# SPEC® CFP2006 Result

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## Hewlett Packard Enterprise

(Test Sponsor: HPE)

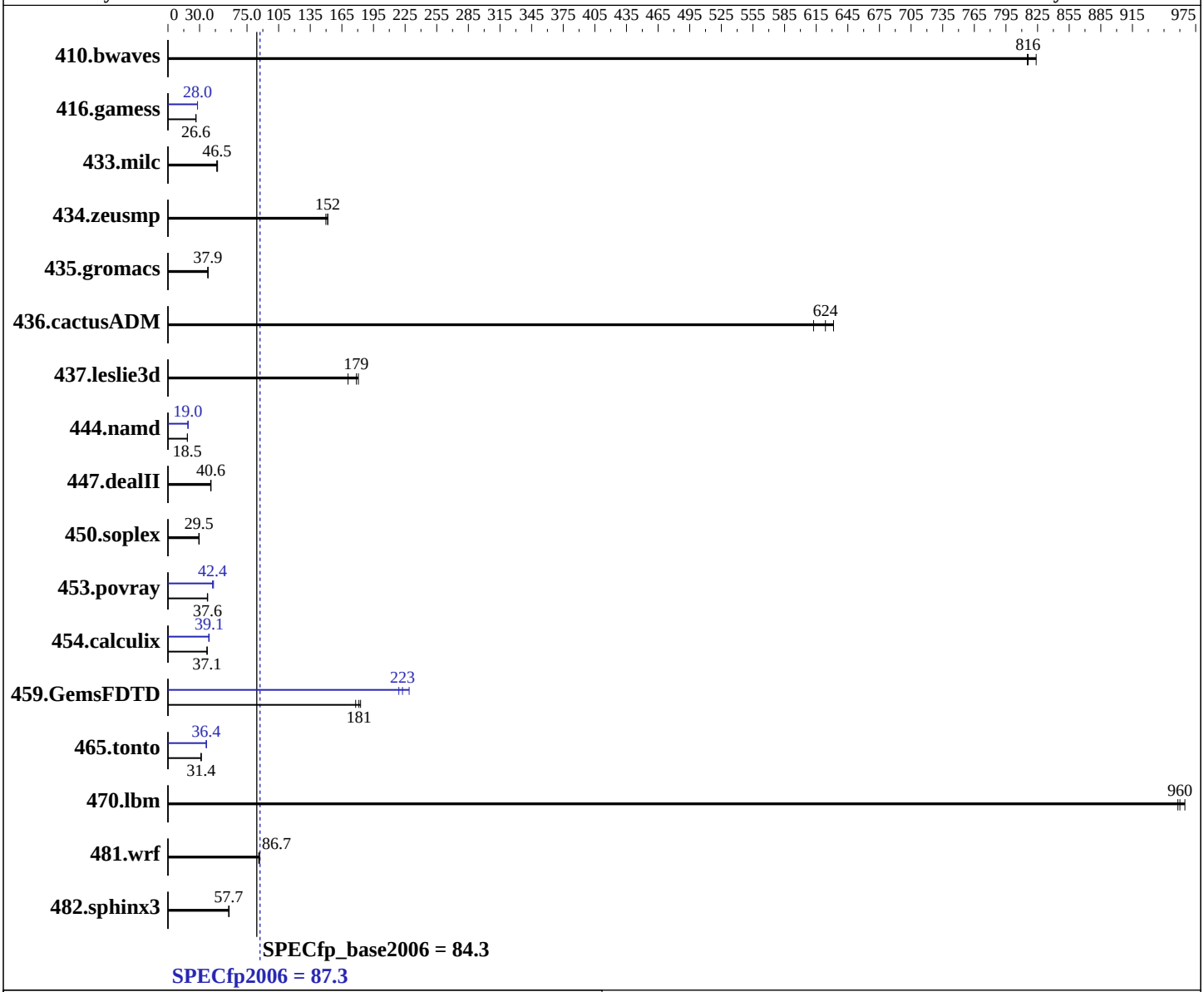
ProLiant DL580 Gen9
(2.10 GHz, Intel Xeon E7-4809 v4)

