



# ARCHER SP Service Quarterly Report

Quarter 2 2016



## Document Information and Version History

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<b>Reviewer(s)</b>	Alan Simpson

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0.1	02/07/16	Initial Draft	Jo Beech-Brandt
0.2	07/07/16	Inserted graphs	Jo Beech-Brandt
0.3	11/07/16	Added maintenance information	Jo Beech-Brandt
0.4	11/07/16	Updated text and added graphs	Anne Whiting
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1.0	12/06/16	Final version	Anne Whiting
1.1	19/10/16	Updated graph p10	Anne Whiting

# 1. The Service

## 1.1 Service Highlights

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

April 2016, May 2016 and June 2016

- Utilisation on the system during 16Q2 was 93% as opposed to 96% in 16Q1. The continued high utilisation of the service supports the need for ongoing investment in HPC whilst presenting challenges to the user community experiencing slow turnaround of their jobs.
- The SP Service has assisted the research councils in analysing the current high demand for ARCHER resources by providing statistics on usage and allocations broken down by various parameters (e.g. job size/length, scientific community, different periods). The production of detailed analysis in short time scales is only possible due to the coherent service view and advanced reporting functionality available in SAFE.
- To help reduce the impact of the high utilisation on the running of user jobs, and following discussions with the Research Councils, the scheduler prioritisation factors were reviewed. We have updated the job priority calculation to increase the weight associated with wait time to try and even up wait times across different job classes. The scheduling coefficients are being monitored to quantify the effect on job wait times.
- We have added a section to the live status page on the website with the scheduling coefficient matrix and usage matrix for various periods to allow users to plan their use of ARCHER more effectively. We have also added a page with historical data for these two plots. These updates have been well received by the user community with a number of positive comments.
- The work carried out to date to preparing for the ISO 9001:2015 certification is going well and has proved very positive, both in identifying areas for further process improvement and in spreading organisational knowledge across teams. An external certification audit is planned for December 2016.
- A new version of SAFE was rolled out providing an improved and more user-friendly interface. To ease transition for users, the older version is being supported until October when access will be removed. Updated training material was produced which includes documentation and training videos. The new version has received positive feedback from the user community, with suggestions being tracked through queries.
- The planning for the next Champions Workshop is progressing. Following feedback from the last workshop, it was decided that the workshops would take place bi-annually and would be located around the UK. The possibility of co-locating with other events was also discussed. The next workshop will be held in Oxford on 5<sup>th</sup>/6<sup>th</sup> September.
- The SP and CSE services coordinated to enable the XALT monitoring tool on the system. This allows detailed monitoring of software usage including: compilers, libraries and parallel models used in applications run on the system. The data is being analysed and will allow the service to provide better information to users, PI's and service partners on how the system is used.
- Following user requests, the short queue hours have been extended from 0900 – 1700 Monday to Friday to be 0800 – 2000 Monday to Friday. This change has been welcomed by users as it gives them a quicker turnaround of small development test jobs.

## 1.2 Forward Look

- Feedback on the effect of changes to the job priority formula on ARCHER will be provided to allow informed decisions to be taken on the next steps.
- SP will coordinate with the CSE service to enable Resource Usage Reporting on ARCHER. This standard Cray tool will provide job-level information on metrics such as memory usage, energy usage and I/O patterns and will complement the data collected by XALT.
- The next Champions Workshop will take place in Oxford, on 5th and 6th September. Registration for the event is open now.
- Continued work for the ISO 9000 certification, including a programme of internal audits to highlight areas for improvement and work on improvements identified.
- SAFE development work on AAAI (Authentication, Authorisation and Accounting Infrastructure) is planned to start in the next quarter. This work is not funded through ARCHER but will benefit the ARCHER Service and the wider UK Research 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	Apr 16		May 16		Jun 16		16Q2
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	99.0%	-2	99.9%	-2	99.8%	-2	-6
2.6.4 – UR	1 WD	0	1 WD	0	1 WD	0	0
<b>Total</b>		<b>-7</b>		<b>-7</b>		<b>-7</b>	<b>-21</b>

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

### 2.1.2 Service Failures

There were no Service Failures in the period as defined in the metric. 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 16Q2.

