

Where are they now?

We thought you might be wondering where the faculty who have left the department are living and working now.

Paul Fisher is now the Head of the Computer Science Department at North Texas State, Denton.

Richard McBride is in the Computer Science Department at South Dakota University, Vermillion.

Roger Hartley is in the Computer Science Department at New Mexico State, University Park.

Rod Bates is employed by Boeing Military Airplane and lives in Wichita.

Tom Pittman is developing his own company in California.

Ed Basham is semi-retired and living here in Manhattan.

Richard Sincovec is with NASA in California.

Fred Maryanski is now at the University of Connecticut.

Linda Shapiro is at the University of Washington in Seattle.

And new faculty. . .

Jan Chomicki

Jan was born and lived in Warsaw, Poland until 1984. He received his MS in Computer Science from Warsaw University in 1979, and later came to the United States and finished his Ph.D. at Rutgers University in 1990.

Jan says his main interests are in the applications of logic to databases and in dynamic aspects of data bases. His current research includes non-standard query answers in deduc-

tive databases, termination and complexity of logic programs, dynamic integrity constraints, and active databases.

He says he finds the atmosphere in the Department very congenial and conducive to research. He would like to see the number of PhD students increase so there would be a few more in each of our PhD level courses.

Jan is married (Wanda) and has three children.

Olivier Danvy

Olivier is from Paris, France and did his undergraduate work at the Universite' de Haute-Normandie, Le Havre, 1981, and his MS and Ph.D. at the Universie' et Marie Curie (Paris VI), France, 1983 and 1986. He was a post-doctoral scholar and assistant professor at the University of Copenhagen, Denmark from 1986-1989. He was a visiting assistant professor at Indiana

University in Fall 1989, and a visiting researcher at Stanford University in spring 1990.

Olivier says his major interests are formal semantics and implementation of programming languages, Scheme and functional languages, self-applicable partial evaluation, computational reflection, continuations, abstract interpretation, and concrete mathematics.

Gurdip Singh

Gurdip is our newest faculty member. He was born in Jalandhar, India and lived there until 1986 when he came to New York to work on his advanced degrees.

Gurdip earned his BS in Computer Science from the Indian Institute of Technology, New Delhi. He then came to the University of New York at Stony Brook where he earned his MS in Computer Science in 1989, and his Ph.D. in 1991. His PhD work was under the direction of Professor Arthur Bernstein.

Gurdip is interested in design and analysis of distributed protocols. Most recently, he has been working on a compositional technique for designing distributed protocols. The technique

allows many complex protocols to be designed from protocols performing simpler activities. He is also interested in distributed algorithms for network control. He has designed algorithms for leader election, constructing a minimum spanning tree, and breadth-first numbering.

Gurdip is married (Harleen) and enjoys the smaller-city atmosphere. He says he finds the environment at K-State very friendly and conducive for research, and finds this a pleasant change after living close to Manhattan in New York.

Gurdip enjoys playing tennis, swimming, and reading history books.

Generous Summer on Campus Students

Since 1980 the Department of Computing and Information Sciences has been offering a Summer On Campus program for AT&T computing professionals who are seeking an M.S. in Computer Science. Each student spends five weeks on the KSU campus each summer until they have satisfied the requirements for the M.S. degree. This takes four or five summers, dependent upon credits transferred from other universities. Each student enrolls in two (3 credit) graduate level classes for that five weeks, for which they spend four hours per day in the classroom. Time outside of class is spent in private study and laboratory programming problems- in which a ten to 14 hour day is not unusual! The goals of this program are:

1. to enhance the technical skills of computing professionals in the central areas of computing sciences, including algorithms, software engineering, data base systems, languages, computer architecture, computational engineering and science, artificial intelli-

gence, and expert systems;

2. to give the students a breadth of knowledge of computing sciences which permits them to acquire a Master's degree in Computer Science.

It is not "all work and no play", however. Picnics, nights in Aggieville, time at the "rec complex" and the final banquet are good social occasions. Being away from their families, these AT&T student-employees form their own SOC family. We enjoy the kinship of the KSU and SOC families and they obviously feel the same way. Each year since 1986 these students (while still in the program) have donated to the Department, for a total of \$17,000. This is much appreciated and these funds have been put to good use to acquire equipment that benefits both the SOC program and our regular on-campus programs.

