

CSAR Service
Consolidated Management Report
and Year End Summary
4th Quarter 1999

Management Summary

The system is the flagship HPC facility for UK Academia and Industry, enabling them to continue their World-Class research and development.

Throughout 1999 the CSAR systems, notably Turing have performed well against the CPARS measures of service quality.

The number of users has grown to a total of 395 for the year.

The quality of science on the service remains high with projects such as accurately measuring the core temperature of the earth to examining the oxidation mechanism in the surface atoms of metals.

The average job wait times over year have remained in general at a low level while job throughput has been good.

The allocation of the Service Quality Tokens over the quarter has provided a useful measure of user satisfaction with the current position showing no black marks outstanding.

The Fujitsu VPP 300 system was successfully moved to Manchester early in 1999, was upgraded in October 1999 and is now fully integrated within the Service. It is also cover by the CPARS.

The Summer School supported by CfS and run by MRCCS was an outstanding success with people attending from all over the world.

The systems were run continuously over the millennium date change period without interruptions to the Service.

Capacity Plans from the consortia indicate usage of Turing will increase substantially during 2000 and, as a consequence, Turing will be upgraded in the first half of 2000 to meet the demand for additional T3E1200E computing capacity.

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
Help Desk						
Non In-depth Queries - Maximum Time to resolve 50% of all queries (working days)	< 1/4	< 1/2	< 1	< 2	< 4	4 or more
Non In-depth Queries - Maximum Time to resolve 95% of all queries (working days)	< 1/2	< 1	< 2	< 3	< 5	5 or more
Administrative Queries - Maximum Time to resolve 95% of all queries (working days)	< 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 in month (working days)	< 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 scheduled 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 satisfactory (see Table 3), i.e. blue measured against the CPARS performance targets.

CSAR Service - Service Quality Report - Actual Performance Achievement

Service Quality Measure	1999											
	Jan	Feb	March	April	May	June	July	Aug.	Sept	Oct	Nov	Dec
HPC Services Availability												
Availability in Core Time (% of time)	99.70%	100%	100%	97.10%	98.50%	99.70%	99.70%	100%	100%	100%	100%	100%
Availability out of Core Time (% of time)	100%	99.40%	98.51%	98.10%	99.71%	99.40%	99.40%	99.40%	99.5%	100%	100%	99.70%
Number of Failures in month	1	3	1	1	3	2	2	1	1	0	0	1
Mean Time between failures in 52 week rolling period (hours)	744	354	432	480	453	395	391	416	437	486	534	563
Fujitsu Service Availability												
Availability in Core Time (% of time)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	99.30%	100%
Availability out of Core Time (% of time)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	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	<2	<1	<3	<3	<2	<2	<1	<3	<2	<1
Administrative Queries - Max Time to resolve 95% of all queries	<1	<5	<2	<2	<2	<1	<1	<1	<1	<2	<1	<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	<0.5	<0.5	<0.5	<0.5	0	0	0	0	0	0
New User Registration Time (working days)	<2	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 month	2	2	2	0	1	2	2	2	1	2	2	2

Table 2

Notes:

- HPC Services Availability has been calculated using the following formulae, based on the relative NPB performance of Turing and Fermat: [Turing availability x 122 / (122 + 3.5)] + [Fermat availability x 3.5 / (122 + 3.5)]
- 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

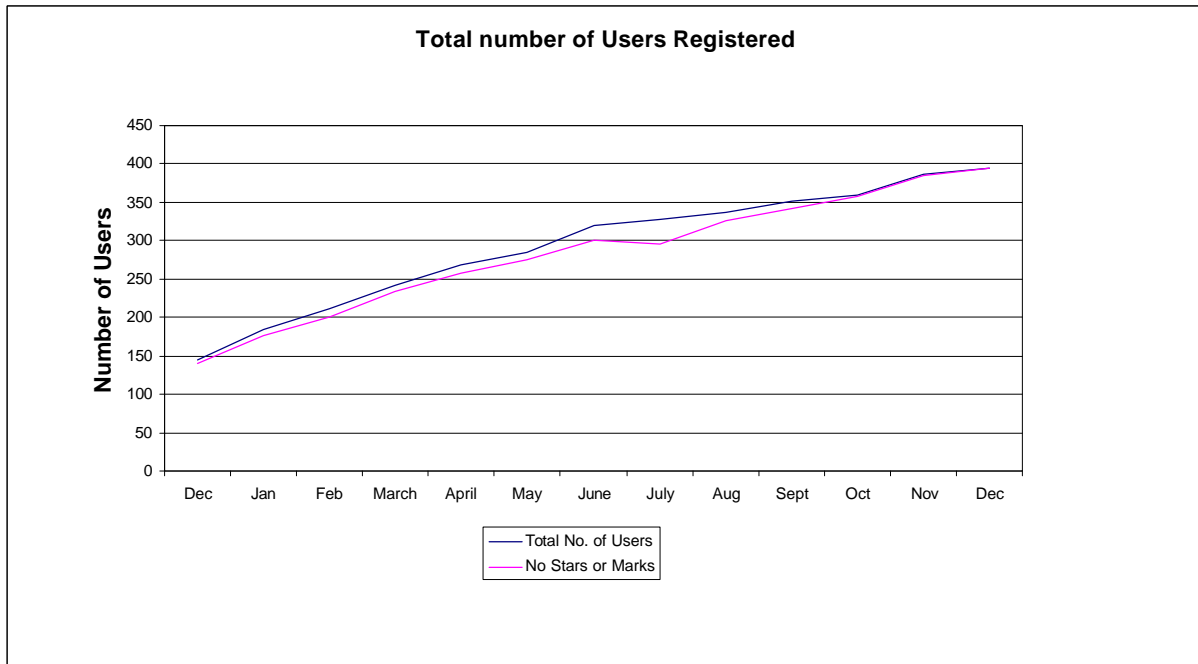
Service Quality Measure	1999											
	Jan	Feb	March	April	May	June	July	Aug.	Sept	Oct	Nov	Dec
HPC Services Availability												
Availability in Core Time (% of time)	-0.039	-0.058	-0.058	0.078	0.039	-0.039	-0.039	-0.058	-0.058	-0.058	-0.058	-0.058
Availability out of Core Time (% of time)	-0.047	0	0	0.039	-0.039	0	0	0	-0.039	-0.047	-0.047	-0.039
Number of Failures in month	-0.008	0	-0.008	-0.008	0	0	0	-0.008	-0.008	-0.009	-0.009	-0.008
Mean Time between failures in 52 week rolling period (hours)	-0.008	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	-0.016	0.016	0.016	0.000	0.000	-0.016	0.016	0.000	-0.016
Administrative Queries - Max Time to resolve 95% of all queries	-0.016	0.031	0	0	0	-0.016	-0.016	-0.016	-0.016	0	-0.016	-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	N/A	-0.002	-0.002	-0.002	-0.002	N/A	N/A	N/A	N/A	N/A	N/A
New User Registration Time (working days)	0	0	0	0	0	0	0	0	0	-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 month	0	0	0	-0.004	-0.003	0	0	0	-0.003	0	0	0
Monthly Total & overall Service Quality Rating for each period:	-0.08	-0.02	-0.05	0.03	-0.01	-0.03	-0.04	-0.05	-0.08	-0.07	-0.09	-0.09
Quarterly Service Credits:	-0.15			0.00			-0.17			-0.25		

