ARCHER SP Service Quarterly Report

Quarter 3 2017

Document Information and Version History

Version:	1.0
Status	Final
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Reviewer(s)	Alan Simpson

Version	Date	Comments, Changes, Status	Authors, contributors, reviewers
0.1	02/10/17	Initial Draft	Anne Whiting
0.2	03/10/17	Added cumulative funding graphs	Anne Whiting
0.3	05/10/17	Added graphs and phone statistics	Jo Beech-Brandt
0.4	11/10/17	Review	Alan Simpson
0.5	12/10/17	Updates post review	Anne Whiting
1.0	12/10/17	Version for EPSRC	Alan Simpson

1. The Service

1.1 Service Highlights

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

July 2017, August 2017 and September 2017.

- Utilisation on the system during 17Q3 was 85%, as compared to 89% in 17Q2. The continued good utilisation of the service supports the need for ongoing investment in HPC.

- Diagnostics software for the ARCHER Lustre file system developed by onsite Cray staff is now being used by the EPCC systems team to show performance bottlenecks in real-time speeding up detection and resolution of issues.

- The default stripe count on the ARCHER Lustre file systems (/work file systems) has been changed from the current default of 4 to a new default of 1. The stripe count on existing directories set to the default stripe count was also changed. No changes were made to any files or directories which had stripe counts that differ from the default. This change should improve file system I/O performance for a significant number of users.

- Improvements have been made to the SAFE project overview reports, including the ability for PIs to track file usage over time for their consortia or project to ensure they stay within file quota limits. Excessive numbers of files can impact machine performance and are difficult to manage at the end of projects when files are moved off to other locations or deleted.

- Tier-2 administration has been integrated into the ARCHER SAFE with the technical assessments from the first Tier-2 RAP call currently being reviewed.

1.2 Forward Look

- Preparation for ISO27001 information security certification has just started with the aim of certification during 2018 for ARCHER and the RDF. This will demonstrate that best practice is followed when handling user data.

- The new version of PBS, 13.408, is due to be tested to ensure it does not adversely affect the service before upgrading.

- Work in still ongoing with Cray and NCAS on the repurposing of a compute node as serial node, known as a "mamu" node. This node allows multiple user jobs to be run simultaneously in a manner similar to the serial nodes and are expected to support the NERC community in compiling their UM code. The functionality is currently being tested on the TDS.

- The scheduler analysis, originally undertaken throughout summer 2016, is being re-run to ensure that the scheduler configuration remains well suited to the ARCHER workload.

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 17		Aug 17		Sept 17		17Q3
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	99.2%	-2	99.8%	-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 were no unplanned outages where responsibility lies within the terms of the SP Contract. Details of planned maintenance sessions 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 17Q3.

2.2 Detailed Service Level Breakdown

2.2.1 Phone Response (PR)

	Jul 17	Aug 17	Sept 17	17Q3
Phone Calls Received	38 (2)	36 (4)	23 (4)	**97 (10)**
Answered 2 Minutes	38	36	23	**97**
Service Level	**100.0%**	**100.0%**	**100.0%**	**100.0%**

The volume of telephone calls remained low in 17Q3. Of the total of 97 calls received above, only 10 were actual ARCHER user calls that either resulted in queries or answered user questions directly.

2.2.2 Query Closure (QC)

	Jul 17	Aug 17	Sept 17	17Q3
Self-Service Admin	830	547	1140	**2517**
Admin	123	132	126	**381**
Technical	36	29	22	**87**
Total Queries	989	708	1288	**2985**
Total Closed in 2 Days	982	702	1285	**2969**
Service Level	**99.3%**	**99.2%**	**99.8%**	**99.5%**

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 17Q3:

	Jul 17	Aug 17	Sept 17	17Q3
Change Requests	0	1	1	**2**

2.2.3 User Registration (UR)

	Jul 17	Aug 17	Sept 17	17Q3
No of Requests	79	69	130	**278**
Closed in One Working Day	79	67*	129	**275**
Average Closure Time (Hrs)	0.5	1.5	0.8	**0.9**
Average Closure Time (Working Days)	0.05	0.15	0.08	**0.09**
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 requests could not be processed in one day due to ARCHER EPSRC approved maintenance session on 23/08/17.

