# SPEC CPU®2017 Floating Point Rate Result

**xFusion**

**FusionServer 2288H V7 (Intel Xeon Platinum 8490H)**

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

## Copies

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<tr>
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<td>549.fotonik3d_r</td>
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<tr>
<td>SPECrate</td>
<td>554.roms_r</td>
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**SPECrate®2017_fp_base = 508**

**SPECrate®2017_fp_peak = Not Run**

## Hardware

**CPU Name:** Intel Xeon Platinum 8490H  
**Max MHz:** 3500  
**Nominal:** 1900  
**Enabled:** 60 cores, 1 chip, 2 threads/core  
**Orderable:** 1,2 chips  
**Cache L1:** 32 KB I + 48 KB D on chip per core  
**Cache L2:** 2 MB I+D on chip per core  
**Cache L3:** 112.5 MB I+D on chip per chip  
**Memory:** 256 GB (8 x 32 GB 2Rx8 PC5-4800B-R)  
**Storage:** 1 x 1920 GB SATA SSD  
**Other:** None

## Software

**OS:** Red Hat Enterprise Linux release 9.0 (Plow)  
5.14.0-70.13.1.el9_0.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 2.00.35 Released Nov-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
**SPEC CPU®2017 Floating Point Rate Result**

xFusion

FusionServer 2288H V7 (Intel Xeon Platinum 8490H)

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</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"`
- `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:
**General Notes (Continued)**

```bash
core i7; 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:**
Performance Profile Set to Performance
SNC Set to Enable SNC4 (4-clusters)

Sysinfo program /spec2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on localhost.localdomain Mon Dec 5 09:08:47 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 8490H
- 1 "physical id"s (chips)
- 120 "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 : 60
- siblings : 120
- 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 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

From lscpu from util-linux 2.37.4:
- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Address sizes: 46 bits physical, 57 bits virtual
- Byte Order: Little Endian
- CPU(s): 120
- On-line CPU(s) list: 0-119

(Continued on next page)
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</table>

**Test Date:** Dec-2022  
**Hardware Availability:** Jan-2023  
**Software Availability:** May-2022

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**Platform Notes (Continued)**

- **Vendor ID:** GenuineIntel
- **BIOS Vendor ID:** Intel(R) Corporation
- **Model name:** Intel(R) Xeon(R) Platinum 8490H
- **BIOS Model name:** Intel(R) Xeon(R) Platinum 8490H
- **CPU family:** 6
- **Model:** 143
- **Thread(s) per core:** 2
- **Core(s) per socket:** 60
- **Socket(s):** 1
- **Stepping:** 6
- **BogoMIPS:** 3800.00
- **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 pdmpele vdtscp lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf tsc_known_freq 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 cat_l2 cdp_l3 invpcid_single intel_pni cdp_l2 ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmon avx2 smep bmi2 erms invpcid cqmm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl xsaveopt xsaves xsaveopt xsave xsetbv1 xsaves cqm_llc cqm_occupa llc cqm_mbb_total cqm_mbb_local split_lock_detect avx_vnni avx512_bf16 wmbnoivd dtherm ida arat pln pts avx512vmbi umip pku ospke waitpkg avx512_vbmid gfnv vaepclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntd q la57 rdpid bus_lock_detect cleandemov movdir movdir64b encqmd fasm md_clear serialize txslidtrk pconfig arch_lbr avx512_fp16 amx_tile flush_l1d arch_capabilities

**Virtualization:** VT-x

- **L1d cache:** 2.8 MiB (60 instances)
- **L1i cache:** 1.9 MiB (60 instances)
- **L2 cache:** 120 MiB (60 instances)
- **L3 cache:** 112.5 MiB (1 instance)
- **NUMA node(s):** 4
- **NUMA node0 CPU(s):** 0-14, 60-74
- **NUMA node1 CPU(s):** 15-29, 75-89
- **NUMA node2 CPU(s):** 30-44, 90-104
- **NUMA node3 CPU(s):** 45-59, 105-119
- **Vulnerability Itlb multihit:** Not affected
- **Vulnerability L1tf:** Not affected
- **Vulnerability Mds:** Not affected
- **Vulnerability Meltdown:** Not affected
- **Vulnerability Spec store bypass:** Mitigation; Speculative Store Bypass disabled via prctl
- **Vulnerability Spectre v1:** Mitigation; usercopy/swapgs barriers and __user pointer sanitization
- **Vulnerability Spectre v2:** Mitigation; Enhanced IBRS, IBPB conditional, RSB filling
- **Vulnerability Srbd:** Not affected

(Continued on next page)
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Hardware Availability: Jan-2023
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Platform Notes (Continued)

Vulnerability Tsx async abort: Not affected

From lscpu --cache:
NAME ONE-SIZE ALL-SIZE WAYS TYPE LEVEL SETS PHY-LINE COHERENCY-SIZE
L1d 48K 2.8M 12 Data 1 64 1 64
L1i 32K 1.9M 8 Instruction 1 64 1 64
L2 2M 120M 16 Unified 2 2048 1 64
L3 112.5M 112.5M 15 Unified 3 122880 1 64

/proc/cpuinfo cache data
cache size: 115200 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 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74
node 0 size: 63567 MB
node 0 free: 54981 MB
node 1 cpus: 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89
node 1 size: 64505 MB
node 1 free: 57709 MB
node 2 cpus: 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104
node 2 size: 64505 MB
node 2 free: 57644 MB
node 3 cpus: 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119
node 3 size: 64458 MB
node 3 free: 57472 MB
node distances:
node 0 1 2 3
0: 10 12 12 12
1: 12 10 12 12
2: 12 12 10 12
3: 12 12 12 10

From /proc/meminfo
MemTotal: 263205964 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
    os-release:
            NAME="Red Hat Enterprise Linux"
            VERSION="9.0 (Flow)"

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SPEC CPU®2017 Floating Point Rate Result

xFusion FusionServer 2288H V7 (Intel Xeon Platinum 8490H)

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Test Date: Dec-2022
Hardware Availability: Jan-2023
Software Availability: May-2022

Platform Notes (Continued)

