SPEC® CFP2006 Result
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Huawei

Huawei 2488 V5 (Intel Xeon Gold 6148)

$SPECfp^{®}\_rate2006 = \quad 2790$

$SPECfp\_rate\_base2006 = \quad 2730$
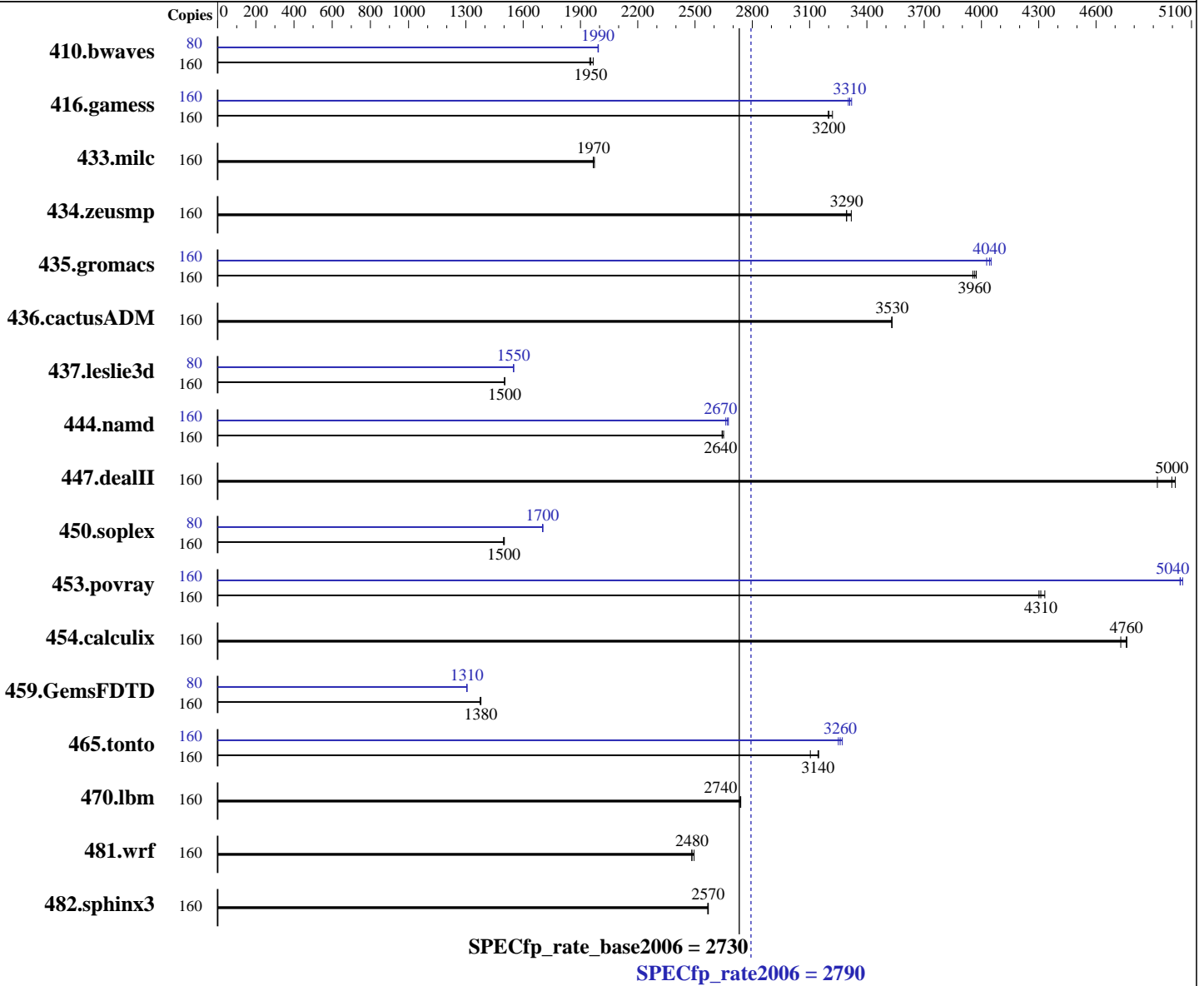
CPU2006 license: 3175
Test sponsor: Huawei
Tested by: Huawei

