NAS Parallel Benchmark Results 12-95

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Abstract

The NAS Parallel Benchmarks have been developed at NASA Ames Research Center to study the performance of parallel supercomputers. The eight benchmark problems are specified in a ‘‘pencil and paper’’ fashion. In other words, the complete details of the problem to be solved are given in a technical document, and except for a few restrictions, benchmarkers are free to select the language constructs and implementation techniques best suited for a particular system. This paper presents performance results of various systems using the NAS Parallel Benchmarks. These results represent the best results that have been reported to us for the specific systems listed.

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Table 1: Standard operation counts for the NPB.

Benchmark Name	Abb.	Class A			Class B		
		Nominal Size	**Operation Count (x 10^9)**	**Mflop/s CRAY Y-MP/1**	**Nominal Size**	**Operation Count (x10^9)**	**Mflop/s CRAY C90/1**
Embarrassingly Parallel	EP	2^{28}	26.68	211	2^{30}	100.9	689
Multigrid	MG	256^3	3.905	176	256^3	18.81	557
Conjugate Gradient	CG	$14x10^3$	1.508	127	$75x10^3$	54.89	447
3-D FFT PDE	FT	256^2x128	5.631	196	$512x256^2$	71.37	645
Integer Sort	IS	$2^{23}x2^{19}$	0.7812	68	$2^{25}x2^{21}$	3.150	244
LU Simulated CFD Appl.	LU	64^3	64.57	194	102^3	319.6	711
SP Simulated CFD Appl.	SP	64^3	102.0	216	102^3	447.1	648
BT Simulated CFD Appl.	BT	64^3	181.3	229	102^3	721.5	705

Table 2: Results of the Embarrassingly Parallel (EP) benchmark.

Computer System	Date Received	Number Processor	Class A		Class B	
			Time in seconds	Ratio to CRAY Y-MP/1	Time in seconds	Ratio to CRAY C90/1
BBN TC2000	Dec 91	64	284.0	0.44	NA	NA
Convex Exemplar SPP1000	Mar 95	1	376.8	0.33	NA	NA
		8	48.1	2.62	191.0	0.77
		16	24.3	5.19	96.0	1.53
		32	11.8	10.69	48.0	3.05
		64	6.1	20.68	24.5	5.98
CRAY C90	Feb 95	1	36.62	3.45	146.41	1.0
		2	18.42	6.85	73.66	1.99
		4	9.15	13.79	36.78	3.98
		8	4.61	27.37	18.37	7.97
		16	2.36	53.46	9.35	15.66
CRAY J916	Feb 95	1	169.44	0.74	675.71	0.22
		2	86.70	1.46	340.13	0.43
		4	43.09	2.93	170.15	0.86
		8	21.54	5.86	85.49	1.71
		16	10.78	11.70	43.16	3.39
CRAY T3D	Feb 95	16	22.74	5.55	91.83	1.59
		32	11.37	11.10	45.92	3.19
		64	5.68	22.21	22.95	6.38
		128	2.87	43.96	11.47	12.76
		256	1.44	87.62	5.74	25.51
		512	0.72	175.24	2.87	51.01
		1024	0.55	229.40	2.19	66.85
CRAY T916	July 95	1	18.56	6.80	76.13	1.92
		2	9.54	13.23	38.11	3.84
		4	4.77	26.45	19.12	7.66
		8	2.42	52.14	9.65	15.17
CRAY Y-MP	Aug 92	1	126.17	1.0	NA	NA
		8	15.87	7.95	NA	NA
DEC Alpha Server 8400 5/300	Oct 95	1	155.6	0.81	622.22	0.24
		2	77.97	1.61	311.9	0.47
		4	39.1	3.23	156.69	0.93
		8	19.71	6.40	78.43	1.87

Table 2: Results of the Embarrassingly Parallel (EP) benchmark.

Fujitsu VPP500	Aug 94	1	44.25	2.85	176.64	0.83
		2	22.3411	5.65	88.7866	1.65
		4	11.24	11.23	44.52	3.29
		8	5.67	22.26	22.36	6.5
		16	2.87	43.96	11.26	13.00
		32	1.46	86.42	5.68	25.78
		64	0.75	168.23	2.88	50.84
IBM RS/6000 SP Wide-node1 (67 MHz)	Mar 95	8	19.91	6.34	79.75	1.84
		16	9.95	12.69	39.89	3.67
		32	4.98	25.34	19.9	7.36
		64	2.49	50.67	9.95	14.71
		128	1.25	100.94	4.99	29.34
IBM RS/6000 SP Thin-node2 (67 MHz)	Mar 95	8	20.82	6.06	82.94	1.77
		16	10.42	12.11	41.47	3.53
		32	5.23	24.12	20.75	7.06
		64	2.62	48.16	10.37	14.12
		128	1.31	96.31	5.19	28.21
Intel iPSC/860	May 92	32	102.7	1.23	NA	NA
		64	51.4	2.46	NA	NA
		128	25.7	4.91	NA	NA
Intel Paragon OSF R 1.2	Jan 95	64	15.29	8.25	61.04	2.40
		128	7.67	16.45	30.57	4.79
		256	3.87	32.60	15.37	9.53
		512	2.23	56.58	8.93	16.40
		1024	1.15	109.71	4.45	32.90
Intel Paragon (SunMos turbo)	Jan 95	64	7.80	16.18	31.15	4.70
		128	3.93	32.10	15.60	9.39
		256	2.00	63.09	7.82	18.62
		512	1.12	112.65	3.98	36.79
		1024	.59	213.85	2.05	71.42
Intel Paragon MP OSF R1.3	Jan 95	64	8.02	15.73	31.42	4.66
		128	4.17	30.26	15.88	9.22
		256	2.26	55.83	8.11	18.05
		512	1.28	95.57	4.23	34.61
Intel Paragon MP (SunMos turbo)	Nov 95	64	5.75	21.94	22.70	6.45
		128	2.94	42.92	11.40	12.84
		256	1.54	81.93	5.78	25.34
		512	0.87	145.02	2.98	49.13

Table 2: Results of the Embarrassingly Parallel (EP) benchmark.

Kendall Square KSR1	Oct 93	16	101.9	1.23	NA	NA
		32	51.4	2.45	NA	NA
		64	26.0	4.85	NA	NA
		128	12.8	9.86	NA	NA
Kendall Square KSR2	Feb 94	32	24.8	5.09	NA	NA
	May 94	64	13.0	9.71	46.6	3.14
Kyoto/Matsushita ADENART	Feb 94	256	32.9	3.83	NA	NA
MasPar MP-1	Aug 92	4K	248.0	0.51	NA	NA
		16K	69.3	1.82	NA	NA
MasPar MP-2	Nov 92	16K	22.4	5.63	NA	NA
Meiko CS-1	Aug 92	16	116.8	1.08	NA	NA
Meiko CS-2	Oct 94	16	39.39	3.20	152.81	0.96
		32	20.45	6.16	77.20	1.90
		64	11.00	11.46	39.48	3.71
		96	7.84	16.07	26.84	5.45
		128	6.29	20.06	21.16	6.92
nCUBE-2S	Mar 94	64	83.8	1.51	336.3	0.44
		128	41.93	3.01	168.2	0.87
		256	20.97	6.02	84.1	1.74
		512	10.50	12.02	42.1	3.48
		1024	5.25	24.03	21.0	6.97
NEC SX-3	Oct 94	1	21.27	5.93	NA	NA
NEC SX-4/32	Oct. 95	1	NA	NA	102.21	1.43
		2	NA	NA	51.23	2.86
		4	NA	NA	25.66	5.71
		8	NA	NA	12.85	11.39
		16	NA	NA	6.48	22.59
		32	NA	NA	3.31	44.23
Silicon Graphics Power Challenge XL (75 MHz)	Oct 94	1	242.95	0.52	973.62	0.15
		4	61.44	2.05	245.74	0.60
		8	30.77	4.10	122.98	1.19
		16	15.48	8.15	61.79	2.37
SGI Power Challenge XL (90 MHz)	May 95	1	169.10	0.75	676.78	0.22
		2	87.46	1.44	352.31	0.42
		4	43.87	2.88	176.52	0.83
		8	21.98	5.74	87.80	1.67
		16	11.05	11.42	44.22	3.31

Table 2: Results of the Embarrassingly Parallel (EP) benchmark.

