# SPEC® CINT2006 Result

## Dell Inc.

PowerEdge 2970 (AMD Opteron 2360 SE, 2.5 GHz)

SPECint®_rate2006 = 108

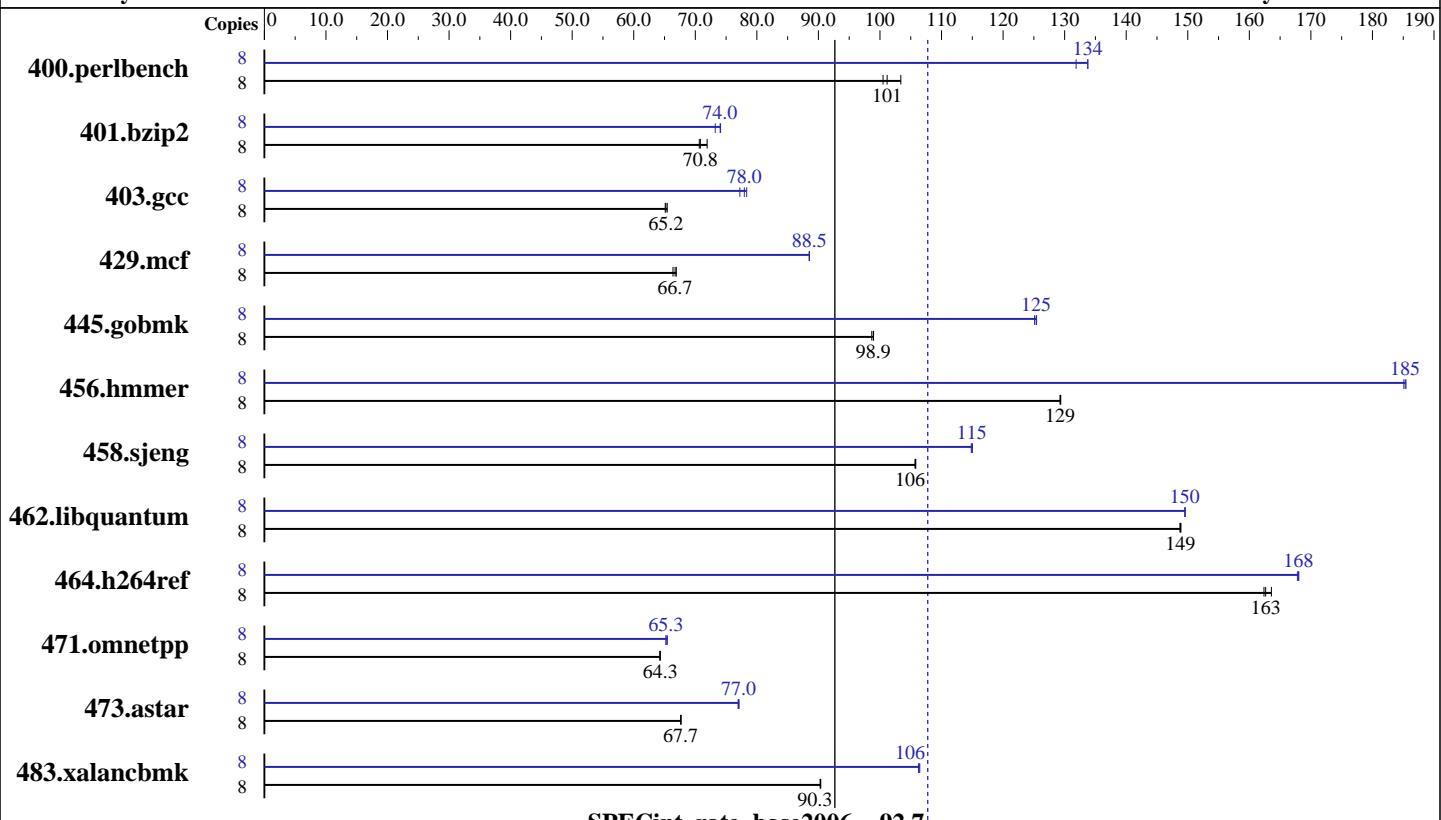SPECint_rate_base2006 = 92.7

**CPU2006 license:** 55
**Test sponsor:** Dell Inc.
**Tested by:** Dell Inc.

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



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## Hardware

CPU Name: AMD Opteron 2360 SE
CPU Characteristics:
CPU MHz: 2500
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 (4 x 4GB, DDR2-667, CL5)
Disk Subsystem: 1 x 73GB 2.5" SAS 10000 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 (multi-user)
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 | 756 | 103 | **773** | **101** | 778 | 100 | 8 | 593 | 132 | **584** | **134** | 584 | 134 |
| 401.bzip2 | 8 | 1073 | 71.9 | 1093 | 70.6 | **1090** | **70.8** | 8 | 1054 | 73.2 | 1042 | 74.1 | **1043** | **74.0** |
| 403.gcc | 8 | 984 | 65.4 | **987** | **65.2** | 989 | 65.1 | 8 | 822 | 78.4 | 834 | 77.2 | **826** | **78.0** |
| 429.mcf | 8 | 1099 | 66.4 | **1094** | **66.7** | 1090 | 66.9 | 8 | **824** | **88.5** | 824 | 88.5 | 824 | 88.6 |
| 445.gobmk | 8 | **848** | **98.9** | 851 | 98.7 | 848 | 99.0 | 8 | 669 | 125 | 671 | 125 | **669** | **125** |
| 456.hmmer | 8 | 577 | 129 | **577** | **129** | 577 | 129 | 8 | 403 | 185 | **403** | **185** | 402 | 185 |
| 458.sjeng | 8 | 916 | 106 | 915 | 106 | **915** | **106** | 8 | 842 | 115 | **842** | **115** | 843 | 115 |
| 462.libquantum | 8 | 1115 | 149 | 1113 | 149 | **1114** | **149** | 8 | 1108 | 150 | **1108** | **150** | 1108 | 150 |
| 464.h264ref | 8 | 1082 | 164 | **1088** | **163** | 1090 | 162 | 8 | 1054 | 168 | 1055 | 168 | **1054** | **168** |
| 471.omnetpp | 8 | 778 | 64.3 | **778** | **64.3** | 778 | 64.2 | 8 | 764 | 65.5 | **766** | **65.3** | 766 | 65.2 |
| 473.astar | 8 | **830** | **67.7** | 830 | 67.6 | 830 | 67.7 | 8 | **729** | **77.0** | 728 | 77.1 | 730 | 77.0 |
| 483.xalancbmk | 8 | 611 | 90.4 | **611** | **90.3** | 611 | 90.3 | 8 | 520 | 106 | **519** | **106** | 518 | 106 |

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
mount -t hugetlbfs nodev /mnt/hugepages
Set vm/nr_hugepages=1200 in /etc/sysctl.conf
```

## 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
    471.omnetpp: -DSPEC_CPU_LP64
      473.astar: -DSPEC_CPU_LP64
  483.xalancbmk: -DSPEC_CPU_LP64 -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
   473.astar: -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.20090713.01.html`

You can also download the XML flags source by saving the following link:
`http://www.spec.org/cpu2006/flags/amd421GH-flags.20090713.01.xml`

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