**xFusion**

**xFusion 5288 V6 (Intel Xeon Gold 6346)**

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base</th>
<th>322</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

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

| Test Date: | Apr-2022 |
| Hardware Availability: | Apr-2021 |
| Software Availability: | Sep-2021 |

### Hardware

- **CPU Name:** Intel Xeon Gold 6346
- **Max MHz:** 3600
- **Nominal:** 3100
- **Enabled:** 32 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:** 36 MB I+D on chip per chip
- **Memory:** 512 GB (16 x 32 GB 2Rx4 PC4-3200AA-R)
- **Storage:** 1 x 960 GB SATA SSD
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux release 8.4 (Ootpa)
- **Compiler:** C/C++: Version 2021.4 of Intel oneAPI DPC++/C++ Compiler Build 20210924 for Linux;
  Fortran: Version 2021.4 of Intel Fortran Compiler Classic Build 20210910 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:** jemalloc memory allocator V5.0.1
- **Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage

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<table>
<thead>
<tr>
<th>Program</th>
<th>Copies</th>
<th>SPECrate®2017_fp_base</th>
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**Note:** Test Date: Apr-2022

**Copyright 2017-2022 Standard Performance Evaluation Corporation**
### Results Table

<table>
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<tr>
<th>Benchmark</th>
<th>Base</th>
<th>Peak</th>
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</table>

**SPECrate®2017_fp_base = 322**

**SPECrate®2017_fp_peak = Not Run**

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"

### 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 2x Intel Xeon Platinum 8280M CPU + 384GB RAM memory using Red Hat Enterprise Linux 8.4

Transparent Huge Pages enabled by default

Prior to runcpu invocation

Filesystem page cache synced and cleared with:

(Continued on next page)
General Notes (Continued)

sync; echo 3> /proc/sys/vm/drop_caches
runcpu command invoked through numacli i.e.: numacli --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 982a61ec0915b55891ef0e16aca64d
running on localhost.localdomain Sun Apr 17 03:41:22 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) Gold 6346 CPU @ 3.10GHz
  2 "physical id"s (chips)
  64 "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 : 16
siblings : 32
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

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): 64
  On-line CPU(s) list: 0-63
  Thread(s) per core: 2
  Core(s) per socket: 16

(Continued on next page)
xFusion 5288 V6 (Intel Xeon Gold 6346)

CPU2017 License: 6488
Test Sponsor: xFusion
Tested by: xFusion
Test Date: Apr-2022
Hardware Availability: Apr-2021
Software Availability: Sep-2021

SPECrate®2017_fp_base = 322
SPECrate®2017_fp_peak = Not Run

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) Gold 6346 CPU @ 3.10GHz
Stepping: 6
CPU MHz: 3600.328
BogoMIPS: 6200.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 36864K
NUMA node0 CPU(s): 0-8, 32-40
NUMA node1 CPU(s): 9-15, 41-47
NUMA node2 CPU(s): 16-23, 48-55
NUMA node3 CPU(s): 24-31, 56-63

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
aperfmprefp pnip 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
rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 invpcid_single ssbd mba ibrs
ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad fs good
sc tsc_adjust bmi1 hle avx2 smep bmi2 ersed invpcid cqm rdt_a avx512f avx512dq rdseed
adx smap avx512sfma clfshopt clwb intel_pt avx512cd sha ni avx512bw avx512vl
xsaveopt xsaves xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local
split_lock_detect wbinvd dtherm ida arat pln pts hwp_epp avx512vbmni umip pku ospke
avx512_vm bmi2 gfn i vaes vpclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq
la57 rpdpd fsr fms m_clear pconfig flush_l1d arch_capabilities

/proc/cpuinfo cache data
cache size : 36864 KB

From numactl --hardware
WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 4 nodes (0-3)
node 0 cpus: 0 1 2 3 4 5 6 7 8 32 33 34 35 36 37 38 39 40
node 0 size: 12816 MB
node 0 free: 121895 MB
node 1 cpus: 9 10 11 12 13 14 15 41 42 43 44 45 46 47
node 1 size: 129020 MB
node 1 free: 125614 MB
node 2 cpus: 16 17 18 19 20 21 22 23 48 49 50 51 52 53 54 55

