

HPCx Service Report

February 2007

1 Introduction

This report covers the period from 0800 on 1 February 2007 to 0800 on 1 March 2007. This was a service month of 672 hours.

Overall usage on the main service passed 88%, the highest value in the service so far. Usage on the development service was also a record, passing 95%. There was only one incident at any severity level, the best performance for any month in the service.

2 Usage

2.1 Availability

Incidents

During this month, there was 1 incident, which was not at SEV1, as can be seen in the following table. 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	0
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 5.5 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	122317	256	590122	8.6%
e03	86	0	413	0.0%
e05	83482	1021	406834	5.9%
e06	35108	74	169383	2.5%
e08	7168	0	34508	0.5%
e11	3342	0	16088	0.2%
e14	6555	1	31564	0.5%
e17	23185	36	111795	1.6%
e19	67	0	323	0.0%
e21	11239	11	54161	0.8%
e23	59419	0	286069	4.1%
e24	22	0	106	0.0%
e25	0	1	6	0.0%
e26	1950	0	9388	0.1%
e27	13691	1	63234	0.9%
e31	258	0	1242	0.0%
e32	15586	0	75039	1.1%
e33	16056	0	77301	1.1%
e35	76952	96	370943	5.4%
e36	129	50	853	0.0%
e37	309016	1	1487743	21.6%
e38	523	0	2516	0.0%
e39	10276	188	50378	0.7%
e40	807	6	3913	0.1%
e42	141581	1	681635	9.9%
e48	2232	0	10745	0.2%
e49	407	16	2039	0.0%
e50	29740	0	143181	2.1%
e51	195	0	939	0.0%
e53	320	31	1693	0.0%
e54	14961	16	72103	1.0%
<i>EPSRC Total</i>	1065509	1806	5120875	74.2%

n01	61022	19	293875	4.3%
n02	120328	14	579378	8.4%
n03	114778	523	546350	7.9%
n04	41262	24	198771	2.9%
<i>NERC Total</i>	337389	579	1618374	23.5%

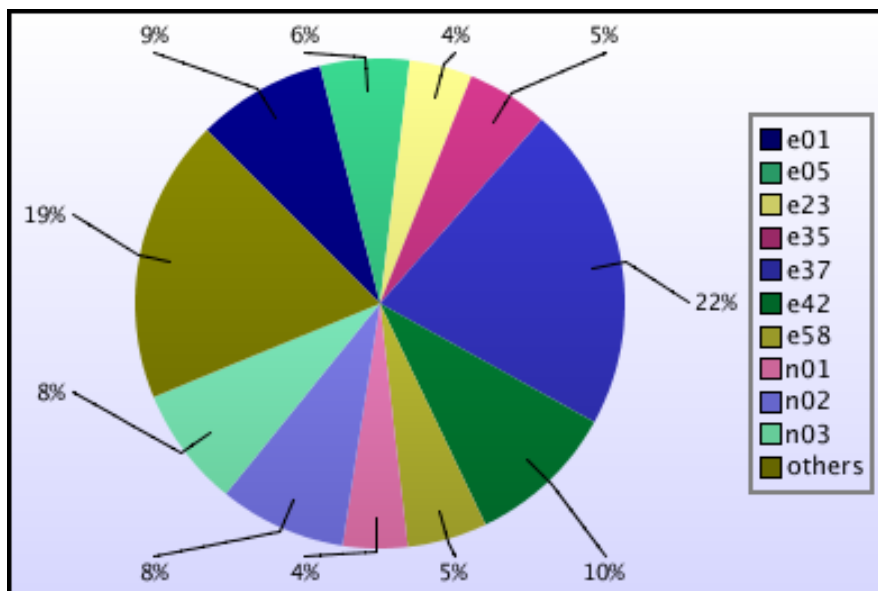
p01	710	0	3419	0.0%
<i>PPARC Total</i>	710	0	3419	0.0%