Table 3

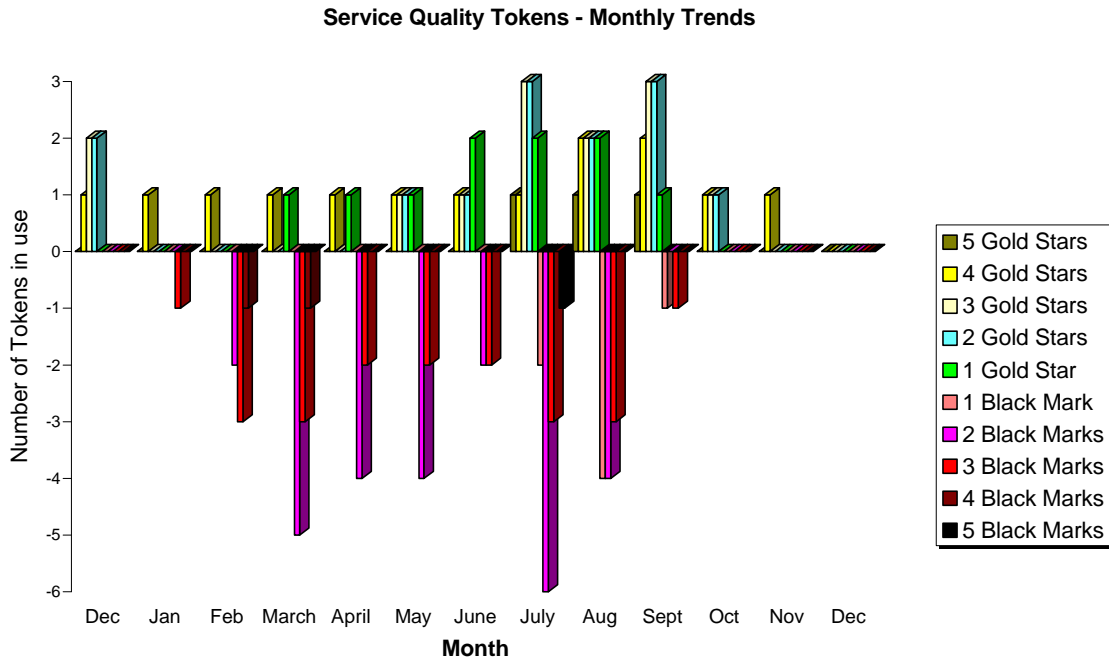
The Annual Service Credit 1999 is -0.60%; i.e. the total accrued service credits for the four quarters in the period.

1.2 Service Quality Tokens

The current position at the end of the quarter is that of the 395 registered users of the CSAR Service none have any outstanding Service Quality Tokens as per the guidelines of the User Steering Group. See below:



The area 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 enabled the user 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.

There are, at the end of the quarter, no outstanding stars or marks.

2. HPC Services Usage

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

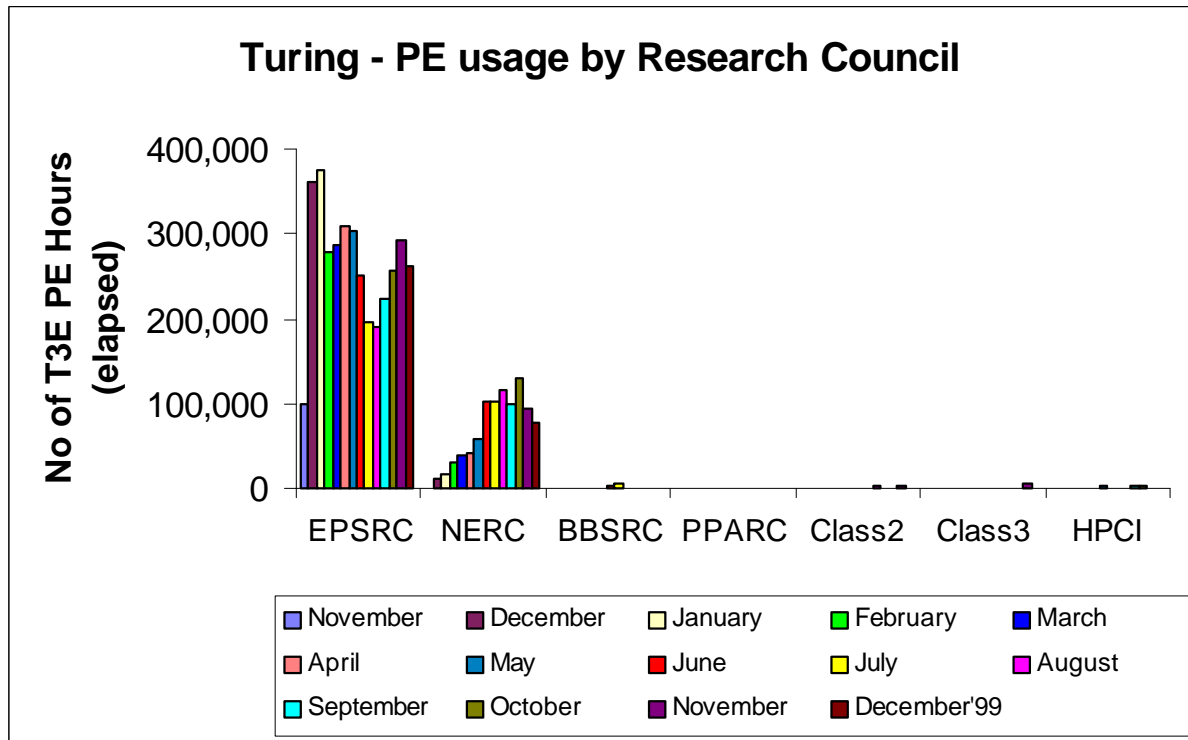
- CPU usage
- User Disk allocation
- HSM/tape usage

This is illustrated in a number of graphs including;

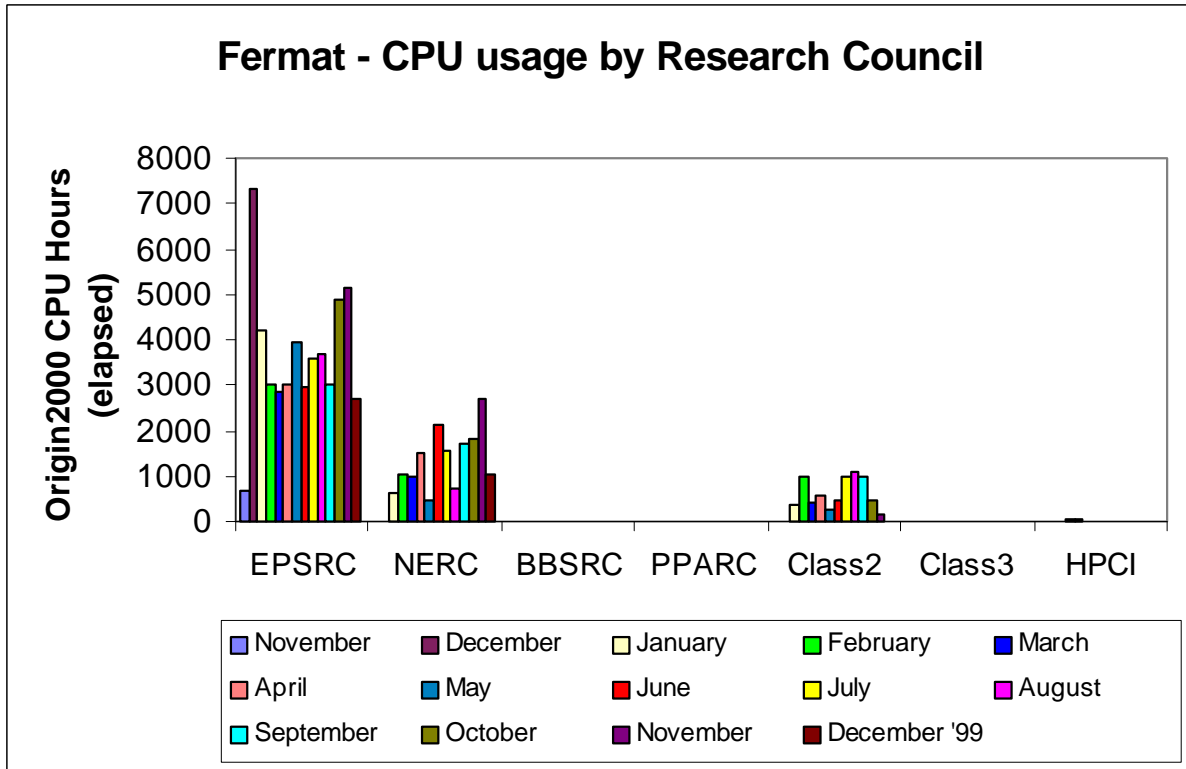
- MPP (T3E) Usage by month, showing usage each month of CPU (T3E PE Elapsed Hours), split by Research Council and giving the equivalent GFLOP-Years as per NPB. The Baseline Capacity (103 GFLOP-Years) is shown by an overlaid horizontal line.
- SMP (Origin) Usage by month, showing usage each month in CPU Hours, split by Research Council and giving the equivalent GFLOP-Years as per NPB. The Baseline Capacity (3.5 GFLOP-Years) is shown by an overlaid horizontal line.
- 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.
- 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.
- 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

