

HPCx Service Report

May 2006

1 Introduction

This report covers the period from 1 May 2006 at 0800 to 1 June 2006 at 0800, a service month of 744 hours.

Utilisation recovered somewhat this month, but at 58% is still below average. Utilisation of the capacity region, at 84%, is very high. Courses run in May totalled 14 days in length.

2 Usage

2.1 Availability

Incidents

During this month, there were 14 incidents, 3 of which was 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	3
2	2
3	9
4	0

The MTBF figures for this month were as follows:

<i>SEV1</i>	<i>Incidents</i>	<i>MTBF</i>
IBM	1.0	732
Site	0.0	∞
External	2.0	366
<i>Overall</i>	3.0	244

The following table gives more details on the Severity 1 incident2:

<i>Failure</i>	<i>Site</i>	<i>IBM</i>	<i>External</i>	<i>Reason</i>
06.045	0%	0%	100%	External network failure
06.046	0%	0%	100%	External network failure
06.051	0%	100%	0%	Maintenance session overrun

Serviceability

There was a total of 12 hours of scheduled downtime this month.

<i>Attribution</i>	<i>UDT</i>	<i>Serviceability</i>
IBM	5:00	99.3
Site	0:00	100.0
External	11:30	98.4
<i>Overall</i>	16:30	97.7

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	49494	93	238732	8.0%
e05	190658	37	918088	30.8%
e06	52342	43	252201	8.5%
e07	36918	1	177741	6.0%
e08	24614	0	118502	4.0%
e10	44	90	646	0.0%
e11	1111	0	5347	0.2%
e14	8809	0	42412	1.4%
e17	2757	0	13275	0.4%
e18	0	0	0	0.0%
e19	1	0	2	0.0%
e20	14150	4	68144	2.3%
e24	11	0	52	0.0%
e25	0	58	278	0.0%
e27	12317	0	59297	2.0%
e31	10094	2	48603	1.6%
e32	26703	15	110734	3.7%
e33	8231	0	39625	1.3%
e35	2154	459	12579	0.4%
e36	18070	0	84407	2.8%
e37	1225	3	5911	0.2%
e40	3416	0	16444	0.6%
<i>EPSRC Total</i>	<i>463115</i>	<i>803</i>	<i>2213022</i>	<i>74.2%</i>

n01	85717	19	412772	13.8%
n02	37873	3	182354	6.1%
n03	7793	0	37519	1.3%
n04	3181	254	16538	0.6%
<i>NERC Total</i>	<i>134565</i>	<i>276</i>	<i>649182</i>	<i>21.8%</i>

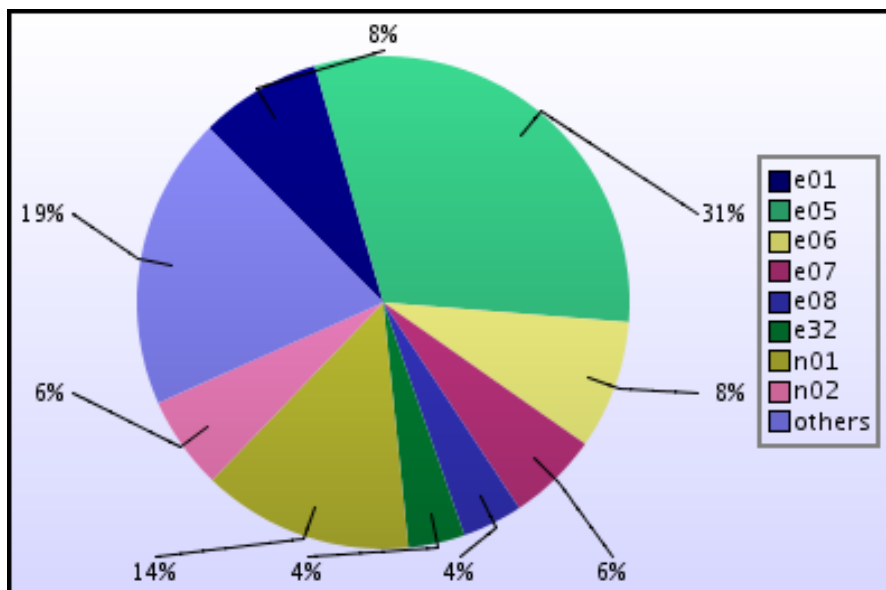
p01	1445	43	7163	0.2%
<i>PPARC Total</i>	<i>1445</i>	<i>43</i>	<i>7163</i>	<i>0.2%</i>

