# SPEC® CFP2006 Result

## Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL380 Gen9
(2.40 GHz, Intel Xeon E5-2680 v4)

$SPECfp^{®}\_rate2006 = 930$
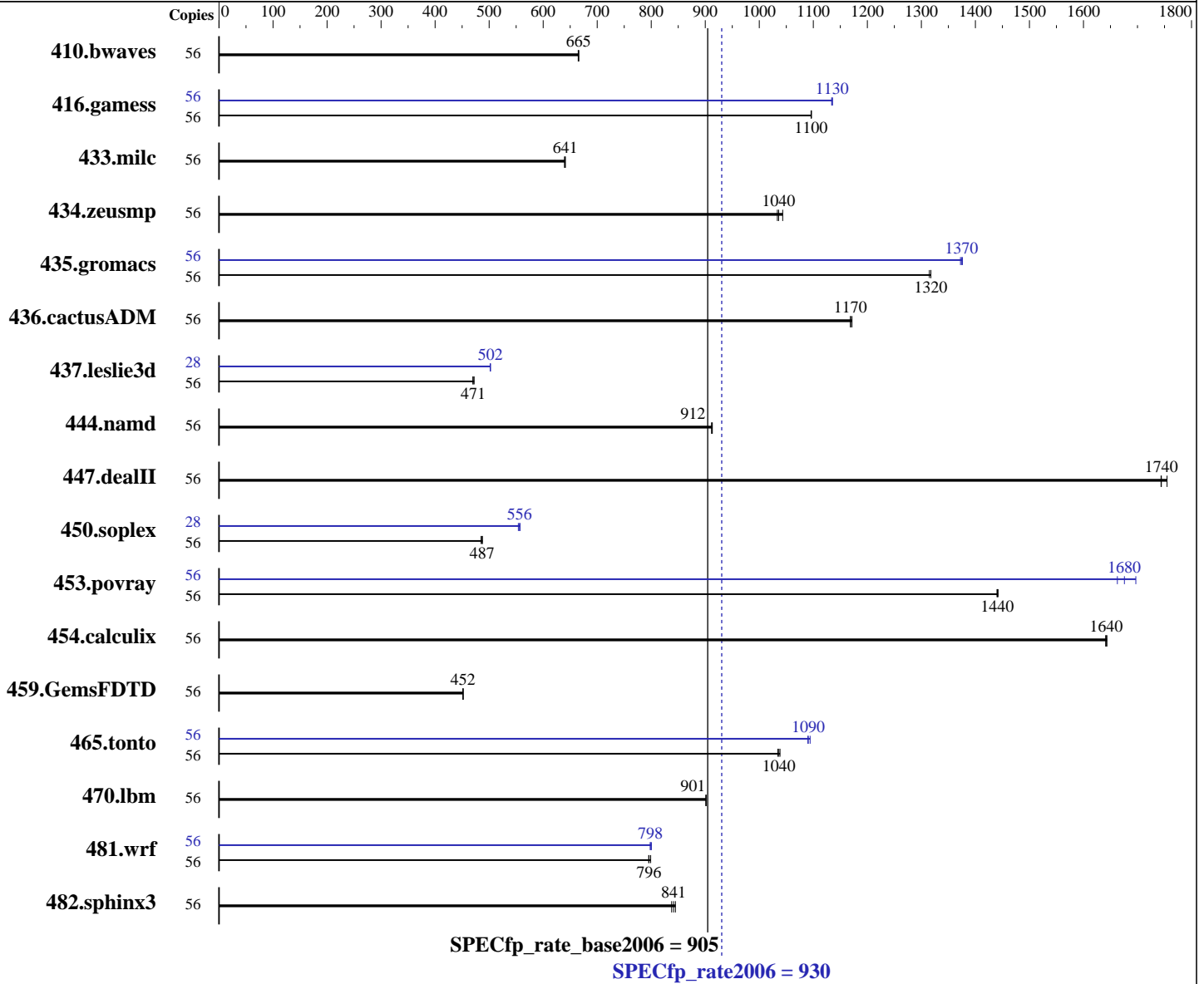
$SPECfp\_rate\_base2006 = 905$

