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RESEARCH SOFTWARE GROUP
BEAR - Advanced Research Computing

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2018 Report

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Introduction

The Research Software Group is part of Advanced Research Computing at the University of Birmingham. The Research Software Group delivers a range of services provided to researchers, and research groups, with the aim of improving the research software written and used by the researchers. BEAR Software's mission is summed up in the words of the Software Sustainability Institute: 'better software, better research'.

The Research Software Group exists to:

- Enable the University of Birmingham's research community to get the best from their research software
- Provide specialist software engineering advice and support to researchers and research software engineers (RSEs)
- Help to enhance the University's reputation for high quality research
- Help researchers get the most from BEAR services, maximising the return on the University's investment in BEAR.



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SOFTWARE GROUP

Advanced Research Computing



Advanced Research Computing or ARC is dedicated to the provision of high powered computational and related services, collectively known as BEAR, designed to support research at Birmingham. The Team has grown rapidly over the past two years following the 2015 Vice Chancellor's Review and in direct response to the demand and specific drivers from our academic community:

- the recognition of the benefits advanced computational techniques can bring to a whole raft of disciplines
- the tsunami of data just waiting to be analysed
- the skills gap and the need to develop capability to enable the exploitation of compute power
- the need for experts to support researchers
- the demands and expectations of funding bodies
- the demand for 'more' from established users of HPC
- the need to provide fit for purpose technology for competitive advantage

The twenty members of ARC are organised in three Groups including **Research Software** with its focus on fostering good practice, embedding skills and supporting the use of software. Alongside sit our **Engagement** and **Architecture Infrastructure and Systems Groups**, the former making sure our services are known across campus and listening to the needs of researchers with the latter designing and building award-winning compute and storage platforms.

With over a thousand projects and thousands of researchers currently using one or more BEAR service, adoption continues to grow and keeps the team very busy with diverse challenges, reflecting the breadth of Birmingham's research. The report that follows provides an introduction to the work of the Research Software Group and gives brief case studies to illustrate the benefits partnership with ARC can deliver. For more information about our services, see the contact information on page 23.



The Team



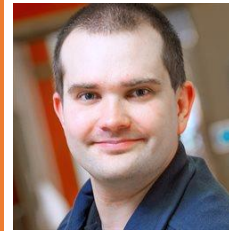
Andrew Edmondson (Ed) – Group Leader

Ed started his career as a software engineer and team leader at QinetiQ, after completing an MMath at the University of Oxford. He left QinetiQ to complete a BA in Theology at Birmingham Christian College and is now nearing the end of a part-time PhD in New Testament Textual Criticism at the University of Birmingham. His PhD is an analysis of the Coherence-Based Genealogical Method (a computer-aided method from the Institut für Neutestamentliche Textforschung in Münster designed to handle complete sets of textual evidence and to identify their initial text and textual history) using Phylogenetics.



Dr Simon Branford – Senior RSE

Simon's experience is in computational research and he has provided high performance computing and mathematical expertise on several research projects. Prior to moving to Birmingham, Simon was a postdoc at the University of Reading in two different areas: evolutionary biology and meteorology. Previously to this he gained a PhD researching the use of hybrid Monte Carlo algorithm for linear algebra problems, and a MSc, in Network Centred Computing (specialising in high performance computing), from the same university. Prior to this he obtained a MMath from the University of Oxford. Simon is a certified Carpentries Instructor.



Laurence Hurst – Senior RSE

Laurence has 10 years experience as a high performance computing (HPC) system administrator, at both Birmingham and Loughborough universities. Prior to this he was a software developer writing stock management systems for car and tractor dealerships. He has a BSc in Computer Science from the University of Warwick. Laurence is a certified Carpentries Instructor and also a certified NVIDIA Deep Learning instructor and University Ambassador.



Mike Allaway – Senior RSE College of Arts and Law

Mike has over 5 years of experience working in IT within the HE sector. He started in a user support role at Cardiff Metropolitan University in 2012 and moved to Birmingham in 2015 to transition into a software development role at the Birmingham Clinical Trials Unit. He holds a BSc with First-class honours in Business Management and Information Systems from Swansea University, as well as an MSc with Distinction in Computing from Cardiff University. He developed a software product as his MSc dissertation for designing medical forms and sold this to the University of Birmingham in 2016.