SPECfp®2006 = 87.3

SPECfp_base2006 = 84.3

**CPU2006 license:** 3
**Test sponsor:** HPE
**Tested by:** HPE

**Test date:** Aug-2016
**Hardware Availability:** Jun-2016
**Software Availability:** Dec-2015




## Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon E7-4809 v4 |
| CPU Characteristics: | |
| CPU MHz: | 2100 |
| FPU: | Integrated |
| CPU(s) enabled: | 32 cores, 4 chips, 8 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 |

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## Software

| | |
|---|---|
| Operating System: | SUSE Linux Enterprise Server 12 (x86_64) SP1, Kernel 3.12.49-11-default |
| Compiler: | C/C++: Version 16.0.0.101 of Intel C++ Studio XE for Linux;<br>Fortran: Version 16.0.0.101 of Intel Fortran Studio XE for Linux |
| Auto Parallel: | Yes |
| File System: | xfs |
| System State: | Run level 3 (multi-user) |

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L3 Cache: 20 MB I+D on chip per chip
Other Cache: None
Memory: 512 GB (32 x 16 GB 2Rx4 PC4-2400T-R, running at 1333 MHz)
Disk Subsystem: 1 x 800 GB NVMe PCIe SSD, RAID 0
Other Hardware: DL580 Gen9 NVMe SSD Express Bay Enablement Kit

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 | 16.7 | 815 | 16.5 | 824 | **16.7** | **816** | 16.7 | 815 | 16.5 | 824 | **16.7** | **816** |
| 416.gamess | **737** | **26.6** | 737 | 26.6 | 739 | 26.5 | **699** | **28.0** | 698 | 28.1 | 699 | 28.0 |
| 433.milc | **198** | **46.5** | 198 | 46.4 | 195 | 47.1 | **198** | **46.5** | 198 | 46.4 | 195 | 47.1 |
| 434.zeusmp | 60.7 | 150 | **60.1** | **152** | 60.0 | 152 | 60.7 | 150 | **60.1** | **152** | 60.0 | 152 |
| 435.gromacs | 189 | 37.9 | 188 | 38.0 | **188** | **37.9** | 189 | 37.9 | 188 | 38.0 | **188** | **37.9** |
| 436.cactusADM | 19.5 | 612 | **19.2** | **624** | 18.9 | 631 | 19.5 | 612 | **19.2** | **624** | 18.9 | 631 |
| 437.leslie3d | **52.6** | **179** | 52.0 | 181 | 55.0 | 171 | **52.6** | **179** | 52.0 | 181 | 55.0 | 171 |
| 444.namd | 435 | 18.4 | 434 | 18.5 | **434** | **18.5** | 421 | 19.0 | **421** | **19.0** | 421 | 19.0 |
| 447.dealII | 280 | 40.9 | 282 | 40.5 | **282** | **40.6** | 280 | 40.9 | 282 | 40.5 | **282** | **40.6** |
| 450.soplex | 281 | 29.7 | **283** | **29.5** | 285 | 29.3 | 281 | 29.7 | **283** | **29.5** | 285 | 29.3 |
| 453.povray | 141 | 37.6 | **141** | **37.6** | 142 | 37.4 | 125 | 42.4 | 123 | 43.2 | **125** | **42.4** |
| 454.calculix | 222 | 37.2 | 222 | 37.1 | **222** | **37.1** | 211 | 39.1 | 214 | 38.6 | **211** | **39.1** |
| 459.GemsFDTD | 58.1 | 183 | **58.6** | **181** | 59.6 | 178 | **47.7** | **223** | 46.4 | 229 | 48.4 | 219 |
| 465.tonto | 314 | 31.3 | 311 | 31.6 | **313** | **31.4** | **270** | **36.4** | 270 | 36.5 | 270 | 36.4 |
| 470.lbm | 14.3 | 958 | **14.3** | **960** | 14.2 | 965 | 14.3 | 958 | **14.3** | **960** | 14.2 | 965 |
| 481.wrf | 130 | 86.1 | **129** | **86.7** | 129 | 86.8 | 130 | 86.1 | **129** | **86.7** | 129 | 86.8 |
| 482.sphinx3 | 336 | 58.1 | **338** | **57.7** | 338 | 57.7 | 336 | 58.1 | **338** | **57.7** | 338 | 57.7 |

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:
  HP Power Profile set to Custom
  HP Power Regulator to HP Static High Performance Mode
  Minimum Processor Idle Power Core C-State set to C6 State
  Minimum Processor Idle Power Package C-State set to No Package State
  QPI Snoop Configuration set to Home Snoop
  Collaborative Power Control set to Disabled
```

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## Platform Notes (Continued)

