# SPEC® CFP2006 Result

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## Hewlett-Packard Company

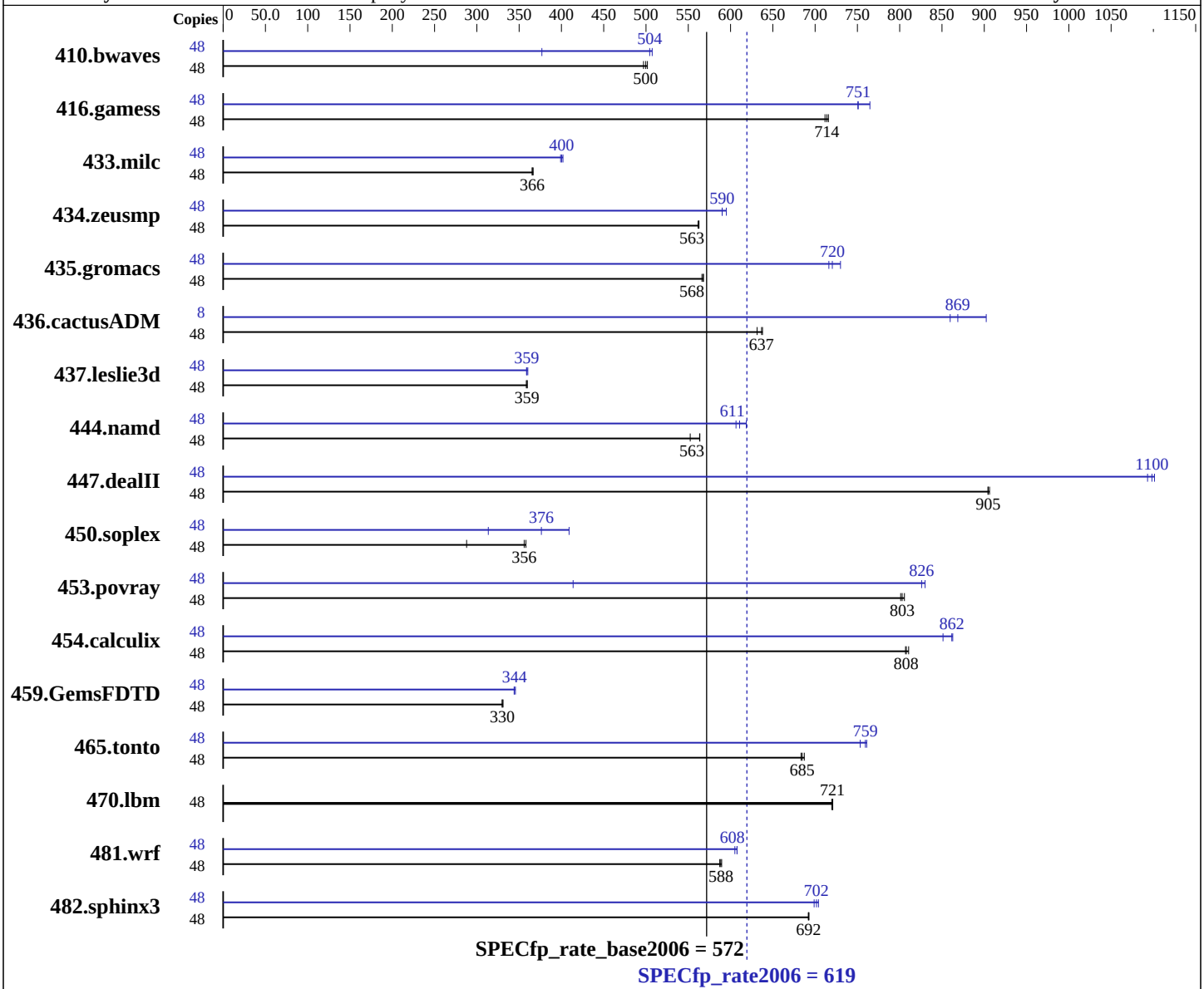
ProLiant DL585 G7
(2.3 GHz AMD Opteron 6176 SE)

SPECfp®_rate2006 = 619

SPECfp_rate_base2006 = 572

**CPU2006 license:** 3
**Test sponsor:** Hewlett-Packard Company
**Tested by:** Hewlett-Packard Company

**Test date:** Apr-2010
**Hardware Availability:** Jun-2010
**Software Availability:** Mar-2010




### Hardware

| | |
|---|---|
| CPU Name: | AMD Opteron 6176 SE |
| CPU Characteristics: | |
| CPU MHz: | 2300 |
| FPU: | Integrated |
| CPU(s) enabled: | 48 cores, 4 chips, 12 cores/chip |
| CPU(s) orderable: | 2,4 chips |
| Primary Cache: | 64 KB I + 64 KB D on chip per core |
| Secondary Cache: | 512 KB I+D on chip per core |

