



# SPEC<sup>®</sup> CFP2006 Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

Integrity Superdome X  
(288 core, 2.50 GHz, Intel Xeon E7-8890 v3)

SPECfp<sup>®</sup>\_rate2006 = 7670

SPECfp\_rate\_base2006 = 7530

CPU2006 license: 3

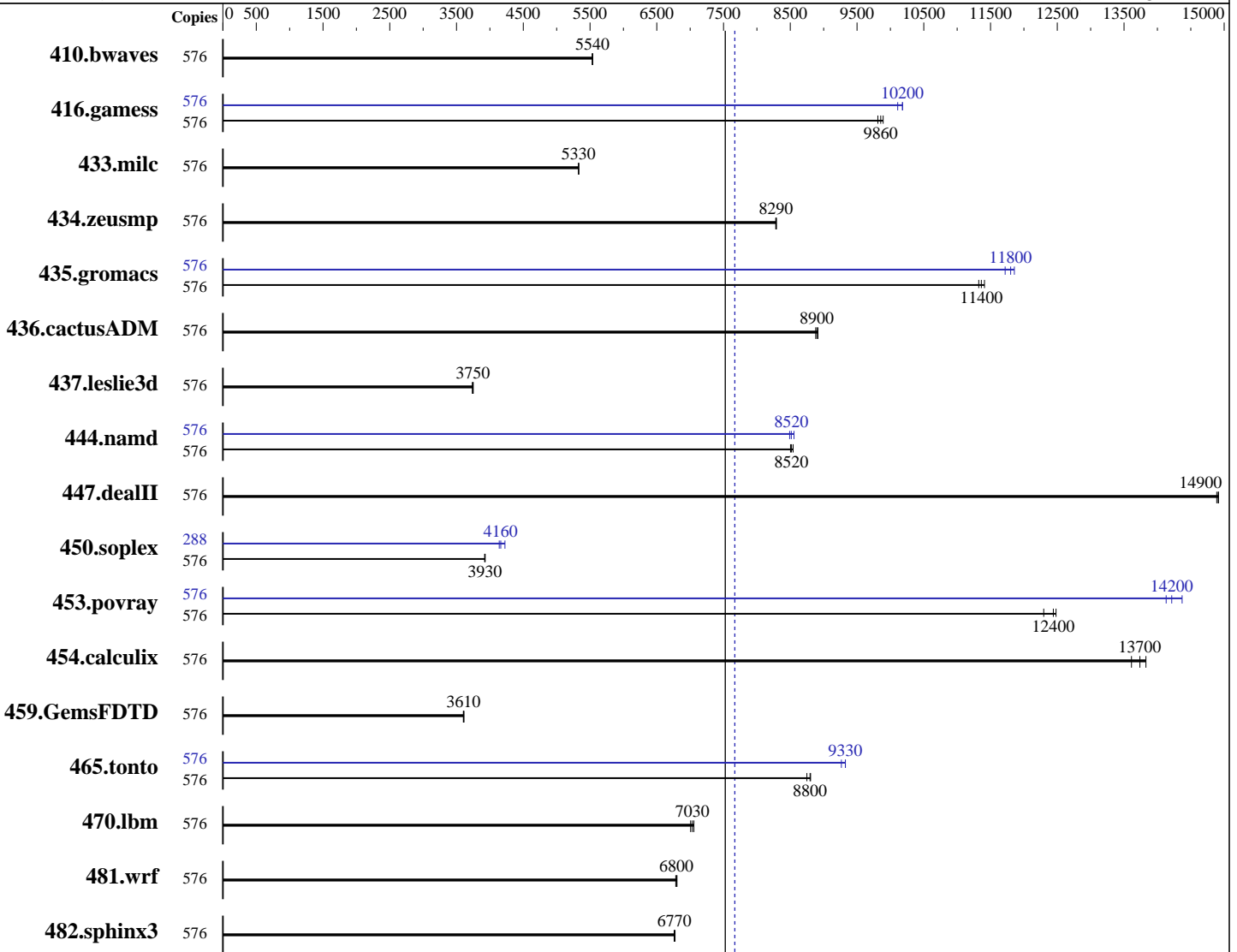
Test sponsor: HPE

Tested by: HPE

Test date: Oct-2015

Hardware Availability: Oct-2015

Software Availability: Aug-2015



SPECfp\_rate\_base2006 = 7530

SPECfp\_rate2006 = 7670

### Hardware

CPU Name: Intel Xeon E7-8890 v3  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.30 GHz  
 CPU MHz: 2500  
 FPU: Integrated  
 CPU(s) enabled: 288 cores, 16 chips, 18 cores/chip, 2 threads/core  
 CPU(s) orderable: 2 to 16 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 11 (x86\_64) SP3  
 Kernel 3.0.101-0.47.55-bigsm  
 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: No  
 File System: tmpfs  
 System State: Run level 3 (multi-user)

