

HPCx Service Report

February 2006

1 Introduction

This report covers the period from 1 February 2006 at 0800 to 1 March 2006 at 0800, a service month of 772 hours.

Overall utilisation, at 69%, was up compared to last month, although still some way behind the figures for the latter part of last year. Capability use, at 35% of the total, has also increased substantially. Utilisation of the development service, at 47%, is starting to ramp up. There were no SEV 1 incidents this month.

2 Usage

2.1 Availability

Incidents

During this month, there were 3 incidents, none of which were at SEV 1. The following table indicates the severity levels of the incidents, where SEV 1 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	1
3	1
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

There was a total of 16.3 hours of scheduled downtime this month.

<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>
e04	166277	127	792922	24.9%
e05	88819	263	428878	13.4%
e06	65745	0	316524	9.9%
e07	438	0	2111	0.1%
e08	1350	0	6499	0.2%
e10	0	5	23	0.0%
e11	10825	0	52115	1.6%
e14	18651	29	89933	2.8%
e16	101	0	484	0.0%
e17	159	0	767	0.0%
e18	1428	0	6876	0.2%
e20	74433	209	359358	11.3%
e24	53166	5	255987	8.0%
e25	3318	126	16578	0.5%
e26	307	0	1480	0.0%
e27	0	0	0	0.0%
e28	34595	0	153706	4.8%
e29	0	24	117	0.0%
e31	1930	39	9482	0.3%
e32	3668	0	12383	0.4%
e40	114	0	547	0.0%
<i>EPSRC Total</i>	<i>525323</i>	<i>827</i>	<i>2506769</i>	<i>78.6%</i>

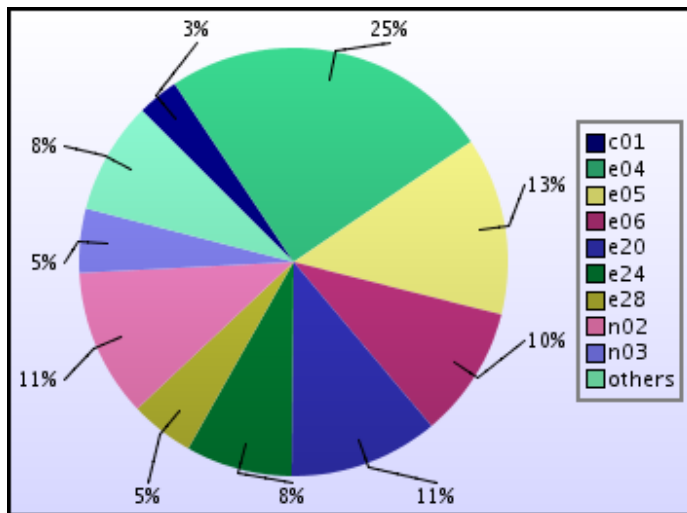
n01	1470	0	7079	0.2%
n02	74105	21	356873	11.2%
n03	32645	97	154428	4.8%
n04	2181	44	10711	0.3%
<i>NERC Total</i>	<i>110401</i>	<i>162</i>	<i>529092</i>	<i>16.6%</i>

p01	2698	3	13003	0.4%
<i>PPARC Total</i>	<i>2698</i>	<i>3</i>	<i>13003</i>	<i>0.4%</i>

