# SPEC® CFP2006 Result
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## Huawei

Huawei 2488 V5 (Intel Xeon Platinum 8176)

$SPECfp®\_rate2006 = 3230$

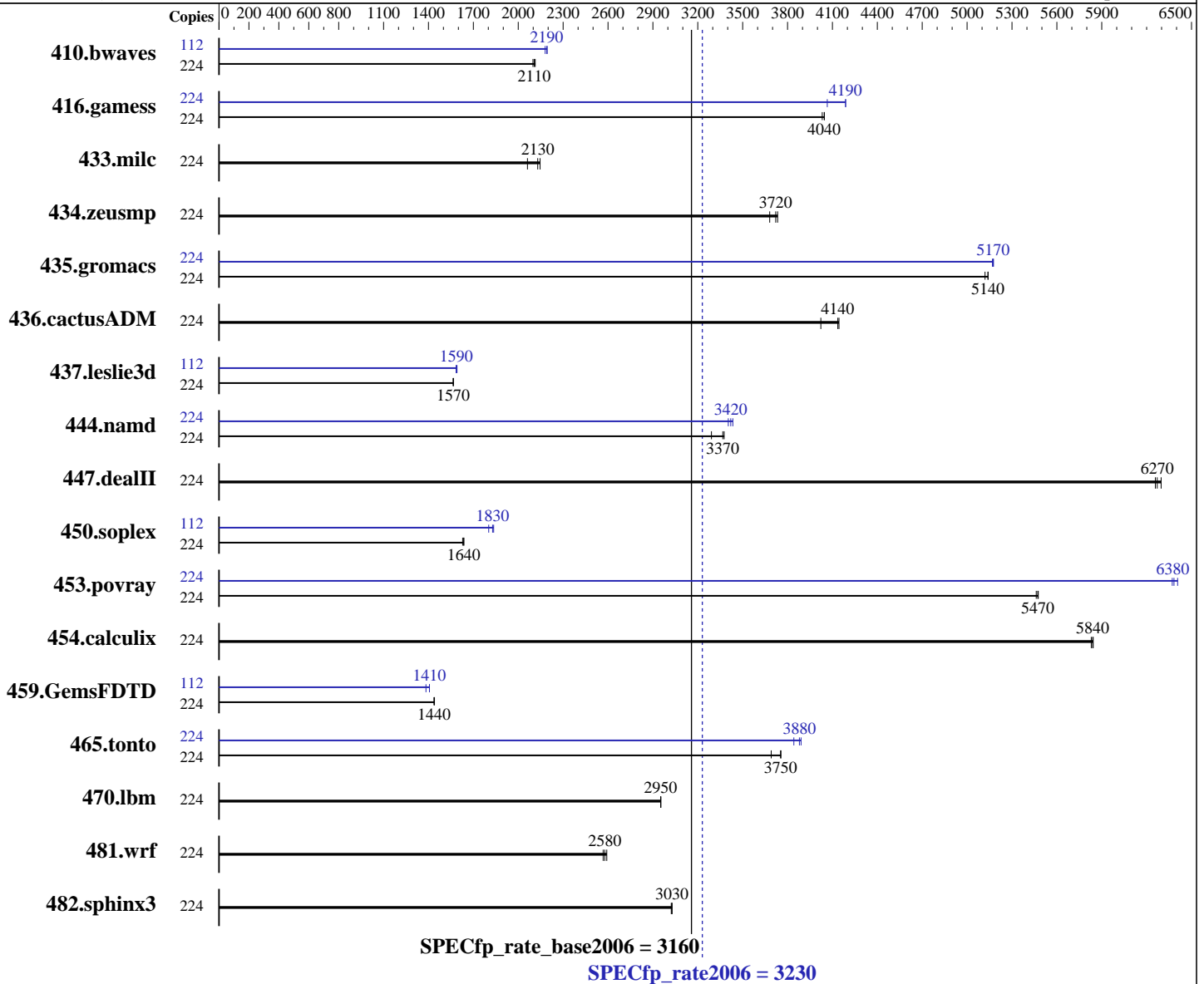$SPECfp\_rate\_base2006 = 3160$

**CPU2006 license:** 3175  
**Test sponsor:** Huawei  
**Tested by:** Huawei

**Test date:** Aug-2017  
**Hardware Availability:** Aug-2017  
**Software Availability:** Apr-2017



Copies

| Benchmark | Copies | Result (blue) | Result (black) |
|---|---|---|---|
| 410.bwaves | 112 / 224 | 2190 | 2110 |
| 416.gamess | 224 / 224 | 4190 | 4040 |
| 433.milc | 224 | | 2130 |
| 434.zeusmp | 224 | | 3720 |
| 435.gromacs | 224 / 224 | 5170 | 5140 |
| 436.cactusADM | 224 | | 4140 |
| 437.leslie3d | 112 / 224 | 1590 | 1570 |
| 444.namd | 224 / 224 | 3420 | 3370 |
| 447.dealII | 224 | | 6270 |
| 450.soplex | 112 / 224 | 1830 | 1640 |
| 453.povray | 224 / 224 | 6380 | 5470 |
| 454.calculix | 224 | | 5840 |
| 459.GemsFDTD | 112 / 224 | 1410 | 1440 |
| 465.tonto | 224 / 224 | 3880 | 3750 |
| 470.lbm | 224 | | 2950 |
| 481.wrf | 224 | | 2580 |
| 482.sphinx3 | 224 | | 3030 |

SPECfp_rate_base2006 = 3160  
SPECfp_rate2006 = 3230

## Hardware

CPU Name: Intel Xeon Platinum 8176  
CPU Characteristics: Intel Turbo Boost Technology up to 3.80 GHz  
CPU MHz: 2100  
FPU: Integrated  
CPU(s) enabled: 112 cores, 4 chips, 28 cores/chip, 2 threads/core  
CPU(s) orderable: 2,4 chip  
Primary Cache: 32 KB I + 32 KB D on chip per core  
Secondary Cache: 1 MB I+D on chip per core  

*Continued on next page*

## Software

Operating System: SUSE Linux Enterprise Server 12 SP2  
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 5 (multi user)  

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| L3 Cache: | 38.5 MB I+D on chip per chip | Base Pointers: | 32/64-bit |
|---|---|---|---|
| Other Cache: | None | Peak Pointers: | 32/64-bit |
| Memory: | 384 GB (24 x 16 GB 2Rx4 PC4-2666V-R) | Other Software: | None |
| Disk Subsystem: | 2 x 900 GB SAS, 10K RPM | | |
| Other Hardware: | None | | |

## Results Table

| Benchmark | Base | | | | | | | Peak | | | | | | |
| | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 410.bwaves | 224 | 1451 | 2100 | **1445** | **2110** | 1440 | 2110 | 112 | 698 | 2180 | **695** | **2190** | 694 | 2190 |
| 416.gamess | 224 | **1084** | **4040** | 1084 | 4050 | 1088 | 4030 | 224 | **1047** | **4190** | 1047 | 4190 | 1079 | 4070 |
| 433.milc | 224 | 997 | 2060 | 958 | 2150 | **965** | **2130** | 224 | 997 | 2060 | 958 | 2150 | **965** | **2130** |
| 434.zeusmp | 224 | 554 | 3680 | **548** | **3720** | 546 | 3730 | 224 | 554 | 3680 | **548** | **3720** | 546 | 3730 |
| 435.gromacs | 224 | **311** | **5140** | 312 | 5120 | 311 | 5140 | 224 | 309 | 5180 | 309 | 5170 | **309** | **5170** |
| 436.cactusADM | 224 | 665 | 4020 | **647** | **4140** | 646 | 4140 | 224 | 665 | 4020 | **647** | **4140** | 646 | 4140 |
| 437.leslie3d | 224 | **1345** | **1570** | 1344 | 1570 | 1345 | 1570 | 112 | 664 | 1580 | 662 | 1590 | **663** | **1590** |
| 444.namd | 224 | 546 | 3290 | 532 | 3380 | **534** | **3370** | 224 | **525** | **3420** | 528 | 3400 | 523 | 3430 |
| 447.dealII | 224 | 407 | 6300 | **409** | **6270** | 409 | 6260 | 224 | 407 | 6300 | **409** | **6270** | 409 | 6260 |
| 450.soplex | 224 | 1147 | 1630 | 1142 | 1640 | **1142** | **1640** | 112 | **511** | **1830** | 509 | 1840 | 518 | 1800 |
| 453.povray | 224 | **218** | **5470** | 218 | 5460 | 218 | 5480 | 224 | **187** | **6380** | 186 | 6410 | 187 | 6370 |
| 454.calculix | 224 | 317 | 5830 | **316** | **5840** | 316 | 5840 | 224 | 317 | 5830 | **316** | **5840** | 316 | 5840 |
| 459.GemsFDTD | 224 | 1650 | 1440 | **1653** | **1440** | 1653 | 1440 | 112 | 845 | 1410 | **845** | **1410** | 859 | 1380 |
| 465.tonto | 224 | **587** | **3750** | 587 | 3760 | 597 | 3690 | 224 | 567 | 3890 | 574 | 3840 | **568** | **3880** |
| 470.lbm | 224 | 1042 | 2950 | **1043** | **2950** | 1043 | 2950 | 224 | 1042 | 2950 | **1043** | **2950** | 1043 | 2950 |
| 481.wrf | 224 | **970** | **2580** | 965 | 2590 | 975 | 2570 | 224 | **970** | **2580** | 965 | 2590 | 975 | 2570 |
| 482.sphinx3 | 224 | 1444 | 3020 | 1442 | 3030 | **1442** | **3030** | 224 | 1444 | 3020 | 1442 | 3030 | **1442** | **3030** |

