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PERSONAL DETAILS

Date of Birth: 8 January 1961

Nationality: Australian

Residency status: Work permits and residency visas for U.S. and U.K.

EDUCATION

1979-82: University of Western Australia, Perth, Australia.

B.Sc. with first class honours in physics, double major in mathematics.

Received prize as the top physics student in 1979 and 1980.

1983-88: University of Southampton, Southampton, U.K.

Ph.D. in computational physics, advisor Prof. Tony Hey.

Commonwealth scholarship award.

PROFESSIONAL EXPERIENCE

1987-88: University of Southampton, Southampton, U.K.

Research Assistant working in the Concurrent Computation Group of the Department of Electronics and Computer Science and at the Transputer Support Center.

1988-90: California Institute of Technology, Pasadena, U.S.A.

Research Fellow with the Physics Department and the Caltech Concurrent Computation Group.

1990-92: Syracuse University, Syracuse, U.S.A.

Research Associate with the Physics Department and the Northeast Parallel Architectures Center.

1992-97: Syracuse University, Syracuse, U.S.A.

Senior Research Scientist at the Northeast Parallel Architectures Center.

1997-present: Adelaide University, Adelaide, Australia.

Senior Research Fellow in the Computer Science Department.

RESEARCH EXPERIENCE

1997-present: Adelaide University, Adelaide, Australia.

Senior Research Fellow with the Distributed and High-Performance Computing Group in the Computer Science Department.

- Currently leading the Distributed and High Performance Computing Group.
- Working on research and development of cluster computing for scientific applications.
- Worked with the Special Research Centre for the Subatomic Structure of Matter (CSSM) in the Department of Physics on the procurement and management of a 160 processor Sun Technical Compute Farm, which was the fastest supercomputer in Australia when installed in June 2000.

- Working with CSSM physicists on the development, porting and optimization of computational physics programs for the compute cluster.
- Worked with computational chemists in the Department of Chemistry on designing, installing and benchmarking a 232 processor PC cluster for molecular modeling applications.
- Working on the development and application of middleware for distributed high-performance computing.
- Leading a project on distributed Geographical Information Systems (GIS) applications that require access to high-performance compute resources and large on-line geospatial data sets such as satellite image archives.
- Leading a project to develop standard interfaces to geospatial image servers for online satellite and aerial photo data archives.
- Developing Java Grande benchmarks and other software for using Java for high-performance computing.

1992-97: Syracuse University, Syracuse, U.S.A.

Senior Research Scientist at the Northeast Parallel Architectures Center.

- Worked on the development of libraries of high-performance software, and information about high-performance computing, as part of the National High-Performance Software Exchange (NHSE) project.
- Developed a library of High Performance Fortran software for the HPF Applications and NHSE projects.
- Developed Web CGI programs for use in education, in collaboration with Community School Networks, Inc., as part of the InfoMall technology transfer program.
- Investigated and developed optimization methods that use Monte Carlo techniques, such as simulated annealing, and their application to problems such as scheduling and timetabling.
- Worked on applications of Web technologies since early 1994, including helping set up a Web server for NPAC, creating a popular Web site for K-12 education (Kids Web), developing advanced Web-based educational applications, and introducing companies to the use of the Web for business as part of the InfoMall technology transfer program.
- Led a project that developed the NPAC Visible Human Viewer, a Java-based interface to digital images of the human body, which won an award at the first Sun JavaOne conference.
- Led a project to investigate the use of parallel computing, the Internet, and VRML to do real-time rendering of digital terrain models, for an educational application involving an interactive flight simulation.
- Helped run the NPAC Research Experiences for Undergraduates Program, a summer research internship program sponsored by the National Science Foundation.
- Led a project on the use of parallel computing in the power utility industry. This involves porting existing code to parallel computers, and developing parallel algorithms for sparse matrix computations and differential-algebraic equation solvers.
- Developed parallel algorithms for graph coloring and connected component labeling, random number generators, and Monte Carlo simulation for various computational physics problems.

1990-92: Syracuse University, Syracuse, U.S.A.

Research Associate with the Physics Department and the Northeast Parallel Architectures Center.

- Developed new algorithms for Monte Carlo simulation of spin models of magnetism, and an interactive graphics environment to visualize different spin models and algorithms.
- Developed and implemented new parallel connected component labeling algorithms that were applied to Monte Carlo simulations of spin models.

