## SPEC CPU®2017 Floating Point Rate Result

**xFusion XH321 V6 (Intel Xeon Platinum 8358)**

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base</th>
<th>456</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**: Aug-2022
- **Hardware Availability**: Apr-2021
- **Software Availability**: Sep-2021

### Hardware

<table>
<thead>
<tr>
<th>Name</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name</td>
<td>Intel Xeon Platinum 8358</td>
</tr>
<tr>
<td>Max MHz</td>
<td>3400</td>
</tr>
<tr>
<td>Nominal</td>
<td>2600</td>
</tr>
<tr>
<td>Enabled</td>
<td>64 cores, 2 chips, 2 threads/core</td>
</tr>
<tr>
<td>Orderable</td>
<td>1,2 chips</td>
</tr>
<tr>
<td>Cache L1</td>
<td>32 KB I + 48 KB D on chip per core</td>
</tr>
<tr>
<td>L2</td>
<td>1.25 MB I+D on chip per core</td>
</tr>
<tr>
<td>L3</td>
<td>48 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Memory</td>
<td>512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R)</td>
</tr>
<tr>
<td>Storage</td>
<td>1 x 960 GB SATA SSD</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>Name</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS</td>
<td>Red Hat Enterprise Linux release 8.4 (Ootpa) 4.18.0-305.el8.x86_64</td>
</tr>
<tr>
<td>Compiler</td>
<td>C/C++: Version 2021.4.0 of Intel oneAPI DPC++/C++ Compiler Build 20210924 for Linux; Fortran: Version 2021.4.0 of Intel Fortran Compiler Classic Build 20210910 for Linux</td>
</tr>
<tr>
<td>Parallel</td>
<td>No</td>
</tr>
<tr>
<td>Firmware</td>
<td>Version 1.05 Released May-2022</td>
</tr>
<tr>
<td>File System</td>
<td>xfs</td>
</tr>
<tr>
<td>System State</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Other</td>
<td>jemalloc memory allocator V5.0.1</td>
</tr>
<tr>
<td>Power Management</td>
<td>BIOS and OS set to prefer performance at the cost of additional power usage</td>
</tr>
</tbody>
</table>

---

### Performance Results

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base (456)</th>
</tr>
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<tbody>
<tr>
<td>503.bwaves_r</td>
</tr>
<tr>
<td>507.cactuBSSN_r</td>
</tr>
<tr>
<td>508.namd_r</td>
</tr>
<tr>
<td>510.parest_r</td>
</tr>
<tr>
<td>511.povray_r</td>
</tr>
<tr>
<td>519.lbm_r</td>
</tr>
<tr>
<td>521.wrf_r</td>
</tr>
<tr>
<td>526.blender_r</td>
</tr>
<tr>
<td>527.cam4_r</td>
</tr>
<tr>
<td>538.imagick_r</td>
</tr>
<tr>
<td>544.nab_r</td>
</tr>
<tr>
<td>549.fotonik3d_r</td>
</tr>
<tr>
<td>554.roms_r</td>
</tr>
</tbody>
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---

**xFusion**

Copyright 2017-2022 Standard Performance Evaluation Corporation
### SPEC CPU®2017 Floating Point Rate Result

xFusion

xFusion XH321 V6 (Intel Xeon Platinum 8358)

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>503.bwaves_r</td>
<td>128</td>
<td>1719</td>
<td>747</td>
<td>1720</td>
<td>746</td>
<td>1720</td>
<td>746</td>
</tr>
<tr>
<td>507.cactuBSSN_r</td>
<td>128</td>
<td>272</td>
<td>595</td>
<td>263</td>
<td>617</td>
<td>264</td>
<td>615</td>
</tr>
<tr>
<td>508.namd_r</td>
<td>128</td>
<td>315</td>
<td>386</td>
<td>313</td>
<td>388</td>
<td>313</td>
<td>388</td>
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<tr>
<td>510.parest_r</td>
<td>128</td>
<td>1552</td>
<td>216</td>
<td>1545</td>
<td>217</td>
<td>1545</td>
<td>217</td>
</tr>
<tr>
<td>511.povray_r</td>
<td>128</td>
<td>527</td>
<td>568</td>
<td>525</td>
<td>569</td>
<td>526</td>
<td>568</td>
</tr>
<tr>
<td>519.lbm_r</td>
<td>128</td>
<td>487</td>
<td>277</td>
<td>486</td>
<td>277</td>
<td>487</td>
<td>277</td>
</tr>
<tr>
<td>521.wrf_r</td>
<td>128</td>
<td>821</td>
<td>349</td>
<td>821</td>
<td>349</td>
<td>821</td>
<td>349</td>
</tr>
<tr>
<td>526.blender_r</td>
<td>128</td>
<td>337</td>
<td>578</td>
<td>339</td>
<td>575</td>
<td>337</td>
<td>579</td>
</tr>
<tr>
<td>527.cam4_r</td>
<td>128</td>
<td>463</td>
<td>483</td>
<td>471</td>
<td>475</td>
<td>465</td>
<td>481</td>
</tr>
<tr>
<td>538.imagick_r</td>
<td>128</td>
<td>198</td>
<td>1610</td>
<td>199</td>
<td>1600</td>
<td>197</td>
<td>1620</td>
</tr>
<tr>
<td>544.nab_r</td>
<td>128</td>
<td>205</td>
<td>1050</td>
<td>206</td>
<td>1050</td>
<td>207</td>
<td>1040</td>
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<tr>
<td>549.fotonik3d_r</td>
<td>128</td>
<td>2176</td>
<td>229</td>
<td>2176</td>
<td>229</td>
<td>2177</td>
<td>229</td>
</tr>
<tr>
<td>554.roms_r</td>
<td>128</td>
<td>1275</td>
<td>160</td>
<td>1274</td>
<td>160</td>
<td>1278</td>
<td>159</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"
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)
**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 982a61ec0915b55891ef0e16aca64d running on localhost.localdomain Thu Aug 4 01:07:08 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) Platinum 8358 CPU @ 2.60GHz
  2 "physical id"s (chips)
  128 "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 : 32
  siblings : 64
  physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
  physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