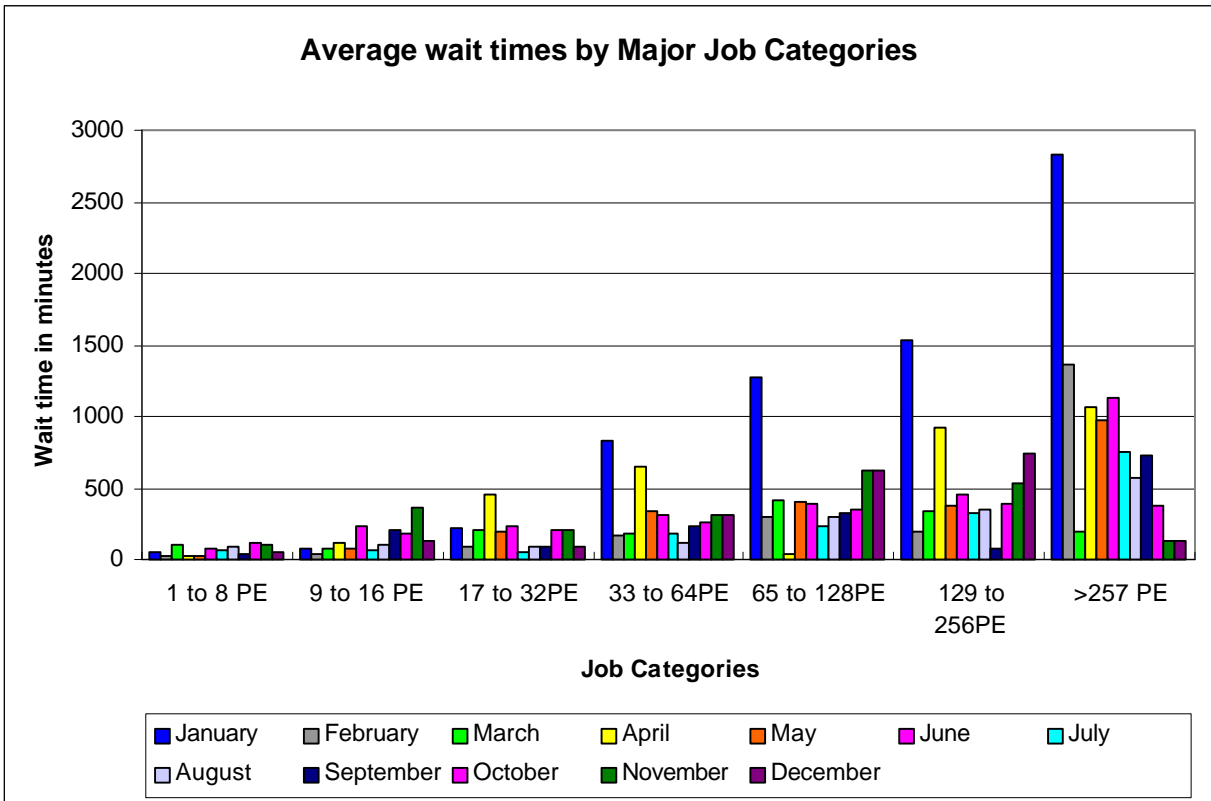
The graphs below show current monthly disk and HSM allocations and usage.



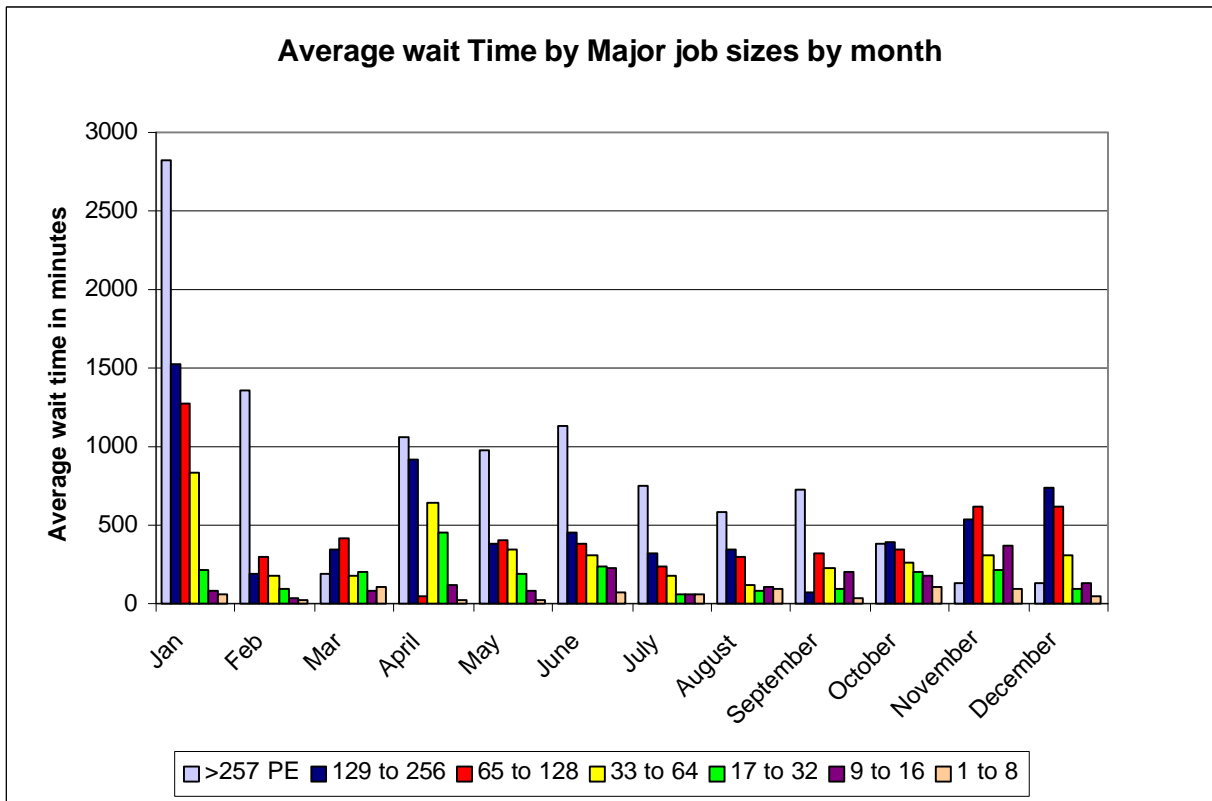
Turing PE usage is shown by Research Council during the months of service to date in the above chart.



