

HPCx Service Report

September 2005

1 Introduction

This report covers the period from 1 September 2005 at 0800 to 1 October 2005 at 0800, a service month of 720 hours.

Overall utilisation fell back somewhat this month, largely as a result of a change in the pattern of work of one major consortium (e04). However, capability use, at more than 39%, was high, as was usage by NERC consortia. There were no SEV1 incidents this month.

1.1 Availability

Incidents

During this month, there were 7 incidents, none 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	0
2	2
3	5
4	0

Accordingly, the attributions and MTBFs for SEV1 incidents 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 15.7 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

1.2 CPU Usage by Consortium

The PIs and titles for the various consortia are listed in Appendix B.

e02	25197	125	97932	3.9%
e03	48333	1	186932	7.4%
e04	33549	2	119088	4.7%
e05	327939	453	953233	37.5%
e06	30327	2	117296	4.6%
e08	1952	0	7549	0.3%
e10	2755	0	10655	0.4%
e11	619	0	2394	0.1%
e14	10005	302	39862	1.6%
e15	64	0	247	0.0%
e17	2195	0	8489	0.3%
e18	6113	0	23644	0.9%
e20	37875	7	146508	5.8%
e24	5300	44	20666	0.8%
e25	0	0	1	0.0%
e26	46	0	179	0.0%
e27	658	0	2544	0.1%
e28	3997	4	15474	0.6%
e29	0	0	0	0.0%
e31	310	0	1197	0.0%
z09	30119	0	116485	4.6%
<i>EPSRC Total</i>	567351	940	1870375	73.6%

n01	67248	16	260145	10.2%
n02	38322	29	148324	5.8%
n03	26698	0	103255	4.1%
n04	6753	3	26129	1.0%
<i>NERC Total</i>	139021	49	537853	21.2%

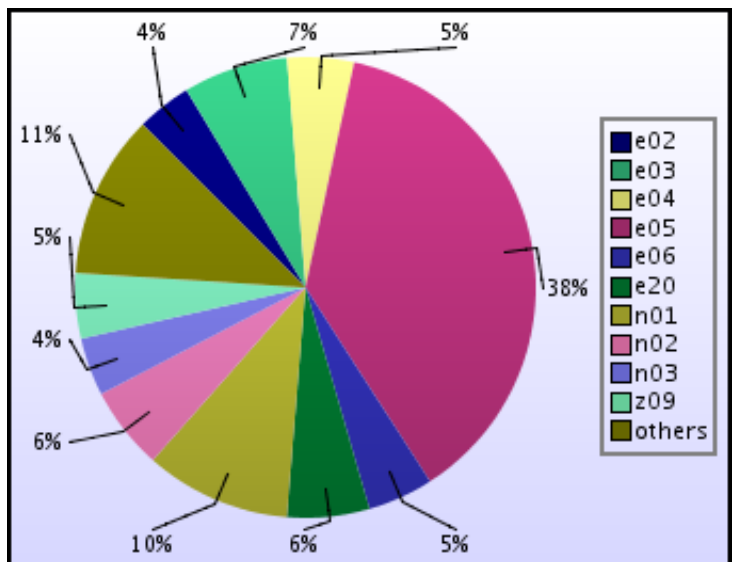
p01	804	35	3244	0.1%
<i>PPARC Total</i>	804	35	3244	0.1%

c01	12805	4	49541	1.9%
<i>CCLRC Total</i>	12805	4	49541	1.9%

b02	931	1	3602	0.1%
b03	4616	11	17895	0.7%
<i>BBSRC Total</i>	5547	12	21497	0.8%

x01	8217	0	31781	1.3%
<i>External Total</i>	8217	0	31781	1.3%

z001	6827	36	26542	1.0%
z004	14	0	54	0.0%
z06	20	3	89	0.0%
<i>HPCx Total</i>	6861	39	26684	1.1%



1.3 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. It uses the conversion rate for the AU which corresponds to the results of the Linpack benchmark running on the new platform; that is, 1 CPU hour = 3.8675 AUs.

