



SPEC CPU®2017 Floating Point Speed Result

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xFusion

SPECspeed®2017_fp_base = 242

xFusion 2288H V6 (Intel Xeon Gold 6338)

SPECspeed®2017_fp_peak = 242

CPU2017 License: 6488

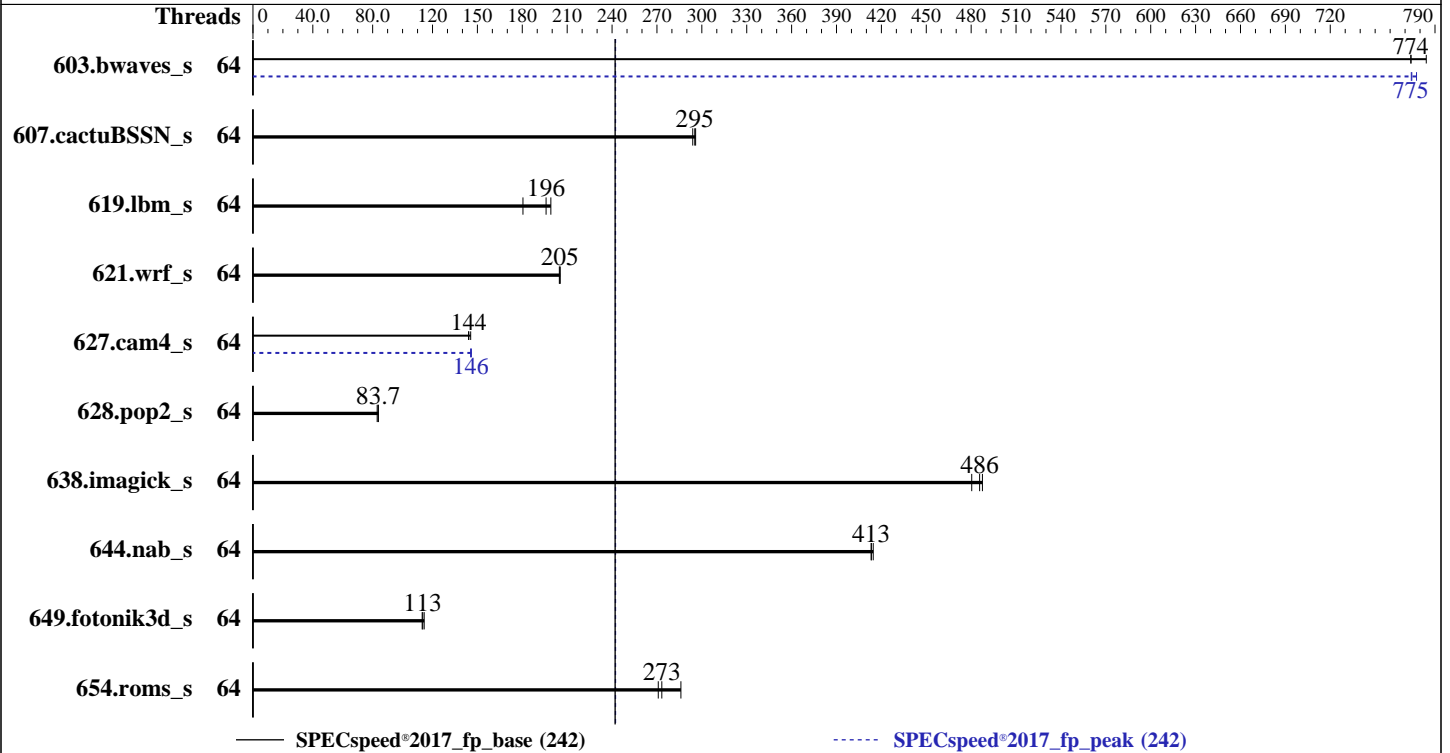
Test Sponsor: xFusion

Tested by: xFusion

Test Date: Jun-2023

Hardware Availability: Apr-2021

Software Availability: Dec-2022



Hardware

CPU Name: Intel Xeon Gold 6338
 Max MHz: 3200
 Nominal: 2000
 Enabled: 64 cores, 2 chips
 Orderable: 1,2 chips
 Cache L1: 32 KB I + 48 KB D on chip per core
 L2: 1.25 MB I+D on chip per core
 L3: 48 MB I+D on chip per chip
 Other: None
 Memory: 512 GB (16 x 32 GB 2Rx4 PC4-3200AA-R)
 Storage: 1 x 960 GB SATA SSD
 Other: None

Software

OS: Red Hat Enterprise Linux 8.4 (Ootpa)
 4.18.0-305.el8.x86_64
 Compiler: C/C++: Version 2023.0 of Intel oneAPI DPC++/C++
 Compiler for Linux;
 Fortran: Version 2023.0 of Intel Fortran Compiler
 for Linux;
 Parallel: Yes
 Firmware: Version 1.55 Released May-2023
 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 set to prefer performance at the cost of
 additional power usage



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Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	64	75.2	784	76.2	774	<u>76.2</u>	<u>774</u>	64	75.9	778	<u>76.2</u>	<u>775</u>	76.2	774
607.cactuBSSN_s	64	56.7	294	56.3	296	<u>56.5</u>	<u>295</u>	64	56.7	294	56.3	296	<u>56.5</u>	<u>295</u>
619.lbm_s	64	26.3	199	<u>26.7</u>	<u>196</u>	29.0	180	64	26.3	199	<u>26.7</u>	<u>196</u>	29.0	180
