



SPEC[®] CFP2006 Result

Copyright 2006-2016 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant ML350 Gen9
(2.20 GHz, Intel Xeon E5-2699 v4)

SPECfp[®]_rate2006 = 1130

SPECfp_rate_base2006 = 1100

CPU2006 license: 3

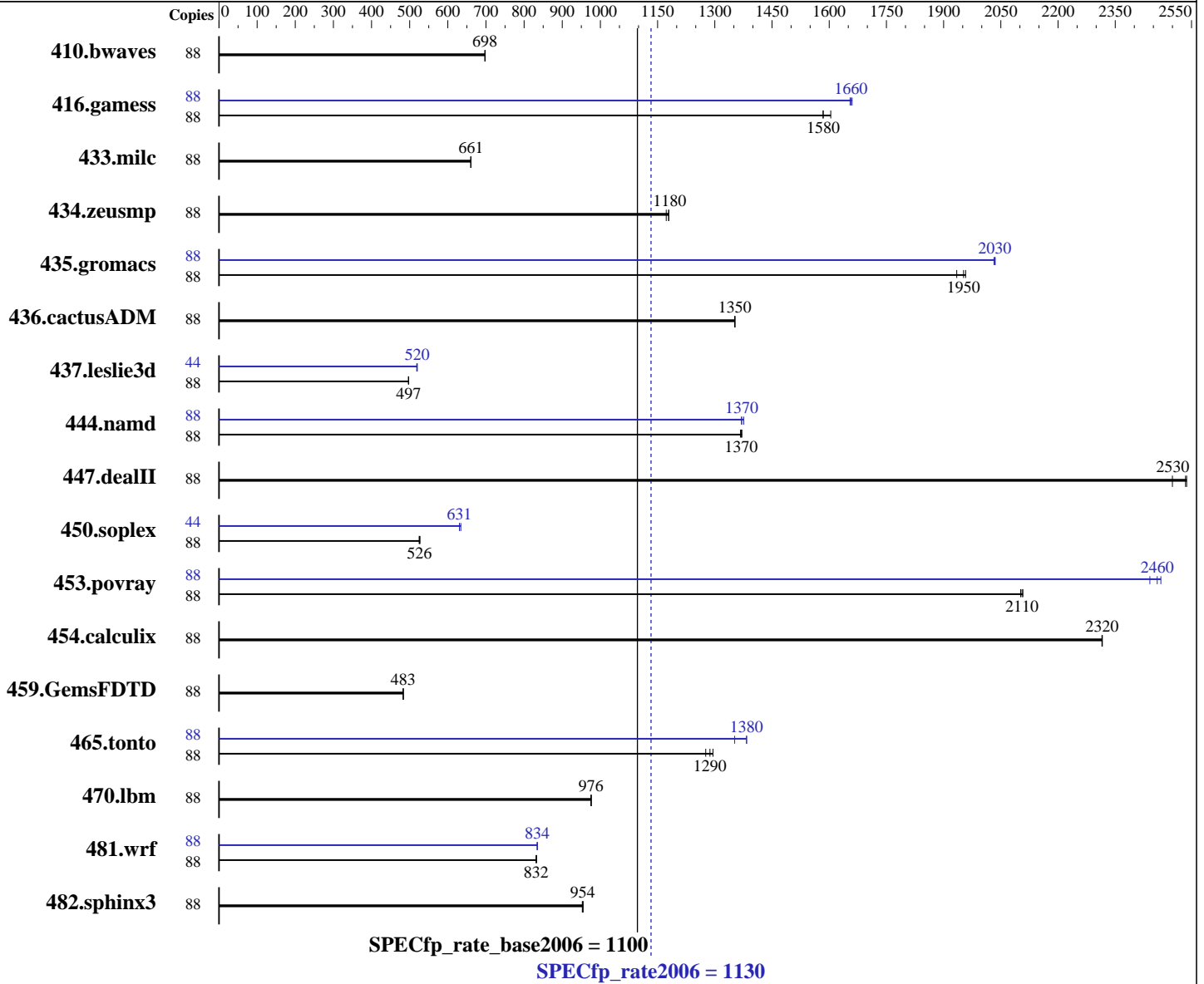
Test sponsor: HPE

Tested by: HPE

Test date: Oct-2016

Hardware Availability: Apr-2016

Software Availability: Aug-2015



Hardware

CPU Name: Intel Xeon E5-2699 v4
 CPU Characteristics: Intel Turbo Boost Technology up to 3.60 GHz
 CPU MHz: 2200
 FPU: Integrated
 CPU(s) enabled: 44 cores, 2 chips, 22 cores/chip, 2 threads/core
 CPU(s) orderable: 1,2 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) 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: No
 File System: xfs
 System State: Run level 3 (multi-user)

Continued on next page



SPEC CFP2006 Result

Copyright 2006-2016 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant ML350 Gen9

(2.20 GHz, Intel Xeon E5-2699 v4)

