CSAR Service

Consolidated Management Report

4th Quarter 2002

Management Summary

This is the consolidated Management report for the fourth quarter 2002 of the CSAR HPC facility for UK Academia and Industry, which enables World-Class research and development.

The number of users has grown to a total of 541 to date.

The Cray T3E (Turing) system continued to run almost to full capacity again this quarter.

Usage of the Origin 3000 (Green) during this quarter has been varied, due in part to the phased approach of replacing the NQS job queuing system with LSF.

The T3E has seen 73% of the Quarter's workload at greater than 64 PEs in size.

CfS remains active in the UK Grid Forum.

LSF is now fully installed and is operational on all the Origins. From the "go live" date of 7th January 2003 LSF will be the primary batch system for the Origins, with only a few PEs left dedicated to NQS for legacy purposes.

Interactive provision on Fermat is to be removed shortly, with Wren now in place as the primary interactive system. Fermat will then become a dedicated batch system.

NERC have given notification that the Fujitsu VPP 300/8 system Fuji is to be removed at the end of March.

Introduction

This Management Report includes a section for each of the main service functions:

1. Service Quality
2. HPC Services
3. Science Applications Support Services
4. Training & Education Services
5. User Registration & New User Services
6. Value-Added Services

Each section includes a status report for the period, including notable achievements and problems, also noteworthy items for the next period.

1 Service Quality

This section covers overall Customer Performance Assessment Ratings (CPARS), HPC System availability and usage, Service Quality Tokens and other information concerning issues, progress and plans for the CSAR Service.

1.1 CPARS

Table 1 gives the measure by which the quality of the CSAR Service is judged. It identifies the metrics and performance targets, with colour coding so that different levels of achievement against targets can be readily identified. Unsatisfactory actual performance will trigger corrective action.

CSAR Service - Service Quality Report - Performance Targets

Service Quality Measure	Performance Targets					
	White	Blue	Green	Yellow	Orange	Red
HPC Services Availability						
Availability in Core Time (% of time)	> 99.9%	> 99.5%	> 99.2%	> 98.5%	> 95%	95% or less
Availability out of Core Time (% of time)	> 99.8%	> 99.5%	> 99.2%	> 98.5%	> 95%	95% or less
Number of Failures in month	0	1	2 to 3	4	5	> 5
Mean Time between failures in 52 week rolling period (hours)	>750	>500	>300	>200	>150	otherwise
Fujitsu Service Availability						
Availability in Core Time (% of time)	> 99.9%	> 99.5%	> 99.2%	> 98.5%	> 95%	95% or less
Availability out of Core Time (% of time)	> 99.8%	> 99.5%	> 99.2%	> 98.5%	> 95%	95% or less
Help Desk						
Non In-depth Queries - Max Time to resolve 50% of all queries	< 1/4	< 1/2	< 1	< 2	< 4	4 or more
Non In-depth Queries - Max Time to resolve 95% of all queries	< 1/2	< 1	< 2	< 3	< 5	5 or more
Administrative Queries - Max Time to resolve 95% of all queries	< 1/2	< 1	< 2	< 3	< 5	5 or more
Help Desk Telephone - % of calls answered within 2 minutes	>98%	> 95%	> 90%	> 85%	> 80%	80% or less
Others						
Normal Media Exchange Requests - average response time	< 1/2	< 1	< 2	< 3	< 5	5 or more
New User Registration Time (working days)	< 1/2	< 1	< 2	< 3	< 4	otherwise
Management Report Delivery Times (working days)	< 1	< 5	< 10	< 12	< 15	otherwise
System Maintenance - no. of sessions taken per system in the month	0	1	2	3	4	otherwise

Table 1

Table 2 gives actual performance information for the period. Overall, the CPARS Performance Achievement was the year 2000 was satisfactory (see Table 3), i.e. Green measured against the CPARS performance targets.

CSAR Service - Service Quality Report - Actual Performance Achievement

Service Quality Measure	2001/2 Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
HPC Services Availability												
Availability in Core Time (% of time)	99.86%	99.73%	99.70%	96.17%	96.08%	97.66%	99.2%	99.75%	98.75%	99.77%	99.25%	99.21%
Availability out of Core Time (% of time)	99.89%	99.85%	99.97%	97.75%	99.90%	99%	100%	100%	99.42%	99.52%	99.57%	100%
Number of Failures in month	2	1	2	2	1	4	0	1	2	1	1	0
Mean Time between failures in 52 week rolling period (hours)	350	324	313	302	324	313	365	381	381	398	417	515
Fujitsu Service Availability												
Availability in Core Time (% of time)	100%	100%	100%	96.89%	100%	100%	100%	100%	100%	100%	100%	100%
Availability out of Core Time (% of time)	100%	100%	100%	98.92%	100%	100%	100%	100%	100%	100%	100%	100%
Help Desk												
Non In-depth Queries - Max Time to resolve 50% of all queries	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Non In-depth Queries - Max Time to resolve 95% of all queries	<1	<2	<1	<1	<2	<5	<2	<2	<1	<2	<2	<2
Administrative Queries - Max Time to resolve 95% of all queries	<0.5	<1	<2	<2	<3	<5	<2	<0.5	<2	<0.5	<0.5	<0.5
Help Desk Telephone - % of calls answered within 2 minutes	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Others												
Normal Media Exchange Requests - average response time	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
New User Registration Time (working days)	0	0	0	0	0	0	0	0	0	0	0	0
Management Report Delivery Times (working days)	10	10	10	10	10	10	10	10	10	10	10	10
System Maintenance - no. of sessions taken per system in the mont	2	2	2	2	2	2	2	2	2	2	2	2

Table 2

Notes:

1. HPC Services Availability has been calculated using the following formulae, based on the relative NPB performance of Turing, Fermat and Green at installation:

   Turing availability x 143/(143+40+233)] + [Fermat availability x 40/ (143+40+233) + Green availability x 233/(143+40+233)]

2. Mean Time Between Failures for Service Credits is formally calculated from Go-Live Date.

Table 3 gives Service Credit values for each month to date. These are accounted on a quarterly basis, formally from the Go-Live Date. The values are calculated according to agreed Service Credit Ratings and Weightings.

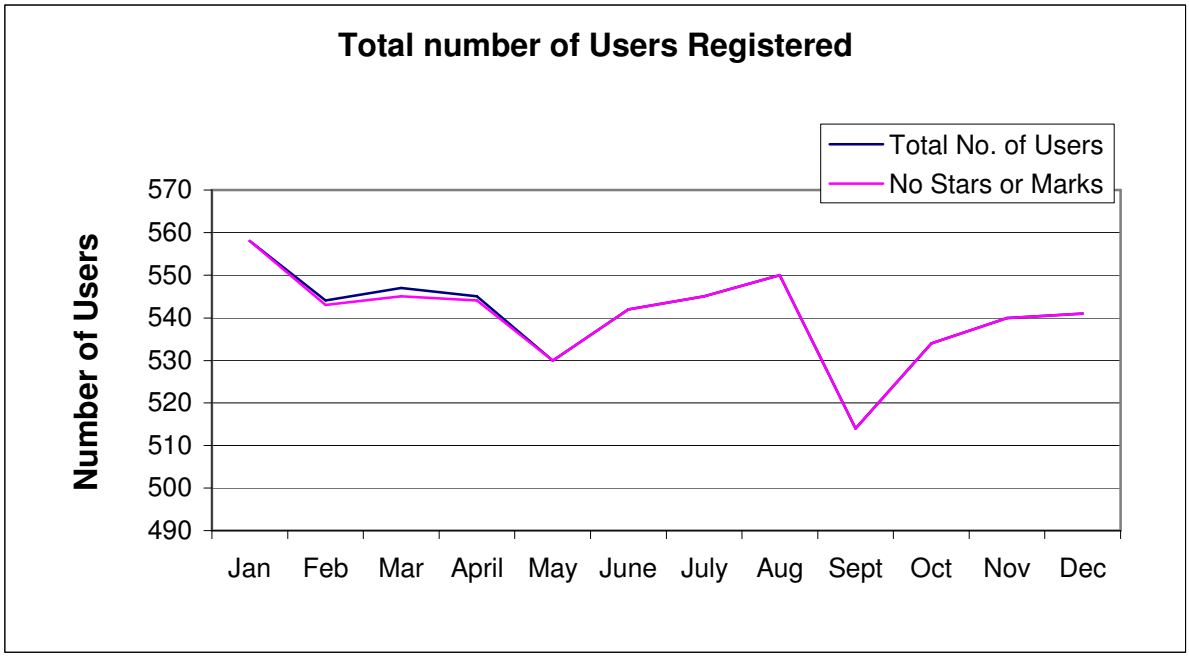
CSAR Service - Service Quality Report - Service Credits

Service Quality Measure	2001/2 Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
HPC Services Availability												
Availability in Core Time (% of time)	-0.039	-0.039	-0.039	0.078	0.078	0.078	0	-0.039	0.039	-0.039	0	0
Availability out of Core Time (% of time)	-0.047	-0.047	-0.047	0.039	-0.047	0.000	-0.047	-0.047	0	-0.039	-0.039	-0.047
Number of Failures in month	0	-0.008	0	0	-0.008	0.000	-0.009	-0.008	0	-0.008	-0.008	-0.009
Mean Time between failures in 52 week rolling period (hours)	0	0	0	0	0	0	0	0	0	0	0	-0.008
Help Desk												
Non In-depth Queries - Max Time to resolve 50% of all queries	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019
Non In-depth Queries - Max Time to resolve 95% of all queries	-0.016	0	-0.016	-0.016	0	0.031	0	0	-0.016	0	0	0
Administrative Queries - Max Time to resolve 95% of all queries	-0.019	-0.016	0	0	0.016	0.031	0	-0.019	0	-0.019	-0.019	-0.019
Help Desk Telephone - % of calls answered within 2 minutes	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004
Others												
Normal Media Exchange Requests - average response time	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002
New User Registration Time (working days)	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019
Management Report Delivery Times (working days)	0	0	0	0	0	0	0	0	0	0	0	0
System Maintenance - no. of sessions taken per system in the mont	0	0	0	0	0	0	0	0	0	0	0	0
Monthly Total & overall Service Quality Rating for each period:	-0.08	-0.08	-0.07	0.03	0.00	0.05	-0.05	-0.08	-0.01	-0.07	-0.05	-0.06
Quarterly Service Credits:			-0.23			0.08			-0.14			-0.19
Annual Service credit												-0.48

