



IBM @server pSeries,
IBM RS/6000 and IBM NUMA-Q
Performance Report

September 11, 2001

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PERFORMANCE of IBM WEB SERVERS SYSTEMS

September 11, 2001

This is update of the September 4, 2001 Systems Performance Report. The TPC-C version 5 results for the IBM @server pSeries 660 Model 6M1 have been added.

Section One of this report includes the SPEC2000 and LINPACK results. The SPEC95 results are included in Section 1a.

Section Two is multi-user performance. The rPerf, SPEC_rate, and SPECweb99 are presented in this section.

Section Three presents the TPC-C version 5 results. The version 3 results are included in Section 3a. Starting April 20, 2001, TPC-C will not accept version 3 results. TPC-C version 3 results can not be compared to version 5 results.

Section Four, TPC-H results of an RS/6000 SP system with 32 375 MHz POWER3 SMP Wide Nodes and the 8, 12 and 16-quad NUMA-Q 2000 Model E410 systems are provided.

Section Five reflects the published NotesBench results to date for RS/6000 systems including the M80 NotesBench Version 5 result.

Section Six reflects the published SPECjvm98 and SPECjbb2000 Java benchmarks.

Sections Seven through Eleven include published application performance benchmarks for SAP, PeopleSoft, Oracle Applications, Baan, J.D.Edwards and VolanoMark (Java).

Section Twelve is a historical list of Relative OLTP estimates for IBM RS/6000 models and IBM RS/6000 SP nodes that have been withdrawn from marketing. IBM has discontinued Relative OLTP results.

All performance measurements for the IBM @server pSeries and IBM RS/6000 systems were made with systems running the AIX operating system. For new and upgraded systems, AIX Version 4.3 or AIX 5L Version 5.1 were used. All other systems used previous versions of AIX. All performance measurements for the NUMA-Q systems were made with the systems running the ptx operating system.

Section 1 - SPEC2000 and LINPACK PERFORMANCE

Model	Processor/ #CPUs	MHz	L1	L2	SPEC	SPEC	SPEC	LINPACK			
			Cache (KB)	Cache (MB)	int 2000	int_ base_ 2000	SPEC fp 2000	fp_ base_ 2000	DP	SP	TPP
#43P-140u	604e	233	32/32	1.0	--	--	--	--	22.6	77.1	156.2
#43P-140n	604e	233	32/32	1.0	--	--	--	--	56	113.3	156.2
#43P-140	604e	332	32/32	1.0	--	--	--	--	59.9	123.6	179.7
43P-150	604e	250	32/32	1.0	105	99.4	90.8	90.8	43	100	170
43P-150	604e	375	32/32	1.0	--	--	--	--	64.8	151.2	255.7
44P-170	P3-II	333	32/64	1.0	180	177	266	225	363	--	833
44P-170	P3-II	400	32/64	4.0	249	239	344	295	461	--	1052
44P-170	P3-II	450	32/64	8.0	316	286	409	356	503	--	1440
#43P-260	P3/1	200	32/64	4.0	--	--	--	180	--	--	--
44P-270	P3-II/1	375	32/64	4.0	262	239	366	313	426	--	1109
44P-270	P3-II/1	375	32/64	8.0	273	247	378	327	426	--	1234
B50	604e	375	32/32	1.0	--	--	--	--	64.8	151.2	255.7
p640-B80	P3-II/1	375	32/64	4.0	262	239	366	313	426	--	1109
p640-B80	P3-II/1	375	32/64	8.0	273	247	378	327	426	--	1234
#F40	604e/1	233	32/32	1.0	--	--	--	--	48.5	109.1	145.6
#F50	604e/1	166	32/32	0.2	--	--	--	--	70.2	98.9	166.4
#F50	604e/1	332	32/32	0.2	--	--	--	--	115.7	158.5	273.4
#F80	RS64 III/1	450	128/128	2.0	234	225	210	205	--	--	--
p620-6F0	RS64 IV/1	600	128/128	2.0	310	295	252	245	--	--	--
p620-6F1	RS64 IV/1	600	128/128	2.0	310	295	252	245	360	--	833
p620-6F1	RS64 IV/2	600	128/128	4.0	--	--	--	--	--	--	1650
p620-6F1	RS64 IV/4	600	128/128	4.0	--	--	--	--	--	--	3144
p620-6F1	RS64 IV/6	668	128/128	8.0	--	--	--	--	--	--	4529
#H70	RS64 II/1	340	64/64	4.0	--	168	--	--	187.6	124	498.3
#H80	RS64 III/1	450	128/128	2.0	234	225	210	205	--	--	--
p660-6H0	RS64 IV/1	600	128/128	2.0	310	295	252	245	--	--	--
p660-6H1	RS64 IV/1	600	128/128	2.0	310	295	252	245	360	--	833
p660-6H1	RS64 IV/2	600	128/128	4.0	--	--	--	--	--	--	1650
p660-6H1	RS64 IV/4	600	128/128	4.0	--	--	--	--	--	--	3144
p660-6H1	RS64 IV/6	668	128/128	8.0	--	--	--	--	--	--	4529
M80	RS64 III/1	500	128/128	4.0	275	264	250	243	--	--	--
M80	RS64 IV/1	750	128/128	8.0	439	409	376	359	--	--	--
p660-6M1	RS64 IV/1	750	128/128	8.0	439	409	376	359	--	--	--

RS/6000 SP Models

Model	Proc./ #CPUs	MHz	L1	L2	SPEC	SPEC	SPEC	LINPACK			
			Cache (KB)	Cache (MB)	int 2000	int_ base_ 2000	SPEC fp 2000	fp_ base_ 2000	DP	SP	TPP
#160 Thin	P2SC	160	32/128	0.0	--	--	--	--	311.9	147	528
#332 T/W	604e/1	332	32/32	0.2	--	--	--	--	115.7	58.5	273
#POWER3 H	P3/1	222	32/64	4.0	--	--	--	--	250	--	656
POWER3 T/W	P3-II/1	375	32/64	8.0	260	248	382	330	409	--	1236
POWER3 H	P3-II/1	375	32/64	8.0	252	229	337	322	424	--	1208

Section 1a - SPEC95 PERFORMANCE

Model	Processor/ #CPUs	MHz	L1	L2	SPEC int95	SPEC		SPEC fp_ base95
			Cache (KB)	Cache (MB)		int_ base95	SPEC fp95	
#43P-140u	604e	233	32/32	1.0	8.66	7.77	5.63	5.30
#43P-140n	604e	233	32/32	1.0	9.24	8.29	5.75	5.48
#43P-140	604e	332	32/32	1.0	12.9	12.2	6.21	5.99
43P-150	604e	250	32/32	1.0	11.1	10.9	8.78	8.28
43P-150	604e	375	32/32	1.0	15.1	14.5	10.1	9.76
44P-170	P3-II	333	32/64	1.0	19.8	18.6	35.6	34.0
44P-170	P3-II	400	32/64	4.0	25.3	23.5	47.9	46.0
44P-170	P3-II	450	32/64	8.0	29.0	26.9	58.4	56.3
#43P-260	P3/1	200	32/64	4.0	12.5	11.5	27.0	25.1
44P-270	P3-II/1	375	32/64	4.0	24.3	22.6	48.2	46.0
44P-270	P3-II/1	375	32/64	8.0	24.5	22.7	53.2	50.7
B50	604e	375	32/32	1.0	15.1	14.5	10.1	9.76
p640-B80	P3-II/1	375	32/64	4.0	24.3	22.6	48.2	46.0
p640-B80	P3-II/1	375	32/64	8.0	24.5	22.7	53.2	50.7
#F40	604e/1	233	32/32	1.0	8.71	7.80	5.34	5.12
#F50	604e/1	166	32/32	0.2	7.52	6.79	8.52	8.11
#F50	604e/1	332	32/32	0.2	14.4	14.0	12.6	12.1
#F80	RS64 III/1	450	128/128	2.0	21.0	18.7	25.4	24.8
#H50	604e/1	332	32/32	0.2	14.4	14.0	12.6	12.1
#H70	RS64 II/1	340	64/64	4.0	16.0	13.7	21.2	20.2
#H80	RS64 III/1	450	128/128	2.0	21.0	18.7	25.4	24.8
M80	RS64 III/1	500	128/128	4.0	24.1	20.7	29.1	28.5

