ARCHER SP Service Quarterly Report

Quarter 4 2019

Document Information and Version History

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0.1	05/12/19	Initial Draft	Anne Whiting
0.2	06/12/19	Added metrics for October and November	Anne Whiting
0.3	16/12/19	Added HPC Systems information	Linda Dewar
0.4	31/12/19	Added December figures	Anne Whiting
0.5	05/01/20	Added usage and utilisation charts and phone information	Jo Beech-Brandt
0.6	13/01/20	Review and minor updates	Anne Whiting
1.0	14/01/20	Version for EPSRC	Alan Simpson & Anne Whiting

1. The Service

1.1 Service Highlights

This is the report for the ARCHER SP Service for the Reporting Periods:

October 2019, November 2019 and December 2019.

- Utilisation over the quarter was 89% which is an increase from the previous quarter where the utilisation was 86%.

- In order to facilitate faster data movement to the RDF GPFS filesystems from the ARCHER login nodes, the existing bonded pair of 10gbit links from the ARCHER core switches to the RDF sitewide network has been upgraded to a pair of 40gbit links. The increase in transfer speed will assist users in transferring data from ARCHER to ARCHER2 via the RDF.

- PBS, the job scheduler for ARCHER, has been upgraded from version 12.2.401 to version 13.0.412 to take advantage of improvements and fixes to issues provided in the upgraded version.

- A Business Continuity and Disaster Recovery (BCDR) scenario test was carried out in October. The aims of such tests are to verify the processes in place, identify improvements and to ensure that staff have had the necessary training should such an event occur, whilst maintaining an uninterrupted service to our users. A scenario was used of a food poisoning outbreak covering both the staff based at the Bayes Centre and the HPC Systems team at the ACF. Staff including managers at all levels were randomly 'afflicted' by the outbreak and removed from active service throughout the day. The remaining team used existing processes to identify a chain of command and to ensure that critical services such as the helpdesk were kept running uninterrupted. Notes were kept by all those involved on how things went and any issues that could be improved. After the test was complete a lessons learned review was carried out and actions taken to address any improvements identified. There were no interruptions to service and the user community was unaware that it had taken place. Exercises such as this help to prepare our staff and to improve our processes to help ensure we keep the services running as best we can in case of major incidents in the future.

- EPCC is delighted to be able to announce that they have passed a 4-day combined external audit of ISO 9001 Quality Management and ISO 27001 Information Security Management. ARCHER and Cirrus, our Tier-2 service, are both in scope for these certifications. The success in achieving these certifications reflects the importance we place on delivering the best and most secure service to our users and to taking action on feedback received to improve our service.

- To contribute to the utilisation of ARCHER over the holidays, the weekend queue was in operation throughout the festive period, from 18:00 Friday 20th December until 06:00 on Monday 6 January. Jobs queued but not run during the weekend queue open hours will remain in the queue, and will be eligible to be run during a subsequent weekend. Jobs in the weekend queue are charged at a 50% discount. The use of the weekend queue has contributed to ensuring a higher utilisation of ARCHER during the holiday period, with utilisation in December 2019 at 94% compared to 80% and 72% in December 2018 and December 2017 respectively.

1.2 Forward Look

- The ARCHER service will end on 18 February 2020 at 17:00. Users who can make use of ARCHER right up until the 17:00 deadline are very welcome to do so, but sufficient time should be left to copy off any final data. Users will be reminded regularly to ensure all data is copied off ARCHER before this date and assistance will be available should this be required. Users who can make use of ARCHER and retrieve any data produced on the last day will be able to run until 17:00 on 18 February 2020. After this date, no data left on ARCHER will be available to either users or service staff.

- Work will continue to prepare the user community and the service for the end of the ARCHER service:

    - We will re-run the data migration webinar to provide assistance for the user community in planning the data migration required for ARCHER2. The recording is available on the ARCHER website and the data migration guide has been updated with the same guidance information. The recorded session and the updated guide have been, and will continue to be, publicised in the weekly ARCHER news email to encourage the user community to prepare for the transition.

    - We are preparing a FAQ section for the ARCHER website to help answer user questions on the end of service and transition to ARCHER2. This will be updated as further information becomes available and additional questions are asked.

    - The Service Exit Plans will be kept up to date and activated as we approach the end of service.

    - Communication will be sent out to the user community as this is made available be EPSRC and NERC.

    - 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.

- With the importance placed on having robust business continuity and disaster recovery plans and processes in place, EPCC is planning to start working towards obtaining ISO 22301 business continuity certification.

- Plans are underway for increasing the ACF external and internal network links to 100GB improving communication speeds for the user community.