c01	20825	35	100190	3.1%
<i>CCLRC Total</i>	20825	35	100190	3.1%

x01	841	44	4263	0.1%
<i>External Total</i>	841	44	4263	0.1%

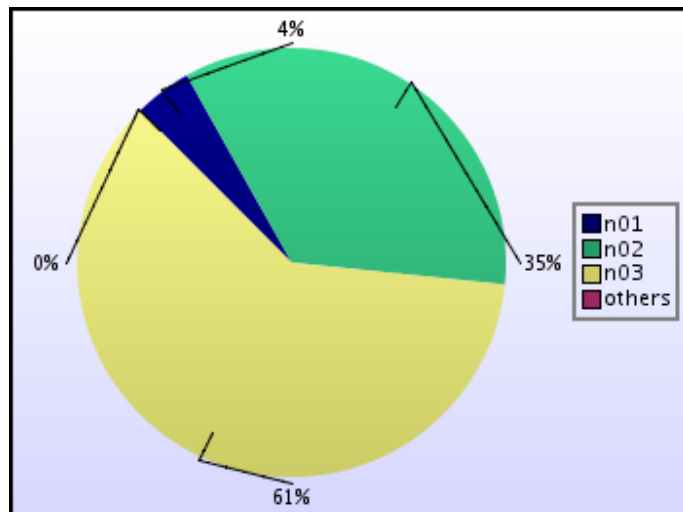
z001	9218	71	31654	1.0%
z002	5	0	22	0.0%
z06	703	145	4085	0.1%
<i>HPCx Total</i>	9925	216	35760	1.1%



Development Service

<i>Consortium</i>	<i>CPU Hours (Parallel)</i>	<i>CPU Hours (Other)</i>	<i>AUs charged</i>	<i>%age of charged AUs</i>
n01	2605	0	12540	4.4%
n02	20734	9	99863	34.8%
n03	36225	87	174822	60.9%
<i>NERC Total</i>	<i>59563</i>	<i>96</i>	<i>287225</i>	<i>100.0%</i>

z001	0	0	1	0.0%
<i>HPCx Total</i>	<i>0</i>	<i>0</i>	<i>1</i>	<i>0.0%</i>



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	311701	9.7%	2602
33–64	198548	6.2%	965
65–128	705323	21.9%	488
129–256	891651	27.6%	451
257–512	484079	15.0%	118
513–1024	634441	19.7%	57

Utilisation by region

Capacity Region (26 nodes, jobs using ≤128 CPUs): a total of 1215573 raw AUs were used; that is 90.3% of the total available in this region

Capability Region (64 nodes, jobs using >128 CPUs): a total of 2010171 raw AUs were used; that is 60.7% of the total available in this region

The remaining 2 nodes are reserved for interactive-parallel work.

Overall utilisation was 68.8%.

Development Service

<i>Number of processors</i>	<i>Raw AUs</i>	<i>%age</i>	<i>Number of jobs</i>
≤32	280393	97.8%	686
33–64	5127	1.8%	39
65–128	1246	0.4%	7
129–256	0	0.0%	0

Overall utilisation was 46.9%.

