



# SPEC® CFP2006 Result

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## IBM Corporation

### SPECfp®\_rate2006 = 169

### IBM System x3755 (AMD Opteron 8360 SE)

### SPECfp\_rate\_base2006 = 152

CPU2006 license: 11

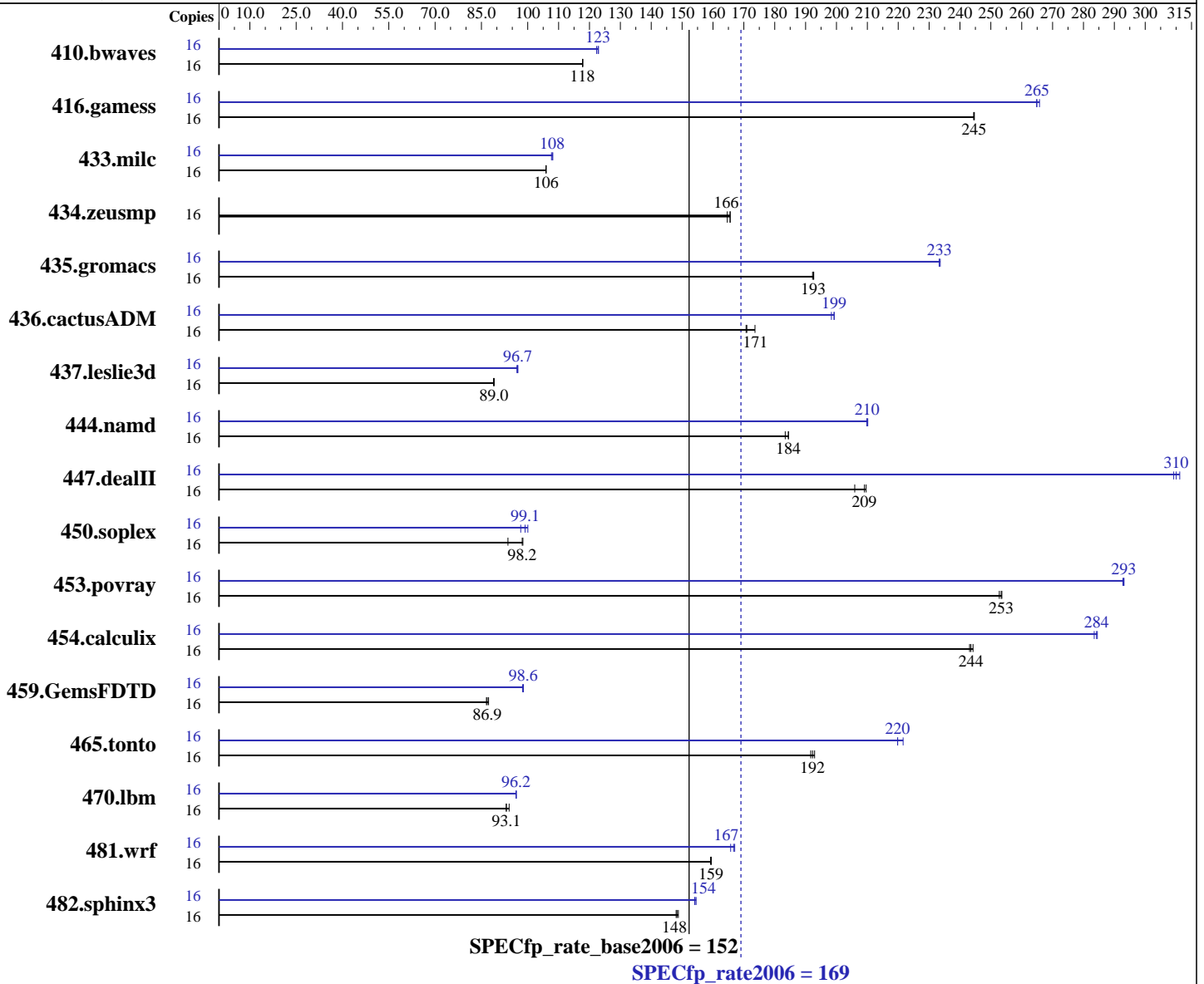
Test date: Jul-2008

Test sponsor: IBM Corporation

Hardware Availability: Jul-2008

Tested by: Advanced Micro Devices

Software Availability: Jun-2008



#### Hardware

CPU Name: AMD Opteron 8360 SE  
 CPU Characteristics:  
 CPU MHz: 2500  
 FPU: Integrated  
 CPU(s) enabled: 16 cores, 4 chips, 4 cores/chip  
 CPU(s) orderable: 1,2,3,4 chips  
 Primary Cache: 64 KB I + 64 KB D on chip per core  
 Secondary Cache: 512 KB I+D on chip per core

