# SPEC® CFP2006 Result

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## Hewlett-Packard Company

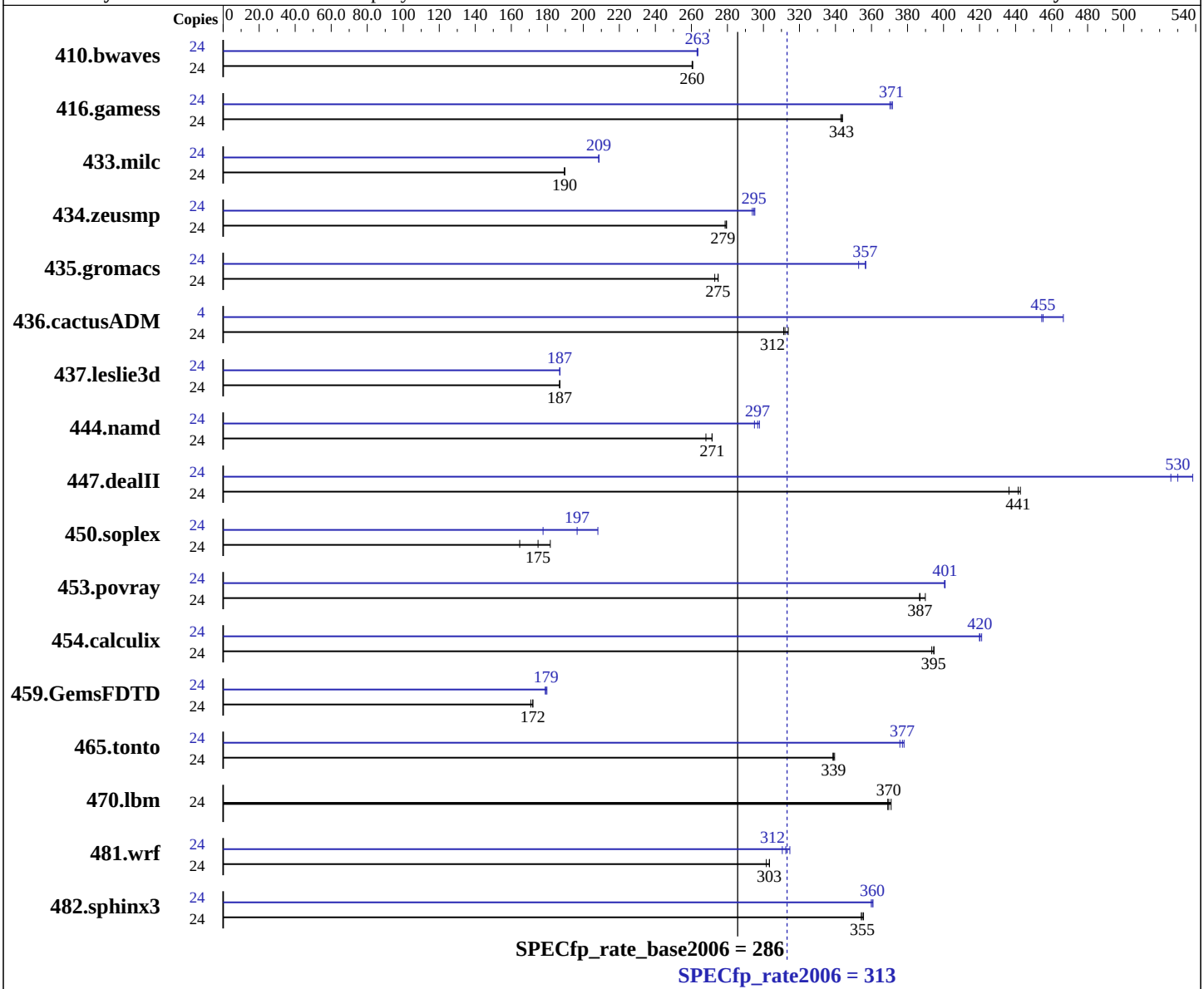
ProLiant SL165z G7
(2.2 GHz AMD Opteron 6174)

