



# SPEC® CFP2006 Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL580 Gen9

(2.10 GHz, Intel Xeon E7-8870 v4)

SPECfp®2006 = 123

SPECfp\_base2006 = 117

CPU2006 license: 3

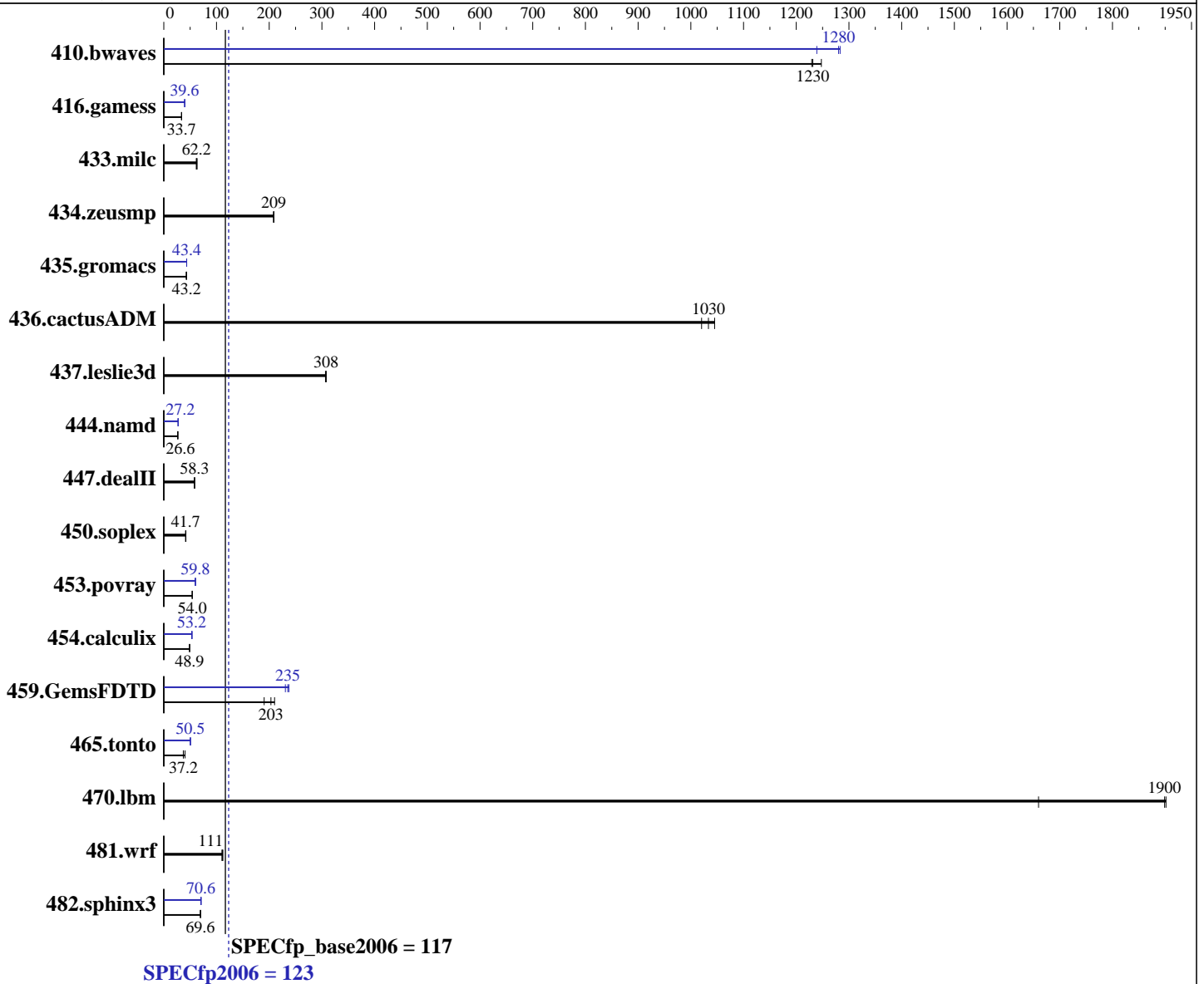
Test sponsor: HPE

Tested by: HPE

Test date: Jun-2016

Hardware Availability: Jun-2016

Software Availability: Dec-2015



## Hardware

CPU Name: Intel Xeon E7-8870 v4  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.00 GHz  
 CPU MHz: 2100  
 FPU: Integrated  
 CPU(s) enabled: 80 cores, 4 chips, 20 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;  
 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: 50 MB I+D on chip per chip  
Other Cache: None  
Memory: 512 GB (32 x 16 GB 2Rx4 PC4-2400T-R, running at 1600 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	10.9	1250	<b><u>11.0</u></b>	<b><u>1230</u></b>	11.1	1230	10.6	1280	11.0	1240	<b><u>10.6</u></b>	<b><u>1280</u></b>
416.gamess	582	33.6	579	33.8	<b><u>582</u></b>	<b><u>33.7</u></b>	495	39.6	<b><u>494</u></b>	<b><u>39.6</u></b>	492	39.8
433.milc	145	63.2	<b><u>148</u></b>	<b><u>62.2</u></b>	149	61.7	145	63.2	<b><u>148</u></b>	<b><u>62.2</u></b>	149	61.7
434.zeusmp	<b><u>43.6</u></b>	<b><u>209</u></b>	43.5	209	43.7	208	<b><u>43.6</u></b>	<b><u>209</u></b>	43.5	209	43.7	208
435.gromacs	<b><u>165</u></b>	<b><u>43.2</u></b>	169	42.4	165	43.4	165	43.4	164	43.4	<b><u>164</u></b>	<b><u>43.4</u></b>
436.cactusADM	<b><u>11.6</u></b>	<b><u>1030</u></b>	11.7	1020	11.4	1050	<b><u>11.6</u></b>	<b><u>1030</u></b>	11.7	1020	11.4	1050
437.leslie3d	30.6	307	<b><u>30.5</u></b>	<b><u>308</u></b>	30.5	308	30.6	307	<b><u>30.5</u></b>	<b><u>308</u></b>	30.5	308
444.namd	301	26.6	<b><u>302</u></b>	<b><u>26.6</u></b>	302	26.5	295	27.2	<b><u>295</u></b>	<b><u>27.2</u></b>	295	27.1
447.dealII	195	58.6	<b><u>196</u></b>	<b><u>58.3</u></b>	197	58.1	195	58.6	<b><u>196</u></b>	<b><u>58.3</u></b>	197	58.1
450.soplex	199	41.9	<b><u>200</u></b>	<b><u>41.7</u></b>	202	41.3	199	41.9	<b><u>200</u></b>	<b><u>41.7</u></b>	202	41.3
453.povray	98.7	53.9	98.4	54.0	<b><u>98.6</u></b>	<b><u>54.0</u></b>	89.1	59.7	<b><u>88.9</u></b>	<b><u>59.8</u></b>	88.2	60.3
454.calculix	169	48.9	169	48.9	<b><u>169</u></b>	<b><u>48.9</u></b>	154	53.7	155	53.1	<b><u>155</u></b>	<b><u>53.2</u></b>
459.GemsFDTD	50.5	210	55.7	190	<b><u>52.2</u></b>	<b><u>203</u></b>	46.0	231	<b><u>45.1</u></b>	<b><u>235</u></b>	44.7	237
465.tonto	243	40.4	266	37.0	<b><u>264</u></b>	<b><u>37.2</u></b>	<b><u>195</u></b>	<b><u>50.5</u></b>	194	50.6	195	50.4
470.lbm	7.23	1900	<b><u>7.24</u></b>	<b><u>1900</u></b>	8.28	1660	7.23	1900	<b><u>7.24</u></b>	<b><u>1900</u></b>	8.28	1660
481.wrf	99.7	112	101	110	<b><u>100</u></b>	<b><u>111</u></b>	99.7	112	101	110	<b><u>100</u></b>	<b><u>111</u></b>
482.sphinx3	279	69.9	281	69.3	<b><u>280</u></b>	<b><u>69.6</u></b>	<b><u>276</u></b>	<b><u>70.6</u></b>	276	70.5	275	70.8

