

HPCx Service Report

May 2007

1 Introduction

This report covers the period from 0800 on 1 May 2007 to 0800 on 1 June 2007, a service month of 744 hours.

Overall utilisation of the main service fell back to 61% this month. A similar drop was noted at this time last year. Utilisation of the development service, at more than 93%, remains exceptionally high. The system continues to be extremely reliable, with no SEV1 incidents for the fourth month running.

2 Usage

2.1 Availability

Incidents

During this month, there were 9 incidents, none of which was at SEV1. The following table indicates the severity levels of the incidents, where SEV1 is defined as a *Failure* (in contractual terms). The definitions used for severity levels can be found in Appendix A.

<i>Severity</i>	<i>Number</i>
1	0
2	5
3	4
4	0

The MTBF figures for this month were as follows:

<i>SEV1</i>	<i>Incidents</i>	<i>MTBF</i>
IBM	0.0	∞
Site	0.0	∞
External	0.0	∞
<i>Overall</i>	0.0	∞

Serviceability

Scheduled downtime for this month was 1.0 hours.

<i>Attribution</i>	<i>UDT</i>	<i>Serviceability</i>
IBM	0:00	100.0
Site	0:00	100.0
External	0:00	100.0
<i>Overall</i>	0:00	100.0

2.2 CPU Usage by Consortium

Main Service

<i>Consortium</i>	<i>CPU Hours (Parallel)</i>	<i>CPU Hours (Other)</i>	<i>AUs charged</i>	<i>%age of charged AUs</i>
e01	105120	275	507419	9.5%
e03	62	0	299	0.0%
e05	274727	783	1265693	23.6%
e06	9313	75	45195	0.8%
e08	17514	6	84349	1.6%
e10	6330	0	30473	0.6%
e11	24574	0	118310	2.2%
e17	5825	3	28057	0.5%
e18	229	0	1105	0.0%
e24	141975	7	683565	12.7%
e26	450	0	2168	0.0%
e29	6038	0	29068	0.5%
e31	3	0	14	0.0%
e33	480	0	2313	0.0%
e35	99055	169	477707	8.9%
e36	28967	52	128420	2.4%
e37	68918	3	331815	6.2%
e39	17678	5	85134	1.6%
e41	2	0	11	0.0%
e42	3835	0	18464	0.3%
e48	2799	0	13478	0.3%
e49	1430	164	7673	0.1%
e50	8585	0	41333	0.8%
e53	0	2	10	0.0%
<i>EPSRC Total</i>	829881	1543	3930820	73.3%

n01	249	0	1200	0.0%
n02	153771	25	740441	13.8%
n03	111167	647	535050	10.0%
n04	4709	114	23217	0.4%
<i>NERC Total</i>	269896	785	1299908	24.2%

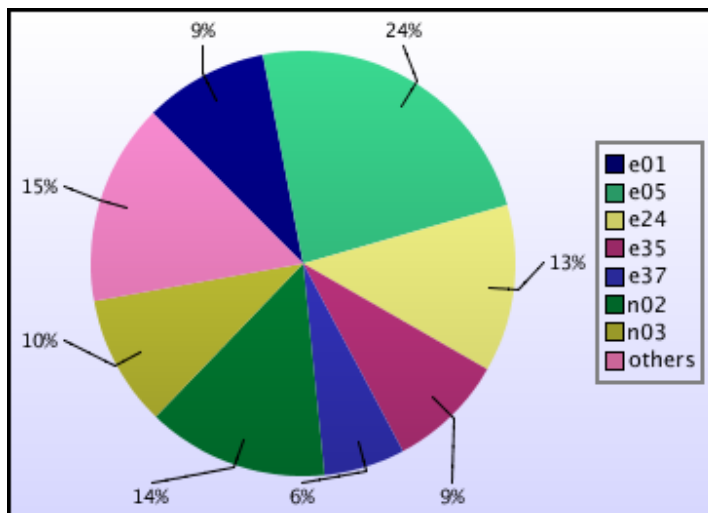
p01	3608	12	17425	0.3%
<i>PPARC Total</i>	3608	12	17425	0.3%

c01	3345	4	16122	0.3%
<i>CCLRC Total</i>	3345	4	16122	0.3%

b08	8289	0	39907	0.7%
<i>BBSRC Total</i>	8289	0	39907	0.7%

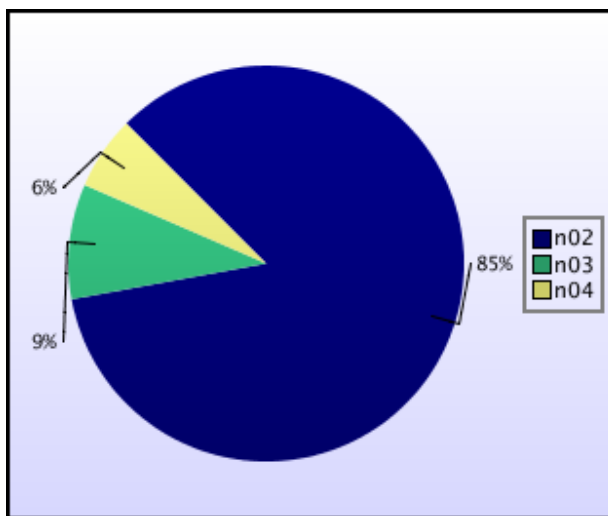
x01	5471	0	26339	0.5%
<i>External Total</i>	5471	0	26339	0.5%

z001	6616	14	31918	0.6%
z004	332	1	1604	0.0%
z06	0	0	0	0.0%
<i>HPCx Total</i>	6948	15	33522	0.6%



