1999·2000

DEPARTMENT OF COMPUTER SCIENCES

Annual Report

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Purdue University

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Annual Report 1999–2000

Purdue University

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Computer Sciences

MESSAGE FROM THE HEAD

Ahmed Sameh
Head of the Department of Computer Sciences

I am pleased to update you on important developments that took place in our department during the 1999–2000 academic year and the beginning of this current academic year, 2000–01. Enrollment in our undergraduate and graduate courses continues to increase and our graduates are in great demand by all sectors of industry. Perhaps the most significant news item is that five new faculty members have joined us during this period. Walid Aref, Sonia Fahmy, Clay Shields and Jan Vitek joined us in August 1999, and Yinlong Sun joined the ranks of our faculty in August 2000. Brief biographies and the research interests of these talented individuals appear in this report. During the same period, Sunil Prabhakar received an NSF-Career award, thus bringing the number of our junior faculty members who have received NSF-Career awards to a total of six. On the whole, our faculty has national and international recognition in their respective fields. One member of our faculty is a member of the National Academy of Engineering, four are IEEE Fellows, and four are ACM Fellows.

The second most significant development has been the pending request by the University to the State of Indiana for a new building for our department. If the first stage of this building materializes with help from private funds, a part of the department would move into new quarters as early as 2004 with the remaining following in 2006. This new building would provide the department with adequate research and instructional space to accommodate our anticipated growth in the number of faculty and graduate students.

Our faculty has continued to be successful in securing an increasingly large sum of research funds from federal agencies, the State of Indiana, and private industry. Two grants totaling approximately $4 million stand out as examples of cooperation among our faculty. These two grants are an NSF Research Infrastructure grant, and a grant from the State of Indiana 21st Century Fund.

I would like to report that a great colleague and one of the giants of Numerical Analysis and Computational Mathematics, Professor Walter Gautschi, has decided to retire from CS & Mathematics at Purdue effective the Fall semester of the 2000–01 academic year. However, Professor Gautschi will continue his research activities as usual. We will cherish his great contributions as a teacher and miss him as a wonderful and talented colleague.

The future of this department looks promising with its renowned senior faculty providing the much-needed stability and its junior faculty offering the fresh intellectual vibrancy needed to survive in this fast changing world of technology.

PURDUE UNIVERSITY

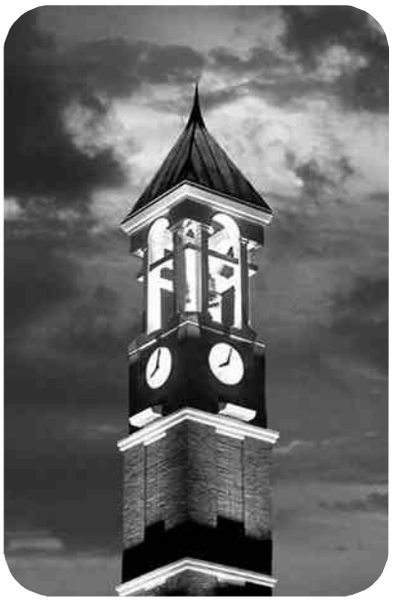
Purdue University

Founded in 1869, Purdue University is a public, state-assisted, doctoral-granting research university. The West Lafayette campus enrollment for the Fall of 1999 was 37,762 students from 50 states and 127 countries.

Purdue is a birthplace of ideas. It is a place of great accomplishments, where faculty and students explore knowledge and make significant contributions to virtually every aspect of contemporary life. With a keen vision of the future the University actively regenerates itself to meet the needs of each new generation.

Purdue maintains a tradition of providing students with a superior, yetaffordable,education.Facultymembers are leadersintheirfields. Extensive library, computer, and laboratory resources give students the opportunity to explore interests and develop research skills.

For more information, see <http://www.purdue.edu>.



Top two photos by David Umberger, Purdue News Service.

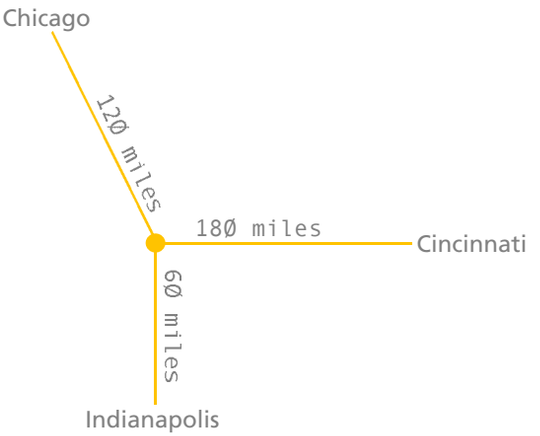
GREATER LAFAYETTE

The home of Purdue University, Greater Lafayette is friendly and spirited. Steeped in history, yet moving steadily towards the future, it is a community with a delightful mixture of Midwestern charm and metropolitan attractions.

The Native Americans were the first to discover the beauty of the Wabash Valley. Then the French arrived in the early 1700's establishing a trading post at Quiatenon, and changes began in the valley. Indiana's newest state park and the Museums at Prophetstown will be opening in phases during the years 2000 and 2001 to celebrate our history.

Separated by the Wabash River, Lafayette and West Lafayette have populations of 49,104 and 30,406 respectively. Residents are able to enjoy all the changes of the four seasons. The average mean temperature in January is 23 degrees F and 73.3 degrees F in July. The average mean rainfall is 36.1 inches and 22.4 inches average snowfall. Greater Lafayette is just off Indiana's Interstate 65, and only 120 miles from Chicago and 60 miles from Indianapolis.

For more information, see <http://www.lafayette-in.com>.



The Department of Computer Sciences

The Department of Computer Sciences at Purdue University, West Lafayette, one of the oldest such departments in the United States, offers challenging B.S., M.S., and Ph.D. programs for about 900 undergraduate and 150 graduate students.

The graduate faculty consists of 38 persons (about 32 full-time equivalents) whose interests span most of computer science: analysis of algorithms and theory of computation, compilers and programming languages, databases, geometric modeling and scientific visualization, information security, networking and operating systems, scientific computing, and software engineering.

Computer Science Department Facilities

The department is dedicated to providing high-quality computing facilities for use by computer science faculty, students, and administrative personnel. The facilities are operated by a technical staff who are not only responsible for the installation and maintenance of the systems, but who also assist faculty and students in the development of software systems for research projects. The staff includes a director, facilities manager, administrative assistant, two hardware engineers, seven system administrators, and several student assistants.

General Facilities

General computing facilities are available for both administrative activities (such as the preparation of research reports and technical publications) and research needs that are not supported by other dedicated equipment. These facilities include six Sun multiprocessor systems, a 32 CPU SGI Origin 2000, two Intel 32 CPU clusters and one 48 CPU cluster, and several Sun and Intel servers. The main systems each have 512 MB to 4 GB of main memory and a total of over500 GB of disk storage. All faculty and manygraduate students have a Sun, Intel, or Silicon Graphics workstation on their desks.

Educational Facilities

Computing systems used by students enrolled in both graduate and undergraduate computer science courses include over 100 Intel PCs running either Sun Solaris x86 or Windows 2000. Four rooms in the Computer Science Building and nearby Recitation Building are dedicated to laboratory-based instruction using these facilities. A later section (Purdue University Computing Center Facilities) lists equipment owned and maintained by the Computing Center but used by computer science students.

I/O Equipment

The department operates both special-purpose output devices as well as general output equipment, including about 60 laser printers, color printers, color scanners, video projectors, a digital video editing suite, and video conferencing equipment.

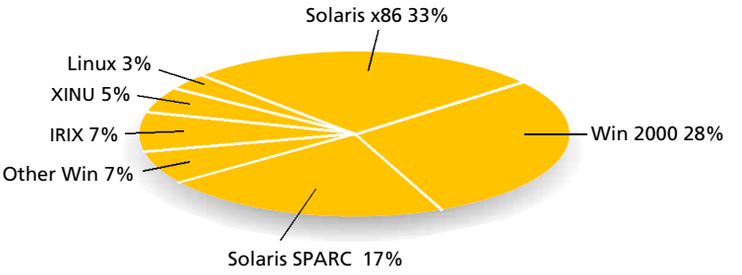
Networking Services

The department is strongly committed to state-of-the-art networking technology to provide access to and communication among its systems, as well as to those elsewhere on campus and throughout the world. Over forty 10 Mbps and 100 Mbps Ethernet hubs and switches included in the Computer Science Building connect the workstations to the departmental computing facilities. Experimental wireless networks are also used in the building. A fiber-optic ATM link connects departmental systems to other systems on campus, as well as to the Internet community via both "commodity" and Internet2/Abilene connections. ISDN and ADSL services are in use for remote access from a number of nearby sites.

Purdue University Computing Center Facilities

In addition to the facilities described above, students and faculty have access to computing systems owned and operated by the Purdue University Computing Center (PUCC). General instructional facilities operated by PUCC include large Sun SPARC servers and several Sun and Intel workstation laboratories. In addition, PUCC provides systems for use in courses taught by the CS Department. These systems include UNIX-based Sun SPARC stations for undergraduate computer science courses and Microsoft Windows-based Intel personal computers for use in an introductory course for non-majors (CS 110). Departmental research projects make use of other facilities provided by PUCC, including a large IBM SP cluster.

CS Department Computers

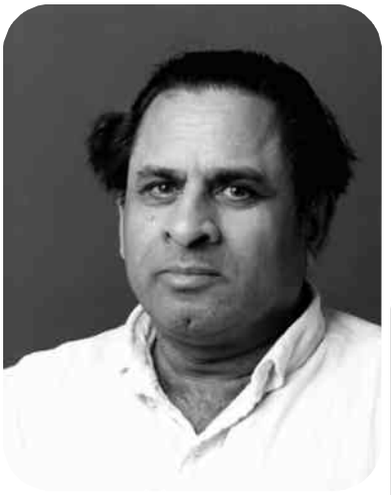


Shreeram S. Abhyankar

Marshall Distinguished Professor of Mathematics, Professor of Computer Sciences and Industrial Engineering (1988)
B.Sc., Bombay, 1951; A.M., Harvard, 1952; Ph.D., 1955

Professor Abhyankar is a fellow of the Indian Academy of Science and an editorial board member of the *Indian Journal of Pure and Applied Mathematics*. He has won numerous awards and honors. Before coming to Purdue, he was an associate professor of mathematics at Johns Hopkins University and came to Purdue as a full professor. In 1967, he was appointed the Marshall Distinguished Professor of Mathematics.

His research areas of interest included algebraic geometry, commutative algebra, local algebra, theory of functions of several complex variables, quantum electrodynamics, circuit theory, invariant theory, combinatorics, computer aided design, and robotics. His current research is in the area of computational geometry and algorithmic algebraic geometry.



David C. Anderson

Professor of Mechanical Engineering and Computer Sciences (1975)
Ph.D., Purdue University, 1974

Professor Anderson conducts research and teaches in the areas of computer-aided design, computer graphics and mechanical engineering design. His research focuses on problems in intelligent manufacturing systems, computer-aidedengineering,designenvironments,highlevel shape representation, geometric modeling, and geometric reasoning.

He is currently deputy director and co-principal investigator of the National Science Foundation Engineering Research Center (ERC) for Collaborative Manufacturing, and chairman of the Mechanical Engineering Design Area. He is a member of the editorial boards of the *Journal of Research in Engineering Design and the Journal of Design and Manufacturing*.

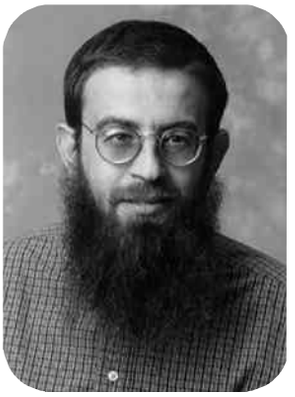
Dr. Anderson is a Fellow of the ASME.

Alberto Apostolico

Professor of Computer Sciences (1984)
Dr. Engineering, Electronic Engineering, University of Naples (Italy), 1973;
Dipl. Perf., Computer Science, University of Salerno (Italy), 1976

Professor Apostolico's research interests are in the areas of algorithmic analysis and design and parallel computation. His recent work deals with algorithms and data structures for combinatorial pattern matching problem as arising in text editing, data compression, picture processing, biomolecular sequence analysis, etc. He is a co-editor (with Z. Galil) of the books *Combinatorial Algorithms on Words* (Springer-Verlag) and *Pattern Matching Algorithms* (Oxford Univ. Press), serves on the editorial boards of *Parallel Processing Letters*, *Theoretical Computer Science*, *Journal of Computational Biology*, *Chaos Theory and Applications*, and was guest editor for a special issue of *Algorithmica* on string algorithms and their applications.

He also serves on the steering committee of the *International Symposia on Combinatorial Pattern Matching*, the Proceedings of which he co-edited in 1993, 1994 and 1997 on the executive committees of the *Fibonacci Institute for the Foundations of Computer Science* and of the *MSE Program in Software Engineering*. He has served on the program committees of many international conferences, most recently, the *International Colloquium on Automata, Languages, and Programming*, the *IEEE Data Compression Conference*, the *IFIP Conference on Parallel Algorithms for Irregularly Structured Problems*, the *Workshop on Algorithms and Data Structures*, *Research in Computational Biology (RECOMB)*, and as an invited speaker at various international conferences and advanced schools.



Walid G. Aref

Associate Professor of Computer Sciences
Ph.D., UniversityofMaryland,College Park, 1993

Walid G. Aref is an associate professor of computer science at Purdue. His research interests are in database systems, spatial and multimedia data indexing, video servers, network-attached storage devices, data mining, algorithms and data structures, and geographic information systems (GIS).

Selected Publications:

Walid G. Aref, Ibrahim Kamel, and Shahram Ghandeharizadeh, Disk Scheduling in Video Editing Systems, *IEEE Transactions on Knowledge and Data Engineering*. To appear. 2001.

Walid G. Aref and Hanan Samet, Efficient Window Block Retrieval in Quadtree-based Spatial Databases, *GeoInformatica*, Vol. 1, No. 1, pp. 59–91, April 1997.

Walid G. Aref, Daniel Barbara, and Padmavathi Vallabhaneni, The Handwritten-Trie: Indexing Electronic Ink, *The 1995 ACM SIGMOD International Conference on Management of Data*, San Jose, California, May 1995.

Mikhail Atallah

Professor of Computer Sciences (1982)
Ph.D., The Johns Hopkins University, 1982.

ProfessorAtallah's current researchinterestsare informationsecurity and algorithms (in particular, for geometric and parallel computation). He received a Presidential Young Investigator Award from the National Science Foundation in 1985. A Fellow of the IEEE, he has served on the editorial boards of *SIAM Journal on Computing*, *Journal of Parallel and Distributed Computing*, *Information Processing Letters*, *Computational Geometry: Theory & Applications*, *International Journal of Computational Geometry & Applications*, *Parallel Processing Letters*, *Methods of Logic in Computer Science*. He was Guest Editor for a Special Issue of *Algorithmica on Computational Geometry*, has served as Editor of the *Handbook of Parallel and Distributed Computing* (McGraw-Hill), as Editorial Advisor for the *Handbook of Computer Science and Engineering*, (CRC Press), and as Editor-in-Chief for *Handbook of Algorithms and Theory of Computation* (CRC Press). He was selected to serve on the Program Committees of various conferences and workshops (including ACM Symposium on Computational Geometry, SIAM Symposium on Discrete Algorithms, Workshop on Algorithms and Data Structures, IEEE Symposium on Parallel and Distributed Processing, IEEE International Parallel Processing Symposium, International Symposium on Algorithms and Computation, and many others). He was Keynote and Invited Speaker at many national and international meetings.

Selected Publications:

M.J. Atallah and S. Prabhakar. (Almost) Optimal Parallel Block Access for Range Queries. *Proceedings of the 19th ACM SIGMOD-SIGACT-SIGART Symposium on Principles of Database Systems*, pp. 205–215, May 2000.

M.J. Atallah, E. Bertino, A. Elmagarmid, M. Ibrahim, and V. Verykios. Disclosure Limitation of Sensitive Rules. *Proceedings IEEE Knowledge and Data Engineering Exchange Workshop*, Chicago, pp. 45–52, November 1999.

M.J. Atallah, Y. Genin and W. Szpankowski. Pattern Matching Image Compression: Algorithmic and Empirical Results. *IEEE Trans. onPattern Analysisand MachineIntelligence*, 21 pp. 614–627, 1999.

