CSAR Service

Consolidated Management Report

3rd 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.

In this the third quarter of production service the CSAR systems have again performed well against the CPARS measures of service quality.

The number of users has grown from 319 up to 351. As a percentage, usage by NERC projects has remained high.

The quality of science on the service remains high with as one example groundbreaking work being done on the core temperature of the earth.

The average job wait times over the quarter 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 service is to be upgraded to an 8 CPU machine that will be fully integrated into the CSAR service and become available as an additional resource for the user base.

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

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. green 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
HPC Services Availability									
Availability in Core Time (% of time)	99.70%	100%	100%	97.10%	98.50%	99.70%	99.70%	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%
Number of Failures in month	1	3	1	1	3	2	2	1	1
Mean Time between failures in 52 week rolling period (hours)	744	354	432	480	453	395	391	416	437
Help Desk									
Non In-depth Queries - Maximum Time to resolve 50% of all queries (working days)	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Non In-depth Queries - Maximum Time to resolve 95% of all queries (working days)	<1	<2	<2	<1	<3	<3	<2	<2	<1
Administrative Queries - Maximum Time to resolve 95% of all queries (working days)	<1	<5	<2	<2	<2	<1	<1	<1	<1
Help Desk Telephone - % of calls answered within 2 minutes	100%	100%	100%	100%	100%	100%	100%	100%	100%
Others									
Normal Media Exchange Requests - average response time in month (working days)	<0.5	0	<0.5	<0.5	<0.5	<0.5	0	0	0
New User Registration Time (working days)	<2	0	0	0	0	0	0	0	0
Management Report Delivery Times (working days)	10	10	10	10	10	10	10	10	10
System Maintenance - no. of scheduled sessions taken per system in the month	2	2	2	0	1	2	2	2	1

Table 2

Notes:

1. 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)]

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	1999								
	Jan	Feb	March	April	May	June	July	Aug.	Sept
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
Availability out of Core Time (% of time)	-0.047	0	0.000	0.039	-0.039	0	0	0	-0.039
Number of Failures in month	-0.008	0	-0.008	-0.008	0	0	0	-0.008	-0.008
Mean Time between failures in 52 week rolling period (hours)	-0.009	0	0	0	0	0	0	0	0
Help Desk									
Non In-depth Queries - Maximum Time to resolve 50% of all queries (working days)	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019
Non In-depth Queries - Maximum Time to resolve 95% of all queries (working days)	-0.016	0	0	-0.016	0.016	0.016	-0.016	-0.016	-0.016
Administrative Queries - Maximum Time to resolve 95% of all queries (working days)	-0.016	0.031	0	0	0	-0.016	-0.016	-0.016	-0.016
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
Others									
Normal Media Exchange Requests - average response time in month (working days)	-0.002	0	-0.002	-0.002	-0.002	-0.002	0	0	0
New User Registration Time (working days)	0	0	0	0	0	0	0	0	0
Management Report Delivery Times (working days)	0	0	0	0	0	0	0	0	0
System Maintenance - no. of scheduled sessions taken per system in the month	0	0	0	-0.004	-0.003	0	0	0	-0.003
Monthly Total & overall Service Quality Rating for each period:	-0.08	-0.02	-0.05	0.03	-0.01	-0.03	-0.05	-0.06	-0.08
Quarterly Service Credits:			-0.15			0.00			-0.19

Table 3

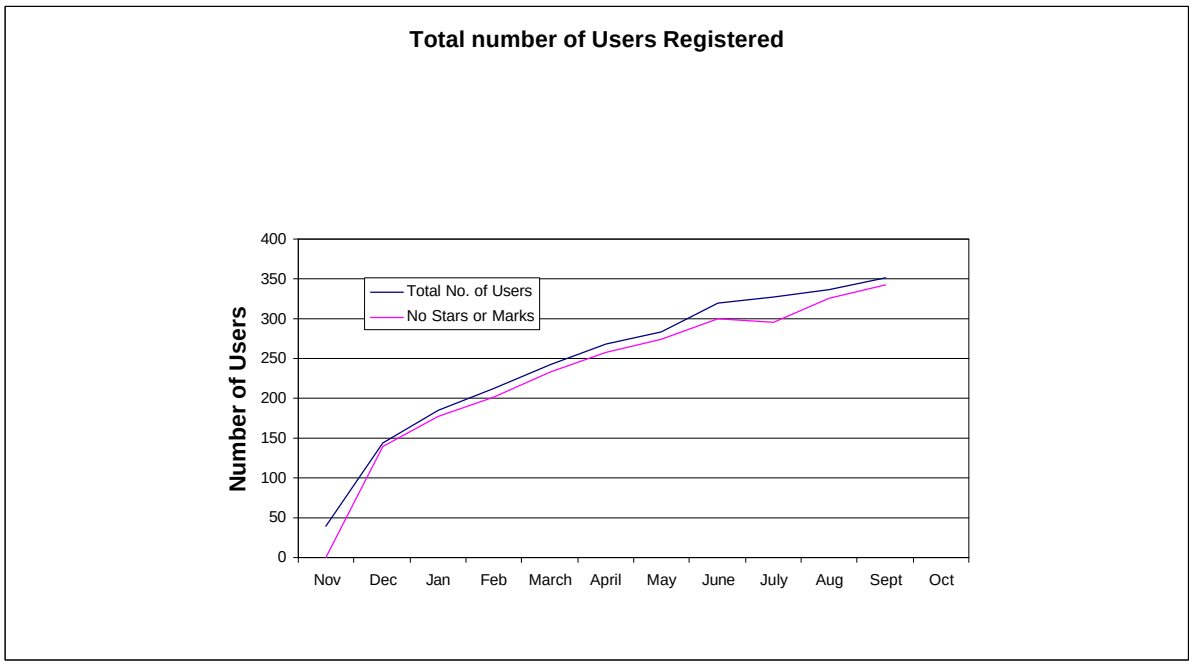
The Quarterly Service Credit for the second quarter is -0.19%, i.e. the total accrued service credits for the three months in the period.

1.2 Service Quality Tokens

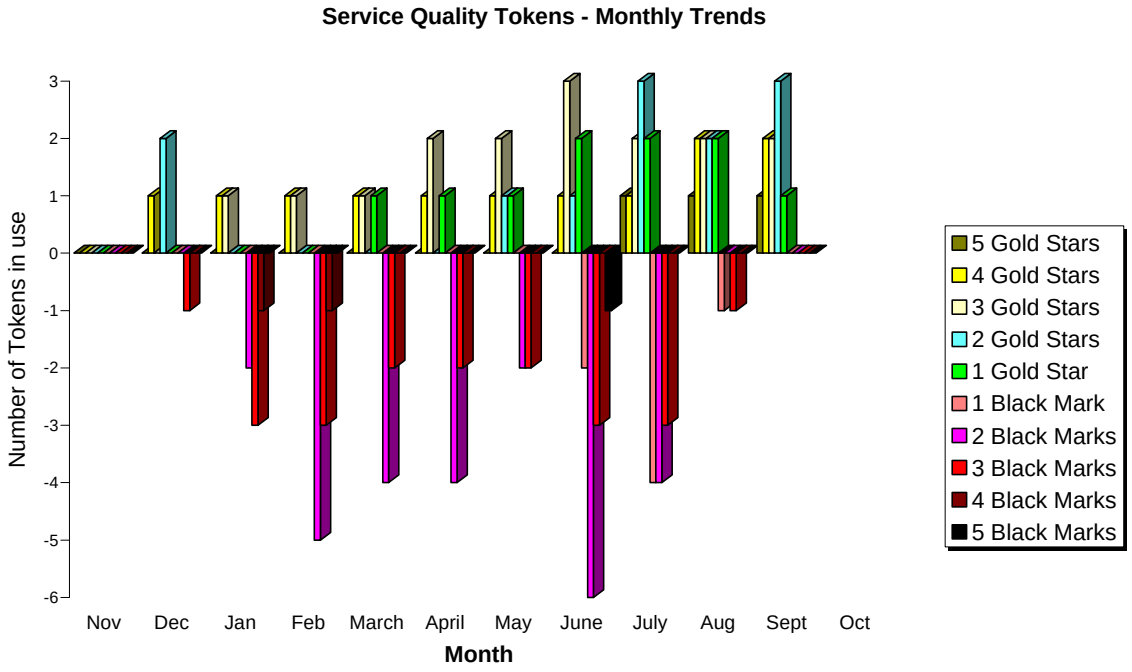
The current position at the end of the quarter is that 9 of the 351 registered users of the CSAR Service had used Service Quality Tokens. See below:

Service Quality Tokens

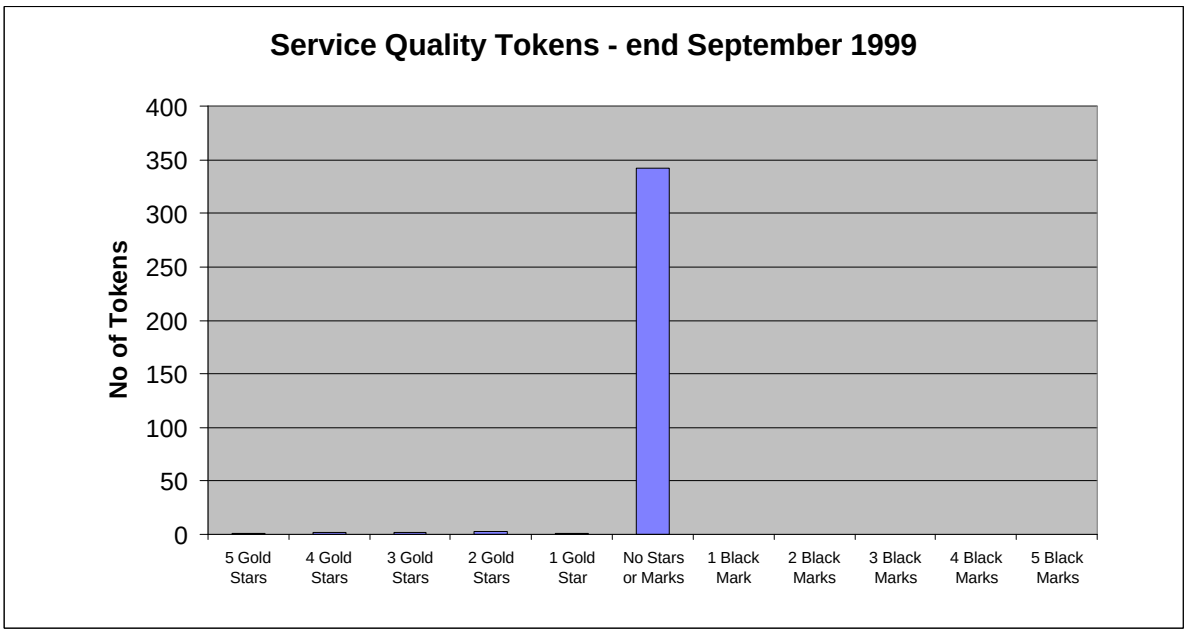
	Position as at end of each month											
	Nov	**Dec**	**Jan**	**Feb**	**March**	**April**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**
5 Gold Stars	0	0	0	0	0	0	0	0	1	1	1	
4 Gold Stars	0	1	1	1	1	1	1	1	1	2	2	
3 Gold Stars	0	0	1	1	1	2	2	3	2	2	2	
2 Gold Stars	0	2	0	0	0	0	1	1	3	2	3	
1 Gold Star	0	0	0	0	1	1	1	2	2	2	1	
No Stars or Marks	0	140	177	201	233	258	275	300	295	326	342	
1 Black Mark	0	0	0	0	0	0	0	2	4	1	0	
2 Black Marks	0	0	2	5	4	4	2	6	4	0	0	
3 Black Marks	0	1	3	3	2	2	2	3	3	1	0	
4 Black Marks	0	0	1	1	0	0	0	0	0	0	0	
5 Black Marks	0	0	0	0	0	0	0	1	0	0	0	
	Nov	**Dec**	**Jan**	**Feb**	**March**	**April**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**
Total No. of Users	40	144	185	212	242	268	284	319	328	337	351	
No Stars or Marks	0	140	177	201	233	258	275	300	295	326	342	



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



In the form of a bar chart, the current statistics are:



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.