Development Service

Consortium	CPU Hours (Parallel)	CPU Hours (Other)	AUs charged	%age of charged AUs
n02	112881	146	544165	84.6%
n03	12481	74	60448	9.4%
n04	8018	0	38601	6.0%
<i>NERC Total</i>	133380	221	643214	100.0%



2.3 CPU Usage by Job Type

The figures for *Raw AUs* given here show the number of AUs actually supplied by the system to users' jobs.

Main service

<i>Number of processors</i>	<i>Raw AUs</i>	<i>%age</i>	<i>Number of jobs</i>
≤32	626725	11.5%	3914
33–64	634914	11.7%	1039
65–128	1501909	27.7%	992
129–256	1595704	29.4%	539
257–512	888121	16.4%	204
513–1024	180571	3.3%	43

Overall utilisation of the main service was 61.1%. Capability usage was 19.7% of the total.

Development Service

<i>Number of processors</i>	<i>Raw AUs</i>	<i>%age</i>	<i>Number of jobs</i>
≤32	605786	94.3%	8197
33–64	36362	5.7%	180
65–128	5	0.0%	1

Overall utilisation of the development service was 93.4%.

2.4 Slowdown and Job Wait Times

Slowdowns

Slowdown is a widely used measure of the relative wait times of different classes of jobs. It is defined as:

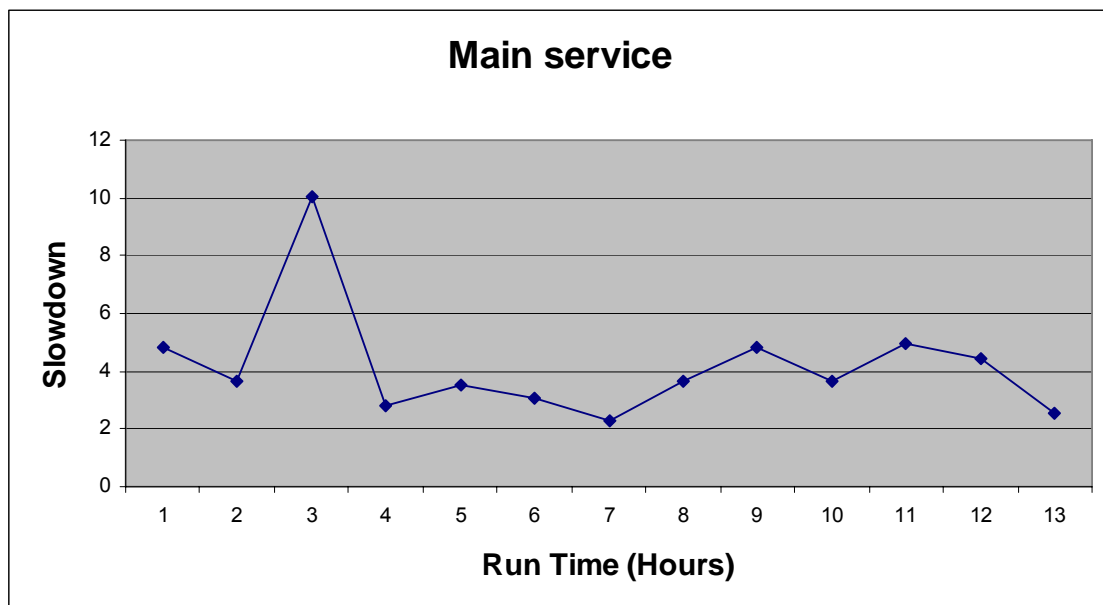
$$\text{Slowdown} = (\text{job run time} + \text{job wait time}) / (\text{job run time})$$