All I can do is to say again "Thank you for being a friend" to CIS at KSU.

Computing Sciences as a Discipline

Computing is a relatively new discipline (when compared with the traditional disciplines such as mathematics, physics, chemistry, etc.), but we have reached a stage in the development of our discipline where it has become important to define computing. In the early years (40's and 50's) our emphasis was on programming systems and languages. As the 70's evolved more theoretical emphasis resulted in a strong foundation for computing. In the 80's we struggled to define our areas of endeavor. The result of this effort is an understanding of our discipline as having three paradigms of research and instruction. First, we have theoretical foundations where we prove theorems about computational objects. This is very much in the mold of pure mathematics. Second, we develop models of computing processes and experiment with their performance and correctness. This is the experimental science model. Finally, we build real systems in the vein of engineering. All three are

important if we are to help solve information-intensive societal problems.

In addition to defining the discipline, we have also come to understand the importance of our research work to other areas. Fundamentally, we must seek ways to integrate computing technology into the process of solving grand challenges. We must become "relevant" and help industries in this country be more competitive in the global technology marketplace. This is the fundamental notion behind the High Performance Computing Initiative before the U.S. Congress.

Even though we have formed a generally accepted view of computing as a discipline, we are still in the early stages of our development. We are excited about the contributions we can make to society and we are striving to equip students with the computing and information technology and research skills to make these contributions.

Faculty Research Interests and Current Projects

Current research programs of the CIS faculty research in the Department can be categorized in five basic areas: programming languages, software engineering, knowledge engineering, database systems, and parallel and distributed systems. Within these broad categories, the faculty are carrying on specific research programs.

Maria Zamfir-Bleyberg, Ph.D., UCLA. In the area of parallel computing, her goal is to develop a language for writing and testing formal specifications of parallel distributed systems based on the AND/OR net model. The AND/OR net model is an initial algebra semantics model for concurrent computing systems, which she has been working on for the past few years. She has also been examining Petri nets as object-oriented systems in which abstract data types provide values for attributes. She has been using this view of Petri nets to define an abstract operational semantics for them based on "reflection". Finally, she hopes that the study of neural networks will open new directions in her research in the area of parallel computing.

Myron A. Calhoun, Ph.D., Arizona State. He is trying to delve deeply into the uses of Finite Inductive Sequences (FIS) as described by Fisher & Case. FIS appears to be directly applicable to the compression of textual data as well as compressing, processing, and recognizing visual images; this latter may also include applications in mobile free-ranging robotics. His ongoing research emphasizes the application of computers to real-world problems such as the development of computer interfaces for the handicapped and low-cost packet-radio networks.

Jan Chomicki, Ph.D., Rutgers. He is mainly interested in the applications of logic to databases and in dynamic aspects of databases. Logic can serve as a query language and as a language for specifying integrity constraints. In this way, the functionality and the application scope of database management systems can be considerably expanded. His current research projects include: non-standard query answers in deductive databases, termination and complexity of logic programs, dynamic integrity constraints,

representation and processing of temporal information, and active databases. His research has theoretical and practical components and he is very interested in seeing some ideas implemented.

Olivier Danvy, Ph.D., Universite' Marie Curie (Paris VI). His research interests include the semantics and implementation of programming languages and program transformations. In particular, he is interested in the representation of control in a computational system as continuations, and by their correspondence with extensional theories such as category theory, types, and logic.

David A. Gustafson, Ph.D., Wisconsin-Madison. He is currently investigating models of the software structure that can be used to develop a software reliability model. Related to the area of reliability is the area of software testing methods. He is developing more thorough test methods that have formal bases. Another area in which he is involved is formal notations for diagrams, both data flow diagrams and hierarchy diagrams. The creation of better notations will allow more formal work on transformations of the diagrams. Finally, he is working on developing notations for describing the software development process in terms of the documents that are produced.

Rodney Howell, Ph.D., Texas-Austin. In the area of real-time scheduling, he has been looking at the complexity of finding valid schedules for various types of recurring real-time task systems. Regarding self-stabilization, he is examining various theoretical limitations for self-stabilized systems. For example, he has recently explored situations in which certain types of models cannot simulate other types of models while preserving self-stabilization. And in the area of Petri nets, he has been examining the computational complexity of various problems, such as reachability, boundedness, equivalence, liveness, and fair nontermination. His main goal in this area of research is to tighten the known bounds of the reachability problem for Petri nets.