621.wrf_s	64	64.4	205	64.6	205	<u>64.5</u>	<u>205</u>	64	64.4	205	64.6	205	<u>64.5</u>	<u>205</u>
627.cam4_s	64	<u>61.4</u>	<u>144</u>	61.5	144	60.9	146	64	60.7	146	<u>60.9</u>	<u>146</u>	60.9	146
628.pop2_s	64	143	83.0	142	83.8	<u>142</u>	<u>83.7</u>	64	143	83.0	142	83.8	<u>142</u>	<u>83.7</u>
638.imagick_s	64	<u>29.7</u>	<u>486</u>	29.6	488	30.0	480	64	<u>29.7</u>	<u>486</u>	29.6	488	30.0	480
644.nab_s	64	42.1	415	<u>42.3</u>	<u>413</u>	42.3	413	64	42.1	415	<u>42.3</u>	<u>413</u>	42.3	413
649.fotonik3d_s	64	79.7	114	<u>80.3</u>	<u>113</u>	80.6	113	64	79.7	114	<u>80.3</u>	<u>113</u>	80.6	113
654.roms_s	64	55.0	286	<u>57.6</u>	<u>273</u>	58.1	271	64	55.0	286	<u>57.6</u>	<u>273</u>	58.1	271

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

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:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/spec2017-icc2023.0/lib/intel64:/spec2017-icc2023.0/je5.0.1-64"
MALLOCONF = "retain:true"
OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM
memory using Redhat Enterprise Linux 8.0
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Filesystem page cache synced and cleared with:
sync; echo 3> /proc/sys/vm/drop_caches
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
sources available from jemalloc.net or https://github.com/jemalloc/jemalloc/releases



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Platform Notes

BIOS configuration:
Performance Profile Set to Load Balance
Hyper-Threading Set to Disabled

Sysinfo program /spec2017-icc2023.0/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost.localdomain Mon Jun 19 19:37:50 2023

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

Table of contents

- 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 239 (239-45.el8)`
 - 12. Services, from `systemctl list-unit-files`
 - 13. Linux kernel boot-time arguments, from `/proc/cmdline`
 - 14. `cpupower frequency-info`
 - 15. `tuned-adm active`
 - 16. `sysctl`
 - 17. `/sys/kernel/mm/transparent_hugepage`
 - 18. `/sys/kernel/mm/transparent_hugepage/khugepaged`
 - 19. OS release
 - 20. Kernel self-reported vulnerability status, from `/sys/devices/system/cpu/vulnerabilities`
 - 21. Disk information
 - 22. `/sys/devices/virtual/dmi/id`
 - 23. `dmidecode`
 - 24. BIOS
-
- 1. `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
-
- 2. `w`
19:37:50 up 4:03, 1 user, load average: 4.97, 5.61, 3.37
USER TTY FROM LOGIN@ IDLE JCPU PCPU WHAT
root tty1 - 15:35 4:01m 1.25s 0.01s -bash
-
- 3. Username
From environment variable \$USER: root
-
- 4. `ulimit -a`
core file size (blocks, -c) 0
data seg size (kbytes, -d) unlimited
scheduling priority (-e) 0
file size (blocks, -f) unlimited

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Platform Notes (Continued)

```

pending signals                (-i) 2060571
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) 2060571
virtual memory                 (kbytes, -v) unlimited
file locks                     (-x) unlimited

```

5. sysinfo process ancestry

```

/usr/lib/systemd/systemd --switched-root --system --deserialize 17
login -- root
-bash
-bash
runcpu --define default-platform-flags -c ic2023.0-lin-core-avx512-speed-20221201.cfg --define cores=64
--tune base,peak -o all --define drop_caches fpspeed
runcpu --define default-platform-flags --configfile ic2023.0-lin-core-avx512-speed-20221201.cfg --define
cores=64 --tune base,peak --output_format all --define drop_caches --nopower --runmode speed --tune
base:peak --size refspped fpspeed --nopreenv --note-preenv --logfile
$SPEC/tmp/CPU2017.026/templogs/preenv.fpspeed.026.0.log --lognum 026.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /spec2017-icc2023.0

```

6. /proc/cpuinfo

```

model name      : Intel(R) Xeon(R) Gold 6338 CPU @ 2.00GHz
vendor_id      : GenuineIntel
cpu family     : 6
model          : 106
stepping      : 6
microcode     : 0xd000363
bugs           : spectre_v1 spectre_v2 spec_store_bypass swapgs
cpu cores     : 32
siblings      : 32
2 physical ids (chips)
64 processors (hardware threads)
physical id 0: core ids 0-31
physical id 1: core ids 0-31
physical id 0: apicids
0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,52,54,56,58,60,62
physical id 1: apicids
128,130,132,134,136,138,140,142,144,146,148,150,152,154,156,158,160,162,164,166,168,170,172,174,176,178,1
80,182,184,186,188,190
Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
virtualized systems. Use the above data carefully.

```

7. lscpu

```

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): 64
On-line CPU(s) list: 0-63

```

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Platform Notes (Continued)

```

Thread(s) per core: 1
Core(s) per socket: 32
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
BIOS Vendor ID: Intel(R) Corporation
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Gold 6338 CPU @ 2.00GHz
BIOS Model name: Intel(R) Xeon(R) Gold 6338 CPU @ 2.00GHz
Stepping: 6
CPU MHz: 1053.615
CPU max MHz: 2001.0000
CPU min MHz: 800.0000
BogoMIPS: 4000.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 49152K
NUMA node0 CPU(s): 0-31
NUMA node1 CPU(s): 32-63
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 aperfmperf pni
pclmulqdq dtes64 monitor 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
ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase 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_mbm_total cqm_mbm_local split_lock_detect wbnoinvd
dtherm ida arat pln pts avx512vbmi umip pku ospke avx512_vbmi2 gfni vaes vpclmulqdq
avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid fsrm md_clear pconfig
flush_l1d arch_capabilities

```

```

-----
8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
available: 2 nodes (0-1)
node 0 cpus: 0-31
node 0 size: 257140 MB
node 0 free: 252564 MB
node 1 cpus: 32-63
node 1 size: 258038 MB
node 1 free: 254355 MB
node distances:
node  0  1
 0:  10  20
 1:  20  10
-----

```

```

-----
9. /proc/meminfo
MemTotal: 527543648 kB
-----

```

```

-----
10. who -r
run-level 3 Jun 19 15:34
-----

```

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Software Availability: Dec-2022

Platform Notes (Continued)

11. Systemd service manager version: systemd 239 (239-45.el8)
Default Target Status
multi-user running

12. Services, from systemctl list-unit-files

STATE	UNIT FILES
enabled	NetworkManager NetworkManager-dispatcher NetworkManager-wait-online atd auditd autovt@ chronyd crond firewalld getty@ import-state irqbalance iscsi iscsi-onboot kdump libstoragemgmt loadmodules lvm2-monitor mcelog mdmonitor microcode multipathd nis-domainname nvme-fc-boot-connections rhsmcertd rsyslog selinux-autorelabel-mark smartd sshd sssd syslog sysstat timedatex tuned udisks2 vdo
disabled	arp-ethers blk-availability chrony-wait console-getty cpupower debug-shell ebttables iprdump iprinit iprupdate ipsec iscsid iscsiui kpatch kvm_stat ledmon nftables nvme-f-autoconnect oddjobd psacct rdisc rhcd rhsm rhsm-facts serial-getty@ sshd-keygen@ systemd-resolved tcsd
generated	SystemTap compile-server gcc-toolset-10-stap-server gcc-toolset-10-systemtap gcc-toolset-9-stap-server gcc-toolset-9-systemtap scripts startup
indirect	sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo
masked	systemd-timedated

13. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=(hd0,gpt3)/boot/vmlinuz-4.18.0-305.el8.x86_64
root=UUID=711de346-1631-4b60-a626-37488271d525
ro
crashkernel=auto
resume=UUID=d6a3ac10-1eal-4e42-a80b-54c427bcad19
rhgb
quiet

14. cpupower frequency-info
analyzing CPU 0:
current policy: frequency should be within 800 MHz and 2.00 GHz.
The governor "performance" may decide which speed to use
within this range.
boost state support:
Supported: yes
Active: yes

15. tuned-adm active
No current active profile.

kernel	vm	vm	vm	vm	vm	vm	vm	vm	vm	vm	
kernel.numa_balancing	1	vm.compaction_proactiveness	0	vm.dirty_background_bytes	0	vm.dirty_ratio	10	vm.dirty_bytes	0	vm.dirty_expire_centisecs	3000
kernel.randomize_va_space	2	vm.dirty_background_ratio	10	vm.dirty_ratio	20	vm.dirty_writeback_centisecs	500	vm.dirtytime_expire_seconds	43200	vm.extfrag_threshold	500
vm.min_unmapped_ratio	1	vm.nr_hugepages	0	vm.nr_hugepages_mempolicy	0						

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Platform Notes (Continued)

```

vm.nr_overcommit_hugepages      0
vm.swappiness                    60
vm.watermark_boost_factor       15000
vm.watermark_scale_factor       10
vm.zone_reclaim_mode            0

```

```

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

```

```

-----
18. /sys/kernel/mm/transparent_hugepage/khugepaged
alloc_sleep_millisecs 60000
defrag                 1
max_ptes_none         511
max_ptes_swap         64
pages_to_scan         4096
scan_sleep_millisecs 10000

```

```

-----
19. OS release
From /etc/*-release /etc/*-version
os-release      Red Hat Enterprise Linux 8.4 (Ootpa)
redhat-release  Red Hat Enterprise Linux release 8.4 (Ootpa)
system-release  Red Hat Enterprise Linux release 8.4 (Ootpa)