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 19		Nov 19		Dec 19		19Q4
Metric	Service Level	Service Points	Service Level	Service Points	Service Level	Service Points	Service Points
2.6.2 – PR	100%	-5	100%	-5	100%	-5	-15
2.6.3 – QC	99.3%	-2	99.9%	-2	100.0%	-2	-6
2.6.4 – UR	1 WD	0	1 WD	0	1 WD	0	0
Total		**-7**		**-7**		**-7**	**-21**

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

2.1.2 Service Failures

There was one unplanned service failure this quarter. ARCHER was rebooted on the 14th August due to a problem with the High Speed Network. Cray are still investigating the root cause.

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 (-21), no Service Credits apply in 19Q4.

2.2 Detailed Service Level Breakdown

2.2.1 Phone Response (PR)

	Oct 19	Nov 19	Dec 19	19Q4
Phone Calls Received	26 (9)	8 (1)	14 (4)	**48 (15)**
Answered in 2 Minutes	26	8	14	**48**
Service Level	**100.0%**	**100.0%**	**100.0%**	**100.0%**

The volume of telephone calls remained low in 19Q4. Of the total of 48 calls received above, only 15 were actual ARCHER user calls that either resulted in queries or answered user questions directly.

2.2.2 Query Closure (QC)

	Oct 19	Nov 19	Dec 19	19Q4
Self-Service Admin	503	567	295	**1365**
Admin	160	103	74	**337**
Technical	26	14	6	**46**
Total Queries	689	684	375	**1748**
Total Closed in 2 Days	684	683	375	**1742**
Service Level	**99.3%**	**99.9%**	**100.0%**	**99.7%**

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

In addition to the Admin and Technical queries, the following Change Requests were resolved in 19Q4:

	Oct 19	Nov 19	Dec 19	19Q4
Change Requests	2	1	0	**3**

2.2.3 User Registration (UR)

	Oct 19	Nov 19	Dec 19	19Q4
No of Requests	135	60	30	**225**
Closed in One Working Day	135	60	30	**225**
Average Closure Time (Hrs)	0.86	0.51	0.75	**0.75**
Average Closure Time (Working Days)	0.09	0.05	0.08	**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 19	Nov 19	Dec 19	19Q4
CRAY	7	3	2	**12**
ARCHER_CSE	196	79	91	**366**
ARCHER_SP	1170	915	547	**2632**
Total Queries Assigned	1376	997	640	**3010**
Total Assigned in 1 Hour	1376	997	640	**3010**
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.

We have only taken one planned maintenance outage in 2019.

The following planned maintenance took place this quarter:

Date	Start	End	Duration	Type	Notes	Reason
16/10/19	09:00	16:47	7 hours 47 minutes	Full outage	Approved by EPSRC 09:00 – 17:00	PBS upgrade from 12.2.401 to version 13.0.412

2.3.3 Quality Tokens and query feedback emails

No quality tokens were received this quarter.

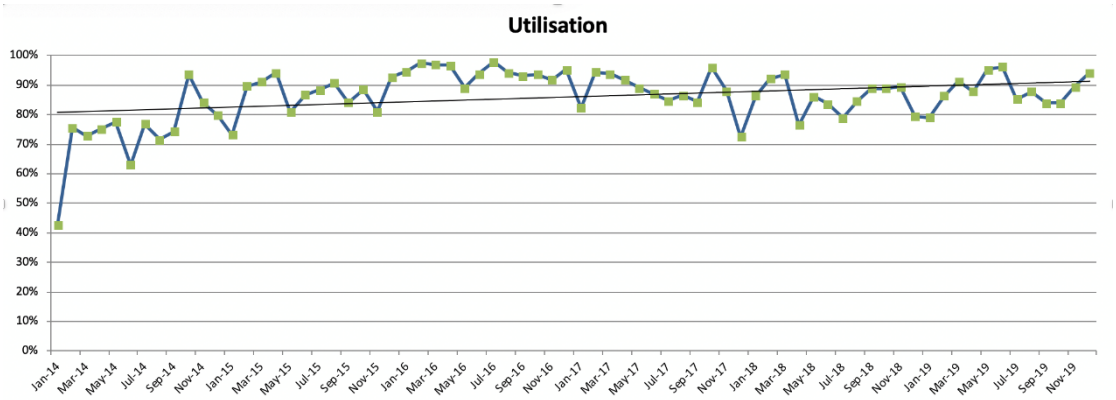
Four very positive feedback emails were received from users upon closure of their queries. No negative feedback emails were received.

