# SPEC® CINT2006 Result

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## Dell Inc.

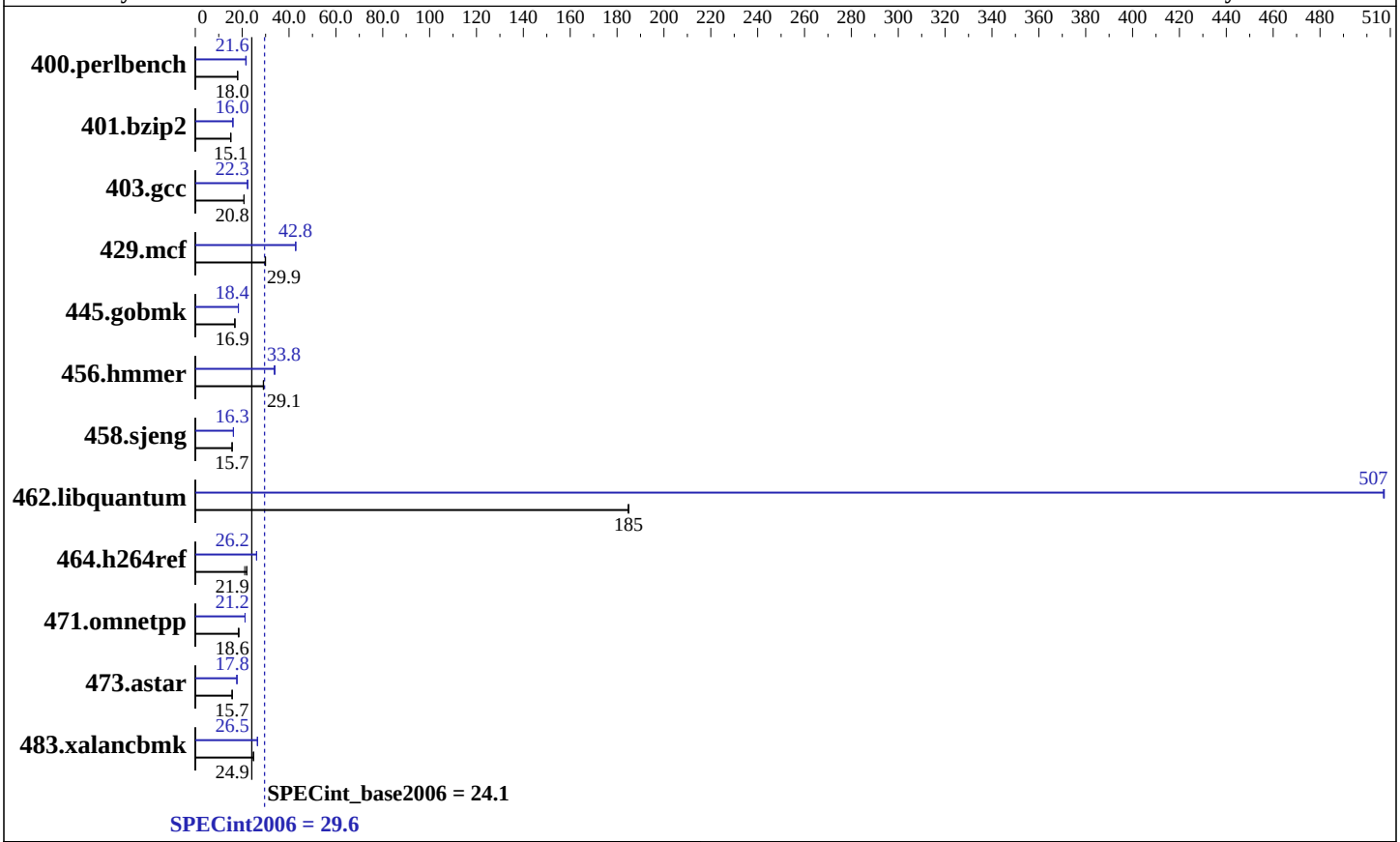
PowerEdge R715 (AMD Opteron 6284 SE, 2.70 GHz)

