SPEC CPU®2017 Floating Point Rate Result

xFusion 2288H V5 (Intel Xeon Silver 4210R)

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base</th>
<th>SPECrate®2017_fp_peak</th>
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<tbody>
<tr>
<td>156</td>
<td>Not Run</td>
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CPU2017 License: 6488  
Test Sponsor: xFusion  
Tested by: xFusion  
Test Date: Jan-2023  
Hardware Availability: Apr-2019  
Software Availability: May-2022

<table>
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<tr>
<td>0</td>
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<td>503.bwaves_r</td>
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<tr>
<td>508.namd_r</td>
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<tr>
<td>510.parest_r</td>
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<tr>
<td>511.povray_r</td>
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<td>526.blender_r</td>
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<tr>
<td>527.cam4_r</td>
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<tr>
<td>538.imagick_r</td>
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<tr>
<td>544.nab_r</td>
</tr>
<tr>
<td>549.fotonik3d_r</td>
</tr>
<tr>
<td>554.roms_r</td>
</tr>
</tbody>
</table>

**Hardware**

- **CPU Name:** Intel Xeon Silver 4210R  
- **Max MHz:** 3200  
- **Nominal:** 2400  
- **Enabled:** 20 cores, 2 chips, 2 threads/core  
- **Orderable:** 1,2 chips  
- **Cache L1:** 32 KB I + 32 KB D on chip per core  
- **L2:** 1 MB I+D on chip per core  
- **L3:** 13.75 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R, running at 2400)  
- **Storage:** 1 x 960 GB SATA SSD  
- **Other:** None

**Software**

- **OS:** Red Hat Enterprise Linux release 8.4 (Ootpa)  
- **Compiler:** C/C++: Version 2022.1 of Intel oneAPI DPC++/C++ Compiler for Linux; Fortran: Version 2022.1 of Intel Fortran Compiler for Linux;  
- **Parallel:** No  
- **Firmware:** Version 8.37 Released Aug-2022  
- **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
xFusion 2288H V5 (Intel Xeon Silver 4210R)

SPECrate®2017_fp_base = 156

SPECrate®2017_fp_peak = Not Run

Results Table

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<tr>
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<th>Seconds</th>
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<th>Base Ratio</th>
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<td>71.3</td>
<td>71.3</td>
<td>893</td>
<td>71.3</td>
</tr>
</tbody>
</table>

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"
MALLOCONF = "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)
SPEC CPU®2017 Floating Point Rate Result

xFusion

xFusion 2288H V5 (Intel Xeon Silver 4210R)

SPECrate®2017_fp_base = 156
SPECrate®2017_fp_peak = Not Run

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

Test Date: Jan-2023
Hardware Availability: Apr-2019
Software Availability: May-2022

General Notes (Continued)

sync; echo 3 >/proc/sys/vm/drop_caches
runcpu command invoked through numacl 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:
Power Policy Set to Performance
XPT Prefetch set to Enabled

Sysinfo program /spec2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acaf64d
running on localhost.localdomain Sat Jan 14 18:26:23 2023

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 4210R CPU @ 2.40GHz
  2 "physical id"s (chips)
  40 "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 : 10
siblings : 20
physical 0: cores 0 1 2 3 4 8 9 10 11 12
physical 1: cores 0 1 2 3 4 8 9 10 11 12

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): 40
On-line CPU(s) list: 0-39
Thread(s) per core: 2
Core(s) per socket: 10

(Continued on next page)
**SPEC CPU®2017 Floating Point Rate Result**

**xFusion**

xFusion 2288H V5 (Intel Xeon Silver 4210R)

**SPECrater®2017_fp_base = 156**

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**CPU2017 License:** 6488  
**Test Sponsor:** xFusion  
**Tested by:** xFusion  
**Test Date:** Jan-2023  
**Hardware Availability:** Apr-2019  
**Software Availability:** May-2022

