SPEC® CFP2006 Result
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IBM Corporation

IBM System x3755 (AMD Opteron 8356)

$SPECfp^®\_rate2006 =$ 161

$SPECfp\_rate\_base2006 =$ 145

CPU2006 license: 11
Test sponsor: IBM Corporation
Tested by: Advanced Micro Devices

Test date: Jun-2008
Hardware Availability: Jul-2008
Software Availability: Jun-2008

Copies

Benchmark	16 (peak)	16 (base)
410.bwaves	117	113
416.gamess	245	225
433.milc	105	102
434.zeusmp	160	
435.gromacs	216	178
436.cactusADM	191	167
437.leslie3d	92.1	84.8
444.namd	193	170
447.dealII	293	195
450.soplex	98.1	96.4
453.povray	269	233
454.calculix	266	227
459.GemsFDTD	96.6	85.1
465.tonto	210	182
470.lbm	95.9	92.6
481.wrf	159	153
482.sphinx3	148	143

SPECfp_rate_base2006 = 145

SPECfp_rate2006 = 161

Hardware

CPU Name: AMD Opteron 8356
CPU Characteristics:
CPU MHz: 2300
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

Continued on next page

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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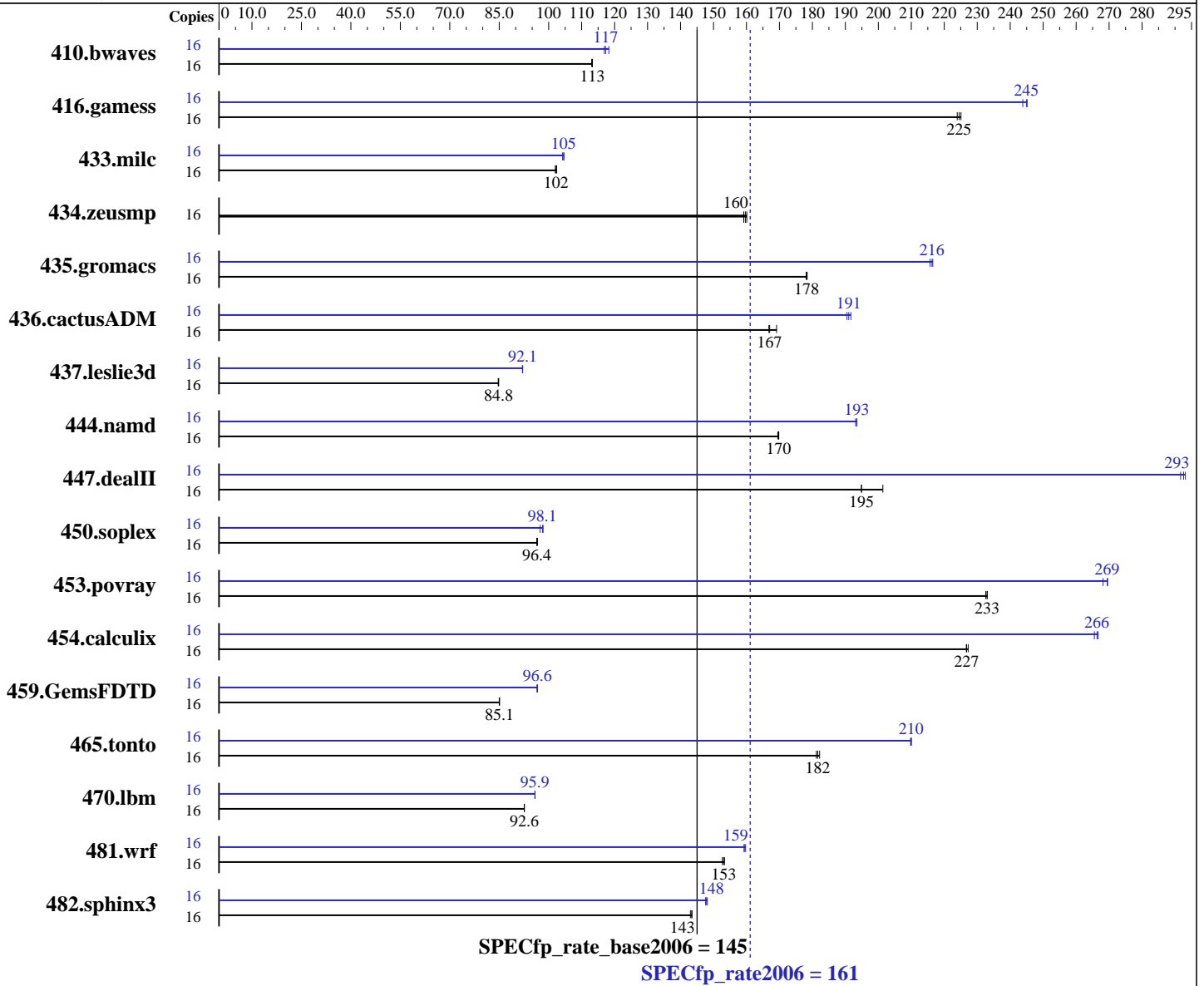|	
CPU2006 license: 11	**Test date:** Jun-2008
Test sponsor: IBM Corporation	**Hardware Availability:** Jul-2008
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L3 Cache: 2 MB I+D on chip per chip	Other Software: None
Other Cache: None	
Memory: 32 GB (16 x 2 GB, DDR2-667 CL5 Reg Dual Rank)	
Disk Subsystem: 1 x 73.4 GB SAS, 15000 RPM	
Other Hardware: None	