The table below shows the outstanding marks and stars as at the end of September, with a brief description of the reason for the allocation.

SUMMARY OF SERVICE QUALITY TOKEN USAGE

No of Stars or Marks	Consortia	Date Allocated	Reason Given
1Gold Star	CSN003 (Fuji)	06/08/99	Good response to suggestions/complaints
2 Gold Stars	CSE003	29/08/99	Interactive improvements good support
2 Gold Stars	CSN003 (Fuji)	20/09/99	Fuji improvements
3 Gold Stars	HPCI Daresbury	27/08/99	Interactive improvements
3 Gold Stars	CSN003 (Fuji)	16/08/99	Fuji improvements, good support
4 Gold Stars	CSN003 (Fuji)	09/08/99	Fuji improvements
4 Gold Stars	CSN003 (Fuji)	27/08/99	Fuji improvements, good support

2. HPC Services Usage

Usage information is given in tabular form, and in graphical format. The system usage information for the period is provided by Project/User Group, totalled by Research Council and overall. This covers:

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

In addition, the following graphs are provided to illustrate usage per month, historically:

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 (103 GFLOP-Years) 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 (3.5 GFLOP-Years) is shown by an overlaid horizontal line.

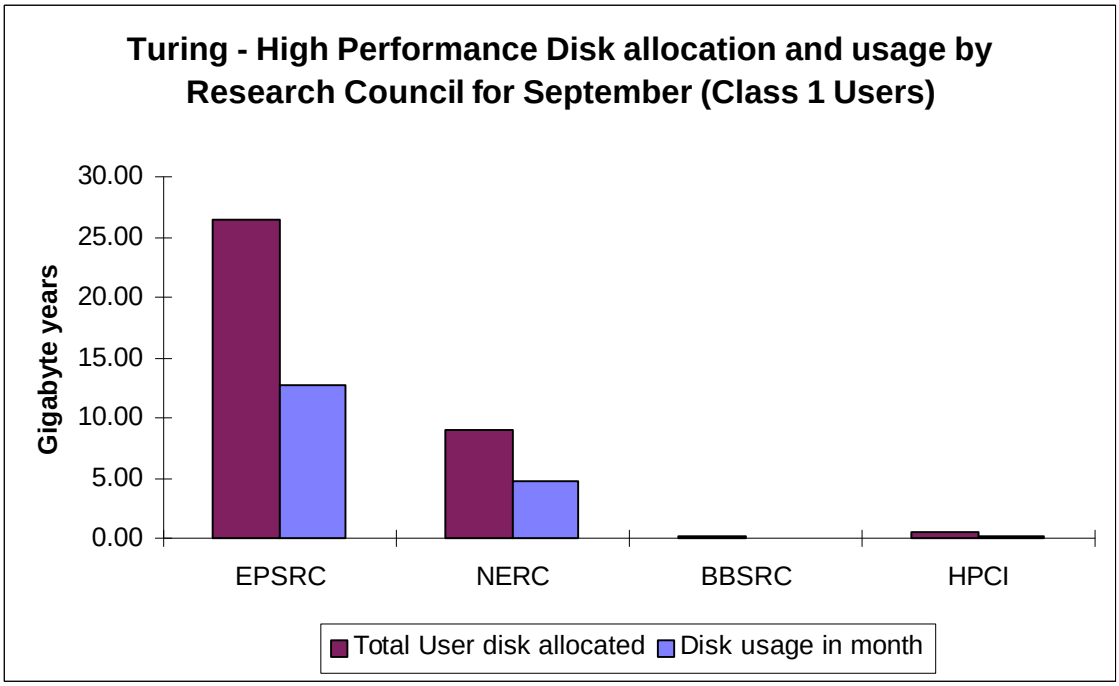
c) High Performance Disk (T3E) allocated for User Data by month, showing the allocated space each month in GBytes, split by Research Council. The Baseline Capacity (1 Terabyte) is shown by an overlaid horizontal line.

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.

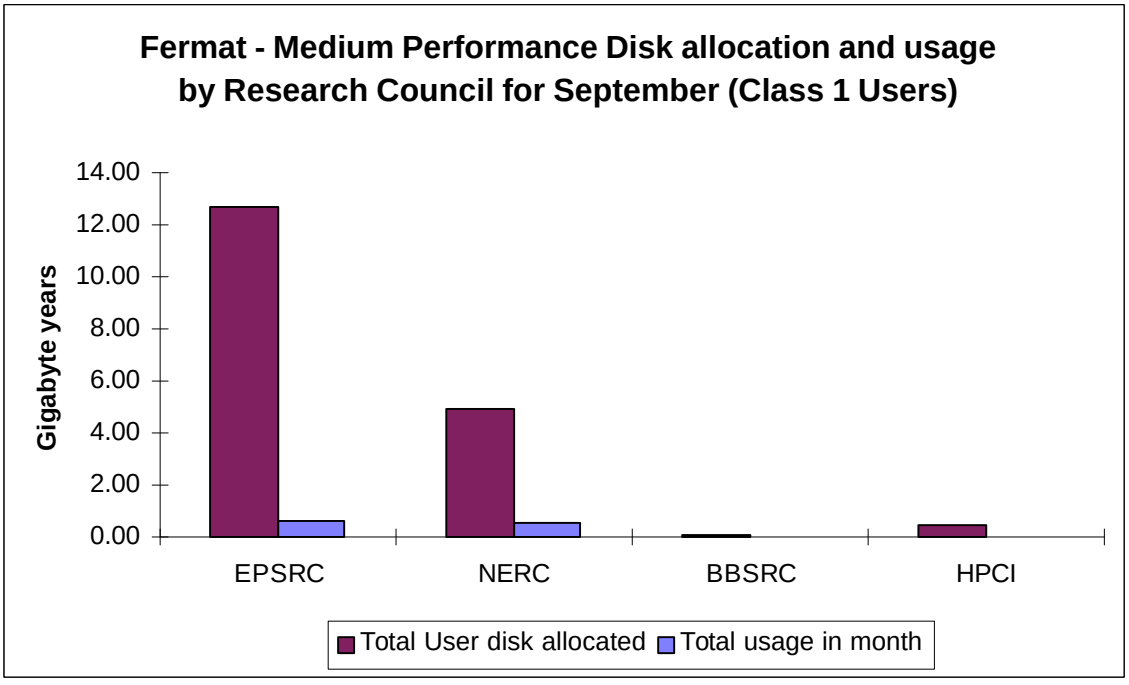
e) HSM/Tape Usage (T3E) by month, showing the volumes held each in GBytes, split by Research Council. The Baseline Capacity (16 Terabytes) available will be shown by an overlaid horizontal line.

2.1 Disk/HSM Usage Charts

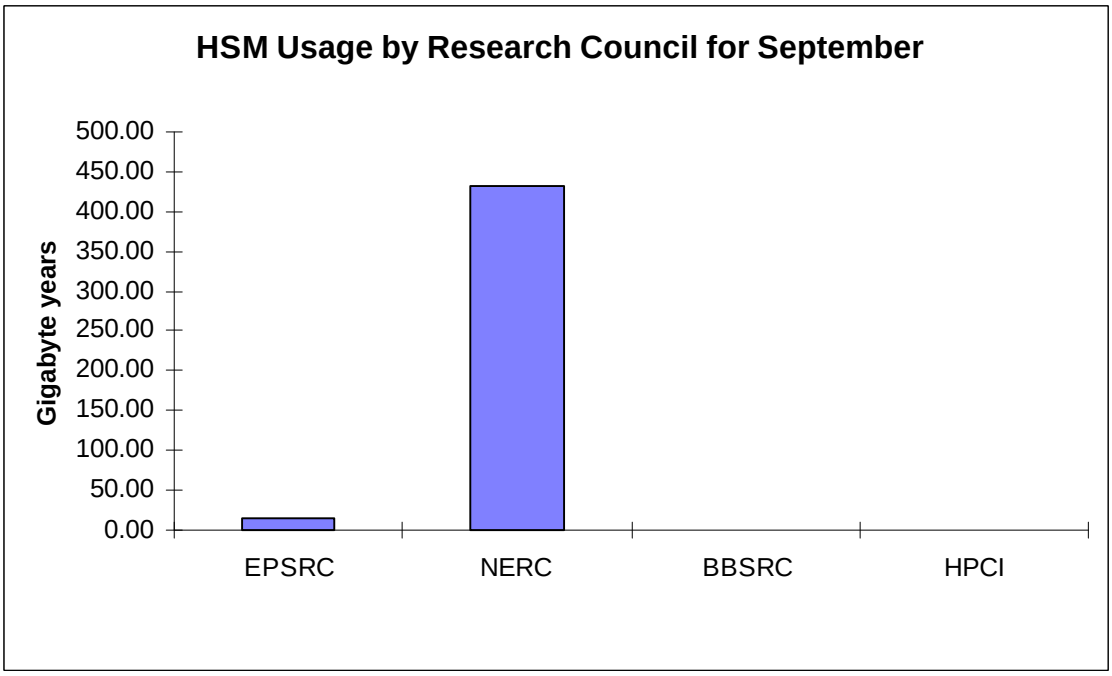
The graphs below show current monthly disk and HSM allocations and usage.



The preceding graph shows actual usage in September against the current allocation of disk on the Turing system.

