ARCHER and ARCHER2
SP Quarterly Report

July – September 2020

EPCC
The University of Edinburgh

Document Information and Version History

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0.1	03/10/20	Initial Draft	Jo Beech-Brandt, Anne Whiting, Clair Barrass
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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:
July 2020, August 2020 and September 2020.

- Utilisation over the quarter was 92% which is higher than the previous quarter where the utilisation was 82%. This shows that ARCHER continues to be a well utilised resource for the scientific community.

- EPCC are pleased to announce they have retained Cyber Essentials information security certification, demonstrating the importance they place on the secure handling of user's data.

- After the security incident that affected the ARCHER service in May, analysis was completed to ensure: that the root causes of the incident are understood; that service improvements are identified; and that the implementation of improvements is tracked. Security measures have been hardened across all aspects of the service to minimise the risk of such an incident occurring again in the future.

1.2 Forward Look

- The ARCHER Service has a further extension to allow the service to continue while ARCHER2 is installed and prepared for users. Users are kept informed of developments via the weekly emails from UKRI and news items on the ARCHER/ARCHER2 websites, and a minimum of 2 weeks notice will be provided for the end of the ARCHER Service.

- The ARCHER Service Exit Plans are being activated as we approach the end of service. EPCC will continue to work with EPSRC and NERC to provide assistance to them in planning the transition of user data and projects from ARCHER to ARCHER2.

- EPCC are preparing for our annual ISO9001 (Quality) and ISO27001 (Information Security) external audits. The ARCHER2 service has been added into the scope for certification for the first time. These internationally recognised certifications demonstrate the focus EPCC places on service delivery and secure data handling.

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	**Jul 20**		**Aug 20**		**Sep 20**		**20Q3**
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	99.1%	-2	98.0%	-1	99.5%	-2	-5
2.6.4 – UR	1 WD	0	1 WD	0	1 WD	0	0
Total		**-7**		**-6**		**-7**	**-20**

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 (-20), no Service Credits apply in 20Q2.

2.2 Detailed Service Level Breakdown

2.2.1 Phone Response (PR)

	Jul 20	Aug 20	Sep 20	20Q3
Phone Calls Received	5 (2)	6 (3)	5 (2)	**16 (7)**
Answered in 2 Minutes	5	6	5	**16**
Service Level	**100.0%**	**100.0%**	**100.0%**	**100.0%**

The volume of telephone calls remained low in 20Q3. Of the total of 16 calls received above, only 7 were actual ARCHER user calls that either resulted in queries or answered user questions directly.

2.2.2 Query Closure (QC)

	Jul 20	Aug 20	Sep 20	20Q3
Self-Service Admin	790	366	420	**1576**
Admin	202	118	110	**430**
Technical	27	17	17	**61**
Total Queries	1019	501	547	**2067**
Total Closed in 2 Days	1010	491	544	**2045**
Service Level	**99.12%**	**98.00%**	**99.45%**	**98.94%**

The above table shows the queries closed by SP during the period. The increase in Self-Service Admin queries during July was caused by the requirement that all users reset their password and upload a new SSH key for their accounts.

In addition to the Admin and Technical queries, the following Change Requests were resolved in 20Q3:

	Jul 20	Aug 20	Sep 20	20Q3
Change Requests	0	0	1	**1**

2.2.3 User Registration (UR)

	Jul 20	Aug 20	Sep 20	20Q3
No of Requests	79	21	39	**139**
Closed in One Working Day	79	21	39	**139**
Average Closure Time (Hrs)	0.4	0.4	0.5	**0.5**
Average Closure Time (Working Days)	0.04	0.05	0.06	**0.05**
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:

	Jul 20	Aug 20	Sep 20	20Q3
CRAY	3	3	3	**9**
ARCHER_CSE	13	7	13	**33**
ARCHER_SP	1449	599	716	**2764**
Total Queries Assigned	1465	609	732	**2764**
Total Assigned in 1 Hour	1464	609	732	**2763**
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 were no full maintenance sessions during Q3; all maintenance activities were carried out during at risk sessions.

2.3.2 Quality Tokens and query feedback emails

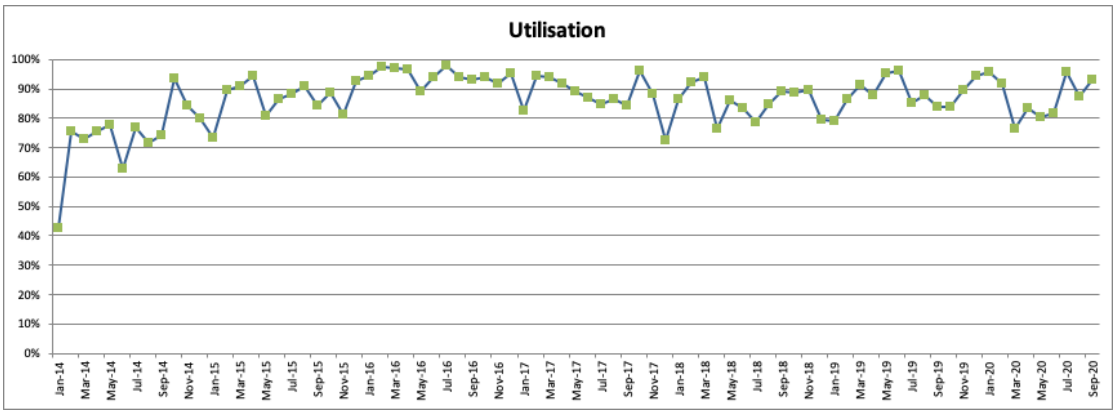
We have received no quality tokens this quarter but we did receive one very positive feedback email.

