ARCHER and ARCHER2
SP Quarterly Report

October – December 2020

EPCC
The University of Edinburgh

Document Information and Version History

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1. The ARCHER Service

1.1 Service Highlights

This is the report for the ARCHER SP Service for the Reporting Periods:
October 2020, November 2020 and December 2020.

- Utilisation over the quarter was 85% which is lower than the previous quarter where the utilisation was 92%. It should be noted that historically we have seen a dip in utilisation over the festive period and this is seen again for December. A festive queue was put in place to help to mitigate this.
- The ARCHER SP Exit plan has been reviewed and plans are in place to end the service in January. A final copy of the ARCHER /home filesystem will be made and this copy will be made available on ARCHER2. Similarly, a final copy of the RDF data will be taken and this will be migrated to the RDFaaS.
- Effort has focused on ensuring that the ARCHER web site reflects the demise of the service and the transition to ARCHER2. Content on the ARCHER web site will remain in place however the main page will point to the ARCHER2 web site and all new content will appear on the ARCHER2 web site.
- HPC Champions was held virtually and involved talks and discussion sessions from the HPC community. There were talks from European Environment for Scientific Software Installations (EESSI), Isambard2 and the two new Tier2 Sites, Baskerville and Sulis, which were followed by the usual discussions.

1.2 Forward Look

- After 7 successful years, the ARCHER Service will end on 27th January 2021.
- The ARCHER SAFE will be retired and the new unified SAFE will replace it.

2. Contractual Performance Report

This is the contractual performance report for the ARCHER SP Service.

2.1 Service Points and Service Credits

The Service Levels and Service Points for the SP service are defined as below in Schedule 2.2.

- **2.6.2 - Phone Response (PR):** 90% of incoming telephone calls answered personally within 2 minutes for any Service Period. *Service Threshold: 85.0%; Operating Service Level: 90.0%.*
- **2.6.3 - Query Closure (QC):** 97% of all administrative queries, problem reports and non in-depth queries shall be successfully resolved within 2 working days. *Service Threshold: 94.0%; Operating Service Level: 97.0%.*
- **2.6.4 - New User Registration (UR):** Process New User Registrations within 1 working day.

Definitions:

Operating Service Level: *The minimum level of performance for a Service Level which is required by the Authority if the Contractor is to avoid the need to account to the Authority for Service Credits.*

Service Threshold: *This term is not defined in the contract. Our interpretation is that it refers to the minimum allowed service level. Below this threshold, the Contractor is in breach of contract.*

Non In-Depth: *This term is not defined in the contract. Our interpretation is that it refers to Basic queries which are handled by the SP Service. This includes all Admin queries (e.g. requests for Disk Quota, Adjustments to Allocations, Creation of Projects) and Technical Queries (Batch script questions, high level technical 'How do I?' requests). Queries requiring detailed technical and/or scientific analysis (debugging, software package installations, code porting) are referred to the CSE Team as In-Depth queries.*

Change Request*: This term is not defined in the contract. There are times when SP receives requests that may require changes to be deployed on ARCHER. These requests may come from the users, the CSE team or Cray. Examples may include the deployment of new OS patches, the deployment Cray bug fixes, or the addition of new systems software. Such changes are subject to Change Control and may have to wait for a Maintenance Session. The nature of such requests means that they cannot be completed in 2 working days.*

2.1.1 Service Points

In the previous Service Quarter, the Service Points can be summarised as follows:

Period	**Oct 20**		**Nov 20**		**Dec 20**		**20Q4**
Metric	**Service Level**	**Service Points**	**Service Level**	**Service Points**	**Service Level**	**Service Points**	**Service Points**
2.6.2 – PR	100.0%	-5	100.0%	-5	100.0%	-5	-15
2.6.3 – QC	99.2%	-2	98.3%	-1	98.2%	-1	-4
2.6.4 – UR	1 WD	0	1 WD	0	1 WD	0	0
Total							**-19**

The details of the above can be found in Section 2.2 of this report.

2.1.2 Service Failures

Details of planned maintenance sessions, if any, can be found in Section 2.3.2.

2.1.3 Service Credits

As the Total Service Points are negative (-19), no Service Credits apply in 20Q4.

2.2 Detailed Service Level Breakdown

2.2.1 Phone Response (PR)

	Oct 20	Nov 20	Dec 20	20Q4
Phone Calls Received	4 (0)	5 (0)	2 (0)	**11 (0)**
Answered in 2 Minutes	4 (0)	5 (0)	2 (0)	**11 (0)**
Service Level	**100.0%**	**100.0%**	**100.0%**	**100.0%**

The volume of telephone calls remained low in 20Q4. Of the total of 11 calls received above, none were actual ARCHER user calls that either resulted in queries or answered user questions directly.

2.2.2 Query Closure (QC)

	Oct 20	Nov 20	Dec 20	20Q4
Self-Service Admin	642	463	290	**1395**
Admin	205	118	128	**451**
Technical	20	17	16	**53**
Total Queries	867	598	434	**1899**
Total Closed in 2 Days	860	588	426	**1874**
Service Level	**99.2%**	**98.3%**	**98.2%**	**98.7%**

The above table shows the queries closed by SP during the period.