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L3 Cache: 45 MB I+D on chip per chip  
Other Cache: None  
Memory: 4 TB (256 x 16 GB 2Rx4 PC4-2133P-L, running at 1600 MHz)  
Disk Subsystem: 8 x C8S59A, 900 GB 10K RPM SAS  
Other Hardware: None

Base Pointers: 32/64-bit  
Peak Pointers: 32/64-bit  
Other Software: Updated libgcc\_s1, glibc, and libstdc++6

## Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	576	1415	5530	1413	5540	<b>1414</b>	<b>5540</b>	576	1415	5530	1413	5540	<b>1414</b>	<b>5540</b>
416.gamess	576	<b>1144</b>	<b>9860</b>	1140	9890	1149	9810	576	1108	10200	1116	10100	<b>1108</b>	<b>10200</b>
433.milc	576	992	5330	992	5330	<b>992</b>	<b>5330</b>	576	992	5330	992	5330	<b>992</b>	<b>5330</b>
434.zeusmp	576	<b>633</b>	<b>8290</b>	633	8280	632	8290	576	<b>633</b>	<b>8290</b>	633	8280	632	8290
435.gromacs	576	360	11400	363	11300	<b>362</b>	<b>11400</b>	576	347	11900	<b>348</b>	<b>11800</b>	351	11700
436.cactusADM	576	775	8880	<b>774</b>	<b>8900</b>	772	8910	576	775	8880	<b>774</b>	<b>8900</b>	772	8910
437.leslie3d	576	<b>1445</b>	<b>3750</b>	1449	3740	1444	3750	576	<b>1445</b>	<b>3750</b>	1449	3740	1444	3750
444.namd	576	<b>542</b>	<b>8520</b>	543	8500	541	8540	576	<b>543</b>	<b>8520</b>	544	8490	540	8560
447.dealII	576	<b>442</b>	<b>14900</b>	443	14900	442	14900	576	<b>442</b>	<b>14900</b>	443	14900	442	14900
450.soplex	576	1223	3930	1225	3920	<b>1224</b>	<b>3930</b>	288	580	4140	<b>577</b>	<b>4160</b>	568	4230
453.povray	576	<b>246</b>	<b>12400</b>	246	12500	249	12300	576	213	14400	217	14100	<b>216</b>	<b>14200</b>
454.calculix	576	349	13600	<b>346</b>	<b>13700</b>	344	13800	576	349	13600	<b>346</b>	<b>13700</b>	344	13800
459.GemsFDTD	576	1697	3600	1692	3610	<b>1695</b>	<b>3610</b>	576	1697	3600	1692	3610	<b>1695</b>	<b>3610</b>
465.tonto	576	648	8750	644	8800	<b>644</b>	<b>8800</b>	576	<b>608</b>	<b>9330</b>	608	9330	612	9270
470.lbm	576	<b>1125</b>	<b>7030</b>	1122	7060	1130	7010	576	<b>1125</b>	<b>7030</b>	1122	7060	1130	7010
481.wrf	576	946	6800	<b>947</b>	<b>6800</b>	948	6780	576	946	6800	<b>947</b>	<b>6800</b>	948	6780
482.sphinx3	576	1657	6770	<b>1659</b>	<b>6770</b>	1661	6760	576	1657	6770	<b>1659</b>	<b>6770</b>	1661	6760

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"  
intel\_idle.max\_cstate=1 appended in kernel command line  
Power profile set with:  
cpupower -c all frequency-set -g performance  
Benchmark installed under /dev/shm/cpu2006 and mounted with:  
mount -o bind /dev/shm/cpu2006 /cpu2006  
Transparent Huge Pages enabled with:

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**SPECfp\_rate2006 = 7670**

**SPECfp\_rate\_base2006 = 7530**

**CPU2006 license:** 3

**Test sponsor:** HPE

**Tested by:** HPE

**Test date:** Oct-2015

**Hardware Availability:** Oct-2015

**Software Availability:** Aug-2015

## Operating System Notes (Continued)

```

echo always > /sys/kernel/mm/transparent_hugepage/enabled
Filesystem page cache cleared with:
echo 1 > /proc/sys/vm/drop_caches
runspec command invoked through numactl i.e.:
numactl --interleave=all runspec <etc>
To run the Intel binaries based off the Intel 16.0 compiler (with SLES11 SP3), the following software was updated:
libgcc_s1 (32 and 64-bit versions) to version 4.8.3+r212056-6.3
glibc (32 and 64-bit versions) to version 2.19-17.72
libstdc++6 (32 and 64-bit versions) to version 4.8.3+r212056-6.3

