# SPEC® CFP2006 Result

## Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL380 Gen9
(2.60 GHz, Intel Xeon E5-2697A v4)

$SPECfp^{®}2006 =$  122
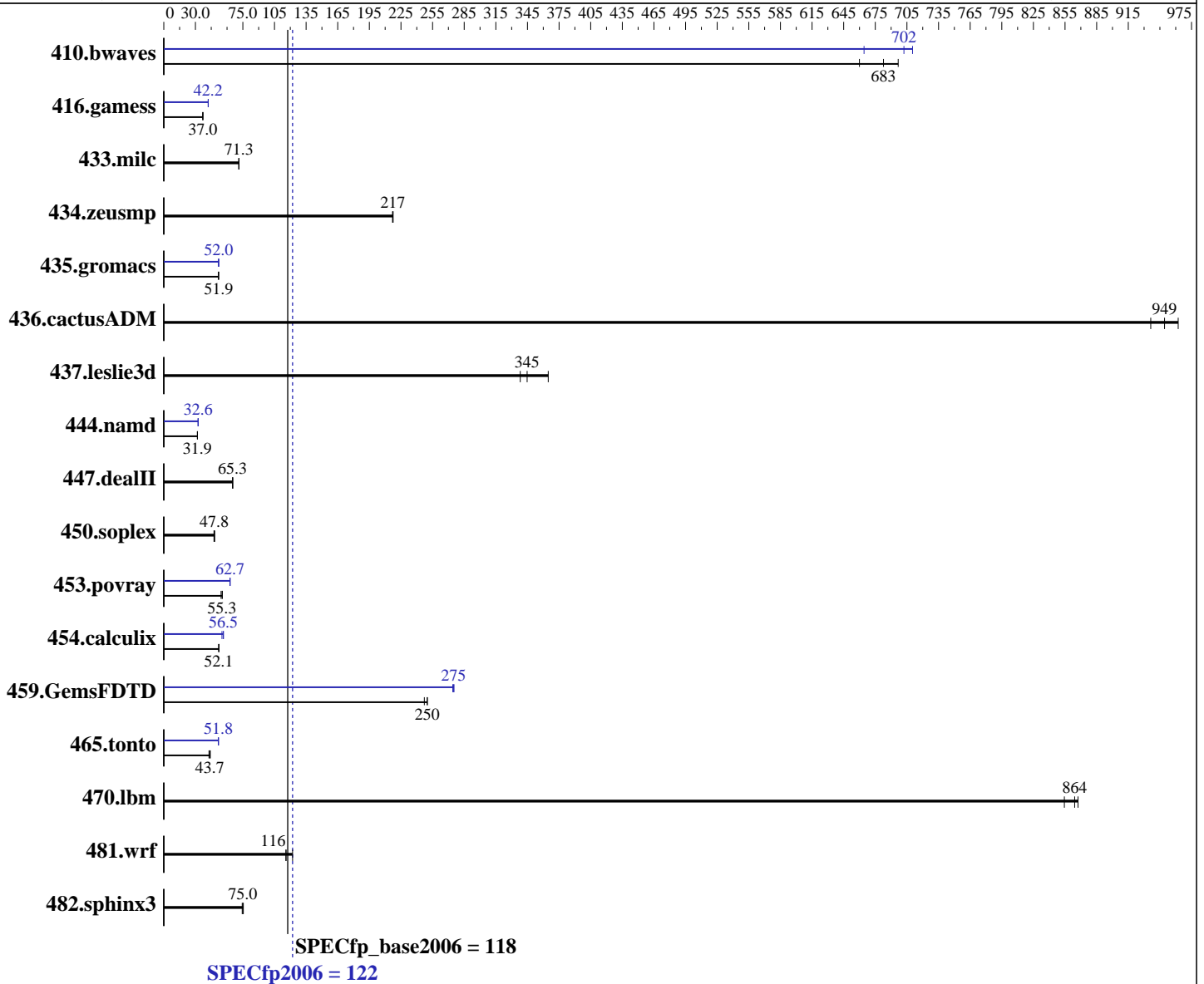
$SPECfp\_base2006 =$  118

| | | |
|---|---|---|
| **CPU2006 license:** 3 | **Test date:** | Jun-2016 |
| **Test sponsor:** HPE | **Hardware Availability:** | Mar-2016 |
| **Tested by:** HPE | **Software Availability:** | Nov-2015 |

0  30.0  75.0  105 135 165 195 225 255 285 315 345 375 405 435 465 495 525 555 585 615 645 675 705 735 765 795 825 855 885 915  975