c01	8927	3	42989	1.4%
<i>CCLRC Total</i>	8927	3	42989	1.4%

b08	9814	0	47250	1.6%
<i>BBSRC Total</i>	9814	0	47250	1.6%

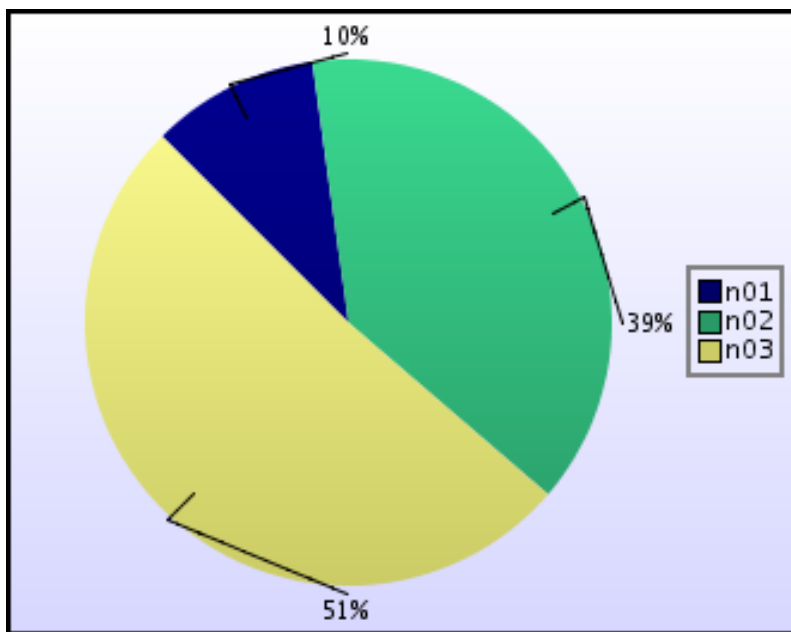
x01	1714	362	9996	0.3%
<i>External Total</i>	1714	362	9996	0.3%

z001	1858	11	8999	0.3%
z002	652	0	3138	0.1%
z004	3	0	15	0.0%
z05	350	0	1686	0.1%
z06	1	0	7	0.0%
<i>HPCx Total</i>	2864	12	13845	0.5%



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	8414	0	40508	10.3%
n02	31413	34	151401	38.5%
n03	41795	0	201217	51.2%
<i>NERC Total</i>	81622	34	393127	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	475844	15.9%	2578
33–64	210027	7.0%	544
65–128	568532	19.0%	347
129–256	1184960	39.5%	593
257–512	445221	14.9%	57
513–1024	109991	3.7%	12

Utilisation by region

Capacity Region (26 nodes, jobs using ≤128 CPUs): a total of 1254403 raw AUs were used; that is 84.2% of the total available in this region

Capability Region (64 nodes, jobs using >128 CPUs): a total of 1742315 raw AUs were used; that is 47.5% of the total available in this region

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

Overall utilisation was 58.8%. The difference in the utilisation figures for the two regions affects the slowdowns and wait times (see section 2.4).

Development Service

<i>Number of processors</i>	<i>Raw AUs</i>	<i>%age</i>	<i>Number of jobs</i>
≤32	300426	76.5%	1222
33–64	26945	6.9%	113
65–128	65592	16.7%	204
129–256	0	0.0%	0

Overall utilisation was 58.1%.