Bharat Bhargava

Professor of Computer Sciences (1988)
Ph.D., Electrical Engineering,
Purdue University, 1974

Professor Bhargava's research involves both theoreticaland experimental studies in distributed systems. His research group has implemented a robust and adaptable distributed database system called RAID, an adaptable video conferencingsystem and is involved in networking researchusing ideas of active routers, diffserv, and mobileIP. Prof. Bhargava has conducted experiments in large scale distributed systems, communications, authentication, key management, fault-tolerance and Quality of Service. He is conducting experiments with large scale communication networks to support emerging applications such as digital library and multimedia databases. His current interests are in secure mobile systems, multimedia security and QoS as a security parameter.

Professor Bhargava was the chairman of the IEEE Symposium on Reliable and Distributed Systems held at Purdue in October 1998. Professor Bhargava is on the editorial board of three international journals. In the 1988 IEEE Data Engineering Conference, he and John Riedl received the best paper award for their work on *A Model for Adaptable Systems for Transaction Processing*. Bhargava is a fellow of Institute of Electrical and Electronics Engineers and Institute of Electronics and Telecommunication Engineers. He has been awarded the charter Gold Core Member distinction by the IEEE Computer Society for his distinguished service. He received Outstanding Instructor Awards from the Purdue chapter of the ACM in 1996 and 1998. He has received an IEEE Technical Achievement award for the major impact of his decade long contributions to foundations of adaptability in communication and distributed systems in 1999. Prof. Bhargava's students have received best paper awards in International conferences and have started a Nasdaq listed company.

Selected Publications:

Bharat Bhargava. Concurrency Control in Database Systems. *IEEE Transactions on Knowledge and Data Engineering (TKDE)*, Vol. 11, No. 1, pp. 3–16, January 1999.

Bharat Bhargava and John Riedl. A Model for Adaptable Systems for Transaction Processing. *IEEE Transactions on Knowledge and Data Engineering (TKDE)*, Vol. 1, No. 4, pp. 433–449, August 1989.

Bharat Bhargava and Melli Annamalai. A communication Framework for Digital Libraries, *Multimedia Systems and Applications*. Vol. 10, No.2/3, pp. 205–236, April 2000.

Douglas E. Comer

Professor of Computer Sciences (1976)
Ph.D., The Pennsylvania State University, 1976.

Professor Comer is an internationally recognizedexpert on computer networking and the TCP/IP protocols. He has been working with TCP/IP and the Internet since the late 1970s. Comer established his reputation as a principal investigator on several early Internet research projects. Comer's research is experimental. He and his students designand implement working prototypes of large, complex systems. Theperformance of the resulting prototypes are then measured. The operating system and protocol software that has resulted from Comer's research has been used by industry in a variety of products.

Professor Comer has created courses on TCP/IP and networking technologies for a variety of audiences, including in-depth courses for engineers and less technical courses for others. Comer is well-known for his series of ground breaking textbooks on computer networks, the Internet, and computer operating systems. His books have been translated into eleven languages, and are widely used in both industry and academia. Comer's three-volume series *Internetworking With TCP/IP* is often cited as an authoritative reference for the Internet protocols. More significantly, Comer's texts have been used by fifteen ofthetopsixteenComputer Sciencedepartments listed in the *U.S. News and World Report* ranking. Comer is a fellow of the ACM and the recipient of numerous teaching awards.

Professor Comer is the editor of the research journal *Software-Practice and Experience*, published by John Wiley & Sons. He is the former chairman of the CSNET technical committee, the DARPA Distributed Systems Architecture Board, and was a member of the Internet Activities Board.

Samuel D. Conte

Professor Emeritus of Computer Sciences and Mathematics (1962)
B.S., Buffalo State, 1939;
M.A., University of Buffalo, 1943;
Ph.D., University of Michigan, 1950

ProfessorConte washeadoftheDepartmentofComputerSciences from 1962to 1979 and directoroftheUniversity Computing Center from 1962 to 1968. Before coming to Purdue, he was manager of the Programming and Analysis Department at TRW Systems from 1956 to 1962 and a professor of mathematics at Wayne State University from 1948 to 1956.

Professor Conte's early research was primarily in the area of numerical analysis and mathematical software. He is co-author of *Elementary Numerical Analysis* (McGraw-Hill), currently in its third edition. In recent years, his research has centered around software engineering in general and software metrics in particular. He has been deriving and experimentally testing models for software effort estimation and programmer productivity as well as metrics for software complexity.

Professor Conte is a senior scientist in the NSF-sponsored Software Engineering Research Center (SERC), a joint center at Purdue University and at the University of Florida. He is co-author (with H. E. Dunsmore and V. Y. Shen) of *Software Engineering Metrics and Models*, Benjamin/Cummings Publishing Company, 1986.

H. E. Dunsmore

Associate Professor of Computer Science (1978)
B.S., Mathematics and Physics, University of Tennessee, 1968;
Ph.D., University of Maryland, 1978

Dr. Dunsmore's research areas include the Internet,the World-Wide Web, Web browsers, Website design and implementation, software engineering, Java, C++, C, JavaScript, and Perl programming, cgi software, object-oriented design and programming, and information systems. Dr. Dunsmore is the Information Systems Convenor for the Global Studies Program in the Office of International Programs. He coordinates research concerning international issues related to the development and the use of Information Systems.

Dr. Dunsmore was selected Outstanding Teacher in the School of Science at Purdue University in 1980. He was selected one of the Top Ten Teachers in the School of Science in both 1994 and 1995. He is a 1996 recipient of the Charles B. Murphy Outstanding Undergraduate Teaching Award at PurdueUniversity. Hewasnamed a Founding Fellow of the Purdue University Teaching Academy in 1997. He was also nominated in 1997 by Purdue University for the Carnegie Foundation U.S. Professor of the Year program. He was selected in 1998 as a member of the Purdue University chapter of Mortar Board (national honor society that recognizes college students and faculty for their achievements in scholarship, leadership, and service). In April, 1999, he was selected for the *Book of Great Teachers* honoring outstanding teaching by Purdue faculty and displayed in the west foyer of the Purdue Memorial Union. He is a member of the Phi Beta Kappa and Upsilon Pi Epsilon (honor society for the computing sciences).

Dr. Dunsmore has extensive legal and industrial consulting experience. He has written over 60 technical articles. He is co-author (with William Theobald) of *Internet Resources for Tourism and Leisure*, Butterworth-Heinemann Publishing Co., (2000).

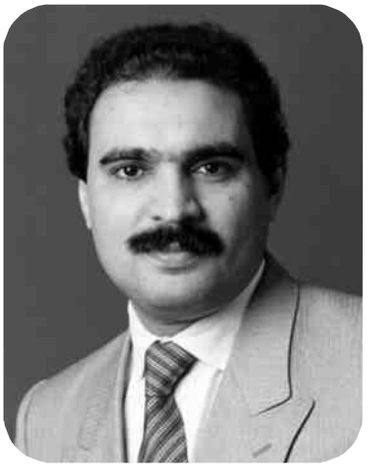
Wayne R. Dyksen

Associate Professor of Computer Sciences (1984)
B.A., Mathematics, Calvin College, 1977
M.S., Applied Mathematics, Purdue University, 1979
Ph.D., Applied Mathematics, Purdue University, 1982

Professor Dyksen's current research interests are in numerical analysis, especially the solution of partial differential equations. Most recently, Dyksen has derived explicit closed-form expressions for the Hermite cubic approximations to both the eigenvalues and the eigenfunctions of the Laplace operator for both the Dirichlet and the Neumann problems. Moreover, for the Dirichlet case, he shows that optimal approximations are obtained using the Gauss points for collocation points.

Dyksen and Robert Lynch have recently developed a new decoupling technique for solving the linear systems arising from Hermite cubic collocation solutions to boundary value problems with both Dirichlet and Neumann boundary conditions. While the traditional approach yields a linear system of order $2N \times 2N$ with bandwidth 2, this new technique decouples this system into two systems, one with a tridiagonal system of order $N-1 \times N-1$ and the other with the identity matrix of order $N \times N$.

Dyksen is now at the University of Nebraska at Omaha.



Ahmed K. Elmagarmid

Professor of Computer Sciences (1988)
B.S., Computer Science, University of Dayton, 1977;
M.S., Computer and Information Science, Ohio State University, 1981;
Ph.D., 1985

Professor Elmagarmid is the Director of the Indiana Center for Database Systems and the Indiana Telemedicine Incubator. He received a Presidential Young Investigator award from the National Science Foundation, and distinguished alumni awards from Ohio State University and the University of Dayton in 1993 and 1995, respectively. Professor Elmagarmid is the editor-in-chief of *Distributed and Parallel Databases: An International Journal*, editor of *IEEE Transactions on Knowledge and Data Engineering*, *Information Sciences Journal*, *Journal of Communication Systems*, and editor of the book series on *Advances in Database Systems*. He has chaired and served on several program committees and served on several editorial boards.

Professor Elmagarmid's research interests focus on applications of database technology to telemedicine, digital government, and electric power management. He has done work in video databases, data quality and confidentiality, and multidatabase systems. He has over 10 active grants from state and federal government agencies as well as several grants from industry.

Professor Elmagarmid serves as an industry consultant in the areas of database systems. He has consulted with Telcordia Technology, Bellcore, IBM, CSC, Harris, D. H. Brown and Associates, MCC, Bell Northern Research, Molecular Design Labs, and UniSql to name a few. He is the owner of a recent patent on workflow database technology.

Selected Publications:

M.J. Atallah, E. Bertino, **A. Elmagarmid,** M. Ibrahim, and V. Verykios. Disclosure Limitation of Sensitive Rules. *Proceedings IEEE Knowledge and Data Engineering Exchange Workshop*, Chicago, pp. 45–52, November 1999.

Sonia Fahmy

Assistant Professor of Computer Sciences (1999)
Ph.D., The Ohio State University, 1999

Sonia Fahmy's current research interests are in the design and evaluation of network architectures and protocols. She is currently investigating quality of service and traffic engineering in computer networks, multipoint communication, transport of voice and video over the Internet, and wireless networks. She has been very active in the Traffic Management working group of the ATM Forum, and has participated in several IETF working groups. She has designed, implemented, simulated and analyzed several traffic management schemes and options, for unicast and multicast communication. The work is published in over 40 ATM Forum contributions, and over 30 journal and conference papers. Some of the results of her work were incorporated in the ATM Forum traffic management specifications 4.0 and 4.1. A patent has also been awarded for one of her algorithms. Sonia is a member of the ACM, IEEE, Phi Kappa Phi, Sigma Xi, and Upsilon Pi Epsilon, and is listed in *International Who's Who in Information Technology 1999*. She has served on the program committees and organized sessions in a number of networking conferences.

Selected Publications:

S. Fahmy, R. Jain, R. Goyal, B. Vandalore, and S. Kalyanaraman. Design and Evaluation of Feedback Consolidation for ABR Point-to-Multipoint Connections in ATM Networks, *Journal of Computer Communications*, 25 July 1999, Vol. 22, Issue 12, pp. 1085–1103 (also appeared in INFOCOM 98).

S. Fahmy, R. Jain, S. Rabie, R. Goyal and B. Vandalore. Quality of Service for Internet Traffic over ATM Service Categories *Journal of Computer Communications*, 15 September 1999, Vol. 22, Issue 14, pp. 1307–1320.

S. Kalyanaraman, R. Jain, **S. Fahmy,** R. Goyal and B. Vandalore. The ERICA Switch Algorithm for ABR Traffic Management in ATM Networks, *IEEE/ACM Transactions on Networking*, February 2000.

Greg N. Frederickson

ProfessorofComputerSciences (1982)
A.B., Economics, Harvard University, 1969;
M.S., Computer Science, University of Maryland, 1976;
Ph.D., Computer Science, University of Maryland, 1977

Professor Frederickson's areas of interest include the analysis of algorithms, with special emphasis on data structures, and graph and network algorithms. His recent work has focused on designing data structures to dynamically maintain information about graphs, on designing optimal algorithms for parametric search problems on trees, and on discovering graph decompositions that facilitate fast algorithms for shortest path problems.

Professor Frederickson has served on the editorial boards of *SIAM Journal on Computing* and *IEEE Transactions on Computers*, and he currently serves on the editorial boards of *Algorithmica* and the *Chicago Journal of Theoretical Computer Science*. He has published a book, *Dissections Plane & Fancy*, Cambridge University Press, 1997.

Selected Publications:

Greg N. Frederickson, Ambivalent data structures for dynamic 2-edge-connectivity and k smallest spanning trees, *SIAM Journal on Computing*, Vol. 26, pp. 484–538, 1997.

Greg N. Frederickson, A data structure for dynamically maintaining rooted trees, *Journal of Algorithms*, Vol. 24, pp. 37–65, 1997.

Greg N. Frederickson and Roberto Solis-Oba, Increasing the weight of minimum spanning trees, *Journal of Algorithms*, Vol. 33, pp. 244–266, 1999.

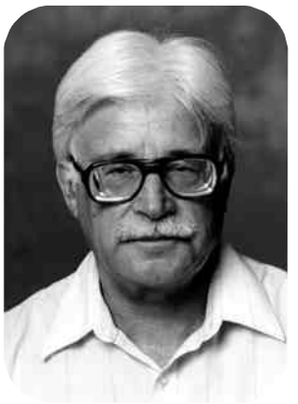
Walter Gautschi

Professor of Computer Sciences and Mathematics (1963)
Ph.D., Basel (Switzerland), 1953

Before coming to Purdue, Professor Gautschi did postdoctoral work as a Janggen-Pöhn Research Fellow at the National Institute of Applied Mathematics in Rome and at the Harvard Computation Laboratory. Healso held positions at the National Bureau of Standards, the American University, the Oak Ridge National Laboratory, and the University of Tennessee. Since coming to Purdue, he has been a Fulbright Scholar at the Technical University of Munich and has held visiting appointments at the University of Wisconsin, Argonne National Laboratory, the Wright-Patterson Air Force Base, ETH Zurich, and the University of Padova. He has been a Fulbright Lecturer, an ACM National Lecturer, and a SIAM Visiting Lecturer. He is, or has been, on the editorial boards of *SIAM Journal on Mathematical Analysis*, *Numerische Mathematik*, *Calcolo*, and *Mathematics of Computation*, and has served as a special editor for *Linear Algebra and Its Applications*. From 1984 to 1995 he has been the managing editor of *Mathematics of Computation* and, since 1991, an honorary editor of *Numerische Mathematik*.

Selected Publications:

W. Gander and **W. Gautschi**. Adaptive Quadrature—Revisited, *BIT 40*, 2000, pp. 84-101.



W. Gautschi. Orthogonal Polynomials: Applications and Computations, in *Acta Numerica 1996*, A. Iserles, Editor, Cambridge University Press, Cambridge, 1996, pp. 45-119.

W. Gautschi. The Incomplete Gamma Functions Since Tricomi, in *Tricomi's Ideas and Contemporary Applied Mathematics, Atti dei Convegni Lincei*, No. 147, Accademia Nazionale dei Lincei, Roma, 1998, pp. 203-237.

Ananth Grama

Assistant Professor of Computer Science
B.E., Computer Science and Technology, University of Roorkee, India, 1989;
M.S., Computer Engineering, Wayne State University, 1990;
Ph.D., Computer Science, University of Minnesota, 1996

Professor Grama's research interests span the areas of parallel and distributed computing architectures, algorithms, and applications. His work on distributed infrastructure deals with development of software support for dynamic clustered and multiclustered environments. Models for platform abstractions and performance modeling are also being developed. His research on applications has focused on particle dynamics methods, their applications to dense linear system solvers, and preconditioning sparse systems. More recently, he has also been working on fast algorithms for data compression and analysis.

Professor Grama has authored several papers and co-authored a text book *Introduction to Parallel Computing: Design and Analysis of Algorithms* with Vipin Kumar, Anshul Gupta, and George Karypis. Another book is forthcoming entitled *Principles of Parallel Programming* co-authored with Vipin Kumar and George Karypis.

Selected Publications:

Ananth Grama, Vivek Sarin, and Ahmed Sameh. Improving error bounds for multipole-based treecodes, *SIAM Journal on Scientific Computing*, 21(5):1790–1803, May 21, 2000.

