# SPEC® CFP2006 Result
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## Hewlett-Packard Company

ProLiant DL560 Gen8
(2.20 GHz, Intel Xeon E5-4603 v2)

$SPECfp^®\_rate2006 = 504$

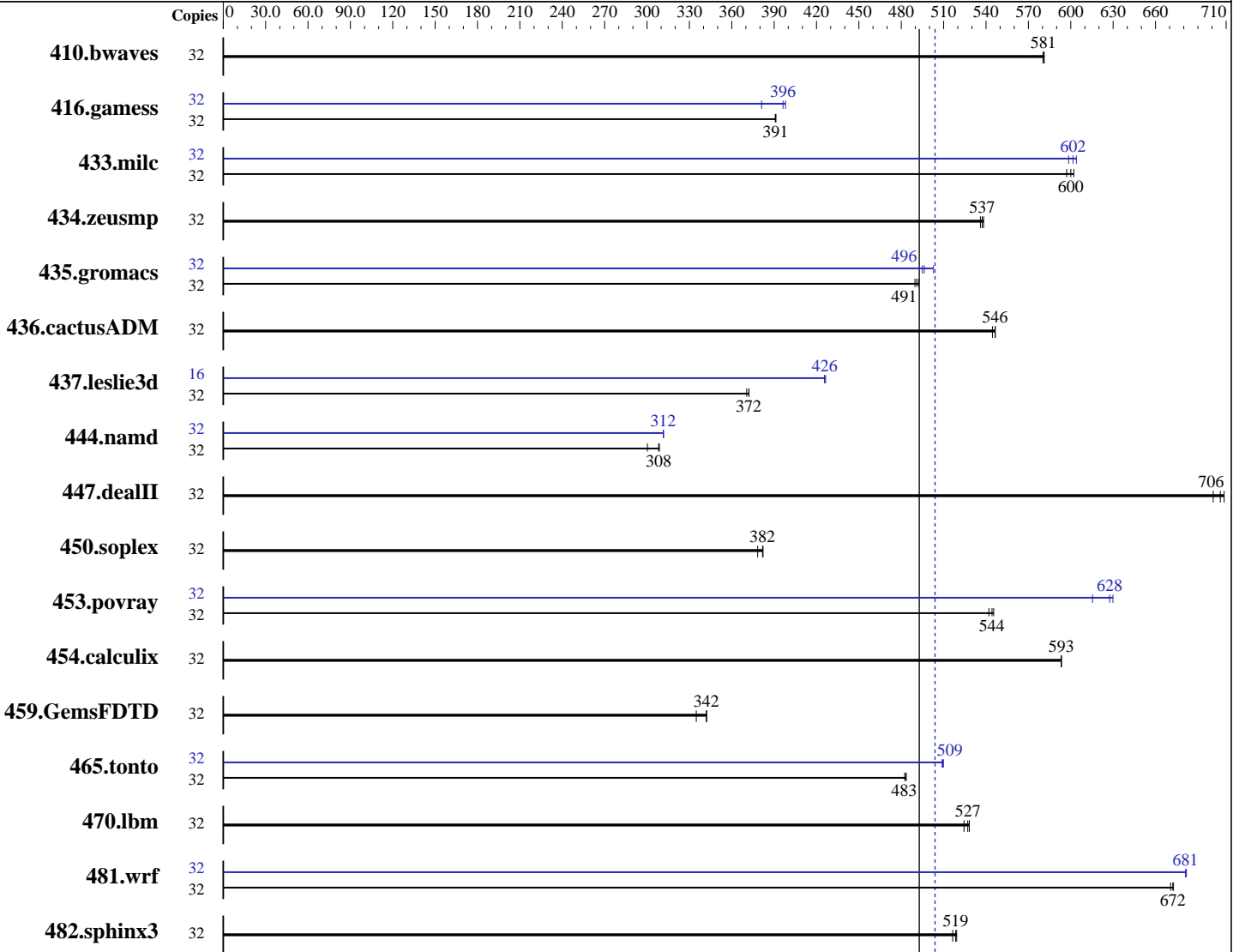$SPECfp\_rate\_base2006 = 493$

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

**Test date:** Apr-2014
**Hardware Availability:** Mar-2014
**Software Availability:** Sep-2013



| Copies | |
|---|---|
| 410.bwaves | 32 — 581 |
| 416.gamess | 32 — 396 / 32 — 391 |
| 433.milc | 32 — 602 / 32 — 600 |
| 434.zeusmp | 32 — 537 |
| 435.gromacs | 32 — 496 / 32 — 491 |
| 436.cactusADM | 32 — 546 |
| 437.leslie3d | 16 — 426 / 32 — 372 |
| 444.namd | 32 — 312 / 32 — 308 |
| 447.dealII | 32 — 706 |
| 450.soplex | 32 — 382 |
| 453.povray | 32 — 628 / 32 — 544 |
| 454.calculix | 32 — 593 |
| 459.GemsFDTD | 32 — 342 |
| 465.tonto | 32 — 509 / 32 — 483 |
| 470.lbm | 32 — 527 |
| 481.wrf | 32 — 681 / 32 — 672 |
| 482.sphinx3 | 32 — 519 |

**SPECfp_rate_base2006 = 493**

**SPECfp_rate2006 = 504**

## Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon E5-4603 v2 |
| CPU Characteristics: | |
| CPU MHz: | 2200 |
| FPU: | Integrated |
| CPU(s) enabled: | 16 cores, 4 chips, 4 cores/chip, 2 threads/core |
| CPU(s) orderable: | 2,4 chip |
| Primary Cache: | 32 KB I + 32 KB D on chip per core |
| Secondary Cache: | 256 KB I+D on chip per core |

**Continued on next page**

## Software

| | |
|---|---|
| Operating System: | Red Hat Enterprise Linux Server release 6.5 (Santiago) 2.6.32-431.el6.x86_64 Kernel 2.6.32-431.el6.x86_64 |
| Compiler: | C/C++: Version 14.0.0.080 of Intel C++ Studio XE for Linux; Fortran: Version 14.0.0.080 of Intel Fortran Studio XE for Linux |
| Auto Parallel: | No |

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| | | | |
|---|---|---|---|
| L3 Cache: | 10 MB I+D on chip per chip | File System: | ext4 |
| Other Cache: | None | System State: | Run level 3 (multi-user) |
| Memory: | 512 GB (32 x 16 GB 2Rx4 PC3-14900R-13, ECC, running at 1333 MHz and CL9) | Base Pointers: | 32/64-bit |
| | | Peak Pointers: | 32/64-bit |
