curriculum vitae Dr. Michael K. Bane

Current Positions

Manager, Centre for AI Solutions, University of Liverpool (*July2019 ongoing*)
Manager of growing AI software development team to support UoL research teams and their industrial engagements, to support the growth of CAIS, to attract major new partners to work with the University, applying the AI research from campus to solve industrial grand challenges, leading to higher Impact and new research funding.

University Teacher, University of Liverpool (Oct2018 *ongoing*)
At Liverpool, I have taught postgraduate modules on "Multi-core and Multi-processor Programming" and "Big Data Group Projects", and actively developed their materials and delivery mechanisms, with ongoing positive feedback from students and peers. I have introduced, taught (Feb-Apr2020) and continue to develop a final year undergraduate module "High Performance Computing" (HPC) and a new "Advanced HPC" module for postgraduates. I have developed the industrial engagement/impact elements of UG & MSc programmes, have been appointed "Placements Coordinator" and also "Deputy Chair" of the department's Industrial Liaison Forum. My research focuses on energy efficient computing, and the pedagogy of efficient use of HPC, with interests in algorithmic development and use of Machine Learning as a tool to improve efficiency of HPC. https://cgi.csc.liv.ac.uk/~mkbane/

Founder, High End Compute Ltd (Incorporated January 2017)
Michael started the "High End Compute" consultancy in Spring 2013 and incorporated in January 2017. HEC engages SMEs in emerging technology/techniques with a focus on parallel computing and low energy computing, via workshops & training and the philosophy of passing on the skills via authentic hands-on examples, & working with institutions to consider their support processes and strategies, data centre choices & wider infrastructure. Recent commissions include design & delivery of training on "How to do Parallel" for National Environmental Research Council postgraduates, production of a training video for Intel via a third party, design & delivery of the relevance of cryptology to school children, briefing paper for eco-Innovation Award on porting for energy savings to emerging architectures, and GPU programming for Doctoral Training programme. https://highendcompute.co.uk

Chair, EMiT Organising Committee
Michael set up the EMerging Tech (techniques/technologies) international conference series and was Chair of the Organising Committee for #EMiT2016 hosted at Barcelona Supercomputing Centre, is co-organiser for EMiT@CIUK (Dec2017) and Chair for EMiT2019, Huddersfield, UK, in April 2019. https://emit.tech

Programme Committee Membership Roles
HETET20 (Workshop on HPC Education and Training for Emerging Technologies) at ISC2020
ICT4S Computing+Sustainability+Education Workshop 2018 http://sustainabilitydesign.org/initiatives/compsused/

Membership of Professional Bodies
HPC Advisory Council http://hpcadvisorycouncil.com
MontBlanc End User Group (ended 2018)

Skills, Expertise and Experience

From code design through to implementing high performing solutions, Michael has the following skills:

- Programming: design practices, design cycle, software engineering, coding, porting, debugging, profiling, optimising, parallelising, role of algorithms, numerical analsysis. Languages: FORTRAN (expert), C (intermediate), CUDA (intermediate), Python (intermediate), Java (intermediate), OpenCL (intro/intermediate), MATLAB (expert/intermediate), Mathematica (intro/intermediate), Machine Learning (intro/intermediate), Python (intermediate). Previous experience with PHP, Javascript.
- Teaching: design & delivery of portfolio of inter-related course modules, with bespoke modifications for given audience, using variety of delivery (including online and face-to-face, with hands-on exercises & examples, with ability to use non-standard tools to get across complex topics (eg jigsaw & coloured balls for students to learn by experience about parallelism, potential speed up and likely bottlenecks)
- Measuring & monitoring energy via IPMI, RAPL, snmp, DCIM. High level analysis of energy consumed by large institution, and formulation of plans to reduce energy consumed.
- Hardware: experience with CPUs, GPUs, FPGAs; experience of setting up machines/networks
- Applications stack: installing applications (optimised for given hardware and use cases), OpenMP, tuning MPI, numerical libraries, post-processing

Formal Training Qualifications

ITIL v3 Foundation; Green IT Foundation; Prince 2 Practioner

International Awards

2009/10: National Environmental Hero: UK Universities' Green Impact award

2008: Best Paper award for "Development and illustrative outputs of the Community Integrated Assessment System (CIAS), a multi-institutional modular integrated assessment approach for modelling climate change": paper was selected by the Editors, with support from the Board members, as the best paper published in EMS in 2008 under the 'Decision Support' category.

2006: Community Modeling and Analysis Systems (CMAS) Award "to recognize your outstanding achievements in advancing and promoting the ideals of the community modelling paradigm".

