**Huawei XH628 V3 (Intel Xeon E5-2609 v4)**

<table>
<thead>
<tr>
<th>SPECf_p_rate2006 = 443</th>
<th>SPECf_p_rate_base2006 = 435</th>
</tr>
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<tbody>
<tr>
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<td>Tested by: Huawei</td>
<td></td>
</tr>
<tr>
<td>CPU2006 license: 3175</td>
<td>Test date: Dec-2016</td>
</tr>
<tr>
<td>Test sponsor: Huawei</td>
<td>Hardware Availability: Mar-2016</td>
</tr>
<tr>
<td>CPU(s) orderable: 1,2 chip</td>
<td>Software Availability: Nov-2015</td>
</tr>
<tr>
<td>Primary Cache: 32 KB I + 32 KB D on chip per core</td>
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<tr>
<td>Secondary Cache: 256 KB I+D on chip per core</td>
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</tbody>
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<thead>
<tr>
<th>Hardware</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name: Intel Xeon E5-2609 v4</td>
<td>Operating System: Red Hat Enterprise Linux Server release 7.2 (Maipo) 3.10.0-327.el7.x86_64</td>
</tr>
<tr>
<td>CPU Characteristics:</td>
<td>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</td>
</tr>
<tr>
<td>CPU MHz: 1700</td>
<td>Auto Parallel: No</td>
</tr>
<tr>
<td>FPU: Integrated</td>
<td>File System: ext4</td>
</tr>
<tr>
<td>CPU(s) enabled: 16 cores, 2 chips, 8 cores/chip</td>
<td></td>
</tr>
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<tr>
<td>410.bwaves</td>
<td>16</td>
<td>362</td>
</tr>
<tr>
<td>416.gamess</td>
<td>16</td>
<td>350</td>
</tr>
<tr>
<td>433.milc</td>
<td>16</td>
<td>482</td>
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<td>434.zeusmp</td>
<td>16</td>
<td>509</td>
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<td>435.gromacs</td>
<td>16</td>
<td>421</td>
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<tr>
<td>436.cactusADM</td>
<td>16</td>
<td>401</td>
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<tr>
<td>437.leslie3d</td>
<td>16</td>
<td>367</td>
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<td>444.namd</td>
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<td>246</td>
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<td>447.dealII</td>
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<td>450.soplex</td>
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<td>453.povray</td>
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<td>541</td>
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<tr>
<td>454.calculix</td>
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<td>479</td>
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<tr>
<td>459.GemsFDTD</td>
<td>16</td>
<td>505</td>
</tr>
<tr>
<td>465.tonto</td>
<td>16</td>
<td>445</td>
</tr>
<tr>
<td>470.lbm</td>
<td>16</td>
<td>415</td>
</tr>
<tr>
<td>481.wrf</td>
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<tr>
<td>482.sphinx3</td>
<td>16</td>
<td>421</td>
</tr>
</tbody>
</table>

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Huawei

Huawei XH628 V3 (Intel Xeon E5-2609 v4)

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

L3 Cache: 20 MB I+D on chip per chip
Other Cache: None
Memory: 64 GB (8 x 8 GB 2Rx8 PC4-2400T-R, running at 1866 MHz)
Disk Subsystem: 1 x 120 GB SATA SSD
Other Hardware: None

System State: Run level 3 (multi-user)
Base Pointers: 32/64-bit
Peak Pointers: 32/64-bit

Benchmark | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio
--- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | ---
410.bwaves | 16 | 436 | 498 | 436 | 499 | 437 | 498 | 16 | 436 | 498 | 436 | 499 | 437 | 498
416.gamess | 16 | 894 | 350 | 895 | 350 | 896 | 350 | 16 | 865 | 362 | 866 | 362 | 865 | 362
433.milc | 16 | 304 | 482 | 305 | 481 | 305 | 482 | 16 | 304 | 482 | 305 | 481 | 305 | 482
434.zeusmp | 16 | 286 | 509 | 286 | 509 | 286 | 509 | 16 | 286 | 509 | 286 | 509 | 286 | 509
435.gromacs | 16 | 286 | 509 | 286 | 509 | 286 | 509 | 16 | 286 | 509 | 286 | 509 | 286 | 509
436.cactusADM | 16 | 264 | 724 | 263 | 726 | 264 | 724 | 16 | 264 | 724 | 263 | 726 | 264 | 724
437.leslie3d | 16 | 410 | 367 | 410 | 367 | 410 | 367 | 16 | 410 | 367 | 410 | 367 | 410 | 367
444.namd | 16 | 535 | 240 | 536 | 240 | 536 | 240 | 16 | 522 | 246 | 522 | 246 | 522 | 246
447.dealII | 16 | 346 | 529 | 347 | 528 | 346 | 529 | 16 | 346 | 529 | 347 | 528 | 346 | 529
450.soplex | 16 | 432 | 309 | 433 | 308 | 433 | 308 | 16 | 432 | 309 | 433 | 308 | 433 | 308
453.povray | 16 | 177 | 481 | 178 | 479 | 178 | 478 | 16 | 157 | 543 | 158 | 539 | 157 | 541
454.calculix | 16 | 261 | 505 | 261 | 505 | 261 | 505 | 16 | 261 | 505 | 261 | 505 | 261 | 505
459.GemsFDTD | 16 | 560 | 303 | 559 | 303 | 559 | 303 | 16 | 560 | 303 | 559 | 303 | 559 | 303
470.lbm | 16 | 351 | 626 | 352 | 625 | 352 | 625 | 16 | 351 | 626 | 352 | 625 | 352 | 625
481.wrf | 16 | 352 | 507 | 349 | 512 | 352 | 508 | 16 | 352 | 507 | 349 | 512 | 352 | 508
482.sphinx3 | 16 | 740 | 422 | 741 | 421 | 740 | 421 | 16 | 740 | 422 | 741 | 421 | 740 | 421

