SPEC® CFP2006 Result
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Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL20 Gen9
(3.90 GHz, Intel Xeon E3-1280 v6)

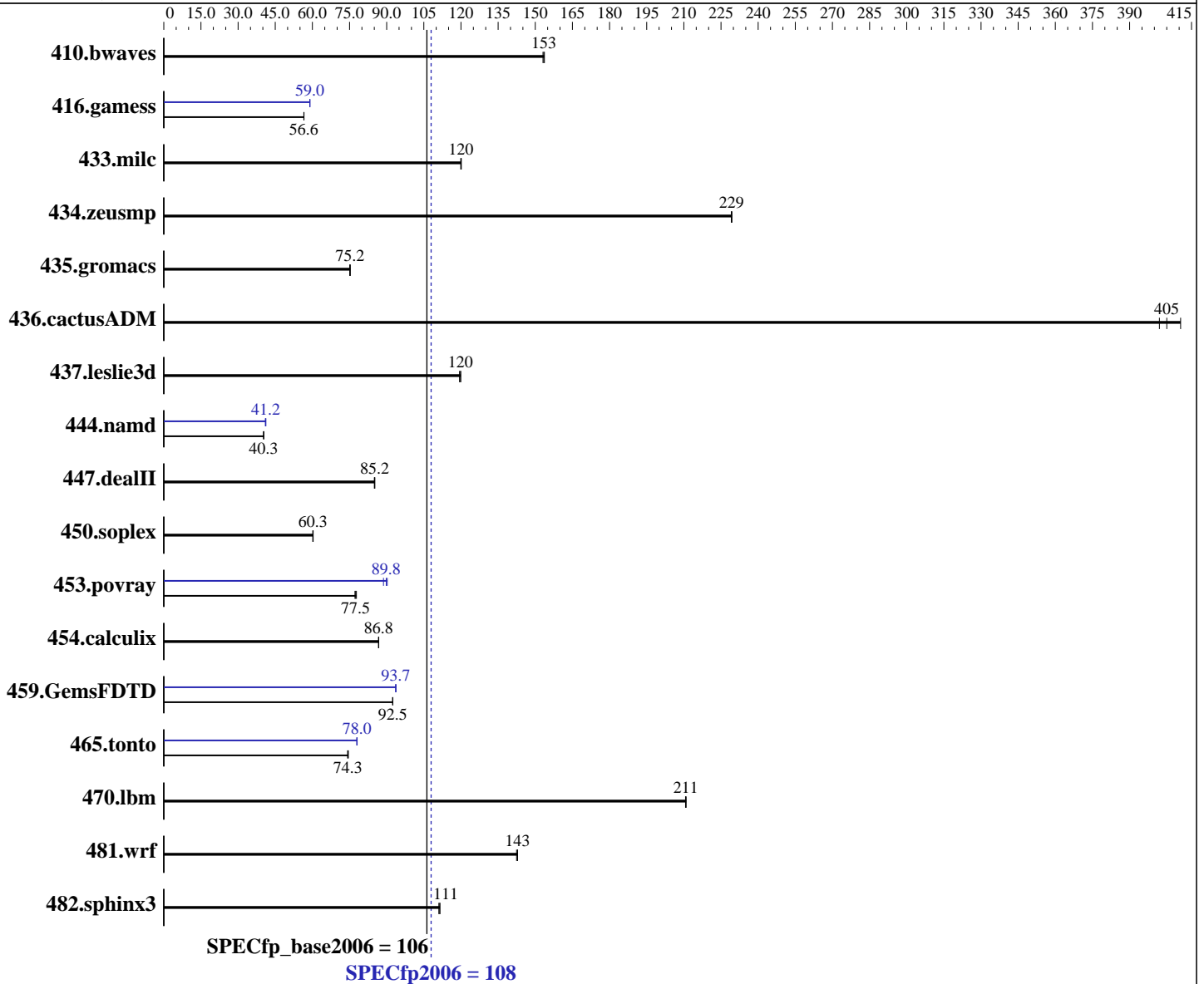$SPECfp^{®}2006 =$ 108

$SPECfp\_base2006 =$ 106

CPU2006 license: 3	**Test date:** Mar-2017
Test sponsor: HPE	**Hardware Availability:** May-2017
Tested by: HPE	**Software Availability:** Nov-2016