Thinking Machines CM-2	Oct 91	8K	126.6	1.00	NA	NA
		16K	63.9	1.97	NA	NA
		32K	33.7	3.74	NA	NA
		64K	18.8	6.71	NA	NA
Thinking Machines CM-200	Oct 91	8K	76.9	1.64	NA	NA
		16K	39.2	3.22	NA	NA
		32K	20.7	6.10	NA	NA
		64K	10.9	11.58	NA	NA
Thinking Machines CM-5	Nov 92	16	42.4	2.98	NA	NA
		32	21.5	5.87	NA	NA
		64	10.9	11.58	NA	NA
		128	5.4	23.36	NA	NA
		256	2.7	46.73	NA	NA
		512	1.4	90.12	NA	NA
Thinking Machines CM-5E	Sep 95	16	27.2	4.64	108.5	1.35
		32	13.6	9.28	54.3	2.70
Thinking Machines CM-500	Sept 95	64	6.9	18.29	27.1	5.40
		128	3.6	35.04	13.7	10.69
		256	2.0	63.09	7.0	20.92

Table 3: Results of the Multigrid (MG) benchmark.

Computer System	Date Received	Number Processor	Class A		Class B	
			Time in seconds	Ratio to CRAY Y-MP/1	Time in seconds	Ratio to CRAY C90/1
Convex Exemplar SPP1000	Mar 95	1	208.0	0.11	NA	NA
		8	29.9	0.74	150.4	0.22
		16	17.3	1.28	85.1	0.40
		32	11.0	2.02	52.7	0.64
		64	NA	NA	39.6	0.85
CRAY C90	Feb 95	1	7.27	3.06	33.78	1.00
		2	3.71	5.99	17.24	1.96
		4	1.92	11.58	8.89	3.80
		8	1.10	20.20	4.59	7.36
		16	0.71	31.30	3.43	9.85
CRAY EL	Aug 92	1	89.19	0.25	NA	NA
		4	27.94	0.80	NA	NA
		8	22.30	0.95	NA	NA
CRAY J916	Feb 95	1	39.08	0.57	184.88	0.18
		2	20.52	1.09	94.71	0.36
		4	10.75	2.07	48.69	0.69
		8	5.88	3.78	26.60	1.27
		16	3.82	2.06	16.12	2.10
CRAY T3D	Feb 95	16	13.78	1.61	66.58	0.51
		32	6.40	3.47	30.10	1.11
		64	2.61	8.51	12.56	2.69
		128	1.36	16.34	6.57	5.14
		256	0.74	30.03	3.37	10.02
		512	0.39	56.97	1.74	19.41
		1024	0.25	88.88	1.15	29.38
CRAY T916	July 95	1	4.43	5.02	20.30	1.66
		2	2.28	9.75	10.50	3.22
		4	1.27	17.50	5.54	6.10
		8	0.99	22.44	4.06	8.32
CRAY Y-MP	Aug 92	1	22.22	1.00	NA	NA
		8	2.96	7.51	NA	NA

Table 3: Results of the Multigrid (MG) benchmark.

Fujitsu VPP500	Mar 95	4	1.44	15.43	6.81	4.96
		8	0.75	29.63	3.59	9.41
		16	0.42	52.90	2.01	16.81
		32	0.26	85.46	1.26	26.81
IBM SP-1	Mar 94	8	17.50	1.27	82.03	0.41
		16	9.49	2.34	44.57	0.76
		32	5.10	4.36	24.37	1.39
		64	2.89	7.69	13.86	2.44
IBM RS/6000 SP Wide-node1 (67 MHz)	Oct 94	8	6.04	3.68	27.92	1.21
		16	3.17	7.01	14.58	2.32
		32	1.69	13.15	7.72	4.38
		64	0.95	23.39	4.36	7.75
		128	0.53	41.92	2.46	13.73
IBM RS/6000 SP Thin-node2 (67 MHz)	Feb 95	8	7.18	3.09	32.73	1.04
		16	3.74	5.94	17.13	1.97
		32	1.99	11.17	9.14	3.96
		64	1.12	19.84	5.20	6.50
		128	0.63	35.27	2.95	11.45
Intel iPSC/860	Aug 92	128	8.6	2.58	NA	NA
Intel Paragon MP (OSF1.3)	Jan 95	64	6.1	3.64	28.7	1.18
		128	3.53	6.29	15.9	2.12
		256	2.48	8.96	10.4	3.24
Intel Paragon (SunMos)	Jan 95	64	7.72	2.88	36.9	0.92
		128	4.05	5.49	19.5	1.73
		256	2.35	9.46	11.4	2.96
		512	1.75	12.70	8.51	3.97
Intel Paragon (SunMos Turbo)	Nov 95	64	5.85	3.8	27.9	1.21
		128	3.17	7.01	15.2	2.22
		256	1.87	11.88	9.05	3.73
		512	1.46	15.22	7.01	4.82
Intel Paragon MP SunMos Turbo	Jan 95	64	4.83	4.60	23.3	1.45
		128	2.78	7.99	13.4	2.52
		256	1.67	13.31	8.12	4.16
		512	1.37	16.22	6.72	5.03
Kendall Square KSR1	Feb 94	32	19.7	1.13	NA	NA
		64	10.3	2.16	NA	NA
		128	5.6	3.97	NA	NA

Table 3: Results of the Multigrid (MG) benchmark.

Kendall Square KSR2	Feb 94 May 94	32 64	10.3 5.7	2.20 3.90	NA 26.1	NA 1.29
MasPar MP-1	Aug 92	16K	12.0	1.86	NA	NA
MasPar MP-2	Nov 92	16K	4.36	5.09	NA	NA
Meiko CS-1	Aug 92	16	42.8	0.52	NA	NA
Meiko CS-2	Oct 94	16 64 128	7.60 2.35 1.43	2.93 9.83 15.54	35.46 10.76 6.55	0.95 3.14 5.16
NEC SX-3	Oct 94	1	2.80	7.94	13.16	2.57
NEC SX-4/32	NA	NA	NA	NA	NA	NA
nCUBE-2S	Mar 94	64 128 512 1024	37.6 19.2 5.3 2.8	0.59 1.16 4.19 7.94	NA NA NA NA	NA NA NA NA
SGI Power Challenge 90 MHz	Oct 95	1 2 4 8 16	37.97 20.03 10.63 6.55 5.71	0.59 1.11 2.09 3.39 3.89	176.22 93.30 49.45 30.43 26.30	0.19 0.36 0.68 1.11 1.28
Thinking Machines CM-2	Dec 91	16K 32K 64K	45.8 26.0 14.1	0.49 0.85 1.58	NA NA NA	NA NA NA
Thinking Machines CM-200	Dec 91	16K 32K	30.2 17.2	0.74 1.29	NA NA	NA NA
Thinking Machines CM-5	Aug 93	32 64 128	19.5 10.9 6.1	1.14 2.03 3.64	NA NA NA	NA NA NA
Thinking Machines CM-5E	Sep 95	16 32	7.7 3.8	2.89 5.85	36.1 18.7	0.94 1.81
Thinking Machines CM-500	Sep 95	64 128 256	2.2 1.41 0.91	10.1 15.76 24.42	10.6 6.2 3.9	3.19 5.49 8.67

Table 4: Results of the Conjugate Gradient (CG) benchmark.