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 17	**Aug 17**	**Sept 17**	**17Q3**
CRAY	3	11	11	**25**
ARCHER_CSE	118	86	96	**300**
ARCHER_SP	1338	1019	1804	**4161**
Total Queries Assigned	1459	1116	1911	**4486**
Total Assigned in 1 Hour	1459	1116	1911	**4486**
Service Level	**100%**	**100%**	**100%**	**100%**

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 a single day each month (fourth Wednesday of each month). This is marked as a full maintenance session for a maximum of 8 hours taken. There is an additional “at-risk” session that is scheduled for the second Wednesday of each month. This reduces the number of sessions taken, which then reduces user impact since the jobs running on the service have to be drained down once per month and not twice. It also eases the planning for training courses running on ARCHER.

Such Maintenance Periods are defined as 'Permitted Maintenance ' and recorded in the Maintenance Schedule. A 6-month forward plan of maintenance has been agreed with EPSRC.

Where possible, SP will perform maintenance on an 'At-risk' basis, thus maximising the Availability of the Service. The following planned maintenance took place in the Service Quarter.

Date	Start	End	Duration	Type	Notes	Reason
23/08/17 – 24/08/17*	0900	17:30	32 hours 30 mins	Full Outage	EPSRC Approved 0900 – 1700	UoE Electrical tests of circuit breakers supplying ARCHER cabinets
27/09/17	0800	17:34	9 hours 34 mins	Full Outage	EPSRC Approved 0800 – 1800	Cray-led session: • SMW PS installation • Firmware update for cabinet rectifiers

* Failure to return to service within planned timescales due to optical fibre problems that Cray are still working to resolve.

2.3.3 Quality Tokens

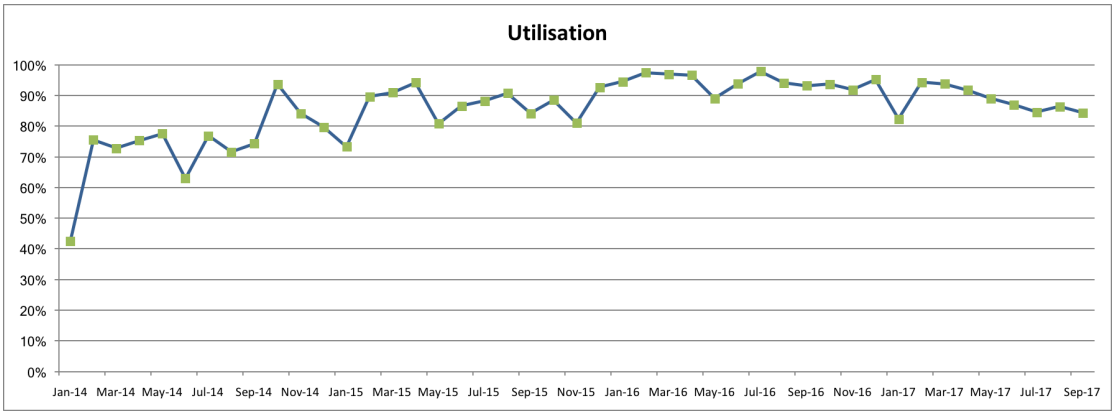
No quality tokens have been received this quarter.