3. Service Statistics

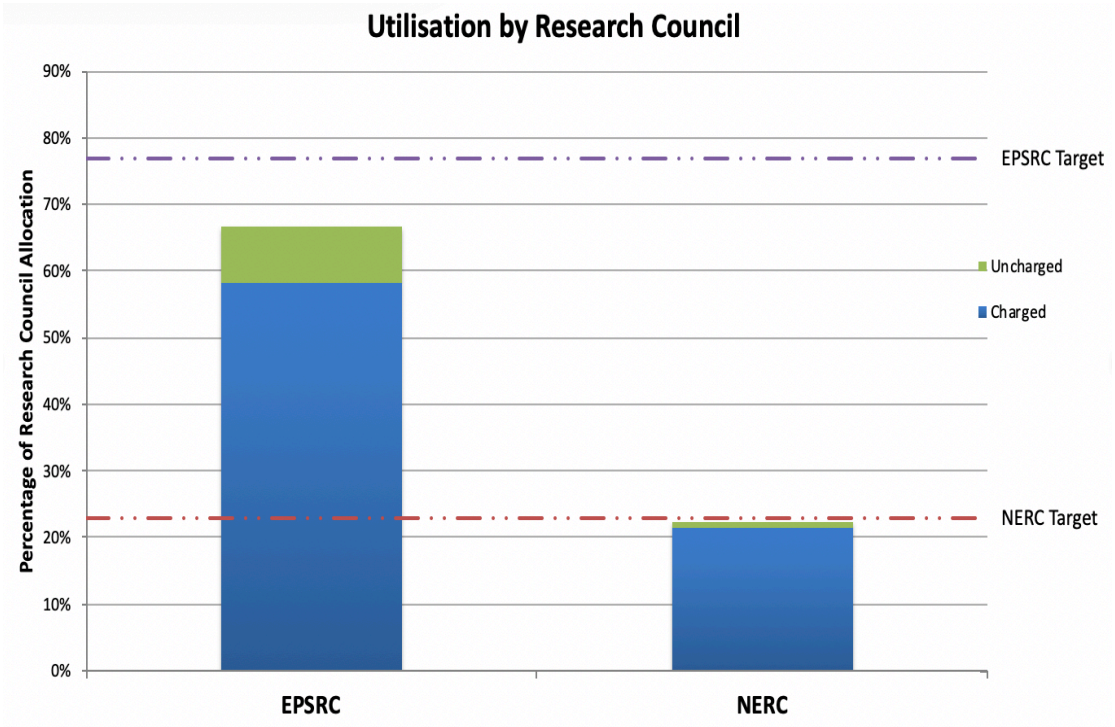
This section contains statistics on the ARCHER service as requested by EPSRC, SAC and SMB.

3.1 Utilisation

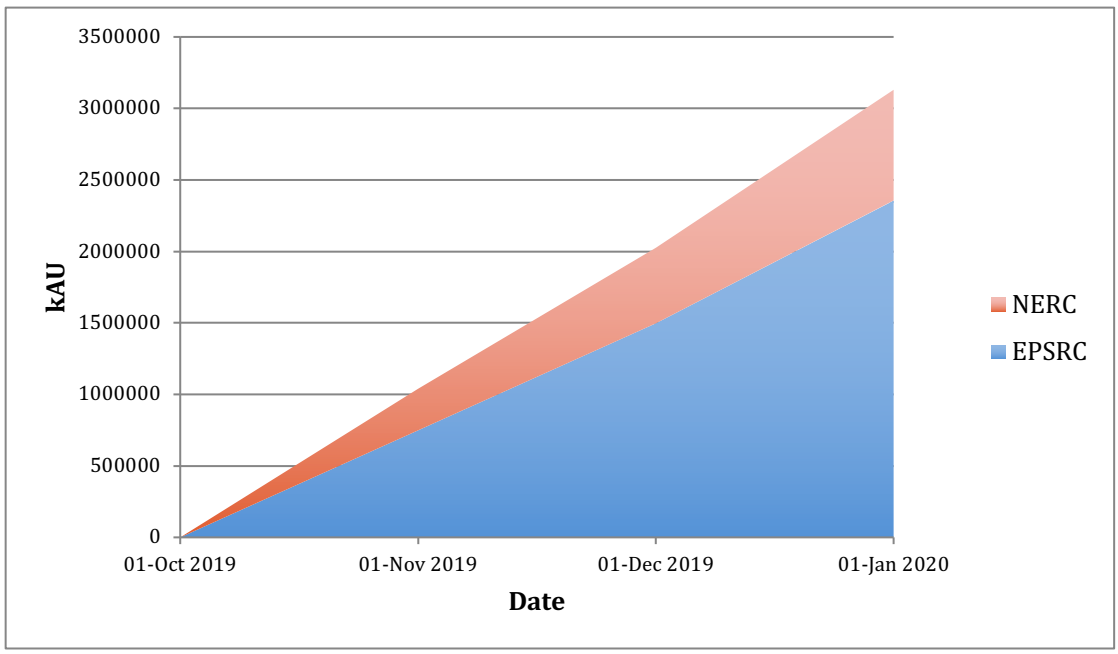
Utilisation over the quarter was 89%, up from 86% the previous quarter. Utilisation for October was 84%, for November 90% and for December 94%. The plot below shows a steady increase in utilisation over the lifetime of the service to Dec 2015 and since then the service has effectively been operating around maximum capacity as shown by the generally steady utilisation value.