Ananth Grama and Vipin Kumar, State-of-the-art in parallel search techniques for discrete optimization problems, *IEEE Transactions on Knowledge and Data Engineering*, 11(1):28–35, Jan/Feb 1999.

Marc Alzina, Wojciech Szpankowski, and **Ananth Grama**, 2D-pattern matching image and video compression, *Data Compression Conference*, pp. 424–433, Snowbird, UT, 1999.

Concettina Guerra

Associate Professor of Computer Sciences (1984)
Dr. Sc. Math., University of Naples, (Italy), 1972

Professor Guerra's research interests are in the area of computer vision, image processing and computational biology. She is currently working on the design and implementation of efficient algorithms for object representation and recognition. She is also interested in the application of techniques developed for vision tasks to problems arising in computational biology.

Susanne E. Hambrusch

Professor of Computer Sciences (1982)
M.S., Computer Science, Technical University of Vienna, 1977;
Ph.D., Computer Science, The Pennsylvania State University, 1982

Professor Hambrusch's research interests are in the area of parallel and distributed computation, scalable systems and algorithms, query processing, and analysis of algorithms. Her research contributions include parallel algorithms for image processing and graph problems, communication and synchronization for data-driven high performance applications, and algorithms for VLSI layout and routing problems. Professor Hambrusch's research has been supported by NSF, ONR, DARPA, DoE, and Microsoft Corp.

Professor Hambrusch is a member of the Editorial Boards of *Parallel Computing and Information Processing Letters* and a member of the IEEE Technical Committee on Parallel Processing (TCPP). She has held visiting positions at the International Computer Science Institute, Berkeley, and at the Technical University of Graz, Austria. Professor Hambrusch is an inaugural member in the *Purdue University Book of Great Teachers* and was selected in 1999 as one of the Ten Best Teachers of Undergraduates.

Selected Publications:

S.E. Hambrusch, C.-M. Liu, and H.-S. Lim, Clustering in Trees: Optimizing Cluster Sizes and Number of Subtrees, *Journal of Graph Algorithms and Applications*, Vol. 4, no. 4, pp. 1-26, 2000.

S.E. Hambrusch, C.-M. Liu, Data Replication for External Searching in Static Tree Structures, *9th International Conference on Information and Knowledge Management* (CIKM 2000), pp. 360-367, 2000.

S.E. Hambrusch, A. Khokhar, and E. Kocalar, Termination Detection: Models and Algorithms for SPMD Computing Paradigms, *12th International Conference on Parallel and Distributed Computing Systems*, pp. 377-382, 1999.

Christoph M. Hoffmann

Professor of Computer Sciences (1976)
Ph.D., University of Wisconsin, 1974

Before joining the Purdue faculty, Professor Hoffmann taught at the University of Waterloo, Canada. He has also been visiting professor at the Christian-Albrechts University in Kiel, West Germany (1980), and at Cornell University (1984-1986). His research focuses on geometric and solid modeling, its applications to manufacturing and science, and the simulation of physical systems. The research includes, in particular, research on geometric constraint solving and the semantics of generative, feature-based design. Professor Hoffmann is the author of *Group-Theoretic Algorithms and Graph Isomorphism*, *Lecture Notes in Computer Science, 136*, Springer-Verlag and of *Geometric and Solid Modeling: An Introduction*, published by Morgan Kaufmann, Inc.

He is on the editorial boards of: *Journal for Symbolic Computation*, *Journal for Applicable Algebra*, *International Journal of Computational Geometry and Applications*, *Computer-Aided Geometric Design*, *Computer Aided Design*, *ACM Transactions on Graphics*, *Computer Graphics, Vision and Image Processing*, *SIAM Monographs in Science and Engineering*, *Computer Graphics Forum*.

Selected Publications:

C. Durand and **C. M. Hoffmann**, A Systematic Framework for Solving Geometric Constraints Analytically, *Journal of Symbolic Computation*, Vol. 30, 2000, 493-520.

C. M. Hoffmann and R. Joan-Arinyo, Parametric Modeling, in *Handbook of Computer Aided Geometric Design* G. Farin, ed. North Holland, 2001.

C. M. Hoffmann and K. J. Kim, Towards Valid Parametric Models, *Computer Aided Design*, Vol. 33, 2001, 81-90.

Antony Hosking

Assistant Professor of Computer Science (1995)
B.Sc., Mathematical Sciences, University of Adelaide, 1985;
M.Sc., Computer Science, University of Waikato, 1987;
Ph.D., Computer Science, University of Massachusetts, 1995

Dr. Hosking's research lies at the intersection between programming languages and database systems, focusing on the integration of language and database functionality for efficient data management. Particular topics of interest include interpretation, compilation, and optimization of object-oriented persistent/database programming languages, and empirical performance evaluation of experimental prototype systems. His current research explores language and compiler support for run-time object management (e.g., garbage collection, persistence, resilience, distribution and security) in the context of the Smalltalk, Modula-3, and Java programming languages.

Selected Publications:

Antony L. Hosking and Jiawan Chen. Mostly-copying reachability-based orthogonal persistence. *In Proceedings of the ACM Conference on Object-Oriented Programming Systems, Languages and Applications,* Denver, Colorado, Nov. 1999.

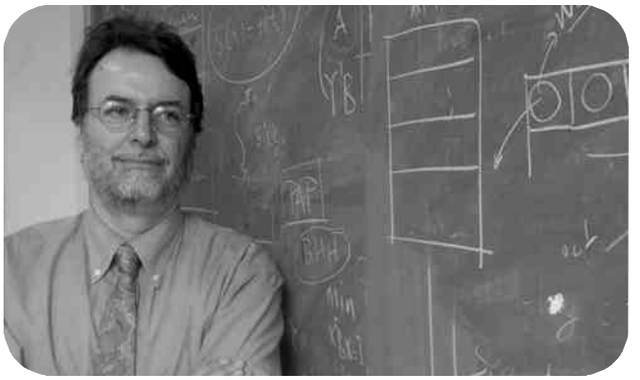
Antony L. Hosking and Jiawan Chen. PM3: An Orthogonal Persistent Systems Programming Language—Design, Implementation, Performance. *In Proceedings of the 25th International Conference on Very Large Data Bases,* Edinburgh, Scotland, Sept. 1999.

Elias N. Houstis

Professor of Computer Sciences (1984)
B.S., Mathematics, University of Athens, Greece, 1969;
Ph.D., Mathematics, Purdue University, 1974

E.N. Houstis is a Professor of Computer Science and Director of the Computational Science & Engineering Program. He has served as acting and associate Head of the Department of Computer Sciences for several years. Houstis is on the editorial board of *Neural, Parallel and Scientific Computations*, *Computational Engineering Science*, and *HPC Users Web-Based Journals* and a member of the IFIPWG 2.5 WorkingGroupin Numerical Software. Houstis's current research interests are in the areas of problem solving environments (PSEs), parallel computation, performance evaluation and modeling,computational intelligence,computational finance, and on-line learning. He is one the principal designers of several domain specific PSEs (i.e., Parallel ELLPACK, PDELab) and numerous performance evaluation studies of PDE software and parallel architectures. He is leading the Parallel ELLPACK group, which is developing infrastructure and implementingmethodologies for reusing "legacy" PDE software on a variety of physical and virtualparallelmachines;anddesigning a WebParallel ELLPACK server. Houstis has been involved in the design of a knowledge based framework (known as PYTHIA) to support theselection of algorithm and machine pairs for a given class of PDE problems based on performance knowledge. This framework has been applied to a simulation system for designing HPC systems (POEMS project), a virtual laboratory environment,and recommender system for mathematical software. He has published several books and over 120 technical articles. He has supervised 14 Ph.D. students and several MS students.

Houstis's research has been supported by the Air Force Office of Scientific Research, the Army Research Office, DARPA, DOE, ESPRIT, INTEL, IBM, AT&T, Kozo-Japan, Purdue University, National Science Foundation, Greek Research Foundation.



Zhiyuan Li

Associate Professor of Computer Science (1997)
B.S.,Mathematics,XiamenUniversity, China, 1982
M.S., Computer Sciences,
University of Illinois, Urbana, 1985
Ph.D., Computer Sciences,
University of Illinois, Urbana, 1989

Zhiyuan Li has led a group to design and implement an inter-procedural parallelizing Fortran compiler, called Panorama, which performs highly efficient array data flow analysis to enable aggressive loop parallelization and locality-enhancement program transformations. Li collaborates with a group at the University of Minnesota to build the Agassiz C compiler to perform similar tasks on C programs.

Li received a National Science Foundation Research Initiation Award and a National Science Foundation Career Award in 1992 and 1995 respectively. In 1998, he co-edited with P. C. Yew a special issue on Compilers and Languages for Parallel and Distributed Computers for *IEEE Transaction on Parallel and Distributed Systems* and two special issues on Compilers and Languages for Parallel Computing for the *International Journal on Parallel Programming*. Li, with P. C. Yew, co-chaired the *10th International Workshop on Languages and Compilers for Parallel Computing* in 1997. He has served as program committee member for several international conferences, including IEEE/ACM International Parallel Processing Symposium (IPPS/SPDP), ACM International Conference on Supercomputing and International Conference on Parallel Processing.

Selected Publications:

Junjie Gu and **Zhiyuan Li**, Efficient Interprocedural Array Data-flow Analysis for Automatic Program Parallelization, *IEEE Trans. on Software Engineering*, Special Issue on Architecture-Independent Languages and Software Tools for Parallel Processing, 26(3), March 2000, pp. 244–261.

Yonghong Song and **Zhiyuan Li**, New Tiling Techniques to Improve Cache Temporal Locality, *Proceedings of ACM SIGPLAN Conference on Programming Language Design and Implementation*, Atlanta, Georgia, May, 1999, pp. 215–228.

Zhiyuan Li, Reducing Cache Conflicts by Partitioning and Privatizing Shared Arrays, *Proceedings of the 1999 International Conference on Parallel Architectures and Compilation Techniques, IEEE Computer Society* and *IFIP WG 10.3*, Newport Beach, California, Oct. 1999, pp. 183–190.

Bradley J. Lucier

Professor of Mathematics and Computer Sciences (1981)
B.Sc.(Hon.),Mathematics,University of Windsor, 1976;
S.M., Applied Mathematics, University of Chicago, 1978;
Ph.D., Applied Mathematics, University of Chicago, 1981

Professor Lucier has worked for ten years on wavelet and multiresolution methods for image processing and other applications. His early work on image and surface compression was with Ronald DeVore and Bjorn Jawerth of the University of South Carolina. Later, he and DeVore collaborated with researchers at the Moffit Cancer Center at the University of South Florida to apply these techniques and theories to compressing images in telemammography.

Lucier's recent research on the relationship between variational problems and wavelet techniques for image processing has been joint with DeVore, Antonin Chambolle of the University of Paris-Dauphine, and Lucier's ex-student, Namyong Lee. They showed that the wavelet shrinkage method introduced by David Donoho and Iain Johnstone could be formulated as the solution of a variational inequality, and they provided sharper bounds on the error incurred by the method. Lucier also worked with Chambolle on a new mathematical formulation of translation-invariant wavelet shrinkage, a technique introduced by Donoho and Ronald Coifman for smoothing images, as a new, nonlinear, wavelet-based, image smoothing scale space.

Most recently, Lucier has worked with Namyong Lee to obtain improved techniques for tomographic reconstruction from noisy data with specific application to Positron Emission Tomography, an important method of brain imaging. He hopes to continue and expand his research into various methods of medical imaging.

This work has been supported continuously by the Office of Naval Research since 1990.

Selected Publications:

Antonin Chambolle, Ronald A. DeVore, Namyong Lee, and **Bradley J. Lucier.** Nonlinear Wavelet Image Processing: Variational Problems, Compression, and Noise Removal through Wavelet Shrinkage, *IEEE Transactions on Image Processing*, 7 (1998), pp. 319–335. Special Issue on Partial Differential Equations and Geometry-Driven Diffusion in Image Processing and Analysis.

Antonin Chambolle and **Bradley J. Lucier.** Interpreting Translation-Invariant Wavelet Shrinkage as a New Image Smoothing Scale Space. submitted.

Namyong Lee and **Bradley J. Lucier.** Wavelet Methods for Inverting the Radon Transform with Noisy Data. submitted.

Robert E. Lynch

Professor Emeritus of Computer Sciences and Mathematics (1967)
B.S., Engineering Physics, Cornell University, 1954;
M.A., Mathematics, Harvard University, 1961;
Ph.D., Applied Mathematics,Harvard University, 1963

Professor Lynch has held positions at Brookhaven National Laboratory, Los Alamos Laboratories, Wright-Patterson Air Force Base, the University of Texas, and General Motors Research Laboratories. Areas of his research include differential equations, linear algebra, software for solving elliptic partial differential equations, and computational biology. He and G. Birkhoff have written the monograph *Numerical Solutions of Elliptic Problems,* SIAM Publications, 1985.

Dan Cristian Marinescu

Professor of Computer Sciences (1984); M.S., Electrical Engineering, Polytechnic Institute, Bucharest, 1965
M.S., Electrical Engineering and Computer Science, University of California at Berkeley, 1969;
Ph.D., EECS, Polytechnic Institute, Bucharest, 1975

Dan Marinescu is Professor of Computer Sciences and (by courtesy) of Electrical and Computer Engineering. Before coming to Purdue, Dr. Marinescu was an associate professor of EECS at the Polytechnic Institute inBucharest andthen a senior researcherat G.S.I. Darmstadt. During the Summer of 1985, he was a visiting professoratthe IBM T. J. Watson Research Center, YorktownHeights,New York and in the Summer of 1993 he was a visiting scientist at the Scalable Systems Division of Intel. His research interests cover real-time systems, computer networks, performance evaluation of computer and communication systems, parallel and distributed systems, and scientific computing.

Dr. Marinescuwasthechief architectof a real-time dataacquisition and analysis system used in experiments leading to the discovery of the superheavy elements; meitnerium, hessium, and nielsbohrium. Heis currentlyleading a project incomputational biologyprocessed on the development of parallel algorithms and methods for the 3-D atomic structure deterioration of large macromolecules like viruses. He is also involved in the Scalable I/O Initiative.

Selected Publications:

L. Bölöni, **D.C. Marinescu,** J.R.Rice, P. Tsompanopoulu, and E.A Vavalis, Agent-based Networks for Scientific Simulation and Modeling, *Con-currencyPracticeand Experience*, vol. 12, nr. 9, pp.845–861, 2000.

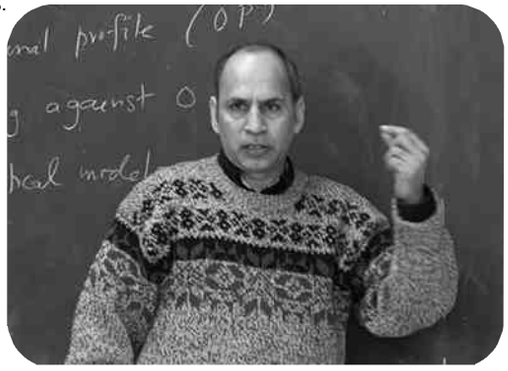
D.C. Marinescu and L. Bölöni, A Component-Based Architecture for Problem Solving Environments, *Mathematics and Computers in Simulation*, Elsevier, pp. 279–293, 2000.

L. Bölöni, K.K. Jun, K. Palacz, R. Sion, and **D.C. Marinescu**, The Bond Agent System and Applications, In Agent Systems, Mobile Agents, and Applications, (D. Kotz and F. Mattern, eds., *Lecture Notes on Computer Science*, vol. 1882, Springer Verlag, 99–112, 2000.

Aditya P. Mathur

Professor of Computer Sciences (1987)
B.E., Electrical Engineering, BITS, Pilani, India, 1970;
M.S., Electrical Engineering, BITS, Pilani, India, 1972;
Ph.D., Computer Science, BITS, Pilani, India, 1977

Aditya Mathur conducts research in the areas of software testing and reliability. Researchquestions of interest to Mathur relate to the effectiveness, scalability, and cost of various test adequacy criteria. Mathur has been a crusader for the use of code coverage criteria in the estimation of software reliability or as an orthogonal metric to assess confidence in the reliability estimates. He has proposed the "Saturation Effect" as a motivating device for the use of a sequence of testing techniques. This device is often used by vendors to enhance marketing of their test tools. Mathur's current work deals with test and management of Internet services. His research group has developed Wabash, a tool for the test and management of CORBA services. Mathur is Director of the Software Engineering Research Center (SERC), an NSF I/UCRC, and an Associate Head of the Department of Computer Sciences.



