



# SPEC<sup>®</sup> CFP2006 Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL380 Gen10  
(2.20 GHz, Intel Xeon Gold 5120)

SPECfp<sup>®</sup>\_rate2006 = 1080

SPECfp\_rate\_base2006 = 1060

CPU2006 license: 3

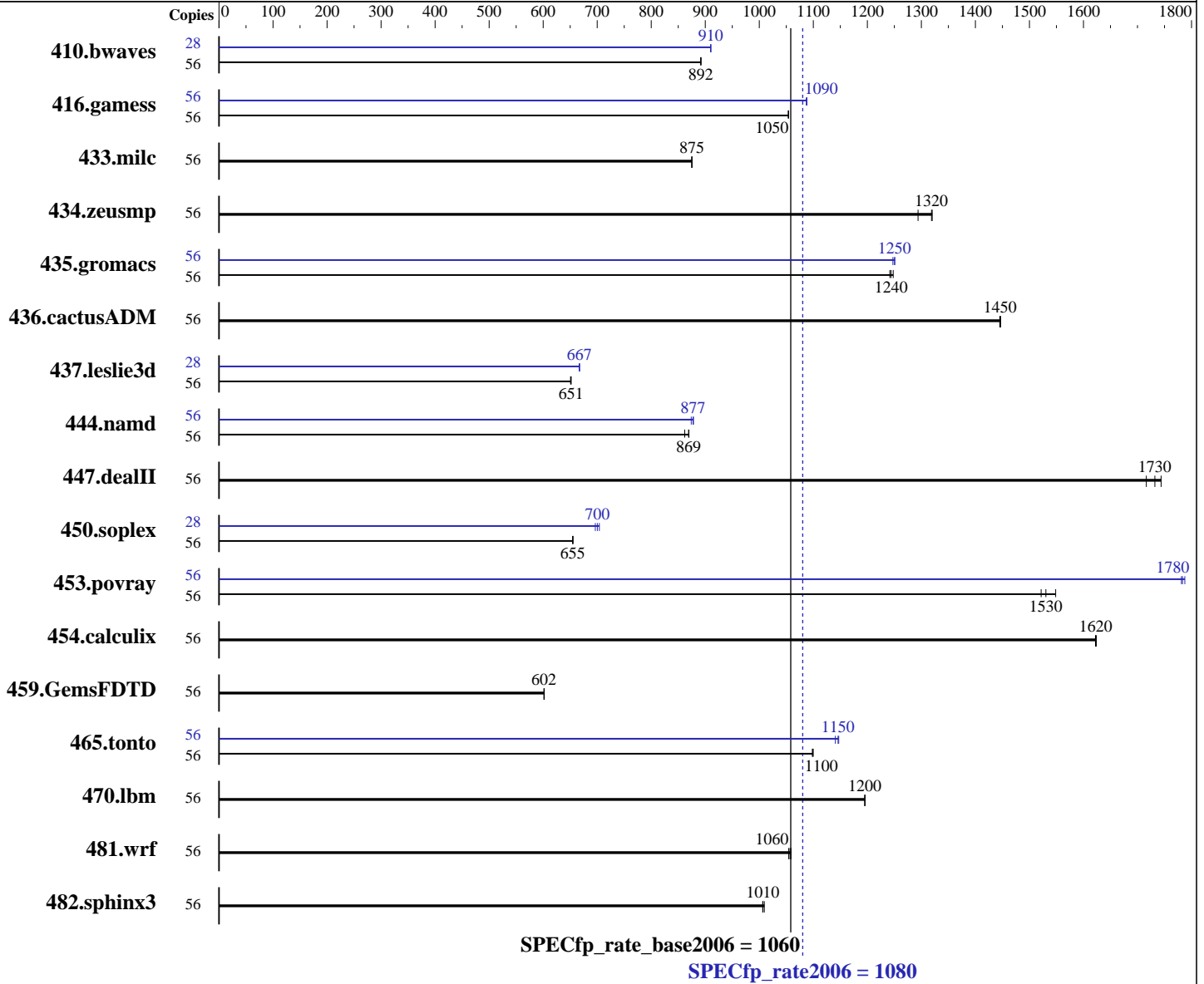
Test sponsor: HPE

Tested by: HPE

Test date: Oct-2017

Hardware Availability: Oct-2017

Software Availability: Apr-2017



## Hardware

CPU Name: Intel Xeon Gold 5120  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.20 GHz  
 CPU MHz: 2200  
 FPU: Integrated  
 CPU(s) enabled: 28 cores, 2 chips, 14 cores/chip, 2 threads/core  
 CPU(s) orderable: 1, 2 chip(s)  
 Primary Cache: 32 KB I + 32 KB D on chip per core  
 Secondary Cache: 1 MB I+D on chip per core

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## Software

Operating System: SUSE Linux Enterprise Server 12 (x86\_64) SP2  
 Kernel 4.4.21-69-default  
 Compiler: C/C++: Version 17.0.3.191 of Intel C/C++ Compiler for Linux;  
 Fortran: Version 17.0.3.191 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: 19.25 MB I+D on chip per chip  
Other Cache: None  
Memory: 384 GB (24 x 16 GB 2Rx8 PC4-2666V-R, running at 2400)  
Disk Subsystem: 2 x 600 GB 10 K SAS HDD, RAID 1  
Other Hardware: None

Base Pointers: 32/64-bit  
Peak Pointers: 32/64-bit  
Other Software: None

## Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	56	853	892	854	891	<b>853</b>	<b>892</b>	28	<b>418</b>	<b>910</b>	418	910	418	910
416.gamess	56	1040	1050	1041	1050	<b>1040</b>	<b>1050</b>	56	<b>1008</b>	<b>1090</b>	1008	1090	1009	1090