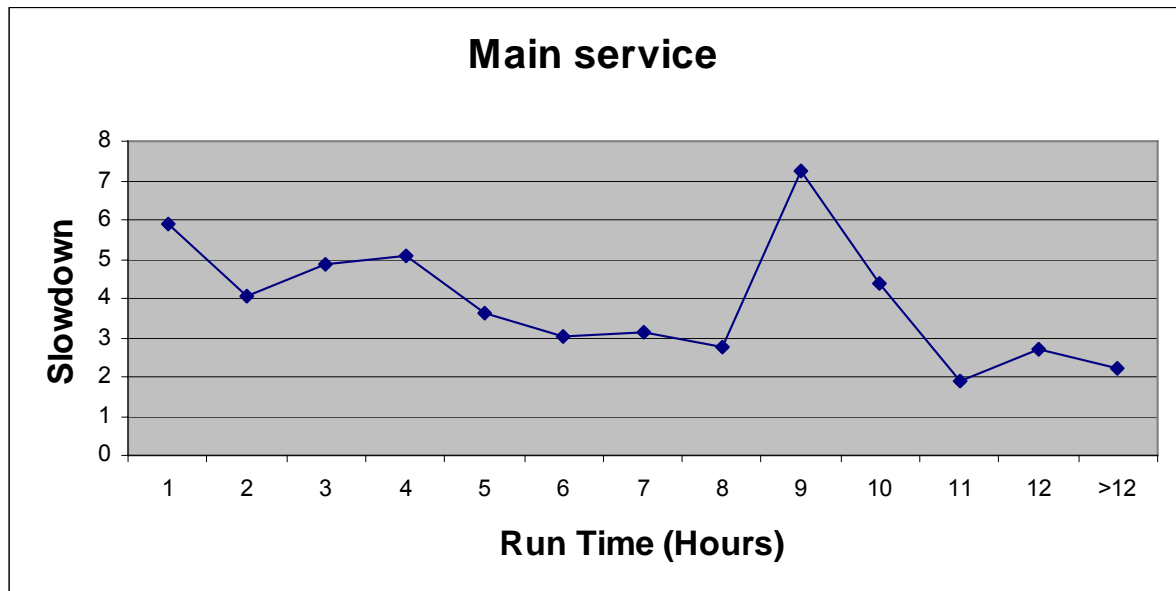
2.4 Slowdown and Job Wait Times

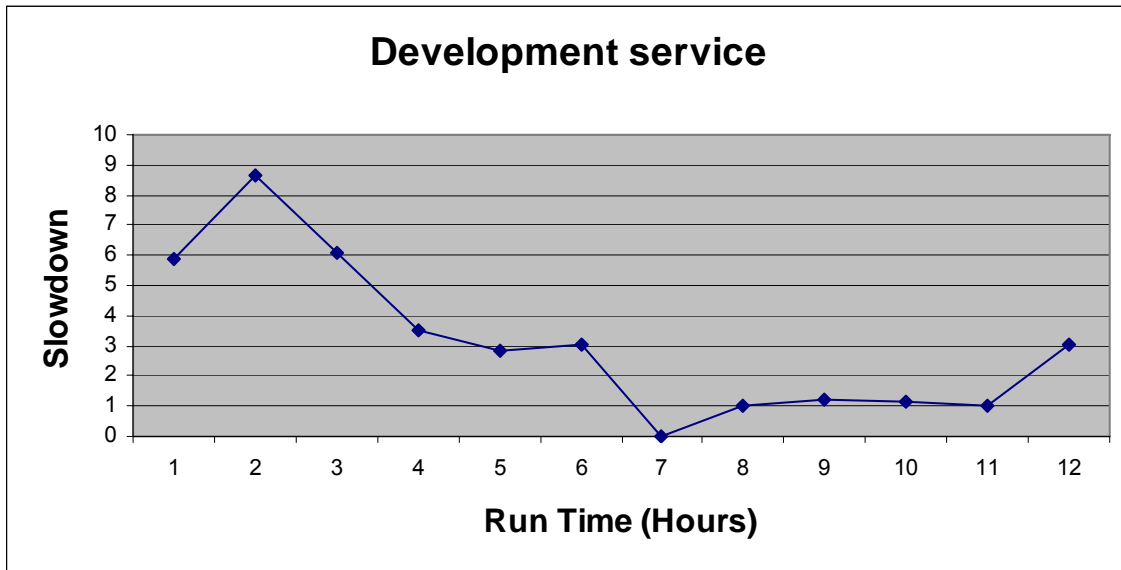
Slowdowns

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

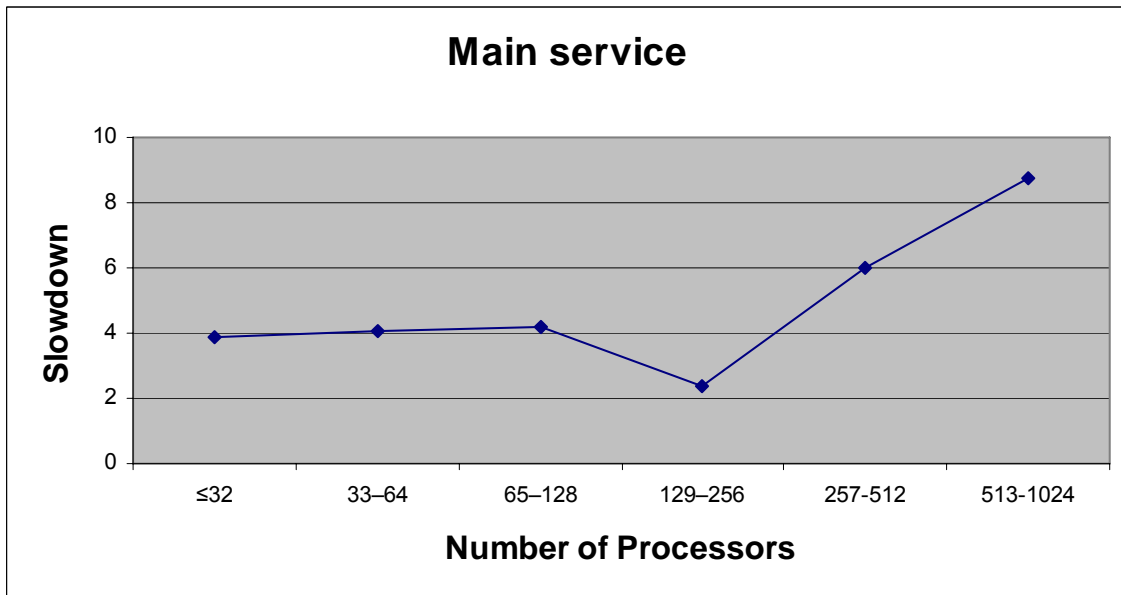
$$\text{Slowdown} = (\text{job run time} + \text{job wait time}) / (\text{job run time})$$