Origin2000 CPU usage is shown by Research Council during the months of service to date in the above chart.

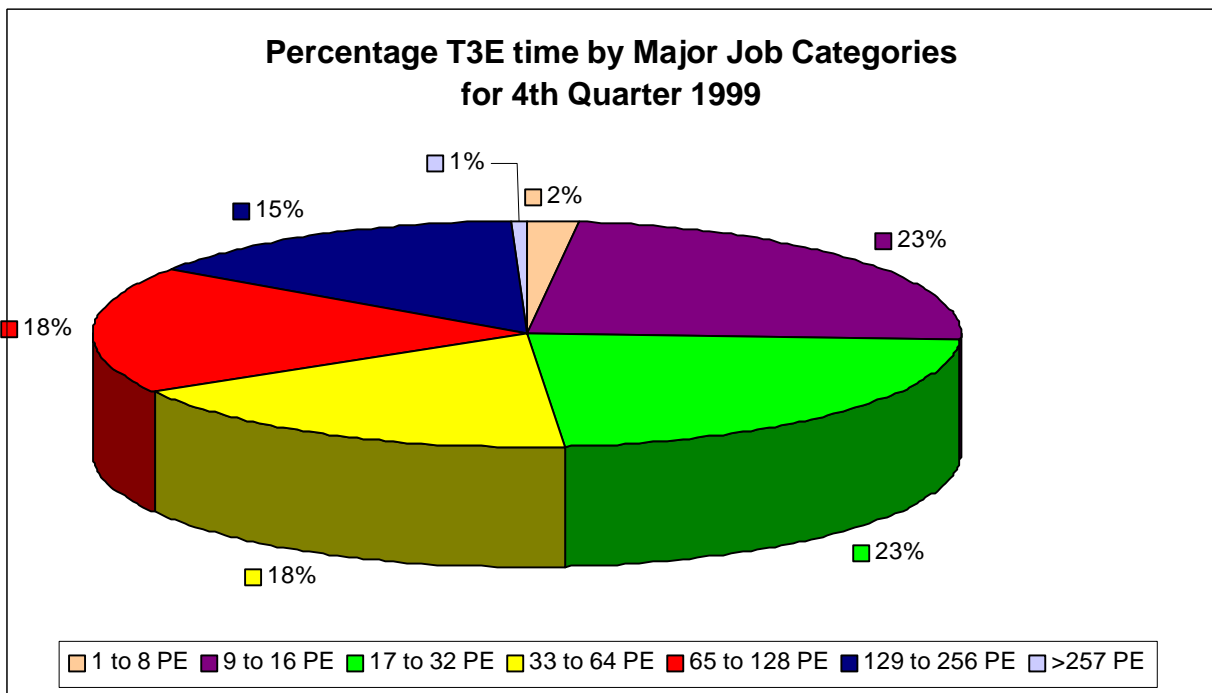


The chart below shows the average wait time trend over the months from January to date.



It can be seen from the above graph that enhancements to the scheduling on Turing have reduced the average wait times however attention must be paid to ensure sufficient head room exists in the system to prevent wait times from rising

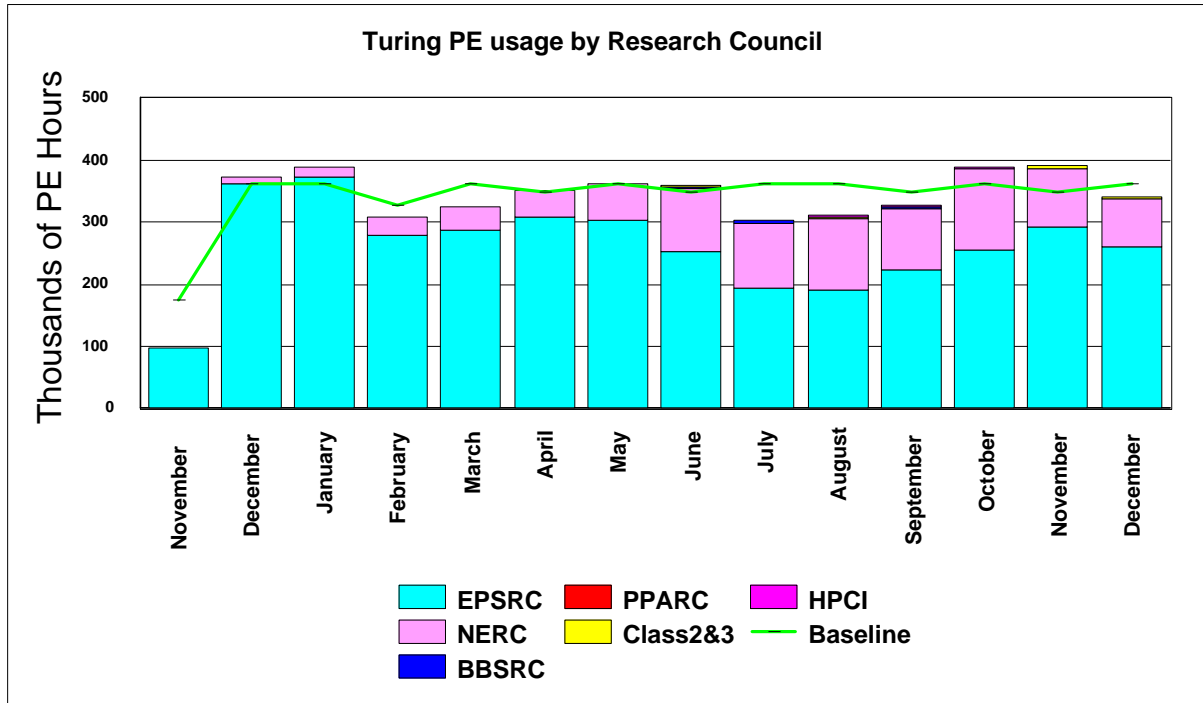
The next chart shows the percentage PE time utilisation by the major job categories on the Turing system for the final quarter in 1999.