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:

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

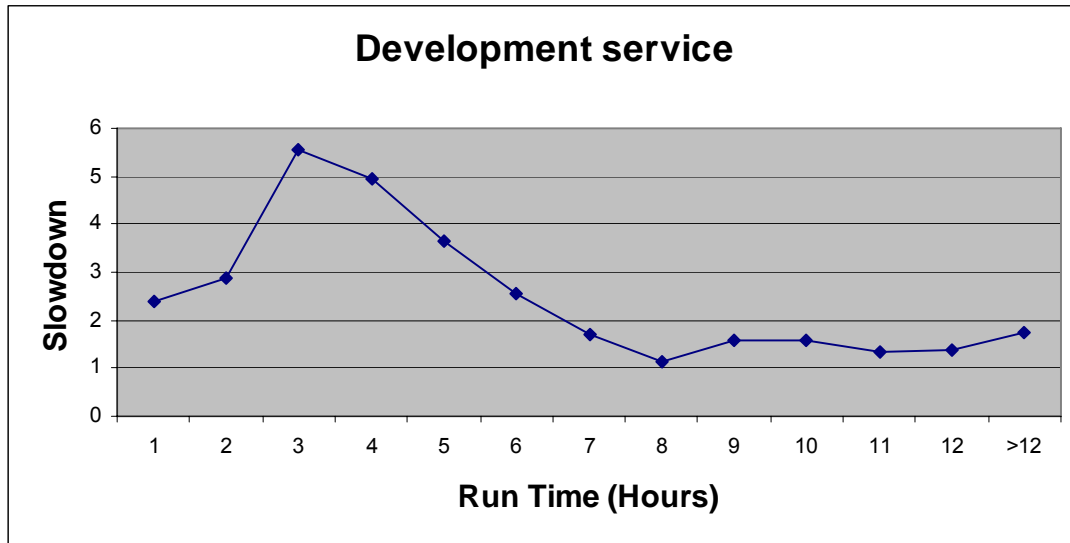
Slowdowns of less than around 10 are usually regarded as reasonable.

Currently the pattern of slowdowns on both services is satisfactory.

Slowdowns by runtime

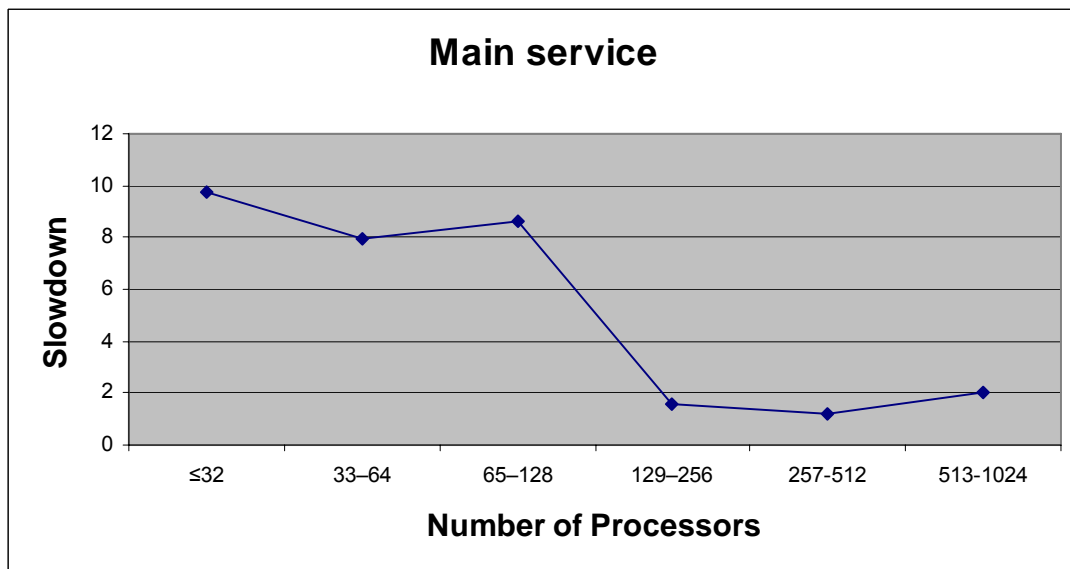
The following graphs show the slowdowns recorded for jobs of differing run times, ignoring those which ran for less than 5 minutes.

