# SPEC® CINT2006 Result

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## Dell Inc.

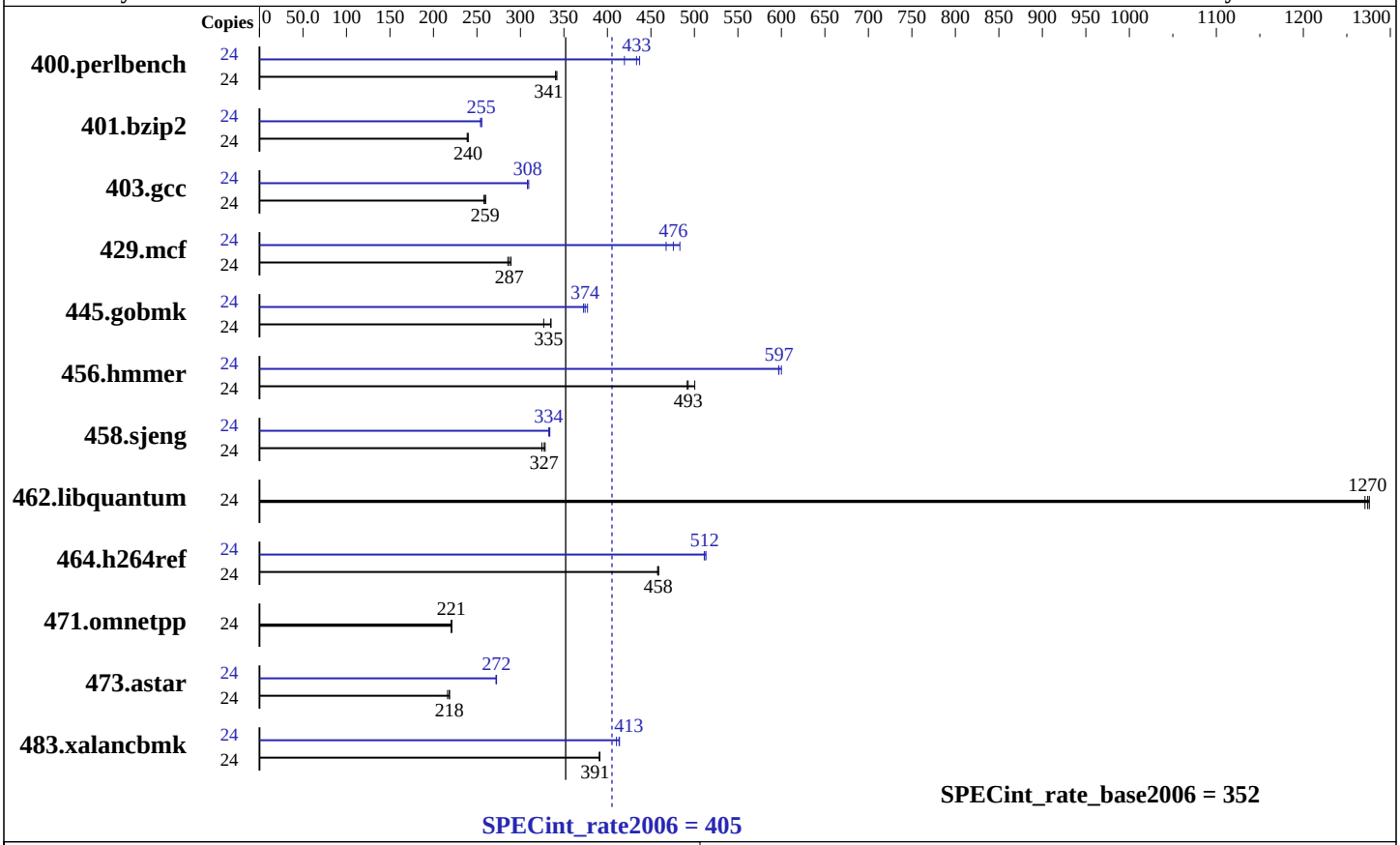
PowerEdge R815 (AMD Opteron 6176 SE, 2.30 GHz)

