ARCHER2
SP Quarterly Report

July – September 2021

EPCC
The University of Edinburgh

Document Information and Version History

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0.1	25/08/2021	Template created	Jo Beech-Brandt
0.2	04/10/2021	Added ISO and feedback info	Anne Whiting
0.3	04/10/2021	Added contractual information, graphs and narrative	Jo Beech-Brandt
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0.5	07/10/2021	Review	Alan Simpson
1.0	13/10/2021	Version for UKRI	Alan Simpson, Jo Beech-Brandt

1 The ARCHER2 Service

This is the report for the ARCHER2 SP Service for the Reporting Period:
1st July – 30th September 2021.

1.1 Service Highlights

- The new 100 Gbit/s ACF Data Centre Network has been deployed for both the 4-cabinet and main ARCHER2 systems. This now provides the main system with full 100 Gbit/s connectivity to both JANET and the RDFaaS.

- We are delighted to announce that we have passed our ISO 9001 Quality and 27001 Information Security external audits with flying colours. Whilst we place the highest level of importance on delivering the ARCHER2 service to meet user requirements and following best practice throughout the year, it is always slightly nerve-racking during external audit time. The auditor is with us for a week reviewing the evidence to show that we are delivering the service that we say we are, looking at everything from service logs through HR practices to user feedback. At the end of an audit, we identify any improvements to be made and track them to ensure they deliver the benefit they are designed to do.

- Work has started on the documentation for the transition of the user of the users from the 4-Cabinet ARCHER2 Service to the full 23-Cabinet ARCHER2 Service. We expect this to be a smooth transition as users will continue to use the same credentials as on the 4-Cabinet system, but users will be responsible for the movement of any /work data they require from the 4-Cabinet service to the full service. Full documentation and a webinar will be provided as assistance will be available to any users who require this.

- A total of 109 pieces of query feedback have been received this quarter from a total of 327 queries handled. Of these the majority were rated good and above, with 70% rated excellent.

- A donation of £1 per user feedback response has been made to our selected charity, Save the children. This quarter a total donation of £228 has been made, with £109 from the SP Query feedback.

- The ARCHER2 online Status page now includes a live feed displaying information of the current status of nodes on the system. This enables users to check in a visual way on the utilisation of the system. This can be viewed at: https://www.archer2.ac.uk/support-access/status.html

- The SP team periodically test the major incident, business continuity and disaster recovery processes that have been put in place to help protect the ARCHER2 service, in the event of a significant incidents or failure. Each year, at around September--October, the team conducts a BCDR test, alternating between a full-scale simulated incident and a table-top audit of one or several aspects of service provision. As the last, full-scale test was conducted in 2019 (when we simulated a loss of a significant number of staff due to food poisoning), we would have -- in normal circumstances -- run a full-scale test in this reporting period. However, given the on-going working constraints imposed by the Covid-19 pandemic, we elected to pursue a hybrid test, which would work through a major-incident scenario but without actually acting out the scenario. The focus for the 2021 test has been the University's Advanced Computing Facility

(ACF) where ARCHER2 is hosted. Taking advantage of a service offered by the University's insurance provider, Zurich Municipal Insurance, we engaged an insurance consultant, Alan Ross, to facilitate a test to explore the response to a major fire at the facility. Planning began in July, when George Beckett (BCDR Test lead) and Paul Clark (Director of HPC Systems) held a series of meetings with Alan Ross to scope out the scenario scope and participation. The actual test was completed on 31 August, involving representatives from the ARCHER2 SP and CSE teams, the ARCHER2 Accommodation team, as well as the University of Edinburgh Estates and Security teams, plus Alan Ross as facilitator. The test was very successful, confirming ACF incident-response processes were able to deal with incidents such as major fires. However, improvement opportunities were identified, around harmonisation of the responses from ACF, alongside the University Estates and Security staff, as well as disseminating information on the gaseous fire suppression system that is fitted in each compute room to a wider pool of ACF staff. Furthermore, the ACF team will aim to meet with representatives from the Scottish Fire and Rescue service, in the coming months, to help optimise the response to a real emergency of this kind. The final report, which is being produced by Alan Ross, is now in draft form, though many findings are already being progressed as part of continual service improvement.