RS/6000 SP Models

Model	Processor/ #CPUs	MHz	L1	L2	SPEC int95	SPEC		SPEC fp_ base95
			Cache (KB)	Cache (MB)		int_ base95	SPEC fp95	
#160 Thin	P2SC	160	32/128	0	8.62	7.77	26.6	23.6
#332 T/W	604e/1	332	32/32	0.2	14.4	14.0	12.6	12.1
#POWER3T/W	P3/1	200	32/64	4.0	12.5	11.5	27.0	25.1
#POWER3 H	P3/1	222	32/64	4.0	13.9	12.8	28.6	26.3
POWER3T/W	P3-II/1	375	32/64	8.0	24.4	22.6	50.9	47.1
POWER3 H	P3-II/1	375	32/64	8.0	23.5	21.8	51.3	48.8

Section 2 - MULTIUSER PERFORMANCE

Model	Processor/ #CPUs	L1 Cache MHz (KB)	L2 Cache (MB)	rPerf	SPEC		SPEC		SPEC web99	
					int_ rate 2000	base_ rate 2000	fp_ rate 2000	fp_ base_ rate 2000		
43P-150	604	250	32/32	1.0	0.18	--	--	--	--	--
43P-150	604	375	32/32	1.0	0.26	--	--	--	--	--
44P-170	P3-II	333	32/64	1.0	0.58	--	--	--	--	--
44P-170	P3-II	400	32/64	4.0	0.73	--	--	--	--	460
44P-170	P3-II	450	32/64	8.0	0.79	--	--	--	--	--
44P-270	P3-II/1	375	32/64	4.0	1.00	--	--	--	--	--
44P-270	P3-II/2	375	32/64	4.0	1.92	6	5.5	7.6	6.6	--
44P-270	P3-II/3	375	32/64	4.0	2.55	--	--	--	--	--
44P-270	P3-II/4	375	32/64	4.0	3.47	11.7	10.7	11.9	10.6	1359
44P-270	P3-II/2	375	32/64	8.0	1.99	6.2	5.6	8	7	--
44P-270	P3-II/4	375	32/64	8.0	3.59	12.4	11.2	12.8	11.5	2175
43P-150	604	250	32/32	1.0	0.18	--	--	--	--	--
B50	604	375	32/32	1.0	0.26	--	--	--	--	--
p640-B80	P3-II/1	375	32/64	4.0	1.00	--	--	--	--	--
p640-B80	P3-II/2	375	32/64	4.0	1.92	6	5.5	7.6	6.6	--
p640-B80	P3-II/3	375	32/64	4.0	2.55	--	--	--	--	--
p640-B80	P3-II/4	375	32/64	4.0	3.47	11.7	10.7	11.9	10.6	--
p640-B80	P3-II/2	375	32/64	8.0	1.99	6.2	5.6	8	7	--
p640-B80	P3-II/4	375	32/64	8.0	3.59	12.4	11.2	12.8	11.5	2175
p620-6F0	RS64 III/1	450	128/128	2.0	0.93	--	--	--	--	--
p620-6F0	RS64 III/2	450	128/128	4.0	2.02	--	--	--	--	--
p620-6F0	RS64 III/4	450	128/128	4.0	3.55	--	--	--	--	--
p620-6F0	RS64 IV/1	600	128/128	2.0	1.26	--	--	--	--	--
p620-6F0	RS64 IV/2	600	128/128	4.0	2.69	--	--	--	--	--
p620-6F0	RS64 IV/4	600	128/128	4.0	4.57	15	14.1	11.1	10.9	3280
p620-6F1	RS64 III/1	450	128/128	2.0	0.93	--	--	--	--	--
p620-6F1	RS64 III/2	450	128/128	4.0	2.02	--	--	--	--	--
p620-6F1	RS64 III/4	450	128/128	4.0	3.55	--	--	--	--	--
p620-6F1	RS64 IV/1	600	128/128	2.0	1.26	--	--	--	--	--
p620-6F1	RS64 IV/2	600	128/128	4.0	2.69	--	--	--	--	--
p620-6F1	RS64 IV/4	600	128/128	4.0	4.57	15	14.1	11.1	10.9	3280
p620-6F1	RS64 IV/6	668	128/128	8.0	7.46	26.5	24.9	17.3	16.9	4654
p660-6H0	RS64 III/1	450	128/128	2.0	0.93	--	--	--	--	--
p660-6H0	RS64 III/2	450	128/128	4.0	2.02	--	--	--	--	--
p660-6H0	RS64 III/4	450	128/128	4.0	3.55	--	--	--	--	--
p660-6H0	RS64 IV/1	600	128/128	2.0	1.26	--	--	--	--	--
p660-6H0	RS64 IV/2	600	128/128	4.0	2.69	--	--	--	--	--
p660-6H0	RS64 IV/4	600	128/128	4.0	4.57	15	14.1	11.1	10.9	3279
p660-6H1	RS64 III/1	450	128/128	2.0	0.93	--	--	--	--	--
p660-6H1	RS64 III/2	450	128/128	4.0	2.02	--	--	--	--	--
p660-6H1	RS64 III/4	450	128/128	4.0	3.55	--	--	--	--	--
p660-6H1	RS64 IV/1	600	128/128	2.0	1.26	--	--	--	--	--
p660-6H1	RS64 IV/2	600	128/128	4.0	2.69	--	--	--	--	--
p660-6H1	RS64 IV/4	600	128/128	4.0	4.57	15	14.1	11.1	10.9	3279
p660-6H1	RS64 IV/6	668	128/128	8.0	7.46	26.5	24.9	17.3	16.9	4522
M80	RS64 III/2	500	128/128	4.0	2.49	--	--	--	--	--
M80	RS64 III/4	500	128/128	4.0	4.42	--	--	--	--	--

