

HPCx Quarterly Report

October to December 2009

1 Introduction

This report covers the period from 1 October 2009 at 0800 to 1 January 2010 at 0800.

Section 2 summarises the main points of the service for this quarter. Section 3 gives details of the usage of the service, including failures, serviceability and overall utilisation. A summary table of the key performance metrics is given in the final section. The Appendices define the incident severity levels and list the current HPCx projects.

Other additional service statistics, obtained through SAFE (the online service administration software) include the following:

- Time usage, broken down by project and by queue;
- Slowdown figures;
- Disk usage, broken down by project;
- Helpdesk activity;
- Service quality tokens.

The summary of this report and the additional SAFE report are available online:

http://www.hpcx.ac.uk/projects/reports/quarterly/HPCx_4Q09.html

2 Executive Summary

2.1 Complementary Capability

- The main focus of the HPCx science support team during the HPCx extension involves providing support for the Complementary Capability Challenge (CCC) projects. These projects all continued to run smoothly during 4Q09. A final update on the CCC projects will be included in the HPCx Final Report which will be issued in February.

2.2 Service Highlights

- The service was very reliable in 4Q09. There were no service failures.
- Utilisation rose in 4Q09 to 90% from 82% in 3Q09. The Low Priority Access initiative accounted for 34% of the overall utilisation. The notional cost of the time used amounted to £877,784. Further details on the initiative can be found in Section 3.3 of this report.
- The helpdesk statistics were again excellent.
- The final HPCx Annual Seminar was held at Daresbury Laboratory on 3rd December. The seminar was well attended, with 35 attendees. There were presentations from HPCx users and staff looking back on research achievements enabled by HPCx, describing work exploiting the flexibility offered under the complementarity initiative, and looking forward to future HPC services.
- The HPCx service will close on 31st January. In relation to this a number of projects have now moved compute resources across to HECToR. All users have been reminded that all data must be copied from HPCx prior to the end of service.

3 Usage Statistics

3.1 Availability

3.1.1 Failures

The monthly numbers of incidents and failures (SEV 1 incidents) are shown in the table below:

	<i>October</i>	<i>November</i>	<i>December</i>
Incidents	4	6	5
Failures	0	0	0

HPCx continued to be very reliable. There were no service failures in 4Q09.

3.1.2 Performance Statistics

This section uses the definitions agreed in Schedule 7, i.e.

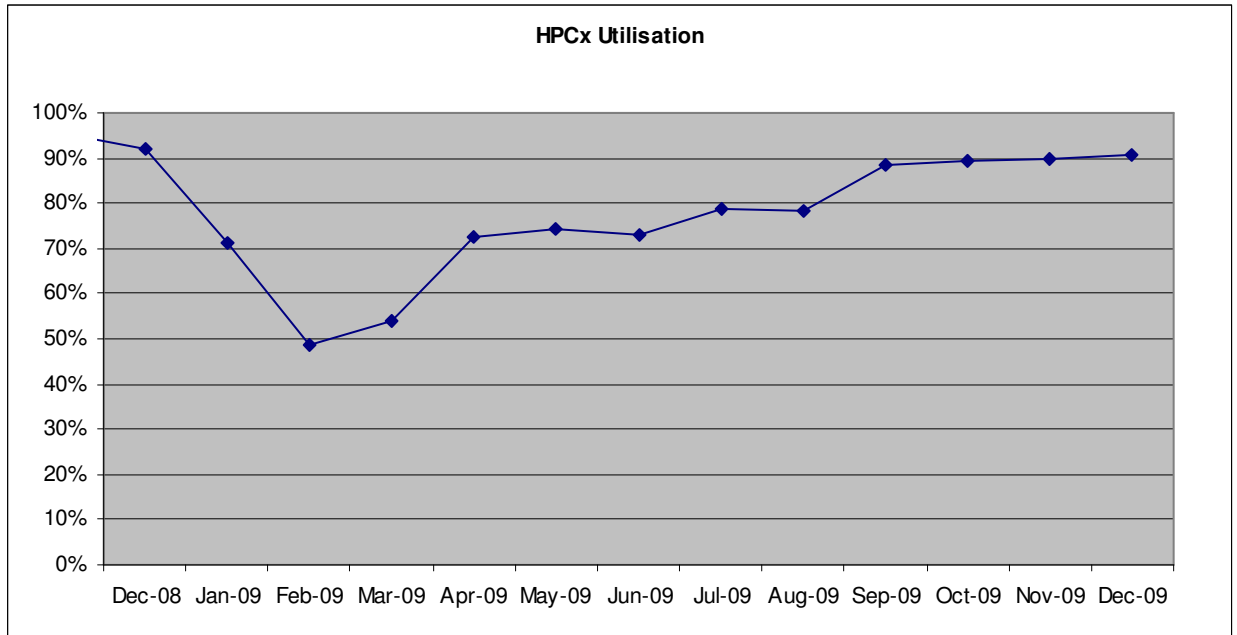
- $MTBF = (24 \times 30.5) / (\text{number of failures in month})$
- $\text{Serviceability (\%)} = 100 \times (\text{WCT} - \text{SDT} - \text{UDT}) / (\text{WCT} - \text{SDT})$