| Disk Subsystem: | 1 x 400 GB SAS SSD, RAID 0 | Other Software: | None |
| Other Hardware: | None | | |

## Results Table

| Benchmark | Base | | | | | | | Peak | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 410.bwaves | 32 | **749** | **581** | 748 | 581 | 749 | 580 | 32 | **749** | **581** | 748 | 581 | 749 | 580 |
| 416.gamess | 32 | **1602** | **391** | 1601 | 391 | 1603 | 391 | 32 | **1581** | **396** | 1644 | 381 | 1574 | 398 |
| 433.milc | 32 | 488 | 602 | 492 | 597 | **490** | **600** | 32 | 491 | 598 | **488** | **602** | 486 | 604 |
| 434.zeusmp | 32 | 543 | 536 | 541 | 538 | **542** | **537** | 32 | 543 | 536 | 541 | 538 | **542** | **537** |
| 435.gromacs | 32 | **465** | **491** | 464 | 492 | 467 | 490 | 32 | 462 | 495 | **460** | **496** | 454 | 503 |
| 436.cactusADM | 32 | **700** | **546** | 700 | 547 | 702 | 545 | 32 | **700** | **546** | 700 | 547 | 702 | 545 |
| 437.leslie3d | 32 | 808 | 372 | 812 | 371 | **808** | **372** | 16 | 353 | 426 | 353 | 426 | **353** | **426** |
| 444.namd | 32 | **833** | **308** | 831 | 309 | 855 | 300 | 32 | **824** | **312** | 824 | 312 | 823 | 312 |
| 447.dealII | 32 | 522 | 701 | 517 | 709 | **519** | **706** | 32 | 522 | 701 | 517 | 709 | **519** | **706** |
| 450.soplex | 32 | **699** | **382** | 705 | 378 | 698 | 382 | 32 | **699** | **382** | 705 | 378 | 698 | 382 |
| 453.povray | 32 | **313** | **544** | 314 | 542 | 312 | 545 | 32 | 277 | 615 | 270 | 630 | **271** | **628** |
| 454.calculix | 32 | 445 | 593 | **445** | **593** | 445 | 593 | 32 | 445 | 593 | **445** | **593** | 445 | 593 |
| 459.GemsFDTD | 32 | **993** | **342** | 1014 | 335 | 992 | 342 | 32 | **993** | **342** | 1014 | 335 | 992 | 342 |
| 465.tonto | 32 | 653 | 482 | **652** | **483** | 651 | 484 | 32 | 618 | 510 | **618** | **509** | 619 | 509 |
| 470.lbm | 32 | 838 | 524 | 832 | 528 | **834** | **527** | 32 | 838 | 524 | 832 | 528 | **834** | **527** |
| 481.wrf | 32 | 533 | 671 | **532** | **672** | 531 | 673 | 32 | 525 | 681 | 524 | 682 | **525** | **681** |
| 482.sphinx3 | 32 | 1208 | 516 | **1203** | **519** | 1201 | 519 | 32 | 1208 | 516 | **1203** | **519** | 1201 | 519 |