Computer System	Date Received	.Number Processor	Class A		Class B	
			Time in seconds	Ratio to CRAY Y-MP/1	Time in seconds	Ratio to CRAY C90/1
BBN TC2000	Dec 91	40	51.4	0.23	NA	NA
Convex Exemplar SPP1000	Mar 95	1	202.9	0.06	NA	NA
		8	22.2	0.54	NA	NA
		16	8.94	1.33	837.0	0.15
		32	4.30	2.77	485.4	0.25
		64	NA	NA	292.1	0.42
CRAY C90	Feb 95	1	3.43	3.48	122.90	1.00
		2	1.79	6.66	63.11	1.95
		4	0.95	12.55	33.25	3.70
		8	0.53	22.49	18.11	6.79
		16	0.34	35.06	10.61	11.58
CRAY EL	Sep 93	1	45.24	0.26	NA	NA
		4	14.29	0.83	NA	NA
		8	10.14	1.18	NA	NA
CRAY J916	July 95	1	15.93	0.75	532.03	0.23
		2	8.42	1.42	293.24	0.42
		4	4.42	2.70	150.92	0.81
		8	2.61	4.57	80.67	1.52
		16	1.68	7.10	42.86	2.87
CRAY T3D	Feb 95	16	14.37	0.83	570.11	0.22
		32	7.44	1.60	291.30	0.42
		64	3.93	3.03	158.81	0.77
		128	2.11	5.65	82.07	1.50
		256	1.21	9.85	47.15	2.61
		512	0.72	16.56	27.34	4.50
		1024	0.58	20.6	16.58	7.41
CRAY T916	July 95	1	1.95	6.11	73.98	1.66
		2	1.10	10.84	37.79	3.25
		4	0.58	20.55	19.65	6.25
		8	0.38	31.37	11.43	10.75
CRAY Y-MP	Aug 92	1	11.92	1.00	NA	NA
		8	2.38	5.01	NA	NA

Table 4: Results of the Conjugate Gradient (CG) benchmark.

Fujitsu VPP500	Aug 94	1	5.68	2.10	NA	NA
		2	3.06	3.90	104.51	1.18
		4	1.72	6.93	55.40	2.22
		8	1.04	11.46	31.80	3.86
		15	NA	NA	20.85	5.89
		16	0.80	14.90	NA	NA
		30	NA	NA	15.21	8.08
IBM SP-1	Feb 94	8	21.37	0.56	NA	NA
		16	12.82	0.93	638.2	0.19
		32	7.98	1.49	362.9	0.34
		64	4.72	2.53	193.4	0.64
IBM RS/6000 SP Wide-node1 (67 MHz)	Mar 94	8	4.91	2.43	156.21	0.79
		16	3.09	3.86	88.4	1.39
		32	2.09	5.70	52.53	2.34
		64	1.6	7.45	33.79	3.64
		128	1.38	8.64	25.44	4.83
IBM RS/6000 SP Thin-node2 (67 MHz)	Mar 95	8	5.60	2.13	234.46	0.52
		16	3.48	3.43	120.23	1.02
		32	2.34	5.09	67.16	1.83
		64	1.72	6.93	38.52	3.19
		128	1.48	8.05	28.50	4.31
Intel iPSC/860	Sep 93	128	7.0	1.70	NA	NA
Intel Paragon (OSF1.2)	Mar 94	64	4.10	2.91	NA	NA
		128	3.30	3.61	132.5	0.93
		256	2.83	4.21	70.0	1.76
		512	NA	NA	47.6	2.58
Intel Paragon (SunMos)	Nov 95	64	3.59	3.32	NA	NA
		128	2.76	4.31	125.4	0.98
		256	2.44	4.89	63.6	1.93
		512	NA	NA	40.5	3.03
Kendall Square KSR1	Feb 94	32	19.0	0.63	NA	NA
		64	13.4	0.89	NA	NA
Kendall Square KSR2	Feb 94	32	9.8	1.22	NA	NA
		64	6.1	1.95	182.0	0.67
MasPar MP-1	Aug 92	4K	64.5	0.18	NA	NA
		16K	14.6	0.82	NA	NA
MasPar MP-2	Nov 92	16K	11.0	1.08	NA	NA
Meiko CS-1	Aug 92	16	67.5	0.18	NA	NA

Table 4: Results of the Conjugate Gradient (CG) benchmark.

Meiko CS-2	Oct 94	16 32	7.18 5.60	1.66 2.13	248.30 156.50	0.49 0.79
nCUBE-2S	Mar 94	64 128 256 512 1024	29.6 16.9 9.6 6.2 4.1	0.40 0.7 1 1.24 1.92 2.91	NA NA NA NA NA	NA NA NA NA NA
NEC SX-4/32	NA	NA	NA	NA	NA	NA
Silicon Graphics Power Challenge XL (75 MHz)	Oct. 94	1 2 4 8 16	39.0 16.9 7.2 4.5 3.5	0.31 0.71 1.66 2.65 3.41	NA NA NA NA NA	NA NA NA NA NA
SGI Power Challenge (90 MHz)	May 95 Oct 95	1 2 4 8 16	35.14 19.58 8.79 4.03 2.54	0.34 0.61 1.35 2.96 4.69	NA NA NA NA NA	NA NA NA NA NA
Thinking Machines CM-2	Mar 92	8K 16K 32K	25.6 14.1 8.8	0.47 0.85 1.35	NA NA NA	NA NA NA
Thinking Machines CM-5	Aug 93	32 64 128	20.7 10.6 6.2	0.58 1.12 1.92	NA NA NA	NA NA NA
Thinking Machines CM-5E	Sep 95	16 32	13.5 8.0	0.88 1.49	454 251	0.27 0.49
Thinking Machines CM-500	Sep 95	64 128 256	5.4 3.9 3.4	2.21 3.06 3.51	149 91 62	0.82 1.35 1.98

Table 5: Results of the 3-D FFT PDE (FT) benchmark.

