

# Jaswinder Pal Singh

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## EDUCATION

Stanford University. Ph.D. in Electrical Engineering, 1993. Advised by Prof. John Hennessy and Prof. Anoop Gupta. My thesis research was at the boundary of applications and parallel computer systems, including programming models, software and hardware.

Stanford University. M.S. in Electrical Engineering, 1989.

Princeton University. B.S. in Electrical Engineering and Computer Science, 1987, *summa cum laude*.

## PROFESSIONAL EXPERIENCE

- 7/05 – present Professor, Computer Science Department, Princeton University.
- 9/19 – present Director of Undergraduate Studies (Majors), Computer Science Department, Princeton University.
- 10/13 – present Member of the Board of Directors, 8x8 Inc. (NASDAQ:EGHT).
- 1/19 – present Member of the Board of Directors, Blockstack, Inc. A private company in blockchain technology.
- 9/14 – present Member of the Board of Trustees, The Dalton School, New York.
- 7/14 – present Director, Program in Applications of Computing, Princeton University. A program for about 125 non-Computer Science majors.
- 9/99 – 2010 Director, Program in Integrative Computer and Application Sciences (PICASso), a multi-department, university-wide interdisciplinary program focused on scalable parallel and distributed computing at the boundary of computer science and a broad range of application sciences. Developing and fostering new interdisciplinary courses, new practice-oriented workshops in scalable computing based on needs gathered from multiple departments, new interdisciplinary seminar series, and programs in effective written and oral scientific communication, as well as funding students and running the program. Creating a core of courses for an interdisciplinary computational science curriculum, taught by faculty in different departments, in addition to parallel and distributed computing courses.
- 7/03 – present Executive Committee, Princeton Institute for Computational Science and Engineering (PICSSiE). A permanent institute that came out of the PICASso program that I led, and that has taken over its activities as well, including a permanent Graduate Certificate Program in Computational Science and Engineering at Princeton that I developed.
- 9/05 – 9/07 Director of Princeton portion of Center for Modeling Viral Immunity and Antagonism, a \$20+M NIH Center involving Mount Sinai School of Medicine and Princeton University. Member, Executive Committee of Center.
- 9/00 – 6/05 Co-founder and Chief Technical Officer, firstRain, Inc. (on leave from Princeton University 9/00 to 6/02). Developing novel Internet/Web applications and Internet infrastructure. Improved and developed new protocols for web-based communication and information access.
- 7/99 – 6/05 Associate Professor, Computer Science Department, Princeton University.
- 3/99 – present Member of the Technical Advisory Board, NOAA Geophysical Fluid Dynamics Laboratory. Aiding in the shift from vector to parallel computing, and in the procurement of large parallel computing and analysis infrastructures.
- 2/95 – 6/99 Assistant Professor, Computer Science Department, Princeton University. Performing research in parallel computer systems and applications. Focus on (i) scalable multiprocessing in both the shared address space and message passing paradigms, including studying the programming and performance tradeoffs between the two, (ii) understanding how shared address space abstractions might be supported using commodity parts, and how applications might be restructured for such systems, and

- (iii) the use of high-performance computing in biology, medicine, cosmology and computer graphics. Advising several Ph.D. students in these areas.
- 2/93 - 1/95 Research Associate, Stanford University. Leading the parallel applications effort in the Stanford DASH/FLASH research groups, and studying the implications of these applications for the design of multiprocessor software and hardware systems. Evaluating performance of real and simulated systems, and developing methodologies for the above. Expanding the SPLASH suite of parallel applications to SPLASH-2. Advising several Ph.D. students.
- 10/87 – 2/93 Research Assistant, Stanford University. Developing parallel scientific and engineering applications and studying their implications for parallel processing systems, software and architecture. Studying the scaling of applications and architectures. Creating and distributing the SPLASH suite of parallel applications.