Benchmark results chart:

- **410.bwaves** — 153
- **416.gamess** — 59.0 / 56.6
- **433.milc** — 120
- **434.zeusmp** — 229
- **435.gromacs** — 75.2
- **436.cactusADM** — 405
- **437.leslie3d** — 120
- **444.namd** — 41.2 / 40.3
- **447.dealII** — 85.2
- **450.soplex** — 60.3
- **453.povray** — 89.8 / 77.5
- **454.calculix** — 86.8
- **459.GemsFDTD** — 93.7 / 92.5
- **465.tonto** — 78.0 / 74.3
- **470.lbm** — 211
- **481.wrf** — 143
- **482.sphinx3** — 111

SPECfp_base2006 = 106
SPECfp2006 = 108

Hardware

CPU Name:	Intel Xeon E3-1280 v6
CPU Characteristics:	Intel Turbo Boost Technology up to 4.20 GHz
CPU MHz:	3900
FPU:	Integrated
CPU(s) enabled:	4 cores, 1 chip, 4 cores/chip
CPU(s) orderable:	1 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:	SUSE Linux Enterprise Server 12 (x86_64) SP2 Kernel 4.4.21-69-default
Compiler:	C/C++: Version 17.0.0.098 of Intel C/C++ Compiler for Linux; Fortran: Version 17.0.0.098 of Intel Fortran Compiler for Linux
Auto Parallel:	Yes
File System:	xfs
System State:	Run level 3 (multi-user)

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L3 Cache:	8 MB I+D on chip per chip	Base Pointers:	64-bit
Other Cache:	None	Peak Pointers:	32/64-bit
Memory:	64 GB (4 x 16 GB 2Rx8 PC4-2400T-E)	Other Software:	None
Disk Subsystem:	1 x 500 GB SATA 7.2 K RPM, RAID 0		
Other Hardware:	None		

Results Table

Benchmark	Base						Peak					
	Seconds	**Ratio**	**Seconds**	**Ratio**	**Seconds**	**Ratio**	**Seconds**	**Ratio**	**Seconds**	**Ratio**	**Seconds**	**Ratio**
410.bwaves	**88.6**	**153**	88.4	154	88.8	153	**88.6**	**153**	88.4	154	88.8	153
416.gamess	346	56.6	**346**	**56.6**	346	56.6	332	58.9	332	59.0	**332**	**59.0**
433.milc	**76.5**	**120**	76.6	120	76.4	120	**76.5**	**120**	76.6	120	76.4	120
434.zeusmp	**39.7**	**229**	39.7	229	39.7	229	**39.7**	**229**	39.7	229	39.7	229
435.gromacs	94.9	75.3	**94.9**	**75.2**	95.1	75.1	94.9	75.3	**94.9**	**75.2**	95.1	75.1
436.cactusADM	29.1	411	**29.5**	**405**	29.7	402	29.1	411	**29.5**	**405**	29.7	402
437.leslie3d	**78.5**	**120**	78.4	120	78.7	119	**78.5**	**120**	78.4	120	78.7	119
444.namd	**199**	**40.3**	199	40.3	199	40.3	195	41.2	196	41.0	**195**	**41.2**
447.dealII	134	85.2	135	85.0	**134**	**85.2**	134	85.2	135	85.0	**134**	**85.2**
450.soplex	138	60.3	**138**	**60.3**	139	60.2	138	60.3	**138**	**60.3**	139	60.2
453.povray	**68.7**	**77.5**	68.4	77.8	68.9	77.2	58.9	90.2	60.0	88.7	**59.2**	**89.8**
454.calculix	**95.1**	**86.8**	95.0	86.8	95.2	86.7	**95.1**	**86.8**	95.0	86.8	95.2	86.7
459.GemsFDTD	115	92.5	115	92.4	**115**	**92.5**	**113**	**93.7**	113	93.6	113	93.7
465.tonto	**132**	**74.3**	133	74.3	132	74.5	**126**	**78.0**	126	78.1	126	77.9
470.lbm	65.1	211	65.2	211	**65.2**	**211**	65.1	211	65.2	211	**65.2**	**211**
481.wrf	78.2	143	**78.2**	**143**	78.4	142	78.2	143	**78.2**	**143**	78.4	142
482.sphinx3	**175**	**111**	175	111	175	111	**175**	**111**	175	111	175	111

