



SPEC CPU®2017 Floating Point Speed Result

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xFusion

SPECspeed®2017_fp_base = 192

FusionServer 5298 V7 (Intel Xeon Silver 4410Y)

SPECspeed®2017_fp_peak = 192

CPU2017 License: 6488

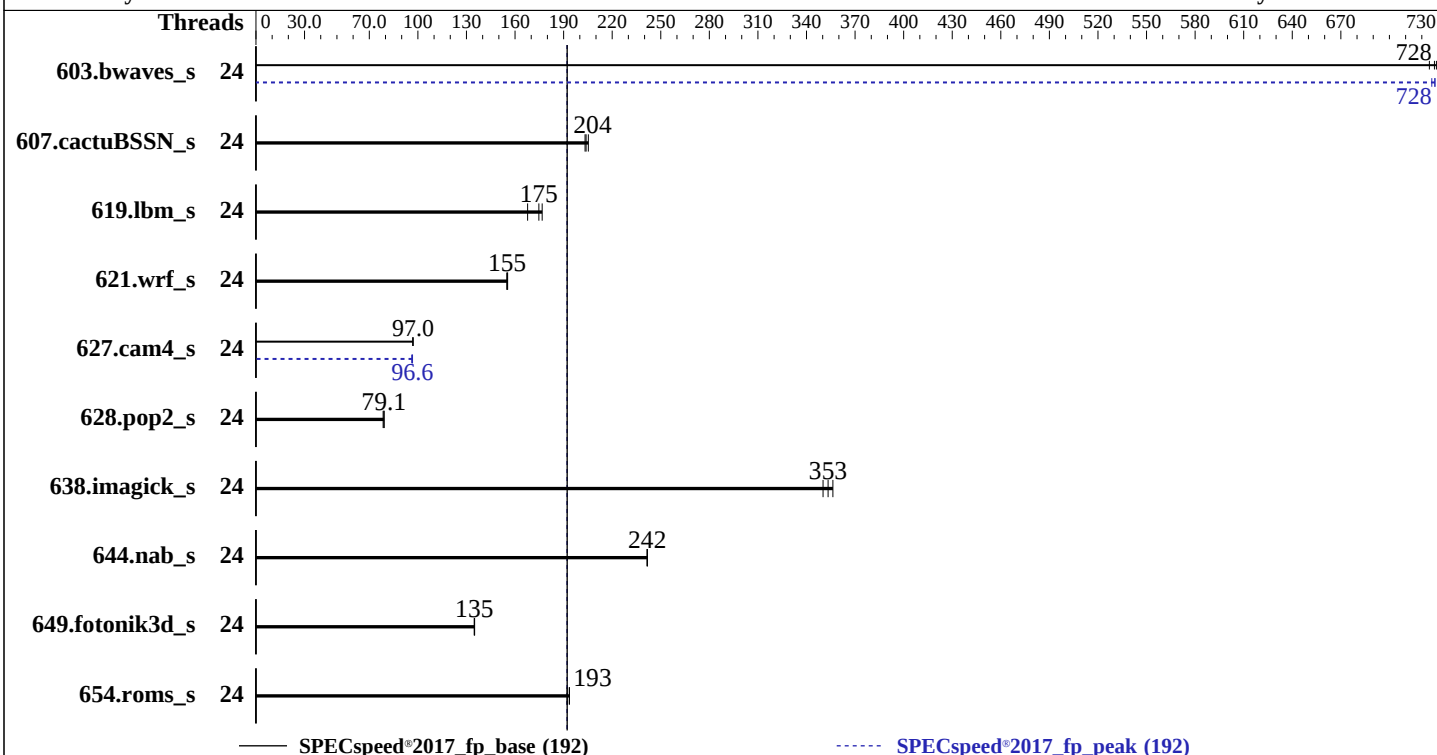
Test Sponsor: xFusion

Tested by: xFusion

Test Date: Aug-2025

Hardware Availability: Dec-2023

Software Availability: Jan-2024



Hardware

CPU Name: Intel Xeon Silver 4410Y
Max MHz: 3900
Nominal: 2000
Enabled: 24 cores, 2 chips
Orderable: 1,2 chips
Cache L1: 32 KB I + 48 KB D on chip per core
L2: 2 MB I+D on chip per core
L3: 30 MB I+D on chip per chip
Other: None
Memory: 512 GB (16 x 32 GB 2Rx8 PC5-5600B-R, running at 4000)
Storage: 1 x 960 GB SATA SSD
Other: CPU Cooling: Air

Software

OS: Red Hat Enterprise Linux 9.2 (Plow)
5.14.0-284.11.1.el9_2.x86_64
Compiler: C/C++: Version 2024.1 of Intel oneAPI DPC++/C++ Compiler for Linux;
Fortran: Version 2024.1 of Intel Fortran Compiler for Linux;
Parallel: Yes
Firmware: Version 01.01.08.03 Released Jun-2025
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.