Computer System	Date Received	Number Processor	Class A		Class B	
			Time in seconds	Ratio to CRAY Y-MP/1	Time in seconds	Ratio to CRAY C90/1
Convex Exemplar SPP1000	Mar 95	1	178.6	0.16	NA	NA
		8	25.5	1.13	375.4	0.29
		16	20.5	1.40	NA	NA
		32	13.9	2.07	NA	NA
CRAY C90	Feb 95	1	8.95	3.21	110.60	1.00
		2	4.53	6.35	55.75	1.98
		4	2.29	12.56	27.95	3.96
		8	1.29	22.30	14.12	7.83
		16	0.80	35.96	7.65	14.46
CRAY EL	May 93	1	105.1	0.27	NA	NA
		4	27.9	1.03	NA	NA
		8	18.5	1.56	NA	NA
CRAY J916	July 95	1	42.84	0.67	530.06	0.21
		2	22.08	1.30	267.92	0.41
		4	11.21	2.57	134.92	0.82
		8	5.80	4.97	70.51	1.57
		16	3.41	8.44	38.06	2.91
CRAY T3D	Feb 95	16	11.80	2.44	NA	NA
		32	5.90	4.87	NA	NA
		64	2.99	9.62	40.57	2.73
		128	1.52	18.93	20.68	5.35
		256	0.77	37.36	10.77	10.27
		512	0.51	56.41	6.44	17.17
		1024	0.32	89.91	3.76	29.41
CRAY T916	July 95	1	5.23	5.50	64.81	1.71
		2	2.67	10.78	32.39	3.41
		4	1.40	20.55	16.65	6.64
		8	0.98	29.36	9.48	11.67
CRAY Y-MP	Aug 92	1	28.77	1.0	NA	NA
		8	4.19	6.87	NA	NA

Table 5: Results of the 3-D FFT PDE (FT) benchmark.

Fujitsu VPP500	Sept. 95	1	11.25	2.56	NA	NA
		2	5.67	5.07	NA	NA
		4	2.88	9.99	31.21	3.54
		8	1.44	19.98	15.92	6.95
		16	0.75	38.36	7.94	13.91
		32	0.40	71.93	4.07	27.17
		64	0.24	119.88	2.18	50.73
IBM SP-1	Feb 94	8	43.68	0.66	NA	NA
		16	22.86	1.26	286.5	0.39
		32	12.08	2.38	143.2	0.77
		64	6.46	4.45	74.5	1.49
IBM RS/6000 SP Wide-node1 (67 MHz)	Oct 94	8	13.31	2.16	NA	NA
		16	7.17	4.01	91.8	1.20
		32	3.96	7.27	47.23	2.34
		64	2.19	13.4	26.05	4.25
		128	1.23	23.39	14.52	7.62
IBM RS/6000 SP Thin-node2 (67 MHz)	Mar 95	8	14.78	1.95	NA	NA
		16	8.09	3.56	101.03	1.09
		32	4.31	6.68	51.38	2.15
		64	2.39	12.04	28.02	3.95
		128	1.30	22.13	15.68	7.05
Intel iPSC/860	Dec 91 Apr 92	64	20.9	1.38	NA	NA
		128	9.7	2.97	NA	NA
Intel Paragon OSF R 1.2	Nov 95	16	24.7	1.16	NA	NA
		32	12.99	2.21	NA	NA
		64	6.83	4.21	83.6	1.32
		128	3.85	7.47	42.07	2.63
		256	3.46	8.32	25.93	4.27
Intel Paragon SunMos	Nov 95	16	20.46	1.41	NA	NA
		32	10.54	2.73	NA	NA
		64	5.47	5.26	60.9	1.82
		128	3.13	9.19	32.15	3.44
		256	2.82	10.20	18.66	5.93
		512	NA	NA	16.17	6.84
Intel Paragon MP R1.3	Nov 95	16	17.6	1.63	NA	NA
		32	9.52	3.02	NA	NA
		64	5.16	5.58	60.9	1.82
		128	2.93	9.82	31.0	3.57
		256	2.73	10.54	19.87	5.57

Table 5: Results of the 3-D FFT PDE (FT) benchmark.

Intel Paragon MP SunMos Turbo	Nov 95	64 128 256 512	3.87 2.38 2.20 1.92	7.43 12.09 13.08 14.98	41.8 22.76 14.2 12.4	2.65 4.86 7.79 8.92
Kendall Square KSR1	Feb 94	32 64	16.2 9.2	1.78 3.13	NA NA	NA NA
Kendall Square KSR2	Feb 94 May 94	32 64	9.0 6.5	3.20 4.43	NA 124.0	NA 0.89
Kyoto/Matsushita ADENART	Feb 94	256	72.7	0.4	NA	NA
MasPar MP-1	Aug 92	16K	18.3	1.57	NA	NA
MasPar MP-2	Nov 92	16K	8.0	3.60	NA	NA
Meiko CS-1	Aug 92	16	170.0	0.17	NA	NA
Meiko CS-2	Oct 94	16 32 64	12.67 7.17 4.53	2.27 4.01 6.35	NA 82.71 48.04	NA 1.34 2.30
nCUBE-2S	Mar 94	64 128 256 512 1024	62.8 32.9 16.0 8.4 4.1	0.46 0.87 1.8 3.43 7.02	NA NA NA NA NA	NA NA NA NA NA
NEC SX-3	Oct 94	1	2.79	10.31	37.52	2.95
NEC SX-4/32	Oct. 95	1 2 4 8 16 32	NA NA NA NA NA NA	NA NA NA NA NA NA	56.57 28.14 14.79 8.03 4.74 3.14	1.96 3.93 7.48 13.77 23.33 35.22
Silicon Graphics Power Challenge XL (75 MHz)	Oct 94	1 2 4 8 16	61.17 35.53 19.98 12.57 11.18	0.47 0.81 1.44 2.29 2.57	761.67 414.52 223.97 130.15 110.37	0.15 0.27 0.49 0.85 1.00

Table 5: Results of the 3-D FFT PDE (FT) benchmark.

SGI Power Challenge (90 MHz)	May 95	1 2 4 8 16	51.89 27.49 16.64 10.47 9.23	0.55 1.05 1.73 2.75 3.11	642.3 331.5 181.4 110.6 93.9	0.17 0.33 0.61 1.00 1.18
Thinking Machines CM-2	Dec 91	16K 32K 64K	37.0 18.2 11.4	0.78 1.58 2.52	NA NA NA	NA NA NA
Thinking Machines CM-200	Dec 91	8K	45.6	0.63	NA	NA
Thinking Machines CM-5	Aug 93	32 64 128	14.9 7.9 6.6	1.93 3.64 4.36	NA NA NA	NA NA NA
Thinking Machines CM-5E	Sep 95 Feb 94	16 32 64 128	12.8 6.7 3.9 2.9	2.25 4.29 7.38 9.92	160 82.0 46.0 34.0	0.69 1.35 2.40 3.25
Thinking Machines CM-500	Sep 95	64 128 256	3.5 1.96 1.33	8.22 14.67 21.63	41.9 22.5 13.2	2.64 4.92 8.38

Table 6: Results of the Integer Sort (IS) benchmark.

Computer System	Date Received	Number Processor	Class A		Class B	
			Time in seconds	Ratio to Cray Y-MP/1	Time in seconds	Ratio to Cray C90/1
Convex Exemplar SPP1000	Mar 95	1	83.2	0.14	NA	NA
		8	10.1	1.13	43.5	0.30
CRAY C90	Feb 95	1	3.33	3.44	12.92	1.0
		2	1.64	6.99	6.50	1.99
		4	0.85	13.48	3.30	3.92
		8	0.46	24.91	1.73	7.47
		16	0.27	42.44	0.98	13.18
CRAY EL	Sep 93	1	43.76	0.26	NA	NA
		4	12.99	0.88	NA	NA
		8	8.45	1.35	NA	NA
CRAY J916	July 95	1	13.75	0.83	54.41	0.24
		2	7.02	1.63	27.96	0.46
		4	3.81	3.00	13.93	0.93
		8	2.21	5.19	7.60	1.70
		16	1.63	7.03	4.91	2.63
CRAY T3D	Feb 95	16	7.07	1.62	NA	NA
		32	3.89	2.95	16.57	0.78
		64	2.09	5.48	8.74	1.48
		128	1.05	10.91	4.56	2.83
		256	0.55	20.84	2.36	5.47
		512	0.31	36.97	1.33	9.71
		1024	0.44	26.05	1.22	10.59
CRAY T916	July 95	1	2.02	5.67	7.44	1.74
		2	1.02	11.24	3.74	3.45
		4	0.52	22.04	1.92	6.73
		8	0.38	30.16	1.41	9.16
CRAY Y-MP	Aug 92	1	11.46	1.00	NA	NA
		8	1.85	6.19	NA	NA

Table 6: Results of the Integer Sort (IS) benchmark.