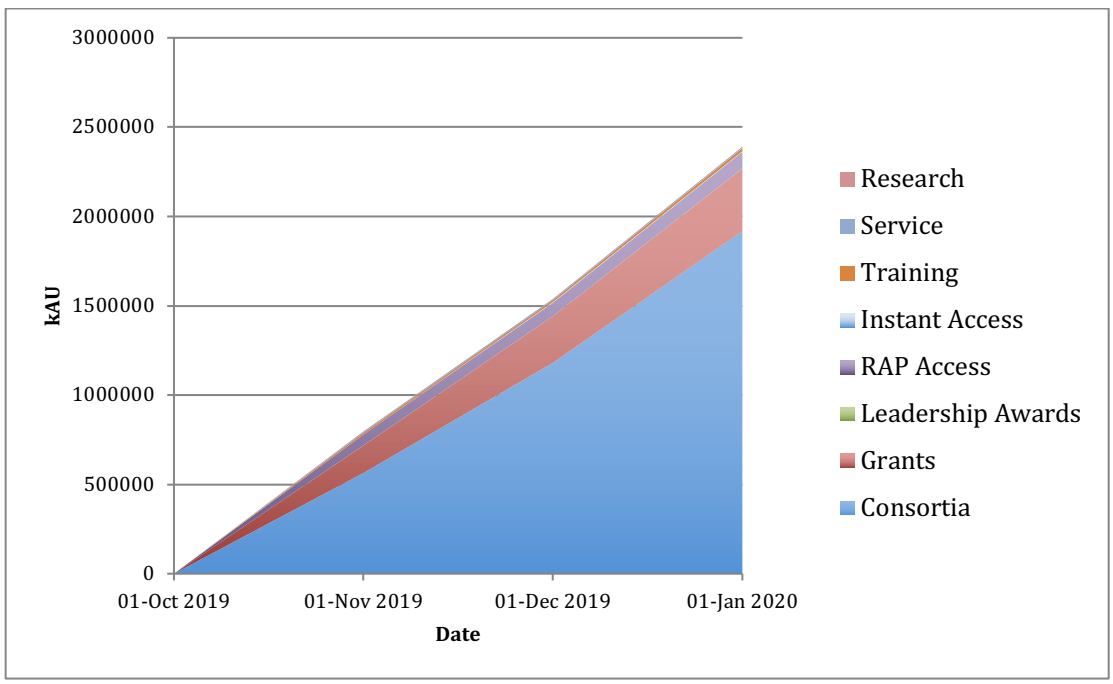
The utilisation by the Research Councils, relative to their respective allocations, is presented below. This bar chart shows the usage of ARCHER by the two Research Councils presented as a percentage of the total Research Council allocation on ARCHER. It can be seen that EPRSC did not meet their target this quarter with their usage being at 67% (against their target of 77%) whereas NERC narrowly missed their target with utilisation being 22% (against their target of 23%). This compares with 70% for EPSRC and 24% for NERC for the previous quarter.



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

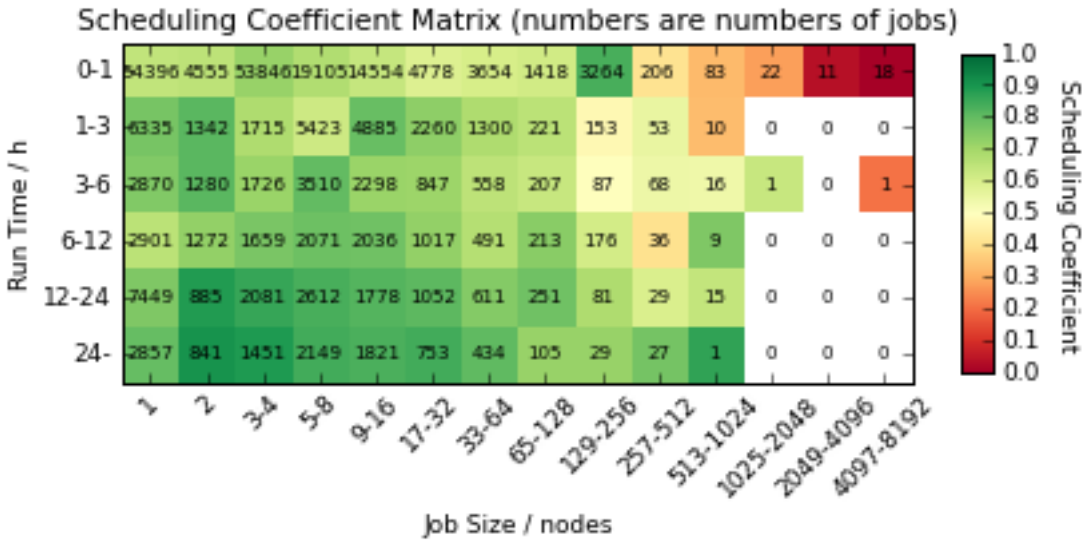


The cumulative allocation utilisation for the quarter by EPSRC broken down by different project types (see below) shows that the majority of usage comes from the scientific Consortia (as expected) with significant usage from research grants, CSC (the Finnish IT Center for Science) and ARCHER RAP projects.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