<i>Number of Processors</i>	<i>Raw AUs</i>	<i>%age</i>	<i>Number of Jobs</i>
≤32	261949	9.1%	2468
33–64	348653	12.2%	833
65–128	608331	21.2%	810
129–256	523356	18.3%	228
257–512	380364	13.3%	89
513–1024	592085	20.7%	91
>1024	149557	5.2%	4

The system is divided into three regions.

Development Region (9 frames, jobs using ≤64 CPUs): a total of 610602 raw AUs were used; that is 76.1% of the total available in this region

Production Region (40 frames, jobs using >64 CPUs): a total of 2253693 raw AUs were used; that is 63.2% of the total available in this region

The remaining frame is reserved for interactive parallel jobs.

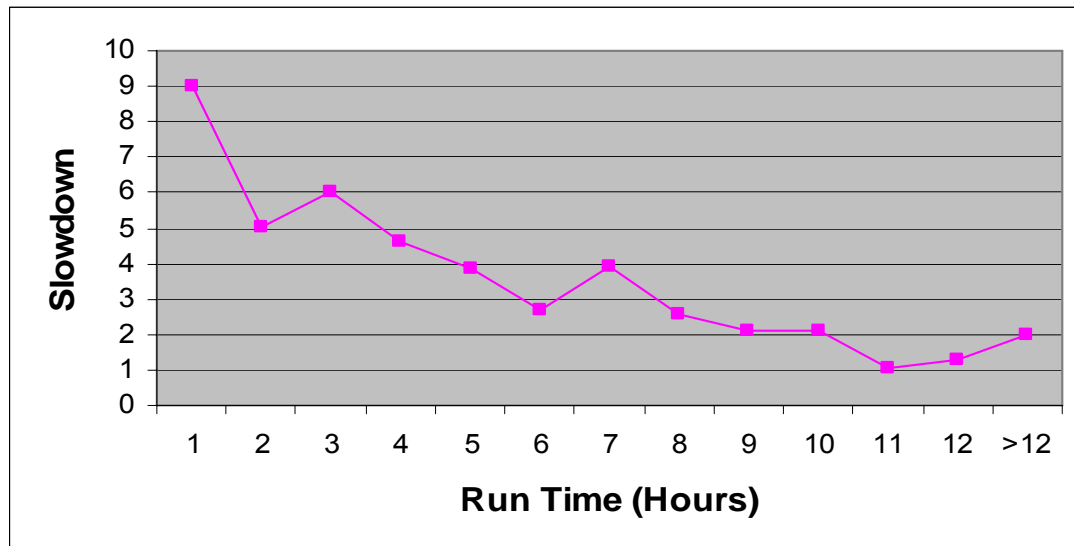
1.4 Slowdown and Job Wait Times

Slowdown

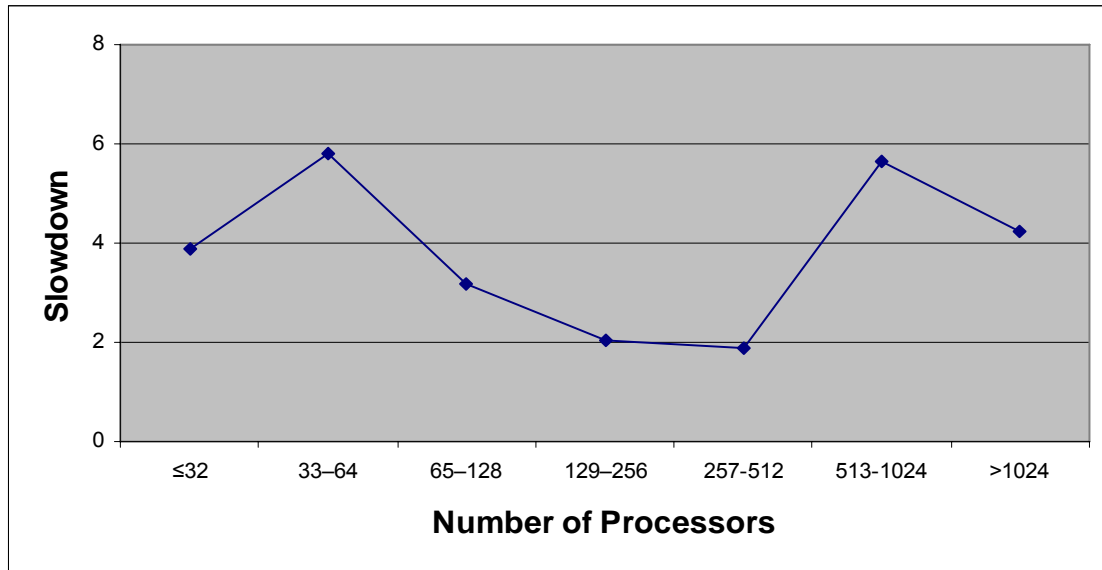
Slowdown is a widely used measure of the relative wait times of different classes of jobs. It is defined as:

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

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). The pattern of slowdowns continues to be satisfactory.



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

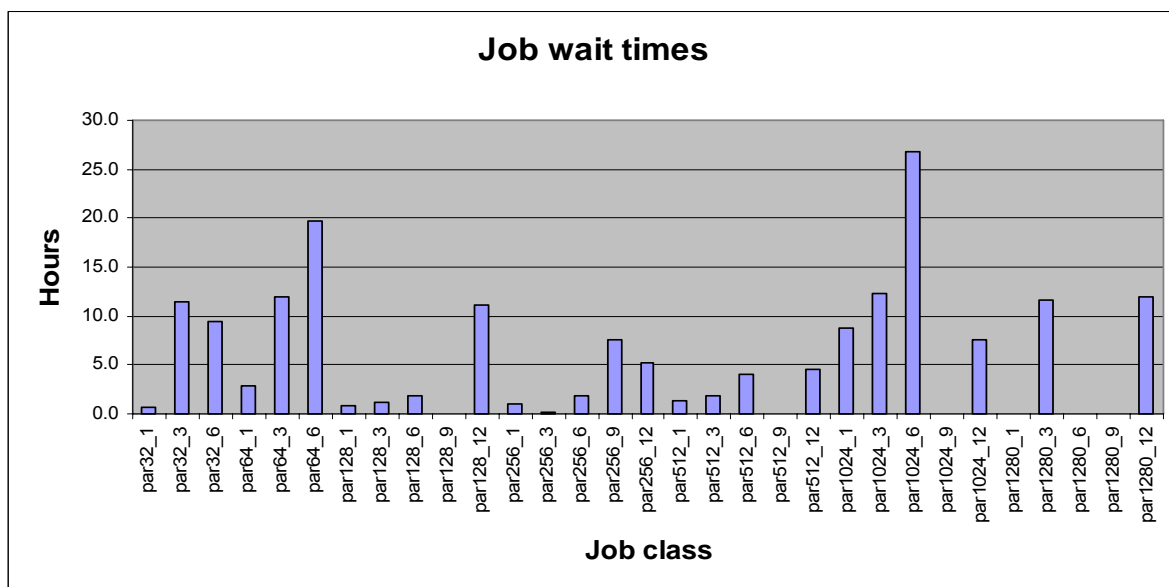


Job wait times

The following table and graph shows the average wait time (in hours) for each class of job. These are also satisfactory. The most prominent spike corresponds to 9 jobs which waited an average of 26.8 hours to run 1024 processors for 6 hours.

Job Class	Category	Maximum Number of CPUs	Maximum Job length	Average wait time	Number of Jobs
par32_1	parallel	32	1	0.6	1927
par32_3	parallel	32	3	11.5	42
par32_6	parallel	32	6	9.4	499
par64_1	parallel	64	1	2.8	463
par64_3	parallel	64	3	12.0	25
par64_6	parallel	64	6	19.7	345
par128_1	parallel	128	1	0.8	487
par128_3	parallel	128	3	1.2	67
par128_6	parallel	128	6	1.8	82
par128_9	parallel	128	9	0.0	0
par128_12	parallel	128	12	11.1	174
par256_1	parallel	256	1	1.0	130
par256_3	parallel	256	3	0.2	18
par256_6	parallel	256	6	1.9	13
par256_9	parallel	256	9	7.5	2
par256_12	parallel	256	12	5.2	65
par512_1	parallel	512	1	1.3	44
par512_3	parallel	512	3	1.8	5
par512_6	parallel	512	6	4.1	15
par512_9	parallel	512	9	0.0	0