Model	Processor/ #CPUs	MHz	L1 Cache (KB)	L2 Cache (MB)	rPerf	SPEC		SPEC		SPEC web99
						int_ rate 2000	int_ base_ rate 2000	fp_ rate 2000	fp_ base_ rate 2000	
M80	RS64 III/6	500	128/128	4.0	6.49	--	--	--	--	--
M80	RS64 III/8	500	128/128	4.0	8.53	25.1	24	21.1	20.6	5509
M80	RS64 IV/2	750	128/128	8.0	3.71	--	--	--	--	--
M80	RS64 IV/4	750	128/128	8.0	6.68	20.3	18.7	16.5	15.7	--
M80	RS64 IV/6	750	128/128	8.0	10.14	--	--	--	--	--
M80	RS64 IV/8	750	128/128	8.0	13.28	38.5	36.9	30	28.8	8,145
p660-6M1	RS64 III/2	500	128/128	4.0	2.49	--	--	--	--	--
p660-6M1	RS64 III/4	500	128/128	4.0	4.42	--	--	--	--	--
p660-6M1	RS64 IV/2	750	128/128	8.0	3.71	--	--	--	--	--
p660-6M1	RS64 IV/4	750	128/128	8.0	6.68	20.3	18.7	16.5	15.7	--
p660-6M1	RS64 IV/6	750	128/128	8.0	10.14	--	--	--	--	--
p660-6M1	RS64 IV/8	750	128/128	8.0	13.28	38.5	36.9	30	28.8	8,145
p680-S85	RS64 III/6	450	128/128	8.0	6.14	--	--	--	--	--
p680-S85	RS64 III/12	450	128/128	8.0	11.66	--	--	--	--	--
p680-S85	RS64 III/18	450	128/128	8.0	16.29	--	--	--	--	--
p680-S85	RS64 III/24	450	128/128	8.0	20.27	--	--	--	--	--
p680-S85	RS64 IV/4	600	128/128	16.0	5.60	--	--	--	--	--
p680-S85	RS64 IV/6	600	128/128	16.0	8.23	--	--	--	--	--
p680-S85	RS64 IV/12	600	128/128	16.0	15.63	--	--	--	--	9106
p680-S85	RS64 IV/18	600	128/128	16.0	21.91	--	--	--	--	--
p680-S85	RS64 IV/24	600	128/128	16.0	27.65	--	--	--	--	--

RS/6000 SP Models

RS/6000-SP Model	Proc./ # CPUs	# Nodes	L1 Cache MHz (KB)	L2 Cache (MB)	rPerf	SPEC		SPEC		SPEC web99
						int_ rate 2000	int_ base_ rate 2000	fp_ rate 2000	fp_ base_ rate 2000	
POWER3T/W	P3-II/2	1	375	32/64	8.0	1.99	--	--	--	--
POWER3 T	P3-II/4	1	375	32/64	8.0	2.64	--	--	--	--
POWER3 W	P3-II/4	1	375	32/64	8.0	3.59	--	--	--	--
POWER3 H	P3-II/4	1	375	32/64	8.0	3.07	11.6	10.6	14.5	14.1
POWER3 H	P3-II/8	1	375	32/64	8.0	6.03	23.1	21	28	27
POWER3 H	P3-II/12	1	375	32/64	8.0	9.11	34.6	31.4	41.1	39
POWER3 H	P3-II/16	1	375	32/64	8.0	12.01	46	41.7	51.7	49.7

Section 2a - SPEC95 AND SPECweb96 PERFORMANCE

Model	Processor/ #CPUs	L1		L2 Cache (MB)	SPEC		SPEC		SPEC web96
		Cache MHz (KB)	Cache MHz (KB)		int_ rate95	base_ rate95	fp_ rate95	base_ rate95	
#43P-260	P3/1	200	32/64	4.0	112	104	243	225	--
#43P-260	P3/2	200	32/64	4.0	221	205	464	434	4597
44P-270	P3-II/1	375	32/64	4.0	218	203	434	434	--
44P-270	P3-II/2	375	32/64	4.0	437	406	767	749	--
44P-270	P3-II/4	375	32/64	4.0	872	811	1146	1142	--
#F40	604e/1	233	32/32	1.0	78.0	69.9	52.0	50.1	--
#F40	604e/2	233	32/32	1.0	151	132	89.0	85.1	--
#F50	604e/1	166	32/32	0.2	67.5	61.0	76.5	72.8	--
#F50	604e/2	166	32/32	0.2	135	121	149	143	--
#F50	604e/4	166	32/32	0.2	267	241	283	267	2148
#F50	604e/1	332	32/32	0.2	128	124	116	109	--
#F50	604e/2	332	32/32	0.2	255	245	218	206	--
#F50	604e/3	332	32/32	0.2	380	365	310	292	--
#F50	604e/4	332	32/32	0.2	485	389	364	6716	--
#F80	RS64 III/1	450	128/128	2.0	189	168	229	223	--
#F80	RS64 III/4	450	128/128	4.0	783	674	837	821	--
#F80	RS64 III/6	500	128/128	4.0	1298	1118	1153	1135	--
#H50	604e/1	332	32/32	0.2	128	124	116	109	--
#H50	604e/2	332	32/32	0.2	255	245	218	206	--
#H50	604e/3	332	32/32	0.2	380	365	310	292	--
#H50	604e/4	332	32/32	0.2	501	485	389	364	6716
#H70	RS64 II/1	340	64/64	4.0	144	124	191	182	--
#H70	RS64 II/2	340	64/64	4.0	287	247	370	354	6958
#H70	RS64 II/3	340	64/64	4.0	430	370	534	512	--
#H70	RS64 II/4	340	64/64	4.0	573	492	674	645	11774
#H80	RS64 III/1	450	128/128	2.0	189	168	229	223	--
#H80	RS64 III/4	450	128/128	4.0	783	674	837	821	--
#H80	RS64 III/6	500	128/128	4.0	1298	1118	1153	1135	--
#R50	604e/2	200	32/32	2.0	137	121	92.5	90.3	--
#R50	604e/4	200	32/32	2.0	268	244	183	176	--
#R50	604e/6	200	32/32	2.0	396	343	261	248	--
#R50	604e/8	200	32/32	2.0	509	445	332	320	--
#S7A	RS64 II/12	262	64/64	8.0	--	--	--	--	20200
M80	RS64 III/8	500	128/128	4.0	1728	1489	1958	1910	--
#S80	RS64 III/12	450	128/128	8.0	--	--	--	--	40161

RS/6000 SP Models

Model	Proc./ # CPUs	# Nodes	MHz	L1	L2	SPEC	SPEC	SPEC	SPEC	SPEC web96
				Cache (KB)	Cache (MB)	int_ rate95	int_ base_95	fp_ rate95	fp_ base_95	
#160 Thin	P2SC	1	160	32/128	0	--	--	243	218	--
#332 T/W	604e/2	1	332	32/32	.2	255	245	218	206	--
#332 T/W	604e/4	1	332	32/32	.2	501	485	389	364	6716
#POWER3T/W	P3/1	1	200	32/64	4.0	112	104	243	225	--
#POWER3T/W	P3/2	1	200	32/64	4.0	221	205	464	434	4597
#POWER3 H	P3/2	1	222	32/64	4.0	249	229	503	461	--
#POWER3 H	P3/4	1	222	32/64	4.0	493	450	999	910	--
#POWER3 H	P3/6	1	222	32/64	4.0	724	661	1464	1329	--
#POWER3 H	P3/8	1	222	32/64	4.0	966	908	1877	1760	--
POWER3 T/W	P3-II/2	1	375	32/64	8.0	438	407	844	804	--
POWER3 T/W	P3-II/4	1	375	32/64	8.0	875	812	1382	1359	--
POWER3 W	P3-II/4	8	375	32/64	8.0	6014	5616	10605	10395	--
POWER3 W	P3-II/4	16	375	32/64	8.0	10366	10001	20251	20220	--
POWER3 W	P3-II/4	32	375	32/64	8.0	17920	17239	38073	38073	--
POWER3 H	P3-II/4	1	375	32/64	8.0	845	786	1739	1670	--
POWER3 H	P3-II/8	1	375	32/64	8.0	1684	1569	3418	3290	--
POWER3 H	P3-II/12	1	375	32/64	8.0	2523	2345	4685	4832	--
POWER3 H	P3-II/16	1	375	32/64	8.0	3352	3121	6353	6202	--