3.2 Scheduling Coefficient Matrix

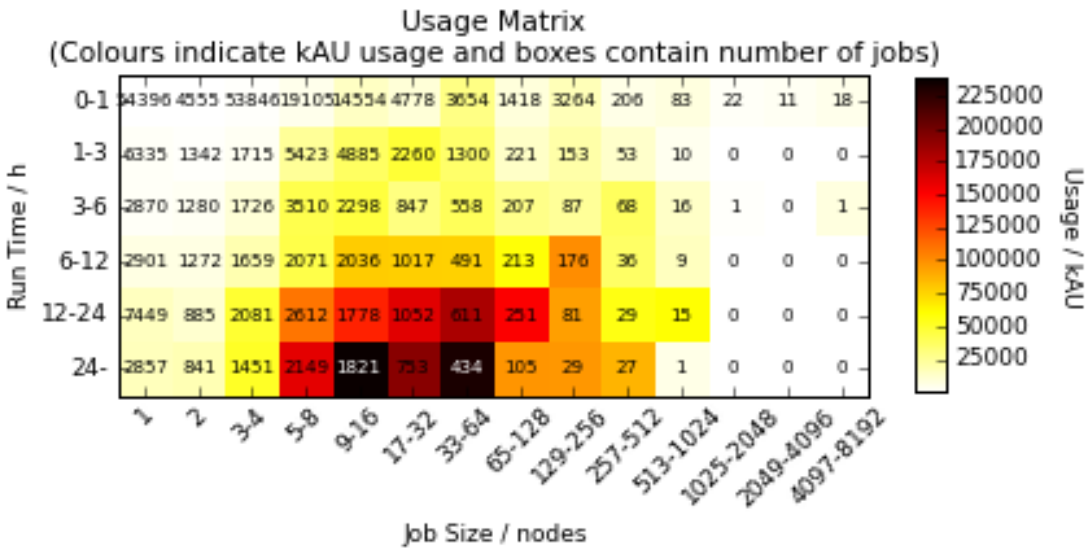
The colour in the matrix indicates the value of the Scheduling Coefficient. This is defined as the ratio of runtime to runtime plus wait time. Hence, a value of 1 (green) indicates that a job ran with no time waiting in the queue, a value of 0.5 (pale yellow) indicates a job queued for the same amount of time that it ran, and anything below 0.5 (orange to red) indicates that a job queued for longer than it ran.