**SPECfp®_rate2006 = 313**

**SPECfp_rate_base2006 = 286**

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

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




### Hardware

| | |
|---|---|
| CPU Name: | AMD Opteron 6174 |
| CPU Characteristics: | |
| CPU MHz: | 2200 |
| FPU: | Integrated |
| CPU(s) enabled: | 24 cores, 2 chips, 12 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 |

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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: 64 GB (16x4 GB, PC3-10600R, CL9)
Disk Subsystem: 1x146 GB 10 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 | 24 | **1252** | **260** | 1253 | 260 | 1251 | 261 | 24 | 1239 | 263 | **1238** | **263** | 1237 | 264 |
| 416.gamess | 24 | 1366 | 344 | 1370 | 343 | **1368** | **343** | 24 | **1267** | **371** | 1265 | 372 | 1269 | 370 |
| 433.milc | 24 | **1162** | **190** | 1163 | 190 | 1162 | 190 | 24 | 1056 | 209 | **1056** | **209** | 1057 | 209 |
| 434.zeusmp | 24 | 781 | 280 | **782** | **279** | 784 | 279 | 24 | 743 | 294 | 740 | 295 | **741** | **295** |
| 435.gromacs | 24 | 628 | 273 | 623 | 275 | **624** | **275** | 24 | 486 | 353 | 480 | 357 | **481** | **357** |
| 436.cactusADM | 24 | 914 | 314 | 921 | 311 | **919** | **312** | 4 | 105 | 455 | **105** | **455** | 102 | 467 |
| 437.leslie3d | 24 | **1207** | **187** | 1207 | 187 | 1208 | 187 | 24 | 1206 | 187 | **1207** | **187** | 1207 | 187 |
| 444.namd | 24 | 718 | 268 | **709** | **271** | 709 | 271 | 24 | 652 | 295 | 646 | 298 | **648** | **297** |
| 447.dealII | 24 | 620 | 443 | 629 | 436 | **622** | **441** | 24 | 522 | 526 | 510 | 538 | **518** | **530** |
| 450.soplex | 24 | 1216 | 165 | **1145** | **175** | 1102 | 182 | 24 | 1127 | 178 | **1018** | **197** | 962 | 208 |
| 453.povray | 24 | **330** | **387** | 330 | 387 | 327 | 390 | 24 | 319 | 400 | **319** | **401** | 319 | 401 |
| 454.calculix | 24 | **502** | **395** | 503 | 393 | 502 | 395 | 24 | 472 | 420 | 470 | 421 | **471** | **420** |
| 459.GemsFDTD | 24 | 1491 | 171 | **1481** | **172** | 1480 | 172 | 24 | 1416 | 180 | **1420** | **179** | 1424 | 179 |
| 465.tonto | 24 | 697 | 339 | 696 | 340 | **697** | **339** | 24 | 625 | 378 | **626** | **377** | 628 | 376 |
| 470.lbm | 24 | 889 | 371 | **892** | **370** | 894 | 369 | 24 | 889 | 371 | **892** | **370** | 894 | 369 |
| 481.wrf | 24 | 884 | 303 | 889 | 302 | **884** | **303** | 24 | 852 | 315 | **858** | **312** | 863 | 310 |
| 482.sphinx3 | 24 | 1315 | 356 | 1320 | 354 | **1318** | **355** | 24 | 1300 | 360 | 1296 | 361 | **1298** | **360** |

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=10800 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
Power efficeny mode set to Performance
```

# 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/hp-amd-linux-flags.20100330.html
http://www.spec.org/cpu2006/flags/x86-open64-4.2.3-flags-revA.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/hp-amd-linux-flags.20100330.xml
http://www.spec.org/cpu2006/flags/x86-open64-4.2.3-flags-revA.xml

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