In addition to the Admin and Technical queries, there were no Change Requests resolved in 20Q4:

	Oct 20	Nov 20	Dec 20	20Q4
Change Requests	0	0	0	**0**

2.2.3 User Registration (UR)

	Oct 20	Nov 20	Dec 20	20Q4
No of Requests	96	57	17	**170**
Closed in One Working Day	96	52	17	**165**
Average Closure Time (Hrs)	0.3	1.4	0.9	**0.7**
Average Closure Time (Working Days)	0.03	0.15	0.09	**0.08**
Service Level	**1 WD**	**1 WD**	**1 WD**	**1 WD**

To avoid double counting, these requests are not included in the above metrics for “Admin and Technical” Query Closure.

2.3.1 Target Response Times

The following metrics are also defined in Schedule 2.2, but have no Service Points associated.

Target Response Times	
1	During core time, an initial response to the user acknowledging receipt of the query
2	A Tracking Identifier within 5 minutes of receiving the query
3	During Core Time, 90% of incoming telephone calls should be answered personally (not by computer) within 2 minutes
4	During UK office hours, all non telephone communications shall be acknowledged within 1 Hour

1 – Initial Response

This is sent automatically when the user raises a query to the address helpdesk@archer.ac.uk. Users may choose not to receive such emails by mailing support@archer.ac.uk.

2 – Tracking Identifier

This is sent automatically when the user raises a query to the address helpdesk@archer.ac.uk. Users may choose not to receive such emails by mailing support@archer.ac.uk. The tracking identifier is set in the SAFE regardless which option the user selects.

3 – Incoming Calls

These are covered in the previous section of the report. Service Points apply.

4 - Query Acknowledgement

Acknowledgment of the query is defined as when the Helpdesk assigns the new incoming query to the relevant Service Provider. This should happen within 1 working hour of the query arriving at the Helpdesk. The Helpdesk processed the following number of incoming queries during the Service Quarter:

	Oct 20	Nov 20	Dec 20	20Q4
CRAY	2	3	0	**5**
ARCHER_CSE	7	2	2	**11**
ARCHER_SP	1223	813	492	**2528**
Total Queries Assigned	1232	818	494	**2544**
Total Assigned in 1 Hour	1231	818	494	**2543**
Service Level	**100.0%**	**100.0%**	**100.0%**	**100.0%**

The Service Desk assigns queries to all groups supporting the service i.e. SP, CSE and Cray. The above table includes queries handled by the other groups supporting the service as well as internally generated queries used to manage the operation of the service.

2.3.2 Maintenance

Maintenance now takes place on at most a single day each month (fourth Wednesday of each month). This is marked as a full outage maintenance session for a maximum of 8 hours taken. There are also additional “at-risk” sessions that may be scheduled for other Wednesdays. This reduces the number of sessions taken, which then reduces user impact since the jobs running on the service have

to be drained down only once per month and not twice. It also eases the planning for training courses running on ARCHER. A 6-month forward plan of maintenance has been agreed with EPSRC.

Feedback has shown that the users would be happier if there were even fewer full outage maintenance sessions, and so we have been working to reduce these as much as possible. Some maintenance activities can only be done during a full outage (e.g., applying firmware updates), but for others the requirement to take a full outage can be evaluated on an individual basis based on potential risk.

There was one full maintenance session during Q4, all other maintenance activities were carried out during at risk sessions.

23rd November 0800 - 24th November 2200

Essential work on the main power settings to the ACF site required a full power shutdown. This affected ARCHER, ARCHER2 4-Cabinet and the RDF.

2.3.2 Quality Tokens and query feedback emails

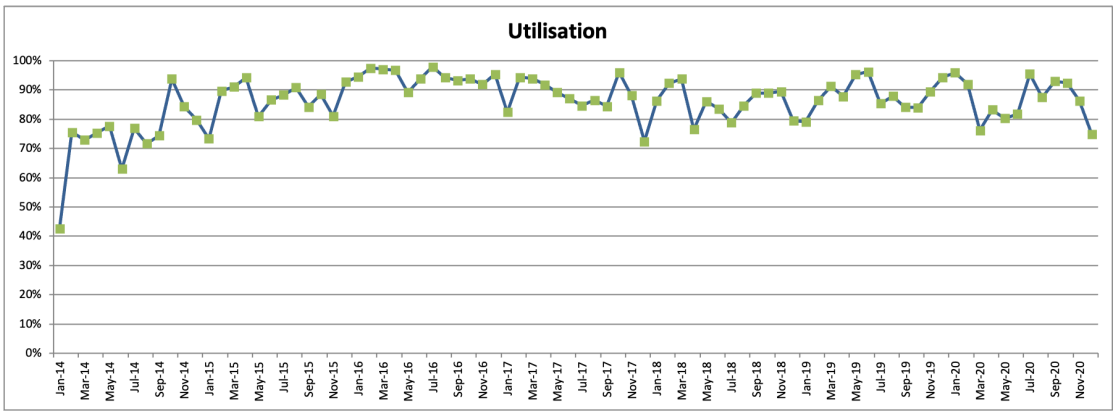
No quality tokens were received this quarter.