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

## Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

## Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"
Transparent Huge Pages enabled with:
 echo always > /sys/kernel/mm/redhat_transparent_hugepage/enabled
Filesystem page cache cleared with:
 echo 1 > /proc/sys/vm/drop_caches
runspec command invoked through numactl i.e.:
 numactl --interleave=all runspec <etc>

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$SPECfp\_rate2006 =$     504

$SPECfp\_rate\_base2006 =$   493

| | |
|---|---|
| **CPU2006 license:** 3 | **Test date:** Apr-2014 |
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### Platform Notes

```
BIOS Configuration:
 HP Power Profile set to Maximum Performance
 Memory Power Savings Mode set to Maximum Performance
 Thermal Configuration set to Maximum Cooling
 Collaborative Power Control set to Disabled
 Dynamic Power Capping Functionality set to Disabled
 Processor Power and Utilization Monitoring set to Disabled
 Memory Refresh Rate set to 1x

Sysinfo program /cpu2006/config/sysinfo.rev6818
$Rev: 6818 $ $Date:: 2012-07-17 #$ e86d102572650a6e4d596a3cee98f191
running on DL560p-Gen8-1K4 Tue Apr  1 08:21:32 2014

This section contains SUT (System Under Test) info as seen by
some common utilities.  To remove or add to this section, see:
  http://www.spec.org/cpu2006/Docs/config.html#sysinfo

From /proc/cpuinfo
   model name : Intel(R) Xeon(R) CPU E5-4603 v2 @ 2.20GHz
      4 "physical id"s (chips)
      32 "processors"
   cores, siblings (Caution: counting these is hw and system dependent.  The
   following excerpts from /proc/cpuinfo might not be reliable.  Use with
   caution.)
      cpu cores : 4
      siblings  : 8
      physical 0: cores 0 1 2 3
      physical 1: cores 0 1 2 3
      physical 2: cores 0 1 2 3
      physical 3: cores 0 1 2 3
   cache size : 10240 KB

From /proc/meminfo
   MemTotal:      529267592 kB
   HugePages_Total:        0
   Hugepagesize:        2048 kB

/usr/bin/lsb_release -d
   Red Hat Enterprise Linux Server release 6.5 (Santiago)

From /etc/*release* /etc/*version*
   redhat-release: Red Hat Enterprise Linux Server release 6.5 (Santiago)
   system-release: Red Hat Enterprise Linux Server release 6.5 (Santiago)
   system-release-cpe: cpe:/o:redhat:enterprise_linux:6server:ga:server

uname -a:
   Linux DL560p-Gen8-1K4 2.6.32-431.el6.x86_64 #1 SMP Sun Nov 10 22:19:54 EST
   2013 x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Mar 31 16:18

SPEC is set to: /cpu2006
```

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## Hewlett-Packard Company

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### Platform Notes (Continued)

```
     Filesystem      Type  Size  Used Avail Use% Mounted on
     /dev/sda3       ext4  365G  215G  131G  63% /

   Additional information from dmidecode:
     BIOS HP P77 11/14/2013
     Memory:
     32x HP 712383-081 16 GB 1333 MHz 2 rank
     16x UNKNOWN NOT AVAILABLE

   (End of data from sysinfo program)
   Regarding the sysinfo display about the memory installed, the correct amount of
   memory is 512 GB and the dmidecode description should have one line reading as:
     32x HP 712383-081 16 GB 1333 MHz 2 rank
```