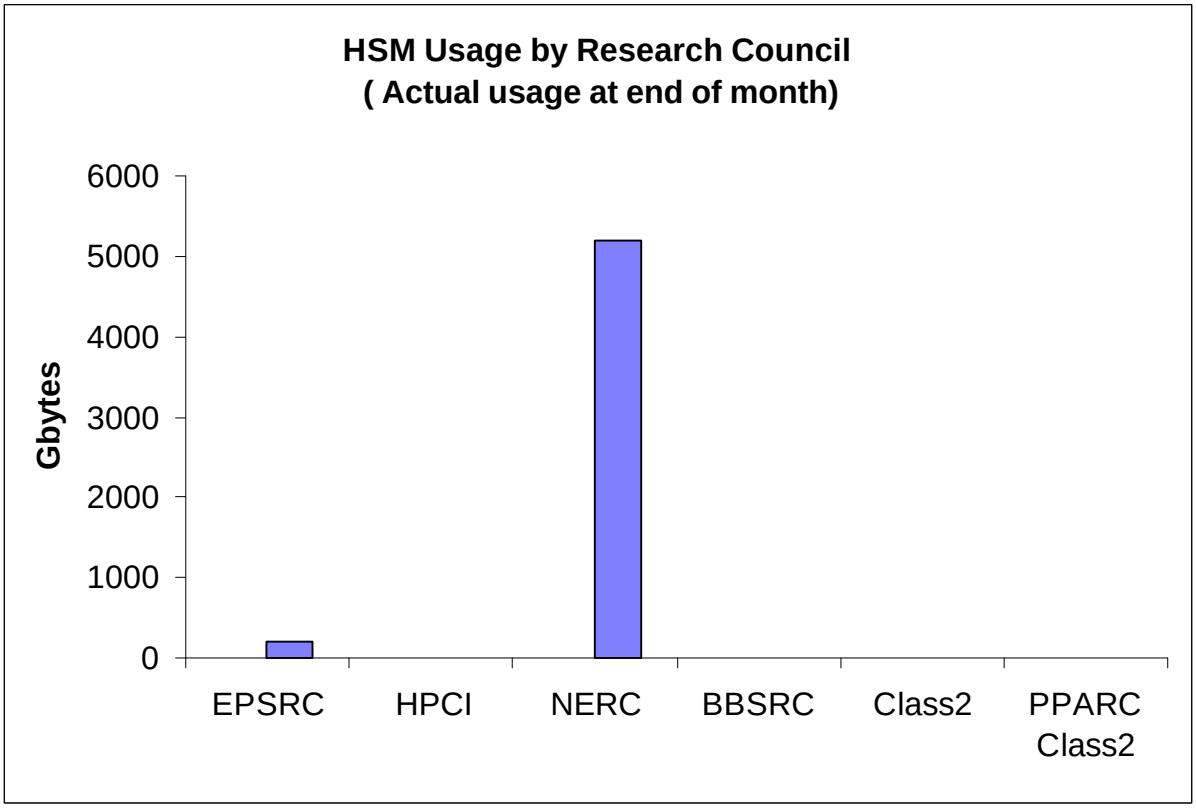


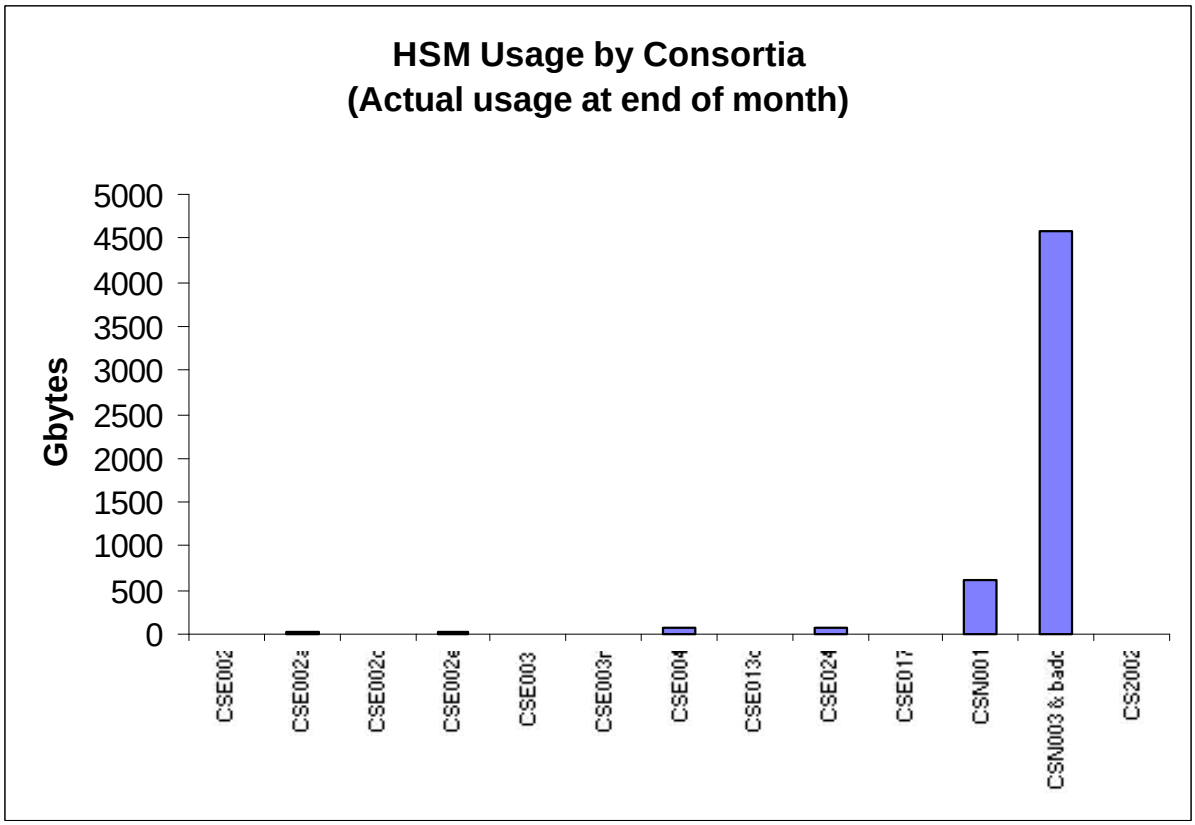
The above graph shows the disk allocations against usage of the disk on Fermat during September.

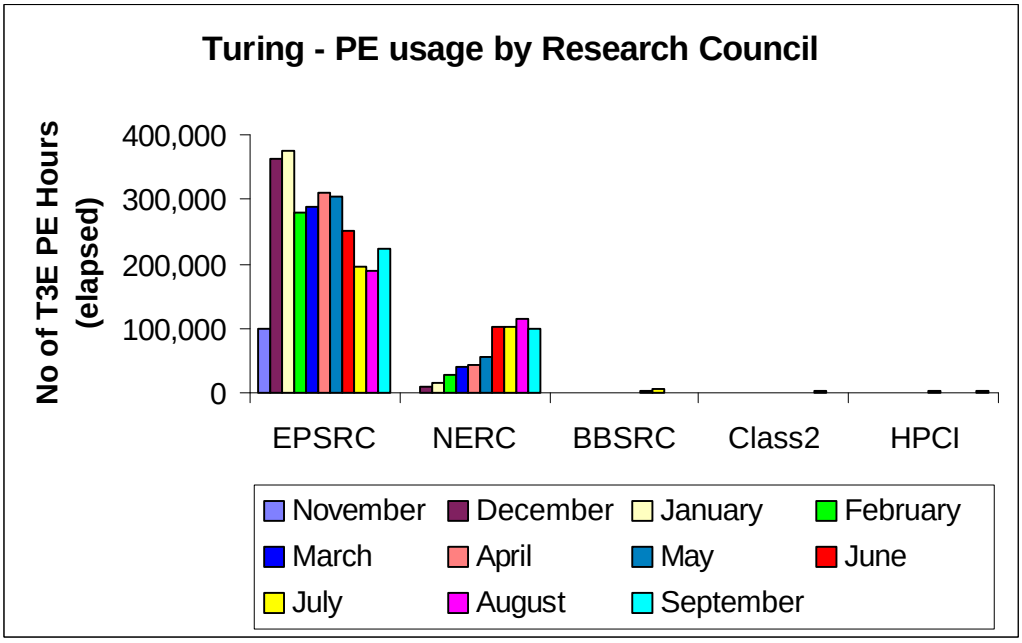


The above graph shows the total usage of the HSM facility by Research Council during September.

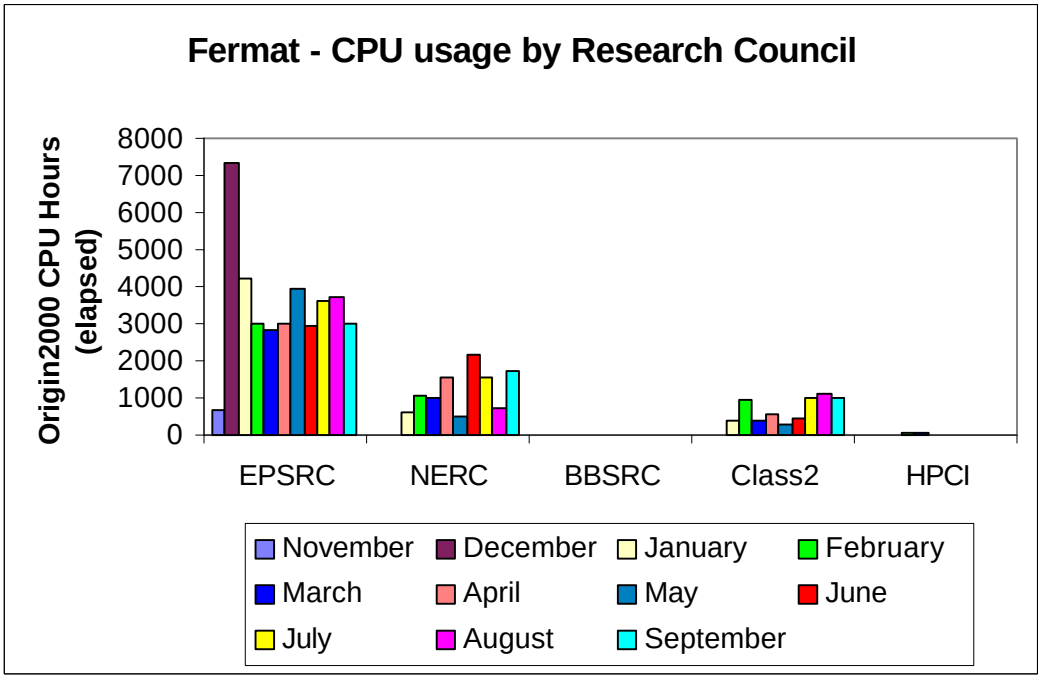
The next two graphs give actual usage of HSM by Research Council and by Consortium as at end September.