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#### 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: ReiserFS  
 System State: Run level 3 (Full multiuser with network)  
 Base Pointers: 64-bit  
 Peak Pointers: 32/64-bit

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L3 Cache: 2 MB I+D on chip per chip  
Other Cache: None  
Memory: 32 GB (16 x 2 GB, DDR2-667 CL5 Reg Dual Rank)  
Disk Subsystem: 1 x 73.4 GB SAS, 15000 RPM  
Other Hardware: None

Other Software: None

### Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	16	<b>1846</b>	<b>118</b>	1845	118	1847	118	16	1778	122	<b>1771</b>	<b>123</b>	1769	123
416.gamess	16	1282	244	1281	245	<b>1281</b>	<b>245</b>	16	<b>1183</b>	<b>265</b>	1179	266	1183	265
433.milc	16	<b>1387</b>	<b>106</b>	1387	106	1386	106	16	1364	108	1358	108	<b>1361</b>	<b>108</b>
434.zeusmp	16	884	165	<b>880</b>	<b>166</b>	879	166	16	884	165	<b>880</b>	<b>166</b>	879	166
435.gromacs	16	593	193	<b>593</b>	<b>193</b>	594	192	16	<b>490</b>	<b>233</b>	489	234	490	233
436.cactusADM	16	1120	171	<b>1118</b>	<b>171</b>	1101	174	16	960	199	<b>960</b>	<b>199</b>	964	198
437.leslie3d	16	<b>1689</b>	<b>89.0</b>	1691	88.9	1688	89.1	16	<b>1555</b>	<b>96.7</b>	1554	96.8	1559	96.5
444.namd	16	700	183	696	184	<b>696</b>	<b>184</b>	16	612	210	611	210	<b>611</b>	<b>210</b>
447.dealII	16	<b>876</b>	<b>209</b>	889	206	873	210	16	588	311	<b>590</b>	<b>310</b>	592	309
450.soplex	16	1426	93.6	1356	98.4	<b>1359</b>	<b>98.2</b>	16	1365	97.7	<b>1346</b>	<b>99.1</b>	1334	100
453.povray	16	336	254	<b>336</b>	<b>253</b>	337	253	16	<b>290</b>	<b>293</b>	290	293	291	293
454.calculix	16	543	243	540	244	<b>542</b>	<b>244</b>	16	466	283	<b>464</b>	<b>284</b>	464	284
459.GemsFDTD	16	1944	87.3	<b>1954</b>	<b>86.9</b>	1960	86.6	16	1727	98.3	1722	98.6	<b>1722</b>	<b>98.6</b>
465.tonto	16	<b>819</b>	<b>192</b>	821	192	816	193	16	710	222	716	220	<b>716</b>	<b>220</b>
470.lbm	16	2363	93.0	2339	94.0	<b>2362</b>	<b>93.1</b>	16	2283	96.3	2284	96.2	<b>2284</b>	<b>96.2</b>
481.wrf	16	1122	159	1121	159	<b>1121</b>	<b>159</b>	16	1078	166	1070	167	<b>1072</b>	<b>167</b>
482.sphinx3	16	2106	148	2096	149	<b>2102</b>	<b>148</b>	16	2024	154	2018	155	<b>2022</b>	<b>154</b>

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  
'ulimit -s unlimited' was used to set environment stack size  
'ulimit -l 2097152' was used to set environment locked pages in memory limit  
Environment variable PGI\_HUGE\_PAGES set to 150  
Set vm/nr\_hugepages=2400 in /etc/sysctl.conf  
mount -t hugetlbfs nodev /mnt/hugepages

