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HPC Advisory Council Technology Survey

Actionable Market Intelligence for High Performance Computing

Brief Technology Survey

- To Advisory Council members: users and vendors
- Survey asked respondents to rate importance of and satisfaction with HPC technologies
- Vendors asked to anticipate user views
- 60 responses: 26 users, 34 vendors



Importance of Technologies

How important are the following HPC solutions components in meeting current requirements? Component	Users Said (N = 25-26)						Vendors Said (N = 33-34)					
	(1 = not important; 5 = very important)											
	1	2	3	4	5	Avg.	1	2	3	4	5	Avg.
Processor core performance	0%	4%	19%	31%	46%	4.19	0%	3%	15%	36%	45%	4.24
Overall processor performance	0%	0%	8%	31%	62%	4.54	0%	3%	3%	24%	70%	4.61
Number of Processors per node	0%	8%	31%	31%	31%	3.85	0%	9%	27%	27%	36%	3.91
Memory capacity (configurable memory per node)	4%	8%	12%	35%	42%	4.04	0%	6%	15%	39%	39%	4.12
Memory performance (latency and/or bandwidth)	0%	4%	8%	15%	73%	4.58	0%	0%	9%	36%	55%	4.45
Cluster interconnect bandwidth	0%	4%	15%	35%	46%	4.23	0%	0%	27%	24%	48%	4.21
Cluster interconnect latency	4%	0%	15%	19%	62%	4.35	0%	0%	9%	26%	65%	4.56
LAN networking bandwidth	4%	15%	42%	27%	12%	3.27	3%	29%	38%	15%	15%	3.09
LAN networking latency	12%	19%	38%	19%	12%	3.00	3%	41%	21%	21%	15%	3.03
Storage system capacity	4%	8%	35%	19%	35%	3.73	3%	12%	36%	36%	12%	3.42
Storage system management software	16%	12%	28%	28%	16%	3.16	3%	33%	30%	12%	21%	3.15
Parallel programming models	0%	0%	31%	35%	35%	4.04	0%	6%	6%	39%	48%	4.30
Parallel programming tools/environment	0%	4%	8%	54%	35%	4.19	0%	9%	15%	39%	36%	4.03
Average:	3%	7%	22%	29%	39%	3.94	1%	12%	19%	29%	39%	3.93

- Vendor responses were consistent with users'. Same top three, but reordered.
- 92% of users ranked "overall processor performance" a four or five.
- Vendors slightly underestimate importance of storage capacity to users.

Satisfaction with Technologies

What is end users' level of satisfaction with the following HPC solutions components?	Users Said (N = 23-24)						Vendors Said (N = 30-32)					
	(1 = not important; 5 = very important)											
Component	1	2	3	4	5	Avg.	1	2	3	4	5	Avg.
Processor core performance	0%	13%	25%	38%	25%	3.75	3%	0%	29%	45%	23%	3.84
Overall processor performance	0%	8%	29%	38%	25%	3.79	3%	3%	30%	40%	23%	3.77
Number of Processors per node	0%	8%	33%	46%	13%	3.63	10%	0%	10%	43%	37%	3.97
Memory capacity (configurable memory per node)	8%	8%	17%	50%	17%	3.58	3%	6%	16%	48%	26%	3.87
Memory performance (latency and/or bandwidth)	13%	17%	29%	25%	17%	3.17	3%	23%	26%	42%	6%	3.26
Cluster interconnect bandwidth	0%	13%	21%	50%	17%	3.71	0%	16%	28%	44%	13%	3.53
Cluster interconnect latency	0%	21%	25%	46%	8%	3.42	0%	13%	38%	31%	19%	3.56
LAN networking bandwidth	9%	0%	35%	30%	26%	3.65	3%	6%	31%	44%	16%	3.63
LAN networking latency	9%	4%	26%	35%	26%	3.65	6%	0%	41%	34%	19%	3.59
Storage system capacity	4%	8%	38%	25%	25%	3.58	3%	6%	32%	39%	19%	3.65
Storage system management software	8%	25%	42%	8%	17%	3.00	7%	20%	30%	37%	7%	3.17
Parallel programming models	8%	33%	38%	21%	0%	2.71	6%	35%	23%	29%	6%	2.94
Parallel programming tools/environment	4%	25%	63%	8%	0%	2.75	10%	29%	32%	23%	6%	2.87
Average:	5%	14%	32%	32%	16%	3.41	4%	12%	28%	38%	17%	3.51