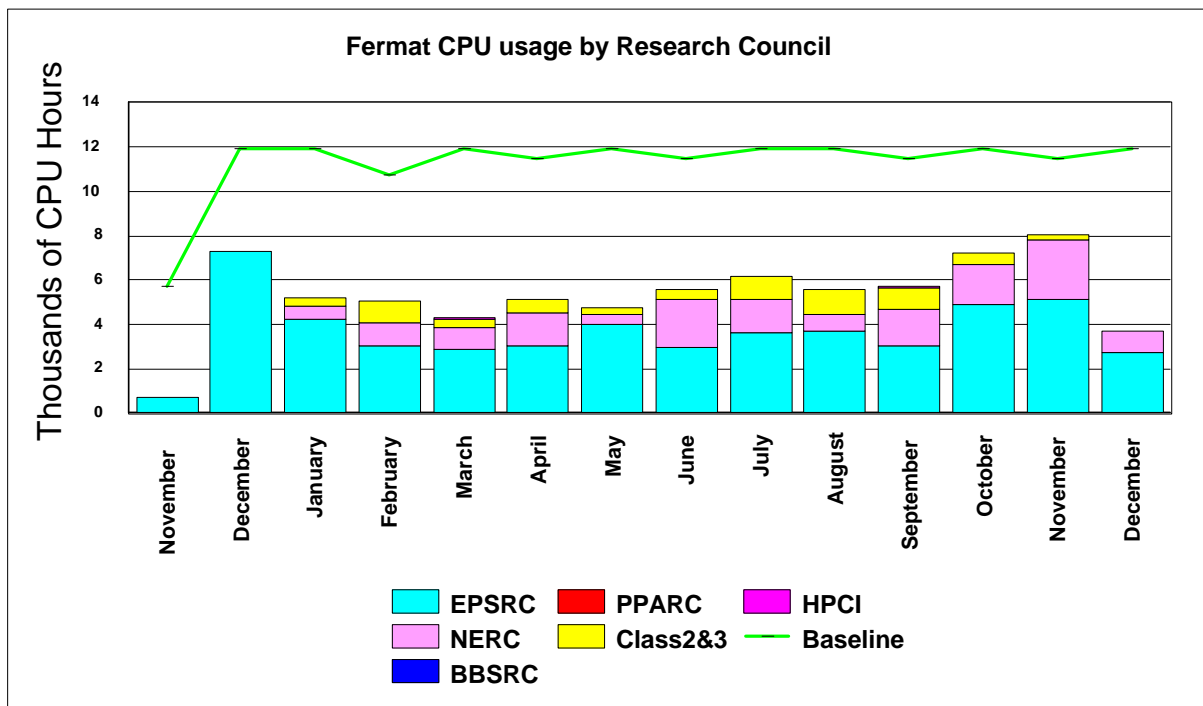
2.2 Baseline System Usage Graphs

In all the Usage Charts, the baseline varies dependant on the number of days in each month, within a 365-day year. The reduced Baseline in November 1998 represents half a month.

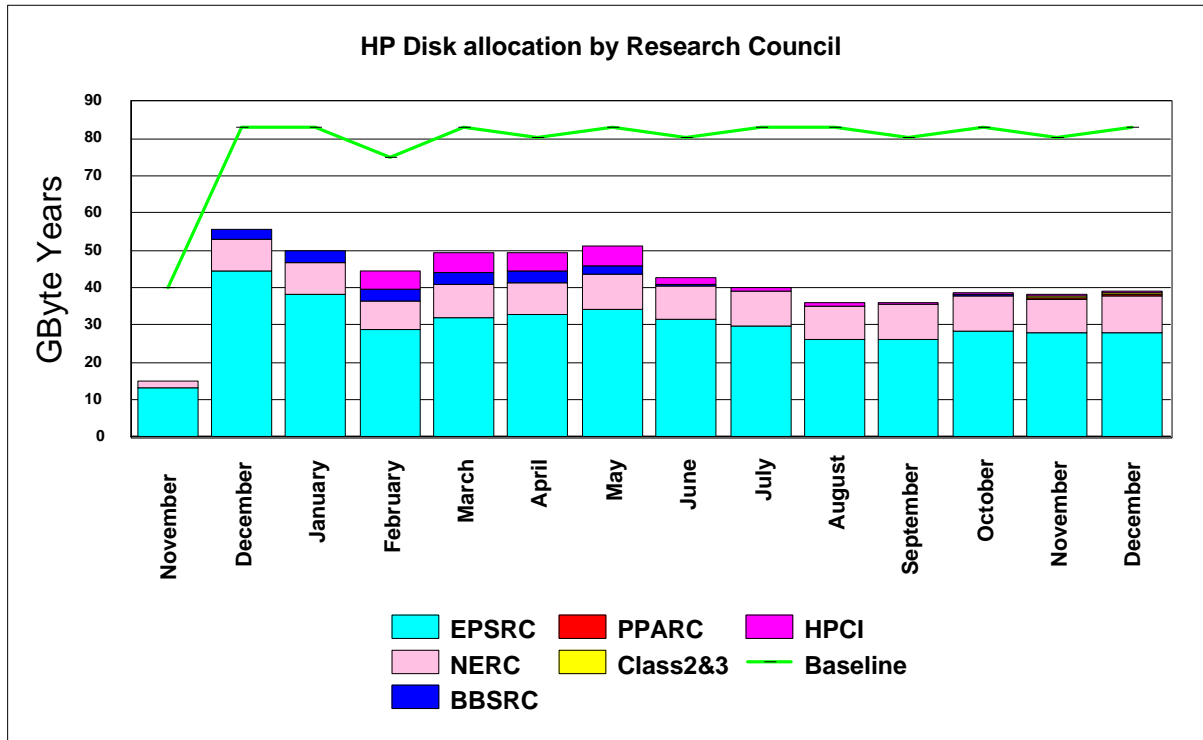
The graph below shows the PE hour's utilisation on Turing by Research Council from November 1998.



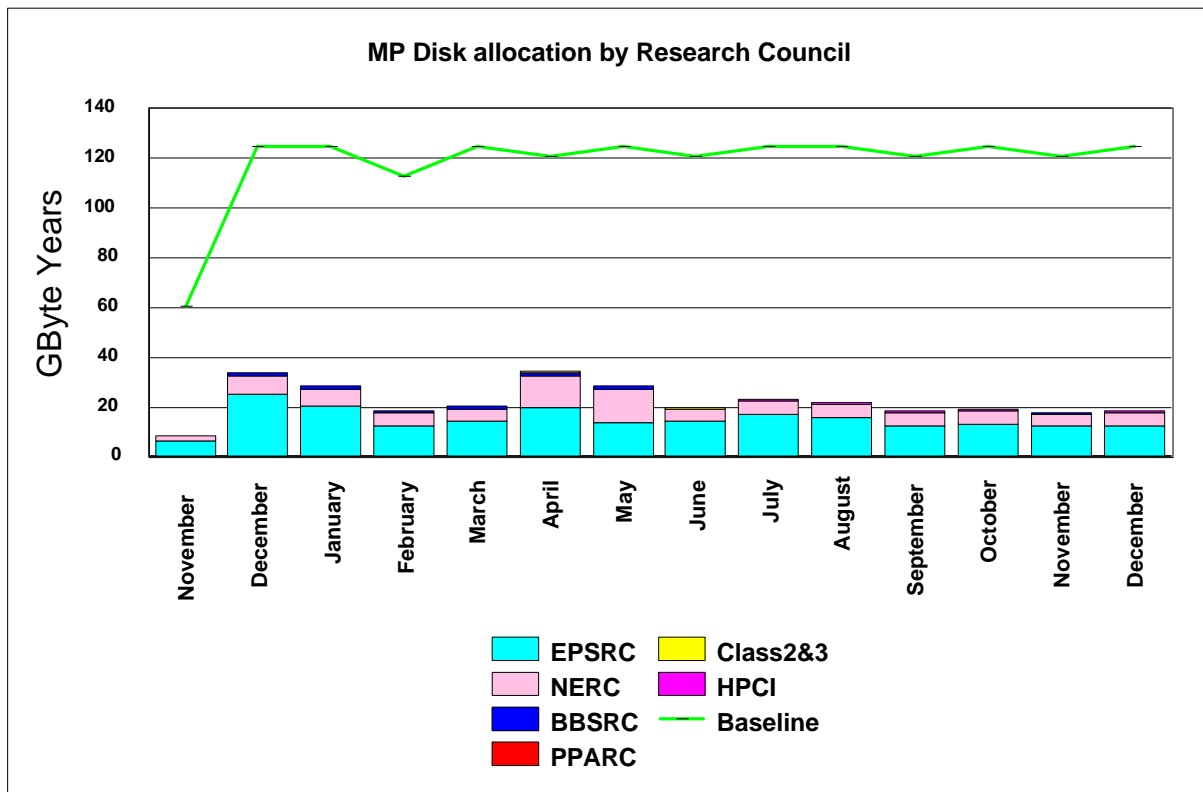
The graph below shows the historic CPU usage on Fermat by Research Council from November.