Section 3 - TPC-C Version 5 PUBLISHED RESULTS

Model	Processor/ # CPUs	# Nodes	MHz	L2	tpmC	\$/tmpC	Database	AIX	Availability
				Cache (KB)					Date
p660-6H1	RS64 IV/6	1	668	8.0	57,346.93	32.59	Oracle V901	4.3.3	06/19/01
M80	RS64 III/8	1	500	4.0	66,750.27	39.24	Oracle V817	4.3.3	09/30/00
*p660-6M1	RS64 IV/8	1	750	8.0	105,025.02	25.33	Oracle V901	4.3.3	09/21/01
p680	RS64 IV/24	1	600	16.0	220,807.27	34.18	Oracle V817	4.3.3	04/13/01

Section 3a - TPC-C Version 3 PUBLISHED RESULTS

Model	Processor/ # CPUs	# Nodes	MHz	L2	tpmC	\$/tmpC	Database	AIX	Availability
				Cache (KB)					Date
#F50	604e/4	1	166	0.2	8,142.40	62.71	Sybase 11.5	4.2.1	02/09/98
#F50	604e/4	1	332	0.2	9,853.13	64.22	Sybase 11.5	4.2.1	02/20/98
#R50	604e/8	1	200	2.0	9,165.13	98.83	Sybase 11.5	4.2.1	09/30/97
#S70	RS64/12	1	125	4.0	18,666.73	108.62	Oracle V8.	4.3.0	09/02/98
#S70	RS64 II/12	1	262	8.0	34,139.63	88.09	Oracle V8.	4.3.1	01/21/99
#S7A	RS64 II/12	5	262	8.0	110,434.10	122.44	Oracle OPS	4.3.2	06/28/99
#H70	RS64 II/4	1	340	4.0	17,133.73	78.50	Oracle V815	4.3.2	11/19/99
#S80	RS64 III/24	1	450	8.0	135,815.70	52.70	Oracle V816	4.3.3	03/01/00
#F80	RS64 III/6	1	500	4.0	33,571.39	58.94	Oracle V816	4.3.3	06/09/00
M80	RS64 III/8	1	500	4.0	66,750.27	45.46	Oracle V817	4.3.3	09/30/00
p680	RS64 IV/24	1	600	16.0	220,807.27	43.30	Oracle V817	4.3.3	04/13/01

Section 4 - TPC-H PUBLISHED RESULTS

TPC-H 1TB: RS/6000 SP with 375 MHz POWER3 SMP nodes

Proc.	# Nodes	MHz	QphH	QppH	QthH	\$/QphH	AIX	Database	Avail. Date
P3-II/4	32	375	12,866.8	12,812.3	12,921.6	649	4.3.3	DB2 UDB7.1	8/15/00

TPC-H 300GB: NUMA-Q 2000 Model E410 (Avail. Date: 05/25/00): Intel Pentium III Xeon

Proc.	# Quads	MHz	QphH	QppH	QthH	\$/QphH	ptx	Database	Avail. Date
Xeon/4	8	700	4027.2	4595.0	3529.8	644	4.5	DB2 UDB7.1	8/31/00
Xeon/4	12	700	5923.2	6624.4	5296.3	648	4.5	DB2 UDB7.1	8/31/00
Xeon/4	16	700	7334.4	8215.0	6548.2	612	4.5	DB2 UDB7.1	8/15/00

Section 5 - NOTESBENCH PUBLISHED RESULTS (R5 Mail)

Model	Processor/ #CPUs	MHz	L1 Cache (KB)	L2 Cache (MB)	Users	TPM	Response Time	\$/User	Version
#43P-140n	604e	233	32/32	1.0	1450	1917	0.484	11.97	4.52
#F50	604e/1	332	32/32	0.2	6000	7947	0.406	14.87	4.53b
#F50	604e/1	332	32/32	0.2	6400	8919	0.292	16.15	4.6
#F80	RS64 III/6	500	128/128	4.0	17400	23973	0.430	19.61	5.0
#H70	RS64 II/4	340	64/64	4.0	15372	11000	--	19.65	4.6
#S70	RS64 II/12	262	64/64	8.0	28800	40075	0.213	21.32	4.6
#S80	RS64 III/24	450	128/128	8.0	57600	71904	--	27.51	5.0
M80	RS64 III/8	500	128/128	4.0	28032	38235	1.424	23.91	5.0

Section 6 - JAVA BENCHMARKS (SPECjvm98, SPECjbb2000) PUBLISHED RESULTS

Model	Processor/ #CPUs	MHz	L1 Cache (KB)	L2 Cache (MB)	SPEC jvm98 (256MB)	SPEC jbb2000 ops/sec
44P-170	P3-II	450	32/64	8.0	57.2	--
44P-270	P3-II/4	375	32/64	8.0	--	14,644
p640-B80	P3-II/4	375	32/64	8.0	--	14,644
p620-6F0	RS64 IV/4	600	128/128	4.0	--	25,087
p660-6H0	RS64 IV/4	600	128/128	4.0	--	25,158
p620-6F1	RS64 IV/4	600	128/128	4.0	--	25,087
p620-6F1	RS64 IV/6	668	128/128	8.0	--	41,855
p660-6H1	RS64 IV/4	600	128/128	4.0	--	25,158
p660-6H1	RS64 IV/6	668	128/128	8.0	--	41,640
M80	RS64 III/8	500	128/128	4.0	--	36,806
M80	RS64 IV/2	750	128/128	8.0	--	18,327
M80	RS64 IV/4	750	128/128	8.0	--	37,074
M80	RS64 IV/8	750	128/128	8.0	--	72,437
p660-6M1	RS64 IV/2	750	128/128	8.0	--	18,327
p660-6M1	RS64 IV/4	750	128/128	8.0	--	37,074
*p660-6M1	RS64 IV/8	750	128/128	8.0	--	72,437
p680-S85	RS64 IV/8	600	128/128	16.0	--	51,565
p680-S85	RS64 IV/12	600	128/128	16.0	--	71,303

Section 7 - SAP STANDARD APPLICATION BENCHMARKS PUBLISHED RESULTS

Sales and Distribution

Benchmark	Model	# CPUs	Steps_Per_Hour	Users	Response_Time	Database	Utilization (%)	Version
SD Two-Tier	#S80	24	513,000	1,708	1.98	DB2 UDB v6.1	99	4.0 B
	#F50	4	38,000	120	1.47	Oracle 7.2.3	99	3.0 F
SD Three-tier	#S80	24	5,007,000	16,640	1.96	Oracle 8.0.5	99	4.0 B
	#S70	12	1,518,000	4,960	1.76	Oracle 8.0.5	98	4.0 B
	#E200	32	865,000	2,804	1.67	Oracle 7.3.3.2	80	3.1 G
	#S70	12	833,000	2,520	0.89	Oracle 7.3.3	98	3.0 F

Assemble-to-Order

Benchmark	Model	# CPUs	AO_Per_Hour	Dialog_Req_Time	Update_Req_Time	Database	Utilization (%)	Version
ATO Two-Tier	p680	24	8,570	--	--	DB2 UDB v7.1	93	4.6 B
	#S80	24	7,700	0.14	0.109	DB2 UDB v6.1	94	4.0 B
	#S80	24	6,300	--	--	DB2 UDB v7.1	92	4.6 B

Benchmark	Model	# CPUs	AO_Per_Hour	Disk_Space	Database	Utilization (%)	Version
ATO Three-Tier	#S80	24	54,220	1,296	DB2 UDB v7.1	94	4.6 B