Cerys Lewis – RSE (Web)

Cerys has over 17 years of full stack web development experience, using a variety of languages. Prior to becoming a Web RSE for University of Birmingham, she worked for the University of Warwick on their internal student administration application software, "Tabula". Previously to that she had a background in Retail Software developing web applications and websites. She is a graduate from Royal Holloway, University of London with a BA(Hons) in English Literature.



Dr Simon Hartley – RSE Centre for Computational Biology

Simon has a degree in theoretical physics and a PhD in Physics and AI. He joined the Research Software Group in October 2018. His previous position was working at Clinical School at Cambridge University, producing tools for breast and ovarian cancer risk prediction.



Dr James Carpenter – Research Applications Specialist

James studied and worked in the Department of Music at the University of Birmingham for 18 years before moving to the Research Software Group in autumn 2018. He completed a PhD in electroacoustic composition in 2013 and has variously worked as a teacher of composition, computer music and studio-related disciplines in the music departments at the University of Birmingham and University of Bristol. Immediately prior to joining the RSG he was Studio Technician in the Birmingham Dept of Music where part of his role involved the administration of the Mac systems, as well as the development of bespoke solutions for the technical management of large-scale and idiosyncratic multichannel loudspeaker concert systems.

RSE (HPC)

University of Birmingham / Aston University

In 2019 we have a new team member joining us. The RSE (HPC) specialises in writing and supporting the use of software on high performance computing, including our local BlueBEAR and BEAR Cloud systems. This post is shared with Aston University 50/50 to support researchers on the regional HPC Midlands Plus cluster.

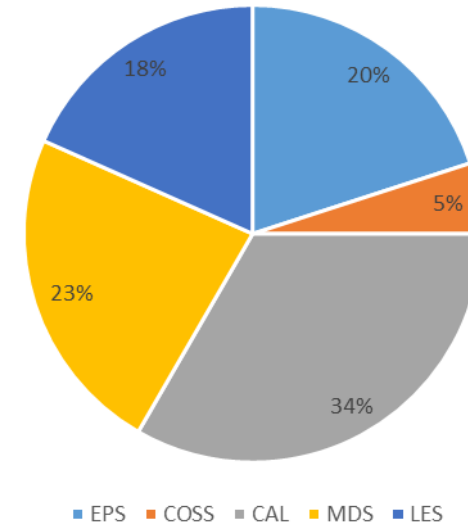


BEAR Software Advice

If a researcher either has need for new research software or wishes to improve their existing software, then BEAR Software RSEs can be engaged to provide advice. BEAR Software RSEs are able to offer advice on the whole life-cycle of research software. Example topics might include:

- Specifying the requirements for a new piece of software or for additions to an existing piece of software.
- Designing and architecting the software.
- Writing user documentation so that installing, and using (including expected input and output of the software) the software is an easier process.
- Producing or using a testing framework or infrastructure for the software, so that a researcher can easily spot if changes or additions to part of the software, or any third party software it relies on, breaks the existing functionality of the software.
- Porting the software to a new platform or system and how to approach optimisation of the software.
- Upgrading the software, and any third party software that may be in use, and how to ensure that the upgrades have not broken the functionality of the software.
- How to manage the release of the software, so that it is available, in an effective and useful way, for use by others in the research community and beyond.
- Integrating a researcher's software with third party software and libraries.
- Using version control to allow a researcher to manage, and track, changes to their software, data, papers, talks, etc.
- Help with specifying the research software requirements of grant applications and specific assistance with the Technical Appendix.
- Provide recommendations about software licenses and licensing issues.
- Advise on available training courses - those available locally, online, and further afield. We can also discuss tailoring existing training courses to meet the specific needs of a research group.
- General discussion about research software or research computing.

By following the BEAR Software Advice a researcher should be able to improve the reliability and maintainability of the research software they write/use and this will help the researcher with the reproducibility and robustness of their research.