Slowdowns of less than around 10 are usually regarded as reasonable. The graph below plots slowdown against run-time (ignoring jobs of less than 5 minutes duration).





In the graph below, we plot the slowdown figures for the main service against the number of processors used and ignoring jobs of less than 1 hour.



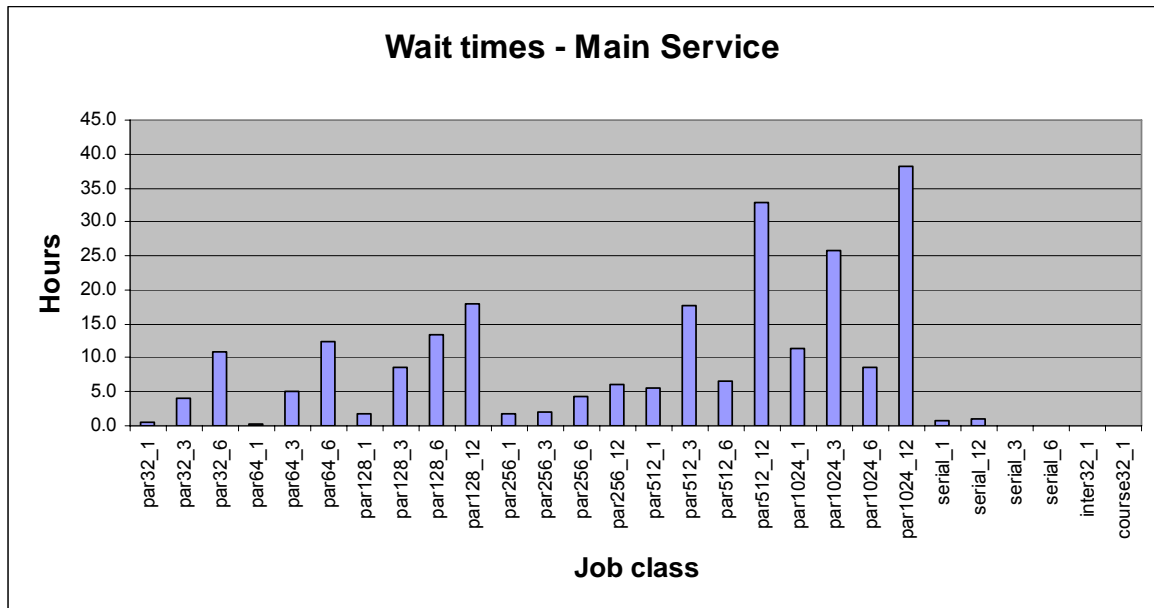
On the development service, all jobs of more than 1 hour in length used 32 processors or less; their average wait time was 4 hours.

In general the pattern of slowdowns is satisfactory. We have made adjustments to the queue configuration on the development service with the aim of improving the throughput of short jobs and are continuing to monitor this carefully.