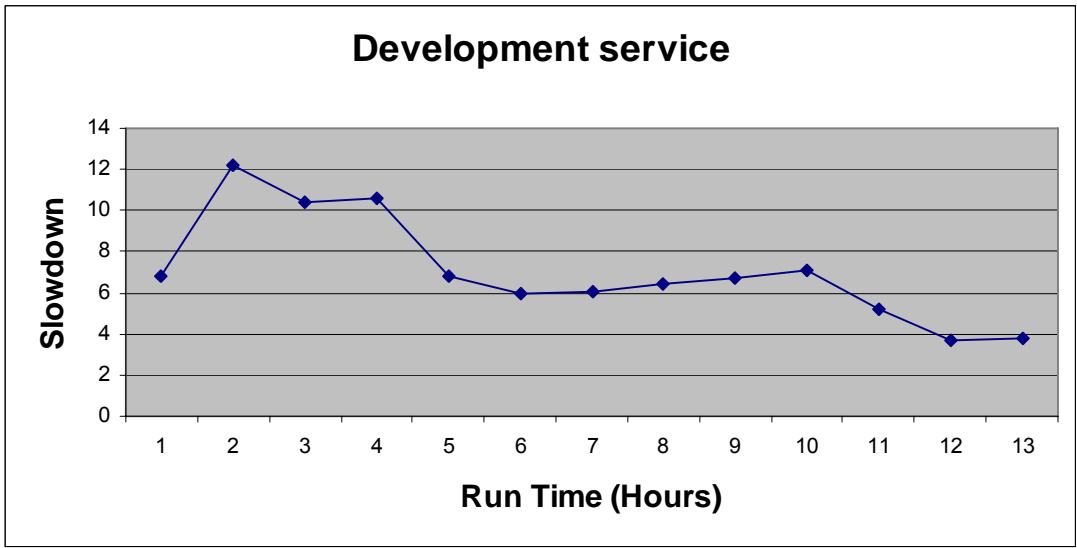
Slowdowns of less than around 10 are usually regarded as reasonable.

On both services, slowdowns are currently generally satisfactory.

Slowdowns by runtime

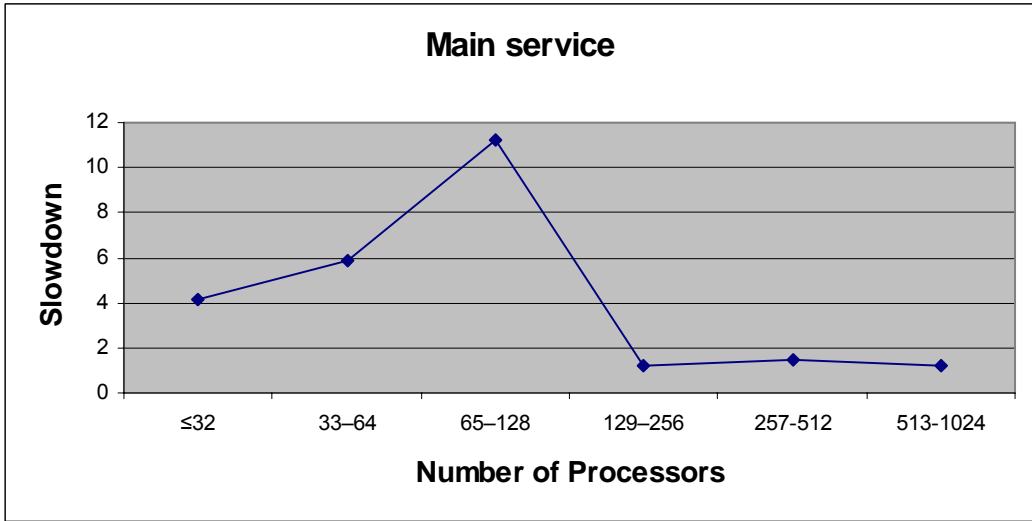
The following graphs show the slowdowns recorded for jobs of differing run times, ignoring those which ran for less than 5 minutes.

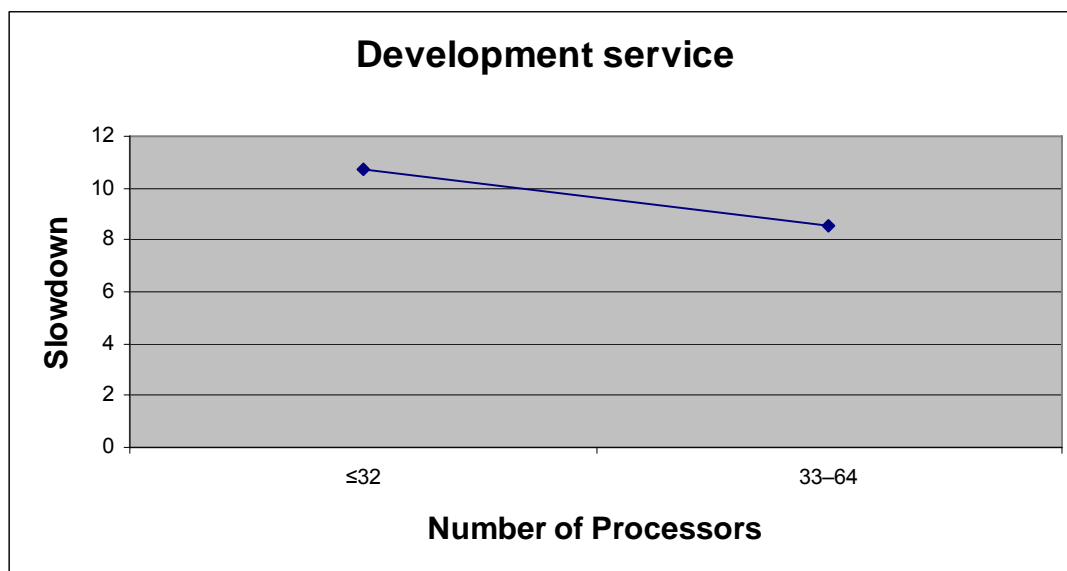




Slowdowns by number of processors

In the graphs below, we plot the slowdown figures against the number of processors used. Only jobs which ran for more than 1 hour are included.