Advice Case Study – CaStLeS Virtual Machine

Researcher

Researcher in College of Medical and Dental Sciences

Technologies

Linux (Ubuntu, Centos), Life Sciences applications.

Project description

The research group are using a proprietary graphical tool used to process data from an instrument, which is currently running in a Kubuntu VM. The entire VM image was supplied by the software’s manufacturer (this is commercially licensed software which only a number of members of the group are licenced to use). The current solution was not ideal for the group and they had requested a Castles VM.

Advice

CaStLeS is “Compute and Storage for Life Sciences”. CaStLeS resources (both compute and storage) are a constituent part of BEAR Cloud and the wider BEAR infrastructure. They are reserved exclusively for the use of research groups carrying out research in the life sciences and governed by academics through the CaStLeS Executive and Strategic Oversight Groups.

We found that the software worked on CentOS but they had problems running it on (K)Ubuntu due to differing library versions and had to do back to the supplier who provided a pre-built VM with it running. We offered to provide a CentOS in the CaStLeS environment and suggested this might be easier since the software “just works” on the CentOS platform. The tool is graphical and compute intensive, so a BEAR Cloud/Castles VM seemed the most appropriate solution. They also wanted to make it more easily usable by all those who are allowed access, as previously it was only setup in a VM on one workstation, which was solved by using a BEAR Cloud/Castles VM.

“Can I just say these services are absolutely brilliant... They make life so much easier... Much more efficient use of resources”



Advice Case Study – Batch processing TDA

Researcher

Viola Wiegand (College of Arts and Law)

Technologies

R, BlueBEAR, batch computing

Project Description

Viola's PhD research seeks to understand connections in discourse through a corpus linguistic approach. Specifically, she studies study how the concept of surveillance is represented in different types of texts. In the study for which she used BlueBEAR services Viola analysed textual co-occurrence patterns in a digital newspaper archive, which required processing a dataset of thousands of text files containing approximately 1.5 billion words. The resulting version of the dataset is not only of use for Viola's thesis, but is an asset that can be used for further research by her research group.

Advice

Viola developed R code to perform textual analysis of a digital archive. In order to run the actual analysis, the dataset first had to be converted into a suitable format and a smaller number of files. The existing version of the dataset contained one file per article for the years that Viola needed to analyse. Combining the thousands of article files into monthly files one by one was going to take forty days with the original set up. So the RSE worked to produce a version of the conversion code that could run on each independent part of the data in parallel and then used BlueBEAR HPC to run these jobs in under two days. The support from the RSE to provide a resulting dataset of less than 300 combined files enabled Viola to run the code for analysing textual patterns in the archive.

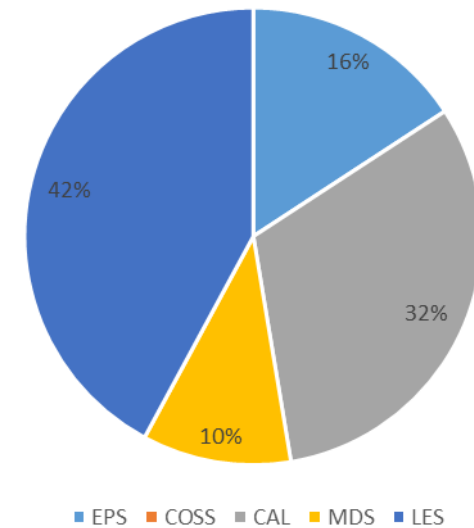
“That’s fantastic, so glad that this is working so quickly! Thank you very much for putting in all this effort so close to the weekend, much appreciated!”



BEAR Software Coaching

If a researcher, or research group, has the need for specific research software expertise, then an RSE can be requested, free of charge, for multiple half-day coaching sessions (max. 20). The RSG can also provide mentoring to an RSE within a research group or college, to enable the RSE to develop technical and non-technical skills. This work could follow on from an initial advice meeting where the further need would be identified and clearly defined objectives would be specified and agreed. Example tasks might include:

- Learning new skills or languages
- Migrating a project to use version control (e.g. Git and GitHub/GitLab).
- Designing and implementing a testing framework.
- Writing user documentation, licensing info etc.
- Testing, debugging, and fixing issues.
- Implementing a new feature.
- Porting the software to a new operating system.
- Designing and implementing a release process.