3. Service Statistics

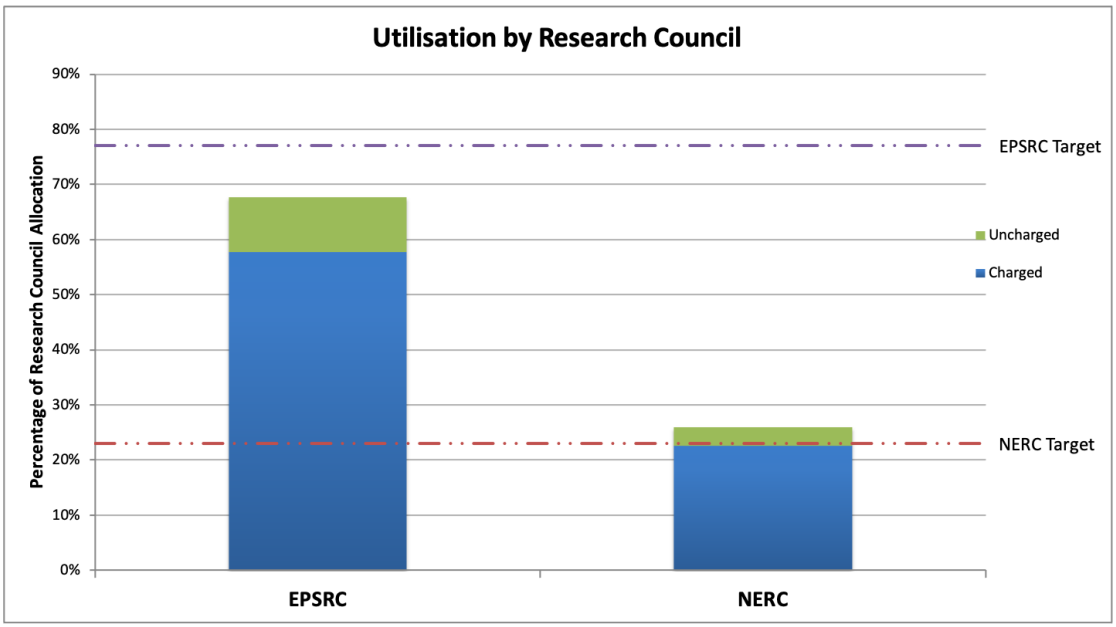
This section contains statistics on the ARCHER service as requested by EPSRC, SAC and SMB.

3.1 Utilisation

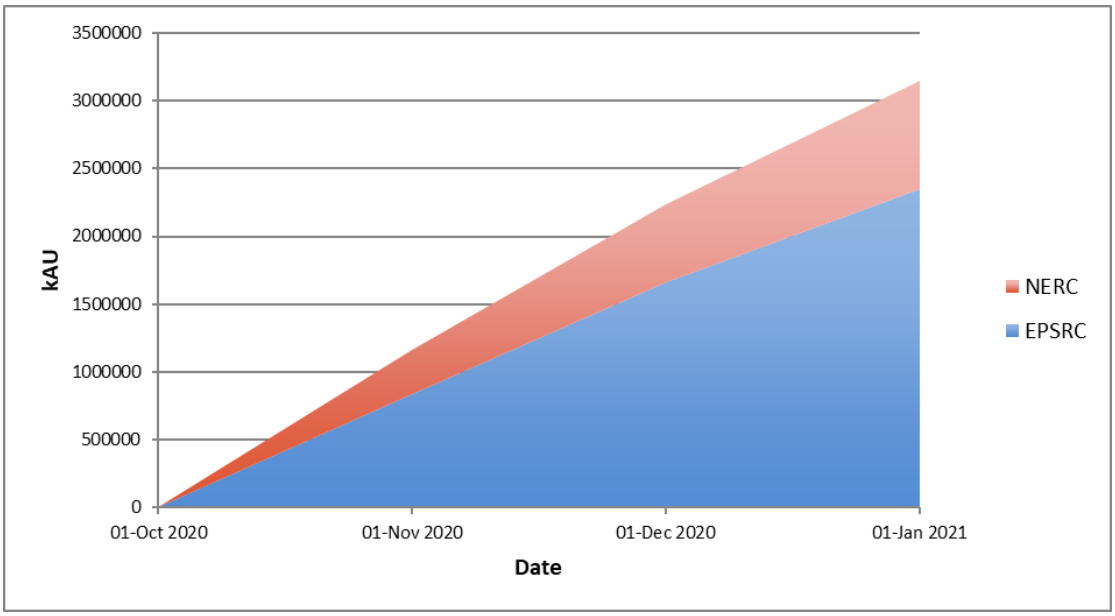
Utilisation over the quarter was 85%, which is down from 92% the previous quarter. Utilisation for October was 92%, for November 86% and for December 75%. The plot below shows a steady increase in utilisation over the lifetime of the service to Dec 2015 and since then the service has effectively been operating around maximum capacity as shown by the generally steady utilisation value.