Fujitsu VPP500	Apr 94	1	2.189	5.24	NA	NA
		2	1.574	7.28	NA	NA
		4	1.098	10.44	3.70	3.49
		8	0.917	12.50	3.03	4.26
IBM SP-1	Feb 94	8	16.81	0.68	NA	NA
		16	8.85	1.29	37.3	0.35
		32	5.04	2.27	20.1	0.64
		64	3.06	3.75	11.2	1.15
IBM RS/6000 SP Wide-node1 (67 MHz)	Mar 95	8	4.93	2.32	19.75	0.65
		16	2.65	4.32	10.60	1.22
		32	1.54	7.44	5.92	2.18
		64	0.89	12.88	3.41	3.79
		128	0.59	19.42	1.98	6.53
IBM RS/6000 SP Thin-node2 (67 MHz)	Feb 95	8	5.16	2.22	20.79	0.62
		16	2.89	3.97	11.46	1.13
		32	1.66	6.90	6.37	2.03
		64	0.91	12.59	3.58	3.61
		128	0.61	18.79	2.05	6.30
Intel iPSC/860	May 92	32	25.7	0.45	NA	NA
		64	17.3	0.66	NA	NA
		128	13.6	0.84	NA	NA
Intel Paragon (OSF1.2)	Mar 94	32	7.81	1.47	NA	NA
		64	4.34	2.64	17.33	0.75
		128	2.41	4.76	9.52	1.36
		256	NA	NA	5.94	2.18
		512	NA	NA	4.69	2.75
Intel Paragon (SunMos)	Mar 94	32	5.48	2.09	NA	NA
		64	3.77	3.04	11.98	1.08
		128	2.29	5.00	7.22	1.79
Kendall Square KSR1	Feb 94	32	10.8	1.06	NA	NA
		64	6.6	1.74	NA	NA
Kendall Square KSR2	Feb 94	32	7.0	1.64	NA	NA
	May 94	64	3.9	2.94	20.3	0.64
Kyoto/Matsushita ADENART	Feb 94	256	46.6	0.25	NA	NA

Table 6: Results of the Integer Sort (IS) benchmark.

MasPar MP-1	Jan 93	16K	11.5	1.00	NA	NA
MasPar MP-2	Jan 93	16K	7.7	1.49	NA	NA
Meiko CS-1	Aug 92	16	62.7	0.18	NA	NA
nCUBE-2S	Mar 94	64 128 256 512 1024	23.2 12.0 6.1 3.2 1.7	0.49 0.96 1.88 3.58 6.74	NA 47.5 NA 12.5 6.5	NA 0.27 NA 1.03 1.99
SGI Power Challenge (90 MHz)	Oct 95	1 2 4 8	20.0 11.9 7.1 5.0	0.57 0.96 1.61 2.29	NA NA NA NA	NA NA NA NA
Thinking Machines CM-200	Dec 91	64K	5.7	2.01	NA	NA
Thinking Machines CM-5	Aug 93	32 64 128	43.1 24.2 12.0	0.27 0.47 0.96	NA NA	NA NA NA
Thinking Machines CM-5E	Sep 95 Feb 94	16 32 64 128	11.9 6.1 3.1 1.66	0.96 1.88 3.70 6.90	NA 31.4 16.4 8.4	NA 0.41 0.79 1.54
Thinking Machines CM-500	Sep 95	64 128 256	3.16 1.67 1.16	3.63 6.86 9.88	16.1 8.2 4.3	0.80 1.58 3.0

Table 7: Results of the LU CFD Application (LU)benchmark.

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Computer System	Date Received	No. Proc.	Class A		Class B	
			Time in seconds	Ratio to Cray YMP/1	Time in seconds	Ratio to Cray C90/1
BBN TC2000	Dec 91	62	3032.0	0.11	NA	NA
Convex Exemplar SPP1000	Mar 95	1	2668	0.13	NA	NA
		8	331	1.00	1492	0.30
		16	196	1.70	827	0.54
		32	126	2.65	465.9	0.9
CRAY C90	Feb 95	1	119.78	2.78	449.54	1.00
		2	62.29	5.35	231.98	1.94
		4	32.20	10.36	121.26	3.71
		8	17.15	19.45	63.03	7.13
		16	10.17	32.79	37.93	11.85
CRAY EL	Aug 92	1	1449.0	0.23	NA	NA
		4	522.3	0.64	NA	NA
		8	351.6	0.95	NA	NA
CRAY J916	July 95	1	492.83	0.68	1994.05	0.23
		2	254.94	1.31	1024.74	0.44
		4	135.07	2.47	526.29	0.85
		8	72.73	4.51	286.17	1.57
		16	47.59	7.01	170.26	2.64
CRAY T3D	Feb 95	16	205.69	1.62	844.53	0.53
		32	106.89	3.12	451.18	1.00
		64	55.32	6.03	233.45	1.93
		128	28.71	11.62	120.53	3.73
		256	15.94	20.92	65.06	6.9
		512	9.02	36.97	36.39	12.35
		1024	7.09	47.4	20.77	21.64
CRAY T916	July 95	1	82.67	4.03	293.38	1.53
		2	46.91	7.11	149.33	3.01
		4	23.68	14.08	77.95	5.77
		8	15.74	21.19	43.13	10.42
		16	NA	NA	28.26	15.91

CRAY Y-MP	Aug 92	1	333.5	1.00	NA	NA
		8	49.5	6.74	NA	NA
DEC Alpha Server 8400 5/300	Oct 95	1	528.6	0.63	2304.9	0.20
		2	301.77	1.11	1350.0	0.33
		4	158.78	2.10	691.8	0.65
		8	91.72	3.64	376.23	1.19
		12	79.13	4.21	296.19	1.51
Fujitsu VPP500	Oct 95	1	101.960	3.27	414.82	1.08
		2	61.409	5.43	242.23	1.86
		3	NA	NA	175.20	2.57
		4	35.789	9.31	NA	NA
		6	NA	NA	97.851	4.59
		8	21.041	15.85	NA	NA
		16	13.944	23.92	NA	NA
		17	NA	NA	43.644	10.30
		34	NA	NA	28.095	16.00
IBM SP-1	Feb 94	8	291.4	1.14	NA	NA
		16	172.9	1.93	604.8	0.74
		32	101.8	3.28	348.1	1.29
		64	63.2	5.28	207.5	2.17
IBM RS/6000 SP Wide-node1 (67 MHz)	Mar 95	8	112.5	2.96	429.8	1.05
		16	64.6	5.16	234.4	1.92
		32	36.5	9.14	129.7	3.47
		64	22.7	14.69	76.8	5.85
		128	15.2	21.94	47.8	9.4
IBM RS/6000 SP Wide-node2 (77 MHz)	Oct 95	1	501.5	0.67	2066.6	0.22
		8	80.81	4.13	311.53	1.44
		16	48.36	6.90	171.79	2.62
		32	29.41	11.34	98.04	4.59
		64	19.20	17.37	59.45	7.56
IBM RS/6000 SP Thin-node1 (67 MHz)	Mar 95	8	120.8	2.76	477.3	0.94
		16	70.9	4.70	255.4	1.76
		32	40.1	8.32	141.3	3.18
		64	24.5	13.61	82.9	5.42
		128	15.9	20.97	51.2	8.78
Intel iPSC/860	Mar 91	64	690.8	0.48	NA	NA
		128	442.5	0.75	NA	NA