William J. Hankley, Ph.D., Ohio State. His research is on formal specification of programs, with a current focus on object-oriented and

Faculty Research (continued)

modular structure (using ADA concepts), high level data types (sets, maps, sequences as in VDM), logic specifications, (predicate calculus and Prolog notations) and temporal description of task behaviors (temporal logic). He is doing related work in verification of specified system properties, development of executable specifications as program prototypes, and use of direct manipulation interfaces for rapid development of prototypes.

Austin Melton, Ph.D., Kansas State. His current work and interest includes using category theory to understand and explain programming semantics, and further he is interested in seeing how category theory itself can be used as a programming language. He is also doing work in software engineering where his work involves trying to develop a foundation upon which a person can with confidence design and define useful software measures. His work in databases involves working on a general method for defining and studying non-normal forms of structures.

Masaski Mizuno, Ph.D., Iowa State. He has worked on process synchronization problems in a distributed computing environment. His group has developed various efficient mutual exclusion and AND-synchronization algorithms. Currently, his group is studying quorum based protocols. They have developed a quorum composition algorithm, which enables efficient construction of "good" quorum structures under a large set of nodes. Recently, he has started research collaboration with Professor Michel Raynal of IRISA, based on their mutual interest in process synchronization. They have developed a method to measure the amount of synchronization delay and the degree of concurrency in parallel programs.

K. Ravindran, Ph.D., British Columbia. He is currently investigating data-driven communication in distributed operating systems to allow fine-grained reconfigurability of services and fine-grained parallelism among functions that compose a server. A second area of current work is the design of a flexible kernel for distributed applications whereby different applications may choose different forms of communication

mechanisms to suit their requirements. He is also working on network architectures and protocols to handle congestion control, bandwidth management and packet multicasting in high speed packet switching.

David Schmidt, Ph.D., Kansas State. In past research, he has shown how to synthesize efficient implementation data structures for languages defined by denotational semantics. He and a research student are building a "rapid prototyping" compiler synthesis system based on these ideas. Recently, he has studied the category-theoretical foundations of a denotational semantics variant called "action-semantics". He and a student have developed a sound and complete type inference algorithm for action semantics; the algorithm is being implemented as part of a programming language analysis "workbench".

Gurdip Singh, Ph.D., New York, Stony Brook. He is mainly interested in design and analysis of distributed protocols. Currently, he is working on a compositional technique for designing distributed protocols. The technique allows many complex protocols to be designed from protocols performing simpler activities. He is also interested in distributed algorithms for network control. He has designed efficient algorithms for leader election, constructing a minimum spanning tree, and breadth-first numbering. Finally, he is interested in average execution time analysis of protocols.

Elizabeth Unger, Ph.D., Kansas. The entire thrust of her research program is in the development of security and integrity systems based upon the object-oriented programming paradigm. The work proceeds with two foci: description of the general interface problem, and characterization of the database administrator and user level integrity constraints. The first thrust includes the completion and documentation of the value of natural change for deterrent value on the tracker attacks; the mathematical and statistical characterization of the security value of such change; the security value of change in conjunction with other deterrent methods; and the characterization of information increment given a user data increment. This latter characterization is just begin-

Faculty Research (continued)

ning with Shannon's concept of entropy as the basis for measurement. Such a measure will allow the use of a semantic model to characterize statistically the security risk of releasing data in certain risk environments. The second thrust is concerned with the formal description of one aspect of user level integrity, the temporality. In this thrust, the next steps are the clear definition of user level integrity, the specification of a language in which to specify constraints, and the definition of the architecture of such a system within contemporary operating systems.

Maarten van Swaay, Ph.D., Leiden (Netherlands). His current interests are in laboratory instrumentation and neural networks. In addition to technical areas, he has a strong interest in social and ethical issues of computing, and has developed a course in that area.