c01	7623	12	36755	0.5%
<i>CCLRC Total</i>	7623	12	36755	0.5%

b08	4840	23	23409	0.3%
<i>BBSRC Total</i>	4840	23	23409	0.3%

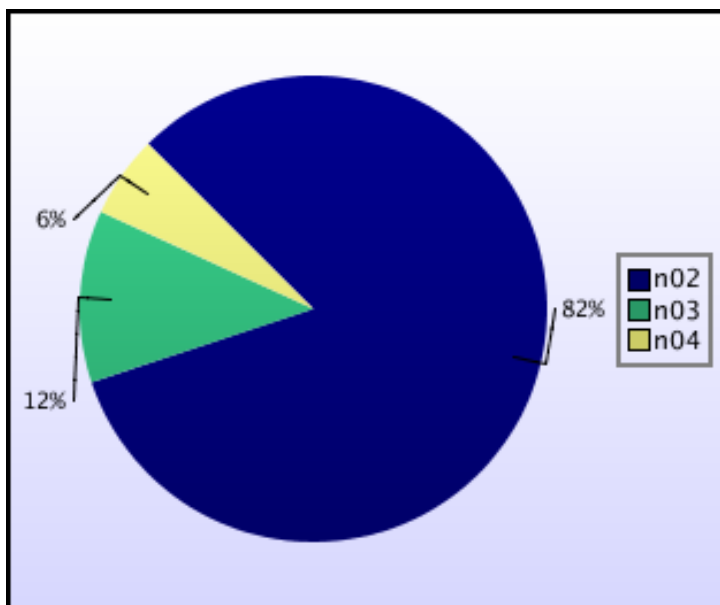
x01	17837	125	86476	1.3%
<i>External Total</i>	17837	125	86476	1.3%

z001	2108	28	10281	0.1%
z004	130	6	654	0.0%
z06	0	0	1	0.0%
<i>HPCx Total</i>	2237	34	10935	0.2%



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>
n02	100467	604	486602	82.4%
n03	14634	0	70453	11.9%
n04	6953	0	33473	5.7%
<i>NERC Total</i>	122053	604	590528	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	619344	9.0%	3620
33–64	437384	6.3%	610
65–128	1530659	22.1%	1252
129–256	2852419	41.3%	633
257–512	1358473	19.6%	119
513–1024	115966	1.7%	11
>1024	0	0.0%	0

Overall utilisation of the main service was 88.6%. Capability usage was 21.3% of the total.

Development Service

<i>Number of processors</i>	<i>Raw AUs</i>	<i>%age</i>	<i>Number of jobs</i>
≤32	560628	95.4%	7995
33–64	26992	4.6%	196
65–128	0	0.0%	0
129–256	0	0.0%	0

Overall utilisation of the development service was 95.4%.

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:

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

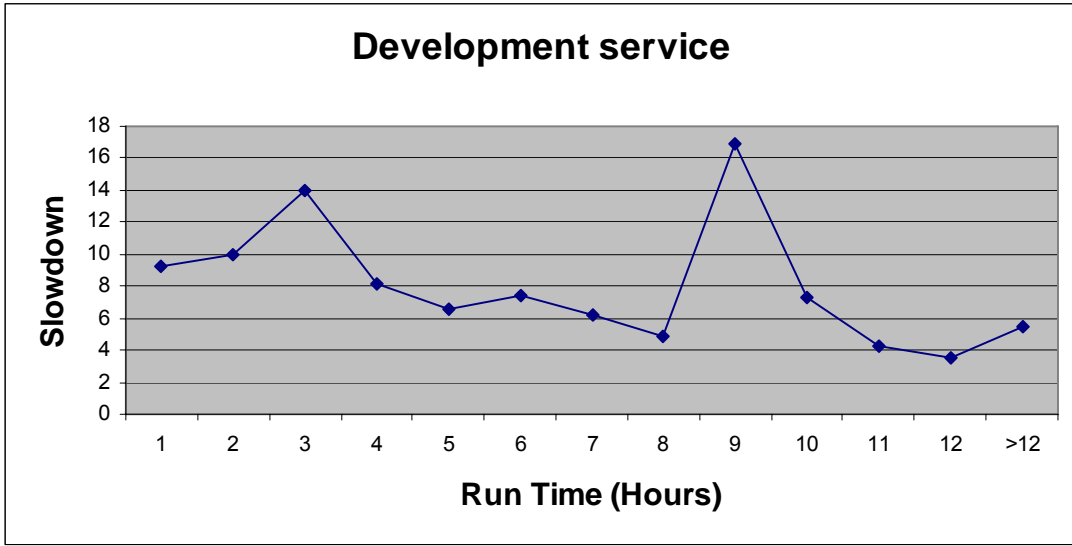
Slowdowns of less than around 10 are usually regarded as reasonable.