Selected Publications:

Eric Wong, J. R. Horgan and **A. P. Mathur**, Effect of Test Set Minimization on Fault Detection Effectiveness, *Software Practice and Experience*, Volume 28, Issue 4, pp. 347–370, 1998.

Eric Wong, J. R. Horgan and **A. P. Mathur**, Test Set Size Minimization and Fault Detection Effectiveness: A Case Study in a Space Application, *Journal of Systems and Software*, Volume 48, Number 2, pp 79–89, October 1999.

J. Cangussu, R. A. DeCarlo and **A. P. Mathur**,A state variable model for the software test process, *Proceedings of 13th International Conference, Software & Systems Engineering and their Applications*, December 5–8, 2000, Paris.

Jens Palsberg

Associate Professor of Computer Science (1996)
Ph.D., Computer Science, University of Aarhus, 1992

Professor Palsberg's main research interests are programming languages, compilers, software engineering, and software security. He has authored over 50 technical papers in these areas. Before coming to Purdue Palsberg was a visiting scientist at various institutions, including MIT. His 1994 book with Michael Schwartzbach is entitled *Object-oriented Type Systems*. In 1998 he received the National Science Foundation Faculty Early Career Development Award, and in 1999 he received the Purdue University Faculty Scholar award. Dr. Palsberg's research has been supported by NSF, DARPA, IBM, and British Telecom. Dr. Palsberg is a member of the editorial board of *IEEE Transactions on Software Engineering*.

Selected Publications:

Jens Palsberg and Christina Pavlopoulou. From polyvariant flow information to intersection and union types. In *Proceedings of POPL'98, 25th Annual SIGPLAN-SIGACT Symposium on Principles of Programming Languages*, pp. 197–208, San Diego, California, January 1998.

Jens Palsberg. Equality-based flow analysis versus recursive types. *ACM Transactions on Programming Languages and Systems*, Vol. 20 No. 6 pp. 1251–1264, 1998.

Jens Palsberg and Tian Zhao. Efficient and flexible matching of recursive types. In *Proceedings of LICS'00, Fifteenth Annual IEEE Symposium on Logic in Computer Science*, Santa Barbara, California, June 2000.

Purdue News Service photo by David Umberger

Kihong Park

Assistant Professor of Computer Sciences (1996)
B.A., School of Management, Seoul National University, 1988; M.S., Computer Science, University of South Carolina, 1990; Ph.D., Computer Science, Boston University, 1996

Professor Park's research centers on design and control issues in high-speed multimedia networks including quality of service provisioning architectures, congestion control, distributed scheduling, and the facilitation of adaptive, fault-tolerant computing on large-scale distributed systems.

He has over 40 technical publications, and has edited a book *Self-Similar Network Traffic and Performance Evaluation* (co-editor: Dr. Walter Willinger) published by Wiley-Interscience, 2000. His thesis, entitled *Ergodicity and Mixing Rate of One-Dimensional Cellular Automata* (advisor: Dr. Peter Gacs), was on a problem in theoretical probability going back to von Neumann, with applications to fault-tolerance and reliability in large scale systems such as the Internet.

Dr. Park was a Presidential University Fellow at Boston University, is a recipient of the NSF CAREER Award,is a Fellow-at-Large of the Santa Fe Institute, has served on several international program committees, NSF panels, and is a member of ACM and IEEE. In 2001, he is organizing an SFI/NSF Workshop titled *The Internet as a Large-Scale Complex System* (co-chair: Dr. Walter Willinger), March 29-31, to be held at the Santa Fe Institute, and a SPIE Conference titled *Scalability and Traffic Control in IP Networks* (co-chair: Dr. Sonia Fahmy), August 20-24, at the Colorado Convention Center in Denver.

Selected Publications:

S. Chen and **K. Park**, An Architecture for Noncooperative QoS Provision in Many-Switch Systems, *In Proceeding of the IEEE INFOCOM '99*, pp. 864–872, 1999.

J. Cruz and **K. Park**, Towards Performance-Driven System Support for Distributed Computing in Clustered Environments, *Journal of Parallel and Distributed Computing*, 59 pp. 132–154, 1999.

T. Tuan and **K. Park**, Multiple Time Scale Congestion Control for Self-Similar Network Traffic, *Performance Evaluation,* 36 pp. 359–386, 1999.

Sunil Prabhakar

Assistant Professor of Computer Sciences (1998)
B. Tech., Electrical Engineering, Indian Institute of Technology, 1990;
M.S., Computer Science, University of California, 1998;
Ph.D., Computer Science, University of California, 1998

Dr. Prabhakar's researchfocuses on issues in large-scale,distributed applications such as multimedia databases, data warehouses, and digital libraries. The efficient execution of I/O is a critical problem for these applications. He is currently developing techniques that improve I/O performance for traditional and multimedia databases. He has developed declustering algorithms for multidimensional data that result in increased parallel I/O scheduling algorithms for robotic removable media libraries. Dr. Prabhakar's interest also lies in the design and development of digital libraries for the management and study of scientific research data. Prior to joining Purdue, Dr. Prabhakarheld a positionwith TataUnisysLtd.from 1990 to 1994.

Selected Publications:

M.J. Atallah and **S. Prabhakar.** (Almost) Optimal Parallel Block Access for Range Queries. In *Proceedings of the International Symposium on Principles of Database Systems* (PODS), pages 205-215, Dallas, TX, May 2000.

T. Johnson and **S. Prabhakar.** Tape Group Parity Protection. *16th IEEE Mass Storage Systems Symposium MSS'99*, San Diego, CA, March 1999.

Vernon J. Rego

Professor of Computer Sciences (1985)
M.Sc., Mathematics, BITS, Pilani, India;
M.S., Computer Science,
Michigan State University;
Ph.D., Computer Science,
Michigan State University, 1985

Vernon Rego directs research in the Parallel Computation and Simulation Laboratory (PacsLab) in Purdue's computer sciences department. His research interests include software systems for high-performance distributed computation, network protocols, threads systems, parallel stochastic simulation, computational probability and performance, and software engineering. His current projects include the ACES software architecture for multi-threaded distributed computing and parallel simulation, including the EcliPSe replicated simulation system (for which he was awarded an IEEE/Gordon Bell Prize), the ParaSol process-oriented distributed simulation system, the Ariadne threads system and the CLAM protocol suite. Professor Rego was also awarded a German Research Council Award for Computer Networking Research. He has been an invited researcher at the Oak Ridge National Laboratories and an ACM National Lecturer. He is an Editor of the *IEEE Transactions on Computers* and an advisory board member of The DoD Advanced Distributed Simulation Research Consortium.

John R. Rice

W. Brooks Fortune Distinguished Professor of Computer Sciences (1964)
Ph.D., California Institute of Technology, 1959

Professor Rice is founder of *ACM Transactions on Mathematical Software* and is on several other editorial boards. He is the past chair of the Computing Research Association, a fellow of the AAAS, of the ACM, and a memberoftheNationalAcademyofEngineering. For the past 15 years, Professor Rice has been analyzing numerical methodsand problemsolving environmentsforscientificcomputing. He has created a general methodology for performance evaluation of mathematical software and developed the ELLPACK system for elliptic problems. It is now being extended to Parallel ELLPACK and PDELab.

Professor Rice has published 21 books. Among recent ones are *Solving Elliptic Problems with ELLPACK* (Springer-Verlag, 1985), *Mathematical Aspects of Scientific Software* (Springer-Verlag, 1988), *Expert Systems for Scientific Computing* (North Holland, 1992), *Enabling Technologies for Computational Science* (Kluwer, 2000). He has also published about 300 scientific articles. The twenty or so articles of 2000 were in the areas of agent based computing, computational science, computer security, mathematical software, problem solving environments, recommender systems, simulating gas turbines, and web based computing.

Ahmed Sameh

Department Head; Samuel D. Conte Professor of Computer Science
Ph.D., University of Illinois at Urbana-Champaign, 1968

Ahmed Sameh is the Samuel D. Conte Professor and Head of Computer Science at Purdue University, West Lafayette. He joined Purdue inJanuary, 1997, after being theHead ofComputer Science at the University of Minnesota, Minneapolis, and the holder of the William Norris Chair in Large-Scale Computing, for four and half years. His current research interests include numerical linear algebra, the design and performance analysis of parallel numerical algorithms, as wellasthedesignof application-specificproblem solving environments.

Sameh received his B.Sc. from the University of Alexandria, Egypt in 1961, M.S. from Georgia Institute of Technology in 1964, and Ph.D. from the University of Illinois (U-C) in 1968, all in Civil Engineering (Structural Mechanics). He was a faculty member of the Department of Computer Science at the University of Illinois (U-C) from 1968 to 1991.

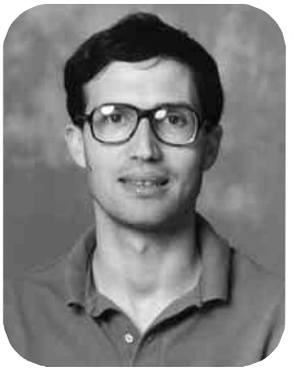
He is a Fellow of ACM, IEEE, the American Association for the Advancement of Science (AAAS), and a member of SIAM. He has also received the IEEE's 1999 Harry Goode Award for seminal and influential work in parallel numerical algorithms.

Selected Publications:

A. Sameh, and Z. Tong, The Trace Minimization Method for the Symmetric Generalized Eigenvalue Problem, *Journal of Computational and Applied Mathematics*, Vol 123, pp. 155–175, 2000.

Z. Tong, and **A. Sameh**, On Optimal Banded Preconditioners for the 5-Point Laplacian, *SIAM Journal on Matrix Analysis and Applications*, Vol 21, No. 2, pp. 477–480, 2000.

A. Sameh, and V. Sarin, Hybrid Parallel Linear Solvers, *International Journal of Computational Fluid Dynamics*, Vol 12, pp. 213–223,1999.



Elisha Sacks

AssociateProfessorofComputerSciences (1994)
Ph.D., Computer Science, Massachusetts Institute of Technology, 1988

Dr. Sacks's research area is geometric reasoning in science and engineering. He is a problem solver who couples domain knowledge, mathematics, and computer science to solve real-world problems. He worked on qualitative analysis of nonlinear dynamical systems for his Ph.D. and for the next few years. He has worked on mechanicaldesignsincethenand plansto continue for a while. The next area that he studies may involve machine learning, scientific visualization, physical simulation, or robotics. His unique skill is in combining (often esoteric) mathematics with (often inarticulated) domain knowledge with (often idealized) computational methods to solve real-world problems.

The mechanical design research addresses kinematic analysis and the related tasks of simulation, tolerancing, and parametric design. Kinematic analysis means computing the ways that mechanical parts interact: howgearsmesh, howlinkagestransform motion,how robots grasp.Kinematicanalysisis central to mechanical design because part contacts largely determine mechanical function and because other forms of analysis (dynamical simulation, stress, tolerance) presuppose it. Prior to his research, a general, practical kinematic analysis algorithm was deemed impossible. He has developed and implemented such an algorithm based on configuration space computation. He is working with academic and industrial collaborators to develop practical mechanical design software based on his research, notably with Ford Motors on transmission design and with Sandia National laboratory on micro-mechanism design. Dr. Sacks is also the Director of the Visualization Center.

Selected Publications:

Joskowicz, L. and **E. Sacks.** Computer-Aided Mechanical Design Using Configuration Spaces. *Computing in Science and Engineering*, 1(6):14-21, 1999.

E. Sacks, C. Pisula, and L. Joskowicz. Visualizing Three-Dimensional Configuration Spaces for Mechanical Design. *Computer Graphics and Applications*, 19(5):50-53, 1999.

E.Sacks and L. Joskowicz. Parametric Kinematic Tolerance Analysis of General Planar Systems. *Computer-AidedDesign*, 30(9):707-714, 1998

Clay Shields

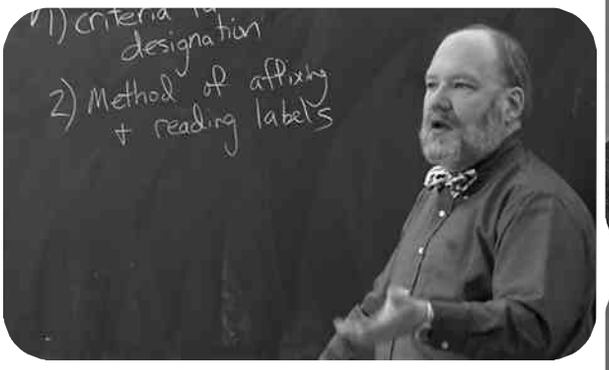
Assistant Professor of Computer Sciences (1999);
B.S., Electrical Engineering, University of Virginia, 1989;
M.S., Computer Engineering, University of California Santa Cruz, 1996; Ph.D., Computer Engineering, University of California Santa Cruz, 1999

Clay Shields' research interests lie in the area of network security. He is currently studying the construction, properties and analysis of anonymous communication protocols. Conversely, he is also examining how to trace packets and streams through a network, with the goal of being able to track network intruders. His other interests include secure unicast and multicast routing protocols, network denial of service, and provisioning for network audit data.

Clay was born in Washington, D.C, and spent much of his childhood living overseas as required by the career of his stepfather, who was a covert agent for the CIA. Clay got an undergraduate degree in electrical engineering from the University of Virginia, and after a year as a computer programmer on Capitol Hill, joined the U.S. Army. Asan infantry officer withthe 101stAirborne Division, he served overseas with the peace-keeping force in the Sinai Peninsula, earning a commendation for liaison work with the Egyptian and Israeli military. Clay left the Army to return to graduate school. After a year at the University of Maryland, making up background requirements, he attended the University of California at Santa Cruz. For his dissertation he studied computer networking, particularly multicast routing and network security issues.

Eugene H. Spafford

Professor of Computer Sciences (1987); Professor of Philosophy (2000); Director, Purdue CERIAS; Interim Purdue Information Systems Security Officer
B.A., Mathematics and Computer Science, SUNY College at Brockport, 1979;
M.S.,Information & Computer Science, Georgia Institute of Technology, 1981;
Ph.D., Information & ComputerScience,Georgia Instituteof Technology, 1986



Dr. Spafford's current research interests are focused on issues of computer and network security, computer crime and ethics, and the social impact of computing. In May of 1998 Purdue University established the Center for Education and Research in Information Assurance and Security (CERIAS) with Spaf as its Director. This university-wide center is intended to address the broader issues of information security and information assurance, and draw on expertise and research across all of the academic disciplines at Purdue. Because of its structure, and the incorporation of the previously-existing COAST Laboratory group in its activities, the CERIAS is the largest and most broadly-structured academic research center in the world in its field.

Among many professional activities, Dr. Spafford is a member of the Computing Research Association's Board of Directors, the US Air Force's Scientific Advisory Board, and he is co-chair of ACM's U.S. Public Policy Committee. Spaf has been awarded status as a CISSP (Certified Information Systems Security Professional), *honoris causa*, by the Board of Directors of (ISC)^2. In October of 2000, Gene received one of the field's most prestigious awards: the NIST/NCSC National Computer Systems Security Award. He is a charter recipient of the Computer Society's *Golden Core*, and he has been named as a *Fellow of the ACM*, as a Fellow of the AAAS, and as a Fellow of the IEEE.

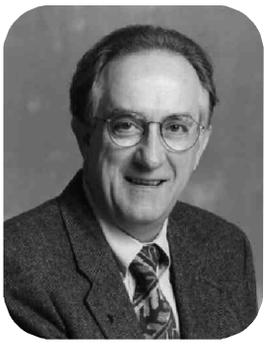
Dr. Spafford is the Academic Editor of the journal *Computers & Security*, and on the editorial and advisory boards of the *Journal of Artificial Life*, ACM's *Transactions on Information and System Security,* and *Network Security*. Among many other publications, Dr. Spafford is co-author of the award-winning book *Practical Unix & Internet Security* (with S. L. Garfinkel), published by O'Reilly and Associates (1991, 1996), and the book *Web Security & Commerce* (also with S. L. Garfinkel; 1997).

Selected Publications:

Thomas E. Daniels and **Eugene H. Spafford**, Identification of Host Audit Data to Detect Attacks on Low-level IP Vulnerabilities, *Journal of Computer Security*, vol 7 #1, pp. 3–35;1999.