---

**Platform Notes (Continued)**

Socket(s): 2  
NUMA node(s): 2  
Vendor ID: GenuineIntel  
BIOS Vendor ID: Intel(R) Corporation  
CPU family: 6  
Model: 85  
Model name: Intel(R) Xeon(R) Silver 4210R CPU @ 2.40GHz  
BIOS Model name: Intel(R) Xeon(R) Silver 4210R CPU @ 2.40GHz  
Stepping: 7  
CPU MHz: 2900.083  
CPU max MHz: 3200.0000  
CPU min MHz: 1000.0000  
BogoMIPS: 4800.00  
Virtualization: VT-x  
L1d cache: 32K  
L1i cache: 32K  
L2 cache: 1024K  
L3 cache: 14080K  
NUMA node0 CPU(s): 0–9, 20–29  
NUMA node1 CPU(s): 10–19, 30–39  
Flags: fpu vme de pse tsc msr pae 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 aperf perf li 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 rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vni flexpriority ept vpid ad fsgsbase tsc_adjust bfr1 hle avx2 smep bmi2 erms invpcid cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_lld arch_capabilities

```
/proc/cpuinfo cache data  
cache size : 14080 KB
```

From `numactl --hardware`  
WARNING: a numactl 'node' might or might not correspond to a physical chip.  
available: 2 nodes (0-1)  
nodemode0 cpus: 0 1 2 3 4 5 6 7 8 9 20 21 22 23 24 25 26 27 28 29  
nodemode0 size: 385207 MB  
nodemode0 free: 372281 MB  
nodemode1 cpus: 10 11 12 13 14 15 16 17 18 19 30 31 32 33 34 35 36 37 38 39  
nodemode1 size: 387066 MB  
nodemode1 free: 381655 MB  
nodemodes:  
nodemode 0 1  
0: 10 21

(Continued on next page)
SPEC CPU®2017 Floating Point Rate Result

xFusion

xFusion 2288H V5 (Intel Xeon Silver 4210R)

CPU2017 License: 6488
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Tested by: xFusion

| SPECrate®2017_fp_base = | 156 |
| SPECrate®2017_fp_peak = | Not Run |

| Test Date: | Jan-2023 |
| Hardware Availability: | Apr-2019 |
| Software Availability: | May-2022 |

Platform Notes (Continued)

1: 21 10

From /proc/meminfo
MemTotal: 790809192 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

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

/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has performance

From /etc/*release* /etc/*version*
os-release:
NAME="Red Hat Enterprise Linux"
VERSION="8.4 (Ootpa)"
ID="rheil"
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): KVM: Mitigation: Split huge pages
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
CVE-2017-5753 (Spectre variant 1): Mitigation: usercopy/swaps 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

(Continued on next page)
SPEC CPU®2017 Floating Point Rate Result

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xFusion 2288H V5 (Intel Xeon Silver 4210R)

SPECRate®2017_fp_base = 156

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**Platform Notes (Continued)**

run-level 3 Jan 14 12:32

SPEC is set to: /spec2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 859G 46G 814G 6% /

From /sys/devices/virtual/dmi/id

Vendor: XFUSSION
Product: 2288H V5
Product Family: Purley
Serial: Serial

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:
24x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933, configured at 2400

BIOS:
BIOS Vendor: XFUSSION
BIOS Version: 8.37
BIOS Date: 08/25/2022
BIOS Revision: 8.37

(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 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
---

C++ | 508.namd_r(base) 510.parest_r(base)
---

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
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**xFusion**

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<th>503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)</th>
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### Base Compiler Invocation

C benchmarks:

icx

C++ benchmarks:

icpx

Fortran benchmarks:

ifx

Benchmarks using both Fortran and C:

ifx icx

Benchmarks using both C and C++:

icpx icx

Benchmarks using Fortran, C, and C++:

icpx icx ifx

### 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:

-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

(Continued on next page)
## Base Optimization Flags (Continued)

**C++ benchmarks:**

- `w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto`
- `mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -ljemalloc`
- `-L/usr/local/jemalloc64-5.0.1/lib`

**Fortran benchmarks:**

- `w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto`
- `mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4`
- `-nostandard-realloc-lhs -align array32byte -auto -ljemalloc`
- `-L/usr/local/jemalloc64-5.0.1/lib`

**Benchmarks using both Fortran and C:**

- `w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto`
- `mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4`
- `-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 -Ofast -ffast-math -flto`
- `mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -ljemalloc`
- `-L/usr/local/jemalloc64-5.0.1/lib`

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

- `w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto`
- `mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -ljemalloc`
- `-L/usr/local/jemalloc64-5.0.1/lib`

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: