



# SPEC<sup>®</sup> CINT2006 Result

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Dell Inc.

SPECint<sup>®</sup>\_rate2006 = 738

PowerEdge R815 (AMD Opteron 6328, 3.20 GHz)

SPECint\_rate\_base2006 = 646

CPU2006 license: 55

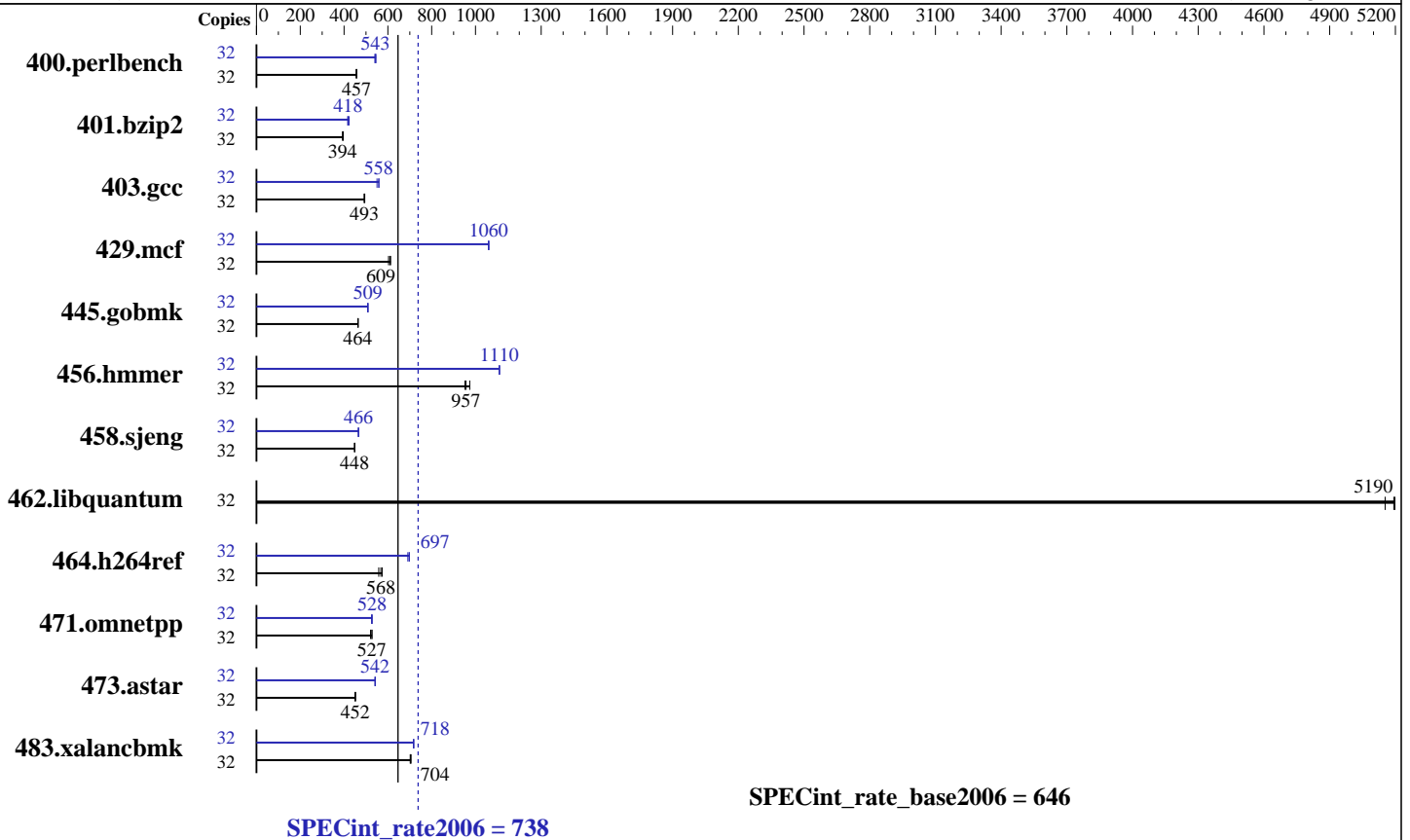
Test date: Nov-2012

Test sponsor: Dell Inc.