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

Copies		
410.bwaves	80	1990
	160	1950
416.gamess	160	3310
	160	3200
433.milc	160	1970
434.zeusmp	160	3290
435.gromacs	160	4040
	160	3960
436.cactusADM	160	3530
437.leslie3d	80	1550
	160	1500
444.namd	160	2670
	160	2640
447.dealII	160	5000
450.soplex	80	1700
	160	1500
453.povray	160	5040
	160	4310
454.calculix	160	4760
459.GemsFDTD	80	1310
	160	1380
465.tonto	160	3260
	160	3140
470.lbm	160	2740
481.wrf	160	2480
482.sphinx3	160	2570

SPECfp_rate_base2006 = 2730

SPECfp_rate2006 = 2790

Hardware

CPU Name:	Intel Xeon Gold 6148
CPU Characteristics:	Intel Turbo Boost Technology up to 3.70 GHz
CPU MHz:	2400
FPU:	Integrated
CPU(s) enabled:	80 cores, 4 chips, 20 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)

Continued on next page

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L3 Cache: 27.5 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 300 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	160	1116	1950	1106	1970	**1113**	**1950**	80	546	1990	545	1990	**546**	**1990**
416.gamess	160	980	3200	**979**	**3200**	973	3220	160	944	3320	948	3300	**946**	**3310**
433.milc	160	**746**	**1970**	744	1970	747	1970	160	**746**	**1970**	744	1970	747	1970
434.zeusmp	160	439	3320	**442**	**3290**	442	3290	160	439	3320	**442**	**3290**	442	3290
435.gromacs	160	**288**	**3960**	288	3970	289	3960	160	284	4030	**283**	**4040**	282	4050
436.cactusADM	160	**541**	**3530**	542	3530	541	3530	160	**541**	**3530**	542	3530	541	3530
437.leslie3d	160	1000	1500	1001	1500	**1000**	**1500**	80	485	1550	**485**	**1550**	485	1550
444.namd	160	**485**	**2640**	486	2640	484	2650	160	**481**	**2670**	482	2660	480	2670
447.dealII	160	372	4920	**366**	**5000**	365	5020	160	372	4920	**366**	**5000**	365	5020
450.soplex	160	**890**	**1500**	891	1500	889	1500	80	392	1700	392	1700	**392**	**1700**
453.povray	160	198	4300	196	4330	**197**	**4310**	160	**169**	**5040**	169	5040	168	5050
454.calculix	160	277	4760	279	4730	**277**	**4760**	160	277	4760	279	4730	**277**	**4760**
459.GemsFDTD	160	1231	1380	1235	1370	**1232**	**1380**	80	651	1300	**650**	**1310**	650	1310
465.tonto	160	507	3100	**501**	**3140**	500	3150	160	481	3270	**483**	**3260**	484	3250
470.lbm	160	802	2740	803	2740	**803**	**2740**	160	802	2740	803	2740	**803**	**2740**
481.wrf	160	716	2500	720	2480	**720**	**2480**	160	716	2500	720	2480	**720**	**2480**
482.sphinx3	160	1215	2570	1213	2570	**1214**	**2570**	160	1215	2570	1213	2570	**1214**	**2570**

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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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-va9t Wed Aug 16 05:40:33 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) Gold 6148 CPU @ 2.40GHz
      4 "physical id"s (chips)
      160 "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 : 20
      siblings  : 40
      physical 0: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
      physical 1: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
      physical 2: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
      physical 3: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
   cache size : 28160 KB

From /proc/meminfo
   MemTotal:       394383068 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"
      ANSI_COLOR="0;32"
      CPE_NAME="cpe:/o:suse:sles:12:sp2"

uname -a:
```

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Platform Notes (Continued)

```
   Linux linux-va9t 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 15 18:46

 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
```

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

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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
```

C++ benchmarks (except as noted below):
```
    icpc -m64
```

```
  450.soplex: icpc -m32 -L/opt/intel/compilers_and_libraries_2017/linux/lib/ia32
```

Continued on next page

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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: -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

       447.dealII: basepeak = yes
```

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Peak Optimization Flags (Continued)

> 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

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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