433.milc	56	587	875	587	875	<b>587</b>	<b>875</b>	56	587	875	587	875	<b>587</b>	<b>875</b>
434.zeusmp	56	<b>386</b>	<b>1320</b>	394	1290	386	1320	56	<b>386</b>	<b>1320</b>	394	1290	386	1320
435.gromacs	56	320	1250	322	1240	<b>321</b>	<b>1240</b>	56	321	1250	<b>320</b>	<b>1250</b>	320	1250
436.cactusADM	56	<b>463</b>	<b>1450</b>	463	1450	463	1450	56	<b>463</b>	<b>1450</b>	463	1450	463	1450
437.leslie3d	56	808	652	<b>808</b>	<b>651</b>	809	651	28	395	667	<b>394</b>	<b>667</b>	394	667
444.namd	56	521	862	<b>517</b>	<b>869</b>	516	870	56	514	874	511	878	<b>512</b>	<b>877</b>
447.dealII	56	367	1740	<b>370</b>	<b>1730</b>	373	1720	56	367	1740	<b>370</b>	<b>1730</b>	373	1720
450.soplex	56	713	655	<b>713</b>	<b>655</b>	713	655	28	<b>333</b>	<b>700</b>	335	697	332	704
453.povray	56	192	1550	<b>195</b>	<b>1530</b>	196	1520	56	<b>167</b>	<b>1780</b>	167	1790	167	1780
454.calculix	56	285	1620	285	1620	<b>285</b>	<b>1620</b>	56	285	1620	285	1620	<b>285</b>	<b>1620</b>
459.GemsFDTD	56	<b>988</b>	<b>602</b>	988	601	987	602	56	<b>988</b>	<b>602</b>	988	601	987	602
465.tonto	56	<b>502</b>	<b>1100</b>	502	1100	501	1100	56	480	1150	483	1140	<b>481</b>	<b>1150</b>
470.lbm	56	643	1200	644	1190	<b>644</b>	<b>1200</b>	56	643	1200	644	1190	<b>644</b>	<b>1200</b>
481.wrf	56	593	1050	<b>592</b>	<b>1060</b>	591	1060	56	593	1050	<b>592</b>	<b>1060</b>	591	1060
482.sphinx3	56	1085	1010	1081	1010	<b>1084</b>	<b>1010</b>	56	1085	1010	1081	1010	<b>1084</b>	<b>1010</b>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

## Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

## Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"  
Transparent Huge Pages enabled by default  
Filesystem page cache cleared with:  
shell invocation of 'sync; echo 3 > /proc/sys/vm/drop\_caches' prior to run  
runspec command invoked through numactl i.e.:  
numactl --interleave=all runspec <etc>



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**Tested by:** HPE

**Test date:** Oct-2017

**Hardware Availability:** Oct-2017

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## Platform Notes

### BIOS Configuration:

Thermal Configuration set to Maximum Cooling  
Memory Patrol Scrubbing set to Disabled  
LLC Prefetcher set to Enabled  
LLC Dead Line Allocation set to Disabled  
Workload Pofile set to General Throughput Compute  
Minimum Processor Idle Power Core C-State set to C1E

Sysinfo program /cpu2006/config/sysinfo.rev6993  
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)  
running on pll5 Fri Oct 27 07:16:32 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) Gold 5120 CPU @ 2.20GHz
 2 "physical id"s (chips)
 56 "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 : 14
  siblings  : 28
  physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
  physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
cache size : 19712 KB
```

### From /proc/meminfo

```
MemTotal:      395925564 kB
HugePages_Total: 0
Hugepagesize:  2048 kB
```

### 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:

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## Platform Notes (Continued)

```
Linux pl15 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 Oct 27 06:53
```

```
SPEC is set to: /cpu2006
```

```
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda2        xfs   559G  214G  346G  39% /
```

```
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 HPE U30 09/29/2017
```

```
Memory:
```

```
24x HPE 840756-091 16 GB 2 rank 2666 MHz, configured at 2400 MHz
```

```
(End of data from sysinfo program)
```

## General Notes

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

```
LD_LIBRARY_PATH = "/cpu2006/lib/ia32:/cpu2006/lib/intel64:/cpu2006/sh10.2"
```

Binaries compiled on a system with 1x Intel Core i7-4790 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
```

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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 -qopt-prefetch -auto-p32
-qopt-mem-layout-trans=3

```

C++ benchmarks:

```

-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -auto-p32
-qopt-mem-layout-trans=3

```

Fortran benchmarks:

```

-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch

```

Benchmarks using both Fortran and C:

```

-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -auto-p32
-qopt-mem-layout-trans=3

```

## Peak Compiler Invocation

C benchmarks:

```
icc -m64
```

C++ benchmarks (except as noted below):

```
icpc -m64
```

```
450.soplex: icpc -m32 -L/opt/intel/compilers_and_libraries_2017/linux/lib/ia32
```

Fortran benchmarks:

```
ifort -m64
```

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## Peak Compiler Invocation (Continued)

Benchmarks using both Fortran and C:

icc -m64 ifort -m64

## Peak 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: -D\_FILE\_OFFSET\_BITS=64  
 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

## 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  
 -qopt-mem-layout-trans=3

447.dealII: basepeak = yes

450.soplex: -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) -qopt-malloc-options=3  
 -qopt-mem-layout-trans=3

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## Peak Optimization Flags (Continued)

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 -qopt-mem-layout-trans=3

Fortran benchmarks:

410.bwaves: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch

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: Same as 410.bwaves

459.GemsFDTD: basepeak = yes

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) -unroll4 -auto -inline-calloc  
-qopt-malloc-options=3

Benchmarks using both Fortran and C:

435.gromacs: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)  
-par-num-threads=1(pass 1) -qopt-prefetch -auto-ilp32  
-qopt-mem-layout-trans=3

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/Intel-ic17.0-official-linux64-revF.html>

<http://www.spec.org/cpu2006/flags/HPE-Platform-Flags-Intel-V1.2-SKX-revD.html>

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2006/flags/Intel-ic17.0-official-linux64-revF.xml>

<http://www.spec.org/cpu2006/flags/HPE-Platform-Flags-Intel-V1.2-SKX-revD.xml>



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

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