# SPEC® CFP2006 Result

## Hewlett-Packard Company

ProLiant DL580 Gen9
(2.50 GHz, Intel Xeon E7-8890 v3)

$SPECfp^{®}2006 =$ 119

$SPECfp\_base2006 =$ 112
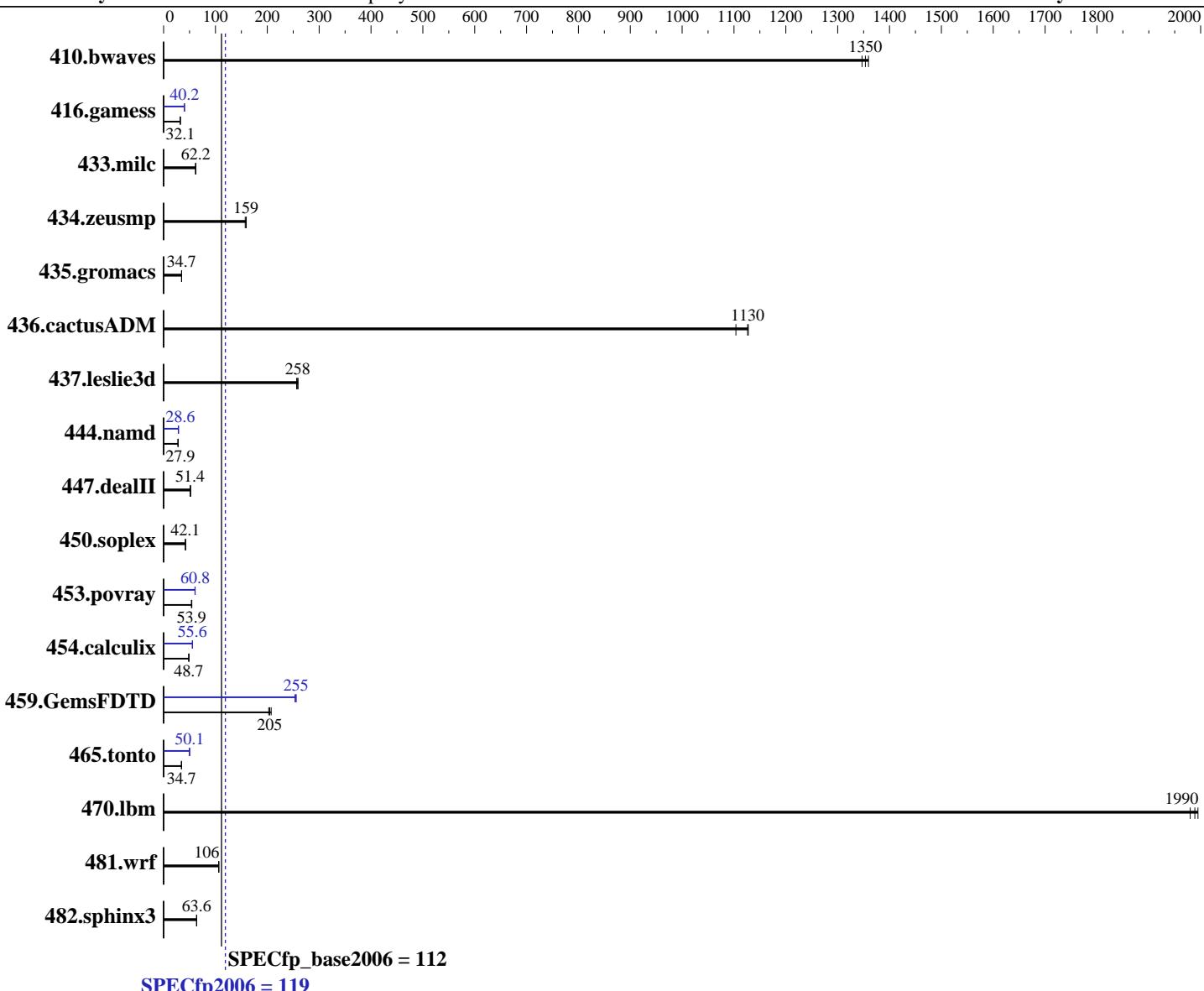
**CPU2006 license:** 3
**Test sponsor:** Hewlett-Packard Company
**Tested by:** Hewlett-Packard Company

**Test date:** Mar-2015
**Hardware Availability:** May-2015
**Software Availability:** Mar-2015

| Benchmark | Score |
|---|---|
| 410.bwaves | 1350 |
| 416.gamess | 40.2 / 32.1 |
| 433.milc | 62.2 |
| 434.zeusmp | 159 |
| 435.gromacs | 34.7 |
| 436.cactusADM | 1130 |
| 437.leslie3d | 258 |
| 444.namd | 28.6 / 27.9 |
| 447.dealII | 51.4 |
| 450.soplex | 42.1 |
| 453.povray | 60.8 / 53.9 |
| 454.calculix | 55.6 / 48.7 |
| 459.GemsFDTD | 255 / 205 |
| 465.tonto | 50.1 / 34.7 |
| 470.lbm | 1990 |
| 481.wrf | 106 |
| 482.sphinx3 | 63.6 |

