



# ARCHER CSE Service Quarterly Report

Quarter 2 2016



## 1. Executive Summary

This report covers the period: 1 April 2016 to 30 June 2016 inclusive.

- Centralised CSE Team:
  - A large amount of work has been performed to understand the parallel I/O performance on ARCHER, how it varies with different parameters and how it compares to other parallel file systems on other UK platforms. This work will shortly be published and incorporated into the user documentation to assist users in making the most out of ARCHER.
  - The XALT monitoring system has been enabled on ARCHER to better understand how software and scientific libraries are used on the system. The data from XALT will be included in all future application reports to consortia to help them understand how their users are using ARCHER.
  - We are currently assessing two software packaging solutions: EasyBuild and Spack, to capture the compilation procedures for centrally installed scientific software on ARCHER. The chosen solution will automate the recompilation procedure for included packages and allow us to provide simple compilation instructions to users for complex software and easily collaborate on software builds with other HPC centres worldwide.
- Training:
  - We delivered 13 days (315 student-days) of face-to-face training in the quarter at 6 different locations, with an average feedback score better than “very good”.
  - We delivered 4 virtual tutorials as live interactive webinars with an average of 14 attendees per session.
  - A report on the third follow-up survey on longer-term impact of training was circulated to the training panel and EPSRC.
  - 34 people successfully completed the ARCHER “driving test” in Q2, 23 of whom have subsequently applied for and received a user account.
- ARCHER Outreach Project:
  - ISC16 High Performance in Frankfurt Germany showcased both Wee ARCHIE and Women in HPC work. Wee ARCHIE was one of the biggest draws to the booth and together with a set of postcards highlighting ARCHER science case studies, raised the profile of work done on ARCHER in the UK. Women in HPC hosted both a workshop and BoF, both of which were well received and attended.
  - Wee ARCHIE development is progressing to facilitate the development of demo applications by non-expert groups. The specifications and build instructions for Wee ARCHLET, a small build your own version of Wee ARCHIE, will shortly be available online for download.
- eCSE:
  - Of 59 projects accepted for the first 7 calls, 56 have started of which 37 have now completed. Of those completed, 27 final reports have been received. 10 had already been reviewed at the eCSE06 meeting and a further 15 were reviewed for the eCSE08 Panel meeting on 28 June. The 2 further final reports received and any others received in the meantime will be reviewed at the eCSE09 Panel meeting around November 2016.
  - The 3 projects which have not yet started are all from eCSE07 and are all due to start by 1 August 2016.
  - The eCSE08 Panel meeting was held on 28 June 2016 and 8 projects were awarded funding. Three early career researchers attended this Panel meeting as observers.

## 2. Collaborations and Outputs Summary

- Presentations:
  - Andy Turner, ScotCHEM Symposium, Edinburgh, 14 June 2016
  - Adrian Jackson, Tsukuba-Edinburgh Collaboration Workshop, Edinburgh, June 2016
  - Adrian Jackson, NGCM Workshop, Southampton, June 2016
  - Scaling hybrid coarray/MPI miniapps on ARCHER, Luis Cebamanos, CUG 2016, London, 7-12 May 2016
  - Oliver Henrich, EPSRC Research Software Engineer Fellowship Launch Event, Royal Society London, 22 April 2016
  - Adrian Jackson, HPC-CORE Workshop, Lancaster, April 2016
- Meetings:
  - Andy Turner, Jo Beech-Brandt, HPC-SIG Meeting, Glasgow, 7 June 2016
  - Oliver Henrich, CCPBioSim/CCP5 Multiscale Modelling Conference, Manchester Conference Centre, 13-15 April 2016
- Papers:
  - Scaling hybrid coarray/MPI miniapps on ARCHER, Luis Cebamanos, CUG 2016 Proceedings:  
[https://cug.org/proceedings/cug2016\\_proceedings/includes/files/pap120.pdf](https://cug.org/proceedings/cug2016_proceedings/includes/files/pap120.pdf)
  - Invertastic: Large-scale Dense Matrix Inversion, Alan Gray, ARCHER White Paper: <http://www.archer.ac.uk/documentation/white-papers/invertastic/invertasticGray.pdf>