Intel Paragon (OSF1.2)	Jul 94	64 128 256 512	190.0 118.0 75.0 NA	1.76 2.83 4.45 NA	675.0 406.0 254.0 175.0	0.67 1.11 1.77 2.57
Kendall Square KSR1	Feb 94	32 64 128	341.0 199.0 155.0	0.98 1.68 2.15	NA NA NA	NA NA NA
Kendall Square KSR2	Feb 94 May 94	32 64	172.0 102.0	1.93 3.27	NA 424.0	NA 1.06
MasPar MP-1	Aug 92	4K	1580.0	0.21	NA	NA
MasPar MP-2	Nov 92	4K	463.5	0.72	NA	NA
Meiko CS-1	Aug 92	16	2937.0	0.11	NA	NA
nCUBE-2S	Mar 94	64 128 256 512 1024	1322.0 712.5 389.1 226.1 134.1	0.25 0.47 0.86 1.48 2.49	NA NA NA NA NA	NA NA NA NA NA
NEC SX-4/16	Oct 95	16	NA	NA	35.26	12.75
Silicon Graphics Power Challenge XL (75 MHz)	Oct 94	1 4 8 16	604.0 231.8 111.7 65.3	0.55 1.44 2.99 5.11	2617.9 1010.5 550.2 308.1	0.17 0.44 0.82 1.46
SGI Power Challeng - XL (90 MHz)	Oct 94	1 2 4 8 16	549.02 356.73 188.33 101.00 65.90	0.61 0.93 1.77 3.30 5.06	2439.90 1500.30 774.93 419.90 292.02	0.18 0.30 0.58 1.07 1.54
Thinking Machines CM-2	Mar 91	8K 16K 32K	1307.0 850.0 546.0	0.26 0.39 0.61	NA NA NA	NA NA NA
Thinking Machines CM-5	Aug 93	32 64 128	418.0 272.0 171.0	0.80 1.23 1.95	NA NA NA	NA NA NA

Thinking Machines CM-5E	Sep 95 Feb 94	16 32 64 128	256 143 97.0 65.0	1.30 2.33 3.44 5.13	957 533 367.0 318.0	0.47 0.84 1.22 1.41
Thinking Machines CM-500	Sep 95	64 128 256	90 61 43	3.71 5.47 7.76	336 247 149	1.34 1.82 3.02

Table 8: Results of the SP simulated CFD application (SP) benchmark.

Computer System	**Date Received**	**Number Processor**	**Class A**		**Class B**	
			Time in seconds	**Ratio to Cray YMP/1**	**Time in seconds**	**Ratio to Cray C90/1**
BBN TC2000	Dec 91	112	880.0	0.54	NA	NA
Convex Exemplar SPP1000	Mar 95	1 8 16 32 64	2533 345 228 144 102	0.19 1.37 2.07 3.27 4.62	NA 1584 1068 697.4 449.5	NA 0.44 0.65 0.99 1.5
CRAY C90	Feb 95	1 2 4 8 16	174.50 87.32 44.75 22.74 12.82	2.70 5.40 10.54 20.73 36.78	689.60 345.57 175.85 90.80 52.22	1.00 2.00 3.92 7.59 13.21
CRAY EL	Aug 92	1 4 8	2025.7 601.9 488.4	0.23 0.78 0.97	NA NA NA	NA NA NA
CRAY J916	July 95	1 2 4 8 16	870.47 436.91 226.66 118.30 77.54	0.54 1.08 2.08 3.99 6.08	3728.69 1927.50 941.08 521.73 316.58	0.18 0.36 0.73 1.32 2.18

Table 8: Results of the SP simulated CFD application (SP) benchmark.

CRAY T3D	Feb 95	16	202.11	2.33	818.07	0.84
		32	104.10	4.53	463.62	1.49
		64	53.26	8.85	233.52	2.95
		128	27.54	17.12	130.45	5.29
		256	14.71	32.05	74.89	9.21
		512	8.91	52.92	42.63	16.18
		1024	5.41	87.15	25.23	27.33
CRAY T916	July95	1	112.37	4.20	427.56	1.61
		2	56.46	8.35	214.63	3.21
		4	30.42	15.50	113.02	6.10
		8	18.69	25.23	60.61	11.38
		16	NA	NA	40.59	16.99
CRAY Y-MP	Aug 92	1	471.5	1.01	NA	NA
		8	64.6	7.30	NA	NA
DEC Alpha Server 8400 5/300	Mar 95	1	749.61	0.63	3448.10	0.20
		4	199.17	2.37	904.45	0.76
		8	118.04	3.99	452.13	1.53
		12	102.75	4.59	364.54	1.89
Fujitsu VPP500	Mar 95	1	99.309	4.75	404.08	1.71
		2	61.588	7.66	241.23	2.86
		4	32.114	14.68	127.48	5.41
		6	NA	NA	83.710	8.24
		8	16.399	28.75	64.930	10.62
		16	8.5761	54.98	NA	NA
		17	NA	NA	30.474	22.63
		32	4.5355	103.96	NA	NA
		34	NA	NA	15.674	44.0
		51	NA	NA	10.654	64.73
		64	2.5483	185.0	NA	NA
IBM SP-1	Feb 94	8	441.6	1.07	NA	NA
		16	268.7	1.75	941.2	0.73
		32	165.0	2.86	522.4	1.32
		64	100.4	4.69	302.3	2.28
IBM RS/6000 SP Wide-node1 (67 MHz)	Mar 95	8	143.8	3.28	589.3	1.17
		16	83.2	5.67	300.6	2.29
		32	48.7	9.68	163.8	4.21
		64	30.1	15.66	91.7	7.52
		128	18.7	25.21	54.8	12.58

Table 8: Results of the SP simulated CFD application (SP) benchmark.