On both services, slowdowns are currently generally satisfactory, although for certain job classes the very utilisation of the system is having an effect..

Slowdowns by runtime

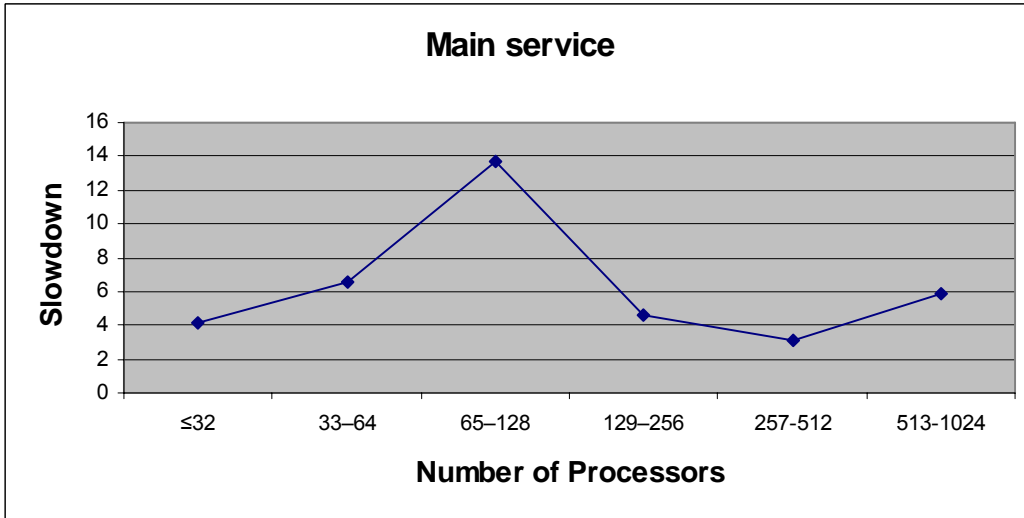
The following graphs show the slowdowns recorded for jobs of differing run times, ignoring those which ran for less than 5 minutes.

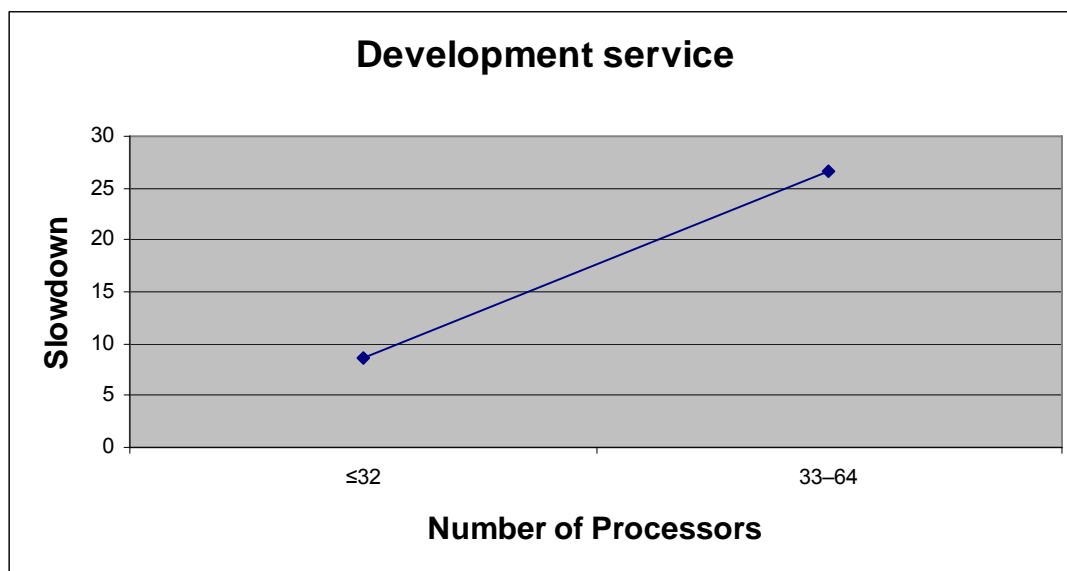




Slowdowns by number of processors

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.