- Monte Carlo simulations of string theories of quantum gravity, using dynamically triangulated random surfaces.
- Wrote sequential and parallel Fortran programs for the NPAC Fortran 90D and High Performance Fortran test suite.
- Studied the use of networks of workstations for parallel computing.

1988-90: California Institute of Technology, Pasadena, U.S.A.

Research Fellow with the Physics Department and the Caltech Concurrent Computation Group.

- Studies of spin models of magnetism using Monte Carlo simulations on parallel computers.
- Developed parallel algorithms for non-local Monte Carlo cluster update algorithms for spin models, including parallel connected component labeling algorithms for both SIMD and MIMD distributed memory parallel computers.

1986-88: University of Southampton, Southampton, U.K.

Research Assistant working in the Concurrent Computation Group of the Department of Electronics and Computer Science and at the Transputer Support Center.

- Implemented parallel matrix algorithms on transputer arrays.
- Ported a sequential Fortran code modeling ocean current flow to a transputer array.
- Wrote and modified demonstration parallel programs incorporating visualizations.
- Wrote programs and documentation for training courses.
- Helped set up and run the Transputer Support Center, a campus-affiliated training and consultancy center.
- Used parallel computers (transputer arrays) to lattice field theory and solid state physics problems, including the lattice Higgs model, the XY spin model, and the quantum Hall effect.

1983-88: University of Southampton, Southampton, U.K.

Doctoral candidate in the Physics Department.

- Numerical studies of phase transitions in lattice gauge theories using a massively parallel SIMD computer. Completed doctoral thesis entitled "Deconfinement Transitions in Lattice Gauge Theories".

1982-83: Monash University, Melbourne, Australia.

Summer undergraduate research studentship in the Physics Department.

- Wrote graphics programs for studying renormalization group transformations in solid state physics.

1981-82: Australian National University, Canberra, Australia.

Summer undergraduate research studentship in the Physics Department.

- Worked on the theory of mirror charges in metals.

RESEARCH STUDENTS

Supervised or co-supervised the research of several graduate students from physics and computer science departments, in a number of different subject areas.

Supervised 14 undergraduate summer research students over a period of 5 years, for the NPAC Research Experiences for Undergraduates (REU) Program in High-Performance Computing and Communications. Was co-leader of the program for 2 years, and prepared a successful proposal to the National Science Foundation for renewal of funding for the program.

Supervised the research of several honours and summer students at Adelaide University.

TEACHING EXPERIENCE

- 1997-00: Helped develop and teach an honours-level course on distributed and high-performance computing.
- 1994-95: Helped run a Research Experiences for Undergraduates summer program for 15 students.
- 1994: Helped develop and teach a course on the World Wide Web to a class of 8th grade students as part of the Young Scholars Program at Syracuse University.
- 1993-94: Developed and taught part of a graduate computational science course.
- 1993: Teaching Assistant, recitations, laboratories and some lectures for freshman physics honors class.
- 1992: Lecture on Monte Carlo methods for computer science numerical methods course.
- 1991: Lecture on Monte Carlo methods for graduate physics statistical mechanics course.
- 1987-88: Demonstrator for computer training courses.
- 1985-86: Teaching Assistant, sophomore physics class.
- 1984-85: Teaching Assistant, freshman physics laboratory.
- 1983: Taught informal lecture course on quantum field theory.
- 1982: Teaching Assistant, recitations and laboratory for freshman physics class.

COMPUTER EXPERTISE

Over 15 years experience in high-performance parallel computing.
Have been working on Web and Internet applications since early 1994.

Computers:

- Sequential:
Unix workstations, IBM PC, Macintosh.
- Shared memory parallel:
Encore Multimax, Sequent Symmetry, BBN Butterfly, SGI Power Challenge, Sun Enterprise SMPs.
- Distributed memory SIMD parallel:
ICL and AMT DAP, Thinking Machines CM-2, Maspar MP-100.
- Distributed memory MIMD parallel:
Meiko Computing Surface, nCUBE/10, nCUBE/2, Intel iPSC/2, Symult S2010, Intel Touchstone Delta and Paragon, Thinking Machines CM-5, IBM SP1 and SP2, Sun Technical Compute Farm, Unix workstation and Beowulf PC clusters.

Languages:

- Sequential:
Pascal, Fortran 77 and 90, C, perl, Java.
- Data parallel:
DAP Fortran, *Lisp, CM Fortran, C*, MPL, High Performance Fortran.
- Message passing parallel:
occam, Express, MPI.

JOURNAL PUBLICATIONS

1. P.D. Coddington, A.J.G. Hey, A.A. Middleton and J.S. Townsend, *The Deconfining Transition for Finite Temperature $U(1)$ Lattice Gauge Theory in $(2 + 1)$ Dimensions*, Phys. Lett. **B175**, 64 (1986).
2. P. Coddington, A. Hey, J. Mandula and M. Ogilvie, *The Lattice Photon Propagator*, Phys. Lett. **B197**, 191 (1987).
3. J.T. Chalker and P.D. Coddington, *Percolation, Quantum Tunneling and the Integer Hall Effect*, J. Phys. **C 21**, 2665 (1988).
4. C.F. Baillie and P.D. Coddington, *Cluster Identification Algorithms for Spin Models — Sequential and Parallel*, Concurrency: Practice and Experience **3**, 129 (1991).
5. C.F. Baillie and P.D. Coddington, *Comparison of Cluster Algorithms for 2-D Potts Models*, Phys. Rev. **B 43**, 10617 (1991).
6. J. Apostolakis, P. Coddington and E. Marinari, *A Multi-Grid Cluster Labeling Scheme*, Europhys. Lett. **17**, 189 (1992).
7. P.D. Coddington and C.F. Baillie, *Empirical Relations Between Static and Dynamic Exponents for Ising Model Cluster Algorithms*, Phys. Rev. Lett. **68**, 962 (1992).
8. J. Apostolakis, P. Coddington and E. Marinari, *New SIMD Algorithms for Cluster Labeling on Parallel Computers*, Int. J. Mod. Phys. **C 4**, 749 (1993).
9. M. Bowick, P. Coddington, L. Han, G. Harris and E. Marinari, *The Phase Diagram of Fluid Random Surfaces with Extrinsic Curvature*, Nucl. Phys. **B 394**, 791 (1993).
10. K. Anagnostopoulos, M. Bowick, P. Coddington, M. Falcioni, L. Han, G. Harris and E. Marinari, *Fluid Random Surfaces with Extrinsic Curvature: II*, Phys. Lett. **B 317**, 102 (1993).
11. P.D. Coddington, *Analysis of Random Number Generators Using Monte Carlo Simulation*, Int. J. Mod. Phys. **C 5**, 547 (1994).
12. P.D. Coddington and L. Han, *Generalized Cluster Algorithms for Frustrated Spin Models*, Phys. Rev. **B 50**, 3058 (1994).
13. S.-J. Bae, S.H. Ko and P.D. Coddington, *Parallel Wolff Cluster Algorithms*, Int. J. Mod. Phys. **C 6**, 197 (1995).
14. Paul D. Coddington, *Random Number Generators for Parallel Computers*, The NHSE Review, 1996 Volume, Second Issue. <http://nhse.cs.rice.edu/NHSEreview/RNG/>,
15. K.A. Hawick, H.A. James, A.J. Silis, D.A. Grove, K.E. Kerry, J.A. Mathew, P.D. Coddington, C.J. Patten, J.F. Hercus and F.A. Vaughan, *DISCWorld: An Environment for Service-Based Metacomputing*, Future Generation Computer Systems **15**, 623 (1999).
16. K.A. Hawick and P.D. Coddington, *Interfacing to Distributed Active Data Archives*, Future Generation Computer Systems **16**, 73 (1999).
17. K.A. Hawick, D.A. Grove, P.D. Coddington and M.A. Buntine, *Commodity Cluster Computing for Computational Chemistry*, Internet Journal of Chemistry **3**, number 4 (2000), <http://www.ijc.com/articles/2000v3/4/>.

CONFERENCE PROCEEDINGS

1. P.D. Coddington, *The Application of Transputer Arrays to Scientific Problems*, Proc. of the First Australian Occam User's Group Meeting, Melbourne (June 1988), J. Hulskamp ed.
2. P.D. Coddington and C.F. Baillie, *A Comparison of Cluster Algorithms for Potts Models*, Proc. of the Int. Symposium on Lattice Field Theory, Capri, Italy (September 1989), Nucl. Phys. B (Proc. Suppl.) **17**, 305 (1990).
3. P.D. Coddington and C.F. Baillie, *Cluster Algorithms for Spin Models on MIMD Parallel Computers*, Proc. of the 5th Distributed Memory Computing Conference, Charleston, SC (April 1990), eds. D.W. Walker and Q.F. Stout (IEEE Computer Society Press, Los Alamitos, California, 1990).
4. P.D. Coddington and C.F. Baillie, *The Dynamical Critical Exponents of the Swendsen-Wang Algorithm for the 2D Ising Model*, Proc. of the IMACS 1st Int. Conf. on Computational Physics, Boulder, CO (June 1990).

5. P.D. Coddington, *Non-local Cluster Update Algorithms for Spin Models*, Proc. of the 2nd Annual World Conference on Transputer Applications, Southampton, U.K. (July 1990), published in Applications of Transputers 2, eds. D.J. Pritchard and C.J. Scott, (IOS Press, Amsterdam, 1990).
6. P.D. Coddington and C.F. Baillie, *Parallel Cluster Algorithms*, Proc. of the Int. Conf. on Lattice Field Theory, Tallahassee, FL (October 1990), Nucl. Phys. B (Proc. Suppl.) **20**, 76 (1991).
7. P.D. Coddington and C.F. Baillie, *Dynamical Exponents for Potts Model Cluster Algorithms*, Proc. of the Int. Conf. on Lattice Field Theory, Tsukuba, Japan (November 1991), Nucl. Phys. B (Proc. Suppl.) **26**, 632 (1992).
8. M. Bowick, B. Brüggmann, P. Coddington, L. Han, G. Harris and E. Marinari, *Random Surfaces and Quantum Gravity: Looking for the Emergence of Continuum Theories from Triangulated Manifolds*, Proc. of the Accademia dei Lincei Meeting, Rome, Italy (September 1992).
9. M. Bowick, P. Coddington, L. Han, G. Harris and E. Marinari, *Strings with Extrinsic Curvature : An Analysis of the Crossover Regime*, Proc. of the Int. Conf. on Lattice Field Theory, Amsterdam, (1992). Nucl. Phys. B (Proc. Suppl.) **30**, 795 (1993).
10. P.D. Coddington, *An Analysis of Distributed Computing Software and Hardware for Applications in Computational Physics*, Proc. of the Second Int. Symposium on High Performance Distributed Computing (HPDC-2), Spokane, WA, July 1993.
11. G.C. Fox and P.D. Coddington, *An Overview of High Performance Computing for the Physical Sciences*, Proc. of the Mardi Gras Conference on High Performance Computing and Its Applications in the Physical Sciences, Baton Rouge, LA (February 1993), eds. D.A. Browne *et al.*, (World Scientific, Singapore, 1994).
12. K. Anupindi, A. Skjellum, P. Coddington, and G. Fox, *Parallel Differential-Algebraic Equation Solvers for Power System Transient Stability Analysis*, Proc. of the Scalable Parallel Libraries Conference, Mississippi State University, October 1993.
13. Kim Mills, Geoffrey Fox, Paul Coddington, Barbara Mihalas, Marek Podgorny, Barbara Shelly and Steven Bossert, *The Living Textbook and the K-12 Classroom of the Future*, Proc. of SuperComputing '95, San Diego, CA, November, 1995.
14. P.D. Coddington, *Tests of Random Number Generators Using Ising Model Simulations*, Proc. of the 1995 US-Japan Bilateral Seminar on Statistical Physics, Int. J. Mod. Phys. **C 7**, 295 (1996).
15. Haluk Topcuoglu, Kivanc Dincer, Fatih Sevigen, Paul D. Coddington, Sanjay Ranka, *Parallel Simulation of Dynamically Triangulated Random Surfaces*, Proc. of the 8th Int. Conf. on Parallel and Distributed Computing and Systems, Chicago, October 1996.
16. M.A.S. Elmohamed, P.D. Coddington, G.C. Fox, *A Comparison of Annealing Algorithms for Academic Course Scheduling*, Selected Papers from the 2nd Int. Conf. on the Practice and Theory of Automated Timetabling (PATAT'97), Toronto, August 1997, eds. Edmund Burke and Mike Carter, Lecture Notes in Computer Science, Springer, 1998.
17. K.A. Hawick, A.L. Brown, P.D. Coddington, J.F. Hercus, H.A. James, K.E. Kerry, K.J. Maciunas, J.A. Mathew, C.J. Patten, A.J. Silis, F.A. Vaughan, *DISCWorld: An Integrated Data Environment for Distributed High-Performance Computing*, Proc. of the 5th IDEA Workshop, Fremantle, February 1998.
18. P.D. Coddington and S.-H. Ko, *Techniques for Empirical Testing of Parallel Random Number Generators*, Proc. of the 12th ACM Int. Conf. on Supercomputing, Melbourne, July 1998.
19. Alvin Leung and Paul Coddington, *Interactive Viewing of 3D Terrain Models using VRML*, Proc. of the Asia Pacific Web Conference (APWeb98), Beijing, September 1998, eds. Y. Yang *et al.*, (International Academic Publishers, 1998).
20. Yuh-Jye Chang, Paul Coddington and Karlie Hutchens, *Viewing the Visible Human using Java and the Web*, Web Technologies and Applications, Proc. of the Asia Pacific Web Conference (APWeb98), Beijing, September 1998. eds. Y. Yang *et al.*, (International Academic Publishers, 1998).
21. P.D. Coddington, K.A. Hawick, K.E. Kerry, J.A. Mathew, A.J. Silis, D.L. Webb, P.J. Whitbread, C.G. Irving, M.W. Grigg, R. Jana, K. Tang, *Implementation of a Geospatial Imagery Digital Library using Java and CORBA*, Proc. of Technologies of Object-Oriented Languages and Systems Asia (TOOLS 27), Beijing, September 1998, eds. J. Chen *et al.*, (IEEE Computer Society, 1998).
22. P.D. Coddington, K.A. Hawick and H.A. James, *Web-based Access to Distributed High-Performance Geographic Information Systems for Decision Support*, Proc. of Hawai'i Int. Conf. on System Sciences (HICSS-32), Maui, January 1999.