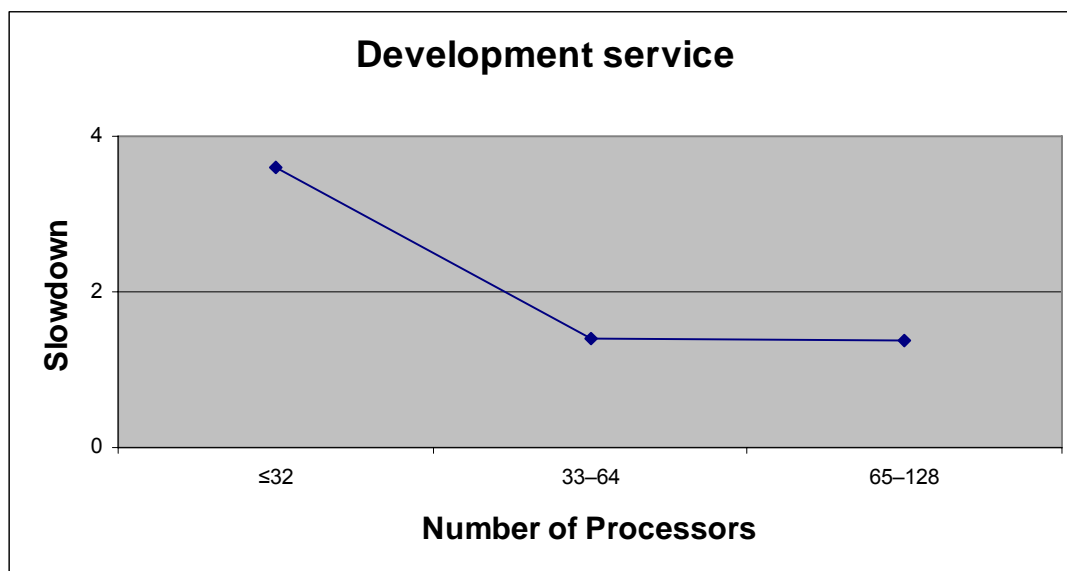




Slowdowns by number of processors

In the graphs below, we plot the slowdown figures against the number of processors used. Jobs which ran for less than 1 hour are ignored. The larger slowdown values for smaller jobs on the main service reflect the difference in the utilisations of the capacity and capability regions.