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 by default.
```

Platform Notes

```
BIOS Configuration:
 Power Profile set to Custom
 Minimum Processor Idle Power Core C-State set to C3 State
 Minimum Processor Idle Power Package C-State set to Package C6 (retention) State
 Energy/Performance Bias set to Maximum Performance
 Thermal Configuration set to Maximum Cooling
 Processor Power and Utilization Monitoring set to Disabled
 Memory Double Refresh Rate set to 1x Refresh
 NUMA Group Size Optimization set to Flat
```

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Test date: Mar-2017
Hardware Availability: May-2017
Software Availability: Nov-2016

Platform Notes (Continued)

```
   Intel HyperThreading set to Disabled

   Sysinfo program /home/cpu2006/config/sysinfo.rev6993
   Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
   running on dl120-g9 Thu Mar 30 15:06:46 2017

   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 E3-1280 v6 @ 3.90GHz
         1 "physical id"s (chips)
         4 "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  : 4
         physical 0: cores 0 1 2 3
      cache size : 8192 KB

   From /proc/meminfo
      MemTotal:       65753568 kB
      HugePages_Total:       0
      Hugepagesize:       2048 kB

   /usr/bin/lsb_release -d
      SUSE Linux Enterprise Server 12 SP2

   From /etc/*release* /etc/*version*
      SuSE-release:
         SUSE Linux Enterprise Server 12 (x86_64)
         VERSION = 12
         PATCHLEVEL = 2
         # 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-SP2"
         VERSION_ID="12.2"
         PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
         ID="sles"
         ANSI_COLOR="0;32"
         CPE_NAME="cpe:/o:suse:sles:12:sp2"

   uname -a:
      Linux dl120-g9 4.4.21-69-default #1 SMP Tue Oct 25 10:58:20 UTC 2016
      (9464f67) x86_64 x86_64 x86_64 GNU/Linux

   run-level 3 Mar 30 11:14
```

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Platform Notes (Continued)

```
   SPEC is set to: /home/cpu2006
     Filesystem      Type  Size  Used Avail Use% Mounted on
     /dev/sda4       xfs   424G  7.5G  416G   2% /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 U22 01/17/2017
     Memory:
      4x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2400 MHz

   (End of data from sysinfo program)
```

General Notes

```
Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,compact,1,0"
LD_LIBRARY_PATH = "/home/cpu2006/libs/32:/home/cpu2006/libs/64:/home/cpu2006/sh10.2"
OMP_NUM_THREADS = "4"

 Binaries compiled on a system with 1x Intel Core i7-4790K CPU + 32GB RAM
 memory using Redhat Enterprise Linux 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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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 -parallel -qopt-prefetch
```

C++ benchmarks:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
```

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

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

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: `basepeak = yes`

        470.lbm: `basepeak = yes`

    482.sphinx3: `basepeak = yes`

C++ benchmarks:

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

    447.dealII: `basepeak = yes`

    450.soplex: `basepeak = yes`

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

Fortran benchmarks:

    410.bwaves: `basepeak = yes`

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

    434.zeusmp: `basepeak = yes`

    437.leslie3d: `basepeak = yes`

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

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

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Peak Optimization Flags (Continued)

Benchmarks using both Fortran and C:

435.gromacs: basepeak = yes

436.cactusADM: basepeak = yes

454.calculix: basepeak = yes

481.wrf: basepeak = yes

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/HPE-Platform-Flags-Intel-V1.2-HSW-revG.html
http://www.spec.org/cpu2006/flags/Intel-ic17.0-official-linux64-revD.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/HPE-Platform-Flags-Intel-V1.2-HSW-revG.xml
http://www.spec.org/cpu2006/flags/Intel-ic17.0-official-linux64-revD.xml

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