## 2.2 Detailed Service Level Breakdown

### 2.2.1 Phone Response (PR)

	<b>Apr 16</b>	<b>May 16</b>	<b>Jun 16</b>	<b>16Q2</b>
Phone Calls Received	24 (6)	24 (6)	33 (9)	<b>81 (21)</b>
Answered 2 Minutes	24 (6)	24 (6)	33 (9)	<b>81 (21)</b>
<b>Service Level</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>

The volume of telephone calls remained low in 16Q2. Of the total of 81 calls received above, only 21 were genuine ARCHER user calls that either resulted in queries or answered user questions directly.

### 2.2.2 Query Closure (QC)

	<b>Apr 16</b>	<b>May 16</b>	<b>Jun 16</b>	<b>16Q2</b>
Self-Service Admin	387	555	321	<b>1263</b>
Admin	172	163	127	<b>462</b>
Technical	18	32	25	<b>75</b>
<i>Total Queries</i>	577	750	473	<b>1800</b>
<i>Total Closed in 2 Days</i>	571	749	472	<b>1792</b>
<b>Service Level</b>	<b>98.96%</b>	<b>99.87%</b>	<b>99.79%</b>	<b>99.56%</b>

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 16Q2:

	<b>Apr 16</b>	<b>May 16</b>	<b>Jun 16</b>	<b>16Q2</b>
Change Requests	4	4	2	<b>10</b>

## 2.2.3 User Registration (UR)

	Apr 16	May 16	Jun 16	16Q2
No of Requests	76	120	68	264
Closed in One Working Day	76	120	68	264
Average Closure Time (Hrs)	0.7	1.0	0.7	0.8
Average Closure Time (Working Days)	0.1	0.1	0.1	0.1
<b>Service Level</b>	<b>1 WD</b>	<b>1 WD</b>	<b>1 WD</b>	<b>1 WD</b>

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

## 2.3 Additional Metrics

### 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](mailto:helpdesk@archer.ac.uk). Users may choose not to receive such emails by mailing [support@archer.ac.uk](mailto:support@archer.ac.uk).

#### 2 – Tracking Identifier

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

	Apr 16	May 16	Jun 16	16Q2
CRAY	5	3	3	11
ARCHER_CSE	186	100	74	360
ARCHER_SP	935	1228	803	2966
Total Queries Assigned	1126	1331	880	3337
Total Assigned in 1 Hour	1126	1331	880	3337
<b>Service Level</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

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

A change in the maintenance arrangements was agreed with the Authority during this quarter. There is now a single day each month (fourth Wednesday of each month) which is marked as a full maintenance session for a maximum of 8 hours taken. There is an additional “at-risk” session which is scheduled for the second Wednesday of each month. This reduces the number of sessions taken, which reduces user impact since the jobs running on the service have to be drained down once 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 the Authority.

If greater than 4 hours downtime is required for maintenance, 20 days prior approval is required from the Authority. 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
13/04/16	0900	1700	8 hrs	At-Risk	EPSRC Approved 0900 – 1700	Software Updates Hypervisor failover test
27/04/16	0900	1831	9hrs 31mins	Full Outage	EPSRC Approved 0900 – 1700 (Cray overrun)	Sonexion SU25 upgrade Hardware (CRAY)
11/05/16	0900	1700	8 hrs	At-Risk	EPSRC Approved 0900 – 1700	Software updates Amend filesystem size
25/05/16	0900	1613	7hrs 13mins	Full Outage	EPSRC Approved 0900 – 1700	Network work Software Updates Field notices and patch sets
08/06/16	0900	1700	8 hrs	At-Risk	EPSRC Approved 0900 – 1700	Implement budget on DAC Configuration changes on RDF
22/06/16	0900	1654	7hrs 54mins	Full Outage	EPSRC Approved 0900 – 1700 (CRAY SESSION)	Hardware updates Minor network change