**SPECfp_base2006 = 112**

**SPECfp2006 = 119**

## Hardware

**CPU Name:** Intel Xeon E7-8890 v3
**CPU Characteristics:** Intel Turbo Boost Technology up to 3.30 GHz
**CPU MHz:** 2500
**FPU:** Integrated
**CPU(s) enabled:** 72 cores, 4 chips, 18 cores/chip
**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 7.1 (Maipo)
Kernel 3.10.0-229.el7.x86_64
**Compiler:** C/C++: Version 15.0.0.090 of Intel C++ Studio XE for Linux;
Fortran: Version 15.0.0.090 of Intel Fortran Studio XE for Linux
**Auto Parallel:** Yes
**File System:** xfs
**Continued on next page**

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| | |
|---|---|
| L3 Cache: | 45 MB I+D on chip per chip |
| Other Cache: | None |
| Memory: | 512 GB (32 x 16 GB 2Rx4 PC4-2133P-R, running at 1600 MHz) |
| Disk Subsystem: | 1 x 400 GB SAS SSD, RAID 0 |
| Other Hardware: | None |

| | |
|---|---|
| System State: | Run level 3 (multi-user) |
| Base Pointers: | 64-bit |
| Peak Pointers: | 32/64-bit |
| Other Software: | None |

## Results Table

| Benchmark | Base | | | | | | Peak | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 410.bwaves | 10.0 | 1360 | **10.0** | **1350** | 10.1 | 1350 | 10.0 | 1360 | **10.0** | **1350** | 10.1 | 1350 |
| 416.gamess | 610 | 32.1 | 605 | 32.3 | **609** | **32.1** | **487** | **40.2** | 486 | 40.3 | 490 | 40.0 |
| 433.milc | **148** | **62.2** | 150 | 61.3 | 147 | 62.3 | **148** | **62.2** | 150 | 61.3 | 147 | 62.3 |
| 434.zeusmp | 57.1 | 159 | **57.3** | **159** | 57.8 | 157 | 57.1 | 159 | **57.3** | **159** | 57.8 | 157 |
| 435.gromacs | 205 | 34.8 | 206 | 34.6 | **206** | **34.7** | 205 | 34.8 | 206 | 34.6 | **206** | **34.7** |
| 436.cactusADM | 10.8 | 1100 | 10.6 | 1130 | **10.6** | **1130** | 10.8 | 1100 | 10.6 | 1130 | **10.6** | **1130** |
| 437.leslie3d | 36.3 | 259 | 36.7 | 256 | **36.4** | **258** | 36.3 | 259 | 36.7 | 256 | **36.4** | **258** |
| 444.namd | 288 | 27.9 | **288** | **27.9** | 288 | 27.9 | 281 | 28.5 | **280** | **28.6** | 280 | 28.7 |
| 447.dealII | 223 | 51.4 | **223** | **51.4** | 219 | 52.1 | 223 | 51.4 | **223** | **51.4** | 219 | 52.1 |
| 450.soplex | 198 | 42.1 | 198 | 42.2 | **198** | **42.1** | 198 | 42.1 | 198 | 42.2 | **198** | **42.1** |
| 453.povray | 99.0 | 53.7 | 97.7 | 54.5 | **98.6** | **53.9** | 87.4 | 60.8 | **87.5** | **60.8** | 88.0 | 60.4 |
| 454.calculix | 170 | 48.5 | 169 | 48.8 | **169** | **48.7** | 148 | 55.6 | **148** | **55.6** | 149 | 55.4 |
| 459.GemsFDTD | 51.1 | 207 | 52.3 | 203 | **51.8** | **205** | 41.9 | 253 | 41.5 | 256 | **41.6** | **255** |
| 465.tonto | 289 | 34.1 | 283 | 34.8 | **284** | **34.7** | 198 | 49.7 | 196 | 50.3 | **197** | **50.1** |
| 470.lbm | 6.94 | 1980 | **6.91** | **1990** | 6.89 | 1990 | 6.94 | 1980 | **6.91** | **1990** | 6.89 | 1990 |
| 481.wrf | **105** | **106** | 105 | 106 | 105 | 106 | **105** | **106** | 105 | 106 | 105 | 106 |
| 482.sphinx3 | 307 | 63.6 | **306** | **63.6** | 305 | 63.9 | 307 | 63.6 | **306** | **63.6** | 305 | 63.9 |

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

## Operating System Notes

```
Stack size set to unlimited using "ulimit -s unlimited"
Transparent Huge Pages enabled with:
 echo always > /sys/kernel/mm/transparent_hugepage/enabled
```