```
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="9.0"
PLATFORM_ID="platform:el9"
PRETTY_NAME="Red Hat Enterprise Linux 9.0 (Plow)"
ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 9.0 (Plow)
system-release: Red Hat Enterprise Linux release 9.0 (Plow)
system-release-cpe: cpe:/o:redhat:enterprise_linux:9::baseos
```

uname -a:
```
Linux localhost.localdomain 5.14.0-70.13.1.el9_0.x86_64 #1 SMP PREEMPT Thu Apr 14 12:42:38 EDT 2022 x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

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<th>CVE-2018-12207 (iTLB Multihit):</th>
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<tbody>
<tr>
<td>CVE-2018-3620 (L1 Terminal Fault):</td>
<td>Not affected</td>
</tr>
<tr>
<td>Microarchitectural Data Sampling:</td>
<td>Not affected</td>
</tr>
<tr>
<td>CVE-2017-5754 (Meltdown):</td>
<td>Mitigation: Speculative Store Bypass disabled via prctl</td>
</tr>
<tr>
<td>CVE-2018-3639 (Speculative Store Bypass):</td>
<td>Mitigation: usercopy/swaps barriers and __user pointer sanitation</td>
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<tr>
<td>CVE-2017-5753 (Spectre variant 1):</td>
<td>Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling</td>
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<tr>
<td>CVE-2017-5715 (Spectre variant 2):</td>
<td>Not affected</td>
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<tr>
<td>CVE-2020-0543 (Special Register Buffer Data Sampling):</td>
<td>Not affected</td>
</tr>
<tr>
<td>CVE-2019-11135 (TSX Asynchronous Abort):</td>
<td>Not affected</td>
</tr>
</tbody>
</table>

run-level 3 Dec 4 22:50

SPEC is set to: /spec2017

```
filesystem type size used avail use% mounted on
/dev/sda3       xfs  420G  69G  351G  17% /
```

From /sys/devices/virtual/dmi/id
```
Vendor:       XFUSION
Product:      2288H V7
Product Family: Eagle Stream
Serial:       2106182101X3N8000005
```

Additional information from dmidecode 3.3 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:

(Continued on next page)
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Test Date: Dec-2022
Hardware Availability: Jan-2023
Software Availability: May-2022

Platform Notes (Continued)

8x Samsung M321R4GA3BB6-CQKDG 32 GB 2 rank 4800

BIOS:
- BIOS Vendor: XFUSION
- BIOS Version: 2.00.35
- BIOS Date: 11/30/2022
- BIOS Revision: 0.35

(End of data from sysinfo program)

Compiler Version Notes

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<tr>
<td>Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2022.1.0 Build 20220316</td>
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<td>Copyright (C) 1985-2022 Intel Corporation. All rights reserved.</td>
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**Compiler Version Notes (Continued)**

Version 2022.1.0 Build 20220316
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Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version
2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

---

Fortran         | 503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)
-----------------|---------------------------------------------------------

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version
2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

---

Fortran, C      | 521.wrf_r(base) 527.cam4_r(base)
-----------------|---------------------------------------------------------

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version
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Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

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Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version
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---

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2022.1.0 Build 20220316
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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
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CPU2017 License: 6488
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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
-fflush -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -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 -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
-fflush -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
-fflush -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

(Continued on next page)
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<th>Spec CPU®2017 Floating Point Rate Result</th>
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xFusion
FusionServer 2288H V7 (Intel Xeon Platinum 8490H)

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<tr>
<th>SPECrate®2017_fp_base = 508</th>
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<tr>
<td>SPECrate®2017_fp_peak = Not Run</td>
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<tr>
<th>CPU2017 License: 6488</th>
<th>Test Date: Dec-2022</th>
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<tr>
<td>Test Sponsor: xFusion</td>
<td>Hardware Availability: Jan-2023</td>
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<tr>
<td>Tested by: xFusion</td>
<td>Software Availability: May-2022</td>
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**Base Optimization Flags (Continued)**

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-tran=4`
- `-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:

You can also download the XML flags sources by saving the following links:
- [http://www.spec.org/cpu2017/flags/xFusion-Platform-Settings-SPR-V1.0-revB.xml](http://www.spec.org/cpu2017/flags/xFusion-Platform-Settings-SPR-V1.0-revB.xml)

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