



# SPEC® CINT2006 Result

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## Dell Inc.

PowerEdge R515  
(AMD Opteron 4228 HE, 2.80 GHz)

SPECint®\_rate2006 = 211

SPECint\_rate\_base2006 = 188

CPU2006 license: 55

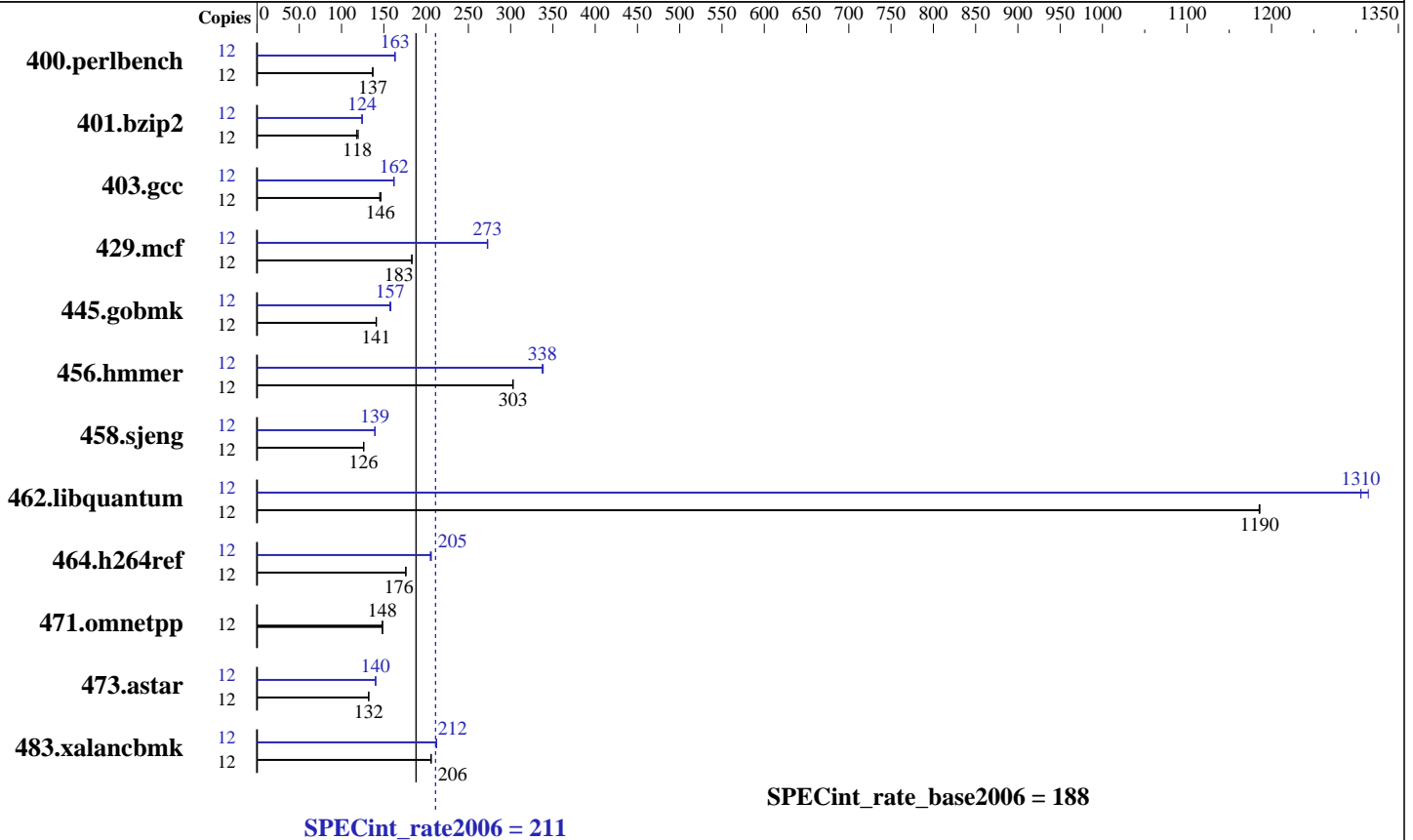
Test sponsor: Dell Inc.

Tested by: Dell Inc.

Test date: Dec-2011

Hardware Availability: Jan-2012

Software Availability: Jul-2011



### Hardware

CPU Name: AMD Opteron 4228 HE  
 CPU Characteristics: AMD Turbo CORE technology up to 3.60 GHz  
 CPU MHz: 2800  
 FPU: Integrated  
 CPU(s) enabled: 12 cores, 2 chips, 6 cores/chip  
 CPU(s) orderable: 1,2 chips  
 Primary Cache: 192 KB I on chip per chip,  
64 KB I shared / 2 cores;  
16 KB D on chip per core  
 Secondary Cache: 6 MB I+D on chip per chip, 2 MB shared / 2 cores  
 L3 Cache: 8 MB I+D on chip per chip  
 Other Cache: None  
 Memory: 32 GB (4 x 8 GB 2Rx4 PC3-12800R-11, ECC)  
 Disk Subsystem: 2 x 73 GB SAS, 15000 RPM  
 Other Hardware: None

### Software

Operating System: Red Hat Enterprise Linux Server release 6.1,  
Kernel 2.6.32-131.0.15.el6.x86\_64  
 Compiler: C/C++: Version 4.2.5.2 of x86 Open64 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 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  | 12     | <b>856</b> | <b>137</b> | 856         | 137        | 857         | 137         | 12     | 720        | 163        | 718         | 163        | <b>718</b>  | <b>163</b>  |
| 401.bzip2      | 12     | 967        | 120        | 983         | 118        | <b>978</b>  | <b>118</b>  | 12     | <b>931</b> | <b>124</b> | 930         | 124        | 934         | 124         |
| 403.gcc        | 12     | 659        | 147        | <b>662</b>  | <b>146</b> | 666         | 145         | 12     | 596        | 162        | 596         | 162        | <b>596</b>  | <b>162</b>  |
| 429.mcf        | 12     | 597        | 183        | <b>597</b>  | <b>183</b> | 598         | 183         | 12     | <b>402</b> | <b>273</b> | 402         | 272        | 401         | 273         |
| 445.gobmk      | 12     | 894        | 141        | 891         | 141        | <b>893</b>  | <b>141</b>  | 12     | 795        | 158        | 800         | 157        | <b>800</b>  | <b>157</b>  |
| 456.hammer     | 12     | 370        | 302        | 370         | 303        | <b>370</b>  | <b>303</b>  | 12     | <b>332</b> | <b>338</b> | 332         | 337        | 331         | 339         |
| 458.sjeng      | 12     | 1148       | 127        | <b>1153</b> | <b>126</b> | 1153        | 126         | 12     | 1041       | 140        | 1041        | 139        | <b>1041</b> | <b>139</b>  |
| 462.libquantum | 12     | 210        | 1190       | 210         | 1190       | <b>210</b>  | <b>1190</b> | 12     | 189        | 1310       | 190         | 1310       | <b>190</b>  | <b>1310</b> |
| 464.h264ref    | 12     | 1509       | 176        | 1509        | 176        | <b>1509</b> | <b>176</b>  | 12     | 1288       | 206        | <b>1292</b> | <b>205</b> | 1295        | 205         |
| 471.omnetpp    | 12     | 506        | 148        | <b>506</b>  | <b>148</b> | 505         | 148         | 12     | 506        | 148        | <b>506</b>  | <b>148</b> | 505         | 148         |
| 473.astar      | 12     | <b>638</b> | <b>132</b> | 638         | 132        | 638         | 132         | 12     | 601        | 140        | <b>600</b>  | <b>140</b> | 600         | 140         |
| 483.xalancbmk  | 12     | <b>402</b> | <b>206</b> | 402         | 206        | 402         | 206         | 12     | 390        | 212        | 390         | 212        | <b>390</b>  | <b>212</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  
Large pages were not enabled for this run  
Binaries were compiled on a system with 2x AMD Opteron 6276 chips + 128GB Memory using RHEL 6.1  
Set kernel/randomize\_va\_space=0 in /etc/sysctl.conf

## General Notes

Environment variables set by runspec before the start of the run:  
LD\_LIBRARY\_PATH = "/root/cpu2006-1.1/amd1104-rate-libs-revA/32:/root/cpu2006-1.1/amd1104-rate-libs-revA/64"

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

## Base Compiler Invocation

C benchmarks:  
opencc

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## Base Compiler Invocation (Continued)

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 -INLINE:aggressive=on  
-IPA:plimit=8000 -IPA:small\_pu=100 -HP:bd=2m:heap=2m -mso  
-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

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## Peak Portability Flags (Continued)

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:unroll\_fb\_req=on -CG:movext\_icmp=off -HP:bd=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:bd=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:bd=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:bd=2m:heap=2m -mso

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:bd=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:bd=2m:heap=2m

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  
-LNO:full\_unroll=10 -IPA:pu\_reorder=2 -HP:bd=2m:heap=2m  
-WOPT:sib=on

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## Peak Optimization Flags (Continued)

462.libquantum: -march=bdver1 -Ofast -mso -OPT:unroll\_size=512  
-OPT:unroll\_times\_max=16 -LNO:prefetch=2  
-LNO:prefetch\_ahead=4 -LNO:pf2=0 -CG:local\_sched\_alg=1  
-INLINE:aggressive=on -IPA:plimit=15000 -IPA:small\_pu=100  
-HP:bdt=2m:heap=2m,limit=300

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: basepeak = yes

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  
-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 -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-rate-revA.html>

<http://www.spec.org/cpu2006/flags/amd1104-platform-rate-revA.html>

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2006/flags/x86-open64-425-flags-rate-revA.xml>

<http://www.spec.org/cpu2006/flags/amd1104-platform-rate-revA.xml>



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

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