SPECint®2006 = 29.6

SPECint_base2006 = 24.1

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

**Test date:** Jul-2012
**Hardware Availability:** Nov-2011
**Software Availability:** Jul-2011




### Hardware

| | |
|---|---|
| CPU Name: | AMD Opteron 6284 SE |
| CPU Characteristics: | AMD Turbo CORE technology up to 3.40 GHz |
| CPU MHz: | 2700 |
| FPU: | Integrated |
| CPU(s) enabled: | 32 cores, 2 chips, 16 cores/chip |
| CPU(s) orderable: | 1,2 chips |
| Primary Cache: | 512 KB I on chip per chip, 64 KB I shared / 2 cores; 16 KB D on chip per core |
| Secondary Cache: | 16 MB I+D on chip per chip, 2 MB shared / 2 cores |
| L3 Cache: | 16 MB I+D on chip per chip, 8 MB shared / 8 cores |
| Other Cache: | None |
| Memory: | 64 GB (8 x 8 GB 2Rx4 PC3-12800R-11, ECC) |
| Disk Subsystem: | 3 x 146 GB SAS, 15000 RPM |
| Other Hardware: | None |

### Software

| | |
|---|---|
| Operating System: | SUSE Linux Enterprise Server 11 SP2 (x86_64) 3.0.13-0.27-default |
| Compiler: | C/C++: Version 4.2.5.2 of x86 Open64 Compiler Suite (from AMD) |
| Auto Parallel: | Yes |
| 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 10.0 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 | 543 | 18.0 | 540 | 18.1 | **542** | **18.0** | 453 | 21.6 | 450 | 21.7 | **452** | **21.6** |
| 401.bzip2 | 638 | 15.1 | **637** | **15.1** | 637 | 15.2 | 601 | 16.0 | 602 | 16.0 | **602** | **16.0** |
| 403.gcc | 387 | 20.8 | 387 | 20.8 | **387** | **20.8** | 360 | 22.4 | **361** | **22.3** | 361 | 22.3 |
| 429.mcf | 304 | 30.0 | **305** | **29.9** | 306 | 29.8 | 213 | 42.9 | **213** | **42.8** | 213 | 42.8 |
| 445.gobmk | 621 | 16.9 | 621 | 16.9 | **621** | **16.9** | 570 | 18.4 | **571** | **18.4** | 571 | 18.4 |
| 456.hmmer | **321** | **29.1** | 320 | 29.2 | 321 | 29.0 | **276** | **33.8** | 276 | 33.8 | 274 | 34.0 |
| 458.sjeng | 770 | 15.7 | **770** | **15.7** | 770 | 15.7 | 744 | 16.3 | 744 | 16.3 | **744** | **16.3** |
| 462.libquantum | 112 | 185 | **112** | **185** | 112 | 185 | 40.8 | 507 | 40.9 | 507 | **40.8** | **507** |
| 464.h264ref | **1009** | **21.9** | 1049 | 21.1 | 1008 | 22.0 | 847 | 26.1 | **846** | **26.2** | 845 | 26.2 |
| 471.omnetpp | **337** | **18.6** | 336 | 18.6 | 341 | 18.3 | 295 | 21.2 | 294 | 21.3 | **294** | **21.2** |
| 473.astar | 446 | 15.7 | 446 | 15.7 | **446** | **15.7** | 394 | 17.8 | 396 | 17.7 | **395** | **17.8** |
| 483.xalancbmk | 278 | 24.8 | 277 | 24.9 | **278** | **24.9** | **260** | **26.5** | 260 | 26.6 | 260 | 26.5 |

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 transparent_hugepage=never as a boot parameter in /boot/grub/menu.lst
Set kernel/randomize_va_space=0 in /etc/sysctl.conf
cpuspeed stop was used to set the CPU frequency to its maximum.

Set vm/nr_hugepages=4000 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 = "4000"
LD_LIBRARY_PATH = "/root/cpu2006/amd1104-speed-libs-revA/32:/root/cpu2006/amd1104-speed-libs-revA/64"
O64_OMP_AFFINITY_MAP = "0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31"
O64_OMP_SPIN_COUNT = "800000"
O64_OMP_SPIN_USER_LOCK = "true"

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

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## General Notes (Continued)

```
Binaries were compiled on a system with 2x AMD Opteron 6220 chips + 64GB Memory using RHEL 6.1
```