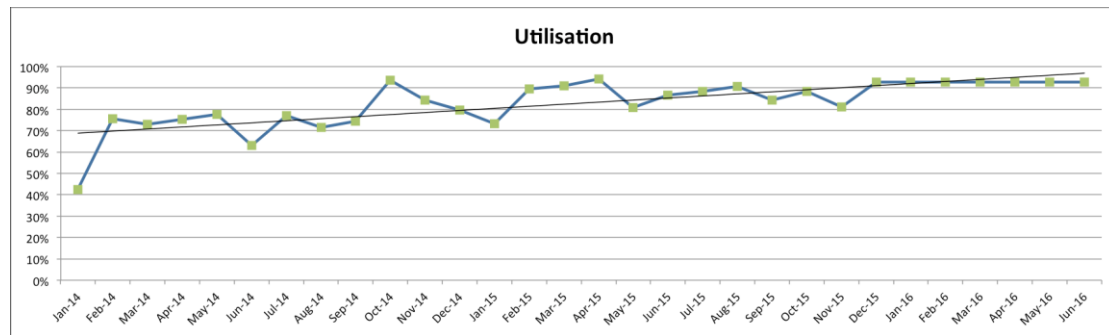


### 3. Service Statistics

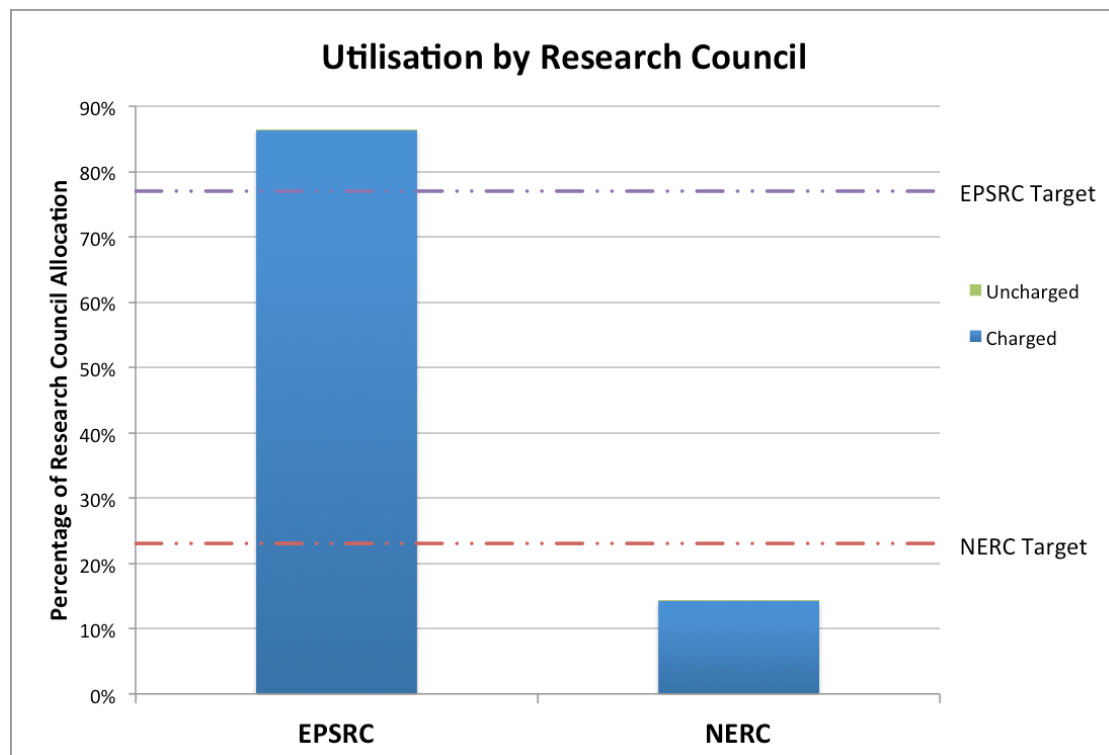
This section contains statistics on the ARCHER service as requested by EPSRC, SAC and SMB.

#### 3.1 Utilisation

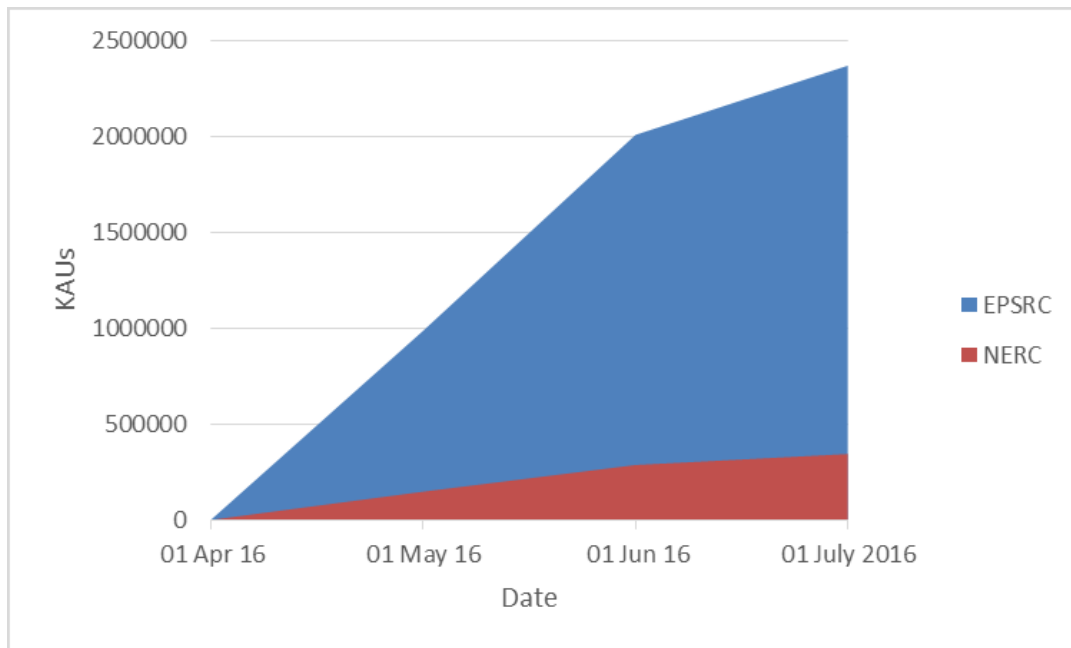
Utilisation over the quarter was 93%. The plot below shows a steady increase in utilisation over the lifetime of the service to Dec 2015 and since then the service has effectively been operating at maximum utilisation as shown by the steady utilisation value:



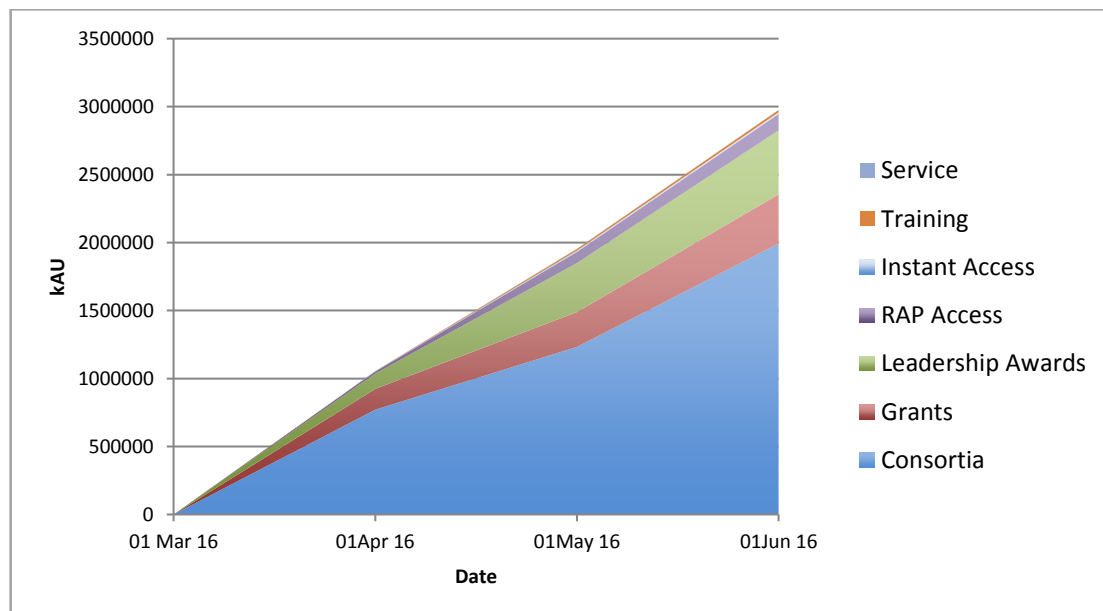
The utilisation by the Research Councils, relative to their respective allocations, is presented below. This bar chart shows the usage of ARCHER by the two Research Councils presented as a percentage of the total Research Council allocation on ARCHER. It can be seen that the EPSRC utilisation exceeded their 77% target this quarter and was 86% whereas NERC utilisation was 14% with their target being 23%. This was in contrast to last quarter where EPSRC was 62% and NERC was 44%.



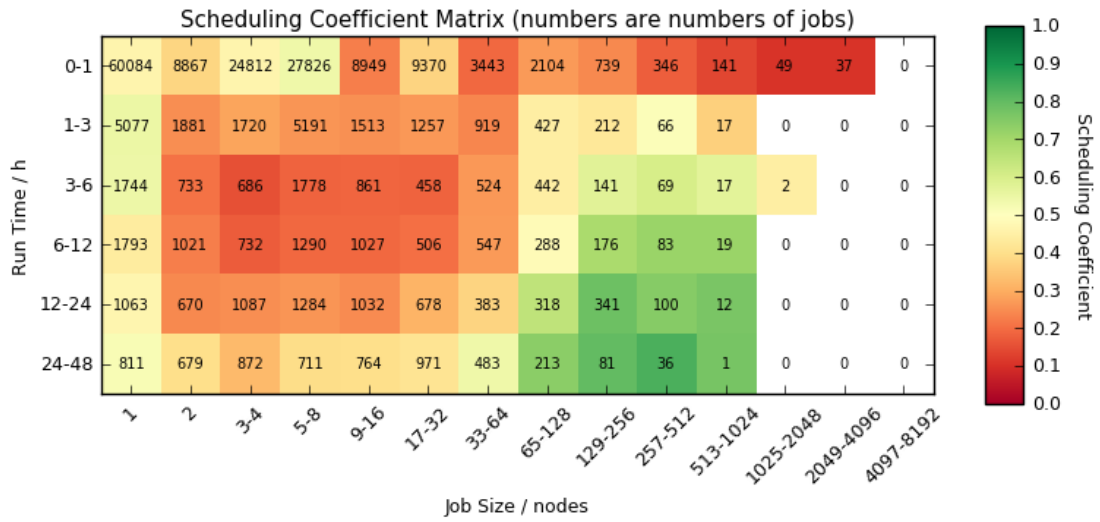
The cumulative allocation utilisation for the quarter by the Research Councils is shown below:



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

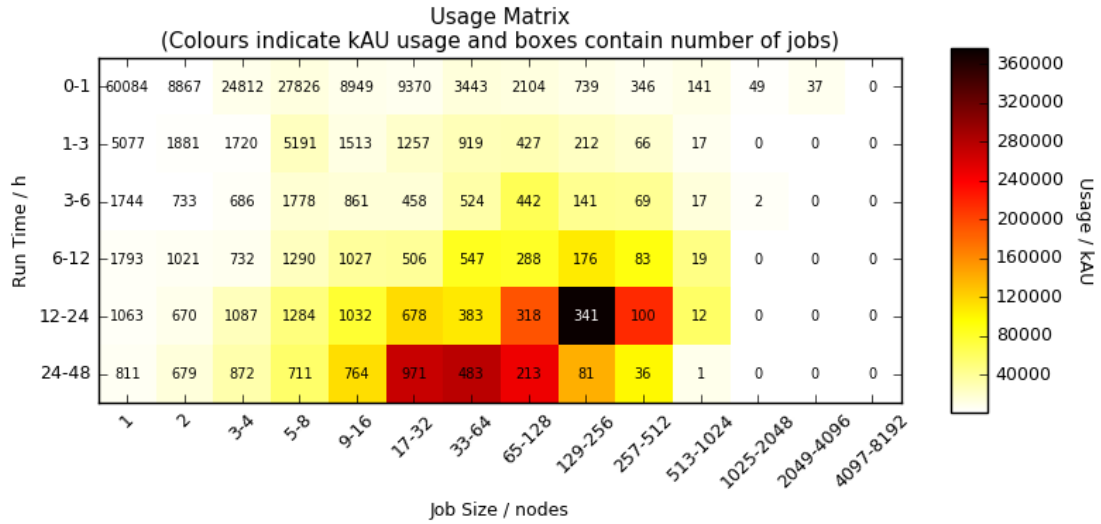


The colour in the matrix indicates the value of the Scheduling Coefficient. This is defined as the ratio of runtime to runtime plus wait time. Hence, a value of 1 (green) indicates that a job ran with no time waiting in the queue, a value of 0.5 (pale yellow) indicates a job queued for the same amount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

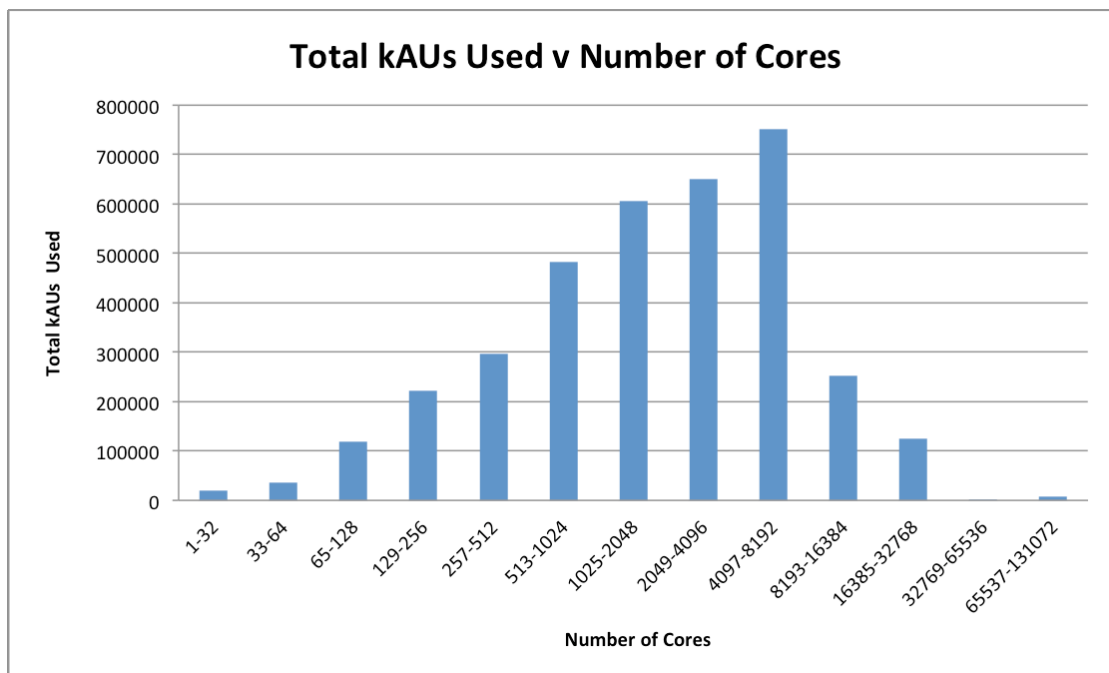
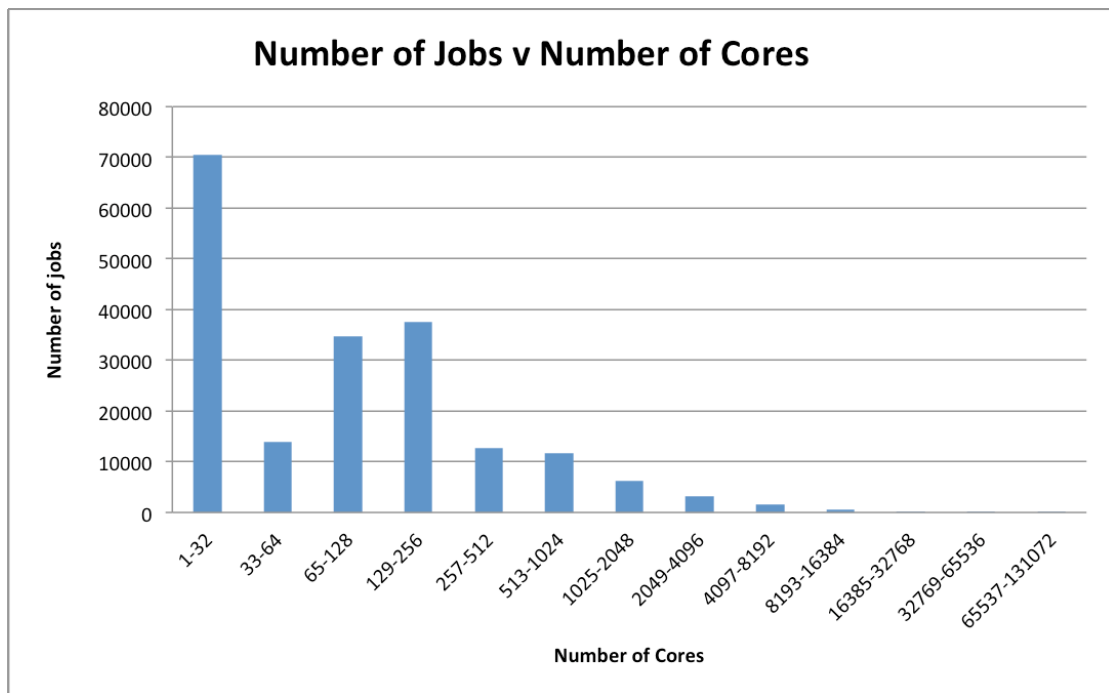
### 3.3 Additional Usage Graphs

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.

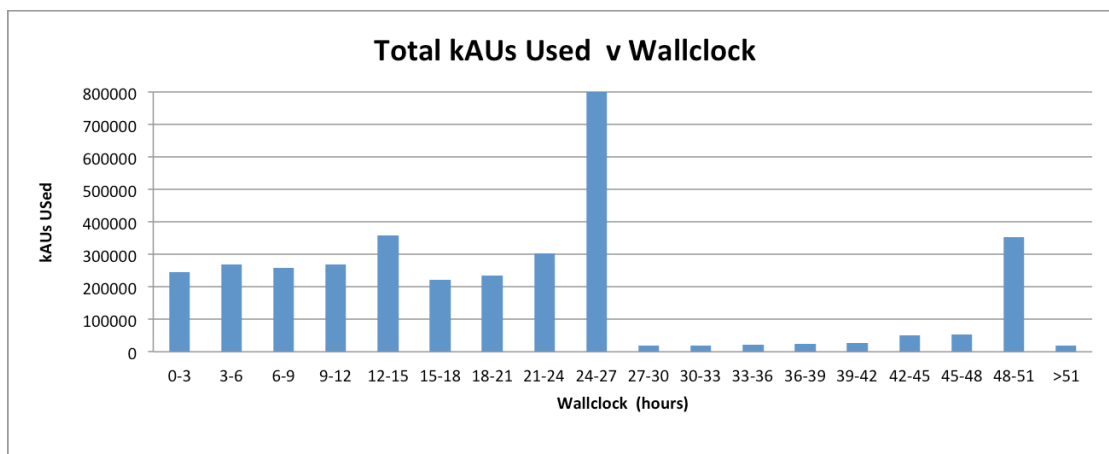
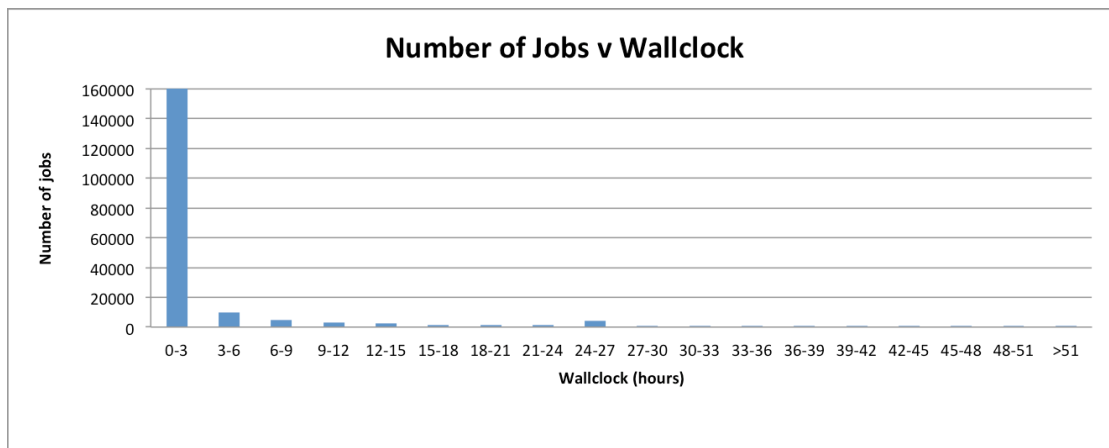