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### Software

| | |
|---|---|
| Operating System: | Red Hat Enterprise Linux Server release 5.4, Advanced Platform with patch RHSA-2009:1670, Kernel 2.6.18-164.9.1.el5 |
| Compiler: | x86 Open64 4.2.3 Compiler Suite |
| Auto Parallel: | Yes |
| File System: | ext3 |
| System State: | Run level 3 (multi-user) |
| Base Pointers: | 64-bit |
| Peak Pointers: | 32/64-bit |

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L3 Cache: 12 MB I+D on chip per chip, 6 MB shared / 6 cores
Other Cache: None
Memory: 128 GB (32x4 GB PC3-10600R, CL9)
Disk Subsystem: 4 x 72 GB 15 K SAS
Other Hardware: None

Other Software: binutils 2.18

## Results Table

| Benchmark | Base | | | | | | | Peak | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 410.bwaves | 48 | 1312 | 497 | 1300 | 502 | **1305** | **500** | 48 | **1293** | **504** | 1731 | 377 | 1286 | 507 |
| 416.gamess | 48 | 1321 | 712 | 1313 | 716 | **1316** | **714** | 48 | 1229 | 765 | **1251** | **751** | 1252 | 751 |
| 433.milc | 48 | **1205** | **366** | 1202 | 367 | 1206 | 365 | 48 | 1104 | 399 | 1097 | 402 | **1101** | **400** |
| 434.zeusmp | 48 | 778 | 562 | **776** | **563** | 776 | 563 | 48 | **740** | **590** | 734 | 595 | 740 | 590 |
| 435.gromacs | 48 | 605 | 566 | 604 | 568 | **604** | **568** | 48 | **476** | **720** | 478 | 716 | 469 | 730 |
| 436.cactusADM | 48 | **901** | **637** | 899 | 638 | 908 | 631 | 8 | 111 | 860 | **110** | **869** | 106 | 902 |
| 437.leslie3d | 48 | 1255 | 360 | 1259 | 358 | **1255** | **359** | 48 | 1258 | 359 | 1252 | 360 | **1257** | **359** |
| 444.namd | 48 | 697 | 552 | **683** | **563** | 683 | 564 | 48 | 635 | 606 | **630** | **611** | 622 | 619 |
| 447.dealII | 48 | 606 | 906 | **607** | **905** | 607 | 904 | 48 | 502 | 1090 | 499 | 1100 | **500** | **1100** |
| 450.soplex | 48 | 1391 | 288 | **1125** | **356** | 1118 | 358 | 48 | 1277 | 314 | **1064** | **376** | 979 | 409 |
| 453.povray | 48 | 319 | 801 | 317 | 806 | **318** | **803** | 48 | **309** | **826** | 308 | 830 | 617 | 414 |
| 454.calculix | 48 | 489 | 811 | **490** | **808** | 491 | 807 | 48 | 459 | 863 | **460** | **862** | 465 | 851 |
| 459.GemsFDTD | 48 | **1543** | **330** | 1543 | 330 | 1539 | 331 | 48 | 1474 | 346 | **1479** | **344** | 1480 | 344 |
| 465.tonto | 48 | **690** | **685** | 691 | 683 | 687 | 687 | 48 | **622** | **759** | 621 | 761 | 627 | 753 |
| 470.lbm | 48 | 915 | 721 | 916 | 720 | **915** | **721** | 48 | 915 | 721 | 916 | 720 | **915** | **721** |
| 481.wrf | 48 | **911** | **588** | 910 | 589 | 913 | 587 | 48 | **882** | **608** | 882 | 608 | 886 | 605 |
| 482.sphinx3 | 48 | 1350 | 693 | 1352 | 692 | **1351** | **692** | 48 | 1329 | 704 | 1339 | 699 | **1333** | **702** |

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 vm/nr_hugepages=21600 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 Increased Cooling
```

## General Notes

```
Environment variables set by runspec before the start of the run:
HUGETLB_LIMIT = "450"
LD_LIBRARY_PATH = "/cpu2006/amd1002mc-rate-revA-libs/64:/cpu2006/amd1002mc-rate-revA-libs/32"
OMP_NUM_THREADS = "6"

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
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_LP64 -DSPEC_CPU_LINUX -DSPEC_CPU_CASE_FLAG
-fno-second-underscore

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## Base Portability Flags (Continued)

482.sphinx3: -DSPEC_CPU_LP64

## Base Optimization Flags

C benchmarks:
-march=barcelona -mso -Ofast -OPT:malloc_alg=1 -HP:bdt=2m

C++ benchmarks:
-march=barcelona -mso -Ofast -static -INLINE:aggressive=on
-OPT:malloc_alg=1 -HP:bdt=2m