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/experiment/fp/new/cpu2006/config/sysinfo.rev6914  
\$Rev: 6914 \$ \$Date:: 2014-06-25 # \$ e3fbb8667b5a285932ceab81e28219e1  
running on linux-vi0i Thu Jun 16 10:02:35 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 E7-8870 v4 @ 2.10GHz
 4 "physical id"s (chips)
 80 "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     : 20
  siblings      : 20
  physical 0:   cores 0 2 3 4 9 10 11 12 16 17 18 19 20 24 25 26 27 28
  physical 1:   cores 0 2 3 4 9 10 11 12 16 17 18 19 20 24 25 26 27 28
  physical 2:   cores 0 2 3 4 9 10 11 12 16 17 18 19 20 24 25 26 27 28
  physical 3:   cores 0 2 3 4 9 10 11 12 16 17 18 19 20 24 25 26 27 28
cache size      : 51200 KB
```

From /proc/meminfo

```
MemTotal:      529316632 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 Jun 16 09:54

SPEC is set to: /home/experiment/fp/new/cpu2006

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/nvme0n1p4	xfs	703G	313G	391G	45%	/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 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 2400 MHz, configured at 1600 MHz

## General Notes

Environment variables set by runspec before the start of the run:

KMP\_AFFINITY = "granularity=fine,compact"

OMP\_NUM\_THREADS = "80"

LD\_LIBRARY\_PATH = "/home/experiment/fp/new/cpu2006/libs/32:/home/experiment/fp/new/cpu2006/libs/64:/home/experiment/fp/new/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



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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.deallI: -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 -auto-ilp32

```

C++ benchmarks:

```

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

```

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 -auto-ilp32
-fp-model fast=2

```

## Peak Compiler Invocation

C benchmarks:

```
icc -m64
```

C++ benchmarks:

```
icpc -m64
```

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## Peak Compiler Invocation (Continued)

Fortran benchmarks:

ifort -m64

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

-nofor-main

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

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## Peak Optimization Flags (Continued)

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

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-alloc  
-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  
-qopt-prefetch-issue-excl-hint -funroll-all-loops  
-auto-ilp32

-nofor-main

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>



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For other inquiries, please contact [webmaster@spec.org](mailto:webmaster@spec.org).

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