## SPEC CPU®2017 Floating Point Rate Result

**xFusion**

**xFusion 5288 V6 (Intel Xeon Silver 4316)**

<table>
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<tr>
<th>Copies</th>
<th>SPECrate®2017_fp_base =</th>
<th>SPECrate®2017_fp_peak =</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>Must Run</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

### Hardware
- **CPU Name**: Intel Xeon Silver 4316
- **Max MHz**: 3400
- **Nominal**: 2300
- **Enabled**: 40 cores, 2 chips, 2 threads/core
- **Orderable**: 1,2 chips
- **Cache L1**: 32 KB I + 48 KB D on chip per core
- **L2**: 1.25 MB I+D on chip per core
- **L3**: 30 MB I+D on chip per chip
- **Memory**: 512 GB (16 x 32 GB 2Rx4 PC4-3200AA-R, running at 2666)
- **Storage**: 1 x 960 GB SATA SSD
- **Other**: None

### Software
- **OS**: Red Hat Enterprise Linux release 8.4 (Ootpa)
  4.18.0-305.el8.x86_64
- **Compiler**: C/C++: Version 2021.1 of Intel oneAPI DPC++/C++ Compiler Build 20201113 for Linux;
  Fortran: Version 2021.1 of Intel Fortran Compiler Classic Build 20201112 for Linux
- **Parallel**: No
- **Firmware**: Version 0.95 Released Dec-2021
- **File System**: xfs
- **System State**: Run level 3 (multi-user)
- **Base Pointers**: 64-bit
- **Peak Pointers**: Not Applicable
- **Other**: None
- **Power Management**: BIOS and OS set to prefer performance at the cost of additional power usage
**SPEC CPU® 2017 Floating Point Rate Result**

xFusion

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<table>
<thead>
<tr>
<th>Benchmark</th>
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<td>978</td>
<td>130</td>
</tr>
</tbody>
</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"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/spec2017/lib/intel64:/spec2017/je5.0.1-64"
MALLOC_CONF = "retain:true"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Red Hat Enterprise Linux 8.1
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Filesystem page cache synced and cleared with:
General Notes (Continued)

sync; echo 3> /proc/sys/vm/drop_caches
runcpu command invoked through numactl i.e.: numactl --interleave=all runcpu <etc>
NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
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:
Performance Profile Set to Performance
SNC Set to Enabled SNC2 (2-clusters)

Sysinfo program /spec2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aca6fcd
running on localhost.localdomain Wed Mar 23 12:06:42 2022

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 4316 CPU @ 2.30GHz
2 "physical id"s (chips)
80 "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 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

From lscpu from util-linux 2.32.1:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 80
On-line CPU(s) list: 0-79
Thread(s) per core: 2
Core(s) per socket: 20

(Continued on next page)
xFusion
xFusion 5288 V6 (Intel Xeon Silver 4316)

SPECrate®2017_fp_base = 300
SPECrate®2017_fp_peak = Not Run

CPU2017 License: 6488
Test Sponsor: xFusion
Tested by: xFusion

Test Date: Mar-2022
Hardware Availability: Apr-2021
Software Availability: May-2021

Platform Notes (Continued)

Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
BIOS Vendor ID: Intel(R) Corporation
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Silver 4316 CPU @ 2.30GHz
BIOS Model name: Intel(R) Xeon(R) Silver 4316 CPU @ 2.30GHz
Stepping: 6
CPU MHz: 2799.879
BogoMIPS: 4600.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 30720K
NUMA node0 CPU(s): 0-9,40-49
NUMA node1 CPU(s): 10-19,50-59
NUMA node2 CPU(s): 20-29,60-69
NUMA node3 CPU(s): 30-39,70-79
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 nop1 xtopology nonstop_tsc cpuid
aperfmpref pni pclmulqdq dtst64 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 avx16c
rdseed lldt ldtt lahf_lm abml 3dnowprefetch cpuid_fault ebcat l3 invecid_single ssbd mba
ibrs ibpb stibp ibrs_enhanced tpr_shadow vmni flexpriority ept vpid ept_ad fsgsbase

tsc_adjust bmis hle avx2 smep bmi2 erms invpcid cmqm rdt_a avx512f avx512dq rdseed
adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl
xsaveopt xsavec xgetbv1 xsaves cmqm_llc cmqm_occup_llc cmqm_mbm_total cmqm_mbm_local
split_lock_detect wbinvd dbtiming ida arat pln pts hwp_epp avx512vbm1 umip pku ospeke
avx512_vbmi2 gfn vaes vpclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq
la57 rdpid fsrm md_clear pconfi flush lld arch_capabilities