Job wait times

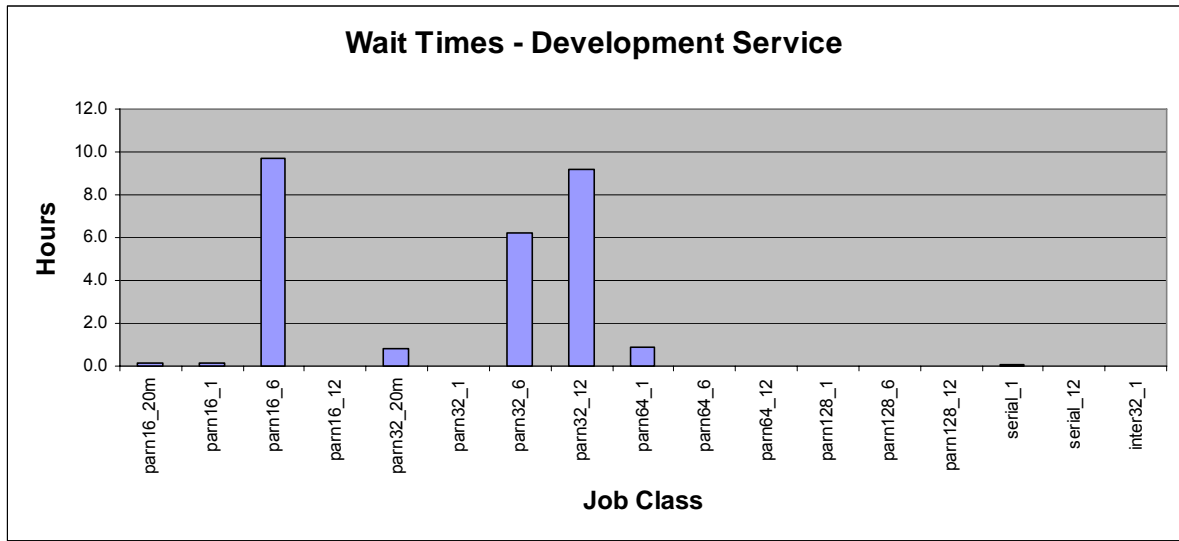
The following table and graph shows the average wait time (in hours) for each class of job on the main service. These are also satisfactory in general.

<i>Job Class</i>	<i>Category</i>	<i>Maximum Number of CPUs</i>	<i>Maximum Job length (hours)</i>	<i>Average wait time</i>	<i>Number of Jobs</i>
par32_1	parallel	32	1	0.4	1718
par32_3	parallel	32	3	4.0	161
par32_6	parallel	32	6	10.8	657
par64_1	parallel	64	1	0.4	740
par64_3	parallel	64	3	5.0	35
par64_6	parallel	64	6	12.4	160
par128_1	parallel	128	1	1.7	192
par128_3	parallel	128	3	8.7	23
par128_6	parallel	128	6	13.3	62
par128_12	parallel	128	12	17.9	177
par256_1	parallel	256	1	1.9	215
par256_3	parallel	256	3	2.1	54
par256_6	parallel	256	6	4.4	87
par256_12	parallel	256	12	6.1	69
par512_1	parallel	512	1	5.5	48
par512_3	parallel	512	3	17.8	17
par512_6	parallel	512	6	6.6	17
par512_12	parallel	512	12	32.9	17
par1024_1	parallel	1024	1	11.3	20
par1024_3	parallel	1024	3	25.8	8
par1024_6	parallel	1024	6	8.6	3
par1024_12	parallel	1024	12	38.2	20
serial_1	serial	1	1	0.7	1798
serial_12	serial	1	12	1.1	75
serial_3	serial	1	3	0.0	3
serial_6	serial	1	6	0.0	7
inter32_1	interactive	32	1	0.0	5397
course32_1	parallel	32	1	0.0	0



The wait times for the development service are shown below. These are also good.

<i>Job Class</i>	<i>Category</i>	<i>Maximum Number of CPUs</i>	<i>Maximum Job length</i>	<i>Average wait time</i>	<i>Number of Jobs</i>
par32_1	parallel	32	1 hour	0.5	3
par32_6	parallel	32	6 hours	31.1	4
parn16_20m	parallel	16	20 mins	0.1	3
parn16_1	parallel	16	1 hour	0.1	82
parn16_6	parallel	16	6 hours	9.7	100
parn16_12	parallel	16	12 hours	0.0	2
parn32_20m	parallel	32	20 mins	0.8	13
parn32_1	parallel	32	1 hour	0.0	65
parn32_6	parallel	32	6 hours	6.2	251
parn32_12	parallel	32	12 hours	9.1	163
parn64_1	parallel	64	1 hour	0.9	39
parn64_6	parallel	64	6 hours	0.0	0
parn64_12	parallel	64	12 hours	0.0	0
parn128_1	parallel	128	1 hour	0.0	7
parn128_6	parallel	128	6 hours	0.0	0
parn128_12	parallel	128	12 hours	0.0	0
serial_1	serial	1	1 hour	0.1	144
serial_12	serial	1	12 hours	0.0	2
inter32_1	interactive	32	1 hour	0.0	49