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

**Copies**

| Benchmark | Copies | Value |
|---|---|---|
| 410.bwaves | 56 | 665 |
| 416.gamess | 56 | 1130 |
| 416.gamess | 56 | 1100 |
| 433.milc | 56 | 641 |
| 434.zeusmp | 56 | 1040 |
| 435.gromacs | 56 | 1370 |
| 435.gromacs | 56 | 1320 |
| 436.cactusADM | 56 | 1170 |
| 437.leslie3d | 28 | 502 |
| 437.leslie3d | 56 | 471 |
| 444.namd | 56 | 912 |
| 447.dealII | 56 | 1740 |
| 450.soplex | 28 | 556 |
| 450.soplex | 56 | 487 |
| 453.povray | 56 | 1680 |
| 453.povray | 56 | 1440 |
| 454.calculix | 56 | 1640 |
| 459.GemsFDTD | 56 | 452 |
| 465.tonto | 56 | 1090 |
| 465.tonto | 56 | 1040 |
| 470.lbm | 56 | 901 |
| 481.wrf | 56 | 798 |
| 481.wrf | 56 | 796 |
| 482.sphinx3 | 56 | 841 |

**SPECfp_rate_base2006 = 905**

**SPECfp_rate2006 = 930**

## Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon E5-2680 v4 |
| CPU Characteristics: | Intel Turbo Boost Technology up to 3.30 GHz |
| CPU MHz: | 2400 |
| 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: | Red Hat Enterprise Linux Server release 7.2, (Maipo) Kernel 3.10.0-327.el7.x86_64 |
| 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 |

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(2.40 GHz, Intel Xeon E5-2680 v4)

**SPECfp_rate2006 =    930**

**SPECfp_rate_base2006 =   905**

| | |
|---|---|
| **CPU2006 license:** 3 | **Test date:**  May-2016 |
| **Test sponsor:** HPE | **Hardware Availability:** Mar-2016 |
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| | | | |
|---|---|---|---|
| L3 Cache: | 35 MB I+D on chip per chip | System State: | Run level 3 (multi-user) |
| Other Cache: | None | Base Pointers: | 64-bit |
| Memory: | 512 GB (16 x 32 GB 2Rx4 PC4-2400T-R) | Peak Pointers: | 32/64-bit |
| Disk Subsystem: | 1 x 400 GB SAS SSD, RAID 0 | Other Software: | None |
| Other Hardware: | None | | |

## Results Table

| Benchmark | Base | | | | | | | Peak | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 410.bwaves | 56 | 1145 | 665 | 1143 | 666 | **1144** | **665** | 56 | 1145 | 665 | 1143 | 666 | **1144** | **665** |
| 416.gamess | 56 | **1001** | **1100** | 1001 | 1100 | 1000 | 1100 | 56 | 967 | 1130 | **966** | **1130** | 966 | 1140 |
| 433.milc | 56 | **802** | **641** | 802 | 641 | 804 | 639 | 56 | **802** | **641** | 802 | 641 | 804 | 639 |
| 434.zeusmp | 56 | 488 | 1040 | 493 | 1030 | **492** | **1040** | 56 | 488 | 1040 | 493 | 1030 | **492** | **1040** |
| 435.gromacs | 56 | 304 | 1310 | 303 | 1320 | **303** | **1320** | 56 | **291** | **1370** | 291 | 1370 | 291 | 1380 |
| 436.cactusADM | 56 | 573 | 1170 | 571 | 1170 | **573** | **1170** | 56 | 573 | 1170 | 571 | 1170 | **573** | **1170** |
| 437.leslie3d | 56 | 1120 | 470 | 1115 | 472 | **1119** | **471** | 28 | 524 | 502 | **524** | **502** | 524 | 502 |
| 444.namd | 56 | 492 | 913 | **492** | **912** | 493 | 912 | 56 | 492 | 913 | **492** | **912** | 493 | 912 |
| 447.dealII | 56 | 367 | 1740 | **367** | **1740** | 365 | 1750 | 56 | 367 | 1740 | **367** | **1740** | 365 | 1750 |
| 450.soplex | 56 | 958 | 488 | **959** | **487** | 963 | 485 | 28 | 421 | 554 | **420** | **556** | 419 | 557 |
| 453.povray | 56 | 207 | 1440 | **207** | **1440** | 207 | 1440 | 56 | 179 | 1660 | 176 | 1700 | **178** | **1680** |
| 454.calculix | 56 | 282 | 1640 | 281 | 1640 | **281** | **1640** | 56 | 282 | 1640 | 281 | 1640 | **281** | **1640** |
| 459.GemsFDTD | 56 | 1314 | 452 | 1316 | 452 | **1316** | **452** | 56 | 1314 | 452 | 1316 | 452 | **1316** | **452** |
| 465.tonto | 56 | 533 | 1030 | 531 | 1040 | **532** | **1040** | 56 | **505** | **1090** | 506 | 1090 | 504 | 1090 |
| 470.lbm | 56 | 854 | 901 | 853 | 902 | **854** | **901** | 56 | 854 | 901 | 853 | 902 | **854** | **901** |
| 481.wrf | 56 | 787 | 795 | 783 | 799 | **786** | **796** | 56 | 782 | 800 | **783** | **798** | 784 | 798 |
| 482.sphinx3 | 56 | **1297** | **841** | 1303 | 838 | 1292 | 845 | 56 | **1297** | **841** | 1303 | 838 | 1292 | 845 |