SPECint®_rate2006 = 405

SPECint_rate_base2006 = 352

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

**Test date:** Sep-2010
**Hardware Availability:** Aug-2010
**Software Availability:** Jul-2010




## Hardware

| | |
|---|---|
| CPU Name: | AMD Opteron 6176 SE |
| CPU Characteristics: | |
| CPU MHz: | 2300 |
| FPU: | Integrated |
| CPU(s) enabled: | 24 cores, 2 chips, 12 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: | 12 MB I+D on chip per chip, 6 MB shared / 6 cores |
| Other Cache: | None |
| Memory: | 64 GB (16 x 4 GB DDR3-1333 DR RDIMM, CL9, ECC) |
| Disk Subsystem: | 1 x 146 GB SAS 10000 RPM SAS |
| Other Hardware: | None |

## Software

| | |
|---|---|
| Operating System: | SUSE Linux Enterprise Server 11 (x86_64) Kernel 2.6.27.19-5-default |
| Compiler: | x86 Open64 4.2.4 Compiler Suite (from AMD) |
| Auto Parallel: | No |
| File System: | ext3 |
| System State: | Run level 3 (Full multiuser with network) |
| Base Pointers: | 32/64-bit |
| Peak Pointers: | 32/64-bit |
| Other Software: | SmartHeap 8.1 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 | 24 | 689 | 341 | 686 | 342 | **689** | **341** | 24 | 559 | 420 | 537 | 437 | **541** | **433** |
| 401.bzip2 | 24 | 970 | 239 | **966** | **240** | 966 | 240 | 24 | 912 | 254 | **908** | **255** | 907 | 255 |
| 403.gcc | 24 | **745** | **259** | 743 | 260 | 749 | 258 | 24 | 624 | 310 | 627 | 308 | **627** | **308** |
| 429.mcf | 24 | 767 | 285 | **762** | **287** | 757 | 289 | 24 | 453 | 483 | 468 | 467 | **460** | **476** |
| 445.gobmk | 24 | **752** | **335** | 770 | 327 | 751 | 335 | 24 | **673** | **374** | 668 | 377 | 676 | 373 |
| 456.hmmer | 24 | **454** | **493** | 447 | 500 | 455 | 492 | 24 | **375** | **597** | 375 | 597 | 373 | 600 |
| 458.sjeng | 24 | **887** | **327** | 884 | 328 | 894 | 325 | 24 | **870** | **334** | 873 | 333 | 870 | 334 |
| 462.libquantum | 24 | **390** | **1270** | 391 | 1270 | 390 | 1280 | 24 | **390** | **1270** | 391 | 1270 | 390 | 1280 |
| 464.h264ref | 24 | **1159** | **458** | 1160 | 458 | 1158 | 459 | 24 | **1038** | **512** | 1035 | 513 | 1039 | 511 |
| 471.omnetpp | 24 | 680 | 221 | **680** | **221** | 679 | 221 | 24 | 680 | 221 | **680** | **221** | 679 | 221 |
| 473.astar | 24 | 771 | 218 | **772** | **218** | 779 | 216 | 24 | 619 | 272 | **619** | **272** | 618 | 273 |
| 483.xalancbmk | 24 | 424 | 391 | 423 | 391 | **424** | **391** | 24 | 404 | 410 | **401** | **413** | 400 | 414 |

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

## Submit Notes

```
The config file option 'submit' was used.
'numactl' was used to bind copies to the cores.
See the configuration file for details.
```

## Operating System Notes

```
'ulimit -s unlimited' was used to set environment stack size
'ulimit -l 2097152'  was used to set environment locked pages in memory limit

Set vm/nr_hugepages=10800 in /etc/sysctl.conf
mount -t hugetlbfs nodev /mnt/hugepages
```

## General Notes

```
Environment variables set by runspec before the start of the run:
HUGETLB_LIMIT = "450"
LD_LIBRARY_PATH = "/cpu2006/amd1002-rate-libs-revC/64:/cpu2006/amd1002-rate-libs-revC/32"

The x86 Open64 Compiler Suite is only available from (and supported by) AMD at
http://developer.amd.com/cpu/open64

Binaries were compiled on SLES10 SP2 with binutils 2.18
```

## Base Compiler Invocation

C benchmarks:
opencc

C++ benchmarks:
openCC

## 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
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:
-march=barcelona -mso -Ofast -CG:local_sched_alg=1
-INLINE:aggressive=on -IPA:plimit=8000 -IPA:small_pu=100
-HP:bdt=2m:heap=2m

C++ benchmarks:
-march=barcelona -mso -Ofast -m32 -INLINE:aggressive=on
-CG:cmp_peep=on -L/root/work/libraries/SmartHeap-8.1/lib -lsmartheap