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

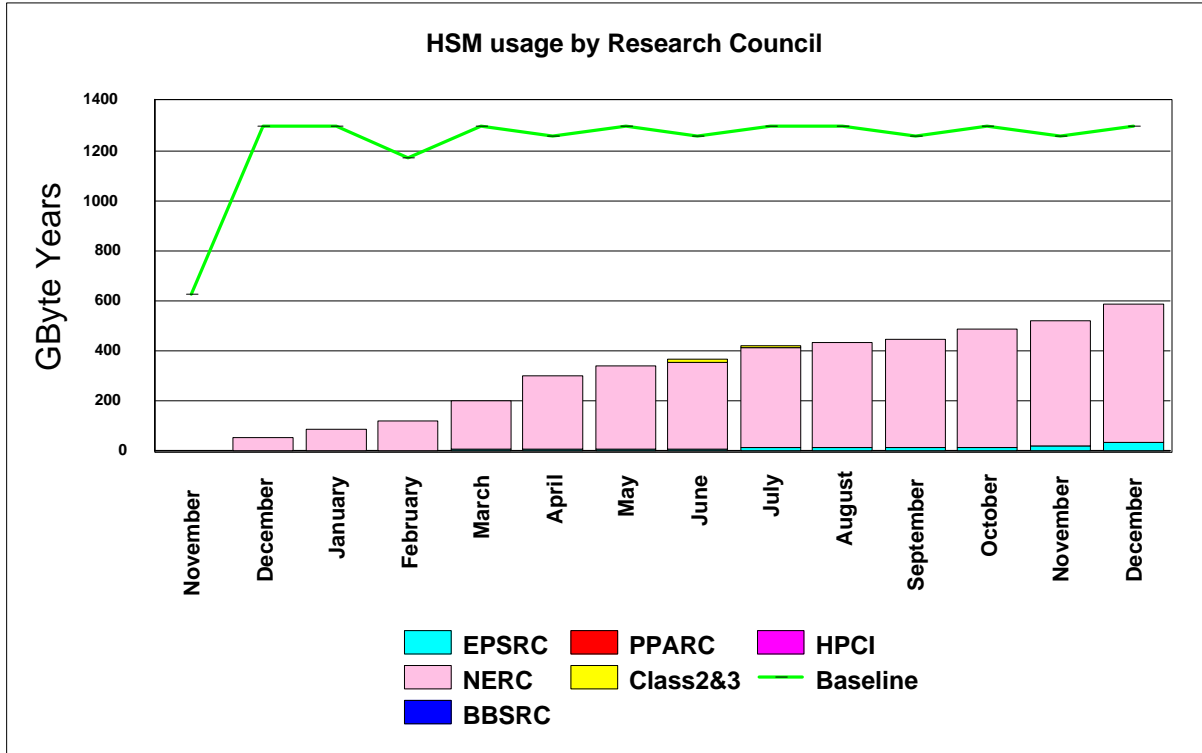


The preceding graph illustrates the historic allocation of the High Performance Disk on Turing.

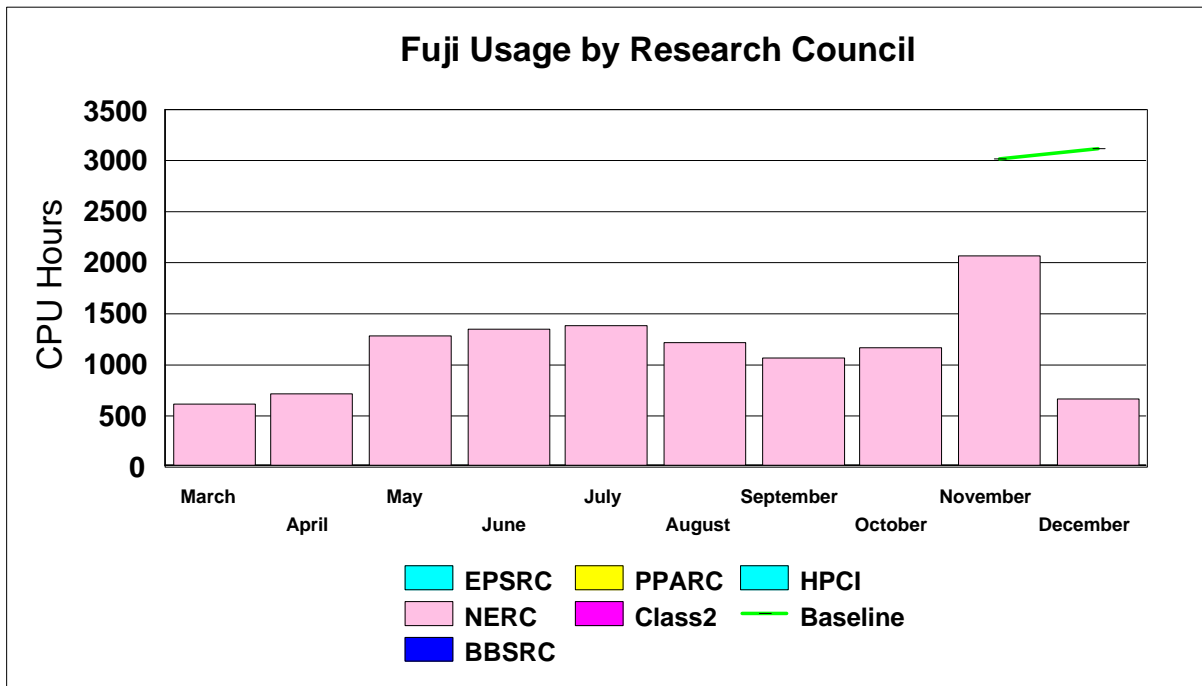


The graph above illustrates the historic allocation of the Medium Performance Disk on Fermat.

The graph below shows the historic HSM usage by Research Council funded projects. The primary usage is for NERC.