## HONORS

- *Presidential Early Career Award for Scientists and Engineers (PECASE)*, 1997. Awarded to twenty young scientists and engineers in the United States selected from all areas of science/engineering by the National Science Foundation.
- *Sloan Research Fellowship*, 1997. Awarded to about 10 young computer scientists every year.
- Paper selected as DEBS 2005 Most Influential Paper. May 2019.
- Paper selected as Best student paper in USENIX USITS Symposium, 2000.
- Paper selected for journal publication from the International Conference on Supercomputing, 1999.
- Paper selected for Journal of Computational Biology from the RECOMB computational biology conference, 1998.
- Paper selected for journal publication from the Symposium on Parallel Algorithms and Architectures, 1996.
- Paper selected for journal publication from the Symposium on Parallel Algorithms and Architectures, 1996.
- Paper nominated for Best Student Paper Award for Supercomputing'97.
- Two papers selected among best 5 submitted to the Intl. Symposium on Computer Architecture (1992 and 1993), one of them as “Impact Paper” for the Federated Computer Research Conferences, 1993.
- *Summa cum laude*, Princeton University. Princeton University Undergraduate Scholarship.
- Member of Phi Beta Kappa, Tau Beta Pi and Sigma Xi since 1987.

## TEACHING

Have taught core undergraduate courses as well as graduate-level courses in Parallel Computing, Parallel Architecture and Programming, Scalable Internet services, applications, protocols and infrastructure, and in analysis of data. Created and taught several new interdisciplinary courses I created for the PICASSo program, catering to and attracting students from many different departments on campus, from Sciences, Engineering, Operations Research and Computer Science. Created and taught courses in Marketplace Design and at the boundary of technology, business, marketplaces and economics. Created and taught a new type of course for Princeton called Innovating at the Boundary of Technology, Business and Marketplaces (dubbed the “CTO Course”).

## Ph.D. DISSERTATIONS SUPERVISED

- Adrian Soviani. New Programming Models for Scalable Parallel Computing.
- Erich Schmidt. Query-independent ranking for large-scale publish-subscribe systems.
- Chi Zhang. A Peer-to-peer substrate for Distributed Search Trees.
- Fengyun Cao. MEDYM: A distributed content-based publish-subscribe system.
- Mao Chen. Using Explicit User Information to Improve Internet Services.
- Yefim Shuf. Improving the Memory Performance of Java Programs.
- Steven Kleinstein. Towards Quantitative Modeling of Immune System Dynamics.
- Hongzhang Shan. A Comparison of Programming Models for High-Performance Parallel Computing.
- Dongming Jiang. Performance Portability on Shared Address Space Architectures.
- Angelos Bilas, Using Network Interfaces to Accelerate Software Shared Memory.
- Liviu Iftode, Shared Virtual Memory using Automatic Update. With Kai Li.

- Steven Cameron Woo, Stanford University. Integrating Block Data Transfer in Cache-coherent Multiprocessors. With John Hennessy.
- Chris Holt, Stanford University. Application and Architectural Bottlenecks in Distributed Shared Memory Multiprocessors, expected 2003. With John Hennessy.
- Cheng Che Chen. Protein Structure Determination in the Presence of Uncertainty: Algorithms and Parallelism.
- Alexander Kozlov, Stanford University. Probabilistic Inference in Belief Networks: Algorithms and Parallelism. With John Hennessy and later Daphne Koller.

Served on dissertation committees of several others.

## **PROGRAM COMMITTEES**

Have served on the program committees and as program chair and track chair of many ACM, IEEE and other conferences in scalable computing, including the International Symposium on Computer Architecture, Supercomputing/SC, SIGMETRICS Conf. on Measurement and Modeling of Computer Systems, Principles and Practice of Parallel Programming, Symposium on Parallel Algorithms and Architectures, International Conference on Supercomputing, International Parallel Processing Symposium, International Conference on Parallel Processing etc., as well as several ACM and IEEE workshops on scalable computing, data analysis and mining, architecture, and languages and compilers.