Table 3

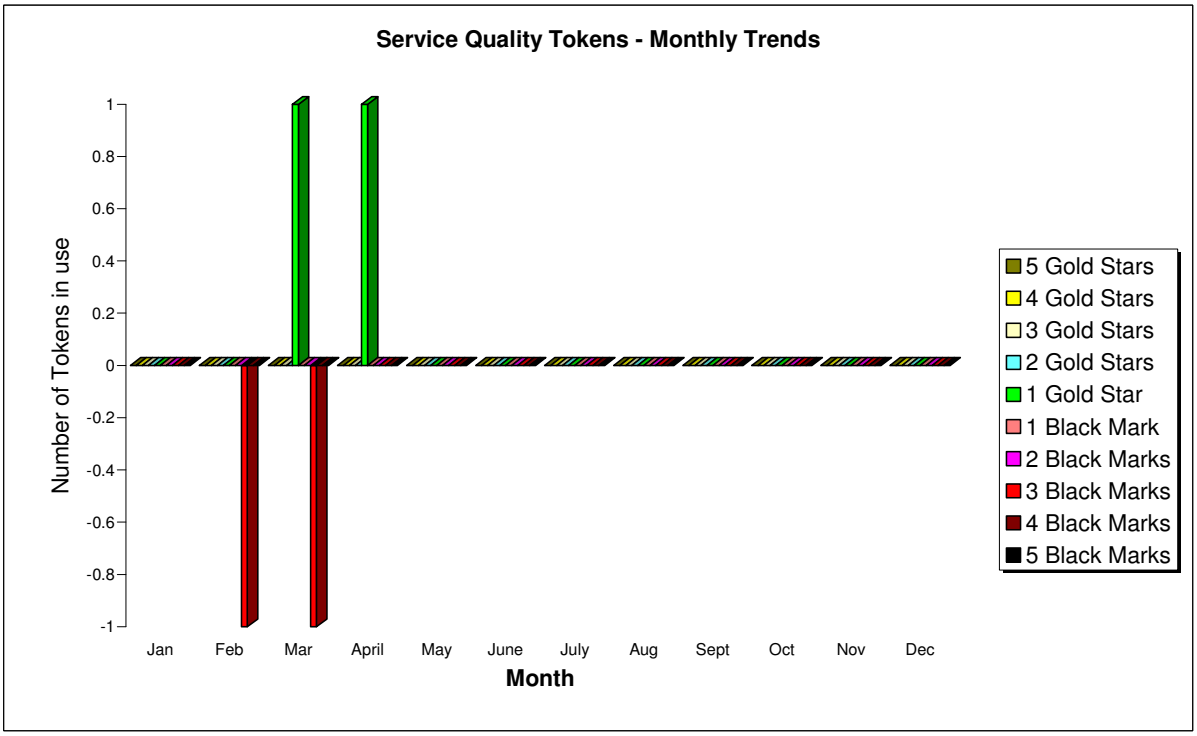
1.2 No. of Registered Users

The current position at the end of the quarter is that there are 541 registered users of the CSAR Service.



1.3 Service Quality Tokens

The graph below illustrates the monthly usage trend of Service Quality Tokens:



Over the course of the quarter the position is that as a management tool the Service Quality Tokens have been available to enable the users to provide qualitative feedback about all aspects of the service. This feedback is used as a mechanism to initiate change in the service where appropriate.

At the end of the quarter there are no black marks or gold stars allocated to the service.

2 HPC Services Usage

Usage information is given in tabular form, and in graphical format. The system usage information covers:

- CPU usage
- User Disk allocation
- HSM/tape usage

This is illustrated in a number of graphs including;

a) MPP (T3E) Usage by month, showing usage each month of CPU (T3E PE Elapsed Hours), split by Research Council and giving the equivalent GFLOP-Years as per NPB. The Baseline Capacity is shown by an overlaid horizontal line.

b) SMP (Origin) Usage by month, showing usage each month in CPU Hours, split by Research Council and giving the equivalent GFLOP-Years as per NPB. The Baseline Capacity is shown by an overlaid horizontal line.

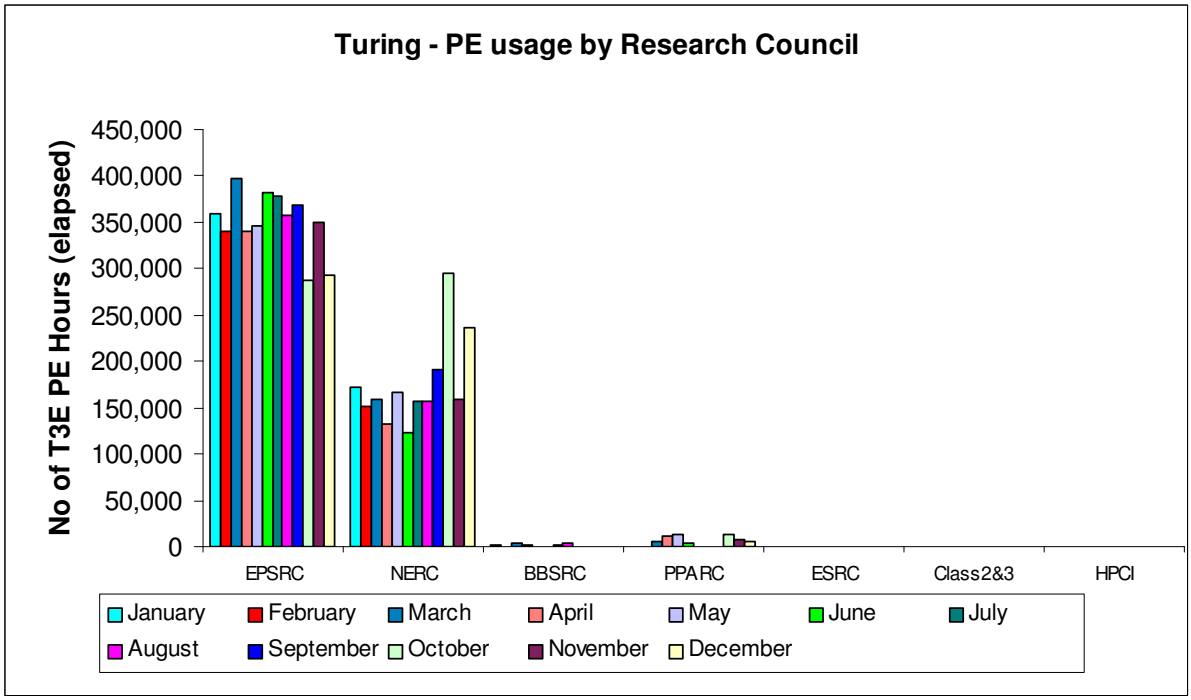
c) High Performance Disk (T3E) allocated for User Data by month, showing the allocated space each month in GBytes, split by Research Council. The Baseline Capacity (1 Terabyte) is shown by an overlaid horizontal line.

d) Medium Performance Disk (Origin) allocated for User Data by month, showing the allocated space each month in GBytes, split by Research Council. The Baseline Capacity (1.5 Terabytes) is shown by an overlaid horizontal line.

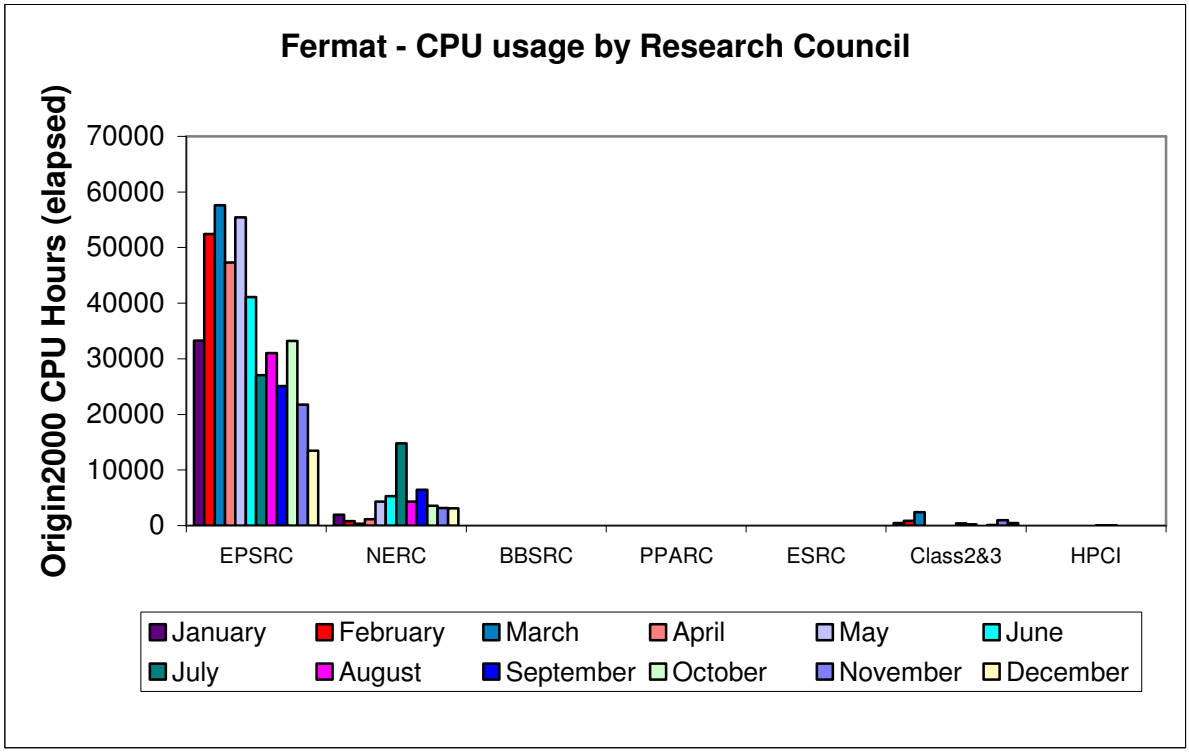
e) HSM/Tape Usage (T3E) by month, showing the volumes held each in GBytes, split by Research Council. The Baseline Capacity (16 Terabytes) available will be shown by an overlaid horizontal line.