### 3. Forward Look

- HPC Benchmarks:
  - We are using the data on the applications used over the lifetime of ARCHER to write a paper with proposals for updating the benchmark set for future procurements. This paper will be circulated to the research councils and major user groups for comment.
  - Once the benchmark applications have been agreed we will work with the users to identify suitable benchmark cases for each of the applications.
  - These benchmarks will then feed into the ARCHER Continuous Integration Server activity to assess the range of performance on ARCHER and into the Future Technology activity to assess performance on different hardware.
- Application Landscape:
  - We plan to enable Cray Resource Usage Reporting to collect job level data on memory usage, energy consumption and I/O statistics and incorporate this data into SAFE so it can be queried by users, PI's and service partners.
  - The CSE service is leading a discussion session on the UK application landscape at the inaugural Research Software Engineers workshop in Manchester in September. This session aims to form a working group to look at ways of gathering information on the UK application landscape.
- Parallel I/O:
  - Initial data on the parallel I/O performance of the ARCHER Lustre file systems will be published on the ARCHER website and used to develop advice for users on how to get the best I/O performance for their applications.
  - We will broaden the investigations to cover, for example, the impact of multiple simultaneous parallel I/O operations on performance.
  - We will coordinate with users to obtain parallel I/O heavy user benchmarks.
- Training:
  - We are developing a new web page on "Training Pathways" to better inform users on how the various ARCHER training courses fit together.
  - A talk on the ARCHER training programme and the success of the driving test has been accepted for the *Third Workshop on Best Practices for HPC Training* to be held at SC16 in November.
  - We continue to look for collaborations when organising training. The upcoming *Scientific Python* course is being held immediately after the ARCHER champions meeting in Oxford; the *Practical Software Development* course is being organised jointly with the EPSRC-funded Software Engineering Support Centre at RAL.
- ARCHER Outreach Project:
  - Women in HPC will hold a full one-day workshop at SC16 and the UK event will be held alongside EuroMPI 2016 (Edinburgh, September). Women in HPC will submit two 'birds of a feather' proposals to SC16 in July. WHPC is also collaborating with EuroMPI 2016 to improve the overall diversity of the conference.
  - The second ARCHER Champions face-to-face meeting will take place on 5/6 September 2016 in Oxford, with the third meeting provisionally scheduled for February 2016.
  - Best practice paper: How to improve the representation of women at conferences is currently in preparation.
  - The outreach material for the Teacher and Outreach Ambassadors pack is now being prepared, with anticipation of the material being released in Q3/Q4 2016.
- eCSE:
  - We are about to embark on a review of the eCSE proposal form to make it easier for reviewers to carry out their assessments efficiently as well as improving the experience for applicants. This is based on feedback we have received from applicants, technical reviewers and panel members.
  - We will continue to work on impact case studies from completed eCSEs.

## 4. Contractual Performance Report

This is the contractual performance report for the ARCHER CSE Service for the Reporting Periods: April 2016, May 2016 and June 2016.

The metrics were specified by EPSRC in Schedule 2.2 of the CSE Service Contract.

### CSE Query Metrics

- **QE1:** The percentage of all queries notified to the Contractor by the Help Desk in a Quarter that the Contractor responds to, and agrees a work plan with, the relevant End User within 3 working hours of receiving the notification from the Help Desk. *Service Threshold: 97%; Operating Service Level: 98%.*
- **QE2:** The percentage of all queries notified by the Help Desk to the Contractor that have been satisfactorily resolved or otherwise completed by the Contractor within a 4-month period from the date it was first notified to the Contractor. *Service Threshold: 80%; Operating Service Level: 90%.*
- **TA1:** The percentage of all technical assessments of software proposals provided to the Contractor by the Help Desk in any Service Period that are successfully completed by the Contractor within 10 days of the technical assessment being provided to the Contractor by the Help Desk. *Service Threshold: 85%; Operating Service Level: 90%.*
- **FB1:** The percentage of End User satisfaction surveys for CSE queries carried out in accordance with the Performance Monitoring System by the Contractor showing the level of End User satisfaction to be “satisfactory”, “good” or “excellent”. *Service Threshold: 30%; Operating Service Level: 50%.*

Period	Apr-16		May-16		Jun-16		Q2 2016	
	Perf.	SP	Perf.	SP	Perf.	SP	Perf.	Total
QE1	100%	-2	100%	-2	100%	-2	100%	-6
QE2	100%	-2	100%	-2	86%	0	97%	-4
TA1	100%	-1	100%	-1	100%	-1	100%	-3
FB1	NA		100%	-2	100%	-2	100%	-4
<b>Total</b>		-5		-7		-5		-17

*Pink – Below Service Threshold  
Yellow – Below Operating Service Level  
Green – At or above Operating Service Level*

Of the two feedback ratings received on In-Depth queries there were two ratings of “Excellent”.

There were only 7 In Depth queries closed in June 2016 so a single long-standing query that had extended beyond four months which was closed has led to the metric being below the operating service level. In normal service, we would expect the occasional query to exceed the four-month resolution period.

## Training Metrics

- FB2:** The percentage of all training satisfaction surveys carried out in accordance with the Performance Monitoring System by the Contractor) in each Quarter that are rated “good”, “very good” or “excellent”. *Service Threshold: 70%; Operating Service Level: 80%.*

Period	Apr-16		May-16		Jun-16		Q2 2016	
	Perf.	SP	Perf.	SP	Perf.	SP	Perf.	Total
FB2	100%	-1	95%	-1	100%	-1	97%	-3
Total		-1		-1		-1		-3

*Pink – Below Service Threshold*  
*Yellow – Below Operating Service Level*  
*Green – At or above Operating Service Level*

## Service Credits

Period	Apr-16	May-16	Jun-16
Total Service Points	-6	-8	-6

## 5. CSE Queries

### Queries Resolved in Reporting Period

#### Metric Descriptions

<b>In-Depth</b>	All technical queries passed to ARCHER CSE team
<b>Course Registration</b>	Requests for registration on ARCHER training courses or enquiries about registration
<b>Technical Assessment: &lt;Category&gt;</b>	Request for Technical Assessments of applications for ARCHER time
<b>eCSE Application</b>	Queries relating to eCSE applications

A total of 367 queries were resolved by the CSE service in the reporting period.

Metric	Apr-16	May-16	Jun-16	Total	% Total
Course Registration	157	59	61	277	75%
In-Depth	15	8	7	30	8%
eCSE Application	5	10	6	21	8%
Technical Assessment: Grant	4	10	2	16	4%
Technical Assessment: Instant	5	5	1	11	3%
Technical Assessment: Leadership	0	1	6	7	2%
Technical Assessment: RAP	1	0	4	5	1%

2 query feedback responses were received on In-depth queries in the reporting period. This represents a 7% return rate for feedback forms.

Resolved In-Depth queries fell into the following categories:

Category	Number of Queries	% Queries
3rd Party Software	19	63%
Login, passwords, SSH	2	7%
User Programs	1	3%
Compilers and system software	1	3%
Batch System and Queues	1	3%
Porting	1	3%
Other	5	13%

### In-Depth Query Highlights

A small number of In-Depth queries have been selected to illustrate the work of the centralised CSE team over the report period.

#### Query 756629: OpenFoam

A user was having an issue with the centrally installed version of OpenFOAM crashing with strange MPI error messages. CSE service recompiled the central version using the latest software modules available on ARCHER and this resolved the problem. Additional information was provided to the user on how to compile OpenFOAM on ARCHER for future reference (OpenFOAM compilation is quite complex). We hope to be able to help users (and CSE staff) with complex recompilations by using a package manager such as EasyBuild or Spack in the future. This should improve the user experience by making this type of query less common and the resolution quicker..

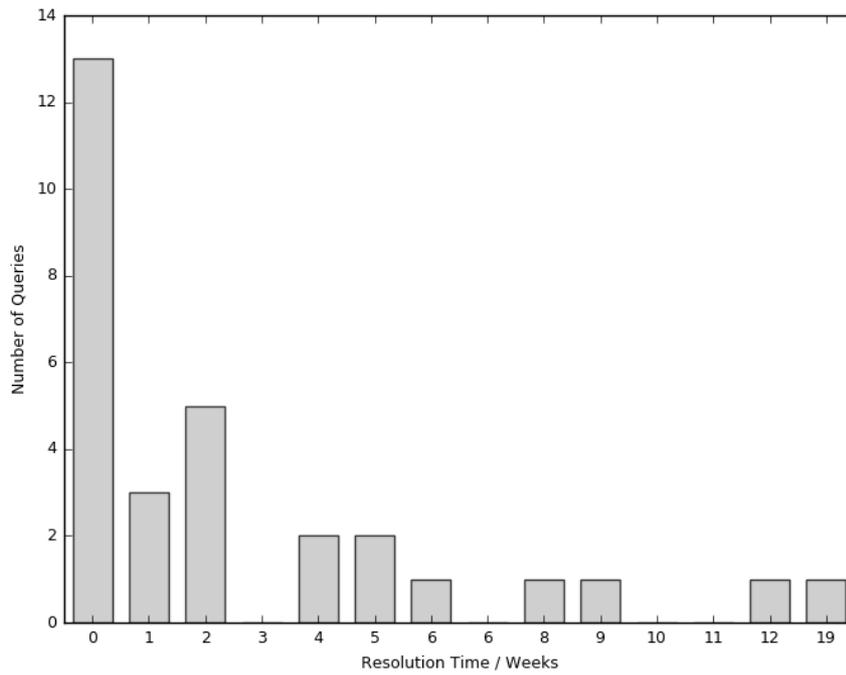
#### Query 770449: Multiple apruns in a job script

A user wants to use multiple nodes in a single job to run parameter sweep calculation. The initial advice had been to use multiple *aprun* commands in their job scripts but in this case the user was running so many commands that it was causing issues for the ARCHER job launcher (MOM) nodes. The CSE team was able to design a method, based on bash, which allowed the user to perform this type of calculation without overloading the ALPS scheduler running on the job launcher nodes. The method is of general use to the ARCHER user community and has also been written up for the ARCHER Best Practice Guide at:

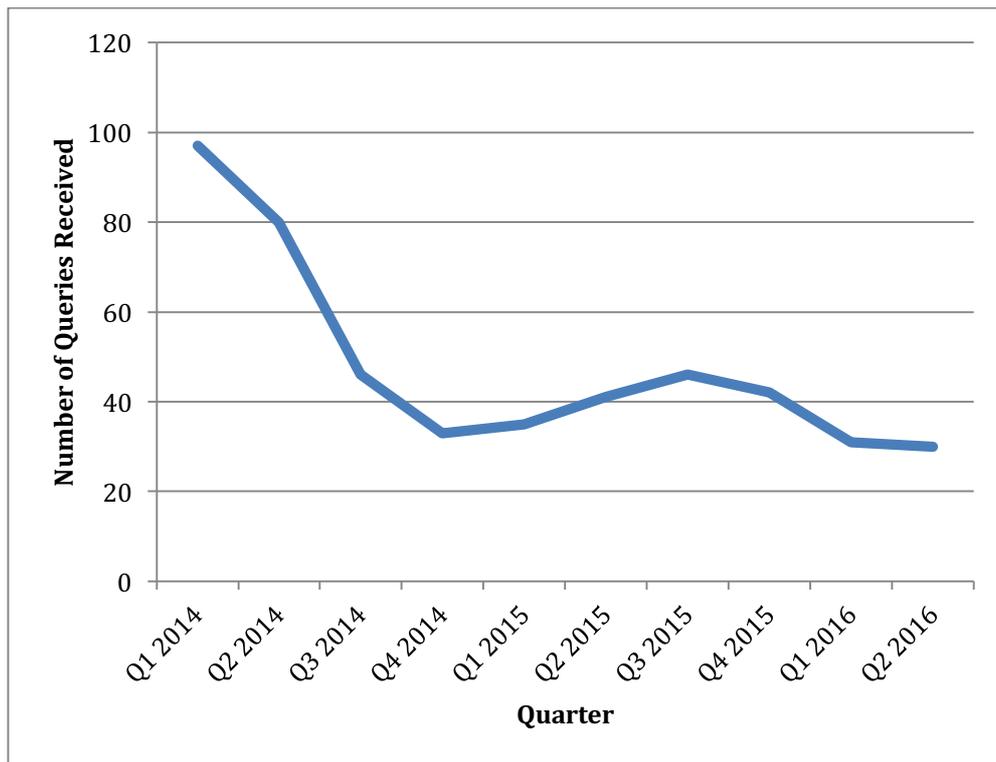
<http://www.archer.ac.uk/documentation/best-practice-guide/batch.php#sec-4.1>

## In-Depth Query Analysis

The histogram below shows the time to resolution for In-Depth queries in the current reporting period. The median resolution time during this period is 1 week (median resolution time since 1 Jan 2014 is 2 weeks).

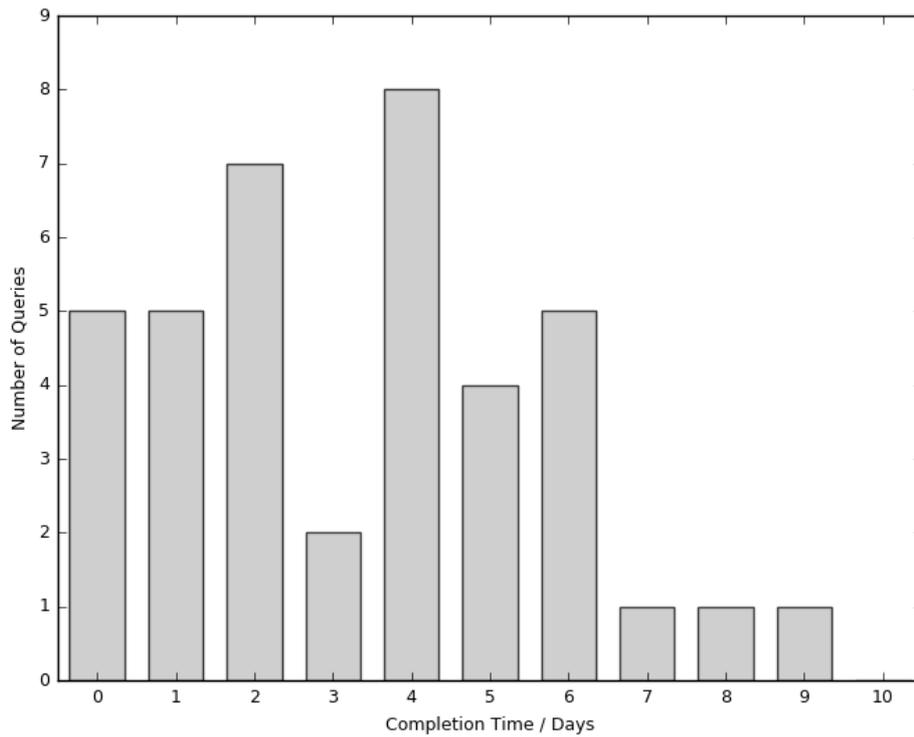


Plot of numbers of In Depth queries received per quarter:

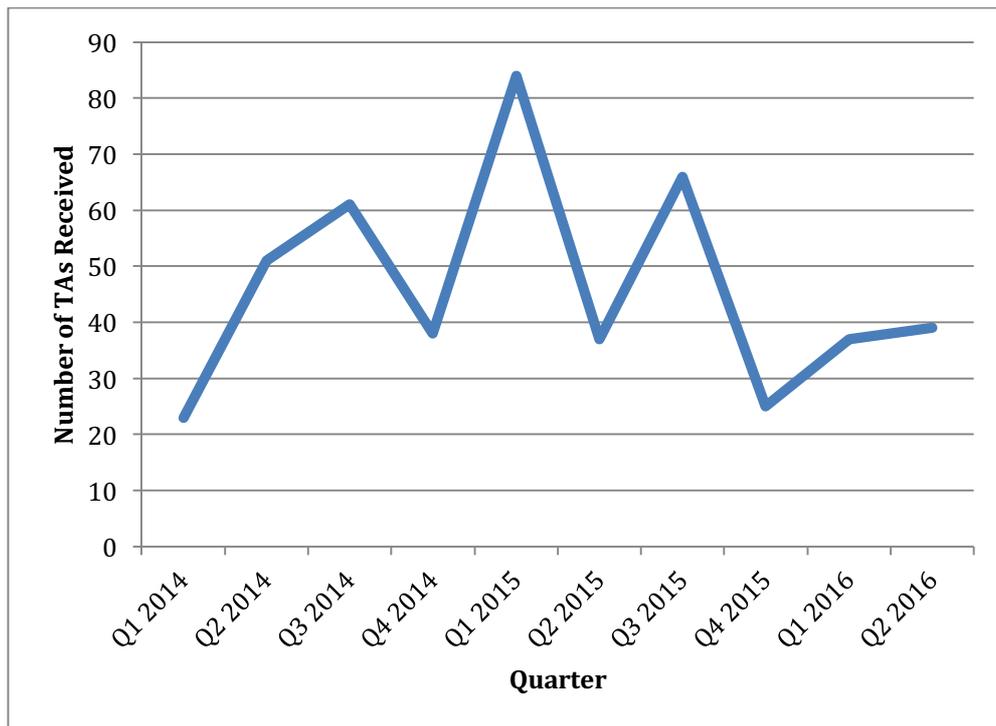


## Technical Assessment Analysis

A histogram of the time to completion for Technical Assessments (see below) reveals that the median completion time for this quarter was 4 days (median completion time since 1 Jan 2014 is 3 days).



Plot of numbers of Technical Assessments received per quarter:



## 6. Centralised CSE Team: Strategic Priorities Progress

In collaboration with user groups and the other Service partners, the CSE service has identified a number of priority areas to invest technical effort from the centralised CSE team. Together we identified three key areas and a number of additional areas.

This identification and prioritisation process has a number of aims:

1. Ensure technical work undertaken by the centralised CSE team is of maximum benefit to the ARCHER user community.
2. Ensure that the CSE service partners effectively with other groups (e.g. Cray CoE, DiRAC benchmarking team) in any joint technical work to bring benefit to the ARCHER user community.
3. Ensure that UK national HPC services have the best technical data on which to base procurement decisions.

In this section we provide updates on progress in the different areas during the reporting periods.

### Parallel I/O Performance

The work this quarter has focused on identifying suitable synthetic benchmarks to provide useful measures of the underlying performance of the I/O infrastructure on the ARCHER Lustre file systems.

Initially, we looked at the IOR benchmark that is commonly used to assess I/O performance but found that this was not useful in furthering understanding I/O performance on ARCHER for a number of reasons:

- the software is opaque with many different options; this hinders understanding on what I/O operations are actually being performed;
- the naïve parallel I/O patterns implemented in IOR do not provide a good representation of user I/O so the results from the benchmark do not provide a useful measure of where the limits of performance are for users.

We also assessed the *benchio* benchmark application written by David Henty and Adrian Jackson at EPCC and found that it has a number of advantages over IOR:

- the software is simple with a small number of options and so it is much easier to profile what I/O operations are actually being performed;
- it implements a parallel I/O pattern that models more closely what user applications actually do;
- it can also measure performance when using the commonly-used HDF5 and NetCDF I/O libraries.

*benchio* is currently limited to assessing write performance (IOR measures both read and write performance) but as part of this activity we will modify the software to implement parallel reads as well.

Using *benchio* we have gathered initial performance data on the ARCHER Lustre file systems and on other HPC systems in the UK. These results will be published on the ARCHER website and used to provide concrete advice to users on tuning their parallel I/O performance.

### Understanding the ARCHER Application Landscape

The XALT tool (<https://github.com/Fahey-McLay/xalt>) has been installed on ARCHER and is now collecting data on both compile events and run events on the system. For the first time on ARCHER, this tool gives us the ability to investigate:

- the use of scientific libraries – which are used and by whom?
- the use of different compiler suites – how many people are using the Cray, Intel and GCC compilers and how are compilers used by different user communities?

- use of hybrid OpenMP/MPI software – which software is using hybrid parallel models in production and how its usage pattern differs from pure MPI usage?
- use of centrally-installed software – how much use do the different centrally-installed software packages see and by whom?

We have recently started work on mining the XALT data to investigate the questions posed above to improve the current service and to help specify requirements for any future procurements.

The Cray Resource Usage Reporting (RUR) tool is currently in testing phase on ARCHER and should be fully enabled soon. RUR collects additional statistics on every running job that are currently unavailable by other methods, e.g. memory usage, energy usage. We plan to incorporate this data into job records in the ARCHER SAFE so users, PI's and service partners can generate usage statistics based on the parameters.

