SPEC® CINT2006 Result
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IBM Corporation

IBM System x3455 (AMD Opteron 2356)

$SPECint^{®}\_rate2006 =$ 102

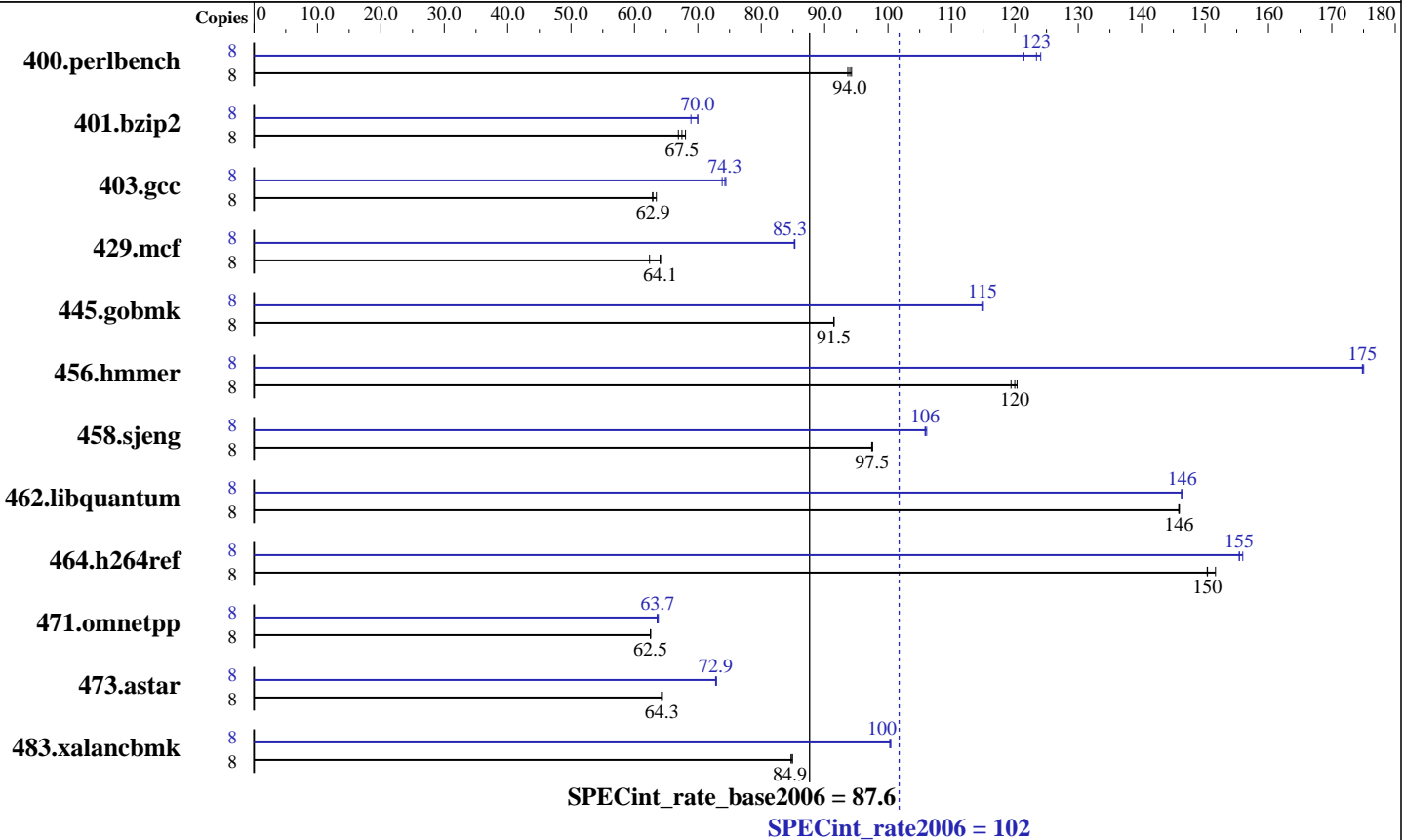$SPECint\_rate\_base2006 =$ 87.6

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		
400.perlbench	8	123
	8	94.0
401.bzip2	8	70.0
	8	67.5
403.gcc	8	74.3
	8	62.9
429.mcf	8	85.3
	8	64.1
445.gobmk	8	115
	8	91.5
456.hmmer	8	175
	8	120
458.sjeng	8	106
	8	97.5
462.libquantum	8	146
	8	146
464.h264ref	8	155
	8	150
471.omnetpp	8	63.7
	8	62.5
473.astar	8	72.9
	8	64.3
483.xalancbmk	8	100
	8	84.9

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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 160 GB SATA, 7200 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: ReiserFS
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	829	94.2	834	93.7	**832**	**94.0**	8	644	121	630	124	**633**	**123**
401.bzip2	8	1134	68.1	**1144**	**67.5**	1153	66.9	8	1120	68.9	1103	70.0	**1103**	**70.0**
403.gcc	8	**1024**	**62.9**	1015	63.5	1025	62.9	8	865	74.4	872	73.8	**867**	**74.3**
429.mcf	8	1170	62.4	**1139**	**64.1**	1138	64.1	8	856	85.2	855	85.3	**856**	**85.3**
445.gobmk	8	917	91.5	**917**	**91.5**	918	91.4	8	**730**	**115**	729	115	731	115
456.hmmer	8	625	119	**622**	**120**	620	120	8	**427**	**175**	426	175	427	175
458.sjeng	8	992	97.6	**993**	**97.5**	994	97.4	8	912	106	914	106	**914**	**106**
462.libquantum	8	1137	146	1136	146	**1136**	**146**	8	1132	146	1133	146	**1132**	**146**
464.h264ref	8	**1177**	**150**	1167	152	1178	150	8	1135	156	**1139**	**155**	1139	155
471.omnetpp	8	800	62.5	799	62.6	**800**	**62.5**	8	784	63.8	786	63.6	**786**	**63.7**
473.astar	8	874	64.3	**873**	**64.3**	872	64.4	8	**771**	**72.9**	770	72.9	771	72.8
483.xalancbmk	8	650	84.9	652	84.7	**650**	**84.9**	8	550	100	**550**	**100**	550	100

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=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.xalancbmk: -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 -lsmartheap`

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 -lsmartheap`

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.html

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

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