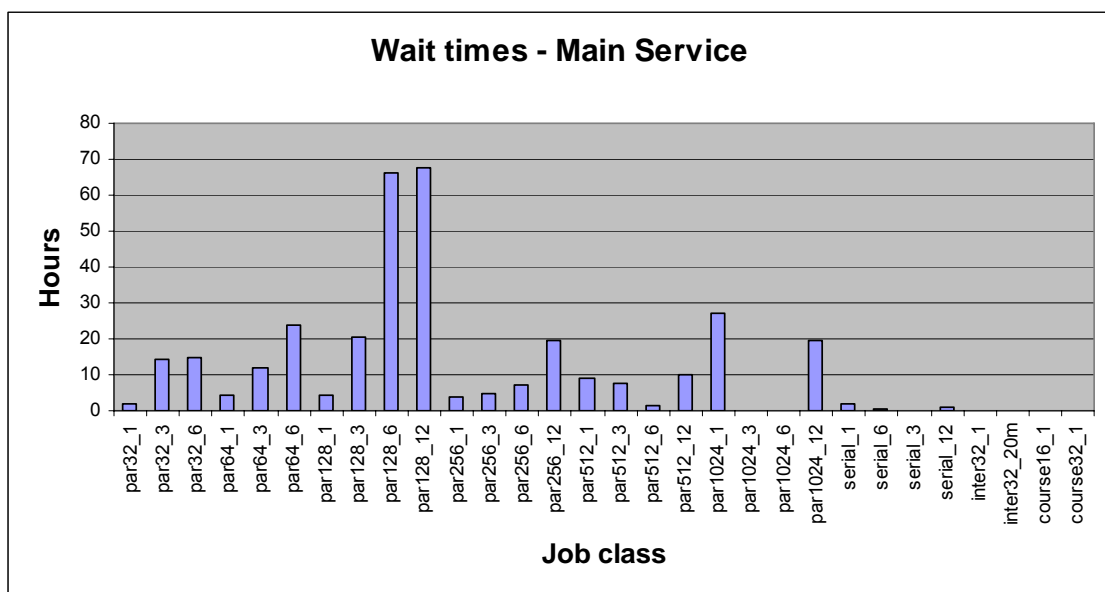


Job wait times – main service

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 exceptionally high utilisation.

Job Class	Category	Maximum Number of CPUs	Maximum Job length	Average wait time	Number of Jobs
par32_1	parallel	32	1	1.8	1849
par32_3	parallel	32	3	14.5	145
par32_6	parallel	32	6	14.9	1626
par64_1	parallel	64	1	4.2	269
par64_3	parallel	64	3	12.0	33
par64_6	parallel	64	6	23.7	308
par128_1	parallel	128	1	4.1	815
par128_3	parallel	128	3	20.5	50
par128_6	parallel	128	6	66.0	185
par128_12	parallel	128	12	67.8	202
par256_1	parallel	256	1	4.0	179
par256_3	parallel	256	3	4.8	36
par256_6	parallel	256	6	7.3	49
par256_12	parallel	256	12	19.5	369
par512_1	parallel	512	1	9.1	42
par512_3	parallel	512	3	7.8	1
par512_6	parallel	512	6	1.4	4
par512_12	parallel	512	12	9.8	72
par1024_1	parallel	1024	1	27.2	3
par1024_3	parallel	1024	3	0.0	0

par1024_6	parallel	1024	6	0.0	0
par1024_12	parallel	1024	12	19.7	8
serial_1	Serial	1	1	1.9	883
serial_6	Serial	1	6	0.3	293
serial_3	Serial	1	3	0.1	47
serial_12	Serial	1	12	0.8	131
inter32_1	interactive	32	1	0.0	1768
inter32_20m	interactive	32	1	0.0	1114
course16_1	interactive	16	1	0.0	0
course32_1	parallel	32	1	0.0	0