### Base Compiler Invocation

C benchmarks:  
pgcc

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## Base Compiler Invocation (Continued)

C++ benchmarks:

pgcpp

Fortran benchmarks:

pgf95

Benchmarks using both Fortran and C:

pgcc pgf95

## Base Portability Flags

410.bwaves: -DSPEC\_CPU\_LP64  
416.gamess: -DSPEC\_CPU\_LP64  
433.milc: -DSPEC\_CPU\_LP64  
434.zeusmp: -DSPEC\_CPU\_LP64  
435.gromacs: -DSPEC\_CPU\_LP64 -Mnomain  
436.cactusADM: -DSPEC\_CPU\_LP64 -Mnomain  
437.leslie3d: -DSPEC\_CPU\_LP64  
444.namd: -DSPEC\_CPU\_LP64  
447.dealII: -DSPEC\_CPU\_LP64  
450.soplex: -DSPEC\_CPU\_LP64  
453.povray: -DSPEC\_CPU\_LP64  
454.calculix: -DSPEC\_CPU\_LP64 -Mnomain  
459.GemsFDTD: -DSPEC\_CPU\_LP64  
465.tonto: -DSPEC\_CPU\_LP64  
470.lbm: -DSPEC\_CPU\_LP64  
481.wrf: -DSPEC\_CPU\_LP64 -DSPEC\_CPU\_CASE\_FLAG -DSPEC\_CPU\_LINUX  
482.sphinx3: -DSPEC\_CPU\_LP64

## 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-64 -Bstatic\_pgi

Fortran benchmarks:

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

Benchmarks using both Fortran and C:

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



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## Base Other Flags

C benchmarks:

-Mipa=jobs:4

C++ benchmarks:

-Mipa=jobs:4

Fortran benchmarks:

-Mipa=jobs:4

Benchmarks using both Fortran and C:

-Mipa=jobs:4

## Peak Compiler Invocation

C benchmarks (except as noted below):

pgcc

470.lbm: pathcc

C++ benchmarks (except as noted below):

pathCC

444.namd: pgcpp

Fortran benchmarks (except as noted below):

pgf95

416.gamess: pathf95

459.GemsFDTD: pathf95

465.tonto: pathf95

Benchmarks using both Fortran and C (except as noted below):

pgcc pgf95

436.cactusADM: pathcc pathf95

## Peak Portability Flags

410.bwaves: -DSPEC\_CPU\_LP64

416.gamess: -DSPEC\_CPU\_LP64

433.milc: -DSPEC\_CPU\_LP64

434.zeusmp: -DSPEC\_CPU\_LP64

435.gromacs: -DSPEC\_CPU\_LP64 -Mnomain

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## Peak Portability Flags (Continued)

436.cactusADM: -DSPEC\_CPU\_LP64 -fno-second-underscore  
 437.leslie3d: -DSPEC\_CPU\_LP64  
 444.namd: -DSPEC\_CPU\_LP64  
 453.povray: -DSPEC\_CPU\_LP64  
 454.calculix: -DSPEC\_CPU\_LP64 -Mnomain  
 459.GemsFDTD: -DSPEC\_CPU\_LP64  
 465.tonto: -DSPEC\_CPU\_LP64  
 470.lbm: -DSPEC\_CPU\_LP64  
 481.wrf: -DSPEC\_CPU\_LP64 -DSPEC\_CPU\_CASE\_FLAG -DSPEC\_CPU\_LINUX  
 482.sphinx3: -DSPEC\_CPU\_LP64

## Peak Optimization Flags

### C benchmarks:

433.milc: -fastsse -Msmartalloc=huge:150 -Msafeptr -Mfprelaxed  
 -Mipa=inline -Mipa=arg -Mipa=const -Mipa=ptr -Mipa=shape  
 -tp barcelona-64 -Bstatic\_pgi

470.lbm: -march=barcelona -Ofast -CG:sse\_cse\_regs=0  
 -CG:locs\_shallow\_depth=1 -m3dnow