## Peak Compiler Invocation

C benchmarks:
opencc

C++ benchmarks:
openCC

## Peak Portability Flags

400.perlbench: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX_X64

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## Peak Portability Flags (Continued)

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 -mso -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast -IPA:plimit=20000 -LNO:opt=0
-OPT:unroll_times_max=8 -OPT:unroll_size=256
-OPT:unroll_level=2 -OPT:keep_ext=on -WOPT:if_conv=0
-CG:local_sched_alg=1 -CG:unroll_fb_req=on
-HP:bdt=2m:heap=2m

401.bzip2: -march=barcelona -mso -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -O3 -OPT:alias=disjoint
-OPT:goto=off -CG:local_sched_alg=1 -HP:bdt=2m:heap=2m

403.gcc: -march=barcelona -mso -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast -LNO:trip_count=256
-LNO:prefetch_ahead=10 -CG:cmp_peep=on -m32
-HP:bdt=2m:heap=2m -GRA:unspill=on -IPA:small_pu=200

429.mcf: -march=barcelona -mso -O3 -ipa -INLINE:aggressive=on
-CG:gcm=off -GRA:prioritize_by_density=on -m32
-HP:bdt=2m:heap=2m

445.gobmk: -march=barcelona -mso -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -O3 -OPT:alias=restrict
-OPT:unroll_times_max=8 -OPT:unroll_size=256
-OPT:unroll_level=2 -OPT:keep_ext=on -ipa -IPA:plimit=750
-IPA:min_hotness=300 -IPA:pu_reorder=1 -LNO:prefetch=1
-LNO:ignore_feedback=off -CG:p2align=on
-CG:unroll_fb_req=on -HP:bdt=2m:heap=2m

456.hmmer: -march=barcelona -mso -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast -LNO:prefetch=0
-OPT:alias=disjoint -OPT:unroll_times_max=8
-OPT:unroll_size=256 -OPT:unroll_level=2 -OPT:keep_ext=on
-CG:local_sched_alg=1 -CG:cflow=0
-CG:push_pop_int_saved_regs=off -CG:cmp_peep=on
-HP:bdt=2m:heap=2m

Continued on next page

## Peak Optimization Flags (Continued)

458.sjeng: `-march=barcelona -mso -fb_create fbdata`(pass 1)
`-fb_opt fbdata`(pass 2) `-O3 -ipa -LNO:ignore_feedback=off`
`-LNO:full_unroll=10 -LNO:fusion=0 -LNO:fission=2`
`-IPA:pu_reorder=2 -CG:ptr_load_use=0`
`-OPT:unroll_times_max=8 -INLINE:aggressive=on`

462.libquantum: `basepeak = yes`

464.h264ref: `-march=barcelona -mso -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`

C++ benchmarks:

471.omnetpp: `basepeak = yes`

473.astar: `-march=barcelona -mso -fb_create fbdata`(pass 1)
`-fb_opt fbdata`(pass 2) `-Ofast -TENV:frame_pointer=off`
`-WOPT:if_conv=0 -GRA:optimize_boundary=on`
`-OPT:alias=disjoint -INLINE:aggressive=on`
`-IPA:small_pu=3000 -IPA:plimit=3000 -m32`
`-HP:bdt=2m:heap=2m`

483.xalancbmk: `-march=barcelona -mso -Ofast -INLINE:aggressive=on -m32`
`-CG:cmp_peep=on -GRA:unspill=on -TENV:frame_pointer=off`
`-fno-emit-exceptions`
`-L/root/work/libraries/SmartHeap-8.1/lib -lsmartheap`

The flags files that were used to format this result can be browsed at
`http://www.spec.org/cpu2006/flags/x86-open64-424-flags-rate-revC.20100901.html`
`http://www.spec.org/cpu2006/flags/amd-platform-rate-revC.html`

You can also download the XML flags sources by saving the following links:
`http://www.spec.org/cpu2006/flags/x86-open64-424-flags-rate-revC.20100901.xml`
`http://www.spec.org/cpu2006/flags/amd-platform-rate-revC.xml`


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For other inquiries, please contact webmaster@spec.org.

Tested with SPEC CPU2006 v1.1.
Report generated on Wed Jul 23 12:54:10 2014 by SPEC CPU2006 PS/PDF formatter v6932.
Originally published on 28 September 2010.