## 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=bdver1 -Ofast -CG:local_sched_alg=1 -CG:p2align=0
-INLINE:aggressive=on -IPA:plimit=8000 -IPA:small_pu=100
-HP:bdt=2m:heap=2m -LNO:prefetch=2
```

C++ benchmarks:
```
-march=bdver1 -Ofast -m32 -INLINE:aggressive=on -CG:cmp_peep=on
-D__OPEN64_FAST_SET -L/root/work/libraries/SmartHeap-10/lib -lsmartheap
```

## Peak Compiler Invocation

C benchmarks:
```
opencc
```

C++ benchmarks:
```
openCC
```

## 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=bdver1 -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast -LNO:prefetch=2 -LNO:opt=0
-IPA:plimit=20000 -OPT:unroll_times_max=8
-OPT:unroll_size=256 -OPT:unroll_level=2 -OPT:keep_ext=on
-WOPT:if_conv=0 -WOPT:sib=on -CG:local_sched_alg=1
-CG:load_exe=0 -CG:unroll_fb_req=on -CG:movext_icmp=off
-HP:bdt=2m:heap=2m

401.bzip2: -march=bdver1 -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -O3 -LNO:prefetch=2 -LNO:pf2=0
-OPT:alias=disjoint -OPT:goto=off -CG:local_sched_alg=1
-HP:bdt=2m:heap=2m

403.gcc: -march=bdver1 -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast -LNO:trip_count=256
-CG:cmp_peep=on -CG:pre_minreg_level=2 -m32
-HP:bdt=2m:heap=2m -GRA:unspill=on -IPA:small_pu=200
-WOPT:sib=on

429.mcf: -march=bdver1 -O3 -OPT:unroll_times_max=5 -ipa
-INLINE:aggressive=on -CG:gcm=off
-GRA:prioritize_by_density=on -m32 -HP:bdt=2m:heap=2m

445.gobmk: -march=bdver1 -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast -OPT:unroll_size=256
-OPT:unroll_times_max=8 -OPT:keep_ext=on -IPA:plimit=750
-IPA:min_hotness=300 -IPA:pu_reorder=1
-LNO:ignore_feedback=off -WOPT:if_conv=2 -HP:bdt=2m:heap=2m

456.hmmer: -march=bdver1 -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast -LNO:prefetch=2
-OPT:alias=disjoint -OPT:unroll_times_max=16
-OPT:unroll_size=512 -OPT:unroll_level=2 -OPT:keep_ext=on
-CG:cflow=0 -CG:cmp_peep=on -CG:pre_local_sched=off
-HP:bdt=2m:heap=2m

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## Peak Optimization Flags (Continued)

458.sjeng: `-march=bdver1 -fb_create fbdata`(pass 1)
`-fb_opt fbdata`(pass 2) `-Ofast -CG:ptr_load_use=0`
`-CG:divrem_opt=on -CG:movext_icmp=off -CG:locs_best=on`
`-CG:p2align=1 -LNO:full_unroll=10 -IPA:pu_reorder=2`
`-HP:bdt=2m:heap=2m -WOPT:sib=on`

462.libquantum: `-march=bdver1 -Ofast -OPT:unroll_size=512`
`-OPT:unroll_times_max=8 -LNO:prefetch=2 -LNO:pf2=0`
`-CG:local_sched_alg=1 -INLINE:aggressive=on`
`-IPA:plimit=8000 -IPA:small_pu=100`
`-HP:bdt=2m:heap=2m,limit=450 -apo`

464.h264ref: `-march=bdver1 -fb_create fbdata`(pass 1)
`-fb_opt fbdata`(pass 2) `-O3 -OPT:unroll_size=256`
`-OPT:unroll_times_max=2 -IPA:plimit=20000`
`-OPT:alias=disjoint -CG:ptr_load_use=0`
`-CG:local_sched_alg=1 -HP:bdt=2m:heap=2m`

C++ benchmarks:

471.omnetpp: `-march=bdver1 -Ofast -D__OPEN64_FAST_SET -CG:gcm=off`
`-INLINE:aggressive=on -WOPT:if_conv=0 -WOPT:sib=on -m32`
`-HP:bdt=2m:heap=2m`

473.astar: `-march=bdver1 -fb_create fbdata`(pass 1)
`-fb_opt fbdata`(pass 2) `-Ofast -TENV:frame_pointer=off`
`-WOPT:if_conv=0 -WOPT:sib=on -CG:divrem_opt=on`
`-CG:p2align=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=bdver1 -Ofast -LNO:prefetch=2 -OPT:unroll_size=512`
`-OPT:unroll_times_max=8 -D__OPEN64_FAST_SET`
`-INLINE:aggressive=on -m32 -CG:cmp_peep=on`
`-CG:local_sched=off -CG:p2align=0 -GRA:unspill=on`
`-TENV:frame_pointer=off -fno-emit-exceptions`
`-L/root/work/libraries/SmartHeap-10/lib -lsmartheap`

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/x86-open64-425-flags-speed-revA-I.html
http://www.spec.org/cpu2006/flags/amd-platform-speed-revA-I.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/x86-open64-425-flags-speed-revA-I.xml
http://www.spec.org/cpu2006/flags/amd-platform-speed-revA-I.xml

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