



# SPEC<sup>®</sup> CINT2006 Result

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Dell Inc.

SPECint<sup>®</sup>\_rate2006 = 116

PowerEdge 2970 (AMD Opteron 2374 HE, 2.20 GHz)

SPECint\_rate\_base2006 = 97.2

CPU2006 license: 55

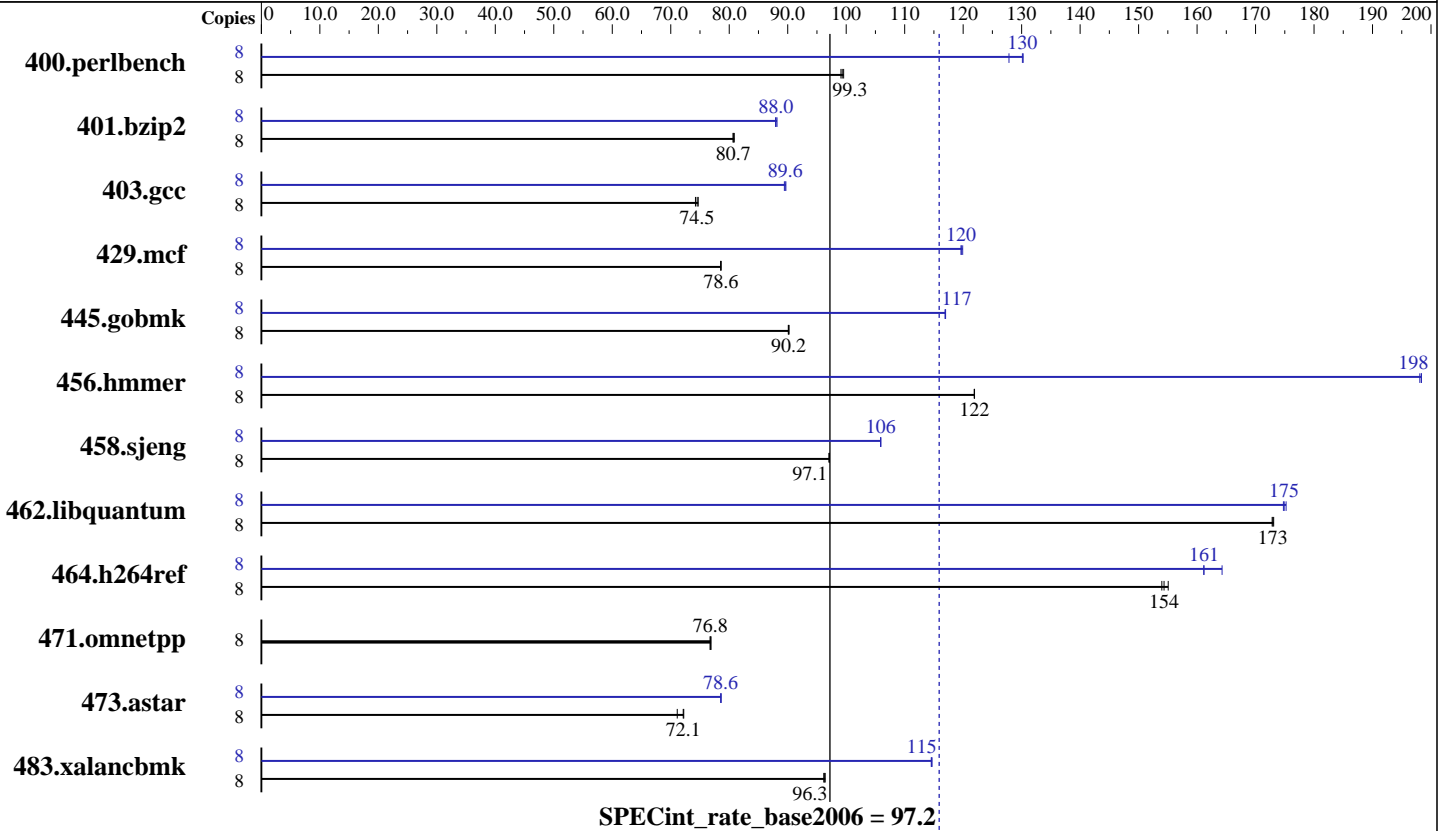
Test sponsor: Dell Inc.

Tested by: Dell Inc.