Business Warehouse

Benchmark	Model	#CPUs/L2/Memory	Throughput rows/hour	Time (mins.)	Dialog_steps /hour	Database	BW Ver.	R3 Ver.
Business Warehouse	#S80	24/8MB/8GB	3,144,179	14,600,000	115,570	DB2 UDB v6.1	1.2 B	4.6 B

Section 8 - PEOPLESOFT VERSION 7.5 BENCHMARKS PUBLISHED RESULTS

General Ledger Benchmark (Journal Lines per Hour)

PS ver	Model	#CPUs -MHz	L2 (MB)	Mem (GB)	Disk (GB)	Small Rate	Med. Rate	Large Rate	X-L Rate	Database
8.0	#F80	6-500	4	16	355	--	2,941,176	3,982,301	--	DB2 7.1
8.0	p620-6F1	6-668	8	16	355	--	3,862,661	5,341,246	--	DB2 7.1
8.0	p620-6F1	6-668	8	16	200	--	2,571,390	2,754,387	--	Oracle 8.1.6
8.0	#S80	24-450	8	24	1800	--	--	--	6,595,823	DB2 7.1
8.0	#S80	24-450	8	48	756	--	--	--	5,876,592	Oracle 8.1.6
7.5	p680	24-600	16	96	2600	--	--	--	15,584,416	Oracle 8.0.5.1
7.5	#S80	24-450	8	96	2600	--	--	--	11,700,468	Oracle 8.0.5.1
7.5	#S80	24-450	8	32	2400	--	--	--	10,030,090	Oracle 8.0.5.0
7.5	#S80	12-450	8	16	850	--	--	--	4,845,744	Oracle 8.0.5.1
7.5	#S7A	12-262	8	16	520	1,416,431	2,873,563	4,533,092	2,717,637	Oracle 8.0.5.1
7.5	#F80	6-500	4	16	2400	--	--	--	4,384,683	Oracle 8.0.5.1
7.5	#H70	4-340	4	8	520	818,331	1,544,163	2,834,467	1,523,461	Oracle 8.0.5.1

HRMS Online

PS ver	Model	#CPUs -MHz	L2 (MB)	Mem (GB)	Disk (GB)	Max Users	Search	Save	Database
7.5	M80	8-500	8	32	728	25,000	0.413	0.487	DB2 EE 6.1

Payroll (Employees per Hour)

PS ver	Model	#CPUs -MHz	L2 (MB)	Mem (GB)	Disk (GB)	Large Rate	X-Large Rate	XX-L Rate	XXX-L Rate	Database
7.5	p680	24-600	16	96	2600	--	--	--	533,546	Oracle 8.0.5.1
7.5	#S80	24-450	8	96	2600	--	--	--	479,357	Oracle 8.0.5.1
7.5	#S80	24-450	8	32	2475	482,897	482,735	487,626	429,461	Oracle 8.0.5.1
7.5	#F80	6-500	4	16	2475	164,571	171,089	169,992	170,052	Oracle 8.0.5.1

General Ledger Benchmark Details

Business Process	p680	#S80
Edit Journal (min.)	10.368	13.902
Post Journal (min.)	1.182	1.482
Total (min.)	11.55	15.384
Journal Lines / Min.	259,740	195,007
Journal Lines / hr.	15,584,416	11,700,468

Payroll Benchmark Details

Business Process	p680	#S80
Paysheet Creation (min.)	7.014	7.2
Payroll Calculation (min.)	37.548	42.486
Payroll Confirmation (min.)	45.402	50.448
Total Runtime (min.)	89.964	100.134
Total Employees processed per hour	533,546	479,357

Section 9 - ORACLE APPLICATIONS STANDARD BENCHMARKS PUBLISHED RESULTS

Model	# CPUs	Users	Avg. Resp. Time (sec)	Release
#S80	24	14,000	1.27	11.0.3
#H70	4	1,525	1.31	11.0.3

Section 10 - BAAN BENCHMARK PUBLISHED RESULTS

Model	# CPUs	2-Tier Host (BRUs)	3-Tier Server (BRUs)	Database	Baan Version
p680	24	11,886	--	DB2 UDB v7.1	5.0b
#S80	24	8,750	17,500	DB2 UDB v7.1	5.0b
#S80	24	6,836	17,441	Oracle v8.16	5.0b
#F80	6	2,345	--	DB2 UDB v7.1	5.0b

Section 11 - VOLANOMARK BENCHMARK PUBLISHED RESULTS

Model	#CPUs/ Memory	200 Connections (msg/sec)	Java2 Version
p680	24/4GB	133,251	1.3.0
#S80	6/4GB	33,906	1.2.2
M80	8/4GB	46,370	1.2.2

Section 12 - J.D. EDWARDS BENCHMARK PUBLISHED RESULTS

eFulfillment benchmark for J.D.Edwards OneWorld(R) Xe product

DB Server	#CPUs / Memory	App. Servers	#CPUs / Memory	Sales Order Lines per Hr.	Database
p680	24/64GB	2x p680	24/64GB	1,029,200	Oracle 8.1.6

Section 13 - HISTORICAL MULTIUSER PERFORMANCE

Type Model	Announce Date	Marketing Withdrawn	Processor	MHz	# Processors	ROLTP
7006-41T	1994/05/24	1997/01/10	PowerPC 601	80	1	N/A
7006-41W	1994/05/24	1997/07/18	PowerPC 601	80	1	N/A
7006-42T	1995/07/07	1997/09/24	PowerPC 604	120	1	N/A
7006-42W	1995/07/07	1997/09/24	PowerPC 604	120	1	N/A
7007-N40	1994/03/08	1995/09/19	PowerPC 601	50	1	N/A
7008-M20	1993/02/02	1995/01/06	POWER	33	1	N/A
7008-M2A	1993/02/02	1994/10/16	POWER	33	1	N/A
7009-C10	1994/05/24	1997/07/18	PowerPC 601	80	1	1.6
7009-C20	1995/06/19	1998/01/30	PowerPC 604	120	1	2.1
7011-220	1992/01/21	1995/01/06	POWER	33	1	.3 est
7011-22W	1992/01/21	1995/01/06	POWER	33	1	N/A
7011-230	1993/05/18	1995/01/06	POWER	45	1	.5 est
7011-23S	1993/05/18	1994/10/26	POWER	45	1	.5 est
7011-23T	1993/05/18	1994/10/26	POWER	45	1	N/A
7011-23W	1993/05/18	1994/10/26	POWER	45	1	N/A
7011-250	1993/09/21	1997/07/18	PowerPC 601	66	1	1.0
7011-2xx U		1997/07/18	PowerPC 601	80	1	1.3
7011-25S	1993/09/21	1996/10/25	PowerPC 601	66	1	1.0
7011-25T	1993/09/21	1997/07/18	PowerPC 601	66/80	1	N/A
7011-25W	1993/09/21	1996/10/25	PowerPC 601	66/80	1	N/A
7012-320	1990/02/15	1992/10/28	POWER	20	1	.3 est
7012-32H	1991/03/12	1994/10/26	POWER	25	1	.4 est
7012-340	1992/01/21	1994/11/04	POWER	33	1	.5 est
7012-34H	1993/07/13	1994/10/26	POWER	41.6	1	.8 est
7012-350	1992/01/21	1993/08/18	POWER	41	1	.8 est
7012-355	1993/02/02	1994/10/26	POWER	41	1	N/A
7012-360	1993/02/02	1994/11/04	POWER	50	1	.9 est
7012-365	1993/02/02	1994/10/26	POWER	50	1	N/A
7012-36T	1993/05/18	1994/10/26	POWER	50	1	N/A
7012-370	1993/02/02	1996/05/20	POWER	62	1	1.7
7012-375	1993/02/02	1994/10/26	POWER	62	1	N/A
7012-37T	1993/05/18	1996/05/20	POWER	62	1	N/A
7012-380	1994/05/24	1996/05/20	POWER2	59	1	2.3
7012-390	1994/05/24	1997/07/18	POWER2	67	1	3.0
7012-39H	1995/02/07	1998/01/30	POWER2	67	1	3.3
7012-397	1997/10/06	1999/03/19	POWER2 SC	160	1	6.7
7012-G30	1994/10/04	1996/10/23	PowerPC 601	75	2	3.1
7012-G30			PowerPC 601	75	4	5.2
7012-G40	1996/07/23	1998/01/08	PowerPC 604	112	1	2.6
7012-G40			PowerPC 604	112	2	4.8
7012-G40			PowerPC 604	112	4	8.8
7013-520	1990/02/15	1992/04/21	POWER	20	1	.3 est
7013-52H	1992/01/21	1995/01/06	POWER	25	1	.4 est
7013-530	1990/02/15	1992/01/02	POWER	25	1	.4 est
7013-53H	1991/10/02	1993/08/18	POWER	33	1	.5 est