## Platform Notes

```
BIOS Configuration
  Intel Hypthreading Options set to Disabled
  Power Profile set to Custom
  Power Regulator set to Static High Performance Mode
  Minimum Processor Idle Power Core C-State set to C6 State
  Minimum Processor Idle Power Package C-State set to Package C6 (retention) State
  Energy/Performance Bias set to Maximum Performance
```

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**Test date:** Mar-2015
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### Platform Notes (Continued)

```
   Collaborative Power Control set to Enabled
   Thermal Configuration set to Maximum Cooling
   Processor Power and Utilization Monitoring set to Disabled
   Memory Refresh Rate set to 1x Refresh

Sysinfo program /cpu2006/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on localhost.localdomain Thu Mar 26 22:16:36 2015

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 E7-8890 v3 @ 2.50GHz
      4 "physical id"s (chips)
      72 "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 : 18
      siblings  : 18
      physical 0: cores 0 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
      physical 1: cores 0 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
      physical 2: cores 0 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
      physical 3: cores 0 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
   cache size : 46080 KB

From /proc/meminfo
   MemTotal:       528072796 kB
   HugePages_Total:        0
   Hugepagesize:        2048 kB

From /etc/*release* /etc/*version*
   os-release:
      NAME="Red Hat Enterprise Linux Server"
      VERSION="7.1 (Maipo)"
      ID="rhel"
      ID_LIKE="fedora"
      VERSION_ID="7.1"
      PRETTY_NAME="Red Hat Enterprise Linux Server 7.1 (Maipo)"
      ANSI_COLOR="0;31"
      CPE_NAME="cpe:/o:redhat:enterprise_linux:7.1:GA:server"
   redhat-release: Red Hat Enterprise Linux Server release 7.1 (Maipo)
   system-release: Red Hat Enterprise Linux Server release 7.1 (Maipo)
   system-release-cpe: cpe:/o:redhat:enterprise_linux:7.1:ga:server

uname -a:
   Linux localhost.localdomain 3.10.0-229.el7.x86_64 #1 SMP Thu Jan 29 18:37:38
   EST 2015 x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Mar 26 15:24
```

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## Platform Notes (Continued)

```
  SPEC is set to: /cpu2006
     Filesystem      Type  Size  Used Avail Use% Mounted on
     /dev/sda4       xfs   368G   51G  317G  14% /
  Additional information from dmidecode:

     Warning: Use caution when you interpret this section. The 'dmidecode' program
     reads system data which is "intended to allow hardware to be accurately
     determined", but the intent may not be met, as there are frequent changes to
     hardware, firmware, and the "DMTF SMBIOS" standard.

     BIOS HP U17 03/13/2015
     Memory:
      64x UNKNOWN NOT AVAILABLE
      32x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2133 MHz, configured at 1600 MHz

   (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 UNKNOWN NOT AVAILABLE 16 GB 2 rank 2133 MHz, configured at 1600 MHz
```

## General Notes

```
  Environment variables set by runspec before the start of the run:
  KMP_AFFINITY = "granularity=fine,compact"
  LD_LIBRARY_PATH = "/cpu2006/libs/32:/cpu2006/libs/64:/cpu2006/sh"
  OMP_NUM_THREADS = "72"

   Binaries compiled on a system with 1x Core i5-4670K CPU + 16GB
   memory using RedHat EL 7.0
```

## 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
```

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## 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
     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:
```
    -xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch
    -ansi-alias
```

C++ benchmarks:
```
    -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -ansi-alias
```

Fortran benchmarks:
```
    -xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch
```

Benchmarks using both Fortran and C:
```
    -xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch
    -ansi-alias
```

## Peak Compiler Invocation

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

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

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

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# Peak Compiler Invocation (Continued)

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

# Peak Portability Flags

```
Same as Base Portability Flags
```

# Peak Optimization Flags

C benchmarks:

        433.milc: basepeak = yes

        470.lbm: basepeak = yes

     482.sphinx3: basepeak = yes

C++ benchmarks:

      444.namd: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
                -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
                -fno-alias -auto-ilp32

      447.dealII: basepeak = yes

      450.soplex: basepeak = yes

     453.povray: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
                -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2) -unroll4
                -ansi-alias

Fortran benchmarks:

     410.bwaves: basepeak = yes

     416.gamess: -xCORE-AVX2(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: basepeak = yes

   459.GemsFDTD: -xCORE-AVX2(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 -opt-prefetch -parallel

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# Peak Optimization Flags (Continued)

465.tonto: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
-inline-calloc -opt-malloc-options=3 -auto -unroll4

Benchmarks using both Fortran and C:

435.gromacs: basepeak = yes

436.cactusADM: basepeak = yes

454.calculix: -xCORE-AVX2 -ipo -O3 -no-prec-div -auto-ilp32 -ansi-alias

481.wrf: basepeak = yes

---

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/Intel-ic15.0-official-linux64.html
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-HSW-revE.html

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You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic15.0-official-linux64.xml
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-HSW-revE.xml

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