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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	24	80.9	729	81.4	725	81.1	728	24	81.0	728	81.0	728	81.2	726
607.cactuBSSN_s	24	82.0	203	81.2	205	81.8	204	24	82.0	203	81.2	205	81.8	204
619.lbm_s	24	30.0	175	29.6	177	31.2	168	24	30.0	175	29.6	177	31.2	168
621.wrf_s	24	85.1	155	85.2	155	85.4	155	24	85.1	155	85.2	155	85.4	155
627.cam4_s	24	91.4	97.0	91.4	97.0	91.5	96.9	24	91.7	96.7	92.1	96.2	91.8	96.6
628.pop2_s	24	151	78.5	150	79.1	150	79.1	24	151	78.5	150	79.1	150	79.1
638.imagick_s	24	40.8	353	41.2	350	40.5	356	24	40.8	353	41.2	350	40.5	356
644.nab_s	24	72.3	242	72.3	242	72.3	242	24	72.3	242	72.3	242	72.3	242
649.fotonik3d_s	24	67.5	135	67.6	135	67.6	135	24	67.5	135	67.6	135	67.6	135
654.roms_s	24	81.3	194	81.9	192	81.4	193	24	81.3	194	81.9	192	81.4	193

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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 = "/home/QYL/cpu2017/lib/intel64:/home/QYL/cpu2017/je5.0.1-64"
MALLOC_CONF = "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
Enable LP [Global] Set to Single LP
ADDDC Sparing Set to Disabled

Sysinfo program /home/QYL/cpu2017/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost.localdomain Mon Aug 25 21:03:18 2025

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

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1. uname -a
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5. sysinfo process ancestry
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10. who -r
11. Systemd service manager version: systemd 252 (252-13.el9_2)
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
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17. sysctl
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19. /sys/kernel/mm/transparent_hugepage/khugepaged
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24. BIOS

1. uname -a
Linux localhost.localdomain 5.14.0-284.11.1.el9_2.x86_64 #1 SMP PREEMPT_DYNAMIC Wed Apr 12 10:45:03 EDT 2023 x86_64 x86_64 x86_64 GNU/Linux

2. w
21:03:18 up 3:27, 1 user, load average: 2.93, 4.84, 3.19
USER TTY LOGIN@ IDLE JCPU PCPU WHAT
root tty1 17:36 3:23m 1.02s 0.02s sh run_speed.sh

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

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Platform Notes (Continued)

scheduling priority	(-e) 0
file size	(blocks, -f) unlimited
pending signals	(-i) 2060249
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) 2060249
virtual memory	(kbytes, -v) unlimited
file locks	(-x) unlimited

```
-----
5. sysinfo process ancestry
/usr/lib/systemd/systemd --switched-root --system --deserialize 31
login -- root
-bash
sh run_speed.sh
runcpu --nobuild --action validate --define default-platform-flags -c
  ic2024.1-lin-sapphirerapids-speed-20240308.cfg --define cores=24 --tune base,peak -o all --define
  drop_caches fpspeed
runcpu --nobuild --action validate --define default-platform-flags --configfile
  ic2024.1-lin-sapphirerapids-speed-20240308.cfg --define cores=24 --tune base,peak --output_format all
  --define drop_caches --nopower --runmode speed --tune base:peak --size refspeed fpspeed --nopreenv
  --note-preenv --logfile $SPEC/tmp/CPU2017.003/templogs/preenv.fpspeed.003.0.log --lognum 003.0
  --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/QYL/cpu2017
-----
```

```
-----
6. /proc/cpuinfo
model name      : Intel(R) Xeon(R) Silver 4410Y
vendor_id      : GenuineIntel
cpu family     : 6
model          : 143
stepping       : 7
microcode      : 0x2b000639
bugs           : spectre_v1 spectre_v2 spec_store_bypass swapgs eibrs_pbrsb
cpu cores      : 12
siblings       : 12
2 physical ids (chips)
24 processors (hardware threads)
physical id 0: core ids 0-11
physical id 1: core ids 0-11
physical id 0: apicids 0,2,4,6,8,10,12,14,16,18,20,22
physical id 1: apicids 128,130,132,134,136,138,140,142,144,146,148,150
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 2.37.4:
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Address sizes:         46 bits physical, 57 bits virtual
Byte Order:            Little Endian
-----
```