Christoph Schuba and **Eugene H. Spafford**, Modeling Firewalls Using Hierarchical Colored Petri Nets, *NATO Symposium on Protecting Information Systems in the 21st Century*, October 1999.

Jai Sundar Balasubramaniyan, Jose Omar Garcia-Fernandez, David Isacoff, **Eugene H. Spafford**, and Diego Zamboni, An Architecture for Intrusion Detection using Autonomous Agents, *Proceedings of the 14th IEEE Computer Security Applications Conference*, Dec 1998.



John M. Steele

Associate Professor of Computer Sciences and Director of the University Computing Center (1963)
M.S., Purdue University, 1965.

John Steele's research interests are in the areas of computer data communications and computer circuits and systems.

Yinlong Sun

Assistant Professor of Computer Sciences (2000)
B.S., Physics, Beijing University, China, 1985;
Ph.D., Physics, Simon Fraser University, Canada, 1995;
Ph.D., Computer Science, Simon Fraser University, Canada, 2000.

Dr. Yinlong Sun joined the Department of Computer Sciences at Purdue University as an assistant professor in the fall of 2000. He received his B.S. from Beijing University of China, and both Ph.D. degrees in Condensed Matter Physics and Computer Science from Simon Fraser University of Canada. His research interests lie in computer graphics, scientific visualization, computer vision, and cross-disciplinary areas. Yinlong is a member of ACM, ACM SIGGRAPH, IEEE and IS&T.

Selected Publications:

Yinlong Sun, F. David Fracchia, and Mark S. Drew, A Physically-Based Dual Representation of Spectral Functions, *Journal of Optical Engineering*, Vol. 39, No. 11, Nov., 2000, pp. 2931–2942.

Yinlong Sun, F. David Fracchia, Mark S. Drew, and Thomas W. Calvert, Rendering Iridescent Colors of Optical Disks, *The 11th EUROGRAPHICS Workshop on Rendering (EGRW)*, Brno, Czech Republic, 2000, pp. 341–352.

Yinlong Sun, F. David Fracchia, Thomas W. Calvert, and Mark S. Drew, Deriving Spectra from Colors and Rendering Light Interference, *IEEE Computer Graphics and Application*, Vol. 19, No. 4, Jul. 1999, pp. 61–67.

Wojciech Szpankowski

Professor of Computer Sciences (1985)
M.S., Electrical Engineering and Computer Science, Technical University of Gdansk, 1976;
Ph.D., Electrical Engineering and Computer Science, Technical University of Gdansk, 1980

Before coming to Purdue, W. Szpankowski was Assistant Professor at the Technical University of Gdansk, and in 1984 he wasAssistant Professor at the McGill University, Montreal. During 1992/1993 he was Professeur Invité at INRIA, Rocquencourt, France. His research interestscover analysisofalgorithms,data compression,information theory, analytic combinatorics, random structures, networking, stability problems in distributed systems, modeling of computer systems and computer communication networks, queuing theory, and operations research. His recent work is devoted to the probabilistic analysis of algorithms on words, analytic information theory, and designing efficient multimedia data compression schemes based on approximate pattern matching.

He is a recipient of the Humboldt Fellowship. He has been guest editors for special issues in *IEEE Transactions on Automatic Control*, *Theoretical Computer Science*, *Random Structures & Algorithms*, and *Algorithmica*. Currently, heisediting a special issue on "Analysis of Algorithms" in *Algorithmica*. He serves on the editorial boards of *Theoretical Computer Science*, *Discrete Mathematics and Theoretical Computer Science*, and book series *Advances in the Theory of Computation and Computational Mathematics*.

Selected Publications:

M. Atallah, Y. Genin and **W. Szpankowski**, Pattern matching image compression: Algorithmic and empirical results, *IEEE Trans. Pattern Analysis and Machine Intelligence*, 21, pp. 618–627, 1999.

C. Knessl and **W. Szpankowski**, Asymptotic Behavior of the Height in a Digital Search Tree and the Longest Phrase of the Lempel-Ziv Scheme, *SIAM J. Computing*, 30, pp. 923–964, 2000.

W. Szpankowski Asymptotic Average Redundancy of Huffman (and other) Block Codes, *IEEE Trans. Information Theory*, 46, pp. 2434–2443, 2000.

Jan Vitek

Assistant Professor of Computer Sciences (1999)
B.S., SES, University of Geneva, 1989;
M.S.,Computer Science, University of Victoria, 1995;
Ph.D.,SES, University of Geneva, 1999

Professor Vitek is interested in efficient implementation of object-oriented programming languages, information security and mobile code. His long term research is to develop secure languages for mobile computations over the Internet. Currently Dr. Vitek is focusing on implementation techniques for customizable Java Virtual Machines. This research is being conducted in the Secure Software Systems Lab which was founded in January 2000 by Profs Vitek, Hosking and Palsberg.

Dr. Vitek was born in Czechoslovakia and left that country for Switzerland well before it became the Czech Republic. He earned his MSc in Computer Science from the University of Victoria in beautiful British Columbia and a PhD from the University of Geneva, Switzerland in 1999. Dr. Vitek's research interests revolve around object-oriented programming languages, compilers and software engineering. He has authored over 30 papers in these areas. He has edited books on mobile objects and secure Internet programming. He has served on program committees for international conferences including OOPSLA, ECOOP, POPL, ESOP, ICALP, ASA/MA, SACMAT. Dr. Vitek is a member of CERIAS.

Selected Publications:

P. Sewell and **J. Vitek**, Secure composition of untrusted code: Wrappers and causality types, *In Proceedings of the 13th IEEE Computer Security Foundations Workshop (CSFW-13)*, Cambridge, U.K., July 2000.

B. Bokowski and **J. Vitek**, Confined Types, *In Proceedings of the 14th Annual ACM SIGPLAN Conference on Object-Oriented Programming Systems, Languages, and Applications (OOPSLA'99)*, Denver, Colorado, November 1999.

C. Bryce, M. Oriol, and **J. Vitek**, A Coordination Model for Agents Based on Secure Spaces, *In Proceedings 3rd International Conference on Coordination Models and Languages (COORDINATION'99)*, LNCS 1594, Amsterdam, Netherlands, Springer-Verlag, Berlin, April 1999.

Samuel S. Wagstaff, Jr.

Professor of Computer Sciences (1983)
B.S., Massachusetts Institute of Technology, 1966;
Ph.D., Cornell University, 1970

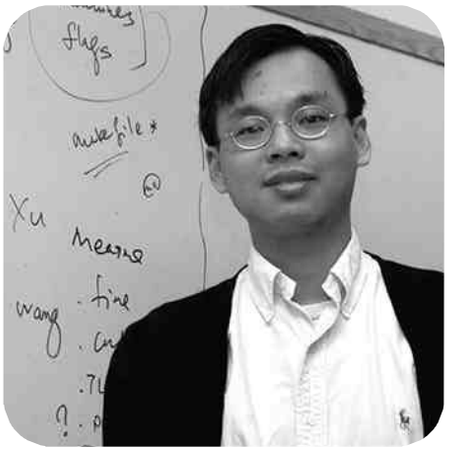
Before coming to Purdue, Professor Wagstaff taught at the Universities of Rochester, Illinois, and Georgia. He spent a year at the Institute for Advanced Study in Princeton. His research interests are in the areas of cryptography, parallel computation, and analysis of algorithms, especially number theoretic algorithms. He and J. W. SmithoftheUniversity of Georgia havebuilt a specialprocessor with parallel capability for factoring large integers. He is the author of *Factorizations of bn ± 1, b = 2, 3, 5, 6, 7, 10, 11, 12 up to high powers, Contemporary Mathematics*, 22, American Mathematical Society, Providence (1983) (second edition 1988), (with John Brillhart, D.H. Lehmer, J. L. Selfridge and Bryant Tuckerman).

Selected Publications:

Samuel S. Wagstaff, Aurifeuillian factorizations and the period of the Bell numbers modulo a prime, *Math. Comp*. 65 (1996), pp. 383–391.

Samuel S. Wagstaff and M. J. Atallah, Watermarking with quadratic residues, *Proceedings of the IS&T/SPIE Conference on Security and Watermarking of Multimedia Contents*, SPIE—The International Society for Optical Engineering, San Jose, California, January, 1999, vol. 3657, pp. 283–288.

Samuel S. Wagstaff, R.-M. Elkenbracht-Huizing, P. L. Montgomery, R. D. Silverman and R. K. Wackerbarth, The number field sieve on many computers, Proceedings of The Fifth Conference of the Canadian Number Theory Association, in Centre de Recherches Mathematiques, Montreal, *Proceedings and Lecture Notes Series*, R. Gupta and K. S. Williams, eds., American Mathematical Society, v. 19 (1999), pp. 81–85.



David K. Y. Yau

Assistant Professor of Computer Sciences (1997)
B.S.,Computer Sciences,Chinese Universityof Hong Kong, Hong Kong, 1989
M.S., Computer Sciences, University of Texas, 1992
Ph.D., Computer Sciences, University of Texas, 1997

David Yau was born in Hong Kong. After getting his Bachelor's degree in computer science from the Chinese University, he spent one year in the local computing industry, with the Systems and Technology group of Citibank, NA. He then entered graduate school at the University of Texas at Austin, where he completed his Ph.D. as a member of the Networking Research Lab.

David is interested in network and operating system architectures and algorithms for quality of service (QoS) provisioning. He is also interested in multimedia coding over IP. He and his students prototype OS and router services on experimental network platforms, and measure their performance impact on benchmark applications. He was the recipient of an IBM graduate fellowship at Texas. In 1999, he received an NSF CAREER award, for OS and network research on QoS.

David is a member of ACM and IEEE. He has been a reviewer for many IEEE and ACM journals and conferences. He has also served on the program committees of IEEE International Conference on network Protocols and IEEE Real-time Systems Symposium.

Selected Publications:

D. K. Y. Yau. ARC-H: Uniform CPU Scheduling for Heterogeneous Services. In *Proceedings of the IEEE International Conference on Multimedia Computing and Systems*, June 1999.

D. K. Y. Yau and Simon S. Lam. Migrating Sockets—End System Support for Networking with QoS Guarantees. *IEEE/ACM Transactions on Networking*, December 1998.

David K. Y. Yau and Simon S. Lam. Adaptive Rate-Controlled Scheduling for Multimedia Applications. *IEEE/ACM Transactions on Networking*, August 1997

Bond Lab:
clockwise:
Ladislau-Lehel Bölöni,
Dr. Marinescu,
Kyung Koo Jun,
Krzysztof Palacz,
Dr. Jeff Bradshaw.

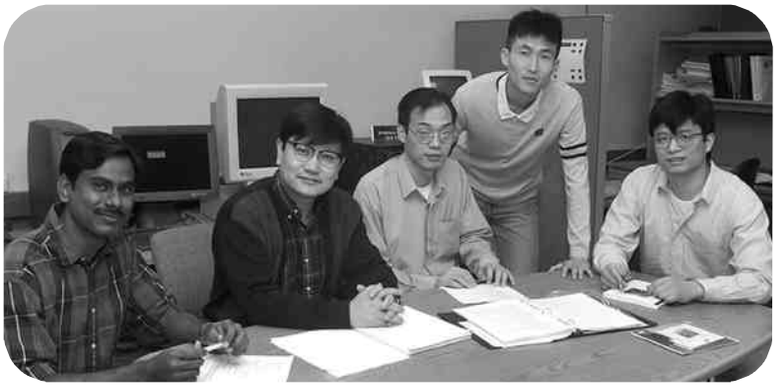
The Bond Laboratory is dedicated to interdisciplinary research in computer science and computational structural biology. Our research is focused on the application of parallel and distributed computing for solving these and other problems. Bond is a Java-based distributed object system and agent framework. It implements message-based middleware and associated services like directory, persistence, monitoring, and security. Bond allows easy construction of multi-agent, distributed applications. Another application of Bond will be a Virtual Laboratory supporting data annotation and metacomputing.

Key technical ideas of the Bond Agent framework include a multi-plane state machine agent model with multiple semantic engines, a component-based architecture (strategies and planes), an agent description language (Blueprint and XML), dynamic agent behavior (agent assembly, mobility, surgery, trimming, and lazy loading of strategies), and multi-lingual, inter-agent communication (KQML and XML).

The laboratory is equipped with several high performance graphics systems and several other workstations. For more information about the research projects conducted in the lab, contact Prof. Marinescu (dcm@cs.purdue.edu) or visit <http://bond.cs.purdue.edu>.

ELLPACK-PDELab is a very high-level language developed at Purdue for the numerical solution of elliptic partial differential equations. The laboratory supports the development of extensions of ELLPACK as well as research in scientific computing in general. The principal extension is PDELab which provides a problem solving environment for general partial differential equations and solutions on parallel computers. High performance graphics workstations are used in developing and implementing innovative approaches to interactive scientific computing. All of the laboratory equipment is networked to the SoftLab facilities as well as to the general departmental facilities. For more information about ELLPACK, visit <http://www.cs.purdue.edu/ellpack>.

The Internetworking Systems Lab houses equipment used for continuing research in the Internetworking, Xinu, and Crosspoint projects. This equipment includes several Sun workstations (including multiprocessor machines), Intelworkstations, and several Hewlett-Packard servers and workstations. In addition, the lab contains both processor and communication equipment for the Crosspoint project. This includes a set of Intel workstations that serve as routers to the wireless net, a FORE ATM switch used as a backbone net for the Intel workstations, and several PCs with wireless Ethernet.



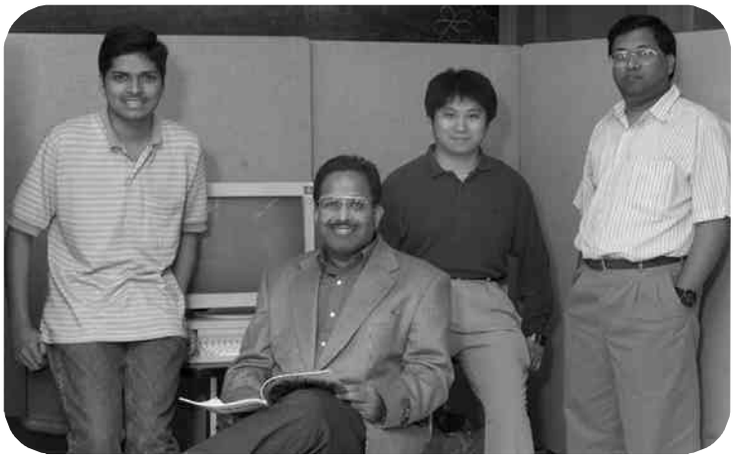
Network Systems Lab: Left to right: John Jaisim Cruz, Dr. Kihong Park, Shaogong Chen, Heejo Lee and Huan Ren.

The Network Systems Lab (NSL) houses people and research equipment related to the study of networks and distributed systems. Specific research areas include self-similar traffic control, real-time/multimedia traffic control, scalable Internet quality of service provision architectures, distributed operating systems, fault-tolerance in distributed systems, and ATM network security. The research projects are supported by grants from NSF, the Purdue Research Foundation, Santa Fe Institute, and Sprint. Additional equipment and software support is provided by Cisco, FORE Systems, and Intel.

Equipment housed in the NSL include30+ single- and dual-processor UltraSPARC, Intel, and SGI workstations running Solaris, Linux, and Windows NT, several private subnets with ATM, IP, and FastEthernet switches, studio quality video/audio capture devices, real-time MPEG 1 & 2 compression engines, four Cisco 7206VXR routers, and a laser printer. For more information about the Network Systems Lab, visit <http://www.cs.purdue.edu/nsl>.

The Indiana Center for Database Systems (ICDS) takes an interdisciplinary approach to solving practical problems in a wide variety of database applications. Research activities of the Center include multimedia databases, data and system integration, data quality, data mining, and data warehousing. Outreach and educational activities include a summer institute for minority students and associations with the Indiana University Medical Center. Technology transfer to state agencies and industries is a major component of ICDS activities. Support from the Indiana 21st Century Research and Technology Fund has created the Indiana Telemedicine Incubator to develop database technologies for the health care industry. The National Science Foundation (NSF) Digital Goverment program is sponsoring a study of ontologies in state and federal family and social services databases. For more information about ICDS, visit <http://www.cs.purdue.edu/icds>.

