ARCHER2
SP Quarterly Report

October – December 2022

EPCC
The University of Edinburgh

Document Information and Version History

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0.2	04/01/2023	Added ISO and feedback info	Anne Whiting
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1.0	13/01/23	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 October – 31st December 2022.

1.1 Service Highlights

- Users can now request access to the ARCHER2 Solid State Disk storage. Several users have requested access and they may see I/O performance improvements from the solid state storage compared to the standard lustre file systems, especially if users read/write a lot of files in parallel or if users use ADIOS2.

- To improve the energy efficiency of the ARCHER2 service, the default CPU frequency was changed for compute nodes. Previously, the default CPU frequency was unset on the service and so compute nodes were free to select the highest value possible within the constraints of the power configuration for the nodes – typically the base frequency of the processor: 2.25 GHz. Benchmarking had shown that setting the frequency to 2.0GHz typically had a minimal effect on performance (1-5% reduction in performance) but could lead to larger savings in energy consumption (10-20%).

- The User Survey results were published on the ARCHER2 website: https://www.archer2.ac.uk/about/reports/

- We were delighted to have passed our external ISO 22301 Business Continuity and Disaster Recovery certification. The standard requires an organisation to identify the business continuity risks that are likely to affect it and the services it supplies to its users. These can range from the major and likely – cyber attacks, power outages, health issues, supply chain issues and the like, to the hopefully unlikely such as civil unrest and natural disasters. Having identified the risks, we created plans and mitigations and tested these to make sure we minimise the risk of the event happening and can work to resolve it and to minimise the impact on our users as smoothly as possible. We have developed a programme of tests for the plans and measures taken throughout the year, ranging from the minor and practical such as fire alarm tests through to major scenario tests.

- A total of 84 user feedback responses were received to SP queries. Of these 82% were rated excellent, 10% very good and 8% good. No feedback below the level of good was received for the quarter. A donation of £84 was made to our chosen charity, Save the Children, a pound for each piece of feedback received.

- Low QoS capacity was increased to support system utilisation and capability jobs, particularly during the festive period. The number of nodes available for the low priority QoS was increased from 1024 nodes to 2048 nodes.

- The final physical decommissioning of the RDF was completed following its retiral / switch off in 2021.

- Conclusion of power cabling works in cr3 / prC, bringing an end to a circa 1 year improvement program in that part of the site which underpins ARCHER2.

- The ACF site was open throughout the festive period to allow HPE and other contractors to complete hardware swaps and fixes.

- Generator black starts completed at various parts of the site, including prC, to prove that the underpinning infrastructure performs as expected in a critical situation.

- Preparations were made for the increase in Plant Room water temperature to increase "free cooling" capacity, including co-ordinating with HPE to increase the CDU provisioned water temperature.

- Building Management System controllers, which support the management and automation of plant equipment, were replaced and upgraded throughout October and November.

- Members of the ARCHER2 SP team attended and contributed to the CIUK 2022 Conference. There was a stand advertising ARCHER2.

1.2 Forward Look

- We are working closely with HPE to develop the plans for both the TDS and main system operating system upgrade. The TDS work will begin during Q1 2023 and the main system will be upgraded in Q2 2023.

- A User Forum is being planned for February/March with a follow-on session in April. This will focus on the operating system upgrade and the impact this may have on users.

- We anticipate increasing the temperature of cooling water provided to ARCHER2 in order to take greater advantage of "free cooling" and the energy savings this should support.

- ARCHER2 staff are preparing submissions to the CUG (Cray User Group) Meeting which will be held in Helsinki in May 2023.

2 ARCHER2 Performance Report

This is the contractual performance report for the ARCHER2 SP Service for the Reporting Periods from 1 October 2022 until 31 December 2022.

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	Oct 2022		Nov 2022		Dec 2022		Q4 2022	
	Perf	Points	Perf	Points	Perf	Points	Perf	Points
Availability	100%	-3	100%	-3	100%	-3	100%	**-9**
SP_Level1 (MTR)	0.00	-2	0.00	-2	0.00	-2	**0.00**	**-6**
SP_Level2 (MTR)	0.05	-2	0.06	-2	0.09	-2	**0.07**	**-6**
SP_Level3 (MTR)	0.14	-2	10.97	-0.5	0.02	-2	**0.14**	**-4.5**
Initial Response (%)	100%	-1	100%	-1	100%	-1	**100%**	**-3**
Query Satisfaction (%)	100%	-2	100%	-2	100%	-2	**100%**	**-6**
Total		**-12**		**-10.5**		**-12**		**-34.5**

2.1.2 Service Credits

As the Total Service Points are negative (-34.5), no Service Credits apply in 22Q4.

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.

