



# SPEC® CINT2006 Result

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## Hewlett-Packard Company

SPECint®\_rate2006 = 422

ProLiant BL465c Gen8  
(2.60 GHz AMD Opteron 6238)

SPECint\_rate\_base2006 = 372

CPU2006 license: 3

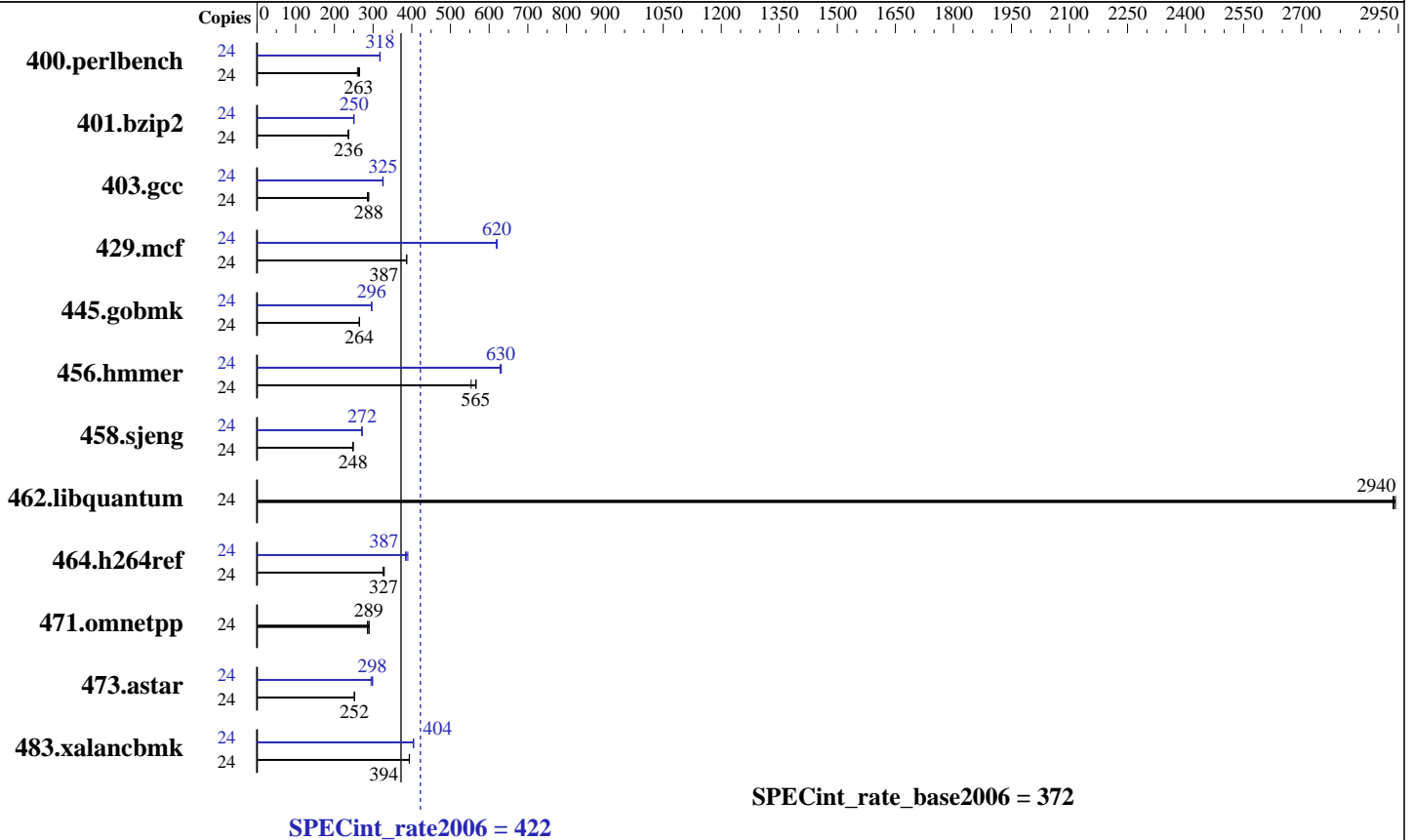
Test date: Jun-2012

Test sponsor: Hewlett-Packard Company

Hardware Availability: Jun-2012

Tested by: Hewlett-Packard Company

Software Availability: Dec-2011



### Hardware

CPU Name: AMD Opteron 6238  
 CPU Characteristics: AMD Turbo CORE technology up to 3.20 GHz  
 CPU MHz: 2600  
 FPU: Integrated  
 CPU(s) enabled: 24 cores, 2 chips, 12 cores/chip  
 CPU(s) orderable: 1,2 chips  
 Primary Cache: 384 KB I on chip per chip,  
 64 KB I shared / 2 cores;  
 16 KB D on chip per core  
 Secondary Cache: 12 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 / 6 cores  
 Other Cache: None  
 Memory: 128 GB (16 x 8 GB 2Rx4 PC3-12800R-11, ECC)  
 Disk Subsystem: 1 x 146 GB 15 K SAS  
 Other Hardware: None

### Software

Operating System: Red Hat Enterprise Linux Server release 6.2,  
 Kernel 2.6.32-220.el6.x86\_64  
 Compiler: C/C++: Version 4.5.1 of  
 x86 Open64 Compiler Suite (from AMD)  
 Auto Parallel: No  
 File System: ext4  
 System State: Run level 3 (multi-user)  
 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  | 24     | <b>893</b>  | <b>263</b> | 903         | 260         | 884        | 265        | 24     | 739         | 317        | 737        | 318         | <b>737</b>  | <b>318</b> |
| 401.bzip2      | 24     | 978         | 237        | 983         | 235         | <b>980</b> | <b>236</b> | 24     | <b>925</b>  | <b>250</b> | 926        | 250         | 924         | 251        |
| 403.gcc        | 24     | 677         | 285        | <b>670</b>  | <b>288</b>  | 669        | 289        | 24     | 592         | 326        | 594        | 325         | <b>594</b>  | <b>325</b> |
| 429.mcf        | 24     | 566         | 387        | <b>566</b>  | <b>387</b>  | 566        | 386        | 24     | <b>353</b>  | <b>620</b> | 354        | 619         | 353         | 620        |
| 445.gobmk      | 24     | 950         | 265        | 952         | 264         | <b>952</b> | <b>264</b> | 24     | 849         | 297        | <b>849</b> | <b>296</b>  | 851         | 296        |
| 456.hammer     | 24     | <b>396</b>  | <b>565</b> | 395         | 566         | 405        | 554        | 24     | <b>356</b>  | <b>630</b> | 355        | 631         | 356         | 628        |
| 458.sjeng      | 24     | <b>1170</b> | <b>248</b> | 1167        | 249         | 1173       | 248        | 24     | 1068        | 272        | 1073       | 271         | <b>1069</b> | <b>272</b> |
| 462.libquantum | 24     | 169         | 2940       | <b>169</b>  | <b>2940</b> | 169        | 2940       | 24     | 169         | 2940       | <b>169</b> | <b>2940</b> | 169         | 2940       |
| 464.h264ref    | 24     | 1615        | 329        | <b>1622</b> | <b>327</b>  | 1629       | 326        | 24     | <b>1373</b> | <b>387</b> | 1384       | 384         | 1362        | 390        |
| 471.omnetpp    | 24     | 526         | 285        | 518         | 290         | <b>519</b> | <b>289</b> | 24     | 526         | 285        | 518        | 290         | <b>519</b>  | <b>289</b> |
| 473.astar      | 24     | <b>669</b>  | <b>252</b> | 668         | 252         | 670        | 252        | 24     | 572         | 295        | 563        | 299         | <b>566</b>  | <b>298</b> |
| 483.xalancbmk  | 24     | 420         | 394        | 421         | 393         | <b>420</b> | <b>394</b> | 24     | 410         | 404        | <b>410</b> | <b>404</b>  | 409         | 405        |

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=21504 in /etc/sysctl.conf  
mount -t hugetlbfs nodev /mnt/hugepages

## Platform Notes

BIOS configuration:  
HP Power Profile set to Maximum Performance  
Thermal Configuration set to Maximum Cooling  
System Locality Information Table to Disabled  
Minimum Processor Idle Power Cle State to Enabled



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## General Notes

Environment variables set by runspec before the start of the run:

HUGETLB\_LIMIT = "480"

LD\_LIBRARY\_PATH = "/cpu2006/amd1104-rate-libs-revC/32:/cpu2006/amd1104-rate-libs-revC/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 6274 chips + 64GB Memory using RHEL 6.1

## Base Compiler Invocation

C benchmarks:

openc

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.hmmmer: -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



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## 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: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 -CG:dsched=on
-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
```

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## Peak Optimization Flags (Continued)

445.gobmk (continued):

-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:heap=2m:bd=2m

-WOPT:sib=on

462.libquantum: basepeak = yes

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:bd=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

-CG:p2align=1 -CG:dsched=on -GRA:optimize\_boundary=on

-OPT:alias=disjoint -INLINE:aggressive=on

-IPA:small\_pu=3000 -IPA:plimit=3000 -m32

-HP:bd=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=1 -GRA:unspill=on

-TENV:frame\_pointer=off -fno-emit-exceptions

-L/root/work/libraries/SmartHeap-10/lib -lsmarheap

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

<http://www.spec.org/cpu2006/flags/HP-Platform-Flags-AMD-V1.2-A.20120703.html>

<http://www.spec.org/cpu2006/flags/x86-open64-451-flags-rate-revC.html>

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

<http://www.spec.org/cpu2006/flags/HP-Platform-Flags-AMD-V1.2-A.20120703.xml>

<http://www.spec.org/cpu2006/flags/x86-open64-451-flags-rate-revC.xml>

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