3. Service Statistics

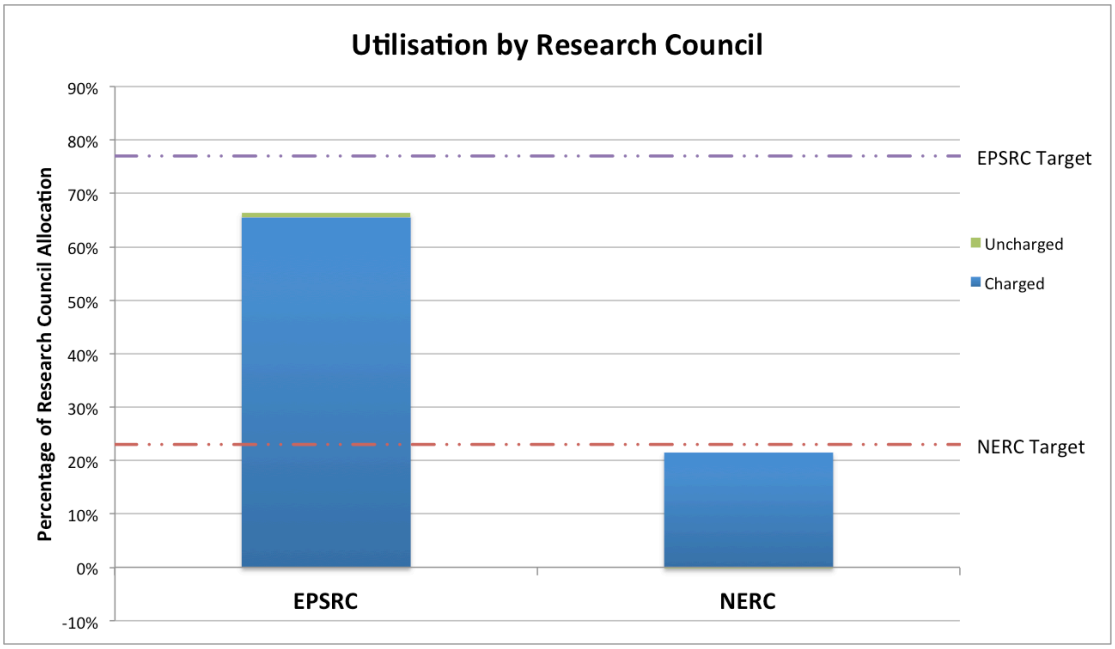
This section contains statistics on the ARCHER service as requested by EPSRC, SAC and SMB.

3.1 Utilisation

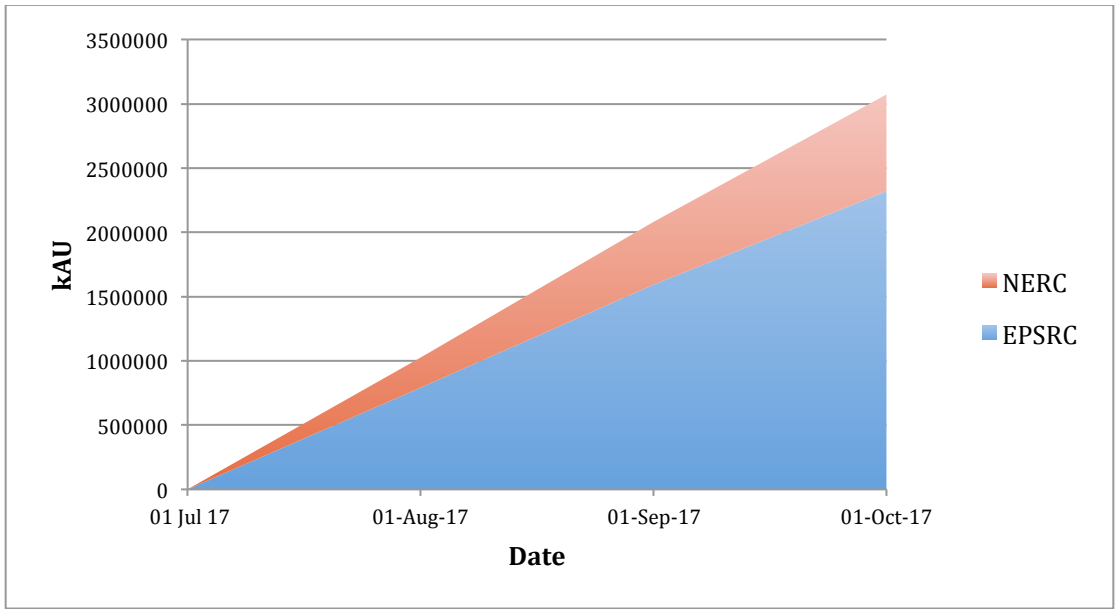
Utilisation over the quarter was 85%. The plot below shows a slight decrease in utilisation since February 2017 but an overall increase over the lifetime of the service:



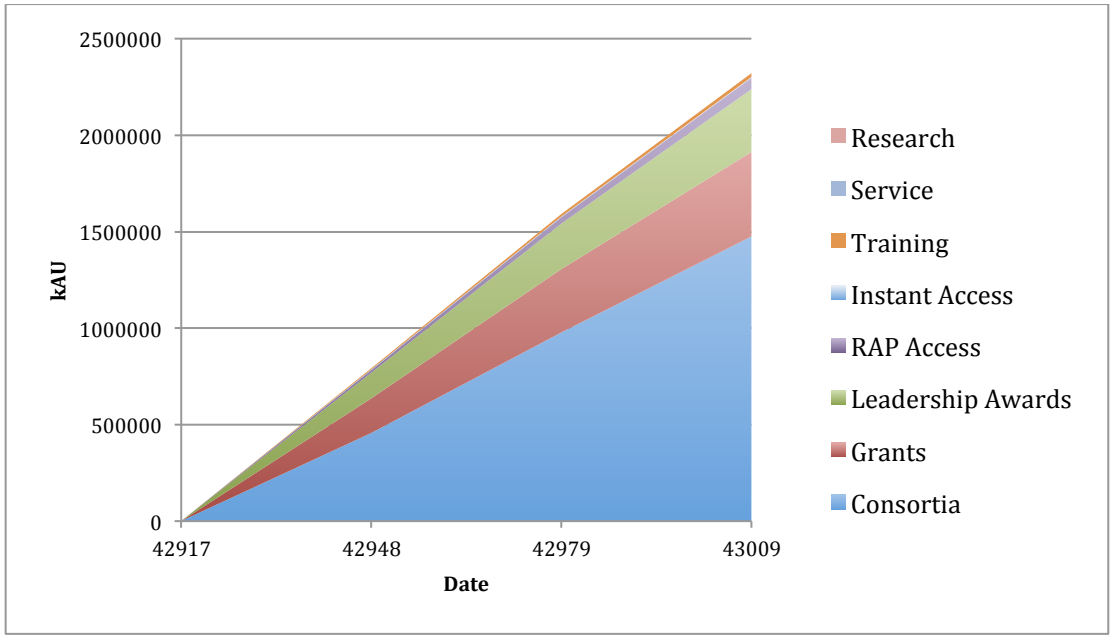
The utilisation by the Research Councils, relative to their respective allocations, is presented below. This bar chart shows the usage of ARCHER by the two Research Councils presented as a percentage of the total Research Council allocation on ARCHER. It can be seen that both Research Councils did not meet their respective targets this quarter with EPSRC being at 65.4% (against their target of 77%) and NERC's utilisation being 21.48% (against their target of 23%).



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

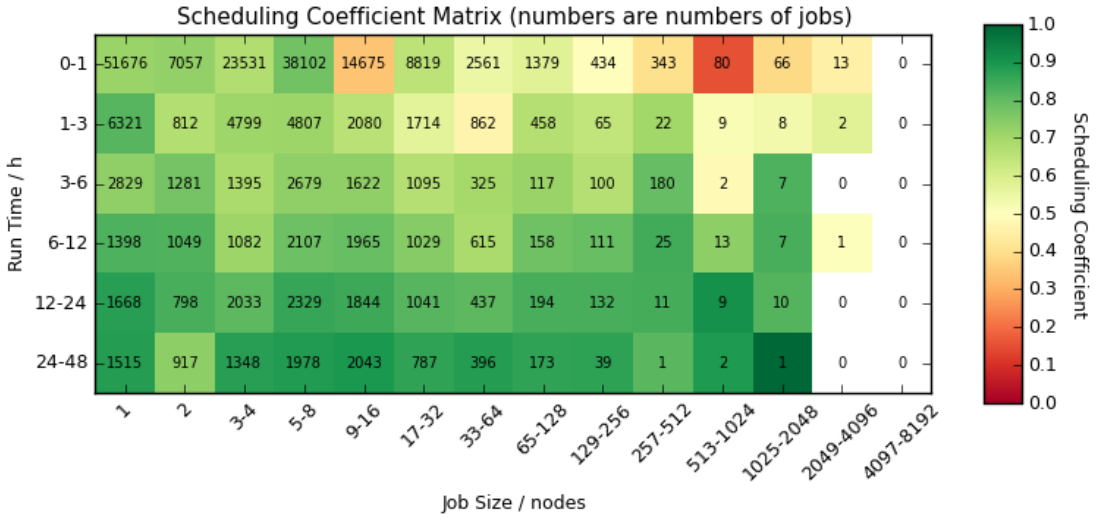


The cumulative allocation utilisation for the quarter by EPSRC broken down by different project types (see below) shows that the majority of usage comes from the scientific Consortia (as expected) with significant usage from research grants, ARCHER Leadership projects and ARCHER RAP projects. The times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



3.2 Scheduling Coefficient Matrix

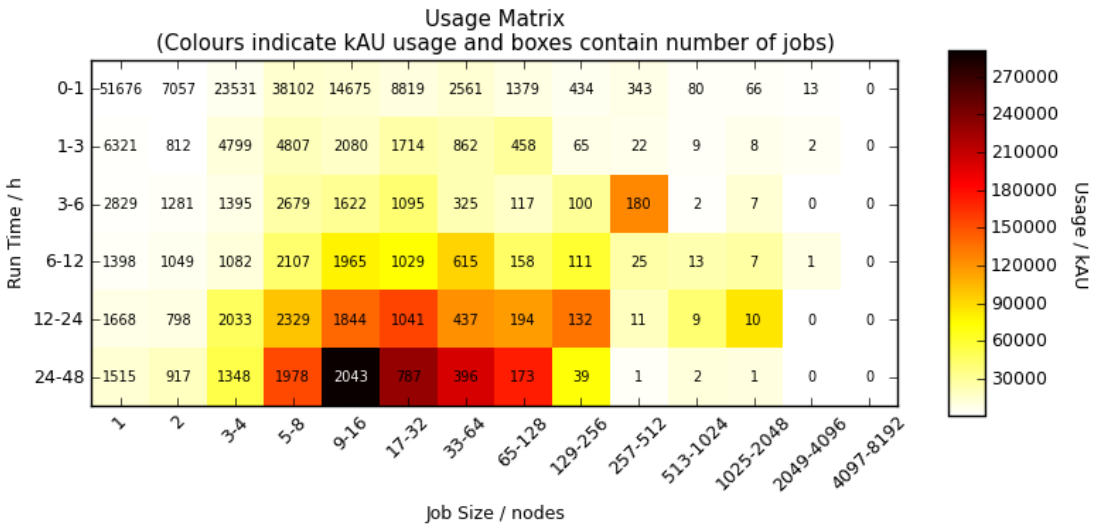
The colour in the matrix indicates the value of the Scheduling Coefficient. This is defined as the ratio of runtime to runtime plus wait time. Hence, a value of 1 (green) indicates that a job ran with no time waiting in the queue, a value of 0.5 (pale yellow) indicates a job queued for the same amount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



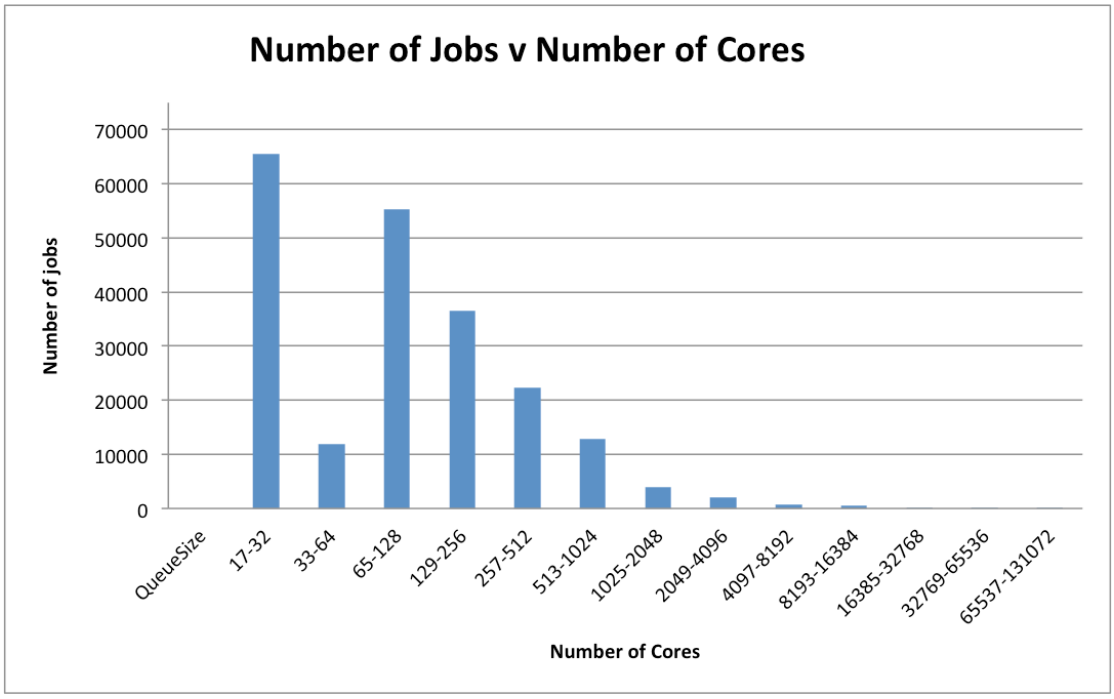
3.3 Additional Usage Graphs

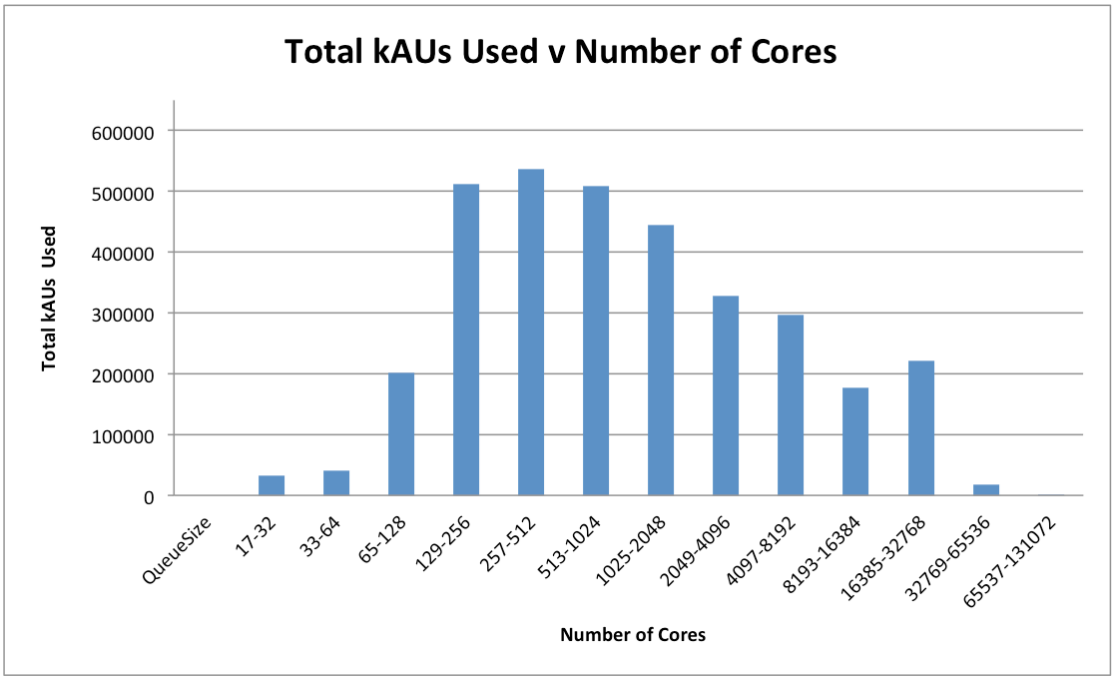
The following charts provide different views of the distribution of job sizes on ARCHER.

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 kAU expended for each class, and the number in the box is the number of jobs of that class.