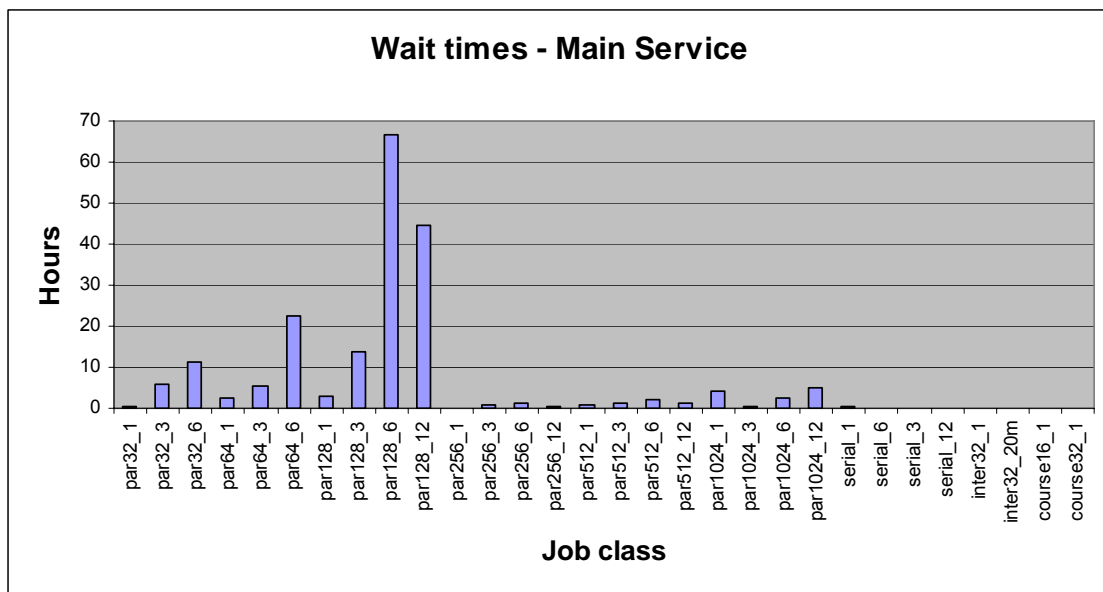


Job wait times – main service

The following table and graph shows the average wait time (in hours) for each class of job on the main service. The long wait times for long 128-processor jobs are attributable to the high utilisation of the capacity region.

Job Class	Category	Maximum Number of CPUs	Maximum Job length	Average wait time	Number of Jobs
par32_1	parallel	32	1	0.5	2614
par32_3	parallel	32	3	5.9	59
par32_6	parallel	32	6	11.1	1241
par64_1	parallel	64	1	2.7	561
par64_3	parallel	64	3	5.5	74
par64_6	parallel	64	6	22.7	404
par128_1	parallel	128	1	3.1	609
par128_3	parallel	128	3	13.9	41
par128_6	parallel	128	6	66.5	142
par128_12	parallel	128	12	44.5	200
par256_1	parallel	256	1	0.2	204
par256_3	parallel	256	3	0.7	72
par256_6	parallel	256	6	1.1	57
par256_12	parallel	256	12	0.5	206
par512_1	parallel	512	1	0.8	97
par512_3	parallel	512	3	1.4	23
par512_6	parallel	512	6	2.2	38
par512_12	parallel	512	12	1.1	46
par1024_1	parallel	1024	1	4.2	23
par1024_3	parallel	1024	3	0.3	7

par1024_6	parallel	1024	6	2.7	7
par1024_12	parallel	1024	12	5.0	6
serial_1	serial	1	1	0.5	2472
serial_6	serial	1	6	0.0	19
serial_3	serial	1	3	0.2	46
serial_12	serial	1	12	0.1	159
inter32_1	interactive	32	1	0.0	1326
inter32_20m	interactive	32	1	0.0	1365
course16_1	interactive	16	1	0.0	0
course32_1	parallel	32	1	0.0	0