<i>Attribution</i>	<i>Metric</i>	<i>October</i>	<i>November</i>	<i>December</i>	<i>Quarterly</i>
IBM	Failures	0	0	0	0
	MTBF	∞	∞	∞	∞
	Serviceability	100.0%	100.0%	100.0%	100.0%
Site	Failures	0	0	0	0
	MTBF	∞	∞	∞	∞
	Serviceability	100.0%	100.0%	100.0%	100.0%
External	Failures	0	0	0	0
	MTBF	∞	∞	∞	∞
	Serviceability	100.0%	100.0%	100.0%	100.0%
Total	Failures	0	0	0	0
	MTBF	∞	∞	∞	∞
	Serviceability	100.0%	100%	100.0%	100.0%

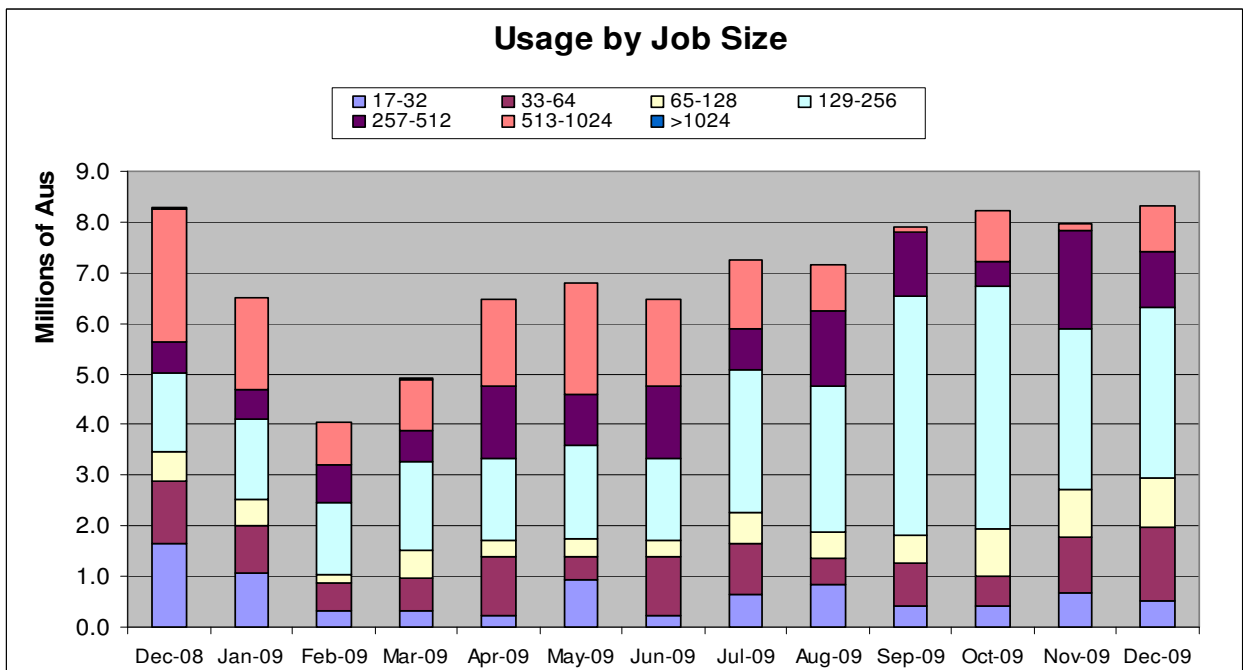
3.2 Utilisation

3.2.1 Overall Utilisation

The graph below shows the overall utilisation of HPCx.