RESEARCH LABORATORIES



Raid Lab: Left to right: Ahsan Habib, Dr. Bharat Bhargava, Sheng-Yih Wang, and Sanjay Madria.

The RAID Laboratory at Purdue has a software environment for conducting scientific research in a variety of subjects: communication experiments for distributed applications, network communication measurement experiments, experimental analysis of communication infrastructure, adaptability experiments for distributed systems, replication and recovery experiments for distributed database systems, concurrent check-pointing and rollback-recovery algorithms, concurrency control for distributed database systems, efficient implementation techniques for distributed systems, digital library, and mobile communication. The laboratory has a network of Sun workstations running the RAID distributed system and Unix operating system. In addition, several systems such as RAID, mini-RAID, and a variety of communication libraries are available. For more information about the RAID project, visit <http://www.cs.purdue.edu/people/bb>.

The Parallel Computation and Simulation Laboratory (PacsLab) supports research that is experimental and multidisciplinary. The emphasis is on methodologies and tools for seamless, secure, scalable, and fault-tolerant concurrent computing on heterogeneous networked platforms. Central to this effort is the notion of domain-oriented software support. Current projects include research on threads systems, network protocols, active messaging communications environments, integrated network services, parallel simulation systems, and a threads-based message passing interface (MPI). The lab maintains a 100 Mbit subnet of 10 Intel workstations, five Sun SPARC 5 systems, a quad-processor SPARC 20, a Silicon Graphics Indigo, and access to a 140-node Intel Paragon via an ATM network. The machines communicate over a 100 Mbps switched Ethernet. The lab was equipped with funding from the Department of Computer Sciences, Intel, NSF, ARO, and ONR. For more information on PacsLab, please see <http://www.cs.purdue.edu/research/PaCS/PaCS.html>.

Bond Lab http://bond.cs.purdue.edu

ELLPACK-PDELab http://www.cs.purdue.edu/ellpack

IndianaCenterfor Database Systems http://www.cs.purdue.edu/icds

Network Systems Lab http://www.cs.purdue.edu/nsl

PacsLab http://www.cs.purdue.edu/research/PaCS/PaCS.html

RAID Laboratory http://www.cs.purdue.edu/people/bb

Secure Software Systems Lab http://www.cs.purdue.edu/s3

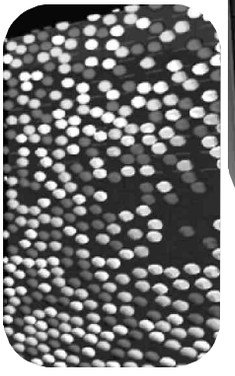
Software Engineering Research Center http://www.serc.net

SoftLab http://www.cs.purdue.edu/research/cse/softlab/softlab.html

The Secure Software Systems Lab designs and implements systems for secure execution of untrusted code, tools for high-assurance computing, and infrastructure for programming language research. We have developed open-source software in the areas of mobile computation, embedded systems, and persistent programming. Our approach is to apply programming language techniques such as type systems, static analysis, and compiler optimizations to a variety of problems including Java security, bytecode compression, software watermarking, real-time system verification, and high-performance persistent storage. Our research is currently supported by NSF, CERIAS, Sun Microsystems, Motorola, Lockheed-Martin, IBM, and Intel. For more information about The Secure Software Systems Lab, visit <http://www.cs.purdue.edu/s3>.

The Software Engineering Research Center Laboratory was established in 1986 with funding from the Software Engineering Research Center and Purdue University. Additional equipment and material have been added through subsequent NSF grants, contributions from the Department of Computer Sciences, and enhancement grants from SERC affiliates. The lab provides a multi-system base of resources to support the research activities of the faculty and students working in the SERC. Resources in the lab and SERC offices include a Sun server, several Sun SPARC workstations, Intel-based PCs, and laser printers. For more information about the Software Engineering Research Center, visit <http://www.serc.net>.

SoftLab. The NSF-sponsored SoftLab laboratory maintains state-of-the-art parallel processing and graphics facilities. In addition to over 30 Sun and Intel-based workstations, the lab includes access to three high-performance 32-processor Intel-based compute servers using dual, quad, and 8-way architectures. The lab uses a wireless infrastructure for experiments in mobile computing. For more information about the SoftLab project, visit <http://www.cs.purdue.edu/research/cse/softlab/softlab.html>.



Researchers in the department are using the 32-processor SGI Origin 2000 computer to produce high-speed simulations of physical phenomena. In the example, fluid is forced up from a grate through a stack of particles. The computer model calculates the complex fluid flow and collision results, then generates a movie to provide a visual display of particle movement. The SGI Origin 2000 was funded by a grant from the National Science Foundation.

This list includes research grants active between September 1999 and December 2000. Research grants are sorted by the name of the (local) principal investigator and co-investigator(s).

Alberto Apostolico

Alberto Apostolico. Algorithmic & Combinatorial Issues in Pattern Matching. National Science Foundation. 9/1/1997–8/31/2000, $104,736.

Alberto Apostolico. Advanced Algorithms & Programs for Biomolecular Sequence Analysis. Purdue Research Foundation. 8/19/1999–8/15/2001, $26,411.

Walid Aref

Ahmed K. Elmagarmid, Bill McIver, Elias N. Houstis, Walid Aref, Sonia Fahmy, Sunil K. Prabhakar, Aref Ghafoor, Gordon Coppoc, and Marie Thursby. Indiana Telemedicine Incubator: A Multidisciplinary Consortium for the Development of Distributed Multimedia Database Technology for the Health Care Industry (21st Century Award). State of Indiana. 2/1/2000–1/31/2004, $1,698,880.

Mikhail J. Atallah

Mikhail J. Atallah. Protocols for Secure Remote Database Access. CERIAS. 6/1/2000–6/30/2001, $25,623.

Mikhail J. Atallah and Samuel S. Wagstaff. Randomness in Computer Security. CERIAS. 6/1/2000–6/30/2001, $21,113.

Mikhail J. Atallah and V. Raskin. Natural Language Watermarking: Enhancing Resilience and Implementation. CERIAS. 6/1/2000–6/30/2001, $24,507.

Mikhail J. Atallah. A New Approach to Tamperproofing Software. CERIAS. 6/1/1999–6/30/2001, $36,012.

Eugene Spafford and Mikhail J. Atallah. Audit Trails: Content, Storage, and Processing. National Science Foundation. 9/1/1999–8/31/2002, $365,844.

Mikhail J. Atallah and Sunil K. Prabhakar. Privacy-Enhancing Audit and Intrusion Detection. CERIAS. 6/1/2000–12/31/2000, $36,702.

Bharat Bhargava

Bharat Bhargava. Communication Experiments for Widely Distributed Environments. National Science Foundation. 7/15/1995–8/31/2000, $334,641.

Bharat Bhargava. CISE Post Doc: Experiments in Adaptable Communication Services. National Science Foundation. 6/1/1998–5/31/2001, $66,000.

Bharat Bhargava. Adaptable Communication Software for Differential QoS. IBM. 7/1/1999–8/15/2001, $35,000.

Bharat Bhargava. Experiments in Adaptable Distributed Systems. National Science Foundation. 8/15/1999–7/31/2002, $251,500.

Bharat Bhargava. Multimedia Traffic Control Using Active Networks. Purdue Research Foundation. 8/16/1999–10/1/2001, $26,411.

Bharat Bhargava. CERIAS Project. CERIAS. 6/30/2000–6/30/2001, $50,000.

Douglas E. Comer

Douglas E. Comer. Software Practice & Experience. John Wiley & Sons. 11/1/1987–12/31/2000, $414,174.

Douglas E. Comer. Crosspoint: A Campus-Scale Wireless Network. Intel Corporation. 11/6/1998, $74,500.

Ahmed K. Elmagarmid

Ahmed K. Elmagarmid. Video Database Systems. Purdue Research Foundation. 6/1/1998–4/15/2001, $24,787.

Aditya P. Mathur and Ahmed K. Elmagarmid. Data Quality 97. Software Engineering Research Center. 7/1998–6/2000, $25,000.

Lefteri Tsoukalas, Ahmed K. Elmagarmid, and Elias N. Houstis. Intelligent Management of the Electric Power Grid through an Innovative Anticipatory Multi-Agent, High Performance. Army Research Office. 1/1/1999–12/31/2000, $1,592,559.

Ahmed K.Elmagarmid. CERIAS Project. CERIAS. 6/1/1999–6/30/2001, $40,000

Ahmed K. Elmagarmid. Ensuring Data Quality for Knowledge Mining and Management. IBM. 7/1/1999–6/30/2001, $35,000.

Ahmed K. Elmagarmid, Aref Ghafoor, John T. Korb, Kihong Park and Eugene Spafford. MSI: A Research Infrastructure for Integrated Quality of Service Management in Multimedia Computing Environments. National Science Foundation. 9/15/1999–7/31/2004, $1,386,611.

Ahmed K. Elmagarmid. Intelligent Content Based Access to Networked Video Databases. National Science Foundation. 10/1/1999–10/31/2001, $240,000.

Ahmed K. Elmagarmid. Support for MSI Project. Telcordia Technology. 10/22/1999, $25,068.

Ahmed K. Elmagarmid. Coil: A Common Object Interconnection Language to Support Database Integration & Evolution. National Science Foundation. 11/1/1999–9/30/2000, $101,964.

Ahmed K. Elmagarmid, Bill McIver, Elias N. Houstis, Walid Aref, Sonia Fahmy, Sunil K. Prabhakar, Aref Ghafoor, Gordon Coppoc, and Marie Thursby. Indiana Telemedicine Incubator: A Multidisciplinary Consortium for the Development of Distributed Multimedia Database Technology for the Health Care Industry (21st Century Award). State of Indiana. 2/1/2000–1/31/2004, $1,698,880.

Ahmed K. Elmagarmid. Digital Government: Database Middleware for Distributed Ontologies in State and Federal Family and Social Services. National Science Foundation. 6/1/2000–5/31/2003, $499,998.

Ahmed K. Elmagarmid and Elias N. Houstis. Confidentiality Issues in Data Mining & Quality of Data. CERIAS. 6/1/2000–6/30/2001, $50,000.

Sonia Fahmy

Ahmed K. Elmagarmid, Bill McIver, Elias N. Houstis, Walid Aref, Sonia Fahmy, Sunil K. Prabhakar, Aref Ghafoor, Gordon Coppoc, and Marie Thursby. Indiana Telemedicine Incubator: A Multidisciplinary Consortium for the Development of Distributed Multimedia Database Technology for the Health Care Industry (21st Century Award). State of Indiana. 2/1/2000–1/31/2004, $1,698,880.

Sonia Fahmy. CERIAS Project. CERIAS. 6/30/2000–6/30/2001, $50,000.

Sonia Fahmy. Multi-Sponsored Schlumberger Foundation. Schlumberger Foundation. 8/17/2000, $30,000.

Greg N. Frederickson

Greg N. Frederickson. Graph Algorithms & Data Structures. National Science Foundation. 7/1/1998–6/30/2001, $158,232.

Ananth Y. Grama

Ahmed Sameh and Ananth Y. Grama. CISE Post Doc: Computational Methods in VLSI Design. National Science Foundation. 7/1/1998–6/30/2001, $66,000.

Ananth Y. Grama, Kihong Park, and David Yau. ISAC: Integrated Systems Support for Adaptive Communication & Computation Control in Clustered Environments. National Science Foundation. 8/1/1998–7/31/2001, $564,107.

Ahmed Sameh, Ananth Y. Grama, Christoph M. Hoffmann, Vivek Sarin, Elisha P. Sacks, Elias N. Houstis, Jorg Peters, John R. Rice, John T. Korb, and Zhiyuan Li. MRI: Acquisition of a Computational Environment for Scientific Computing. National Science Foundation. 9/1/1998–8/31/2001, $700,000.

Ananth Y. Grama. Analytical & Computational Framework for N-body Simulations. National Science Foundation. 12/1/1998–11/30/2001, $189,399.

Ananth Y. Grama. Fast Algorithms and Applications in Computational Electromagnetics. Purdue Research Foundation. 1/4/1999–1/3/2001, $25,109.

Ananth Y. Grama. Fast Methods for Particle Dynamics & Their Applications (Career Award). National Science Foundation. 2/15/1999–1/31/2003, $234,947.

Ahmed Sameh, Ananth Y. Grama, and Vivek Sarin. Innovative Algorithms and Techniques for Large Scale Simulations. National Science Foundation. 9/1/1999–8/31/2002, $308,521.

Ananth Y. Grama. CERIAS Project. CERIAS. 6/1/2000–6/30/2001, $50,000.

Ananth Y. Grama. Academic Allowance for Paul Ruth. The Krell Institute. 8/1/2000–7/31/2001, $1,000.

Susanne E. Hambrusch, Jens Palsberg, and Ananth Y. Grama. Fellowship Initiative in the Development of the Next-Generation Computing Infrastructure. US Department of Education. 8/14/2000–5/18/2003, $486,750.

Susanne E. Hambrusch

Susanne E. Hambrusch. Communication Experiments for Widely Distributed Environments. National Science Foundation. 7/15/1997–8/31/2000, $314,641.

Susanne E. Hambrusch, Jens Palsberg, and Ananth Y. Grama. Fellowship Initiative in the Development of the Next-Generation Computing Infrastructure. US Department of Education. 8/14/2000–5/18/2003, $486,750.

Christoph M. Hoffmann

Christoph M. Hoffmann. Spatial Geometric Constraint Solving Using Constructive Geometry & Homotopy Cont. National Science Foundation. 7/1/1995–6/30/1999, $265,312.

Christoph M. Hoffmann. Design System Architectures for Manufacture. Office of Naval Research. 3/1/1996–12/31/1999, $330,000.

Ahmed Sameh, Ananth Y. Grama, Christoph M. Hoffmann, Vivek Sarin, Elisha P. Sacks, Elias N. Houstis, Jorg Peters, John R. Rice, John T. Korb, and Zhiyuan Li. MRI: Acquisition of a Computational Environment for Scientific Computing. National Science Foundation. 9/1/1998–8/31/2001, $700,000.

Christoph M. Hoffmann. Analysis of Segmented Spatial Distributions. Army Research Office. 4/15/1999–4/14/2001, $162,571.

Christoph M. Hoffmann. Capturing Multilayered Design Intent Using Efficient Constraint Decomposition. National Science Foundation. 1/14/2000–8/31/2002, $182,577.

Tony Hosking

Antony Hosking. Compiling with Persistence. National Science Foundation. 8/1/1997–7/31/2000, $185,000.

Jan Vitek and Antony Hosking. CERIAS Project. CERIAS. 6/1/1999–6/30/2001, $41,558

RESEARCH FUNDING

Elias N. Houstis

John R. Rice and Elias N. Houstis. Kozo Keikaku Engineering Contract. Kozo Keikaku Engineering. 6/1/1996–7/31/2000, $80,000.

Elias N. Houstis and John R. Rice. An Environment for End-to-End Performance Design of Large Scale Parallel Adaptive Computer Communications Systems (University of Texas @ Austin). Defense Advanced Research Projects Agency. 6/8/1997–01/2001, $202,272.

Elias N. Houstis. Computational Methods & Systems for the Option Valuation Problem. Purdue Research Foundation. 6/16/1997–6/13/2000, $27,047.

John R. Rice and Elias N. Houstis. Institute for Gas Turbine Dynamics Simulation (Sandia National Labs). Department of Energy. 7/1/1998–9/30/2001, $1,500,000.

Ahmed Sameh, Ananth Y. Grama, Christoph M. Hoffmann, Vivek Sarin, Elisha P. Sacks, Elias N. Houstis, Jorg Peters, John R. Rice, John T. Korb, and Zhiyuan Li. MRI: Acquisition of a Computational Environment for Scientific Computing. National Science Foundation. 9/1/1998–8/31/2001, $700,000.

Lefteri Tsoukalas, Ahmed K. Elmagarmid, and Elias N. Houstis. Intelligent Management of the Electric Power Grid through an Innovative Anticipatory Multi-Agent, High Performance. Army Research Office. 1/1/1999–12/31/2000, $1,592,559.

Ahmed K. Elmagarmid, Bill McIver, Elias N. Houstis, Walid Aref, Sonia Fahmy, Sunil K. Prabhakar, Aref Ghafoor, Gordon Coppoc, and Marie Thursby. Indiana Telemedicine Incubator: A Multidisciplinary Consortium for the Development of Distributed Multimedia Database Technology for the Health Care Industry (21st Century Award). State of Indiana. 2/1/2000–1/31/2004, $1,698,880.