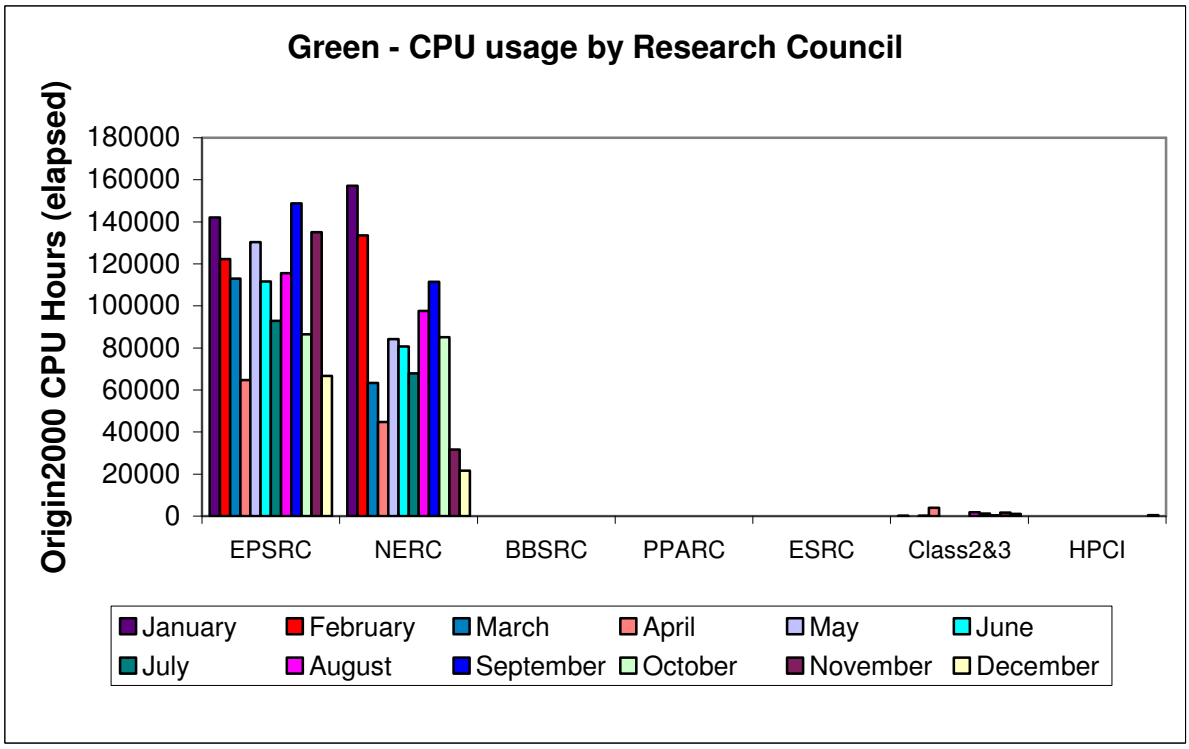
2.1 Service Usage Charts

The graphs below show recent monthly PE, CPU, disk and HSM allocations and usage.

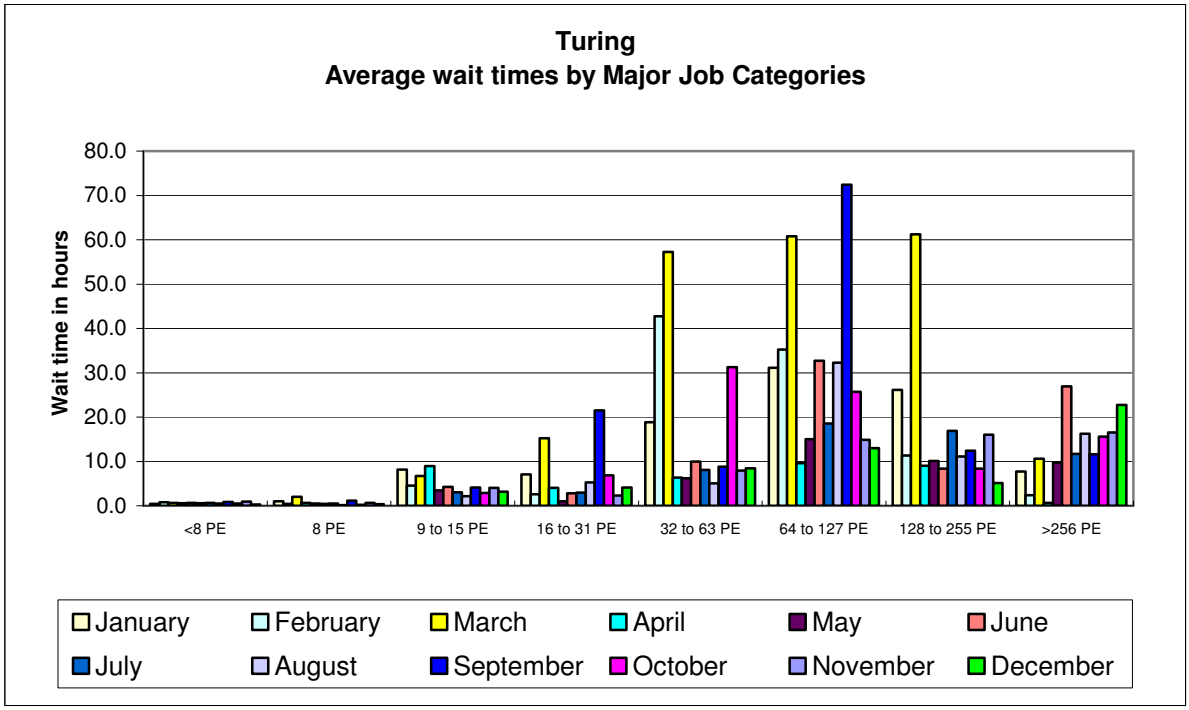


Turing PE usage is shown by Research Council during the last 12 months of service in the above chart.

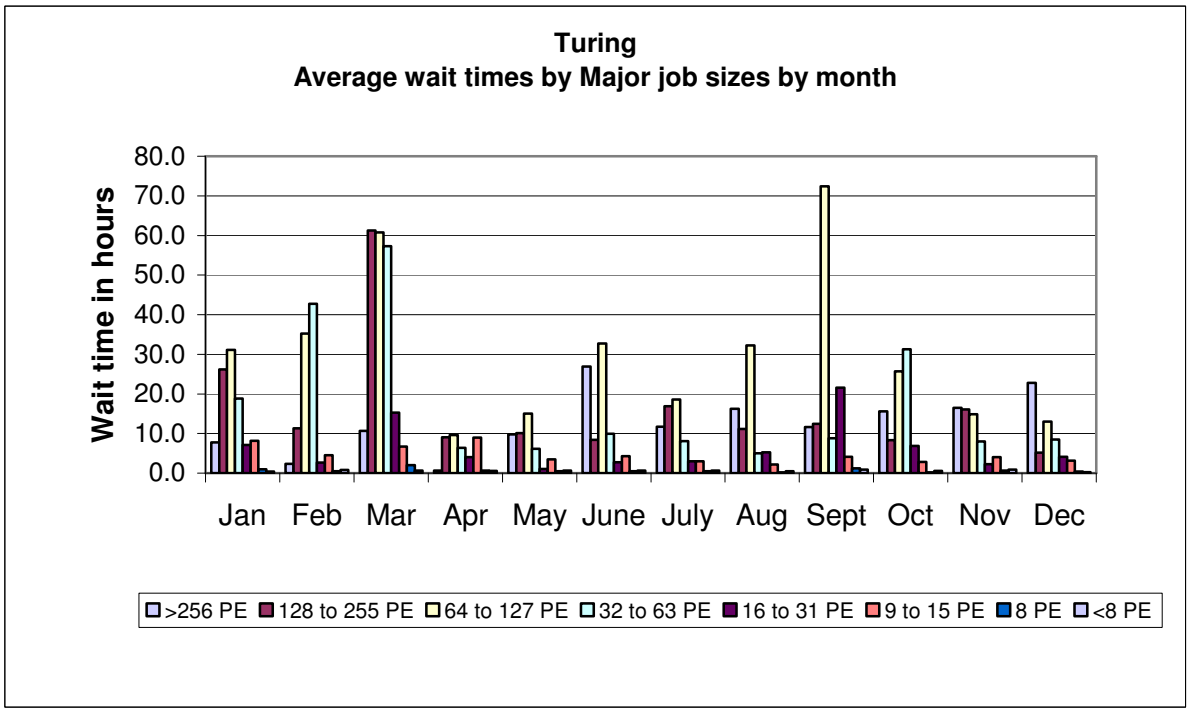




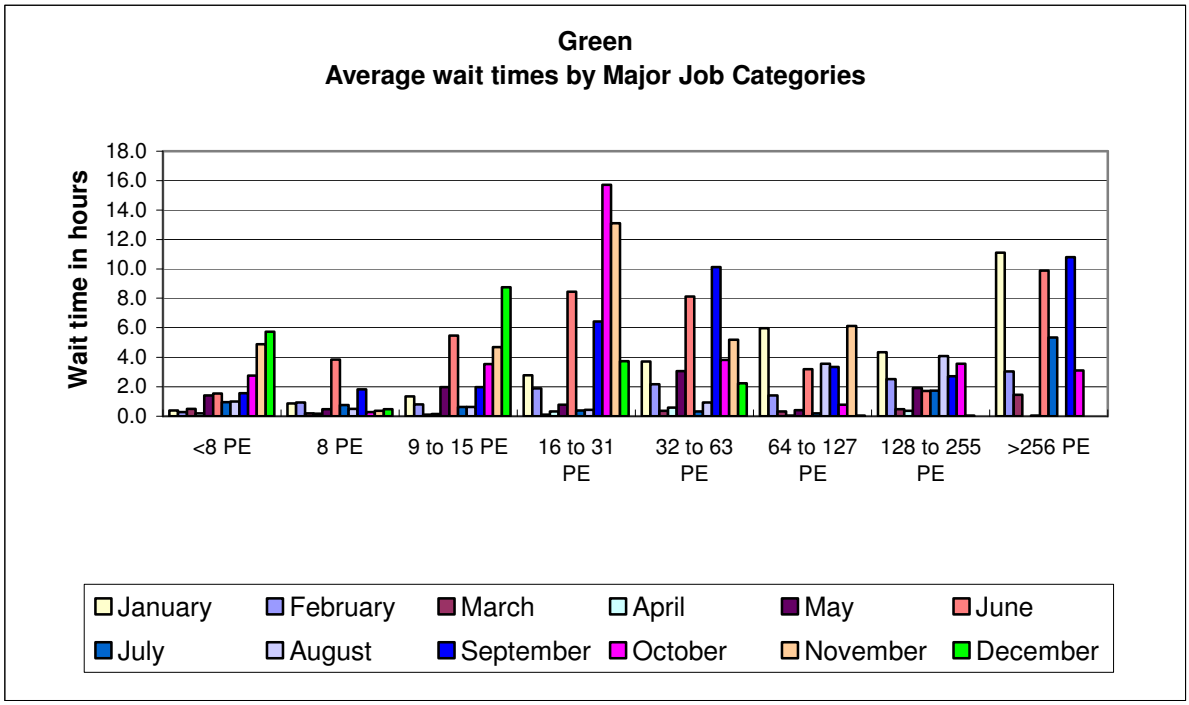
Usage of the two SGI Origin systems, Fermat and Green, is shown by Research Council during the last 12 months of service in the above charts.