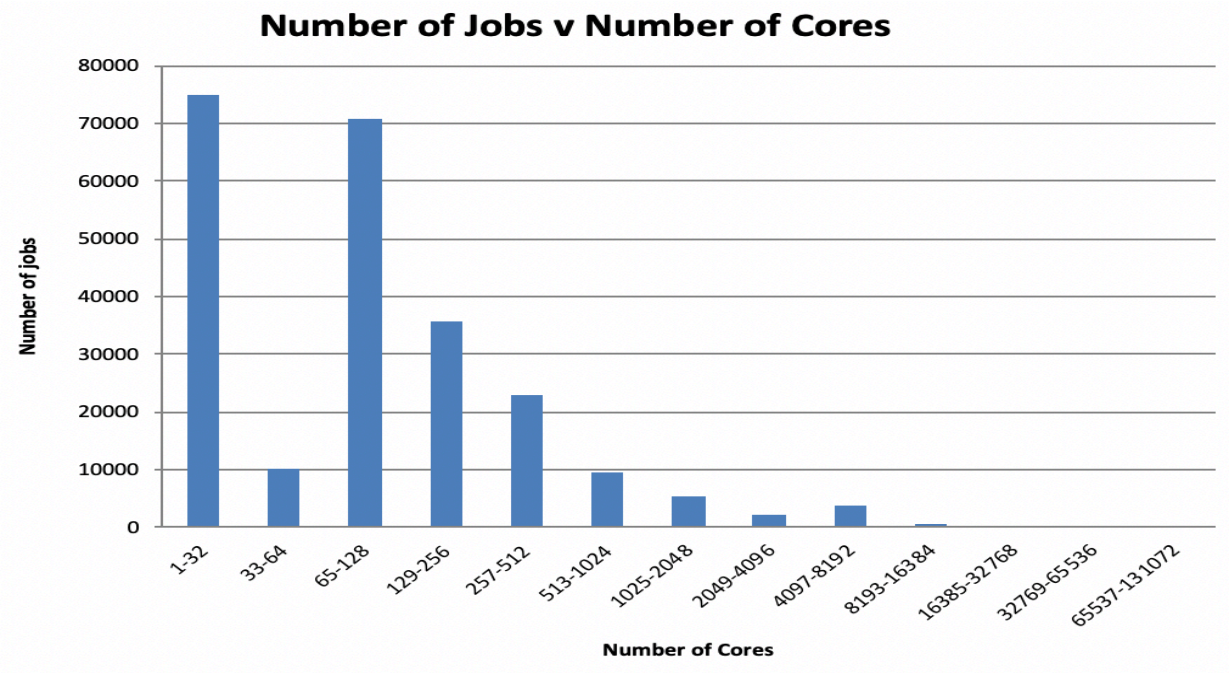
3.3 Additional Usage Graphs

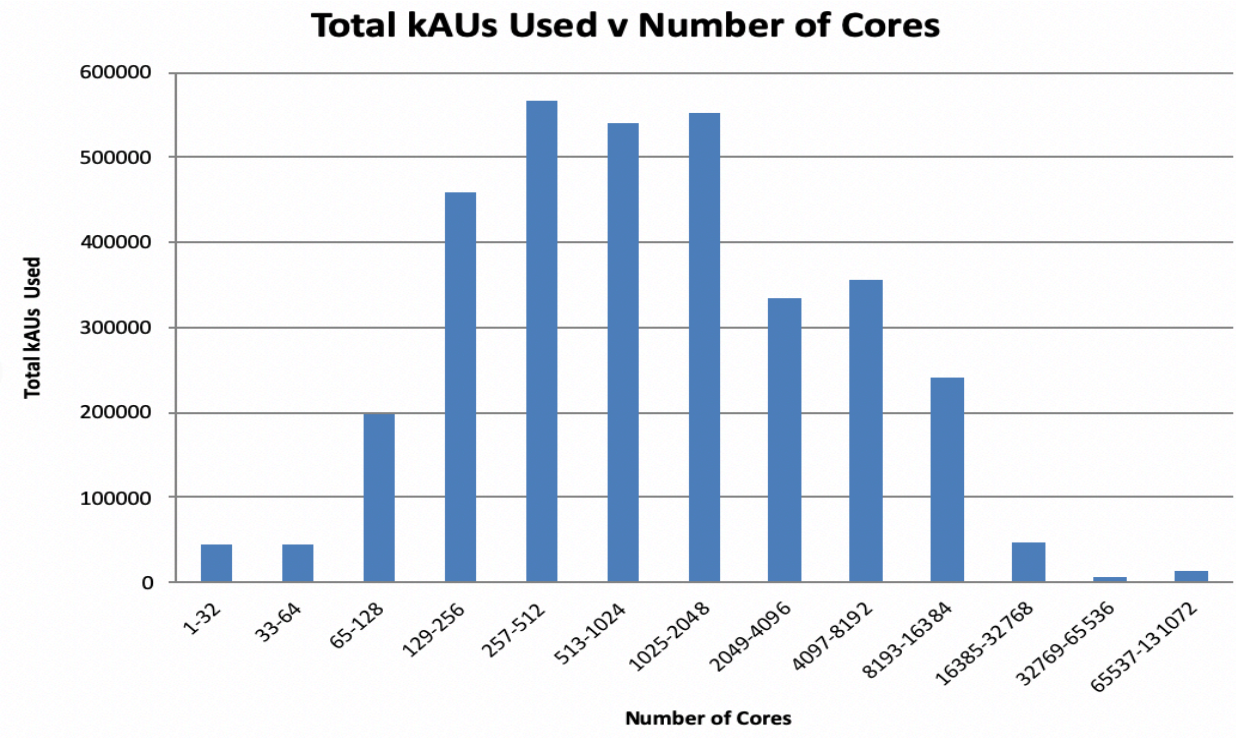
The following charts provide different views of the distribution of job sizes on ARCHER.

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.