1.2 Forward Look

- We expect the full 23-Cabinet service to be available to all users within the next Quarter. Users will be informed of arrangements for transition and support will be provided where needed.

- Work is progressing well on the benefits realisation and impact reporting. These reports will be used to contribute to the business case for future investment in HPC for the science community. Data can be pulled from the SAFE and other sources to provide such information as the sciences areas covered by projects running on ARCHER2 or the institutions where from which users attend training courses. All data is anonymised and is used cumulatively to provide statistics. The next step is demonstrating the new reports to UKRI once final tweaks are complete, and then to present the approach and any new data required from PIs and users at a Consortium Chairs meeting to receive feedback.

- Detailed planning around acceptance testing and carrying out specific runs on the system is ongoing as we get to this critical period before go-live. This is for all service elements to work in conjunction with accommodate to stress test the underpinning Mechanical & Electrical (M&E) infrastructure.

- SP are working closely with CSE to integrate ReFrame tests into the ARCHER2 monitoring systems. ReFrame (https://reframe-hpc.readthedocs.io/) is a tool that allows for automated regression and performance tests to be run on demand. A regular series of runs of these tests with the results fed into the ARCHER2 monitoring systems will provide valuable data to help improve the quality of the ARCHER2 service for users.

- SP and CSE are working together to trial the use of the Xalt tool (https://github.com/xalt/xalt) to gather detailed data from the service on the use of different software. This data will allow us to provide more focussed support for users and ensure that the software library maintained by the service evolves to match user requirements.

2 ARCHER2 Performance Report

This is the contractual performance report for the ARCHER2 SP Service for the Reporting Periods from 1 April 2021 until 30 June 2021.

2.1 Service Points and Service Credits

The Service Levels and Service Points for the SP service are defined by EPSRC in Schedule 2.2 of ARCHER2 SP Service Contract.

The Working Day (WD) for the ARCHER2 Service is 10 Working Hours (WH) as the Service operates from 0800-1800. The Median Time to Resolution is measured in WD.

- **Availability**: *Service Threshold: <=96.5%; Operating Service Level: >98.0%, ≤ 98.5%.*
- **ARCHER2_SP_Level1 (MTR)**: The Median Time to Resolution, of all SP queries falling within Level 1 resolved by the Contractor in the Reporting Period. *MTR Service Threshold: >1 WD; Operating Service Level: >0.3 WD, ≤ 0.45 WD.*
- **ARCHER2_SP_Level2 (MTR)**: The Median Time to Resolution, of all SP queries falling within Level 2 resolved by the Contractor in the Reporting Period. *MTR Service Threshold: >8 WD; Operating Service Level: >2 WD, ≤4 WD.*
- **ARCHER2_SP_Level3 (MTR)**: The Median Time to Resolution, of all SP queries falling within Level 3 resolved by the Contractor in the Reporting Period. *MTR Service Threshold: >25 WD; Operating Service Level: >12 WD, ≤16 WD.*
- **Initial Response to Queries (%):** The percentage of the total number of SP queries assigned to the Contractor in the Reporting Period responded to within 3 Working Hours. *Service Threshold: <96.00%; Operating Service Level: 98.00 – 98.99%.*
- **Query User Satisfaction (%):** The percentage of the total number of query satisfaction surveys completed in each Reporting Period, rating the quality of the resolution of Queries by the Contractor as "Good", "Very Good" or "Excellent". *Operating Service Level: 82.00 – 87.99%*

2.1.1 Service Points

Metric	Jul 2021		Aug 2021		Sep 2021		Q3 2021	
	Perf	Points	Perf	Points	Perf	Points	Perf	Points
Availability	-	-	-	-	-	-	**-**	**-**
SP_Level1 (MTR)	0.00	-2	0.00	-2	0.00	-2	**0.00**	**-6**
SP_Level2 (MTR)	0.04	-2	0.06	-2	0.06	-2	**0.06**	**-6**
SP_Level3 (MTR)	4.53	-2	5.53	-2	4.52	-2	**5.03**	**-6**
Initial Response (%)	100%	-1	100%	-1	100%	-1	**100%**	**-3**
Query Satisfaction (%)	100%	-2	100%	-2	98%	-2	**99%**	**-6**
Total		**-9**		**-9**		**-9**		**-27**

2.1.2 Service Credits

As the Total Service Points are negative (-27), no Service Credits apply in 21Q3.