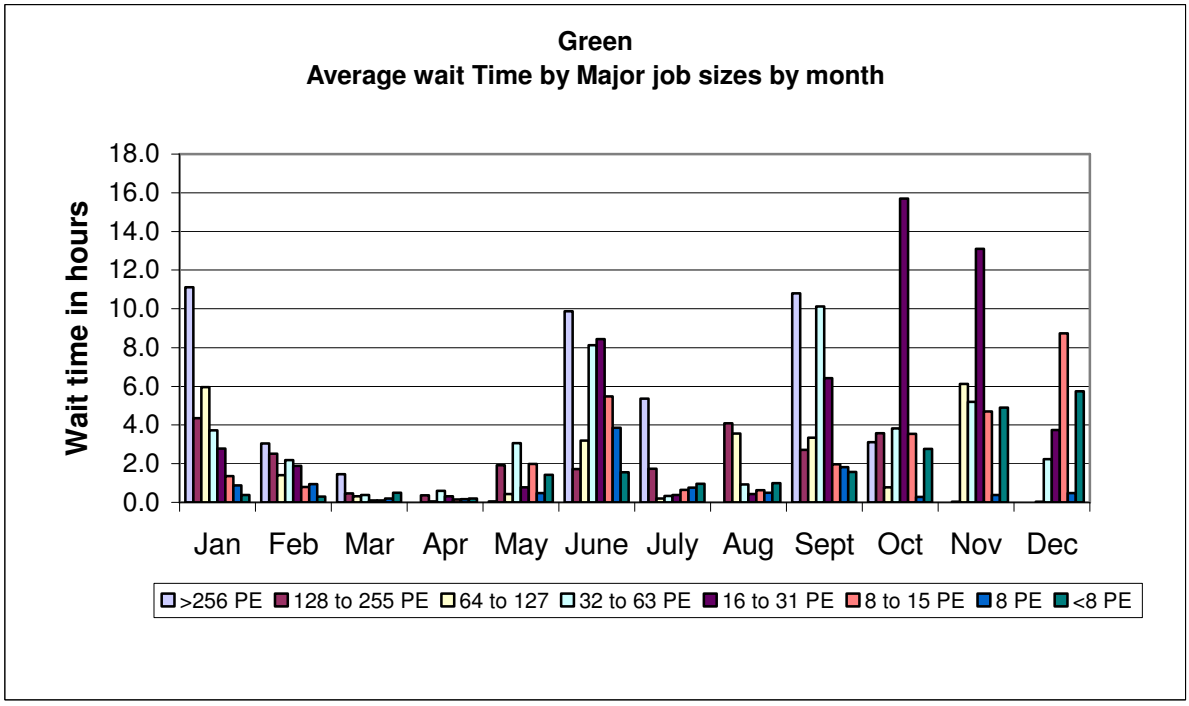


The above chart shows the wait time trend in hours on the Turing system. The quarter has seen job wait times gradually decrease.



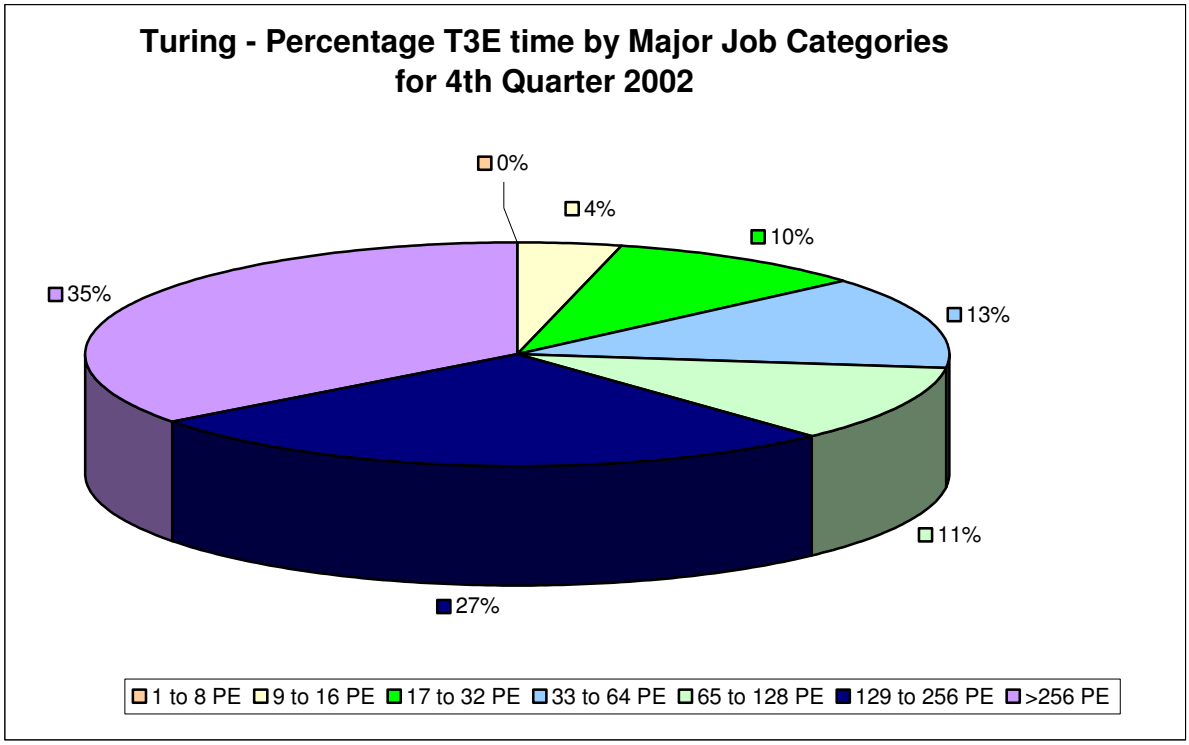
The following two charts show average wait times in hours for the quarter on the Origin 3000 (Green).



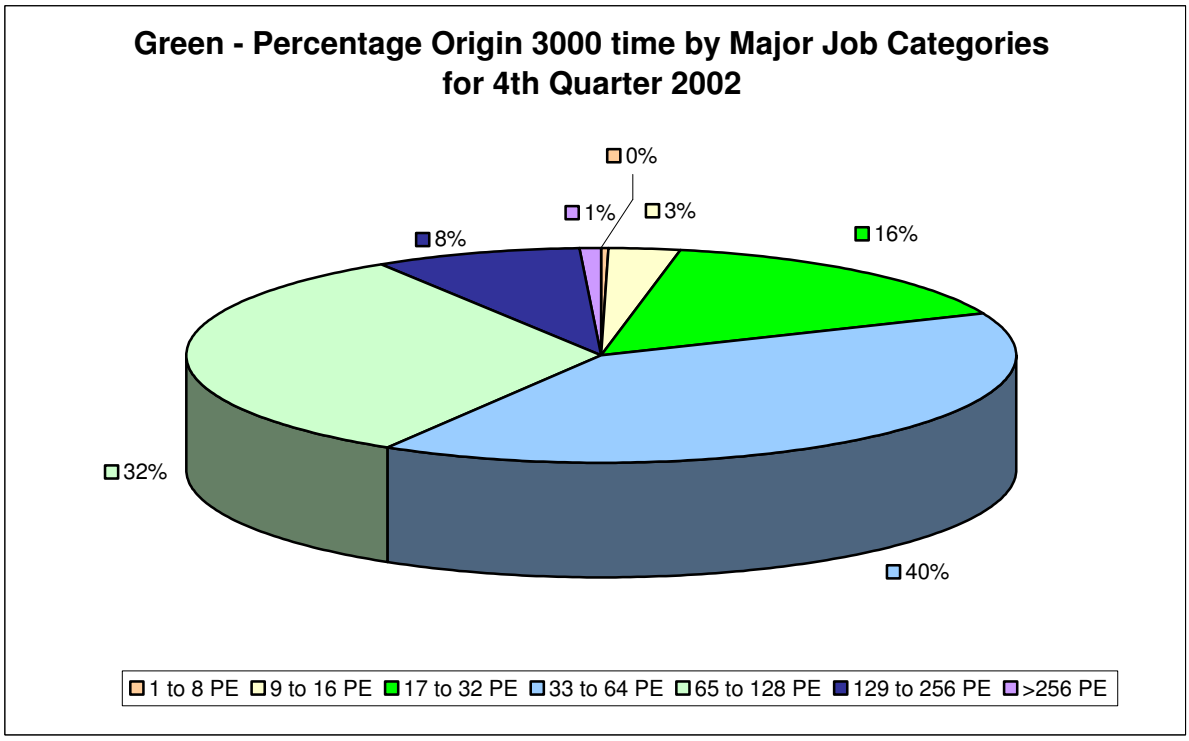


Green wait times are higher due to fuller loading of the system typically requiring 24 hours of processing.