IBM RS/6000 SP Wide-node2 (77 MHz)	Oct 95	1 8 16 32 64	711.8 114.15 69.32 43.20 26.46	0.66 4.13 6.80 10.91 17.82	3087.0 453.66 248.51 142.88 80.17	0.22 1.52 2.77 4.83 8.60
IBM RS/6000 SP Thin-node2 (67 MHz)	Mar 95	8 16 32 64 128	161.1 93.3 53.6 32.7 20.6	2.93 5.05 8.80 14.42 22.89	640.9 342.3 184.4 101.6 59.9	1.08 2.01 3.74 6.79 11.51
Intel iPSC/860	Jul 94 Aug 92	64 128	640.0 449.5	0.74 1.05	NA NA	NA NA
Intel Paragon (OSF1.2)	Jul 94	64 102 128 204 256 324 400 484	226.0 NA 143.0 NA 97.0 89.0 NA NA	2.09 NA 3.30 NA 4.86 5.30 NA NA	960.0 610.0 NA 387.0 301.0 262.0 246.0 209.0	0.72 1.13 NA 1.78 2.29 2.63 2.80 3.30
Kendall Square KSR1	Feb 94	32 64 128	418.0 257.0 160.0	1.13 1.83 2.95	NA NA NA	NA NA NA
Kendall Square KSR2	Feb 94 May 94	32 64	221.0 131.0	2.13 3.59	NA 495.0	NA 1.39
Kyoto/Matsushita ADENART	Feb 94	256	209.9	2.24	NA	NA
MasPar MP-1	Aug 92	4K	1772	0.27	NA	NA
MasPar MP-2	Nov 92	4K	615	0.77	NA	NA
Meiko CS-1	Aug 92	16	2975	0.16	NA	NA
nCUBE-2S	Mar 94	64 128 256 512 1024	1243.2 717.4 387.3 208.6 120.9	0.38 0.66 1.22 2.26 3.90	NA NA NA NA NA	NA NA NA NA NA

Table 8: Results of the SP simulated CFD application (SP) benchmark.

NEC SX-3	Oct 94	1	75.72	6.23	495.0	1.39
NEC SX-4/32	Oct 95	1	NA	NA	416.34	1.66
		2	NA	NA	213.34	3.23
		4	NA	NA	108.66	6.35
		8	NA	NA	56.91	12.11
		16	NA	NA	31.75	21.72
		32	NA	NA	17.76	38.82
Silicon Graphics Power Challenge XL (75 MHz)	Oct 94	1	858.3	0.55	3719.5	0.19
		4	225.8	2.09	947.6	0.73
		8	119.5	3.95	491.4	1.40
		16	67.2	7.02	313.1	2.20
SGI Power Challenge - XL (90 MHz)	May 95	1	757.00	0.62	3343.90	0.21
		2	387.90	1.22	1685.30	0.41
		4	200.44	2.35	853.35	0.81
		8	106.43	4.43	445.38	1.55
		16	63.18	7.46	294.22	2.34
Thinking Machines CM-2	Dec 91	16K	1444.0	0.33	NA	NA
		32K	917.0	0.51	NA	NA
		64K	640.0	0.74	NA	NA
Thinking Machines CM-5		32	289.0	1.63	NA	NA
		64	170.0	2.77	NA	NA
		128	119.0	3.96	NA	NA
Thinking Machines CM-5E	Sep 95	16	268	1.76	1580	0.44
		32	144	3.27	771	0.89
	Feb 94	64	104.0	4.53	595.0	1.16
		128	61.0	7.73	320.0	2.16
Thinking Machines CM-500	Sep 95	64	85	5.55	405	1.70
		128	51	9.25	236	2.92
		256	34	13.87	140	4.93

Table 9: Results of the BT simulated CFD application (BT) benchmark.

Computer System	Date Received	Number Processor	Class A		Class B	
			Time in seconds	Ratio to CRAY Y-MP/1	Time in seconds	Ratio CRAY C90/1
BBN TC2000	Dec 91	112	1378.0	0.58	NA	NA
Convex Exemplar SPP1000	Mar 95	1	2825	0.28	NA	NA
		8	366	2.17	1675	0.61
		16	211	3.76	984	1.04
		32	125	6.34	559.8	1.82
		64	78	10.16	338.2	3.03
CRAY C90	Feb 95	1	276.80	2.86	1023.4	1.00
		2	139.44	5.68	519.46	1.97
		4	72.11	10.99	265.20	3.86
		8	36.99	21.42	138.16	7.41
		16	20.30	39.03	78.80	12.99
CRAY EL	May 93	1	3832.8	0.21	NA	NA
		4	1090.2	0.73	NA	NA
		8	764.1	1.04	NA	NA
CRAY J916	July 95	1	1202.53	0.66	5356.59	0.19
		2	608.83	1.30	2789.74	0.37
		4	317.62	2.49	1414.43	0.72
		8	168.46	4.70	765.60	1.34
		16	98.80	8.02	426.91	2.40

Table 9: Results of the BT simulated CFD application (BT) benchmark.

CRAY T3D	Feb 95	16	230.41	3.44	918.04	1.11
		32	115.53	6.85	476.97	2.15
		64	59.01	13.43	252.86	4.04
		128	29.96	26.44	128.21	7.98
		256	15.89	49.87	68.38	15.0
		512	8.39	94.45	38.01	26.92
		1024	4.56	173.77	20.45	50.04
CRAY T916	July 95	1	193.19	4.10	649.10	1.58
		2	100.10	7.92	332.38	3.08
		4	53.23	14.89	169.27	6.05
		8	30.66	25.84	92.43	11.07
		16			64.06	15.98
CRAY Y-MP	Aug 92	1	792.4	1.00	NA	NA
		8	114.0	6.95	NA	NA
DEC Alpha Server 8400 5/300	Oct 95	1	1048.7	0.76	4076.50	0.25
		2	527.04	1.50	2525.00	0.41
		4	271.13	2.92	1278.60	0.80
		8	146.91	5.39	649.53	1.58
		12	103.47	7.66	458.21	2.23
Fujitsu VPP500	Mar 95	1	142.42	5.56	NA	NA
		2	75.17	10.54	NA	NA
		4	39.14	20.25	NA	NA
		8	19.82	39.98	NA	NA
		16	9.99	79.32	NA	NA
		17	NA	NA	37.26	27.47
		32	5.09	155.68	NA	NA
		34	NA	NA	18.82	54.38
		51	NA	NA	12.61	81.16
		64	2.66	297.90	NA	NA
IBM SP-1	Aug 94	8	443.9	1.79	NA	NA
		16	249.2	3.18	987.4	1.04
		32	143.0	5.54	511.2	2.00
		64	83.1	9.54	274.6	3.73
IBM RS/6000 SP Wide-node1 (67 MHz)	Mar 95	8	206.7	3.83	862.8	1.19
		16	112.9	7.02	440.6	2.32
		32	61.8	12.82	226.8	4.51
		64	34.7	22.84	119.1	8.59
		128	20.1	39.42	67.0	15.27

Table 9: Results of the BT simulated CFD application (BT) benchmark.

IBM RS/6000 SP Wide-node2 (77 MHz)	Oct 95	1 8 16 32 64	1130.7 170.74 95.48 51.34 29.01	0.70 4.64 8.30 15.44 27.31	4775.7 708.47 375.76 197.91 105.19	0.21 1.44 2.72 5.17 9.73
IBM RS/6000 SP Thin-node2 (67 MHz)	Feb 95	8 16 32 64 128	216.6 118.0 64.9 36.3 20.8	3.66 6.72 12.21 21.83 38.10	889.8 459.2 237.2 124.8 69.6	1.15 2.23 4.31 8.20 14.70
Intel iPSC/860	Aug 92	64 128	714.7 414.3	1.11 1.91	NA NA	NA NA
Intel Paragon (OSF1.2)	Mar 94	64 102 128 204 256 306 408 510 512	235.0 NA 129.0 NA 83.0 NA NA NA 63.0	3.37 NA 6.14 NA 9.55 NA NA NA 12.58	NA 633.0 NA 359.0 NA 257.0 226.0 196.0 NA	NA 1.62 NA 2.86 NA 3.98 4.53 5.22 NA
Intel Paragon (SunMos)	Nov 93 Mar 94	64 102 128 204 306	224.0 NA 113.0 NA NA	3.54 NA 7.01 NA NA	NA 598.0 NA 324.0 215.0	NA 1.71 NA 3.16 4.76
Kendall Square KSR1	Feb 94	32 64 128	457 256 145	1.74 3.1 5.46	NA NA NA	NA NA NA
Kendall Square KSR2	Feb 94 May 94	32 64	225 130	3.52 6.10	NA 542.0	NA 1.89
Kyoto/Matsushita ADENART	Feb 94	256	314.1	2.52	NA	NA
MasPar MP-1	Aug 92	4K	2396.0	0.33	NA	NA
MasPar MP-2	Nov 92	4K	789.0	1.00	NA	NA
Meiko CS-1	Aug 92	16	2984.0	0.27	NA	NA

Table 9: Results of the BT simulated CFD application (BT) benchmark.