par512_12	parallel	512	12	4.6	25
par1024_1	parallel	1024	1	8.8	45
par1024_3	parallel	1024	3	12.2	10
par1024_6	parallel	1024	6	26.8	9
par1024_9	parallel	1024	9	0.0	0
par1024_12	parallel	1024	12	7.5	27
par1280_1	parallel	1280	1	0.0	0
par1280_3	parallel	1280	3	11.6	1
par1280_6	parallel	1280	6	0.0	0
par1280_9	parallel	1280	9	0.0	0
par1280_12	parallel	1280	12	12.0	3
serial_1	serial	1	1	0.7	509
serial_12	serial	1	3	0.1	33
serial_3	serial	1	6	0.0	40
serial_6	serial	1	9	0.1	23
serial_9	serial	1	12	0.0	5
inter32_1	interactive	32	1	0.0	2082
Course32_1	parallel	32	1	0.0	0



1.5 Disk Occupancy

Home Space

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

<i>Consortium</i>	<i>Disc Occupancy (Kb)</i>	<i>Disc Quota (Kb)</i>
b02	16,177,088	51,200,000
b03	4,384	51,200,000
b04	64	51,200,000
b05	16,802,368	51,200,000
b06	15,353,152	51,200,000
c01	95,685,184	102,400,000
e01	45,068,640	50,006,016
e02	23,561,280	39,760,896
e03	139,173,600	230,412,288
e04	98,354,656	102,400,000
e05	211,404,896	369,868,800
e06	267,634,528	307,200,000
e07	6,172,544	20,480,000
e08	17,410,784	20,480,000
e10	10,143,232	10,240,000
e11	38,172,192	102,400,000
e12	8,976,640	20,480,000
e14	74,157,376	102,400,000
e15	4,084,864	51,200,000
e16	47,392	20,480,000
e17	9,899,168	51,200,000
e18	38,612,960	40,960,000
e19	44,096	40,960,000
e20	43,129,184	61,440,000
e21	97,792	51,200,000
e22	96	10,240,000
e23	96	51,200,000
e24	686,656	51,200,000
e25	105,792	51,200,000
e26	18,959,552	20,480,000
e27	1,440	20,480,000
e28	128	40,960,000
e29	2,155,936	30,720,000
e30	64	40,960,000
e31	1,893,536	51,200,000
e32	96	51,200,000
n01	45,861,312	51,200,000
n02	97,247,936	131,072,000
n03	47,161,920	102,400,000

n04	131,724,640	307,198,976
n05	2,080	10,240,000
p01	32,348,864	40,960,000
x01	31,752,032	51,200,000
x02	8,956,000	20,480,000
z001	199,170,528	235,521,024
z002	42,920,992	49,153,024
z003	256	3,072
z004	72,530,880	102,400,000
z05	4,288,320	30,720,000
z06	49,037,536	51,200,000
z07	12,295,296	30,720,000
z09	6,423,392	51,200,000

Workspace

<i>Consortium</i>	<i>Disc Occupancy (Kb)</i>	<i>Disc Quota (Kb)</i>
b02	15,104	1,049,600
b03	22,950,688	102,400,000
b04	64	102,400,000
b05	6,372,000	102,400,000
b06	638,272	102,400,000
c01	69,297,664	102,400,000
e01	1,068,265,216	1,177,600,000
e02	8,555,264	10,240,000
e03	10,016	512,000,000
e04	1,792,616,736	2,252,800,000
e05	142,217,984	232,653,824
e06	249,545,312	409,600,000
e07	52,853,760	102,398,976
e08	139,232	1,024,000
e10	275,396,064	307,200,000
e11	192	102,400,000
e12	743,584	102,400,000
e14	67,718,272	102,400,000
e15	18,251,584	102,400,000
e16	192	61,440,000
e17	544	102,400,000
e18	160	81,920,000
e19	172,772,544	204,800,000
e20	504,005,120	1,024,000,000
e21	1,024	102,400,000
e22	96	20,480,000
e23	96	102,400,000
e24	26,692,768	102,400,000
e25	2,019,776	102,400,000
e26	128	40,960,000

e27	192	40,960,000
e28	10,551,168	81,920,000
e29	128	8,192,000
e30	64	81,920,000
e31	877,664	102,400,000
e32	96	102,400,000
n01	235,604,032	512,000,000
n02	1,390,927,232	1,504,257,024
n03	31,968	1,026,048
n04	348,575,200	768,000,000
n05	25,564,480	92,160,000
p01	1,022,464	1,024,000
x01	100,497,440	102,400,000
x02	128	20,480,000
z001	331,102,304	409,598,976
z002	296,512	788,480
z003	192	3,072
z004	24,885,344	25,600,000
z05	256	1,024,000
z06	26,188,032	102,400,000
z07	1,664	1,024
z09	27,105,856	102,400,000