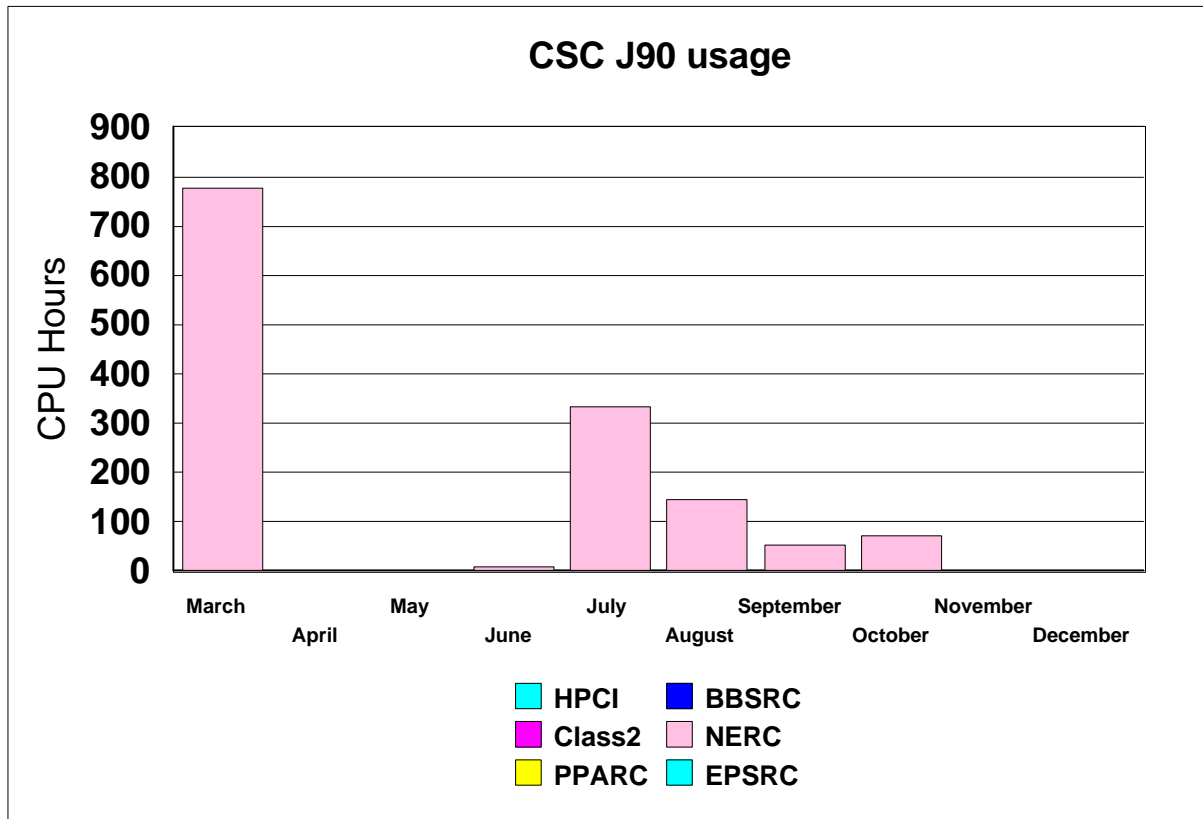
2.2.1 Fujitsu System Usage Graph



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

The system has been fully integrated into the CSAR service from November, and was 100% available both in core and out of core time during December.

2.2.1 Guest System Usage Graphs



The above graph shows the current usage on the CSC Cray J90 based at the CSC, in Farnborough. The usage for the past two months has been zero.

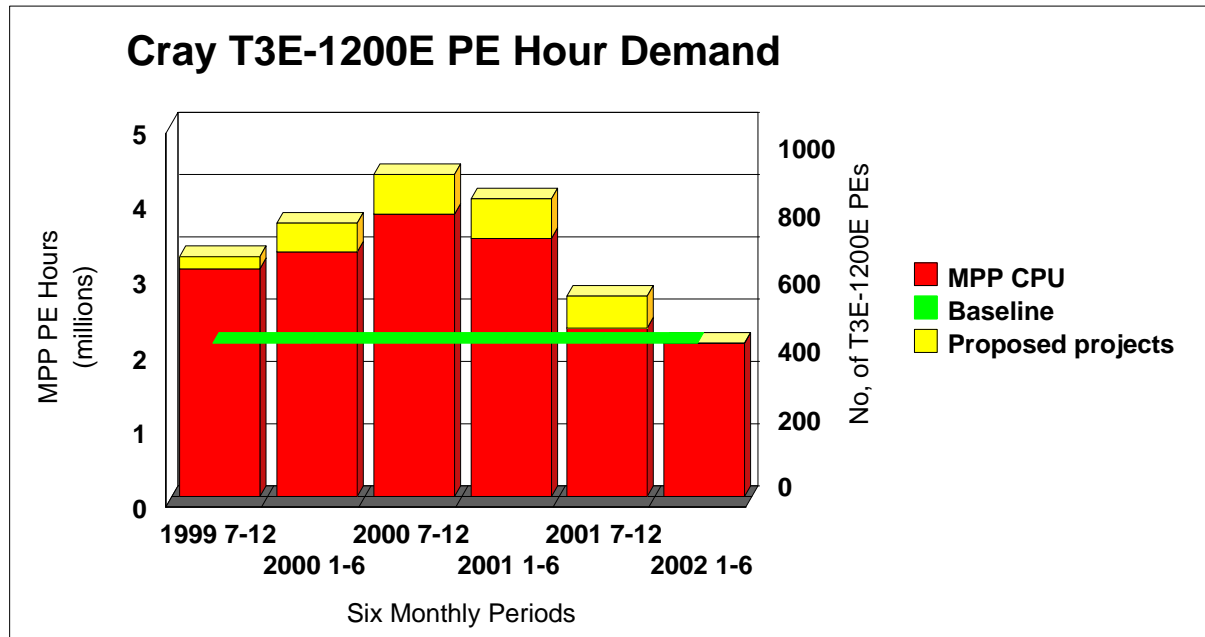
2.3 Service Status, Issues and Plans

Status

This month saw the system run to just under the baseline. The baseline over the course of the year has been attained or exceeded in six of the twelve months.

Issues

The capacity planning information currently available has been included below, and has been used in assessing the appropriate upgrades to the Turing system in the year 2000.



Plans

The systems have been successfully transitioned through the millennium date change. The upgrade plans for Turing will be published shortly post the meeting of the CfS Management Board.

The ACSI prototyping system will be situated at Manchester Computing, and further details of the installation will be released, as they become available.

3 Science Application Support Services

3.1 Consortia Support

Support continues to be provided to consortia both inside and outside the Service Token scheme. Substantial parallelisation and optimisation work has been performed on the CASTEP code on behalf of the UKCP Consortium, and this work is continuing. It has been very well received both by the UKCP consortium itself and also by MSI, the owners of the code. It is likely that other consortia will subsequently make use of this code. Additional parallelisation work is starting for HPC for Complex Fluids Consortium. It is anticipated that further such work may arise for this consortium once this work is complete. A new conjugate gradient solver has been written for the Large Eddy Simulation of Open Channel Flows. Further visualisation work has been performed for the Earth Mantle simulations carried out by the Terra Group.

An announcement was made about the free code evaluation service both in the last edition of CSAR Focus and by email to all users. There was some interest in this offer just before Christmas and this is being pursued.

A presentation on the CSAR service was given to part of the HPC for Complex Fluids Consortium at Queen Mary and Westfield College. The parallelisation work for this consortium arose as a direct consequence of this visit.

3.2 Collaboration with ‘HPCI Centres’

The joint bid with the former HPCI Centres at Daresbury Laboratory and at EPCC for the provision of core support in high end computing has been successful. The role of this group is to track and disseminate information on developing standards in software and tools and to promote good programming practice. The primary involvement for CSAR is in the areas of visualisation and metacomputing, and funding will be provided for one additional person. However the support will be *co-ordinated* between the three sites to maximise the benefits to the community as a whole. The first meeting will be in January.

3.3 Conferences and Meetings

The following meetings/conferences have been attended:

- SC99 – see below.
- The IEEE conference on Cluster Computing in Melbourne - a paper on the use of LSF on a cluster of workstations was presented.
- Daresbury Machine Evaluation Workshop
- EPCC Seminar on Parallel Libraries and Tools

3.4 SC99

CSAR and AVS staff gave a full day tutorial on 'Framework Technologies and Large Data Visualisation'. It was well received and the speakers have been asked to give another tutorial next year.

CSAR Applications were involved in the setting up of a global metacomputer linking T3Es at Manchester, Stuttgart and Pittsburgh with a Hitachi SR8000 in Tsukuba, Japan. Three applications of the global metacomputer were demonstrated at SC99 resulting in the award of top prize in the HPC Games challenge. The CSAR experiment involved processing data from Jodrell Bank simultaneously on the three T3Es. The programming techniques used will also be suited to processing experimental data in real-time via a supercomputer as mentioned in the original HPC bid. We are continuing to work with Jodrell to develop this and will offer the service to other UK experimental facilities as appropriate. The SC99 experiments were reported in a special edition of HPCWire on December 7th and in the December/January edition of Scientific Computing World.