3. Service Statistics

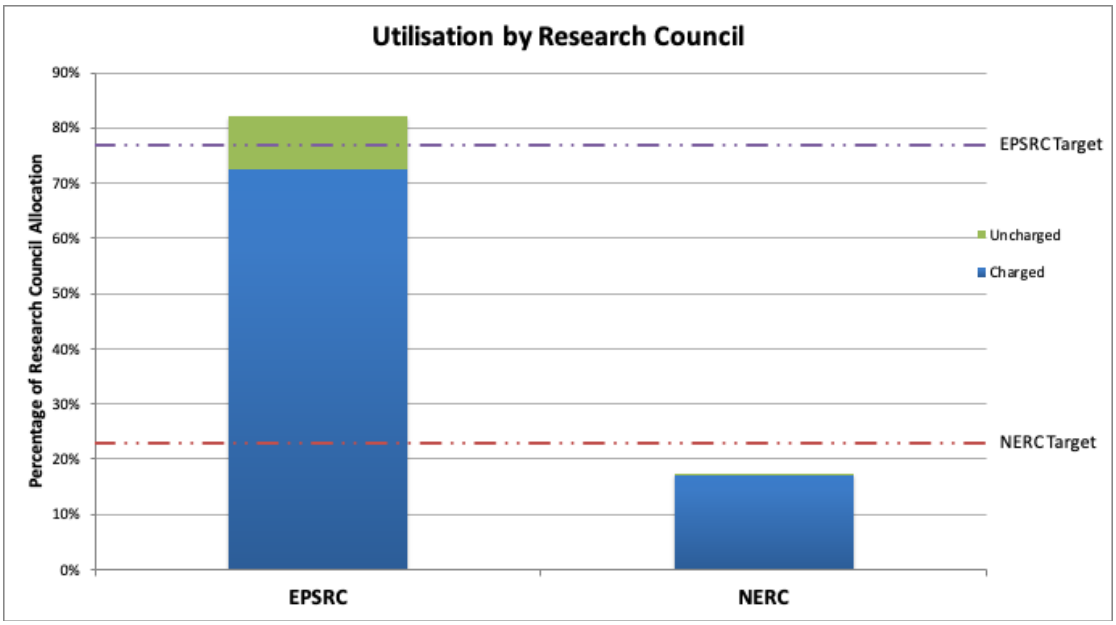
This section contains statistics on the ARCHER service as requested by EPSRC, SAC and SMB.

3.1 Utilisation

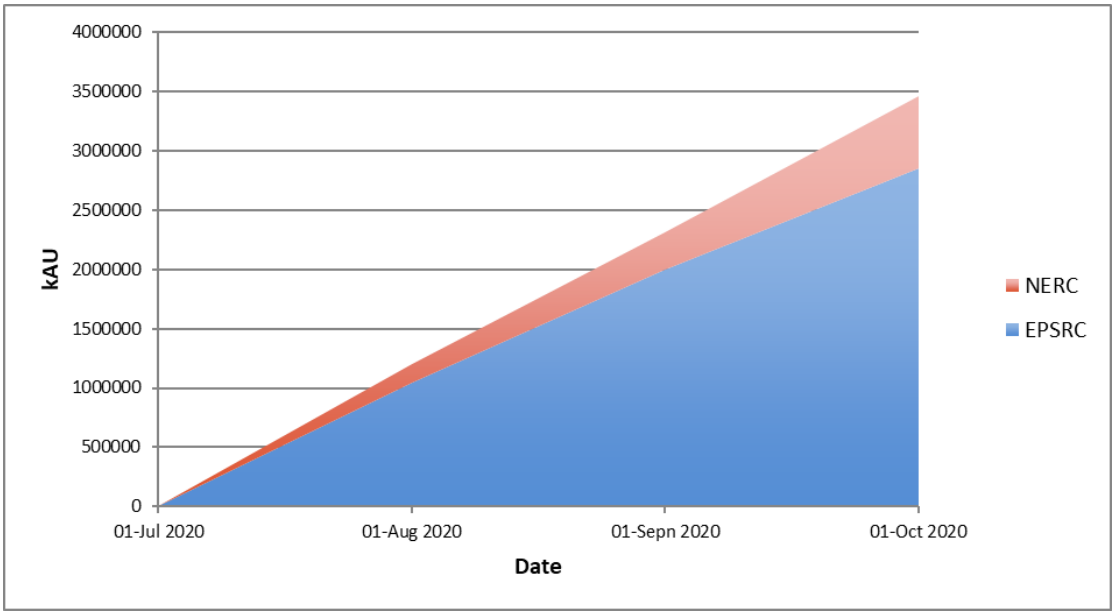
Utilisation over the quarter was 92%, which is up from 82% the previous quarter. Utilisation for July was 96%, for August 87% and for September 93%. The plot below shows a steady increase in utilisation over the lifetime of the service to Dec 2015 and since then the service has effectively been operating around maximum capacity as shown by the generally steady utilisation value.