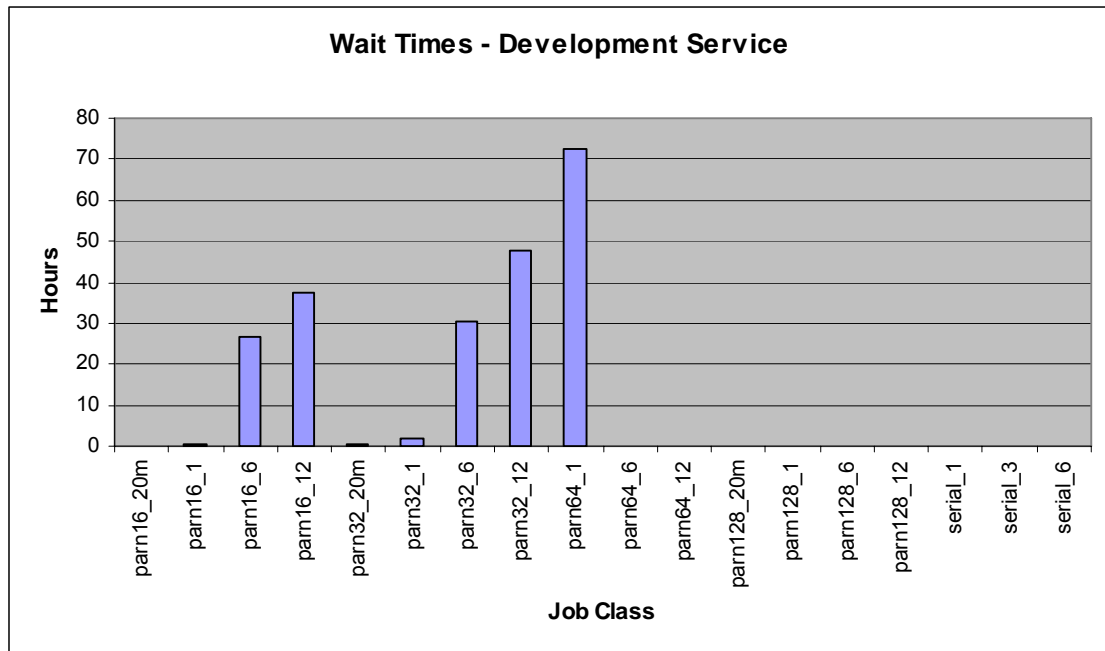


Job wait times – development service

Wait times on the development have grown to some degree, especially for long jobs. Given the exceptionally high utilisation of the service (93.4%), this is not unexpected.

Job Class	Category	Maximum Number of CPUs	Maximum Job length	Average wait time	Number of Jobs
parn16_20m	parallel	16	20 mins	0.1	784
parn16_1	parallel	16	1 hour	0.7	4928
parn16_6	parallel	16	6 hours	26.4	193
parn16_12	parallel	16	12 hours	37.5	213
parn32_20m	parallel	32	20 mins	0.6	358
parn32_1	parallel	32	1 hour	1.7	1544

parn32_6	parallel	32	6 hours	30.4	81
parn32_12	parallel	32	12 hours	47.7	96
parn64_1	parallel	64	1 hour	72.4	180
parn64_6	parallel	64	6 hours	0.0	0
parn64_12	parallel	64	12 hours	0.0	0
parn128_20m	parallel	128	20 mins	0.0	0
parn128_1	parallel	128	1 hour	0.0	0
parn128_6	parallel	128	6 hours	0.0	0
parn128_12	parallel	128	12 hours	0.0	0
serial_1	serial	1	1 hour	0.0	2332
serial_3	serial	1	12 hours	0.0	11
serial_6	serial	1	12 hours	0.0	41



2.5 Disk Occupancy

Home Space

Home space is the part of the disk space that is regularly backed up.

<i>Consortium</i>	<i>Disc Occupancy (Mb)</i>	<i>Disc Quota (Mb)</i>
b02	34,058	50,000
b03	52,711	50,000
b08	9,305	50,000
c01	148,598	300,000
e01	198,913	199,995
e03	59,154	225,012
e05	356,662	600,550
e06	289,875	300,000
e08	94,422	100,000
e10	97,184	150,000
e11	39,405	100,000
e14	99,353	100,000
e15	40,791	50,000
e16	133	20,000
e17	46,660	50,000
e18	37,438	40,000
e19	1,417	40,000
e20	57,802	60,000
e21	1,521	50,000
e22	5,268	10,000
e23	9,733	50,000
e24	23,260	394,376
e25	9,668	50,000
e26	18,032	20,000
e27	19,054	20,000
e29	22,633	50,000
e30	0	40,000
e31	43,633	50,000
e32	47,110	50,000
e33	11,234	50,000
e34	0	50,000
e35	44,776	100,000
e36	49,084	50,000
e37	120,967	204,800
e38	11,670	50,000
e39	32,504	150,000
e40	18,109	50,000
e41	1,532	100,000

e42	29,232	100,000
e45	43,936	50,000
e46	6,605	50,000
e47	0	50,000
e48	5	50,000
e49	33,773	50,000
e50	3,257	13,000
e51	4,469	50,000
e52	11	50,000
e53	3,062	50,000
e54	46,526	50,000
e55	1,664	50,000
e56	47,509	50,000
e57	0	50,000
e58	21,606	100,000
e60	4,480	50,000
e61	14,644	50,000
n01	104,110	250,000
n02	159,904	298,000
n03	86,355	100,000
n04	262,928	299,999
p01	118,032	200,000
x01	42,672	50,000
x02	8,746	20,000
x03	4,227	50,000
z001	473,295	500,000
z002	45,347	124,000
z003	0	3
z004	98,426	100,000
z05	4,188	30,000
z06	58,382	75,000
z07	34,616	50,000
z10	490	50,000