### General Notes

```
Environment variables set by runspec before the start of the run:
LD_LIBRARY_PATH = "/cpu2006/libs/32:/cpu2006/libs/64:/cpu2006/sh"

 Binaries compiled on a system with 1x Core i7-860 CPU + 8GB
 memory using RedHat EL 6.4
```

### Base Compiler Invocation

C benchmarks:
```
     icc   -m64
```

C++ benchmarks:
```
     icpc  -m64
```

Fortran benchmarks:
```
     ifort -m64
```

Benchmarks using both Fortran and C:
```
     icc   -m64 ifort -m64
```

### 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 -nofor_main
  436.cactusADM: -DSPEC_CPU_LP64 -nofor_main
    437.leslie3d: -DSPEC_CPU_LP64
      444.namd: -DSPEC_CPU_LP64
```

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## Base Portability Flags (Continued)

```
   447.dealII: -DSPEC_CPU_LP64
   450.soplex: -DSPEC_CPU_LP64
   453.povray: -DSPEC_CPU_LP64
  454.calculix: -DSPEC_CPU_LP64 -nofor_main
 459.GemsFDTD: -DSPEC_CPU_LP64
    465.tonto: -DSPEC_CPU_LP64
     470.lbm: -DSPEC_CPU_LP64
     481.wrf: -DSPEC_CPU_LP64 -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LINUX
   482.sphinx3: -DSPEC_CPU_LP64
```

## Base Optimization Flags

C benchmarks:
```
-xAVX -ipo -O3 -no-prec-div -opt-prefetch -auto-p32 -ansi-alias
-opt-mem-layout-trans=3
```

C++ benchmarks:
```
-xAVX -ipo -O3 -no-prec-div -opt-prefetch -auto-p32 -ansi-alias
-opt-mem-layout-trans=3
```

Fortran benchmarks:
```
-xAVX -ipo -O3 -no-prec-div -opt-prefetch
```

Benchmarks using both Fortran and C:
```
-xAVX -ipo -O3 -no-prec-div -opt-prefetch -auto-p32 -ansi-alias
-opt-mem-layout-trans=3
```

## Peak Compiler Invocation

C benchmarks:
```
icc   -m64
```

C++ benchmarks:
```
icpc   -m64
```

Fortran benchmarks:
```
ifort -m64
```

Benchmarks using both Fortran and C:
```
icc   -m64 ifort -m64
```

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## Peak Portability Flags

Same as Base Portability Flags

## Peak Optimization Flags

C benchmarks:

433.milc: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
-no-prec-div(pass 2) -opt-mem-layout-trans=3(pass 2)
-prof-use(pass 2) -auto-ilp32

470.lbm: basepeak = yes

482.sphinx3: basepeak = yes

C++ benchmarks:

444.namd: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
-no-prec-div(pass 2) -opt-mem-layout-trans=3(pass 2)
-prof-use(pass 2) -fno-alias -auto-ilp32

447.dealII: basepeak = yes

450.soplex: basepeak = yes

453.povray: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
-no-prec-div(pass 2) -opt-mem-layout-trans=3(pass 2)
-prof-use(pass 2) -unroll4 -ansi-alias

Fortran benchmarks:

410.bwaves: basepeak = yes

416.gamess: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
-no-prec-div(pass 2) -prof-use(pass 2) -unroll2
-inline-level=0 -scalar-rep-

434.zeusmp: basepeak = yes

437.leslie3d: -xAVX -ipo -O3 -no-prec-div -opt-prefetch

459.GemsFDTD: basepeak = yes

465.tonto: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
-no-prec-div(pass 2) -prof-use(pass 2) -unroll4 -auto
-inline-calloc -opt-malloc-options=3

Benchmarks using both Fortran and C:

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# Peak Optimization Flags (Continued)

435.gromacs: `-xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)`
`-no-prec-div(pass 2) -opt-mem-layout-trans=3(pass 2)`
`-prof-use(pass 2) -opt-prefetch -auto-ilp32`

436.cactusADM: `basepeak = yes`

454.calculix: `basepeak = yes`

481.wrf: `-xAVX -ipo -O3 -no-prec-div -auto-ilp32`

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/Intel-ic14.0-official-linux64.20140128.html
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-revD.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic14.0-official-linux64.20140128.xml
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-revD.xml

For questions about this result, please contact the tester.
For other inquiries, please contact webmaster@spec.org.

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