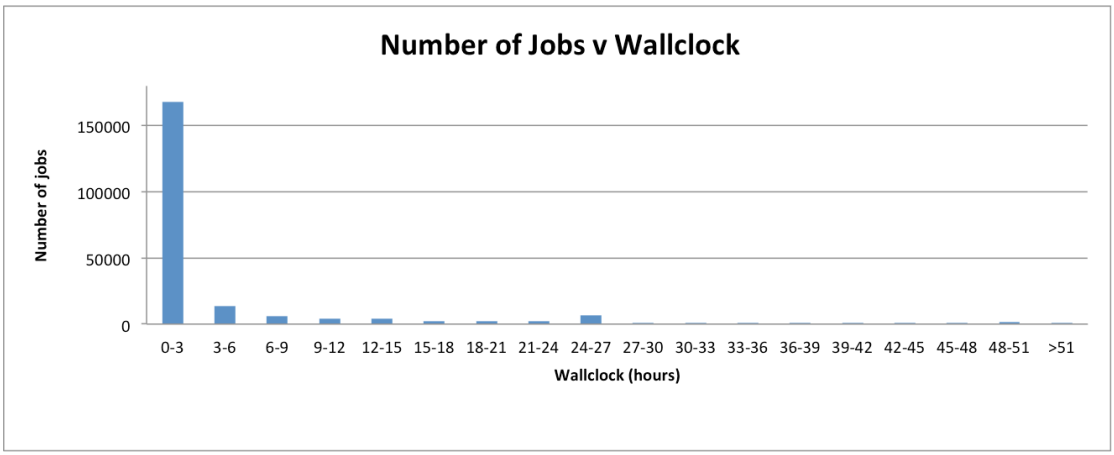
Analysis of Job Sizes

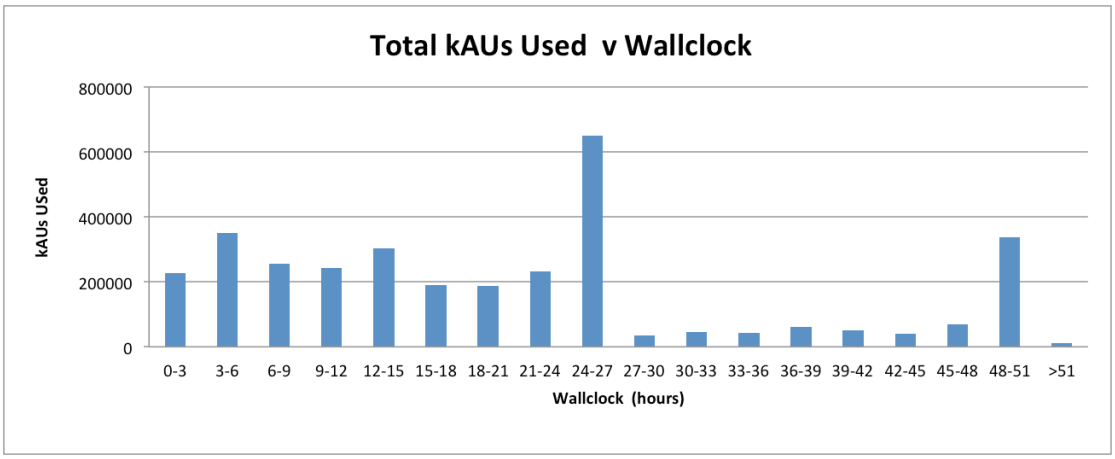




The first graph shows that, in terms of numbers, there are a significant number of jobs using no more than 1024 cores. However, the second graph reveals that most of the kAUs were spent on jobs between 129 cores and 8192 cores. The number of kAUs used is closely related to money and shows better how the investment in the system is utilised.

