Ole Nielsen

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Mission

Focusing on issues that matter. Working together to achieve greatness. Embracing and driving change.

Quotes

- Gordon

- Jono

- John

- David

- ...

- Truly outstanding is the best way to sum up the leadership that Ole has shown in the use of high performance computing and professional software engineering to support a wide range of applications within Geoscience Australia. *GA AGM award 2008.*

- In particular, Oles discipline and demand for high quality software engineering has allowed the tsunami risk modelling team to undertake challenging cutting-edge projects for a number of clients with confidence that our tools can meet varied requirements. *Jane Sexton, Geoscience Australia, 2008.*

- Ole almost single handedly championed the idea of GA obtaining a Beuwolf cluster computer, by first developing a small test bed, gathering together a band of users and then being deeply involved in the subsequent business plan, tender, purchase and testing of the new GA system. *Prof Stephen Roberts, ANU Dept Mathematics, 2006.*

Career History

- *Mar 2013 – Present*: Software Development Manager, Geoscience Australia. Oversight of software development, management of 39 staff, responsible for software quality and knowledge management.

- *Mar 2010 – Mar 2013*: Numerical Modeller, Australia-Indonesia Facility for Disaster Reduction, AusAID, Indonesia. Oversight of software engineering and computational infrastructure supporting the Indonesian government disaster management agency in better planning and decision making.

- *Mar 2003 – Mar 2010*: Senior Computational Scientist, Geoscience Australia. Research, development and application of natural hazard models. In particular, leading the development of ANUGA hydrodynamic modelling and its application in tsunami impact modelling.

- *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.

Education

- Doctor of Philosophy (May 1998)
  Technical University of Denmark
  Department of Mathematical Modelling
  Thesis: "Wavelets in Scientific Computing"

- Master of Science (November 1993)
  Roskilde University, Denmark
  Department of Computer Science
  Thesis: "DISCO – DIScrete and COntinuous simulation"

- Batchelor of Science (June 1990)
  Roskilde University, Denmark
  Department of Mathematics

Some achievements

- Built cohesive team of almost 40 software developers following centralisation of software development in Geoscience Australia and implemented agreed quality measures and development standards for the main development languages in use in the organisation. I lead the increased focus on Continuous Delivery, Open Source, Test Automation and Cloud Computing

- Lead the development of a novel and user friendly application for rapid and reproducible estimation of impact from natural disasters called InaSAFE which is available at `www.inasafe.org`. Version 1.0 was publicly and officially launched at the Asian Ministerial Conference on Disaster Risk Reduction in October 2012 and shown to the president of Indonesia as the centrepiece of Australian Indonesian cooperation in Disaster Management. InaSAFE is currently being provided to local and national disaster managers in Indonesia. The World Bank who is a partner in this project is building web applications based on InaSAFE for use world wide.

- Development of InaSAFE - a software tool that can model impact from natural hazards to infrastructure and population. InaSAFE was developed for Indonesia but is used more broadly. InaSAFE won the Black Duck prize for most promising projects of 2012.

- A new modelling capability, ANUGA, that can simulate impacts of tsunami, 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. More information about the ANUGA project is available at `http://en.wikipedia.org/wiki/ANUGA_Hydro`

- 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, used widely in the scientific community (bio-informatics, health and datamining and modelling) and underpins projects such as ANUGA, python-FALL3D, URS-TSUNAMI and EQRM. Pypar is available at `http://code.google.com/p/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

- *Development of python-FALL3D: a modified procedure for modelling volcanic ash dispersal in the Asia-Pacific region.* Bear-Crozier, A.N., Kartadinata, N., Heriwaseso, A and Nielsen, O (2012). Natural Hazards, Vol 64 (1), pp. 821-838.

- *Towards spatially distributed quantitative assessment of tsunami inundation models.* Jakeman, J. D., Nielsen, O.M., Van Putten, K. Mleczko, R., Burbidge, D. and Horspool, N. Ocean Dynamics 2010, DOI 10.1007/s10236-010-0312-4

- *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.