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): 128
On-line CPU(s) list: 0-127

(Continued on next page)
xFusion

xFusion XH321 V6 (Intel Xeon Platinum 8358)

<table>
<thead>
<tr>
<th>CPU2017 License: 6488</th>
<th>Test Date: Aug-2022</th>
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<tbody>
<tr>
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</table>

**SPEC CPU®2017 Floating Point Rate Result**

**SPECrate®2017_fp_base = 456**

**SPECrate®2017_fp_peak = Not Run**

**Platform Notes (Continued)**

- Thread(s) per core: 2
- Core(s) per socket: 32
- Socket(s): 2
- NUMA node(s): 4
- Vendor ID: GenuineIntel
- BIOS Vendor ID: Intel(R) Corporation
- CPU family: 6
- Model: 106
- BIOS Model name: Intel(R) Xeon(R) Platinum 8358 CPU @ 2.60GHz
- Stepping: 6
- CPU MHz: 3300.00
- BogoMIPS: 5200.00
- Virtualization: VT-x
- L1d cache: 48K
- L1i cache: 32K
- L2 cache: 1280K
- L3 cache: 49152K
- NUMA node0 CPU(s): 0-15, 64-79
- NUMA node1 CPU(s): 16-31, 80-95
- NUMA node2 CPU(s): 32-47, 96-111
- NUMA node3 CPU(s): 48-63, 112-127
- Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush dts acp1 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 aperfmperf pni pclmulqdq dtses64 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 tpr_shadow vt_ms flexpriority ept vpid ept_ad fsparsebase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local split_lock_detect wbnoinvd dtherm ida arat pln pts hwp_epp avx512vbm ulmpk ospke avx512_vbmi2 gfni vaes vpcmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid fsgsbase arch_capabilities

/proc/cpuinfo cache data
- cache size: 49152 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 9 10 11 12 13 14 15 16 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79

node 0 size: 128155 MB
node 0 free: 119500 MB

node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79
node 1 size: 128155 MB
node 1 free: 119500 MB

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

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xFusion XH321 V6 (Intel Xeon Platinum 8358)

SPECRate®2017_fp_base = 456
SPECRate®2017_fp_peak = Not Run

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

Test Date: Aug-2022
Hardware Availability: Apr-2021
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Platform Notes (Continued)

89 90 91 92 93 94 95
node 1 size: 129017 MB
node 1 free: 122027 MB
node 2 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 96 97 98 99 100 101 102
103 104 105 106 107 108 109 110 111
node 2 size: 129017 MB
node 2 free: 122047 MB
node 3 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 112 113 114 115 116 117
118 119 120 121 122 123 124 125 126 127
node 3 size: 128977 MB
node 3 free: 122090 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:       527531080 kB
HugePages_Total:       0
Hugepagesize:       2048 kB

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

(Continued on next page)
Platform Notes (Continued)

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
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Aug 3 07:09

SPEC is set to: /spec2017

Filesystem        Type   Size  Used  Avail   Use% Mounted on
/dev/mapper/rhel-root xfs     70G   49G   22G   70%   /

From /sys/devices/virtual/dmi/id
Vendor: XFUSION
Product: XH321 V6
Product Family: Whitley

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

BIOS:
BIOS Vendor: INSYDE Corp.
BIOS Version: 1.05
BIOS Date: 05/16/2022
BIOS Revision: 1.5

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
<table>
<thead>
<tr>
<th>C</th>
<th>519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,</td>
<td></td>
</tr>
<tr>
<td>Version 2021.4.0 Build 20210924</td>
<td></td>
</tr>
<tr>
<td>Copyright (C) 1985-2021 Intel Corporation. All rights reserved.</td>
<td></td>
</tr>
</tbody>
</table>
==============================================================================

(Continued on next page)
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 2021.4.0 Build 20210924 
Copyright (C) 1985-2021 Intel Corporation. All rights reserved.

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 
Copyright (C) 1985-2021 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 2021.4.0 Build 20210924 
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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
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Copyright (C) 1985-2021 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on  
Intel(R) 64, Version 2021.4.0 Build 20210910_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  
Intel(R) 64, Version 2021.4.0 Build 20210910_000000 
Copyright (C) 1985-2021 Intel Corporation. All rights reserved.

Fortran, C      | 521.wrf_r(base) 527.cam4_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  
Copyright (C) 1985-2021 Intel Corporation. All rights reserved.

---

### 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.hmmb: -DSPEC_LP64  
521.nwchem: -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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**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`  
- `-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 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -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 -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`

**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 -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:
- [http://www.spec.org/cpu2017/flags/xFusion-Platform-Settings-ICX-V1.2.html](http://www.spec.org/cpu2017/flags/xFusion-Platform-Settings-ICX-V1.2.html)
### SPEC CPU®2017 Floating Point Rate Result

**xFusion**

**xFusion XH321 V6 (Intel Xeon Platinum 8358)**

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

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

- [http://www.spec.org/cpu2017/flags/xFusion-Platform-Settings-ICX-V1.2.xml](http://www.spec.org/cpu2017/flags/xFusion-Platform-Settings-ICX-V1.2.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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