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Platform Notes (Continued)

CPU(s): 24
On-line CPU(s) list: 0-23
Vendor ID: GenuineIntel
BIOS Vendor ID: Intel(R) Corporation
Model name: Intel(R) Xeon(R) Silver 4410Y
BIOS Model name: Intel(R) Xeon(R) Silver 4410Y
CPU family: 6
Model: 143
Thread(s) per core: 1
Core(s) per socket: 12
Socket(s): 2
Stepping: 7
CPU max MHz: 3900.0000
CPU min MHz: 800.0000
BogoMIPS: 4000.00
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 pdpe1gb rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf tsc_known_freq 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 cat_l2 cdp_l3 invpcid_single intel_ppin cdp_l2 ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 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 avx_vnni avx512_bf16 wbnoinvd dtherm ida arat pln pts hfi avx512vbmi umip pku ospke waitpkg avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid bus_lock_detect cldemote movdiri movdir64b enqcmd fsrm md_clear serialize tsxldtrk pconfig arch_lbr ibt amx_bf16 avx512_fp16 amx_tile amx_int8 flush_l1d arch_capabilities
Virtualization: VT-x
L1d cache: 1.1 MiB (24 instances)
L1i cache: 768 KiB (24 instances)
L2 cache: 48 MiB (24 instances)
L3 cache: 60 MiB (2 instances)
NUMA node(s): 2
NUMA node0 CPU(s): 0-11
NUMA node1 CPU(s): 12-23
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Mmio stale data: Not affected
Vulnerability Retbleed: 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, PBSRB-eIBRS SW sequence
Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected

From lscpu --cache:

NAME	ONE-SIZE	ALL-SIZE	WAYS	TYPE	LEVEL	SETS	PHY-LINE	COHERENCY-SIZE
L1d	48K	1.1M	12	Data	1	64	1	64
L1i	32K	768K	8	Instruction	1	64	1	64
L2	2M	48M	16	Unified	2	2048	1	64
L3	30M	60M	15	Unified	3	32768	1	64

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Platform Notes (Continued)

8. numactl --hardware

NOTE: a numactl 'node' might or might not correspond to a physical chip.

```
available: 2 nodes (0-1)
node 0 cpus: 0-11
node 0 size: 257063 MB
node 0 free: 256127 MB
node 1 cpus: 12-23
node 1 size: 258040 MB
node 1 free: 256944 MB
node distances:
node    0    1
 0:   10   21
 1:   21   10
```

9. /proc/meminfo

MemTotal: 527466752 kB

10. who -r

run-level 3 Aug 25 17:35

11. Systemd service manager version: systemd 252 (252-13.el9_2)

```
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 firewalld getty@ insights-client-boot irqbalance kdump low-memory-monitor
lvm2-monitor mdmonitor microcode nis-domainname rhsmcertd rsyslog rtkit-daemon
selinux-autorelabel-mark sep5 sshd sssd systemd-boot-update systemd-network-generator
tuned udisks2 upower
enabled-runtime systemd-remount-fs
disabled        blk-availability canberra-system-bootup canberra-system-shutdown
canberra-system-shutdown-reboot chrony-wait console-getty cpupower debug-shell
dnf-system-upgrade kvm_stat man-db-restart-cache-update nftables pesign rdisc rhcd rhsm
rhsm-facts rpmdm-rebuild selinux-check-proper-disable serial-getty@ sshd-keygen@
systemd-boot-check-no-failures systemd-pstore systemd-sysex
indirect        sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo systemd-sysupdate
systemd-sysupdate-reboot
```

14. Linux kernel boot-time arguments, from /proc/cmdline

```
BOOT_IMAGE=(hd0,gpt2)/vmlinuz-5.14.0-284.11.1.el9_2.x86_64
root=/dev/mapper/rhel-root
ro
crashkernel=1G-4G:192M,4G-64G:256M,64G-:512M
resume=/dev/mapper/rhel-swap
rd.lvm.lv=rhel/root
rd.lvm.lv=rhel/swap
```

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Platform Notes (Continued)

15. cpupower frequency-info

analyzing CPU 0:

current policy: frequency should be within 3.90 GHz and 3.90 GHz.