## Analysis of Job Sizes



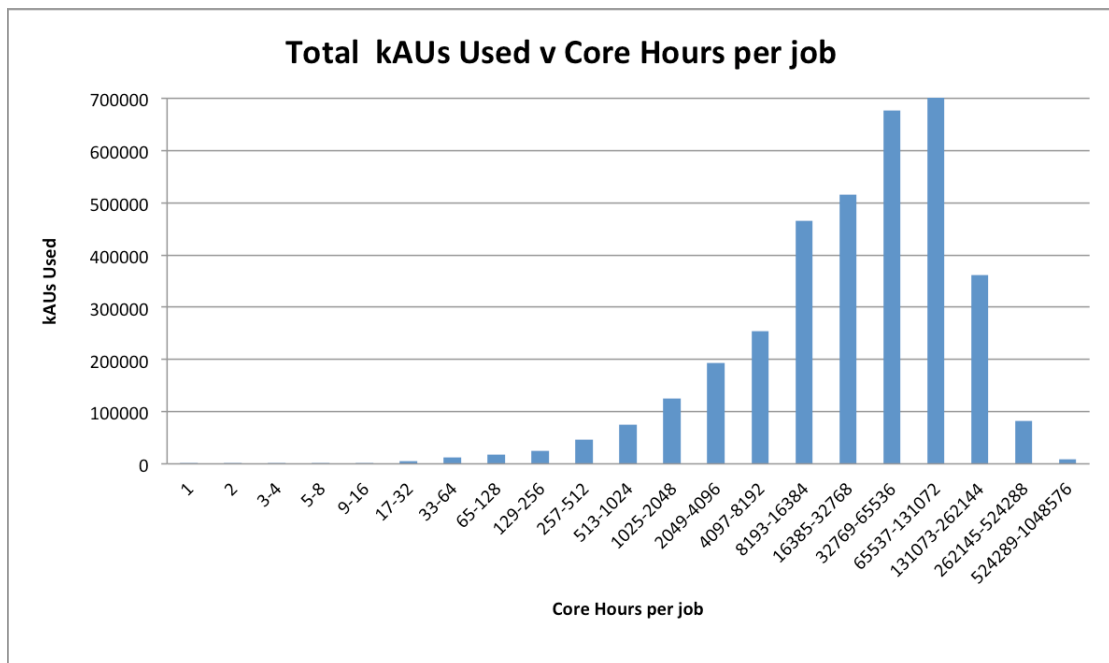
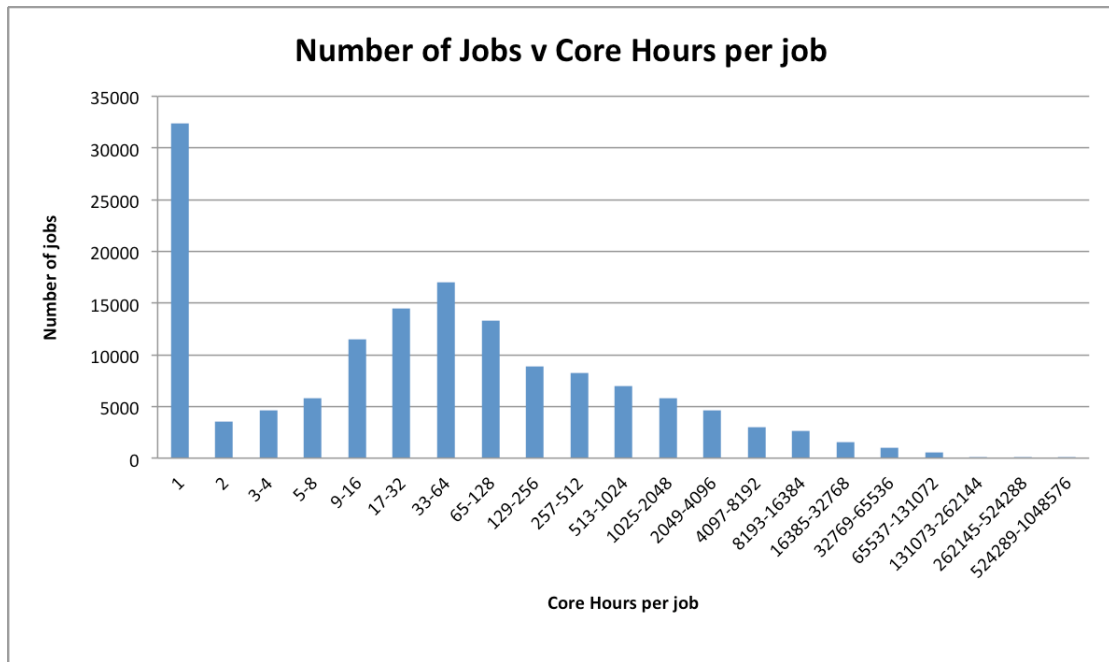
The first graph shows that, in terms of numbers, there are a significant number of jobs using no more than 256 cores. However, the second graph reveals that most of the kAUs were spent on jobs between 257 cores and 8192 cores. The number of kAUs used is closely related to money and shows better how the 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



## **Appendix – Infrastructure report**

There is nothing to report regarding infrastructure work within this quarter.