Workspace

<i>Consortium</i>	<i>Disc Occupancy (Mb)</i>	<i>Disc Quota (Mb)</i>
b02	15	1,025
b03	47,908	100,000
b08	5,100	50,000
c01	89,068	100,000
e01	1,141,082	1,249,995
e03	10	500,000
e05	401,975	647,004
e06	367,939	400,000
e08	141	5,000

e10	331,345	400,000
e11	45,568	100,000
e14	198,693	250,000
e15	37,597	100,000
e16	0	60,000
e17	91,697	100,000
e18	26,366	80,000
e19	169,244	200,000
e20	941,925	1,000,000
e21	1	100,000
e22	0	20,000
e23	37,389	100,000
e24	1	2,800,000
e25	140,152	150,000
e26	0	40,000
e27	2,760	40,000
e29	7	9,800
e30	0	80,000
e31	99,318	100,000
e32	99,998	100,000
e33	99,885	100,000
e34	0	100,000
e35	2,443	200,000
e36	48,895	50,000
e37	175,090	307,200
e38	0	100,000
e39	0	100,000
e40	1	100,000
e41	124,020	200,000
e42	240,639	400,000
e45	0	100,000
e46	0	50,000
e47	0	160,000
e48	95,722	200,000
e49	25,224	50,000
e50	215,543	100,000
e51	0	100,000
e52	0	50,000
e53	784	150,000
e54	0	100,000
e55	0	100,000
e56	99,999	100,000
e57	0	100,000
e58	0	200,000
e60	0	100,000
e61	0	100,000
n01	157,473	800,000
n02	6,641,836	8,499,904

n03	31,797	81,002
n04	515,618	750,000
p01	41,764	50,000
x01	142,493	160,000
x02	0	20,000
x03	178	50,000
z001	441,147	500,000
z002	1,617	770
z003	0	3
z004	18,874	25,000
z05	4,740	20,000
z06	57,096	100,000
z07	6	20,000
z10	0	50,000

Development service space

This is the disk space reserved for users of the development service.

<i>Consortium</i>	<i>Disc Occupancy (Mb)</i>	<i>Disc Quota (Mb)</i>
n02	5,675,160	9,499,003
n04	315,160	526,899

2.6 Tape Archive

<i>Consortium</i>	<i>Usage (Tapes)</i>	<i>Quota (Tapes)</i>	<i>Files</i>	<i>Data (Gb)</i>
c01	2	2	7,231	65
e01	60	60	261,363	5,453
e03	5	5	18,797	429
e14	10	10	391,623	595
e15	1	3	26	6
e24	10	10	7,785	803
e26	2	2	545	27
e42	10	10	29,481	447
n01	291	295	32,453	31,569
n02	471	505	538,144	51,312
n04	28	30	116,775	3,740
z001	7	10	11,045	67
z002	3	4	5,802	15
z06	1	3	833	68

Note that a tape is counted in the *Usage* column even if it is only partly occupied.

3 Support

3.1 Helpdesk

The format of this section has evolved this month, reflecting the advent of the new SAFE-based helpdesk software.

Classifications

<i>Service metric</i>	<i>Number</i>	<i>% of all</i>
Administrative	28	31.8%
Technical	42	47.7%
In-depth	12	13.6%
PMR	1	1.1%
TOTAL	83	100.0%

The *PMR* service metric includes in-depth queries that result in Problem Management Reports for IBM.

In place of the former *Service Area* information we shall supply a breakdown of queries by subject category.

<i>Category</i>	<i>Number</i>	<i>% of all</i>
Login, passwords, ssh	22	26.5%
Disks, tapes, resources	18	21.7%
3rd party software	8	9.6%
User programs	6	7.2%
Compilers and system software	5	6.0%
User behaviour	5	6.0%
SAFE	4	4.8%
Batch system and queues	3	3.6%
Courses	2	2.4%
None	2	2.4%
Other	2	2.4%
Porting	2	2.4%
Tools	2	2.4%
Access to HPCx	1	1.2%
Static website	1	1.2%
TOTAL	83	100.0%

Performance

<i>Metric</i>	<i>Achieved</i>	<i>Total</i>	<i>Fraction</i>	<i>Target</i>
All queries - three days	68	70	97%	97%
Administrative queries - two days	27	28	96%	97%
All queries - one day	53	70	76%	75%

Query handlers

<i>Handler</i>	<i>Technical</i>	<i>In-depth</i>	<i>Admin</i>	<i>PMR</i>
Sysadm	16	2	10	0
DL	6	2	1	1
EPCC	20	8	17	0

3.2 Training

There were no training courses this month.