The outputs from this activity provide key inputs to the Assessing New HPC Technologies and Continuous Integration Server activities.

### **Assessing New HPC Technologies**

We have begun initial discussions with various parties over getting access to different HPC architectures. This activity depends on input from the Application Landscape activity to provide a set of useful applications and benchmarks to use for the technology assessment and we hope to have an initial set of these in the next quarter.

### **Other Areas**

The **Continuous Integration (CI) Server activity** is using the Jenkins CI software to periodically run a *benchio* I/O performance benchmark to assess the range of performance that users can expect to see from the Lustre file systems. As with the New Technologies activity above, having an agreed set of benchmarks will allow the CI Server to be of most use to the community by providing information on both the range of performance for specific applications and access to up to date profiling information on the applications to help understand where the performance bottlenecks currently lie.

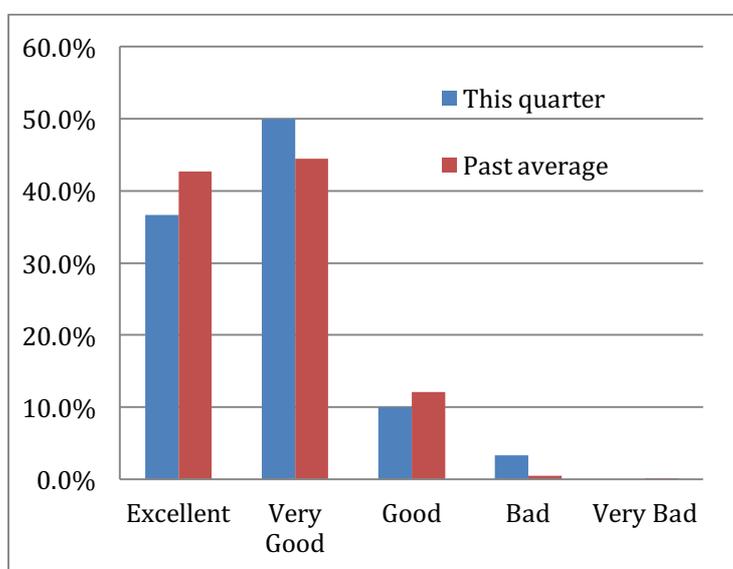
The **Autotuning Framework activity** is working in partnership with the Cray Centre of Excellence to port their autotuning framework for use in modifying input parameters to user applications so that we can provide specific advice on what range of parameter values give optimal performance for specific use cases at different core counts. The VASP application has been chosen as the initial use case as it has a number of parallel decomposition parameters that can be set at runtime and because it is the single most used application on ARCHER.

## 7. Training

In the reporting period, the CSE Service has provided a total of 13 days (315 student-days) of face-to-face training across six different locations and 2 days of interactive online tutorials (average attendance 14 per tutorial).

Month	Dates	Course	Location	Days	Attendees
Apr 2016	6	Using MPI – Q&A Session	Online	0.5	13
	11 - 12	Data Carpentry	London	2	17
	12 - 14	Shared-Memory Programming with OpenMP	Southampton	3	25
May 2016	4	Using the Data Analytics Cluster	Online	0.5	4
	11 - 12	Shared-Memory Programming with OpenMP	Sheffield	2	16
	12 - 13	Modern Fortran Programming	Leeds	2	29
Jun 2016	19 - 20	Scientific Python	Liverpool	2	32
	8	Modern Fortran	Online	0.5	26
	9 - 10	Software Carpentry	Belfast	2	26
	22	eCSE Seminar: libcf2lcs	Online	0.5	12

On the feedback for face-to-face courses, attendees rate the course on a scale of 1-5 (“Very bad”, “Bad”, “Good”, “Very good” and “Excellent”). The average feedback using this metric was 4.2, i.e. better than “Very Good”. Users provided 60 feedback forms, a response rate of 41%.



The two scores of “Bad” were given for the *Scientific Python* and *Modern Fortran* courses. The comments on the feedback forms indicate that this was largely due to the courses not being at the level expected by these two attendees. We are therefore reviewing the course descriptions to ensure that the level is made as explicit as possible.

18.5 days of face-to-face training are planned for the next quarter, plus 1.5 days of online training.

<b>Month</b>	<b>Dates</b>	<b>Course</b>	<b>Location</b>	<b>Days</b>	<b>Attendees</b>
Jul 2016	6-8	Performance Analysis Workshop	Cambridge	3	
	7	TAU HPC Tool	Online	0.5	
	11-12	Hands-on Intro to HPC	Edinburgh	2	
	13-15	Message-Passing Programming with MPI	Edinburgh	3	
Aug 2016	2-4	Advanced OpenMP	Bristol	3	
	10	TBC	Online	0.5	
Sep 2016	6-7	Scientific Python	Oxford	1.5	
	8-9	Shared-Memory Programming with OpenMP	London	2	
	14	TBC	Online	0.5	
	28-29	Practical Software Development	RAL	2	
	29-30	Advanced MPI	Edinburgh	2	