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	31,881.6	50,000
b03	4,495.2	50,000
b05	16,361.4	50,000
b06	14,993.3	50,000
b08	0.1	50,000
c01	87,088.8	100,000
e01	44,028.6	48,834
e02	23,079.3	38,829
e03	54,396.0	225,012
e04	52,867.8	100,000
e05	206,002.6	445,000
e06	280,151.2	300,000
e07	7,547.1	20,000
e08	23,704.6	50,000
e10	9,569.8	10,000
e11	39,645.6	100,000
e14	84,424.2	100,000
e15	4,053.3	50,000
e16	175.2	20,000
e17	17,074.7	50,000
e18	35,937.4	40,000
e19	43.1	40,000
e20	51,429.8	60,000
e21	95.5	50,000
e22	127.9	10,000
e23	0.1	50,000
e24	1,069.9	50,000
e25	5,358.4	50,000
e26	19,561.9	20,000
e27	3,401.0	20,000
e28	24,862.0	40,000
e29	422.5	30,000
e30	0.1	40,000
e31	44,829.9	50,000
e32	24,907.1	50,000
e33	121.7	50,000
e36	211.4	50,000
e37	0.3	100,000

e40	299.9	50,000
n01	49,111.5	50,000
n02	96,420.5	128,000
n03	50,710.9	100,000
n04	176,189.0	299,999
p01	32,939.8	40,000
x01	39,745.9	50,000
x02	8,746.2	20,000
z001	264,724.6	270,001
z002	44,003.9	48,001
z003	0.2	3
z004	72,106.6	100,000
z05	4,187.8	30,000
z06	49,298.1	50,000
z07	20,869.4	30,000
z09	15,366.4	50,000

Workspace

<i>Consortium</i>	<i>Disc Occupancy (Mb)</i>	<i>Disc Quota (Mb)</i>
b02	14.8	1,025
b03	60,232.6	100,000
b05	6,222.7	100,000
b06	623.3	100,000
b08	0.1	50,000
c01	80,317.7	100,000
e01	1,076,225.0	1,150,000
e02	8,354.8	10,000
e03	9.8	500,000
e04	2,737,576.0	3,200,000
e05	163,947.8	487,804
e06	273,662.9	400,000
e07	51,741.2	99,999
e08	140.6	5,000
e10	284,222.9	300,000
e11	10,397.2	100,000
e14	121,279.7	150,000
e15	18,238.4	100,000
e16	0.2	60,000
e17	815.1	100,000
e18	6,498.4	80,000
e19	168,861.6	200,000
e20	782,825.6	1,000,000
e21	1.0	100,000
e22	0.1	20,000
e23	0.1	100,000

e24	177,252.7	300,000
e25	108,018.2	150,000
e26	0.1	40,000
e27	0.3	40,000
e28	37,908.0	80,000
e29	919.0	8,000
e30	0.1	80,000
e31	50,841.4	100,000
e32	484.2	100,000
e33	1,162.2	100,000
e36	0.1	50,000
e37	0.1	150,000
e40	0.2	100,000
n01	272,246.0	500,000
n02	1,433,954.0	1,999,003
n03	938.2	1,002
n04	436,118.4	750,000
p01	998.5	1,000
x01	61,409.4	100,000
x02	0.2	20,000
z001	338,511.9	399,999
z002	290.4	770
z003	0.2	3
z004	23,742.4	25,000
z05	0.3	1,000
z06	58,667.8	100,000
z07	1.7	10
z09	22,327.8	100,000

Development 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>
n01	0.0	500,000
n02	84,409.9	5,210,003