The governor "performance" may decide which speed to use within this range.

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	0
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

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/khugepaged

alloc_sleep_millisecs	60000
defrag	1
max_ptes_none	511
max_ptes_shared	256
max_ptes_swap	64
pages_to_scan	4096
scan_sleep_millisecs	10000

20. OS release

From /etc/*-release	/etc/*-version
os-release	Red Hat Enterprise Linux 9.2 (Plow)
redhat-release	Red Hat Enterprise Linux release 9.2 (Plow)
system-release	Red Hat Enterprise Linux release 9.2 (Plow)

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Platform Notes (Continued)

21. Disk information

SPEC is set to: /home/QYL/cpu2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/mapper/rhel-home	xfs	819G	174G	645G	22%	/home

22. /sys/devices/virtual/dmi/id

Vendor: XFUSION
Product: 5298 V7
Product Family: Eagle Stream
Serial: 210231Y04810K8200816

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:

2x Samsung M321R4GA3PB0-CWMJH 32 GB 2 rank 5600, configured at 4000
1x Samsung M321R4GA3PB0-CWMKH 32 GB 2 rank 5600, configured at 4000
13x Samsung M321R4GA3PB0-CWMXH 32 GB 2 rank 5600, configured at 4000

24. BIOS

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

BIOS Vendor: XFUSION
BIOS Version: 01.01.08.03
BIOS Date: 06/16/2025
BIOS Revision: 8.3

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 2024.1.0 Build 20240308
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C++, C, Fortran | 607.cactuBSSN_s(base, peak)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
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Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
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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 2024.1.0 Build 20240308
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Compiler Version Notes (Continued)

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

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308

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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308

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Base 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

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:

-w -std=c11 -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast -ffast-math

-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp

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Base Optimization Flags (Continued)

C benchmarks (continued):

```
-DSPEC_OPENMP -Wno-implicit-int -mprefer-vector-width=512  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Fortran benchmarks:

```
-w -m64 -Wl,-z,muldefs -DSPEC_OPENMP -xsapphirerapids -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:

```
-w -m64 -std=c11 -Wl,-z,muldefs -xsapphirerapids -Ofast -ffast-math  
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp  
-DSPEC_OPENMP -Wno-implicit-int -mprefer-vector-width=512  
-nostandard-realloc-lhs -align array32byte -auto  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Benchmarks using Fortran, 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 -fiopenmp -DSPEC_OPENMP -Wno-implicit-int  
-mprefer-vector-width=512 -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



SPEC CPU®2017 Floating Point Speed Result

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xFusion

SPECspeed®2017_fp_base = 192

FusionServer 5298 V7 (Intel Xeon Silver 4410Y)

SPECspeed®2017_fp_peak = 192

CPU2017 License: 6488

Test Sponsor: xFusion

Tested by: xFusion

Test Date: Aug-2025

Hardware Availability: Dec-2023

Software Availability: Jan-2024

Peak Optimization Flags

C benchmarks:

619.lbm_s: basepeak = yes

638.imagick_s: basepeak = yes

644.nab_s: basepeak = yes

Fortran benchmarks:

603.bwaves_s: -w -m64 -Wl,-z,muldefs -DSPEC_OPENMP -xsapphirerapids -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: -w -m64 -std=c11 -Wl,-z,muldefs -xsapphirerapids -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP -Wno-implicit-int -mprefer-vector-width=512 -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-ic2024-official-linux64.html>

<http://www.spec.org/cpu2017/flags/xFusion-Platform-Settings-EMR-V1.1.html>

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

<http://www.spec.org/cpu2017/flags/Intel-ic2024-official-linux64.xml>

<http://www.spec.org/cpu2017/flags/xFusion-Platform-Settings-EMR-V1.1.xml>



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