# Huawei

Huawei 1288H V5 (Intel Xeon Silver 4110)

<table>
<thead>
<tr>
<th>SPECfp®2006</th>
<th>112</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECfp_base2006</td>
<td>107</td>
</tr>
</tbody>
</table>

## Hardware

- **CPU Name:** Intel Xeon Silver 4110
- **CPU Characteristics:** Intel Turbo Boost Technology up to 3.00 GHz
- **CPU MHz:** 2100
- **FPU:** Integrated
- **CPU(s) enabled:** 16 cores, 2 chips, 8 cores/chip
- **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

## 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:** Yes
- **File System:** xfs

## Test Details

- **CPU2006 license:** 3175
- **Test sponsor:** Huawei
- **Tested by:** Huawei
- **Test date:** Aug-2017
- **Hardware Availability:** Sep-2017
- **Software Availability:** Nov-2016

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**SPECfp®2006 = 112**

### SPECfp2006 Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Result</th>
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<tr>
<td>410.bwaves</td>
<td>42.9</td>
</tr>
<tr>
<td>416.gamess</td>
<td>38.5</td>
</tr>
<tr>
<td>433.milc</td>
<td>69.3</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>213</td>
</tr>
<tr>
<td>435.gromacs</td>
<td>42.4</td>
</tr>
<tr>
<td>436.cactusADM</td>
<td></td>
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<tr>
<td>437.leslie3d</td>
<td>328</td>
</tr>
<tr>
<td>444.namd</td>
<td>29.6</td>
</tr>
<tr>
<td>447.dealII</td>
<td>59.1</td>
</tr>
<tr>
<td>450.soplex</td>
<td>38.2</td>
</tr>
<tr>
<td>453.povray</td>
<td>63.8</td>
</tr>
<tr>
<td>454.calculix</td>
<td>57.7</td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td>263</td>
</tr>
<tr>
<td>465.tonto</td>
<td>54.3</td>
</tr>
<tr>
<td>470.lbm</td>
<td>39.6</td>
</tr>
<tr>
<td>481.wrf</td>
<td>93.9</td>
</tr>
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**SPECfp_base2006 = 107**
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CPU2006 license: 3175
Test sponsor: Huawei
Tested by: Huawei
L3 Cache: 11 MB I+D on chip per chip
Other Cache: None
Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2666V-R, running at 2400 MHz)
Disk Subsystem: 1 x 1200 GB SAS, 10000 RPM
Other Hardware: None
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 32/64-bit
Other Software: None

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds Base</th>
<th>Ratio Base</th>
<th>Seconds Peak</th>
<th>Ratio Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>20.9</td>
<td>651</td>
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<td>435.gromacs</td>
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<td>42.4</td>
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<td>39.5</td>
<td>248</td>
<td>39.6</td>
</tr>
<tr>
<td>470.lbm</td>
<td>17.0</td>
<td>810</td>
<td>17.0</td>
<td>810</td>
</tr>
<tr>
<td>481.wrf</td>
<td>119</td>
<td>94.2</td>
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<td>93.9</td>
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<td>482.sphinx3</td>
<td>329</td>
<td>59.3</td>
<td>329</td>
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</tr>
</tbody>
</table>

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

Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

Platform Notes

BIOS configuration:
Set Power Efficiency Mode to Custom
Set Hyper-Threading to Disable
Sysinfo program /spec17/config/sysinfo.rev6993
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
running on localhost.localdomain Wed Aug 2 10:53:26 2017

This section contains SUT (System Under Test) info as seen by some common utilities. To remove or add to this section, see:
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Platform Notes (Continued)

http://www.spec.org/cpu2006/Docs/config.html#sysinfo

From /proc/cpuinfo
  model name: Intel(R) Xeon(R) Silver 4110 CPU @ 2.10GHz
  2 "physical id"s (chips)
  16 "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: 8
siblings: 8
physical 0: cores 0 1 2 3 4 5 6 7
physical 1: cores 0 1 2 3 4 5 6 7
cache size: 11264 KB

From /proc/meminfo
  MemTotal: 790482140 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)

  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 1 13:32

  SPEC is set to: /spec17
  Filesystem Type Size Used Avail Use% Mounted on
  /dev/sda2 xfs 898G 19G 880G 3% /

  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. 0.20 07/14/2017
  Memory:
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CPU2006 license: 3175
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Platform Notes (Continued)

24x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666 MHz, configured at 2400 MHz

(End of data from sysinfo program)

General Notes

Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/spec17/libs/32:/spec17/libs/64:/spec17/sh10.2"
OMP_NUM_THREADS = "16"

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
runcspe 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
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

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Base Portability Flags (Continued)

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 -parallel -qopt-prefetch
C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
Fortran benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -qopt-prefetch
Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -qopt-prefetch

Peak Compiler Invocation

C benchmarks:
icc -m64
C++ benchmarks:
icpc -m64
Fortran benchmarks:
ifort -m64
Benchmarks using both Fortran and C:
icc -m64 ifort -m64

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

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**Peak Optimization Flags (Continued)**

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

447.dealII: basepeak = yes  
450.soplex: basepeak = yes  
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 -ansi-alias

Fortran benchmarks:

410.bwaves: basepeak = yes  
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: basepeak = yes  
459.GemsFDTD: -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 -qopt-prefetch -parallel

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) -inline-calloc -qopt-malloc-options=3  
-auto -unroll4

Benchmarks using both Fortran and C:

435.gromacs: basepeak = yes  
436.cactusADM: basepeak = yes  
454.calculix: -xCORE-AVX2 -ipo -O3 -no-prec-div -auto-ilp32

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## Huawei 1288H V5 (Intel Xeon Silver 4110)

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### Peak Optimization Flags (Continued)

481.wrf: basepeak = yes

The flags files that were used to format this result can be browsed at:
- [Intel-ic17.0-official-linux64.html](http://www.spec.org/cpu2006/flags/Intel-ic17.0-official-linux64.html)
- [Huawei-Platform-Settings-SKL-V1.6.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:
- [Intel-ic17.0-official-linux64.xml](http://www.spec.org/cpu2006/flags/Intel-ic17.0-official-linux64.xml)
- [Huawei-Platform-Settings-SKL-V1.6.xml](http://www.spec.org/cpu2006/flags/Huawei-Platform-Settings-SKL-V1.6.xml)

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Tested with SPEC CPU2006 v1.2.  
Report generated on Wed Sep 6 11:45:56 2017 by SPEC CPU2006 PS/PDF formatter v6932.  
Originally published on 5 September 2017.