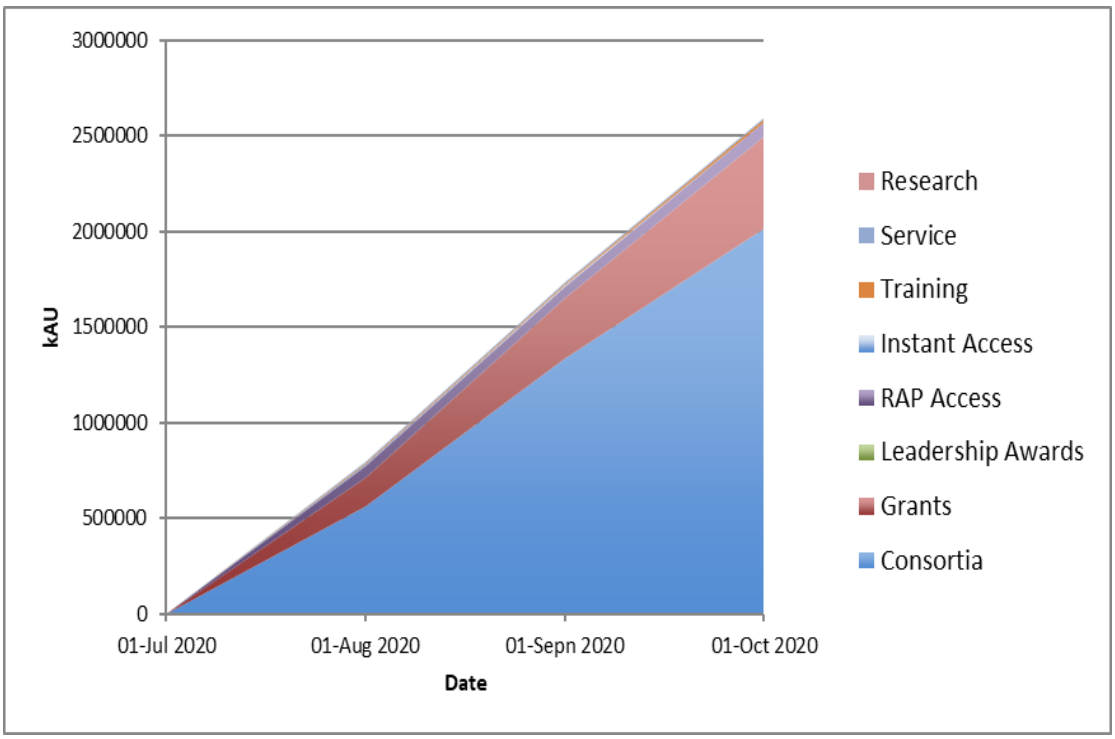
The utilisation by the Research Councils, relative to their respective allocations, is presented below. This bar chart shows the usage of ARCHER by the two Research Councils presented as a percentage of the total Research Council allocation on ARCHER. It can be seen that EPRSC exceeded their target this quarter with their usage being at 82% (against their target of 77%) and NERC missed their target with utilisation being 17% (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:

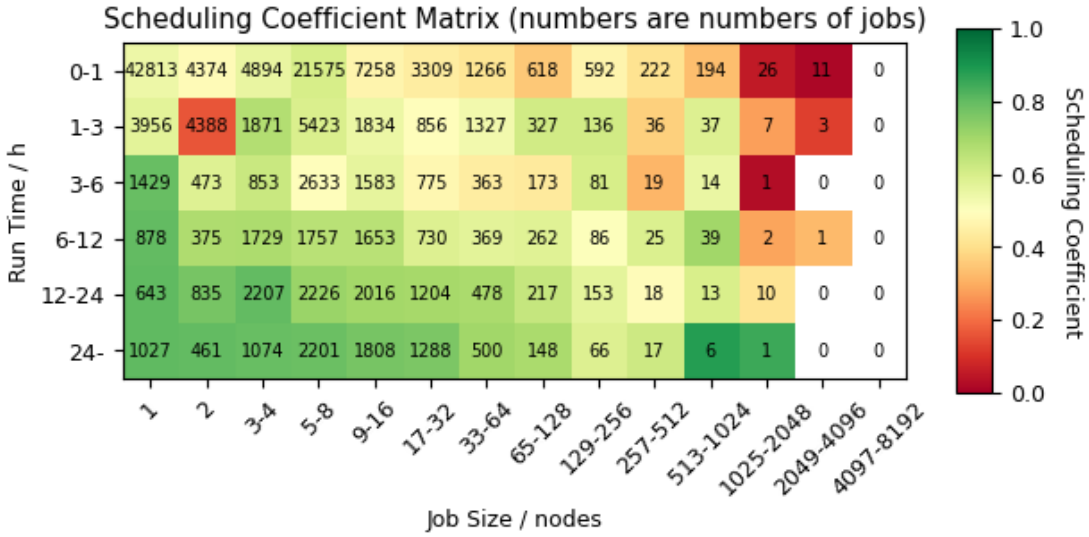


The cumulative allocation utilisation for the quarter by EPSRC broken down by different project types (see below) shows that the majority of usage comes from the scientific Consortia (as expected) with significant usage from research grants and ARCHER RAP projects. The total time used by Instant Access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