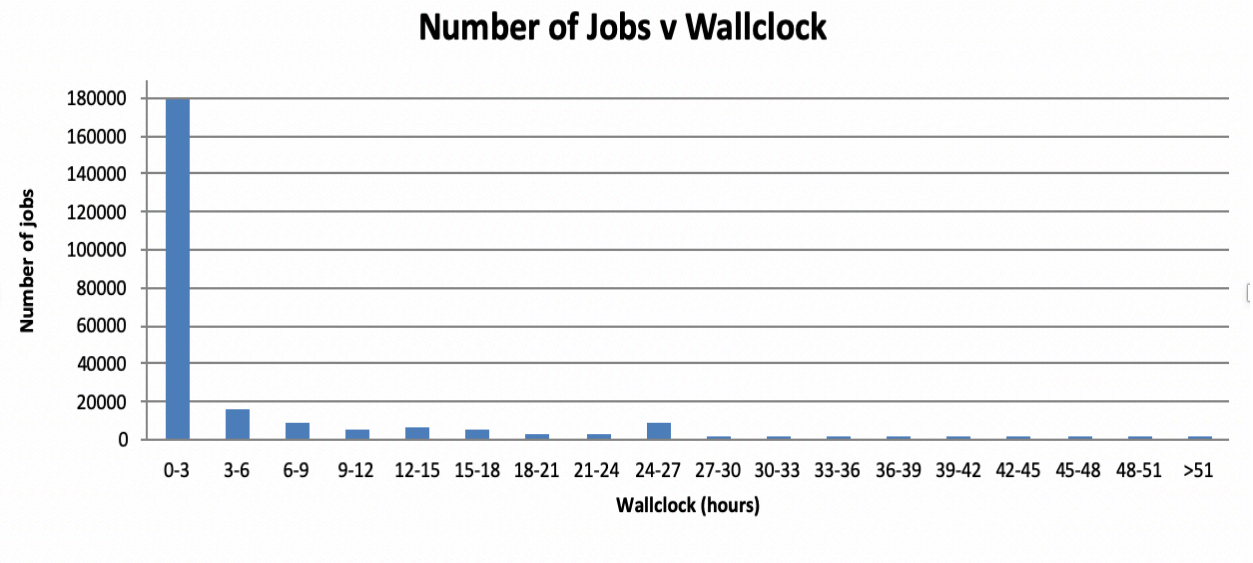
Analysis of Job Sizes

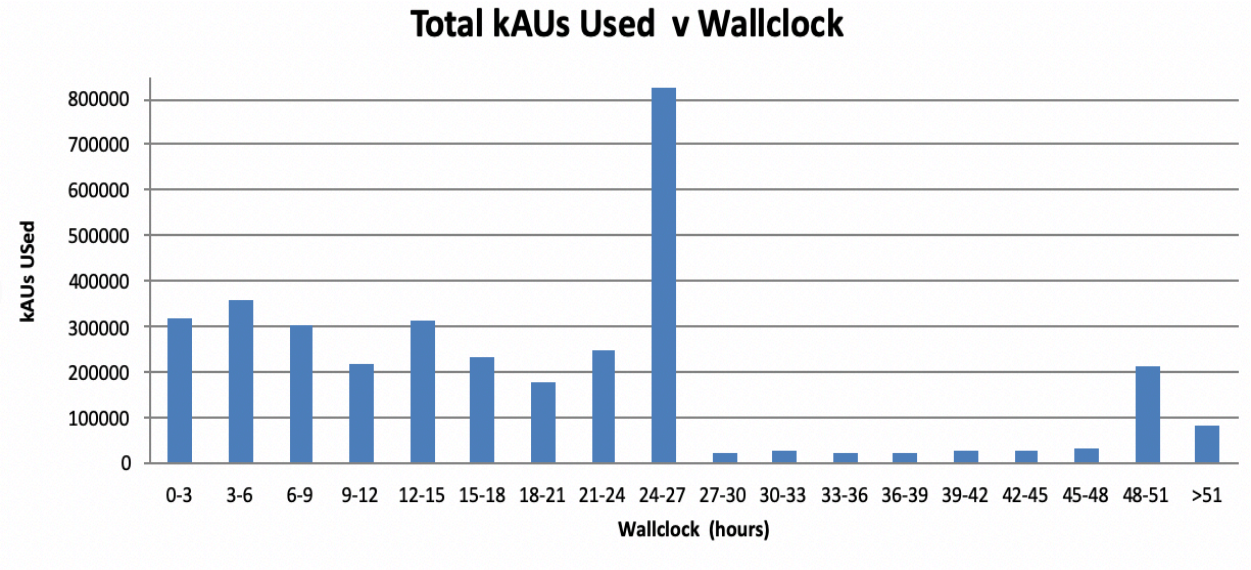




The first graph shows that, in terms of numbers, there are a significant number of jobs using no more than 512 cores. However, the second graph reveals that most of the kAUs were spent on jobs between 129 cores and 16384 cores. The number of kAUs used is closely related to money and shows better how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