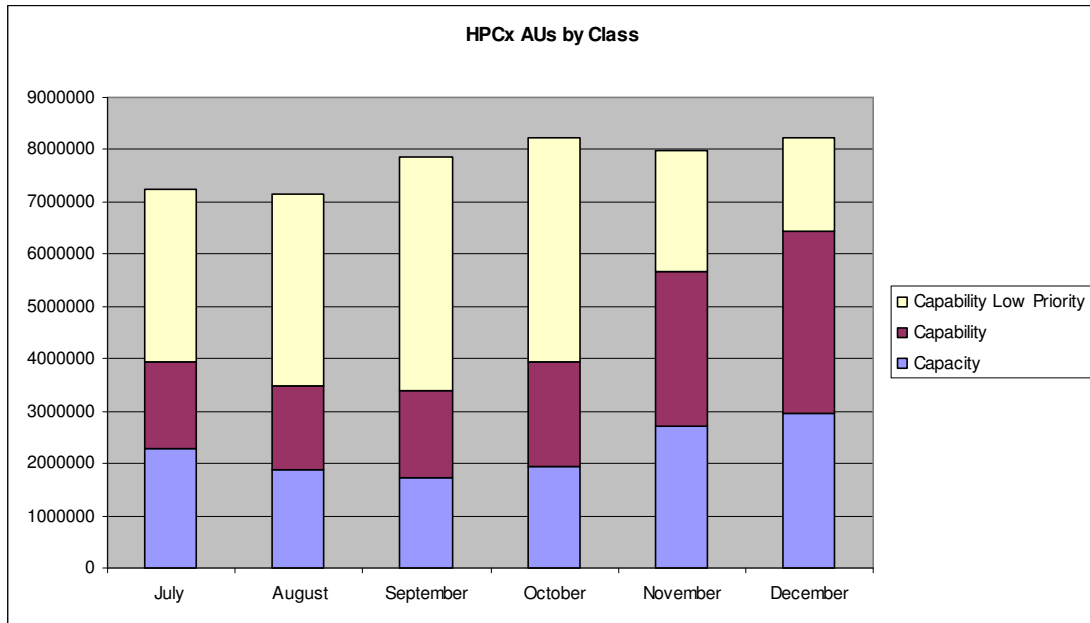


3.2.2 CPU Usage by Job Size

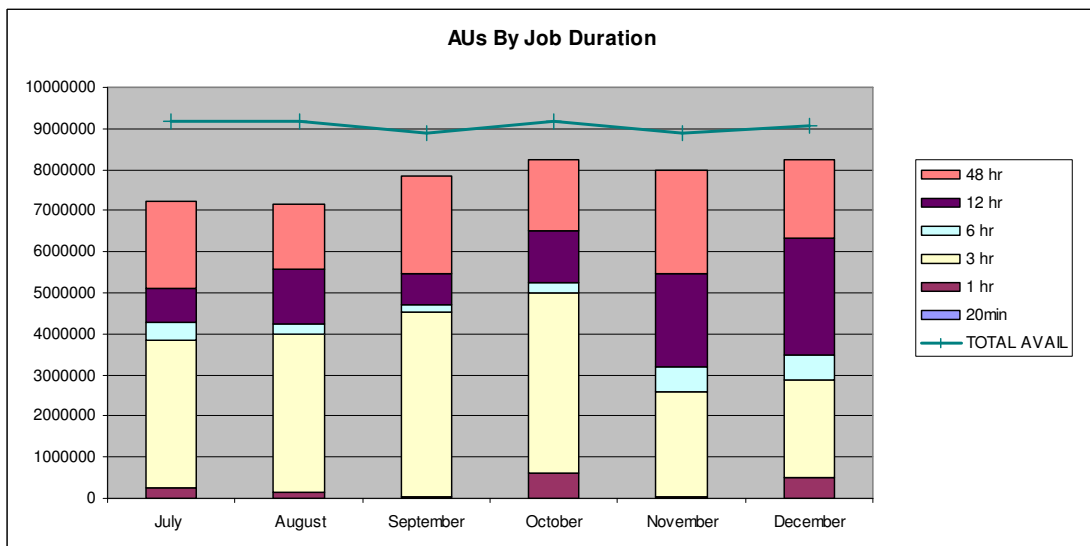


3.3 Low Priority Access Initiative

3.3.1 Impact on Utilisation



In 4Q09 the overall HPCx utilisation was 90%. 8.4 Million LPA AUs were used, at a notional cost of £0.9M. Uncharged time accounted for 34% of the overall utilisation.



Throughout 4Q09 the utilisation from paid jobs increased month on month. The low priority usage successfully filled the remaining gap in capacity each month to ensure that overall utilisation was constant.

