



# SPEC® CINT2006 Result

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## IBM Corporation

SPECint®\_rate2006 = 98.3

## IBM System x3655 (AMD Opteron 2356)

SPECint\_rate\_base2006 = 84.7

CPU2006 license: 11

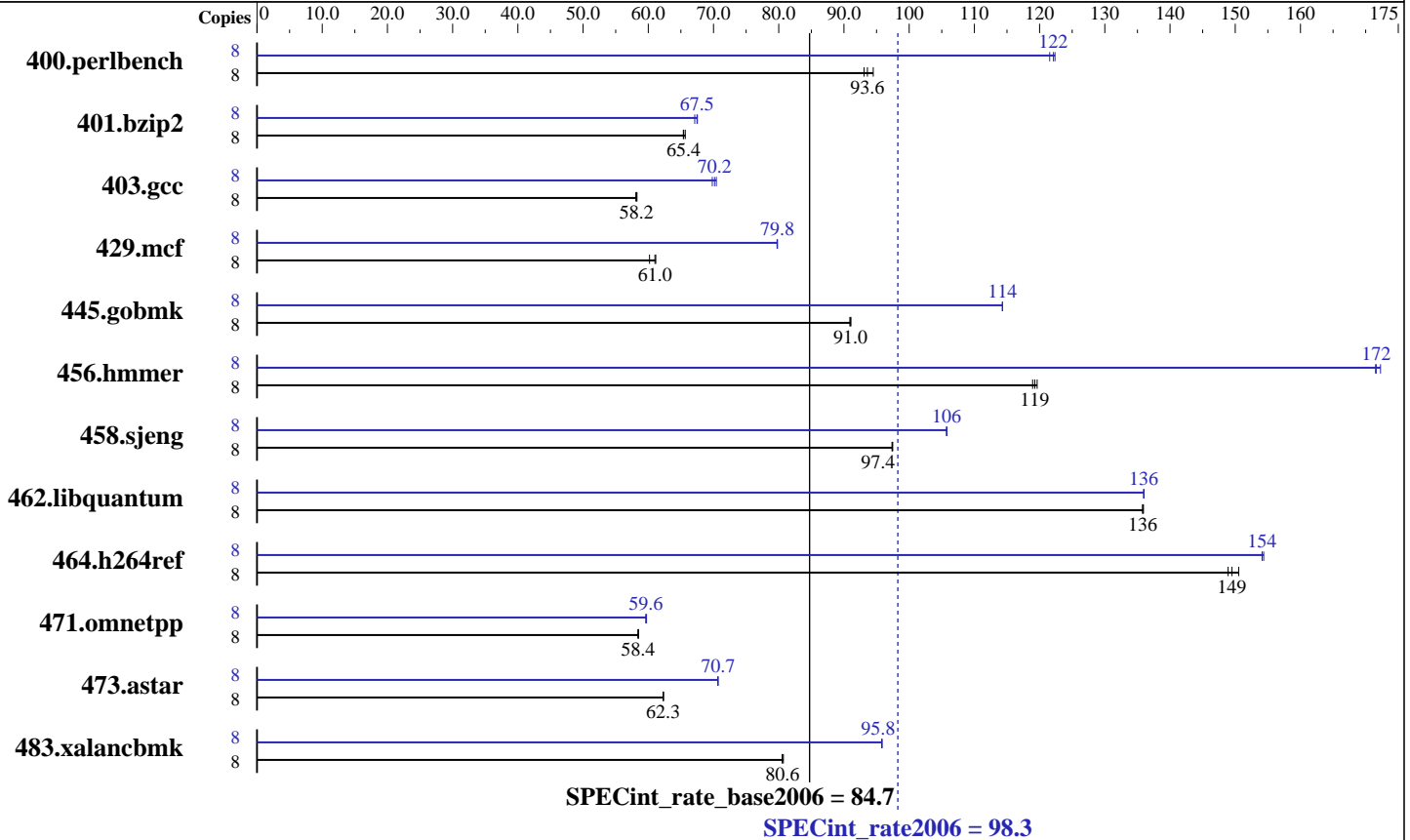
Test sponsor: IBM Corporation

Tested by: Advanced Micro Devices

Test date: Jun-2008

Hardware Availability: Jul-2008

Software Availability: Jun-2008



### Hardware

CPU Name: AMD Opteron 2356  
 CPU Characteristics:  
 CPU MHz: 2300  
 FPU: Integrated  
 CPU(s) enabled: 8 cores, 2 chips, 4 cores/chip  
 CPU(s) orderable: 1,2 chips  
 Primary Cache: 64 KB I + 64 KB D on chip per core  
 Secondary Cache: 512 KB I+D on chip per core  
 L3 Cache: 2 MB I+D on chip per chip  
 Other Cache: None  
 Memory: 16 GB (8 x 2 GB, DDR2-667 CL5 Reg Dual Rank)  
 Disk Subsystem: 1 x 73.4 GB SAS, 15000 RPM  
 Other Hardware: None

