



# SPEC<sup>®</sup> CFP2006 Result

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## Hewlett-Packard Company

### SPECfp<sup>®</sup>\_rate2006 = 186

ProLiant DL385 G7  
(2.6 GHz AMD Opteron 6282 SE)

### SPECfp\_rate\_base2006 = 172

CPU2006 license: 3

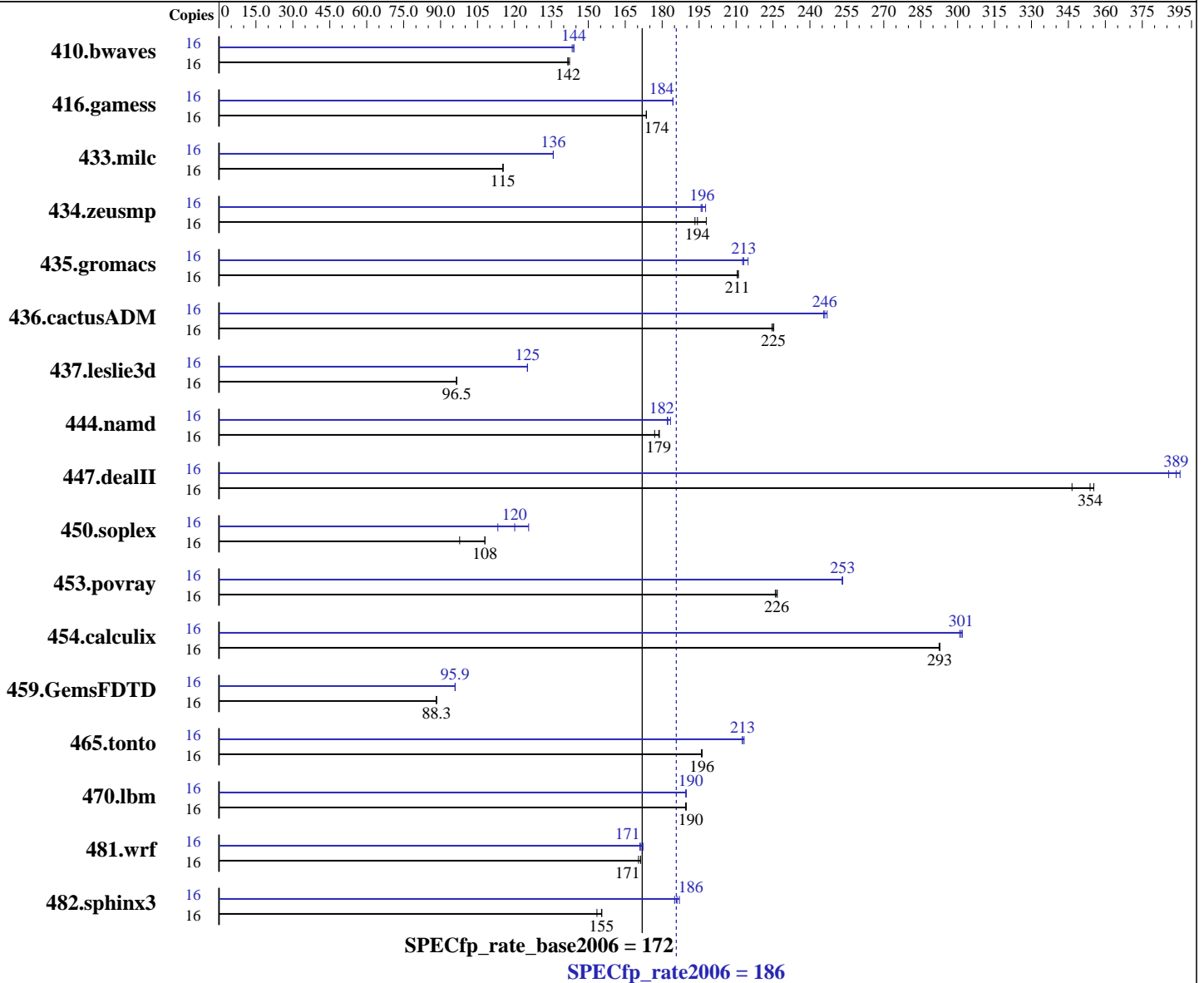
Test date: Oct-2011

Test sponsor: Hewlett-Packard Company

Hardware Availability: Nov-2011

Tested by: Hewlett-Packard Company

Software Availability: Jul-2011



### Hardware

CPU Name: AMD Opteron 6282 SE  
 CPU Characteristics: AMD Turbo CORE technology up to 3.30 GHz  
 CPU MHz: 2600  
 FPU: Integrated  
 CPU(s) enabled: 16 cores, 1 chip, 16 cores/chip  
 CPU(s) orderable: 1,2 chips

### Software

Operating System: Red Hat Enterprise Linux Server release 6.1, Kernel 2.6.32-131.0.15.el6.x86\_64  
 Compiler: C/C++/Fortran: Version 4.2.5.2 of x86 Open64 Compiler Suite (from AMD)  
 Auto Parallel: No  
 File System: ext3  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: 32/64-bit

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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 PC3-10600R-9, ECC)

Disk Subsystem: 1 x 300 GB 7.2 K SATA

Other Hardware: None

Other Software: None

## Results Table

| Benchmark     | Base   |             |             |             |             |             |            | Peak   |             |            |             |             |             |            |
|---------------|--------|-------------|-------------|-------------|-------------|-------------|------------|--------|-------------|------------|-------------|-------------|-------------|------------|
|               | Copies | Seconds     | Ratio       | Seconds     | Ratio       | Seconds     | Ratio      | Copies | Seconds     | Ratio      | Seconds     | Ratio       | Seconds     | Ratio      |
| 410.bwaves    | 16     | 1535        | 142         | <u>1534</u> | <u>142</u>  | 1527        | 142        | 16     | <u>1509</u> | <u>144</u> | 1516        | 143         | 1509        | 144        |
| 416.gamess    | 16     | 1805        | 174         | 1805        | 174         | <u>1805</u> | <u>174</u> | 16     | 1699        | 184        | <u>1699</u> | <u>184</u>  | 1699        | 184        |
| 433.milc      | 16     | <u>1273</u> | <u>115</u>  | 1273        | 115         | 1274        | 115        | 16     | 1082        | 136        | <u>1082</u> | <u>136</u>  | 1082        | 136        |
| 434.zeusmp    | 16     | 736         | 198         | <u>749</u>  | <u>194</u>  | 753         | 193        | 16     | 737         | 198        | 744         | 196         | <u>742</u>  | <u>196</u> |
| 435.gromacs   | 16     | 543         | 211         | <u>543</u>  | <u>211</u>  | 541         | 211        | 16     | 532         | 215        | <u>536</u>  | <u>213</u>  | 537         | 213        |
| 436.cactusADM | 16     | <u>849</u>  | <u>225</u>  | 851         | 225         | 849         | 225        | 16     | 774         | 247        | <u>777</u>  | <u>246</u>  | 778         | 246        |
| 437.leslie3d  | 16     | <u>1558</u> | <u>96.5</u> | 1558        | 96.6        | 1559        | 96.5       | 16     | 1200        | 125        | <u>1200</u> | <u>125</u>  | 1201        | 125        |
| 444.namd      | 16     | 725         | 177         | 717         | 179         | <u>718</u>  | <u>179</u> | 16     | <u>704</u>  | <u>182</u> | 705         | 182         | 700         | 183        |
| 447.dealII    | 16     | <u>517</u>  | <u>354</u>  | 528         | 346         | 515         | 355        | 16     | 475         | 386        | <u>471</u>  | <u>389</u>  | 469         | 390        |
| 450.soplex    | 16     | 1365        | 97.7        | 1235        | 108         | <u>1236</u> | <u>108</u> | 16     | 1178        | 113        | <u>1111</u> | <u>120</u>  | 1061        | 126        |
| 453.povray    | 16     | 377         | 226         | <u>376</u>  | <u>226</u>  | 375         | 227        | 16     | 336         | 253        | <u>336</u>  | <u>253</u>  | 336         | 253        |
| 454.calculix  | 16     | 451         | 292         | <u>451</u>  | <u>293</u>  | 451         | 293        | 16     | 439         | 301        | 437         | 302         | <u>438</u>  | <u>301</u> |
| 459.GemsFDTD  | 16     | 1923        | 88.3        | <u>1922</u> | <u>88.3</u> | 1921        | 88.4       | 16     | 1769        | 96.0       | <u>1770</u> | <u>95.9</u> | 1771        | 95.9       |
| 465.tonto     | 16     | 803         | 196         | <u>803</u>  | <u>196</u>  | 803         | 196        | 16     | 738         | 213        | <u>740</u>  | <u>213</u>  | 741         | 213        |
| 470.lbm       | 16     | 1160        | 190         | 1158        | 190         | <u>1159</u> | <u>190</u> | 16     | 1160        | 190        | 1159        | 190         | <u>1159</u> | <u>190</u> |
| 481.wrf       | 16     | <u>1044</u> | <u>171</u>  | 1049        | 170         | 1044        | 171        | 16     | 1038        | 172        | <u>1043</u> | <u>171</u>  | 1045        | 171        |
| 482.sphinx3   | 16     | 2032        | 153         | <u>2007</u> | <u>155</u>  | 2005        | 156        | 16     | 1685        | 185        | 1668        | 187         | <u>1676</u> | <u>186</u> |

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 "echo never > /sys/kernel/mm/redhat\_transparent\_hugepage/enabled"

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### Operating System Notes (Continued)

Set "kernel/randomize\_va\_space=0" in /etc/sysctl.conf  
Set vm/nr\_hugepages=28672 in /etc/sysctl.conf  
Set "nodev /mnt/hugepages hugetlbfs defaults 0 0" in /etc/fstab

### Platform Notes

BIOS settings:  
HP Power Profile set to Maximum Performance  
Thermal Configuration set to Increased Cooling

### General Notes

Environment variables set by runspec before the start of the run:  
HUGETLB\_LIMIT = "896"  
LD\_LIBRARY\_PATH = "/cpu2006/amd1104-rate-libs-revA/32:/cpu2006/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  
C++ benchmarks:  
openCC  
Fortran benchmarks:  
openf95  
Benchmarks using both Fortran and C:  
opencC openf95

### Base Portability Flags

410.bwaves: -DSPEC\_CPU\_LP64  
416.gamess: -DSPEC\_CPU\_LP64  
433.milc: -DSPEC\_CPU\_LP64  
434.zeusmp: -DSPEC\_CPU\_LP64  
435.gromacs: -DSPEC\_CPU\_LP64  
436.cactusADM: -DSPEC\_CPU\_LP64 -fno-second-underscore  
437.leslie3d: -DSPEC\_CPU\_LP64  
444.namd: -DSPEC\_CPU\_LP64  
447.dealII: -DSPEC\_CPU\_LP64

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## Base Portability Flags (Continued)

```
450.soplex: -DSPEC_CPU_LP64
453.povray: -DSPEC_CPU_LP64
454.calculix: -DSPEC_CPU_LP64
459.GemsFDTD: -DSPEC_CPU_LP64
465.tonto: -DSPEC_CPU_LP64
470.lbm: -DSPEC_CPU_LP64
481.wrf: -DSPEC_CPU_LINUX -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LP64
        -fno-second-underscore
482.sphinx3: -DSPEC_CPU_LP64
```

## Base Optimization Flags

C benchmarks:

```
-march=bdver1 -Ofast -OPT:malloc_alg=1 -HP:bd=2m:heap=2m
-IPA:plimit=8000 -IPA:small_pu=100 -mso
```

C++ benchmarks:

```
-march=bdver1 -Ofast -static -CG:load_exe=0 -OPT:malloc_alg=1
-INLINE:aggressive=on -HP:bd=2m:heap=2m -D__OPEN64_FAST_SET
```

Fortran benchmarks:

```
-march=bdver1 -Ofast -LNO:blocking=off -OPT:rsqrt=2
-OPT:unroll_size=256 -HP:bd=2m:heap=2m -mso
```

Benchmarks using both Fortran and C:

```
-march=bdver1 -Ofast -OPT:malloc_alg=1 -HP:bd=2m:heap=2m
-IPA:plimit=8000 -IPA:small_pu=100 -mso -LNO:blocking=off
-OPT:rsqrt=2 -OPT:unroll_size=256
```

## Peak Compiler Invocation

C benchmarks:

```
openc
```

C++ benchmarks:

```
openCC
```

Fortran benchmarks:

```
openf95
```

Benchmarks using both Fortran and C:

```
openc openf95
```



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## Peak Portability Flags

```

410.bwaves: -DSPEC_CPU_LP64
416.gamess: -DSPEC_CPU_LP64
433.milc: -DSPEC_CPU_LP64
434.zeusmp: -DSPEC_CPU_LP64
435.gromacs: -DSPEC_CPU_LP64
436.cactusADM: -DSPEC_CPU_LP64 -fno-second-underscore
437.leslie3d: -DSPEC_CPU_LP64
444.namd: -DSPEC_CPU_LP64
453.povray: -DSPEC_CPU_LP64
454.calculix: -DSPEC_CPU_LP64
459.GemsFDTD: -DSPEC_CPU_LP64
465.tonto: -DSPEC_CPU_LP64
470.lbm: -DSPEC_CPU_LP64
481.wrf: -DSPEC_CPU_LINUX -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LP64
-fno-second-underscore
482.sphinx3: -DSPEC_CPU_LP64

```

## Peak Optimization Flags

### C benchmarks:

```

433.milc: -march=bdver1 -Ofast -CG:movnti=1 -CG:locs_best=on
-HP:bdt=2m:heap=2m -IPA:plimit=7000 -IPA:callee_limit=1200
-OPT:struct_array_copy=2 -OPT:alias=field_sensitive -mso

470.lbm: -march=bdver1 -Ofast -CG:cmp_peep=on
-OPT:unroll_times_max=8 -OPT:unroll_size=256
-OPT:unroll_level=2 -OPT:keep_ext=on -HP:bdt=2m:heap=2m
-IPA:plimit=8000 -IPA:small_pu=100 -mso

482.sphinx3: -march=bdver1 -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast -OPT:malloc_alg=2
-CG:cmp_peep=on -CG:local_sched_alg=2 -INLINE:aggressive=on
-LNO:prefetch=2 -LNO:prefetch_ahead=4 -mso

```

### C++ benchmarks:

```

444.namd: -march=bdver1 -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast -LNO:ignore_feedback=off
-CG:local_sched_alg=2 -CG:load_exe=0 -OPT:unroll_size=256
-fno-exceptions -HP:bdt=2m:heap=2m

447.dealII: -march=bdver1 -Ofast -D__OPEN64_FAST_SET -static
-INLINE:aggressive=on -LNO:opt=0 -LNO:simd=0
-fno-emit-exceptions -m32 -OPT:unroll_times_max=8
-OPT:unroll_size=256 -OPT:unroll_level=2 -HP:bdt=2m:heap=2m
-GRA:unspill=on -CG:cmp_peep=on -CG:movext_icmp=off
-TENV:frame_pointer=off

```

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## Peak Optimization Flags (Continued)

450.soplex: -march=bdver1 -fb\_create fbdata(pass 1)  
-fb\_opt fbdata(pass 2) -O3 -INLINE:aggressive=on -OPT:RO=1  
-OPT:IEEE\_arith=3 -OPT:IEEE\_NaN\_Inf=off  
-OPT:fold\_unsigned\_relops=on -fno-exceptions -m32  
-HP:bd=2m:heap=2m -WOPT:sib=on

453.povray: -march=bdver1 -fb\_create fbdata(pass 1)  
-fb\_opt fbdata(pass 2) -Ofast -CG:pre\_local\_sched=off  
-INLINE:aggressive=on -HP:bd=2m:heap=2m -OPT:transform=2  
-OPT:alias=disjoint -WOPT:aggcm=0

### Fortran benchmarks:

410.bwaves: -march=bdver1 -fb\_create fbdata(pass 1)  
-fb\_opt fbdata(pass 2) -Ofast -OPT:Ofast -OPT:treeheight=on  
-LNO:blocking=off -LNO:ignore\_feedback=off -LNO:fu=4  
-LNO:loop\_model\_simd=on -LNO:simd\_rm\_unity\_remainder=on  
-WOPT:aggstr=0 -HP:bd=2m:heap=2m -CG:cmp\_peep=on

416.gamess: -march=bdver1 -fb\_create fbdata(pass 1)  
-fb\_opt fbdata(pass 2) -O3 -LNO:fu=6 -LNO:blocking=0  
-LNO:simd=0 -OPT:Ofast -OPT:ro=3 -OPT:unroll\_size=256  
-OPT:unroll\_times\_max=2 -CG:local\_sched\_alg=1  
-HP:bd=2m:heap=2m -WOPT:sib=on

434.zeusmp: -march=bdver1 -Ofast -LNO:blocking=off -LNO:interchange=off  
-HP:bd=2m:heap=2m

437.leslie3d: -march=bdver1 -Ofast -CG:pre\_minreg\_level=2 -LNO:simd=0  
-LNO:fusion=2 -HP:bd=2m:heap=2m -mso

459.GemsFDTD: -march=bdver1 -Ofast -OPT:unroll\_size=0 -LNO:fission=2  
-CG:load\_exe=0 -CG:local\_sched\_alg=2 -HP

465.tonto: -march=bdver1 -Ofast -OPT:alias=no\_f90\_pointer\_alias  
-LNO:blocking=off -CG:load\_exe=1 -IPA:plimit=525  
-HP:bd=2m:heap=2m

### Benchmarks using both Fortran and C:

435.gromacs: -march=bdver1 -fb\_create fbdata(pass 1)  
-fb\_opt fbdata(pass 2) -Ofast -OPT:rsqrt=2  
-HP:bd=2m:heap=2m

436.cactusADM: -march=bdver1 -fb\_create fbdata(pass 1)  
-fb\_opt fbdata(pass 2) -Ofast -LNO:blocking=off  
-LNO:prefetch=2 -HP -CG:locs\_shallow\_depth=1 -CG:load\_exe=0  
-WOPT:sib=on

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## Peak Optimization Flags (Continued)

454.calculix: -march=bdver1 -Ofast -OPT:unroll\_size=256  
-GRA:optimize\_boundary=on -HP:bdt=2m:heap=2m

481.wrf: -march=bdver1 -Ofast -LNO:blocking=off -LANG:copyinout=off  
-IPA:callee\_limit=5000 -GRA:prioritize\_by\_density=on  
-CG:load\_exe=1 -HP -WOPT:sib=on

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/hp-amd-linux-flags.20100330.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/hp-amd-linux-flags.20100330.xml>

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For questions about this result, please contact the tester.  
For other inquiries, please contact [webmaster@spec.org](mailto:webmaster@spec.org).

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