Test date: Jan-2009

Hardware Availability: Feb-2009

Software Availability: Oct-2008



## Hardware

CPU Name: AMD Opteron 2374 HE  
 CPU Characteristics:  
 CPU MHz: 2200  
 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: 6 MB I+D on chip per chip  
 Other Cache: None  
 Memory: 32 GB (8 x 4 GB DDR2-800)  
 Disk Subsystem: 1 x 73 GB 15000 RPM SAS  
 Other Hardware: None

## Software

Operating System: SUSE Linux Enterprise Server 10 (x86\_64) SP2, Kernel 2.6.16.60-0.21-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: binutils 2.18 32-bit and 64-bit libhugetlbfs libraries 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	8	<b>787</b>	<b>99.3</b>	785	99.6	789	99.1	8	611	128	600	130	<b>601</b>	<b>130</b>
401.bzip2	8	<b>957</b>	<b>80.7</b>	955	80.9	957	80.7	8	876	88.2	<b>877</b>	<b>88.0</b>	878	87.9
403.gcc	8	868	74.2	862	74.7	<b>864</b>	<b>74.5</b>	8	720	89.4	718	89.7	<b>719</b>	<b>89.6</b>
429.mcf	8	<b>929</b>	<b>78.6</b>	929	78.5	928	78.6	8	<b>610</b>	<b>120</b>	610	120	608	120
445.gobmk	8	<b>931</b>	<b>90.2</b>	931	90.1	930	90.2	8	717	117	<b>718</b>	<b>117</b>	718	117
456.hammer	8	612	122	612	122	<b>612</b>	<b>122</b>	8	<b>376</b>	<b>198</b>	377	198	376	198
458.sjeng	8	997	97.1	<b>997</b>	<b>97.1</b>	997	97.1	8	914	106	914	106	<b>914</b>	<b>106</b>
462.libquantum	8	959	173	<b>958</b>	<b>173</b>	958	173	8	<b>948</b>	<b>175</b>	948	175	946	175
464.h264ref	8	1150	154	<b>1147</b>	<b>154</b>	1142	155	8	1078	164	<b>1098</b>	<b>161</b>	1099	161
471.omnetpp	8	<b>651</b>	<b>76.8</b>	650	76.9	652	76.7	8	<b>651</b>	<b>76.8</b>	650	76.9	652	76.7
473.astar	8	778	72.2	790	71.1	<b>779</b>	<b>72.1</b>	8	714	78.6	<b>715</b>	<b>78.6</b>	715	78.6
483.xalancbmk	8	574	96.2	<b>573</b>	<b>96.3</b>	573	96.4	8	481	115	<b>482</b>	<b>115</b>	482	115

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

## Operating System Notes

The libhugetlbfs libraries were installed using the installation rpms that came with the distribution.

'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=7168 in /etc/sysctl.conf  
mount -t hugetlbfs nodev /mnt/hugepages

## General Notes

Environment variables set by runspec before the start of the run:  
HUGETLB\_MORECORE = "yes"  
LD\_LIBRARY\_PATH = "/root/cpu2006\_1.1/amd909gh-libs/64:/root/cpu2006\_1.1/amd909gh-libs/32"



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## 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  
 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:

-Mvect=cachesize:6291456 -fastsse -Msmartalloc=huge -Mfprelaxed  
-Mipa=fast -Mipa=inline -tp barcelona-64 -Bstatic\_pgi

C++ benchmarks:

-Mvect=cachesize:6291456 -fastsse -Msmartalloc=huge -Mfprelaxed  
--zc\_eh -Mipa=fast -Mipa=inline:10 -tp barcelona-32 -Bstatic\_pgi

## Base Other Flags

C benchmarks:

-Mipa=jobs:4

C++ benchmarks:

-Mipa=jobs:4

## Peak Compiler Invocation

C benchmarks (except as noted below):

pathcc

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## Peak Compiler Invocation (Continued)

456.hmmcr: pgcc

462.libquantum: pgcc

C++ benchmarks (except as noted below):

pgcpp

483.xalancbmk: pathCC

## Peak Portability Flags

400.perlbench: -DSPEC\_CPU\_LP64 -DSPEC\_CPU\_LINUX\_X64  
 401.bzip2: -DSPEC\_CPU\_LP64  
 445.gobmk: -DSPEC\_CPU\_LP64  
 456.hmmcr: -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 -fb\_create fbdata(pass 1)  
 -fb\_opt fbdata(pass 2)  
 -Wl,-T/usr/share/libhugetlbfs/ldscripts/elf\_x86\_64.xBDT(pass 2)  
 -L/usr/lib64 -lhugetlbfs(pass 2) -Ofast -IPA:plimit=20000  
 -IPA:field\_reorder=on -LNO:opt=0 -WOPT:if\_conv=0  
 -CG:local\_sched\_alg=1

401.bzip2: -march=barcelona -O3 -OPT:alias=disjoint -OPT:Ofast  
 -OPT:goto=off -INLINE:aggressive=on -CG:local\_sched\_alg=1  
 -m3dnow  
 -Wl,-T/usr/share/libhugetlbfs/ldscripts/elf\_x86\_64.xBDT  
 -L/usr/lib64 -lhugetlbfs

403.gcc: -march=barcelona -fb\_create fbdata(pass 1)  
 -fb\_opt fbdata(pass 2) -Ofast -OPT:malloc\_alg=1  
 -LNO:trip\_count=256 -LNO:prefetch\_ahead=10  
 -CG:prefer\_lru\_reg=off -m32

429.mcf: -march=barcelona -O3 -ipa -INLINE:aggressive=on  
 -CG:gcm=off -GRA:prioritize\_by\_density=on -m32  
 -L/usr/lib -lhugetlbfs

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## Peak Optimization Flags (Continued)

445.gobmk: -march=barcelona -fb\_create fbdata(pass 1)  
 -fb\_opt fbdata(pass 2)  
 -Wl,-T/usr/share/libhugetlbfs/ldscripts/elf\_x86\_64.xBDT(pass 2)  
 -L/usr/lib64 -lhugetlbfs(pass 2) -O3 -OPT:alias=restrict  
 -LNO:prefetch=1 -LNO:ignore\_feedback=off -CG:p2align=on

456.hmmr: -Mvect=cachesize:6291456 -fastsse -Mvect=partial  
 -Munroll=n:8 -Msmartalloc=huge -Msafeptr -Mprefetch=t0  
 -Mfprelaxed -Mipa=const -Mipa=ptr -Mipa=arg -Mipa=inline  
 -tp barcelona-64 -Bstatic\_pgi

458.sjeng: -march=barcelona -fb\_create fbdata(pass 1)  
 -fb\_opt fbdata(pass 2)  
 -Wl,-T/usr/share/libhugetlbfs/ldscripts/elf\_x86\_64.xBDT(pass 2)  
 -L/usr/lib64 -lhugetlbfs(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: -Mvect=cachesize:6291456 -fastsse -Munroll=m:8  
 -Msmartalloc=huge -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)  
 -Wl,-T/usr/share/libhugetlbfs/ldscripts/elf\_x86\_64.xBDT(pass 2)  
 -L/usr/lib64 -lhugetlbfs(pass 2) -O3 -IPA:plimit=20000  
 -OPT:alias=disjoint -LNO:prefetch=0 -CG:ptr\_load\_use=0  
 -CG:push\_pop\_int\_saved\_regs=off -CG:prefer\_lru\_reg=off

C++ benchmarks:

471.omnetpp: basepeak = yes

473.astar: -Mpfi(pass 1) -Mpfo(pass 2) -Mipa=fast(pass 2)  
 -Mipa=inline:6(pass 2) -Mvect=cachesize:6291456 -fastsse  
 -O4 -Msmartalloc=huge -Msafeptr=global -Mfprelaxed  
 --zc\_eh -tp barcelona-32 -Bstatic\_pgi

483.xalancbmk: -march=barcelona -Ofast -INLINE:aggressive=on -m32  
 -L/root/work/libraries/SmartHeap\_8.1/lib -lsmarheap

## Peak Other Flags

C benchmarks:

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## Peak Other Flags (Continued)

456.hmmer: -Mipa=jobs:4

462.libquantum: -Mipa=jobs:4

C++ benchmarks (except as noted below):  
-Mipa=jobs:4(pass 2)

483.xalancbmk: No flags used

The flags files that were used to format this result can be browsed at

[http://www.spec.org/cpu2006/flags/pgi72\\_linux\\_flags.20090713.html](http://www.spec.org/cpu2006/flags/pgi72_linux_flags.20090713.html)  
[http://www.spec.org/cpu2006/flags/CPU2006\\_flags.20090710.html](http://www.spec.org/cpu2006/flags/CPU2006_flags.20090710.html)  
<http://www.spec.org/cpu2006/flags/amd-platform-amd909gh.html>

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

[http://www.spec.org/cpu2006/flags/pgi72\\_linux\\_flags.20090713.xml](http://www.spec.org/cpu2006/flags/pgi72_linux_flags.20090713.xml)  
[http://www.spec.org/cpu2006/flags/CPU2006\\_flags.20090710.xml](http://www.spec.org/cpu2006/flags/CPU2006_flags.20090710.xml)  
<http://www.spec.org/cpu2006/flags/amd-platform-amd909gh.xml>

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

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