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

## Submit Notes

    The config file option 'submit' was used.

## 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:
      HP Power Profile set to Custom
      HP Power Regulator to HP Static High Performance Mode

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ProLiant DL380 Gen9
(2.40 GHz, Intel Xeon E5-2680 v4)

SPECfp_rate2006 =       930

SPECfp_rate_base2006 =   905

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

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

## Platform Notes (Continued)

```
   Minimum Processor Idle Power Core C-State set to C1E State
   Minimum Processor Idle Power Package C-State set to No Package State
   QPI Snoop Configuration set to Home Snoop
   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

Sysinfo program /home/new_fp/cpu2006/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on DL380Gen9allbin Wed May 11 10:05:04 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 E5-2680 v4@ 2.40GHz
      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:       528063216 kB
   HugePages_Total:        0
   Hugepagesize:        2048 kB

From /etc/*release* /etc/*version*
   os-release:
      NAME="Red Hat Enterprise Linux Server"
      VERSION="7.2 (Maipo)"
      ID="rhel"
      ID_LIKE="fedora"
      VERSION_ID="7.2"
      PRETTY_NAME="Red Hat Enterprise Linux Server 7.2 (Maipo)"
      ANSI_COLOR="0;31"
      CPE_NAME="cpe:/o:redhat:enterprise_linux:7.2:GA:server"
   redhat-release: Red Hat Enterprise Linux Server release 7.2 (Maipo)
   system-release: Red Hat Enterprise Linux Server release 7.2 (Maipo)
   system-release-cpe: cpe:/o:redhat:enterprise_linux:7.2:ga:server

uname -a:
   Linux DL380Gen9allbin 3.10.0-327.el7.x86_64 #1 SMP Thu Oct 29 17:29:29 EDT
   2015 x86_64 x86_64 x86_64 GNU/Linux
```

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## Platform Notes (Continued)

```
  run-level 3 May 11 10:03

  SPEC is set to: /home/new_fp/cpu2006
     Filesystem      Type  Size  Used Avail Use% Mounted on
     /dev/sda5       xfs   318G  135G  184G  43% /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 03/23/2016
   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:
  LD_LIBRARY_PATH = "/home/new_fp/cpu2006/libs/32:/home/new_fp/cpu2006/libs/64:/home/new_fp/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

Benchmarks using both Fortran and C:
    icc   -m64 ifort -m64

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

**Test date:** May-2016
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**Software Availability:** Nov-2015

## 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 -auto-ilp32
    -ansi-alias -opt-mem-layout-trans=3 -qopt-prefetch-issue-excl-hint
```

C++ benchmarks:
```
    -xCORE-AVX2 -ipo -O3 -no-prec-div -static -opt-prefetch
    -fp-model fast=2                            -auto-ilp32 -ansi-alias
```

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 -auto-ilp32
    -ansi-alias -opt-mem-layout-trans=3 -qopt-prefetch-issue-excl-hint
```

## 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
```

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SPECfp_rate2006 =         930

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

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

## Peak Compiler Invocation (Continued)

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:

        444.namd: basepeak = yes

        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

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# Peak Optimization Flags (Continued)

    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`

  436.cactusADM: `basepeak = yes`

    454.calculix: `basepeak = yes`

       481.wrf: `-xCORE-AVX2 -ipo -O3 -no-prec-div -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-BDW-revF.html`
`http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-HSW-revE.html`

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

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For other inquiries, please contact webmaster@spec.org.

Tested with SPEC CPU2006 v1.2.
Report generated on Thu Jun 30 14:06:58 2016 by SPEC CPU2006 PS/PDF formatter v6932.
Originally published on 14 June 2016.