SPEC® CFP2006 Result

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant BL460c Gen9
(2.00 GHz, Intel Xeon E5-2660 v4)

$SPECfp^{®}\_rate2006 =$ 874
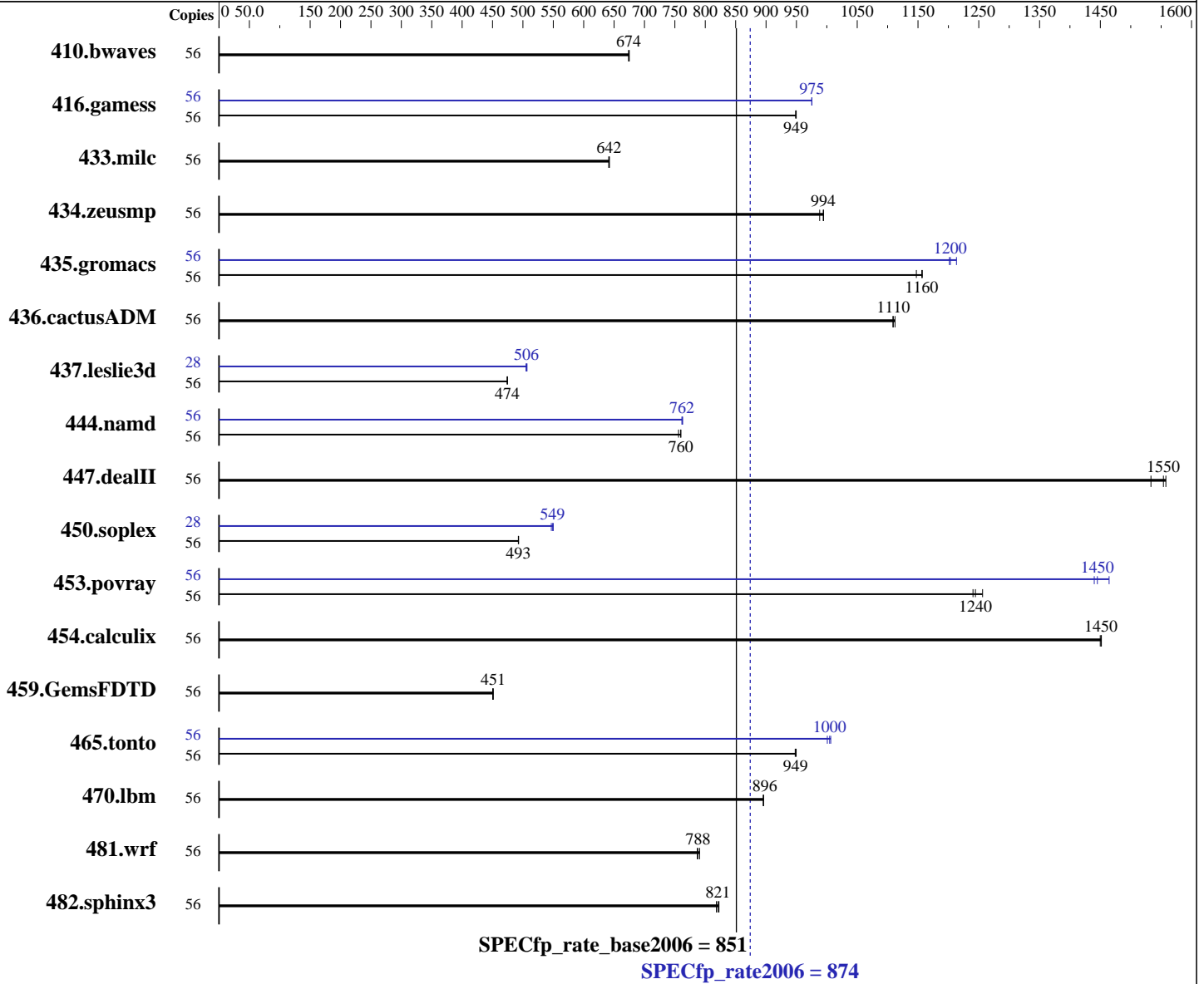
$SPECfp\_rate\_base2006 =$ 851

CPU2006 license: 3		**Test date:**	Mar-2016
Test sponsor:	HPE	**Hardware Availability:**	Mar-2016
Tested by:	HPE	**Software Availability:**	Nov-2015

