xFusion
FusionServer 2288H V7 (Intel Xeon Platinum 8471N)

SPECrater®2017_fp_base = 477
SPECrater®2017_fp_peak = 478

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

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

Specifications:

CPU Name: Intel Xeon Platinum 8471N
Max MHz: 3600
Nominal: 1800
Enabled: 52 cores, 1 chip, 2 threads/core
Orderable: 1 chip
Cache L1: 32 KB I + 48 KB D on chip per core
L2: 2 MB I+D on chip per core
L3: 97.5 MB I+D on chip per chip
Other: None
Memory: 256 GB (8 x 32 GB 2Rx8 PC5-4800B-R)
Storage: 1 x 1920 GB SATA SSD
Other: None

OS: Red Hat Enterprise Linux release 9.0 (Plow)
Compiler: C/C++: Version 2023.0 of Intel oneAPI DPC++/C++
Fortran: Version 2023.0 of Intel Fortran Compiler
Firmware: No
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: jemalloc memory allocator V5.0.1
Power Management: BIOS and OS set to prefer performance at the cost of additional power usage
## Results Table

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**SPECrate®2017_fp_base = 477**

**SPECrate®2017_fp_peak = 478**

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

## Submit Notes

The numacl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numacl 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 = "/home/spec2017-ic2023/lib/intel64:/home/spec2017-ic2023/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
Filesysterm page cache synced and cleared with:
```
sync; echo 3 > /proc/sys/vm/drop_caches
```
runcpu command invoked through numacl i.e.:
`numacl --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.

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

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**General Notes (Continued)**

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 /home/spec2017-ic2023/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost.localdomain Mon Jul 31 12:19:29 2023

SUT (System Under Test) info as seen by some common utilities.

---

1. uname -a
2. w
3. Username
4. ulimit -a
5. sysinfo process ancestry
6. /proc/cpuinfo
7. lscpu
8. numactl --hardware
9. /proc/meminfo
10. who -r
11. Systemd service manager version: systemd 250 (250-6.el9_0)
12. Failed units, from systemctl list-units --state=failed
13. Services, from systemctl list-unit-files
14. Linux kernel boot-time arguments, from /proc/cmdline
15. cpupower frequency-info
16. tuned-adm active
17. sysctl
18. /sys/kernel/mm/transparent_hugepage
19. /sys/kernel/mm/transparent_hugepage/khugepaged
20. OS release
21. Disk information
22. /sys/devices/virtual/dmi/id
23. dmidecode
24. BIOS

---

1. 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

---

2. w
12:19:29 up 6:19, 1 user, load average: 26.95, 78.83, 94.27
USER TTY LOGIN@ IDLE JCPU PCPU WHAT
root tty1 06:01 6:18m 1.23s 0.03s -bash

(Continued on next page)
Platform Notes (Continued)

3. Username
   From environment variable $USER: root

4. ulimit --a
   real-time non-blocking time (microseconds, -R) unlimited
   core file size (blocks, -c) 0
   data seg size (kbytes, -d) unlimited
   scheduling priority (-e) 0
   file size (blocks, -f) unlimited
   pending signals (-i) 1028001
   max locked memory (kbytes, -l) 64
   max memory size (kbytes, -m) unlimited
   open files (-n) 1024
   pipe size (512 bytes, -p) 8
   POSIX message queues (bytes, -q) 819200
   real-time priority (-r) 0
   stack size (kbytes, -s) unlimited
   cpu time (seconds, -t) unlimited
   max user processes (-u) 1028001
   virtual memory (kbytes, -v) unlimited
   file locks (-x) unlimited

5. sysinfo process ancestry
   /usr/lib/systemd/systemd --switched-root --system --deserialize 28
   login -- root
   -bash
   -bash
   runcpu --define default-platform-flags --copies 104 --c ic2023.0-lin-sapphirerapids-rate-20221201.cfg
     --define smt-on --define cores=52 --define physicalfirst --define invoke_with_interleave --define
     drop_caches --tune base,peak --iterations 3 -- all fprate
   runcpu --define default-platform-flags --copies 104 --configfile ic2023.0-lin-sapphirerapids-rate-20221201.cfg
     --define smt-on --define cores=52 --define physicalfirst
     --define invoke_with_interleave --define drop_caches --tune base,peak --iterations 3 --output_format all
     --nopower --runmode rate --tune base:peak --size framerate fprate --nopreenv --note-preenv --logfile
     SPEC/tmp/CPU2017.163/templogs/preenv.fprate.163.0.log --lognum 163.0 --from_runcpu 2
   specperl $SPEC/bin/sysinfo
   $SPEC = /home/spec2017-ic2023

6. /proc/cpuinfo
   model name : Intel(R) Xeon(R) Platinum 8471N
   vendor_id : GenuineIntel
   cpu family : 6
   model : 143
   stepping : 8
   microcode : 0x2b000111
   bugs : spectre_v1 spectre_v2 spec_store_bypass swapgs
   cpu cores : 52
   siblings : 104
   1 physical ids (chips)
   104 processors (hardware threads)
   physical id 0: core ids 0-51
   physical id 0: apicids 0-103
   Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
   virtualized systems. Use the above data carefully.