```

```

-----
20. Kernel self-reported vulnerability status, from /sys/devices/system/cpu/vulnerabilities
itlb_multihit      Not affected
l1tf                Not affected
mds                 Not affected
meltdown           Not affected
spec_store_bypass  Mitigation: Speculative Store Bypass disabled via prctl and seccomp
spectre_v1         Mitigation: usercopy/swaps barriers and __user pointer sanitization
spectre_v2         Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
srbds              Not affected
tsx_async_abort    Not affected

```

For more information, see the Linux documentation on hardware vulnerabilities, for example <https://www.kernel.org/doc/html/latest/admin-guide/hw-vuln/index.html>

```

-----
21. Disk information
SPEC is set to: /spec2017-icc2023.0
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda3       xfs   420G  42G  378G  10% /

```

```

-----
22. /sys/devices/virtual/dmi/id
Vendor:          XFUSION
Product:         2288H V6
Product Family:  Whitley
Serial:          Serial

```

```

-----
23. dmidecode
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

```

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Platform Notes (Continued)

determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.

Memory:

16x Samsung M393A4K40DB3-CWE 32 GB 2 rank 3200

24. BIOS

(This section combines info from /sys/devices and dmidecode.)

BIOS Vendor: XFUSION
BIOS Version: 1.55
BIOS Date: 05/09/2023
BIOS Revision: 1.55

Compiler Version Notes

=====
C | 619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base, peak)
=====

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

=====
C++, C, Fortran | 607.cactuBSSN_s(base, peak)
=====

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

=====
Fortran | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak) 654.roms_s(base, peak)
=====

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

=====
Fortran, C | 621.wrf_s(base, peak) 627.cam4_s(base, peak) 628.pop2_s(base, peak)
=====

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Base Compiler Invocation

C benchmarks:
icx

(Continued on next page)



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Base Compiler Invocation (Continued)

Fortran benchmarks:

ifx

Benchmarks using both Fortran and C:

ifx icx

Benchmarks using Fortran, C, and C++:

icpx icx ifx

Base Portability Flags

```
603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
-assume byterecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64
```

Base Optimization Flags

C benchmarks:

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

Fortran benchmarks:

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

Benchmarks using both Fortran and C:

```
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -Wno-implicit-int -nostandard-realloc-lhs
-align array32byte -auto -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

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SPEC CPU®2017 Floating Point Speed Result

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xFusion

SPECspeed®2017_fp_base = 242

xFusion 2288H V6 (Intel Xeon Gold 6338)

SPECspeed®2017_fp_peak = 242

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

Test Date: Jun-2023
Hardware Availability: Apr-2021
Software Availability: Dec-2022

Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++:

```
-m64 -std=c++14 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-gopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP -Wno-implicit-int
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Peak Compiler Invocation

C benchmarks:

icx

Fortran benchmarks:

ifx

Benchmarks using both Fortran and C:

ifx icx

Benchmarks using Fortran, C, and C++:

icpx icx ifx

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

619.lbm_s: basepeak = yes

638.imagick_s: basepeak = yes

644.nab_s: basepeak = yes

Fortran benchmarks:

(Continued on next page)



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Test Date: Jun-2023
Hardware Availability: Apr-2021
Software Availability: Dec-2022

Peak Optimization Flags (Continued)

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

649.fotonik3d_s: basepeak = yes

654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

621.wrf_s: basepeak = yes

```
627.cam4_s: -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast  
-ffast-math -flto -mfpmath=sse -funroll-loops  
-qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP  
-Wno-implicit-int -nostandard-realloc-lhs  
-align array32byte -auto -L/usr/local/jemalloc64-5.0.1/lib  
-ljemalloc
```

628.pop2_s: basepeak = yes

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: basepeak = yes

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>

<http://www.spec.org/cpu2017/flags/xFusion-Platform-Settings-ICX-V1.2.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>

<http://www.spec.org/cpu2017/flags/xFusion-Platform-Settings-ICX-V1.2.xml>

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