## 8. Outreach Project

### Work Package 1: Diversity

#### Current/completed activities:

- Diversity in HPC ([www.hpc-diversity.ac.uk](http://www.hpc-diversity.ac.uk))
  - Currently we have 9 interviews and 10 historical biographies available online.
- Women in HPC
  - Women in HPC at ISC16:  
WHPC held a half-day workshop and a BoF at ISC16. Both were well attended. Feedback collected from the workshop (none was collected for the BoF), indicates that all attendees that provided feedback found the event worthwhile and informative. The sessions included methods for improving diversity in the workplace and early career development including posters for early career women and 'Skills to thrive in the HPC community'.
  - WHPC will run a one-day workshop at SC16 (Salt Lake City, UT, November 2016) and an 'Evening with interesting people' careers event in September in Edinburgh alongside EuroMPI 2016. We will also be applying for two BoFs at SC16.

#### Future activities:

- Diversity best practice guides: "How to improve the representation of women at conferences" has now been drafted and is now in the final stages for release.

### Work Package 2: User Engagement and Skills Development

#### Current/Completed activities:

- The second Hands-on Porting and Optimisation workshop was held at Imperial College, London on 13 May 2016. We had 21 attendees consisting of a mixture of PhD students, Research Associates and Research Fellows. We helped existing ARCHER users identify performance bottlenecks in their code and advised on optimisation, assisted new users figure out how to use the machine to run their software of interest and understand the possibilities of ARCHER, and talked to potential future users about how they might make use of the machine.
- ARCHER Champions:
  - The first ARCHER Champions meeting was held on 16 and 17 March 2016. Based on the feedback we intend to run events approximately every six months to coincide with other UK HPC events where possible (e.g. HPCSIG meetings).
  - The next ARCHER Champions face-to-face meeting will be held in Oxford, 5-6 September and is now open for registrations.

#### Future activities:

- The third ARCHER Champions face-to-face meeting is provisionally scheduled for February 2017.

### Work Package 3: Outreach Programme

#### Current/Completed activities:

- Wee ARCHIE:
  - Work is underway to enhance the demos, and ensure that they are easily downloaded and installed on Raspberry PI clusters built by schools. This includes an application framework in VTK and writing a server to handle communications to ensure that debugging is simple in future applications. This should facilitate WEE ARCHIE application development by non-expert groups.
  - A design specification and parts list will be released online shortly to facilitate schools and childrens' club/activity groups building "Wee ARCHLET", a small build your own version of Wee ARCHIE.
- Teacher and outreach ambassadors pack:

- There is now a new outreach site that will host the outreach material developed during this project and provide categorised information based on the reader (e.g. teachers, parents, children and Higher Education STEM ambassadors).
- Work has now begun on the teacher and outreach ambassador's packs. We are working with teachers from English and Scottish Schools to ensure that we provide information relevant to the curriculum and material that can be easily used by computer science teachers.
- Already completed activities:
  - Wee ARCHIE, the model supercomputer constructed from 18 Raspberry Pi 2s has now been built.
  - Design-your-own-supercomputer App: the "ARCHER Challenge" app has now been completed and is available to play online: <https://archer-webapps.epcc.ed.ac.uk/challenge/index.html>.

**Future activities:**

- National outreach activities designed to reach a wide geographical distribution of schools and children.
  - We plan to obtain accreditation from the Children's University for our on-line outreach material. This nationwide scheme operates a credit-based passport scheme and should provide benefit to schoolchildren on a nationwide level.
  - We plan to attend the Big Bang Fair again in 2017 to maximise our return on investment to discuss HPC with the general public.
- Teacher pack:
  - This will be produced over the next 6 months.
  - Teacher support forum and tutorials – 2016/17
  - Teacher's workshop – mid/late 2016.
- Outreach Ambassadors:
  - The outreach ambassadors pack is now in development and we anticipate holding our first training session in Q3/Q4 of 2016.