Hardware Availability: Dec-2012

Tested by: Dell Inc.

Software Availability: Aug-2012



## Hardware

CPU Name: AMD Opteron 6328  
 CPU Characteristics: AMD Turbo CORE technology up to 3.80 GHz  
 CPU MHz: 3200  
 FPU: Integrated  
 CPU(s) enabled: 32 cores, 4 chips, 8 cores/chip  
 CPU(s) orderable: 2,4 chips  
 Primary Cache: 256 KB I on chip per chip, 64 KB I shared / 2 cores; 16 KB D on chip per core  
 Secondary Cache: 8 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 / 4 cores  
 Other Cache: None  
 Memory: 256 GB (32 x 8 GB 2Rx4 PC3-12800R-11, ECC)  
 Disk Subsystem: 6 x 73 GB 7200 RPM SATA  
 Other Hardware: None

## Software

Operating System: Red Hat Enterprise Linux Server release 6.3, Kernel 2.6.32-279.el6.x86\_64  
 Compiler: C/C++: Version 4.5.2 of x86 Open64 Compiler Suite (from AMD)  
 Auto Parallel: No  
 File System: ext4  
 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   |            |             |            |             |             |             |
|----------------|--------|------------|-------------|------------|------------|-------------|------------|--------|------------|-------------|------------|-------------|-------------|-------------|
|                | Copies | Seconds    | Ratio       | Seconds    | Ratio      | Seconds     | Ratio      | Copies | Seconds    | Ratio       | Seconds    | Ratio       | Seconds     | Ratio       |
| 400.perlbench  | 32     | 687        | 455         | 683        | 458        | <b>684</b>  | <b>457</b> | 32     | 578        | 541         | <b>576</b> | <b>543</b>  | 573         | 546         |
| 401.bzip2      | 32     | 779        | 396         | 785        | 393        | <b>784</b>  | <b>394</b> | 32     | 730        | 423         | <b>739</b> | <b>418</b>  | 741         | 417         |
| 403.gcc        | 32     | 524        | 492         | 521        | 494        | <b>523</b>  | <b>493</b> | 32     | 461        | 559         | 468        | 550         | <b>462</b>  | <b>558</b>  |
| 429.mcf        | 32     | <b>479</b> | <b>609</b>  | 476        | 613        | 484         | 603        | 32     | 276        | 1060        | 275        | 1060        | <b>275</b>  | <b>1060</b> |
| 445.gobmk      | 32     | 723        | 464         | <b>724</b> | <b>464</b> | 724         | 464        | 32     | <b>659</b> | <b>509</b>  | 661        | 508         | 659         | 509         |
| 456.hammer     | 32     | <b>312</b> | <b>957</b>  | 307        | 974        | 314         | 952        | 32     | 269        | 1110        | <b>269</b> | <b>1110</b> | 269         | 1110        |
| 458.sjeng      | 32     | <b>864</b> | <b>448</b>  | 864        | 448        | 864         | 448        | 32     | <b>831</b> | <b>466</b>  | 832        | 465         | 831         | 466         |
| 462.libquantum | 32     | <b>128</b> | <b>5190</b> | 128        | 5200       | 129         | 5150       | 32     | <b>128</b> | <b>5190</b> | 128        | 5200        | 129         | 5150        |
| 464.h264ref    | 32     | 1234       | 574         | 1268       | 558        | <b>1247</b> | <b>568</b> | 32     | 1025       | 691         | 1015       | 698         | <b>1016</b> | <b>697</b>  |
| 471.omnetpp    | 32     | 384        | 521         | <b>380</b> | <b>527</b> | 379         | 528        | 32     | <b>379</b> | <b>528</b>  | 380        | 526         | 379         | 528         |
| 473.astar      | 32     | 497        | 452         | <b>497</b> | <b>452</b> | 499         | 450        | 32     | 414        | 542         | <b>415</b> | <b>542</b>  | 415         | 542         |
| 483.xalancbmk  | 32     | 313        | 706         | <b>314</b> | <b>704</b> | 315         | 702        | 32     | 308        | 718         | 308        | 717         | <b>308</b>  | <b>718</b>  |