Meiko CS-2	Oct 94	8 16 32	570.4 286.6 149.3	1.39 2.77 5.31	NA NA NA	NA NA NA
nCUBE-2S	Mar 94 Jul 94	64 128 256 512 1024	1243.2 644.7 336.7 179.1 100.9	0.64 1.22 2.35 4.42 7.85	NA NA NA NA NA	NA NA NA NA NA
NEC SX-3	Oct 94	1	100.31	7.90	NA	NA
NEC SX-4/32	Oct. 95	1 2 4 8 16 32	NA NA NA NA NA NA	NA NA NA NA NA NA	620.36 316.72 160.77 83.52 46.25 25.15	1.65 3.23 6.37 12.25 22.13 40.69
Silicon Graphics Power Challenge XL (75 MHz)	Oct 94	1 4 8 16	1330.3 355.9 177.0 91.8	0.60 2.23 4.48 8.63	5698.7 1450.0 775.0 426.0	0.18 0.71 1.32 2.40
SGI Power Challneg XL (90 MHz)	May 95	1 2 4 8 16	1145.20 574.37 298.74 152.65 80.20	0.69 1.38 2.65 5.19 9.88	5089.60 2537.70 1278.60 672.56 391.88	0.20 0.40 0.80 1.52 2.61
Thinking Machines CM-2	Dec 91	16K 32K 64K	1118.0 634.0 370.0	0.71 1.25 2.14	NA NA NA	NA NA NA
Thinking Machines CM-200	Dec 91	16K 32K	832.0 601.0	0.95 1.32	NA NA	NA NA
Thinking Machines CM-5	May 93	32 64 128	284.0 175.0 119.0	2.79 4.50 6.66	NA NA NA	NA NA NA
Thinking Machines CM-5E	Sep 95 Feb 94	16 32 64 128	259 135 84.0 48.0	3.06 5.87 9.43 16.50	1480 712 464.0 253.0	0.69 1.44 2.21 4.05

Table 9: Results of the BT simulated CFD application (BT) benchmark.

Thinking Machines CM-500	Sep 95	64 128 256	75 43 27	10.56 18.43 29.34	370 209 114	2.77 4.90 8.98

Table 10: Approximate sustained performance per dollar for Class B LU benchmark

.

Computer System	**# Proc.**	**Memory**	**Ratio to C90/1**	**List Price Million Dollars**	**Performance per Million Dollars**	**Date**
Convex SPP1000	32	4 GB	0.96	1.25	0.77	Mar 95
CRAY C916	16	2 GB	11.85	30.50	0.39	Mar 95
CRAY J916	16	2 GB	2.64	1.05	2.51	Jul 95
CRAY T3D	128	64 MB/PE	3.73	3.6	1.04	Mar 95
CRAY T916	16	2 GB	15.91	15.0	1.06	Oct 95
DEC Alpha Server 8400 5/300	12	2 GB	1.51	0.718	2.10	Oct 95
IBM RS/6000 SP Wide-node1 (67 MHz)	64	128 MB/PE	5.85	5.08	1.15	Mar 95
IBM RS/6000 SP Wide-node2 (77 MHz)	64	128 MB/PE	7.56	5.74	1.32	Oct 95
IBM RS/6000 SP Thin-node2 (67 MHz)	64	64 MB/PE	5.42	3.48	1.56	Mar 95
NEC SX-4/16	16	4 GB	12.75	8.1	1.57	Oct 95

SGI PC XL (75 MHz)	16	2 GB	1.46	0.895	1.63	Jun 94
SGI PC XL (90 MHz	16	2 GB	1.54	1.02	1.51	May 95

Table 11: Approximate sustained performance per dollar for Class B SP benchmark

.

Computer System	**# Proc**	**Memory**	**Ratio to C90/1**	**List Price Million Dollars**	**Performance per Million Dollars**	**Date**
Convex SPP1000	64	8 GB	1.5	2.50	0.60	Mar 95
CRAY C916	16	2 GB	13.21	30.50	0.43	Mar 95
CRAY J916	16	2 GB	2.18	1.05	2.07	July 95
CRAY T3D	128	64 MB/PE	5.29	3.6	1.47	Mar 95
CRAY T916	16	2 GB	16.99	15.0	1.13	Oct 95
DEC Alpha Server 8400 5/300	12	2 GB	1.89	0.718	2.63	Oct 95
Fujitsu VPP500	51	256 MB/PE	64.73	31.00	2.09	Mar 95
IBM RS/6000 SP Wide-node1 (67 MHz)	64	128 MB/PE	7.52	5.08	1.48	Mar 95
IBM RS/6000 SP Wide-node2 (77 MHz)	64	128 MB/PE	8.60	5.74	1.50	Oct 95
IBM RS/6000 SP Thin-node2 (67 MHz)	64	64 MB/PE	6.79	3.48	1.95	Mar 95

NEC SX-4/32	32	4 GB	38.82	12.5	3.11	Oct 95
SGI PC XL (75 MHz)	16	2 GB	2.20	0.895	2.45	Jun 94
SGI PC XL (90 MHz	16	2 GB	2.34	1.02	2.29	May 95

Table 12: Approximate sustained performance per dollar for Class B BT benchmark

.

Computer System	**# Proc**	**Memory**	**Ratio to C90/1**	**List Price Million Dollars**	**Performance per Million Dollars**	**Date**
Convex SPP1000	64	8 GB	3.03	2.50	1.21	Mar 95
CRAY C916	16	2 GB	12.99	30.50	0.43	Mar 95
CRAY J916	16	2 GB	2.40	1.05	2.29	July 95
CRAY T3D	128	64 MB/PE	7.98	3.6	2.22	Mar 95
CRAY T916	16	2 GB	15.98	15.0	1.07	Oct 95
DEC Alpha Server 8400 5/300	12	2 GB	2.23	0.718	3.11	Oct 95
Fujitsu VPP500	51	256 MB/PE	81.16	31.00	2.62	Mar 95
IBM RS/6000 SP Wide-node1 (67 MHz)	64	128 MB/PE	8.59	5.08	1.69	Mar 95
IBM RS/6000 SP Wide-node2 (77 MHz)	64	128 MB/PE	9.73	5.74	1.70	Oct 95
IBM RS/6000 SP Thin-node2 (67 MHz)	64	64 MB/PE	8.20	3.48	2.36	Mar 95

NEC SX-4/32	32	4 GB	40.69	12.5	3.26	Oct 95
SGI PC XL (75 MHz)	16	2 GB	2.40	0.895	2.68	Jun 94
SGI PC XL (90 MHz)	16	2 GB	2.61	1.02	2.56	May 95