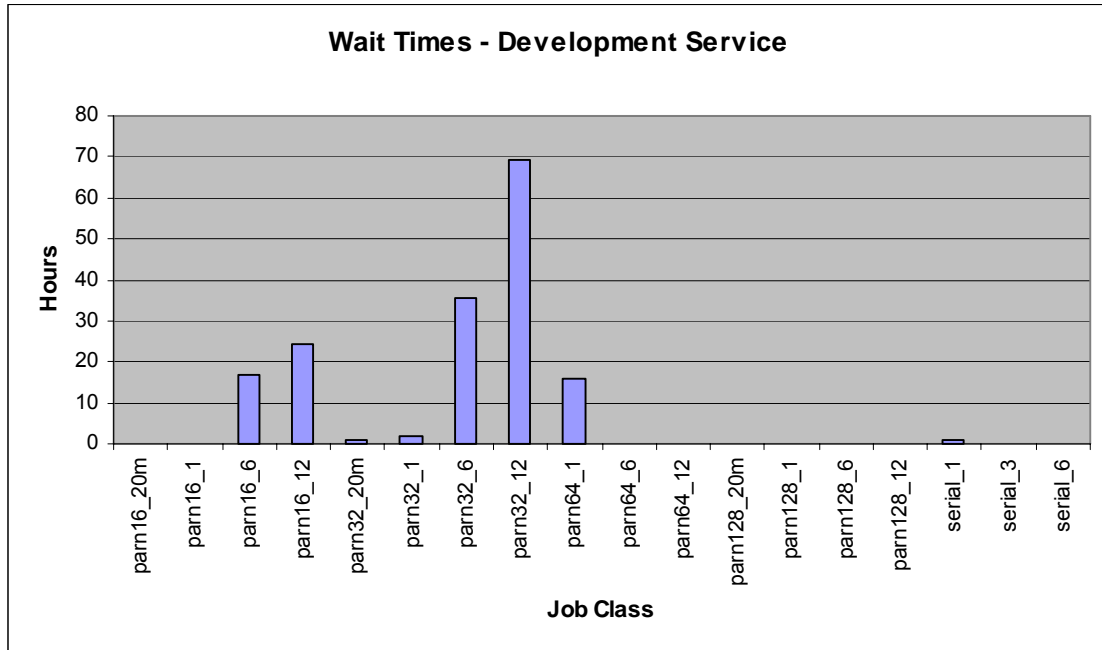


Job wait times – development service

Once again, the long wait times for 12-hour 32-processor jobs are attributable to the completely exceptional (95%) utilisation of the service.

Job Class	Category	Maximum Number of CPUs	Maximum Job length	Average wait time	Number of Jobs
parn16_20m	parallel	16	20 mins	0.1	1129
parn16_1	parallel	16	1 hour	0.2	3941
parn16_6	parallel	16	6 hours	16.9	205
parn16_12	parallel	16	12 hours	24.1	191
parn32_20m	parallel	32	20 mins	0.9	444
parn32_1	parallel	32	1 hour	1.8	1869
parn32_6	parallel	32	6 hours	35.5	96
parn32_12	parallel	32	12 hours	69.1	120
parn64_1	parallel	64	1 hour	16.1	153
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	0.9	3222
serial_3	serial	1	12 hours	0.0	5
serial_6	serial	1	12 hours	0.0	2



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	34058	50,000
b03	52711	50,000
b08	13278	50,000
c01	148221	150,000
e01	120240	199,995
e02	23079	38,829
e03	57410	225,012
e05	317512	576,050
e06	292801	300,000
e08	90851	100,000
e10	38498	150,000
e11	37674	100,000
e14	75531	100,000
e15	40791	50,000
e16	133	20,000
e17	36182	50,000
e18	32350	40,000
e19	1417	40,000
e20	59001	60,000
e21	948	50,000
e22	5268	10,000
e23	48697	50,000
e24	68843	394,376
e25	8759	50,000
e26	19269	20,000
e27	17981	20,000
e29	20835	30,000
e30	0	40,000
e31	43633	50,000
e32	47046	50,000
e33	5593	50,000
e34	0	50,000
e35	52966	100,000
e36	46546	50,000
e37	71068	100,000
e38	8071	50,000
e39	20136	150,000
e40	24350	50,000

e41	1521	100,000
e42	26201	100,000
e45	13211	50,000
e46	6569	50,000
e47	0	50,000
e48	5	50,000
e49	38362	50,000
e50	3352	13,000
e51	5829	50,000
e52	11	50,000
e53	1785	50,000
e54	8582	50,000
e55	1664	50,000
e56	47509	50,000
e57	0	50,000
e58	46416	100,000
e60	5270	50,000
e61	0	50,000
n01	47613	100,000
n02	157210	298,000
n03	70023	100,000
n04	215379	299,999
p01	80668	200,000
x01	36404	50,000
x02	8746	20,000
x03	4227	50,000
z001	442553	500,000
z002	45259	124,000
z003	0	3
z004	91326	100,000
z05	4188	30,000
z06	60750	75,000
z07	31260	50,000
z10	8.8	50,000