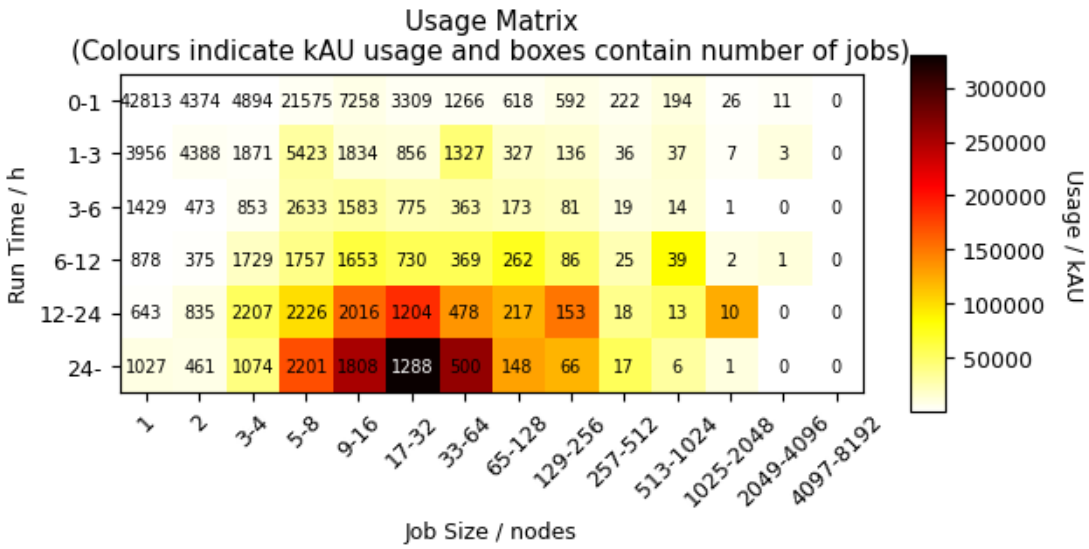


3.2 Scheduling Coefficient Matrix

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.



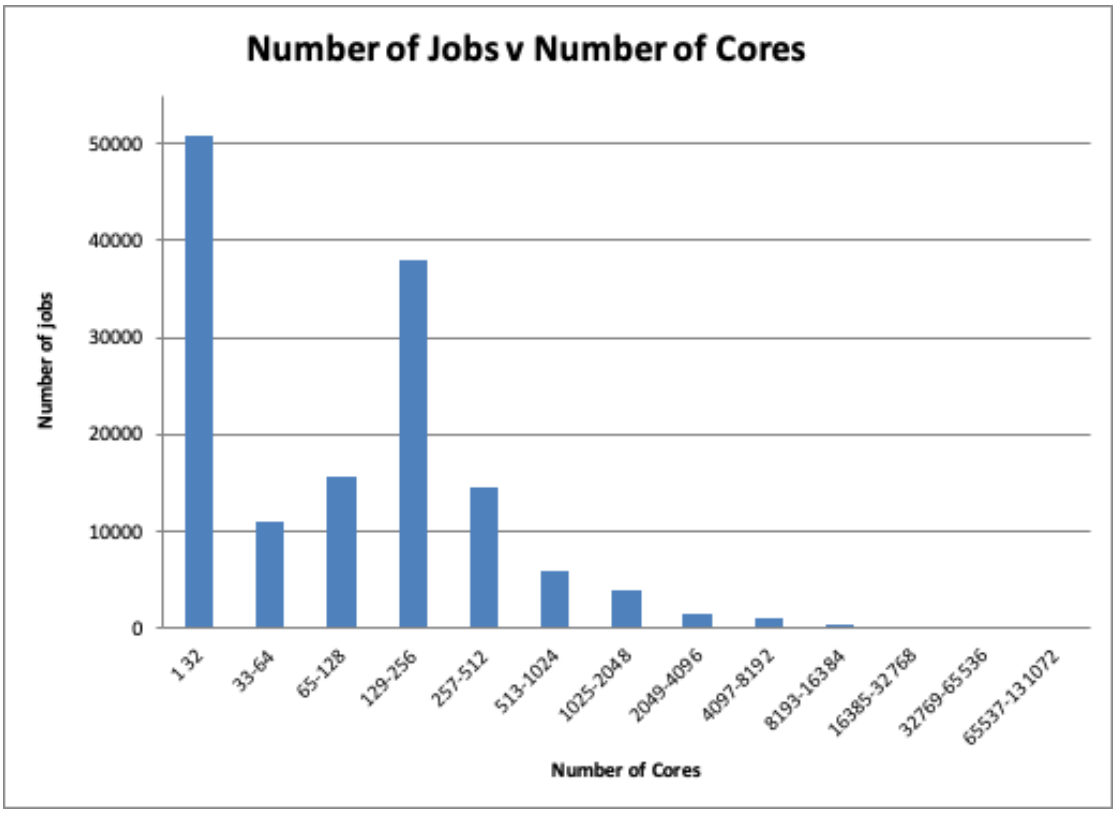
The usage heatmap below provides an overview of the usage on ARCHER over the quarter for different job sizes/lengths. The colour in the heatmap indicates the number of kAUs expended for each class, and the number in the box is the number of jobs of that class.