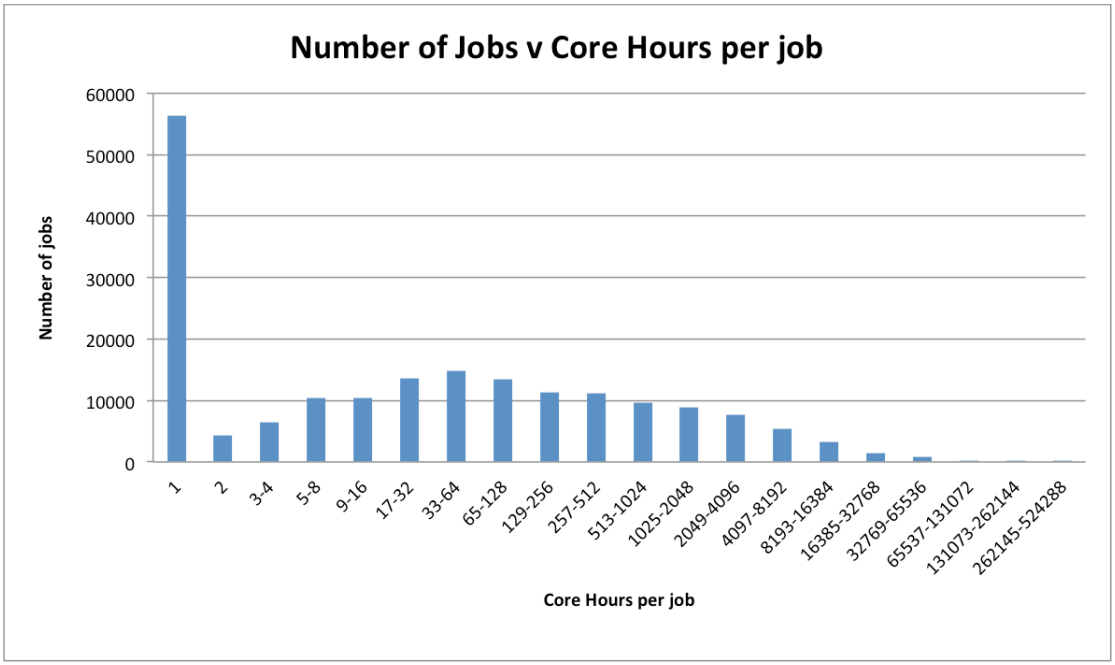
Analysis of Jobs Length

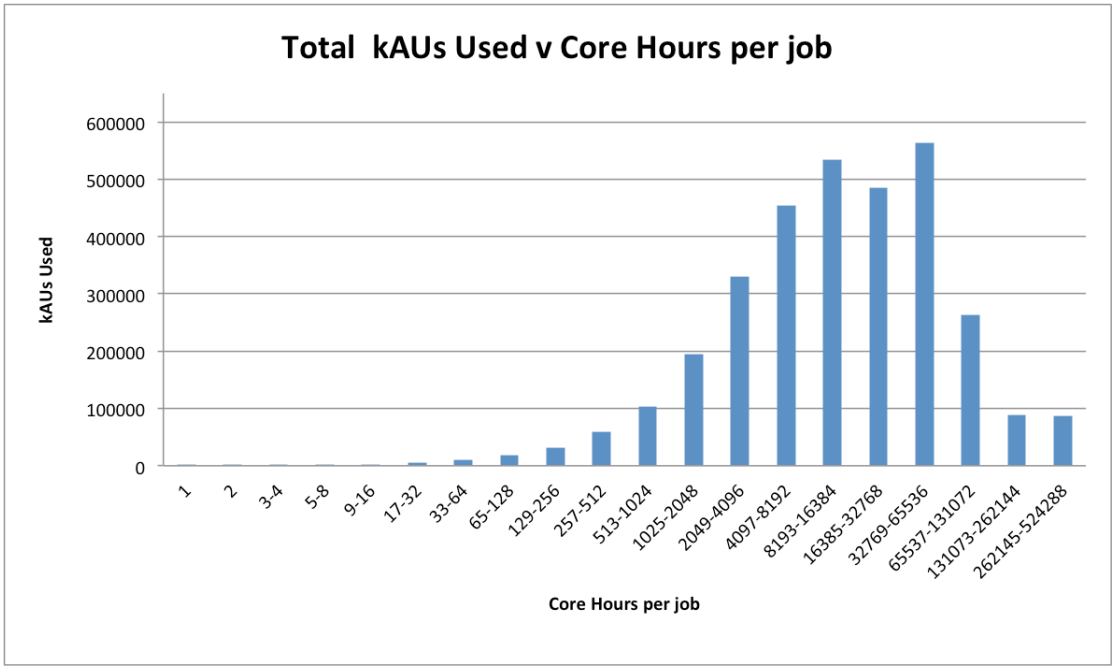




From the first graph, it would appear that the system is dominated by short jobs. However, the second graph shows that actual usage of the system is more spread and dominated by jobs of up to 27 hours with a second peak for jobs at 48-51 hours.

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.