- **410.bwaves** — 702 / 683
- **416.gamess** — 42.2 / 37.0
- **433.milc** — 71.3
- **434.zeusmp** — 217
- **435.gromacs** — 52.0 / 51.9
- **436.cactusADM** — 949
- **437.leslie3d** — 345
- **444.namd** — 32.6 / 31.9
- **447.dealII** — 65.3
- **450.soplex** — 47.8
- **453.povray** — 62.7 / 55.3
- **454.calculix** — 56.5 / 52.1
- **459.GemsFDTD** — 275 / 250
- **465.tonto** — 51.8 / 43.7
- **470.lbm** — 864
- **481.wrf** — 116
- **482.sphinx3** — 75.0

SPECfp_base2006 = 118
SPECfp2006 = 122

## Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon E5-2697A v4 |
| CPU Characteristics: | Intel Turbo Boost Technology up to 3.60 GHz |
| CPU MHz: | 2600 |
| FPU: | Integrated |
| CPU(s) enabled: | 32 cores, 2 chips, 16 cores/chip, 2 threads/core |
| CPU(s) orderable: | 1,2 chip |
| Primary Cache: | 32 KB I + 32 KB D on chip per core |
| Secondary Cache: | 256 KB I+D on chip per core |

## Software

| | |
|---|---|
| Operating System: | Red Hat Enterprise Linux Server release 7.2, (Maipo) Kernel 3.10.0-327.el7.x86_64 |
| Compiler: | C/C++: Version 16.0.0.101 of Intel C++ Studio XE for Linux; Fortran: Version 16.0.0.101 of Intel Fortran Studio XE for Linux |
| Auto Parallel: | Yes |
| File System: | xfs |

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| | | | |
|---|---|---|---|
| L3 Cache: | 40 MB I+D on chip per chip | System State: | Run level 3 (multi-user) |
| Other Cache: | None | Base Pointers: | 64-bit |
| Memory: | 512 GB (16 x 32 GB 2Rx4 PC4-2400T-R) | 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 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Seconds** | **Ratio** | **Seconds** | **Ratio** | **Seconds** | **Ratio** | **Seconds** | **Ratio** | **Seconds** | **Ratio** | **Seconds** | **Ratio** |
| 410.bwaves | 19.5 | 697 | 20.6 | 660 | **19.9** | **683** | 19.1 | 710 | 20.5 | 664 | **19.4** | **702** |
| 416.gamess | 529 | 37.0 | **529** | **37.0** | 528 | 37.1 | 464 | 42.2 | **464** | **42.2** | 465 | 42.1 |
| 433.milc | 129 | 71.3 | 129 | 71.2 | **129** | **71.3** | 129 | 71.3 | 129 | 71.2 | **129** | **71.3** |
| 434.zeusmp | 41.9 | 217 | **41.9** | **217** | 41.8 | 218 | 41.9 | 217 | **41.9** | **217** | 41.8 | 218 |
| 435.gromacs | 137 | 52.0 | 138 | 51.9 | **137** | **51.9** | 137 | 52.1 | 137 | 52.0 | **137** | **52.0** |
| 436.cactusADM | 12.4 | 962 | **12.6** | **949** | 12.8 | 936 | 12.4 | 962 | **12.6** | **949** | 12.8 | 936 |
| 437.leslie3d | 25.8 | 365 | **27.3** | **345** | 27.8 | 338 | 25.8 | 365 | **27.3** | **345** | 27.8 | 338 |
| 444.namd | **251** | **31.9** | 251 | 31.9 | 252 | 31.9 | 246 | 32.6 | **246** | **32.6** | 246 | 32.6 |
| 447.dealII | 175 | 65.3 | **175** | **65.3** | 175 | 65.4 | 175 | 65.3 | **175** | **65.3** | 175 | 65.4 |
| 450.soplex | 175 | 47.6 | 173 | 48.3 | **174** | **47.8** | 175 | 47.6 | 173 | 48.3 | **174** | **47.8** |
| 453.povray | 95.7 | 55.6 | **96.2** | **55.3** | 97.9 | 54.3 | 84.8 | 62.7 | **84.8** | **62.7** | 84.4 | 63.0 |
| 454.calculix | 158 | 52.3 | **158** | **52.1** | 158 | 52.1 | 146 | 56.5 | **146** | **56.5** | 150 | 55.2 |
| 459.GemsFDTD | 42.4 | 250 | 42.9 | 247 | **42.4** | **250** | 38.7 | 274 | **38.6** | **275** | 38.5 | 275 |
| 465.tonto | 223 | 44.1 | 230 | 42.8 | **225** | **43.7** | 190 | 51.8 | **190** | **51.8** | 190 | 51.9 |
| 470.lbm | 16.1 | 854 | **15.9** | **864** | 15.8 | 867 | 16.1 | 854 | **15.9** | **864** | 15.8 | 867 |
| 481.wrf | **96.3** | **116** | 96.4 | 116 | 91.4 | 122 | **96.3** | **116** | 96.4 | 116 | 91.4 | 122 |
| 482.sphinx3 | **260** | **75.0** | 262 | 74.4 | 258 | 75.4 | **260** | **75.0** | 262 | 74.4 | 258 | 75.4 |