Workspace

<i>Consortium</i>	<i>Disc Occupancy (Mb)</i>	<i>Disc Quota (Mb)</i>
b02	15	1,025
b03	47908	100,000
b08	5100	50,000
c01	85822	100,000
e01	1184234	1,249,995
e02	8355	10,000
e03	10	500,000
e05	372393	598,004

e06	364325	400,000
e08	141	5,000
e10	325286	400,000
e11	40405	100,000
e14	206423	250,000
e15	37597	100,000
e16	0	60,000
e17	77177	100,000
e18	24820	80,000
e19	169244	200,000
e20	941925	1,000,000
e21	1	100,000
e22	0	20,000
e23	84509	100,000
e24	1951712	2,800,000
e25	127242	150,000
e26	0	40,000
e27	2760	40,000
e29	5296	8,000
e30	0	80,000
e31	96130	100,000
e32	99998	100,000
e33	41848	100,000
e34	0	100,000
e35	0	200,000
e36	35655	50,000
e37	118833	150,000
e38	0	100,000
e39	0	100,000
e40	1	100,000
e41	36462	200,000
e42	236190	400,000
e45	0	100,000
e46	0	50,000
e47	0	160,000
e48	63649	200,000
e49	25224	50,000
e50	182288	100,000
e51	0	100,000
e52	0	50,000
e53	530	150,000
e54	0	100,000
e55	0	100,000
e56	99999	100,000
e57	0	100,000
e58	0	200,000
e60	0	100,000
e61	0	100,000

n01	410999	800,000
n02	2188866	2,999,904
n03	4053	81,002
n04	429847	750,000
p01	41764	50,000
x01	131862	160,000
x02	0	20,000
x03	178	50,000
z001	420248	500,000
z002	1617	770
z003	0	3
z004	4577	25,000
z05	4740	20,000
z06	57219	100,000
z07	24	20,000
z10	0.1	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>
n01	0	500,000
n02	7733675	8,420,003
n04	85755	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	7231	65
e01	52	60	149878	5097
e03	5	5	18797	429
e14	10	10	391623	595
e15	1	3	26	6
e24	10	10	14459	1524
e26	2	2	545	27
e42	10	10	29481	447
n01	282	285	31844	30562
n02	355	358	467548	41662
n04	28	30	116775	3740
z001	7	10	11045	67
z002	3	4	5802	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	26	34.2
Technical	42	55.3
In-depth	8	10.5
PMR	0	0.0
TOTAL	76	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 3 platform	70	92.1
Website	1	1.3
Other/general	5	6.6
TOTAL	76	100.0

Performance

<i>All non-indepth queries</i>	<i>Number</i>	<i>%</i>	<i>Target</i>
Finished within 24 Hours	46	67.6	75%
Finished within 72 Hours	68	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	24	92.3	97%
Finished after 48 Hours	2	7.7	

Experts Handling Queries

<i>Expert</i>	<i>Admin</i>	<i>Technical</i>	<i>In-Depth</i>	<i>PMR</i>
epcc.ed.ac.uk	18	21	5	0
dl.ac.uk	2	9	1	0
Sysadm	6	12	2	0
Other people	0	0	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	15.4
Blake	1.8
Bush	20.0
Guest	5.0
Johnstone	6.0
Jones	2.0
Plummer	10.0
Sunderland	20.0
Total (Days)	80.2
FTEs	4.5

EPCC

<i>Name</i>	<i>Days</i>
Simpson	17.2
Booth	22.4
Henty	4.3
Smith	6.7
Bull	2.0
Fisher	4.0
Hein	9.2
Jackson	0.3
Reid	3.1
Stratford	3.4
Nazarova	14.9
Trew	4.3
Gray	3.9
D'Mellow	0.9
Johnson	1.2
Maynard	1.8
Weiland	17.7

Other staff	0.8
Total (Days)	118.1
FTEs	6.7

Overall Levels

	<i>FTEs</i>
DL	4.5
EPCC	6.7
Total	11.2

4.2 Systems Staffing

<i>Name</i>	<i>Days</i>
Andrews	16.2
Blake	0.0
Brown	20.0
Fisher	11.0
Georgeson	19.0
Franks	19.0
Jones	1.0
BITD	16.0
Total (Days)	102.2
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	11.2
Number of training days per month	20/12	25/12	4/2
Non in-depth queries resolved within 3 days	85%	97%	100.0%
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

EPSRC Projects

<i>Code</i>	<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 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

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