Type Model	Announce Date	Marketing Withdrawn	Processor	MHz	# Processors	ROLTP
7013-540	1990/02/15	1992/01/02	POWER	30	1	.5 est
7013-550	1990/10/30	1993/08/18	POWER	41	1	.8 est
7013-55L	1993/05/18	1994/10/26	POWER	41.6	1	.8 est
7013-560	1992/01/21	1993/12/21	POWER	50	1	.9 est
7013-570	1993/02/02	1996/05/20	POWER	50	1	1.3
7013-580	1992/09/22	1996/05/20	POWER	62.5	1	1.7
7013-58H	1993/09/21	1996/10/25	POWER2	55	1	3.2
7013-590	1993/09/21	1997/09/24	POWER2	66	1	3.9
7013-59H	1994/05/24	1997/01/10	POWER2	66	1	4.4
7013-591	1995/07/25	1997/07/18	POWER2	77	1	4.5
7013-595	1996/10/08	1999/01/08	POWER2 SC	135	1	5.8
7013-J30	1994/10/04	1996/10/23	PowerPC 601	75	2	4.5
7013-J30			PowerPC 601	75	4	7.5
7013-J30			PowerPC 601	75	6	10.3
7013-J30			PowerPC 601	75	8	11.7
7013-J40	1996/07/23	1998/01/08	PowerPC 604	112	2	5.8
7013-J40			PowerPC 604	112	4	10.0
7013-J40			PowerPC 604	112	6	14.5
7013-J40			PowerPC 604	112	8	19.2
7013-J50	1997/04/15	1999/01/18	PowerPC 604e	200	2	9.3
7013-J50			PowerPC 604e	200	4	17.0
7013-J50			PowerPC 604e	200	6	23.8
7013-J50			PowerPC 604e	200	8	30.6
7015-930	1990/02/15	1992/07/15	POWER	25	1	.4 est
7015-950	1991/05/07	1993/12/21	POWER	41	1	.8 est
7015-970	1992/04/21	1993/08/18	POWER	50	1	.8 est
7015-97B	1993/02/02	1995/01/06	POWER	50	1	1.3 est
7015-980	1992/09/22	1993/08/18	POWER	62.5	1	1.7 est
7015-98B	1993/02/02	1996/05/20	POWER	62.5	1	1.7
7015-990	1993/09/21	1996/05/20	POWER2	71.5	1	3.3
7015-R10	1994/05/24	1996/05/20	POWER	50	1	1.6
7015-R20	1994/05/24	1998/01/30	POWER2	66	1	4.4
7015-R21	1995/07/25	1996/10/25	POWER2	77	1	4.5
7015-R24	1994/05/24	1998/01/30	POWER2	71.5	1	4.9
7015-R30	1994/10/04	1996/10/23	PowerPC 601	75	2	4.5
7015-R30			PowerPC 601	75	4	7.5
7015-R30			PowerPC 601	75	6	10.3
7015-R30			PowerPC 601	75	8	11.7
7015-R40	1996/07/23	1998/01/08	PowerPC 604	112	2	5.8
7015-R40			PowerPC 604	112	4	10.0
7015-R40			PowerPC 604	112	6	14.5
7015-R40			PowerPC 604	112	8	19.2
7015-R50	1997/04/15	2000/08/15	PowerPC 604e	200	4	17.0
7015-R50			PowerPC 604e	200	6	23.8
7015-R50			PowerPC 604e	200	8	30.6
7017-S70	1997/10/06	1999/12/13	RS64	125	4	24.2
7017-S70			RS64	125	8	46.3
7017-S70			RS64	125	12	62.2
7017-S70	1998/10/05	1999/12/13	RS64 II	262	4	46.0
7017-S70			RS64 II	262	8	82.7
7017-S70			RS64 II	262	12	113.8

Type Model	Announce Date	Marketing Withdrawn	Processor	MHz	# Processors	ROLTP
7017-S7A	1998/10/05	2000/12/01	RS64 II	262	4	52.7
7017-S7A			RS64 II	262	8	98.7
7017-S7A			RS64 II	262	12	136.7
7017-S80	1999/09/13	2001/08/31	RS64 III	450	6	161.7
7017-S80			RS64 III	450	12	306.7
7017-S80			RS64 III	450	18	428.7
7017-S80			RS64 III	450	24	533.3
7017-S80	2000/10/03	2001/08/31	RS64 IV	600	6	219.0
7017-S80			RS64 IV	600	12	416.0
7017-S80			RS64 IV	600	18	583.3
7017-S80			RS64 IV	600	24	736.0
7024-E20	1995/10/10	1997/07/18	PowerPC 604	100	1	2.5
7024-E20			PowerPC 604	133	1	2.8 est
7024-E20			PowerPC 604	166	1	3.7 est
7024-E30	1996/04/23	1999/03/19	PowerPC 604	133	1	2.8
7024-E30			PowerPC 604	166	1	3.7
7024-E30			PowerPC 604e	233	1	4.7
7025-F30	1996/02/20	1998/01/08	PowerPC 604	133	1	2.8
7025-F30			PowerPC 604	166	1	3.7
7025-F40	1996/10/08	2000/05/08	PowerPC 604	166	1	2.8
7025-F40			PowerPC 604	166	2	4.2
7025-F40			PowerPC 604e	233	1	3.7
7025-F40			PowerPC 604e	233	2	5.2
7025-F50	1997/04/15	2001/07/17	PowerPC 604e	166	1	8.2
7025-F50			PowerPC 604e	166	2	14.9
7025-F50			PowerPC 604e	166	3	21.0
7025-F50			PowerPC 604e	166	4	27.1
7025-F50		2001/07/17	PowerPC 604e	332	1	10.0
7025-F50			PowerPC 604e	332	2	17.9
7025-F50			PowerPC 604e	332	3	25.2
7025-F50			PowerPC 604e	332	4	32.8
7025-F80	2000/05/09	2001/07/13	RS64 III	450	1	23.0
7025-F80			RS64 III	450	2	50.0
7025-F80			RS64 III	450	4	87.7
7025-F80			RS64 III	500	6	111.9
7025-F80	2001/04/17	2001/07/13	RS64 IV	600	1	32.3
7025-F80			RS64 IV	600	2	69.0
7025-F80			RS64 IV	600	4	117.0
7025-F80			RS64 IV	668	6	191.2
7026-H10	1996/10/08	1998/02/27	PowerPC 604e	166	1	2.8
7026-H10			PowerPC 604e	166	2	4.2
7026-H10			PowerPC 604e	233	1	3.7 est
7026-H10			PowerPC 604e	233	2	5.2 est