4 Staffing

4.1 Science Support Staffing

Daresbury Laboratory

<i>Name</i>	<i>Days</i>
Ashworth	10.8
Blake	1.5
Bush	18.0
Johnstone	7.5
Jones	3.6
Plummer	10.0
Sunderland	17.0
Todorov	10.0
Total (Days)	78.4
FTEs	4.4

EPCC

<i>Name</i>	<i>Days</i>
Simpson	21.9
Booth	17.7
Henty	4.4
Smith	2.2
Bull	7.2
Fisher	6.0
Hein	23.9
Jackson	6.8
Reid	15.5
Stratford	2.8
Nazarova	4.5
Trew	4.3
Gray	12.6
D'Mellow	14.3
Hill	1.4
Johnson	1.0

Maynard	0.8
Weiland	21.4
Total (Days)	168.4
FTEs	9.5

Overall Levels

	<i>FTEs</i>
DL	4.4
EPCC	9.5
Total	13.9

4.2 Systems Staffing

<i>Name</i>	<i>Days</i>
Andrews	18.0
Brown	21.0
Fisher	10.5
Georgeson	18.0
Franks	16.2
Jones	0.9
BITD	18.0
Total (days)	102.6
FTEs	5.8

Note: BITD covers a range of bookings from a support department who provide approximately 1 FTE to support computer room operations, electrical and mechanical site services and networking and security. Roughly a dozen staff charge time to the project in amounts which vary from month to month. We believe that it adds no value to report these individual bookings although a full listing can be provided annually if required.

5 Summary of Performance Metrics

<i>Metric</i>	<i>TSL</i>	<i>FSL</i>	<i>Monthly Measurement</i>
Technology serviceability	80%	99.2%	100.0%
Technology MTBF (hours)	200	300	∞
Number of AV FTEs	7.5	10	13.9
Number of training days per month	20/12	25/12	13/5
Non in-depth queries resolved within 3 days	85%	97%	97.1%
Number of A&M FTEs	3.75	5.75	5.8
A&M serviceability	80%	99.6%	100.0%

Appendix A: Incident Severity Levels

SEV 1 — anything that comprises a FAILURE as defined in the contract with EPSRC.

SEV 2 — NON-FATAL incidents that typically cause immediate termination of a user application, but not the entire user service.

The service may be so degraded (or liable to collapse completely) that a controlled, but unplanned (and often very short-notice) shutdown is required or unplanned downtime subsequent to the next planned reload is necessary.

This category includes unrecovered disc errors where damage to filesystems may occur if the service was allowed to continue in operation; incidents when although the service can continue in operation in a degraded state until the next reload, downtime at less than 24 hours notice is required to fix or investigate the problem; and incidents whereby the throughput of user work is affected (typically by the unrecovered disabling of a portion of the system) even though no subsequent unplanned downtime results.

SEV 3 — NON-FATAL incidents that typically cause immediate termination of a user application, but the service is able to continue in operation until the next planned reload or re-configuration.

SEV 4 — NON-FATAL recoverable incidents that typically include the loss of a storage device, or a peripheral component, but the service is able to continue in operation largely unaffected, and typically the component may be replaced without any future loss of service.

Appendix B: Projects

B.1 Current Projects

	<i>Class</i>	<i>Title</i>	<i>PI</i>
e01	1	UK Turbulence Consortium	Dr Gary Coleman
e05	1	Materials Chemistry using Terascaling Computing	Prof Richard Catlow
e06	1	UK Car-Parrinello Consortium	Prof Paul Madden
e07	2	Turbulent Plasma Transport in Tokamaks	Dr Colin M Roach
e08	2	Organic Solid State	Prof Sarah Price
e10	1	Reality Grid	Prof Peter Coveney
e11	1	Bond making and breaking at surfaces	Prof Sir David A King
e14	1	Blade and Cavity Noise	Prof Neil Sandham
e15	2	CSAR/HPCx Collaboration	Dr Mike Pettipher
e16	1	Cardiac virtual tissues	Prof Arun V Holden
e17	1	Integrative Biology	Dr David Gavaghan
e18	1	DARP: Highly swept leading edge separations	Prof Michael A Leschziner
e19	1	Edinburgh Soft Matter and Statistical Physics Group	Prof Michael E Cates
e20	1	UK Applied Aerodynamics Consortium	Dr Ken Badcock
e21	1	Intrinsic Parameter Fluctuations in Decananometer MOSFETs	Prof Asen M Asenov
e22	1	Preconditioners for finite element problems	Prof David J Silvester
e23	1	Exploitation of Switched Lightpaths for e-Science Applications	Prof Peter Clarke
e24	1	DEISA - Distributed European Infrastructure for Supercomputing Applications	Dr David Henty
e25	1	Turbulent vortex motion in stratified flows	Dr Gary Coleman
e26	1	Simulation of Radioprobing	Dr Charlie Laughton
e27	1	SPICE	Prof Peter V Coveney
e29	1	Free-surface-piercing circular cylinders	Dr Eldad Avital

