



# SPEC<sup>®</sup> CFP2006 Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL380 Gen9  
(2.40 GHz, Intel Xeon E5-2699A v4)

SPECfp<sup>®</sup>2006 = 127

SPECfp\_base2006 = 120

CPU2006 license: 3

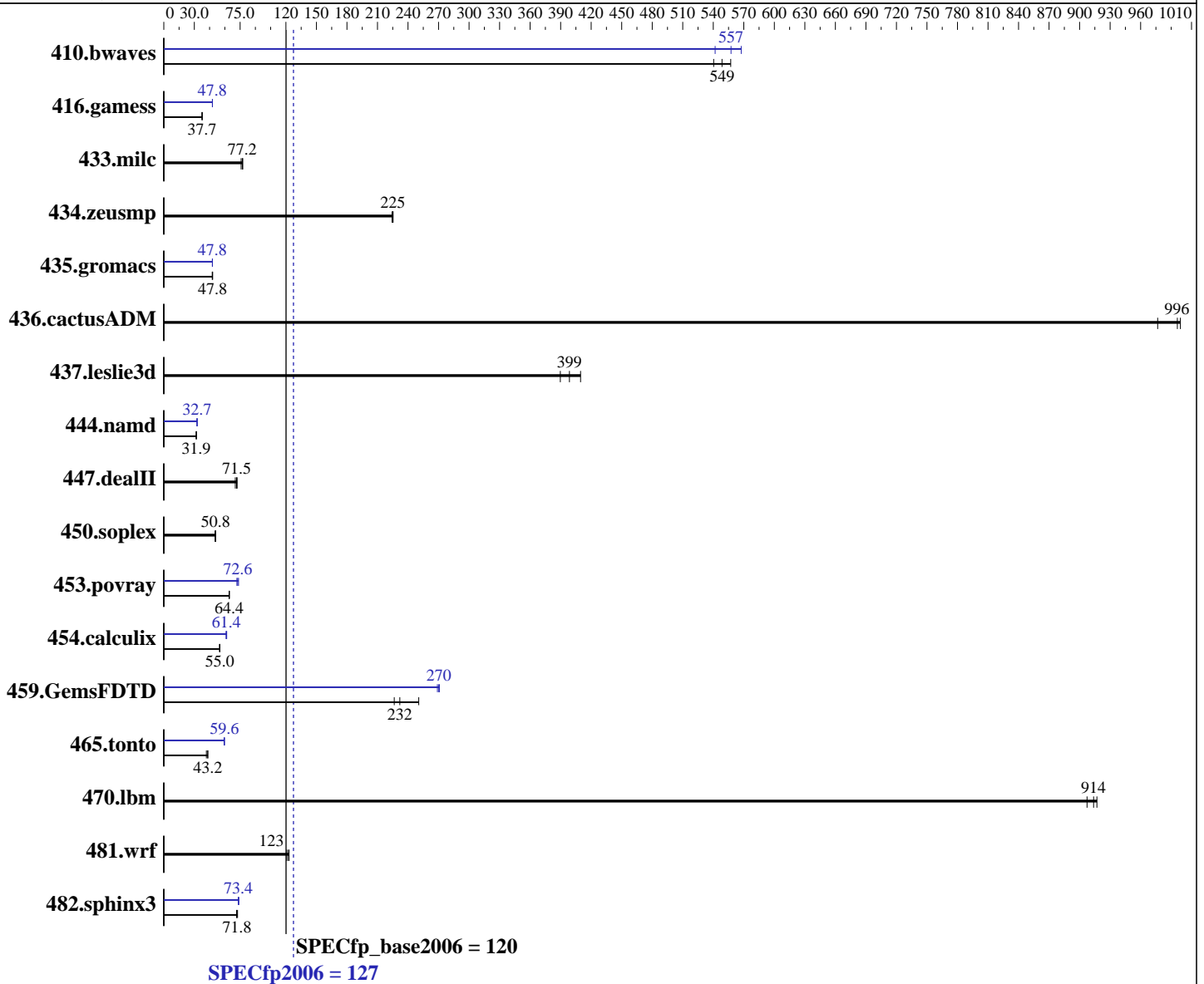
Test sponsor: HPE

Tested by: HPE

Test date: Oct-2016

Hardware Availability: Oct-2016

Software Availability: Dec-2015



## Hardware

CPU Name: Intel Xeon E5-2699A v4  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.60 GHz  
 CPU MHz: 2400  
 FPU: Integrated  
 CPU(s) enabled: 44 cores, 2 chips, 22 cores/chip  
 CPU(s) orderable: 1,2 chips  
 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: 55 MB I+D on chip per chip  
Other Cache: None  
Memory: 512 GB (16 x 32 GB 2Rx4 PC4-2400T-R)  
Disk Subsystem: 1 x 400 GB SAS SSD, RAID 0  
Other Hardware: None