Virgil Wallentine, Ph.D., Iowa State. His work centers on what can be distributed, how it can be distributed across multiple processing units, and what properties of the system make it amenable to distribution. He is presently working in the area of Parallel Discrete Event Simulation (PDES) and in methods for debugging distributed programs. Special emphasis is placed on the study of formal language semantics for the time-space model of synchronization and study of temporal behavior of PDES. He has several on-going projects which include the construction of a system which supports a visual programming facility for queueing networks, a performance prediction environment for PDES, and a knowledge-based debugging system for distributed programs.

Seminar Presentations in the Department

This has been an especially productive year for Department seminars. As one can see from the range of topics, there was "something for everyone".

September 27: Dr. Charles Consel, Yale University, "Semantics-Directed Generation of a Prolog Compiler".

October 3: Dr. James Bezdek, University of West Florida, "Non-Standard Clustering Algorithms".

October 25: Susen Even, PhD Candidate, Iowa State, "Type Inference for Action Semantics".

November 2: Dr. Andrzej Filinski, Carnegie-Mellon University, "Declarative Continuations and Categorical Duality".

November 14: Dr. Radia Perlman, Digital Equipment Corporation, "Calculating a Safe Route in a Computer Network Despite Traitorous Advisors".

November 20: Dr. Andrzej Ciepielwowski, University of Iowa, "Parallel Implementations of Prolog: How to Map Dynamic Trees to Multiple Processors".

November 29: Dr. Olivier Danvy, Kansas State University, "Partial Evaluation in Parallel".

January 17: Dr. Lou Rosier, University of Texas-Austin, "Ideas and Results Concerning the Scheduling of Hard-Real-Time Systems".

January 18: Dr. Mikhail Bulyonkov, Institute of Informatics Systems, Novosibirsk, USSR,

"Mixed Computation - Partial Evaluation and Data Specialization".

January 24: Dr. Dan Marinescu, Purdue University, "Performance Analysis of Paralled Computations on Distributed Memory Multiprocessors: Models and Experiments".

February 28: Dr. Jurgen Koslowski, Kansas State University-Mathematics, "Currying in Computer Science".

March 6: Mary Lou Hines, PhD Candidate, Kansas State University, "Conceptual Object-Oriented Database: the COODB Model".

March 7: Dr. Cliff Stoll, Harvard-Smithsonian Center for Astrophysics, "Stalking the Wily Hacker".

March 18: Dr. Pierre Jouvelot, Ecole des Mines de Paris, France, "Effect Reconstruction in Polymorphic Effect Systems".

March 21: Mr. Richard W. Stephenson, Advanced Technology, SW Bell-St. Louis, "The Evolving ISDN Network".

April 3: Dr. S. Lakshmivarahan, Univ. of Oklahoma, "Symmetry in Interconnection Networks".

April 19: Dr. Donald A. Smith, Brandeis University, "Partial Evaluation of Logic Programs: Concepts and Experiments".

Seminar Presentations (continued)

May 2: Dr. Guntis Barzdins, New Mexico State, "Inductive Synthesis of Term Rewriting Systems".

May 9: Dr. Chet Murthy, Cornell, "Extracting Computational Context from Classical Proofs".

May 20: Dr. Peter D. Moses, Aarhus University, "Denotational Semantics".

May 31: Dr. Michael Raynal, IRISA, France, "The Casual Ordering and A Simple Way".

June 3: Dr. Anthony J. Bonner, Indiana University, "Objects and Views".

June 24: Dr. Ira Pohl, University of California, Santa Cruz, "Object Oriented Programming and Design".

CIS Goes Satellite

Computing, communications, and information technologies sit on a rapidly changing knowledge base. While undergraduate and graduate programs in CIS and computer engineering give graduates a solid base for the near future, it is difficult for professionals in the field to keep up with the rapid changes in theory, systems, and technology. Thus, CIS is expanding its instructional programs at the MS level by offering courses via satellite. In the Spring 1992 semester, Dr. Elizabeth Unger will offer a graduate

course in data base systems design/security/integrity. Through a contract with the National Technological University, this course (and future courses) will be available to more than 100 companies nationwide. These courses will apply to an MS in Computer Science at KSU or to an MS in Computer Science offered entirely vis satellite from NTU. Maybe it's time to upgrade your skills and/or pursue an advanced degree. See us on the "tube" and keep abreast of the changing technology.

Department Network and Machine Configuration