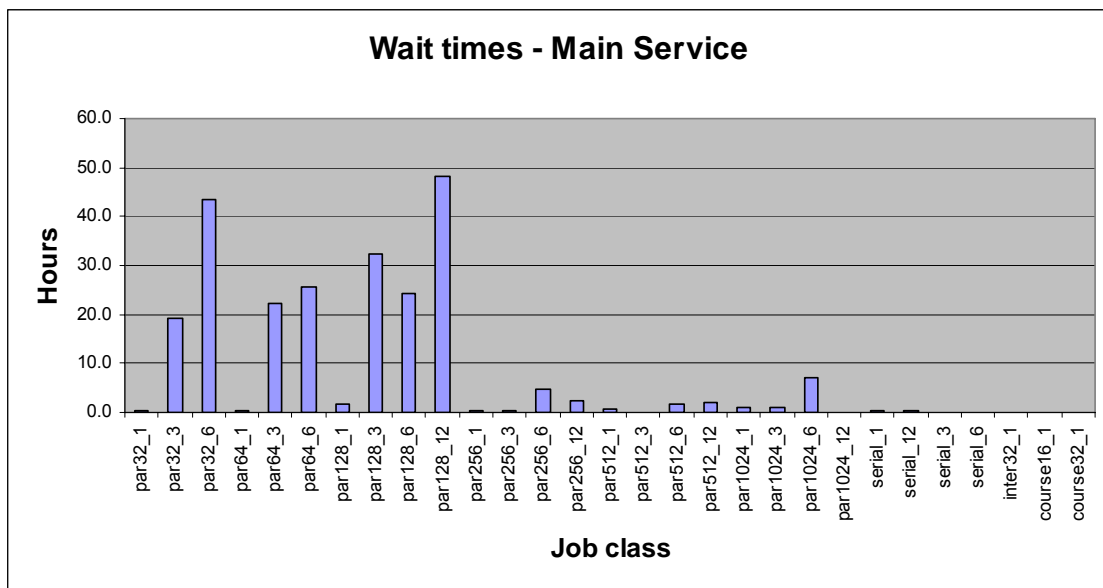


Job wait times

The following table and graph shows the average wait time (in hours) for each class of job on the main service. Once again, the differing utilisations of the capacity and capability regions (see section 2.3) are reflected in the longer wait times for smaller jobs.

Job Class	Category	Maximum Number of CPUs	Maximum Job length	Average wait time	Number of Jobs
par32_1	parallel	32	1	0.4	1570
par32_3	parallel	32	3	19.3	330
par32_6	parallel	32	6	43.4	678
par64_1	parallel	64	1	0.4	373
par64_3	parallel	64	3	22.1	20
par64_6	parallel	64	6	25.8	151
par128_1	parallel	128	1	1.8	179
par128_3	parallel	128	3	32.3	9
par128_6	parallel	128	6	24.3	17
par128_12	parallel	128	12	48.1	142
par256_1	parallel	256	1	0.3	277
par256_3	parallel	256	3	0.3	153
par256_6	parallel	256	6	4.6	21
par256_12	parallel	256	12	2.5	142
par512_1	parallel	512	1	0.8	30
par512_3	parallel	512	3	0.0	2
par512_6	parallel	512	6	1.6	4
par512_12	parallel	512	12	1.9	18
par1024_1	parallel	1024	1	1.1	2

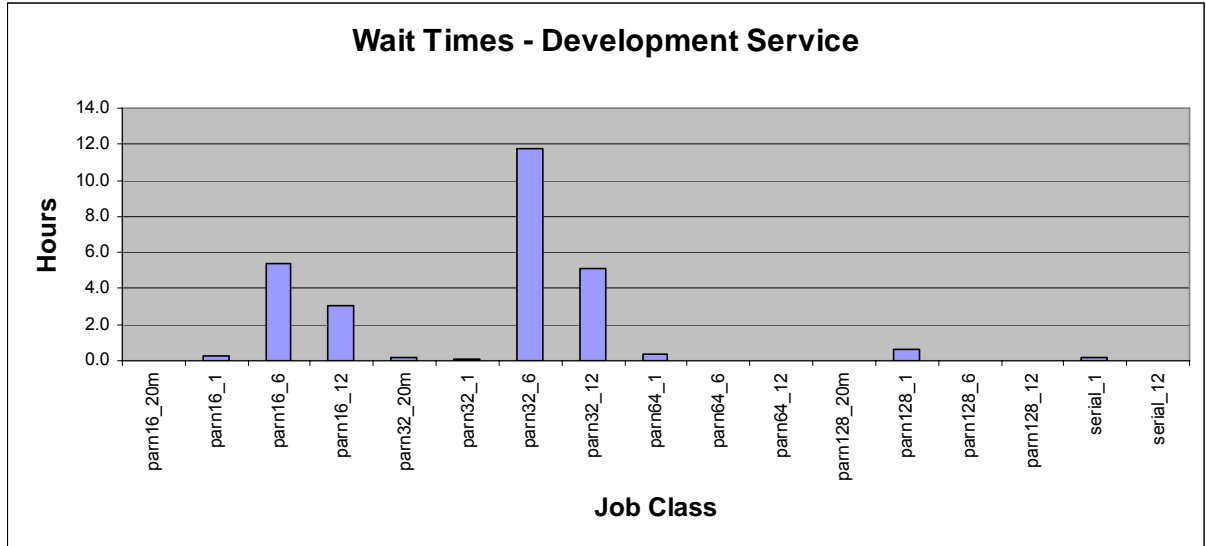
par1024_3	parallel	1024	3	1.2	1
par1024_6	parallel	1024	6	7.0	7
par1024_12	parallel	1024	12	0.0	0
serial_1	serial	1	1	0.3	397
serial_12	serial	1	12	0.3	149
serial_3	serial	1	3	0.0	2
serial_6	serial	1	6	0.0	39
inter32_1	interactive	32	1	0.0	2094
course16_1	interactive	16	1	0.0	19
course32_1	parallel	32	1	0.0	0



The wait times for the development service are shown below.