2.2 SP Query Statistics

The metrics were specified by EPSRC in Schedule 2.2 of ARCHER2 SP Service Contract.

- **Assigned:** The number of SP queries assigned to the Contractor within each query resolution category in the Reporting Period.

- **Resolved:** The number of SP queries resolved by the Contractor within each query resolution category in the Reporting Period.
- **Backlog:** The number of SP queries assigned to the Contractor that remained unsolved within each query resolution category in the Reporting Period
- **Correspondence:** The average number of pieces of correspondence generated for SP queries in each query resolution category.
- **First Response:** The average time taken for the Contractor to first respond to the Originator of the SP query.

July 2021					
Service level	**Assigned**	**Resolved**	**Backlog**	**Correspondence**	**First Response**
SP_Level1	3474	3481	0	0.12	0:01:29
SP_Level2	114	102	28	8.588	0:14:14
SP_Level3	1	1	3	21	0:00:00
August 2021					
Service level	**Assigned**	**Resolved**	**Backlog**	**Correspondence**	**First Response**
SP_Level1	1916	1909	7	0.154	0:01:41
SP_Level2	96	100	24	7.31	0:17:13
SP_Level3	0	1	2	18	0:06:47
September 2021					
Service level	**Assigned**	**Resolved**	**Backlog**	**Correspondence**	**First Response**
SP_Level1	1435	1442	0	0.211	0:00:40
SP_Level2	115	126	13	7.46	1:21:29
SP_Level3	3	0	5	0	0:00:00
Q3 2021					
Service level	**Assigned**	**Resolved**	**Backlog**	**Correspondence**	**First Response**
SP_Level1	6825	6832	0	0.149	0:01:22
SP_Level2	325	328	13	7.77	0:40:59
SP_Level3	4	2	5	19.5	0:03:23

2.3 Query Resolution

Metric	**Jul 2021**		**Aug 2021**		**Sep 2021**		**Q3 2021**	
Service Level	**MTR**	**Resolved**	**MTR**	**Resolved**	**MTR**	**Resolved**	**MTR**	**Resolved**
SP_Level1	0:00:33	3481	0:00:20	1909	0:00:20	1442	0:00:25	6832
SP_Level2	0:28:13	102	0:34:08	100	0:36:10	126	0:34:19	328
SP_Level3	45:16:32	1	55:20:8	1	0:00:00	0	50:18:25	2
Total		**3584**		**2010**		**1568**		**7162**

There was 1 query that failed the maximum completion time during this period. This had been an operational error by the Service Desk operator who had killed a query which he had assumed was a duplicate query as the user had submitted the identical request for both ARCHER2 and Cirrus simultaneously. A follow up email was sent to the user apologising for the error and an explanation. The user concerned replied confirming that the error had not impacted his work which was just starting on the system. This incident has been highlighted to operators to avoid it reoccurring.

A total of 7,162 queries were resolved by the ARCHER2 SP Service in the Reporting Period. The percentage of user queries responded to within 3 hours was 100%.

2.4 Query Feedback

During July, there were 35 feedback scores received during this period. 100% were Good, Very Good or Excellent with 71% given the highest score of Excellent.

During August, there were 32 feedback scores received during this period. 100% were Good, Very Good or Excellent with 63% given the highest score of Excellent.

During September, there were 42 feedback scores received during this period. 98% were Good, Very Good or Excellent with 74% given the highest score of Excellent.

