Huawei 2288 V5 (Intel Xeon Silver 4208)

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CPU2017 License: 3175  
Test Sponsor: Huawei  
Tested by: Huawei  
Test Date: Mar-2019  
Hardware Availability: Apr-2019  
Software Availability: Dec-2018

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<td>554.roms_r</td>
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**Hardware**

- **CPU Name**: Intel Xeon Silver 4208  
- **CPU Name**: Intel Xeon Silver 4208  
- **Max MHz.**: 3200  
- **Nominal**: 2100  
- **Enabled**: 16 cores, 2 chips, 2 threads/core  
- **Orderable**: 1,2 chips  
- **Cache L1**: 32 KB I + 32 KB D on chip per core  
- **Cache L2**: 1 MB I+D on chip per core  
- **Cache L3**: 11 MB I+D on chip per chip  
- **Other**: None

**Memory**: 192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R, running at 2400)

**Storage**: 1 x 1200 GB SAS, 10000 RPM

**Other**: None

**Software**

- **OS**: SUSE Linux Enterprise Server 12 SP4 (x86_64)  
- **Compiler**: C/C++: Version 19.0.1.144 of Intel C/C++ Compiler Build 20181018 for Linux; Fortran: Version 19.0.1.144 of Intel Fortran Compiler Build 20181018 for Linux
- **Firmware**: Version 6.52 Released Mar-2019
- **File System**: xfs
- **System State**: Run level 3 (multi-user)
- **Base Pointers**: 64-bit
- **Peak Pointers**: 64-bit
- **Other**: None
Huawei
Huawei 2288 V5 (Intel Xeon Silver 4208)

CPU2017 License: 3175
Test Sponsor: Huawei
Tested by: Huawei

SPECrate2017_fp_base = 91.8
SPECrate2017_fp_peak = 94.8

Results Table

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</table>

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"

General Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/spec2017/lib/ia32:/spec2017/lib/intel64"
Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.5
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Filesystem page cache synced and cleared with:
sync; echo 3> /proc/sys/vm/drop_caches
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)
is mitigated in the system as tested and documented.
SPEC CPU2017 Floating Point Rate Result

Huawei
Huawei 2288 V5 (Intel Xeon Silver 4208)

CPU2017 License: 3175
Test Sponsor: Huawei
Tested by: Huawei

SPECrate2017_fp_base = 91.8
SPECrate2017_fp_peak = 94.8

Test Date: Mar-2019
Hardware Availability: Apr-2019
Software Availability: Dec-2018

General Notes (Continued)

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1) is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2) is mitigated in the system as tested and documented.

Platform Notes

BIOS configuration:
Power Policy Set to Performance
XPT Prefetch Set to Enabled
Sysinfo program /spec2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on linux-0o4j Sun Mar 24 02:31:48 2019

SUT (System Under Test) info as seen by some common utilities.
For more information on this section, see
https://www.spec.org/cpu2017/Docs/config.html#sysinfo

From /proc/cpuinfo
model name : Intel(R) Xeon(R) Silver 4208 CPU @ 2.10GHz
  2 "physical id"s (chips)
  32 "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 : 16
physical 0: cores 0 2 3 4 5 6 7
physical 1: cores 0 2 3 4 5 6 7

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 32
On-line CPU(s) list: 0-31
Thread(s) per core: 2
Core(s) per socket: 8
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4208 CPU @ 2.10GHz
Stepping: 6
CPU MHz: 2100.000
CPU max MHz: 3200.000

(Continued on next page)
Huawei 2288 V5 (Intel Xeon Silver 4208)

SPECrate2017_fp_base = 91.8
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CPU2017 License: 3175
Test Sponsor: Huawei
Tested by: Huawei
Test Date: Mar-2019
Hardware Availability: Apr-2019
Software Availability: Dec-2018

Platform Notes (Continued)

CPU min MHz: 800.0000
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 11264K
NUMA node0 CPU(s): 0-7,16-23
NUMA node1 CPU(s): 8-15,24-31
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfmpref pni pclmulqdq dtes64 ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm
pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c
rdseed lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single ssbd
mfa ibrs ibpb stibp tpr_shadow vmni flexpriority ept vpid fsgsbase tsc_adjust bm1
hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdmsk avx512f avx512dq rdseed adx smap
cflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaves xsavec xgetbv1 xsaves
cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln pts pku ospke
avx512_vnni flush_lld arch_capabilities

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
   available: 2 nodes (0-1)
   node 0 cpus: 0 1 2 3 4 5 6 7 16 17 18 19 20 21 22 23
   node 0 size: 95165 MB
   node 0 free: 94015 MB
   node 1 cpus: 8 9 10 11 12 13 14 15 24 25 26 27 28 29 30 31
   node 1 size: 96499 MB
   node 1 free: 95433 MB
   node distances:
   node 0 1
   0: 10 21
   1: 21 10

From /proc/meminfo
   MemTotal: 196265040 kB
   HugePages_Total: 0
   Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
   SuSE-release:
      SUSE Linux Enterprise Server 12 (x86_64)
      VERSION = 12

(Continued on next page)
Huawei 2288 V5 (Intel Xeon Silver 4208)

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CPU2017 License: 3175
Test Sponsor: Huawei
Test Date: Mar-2019
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Platform Notes (Continued)