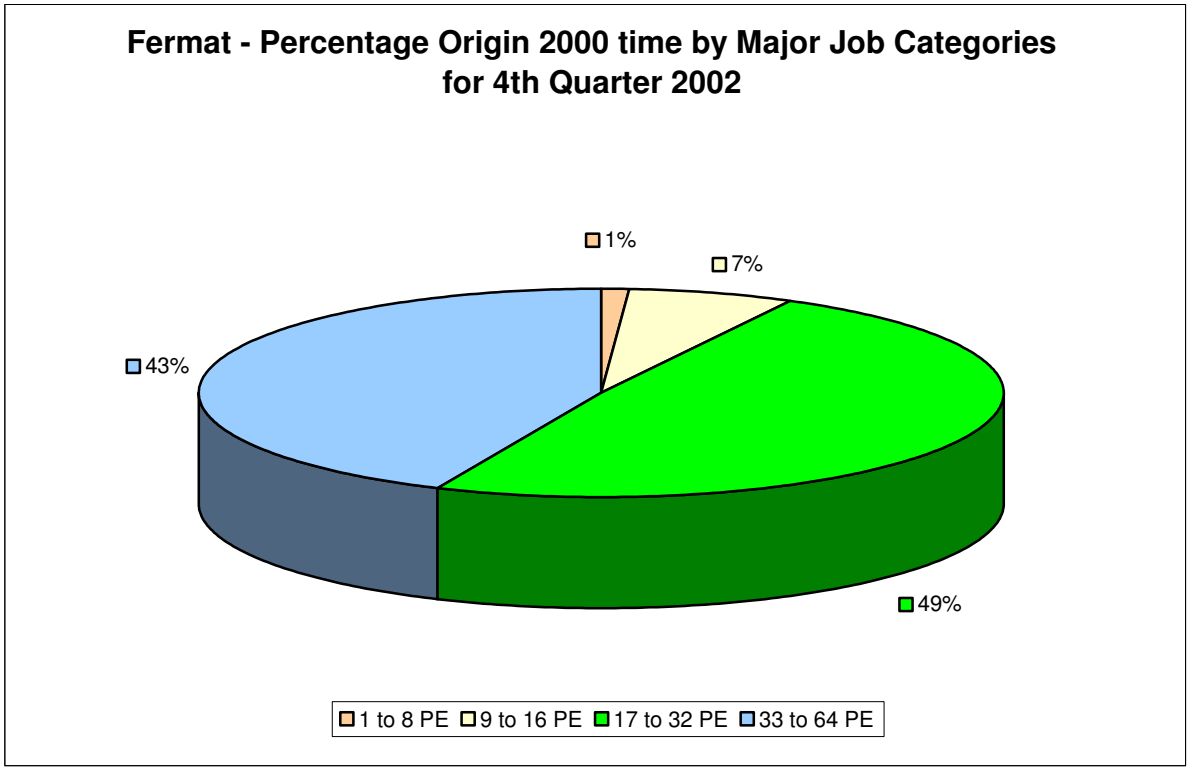
The next three charts show the percentage PE time utilisation by the major job categories on the Turing, Green and Fermat systems for the 4th quarter 2002.



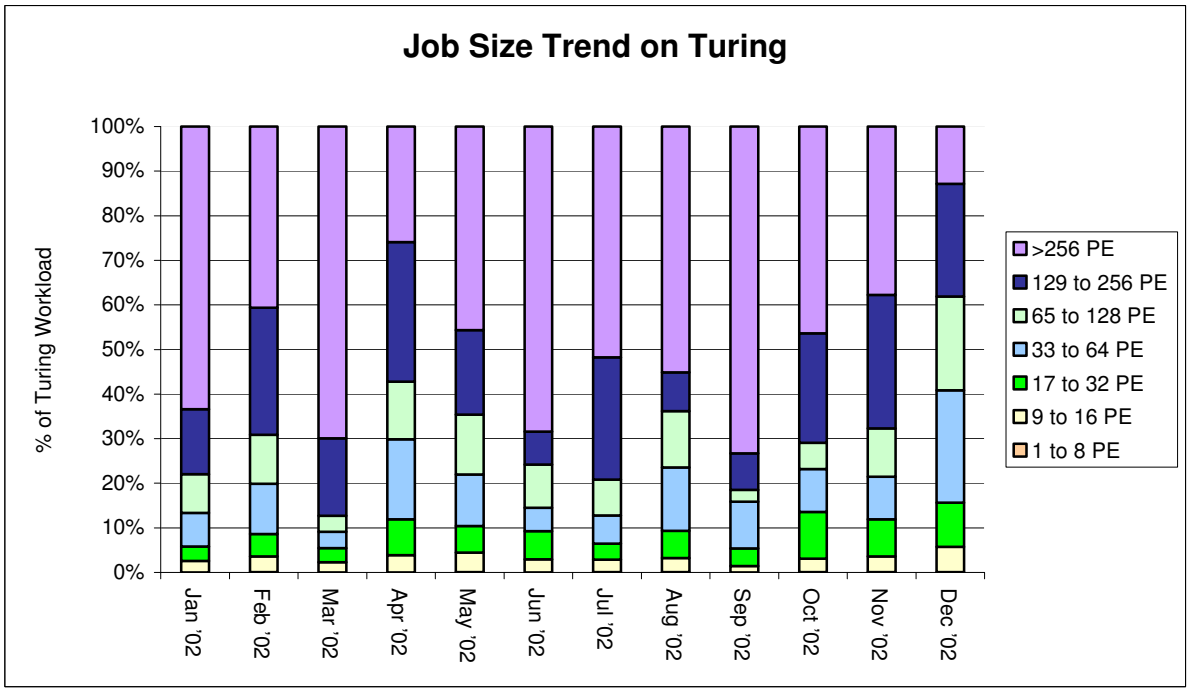
The predominant job size on Turing is large, with the percentage of jobs greater than 64 PEs for the quarter being 73%.



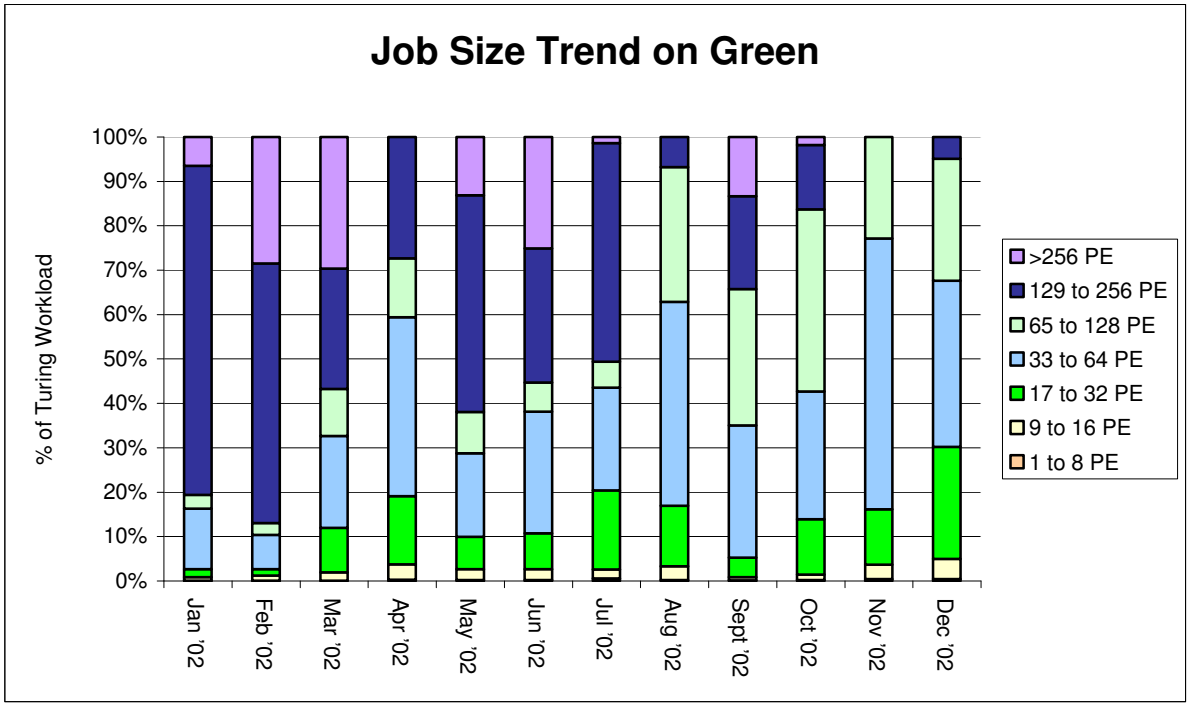
On Green, the 4th quarter has seen a varied workload, most concentrated in the range 128PEs and less. However, it should be noted that this is due in part to the phased introduction of LSF to replace NQS as the job scheduling system, during which groups of processors have been migrated from NQS to LSF.



On Fermat the greatest proportion of jobs during the quarter were in the 17 to 64 PE range at 92%.



The last few months of 2002 have seen reducing usage of the T3E for jobs above 128 PEs.