## **INVITED EVALUATION COMMITTEES AND TALKS**

Have served on several invited government research/education program and proposal evaluation committees, including for the US Government (NOAA's procurement programs and the National Science Foundation) and the Swedish Government (Evaluating the ARTES/PAMP national program for scientific research and graduate education in high-performance computing, as well as other programs for the Swedish Research Council). Have also served as an external evaluator for faculty hiring at Uppsala University, Sweden and the University of Copenhagen, Denmark.

Have delivered many invited presentations and lectures at a variety of international and domestic venues, including:

- Conference panels and invited presentations at ISCA, ASPLOS, SIAM and other conferences and workshops
- NSF and DARPA PI meetings in scalable computing and interdisciplinary research and education
- International government programs (Sweden and India, including India's cross-IIT TECHFEST)
- U.S. universities such as UC Berkeley, U. Washington, Stanford, NYU, U of Toronto, SUNY, etc.
- International universities and research laboratories/centers in France, India, Italy, Japan, Sweden, and South Africa.
- Industrial research laboratories such as Microsoft, Sun, IBM, Panasonic, Siemens etc.
- Government research laboratories such as NASA, Sandia, Argonne, PPPL (plasma physics) and GFDL (climate)
- Industrial research and product/business organizations; e.g. Yahoo, Microsoft, Endeca, etc.
- Several industrial conferences and trade shows, industrial/academic and executive summits involving web-based information access, search, dissemination/communication and intelligence.

## **PATENTS**

Patents awarded:

Method and apparatus for focused crawling. United States Patent 20060277175. Pub. Date 12/07/2006.

Method and apparatus for focused crawling. United States Patent 7080073. Pub. Date 07/18/2006.

Method and apparatus for searching network resources. United States Patent 6915294. Pub. date 07/05/2005.

Method and apparatus for searching network resources. United States Patent 20050210018. Pub. date 09/22/2005

Method and apparatus for searching network resources. United States Patent 7415469. Pub. date 09/05/2006.

Method and apparatus for extracting relevant network data. United States Patent 7103838. Publication date 09/05/06.

## **SAMPLE GRANTS RECEIVED**

(Grants in which I am Principal Investigator, not Co-Principal Investigator. Pending grant proposals not included.)

Princeton CTO Research and Education, \$800,000, 2010. Additional funds being secured.

National Institutes of Health. HHSN266200500021. \$20,250,000. PI of Princeton Portion.

National Science Foundation IGERT Grant, No. DGE-9972930. Funds up to fourteen graduate students per year in scalable internet services, computing and data analysis. \$2,172,000.

Accessible Climate Computing for 'Downstream' Science: An Energy and Climate Grand Challenge Proposal. Princeton Grand Challenges Program. \$100,000 per year.

National Science Foundation. Presidential Early Career Award for Scientists and Engineers (PECASE). Only computer scientist to receive it that year. \$500,000.

National Science Foundation. CISE Research Award. \$980,000.

National Science Foundation. CISE Instrumentation Award. Three projects in applications and scalable computing. \$2,172,000.

National Science Foundation. Adaptive Performance Portable Software for Next-Generation Applications. \$600,000. firstRain, Inc. Collaborative Student Research Grant.

National Oceanic and Atmospheric Administration Grant.

Alfred P. Sloan Foundation. Sloan Research Fellowship. \$35,000.

## **PROFESSIONAL ORGANIZATIONS**

The Association for Computing Machinery

Institute of Electrical and Electronics Engineers, Inc.

Phi Beta Kappa, Tau Beta Pi, Sigma Xi

## **PUBLICATIONS**

One leading graduate/practitioner level textbook (below) and over 100 refereed conference and journal publications (available upon request).

### **Textbook**

David E. Culler, Jaswinder Pal Singh. *Parallel Computer Architecture: A Hardware-Software Approach*. With Anoop Gupta. Morgan Kaufmann Publishers, 1998. Leading textbook in parallel architecture and programming.