/proc/cpuinfo cache data

cache size: 30720 KB

From numactl --hardware

WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 4 nodels (0-3)
nodel 0 cpus: 0 1 2 3 4 5 6 7 8 9 40 41 42 43 44 45 46 47 48 49
node 0 size: 128153 MB
node 0 free: 121553 MB
node 1 cpus: 10 11 12 13 14 15 16 17 18 19 50 51 52 53 54 55 56 57 58 59
node 1 size: 129019 MB
node 1 free: 124878 MB
node 2 cpus: 20 21 22 23 24 25 26 27 28 29 60 61 62 63 64 65 66 67 68 69

(Continued on next page)
**Platform Notes (Continued)**

- node 2 size: 128982 MB
- node 2 free: 124665 MB
- node 3 cpus: 30 31 32 33 34 35 36 37 38 39 70 71 72 73 74 75 76 77 78 79
- node 3 size: 129017 MB
- node 3 free: 124689 MB
- node distances:
  - node 0 1 2 3
  - 0: 10 11 20 20
  - 1: 11 10 20 20
  - 2: 20 20 10 11
  - 3: 20 20 11 10

From `/proc/meminfo`
- MemTotal: 527536452 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

/sbin/tuned-adm active
- Current active profile: throughput-performance

From `/etc/*release* /etc/*version*`
- os-release:
  - NAME="Red Hat Enterprise Linux"
  - VERSION="8.4 (Ootpa)"
  - ID="rhel"
  - ID_LIKE="fedora"
  - VERSION_ID="8.4"
  - PLATFORM_ID="platform:el8"
  - PRETTY_NAME="Red Hat Enterprise Linux 8.4 (Ootpa)"
  - ANSI_COLOR="0;31"
- redhat-release: Red Hat Enterprise Linux release 8.4 (Ootpa)
- system-release: Red Hat Enterprise Linux release 8.4 (Ootpa)
- system-release-cpe: cpe:/o:redhat:enterprise_linux:8.4:ga

uname -a:
- Linux localhost.localdomain 4.18.0-305.el8.x86_64 #1 SMP Thu Apr 29 08:54:30 EDT 2021
- x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:
- CVE-2018-12207 (iTLB Multihit): Not affected
- CVE-2018-3620 (L1 Terminal Fault): Not affected
- Microarchitectural Data Sampling: Not affected
- CVE-2017-5754 (Meltdown): Not affected
- CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled via prctl and seccomp

(Continued on next page)
XFusion

XFusion 5288 V6 (Intel Xeon Silver 4316)

SPECrater®2017_fp_base = 300
SPECrater®2017_fp_peak = Not Run

CPU2017 License: 6488
Test Sponsor: XFusion
Test Date: Mar-2022
Tested by: XFusion
Hardware Availability: Apr-2021
Software Availability: May-2021

Platform Notes (Continued)

CVE-2017-5753 (Spectre variant 1):
Mitigation: usercopy/swapgs barriers and __user pointer sanitization
CVE-2017-5715 (Spectre variant 2):
Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Mar 23 08:20
SPEC is set to: /spec2017
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 xfs 420G 65G 356G 16% /

From /sys/devices/virtual/dmi/id
Vendor: XFUSION
Product: 5288 V6
Product Family: Whitley
Serial: 1234567

Additional information from dmidecode 3.2 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.
Memory:
16x Samsung M393A4G43AB3-CWE 32 GB 2 rank 3200, configured at 2666

BIOS:
BIOS Vendor: INSYDE Corp.
BIOS Version: 0.95
BIOS Date: 12/22/2021
BIOS Revision: 0.95

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C | 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
==============================================================================
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2021.1 Build 20201113
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==============================================================================

(Continued on next page)
xFusion

xFusion 5288 V6 (Intel Xeon Silver 4316)