Coaching Case Study: Feral Parakeets

Researchers

Richard Bufton, College of Life and Environmental Sciences

James Reynolds, College of Life and Environmental Sciences

Technologies

Python, Web, Databases, Mobile applications

Project Description

As part of his PhD, Richard is studying the presence of feral parakeets in Europe. He wants to develop a mobile app to enable people to report sightings of feral parakeets from anywhere in Europe (or possibly the world).

Coaching

Richard had no prior coding experience making this an ambitious project. We started by teaching Richard python and fundamental programming principles and structure. From there we moved onto designing a database to store the information gathered and developing the web-based infrastructure to support a mobile application. This has an internationalised (into 4 languages) on-line data gathering form in the first instance. Richard and the RSE are now working on the mobile app.



Coaching Case Study: Mapping Environmental Action in Scotland

Researcher

Jeremy Kidwell, College of Arts and Law

Technologies

R, GIS, R Markdown

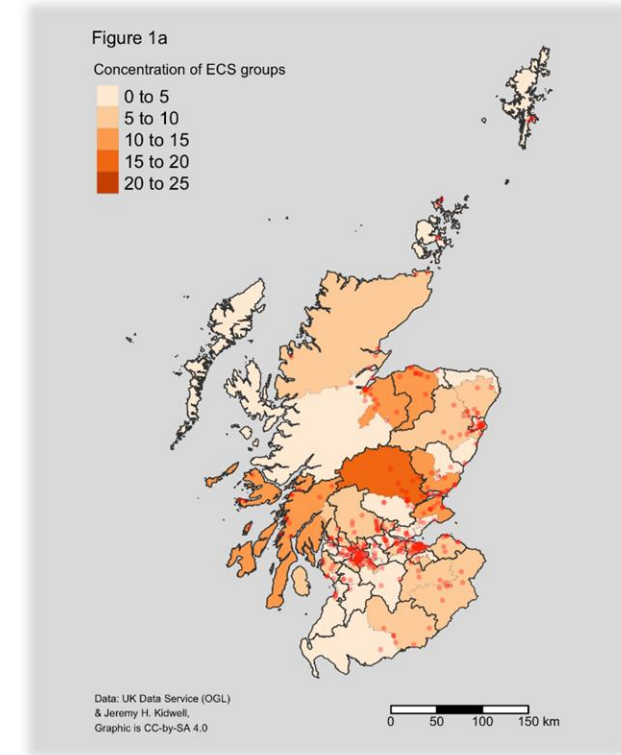
Project Description

Environmentalism has been treated by governments and environmental charities as a largely secular concern. Third-sector groups and governments, particularly in Britain and Europe, have largely ignored religious groups as they have gone about their business crafting agendas for behaviour change, developing funding programmes, and developing platforms to mitigate ecological harm, motivate consumers and create regulation regimes. Since 2008, the Scottish Government has provided a significant portion of funding for the ecumenical charity, Eco-Congregation Scotland, which works to promote literacy on environmental issues in religious communities in Scotland and helps to certify congregations under their award programme. What is not well known, however, is whether or how their membership might be different from other environmental groups. This study represents an attempt to illuminate this new interest with some more concrete data about religious groups in Scotland and how they may differ from non-religious counterparts.

Coaching

The RSEs worked with Jeremy to improve the reliability of the R markdown script and to update the script to use a newer, more efficient R library. This engagement also provided the RSEs an opportunity to learn about GIS, and mapping in R, from Jeremy.

Thanks to you both today – really, really helpful stuff! Excited for the next session.



Coaching Case Study - ITM CPET database

Researcher

Ruth Benson - Academic Clinical Lecturer in Institute of Cancer and Genomic Sciences

Technologies

Python, Pandas, Jupyter Notebooks

Project Description

Ruth is intending to do some research with Testing (CPET) data, predominantly in relation to anaesthetic risks for patients about to undergo general anaesthesia. Currently the CPET data is located in pieces at four sites. Ruth wants to create a new data repository for CPET data at the University which will become “the” source for CPET data, and import existing datasets from 4 other sites into it.