- Users are satisfied with processor performance.
- Vendors' top two – processors and memory per node – were not in users' top three.
- Users are more satisfied with cluster bandwidth than vendors predicted.

“Satisfaction Gaps”

SATISFACTION GAP (Satisfaction score - Importance score) x 100	Users Said			Vendors Said		
	Sat.	Imp.	GAP	Sat.	Imp.	GAP
Processor core performance	3.75	4.19	-44	3.84	4.24	-40
Overall processor performance	3.79	4.54	-75	3.77	4.61	-84
Number of Processors per node	3.63	3.85	-22	3.97	3.91	6
Memory capacity (configurable memory per node)	3.58	4.04	-46	3.87	4.12	-25
Memory performance (latency and/or bandwidth)	3.17	4.58	-141	3.26	4.45	-119
Cluster interconnect bandwidth	3.71	4.23	-52	3.53	4.21	-68
Cluster interconnect latency	3.42	4.35	-93	3.56	4.56	-100
LAN networking bandwidth	3.65	3.27	38	3.63	3.09	54
LAN networking latency	3.65	3.00	65	3.59	3.03	56
Storage system capacity	3.58	3.73	-15	3.65	3.42	23
Storage system management software	3.00	3.16	-16	3.17	3.15	2
Parallel programming models	2.71	4.04	-133	2.94	4.30	-136
Parallel programming tools/environment	2.75	4.19	-144	2.87	4.03	-116
Average:	3.41	3.94	-52	3.51	3.93	-42

Programming models and memory performance create the largest “satisfaction gaps”: areas of dissatisfaction relative to importance.

Incorporation of New Technologies

Incorporation or impact of new technologies on HPC in next two years	Users Said (N = 25)						Vendors Said (N = 30-33)					
	(1 = very unlikely; 5 = very likely)											
Component	1	2	3	4	5	Avg.	1	2	3	4	5	Avg.
GPU based acceleration	8%	16%	4%	32%	40%	3.80	0%	6%	9%	28%	56%	4.34
FPGU based acceleration	32%	16%	32%	16%	4%	2.44	13%	37%	20%	20%	10%	2.77
Solid State Disks	4%	20%	28%	32%	16%	3.36	3%	3%	31%	31%	31%	3.84
New processor architectures	8%	12%	16%	36%	28%	3.64	3%	16%	22%	34%	25%	3.63
New programming models	4%	4%	28%	48%	16%	3.68	6%	13%	25%	31%	25%	3.56
Optical interconnect technology	8%	12%	28%	40%	12%	3.36	6%	18%	24%	39%	12%	3.33
Optical networking technology	4%	24%	20%	44%	8%	3.28	6%	26%	26%	26%	16%	3.19
Optical processors	16%	36%	24%	16%	8%	2.64	34%	19%	28%	9%	9%	2.41
Next generation networking technology	4%	12%	44%	20%	20%	3.40	6%	9%	27%	42%	15%	3.52
Cloud computing	20%	12%	28%	24%	16%	3.04	0%	19%	19%	47%	16%	3.59

- GPU computing is the most likely to be adopted and have an impact on HPC.
- Vendors tend to be more optimistic than users on new technology – except with respect to optical interconnects and processors.
- The biggest gap in expectations is in cloud – vendors see cloud as significantly more impactful than users do.



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