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 vm/nr\_hugepages=28672 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 = "896"

LD\_LIBRARY\_PATH = "/root/cpu2006-1.2/amd1206-rate-libs-revA/32:/root/cpu2006-1.2/amd1206-rate-libs-revA/64"

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

Binaries were compiled on a system with 2x AMD Opteron 6386SE chips + 128GB Memory using RHEL 6.3



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## 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:  
-Ofast -CG:local\_sched\_alg=1 -INLINE:aggressive=ON -IPA:plimit=8000  
-IPA:small\_pu=100 -HP:bd=2m:heap=2m -mso -LNO:prefetch=2  
-march=bdver1

C++ benchmarks:  
-Ofast -m32 -INLINE:aggressive=on -CG:cmp\_peep=on -D\_\_OPEN64\_FAST\_SET  
-march=bdver1 -L/root/work/libraries/SmartHeap-10/lib -lsmarheap

## 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
473.astar: -DSPEC_CPU_LP64
483.xalancbmk: -DSPEC_CPU_LINUX

```

## Peak Optimization Flags

C benchmarks:

```

400.perlbench: -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:unroll_fb_req=on
-CG:movext_icmp=off -HP:bd=2m:heap=2m -march=bdver1
-GRA:aggr_loop_splitting=off -GRA:loop_splitting=off

401.bzip2: -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
-march=bdver2

403.gcc: -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 -march=bdver2 -mno-fma4

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

445.gobmk: -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:bd=2m:heap=2m -march=bdver1

456.hmmer: -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
-CG:p2align=0 -CG:load_exe=3 -CG:dsched=on -march=bdver1

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## Peak Optimization Flags (Continued)

458.sjeng: -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 -LNO:full\_unroll=10 -IPA:pu\_reorder=2  
-HP:heap=2m:bd=2m -WOPT:sib=on -march=bdver1

462.libquantum: basepeak = yes

464.h264ref: -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:bd=2m:heap=2m -march=bdver1

C++ benchmarks:

471.omnetpp: -Ofast -m32 -INLINE:aggressive=on -CG:cmp\_peep=on  
-WOPT:sib=on -D\_\_OPEN64\_FAST\_SET -march=bdver2 -mno-fma4  
-L/root/work/libraries/SmartHeap-10/lib -lsmartheap

473.astar: -fb\_create fbdata(pass 1) -fb\_opt fbdata(pass 2) -Ofast  
-WOPT:if\_conv=0 -WOPT:sib=on -CG:divrem\_opt=on  
-CG:p2align=1 -CG:dsched=on -GRA:optimize\_boundary=on  
-OPT:alias=disjoint -INLINE:aggressive=on  
-IPA:small\_pu=3000 -IPA:plimit=3000 -HP:bd=2m:heap=2m  
-march=bdver1

483.xalancbmk: -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=1 -GRA:unspill=on  
-TENV:frame\_pointer=off -fno-emit-exceptions -march=bdver2  
-mno-fma4  
-L/root/work/libraries/SmartHeap-10/lib -lsmartheap

The flags file that was used to format this result can be browsed at

<http://www.spec.org/cpu2006/flags/x86-open64-452-flags-rate-revA-II.html>

You can also download the XML flags source by saving the following link:

<http://www.spec.org/cpu2006/flags/x86-open64-452-flags-rate-revA-II.xml>



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