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	<b><u>24.8</u></b>	<b><u>549</u></b>	24.4	557	25.1	540	23.9	567	<b><u>24.4</u></b>	<b><u>557</u></b>	25.1	542
416.gamess	519	37.7	521	37.6	<b><u>520</u></b>	<b><u>37.7</u></b>	<b><u>410</u></b>	<b><u>47.8</u></b>	410	47.8	410	47.8
433.milc	118	77.6	121	76.0	<b><u>119</u></b>	<b><u>77.2</u></b>	118	77.6	121	76.0	<b><u>119</u></b>	<b><u>77.2</u></b>
434.zeusmp	40.6	224	40.4	225	<b><u>40.4</u></b>	<b><u>225</u></b>	40.6	224	40.4	225	<b><u>40.4</u></b>	<b><u>225</u></b>
435.gromacs	150	47.6	149	48.0	<b><u>149</u></b>	<b><u>47.8</u></b>	150	47.8	<b><u>149</u></b>	<b><u>47.8</u></b>	149	47.8
436.cactusADM	12.0	999	<b><u>12.0</u></b>	<b><u>996</u></b>	12.2	977	12.0	999	<b><u>12.0</u></b>	<b><u>996</u></b>	12.2	977
437.leslie3d	23.0	410	<b><u>23.6</u></b>	<b><u>399</u></b>	24.1	390	23.0	410	<b><u>23.6</u></b>	<b><u>399</u></b>	24.1	390
444.namd	251	32.0	<b><u>251</u></b>	<b><u>31.9</u></b>	251	31.9	245	32.7	<b><u>245</u></b>	<b><u>32.7</u></b>	245	32.7
447.dealII	<b><u>160</u></b>	<b><u>71.5</u></b>	163	70.3	159	72.1	<b><u>160</u></b>	<b><u>71.5</u></b>	163	70.3	159	72.1
450.soplex	165	50.4	<b><u>164</u></b>	<b><u>50.8</u></b>	164	50.9	165	50.4	<b><u>164</u></b>	<b><u>50.8</u></b>	164	50.9
453.povray	82.9	64.2	82.6	64.4	<b><u>82.7</u></b>	<b><u>64.4</u></b>	74.1	71.8	72.4	73.5	<b><u>73.3</u></b>	<b><u>72.6</u></b>
454.calculix	150	55.1	151	54.8	<b><u>150</u></b>	<b><u>55.0</u></b>	<b><u>134</u></b>	<b><u>61.4</u></b>	133	61.8	135	61.2
459.GemsFDTD	42.3	251	<b><u>45.7</u></b>	<b><u>232</u></b>	46.8	226	<b><u>39.3</u></b>	<b><u>270</u></b>	39.2	271	39.5	269
465.tonto	227	43.3	235	41.8	<b><u>228</u></b>	<b><u>43.2</u></b>	165	59.6	166	59.3	<b><u>165</u></b>	<b><u>59.6</u></b>
470.lbm	15.0	917	<b><u>15.0</u></b>	<b><u>914</u></b>	15.1	907	15.0	917	<b><u>15.0</u></b>	<b><u>914</u></b>	15.1	907
481.wrf	92.3	121	<b><u>91.1</u></b>	<b><u>123</u></b>	90.8	123	92.3	121	<b><u>91.1</u></b>	<b><u>123</u></b>	90.8	123
482.sphinx3	272	71.5	269	72.5	<b><u>271</u></b>	<b><u>71.8</u></b>	<b><u>266</u></b>	<b><u>73.4</u></b>	264	73.7	266	73.2

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 Hyperthreading Option set to Disabled  
Power Profile set to Balanced Power and Performance  
Collaborative Power Control set to Disabled  
QPI Snoop Configuration set to Home Snoop  
Thermal Configuration set to Maximum Cooling  
Processor Power and Utilization Monitoring set to Disabled  
Memory Double Refresh Rate set to 1x Refresh

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Tested by: HPE

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Hardware Availability: Oct-2016

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## Platform Notes (Continued)

Sysinfo program /home/HP\_recompiled\_binaries/cpu2006/config/sysinfo.rev6914  
\$Rev: 6914 \$ \$Date:: 2014-06-25 #\$ e3fbb8667b5a285932ceab81e28219e1  
running on dl380-gen9-2699a Thu Oct 13 09:22:47 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 E5-2699A v4 @ 2.40GHz
 2 "physical id"s (chips)
 44 "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 : 22
siblings   : 22
physical 0: cores 0 2 3 4 8 10 11 12 16 17 18 19 20 21 24 25 26 27 28
physical 1: cores 0 2 3 4 8 10 11 12 16 17 18 19 20 21 24 25 26 27 28
cache size : 56320 KB
```

From /proc/meminfo

```
MemTotal:      528960968 kB
HugePages_Total:      0
Hugepagesize:    2048 kB
```

/usr/bin/lsb\_release -d

```
SUSE Linux Enterprise Server 12 SP1
```

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 dl380-gen9-2699a 3.12.49-11-default #1 SMP Wed Nov 11 20:52:43 UTC 2015
(8d714a0) x86_64 x86_64 x86_64 GNU/Linux
```

run-level 3 Oct 13 09:14

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## Platform Notes (Continued)

SPEC is set to: /home/HP\_recompiled\_binaries/cpu2006  
Filesystem Type Size Used Avail Use% Mounted on  
/dev/sda4 xfs 331G 93G 238G 29% /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 P89 09/12/2016

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"

OMP\_NUM\_THREADS = "44"

Binaries compiled on a system with 1x Intel Xeon E5 2660 v4 CPU + 128GB RAM  
memory using Redhat Enterprise Linux 7.2

LD\_LIBRARY\_PATH = "/home/HP\_recompiled\_binaries/cpu2006/libs/32:/home/HP\_recompiled\_binaries/cpu2006/libs/64:/home/HP\_recompiled\_binaries/cpu2006/sh"

## 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

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## Base Portability Flags (Continued)

```

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 -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.dealIII: 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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