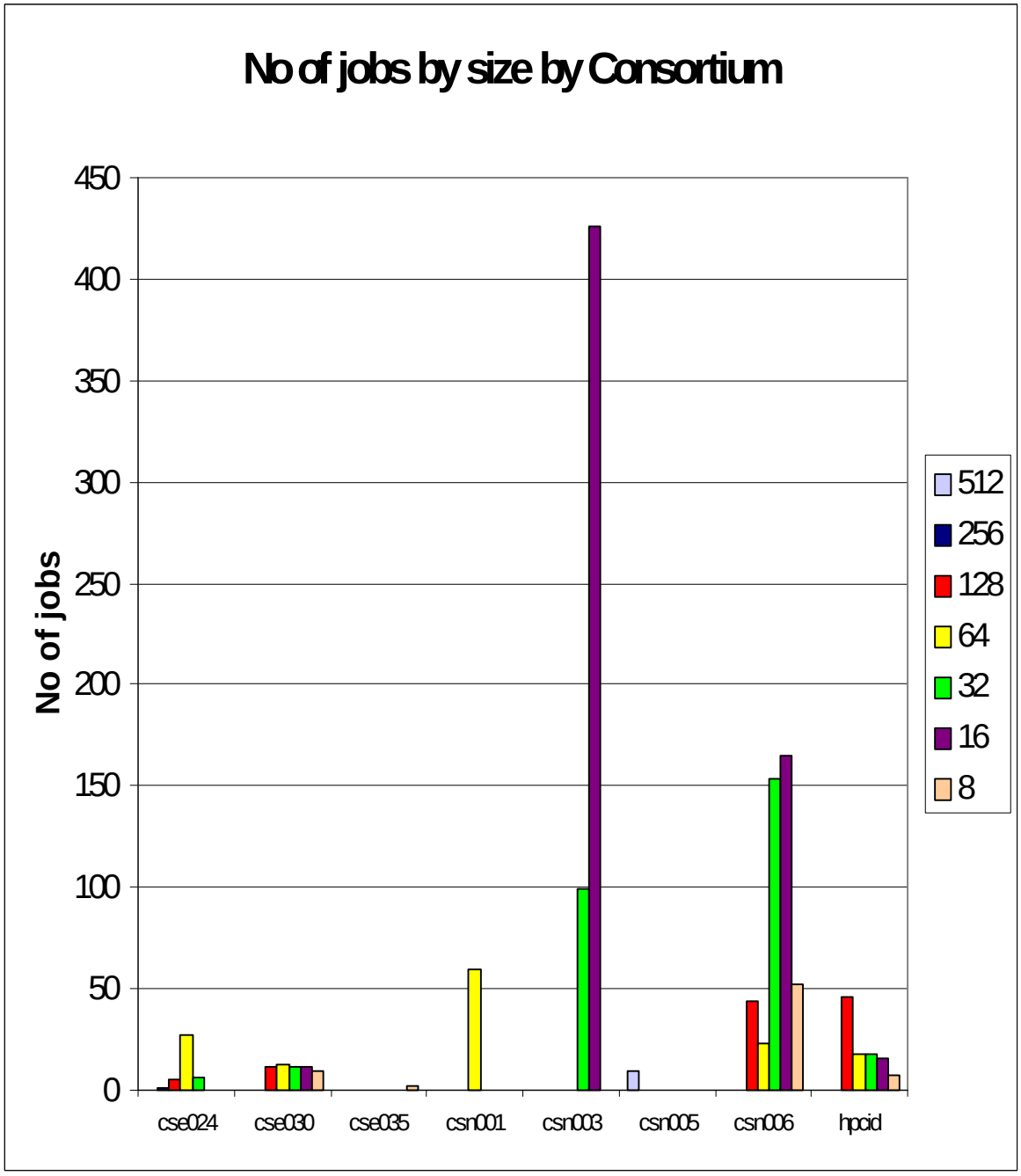


Turing PE usage is shown by Research Council during the months of service to date in the above chart.



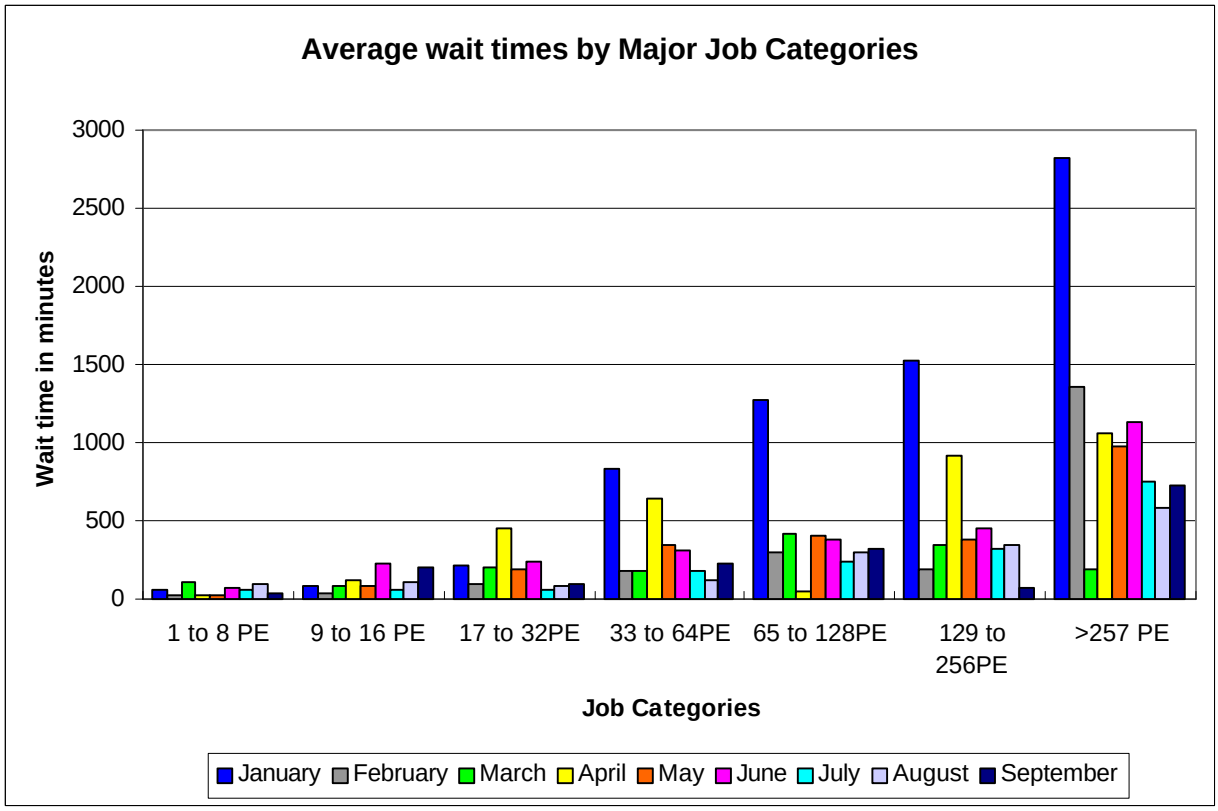
Origin2000 CPU usage is shown by Research Council during the months of service to date in the above chart.

Job statistics for Turing:

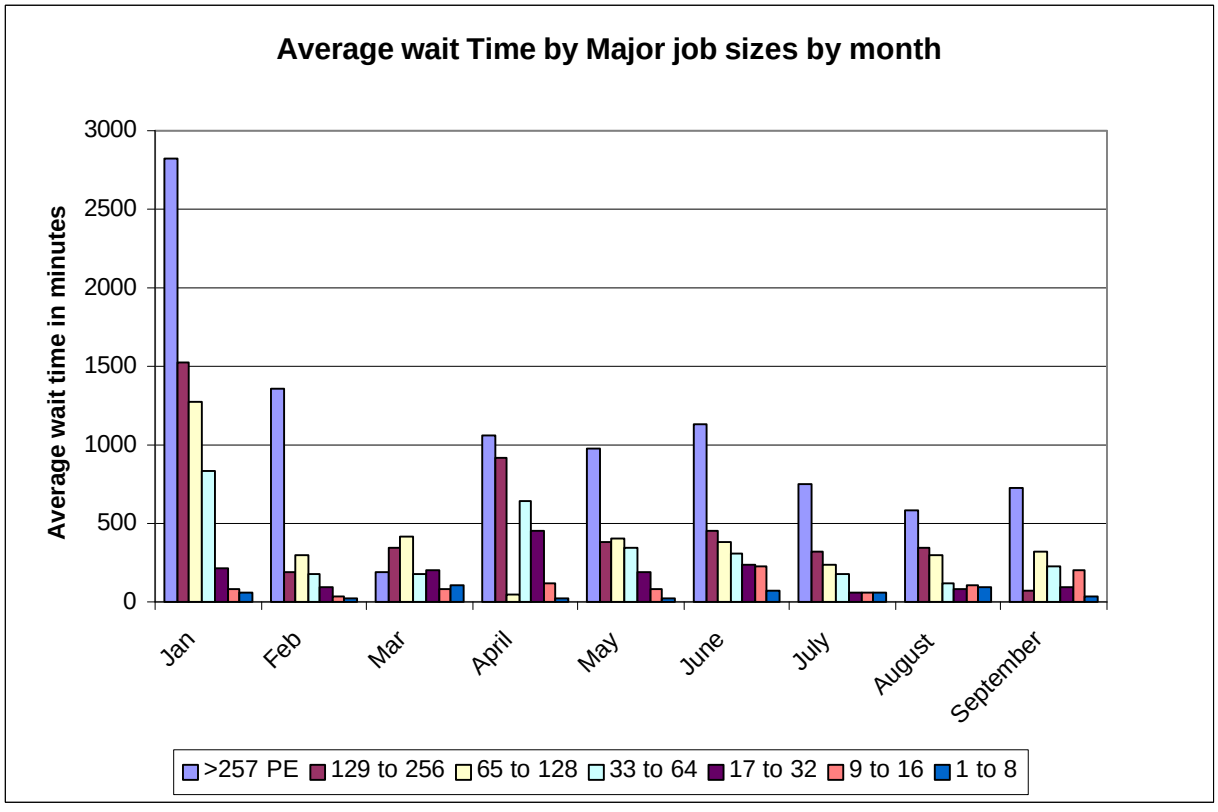


The above graph shows the number of jobs of the major sizes run in the period 1st to 30th September 1999.

The next graph shows the wait times in minutes for the major categories of jobs.