Coaching Supplied

Ruth has no prior coding experience, so the RSE started by teaching her python and basic programming principles and structure. We moved on to doing data-analysis using Pandas and then Pandas in conjunction with Jupyter Notebooks. While waiting for the legal aspects of the original project to become finalised, we have focused on building skills which will enable Ruth to rapidly progress this project when it comes to fruition by experimenting with other datasets using tools which will enable her to complete the work.

“[The RSE] has provided invaluable guidance and design solutions for my original project goals. His coaching sessions have taken me from knowing absolutely nothing about coding, to being comfortable writing basic scripts, performing basic computations, using GIT, and now reading and starting to manage some of the large datasets I am using for my research. His approach is practical and relevant for my goals, which has been key to my coding achievements so far.”

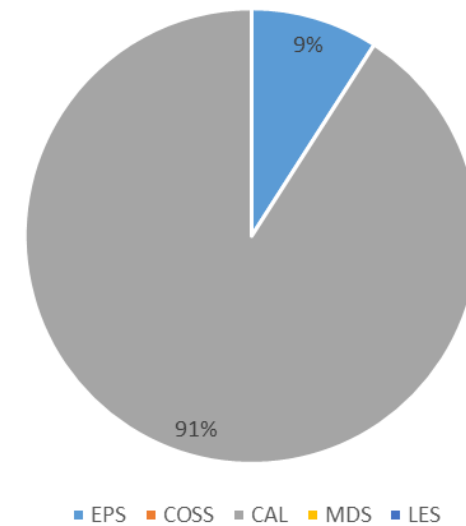


BEAR Software Coding

Similarly to our coaching offering, a researcher, or research group, can request an RSE to carry out software development, free of charge, for up to ten days. During these sessions the RSE would be embedded in the research group (physically or virtually) to work with them to complete specific agreed objectives. This work could follow on from an initial advice meeting where the further need would be identified and clearly defined objectives would be specified and agreed.

The same kind of tasks can be achieved via our coaching or coding services. Our preference is for coaching engagements – as these deliver not only an end-product, but also the skills required to carry out such work again in future.

The majority of our coding engagements have been in the College of Arts and Law (CAL). This is due, in part, to CAL having invested in a dedicated RSE for the college.



Coding Case Study – Centre for Digital Cultures

Researchers

Dorothy Butchard, College of Arts and Law

Matthew Hayler, College of Arts and Law

Technologies

Django 2, Python 3, HTML5, CSS3, JavaScript, jQuery, Bootstrap 4

Project Description

The Centre for Digital Cultures is a new research centre within the College of Arts and Law at the University of Birmingham. Its purpose is to study the effects of digitisation in the 20th and 21st Centuries. The Centre fosters interdisciplinary research and teaching to investigate how artefacts, practices, and communities are created, engaged, or impacted by digital technologies of all kinds. The Centre had a need for a web presence that offers more functionality than is available through the standard University website.

Coding Content

In response to the need for a bespoke solution, the RSG has designed a custom website <https://digitalcultures.bham.ac.uk> that:

- showcases the Centre's research
- promotes upcoming events
- allows members of the Digital Cultures community to discuss important topics relating to research and teaching in this area
- allows the non-technical users to manage their content through an admin dashboard
- offers an engaging and modern user interface
- is built using new technologies, improving the website's maintainability, security, and longevity