Copies

Benchmark		
410.bwaves	56	674
416.gamess	56	975
	56	949
433.milc	56	642
434.zeusmp	56	994
435.gromacs	56	1200
	56	1160
436.cactusADM	56	1110
437.leslie3d	28	506
	56	474
444.namd	56	762
	56	760
447.dealII	56	1550
450.soplex	28	549
	56	493
453.povray	56	1450
	56	1240
454.calculix	56	1450
459.GemsFDTD	56	451
465.tonto	56	1000
	56	949
470.lbm	56	896
481.wrf	56	788
482.sphinx3	56	821

SPECfp_rate_base2006 = 851

SPECfp_rate2006 = 874

Hardware

CPU Name:	Intel Xeon E5-2660 v4
CPU Characteristics:	Intel Turbo Boost Technology up to 3.20 GHz
CPU MHz:	2000
FPU:	Integrated
CPU(s) enabled:	28 cores, 2 chips, 14 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 12 (x86_64) SP 1 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 5 (multi-user, w/GUI)

Continued on next page

SPEC CFP2006 Result
Copyright 2006-2016 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant BL460c Gen9
(2.00 GHz, Intel Xeon E5-2660 v4)

$SPECfp_rate2006 = $ **874**

$SPECfp_rate_base2006 = $ **851**

CPU2006 license: 3	**Test date:** Mar-2016
Test sponsor: HPE	**Hardware Availability:** Mar-2016
Tested by: HPE	**Software Availability:** Nov-2015

L3 Cache:	35 MB I+D on chip per chip	Base Pointers:	32/64-bit
Other Cache:	None	Peak Pointers:	32/64-bit
Memory:	256 GB (8 x 32 GB 2Rx4 PC4-2400T-R)	Other Software:	None
Disk Subsystem:	2 x 500 GB SAS HDD 10 K, RAID 1		
Other Hardware:	None		

Results Table

Benchmark	Copies	Base Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Peak Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	56	**1129**	**674**	1127	675	1129	674	56	**1129**	**674**	1127	675	1129	674
416.gamess	56	1156	949	1155	950	**1155**	**949**	56	1124	975	1124	975	**1124**	**975**
433.milc	56	802	641	800	642	**801**	**642**	56	802	641	800	642	**801**	**642**
434.zeusmp	56	516	988	512	995	**513**	**994**	56	516	988	512	995	**513**	**994**
435.gromacs	56	346	1160	**346**	**1160**	349	1150	56	**332**	**1200**	333	1200	330	1210
436.cactusADM	56	**603**	**1110**	602	1110	604	1110	56	**603**	**1110**	602	1110	604	1110
437.leslie3d	56	1110	474	1109	475	**1110**	**474**	28	**520**	**506**	521	505	519	507
444.namd	56	**591**	**760**	591	760	594	756	56	**590**	**762**	589	763	590	762
447.dealII	56	418	1530	411	1560	**412**	**1550**	56	418	1530	411	1560	**412**	**1550**
450.soplex	56	**948**	**493**	948	492	947	493	28	425	550	427	547	**425**	**549**
453.povray	56	240	1240	237	1260	**239**	**1240**	56	207	1440	**206**	**1450**	203	1460
454.calculix	56	319	1450	318	1450	**318**	**1450**	56	319	1450	318	1450	**318**	**1450**
459.GemsFDTD	56	1320	450	**1317**	**451**	1317	451	56	1320	450	**1317**	**451**	1317	451
465.tonto	56	580	950	581	948	**581**	**949**	56	548	1010	551	1000	**549**	**1000**
470.lbm	56	859	896	859	896	**859**	**896**	56	859	896	859	896	**859**	**896**
481.wrf	56	791	791	**794**	**788**	795	787	56	791	791	**794**	**788**	795	787
482.sphinx3	56	**1330**	**821**	1327	823	1334	818	56	**1330**	**821**	1327	823	1334	818

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>

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant BL460c Gen9
(2.00 GHz, Intel Xeon E5-2660 v4)

$SPECfp\_rate2006 =$ 874

$SPECfp\_rate\_base2006 =$ 851

CPU2006 license: 3
Test sponsor: HPE
Tested by: HPE

Test date: Mar-2016
Hardware Availability: Mar-2016
Software Availability: Nov-2015

Platform Notes

```
    BIOS Configuration:
    Intel Hyperthreading Option set to Enabled
    Power Profile set to Custom
    Power Regulator set to Static High Performance Mode
    Minimum Processor Idle Power Core C-State set to C1E State
    Minimum Processor Idle Power Package C-State set to No Package State
    Collaborative Power Control set to Disabled
    QPI Snoop Configuration set to Cluster on Die
    Thermal Configuration set to Maximum Cooling
    Processor Power and Utilization Monitoring set to Disabled
    Memory Refresh Rate set to 1x Refresh
    Sysinfo program /home/cpuv1.3/cpu2006/config/sysinfo.rev6914
    $Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
    running on bl460c2-gen9-b Wed Mar 16 16:00:15 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 E5-2660 v4@ 2.00GHz
          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 : 17920 KB

    From /proc/meminfo
       MemTotal:       264324704 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"
```