Experiments such as this are seen to be of great importance in the future developments of high performance computing, and will help to keep the UK academic community at the forefront of these developments.

3.5 Training and Education

A new course schedule has been produced for the second semester starting from 31st January 2000.

In addition to the courses given at Manchester, other courses have been given on request at remote sites. The 3-day SGI Origin2000 Optimisation and Parallelisation course was given at the University of Leicester. Training for the T3E and for the Unified Model has been given to the UK Met Office.

3.6 Service Developments

A new version of the file copy utility, xcp, is currently being tested and will be released shortly.

There have been a few requests for the secure shell to be implemented and this is now being pursued.

4 Training & Education Services

We have been revising and updating our courses in preparation for the start of the first semester training programme in October. An Introduction to the Origin 2000 course is nearing completion and the C++ for Scientific programming is being rewritten to make it more relevant to users of high-end computing facilities. As mentioned in the previous section, the course on shared-memory programming using threads is being updated to use Posix threads as well as Solaris threads.

5 User Registration and Project Management Services

This section covers aspects relating to the registration of projects and users, and the management of projects and resources.

There have been some minor developments in project management aspects over the last quarter. The Fujitsu system has been fully integrated into the registration system so that registration and resource management tasks can be performed via the web in the same way as for the other CSAR systems. This has been complicated by the fact that user disk quotas are used on a number of different file systems on the Fujitsu.

Following discussions at the last CfS Board Meeting, a major change has been made to the resource calculator used to determine generic token totals and notional costs for proposed projects. The calculator now provides the

predicted costs for the time of usage, using the changing costs over time (the original calculator used Year 1 pricing). The generic token total is calculated to enable projects to purchase the required actual resources for the whole of the project at the start of the grant, as required. The new calculator is not yet live on the web site, awaiting approval from EPSRC. It is intended to inform all the Research Councils of this change, and a draft email to this effect is also with EPSRC for approval. The web-based usage reports have also been amended to use the prevailing exchange rate at the time of usage in the option to convert back to generic tokens.

Also agreed at the last CfS Board Meeting was the suggestion to perform the initial trade of resources for projects. This is now in place. Related to this there was a proposal to inform project PIs by email when they were permitted to re-trade (every three months) and inviting them to review their capacity plans. This was put to the recent meeting of the User Steering Group and agreed. We intend to implement this shortly. Also at the User Steering Group it was commented that capacity plans would be easier to maintain if they included information on usage to date in each period. This is an added complexity, which may not be welcomed by all project PIs, but we intend to consider how we might address this request in the current quarter.

Summary Report on the first Annual User Survey

The first Annual User Survey was carried out in December. A comprehensive web-based questionnaire was made available to users for a period of three weeks (<http://www.csar.cfs.ac.uk/usersurvey99.shtml>).

60 completed forms were received; representing approximately 15% of all Class 1/2/3 users currently registered (390 in total). Approximately 25% of the registered users are considered inactive on the machines in that they have no file store usage. Viewed as a proportion of the active users, the response is 21%. This is higher than anticipated, based on the levels of feedback via other mechanisms. We therefore view this as a valuable exercise.

The survey responses have been very positive. A full analysis of the results is currently being finalised, and a summary report will be distributed to CfS Board members and made available to users via the web in the next few weeks. Any comments made on the forms will be distributed to CSAR staff. In advance of this full report, a selection of the responses is as follows:

88% stated that they believed the overall HPC service provision by CSAR to be good or very good - the top two categories (33% very good, 55% good, 12% adequate). 93% agreed that their research had benefited from access to CSAR.

Users were asked for their views on various systems aspects: service availability; job turnaround times; job scheduling; job time limits; provision for interactive use; temporary disk provision; and the archive (hold/tape) facility. Over 90% of users were very or fairly satisfied with all of these aspects, with the exception of job time limits, where the figure was 85% very or fairly satisfied. The most satisfaction was with service availability levels, with 98% satisfied (54% very satisfied).

In terms of users' dealings with CSAR staff, 98% of those who expressed a view were very or fairly satisfied (over 60% very satisfied).

6 Value-Added Services

6.1 Joint projects

The development of the Multi-pipe utility for AVS and SGI multi-pipe graphics has met all its deadlines with a first release to a company in December 1999. Discussions are under way about distribution of the software, and about a phase II development.

6.2 Research Liaison

The work with Stuttgart and Pittsburgh continues and is reported elsewhere.
The collaborative project with DL and EPCC submitted to EPSRC for Core HPC support is reported elsewhere.

6.4 New Applications Initiative

The multi-pipe capable module for AVS/Express has now been made into a commercial product by AVS Inc, which will be demonstrated to Research Council users at the Visualisation and Virtual Environments Computational Club at Salford University on Friday, 14th January. This exciting product allows users to rapidly develop post simulation visualisations on a workstation or low powered machine, and then migrate them into a fully immersive environment such as a Reality Centre or CAVE by the substitution of a single AVS module.

CfS have delivered computational and development resources to a research project intended to couple major supercomputing centres together. The scientific problems tackled included a 2,000,000 particle molecular dynamics simulation, a flow simulation of a spacecraft re-entering the atmosphere, and a large-scale analysis of radio astronomy data.

6.3 Databases

We have not been able to discuss with EPSRC how best to populate the database, but we now have some material to kick-start it anyway. We will discuss with EPSRC how to promote its use.

6.4 Adding value to other major research facilities

The National Centre for Virtual Environments at Salford University have started a research project into computational steering, coupling their Virtual Reality environments with simulations running on CSAR services. CfS have been active in our assistance, offering networking and applications design consultancy, training, and software product support. The N.C.V.E. are planning computational steering applications in the areas of medical imaging and mechanical engineering (collision detection).

As mentioned in section 6.4, CfS have undertaken computational grid applications development. One anticipated benefit is to allow the Jodrell Bank radio telescopes to reconstruct signals in near real time (i.e. while the observation is taking place), and so make better use of the observation time.

6.5 ASCI prototyping capability

Recent developments associated with the ASCI project indicate that the original outline plans for an ASCI prototyping capability are no longer adequate. CfS has been working to define a more concrete set of proposals associated with the capability, in order to maximise its usefulness to UK academia. These plans were presented to the CSAR User Steering Group on 15th December 1999.

CfS is now intending to take these plans forward by presenting a Contract Change Note (CCN) within the next month.

MRCCS

MRCCS Seminars

The first series of seminars organised by MRCCS on topics in High Performance Computing and Visualisation were held on Friday afternoons in the Department of Computer Science at the University of Manchester. A wide range of topics was covered. Speakers came from around the UK. Attendance was predominantly from the North West of England including people from Daresbury Laboratory, and the Universities of Salford and Leeds. The series for the second semester is currently being organised.

Presentations

W T Hewitt presented a lecture entitled "HPC in the UK" at the ARCADE meeting in Bologna.

Summer School 2000

The second MRCCS Summer School will take place in early September and will be on the subject 'Supercomputing with Linux'.

EU Projects

We are partners in two projects that are being submitted by 17th January closing date under Framework V.

International Conferences

Since the last report we have secured Euro-par 2001 in Manchester, 28th – 31st August 2001. Professor John Gurd will be the programme chair.

A meeting of the EG2001 national organising meeting has taken place to establish roles etc. Mr W T Hewitt, Dr N John and Dr I Herman (CWI, NL) are the conference chairs; Dr A Chalmers (Bristol) and Ms Theresa-Marie Rhyne (EPA, USA) are the international programme chairs. The conference themes will include computational steering/visual supercomputing.

A similar meeting for Euro-Par 2001 will be held late January/early February.

Summer Students

Planning for the 2000 summer student programme has started.