 1:00 P.M., 2240 DCL.

Paul Petersen, Kuck and Associates, “Language Extensions for Multiprocessors,” CSAR/DCS Seminar, 4:00 P.M., Thursday, November 6, 1997, 1310 DCL.


Guoyu Lin, Technical University of Hamburg, “Numerical Investigation of Crack Growth Behavior Using a Cohesive Zone Model,” CSAR Seminar, 11:00 A.M., Friday, October 31, 1997, 1102 DCL.

Michael Heath, UIUC/CS, “Rocket Science Meets Computer Science,” Computer Science Colloquium, 4:00 P.M., Monday, October 27, 1310 DCL.

Michael Wolfe, The Portland Group, “Parallel Programming with High Performance Fortran,” CSAR/DCS Seminar, 4:00 P.M., Thursday, October 23, 1997, 1310 DCL.

Dennis Gannon, Indiana University, “High-Performance C++ for Scientific Applications,” CSAR/DCS Seminar, 3:00 P.M., Monday, October 20, 2501 DCL.

Noel Nachtigal, Oak Ridge National Laboratory, “Iterative Methods for Nonsymmetric Linear Systems,” CSAR/CSE Seminar, 2:00 P.M., Friday, October 10, 2240 DCL.

Michael Heath, UIUC/CS, “VR: Virtual Rocketry?,” Computer Systems Seminar, 4:00 P.M., Tuesday, September 16, B02 CSRL.