### Software

Operating System: SuSE Linux Enterprise Server 10 (x86\_64) SP1, Kernel 2.6.16.46-0.12-smp  
 Compiler: PGI Server Complete Version 7.2 PathScale Compiler Suite Version 3.2  
 Auto Parallel: No  
 File System: ext3  
 System State: Run level 3 (Full multiuser with network)  
 Base Pointers: 32/64-bit  
 Peak Pointers: 32/64-bit  
 Other Software: SmartHeap 8.0 32-bit Library for Linux



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## Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
400.perlbench	8	827	94.5	840	93.1	<b>835</b>	<b>93.6</b>	8	643	122	639	122	<b>640</b>	<b>122</b>
401.bzip2	8	1176	65.7	<b>1180</b>	<b>65.4</b>	1181	65.4	8	1150	67.1	1143	67.5	<b>1144</b>	<b>67.5</b>
403.gcc	8	<b>1106</b>	<b>58.2</b>	1105	58.3	1109	58.1	8	914	70.4	<b>918</b>	<b>70.2</b>	923	69.8
429.mcf	8	1212	60.2	<b>1196</b>	<b>61.0</b>	1193	61.1	8	<b>914</b>	<b>79.8</b>	915	79.7	914	79.8
445.gobmk	8	922	91.0	923	90.9	<b>922</b>	<b>91.0</b>	8	734	114	<b>734</b>	<b>114</b>	734	114
456.hmmer	8	<b>626</b>	<b>119</b>	624	120	628	119	8	<b>435</b>	<b>172</b>	433	172	435	172
458.sjeng	8	<b>994</b>	<b>97.4</b>	993	97.5	994	97.4	8	915	106	916	106	<b>915</b>	<b>106</b>
462.libquantum	8	1219	136	1221	136	<b>1220</b>	<b>136</b>	8	1219	136	1219	136	<b>1219</b>	<b>136</b>
464.h264ref	8	1189	149	<b>1184</b>	<b>149</b>	1176	151	8	<b>1149</b>	<b>154</b>	1147	154	1149	154
471.omnetpp	8	855	58.5	<b>856</b>	<b>58.4</b>	856	58.4	8	837	59.7	<b>838</b>	<b>59.6</b>	839	59.6
473.astar	8	902	62.3	901	62.3	<b>901</b>	<b>62.3</b>	8	<b>794</b>	<b>70.7</b>	794	70.7	795	70.7
483.xalancbmk	8	684	80.7	<b>685</b>	<b>80.6</b>	685	80.5	8	576	95.8	<b>576</b>	<b>95.8</b>	576	95.8

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

## Operating System Notes

```
'numactl' was used to bind copies to the cores
Environment variable PGI_HUGE_PAGES set to 150
'ulimit -s unlimited' was used to set environment stack size
'ulimit -l 2097152' was used to set environment locked pages in memory limit
Set vm/nr_hugepages=1200 in /etc/sysctl.conf
mount -t hugetlbfs nodev /mnt/hugepages
```

## Base Compiler Invocation

C benchmarks:

pgcc

C++ benchmarks:

pgcpp

## Base Portability Flags

```
400.perlbench: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX_X64
401.bzip2: -DSPEC_CPU_LP64
403.gcc: -DSPEC_CPU_LP64
429.mcf: -DSPEC_CPU_LP64
445.gobmk: -DSPEC_CPU_LP64
456.hmmer: -DSPEC_CPU_LP64
```

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## Base Portability Flags (Continued)

458.sjeng: -DSPEC\_CPU\_LP64  
462.libquantum: -DSPEC\_CPU\_LP64 -DSPEC\_CPU\_LINUX  
464.h264ref: -DSPEC\_CPU\_LP64  
483.xalancbmk: -DSPEC\_CPU\_LINUX

## Base Optimization Flags

C benchmarks:  
-fastsse -Msmartalloc=huge:150 -Mfprelaxed -Mipa=fast -Mipa=inline  
-tp barcelona-64 -Bstatic\_pgi

C++ benchmarks:  
-fastsse -Msmartalloc=huge:150 -Mfprelaxed --zc\_eh -Mipa=fast  
-Mipa=inline -tp barcelona -Bstatic\_pgi