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

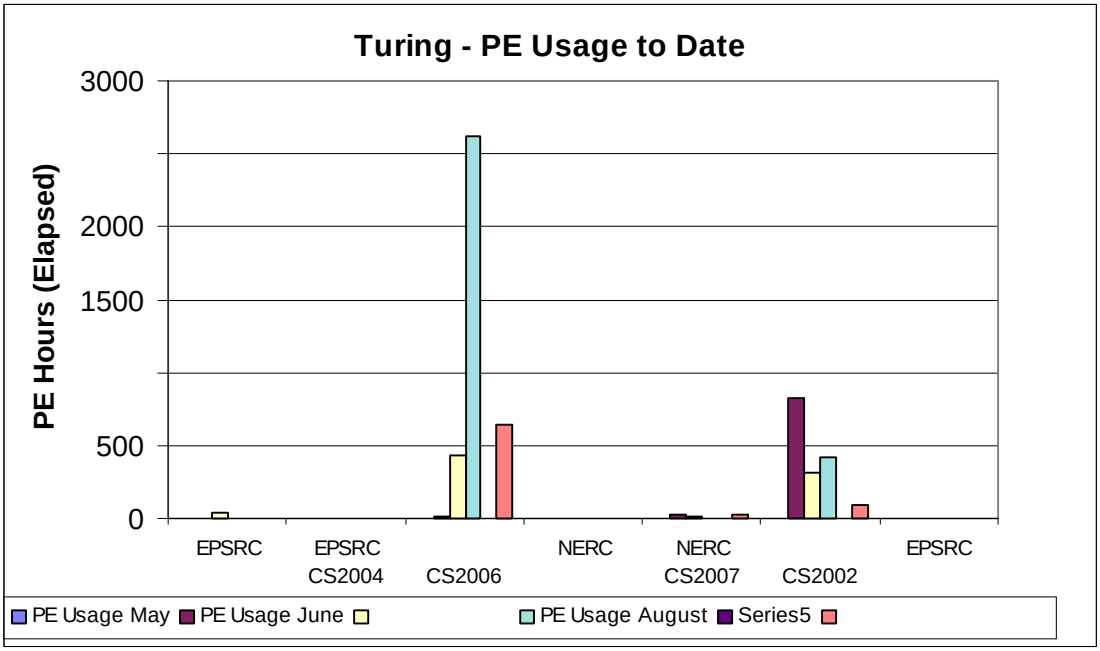


It can be seen from the above graph that enhancements to the scheduling on Turing have reduced the average wait times however attention must be paid to ensure sufficient head room exists in the system to prevent wait times from rising

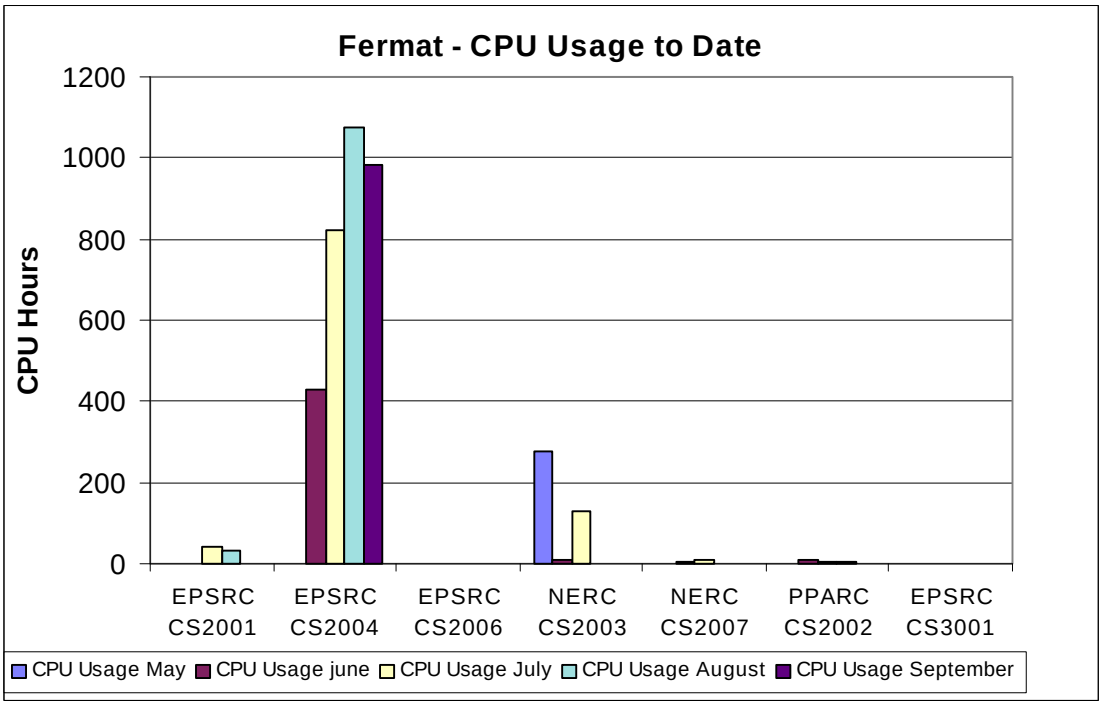
2.2 Historic Usage Charts

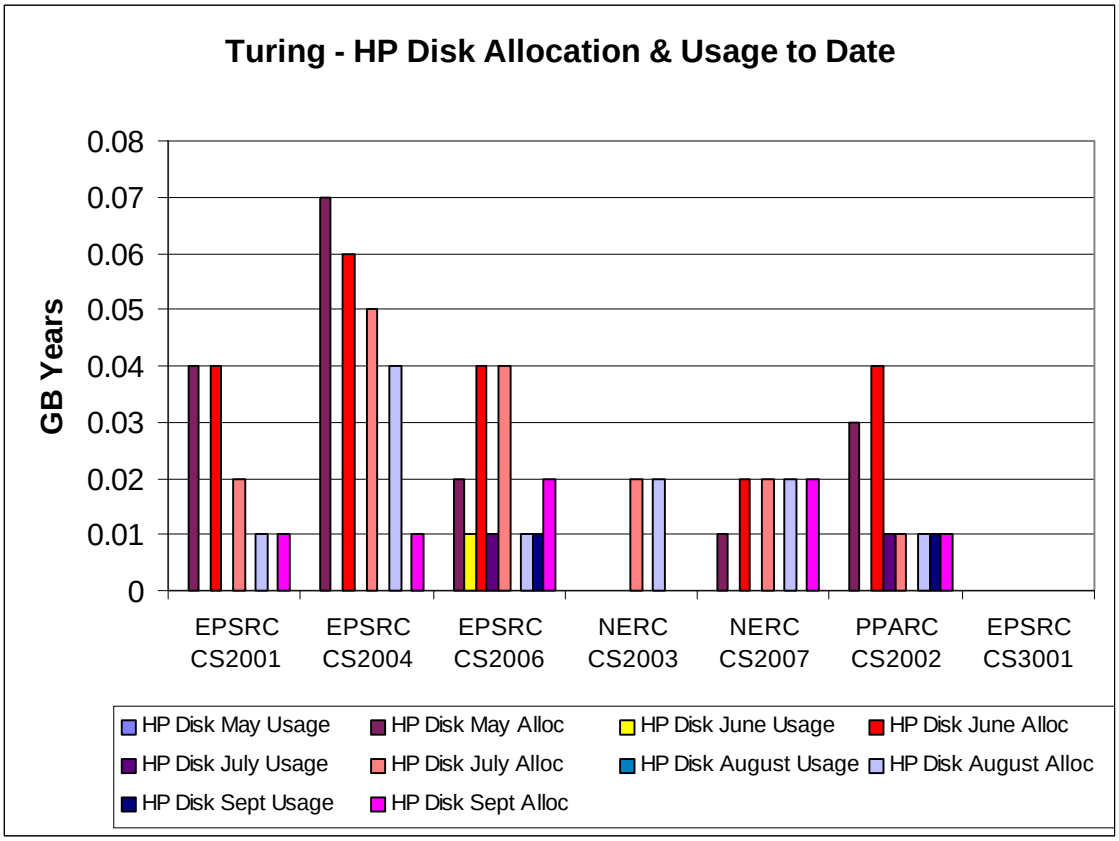
2.2.1Class 2 & 3 Usage Charts

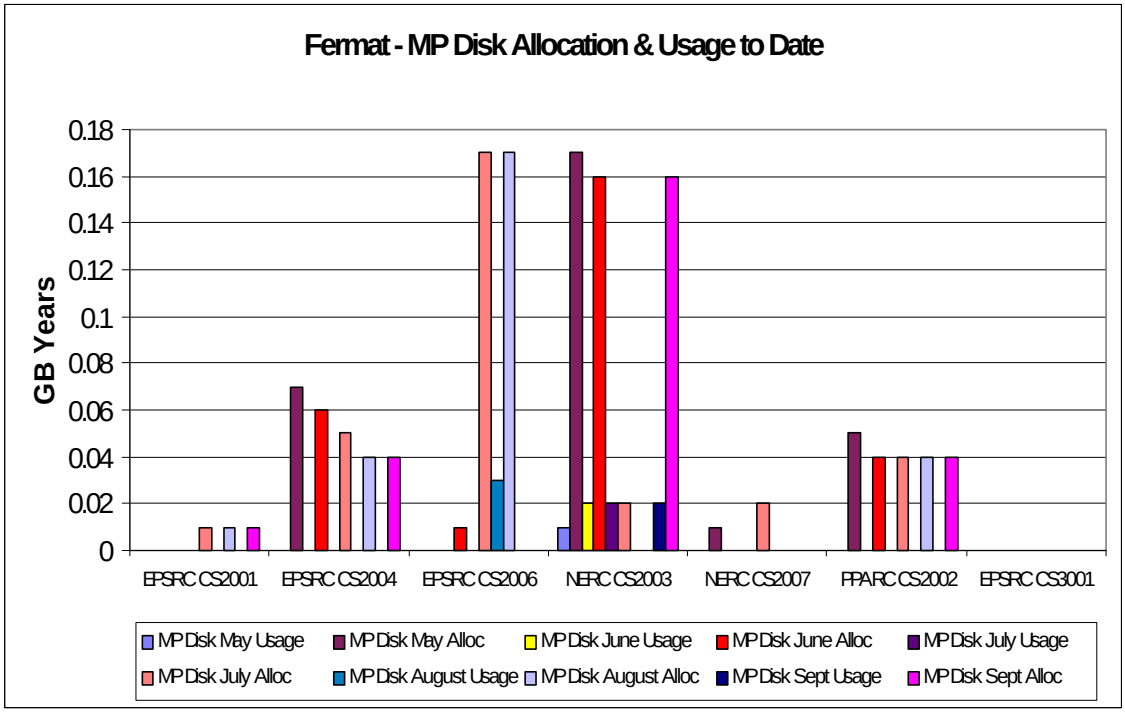
The next series of charts show the usage of the system by the class 2 & class 3 users. The usage is shown by project and identifies the Research Council of the individual projects.