3.3.2 Usage by CCC Projects

The eight CCC projects accounted for 40% of the overall utilisation of HPCx in 4Q09. The table below shows their usage to date on HPCx, including use of the Low Priority Access queues.

Code	Title	PI	AUs Allocated	AUs Used	LPA Usage	AUs Left
e96	CCC1	Dr Trevor Thomas	175,000	106,582	0	68,418
e97	CCC2	Dr Adrian Mulholland	400,000	43	0	399,957
e98	CCC3	Dr Anantanarayanan Thyagaraja	2,000,000	1,987,229	29,034	12,771
e99	CCC4	Dr Carmen Domene	2,110,615	2,110,615	10,884,251	0
e100	CCC5	Prof Mark Sansom	2,640,000	2,629,994	0	10,006
e101	CCC6	Dr Antonio Tilocca	1,700,000	1,656,670	0	43,330
e102	CCC7	Dr Svante Jonsell	2,500,000	2,530,815	836,064	0
e103	CCC8	Dr Carole Morrison	3,555,457	3,059,215	0	496,242
Total			15,081,072	14,081,163	11,749,349	1,030,724

Note: Project e97 have completed key porting tasks on HPCx. Production runs will be completed under separate funding.

4 Staffing

<i>AV</i>	Oct-09	Nov-09	Dec-09
<i>DL</i>	1.7	0.8	0.8
<i>EPCC</i>	2.6	1.9	1.0
<i>Total</i>	4.3	2.7	1.8

<i>Systems</i>	4.9	5.0	4.8
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6 Summary of Performance Metrics

<i>Metric</i>	<i>TSL</i>	<i>FSL</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>	<i>4Q09</i>
Technology serviceability	80.0%	99.2%	100.0%	100.0%	100.0%	100.0%
Technology MTBF (hours)	200	300	∞	∞	∞	∞
Number of AV FTEs	-	-	4.3	2.7	1.8	2.9
*Total AV FTEs Phase4 Profile	-	-	101.3%	102.3%	101.9%	101.9%
Non in-depth queries resolved within 3 days	85.0%	97.0%	100.0%	100.0%	100.0%	100.0%
Number of A&M FTEs	2.75	4.75	4.9	5.0	4.8	4.9
A&M serviceability	80.0%	99.0%	100.0%	100.0%	100.0%	100.0%

<i>Colour</i>	<i>Meaning</i>
	Exceeds FSL
	Between TSL and FSL
	Below TSL

* The staffing profile in Phase4 varies from month to month. As at the end of 4Q09, the service has expended 73.4 of the total 74 AV FTEs for Phase4.

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: Research Consortia on HPCx

Code	Title	Funding Body	Class	PI	Total AUs allocated	AUs used	AUs left
STFC Projects							
p01	Atomic Physics and Astrophysics at QUB	PPARC	Class1	Dr Penny Scott	1,654,759	1,603,148	51,611
P02	EdQCD	PPARC	Class1	Dr Chris Maynard	320,000	0	320,000
c01	Daresbury Laboratory Facilities Agreement Consortium	CCLRC	Class1	Dr Richard Blake	7,604,817	6,717,828	886,989
EPSRC Projects							
e01	UK Turbulence Consortium	EPSRC	Class1	Dr Gary Coleman	25,869,737	25,730,109	139,628
e05	Materials Chemistry Using Terascaling Computing	EPSRC	Class1	Prof Richard Catlow	57,434,335	45,929,168	11,505,167
e10	Reality Grid	EPSRC	Class1	Prof Peter Coveney	1,865,794	875,462	990,332
e100	CCC5	EPSRC	Class1	Prof Mark Sansom	2,640,000	2,669,614	-29,614
e101	CCC6	EPSRC	Class1	Dr Antonio Tilocca	1,700,000	1,656,670	43,330
e102	CCC7	EPSRC	Class1	Dr Svante Jonsell	2,500,000	2,530,815	-30,815
e103	CCC8	EPSRC	Class1	Dr Carole Morrison	3,555,457	3,059,215	496,242
e104	Mechanistic Study Thermal Decomp of nitrogen-rich molecules	EPSRC	Class2	Dr Peter Portius	100,000	101,105	-1,105
e105	Reasoning with Relaxed Memory Models	EPSRC	Class2	Dr Peter Sewell	19,200	11,361	7,839
e106	Black Box Algebraic Solvers	EPSRC	Class1	Dr Milan Mihajlovic	199,266	0	199,266
e18	DARP: Highly swept leading edge separations	EPSRC	Class1	Prof Michael Leschziner	622,500	417,450	205,050
e19	Edinburgh Soft Matter and Statistical Physics Group	EPSRC	Class1	Prof Michael Cates	1,631,376	1,626,713	4,663