Relevant Recent Professional Experience

Member of UoM General Assembly (Sept. 2011 – Summer 2014)
Secretary, UoM Computational Operations Team (2011-2013)
Chair, UoM Bicycle Users' Group (2010 – Feb 2016)
Communications Officer, HPC SIG (Summer 2012 – December 2013)

Research Scientist, Energy Efficient Computing, Hartree Centre (Feb2016-Oct2018)
EEC Researcher for the Total Software Energy Reporting & Optimisation project; building collaborations between Hartree and vendors; exploring methodologies for hierarchical power & energy measurements; researching avenues for reducing energy to solution (at chip, node, rack & data centre) without adverse increase in time to solution/impact on users. http://community.hartree.stfc.ac.uk/portal/site/eecrp

Manager, Research Apps, IT Services, Univ. of Manchester (Dec 2014 – Feb 2016)
Manager responsible for support of wide portfolio of research applications available to 10,000 researchers at The University of Manchester. Michael brought together two sets of people to form a highly functional new team that supported researchers in their computational and data requirements, from desktop to supercomputers, across a range of programming languages, IDEs and software development tools in both traditional fields of compute/data but also emerging arenas such as many-core, FPGA, ML, heterogenous architectures and energy efficienct computing. Michael's remit also included the development of the Research Computing Training Service and of Research Data Management before his resignation in order to develop his "High End Compute" consultancy

Senior Research Applications & Collaboration Consultant, IT Services, UoM (Dec 2008 – Nov 2014)
Providing strategic direction and expert support to University of Manchester (UoM) and N8/N8HPC researchers in fields of research computing (comprising high end compute, research data management and emerging technologies for computation and informatics) via in-depth support and training. Michael co-ordinated UoM's Research Computing Training Service and wrote, delivered & maintained the UNIX, writing/running programs, Intro to Optimisation, Intro to Parallelisation, MPI, OpenMP and GPU training courses. Michael initiated the GPU Club (Nov2010) to identify & track emerging computational technologies (hardware, software & algorithms) for potential use to maximise research. Michael's instrumental role has built long term relationships with vendors (including AMD, ARM, Intel & NVIDIA) resulting in award of NVIDIA CUDA Research Centre. Michael was responsible for the team's support model, managed various projects, oversaw moves to better interrogate the University's assorted research management systems, and mentored UoM staff. Bane took a short secondment with Environmental Sustainability Team to review data capture & analysis, review implementation of previous energy-saving plan, and produced (with acknowledged praise) forward plan on reducing energy footprint of IT services & using ICT to further reduce UoM's environmental footprint. During his tenure, Bane was named/involved on a variety of research proposals and awards, including NERC GPU, EPS KTA & EPSRC HECToR GPU Testbed along with outreach/STEM innovation awards.

PDRA, Centre for Atmospheric Science, SEAES, Univ. of Manchester [UoM] (Aug. 2004 – Nov. 2008)
Improving the CMAQ Models-3 package, including its numerical and aerosol processes, for modelling aerosol transport in the United Kingdom, including beta tester for "CMAQ Unified" bundles and its meteorological preprocessor, MCIP (for processing data from running MM5, a predecessor to WRF) and have worked with the UM and its UM-to-MCIP processor. Referee for ACPD journal.

Research Associate, Centre for Novel Computing, **Computer Science, UoM**. (Jan. 2000 – July 2004)
A mix of research and project work including: working on Tyndall Centre's flagship project (softIAM) to provide a community integrated assessment system for improving the understanding of climate change, by writing & implementing a portable, flexible framework for coupling remote models (monetary drivers, GCMs, impact models); undertaking optimization of Southampton Oceanographic Centre's "occam" sea model - a large parallel (MPI) high resolution model of the world's oceans; named researcher on EPSRC-funded "Ovaltine" project to develop proof of concept for tool to support automatic parallelisation of OpenMP codes; coding projects for National Office of Statistics and Univ. of Manchester Mobile Systems Architecture; refereed papers EuroPar 2001 & 2002, EuropeanAcrossGrids, compFrame2003 and SuperComputing 2003; gave invited presentations at EuroPar 2002 and 6th European SGI/Cray MPP Workshop (2000).

HPC Applications Support, Manchester Computing/CSAR, Univ. of Manchester. (Aug98–Dec99)
Undertook in-depth support for users of the CSAR supercomputers and local HPC users, particularly on shared memory SGI Origin and Cray MPP systems, with particular reference to single node optimisation, improving parallel performance and performance analysis; developing and delivering training on optimisation and parallelisation for the Origin2000, including writing a new OpenMP course and delivering a 3-day bespoke course for the University of Leicester.

Selected Publications

"Proceedings of the EMerging Technology (EMiT) Conference 2019". Editors: **M.K. Bane**, V. Holmes et al. ISBN 978-0-9933426-4-6.