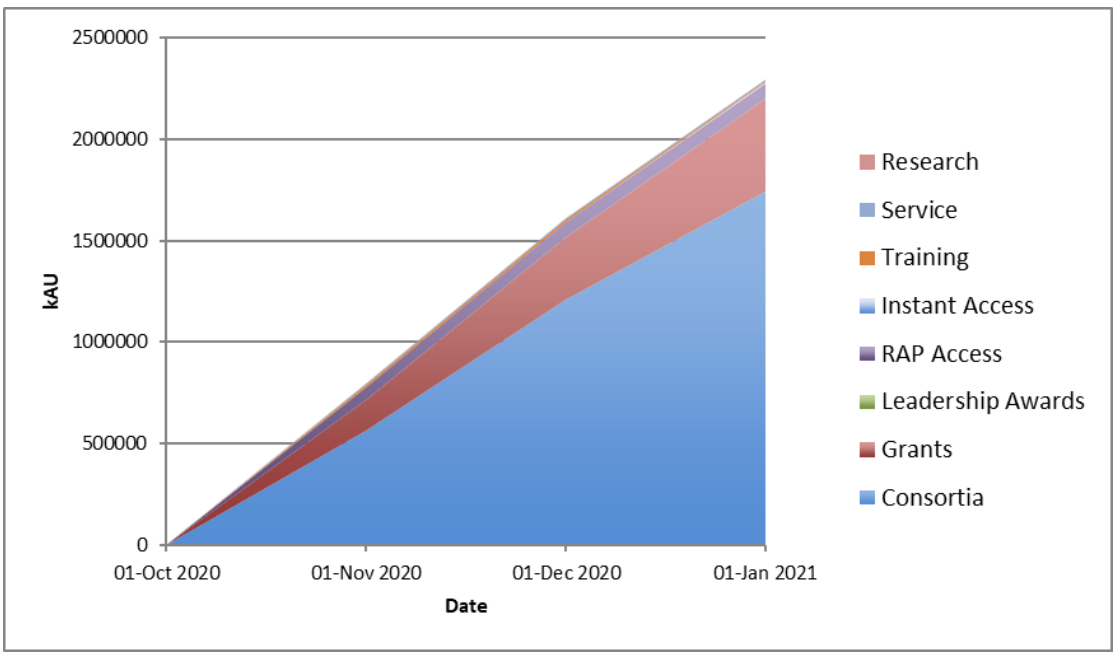
The utilisation by the Research Councils, relative to their respective allocations, is presented below. This bar chart shows the usage of ARCHER by the two Research Councils presented as a percentage of the total Research Council allocation on ARCHER. It can be seen that EPRSC did not meet their target this quarter with their usage being at 68% (against their target of 77%) and NERC exceeded their target with utilisation being 26% (against their target of 23%). This compares with 60% for EPSRC and 16% for NERC for the previous quarter.



The cumulative allocation utilisation for the quarter by the Research Councils is shown below:

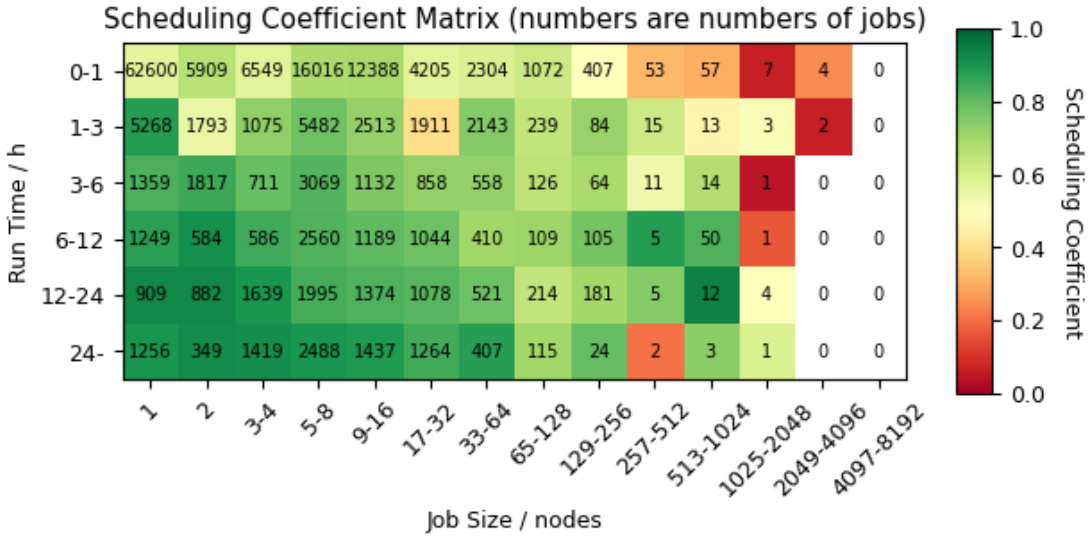


The cumulative allocation utilisation for the quarter by EPSRC broken down by different project types (see below) shows that the majority of usage comes from the scientific Consortia (as expected) with significant usage from research grants and ARCHER RAP projects. The total time used by Instant Access projects is very small.

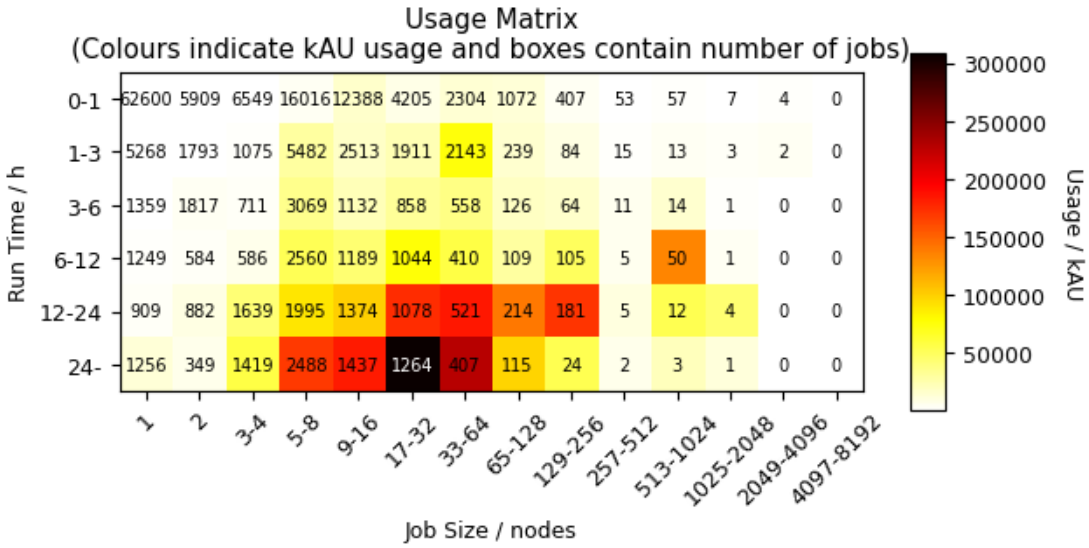


3.2 Scheduling Coefficient Matrix

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.



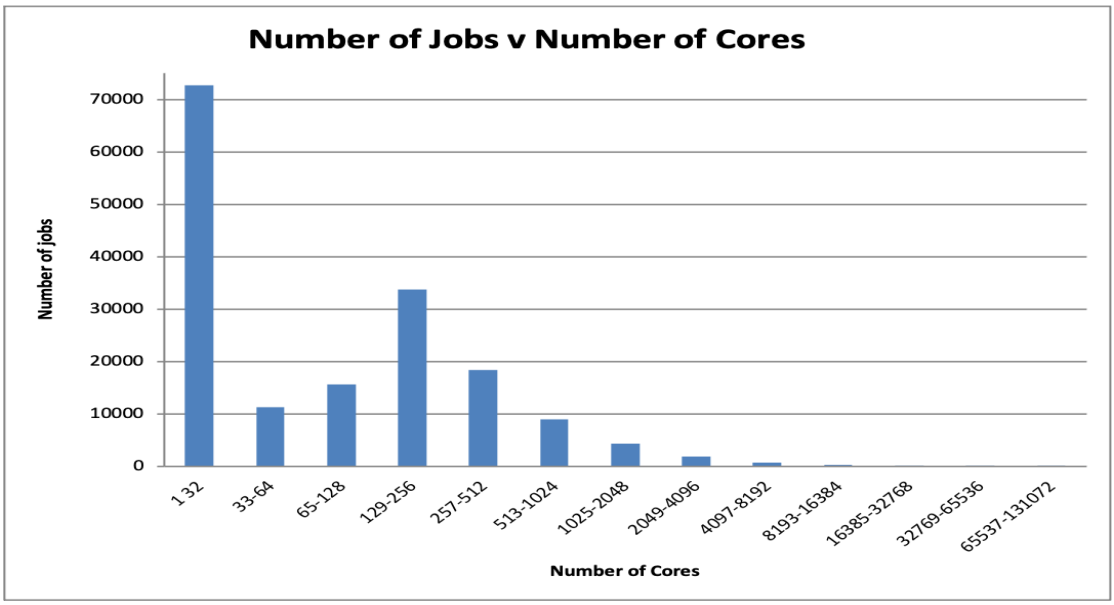
The usage heatmap below provides an overview of the usage on ARCHER over the quarter for different job sizes/lengths. The colour in the heatmap indicates the number of kAUs expended for each class, and the number in the box is the number of jobs of that class.

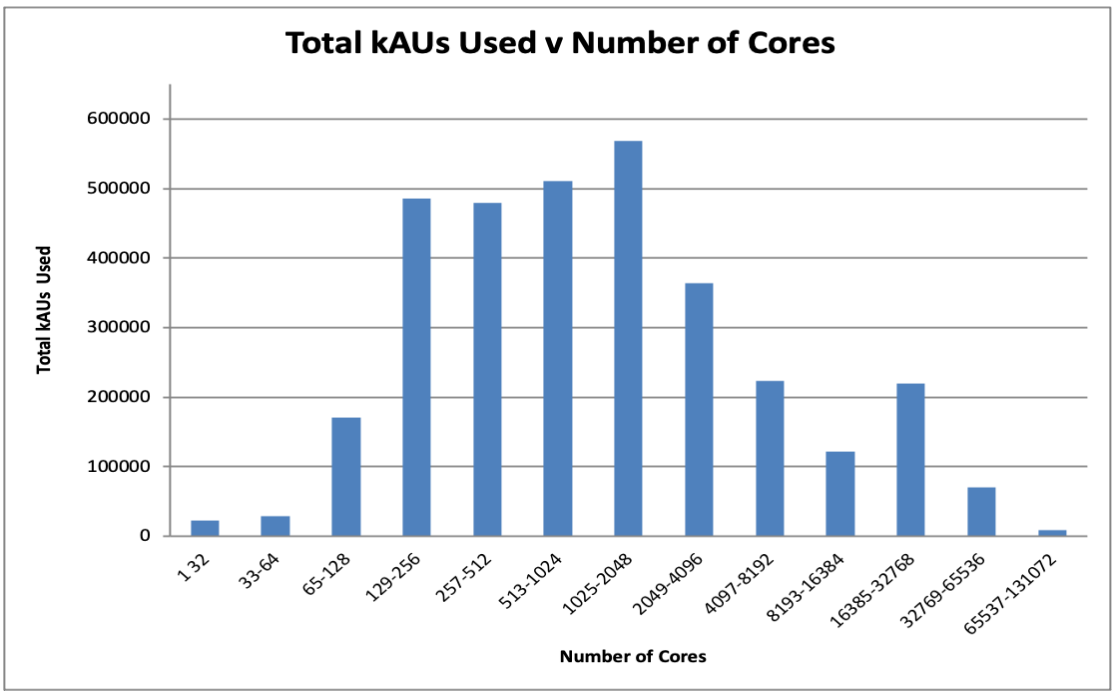


3.3 Additional Usage Graphs

The following charts provide different views of the distribution of job sizes on ARCHER.

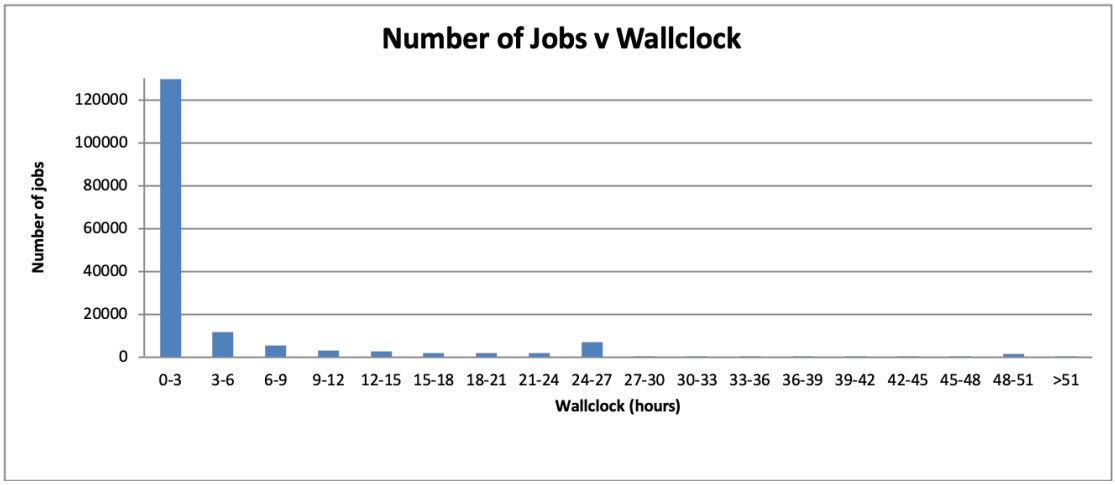
Analysis of Job Sizes

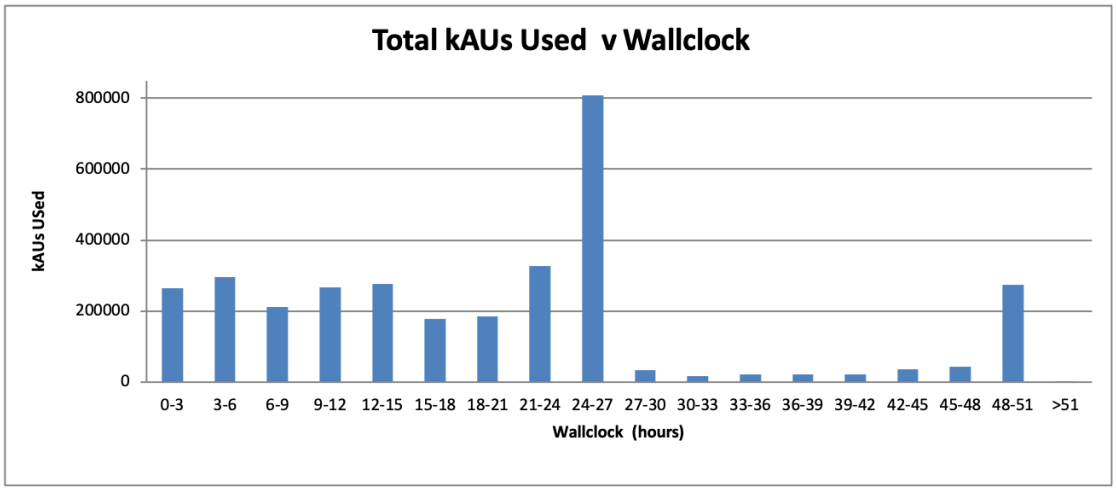




The first graph shows that, in terms of numbers, there are a significant number of jobs using no more than 512 cores. However, the second graph reveals that most of the kAUs were spent on jobs between 129 cores and 16384 cores. The number of kAUs used is closely related to money and shows better how the investment in the system is utilised.

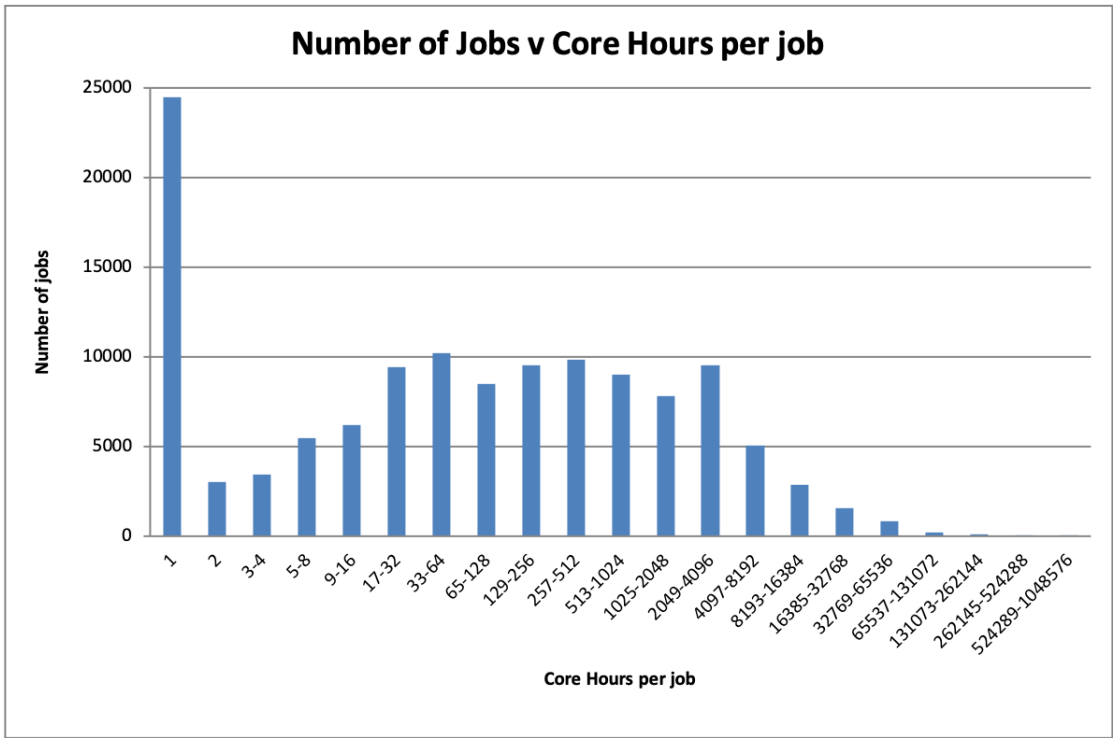
Analysis of Jobs Length

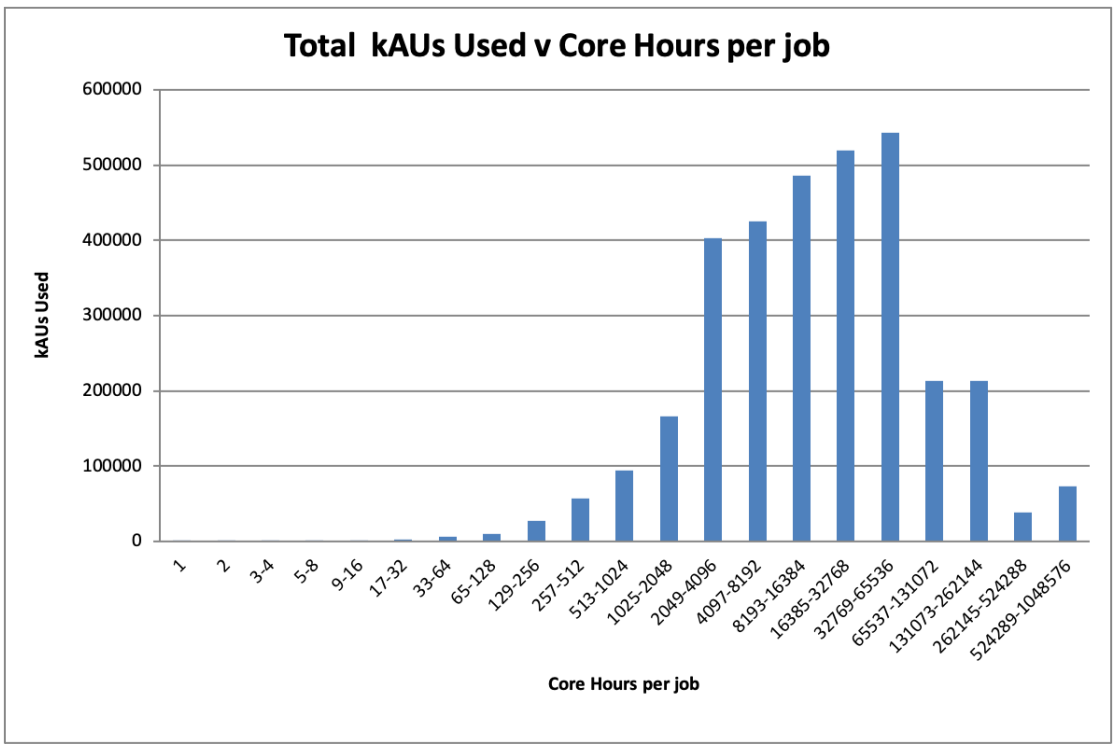




From the first graph, it would appear that the system is dominated by short jobs. However, the second graph shows that actual usage of the system is more spread and dominated by jobs of around 24 hours with a second peak for jobs around 48 hours.

Core Hours per Job Analysis





The above graphs show that, while there are quite a few jobs that use only a small number of core hours per job, most of the resource is consumed by jobs that use tens of thousands of core hours per job.

1 The ARCHER2 Service

1.1 Service Highlights

- The ARCHER2 4-Cabinet service was opened to the nominated early access users. This initial group of users were nominated by the Scientific Consortia to port important codes, test workflows, and test the system.

- A webinar was given detailing the Access Mechanisms for ARCHER2. Representatives from EPSRC and NERC attended to enable them to answer any specific questions if needed.

- EPCC are working with UKRI to agree a set of benefits realisation metrics for ARCHER2. These are the measures which help to demonstrate the benefits delivered to the users of ARCHER2 and their research and science by the investment made in purchasing and running the ARCHER2 service. The figures generated contribute to the business case for the next national service, shall we call it ARCHER3 for now? The main source of data is that held in the SAFE, and we are going to be asking PIs and users to help us create the data by inputting additional data such as publications. There is a clear incentive for the user community to help ensure that the data is as complete as possible to help justify future investment in the HPC services we all use and on which research and science depends

- EPCC are pleased to announce that they have passed their annual external ISO9001 (Quality) and ISO27001 (Information Security) audits. The ARCHER2 service was included in the scope for certification for the first time and the audit carried out remotely, which was a new experience. These internationally recognised certifications demonstrate the continuing importance EPCC places on service delivery and secure data handling.

- User documentation has been regularly updated based on feedback from the early users on the 4-Cabinet system. This has ensured a high-quality set of user documentation was available for the user community on their transition to the ARCHER2 system.

- An on-boarding guide was prepared to support users transitioning from ARCHER to ARCHER2.

- The ARCHER/ARCHER2 image and video competition ran during this period, with a range of high-quality scientific images being submitted. These images help to showcase the world-leading science being carried out on ARCHER and ARCHER2.

1.2 Forward Look

- Following the end of the ARCHER Service on 27th January, all UKRI projects with active ARCHER allocation will be migrated to the ARCHER2 4-Cabinet system. We will assist users to ensure a seamless transition to the new service.

2 ARCHER2 Performance Report

This is the contractual performance report for the ARCHER2 SP Service for the Reporting Periods from 1st October 2020 until 31st December 2020.

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 2020		Nov 2020		Dec 2020		Q4 2020	
	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)	0.10	-2	0.06	-2	0.12	-2	**0.10**	**-6**
SP_Level3 (MTR)	2.74	-2	0.24	-2	1.45	-2	**1.45**	**-6**
Initial Response (%)	100%	-1	100%	-1	100%	-1	**100%**	**-3**
Query Satisfaction (%)	100%	-2	100%	-2	100%	-2	**100%**	**-6**
Total		**-5**		**-5**		**-5**		**-27**

2.1.2 Service Credits

As the Total Service Points are negative (-27), no Service Credits apply in 20Q4.

2.2 SP Query Statistics

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

- **No. of Assigned:** The number of SP queries assigned to the Contractor within each query resolution category in the Reporting Period.
- **No. of 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
- **Avg No. of Correspondence:** The average number of pieces of correspondence generated for SP queries in each query resolution category.
- **Avg Time of First Responses:** The average time taken for the Contractor to first respond to the Originator of the SP query.

October 2020					
Service level	**Assigned**	**Resolved**	**Backlog**	**Correspondence**	**First Response**
SP_Level1	1313	1312	1	0.23	0:02:02
SP_Level2	52	45	10	8.07	0:40:46
SP_Level3	2	2	0	7.5	0:27:06
November 2020					
Service level	**Assigned**	**Resolved**	**Backlog**	**Correspondence**	**First Response**
SP_Level1	463	464	0	0.27	0:13:48
SP_Level2	49	50	9	8.38	0:22:24
SP_Level3	3	1	2	8	0:17:06
December 2020					
Service level	**Assigned**	**Resolved**	**Backlog**	**Correspondence**	**First Response**
SP_Level1	727	727	0	0.24	0:00:51
SP_Level2	48	45	12	10.8	0:25:53
SP_Level3	1	1	2	7	1:32:20
Q4 2020					
Service level	**Assigned**	**Resolved**	**Backlog**	**Correspondence**	**First Response**
SP_Level1	2503	2503	0	0.24	0:03:36
SP_Level2	149	140	12	9.06	0:29:25
SP_Level3	6	4	2	7.5	0:40:54

2.3 Query Resolution

Metric	**Oct 2020**		**Nov 2020**		**Dec 2020**		**Q4 2020**	
Service Level	**MTR**	**Number Resolved**	**MTR**	**Number Resolved**	**MTR**	**Number Resolved**	**MTR**	**Number Resolved**
SP_Level1	0.00	1312	0.00	464	0.00	727	0.00	2503
SP_Level2	0.10	45	0.06	50	0.12	45	0.10	140

SP_Level3	2.74	2	0.24	1	1.45	1	1.45	4
Total		**1359**		**515**		**773**		**2647**

There were 0 queries that failed the maximum completion time during this period.

A total of 2647 queries were resolved by the ARCHER2 SP Service in the Reporting Period. The percentage of queries responded to within 3 hours was 100%. A lot of the queries related to new user accounts and we expected to see a sharp increase in queries as more users migrate to ARCHER2.

2.4 Query Feedback

There were 49 feedback scores received during this period. 100% were Good, Very Good or Excellent with 69% given the highest score of Excellent.

2.4 Maintenance

As the ARCHER2 Service has not yet been launched, there were no maintenance sessions during this period.