1.6 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
e26	2	2	72	11
n01	70	70	2762	6374
n02	50	50	72859	7189
n04	19	20	64038	2102
z001	2	2	6189	50
z002	3	4	1619	11
z06	1	3	833	68

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

2 Support

2.1 Helpdesk

Classifications

<i>Category</i>	<i>Number</i>	<i>% of all</i>
Administrative	32	42.1
Technical	35	46.1
In-depth	9	11.8
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 2 platform	56	73.7
Website	3	3.9
Other/general	17	22.4
TOTAL	76	100.0

Performance

<i>All non-indepth queries</i>	<i>Number</i>	<i>%</i>	<i>Target</i>
Finished within 24 Hours	51	76.1	75%
Finished within 72 Hours	67	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	29	90.6	97%
Finished after 48 Hours	3	9.4	

Experts Handling Queries

<i>Expert</i>	<i>Admin</i>	<i>Technical</i>	<i>In-Depth</i>	<i>PMR</i>
epcc.ed.ac.uk	26	14	7	0
dl.ac.uk	2	11	2	0
Sysadm	3	10	0	0
Other people	1	0	0	0

2.2 Training

No training courses were held in September. The last day of the *Practical Software Development* course fell on 1 September, but this was included in the figures for August.

3 Staffing

3.1 Science Support Staffing

Daresbury Laboratory

<i>Name</i>	<i>Days</i>
Ashworth	12.7
Blake	5.5
Bush	10.0
Guest	5.5
Johnstone	11.0
Jones	3.6
Plummer	14.0
Sherwood	2.8
Sunderland	21.0
Thomas	11.0
Pickles	1.7
van Dam	2.5
Total (Days)	101.2
FTEs	5.7

EPCC

<i>Name</i>	<i>Days</i>
Simpson	14.3
Booth	8.5
Henty	8.4
Smith	13.9
Bull	8.7
Fisher	5.0
Hein	12.0
Jackson, Adrian	3.4
Pringle	3.5
Reid	13.3
Holden	9.5
Trew	5.5
Gray	4.2
D'Mellow	16.4
Hill	6.5
Dobrzelecki	12.0
Helpdesk	3.6
Total (Days)	148.5
FTEs	8.4

Overall Levels

	<i>FTEs</i>
DL	5.7
EPCC	8.4
Total	14.1

3.2 Systems Staffing

<i>Name</i>	<i>Days</i>
Andrews	15.8
Blake	0.0
Brown	22.0
Fisher	4.0
Georgeson	16.5
Franks	13.5
Jones	0.0
Shore	13.5
BITD	22.0
Total (days)	107.3
FTEs	6.0

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.

4 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	14.1
Number of training days per month	22.5/12	30/12	20/9
Non in-depth queries resolved within 3 days	85%	97%	100.0%
Number of A&M FTEs	3.75	5.75	6.0
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	Prof Neil Sandham
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
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
e12	1	Parallel programs for the simulation of complex fluids	Dr Mark R Wilson
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
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
n05	2	Non-linear Wave-particle Instabilities in Plasmas	Dr Mervyn Freeman

BBSRC Projects

<i>Code</i>	<i>Class</i>	<i>Title</i>	<i>PI</i>
b02	1	Modelling enzyme catalysis	Dr Adrian J Mulholland
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

Externally-funded Projects

<i>Code</i>	<i>Title</i>	<i>PI</i>
x01	HPC-Europa	Dr J-C Desplat
x02	OHM Ltd	Mr Mark Westwood

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
e09	2	Molecular Properties and their Geometry	Prof Peter Taylor
e13	1	TeraGyroid project	Dr Richard J Blake