SPECraté®2017_fp_base = 300
SPECraté®2017_fp_peak = Not Run

CPU2017 License: 6488
Test Sponsor: xFusion
Tested by: xFusion

Test Date: Mar-2022
Hardware Availability: Apr-2021
Software Availability: May-2021

Compiler Version Notes (Continued)

C++  | 508.namd_r(base) 510.parest_r(base)
-----------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

-----------------------------------------------------------------------------
C++, C  | 511.povray_r(base) 526.blender_r(base)
-----------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

-----------------------------------------------------------------------------
C++, C, Fortran  | 507.cactuBSSN_r(base)
-----------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2021.1 Build 20201113
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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
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Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
Intel(R) 64, Version 2021.1 Build 20201112_000000
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-----------------------------------------------------------------------------
Fortran  | 503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)
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Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
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SPECCPU®2017 Floating Point Rate Result

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xFusion 5288 V6 (Intel Xeon Silver 4316)

CPU2017 License: 6488
Test Sponsor: xFusion
Tested by: xFusion

SPECCrate®2017_fp_base = 300

Test Date: Mar-2022
Hardware Availability: Apr-2021
Software Availability: May-2021

Compiler Version Notes (Continued)

Version 2021.1 Build 20201113
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Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icx

Benchmarks using both C and C++:
icpx icx

Benchmarks using Fortran, C, and C++:
icpx icx ifort

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

SPECCrate®2017_fp_peak = Not Run
**SPEC CPU®2017 Floating Point Rate Result**

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### Base Optimization Flags

**C benchmarks:**

- `-w -std=c11 -m64 -W1,-z,muldefs -xCORE-AVX512 -Oفات -ffast-math`  
- `-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4`  
- `-mbranches-within-32B-boundaries -ljemalloc`  
- `-L/usr/local/jemalloc64-5.0.1/lib`

**C++ benchmarks:**

- `-w -m64 -W1,-z,muldefs -xCORE-AVX512 -Oفات -ffast-math -flto`  
- `-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4`  
- `-mbranches-within-32B-boundaries -ljemalloc`  
- `-L/usr/local/jemalloc64-5.0.1/lib`

**Fortran benchmarks:**

- `-w -m64 -W1,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div`  
- `-qopt-prefetch -ffinite-math-only`  
- `-qopt-multiple-gather-scatter-by-shuffles -qopt-mem-layout-trans=4`  
- `-nostandard-realloc-lhs -align array32byte -auto`  
- `-mbranches-within-32B-boundaries -ljemalloc`  
- `-L/usr/local/jemalloc64-5.0.1/lib`

**Benchmarks using both Fortran and C:**

- `-w -m64 -std=c11 -W1,-z,muldefs -xCORE-AVX512 -Oفات -ffast-math`  
- `-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo`  
- `-no-prec-div -qopt-prefetch -ffinite-math-only`  
- `-qopt-multiple-gather-scatter-by-shuffles`  
- `-mbranches-within-32B-boundaries -nostandard-realloc-lhs`  
- `-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib`

**Benchmarks using both C and C++:**

- `-w -m64 -std=c11 -W1,-z,muldefs -xCORE-AVX512 -Oفات -ffast-math`  
- `-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4`  
- `-mbranches-within-32B-boundaries -ljemalloc`  
- `-L/usr/local/jemalloc64-5.0.1/lib`

**Benchmarks using Fortran, C, and C++:**

- `-w -m64 -std=c11 -W1,-z,muldefs -xCORE-AVX512 -Oفات -ffast-math`  
- `-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3`  
- `-no-prec-div -qopt-prefetch -ffinite-math-only`  
- `-qopt-multiple-gather-scatter-by-shuffles`  
- `-mbranches-within-32B-boundaries -nostandard-realloc-lhs`  
- `-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib`

---

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

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<th>Software Availability:</th>
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<td>Mar-2022</td>
<td>Apr-2021</td>
<td>May-2021</td>
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</table>

You can also download the XML flags sources by saving the following links:

http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml
http://www.spec.org/cpu2017/flags/xFusion-Platform-Settings-ICX-V1.1.xml

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

Tested with SPEC CPU®2017 v1.1.8 on 2022-03-23 12:06:41-0400.
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