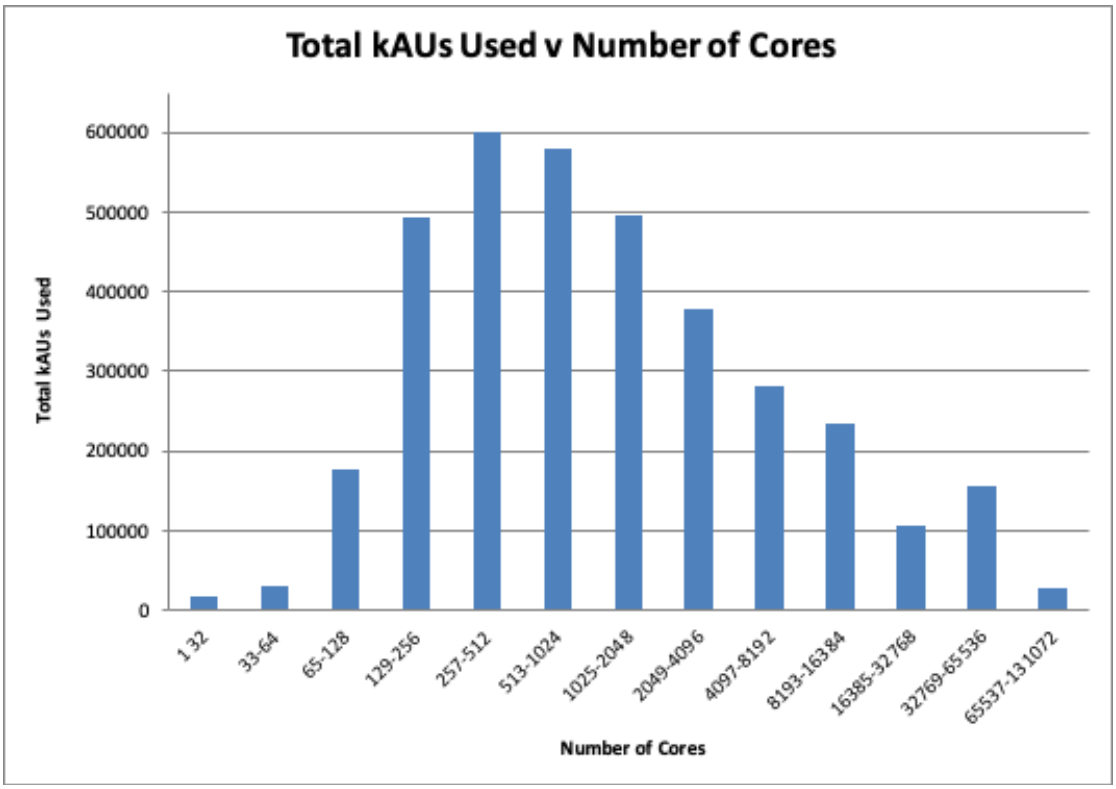


3.3 Additional Usage Graphs

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

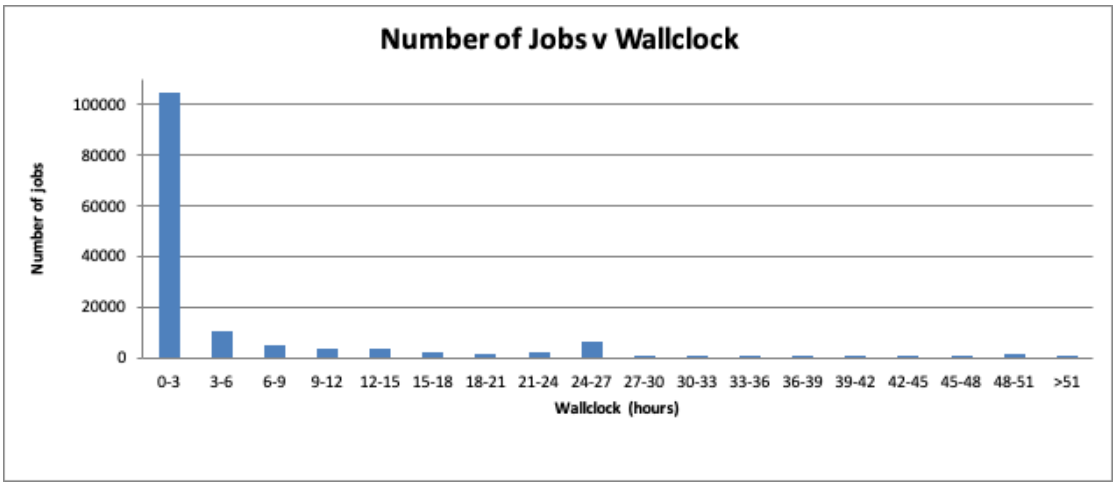
Analysis of Job Sizes

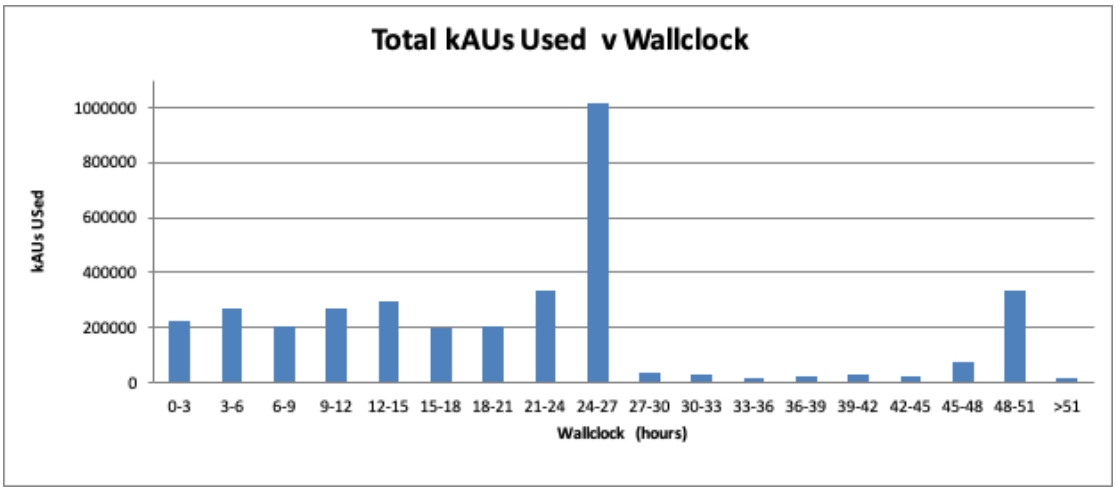




The first graph shows that, in terms of numbers, there are a significant number of jobs using no more than 512 cores. However, the second graph reveals that most of the kAUs were spent on jobs between 129 cores and 16384 cores. The number of kAUs used is closely related to money and shows better how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

