# Paul Bartholomew

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I am an applications consultant in HPC at EPCC, University of Edinburgh with over six years' experience working with, and developing, Computational Fluid Dynamics (CFD) software for research and industry. In the course of this research I have developed extensive skills working with research software and programming in widely used scientific languages including `C`, `Fortran` and `Python` and a passion for computational science.

## Education

**2013 – 2017**   **PhD in Computational Fluid Dynamics**, *Department of Mechanical Engineering, Imperial College London*, Title: Development of an implicit framework for the two-fluid model on unstructured grids.
- Contributed to the development of a general-purpose CFD research code, implementing a fully-coupled solver for the two-fluid model.
  - Learned to write `C` and write software intended for parallel computing
- Published in international peer-reviewed journal
- Presented work at national and international conferences
- Contributed to teaching of MSc students as a Graduate Teaching Assistant for the CFD course

**2009 – 2013**   **MEng. (First class) in Mechanical Engineering**, *Imperial College London*.
- Achieved the 3rd year Dean's list

**2007 – 2008**   **Advanced Highers**, *AAA in Chemistry, Maths and Physics*.
- Senior Proxime Accessit, Bearsden Academy

**2006 – 2007**   **Highers**, *AAAA in Chemistry, Maths, Physics and Technical Studies; B in English*.

**2004 – 2006**   **Standard Grades**, *Grade 1 in Art, Chemistry, French, Geography, Maths, Physics and Technical Studies; grade 2 in English*.

## Professional/research experience

**2019 – pres.**   **Applications consultant in HPC**, EPCC, University of Edinurgh.
- Ported legacy code bases to remove compiler-specific behaviour to support new systems including `ARCHER2`
- Gained experience profiling and analysing codes to diagnose performance issues for HPC
- Developed good working relationships working with external partners, both industrial and academic
- Proposed and supervised MSc projects

**2018 – 2019**   **eCSE 13-03 *A high-order accurate solver for free-surface flows***, Imperial College London.
- Awarded additional funding to continue work of eCSE 10-02 to develop a free-surface solver
- Key contributor to project to modernise `Incompact3d` codebase
- Presented work at national and international conferences

**2017 – 2018**   **eCSE 10-02 *An adjoint solver for variable-density flows in the low Mach number limit***, Imperial College London.
- Implemented a low Mach number solver in open-source CFD code `Incompact3d`
  - Learned to write `Fortran`
  - Gained experience working with Tier-1/0 super computers
- Presented work at national conferences
- Published in international peer-reviewed journal

**2012**   **Undergraduate Research Opportunities Programme**, Imperial College London.
- Won funding to join a research group in the Thermofluids division of the Mechanical Engineering department at Imperial College for the summer between the third and final year of my undergraduate MEng. degree.
- Gained experience working with Paraview
- Developed simple CFD code in Python

**2008 – 2009**   **Year In Industry**, *BAE Systems*, Glasgow.
- Worked in the operations department at the Scotstoun shipyard
- Implemented a requisition tracking system to facilitate transfer of materials between projects
- Assisted in project management of the charity project to refit the Seagull barge

## Publications

Include:

**P. Bartholomew, G. Deskos, R. Frantz, F. Schuch, E. Lamballais, S. Laizet**, *Xcompact3d: An open-source framework for solving turbulence problems on a Cartesian mesh in SoftwareX* , 2020.

**P. Bartholomew, S. Laizet**, *A New Highly Scalable, High-Order Accurate Framework for Variable-Density Flows: Application to Non-Boussinesq Gravity Currents in Computer Physics Communications* , 2019.

**P. Bartholomew, F. Denner, M. H. Abdol-Azis, A. Marquis, B. van Wachem**, *Unified Formulation of the Momentum-Weighted Interpolation for Collocated Variable Arrangements in Journal of Computational Physics* , 2018.

## Skills and interests

**Technical knowledge**.
- Very strong background in numerical software, particularly CFD, having worked with and extended two research codes each using different numerical methods
- Contributed to the development of new software
- Able to effectively troubleshoot problems in simulations

**Computer programming and skills**.
- Have developed software in several of the major languages used in computational science including `C`, `Fortran` and `Python` and have experience using `MATLAB/Octave`
- Have experience programming for distributed systems and a good knowledge of `MPI` and the `PETSc` library
- Familiar with Linux use and administration
- Experience using tier-1/0 HPC systems
  - Experience using multiple profiling tools on tier-1/0 HPC systems

**Communication skills**.
- Strong presentation skills developed by presenting to both specialist and non-specialist audiences at national and international conferences
- Ability to explain concepts clearly, honed by working as a Graduate Teaching Assistant during my PhD and supervising MSc students
- Contributed to the development of team members by producing a short introduction to git to present to PhD students in the group
- Precise and clear writing skills developed by publishing work in peer-reviewed journals
- Combining these skills with software development has great potential for scientific software
  - I have applied this with literate programming techniques to produce reports with integrated post-processing code, improving the presentation of the analysis and enabling reproducibility of the report

**Teamwork and collaboration**.
- Good teamwork skills having worked as part of a team during both my PhD and PDRA positions working on common software for research
- Experience working with source control management tools including git and svn
- Identification of areas for improvement
  - Instigated development of a post-processing library in collaboration with another PDRA, based on Python tools we had developed to encourage shared approaches to data analysis. This has contributed to the work of other team members

**Personal interests**.
- **Sports** Cycling, badminton and squash
- **Hobbies** Guitar

## Referees

Available on demand.