



# SPEC<sup>®</sup> CINT2006 Result

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## IBM Corporation

SPECint<sup>®</sup>2006 = 13.5

## IBM System x3455 (AMD Opteron 2352)

SPECint\_base2006 = 11.5

CPU2006 license: 11

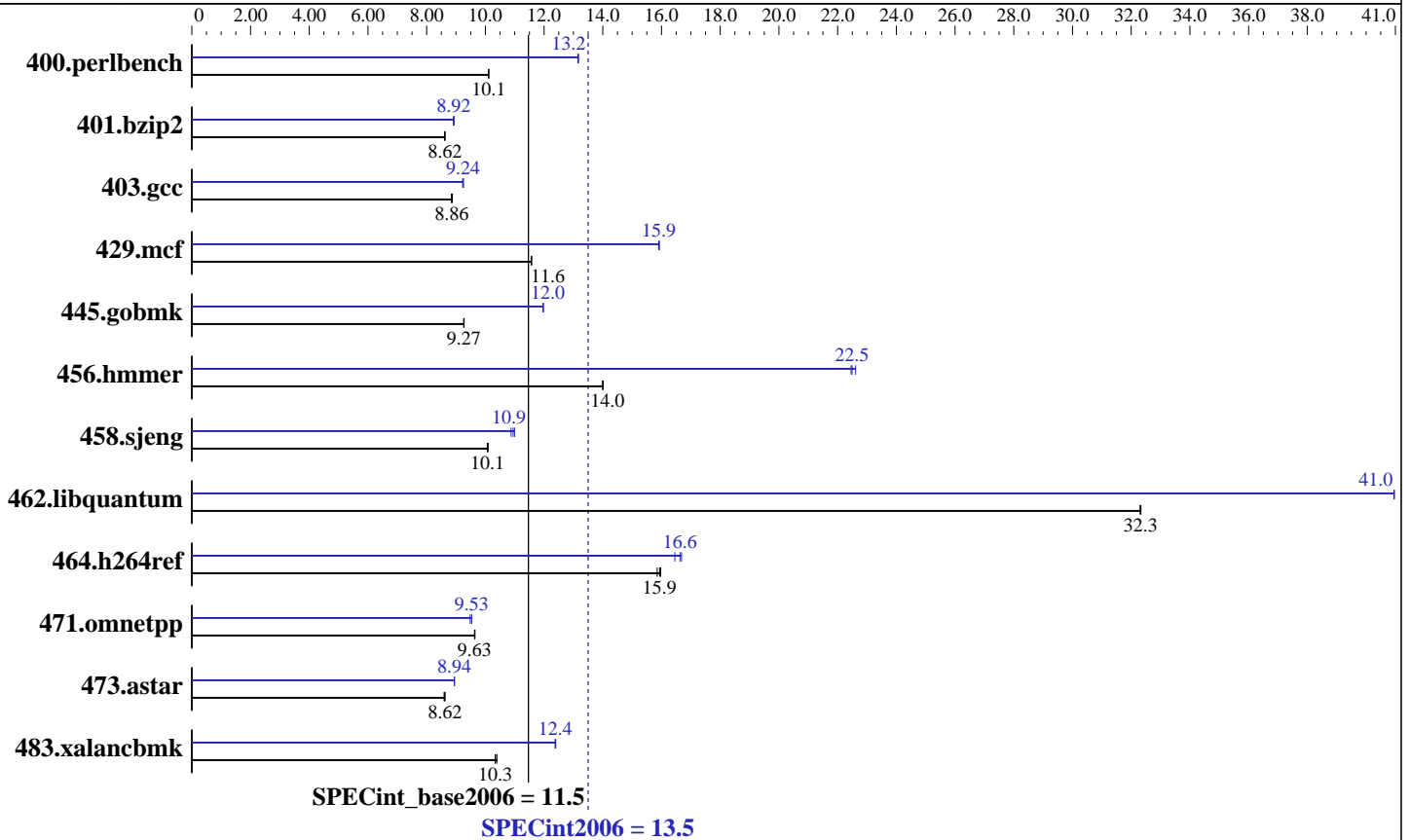
Test date: Jun-2008

Test sponsor: IBM Corporation

Hardware Availability: Jul-2008

Tested by: Advanced Micro Devices

Software Availability: Jun-2008



### Hardware

CPU Name: AMD Opteron 2352  
 CPU Characteristics:  
 CPU MHz: 2100  
 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        |             |             |             |            |             |
|----------------|-------------|-------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------------|-------------|
|                | Seconds     | Ratio       | Seconds    | Ratio       | Seconds     | Ratio       | Seconds     | Ratio       | Seconds     | Ratio       | Seconds    | Ratio       |
| 400.perlbench  | 966         | 10.1        | <b>966</b> | <b>10.1</b> | 966         | 10.1        | 741         | 13.2        | <b>743</b>  | <b>13.2</b> | 743        | 13.1        |
| 401.bzip2      | 1120        | 8.62        | 1119       | 8.62        | <b>1119</b> | <b>8.62</b> | <b>1081</b> | <b>8.92</b> | 1080        | 8.93        | 1083       | 8.91        |
| 403.gcc        | <b>909</b>  | <b>8.86</b> | 907        | 8.88        | 910         | 8.84        | 870         | 9.25        | <b>871</b>  | <b>9.24</b> | 873        | 9.22        |
| 429.mcf        | <b>788</b>  | <b>11.6</b> | 788        | 11.6        | 788         | 11.6        | <b>573</b>  | <b>15.9</b> | 574         | 15.9        | 573        | 15.9        |
| 445.gobmk      | <b>1132</b> | <b>9.27</b> | 1131       | 9.28        | 1132        | 9.26        | 876         | 12.0        | <b>876</b>  | <b>12.0</b> | 877        | 12.0        |
| 456.hammer     | <b>666</b>  | <b>14.0</b> | 667        | 14.0        | 666         | 14.0        | <b>415</b>  | <b>22.5</b> | 415         | 22.5        | 413        | 22.6        |
| 458.sjeng      | <b>1201</b> | <b>10.1</b> | 1199       | 10.1        | 1202        | 10.1        | 1113        | 10.9        | <b>1105</b> | <b>10.9</b> | 1101       | 11.0        |
| 462.libquantum | 641         | 32.3        | <b>641</b> | <b>32.3</b> | 641         | 32.3        | 506         | 40.9        | 506         | 41.0        | <b>506</b> | <b>41.0</b> |
| 464.h264ref    | <b>1389</b> | <b>15.9</b> | 1385       | 16.0        | 1396        | 15.9        | 1345        | 16.5        | <b>1331</b> | <b>16.6</b> | 1327       | 16.7        |
| 471.omnetpp    | 648         | 9.65        | <b>649</b> | <b>9.63</b> | 649         | 9.63        | 655         | 9.54        | <b>656</b>  | <b>9.53</b> | 659        | 9.48        |
| 473.astar      | 817         | 8.59        | 814        | 8.62        | <b>814</b>  | <b>8.62</b> | 785         | 8.95        | <b>785</b>  | <b>8.94</b> | 785        | 8.94        |
| 483.xalancbmk  | <b>667</b>  | <b>10.3</b> | 664        | 10.4        | 667         | 10.3        | 557         | 12.4        | 557         | 12.4        | <b>557</b> | <b>12.4</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 896
Set vm/nr_hugepages=1792 in /etc/sysctl.conf
mount -t hugetlbfs nodev /mnt/hugepages
powersave -f was used to set the CPU frequency to its maximum.
```

## 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
```

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## Base Portability Flags (Continued)

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

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

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