Fortran benchmarks:
-march=barcelona -mso -Ofast -HP

Benchmarks using both Fortran and C:
-march=barcelona -mso -Ofast -OPT:malloc_alg=1 -HP:bdt=2m -HP

## Peak Compiler Invocation

C benchmarks:
opencc

C++ benchmarks:
openCC

Fortran benchmarks:
openf95

Benchmarks using both Fortran and C:
opencc openf95

## 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

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## Peak Portability Flags (Continued)

459.GemsFDTD: -DSPEC_CPU_LP64
465.tonto: -DSPEC_CPU_LP64
470.lbm: -DSPEC_CPU_LP64
481.wrf: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX -DSPEC_CPU_CASE_FLAG
-fno-second-underscore
482.sphinx3: -DSPEC_CPU_LP64

## Peak Optimization Flags

C benchmarks:

433.milc: -march=barcelona -mso -Ofast -CG:movnti=1
-CG:local_sched_alg=1 -CG:locs_shallow_depth=1
-HP:bdt=2m:heap=2m -LNO:prefetch=3

470.lbm: basepeak = yes

482.sphinx3: -march=barcelona -mso -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast -OPT:malloc_alg=2
-CG:sse_cse_regs=0 -CG:locs_shallow_depth=1 -CG:cmp_peep=on
-CG:local_sched_alg=1 -INLINE:aggressive=on

C++ benchmarks:

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

447.dealII: -march=barcelona -mso -Ofast -static -INLINE:aggressive=on
-LNO:opt=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 -TENV:frame_pointer=off

450.soplex: -march=barcelona -mso -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -O3 -INLINE:aggressive=on
-OPT:IEEE_arith=3 -OPT:IEEE_NaN_Inf=off
-OPT:fold_unsigned_relops=on -OPT:malloc_alg=1
-CG:load_exe=0 -fno-exceptions -m32 -HP:bdt=2m

453.povray: -march=barcelona -mso -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast -INLINE:aggressive=on

Fortran benchmarks:

410.bwaves: -march=barcelona -mso -O3 -OPT:Ofast -OPT:treeheight=on
-LNO:blocking=off -LNO:prefetch_ahead=5
-LNO:ignore_feedback=off -WOPT:aggstr=0 -HP:bdt=2m:heap=2m

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# Peak Optimization Flags (Continued)

410.bwaves (continued):
-CG:cmp_peep=on

416.gamess: -march=barcelona -mso -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -O3 -LNO:fu=6 -LNO:blocking=0
-LNO:prefetch=0 -OPT:Ofast -OPT:ro=3 -OPT:unroll_size=256
-HP:bdt=2m:heap=2m

434.zeusmp: -march=barcelona -mso -Ofast -LNO:blocking=off
-LNO:interchange=off -OPT:treeheight=on -OPT:unroll_size=256
-CG:cmp_peep=on -GRA:prioritize_by_density=on -HP

437.leslie3d: -march=barcelona -mso -Ofast -HP:bdt=2m:heap=2m

459.GemsFDTD: -march=barcelona -mso -Ofast -LNO:fission=2
-LNO:prefetch_ahead=1 -CG:load_exe=0 -CG:local_sched_alg=1
-HP

465.tonto: -march=barcelona -mso -Ofast
-OPT:alias=no_f90_pointer_alias -LNO:blocking=off
-CG:load_exe=1 -IPA:plimit=525 -HP

Benchmarks using both Fortran and C:

435.gromacs: -march=barcelona -mso -Ofast -OPT:rsqrt=2
-HP:bdt=2m:heap=2m

436.cactusADM: -march=barcelona -mso -fb_create fbdata(pass 1)
-fb_opt fbdata(pass 2) -Ofast -apo -LNO:prefetch_ahead=1
-HP:bdt=2m:heap=2m -LANG:heap_allocation_threshold=100

454.calculix: -march=barcelona -mso -Ofast -CG:load_exe=0
-CG:ptr_load_use=0 -CG:local_sched_alg=2 -CG:compute_to=on
-LNO:prefetch_ahead=30 -WOPT:unroll=2
-GRA:optimize_boundary=on -HP:bdt=2m:heap=2m

481.wrf: -march=barcelona -mso -Ofast -LNO:blocking=off
-LNO:prefetch_ahead=10 -LANG:copyinout=off
-IPA:callee_limit=5000 -GRA:prioritize_by_density=on -m3dnow
-HP

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/x86-open64-4.2.3-flags-revA.html
http://www.spec.org/cpu2006/flags/amd-platform-revA.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/x86-open64-4.2.3-flags-revA.xml
http://www.spec.org/cpu2006/flags/amd-platform-revA.xml

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