Benjamin Symons, Paul Popelier, **Michael Bane**, "*Lessons from Coarse Grained OpenMP Parallelisation and Code Optimisations to Accelerate Quantum Computational Chemistry FORTRAN90 Code 'FFLUX'*", UK OpenMP Users Conference, June 2019

Michael Bane, "*Energy Efficient Computing Research at STFC Hartree Centre*", poster, ISC2018. https://2018.isc-program.com/presentation/?id=proj111&sess=sess144 (visited April2019)

David Topping, Irfan Alibay, and **Michael Bane**, "*Accelerating activity coefficient calculations using multicore platforms, and profiling the energy use resulting from such calculations*", EGU2017-12246

N. Di Pasquale, **M. Bane**, S.J. Davie and P.L.A. Popelier (2016), "*FEREBUS: Highly Parallelized Engine for Kriging Training*", J. Comput. Chem., vol. 37, 2606-2616.

"*Proceedings of the EMerging Technology (EMiT) Conference 2016*", Editors: B.D.Rogers, D.Topping, F. Mantovani, **M.K.Bane**. ISBN 978-0-9933426-3-9.

D.O. Topping, M. Barley, **M. Bane**, N.J. Higham, B. Aumont, and G. McFiggans (2016), "*UManSysProp: An online facility for molecular property prediction and atmospheric aerosol calculations*", Geosci. Model. Dev. 9, pp899-914.

"*Proceedings of the Emerging Technology (EMiT) Conference 2015*", Editors: B.D.Rogers, D.Topping, **M.K.Bane**. ISBN 978-0-9933426-0-8.

R. Warren, S. de la Nava Santos, N.W. Arnell, **M. Bane**, T. Barker, C. Barton et al (2008), "*Development and illustrative outputs of the Community Integrated Assessment System (CIAS), a multi-institutional modular integrated assessment approach for modelling climate change*", Environmental Modelling & Software, Volume 23, Issue 5, May 2008, pp592-610.

R.W. Ford, G.D. Riley, M.K. **Bane**, C.W. Armstrong and T.L. Freeman (2006), "*GCF: a General Coupling Framework*", Concurrency and Computation: Practice & Experience (John Wiley & Sons), vol. 18, no. 2, pp163-181, 2006.

Elliot, M. J., Manning, A., Mayes, K., **Bane**, M. and Gurd,J., (2005) "*SUDA: a program for identifying and grading special uniques*". Proceedings of UNECE worksession of statistical Data Confidentiality, Geneva, November 2005.

Michael K **Bane** and Graham D Riley (2002), "*Extended Overhead Analysis for OpenMP*" in Euro-Par 2002 Parallel Processing, 8th International EuroPar Conference, Paderborn, Germany, Aug 2002.

M.K. **Bane**, M.D. Mihajlovic (2001), "*A Fast Parallel Solver for the Biharmonic Problem*", Proceedings of the Tenth SIAM Conference on Parallel Processing for Scientific Computing, Portsmouth, Virginia USA, 2001

M.K. **Bane** and G.R. Riley (2000) "*Automatic Overheads Profiler for OpenMP Codes*" EWOMP2000 conference, 14-15 Sept. 2000, University of Edinburgh.

M.K. **Bane**, R. Keller, M. Pettipher & I. Smith (2000) "*A Comparison of MPI and OpenMP Implementations of a Finite Element Analysis Code*" Cray User Group 22-26 May 2000, Noordwijk NL

M.K. **Bane** and T.L. Freeman, (1992) "*Asynchronous Algorithms for Calculating Polynomial Zeros*" in "Parallel Computing: Problems, Methods and Applications", ed. Messina, P. and Murli, A., Elsevier, Amsterdam, pp. 53-62, 1992

T.L. Freeman and M.K. **Bane**, (1991) "*Asynchronous Polynomial Zero-Finding Algorithms*". Parallel Computing 17, pp. 673-681, 1991.

M.K. **Bane** and T.L. Freeman, (1991) "*Implementation of Parallel Asynchronous Iterative Methods in occam*" in "Applications of Transputers III", ed. Durrani, T.S., et al, I.O.S., Amsterdam, 1991.

T.L. Freeman and M.K. **Bane**, (1990) "*An occam Implementation of an Asynchronous Algorithm for Calculating Polynomial Zeros*" in "Applications of Transputers II", ed. Pritchard, D.J. and Scott, C.J., I.O.S., Amsterdam, pp. 533-540, 1990

Education

PhD in Numerical Analysis and Computing
1988 – 1992, University of Manchester: Doctorate involved implementing numerical algorithms for determining the zeros of polynomials on a novel parallel computer platform (transputer array), focusing on asynchronous communications and performance analysis of the algorithms.

MSc in Numerical Analysis and Computing
1987 – 1988, University of Manchester: Dissertation involved surveying numerical methods to solve differential-algebraic equations, using real life examples from astrophysics with insights gained and improved methods being taken up by astrophysicists.

BSc 2(i) in Physics
1984 – 1987, University of Birmingham

Contact

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