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 Snoop Mode to ES mode

Continued on next page
Huawei XH628 V3 (Intel Xeon E5-2609 v4)

SPECfp_rate2006 = 443
SPECfp_rate_base2006 = 435

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Platform Notes (Continued)

Set Patrol Scrub to Disable
Sysinfo program /spec16/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on localhost.localdomain Fri Dec 23 20:38:03 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 E5-2609 v4 @ 1.70GHz
  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
cautions.)
  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 : 20480 KB

From /proc/meminfo
MemTotal:       65569452 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)

uname -a:
Linux localhost.localdomain 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

run-level 3 Dec 23 07:46

SPEC is set to: /spec16
  Filesystem Type Size Used Avail Use% Mounted on
  /dev/sda2 ext4 99G 5.5G 88G 6% /

Additional information from dmidecode:

Continued on next page
Huawei

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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. 3.31 08/22/2016
Memory:
8x Hynix HMA41GR7AFR8N-UH 8 GB 2 rank 2400 MHz, configured at 1867 MHz
8x NO DIMM NO DIMM

(End of data from sysinfo program)

General Notes

Environment variables set by runspec before the start of the run:
LD_LIBRARY_PATH = "/spec16/libs/32:/spec16/libs/64:/spec16/sh"

Binaries compiled on a system with 1x Intel Core i5-4670K CPU + 32GB memory using RedHat EL 7.1
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>
The Huawei XH622 V3 and Huawei XH628 V3 and Huawei XH620 V3 are electronically equivalent.
The results have been measured on a Huawei XH620 V3 model.

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

Continued on next page
Huawei

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Test date: Dec-2016
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Base Portability Flags (Continued)

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 -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LINUX
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 -opt-prefetch -auto-p32
-ansi-alias -opt-mem-layout-trans=3

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
-ansi-alias -opt-mem-layout-trans=3

Fortran benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
-ansi-alias -opt-mem-layout-trans=3

Peak Compiler Invocation

C benchmarks:
icc -m64

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

Continued on next page
Peak Compiler Invocation (Continued)

Benchmarks using both Fortran and C:

```plaintext
icc -m64 ifort -m64
```

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

- 433.milc: basepeak = yes
- 470.lbm: basepeak = yes
- 482.sphinx3: basepeak = yes

C++ benchmarks:

- 444.namd: -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) -opt-mem-layout-trans=3(pass 2)
  -prof-use(pass 2) -fno-alias -auto-ilp32

- 447.dealII: basepeak = yes
- 450.soplex: basepeak = yes
- 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) -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) -prof-use(pass 2) -unroll2
  -inline-level=0 -scalar-rep-

- 434.zeusmp: basepeak = yes
- 437.leslie3d: basepeak = yes

Continued on next page
Huawei XH628 V3 (Intel Xeon E5-2609 v4)  

| SPECfp_rate2006 | 443 |
| SPECfp_rate_base2006 | 435 |

CPU2006 license: 3175  
Test sponsor: Huawei  
Tested by: Huawei  
Test date: Dec-2016  
Hardware Availability: Mar-2016  
Software Availability: Nov-2015

Peak Optimization Flags (Continued)

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) -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) -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: basepeak = yes

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/Intel-ic16.0-official-linux64.html
http://www.spec.org/cpu2006/flags/Huawei-Platform-Settings-BDW-V1.0.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic16.0-official-linux64.xml
http://www.spec.org/cpu2006/flags/Huawei-Platform-Settings-BDW-V1.0.xml