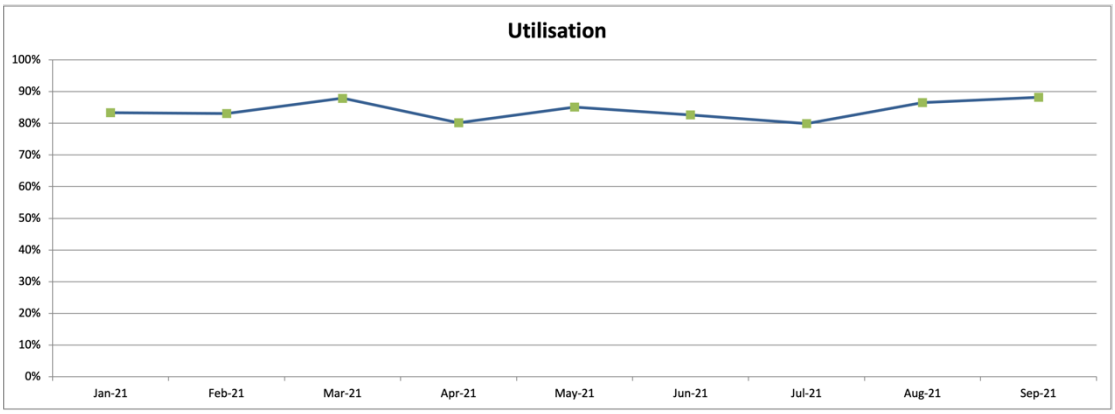
2.5 Maintenance and Outages

Type	Start	End	Duration	User Impact	Reason
Partial: Compute Nodes	30/09/21 0830	30/09/21 1130	3 hours	Users were able to connect to the UANs and submit jobs to the compute nodes which were queued until the full service returned.	An internal switch required a reboot
Full (Unplanned)	14/09/21 1100	15/09/21 1600	29 hours	Users were unable to connect to Service. Service was returned with the Singularity fix applied.	Power issues within the Edinburgh area. HPE applied a fix for Singularity issue
Full	25/08/21 1400	26/08/21 1115	21 hours 15mins	Users unable to connect to service.	HPE apply an essential security patch
At-Risk	25/08/21 and 18/08/21	25/08/21 and 18/08/21		Momentary interruptions to the UANs.	Move ARCHER2 4 Cabinet system to a new network at the ACF
Partial: Compute Nodes and Work filesystem (Unplanned)	28/07/21 1200	28/07/21 1500	3 hours	Running jobs failed and /work filesystem was unavailable	Power issue at ACF
Full (Unplanned)	20/07/21	22/07/21	47 hours 43 mins	Prevented new jobs from starting to reduce the impact. Some running jobs may also have crashed but some jobs finished to completion.	HPE issue with the interconnect that caused some new jobs to fail on MPI initialisation