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spec

SPEC CPU®2017 Floating Point Rate Result

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Platform Notes (Continued)

7. lscpu

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): 104

On-line CPU(s) list: 0-103

Vendor ID: GenuineIntel

BIOS Vendor ID: Intel(R) Corporation

Model name: Intel(R) Xeon(R) Platinum 8471N

CPU family: 6

Model: 143

Thread(s) per core: 2

Core(s) per socket: 52

Socket(s): 1

Stepping: 8

BogoMIPS: 3600.00

Flags: fpu vme de pse 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 arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf tsc_known_freq pni pclmulqdq dtes64 msr dtes64_64 realapicid cpldepartments

Virtualization: VT-x

L1d cache: 2.4 MiB (52 instances)

L1i cache: 1.2 MiB (52 instances)

L2 cache: 104 MiB (52 instances)

L3 cache: 97.5 MiB (1 instance)

NUMA node(s): 4

NUMA node0 CPU(s): 0-12,52-64

NUMA node1 CPU(s): 13-25,65-77

NUMA node2 CPU(s): 26-38,78-90

NUMA node3 CPU(s): 39-51,91-103

Vulnerability Itlb multihit: Not affected

Vulnerability Lttf: 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/swaps barriers and __user pointer sanitation

Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling

Vulnerability Srbdss: Not affected

Vulnerability Tax async abort: Not affected

From lscpu --cache:

NAME ONE-SIZE ALL-SIZE TYPE LEVEL SETS PHY-LINE COHERENCY-SIZE

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Platform Notes (Continued)

L1d 48K 2.4M 12 Data 1 64 1 64
L1i 32K 1.6M 8 Instruction 1 64 1 64
L2 2M 104M 16 Unified 2 2048 1 64
L3 97.5M 97.5M 15 Unified 3 106496 1 64

8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
available: 4 nodes (0-3)
n0 node cpus: 0-12,52-64
node cpus: 0-12,52-64
node 0 free: 63568 MB
node 0 free: 49646 MB
node 0 free: 53865 MB
node 0 free: 53892 MB

8. numactl --hardware
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

9. /proc/meminfo
MemTotal: 263209020 kB

10. who -r
run-level 3 Jul 31 06:00

11. Systemd service manager version: systemd 250 (250-6.e19_0)
Default Target Status
multi-user degraded

12. Failed units, from systemctl list-units --state=failed
UNIT LOAD ACTIVE SUB DESCRIPTION
* sep5.service loaded failed failed systemd script to load sep5 driver at boot time

13. Services, from systemctl list-unit-files
STATE UNIT FILES
enabled NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd chronyd crond
dbus-broker firewall-getty irquebalance kdump lvm2-monitor mdmmonitor microcode
nis-domainname rhsmcertd rsyslog selinux-automount sselinux-label-mark sep5 sshd sssd syslogstat
systemd-network-generator tuned udisks2 upower

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Platform Notes (Continued)

14. Linux kernel boot-time arguments, from /proc/cmdline
   BOOT_IMAGE=(hd0,gpt2)/vmlinuz-5.14.0-70.13.1.el9_0.x86_64
   root=/dev/mapper/rhel-root
   crashkernel=1G-4G:192M,4G-64G:256M,64G-:512M
   resume=/dev/mapper/rhel-swap
   rd.lvm.lv=rhel/root
   rd.lvm.lv=rhel/swap

15. cpupower frequency-info
   analyzing CPU 0:
   Unable to determine current policy
   boost state support:
   Supported: yes
   Active: yes

16. tuned-adm active
   Current active profile: throughput-performance

17. sysctl
   kernel.numa_balancing               1
   kernel.randomize_va_space           2
   vm.compaction_proactiveness         20
   vm.dirty_background_bytes           0
   vm.dirty_background_ratio          10
   vm.dirty_bytes                      0
   vm.dirty_expire_centisecs           3000
   vm.dirty_ratio                      40
   vm.dirty_writeback_centisecs       500
   vm.dirtytime_expire_seconds        43200
   vm.extfrag_threshold               500
   vm.min_unmapped_ratio               1
   vm.nr_hugepages                    10
   vm.nr_hugepages_mempolicy          0
   vm.nr_overcommit_hugepages         0
   vm.swappiness                      10
   vm.watermark_boost_factor          15000
   vm.watermark_scale_factor          10
   vm.zone_reclaim_mode               0