## Base Other Flags

C benchmarks:  
-Mipa=jobs:4

C++ benchmarks:  
-Mipa=jobs:4

## Peak Compiler Invocation

C benchmarks (except as noted below):  
pgcc

400.perlbench: pathcc

403.gcc: pathcc

445.gobmk: pathcc

464.h264ref: pathcc

C++ benchmarks (except as noted below):  
pathCC

473.astar: pgcpp



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## Peak Portability Flags

400.perlbench: -DSPEC\_CPU\_LP64 -DSPEC\_CPU\_LINUX\_X64  
 401.bzip2: -DSPEC\_CPU\_LP64  
 445.gobmk: -DSPEC\_CPU\_LP64  
 456.hmmer: -DSPEC\_CPU\_LP64  
 458.sjeng: -DSPEC\_CPU\_LP64  
 462.libquantum: -DSPEC\_CPU\_LP64 -DSPEC\_CPU\_LINUX  
 464.h264ref: -DSPEC\_CPU\_LP64  
 483.xalanbmk: -DSPEC\_CPU\_LINUX

## Peak Optimization Flags

C benchmarks:

400.perlbench: -march=barcelona -fb\_create fbdata(pass 1)  
 -fb\_opt fbdata(pass 2) -Ofast -IPA:plimit=20000 -LNO:opt=0  
 -WOPT:if\_conv=0 -CG:local\_sched\_alg=1

401.bzip2: -Mpfi=indirect(pass 1) -Mpfo=indirect(pass 2) -fastsse -O4  
 -Msmartalloc=huge:150 -Mprefetch=t0 -Mnounroll  
 -tp barcelona-64 -Bstatic\_pgi

403.gcc: -march=barcelona -fb\_create fbdata(pass 1)  
 -fb\_opt fbdata(pass 2) -O3 -OPT:Ofast -m32

429.mcf: -fastsse -Msmartalloc=huge:150 -Mipa=fast -Mipa=inline:1  
 -tp barcelona -Bstatic\_pgi

445.gobmk: -march=barcelona -fb\_create fbdata(pass 1)  
 -fb\_opt fbdata(pass 2) -O3 -OPT:alias=restrict  
 -LNO:prefetch=1 -LNO:ignore\_feedback=off -CG:p2align=on

456.hmmer: -fastsse -Mvect=partial -Munroll=n:8 -Msmartalloc=huge:150  
 -Msafeptr -Mprefetch=t0 -Mfprelaxed -Mipa=const -Mipa=ptr  
 -Mipa=arg -Mipa=inline -tp barcelona-64 -Bstatic\_pgi

458.sjeng: -Mpfi(pass 1) -Mpfo(pass 2) -Mipa=fast(pass 2)  
 -Mipa=inline:1(pass 2) -Mipa=noarg(pass 2) -fastsse  
 -Msmartalloc=huge:150 -Mfprelaxed -tp barcelona-64  
 -Bstatic\_pgi

462.libquantum: -fastsse -Munroll=m:8 -Msmartalloc=huge:150  
 -Mprefetch=distance:4 -Mfprelaxed -Mipa=fast -Mipa=inline  
 -Mipa=noarg -tp barcelona-64 -Bstatic\_pgi

464.h264ref: -march=barcelona -fb\_create fbdata(pass 1)  
 -fb\_opt fbdata(pass 2) -O3 -IPA:plimit=20000  
 -OPT:alias=disjoint -LNO:prefetch=0 -CG:ptr\_load\_use=0  
 -CG:push\_pop\_int\_saved\_regs=off

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## Peak Optimization Flags (Continued)

C++ benchmarks:

471.omnetpp: -march=barcelona -Ofast -CG:gcm=off -INLINE:aggressive=on  
-OPT:alias=disjoint -WOPT:if\_conv=0 -m32 -lsmarheap

473.astar: -Mpfi(pass 1) -Mpfo(pass 2) -Mipa=fast(pass 2)  
-Mipa=inline:6(pass 2) -fastsse -O4 -Msmartalloc=huge:150  
-Msafeptr=global -Mfprelaxed --zc\_eh -tp barcelona  
-Bstatic\_pgi

483.xalancbmk: -march=barcelona -Ofast -OPT:unroll\_times\_max=8  
-CG:push\_pop\_int\_saved\_regs=off -CG:ptr\_load\_use=0 -m32  
-lsmarheap

## Peak Other Flags

C benchmarks:

429.mcf: -Mipa=jobs:4

456.hmmer: -Mipa=jobs:4

458.sjeng: -Mipa=jobs:4(pass 2)

462.libquantum: -Mipa=jobs:4

C++ benchmarks (except as noted below):

-L/root/work/cpu2006-amd421gh/amd421gh.libs/32

473.astar: -Mipa=jobs:4(pass 2)

The flags file that was used to format this result can be browsed at

<http://www.spec.org/cpu2006/flags/amd421GH-flags.20090713.00.html>

You can also download the XML flags source by saving the following link:

<http://www.spec.org/cpu2006/flags/amd421GH-flags.20090713.00.xml>



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For other inquiries, please contact [webmaster@spec.org](mailto:webmaster@spec.org).

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