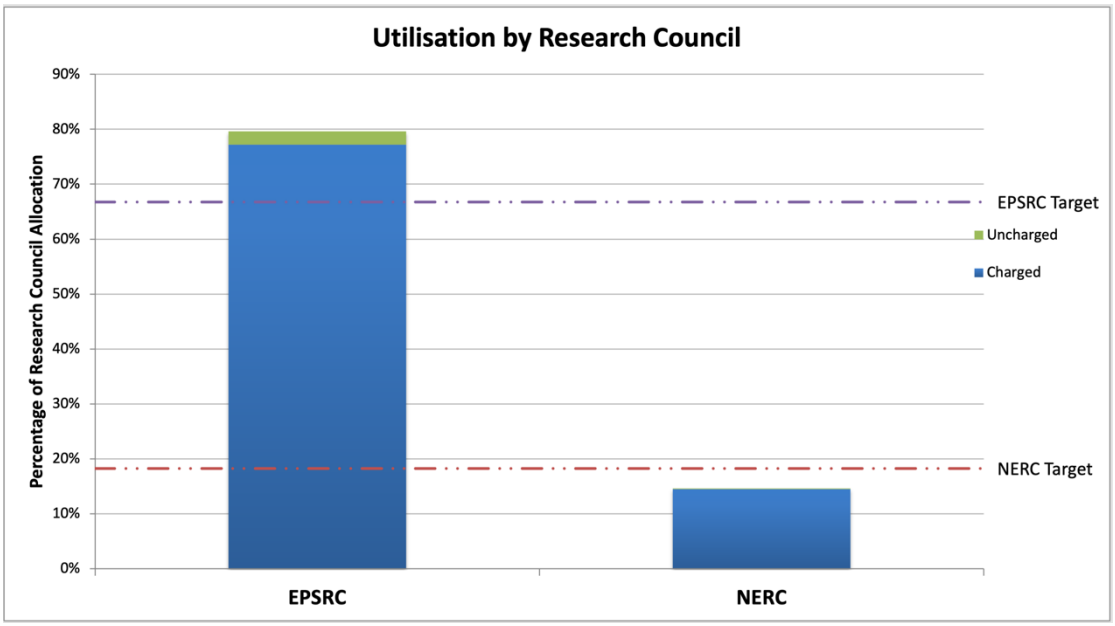
3 ARCHER2 Service Statistics

3.1 Utilisation

Utilisation from 1 July – 30 September is 85% which is slightly increased from 83% the previous quarter. Utilisation for July was 80%, for August 87% and for September 88%.

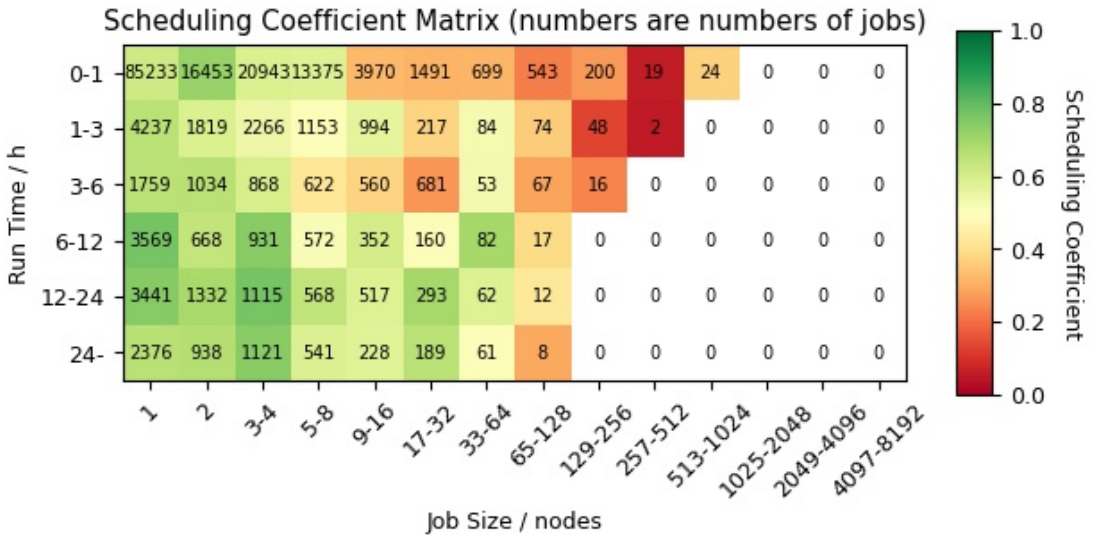


The utilisation by the Research Councils, relative to their respective allocations, is presented below. This bar chart shows the usage of ARCHER2 by the two Research Councils presented as a percentage of the total Research Council allocation on ARCHER2. It can be seen that EPRSC exceeded their target this quarter with their usage being at 79.6% (against their target of 66.8%) but NERC missed their target with utilisation being 14.6% (against their target of 18.2%).



3.2 Scheduling Coefficient Matrix

The colour in the matrix indicates the value of the Scheduling Coefficient. This is defined as the ratio of runtime to runtime plus wait time. Hence, a value of 1 (green) indicates that a job ran with no time waiting in the queue, a value of 0.5 (pale yellow) indicates a job queued for the same amount of time that it ran, and anything below 0.5 (orange to red) indicates that a job queued for longer than it ran. As may be expected, the system is very busy and users are having to queue for longer than on ARCHER2. Measures were introduced to try to alleviate the queue such as limiting the large, long jobs and placing limits on the number of jobs that one user can run at any time.



The usage heatmap below provides an overview of the usage on ARCHER2 over the quarter for different job sizes/lengths. The colour in the heatmap indicates the number of CUs expended for each class, and the number in the box is the number of jobs of that class.