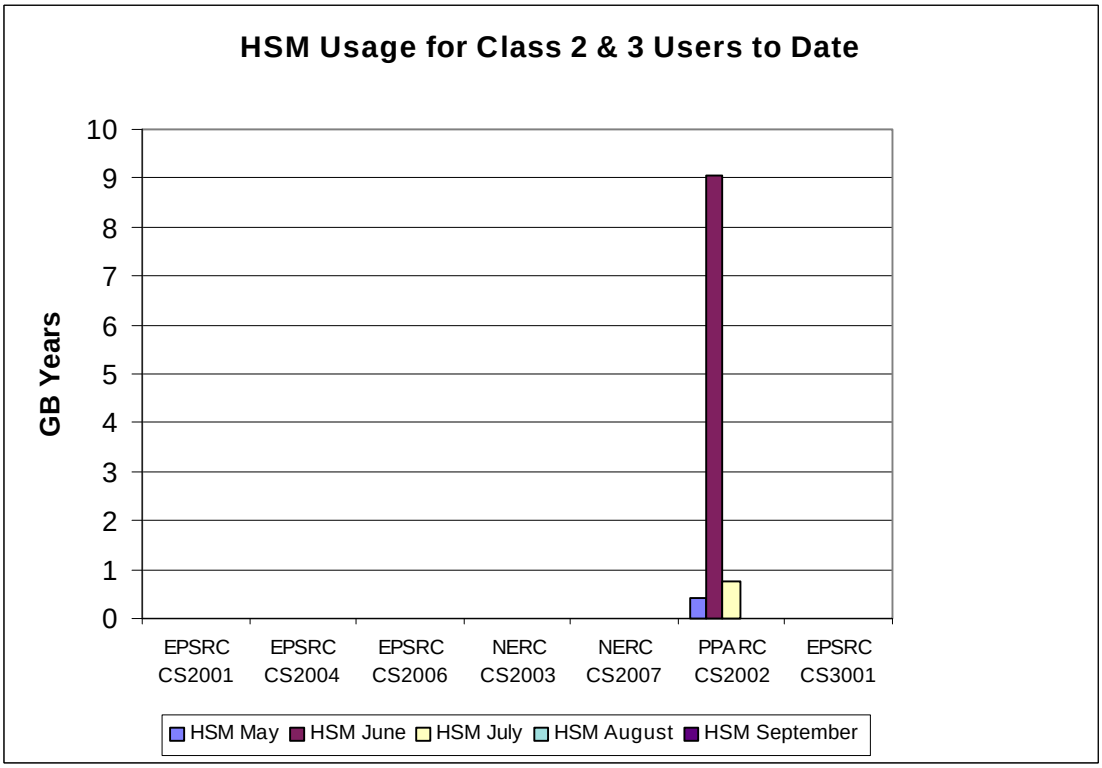
The above chart shows the PE usage of the Turing system.







The above chart shows the disk allocations on the Fermat system.

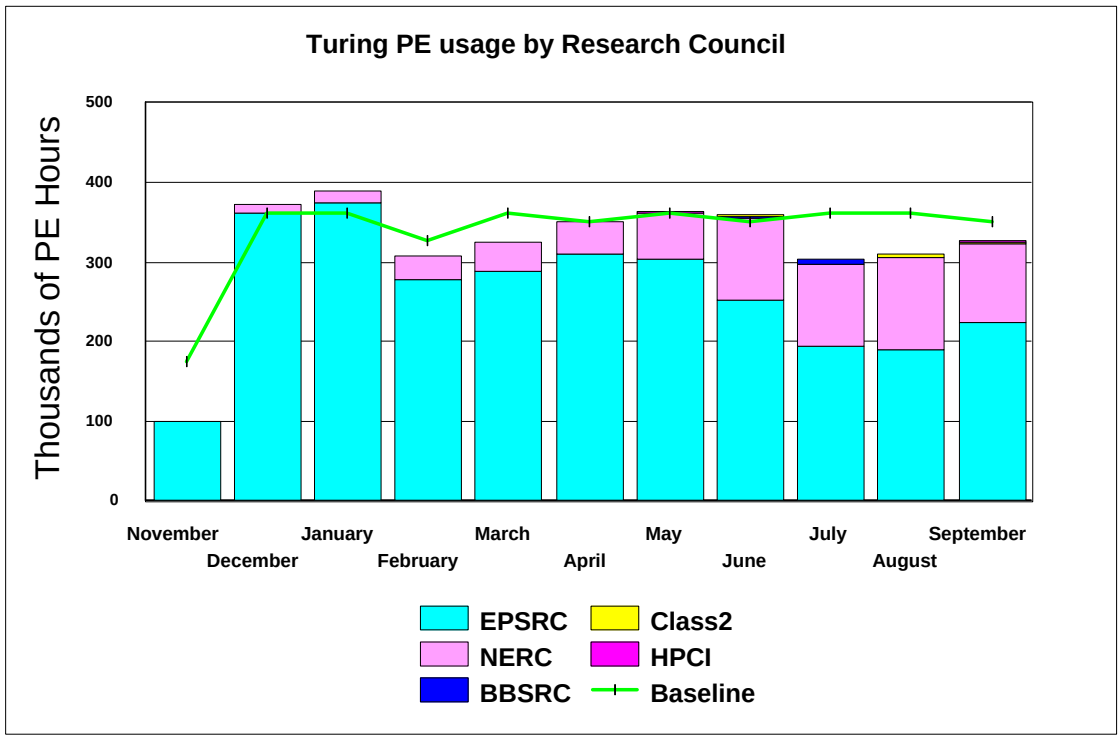


The above chart shows the HSM usage.

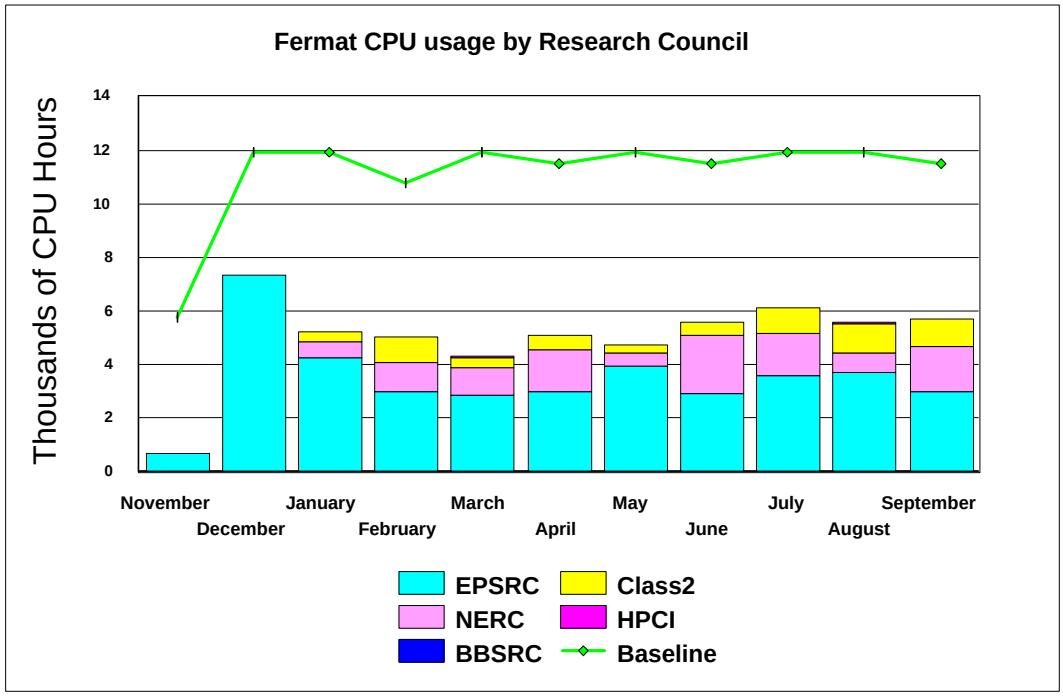
2.2.2 Baseline System Usage Graphs

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.

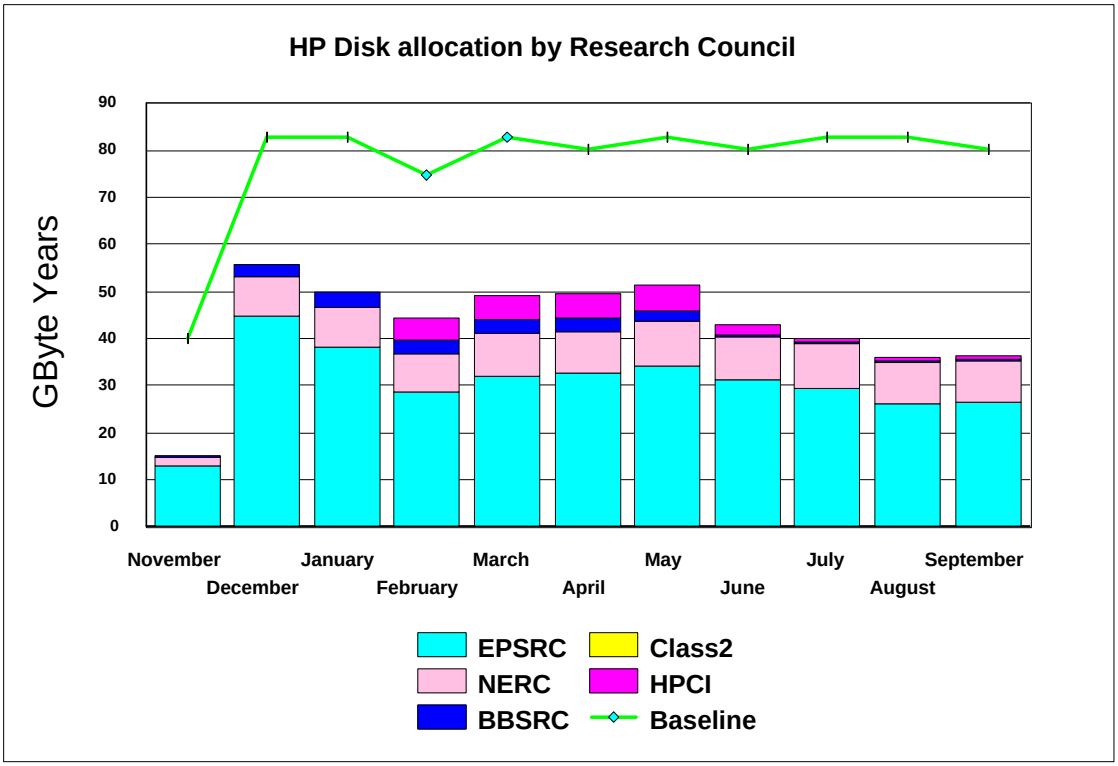
The graph below shows the PE hour's utilisation on Turing by Research Council from November 1998.