482.sphinx3: -Mpfi=indirect(pass 1) -Mpfo=indirect(pass 2)  
 -Mipa=fast(pass 2) -Mipa=inline(pass 2) -fastsse  
 -Mfprelaxed -Msmartalloc -tp barcelona-64 -Bstatic\_pgi

### C++ benchmarks:

444.namd: -Mpfi(pass 1) -Mpfo(pass 2) -Mipa=fast(pass 2)  
 -Mipa=inline(pass 2) -fastsse -Munroll=n:4 -Munroll=m:8  
 -Msmartalloc=huge:150 -Mnodepchk -Mfprelaxed --zc\_eh  
 -tp barcelona-64 -Bstatic\_pgi

447.deallI: -march=barcelona -Ofast -static -INLINE:aggressive=on  
 -fno-exceptions -m32

450.soplex: -march=barcelona -fb\_create fbdata(pass 1)  
 -fb\_opt fbdata(pass 2) -O3 -TENV:frame\_pointer=off  
 -LNO:prefetch=1 -OPT:malloc\_alg=1 -CG:load\_exe=0 -m32

453.povray: -march=barcelona -fb\_create fbdata(pass 1)  
 -fb\_opt fbdata(pass 2) -Ofast

### Fortran benchmarks:

410.bwaves: -Mpfi(pass 1) -Mpfo(pass 2) -Mipa=fast(pass 2)  
 -Mipa=inline(pass 2) -fastsse -Msmartalloc  
 -Mprefetch=distance:12 -Mprefetch=nta -Mpre -Mfprelaxed  
 -tp barcelona-64 -Bstatic\_pgi

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## Peak Optimization Flags (Continued)

416.gamess: -march=barcelona -fb\_create fbdata(pass 1)  
-fb\_opt fbdata(pass 2) -O2 -OPT:Ofast -OPT:ro=3  
-OPT:unroll\_size=256

434.zeusmp: basepeak = yes

437.leslie3d: -Mphi=indirect(pass 1) -Mpfo=indirect(pass 2)  
-Mipa=fast(pass 2) -Mipa=inline(pass 2) -fastsse  
-Mvect=fuse -Msmartalloc=huge:150 -Mprefetch=distance:8  
-Mprefetch=t0 -Mfprelaxed -tp barcelona-64 -Bstatic\_pgi

459.GemsFDTD: -march=barcelona -Ofast -LNO:fission=2 -LNO:simd=2  
-LNO:prefetch\_ahead=1 -CG:load\_exe=0

465.tonto: -march=barcelona -Ofast -OPT:alias=no\_f90\_pointer\_alias  
-LNO:blocking=off -CG:load\_exe=1 -IPA:plimit=525

Benchmarks using both Fortran and C:

435.gromacs: -fastsse -Msmartalloc=huge:150 -Mfprelaxed -Mfpapprox=rsqrt  
-Mipa=fast -Mipa=inline -tp barcelona-64 -Bstatic\_pgi

436.cactusADM: -march=barcelona -fb\_create fbdata(pass 1)  
-fb\_opt fbdata(pass 2) -Ofast -LNO:blocking=off

454.calculix: -Mphi=indirect(pass 1) -Mpfo=indirect(pass 2)  
-Mipa=fast(pass 2) -Mipa=inline(pass 2) -fastsse  
-Msmartalloc=huge:150 -Mprefetch=t0 -Mpre -Mfprelaxed  
-tp barcelona-64 -Bstatic\_pgi

481.wrf: -fastsse -Mvect=noaltcode -Msmartalloc  
-Mprefetch=distance:8 -Mfprelaxed -tp barcelona-64  
-Bstatic\_pgi

## Peak Other Flags

C benchmarks (except as noted below):  
-Mipa=jobs:4(pass 2)

470.lbm: No flags used

C++ benchmarks:

444.namd: -Mipa=jobs:4(pass 2)

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## Peak Other Flags (Continued)

Fortran benchmarks (except as noted below):

-Mipa=jobs:4(pass 2)

416.gamess: No flags used

459.GemsFDTD: No flags used

465.tonto: No flags used

Benchmarks using both Fortran and C (except as noted below):

-Mipa=jobs:4(pass 2)

436.cactusADM: No flags used

481.wrf: No flags used

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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