```
      Thermal Configuration set to Maximum Cooling
      Processor Power and Utilization Monitoring set to Disabled
      Intel Hyperthreading set to Disabled

   Sysinfo program /home/intel_binary/cpu2006/config/sysinfo.rev6914
   $Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
   running on linux-vi0i Thu Aug 25 16:11:30 2016

   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 E7-4809 v4 @ 2.10GHz
         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 : 8
         siblings  : 8
         physical 0: cores 0 1 2 3 4 5 6 7
         physical 1: cores 0 1 2 3 4 5 6 7
         physical 2: cores 0 1 2 3 4 5 6 7
         physical 3: cores 0 1 2 3 4 5 6 7
      cache size : 20480 KB

   From /proc/meminfo
      MemTotal:       529322648 kB
      HugePages_Total:       0
      Hugepagesize:       2048 kB

   From /etc/*release* /etc/*version*
      SuSE-release:
         SUSE Linux Enterprise Server 12 (x86_64)
         VERSION = 12
         PATCHLEVEL = 1
         # This file is deprecated and will be removed in a future service pack or
         release.
         # Please check /etc/os-release for details about this release.
      os-release:
         NAME="SLES"
         VERSION="12-SP1"
         VERSION_ID="12.1"
         PRETTY_NAME="SUSE Linux Enterprise Server 12 SP1"
         ID="sles"
         ANSI_COLOR="0;32"
         CPE_NAME="cpe:/o:suse:sles:12:sp1"

   uname -a:
      Linux linux-vi0i 3.12.49-11-default #1 SMP Wed Nov 11 20:52:43 UTC 2015
      (8d714a0) x86_64 x86_64 x86_64 GNU/Linux
```

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## Platform Notes (Continued)

```
 run-level 3 Aug 25 11:54

 SPEC is set to: /home/intel_binary/cpu2006
    Filesystem     Type  Size  Used Avail Use% Mounted on
    /dev/nvme0n1p4 xfs   703G  147G  557G  21% /home
 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 05/16/2016
   Memory:
    64x UNKNOWN NOT AVAILABLE
    32x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2400 MHz, configured at 1333 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 2400 MHz, configured at 1333 MHz
```

## General Notes

```
Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
OMP_NUM_THREADS = "32"
LD_LIBRARY_PATH = "/home/intel_binary/cpu2006/libs/32:/home/intel_binary/cpu2006/libs/64:/home/intel_binary/cpu2006/sh"
 Binaries compiled on a system with 1x Intel Core i5-4670K CPU + 32GB
 memory using RedHat EL 7.1
```

# 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
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

Continued on next page

## 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:threadsafe(pass 1) -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -par-num-threads=1(pass 1) -prof-use(pass 2) -fno-alias -auto-ilp32

447.dealII: basepeak = yes

450.soplex: basepeak = yes

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

Fortran benchmarks:

410.bwaves: basepeak = yes

416.gamess: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1) -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -par-num-threads=1(pass 1) -prof-use(pass 2) -unroll2 -inline-level=0 -scalar-rep-

434.zeusmp: basepeak = yes

437.leslie3d: basepeak = yes

Continued on next page

## Peak Optimization Flags (Continued)

459.GemsFDTD: `-xCORE-AVX2`(pass 2) `-prof-gen:threadsafe`(pass 1) `-ipo`(pass 2) `-O3`(pass 2) `-no-prec-div`(pass 2) `-par-num-threads=1`(pass 1) `-prof-use`(pass 2) `-unroll2 -inline-level=0 -opt-prefetch -parallel`

465.tonto: `-xCORE-AVX2`(pass 2) `-prof-gen:threadsafe`(pass 1) `-ipo`(pass 2) `-O3`(pass 2) `-no-prec-div`(pass 2) `-par-num-threads=1`(pass 1) `-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-ic16.0-official-linux64.html`
`http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-HSW-revE.html`

You can also download the XML flags sources by saving the following links:
`http://www.spec.org/cpu2006/flags/Intel-ic16.0-official-linux64.xml`
`http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-HSW-revE.xml`


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Tested with SPEC CPU2006 v1.2.
Report generated on Wed Oct 19 10:29:14 2016 by SPEC CPU2006 PS/PDF formatter v6932.
Originally published on 18 October 2016.