SPEC® CFP2006 Result
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Huawei

Huawei CH121 V5 (Intel Xeon Gold 6140)

$SPECfp^®\_rate2006 =$ 1390

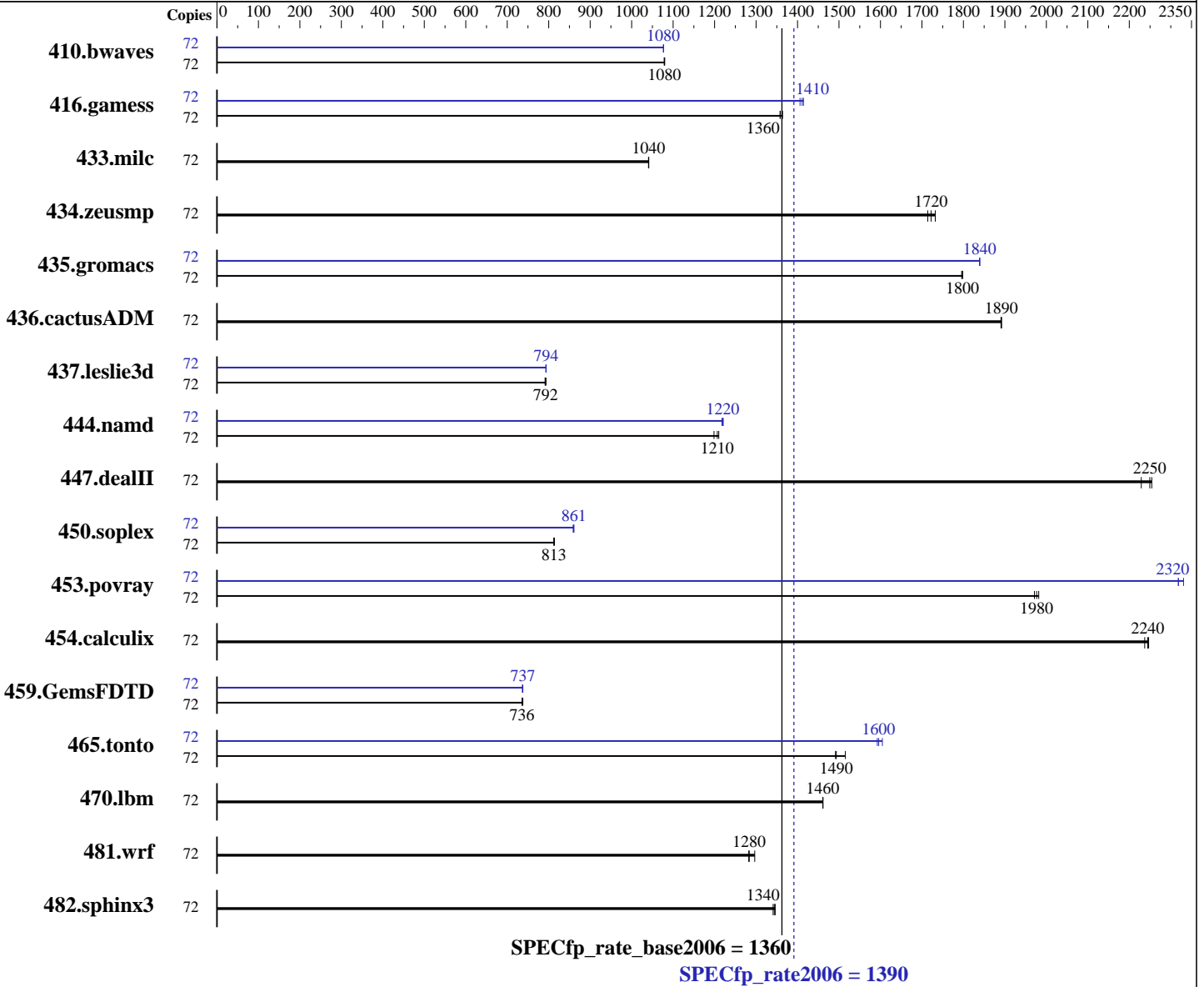$SPECfp\_rate\_base2006 =$ 1360

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

Test date: Jun-2017
Hardware Availability: Aug-2017
Software Availability: Nov-2016

SPECfp_rate_base2006 = 1360

SPECfp_rate2006 = 1390

Hardware

CPU Name:	Intel Xeon Gold 6140
CPU Characteristics:	Intel Turbo Boost Technology up to 3.70 GHz
CPU MHz:	2300
FPU:	Integrated
CPU(s) enabled:	36 cores, 2 chips, 18 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:	1 MB I+D on chip per core

Continued on next page

Software

Operating System:	Red Hat Enterprise Linux Server release 7.3 (Maipo) 3.10.0-514.el7.x86_64
Compiler:	C/C++: Version 17.0.0.098 of Intel C/C++ Compiler for Linux; Fortran: Version 17.0.0.098 of Intel Fortran Compiler for Linux
Auto Parallel:	No
File System:	xfs

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L3 Cache: 24.75 MB I+D on chip per chip
Other Cache: None
Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2666V-R)
Disk Subsystem: 1 x 1200 GB SAS, 10000 RPM
Other Hardware: None