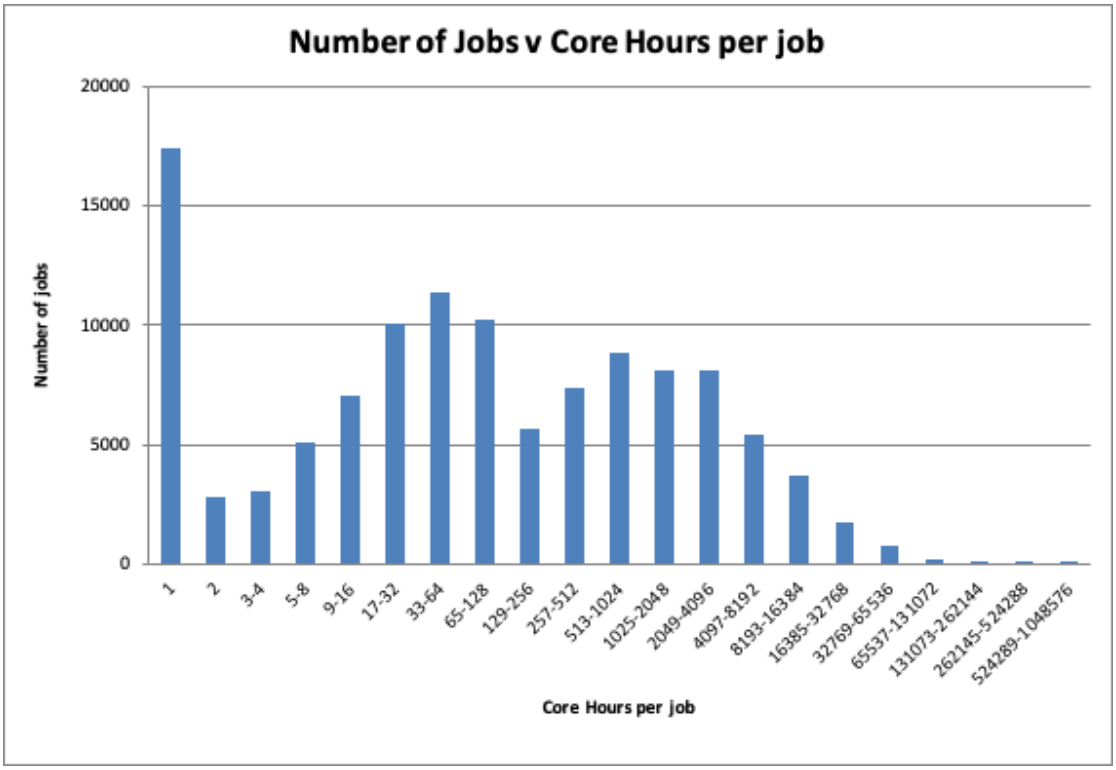
Analysis of Jobs Length

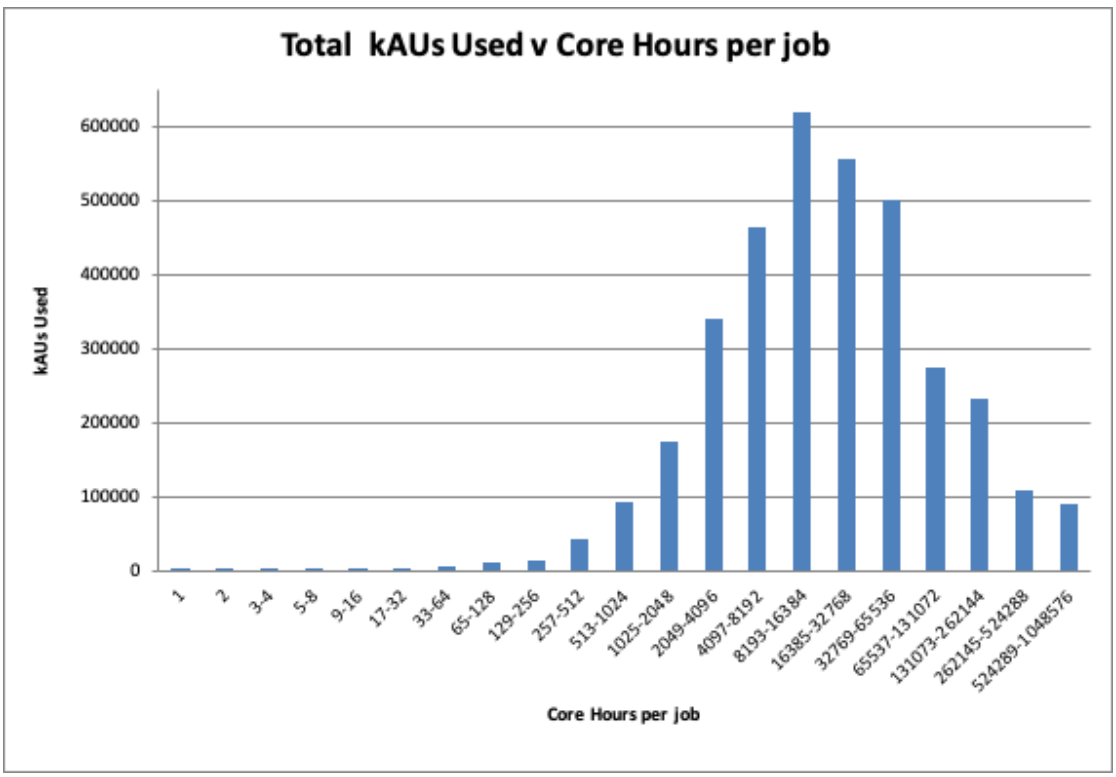




From the first graph, it would appear that the system is dominated by short jobs. However, the second graph shows that actual usage of the system is more spread and dominated by jobs of around 24 hours with a second peak for jobs around 48 hours.

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 number of ARCHER2 SP queries have increased in this period and all ARCHER2 Service Levels were met. However, such queries are still low in number as the ARCHER2 Service has not yet launched to users. Four users provided feedback and scored the Service Desk as Excellent.

- The 4-Cabinet ARCHER2 System has arrived in Edinburgh and the installation team prepared the system for the ARCHER2 users. A daily blog and tweets were used to publicise the installation of system. EPCC staff are working with HPE/Cray to get the 4-Cabinet ready for the UKRI-nominated early users ahead of the full transition for all ARCHER users to ARCHER2. Work continues to resolve issues before final testing and deployment can take place which includes site customisation and configuration.

- The ARCHER2 /home filesystem has been installed with a Disaster Recovery (DR) system installed at a remote site. This has been configured and tested. This has been mounted on the 4-Cabinet ARCHER2 and is ready to be mounted on both the 19/23 Cabinets and the Test and Development System (TDS) when they arrive on site. Data is being synced to the remote site for DR purposes appropriately.

- Meetings were held with the PIs of the ARCHER2 Scientific Consortia to discuss early access arrangements and migration to ARCHER2. A webinar was also given to the early users to prepare them for the ARCHER2 service.

- The Test and Development System (TDS) has been successfully utilised by the EPCC team to test and develop codes. The TDS will be moved to Edinburgh in the next few weeks.

- The ARCHER2 website continues to see significant traffic and is being updated regularly with the latest developments including new access mechanism for users, user documentation and call information.