Type Model	Announce Date	Marketing Withdrawn	Processor	MHz	# Processors	ROLTP
7026-H50	1998/02/09	2000/12/01	PowerPC 604e	332	1	10.0
7026-H50			PowerPC 604e	332	2	17.9
7026-H50			PowerPC 604e	332	3	25.2
7026-H50			PowerPC 604e	332	4	32.8
7026-H70	1999/04/06	2001/07/17	RS64 II	332	1	16.7
7026-H70			RS64 II	332	2	31.9
7026-H70			RS64 II	332	3	44.5
7026-H70			RS64 II	332	4	57.1
7026-H80	2000/05/09	2001/07/13	RS64 III	450	1	23.0
7026-H80			RS64 III	450	2	50.0
7026-H80			RS64 III	450	4	87.7
7026-H80			RS64 III	500	6	111.9
7026-H80	2001/04/17	2001/07/13	RS64 IV	600	1	32.3
7026-H80			RS64 IV	600	2	69.0
7026-H80			RS64 IV	600	4	117.0
7026-H80			RS64 IV	668	6	191.2
7030-3AT	1994/05/24	1997/01/10	POWER2	59	1	N/A
7030-3BT	1994/05/24	1998/01/08	POWER2	67	1	N/A
7030-3CT	1995/02/07	1998/01/08	POWER2	67	1	N/A
7030-397	1997/10/06	1999/01/19	POWER2 SC	160	1	N/A
7043-140	1996/10/08	2000/12/01	PowerPC 604e	166	1	2.9
7043-140			PowerPC 604e	200	1	3.6
7043-140upg			PowerPC 604e	233	1	3.6
7043-140new			PowerPC 604e	233	1	3.9
7043-140			PowerPC 604e	332	1	5.3
7043-150	1998/10/05		PowerPC 604e	250/375	1	4.0/6.0
7043-240	1996/10/08	1999/03/19	PowerPC 604e	166	1	2.8
7043-240			PowerPC 604e	166	2	4.2
7043-240			PowerPC 604e	233	1	3.7
7043-240			PowerPC 604e	233	2	5.2
7043-260	1998/10/05	2000/12/01	POWER3	200	1	10.5
7043-260			POWER3	200	2	21.0
7248-100	1995/06/19	1997/01/10	PowerPC 604	100	1	1.5
7248-120			PowerPC 604	120	1	1.9
7248-132			PowerPC 604	133	1	2.1
7248 - Upg			PowerPC 604e	166	1	2.6
7317-D10	1996/10/08	1999/12/13	PowerPC 604e	166	1	3.7 est
7317-D10			PowerPC 604e	233	1	4.7 est
7317-F3L	1996/10/08	1999/12/13	PowerPC 604	133	1	2.8 est
7317-F3L			PowerPC 604e	166	1	3.7 est
7317-F3L			PowerPC 604e	233	1	4.7 est

Note: The Relative OLTP projections are based on different levels of AIX and databases. As a result, actual performance may vary. Estimates have been provided where no historical projections were available. Systems with N/A for ROLTP are workstation products.

RS/6000 SP Models

Node Type	Announce Date	Marketing Withdrawn	Processor	MHz	# Processors	ROLTP
SP1	1993/02/02	1994/12/16	POWER	62.5	1	1.7
Thin 1	1995/08/22	1996/12/20	POWER2	66	1	3.0
Thin 2	1995/08/22	1997/06/27	POWER2	66	1	3.3
Thin P2SC	1996/10/08	1998/04/21	POWER2 SC	120	1	5.8
Wide 1	1995/08/22	1996/12/20	POWER2	66	1	3.9
Wide 2	1995/08/22	1997/06/27	POWER2	77	1	4.5
Wide P2SC	1996/10/08	1998/04/21	POWER2 SC	135	1	5.8
High 1	1996/07/23	1998/01/08	PowerPC 604	112	2	5.8
High 1			PowerPC 604	112	4	10.0
High 1			PowerPC 604	112	6	14.5
High 1			PowerPC 604	112	8	19.2
High 2	1997/08/26	1998/04/21	PowerPC 604e	200	2	9.3
High 2			PowerPC 604e	200	4	17.0
High 2			PowerPC 604e	200	6	23.8
High 2			PowerPC 604e	200	8	30.6
160 Thin	1997/10/06	1998/04/21	POWER2 SC	160	1	6.7
332 T/W	1998/04/21	2000/12/29	PowerPC 640e	332	2	17.9
332 T/W			PowerPC 640e	332	4	32.8
POWER3 T/W	1999/02/01	2000/06/30	POWER3	200	1	10.5
POWER3 T/W			POWER3	200	2	21.0
POWER3 H	1999/09/13	2000/12/29	POWER3	222	2	23.0
POWER3 H			POWER3	222	4	43.3
POWER3 H			POWER3	222	6	64.0
POWER3 H			POWER3	222	8	81.3

Note: The Relative OLTP projections are based on different levels of AIX and databases. As a result, actual performance may vary. Estimates have been provided where no historical projections were available.

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* - New from September 4, 2001 version

- These systems have been withdrawn from marketing or announced to be withdrawn from marketing and are included for historical purposes.

P2SC - POWER2 Super Chip; P3 - POWER3 ; P3-II - POWER3-II ; T/W - Thin or Wide SP node

NOTES ON PERFORMANCE BENCHMARKS AND VALUES

The performance benchmarks and the values shown here were derived using particular, well configured, development-level computer systems. Unless otherwise indicated for a system, the values were derived using 32-bit applications and external cache if external cache is supported on the system. All performance benchmark values are provided "AS IS" and no warranties or guarantees are expressed or implied by IBM. Actual system performance may vary and is dependent upon many factors including system hardware configuration and software design and configuration. Buyers should consult other sources of information to evaluate the performance of systems they are considering buying and should consider conducting application oriented testing. For additional information about the performance benchmarks, values and systems tested, please contact your IBM local Branch Office or IBM Authorized Reseller or access the following on the Web:

SPEC - <http://www.spec.org>
TPC - <http://www.tpc.org>
LINPACK - <http://www.netlib.no/netlib/benchmark/performance.ps>

Unless otherwise indicated for a system, the performance benchmarks were conducted using AIX v 4.2 ,v 4.3 or v5.1. IBM C for AIX v 3.6.4.0 and XL Fortran v 6.1.0.0 and v 7.1.0.0 were the compilers used in the benchmark tests. The preprocessors used in the benchmark tests include KAP 3.2 for Fortran and KAP/C 1.4.2 from Kuck & Associates and VAST-2 v 4.01X8 from Pacific-Sierra Research. The preprocessors were purchased separately from these vendors.

The following SPEC and LINPACK benchmarks reflect the performance of the microprocessor, memory architecture and compiler of the tested system:

SPECint95 - SPEC component-level benchmark that measures integer performance. Result is the geometric mean of eight tests that comprise the CINT95 benchmark suite. All of these are written in C language.

SPECint base95 is the result of the same tests in CINT95 with a maximum of four compiler flags that must be used in all eight tests.

SPECint rate95 - Geometric average of the eight SPEC rates from the SPEC integer tests (CINT95).

SPECint base rate95 is the result of the same tests as CINT95 with a maximum of four compiler flags that must be used in all eight tests.

SPECfp95 - SPEC component-level benchmark that measures floating-point performance. Result is the geometric mean of ten tests, all written in FORTRAN, that are included in the CFP95 benchmark suite.

SPECfp base95 is the result of the same tests in CFP95 with a maximum of four compiler flags that must be used in all ten tests.

SPECfp rate95 - Geometric average of the ten SPEC rates from SPEC floating-point tests (CFP95).

SPEC base rate95 is the result of the same tests as CFP95 with a maximum of four compiler flags that must be used in all ten tests.

SPECint2000 - New SPEC component-level benchmark that measures integer performance. Result is the geometric mean of twelve tests that comprise the CINT2000 benchmark suite. All of these are written in C language except for one which is in C++.

SPECint base2000 is the result of the same tests in CINT2000 with a maximum of four compiler options that must be used in all twelve tests.

SPECint rate2000 - Geometric average of the twelve SPEC rates from the SPEC integer tests (CINT2000).

SPECint rate base2000 is the result of the same tests as CINT2000 with a maximum of four compiler options that must be used in all twelve tests.

SPECfp2000 - New SPEC component-level benchmark that measures floating-point performance. Result is the geometric mean of fourteen tests, all written in FORTRAN and C languages, that are included in the CFP2000 benchmark suite.

SPECfp_base2000 is the result of the same tests in CFP2000 with a maximum of four compiler options that must be used in all fourteen tests.

SPECfp_rate2000 - Geometric average of the fourteen SPEC rates from SPEC floating-point tests (CFP2000).

SPECfp_rate_base2000 is the result of the same tests as CFP2000 with a maximum of four compiler options that must be used in all fourteen tests.

SPECweb96 - Maximum number of Hypertext Transfer Protocol (HTTP) operations per second achieved on the SPECweb96 benchmark without significant degradation of response time. The Web server software is IBM HTTP Server or ZEUS from Zeus Technology Ltd.

SPECweb99 - Number of conforming, simultaneous connections the Web server can support using a predefined workload. The SPECweb99 test harness emulates clients sending the HTTP requests in the workload over slow Internet connections to the Web server. The Web server software is Zeus from Zeus Technology Ltd.

SPECjvm99 - The SPECjvm98 benchmark suite contains eight different tests. Each test measures the time it takes to load the program, verify the class files, compile on the fly if a JIT compiler is used, and execute the test. A geometric mean is used to compute the a composite score. Test scores are normalized against a reference machine. Higher scores indicate better performance.

SPECjbb2000 - Expressed in operations per second. SPECjbb2000 represents an order processing application for a wholesale supplier. It is implemented as a Java program emulating a three-tier client/server system with emphasis on the middle tier.

LINPACK DP (Double Precision) - n=100 data array. Units are Megaflops.

LINPACK SP (Single Precision) - n=100 data array. Units are Megaflops.

LINPACK TPP (Toward Peak Performance) - n=1,000 data array. Units are Megaflops. ESSL Version 3.1.1 or 3.1.2 was used in this test.

The following Transaction Processing Council (TPC) benchmarks reflect the performance of the microprocessor, memory subsystem, disk subsystem and some portions of the network:

tpmC - TPC Benchmark C throughput measured as the average number of transactions processed per minute during a valid TPC-C configuration run of at least twenty minutes.

\$/tpmC - TPC Benchmark C price-performance ratio reflects the estimated five year total cost of ownership for system hardware, software and maintenance and is determined by dividing such estimated total cost by the tpmC for the system.

QppH is the power metric of TPC-H and is based on a geometric mean of the 17 TPC-H queries, the insert test and the delete test. It measures the ability of the system to give a single user the best possible response time by harnessing all available resources. QppH is scaled based on database size from 30GB to 1TB.

QthH is the throughput metric of TPC-H and is a classical throughput measure characterizing the ability of the system to support a multiuser workload in a balanced way. A number of query users is chosen, each of which must execute the full set of 17 queries in a different order. In the background, there is an update stream that runs a series of insert/delete operations. QthH is scaled based on the database size from 30GB to 1TB.

QpH is the geometric mean of the power tests (QppH) and the throughput tests (QthH).

\$/QphH is the price/performance metric for the TPC-H benchmark where QphH is the geometric mean of QppH and QthH. The price is the five year cost of ownership for the tested configuration and includes maintenance and software support.

NotesBench is the driver program to test various aspects of Lotus Notes. It is designed to execute the commands in customized workload scripts, simulating Notes client actions. Notesbench tests include "mail only", "mail and database". All IBM results have been published with the "mail only" workload.

Total Users - number of active users supported in the workload, each producing approximately one transaction/minute.

TPM - transactions per minute (NotesMark)

Average Response Time - average time for a transaction to be completed for an average user action.

\$/User - Total cost of the hardware and software including discounts quoted by a supplier.

NOTES ON PERFORMANCE ESTIMATES

The rPerf (Relative Performance) is an estimate of commercial processing performance. It is derived from an IBM analytical model which uses characteristics from IBM internal workloads, TPC and SPEC benchmarks. The rPerf model is not intended to represent any specific public benchmark results and should not be reasonably used in that way. The model simulates some of the system operations such as CPU, cache and memory. However, the model does not simulate disk or network I/O operations. Although the model uses general database and operating system parameters, it does not reflect specific database or AIX version or releases. Unless otherwise indicated, the model assumes the use of 32-bit applications.

Unless otherwise indicated, rPerf is estimated only at the time a system is introduced. The IBM @server pSeries Model B80 is the baseline reference system and has a value of 1.0. Although rPerf may be used to compare estimated IBM UNIX commercial processing performance, actual system performance may vary and is dependent upon many factors including system hardware configuration and software design and configuration. IBM withdrew Relative OLTP (ROLTP). Starting June 2001, IBM will not publish/update ROLTP results. ROLTP results of systems that are withdrawn from the market are left in Section 12, Historical Multiuser Performance.

APPLICATION BENCHMARKS

SAP - Benchmark overview information: www.sap-ag.de/solutions/technology/bench.htm
Benchmark White Paper September, 2000; www.sap-ag.de/solutions/technology/pdf/50020428.pdf

PEOPLESOFT - To get information on PeopleSoft benchmarks, contact PeopleSoft directly or the PeopleSoft/IBM International Competency Center in San Mateo, CA.

ORACLE Applications - Benchmark overview information: www.oracle.com/apps_benchmark/

BAAN - The Baan benchmark demonstrates the scalability of Baan ERP solutions. The test results provide the number of Baan Reference Users (BRUs) that can be supported on a specific system. BRU is a single on-line user or a batch unit workload. These metrics are consistent with those used internally by both IBM and Baan to size systems.

To get information on Baan benchmarks contact Baan directly or the IBM/Baan International Competency Center San Mateo, CA.

VOLANOMARK - VolanoMark is a 100% Pure Java server benchmark characterized by long-lasting network connections and high thread counts. In this context, long-lasting means the connections last several minutes or longer, rather than just a few seconds. The VolanoMark benchmark creates client connections in groups of 20 and measures how long it takes for the clients to take turns broadcasting their messages to the group. At the end of the test, it reports a score as the average number of messages transferred by the server per second. For additional information: www.volano.com



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