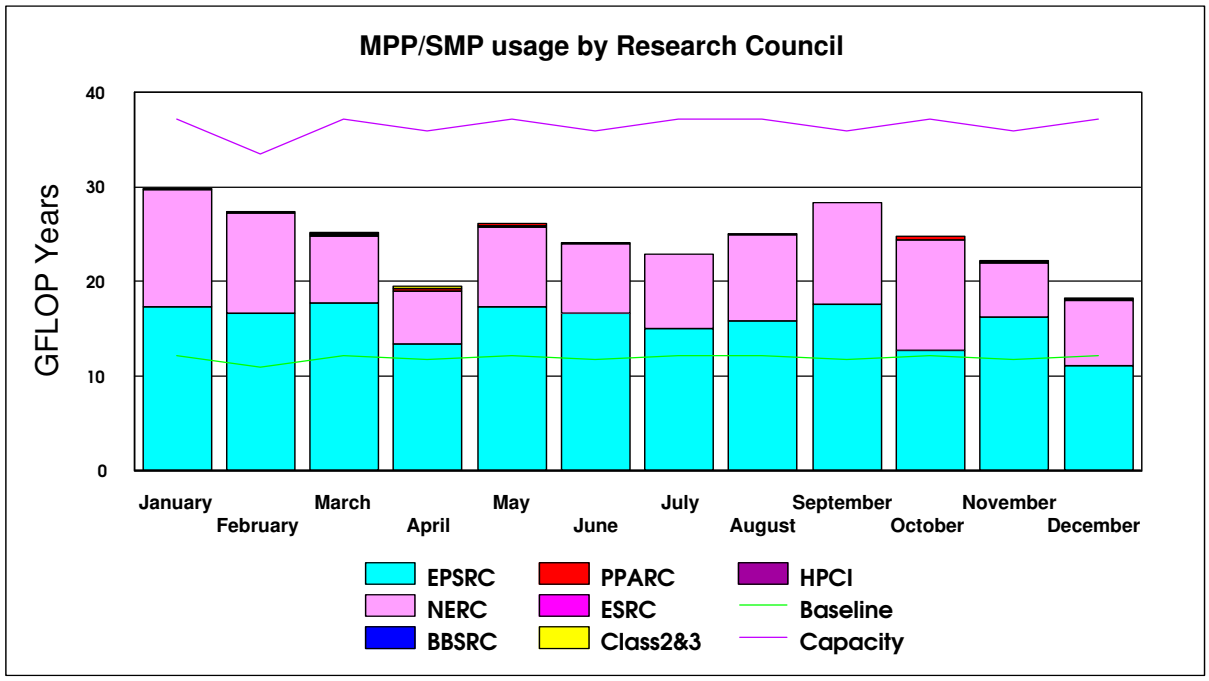
The recent trend towards usage of Green for smaller jobs, less than 128 CPUs, is expected to reverse with larger numbers of CPUs now assigned to LSF.

2.2 System Usage Graphs

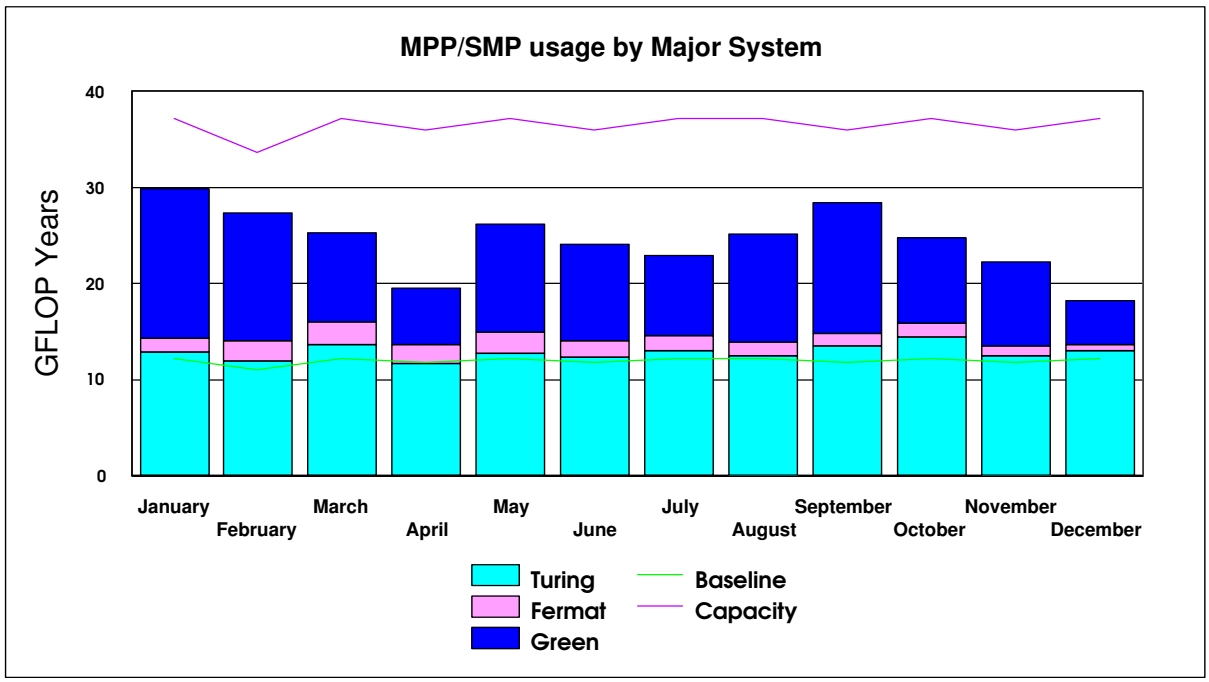
In all the Usage Charts, the baseline varies dependant on the number of days in each month, within a 365-day year.

2.2.1 Baseline System

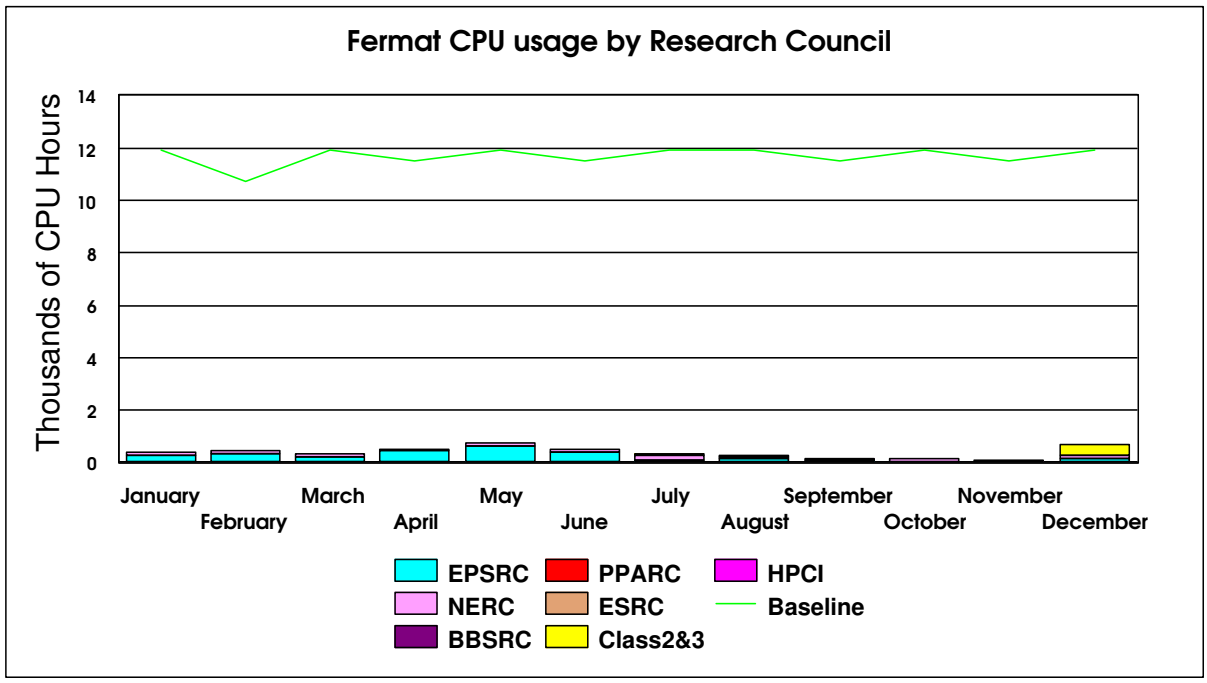
The graph below shows the Gflop year's utilisation on CSAR's systems by Research Council for the last 12 months.



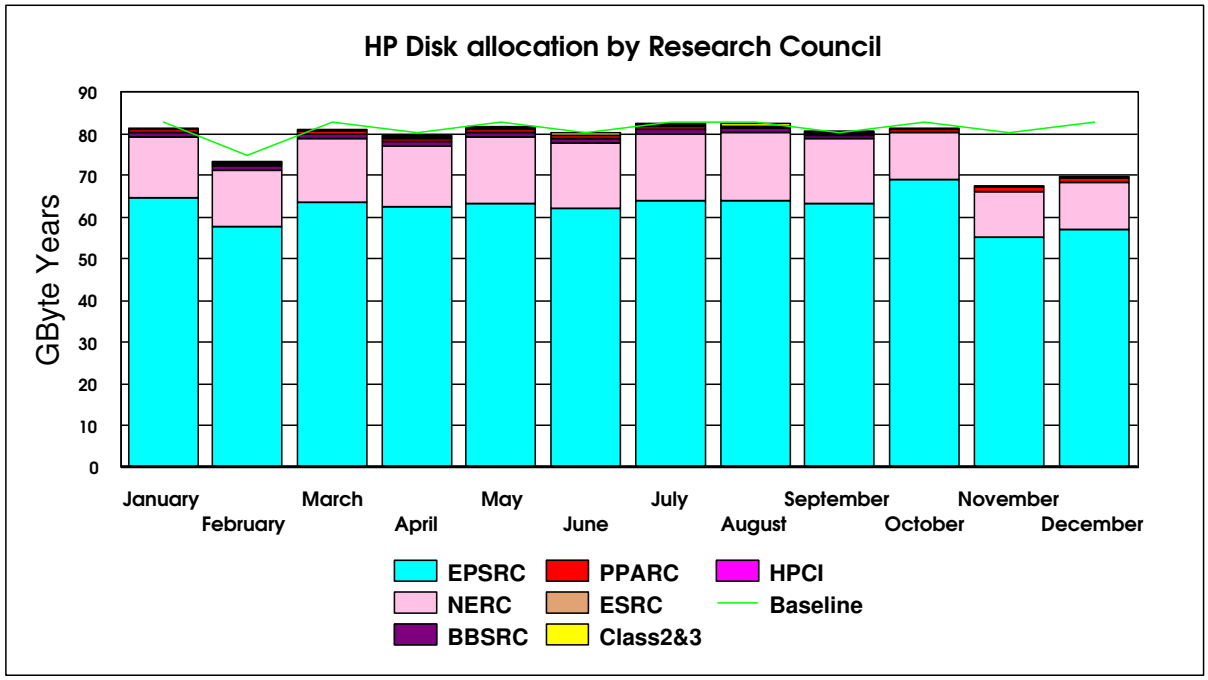
The graph below shows the same service utilisation by major system. .