Coding Case Study – Hispanic Exile

Researcher

Francis Lough, College of Arts and Law

Technologies

Django 2, Python 3, HTML5, CSS3, JavaScript, jQuery, Bootstrap 4

Project Description

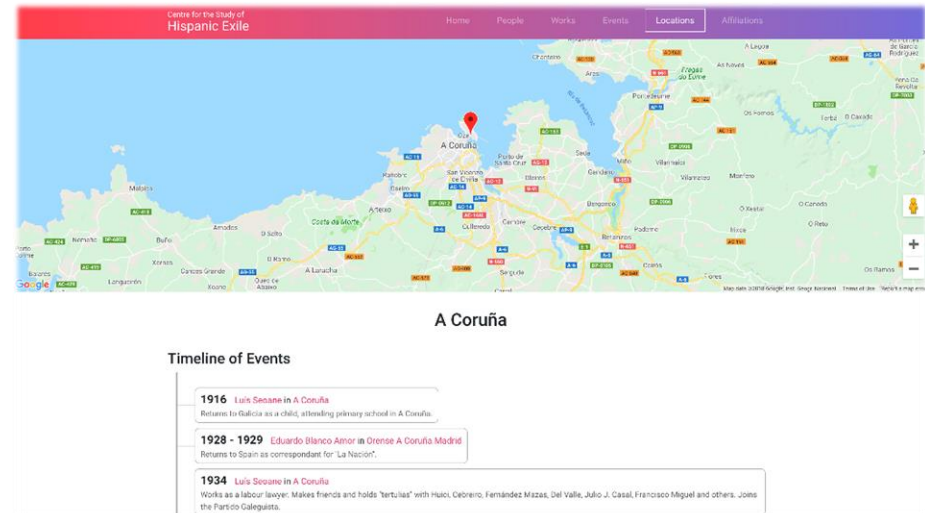
The Exile Remains database was created by members of the Centre for the Study of Hispanic Exile at the University of Birmingham. The database contains entries on Spanish Republican Exiles and their works. The research project in which the Exile Remains database was populated ran from 2007-2008, but the website that acts as a searchable interface for the database is still active and used today. However, given that the website has not been updated since this time, there are several key concerns that threaten its continued existence. Most importantly are security concerns, as it currently exists on an old, vulnerable server and is incompatible with newer, more secure servers. Additionally, the interface is outdated, meaning that, for example, it doesn't run well on mobile devices.

Coding

In order to preserve the Exile Remains database, the RSG have redesigned the website from scratch. In doing so, the website will be able to run for at least 5 more years and will allow the project team to promote the new site to gain a renewed interest in their research, maximising its impact.

The new Hispanic Exile website <https://hispanic-exile.bham.ac.uk/> benefits from:

- modern technologies, allowing for increased performance and maintainability
- runs on a newer, more secure web server
- a more attractive and intuitive UI
- responsive design, allowing it to run well on mobile devices



Coding Case Study - Estoria Crowdsourcing Site

Researcher

Aengus Ward, College of Arts and Law

Technology

Django, Python, HTML, Javascript/JQuery, Bootstrap

Project Description

The Estoria de Espanna Digital project focused on the construction of the first major digital edition of a sustained text in medieval Spanish prose and provides a digital edition of Alfonso el Sabio's most renowned chronicle, which details the history of Spain from its legendary origins up to the death of Fernando III, el Santo.

The crowdsourcing web application seeks to build on this and provides a web application which allows members of the public to transcribe sections of the manuscript through an online interface. Its primary aim is to crowdsource participants from all over the world (including those outside academia) to be able to contribute to translation of these important manuscripts.

Coding

<https://transcribeestoria.bham.ac.uk>, which is available in both English and Spanish, allows user to register themselves and view pages of a manuscript through a viewing screen and transcribe against a base text.

The user is able to zoom in and move around the image to see detail and an interface is provided which allows users to edit the xml using special characters and TEI (<http://www.tei-c.org/>) markup. Users are able to record partial progress as they go along and continue from their previous updates once logged in a second time.

The site also incorporates a training area which allows users to learn the process involved in the transcription and an admin area which allows the site administrators to validate the xml provided by the participants against the hand transcribed texts, to upload new manuscripts and to remove old texts as necessary.



BEAR Support

The Research Software Group handles a wide range of support tickets for BEAR, ranging from relatively simple user training issues up to advising on how to write and run complex multi-node HPC jobs, in addition to the continuous flow of application installation requests which span a broad array of disciplines. We also oversee the administrative streamlining of users' BEAR projects, groups, storage, etc.