Code	Title	Funding Body	Class	PI	Total AUs allocated	AUs used	AUs left
e20	UK Applied Aerodynamics Consortium	EPSRC	Class1	Dr Ken Badcock	5,190,000	4,696,038	493,962
e24	DEISA	EPSRC	Class1	Dr David Henty	10,306,807	10,285,457	21,350
e30	Metal/Oxide Interfaces at the Atomic Level	EPSRC	Class1	Prof Nora de Leeuw	200,000	168,123	31,877
e33	Engineering Functional Coatings	EPSRC	Class1	Prof Roger Smith	7,500,000	5,587,749	1,912,251
e34	Dissolution of Bioactive Phosphate Glasses	EPSRC	Class1	Prof Nora de Leeuw	1,200,000	1,221,702	-21,702
e35	Non-adiabatic processes	EPSRC	Class1	Dr Tchavdar Todorov	9,274,788	8,274,786	1,000,002
e37	LESUK_3	EPSRC	Class1	Prof Jim McGuirk	10,440,000	7,398,833	3,041,167
e39	The Supergen 5 biological fuel cells consortium	EPSRC	Class1	Prof Fraser Armstrong	2,387,748	2,292,837	94,911
e40	Computational Quantum Many-Body Theory	EPSRC	Class1	Prof Richard Needs	1,290,564	456,633	833,931
e41	Flow in Weapon Bays	EPSRC	Class1	Dr George Barakos	1,335,789	1,435,625	-99,836
e42	Computational Combustion for Engineering Applications	EPSRC	Class1	Prof. Kai Luo	8,176,657	8,113,682	62,975
e44	Extreme Wave Loading on Offshore Wave Energy Devices	EPSRC	Class1	Dr Deborah Greaves	737,280	390,452	346,828
e46	Advanced materials with complex architectures	EPSRC	Class2	Dr Paul Mummery	510,957	532,729	-21,772
e50	Biological interface with materials	EPSRC	Class1	Prof John Harding	1,186,702	1,164,438	22,264
e60	Device Electronics Based on nanoWires and NanoTubes	EPSRC	Class1	Prof Merlyne de Souza	4,049,242	2,462,042	1,587,200
e61	Enhancement of droplet concentrations in clouds	EPSRC	Class1	Dr Alan Gadian	402,063	402,062	1
e63	UK AAC	EPSRC	Class1	Dr. Nick Hills	12,000,000	3,163,942	8,836,058
e64	Jet noise from instability mode interactions	EPSRC	Class1	Prof Neil Sandham	4,200,000	4,221,466	-21,466

Code	Title	Funding Body	Class	PI	Total AUs allocated	AUs used	AUs left
e65	Next Generation of SBLI Code	EPSRC	Class1	Dr Yufeng Yao	1,340,000	1,339,028	972
e66	Study of Synthetic Jets	EPSRC	Class1	Prof Michael Leschziner	795	795	0
e67	Numerical Investigation of Jet Noise	EPSRC	Class1	Dr Anurag Agarwal	4,096,565	929,613	3,166,952
e68	UK-SHEC Consortium	EPSRC	Class1	Dr T.J. Mays	2,296,606	1,043,902	1,252,704
e70	Streak Instability and Bypass Transition	EPSRC	Class1	Dr Xuesong Wu	600,000	0	600,000
e93	ACE: Architecture Exercise	EPSRC	Support	Dr Lorna Smith	500,000	413,528	86,472
e95	Numerical Simulation of Rotating Stall and Surge	EPSRC	Class1	Dr Mehdi Vahdati	1,266,000	0	1,266,000
e96	CCC1	EPSRC	Class1	DR Trevor Thomas	175,000	106,582	68,418
e97	CCC2	EPSRC	Class1	Dr Adrian Mulholland	400,000	43	399,957
e98	CCC3	EPSRC	Class1	Dr Anantanarayanan Thyagaraja	2,000,000	1,987,229	12,771
e99	CCC4	EPSRC	Class1	Dr Carmen Domene	2,110,617	2,110,615	2
External projects							
x01	HPC-Europa	External	Class1	Dr Judy Hardy	2,852,697	2,128,143	724,554
x02	OHM Ltd	External	Class1	Dr. Lucy MacGregor	259,123	242,387	16,736
x03	IBM	External	Class1	Mr Derrick Byford	1,060,000	77,725	982,275