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"
Turbo mode set with:
cpupower -c all frequency-set -g performance

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SPECfp_rate_base2006 = 3160

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**Test sponsor:** Huawei
**Tested by:** Huawei

**Test date:** Aug-2017
**Hardware Availability:** Aug-2017
**Software Availability:** Apr-2017

### Platform Notes

```
BIOS configuration:
Set SNC to enabled
Set IMC interleaving to 1 way interleave
Sysinfo program /home/cpu2006/config/sysinfo.rev6993
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
running on linux-k6p5 Sat Aug 19 05:48:23 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) Platinum 8176 CPU @ 2.10GHz
      4 "physical id"s (chips)
      224 "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 : 28
      siblings  : 56
      physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24
      25 26 27 28 29 30
      physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24
      25 26 27 28 29 30
      physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24
      25 26 27 28 29 30
      physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24
      25 26 27 28 29 30
   cache size : 39424 KB

From /proc/meminfo
   MemTotal:      394369512 kB
   HugePages_Total:       0
   Hugepagesize:       2048 kB

/usr/bin/lsb_release -d
   SUSE Linux Enterprise Server 12 SP2

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"
```

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| | | | |
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## Platform Notes (Continued)

```
        ANSI_COLOR="0;32"
        CPE_NAME="cpe:/o:suse:sles:12:sp2"

  uname -a:
     Linux linux-k6p5 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 5 Aug 18 17:25

  SPEC is set to: /home/cpu2006
     Filesystem      Type   Size   Used Avail Use% Mounted on
     /dev/sda4       xfs    516G    17G  500G    4% /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 INSYDE Corp. 0.38 07/28/2017
   Memory:
   8x NO DIMM NO DIMM
   24x Samsung M393A2K43BB1-CTD 16 GB 2 rank 2666 MHz

  (End of data from sysinfo program)
```

## General Notes

```
Environment variables set by runspec before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2006/lib/ia32:/home/cpu2006/lib/intel64:/home/cpu2006/sh10.2"

 Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM
 memory using Redhat Enterprise Linux 7.2
 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>
```

## Base Compiler Invocation

C benchmarks:
       icc -m64

C++ benchmarks:
       icpc -m64

Fortran benchmarks:
       ifort -m64

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**Test date:** Aug-2017

**Hardware Availability:** Aug-2017

**Software Availability:** Apr-2017

## 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 -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
```

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# Peak Compiler Invocation (Continued)

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
```

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
```

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# Peak Optimization Flags (Continued)

```
     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

     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: Same as 410.bwaves

      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/Huawei-Platform-Settings-SKL-V1.6.html

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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/Huawei-Platform-Settings-SKL-V1.6.xml

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