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 C1E 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
  Thermal Configuration set to Maximum Cooling
```
Continued on next page

# SPEC CFP2006 Result

## Hewlett Packard Enterprise
(Test Sponsor: HPE)

**SPECfp2006 =** 122

### ProLiant DL380 Gen9
(2.60 GHz, Intel Xeon E5-2697A v4)

**SPECfp_base2006 =** 118

| | | | |
|---|---|---|---|
| **CPU2006 license:** 3 | | **Test date:** | Jun-2016 |
| **Test sponsor:** HPE | | **Hardware Availability:** | Mar-2016 |
| **Tested by:** HPE | | **Software Availability:** | Nov-2015 |

## Platform Notes (Continued)

```
   Processor Power and Utilization Monitoring set to Disabled
   Memory Refresh Rate set to 1x Refresh

 Sysinfo program /home/cpu2006/config/sysinfo.rev6914
 $Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
 running on DL380Gen9-Biswa Sun Jun  5 23:20:40 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 E5-2697A v4 @ 2.60GHz
       2 "physical id"s (chips)
       64 "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 : 16
       siblings  : 32
       physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
       physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
    cache size : 40960 KB

 From /proc/meminfo
    MemTotal:       528062728 kB
    HugePages_Total:       0
    Hugepagesize:       2048 kB

 From /etc/*release* /etc/*version*
    os-release:
       NAME="Red Hat Enterprise Linux Server"
       VERSION="7.2 (Maipo)"
       ID="rhel"
       ID_LIKE="fedora"
       VERSION_ID="7.2"
       PRETTY_NAME="Red Hat Enterprise Linux Server 7.2 (Maipo)"
       ANSI_COLOR="0;31"
       CPE_NAME="cpe:/o:redhat:enterprise_linux:7.2:GA:server"
    redhat-release: Red Hat Enterprise Linux Server release 7.2 (Maipo)
    system-release: Red Hat Enterprise Linux Server release 7.2 (Maipo)
    system-release-cpe: cpe:/o:redhat:enterprise_linux:7.2:ga:server

 uname -a:
    Linux DL380Gen9-Biswa 3.10.0-327.el7.x86_64 #1 SMP Thu Oct 29 17:29:29 EDT
    2015 x86_64 x86_64 x86_64 GNU/Linux

 run-level 3 Jun 5 23:18

 SPEC is set to: /home/cpu2006
    Filesystem      Type  Size  Used Avail Use% Mounted on
    /dev/sda5       xfs   318G  135G  184G  43% /home
```

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## Platform Notes (Continued)

```
  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 P89 04/12/2016
    Memory:
     8x UNKNOWN NOT AVAILABLE
     16x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2400 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:
  16x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2400 MHz
```

## General Notes

```
  Environment variables set by runspec before the start of the run:
  KMP_AFFINITY = "granularity=fine,compact,1,0"
  OMP_NUM_THREADS = "32"
  LD_LIBRARY_PATH = "/home/cpu2006/libs/32:/home/cpu2006/libs/64:/home/cpu2006/sh"

   Binaries compiled on a system with 1x Intel Xeon E5-2660 v4 CPU + 128GB
   memory using RedHat EL 7.2
```

## 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
```

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$SPECfp2006 = $ 122

$SPECfp\_base2006 = $ 118

## Base Portability Flags (Continued)

```
  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 -static -parallel -opt-prefetch
-ansi-alias -qopt-prefetch-issue-excl-hint
```

C++ benchmarks:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -static -opt-prefetch -ansi-alias
```

Fortran benchmarks:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -static -parallel -opt-prefetch
-fp-model fast=2
-qopt-prefetch-issue-excl-hint
```

Benchmarks using both Fortran and C:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -static -parallel -opt-prefetch
-ansi-alias -qopt-prefetch-issue-excl-hint
-fp-model fast=2
```

## Peak Compiler Invocation

C benchmarks:

```
icc   -m64
```

C++ benchmarks:

```
icpc  -m64
```

Fortran benchmarks:

```
ifort -m64
```

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|---|---|---|
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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: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: -xCORE-AVX2 -ipo -O3 -no-prec-div -static -parallel
> -opt-prefetch
> -fp-model fast=2
> -qopt-prefetch-issue-excl-hint -funroll-all-loops

> 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-

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# Peak Optimization Flags (Continued)

434.zeusmp: basepeak = yes

437.leslie3d: basepeak = yes

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: -xCORE-AVX2 -ipo -O3 -no-prec-div -static -parallel
-opt-prefetch -ansi-alias
-fp-model fast=2                                                                      -nofor-main
-qopt-prefetch-issue-excl-hint -funroll-all-loops
-auto-ilp32

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/HP-Compiler-Flags-Intel-V1.2-HSW-revF.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/HP-Compiler-Flags-Intel-V1.2-HSW-revF.xml
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-HSW-revE.xml

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

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