Heterogenous HPC

The BlueBEAR compute nodes vary in architecture and GPU provision: the majority of the nodes contain Intel Haswell or Broadwell processors with a small amount of new Intel Skylake and some containing Intel Sandy Bridge, although these are in the process of being phased-out. The addition of **the largest IBM PowerAI cluster in the UK** in late-2018 has added PPC architecture to what was previously an x86-64 HPC. A few of the nodes also have NVIDIA GPUs (various models) but most notably each of the POWER9 nodes includes four NVIDIA V100 GPUs along with a terabyte of RAM.

We also support and provide the same suite of applications on BEAR Cloud Virtual Machines running Centos or Ubuntu.

Automated Application Building

The architectural diversity of the HPC necessitates a flexible build system and we chose EasyBuild, which was developed by the HPC team at Ghent University, Belgium. The software is broadly agnostic to processor type, although certain modifications are having to be made to accommodate the POWER 9 nodes as x86 is assumed in many situations. The Research Software Group is currently undertaking a significant portion of the development of PPC provision in EasyBuild which we are contributing back to the international community.

Beginning in 2018 we now follow EasyBuild's toolchains, which are updated every 6 months titled, e.g. 2018a, 2018b etc. With each toolchain comes a newer version of GCC, the Intel Compilers, Python, R etc. and by synchronising with the main EasyBuild Github repository we ensure that we're taking full advantage of the EasyBuild community's "EasyConfig" developments, i.e. where either new application or updated application configurations are released. We also maintain a private repository of application configurations which, when appropriate, we push back to the main EasyBuild GitHub repository and therefore contribute further to the project.



Training

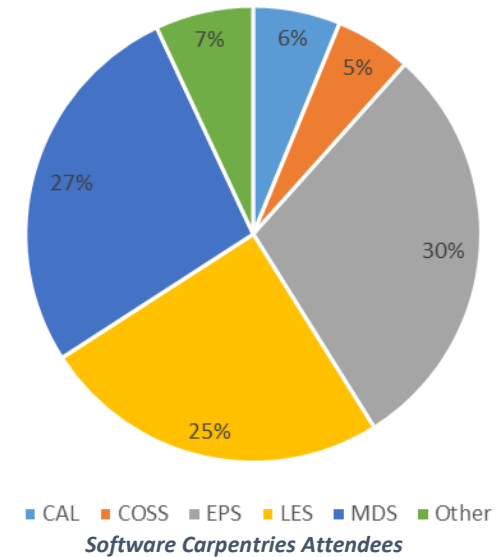
The Research Software Group provides and co-ordinates a range of training courses for researchers at the University of Birmingham.

Software Carpentries

In 2018 we ran four Software Carpentries Python courses, and two Software Carpentries R courses. Each was a two day course. In total we had 66 research students and 63 staff attend. As of mid-January we have already filled 220 places on Software Carpentries courses in 2019.

Software Carpentries is a key component of our service aiming at providing and introduction to the software skills that our research community needs.

The University has six certified Carpentries instructors, including two from the Research Software Group. The other four instructors are a mixture of staff and PhD students from various colleges. In 2019 we are training six more instructors to allow us to deliver more of these important courses.



“All staff were knowledgeable, enthusiastic, approachable and most importantly were able to pitch appropriately to laymen. Instructors were both keen to make sure we understood the underpinnings of the subject, which I appreciate, and they went to great lengths to make sure everyone understood.”

“Excellent introduction to programming. I understand how Python and Git work now so I can see the benefits of using them and can recommend to other researchers to use them.”



NVIDIA Deep Learning Institute

Laurence Hurst, a senior RSE in the Research Software Group, is a certified NVIDIA Deep Learning instructor. We regularly run NVIDIA Deep Learning Institute Fundamentals of Computer Vision workshops for researchers. This is an instructor led hands-on workshop during which attendees learn the basics of deep learning by training and deploying neural networks. On completion of the course, attendees are able to start solving their own problems with deep learning. For the first course, in November 2018, out of 20 available, all 20 places were filled within 2 minutes of the event signup page being available and 18 of those 20 attended on the day. As of mid-January we have already filled 80 places on this course in 2019.

BEAR Necessities

We teach an introductory course to HPC called BEAR Necessities. This course is designed to help researchers get the most out of our BlueBEAR supercomputer.

"Very clear & thorough", "Excellent - all very helpful & approachable", "Slides easy to follow ...", "Very helpful and show a sound knowledge in BlueBEAR services and coding.", "Good and clear explanations, thanks!"

ARCHER Courses

ARCHER is the UK National Supercomputing Service. See www.archer.ac.uk. In 2018 we facilitated Birmingham researcher's participation in ARCHER's OpenMP and MPI series. ARCHER provide online training courses where they produce the training material and the online lectures. We then provide a local room and RSE support for those attending the course.



Community

In conjunction with the Research Engagement Group, we are active participants in:

University of Birmingham special interest groups

Bioinformatics SIG, CFD SIG, MATLAB SIG, Academic Programmers SIG (Ed is co-chair)

University of Birmingham Communities and Conferences

The Hacker Within – most of the team attend these events, and we have presented three times in 2018: “Good Software Practices” (Ed), “Reproducible Research” (Simon B.) and “Compiling software on Linux - the good, the bad and the ugly” (James and Ed)

Digital Research Conversations – Simon H. gave a talk on “Software as Research”

Digital Humanities Forum - Ed spoke on “Digital Humanities Research: "Hacking"”

BEAR Challenge – Advanced Research Computing ran a two-day workshop for undergraduate students on HPC. Ed co-hosted the event and spoke on using HPC. Laurence ran a session on neural networks.

BEAR Post-graduate Research Conference 2018 – Ed spoke on "Theology, software and HPC"

UK RSE Conference

The UK RSE conference is the leading international conference for Research Software Engineering in the world. 2018 saw the third UK RSE conference, this time held in Birmingham, at which:

- Cerys was a volunteer
- Laurence gave a talk on “How RSEs address the advanced computing facilities accessibility gap in Higher Education”
- Ed gave a talk on “The first year in the life of a Research Software Group”

Ed has subsequently been appointed Programme Chair of the 2019 conference, again to be held in Birmingham. See <https://rse.ac.uk/conf2019/>



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WSSSPE 2018

WSSSPE stands for “Working Towards Sustainable Software for Science: Practice and Experiences”. It promotes sustainable research software by addressing challenges related to the full lifecycle of research software through shared learning and community action. Ed attended WSSSPE 6.1 in Amsterdam, and presented a poster on “University of Birmingham Research Software Group - Structure, Services and Stories”. See <https://bssw.io/events/wssspe-6-1>

Ed also collaborated on a blog post later published as “Some software should be sustained, and some shouldn’t. But how can we choose, what is the cost of sustaining it, and what is the cost of letting it pass away?” See <https://www.software.ac.uk/blog/2018-12-13-some-software-should-be-sustained-and-some-shouldnt-how-can-we-choose-what-cost>

POWER AI User Group

Ed is the chair of the new POWER AI User Group which aims to form a community of people who use or support PowerAI systems in Universities. Ed chaired and spoke at the inaugural half-day event in at CIUK December.

HPC-SIG EasyBuild workshop

The University of Birmingham has always been active in the UK HPC-SIG community. In 2018 we identified that there was a significant desire for an EasyBuild workshop amongst the HPC-SIG members. We put on such a workshop, hosting it in Birmingham. Ed spoke about how we use EasyBuild here. We were very pleased that Kenneth Hoste from Ghent was able to come and lead a number of interesting and important sessions.



Contact Us

BEAR Software

For any help with anything related to research software at the University of Birmingham please email bear-software@contacts.bham.ac.uk

For information about BEAR Software, see www.birmingham.ac.uk/bear-software

BEAR / Advanced Research Computing

For general HPC enquires (including BEAR Cloud), contact the BEAR team by email at bearinfo@contacts.bham.ac.uk

Follow the Advanced Research Computing's twitter feed @uob_rescomp at twitter.com/uob_rescomp

For information about BEAR, see www.birmingham.ac.uk/bear

Requests, Faults, Complaints

The IT Service Desk is your route to find answers, request items/help or log faults and any complaints online at www.itservicedesk.bham.ac.uk/



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