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant BL460c Gen9
(2.00 GHz, Intel Xeon E5-2660 v4)

SPECfp_rate2006 =   874

SPECfp_rate_base2006 =   851

CPU2006 license: 3
Test sponsor: HPE
Tested by: HPE

Test date: Mar-2016
Hardware Availability: Mar-2016
Software Availability: Nov-2015

Platform Notes (Continued)

```
        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 bl460c2-gen9-b 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 5 Mar 16 15:54

  SPEC is set to: /home/cpuv1.3/cpu2006
     Filesystem      Type  Size  Used Avail Use% Mounted on
     /dev/sda4       xfs   424G  218G  207G  52% /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 I36 02/22/2016
   Memory:
     8x UNKNOWN NOT AVAILABLE
     8x 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 256 GB and the dmidecode description should have one line reading as:
 8x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2400 MHz
```

General Notes

```
 Environment variables set by runspec before the start of the run:
 LD_LIBRARY_PATH = "/home/cpuv1.3/cpu2006/libs/32:/home/cpuv1.3/cpu2006/libs/64:/home/cpuv1.3/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

Continued on next page

SPEC CFP2006 Result

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant BL460c Gen9
(2.00 GHz, Intel Xeon E5-2660 v4)

SPECfp_rate2006 =   874

SPECfp_rate_base2006 =   851

CPU2006 license: 3
Test sponsor: HPE
Tested by: HPE

Test date: Mar-2016
Hardware Availability: Mar-2016
Software Availability: Nov-2015

Base Compiler Invocation (Continued)

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 -static -opt-prefetch
-qopt-prefetch-issue-excl-hint -auto-p32 -ansi-alias
-opt-mem-layout-trans=3
```

C++ benchmarks:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -static -opt-prefetch
-qopt-prefetch-issue-excl-hint -auto-p32 -ansi-alias
-opt-mem-layout-trans=3
```

Fortran benchmarks:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -static -opt-prefetch
-qopt-prefetch-issue-excl-hint
```

Benchmarks using both Fortran and C:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -static -opt-prefetch
-qopt-prefetch-issue-excl-hint -auto-p32 -ansi-alias
-opt-mem-layout-trans=3
```

SPEC CFP2006 Result
Copyright 2006-2016 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant BL460c Gen9
(2.00 GHz, Intel Xeon E5-2660 v4)

SPECfp_rate2006 = 874

SPECfp_rate_base2006 = 851

CPU2006 license: 3
Test sponsor: HPE
Tested by: HPE

Test date: Mar-2016
Hardware Availability: Mar-2016
Software Availability: Nov-2015

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:

        433.milc: basepeak = yes

        470.lbm: basepeak = yes

        482.sphinx3: basepeak = yes

C++ benchmarks:

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant BL460c Gen9
(2.00 GHz, Intel Xeon E5-2660 v4)

$SPECfp_rate2006 = $ 874

$SPECfp_rate_base2006 = $ 851

CPU2006 license: 3
Test sponsor: HPE
Tested by: HPE

Test date: Mar-2016
Hardware Availability: Mar-2016
Software Availability: Nov-2015

Peak Optimization Flags (Continued)

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) -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) -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) -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) -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) -static(pass 2) -prof-use(pass 2)
    -opt-malloc-options=3 -opt-prefetch

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) -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) -static(pass 2)
    -opt-mem-layout-trans=3(pass 2) -prof-use(pass 2)
    -opt-prefetch -auto-ilp32

Continued on next page

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant BL460c Gen9
(2.00 GHz, Intel Xeon E5-2660 v4)

$SPECfp\_rate2006 =$ 874

$SPECfp\_rate\_base2006 =$ 851

CPU2006 license: 3	**Test date:** Mar-2016
Test sponsor: HPE	**Hardware Availability:** Mar-2016
Tested by: HPE	**Software Availability:** Nov-2015

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/HP-Platform-Flags-Intel-V1.2-HSW-revE.html
http://www.spec.org/cpu2006/flags/HP-Compiler-Flags-Intel-V1.2-BDW-revE.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-HSW-revE.xml
http://www.spec.org/cpu2006/flags/HP-Compiler-Flags-Intel-V1.2-BDW-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 Tue May 3 18:00:26 2016 by SPEC CPU2006 PS/PDF formatter v6932.
Originally published on 3 May 2016.