PATCHLEVEL = 4
# 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-SP4"
VERSION_ID="12.4"
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP4"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp4"

uname -a:
x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Mar 23 16:37

SPEC is set to: /spec2017
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 xfs 919G 11G 909G 2% /

Additional information from dmidecode follows. 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. 6.52 03/16/2019
Memory:
4x NO DIMM NO DIMM
12x Samsung M393A2K43CB2-CVF 16 GB 2 rank 2933, configured at 2400

(End of data from sysinfo program)

Compiler Version Notes

=================================================================================
CC  519.lbm_r(base) 538.imagick_r(base, peak) 544.nab_r(base, peak)
=================================================================================

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
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=================================================================================
CC  519.lbm_r(peak)
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Huawei

Huawei 2288 V5 (Intel Xeon Silver 4208)

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CPU2017 License: 3175
Test Sponsor: Huawei
Tested by: Huawei

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**Compiler Version Notes (Continued)**

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
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CXXC 508.namd_r(base) 510.parest_r(base, peak)

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CXXC 508.namd_r(peak)

-----------------------------------------------

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CC 511.povray_r(base) 526.blender_r(base, peak)

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CC 511.povray_r(peak)

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FC 507.cactuBSSN_r(base, peak)

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Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
# SPEC CPU2017 Floating Point Rate Result

**Huawei**

**Huawei 2288 V5 (Intel Xeon Silver 4208)**

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## Compiler Version Notes (Continued)

Version 19.0.1.144 Build 20181018
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Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
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Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.1.144 Build 20181018
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FLICT 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base)

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.1.144 Build 20181018
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FLICT 554.roms_r(peak)

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CC 521.wrf_r(base) 527.cam4_r(base)

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CC 521.wrf_r(peak) 527.cam4_r(peak)

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Huawei

Huawei 2288 V5 (Intel Xeon Silver 4208)

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CPU2017 License: 3175
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Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
ifort -m64 icc -m64 -std=c11

Benchmarks using both C and C++:
icpc -m64 icc -m64 -std=c11

Benchmarks using Fortran, C, and C++:
icpc -m64 icc -m64 -std=c11 ifort -m64

Base Portability Flags

503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-xCORE-AVX2 -ipo -03 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

C++ benchmarks:
-xCORE-AVX2 -ipo -03 -no-prec-div -qopt-prefetch -ffinite-math-only

(Continued on next page)


Huawei

Huawei 2288 V5 (Intel Xeon Silver 4208)

<table>
<thead>
<tr>
<th>SPECrate2017_fp_base</th>
<th>91.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_fp_peak</td>
<td>94.8</td>
</tr>
</tbody>
</table>

CPU2017 License: 3175
Test Sponsor: Huawei
Test Date: Mar-2019
Hardware Availability: Apr-2019
Tested by: Huawei
Software Availability: Dec-2018

Base Optimization Flags (Continued)

C++ benchmarks (continued):
- `qopt-mem-layout-trans=4`

Fortran benchmarks:
- `xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only`
- `qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs`
- `align array32byte`

Benchmarks using both Fortran and C:
- `xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only`
- `qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs`
- `align array32byte`

Benchmarks using both C and C++:
- `xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only`
- `qopt-mem-layout-trans=4`

Benchmarks using Fortran, C, and C++:
- `xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only`
- `qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs`
- `align array32byte`

Peak Compiler Invocation

C benchmarks:
- `icc -m64 -std=c11`

C++ benchmarks:
- `icpc -m64`

Fortran benchmarks:
- `ifort -m64`

Benchmarks using both Fortran and C:
- `ifort -m64 icc -m64 -std=c11`

Benchmarks using both C and C++:
- `icpc -m64 icc -m64 -std=c11`

Benchmarks using Fortran, C, and C++:
- `icpc -m64 icc -m64 -std=c11 ifort -m64`
Huawei

Huawei 2288 V5 (Intel Xeon Silver 4208)

| SPECrate2017_fp_base | 91.8 |
| SPECrate2017_fp_peak | 94.8 |

CPU2017 License: 3175
Test Sponsor: Huawei
Tested by: Huawei

Test Date: Mar-2019
Hardware Availability: Apr-2019
Software Availability: Dec-2018

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

519.lbm_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4

538.imagick_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4

544.nab_r: Same as 538.imagick_r

C++ benchmarks:

508.namd_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4

510.parest_r: basepeak = yes

Fortran benchmarks:

503.bwaves_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs -align array32byte

549.fotonik3d_r: Same as 503.bwaves_r

554.roms_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs -align array32byte

Benchmarks using both Fortran and C:

-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs -align array32byte

Benchmarks using both C and C++:

(Continued on next page)
Huawei

Huawei 2288 V5 (Intel Xeon Silver 4208)

SPECrate2017_fp_base = 91.8
SPECrate2017_fp_peak = 94.8

CPU2017 License: 3175
Test Sponsor: Huawei
Tested by: Huawei

Test Date: Mar-2019
Hardware Availability: Apr-2019
Software Availability: Dec-2018

Peak Optimization Flags (Continued)

511.povray_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

526.blender_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

The flags files that were used to format this result can be browsed at

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Huawei-Platform-Settings-SKL-V1.9-revC.xml

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.