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	16	1920	113	**1920**	**113**	1923	113	16	1860	117	**1854**	**117**	1839	118
416.gamess	16	1392	225	1399	224	**1395**	**225**	16	**1279**	**245**	1285	244	1278	245
433.milc	16	1434	102	**1436**	**102**	1440	102	16	1409	104	1404	105	**1405**	**105**
434.zeusmp	16	909	160	915	159	**912**	**160**	16	909	160	915	159	**912**	**160**
435.gromacs	16	641	178	**641**	**178**	640	178	16	528	217	**528**	**216**	530	216
436.cactusADM	16	1130	169	**1145**	**167**	1146	167	16	**1001**	**191**	1004	190	998	192
437.leslie3d	16	1773	84.8	1776	84.7	**1774**	**84.8**	16	**1633**	**92.1**	1634	92.0	1633	92.1
444.namd	16	756	170	757	170	**756**	**170**	16	663	194	665	193	**663**	**193**
447.dealII	16	909	201	939	195	**939**	**195**	16	**626**	**293**	624	293	628	292
450.soplex	16	**1384**	**96.4**	1381	96.6	1384	96.4	16	1370	97.4	**1360**	**98.1**	1357	98.3
453.povray	16	**365**	**233**	366	233	365	233	16	316	270	317	268	**316**	**269**
454.calculix	16	581	227	582	227	**582**	**227**	16	**496**	**266**	495	267	497	266
459.GemsFDTD	16	1995	85.1	1997	85.0	**1995**	**85.1**	16	1760	96.5	**1758**	**96.6**	1757	96.6
465.tonto	16	864	182	869	181	**867**	**182**	16	750	210	**750**	**210**	751	210
470.lbm	16	2374	92.6	**2374**	**92.6**	2373	92.7	16	**2294**	**95.9**	2293	95.9	2294	95.8
481.wrf	16	1166	153	1171	153	**1167**	**153**	16	1122	159	**1122**	**159**	1119	160
482.sphinx3	16	2173	143	2181	143	**2175**	**143**	16	2113	148	**2110**	**148**	2105	148

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.dealII: -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: -Mpfi=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: -Mpfi=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.html

You can also download the XML flags source by saving the following link:
http://www.spec.org/cpu2006/flags/amd421GH-flags.xml

For questions about this result, please contact the tester.
For other inquiries, please contact webmaster@spec.org.

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