Ahmed K. Elmagarmid and Elias N. Houstis. Confidentiality Issues in Data Mining & Quality of Data. CERIAS. 6/1/2000–6/30/2001, $50,000.

Zhiyuan Li

Zhiyuan Li. A Compiler Assisted Approach to High Performance Memory Architectures (Career Award). National Science Foundation. 8/15/1997–5/31/1999, $49,400.

Zhiyuan Li. Experiments with Concurrent Multithreaded Archictectures for High-Performance Computing. National Science Foundation. 8/18/1997–1/31/2001, $152,123.

Ahmed Sameh, Ananth Y. Grama, Christoph M. Hoffmann, Vivek Sarin, Elisha P. Sacks, Elias N. Houstis, Jorg Peters, John R. Rice, John T. Korb, and Zhiyuan Li. MRI: Acquisition of a Computational Environment for Scientific Computing. National Science Foundation. 9/1/1998–8/31/2001, $700,000.

Zhiyuan Li. Compiler Techniques for Improving Data Locality in Complex Program Constructs. National Science Foundation. 9/1/1999–8/31/2002, $170,000.

Zhiyuan Li. Compiler Research. Sun Microsystems. 5/2000, $50,000.

Zhiyuan Li and David Yau. Memory Management Software on Palm-Size Computers (21st Century Fund). State of Indiana. 8/4/2000–8/4/2002, $393,230.

Bradley J. Lucier

Bradley J. Lucier. Multiscale Methods in Image Processing. Office of Naval Research. 11/1/1999–9/30/2002, $180,000

Robert E. Lynch

Dan C. Marinescu and Robert E. Lynch. Parallel & Distributed Computing for Solving Large Structural Biology Problems. National Science Foundation. 9/15/1995–8/31/2001, $2,385,000.

The Indiana Center for Database Systems (ICDS) received a donation from NCR and Wal-Mart of a Teradata database engine. The Teradata system has 80 processors, 20 gigabytes of memory, and 400 disk drives with an aggregate disk space of 1.6 terabytes.

Dan C. Marinescu

Dan C. Marinescu. Study of Paging & Activity of Parallel Programs (California Institute of Technology). National Science Foundation. 6/1/1995–8/31/1999, $149,977.

Dan C. Marinescu and Robert E. Lynch. Parallel & Distributed Computing for Solving Large Structural Biology Problems. National Science Foundation. 9/15/1995–8/31/2001, $2,385,000.

Dan C. Marinescu. Middleware for a Virtual Laboratory. Purdue Research Foundation. 3/24/1999–5/13/2001, $12,626.

Aditya P. Mathur

Aditya P. Mathur. SERC: Industry/ University Cooperative Reseach Center for Software Engineering. National Science Foundation. 9/15/1994–2/28/2001, $125,000.

Aditya P. Mathur. Cooperative Research Center for Software Engineering. National Science Foundation. 9/1995–8/2000, $5,000.

Aditya P. Mathur. Development & Evaluation of a Methodology to Assess the Impact of Failures of COTS Components on System Software. Purdue Research Foundation. 8/18/1997–10/30/1999, $25,360.

Aditya P. Mathur. SERC: Industry/University Cooperative Research Center for Software Engineering: Architecture Based Estimation of Software Reliability. National Science Foundation. 9/1/1997–8/31/1999, $50,000.

Aditya P. Mathur. Research Support. Motorola. 12/1/1998, $10,000.

Aditya P. Mathur. SERC: Industry/University Cooperative Research Center for Software Engineering. National Science Foundation. 9/1/1999–8/31/2004, $235,052.

Aditya P. Mathur. Industry/University Cooperative Research Center for Software Engineering. National Science Foundation. 9/1/1999–8/31/2000, $100,052.

Aditya P. Mathur. Research in Testing and Management of Distributed Systems. British Telecom. 5/1/2000–4/30/2001, $8,940.

Jens Palsberg

Michael Young and Jens Palsberg. Rome Labs: Perpetual Testing. Defense Advanced Research Projects Agency. 12/20/1996–9/19/2000, $530,000.

Jens Palsberg. Type Inference for Object-Oriented Software (Career Award). National Science Foundation. 4/1/1998–3/31/2002, $205,000.

RESEARCH FUNDING

Secure Software Systems Lab: Seated clockwise: Dr. Jens Palsberg, Jiawan Chen, Dr. Jan Vitek, Dennis Brylow, David Whitlock, Thomas VanDrunen, Yi Zhang. Back row: Dr. Antony Hosking, Niels Damgaard, Adam Welc, Di Ma, Bogdan Carbunar, Wanjun Wang.

Jens Palsberg. Software Security in Distributed Systems. IBM. 7/31/1999–6/30/2000, $35,000.

Jens Palsberg. Secure Assembly of Software Systems Components. CERIAS. 6/1/2000–6/30/2001, $45,301.

Susanne E. Hambrusch, Jens Palsberg, and Ananth Y. Grama. Fellowship Initiative in the Development of the Next-Generation Computing Infrastructure. US Department of Education. 8/14/2000–5/18/2003, $486,750.

Kihong Park

Kihong Park. The Internet as a Complex System, Santa Fe Institute, Fellow-at-Large, 8/00–7/01, $5,000.

Kihong Park, QoS-Aware, Secure and Reliable Distributed Scheduling, Xerox, 11/00–10/01, $15,000.

Kihong Park and Eugene Spafford. An Authentication-Based Secure Distributed Object System. Sprint. 1/1/1996–12/31/1999, $215,000.

Aditya P. Mathur and Kihong Park. Reliability & Fault Tolerance. Software Engineering Research Center. 7/1/1997–6/30/2000, $25,000.

Kihong Park. Self-Similar Network Traffic and Its Control. National Science Foundation. 3/1/1998–2/28/2002, $215,000.

Ananth Y. Grama, Kihong Park, and David Yau. ISAC: Integrated Systems Support for Adaptive Communication & Computation Control in Clustered Environments. National Science Foundation. 8/1/1998–7/31/2001, $564,107.

Kihong Park. Dune (Distributed Unix Environment): An "Off-the-Shelf" Approach to Distributed Operating System Design. Purdue Research Foundation. 8/17/1998–8/16/2000, $25,037.

Kihong Park. Toward a QoS Provision Architecture in Noncooperative Networks: Theory and Implementation (Career Award). National Science Foundation. 5/1/1999–4/30/2003, $348,401.

Ahmed K. Elmagarmid, Aref Ghafoor, John T. Korb, Kihong Park and Eugene Spafford. MSI: A Research Infrastructure for Integrated Quality of Service Management in Multimedia Computing Environments. National Science Foundation. 9/15/1999–7/31/2004, $1,386,611.

Sunil K. Prabhakar

Sunil K. Prabhakar. Efficient Management of Very Large Data. IBM. 7/1/1999–6/30/2001, $35,000.

Ahmed K. Elmagarmid, Bill McIver, Elias N. Houstis, Walid Aref, Sonia Fahmy, Sunil K. Prabhakar, Aref Ghafoor, Gordon Coppoc, and Marie Thursby. Indiana Telemedicine Incubator: A Multidisciplinary Consortium for the Development of Distributed Multimedia Database Technology for the Health Care Industry (21st Century Award). State of Indiana. 2/1/2000–1/31/2004, $1,698,880.

Mikhail J. Atallah and Sunil K. Prabhakar. Privacy-Enhancing Audit and Intrusion Detection. CERIAS. 6/1/2000–12/31/2000, $36,702.

Vernon Rego

Vernon Rego. Superconcurrent Computations on Heterogeneous Networks. Army Research Office. 6/1/1995–5/31/1999, $100,000.

Vernon Rego. A Software Architecture for Scalable Simulations on Heterogeneous Networks. Army Research Office. 5/1/1996–1/30/2001, $352,416.

Vernon Rego. Scalable Protocal Support for Multithreaded Distributed Computing and Simulation. Army Research Office. 3/1/1997–6/30/1999, $119,388.

Vernon Rego. Connectionless Multithreaded Protocols for Multiway Collaborative Computing. Purdue Research Foundation. 10/6/1997–10/5/1999, $24,630.

Vernon Rego. Multithreaded User-Space Mutliprotocols: Experiments with Collaborative Multimedia. Army Research Office. 3/2/1998–3/1/2001, $99,987.

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Vernon Rego. User-Space Protocols for Distributed Applications. Purdue Research Foundation. 10/6/1999–6/18/2001, $12,646.

John R. Rice

John R. Rice and Elias N. Houstis. Kozo Keikaku Engineering Contract. Kozo Keikaku Engineering. 6/1/1996–7/31/2000, $80,000.

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John R. Rice. Tools for Algorithm Selection in Computational Science. Purdue Research Foundation. 1/5/1998–1/4/2000, $23,739.

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Ahmed Sameh, Ananth Y. Grama, Christoph M. Hoffmann, Vivek Sarin, Elisha P. Sacks, Elias N. Houstis, Jorg Peters, John R. Rice, John T. Korb, and Zhiyuan Li. MRI: Acquisition of a Computational Environment for Scientific Computing. National Science Foundation. 9/1/1998–8/31/2001, $700,000.

RESEARCH FUNDING

Elisha P. Sacks

Elisha P. Sacks. REU: Integrated Computer Aided Mechanical Design with Configuration Spaces. National Science Foundation.4/97–3/01, $5,000.

Elisha P. Sacks. Integrated Computer Aided Mechanical Design with Configuration Spaces. National Science Foundation. 4/1/1997–3/31/2001, $215,516.

Ahmed Sameh, Ananth Y. Grama, Christoph M. Hoffmann, Vivek Sarin, Elisha P. Sacks, Elias N. Houstis, Jorg Peters, John R. Rice, John T. Korb, and Zhiyuan Li. MRI: Acquisition of a Computational Environment for Scientific Computing. National Science Foundation. 9/1/1998–8/31/2001, $700,000.

Ahmed Sameh

Ahmed Sameh. High Performance Computing for Large Dynamical Systems. National Science Foundation. 2/15/1997–1/31/2000, $75,440.

Ahmed Sameh. Direct Simulation of the Motion of Particles in Flowing Liquid. National Science Foundation. 4/1/1997–3/31/2001, $207,959.

Ahmed Sameh and Ananth Y. Grama. CISE Post Doc: Computational Methods in VLSI Design. National Science Foundation. 7/1/1998–6/30/2001, $66,000.

Ahmed Sameh, Ananth Y. Grama, Christoph M. Hoffmann, Vivek Sarin, Elisha P. Sacks, Elias N. Houstis, Jorg Peters, John R. Rice, John T. Korb, and Zhiyuan Li. MRI: Acquisition of a Computational Environment for Scientific Computing. National Science Foundation. 9/1/1998–8/31/2001, $700,000.

Ahmed Sameh. Performance Evaluation & Optimization of Scientific Kernels. Silicon Graphics. 10/1/1998–9/30/1999, $25,000.

Ahmed Sameh. Innovative Algorithms & Techniques for Large Scale Simulations. National Science Foundation. 9/99–8/02, $308,521.

Ahmed Sameh. Efficient Algorithms for Large-Scale Dynamical Systems. National Science Foundation. 2/1/2000–1/31/2003, $156,443.

Ahmed Sameh. Graduate Opportunities Doctoral Program for Sherian Clay. Purdue University. 8/1/2000–7/31/2001, $16,334.

Clay Shields

Clay Shields. CERIAS Project. CERIAS. 6/1/1999–6/30/2001, $112,289.

Eugene Spafford

Kihong Park and Eugene Spafford. An Authentication-Based Secure Distributed Object System. Sprint. 1/1/1996–12/31/1999, $215,000.

Eugene Spafford. Proposal on Autonomous Security Agents and Vulnerabilities Database. National Security Agency. 1/7/1997–9/30/2000, $782,195.

Eugene Spafford. MacCaulay Brown Packet Tracker. National Security Agency. 6/4/1999–9/30/2000, $160,299.

Eugene Spafford and Mikhail J. Atallah. Audit Trails: Content, Storage, and Processing. National Science Foundation. 9/1/1999–8/31/2002, $365,844.

Ahmed K. Elmagarmid, Aref Ghafoor, John T. Korb, Kihong Park and Eugene Spafford. MSI: A Research Infrastructure for Integrated Quality of Service Management in Multimedia Computing Environments. National Science Foundation. 9/15/1999–7/31/2004, $1,386,611.

Wojciech Szpankowski

Wojciech Szpankowski. Data Compression from a String Matching Perspective: Second Order. National Science Foundation. 9/15/1995–8/31/2000, $286,535.

Wojciech Szpankowski. Towards Analytic Information Theory. National Science Foundation. 7/1/1998–6/30/2002, $292,194.

Wojciech Szpankowski. CERIAS Project. CERIAS. 6/30/2000–6/30/2001, $50,000.

Wojciech Szpankowski and I. Kontoyiannis. Towards Analytic Information Theory. Purdue Global Initiative Faculty Grant. 3/01/99, $10,000.

Wojciech Szpankowski and Shu Lin. 1999 IEEE Information Theory and Communication Workshop and 1999 Information Theory and Networking Workshop. National Science Foundation. 3/99, $25,500.

Jan Vitek

Jan Vitek and Antony Hosking. CERIAS Project. CERIAS. 6/1/99–6/30/01, $41,558

Jan Vitek. Lockheed Martin. 6/1/00–6/30/01, $50,000.

Samuel Wagstaff

Mikhail J. Atallah and Samuel S. Wagstaff. Randomness in Computer Security. CERIAS. 6/1/2000–6/30/2001, $21,113.

Samuel S. Wagstaff. Good Polynomials for the Number Field Sieve. CERIAS. 6/1/2000–6/30/2001, $20,424.

Samuel S. Wagstaff. Encryption Algorithm. Western Digital Corporation. 8/23/2000–8/22/2001, $32,546.

David Yau

Ananth Y. Grama, Kihong Park, and David Yau. ISAC: Integrated Systems Support for Adaptive Communication & Computation Control in Clustered Environments. National Science Foundation. 8/1/1998–7/31/2001, $564,107.

David Yau. QoS Architecture for General Purpose Network (Career Award). National Science Foundation. 3/15/1999–2/28/2003, $205,698.

David Yau. CERIAS Project. CERIAS. 6/00–6/01, $50,000.

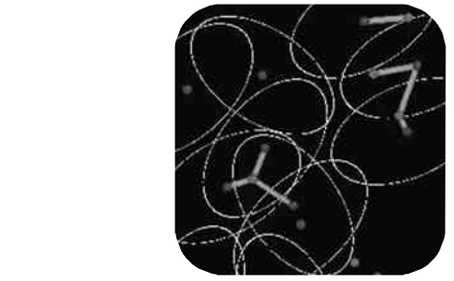
Zhiyuan Li and David Yau. Memory Management Software on Palm-Size Computers (21st Century Fund). State of Indiana. 8/4/2000–8/4/2002, $393,230.

Research Funding

43.0%	National Science Foundation
21.8%	Private Industries/Foundations
8.4%	Advanced Research Projects Agency (DARPA/ARPA)
8.3%	National Security Agency / Department of Defense
6.7%	Army Research Office
5.8%	Office of Naval Research
3.5%	Purdue Research Foundation
1.9%	NASA National Aeronautics and Space Administration
.6%	Other

CORPORATE PARTNERS PROGRAM

Computer Sciences



TheCorporate Partners Program (CPP) is a program encouraging corporate involvement in the Department of Computer Sciences. Companies, which participate at membership tiers by making unrestricted donations, are involved in the everyday activity of the department. They have opportunities to speak in classes, sponsor student projects, and otherwise make contact with CS students and faculty. Members of the CPP include giants of the IT industry as well as smaller, specialized companies. Partner members represent companies in Indiana as well as across the United States. The diverse membership offers information and guidance about the vast career opportunities available to computer science students.

A subset of the Corporate Partners Program is the Corporate Partners Council. Members are executives or senior managers with select CPP companies participating at the "partner" level. They meet twice each year to provide input and feedback to departmental and school leadership. Recent contributions of the council include assistance in revising the undergraduate and graduate curriculums, insight in drafting the departmental strategic plan, ideas regarding retention and enrollment issues, collaborative efforts with faculty and student research, as well as alerting the department to industry areas of concern.