**Work Package 4: Impact Material**

**Current/Completed activities:**

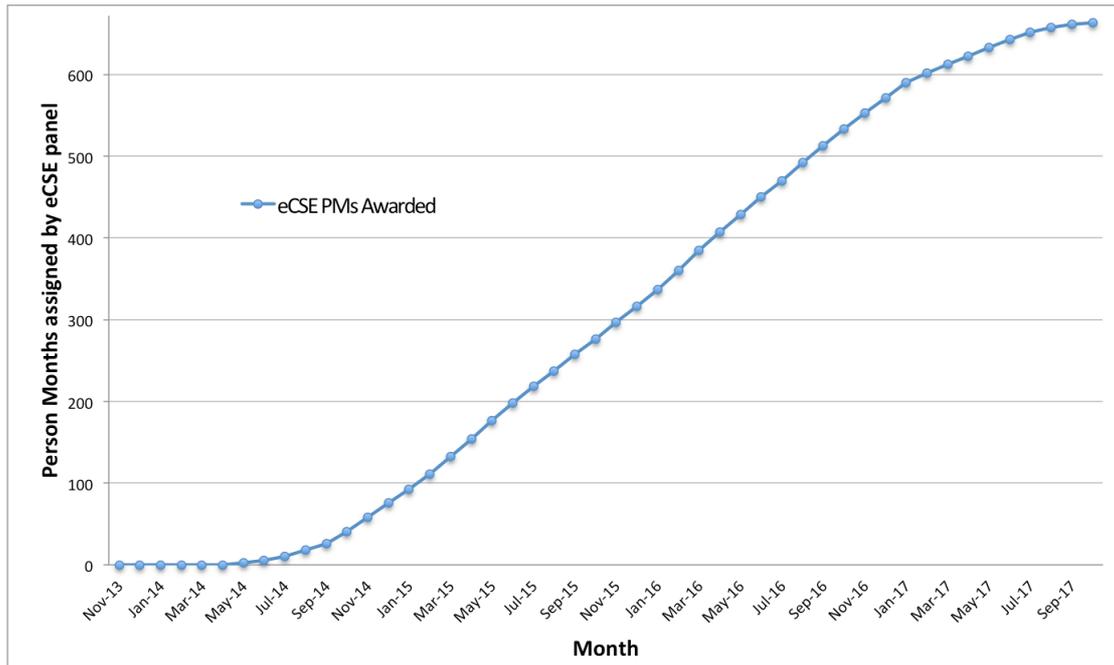
- ARCHER case studies: ten completed.
- Annual impact and success report is currently in progress, and including the successes and scientific impact of ARCHER on the UK and international research community.

**Future activities:**

Continuing programme of case study development from a variety of sources, including eCSE's, image and impact competitions, and consortia.

## 9. Embedded CSE (eCSE)

### Overview of eCSE Effort



- The eCSE person months awarded up to and including the 8<sup>th</sup> eCSE call are shown in blue
- At least 672 person months will be awarded by the end of the project (14 FTEs for 4 years)
- 670 person months have been awarded so far over 67 awarded eCSE projects

## eCSE Call 1 – Call 8

eCSE call	No. proposals	No. projects awarded	No. projects started	No. projects completed	No. final reports received	Notes
eCSE01	19	14	14	13	12	One late final report is being pursued
eCSE02	17	9	9	8	8	
eCSE03	16	10	10	8	5	One late final report is being pursued. The final reports for the other 2 completed projects are not due yet.
eCSE04	16	8	8	5	2	One late final report is being pursued. The final reports for the other 2 completed projects are not due yet.
eCSE05	14	8	8	1	0	The final report for the completed project is not due yet.
eCSE06	9	5	5	1	0	The final report for the completed project is not due yet.
eCSE07	16	5	2	0	0	
eCSE08	21	8	0	0	0	The Panel meeting took place on 28 June 2016 and start dates for projects are not yet confirmed
<b>Total</b>	<b>128</b>	<b>67</b>	<b>56</b>	<b>36</b>	<b>27</b>	

- A risk analysis identified all projects as being of either low or very low risk apart from the following:
  - eCSE04-4 which was identified as being of medium risk as the person named to do the technical work was offered a position elsewhere
    - The member of staff originally named on the contract completed 1.5 of the 12 months of work before leaving to take up another post. With approval from the PI and eCSE Panel chair, we identified a new member of staff within the ARCHER CSE team who took on the work from 01/10/15 and this project is being monitored within the CSE team
  - eCSE04-10 which was identified as being of medium risk as the PI indicated that the person named to do the technical work may not be available
    - This project will go ahead with the original staffing. There was a short delay to the start of the project that started on 01/01/16 and the project appears to be progressing well.
  - eCSE04-16 which was identified as being of medium risk as the PI indicated that the person named to do the technical work may not be available
    - This project started on 01/9/15 with a change of staffing. This project was originally to be staffed by Imperial College but was instead staffed by STFC. The project is now very close to completion.

- eCSE07-15 which was identified as being of medium risk as the named member of technical staff was not able to commit the proposed amount of time to the project
  - The PI's team have identified a second member of staff who will also work on the project. The Panel chair has approved this.
- Justin Finn, School of Engineering, The University of Liverpool gave an ARCHER webinar on 22 June 2016 on the work of his eCSE project eCSE04-14 entitled "libcfd2lcs: A general purpose library for computing Lagrangian coherent structures during CFD simulations".

### eCSE Call 8 Panel meeting

- The eCSE08 call opened on 29 March 2016 and closed on 10 May 2016 receiving a record 21 proposals. The corresponding Panel meeting to select proposals took place on 28 June 2016.
- At the Panel meeting 8 proposals were selected, including 1 proposal from a New Community, awarding 88 person months in total. This results in 670 person months awarded across the first 8 calls out of our target of 672 person months. However, there are still sufficient monetary funds to open a further call in August and the expectation of a further year's CSE funding should allow us to open further calls next year in line with the regular pattern of calls.

### Future eCSE Calls

- eCSE calls are run to a regular schedule. The future calls are:
  - eCSE09: opens Tuesday 2 August 2016 and closes at 4pm on 13 September 2016
  - We then expect to open calls in line with the well-established pattern during 2017.