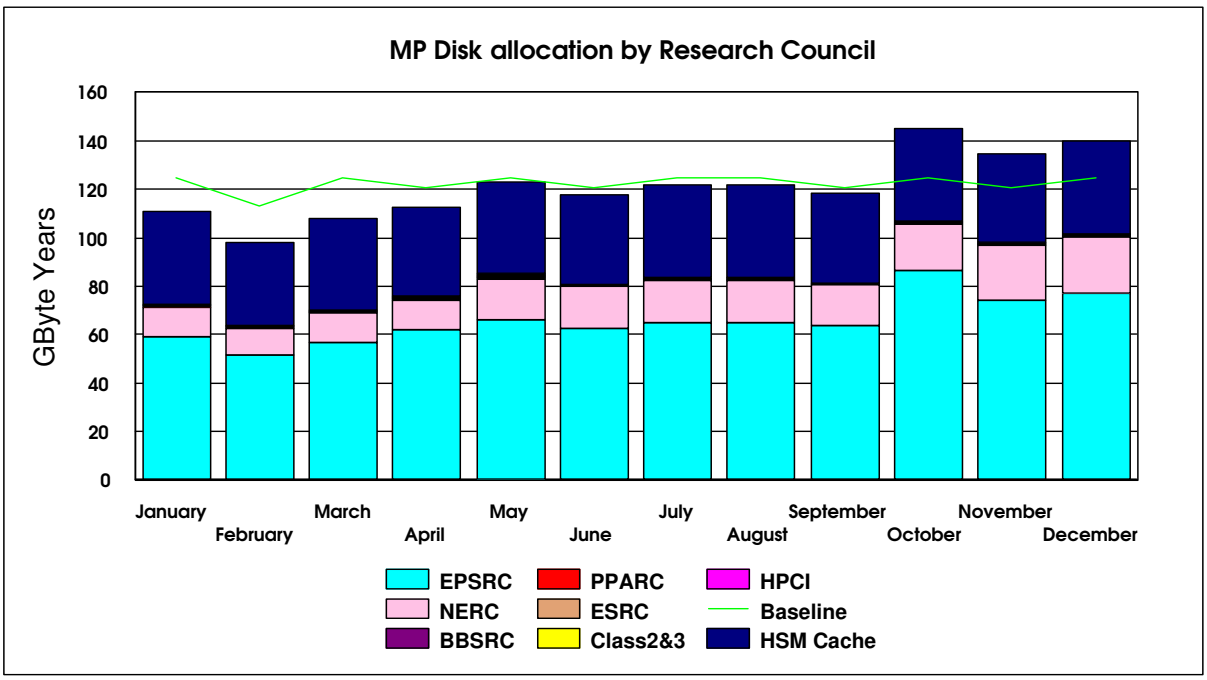
The next chart shows the historic interactive usage of the 'Baseline' Fermat system (equivalent to 16 @250Mhz CPU's).



The next series of graphs illustrates the usage of the disk and HSM resources of the system.

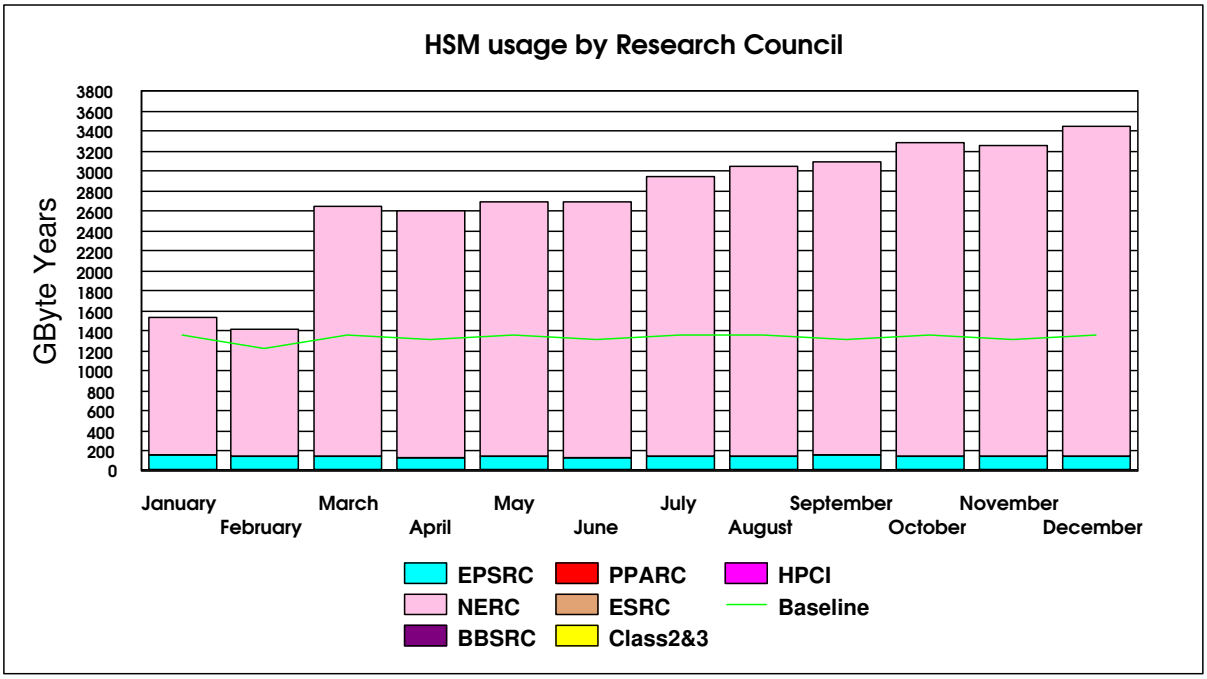


The preceding graph illustrates the historic allocation of the High Performance Disk on Turing.

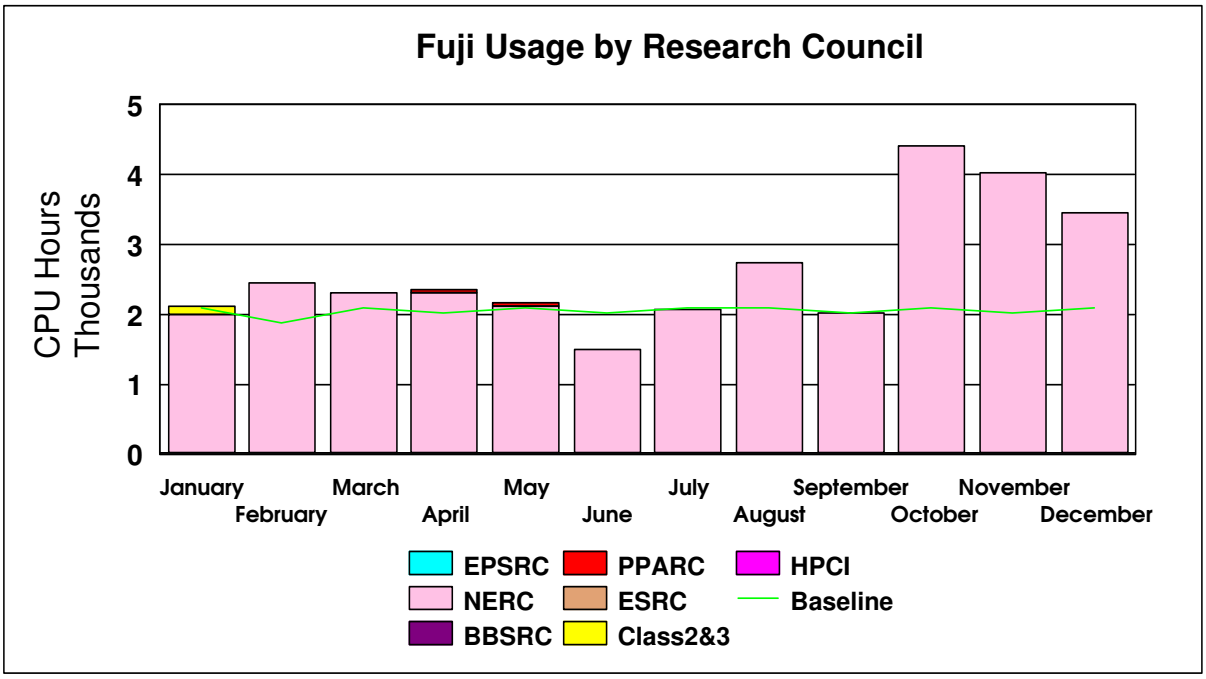


The graph above illustrates the historic allocation of the Medium Performance Disk on Fermat.

The graph below shows the historic HSM usage by Research Council funded projects, which has exceeded the overall Baseline of 16 Terabytes, and now totals 41 Terabytes.



2.2.2 Fujitsu System Usage Graph



The above graph shows the current CPU usage on the Fujitsu VPP 300 NERC system based at the University of Manchester. The Fujitsu usage was variable during the quarter.

2.2.3 Guest System Usage

The Compaq ES40 cluster has now been withdrawn from service due to continued zero usage demand.

2.3 Service Status, Issues and Plans

Status

The workload on the machines is showing a downward trend; this position will be monitored to establish whether this is a seasonal effect or due to other influences.

Issues

This quarter has seen fewer large jobs on Green run due to the impact of the phased LSF installation. This resulted in two batch partitions, one LSF and one NQE, existing on the machines at the same time. However, this provided the user base with an extended testing period.

Plans

LSF is now fully installed and is operational on all the Origins. From the "go live" date of 7th January 2003 LSF will be the primary batch system for the Origins, with only a few PEs left dedicated to NQS for legacy purposes.

Interactive provision on Fermat is to be removed shortly, with Wren now in place as the primary interactive system. Fermat will then become a dedicated batch system.

NERC have given notification that the Fujitsu VPP 300/8 system Fuji is to be removed at the end of March.

3 Project Management, Documentation and User Feedback

This section covers aspects relating to the registration of projects and users, the management of projects and resources, topics associated with documentation and user feedback.

3.1 Project Applications

15 applications for new CSAR projects were received in the fourth quarter of 2002.

3.2 New Projects

9 new CSAR projects were started.

3.3 Queries

Overall, 228 queries relating to the CSAR service were received by the Helpdesk between 1st October and 31st December 2002.