Job Class	Category	Maximum Number of CPUs	Maximum Job length	Average wait time	Number of Jobs
parn16_20m	parallel	16	20 mins	0.0	94
parn16_1	parallel	16	1 hour	0.3	158
parn16_6	parallel	16	6 hours	5.4	28
parn16_12	parallel	16	12 hours	3.0	6
parn32_20m	parallel	32	20 mins	0.2	158
parn32_1	parallel	32	1 hour	0.1	308
parn32_6	parallel	32	6 hours	11.7	193
parn32_12	parallel	32	12 hours	5.1	277
parn64_1	parallel	64	1 hour	0.4	113
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	0.6	204
parn128_6	parallel	128	6 hours	0.0	0
parn128_12	parallel	128	12 hours	0.0	0
serial_1	serial	1	1 hour	0.2	1660
serial_12	serial	1	12 hours	0.0	0



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	34,058.1	50,000
b03	52,710.5	50,000
b08	703.9	50,000
c01	117,444.2	150,000
e01	39,308.1	48,829
e02	23,079.3	38,829
e03	55,181.2	225,012
e05	225,229.9	448,550
e06	260,657.7	300,000
e07	12,890.2	20,000
e08	42,457.3	50,000
e10	24,578.8	150,000
e11	39,645.7	100,000
e14	87,360.9	100,000
e15	28,674.2	50,000
e16	132.9	20,000
e17	18,374.3	50,000
e18	38,353.5	40,000
e19	674.9	40,000
e20	57,375.4	60,000
e21	95.3	50,000
e22	127.9	10,000
e23	0.1	50,000
e24	43,176.3	200,000
e25	5,387.5	50,000
e26	12,152.6	20,000
e27	7,042.5	20,000
e29	2,087.8	30,000
e30	0.1	40,000
e31	48,418.8	50,000
e32	46,942.5	50,000
e33	121.7	50,000
e34	0.1	50,000
e35	2,390.6	100,000
e36	16,482.2	50,000
e37	49,109.5	100,000
e40	3,648.1	50,000
e41	0.1	100,000

n01	44,914.0	100,000
n02	97,022.1	128,000
n03	50,439.8	100,000
n04	184,858.7	299,999
p01	74,728.6	200,000
x01	49,705.3	50,000
x02	8,746.2	20,000
x03	634.6	50,000
z001	244,696.1	270,001
z002	31,397.0	48,001
z003	0.2	3
z004	80,251.9	100,000
z05	4,188.4	30,000
z06	49,972.2	50,000
z07	23,083.4	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	47,907.9	100,000
b08	5,019.5	50,000
c01	60,807.0	100,000
e01	1,149,364.2	1,149,995
e02	8,354.8	10,000
e03	9.8	500,000
e05	205,347.8	487,804
e06	388,731.2	400,000
e07	81,641.6	99,999
e08	140.8	5,000
e10	284,222.9	400,000
e11	18,650.6	100,000
e14	119,300.1	150,000
e15	18,238.4	100,000
e16	0.2	60,000
e17	1,686.1	100,000
e18	10,434.3	80,000
e19	168,861.6	200,000
e20	924,434.1	1,000,000
e21	1.0	100,000
e22	0.1	20,000
e23	0.1	100,000
e24	72,942.2	500,000
e25	144,257.2	150,000
e26	0.1	40,000

e27	0.3	40,000
e29	5,296.1	8,000
e30	0.1	80,000
e31	98,515.8	100,000
e32	90,365.8	100,000
e33	311.0	100,000
e34	0.1	100,000
e35	0.2	200,000
e36	0.1	50,000
e37	9,741.7	150,000
e40	0.2	100,000
e41	0.1	200,000
n01	313,633.2	500,000
n02	1,681,104.9	1,999,003
n03	60.3	41,002
n04	254,793.3	750,000
p01	41,764.4	50,000
x01	72,087.8	100,000
x02	0.2	20,000
x03	177.6	50,000
z001	384,279.0	399,999
z002	390.0	770
z003	0.2	3
z004	23,739.9	25,000
z05	4,739.7	20,000
z06	71,343.4	100,000
z07	1.7	1
z09	53,680.4	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	1304745.5	5,210,003
n04	0	500,000