October 2022					
Service level	**Assigned**	**Resolved**	**Backlog**	**Correspondence**	**First Response**
SP_Level1	1640	1640	0	0.18	0:01:22
SP_Level2	98	108	15	6.9	0:14:33
SP_Level3	2	1	2	5	0:18:43
November 2022					
Service level	**Assigned**	**Resolved**	**Backlog**	**Correspondence**	**First Response**
SP_Level1	2697	2697	0	0.13	0:02:14
SP_Level2	85	84	16	6.5	0:14:20
SP_Level3	0	1	1	24	0:26:02
December 2022					
Service level	**Assigned**	**Resolved**	**Backlog**	**Correspondence**	**First Response**
SP_Level1	2321	2320	1	0.14	0:00:12
SP_Level2	69	71	14	7	0:20:28
SP_Level3	2	1	2	5	0:00:49
Q4 2022					
Service level	**Assigned**	**Resolved**	**Backlog**	**Correspondence**	**First Response**
SP_Level1	6658	6657	1	0.15	0:01:28
SP_Level2	252	263	14	6.8	0:16:04
SP_Level3	4	3	2	11	0:15:11

2.3 Query Resolution

Metric	**Oct 2022**		**Nov 2022**		**Dec 2022**		**Q4 2022**	
Service Level	**MTR**	**Resolved**	**MTR**	**Resolved**	**MTR**	**Resolved**	**MTR**	**Resolved**
SP_Level1	0:00:21	1640	0:00:31	2697	0:00:05	2320	0:00:22	6657
SP_Level2	0:32:38	108	0:35:18	84	0:54:31	71	0:39:06	263
SP_Level3	1:22:26	1	109:41:46	1	0:12:42	1	1:22:26	3
Total		**1749**		**2782**		**2392**		**6923**

A total of 6923 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 October, there were 32 feedback scores received during this period. 100% were Good, Very Good or Excellent with 84% given the highest score of Excellent.

During November, there were 16 feedback scores received during this period. 100% were Good, Very Good or Excellent with 81% given the highest score of Excellent.

During December, there were 24 feedback scores received during this period. 100% were Good, Very Good or Excellent with 79% given the highest score of Excellent.

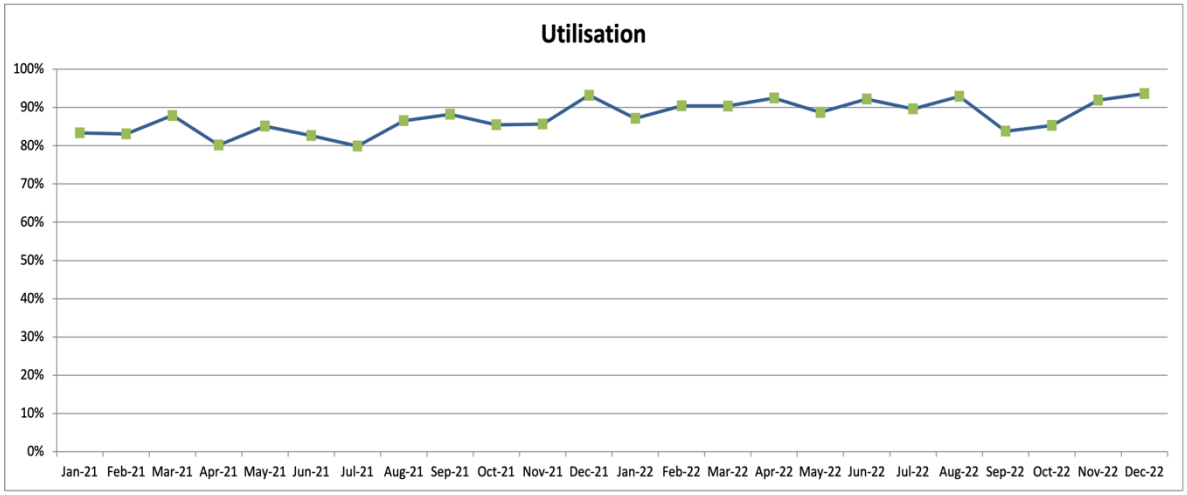
2.5 Maintenance and Outages

Type	Start	End	Duration	User Impact	Reason	Attributable
Login outage	11-10-22 12:30	11-10-22 13:00	30m	Users were unable to connect to ARCHER2 or SAFE	UoE DNS and network issue.	Accommodation
Full	17-10-22 0900	17-10-22 1315	4h 15m	No access to system	Slingshot interconnect reboot to allow the return of failed links which were causing job failures	Emergency (HPE)
At-risk	06-12-22 0900	06-12-22 1200	3h	/work filesystem	Integration of the additional lustre filesystem; could impact projects on filesystem3.	HPE
Partial	14-12-22 0940	14-12-22 1530	5hr 50m	Around 2000 nodes were unavailable so users' jobs took longer to run	Possible power and/or network issue	Accommodation