Tape Archive

<i>Consortium</i>	<i>Usage (Tapes)</i>	<i>Quota (Tapes)</i>	<i>Files</i>	<i>Data (Gb)</i>
c01	2	2	17	17
e01	38	38	36747	3425
e03	5	5	18797	429
e04	4	14	1260	254
e14	8	10	11641	90
e26	2	2	72	11
n01	127	160	15283	13280
n02	117	180	81249	15328
n04	20	20	71265	2407
z001	2	10	6189	50
z002	4	4	5810	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

Classifications

<i>Category</i>	<i>Number</i>	<i>% of all</i>
Administrative	17	23.3
Technical	45	61.6
In-depth	11	15.1
PMR	0	0.0
TOTAL	73	100.0

The PMR category indicates in-depth queries that result in Problem Management Reports for IBM.

<i>Service Area</i>	<i>Number</i>	<i>% of all</i>
Phase 2 platform	70	95.9
Website	1	1.4
Other/general	2	2.7
TOTAL	73	100.0

Performance

<i>All non-indepth queries</i>	<i>Number</i>	<i>%</i>	<i>Target</i>
Finished within 24 Hours	51	82.3	75%
Finished within 72 Hours	62	100.0	97%
Finished after 72 Hours	0	0.0	

<i>Administrative queries</i>	<i>Number</i>	<i>%</i>	<i>Target</i>
Finished within 48 Hours	17	100.0	97%
Finished after 48 Hours	0	0.0	

Experts Handling Queries

<i>Expert</i>	<i>Admin</i>	<i>Technical</i>	<i>In-Depth</i>	<i>PMR</i>
epcc.ed.ac.uk	9	18	8	0
dl.ac.uk	1	8	2	0
Sysadm	7	18	1	0
Other people	0	1	0	0

3.2 Training

There were no training courses in February.

4 Staffing

4.1 Science Support Staffing

Daresbury Laboratory

<i>Name</i>	<i>Days</i>
Ashworth	9.8
Blake	1.5
Bush	19.0
Guest	4.5
Johnstone	9.8
Jones	3.8
Plummer	20.0
Sherwood	1.9
Sunderland	18.5
Thomas	10.0
Pickles	1.9
van Dam	2.5
Total (Days)	103.1
FTEs	5.8

EPCC

<i>Name</i>	<i>Days</i>
Simpson	14.6
Booth	14.7
Henty	9.2
Smith	11.8
Bull	4.0
Fisher	3.3
Hein	14.5
Jackson	0.7
Pringle	2.1
Reid	6.2
Stratford	4.3
Nazarova	4.0
Trew	0.7
Gray	13.0
D'Mellow	17.4
Hill	2.4

Helpdesk	1.3
Total (Days)	124.0
FTEs	7.0

Overall Levels

	<i>FTEs</i>
DL	5.8
EPCC	7.0
Total	12.8

4.2 Systems Staffing

<i>Name</i>	<i>Days</i>
Andrews	15.0
Blake	0.0
Brown	20.0
Fisher	11.0
Georgeson	13.5
Franks	15.0
Jones	1.0
Shore	15.0
BITD	20.0
Total (days)	110.5
FTEs	6.2

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	12.8
Number of training days per month	20/12	25/12	0/2
Non in-depth queries resolved within 3 days	85%	97%	100.0%
Number of A&M FTEs	3.75	5.75	6.2
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>Code</i>	<i>Class</i>	<i>Title</i>	<i>PI</i>
e04	1	Chemreact Computing Consortium	Prof Jonathon Tennyson
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 Decanometer 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
e28	1	Towards the Dynome	Dr Jonathan W Essex
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
z09		HECToR Benchmarking	Dr Edward Smyth

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

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

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
e01	1	UK Turbulence Consortium	Prof Neil Sandham
e09	2	Molecular Properties and their Geometry	Prof Peter Taylor
e12	1	Parallel programs for the simulation of complex fluids	Dr Mark R Wilson
e13	1	TeraGyroid project	Dr Richard J Blake
x02		OHM Ltd	Mr Mark Westwood
n05	2	Non-linear Wave-particle Instabilities in Plasmas	Dr Mervyn Freeman