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	7029	43
e01	38	38	41998	3438
e03	5	5	18797	429
e14	8	10	19164	178
e26	2	2	545	27
n01	162	180	19983	16932
n02	156	230	88930	20222
n04	30	30	110306	3255
z001	2	10	6189	50
z002	4	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	66	51.2
Technical	55	42.6
In-depth	7	5.4
PMR	1	0.8
TOTAL	129	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	107	82.9
Website	10	7.8
Other/general	12	9.3
TOTAL	129	100.0

Performance

<i>All non-indepth queries</i>	<i>Number</i>	<i>%</i>	<i>Target</i>
Finished within 24 Hours	104	86.0	75%
Finished within 72 Hours	121	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	66	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	49	31	5	0
dl.ac.uk	0	7	0	1
Sysadm	17	17	2	0
Other people	0	0	0	0

3.2 Training

<i>Title of Course</i>	<i>Start Date</i>	<i>Length (Days)</i>	<i>Place days</i>	<i>HPCx User Days</i>	<i>HPCx Staff Days</i>
Shared Memory Programming	02-May	3	75	42	3
Message Passing Programming	09-May	3	75	63	0
Parallel Decomposition	24-May	3	75	48	0
Porting Codes for CSAR to HPCx	25-May	1	25	12	0
Applied Numerical Algorithms	30-May	4	100	68	0

4 Staffing

4.1 Science Support Staffing

Daresbury Laboratory

<i>Name</i>	<i>Days</i>
Ashworth	8.6
Blake	2.0
Bush	19.0
Guest	5.0
Johnstone	10.0
Jones	3.8
Plummer	8.5
Sherwood	0.0
Sunderland	19.0
Thomas	0.0
Pickles	1.4
van Dam	0.0
Total (Days)	77.3
FTEs	4.4

EPCC

<i>Name</i>	<i>Days</i>
Simpson	14.2
Booth	17.3
Henty	10.8
Smith	13.5
Bull	2.7
Fisher	8.5
Hein	15.5
Jackson	4.7
Pringle	2.7
Reid	8.8
Stratford	6.5
Nazarova	6.7
Trew	4.3
Gray	5.5
D'Mellow	18.3
Hill	3.5

Johnson	1.0
Beckett	5.2
Helpdesk	0.0
Training	4.7
Total (Days)	154.4
FTEs	8.7

Overall Levels

	<i>FTEs</i>
DL	4.4
EPCC	8.7
Total	13.1

4.2 Systems Staffing

<i>Name</i>	<i>Days</i>
Andrews	15.0
Blake	0.0
Brown	21.0
Fisher	9.5
Georgeson	15.0
Franks	14.3
Jones	1.0
Shore	15.0
BITD	20.0
Total (days)	110.7
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%	99.3%
Technology MTBF (hours)	200	300	732
Number of AV FTEs	7.5	10	13.1
Number of training days per month	20/12	25/12	21/5
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

EPSRC Projects

<i>Code</i>	<i>Class</i>	<i>Title</i>	<i>PI</i>
e01	1	UK Trubulence 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 JJ McQuirk
e40	1	Computational Quantum Many-Body Theory	Prof R Needs
e41	1	Flow in Weapon Bays	Dr George N Barakos
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 J-C Desplat
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

Note: The original project e01 ended on 30 April 2005. The new UKTC project started on 1 March 2006. At the request of the PI it was assigned the same code as the old one, and inherited its disk space.

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
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
x02		OHM Ltd	Dr Lucy MacGregor
n05	2	Non-linear Wave-particle Instabilities in Plasmas	Dr Mervyn Freeman