- A Business Continuity and Disaster Recovery (BCDR) table-top test took place in September. These tests help EPCC to prepare for major incidents that put the Centre's ability to perform CSE and SP commitments at risk. The joint CSE and SP teams undertake a range of BCDR-focused activities, where a representative group meet to analyse identified, possible major incidents, their implications, and measures that can be put in place to minimise their impact on the ARCHER and ARCHER2 service. This latest test was focused on the topical threat of a widespread failure of home-broadband services, which would inhibit EPCC staff from progressing their work while at home. Also considered, as part of the analysis was the effects of a major failure of the University of Edinburgh's network services, which are required to access various critical ARCHER, ARCHER2 and ACF services. The team reviewed likely scenarios and the required responses to those scenarios, as documented in the Quality Management System. The team identified several potential resiliency improvements to the ARCHER/ ARCHER2 Service Desk, which are prudent to

act on (especially, given the expectation of extended homeworking for many in the team). Key findings were found and will be analysed and implemented where needed.

1.2 Forward Look

- We continue to work with EPSRC and NERC to ensure the seamless transition of users from ARCHER to ARCHER2.
- We are in the final planning and early installation stages of increasing the external and internal network links to 100GB which will improve communication speeds for the user community.
- A webinar is planned to publicise the various *Access Mechanisms for ARCHER2*.
- The findings from the recent BCDR test will be analysed and implemented where appropriate.
    - Service Desk processes will be updated to address the course of action to take in the event of a loss of Internet services.
    - Additional monitoring should be implemented, to detect an issue with Service Desk operation, and potentially integrated into other ARCHER2 monitoring system.
    - The ACF provides an independent, resilient Internet connection that could be used in the event of widespread or extended home-broadband-related activities.
    - Simple smartphone-friendly procedures should be introduced to support template user communications, in the event of significant Internet problems.
- These findings will be implemented over the coming weeks, in preparation for the introduction of the full ARCHER2 service at the beginning of 2021.

2 ARCHER2 Performance Report

This is the contractural performance report for the ARCHER2 SP Service for the Reporting Periods: July 2020, August 2020 and September 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%.*
- **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.*
- **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.*
- **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 2020		Aug 2020		Sep 2020		Q3 2020	
	Perf	Points	Perf	Points	Perf	Points	Perf	Points
Availability	-	-	-	-	-	-	**-**	**-**
SP_Level1 (MTR)	-	-	-	-	-	-	**-**	**-**
SP_Level2 (MTR)	0.08	-2	0.08	-2	0.07	-2	**0.07**	**-6**
SP_Level3 (MTR)	-	-	-	-	-	-	**-**	**-**
Initial Response (%)	100%	-1	100%	-1	100%	-1	**100%**	**-3**
Query Satisfaction (%)	100%	-2	100%	-2	100%	-2	**100%**	**-6**
Total		**-5**		**-5**		**-5**		**-15**

2.1.2 Service Credits

As the Total Service Points are negative (-15), no Service Credits apply in Q3 2020.

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 (hh:mm:ss)

July 2020					
Service level	**Assigned**	**Resolved**	**Backlog**	**Correspondence**	**First Response**
SP_Level1	0	0	0	0	0
SP_Level2	4	4	3	8.3	0:12:43
SP_Level3	0	0	0	0	0
August 2020					
Service level	**Assigned**	**Resolved**	**Backlog**	**Correspondence**	**First Response**
SP_Level1	0	1	0	0	0
SP_Level2	14	14	0	7.4	0:24:42
SP_Level3	0	0	0	0	0
September 2020					
Service level	**Assigned**	**Resolved**	**Backlog**	**Correspondence**	**First Response**
SP_Level1	0	0	0	0	0
SP_Level2	10	8	2	5.5	0:28:00
SP_Level3	0	0	0	0	0
Q3 2020					
Service level	**Assigned**	**Resolved**	**Backlog**	**Correspondence**	**First Response**
SP_Level1	0	0	0	0	0
SP_Level2	28	26	2	6.9	0:23:52
SP_Level3	0	0	0	0	0

2.3 Query Resolution

Metric	Jul 2020		Aug 2020		Sept 2020		Q3 2020	
Service Level	**MTR**	**Resolved**	**MTR**	**Resolved**	**MTR**	**Resolved**	**MTR**	**Resolved**
SP_Level1	0	0	0	0	0	0	0	0
SP_Level2	0.08	4	0.08	14	0.07	8	0.07	26
SP_Level3	0	0	0	0	0	0	0	0
Total		**4**		**14**		**8**		**26**

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

A total of 26 queries were resolved by the ARCHER2 SP Service in the Reporting Period. The percentage of queries responded to within 3 hours was 100%. The number of SP queries are still low which is expected as the ARCHER2 Service has not yet launched. However we have seen an increase in the number of queries as users have started to contact the Service Desk to enquire about access mechanisms for ARCHER2.

2.4 Query Feedback

We received feedback from 4 queries during this period and all rated their User Satisfaction as Excellent.

2.4 Maintenance

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