## SPEC CPU®2017 Floating Point Rate Result

**xFusion**

xFusion CH121 V5 (Intel Xeon Silver 4210R)

<table>
<thead>
<tr>
<th>SPECRate®2017_fp_base =</th>
<th>157</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:** Jan-2023  
**Hardware Availability:** Apr-2019  
**Software Availability:** May-2022

### Software

- **OS:** Red Hat Enterprise Linux release 8.4 (Ootpa)  
  4.18.0-305.el8.x86_64
- **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
- **Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage

### 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
- **Memory:** 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R, running at 2400)
- **Storage:** 1 x 960 GB SATA SSD
- **Other:** None

| Copies | 0 | 40 | 80 | 120 | 160 | 200 | 240 | 280 | 320 | 360 | 400 | 440 | 480 | 520 | 560 | 600 | 640 | 680 | 720 | 760 | 800 | 820 |
|--------|---|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| x | 503.bwaves_r | 40 | 81.7 | 173 |
| x | 507.cactuBSSN_r | 40 | 83.3 | 173 |
| x | 508.namd_r | 40 | 73.3 |
| x | 510.parest_r | 40 | 147 |
| x | 511.povray_r | 40 | 81.7 |
| x | 519.lbm_r | 40 | 148 |
| x | 521.wrf_r | 40 | 133 |
| x | 526.blender_r | 40 | 139 |
| x | 527.cam4_r | 40 | 382 |
| x | 538.imagick_r | 40 | 251 |
| x | 544.nab_r | 40 | 178 |
| x | 549.fotonik3d_r | 40 | 71.3 |
| x | 554.roms_r | 40 | 81.4 |

---

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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
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<tr>
<td>503.bwaves_r</td>
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<td>554.roms_r</td>
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<td>71.3</td>
<td>893</td>
<td>71.2</td>
</tr>
</tbody>
</table>

SPECrate®2017_fp_base = 157
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)
xFusion

xC Fusion CH121 V5 (Intel Xeon Silver 4210R)

| SPECrate®2017_fp_base = 157 |
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CPU2017 License: 6488
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Test Date: Jan-2023
Hardware Availability: Apr-2019
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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.

jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

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 982a61ec0915b55891ef0e16acafc64d
running on localhost.localdomain Fri Jan 13 01:29:57 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)
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#### SPECrate®2017_fp_base = 157

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### 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:** 2900.105
- **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 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
  rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single ssbd
  mba ibrs ibpb stibp ibrsenhanced tpr_shadow vnmi flexpriority ept vpid ept_ad
  fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erts invpcid cqm mpx rdt_a avx512f
  avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl
  xsaves xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
  dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_l1d 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)
node 0 cpus: 0 1 2 3 4 5 6 7 8 9 20 21 22 23 24 25 26 27 28 29
node 0 size: 385244 MB
node 0 free: 372144 MB
node 1 cpus: 10 11 12 13 14 15 16 17 18 19 30 31 32 33 34 35 36 37 38 39
node 1 size: 387029 MB
node 1 free: 378943 MB
node distances:
  node 0 1
  0: 10 21

(Continued on next page)
Platform Notes (Continued)

1: 21 10

From /proc/meminfo
   MemTotal: 790809188 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/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

(Continued on next page)
Platform Notes (Continued)

run-level 3 Jan 12 21:20

SPEC is set to: /spec2017
Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda4      xfs   859G   45G  815G   6% /

From /sys/devices/virtual/dmi/id
Vendor:         XFUSION
Product:        CH121 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:       XFUSION
BIOS Version:      8.37
BIOS Date:         08/25/2022
BIOS Revision:     8.37

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
| 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.
==============================================================================

==============================================================================
| 508.namd_r(base) 510.parest_r(base) |
==============================================================================

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Compiler Version Notes (Continued)

==============================================================================
C++, C          | 511.povray_r(base) 526.blender_r(base)
------------------------------------------------------------------------------
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Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
==============================================================================
C++, C, Fortran | 507.cactuBSSN_r(base)
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 2022.1.0 Build 20220316
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Fortran         | 503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)
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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
-ffti -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

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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` 
- `-l-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` 
- `-l-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` 
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- `-l-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-CSL-V1.1.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/xFusion-Platform-Settings-CSL-V1.1.xml

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