23. P.D. Coddington, J.A. Mathew and K.A. Hawick, *Interfaces and Implementations of Random Number Generators for Java Grande Applications*, Proc. of High Performance Computing and Networks Europe (HPCN '99), Amsterdam, April 1999.
24. J.A. Mathew, P.D. Coddington and K.A. Hawick, *Analysis and Development of Java Grande Benchmarks*, Proc. of ACM 1999 Java Grande Conference, Palo Alto, California, June 1999.
25. D.A. Grove, P.D. Coddington, K.A. Hawick and F.A. Vaughan, *Cluster Computing with iMacs and Power Macintoshes*, Proc. of Int. Conf. on Parallel and Distributed Computing Systems (PDCS'99), Fort Lauderdale, August 1999.
26. H.A. James, K.A. Hawick and P.D. Coddington, *Scheduling Independent Tasks on Metacomputing Systems*, Proc. of Int. Conf. on Parallel and Distributed Computing Systems (PDCS'99), Fort Lauderdale, August 1999.
27. P.D. Coddington, M.W. Grigg, S.J. Del Fabbro, K.A. Hawick, S.P. James, E.H.S. Lo, A.K. Lui, K.D. Mason and M.J. Owen, *Interfacing to On-line Geospatial Imagery Archives*, Proc. of Australasian Urban and Regional Information Systems Assoc. Conf. (AURISA'99), Leura, NSW, 1999.
28. K.E. Kerry Falkner, P.D. Coddington and M.J. Oudshoorn, *Implementing Asynchronous Remote Method Invocation in Java*, Proc. of Parallel and Real-Time Systems (PART'99), Melbourne, September 1999.
29. K.A. Hawick, P.D. Coddington, H.A. James and C.J. Patten, *On-Line Data Archives*, Proc. of Hawai'i International Conference on System Sciences (HICSS-34), Maui, January 2001.
30. K.A. Hawick, H.A. James and P.D. Coddington, *A Reconfigurable Component-based Problem Solving Environment*, Proc. of Hawai'i International Conference on System Sciences (HICSS-34), Maui, January 2001.
31. H.A. James, K.A. Hawick and P.D. Coddington, *An Environment for Workflow Applications on Wide-Area Distributed Systems*, Proc. of Hawai'i International Conference on System Sciences (HICSS-34), Maui, January 2001.

BOOKS

1. Contributions to G.C. Fox, P.C. Messina, R.D. Williams, editors, *Parallel Computing Works!*, (Morgan Kaufmann, San Francisco, 1994).