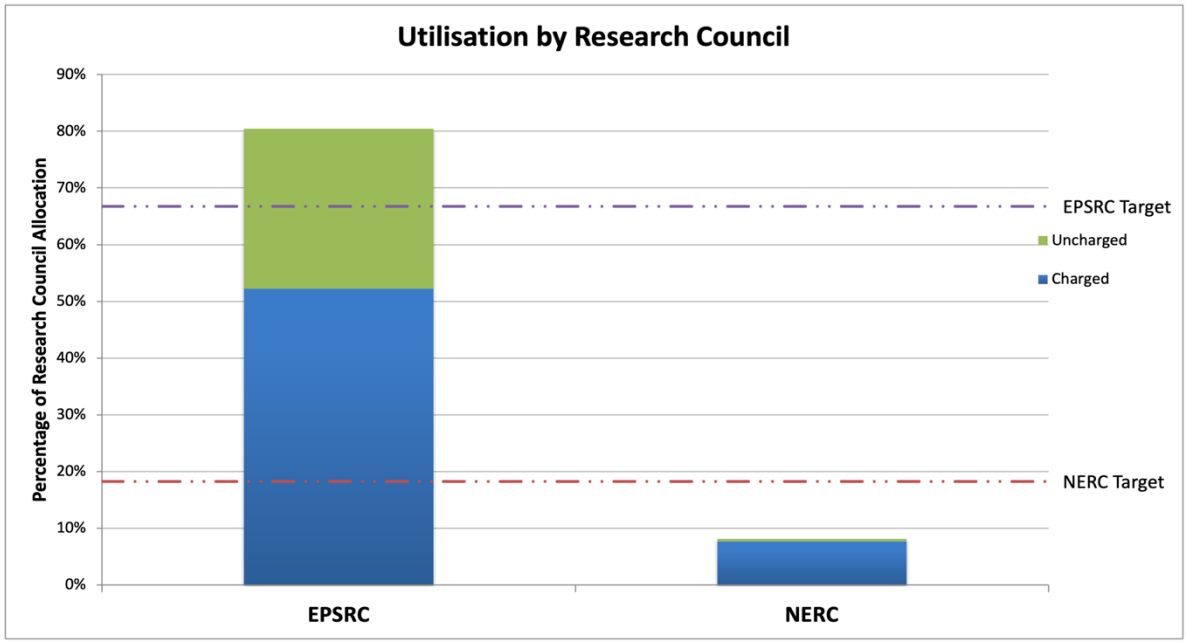
3 ARCHER2 Service Statistics

3.1 Utilisation

Utilisation from 1st October – 31st December is 90% which is slightly increased from 89% the previous quarter. Utilisation for October was 85%, for November 92% and for December 94%.

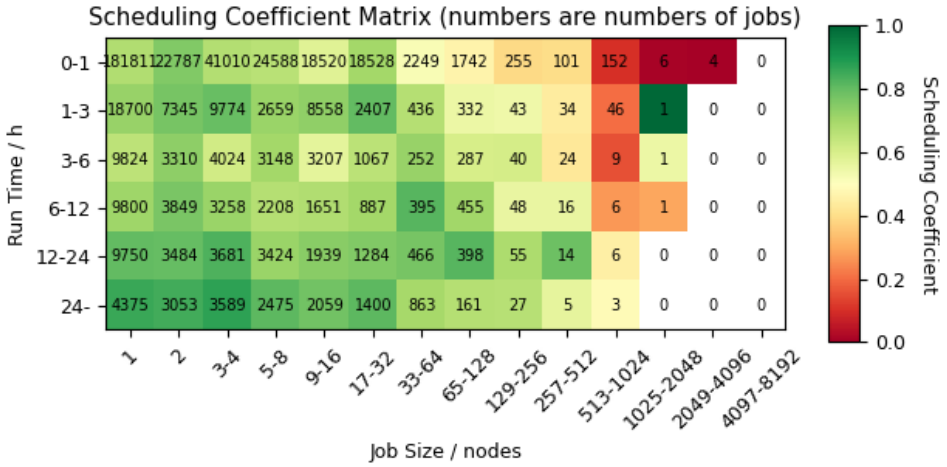


The utilisation by the Research Councils, relative to their respective allocations, is presented below. This bar chart shows the usage of ARCHER2 by the two Research Councils presented as a percentage of the total Research Council allocation on ARCHER2. It can be seen that EPRSC exceeded their target this quarter with their usage being at 80.5% (against their target of 66.8%) but NERC missed their target with utilisation being 8.1% (against their target of 18.2%). It can be noted that although the low priority QoS is still being utilised, the uncharged proportion for EPSRC has decreased from 45% uncharged in quarter 3 to 28% uncharged in quarter 4.



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.