18. /sys/kernel/mm/transparent_hugepage
   allocs
   defrag  always defer defer+madvise [madvise] never
   enabled  [always] madvise never
   hpage_pmd_size    2097152
   shmem_enabled     always within_size advise [never] deny force

19. /sys/kernel/mm/transparent_hugepage/ksm
   allocsleep_millisecs   60000
   defrag  1
   max_ptes_none          511
   max_ptes_shared        256
   max_ptes_swap          64
   pages_to_scan          4096
   scan_sleep_millisecs   10000

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Platform Notes (Continued)

20. OS release
   From /etc/*-release /etc/*-version
   os-release Red Hat Enterprise Linux 9.0 (Plow)
   redhat-release Red Hat Enterprise Linux release 9.0 (Plow)
   system-release Red Hat Enterprise Linux release 9.0 (Plow)

21. Disk information
   SPEC is set to: /home/spec2017-ic2023
   Filesystem Type Size Used Avail Use% Mounted on
   /dev/mapper/rhel-home xfs 1.7T 116G 1.6T 7% /home

22. /sys/devices/virtual/dmi/id
   Vendor: XFUSION
   Product: 2288H V7
   Product Family: Eagle Stream
   Serial: serial

23. dmidecode
   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:
   8x Samsung M321R4GA3BB6-CQKDG 32 GB 2 rank 4800

24. BIOS
   (This section combines info from /sys/devices and dmidecode.)
   BIOS Vendor: XFUSION
   BIOS Version: 2.00.55
   BIOS Date: 03/07/2023
   BIOS Revision: 0.55

Compiler Version Notes

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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
xFusion

FusionServer 2288H V7 (Intel Xeon Platinum 8471N)

SPECraten®2017_fp_base = 477
SPECraten®2017_fp_peak = 478

CPU2017 License: 6488
Test Sponsor: xFusion
Test Date: Jul-2023
Hardware Availability: Jan-2023
Tested by: xFusion
Software Availability: Dec-2022

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 -xsapphirerapids -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-Wno-implicit-int -mprefer-vector-width=512 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

C++ benchmarks:
-w -std=c++14 -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -mprefer-vector-width=512 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

Fortran benchmarks:
-w -m64 -Wl,-z,muldefs -xsapphirerapids -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 -xsapphirerapids -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-Wno-implicit-int -mprefer-vector-width=512 -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using both C and C++:
-w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int -mprefer-vector-width=512

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

xFusion
FusionServer 2288H V7 (Intel Xeon Platinum 8471N)

SPECrate®2017_fp_base = 477
SPECrate®2017_fp_peak = 478

CPU2017 License: 6488
Test Sponsor: xFusion
Tested by: xFusion
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Base Optimization Flags (Continued)

Benchmarks using both C and C++ (continued):
-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using Fortran, C, and C++:
-w -m64 -std=c++14 -std=c11 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int -mprefer-vector-width=512
-nostandard-realloc-lhs -align array32byte -auto -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

Peak 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

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

519.lbm_r: basepeak = yes

(Continued on next page)
Peak Optimization Flags (Continued)

538.imagick_r: basepeak = yes
544.nab_r: basepeak = yes

C++ benchmarks:
508.namd_r: basepeak = yes
510.parest_r: basepeak = yes

Fortran benchmarks:
503.bwaves_r: basepeak = yes
549.fotonik3d_r: basepeak = yes

Benchmarks using both Fortran and C:
521.wrf_r: basepeak = yes
527.cam4_r: basepeak = yes

Benchmarks using both C and C++:
511.povray_r: -w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs -fprofile-generate(pass 1) -fprofile-use=default.profdata(pass 2) -xCORE-AVX2(pass 1) -ffast-math -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -Wno-implicit-int -mprefer-vector-width=512 -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
526.blender_r: basepeak = yes

Benchmarks using Fortran, C, and C++:
SPEC CPU®2017 Floating Point Rate Result

xFusion

FusionServer 2288H V7 (Intel Xeon Platinum 8471N)

| SPECrate®2017_fp_base = 477 |
| SPECrate®2017_fp_peak = 478 |

CPU2017 License: 6488
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The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.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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