3.4 User Survey

The CSAR Annual User Survey for 2002 took place in December. The number of respondents to the survey was much higher than last year, possibly because the request to complete the survey was made by EPSRC rather than by CSAR. CSAR thanks EPSRC for their assistance. The responses were generally very positive, with 84% of respondents saying the service was either good or very good. A full report will be made available on the CSAR web pages.

3.5 Service Quality Tokens

There were no black tokens or gold stars awarded during this quarter. One black token was awarded and subsequently removed after the user discovered the error to be their own.

3.6 Annual Report

The CfS Annual Report is currently being prepared for publication.

3.7 CSAR Focus

The Winter edition of CSAR Focus has been published.

4 Scientific Application Support Services

4.1 Training and Education

The early 2003 course schedule has been devised and will be available shortly.

4.2 Consortia Support

Further optimisation support for CSAR project cse086 has been carried out. This involved the development of alternative routines to those provided in the standard ScaLAPACK Library. The results of this work were presented (as a joint paper by CSAR staff and the consortium involved) at the Parallel Matrix Algorithms and Applications (PMAA 02) in Switzerland. There is potential for more work here, negotiations will follow the submission of a paper in late January. The success of this linear algebra optimisation is also generating significant interest from vendors, who see the benefit of further optimising routines in the ScaLAPACK library.

Significant effort has been given in identifying an obscure problem in the molecular dynamics code, LAMMPS, on behalf of one consortium.

Assistance is being provided on the porting of codes from Fuji to Green.

A class 2 project is using direct solvers for finite element analysis. CSAR has helped to port their code to Fermat and will be discussing the possibilities for using the parallel iterative solvers being developed at the University of Manchester.

4.3 Applications Software

All of the main application software has been moved over to the SAN. The access method has been improved via the use of modules.

4.3.1 Unified Model

We have installed the Unified Model version 5.3 on Turing and are porting it to the Origins.

4.3.2 GAUSSIAN98

A new version of this software, Rev. 11.3, has been installed on the Origins.

4.3.3 LAMMPS

We have installed the latest version on the CSAR machines.

4.3.4 Cray Programming Environment

The latest Cray Programming Environment, PrgEnv 3.6, is now available on Turing..

4.3.5 PVM

PVM 3.3 is now available.

4.3.6 MPT

MPT 1.6 is now the default on the Origins.

4.3.7 NAG Parallel Library

We plan to obtain the NAG parallel library on evaluation license. If there is sufficient user interest, we will request funding to make it available generally.

4.3.8 Fluent

We are currently installing and evaluating Fluent, a popular CFD package. Users who may be interested in using this package should contact Keith Taylor.

4.3.9 Grid Software

Globus has been installed on Wren. Globus job managers have been installed so that jobs can be submitted to the LSF queues on the Origins. Globus now supports job limits. Unicore and Globus now accept each other's certificates.

4.4 LSF

LSF is now fully installed and is operational on all the Origins. As of 7th January, it is the primary batch system for the Origins, with 540 of the 556 available batch CPUs now devoted to LSF. There are some ongoing issues with the finer details of the implementation (e.g. scheduling policies) that are still being addressed.

5 Collaboration and Conferences

5.1 MRCCS Projects

5.1.1 Reality Grid

The RealityGrid project made use of the CSAR systems in a series of demonstrations of trans-Atlantic computational steering at Supercomputing 2002, Baltimore, November 2002, on the UK e-Science and SGI booths. A lattice-boltzmann simulation running on 128 processors of CSAR's Origin 3800 Green was steered from a laptop in Baltimore into physically interesting parameter regimes, while the current state of the physical system was being visualized in real time, using an SGI Onyx system located in Baltimore. The demonstrations made use of the UNICORE Grid middleware, the GLUE web services hosting environmnent from The Mind Electric, the grid services demonstrator software from Dave Snelling of Fujitsu, SGI's OpenGL VizServer, and RealityGrid's own computational steering software.

Other grid-enabled systems at CSAR and the University of Manchester were used in several entries to the "HPC Challenge" competition at Supercomputing 2002, including the Global Grid Testbed Collaboration which took top honours in the categories of "most geographically distributed application" and "most heterogeneous application". The Global Grid Testbed consisted of 70 Globus-enabled systems on 5 continents, ranging from 1024 processor clusters down to a lowly Sony Playstation2. Ironically, it was the Playstation - administered by Mike Jones of the University of Manchester - that earned the epithet of "most reliable system in the testbed".

5.1.2 Access Grid

The status of the Access Grid at Manchester is much the same as reported in the last Quarterly Report (http://www.csar.cfs.ac.uk/admin/reports/service_quarterly/third2002.pdf). In brief, usage is high and users are varied. An interesting example of this is a performance art event that was held in October - 'navigating gravity' - in conjunction with the University of Florida and including an audience in Australia. More details can be found on http://www.navigatinggravity.net/. Global development on Access Grid technology is imminent with the release of AG2.0 due early next year. Manchester hopes to have a high profile involvement in this effort. The e-Science Core Programme commissioned a comparative report on videoconferencing technologies to help determine a roadmap for the future. Michael Daw managed this effort, which involved many experts from the fields of H.323/H.320 videoconferencing and VRVS as well as Access Grid. This report should soon be publicly available and should form the basis for new UK funding to support distributed collaboration.

5.1.3 GRIP

GRIP, the Grid Interoperability Project is proceeding well. Manchester is coordinating publicity for this project, which includes running the website.

5.1.4 SAMD Project

CSAR staff contributed to the development of the ESRC e-Science demonstrator project SAMD, which is now complete. The SAMD project demonstrates the advantages that single sign-on to both data and computational resources can bring to the social sciences. SAMD has been demonstrated at the UK e-Science All Hands Meeting (Sheffield, September 2002), Supercomputing 2002 (Baltimore, November 2002) and at the ESRC Research Methods Workshop on Combining Data (Manchester, December 2002). The Globus installations on the CSAR Origin systems were used in these demonstrations. More information on the SAMD project can be found at: http://www.sve.man.ac.uk/Research/AtoZ/SAMD.

5.1.5 UKHEC

The UKHEC project formally ended on 31st December 2002. This successful collaboration between MRCCS, DL and EPCC provided valuable support to the high end computing community over the 3 years of its term.

There are two remaining events scheduled to take place under this project:

- Visualization for High End Computing, 6th February 2003 - University of Manchester.
- Workshop on Parallel Finite Element Analysis, 13th-14th March 2003 - University of Manchester.

And some seminars that took place during this quarter:

- Data Management for High End Computing, 10th January 2003 - CLRC Rutherford Appleton Laboratory. (no report available yet)
- Third UKHEC Annual Seminar, 9th -10th December 2002 - CLRC Daresbury Laboratory – (held in conjunction with 13MEW, 11th –12th December). A well attended event, especially by vendors later in the week.
- Programming Shared Memory Systems, 8th November 2002 - University of Edinburgh, University of Manchester.

MRCCS attended and/or presented at all of these seminars.

5.1.6 Advanced Virtual Prototyping /Finite Elements

The parallel finite element analysis software being developed at the University of Manchester, is being used and adapted within this project, with the objective of achieving real time finite element analysis.

5.2 Events

Supercomputing 2002, Baltimore – see below.
The CSAR Team & machines played an active role in 6th Global grid Forum

CSAR staff presented a paper at “Parallel Matrix Algorithms and Applications” in Neuchatel, Switzerland, in November 2002.

CSAR/MRCCS staff had a successful visit to Copenhagen to collaborate on a MHD code intended to work in a metacomputing environment.

CSAR staff attended the ECMWF workshops in November.

CSAR/.MRCCS staff also attended : IST 2002 in Copenhagen, Nov 2-4th ; the European Research agenda Launch in Brussels on Nov 11-13; the Unicore Symposium and Grid Computing Workshop, Bonn, Nov 27-28; the Eurogrid workshop at the Euroweb conference, Dec 18th; the 3rd Annual UKHEC seminar in Daresbury 9/10 December; and the 13th Machine Evaluation Workshop in Daresbury 11/12 December.

6 Added Value Services

6.1 International Conferences

November saw the annually titled “Supercomputing 2002” conference, this year in Baltimore, MD. CSAR/CfS/MRCCS/SVE provided a strong presence (see also the RealityGrid paragraph). The SVE group had a stand on the exhibition floor, promoting SVE and CSAR, and CSAR and MRCCS staff attended some papers/tutorials, and SVE staff gave presentations on some stands – notably SGI’s main stand.

SVE/MRCCS staff and CSAR hardware also took part in/gave several demonstrations, including the double award winning Cactus effort, and were also involved in several meta-computing experiments.

The senior SVE/CfS staff present also had many useful briefing sessions with HPC vendors, and the event was regarded as a great success in terms of collaboration/relationship building with our colleagues at HPCx.

6.2 Seminars

Various seminars have been run with subjects relating to HPC application areas, grid computing and clusters. The programme will continue to bring in speakers from around the UK and worldwide. Most of the seminars will be offered to a worldwide audience via the Access Grid, with the speakers themselves often using this technology to save time, energy and expense by presenting remotely.

6.3 Visualisation

MVC (part of the SVE Group at Manchester) has been nominated by Bob Bishop (Chairman and CEO of SGI) for inclusion in the online archives of the Computerworlds Honors Program. This is primarily for the Op3D project and the novel use being made of remote visualization within this work. See: http://www.cwheroes.org.

A UKHEC seminar on "Visualization for High Performance Computing" has been organised for 6th February 2003. This seminar will focus on the challenges and methodologies of applying visualisation to high end computing, including parametric steering, integration with the Grid, applications, etc. A high calibre group of speakers will be talking at the event, and a keynote talk onLarge-Scale Scientific Visualization will be given by Charles Hansen of the SCI Institute, University of Utah. For full details see: http://www.ukhec.ac.uk/events/viz2002.

A workshop proposal to the Web3D 2003 conference in collaboration with the Universities of Leeds and Imperial has been accepted. It is a half day workshop on using Web3D for Medical Education and Training.

6.4 eScience & the GRID

CSAR continues to be actively involved in the deployment, maintenance and support of the UK e-Science Grid, through its participation in the UK Grid Engineering Task Force and the UK Grid Support Centre. The most recent initiative on this front is the "level 2" grid project, which aims to improve the persistence and reliability of the UK e-Science Grid.