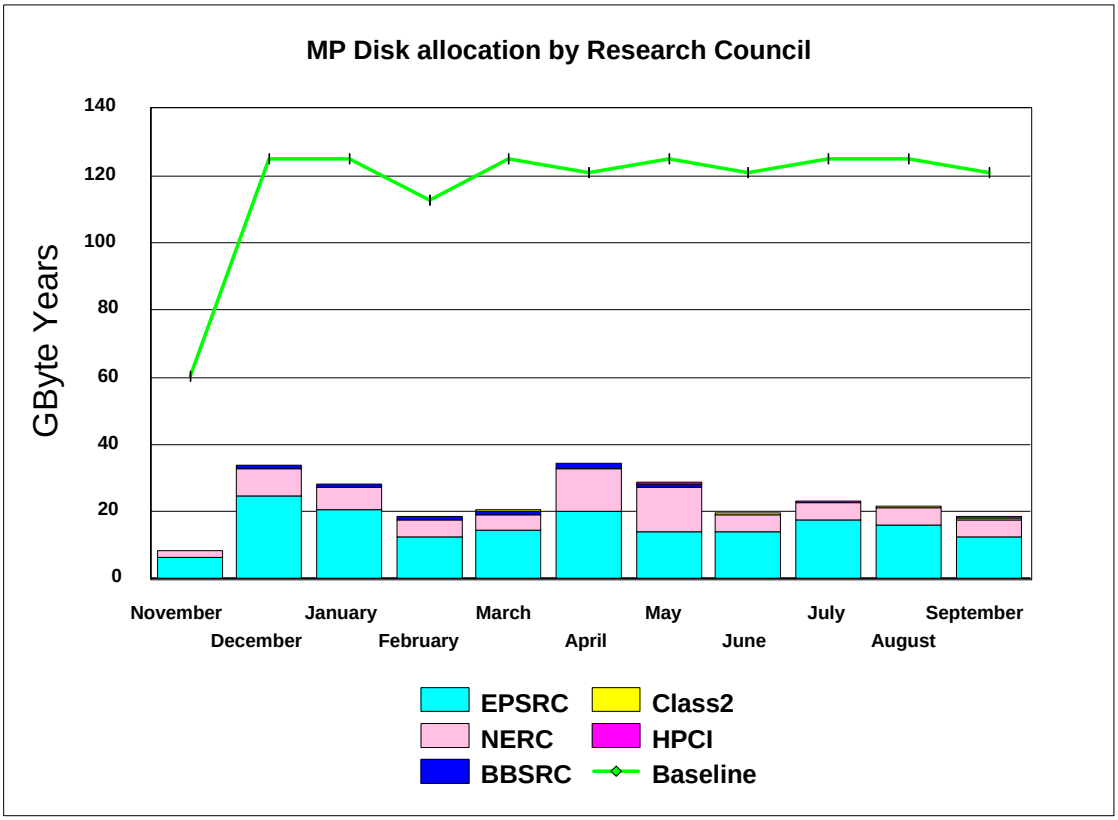
The graph below shows the historic CPU usage on Fermat by Research Council from November.



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

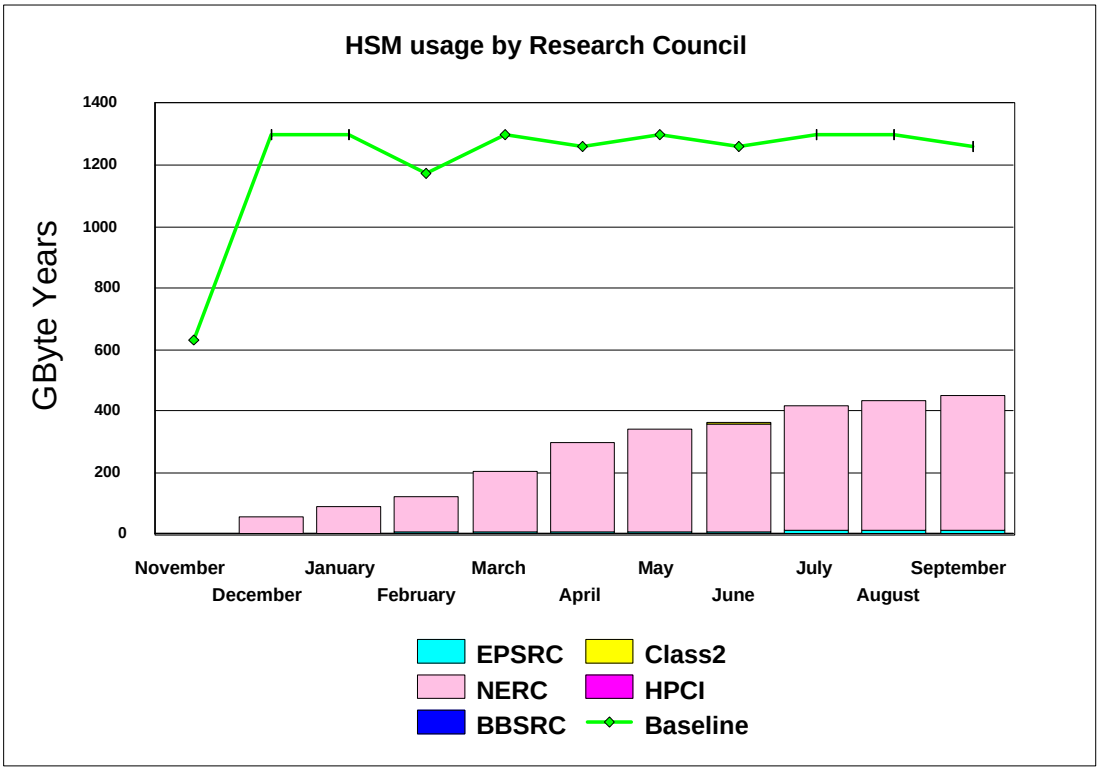


The preceding graph illustrates the historic allocation of the High Performance Disk on Turing.

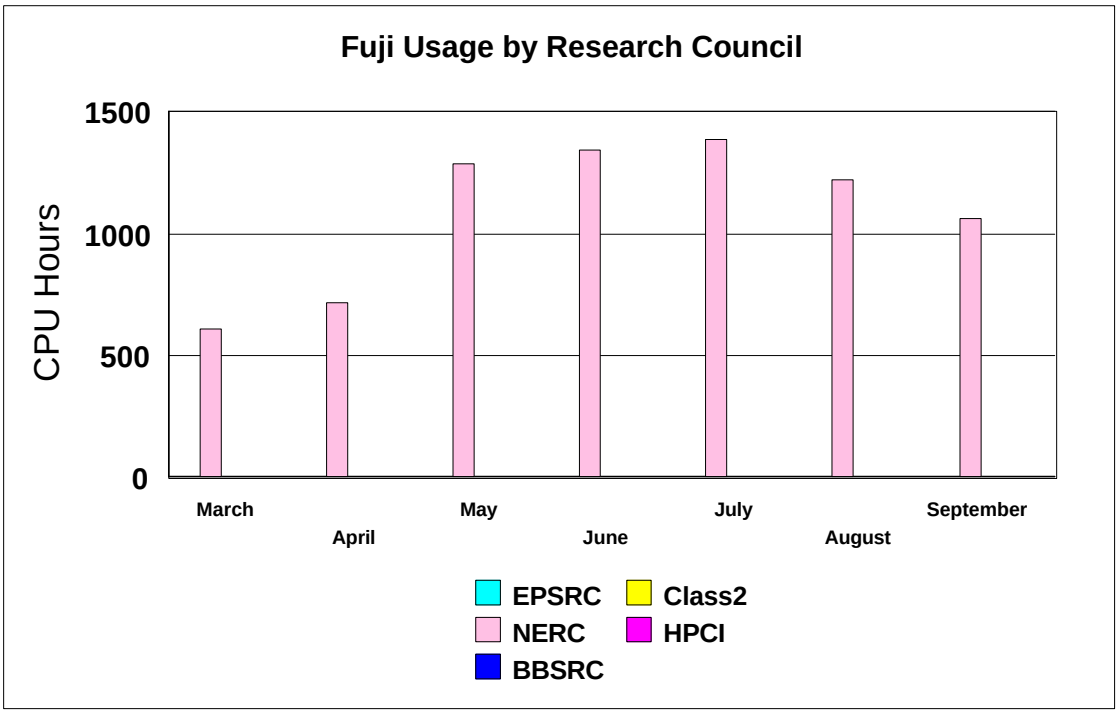


The graph above illustrates the historic allocation of the Medium Performance Disk on Fermat.

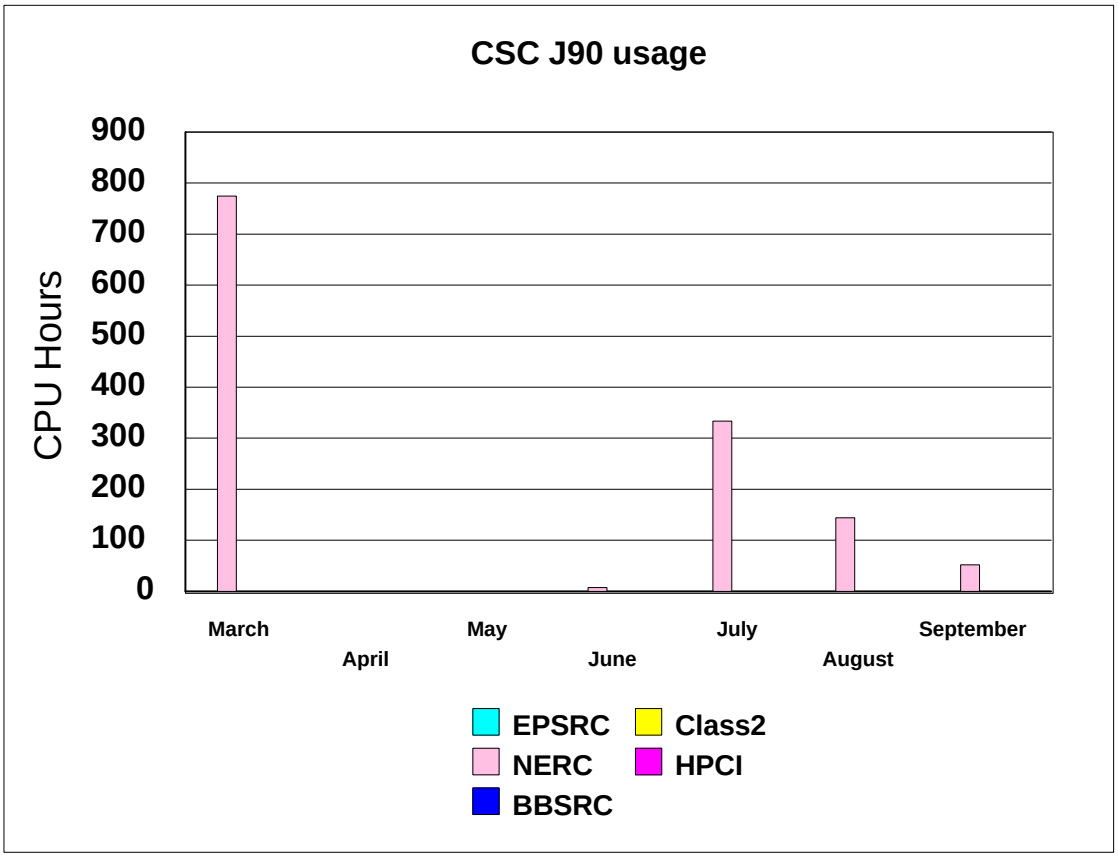
The graph below shows the historic HSM usage by Research Council funded projects. The primary usage is for NERC.