(Continued on next page)
xFusion
xFusion 5288 V6 (Intel Xeon Gold 6346)  SPECrate®2017_fp_base = 322
SPECrate®2017_fp_peak = Not Run

CPU2017 License: 6488  Test Date:  Apr-2022
Test Sponsor:  xFusion  Hardware Availability:  Apr-2021
Tested by:  xFusion  Software Availability:  Sep-2021

Platform Notes (Continued)

node 2 size: 129020 MB
node 2 free: 125387 MB
node 3 cpus: 24 25 26 27 28 29 30 31 56 57 58 59 60 61 62 63
node 3 size: 129017 MB
node 3 free: 125374 MB
node 0 1 2 3
distances:
0:  10  11  20  20
1:  11  10  20  20
2:  20  20  10  11
3:  20  20  11  10

MemTotal:       527539912 kB
HugePages_Total:       0
Hugepagesize:       2048 kB

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

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)
SPEC CPU®2017 Floating Point Rate Result

xFusion

xFusion 5288 V6 (Intel Xeon Gold 6346)

SPECraté®2017_fp_base = 322
SPECraté®2017_fp_peak = Not Run

CPU2017 License: 6488
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Platform Notes (Continued)

CVE-2017-5753 (Spectre variant 1):
Mitigation: usercopy/swapsgs 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 Apr 17 00:40

SPEC is set to: /spec2017

Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda3      xfs   420G   88G  333G  21% /

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:
12x Samsung M393A4G43AB3-CWE 32 GB 2 rank 3200
4x Samsung M393A4K40DB3-CWE 32 GB 2 rank 3200

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 2021.4.0 Build 20210924
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(Continued on next page)
xFusion

xFusion 5288 V6 (Intel Xeon Gold 6346)

SPEC CPU®2017 Floating Point Rate Result

SPECrater®2017_fp_base = 322
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CPU2017 License: 6488
Test Sponsor: xFusion
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Test Date: Apr-2022
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Compiler Version Notes (Continued)

C++          | 508.namd_r(base) 510.parest_r(base)
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C++, C       | 511.povray_r(base) 526.blender_r(base)
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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2021.4.0 Build 20210924
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C++, C, Fortran | 507.cactuBSSN_r(base)
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Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
Intel(R) 64, Version 2021.4.0 Build 20210910_000000
Copyright (C) 1985-2021 Intel Corporation. All rights reserved.

Fortran      | 503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)
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Fortran, C   | 521.wrf_r(base) 527.cam4_r(base)
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## SPEC CPU®2017 Floating Point Rate Result

### xFusion

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### Compiler Version Notes (Continued)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2021.4.0 Build 20210924  
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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
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Specrate®2017_fp_peak = Not Run

**Base Optimization Flags**

**C benchmarks:**
- `-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -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 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -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 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div -ffinite-math-only`
- `-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo`
- `-qopt-merge -qopt-prefetch -qopt-mem-layout-trans=4 -ipo`
- `-qopt-multiples-gather-scatter-by-shuffles -qopt-mem-layout-trans=4 -ipo`
- `-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 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div -ffinite-math-only`
- `-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo`
- `-qopt-merge -qopt-prefetch -qopt-mem-layout-trans=4 -ipo`
- `-qopt-multiples-gather-scatter-by-shuffles -qopt-mem-layout-trans=4 -ipo`
- `-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 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div -ffinite-math-only`
- `-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo`
- `-qopt-merge -qopt-prefetch -qopt-mem-layout-trans=4 -ipo`
- `-qopt-multiples-gather-scatter-by-shuffles -qopt-mem-layout-trans=4 -ipo`
- `-nostandard-realloc-lhs -align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib`

**Benchmarks using Fortran, C, and C++:**
- `-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div -ffinite-math-only`
- `-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo`
- `-qopt-merge -qopt-prefetch -qopt-mem-layout-trans=4 -ipo`
- `-qopt-multiples-gather-scatter-by-shuffles -qopt-mem-layout-trans=4 -ipo`
- `-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
http://www.spec.org/cpu2017/flags/xFusion-Platform-Settings-ICX-V1.1.html
xFusion

xFusion 5288 V6 (Intel Xeon Gold 6346)

SPECrate®2017_fp_base = 322
SPECrate®2017_fp_peak = Not Run

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<th>Test Date: Apr-2022</th>
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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.

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