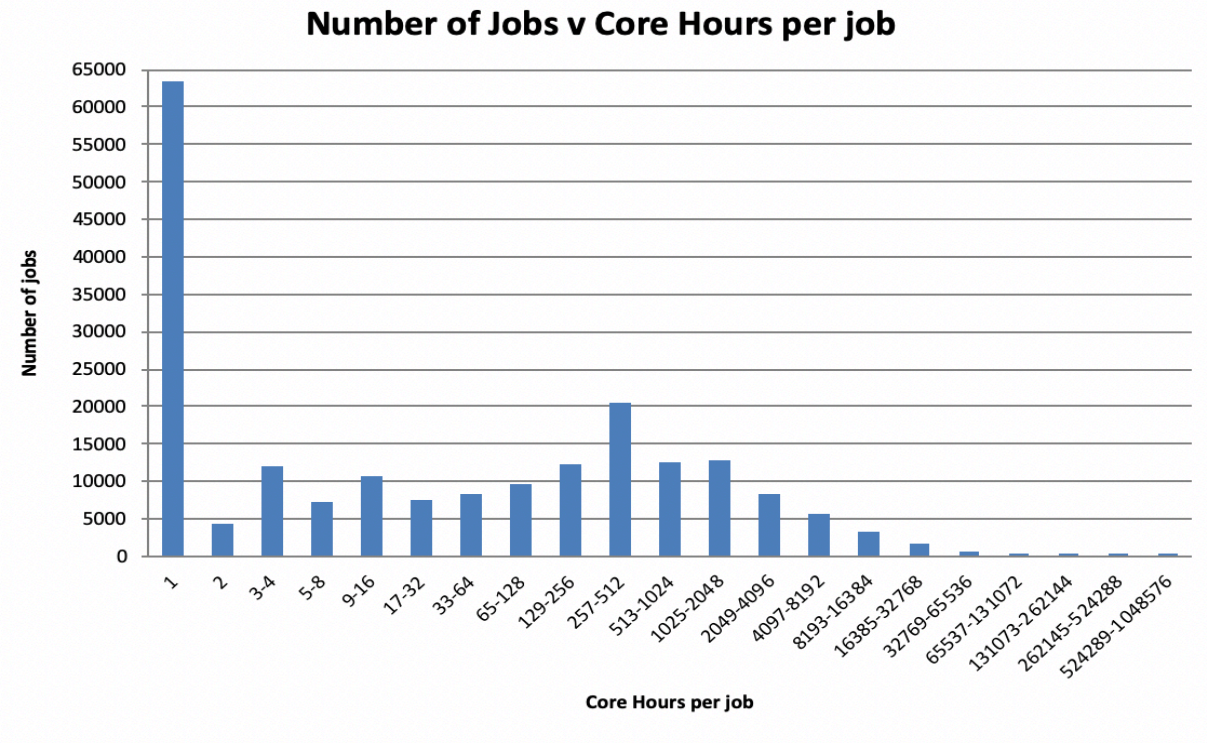
Analysis of Jobs Length

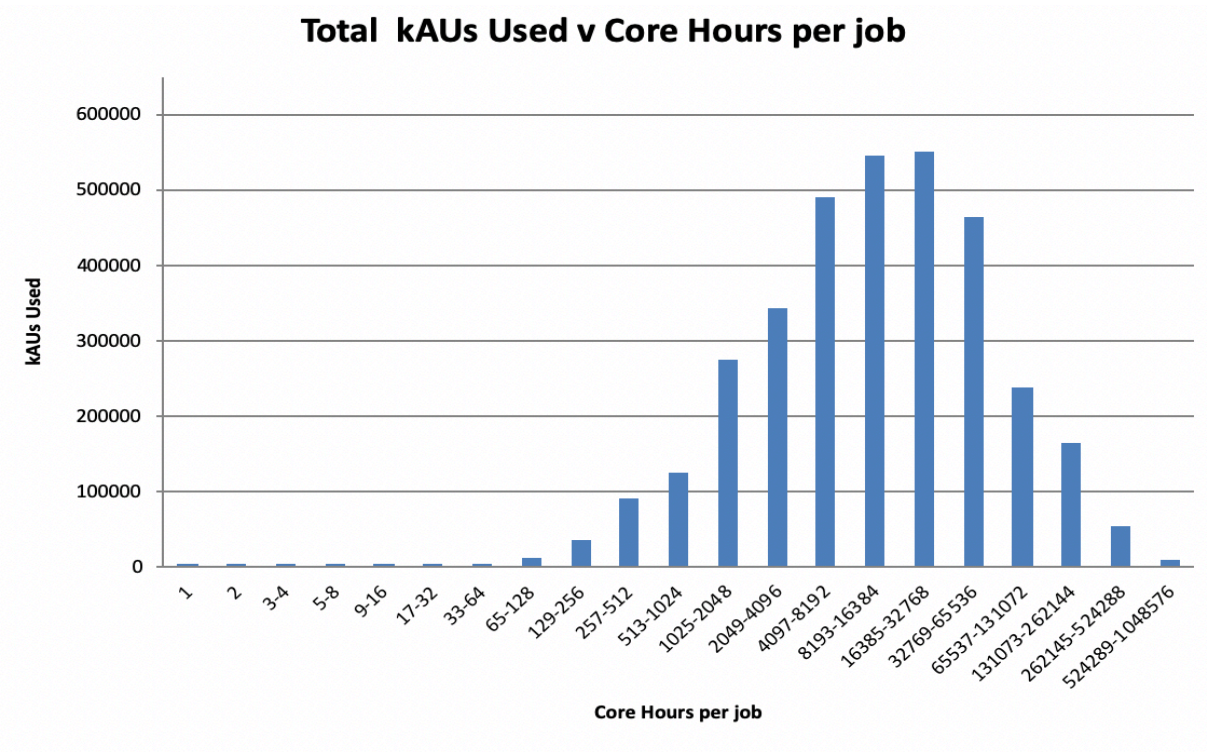




From the first graph, it would appear that the system is dominated by short jobs. However, the second graph shows that actual usage of the system is more spread and dominated by jobs of up to 27 hours with a second peak for jobs around 48 hours.

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.