SPECfp_rate2006 = 1130

SPECfp_rate_base2006 = 1100

CPU2006 license: 3

Test sponsor: HPE

Tested by: HPE

Test date: Oct-2016

Hardware Availability: Apr-2016

Software Availability: Aug-2015

L3 Cache: 55 MB I+D on chip per chip
Other Cache: None
Memory: 256 GB (16 x 16 GB 2Rx4 PC4-2400T-R)
Disk Subsystem: 1 x 800 GB SAS SSD, RAID 0
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	88	1713	698	<u>1715</u>	<u>698</u>	1715	697	88	1713	698	<u>1715</u>	<u>698</u>	1715	697
416.gamess	88	1074	1600	<u>1088</u>	<u>1580</u>	1088	1580	88	1038	1660	1041	1650	<u>1040</u>	<u>1660</u>
433.milc	88	1223	661	1224	660	<u>1223</u>	<u>661</u>	88	1223	661	1224	660	<u>1223</u>	<u>661</u>
434.zeusmp	88	683	1170	679	1180	<u>679</u>	<u>1180</u>	88	683	1170	679	1180	<u>679</u>	<u>1180</u>
435.gromacs	88	<u>322</u>	<u>1950</u>	325	1930	321	1960	88	<u>309</u>	<u>2030</u>	309	2030	309	2040
436.cactusADM	88	778	1350	<u>777</u>	<u>1350</u>	777	1350	88	778	1350	<u>777</u>	<u>1350</u>	777	1350
437.leslie3d	88	<u>1664</u>	<u>497</u>	1663	497	1665	497	44	<u>796</u>	<u>520</u>	798	518	796	520
444.namd	88	<u>515</u>	<u>1370</u>	515	1370	516	1370	88	515	1370	513	1380	<u>515</u>	<u>1370</u>
447.dealII	88	397	2540	<u>397</u>	<u>2530</u>	403	2500	88	397	2540	<u>397</u>	<u>2530</u>	403	2500
450.soplex	88	1399	525	1392	527	<u>1396</u>	<u>526</u>	44	<u>582</u>	<u>631</u>	579	634	582	631
453.povray	88	222	2110	<u>222</u>	<u>2110</u>	223	2100	88	192	2440	<u>190</u>	<u>2460</u>	190	2470
454.calculix	88	313	2320	<u>314</u>	<u>2320</u>	314	2320	88	313	2320	<u>314</u>	<u>2320</u>	314	2320
459.GemsFDTD	88	1933	483	<u>1933</u>	<u>483</u>	1933	483	88	1933	483	<u>1933</u>	<u>483</u>	1933	483
465.tonto	88	679	1280	<u>673</u>	<u>1290</u>	669	1300	88	640	1350	626	1380	<u>626</u>	<u>1380</u>
470.lbm	88	1240	975	<u>1239</u>	<u>976</u>	1238	976	88	1240	975	<u>1239</u>	<u>976</u>	1238	976
481.wrf	88	1182	831	1180	833	<u>1182</u>	<u>832</u>	88	1177	835	1178	834	<u>1178</u>	<u>834</u>
482.sphinx3	88	<u>1798</u>	<u>954</u>	1796	955	1800	953	88	<u>1798</u>	<u>954</u>	1796	955	1800	953

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 with:
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>



SPEC CFP2006 Result

Copyright 2006-2016 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant ML350 Gen9

(2.20 GHz, Intel Xeon E5-2699 v4)

SPECfp_rate2006 = 1130

SPECfp_rate_base2006 = 1100

CPU2006 license: 3

Test sponsor: HPE

Tested by: HPE

Test date: Oct-2016

Hardware Availability: Apr-2016

Software Availability: Aug-2015

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 C3 State
 Minimum Processor Idle Power Package C-State set to No Package State
 QPI Snoop Configuration set to Cluster On Die
 Collaborative Power Control set to Disabled
 Thermal Configuration set to Maximum Cooling
 Processor Power and Utilization Monitoring set to Disabled
 Memory Refresh Rate set to 1x Refresh
 Energy Performance Bias set to Balanced Performance

Sysinfo program

/home/specuser/cpu2006/HP_build_ic16_suite_latest_smartheap_linked/cpu2006/config/sysinfo.rev6914

\$Rev: 6914 \$ \$Date:: 2014-06-25 #\$ e3fbb8667b5a285932ceab81e28219e1

running on linux-szds Wed Oct 5 12:40:33 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 E5-2699 v4 @ 2.20GHz
 2 "physical id"s (chips)
 88 "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  : 44
  physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27
 28
  physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27
 28
cache size : 28160 KB

```

From /proc/meminfo

```

MemTotal:      264321160 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:

```

Continued on next page



SPEC CFP2006 Result

Copyright 2006-2016 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant ML350 Gen9

(2.20 GHz, Intel Xeon E5-2699 v4)

SPECfp_rate2006 = 1130

SPECfp_rate_base2006 = 1100

CPU2006 license: 3

Test sponsor: HPE

Tested by: HPE

Test date: Oct-2016

Hardware Availability: Apr-2016

Software Availability: Aug-2015

Platform Notes (Continued)

```

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-szds 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 5 12:38

SPEC is set to:

/home/specuser/cpu2006/HP_build_ic16_suite_latest_smarterheap_linked/cpu2006

```

Filesystem      Type      Size      Used      Avail    Use%  Mounted on
/dev/sda4        xfs       703G      646G      58G     92%  /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 P92 04/12/2016

Memory:

8x UNKNOWN NOT AVAILABLE

16x UNKNOWN NOT AVAILABLE 16 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 256 GB and the dmidecode description should have one line reading as: 16x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2400 MHz

General Notes

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

LD_LIBRARY_PATH = "/home/specuser/cpu2006/HP_build_ic16_suite_latest_smarterheap_linked/cpu2006/libs/32:/home/specuser/cpu2006/HP_build_ic16_suite_latest_smarterheap_linked/cpu2006/libs/64:/home/specuser/cpu2006/HP_build_ic16_suite_latest_smarterheap_linked/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

Continued on next page



SPEC CFP2006 Result

Copyright 2006-2016 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant ML350 Gen9

(2.20 GHz, Intel Xeon E5-2699 v4)

SPECfp_rate2006 = 1130

SPECfp_rate_base2006 = 1100

CPU2006 license: 3

Test sponsor: HPE

Tested by: HPE

Test date: Oct-2016

Hardware Availability: Apr-2016

Software Availability: Aug-2015

Base Compiler Invocation (Continued)

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 -no-prec-sqrt -static -auto-ilp32
-ansi-alias -opt-mem-layout-trans=3 -opt-prefetch
-qopt-prefetch-issue-excl-hint

C++ benchmarks:

-xCORE-AVX2 -ipo -O3 -no-prec-div -no-prec-sqrt -static -auto-ilp32
-ansi-alias -opt-mem-layout-trans=3 -qopt-calloc

Fortran benchmarks:

-xCORE-AVX2 -ipo -O3 -no-prec-div -no-prec-sqrt -static
-opt-prefetch -fp-model fast=2
-qopt-prefetch-issue-excl-hint

Continued on next page



SPEC CFP2006 Result

Copyright 2006-2016 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant ML350 Gen9

(2.20 GHz, Intel Xeon E5-2699 v4)

SPECfp_rate2006 = 1130

SPECfp_rate_base2006 = 1100

CPU2006 license: 3

Test sponsor: HPE

Tested by: HPE

Test date: Oct-2016

Hardware Availability: Apr-2016

Software Availability: Aug-2015

Base Optimization Flags (Continued)

Benchmarks using both Fortran and C:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -no-prec-sqrt -static -auto-ilp32
-ansi-alias -opt-mem-layout-trans=3 -opt-prefetch
-qopt-prefetch-issue-excl-hint
-fp-model fast=2
```

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/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
```



SPEC CFP2006 Result

Copyright 2006-2016 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant ML350 Gen9

(2.20 GHz, Intel Xeon E5-2699 v4)

SPECfp_rate2006 = 1130

SPECfp_rate_base2006 = 1100

CPU2006 license: 3

Test sponsor: HPE

Tested by: HPE

Test date: Oct-2016

Hardware Availability: Apr-2016

Software Availability: Aug-2015

Peak Optimization Flags

C benchmarks:

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) -no-prec-sqrt(pass 2)
-static(pass 2) -opt-mem-layout-trans=3(pass 2)
-prof-use(pass 2) -fno-alias -auto-ilp32

447.dealII: 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) -no-prec-sqrt(pass 2)
-static(pass 2) -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) -no-prec-sqrt(pass 2)
-static(pass 2) -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) -no-prec-sqrt(pass 2)
-static(pass 2) -prof-use(pass 2) -unroll2 -inline-level=0
-scalar-rep-

434.zeusmp: basepeak = yes

437.leslie3d: -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) -no-prec-sqrt(pass 2)
-static(pass 2) -prof-use(pass 2) -opt-malloc-options=3
-opt-prefetch

459.GemsFDTD: basepeak = yes

Continued on next page



SPEC CFP2006 Result

Copyright 2006-2016 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant ML350 Gen9

(2.20 GHz, Intel Xeon E5-2699 v4)

SPECfp_rate2006 = 1130

SPECfp_rate_base2006 = 1100

CPU2006 license: 3

Test sponsor: HPE

Tested by: HPE

Test date: Oct-2016

Hardware Availability: Apr-2016

Software Availability: Aug-2015

Peak Optimization Flags (Continued)

```
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) -no-prec-sqrt(pass 2)
           -static(pass 2) -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) -no-prec-sqrt(pass 2)
            -static(pass 2) -opt-mem-layout-trans=3(pass 2)
            -prof-use(pass 2) -opt-prefetch -auto-ilp32
```

436.cactusADM: basepeak = yes

454.calculix: basepeak = yes

```
481.wrf: -xCORE-AVX2 -ipo -O3 -no-prec-div -no-prec-sqrt -static
         -auto-ilp32
```

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-revG.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-revG.xml>
<http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-HSW-revE.xml>

SPEC and SPECfp are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

For questions about this result, please contact the tester.
For other inquiries, please contact webmaster@spec.org.

Tested with SPEC CPU2006 v1.2.
Report generated on Wed Nov 23 12:31:09 2016 by SPEC CPU2006 PS/PDF formatter v6932.
Originally published on 1 November 2016.