Aprimo Steve Ehrlich

The Boeing Company Bob Byrne

Centillion Data Systems Bill Miller

Centrics Don Shaffer

Eli Lilly Mike Rudicle

Guidant Jim Mapel

Hewlett Packard Janice Zdankus

IBM Sanjiva Weerawarana

Intel Kevin Kahn

Lockheed Martin Rich Kahler

Lucent Technologies Helen Bauer

Made2Manage Gary Rush

Microsoft John Spencer

Motorola Jack Leifel

Raytheon Systems Jerry Slater

RealMed Larry Giggerich

Schlumberger Meyer Bengio

Tektronix Steve Sutton

Tivoli Systems Bryan Everly

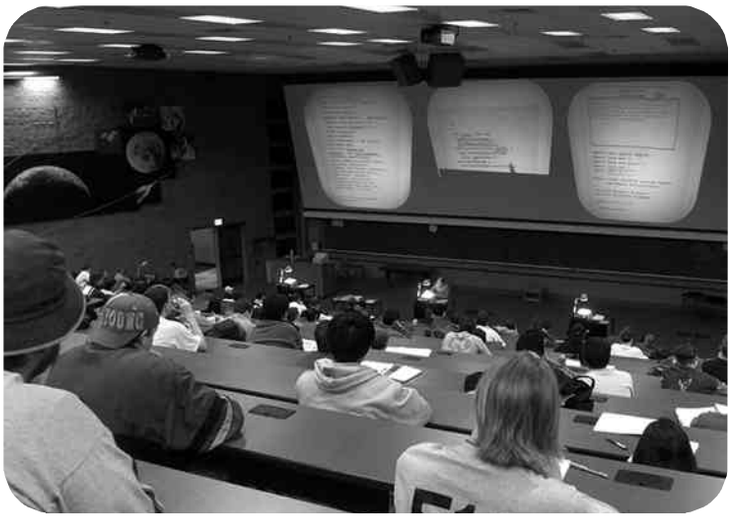
TRW Dave Capka

Computer Science Courses

These regular courses were offered by Computer Science faculty during the academic year 1999–2000.

110 Introduction to Computers
152 FORTRAN Programming for Engineers
154 FORTRAN Programming
156 C Programming for Engineers
158 C Programming
178 Introduction to Computer Science
180 Programming I
181 Programming II
192 Computer Science Resources Seminar
235 Introduction to Organizational Computing
250 Computer Architecture
251 Data Structures
348 Information Systems
352 Compilers: Principles and Practice
354 Operating Systems
381 Introduction to the Analysis of Algorithms
406 Software Engineering I
407 Software Engineering II
414 Numerical Methods
422 Computer Networks
426 Computer Security
435 Computer Graphics and Visualization
448 Introduction to Relational Database Systems
483 Introduction to the Theory of Computation
491 Senior Resources Seminar
502 Compiling and Programming Systems
503 Operating Systems
510 Software Engineering
514 Numerical Analysis
520 Computational Methods in Analysis
525 Parallel Computing
535 Interactive Computer Graphics
536 Data Communication and Computer Networks
541 Database Systems
542 Distributed Database Systems
543 Introduction to Simulation & Modeling of Computer Systems
555 Cryptography and Data Security
565 Programming Languages
580 Algorithm Design, Analysis, and Implementation
584 Theory of Computation and Computational Complexity
603 Advanced Topics in Distributed Systems
615 Numerical Solution of Partial Differential Equations
636 Internetworking

Courses http://www.cs.purdue.edu/courses/descriptions.html



Graduate Assistants

Sanjay Agrawal
Srinivas Avasarala
Matthew Baarman
Biana Babinsky
Anna Berdichevskaya
Binita Binita
Ladislau-Lehel Bölöni
Dennis Brylow
Florian Buchholz
Jason Byars
Bogdan Carbunar
Brian Carrier
Hoi Chang
Rahul Chari
Jiawan Chen
Xiangjing Chen
Gong Cheng
Yung-Pin Cheng
Yui Chow
Jared Crane
John Cruz
Jiangtao Dai
Thomas Daniels
Nitesh Dhanjani
Yonghua Ding
Wenliang Du
James Early
Guotong Feng
Chapman Flack
Ravi Gadde
Ravi Ganesh Ithal
Sudipto Ghosh
Rajeev Gopalakrishna
Priya Govindarajan
Vinay Gupta
Robert Gwadera
Md Ahsan Habib
Moustafa Hammad
Kaichuan He
Daniel Hintz
Feng Hong
Jianying Huang
Georgios Iakovou
Mohamed Ali Ibrahim
Ihab Ilyas
Ioannis Ioannidis
Karthik Jaganathan
Sandeep Jain
Jing Jia
Akshay Johar
Kyung Koo Jun
Dmitri Kalashnikov
Sarat Kamisetty
Jaganathan Karthik
Tapan Prem Karwa
Ambarish Kenghe
Florian Kerschbaum
Young Jun Kim
Matthew Knepley
Yulianto Ko
Atul Kumar
Benjamin Kuperman
Minseok Kwon
Min-Ho Kyung
Usman Latif
Kaiyu Li
Long Li
Zhongwei Liang

Graduate Assistants
(continued)

Chuan-Ming Liu
Kai Liu
Stefano Lonardi
Yi Lu
Tian Luan
David Lutterkort
Di Ma
Salvador Mandujano
Sohil Maru
David McClure
Pascal Meunier
Stephanie Ann Miller
Abdul Ghani Rehan Mohammed
Mohamed Fathalla Mokbel
Sambhrama Mundkur
Sanket Mahadev Naik
Ramkumar Natarajan
Jianlong Ni
Krzysztof Palacz
Manu Pathak
James Pollard
Venkatesh Prabhakar
Darshan Randhir Purohit
Samanvitha Srinivasa Rao
Huan Ren
Abdelmounaam Rezgui
Paul Ruth
Saurabh Sandhir
Qiuyun Shao
Abhinay Sharma
Amit Jayant Shirsat
Ravi Inder Singh
Radu Sion
Yonghong Song
Eric Sparks
Arjun Sreekantaiah
Baskar Sridharan
Jinyan Su
Tsz Shing Peter Tam
Vinayak Tanksale
Christopher Telfer
Manish Tiwari
Mahesh Tripunitara
Keith Turner
Jaideep Shrikant Vaidya
Jamie Van Randwyk
Thomas VanDrunen
Ameya Sharad Varde
Cheng Wang
Sheng-Yih Wang
Shahani Weerawarana
Adam Welc
David Whitlock
Matthias Wollnik
Hao Wu
Yuni Xia
Rong Xu
Dow-Yung Yang
Hocheong Yu
Yichong Yu
Diego Zamboni
Cenyu Zhang
Hongdi Zhang
Hongyan Zhang
Jin Zhang
Ruihao Zhang
Yan Zhang
Yi Zhang
Tian Zhao
Yixue Zhu

EDUCATION

Computer Science Statistics

32 Faculty

900 Undergraduate Majors

150 Graduate Students

Ph.D. Recipients

August 2000

Yung-Pin Cheng
Refactoring Design Models for Compositional Verification, Conformance Testing, and Inductive Verification
Advisor: M. Young

Steven M Cutchin
Flexible User Interface Coupling with Operation Transformation
Advisor: C. Bajaj

Young Jun Kim
Visualization and Animation for Situation Awareness in the Battlefield
C. M. Hoffmann

Sudipto Ghosh
Testing Component-Based Distributed Applications
Advisor: A. P. Mathur

May 2000

Ladislau-Lehel Bölöni
Contributions to Distributed Object and Agent Systems
Advisor: D. C. Marinescu

David Lutterkort
Envelopes of Nonlinear Geometry
Advisor: J. Peters

Valerio Pascucci
Multidimensional And Multiresolution Geometric Data Structures For Scientific Visualization
Advisor: C. Bajaj

Sheng-Yih Wang
Approaches to Multimedia Traffic Management and Control
Advisor: B. Bhargava

December 1999

Neelam Gupta
Automated Test Data Generation Using Iterative Relaxation Methods.
Advisor: A. P. Mathur

Shahani M. Weerawarana
Software Reuse Methodologies for Parallel and Netcentric Scientific Computing.
Advisor: E. N. Houstis

August 1999

Reuben D. Pasquini
Algorithms for Improving the Performance of Optimistic Parallel Simulation.
Advisor: V. J. Rego

Zhanye Tong
Parallel Algorithms for Large Sparse Generalized Eigenproblems.
Advisor: A. H. Sameh

Vassilios Verykios
Knowledge Discovery in Scientific Databases.
Advisor: E. N. Houstis

May 1999

Carlos Gonzalez-Ochoa Aleman
Interactive Modeling Using Surface Splines.
Advisor: J. Peters

Guozhong Zhuang
Compression and Progressive Transmission of Three-dimensional Models.
Advisor: C. Bajaj

1999

Kwan-Liu Ma, ICASE
Image Graphs: A Novel Research Center Approach to Visual Data Exploration.
January 25, 1999

Martin Ester,
University of Munich
Knowledge Discovery in Spatial Databases.
February 1, 1999

Andrzej Szymczak,
Georgia Institute of Technology
Grow and Fold: Compression Of Tetrahedral Meshes,
February 4, 1999

Tamal Day, Indian Institute of Technology-Kharagpur
Reconstructing Curves and Surfaces from Samples
February 8, 1999

Yi Pan,
University of Dayton
Communication and Computation on Arrays with Reconfigurable Optical Buses
February 12, 1999

Hillol Kargupta,
Washington State University
Collective Data Mining from Distributed, Heterogeneous Sites
February 15, 1999

Doug A. Bowman,
Georgia Institute of Technology
Interaction Design for Immersive Virtual Environments
February 18, 1999

Clay Shields, University of California-Santa Cruz
Securing Multicast Routing and Multicast Anonymity
February 22, 1999

Jan Vitek,
University of Geneva
Distributed Programming with Seals.
February 25, 1999

Pierangela Samarati,
University of Milan
A Unified Framework for Supporting Multiple Access Control Policies
March 1, 1999

Jeffrey MacKie-Mason
University of Michigan
Action Protocols for Decentralized Scheduling
March 1, 1999

Amir Michail,
University of Washington-Seattle
An Exploratory approach to Software Reuse
March 2, 1999

Julian Dolby, University of Illinois-Urbana-Champaign
Automatic Inline Object Allocation
March 3, 1999

Walid Aref,
Panasonic Technologies Inc.
Efficient Support of Spatial and Multimedia Data Objects in Database Management Systems
March 4, 1999

Johannes Gehrke,
University of Wisconsin-Madison
Scalable Decision Tree Construction
March 8, 1999

Lt. Col. Alec Yasinsac,
Camp Lejeune, NC
Cryptographic Protocols
March 10, 1999

Sonia Fahmy,
The Ohio State University
Traffic Management for Multipoint Connections in ATM Networks
March 11, 1999

Jignesh Patel,
NCR and University of Wisconsin
Efficient Database Support for Spatial Applications
March 22, 1999

Ming-Yang Kao,
Yale University
Fast and Accurate Reconstruction of Evolutionary Trees: A Model-Based Study
March 24, 1999

Ashfaq Khokhar,
University of Delaware
Scalable Computing for Multimedia Information Systems
March 25, 1999

Raj Yavatkar,
Intel Corp.
Proactive Networks: A New Paradigm for Building Responsive Networks
March 29, 1999

Thomas Bressound,
Ascend Communications, Inc.
TFT: A Software System for Application-Transparent Fault Tolerance
March 29, 1999

Mustafa Uysal, University of Maryland-College Park
Active Disks: Programming Model, Algorithms, and Evaluation
March 30, 1999

Guohong Cao,
Ohio State University
Design of Efficient Fault-Tolerant Systems on Wireless Networks
April 1, 1999

Walter Willinger,
AT&T Labs
On Scaling Phenomena in Internet Traffic
April 1, 1999

Will Marrero,
Carnegie Mellon University
Modeling and Analyzing Security Protocols with Brutus
April 5, 1999

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Bioinformatics: A Gold Mine for Computer Scientists to Explore
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Spatial-Temporal Data Mining
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Composing and Validating Software Models to Assess the Performability of Competing Design Candidates
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Reduced Representations for Very Large Databases
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Scalable Prefix Matching for IP Packet Forwarding and Classification
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Secure Attribute Services on the Web
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QUT (Australia) and Purdue University
WebFINDIT - An Architecture and System for Querying Web Databases
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University of Illinois-Chicago
A Framework for a Scalable Agent Architecture of Heterogeneous Knowledge Sources
June 11, 1999

William McIver, Jr.,
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The COIL Project: Designing A Component-Based Language for Data Source Integration in Common Object Environments
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Vijay Kumar, University of Missouri-Kansas City
Commitment and Recovery in Mobile Databases
August 23, 1999

GUEST LECTURES

2000

T.K. Lakshman,
Hewlett Packard
HP's Compiler Technology for IA64: A Preview
September 27, 1999

Barry Jay, University of Technology-Sydney,
Shape Theory: FISh Implementation
October 4, 1999

Fred Baker,
Cisco Systems
Towards Global Quality of Service in the Internet
October 12, 1999

Stefano Sapccapietra,
Ecole Polytechnique Federale de Laussane
MURMUR: A Research Agenda On Multiple Representations
November 8, 1999

John B. Kenney,
Tellabs Research Center
Frame-Based Fair Bandwidth Allocation for Input/Output Buffered Switches
November 15, 1999

Mukesh Mohania,
Western Michigan University
Making Aggregate Views Self-Maintainable
November 22, 1999

Wil van der Aaist,
Eindhoven University of Technology
Inheritance of Interorganizational Workflows: How to Agree to Disagree Without Loosing Control
December 1, 1999

Sorin Istrail,
Sandia National Labs
Research Laboratory,
Division of Computation,
Computers and Mathematics Protein Folding and Combinatorial Chemistry: Finding Better and Best Needles in Haystacks
December 6, 1999

Anselmo Lastra,
University of North Carolina-Chapel Hill
Being There: Bringing the Real to Virtual Reality
February 7, 2000

Matthew Seidl,
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Improving the Reference Locality of Dynamically Allocated Objects
February 14, 2000

Martin Burtscher,
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The Evolution of a Load Value Predictor
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Amnon H. Eden,
Tel Aviv University
A Formal Language for O-O Software Architecture
February 22, 2000

Jingfang Huang,
Massachusette Institute of Technology
A Fast Multipole Method for the Yukawa Potential
February 25, 2000

Baoquan Chen,
New York University
Image-based Volume Rendering
February 28, 2000

Murali Sitaraman,
West Virginia University
A System for Predictable Component-Based Software Construction
March 2, 2000

Stephen Chenney, University of California-Berkeley
Scalable and Controllable Simulation for Computer Graphics
March 6, 2000

Anastassia Ailamaki,
University of Wisconsin
Architecture-Conscious Database Systems
March 10, 2000

John C. Hart,
Washington State University
Computational Topology for Computer Graphics
March 20, 2000

Yinlong Sun,
Simon Fraser University
A Framework of Spectral Rendering
March 23, 2000

Sean W. Smith,
IBM Corporation
Building a Secure Coprocessor Platform for the Real World
March 30, 2000

Nicholas Donofrio,
IBM Corporation
The Next Generation of e-business
April 3, 2000

Somesh Jha,
Carnegie Mellon University
Survivability Analysis of Software Specifications
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Query and Data Mapping Across Heterogeneous Information Sources
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Jon D. Reid,
Micro Data Base Systems, Inc.
Multi-Tier Applications and the Multi-Model Database: TITANIUM
April 17, 2000

Paul Barford,
Boston University
Understanding End-to-End Performance of Wide Area Services
April 19, 2000

Chris Long, Jr.,
University of California-Berkeley
Designing Better Gestures for Pen-based interfaces
April 24, 2000

K.H. (Kane) Kim,
University of California-Irvine
Real-Time Object-Oriented Distributed Software Engineering: A Conservative Paradigm and the TMO Approach
April 24, 2000

Valery Trifonov,
Yale University
Types for Compiling Java and Running HOT Programs
April 27, 2000

Doug Lea,
University of New York-Oswego
Fork/Join Parallelism in Java
May 1, 2000

Matthias Blume,
Kyoto University
Compiling with Nondeterministic Choice for Expressing Pending Optimization Decisions
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Jun Luc Moreau,
University of Southampton
Distributed Directory Service and Message Routing for Mobile Agents
June 5, 2000

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