2.2.2 Guest System Usage Graphs



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



The above graph shows the current usage on the CSC Cray J90 based at the CSC, in Farnborough.

2.3 Service Status, Issues and Plans

Status

The current status is that over the quarter insufficient work has been submitted to enable the baseline capacity to be met. This however is not reflected in the capacity plans, which indicate that the machine requires additional hardware to meet the planned requirement

Issues

The capacity planning information on the system still shows a disparity when compared to actual usage for a large number of the consortia's currently using the system.

Plans

The planned date for the Fujitsu upgrade to be completed is the 1st November 1999.

It is also planned for the CSAR service's T3E to be involved in a 4 way virtual Supercomputer in co-operation with Stuttgart, Pennsylvania and an academic system in Japan. Testing of the codes will commence soon with a live demonstration being carried out at SC99 in Portland.

It is also planned to upgrade the Software on the Archive Management system, also the UNICOS software.

3 Science Application Support Services

3.1 Consortia Support

Support is being provided to consortia both inside and outside the token scheme. Optimisation work for the Conquest code is continuing while contractual issues to do with the software are being progressed. We have provided support for large-eddy simulation codes, visualisation support for the Terra Group, and investigation of coupled models running on Turing and Fermat for the Occam group and preliminary investigations of the parallelisation of a code for the UK Turbulence Consortium. We have found that there are difficulties raised when projects request support but have not made provision for this in their initial applications or capacity plans. Based on this experience we are making recommendations as new projects are assessed to provide for applications and optimisation support, based on our experiences over the past year. We will be announcing a scheme to provide a few days support effort to assess current codes and advise as to how they might be optimised for the CSAR service. This would be outside the token scheme. If the projects wish to act on the recommendations by allocating support tokens then we will be able to do this by mutual agreement as described in the CSAR ULF Report 3.

3.2 Improving the Service

The CSAR Applications/Optimisation team have been working with our colleagues in CSC to identify ways in which the service can be improved in terms of interactive usage, since users have reported some problems. As a result, interactive jobs are now launched much more quickly. We ask users who are doing development work to keep us informed of any problems in this area and we will address them speedily. The other area of concern involves slow response times for interactive work. This is mainly caused by some jobs using command processors where they should be using applications processors. We have contacted these users and discussed solutions that enable them to continue their work while freeing command processors and this seems to have improved the situation.

3.3 Collaboration with HPCi Centres

We have been working with Daresbury HPCI to produce a report on libraries and tools for efficient FFTs on MPP systems. In particular we have evaluated FFTW and an article on this will appear in the next edition of CSAR focus. We are also working with the HPCIs to investigate and promote the use of OpenMP and CSAR staff have set up WWW pages to disseminate this work. We have requests to give our Origin 2000 course to some sites who have brought their own O2000 machines, this will increase the potential customer base for HPC services and develop links with users of such mid-range systems and identify cases that could benefit by running their application on a high-end system.
In conjunction with Daresbury and EPCC we have bid for funds to EPSRC for a collaborative project to provide core high end computing support.

3.4 Conferences and meetings

CSAR staff attended and gave a talk at the UK MHD99 meeting in Glasgow. We have also attended and presented a talk at the European Metacomputing Meeting at Stuttgart and are helping with the organisation of the next meeting in February 2000. We have written and delivered courses for the UK Met Office and the material prepared will be of use to other groups who use the Unified Model. The planned workshop on Computational Chemistry announced in the last ULF report has been postponed, but the ideas proposed will be incorporated into next years summer school. CSAR staff attended the Materials Science workshop this September and this gave us an opportunity to start collaboration between support staff with experience in molecular modeling and those modeling the behavior of materials by finite elements using macroscopic approximations for materials properties. We see these two approaches starting to converge and wish to offer support for those CSAR projects involved in such dual approaches.

3.5 Reports and Papers

We have been evaluating software tools for cluster management and load balancing, particularly LSF. This has resulted in the production of a technical report on cluster management tools and a paper on the effect of LSF on a busy cluster running parallel jobs. This later paper has been accepted for the IEEE Conference on Cluster Computing in Melbourne this December. This work is of importance to CSAR users in two senses, firstly because increasingly projects will run on a local cluster for small to medium sized problems and can benefit from advice on stepping up from such a cluster to a high-end machine. To do this we must evaluate performance on both types of systems. Secondly LSF will eventually replace NQE as the batch scheduler on SGI systems and is therefore high quality advice on its operation will be of benefit to CSAR users.

The CSAR summer student program (see the valued added section) has produced some important technical work in the areas of OpenMP programming, visualization in spherical geometry and a detailed report describing experiences of running programs using a multi-threaded programming paradigm using a variety of threads libraries, Solaris threads, Posix Threads and Java Threads. This work also involved updating the examples in the CSAR course on Threads for Shared Memory Programming to be Posix-compatible. We have also investigated libraries that can translate calls to Solaris Threads to Posix threads. Finally we have extensively investigated the issues involved in porting to Java threads. The work of the summer students is available on the WWW and links will be made to this from the CSAR WWW pages. We also intend to share the results of this work with others working in these areas and particularly with staff from the HPCIs.

3.6 Visualization Support

Jo Leng joined the applications team in June and has been working on support for projects who need visualization techniques to analyse their data. Work is progressing on the problems of visualizing data generated by simulations using spherical geometry. This work is being carried out initially on behalf of the Terra group, but has applications to other groups working in geophysics, climate modeling and molecular modeling. Jo has also been working with Class 3 users in archaeology, using visualization techniques to interpret scans of underground sites.

3.7 SC99

The University of Manchester will exhibit the CSAR service on its stand in the Research Exhibition of SC99.

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.

The CSAR Registration System is now fully stabilised, with the only substantial development work in the last quarter being the integration of the Fujitsu VPP300 as a CSAR system (as opposed to a 'Guest Service'), due to coincide with the major upgrade of that system on 1st November 1999.

The Registration System and associated facilities such as the web-based usage reports are used daily by CSAR staff. Suggestions from users and project PIs are always welcome; we have for example added an extra option to display usage in terms of generic tokens in the web-based usage reports, following a request from a project PI. The Registration System continues to benefit from developments for other services at Manchester Computing.

At the last CfS Board Meeting there were discussions on how to simplify the resource token system for project PIs (as raised by HSC). This subject was also raised at the recent HPC User Meeting. There was little response from the attendees at that meeting, which is in line with the level of feedback in recent months via the CSAR feedback mechanisms. The majority of project PIs appear to be managing their project administration tasks. We support the suggestion made by one PI at the User Meeting that responsibility should be devolved to another member of the group if the PI considers the tasks to be too time consuming; many projects already do this.

CfS has given consideration to ways in which administrative tasks may be simplified. Perhaps one of the most daunting tasks is the initial trade of generic tokens, particularly for new PIs unfamiliar with the procedures and the web pages. It is suggested therefore that we could perform the initial trade for them by default, using the proposed resource profile (unless the final allocation is different). This would assist PIs in the initial setting up of their project.

It should be noted that projects very rarely re-trade resources in practice; they only do so if they are running out of a particular resource. Thus any early fears of excessive trading have proved to be ill founded. Whilst a general reluctance to re-trade gives some stability to resource allocation levels, it goes hand in hand with a reluctance to keep capacity plans up to date. In an effort to encourage regular reviewing of usage and plans, it is suggested that PIs be emailed automatically every three months when they are allowed to perform a re-trade.

During the second and third quarters there was substantial work on the CSAR web site as a whole, and a major new release was made in August. Information has been re-organised to separate user specific information (software, documentation, system usage information etc.) from registration, administrative and management information and facilities. All pages and user guides have been reviewed and updated, and a detailed site map is available. Feedback on the new release has been very positive. Work has now started on updating the pages to reflect the fuller integration of the Fujitsu system into the service.

6 Value-Added Services

6.1 Access to Enhanced HPC Facilities

The level of usage from external clients has not yet reached a level at which the enhancement of existing facilities can be initiated.

6.2 Industrial Liaison Programme

- **Joint Projects -** The development of the Multi-pipe utility for AVS and SGI multi-pipe graphics hardware continues on schedule. We expect to have the first release in November.
- **Databases**
- **Visiting Scientist Programme**

There is nothing to report on the above items.

6.3 Research Liaison Programme

We have had two visitors from Sao Paulo, who installed their Parallel Volume Visualization (PVV) Software and we started a joint development of the MPI part of this software.

The work with HLRS on meta computing is progressing well. With Pittsburgh, Stuttgart and Tsukuba we are preparing a meta-computing demonstration for SC99.

6.4 New Applications Initiative

There is nothing to report on the above item at present.

6.5 Auxiliary Equipment

The auxiliary equipment scheme has been actively marketed to PI's throughout the user community, with very little uptake. The common reaction has been that the programme is of interest, but not over the summer period.

6.6 Technology Access

We continue to explore opportunities for access to additional technology.

6.7 Databases

The infrastructure is in place and will be released before the end of October. It is now planned to discuss with the Research Councils as to how to populate the database with quality material.

6.8 Adding value to other major research facilities

There is a continuing dialogue in this area, however there is nothing to report at this present time.

6.9 Access to Guest Systems

The CSC J90 system remains at present, however its utilisation is low. Work continues with Hewlett-Packard, with a view to CfS providing an HP N-class system. Work is also ongoing with Fujitsu in regard to upgrading the present VPP300 facility that is now scheduled to be completed by November 1st.

6.10 ASCI Prototyping Capability

SGI is to be a major sponsor at the forthcoming conference on ASCI technology and strategic issues to be held in Oxford in April 2000, hosted by AWE.

CfS is also pleased to confirm that the site of the European ASCI prototyping centre will be at the University of Manchester. CfS consortium members have identified a programme of activity to define the best way forward, so that UK academics will be able to derive the most benefit from the change in programming paradigm represented by the ASCI initiative.

6.11 Manchester Research Centre for Computational Science

This has been a very successful period for MRCCS

International Conferences

We will host the following conferences: Cray User Group in 2002 (now called SUMMIT), Eurographics 2001, and European Cray Workshop in 2000. We are on the shortlist for Euro-par 2001.

Summer Student Programme

We hosted ten students for ten weeks over the summer who undertook a range of projects. A full report of this will be produced separately.

HPC Summer School

The Summer School in Distributed Memory Programming and Scientific Visualization took place from 6th – 17th September. This event was very successful.

29 people were registered: 2 from Brazil, 2 from Universities in Europe, 1 from a government research lab in Europe, 3 from UK government funded institutions in the UK, and 17 from UK Universities. Speakers were from Europe and the US. The feedback from participants has all been very positive, particularly from those about to start using the CSAR service. We would like to express our thanks to the speakers, many of whom traveled great distances, to the participants and to the local staff, who all helped to make this event so successful.