System State: Run level 3 (multi-user)
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	72	906	1080	907	1080	**907**	**1080**	72	909	1080	**909**	**1080**	908	1080
416.gamess	72	1038	1360	**1038**	**1360**	1034	1360	72	**999**	**1410**	997	1410	1003	1410
433.milc	72	635	1040	635	1040	**635**	**1040**	72	635	1040	635	1040	**635**	**1040**
434.zeusmp	72	382	1710	**380**	**1720**	378	1730	72	382	1710	**380**	**1720**	378	1730
435.gromacs	72	**286**	**1800**	286	1800	286	1800	72	**280**	**1840**	279	1840	280	1840
436.cactusADM	72	455	1890	455	1890	**455**	**1890**	72	455	1890	455	1890	**455**	**1890**
437.leslie3d	72	855	791	**854**	**792**	853	793	72	**853**	**794**	853	793	853	794
444.namd	72	482	1200	477	1210	**479**	**1210**	72	474	1220	**473**	**1220**	473	1220
447.dealII	72	370	2230	365	2250	**366**	**2250**	72	370	2230	365	2250	**366**	**2250**
450.soplex	72	**739**	**813**	738	814	739	812	72	**698**	**861**	698	861	699	859
453.povray	72	**194**	**1980**	194	1970	193	1980	72	165	2320	164	2330	**165**	**2320**
454.calculix	72	266	2240	**265**	**2240**	264	2250	72	266	2240	**265**	**2240**	264	2250
459.GemsFDTD	72	**1039**	**736**	1039	736	1036	738	72	**1036**	**737**	1037	736	1036	738
465.tonto	72	468	1520	475	1490	**474**	**1490**	72	445	1590	442	1600	**444**	**1600**
470.lbm	72	**677**	**1460**	677	1460	677	1460	72	**677**	**1460**	677	1460	677	1460
481.wrf	72	**627**	**1280**	627	1280	620	1300	72	**627**	**1280**	627	1280	620	1300
482.sphinx3	72	**1044**	**1340**	1042	1350	1046	1340	72	**1044**	**1340**	1042	1350	1046	1340

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"

Platform Notes

    BIOS configuration:
    Set Power Efficiency Mode to Performance
    Set SNC to Enable

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Platform Notes (Continued)

```
Set IMC Interleaving to 1 way
Set Patrol Scrub to Disable
Sysinfo program /spec17/config/sysinfo.rev6993
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
running on localhost.localdomain Fri Aug 12 07:13:14 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) Gold 6140 CPU @ 2.30GHz
      2 "physical id"s (chips)
      72 "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 : 18
      siblings  : 36
      physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
      physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
   cache size : 25344 KB

From /proc/meminfo
   MemTotal:       790481628 kB
   HugePages_Total:        0
   Hugepagesize:        2048 kB

From /etc/*release* /etc/*version*
   os-release:
      NAME="Red Hat Enterprise Linux Server"
      VERSION="7.3 (Maipo)"
      ID="rhel"
      ID_LIKE="fedora"
      VERSION_ID="7.3"
      PRETTY_NAME="Red Hat Enterprise Linux Server 7.3 (Maipo)"
      ANSI_COLOR="0;31"
      CPE_NAME="cpe:/o:redhat:enterprise_linux:7.3:GA:server"
   redhat-release: Red Hat Enterprise Linux Server release 7.3 (Maipo)
   system-release: Red Hat Enterprise Linux Server release 7.3 (Maipo)
   system-release-cpe: cpe:/o:redhat:enterprise_linux:7.3:ga:server

uname -a:
   Linux localhost.localdomain 3.10.0-514.el7.x86_64 #1 SMP Wed Oct 19 11:24:13
   EDT 2016 x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Aug 7 03:29

SPEC is set to: /spec17
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/sda2      xfs   898G   14G  885G   2% /
Additional information from dmidecode:
```

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Platform Notes (Continued)

```
   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. 0.13 04/11/2017
   Memory:
   24x Samsung M393A4K40BB2-CTD 32 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 = "/spec17/libs/32:/spec17/libs/64:/spec17/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 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>
```

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
```

Base Portability Flags

```
   410.bwaves: -DSPEC_CPU_LP64
   416.gamess: -DSPEC_CPU_LP64
     433.milc: -DSPEC_CPU_LP64
   434.zeusmp: -DSPEC_CPU_LP64
```

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Huawei

Huawei CH121 V5 (Intel Xeon Gold 6140)

SPECfp_rate2006 =   1390

SPECfp_rate_base2006 = 1360

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

Test date: Jun-2017
Hardware Availability: Aug-2017
Software Availability: Nov-2016

Base Portability Flags (Continued)

```
     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
```

Fortran benchmarks:
```
ifort -m64
```

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

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Software Availability: Nov-2016

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

    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:

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Test sponsor: Huawei	**Hardware Availability:** Aug-2017
Tested by: Huawei	**Software Availability:** Nov-2016

Peak Optimization Flags (Continued)

```
  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.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.xml
http://www.spec.org/cpu2006/flags/Huawei-Platform-Settings-SKL-V1.6.xml

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