e30	1	Metal/Oxide Interfaces at the Atomic Level	Dr Nora de Leeuw
e31	1	Lateral Straining of Wall-Bounded Turbulence	Dr Gary N Coleman
e32	1	Rapid Prototyping of Usable Grid Middleware	Prof Peter V Coveney
e33	1	Engineering Functional Coatings	Prof Roger Smith
e34	1	Dissolution of Bioactive Phosphate Glasses	Dr N de Leeuw
e35	1	Non-adiabatic processes	Dr T Todorov
e36	1	Jets in Cross-Flow	Dr Y Yao
e37	1	LESUK_3	Prof J J McGuirk
e38	1	Viscoelastic deformation in 3D non-linear media	Prof Greg A Houseman
e39	1	The Supergen 5 biological fuel cells consortium	Prof FA Armstrong
e40	1	Computational Quantum Many-Body Theory	Prof R Needs
e41	1	Flow in Weapon Bays	Dr George N Barakos
e42	1	Computational Combustion for Engineering Applications	Prof K Luo
e45	1	Metals under extreme conditions	Prof Mike Gillan
e46	1	Advanced materials with complex architectures	Dr Paul Mummery
e47	1	Parallel stochastic analysis for geo-engineering	Dr Michael A. Hicks
e48	1	Organised structure in turbulent flows	Prof Sergei Chernyshenko
e49	1	Integrated Programme of Research in Aeronautical Engineering	Prof Michael Leschziner
e50	1	Biological interface with materials	Prof John Harding
e51	1	Super-computing data mining	Dr Mike Pettipher
e52	1	Spacecraft force modelling	Dr M Ziebart
e53	1	Large-scale communication networks	Prof J M Pitts
e54	1	Free surface simulation of waves overtopping during storms	Dr D M Ingram
e55	1	High-Reynolds-Number Near-Wall Flows	Prof Michael Leschziner
e56	1	Infectious disease threats	Dr Iain Barrass
e57	1	Triplex DNA Structures	Dr Hooshang Nikjoo

e58	1	Quantum Simulations for Chemical Biology	Dr Carmen Domene
e60	1	Device Electronics Based on nanoWires and NanoTubes	Dr Merlyne M de Souza
e61	1	Enhancement of droplet concentrations in clouds	Dr Alan A M Gadian

PPARC Projects

<i>Code</i>	<i>Class</i>	<i>Title</i>	<i>PI</i>
p01	1	Atomic Physics and Astrophysics	Prof Alan Hibbert

NERC Projects

<i>Code</i>	<i>Class</i>	<i>Title</i>	<i>PI</i>
n01	1	Large-Scale Long-Term Ocean Circulation	Dr David Webb
n02	1	NCAS	Prof Alan J Thorpe
n03	1	Computational Mineral Physics Consortium	Dr John Brodholt
n04	1	Shelf Seas Consortium	Dr Roger Proctor

BBSRC Projects

<i>Code</i>	<i>Class</i>	<i>Title</i>	<i>PI</i>
b02	1	Modelling enzyme catalysis	Dr Adrian J Mulholland
b08	1	IntBioSim	Prof M S Sansom

CCLRC Projects

<i>Code</i>	<i>Class</i>	<i>Title</i>	<i>PI</i>
c01	1	Daresbury Laboratory Facilities Agreement Consortium	Dr Richard J Blake

Externally-funded Projects

<i>Code</i>	<i>Title</i>	<i>PI</i>
x01	HPC-Europa	Dr Judy Hardy
x03	IBM	Mr Derrick J Byford

HPCx Projects

<i>Code</i>	<i>Title</i>	<i>PI</i>
z001	HPCx Support	Dr Alan Simpson
z002	Systems and Operations	Mr Mike Brown
z003	Test Project	Dr Denis Nicole
z004	HPCx Training	Dr David Henty
z05	Outreach Projects	Dr Richard Blake
z06	Application Porting	Dr David Henty
z07	Package Installation	Dr Mike Ashworth
z10	Globus	Dr Stephen P Booth

B.2 Former Projects

<i>Code</i>	<i>Class</i>	<i>Title</i>	<i>PI</i>
b01	2	Quantum Chemistry Studies of the Rusticyanin Protein Crystal	Prof Samar Hasnain
b03	1	Towards a virtual outer membrane	Prof Mark S Sansom
b04	1	Life sciences software development	Dr Jo L Dicks
b05	1	Virtual forced evolution of catalytic transition metal complexes	Dr Marcus Durrant
b06	2	Biomolecular computational chemistry	Prof Jonathan D Hirst
e02	1	Ab-initio simulation of covalently bonded materials	Dr Patrick Briddon
e03	1	Multi-photon, electron collisions and BEC HPC consortium	Prof Ken Taylor
e04	1	Chemreact Computing Consortium	Prof Jonathon Tennyson
e07	2	Turbulent Plasma Transport in Tokamaks	Dr Colin M Roach
e09	2	Molecular Properties and their Geometry	Dr Mark R Wilson
e12	1	Parallel programs for the simulation of complex fluids	Dr Richard J Blake
e13	1	TeraGyroid project	Mr Mark Westwood
e28	1	Towards the Dynome	Dr Jonathan W Essex
z09		HECToR Benchmarking	Dr Edward Smyth
x02		OHM Ltd	Dr Lucy MacGregor
n05	2	Non-linear Wave-particle Instabilities in Plasmas	Dr Mervyn Freeman