```

## Platform Notes

Firmware settings:

```

Memory RAS Configuration set to Maximum Performance
Sysinfo program /cpu2006/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on hawk050os1 Tue Oct 20 23:12:43 2015

```

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 E7-8890 v3 @ 2.50GHz
 16 "physical id"s (chips)
 576 "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 : 18
siblings  : 36
physical 0: cores 0 1 2 3 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 1: cores 0 1 2 3 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 2: cores 0 1 2 3 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 3: cores 0 1 2 3 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 4: cores 0 1 2 3 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 5: cores 0 1 2 3 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 6: cores 0 1 2 3 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 7: cores 0 1 2 3 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 8: cores 0 1 2 3 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 9: cores 0 1 2 3 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 10: cores 0 1 2 3 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 11: cores 0 1 2 3 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 12: cores 0 1 2 3 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 13: cores 0 1 2 3 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 14: cores 0 1 2 3 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 15: cores 0 1 2 3 8 9 10 11 16 17 18 19 20 24 25 26 27
cache size : 46080 KB

```

From /proc/meminfo

MemTotal: 4235779104 kB

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## Platform Notes (Continued)

HugePages\_Total: 0  
Hugepagesize: 2048 kB

```
/usr/bin/lsb_release -d
SUSE Linux Enterprise Server 11 (x86_64)
```

```
From /etc/*release* /etc/*version*
SuSE-release:
SUSE Linux Enterprise Server 11 (x86_64)
VERSION = 11
PATCHLEVEL = 3
```

```
uname -a:
Linux hawk050os1 3.0.101-0.47.55-bigsmpl #1 SMP Thu May 28 08:25:11 UTC 2015
(dc083ee) x86_64 x86_64 x86_64 GNU/Linux
```

```
run-level 3 Oct 20 08:13 last=S
```

```
SPEC is set to: /cpu2006
Filesystem      Type      Size  Used Avail Use% Mounted on
tmpfs           tmpfs    2.0T  488G  1.5T  25% /dev/shm
```

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 Bundle: 007.005.000 SFW: 033.161.000 07/18/2015

Memory:  
222x HP 36ASF2G72LZ-2G1A1 16 GB 2133 MHz, configured at 1600 MHz  
18x HP HMA42GL7MFR4N-TF 16 GB 2133 MHz, configured at 1600 MHz  
16x HP M386A2G40DB0-CPB 16 GB 2133 MHz, configured at 1600 MHz  
128x not defined not defined

(End of data from sysinfo program)

Regarding the sysinfo display about the memory installed, the correct amount of memory is 4 TB and the dmidecode description should have three lines reading as:

```
222x HP 36ASF2G72LZ-2G1A1 16 GB 2133 MHz, configured at 1600 MHz
18x HP HMA42GL7MFR4N-TF 16 GB 2133 MHz, configured at 1600 MHz
16x HP M386A2G40DB0-CPB 16 GB 2133 MHz, configured at 1600 MHz
```

## General Notes

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

```
LD_LIBRARY_PATH = "/cpu2006/libs/32:/cpu2006/libs/64:/cpu2006/sh"
```

Binaries compiled on a system with 1x Intel Core i5-4670K CPU + 32GB memory using RedHat EL 7.1



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## 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  
 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 -opt-prefetch -auto-p32  
-ansi-alias -opt-mem-layout-trans=3

C++ benchmarks:

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

Fortran benchmarks:

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

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## Base Optimization Flags (Continued)

Benchmarks using both Fortran and C:

-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32  
-ansi-alias -opt-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\_2016/linux/compiler/lib/ia32\_lin

Fortran benchmarks:

ifort -m64

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:

Continued on next page



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## Peak Optimization Flags (Continued)

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) -opt-mem-layout-trans=3(pass 2)  
-prof-use(pass 2) -fno-alias -auto-ilp32

447.dealIII: basepeak = yes

450.soplex: -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) -opt-mem-layout-trans=3(pass 2)  
-prof-use(pass 2) -opt-malloc-options=3

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) -opt-mem-layout-trans=3(pass 2)  
-prof-use(pass 2) -unroll4 -ansi-alias

### Fortran benchmarks:

410.bwaves: basepeak = yes

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: basepeak = yes

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

### Benchmarks using both Fortran and C:

435.gromacs: -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) -opt-mem-layout-trans=3(pass 2)  
-prof-use(pass 2) -opt-prefetch -auto-ilp32

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## Peak Optimization Flags (Continued)

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-ic16.0-official-linux64.html>

<http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-Integrity-revA.html>

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

<http://www.spec.org/cpu2006/flags/Intel-ic16.0-official-linux64.xml>

<http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-Integrity-revA.xml>

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