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Mission

Applying science and technology to problems that really matter.

Career History

- *Mar 2003 – Present*: Computational Scientist, Risk and Impact Analysis Group, Geoscience Australia. Research, development and application of natural hazard models.
 - *Sep 2003 – Dec 2003*: Visiting Professor, Department of Mathematics, Suranaree University of Technology, Nakhorn Ratchasima, Thailand. Teaching PhD course in High Performance Computing.
 - *Nov 1998 – Feb 2003*: Research Fellow, School of Mathematical Sciences, Australian National University. Research in enterprise datamining.
 - *Mar 1998 – Oct 1998*: Scientific Computing Consultant
UNI•C, Danish Computing Centre for Research and Education.
Design and development of parallel image analysis algorithm.
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Education

- Doctor of Philosophy (May 1998)
Technical University of Denmark
Department of Mathematical Modelling
Thesis: “Wavelets in Scientific Computing”
Available at <http://datamining.anu.edu.au/~ole>
- Master of Science (November 1993)
Roskilde University, Denmark
Department of Computer Science
Thesis: “DISCO – DIScrete and COntinuous simulation”
- Bachelor of Science (June 1990)
Roskilde University, Denmark
Department of Mathematics

Main achievements

- A new modelling capability that can simulate impacts of tsunamis, storm surge or flood disasters on the built environment. This work was awarded the Emergency Management Australia "Safer Communities Award" in 2005 and 2007 as well as the Asia-Pacific Spatial Excellence Award in 2007. The software underpinning this work is available at <http://sourceforge.net/projects/anuga>
- A corporate high performance computing capability in my organisation. This involved building a prototype parallel Linux cluster, developing and presenting the business case to the senior management team, setting up a corporate wide special interest group, managing the installation process from tender to final acceptance testing.
- Influencing my workplace to take up modern software development methodologies and practices that have improved the quality, speed and audit trail of corporate software.
- A binding for the Message Passing Interface (MPI) for the Python programming language. Pypar is open source and used widely in the scientific community (bio-informatics, health and datamining and modelling). Pypar is available at <http://sourceforge.net/projects/pypar>
- The development of a WEB-enabled data exploration tool online analysis of large Health care databases at the Health Insurance Commission. This involved datamining and record linkage of about 80 million MBS claims and 50 million PBS claims and required the development of special purpose software to handle these volumes.
- Developed vector-parallel fast wavelet transforms for the Fujitsu scientific software library. The implementation was accompanied by a performance model that predicted both sequential and parallel actual performance. About 80 % of peak performance on one processor was achieved, and the parallel efficiency was *independent* of the problem size as well as the number of processors.
- Developed an efficient algorithm for wavelet transforms of circulant matrices and various operations on them. Exploiting the particular structure of this problem reduced the storage requirements as well as the algorithmic complexity from *quadratic* to *linear* in the number of non-zeros.

Selected publications

- *Modelling answers tsunami questions.* Ole Nielsen, Jane Sexton, Duncan Gray and Nick Bartzis. AusGeo News September 2006 Issue No. 83.
<http://www.ga.gov.au/ausgeonews/ausgeonews200609/modelling.jsp>
- *Parallelisation of a finite volume method for hydrodynamic inundation modelling.* S. G. Roberts, L. Stals and O. M. Nielsen. Proceedings of CTAC'06 - The 13th Biennial Computational Techniques and Applications Conference, 2-5 July 2006, ANZIAM Journal, Vol 48.
<http://anziamj.austms.org.au/ojs/index.php/ANZIAMJ/article/view/153>
- *Hydrodynamic modelling of coastal inundation.* Nielsen, O., S. Roberts, D. Gray, A. McPherson and A. Hitchman In Zerger, A. and Argent, R.M. (eds) MODSIM 2005 International Congress on Modelling and Simulation. Modelling and Simulation Society of Australia and New Zealand, December 2005, pp. 518-523. ISBN: 0-9758400-2-9.
<http://www.mssanz.org.au/modsim05/papers/nielsen.pdf>

- *Computer Architecture and Organization*. Chapter in Encyclopedia of Biostatistics, second edition. Ole M. Nielsen, Wiley InterScience, 2005
- *Quantifying Vulnerability: A methodology for those at risk to natural hazards*. A. Dwyer, C. Zoppou, O. Nielsen, S. Day, S. Roberts. International Journal of Mass Emergencies and Disasters (In review)
- *An Iterative Approach to Determining the Length of the Longest Common Subsequence of Two Strings*. Hilary S Booth, Ole M Nielsen, Susan R Wilson. Methodology And Computing In Applied Probability 6 (4): 401-421, Kluwer Press December 2004
- *Multidimensional Smoothing Using Hyperbolic Interpolatory Wavelets*. Markus Hegland, Ole M. Nielsen and Zuowei Shen, Electronic Transactions on Numerical Analysis 17:168-180, 2004.
- *Parallelisation of Sparse Grids for Large Scale Data Analysis*. Jochen Garcke, Markus Hegland and Ole Nielsen. In P.M.A. Sloot, D. Abrahamson, A. Bogdanov, J. Dongarra, and J Gorbachev, editors, Computational Science - ICCS 2003, volume 2659 of Springer Lecture Notes in Computer Science, pages 683-692, 2003.
- *Parallel Computing Techniques for High Performance Probabilistic Record Linkage*. Peter Christen, Markus Hegland, Stephen Roberts, Ole M Nielsen, T. Churches, and K Lim. Proceedings of the symposium on Health Data Linkage, 2002.
- *Data Mining with Python*. Ole M. Nielsen, Peter Christen, Markus Hegland and Tatiana Semenova, Proceedings of the 9th International Python Conference, Long Beach, California, March 2001. Foretec Seminars, Inc
- *Scalable Parallel Algorithms for Surface Fitting and Data Mining*. Peter Christen, Markus Hegland, Ole M. Nielsen, Stephen Roberts, Peter E. Strazdins and Irfan Altas, Elsevier Journal of Parallel Computing, special issue on *Aspects of Parallel Computing for Linear Systems and Associated Problems*, September 2000.
- *Data Mining of Administrative Claims Data of Pathology Services*. Simon Hawkins, Graham Williams, Rohan Baxter, Peter Christen, Michael Fett, Markus Hegland, Fuchun Huang, Ole Nielsen, Tatiana Semenova and Andrew Smith, Thirty-Fourth Hawaii International Conference on System Sciences (HICSS-34), January 2001.
- *Parallel Performance of Fast Wavelet Transforms*. Ole Møller Nielsen and Markus Hegland, International Journal of High Speed Computing, Vol. 11, No. 1 (2000) 55-74. World Scientific Publishing Company
- *High Dimensional Wavelet Smoothing, CTAC99 proceedings*. Ole Nielsen, Journal of the Australian Mathematical Society Series B - Applied Mathematics, June 2000
- *Wavelet Analysis for Power System Transients*. Anthony Wayne Galli and Ole Møller Nielsen, IEEE Computer Applications in Power, Volume 12, Number 1, January 1999.